TERRA UNIVERSAL.COM
Critical Environment Solutions

Installation and Operating Guide *Document No. 1800-47*

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 Terra Nitrogen Generator.

By studying this document carefully, you can be assured of a long, efficient service life from your system.

2.0 Description

Terra Universal's Nitrogen Generator is designed to provide reliable dry nitrogen without the expense and inconvenience associated with bottled systems. It uses efficient membrane separation technology to generate nitrogen from compressed air (see the chart below for typical system performance).

The system contains a gas pressure regulator and indicating gauge, a flowmeter, a 1-micron air-line coalescing prefilter, a 0.01-micron air-line coalescing filter, and the air separator membrane module. The prefilter removes all solids 1 micron and larger, along with water droplets and most oil aerosols. The coalescing filters remove solids 0.01 microns and larger and 99.999+% of oil aerosols, thereby protecting the membrane module from oil and other impurities in the incoming air-line and ensuring a long service life. Oil and moisture condensation from the prefilter and coalescing filters exits the system through a 1/4" slip-fit connector that can be directed to an in-house drain.

From left to right:
Cat. #2700-12B, #2700-11B, #2700-09B

3.0 Set-Up and Operation

Before operation, carefully unpack and inspect the Nitrogen Generator. Any damage should be reported immediately to the shipping company.

WARNING

To prevent dangerously low oxygen levels and risk of asphyxiation, nitrogen-purged systems should only be installed in a well-ventilated area.

Connecting and Operating the System

1. With the pressure regulator (counter clockwise rotation) and flowmeter (clockwise rotation) completely closed, connect the Nitrogen Generator to an incoming compressed air line by means of the 3/8" (5/8" for Cat. #2700-09B) inlet slip fitting on the top panel. The compressed air fed into the Nitrogen Generator should be regulated externally between 100 and 200 psi (For maximum purity, choose the highest inlet pressure possible.)

2. Connect the nitrogen outlet by means of the other 3/8" (5/8" for Cat. No. #2700-09A) quick connect fittings on the top panel.

3. Open regulator (completely clockwise) and flowmeter (completely counterclockwise) to allow unrestricted flow at full line pressure. The outlet pressure will drop roughly 20-30% from the inlet pressure as the compressed air flows through the membrane. Flow and purity are determined by adjusting either the pressure regulator or flowmeter.

   If consistent outlet pressure is required, set the pressure regulator at the desired level and then adjust the flowmeter to achieve the desired flow at your selected pressure. The lower the flow rate at any pressure level, the higher the product purity. The higher the pressure at any flow rate, the higher the product purity.

NOTE

For your convenience, Terra installed a low-pressure alarm to alert users of gas line kinks or compressor malfunctions via an easy-to-see Operator Status Indicator (OSI) light. This light emits a solid-color glow under normal conditions and flashes if it detects that the compressed air feed falls below 70 PSI. This light is 120VAC powered and included as a convenience; electricity is not needed for the generator to extract nitrogen from compressed air.

Refer to flow tables on following pages for guidelines on typical purities achieved at varying pressures and temperatures. Conduct purity tests to determine the settings that meet your specifications.

Initial Calibration

The frequency at which to replace pre-filters will vary depending on your application and system set-up. To help determine the frequency for your system, check the pre-filter every three months until the color indicator on the pre-filter turns yellow, which signifies that it's time to replace it with a new pre-filter. Use the elapsed-time data from this procedure to set up a filter maintenance schedule that corresponds to your workflow. By doing this, the membrane filter will last indefinitely.

4.0 Maintenance

The membrane module inside the Nitrogen Generator is designed to operate maintenance-free as long as the prefilter and coalescing filters effectively remove impurities (particularly oil vapor) from the feed air.

A slide indicator on these filters changes color (from green, to yellow, and then to red) when the filter element inside either unit needs to be replaced (see Figure 1). This indicator should be monitored monthly. Under continuous use at 100 PSI, filters will operate for approximately two years (20,000 hours).

Replacing Filter Elements

1. Open the front housing panel of the Nitrogen Generator to expose the filters (see Figure 1).
2. Rotate the self-locking bayonet head 1/8 turn counterclockwise to release it from the bowl (see Figure 2).
3. Pull the filter element to release it from the head. Remove the bottom filter element cap.

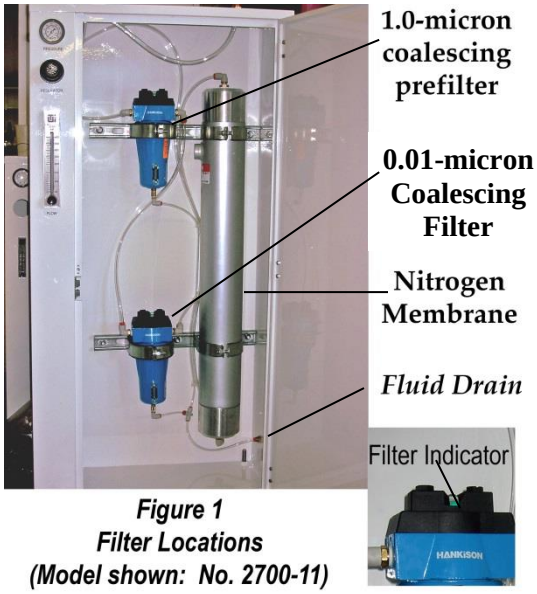


Figure 1
Filter Locations
(Model shown: No. 2700-11)

Figure 2
Removing Filter Head

4. Attach the bottom cap to the replacement filter element and push it into the filter head until it locks in place.
5. Rotate the filter head 1/8 turn clockwise to reattach it to the filter bowl. Close the front panel.

Replacement Filter Elements

	Cat. #
1-micron Prefilter	2700-15
0.01-micron Coalescing Filter	2700-16

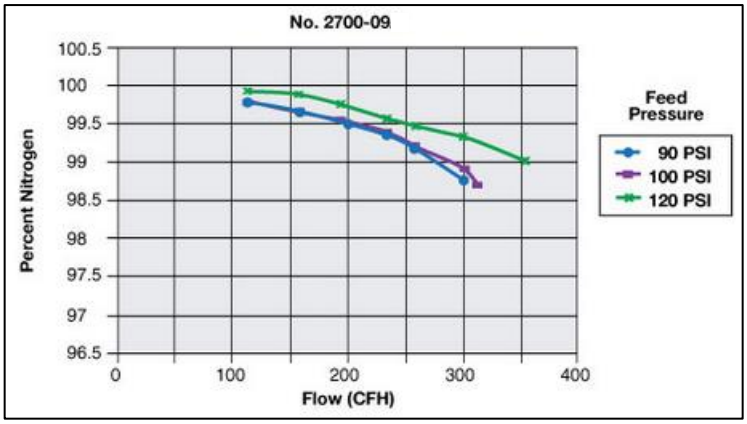
Nitrogen Membrane

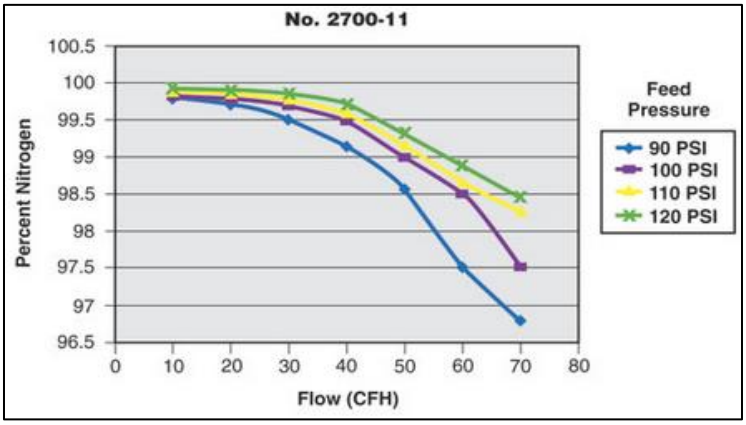
For Model 2700-09	2700-36
For Model 2700-11	2700-37
For Model 2700-12	2700-38

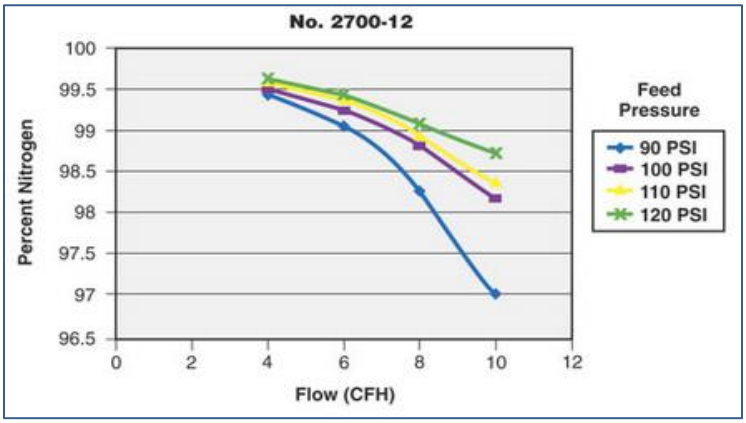
5.0 Specifications and Performance Data

Model	Dimensions*	Weight (uncrated)	Flowmeter Range
2700-09	24"W x 14"D x 68.25"H	157 lbs.	0 - 400 SCFH
2700-11	24"W x 12"D x 49.25"H	96 lbs.	0 - 100 SCFH
2700-12	20"W x 12"D x 35.25"H	58 lbs.	0 - 20 SCFH

* Includes polypropylene leveling feet; excludes other hardware.







Housing:	Powder-coated white CR steel cabinet with polyethylene leveling feet
Feed Air Pressure:	200 PSIG MAX
Feed Air Temperature:	40°F to 122°F
Nitrogen Outlet Flow:	See graphs at right.
Prefilter:	One-micron absolute filtration. Dual glass micro-fiber filter beds coalesce and remove water droplets. Remaining oil content: 1 ppm by weight. Includes slide indicator (to indicate need for filter change), liquid level indicator and internal drain. ISO 8573.1 Quality Class - Solids: Class 2, Oil Content: Class 4
Coalescing Filter:	Absolute filtration of 0.01µm particles; 99.999+% oil removal efficiency. Includes slide indicator (to indicate need for filter change), liquid level indicator and internal drain. ISO 8573.1 Quality Class - Solids: Class 1, Oil Content: Class 1
Membrane Module:	Semipermeable hollow fiber bundles.
Electrical:	Power not needed to generate nitrogen, but low-pressure indicator light requires 120VAC. User-supplied air compressor may require electricity.

Flow vs. Purity @ 50° C (122ºF)

(Based on 77° ambient)

	No. 2700-09 Product Purity				No. 2700-11 Product Purity				No. 2700-12 Product Purity			
Flow in SCFH	**99%**	**98%**	**97%**	**95%**	**99%**	**98%**	**97%**	**95%**	**99%**	**98%**	**97%**	**95%**
@ 150 psi	662	931	1188	1714	181	254	325	469	16	22	28	41
@ 135 psi	578	815	1042	1505	158	223	285	412	14	19	25	36
@ 125 psi	522	737	943	1365	143	202	258	374	12	18	22	32
@ 110 psi	437	620	795	1153	120	170	218	316	10	15	19	27
@ 100 psi	381	542	696	1012	104	148	191	277	9	13	17	24
@ 90 psi	326	465	598	871	89	127	164	238	8	11	14	21

Typical Nitrogen Product Flow Rates

Nm3/h (SCFH) flow at purity —13.8 barg (200 PSI) and 45°C (113°F)

Model	Purity Level 95%	96%	97%	98%	99%	99.5%	99.9%
2700-09	65 (2461)	55 (2084)	45 (1715)	36 (1350)	26 (970)	20 (745)	11 (407)
2700-11	18 (673)	15 (570)	12 (468)	10 (369)	7 (266)	5 (205)	3 (110)
2700-12	1.5 (59)	1.3 (49)	1.1 (41)	0.8 (32)	0.6 (23)	0.5 (18)	0.3 (10)

Air Feed Requirements

Nm3/h (SCFH) flow at purity —13.8 barg (200 PSI) and 45°C (113°F)

Model	Purity Level 95%	96%	97%	98%	99%	99.5%	99.9%
2700-09	122 (4655)	111 (4218)	99 (3776)	88 (3331)	76 (2883)	70 (2654)	50 (1902)
2700-11	34 (1274)	30 (1156)	27 (1034)	24 (913)	21 (787)	19 (726)	14 (521)
2700-12	2.9 (110)	2.6 (99)	2.4 (91)	2.1 (80)	1.8 (68)	1.7 (65)	1.2 (46)

Flow Volume Decrease

Outlet / Inlet flow, By Percentage

At N2 Purity	Oulet Flow
95%	53% of inlet flow
96%	49% of inlet flow
97%	45% of inlet flow
98%	40% of inlet flow
99%	34% of inlet flow
99.5%	28% of inlet flow
99.9%	21% of inlet flow

6.0 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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Freight Shortage or Damage: Upon receipt of any equipment from Terra Universal, Inc., customer shall immediately unpack and inspect for damage or shortage. The customer shall not accept a damaged package or a short shipment until the carrier makes a "damage or shortage" notation on both the carrier's and customer's copy of the freight bill or delivery receipt. Service title passes when the shipment is loaded, so customer is responsible for filing and collecting a freight claim. Any replacement products must be ordered and paid for separately. For Terra's "Policy and Procedures for Returning Goods," see Terra's Internet site: www.TerraUniversal.com.

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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Warranty Returns: All warranty returns must be authorized in advance by Terra Universal and approved under an RMA. Unless approved in advance for good reason, all returns must be in original condition, including all manuals, and must be packaged in original packaging materials. All returned goods are to be shipped to Terra Universal, freight prepaid at customer's expense. See Terra's "Policy and Procedure for Returned Goods."

Thank you for ordering from
Terra Universal!