

SMARTBOX™

Auto CO₂ System

Models *M1TSFF3C-FM*

9/20/2017



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EMC / EMI.

This equipment has been tested and found to **comply with the limits for a Class A Equipment**, pursuant to part 15 of the FCC rules.

IEC 61326-1:2005 / EZ 61326-1:2006



DISCLAIMER

THIS MANUAL MUST BE READ BEFORE SETTING UP AND OPERATING THE AUTO CO₂ SYSTEM. The user should be thoroughly familiar with the contents of this manual prior to using the system with animals. Only technicians that are properly certified should operate the Auto CO₂ System. The user/owner of this equipment shall have the sole responsibility for any damage or injury resulting from operation that is not in accordance with the authorized instructions. This includes, but is not limited to, operating the equipment outside of recommended safety levels, variation from specified operating instructions and not following standard laboratory safety procedures when working with anesthetic agents and volatile compressed gases.

The system and its components must only be modified or repaired by Euthanex-authorized service technicians. Improper modification or repair may result in danger to personnel, harm or death to animals and/or equipment damage. The user/owner of this equipment shall have the sole responsibility for any damage or injury resulting from improper maintenance and repair that is not done by authorized maintenance and repair personnel.

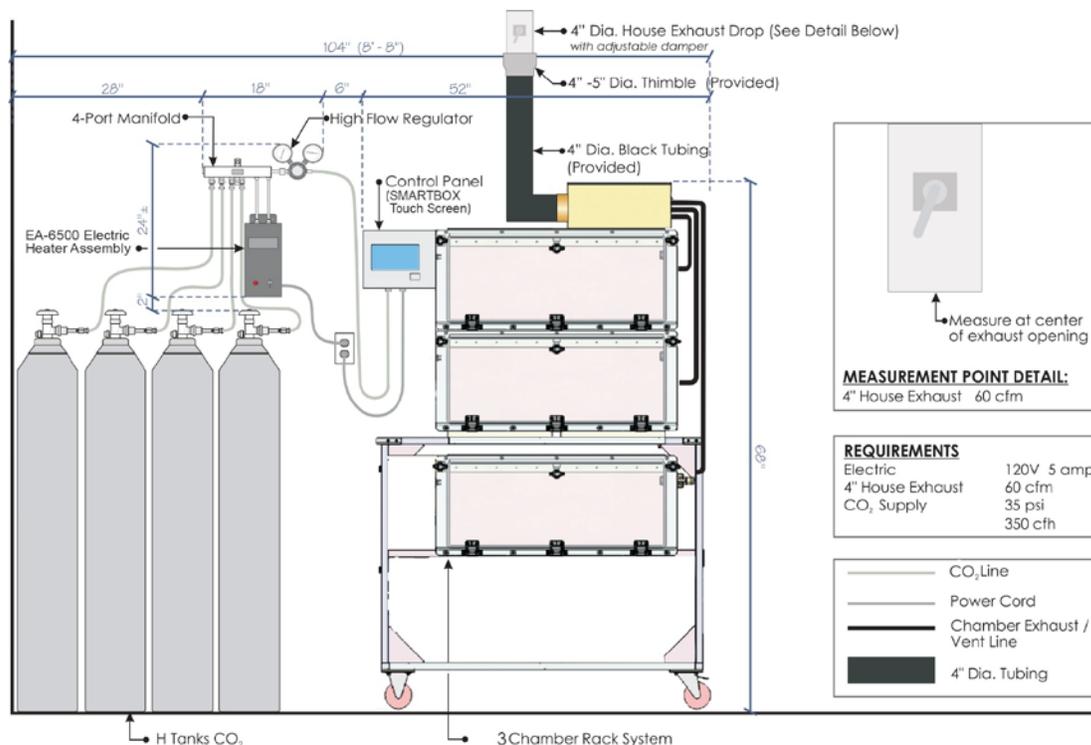
Parts that have failed, in whole or in part, exhibit excessive wear, are contaminated or are otherwise at the end of their useful life, should not be used and should be replaced with parts supplied by Euthanex Corporation. Tampering with the controller unit by unauthorized personnel voids all warranties and specifications. The manufacturer assumes no responsibility for any malfunction or failure of the unit if tampering is suspected.

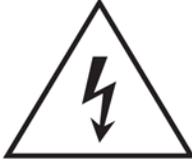
SMARTBOX FIXED FLOW SYSTEM OVERVIEW

The SmartBox Fixed Flow M1-TSFF Auto CO₂ System is an advanced automated euthanasia unit that has been developed specifically for euthanizing small rodents. The system incorporates three key components, the SmartBox Fixed Flow Controller, the M1 Chamber and the Exhaust Blower. The system works with preset timings that assure humane and efficient levels of CO₂. Gas flow rate is set at the source (fixed flow), while the timings are controlled by the automated controller unit. The controller does not impact the flow rate, but delivers gas at the rate that is output by the source.

The TSFF Controller operates in preset automated stages:

- 1) Gas Flow: Flow rate is set to conform to the AVMA guidelines for humane euthanasia. CO₂ flows into the top chamber and anesthetizes the animals with minimal stress. While the animals are anesthetized, the gas flow continues and increases the chamber's CO₂ concentration to euthanizing level.
- 2) Dwell Time: Gas flow shuts off and the chamber remains fully charged to assure euthanasia of all animals.
- 3) Optional 2nd Gas Charge can be set for each species registered in system.
- 4) Evacuation Time: Onboard blower evacuates CO₂ out of the chamber and into the in-house exhaust system and then shuts off after the chamber is fully purged. All gas is completely purged from the chamber, making it safe for personnel to remove cages at the completion of the cycle.





The lightning flash with an arrowhead symbol within an equilateral triangle, is intended to alert the user to the presence of uninsulated "dangerous voltage" within the product's enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.

1. Read these instructions.
2. Keep these instructions.
3. Heed all warnings.
4. Follow all instructions.
5. Do not use this unit near water.
6. Do not clean by spraying liquid directly onto unit.
7. Do not block any ventilation openings. Install in accordance with the manufacturer's instructions.
8. Do not install near any heat sources such as radiators, heat registers, stoves, or other unit that produce heat.
9. Do not defeat the safety purpose of the polarized or grounding-type plug. A polarized plug has two blades with one wider than the other. A grounding type plug has two blades and a third grounding prong. The wide blade or the third prong are provided for your safety. If the provided plug does not fit into your outlet, consult an electrician for replacement of the obsolete outlet.
10. Protect the power cord from being walked on or pinched particularly at plugs, convenience receptacles, and the point where they exit from the unit.
11. Unplug this unit during lightning storms or when unused for long periods of time.
12. Refer all servicing to qualified service personnel. Servicing is required when the unit has been damaged in any way, such as power-supply cord or plug is damaged, liquid has been spilled or objects have fallen into the unit, the unit has been exposed to rain or moisture, does not operate normally, or has been dropped.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the product.

Warning!

- To reduce the risk of fire or electric shock, do not expose this unit to rain or moisture.
- Use line cord supplied with the product.
- Be advised that different operating voltages require the use of different types of line cord and attachment plugs. The unit was shipped with the requested plug. If the installation requirements change please contact us for the correct plug.
- This equipment should be installed near the socket outlet and disconnection of the device should be easily accessible.
- Do not install in a confined space.
- Do not open the unit - risk of electric shock inside.

Caution:

You are cautioned that any change or modifications not expressly approved in this manual could void your authority to operate this equipment.

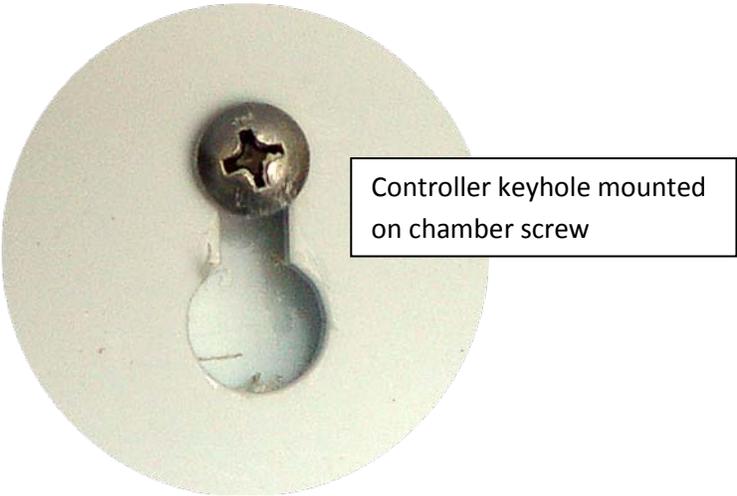
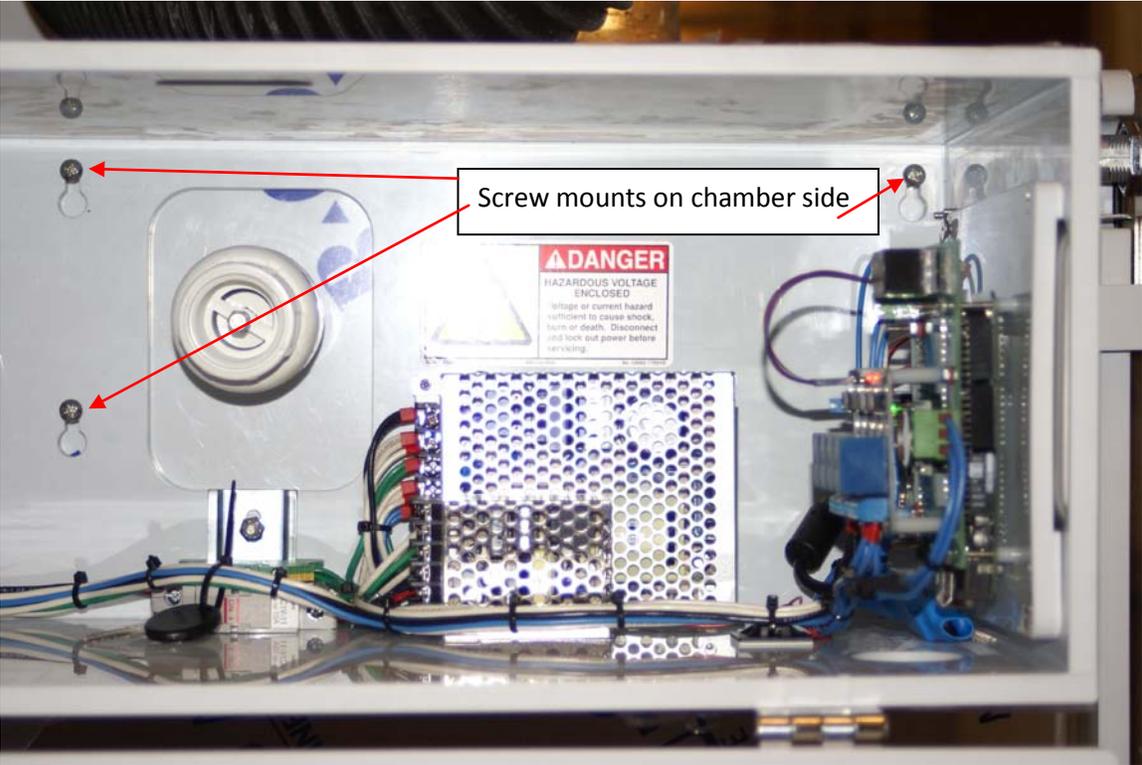
Service

- There are no user-serviceable parts inside.
- All service must be performed by qualified personnel.

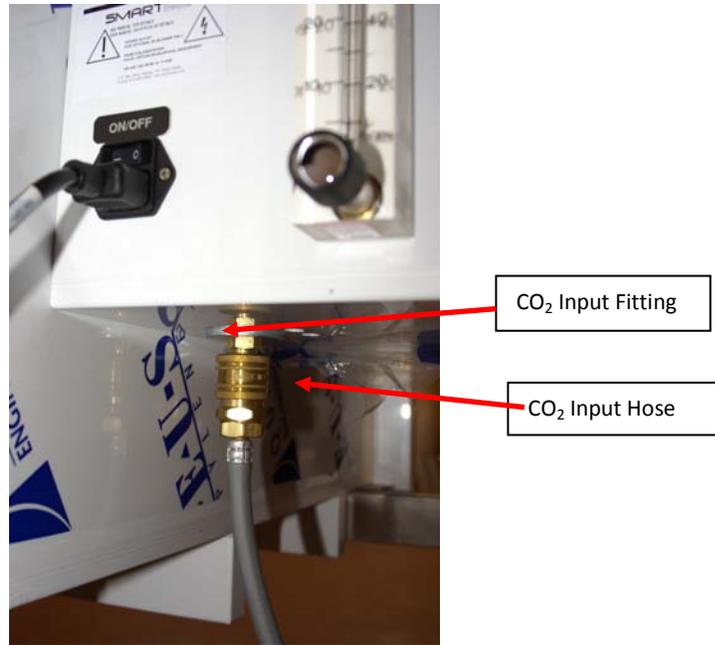
Voltage	100-240 v ac 50-60hz 5 amp Max (auto select)
Pressure	175 psi max to inlet
Temp	0 to 40°C <> 10 to 85% RH (no condensation)

SYSTEM SETUP

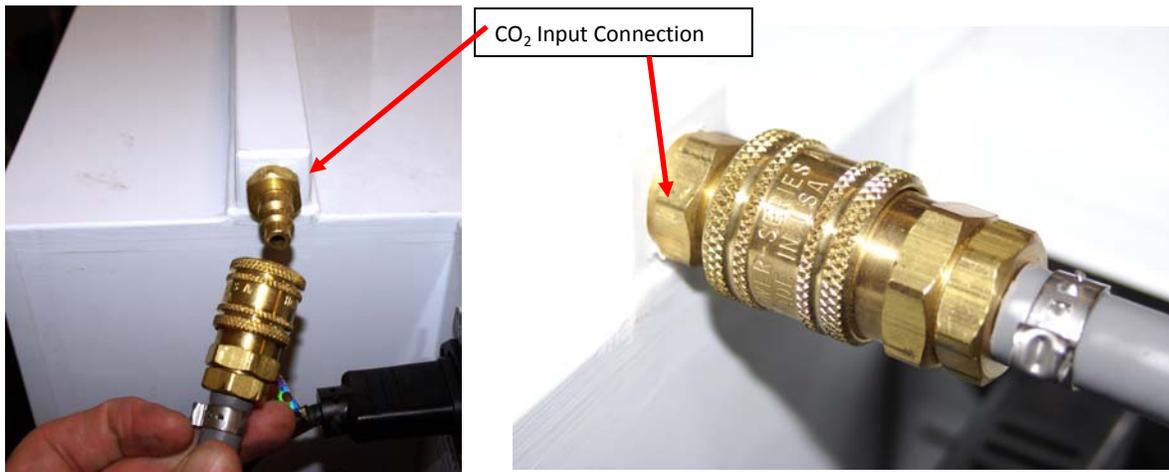
- 1) The SmartBox controller is attached to the top M1 chamber utilizing the four keyholes on the back of the controller. Note: The chamber door must be opened to hang controller.



Align the keyholes with the four screws on the left side of the chamber. Push in and slide down to secure. The screws may be tightened for permanent mounting.



- 2) On the bottom of the SmartBox side control box is a brass CO₂ input fitting that must be connected to the CO₂ supply. For Tank supply gas see step #9 and for house see step #12.



- 3) On the side of the M1 chamber is a brass CO₂ input fitting that must be connected to the CO₂ supply line that is coming out of the side control box. Do this for each chamber in the system.

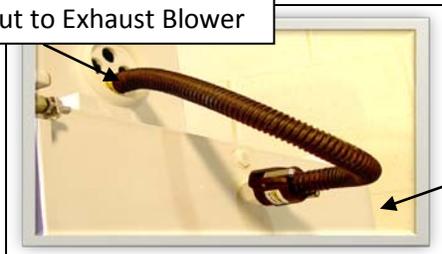


4) **TSFF-2C/3C Models Only** are equipped with the ESC safety lock microswitch that allows the second and third chamber to lock when in use. Use the four pin connector to attach to the back of the ESC.



5) Rest the exhaust blower on top of the chamber. The large 4" exhaust hose must be on left and the 1" intake hose on the right.

CO₂ Input to Exhaust Blower

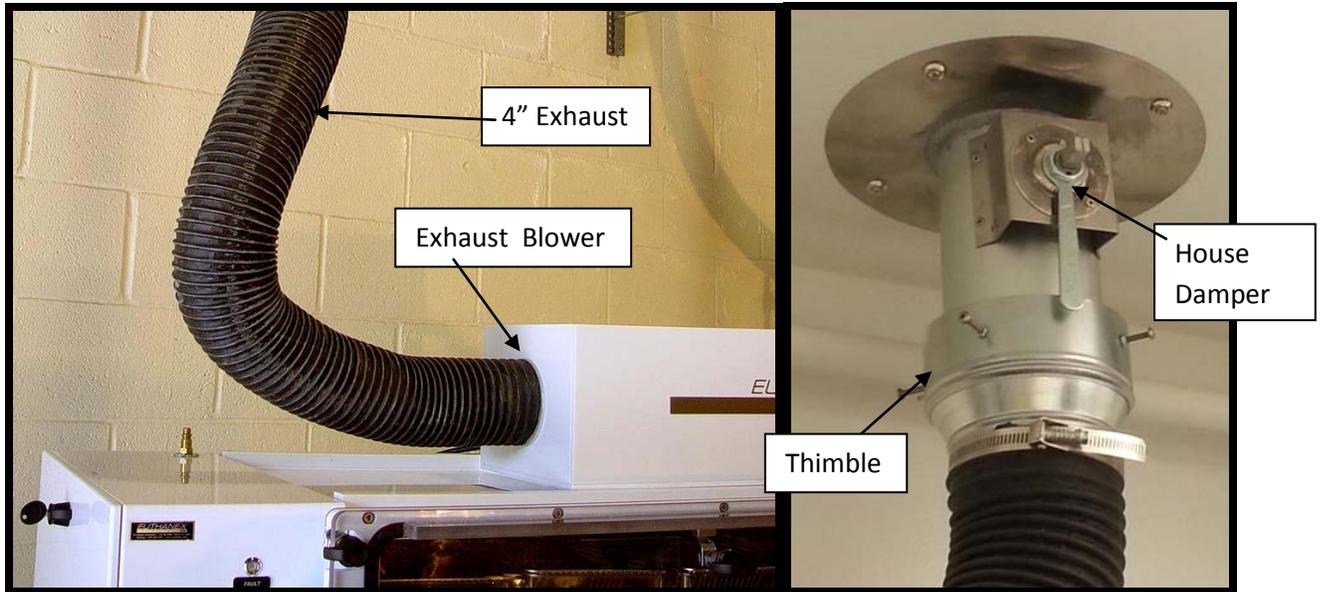


CO₂ Output from Chamber

6) Attach the 1" intake hose from the blower to the "CO₂ Out" on the right side of top chamber. The clamp connector fastens by pulling the two clamps away from chamber. Do this for each chamber in the system.

Connect the data cable 15 pin connector that is from the side control box to the female 15 pin connector on the exhaust blower box next to the power cord.





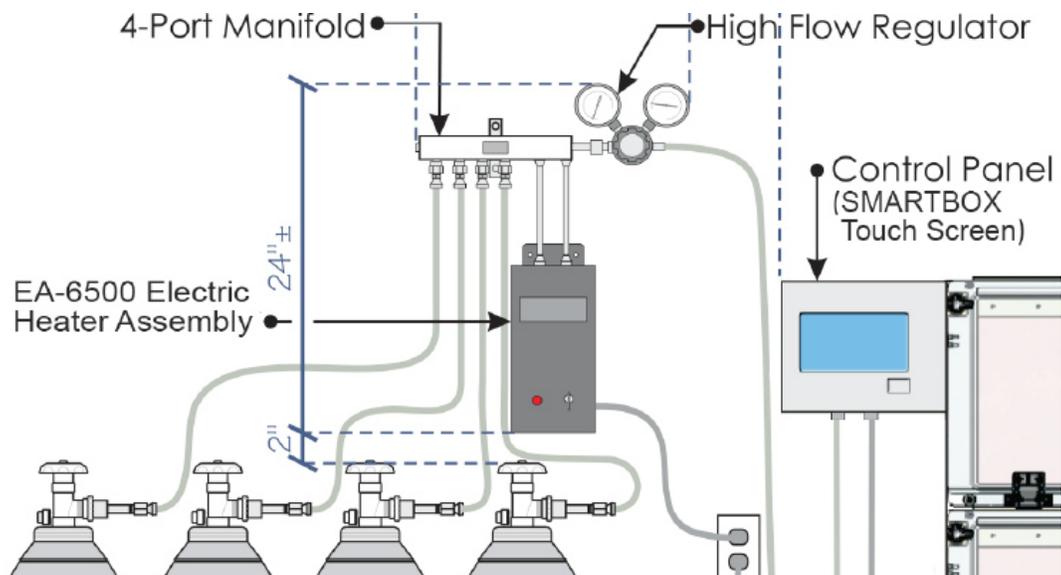
7) Attach the 4" exhaust hose from the blower to the in-house exhaust system. For facilities without in-house exhaust, drop the exhaust hose to the floor, allowing the CO₂ to dissipate away from personnel.

Euthanex also offers a flat wall plate thimble for adapting to flat return grates.

8) **For hose supplied gas go to step #12**

8) **For hose supplied gas go to step #10**

9) EA-6500 Install Instructions



The unit should be mounted above the top of the tanks as seen above. The power must be within 6 ft of the mounting location.

Tools required: level, marker, 1/4 drill bit for concrete or drywall

- A. Hold assembly firmly against the wall where you would like to mount your manifold.

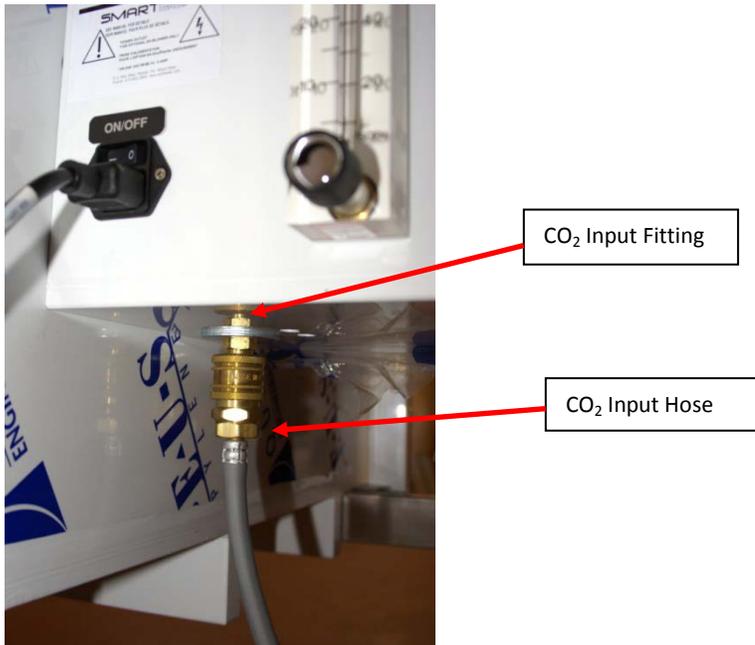


- B. Use level to ensure the manifold is level against the wall



- C. Use a marker or pencil to scribe the four (4) holes, 2 located on the manifold bracket and 2 located on the regulator bracket.
- D. Remove the assembly to expose scribe marks
- E. Use a 1/4" drill bit (not included) and drill the four (4) holes
- F. Insert the four (4) plastic anchors (included) and press firmly into the wall
- G. Hold the assembly against the wall and line up the predrilled holes
- H. Use a #2 screwdriver and screw the four (4) screws through the plate into the anchors

- I. Connect the power cord. Turn on the heater and leave it on, it is thermostatically controlled.
- J. Connect the hose from the regulator to the gas inlet on the side control box of your system.



- K. Attach CO₂ hoses to the tanks.



- L. Once the tanks are connected, open the shutoffs.



M. Adjust the regulator.

SYSTEM	SETTING
M1-TSFM-2	40 PSIG
M1-TSFM-3	40 PSIG



10) For house supplied gas connect the supplied FF-1130 hose from the barb on the house side to the connector for gas in on the side control box as shown above.



For either methods of gas supply, gas flow is regulated using the flow meters on the back side of the side control box. **ADJUST GAS INLET RATE TO 50 LPM**

11) Plug AC cord from SmartBox controller into AC power outlet.



12) Plug AC cord from exhaust blower into back of the SmartBox controller.



This outlet is to only be used for the EA-Blower supplied by Euthanex.

Cette sortie est à être utilisé uniquement pour l'EA-Soufflante fournies par Euthanex.



Plugging any other device into this outlet can cause electrical shock or fire.

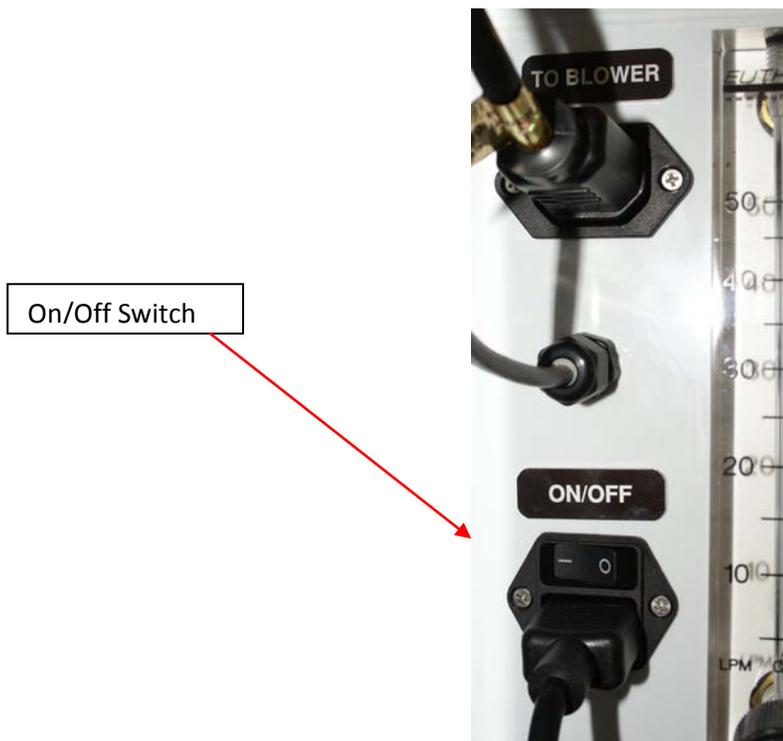
Brancher un autre appareil sur cette prise peut provoquer un choc électrique ou un incendie.

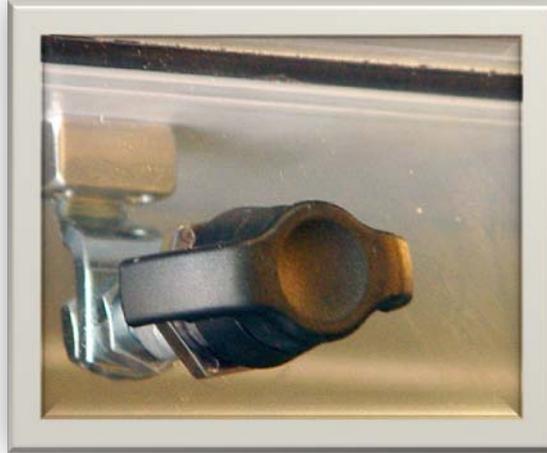
Setup is now complete.

OPERATING THE SYSTEM



- 1) Press the On switch in the back of the SmartBox FF. The unit will boot and come to the home screen ready for use. If this is the first time using the system the operating parameters must be setup prior to running any cycles (see administrator instructions).





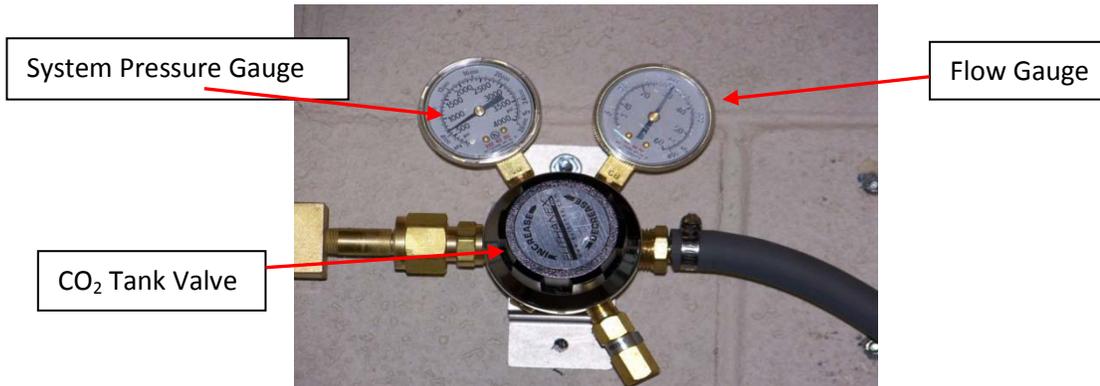
- 2) Turn the three knobs on the front of the M1 chamber door counterclockwise to open. **Please note: Knobs must be in a fully horizontal position in order to open.**
- 3) The chamber(s) is now ready to be loaded. Cages with wire bar lids can be stacked in two layers. Do not position upper layer cages directly on top of cages below. Cages must be slightly offset to allow circulation of gas to lower level cages.

A chamber can accommodate up to 20 standard mouse cages or 3 standard rat cages. Number of cages accommodated will vary based upon actual cage size. Do not attempt to place more cages than will comfortably fit into the chamber.

Cages without wire bar lids require the optional “EZ-1315 Shelf Divider Panel.”



- 4) After the chamber is loaded, close the door and **turn all three knobs fully clockwise to seal. If the knobs are not fully turned, a slight gas leak may occur.** The red “Fault” light indicates that the door is open. It does NOT indicate that the door is not fully latched.
- 5) Open the gas flow from the CO₂ manifold by turning the regulator valve knob counterclockwise. The left gauge should be reading 800 PSI if the tanks are full, less if it is not full tanks.



- 6) Open the gas flow out of the regulator by turning the control bar counterclockwise. This begins the flow of gas to the controller. **Set the regulator flow rate at 40 PSGI**



SMARTBOX®

M1-TSFM-3

Start

Admin

7) From the home screen press start.

If the system has password turned on you will get the following screen. Enter password to move forward.

Enter Password

7	8	9
4	5	6
1	2	3
C	0	⊗

Back

Next

8) Enter Password and hit "NEXT"

Select Species

MICE
RAT

Back

Status

Next

Note: The status button will show if any cycle is currently running.

9) Select the species by touching the type you want to use. Then press "Next"

Select Chambers for Cycle

Chamber A - Available

Chamber B - Available

Chamber C - Available

Back

Next

10) Select the chambers that will be used by touching the ones you want to use. As they are selected they will change state to indicate they have been selected. Then press "Next"



MICE Selected

Door A is Closed. Select Start to Proceed

Door B is Closed. Select Start to Proceed



- 11) If the doors are closed the above screen will appear. If the door is not shut properly you will see a message to close the door. Press Start to begin the cycle.
- 12) During the first initial run, adjust the regulator flow rate to 100 CFPH. This adjustment will assure a humane process. Animals will first be anesthetized with minimal stress and then euthanized while asleep. Exceeding this flow rate may introduce stress to animals and result in operation outside of AVMA guidelines. (This regulator adjustment is typically only required the first time using the system and when a full CO₂ tank is first put on line.)
- 13) The system will cycle through three stages:
 - Stage 1:** Gas flows through the chamber, fully charging the chamber with CO₂.
 - Stage 2:** Gas flow stops and the chamber remains fully charged with CO₂.

Chamber	Species	Cycle	Time Remaining	Total Time Remaining
A	MICE	Charge	05:54	09:24
B	MICE	Charge	05:54	09:26
C	Available			

Emergency Stop Home Start New Cycle

Option: If programmed the system will do a second charge and dwell cycle.

Stage 3: Exhaust blower turns on and purges the chamber, fully evacuating CO₂.

14) After the blower automatically switches off, the animals may be safely removed from the chamber.

15) The red emergency "STOP" button may be pressed at any time to stop the euthanasia cycle. A password may be required to engage the stop (admin setting).

Chamber	Total Time Remaining
A	08:58
B	09:00
C	

Select Chamber to Stop

Chamber A - Selected

Chamber B - Selected

Cancel OK

Emergency Stop Home Start New Cycle

The above screen will appear to allow the selection of chambers to stop. Touch the text of the ones you want. Press "OK". Gas will immediately stop flowing and the unit will purge.

Changing Operating Specifications Admin Functions:

Default flow rates and times were chosen to comply with the latest guidelines of the AVMA Panel on Euthanasia and through extensive testing performed by Euthanex. Flow rates and times are programmable and may be changed by a designated administrator. Refer to the “Recommended Settings” section to view the factory presets for each cycle. Flow rates and times are password protected for security. Each M1 chamber is 200 liter in volume.

The euthanasia stage delivers the CO₂, humanely euthanizing the animals. After all gas has been delivered, the dwell stage allows the gas to remain in the chamber for a pre-set amount of time, ensuring proper euthanasia. The final stage is evacuation. All gas is removed from the chambers by an independent blower, making it safe for the personnel to remove the cages.

CO2 Time: This determines the amount of time “CO2” is to be delivered during the euthanizing stage.

Dwell: After all gas has been delivered, the dwell stage allows the gas to remain in the chamber for a preset amount of time, ensuring proper euthanasia.

2n CO2 Time: This determines the amount of time “CO2” is to be delivered during the 2nd charge euthanizing stage.

2nd Dwell: After gas has been delivered for the 2nd charge, the dwell stage allows the gas to remain in the chamber for a preset amount of time, ensuring proper euthanasia.

Flow Rate: This is the pre-set amount of gas to be delivered for the chamber. The gas flow rate is delivered in liters per minute (lpm). We recommend a flow rate of 50LPM which equals 25% displacement (AVMA Guidelines).



This red button will issue the system to shutdown. Once pressed the screen will go black and the main power switch need to be turned off to shut off the unit completely.

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M1-TSFM-3



1. From the Home Screen press Admin.

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Enter Admin Password

Enter Admin Password:

7	8	9
4	5	6
1	2	3
C	0	«

Back Next

2. Enter the Administrator 4 digit password (default is 7777 and can be changed once in the admin settings screen) and press Next.

Select Admin Options



3. The Admin Options Screen will appear.

- a. Add New Species
 - i. Use this to add new Species for cycle
- b. Edit Existing Species
 - i. Use to change operating parameters of defined species that are already in the system.
- c. Change System Parameters
 - i. Use to change Exhaust time and basic system settings.
- d. Add New User
 - i. Setup new user name and password.
- e. Edit User
 - i. Change user names or passwords that are already in the system.
- f. Change Admin Password
- g. Set Unit Location

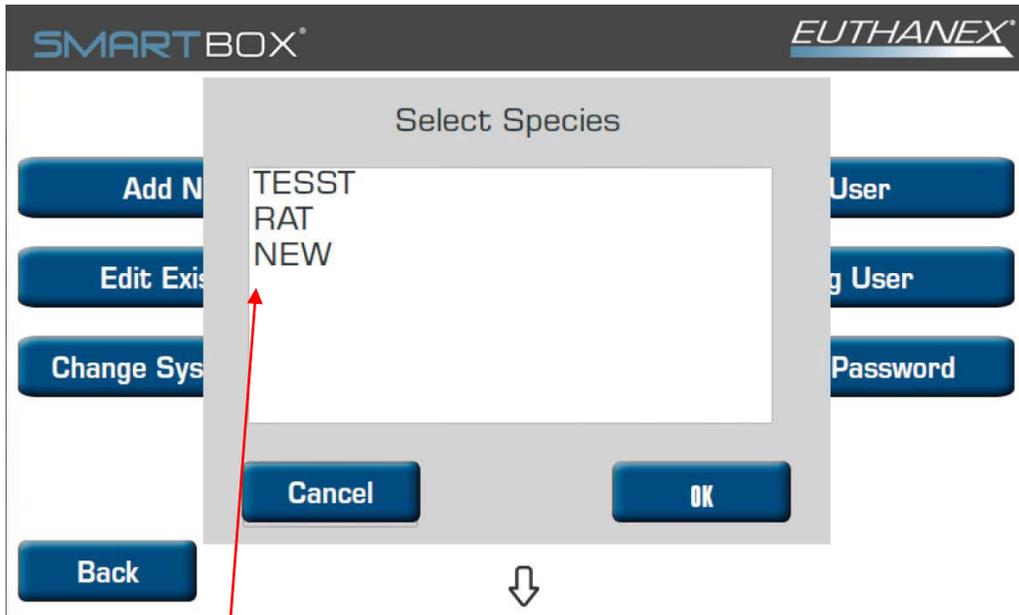
This will identify where the system is located on the use logging website.

4. To **Add new Species**, select from admin screen
5. The add new cage screen will be displayed.
 - a. Type in the Label of the Species that you want to add.

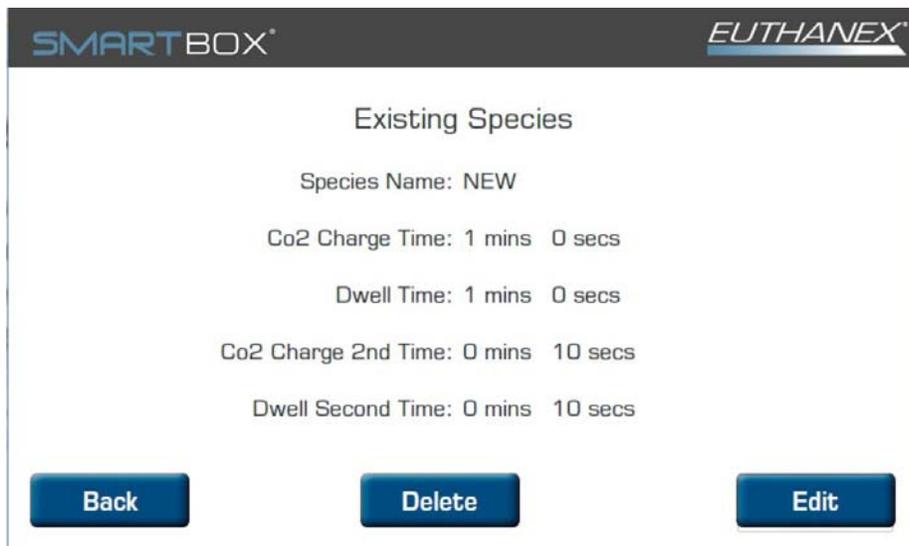
- b. When input is complete press next.
- c. Now the times need to be set for the new Species. Use the + and – next to the times to be adjusted.

- d. If a second charge is needed input times here.
- e. Once the settings are correct press Save and then OK, it will return to the Admin screen.

6. To **Edit Species**, select from admin screen



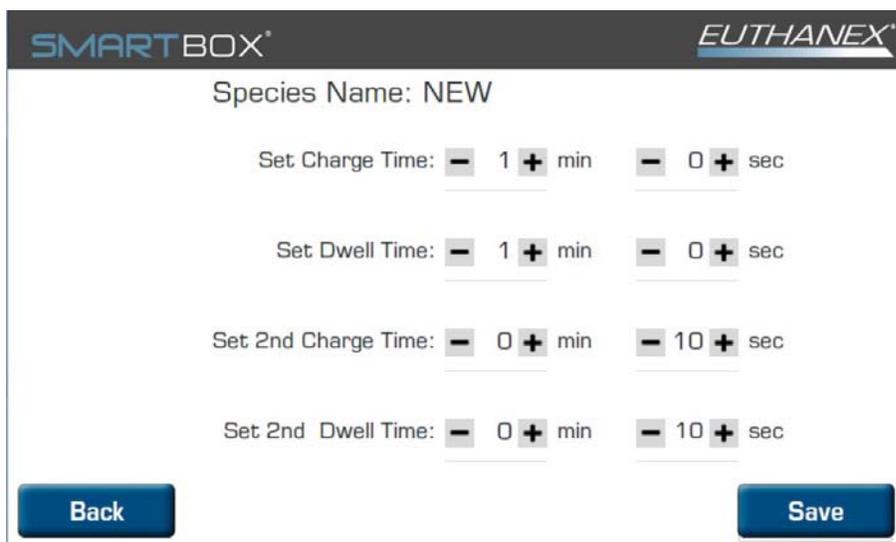
- a. Select the species that you would like to edit from the popup and hit ok.



- b. The info screen will appear. From this screen you can delete or edit the species.



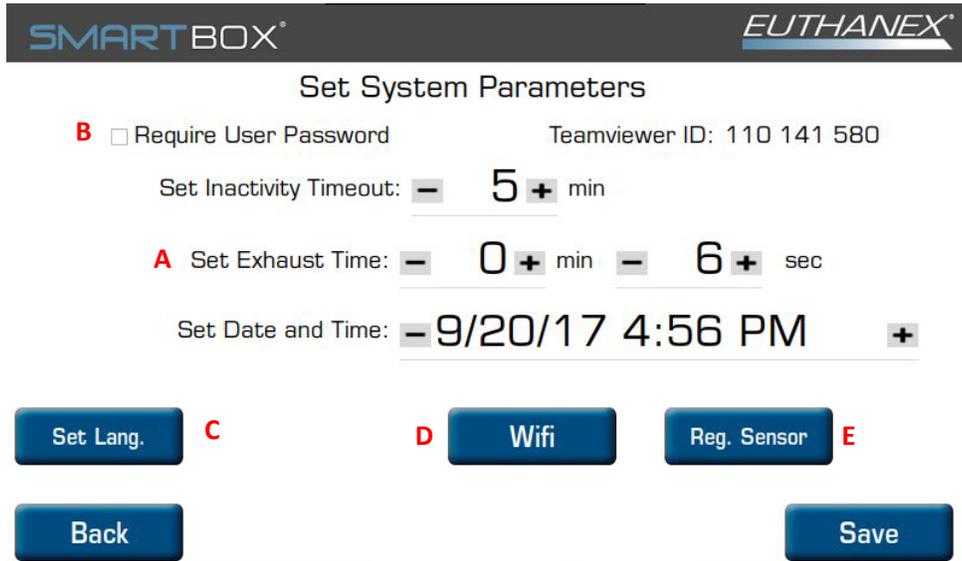
- c. Press Edit and the name edit will appear. Change name here or just hit next when complete. The next screen will appear.



- d. The parameters will appear. Change the times parameters here. Hit save when complete. A confirm popup will appear, just hit ok to return to the main screen.



7. Change **System Parameters**, select from admin screen
 - a. Change Exhaust time using the + and – next to the times to be adjusted **A**.
 - b. Select if the system will require a password for users. **B**
 - c. Adjust system language. As more translations are added we will update the software. **C**

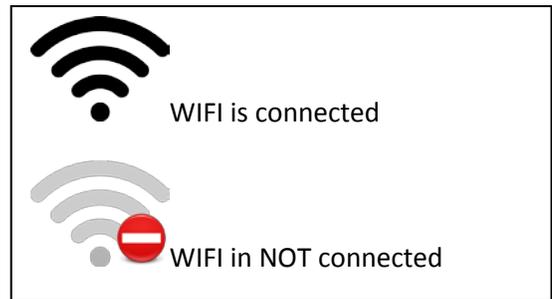


- d. Highlight the language that you would like to use then hit ok. The system will restart in the selected language.



- e. When all changes are made select OK.

- f. WIFI settings. Used to connect the unit to your WIFI network. **C**



Select the network and security protocol then enter the password. Hit Save.

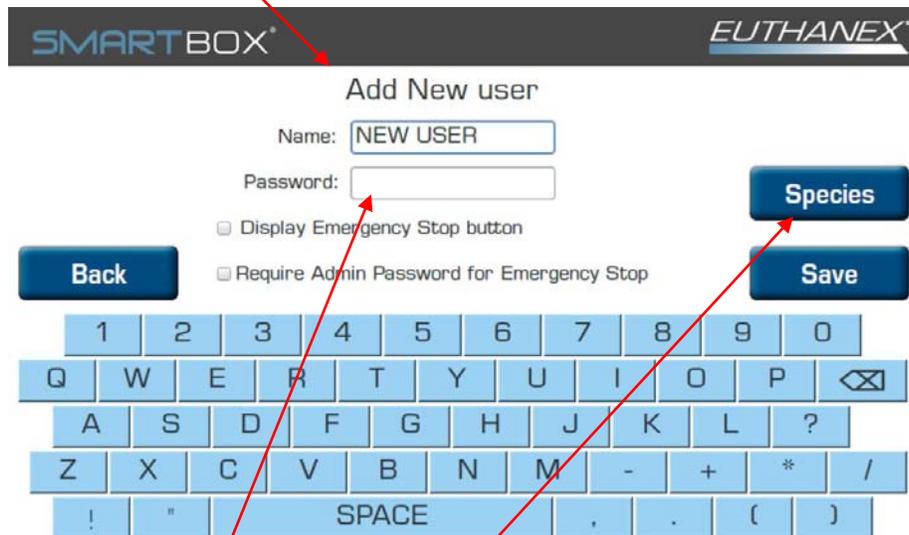
- g. Reg Sensor. **D**

If you have purchased the Remote tanks monitor option, this is where you can register and name the tank monitors.

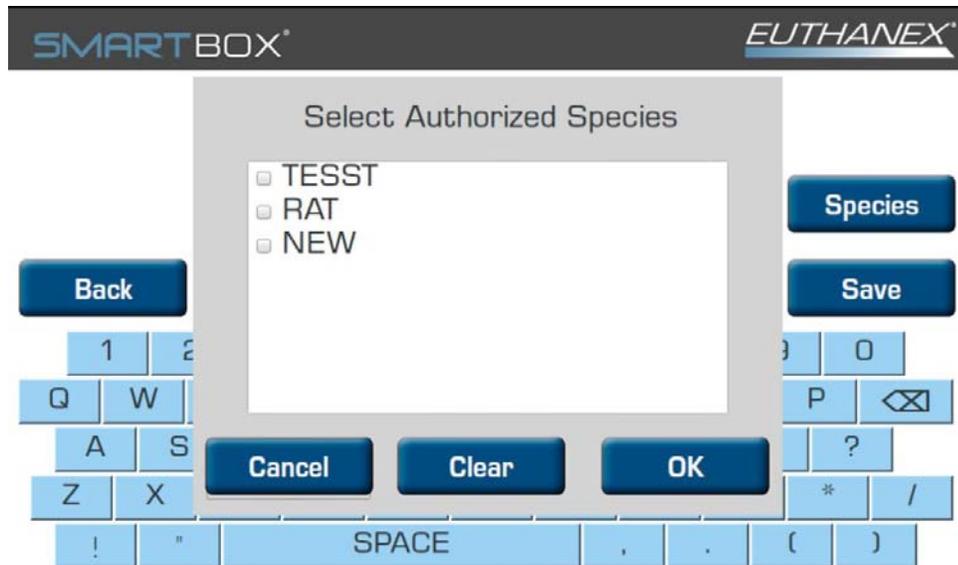
- h. When all changes are made select Save.

8. Add New User

- a. Type in the user name that you want to add.



- b. Set the user password. Select if the user will have Emergency Stop button during the cycle and if it will require a password to engage.
- c. Set the users allowable species. A selection popup will appear.



- d. This option allows the admin to limit the users to their designated cages. Set a selection next to each species allow. Once complete hit OK. A confirm popup will appear, hit OK to return to the main screen.

9. Edit User

- a. Select the use that you would like to edit from the popup. Hit OK



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Editing User

Name:

Password:

Display Emergency Stop button

Require Admin Password for Emergency Stop

Buttons: Delete, Back, Species, Save

Keyboard: 1-0, Q-W-E-R-T-Y-U-I-O-P, A-S-D-F-G-H-J-K-L-?, Z-X-C-V-B-N-M-_-+_*_/

b. Change User settings as desired. Also the user can be deleted. Hit save when complete.

10. Change Admin Password

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Edit Admin Password

Keypad: 7 8 9, 4 5 6, 1 2 3, C 0 <X>

Buttons: Back, Save

a. Input current Admin password, change to new password and hit save.

11. Use logging website.

For the unit to send logs to our usage website it must be on wi-fi

To access logs:

<https://eztrakdata.com/runlog/runlog.swf>

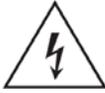
use the user id and password that was provided to you on the calibration sheet for the unit. If you did not get user access please call us and we will set one up for you.

TROUBLESHOOTING

Before any service is done that would require opening the unit it must be disconnected from the power source. If your location has lockout-tagout protocols please follow them.

System will not turn on:

- 1) Make sure power cord is properly plugged in.
- 2) Make sure the power switch on the back of the unit is turned in the "ON" position.



- 3) Before Checking fuses located on top of the ON/OFF switch in the back of the unit, disconnect the supply power to the unit by unplugging power cord.

Gas is not being delivered to the chamber or the flow rate is not correct:

- 1) Check that your gas supply has not run out.
- 2) Check that the CO₂ tank valve is fully open.
- 3) Check that the connections from the gas supply regulator to the controller CO₂ input is properly mated.
- 4) Check that the gray hose inside the controller is connected to the chamber input fitting.
- 5) Check that the regulator is open and set to 125 CFH.
- 6) Check that the flowmeter on the back of the control box is set to 50LPM.
- 7) Check that the electric heater, inline from the gas supply to the regulator, is operating. The heater runs intermittently, switching on when heat is required. If the gas is not adequately heated, it will not flow properly.

Gas does not completely purge from the chamber during the evacuation stage of the gas cycle:

- 1) Check that the blower box is properly connected to the chamber.
- 2) Check that all chamber exhaust/vent lines are connected to the exhaust side of chamber.
- 3) If problem continues, you may change the length of time the blower is activated by reprogramming the purge time. See page 17 for instructions on changing presets.

Not all animals are being euthanized after the completion of gas cycle:

- 1) Check that all connections in the entire system are properly attached.
- 2) Check that your gas supply has not run out.
- 3) Check that the flowmeter on the back of the control box is set to 50LPM.
- 4) It may be necessary to revise settings for the particular species that you are having difficulties with. Contact Euthanex for information on this.

Personnel gas exposure limits are being exceeded:

- 1) Check that all connections in the entire system are properly attached.
- 2) Check that the blower box is properly wired to the controller.
- 3) Check that the exhaust/vent line is connected to the exhaust side of chamber.
- 4) Check that the 4" exhaust duct is properly connected between the exhaust blower and the in-house exhaust system. The house exhaust must pull 100 – 150 CFM.

System not responsive:

- 1) Shut door message appears when doors are closed.
- 2) Screen Saver doesn't disappear when screen is touched.

In both of the above please power off system at master power switch located on the lower left of the rear side of the control box. Allow power to be off for at least 1 min.

If this troubleshooting guide does not resolve your problem, contact Euthanex Tech Support at 1-877-559-0159, or info@euthanex.com.



1-877-559-0159 Toll Free

610-559-0159 Phone

610-821-3061 Fax

www.euthanex.com

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