ANAEROBIC CHAMBERS

Model

AC505/515/706/716
CONTROLLED ATMOSPHERE

Instruction Manual
- October 2014 (R) –

- Thank you for purchasing Anaerobic Chambers, AC505/515/706/716 of Yamato Scientific.
- To use this unit properly, read this "Instruction Manual" thoroughly before using the unit. Keep this instruction manual around this unit for reference at any time.

⚠ WARNING:
Carefully read and thoroughly understand the important warning items described in this manual before using this unit.

Contents

ANAEROBIC CHAMBERS
AC505/515/706/716
Controlled Atmosphere Chambers

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. Nothing needs to be added except your gas of choice.

General Information

The Yamato AC505/515/706/716 Controlled Atmosphere (Anaerobic) Chambers, have been engineered to be self-contained, compact, and easily portable on a standard laboratory cart. The Model AC505/515 is a single operator design, while AC706/716 is set up for two (2) or more operators. (Maximum of four [4] people.)

Our 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.

The clear top section of the glove box is formed from one piece of acrylic plastic to eliminate the possibility of through the wall leakage of Oxygen. 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 (11).**

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. Its brilliance helps illuminate the internal work environment and increase operator eye comfort.

There are four (4) ground key cock valves. Two (2) on the transfer chamber and one (1) each on the side walls of the main chamber top. These valves are labeled "N2" but you may use any inert gas. **Refer to our "Possible Gas Variations" information on page (8).**

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 fluorescent light, the main (on/off) power switch, a flow meter for the drying train, three (3) Micro-Switches which control the light, and two (2) diaphragm type vacuum pumps, one each for the Drying Train and Transfer Chamber.

The Drying Train consists of its own vacuum pump and three (3) clear canisters which contain Molecular Sieve. The flow meter on the shroud indicates whether there is a stoppage in the Drying Train or not. If the ball does not rise in the meter, it usually means the Drying Train canisters are saturated and need to be re-charged. (Dried out.). **Refer to the Recharging Molecular Sieve" section on page (15)** of this manual.

The function of the Catalyst Heater is threefold;

1. It heats the Aluminized Palladium Pellets for a more efficient chemical reaction.
2. The fan draws the internal atmosphere off the floor and circulates it through the heater "chimney" thus creating uniformity of internal temperature.
3. It eliminates the need for an additional incubator.

Electrical power requirements are:
Domestic U.S and North America @ 115-120 Volts.
International models @ 220-240 Volts.

Two (2) Palladium canisters are included in the system. One is for immediate use and the other is for a backup in the future. **Refer to "General Maintenance Schedule" on page (12) and "The Basic Chemical Reaction Sheet" on page (7).**

Set-up Procedures

1. Place glove box in your desired laboratory location. **NOTE:** If you have one of the larger units, be very careful when moving the box through narrow doorways. **Do not let the clamps "hit" the door frame**.

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 (13)** 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 page (23)** 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. Place the Catalyst Heater and Palladium Canister unit on the white bottom of the glove box. **Do not place the Palladium canister on top of the heater unit yet.** Two (2) Palladium canisters are included with the system. Hold one (1) in reserve for future use.

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. Sometimes 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.

8. Attach the three (3) Drying Train canisters to the plate on the back side of the clear top section. Refer to the enclosed drawing and photos. Attach the white male couplings to the white female couplings.

9. You may now attach your incoming inert (gas mix) line. In most cases, you will want to use the ground key cock valve located by the transfer chamber.
Please refer to the **section "Purging the Main Working Chamber" on page (9 & 10)** in this manual.

10. Plug the unit into your electrical power source.

YOUR UNIT IS NOW READY FOR DOING THE "RUNNING PURGE."

(Refer to the "Purge Section" of this manual)

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.

$$O_2 + H_2 + \text{Palladium} + \text{Heat} = H_2O$$

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 AC505/515/706/716 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 Yamato Controlled Atmosphere Chamber glove boxes.

However, <u>in all cases you must use the small amount of Hydrogen</u> 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.

Technique for Purging the Main Working Chamber

Using the Transfer Chamber Vacuum Pump

All AC505/515/706/716 Controlled Atmosphere Chambers have vacuum pumps built into the top shroud. The pump operates when the "Transfer Chamber" Micro-Switch is activated. The vacuum line goes directly from the vacuum pump to the Transfer Chamber key cock valve.

NOTE:
We recommend you purge using the special "Gas Mix" formula described in the following pages.

When using the built in vacuum pump for purging, you must;

1. Use the vacuum key cock valve on the Transfer Chamber. **Refer to STEP #1 below**.
2. Release the inner clamps for the Transfer Chamber door. It should be slightly opened.
3. Set the incoming gas source **OR** 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 special gas mixture source to the Transfer Chamber key cock valve. (Labeled N2.) Set up incoming flow rate at 25 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. Activate the Transfer Chamber pump Micro-Switch. Draw a vacuum down to about 18 or 20". **Watch the gloves.**

Technique for Purging the Main Working Chamber

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 special gas mix.

For vacuum pump data, refer to the **"Replacement Parts List" on page (27).**

Entry through the Transfer Chamber

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

General Maintenance Schedule

It is strongly recommended that operators <u>remove all jewelry</u> 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.

<u>CAUTION:</u> Make sure the Drying Train canisters are not saturated with moisture. <u>If so, they must be recharged</u>. 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.

Replace the Molecular Sieve in the Drying Train canisters. 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 (20).**

Refer to **"Replacement Parts and Accessories"** sections of this manual.

Glove Change Out Procedure

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 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. Re-tape 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 System

All Controlled Atmosphere (Anaerobic) Chambers include the standard drying train components which are;

A. Diaphragm type vacuum pump.
B. Three (3) clear plastic canisters.
C. Molecular Sieve media. **(Rechargeable media)**
D. Pressure hoses and quick dis-connects.

The Controlled Atmosphere (Anaerobic) Chamber drying train is activated by pressing the Micro-Switch labeled “Drying Train,” which is located on the top black shroud.

IMPORTANT

It is not necessary to activate the Drying Train continually.
Just use it as needed. **Never leave the Drying Train running unattended.**

How the Drying Train works
Refer to the “Drying Train System photographs” in this section.

The basic function of the Drying Train is to remove excess moisture from within the Controlled Atmosphere (Anaerobic) Chamber. Molecular Sieve will also act as a filter for purifying the internal atmosphere.

1. Depress the “Drying Train switch on the top shroud.
2. When the vacuum pump activates, it draws the internal atmosphere from within the glove box and pulls it through the three (3) 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

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 450°F (232°C).

1. Depress the white dis-connects at each end of the clear plastic canister. 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**.

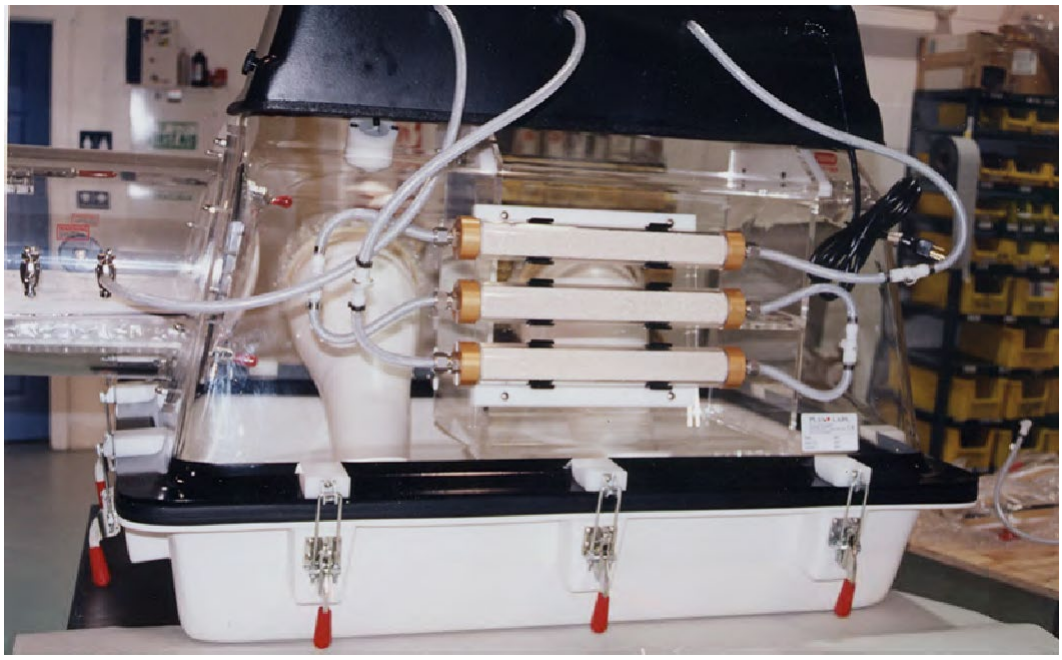
3. After baking (re-charging), allow the material to cool down to room temperature and pour it back into the canister(s). If the Molecular Sieve beads include “powdered material”, do not re-use it. It will clog the canister orifice. **Make sure the end cap is tight**.

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

5. Restart the vacuum pump to make sure the system is open and has no blockage. **NOTE: The ball in the front flowmeter (on the top shroud) will indicate whether the system is “OK” or not.**

    a. The ball will rise if the system is open, OR it will remain down if the system has a blockage. If you have a blockage**, (Note point #3 above)** also check the quick dis-connects to make sure they are properly seated.

    b. **Refer also to the “Trouble Shooting Section” on pages (21-23)**.



Typical Drying Train Set-Up

Typical set of “Quick Disconnect”.

#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 re-lubricated 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	
Setpoint accuracy:	±0.3° of span	
Thermocouple:	18" type T	

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	ºC
inPt	tC t
Lo.SC	0.0
hi.SC	50.0
diSP	0.1º
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	VArº
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

How to Regenerate
Palladium Pellets in the Catalyst Heater System

The Palladium Pellets can be regenerated by baking in a "hot" oven at **450°C degrees Fahrenheit (235°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.

Glove Boxes and Isolators

Occasionally situations might occur which are perplexing. “What’s wrong with my glove box?” These 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 “overpower” 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 Drying Train**.”

B. **For AC505/515 Units 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 (7) “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: Re-check 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 (9-10).**

Glove Boxes and Isolators

C. The small ball in the flowmeter (top shroud) does not rise when the drying Train is turned on.

Suggestion: Double check the color of the Molecular Sieve in the Drying Train canisters. A darker color change indicates a high level of moisture absorption in one or all of the canisters. The vacuum pump cannot overcome the resistance of the excess moisture. **"The Molecular Sieve is waterlogged."** You must re-charge the Drying Train Molecular Sieve.

Refer to **"Re-charging the Molecular Sieve" on page (15).**

SIDE NOTE: Sometimes the vacuum pump will continue to operate and draw off the internal atmosphere from the main chamber, **BUT** it cannot overcome the resistance of the excess water in the canister(s) and replace the atmosphere.

If the vacuum pump is left unattended, the severe negative pressure build-up might cause the gloves to "pop," **OR** the glove box itself might break.

It is very important you monitor the ball in the front flow meter daily. If the ball does not rise, it is time to recharge the Drying Train.

IMPORTANT

It is not necessary to activate the Drying Train continually.
Just use it as needed. Never leave the Drying Train running unattended.

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 (13)** and **"Recharging the Molecular Sieve" on page (15).**

Glove Boxes and Isolators

E. A vacuum results when I activate the drying train system. The gloves are pulled into the main chamber.

Suggestion: Regenerate the molecular sieve. Refer to section **"Recharging the Molecular Sieve" on page (15).**

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 <u>AC505/515 Units</u> Only:** The Catalyst Heater Unit does not reach the preferred setpoint....

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 setpoint on digital controller.
Check heating element (p/n 800-HE/2000-EXP).

Most components 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 these 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 avail- able.

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.

Yamato Warranty Policy

Yamato Scientific America warrants, from the date of shipment from Yamato warehouse, for a period of one (1) year. All products, parts and materials shall be free of defects in material and workmanship under normal use consistent with the product instructions. This product warranty does not apply to products purchased from unauthorized resellers/distributors.

Yamato reserves the right to inspect the product under claim before having an obligation to repair or replace the defective unit covered by this warranty. All costs of shipping to Yamato for inspection shall be borne solely by the purchaser. Products repaired or replaced under the terms of the warranty may be refurbished or new product will be provided at the discretion of Yamato.

Warranty Conditions

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.

Consumables such as gloves, bulbs, or filters are not covered under this warranty.

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 using our products.

Product Return Policy

If you are not satisfied with your purchase and wish to make a return, contact our customer service to inquire about a Return of Merchandise Authorization Number (RMA). Merchandise returned without an RMA number will not be accepted and will be returned to the sender. Return requests must be made within 15 days of the customer's receipt of the merchandise.

All returns must be unused and in unopened original packaging and include all items and manuals originally shipped.

The purchaser is responsible for the shipping cost of return shipment. Insurance on the return shipment is required. Damage or loss of merchandise during shipping is the responsibility of the sender. Returned shipments that arrive damaged will be returned back to the sender, and credit will not be rendered.

All returned products, parts and materials are subject to a 25% restocking fee. Shipping and handling cost are non-refundable. All retrofitted, customized and special order item sales are final and non-returnable.

In Case of Request for Repair

If the failure occurs, stop the operation, turn OFF the power switch, and unplug the power plug. Please contact the sales agency that this unit was purchased, or the Yamato Scientific's sales office.

< Check following items before contact >

- ◆ Model Name of Product
- ◆ Production Number
- ◆ Purchase Date
- ◆ About Trouble (as detailed as possible)

Replacement Parts List

Description	Part #
A) Micro switch	EL1053
B) Micro switch lamp	EL1054
C) White lens	EL1055
D) Filter module	EL1262
E) Rocker switch	EL1061
F) Vacuum Pump	
Domestic (USA)	800-PUMP
All Export Models	800-PUMP/EXP
G) Transformer	
Domestic (USA)	EL1051
Export 220V	EL1100
H) LED 4 Bulb Light Strip	EL1511
I) LED Power Supply	EL1544
J) Duplex outlet for pump	EL1045
K) Starter	EL1048
L) Starter base	EL1047
M) Black Knob	HW3110
N) Flowmeter	HW3125
O) Outer transfer chamber door clamp	HW3127
P) Inner transfer chamber door clamp	HW3128
Q) Vacuum Gauge	HW3129
R) Male Quick disconnect	HW3182
S) Female Quick disconnect	HW3183
T) Transfer Chamber gasket	MS2046
U) Molecular sieve (1500 grams)	800-MOLS/M
V) Drying Train Canisters (set of three 3)	800-MOLS

Catalyst Heater Unit	Catalog
Complete unit (less Palladium canister)	
A. Catalog (115-120V)	800-HEATER
B. Catalog (220-240V)	800-HEATER/EXP
C.) Blower motor	EL1065
D.) On/off switch	EL1125
E.) Digital controller	EL1242
F.) Heating coil (115-120V)	800-HE/2000
G.) Heating coil (220-240V)	800-HE/2000-EXP
H.) Palladium canister (each)	800-PC

Replacement Parts List

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

ACCESSORIES

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/CE	220/Volt, 50Hz
CART-GB	Stainless Steel Support Cart with casters & gas tank racks.
CART-GBB	Stainless Steel Support Cart with casters & gas tank racks.
800-SHELF-I (NB)	Shelf Package for Culture Plates - Factory Installed Only.
800-SHELF-II (NBB)	Shelf Package for Culture Plates - Factory Installed Only.
800-DHI	Digital Humidity Indicator (0-100% Rh) 110/Volt, 60Hz.
800-DHI/EXP	220/Volt, 50Hz
800-PRV	Pressure Relief Valve

Materials of Construction:

Main Working Chamber:

•Walls:	.375” thick clear cast acrylic
•Bottom: #855-AC	.250” thick white thermoset plastic
#855-ACB	.375” thick clear cast acrylic
•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

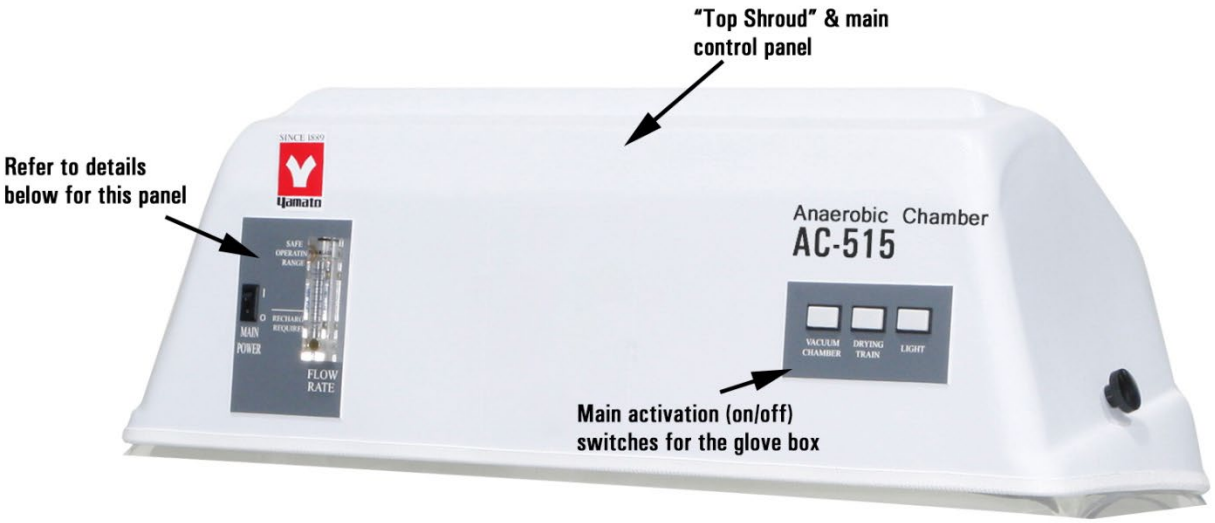
Main chamber:

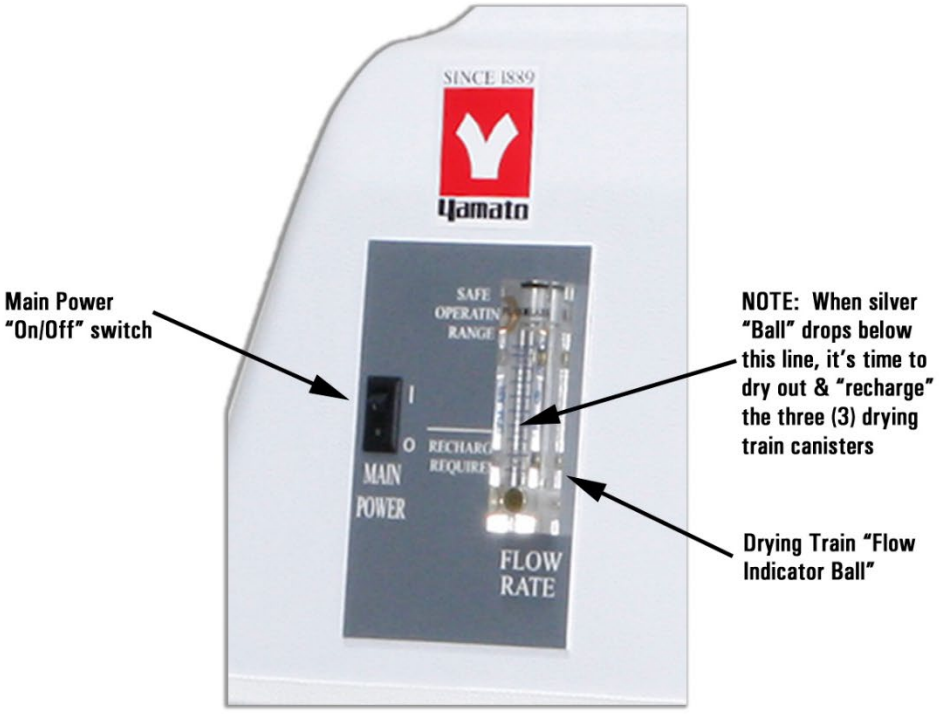
Max. pressure	+6” of WC (11.2 torr)
Max. vacuum	-6” of WC (11.2 torr)

Transfer chamber:

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

Top Cover (Shroud) Details & Set Up

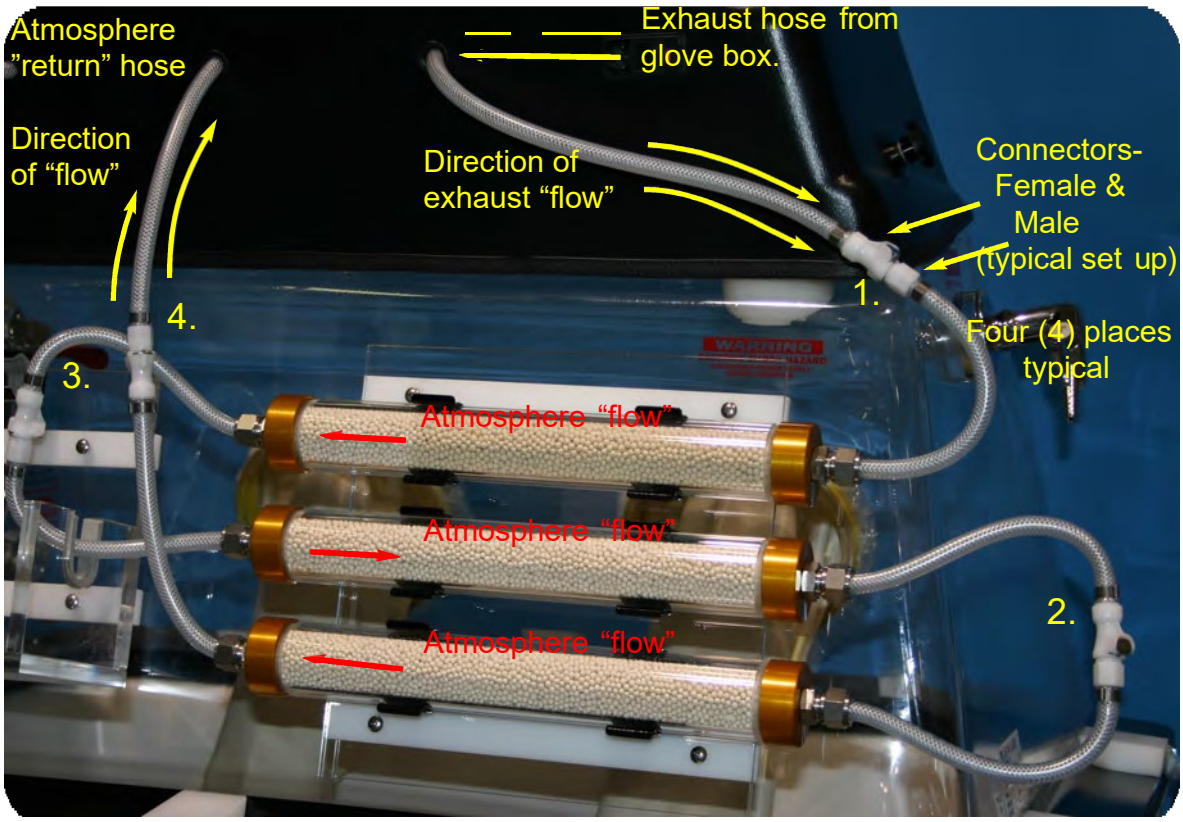




Drying Train System Details & Set Up Catalog
#800-DT & #800-DT/EXP

Procedure:

1. Place (snap) the three (3) plastic canisters into the black brackets.
2. Connect the plastic hoses as illustrated. (Locations 1 through 4)



Responsibility

Please follow instructions in this document when using this unit. Yamato Scientific has no responsibility for accidents or breakdown of device due to failure to comply. Never conduct what this document forbids as unexpected accidents or breakdown may result.

Instruction Manual for Anaerobic Chambers
Model AC505/515/706/716
October 2014

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