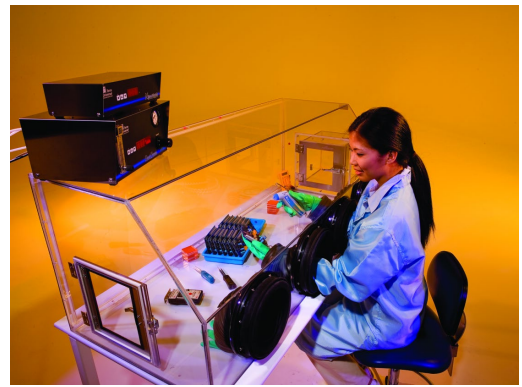


Installation & Operation Manual *Document No. 1800-42*
Series 100 Glove Box



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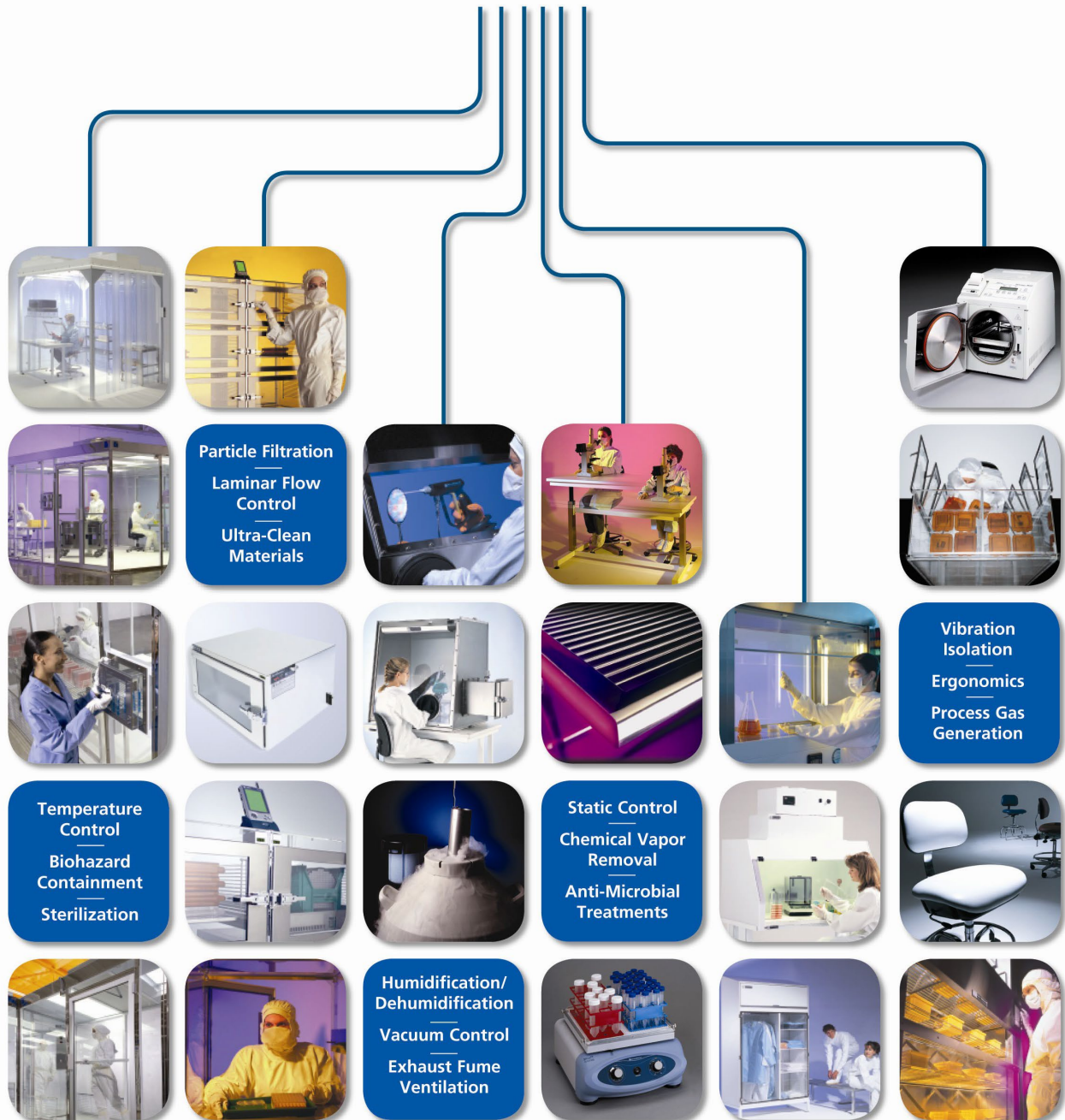




Table of Contents

Section 1.0 – Introduction

Section 2.0 – Description

Flowmeter	4
Automatic Relief/Bleed (RB) Valve.....	4
Dual Purge™ System.....	4
Dual Purge System w/ NitroWatch® or DewWatch™ Modules	5
Closed-Loop Filtration	6
Open-Loop Filtration	6
Internal-Mount (In-Unit) Filtration	6
IonBar Ionizing Bar.....	6
Air Locks	6
Glove/Sleeve Combinations	7
Glove Port Covers.....	7
Cord Port.....	7
Multi-Outlet Power Strip	7

Section 3.0 – Installation

Glove Box Base Unit (with or without Flowmeter; filtration module):	8
Glove Box with Dual Purge System (w/o NitroWatch):.....	10
Glove Box with Dual Purge System and NitroWatch module:	13
DewWatch Setup	16

Section 4.0 – Operation

Glove Box Base Unit (without Flowmeter):.....	17
Glove Box Base Unit (with Flowmeter):.....	17
Glove Box with Filtration Module.....	17
Glove Box with Dual Purge System.....	17
Instructions for NitroWatch Module	19
Use of Glove Box with Oversized Internal Equipment.....	19

Section 5.0 – Maintenance

Cleaning.....	20
Installing/Removing Gloves.....	20
To Replace Whole-Molded Gloves:.....	20
To Disassemble/Reassemble Modular Gloves:.....	22
To disassemble the glove assembly:.....	22

Section 6.0 – Troubleshooting.....	23
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Section 7.0 – Warranty	25
-------------------------------------	-----------

Section 8.0 – Related Products	26
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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 presents information on installing and operating the Terra Series 100 Plastic Glove Box, either as a base unit or in combination with any of the many product enhancements available to best serve your processing needs.

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

Related Manuals – Available for download from www.TerraUniversal.com:

- Glove and Sleeve Installation (Doc. No. 1800-43)
- Filtration/Recirculation Modules (Doc. No. 1800-06)
- IonBar™ Ionizing Bar (Doc. No. 1800-45)

2.0 Description

Terra's Series 100 Glove Boxes provide a clean, humidity-controlled environment for a variety of critical assembly and inspection procedures. Their modular design allows for an assortment of options to suit your specific requirements. They are constructed of lightweight, transparent materials and feature all solvent-welded seams (with the exception of polypropylene, which uses fasteners) to ensure a tight seal that won't outgas. Santoprene gaskets on the side doors and removable back panel provide a safe, positive-pressure seal while allowing full access to the internal chamber to insert or remove materials or equipment. The side doors open inward with ergonomic LiftLatches to allow an operator to pass materials in to and out of the glove box easily.



Figure 1: Single-model (two glove ports) Series 100 Glove Box



Series 100 Glove Box

The Series 100 Glove Box maintains positive-pressure for a clean, low-humidity environment. It comes in five different materials and as a single or double model. Acrylic is suitable for general applications, but its static-generative properties and susceptibility to damage by a wide range of chemicals makes polyvinyl chloride, or PVC (either dissipative or non-dissipative), preferable in many cases. Polycarbonate is available for uses involving thermal stress. Polypropylene offers greater chemical resistance.

This glove box features two 1/8" pipe-tapped ports at the rear of the top surface, one for feeding in the purge gas and one for monitoring the internal cabinet pressure. These ports allow you to control the gas flow into the glove box. You have the option of adding more options, described below, to enhance the control of the environment inside your Terra Series 100 Glove Box.

Flowmeter

For the administration of inert process gas into your glove box, a Flowmeter regulates the rate by which a process gas passes into the glove box. While generally installed with your order, a Flowmeter can be ordered as an aftermarket item and installed by the user, using Terra's fitting kit no. 1600-56, which includes a brass male connector (positioned at the Flowmeter inlet, directly behind the flow adjustment knob, for connection to the incoming gas line) and a hex nipple (which secures the Flowmeter to the "Gas In" port through the glove box wall).

It is recommended that customers requiring a Flowmeter also include Relief/Bleed (RB)[®] Valves, described below.

Automatic Relief/Bleed (RB) Valve

A necessity for any positive-pressure glove box installation, Terra's Automatic Relief/Bleed Valve – or RB Valve – ensures that the internal pressure of your glove box never reaches a level that could result in damage to the unit or injury to the user. This simple, elegantly-designed add-on automatically releases air from inside the glove box anytime the unit's internal pressure exceeds the valve's pre-set limit.



Operation of a Series 100 Glove Box in a positive-pressure application without an installed RB Valve may result in damage to the unit and/or injury to its user(s). To prevent this from occurring, Terra installs multiple RB Valves in pressurized chambers. The quantity depends on the chamber size.

Dual Purge™ System

The Terra Dual Purge System assists the user by maintaining a positive-pressure environment inside a glove box while making efficient use of the user's inert gas supply.

The Dual Purge System monitors the internal pressure of a glove box, feeding it a constant user-specified low-flow purge to maintain a positive-pressure environment that blocks out contaminants while economizing the gas supply. When the system detects a drop in pressure (such as when a door is

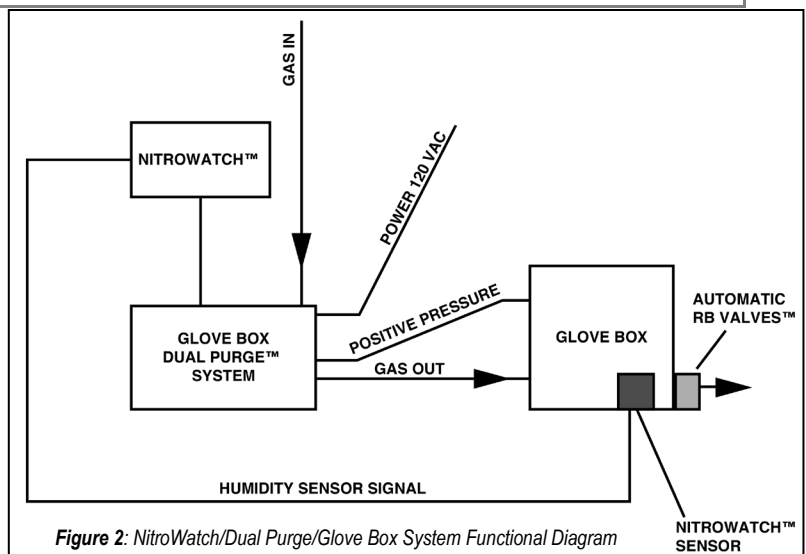


Figure 2: NitroWatch/Dual Purge/Glove Box System Functional Diagram



Series 100 Glove Box

opened), it automatically initiates a high-flow purge to help quickly return the system to a positive-pressure state while simultaneously flushing out any moisture or contaminants that might have entered the chamber. Once a positive-pressure environment is regained, the system switches back to its low-flow operation.

Features of the Dual Purge System include a Flowmeter and pressure regulator to control the incoming flow of gas, an internal positive pressure gauge to monitor the pressure inside the glove box, and a built-in pressure alarm, which provides audible and visible alarms when internal pressure falls below a user-defined point.

Dual Purge System w/ NitroWatch® or DewWatch™ Modules

Terra's Dual Purge System can be upgraded with the purchase of a NitroWatch System or a DewWatch module for additional environmental control capabilities. While the Dual Purge System still allows a user to automatically maintain a positive-pressure environment inside their glove box, the NitroWatch module enables the Dual Purge to monitor relative humidity levels as well, using the system's high-flow purging capabilities to flush out internal moisture until it reaches a user-specified sub-ambient RH level. The low-flow purge setting of the Dual Purge System then helps maintain the internal humidity levels, making efficient use of the gas supply. The DewWatch operates similarly to the NitroWatch but controls moisture by dew point.

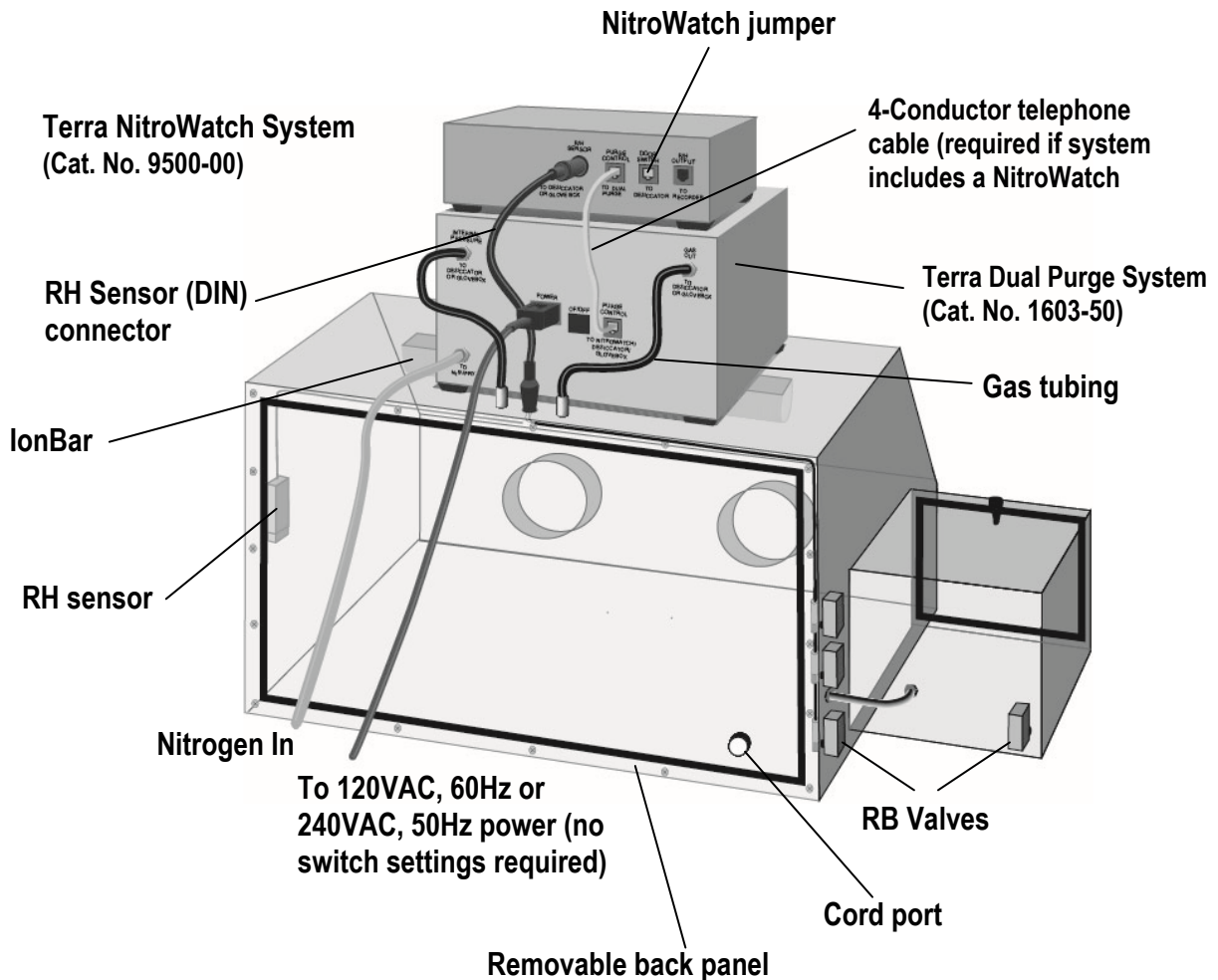


Figure 3: Rear view of Series 100 Glove Box Isolator, identifying components (representative diagram).
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Description (cont'd)

Both NitroWatch and DewWatch connect to the Dual Purge System via low-voltage cable, from which it both communicates with the Dual Purge System and draws its power; the NitroWatch and DewWatch require no external power connection.

Monitoring of the internal relative humidity is accomplished by a factory-installed sensor. This sensor can be calibrated by the user with the aid of a certified humidity measuring device.

NitroWatch and DewWatch feature 0-100% RH range with +/- 3% accuracy (at 60 degrees F), and an audible and visual alarm to notify users when humidity level increase above set threshold. No external power plugs are required.

Closed-Loop Filtration

Closed-loop filtration continuously draws air from the glove box to an externally-mounted filter to remove particulates, aerosols, spores, and other contaminants before directing the now-clean air back into the glove box. A four-position diverter valve gives the user the option of opening the filtration loop in order to draw in "fresh" air from outside the system.

Open-Loop Filtration

For applications where a clean environment is desired with little concern for humidity and pressure, in addition to the closed-loop (in-unit) filtration module detailed above, Terra also offers an open-loop filtration module. With an open-loop filtration module, the components of the system reside outside of the glove box itself, maximizing the internal volume available to the user.

A HEPA intake filter ensures that the air entering the glove box is 99.99% free of contaminants 0.3 um or larger. A similar HEPA filter screens the exhaust air, removing any contaminants picked up inside the enclosure to ensure that the air exiting the system is safe for indoor release. Both filters are housed in disposable Plexiglas housings that facilitate safe handling and disposal when in need of replacing.

Internal-Mount (In-Unit) Filtration

This in-unit HEPA filtration module circulates the air inside a glove box through an enclosed HEPA filter, effectively removing 99.99% of particles 0.3 um or larger. This module can be used alone or in conjunction with the Dual Purge or Dual Purge with NitroWatch configurations.

IonBar Ionizing Bar

To neutralize the static charges of an enclosure, the Series 100 Glove Box has the option of coming installed with an ionizing bar.

Air Locks

Air Locks can be mounted on either side of the chamber to provide a safe, practical way of moving materials into and out of the work area. Materials are loaded into the air lock by means of an external door; an operator then opens an internal door inside the glove box to bring materials into the work area. Each air lock features its own gas inlet, and Automatic RB Valve port.



Description (cont'd)

Glove/Sleeve Combinations

One piece glove/sleeve or two-piece combination glove/sleeve fit into the ports of Terra's glove boxes and atmospheric chambers for safe, easy handling of materials and can be adapted to work with any number of compatible glove types. For a complete list of compatible gloves, visit www.TerraUniversal.com

Modular glove/sleeve combinations ship standard with one pair of tempered latex industrial gloves (select desired size). Attachment clamps are included.

Glove Port Covers

This optional feature allows you to seal the system and then remove gloves for cleaning or change-out – while maintaining the integrity of the internal glove box environment. The port covers can be removed from the glove box, after use to maintain an uncluttered work environment.

Cord Port

This optional feature is built into the glove box at time of order, and provides a way for internal equipment to access electricity. Power cords are fed out of the hole in the lower rear panel, to nearby outlets.

Multi-Outlet Power Strip

Another way to make sure internal equipment has access to electricity is to install a multi-outlet power strip with on-off switch and surge protector. The cord for the power strip is fed out of the glove box through a small cord port, ready to plug into a nearby outlet.



3.0 Installation

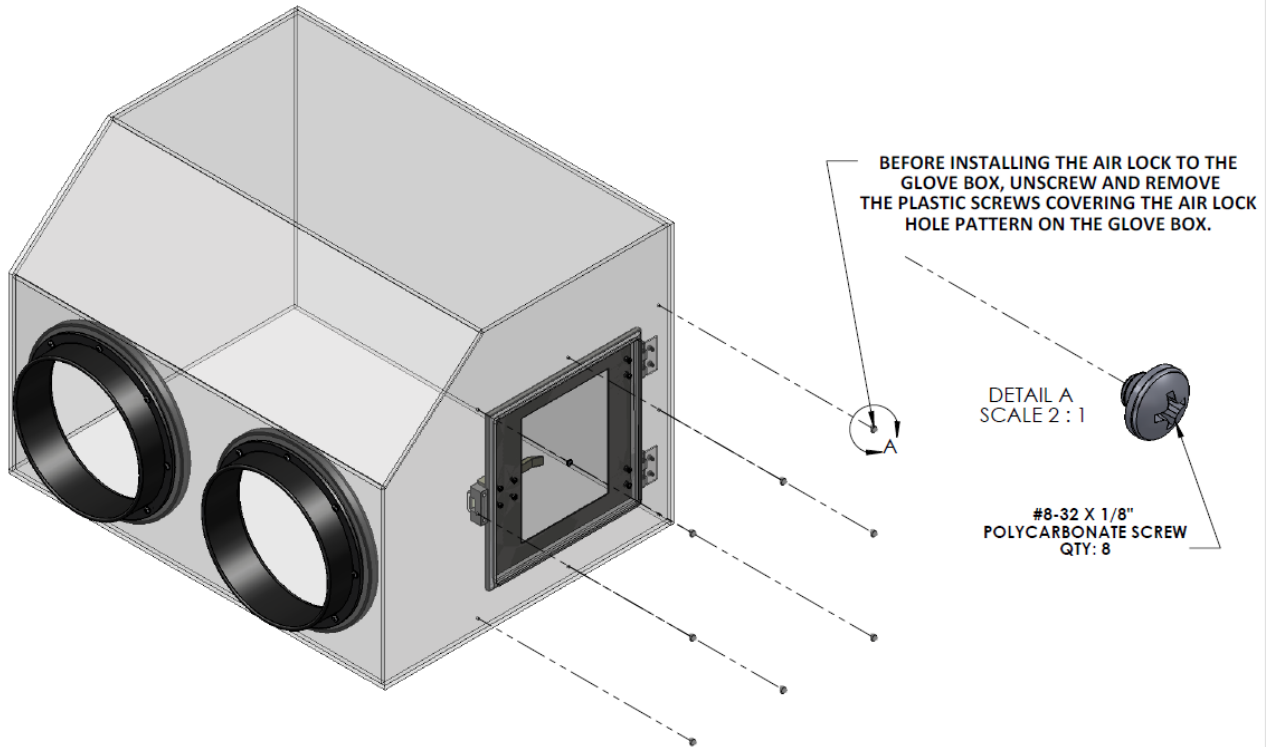
Glove Box Base Unit (with or without Flowmeter; filtration module):

Items you will need:

- Slotted screwdriver
- In-house gas supply, regulated to no more than 70 PSI (Flowmeter applications only).
- 110 VAC, 60 Hz or 220VAC 50/60Hz grounded power receptacle, as ordered (filtration module).

1. Uncrate your glove box, inspecting it for signs of damage. If damage is present, notify your shipping company immediately to process a damage claim.
2. Position your glove box on a level, stable surface, away from heat or chemicals that could damage it.
3. If a Flowmeter was ordered, make sure that it is securely installed near the top of the cabinet. Make adjustments as necessary to ensure that the fitting is secure.
4. If a filtration module was ordered, connect the equipment to an appropriate power source.
 - a. Set the Flowmeter between 5-20 Standard Cubic Feet per Hour (SCFH).
5. Attach your gloves (if they have not come pre-attached.) Reference the section titled "5.0 Maintenance – Installing/Removing Gloves" for more details.
6. Your glove box is now installed and ready for use.

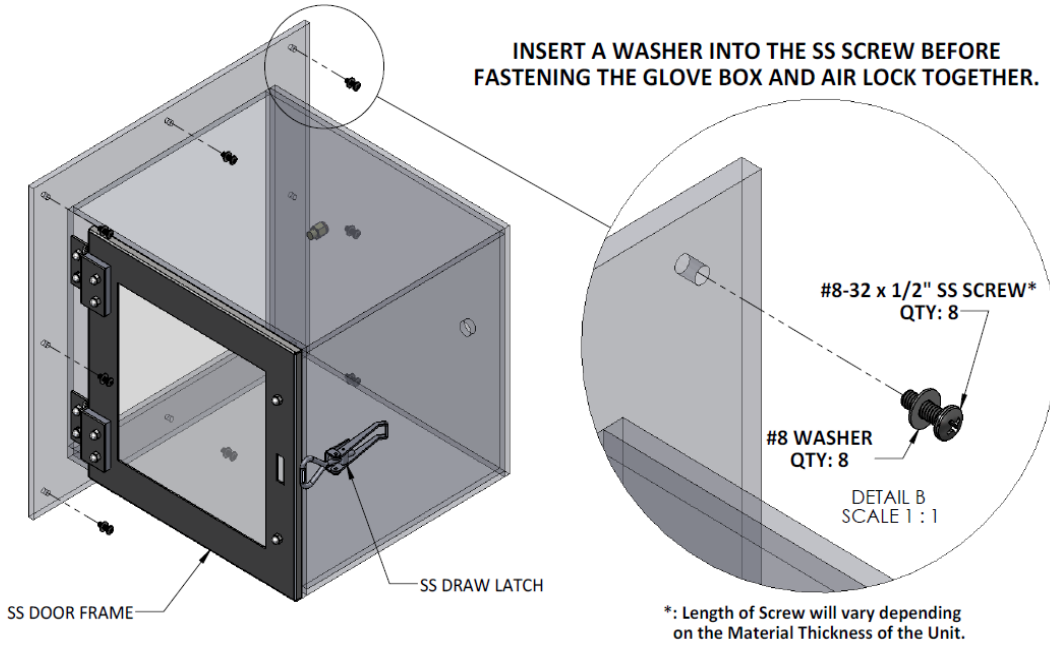
AIR LOCK INSTALLATION GUIDE



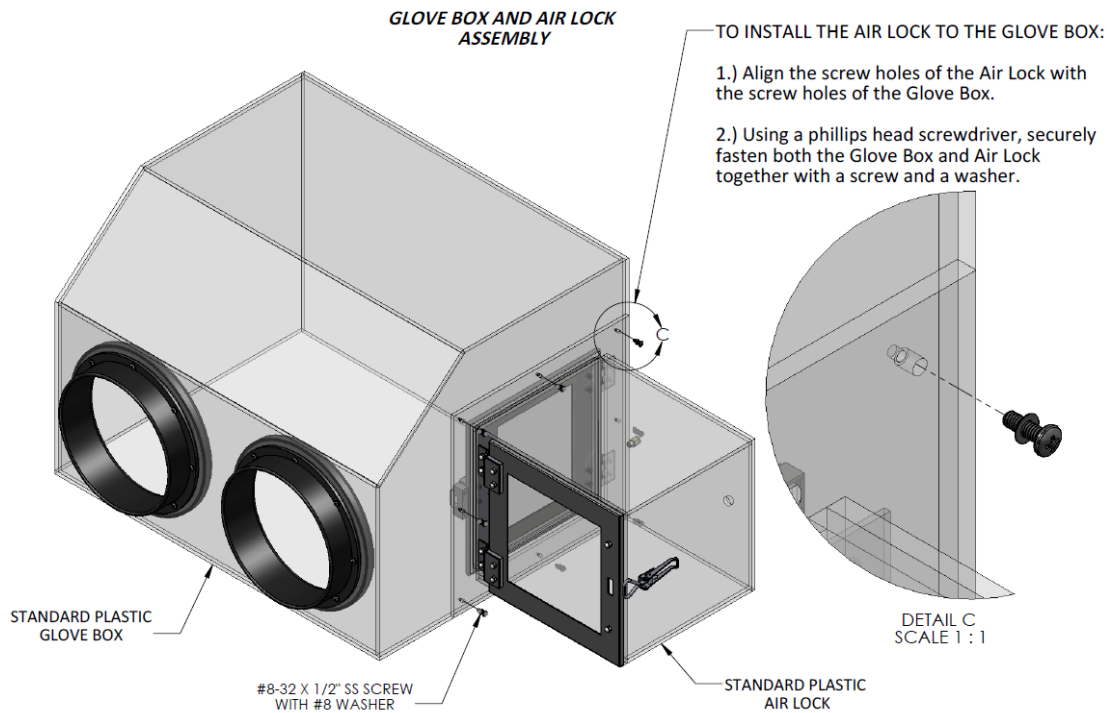


Series 100 Glove Box

PREPARING THE AIR LOCK FOR INSTALLATION.



GLOVE BOX AND AIR LOCK ASSEMBLY





Glove Box with Dual Purge System (w/o NitroWatch):

Items you will need:

- In-house inert gas supply, regulated to no more than 70 PSI.
- 110VAC, 60Hz or 220VAC 50/60Hz grounded power receptacle.
- 1/4" poly tubing, suitable for pressured gas distribution, and long enough for connection.



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

1. Uncrate your glove box, inspecting it for signs of damage. If damage is present, notify your shipping company immediately to process a damage claim.
2. Position your glove box on a level, stable surface, away from heat or chemicals that could damage it.
3. Attach your gloves (if they have not come pre-attached.) Reference the section titled "5.0 Maintenance – Installing/Removing Gloves" for more details.
4. Position the Dual Purge System within close proximity of your glove box. Terra suggests mounting the Dual Purge System on top of, or immediately to the side of, the glove box.
5. Plug the power cord of the Dual Purge unit into a grounded receptacle. The Dual Purge operates on 110VAC, 60Hz or 220VAC, 50/60Hz. No power switch settings are required.
6. Close the Dual Purge System's Flowmeter by turning its knob clockwise until tight.
7. Close the Dual Purge System's regulator by turning its knob counter-clockwise until loose.
8. Using cleanly-cut 1/4" poly tubing, connect the Dual Purge System's "Gas Out" port to the gas inlet fitting on your glove box. Accomplish this by pushing the end of the tubing into the fitting. Test is by gently pulling; it should not come out. Release the tubing by compressing the fitting's collar, and pulling on the tubing.
9. From the "Internal Pressure" port of your Dual Purge, run another length of 1/4" poly tubing to the other fitting on your glove box. See Figure 4 below for connection locations.
10. Perform **Initial Calibration** and **System Configuration**, per the instructions below.



Series 100 Glove Box

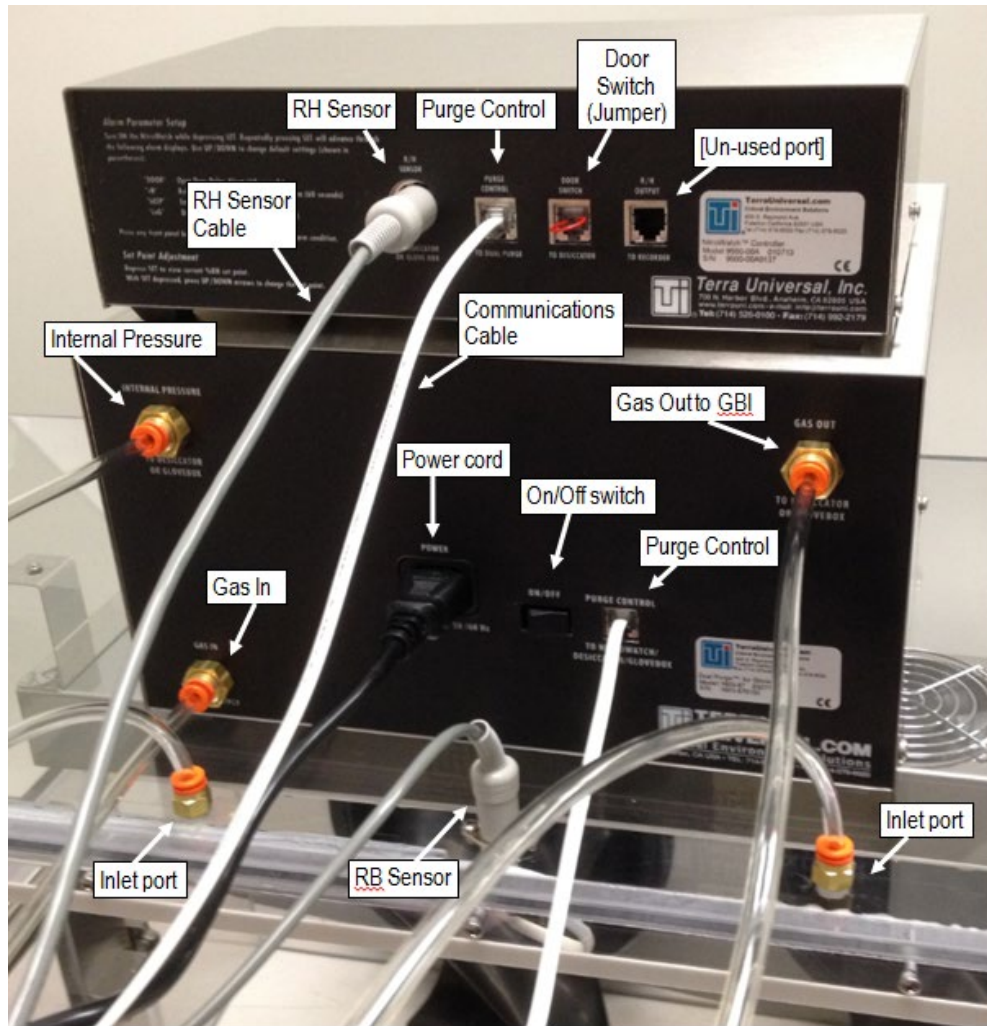


Figure 4: Rear of Dual Purge and NitroWatch Systems showing ports and connections.



Series 100 Glove Box

INITIAL CALIBRATION		DUAL PURGE SYSTEM
<p>While pressing and holding <i>both</i> the SET and UP buttons, turn the power to the Dual Purge System ON. The display will indicate “CAL.” Hold these buttons for three seconds before releasing.</p> <p>You will automatically be brought into “System Configuration” mode.</p>		
SYSTEM CONFIGURATION		DUAL PURGE SYSTEM
<p>While the Dual Purge System has been factory-configured to standard defaults – or, if requested at time of order, to customer specifications – the system can be reconfigured at any time to suit a variety of your operational needs.</p> <p>NOTE: INITIAL CALIBRATION brings you directly into the first setting criteria (“Purge Delay”) of System Configuration mode; there is no need to turn the system off as instructed below.</p> <p>To enter SYSTEM CONFIGURATION mode: Turn the Dual Purge System OFF. While pressing and holding <i>only</i> the SET button, turn the unit ON. The display will show “Prg,” for “Purge Delay,” the first settings to be changed.</p> <p>Change the settings by pressing either the UP or DOWN button. Accept setting changes and advance to the next setting by pressing the SET button. Changes made are automatically saved in the system. Holding the SET button before releasing it will display an abbreviated name for the setting you are about to advance into (i.e., “Prg” for “Purge Delay”).</p>		
Display	Description	Default
Prg	Purge Delay Measured in seconds, the purge delay is the amount of time that the high-flow purge process will remain active after the internal pressure has been restored. Settings can range from 0 – 255 seconds.	60
door	Open Door Alarm <i>Irrelevant in most glove box applications.</i> This setting specifies the number of seconds that a door must remain open before the built-in alarm is sounded. Settings can range from 0 – 255 seconds. Unless your glove box has been specifically ordered with a door sensor, skip this setting (press SET) as it will have no effect on your system’s operation.	60
beeP	Beeper Enable Toggles the audible alarm beeper ON or OFF.	ON
Glo	Glove Box Control Mode Though it was designed with the glove box in mind, Terra’s Dual Purge System can be used in a wide-variety of applications. Because of this built-in versatility, an option exists to disable its glove box-native programming. Toggling this feature OFF accomplishes this. <i>DO NOT alter this setting from the factory default unless you are trained to do so.</i>	ON
Press	Activation Pressure This setting allows you to adjust the pressure (in milli-inches WG) at which the high purge is activated. Settings can range from 0 – 255 milli-inches WG. (Setting not accessible when Glove Box Control Mode is toggled “OFF”)	20
DonE	Finish Press SET once more to begin operation.	
<p>Made a mistake? Simply turn the Dual Purge System OFF and re-enter System Configuration mode as described above.</p>		



Installation (cont'd)

11. After configuration, turn your Dual Purge System OFF. Your settings will be retained.
12. Connect your in-house gas supply to the "Gas In" port on the rear panel of the Dual Purge System via ¼" poly tubing. Refer to Figure 4 on how to operate the fittings.



For the safety of your personnel and equipment, your in-house gas supply should have a regulated pressure of 70 PSI max when using the Terra Series 100 Glove Box. Install a pressure regulator (not included) if your in-house gas supply exceeds this pressure.

13. Turn the pressure regulator of the Dual Purge System clockwise until the pressure gauge reads between 30 and 40 PSI (use more pressure for larger glove boxes with 4 arm ports).
14. Turn the Flowmeter counter-clockwise to the desired setting (between 5-20 SCFH is recommended).
15. Turn your Dual Purge System ON. After a few seconds, the high-flow purge should activate, quickly inducing a positive-pressure environment inside your glove box.
16. Your unit is now set up and ready for use. Proceed to the section titled "4.0 Operation" for additional operating instructions.

Glove Box with Dual Purge System and NitroWatch module:

Items you will need:

- NitroWatch Control Module
- Humidity Sensor w/ cable (installed in glove box at time of order)
- One (1) 5-ft low-voltage communications cable (included w/ NitroWatch)

1. Set up Glove Box with Dual Purge System as instructed under steps 1-14 in the above section titled "3.0 Installation – Glove Box with Dual Purge System (w/o NitroWatch)."
2. Connect the NitroWatch control module to the Dual Purge System with the supplied low-voltage communications cable. This cable will run from the "Purge Control" communications port on the NitroWatch to the "Purge Control" communications port on the Dual Purge System. Connect the RH Sensor cable's round DIN connector to "R/H Sensor" port on the NitroWatch. Refer to Figure 4 for connections.



NOTE

- The "Door Switch" port on the NitroWatch module comes factory-equipped with a jumper to facilitate glove box operation. Removal of this jumper affects the functionality of the unit.
- The "R/H Output" port on the NitroWatch module is rarely used in Glove Box applications.

3. Perform **NitroWatch Configuration**, as outlined below.



Series 100 Glove Box

SYSTEM CONFIGURATION		NITROWATCH MODULE
<p>Do not proceed with NitroWatch Configuration if you have not completed Step 1 above, and have successfully calibrated and configured the Dual Purge System for operation.</p> <p>To enter NITROWATCH CONFIGURATION mode: While the Dual Purge System is OFF, press and hold <i>only</i> the SET button on the NitroWatch module. While doing this, turn the Dual Purge System ON. The NitroWatch module will be in its configuration mode; the display will show “Door,” for “Open Door Alarm,” the first setting to that can be adjusted. Release the SET button.</p> <p>Change the settings by pressing either the UP or DOWN button. Accept setting changes and advance to the next setting by pressing the SET button. Changes made are automatically saved in the system. Holding the SET button before releasing it will display an abbreviated name for the setting you are about to advance into (i.e., “Door” for “Open Door Alarm”).</p>		
Display	Description	Default
door	<p>Open Door Alarm <i>Irrelevant in most glove box applications.</i> This setting specifies the amount of time, either seconds or minutes (see “Alr” setting below) that a door must remain open before the built-in alarm is sounded. Settings can range from 0 – 255. Unless your glove box has been specifically ordered with a door sensor, skip this setting (press SET) as it will have no effect on your system’s operation.</p>	60
rH	<p>High Relative Humidity Alarm Delay Amount of time, in seconds, that the relative humidity inside the enclosure must remain above the specified settings before the audible alarm is sounded. Allows the user the option of increasing or decreasing the amount of time the glove box has to return to the desired humidity levels. This helps separate normal operating procedures (like opening and closing of air locks) from abnormal events (such as leaks or doors unintentionally left open.) Settings can range from 0 – 255 seconds.</p>	60
beeP	<p>Beeper Enable Toggles the audible alarm beeper ON or OFF.</p>	ON
hU	<p>HUMEX Operation Mode <i>Irrelevant in most glove box applications.</i> This setting toggles the operational objective of the unit. When set to OFF, the unit functions as a NitroWatch module, as specified in this manual. If set to ON, the unit assumes the role of a Terra Humex2 module. <i>DO NOT alter this setting from the factory default unless you are trained to do so.</i> Press SET to skip this setting and proceed to the next parameter.</p>	OFF
Add	<p>ADJUST Parameter Use this function to compensate for measured discrepancies between the NitroWatch readout and that of an independently-calibrated RH measuring device. This setting adds or subtracts from the NitroWatch-measured readings to accurately display the true internal RH levels inside the glove box. Settings range from +49.5 to -50.0.</p> <p>NOTE: This setting wraps around. Exceeding +49.5 will wrap to -50.0. Similarly, decreasing past -50.0 will wrap to +49.5.</p> <p>NOTE: Adjusting this setting will reduce the effective range of the installed RH sensor. For example, an adjustment setting of -10 will reduce the effective maximum true RH measuring capability to 90.</p>	0.0
Alr	<p>Alarm Time Units Allows the user to select the unit of time in either minutes (“LONG”) or seconds (“SHrt”) as it relates to the Open Door Alarm (“Door”) setting above.</p>	SHrt



Series 100 Glove Box

SYSTEM CONFIGURATION (CONT'D)		NITROWATCH MODULE
Display	Description	Default
LoG	Data Logging Time Interval <i>Irrelevant in most glove box applications.</i> This setting adjusts the interval, measured in minutes, which data is relayed via the "R/H Output" port. Settings can range from 0 – 255 minutes.	120
	Finish Press SET once more to begin operation.	

Made a mistake? Simply turn the Dual Purge System OFF and re-enter NitroWatch Configuration mode as described above.

4. The Dual Purge System and attached NitroWatch module are now ready for operation. Proceed to the section titled "4.0 Operation" for additional operating instructions.



DewWatch Setup

1401-07 DewWatch Controller

1401-12 Sensor Probe

Connections:

1. Connect phone cable from “PURGE CONTROL” on the back panel of the DewWatch to “PURGE CONTROL” on the back panel of the Dual Purge.
2. Plug the DewWatch sensor cable into the “SENSOR” port on the back panel of the DewWatch.
3. Plug the door switch cable into the “DOOR SWITCH” port on the back panel of the DewWatch. (For gloveboxes and applications with out door switch output, a jumper should be installed in this port.)
4. Connect the power cord to AC power.

Set-Up:

1. Switch the Power ON.
2. After initialization the display will read dew point in degrees C.

To change set-point for output to Dual Purge, use the following sequence on the control panel:

PRESS KEY	DISPLAY WILL READ
ESC	ESC
ENTER	ESC
ESC	AL A
ENTER	DEG C
ENTER	AL HI
ENTER	X.XX (current set-point value, numeric)
▲ ▼	Press up/down arrow keys to change set-point to desired value
ENTER	AL A
ESC	RUN?
ENTER	busy (the busy will display for about 2 seconds and then the display will show the current sensed value)



4.0 Operation

Glove Box Base Unit (without Flowmeter):

After setup, the Terra Series 100 Glove Box base unit operates without user intervention.

Glove Box Base Unit (with Flowmeter):

To increase or decrease the amount of gas entering your enclosure, turn the knob on the Flowmeter counter-clockwise or clockwise as needed. Depending on the size of your glove box and the nature of its operation, a setting of 5-20 Standard Cubic Feet per Hour (SCFH) should suffice in providing a general positive-pressure environment (use 5-10 SCFH for two-arm port models, and 5-20 SCFH for four-arm port models).

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 overpressures could in time damage seals or distort doors.



Operation of a Series 100 Glove Box in a positive-pressure application without an installed RB Valve may result in damage to the unit and/or injury to its user(s). To prevent this from occurring, Terra installs multiple RB Valves in pressurized chambers. The quantity depends on the chamber size.

Glove Box with Filtration Module

After setup, the Terra Series 100 Glove Box with Filtration Module operates without user intervention.

Glove Box with Dual Purge System

After **System Configuration**, Terra's Dual Purge System operates without user intervention. To adjust the system's configuration after installation, refer to the **System Configuration** instructions in the section entitled "3.0 Installation – Glove Box with Dual Purge System." (**DO NOT** perform **Initial Calibration** if you have already successfully done so.)

In addition to the System Configuration procedure, the Dual Purge System allows the user to monitor and change a limited number of parameters while in operation.



Operation (cont'd)

CONTROL PANEL/DISPLAY		DUAL PURGE SYSTEM
Function	Description	View/Modify
High-Flow Bypass	Modifiable. Enables/Disables the high-flow purge process. Particularly useful when using fine powders or other air current-sensitive material inside the glove box. While disabled, air pressure can be maintained with the low-flow purge provided by the unit's Flowmeter.	To View: Press and hold SET To Modify: While holding SET, press DOWN to deactivate the high-flow purge; press UP to activate it.
Incoming Line Pressure	Non-Modifiable. Displays the incoming gas line pressure. Measured in PSI. This number should approximate the analog regulator reading on the unit.	To View: Press and hold UP
Internal Pressure	Non-Modifiable. Displays the internal pressure of the glove box environment. Measured in milli-inches of Water Gauge (WG)	To View: Press and hold DOWN
Purge Timer	Non-Modifiable. Displays the number of seconds that the high-flow purge will remain active after restoring internal pressure to the levels specified by the user at System Configuration. Measured in seconds. Will display "00" if high-flow purge is not active.	To View: Press and hold UP and DOWN simultaneously.
Alarm Silence	In the event that an audible alarm is triggered, the control panel can be used to silence the alarm while the user addresses the cause of it.	To Modify: Press and release any button to silence the alarm.

To activate the low-flow purge, turn the Flowmeter's control knob counter-clockwise until the gauge reaches the desired setting. For most standard glove boxes, a flow-rate of 5-10 Standard Cubic Feet per Hour (SCFH) will maintain a positive pressure inside the glove box while making efficient use of your in-house gas supply.



NOTE

- Use of low-flow purge is recommended if the glove box air lock will be opened frequently.
- Fine-tuning of the flow rate will limit how often the Dual Purge System's high-flow bypass is activated.
- In the event of power outage, the high-purge flow will be disabled. The low-flow purge, however, will continue to operate to help maintain your glove box environment.
- Typically, continual use of low-flow purge in an undisturbed chamber may, over time, result in a very low humidity level (<10% RH) inside the glove box chamber.



Operation (cont'd)

Instructions for NitroWatch Module

After **NitroWatch Configuration**, the NitroWatch module will operate in tandem with the Dual Purge System without any user intervention. To adjust the module's configuration after installation, refer to the **NitroWatch Configuration** instructions in the earlier section entitled "3.0 Installation – Glove Box with Dual Purge System and NitroWatch Module."

In addition to the NitroWatch Configuration procedure, the NitroWatch module allows the user to monitor and change a limited number of parameters while in operation.

CONTROL PANEL/DISPLAY		NITROWATCH MODULE
Function	Description	View/Modify
Humidity Set-Point	Modifiable. Specifies the maximum relative humidity allowed inside the glove box. If the maximum relative humidity is exceeded, the NitroWatch will initiate a high-flow purge via the Dual Purge System. NOTE: The NitroWatch will continue a high-flow purge until the relative humidity inside the glove box is one-half percent (0.5%) less than the user-specified amount.	To View: Press and hold SET To Modify: While holding SET, press DOWN to decrease the maximum allowable relative humidity; press UP to increase this setting.
Alarm Silence	In the event that an audible alarm is triggered, the control panel can be used to silence the alarm while the user addresses the cause of it.	To Modify: Press and release any button to silence the alarm.

Use of Glove Box with Oversized Internal Equipment

Terra Series 100 Glove Boxes come standard with a removable back panel for the installation of equipment and devices that are too large to pass through the air lock. Equipment of this type includes scales, measures, and miscellaneous handling equipment.

To remove the back panel:

1. On the back panel, carefully remove each mounting screw (number varies with unit), dismantling the rear panel after the last one is removed.
2. Place your equipment inside the enclosure. As a general rule, your equipment should be clean and debris-free before inserting it into the enclosure.
3. If a cord port was installed in the back panel for electrical equipment, feed the power cords out of the hole prior to replacing the back panel.
4. Carefully align the screw holes of the rear panel with the holes on the glove box and reinsert the mounting screws. Carefully tighten the screws, ensuring an even seal along the gasket seal that lines the perimeter of the rear panel. **Be carefully not to over-tighten the screws, as damage may result.**



5.0 Maintenance

Terra Series 100 Glove Boxes require minimal maintenance. They are designed to be versatile and yet simple to maintain. Occasionally, you may have the desire to clean the unit or replace its gloves. Instructions to do both are listed below.

Cleaning

Cleaning of the Terra Series 100 Glove Box can be accomplished by use of clean, lukewarm water and the option of a mild, non-abrasive detergent, applied with a clean, soft cloth. Take care to rinse the cleaning cloth thoroughly if granulated particles accumulate on it; avoid rubbing these particles into the enclosure's interior surface.

If a cleaning detergent is used, rinse the enclosure with clean, lukewarm water and a clean, soft cloth prior to drying.

Dry the surface by blotting it gently with a clean, absorbent, low fiber-shedding cloth.



CAUTION

- **DO NOT use abrasives or solvents on your Terra Series 100 glove box components. Use of such products can damage their visual appearance and/or transparency and might – especially in the case of acrylic – damage the performance and functionality of the product.**
- **DO NOT use solutions containing more than 5% bleach.**
- **DO NOT expose the Terra Series 100 Glove Box to extreme heat. Doing so will deform and damage the unit. (Static-dissipative PVC enclosures should not be exposed to temperatures above 80 degrees Fahrenheit.)**

Installing/Removing Gloves

The Terra Series 100 Glove Box features a user-friendly method for glove replacement.

Items you will need:

- Slotted Screwdriver
- Replacement gloves and/or sleeves, having the appropriate diameter for your glove ports.



WARNING

Ensure that there is neutral pressure inside the Glove Box before attempting glove replacement.

To Replace Whole-Molded Gloves:

1. Pull back the sleeve overlap on the glove port, exposing the screw cinch fastener securing the glove to the port.
2. Using a slotted screwdriver, loosen the cinch from around the port and remove it.
3. Remove the glove sleeve overlap from around the port.
4. Extract used glove from the glove box.
5. Insert new glove through the glove box port. **Ensure that the proper hand is inserted into its corresponding port (left to left; right to right).** Arrange the gloves so that they are properly aligned (right-side up) and at an ergonomic, user-friendly angle. A slightly-inward angle may be desirable, particularly for more rigid glove types.



Series 100 Glove Box

6. Wrap the end of the glove sleeve (the last 2"-3" of sleeve) over the glove port, leaving enough sleeve material to overlap upon itself and cover the screw cinch. There should be no creases or wrinkles where the glove sleeve covers the glove port caused by an ill-fitting or poorly-aligned sleeve.



Maintenance (cont'd)

7. Replace the screw cinch, tightening it to create an airtight seal between the glove port and the glove sleeve.
8. Fold the rest of the glove overlap over the screw cinch to prevent unintentional tampering with the cinch and to provide a clean, safe finish to the glove port.

To Disassemble/Reassemble Modular Gloves:

The hand component of Terra's glove assemblies can be modified with the sleeve component remaining mounted to the glove port or with the sleeve removed from the glove port. If you wish to remove the entire assembly before modifying it, follow Steps 1-4 in the section titled, "Section 5.0 – To Replace Whole-Molded Gloves."



NOTE

It is recommended that you remove the entire glove assembly before replacing one of its components, even if you are replacing only the glove component. This will facilitate ergonomic alignment much more easily than if the sleeve was to remain attached to the glove port.

The hand component of Terra's glove assemblies is attached to its sleeve component by a special joining ring. This ring securely binds the ends of both components together, essentially sealing the assembly against leaks or contamination.

To disassemble the glove assembly:

1. Reaching into the glove assembly, locate the joining ring (a hard plastic cuff where the sleeve and glove meet) and pull it toward you, inverting the glove upon itself. Only invert the glove to a length required to comfortably access and work with the joining ring.
2. Remove the binding spring from the joining ring. This circular spring can be detached from itself (where one end meets the other) or rolled out of its setting with applied force. Set the spring aside for installation. The retaining ring can now be separated from the glove and sleeve components.
3. Remove the retaining ring from the glove and sleeve components. Set the ring aside for installation. The glove and sleeve are now separated.
4. If the sleeve is to be replaced, turn the new sleeve in upon itself as the old sleeve was during disassembly. This will ready the sleeve component for attachment to the glove component.
5. Insert the glove to be attached through the inverted opening of your sleeve. Align the edge of the glove sleeve with the edge of the glove hand.
6. Place the joining spring over the inside-out glove sleeve. Fold the glove sleeve over the outside of the joining ring, covering it completely.
7. Fold the end of the glove hand over the joining ring, so that it overlaps what you have already done with the glove sleeve.
8. Reattach the retaining spring so that it compresses the glove/sleeve ends overlapping the joining ring into the groove that runs along its outside diameter. The two parts are now securely joined.
9. *Carefully* push the retaining ring back into the glove sleeve until it has returned to its right-side-out configuration. Your reassembly is now complete.



CAUTION

Exercise care when pushing the joining ring back into the glove sleeve. As the assembly is extended, the diameter of the sleeve will narrow, increasing friction between the sleeve and the joining ring. Excessive friction between the two may dislodge the retaining spring, forcing a reassembly of the two components.

10. If you removed the entire assembly from the glove port, reattach the assembly by following Steps 5-8 of the section titled, "Section 5.0 – To Replace Whole-Molded Gloves."



6.0 Troubleshooting

This table describes the most common performance issues, their causes, and recommended courses of action.

		Symptom	Possible Cause(s)	Solution
Power Concerns	All Accessories	System won't turn on.	- Power cord not plugged in.	- Inspect power cord leading from unit. Make sure that it is fully connected to the unit's power port. - Make sure that the power cord is plugged into a functioning outlet of appropriate voltage.
	Dual Purge		- Unit not switched ON.	- Switch unit ON.
- Power supply/outlet is faulty/damaged.			- Try operating the unit from another outlet. - Check your building's fuse box, ensuring that the fuses governing your work area are not blown and are in good condition. Replace them if necessary.	
			- Internal fuse is blown.	- Using standard screwdriver, remove the housing of the Dual Purge system. A ½-amp fuse is mounted on the circuit board controller. If this fuse is blown, it needs to be replaced. Call Terra for a replacement fuse.
Pressure Concerns	Dual Purge	System stays in high-flow purge at all times. ...or... System constantly switches between high- and low-flow purge.	- Improperly programmed system. - System settings are too high. - Inadequate Flowmeter setting.	- Disconnect the Dual Purge System from the glove box, internal gas supply and NitroWatch Module. Repeat INITIAL CALIBRATION, SYSTEM CONFIGURATION, and NITROWATCH CONFIGURATION processes as indicated in Section 3.0. - Adjust the "Press" settings during SYSTEM CONFIGURATION. For most applications, the default setting of 20 milli-inches WG should suffice. Settings higher than 70 milli-inches WG may produce constant high-flow purge.
			- Inadequate Flowmeter setting.	- Increase Flowmeter setting to maintain positive-pressure purge during low-flow operation.
	NitroWatch		- Low humidity settings.	- Wait for the humidity levels to lower to your specified settings. - Raise your desired humidity levels (See Section 4.0) - If working with moisture-containing material, increase Flowmeter setting to allow for greater moisture-purging during low-flow operation.
	Glove Box		- Glove box leak present.	- Ensure that the doors to the enclosure are properly closed. - Ensure that your glove sleeves are properly sealed against the glove ports. - Inspect all gaskets and seals for misalignment, cracks or peeling. If the rear panel has been recently removed for equipment insertion, pay particular attention to this area. - Contact Terra Universal for assistance.



Troubleshooting (cont'd)

	Symptom	Possible Cause(s)	Solution
Power Concerns (cont'd)	System No gas is flowing into glove box during low-flow purge.	<ul style="list-style-type: none"> - Insufficient Gas Supply. - Gas supply is down. - Gas supply is leaking. - Gas supply is impeded. 	<ul style="list-style-type: none"> - Check to ensure that the incoming gas supply is functioning and that there are no holes/kinks/obstructions along the line. If the incoming gas supply line uses a filter, ensure that it is not obstructed, clogged, or in need of replacement.
	Flowmeter ...and/or... Analog line pressure gauge on the Dual Purge System does not display any pressure.	<ul style="list-style-type: none"> - Incoming line regulator is turned off. - Flowmeter has been incorrectly set. 	<ul style="list-style-type: none"> - Open the incoming line regulator (70 PSI max.) - Open Flowmeter by turning counter-clockwise. Recommended setting for standard units is 5 - 20 SCFH to maintain positive pressure; higher setting may be required for larger units.
	Dual Purge	<ul style="list-style-type: none"> - The Dual Purge regulator is closed. 	<ul style="list-style-type: none"> - Open the Dual Purge regulator by turning the knob clockwise until the gauge reaches the desired setting. Recommended settings are between 30 – 40 PSI.
Operational Concerns	Filtration Module Excessive noise from filtration module.	<ul style="list-style-type: none"> - Clogged air filter. - Clogged air duct. - Defective blower/fan unit. 	<ul style="list-style-type: none"> - Contact Terra Universal for assistance.
	Filtration Module Insufficient/decreased airflow circulating into/out of the filtration module.	<ul style="list-style-type: none"> - Low speed control setting. - Clogged air filter. - Clogged air duct. - Defective blower/fan unit. 	<ul style="list-style-type: none"> - If speed control present, increase speed control to desired rate. - Contact Terra Universal for assistance.
	Filtration Module Airflow disturbs sensitive materials/powders/measure equipment inside the glove box.	<ul style="list-style-type: none"> - Air filtration module is creating a turbulent environment. 	<ul style="list-style-type: none"> - If equipped with a speed control, lower the speed settings of your filtration module to better suit your needs. - If speed control is not present, deactivate filtration module by turning it off or by unplugging it from its power supply.
	IonBar	<ul style="list-style-type: none"> - Air circulation from IonBar is creating a turbulent environment. 	<ul style="list-style-type: none"> - If equipped with a speed control, lower the speed settings of your IonBar module to better suit your needs. - If speed control is not present, deactivate the IonBar by unplugging it, either at its low-voltage connection with its power transformer or by disconnecting the transformer itself.
	NitroWatch NitroWatch delivers an obviously incorrect humidity reading.	<ul style="list-style-type: none"> - Faulty connection between NitroWatch module and humidity sensor inside glove box. - Humidity sensor failure. 	<ul style="list-style-type: none"> - Disconnect and then reconnect the low-voltage cable connecting the humidity sensor to the NitroWatch module. - Contact Terra Universal for assistance.



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. This limited warranty covers parts and labor, but not transportation and insurance charges. 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. Repairs may be completed by 3rd party service agents approved by Terra Universal. Terra Universal reserves the rights to limit this warranty based on a service agent's travel, working hours, the site's entry restrictions and unobstructed access to serviceable components of the product. 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.

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."

Terra Universal Warranty Policy: <https://www.terrauniversal.com/warranty/>

*Thank you for ordering from
Terra Universal!*



8.0 Related Products

Users of Terra Universal's Vibration-Free WorkStations may also be interested in:

	<table border="1"><tr><td data-bbox="597 504 1242 556">Vibration-Free Platform</td><td data-bbox="1242 504 1443 556">1580-02; -03</td></tr><tr><td colspan="2" data-bbox="597 556 1443 745">Description: Incorporating many of the design features and functionality of its larger sibling, the Vibration-Free WorkStation, Terra's Vibration-Free Platform is ideal for users who possess a need for vibration damping but not the equipment size necessitating the larger stand-alone unit. Mountable on any work surface, the Vibration-Free Platform is highly portable and easy-to-install.</td></tr><tr><td colspan="2" data-bbox="597 745 1443 808">Applications: High Magnification Microscope/Video Inspection; Wire Bonding and Wire Bond Testing; Wafer Inspection and Probing... and more!</td></tr><tr><td colspan="2" data-bbox="597 808 1443 873">Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com</td></tr></table>	Vibration-Free Platform	1580-02; -03	Description: Incorporating many of the design features and functionality of its larger sibling, the Vibration-Free WorkStation, Terra's Vibration-Free Platform is ideal for users who possess a need for vibration damping but not the equipment size necessitating the larger stand-alone unit. Mountable on any work surface, the Vibration-Free Platform is highly portable and easy-to-install.		Applications: High Magnification Microscope/Video Inspection; Wire Bonding and Wire Bond Testing; Wafer Inspection and Probing... and more!		Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com	
Vibration-Free Platform	1580-02; -03								
Description: Incorporating many of the design features and functionality of its larger sibling, the Vibration-Free WorkStation, Terra's Vibration-Free Platform is ideal for users who possess a need for vibration damping but not the equipment size necessitating the larger stand-alone unit. Mountable on any work surface, the Vibration-Free Platform is highly portable and easy-to-install.									
Applications: High Magnification Microscope/Video Inspection; Wire Bonding and Wire Bond Testing; Wafer Inspection and Probing... and more!									
Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com									
	<table border="1"><tr><td data-bbox="597 903 1242 955">Wire Bond Strength Tester Inspection Station</td><td data-bbox="1242 903 1443 955">9101-17; -26</td></tr><tr><td colspan="2" data-bbox="597 955 1443 1207">Description: Providing cost-effective, on-line destructive and non-destructive testing, Terra's Wire-Bond Strength Tester and Inspection Station feature a stereo microscope for increased precision and reliability. Each inspection station can be configured with a variety of accessories (sold separately) to suit all of your testing needs. The "Complete Package" ships with user-specified 10x or 20x microscope magnification and all seven pull gauges. Packages with individual gauges are also available.</td></tr><tr><td colspan="2" data-bbox="597 1207 1443 1260">Applications: Wire Bond Testing</td></tr><tr><td colspan="2" data-bbox="597 1260 1443 1295">Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com</td></tr></table>	Wire Bond Strength Tester Inspection Station	9101-17; -26	Description: Providing cost-effective, on-line destructive and non-destructive testing, Terra's Wire-Bond Strength Tester and Inspection Station feature a stereo microscope for increased precision and reliability. Each inspection station can be configured with a variety of accessories (sold separately) to suit all of your testing needs. The "Complete Package" ships with user-specified 10x or 20x microscope magnification and all seven pull gauges. Packages with individual gauges are also available.		Applications: Wire Bond Testing		Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com	
Wire Bond Strength Tester Inspection Station	9101-17; -26								
Description: Providing cost-effective, on-line destructive and non-destructive testing, Terra's Wire-Bond Strength Tester and Inspection Station feature a stereo microscope for increased precision and reliability. Each inspection station can be configured with a variety of accessories (sold separately) to suit all of your testing needs. The "Complete Package" ships with user-specified 10x or 20x microscope magnification and all seven pull gauges. Packages with individual gauges are also available.									
Applications: Wire Bond Testing									
Price: Contact your Terra Universal sales representative or visit www.TerraUniversal.com									