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Critical Environment Solutions

Supplemental Manual *Document No. 1800-38*

NitroPlex™ RH Control System

Supplemental Manual

NitroPlex™ RH Control System

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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 is intended to be a supplement to **Doc. #1800-40: Desiccators and RH Controllers** that explains the setup and operation of the NitroPlex™ System and its components.

The NitroPlex™ RH Control System is only compatible with the following desiccator cabinets and must be specified at the time of order:

NitroPlex™ System Compatibility
Standard Adjust-A-Shelf™ Desiccator Cabinets
Faraccators
Tape-and-Reel™ Desiccators
Kiticcators
Series 400 Stainless Steel Desiccator Cabinets

NitroPlex™-Equipped Adjust-A-Shelf™ Desiccator Cabinet

NOTE

This manual focuses on the setup and operation of the IsoDry™ RH Control System.

For instructions on the installation and care of the IsoDry™ Adjust-A-Shelf™ Desiccator Cabinet, refer to Doc. #1800-40: Desiccators and RH Controllers.

2.0 Description

The NitroPlex™ System functions as a multiplex nitrogen controller. It controls a purge of nitrogen to each desiccator chamber independently to maintain a constant relative humidity level below an adjustable set-point. This multiplexing capability ensures the very lowest recovery times and nitrogen use possible in a desiccator storage system. This enhanced efficiency, in turn, provides top-tier protection for moisture-sensitive stored components, while simultaneously minimizing operating costs. The results: longer shelf lives and lower rejection rates.

During normal operation, the NitroPlex continuously monitors the relative humidity level in each chamber and indicates these readings on a 4-digit LED display.

When an access door is opened or the RH level climbs above the preset threshold, the NitroPlex directs a high-flow purge of nitrogen gas to that chamber only. Any moisture that might enter is purged through the Automatic RB Valve in the same chamber—before it can affect stored materials in that chamber.

Terra Universal's NitroPlex™ system consists of several sensor/display modules, one installed in each desiccator chamber, and an equal number of purge valves installed in the rear plenum chamber.

Each NitroPlex™ Humidity Module consists of a humidity sensor, door sensor/switch and a 4 digit LED display. A gas delivery system, which runs down the rear of the desiccator cabinet, contains all necessary wiring valves and gas plumbing that interface each chamber module.

The NitroPlex™ Humidity Module will monitor the humidity level in each desiccator chamber independently. When the humidity rises above the user-selected sub-ambient set point in any of the chambers, a high-flow nitrogen purge is directed to that chamber for as long as is needed to bring the humidity down to your required level. The system will bleed off any excess nitrogen pressure, along with moisture and contaminants, through the Automatic Relief/Bleed Valve that is incorporated in each chamber of the cabinet.

The humidity level of each chamber is displayed separately in large LEDs on the front of each chamber. The LED displays will flash warning signals any time a desiccator door is left open for too long or if the system remains in purge mode for too long.

NitroPlex™ Humidity Modules

Rear Plenum

LED Display

3.0 Installation

CAUTION

Do not position the desiccator so that the power supply and nitrogen source connections are inaccessible. The power supply serves as the main disconnect for the system.

Before installation and operation, carefully unpack the desiccator and accessories and check for signs of damage or missing parts. Wipe down with a particle-free cloth.

CAUTION

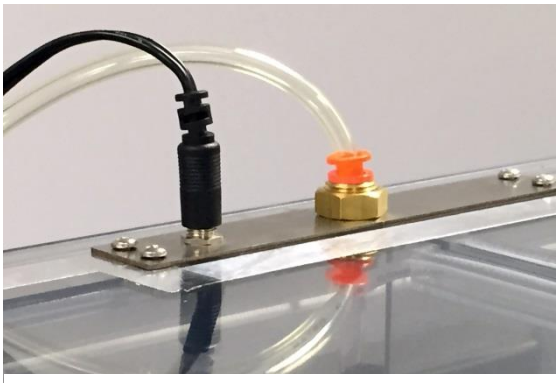
Never use alcohol or other cleaning agents on acrylic surfaces.

The Nitroplex™ RH Control System consists of:

- **Multi-Chamber Desiccator**
- **Power Distribution Module**
- **Humidity Modules (one in each chamber)**

1. Connect power cord of the 12VDC universal power supply (Phihong PSAC60W-120) to a 120/240 VAC outlet. Connect the other end to the power terminal at the top rear of the desiccator.

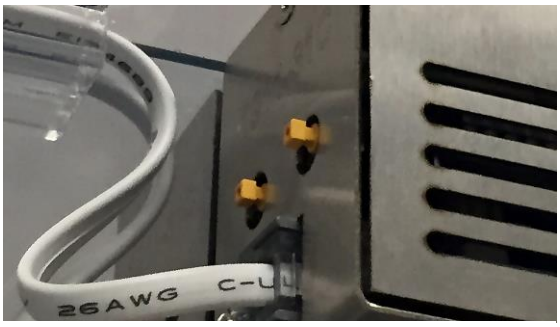
2. Connect a 1⁄4" nitrogen gas supply line externally regulated at 70 - 80 psi to the gas fitting at the top rear of the desiccator.



Power supply and nitrogen gas connections

3. With the gas supply on and the power connected, all Nitroplex™ Humidity Modules will light up and read the relative humidity in their respective chambers. The factory set point for the relative humidity is 10% RH.

4. **RH Set Point (Factory Setting: 10% RH):** With the power ON, open the chamber door and reach behind the Nitroplex™ Humidity Module to access the two configuration buttons. Press and release either button to view the current set point. One button will increase the RH set point and the other button will decrease it.



Configuration Buttons

After a four-second delay, during which time no buttons are pressed, the unit will save the new set point to the EEPROM and return to normal operation, displaying the current RH level. In normal operation mode (no buttons pushed), the unit will display the RH reading from the built-in RH sensor. When the magnetic door sensor in the front of the unit detects an open door or if the R/H reading is higher than the set point value, then the output to the solenoid valve will activate a nitrogen purge. The solenoid output will remain active for 30 seconds after the door is closed and after the RH reading reaches the set point.

NOTE **Although the RH level can be specified anywhere between 0 and 99.5% RH, the practical set point range is from room ambient (highest setting) down to 2% RH.**

4.0 Changing System Defaults

The NitroPlex™ Humidity Module is factory programmed with default values (indicated in parentheses below) for the Humidity Offset, the Open Door Alarm, the RH Alarm, the Purge Delay, and the Identification Number.

To change any of these values:

1. Disconnect the low voltage wire from the humidity module and then hold down both configuration buttons while reconnecting the low voltage wire. While both buttons are held, the display will read "-rH-" indicating the Relative Humidity Offset function. Release the two buttons to display the current offset value (0).

2. **Relative Humidity Offset (Factory Setting: 0)**: This function allows you to offset the %RH scale by ± 10 to compensate for measured discrepancies between the NitroPlex™ readout and that of an independent %RH calibrator.

   While facing the LED display, the button on the right will increase the offset value. The offset value will wrap around to -10 after reaching +10.

NOTE **A side effect of using an offset value other than zero is that the %RH range will be reduced, e.g., if the offset value is -10, then the maximum RH value that can occur is 90 because the input value (100) will be added to the offset value before the system uses it.**

3. **Open Door Alarm (Factory Setting: 60 seconds):** After configuring the Relative Humidity Offset, press and hold the left button to display "door," indicating the Open Door Alarm function. When you release the left button, the display will read "60," indicating that if a chamber door is left open for longer than 60 seconds, the module will flash "open door."

   Press the right button to increase this value in one-second increments. When the value reaches 255 it will wrap around to 0 again. Press and hold the right button to rapidly advance the value.

4. **Relative Humidity Alarm (Factory Setting: 180 seconds):** After configuring the Open Door Alarm, press and hold the left button again to display "rH," indicating the Relative Humidity Alarm function. When the left button is released, the display will read "180," indicating that if the chamber remains in purge mode (either because a door is open or the %RH exceeds the set point) for longer than 180 seconds, the module will flash "rH" to indicate a system problem (generally, door ajar or insufficient gas flow).

   Press the right button to increase this value in one-second increments. When the value reaches 255 it will wrap around to 0 again. Press and hold the right button to rapidly advance the value.

5. **Purge Delay (Factory Setting: 30 seconds):** After configuring the Relative Humidity Alarm, press and hold the left button to display "PurG," indicating the Purge Delay function. When the left button is released, the display will read "30", indicating that the solenoid that directs a purge of nitrogen to this chamber will remain open (purge on) for 30 seconds after normal operation has been achieved (humidity set point attained and door closed). This purge delay allows the system additional time after a door is opened to flush moisture and contaminants that may have entered the chamber.

   Press the right button to increase this value in one-second increments. When the value reaches 255 it will wrap around to 0 again. Press and hold the right button to rapidly advance the value.

6. **Exit Set-Up Mode:** After configuring the Purge Delay, press the left button to display the humidity module's "Id". To exit setup, press and hold the left button to display "done".

   Upon releasing the left button, the new default values will be stored in EEPROM and reloaded each time the unit is powered up.

7. Repeat steps 1 through 7 as needed for all other chambers.

5.0 Desiccator Service and Maintenance

CAUTION

- **Do not clean acrylic with alcohol or other strong cleaning agents.**
- **Do not expose static-dissipative PVC to extreme heat or direct sunlight.**
- **A Terra stainless steel shield is required on the bottom of each static-dissipative PVC desiccator chamber to prevent scratching.**

Refer to the **Doc. #1800-40: Desiccators and RH Controllers** for information regarding the care and service of your desiccator.

6.0 Troubleshooting

Terra Universal's desiccators are designed to provide years of reliable, efficient service. If you should experience any problems that arise during operation of your NitroPlex™ desiccator, refer to the appropriate troubleshooting procedure below. If the problem persists, or if you encounter any problems not described below, call Terra Universal for additional assistance.

WARNING

Do not attempt to disassemble any of the modules. Contact Terra for assistance.

PROBLEM: System won't turn on.

POSSIBLE SOLUTIONS:

1. Make sure that the power cord of the NitroPlex™ System is plugged into a working outlet and all low-voltage wires are properly connected in each chamber. If the problem persists, call Terra Universal.

PROBLEM: The digital display is flashing "rH high".

EXPLANATION: The chamber has been in high-flow nitrogen purge mode for an extended period of time (Factory Default Alarm Setting: 180 Seconds). The alarm will deactivate when the chamber reaches the programmed set point.

POSSIBLE SOLUTIONS:

1. Make sure that the doors are properly closed and that the magnetic door sensors are aligned.
2. If the relative humidity levels are not falling, you may need to increase the flow from the nitrogen gas supply (not to exceed 80 psi) or use nitrogen of a higher purity.
3. Check the door seals of the desiccator to make sure that there are no visible gaps. The flexible gaskets are designed to allow a small amount of leakage in order to maintain a positive pressure environment.

PROBLEM: The digital display is flashing "open door".

EXPLANATION: The chamber door has been open for an extended period of time (Factory Default Alarm Setting: 60 Seconds).

POSSIBLE SOLUTIONS:

1. Make sure that all chamber doors are closed and that all magnetic door sensors are making contact.

PROBLEM: The desiccator is leaking excessively.

POSSIBLE SOLUTIONS:

1. Check the condition of the gasket on the desiccator. If the gasket is cracked or peeling, call Terra Universal for a replacement.
2. Check door alignment. Leaks may develop if doors are out of alignment.

PROBLEM: The humidity module delivers an obviously incorrect humidity reading.

POSSIBLE SOLUTIONS:

1. Check the low-voltage connection on the rear of the humidity module. If the connection to the sensor is good, and the unit still fails to deliver an accurate reading, contact Terra Universal.

7.0 Specifications


NOTE

Refer to the original order form for the exact specifications/configuration of your desiccator.


WARNING

Internal chamber pressure must never exceed 0.5 psi when the desiccator is purged with nitrogen.

NitroPlex™ Humidity Modules

Operating Temperature:	50°F to 140°F
Module Dimensions:	1.5"W x 2.75"D x 1.5"H
Power Requirements:	110VAC, 50/60Hz or 220VAC, 50Hz at main power connection 12VDC to each module (via low-voltage phone cable)
Case Material:	Stainless steel
Display:	5 digit LED display
Electrical Connections:	4-connector low-voltage phone cable
Measuring Range:	0-100% RH
Accuracy (at 20° C):	± 2% RH
Display Resolution:	± 0.1% RH
Temp. Dependence:	± 0.04% RH/°C
Sensor Calibration:	None required, but scale offset routine allows display compensation. Capacitive sensor pick-up should be tested and replaced as necessary (about every 5 years under normal use).
Max Gas Inlet Pressure:	80 psi

Automatic RB™ (Relief/Bleed) Valve

Operating Temperature:	32°F to 140°F
Dimensions:	0.43"W x 0.43"D x 1.5"H
Material:	Styrene-acrylonitrile (SAN) resin


WARNING

Automatic RB Valves are required in nitrogen-purged desiccators to prevent dangerous pressure buildup.

8.0 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.

Products Manufactured by Others: Terra Universal, Inc., warrants that, to the best of its ability, Terra's representations of products that are manufactured by others reflect the manufacturer's representations, subject to change without notice. Sole warranty for these products is the original manufacturer's warranty that is passed forward to the purchaser and constitutes the customer's sole remedy for these products. Detailed warranties for distributed products are available through Terra sales representatives.

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!