Vinyl Anaerobic Chamber Setup Manual

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Document History

Part #	Manual Version	Product Version	Date
1200002	Vinyl Anaerobic Chamber Setup Manual 090113	Vinyl Anaerobic Chambers 2006 to 2016	Sept. 1, 2013
1200002	Vinyl Anaerobic Chamber Setup Manual 072816	Vinyl Anaerobic Chambers 2016 to 2017	July 28,2016
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1200002	Vinyl Anaerobic Chamber Setup Manual 061820	Vinyl Anaerobic Chambers 2018 to Present	June 18, 2020

How to Use this Manual

- You may print the manual. We recommend two-sided printing to conserve paper and provide a more compact document if your printer permits.
- You may view the manual on your computer in Adobe Acrobat or Acrobat Reader. In addition to Adobe's navigational aids, we have provided the following links:
  - To go to a specific entry in the table of contents, click on that entry.
  - To return to the table of contents from anywhere in the manual, click on any section number.
  - To scroll through the main section headings in the manual, click on any main heading. You will go directly to the next one.
  - To skip an optional section, click on the provided link. You will go to the next applicable section.

Safety, Warranty, and Support Information

WARNING!

DO NOT USE PURE HYDROGEN IN ESTABLISHING AND MAINTAINING YOUR CHAMBER ENVIRONMENT. USE ONLY PRE-MIXED GASES. THE USE OF PURE HYDROGEN OR PRE-MIXED GASES WITH A HYDROGEN CONTENT GREATER THAN 5 % MAY CREATE AN EXPLOSIVE MIXTURE IN YOUR CHAMBER.

LATEX WARNING!

LATEX GLOVES WITH POWDER MAY BE INSTALLED ON THIS EQUIPMENT. SOME PEOPLE MAY BE ALLERGIC TO LATEX AND/OR THE POWDER. COY LABORATORY PRODUCTS CANNOT ACCOUNT FOR THE CONTENT OF GLOVES BOUGHT FROM OTHER VENDORS.

WARRANTY

The electronic components in this chamber are warranted against defects in material and workmanship during the first 12 months after the original date of shipment. Vacuum pumps that have been damaged due to rusting or moisture will not be covered under this warranty.

The vinyl bag portion of the anaerobic chamber is warranted against defects in material and workmanship for 1 year after the original date of shipment.

The factory will, at its option, either repair or replace defective materials within the above periods at no charge for parts and labor.

All returns or exchanges must first be authorized by Coy Laboratory Products, Inc.

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THE RESPONSIBILITY OF COY LABORATORY PRODUCTS, INC., IS LIMITED TO THE PURCHASE PRICE OF THIS PRODUCT. COY LABORATORY PRODUCTS, INC., WILL NOT BE RESPONSIBLE FOR ANY CONSEQUENTIAL DAMAGES.

THIS WARRANTY DOES NOT COVER DAMAGE IN SHIPMENT OR DAMAGE AS A RESULT OF IMPROPER USE OR MAINTENANCE OF THE PRODUCT.

THIS WARRANTY DOES NOT COVER DAMAGES CAUSED BY EXCESSIVE LINE TRANSIENTS ON THE AC SUPPLY LINE.

TECHNICAL SUPPORT

To obtain technical support, contact Coy Laboratory Products by either phone or e-mail:

Phone:(734) 475-2200
E-mail:techservice@coylab.com

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Introduction to the Vinyl Anaerobic Chamber 1

The Coy vinyl anaerobic chamber is constructed of flexible PVC vinyl. The seams are sealed together using a radio frequency welding technique. The bottom of the chamber is attached to a ¾--inch particle board base, which is padded with foam and covered with vinyl. The chamber is supported by a tubular aluminum frame, which is also attached to the particle board base.

The chamber is a totally sealed unit, except for two entry ports: the equipment entry port and the airlock:

- The equipment entry port is used for installing large equipment during setup. It is sealed with a large plastic disk, which is held in place with vinyl tape, prior to purging oxygen from the chamber and establishing the anaerobic environment.
- The airlock is used on a regular basis by lab personnel to pass items between the chamber and the outside environment without disrupting the chamber's anaerobic environment.

Lab personnel access the chamber to perform their operations through glove ports, which have permanently attached sleeves equipped with quick change cuffs. The quick change cuff (QCC) system permits gloves to be changed quickly with minimal disruption of the chamber atmosphere. Latex or neoprene gloves are mounted on a special adapter ring that fits the cuff snugly and are held in place with an O-ring, ensuring an airtight seal. Switching gloves is merely a matter of sliding the installed glove off the cuff and replacing it with another.

1.1 Chamber Models

The standard chamber comes in three sizes:

Type A:

Chamber Size	Base Size	Glove Ports
32 in × 59 in (81.3 cm × 149.9 cm)	36 in × 77 in (91.4 cm × 195.6 cm)	2

Type B:

Chamber Size	Base Size	Glove Ports
32 in × 78 in (81.3 cm × 198.1 cm)	36 in × 95 in (91.4 cm × 195.6 cm)	4

Type C:

Chamber Size	Base Size	Glove Ports
32 in × 42 in (81.3 cm × 196.7 cm)	36 in × 60 in (91.4 cm × 152.4 cm)	2

Custom configurations are also available. The instructions in this manual apply to custom configurations as well as to standard types.

The chamber and the flanges that support the frame are attached to the chamber base at the factory. The aluminum frame is shipped dismantled and must be assembled during setup. A large plastic disk is provided to seal the equipment entry port after the components have been installed.

1.2 Standard Components

The standard chamber package includes the following components:

Component	Type A	Type B	Type C
Airlock	1	1	1
Vacuum Pump	1	1	1
Gas Pressure Regulator (Background Gas)[1]	1	1	1
Gas Pressure Regulator (Gas Mix) [1]	1	1	1
Catalyst Fan Boxes	2	2	1
Catalyst Stak-Paks	4	4	2
Power Strips	2	2	1
Feed-Thru Adapters with Stoppers	4	4	3
Gloves (installed on quick change cuffs)	1 pair	2 pair	1 pair
Extra Gloves and Accessories (QCC system)[2]	2 sets	4 sets	2 sets
Plug and O-ring Install Tool (QCC system)	1 set	1 set	1 set
Work Mats	1	2	1
Chamber Setup and Care Kit	1	1	1

[1]Gas regulators are not included with many non-US orders, in which case they may either be supplied by local dealers or left to the customer to provide.

[2]Set includes 2 O-rings and 1 adapter ring for each glove.

1.2.1 The airlock

The airlock is used for the transfer of items from the lab environment to the anaerobic chamber and vice versa. It has two doors. The inner door seals the airlock from the chamber, and the outer door seals the airlock from the external environment.

Your chamber has an automatic airlock:

Automatic airlocks are operated through a controller that can be programmed to perform the vacuum and purge procedures needed during day-to-day operations before transferring materials into the chamber. The airlock can also be operated manually through the controller.

1.2.2 The vacuum pump

The vacuum pump is used to remove existing gases from the chamber or the airlock during vacuum and purge operations:

A flexible hose that is permanently installed in the back of the airlock connects to a connector on the vacuum pump.

1.2.3 The gas pressure regulators

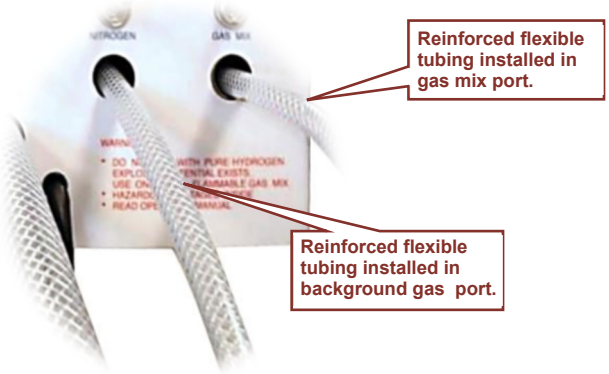
Two gas pressure regulators are provided to control the pressure of the gases flowing into the airlock—one for the background gas (usually nitrogen) and one for the hydrogen gas mix:

Background Gas Pressure Regulator

Gas Mix Pressure Regulator

The two regulators are fundamentally the same, except for the fittings that connect to the supply tank valve.

The pressure regulators connect directly to the tank valve. A 12 ft (3.6 m) length of reinforced flexible tubing connects each pressure regulator to the airlock. The tubing is preinstalled in the airlock and is connected to the regulators during setup:



Note: *Some non-US/Canadian orders are not supplied with the pressure regulators described above.*

1.2.4 Catalyst fan boxes

Catalyst fan boxes circulate the chamber's atmosphere through palladium catalyst, which, in the presence of hydrogen, removes oxygen. They also provide a homogeneous mix of gases in the chamber.

Catalyst fan boxes may be either heated or unheated:

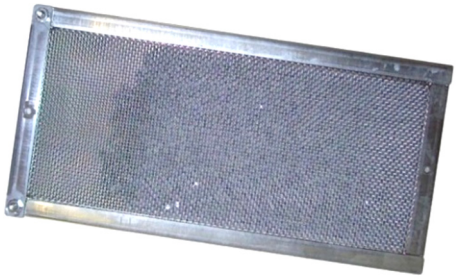
Heated Catalyst Fan Box

Unheated Catalyst Fan Box

The standard heated catalyst fan box is used for chambers where temperature control is critical. It can maintain the chamber's temperature from ambient to about 40 °C. A high-range version can maintain temperatures to 50 °C. The unheated catalyst fan box is used for chambers that do not need temperature control or have a model 2000 incubator.

1.2.5 Catalyst Stak-Paks

A Stak-Pak is a wire mesh container that is placed at the front of the catalyst fan box:



The catalyst Stak-Pak contains alumina pellets coated with a thin layer of palladium chloride. In the presence of palladium chloride, hydrogen and oxygen molecules meet and form water molecules, which are absorbed by the alumina.

1.2.6 Power strips

Power to the chamber components is supplied through 6-receptacle power strips.

Two power strips are included with Type A and B chambers. One is provided for type C chambers.

Note: *The above photo shows a U.S. power strip. Power strips for other countries may look different.*

1.2.7 Feed-thru adapters

Feed-thru adapters provide airtight entry points for outside connections (e.g., power cords, tubing, computer cables) that need to be passed through the wall of the sealed chamber.

Standard Type A and B chambers have two feed-thru adapters that are specifically designed for power strips and two multipurpose adapters for general use as needed. One power-strip adapter and one multipurpose adapter are located by the equipment entry port. The other set is behind the airlock. Type C chambers have one power strip adapter (located by the equipment entry port) and two general-use adapters (one on each side of the chamber).

If you have purchased the anaerobic gas infuser option (see section 1.3.5 on page 10), the general purpose adapter behind the airlock will be used for the line connections from the gas infuser to the chamber. Otherwise, it is a spare and can be used as you see fit.

Note: *Your chamber may have additional feed-thru adapters installed if they were requested when the chamber was purchased.*

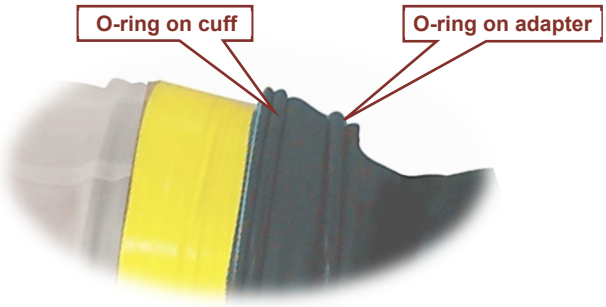
1.2.8 Gloves

One pair of gloves is installed prior to shipping for each set of glove ports:

Unless otherwise requested when the order was made, latex gloves will be installed. If your company requested it, neoprene gloves may be installed instead. The gloves will be a size Large unless a different size was requested when the order was placed.

Caution: *If you are latex sensitive, do not put your hands in the gloves until you have verified that they are neoprene and not latex. If they are latex, you will not be able to complete setup unless you replace the gloves with neoprene gloves or take adequate precautions to protect yourself from contact with the latex.*

Quick change cuffs are installed in all glove ports. The cuffs remain permanently attached to the port sleeve. The gloves are attached to an adapter ring with an O-ring and held in place on the cuff with another O-ring:



They can be changed or replaced quickly by simply removing the glove with its attached adapter ring from the cuff and replacing it with another.

The following items for glove replacement are included with your chamber:

Extra gloves
1 pair per glove port set

Adapter rings
2 per glove port set

O-rings
2 per adapter ring

O-ring install tool
1 per chamber

Glove port plug
1 per chamber

They are packed in the airlock in a plastic bag.

The new glove is attached to the adapter ring outside of the chamber and inserted into the chamber through the airlock. Before the glove is changed, the glove port with the damaged glove is plugged. Then the damaged glove is removed from the cuff and replaced with the new one with minimal disruption of the chamber atmosphere.

The quick change cuff system also enable persons in chambers with multiple users to easily change glove sizes or even have their own pair of gloves. Additional gloves, adapter rings, and O-rings can be purchased from Coy.

Note: *Instructions for attaching the glove to the adapter and more detail on the glove changing process can be found in the* Vinyl Anaerobic Chamber Operation Manual.

1.2.9 Chamber setup and care kit

The chamber setup and care kit contains items that are needed for the setup and maintenance of your chamber. It includes the following:

1 roll of 3M™ yellow vinyl tape

2 Allen wrenches: 5⁄32 in and 1⁄2 in

The yellow vinyl tape is used for sealing the equipment entry port and securing the stopper containing the lines from the gas infuser. The allen wrenches are used for assembling and disassembling the chamber frame.

Note: *3M yellow vinyl tape is the only tape Coy has found that leaves no sticky residue and is airtight.*

1.3 Optional Components

A number of optional components are available for the vinyl anaerobic chamber. Your lab may have purchased one or more of these when your unit was purchased. We highlight the most commonly used ones below. Most chamber setups include at least one of these.

1.3.1 Interior shelves

Most installations include a shelving unit. The 4-shelf units that can be installed in vinyl anaerobic chambers are 10.5 in (26.7 cm) deep and are available in 36 in (91.4 cm) and 28 in (71.1 cm) widths:

36 in (91.4 cm)

28 in (71.1 cm)

A 16 in (40.6 cm) 3-shelf unit is also available:

16 in (40.6 cm)

1.3.2 Model 12 anaerobic monitor (CAM-12)

The Coy anaerobic monitor (CAM-12) is designed to monitor the oxygen/hydrogen content inside an anaerobic chamber:

It has two separate alarms, one for oxygen and one for hydrogen. Both alarms can be set to your preference levels. The oxygen alarm limit can be adjusted to the level you want to consider high. Both an upper and a lower limit can be set for the hydrogen alarm.

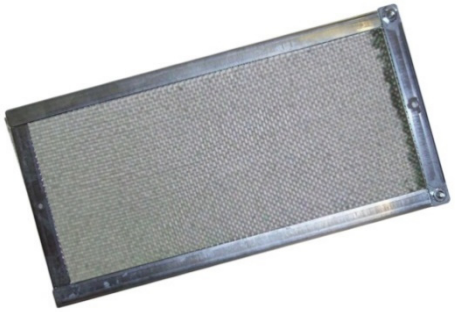
1.3.3 Model 2000 incubator

The model 2000 incubator is designed specifically for use in small spaces, so it is ideally suited to the chamber:

Because it has sliding doors, no space needs to be allowed for door opening. The standard unit has a temperature range of up to 40 °C. The high-range unit has a temperature range of up to 65 °C.

1.3.4 Desiccant Stak-Paks

Desiccant Stak-Paks are used to control moisture in the chamber:



They are attached to the catalyst Stak-Paks and the combined unit is placed in the catalyst fan box:

The desiccant Stak-Pak that is available through Coy contains alumina pellets. Empty Stak-Paks that can be filled with your own choice of desiccant are also available.

1.3.5 Anaerobic gas infuser (AGI)

The Coy anaerobic gas infuser automatically ensures proper hydrogen levels in your anaerobic chamber and maximizes anaerobic gas mix efficiency:

The gas infuser is designed to work with the Coy anaerobic monitor (CAM-12). It continually receives hydrogen readings from the anaerobic monitor. When the hydrogen level falls below 2.5 %, a valve is automatically opened and the hydrogen gas mix flows slowly into the chamber. When a 2.5 % hydrogen level is reached, the valve is closed.

If the hydrogen level has not reached 2.5 % within a predetermined time frame, an alarm will sound and the gas flow will stop. Automatic operation will resume when you clear the error.

1.3.6 Gas leak detector

The gas leak detector is used for detecting leaks in the anaerobic chamber:

It senses hydrocarbons (hydrogen gas mix) and will detect leaks as small as a pin hole. Because it detects hydrogen, it can also be used to detect leaks in the gas mix tubing and fittings.

1.3.7 Incandescent flaming device

The incandescent flaming device makes it easy to flame a bacteria loop or the edge of a culture tube:

It is operated with a foot switch that is installed outside of the chamber. The foot-switch cable is routed into the chamber through a feed-thru adapter (see page 6). The stopper for the feed-thru adapter is installed on the foot-switch cord.

1.3.8 Recirculating atmosphere filter

The atmosphere filter removes contamination from the chamber atmosphere:

The internal atmosphere is removed from the chamber by the vacuum pump on the unit, circulated through the filter, and returned to the chamber. It can remove contaminant particles 0.3 µm or larger. It cycles 0.85 m^3/h (30 f^3/h) and can be run periodically on an as-needed basis.

1.3.9 Large capacity dehumidifier

The large capacity dehumidifier allows control of the moisture levels inside the Coy vinyl anaerobic chamber automatically without the use of desiccant:

It is a much better solution to serious moisture problems than using desiccant Stak-Paks.

When it is installed, it attaches to the frame side support by the equipment entry port. The dehumidifier disk is used to seal the equipment entry port instead of the standard plastic disk.

1.3.10 Hydrogen sulfide removal column

Some types of chamber activities may generate hydrogen sulfide (H_2S). It is important to control hydrogen sulfide in the chamber because it attacks certain metals and can damage catalyst. It is especially detrimental to the oxygen and hydrogen sensors in the anaerobic monitor and to printed circuit boards in any electronic equipment.

The Coy hydrogen sulfide removal column (HSRC) is an efficient, effective method of controlling H_2S in your chamber:

The 28 in tall unit can be placed vertically on the floor of the chamber or horizontally in a special cradle on top of a 28 in or 36 in shelf. The cradle is not automatically included with the column and must be purchased separately from Coy:

Once installed, the HSRC provides maintenance-free, high-capacity removal of H_2S by continuously recirculating the chamber's atmosphere through the column.

The HSRC's unique layering of the removal media acts through a combination of adsorption and chemisorption and maintains performance under a broad range of operating conditions. An integrated airflow system, combined with the column design, ensures required contact time and flow rate to take advantage of the high H_2S removal capacity with single-pass H_2S clearance. No maintenance is required, except for changing the removal media every several months.

1.4 How the Chamber Works

The chamber is completely sealed from the laboratory environment. The only entrance to the chamber is through the airlock. The chamber's anaerobic environment is a hydrogen gas mix, which is continuously circulated through the chamber by the catalyst fan boxes. As long as sufficient hydrogen is present, any oxygen that is drawn into the catalyst fan boxes is removed when it comes into contact with the palladium catalyst.

1.4.1 The anaerobic environment

Two gases are used to create the anaerobic environment—a background gas (aka purge gas) and a hydrogen gas mix. The gases are customer-provided. Coy does not supply the gases.

To establish the initial anaerobic environment, the oxygen-rich air is removed and the chamber is filled with background gas. After the oxygen is purged from the chamber, the chamber is filled with the hydrogen gas mix.

The above process is repeated until the amount of hydrogen, which must be present for ongoing oxygen removal, is sufficient. Any remaining oxygen is removed when the chamber atmosphere is circulated through the catalyst fan boxes and passes through the palladium catalyst. Periodically, the chamber hydrogen content must be refreshed to ensure that there is enough hydrogen for oxygen removal. If you have an anaerobic gas infuser, this will be done automatically.

1.4.2 The gases

Any inert gas can be used as a background gas. The most commonly used background gas is nitrogen, which is both safe and inexpensive. The gas mix should be no more than 5 % hydrogen, with the balance being any inert gas. It is OK to use standard or inexpensive mixes of hydrogen and inert gas. You do not need to purchase specialty gases, as they are expensive. Check with your gas supplier regarding quality options.

5 % hydrogen is non-flammable but still provides enough hydrogen for oxygen removal. Mixes with lower levels are acceptable but the chamber's hydrogen content may need to be refreshed more frequently. Flammable gas mixes should not be used.

Setting Up the Chamber 2

The physical setup of the vinyl anaerobic chamber is relatively simple. It does, however, involve some crawling about and some lifting of heavy or awkward components. At least two people are needed to lift and carry the chamber. Some of the components are also heavy.

For larger chambers (types A and B and some custom chambers), one person will need to be able to crawl into the chamber for some setup and unpacking activities. For smaller chambers (type C and some custom chambers), all areas are accessible by simply reaching inside.

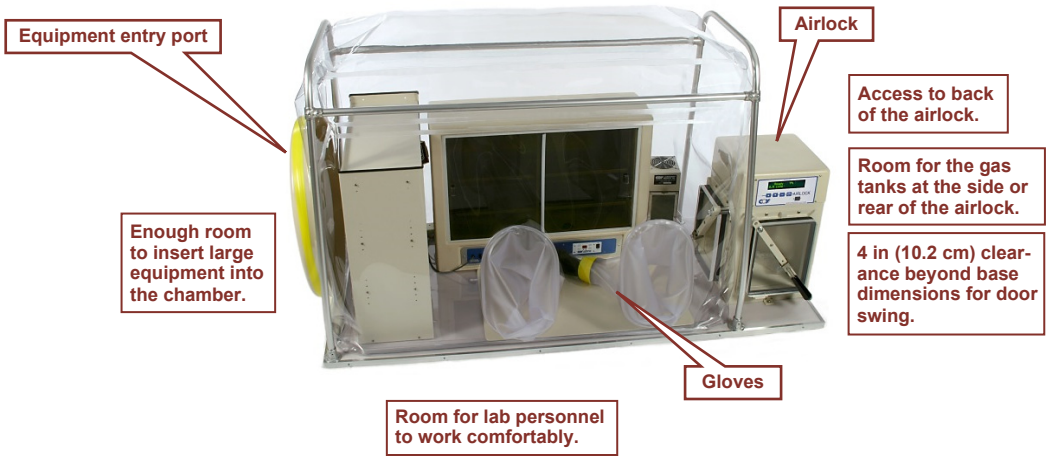
2.1 Selecting a Site for the Chamber

The chamber may be placed on any flat, stable surface in your laboratory that is large enough and strong enough to hold the entire chamber, its contents, and at least one person during setup. It should support a minimum of 500 lb (227 kg) and meet the following requirements:

- The height of the surface should allow lab personnel to comfortably access the glove openings and work inside the chamber.
- Access to an electrical outlet is needed for the power strip(s), airlock, and anaerobic gas infuser (if used). A minimum of 20 A is needed for the airlock.
- The area should be free from sharp objects that could puncture the chamber.
- Make sure there is nothing over the chamber that could fall and damage the chamber.
- A clearance of 55 in (140 cm) above the chamber base is required to allow for chamber inflation. The top of the chamber rises a few inches above the frame when fully inflated.

Note: *Custom units may require more clearance above the chamber.*

Ideally, the area around the chamber should be open to allow easy access for setup and maintenance and minimize the risk of puncture by sharp objects. The sides and front of the chamber must have enough clearance for the following:



- There should be enough room for laboratory personnel to work in front of the chamber.
- There should be enough room in front of the equipment entry port to install equipment during setup and to add or upgrade components down the road.
- There must be at least 4 in (10.2 cm) clearance beyond the base of the chamber to allow for outer airlock door swing.
- There must be room on the side of the airlock for the gas tanks, and lab personnel must be able to access the back of the airlock.

If possible, the area behind the tanks should also be open. If the chamber must be placed next to a wall, make sure there are no sharp objects on the wall, such as outlets, cabinet doors, or shelving.

2.2 Unpacking the Chamber

After the vinyl anaerobic chamber has been uncrated and delivered to the location where it is to be set up, it needs to be unpacked. Your chamber will be packed with tissue paper, both inside and out, to protect the vinyl from scratches. The unassembled chamber frame, consisting of two frame supports and two hanger poles, is packed on top:

For US installations, some chamber components (e.g., catalyst fan boxes, shelving, incubator) may be packed inside the chamber. Heavier or large components (e.g., large capacity dehumidifier) are packed in separate containers. For non-US installations, all electronic components are boxed separately. Non-electronic components may be packed inside the chamber.

The vacuum pump is mounted on a plywood board and attached to the inside of the crate. Some small parts and accessories are packed inside the airlock. These include:

- Stak-Paks (both catalyst and desiccant).
- Extra rubber stoppers.
- Gas leak detector (if ordered).
- Power strips (US orders only). For non-US orders, they are pre-installed.
- Printed quick setup guide and instruction manuals for purchased Coy optional components.
- Extra gloves and accessories for QCC system.
- Chamber setup and care kit, which contains the allen wrenches and yellow tape needed for setup.

Note: *We recommend removing all the items that are shipped inside the chamber before placing the chamber in its location. It will be easier to move the chamber into position and there will be less risk of damaging the vinyl.*

Important: *Be sure to remove jewelry and articles of clothing with sharp or pointed parts (e.g., shoes with buckles, belts) before setting up the chamber.*

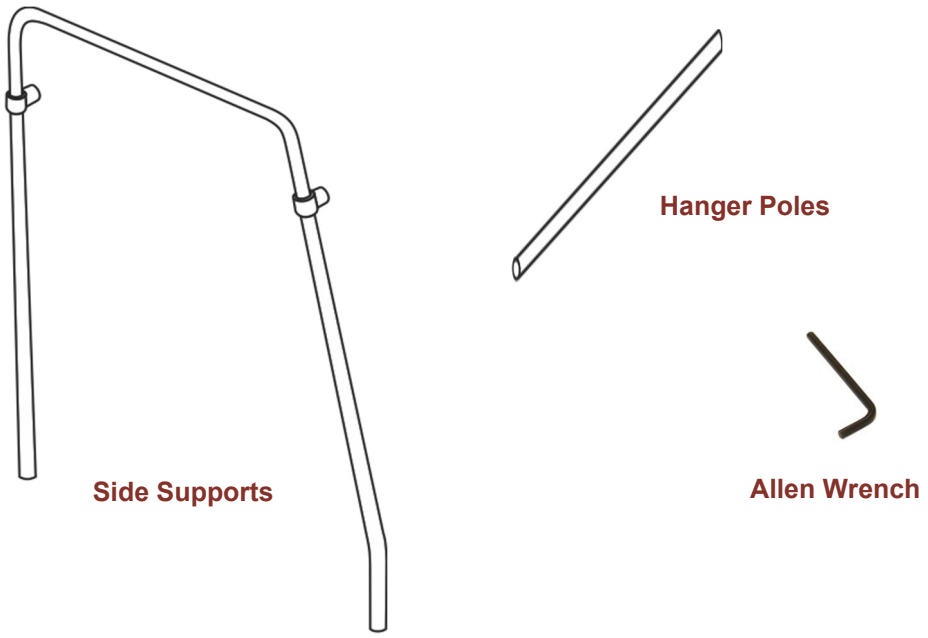
To unpack the chamber

1. Remove the frame supports and hanger poles.
2. Remove the tissue paper and the items that are packed inside the chamber.
3. Place the chamber base on the surface you have selected for the chamber.
4. Remove the components and accessories that are packed inside the airlock and put them together in a safe place so you can find them when needed.

Note: *You can wait to do the final cleanup of the tissue paper, etc., after the chamber is set up.*

2.3 Installing the Side Supports

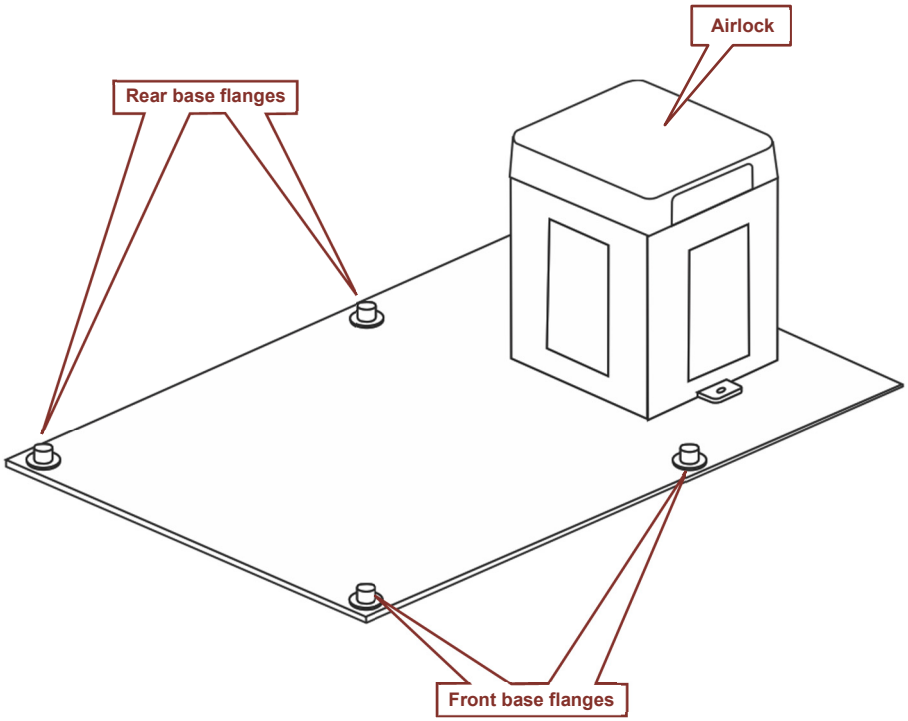
The chamber package contains two side supports and two hanger poles for the vinyl chamber. The 5⁄32-inch allen wrench you will need for assembling the chamber is packed in your chamber setup and care kit:



Reminder: *The chamber setup and care kit (which contains the allen wrenches) was packed in the airlock for shipping.*

Note: *Allen wrenches are also called hex keys and sometimes allen keys.*

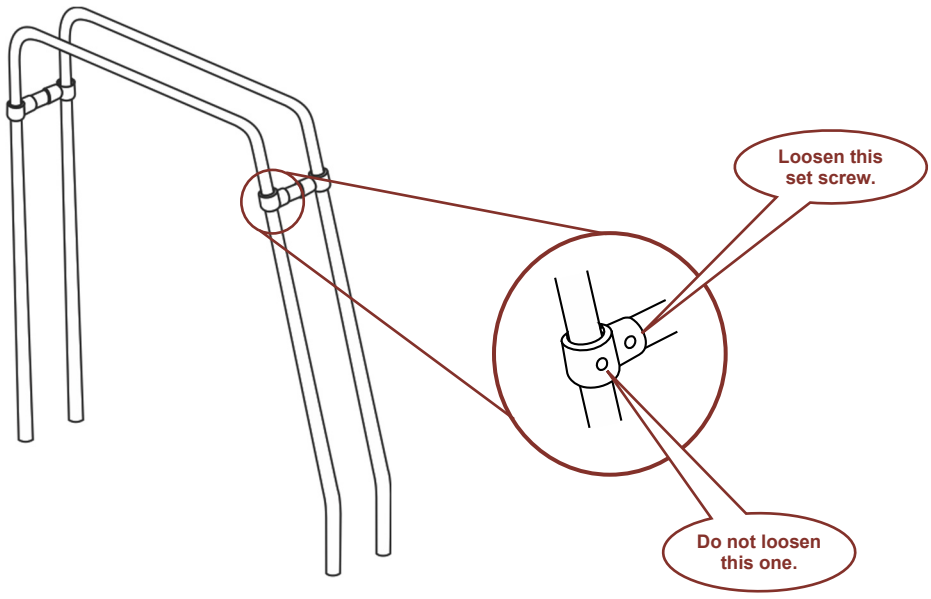
Your first step after you unpack the chamber is to install the side supports. The airlock and base flanges for the side supports are attached to the chamber base:



Note: *The illustration above and the one on the following page show the chamber base and supports without the vinyl chamber to more clearly illustrate assembly.*

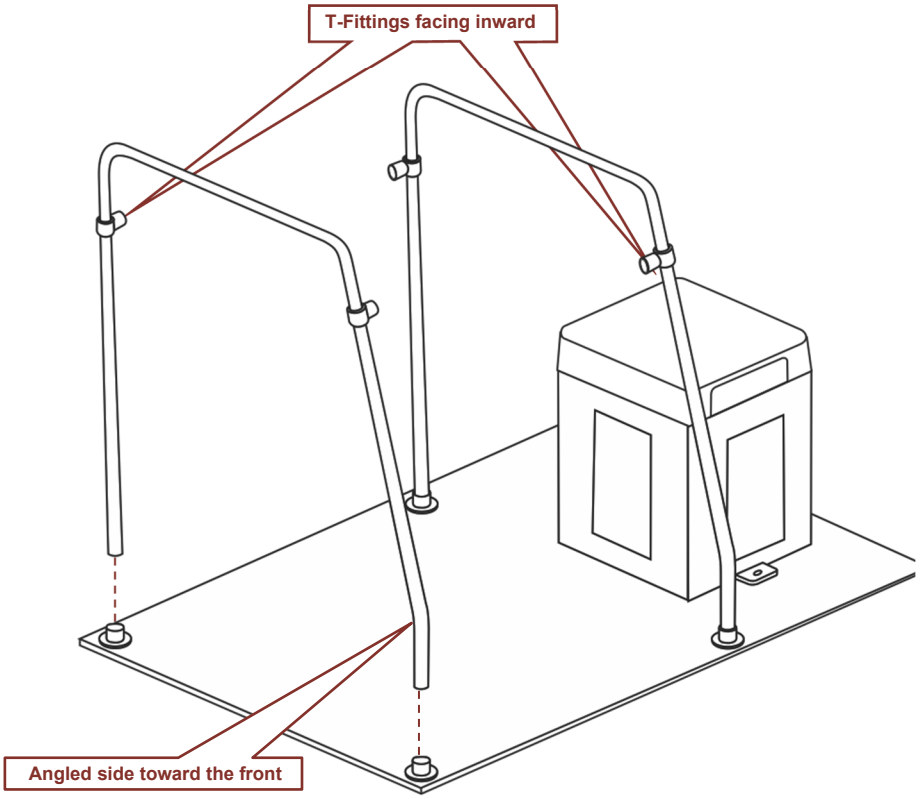
To install the side supports

1. The two side supports are held together by two pipe sections for packing purposes. Using the 5⁄32-inch allen wrench from your chamber care kit, loosen the set screws that hold the pipe sections and remove the pipe sections:



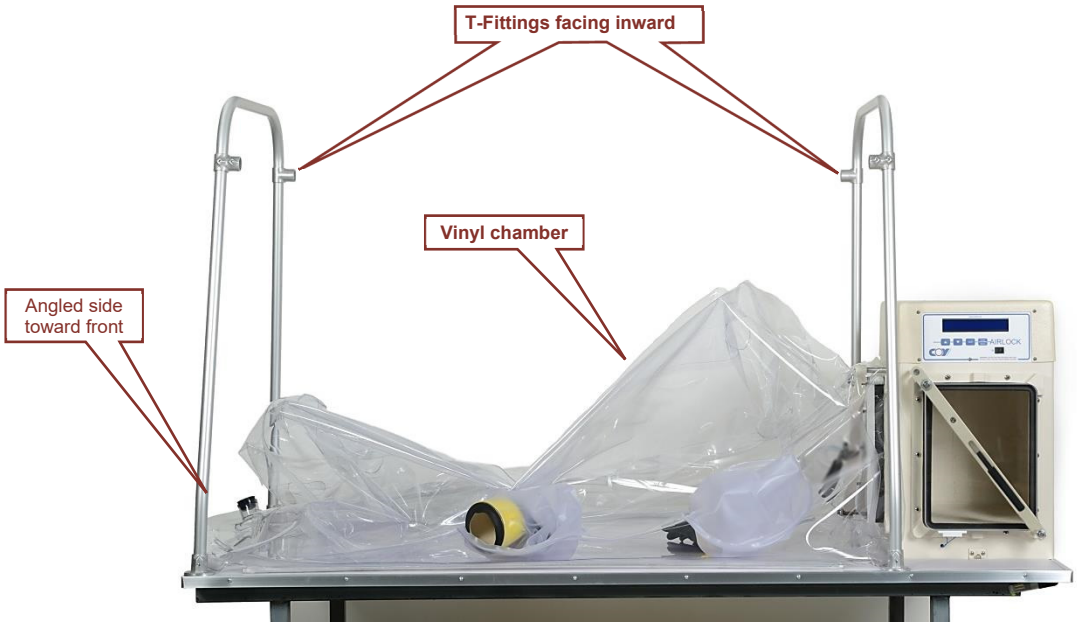
Do not loosen the set screws that hold the T-fittings to the supports (see above)!

2. Insert the side supports into the base flanges:



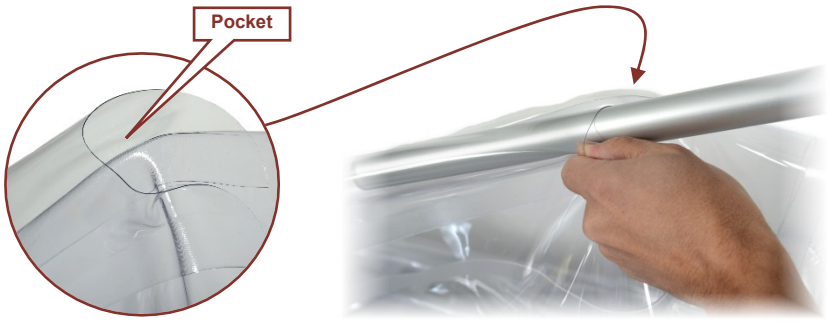
- Make sure the angled side is toward the front and the T-fittings are facing inward.
- Make sure the side supports are properly seated in the base flanges. They should go all the way down to the base.
- Do not tighten the set screws in the base flanges. We will do that later.

When you finish inserting the supports, your unit will look like this:



2.4 Attaching the Vinyl Chamber to the Frame

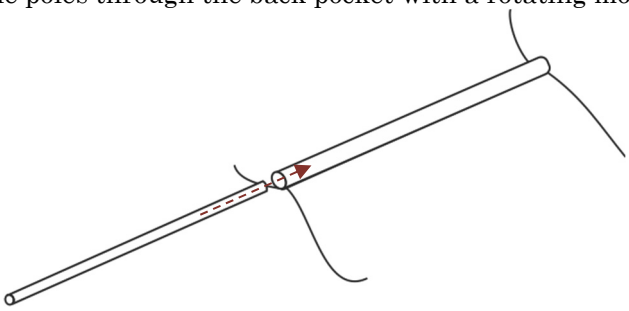
Next, you need to attach the vinyl chamber to the frame. The vinyl chamber has two long pockets for the hanger poles:



The chamber is packed so that the pockets are on top and oriented in the correct position (i.e., the pocket toward the back of the frame is the back pocket).

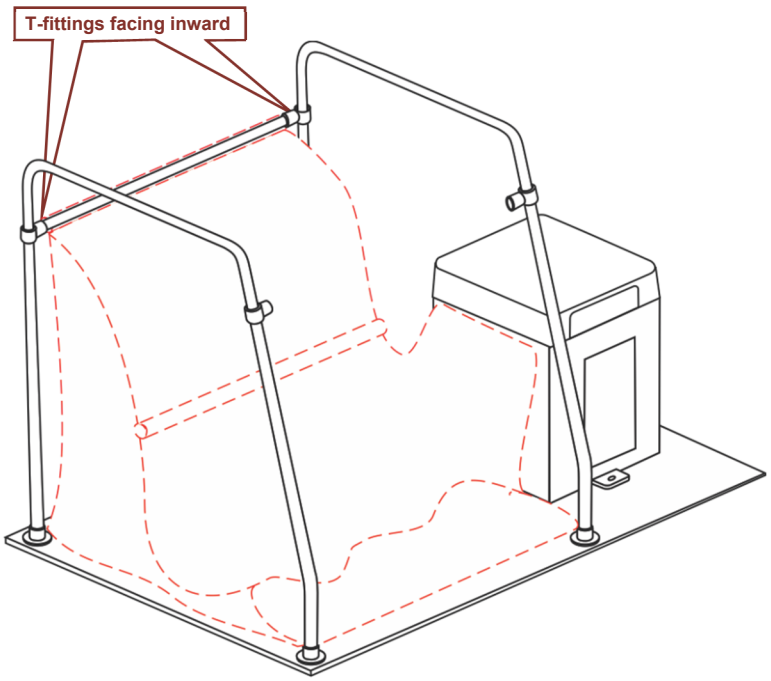
To insert the hanger poles

1. Slide one of the poles through the back pocket with a rotating motion:



Do not force the pole through the pocket.

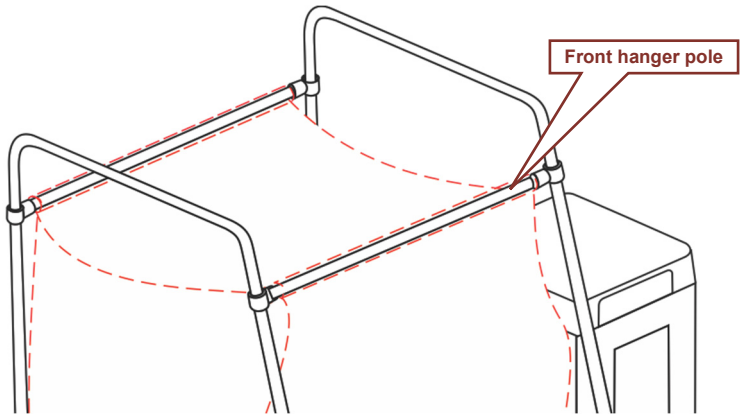
2. Insert the ends of the hanger pole into the back set of T-fittings:



You may need to spread the side supports slightly to insert the pole.

At this point your unit will look something like this:

3. Insert the other hanger pole into the front hanger pocket, just as you did the back one, and insert the pole into the front pair of T-fittings:



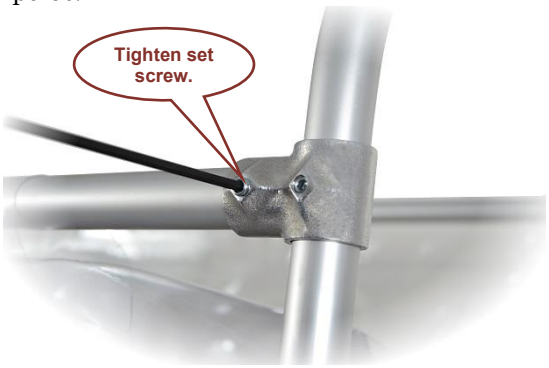
Your unit should now look similar to this:

2.5 Finishing Up

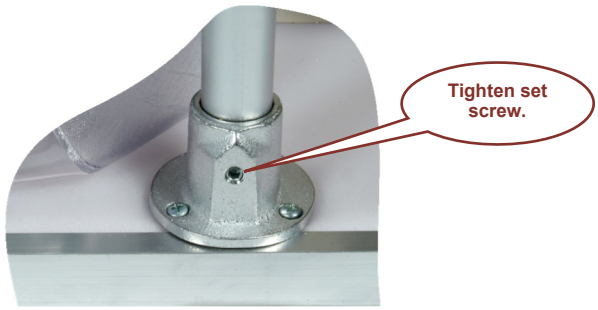
Now all you need to do is tighten the set screws and remove any leftover tissue paper and trash from the chamber interior. When you finish, the chamber should be ready for equipment installation.

To complete the chamber setup

1. Use the 5⁄32-inch allen wrench to tighten the set screws in the T-fittings that hold the hanger poles:



2. Remove the yellow tape that covers the set screws in the base flanges. Tighten the set screws with the 5⁄32-inch allen wrench:



3. Remove any tissue paper or other packing material that still may be inside the chamber and make sure all components are out of the chamber. You will probably need to crawl inside to do this.

Planning Your Chamber Layout 3

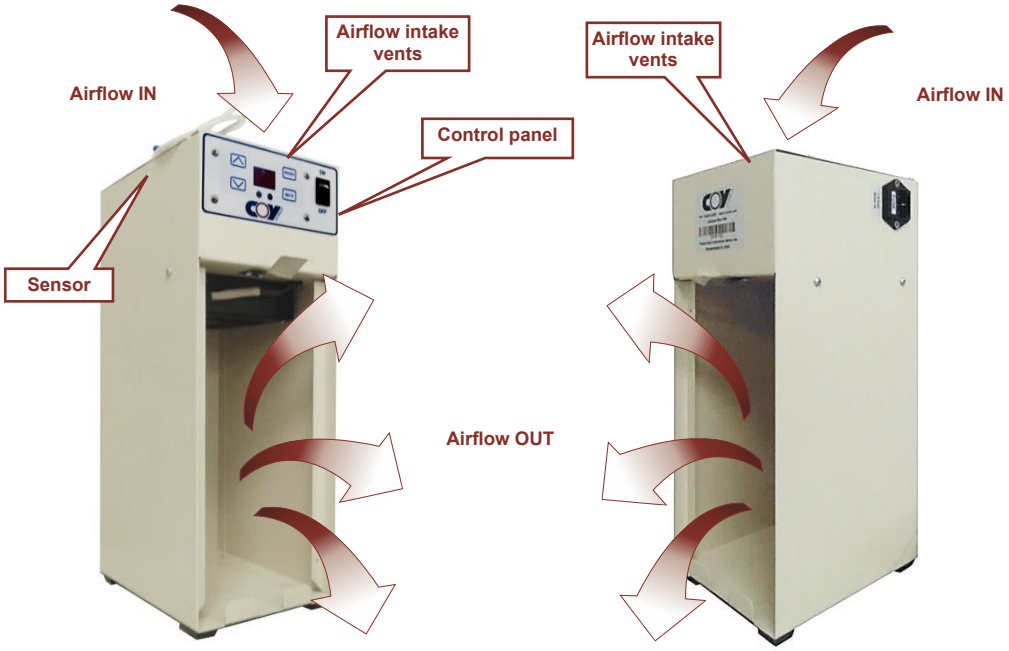
Once your chamber is set up, you can install the large equipment components. Large equipment is defined as any component that will not fit into the airlock. These components must be installed through the equipment entry port before the chamber is sealed. Before you do so, however, you will need to determine where you are going place these components in your chamber. This includes both the components that were purchased for your chamber and any additional equipment of your own that you want to use in the chamber.

3.1 Component Placement Guidelines

Although your chamber layout is ultimately governed by personal preference and the workspace needed, your catalyst fan boxes and the optional components you have purchased for your chamber somewhat determine and limit the arrangement you can have. Given below are some guidelines for the placement of standard and commonly used optional equipment. For information about other Coy or third-party optional components, refer to the manual provided with the component.

3.1.1 Catalyst fan boxes

The catalyst fan boxes circulate the chamber atmosphere through the palladium catalyst. The atmosphere is drawn in through the intake vents on the top of the box and blown out through the front opening, where it passes through the catalyst:



Heated Catalyst Fan Box Unheated Catalyst Fan Box

The heated catalyst fan box has a sensor and a control panel. The other parts are the same.

Ideally, for best performance, catalyst fan boxes should be positioned vertically with the opening facing the center of the chamber:

- If you have two catalyst fan boxes, we recommend that you place them on opposite sides of the chamber. This spacing is particularly important for heated catalyst fan boxes in order to optimally control the temperature.
- If you have one catalyst fan box, we recommend that you place it near the airlock for more efficient removal of oxygen that enters through the airlock. The oxygen levels are at their highest point after an airlock cycle.
- Do not position a catalyst fan box with either the intake vents or the front opening resting against any of the chamber walls or under a shelf, as catalyst fan box efficiency is sharply decreased.
- If you are placing an incubator or a 36 in shelving unit in a type C chamber, the component will take up the entire rear of the chamber, leaving no room for the one catalyst fan box. We recommend that you place the catalyst fan box horizontally on top of the shelving unit:

The front should be facing toward the front of the chamber and the vents on top should not be blocked by any equipment.

Note: *The illustrations above show the unheated catalyst fan box. Yours may be the heated model.*

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Note: *You may also use the above solution for any configuration with two catalyst fan boxes where there is no room to place both fan boxes on the chamber floor. In such cases, the catalyst fan box nearest to the airlock should be placed vertically on the floor. The one on the opposite side can be placed on whatever component is available (e.g., on the top of a shelving unit or incubator).*

3.1.2 Shelving

Shelving may be placed at the back of the chamber or on the side of the chamber opposite the airlock, depending on the unit's size:

36 in (91.4 cm) **28 in (71.1 cm)** **16 in (40 cm)**

Make sure the unit is placed so that it doesn't interfere with your needed work-space. Do not place it in front of the airlock.

3.1.3 Incubator

Because of its width and because it must be located so as not to interfere with available workspace, the incubator is always placed at the back of the chamber in standard vinyl chambers:

Custom chambers may be able to accommodate it elsewhere.

3.1.4 Anaerobic monitor

The anaerobic monitor should be placed where it can produce accurate readings for oxygen and hydrogen levels:

The monitor should be positioned with sufficient airflow around it to enable good gas exchange and temperature stability, both of which are necessary for operation. The top shelf of a shelving unit or the top of the incubator are generally good places.

Keep in mind that cycling the airlock produces the largest influx of oxygen. After an airlock cycle, oxygen levels will be highest near the airlock door and quickly eliminated by the catalyst. To accurately monitor the oxygen from an airlock cycle, place the monitor on the side of the shelf or incubator that is nearest the door.

3.1.5 Hydrogen sulfide removal column

The hydrogen sulfide removal column (HSRC) requires optimal airflow to draw the chamber atmosphere into the column so that H_2S can be removed. Without adequate airflow, it cannot function properly. It must be placed in a location where airflow is not blocked or compromised. It is extremely important to ensure that airflow intake at the top of the fan and the opening in the shroud at the bottom of the column where the cleaned atmosphere exits are not blocked:

It is not possible to check chamber airflow until the chamber is up and running, so initial positioning must be based on an "educated guess". You may have to re-position some components to eliminate dead spots that affect the HSRC after you have had a chance to check the airflow.

The HSRC can be installed either vertically or horizontally:

Vertical installations

Either of the back corners are good locations for vertical installations. The corner behind the airlock is generally good. However, care must be taken when positioning the unit to allow for the flexibility of the vinyl, as dimensions in this area can vary when the inner airlock door is opened or closed.

Horizontal installations

The best place for horizontal installations is on the top shelf of a shelving unit or the top of an incubator or other tall piece of equipment. Positioning it on a lower shelf compromises airflow. Make sure that the fan's airflow intake is not blocked.

Important: *Ensure that the shelf unit is stable and level before installing the HSRC.*

3.1.6 Work mat

Coy recommends that you use a work mat to protect the floor of the chamber and provides one of the appropriate size for each pair of gloves in your chamber. The work mat should be placed in front of the gloves.

3.2 Determining Your Component Layout

Your layout is determined by the placement requirements of the Coy components you have purchased, other existing equipment, and personal preference. There is no one right way to lay them out, although space is a limiting factor, especially in smaller chambers. The primary considerations are that the work area is laid out for optimal efficiency for the tasks to be performed in the chamber, gives you enough working room, and provides adequate atmosphere circulation for catalyst operation and temperature control.

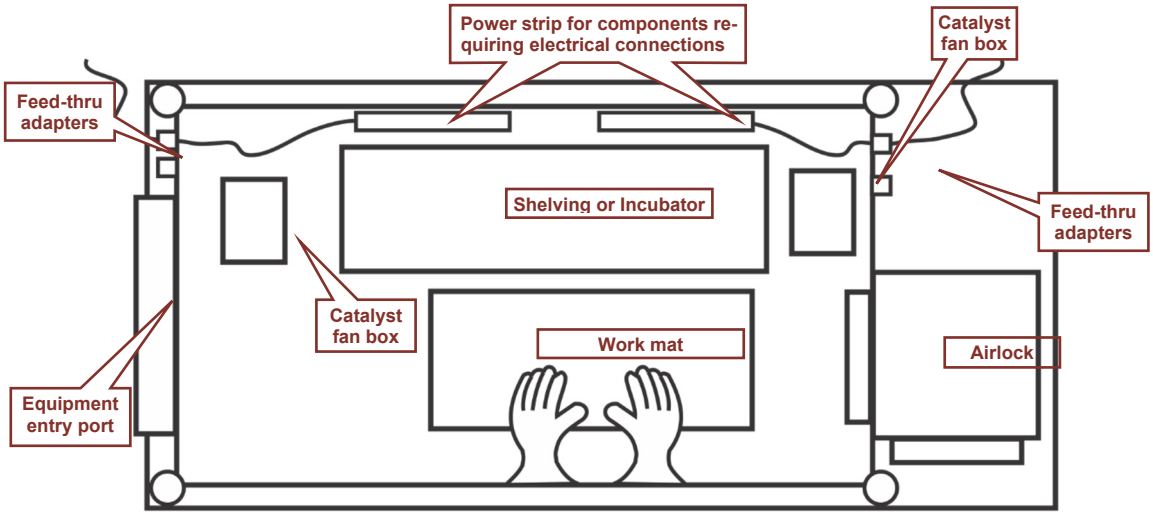
We advise you to plan your layout before you position the components in the chamber to avoid excessive repositioning. Some of the components have sharp edges or corners. Therefore, it is best to keep rearrangement at a minimum to decrease the risk of tearing the vinyl. Here are some suggested layouts for major components in standard chambers. If you have a custom chamber, you may have different options or limitations.

The examples below show some possible configurations and are provided to help you plan your layout. They show Coy components only. If you have additional equipment to place in your chamber, be sure to allow space for it also.

Important: *The layout samples are not setup instructions. Do not attempt to position your components in the chamber at this point. After you determine the layout for your chamber components based on the information in section 3.1, the sample layouts below, and your own specific needs, you can install your components, following the instructions given in Chapter 4.*

3.2.1 Basic configuration with minimal components

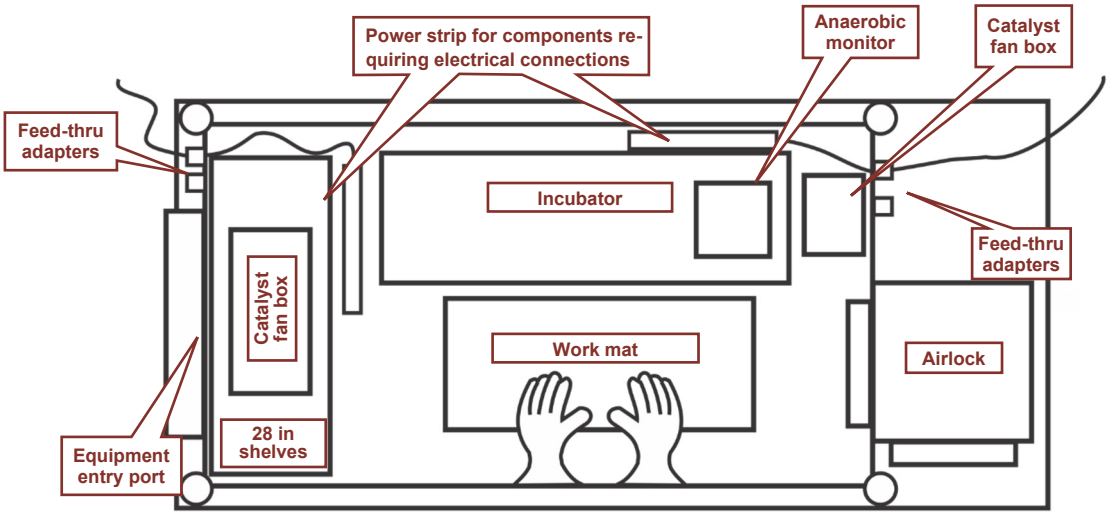
Here is a minimal basic configuration for a Type A chamber with two catalyst fan boxes, a set of shelves or an incubator, and a work mat:



The shelf unit or incubator is placed in the back of the chamber where it will not interfere with the work area. 36 in (91.4 cm) shelves are shown. A smaller size shelf unit can also be used. The two catalyst fan boxes are placed on opposite sides of the chamber and the work mat is placed in front of the glove openings. An anaerobic monitor could be added to this layout and placed on top of the shelf unit or the incubator.

3.2.2 Configuration with an incubator for a Type A chamber

Many configurations include an incubator. The configuration below for a Type A chamber has an incubator, an anaerobic monitor, and a set of 28 in (71.1 cm) shelves:

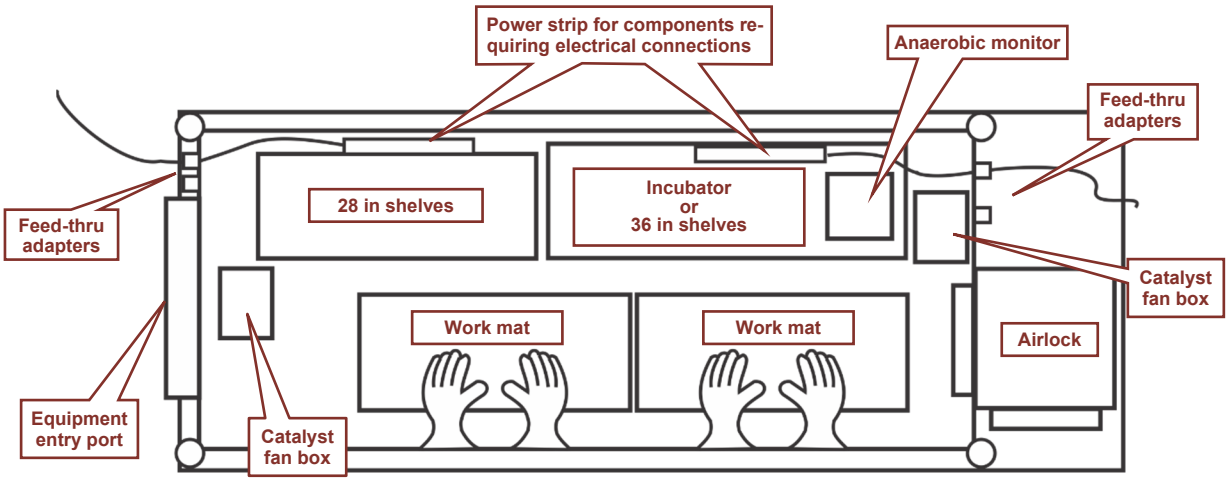


The incubator is placed at the back of the chamber and the shelves at the side. One catalyst fan box is placed vertically on the same side as the airlock and the other is placed horizontally on the top shelf of the shelving unit on the opposite

side. The anaerobic monitor is placed on top of the incubator. This arrangement provides maximum workspace in a crowded chamber.

3.2.3 Configuration for a Type B Chamber

The Type B chamber is large enough for both an incubator and a set of 28 in (71.1 cm) shelves to be placed at the back, leaving more work room in the front:



If you do not have an incubator, two sets of shelves can be placed at the back instead. The Type B chamber can accommodate one 36 in unit and one 28 in unit.

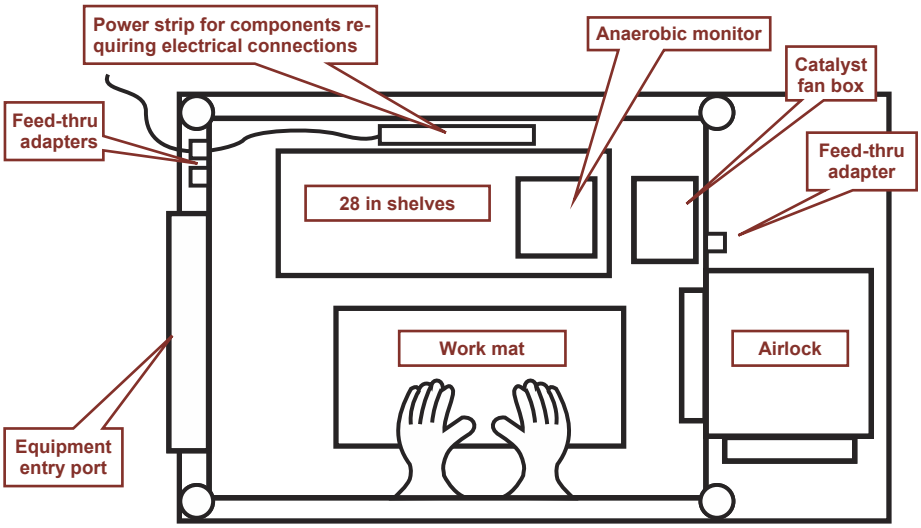
In the illustration above, one power strip is placed on the incubator instead of on the chamber floor as it has been in the previous illustrations. The anaerobic monitor is placed on either the incubator or the shelves nearest the door.

3.2.4 Layouts for a Type C chamber

The Type C chamber is the smallest chamber and has limited space for components. It cannot hold both an incubator and a set of shelves.

3.2.4-A A Type C chamber with shelves

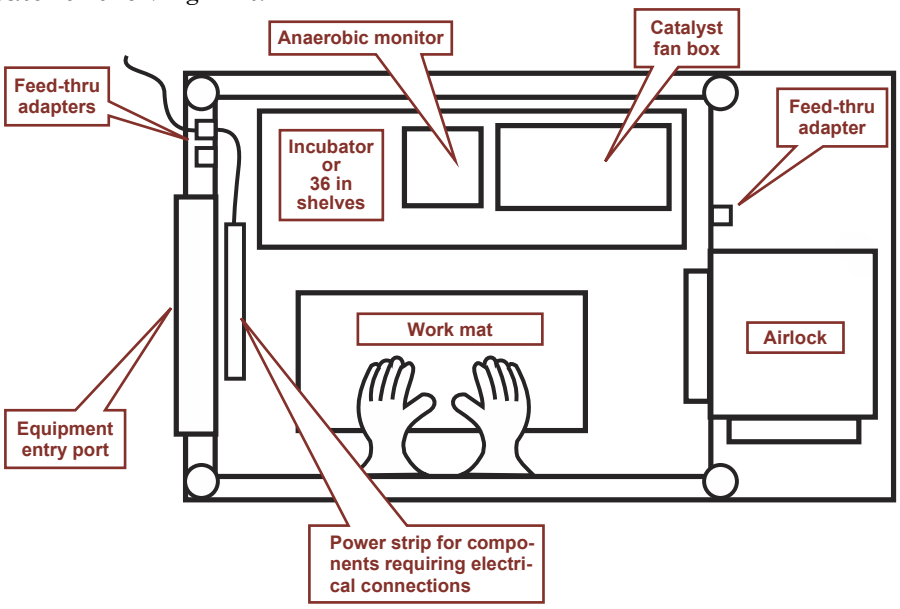
This illustration shows a Type C chamber with a set of 28 in (71.1 cm) shelves:



The catalyst fan box is positioned near the airlock. Because the shelving does not take up the entire width of the chamber, the catalyst fan box can be placed on the floor in the preferred vertical position. The anaerobic monitor is placed on the top shelf of the shelf unit. The power strip is accessible through the shelves. To accommodate 36 in shelves, place the catalyst fan box on the shelves as shown in section 3.2.4-B below.

3.2.4-B A Type C chamber with an incubator or 36 in shelves

The Type C chamber can accommodate either an incubator or a set of 36 in shelves. In this case, the best place for the catalyst fan box is on top of the incubator or shelving unit:



There is no room to position it on the floor without taking up work space. The fan box should be positioned horizontally. In the above illustration, the anaerobic monitor is placed next to the fan box. It could also be placed on a lower shelf in a chamber with a shelving unit as long as the airflow is adequate.

Installing the Chamber Components 4

Your next step is to install the large equipment in the chamber, using the layout you have planned. You may wish to make some adjustments after you see the components in the chamber. If you have not yet planned your layout, we suggest that you do so before you install the components to eliminate any unnecessary re-arrangement and reduce the chances of accidentally puncturing the vinyl.

All large equipment is installed through the equipment entry port. We have given instructions here for the catalyst fan boxes and the most commonly used optional components—the anaerobic monitor, the gas infuser, the incubator, the hydrogen sulfide removal column, and shelf units. If you have any other components, refer to the component manual for installation information.

The order of the sections in this chapter is arbitrary and is not meant to represent installation order. In general, it is best to install your components starting with largest first. There are three exceptions:

- The power strip(s) and work mat(s) should be installed first.
- Equipment that blocks the entry port should be installed last.
- Equipment that interferes with access to other equipment should be installed after the component it blocks is in position.

Important: *Be very careful when moving equipment into and around in the chamber. Some components have sharp edges and corners, which can puncture the vinyl.*

4.1 Installing the Power Strip(s) and Work Mat(s)

Before you install any equipment, you must first install the power strip(s) so that power connections will be available for the components that need them. Two power strips are provided for Type A and B chambers You should also install the work mat(s) so that it is available in cases where you want to protect the chamber floor during an equipment installation procedure.

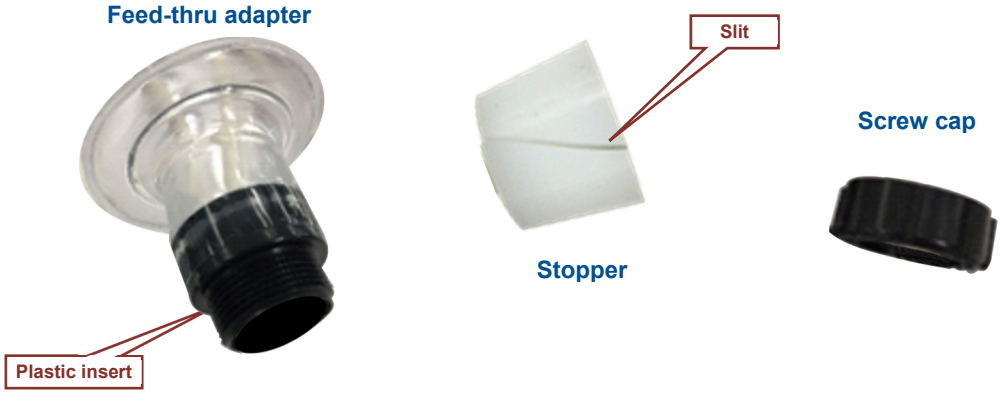
4.1.1 Installing the power strip(s)

The power strips are stored in the airlock for shipping:

They are generally placed in the back of the chamber near the feed thru-adapters They should be placed in a location that is out of the way but easily accessible and doesn't interfere with the work area. If there is no room for the power strip on the chamber floor, you may place it on a shelf or another accessible piece of equipment or use Velcro to attach it to the side of a shelving unit or the incubator after your components are installed.

Note: *Non-US power strips may be installed in the chamber at the factory. If your power strip is already installed, you may skip this section and go to section 4.1.2*

The power strip feed-thru adapter is specifically designed for plug strip installation:

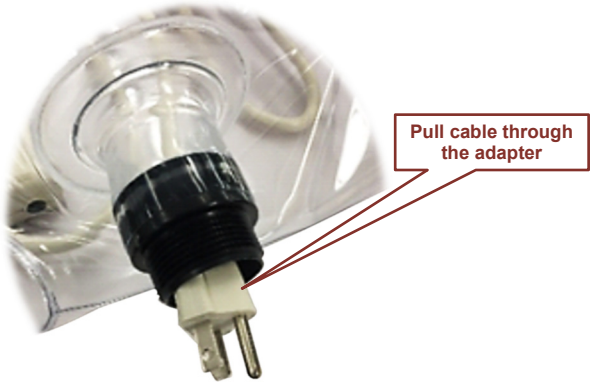


A threaded black plastic insert is permanently installed in the opening of a standard vinyl feed-thru adapter. The rubber stopper, which is used to seal the adapter, is slit to enable installation of the power cord. A screw-cap-style nut is screwed on to the adapter insert, ensuring that stopper cannot be pulled out of the adapter port.

Types A and B chambers have two power strip feed-thru adapters, one behind the equipment entry port and one behind the airlock. Type C chambers have one power strip feed-thru adapter, located behind the equipment entry port. If you have a type A or B chamber, we recommend that you install both power strips, even if you don't think you will need both of them, as it is much easier to do this in an empty chamber than it would be to add the second one later in working chamber after all the components are installed.

To install a power strip

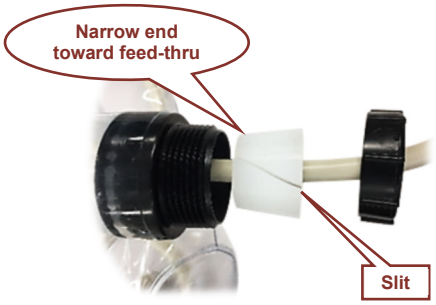
1. Place the power strip in its approximate location at the back of the chamber.
2. Insert the power strip cable into the feed-thru adapter and pull it through to the outside:



Important: *Make sure you pull enough cable out to reach the power outlet you plan to connect to!*

3. Thread the screw cap onto the cable:

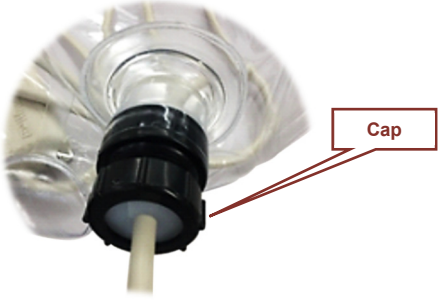
4. Insert the cable into the stopper through the slit:



Make sure the narrow end of the stopper is toward the feed-thru!

5. Insert the stopper into the feed-thru adapter as far as it will go:

6. Screw the cap onto the adapter:



Important: *Do not plug the power strips into a wall outlet at this time!*

4.1.2 Installing the work mat(s)

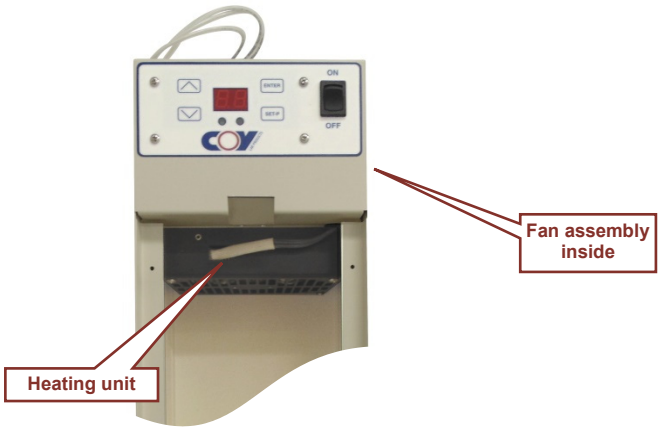
The standard position of the work mat is in front of the gloves. (For Type B chambers, two work mats are provided–one for each pair of gloves.) During the installation process, however, you may feel free to move it anywhere you feel it is necessary to protect the chamber floor. Just don't accidentally leave it positioned under an installed component!

4.2 Installing a Heated Catalyst Fan Box

Note: *The instructions and information in this section apply to heated catalyst fan boxes only. Instructions for installing unheated catalyst fan boxes are given in section 4.3.*

The heated catalyst fan box is used for chambers where temperature control is necessary:

The desired temperature is set through the control panel on the front of the box. The heat is supplied by a heater that is bolted to the inside of the fan assembly:



The heater is turned on and off automatically by the controller as needed, based on the temperature reported by the sensor and the user-defined set point.

The unit is shipped with power cord and sensor clip packed inside the fan box. Four rubber feet are attached to the fan box. Four additional rubber feet are packed in the fan box, in case you need to use the unit in a horizontal position.

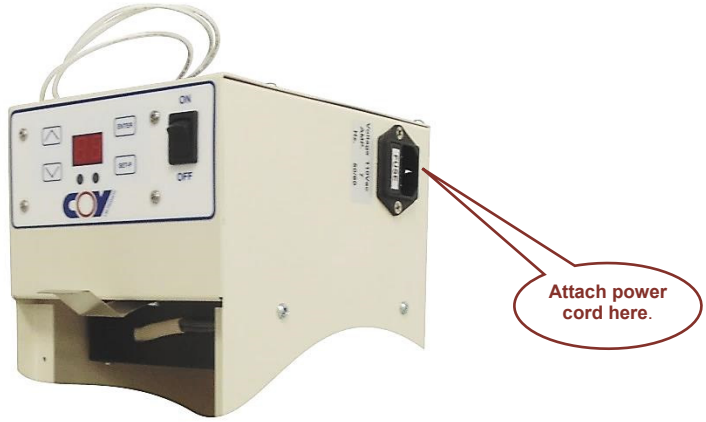
Before you install the fan box in the chamber, you will need to connect the power cord to the fan box. If you are planning to place the unit horizontally, you will also need to attach the extra rubber feet to the side of the unit.

To attach the rubber feet and power cord

1. If the box is to be placed horizontally on top of an incubator or shelf, attach the spare set of rubber feet to the four corners of the side it will be resting on (the side opposite the power cord receptacle):

   To attach the feet, peel back the protective backing and stick them on. Do not take the original feet off. You may want to use the box vertically in the future.

2. Insert the female connector on the power cord into the recessed power inlet receptacle on the side of the box:



   Make sure it is fully inserted into the receptacle.

To install the heated fan box in the chamber

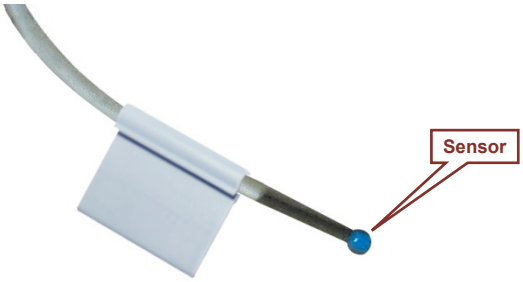
1. Place the catalyst fan box in its selected location.

2. Position the fan box so the front opening is pointed toward the center of the chamber.

3. Remove the cable tie from the sensor cable.

4. Locate the sensor clip. It should be packed inside the fan box:

5. Attach the clip to the sensor cable:



It can be anywhere on the cable, but it should be no closer to the sensor than shown in the illustration above.

6. Select a location for the sensor in the area where the temperature is most critical. You may attach it to any piece of equipment in the chamber.

7. Remove the backing from the clip and attach it to its selected location.

Important: *Make sure the blue tip of the sensor does not touch the surface of the component it is attached to or anything else in the surrounding area. If it does, change the position of the clip on the sensor cable.*

8. Plug the fan box into the power strip.

9. Turn the power switch **ON**:

Note: *The unit will not power up at this time, as the power strip is not plugged in during the initial component setup. It will power up when the power strip is connected to a power source and turned on.*

4.3 Installing an Unheated Catalyst Fan Box

Note: *The instructions and information in this section apply to unheated catalyst fan boxes only. Instructions for heated fan boxes are given in section 4.2.*

Unheated catalyst fan boxes do not have a power switch or any other controls. They circulate the atmosphere through the fan box to remove oxygen and provide a homogeneous mix of gases, but they do not control temperature.

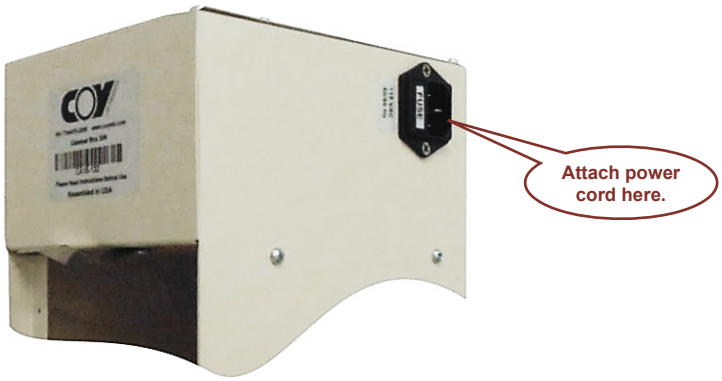
The power cord is packed in the fan box, along with four additional rubber feet that will need to be attached to the side of the fan box if you place the unit in a horizontal position.

To attach the rubber feet and power cord

1. If the fan box is to be placed horizontally on top of an incubator or shelf, attach the rubber feet to the four corners of the side it will be resting on (the side opposite the power cord receptacle):

To attach them, peel back the protective backing and stick them on. Do not remove the original feet, as you may want to use the box vertically in the future.

2. Insert the female connector on the power cord into the recessed power inlet receptacle on the side of the box:



Make sure it is fully inserted into the receptacle.

To install the unheated fan box in the chamber

1. Place the catalyst fan box in its selected location.
2. Position the box so the front opening is facing the center of the chamber.
3. Plug the power cord into the power strip.

Note: *The unit will not power up at this time, as the power strip is not plugged in during the initial component setup.*

4.4 Installing the Shelving

The shelving units are packaged unassembled and need to be assembled before you can install them.

To install a shelving unit

1. Assemble the unit. The assembly instructions can be found in the shelving unit package.
2. Place the unit in its location in the chamber.

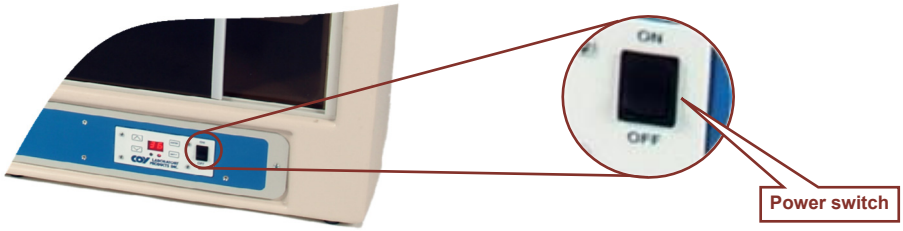
Note: *While the shelf units do feature adjustable shelving, it is easier to make the adjustments outside of the chamber. So, it is best to decide on their arrangement prior to installation.*

4.5 Installing the Incubator

Installing the incubator is merely a matter of positioning it in the chamber and connecting it to the power strip. Because of its width, the incubator is usually positioned in the back of the chamber. If you are planning to place a catalyst fan box or an anaerobic monitor on top of the incubator, install the incubator first.

To install the incubator

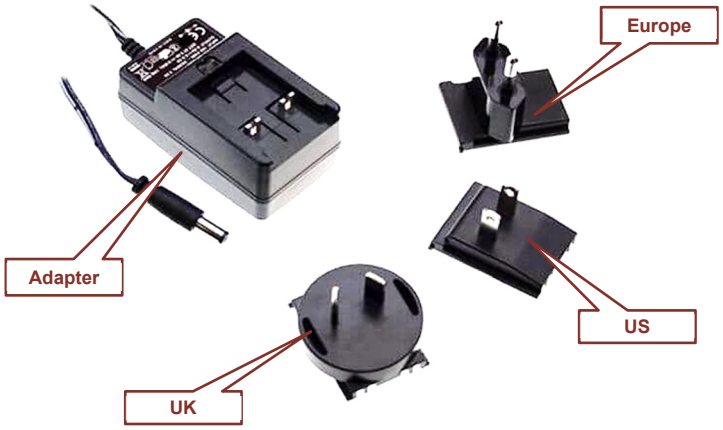
1. Place the incubator in its selected location in the chamber.
2. Plug the power cord into the power strip.
3. Make sure the power switch is turned **OFF:**



4.6 Installing the Anaerobic Monitor

When you install the anaerobic monitor, you must place the monitor in its location and connect it to the power strip. The anaerobic monitor has a separate power supply adapter, which converts the AC line voltage to the lower DC voltage required for the unit's electronic operation.

The power supply adapter comes with three different plugs: US, UK and continental Europe:



You will need to install the correct one for your facility.

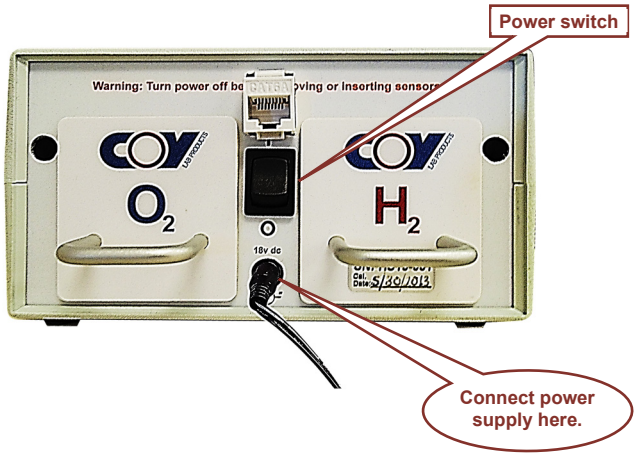
To install the plug

1. Slide the plug into the adapter:

2. When you hear a click, the plug is fully seated:

To install the anaerobic monitor

1. Insert the jack connector on the power supply adapter into the power connector in the back of the monitor:



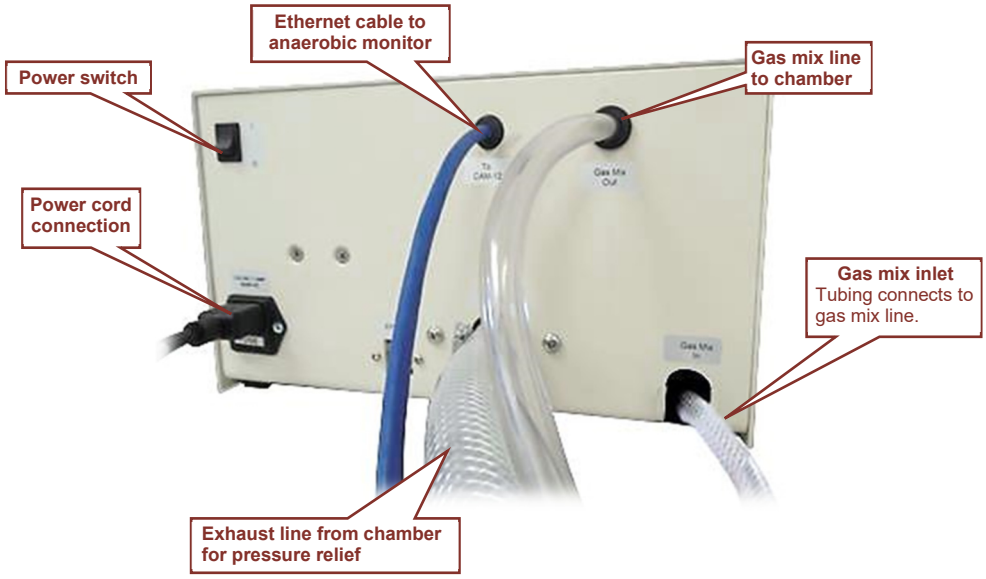
2. Set the power switch to **I** (on).
3. Place the monitor in its selected location.
4. Plug the power supply into the power strip.

Note: *The unit will not power up at this time because the power strip is not plugged in during initial component setup.*

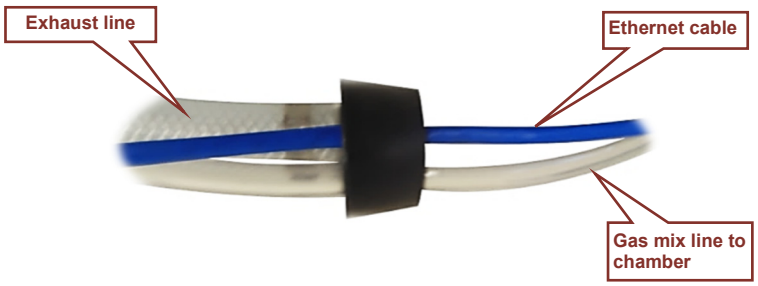
4.7 Connecting the Anaerobic Gas Infuser

If you have purchased the Coy anaerobic gas infuser, you will need to connect it to the chamber, the anaerobic monitor, and the airlock. The connections to the chamber and the anaerobic monitor must be made after the monitor is installed and before the chamber is sealed. The instructions for connecting to the airlock will be given in the next chapter.

The gas infuser is shipped with its connections intact (except for the power cord, which is packed separately in the same carton):



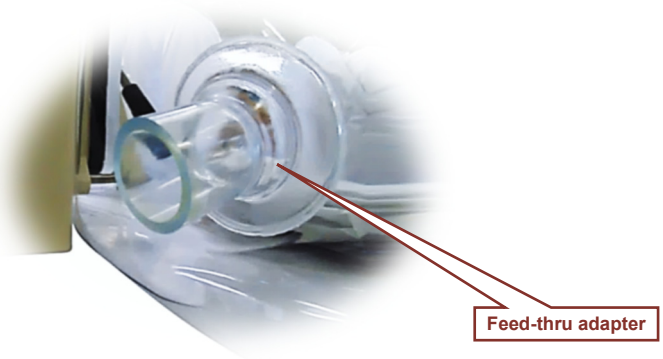
All lines that are connected to the chamber are attached to a rubber stopper:



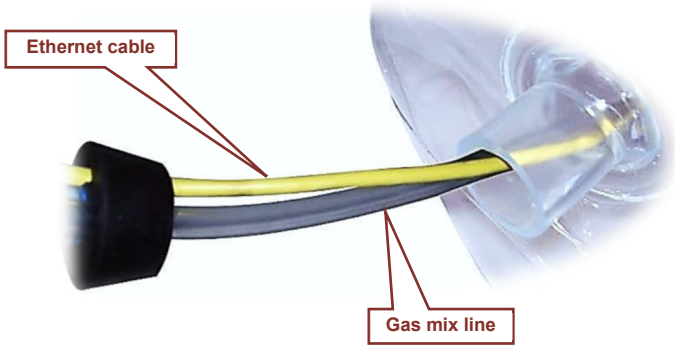
To connect the anaerobic monitor to the gas infuser

1. Place the gas infuser on top of the airlock:

2. Locate the feed-thru adapter for the gas infuser in the chamber wall. It should be just behind the airlock:



3. Insert the Ethernet cable and the gas mix line into the feed-thru adapter:



4. Continue pushing the lines into the chamber until the rubber stopper reaches the feed-thru adapter opening.

5. Rub alcohol on the outside of the stopper so it will slide more easily. Then push it into the feed-thru adapter until it is at least ¾ of the way in:

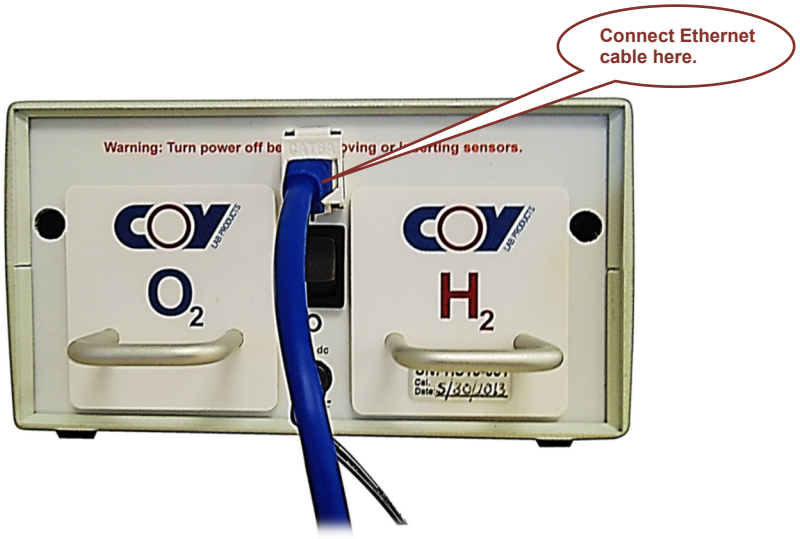
Note: *Alcohol may discolor the vinyl but it will not do any actual harm to the material.*

6. Secure the stopper to the feed-thru with yellow tape (included in your chamber setup and care kit).

7. Route the gas mix line along the back of the inside of the chamber behind the other installed components (incubator, shelving, etc.)

Note: *You may cut the gas mix line, if necessary, for a better fit, but it should be no shorter than one foot from the feed-thru adapter.*

8. Connect the Ethernet cable to the anaerobic monitor:



Push the connector into the port until you hear it click. Then tug gently to make sure the connection is secure.

Note: *The Ethernet cable will not necessarily be either of the colors shown in this section. Whatever cable is installed in the gas infuser is correct!*

4.8 Installing the Hydrogen Sulfide Removal Column

The hydrogen sulfide removal column (HSRC) is shipped unassembled and must be assembled *before* you place it inside the chamber. You should have the following parts:

Refillable cartridge

Fan assembly

Indicator strip holder

Column base

Note: *A disposable cartridge is also available for the HSRC. More information can be found in the HSRC manual. If you are interested, contact Coy.*

4.8.1 Assembling the column

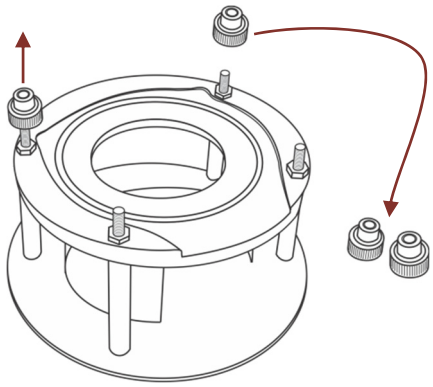
Assembling the cartridge is relatively simple. First, you attach the base to the cartridge. Then you attach the fan assembly to the cartridge. The pieces are designed to fit together, so there is no guesswork involved.

Hint: *To make installation of the fan assembly easier, do not remove the twist tie from the power cord until after the assembly is installed.*

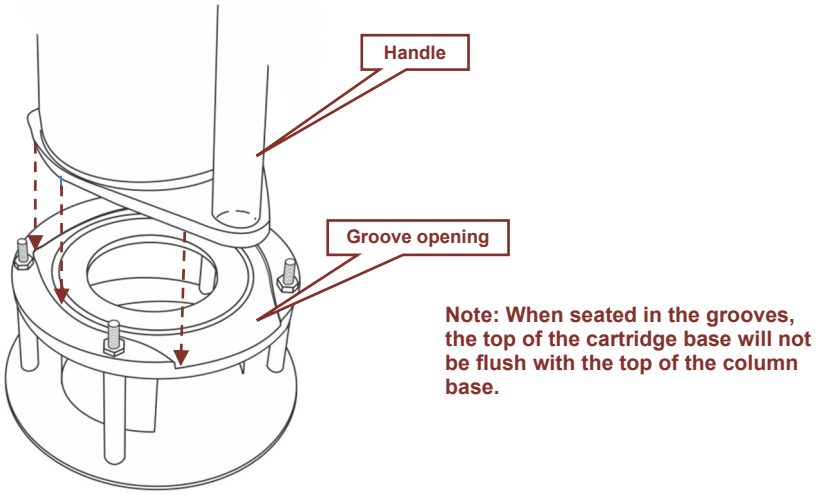
To attach the base to the cartridge

1. Wipe the top of the base and the bottom of the cartridge with a lint-free cloth and water (or 70 % isopropyl alcohol solution) to ensure that they are dust free.

2. Remove the nuts from the base and set them aside:

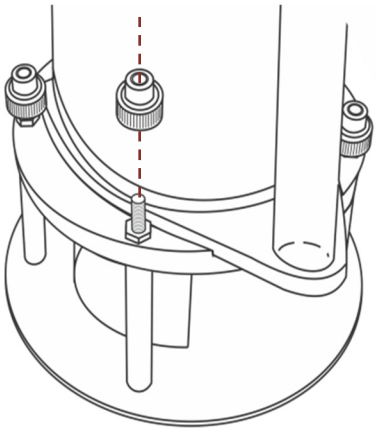


3. Position the cartridge over the base with the handle over the groove opening in the front of the base:



Then fit the cartridge into the grooves on the top of the base. Make sure that the cartridge sits flat in the base.

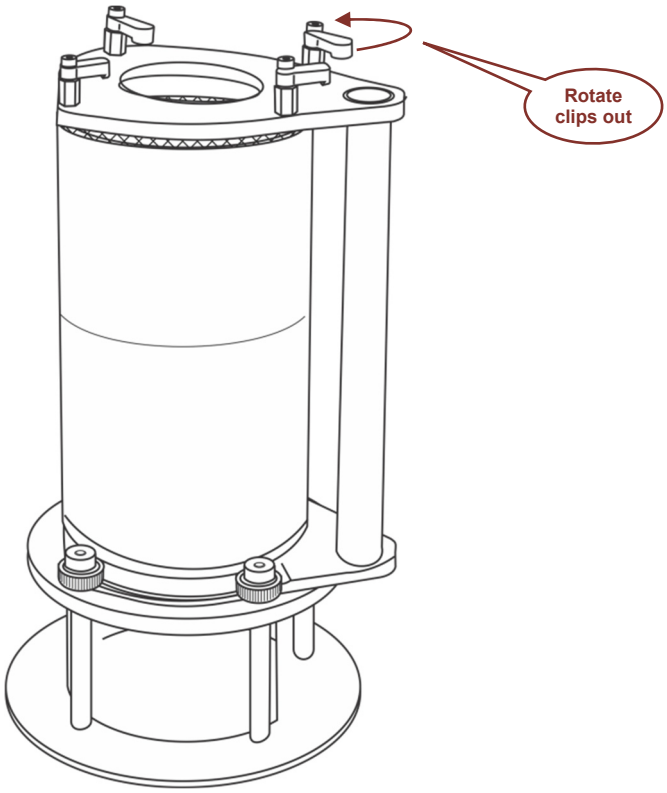
4. Install the nuts with the *LARGE SIDE DOWN*. The base of the nut will overlap the cartridge base:



5. Tighten the screws as much as possible. Make sure the cartridge is held firmly and does not wobble. When the screws are properly installed, they will look like this:

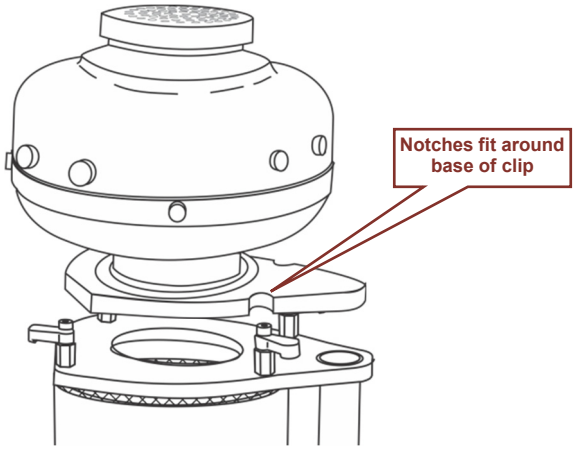
To install the fan assembly

1. Rotate the clips on the top of the cartridge so that they point away from the cartridge:



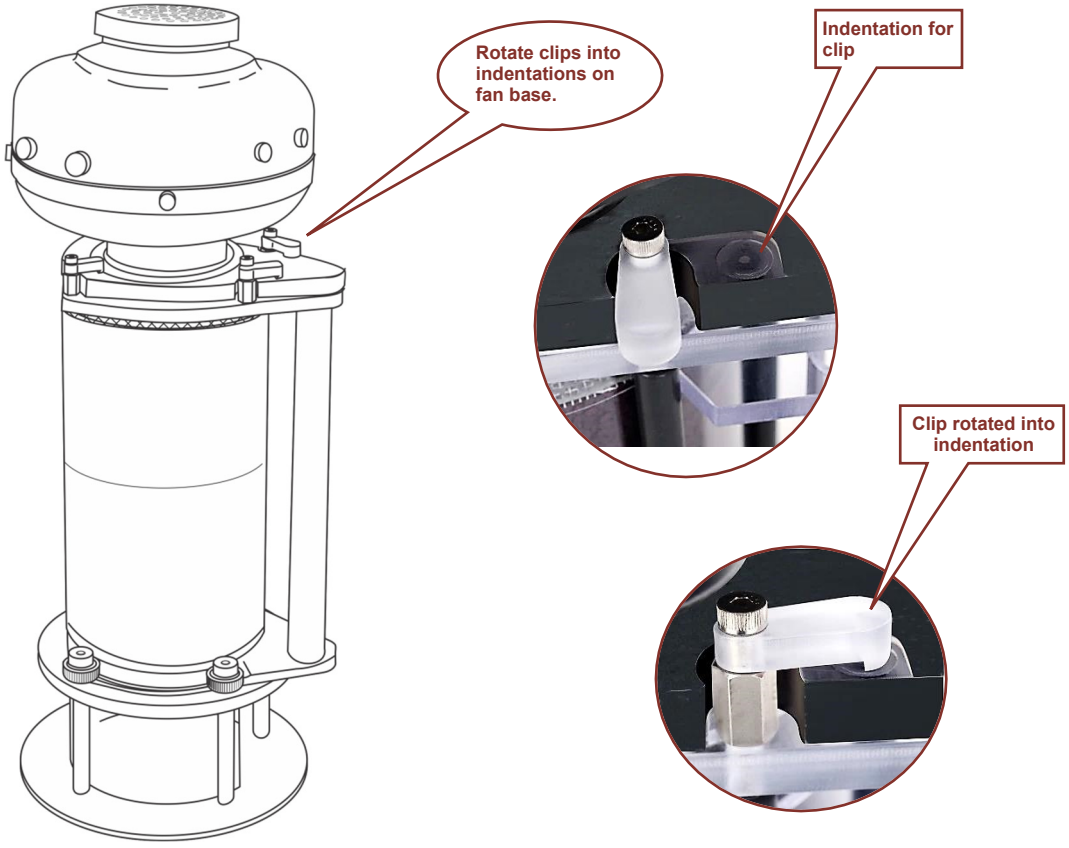
2. Wipe the cartridge top and the bottom of the fan base with a lint-free cloth and water or 70 % isopropyl alcohol solution to remove any dust or other particles that may be present.

3. Place the fan assembly on the cartridge top between the four clips:



The notches in the front of the fan base fit around the the base of the clips and will line the unit up correctly with the cartridge top.

4. When the fan assembly is properly seated, rotate the clips into the indentations on the fan assembly base as shown below to hold the fan in place:



Do not tighten the screws in the clips.

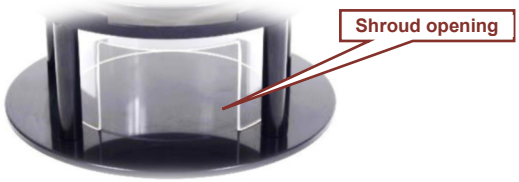
4.8.2 Installing the HSRC vertically

If you are positioning the HSRC vertically, no further setup is required for the unit until you have completed the setup of your chamber and establish the chamber atmosphere. All you need to do is position it in the chamber and connect it to power.

To position the HSRC vertically

1. Place the HSRC in its chosen position in the chamber:

2. Orient the clear plastic shroud opening so that it directs airflow output in the direction you want:



   Make sure its output will not be impeded by any components. You can make adjustments later after the chamber atmosphere is up and running and you can check airflow.

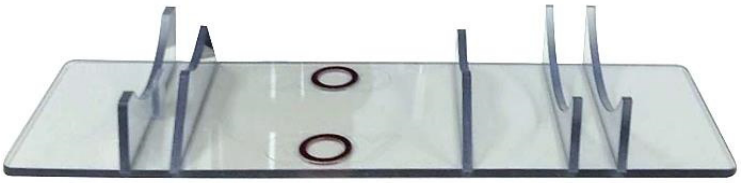
3. Remove the twist tie from the power cord:

4. Make sure the unit is turned off. The switch is on the power cord:

5. Plug the power cord into the power strip.

4.8.3 Installing the HSRC horizontally

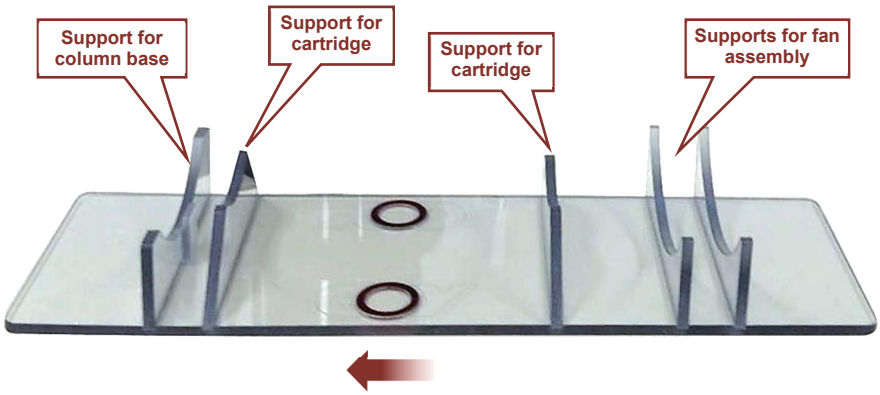
If you are planning to install the HSRC horizontally, you will need to position the unit in its cradle:



The cradle (part #8703036) is not automatically included with the HSRC and must be purchased separately. If you did not purchase it when you ordered your chamber, contact Coy to obtain one. *Do not install the HSRC horizontally without it!*

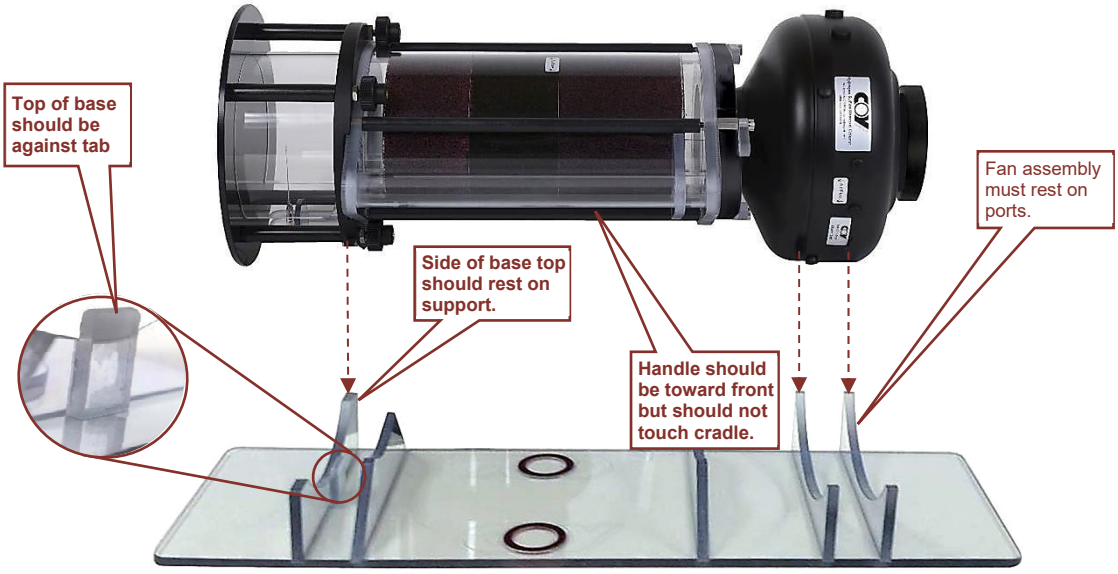
To install the HSRC horizontally

1. Place the HSRC cradle on the top shelf of a shelving unit (or on top of another chosen component).
2. The HSRC only fits in the cradle one way:



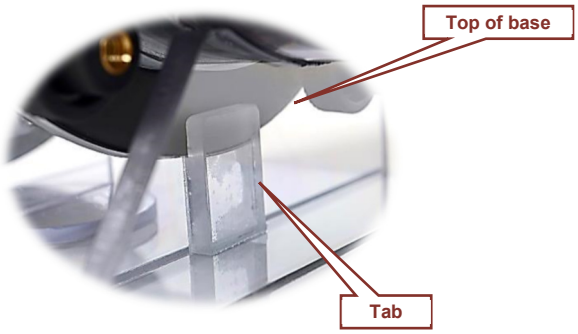
   Orient the cradle on the shelf so that the air will flow in the direction you want when the column is in position.

3. Place the column in the cradle as shown below:



4. After the column is in position, the bottom of the base should align with the edge of the cradle:

If it does not, the top of the base is not in contact with the tab on the support. Adjust the position of the column:



When it is properly positioned against the tab, the edge will align correctly.

5. Connect the power cord to the power strip as follows:
   - Remove the twist tie from the power cord:

   - Make sure the unit is turned off. The switch is on the power cord:

   - Plug the power cord into the power strip.

4.9 Sealing the Chamber

After the large equipment has been installed, arranged to your satisfaction, and plugged into the power strip, you must seal the large equipment entry port with the plastic disk.

Note: *If you have purchased a large capacity dehumidifier, the dehumidifier disk is installed in the entry port instead of the plastic disk. See section 4.10 for instructions.*

To seal the chamber

1. Insert the entire disk into the chamber.

2. Orient the disk so that COY reads backwards when you face the disk from outside the chamber:

3. Place the bottom part of the disk along the vinyl opening:

4. Insert your hands under the vinyl at the top of the port and grab the top of the disk:

5. Push down on the disk and pull it toward you into the opening:

There should be about 1 in (2.5 cm) of vinyl on the disk all around the opening.

6. Once the vinyl is tight around the disk, you can tape the disk to the chamber with the yellow tape supplied in your chamber setup and care kit:
   - Make sure the first revolution of tape straddles the vinyl and the disc to ensure a good seal all the way around the disk. Do not let the tape wrinkle:

   This revolution seals the port.
   - The remaining revolutions should overlap the first revolution on both sides to ensure a complete seal.
   - Nine revolutions of tape should be sufficient to hold and seal the chamber properly.

7. When you finish, there should be a band of yellow tape about 3 in (7.5 cm) wide:

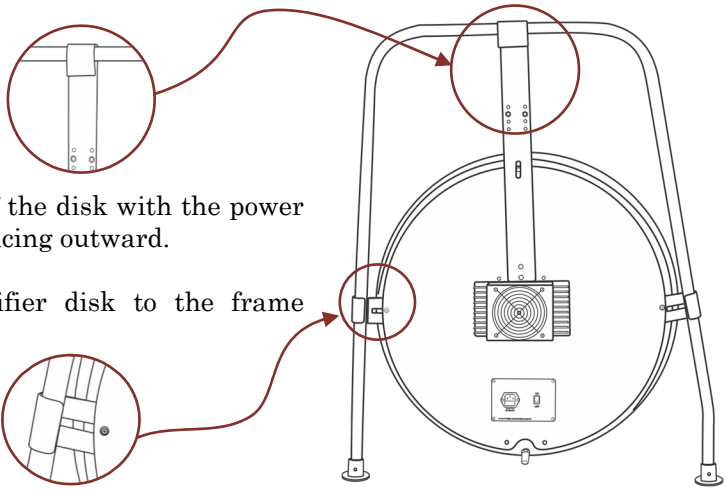
4.10 Installing the Large Capacity Dehumidifier

If you have purchased a large capacity dehumidifier, you must install it on the chamber frame before you can seal the chamber.

The dehumidifier attaches to the chamber frame on the same side as the equipment entry port:

To install the dehumidifier

1. Hang the dehumidifier on the chamber frame in front of the equipment entry port:



   Make sure the side of the disk with the power outlet and switch is facing outward.

2. Secure the dehumidifier disk to the frame with the side hooks:

3. Follow the instructions in section 4.9 to install the disk in the equipment entry port, starting with step 3.

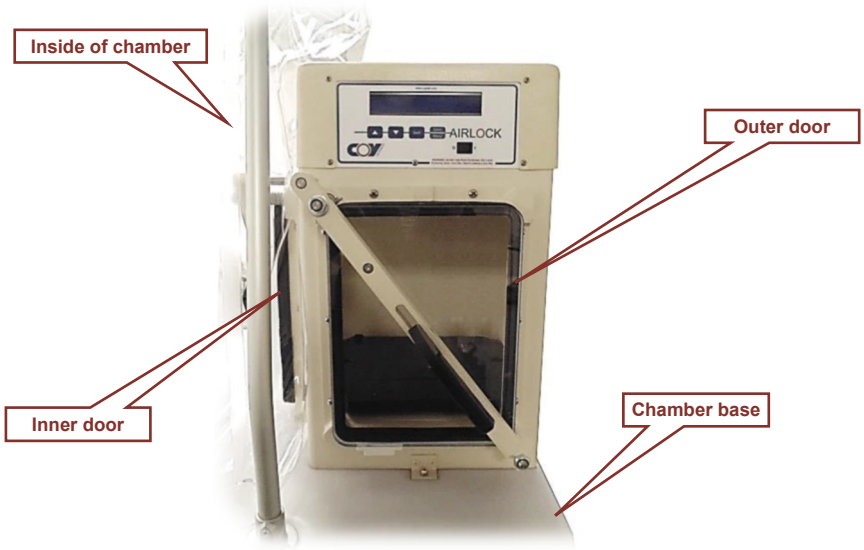
Note: *The power cord for the dehumidifier fan is packed with the dehumidifier. You can install it now or wait until you are ready to start running the dehumidifier. Further information on dehumidifier operation can be found in the large capacity dehumidifier instruction manual.*

Setting Up an Automatic Airlock 5

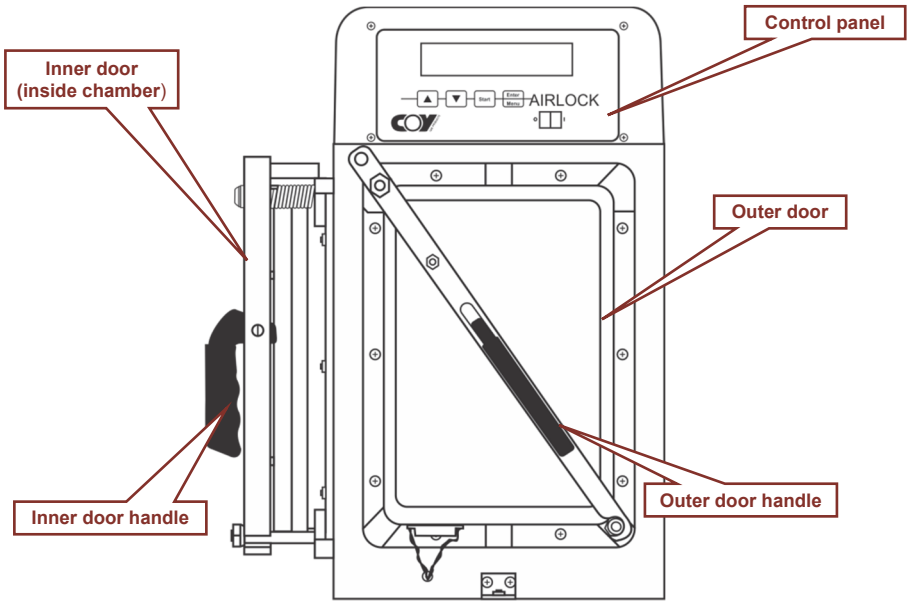
After your chamber is set up, you can connect the airlock to the vacuum pump and the gases.

5.1 Introduction to the Automatic Airlock

The automatic airlock is attached to the vinyl chamber and to the chamber base:



The airlock has 2 doors: an outer door, which allows access to the airlock from the outside and an inner door, which opens from within the chamber:



A control panel above the outer door is used to manually control the airlock and select menu options for automatic operation.

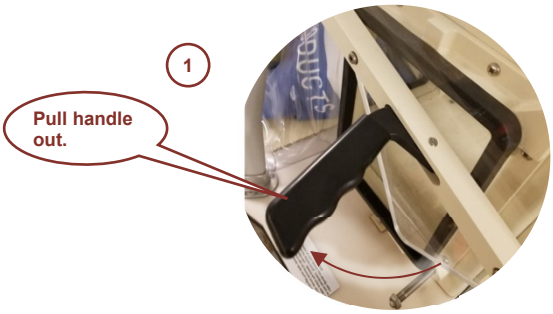
5.1.1 The airlock doors

The airlock doors have a spring-loaded corner pivot, which allows the doors to swing up and out of the way. In standard chambers and most custom chambers the outer door pivots up and to the right and the inner door pivots up and toward the back of the chamber.

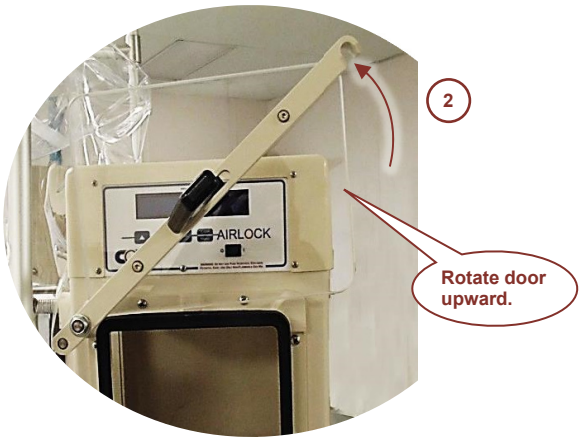
Note: *Some chambers may have the airlock on the opposite side. In that case, the outer door will open to the left. The inner door always opens toward the back of the chamber.*

To open the door

1. Pull the handle out to unlock the door.

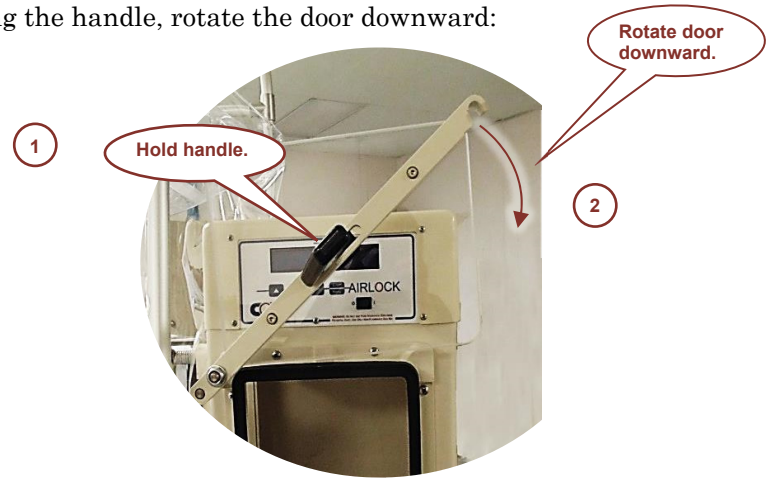


2. Rotate the door upward:

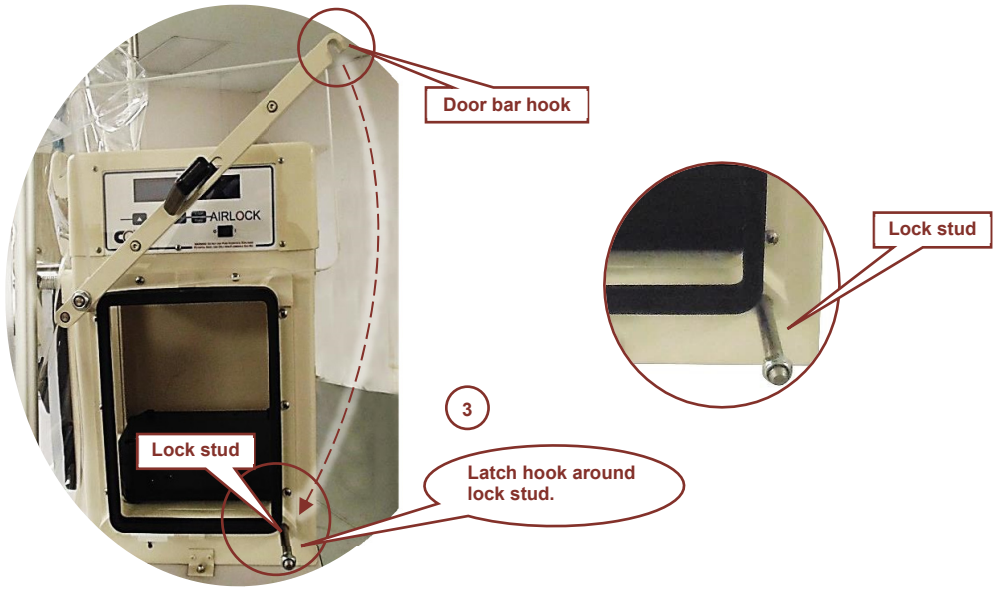


To close the door

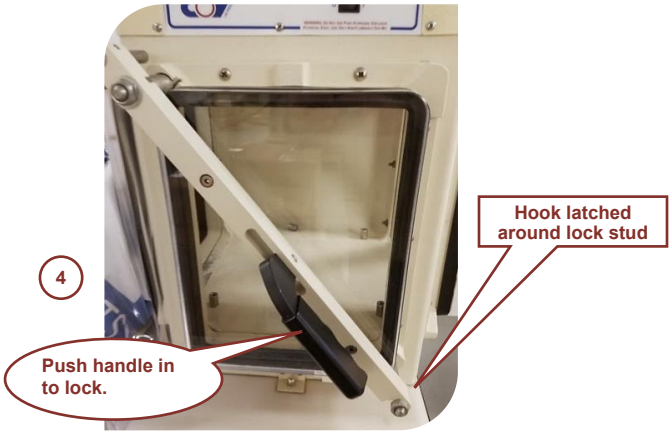
1. Holding the handle, rotate the door downward:



2. Latch the door bar hook around the lock stud (the pin at the bottom of the door opening):



3. Push the handle in to lock it in place:



5.1.2 The control panel

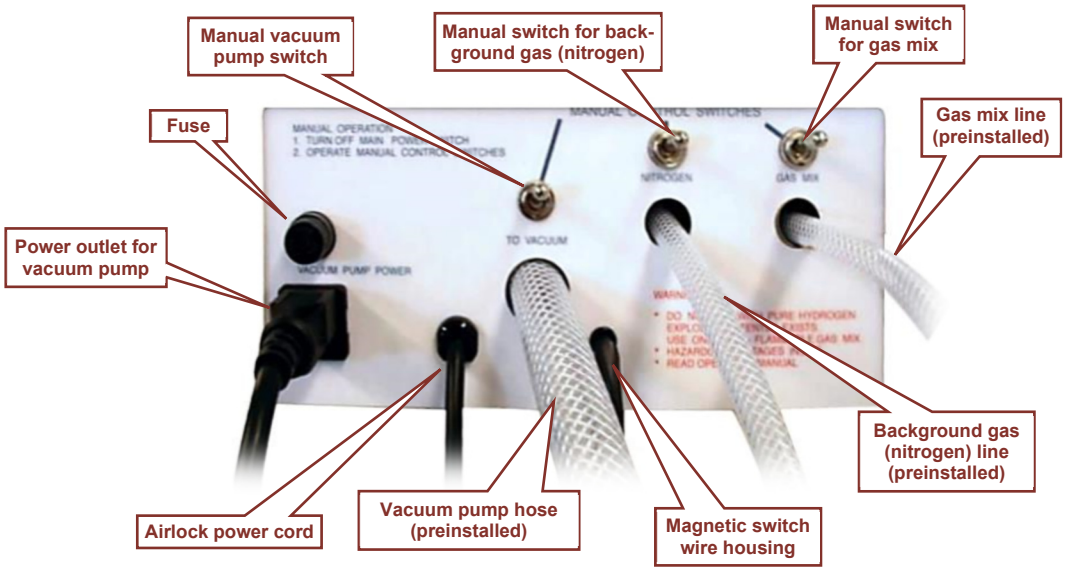
The control panel at the top of the airlock in the front is used to control the airlock directly when operating manually:

In Chapter 6, we will use the control panel when we create our initial anaerobic environment.

The control panel also allows you to set up and run stored routines to reestablish anaerobic conditions in your airlock during normal operation. You can learn more about this later in the *Vinyl Anaerobic Chamber Operation Manual*.

5.1.3 The airlock connections

The back panel of the airlock contains the gas lines, connections to the vacuum pump, and the electrical connections. It also contains manual switches to operate the gas lines and vacuum pump:



The gas lines and the vacuum pump hose are preinstalled at the factory.

Note: *Installation instructions for all airlock connections are given in sections 5.2 and 5.5.*

5.2 Connecting the Gas Lines

The gas supply tanks are connected to the airlock through gas regulators, which control the flow of gas from the tank to the airlock.

5.2.1 The regulators

Your shipment contains two gas pressure regulators–one for the background gas tank and one for the gas mix tank. They are basically identical except for the fitting that connects the regulator to the supply tank:

Background gas pressure regulator:

Gas mix pressure regulator:

Be sure to use the correct regulator for the line you are connecting.

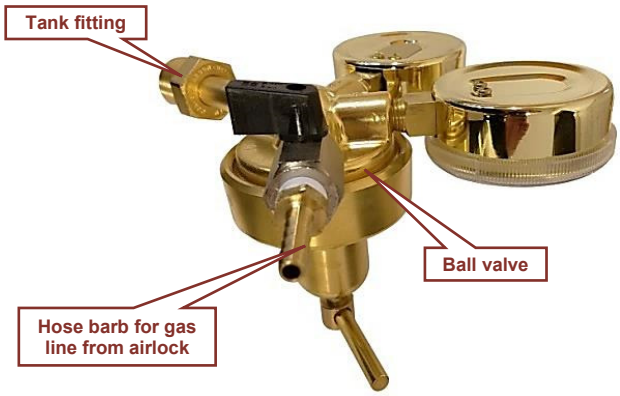
Note: *Your regulators may look different if they are not Coy-supplied, but they should have the same functioning parts and fittings.*

Note: *Some non-US/Canadian orders are not supplied with the regulators described above. The guiding principal is to supply the chamber with the appropriate gases between 15 psi (104 kPa) and 25 psi (172 kPa).*

5.2.2 The ball valve

All Coy-supplied regulators are supplied with a ball valve. The ball valve is used to turn the gas on and off at the regulator so you do not have to turn the gas off at the tank when you want to stop the flow to the airlock temporarily.

The ball valve is located on the back side of the regulator:



The hose barb for the gas line is attached to the ball valve.

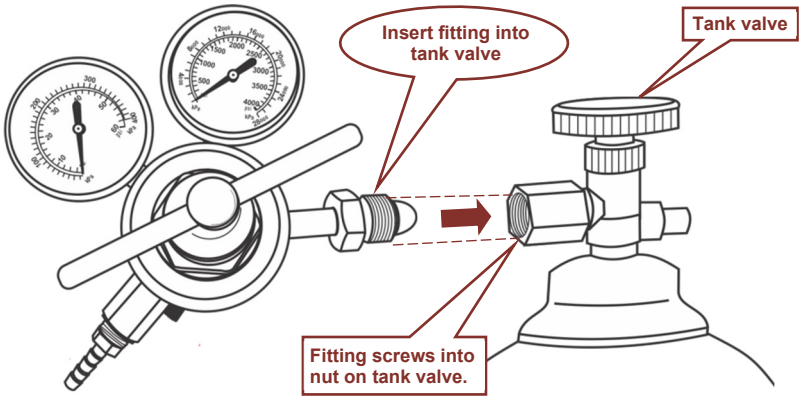
5.2.3 Connecting the pressure regulators to the gas supply

Because the connections to the supply tank are different for the two pressure regulators, they cannot be installed on the wrong tank. The fitting on the background (nitrogen) gas regulator will not fit the gas mix tank and vice versa.

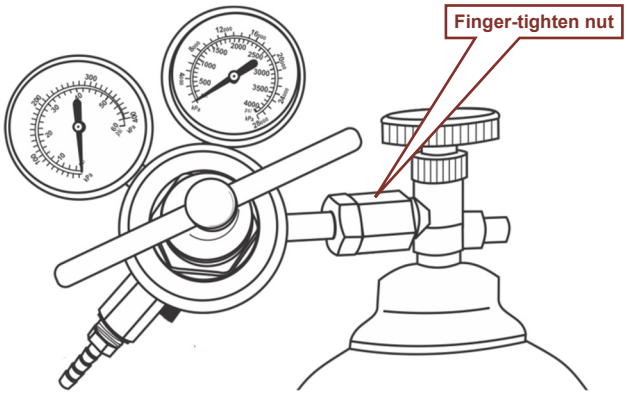
Note: *If your laboratory uses an internal gas source instead of supply tanks, attach the regulator to your internal source outlet.*

To connect the background gas pressure regulator to the supply tank

1. Insert the fitting on the pressure regulator into the tank valve outlet fitting:



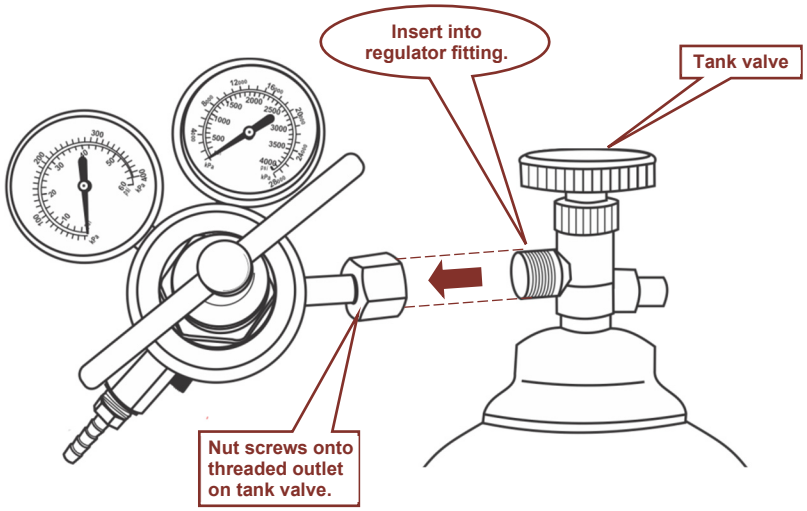
2. Finger-tighten the nut on the tank:



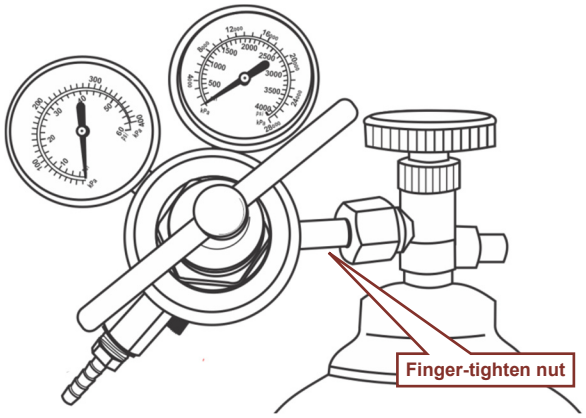
3. Use a crescent wrench to tighten it further. Make sure it is as tight as possible.

To connect the gas mix pressure regulator to the supply tank

1. Connect the fitting on the pressure regulator to the tank valve outlet. The nut of the pressure regulator fits over the threaded outlet fitting:



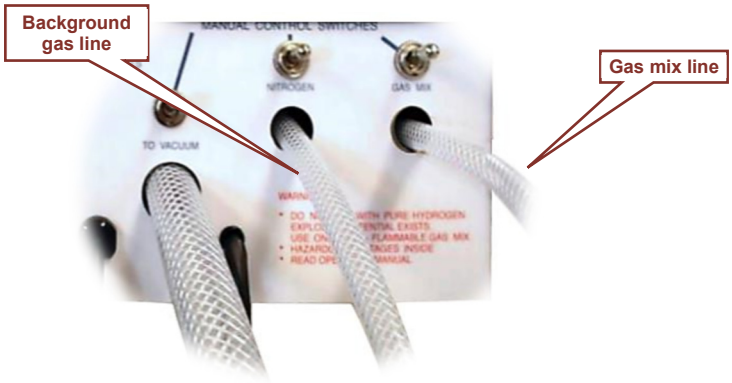
2. Finger-tighten the nut on the pressure regulator by turning it to the left (this fitting is threaded opposite of standard):



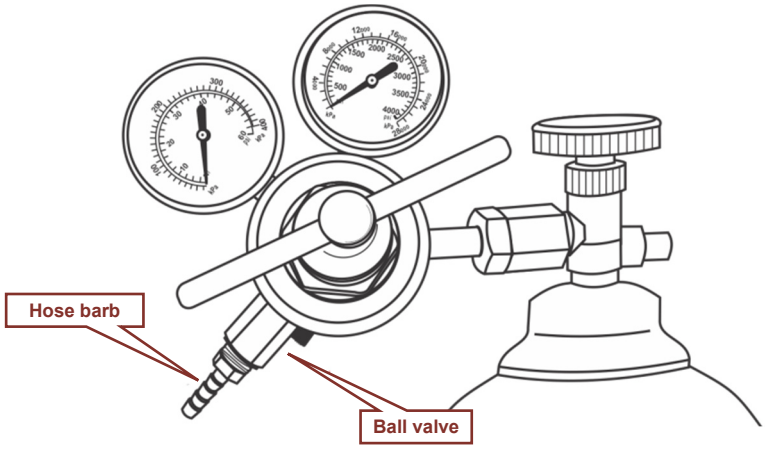
3. Use a crescent wrench to tighten the nut further. Make sure it is as tight as possible.

5.2.4 Connecting the pressure regulators to the airlock

The pressure regulators are connected to the airlock via reinforced flexible vinyl tubing. The tubing is preinstalled in the rear of the airlock:



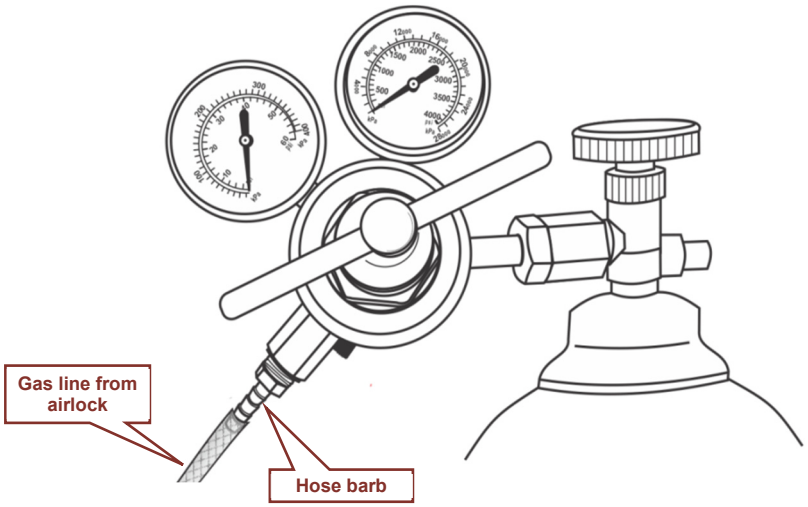
You must connect it to the hose barb fitting, which is attached to the ball valve on the gas pressure regulator assembly:



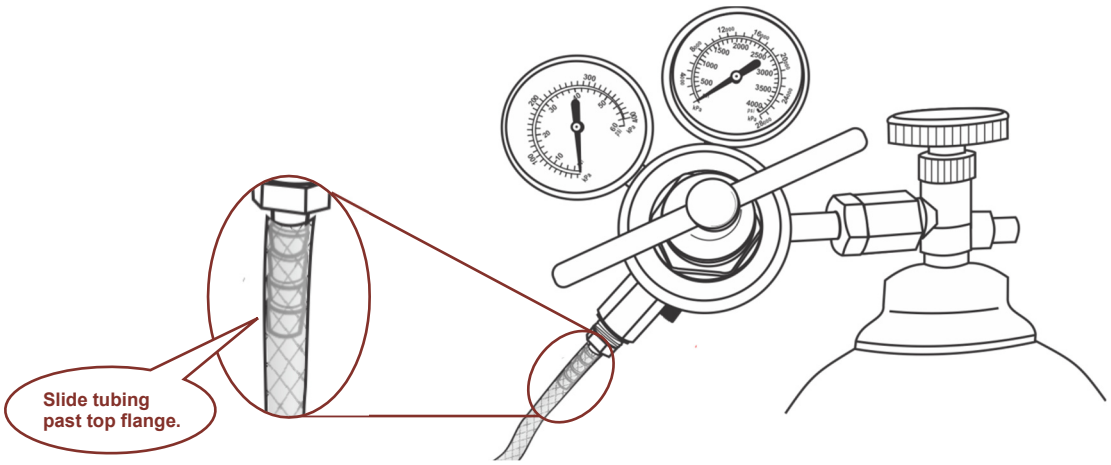
The tubing is attached to the hose barb with heavy-duty tie-wraps, which have been included with your chamber.

To connect the background gas line to the pressure regulator

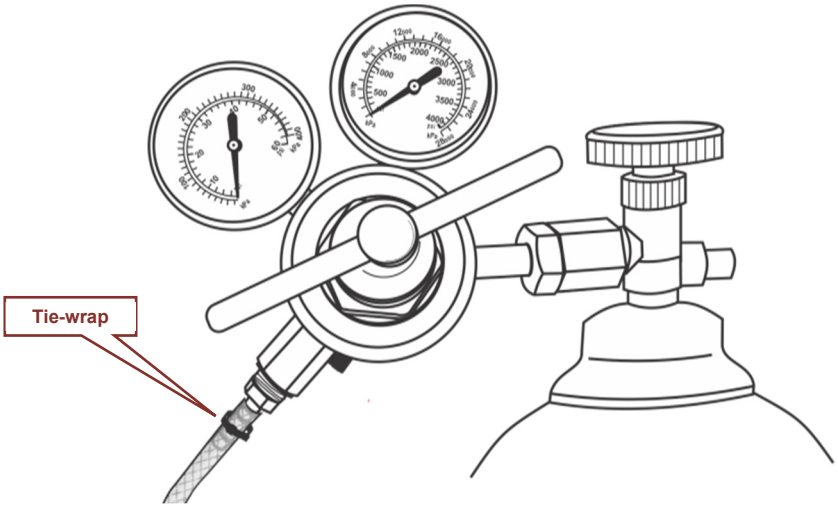
1. Make sure you are connecting the gas line to the correct regulator!
2. Place the gas line tubing over the end of the hose barb:



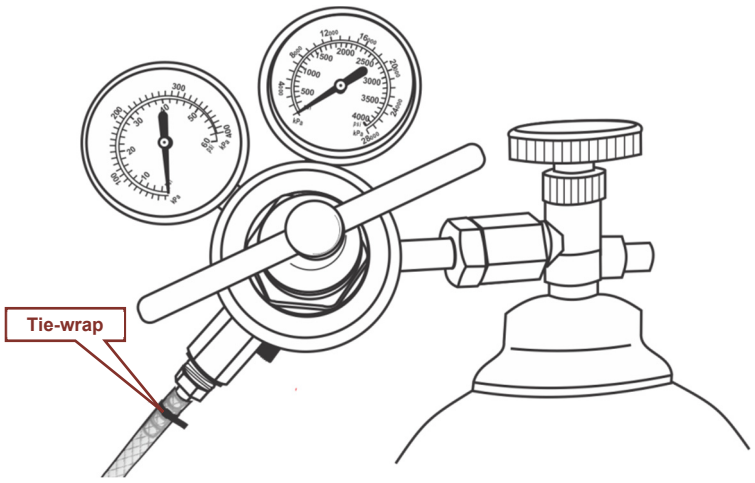
3. Slide the tubing into position on the hose barb:



4. Place a heavy-duty tie-wrap around the tubing:



5. Tighten the tie-wrap as tight as possible:



To connect the gas mix line to the pressure regulator

The instructions for connecting the gas mix line depend on whether or not you have a gas infuser:

- If you do not have a gas infuser, follow the instructions for connecting the background gas line above to install the gas mix line.
- If you have a gas infuser, follow the instructions in section 5.2.5 below

5.2.5 Connecting the gas mix line if you have a gas infuser

If you have purchased an anaerobic gas infuser with your chamber, the gas mix regulator must supply both the airlock and the gas infuser. To permit this, a section of flexible tubing is pre-installed in the gas infuser:

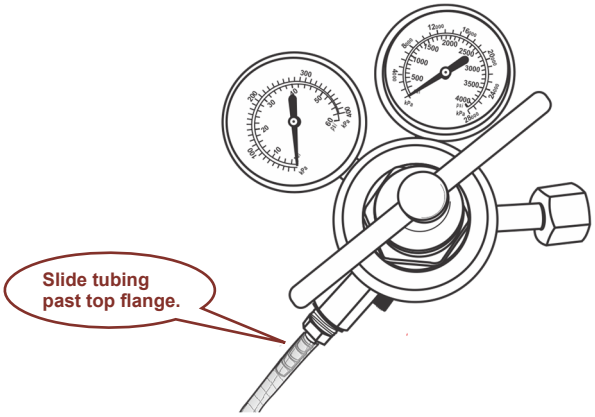
To permit the gas mix tank to supply both the airlock and the gas infuser, a T-fitting has been preinstalled in the gas mix line:

The gas mix line segment from the gas infuser is attached to one hose barb of the T-fitting:

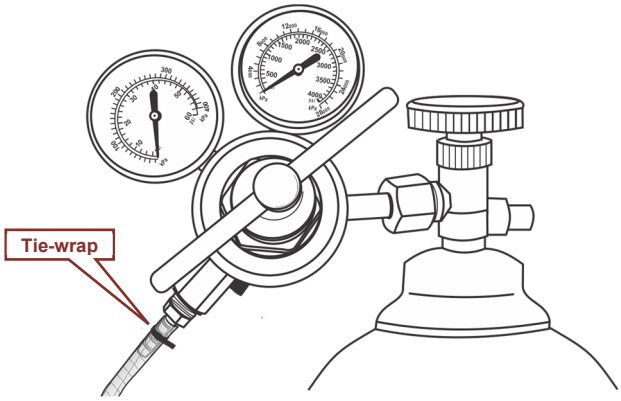
Another line segment, which connects to the gas mix regulator, is preinstalled on the opposite hose barb.

To connect the gas mix line to the regulator

1. Slide the open end of the gas mix line onto the gas mix regulator hose barb:



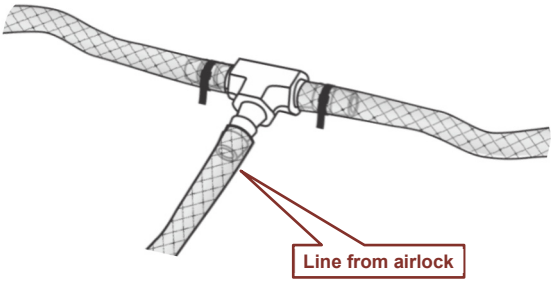
2. Place a heavy-duty tie-wrap around the tubing:



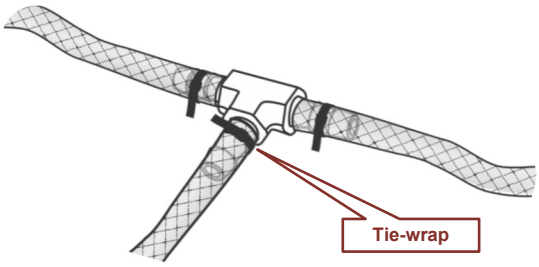
3. Tighten the tie-wrap as tight as possible.

To attach the airlock gas mix line to the T-fitting

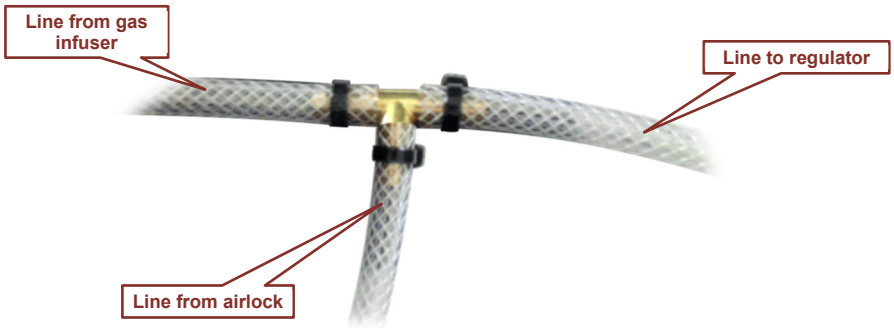
1. Slide the gas mix line from the airlock onto the empty hose barb on the T-fitting:



2. Attach the tubing to the hose barb with a heavy-duty tie-wrap:

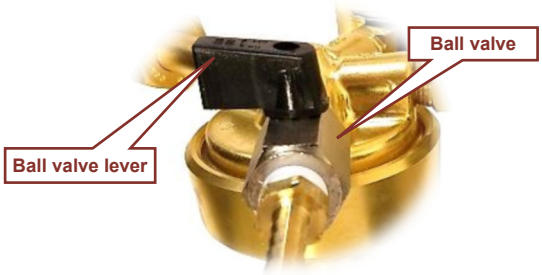


Your completed installation will look similar to this:

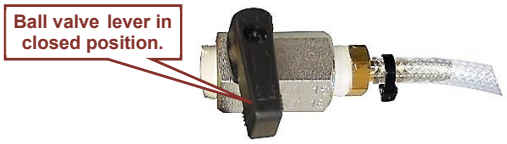


5.3 Turning on the Gas

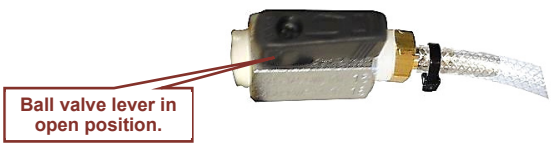
After gas line installation is complete, you can turn on the gas. Gas line pressure is controlled by the regulator. Gas flow to the airlock can be turned on and off with the ball valve lever:



- When the lever is perpendicular to the ball valve, the ball valve is closed:



- When the lever is parallel to the ball valve, the ball valve is open:



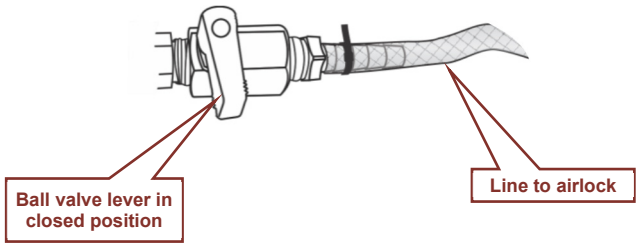
The pressure of the gas flowing into the tank is regulated by the pressure regulator valve:

Note: *If you do not have a regulator supplied by Coy, your regulator will most likely not have a ball valve. If it does not, gas flow to the airlock may only be controlled through the pressure regulator valve.*

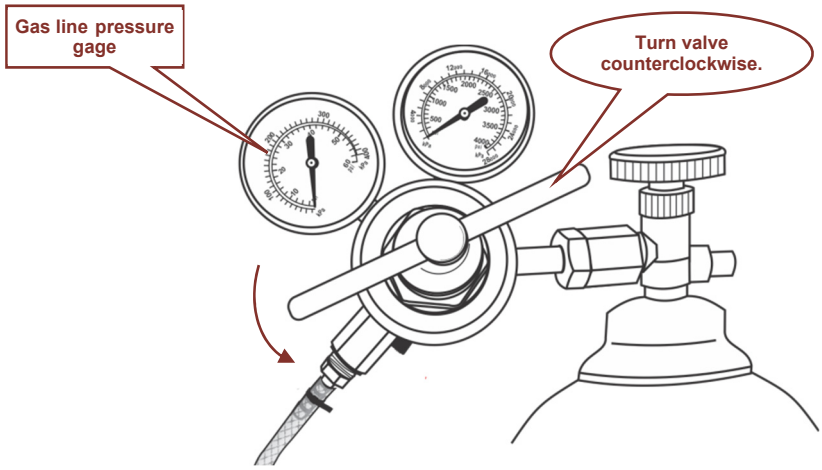
To turn on the gas

Do the following for each gas line:

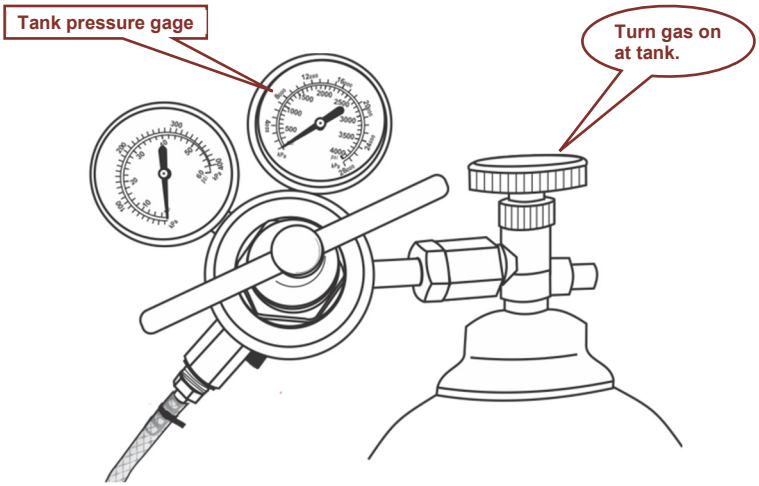
1. Close the ball valve by turning the lever until it is perpendicular to the ball valve:



2. Turn the pressure regulator valve counterclockwise until it stops. The gas line pressure gage should read **0**:



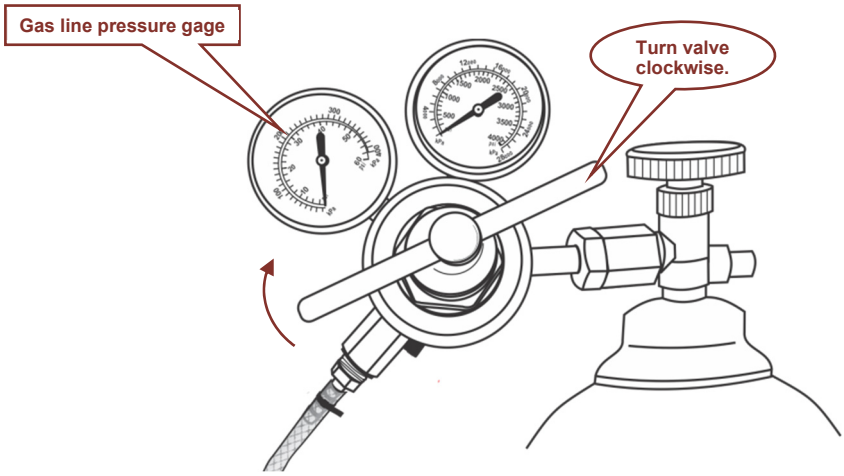
3. Turn the gas on at the tank. The tank pressure gage will display the current pressure for the tank:



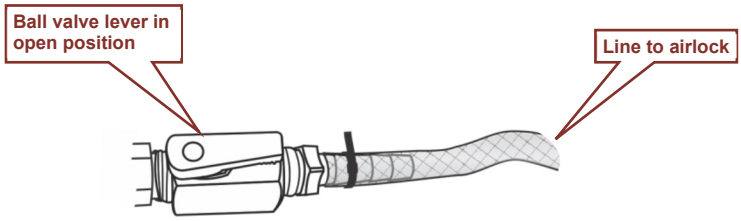
The pressure reading shows how much gas is left in the tank. Assuming this is a new tank, the reading should show a full tank.

Note: *If your lab has an internal gas source, follow your lab's guidelines for turning on the gas supply and determining the appropriate pressure gage reading.*

4. Set the gas line pressure by turning the pressure regulator valve clockwise until the gas line pressure gage displays 20 psi (138 kPa):



5. Open the ball valve by turning the ball valve lever until it is parallel to the ball valve:



5.4 Checking for Leaks

After you turn on the gas, you must check the lines for leaks. This is extremely important, as even a small leak can affect chamber performance. DO NOT SKIP THIS STEP!

To check for leaks

1. Close the tank valve of the line you are testing so that no more gas will be fed into the line and watch the gas line pressure gage:
   - If the pressure does not drop below your lab's specified setting within 10 minutes, there are no leaks and your installation is complete.
   - If the pressure drops, there is a leak.
2. Close the ball valve to isolate the regulator from the tubing:
   - If the pressure drops further, the regulator is leaking and needs to be replaced. Contact Coy for a replacement.
   - If the pressure does not drop, the tubing is leaking. Continue with step 3.
3. Remove the tie-wrap from the ball valve connection and try to push the tubing up further on the hose barb:
   - If the gas line pressure stabilizes, this connection was most likely the cause of the leak. Place a new tie-wrap on the connection.
   - If the pressure continues to drop, the problem is elsewhere in the line and it needs to be replaced. Contact Coy for instructions.

Note: *If your regulators do not have ball valves, you cannot isolate the regulator as described in step 2 above. Instead, make a soap-and-water solution and brush it on the connection at the regulator. If it bubbles, there is a leak in the line. Continue with step 3.*

5.5 Connecting the Vacuum Pump

The vacuum pump is connected to the airlock through a hose connection and is operated from the airlock:

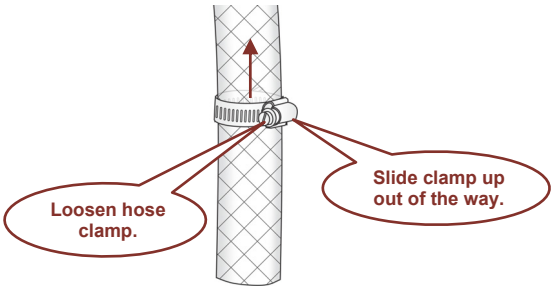
The hose is attached to the back panel of the airlock and must be connected to the pump during setup. A hose clamp for installation is included in your shipment.

Power is supplied through a power outlet on the airlock. The vacuum pump is mounted on a plywood board when it is shipped.

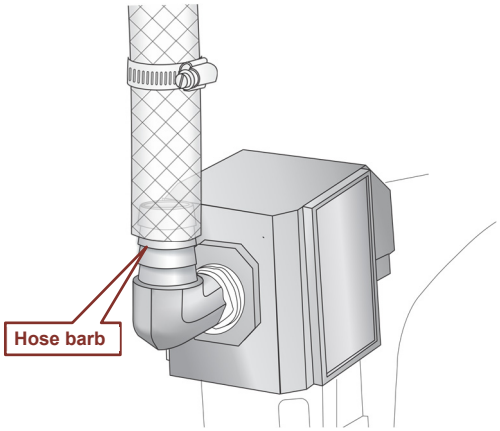
To connect the vacuum pump

1. Place the vacuum pump on a secure surface, either below the chamber or behind the airlock. Make sure the space is well ventilated to prevent the pump from overheating and close enough to the airlock for the power cord to reach the back panel.
2. Plug the vacuum pump power cord into the power outlet marked **VACUUM PUMP POWER** on the back of the airlock:

3. Connect the vacuum pump hose to the vacuum pump as follows:
   - Locate the hose clamp. It should be packed in the airlock.
   - Loosen the hose clamp and slide the clamp onto the hose and out of the way:

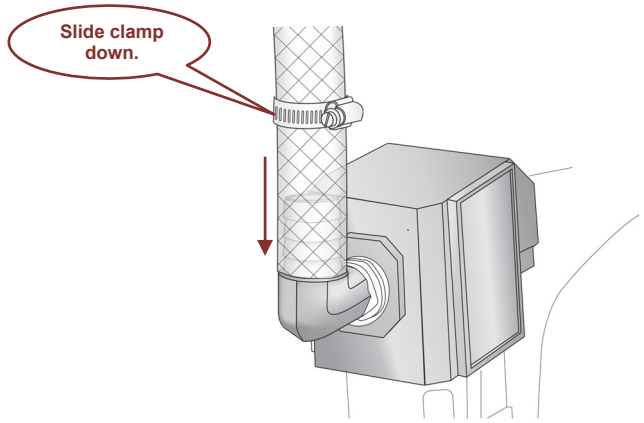


   - Slide the hose onto the hose barb on the pump connector:

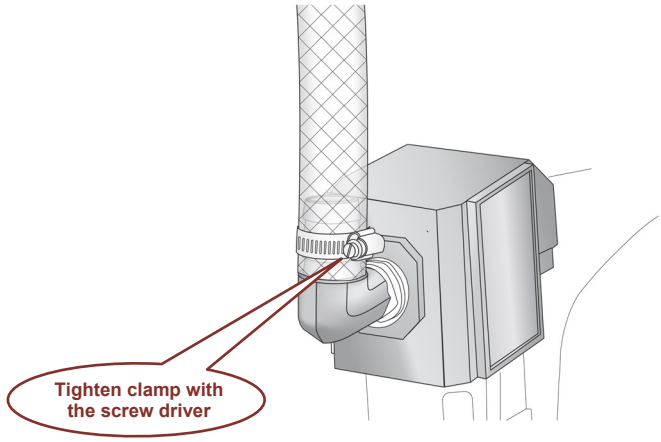


Note: *The hose fits very snugly to ensure a secure connection, so it may be difficult to slide on.*

- Slide the hose clamp down to the bottom of the hose barb:



- Tighten the hose clamp to secure the connection:



Creating an Anaerobic Environment 6

Once your airlock is connected to the gas supply tanks and the vacuum pump, you can create the initial anaerobic environment. During this procedure, you will be inflating and collapsing the chamber to purge oxygen from the chamber.

6.1 Preparing the Chamber for Purging

Before performing the purging process, you will need to get the chamber ready for purging.

6.1.1 Getting the components ready

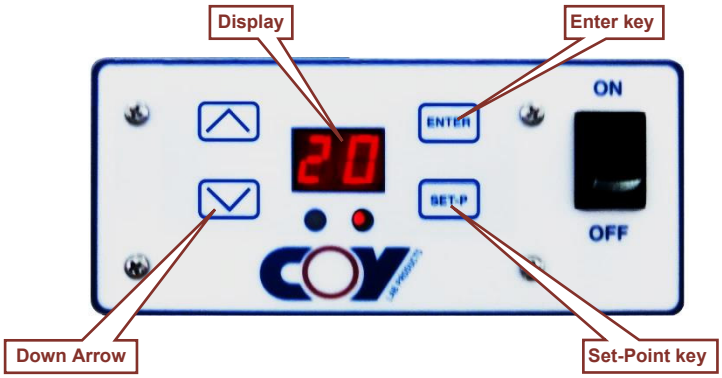
Your first step is to connect the chamber components to power and prepare them for the purging process.

To connect and power up the chamber components

1. Plug the airlock and gas infuser (if you have one) into a wall outlet.
2. Plug the power strip into a wall outlet and turn it on. The catalyst fan box(es) and the anaerobic monitor (if you have one) will be turned on. No other components should be operating.
3. If you have an incubator, slide the door open to allow oxygen evacuation during the purge. Make sure the power switch is set to **OFF**.
4. Do one of the following:
   - If you have heated catalyst fan boxes, go to section 6.1.2.
   - If you do not have a heated catalyst box but have an anaerobic monitor installed, go to section 6.1.3.
   - If you do not have either of the above, skip to section 6.1.5.

6.1.2 Setting the heated catalyst fan box set point

To ensure that the fan box heaters do not start operating until the purge process is complete, you must set the set point temperature in the controller to below the current ambient temperature:



To set the set point

1. Press [SET-P]. The display will show the current set point.
2. Press [▽] and hold it down until the displayed temperature is well below the current ambient temperature.
3. Release [▽] and press [ENTER] to enter the value into the controller.

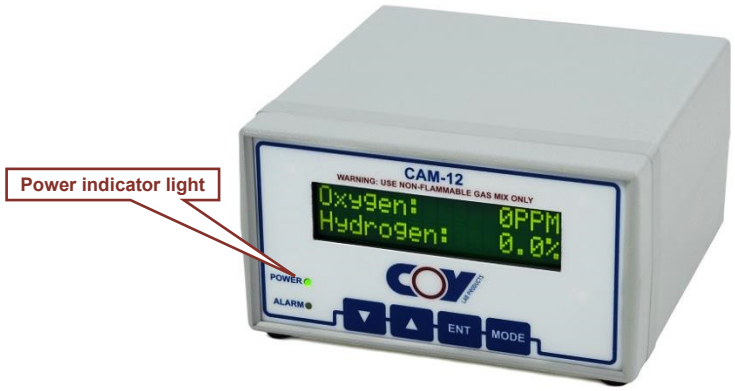
Note: *You must hold the [▽] down to change the value. Pressing and releasing the key will not change the value.*

Important: *You must press [ENTER] to set the value. If you do not press [ENTER], the value will not be changed in the controller.*

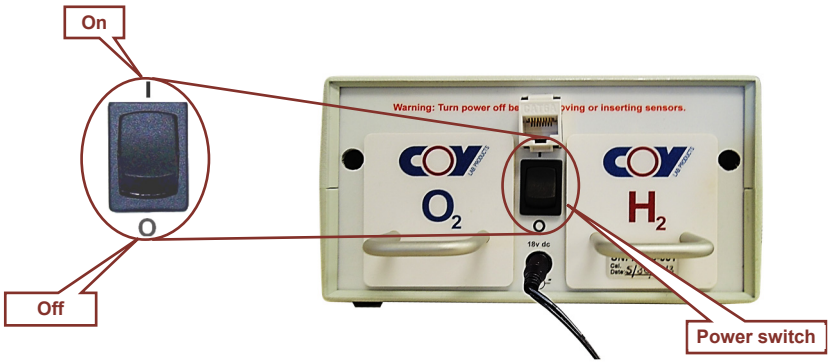
6.1.3 Setting up the anaerobic monitor

The anaerobic monitor will make creating an anaerobic environment in your chamber much easier, because it takes the guesswork out of determining when sufficient oxygen is purged from the chamber.

The monitor should have been turned on when the power strip was activated. The **Power** indicator light should be on and the display should be active:

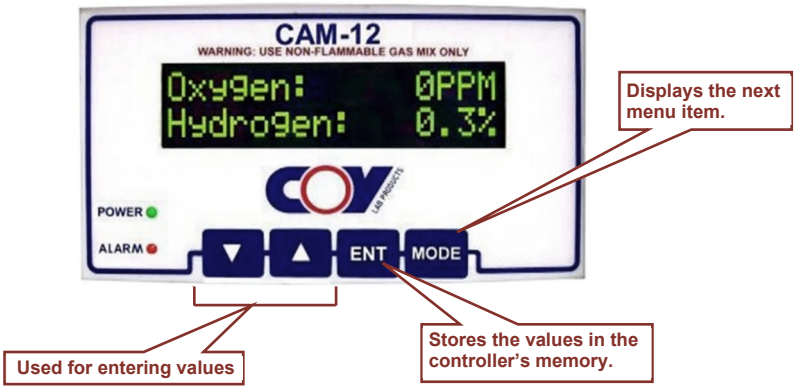


If the unit is not turned on, set the power switch on the back of the monitor to **I**:



As soon as it is turned on, the anaerobic monitor will begin to display the level of hydrogen and oxygen in the surrounding area. However, it takes some time to stabilize. In normal room air, it will display an oxygen level of 0 ppm and a hydrogen level of 0.3 % ± 0.2 %. A minimum hydrogen level of 1.5 % is needed for proper operation. The monitor will not display a valid oxygen level until the hydrogen level has stabilized at 1.5 % or higher.

The control panel on the anaerobic monitor contains a display area and 4 function keys:



The function keys are used to display and navigate through the user setup menu and to set operating parameters. These include:

- Setting alarm limit levels for hydrogen (upper and lower) and oxygen (upper).
- Enabling or disabling the audible alarm. The default is disabled.
- Setting compensation parameters for gas mixes that contain carbon dioxide.

Important: *Menu options are also available for the following maintenance functions:*

- *Downloading sensor calibration data (needed only for sensor replacement).*
- *Recalibrating the zero oxygen point.*

These functions are NOT needed during setup or regular operation. If you accidentally select either of these options, press MODE *to return to the main menu.*

To access the user setup menu

1. Hold down either MODE or ENT until the following item appears in the display area:

2. Press MODE to display the menu options in sequence. Each time you press MODE, the next option will appear. If you keep pressing MODE, you will cycle back to option 1.

To exit from the setup menu

1. Press MODE to display the next menu options in sequence until the exit setup menu option appears:

2. Press ENT to exit menu mode and return the display to the hydrogen and oxygen values.

For creating the initial anaerobic environment, none of the operating parameters need to be set unless you use a gas mix that contains CO_2. The audible alarm should remain disabled during setup, as out-of-range oxygen and hydrogen levels may cause it to go off. The default alarm levels will be fine for initial setup. If your gas mix contains CO_2, you must enter the CO_2 compensation. Continue with section 6.1.4. Otherwise, skip to section 6.1.5.

6.1.4 Setting the CO_2 compensation

If your gas mix contains carbon dioxide, you MUST set the CO_2 compensation BEFORE you establish the anaerobic environment or the hydrogen and oxygen gas values will not be correct. For more information on determining this value, refer to the anaerobic monitor manual.

Important: *If your gas mix does not contain carbon dioxide, do not enter CO_2 compensation.*

To set the CO_2 compensation

1. Access the user setup menu.
2. Press MODE as many times as needed to display the CO_2 compensation option (option 4):

3. Press ENT to select the CO_2 compensation menu. You will see the following item and the default setting, which should be **OFF**:

4. Press either ▼ or ▲ to change **OFF** to **ON**:

5. Press ENT and the following item will be displayed:

   The current compensation value will be displayed. The default is 0 %.

6. Use the ▲ and ▼ keys to enter the percentage of CO_2 in your gas mix:
   - Press ▲ to increase the value by 1 %.
   - Press ▼ to decrease the value by 1 %.
   - To increase or decrease the value rapidly, hold the key down until the value you want to enter appears. If you overshoot, use the opposite key to back up.

   The maximum value allowed is 20 %.

7. Press ENT to save your value and you will return to the CO_2 compensation menu:

Important: *You must press ENT after entering a value to store it in the monitor's memory. If you press MODE without pressing ENT the value will not be changed.*

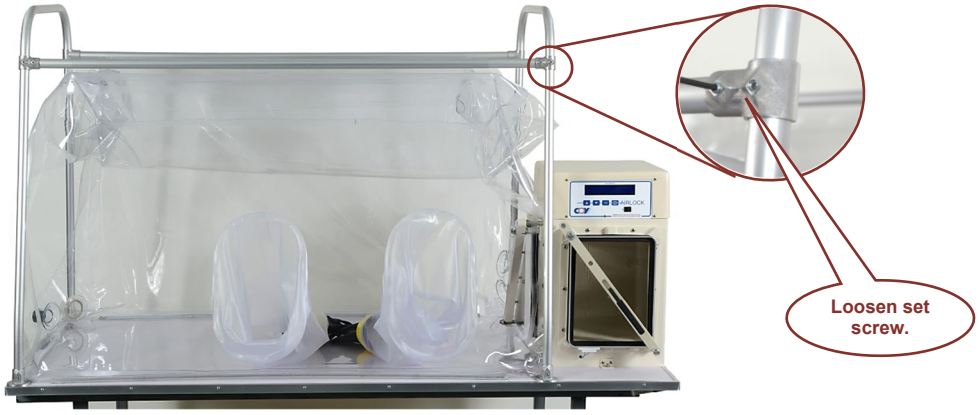
6.1.5 Removing the front hanger pole

The last step in preparing the chamber for purging is to remove the front hanger pole to speed up the deflation process. When the chamber collapses, the front part of the chamber may rest on objects located in front of the chamber (shelves at the side of the chamber or catalyst fan boxes, for example). If there are any sharp

corners or protrusions that could puncture the vinyl, you will need to take steps to ensure that the chamber will not rest directly on them.

To remove the front hanger pole

1. Cover all sharp edges and protrusions that may come into contact with the vinyl with protective padding.
2. Loosen the set screws on the T-fittings that hold the front hanger pole in place:

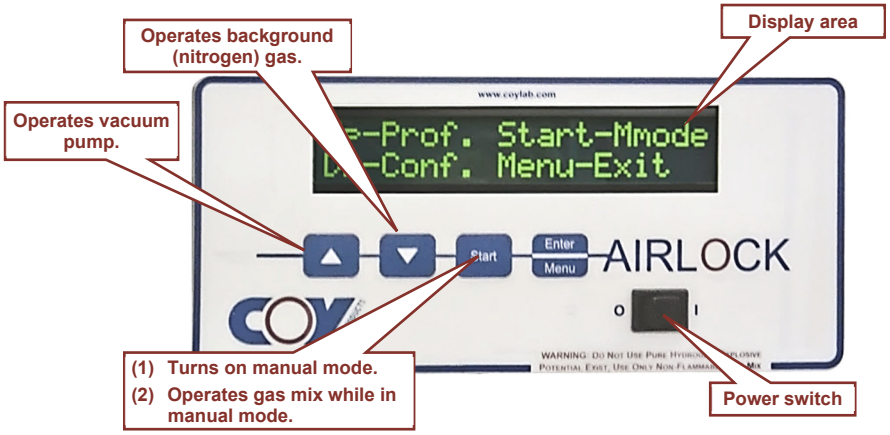


3. Remove the hanger pole from the T-fittings and slide it out of its pocket:

6.2 Purging the Chamber

To create the initial anaerobic environment, you must purge the chamber of oxygen. First, you manually inflate the chamber with background (nitrogen) gas and then deflate the chamber. You do this several times (the number depends on the size of the chamber). Then you repeat this procedure with the gas mix.

When you purge with an automatic airlock, you use the airlock control panel in manual mode. In manual mode, the keys on the control panel are assigned special functions to operate the pump and the gas lines:



You hold the key down to run the component and release the key to stop.

Note: *The airlock can also be operated manually from the switches on the back of the airlock. However, it is best to use the controller when you operate manually, as some manual functions benefit from display information. The switches on the back of the airlock are intended for airlock operation if the controller fails.*

To start the purge operation

1. Close the outer door of the airlock and open the inner door. Make sure the outer door is latched and locked (see section 5.1.1 in Chapter 5).
2. Set the gas line pressure for both the background gas and the gas mix to between 50 psi (345 kPa) and 60 psi (414 kPa) to speed up inflation (see step 4 on page 67 for instructions if you need them).

Reminder: *Do not let the gas line pressure exceed 60 psi (414 kPa).*

3. Make sure the ball valves on the pressure regulators for both gases are open (see section 5.3 of Chapter 5).
4. Turn the airlock controller on and press Enter Menu to access the menu.
5. Press the Start key to enter manual mode. The manual mode key functions will be displayed in the display area:

Wait until it finishes (about 6 seconds).

To perform a background gas purge

1. Press the key and hold it down to inflate the chamber with background gas. When the gloves stick straight out as shown below, release the key:

Caution: *Do not overinflate the chamber!*

2. Open the outer door to the airlock and the chamber will begin to collapse:

- You may use your hands to assist if you wish:

- The chamber collapses rapidly so be ready to close the airlock door quickly:

Important: *Do not let the vinyl come into contact with any sharp objects.*

3. As soon as the chamber is collapsed, close the outer airlock door *IMMEDIATELY* to retain the loss of positive pressure:

Make sure the door is latched and locked.

4. Repeat steps 1 through 3 as specified for your chamber in the table below:

Chamber Type	Volume	Times to Repeat
Type A	44 ft^3 (1238 L)	2
Type B	58 ft^3 (1636 L)	3
Type C	31 ft^3 (881 L)	1

Note: *If you have a custom chamber, select the standard chamber that is closest in size to your chamber. If your chamber is significantly larger than the type B chamber, add an extra repetition.*

To perform a gas mix purge

1. Make sure the outer door is latched and locked. Then press Start to turn on the gas mix. Hold the key down to inflate the chamber until the gloves stick straight out as they did during the background gas purge.

Caution: *Do not overinflate the chamber!*

2. Open the outer door to the airlock to collapse the chamber. As the chamber collapses, you may use your hands to assist.
3. When the chamber is collapsed, close the outer airlock door *IMMEDIATELY* to retain the loss of positive pressure. Make sure it is latched and locked.
4. Repeat steps 1 through 3 as specified below:
   - If you have an anaerobic monitor, you may use it to monitor your hydrogen level. Repeat steps 1 through 3 until the hydrogen level is 2.5 % or higher (assuming a 4 % tank).

Reminder: *The anaerobic monitor does not display valid oxygen levels if no hydrogen is present. You will not see any reliable readings until the hydrogen level is approximately 1.5 %.*

Note: *The anaerobic monitor may take several minutes to fully register the correct hydrogen levels. Wait for the H_2 readings to stabilize before performing another repetition. Alternatively, you may use the chart below to determine the number of repetitions and perform additional repetitions after the monitor has stabilized.*

- If you do not have an anaerobic monitor, use the table below to determine the number of repetitions:

Chamber Type	Volume	Times to Repeat
Type A	44 ft³ (1238 L)	2
Type B	58 ft³ (1636 L)	3
Type C	31 ft³ (881 L)	1

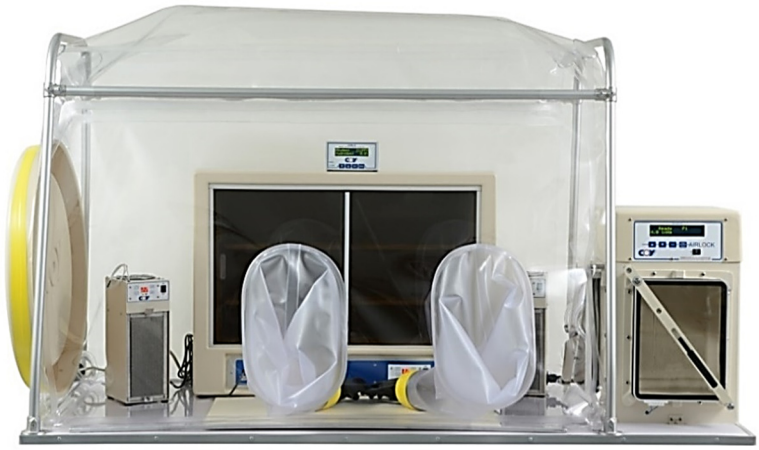
Note: *If you have a custom chamber, select the standard chamber that is closest in size to your chamber. If your chamber is significantly larger than a type B chamber, add an extra repetition.*

6.3 Preparing the Chamber for Operation

After your purge is complete, you will need to inflate the chamber with gas mix and reset the gas pressure so your chamber will be ready for oeration.

To prepare the chamber for operation

1. While the chamber is still collapsed, reinsert the hanger pole into the pocket. Then place the pole in the T-fittings on the side supports and tighten the set screws.
2. Inflate the chamber with the gas mix, but not to the point where the gloves stick out. It should now look like this and be ready for catalyst introduction:



3. Reset the gas pressure regulators to 20 psi (138 kPa).
4. Switch the gas flow to the airlock on and off quickly with the manual switches in the back of the airlock to bring the pressure gages to the 20 psi setting.

6.4 Setting the Flow Rate for the Gas Infuser

The gas flow rate is the amount of gas that flows through a given point in a given time interval. Usually, the unit of measure is SCFH (standard cubic feet per hour). The flow meters on Coy components use SCFH units.

The flow rate affects the inflation level of the anaerobic chamber. The recommended setting to start with is 15 SCFH. After you have run the chamber with the gas infuser for a few days, you can make adjustments if necessary.

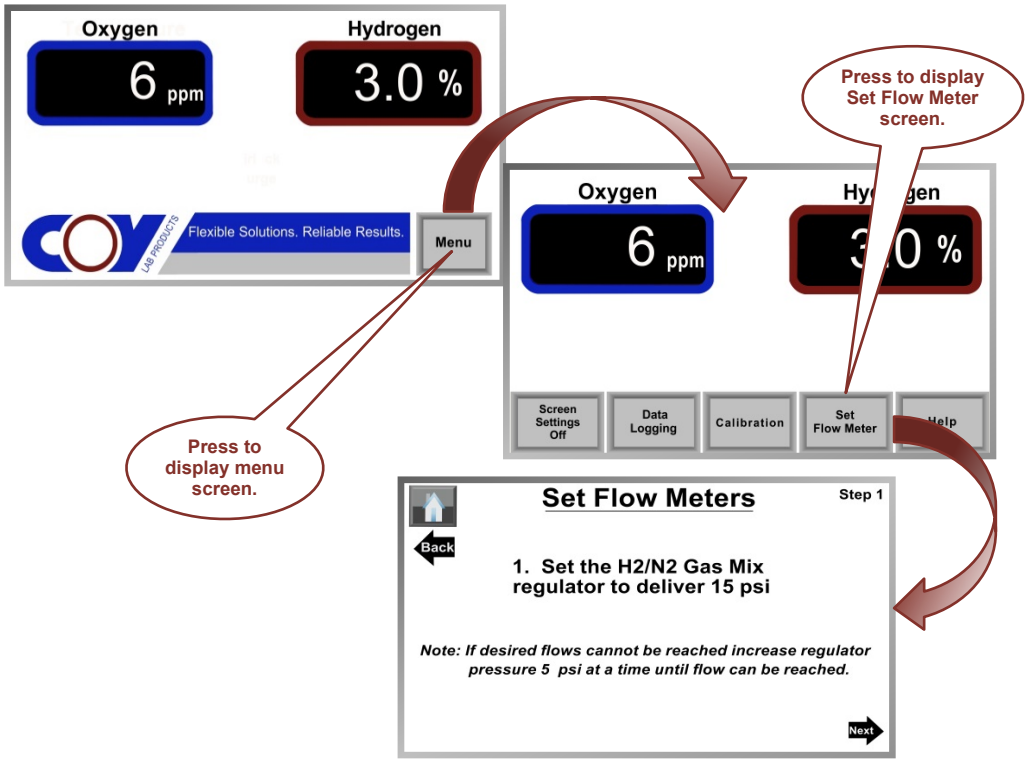
The flow meter on the anaerobic gas infuser controls the flow rate of the gas mix entering the chamber:

The gas infuser must be turned on and the gas must be flowing through the gas infuser into the chamber to set the flow rate. The following procedure, which is run through the touch screen, starts the gas flow so you can set the flow rate before the gas infuser is in use or interrupt automatic operation to set or adjust the flow rate after the chamber is fully operational.

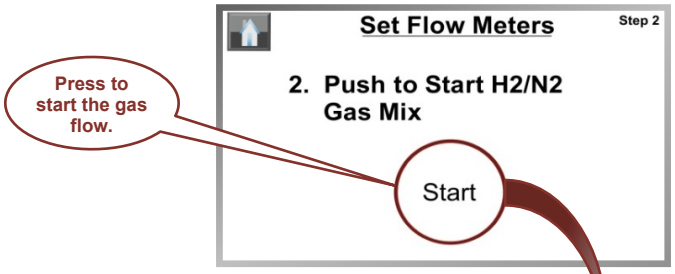
Important: *You must set the flow rate before the gas infuser can operate. If the flow rate is 0, no gas can flow into the chamber.*

To set the flow rate

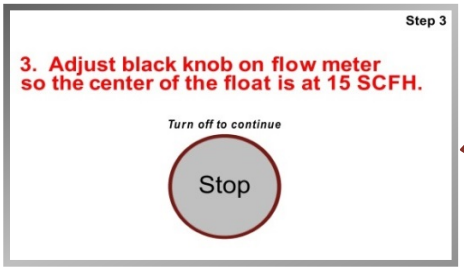
1. Make sure the gas infuser is turned on and receiving readings from the anaerobic monitor.
2. Press **Menu** on the touch screen to display the menu screen and select **Set Flow Meter** to display the **Set Flow Meter** screen:



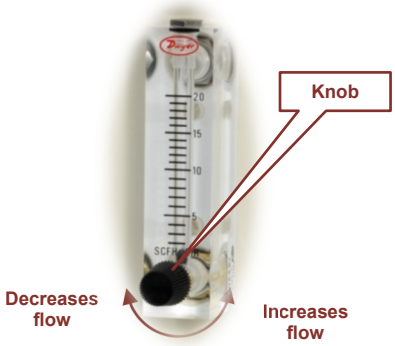
3. Set the gas mix regulator to 15 psi (103 kPa) and press Next to display the step 2 screen.
4. Press **Start** to turn on the gas:



The gas will start flowing and step 3 screen will appear:



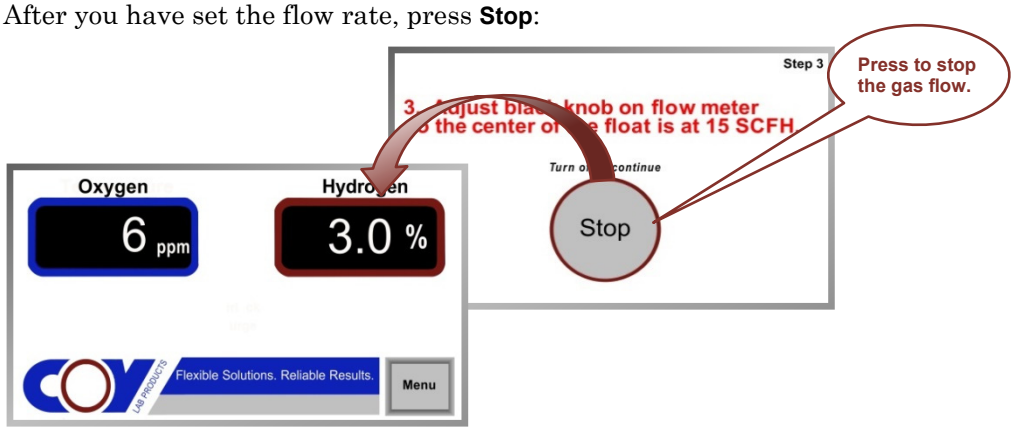
5. Set the flow rate to 15 SCFH by turning the knob at the bottom of the flow meter:



- Turn the knob clockwise to decrease the flow.
- Turn the knob counterclockwise to increase the flow.

The center of the float should be on **15**.

6. After you have set the flow rate, press **Stop**:

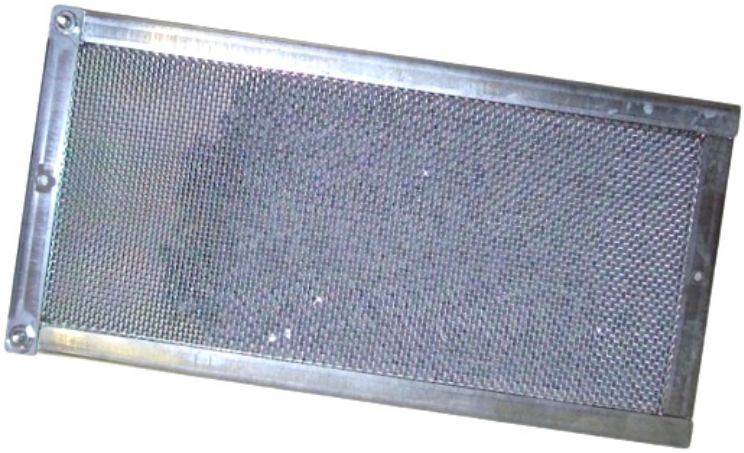


The gas flow will stop and you will return to the main screen.

7. Reset the gas mix regulator to its orginal setting (usually 20 psi unless you have determined that another setting is better for your chamber).

6.5 Introducing the Palladium Catalyst

After you have completed the purging procedure, you can introduce the palladium catalyst into the environment. The palladium catalyst is contained in a Coy Stak-Pak:



Coy provides two catalyst Stak-Paks for each catalyst fan box in your chamber. Only one catalyst Stak-Pak at a time is installed in a catalyst fan box. The other is a spare to replace the one in current use when it needs rejuvenating.

Note: *More information on catalyst rejuvenation and the use of Stak-Paks can be found in the Vinyl Anaerobic Chamber Operation Manual.*

6.5.1 Attaching the desiccant Stak-Paks

If you are using desiccant Stak-Paks to control moisture, we recommend that you introduce them into the environment when you introduce the palladium catalyst Stak-Paks. If you are not using a desiccant, skip this section and go to 6.5.2.

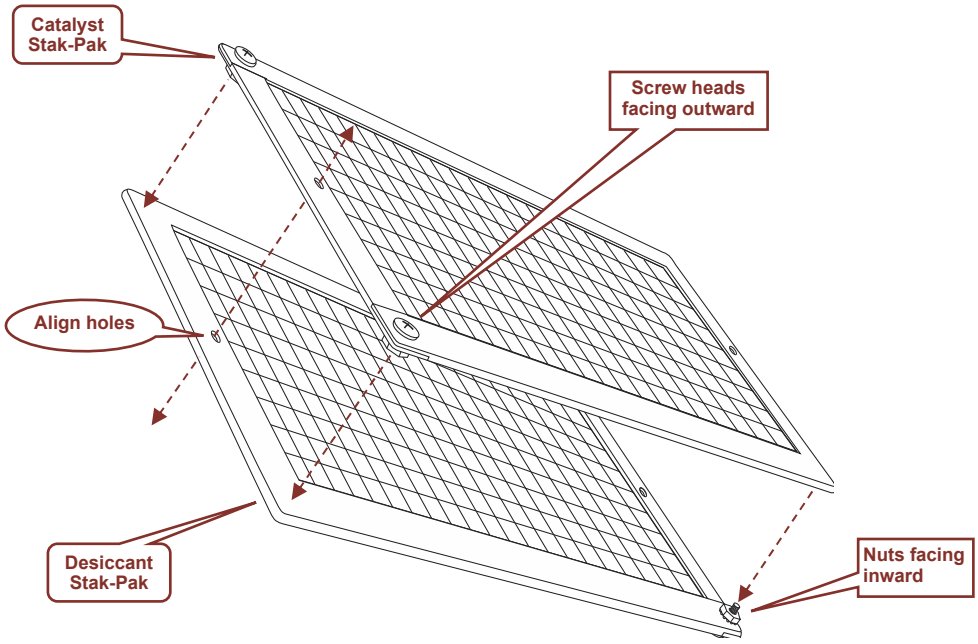
The desiccant Stak-Paks must be attached to the catalyst Stak-Paks, which is best done before the Stak-Paks are placed in the chamber. The two Stak-Paks are attached to each other with machine screws:

The screws are fastened with lock nuts. One side of the lock nut has teeth. The other is smooth:

Coy provides the necessary hardware.

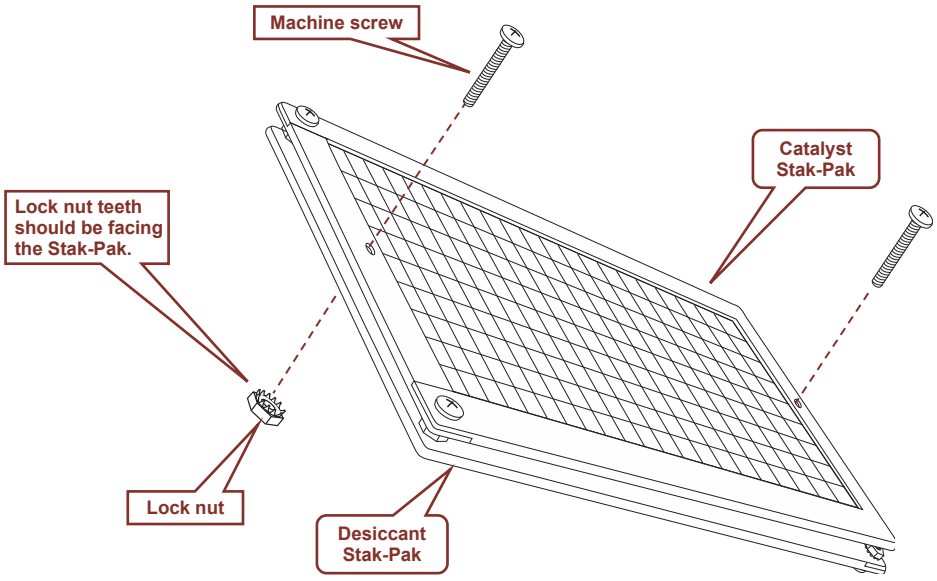
To attach a desiccant Stak-Pak to a catalyst Stak-Pak

1. Place the palladium catalyst Stak-Pak on top of the desiccant Stak-Pak as shown:



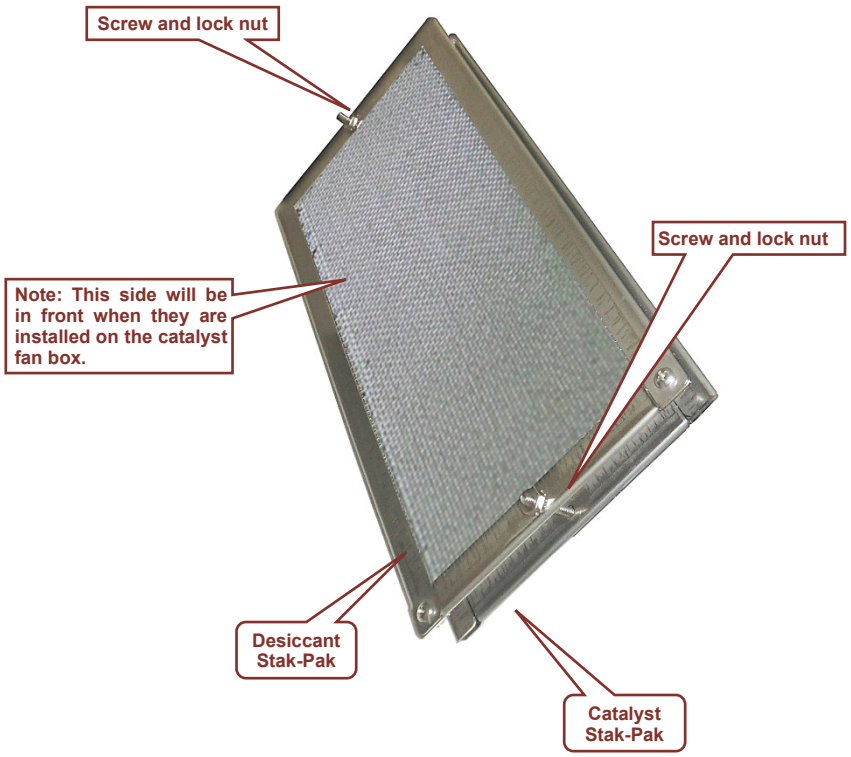
   - One end of the Stak-Pak has screws. Orient the Stak-Paks so that the ends with the screws are opposite each other.
   - Make sure the sides with the screw heads are facing outward on both Stak-Paks.
   - Make sure the screw holes at the ends of the Stak-Paks are aligned.

2. Insert the provided screws through the screw holes and fasten them with the lock nuts:



   - Be sure to insert the screws through the catalyst Stak-Pak first.
   - Make sure that the teeth of the lock nuts are facing inward toward the desiccant Stak-Pak.

3. When you finish, the two Stak-Paks should look like this:



Important: *Do not use more than one desiccant Stak-Pak per catalyst fan box. For serious moisture control problem, we recommend using a Coy large capacity dehumidifier instead of trying to control moisture with multiple desiccant Stak-Paks.*

6.5.2 Placing the Stak-Paks in the airlock

The catalyst Stak-Paks enter the chamber through the airlock. When you place Stak-Paks in the airlock, you must be very careful to maintain the chamber anaerobic environment. The inside door must be closed before the Stak-Pak(s) can be placed in the airlock. After you place the Stak-Pak(s) in the airlock, the airlock must be operated to anaerobic conditions before the inner door can be opened to access the Stak-Pak(s).

To place the Stak-Paks in the airlock

1. Close the inner door of the airlock. Make sure it is latched and locked.
2. Open the outer door and place the Stak-Pak(s) in the airlock.
3. Close the outer door. Make sure it is latched and locked.

Note: *If you have two catalyst fan boxes, you can place both Stak-Paks in the airlock at the same time.*

6.5.3 Operating the airlock to anaerobic conditions

Your next step is to create an anaerobic environment in the airlock so you can open the inner door and remove the Stak-Pak(s). You can do this easily by running the airlock in automatic mode.

To create anaerobic conditions in an automatic airlock

1. Make sure the airlock pressure for both gases is set to 20 psi (138 kPa) on the gas pressure regulators.

2. Make sure the inner door is closed and locked. The airlock does not monitor the inner door. It will run regardless of whether the inner door is open or closed, but it will not create an anaerobic environment if the door is open.

3. You will see one of two messages on the controller display panel:

   - If the outer door is open, you will see the following message:

     You must close the door before you can proceed. The airlock will not operate in automatic mode with the outer door open.

   - If the outer door is shut, you will see the following message:

     You can proceed with automatic operation.

4. Press the Start key to operate the airlock. When the airlock is anaerobic, you will see the following message:

   You can now remove and install the Stak-Pak(s).

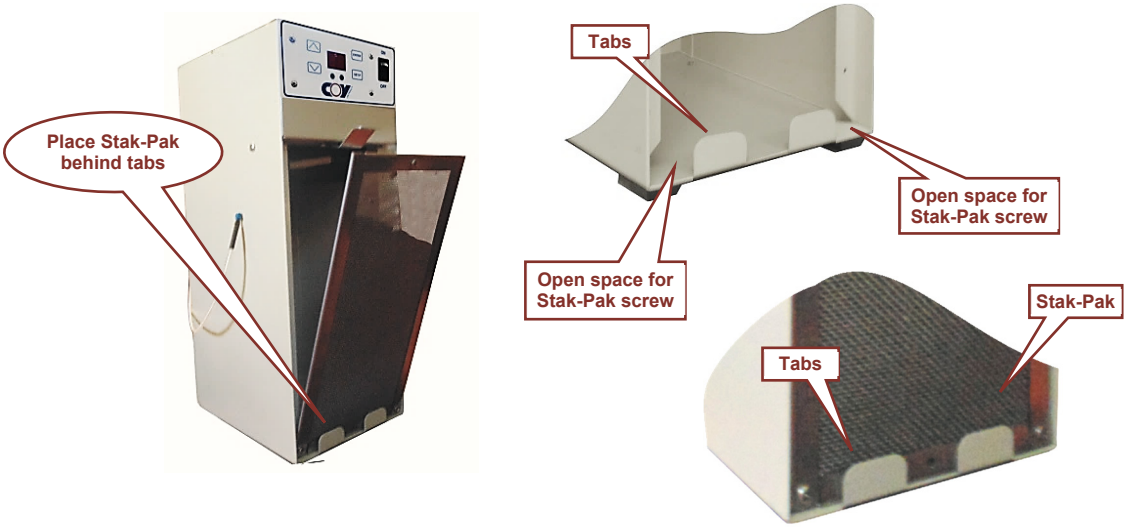
6.6 Installing the Catalyst Stak-Pak(s)

Once the airlock is anaerobic, you can place the Stak-Pak(s) in the catalyst fan box.

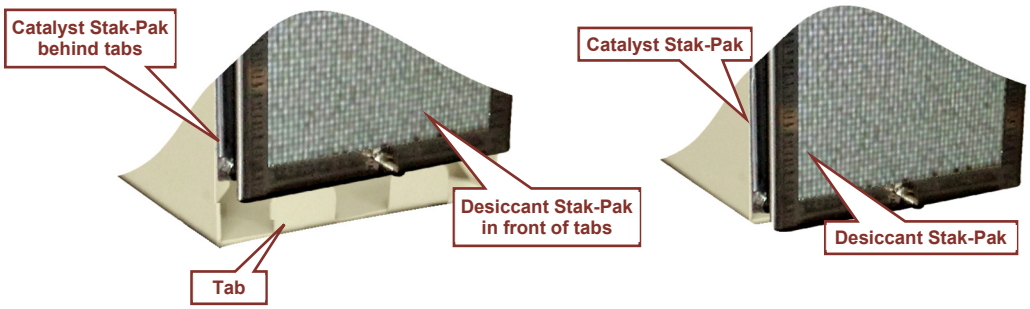
To place a catalyst Stak-Pak in the fan box

1. Open the inner door of the airlock and take the Stak-Pak out.

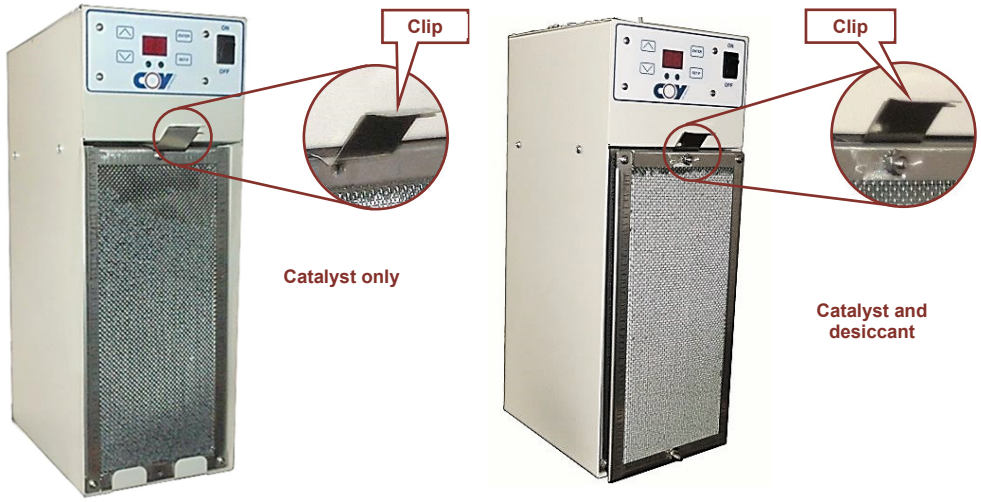
2. Place the bottom of the Stak-Pak behind the tabs at the bottom of the fan box:



- The Stak-Pak screws will fit into the open spaces at the bottom of the box (see top right picture above).
- If a desiccant Stak-Pak is attached to the catalyst Stak-Pak, the catalyst Stak-Pak should be directly in front of the opening. Only the catalyst Stak-Pak goes behind the tabs

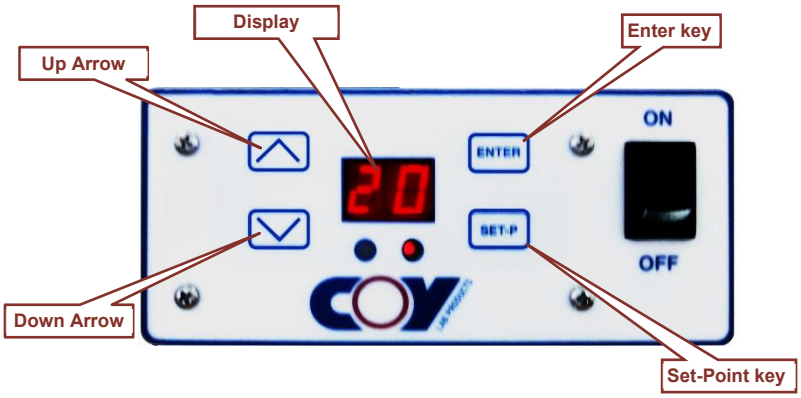


3. Push the Stak-Pak into the recessed area of the opening. The clip at the top of the recessed area should hold it in place:



If a desiccant Stak-Pak is attached, the clip will clip onto the catalyst Stak-Pak only.

4. If you have heated catalyst fan boxes, you should now set the set point to the temperature you want to maintain:
   - Press SET-P. The display ill show the current set point.



   - Press ^ to increment the value. Hold the key down until the temperature you want to maintain is displayed. If you overshoot, press v to back up.
   - Press ENTER to enter the value into the controller.

5. In about 2 hours or less (depending on chamber size), the oxygen content in your chamber should be low enough to begin routine tasks.

Note: *You may also want to change the default alarm limits for the anaerobic monitor at this time. Instructions can be found in the CAM-12 manual. The CAM-12 manual also contains additional information about the monitor, including its basic features, how it works, safety instructions, maintenance, etc., which you should be familiar with before you start chamber operations.*

6.7 Activating the Hydrogen Sulfide Removal Column

Once the chamber is operational, you can power up and complete the setup of the HSRC. This involves checking chamber airflow, positioning the shroud for optimal airflow through the column, and installing an indicator strip. If your chamber does not have an HSRC, skip this section and continue to section 6.8.

To power up the HSRC

1. Ensure that the power cord is plugged into the power strip.
2. Make sure there are no visible objects blocking the fan or the opening in the plastic shroud in the base.
3. Turn the power on with the power switch on the power cord.

Important: *Once turned on, the HSRC should be left running at all times for optimal H_2S removal. Running it sporadically will markedly decrease the effectiveness of its removal capabilities.*

6.7.1 Checking the airflow

To efficiently remove H_2S from the chamber, airflow through the column must be unimpeded, both at the intake point and at the point where it leaves the column. Even with the HSRC continually drawing the chamber atmosphere into the col-

umn, H_2S can still accumulate in dead spots in the chamber where the air does not move. For optimal removal of H_2S, these dead spots must be eliminated as much as possible.

The best way to check airflow is to use an airflow meter, which can be purchased from Coy (part #2900000) if you do not have one. You may have done so already as part of your chamber package. Alternatively, you can use suspended tissue.

To optimize chamber airflow

1. Using an airflow meter or suspended tissue, check the entire chamber thoroughly. Pay special attention to corners, out-of-the-way places, and areas where items sensitive to H_2S are located.

2. Eliminate dead spots by doing any or all of the following:
   - Move any equipment that may be blocking the area.
   - Reposition or reorient catalyst boxes to direct airflow more optimally.
   - Install small fans to increase circulation in problem areas.

To check column airflow

1. Check the fan assembly:
   - Make sure nothing is blocking the airflow intake at the top of the column:

   - Make sure there is optimal airflow around the fan assembly.

   Correct any problems by repositioning the HSRC and/or repositioning or re-orienting any components that are causing the problem.

2. Check the area around the shroud opening:
   - Make sure nothing is blocking the opening. Remove or relocate any obstruction.
   - Make sure the airflow is not impeded by any components, as this will prevent the "cleaned" atmosphere from distributing itself optimally. Reposition the shroud opening. if necessary, to redirect the airflow.

Note: *The shroud opening may be redirected to optimize the movement of the chamber atmosphere and serve as an additional "weapon" for eliminating dead spots.*

6.7.2 Inserting the indicator strip

The indicator strip lets you know when the media in the cartridge needs to be changed. When the media is working successfully, the atmosphere flowing out of the column should be clean. When the media ceases to perform optimally (usually after a period of several months), the cleaned atmosphere will start showing

increasing traces of H_2S and the strip will change color to show that it is time to replace the media.

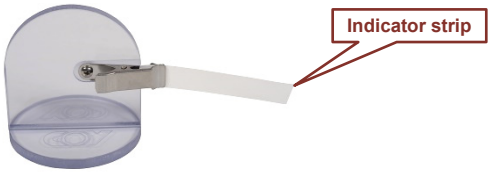
The indicator strip must be positioned so that it is fully inside the shroud and easily visible. Adjust the position of the shroud, if necessary, to ensure visibility.

Caution: *You must wear gloves for this procedure. The strips are impregnated with lead acetate.*

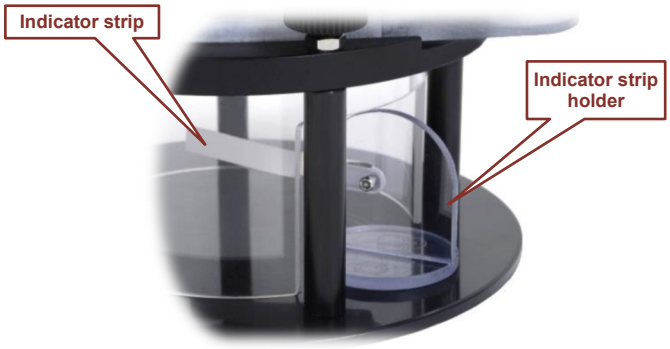
To insert the indicator strip in a vertical installation

1. Orient the clip on the strip holder so that it points horizontally:

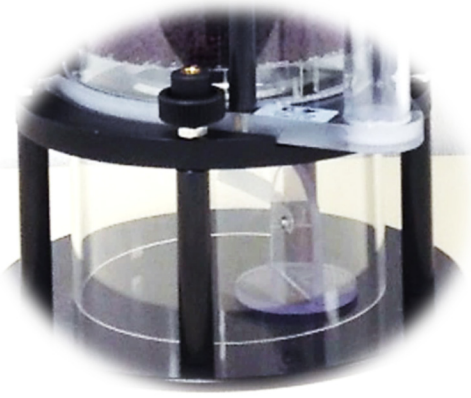
2. Using gloves, place an indicator strip in the clip:



3. Insert the strip into the shroud opening:



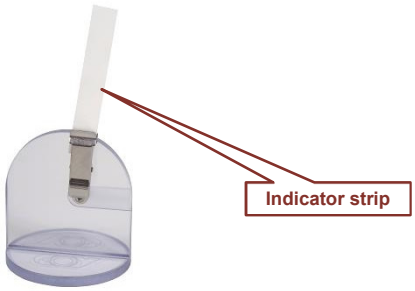
Make sure it inserted completely into the shroud:



To insert the indicator strip in a horizontal installation

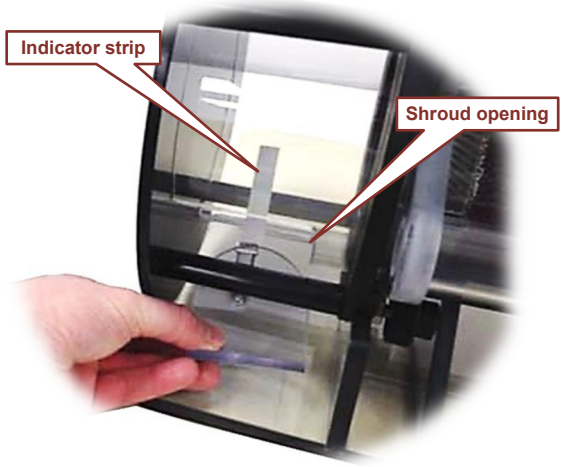
1. Orient the clip on the indicator strip holder so that it points vertically:

2. Using gloves, place an indicator strip in the clip:

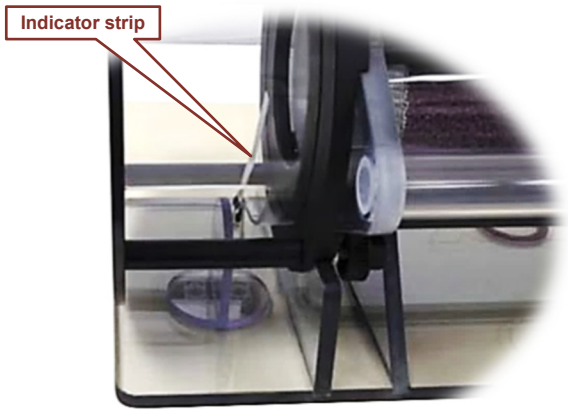


3. Adjust the position of the shroud opening so you can insert the entire strip vertically.

4. Insert the strip into the shroud opening:



5. Make sure the strip is inserted completely into the shroud and remains vertical so the airflow coming out of the column will hit it directly:



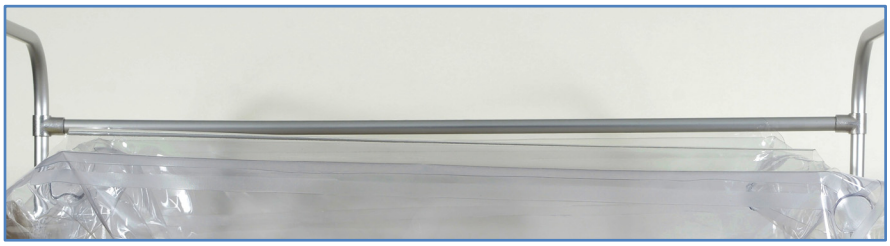
6.8 Increasing the Hydrogen Content

If you do not have enough hydrogen present in the chamber, the anaerobic monitor and catalyst fan boxes will not function properly. After the first 24 hours of operation, you should partially vacuum the chamber and reinflate it with gas mix to introduce more hydrogen:

- If you have a Coy anaerobic monitor, you should monitor the oxygen content in your chamber during the next 24 to 48 hours. You should also monitor the hydrogen content to make sure it does not go below 1.5 %. You can repeat the procedure below as often as necessary to maintain a sufficient amount of hydrogen.
- If you do not have an anaerobic monitor, follow the guidelines given in the instructions below for the number of times to deflate and reinflate the chamber to achieve a working atmosphere for your chamber.

To refresh hydrogen levels

1. Make sure the outer door of the airlock is closed and latched.
2. Open the inner door of the airlock.
3. Press Enter Menu to access the menu and Start to enter manual mode.
4. Hold the ▼ key down to manually vacuum the chamber.
5. When the chamber has collapsed to the level of the hanger poles as shown below, release ▼.



6. Press and hold the Start key to manually reinflate the chamber with gas mix:
7. When the chamber is fully inflated, release the Start key.
8. Repeat steps 4 through 7 as specified below:
   - If you have a gas infuser, repeat these steps until the anaerobic monitor shows a reading of 2.0 % to 2.5 %. At that point the gas infuser should be able to maintain a 2.5 % hydrogen level automatically.
   - If you have an anaerobic monitor but do not have a gas infuser, repeat these steps as many times as necessary until the hydrogen level is between 1.5 % and 4 %. Do not let it go above 4 %.
   - If you do not have an anaerobic monitor, follow the guidelines below for your chamber type:

Chamber Type	Volume	Times to Repeat
Type A	44 ft^3 (1238 L)	3
Type B	58 ft^3 (1636 L)	4
Type C	31 ft^3 (881 L)	2

Note: *If you have a custom chamber, select the standard chamber that is closest in size to your chamber. If your chamber is significantly larger than the type B chamber, add an extra repetition.*

6.9 Calibrating the Anaerobic Gas Infuser

This section applies only to chambers with an anaerobic gas infuser. If you do not have a gas infuser, go to section 6.10.

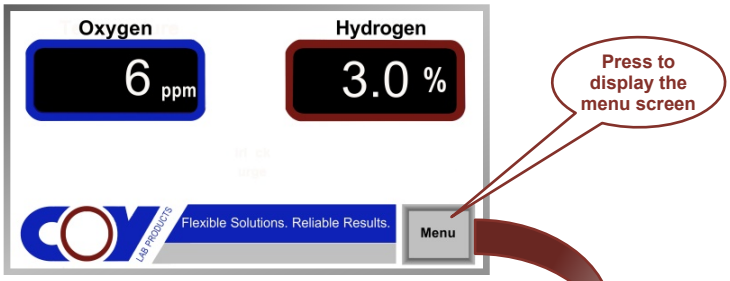
The anaerobic gas infuser automatically maintains a 2.5 % hydrogen level in your chamber. To accurately maintain this level, the values displayed on the gas infuser must match the readings reported by the anaerobic monitor. Since the anaerobic monitor reports the current oxygen and hydrogen readings to the gas infuser, the gas infuser must be calibrated to the anaerobic monitor.

Calibration is simply the process of determining the difference between the actual gas content reported by the anaerobic monitor and the values displayed by the gas infuser and enter it on the gas infuser touch screen. This difference is called the *offset*.

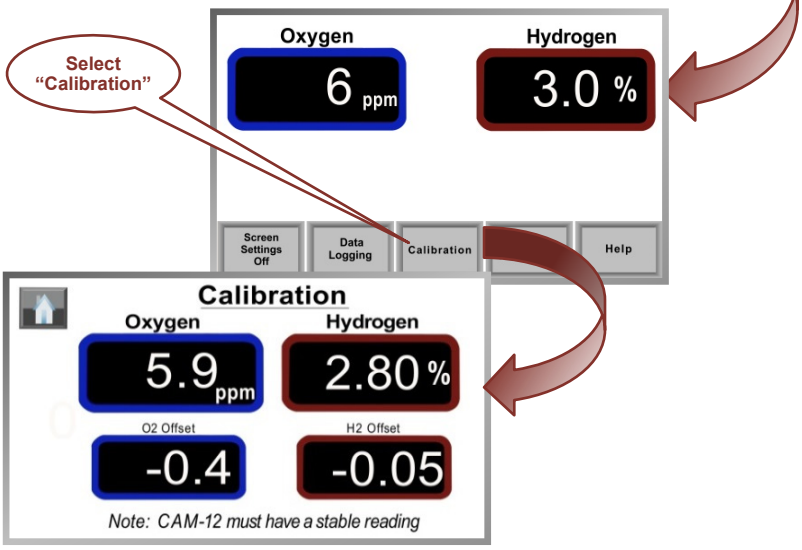
Important: *The anaerobic monitor must be stable and in communication with the gas infuser before you can calibrate the gas infuser.*

To display the calibration screen

1. Press the **Menu** key to display the menu screen:



2. Select **Calibration** to display the **Calibration** screen:



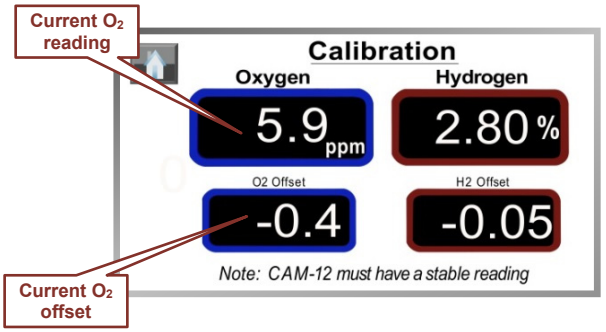
The offset values are the values currently being applied to the values from the monitor. The oxygen and hydrogen fields show the corrected values from the monitor after the offset has been applied.

6.9.1 Calculating the offset

To calculate the oxygen and hydrogen offset values, you must first calculate the difference between the value displayed on the anaerobic monitor and the value displayed on the gas infuser.

6.9.1-A Calculating the oxygen offset

The oxygen value and current offset are displayed on the left side of the **Calibration** screen:



The oxygen value is displayed to the nearest 0.1 ppm. If the oxygen value displayed on the gas infuser screen is different from the oxygen reading on the anaerobic monitor, you will need to calibrate the oxygen display on the gas infuser.

To calculate the oxygen offset

1. Compare the oxygen value on the gas infuser with the oxygen reading displayed on the anaerobic monitor:

   - +If the value displayed on the anaerobic monitor is lower than the value displayed on the gas infuser, *subtract* the *value displayed* on the *monitor from* the *value displayed* on the *gas infuser:*

     Anaerobic monitor value: 4.2 ppm
     Gas infuser value: 5.9 ppm
     Difference: 5.9 – 4.2 = 1.7

   - If the value displayed on the anaerobic monitor is higher than the value displayed on the gas infuser, *subtract* the *value displayed* on the *gas infuser from* the *value displayed* on the *monitor*.

     Anaerobic monitor value: 4.7 ppm
     Gas infuser value: 2.9 ppm
     Difference: 4.7 – 2.9 = 1.8

2. Since the current offset has already been factored into the displayed oxygen value, the new offset value must be incorporated into the current offset:

   - If the oxygen value on the anaerobic monitor is less than the value displayed on the gas infuser, the offset must be *reduced*. Subtract the difference from the current offset:

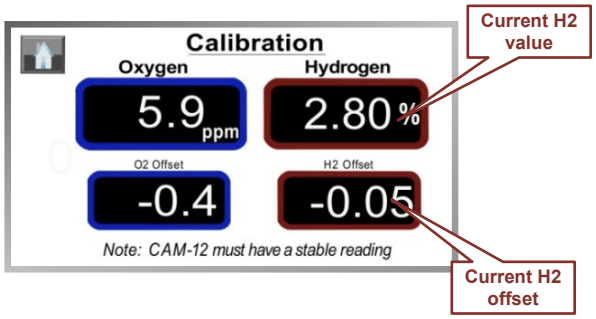
     O2 value from anaerobic monitor: 4.2 ppm
     O2 value displayed on gas infuser: 5.9 ppm
     Difference: 5.9 – 4.2 = 1.7
     Current offset value: –0.3
     New offset value: –0.3 – 1.7 = –2.0

- If the oxygen value on the anaerobic monitor is *greater than* the oxygen value displayed on the gas infuser, the offset must be *increased*. Add the difference to the current offset:

  O2 value from anaerobic monitor: 4.7 ppm
  O2 value displayed on gas infuser: 2.9 ppm
  Difference: 4.7– 2.9 = 1.8
  Current offset value: –0.3
  New offset value: –0.3 + 1.8 = 1.5

6.9.1-B Calculating the hydrogen offset

The hydrogen value and offset are displayed on the right side of the **Calibration** screen:



The hydrogen value is displayed to the nearest 0.01 %. If the hydrogen value displayed on the gas infuser screen is different from the hydrogen reading on the anaerobic monitor, you will need to calibrate the hydrogen display on gas infuser.

To calculate hydrogen offset

1. Compare the hydrogen value on the gas infuser with the oxygen reading displayed on the anaerobic monitor:

   - If the value displayed on the anaerobic monitor is lower than the value displayed on the gas infuser, *subtract* the *value displayed* on the *monitor* from the *value displayed* on the *gas infuser:*

     Anaerobic monitor value: 2.32 %
     Gas infuser value: 2.8 %
     Difference: 2.8 – 2.32 = 0.48

   - If the value displayed on the anaerobic monitor is higher than the value displayed on the gas infuser, *subtract the value displayed on the gas infuser from the value displayed on the monitor.*

     Anaerobic monitor value: 2.72 %
     Gas infuser value: 2.5 %
     Difference: 2.72– 2.5 = 0.22

2. To calculate the new offset, you must incorporate the offset value you calculated into the current offset:

   - If the hydrogen value on the anaerobic monitor is less than the value displayed on the gas infuser, the offset must be reduced. Subtract the difference from the current offset:

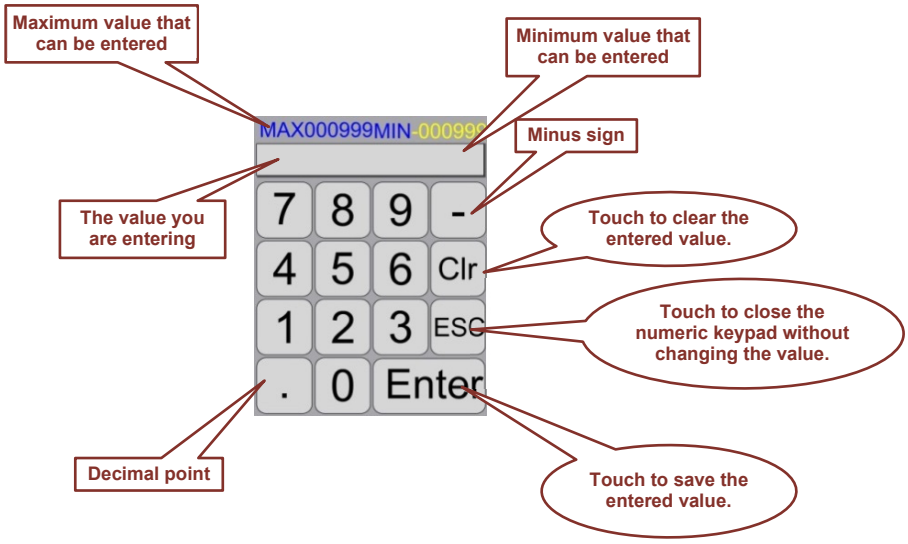
     H2 value from anaerobic monitor: 2.32 %
     H2 value displayed on gas infuser: 2.8 %
     Difference: 0.48
     Current offset value: –0.2
     New offset value: –0.2 – 0.48 = –0.68

- If the hydrogen value on the anaerobic monitor is greater than the value displayed on the gas infuser, the offset must be increased. Add the difference to the current offset:

H2 value from anaerobic monitor:	2.72 %
H2 value displayed on gas infuser:	2.5 %
Difference:	0.22
Current offset value:	–0.3
New offset value:	–0.3 + 0.22 = –0.08

6.9.2 Entering the offset values

The offset values are entered into the offset value fields through the numeric keypad. You enter the values by touching the numbers. The value is displayed in the field above the number keys as you enter it:

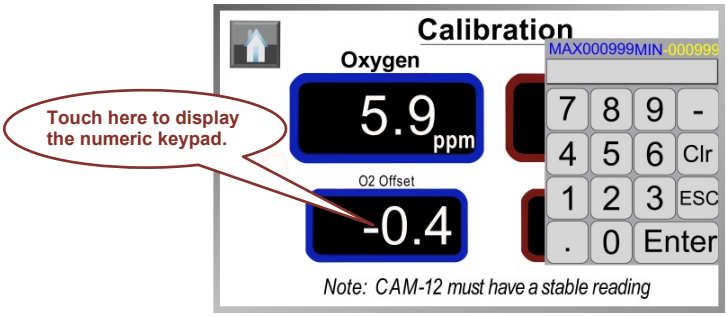


Use the special non-numeric keys to do the following:

- To make a number negative, place a minus sign in front.
- To enter a decimal number, enter the digits to the left of the decimal point. Then insert a decimal point and enter the digits to the right.
- To erase your entry and start over, press **Clr**.
- To exit without changing the displayed value, press **ESC**.
- To save the entered value, press **Enter**.

To enter the new O_2 offset

1. Touch the center of the **O_2 Offset** field to display the numeric keypad:



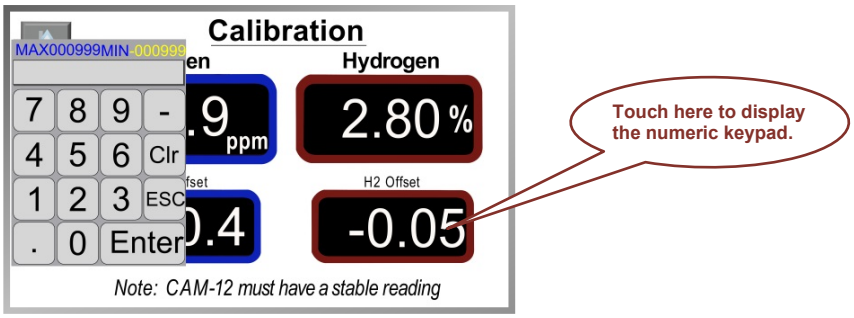
2. Use the numeric keypad to enter the new offset value you calculated in section 6.9.1-A. The value will appear in the field above the number keys as you type.

3. Only 1 decimal place is allowed for the O_2 offset. Additional decimal places will be ignored.

4. Touch **Enter** to save the new value. The keypad will close and the number will appear in the **O_2 Offset** field.

To enter the new H_2 offset

1. Touch the center of the **H_2 Offset** field to display the numeric keypad:



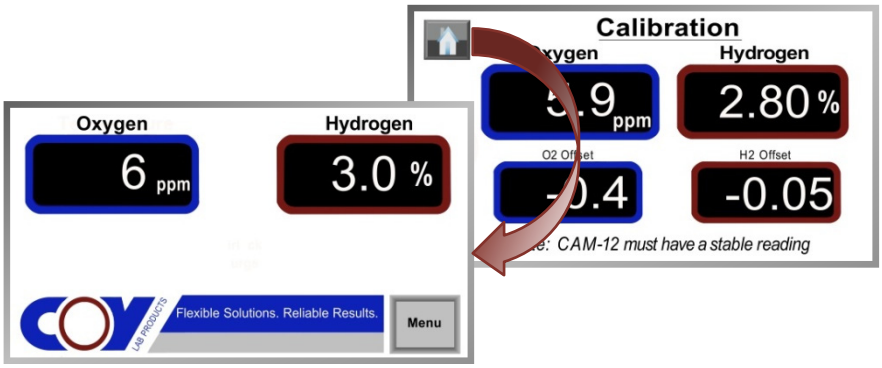
2. Use the numeric keypad to enter the new offset value you calculated in section 6.9.1-B. The value will appear in the field above the number keys as you type.

3. Only 2 decimal places are allowed for the H_2 offset. Additional decimal places will be ignored.

4. To save the new offset, touch **Enter**. The keypad will close and the number will appear in the **H2 Offset** field.

To leave the screen

Press  to return to the home screen:



6.10 Your Next Step

Your chamber is now set up and ready to go. Before you proceed, you should read Chapters 3, 4, and 5 in the *Vinyl Anaerobic Chamber Operation Manual* for additional information on airlock and catalyst box operation. You should also familiarize yourself with your preventive maintenance responsibilities, which are outlined in Chapter 7.

Optional components that are used in the chamber have their own separate manuals that contain basic operating instructions over and above those given in the setup manual. They also contain safety precautions, additional technical information, and maintenance and repair instructions. You should definitely read the safety precautions for each component that is installed in your chamber. The other material can be accessed on an as-needed basis