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Live Animal Waste Filtration System Instruction Manual

Automatic and Manual Operation

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WARRANTY

This product is warranted against defects in material and workmanship during the first 12 months after original date of shipment.

The factory will, at its option, repair or replace defective material within this period at no charge for parts and labor.

All returns or exchanges must first be authorized by COY LABORATORY PRODUCTS, INC.

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COY LABORATORY PRODUCTS, INC.

14500 COY DRIVE

GRASS LAKE, MI 49240

The responsibility of COY LABORATORY PRODUCTS, INC. is limited to the purchase price of this product, and 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 this product. This warranty does not cover damages caused by excessive line transients on the AC supply line.

General Description

System Configuration

The Live Animal Filtration System consist of the following items.

1 x capsule of Carbolime (white granules)

1 x capsule of Activated Charcoal (black granules)

1 x Vacuum Pump

All Tubing and necessary fittings

Automatic system also Includes CO₂ Controller and Sensor

NOTE: If ordered with a COY Hypoxic/Hyperoxic Glove Box the capsules will be mounted to the outside rear wall. If **Added Capacity animal filtration system was purchased the diagram is on page 6.**

The operating principle

The Vacuum pump pulls glove box atmosphere through the capsules filtering CO₂ out through a chemical reaction forming water, and then through the activated charcoal filter out other impurities associated with live animal containment.

The manual mode is operated by a switch on the vacuum pump. The Automatic System is activated by the COY CO₂ Controller determined by the user desired set-point (00.0%) of CO₂ and the sensor readings inside the glove box.

Setup Procedure

1. Remove Pump from the packaging box and place it the most desirable spot for your lab operation. The connection tubing supplied will extend to approximately 5 ft. (152 cm).
2. If purchased with a COY Polymer Hypoxic Glove Box the Capsules will be connected to the glove box and all tubing will be connected to the glove box except for the Outlet from the Activated Charcoal capsule and the Glove Box Inlet. If purchased with a Vinyl Hypoxic Glove Box then the capsules are shipped attached to a bracket that will have to be attached to the rear of airlock, this is a simple hook/hang connection.
3. These connections have tubing connected on one side but needs to be connected to the supplied vacuum pump using Figure #1 and 2 below as a guide. Figure #1 refers to rigid glove boxes (polymer and aluminum) Figure #2 refers to the vinyl style glove boxes.
4. When Connecting the vacuum pump make sure the Glove Box Gas Inlet Tubing is connected to the Pump Gas Outlet (arrows indicate flow direction on the pump) Coil excess tubing and secure with supplied tie wrap.

Figure #1: Tubing Connections Polymer Glove Box

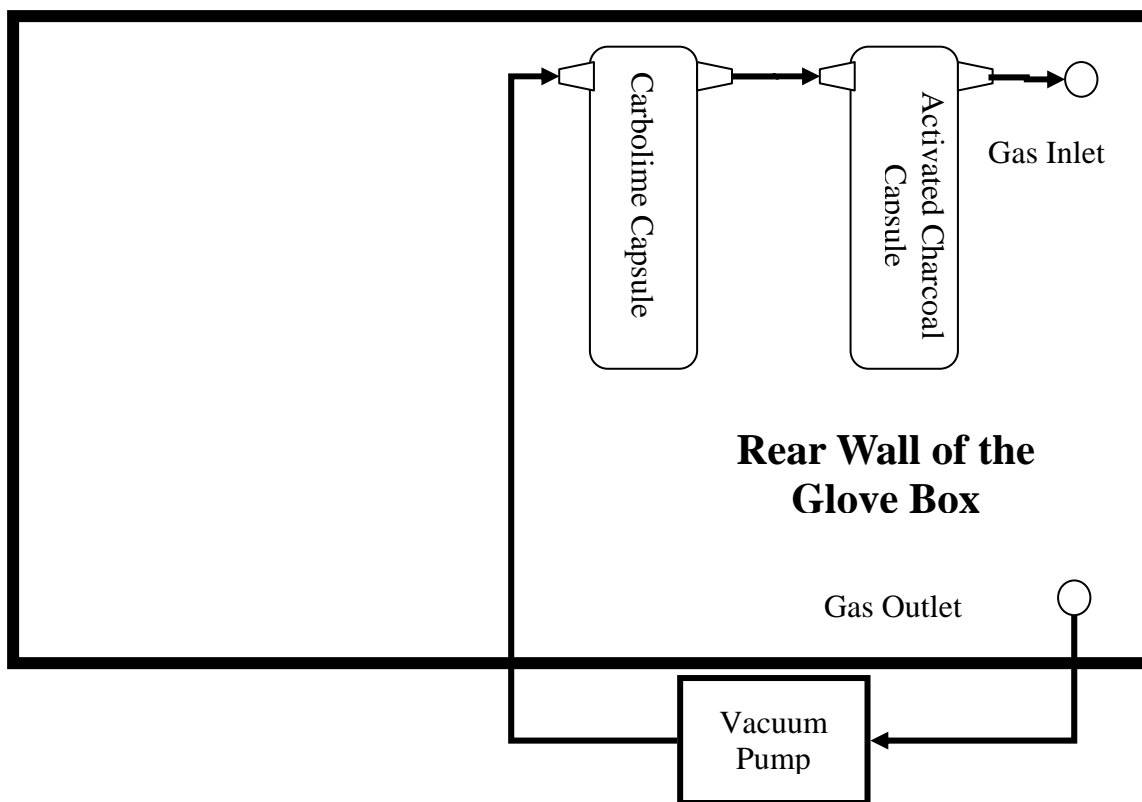
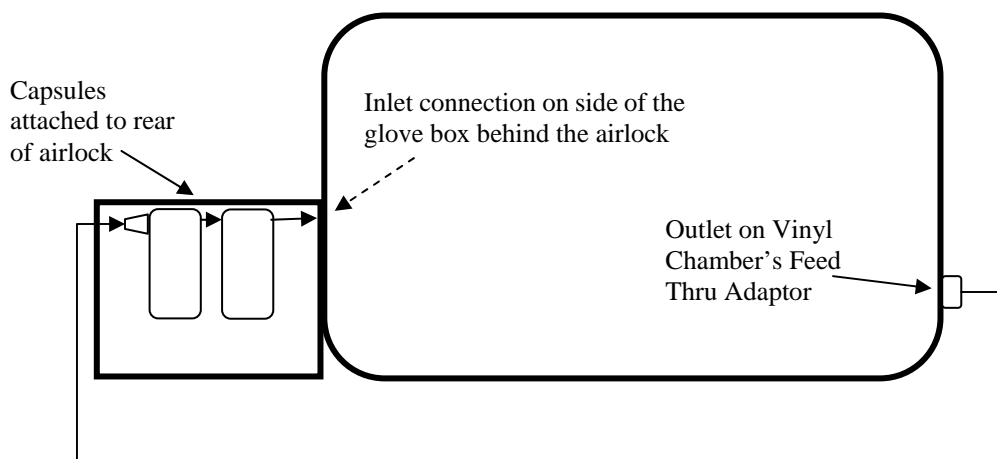


Figure #2: Tubing Connections Vinyl Glove Box



For Manual Systems Only

5. Position the pump in a convenient location keeping in mind that the switch on the power cord will have to be accessed 1-4 times a day.
6. With the switch turned "OFF". Insert plug into appropriate power outlet and begin operations.

For Automatic Systems Only

7. Locate the Black CO₂ sensor port on the chamber/glove box (generally centered in the back of the COY aluminum or polymer style glove boxes, and behind the airlock on the flexible vinyl chamber, see figure 2). However custom built glove boxes and certain accessories, such as a UV Light, may change the location of the sensor port.
8. Loosen the sensor mounting port nut by hand (do not remove nut).
9. Insert the CO₂ sensor far enough into the port so that the entire cell membrane is inside the chamber (see figure 3).
10. Tighten the sensor mounting port nut while holding the sensor in place to ensure it does not move during installation. Notice the rubber gasket sealing around the sensor. The nut is tight enough when the sensor cannot be moved. **For proper chamber operation it must be airtight around the sensor.**

Added Capacity Animal Filtration

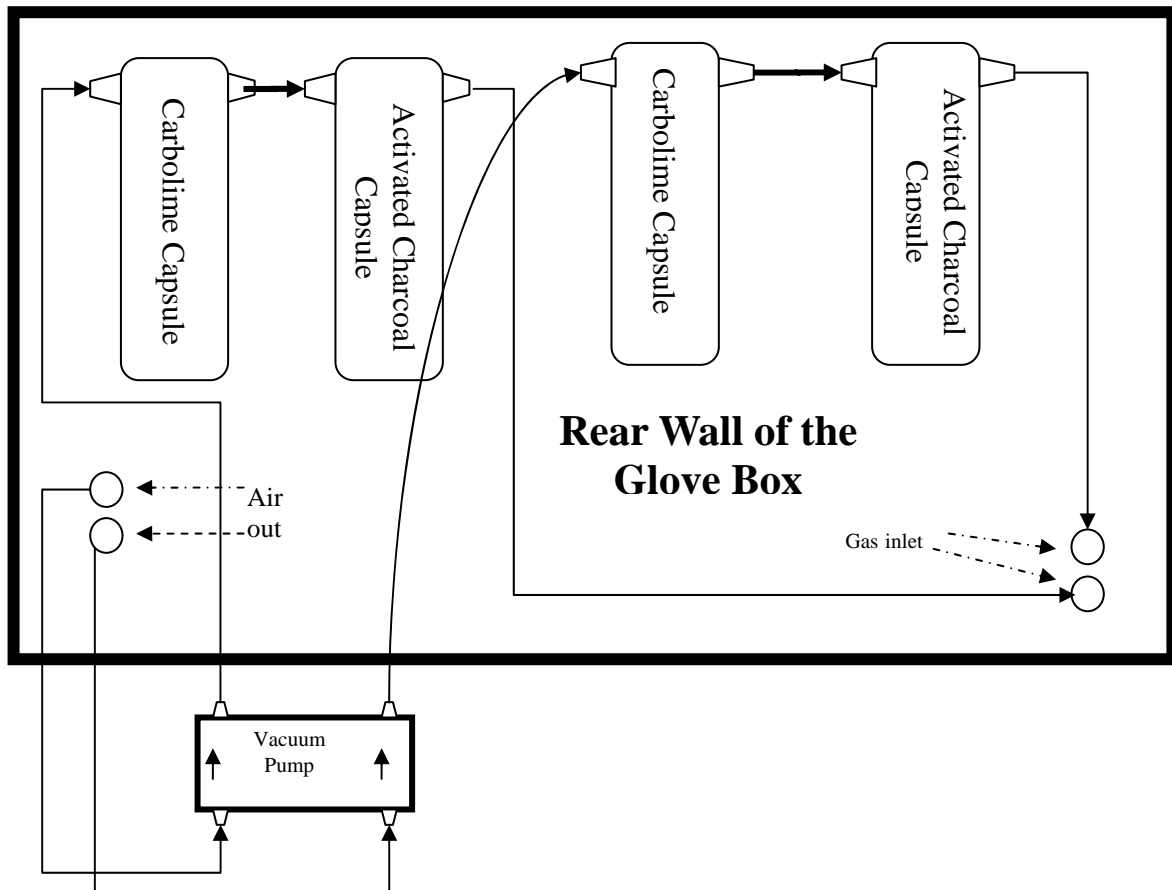
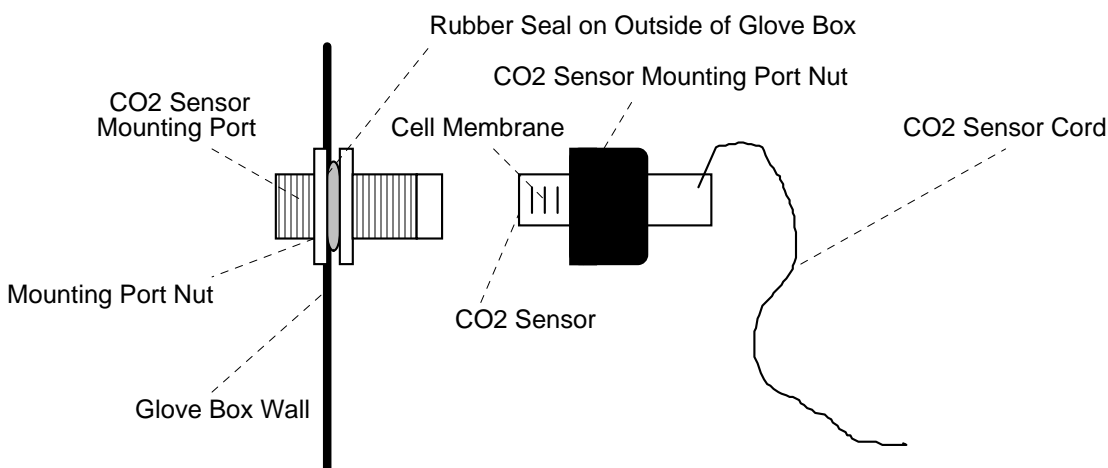
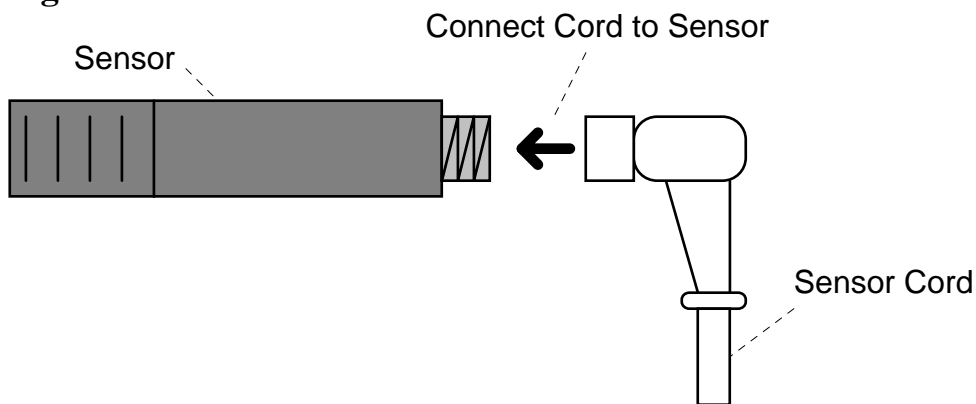


Figure #3: Mounting Port and Sensor Connection



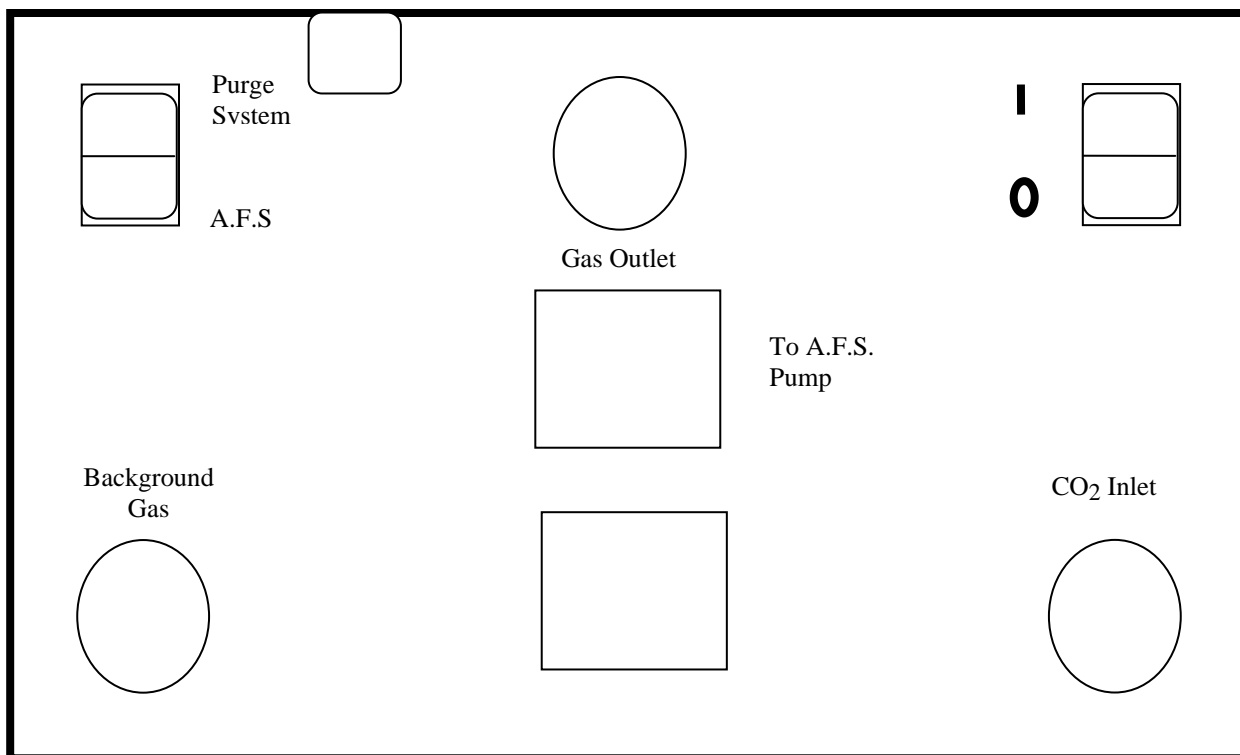
11. Find a suitable location for the controller (i.e. top of the airlock, or external shelf).
12. Insert the sensor cord screw plug into the back of the CO₂ sensor (see figure 3). **Do not force the plug into the sensor.** The plug is “keyed” use light pressure to start and then allow the threads to pull the plug onto the sensor.

Figure #4 CO2 Sensor Connection



12. Plug the power cord from the vacuum Pump into the rear of the CO₂ Controller labeled To A.F.S. Pump (See Figure #3) and make sure the switch on the top left hand side of the rear panel is flipped to the A.F.S. mode.

Figure #3 Rear Panel of Carbon Dioxide Controller



13. The CO₂ controller is now ready to use.

System Function

Manual System

When ON the system pump draws glove box atmosphere out and through the capsules removing CO₂ and other waste byproduct associated with live animal containment. There is no monitoring of these conditions but a one person (42 inch polymer chamber) circulates the entire atmosphere in 10.5 minutes. This will help you establish an initial protocol for maintenance of your system.

NOTE: The Pump may be left ON the entire time a study is taking place but keep in mind this can shorten the life of the pump. If you do chose this option try to keep the pump as cool as possible by placing a fan near it in a well ventilated space.

It is recommended that a CO₂ indicator/monitor is used during the initial few weeks of operation to help establish a protocol for operating the system. A number of factors influence how often and how long the system should operate based on number of animals, size of the animals, length of time in the system, size of the glove box etc.

Automatic System

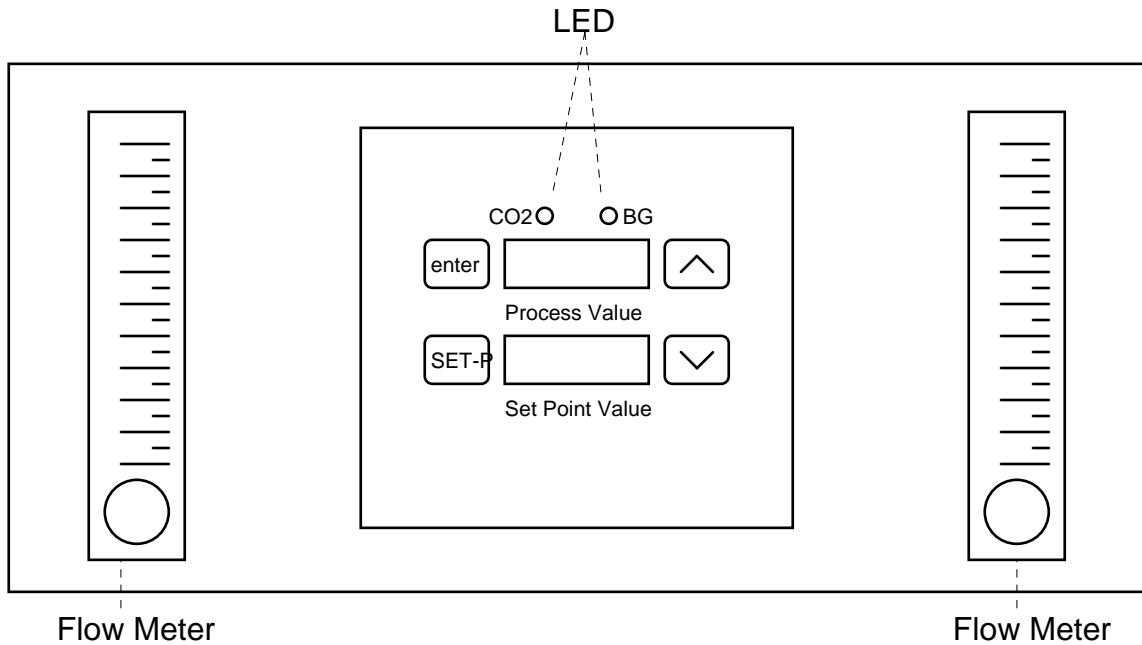
The Carbon Dioxide Controller is intended to maintain a CO₂ level in a chamber/glove box based on the users set-point. It accomplishes this by sensing the current concentration, and then sending a signal to the vacuum pump to begin operating. The set point (see figure 4) is used to set the CO₂ level desired in the chamber. The controller has been programmed to maintain a level of CO₂ within +/- 0.1% of the set point, this is the **Control Tolerance**.

The Flow Meters on the Controller are not used on this system. If you switch to the purge system they are used to control flow rates of gas (see CO₂ Controller Manual).

To obtain uniform CO₂ concentration throughout the chamber, the small circulating fan must be on at **ALL** times. Please note the addition of a COY Fan Box (heated or unheated) eliminates the need for this fan.

Since CO₂ is produced in greater abundance than any other by products and thus the control for the automatic system is based on the CO₂ levels.

Figure # 4 Front Panel of CO2 Controller



Carbolime System

Carbolime carbon dioxide absorbent is a granular soda lime absorbent for the efficient removal of carbon dioxide from closed and semi-closed patient breathing circuits. Carbolime is a quality compound which contains no potassium hydroxide(KOH). It is formed by proportionately mixing calcium hydroxide ($\text{Ca}(\text{OH})_2$) with a small amount of sodium Hydroxide (NaOH).

Carbolime is supplied as hard, irregularly shaped granules, which have been processed to remove dust formation from friction. Significant process improvements have resulted in enhancements in moisture content (12-19%), hardness, and porosity generation. As a result, Carbolime delivers dependable, efficient CO_2 absorption.

Color Indication and Regeneration

Carbolime contains a small amount of ethyl violet, which acts as a color indicator when the absorbent is nearing exhaustion. Carbolime color is white to off-white. As CO_2 is absorbed, it reacts with the ethyl violet, which causes the granules to change to a purple color. The purple color will intensify to indicate exhaustion. When the deep purple color has penetrated throughout the Capsule, the used material should be discarded.

If exhausted material is left standing its color will slowly change back to white.

Carbolime in this newly regenerated state **should never be re-used** as it will quickly turn purple almost immediately. Therefore it is essential to empty canisters immediately after

use.

- **Low Dust** - Minimum dust levels with the benefits of high surface area and graded particle size.
- **Low risk of carbon monoxide formation** due to good resistance of dry gas desiccation.
- **Low odor** due to reliability control of indicator dye concentration. Dye overdosing causes amines to be released: dye under dosing causes poor / no color change.

Warning: Avoid contact with skin or eyes, and direct sunlight.

NOTE: During operation the Carbolime produces moisture and water may form in the capsule this is normal and no cause for concern. If the moisture builds to a level where it is in the tubing leading to the inlet of the pump you will want to remove and dry or simply replace the tubing to prevent moisture from entering the pump and shortening the life span. A desiccant capsule can also be added to the system if the problem persists, contact COY (734-475-2200/ sales@coylab.com).

Activated Carbon System

The Activated Carbon (charcoal) removes other impurities associated with live animal containment. There is no indicator so every 2-3 months the charcoal should be replaced. Mesh size 4-8 (2.4 to 5.0 mm).

Operation of CO₂ Controller

1. Plug the controller into an electrical outlet.
2. Turn the unit on using the rocker switch on the back (see figure #3).
3. Let the device warm up for a period of five minutes. During this warm up period make sure the switch on the back of the CO₂ Controller is set to A.F.S. (see figure #3)
4. After going through a warm up period, the display will show two numbers. The top number (Process Value) is the measured CO₂ concentration and the bottom number (set point value) is the present CO₂ set point.
5. Using figure #6 adjust the set points:
 - A) Press the lower left key (SET-P). This enables the set point to be adjusted. If the SET-P button is not pushed the user could push the up and down buttons and nothing would change.
 - B) Press the arrow key (up or down) until the desired set point for the CO₂ level is displayed in red on the bottom numeric display.
 - C) Press the upper right key (Enter) to set the value in memory.
If you do not do this, the new value will NOT be set, and the previous value will be restored. Notice that if the set point is outside the control tolerance (0.1 %) the Red LED will turn on indicating that the pump needs to turn ON to remove excess CO₂

GREEN = Pump System (BG)
RED = CO₂ (Not used in this system)

Calibration of CO₂ Controller

The sensor has an expected life of greater than 2 years. During that time, there may be a drift in the CO₂ measurements. The sensor has a long term stability of less than $\pm 5\%$ Full Scale/2 years. It is best to periodically (once a year) calibrate the sensor. To do this, remove the sensor from the chamber, plug the opening in the sensor fitting to maintain chamber integrity and remove the sensor from its cord. **Notice only the sensor needs to be returned to the factory not the entire controller.**

Controller Specifications

Range	0-19.9%
Accuracy	$\pm 0.02\%$ CO ₂ + 2% of reading]
Nonlinearity	$\pm 0.5\%$ of full scale FS
Repeatability	$\pm 1\%$ of FS
Temperature Dependence	-0.1% FS/degree Celsius
Pressure Dependence	+0.15 % of reading/hPa
Long-term stability	$\pm 5\%$ FS/2 years
Response time	90% at 1 minute
Operating Temperature Range	-20 - +60 degrees C
Humidity Range	0-100% RH (non-condensing)

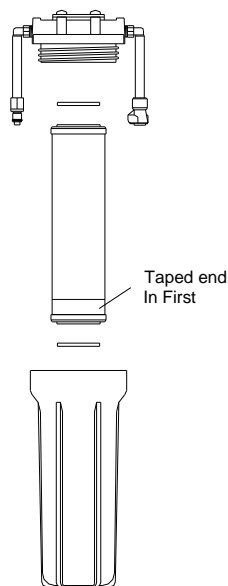
Cartridge replacement Instructions

- A. Turn off the pump using the A.F.S. switch on the back of controller. (Automatic units)
 - * Manual switch for the manual units
- B. Disconnect the housing from the chamber using the quick disconnect tube fittings by pressing the silver tab and gently pulling the two fitting a part.
- C. Lift the housing straight up to remove the housing off the bracket.
- D. Unscrew the bowl from the housing. (**Caution:** Never unscrew bowl from the house when Housing is still attach to the chamber) **Note: When opening filter housing to change cartridge, it is common for O-ring / Gasket to lift out of housing and stick to cap.**
- E. Remove O-ring / Gasket from sump and wipe groove and O-ring / Gasket clean. Lubricate O-ring/ Gasket with a coating of clean silicon grease. Place O-ring / Gasket back in place and press O-ring / Gasket down into the groove with two fingers. **Note:** This step is important to ensure proper filter seal. Make sure the O-ring is seated level in the groove. **Caution:** If O-ring / Gasket appears damage or crimped it should be replaced at this time.
- F. Insert a new cartridge into the clear bowl making sure that it slips down over the standpipe. Make sure the taped end is place into the bowl first. If the cartridge is installed incorrectly the system will not work.
- G. Screw the bowl onto the cap and hand tighten. DO NOT OVER TIGHTEN. Make sure cartridge slip over the cap standpipe.
- H. Place the housing back onto the bracket on the chamber.
- I. Reconnect the tubing (housing) to the chamber. When connecting the tubing, listen for a click this indicate that the fittings are locked together.
- J. Turn Pump back on and check for leaks.

Refilling Cartridges

- A. Remove cartridges using the Cartridge replacement Instructions.
- B. Remove the tape from the end of the cartridge.
- C. Remove the end cap and filter element.
- D. Remove filtering material and dispose of it in accordant to Local regulations.
- E. Refill cartridge with new filter material about half way. Tap the cartridge gently on table top a couple of times to compress the filter material. Finish filling the cartridge to with in about 1 ¼” to the top. Tap the cartridge again gently on table top a couple of times to compress the filter material. Add more filter material if need to bring material to with in 1 ¼” to the top.
- F. Place end cap on the cartridge and tape closed. **Note:** When taping end cape onto the cartridge be careful not to cover the hole on the cap with the tape. Keep the tape on the side of the cartridge and cap.
- H. Reinstall cartridges using the Cartridge replacement Instructions.

Assembly Drawing of the Filter Housing



Notes

If you are pulling a vacuum on the chamber STOP the pump immediately. Check the housing filter make sure the black O-Ring is in the proper position and the lid is tight.

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