



Installation and Operating Guide Document No. 1800-40

# Desiccator Cabinets and RH Controllers

© Copyright 2022 Terra Universal Inc. All rights reserved. • Revised May 2022

## Your Comprehensive Equipment Source





## Table of Contents

1. Introduction .....	3
2. Safety.....	4
3. Description .....	5
3.1 Desiccators.....	5
3.2 RH Controllers .....	5
3.2.1 Flowmeter.....	5
3.2.2 Dual Purge™ System.....	6
3.2.3 Smart® IsoDry® Nitro-Watch™ .....	7
4. Installation.....	8
4.1 Flowmeter Set-Up (Rear View) .....	10
4.2 Dual Purge™ Set-Up (Rear View).....	11
4.3 Smart® IsoDry® Nitro-Watch™ Set-Up (Rear View) .....	12
5. RH Controller Operation.....	13
5.1 Flowmeter Operation .....	13
5.2 Dual Purge™ Operation.....	13
5.3.1 Battery Insertion .....	15
5.3.2 Initial Programming .....	15
5.3.3 System Configuration Menu .....	16
6. Desiccator Service and Maintenance .....	19
7. Troubleshooting .....	21
8. Specifications.....	24
9. Warranty .....	26



## Installation and Operating Guide

# High- Desiccator Cabinets and RH Controllers

© Copyright 2022 Terra Universal Inc. All rights reserved • Revised May 2022• Document No. 1800-40

## 1. Introduction

This manual provides installation and operating guidelines for the following desiccator models:

### Adjust-A-Shelf™ Desiccators

- Standard Adjust-A-Shelf™
- Pass-through Adjust-A-Shelf™
- Wafer Box Adjust-A-Shelf™
- Kitting Tray Adjust-A-Shelf™
- Tape and Reel Adjust-A-Shelf™
- Farracator

### Stainless Steel Desiccators

- Series 100
- Series 200
- Series 300
- Series 400



This manual also covers the following RH controllers:

### RH Controllers

- Flowmeter
- Dual Purge™ System
- Smart® IsoDry® Nitro-Watch™



If your desiccator features a NitroPlex™ System, please refer to **Doc. #1800-38 NitroPlex™ RH Control System** for additional instructions relevant to your RH control system.

If you purchased an IsoDry® desiccator, please refer to **Doc. #1788-26 IsoDry® RH Control System** for additional instructions relevant to your specific RH control system.



## 2. Safety

### Proprietary Notice

This manual pertains to proprietary devices manufactured by Terra Universal, Inc. Neither this document nor any portion of it may be reproduced in any way without prior written permission from Terra Universal.

Terra Universal makes no warranties applying to information contained in this manual or its suitability for any implied or inferred purpose. Terra Universal shall not be held liable for any errors this manual contains or for any damages that result from its use.

### 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.



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

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.



## 3. Description

This section provides background information on Terra Universal's desiccators and RH controllers.

### 3.1 Desiccators

Terra Universal offers several lines of desiccator cabinets:

**Adjust-A-Shelf™ Desiccators** are outfitted with stainless steel racks with half inch adjustment increments that allow you to add your choice of shelves.

**Pass-through Adjust-A-Shelf™ Desiccators** have doors on the front and rear of each chamber, making materials accessible from either side.

**Wafer Box Adjust-A-Shelf™ Desiccators** are specifically sized for optimal storage of FOUPs (silicon wafer carriers).

**Kitting Tray Adjust-A-Shelf™ Desiccators** are designed for optimal access and storage density of tote boxes (kitting trays).

**Tape-and-Reel Adjust-A-Shelf™ Desiccators** feature racks that securely hold a variety of embossed carrier reels up to 1.25" thick and 14" in diameter.

**Faraccators™** employ the Faraccator concept to shield static-sensitive components against the danger of ESD (electrostatic discharge).

**Double Agent Desiccators™** are an electrically grounded Adjust-A-Shelf™ Desiccator contained within a high-security safe.

Each of these cabinets employs a similar nitrogen-flow design: clean, dry nitrogen is fed into a plenum chamber that distributes the gas to each of the chambers. Nitrogen mixes with the moisture-laden air and pressurizes the cabinet, purging the mixture through the installed automatic relief/bleed (RB) valves. Relative humidity decreases as the nitrogen concentration increases inside each of the chambers.

### 3.2 RH Controllers

There are three types of RH controllers that monitor and/or control the flow of nitrogen gas into the desiccator.

#### 3.2.1 Flowmeter

*Compatible with: All Adjust-A-Shelf™ and Stainless Steel Desiccators (except IsoDry®)*

A flowmeter provides a constant flow of nitrogen gas into the desiccator. It is not ideal for use in large desiccators with doors that are frequently opened.

Left on a very low setting, the flowmeter will maintain a constant positive pressure that halts the influx of moisture through small cracks or through plastic walls (which are hygroscopic). However, this low flow rate will not block the influx of moisture or contaminants when a door is opened, nor will it quickly remove moisture once it enters the cabinet.



At a high flow rate, the system will remove moisture more effectively and block its influx when a door is opened, but the system will also consume an unnecessarily high amount of nitrogen at other times, and excessive pressure could damage seals or distort doors over time.

### 3.2.2 Dual Purge™ System

**Compatible with: All Adjust-A-Shelf™ and Stainless Steel Desiccators (except IsoDry®)**

**Requires: RB Valve**

The Dual Purge System provides variable gas purging to protect your stored materials. It provides a low-level purge just adequate to block out moisture and contaminants while the desiccator doors are closed. When an access door is opened, it automatically initiates a high-level purge adequate to minimize backfill. An adjustable time delay maintains the high-level purge for a set time after the door is closed. After the high-level purge ends, the economical low-level purge is restored.



**RB Valve  
(Factory-installed)**

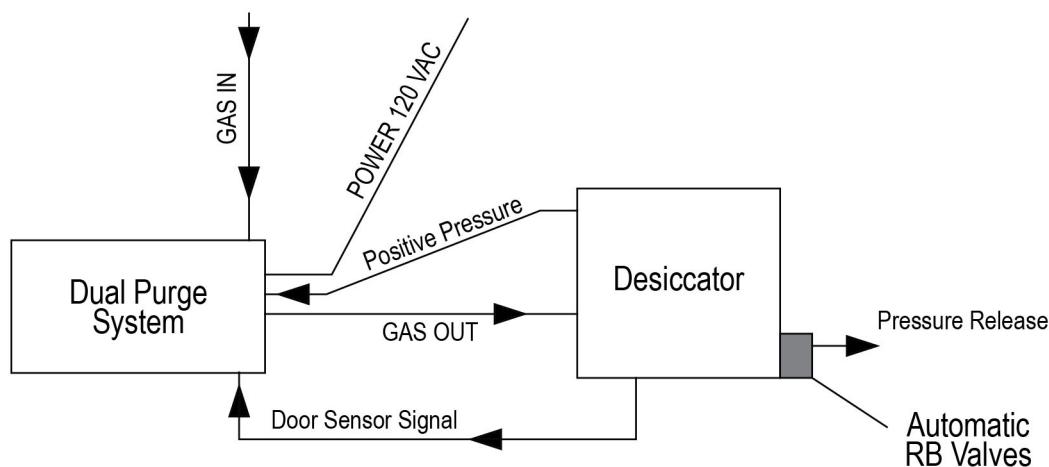
The Dual Purge System is designed for enclosures that feature several access doors (as most desiccators do). It relies on a door sensor switch to activate the high- and low-level purges.

Each unit features a system line pressure gauge and regulator, internal positive pressure gauge, a 2-amp fuse (located inside the housing), an internal flowmeter, and all necessary gas line connections.

In addition, each unit features warning lights. One automatically flashes if a door is left open more than 60 seconds (user adjustable). This feature helps save nitrogen and reduces risk of contamination. The other flashes if the inlet line pressure falls below 35 psi. This alarm alerts the user of a problem with the supply line.



**Because variable inflow of nitrogen requires variable pressure relief, the use of an Automatic RB Valve (Cat. No. 1600-60B) is mandatory with the Dual Purge System. Failure to incorporate an Automatic RB Valve could lead to cabinet damage!**





### 3.2.3 Smart® IsoDry® Nitro-Watch™

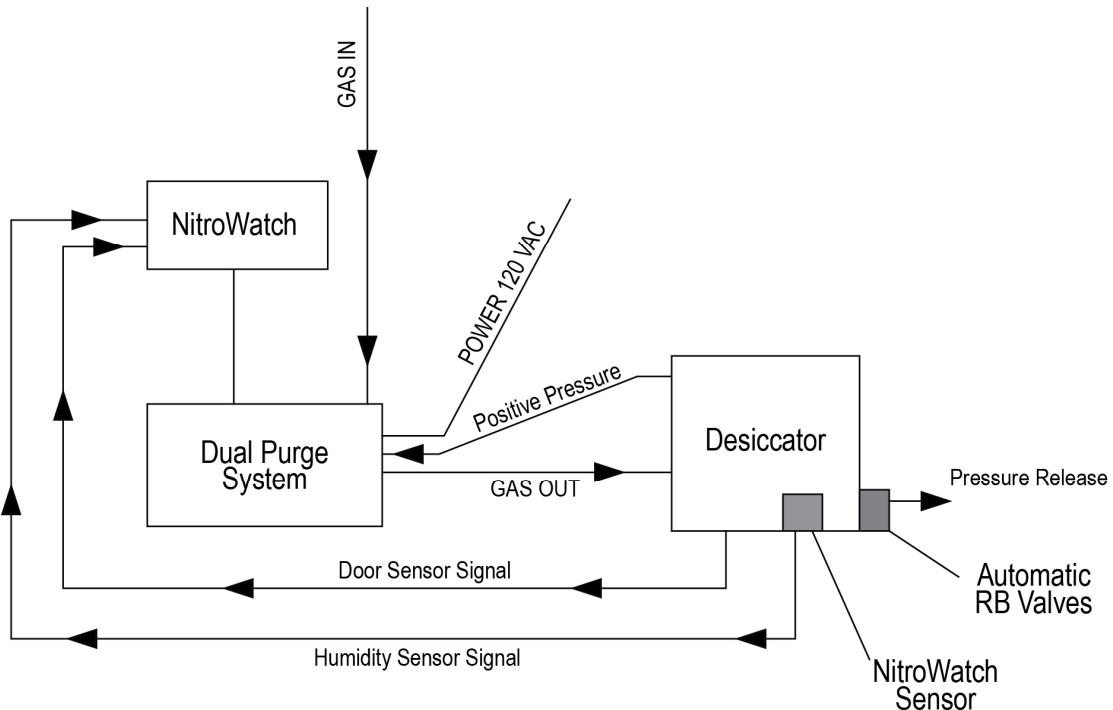
**Compatible with:** All Adjust-A-Shelf™ and Stainless Steel Desiccators (except IsoDry®)  
**Requires:** Dual Purge™ System and RB Valve

The Smart® IsoDry® Nitro-Watch™ senses and displays the relative humidity level (from ambient to 0%) inside a desiccator or glove box within  $\pm 1.5\%$  RH. It operates in tandem with the Dual Purge System and Automatic RB Valve to precisely and automatically control the flow of nitrogen into the desiccator and maintain a preset humidity level, no matter how operating conditions may change. This system also logs RH, temp, door open/close, purge on/off, and sensor removal/ attachment. The system can log months of data depending on the logging interval selected, all of which can be downloaded to a USB flash drive.

The Nitro-Watch™ consists of two basic components: a humidity sensor and an indicator/controller unit.

The **Humidity Sensor** is mounted inside the desiccator. It uses a fast-response capacitive probe whose capacitance is proportional to the humidity level. The sensor is capable of measuring humidity over the entire humidity range, from 0 to 100% RH, with an accuracy of  $\pm 1.5\%$  RH at a temperature of 68 degrees F.

The **Control Unit** provides the indicators and controls necessary to set the desired humidity level and to measure the actual humidity level inside the chamber.



For additional instructions and general specifications for the Nitro-Watch™, please refer to Doc. #1800-19 Smart IsoDry NitroWatch Manual.



## 4. Installation

### Step 1: Unpacking

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.



**Never use alcohol or other cleaning agents on acrylic surfaces.**

**CAUTION**

### Step 2: Preparation

The desiccator will require a supply of clean, dry air or nitrogen (less than 5 ppm(v) H<sub>2</sub>O) and 1/4" polyethylene tubing. If a Dual Purge System will be used, the desiccator will also require a standard 110VAC, 60Hz or 220VAC, 50Hz power supply.

If your model includes an electrical grounding terminal on top of the desiccator, be sure to locate the desiccator near an available grounding point for connection.



**Do not position the desiccator so that the connection to the main power supply or nitrogen source is inaccessible. These connections serve as the main disconnect for the system in the event of an emergency.**

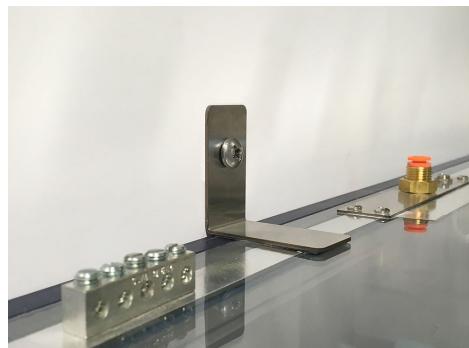
**CAUTION**

### Step 3: Securing the Desiccator



- To prevent dangerously low oxygen levels and risk of asphyxiation, nitrogen-purged systems should only be installed in a well-ventilated area.
- Desiccator cabinets taller than 30"H must be secured against a wall to prevent tipping.

1. Position the desiccator flush against the wall.
2. Apply the double-sided VHB tape to the bottom of the supplied wall bracket.
3. Stick the wall bracket onto the top of the desiccator as shown in the photo, making sure that the bracket will sit flush against the wall. Apply firm pressure for a few seconds and then wait 20 minutes for the bond to strengthen (full adhesion occurs after 72 hours)
4. While you wait, mark the screw placement and drill a pilot hole.
5. Ensure that the desiccator is still flush against the wall and then fasten the bracket to the wall using the supplied screw.



Correct Orientation of Wall Bracket



## Step 4: Door Alignment

All cabinets are checked prior to packaging to ensure proper door alignment. However, they can come out of alignment during shipping due to the inherent flexibility of plastic.

On a properly aligned, level cabinet, all door latches are engaged directly in the center of the corresponding catch (see photos). To re-align a cabinet,

1. Open all doors.
2. Make sure that the bottom of the cabinet is level. Use the leveling feet of the stand or shims to level the bottom of the support stand.
3. Starting at the bottom of the cabinet and working up, close each door. Make sure that each latch engages the center of the corresponding catch.



Door Latch Correctly Centered



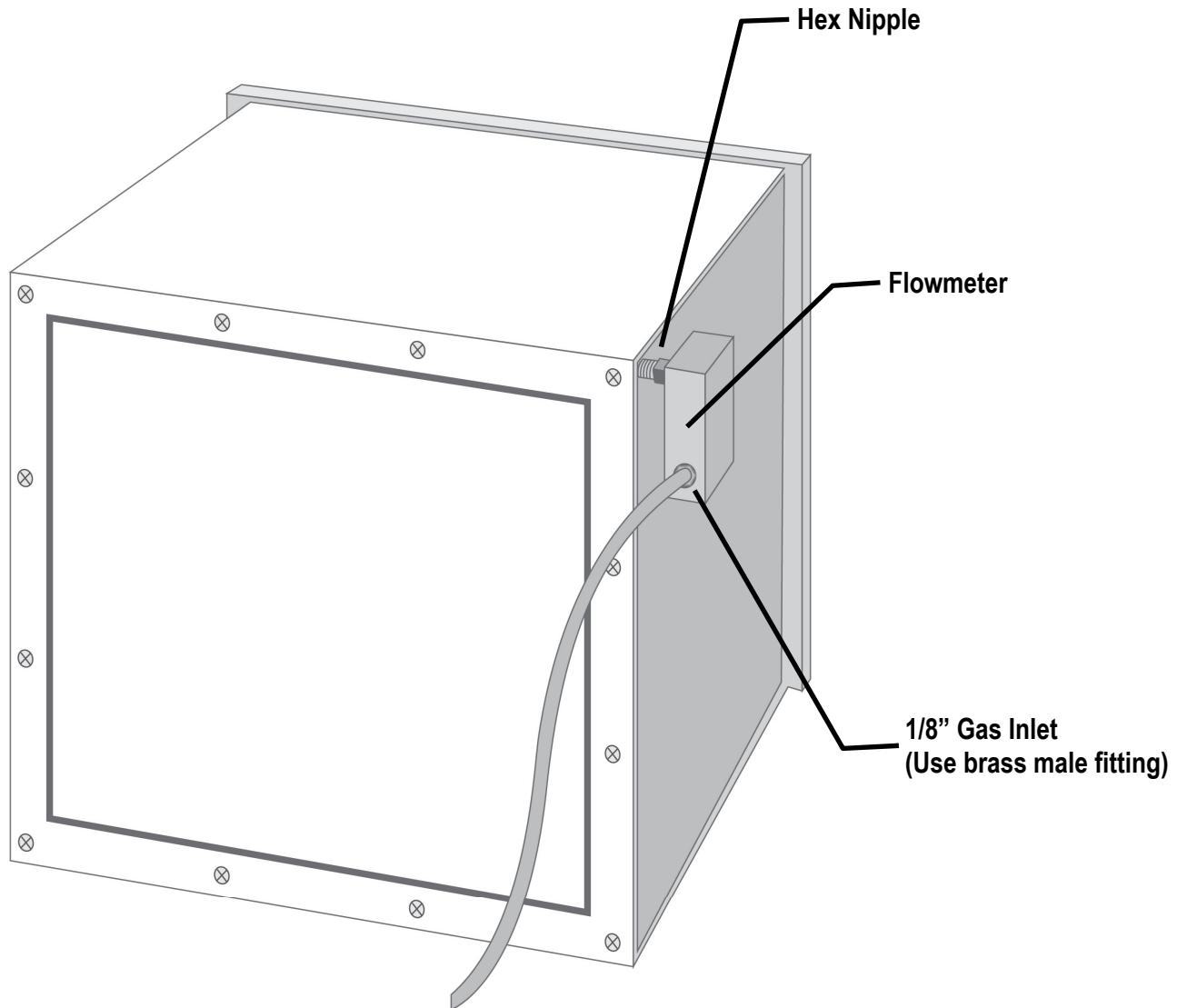
CAUTION

Installation of at least one Terra Automatic RB Valve (Cat. #1600-60B) is required to protect against permanent damage to seals and doors.



## 4.1 Flowmeter Set-Up (Rear View)

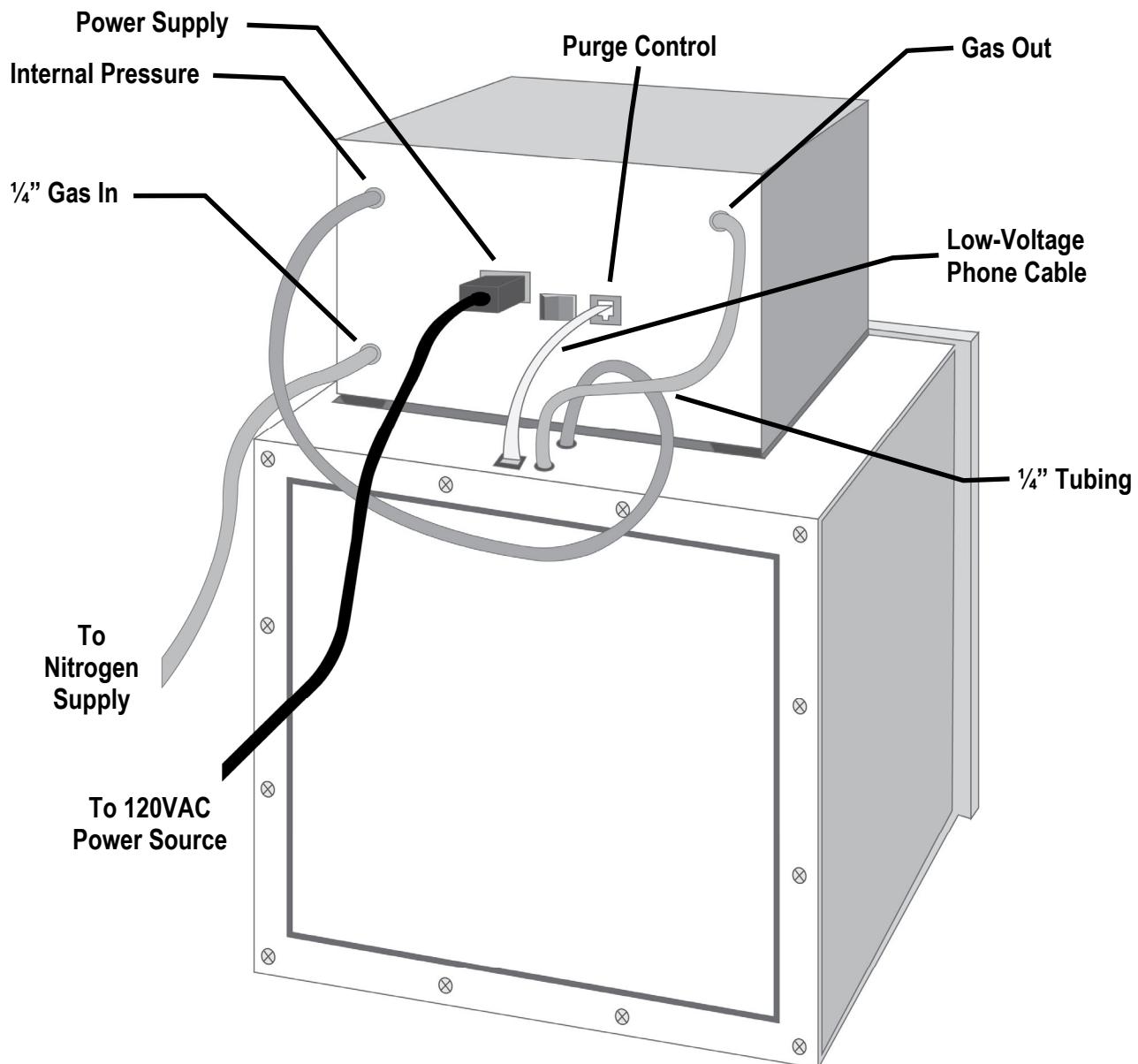
1. Thread the hex nipple into the opening on the side of the desiccator.
2. Hand-tighten the flowmeter onto the other end of the hex nipple.
3. Use the brass male connector to attach 1/8" tubing to the gas inlet on the back of the flowmeter.





## 4.2 Dual Purge™ Set-Up (Rear View)

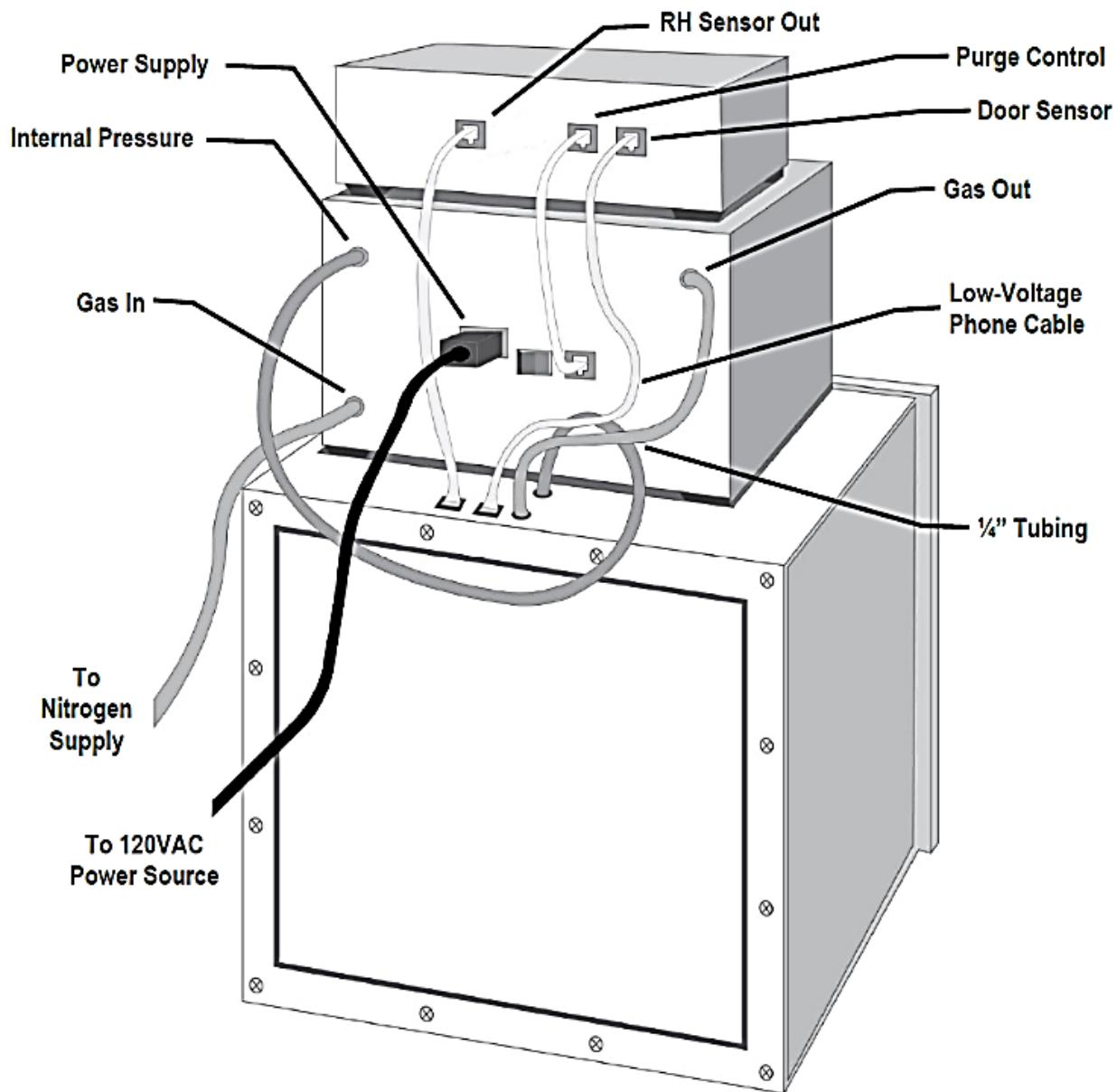
1. Use  $\frac{1}{4}$ " tubing to connect the Internal Pressure inlet and Gas Out port to the desiccator as shown.
2. Use the low-voltage phone cable to connect the Purge Control to the desiccator.
3. Connect the nitrogen supply to the Gas In port on the Dual Purge using  $\frac{1}{4}$ " tubing.
4. Use the power supply cable to connect the Dual Purge to a 120VAC outlet.





## 4.3 Smart® IsoDry® Nitro-Watch™ Set-Up (Rear View)

1. Use  $\frac{1}{4}$ " tubing to connect the Internal Pressure inlet and Gas Out port to the desiccator.
2. Use a low-voltage phone cable to connect the two ports labeled "Purge Control" on the Nitro-Watch™ and Dual Purge.
3. Use another low-voltage phone cable to connect the Nitro-Watch™ "Door Sensor" port to the desiccator.
4. Use a third low voltage phone cable to connect the Nitro-Watch™ RH Sensor port to the matching port on the desiccator.
5. Connect the nitrogen supply to the Gas In port on the Dual Purge using  $\frac{1}{4}$ " tubing.
6. Use the power supply cable to connect the Dual Purge to a 120VAC outlet.





## 5. RH Controller Operation

### 5.1 Flowmeter Operation

Set the flowmeter to between 5 and 20 SCFH (depending on desiccator size and moisture requirements). Connect ¼" tubing from externally-regulated gas source (20 – 40 psi, depending on desiccator size) to flow meter inlet. Push tubing in for connection; to release, depress connector ring and pull tubing out.

For these reasons, Terra recommends the Dual Purge system for more efficient nitrogen control, and the NitroWatch system for automatic %RH set point control.

### 5.2 Dual Purge™ Operation

1. **Zero Calibration:** This routine is run before shipping to ensure that the pressure sensor that activates the Low Pressure Alarm is properly calibrated. You need to run the routine only if the Low Pressure Alarm is activated even though the Dual Purge is connected to a nitrogen supply with at least 5 psi of pressure.

To perform the zero calibration routine, disconnect the incoming gas supply line. (Any pressure on the internal pressure transducers while this routing is run will be subtracted from the reading during normal operation, resulting in incorrect low-pressure alarms.)

Press and hold SET and UP buttons while turning on system power. The display will indicate "CAL" and then automatically set the zero value.

2. **Initial Programming:** Turn ON the Dual Purge System while depressing SET (the left button on the front control panel). Each time you release and then press and hold the SET button, you will advance through the following control functions. Use UP/DOWN to change default settings (shown in parentheses):

**Prg 1**    Purge Delay (minutes): No. of minutes high purge remains active after door is closed (default: 0)

**Prg 2**    Purge Delay (seconds): No. of seconds that the high purge remains active after door is closed (default: 5). If operating the Dual Purge without a NitroWatch, you should increase this setting to 60.

**door**    No. of seconds a door must remain open to activate OPEN DOOR alarm (default: 60)

**beeP**    State of the BEEPER enable (default: ON)

**Glo**    Activates GLOVE BOX control mode—Press UP to turn ON and proceed to glove box pressure setting, DOWN to turn OFF (default: OFF). In GLOVE BOX mode, this setting lets you adjust the pressure (milli-inches WG) at which the high purge is activated (default: 0.2). See “zero calibration” above.

**DonE**    Settings are complete; press SET once more to begin operation.

**Made a mistake?** To reset the system, turn the system OFF while in setup mode and restart while holding the SET button.



3. **Operation Display Functions:** After completing initial programming, press the specified button to view these operating conditions:

**High Purge Bypass: Press and hold SET**

In some applications (especially using fine powders in a glove box), you may wish to deactivate the high purge function, which could create turbulence. To do so, press DOWN while holding SET. To activate high purge, hold UP while holding SET.

**Incoming Line Pressure: Press and hold UP (displays line pressure in PSI)**

Turn the pressure regulator (the round knob on the right side of the Dual Purge control panel) until the pressure gauge reads 30 psi (for bench-top desiccators) or 40 psi (for larger standing desiccators). Note that regulator knob is cross-threaded: rotate clockwise to open the valve and increase pressure, or counterclockwise to close the valve and reduce pressure. For safe operation, pressure should be externally regulated below 70 psi.

**Internal Pressure: Press and hold DOWN (displays internal cabinet pressure in milli-inches of WG)**

The Dual Purge System includes a flowmeter, which provides a continuous low-level purge to maintain a constant positive pressure inside the cabinet. The flowmeter also ensures uninterrupted nitrogen flow if power or system electronics ever fail.

If continuous purging is desired, open the flowmeter to 5 – 10 SCFH (depending on chamber size). This is recommended if you require a very low humidity set point (less than 10%RH) or if doors are frequently opened. Continuous purging will tend to drive the %RH level very low.

If continuous purging is not required, close the flowmeter. The Dual Purge System will initiate a gas purge only when an access door is opened or when the humidity level climbs above the set point (if your system includes a NitroWatch).



**NOTE** On systems with very large plastic access doors, a continuous purge can cause temporary door deflection and gas leakage. This condition does not indicate a permanent leak and generally does not damage the cabinet. When pressure is removed, doors return to their natural position and re-establish an effective seal. This deflection does, however, result in nitrogen waste and indicates the need to reduce the flowmeter setting.

**Purge Timer: Press and hold UP and DOWN simultaneously** to review the number of seconds the high-flow purge is active after a door is closed. To change this value, see "Initial Programming" above.

**"Hi" Indicator** indicates that the Dual Purge System is in high-purge mode (you will see at least one bar to the right of this display, which indicates an internal positive pressure).

**Flashing "Lo Pres"** indicates the absence of incoming line pressure. Check the line for proper connection, and check the nitrogen source to ensure to ensure incoming flow.



## 5.3 Smart® IsoDry® NitroWatch™ Operation



The NitroWatch draws its power from the Dual Purge System and will not operate unless the Dual Purge System is plugged in and turned ON.



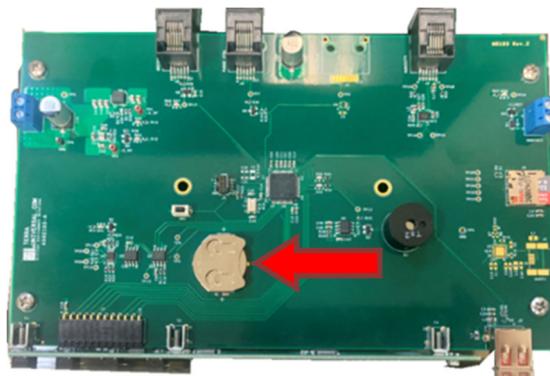
The Smart® IsoDry® Nitro-Watch™ uses a CR2032 coin cell battery to keep time while power to the system is off. The battery needs to be added to the circuit board before system start up. If no battery is present the system will not keep time when the system is powered off and the system time will need to be set again when the system is turned on.

### 5.3.1 Battery Insertion

1. Unfasten the screws on both sides of the Nitro-Watch™ Controller to remove the cover.



2. Remove the cover to expose the circuit board.
3. Insert the battery into the battery holder.



4. Reattach and secure the cover over the circuit board.
5. Begin System Configuration process.

### 5.3.2 Initial Programming

Turn ON the Dual Purge System while holding down the SET button on the Smart® IsoDry® Nitro-Watch™ control panel (the left button on the front control panel).

Press the UP/DOWN arrow to navigate through the system menu and SET button to accept the values. Press the ESC button to clear the inputted value for the current menu item back to default and return to the previous menu item.



This adjustable offset value will wrap around if the maximum or minimum is exceeded. For example, if you try to set the adjust value above the maximum scale offset of 49.5, the value will wrap around to -50. Also, a side effect of using an offset value other than zero is that the R/H range will be reduced. For example, if the offset value is -10, then the maximum R/H value that can occur is 90 because the input value (100) will be added to the adjust value before the system uses it.

**Adjust Humidity Set Point:** After completing initial programming, press the SET button to view the current % RH set point (default setting: 15%). Use the UP/DOWN keys to change this set point. Press SET again to save the new set point value.

**Beeper Silencing:** Press ESC button to temporarily deactivate the alarm beeping sound. The screen will still show the alarm is active, but the sound will be muted.

### 5.3.3 System Configuration Menu

Display	Description	Function	Unit	Default	Active Keys
DR ALARM	Door Open Alarm Delay (Door Sensor Only)	The number of seconds the door remains open before the alarm.	Seconds: 0-255	10	UP/DWN to increment/decrement sub-menu values SET to accept values and jump back to main menu
DR DELAY	Door Delay (Door Sensor Only)	The number of seconds to activate the purging after the door is open.	Seconds: 0-255	0	UP/DWN to increment/decrement sub-menu values SET to accept values and jump back to main menu
RH ALARM	RH Purge Alarm Delay	The number of seconds the RH level must remain above (or below for HUMEX mode) the set point to activate the alarm.	Seconds: 0-255	10	UP/DWN to increment/decrement sub-menu values SET to accept values and jump back to main menu
BEEP	Beeper Used for Alarms	Alarm	X	ON	UP/DWN to toggle between ON/OFF
HUMEX	Humex Mode	"OFF" maintains below ambient humidity (standard Nitro-Watch™ functionality). "ON" maintains above ambient humidity.	X	OFF	UP/DWN to toggle between ON/OFF
RH CAL	RH Calibration	Turn ON/OFF the calibration algorithm for the humidity sensor calculation.  <b>Note:</b> the Nitro-Watch™ sensor operates at an accuracy of ±1.5% RH without any calibration required. However calibration may be performed using the calibration settings if the user wishes to calibrate based on a reference device.	X	OFF	UP/DWN to toggle between ON/OFF
A	Calibration Parameter	-These parameters are coefficients and intercepts for an equation to calibrate the RH sensor's readings and compensate for measured discrepancies. If RH CALIBRATION is ON, allows cubic equations for A term. -If OFF, then skip.	(-99.99999, +99.99999)	0	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to increment/decrement within each digit SET to save and move to the next digit SET after last digit to save and move to next menu item ESC to cancel action and jump back to sub-menu #1
B	Calibration Parameter	-These parameters are coefficients and intercepts for an equation to calibrate the RH sensor's readings and compensate for measured discrepancies. If RH CALIBRATION is ON, allows cubic equations for B term. -If OFF, then skip.	(-99.99999, +99.99999)	0	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to increment/decrement within each digit SET to save and move to the next digit SET after last digit to save and move to next menu item ESC to cancel action and jump back to sub-menu #1



C	Calibration Parameter	-These parameters are coefficients and intercepts for an equation to calibrate the RH sensor's readings and compensate for measured discrepancies. If RH CALIBRATION is ON, allows the user to set the cubic equations for C term. -If OFF, then skip.	(-99.99999, +99.99999)	0	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to increment/decrement within each digit SET to save and move to the next digit SET after last digit to save and move to next menu item ESC to cancel action and jump back to sub-menu #1
D	Calibration Parameter	-These parameters are coefficients and intercept for an equation to calibrate the RH sensor's readings and compensate for measured discrepancies. If RH CALIBRATION is ON, allows the user to set the cubic equations D term. -If OFF, then skip.	(-99.99999, +99.99999)	0	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to increment/decrement within each digit SET to save and move to the next digit SET after last digit to save and move to next menu item ESC to cancel action and jump back to sub-menu #1
DATA LOG	Data Logging Interval (SD card logs humidity only and door open or closed events must be logged as they occur.)	The time interval at which data is logged to the system's memory. For example, data logging set at 10 means the data will be logged every 10 seconds.	1 SEC, 10 SEC, 30 SEC, 1 MIN, 5 MIN, 1 HOUR	1 MIN	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to toggle between allowed values SET key to accept values and jump to main menu ESC to cancel action and jump back to sub-menu #1
DATE FMT	Date Format	The format in which date is inputted and logged in data logging.	DMY/MDY	MDY	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to toggle between allowed values SET to accept values and jump to main menu ESC to cancel action and jump to main menu
SET DATE	Input Date	The user inputs the current date, in the format selected from the date format menu option. Display will show "MM.DD.YYYY" as default. Underscore "_" indicates the current field selected for input i.e. "12._M.YYYY"	MM.DD.YYYY	MM.DD.YYYY	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to toggle between allowed values SET to move from one field to the next (i.e. MM to DD) SET to accept values after last field and jump to main menu ESC to cancel action and jump to main menu
SET TIME	Input time in 24 hour format	The user inputs the time in 24 hour format. Display will show "HH:MM" as default. Seconds are always assumed to be 00 when entering a time.	HH:MM	HH:MM	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to toggle between allowed values SET to move from one field to the next (i.e. HH to MM) SET to accept values after last field and jump back to main menu ESC to cancel action and jump to main menu
TEMP	Temperature Units	The units in which temperature is logged.	C/F	F	UP/DWN to navigate within sub-menu #1 SET to jump to sub-menu #2 UP/DWN to toggle between allowed values SET to accept values and jump to main menu ESC to cancel action and jump to main menu

The Nitro-Watch™ will now activate high-flow purging whenever the %RH level inside the desiccator exceeds the specified set point. Your desiccator is ready for operation.



CAUTION

Installation of at least one Terra Automatic RB Valve (Cat. #1600-60B) is required to protect against permanent damage to seals and doors.



NOTE

If the Dual Purge System remains at high-level purge, or if it frequently fluctuates between high and low-level purge, you need to increase your flowmeter setting. Increase the flowmeter setting until the humidity level falls a few percent below your set point. At this flowmeter setting, the system will be able to maintain the desired humidity while on the low-level purge—and save nitrogen.



WARNING

As you increase the flow, the internal positive pressure will also increase. You may safely increase this pressure as high as .3" WC as long as the chamber incorporates Automatic RB Valves, which automatically protect against the possibility of warping or explosion.



NOTE

Because the humidity sensor is exposed to moisture during shipping, the system must generally operate for a couple of days in a dry nitrogen environment before the sensor dries out and delivers completely accurate readings.



## 6. Desiccator Service and Maintenance



- 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.

### Acrylic and Static-Dissipative PVC Desiccators

Both acrylic and static-dissipative PVC desiccators should be periodically cleaned with clean, lukewarm water and a clean nonabrasive cloth. If desired, a mild, non-abrasive detergent may also be used. Use only light pressure when cleaning.

If the outside of the acrylic is exceptionally dirty or gritty, rinse the surface first by lightly swabbing a saturated cloth over the surface and allowing surfactants to drain away. Avoid rubbing dirt or grit into the surface. Turn the cloth often and replace with a clean cloth frequently. Dry the acrylic by blotting gently with a clean, dry cloth.

If you clean the inside of a desiccator with water, you should dry the inside surface thoroughly and then purge the cabinet with nitrogen for several hours before reintroducing moisture-sensitive stored materials.

### Special Care of Static-Dissipative PVC Plating

Although static-dissipative PVC has greater tensile strength than acrylic, it is not as rigid, and so it tends to bow if not supported adequately. For this reason, you should not stack static-dissipative PVC desiccators or place heavy objects on top of them. These desiccators should also be kept away from temperature extremes; avoid prolonged exposure to temperatures over 80 degrees Fahrenheit. Always avoid scratching the surfaces.

### Stainless Steel Desiccators

Stainless steel should always be cleaned with alcohol (or similar cleaning agent) and a damp cloth.

### Desiccator Door Replacement

Under normal operating conditions, desiccator doors should operate for years without warping, particularly when doors are equipped with stainless steel frames. Even if some warping should occur, the Dual Purge System and Nitro-Watch™ will ensure that the desiccator maintains a positive internal pressure.

If your desiccator should experience warping, you need to determine the cause before replacing the door. Check to make sure that the Automatic RB Valve is operating properly. Ensure that the incoming pressure from the nitrogen source does not exceed 100 psig.

Users are responsible for replacement and installation. Call Terra Universal for any required replacement doors (we will need the model number, which is printed on a label affixed to the lower right side of every standard TUI desiccator).

To replace a door, simply remove the screws that hold the door in place, remove the old door and install the new one. The back panel is similarly secured by a number of screws; make sure that you do not overtighten these, or the door may be damaged.

After replacing the door, you may need to realign the desiccator doors to ensure an adequate seal; refer back to **Section 4 - Installation**.

### Testing and Replacing the Nitro-Watch™ Humidity Sensor



If a discrepancy is observed between the displayed %RH and that of an independent humidity calibrator, the humidity scale can be compensated accordingly (refer to the programming instructions on page 12).

The humidity sensor does not require calibration. The sensor should be tested periodically and replaced as necessary (about every 5 years under normal use).



## 7. 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 desiccator with the Dual Purge System and NitroWatch, 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 Dual Purge System is plugged into an appropriate outlet and that the two telephone cables to the Nitro-Watch™ and desiccator are properly connected.
2. Make sure that the power switch of the Dual Purge System is in the ON position.
3. Check the fuse of the Dual Purge System. The 2 amp fuse, mounted on the circuit board controller, is accessible once the stainless steel housing cover is removed.

**PROBLEM:** System stays in high purge at all times.

**POSSIBLE SOLUTIONS:**

1. Make sure that the doors are sealing properly and that the sensor switches are making contact. (See alignment procedure on pg. 3.)
2. If your system incorporates a Nitro-Watch™ and you require a very low humidity level, you may need to increase the flowmeter setting on the Dual Purge System to provide more than 0.1" WC internal pressure.
3. You should increase the flowmeter setting until the system maintains a humidity level a few percent below the humidity set point without switching to the high-level purge. Remember, though, that the Dual Purge System should be able to maintain the humidity level you require with a low-level purge as long as access doors remain closed.
4. If you are operating a large desiccator and require a low humidity level, your system may need to operate on high purge much of the time to compensate for the hygroscopic characteristics of the acrylic (or static-dissipative PVC) desiccator walls. These materials absorb moisture from outside of the desiccator and pass it inside. The higher the difference between the external and internal humidity levels, the more nitrogen you will need in order to remove this moisture. Yet if you operate on high-flow purge most of the time, you consume large amounts of nitrogen and run the risk of pressure build-ups.



**PROBLEM:** The system constantly switches between high and low purge.

**POSSIBLE SOLUTIONS:**

1. Make sure that all access doors are closed and that all sensor switches are making contact. Check door seals for leaks.
2. The flowmeter is set too low. Increase the flow and make sure you maintain at least 0.1" WC or more internal pressure. This is especially important if our system incorporates a Nitro-Watch™ and you have established a low humidity set point. You should increase the flowmeter setting until the Dual Purge System maintains a humidity level a few percent below the set point without switching to the high-level purge.

**PROBLEM:** The desiccator is leaking.

**POSSIBLE SOLUTIONS:**

1. Check the condition of the gasket on the desiccator. If it is cracked or peeling, call Terra for a replacement.
2. Check door alignment ("Set-Up"). Leaks may develop if doors are out of alignment, a condition that's easy to remedy.

**PROBLEM:** Line pressure gauge does not display any pressure, or displays the "Low Pressure" alarm at all times.

**POSSIBLE SOLUTIONS:**

1. Supply gas is down, or for some reason is not reading the Dual Purge system. Check your supply line for kinks or blockage.
2. If your gas system utilizes a filter, it may be clogged and need to be replaced.
3. Check the line pressure regulator to make sure it is not closed
4. Run the "Zero Calibration" routine described in Section 3.2.



**PROBLEM:** The Nitro-Watch™ delivers an obviously incorrect humidity reading.

**POSSIBLE SOLUTIONS:**

1. Disconnect and then reconnect the low-voltage cable connecting the humidity sensor to the Smart® Nitro-Watch™ module.
2. Check the sensor connection to the rear panel of the control module.
  - a. If the connection is good and the unit still fails to deliver an accurate reading, contact Terra Universal.

**PROBLEM:** The Nitro-Watch™ delivers a low-pressure alarm.

**POSSIBLE SOLUTIONS:**

1. Turn off the Dual Purge system using the back switch.
2. Disconnect the N<sub>2</sub> gas line.
3. Open the flowmeter and regulator.
4. Simultaneously press and hold the "Set" and "Up" buttons while turning on the Dual Purge system. The display will show "CAL". Press "Set" to proceed to the next setting.
5. Set under the "CAL" menu,
  - a. "Prg1" to 0 minutes
  - b. "Prg2" to 5 seconds
  - c. "Door" to 60
  - d. "Beep" to ON
  - e. "Glov" to OFF
6. Re-connect the N<sub>2</sub> gas line, set the flowmeter to 7 SCFH, and set the regulator to 30 psi.



## 8. Specifications



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

NOTE

### Acrylic Desiccators

The acrylic used in Terra desiccators is more rigid than acetates or vinyls, and is much more resistant than glass to thermal shock. The tensile strength of this material is 10,000 PSI at room temperature; however, when continuously loaded, imposed loading should not be allowed to exceed 750 PSI. The desiccator is rated for operation in an environment with temperatures between 32°F (0°C) and 104°F (40°C) and a relative humidity of up to 92%.

Exposure to direct sunlight may cause the material to warp and distort. Therefore, any acrylic desiccator should be kept out of direct sunlight.

The self-ignition temperature is 830 degrees Fahrenheit (443 degrees Celsius) measured in accordance with ASTM D-1929. The products of combustion, when sufficient air is present, are water and carbon dioxide. However, as with many other common combustible materials, when sufficient air is not present during combustion, toxic carbon monoxide will be produced.

### Static-Dissipative PVC Desiccators

Static-dissipative PVC features surface resistance between 106 and 108 ohms/square—much less than that of other treated plastics. Tests show that when 10KV is applied to the surface, electrostatic potential remains less than 15V, and static decay time is less than 1 second. And because this plating offers such effective static dissipation, it will not attract dust or other contaminating particles that could damage sensitive microelectronic components.

In a test conducted in accordance with Mil-B-81705B, the plating was conditioned for 24 hours at a relative humidity of 12% and a temperature of 70 degrees F. The sample exceeded the 2.0 second static decay requirement to zero as specified; in fact, it had a decay time of 0.01 seconds for each measurement taken! It had a surface resistivity of 1.7 x 10<sup>7</sup> ohms per square on one side and 2.8 x 10<sup>7</sup> on the other.

This plating is also durable. It features superb resistance to UV radiation; tests have indicated no loss of static protection after 500 hours of continuous exposure to a fadeometer. In temperature tests, it maintained its dissipative properties after 100 cycles of temperature fluctuations from -5°C to 60°C. It is also completely noncombustible.

The plating also offers all of the chemical-resistance of standard PVC plating. It remains unaffected by a wide range of chemical solutions.

### Stainless Steel Desiccators

These desiccators are constructed of either 304 or 316 stainless steel, with a No. 2B or No. 4 mill finish. The stainless steel can optionally be electropolished, which removes surface irregularities to create an ultra-smooth surface. Viewing windows are typically made of static-dissipative PVC, but some models are available with tempered glass.

### Gaskets



Terra desiccators use one-piece neoprene gaskets and are mechanically attached to door frames without the use of adhesives or other materials that could outgas.

### Flowmeter

Operating Temperature:

Flow Rate: 0–20 SCFH

Line Pressure Gauge: 0–60 psi

Open Door Alarm: Factory set at 60 seconds (adjustable)

Inlet/outlet: 1/4" OD polyethylene tubing

Case Material: Stainless steel; chrome-plated or stainless steel internal fittings

Timer Adjustment: Factory set at 60 seconds (adjustable 0 - 8 minutes)

Internal Positive Pressure: 0-0.4"WC

### Dual Purge System

Operating Temperature:

Overall Dimensions: 12"W x 11.25"D x 7"H

Weight: 16 lbs.

Power Requirement: 120/220 VAC, 50/60 Hz, 2 Amp

Universal power supply requires no switch settings.

Degree of Protection: IPX0

### Nitro-Watch™

Operating Temperature:

Dimensions: 9"W x 5.5"D x 2.5"H

Power Requirements: 12 VDC (from Dual Purge)

Sensor Dimensions: 4.385"W x 1.5"D x 0.89"H

Case Material: Stainless steel

Display: 3½ digit LED display

Electrical Connections: Phone-Jack

Output: 0-5 V

Measuring Range: 0-100% RH

Accuracy (at 20° C): ± 1.5% RH

Display Resolution: ± .1% RH

Temp. Dependence: ± .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).

### Automatic RB™ (Relief/Bleed) Valve

Operating Temperature:

Dimensions: 0.43"W x 0.43"D x 1.5"H

Material: Styrene-acrylonitrile (SAN) resin



## 9. 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](http://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.

**All Claims:** Terra Universal expressly disclaims all other warranties, expressed or implied or implied by statute, including the warranties of merchantability or fitness for intended use. Terra Universal is not responsible for consequential or incidental damages arising out of the purchase or use of the products supplied by Terra Universal. Terra Universal is not liable for damage to facilities, other equipment, products, property or personnel of others, or of their agents, suppliers, or affiliated parties, which is caused or alleged to have been caused by products supplied by Terra Universal. In any event or series of events, Terra Universal's total liability for any and all damages whatsoever is limited to the lesser of the actual damages or the original invoice cost of the items alleged to have caused the damage. The customer's sole and exclusive remedy for any cause of action whatsoever is repair or replacement of the non-conforming products or refund of the actual purchase price, at the sole option of Terra Universal. All claims must be made in writing within 90 days of the date the product was shipped. Any claims not made within this time limit shall be deemed waived by the customer. Terra Universal is not responsible for any additional costs of repair caused by poor packaging or in-shipment damage during return.

**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!*