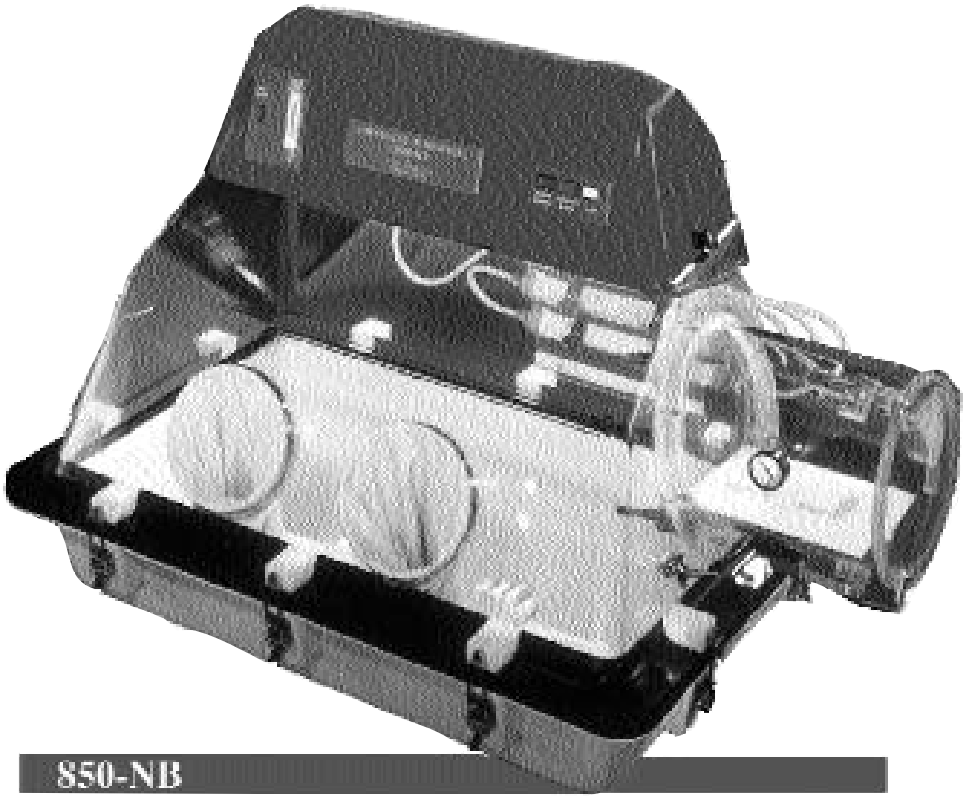
OPERATION MANUAL

Nitrogen Dry Box
850-NB/110 or 850-NBB/110



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850-NB & NBB
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CONTROLLED ATMOSPHERE

Nitrogen Dry Box

Models 850-NB & NBB

This chamber has been designed to provide an enclosure which will enable the operator to replace the ambient room atmosphere with alternative choices, such as

NITROGEN, ARGON, PLASMA

or other inert type gases.

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.

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THE 850-NB SYSTEM

The Plas-Labs, Model 850-NB or 850-NBB Nitrogen Dry Box Chamber has been engineered to be self contained, compact and easily portable on a standard laboratory cart. The Plas-Labs' cart cushions the chamber and has horizontal racks for the safe storage of anaerobic gas tanks.

The basic housing is formed of rigid acrylic plastic to eliminate the possibility of through the wall leakage of oxygen into the chamber. The vacuum or transfer chamber is constructed of .500 thick acrylic plastic which is also rigid. The clear acrylic provides constant visual observation over whatever items being transferred into or out of the main chamber.

The inner door of the transfer chamber has been engineered to open automatically. If you open the inner clamps slightly, this will occur once the atmospheric pressure between the basic housing and transfer chamber is neutralized.

Our gasketing system is double layered, closed cell, self skinning neoprene. The double layered technique is far superior to a simple single gasket which can easily take a set. Use of high vacuum silicone grease between the gaskets is recommended. All clamps are completely adjustable to compensate for wear.

The white plastic bottom is a matched die molded piece of thermoset plastic. Its brilliance helps to illuminate the internal work area and increase operator eye comfort.

Electrical requirements are such that the system operates on **110/120 volt 60 Hz, AC current**. A six (6) foot long three (3) wire plug is standard with the package. All electrical switches are illuminated to provide instant awareness of the system status, whether on or off.

The drying train is designed to be rejuvenated without destroying the integrity of the internal chamber. The system consists of three (3) rechargeable drying train filters. The system can be removed and replaced using self-closing (quick disconnect) fittings.

Two (2) diaphragm type pressure/vacuum pumps are supplied within the top housing. One pump is used for the vacuum (transfer) chamber and the other is used for the drying train system. Both pumps can be operated simultaneously. This enables the operator to utilize the transfer chamber without disturbing the drying train. The drying train system needs to be activated only occasionally. Continual operation should not be necessary, once or twice a day should suffice.

COMPONENTS AND THEIR FUNCTIONS

Diaphragm type Vacuum/Pressure pumps

These pumps are rated for long life and have shaded pole motors with built-in over load protectors. Two (2) pumps are included with each Anaerobic chamber. Each pump has its own function, one each for:

1. Vacuum (transfer) chamber purging
2. Drying train system

Vacuum (transfer) chamber

This chamber is used when the investigator wants to take samples in or out of the main working chamber. A common technique for using a transfer chamber is as fol lows:

1. Place sample in transfer chamber and lock. Make sure both doors are locked.

2. Depress the illuminated vacuum button. This activates the transfer chamber vacuum pump.
   NOTE: be sure the Nitrogen gas valve is in the closed position during evacuation of the chamber.

3. Once a vacuum of approximately 20” to 21” of Hg (Mercury) has been reached, turn off the vacuum pump. Open the Nitrogen valve and release enough gas to bring the vacuum gauge back to zero. Caution: DO NOT OVER PRESSURIZE.

4. This process should be repeated a total of three (3) times. This is commonly called purging the transfer chamber.

5. Upon completion of the third cycle, when the vacuum gauge is nearing zero, unlock the internal door clamps. The door will open automatically when the two (2) chamber pressures are neutralized.

6. Once the internal door opens, the sample(s) to be transferred can be brought into the main working chamber.

7. Removal of sample(s) from the main work chamber should be accomplished in the same manner as entry. However, purging the vacuum system three (3) times is not necessary. Just make sure the inner door is locked when the outer door is opened.

Drying Train System

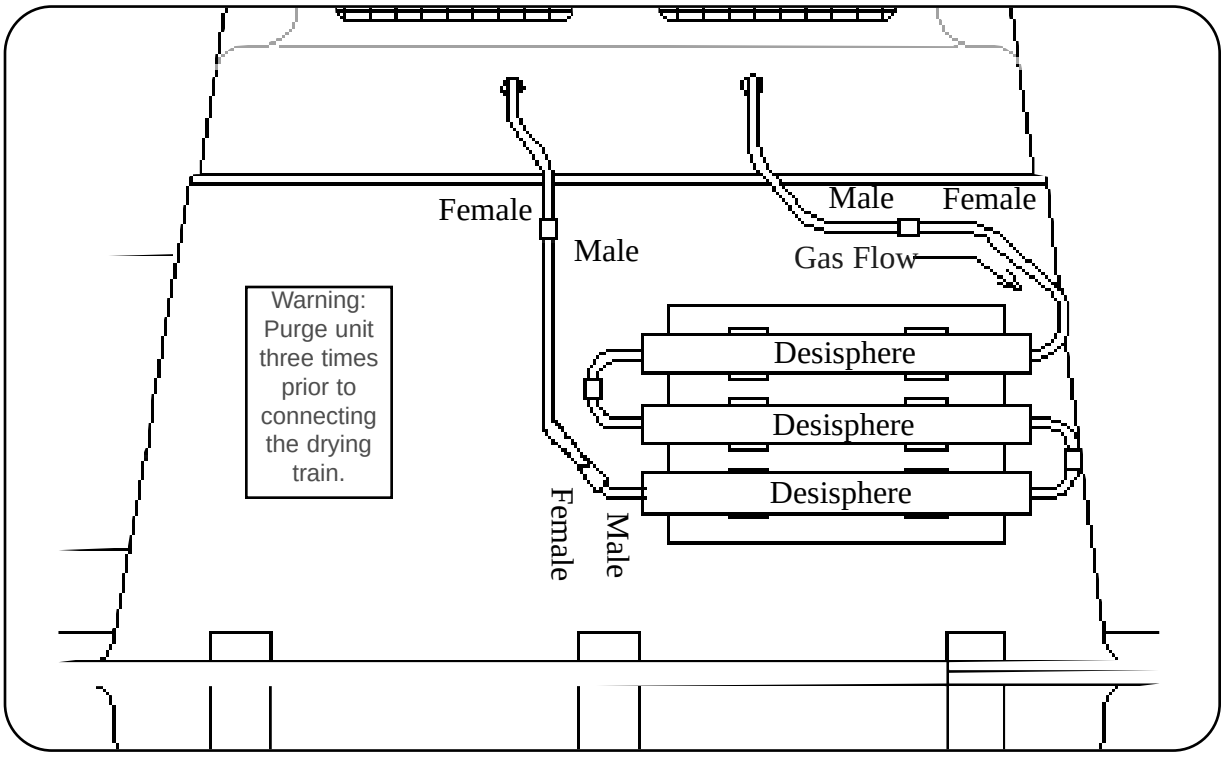
This is a closed system and is designed to re-circulate the internal environment of the main working chamber. It has its own pump system. It should not be necessary for this to run continuously.

The vacuum/pressure pump draws the internal atmosphere through three (3) rechargeable canisters. The system is designed to reach very low dew-points and maximize inert gas dehydration. Upon completion of the circulatory route through the last canister, the dehydrated atmosphere is pulled through the vacuum/pressure pump and pushed into the main chamber.

There are three (3) transparent canisters located on the back of the unit. These canisters contain a very efficient desiccant material called "Desisphere"™ which acts as a atmosphere filter and removes water vapor. This material is approximately 35% more efficient than Silica Gel and Molecular Sieves. The water vapor is generated by the chemical reaction of Hydrogen, Palladium and heat in the presence of oxygen.

"Desisphere"™ may be rejuvenated at least two (2) times. Empty the desiccant mixture on a metal tray and heat in an oven for two hours at approximately 160C or 320F. "Desisphere"™ will return to it's original color re-charged and ready for use. The plastic canisters should not be placed in the oven as they will melt.

Drying Train & Oxygen Removal System



SET-UP PROCEDURES

1. Check gloves for any tears or cuts before using. If there are any you will need to replace the glove or gloves. To install gloves place the beaded end of the glove's arm around the groove on the glove port ring. Using yellow tape wrap the tape three times around the glove port ring. Make sure there are no wrinkles in the tape. Then carefully place the large steel glove port ring clamp around the taped assembly. Tighten the worm gear so it is snug, but not too tight to crush the plastic glove port ring.

2. Carefully remove the clear top section of the unit. Clean the inside of the clear top and white bottom. Make sure the black gaskets on the top and bottom of the units are clean. Clean **gaskets only** with a slightly diluted alcohol solution.

3. Coat the two (2) gasket surfaces with a layer of high vacuum silicone grease. The tube of silicone vacuum grease has been provided for this procedure. Place all pieces of equipment in the white bottom portion of unit. These should be devices needed during normal controlled atmosphere operations. eg., catalyst heater unit (do not turn on yet).

4. Carefully place the clear section on top of the white bottom section. Make sure the clamps line up and the edges of the two halves are aligned.

5. Clamps may or may not need to be adjusted. To adjust, loosen or tighten the two (2) nuts on the "U" bolt. Snap clamps together so they actually lock into position. **Do not over compress the gaskets. The flanges should not be bowed. They should be evenly compressed.**

6. The Drying Train Support Plate consists of a clear piece of plastic which has six (6) black brackets mounted on it and four (4) screws. This Support Plate is fastened to the rear of the chamber wall by screwing on to the parallel white brackets.

   The three (3) Drying Train canisters snap into the black brackets. The canister con taining Molecular Sieve should be placed on the top. This is the canister with the brown (tan) beads. Make sure the quick dis-connects are firmly coupled together. The Flow Meter on the front of the shroud merely indicates whether the Drying Train System is operating adequately. It should be opened to the maximum flow rate possible. If a restriction occurs in the system, the ball will fall to the bottom of the scale.

7. Now your system is ready for purging.

TECHNIQUE FOR PURGING THE CHAMBER

From this point on use the gloves as a rough indicator of pressure within the chamber. Watch them as they move in and out of the chamber. Positive pressure pushes the gloves out of the chamber and negative pressure draws them back in.

1. With inner transfer chamber door open approximately 2.5cm, turn the vacuum system pump on and emit a slow flow of Nitrogen (N_2) gas. Raise the level of your Nitrogen (N_2) input until the gloves protrude out of the chamber approximately 18cm.

2. Turn off Nitrogen (N_2) gas and let the vacuum pump draw off the inner atmosphere until the gloves recede into the chamber. Keep the vacuum on until the gloves extend (limply) into the chamber.

3. Stop the vacuum pump and turn the Nitrogen (N_2) on again. Introduce Nitrogen (N_2) until the gloves protrude out of the chamber 18cm.

4. Repeat steps 2 through 3, two more times and then turn off.

5. Turn off vacuum pump and Nitrogen inlet. You now have purged the chamber. Most of the inner atmosphere will be Nitrogen (N_2).

SUGGESTED ACCESSORIES

An additional tray of silica gel may be left open inside the working chamber to indicate and absorb moisture.

An inexpensive **thermometer** may be useful, optimum temperature for most culture work is 35-37C. **Catalog #800-TEMP (Envirosafe Style)**

An inexpensive **hygrometer** may be useful also, but is not required. Optimum humidity in the chamber depends upon the type of work being done. **Catalog #800-HYGRO**

If you are concerned about static control, we offer the **"Counter-Spi"** anti-static Ion-Emitter. **Catalog #800AS/SPI**

These and other accessories are available from Plas-Labs. For any technical assistance, please call 800-866-7527.

ENTRY THROUGH THE TRANSFER CHAMBER

The transfer chamber is used for entering materials into the main working chamber without disturbing the Anaerobic Atmosphere.

It is important to keep the inner Transfer Chamber door closed in normal operation. This is a safeguard in case the outer door is opened by mistake.

To use the Transfer Chamber:

1. Open the exterior door and place the desired materials inside the chamber.
   TIP: The white plastic tray is useful for liquids.

2. Close and lock the outer Transfer Chamber door.

3. Open the Vacuum Valve and turn on the Vacuum Chamber Pump. Draw a vacuum down to 20” of Hg.

4. Turn off the Vacuum Pump and close the valve. Open the valve for your gas of choice.

5. Introduce the gas until the vacuum gauge reads zero “0”.
   TIP: It is best to slow down the gas flow when the gauge nears five 5” inches.

REPEAT THIS PROCEDURE A TOTAL OF THREE (3) TIMES.

6. Upon completion of the third sequence you may safely open the inner door and transfer your materials.