Humex™ 2 Inline Humidification System

Your Comprehensive Equipment Source

Particle Filtration

Laminar Flow Control

Ultra-Pure Water

Vibration Isolation

Ergonomics

Process Gas Generation

Temperature Control

Biohazard Containment

Sterilization

Static Control

Chemical Vapor Removal

Anti-Microbial Treatments

Humidification/ Dehumidification

Vacuum Control

Exhaust Fume Ventilation

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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:

The information presented here is subject to change without notice.

! 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.

1.0 Description

The Humex™ 2 Humidifier provides inline humidification of nitrogen or other process gas being fed into a glove box or similar enclosure.

During operation, a 20W resistance heater inside the Humex 2 vaporizes incoming water fed into a stainless steel chamber. Process gas, which enters the Humex 2 through separate 0.25"-diameter flexible tubing, is humidified with steam as it passes through this chamber on its way to a glove box or other enclosure.

The Humex 2 humidity sensor, installed inside the remote enclosure, monitors the relative humidity (RH) level. As soon as the %RH falls below a user-selected threshold, a relay inside the Humex activates the heater and a solenoid that turns on the water flow. When the %RH set-point is attained, the Humex turns off heater and water flow.

Operation with the Dual Purge™

For optimal efficiency—and to conserve nitrogen— the Humex can be operated with Terra's Dual Purge Variable Purge Controller.

In this configuration, the Humex issues a signal to the Dual Purge via a 4-connector low-voltage cable to initiate high flow (bypassing the Dual Purge flowmeter) whenever the humidity falls below the set-point. This high flow of process gas quickly humidifies the enclosure.

When the set-point is attained, the Humex deactivates the high flow (as well as the Humex humidification system) to conserve on nitrogen. In this low-flow purge, the flow rate is restricted by the Dual Purge flowmeter.

Refer to Operating Manual No. **1800-42** or **1800-13** for further information on Terra's Glove Box Dual Purge System.
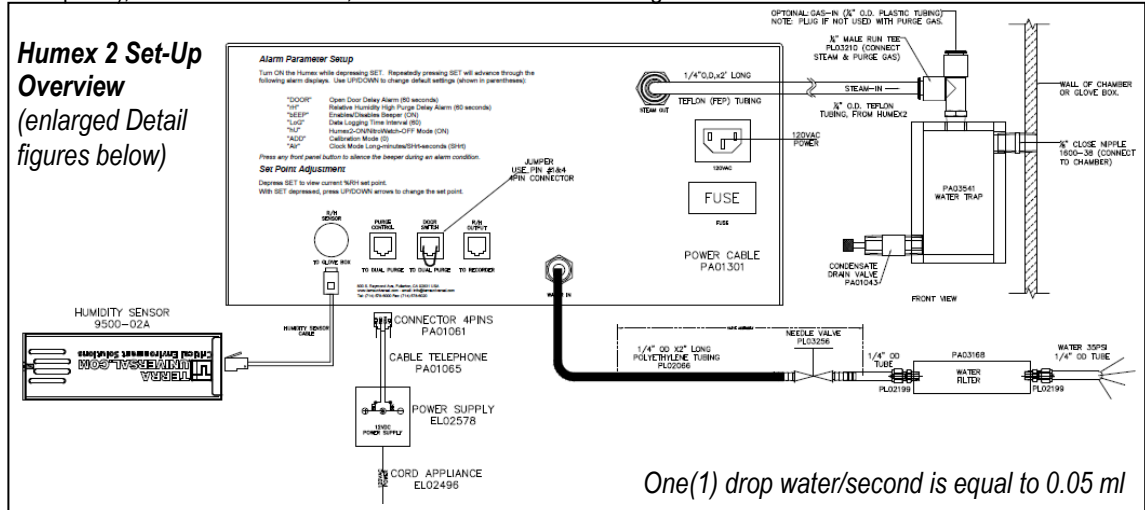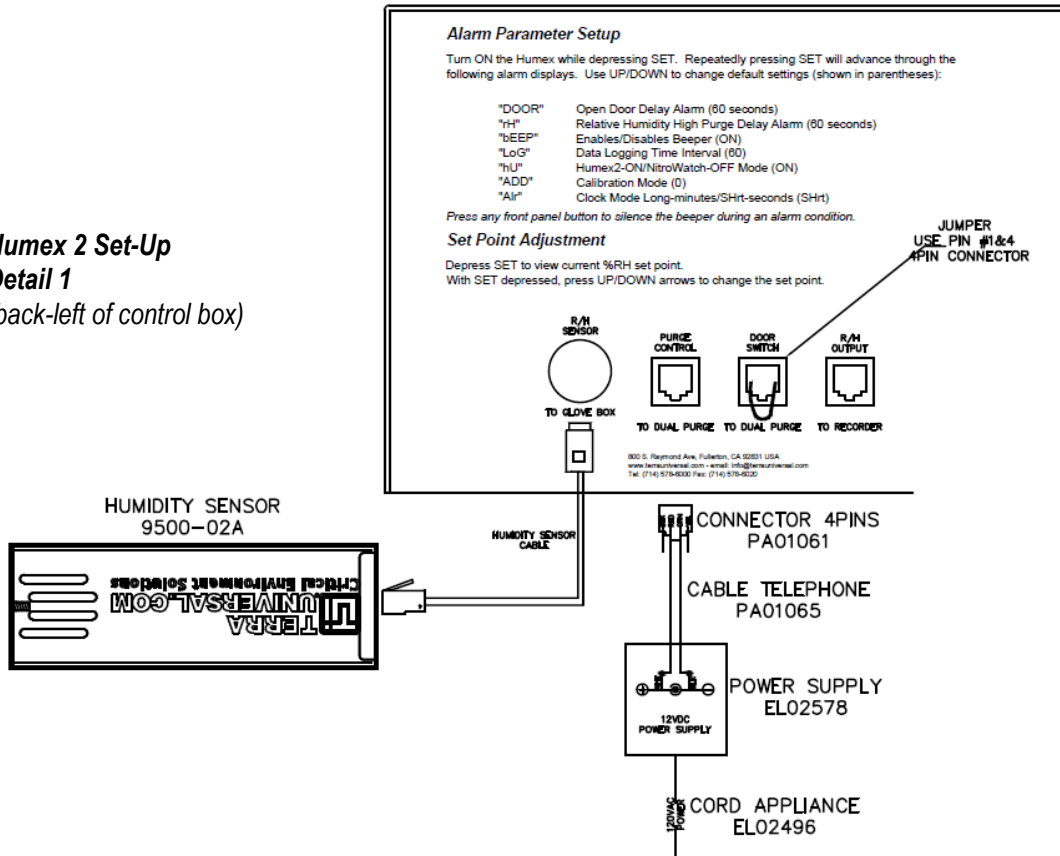
2.0 Set Up and Operation: Humex 2 without Dual Purge

Humex 2 Set Up *(refer to Overview and Detail drawings below)*

Includes: Humex 2 controller (Part No. 9081-02), humidity sensor (Part No. 9500-02A), 120VAC power cord, 12DC power supply and cord, pinch valve assembly, water filter, humidity sensor cable, Door Switch jumper (installed on rear panel), 0-20 SCFH flowmeter, and 0.25" clear urethane tubing.
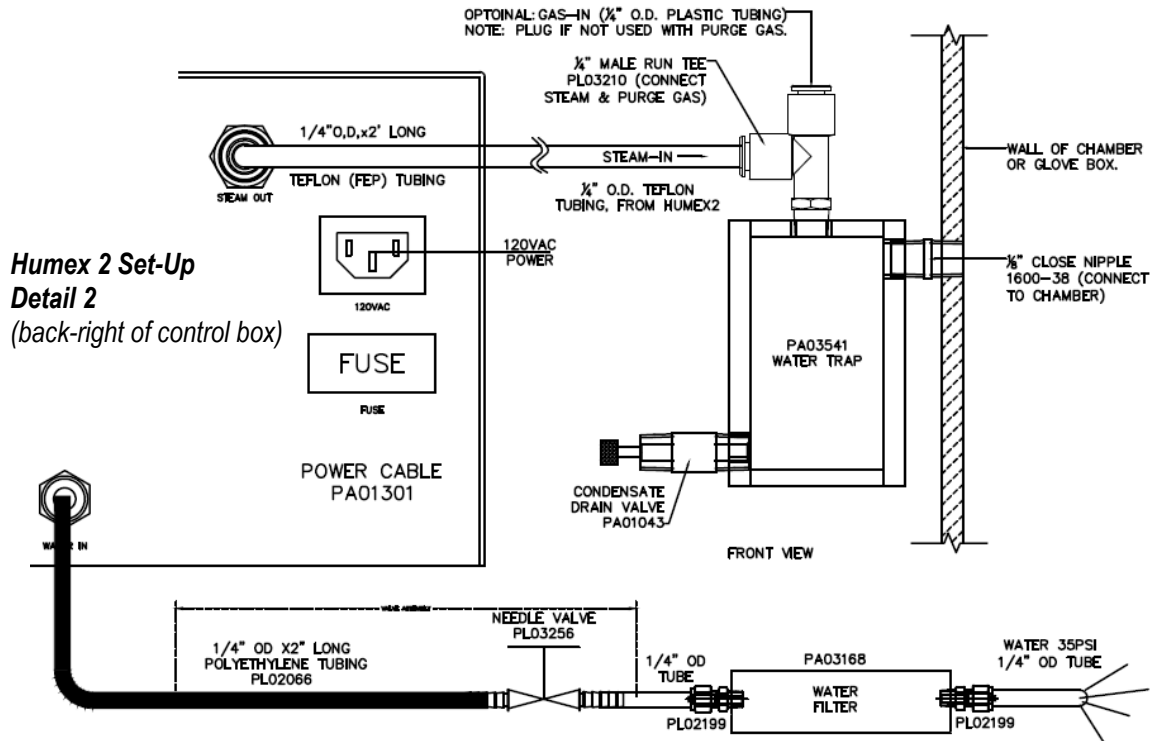
Humex 2 Set-Up Overview
(enlarged Detail figures below)

One(1) drop water/second is equal to 0.05 ml

Humex 2 Set-Up Detail 1
(back-left of control box)

Humex 2 Set-Up Detail 2 (back-right of control box)

2.1. Carefully unpack the unit and check for any visible damage or missing parts. Any damage should be reported immediately to the shipping company.

2.2. Make sure that your glove box is placed on a level, stable surface, away from heat or chemicals that could damage it.

2.3. Use a length of 0.25" tubing to connect "Steam Out" on the rear panel to the gas inlet of the water trap. Do this by loosening the Poly-Tite collar, inserting the tubing, and tightening the collar.

2.4. Connect the pinch valve assembly into the exit side of the water filter and the "Water" port on the rear panel.

2.5. Connect the water filter inlet side to a water source.

2.6. Connect one of the 3-pin DIN connectors of the RH sensor to the "R/H Sensor" port on the rear panel, and the other end to the "R/H Sensor" port of the glove box.

2.7. Plug the power cord to a grounded 120VAC receptacle. Plug the other end into the "120VAC" connector on the rear panel.

2.8. Plug the 12VDC power supply into a grounded 120VAC receptacle. Plug the phone jack connector into the "Purge Control" port on the rear of the Humex 2 controller.

2.9. **Initial Humex 2 Programming**

Unplug the 12VDC power connector (phone jack). Hold down the SET button while reconnecting the 12VDC connector to turn ON power to the Humex 2. The set button is the left-most button on the front control panel.

Repeatedly pressing SET will advance through these alarm displays. Use UP/DOWN buttons to change default settings (show in parentheses). See steps below for more information on each setting.

DOOR Open Door Delay Alarm (60 seconds) – used only for multi-door cabinets with door sensor switches. For glove boxes, a jumper is installed in the "Door Switch" port to deactivate this alarm.

rH Relative Humidity Set Point Alarm (60 seconds) – the number of seconds that the %RH level must be below the humidity set-point before alarm is activated.

bEEP Enables and disables beeper.

hU Humex/NitroWatch Alarm Mode – toggles back and forth between operation mode for Humex 2 Humidifier and NitroWatch® Low-Humidity systems. When the "hU" mode is ON, the system activates the rH alarm when the measured %RH level remains below the set-point for the specified time (appropriate to humidification applications). When the "hU" mode if OFF, the system activates the rH alarm when the measured %RH level remains above the set-point for the specified time (appropriate to dehumidification applications).
NOTE: Humex and NitroWatch both work with Dual Purge controller, but not simultaneously. Connections need to be adjusted when going from one to the other. Refer to schematics on page 7 in this manual (Doc. #1800-69), as well as Doc. #1800-42 or #1800-13.

Add Calibration Adjust Mode – adds a supplemental numerical value (positive or negative) to the measured %RH to allow calibration of the device to an NIST-certified or other RH meter.

Alr Alarm Timers – lets you select minutes ("Long") or seconds ("SHrt") as the time scale for all alarm functions.

Once you enter the SET mode, use these guidelines to change any defaults:

2.11. **Door** The display will indicate "door" until the set button is released. The value displayed is the number of seconds that the door must be open before an OPEN DOOR alarm will be activated. Use the UP and DOWN buttons to set this value. Press the SET button to finish and move to the next parameter.

2.12 **rH** The display will indicate "rH" until the set button is released. The value displayed is the number of seconds that the R/H input must be below the set-point when in the Humex mode before a LOW RH alarm will be activated. Use the UP and DOWN buttons to set this value. Press the SET button to finish and move to the next parameter.

   Note: The "Nitrowatch" mode allows operation of the RH sensor with Terra's NitroWatch low-humidity controller. In this mode, a HIGH R/H alarm is activated when the R/H input is above the set-point.

2.13 **bEEP** The display will indicate "bEEP" until the set button is released. The display will indicate "on" or "off." Use the UP and DOWN buttons to change this value. ON indicates that the beeper will be activated when an alarm occurs. OFF indicates that the beeper is disabled. Press the SET button to finish and move to the next parameter.

2.14   **Hu**   The display will indicate "hU" until the set button is released. Use the UP and DOWN buttons to change the displayed value: ON indicates HUMEX mode (humidification); OFF indicates NITROWATCH mode (dehumidification).

2.15   **Add**   The display will indicate a supplemental value that the Humex will "Add" to the measured RH. This value adjusts the R/H reading to allow manual calibration to an independent humidity sensor or calibration device. Use the UP and DOWN buttons to set this value, which can be positive or negative. Press the SET button to finish and exit the setup mode.

  Note: the "Add" value will wrap around if the maximum or minimum value is exceeded. For example, if you try to set the supplemental adjustment value above 49.5, the value will wrap around to -50.

        A side effect of using an adjust value other than zero is that the R/H range will be reduced. For example, if the adjust 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.

2.16   **Alr**   The display will indicate "Alr" until the set button is released. This is the MINUTES/SECONDS selector for the alarm timers. Use the UP and DOWN buttons to change this setting. The display will indicate "Long" for MINUTES and "SHrt" for SECONDS. Press the SET button to finish.

Press SET once more to advance to Normal Run Mode. You should view the current %RH level inside the glove box.

Make a mistake? No Problem!
To reset the system, turn the system OFF while in setup mode and restart while holding the SET button.

Humex 2 Operation

After completing the set-up programming steps above, enter SET to view the current % RH set-point. Use the UP/DOWN keys to change this value. Press SET again to return to Normal Run Mode and view current % RH.

Beeper Silencing – Press any front panel button to silence the beeper during an alarm condition.

The Humex 2 will now turn ON a low flow of water and activate the heater to introduce water vapor into the glove box whenever the %RH falls below the set-point. When the set-point is attained, this moisture flow is terminated.

Humex 2™ Inline Humidification System

3.0 Operation: Humex 2 with Dual Purge

Includes: Humex 2 controller, humidity sensor, and connecting lines listed in Section 2.0 above, along with Glove Box Dual Purge System (Part No. 1603-57). Refer to illustrations on pages 3 and 4.
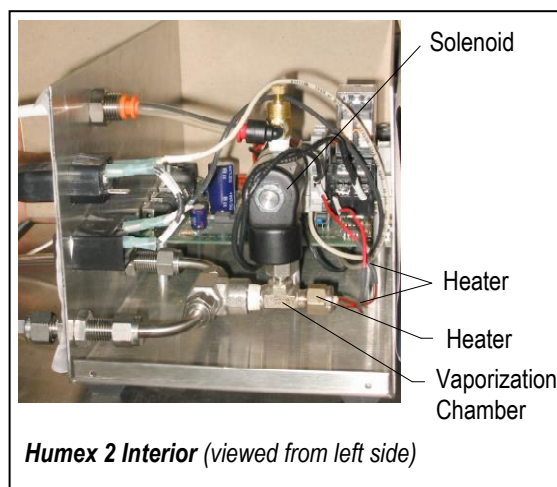

Humex 2 Set-Up with Dual Purge System
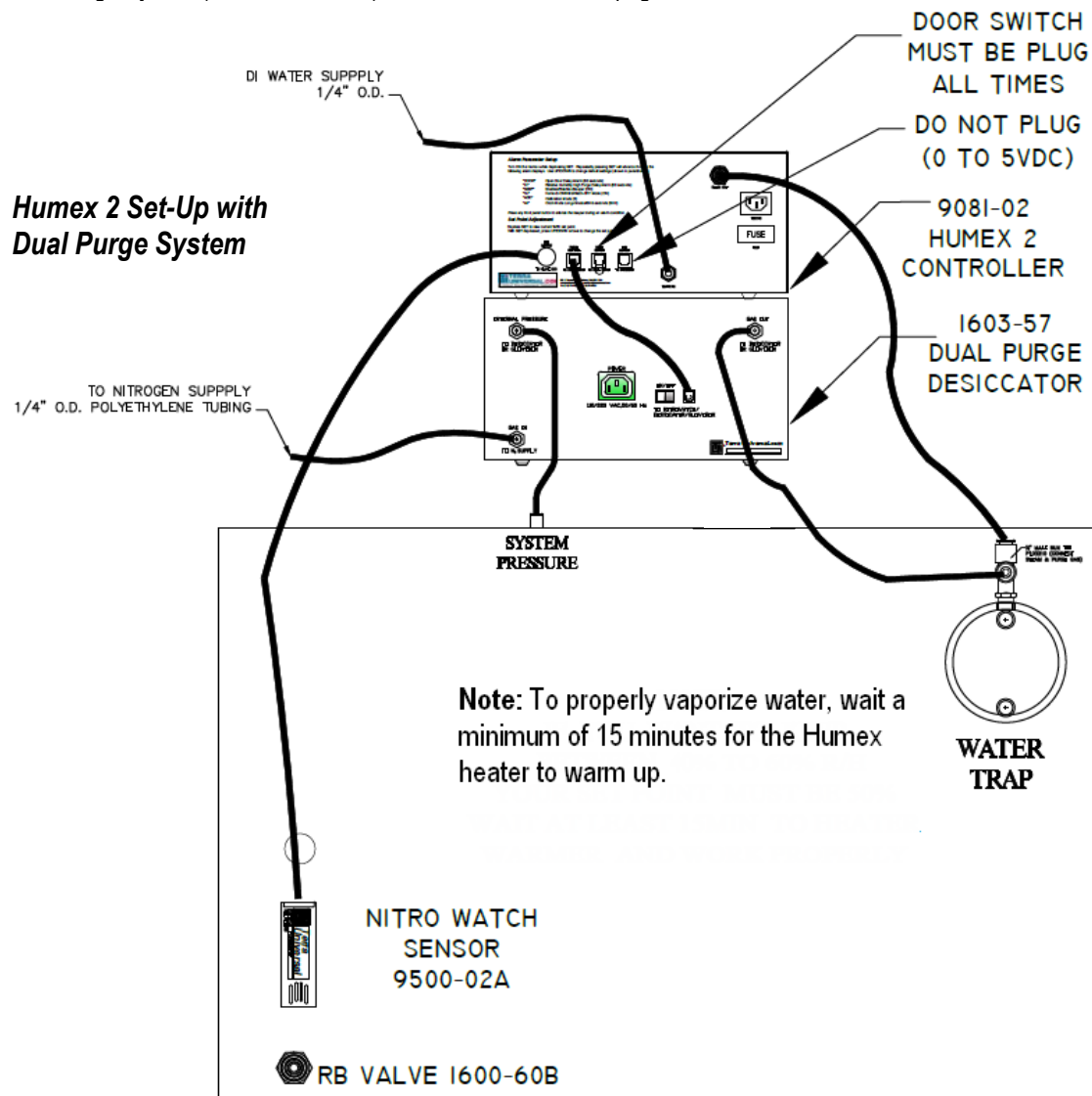
3.1. Carefully unpack the unit and check for any visible damage or missing parts. Any damage should be reported immediately to the shipping company.

3.2. Make sure that your glove box is placed on a level, stable surface, away from heat or chemicals that could damage it.

3.3. Complete the Humex 2 and Dual Purge System connections as indicated in the illustrations. Note: The PURGE CONTROL connection allows the Humex 2 to draw power from and to control the Dual Purge System.

3.4. Leave the jumper cable connected to the DOOR SWITCH port on the Humex. This connection is used only in desiccator applications.

3.5. Dual Purge 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 SET, you will advance through the following control functions. Use UP/DOWN to change default settings (included in parentheses):

Prg Purge Delay: The Dual Purge System senses the internal cabinet pressure and activates a high-flow purge when this pressure falls below a set level. The "Prg" setting lets you specify the number of seconds the high purge remains active after internal glove box pressure level is restored (default: 60).

door Number of seconds a door must remain open to activate the OPEN DOOR alarm (default: 60). Inactive in Glove Box applications.

bEEP Enables and disables beeper (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: ON).

Press In GLOVE BOX mode, this setting lets you adjust the pressure (milli-inches WG) at which the high purge is activated (default: 0.2).

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

Humex 2 Interior (viewed from left side)

Make a mistake? No Problem! To reset the system, turn the system OFF while in setup mode and restart while holding the SET button.

Humex 2 Operation with the Dual Purge System

3.6 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 & 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 between 30 and 40 psi (use more pressure for larger glove boxes with 4 or more arm ports).

Internal Pressure – Press and hold DOWN (displays 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.

If continuous purging is desired, set the flowmeter so that the pressure gauge reads at least 0.1" WG when the system is in low purge state.

If continuous purging is not required, close the flowmeter. The Dual Purge System will initiate a purge only when an air lock door is opened, or when humidity level falls below the set-point (if your system includes a Humex 2).

Purge Delay Timer – Press and hold UP and DOWN simultaneously to review the number of seconds the high-flow purge is active after the internal pressure set-point is established. To change this value, see "Programming," above.

⚠ **CAUTION!:** **Because the high-level purge fed into the system can lead to excessive internal pressure, you must equip a glove box with an Automatic RB Valve when you install a Dual Purge System.**

3.7 Turn the Dual Purge System ON by placing the power switch in the "up" position. The Humex 2 LED display should indicate some humidity level.

NOTE: Allow about 5 minutes for the system to warm up after turning power "ON."

3.8 Proceed with the Humex 2 set up and programming procedures detailed in steps 2.1 through 2.16 above.

Make a mistake? No Problem! To reset the system, cut power to the Humex 2 by turning the Dual Purge System OFF while in setup mode and restart while holding the SET button.

3.9 **Adjust Humidity Set Point:** After completing initial programming, press the SET button to view the current % RH set point. Use the UP/DOWN keys to change this set point.

3.10 **Beeper Silencing**: Press any front panel button to silence the beeper during an alarm condition.

The Humex 2 will now activate high-flow purging whenever the %RH level inside the glove box falls below the specified set point. Your system is ready for operation.

Operating Tips

- If too much sputtering of water occurs in the process chamber during Humex 2 operation, decrease the water supply by incrementally closing the pinch valve.

- If the %RH does not rise after 3 – 5 minutes of Humex 2 operation, open the pinch valve incrementally to increase water flow.

- Keep the "gas out" line from the Humex 2 to the process chamber as short as possible.

- 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.

  As you increase the flow, the internal positive pressure will also increase. You may safely increase this pressure as high as 0.3" WC as long as the chamber incorporates Automatic RB Valves, which automatically protect against the possibility of warping or explosion.

4.0 Maintenance

Replacing Heater

The Humex 2 heater has a MTBF (mean time before failure) rating of 500 hours, equivalent to years of typical operation. If the heater needs to be replaced,

4.1   Remove the sheet metal screws to remove the top cover.

4.2   Use a 7/16" wrench to loose the fittings around the heater.

4.3   Remove the tubing elbows by loosening the fittings at both ends (see illustration)

4.4   Undo the heater wires (one at the relay, the other at the terminal block)

4.5   Install new heater, using reverse procedure.

	Cat. #
Replacement Heater	**9081-05**
Replacement Filter	**9081-06**

Activated charcoal filter, attached to incoming water line

5.0 Specifications

See separate QuickStart (Doc. No. 1800-42 or 1800-13) for further specifications on Terra's Dual Purge System and Glove Boxes

Dimensions:	12"W x 11.25"D x 7"H
Weight:	16 lbs.
Power	12 V/DC (from Dual Purge or 12VDC supply) for electronics; 120VAC for heater
Sensor Dimensions:	1.5" x .75" x 4"
Case Material:	Stainless steel
Water Line Pressure:	5 - 35 psi
Water Filter:	Activated charcoal
Flow*:	15 CFH (optimal); 30 CFH max. (high-flow purge when used with Dual Purge System)
Gas Line Pressure:	Should be externally regulated between 20 – 35 psi**
Humidification Rate:	35% RH / Cu. Ft. of enclosure / hour
Humidity Display:	3 1/2 digit LED display
Electrical Connections:	Screw terminals
Humidity Output:	0 – 5 V
Measuring Range:	0 – 100% RH
Accuracy (at 20° C):	± 2% RH
Display Resolution:	± 0.1% RH
Temp. Dependence:	± 0.04% RH/°C
Sensor Calibration:	None required. Calibration ("Add") mode allows %RH readout adjustment to independent calibration source, if required.
Heater:	20W, 120VAC resistance heater in Stainless Steel housing; 1.25" x 0.25
Water Solenoid:	6W
Fuse:	4A

* Flow should be externally regulated between 5 – 20 CFH, either using the Dual Purge flowmeter or separate flowmeter.

** User-furnished regulator or Dual Purge System required for gas pressure regulation

6.0 Warranty

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

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

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

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