OPERATION MANUAL

TEMPERATURE/HUMIDITY CONTROLLED GLOVE BOX

Models 890-THC & 890-THC/IG

(Domestic & Export Models)

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GENERAL INFORMATION

TEMPERATURE AND HUMIDITY CONTROLLED GLOVE BOXES #890-THC and #890-THC/IG 110V/220V

This chamber has been designed to create a temperature and humidity controlled environment. The major components include: operator interface, main working chamber, transfer chamber, and order specific components and accessories. The glove box includes two gas purging valves which will enable the operator to create an inert or anaerobic environment in the main chamber.

IT IS **NOT** TO BE USED WITH EXPLOSIVE GASES
OR
OPEN FLAMES.

The units are shipped as complete systems and nothing needs to be added except your gas of choice.

PLAS■LABS, INC.
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GENERAL INFORMATION

The Plas-Labs #890-THC & #890-THC/IG Temperature and Humidity Controlled Glove Box, have been engineered to be self contained, compact, and easily portable on a standard laboratory cart.

Both of the #890-THC and #890-THC/IG feature an internal PLC for temperature and humidity control, large touch screen operator interface, fluorescent lamp, 180 watt thermoelectric assembly (Peltier), nebulizer for humidifying, vacuum capable transfer chamber, room temperature sensor, serial port connection for data logging, one pair of white Hypalon™ ambidextrous gloves, two gas purging valves, and multiple outlet electrical strip.

Our optional stainless steel support cart (trolley) is engineered to contain gas tanks on the lower storage racks for bottled tank safety. It is also cushioned to minimize vibrations and shocks. Part # CART-GB

The clear top section of the glove box is formed from one piece of acrylic plastic to eliminate the possibility of air leakage. It features highly radiused corners for ease of cleaning while wearing gloves. The vacuum or transfer chamber is also rigid acrylic plastic, with .500" thick walls.

The Transfer Chamber features two (2) ground key cock valves, one (1) vacuum gauge, and a white plastic leveling tray which is useful for transferring liquids. The inner door of the transfer chamber will open automatically when the transfer chamber and main working chamber pressures are equalized. You must release (open) the inner clamps to achieve this. Refer to the section *"Transfer Chamber Entry method" on page (20).*

Our gasket system is double layered, closed cellular, self skinning, neoprene. This technique is far superior to single gasket systems which can "take a set." Use the High Vacuum Silicone Grease (provided) when sealing the gaskets. A light application on the bottom gasket will suffice. Adjustable steel clamps hold the top and bottom sections together.

The white plastic bottom is a matched die molded thermoset plastic. It's brilliance helps illuminate the internal work environment and increase operator eye comfort.

GENERAL INFORMATION
continued

A hospital grade multiple electrical power strip with four (4) receptacles is included with the glove box.

The top black shroud (cover) houses all main electrical components: a touch screen operator display, a fluorescent light, the main (on/off) power switch, a DB9 serial port connection, temperature and humidity transmitters, solenoid valves, relays, power supplies, and a circulation pump (890-THC unit only).

Temperature Control

The temperature is controlled by the interanl PLC and a 180 Watt thermoelectric assembly (Peltier device) mounted on the back wall of the glove box.

Humidity Control

Both of the #890-THC and #890-THC/IG include a side wall mounted nebulizer. This nebulizer is used to increase the moisture (Rh) inside the glove box.

Moisture Removal

The difference between the two models (890-THC and 890-THC/IG) is how the moisture is removed. There are two ways of achieving this: molecular sieve and inert gas.

#890-THC includes a circulation pump and two canisters filled with molecular sieve. When humidity (moisture) needs to be removed from the main chamber, the PLC activates the circulation pump. The pump pulls air from the main chamber and passes it through the two drying canisters and then back into the main chamber. Once the desired humidity level is reached, the PLC turns the pump off. Because the molecular sieve has a maximum water capacity, periodic regeneration is required. Refer to the *"Recharging Molecular Sieve"* section on page (24) of this manual.

#890-THC/IG uses an inert gas source to remove humidity (moisture). When humidity needs to be removed from the main chamber, the PLC opens up an internal gas valve to allow inert gas to flow into the main chamber. As the inert gas enters the chamber, the excess gas pressure is relieved through a factory mounted pressure relief valve. Once the desire humidity level is reached, the PLC closes the gas valve. Circulation pump and desiccant canisters are not included with this model.

SET UP PROCEDURES

1. Place glove box in your desired laboratory location. NOTE: the top and bottom sections of the glove box can be separated for moving through narrow door openings.

2. Inspect the gloves for any tears or cuts. If there are any, you will need to replace them before using the glove box. Please refer to the "Glove Change Out procedures" on page (22) in this manual.

3. Carefully remove the CLEAR top section of the unit. If necessary, clean the inside walls and top section of the unit. Make sure all the black gaskets on the doors and top section are clean. Please refer to the "Maintenance and Care" section on pages (32-33) in this manual.

4. Install all large pieces of equipment inside the glove box. Plug the device into the interior electrical outlet after you have replaced the clear top section. Apply the High Vacuum Silicone Grease (supplied) to the lower black gasket at this time.

5. Unpackage items in the transfer chamber. They include a white leveling plate, a roll of yellow tape, IBM type power cord, and a bottle of plastic polish.

6. Carefully replace the top clear section on the glove box. Make sure it is in the same position as when you removed it. Make sure the clamps line up and both the top and bottom sections are aligned properly. Do not forget to lock the clamps. You may now (electrically) plug in the device(s) inside the glove box.

7. All clamps have been pre-set at the factory. Some times during shipping, they may become loose and need re-adjusting. They can be adjusted by loosening the nut(s) and retightened. Be careful not to over compress the clamps or gaskets.

SET UP PROCEDURES
continued

8. Unscrew the water jar on the nebulizer and fill to the "fill line" with filtered water. NOTE: the nebulizer is located on the back left side of the glove box.

9. Verify that all hoses and cables are connected and secured. Please refer to the drawing "Utility Connections" at the back of this manual.

10A. #800-THC Model Only
Remove the two desiccant canisters and insert into mounting clips on the back of the glove box. NOTE: each canister has different hose fittings. Mount the canisters in the same orientation as featured in the drawing "Utility Connections" at the back of this manual.

10B. #800-THC/IG Model Only
Connect your inert gas source to the serrated nipple on the back of the black shroud. The serrate nipple will accept an inner hose diameter of .250" to .500". Secure the gas hose with a small hose clamp. NOTE: recommended pressure for the inert gas source is 50 psi. An in-line regulator may be needed with some house gas supply systems.
Open the gas valve and verify that the gas line is not leaking at the connection. This can be done by just listening for leaks.

11. OPTIONAL
You may attach an inert gas source directly to the chamber. This is only necessary if you plan on working with an inert environment.
In most cases, you will want to use the ground key cock valve located on the transfer chamber. This eliminates the need to switch the inert gas source between the transfer chamber and main chamber.
Please refer to the section "Purging the Main Working Chamber" on page (18 & 19) in this manual.

12. Plug the unit into your electrical power source.

YOUR UNIT IS NOW READY TO OPERATE

THE OPERATOR INTERFACE

POWERING UP THE 890-THC and 890-THC/IG

The main power switch is located on the back of the black shroud. Turn the unit on. The start screen on the operator display will display:

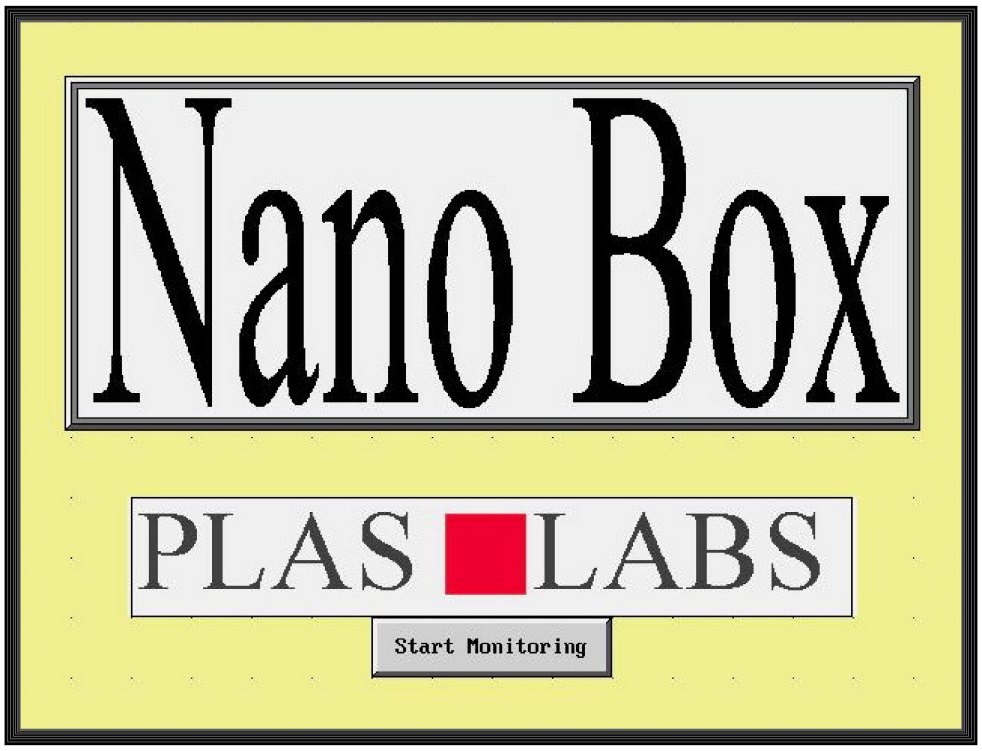


Fig. 1-Start Screen

Press the "Start Monitoring" button to access the Main Control Screen.

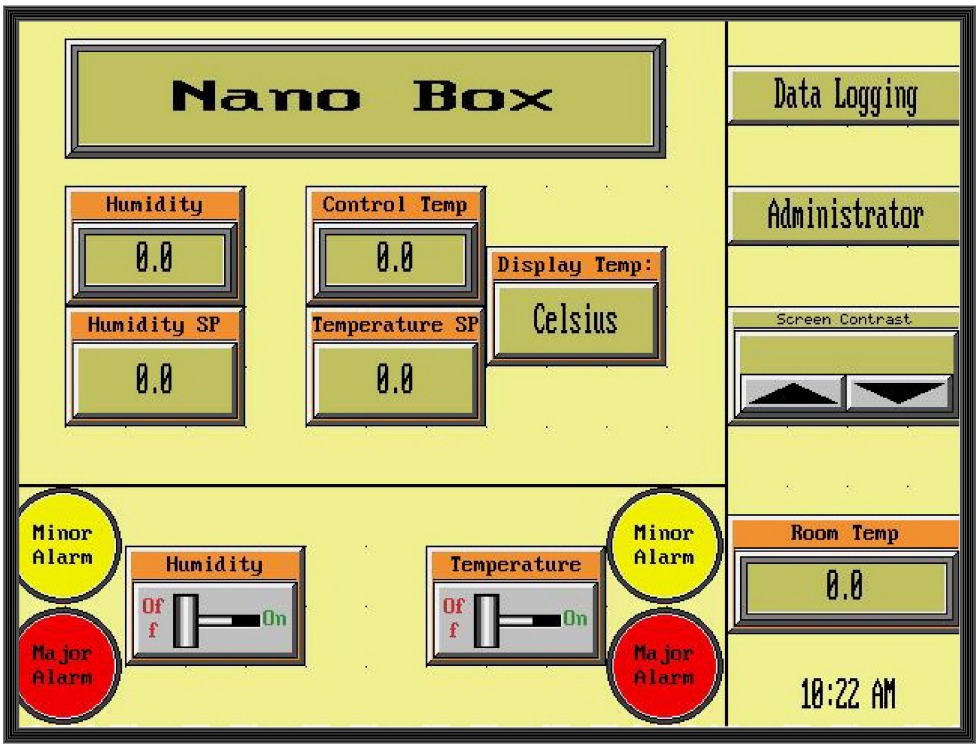


Fig. 2- Main Control Screen

NAVIGATING THROUGH THE MAIN CONTROL SCREEN

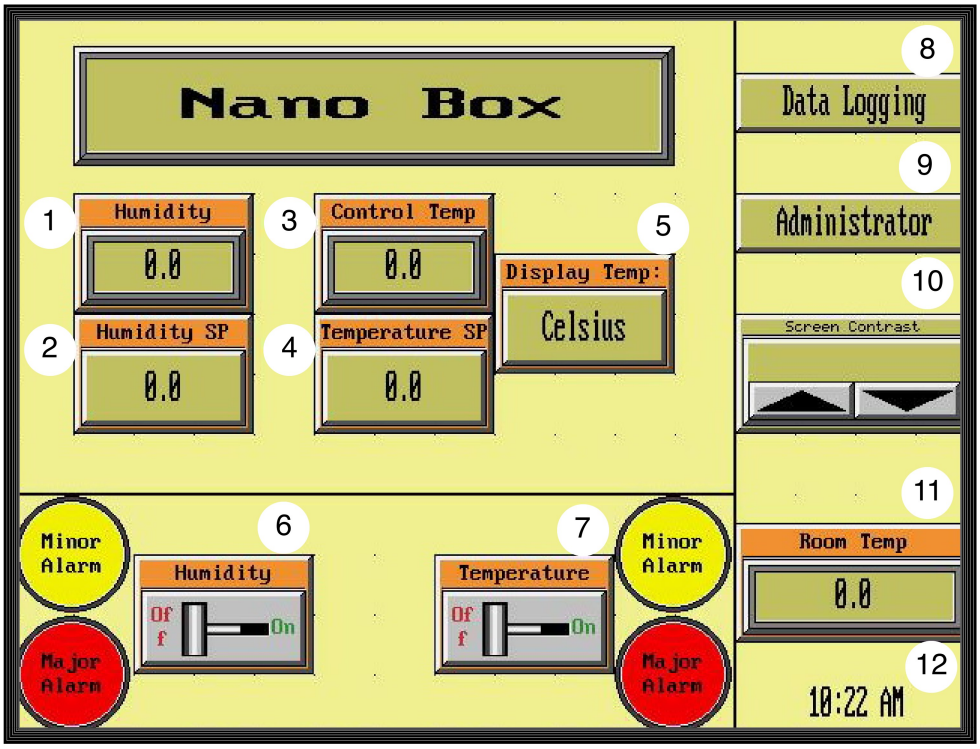


Fig. 2-Main Control Screen

1. **Humidity Level**, displays the current humidity level inside the main chamber of the glove box.
2. **Humidity Set Point**, displays the current humidity set point. Set point can be changed by pressing this button. See “changing the set points” on the next page of this manual.
3. **Control Temperature**, displays the current temperature inside the main chamber of the glove box.
4. **Temperature Set Point**, displays the current temperature set point. The set point can be changed by pressing this button. See “changing the set points” on the next page of this manual.
5. **Display Temperature**, displays temperature unit of measure. Can be changed by pressing the button (Celsius/Fahrenheit).
6. **Humidity Control** This is the on/off control switch for Humidity Control. It can be turned on and off by pressing this button.
7. **Temperature Control** This is the on/off control switch for the Temperature Control. It can be turned on and off by pressing this button.
8. **Data Logging** Press this button to access the 24 hour Data Logging window.
9. **Administrator** Press this button to access the Administration window. This is pass word protected.
10. **Screen Contrast** Use the Up and Down keys to adjust the screen contrast.
11. **Room Temperature** displays the current room temperature.
12. **Real Time Clock** displays clock.

CHANGING THE TEMPERATURE AND HUMIDITY SET POINTS

The temperature and humidity set points are changed from the Main Control Screen. Press either “Humidity SP” or “Temperature SP” (buttons 2 or 4, Fig. 2). A numeric key-pad pops up. Use the numeric buttons to change the set point. Once the set point has been changed, press enter. This will take you back to the Main Control Screen, your new set points will be displayed.

USING THE ADMINISTRATOR WINDOW

The Administrator Screen can be accessed by pressing the “Administrator” button on the Main Control Screen. This is a password protected screen. When you press the Administrator button, a numeric keypad pops up-”Enter Security Code”. Enter the default password 1111 and press enter.

NOTE: Password factory set to 1111.

From the Administrator screen you can:

1. Change the Administrator password
2. Adjust the clock
3. Test the inputs and outputs
4. Adjust Preset Conditions
5. Adjust the Alarm Setup
6. Adjust the PID Setup

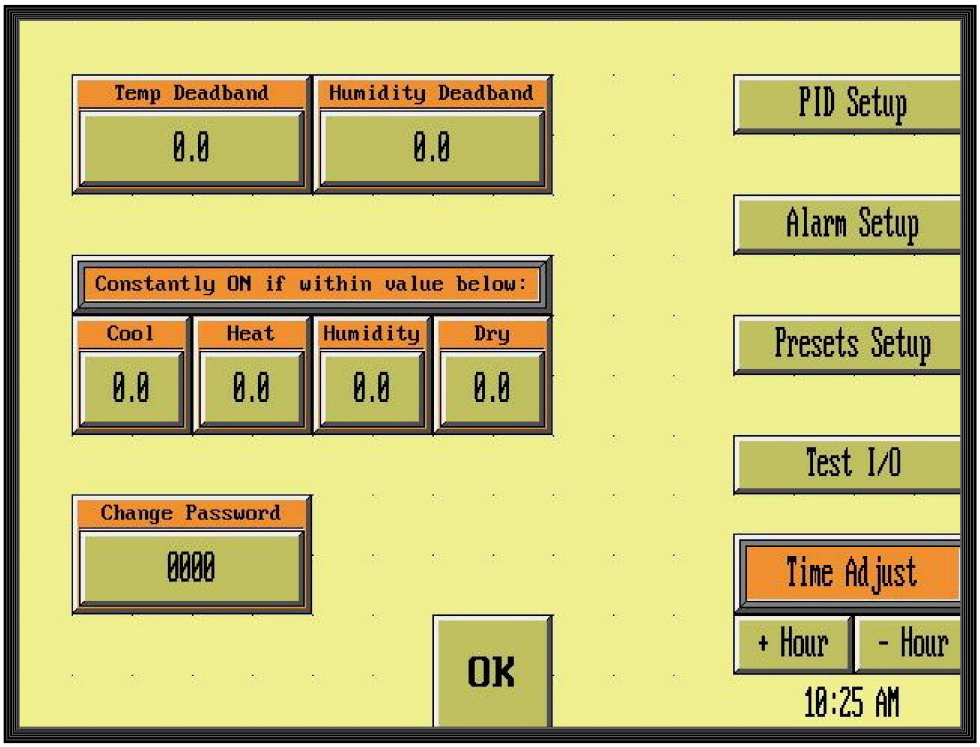


Fig. 3-Administrator Screen

USING THE ADMINISTRATOR SCREEN continued

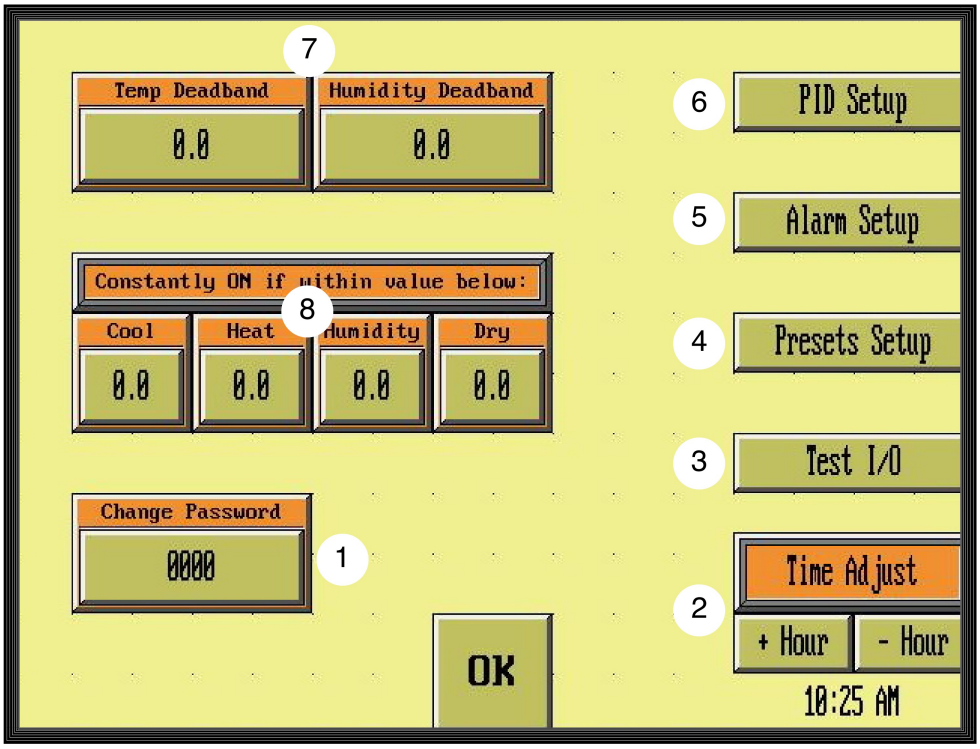


Fig. 3-Administrator Screen

1. **Change Password** Press this button to change the Administrator password. A numeric keypad pops up, “Change Password”. Use the numeric buttons to change the password, then press “enter”. NOTE: password must be four digits.
2. **Time Adjust** Use the “+ Hour” and “- Hour” buttons to adjust the clock time.
3. **Test I/O** Use this button to test and verify the PLC’s inputs and outputs. Please refer to the section “Using the Test I/O Screen” on page 11 in this manual.
4. **Presets Setup** Use this button to set up your preset conditions. This is beneficial when several different testing parameters are being used throughout the course of an experiment. Please refer to the section “Using the Preset Setup” on page 12 in this manual.
5. **Alarm Setup** Use this button to adjust the alarms. From this screen you can turn alarms on and off, view the alarm log, and change the alarm values. Please refer to the section “Using the Alarm Setup Screen on page 13 in this manual.
6. **PID Setup** Use this button to adjust the PID control settings. This feature is beneficial when working with various heat loads. By changing the PID settings you can achieve optimal control. Please refer to the section “Using the PID Setup Screen on page 14 in this manual.
7. **Temperature and Humidity Deadbands** These buttons allow direct access to the Deadband settings. When you press on of these buttons, a numeric keypad pops up “Temp Deadband”. Use the numeric buttons to change the value, then press “enter”.
8. **Control Override** These buttons allow you to change individual deadbands for each output: cool, heat, humidify, and dry.

USING THE TEST I/O SCREEN

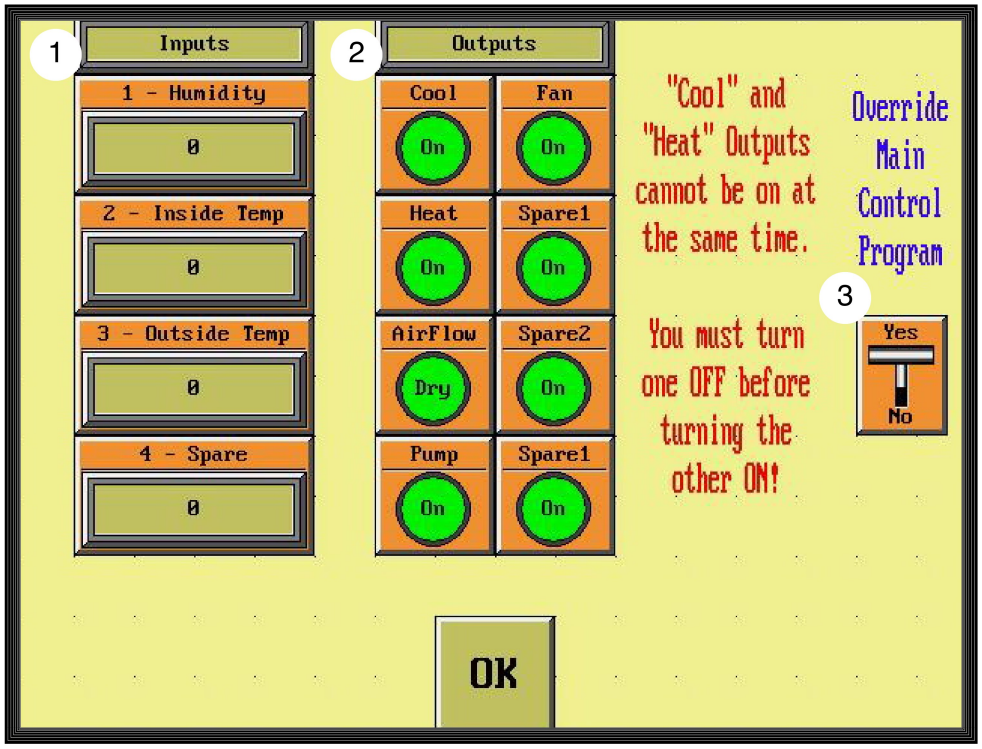


Fig. 4- I/O Screen

The Test I/O screen is accessed by pressing the “Test I/O” button on the Administrator screen (button 3, Fig. 3). The primary purpose of this screen is to manually override the control program (turn the temperature and humidity control off), and to test the outputs. This screen is only meant to be used in troubleshooting applications.

1. **Inputs** Display the current engineering unit for each of the input sensors. The first three inputs will display a value relative to their respective input, while the fourth input is a spare and will display zero.
2. **Outputs** Display the current status of the control relays. You can manually turn on and off the outputs by pressing their respective button.
3. **Main Override Switch** This button can be used to manually override the main temperature and humidity control program. This is used during troubleshooting applications to test individual system outputs without interference from the control program.

USING THE PRESET SETUP SCREEN

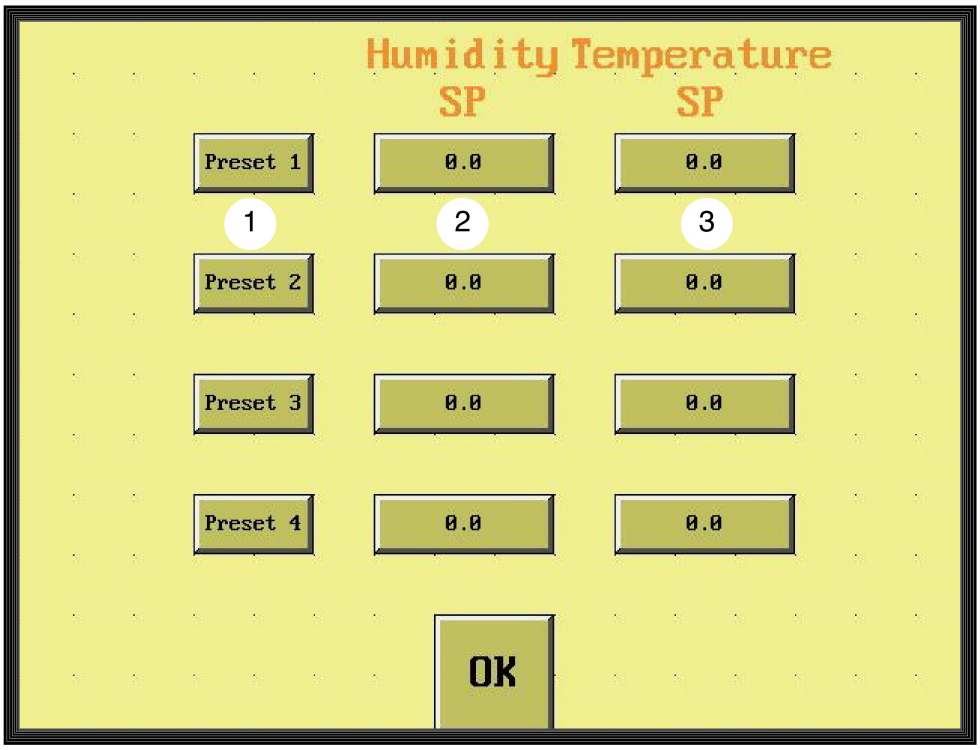


Fig. 5-Preset Setup Screen

The Preset Setup screen is accessed by pressing the “Preset Setup” button on the Administrator screen (button 4, Fig. 3). The Preset Setup screen is used to enter up to four preset temperature and humidity conditions. Each preset allows you to customize the temperature and humidity set points.

1. **Presets 1-4** These buttons are used to enter the preset conditions. Once one of the preset buttons is pressed, the temperature and humidity set points will be changed on the Main Control Screen (Fig. 2).
2. **Humidity SP** These buttons are used to enter the humidity set points for each pre set condition. When you press one of the buttons, a numeric keypad pops up. Enter your set point value and press enter.
3. **Temperature SP** These buttons are used to enter the temperature set points for each preset condition. When you press one the button, a numeric keypad pops up. Enter your set point value and press enter.

USING THE ALARM SETUP SCREEN

Fig. 6-Alarm Setup Screen

The Alarm Setup screen is accessed by pressing the “Alarm Setup” button on the Administrator screen (button 5, Fig. 3). The Alarm Setup screen is used to set minor and major alarms for both temperature and humidity. From the Alarm setup screen you can also turn the alarms on and off, change the temperature and humidity set points, and access the PID Setup screen.

1. **Humidity SP** Press this button to change the humidity set point (SP).
2. **Temperature SP** Press this button to change the temperature set point (SP).
3. **Enable Alarm** This button controls the humidity alarm. When the alarm is on, both major and minor alarms will be activated.
4. **Enable Alarm** This button controls the temperature alarm. When the alarm is on, both major and minor alarms will be activated.
5. **Major Limit** Press this button to change the major alarm limit. The major limit alarm is activated when the process value (pv) falls below the major limit value. Example: major limit is set to 1.0. If the set point is 80.0 and the p.v. is 78.0, the major limit alarm will be displayed. As soon as the process value reaches 79.1, the major limit alarm turns off.
6. **Minor Limit** Press this button to change the minor alarm limit. The minor limit alarm is activated when the process value (pv) goes above the minor alarm limit. Example: minor limit is set to 1.0. If the set point is 80.0 and the p.v. is 82.0, the minor limit alarm will be displayed on the main control screen. As soon as the process value reaches 80.9, the minor limit alarm turns off.
7. **PID Setup** Press this button to access the PID Setup screen.

USING THE PID SETUP SCREEN

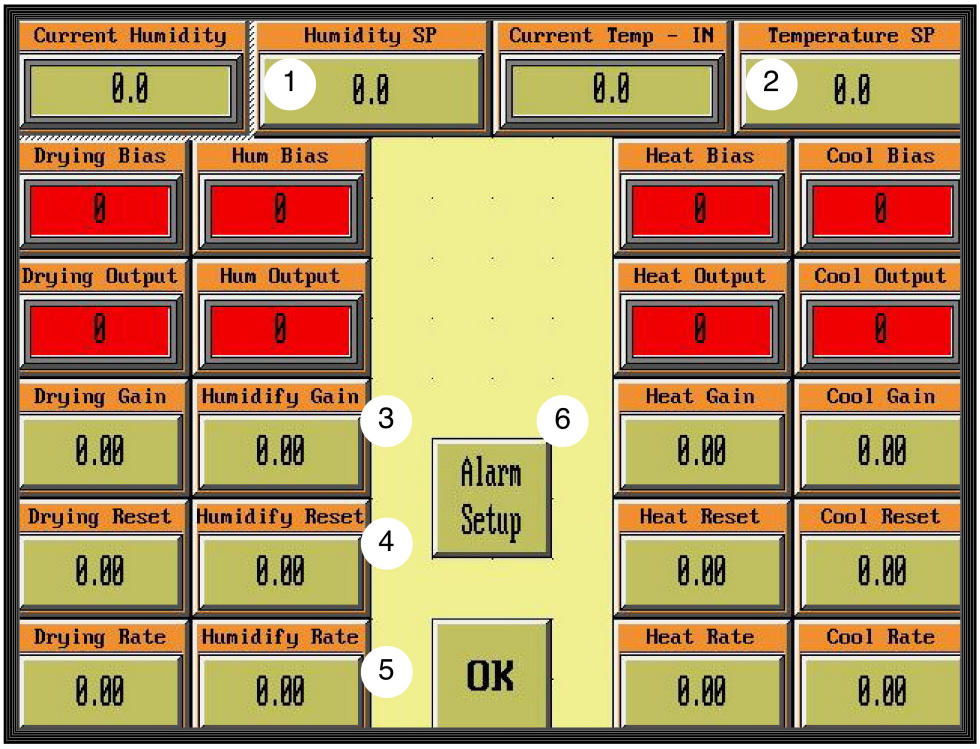


Fig. 7-PID Setup Screen

The PID Setup screen is accessed by pressing the “PID Setup” button on the Administrator screen (button 5, Fig. 3) or Alarm Setup screen (button 7,Fig. 6). The PID Setup screen is used to adjust the PID settings for both temperature and humidity. The components of PID are proportional (gain), integral (reset), and derivative (rate). Adjustments can be made to “fine tune” the controlling aspects of the #890-THC.

1. **Humidity SP** Press this button to change the humidity set point (SP).
2. **Temperature SP** Press this button to change the temperature set point (SP).
3. **Gain** Use this button to adjust the gain on either temperature or humidity. Factory set to 1.0. Decrease the Gain if the process overshoots excessively or oscillates excessively. Increase the Gain if process responds slowly or if the process fails to meet set point.
4. **Reset** Use this button to adjust the reset on either temperature or humidity. Factory set to 0.0. Add reset until the process becomes unstable, then decrease until stability is restored.
5. **Rate** use this button to adjust the reset on either temperature or humidity. Factory set to 0.0. Rate can cause process instability. Typically add Rate as 1/10th of reset value. Decrease Rate if the process overshoots/undershoots or if the process oscillates excessively.
6. **Alarm Setup** Press this button to access the Alarm Setup screen.

USING THE DATA LOGGING SCREEN

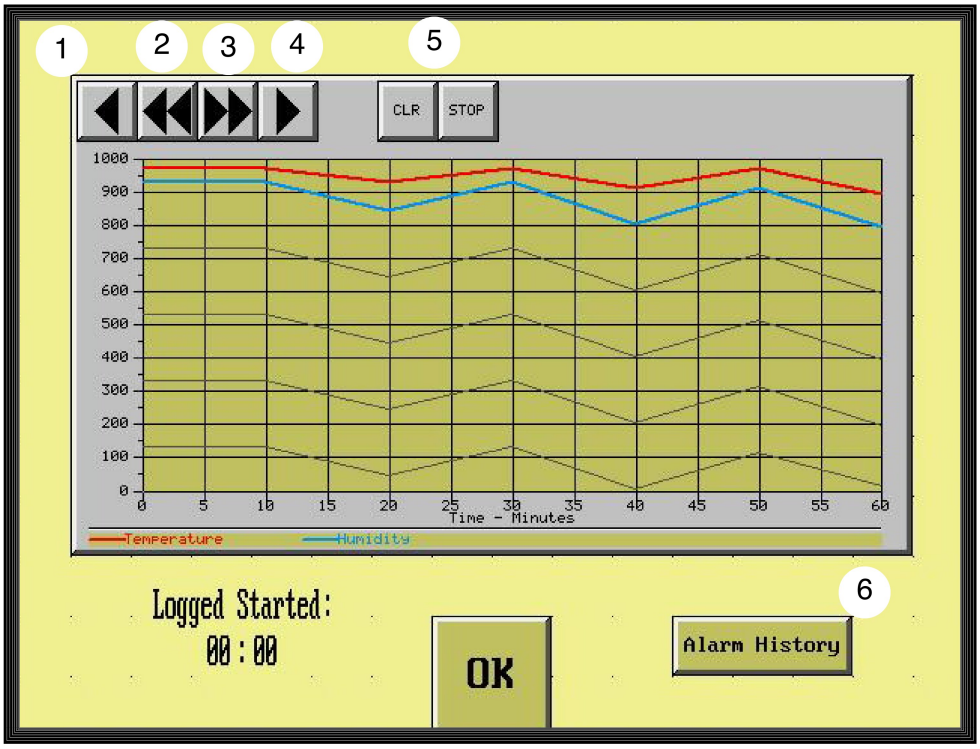


Fig. 8-Data Logging Screen

The Data Logging screen is accessed by pressing the “Data Logging” button on the Main Control screen (button 8, Fig. 2) or Alarm Setup screen (button 7,Fig. 6). The Data Logging screen displays the temperature and humidity process values over the last 24 hours. It is intended to offer a quick overview of the temperature and humidity control.
NOTE: For lengthy data logging requirements, you can use the serial port on the back of the black shroud.

1. **Back** This button scrolls the graph back 30 minutes.
2. **Back** This button scrolls the graph back to the beginning of the data logging session.

   NOTE: Data logging begins when the unit is turned on.
3. **Forward** This button scrolls the graph forward 30 minutes.
4. **Forward** This button scrolls the graph to the most recent data logging point.
5. **CLR/STOP** These buttons can be used to clear the data or start and stop the data logging.

   NOTE: Data is stored in the PLC as static RAM.
   When you turn the #890-THC or #890-THC/IG off, the data is lost.
6. **Alarm History** Press this button to access the Alarm History. The “Item Description” button gives you the exact time and condition for each alarm. This data is stored in the PLC as EPROM and is not lost when the unit is powered down.

WORKING IN THE GLOVE BOX

THE BASIC CHEMICAL REACTION

In simplest terms; when trace amounts of Oxygen come into contact with Hydrogen and the Palladium Pellets (with heat), Oxygen is reduced to water vapor.

$O_2 + H_2 + Palladium + Heat = H_2O$

This water is produced in the form of vapor (fog).

ANAEROBIC GAS MIXTURE RECOMMENDED MIX PERCENTAGES

The preferred gas mixture for use with the catalyst heater unit in the Model 890-THC and 890-THC/IG is as follows:

Nitrogen N_2 =	**85%**
Hydrogen H_2 =	**10%**
Carbon Dioxide CO_2 =	**5%**
Total Mixture =	**100%**

WARNING: Do not use more than 10-15% Hydrogen in your gas mixture. This is a standard safety precaution, since 20-80% Hydrogen is explosive.

POSSIBLE VARIATIONS of CONTROLLED ATMOSPHERE GASES

There are several possible atmosphere variations when using Plas-Labs Controlled Atmosphere Chamber glove boxes.

However, in **all** cases you must use the small amount of Hydrogen to cause the chemical reaction which reduces the Oxygen into water vapor.

WARNING !!
DO NOT EXCEED THE 10% LEVEL OF HYDROGEN as it is very explosive!!

Variations using INERT GASES are as follows;

For an ARGON ATMOSPHERE use:

90% Argon
10% Hydrogen
100% gas mixture

For a HELIUM ATMOSPHERE use:

90% Helium
10% Hydrogen
100% gas mixture

For a NITROGEN ATMOSPHERE use:

85% Nitrogen
10% Hydrogen
5% CO_2
100% gas mixture

NOTE: The CO_2 should be used when working with living organisms such as anaerobes.

If you have additional questions,
please contact our technical service department at:

TEL: 1-517-372-7177 (Ext 27) FAX: 1-517-372-2857

TECHNIQUE FOR PURGING THE MAIN WORKING CHAMBER

All #890-THC & #890-THC/IG Temperature and Humidity Controlled Glove Boxes have two gas key cock valves on the main chamber. Two additional gas key cock valves are mounted on the transfer chamber. A vacuum pump is needed for purging the transfer chamber and main chamber of the glove box.
The main chamber can be purged using an inert gas or the special anaerobic gas mixture (page 16).

NOTE

When using the special anaerobic gas mixture, you must have the #800-HEATER, Digital Heater unit and #800-PC, Palladium catalyst for the reaction to occur.

Connecting the vacuum pump and gas lines:

1. Use the valves on the transfer chamber. Refer to STEP #1 below.
2. Vacuum pump hose should be .250" to .500" I.D. and secured with a hose clamp.
3. Set the incoming gas source OR gas cylinder (bottle) regulator to 25-50 PSI. (340 kPa maximum.)

When purging, use the gloves as an indicator of pressure within the glove box. Watch them carefully as they move in and out of the main chamber. Positive pressure pushes the gloves out and negative pressure draws the gloves back into the chamber.

STEP #1

A. Attach the hose from your gas source to the Transfer Chamber key cock valve. (Labeled N_2.) Set up incoming flow rate at 25-50 P.S.I. maximum. The key cock valve should be closed.
B. Release the inner clamps for the Transfer Chamber door. It should be slightly open.
C. Turn on vacuum pump and draw a vacuum down until the gloves are pulled inside the glove box (off of the floor).

PURGING THE MAIN WORKING CHAMBER continued

STEP #2

When the gloves extend into the main chamber and slightly touch the floor of the glove box, open the key cock valve and introduce the gas mixture. Watch the gloves. Raise the level of gas input until the gloves extend out of the glove box approximately 14" inches (34 or 35 cm).

STEP #3

At this point, turn off the incoming gas and again turn on the vacuum pump. This will exhaust the inner atmosphere until the gloves extend into the glove box. Watch the gloves. The vacuum should be left on until the gloves extend into the glove box approximately 14" inches (34 or 35 cm). Another good indicator is when they barely touch the inner floor.

STEP #4

Repeat steps #2, #3, and #4 at least eight (8) or nine (9) more times (purge cycles) then turn off the gas and vacuum pump.

You have now successfully "purged" your glove box and the inner atmosphere is primarily your inert gas or special gas mix.

Additional questions???

Contact our Technical "Hot Line"

at

Tel: 1-800-866-7527 Tel: 1-517-372-7177

Fax: 1- 517-372-2857 email: mikeregan@plas-labs.com

ENTRY THROUGH THE TRANSFER CHAMBER

The transfer chamber is used for inserting materials into and out of the main working chamber without disturbing the the main chamber atmosphere.

It is important to keep both transfer chamber doors closed during normal operation. This is a safeguard in case the outer door is opened by mistake.

1. With the inner door closed and locked, open the outer door and place the desired materials inside the chamber. The white plastic tray is useful for liquids.
2. Close and lock the outer door.
3. Open the vacuum valve and push the button to turn on the vacuum chamber pump. Draw a vacuum down to 18" to 20" of Hg. Watch the vacuum gauge. When that level is reached, turn off the vacuum pump and close the vacuum valve.
4. Now open the ground key cock valve to introduce your gas of choice. Continue this until the gauge reads "O"

TIP: Slow down the gas flow when the gauge nears five (5") inches. You can control the incoming flow procedure easier.

According to the U.S. Centers for Disease Control protocol

REPEAT THIS PROCEDURE A TOTAL OF THREE (3) TIMES

5. Upon completion of the third (3rd) sequence, you may safely open the inner door and transfer your materials into the main chamber.

TIP: The white plastic leveling tray is helpful when transferring liquids.

Additional questions???
Contact our Technical "Hot Line"
at
Tel: 1-800-866-7527
Tel: 1-517-372-7177
Fax: 1- 517-372-2857
email mikeregan@plas-labs.com

GENERAL MAINTENANCE SCHEDULE
#890-THC & #890-THC/IG Temperature and Humidity Controlled Glove Boxes

It is strongly recommended that operators remove all jewelry during use of the glove box (isolator).

Weekly:

General cleaning (refer to our cleaning procedures)
NOTE: This will vary as to your in house protocol.

Check nebulizer water level.

#890-THC only: Make sure the Drying Train canisters are not saturated with moisture. If so, they must be recharged.
Refer to *"Recharging the Drying Train"* section.

Monthly:

Check gloves and gasketing for excessive wear and tear.
Check to see if any clamps need adjusting.

Semi Annually:

Perform your standard main chamber leak test.

Annually:

Replace the Hypalon gloves. Check all gasketing for excess wear and tear. Make sure mechanical fasteners (screws) have not vibrated loose. If so, tighten them carefully.

Calibrate Rh transmitter. See transmitter information on pages 35-37.

Replace the Molecular Sieve in the Drying Train canisters.

OPTIONAL ACCESSORIES

#800-PC, Palladium Catalyst
Install the "back up" Palladium canister. Re-charge the original Palladium canister for future use. Refer to the *"Regenerating the Palladium Pellets" section on page (28).*

#800-HEATER, Digital Heater Unit
Clean and lubricate fan motor. See page 26.

GLOVE CHANGE OUT PROCEDURE

R-6/2003

The glove change out procedure should be well defined and practiced before the actual change out takes place. Establish a contingency plan in case containment is lost.

The glove box (isolator) is equipped with glove ports, each with an 8.75"Ø machined groove for the glove ring. Before you remove a glove, be sure to have a glove port "plug" (#800-PLUG) inside the chamber. The glove port plug is used to seal the inside of the glove port during the change out. NOTE: It is very useful to keep a glove port plug inside the chamber at all times.

1. Insert your hand into the glove that is to be changed. Pull the glove port plug into the inside glove port opening and tighten securely. It is tightened by rotating the big RED knob clockwise. Make sure you have the damaged glove completely out of the chamber.

   NOTE

   You do not need to use the glove port plug if the glove box is shut down for periodic cleaning.

2. Remove the old yellow vinyl tape and stainless steel worm gear clamp.

3. Remove the old damaged glove. NOTE: You may want to to place a disposable plastic bag around the old glove when you pull it off the machined groove on the port ring.

4. Make sure there is no debris on the glove port ring. It must be completely clean before mounting the new glove.

5. Insert the new glove into the port ring (and glove box). Make sure the thumb is pointed up, and the glove end (BEAD) is securely placed into the machined groove.

6. Retape and seal the beaded end of the glove to the glove port ring. Wrap the tape three (3) times around the glove and port ring. NOTE: It is important you do not have any wrinkles in the tape.

7. Re-attach the stainless steel worm clamp making sure it covers the beaded end of the glove. Secure it snugly, but do not over tighten.

8. To remove the glove port plug, reverse the original procedure as in Step #1. Turn the red knob counter-clockwise until the plug is released.

THE DRYING TRAIN PACKAGE
#890-THC ONLY

The Drying Train components consist of:

A. Diaphragm type vacuum pump.
B. Two (2) clear plastic canisters with mounting brackets.
C. Molecular Sieve media. (Rechargeable)
D. Pressure hoses and quick dis-connects.

The Controlled Atmosphere (Anaerobic) Chamber drying train is activated by the PLC whenever moisture needs to be removed from the main chamber.
The molecular sieve can adsorb up to 30% of its weight in water.

How the Drying Train works

The basic function of the Drying Train is to remove excess moisture from within the #890-THC, Temperature and Humidity Controlled Glove Box. Molecular Sieve will also act as a filter for purifying the internal atmosphere.

1. The PLC activates the vacuum pump.
2. When the vacuum pump activates, it draws the internal atmosphere from within the glove box and pulls it through the two (2) Molecular Sieve canisters.
3. The Molecular Sieve beads absorb the excess moisture and atmosphere impurities.
4. The internal atmosphere then passes through the vacuum pump and is “pushed” back into the main working chamber.

RE-CHARGING THE MOLECULAR SIEVE #890-THC ONLY

The Molecular Sieve can be re-charged by emptying the contents of the canisters into a metal tray and baking in a hot oven for two (2) hours at 320°F (320°C).

1. Disconnect the 1/4" O.D. hose from the canister on the left side. On the push-to-seal fitting, press down on the dark gray flange and pull the 1/4" O.D. hose out of the fitting.
   Disconnect the quick disconnect on the 1/2" O.D. hose from the canister on the right side.
   Remove the canister from the black clamps.

2. Open one end of the plastic canister and pour the contents into a metal pan. Place the metal pan with Molecular Sieve in the oven. Do not place the plastic canister in the oven. It will melt.

3. After baking (re-charging), allow the material to cool down to room temperature and pour it back into the canister(s). If the Molecular Sieve beads include "powdered material", do not re-use it. It will clog the canister orifice. Make sure the end cap is tight and the o-ring is set.

4. Replace the canister in the black clamp(s) and re-connect the quick dis-connects.

5. Verify that the end cap is sealed by activating the drying train. (Set humidity level to 0.0%). Let the vacuum pump run for 15 minutes. Check the gloves during this time.
   If you see a negative pressure being created (gloves drawing in), there is a leak in one of the canisters.
   If there is a leak, re-check the end cap to make sure the o-ring is set.

Refer also to the "Trouble Shooting Section" on pages (29-31).

OPTIONAL ACCESSORIES
#890-THC/AC

Accessories:

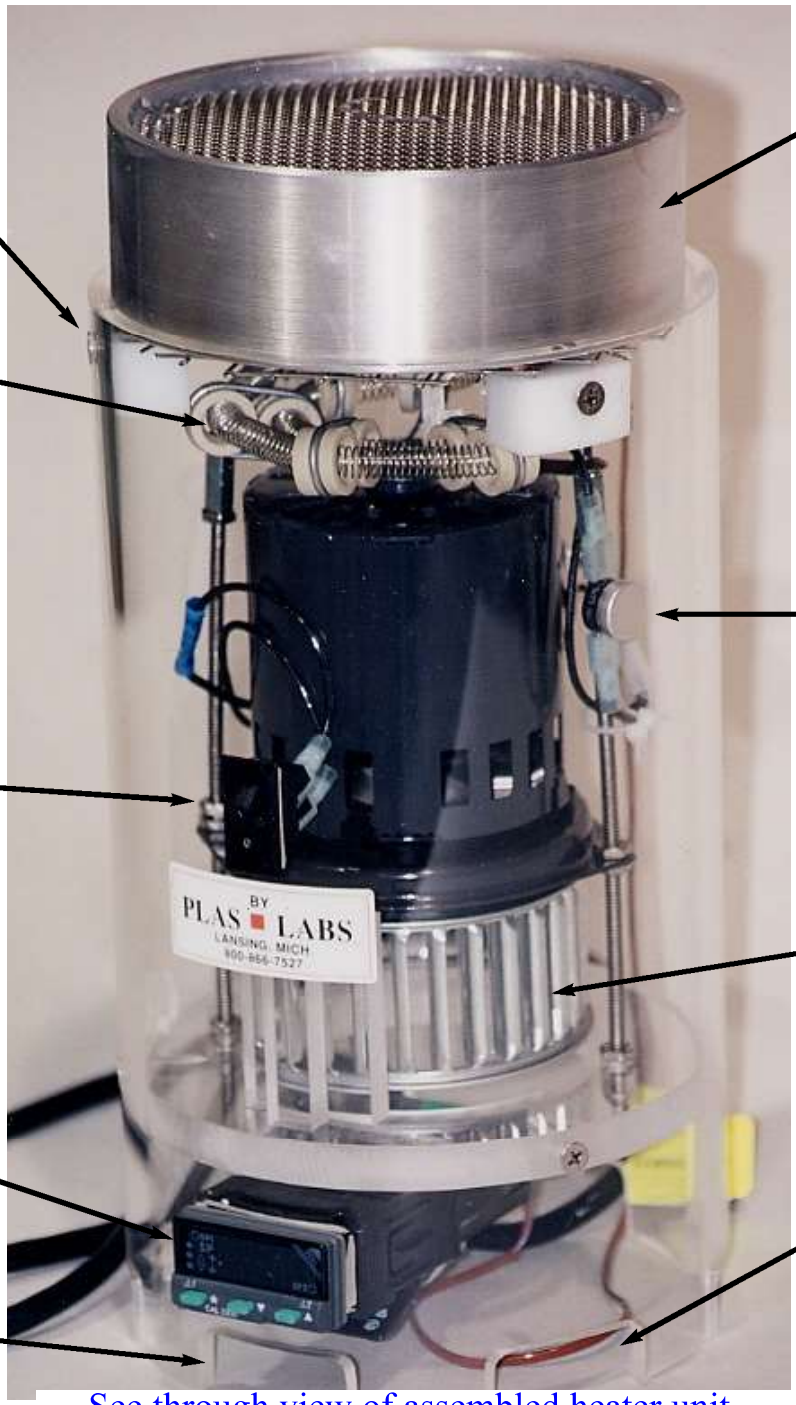
#800-HEATER, Digital Heater Unit

#800-PC, Palladium Catalyst

R 6/03 ©

CATALYST HEATER UNIT
WITH PALLADIUM CANISTER

(Two [2] canisters included with each set)



Temperature Sensor

Palladium Canister, #800-PC. (2 provided) Save one for future back-up

Heater Coils (Elements)

High Temperature cut-off sensor. (Safety feature.)

MainPower ON/OFF Switch

Ventilator (Fan) for atmosphere movement

Programmable Temperature Controller

Typical openings for entry of internal chamber atmosphere.

Typical openings for entry of internal chamber atmosphere.

See through view of assembled heater unit.

NOTE:

Heater is catalog #800-HEATER

Palladium Canister is catalog #800-PC (quantity @ 1)

INSTRUCTION SHEET
CATALYST HEATER UNIT
#800-HEATER

This new generation heater is equipped with a programmable logic controller to optimize the heater's performance. The digital readout allows you to quickly determine the working temperature within the glove box. The heater is also equipped with an 18" thermocouple (temperature sensor) which allows you to gather accurate readings near your experiment.

How it works:

When the heater is turned on, the circulation fan draws air from the bottom of the glove box and pushes it through the heater and across the heater coil. The programmable controller allows you to set your desired temperature. The heater has been factory set to 37°C. The actual temperature is continually displayed on the controller.

How to change the set point:

Press and hold the "*" key on the controller (this will display the set point). While the "*" key is held down use the UP/DOWN keys to adjust the set point. Once the adjustment has been made, release the "*" key and the actual conditions will be displayed.

IMPORTANT: If you ordered the palladium catalyst (#800-PC), please allow the heater to reach set point before placing the catalyst on top of the heater.

General Maintenance:

The motor bearings should be relubricated every six months with 10 to 20 drops of SAE 10W or 20W nondetergent oil (ML type).

Product Data:

Outside Dimensions:	12" high x 6.5" diameter
Power requirements:	110V/60 Hz 4.2 amps
	220V/50 Hz 2.1 amps
Temperature range:	ambient to 50°C
Resolution:	0.1°C
Set point accuracy:	±0.3° of span
Thermocouple:	18" type T

Contact our Technical "Hot Line"

at

Tel: 1-800-866-7527 Tel: 1-517-372-7177
Fax: 1- 517-372-2857 email: mikeregan@plas-labs.com

CAL 3200 CONTROLLER PARAMETERS
FOR
#800-HEATER

CYC.2	on.oF
bnd.2	4.0
SEt.2	0.0
SP.Ly	oFF
oFSt	0.5*
CYC.t	6.0
dAC	0.5
dEr.t	oFF
int.t	10
bAnd	4.0
tunE	oFF

LEVEL 1

unit	°C
inPt	tC t
Lo.SC	0.0
hi.SC	50.0
diSP	0.1°
SP2.b	Lt.ho
SP2.A	nonE
PL.2	100
PL.1	100
hAnd	oFF
SP1.P	*var.*

LEVEL 2

rESt	nonE
VEr	3
dAtA	Ct A
rEAd	VAr°
ChEy	oFF
Zero	0.0
SPAn	0.0
rEV.L	1n.2n
rEV.d	1r.2d
burn	uP.SC
SP2.d	rLy
SP1.d	SSd

LEVEL 3

REGENERATING THE PALLADIUM CATALYST

The Palladium Pellets can be regenerated by baking in a "hot" oven at 450 degrees Fahrenheit (235 degrees C) for approximately four (4) hours.

The exact length of time is dependent upon the severity of the "by-product" coating on the pellets. The whole canister can be placed in the oven OR it can be opened and the contents poured in a metal baking pan. The pellets will have a white coating (powder) on them and the heating process will cause the coating to drop off.

After the baking period, the canister should be "shocked" or "banged" on a hard surface so the white covering on the pellets will drop off. If you choose to open the aluminum canister “agitate” or roll the pellets around in the pan. The white covering (powder) on the pellets will drop off.

The canister of Palladium is then ready for re-use.

Additional questions???

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at

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MISCELLANEOUS INFORMATION

TROUBLESHOOTING POSSIBLE PROBLEMS
Glove Boxes and Isolators

3/2003

Occasionally situations might occur which are perplexing. "What's wrong with my glove box?" Plas-Labs glove boxes and isolators have been designed to be very durable and as trouble free as possible. Because they require a minimum of maintenance, (months or even years), it is easy to forget our recommended guidelines.

The following are hints to solving potential problems;

A. In the middle of vacuuming the Transfer Chamber, *you turn off the vacuum pump. It will not restart.*

Suggestion: The vacuum pump cannot "over power" the existing negative pressure (vacuum) in the Transfer Chamber. You must introduce your preferred gas mixture to relieve the negative pressure. When the negative pressure is lowered, the pump will restart.

SIDE NOTE: Occasionally this situation will also occur when using the Drying Train as well. There are two (2) possible solutions;

1. Relieve the negative pressure in the Drying Train system.
2. You might have excess moisture in the Drying Train canisters. This means you have to re-charge the Drying Train media. Refer to the section *"Re-charging the* the Drying Train.*"*

B. For use with HEATER and palladium catalyst Only: *The chemical reaction does not occur* and you cannot get internal "fog" which indicates the Oxygen is being reduced.

Suggestion: Double check the gas mix ratio. Refer to the section on page (16) *"Basic Chemical Reaction."* It is very important you have ten (10%) percent Hydrogen in the gas mix. No more and no less. Remember that over fifteen (15%) percent of Hydrogen is extremely explosive.

Suggestion: Recheck how many times you have purged the glove box. Depending upon the internal conditions of the glove box, you might have to purge it at least ten (10) times to remove excess amounts of Oxygen. Refer to the section *"Techniques for Purging" on pages (18-19).*

TROUBLESHOOTING POSSIBLE PROBLEMS
Glove Boxes and Isolators
(continued)

C. *The fluorescent light does not come on...*

Suggestion: Check to make sure the main power is on
Check to make sure the fluorescent lamp is securely fastened in the lamp holders.

Procedure: Remove black shroud by unscrewing black knobs at each end. Tilt shroud away from the clear acrylic top and check fluorescent bulb. Rotate (twist) it until it is set properly.

D. *The transfer chamber OR main chamber does not hold a vacuum...*

Suggestion: Check to make sure all gas valves are closed and the clamps are securely fastened.
Check the gloves for a possible tear (hole).

Procedure: Refer to sections *"Glove Change Out Procedure" on page (22)* and *"Recharging the Molecular Sieve" on page (24).*

E. *A vacuum results when I the drying train is activated...* The gloves are pulled into the main chamber.

Suggestion: Regenerate the molecular sieve. Refer to section *"Recharging the Molecular Sieve" on page (24).*

Procedure: See regeneration instructions in that section.
Check to make sure all quick disconnect in the drying train line are attached.
Reseat the o-ring inside the clear acrylic canister if loose.

F. For #AC Style Units Only: *The Catalyst Heater Unit does not reach the preferred set point....*

Suggestion: Remove the palladium canister from the top of the heater. Make sure the thermo-couple wire on the heater is attached tightly. Sometimes the electrical contacts come loose during shipping.
Check set point on digital controller.
Check heating element (p/n 800-HE/2000-EXP).

G. *The moisture is not being removed from the main chamber....*

Suggestion: Recharge the molecular sieve. Refer to section *"Recharging the Molecular Sieve"* on page 24.
Check for moisture build up on the fins of the Peltier Device. This is caused when you go from extreme heat to extreme cool conditions.

Additional questions???
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at

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MAINTENANCE AND CARE OF PLAS■LABS PRODUCTS

Most components in **Plas■Labs** products consist of "thermoplastics", stainless steel, and aluminum. Like any piece of fine laboratory equipment, care should be taken to avoid dropping, mishandling, and misapplication. To sterilize our chamber we recommend a sterilant disinfectant such as **"ABQ"** product manufactured by Alcide Corporation 206-882-2555 or **"CLIDOX-S"** manufactured by Pharmacal Labs, 203-729-5237.

THERMOPLASTIC COMPONENTS

A. CLEANERS

Cleaning thermoplastics is best accomplished with soap or detergent and water solutions. In cases where residues left by these agents is undesirable, special cleaning solvents may be used. Soaps and detergents (except those of the abrasive type), will not harm plastics, but several common solvents will.

In general, aromatic and chlorinated hydrocarbons will attack most plastic surfaces. This applies to all of the plastics used in **Plas■Labs** products.

Examples of these products include (but are not limited to), acetone, ether, gasoline, lacquer thinner, methyl-ethyl-keytone, methylene chloride, and toluene.

Thermoplastics have a limited resistance to alcohol (all types) but their use is not recommended.

Dilution of alcohol with water will minimize damage, but the exposure time should be kept to a minimum. Prolonged contact of plastics to alcohol will cause the plastic to "craze". (This is a fine cracking close to the exposed surface.) Crazing severely reduces the optical qualities and strength of the plastic.

Some Recommended Cleaners Include:

Brillianize Cleaner, an anti-static liquid cleaner.
Polly-Kleen, an anti-static cleaner for Styrene's.
Rez-N-Kleen, anti-static cleaner which also removes tape residues.
Mask-Off, a cleaner which removes paper and tape residues.
20/20 Cleaner, an Anti-Static liquid cleaner.

B. POLISHES

While the above cleaning solutions have some polishing capabilities, they will not remove scratches from plastics. This can only be done with automotive type waxes or the finer grades of rubbing and polishing compounds. These products should be specifically for acrylic enamels and lacquer base paint.

C. SCRATCH REMOVERS

Deep scratches should first be sanded with fine grit (400 or finer) wet sandpaper. Steel Wool (OOOO Finest Grade) is also very helpful. Use the polishing materials (rubbing compounds), mentioned above for the final stage.

STAINLESS STEEL COMPONENTS

Stainless Steel is resistant to all solvents and detergents. Polishing can be accomplished by using fine grades of Steel Wool and/or #707 Scotch Brite Pads (3-M Corp.). For the final stage, use a polishing spray like "Stainless Steel Magic."

ALUMINUM COMPONENTS

Again, solvents or detergents may be used for cleaning aluminum. If the aluminum becomes tarnished, it may be rubbed with any of the many commercial polishes available.

Anodized aluminum parts should not be polished as it will remove the protective coating.

A FINAL WORD OF CAUTION

Thermoplastic materials like acrylic, polystyrene, Noryl, A.B.S., etc., will be attacked by aromated hydrocarbons. Use of them will cause crazing, discoloration, and/or cracking. In some cases joints will separate.

Please try to avoid using the following:

1. Methyl Ethyl Keytone
2. Acetone
3. Methylene Chloride
4. Bleach
5. Ether

In all cases, try to avoid the use of abrasives to clean your equipment.

Revised 2002

PLAS■LABS
LIMITED WARRANTY

Plas■Labs, Inc., warrants all materials and components used in the manufacture or assembly of its' products against defects in materials and workmanship for a period of twelve (12) months after shipment. In the event of product failure of operation, the obligation of **Plas■Labs** under this warranty shall be limited to repairing or replacing at its' option, any part of said equipment which upon **Plas■Labs** inspection is determined defective.
Defective items are to be returned to **Plas■Labs**, Lansing, Michigan. All transportation charges are to be prepaid.

Contact us at 1-800-866-7527 for a "RETURN AUTHORIZATION NUMBER."

This warranty does not apply to equipment or parts which fail because of abuse; accident, alteration, misuse, erosion, improper installation, or improper replacement of a repaired item.

The buyer assumes all risks for results obtained from these products, whether used alone or in combination with other items. It is expressly understood that we are not responsible and will not be held liable for damage and/or injury caused by the use of our products.

This warranty is in lieu of any other warranty, expressed, or implied, including merchantability of fitness, and of all other obligations or liability whatsoever on **Plas■Labs** part.

Additional Questions??
Contact our Technical "Hot Line" at 1-517-372-7177 (US).

TRANSMITTER INFORMATION

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REPLACEMENT PARTS LIST
Catalog #890-THC & #890-THC/IG
Domestic and Export Models

Descriptive part	Part #
A) 3 way Solenoid valve	EL1301
B) 2 way solenoid valve (890-THC/IG only)	EL1054
C) 24 VDC/12.5 Amp Power Supply	EL1362
D) Filter module	EL1262
E) Rocker (on/off) switch	EL1125
F) Vacuum Pump	
Domestic (USA)	800-PUMP
All Export Models	800-PUMP/EXP
G) RTD Transmitter	EL1428
H) Fluorescent lamp holder	EL1046
I) 24" fluorescent lamp	EL1049
J) Ballast for 24" lamp	EL1050
K) Duplex outlet for pump (890-THC only)	EL1045
L) 24 VDC/1.2 Amp power Supply	EL1025
M) 3PDT Relay	EL1422
N) SPST Relay	EL1041
O) Rh Transmitter	EL1232
P) Outer transfer chamber door clamp	HW3127
Q) Inner transfer chamber door clamp	HW3128
R) Vacuum Gauge	HW3129
S) Male Quick disconnect	HW3182
T) Female Quick disconnect	HW3183
U) Transfer Chamber gasket	MS2046
V) 8' Long Power Cord	EL1142
X) Molecular sieve (1500 grams)	800-MOLS/M
Y) Drying Train Canisters	MS2014

REPLACEMENT PARTS
890-THC and 890-THC/IG
(Domestic & Export Models)
(Continued)

Plas Labs Part #	Description
CH6015	#1 Novus™ Cleaner
CH6016	#2 Novus™ Cleaner
800-GH	White ambidextrous Hypalon gloves (Pair)
HW3124	9” worm drive clamp
MS2027	yellow 3M vinyl tape
MS2046	Gasket, Neoprene, for transfer chamber door
MS2029	Gasket, Neoprene, 1” wide x .500” thick (Top)
MS2028	Gasket, Neoprene, 2” wide x .500” thick (Bottom)
CH6020	High Vacuum Grease, 5.3oz tube

USEFUL ACCESSORIES

Plas Labs Part #	Description
800-PLUG	Glove Port Plug (pair)
800-ONEG	Oxygen Removal System, Complete
800-HEPA/P	HEPA Capsule For Vacuum Pump
800-AS/SPI	Work Station Ionizer. Effectively eliminates all static charges within 36” of unit. Non-air assisted. 110/Volt, 60Hz.
800-AS/SPI/EXP	220/Volt, 50Hz
CART-GB	Stainless Steel Support Cart with casters & gas tank racks.
800-SHELF-I (NB)	Shelf Package For Culture Plates - Factory Installed Only.
800-PRV	Pressure Relief Valve

Visit www.plas-labs.com for product specification sheets
email: mikeregan@plas-labs.com

PRODUCT INFORMATION

Materials of Construction:

Main Working Chamber:

•Walls:	.375” thick clear cast acrylic
•Bottom:	.250” thick white thermoset plastic
•Top viewing panel:	.250” thick clear cast acrylic
•Gasketing:	1” wide x .5” thick black “skinned” Neoprene
	2” wide x .5” thick black “skinned” Neoprene
•Gas Key Cock Valves:	Nickle plated brass

Transfer Chamber:

•Doors:	.500” thick clear cast acrylic
•Gaskets:	.500” Ø neoprene
•Clamps:	Rivets: type 430 stainless steel
	Stamped parts: 302/304 stainless steel
	Handle: pvc
•Hinges	
•Fasteners	18-8 type stainless steel
•Pop Valve	Body: polypropylene
	O-ring: Buna-N
	Springs: type 316 stainless steel

Product Specifications
Recommended Operational Pressures

For containment purposes:	-0.5” of water column
For isolation purposes:	0.5” of water column

Main chamber:

Max. pressure	+6” of WC (11.2 torr)
Max. vacuuum	-6” of WC (11.2 torr)

Transfer chamber:

Max. pressure	Not engineered to support positive pressure
Max vacuum	-26” of Hg. (660 torr)