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Critical Environment Solutions

Installation and Operating Guide ***Document No. 1800-98***

High-Capacity Nitrogen Generator

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High-Capacity Nitrogen Generator

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Safety Notice

A thorough familiarity with all operating guidelines is essential to safe operation of the product. Failure to observe safety precautions could result in poor performance, damage to the system or other property, or serious bodily injury or death.

The following symbols are intended to call your attention to two levels of hazard involved in operation:

CAUTION

Cautions are used when failure to observe instructions could result in significant damage to equipment.

WARNING

Warnings are used when failure to observe instructions or precautions could result in injury or death.

The information presented here is subject to change without notice.

1.0 Introduction

This manual provides information on installing and operating your High-Capacity Nitrogen Generator.

For more information, please visit https://www.terrauniversal.com/desiccators-dry-boxes/n2-generator-compressor.php.

WARNING

When installing or setting up equipment that uses compressed air, always wear appropriate personal protective equipment including impact-resistant safety glasses and hearing protection.

Ensure that the appropriate number of safety valves is installed in the compressed air distribution system leading up to the nitrogen generator. Check the compressed air lines and fittings for deterioration or other unsafe working conditions.

When installing the nitrogen generator, shut off the air supply and take the necessary precautions to prevent someone from accidentally opening the air supply during installation.

Always ensure adequate ventilation around the nitrogen generator. Inert nitrogen gas will displace oxygen in the air and can pose an asphyxiation hazard.

2.0 Description

Terra Universal's High-Capacity Nitrogen Generator provides a consistent flow of high-purity nitrogen gas without the expense and inconvenience associated with bottle systems.

As shown in the diagram below, compressed air enters the system through a 200-gallon tank. The air passes through two-stage coalescing filtration, followed by an activated carbon (adsorption) filter, and a fourth-stage coalescing filter. The pressure regulator caps the pressure at 180 PSI to protect the nitrogen separation membranes (max 189 PSIG).

The dual-membrane system generates high-purity nitrogen by extracting the other gaseous elements, exhausting them from the system. A flow-restricting valve positioned downstream of the membranes is preset at the factory to deliver the highest possible purity. Adjusting this valve will increase the fill rate of the nitrogen storage tank at the cost of purity (not recommended).

The smaller, 60-gallon tank stores the nitrogen gas under pressure. When the tank pressure reaches 150 PSI, a pressure switch triggers the solenoid valve next to the pressure regulator, stopping flow to the membrane system. After the tank pressure drops by 30 PSI (down to 120 PSI), the solenoid valve will reopen and begin refilling the nitrogen storage tank.

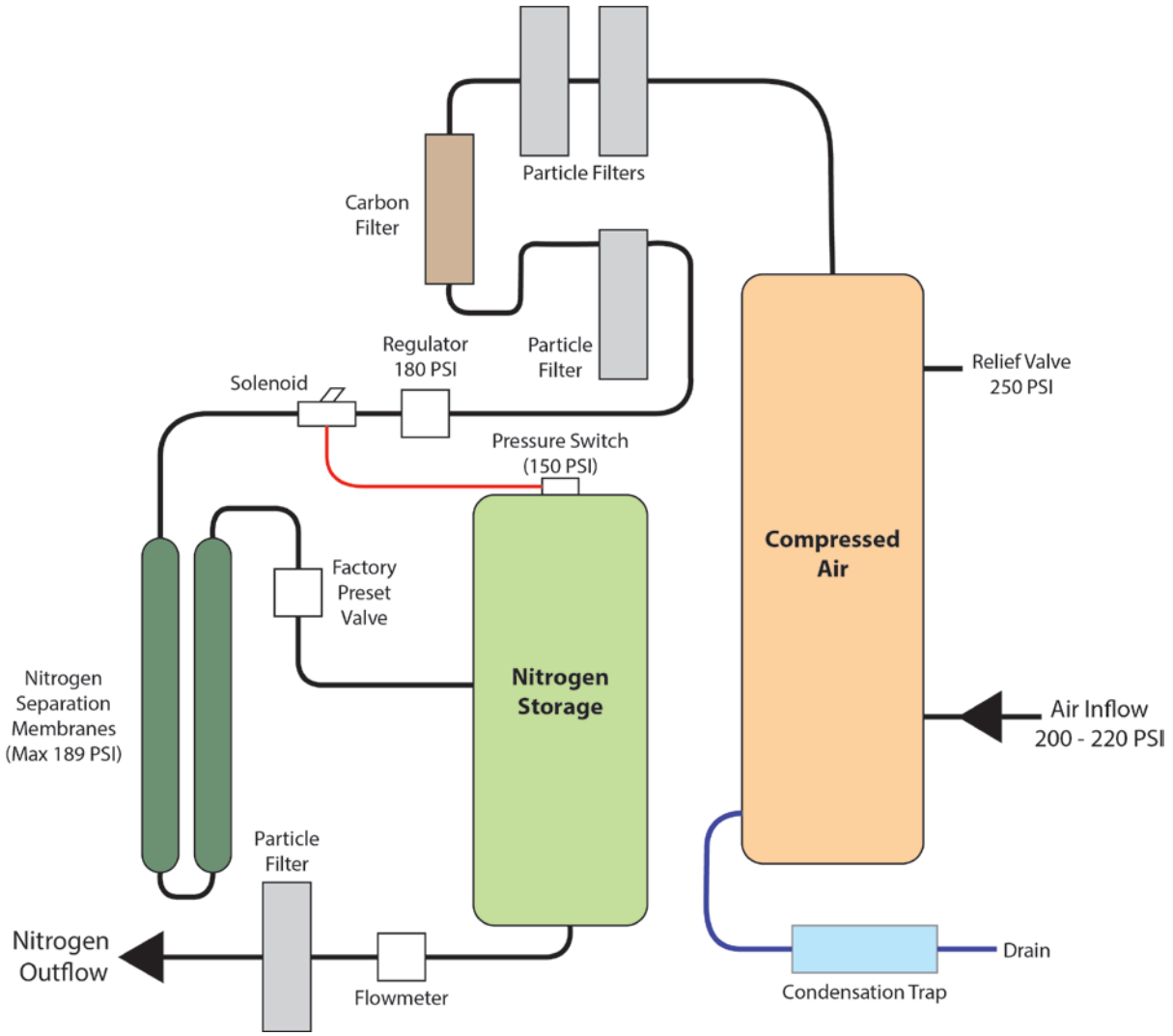

Figure 1. System Diagram

An inline flow meter allows operators to measure and adjust the outlet flow of nitrogen gas. The nitrogen gas passes through one final coalescing filter before exiting the unit.

3.0 Installation

> WARNING
> The nitrogen generator housing is top-heavy and must be maneuvered with care to avoid tipping.

3.1 Site Preparation

A. Make sure that the unit will be placed on a level, stable surface, away from heat or chemicals that could damage it.

B. Ensure that a compressed air source (at least 200 PSI) and dedicated electrical circuit are located near the installation site.

3.2 Unpacking

Carefully remove the crating from around the unit and inspect for damage. If mounted to a pallet, leave the unit secured on the pallet until it reaches the installation site.

Be careful not to throw away any loose components or other important items with the packing material. Any damage should be reported according to the terms in the shipping agreement.

3.3 Installation

A. Locate the power cord and secure it prior to moving the unit.

B. Using a forklift or similar equipment, carefully maneuver the unit to the installation site and place the unit on the ground. Remove the wooden pallet (if applicable).

C. Close the shutoff valve between the fourth-stage coalescing filter and the pressure regulator (see Figure 2 on pg. 6).

D. Prior to connecting a new air compressor, follow the manufacturer's instructions for breaking in the motor.

E. Regulate the compressed air source to 200 PSI.

F. Allow the air compressor to run with the outlet open for a few seconds to remove debris.

G. Shut off the compressed air source.

H. Use high-pressure tubing and fittings to connect the compressed air source to the inlet valve located on the side of the unit (see Figure 3 on pg. 6).

Figure 2. Post-Filter Shutoff Valve (shown in "closed" position)

Figure 3. Inlet Valve on Compressed Air Storage Tank (shown with side panel removed)

I. Open the inlet valve on the compressed air tank.

J. Connect the power cable to the electrical supply. Verify that the LED logo on the front of the unit is flashing.

K. Reopen the compressed air source to begin filling the compressed air tank. Leave the post-filter shutoff valve (from Figure 2) in the "closed" position.

L. Locate the condensate drain at the bottom of the compressed air tank. Direct the drain tubing to a suitable location for intermittent draining.

4.0 Operation

> CAUTION
>
> Ensure the area is well-ventilated before proceeding with Initial Start-Up. Be sure to wear hearing and eye protection when working in and around the nitrogen generator.

4.1 Initial Startup

A. Close the flow meter by turning the adjustment knob clockwise until it stops (see Figure 4).

B. Verify the pressure gauge on the compressed air tank reads at least 200 PSI.

C. Reopen the post-filter shutoff valve (refer back to Figure 2).

D. Set the pressure regulator to 180 PSI using the T-handle adjustment screw (see Figure 4).

E. Allow approximately 60 minutes for the nitrogen gas storage tank to fill. The system will automatically close the solenoid valve when the tank pressure reaches 150 PSI.

F. Extend a line from the nitrogen gas outlet to the outside of the building or a suitable exhaust area. Open the flow meter using the adjustment knob (see Figure 4) and allow time for the tank to release any residual air or contaminants.

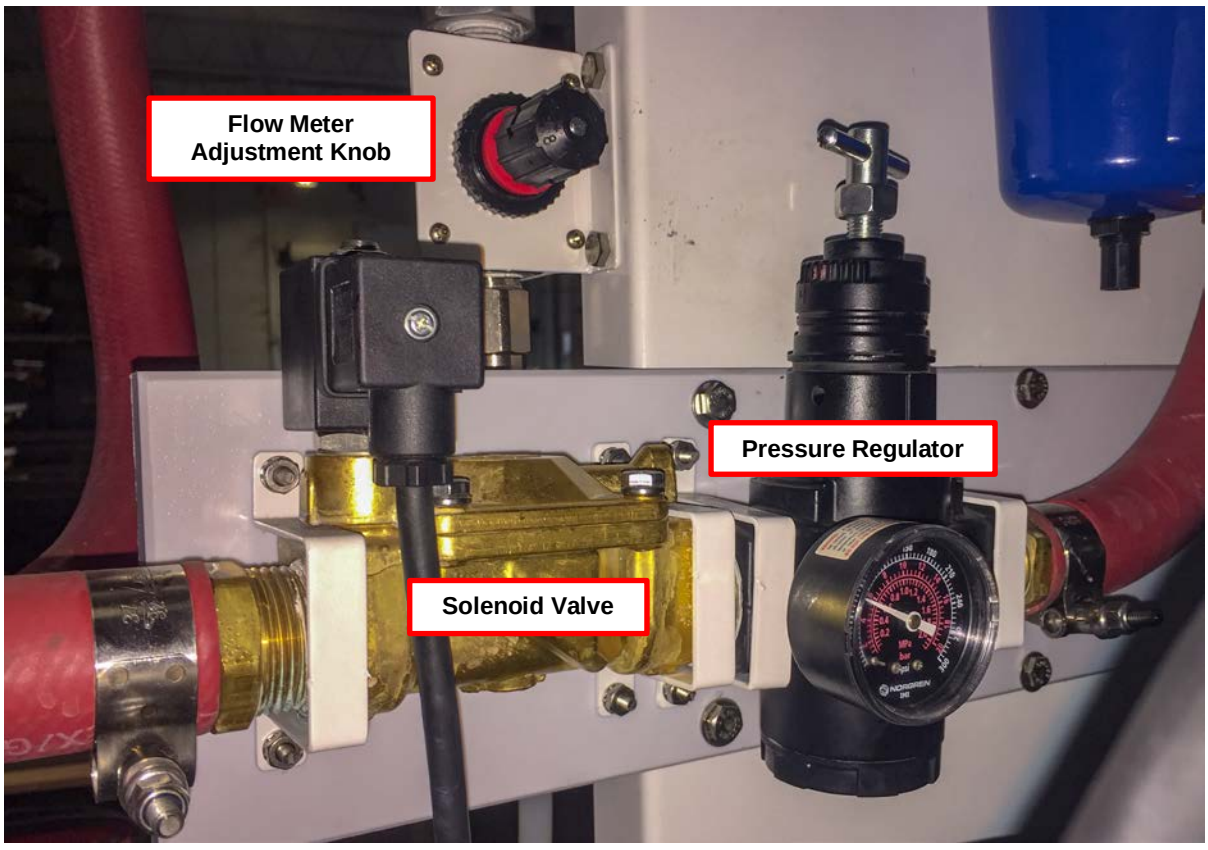

Figure 4. Solenoid Valve and Pressure Regulator

G. After purging the tank, close the flow meter and allow the tank to refill. The LED logo will stop flashing and glow solid when the tank reaches 150 PSI, triggering the solenoid valve.

The High-Capacity Nitrogen Generator is now ready for use.

4.2 Adjusting the Flow of Nitrogen Gas

Open the main access door to the nitrogen generator and locate the flow meter (see Figure 5). Below the flow meter is an adjustment knob for changing the inlet flow.

To calculate the flow rate in SCFM, use the scale chart on the flow meter:

A. Note the pressure reading on the nitrogen storage tank.
B. Follow the corresponding vertical line (psig) on the flow meter scale until it intersects with the red horizontal bar.
C. Estimate the flow rate based on the closest diagonal curve to the intersection point.

4.3 Adjusting the Preset Valve for High-Flow Applications

The valve shown in Figure 6 is preconfigured at the factory to ensure nitrogen gas purity of at least 99%.

As a general rule, this valve should only be adjusted when the production of nitrogen gas cannot keep up with the demand at the flow meter.

If this situation arises, users can open the valve to increase the flow rate; however, this may have an impact on the purity of the nitrogen gas.

Any time that the preset valve is adjusted, users must measure the purity of the resulting nitrogen gas to ensure it meets the application requirements.

Figure 5. Flow Meter and Adjustment Knob

Figure 6. Factory Preset Valve

4.4 Adjusting the Pressure Switch on the Nitrogen Gas Storage Tank

The pressure switch on the nitrogen gas storage tank actuates the solenoid valve, halting nitrogen generation when the tank reaches 150 PSI (factory default). While the tank is filling with nitrogen gas, the LED logo on the front of the unit flashes. When the pressure switch shuts off the air supply, the LED logo glows solid.

Users can adjust the high-pressure set-point on the pressure switch to suit their application.

To adjust the pressure switch:

A. Disconnect the power supply.
B. Remove the cover from the pressure switch (see Figure 7).
C. Turn the adjustment nut clockwise to increase the set-point or counter-clockwise to decrease the set-point. One turn equals approximately 2.5 PSI
D. Reinstall the cover (hand-tighten only).
E. Reconnect the power supply.
F. Allow the nitrogen gas storage tank to fill and observe the pressure level on the gauge. Note the level at which the solenoid valve closes and the LED logo stops flashing.
G. Repeat the above procedure if further adjustments are needed.

Figure 7. Pressure Switch with Cover Removed

5.0 Maintenance

> CAUTION
>
> Take care when cleaning to avoid excessive spraying, particularly when using conductive liquids, which can damage the electronic connections and components.

5.1 Cleaning

Clean surfaces with clean, lukewarm water with or without a mild, non-abrasive detergent. Always check material compatibility before selecting a cleaning agent. Avoid cleaning with a circular motion, which rubs dirt or grit into the surface.

5.2 Draining Condensate

The High-Capacity Nitrogen Generator includes an automatic drain that collects condensate and discharges it when a preset level is reached. The self-monitoring unit operates as long as the nitrogen generator is connected to power and does not cause any pressure-loss in the system.

5.3 Filter Replacement

> WARNING
>
> Before replacing filter elements, shut off the air supply and depressurize the system by opening all inlet and outlet valves.

Filter Replacement Schedule	
Coalescing Filters	12 months
Activated Carbon Filters	6 months
Note: Filter life will vary depending on the inlet air quality.	

Each coalescing filter uses a replaceable filter cartridge to remove oil and water vapors from the air. The color-coded differential pressure (DP) indicator shows filter saturation: green indicates a clean filter and red indicates a fully saturated filter. The small, vertical window near the bottom of the filter housing allows operators to see liquid collecting in the filter bowl. Liquid can be drained from the filter housing as-needed by loosening the bottom drain port.

To replace coalescing filter cartridges:

A. Shut off the compressed air supply and release any pressure remaining in the nitrogen generator system.
B. When all pressure gauges read 0 PSI and air movement can no longer be felt at the inlets/outlets, twist the lower half of the filter housing to release the filter bowl, exposing the filter element.
C. Unscrewing the used filter element and install the replacement cartridge.
D. Reinstall the filter bowl.

Please contact a Terra representative for replacement filter cartridges.

Figure 8. Two-Stage Coalescing Filtration

6.0 Specifications

High-Capacity Nitrogen Generator	
Electrical Requirements	120V, 60Hz (220V, 50Hz, if applicable)
Body Material	Powder-coated steel
Exterior Dimensions	60" x 44" x
Nitrogen Storage Tank	60 gal
Compressed Air Tank	200 gal

Two-Stage Coalescing Filtration	
Efficiency at 0.01 Micron (1st Stage)	93%
Efficiency at 0.01 Micron (2nd Stage)	99.99%
Max Pressure	250 PSIG
Housing Material	Anodized Aluminum
Filter Type	Replaceable Cartridge
Filter Materials: Borosilicate glass microfibers with fluorocarbon resin binder. Resistant to water, all hydrocarbon and synthetic lubricants.	

Nitrogen Separation Membranes	
Minimum Operating Pressure	60 PSIG
Max Operating Pressure	189 PSIG
Pre-Filter	Activated carbon (hydrocarbon filtration)
Nitrogen Purity	99%+

Single-Stage Coalescing Filters	
Efficiency at 0.01 Micron	99.99%
Max Pressure	250 PSIG
Max Temperature	130°F (54°C)
Housing Material	Anodized Aluminum
Filter Type	Replaceable Cartridge
Filter Materials: Borosilicate glass microfibers with fluorocarbon resin binder. Resistant to water, all hydrocarbon and synthetic lubricants.	

Flowmeter	
Model	Hedland H671A-050 (Badger Meter)
Scale	Multi-pressure flow, SCFM
Flow Range	5 – 50 SCFM (depending on PSIG)

Regulator	
Max Operating Pressure	250 PSI
Max Flow	350 SCFM

Condensate Drain	
Model	Kaeser ECO-DRAIN 31

7.0 Warranty

Products Manufactured by Terra: Terra Universal, Inc., warrants products that it manufactures to be free from defects for a period of 12 months for parts and 90 days for labor, commencing from the date of shipment. Terra's sole responsibility is to repair or replace, at its option, any part of the product that proves defective or malfunctioning during this time limit. In some cases, components incorporated in Terra Universal products are covered by additional warranties from component manufacturers; obtain specific information from Terra sales representatives. This warranty is void if the equipment is abused or modified by the customer, is operated outside Terra's operating instructions or specifications, or is used in any application other than that for which it is specified. This warranty does not include routine maintenance or service procedures, breakage of quartz baths after 60 days, shipping damage, nor damage from misuse, intentional or unintentional abuse, neglect, natural disasters, or acts of God.

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Generally, customers can improve the chance of collecting on a freight claim by following these procedures: 1) formally requesting that the carrier inspect the shipment immediately upon suspecting damage or shortage to verify condition; 2) notifying the carrier upon discovery of concealed damage and requesting an inspection within 15 days of receipt, both in person or phone and following up via mail; 3) keeping the shipment as intact as possible, including retaining original packaging materials and keeping the product as close to the original receiving location as possible; 4) holding salvage for disposition by the carrier.

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