



**Automated Air Distribution Manifold  
Model ASM<sup>®</sup>-1 Smart Manifold<sup>™</sup>  
Instruction Manual**

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Model ASM<sup>®</sup>-1 Smart Manifold<sup>™</sup>  
Instruction Manual**

Covered under the following U.S. patent: 8,033,161

**Environmental Technology, Inc.**

1850 North Sheridan Street  
South Bend, Indiana 46628  
(574) 233-1202 or (800) 234-4239  
FAX (574) 233-2152 or (888) 234-4238  
<http://www.networketi.com/>

## **SAFETY INFORMATION AND WARNINGS**

### **Abnormal Odor or Smoke**



In the event of smoke or a burning or abnormal odor, immediately interrupt power to the ASM-1 Smart Manifold with the POWER switch at the rear of the unit, unplug the unit, or turn off the circuit breaker controlling the outlet. Note that only the AC model of the ASM-1 Smart Manifold has an ON / OFF switch.

### **Lethal Voltages Present**



Lethal voltages are present inside the ASM-1 Smart Manifold. Service should be performed by qualified personnel only. There are no user serviceable components inside the chassis.

### **Pneumatics**



Each of the air pumps inside the ADH NETCOM automatic air dehydrators which will be attached or installed with the ASM-1 Smart Manifold is capable of generating as much as 24 psig (1,655mbar). Other attached dry air sources may be capable of generating even higher pressures. Proper safety practice requires treating all pneumatic components with care. Always vent the system to atmospheric pressure before servicing pneumatic components.

### **Rack Mounting**



Before and after rack mounting the ASM-1 Smart Manifold, ensure that the rack is stable. Mounting of the ASM-1 Smart Manifold into a rack should be such that a hazardous condition is not created due to uneven mechanical loading. Verify that adequate air flow and power source capacity is available to the unit. Ensure that the ASM-1 Smart Manifold maximum operating temperature of 130°F (55°C) will not be compromised by other components in the rack. Ensure reliable earthing of the ASM-1 Smart Manifold.



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DATA LOG

To get the best service from and gain the greatest understanding of your system, it is recommended to keep a Data Log tracking the most significant system statistics. Such a Data Log should include items such as ambient temperature, relative humidity, system pressure, duty cycle, flow rate, and canister temperature. Entries to the Log can be made at a time interval of your choosing, once daily or weekly, for instance, and should reflect the specific conditions in which your system operates. The Data Log will help you understand your system by allowing you to track system performance in various environmental conditions, including daily and seasonal variations. In keeping such a Log, performance patterns will begin to emerge, enabling you to have a greater understanding of your system's performance over time, as well as greater control when setting or changing the user-configurable performance parameters.



## **UNPACKING THE UNIT**

Immediately upon receipt, inspect the container and packing material for any noticeable damage. Unpack the Smart Manifold, taking care not to damage the packing materials. Save the shipping container and related materials until normal operation has been established. If the unit must be returned, take care to ensure that it is repackaged as it was received.

As soon as it arrives at your facility, inspect the Smart Manifold for electrical and mechanical damage. If any of the following problems is found, contact Environmental Technology, Inc., Customer Service:

- contents incomplete or incorrect;
- internal or external mechanical damage; and
- defective operation.

Environmental Technology, Inc., Customer Service is available from 8:00 a.m. to 5:00 p.m. Eastern Time at (574) 233-1202 or (800) 234-4239. In the event of shipping damage, keep the packing materials for inspection by the carrier.



## INVENTORY

Using the information below, verify that the shipping package contains all of the parts listed. If there are any discrepancies, notify Environmental Technology, Inc., Customer Service immediately between 8:00 a.m. and 5:00 p.m. Eastern Time at (574) 233-1202 or (800) 234-4239.

ITEM QTY.	PART NUMBER	ITEM DESCRIPTION
1	23658	ASM-1 Smart Manifold, AC Power Supply
1	24303	Documentation CD ROM, ADH NETCOM and ASM-1 Smart Manifold
1	23681	ASM-1 Smart Manifold Installation Sheet
1	23678	ASM-1 Accessory Kit
2	18198	1/8 NPT to 1/4" Barbed Brass Fitting
2	23428	1/8 NPT to 3/8" Barbed Brass Fitting
4	23245	Mounting Bracket
1	17618	Power Cord
8	11040	Rack-mounting screw (#8-32)
8	10641	#8 Split Washer

## **GLOSSARY**

Listed below are some key words and their definitions.

### **Duty Cycle**

The amount of time, expressed as a percentage, that the unit is actually on, cycling, and pumping pressurized dry air.

### **High Limit Target Pressure**

The high set point of the operating pressure range for the dehydrator. This is the pressure the unit will target during compressor operation. The actual turn off pressure is adjusted in software every pressurization cycle after determining the rate of pressure change during that cycle. This software compensation for rate of pressure change during pressurization minimizes compressor undershoot. The High Limit Target Pressure setting must be set between 0.20 and 7.5 psig (14 and 517mbar). The High Limit Target Pressure factory default setting is 0.50 psig (34.5mbar).

### **High Pressure Alarm Level**

The high pressure point at which an alarm condition will be indicated. The High Pressure Alarm setting must be set higher than the High Limit Target Pressure setting. The High Pressure Alarm factory default setting is 1.5 psig (103.5mbar).

### **Leak Down Rate**

Leak down rate is a pressure drop expressed as a percentage per minute.

### **Low Limit Target Pressure**

The low set point of the operating pressure range for the dehydrator. This is the pressure at which the unit will turn on the compressor during compressor operation. The Low Limit Target Pressure setting must be set lower than the High Limit Target Pressure setting by at least 0.1 psig (7mbar). The Low Limit Target Pressure factory default setting is 0.30 psig (21mbar).

## **Low Pressure Alarm Level**

The low pressure point at which an alarm condition will be indicated. The Low Pressure Alarm setting must be set lower than the Low Limit Target Pressure setting. The Low Pressure Alarm Level factory default setting is 0.15 psig (10mbar).

## **Parallel Pumping**

A user-configurable pumping mode in which the Smart Manifold runs multiple ADH NETCOM dehydrators to pressurize the system to a larger volume than maintainable using only a single dehydrator. The Smart Manifold will call for all configured, attached ADH NETCOM dehydrators to pump together based on the system pressure as measured at the ASM-1 Smart Manifold automated air distribution manifold.

## **Redundant Pumping**

A second type of user-configurable pumping mode in which the Smart Manifold runs one ADH NETCOM dehydrator to pressurize the system while maintaining additional ADH NETCOM automatic dehydrator(s) in stand-by mode. To ensure that a stand-by dehydrator is maintained in operational condition, the Smart Manifold will periodically alternate which dehydrator is active. This period of time, called Switch Time, is user-configurable from 1 to 99 hours. The Switch Time factory default setting is 24 hours. If the Switch Time is set to 0, the system will automatically switch to the other dehydrator with every cycle.

## **Solar Gain**

Generally occurring each day at sunrise, the time when sunlight and heat increase, resulting in a natural corresponding rise in temperature and pressure inside a cable line. This can also occur before or after a major weather event.

## **PRODUCT FEATURES**

Major features of the ASM-1 Smart Manifold automated air distribution manifold are listed below.

- distributes dry, low-pressure air from one or more dehydrators to one or more equipment or transmission lines
- continuous system monitoring allows leaking lines to be isolated while the rest of the system remains pressurized
- periodic automated line testing can identify future line leaks for maintenance planning before critical failures
- highly configurable to meet the needs of wide ranging applications
- programmable operating pressure range from 0.10 to 7.50 psig (7 to 517mbar), configurable in increments of 0.01 psig (0.67mbar)
- a programmable valve to bleed off excess system pressure commonly associated with solar gain
- “future-proof” software-based features allow updates and upgrades while in service
- remote monitoring and control with web interface or SNMP
- configurable Parallel Pumping mode combines multiple ADH NETCOM automatic air dehydrators for increased system capacity
- configurable Redundant Pumping mode combines multiple ADH NETCOM automatic air dehydrators for increased system reliability
- Ethernet, RS-422/485, RS-232, and alarm relay outputs for compatibility with nearly any system
- simple power connections for 100–240 VAC
- small, light-weight chassis with multiple mounting options makes installation easy



## MEAN TIME BETWEEN FAILURE STATEMENT

**ASM-1 SMART MANIFOLD AUTOMATED AIR DISTRIBUTION MANIFOLD  
MEAN TIME BETWEEN FAILURE  
RELIABILITY STATEMENT**

Environmental Technology, Inc., hereby confirms that all original components and spare or replacement parts used in the ASM-1 Smart Manifold Automated Air Distribution Manifold have the reliability characteristics stated below.

ASM-1 Smart Manifold Overall Reliability Mean Time Between Failure (MTBF) Rate:  
More than 75,000 hours when maintaining a 5% or lower duty cycle.

**ASM-1 SMART MANIFOLD AUTOMATED AIR DISTRIBUTION MANIFOLD  
ORIGINAL COMPONENT AND REPLACEMENT PART RELIABILITY LIST**

Item Number	Part Description	Replacement Part Number	MTBF (hours)	Storage (°C)
1	Main Circuit Board	23253	75,000+	-40 to +60
2	AC Power Supply Module	23860	420,500+	-40 to +60
3	Solenoid Valve	23652	150,000+	-40 to +60
4	ASM-1 Smart Manifold Manual	23680	–	-40 to +60

ETI Products and Accessories:

<http://www.networketi.com/products.htm>

Telecom Products and Data Sheets:

<http://www.networketi.com/products.htm>

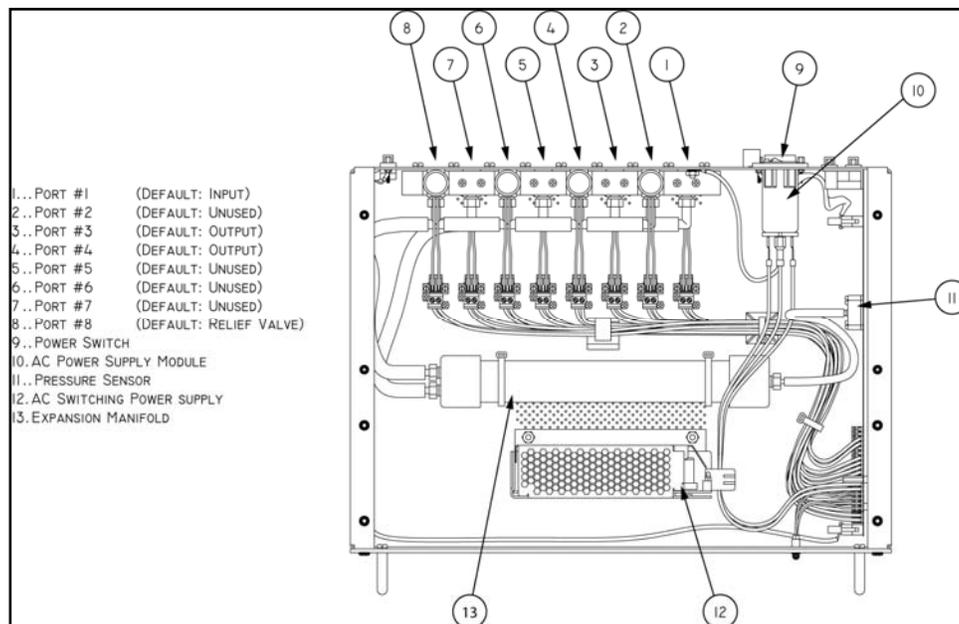
Telecom manuals:

[http://www.networketi.com/telecom\\_manuals.html](http://www.networketi.com/telecom_manuals.html)

## INTRODUCTION AND THEORY OF OPERATION

The ASM-1 Smart Manifold automated air distribution manifold distributes dry, pressurized air from one or more dehydrators to one or more transmission lines. Typically, the ASM-1 Smart Manifold is used with one or more Environmental Technology, Inc., ADH NETCOM automatic air dehydrators which are the source of the dry, pressurized air. Through a series of solenoid valves located inside the Smart Manifold, dry, pressurized air is pumped from any of the ADH NETCOM dehydrators connected to it out to field equipment or transmission lines.

The ASM-1 Smart Manifold automated air distribution manifold has eight ports, seven of which are customer-configurable as needed. Refer to Figure 1. Ports are configurable as Input ports (to which ADH NETCOM automatic air dehydrators will be connected), Output ports (to which equipment or transmission lines will be connected), Critical Output ports (“Crit. Out.”), or Unused. The eighth port is configured as Bleed, allowing the Smart Manifold to dispel excess system pressure common with solar gain or to vent the system during certain system tests. Note that the port designations of Input, Output, Critical Output, Unused, or Bleed are customer-configurable and can be changed or re-assigned at any time, providing wide ranging flexibility as system needs evolve.



**Figure 1. ASM-1 SMART MANIFOLD COMPONENTS.**  
(NOTE: The port designations shown on the left are the factory default settings and can be user-configured as desired.)



The ASM-1 Smart Manifold automated air distribution manifold and the ADH NETCOM automatic air dehydrator, the source of the pressurized, dry air, work best together supplying pressurized, dry air in a flowing system, where the system completely replaces the air on a regular basis. Therefore, the equipment or transmission line receiving the pressurized air should be slightly leaky. For a waveguide, this is best accomplished by slightly opening a purge valve at the window end of the system. Installing a pressure relief valve, purposely set higher than the High Limit Target Pressure, will allow the solar gain pressure to bleed off. Likewise, air dielectric coaxial cable should be equipped with a valve at the far end which can be set to allow for a small bleed valve. Note, however, that many systems already have sufficient normal leakage such that additional actions might not be necessary.

Though other dehydrators can be used with the system, advanced features are available when the Smart Manifold is used with Environmental Technology, Inc., ADH NETCOM automatic air dehydrators. The standard unit provides dry air at 0.5 psig (34.5mbar) and can deliver up to 26 cubic feet of air per hour (12.3 liters per minute). Output pressure is field configurable up to 7.5 psig (517mbar), configurable in increments of 0.01 psig (0.67mbar). The factory default pressure setting is 0.5 psig (34.5mbar). The safety relief valve, installed on Port 8, operates at the high pressure alarm level and provides over-pressure protection.

The ASM-1 Smart Manifold automated air distribution manifold operates from 100 to 240 VAC, 50/60 Hz, and does not require any customer adjustments to operate within the allowed supply power ranges.

For optimal performance and life expectancy of the Smart Manifold and the ADH NETCOM dehydrators connected to it, a duty cycle of between 1% and 20% is recommended. A tightly sealed system may experience a pressure increase with a rise in ambient temperature, known as solar gain. The ASM-1 Smart Manifold automated air distribution manifold will bleed off such build-up if system pressure reaches the pressure bleed valve set point, but it is advised that the Smart Manifold not be used as the only means of over-pressure protection in any but the smallest of systems.

The ASM-1 Smart Manifold automated air distribution manifold features automated individual line testing and isolation, in the event a line should fail, along with networked monitoring, management, and control. Used in conjunction with ADH NETCOM automatic air dehydrators, the Smart Manifold offers additional features to allow combining multiple ADH NETCOM automatic air dehydrators for increased system volume or to enhance system reliability.

Multiple ADH NETCOM automatic air dehydrators can be controlled by a single ASM-1 Smart Manifold automated air distribution manifold in Parallel or Redundant pumping mode. Parallel pumping of two or more ADH NETCOM dehydrators provides increased volumes of dry low-pressure air by running multiple ADH NETCOM dehydrators together as one. Redundant pumping of two or more ADH NETCOM dehydrators provides increased system reliability by keeping one or more dehydrators in stand-by mode if the active dehydrator should fail. To enhance system reliability in this mode, each dehydrator alternates as primary.

### REDUNDANT PUMPING

The ASM-1 Smart Manifold automated air distribution manifold can be user-configured to control multiple ADH NETCOM automatic air dehydrators in Redundant pumping mode. The Smart Manifold runs one ADH NETCOM to pressurize the system, while maintaining an additional ADH NETCOM in stand-by mode. Should the active unit fail, it will be isolated and another dehydrator will be activated. To ensure that a stand-by dehydrator is maintained in operational condition, the Smart Manifold periodically alternates which dehydrator is active. This period of time is user-configurable from 1 to 99 hours and is set to 24 hours default at the factory. If set to 0, the system will automatically switch to the other dehydrator with every cycle.

### PARALLEL PUMPING

An ASM-1 Smart Manifold automated air distribution manifold can be configured to control multiple ADH NETCOM automatic air dehydrators in Parallel pumping mode. The Smart Manifold will run multiple ADH NETCOM dehydrators to pressurize the system to a larger volume than maintainable with a single dehydrator. The Smart Manifold will call for all configured, attached ADH NETCOM dehydrators to pump together based on the system pressure as measured at the ASM-1 Smart Manifold automated air distribution manifold.

### SENSORS

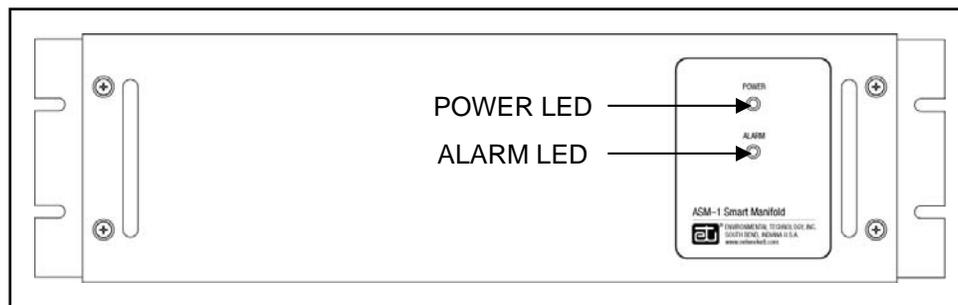
The ASM-1 Smart Manifold automated air distribution manifold has an ambient air temperature sensor and a pressure sensor located on the computer board. The pressure sensor measures the system air pressure during normal operations and individual port pressures during system testing.

## ALARMS

The ASM-1 Smart Manifold automated air distribution manifold notifies the operator of a variety of alarm conditions. For a full explanation of the Smart Manifold user-configurable alarms and alarm conditions, see the Alarms section of this manual.

## DISPLAYS

The standard display configuration includes two LED indicators on the front panel for Power and Alarm. Refer to Figure 2. A web interface provides detailed status information display and allows for unit configuration.



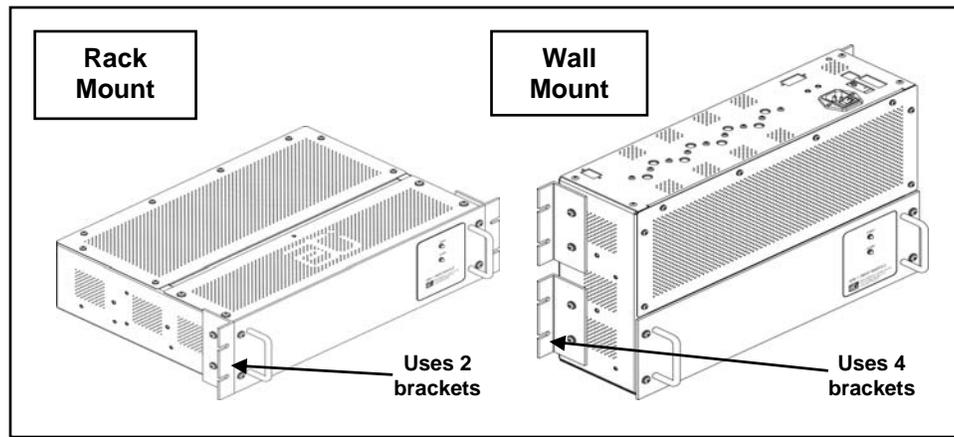
**Figure 2. ASM-1 SMART MANIFOLD FRONT PANEL.**

## MAIN CONTROL BOARD

The ASM-1 Smart Manifold automated air distribution manifold utilizes a single computer circuit board which includes the microprocessor, the pressure sensor, and the I/O connection for both internal control and external communications. The microprocessor controls all internal Smart Manifold functions. It acts on data collected from various sensors to control operation of the solenoid valves. It monitors system operation and generates status and alarm conditions which are communicated via LED indicators (power and summary alarm), programmable alarm relays, serial I/O interfaces (RS-232 and RS-422/485), and through the communications module.

## INSTALLATION

The ASM-1 Smart Manifold automated air distribution manifold can be mounted on a shelf, in a rack, or on a wall. Refer to Figures 3 through 15. The unit requires only 5-1/4 inches (3-U) of rack space and is just 12 inches (304.8mm) deep. The mounting hardware allows for flexible installation options including dual- and single-post rack mounting. The standard unit weighs just 11 lbs (5 kg).



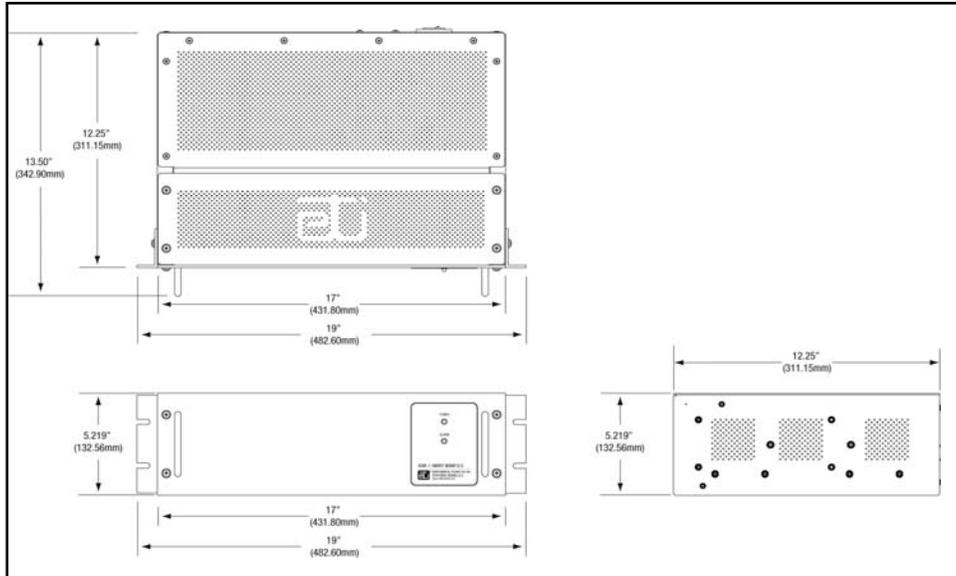
**Figure 3. ASM-1 RACK AND WALL MOUNT CONFIGURATIONS.**

### RACK MOUNTING

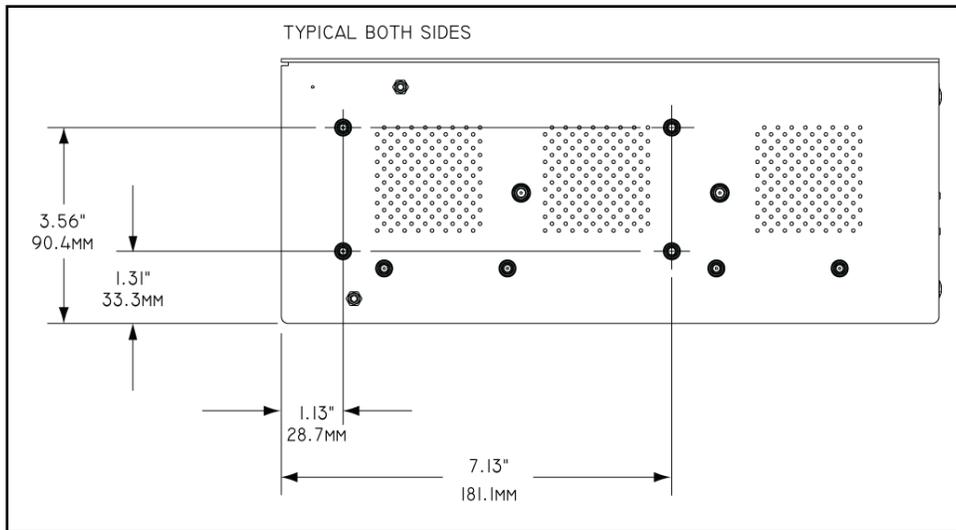
#### CAUTION

Before and after rack mounting the ASM-1 Smart Manifold, ensure that the rack is stable. Mounting of the Smart Manifold into the rack should be such that a hazardous condition is not created due to uneven mechanical loading. Verify that adequate air flow and power supply capacity is available to the unit. Ensure that Smart Manifold maximum operating temperature of 130°F (55°C) will not be compromised by other components in the rack. Ensure reliable earthing of the Smart Manifold.

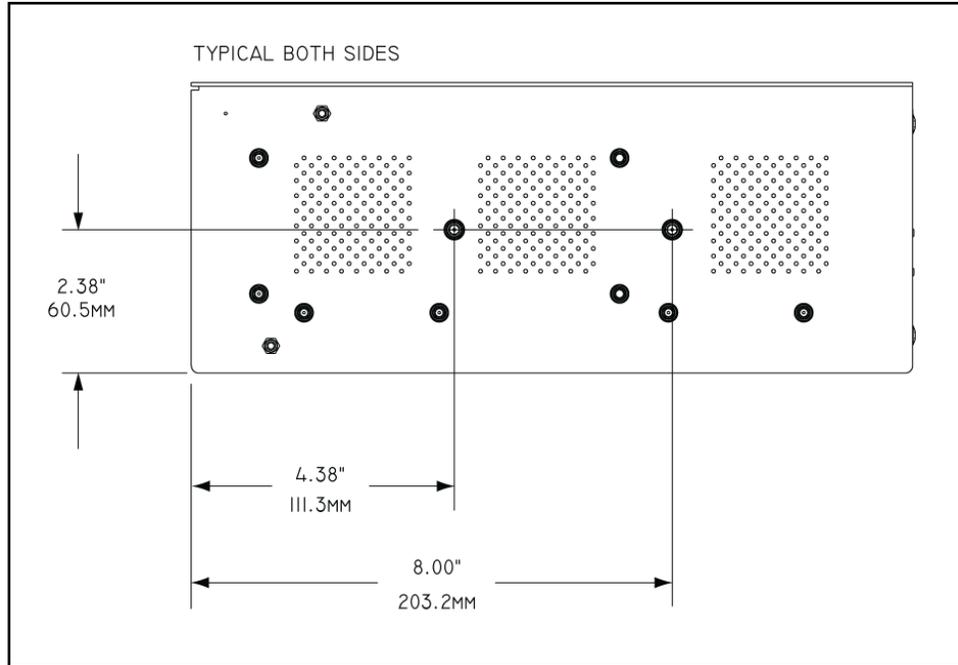
The ASM-1 Smart Manifold automated air distribution manifold can be mounted in a standard 19" communications rack at one of four depths utilizing two mounting locations. Mounting depths available are flush, 2", 6", and 8". The side panels of the chassis contain tapped holes (#8-32) to facilitate installation. The ASM-1 Smart Manifold should be mounted using chassis slide rails (not supplied) or on support channels mounted on the inside of the relay rack. Because the Smart Manifold seldom requires operator attention, a location in the lower portion or extreme upper portion of the rack may be considered.



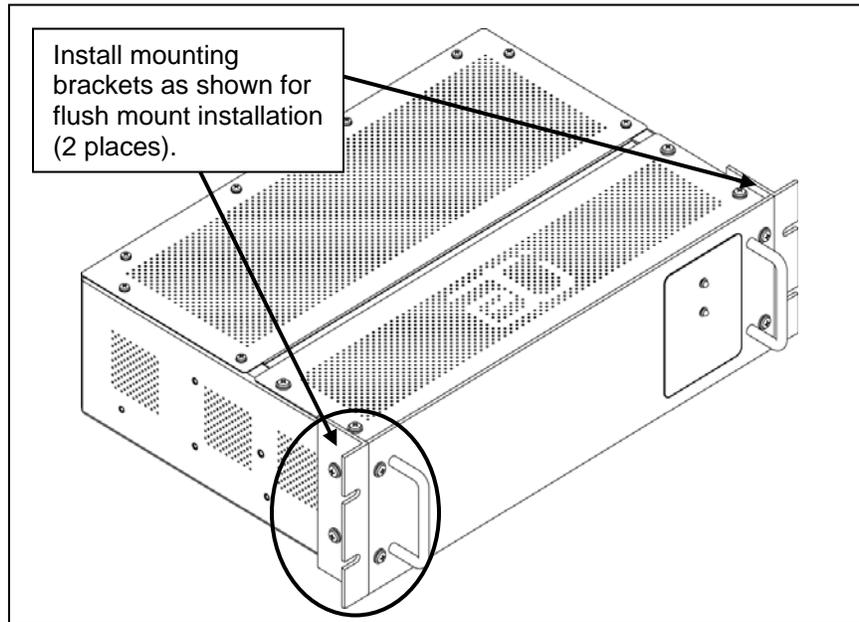
**Figure 4. ASM-1 SMART MANIFOLD RACK MOUNTING DIMENSIONS.**



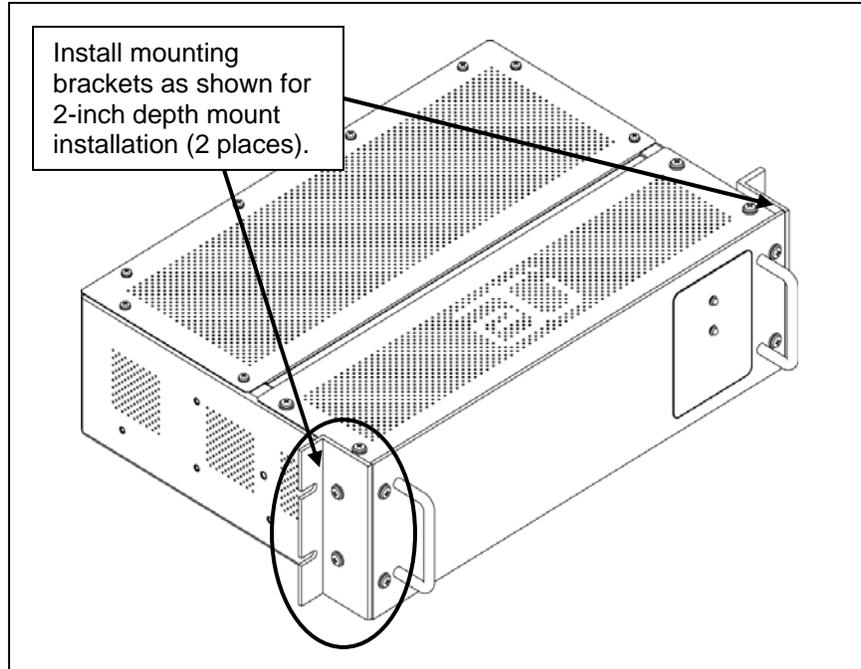
**Figure 5. ASM-1 SMART MANIFOLD RACK MOUNT HOLE DIMENSIONS.**



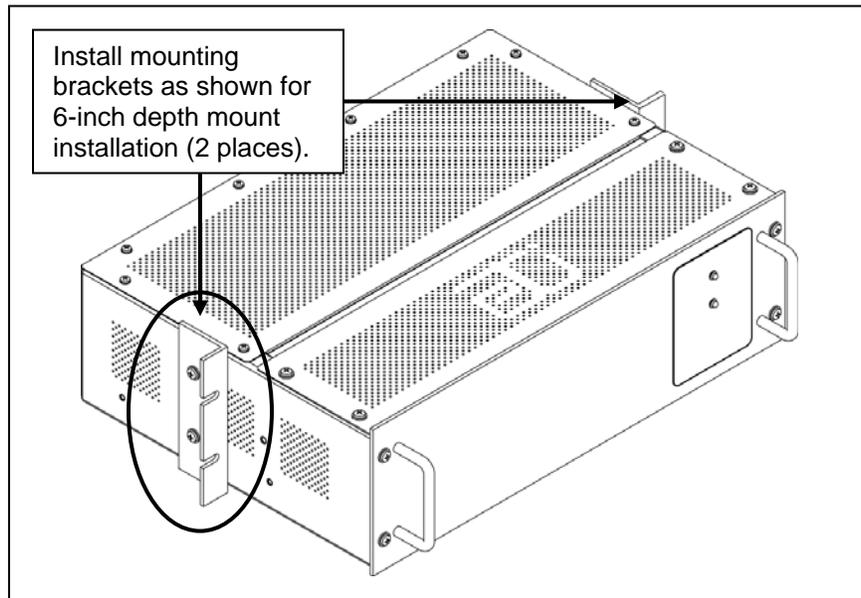
**Figure 6. ASM-1 SMART MANIFOLD  
RACK SLIDE RAIL MOUNT HOLE DIMENSIONS.**



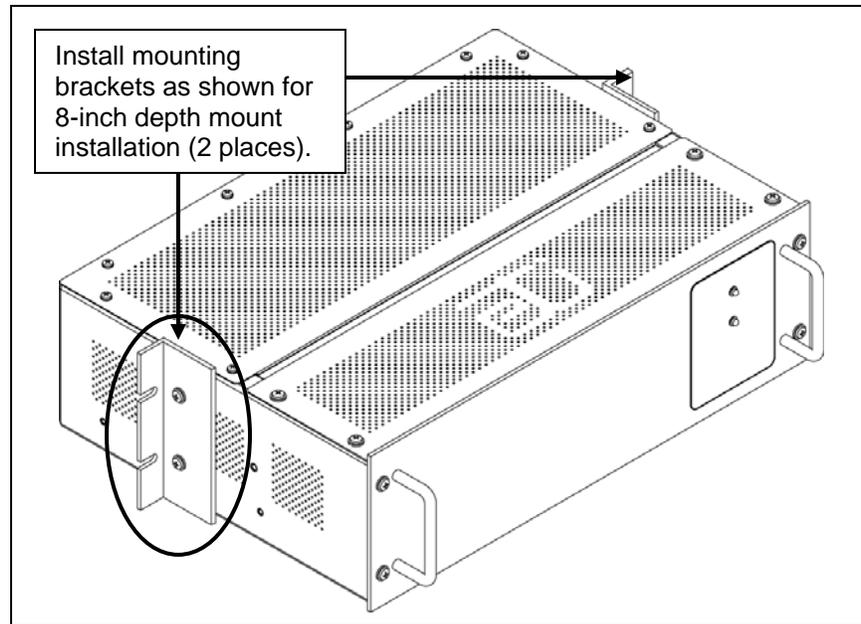
**Figure 7. MOUNTING BRACKETS IN FLUSH MOUNT POSITION.**



**Figure 8. MOUNTING BRACKETS IN 2-INCH DEPTH POSITION.**



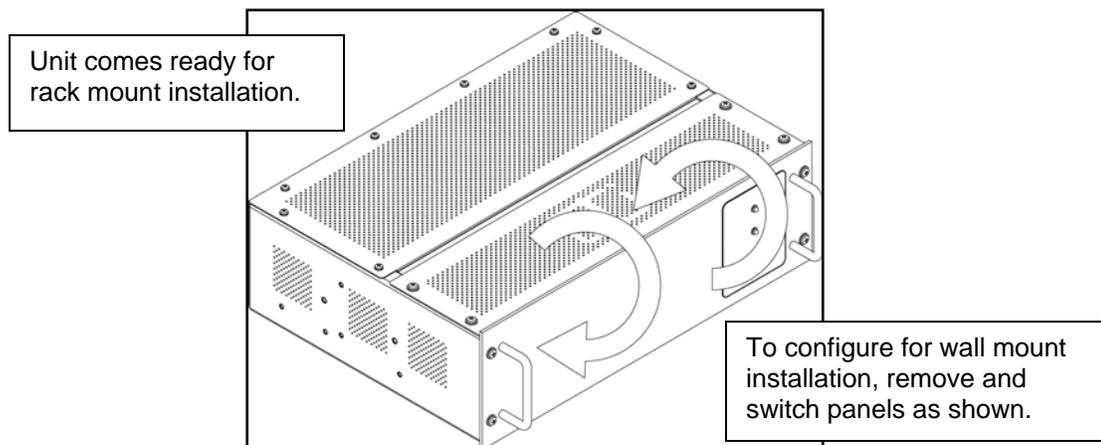
**Figure 9. MOUNTING BRACKETS IN 6-INCH DEPTH POSITION.**



**Figure 10. MOUNTING BRACKETS IN 8-INCH DEPTH POSITION.**

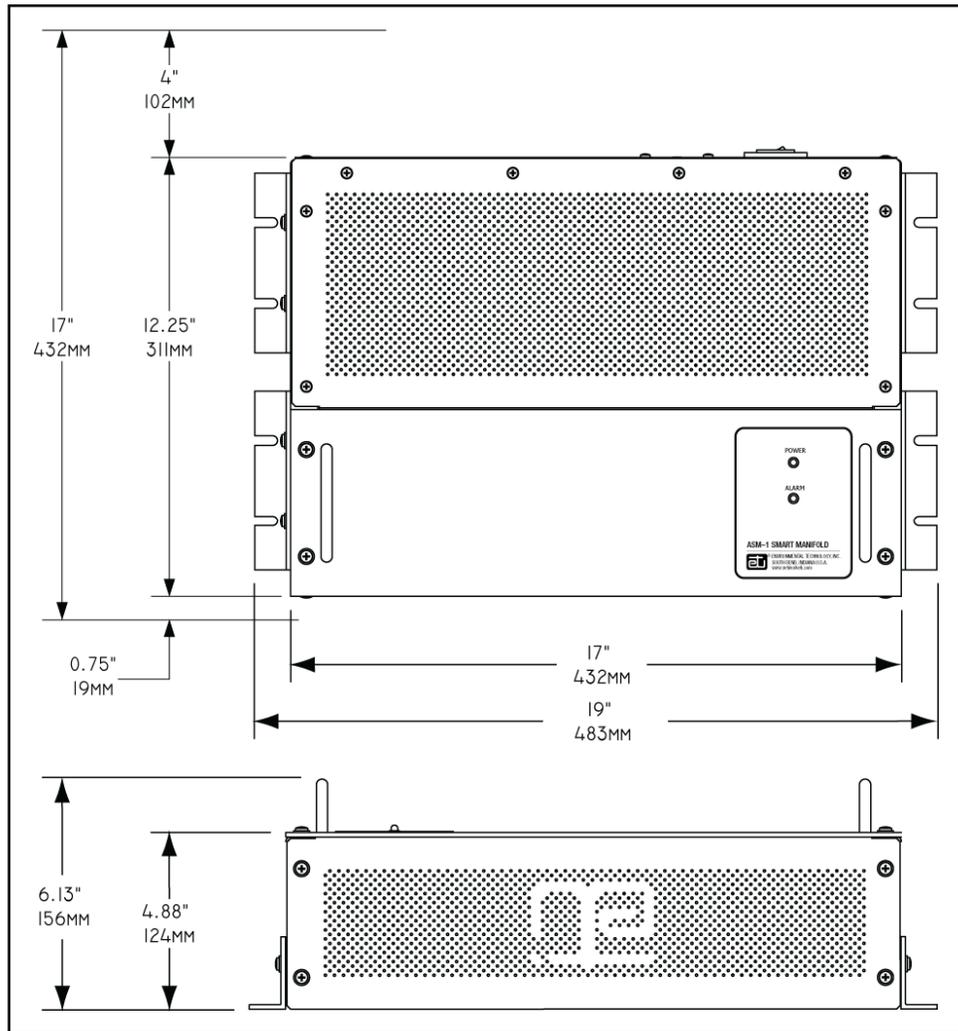
## WALL MOUNTING

To configure the Smart Manifold for wall installation, remove the front panel and the portion of the vented cover with the ETI logo. Reinstall the front panel so that it will be in the new front position once the unit is oriented for wall mounting. Reinstall the small vented panel so that it will be in the new bottom position.



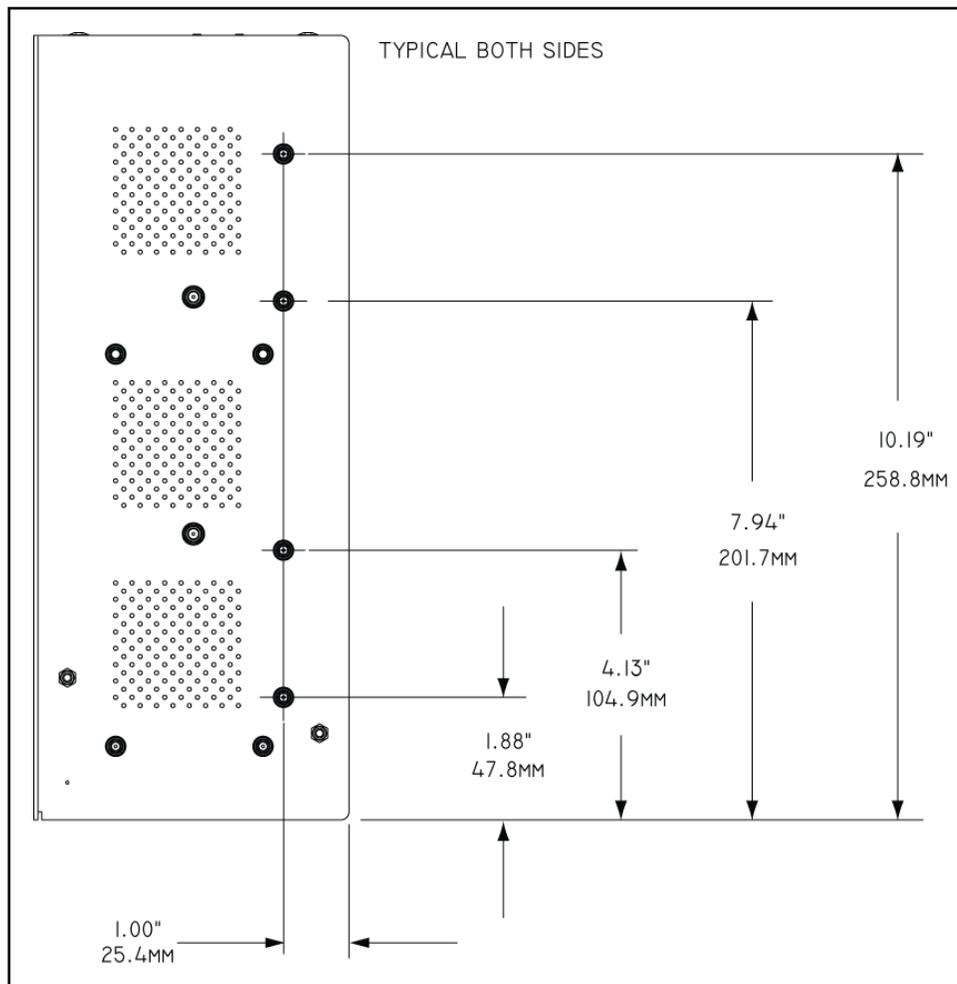
**Figure 11. ASM-1 WALL MOUNT CONVERSION.**

Wall mounting an ASM-1 Smart Manifold automated air distribution manifold requires an area approximately 17" (432mm) high by 19" (483mm) wide and will project slightly more than 6" (156mm) out from the wall. Refer to Figure 12. Plan your installation so that the Smart Manifold will not interfere with normal traffic patterns at your site. Ensure that the wall mounted unit has sufficient clearance above the connection panel to facilitate access to the power, communications, and pneumatic interfaces.

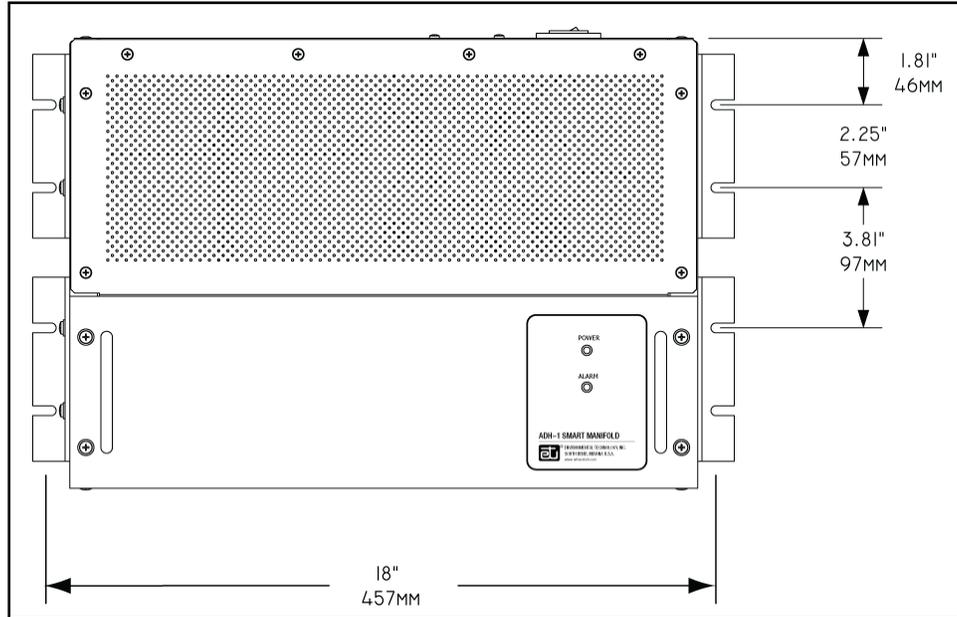


**Figure 12. ASM-1 SMART MANIFOLD  
WALL MOUNT OVERALL DIMENSIONS.**

To wall mount an ASM-1 Smart Manifold automated air distribution manifold, all four mounting brackets are used. Refer back to Figure 3. Mounting brackets will accommodate fasteners up to 1/4" (6 mm) in diameter. The choice of anchors and companion hardware should be appropriate for the mounting surface. At least four anchors (minimum one per mounting bracket) should be used and each should be capable of supporting at least 16 pounds (7.3 kg). If more than four anchors are used, it is recommended that the combined load capacity be at least 64 pounds (29 kg). Wall mount dimensions are found in Figures 13 and 14.



**Figure 13. ASM-1 SMART MANIFOLD  
WALL MOUNTING BRACKET HOLE DIMENSIONS.**



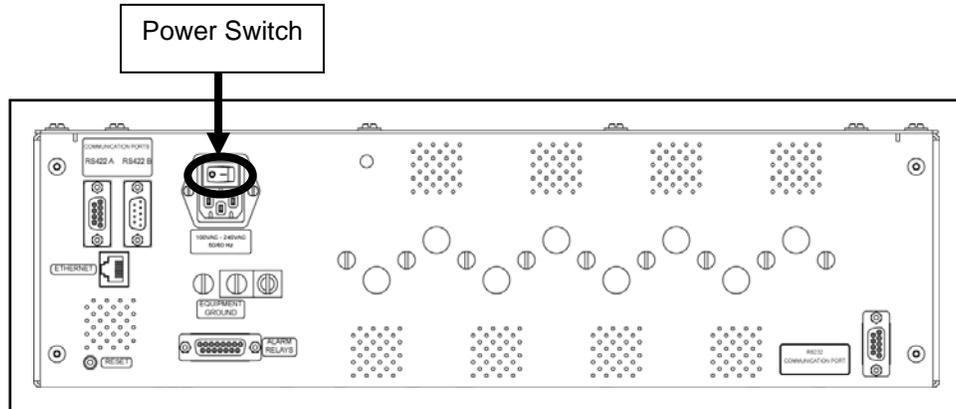
**Figure 14. ASM-1 SMART MANIFOLD  
WALL MOUNT POINT DIMENSIONS.**

## PNEUMATIC CONNECTIONS

The ASM-1 Smart Manifold comes supplied with two 1/4" brass barbed fittings and two 3/8" brass barbed fittings for connecting the feed hose to the 1/8" NPT female air discharge port. Alternatively, other customer supplied fittings may be used to connect to the 1/8" NPT female air discharge port. For longer feed lines, larger diameter feed hose should be used to minimize compressor cycling during significant volume changes such as initial pressurization.

## POWER CONNECTIONS

The ASM-1 Smart Manifold uses a standard NEMA 5-15P to IEC 320-C13 power cord (included; Part Number 17618). Place the power switch in the Off (O) position before connecting the power cord. Refer to Figure 15.



**Figure 15. ASM-1 SMART MANIFOLD  
POWER AND COMMUNICATIONS CONNECTIONS.**

Before connecting an ADH NETCOM automatic air dehydrator to a Smart Manifold automated air distribution manifold, it is first necessary to install the proper fitting(s) onto the Smart Manifold ports which will be used in the system. As described on the Inventory page of this manual, two types of brass fittings are supplied with the Smart Manifold. They are not interchangeable. The first type, Part Number 18198, connects a 1/8" NPT to a 1/4" hose barbed fitting. The second type of fitting, Part Number 23428, connects a 1/8" NPT to a 3/8" barbed fitting. Though not required, it is recommended to use the second type of fitting, the one with the 3/8" barbed fitting, on all Input ports, as well as on those Output ports with tube runs longer than one hundred (100) feet or about 30 meters. Directions for the proper installation of both types of fittings are the same.

Install one of the 1/8" NPT to 3/8" hose barbed fittings onto (Input) Port 1 on the Smart Manifold. First, apply some Teflon thread tape (or compatible thread sealant) around the threads of the fitting. Next, finger-tighten the fitting onto the port. Finally, using a wrench, fully tighten the fitting by rotating the fitting with the wrench at least two more turns to the right or clockwise. Also at this time, and in the same way, connect fittings to the remaining Smart Manifold Input and Output ports which will be used. On all fittings, use Teflon tape or compatible sealant or lubricant on the threads and use a wrench to fully tighten each fitting.



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Once the correct brass fittings have been installed onto the Smart Manifold ports which will be used, the set-up process may continue. Depending on the number of dehydrators and transmission lines which will be connected to the Smart Manifold, you may choose to make these connections at this time. If you choose not to connect the dehydrators and equipment to the Smart Manifold at this time, you will have the chance to do so following the Configuration process. Connect the equipment or transmission lines to be pressurized to the Output ports (pre-configured as Ports 3 and 4) and the dehydrator to the Input port (pre-configured as Port 1). If more than one ADH NETCOM dehydrator will be used, connect it to Port 2. You will have the chance later on to reconfigure Port 2 from Unused to Input. Secure all air lines in place on the fittings by pressing the hose tightly into place over the fittings. Continue connecting all of the devices in your system, the dehydrators as Input ports, and the equipment or transmission lines as Output ports, even though each individual port and the entire system as a whole have not yet been configured in their final form. Leave the individual units' On / Off power switches in the Off (O) position and plug in all of the individual system device power cables to a surge protecting electrical outlet power strip.

## COMPUTER NETWORK COMMUNICATIONS

The ASM-1 Smart Manifold automated air distribution manifold features Ethernet network communications, as well as RS-232 and RS-422/485 serial communications. The primary protocols utilized by the Ethernet communications are SNMP (Simple Network Management Protocol), HTTP (Hypertext Transfer Protocol), UDP (User Datagram Protocol), and TFTP (Trivial File Transfer Protocol). The Smart Manifold communications capabilities allow for monitoring and configuration of the unit, as well as providing a means for upgrading the software in the field.

The initial factory default setting is a fixed IP address of 192.168.52.9, a fixed subnet mask of 255.255.255.0, and a fixed gateway of 192.168.52.1.

The ASM-1 Smart Manifold automated air distribution manifold includes three alarm relays for communication of alarm conditions. These are configured at the factory as Summary Alarm, Low Pressure Alarm, and High Duty Cycle or Internal Leak Alarm, though each relay can be customer-configured to any of the alarm conditions tracked by the Smart Manifold.

The Smart Manifold serial ports use standard DB-9 connectors. Refer back to Figure 15. Pin outs for the RS-232 are shown in Table 1 below and for the RS-422/485 in Table 2. The Ethernet port uses a standard RJ-45 connector and can use CAT-5 or CAT-5E UTP cable. The alarm relays use a female DB-15 using the pin outs as shown in Table 3.

PIN	DESCRIPTION
1	OPEN
2	TX
3	RX
4	DTR
5	GND
6	DSR
7	CTS (Tied to Pin 8)
8	RTS (Tied to Pin 7)
9	OPEN
<b>NOTE:</b> Use straight cable to PC.	

**Table 1. RS-232 PIN DESCRIPTIONS.**

PIN	DESCRIPTION
1	Shield Ground
2	Receive Ready
3	Receive +
4	Transmit +
5	Signal Ground
6	Transmit -
7	Ready To Send (Tied to Pin 8)
8	Clear To Send (Tied to Pin 7)
9	Receive -

**Table 2. RS-422 PIN DESCRIPTIONS.**

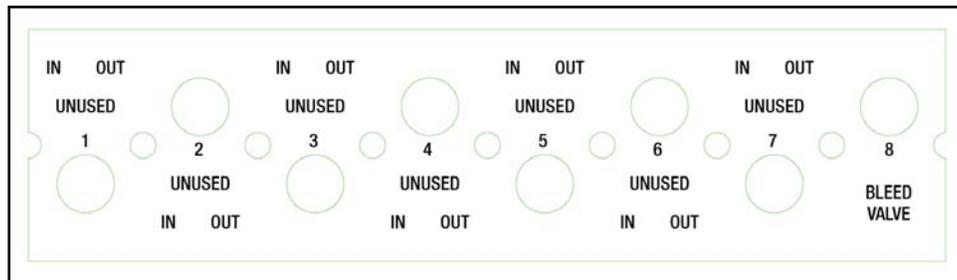
PIN	DESCRIPTION
1	RELAY 1 Closed on alarm
2	RELAY 1 Open on alarm
3	RELAY 2 Closed on alarm
4	RELAY 2 Common
5	RELAY 2 Open on alarm
6	Not used
7	Not used
8	Not used
9	RELAY 1 Common
10	RELAY 1 Common
11	RELAY 3 Open on alarm
12	RELAY 3 Closed on alarm
13	Not used
14	Not used
15	Not used

**Table 3. DB-15 PIN DESCRIPTIONS.**

## SYSTEM SET-UP

This section presents important background information prior to performing system configuration. Read it in its entirety. Specific instructions for configuring the system are found in the next section: Configuring the System – User Inputs.

To ensure the desired function and results from the Smart Manifold system, its operating parameters must first be configured as desired. Eight ports are located on the back of the Smart Manifold. Refer to Figure 16. Remember, when setting up the system, that the ADH NETCOM automatic air dehydrator(s) connected to it will serve as the source of the pressurized dry air used by the system. For that reason, each ADH NETCOM unit is considered an input to the system and must be connected to a Smart Manifold port configured as an Input port. Similarly, each transmission line or piece of equipment receiving pressurized dry air is considered an output and must be connected to a Smart Manifold port configured as an Output port.



**Figure 16. ASM-1 SMART MANIFOLD BACK LABEL.**

Though each Smart Manifold port is user-configurable and can be re-configured based on need and future expansion, the eight ports on the Smart Manifold have been pre-configured at the factory as described here. Port 1 is pre-configured as an Input port, meaning that it is ready to accept an ADH NETCOM dehydrator without having to be re-configured. Ports 3 and 4 are pre-configured as Output ports, meaning that these ports are ready to accept equipment or transmission lines without having to be re-configured. Port 8 is pre-configured as a bleed valve to automatically bleed off increased system pressure, such as from solar gain or to vent the system during certain system tests. A bleed plug has been installed at the factory on Port 8 so all that's necessary when configuring this port is to make sure to configure it as Bleed. Finally, Ports 2, 5, 6, and 7 are all pre-configured as Unused. When configuring the ports, it is suggested to circle or mark the configuration of each port on the back label of the unit.

If more than one ADH NETCOM automatic air dehydrator is used in the system, the Smart Manifold is capable of running two different operating or pumping modes: Parallel and Redundant. In Parallel pumping mode, the Smart Manifold runs multiple ADH NETCOM dehydrators to pressurize the system to a larger volume than would be maintainable using only a single dehydrator. The Smart Manifold will call for all ADH NETCOM dehydrators to pump together based on the system pressure as measured at the Smart Manifold.

In Redundant pumping mode, the Smart Manifold runs one ADH NETCOM dehydrator to pressurize the system, while maintaining additional ADH NETCOM dehydrator(s) in stand-by status. To ensure that a stand-by dehydrator is maintained in operational condition, the Smart Manifold periodically alternates which dehydrator is active. This period of time is user-configurable from 1 to 99 hours and, if set to 0, will cause the system to switch dehydrators every cycle.

Make sure that any port (1 through 7) to which no dehydrator or equipment line is connected is configured as Unused. This will keep the system from exhibiting symptoms of a leak when there is, in fact, no leak present. If using ADH NETCOM dehydrators with the system, make sure that each one is set to the same pressure range parameters as all the others and that all the dehydrators are set to the same pressure range parameters as the Smart Manifold itself.

Note that if any Output port is configured as Critical Output (“Crit. Out”), that that port will not be isolated or shut down automatically by the system, even if operating conditions indicate that it should be. Therefore, if an alarm condition indicates that a Critical Output port should be isolated and shut down, it requires immediate attention because that means that the equipment or transmission line connected to that port has a problem and is dumping or leaking dry air from the system and cannot and never will attain the proper or desired pressure. This situation requires immediate attention and correction.

## **CONFIGURING THE SYSTEM – USER INPUTS**

Instructions for setting the Smart Manifold automated air distribution manifold user-configurable operating parameters are presented on the next several pages. Before starting that process, it is useful to review the following definitions.

The Smart Manifold output pressure setting may be configured from 0.10 to 7.50 psig (7 to 517mbar), in 0.01 psig (0.67mbar) increments. Operational and alarm settings, along with their factory default values, are listed below.

**High Pressure Alarm Level** – the point at which high pressure will indicate an alarm condition. The High Pressure Alarm Level setting must be set higher than the High Limit Target Pressure setting. The High Pressure Alarm Level factory default setting is 1.5 psig (103.5mbar). This setting should be based on the limits of the system components.

**High Limit Target Pressure** – the high set point of the operating pressure range for the dehydrator. This is the high pressure the unit will target during compressor operation. The actual turn off pressure is adjusted in the software every pressurization cycle after determining the rate of pressure change during that cycle. This software compensation for rate of pressure change during pressurization minimizes compressor undershoot. The High Limit Target Pressure setting must be set between 0.20 and 7.5 psig (14 and 517mbar). The High Limit Target Pressure factory default setting is 0.50 psig (34.5mbar).

**Low Limit Target Pressure** – the low set point of the operating pressure range for the dehydrator. This is the low pressure the unit will target during compressor operation. The Low Limit Target Pressure setting must be set lower than the High Limit Target Pressure setting by at least 0.1 psig (7mbar). The Low Limit Target Pressure factory default setting is 0.30 psig (21mbar).

**Low Pressure Alarm Level** – the point at which low pressure will indicate an alarm condition. The Low Pressure Alarm Level setting must be set lower than the Low Limit Target Pressure setting. The Low Pressure Alarm Level factory default setting is 0.15 psig (10mbar).

**Display Units** – The pressure unit of measure displayed by the Smart Manifold is user-configurable as either English (psig) or SI (metric, millibars). The factory default display setting is English.

**Alarm Relays** – Three alarm relay outputs may be configured for any alarm or warning condition. All three relays are energized at power up and de-energized during an alarm condition or whenever power is removed from the dehydrator.

The factory default alarm relay outputs are:

- Alarm Relay 1 – Summary Alarm
- Alarm Relay 2 – Low Pressure
- Alarm Relay 3 – High Duty Cycle

**High Duty Cycle Alarm Level** – The set point at which the Smart Manifold will alarm for a high duty cycle. The factory default setting is 50%.

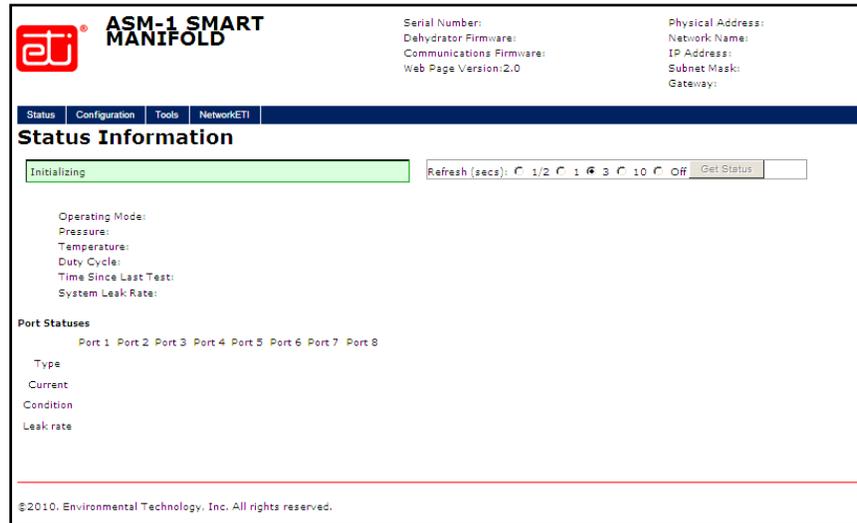
**Automatic Bleed Valve** – Smart Manifold Port #8 is pre-configured at the factory as an automatic bleed valve. The bleed valve will open if the system pressure exceeds the configured pressure point for 30 seconds. This bleed value is the same as the High Pressure Alarm Level. The automatic bleed valve will bleed off system pressure down to the High Limit Target Pressure. A bleed plug has already been installed at the factory on Port 8 so all that's necessary when configuring this port is to make sure to configure it as Bleed.

Perform the steps below to configure the Smart Manifold for initial service. If, as suggested in the Data Log paragraph on page 3, you choose to keep a Data Log to track system performance, you can go back at a later time and change or “fine tune” your system settings to reflect the conditions in which your system operates. Until then, to get the system up and running, the procedure below is all that's required initially.

The IP address for the Smart Manifold may be configured either first or last, as desired. In the instructions below, configuring the IP address is done after the other performance parameters have been configured. The choice of when to configure the IP address depends on a variety of factors, such as the number of machines you are configuring. Again, the best source of information regarding this decision is your own IT Department or System or Network Administrator. The actual physical connection of the equipment and transmission lines and the ADH NETCOM dehydrator(s) used in the system will be done after configuration. In this way, the system will not be operating while being configured.

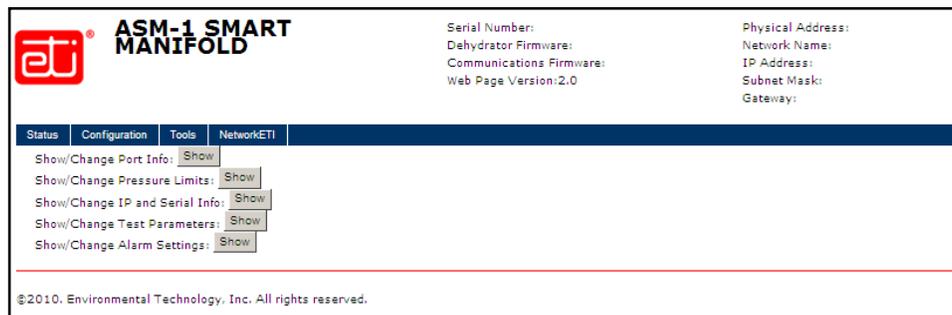
Many of the configuration screens have help screens to define each parameter and assist in the configuration process. Refer to them for useful information.

1. Using an Ethernet cable, connect to the Smart Manifold directly from a PC. A cross-over cable or switch is recommended. Use a web browser to call up the Smart Manifold using the default IP address 192.168.52.9. The Main or Status page will be displayed. Refer to Figure 17.



**Figure 17. THE SMART MANIFOLD MAIN PAGE.**

- From the Main Page, click the Configuration tab. Refer to Figure 18.



**Figure 18. THE CONFIGURATION PAGE.**

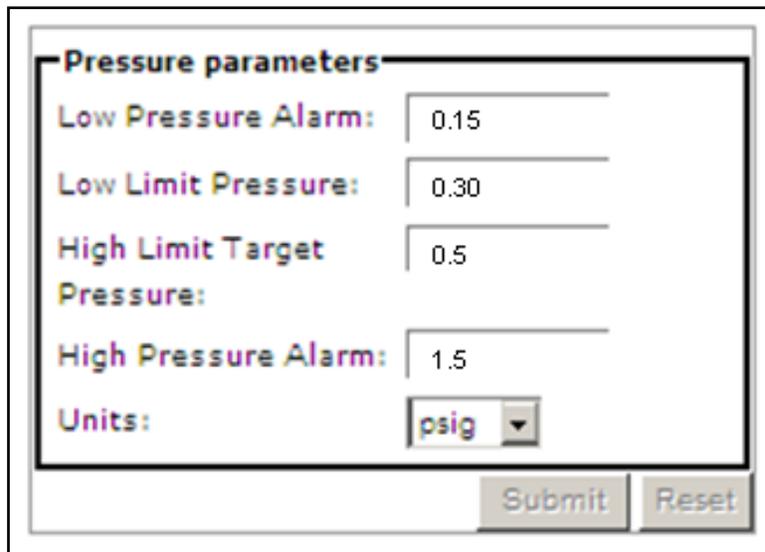
- From the Configuration tab, select Port Information. Refer to Figure 19. On this page, configure each of the eight ports as Input, Output, Critical Output, Unused, or Bleed. Because the ADH NETCOM supplies the dry, pressurized air used by the system, that is considered an input and should be connected to Port 1, factory configured as an Input port. As each ADH NETCOM dehydrator or input unit is configured, indicate on each line the IP address or network name you will enter later for that dehydrator. It is important to configure as Unused any port to which no dehydrator or equipment line is connected. This will keep the system from exhibiting symptoms of a leak when there is, in fact, no leak present.

Name	Type	Disabled	IP type	IP addr/name
Port 1	Input	<input type="checkbox"/>	None	
Port 2	Unused	<input type="checkbox"/>	None	
Port 3	Output	<input type="checkbox"/>	None	
Port 4	Output	<input type="checkbox"/>	None	
Port 5	Unused	<input type="checkbox"/>	None	
Port 6	Unused	<input type="checkbox"/>	None	
Port 7	Unused	<input type="checkbox"/>	None	
Port 8	Bleed	<input type="checkbox"/>	None	

**Figure 19. THE PORT INFORMATION SCREEN.**

4. Because the equipment lines use the pressurized air supplied by the ADH NETCOM, they are considered outputs and should be connected to Ports 3 and 4, already factory configured as Output ports. If using only one equipment line in the system, connect it to Port 3 and change the configuration of Port 4 from Output to Unused.
5. If you will have more than two equipment or transmission lines in your system, connect them to Ports 4 through 7, as needed, changing the configuration of those ports from Unused to Output, as appropriate.
6. Configure as Critical Output (Crit. Out) any equipment line you consider critical, meaning that even if found to be very leaky, that port will not be shut down.
7. Confirm that Port 8 is configured as Bleed as it is the system bleed valve.
8. The third column on the Port Information Screen is used to configure a port as Disabled. Disabled differs from Unused in that the Disabled designation is intended as an action or response to a temporary situation. Therefore, upon initial system configuration, do not use the Disabled designation. Any port to which neither a dehydrator nor equipment line is connected initially should be configured as Unused in the second column rather than Disabled in the third column.

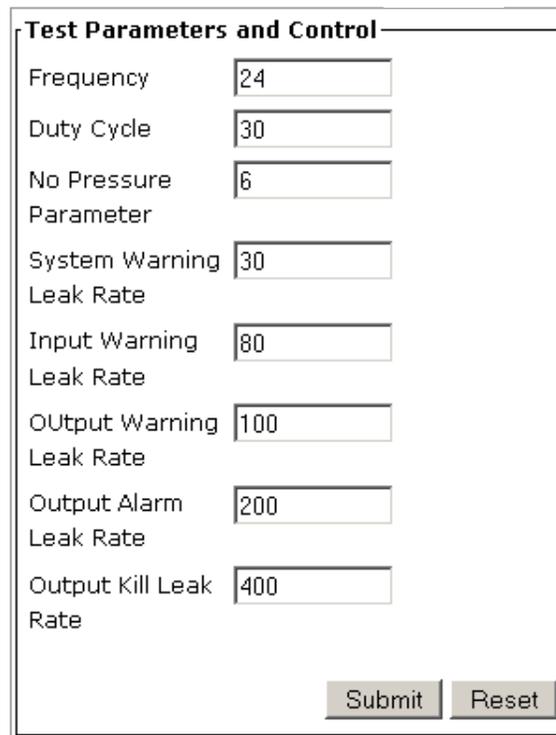
9. At the top of the Port Information page, under Operating Mode, notice that Standalone is the factory default setting. If using one or more ADH NETCOM dehydrators with your system, use the pull-down menu to select either Redundant or Parallel as the Operating Mode. A help screen appears explaining each of the three operating modes. As desired, select Redundant or Parallel as the Operating Mode to take full advantage of the system communications capabilities.
10. Once the ports have been configured as desired, press Submit to enter the settings. It is useful to circle or mark on the back panel label the configuration of each port.
11. Still on the Configuration Page, select Pressure Limits. Refer to Figure 20. If this is a new system, check with your System Administrator to confirm whether the factory default settings are acceptable for use for your system. If the Smart Manifold is replacing an existing dehydrator system and your current system settings have provided satisfactory service, use the current settings you now have set on your existing dehydrator. They can, as needed, be changed later. If using more than one ADH NETCOM dehydrator in your system, make sure that each one is set to the same pressure range parameters as all the others and that all the dehydrators are set to the same pressure range parameters as the Smart Manifold itself. Press SUBMIT when finished.



The screenshot shows a web-based configuration interface titled "Pressure parameters". It contains five input fields with the following values: "Low Pressure Alarm" is 0.15, "Low Limit Pressure" is 0.30, "High Limit Target Pressure" is 0.5, and "High Pressure Alarm" is 1.5. The "Units" field is a dropdown menu currently set to "psig". At the bottom right of the form are two buttons labeled "Submit" and "Reset".

**Figure 20. THE PRESSURE PARAMETERS PAGE SHOWING THE FACTORY DEFAULT SETTINGS.**

12. From the Configuration Page, select the Test Parameters screen. Refer to Figure 21. Every field on that page has a help screen explaining the meaning of each, its applicable unit of measure, and the factory default value. It is not necessary to make any changes to the default values on this page, although some parameter settings might need to be adjusted slightly if the system fails the test procedure.

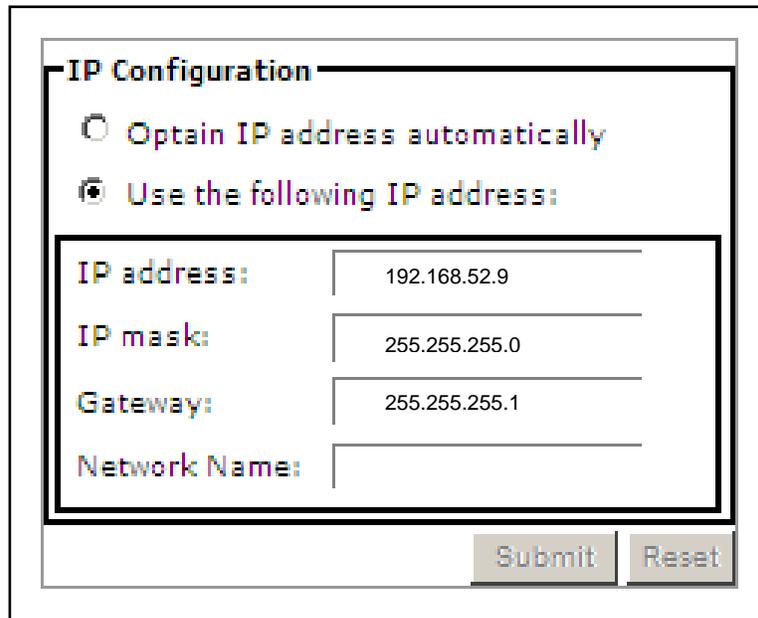


Test Parameters and Control	
Frequency	24
Duty Cycle	30
No Pressure Parameter	6
System Warning Leak Rate	30
Input Warning Leak Rate	80
Output Warning Leak Rate	100
Output Alarm Leak Rate	200
Output Kill Leak Rate	400

Submit    Reset

**Figure 21. THE TEST PARAMETERS PAGE.**

13. On the IP and Serial Information page, set the Smart Manifold IP address or network name. Refer to Figure 22. Obtain the IP Mask and Gateway settings from your System Administrator, if necessary.



The screenshot shows a web interface titled "IP Configuration". It has two radio button options: "Optain IP address automatically" (unselected) and "Use the following IP address:" (selected). Below these are four input fields: "IP address:" with the value "192.168.52.9", "IP mask:" with "255.255.255.0", "Gateway:" with "255.255.255.1", and "Network Name:" which is empty. At the bottom right are "Submit" and "Reset" buttons.

**Figure 22. THE IP CONFIGURATION PAGE SHOWING THE DEFAULT SETTINGS.**

14. Once the Smart Manifold system has been configured, it is recommended to print out all of the configuration settings whether they are the default settings or your own newly configured settings. In this way, they can always be reset if accidentally changed or used for reference, as needed.
15. If not already done, connect the dehydrators and equipment lines to the Smart Manifold at this time. Connect the equipment lines or outputs first, remembering that Ports 3 and 4 are already pre-configured as Output ports, and then the dehydrators or inputs after that, remembering that Port 1 is already pre-configured as an Input port. Connect in this order to avoid the system going on and off as you attach the equipment. Leave the power switch for each device in the OFF (O) position and plug each device into surge-protecting electrical power strips.

16. Connect to each of the system ADH NETCOM dehydrators. If either the IP address or the network name needs to be changed, do so at this time. If this information is not available, perform the Reset Procedure described below to clear and reset the ADH NETCOM dehydrator IP address to 192.168.52.9, and configure it from there. Change the IP address(es) of the system NETCOM(s) to those entered in step 3 under Port Information. If there is more than one ADH NETCOM dehydrator in the system, make sure to carefully enter the information for each dehydrator on the appropriate line.

If needed during the set-up process, the Reset Procedure is described below. The Reset Procedure is used to clear an existing IP address from an ADH NETCOM automatic air dehydrator prior to reconfiguring it for use in or as part of a Smart Manifold dehydration system.

To perform the Reset Procedure, perform the steps below.

1. Turn off power to the ADH NETCOM unit.
2. Press and hold the RESET button on the back of the unit. Keep the RESET button pressed.
3. With the RESET button still pressed down, turn the power back on to the dehydrator and wait for the alarm light to start blinking, at which time, release the RESET button. Upon completion of this procedure, the unit will be in its original, factory default configuration.

Performing this procedure will not reset, clear, or change the operating parameters of the ADH NETCOM. This procedure can also be used to reset the IP configuration of the Smart Manifold.

## **OPERATION**

### **NORMAL OPERATION**

To begin system operation, with all system power cords plugged into surge-protecting electrical strips, turn the individual power switches to the On (→) position. The system automatically begins functioning once power is applied. No operator intervention beyond this is required for basic system operation.

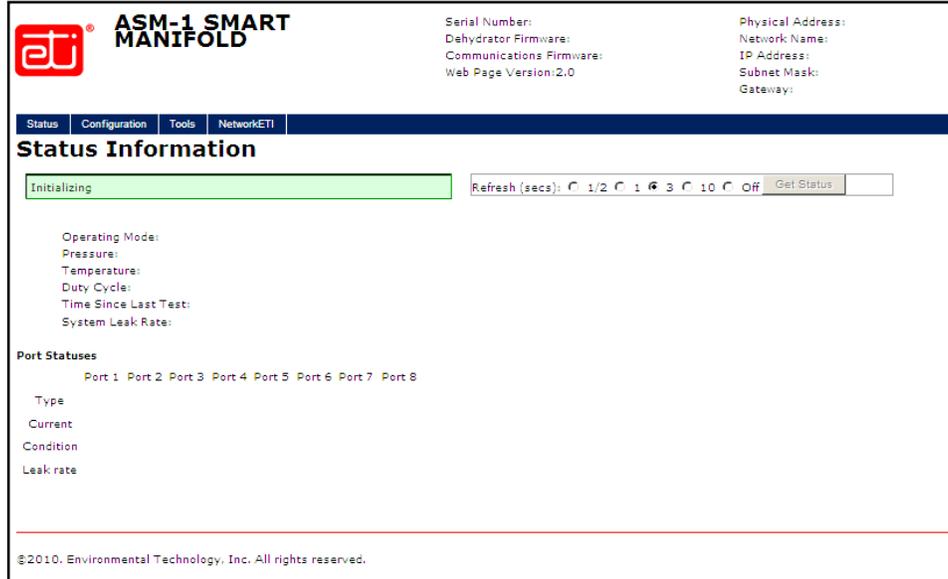
### **INDICATORS**

The Smart Manifold has two LED indicators, both located on the unit front panel. The Power LED lights up whenever power is running to the unit. The Alarm LED functions as a summary alarm and lights up to indicate the presence of any of several alarm conditions. When an Alarm condition is indicated, connect to the system using the Ethernet connection and a PC, then look at the Status information. The alarm condition will be displayed there.

Remember that if any Output port is configured as Critical Output (“Crit. Out”), that that port will not be isolated or shut down automatically by the system, even if operating conditions indicate that it should be. Therefore, if an alarm condition indicates that a Critical Output port should be isolated and shut down, it requires immediate attention because that means that the equipment or transmission line connected to that port has a problem and is dumping or leaking dry air from the system and cannot and never will attain the proper or desired pressure. Correct this situation immediately.

### **STATUS INFORMATION**

To obtain operational status information for the Smart Manifold, use either the simple web interface or query the dehydrator via SNMP. Optionally, the dehydrator may be queried using the S-A protocol via one of the serial ports on the back of the units. The ASM-1 Smart Manifold Main or Status Screen is presented in Figure 23 on the next page.



FUNCTION	DESCRIPTION
Machine Identification	Shows hardware, firmware, software, and IP identity
Status Control Button	From any screen, click to display the Main or Status Screen
Configuration Control Button	From any screen, click to view, set, or change parameters
Tools Control Button	From any screen, click to enter Tools page
NetworkETI Button	From any screen, click to go to ETI web site
Status / Alarm Window	Displays general information and any current alarm conditions
Refresh Indicator	A configurable indicator of how often the screen updates
Operating Mode	Indicates Parallel, Redundant, or Standalone operating mode
Pressure	Shows current system pressure based on currently active canister
Temperature	Ambient temperature inside the box
Duty Cycle	Indicates the percentage of time the system is actually pressurizing
Time Since Last Test	The time since last self-test
System Leak Rate	Percent of pressure drop per minute with Input and Output ports shut
Type	Indicates port configuration: Input, Output, Crit. Output, Unused, or Bleed. Also indicates Disabled (Dis) which the operator selects.
Current	Indicates Open or Shut referring to the solenoid
Condition	Indicates Active or Dead as determined by the system software
Leak Rate	Percent of pressure drop per minute for a single port

**Figure 23. THE ASM-1 SMART MANIFOLD MAIN OR STATUS SCREEN.**

## **MAINTENANCE**

### **PREVENTIVE MAINTENANCE**

The ASM-1 Smart Manifold automated air distribution manifold requires no preventive maintenance. All components in the Smart Manifold are designed to have a minimum operational life of 15 years at duty cycles of up to 20%. Higher duty cycles may reduce component life.

### **CORRECTIVE MAINTENANCE**

Verifying the performance of the ASM-1 Smart Manifold automated air distribution manifold requires special equipment, fixtures, and expertise. Please consult with Environmental Technology Technical Support before attempting to service or repair an ASM-1 Smart Manifold.

### **WARNING**

Servicing should be performed by qualified personnel. ADH NETCOM dehydrators contain lethal voltages. Assume that all circuits are live. Attached ADH NETCOM automatic air dehydrators may produce as much as 24 psig (1,655mbar) under worst case failure. Vent the system to the atmosphere before servicing pneumatic components.

All fittings and hardware are standard American dimensions (inches). Use a solution of mild liquid dish detergent and water to locate air leaks.

### **CAUTION**

Do not apply power to the unit unless all internal connections have been made. Failure to do this may result in component damage.

## **AUTOMATED PORT TESTING**

The ASM-1 Smart Manifold automated air distribution manifold features a computerized port testing routine. Several conditions initiate port testing.

Port testing initiates:

- periodically, based on a user-configured time of 1-999 hours. (Note that configuring this to zero (0) hours will shut off the periodic testing function.);
- when system pressure drops below a user-defined minimum;
- when the system duty cycle rises above a user-defined maximum;
- when there is a failure to pressurize after 1 - 60 minutes (user-configurable, with the default setting being 60 minutes); and
- manually, when requested by the user. (Note that the user can test only one port and not a complete test.)

Automated port testing, once initiated, momentarily closes all the ports and then cycles through the active ports, which are defined as being any port not currently configured as Unused. Each active port is checked in turn to ensure that the connected equipment line can maintain pressure. The automated port testing cycle takes about 15 seconds for each active port. After each active port passes the testing procedure, it is placed back into normal operation. There are several possible states for active ports. These are determined differently for the Input ports than for the Output ports. The results of the automated port testing process are typically presented by the system software as an alarm or alarm condition. The various types of alarms and the meaning of each are presented in the next section of this Manual entitled Alarms.

## ALARMS

The ASM-1 Smart Manifold automated air distribution manifold alerts the user to a variety of alarm conditions. These alarm conditions are listed below. Most of these alarm condition parameters are configurable by the user.

There are two kinds of alarms or alarm conditions with regard to ASM-1 Smart Manifold operation. The first kind are “global” alarms and they pertain to the entire system. These global alarms are listed below.

ALARM NUMBER	ALARM NAME	ALARM DESCRIPTION	GENERAL COMMENTS
1	Leaky System	System leaks with all ports closed	User configurable
2	High Duty Cycle	System runs too frequently	User configurable
3	Low Pressure	System pressure is less than the configurable low pressure setting	User configurable
4	High Pressure	System pressure exceeds the configurable high pressure setting	User configurable
5	Low Temperature	–	Informational
6	High Temperature	–	Informational
7	EEPROM Corrupted	–	Pertains to non-volatile storage
8	Unable To Pressurize	System pressure does not rise within configured amount of time	User configurable time setting
9	Mode Switch	System has to operate in a mode other than that selected by the user	Due to communications error or system leaks

### ASM-1 SMART MANIFOLD ALARM CONDITIONS.

## USER-DEFINED ALARM VARIABLES

**High Duty Cycle Alarm Level** – The configurable set point at which the Smart Manifold will indicate a high duty cycle. The factory default setting is 50%. The system duty cycle and the discharge pressure are available for display.

Typically, the system should be tight enough to limit the duty cycle to less than 20%. System component life decreases as duty cycle increases. A Duty Cycle Alarm occurs if the duty cycle exceeds the configured Duty Cycle Alarm level.

**Low Pressure Alarm Level** – The user configurable low pressure limit at which an alarm condition will be indicated. Note that the Low Pressure Alarm must be set lower than the Low Limit Target Pressure and that the factory default setting is 0.15 psig (10mbar). A Low Pressure Alarm occurs if the pressure stays below the configured Low Pressure Alarm level for more than 30 seconds.

**High Pressure Alarm Level** – The user configurable high pressure limit at which an alarm condition will be indicated. Note that the High Pressure Alarm must be set higher than the High Limit Target Pressure and that the factory default setting is 1.5 psig (103.5mbar). A High Pressure Alarm occurs if the pressure exceeds the configured High Pressure Alarm level for more than 30 seconds. If a bleed valve is present, this is the level at which it will actuate.

In addition to the system global alarms explained above, there are also alarms for each individual port: four for Input ports and four for Output ports. These are listed in the two tables on the following page.



<b>ALARM NUMBER</b>	<b>ALARM NAME</b>	<b>ALARM DESCRIPTION</b>	<b>GENERAL COMMENTS</b>
1	Slow Leak		Can occur at any time
2	Fast Leak	Can't pressurize	Can happen only while operating in one of the remote modes with ADH NETCOM units
3	Not Trying To Pressurize	Bad pump on a NETCOM unit or similar situation	Can happen only while operating in one of the remote modes with ADH NETCOM units
4	Communications Error		Can happen only while operating in one of the remote modes with ADH NETCOM units

**INPUT PORT ALARMS.**

<b>ALARM NUMBER</b>	<b>ALARM NAME</b>	<b>ALARM DESCRIPTION</b>	<b>GENERAL COMMENTS</b>
1	Slow Leak	Detects a slow line leak	User configurable set point
2	Bad Leak	Detects a bad line leak	User configurable set point
3	Very Bad Leak	Leaking badly enough to shut down a port not configured as critical	Same user configurable set point as for Output Port Alarm #4
4	Port Shutdown	Port is shut down as a result of a very bad leak	Same user configurable set point as for Output Port Alarm #3

**OUTPUT PORT ALARMS.**

## TROUBLESHOOTING

Use the following information to troubleshoot the ASM-1 Smart Manifold in the event that a problem develops.

### **Nothing works.**

Verify the unit has power.

- Check the On-Off switch on the back of the unit.

- Check the power cable for proper installation.

- Ensure that power is available at the outlet and circuit breaker.

Move the unit to the bench and remove the top cover.

- Apply power.

- Verify green LED indicator on power supply/converter(s).

- Verify wiring and connections from AC power entry.

- Verify 24VDC between “+24HC” and “GND” probe points next to J4 terminal block on the main control circuit board.

If no power after verifying wiring and connections to the power supply/converter(s), then replace the power supply/converter(s).

### **Alarm 04 - High Temperature Alarm**

Check for inadequate ventilation around unit.

- Check equipment room temperature above 100°F.

- Remove front cover and check temperature near center of main circuit board.

- If over 120°F, check equipment room temperature and/or ventilation around the unit.

- If below 120°F, replace main control circuit board.



### **Alarm 05 - Low Temperature Alarm**

Check that equipment room temperature is above 40°F.

Equipment room temperature above 40°F.

If so, replace main control circuit board.

## REPLACEMENT PARTS

To order replacement parts for the ASM-1 Smart Manifold automated air distribution manifold or any Environmental Technology, Inc., product, contact Customer Service at (800) 234-4239 or (574) 233-1202 between the hours of 8:00 a.m. and 5:00 p.m., Eastern time.

<b>PART NUMBER</b>	<b>ITEM DESCRIPTION</b>
23691	Front Panel Assembly
23253	Main Circuit Board
23446	Power Filter Module and Switch (AC, Rack/Wall Mount Units)
23445	AC Power Supply Module
24210	Solenoid Assembly Kit (Replaces 23666, 23667, or 23669 Solenoid Assemblies)
23857	Bleed Valve Plug
24303	Documentation CD ROM, ADH NETCOM and ASM-1 Smart Manifold
23678	Accessory Kit, ASM-1 Smart Manifold
17618	Power Cord
23245	Mounting Bracket Pair (2)

## SPECIFICATIONS

Specifications for the ASM-1 Smart manifold automated air distribution manifold are listed below. Refer also to the Product Label on the unit itself.

### GENERAL

Approvals	 <p>Type 1950 Information Technology Equipment</p>  <p>Also evaluated by Underwriters Laboratories Inc<sup>®</sup> In accordance with IEC Publication 60950</p>
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### ENCLOSURE

Dimensions	17" x 12" x 5-1/4" (432mm x 305mm x 133mm)
Weight	11 lbs (5 kg)
Mounting	Dual-post rack, flush mounted Single-post rack, center mounted Wall mounted

### POWER

	Standard Configuration	ASM-1 AC NEMA II Configuration
Supply	100–240 VAC, 50/60 Hz	220–240 VAC, 50/60 Hz
Maximum Current	1.0 Amps at 100 V	1.4 Amps @ 240 V
Power Usage	100 W maximum	336 W maximum
Heat Dissipation	341 BTU/hour maximum	1,100 BTU/hour maximum

### OUTPUT

Maximum Pressure	7.5 psig (517mbar)
Ports	8 x 1/8" NPT; 3/8" or 1/4" hose barbs (both included)
Operating Units	SI (millibars); English (psig), default



## CONTROL

Protocols	HTTP (Web Interface), SNMP, UDP, TFTP
Maximum Pressure	Configurable Range: 0.20 psig to 7.5 psig (14 mbar to 517mbar), Default: 0.50 psig (34.5mbar)
Minimum Pressure	Configurable Range: 0.10 psig to 7.4 psig (7mbar - 510mbar), Default: 0.30 psig (21mbar)
Low Pressure Alarm Level	User Configurable, Default: 0.15 psig (10mbar)
High Pressure Alarm Level	User Configurable, Default 1.5 psig (103.5mbar)
Alarm Relays	Contact Type - Form C, SPDT, reverse acting Ratings - 0.25 Amps @ 60 V User Configurable, Defaults: Alarm Relay 1: Summary Alarm, Alarm Relay 2: Low Pressure Alarm, Alarm Relay 3: High Duty Cycle Alarm
Parallel Pumping Configuration	User Configurable, Default: Off
Redundant Pumping Configuration	User Configurable, Default: Off

## ENVIRONMENTAL

Operating Temperature	32°F to 130°F (0°C to 55°C)
Storage Temperature	-40°F to 150°F (-40°C to 60°C)

## **APPENDIX A – ASM-1 SMART MANIFOLD AC NEMA CONFIGURATION**

### DESCRIPTION

The ASM-1 Smart Manifold AC NEMA automated air distribution manifold provides the same functionality as the standard ASM-1 Smart Manifold, housed in an environmentally sheltered polypropylene, IP66, NEMA 4X enclosure. Because of the NEMA enclosure, the unit can be mounted outside which not only saves interior shelf space but also protects the unit from harmful environmental factors. The ASM-1 Smart Manifold AC NEMA automated air distribution manifold is also available with optional Type 1 and Type 2 MIL-SPEC connectors, making field replacement quick with minimal downtime. Refer to Figures 1 and 2 below for views of internal components and dimensions.

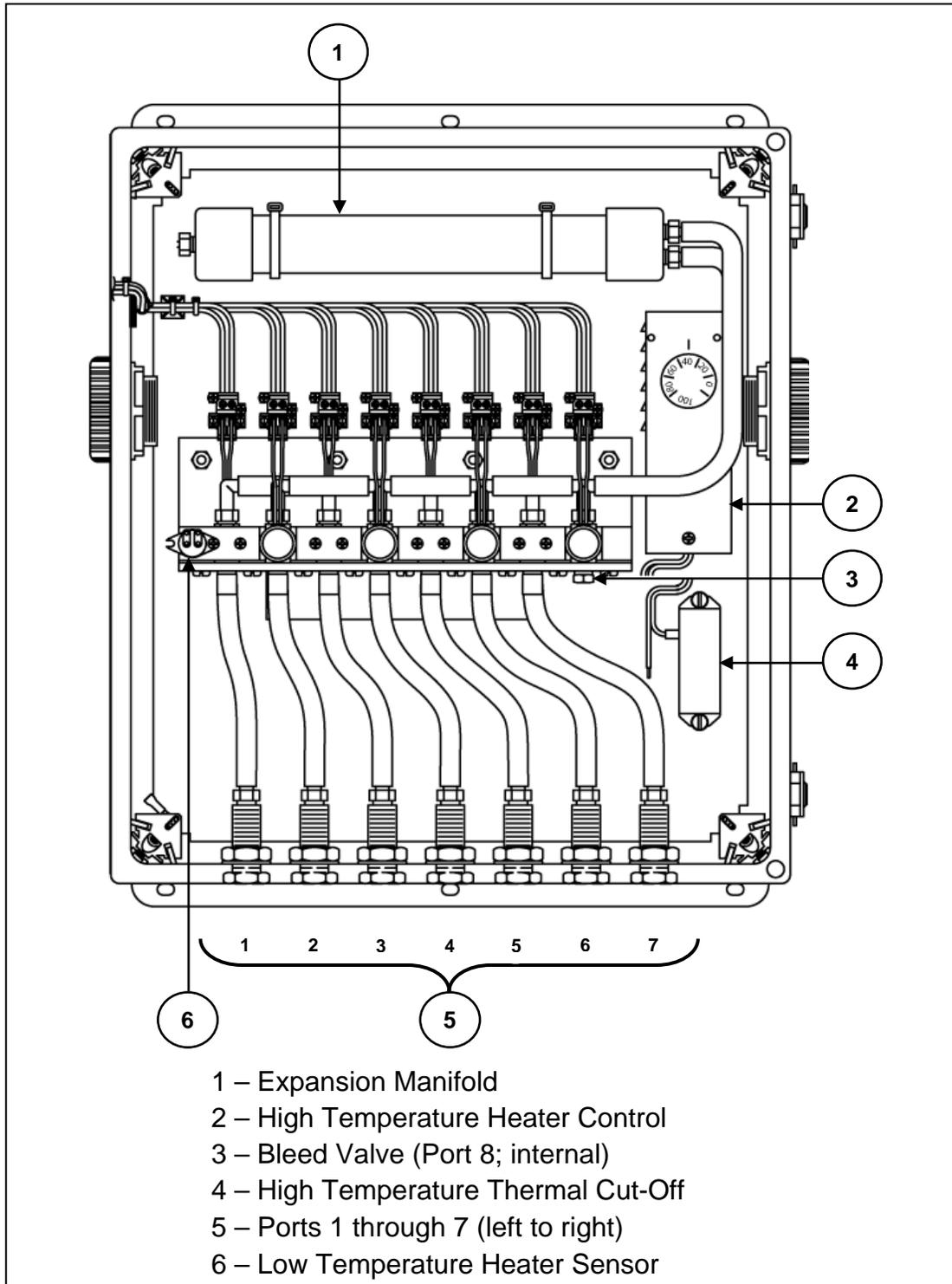
While the NEMA enclosure keeps out moisture, the temperature control system allows operation down to -40°F (-40°C). The temperature control system in the NEMA unit allows reliable operation from -40°F (-40°C) to 130°F (55°C), with a storage temperature range from -40°F (-40°C) to 150°F (60°C). Power requirements for the NEMA configuration can be found on page 46 of this manual.

Communications features are the same for the standard Smart Manifold and the NEMA configuration. Specifically, the following computer communications protocols can be used:

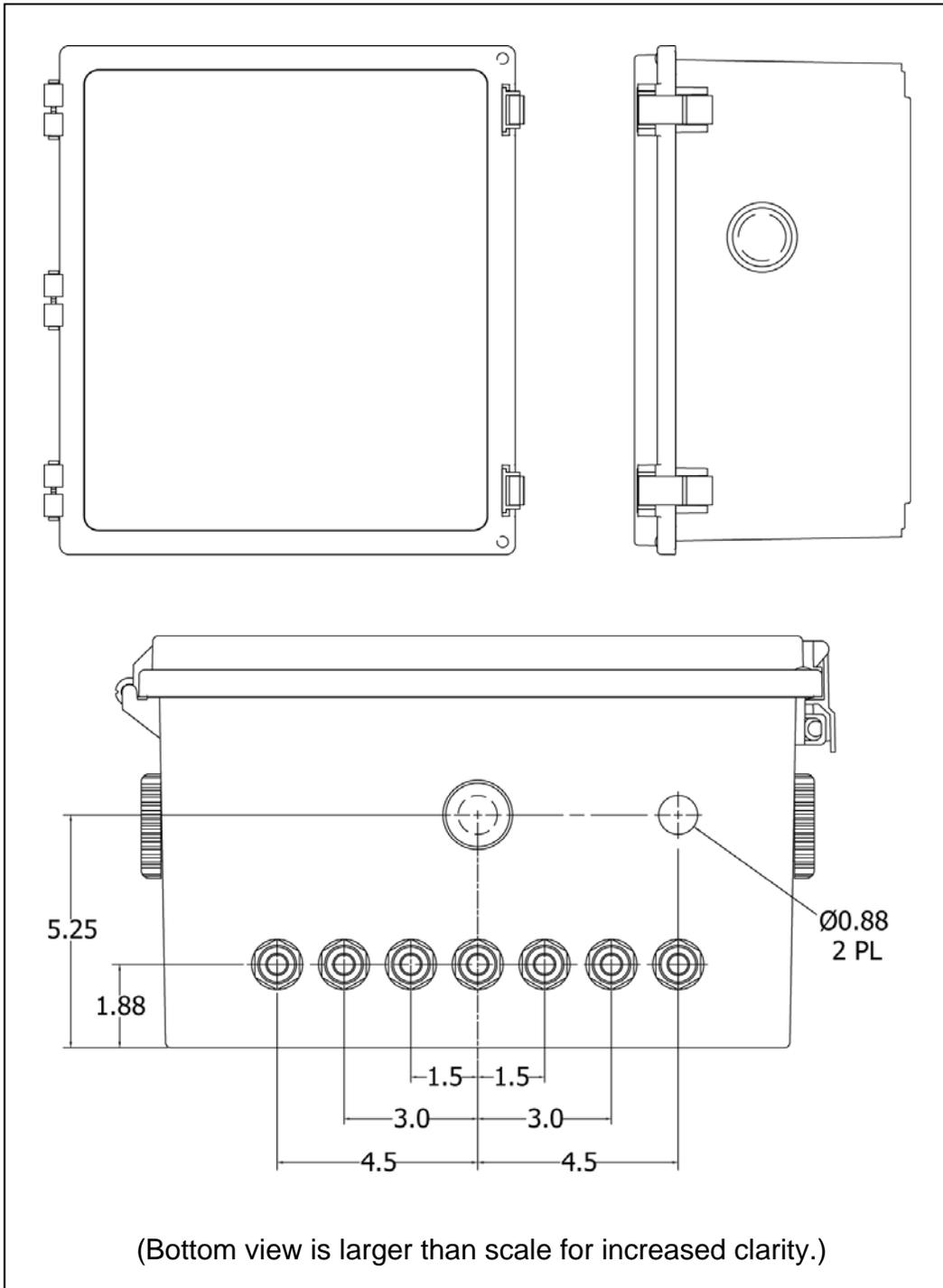
- Hypertext Transfer Protocol (HTTP);
- Simple Network Management Protocol (SNMP);
- User Datagram Protocol (UDP); and
- Trivial File Transfer Protocol (TFTP).

The NEMA enclosure has a dedicated temperature and humidity control system to enable outdoor operation. To save energy, small heaters are mounted near the pump to allow normal operation at temperatures below 40°F. Excess heat from those heaters is utilized within the enclosure to heat other, less temperature sensitive components. To keep moisture from collecting internally, pressurized water vapor is discharged from the dehydrator through a discharge port and diffuser during regeneration.

The ASM-1 Smart Manifold automated air distribution manifold is available in various configurations and installation is not the same for all of them. Although this Appendix describes installation, the Installation Sheet that came with your unit is the best source for installation information for your specific configuration.



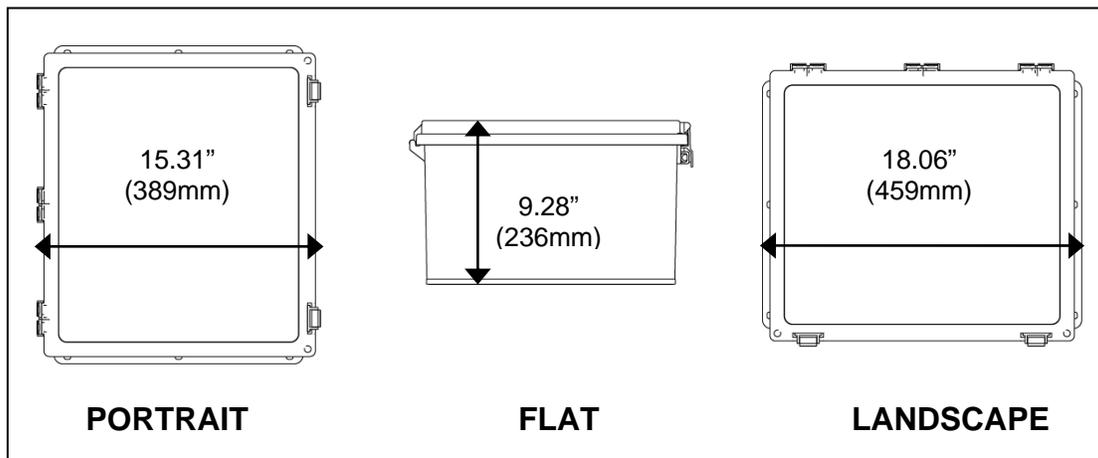
**Figure 1. ASM-1 SMART MANIFOLD AC NEMA COMPONENTS.**



**Figure 2. ASM-1 SMART MANIFOLD AC NEMA ENCLOSURE DIMENSIONS**  
(Standard AC NEMA enclosure configuration shown above).

## PREPARING FOR INSTALLATION

The ASM-1 Smart Manifold AC NEMA automated air distribution manifold can be installed on a post or pole, on a shelf, or on a wall. Due to size and space constraints, do not mount the unit on a rack. The enclosure can be positioned with the hinges on the left side of the box (Portrait), along the top of the box (Landscape), or with the enclosure feet down (Flat). Refer to Figure 3.



**Figure 3. ASM-1 SMART MANIFOLD AC NEMA MOUNTING POSITIONS.**

To install the unit in the Portrait position, a suitable mounting area measuring 15.31" W x 18.06" L x 9.28" D (389mm W x 459mm L x 236mm D) must be available. The mounting hardware and the wall should be capable of supporting a static load about four times the weight of the unit, or 100 pounds (45kg).

The ASM-1 Smart Manifold AC NEMA automated air distribution manifold is permanently connected equipment and does not have an internal disconnect device. A readily accessible disconnect device, short circuit, and current protection shall be provided by the customer and are not supplied by Environmental Technology, Inc. If the unit is part of a building installation or may be subject to transient overvoltages exceeding those for International Electrical Code (IEC) Overvoltage Category II, then the customer shall also provide additional protection to satisfy IEC Overvoltage Category III and IV.

AC power shall be provided with protection that complies with UL 1449 and IEC 61643. A branch circuit with a 15A breaker for short circuit protection is required. When not using the optional Type 1 or Type 2 military connector kits, the power terminal block is suitable only with 14 AWG copper wire.



The customer is responsible for installing the unit in a secure, Restricted Access Location, accessible only by personnel qualified to work with this equipment.

## INSTALLATION

To install the ASM-1 Smart Manifold AC NEMA automated air distribution manifold, perform the steps below.

### NOTE

The ASM-1 Smart Manifold AC NEMA automated air distribution manifold does not have a Power Switch. For that reason, remember that power is running to the unit as soon as the power source cable is connected.

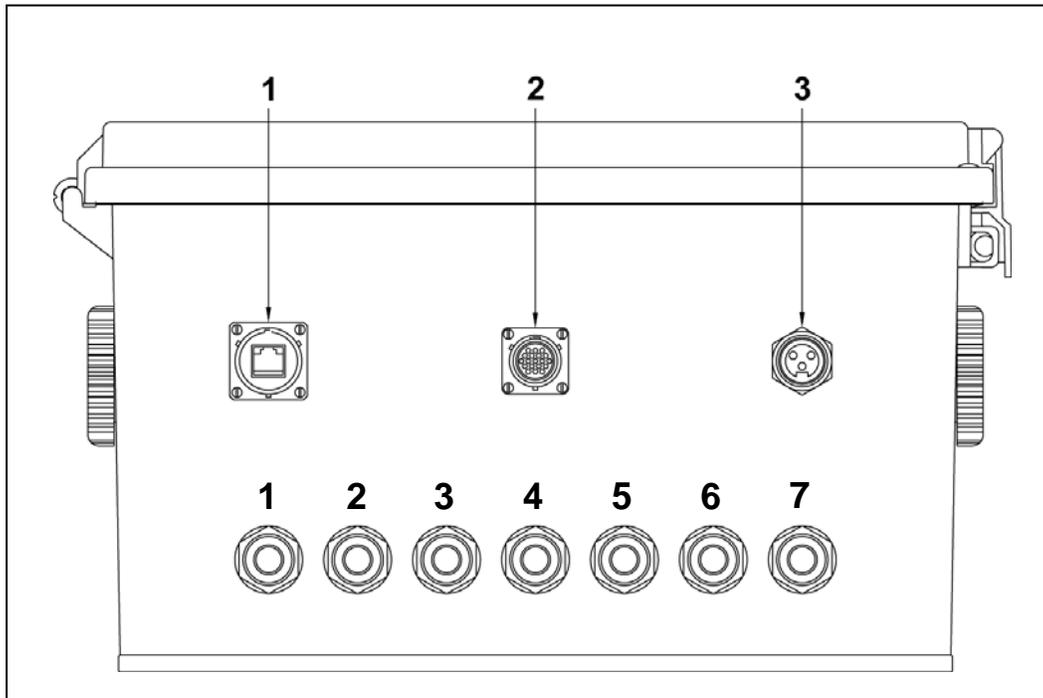
At this time, shut off the facility circuit breaker serving the ASM-1 Smart Manifold AC NEMA unit.

1. Before proceeding with installation, make sure the facility circuit breaker serving the ASM-1 Smart Manifold AC NEMA unit has been shut off.
2. Using four (4) 5/16" mounting bolts, fasten the unit to the mounting wall or surface. To ensure stable mounting, use mounting hardware of a length appropriate to the surface or material on or into which the unit is being installed. The installation surface or material must be capable of supporting a static load of approximately four times the weight of the unit, or 100 pounds (45kg). Fasten mounting hardware securely into place.
3. Two breathers are located on the enclosure, one on either side. They allow air into the enclosure. Do not remove the breather caps. They are specially designed to let air into the enclosure, while preventing water and dust entry. Turn each breather cap clockwise at this time just to make sure they are properly seated.

## CONNECTING THE CABLES

To take full advantage of the ASM-1 Smart Manifold AC NEMA automated air distribution manifold communications capabilities, connect the communications cables as described below. Although the unit can now function, it cannot alert the user to any of the alarm conditions which the unit has been designed to report, nor can any reconfiguring of the unit be done remotely, without the communications cables installed.

To facilitate communications with the ASM-1 Smart Manifold AC NEMA, three (3) serial ports, three (3) alarm relays, and an Ethernet port are provided. Most often, when replacing an old unit, the RS-422/485 cable will be used. When installing a new unit that is not replacing an existing unit, the use of the Ethernet cable is recommended for monitoring unit status. Refer to Figure 4 below.

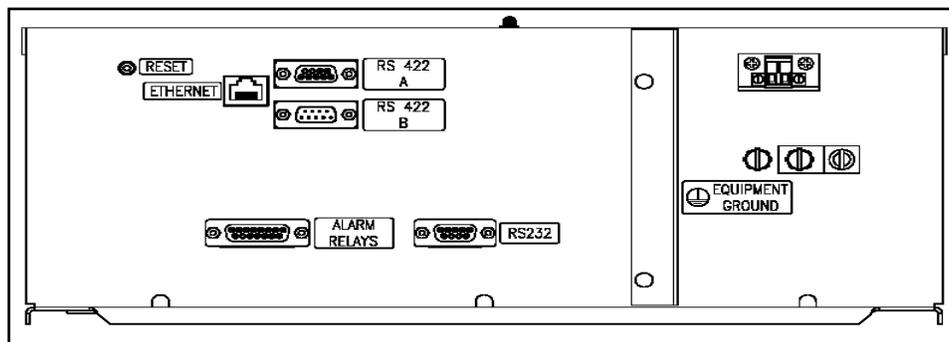


COMMUNICATION PORTS	FUNCTION
1	Ethernet Connection
2	RS-422 Connection / Alarm Relays
3	100VAC-240VAC Connection

CONFIGURATION PORTS	DEFAULT CONFIGURATION
1	Input
2	Unused
3	Output
4	Output
5	Unused
6	Unused
7	Unused
8 (inside the enclosure)	(Bleed; internal to the enclosure)

**Figure 4. ASM-1 SMART MANIFOLD AC NEMA  
COMMUNICATION AND CONFIGURATION PORTS**  
(Type II AC NEMA enclosure configuration shown above).

On the inside panel, there are two ports for the RS-422/485 cable, labeled A and B, as well as a port labeled for the RS-232 cable. Refer to Figure 5 below. Of the two RS-422/485 ports, A is the female end, while B is the male end. Be careful when installing these cables because the female (port A) connector end of the RS-422/485 cable is the same as the connector end of the RS-232 cable. RS-232 connector pin assignments are presented in Table 1 on page 24 of this Manual. For a description of pin assignments for the RS-422/485 cable, refer back to Table 2 on page 24 of this Manual. For alarm relay connector pin assignments, refer to Table 3 on page 25.



**Figure 5. CABLE CONNECTION LOCATIONS.**

4. Close and secure the enclosure using the fastening latches. Make sure the latches snap into position and that they are fully closed and secured.

## CONFIGURING THE UNIT

Once the unit is installed and connected, it is necessary to configure or set up the desired specific values and performance parameters for your specific unit, installation, or location. Refer back to the section entitled Configuring the System, beginning on page 31 in this Manual, or see the Installation Sheet accompanying the unit. Refer back to Figure 4 for port configurations.

Once the newly installed unit has been successfully configured, turn on the system and verify that the system pressurizes and that it is running at a Duty Cycle of less than 20%.

## **APPENDIX B – S-A / UDP COMMANDS FOR ASM-1 SMART MANIFOLD**

### UDP Protocol

A UDP message to an ADH NETCOM consists of the following:

- C: 43 hex; C stands for command
- Index: a one-byte field used to match a query to a response
- Command Character: See list of commands
- Zero or more data bytes

The response to a message is in the same form as above, except that the first character is replaced with a return code. The return code will be one of the following:

- Y: Command accepted and acted upon if relevant
- N: Command rejected
- ?: Command not valid

### Commands

Command characters are referred to either as a quoted character (using single quotes) or as that character's hex value. For example, if I want to know the model of automatic dehydrator I am talking to, I would use either '0' or 30 hex as the command character.



This applies to both serial Scientific Atlanta (S-A) protocol and our UDP protocol. Details are just as in the ADH NETCOM.

All commands to the ASM-1 are single characters.

List of commands: (details follow)

Group 1: status (changes often, without user intervention)

1: return status string, default units

E: return status string, English units

M: return status string, metric units

L: return list of active alarms

G: return active messages

T: return results of last test

N: combination of commands L (above) and P (below)

Group 2: configuration (does not change often, never by itself)

0: return ID

F: return firmware identification

I: return serial numbers, etc.

C: return pressure limits

P: return port configuration

Group 3: action

5: start a test

6: terminate the test

7: go offline (to standby)

8: go back online (out of standby)

Details:

Preliminary: several places we use single-character abbreviations for port types.

These are as follows:

I: input

O: output

C: critical output

B: bleed port

X: unused

The character will be lower case if it is disabled; this is only done for types I, O, and C.

Commands 1,E,M:

Returns a fixed-length string, length 14.

Char 0: E for English units, M for metric

1,2: current state; Rn or S\_

R: redundant pumping, n the port currently in use

P: parallel pumping

S: standalone

T: testing

I: an intermediate state, transient

C: initializing communications

M: manual mode

O: offline (standby)

X: serious error happened: gave up

Char 3: A if there is an alarm condition, else -

4,5,6: pressure, in hundredths of a psi or in mbar

7-10: sign and 3-digit temperature, degrees F or C

11-13: duty cycle in percent; or --- if none available

Command L: returns a list of active alarms, coded

String returned is 20 to 28 characters. The first four represent a single 16-bit hex number (high byte first), representing global alarms. This is followed by eight 2- or 3-character substrings, each representing an alarm for a single port: port 1, 2, etc. If the port is disabled, this is a decimal point followed by a 2-character hex number. If it is not disabled, it is simply the 2-character hex number. This number is an 8-bit value, bit-mapped, representing the alarm conditions that are present in that port.

Global alarms: bit 0 is alarm 1, bit 1 is alarm 2, etc.

Meaning of global alarms:

01: leaky system

02: high duty cycle

03: low pressure

04: high pressure

05: low temperature

06: high temperature

07: EEROM (configuration) corrupted

08: unable to pressurize

09: mode switch: using mode other than user intended

10-16: reserved for future use

Port-specific alarms: bit 0 is alarm 1, etc.

Meaning of port-specific alarms:

- 1: slow leak on input port
- 2: fast leak on input port: can't pressurize
- 3: dehydrator apparently not trying to pressurize (input)
- 4: comm error (input)
- 5: slow leak, output port
- 6: bad leak, output port
- 7: leaking bad enough to shut down, if not critical port
- 8: port actually shut down because of leak

Command N: combined alarm/ port types

String returned has a fixed length of 28 characters.

The first four are as in the L command, representing global alarm bits. This is followed by eight 3-byte strings. The first byte is the port type, as in the P command. The next two bytes are the port-specific alarm bits for that port, as in the L command.'

Command T: test results

Note: leak rates are given as 3-character decimal numbers; they are maxed out at 999. This is a percentage drop in one minute.

Return from the T command is a coded sequence of fields; each field is terminated with a semicolon.

Field 1: time since the last test

This is just an X if there has been no test

Otherwise, it is hhh:mm:ss. The hours maxes out at 999.

Field 2: leak rate of the system, with all ports closed

First character is S.

This is followed by a hyphen (-) if there is no leak rate available;  
or by =rrr, where rrr is the leak rate measured.

Fields 3-10: eight fields, each representing a port (1 through 8)

First character is the port type (see above).

This is followed by a + if the port is currently open, - if shut

For types I, O, and C this is followed by extra information:

A character + if the port is in use, - if it is dead

A hyphen if there is no leak rate available, or =rrr if there is one.



Command G: a list of active messages.

This is a variable-length string, a list of two-character abbreviations.

These are:

- XX: no messages
- XD: high duty cycle will not trigger test
- XP: low pressure will not trigger test
- XT: failure to pressurize will not trigger test
- EC: bad calibration factors in EEROM
- EL: bad pressure limits in EEROM
- EP: bad port definitions in EEROM
- TA: timed test was aborted

Command O: this just returns the string "ASM-1".

Command F: this returns the main firmware ID, followed by a semicolon, followed by the communications firmware ID.

Command I: this returns the board serial number, then a semicolon, then the ETI part number of the unit, then a semicolon, then the serial number of the whole unit.

Command C: this returns a string giving the pressure limits in use.

First character is E for English, M for metric.

Then four 3-character decimal numbers, representing the four limits (low alarm, low limit, high limit, high alarm), either in hundredths of a psi or in mbars.

Command P: 8 characters, one for each port: the port type, as above.

Commands 5 and 7 will return a NAK (serial) or return type N, meaning refused, if the unit can't go into test mode or into standby at this time.

Commands 6 and 8 will always succeed.



## ORDERING INFORMATION

ORDER NUMBER	DESCRIPTION
23658	ASM-1 Smart Manifold AC
23678	ASM-1 Smart Manifold Accessory Kit
23680	ASM-1 Smart Manifold Instruction Manual (this document)
23681	ASM-1 Smart Manifold Installation Sheet
23743	ASM-1 Smart Manifold Data Sheet
24508	ASM-1 Smart Manifold NEMA II AC
24515	ASM-1 Smart Manifold NEMA II AC Installation Sheet
24516	ASM-1 Smart Manifold NEMA II AC Data Sheet
24303	Documentation CD ROM, ADH NETCOM and ASM-1 Smart Manifold

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