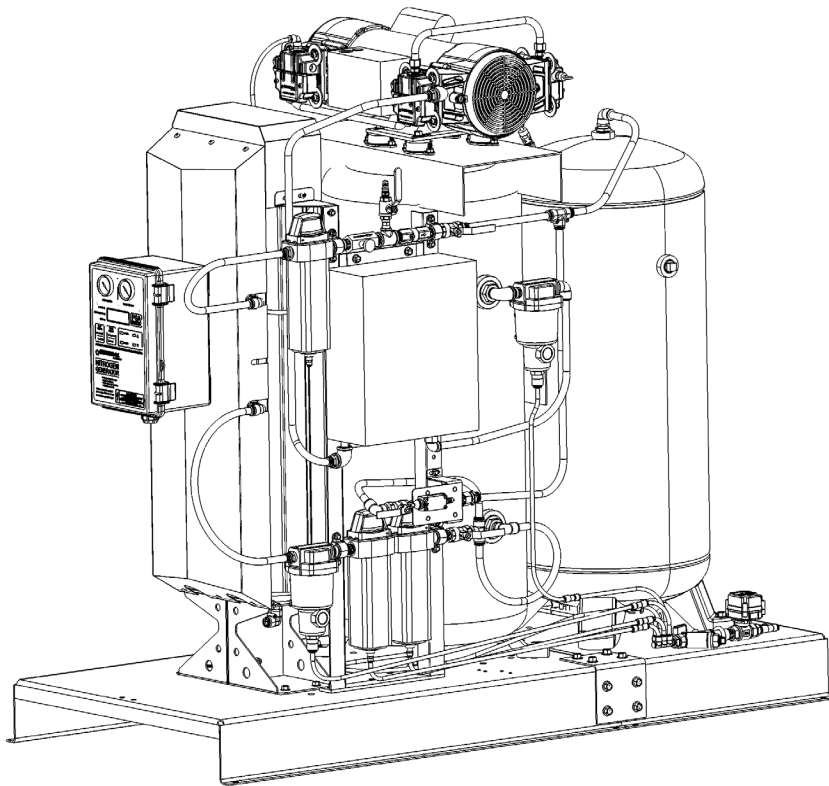




# NGPSA

## Installation, Operation and Maintenance Manual



Call **1-800-345-8207**  
or visit our web site for our complete product listing  
**[www.GeneralAirProducts.com](http://www.GeneralAirProducts.com)**

NGPSA OIM  
REV: 1  
(09/23)



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If there are any questions regarding installation, operation, or maintenance of this system, please call 1-800-345-8207

**IMPORTANT: ALL INFORMATION SUBJECT TO CHANGE WITHOUT NOTICE.  
Consult factory for the most up to date version of this manual - 1-800-345-8207.**

# Section 1 Safety & Warnings

This manual contains safety information that is important to know and understand. This information is provided for the safety of installers, operators, and users of the Nitrogen Generator. To help recognize this information, observe the following symbols.



Danger indicates an imminently hazardous situation which, if not avoided, WILL result in death or serious injury.



Warning indicates a potentially hazardous situation which, if not avoided, COULD result in death or serious injury.



Caution indicates a potentially hazardous situation which, if not avoided, MAY result in minor or moderate injury.



Notice indicates important information, that if not followed may cause damage to equipment or property.

## 1.1 Important Notice to Users

The Installation and Owner's Manual supplied with each unit must be read thoroughly and completely understood before installation and operation of the Nitrogen Generator. All appropriate safety standards for handling of gases as determined by local or national laws and regulations should be followed at all times.

## 1.2 Unpacking

After unpacking unit, carefully inspect all parts and equipment for any damage that may have occurred during transit. Make sure to tighten fittings, bolts, etc. before putting unit into service.



## 1.3 General Safety Information

Important: Read all of the safety information in this manual before operating this equipment. Use of the equipment in a manner not specified within this manual may impair the protection provided by the generator and could result in an unplanned release of pressure, which may cause serious injury or damage. Only competent personnel, who have been trained, qualified, and approved by General Air Products should perform commissioning, servicing, and repair procedures.


When handling, installing, or operating this equipment, personnel must employ safe engineering practices and observe all related local regulations, health, and safety procedures, and legal requirements for safety.

Ensure that the equipment is depressurized and electrically isolated, before carrying out any of the scheduled maintenance instructions specified in this manual.

The warnings in this manual cover the most known potential hazards, but by definition cannot be all-inclusive. If the user employs an operating procedure, item of equipment, or a method of working that is not specifically recommended by General Air Products, the user must ensure that the equipment will not be damaged or become hazardous to persons or property.

Nitrogen is not a poisonous gas. However, in a concentrated form, there is a risk of asphyxiation. The generator produces a flow of nitrogen and oxygen enriched air which quickly disperses in the atmosphere. However, do not directly inhale the output gas from the generator outlet pipe.

The generator is classified as non-hazardous for transportation purposes and as non-flammable for fire regulations. This equipment is for indoor use only. Do not operate outdoors.

 <b>WARNING</b>
Operation of the nitrogen separator above the rated design pressure may be hazardous. Do not connect it to compressed air sources that can exceed its maximum rated pressure without installing appropriate pressure controls and safety relief devices in the compressed air supply line.

Specific procedures must be developed for maintenance of the equipment in which the nitrogen separator is located. Appropriate labels must be continuously displayed in all areas where personnel might be exposed to a nitrogen atmosphere under any condition.

 <b>NOTICE</b>
Do not attempt to disassemble the nitrogen generator. Equipment damage may occur and cause the system to function incorrectly.

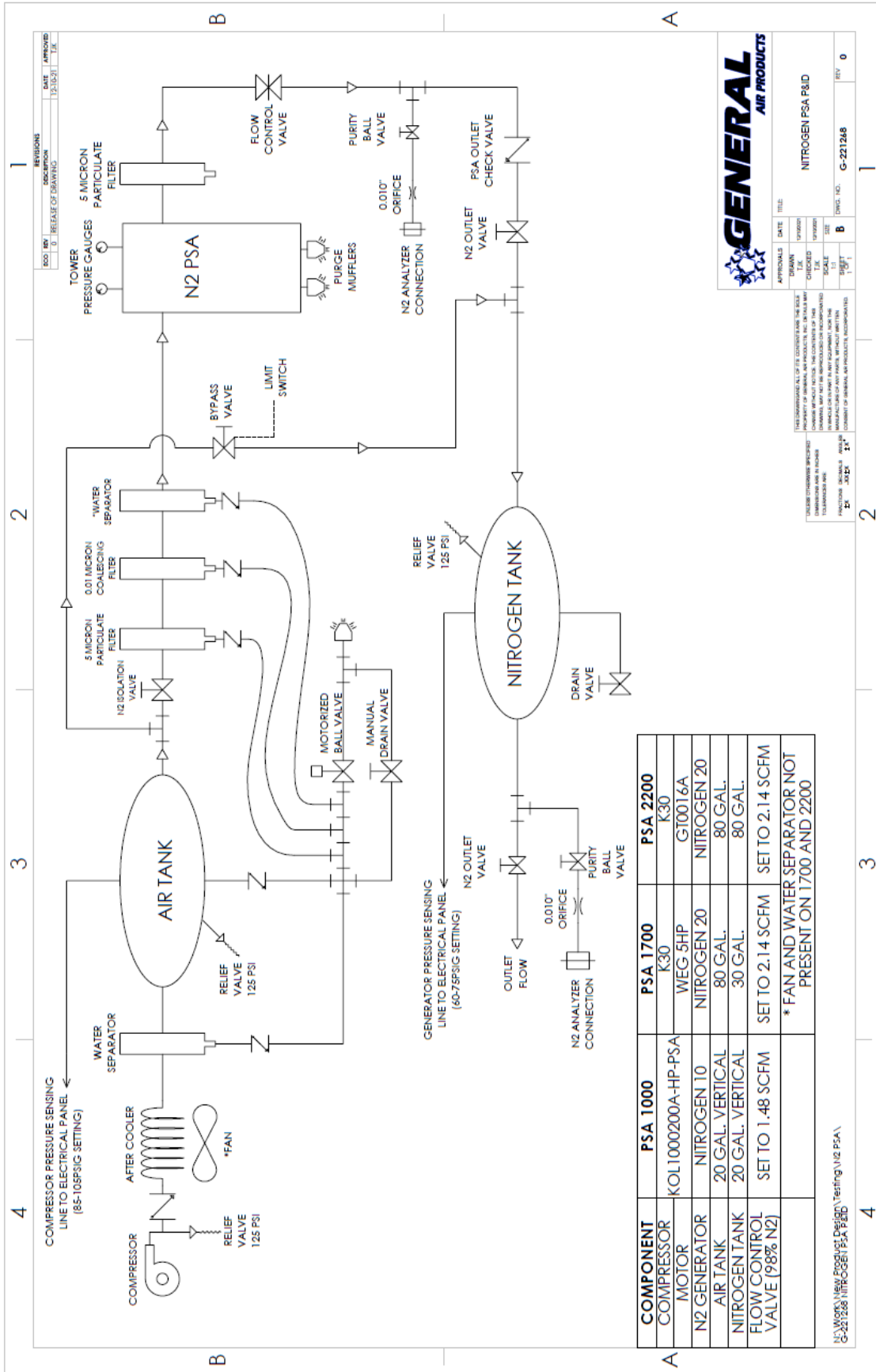
## Section 2 System Overview

The NGPSA Nitrogen Generator operates using Pressure Swing Adsorption (PSA) gas separation technology, which utilizes 2 towers of Carbon Molecular Sieve (CMS) to separate nitrogen from the other gases contained in the air. Smaller oxygen and water vapor molecules latch onto the molecular sieve bed and the larger nitrogen molecules continue downstream to the separator outlet. While tower 1 is generating an enriched high-pressure stream of nitrogen, tower 2 is purging away all the waste oxygen and water vapor molecules to the atmosphere. This process occurs for a set duration and eventually the towers will switch their role; tower 2 generates an enriched nitrogen stream and tower 1 purges away all the waste air to atmosphere.

The Nitrogen Generator is specifically designed to provide clean, dry, high purity nitrogen for use in various process systems. The generator is a fully assembled package using factory pre-engineered air compressors and controls. These turn-key systems include all air filtration equipment required to keep the generator operating at peak efficiency.

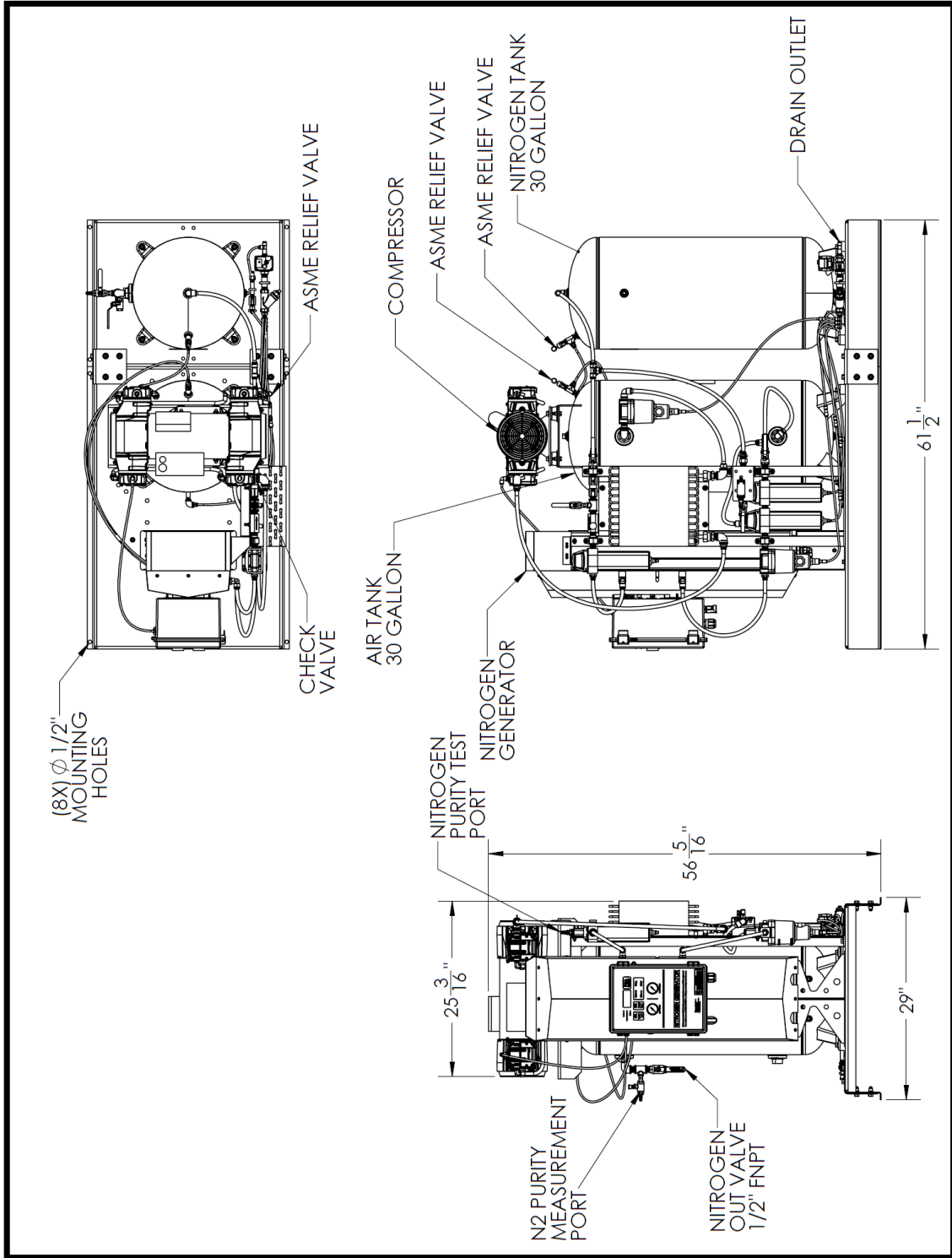
Product Designation	Outlet Pipe Connection, (FNPT)	Sprinkler System Capacity (GAL.)	Bypass Capacity (GAL.)	Weight (lbs.)	Outlet N2 Pressure (PSI)	Air Tank Pressure (PSI)
NGPSA-1000	1/2	16880	1100	525	60-75	85-105
NGPSA-1700	1/2	24390	1700	775	60-75	85-105
NGPSA-2200	1/2	24390	2200	915	60-75	85-105

## 2.1 Piping and Instrumentation Diagram



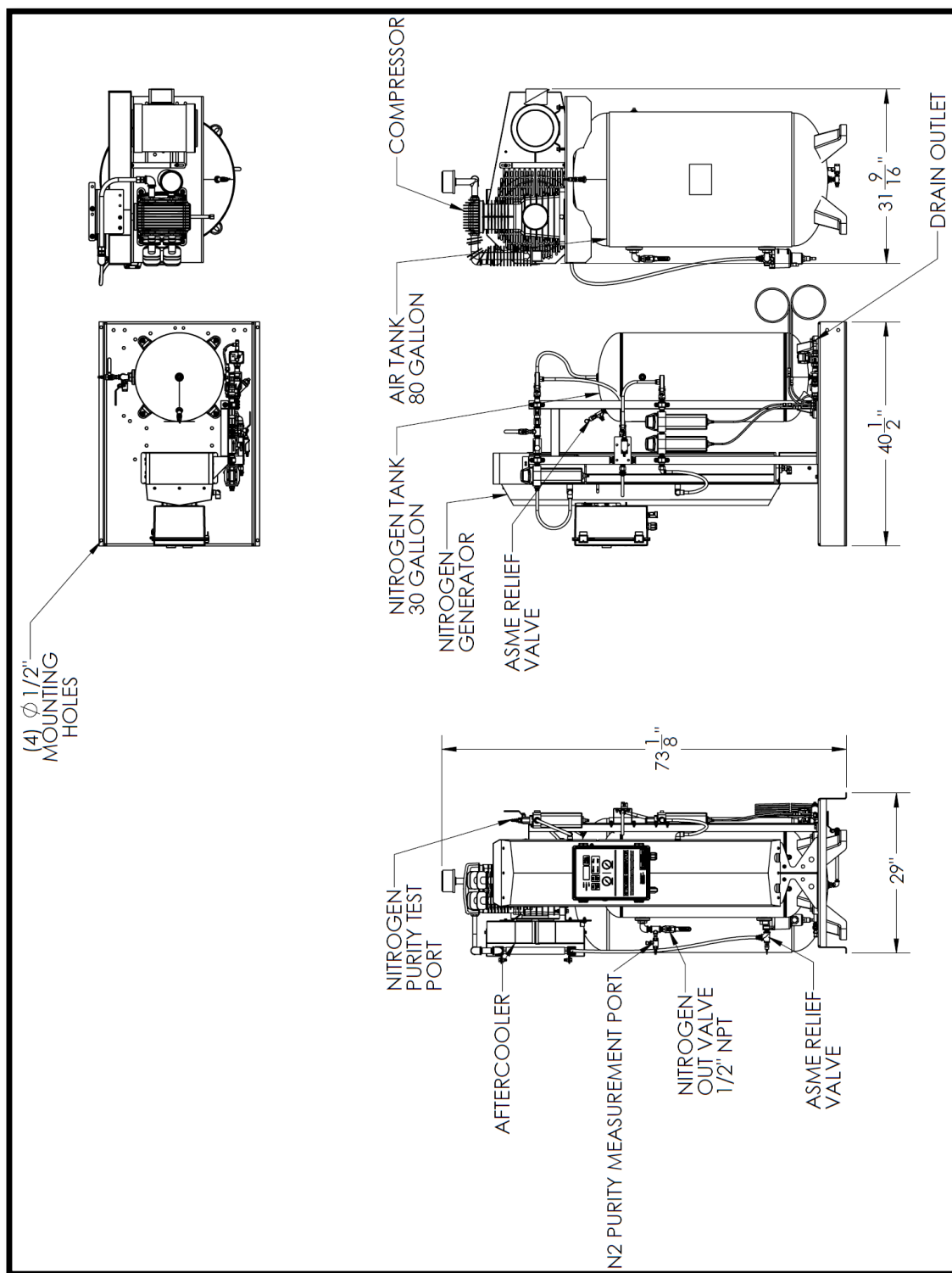
## 2.2 General Arrangement Views

### NGPSA-1000 General Arrangement

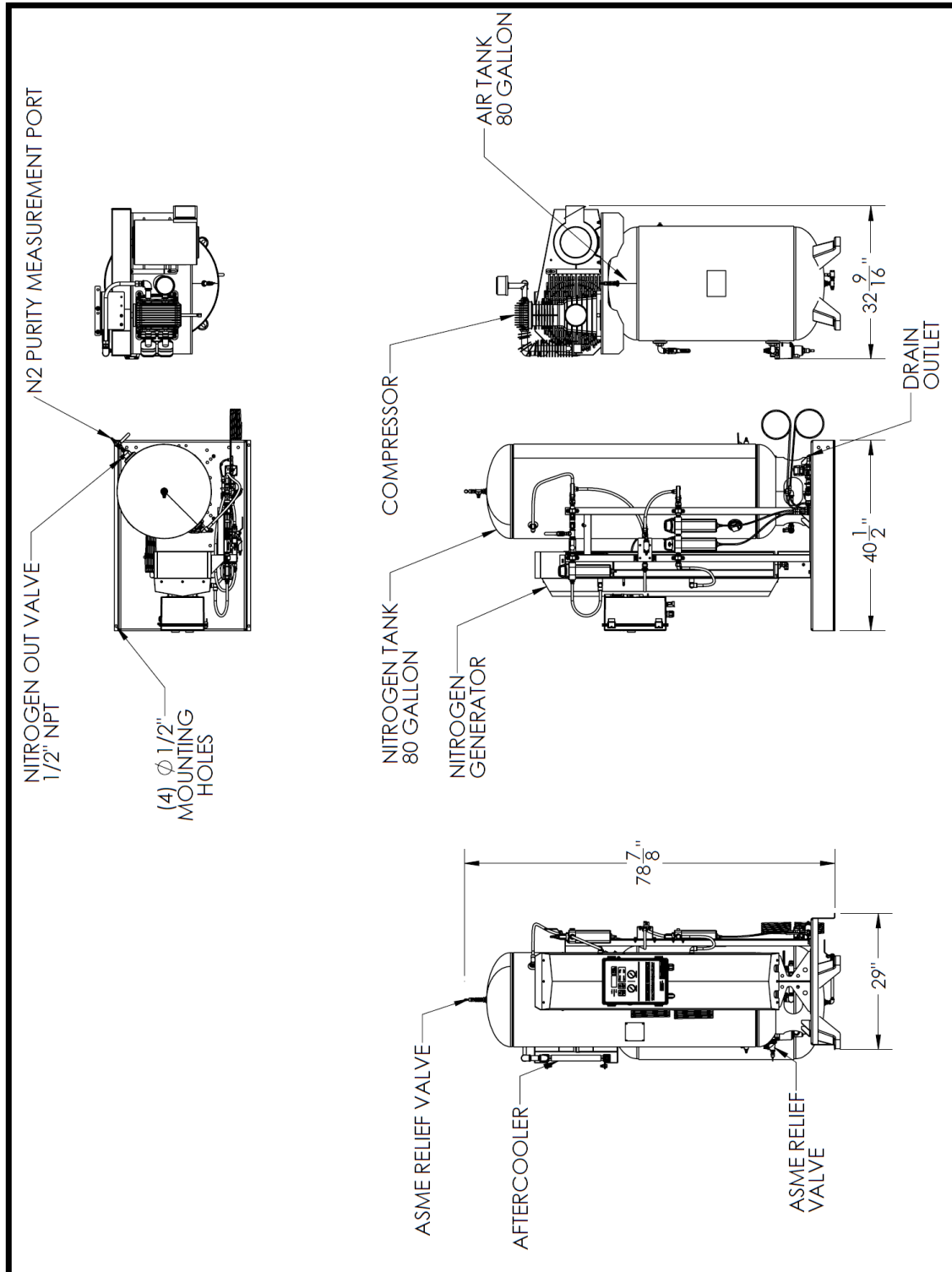




# NGPSA-1700 General Arrangement



# NGPSA-2200 General Arrangement



## Section 3 Before Installation Begins

- Find a location for the nitrogen generator to be installed meeting these requirements:

Dimensions are within the above noted General Arrangement drawing under Section 2	
Dry, clean, and well-ventilated	
Ambient temperatures above 50° F at all times	
Access to front for service	
Conveniently located near fire sprinkler system connections	
Conveniently located near drain	

### **WARNING**

The Nitrogen Generator creates a 30% to 40% oxygen stream which may pose a flammability problem in an oxygen-sensitive environment. Pipe per installation requirements and ensure the area surrounding the nitrogen generator is adequately ventilated. The Nitrogen Generator should always be installed in an adequately ventilated room. Nitrogen is nontoxic and largely inert. Rapid release of nitrogen gas into an enclosed space displaces the oxygen and can cause an asphyxiation hazard. Inhalation of nitrogen in excessive concentrations can result in unconsciousness without any warning symptoms.

- Run a dedicated electrical circuit with an electrical disconnect switch to the install location.

**NOTE:** The NGPSA Nitrogen Generators may operate on numerous voltages and at different amperages as noted in the following table.

Model	Phase	Amperage	Voltage/Hz.	Circuit Breaker Size (Amps)
NGPSA-1000-2A	SINGLE	12.3	208/60	20
NGPSA-1000-3A	SINGLE	10.6	230/60	20
NGPSA-1000-2B	THREE	10.2	208/60	20
NGPSA-1000-3B	THREE	10.2	230/60	20
NGPSA-1000-4B	THREE	5.1	460/60	15
NGPSA-1700-2B	THREE	13.2	208/60	20
NGPSA-1700-3B	THREE	13.2	230/60	20
NGPSA-1700-4B	THREE	6.6	460/60	15
NGPSA-2200-2B	THREE	20.3	208/60	30
NGPSA-2200-3B	THREE	20.3	230/60	30
NGPSA-2200-4B	THREE	10.2	460/60	20

## Section 4 Uncrating and Inspection

On arrival, do a full inspection by checking all packages and crates in the shipment for damage. If damage is found, sign for the damage or refuse the shipment. Contact the carrier immediately and file a shipping damage claim with the carrier.

Check to ensure all components are contained and no visible damage has occurred during shipping.



Important: Read all of the safety information in this manual before installing or operating this equipment.

### Crate Checklist:

Item	
Nitrogen storage tank	
Air storage tank	
Nitrogen generator	
Air Compressor	
Manual	
10 ft. 1/4" condensation drain tube	
Nitrogen Analyzer	

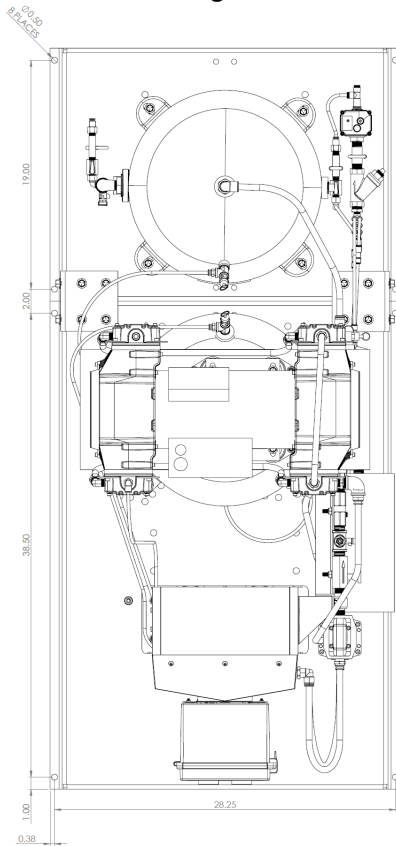


N2 Analyzer

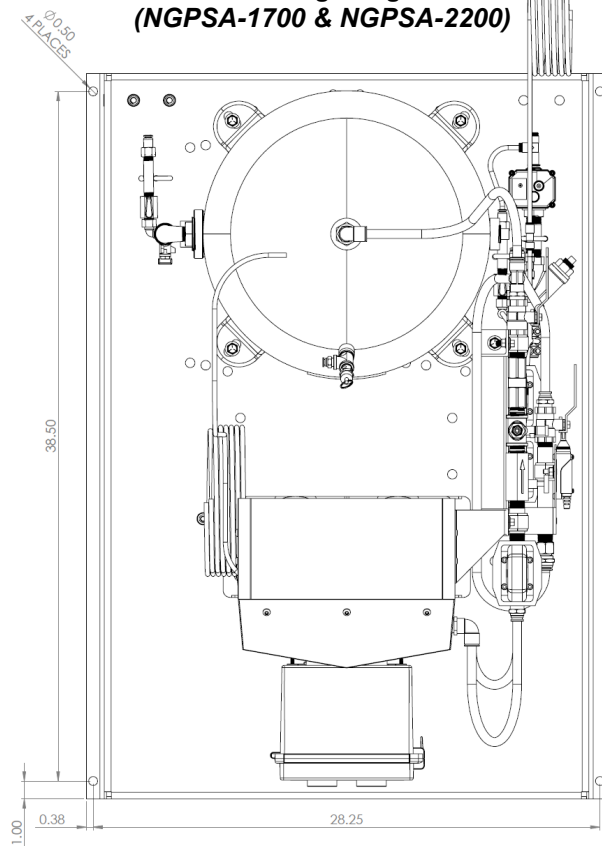
## Section 5 Installation of Nitrogen Generator

- Anchor the unit to a level surface using the 1/2" diameter holes on the Nitrogen Generator base.
- The NGPSA-1700 and NGPSA-2200 air tank and compressor must be mounted separate from the base. Use the feet on the air tanks to anchor them to a level surface close to the Nitrogen Generator base.

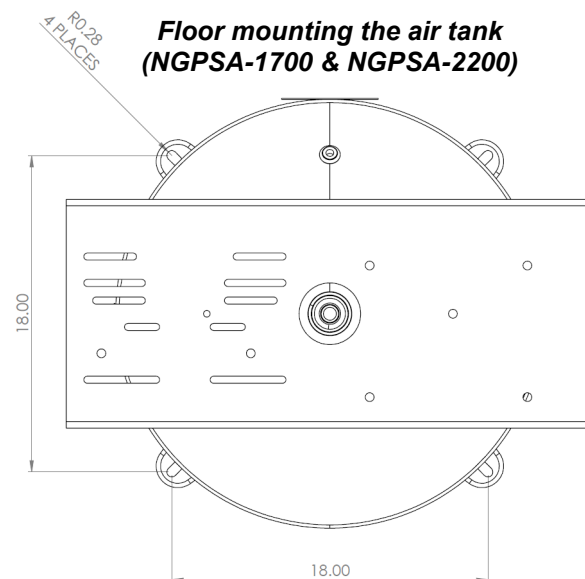
**Floor mounting the NGPSA-1000**



**Floor mounting the generator (NGPSA-1700 & NGPSA-2200)**



**Floor mounting the air tank (NGPSA-1700 & NGPSA-2200)**

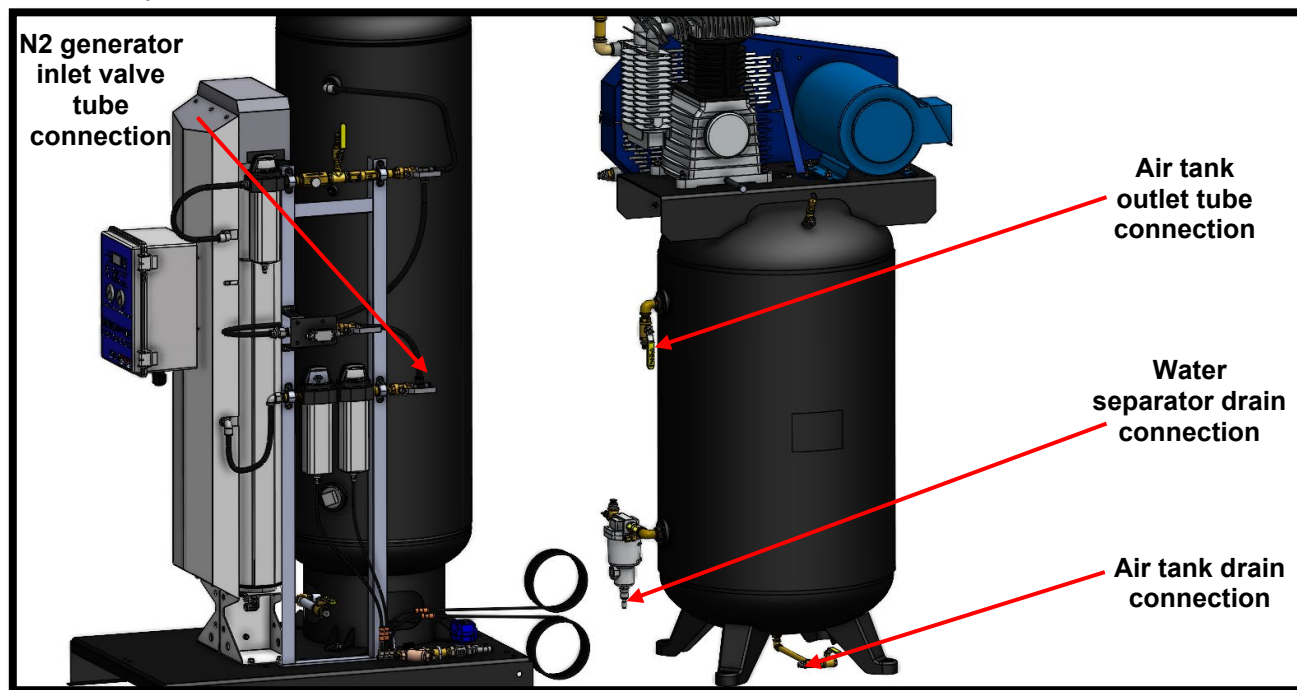


- Close the ½” nitrogen outlet shutoff valve on the nitrogen storage tank. See Section 2.2 General Arrangement Views for reference.
- Use the supplied 10’ of ¼” OD tube to run the drain line from the base of the generator. See Section 2.2 General Arrangement Views for reference. NOTE: Tubing will need to be restrained as air pressure from the drain valve may cause the tubing to be displaced from the drain.
- Install ½” NPT pipe (or larger) from the ½” FNPT nitrogen tank outlet valve to the fire sprinkler system air maintenance device.
- Install ½” NPT pipe from the Air Maintenance Device to the sprinkler system using standard accepted installation practices. Additional system components may be required.

### Additional Installation For NGPSA-1700 & 2200 Only

The NGPSA-1700 & 2200 are shipped in two separate pieces; the nitrogen storage tank and the air compressor portion. Because they are separate, they must be plumbed and wired together.

- Using the supplied ½” tubing, connect the air compressor tank outlet connection to the N2 generator inlet valve as shown below. Simply push the tube into the fitting until snug. Pull on the tube slightly to ensure that it is properly connected.



- Connect the two separate supplied ¼” tubes to the air tank drain and the water separator connections as shown above.

## 5.1 Wiring

All wiring should be performed by a licensed electrician and conform to NEC and all applicable local standards. For wiring instructions refer to the Wiring Diagrams below.

### For NGPSA-1700 & 2200 Only

Use the supplied wiring cable from the electrical enclosure to connect to the motor. Follow the wiring instruction inside the motor wire cover. Take note of the voltage, the NGPSA-1700 & 2200 are dual voltage motors, ensure that the correct wiring instruction is followed.

## 5.2 Wiring Diagrams

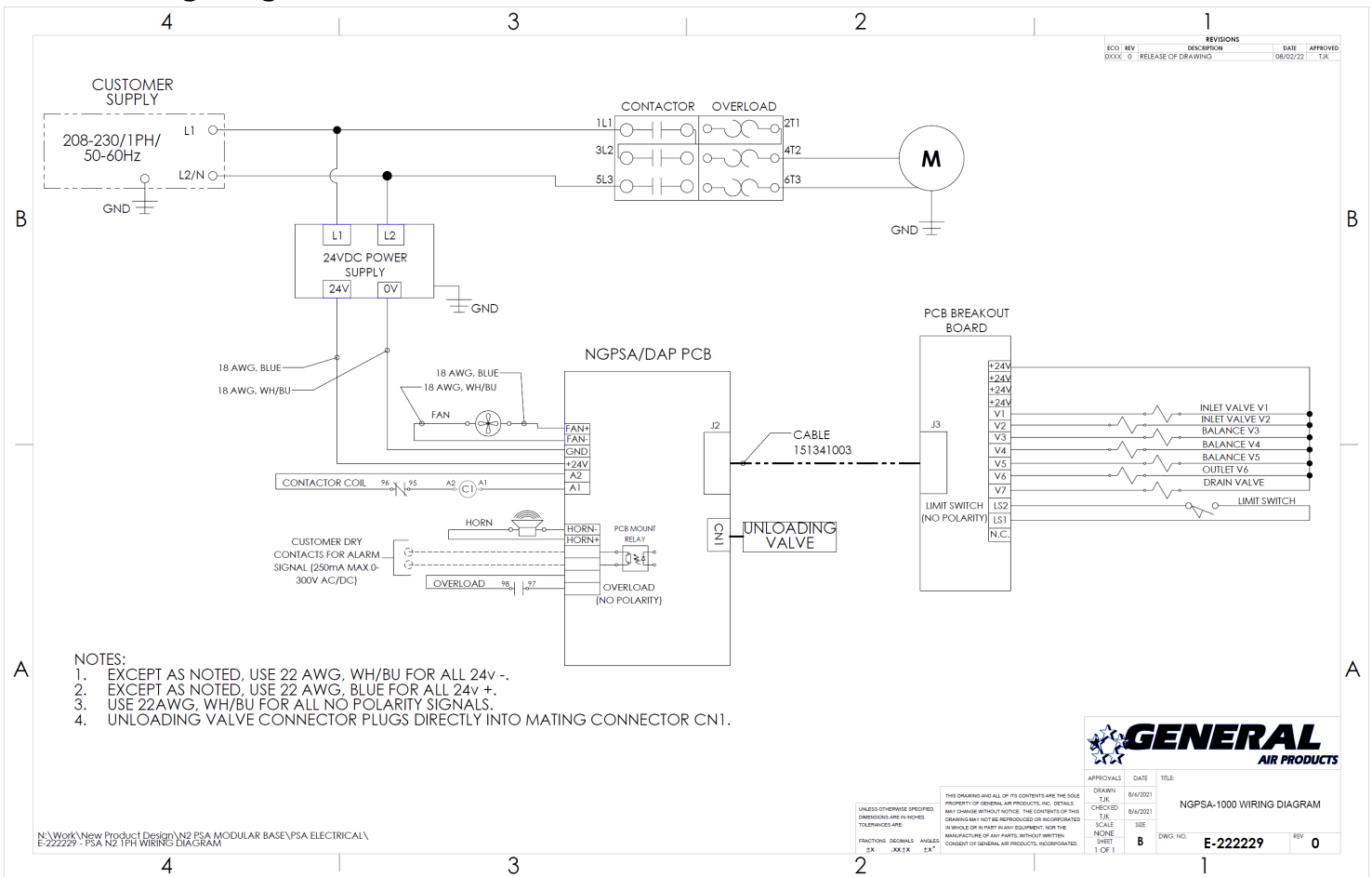


Figure 1. NGPSA-1000 wiring diagram

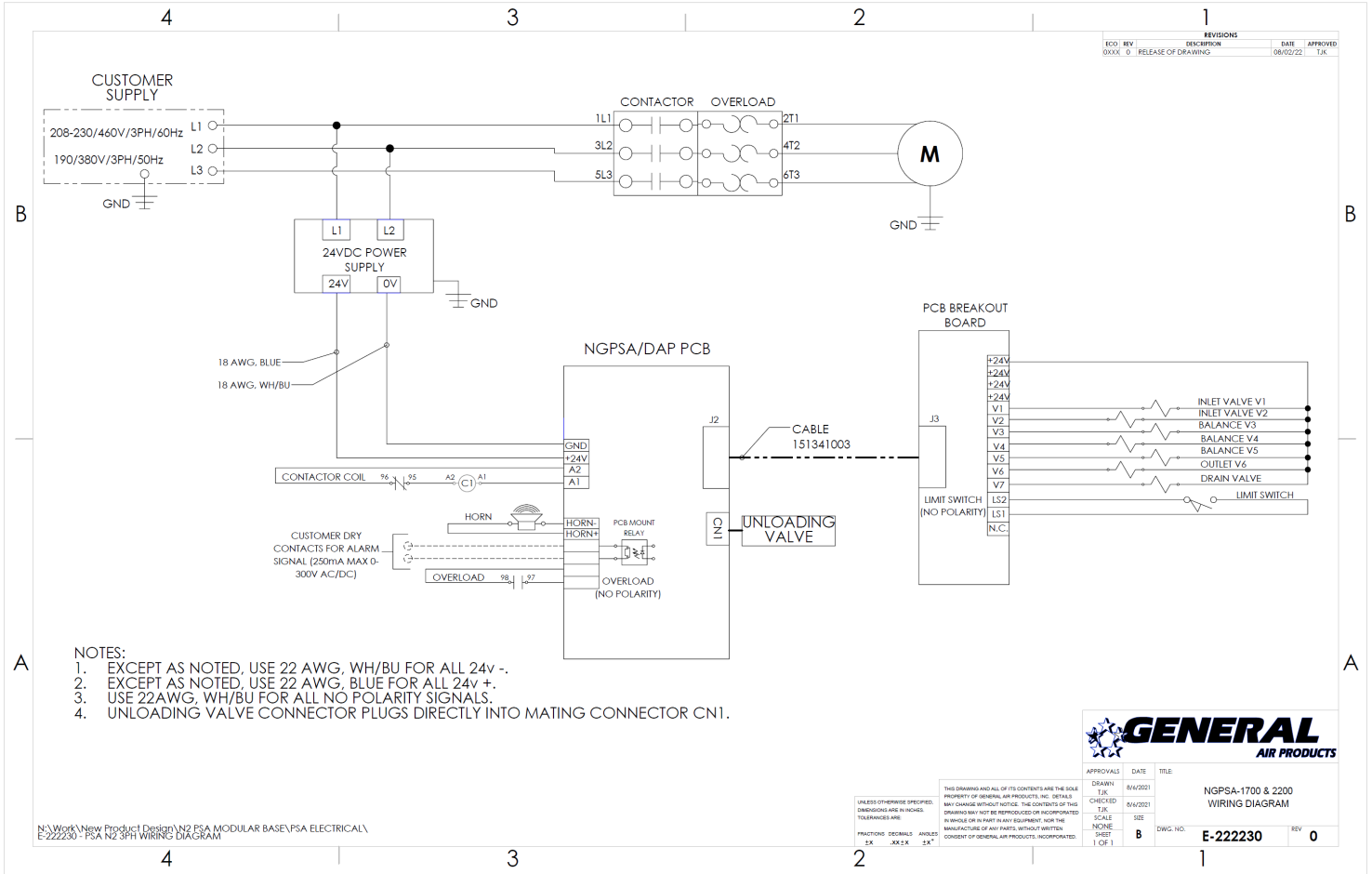
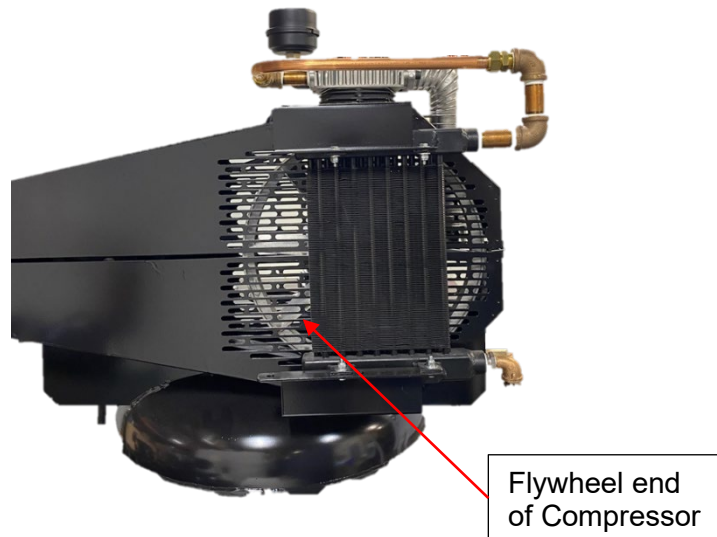


Figure 2. NGPSA-1700 & 2200 wiring diagram

Wiring location is inside the generator electrical enclosure.

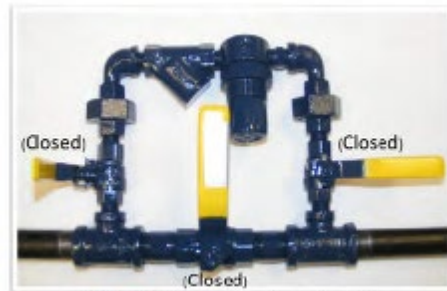
If you are installing a 3-phase unit, rotation direction will need to be checked for the air compressors. Flywheel rotation is counter-clockwise when looking at the fan end of the compressor as shown below. If rotation is not correct, then switch any two of the 3 wires (L1, L2, or L3) on the terminal blocks inside the electrical enclosure.





### 5.3 Initial Air Fill

- Before beginning, make sure the water supply to the sprinkler system is turned off and sprinkler piping has been completely drained.
- Make sure all piping connections have been made according to installation instructions.
- Close all Air Maintenance Device (AMD) valves. If multiple AMDs are used, ensure all valves are in the closed position.



**NOTE:** AMD shown in closed position

- Turn the Nitrogen/Air Fill handle to the Air Fill position.
- Ensure that the nitrogen tank outlet ball valve is in the closed position.
- Turn on the nitrogen generator. The power on LED will turn on.
- The compressor will run until it reaches its off pressure of 105psig.
- Check all piping connections for leaks as pre-plumbed piping may have loosened during shipping.
- The nitrogen generator is now ready to fill the sprinkler system to the required supervisory pressure.
- Open the ball valve at the nitrogen storage tank outlet.
- Open the AMD bypass valve to begin filling the sprinkler system.



**NOTE:** AMD shown in bypass position

## CAUTION

If there is more than one AMD on the system, then close the others. Fill one system at a time.

- Allow the sprinkler system to reach the required pressure. NOTE: This should finish in 30 minutes per the required NFPA guidelines.
- As soon as the sprinkler system supervisory pressure is reached, put the sprinkler system back into service by placing the AMD in the maintenance position (refer to the AMD manual for proper operation).



**NOTE:** AMD shown in maintenance position



## **CAUTION**

If there is more than one AMD on the system, fill EACH system individually and repeat steps 11 through 13

## 5.4 Nitrogen Startup

1. Having completed Section 5.3 Initial Air Fill, the system is now ready to begin generating nitrogen. Turn the Nitrogen/Air Fill handle to the Nitrogen position.
2. The generator will only enter Nitrogen Mode if the nitrogen tank air pressure is below 60 psig. Open the ball valve on the nitrogen tank drain until the pressure drops to 60 psig.
3. The left or right tower gauge on the control panel should now display a pressure between 85 and 100 psig. The time it will take for each NGPSA model to go from 60-75psig in Nitrogen Mode is shown in the table below.
4. Repeat steps 2 & 3 to ensure that the nitrogen fill times from 60-75psig are consistent.
5. On the second cycle, open the Nitrogen Test Port Valve located on the outlet of the Nitrogen Generator.
6. Turn on the Nitrogen Analyzer. For more information on the Nitrogen Analyzer see Section 11.
7. Attach the Nitrogen Analyzer to the Nitrogen Test Port.
8. The nitrogen purity level reading should measure 98%+. If not go to the troubleshooting section.
9. Close the Nitrogen Test Port Valve and disconnect the Nitrogen Analyzer. Make sure to power off the Nitrogen Analyzer.
10. Do not leave the Nitrogen Test Port Valve open.
11. The system is now in operation. For purging instructions, see the Purge Valve Manual.

Model	NGPSA-1000	NGPSA-1700	NGPSA-2200
Time from 60-75psig @ 98% N <sub>2</sub>	2 minutes 45 seconds	1 minute 45 seconds	5 minutes

## Section 6 Nitrogen Control Module

The Nitrogen Control Module is an embedded processor with an LCD display used to control the nitrogen generator and provide useful information on alarm, compressor operating hours and cycles, and nitrogen operation.

### 6.1 Main Display

When cycling power to the controller, the initial display will provide the user with the most useful information. This can be seen below in Figure 1.



Figure 3. Main Display

Table 1. Main Display details

1	<p>The “STATUS” of the generator is shown here. This consists of the following:</p> <ul style="list-style-type: none"> <li>• N2 ON – The system is generating nitrogen until the nitrogen tank reaches 75psig.</li> <li>• BYPASS ON – The air fill valve is in the bypass position and no nitrogen is being generated.</li> <li>• PURGING – The nitrogen generator has reached its maximum pressure of 75psig and will enter “N2 ON” when pressure in the nitrogen tank drops to 60psig.</li> <li>• N2 PURGE – The nitrogen tank has just reached its cutout pressure of 75psig, but must complete its purge cycle before entering “PURGING” mode.</li> </ul>
2	<p>The up and down arrows shown here indicate that by pressing the UP and DOWN arrow buttons on the controller will scroll through the other displays.</p>
3	<p>“AIR PRES:” displays the pressure in the air tank in psig</p>

When pressing the UP and DOWN ARROW buttons on the controller, the LCD display will scroll through all the information available on the generator. Figure 2 below is an example of what will be shown when scrolling through the display.



Figure 4. Display shown when pressing the DOWN ARROW button on the controller.

The table below describes all the information that can be viewed on the generator LCD display.

Table 2. Information shown on the LCD display.

1	The "STATUS" of the generator as described above in table 1.
2	"AIR PRES:" displays the pressure in the air tank in psig
3	"N2 PRES:" displays the pressure in the nitrogen tank in psig
4	"Co. HOURS" compressor run hours since the unit was commissioned.
5	"Co. CYCLES" compressor cycles since the unit was commissioned.
6	"N2 CYCLES" nitrogen cycles since the unit was commissioned.
7	"N2 HOURS" nitrogen run hours since the unit was commissioned.

## Section 7 Nitrogen Generator Alarms/Troubleshooting

The nitrogen generator has 4 alarms. If an alarm is activated, the bottom row of the LCD display will show the text "ALARM ACTIVE". The active alarm will remain on the bottom row of the LCD display even when scrolling through the other displays.

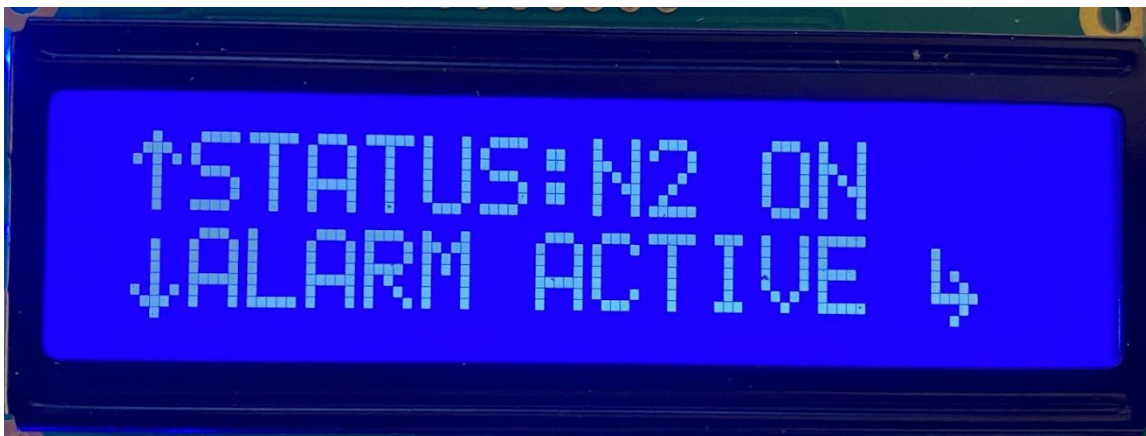


Figure 5. "ALARM ACTIVE" will be displayed on the bottom row when the generator has an active alarm.

To clear an active alarm, press the "ENTER" button on the generator control panel. When pressing this button, a description of the alarm will be displayed along with the option to reset the alarm as shown below in Figure 4.



Figure 6. The alarm description is displayed when pressing "ENTER" with an active alarm.

Pressing "ENTER" again will reset the alarm.

### **Alarm 1 – Compressor Overload**

**Issue:** The motor overload has tripped due to excessive current.

**Solution:**

1. Turn power OFF to the nitrogen generator.
2. Check overload setting.
3. Reset the thermal overload located at the bottom of the compressor contactor. Measure amperage of motor - check for excessive amp draw.

### **Alarm 2 – Excessive Air Compressor Run**

**Issue:** The air compressor has run for longer than 45 minutes continuously.

**Solution:**

1. Check the pressure in the air storage tank. If the pressure is greater than 105 PSI and the compressor is still running it could indicate a pressure transducer issue.
2. Check the nitrogen generator system for leaks by conducting a leak test.

### **Alarm 3 – Compressor Excess Cycles**

**Issue:** Air compressor has cycled more than 8 times in 1 hour.

**Solution:**

1. The unit is running more frequently than normal. Check to ensure all valves are in correct position.
2. Check the nitrogen generator system for leaks by conducting a leak test.
3. Check the system process for leaks.

### **Alarm 4 – Bypass Alarm**

**Issue:** The nitrogen generator has been left in Bypass Mode (air fill) for over 45 minutes.

**Solution:**

1. Turn the Nitrogen/Air Fill Valve to the Nitrogen position. Open the nitrogen outlet valve. Refer to the Nitrogen Filling procedure under section 6.2 Nitrogen Startup.
2. If the unit is filling multiple systems or is being left intentionally in Air Fill Mode, simply reset the alarm by pressing the “ENTER” button twice. Note that the alarm will turn on again in 45 minutes if still left in Air Fill Mode.

### **Issue: The air compressor does not turn on.**

**Solution:**

1. Ensure the unit has power and is properly wired.
2. Check the pressure reading on the air storage tank.
3. Make sure all manual valves are open or closed where necessary.
4. Check for alarms.

### **Issue: The air compressor takes too long to fill.**

**Solution:**

1. Confirm all valves are in the correct position.
2. Check the nitrogen generator system for leaks.
3. Check the system process for leaks.

### **Issue: There is water in my drain hose.**

**Solution:**

1. Press and hold the Drain button on the control panel to test if the drain valve is working.

### **Issue: Nitrogen tower pressure is lower than 80 PSI.**

**Solution:**

1. Ensure all the ball valves are in the correct position or Nitrogen Mode, go to Nitrogen Startup.
2. Check tower pressure on the control panel. The tower that is generating nitrogen should be between 80 and 105 PSI.
3. Close Nitrogen Test Port Valve (Green Handle).



## Section 8 Process Piping System Leak Check

If no leak could be found in the nitrogen generator and the unit reaches its desired pressures in the allotted time, this indicates the sprinkler system piping system may have a leak larger than the unit can handle in nitrogen generating mode. Isolate the process piping system and see if the pressure drops over time.

## Section 9 Maintenance



### WARNING

All pressure must be relieved from the entire nitrogen generator system BEFORE servicing. To avoid system damage and/or personal injury, the nitrogen generator should be isolated from the compressed air supply and the generator system fully depressurized before any maintenance or service is performed. All maintenance and troubleshooting activities for the Nitrogen Generator should be performed by qualified personnel using reasonable care. Before servicing, isolate the process piping system from the nitrogen generator by closing the ball valve at the generator discharge port and relieving all system pressure from the Nitrogen Generator. Failure to do so could result in serious injury or death.

The Nitrogen Generator features durable components and construction for long-lasting value, reliable performance, and require little maintenance.

Schedule Maintenance Table	
Part	Frequency
5 Micron & Coalescing Filters	Annually
Nitrogen Purity Analyzer	Calibrate & replace batteries when needed
Pressure Settings	Inspected Quarterly

Air Compressor Maintenance Instructions	
<p><b>QUARTERLY</b> (or as needed)</p>	<ul style="list-style-type: none"> <li>• Check for unusual noise or vibration</li> <li>• Drain condensate from receiver &amp; traps</li> <li>• Clean all external parts &amp; motor</li> <li>• Tighten fittings, nuts &amp; screws as required</li> <li>• Inspect all filter elements &amp; clean if needed</li> <li>• Manually test safety relief valve</li> <li>• Inspect air system for leaks</li> <li>• Check oil level (Lubricated Units Only)</li> <li>• Inspect oil for contamination (Lubricated Units Only)</li> <li>• Check belt tension and wear (Lubricated Units Only)</li> </ul>
<p><b>ANNUALLY</b> (or as needed)</p>	<ul style="list-style-type: none"> <li>• Change oil - Part # APC01Q (Lubricated Units Only)</li> <li>• Change all filter elements</li> </ul>



Nitrogen Generator Maintenance Kits		
Part	Model used on	What's Included
<b>NGPSA-MK-1000</b>	NGPSA-1000	N2 Filters, Compressor Intake Filters, Analyzer Batteries
<b>NGPSA-MK-1700</b>	NGPSA-1700	N2 Filters, Compressor Oil & Intake Filter, Analyzer Batteries
<b>NGPSA-MK-2200</b>	NGPSA-2200	N2 Filters, Compressor Oil & Intake Filter, Analyzer Batteries

Replacement Parts	
Part	Replacement Part Number
NITROGEN ANALYZER	NGP-PSN2
N2 ANALYZER SENSOR ELEMENT	F/NGP
OIL-LESS MINOR REPAIR KIT(1 PER CYL) (NGPSA-1000 ONLY)	OLP-MRK-2.75
CYLINDER REPAIR KIT (1 PER CYL) (NGPSA-1000 ONLY)	OLP-CRK-2.75
MOTORIZED VALVE	G-JFMSV00010
OIL-LESS COMPRESSOR INTAKE FILTER ELEMENT (1 PER CYL) (NGPSA-1000 ONLY)	OLP-IFK1
INTAKE FILTER ELEMENT AND ASSEMBLY (NGPSA-1700 & 2200 ONLY)	0238 ELEMENT, FILASYK30 FILTER ASSY.



## NOTICE

The maintenance instructions below are per NFPA 25 Code Requirements:

### 13.10.2 - Inspection

Air Compressors dedicated to water-based fire protection systems shall be inspected monthly to verify the following:

1. Air Compressor is free of physical damage.
2. Power wiring to the air compressor is intact and free of physical damage.
3. Piping from the air compressor to the fire protection system is intact and free of physical damage.
4. The means of anchoring the air compressor to the structure or to the system piping is secure, tight, and free of physical damage.

### 13.10.3 - Testing

Air Compressors dedicated to water-based fire protection systems shall be tested annually to verify the following:

1. Air compressor operates as intended on the proper drop of air pressure in the fire protection system.
2. Air compressor restores normal air pressure in the fire protection system in the required time frame.
3. Air compressor does not overheat while running.

### 13.10.4 – Maintenance

Air Compressors dedicated to water-based fire protection systems shall be maintained in accordance with the manufacturer's instructions.

## 9.1 Filter Replacement

1. Isolate the nitrogen generator and relieve pressure.
2. Disconnect the power to the nitrogen generator.
3. Unscrew the filter bowl from the filter body. This can be done without disconnecting the drain line.
4. Remove the element by pulling the filter out.
5. Clean the filter body and bowl with a clean rag.
6. Replace the filter elements using filters provided in the replacement kit.
7. Check for leaks.



Relieve pressure and  
remove filter bowls

Unscrew filter body.

Pull filter element out.

## 9.2 Air Compressor Replacement

1. Isolate the nitrogen generator and relieve pressure.
2. Disconnect the power to the nitrogen generator.
3. Disconnect wires in junction box on the air compressor being replaced.
4. Remove tubing from compressor discharge.
5. Remove tubing from compressor unloading line.
6. Remove bolts holding compressor to rubber isolation mounts.
7. Install new air compressor.
8. Verify wiring in motor junction box corresponds to the input voltage.
9. Reconnect the discharge and unloading line tubing.
10. Power the generator ON. Check rotation if 3-phase.
11. Check for leaks.

## Section 10 Normal Operating Parameters

The NGPSA System uses a two-tank system design to deliver high purity nitrogen. The pressure transducer on the air storage tank controls the air compressor by turning it on and off between 85-105 PSI. Another pressure transducer on the nitrogen tank controls the nitrogen shutoff valve in the N2 PSA generator. Whenever the nitrogen storage tank requires nitrogen, the nitrogen shutoff valve opens allowing air to come from the air storage tank into the PSA towers to produce nitrogen. Once the nitrogen storage tank reaches 75 PSI the nitrogen shutoff valve closes.

- Periodic (typically less than 8 times an hour) running of the air compressor is expected.
- Periodic (typically less than 12 times a day) opening and closing of the nitrogen shutoff valve is expected.
- When the nitrogen shutoff valve is closed, the PSA tower pressure will read less than 80 PSI.
- The drain valve automatically releases condensate from the unit when operating in Nitrogen Mode.

NOTE: These are typical durations. Actual times may be slightly longer or shorter. These are typical pressure set points. Actual pressure can be  $\pm 3$  PSI.

Operational State	NGPSA-100	NGPSA-1700	NGPSA-2200	Recorded Parameter
Air Compressor OFF Pressure	105 PSI	105 PSI	105 PSI	
Air Compressor ON Pressure	85 PSI	85 PSI	85 PSI	
Time Interval to build pressure from 85 PSI to 105 PSI in air storage tank (N2 Mode Off)	45 Seconds	45 Seconds	30 Seconds	
Nitrogen Valve OFF Pressure (Nitrogen Tank Pressure)	75 PSI	75 PSI	75 PSI	
Nitrogen Valve ON Pressure (Nitrogen Tank Pressure)	60 PSI	60 PSI	60 PSI	
Time Interval to build pressure from 60 PSI to 75 PSI in nitrogen storage tank	3 Minutes (Maximum)	2 Minutes (Maximum)	5 Minutes (Maximum)	

## Section 11 Nitrogen Analyzer Instructions

Component	Description
3 ½ Digit Display	The 3 ½ digit liquid crystal display (LCD) provides direct readout of nitrogen concentrations in the range of 0 - 105.0% (100.1% - 105.0% used for calibration determination purposes). The digits also display error codes and calibration codes as necessary.
Low Battery Indicator	The low battery indicator is located at the top of the display and is only activated when the voltage on the batteries is below a normal operating level.
% Symbol	The "%" sign is located to the right of the concentration number and is present during normal operation.
Calibration Symbol	The calibration symbol is located at the bottom of the display and is timed to activate when a calibration is necessary.
ON/OFF Key	This key is used to turn the device on or off.
Calibration Key	This key is used to calibrate the device. Holding the key for more than three seconds will force the device to enter a calibration mode

### 11.1 Automatic Calibration

After the unit is turned on, it will automatically calibrate to room air. The display should be stable and reading 79.1%. To check the nitrogen concentration of a sample gas: (after the unit has been calibrated)

1. Connect the Tygon tubing to the bottom of the analyzer by threading the barbed adapter onto the oxygen sensor.
2. Attach the other end of the sample hose to the sample gas source and initiate flow of the sample to the unit at a rate of 1-10 liters per minute. 2 liters per minute is recommended.
3. Using the ON/OFF key, make sure the unit is in the power "ON" mode.
4. Allow the nitrogen reading to stabilize. This will take approximately 30 seconds or more.

### 11.2 Calibrating the N2 Analyzer

Calibrate the N2 analyzer upon initial power-up. Thereafter, we recommend calibration on a weekly basis. To serve as a reminder, a one week timer is started with each new calibration. At the end of one week a reminder icon appears on the bottom of the LCD. Calibration is recommended if the user is unsure when the last calibration procedure was performed, or if the measurement value is in question.

With compressed air (79.1% N2), new calibration is required when:

- The measured N2 percentage in 79.1% N2 is above 80.1% N2
- The measured N2 percentage in 79.1% N2 is below 78.1% N2
- The CAL reminder icon is blinking at the bottom of the LCD

A simple calibration may be made with the sensor open to static ambient air.

### 11.3 Calibration Errors and Error Codes

The nitrogen purity analyzer has a self test feature built into the software to detect faulty calibrations, oxygen sensor failures, and low operating voltage. Refer to the following table for an explanation of error codes and possible actions to take.

Code	Meaning	Corrective Action
E02	No sensor attached	Open the hand held nitrogen purity analyzer and disconnect and reconnect sensor. Unit should perform an auto calibration and should read 79.1%. If not, contact Customer Service for possible sensor replacement.
E02	No valid calibration data available	Make sure unit has reached thermal equilibrium. Press and hold the Calibration Button for three seconds to manually force a new calibration.
E02 or ED4	Battery below minimum operating voltage	Replace batteries.
CAL Err St: O2	Sensor reading not stable	Wait for displayed nitrogen reading to stabilize, when calibrating the device at 100% oxygen. Wait for unit to reach thermal equilibrium (Please note that this can take up to one half hour, if the device is stored in temperatures outside the specified operating temperature range).
CAL Err lo	Sensor voltage too low	Press and hold the Calibration Button for three seconds to manually force a new calibration. If unit repeats this error more than three times, contact Customer Service for possible sensor replacement.
CAL Err hi	Sensor voltage too high	Press and hold the Calibration Button for three seconds to manually force a new calibration. If unit repeats this error more than three times, contact Customer Service for possible sensor replacement.
CAL Err Bat	Battery voltage too low to recalibrate	Replace batteries.

### 11.4 Changing the Batteries

When the batteries need to be changed, the device will indicate this in one of two ways:

1. The battery icon on the bottom of the display will begin to flash. This icon will continue to flash until the batteries are changed. The unit will continue to function normally for approx. 200 hours.
2. If the device detects a very low battery level, an error code of "E04" will be present on the display, and the unit will not function until the batteries are changed.

To change the batteries, begin by removing the three screws from the back of the device. A #1 phillips screwdriver is required to remove these screws. Once the screws are removed, gently separate the two halves of the device. The batteries can now be replaced from the back half of the case. Be sure to orient the new batteries as indicated in the embossed polarity on the back case. *NOTE:* If the batteries are installed incorrectly the batteries will not make contact and the device will not operate. Carefully, bring the two halves of the case together while positioning the wires so they are not pinched between the two case halves. The gasket separating the halves will be captured on the back case half. Reinsert the three screws and tighten until the screws are snug. The device will automatically perform a calibration and begin displaying % of oxygen.

*HELPFUL HINT:* If unit does not function, verify that the screws are tight to allow proper electrical connection.

## 11.5 Changing the Oxygen Sensor

Should the oxygen sensor require changing, the device will indicate this by presenting “Cal Err lo” on the display after initiating a calibration.

To change the oxygen sensor, begin by removing the three screws from the back of the device. A #1 Phillips screwdriver is required to remove these screws. Once the screws are removed, gently separate the two halves of the device.

Disconnect the oxygen sensor from the printed circuit board by pressing the unlock lever first and then pull the connector out of the receptacle. The oxygen sensor can now be replaced in the back half of the case.

*HELPFUL HINT:* Be sure to orient the new sensor by aligning the red arrow on the sensor with the arrow in the back case. A small tab is located on the back case that is designed to engage the sensor and prevent it from rotating within the case.

*NOTE:* If the oxygen sensor is installed incorrectly, the case will not come back together and the unit may be damaged when the screws are reinstalled. Reconnect the oxygen sensor to the connector on the printed circuit board. Carefully bring the two halves of the case together while positioning the wires to ensure they are not pinched between the two case halves. Make sure the sensor is fully inserted and in the proper orientation. Reinsert the three screws and tighten until the screws are snug. Verify the unit operates properly. The device will automatically perform a calibration and begin displaying % of oxygen.



# Section 12 Warranty Policy

## GENERAL PROVISIONS & LIMITATIONS

General Air Products, Inc. (the "Company") warrants to each original purchaser ("Purchaser") of its new products from the Company or its Authorized Distributor that such products are, at the time of delivery to the Purchaser, made with good materials and workmanship. No warranty is made with respect to:

1. Any product, which has been repaired or altered in such a way, in the Companies judgment, as to affect the product adversely.
2. Any product, which has, in the Companies judgment been subjected to negligence, accident, improper storage, improper installation or application.
3. Any product, which has not been operated or maintained in accordance with the recommendations of the Company.
4. Components or accessories manufactured, warranted and serviced by others.
5. Any reconditioned or prior owned product.

Claims for items described in 4. above should be submitted directly to the manufacturer of the component or accessory.

## WARRANTY PERIOD

The Company's obligation under this Warranty is limited to repair or, at its option, replacing during normal business hours at the designated facility of the Company, any part that in its sole judgment proved not to be as warranted within the applicable Warranty Period as follows.

## COMPONENTS

All non-consumable components are warranted for 12 months from the date of purchase or 18 months from date of manufacture, whichever ever occurs first. Consumables are not covered under warranty. The unit must have been installed by either a factory authorized distributor or agent in accordance with the factory recommendations taking into account all other local site conditions not originally noted to the factory. The unit must be operated and maintained in accordance with the Factory recommendations and original design conditions. Failure to provide such proof of the above may void warranty.

## LABOR TRANSPORTATION & INSPECTION

The Company will repair or replace any product or part thereof which in the Company's sole judgement is defective in material or workmanship. Labor costs are not covered under warranty.

All costs of transportation of product, labor or parts claimed not to be as warranted and, of repaired or replaced parts to or from factory shall be borne by purchaser. The Company may require the return of any part claimed not to be as warranted to one of its facilities as designated by the Company, transportation prepaid by Purchaser, to establish a claim under this warranty.

Replacement parts provided under the terms of the warranty are warranted for the remainder of the Warranty Period of the product upon which installed to the same extent as if such parts were original components, or for 90 days whichever is longer.

## DISCLAIMER

THE FOREGOING WARRANTY IS EXCLUSIVE AND IT IS EXPRESSLY AGREED THAT, EXCEPT AS TO TITLE, THE COMPANY MAKES NO OTHER WARRANTIES, EXPRESSED OR IMPLIED OR STATUTORY, INCLUDING ANY IMPLIED WARRANTY OR MERCHANTABILITY.

THE REMEDY PROVIDED UNDER THIS WARRANTY SHALL BE THE SOLE, EXCLUSIVE AND ONLY REMEDY AVAILABLE TO THE PURCHASER AND IN NO CASE SHALL THE COMPANY BE SUBJECT TO ANY OTHER OBLIGATIONS OR LIABILITIES. UNDER NO CIRCUMSTANCES SHALL THE COMPANY BE LIABLE FOR SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOSSES OR DELAYS HOWSOEVER CAUSED.

No statement, representation, agreement, or understanding, oral or written, made by any agent, distributor, representative or employee of the Company which is not contained in this Warranty will be binding upon the company unless made in writing and executed by an officer of the Company.

This warranty shall not be effective as to any claim which is not presented within 30 days after the date upon which the product is claimed not to have been as warranted. Any action for breach of this warranty must be commenced within one year after the date upon which the cause of action occurred.

Any adjustment made pursuant to this warranty shall not be construed as an admission by the Company that any product was not as warranted.

## PROMPT DISPOSITION & RETURNS POLICY

The Company will make a good faith effort for prompt correction or other adjustment with respect to any product, which proves to be defective within the warranty period. Before returning any product, write or call the distributor, agent or authorized company from which the product was purchased, describing defect and giving date and number of original invoice, as well as proof of Factory supplied consumables and proof of scheduled maintenance. No products will be accepted for return without the Company issuing a "Returned Goods Authorization" (RGA) to the Purchaser and unless accompanied by a properly authorized RGA request form initiated by the Purchaser. Return freight must be prepaid and each returned product must have the RGA number clearly marked on the product. Title and risk of loss pass to buyer upon delivery to the common carrier.

## PRODUCT SUITABILITY

Many States, Localities and Countries have codes and regulations governing sales, construction, installation, and/or use of products for certain purposes, which may vary from those in neighboring areas. While General Air Products, Inc. attempts to assure that its products comply with such codes, it cannot guarantee compliance, and cannot be responsible for how the product is installed or used. Before purchase and use of a product, please review the product application, and national and local codes and regulations, and be sure that the product, installation, and use will comply with them.

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