



# INSTRUCTION MANUAL

**EZ Systems**

Small Animal Anesthesia Systems



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## ABOUT THIS MANUAL

The following symbols are used in this guide:



This symbol indicates a CAUTION. Cautions warn against actions that can cause damage to equipment. Please read these carefully.



This symbol indicates a WARNING. Warnings alert you to actions that can cause personal injury or pose a physical threat. Please read these carefully.

NOTES and TIPS contain helpful information.

## INTRODUCTION

THIS MANUAL MUST BE READ BEFORE SETTING UP AND OPERATING THE EZ-ANESTHESIA 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 to use Isoflurane vaporizer and anesthetic equipment should operate the EZ-Anesthesia 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 authorized service technicians. Improper modification or repair may result in danger to personnel, harm or death to animal, 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. Contact WPI technical support for an list of authorized service technicians (941.371.1003/TechnicalSupport@wpiinc.com).

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 replacements parts supplied by WPI.

Opening the vaporizer unit by unauthorized personnel automatically voids all warranties and specifications. The manufacturer assumes no responsibility for any malfunction or failure of the unit if the seal is broken. Do not open or remove screws that secure cover on the water pump unit. Doing so may create electric shock hazard and will void all warranties and specifications on the unit.

# ANATOMY OF EZ ANESTHESIA

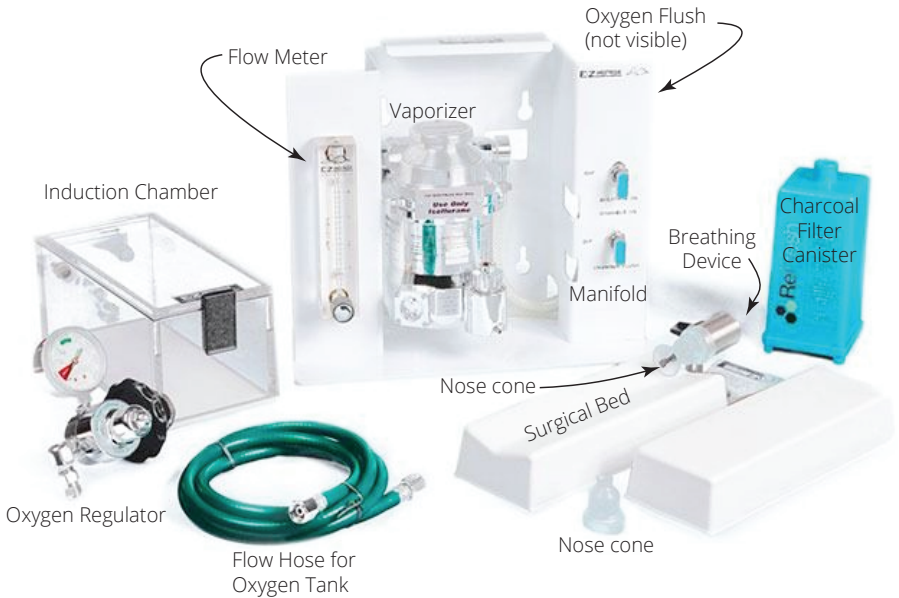


Fig. 1—The items labeled in this picture are described on the next page.

## Small Animal Inhalation Anesthesia Incorporates Three Phases:

1. First Phase: Animal(s) are placed in the induction chamber where they are initially anesthetized with an exact concentration of anesthetic, typically isoflurane.
2. Second Phase: Anesthetized animal is transferred from the induction chamber onto a surgical bed with a breathing device and mask that supplies a constant flow of anesthetic gas to keep the animal safely anesthetized during procedures.
3. Third Phase: Animal is placed in a clean chamber for recovery.

## Anatomy of an Anesthesia System

**Oxygen Source** that can be supplied from an in-house line or tank. The oxygen functions as a carrier for the anesthetic gas and serves as a blending agent to control the concentration of anesthetic.

**Oxygen Regulator** controls the pressure of oxygen from its source into the flowmeter that inputs into the vaporizer.

**Flowmeter 1** controls the flow rate of oxygen into the vaporizer.

**Vaporizer** precisely blends oxygen and the anesthetizing liquid to create an anesthetic gas at the exact concentration level required.

**Manifold** distributes anesthetic gas to the induction chamber and the breathing devices.

**Flowmeter 2** controls the flow rate of the anesthetic gas output from the vaporizer manifold to the induction chamber.

**Induction Chamber** facilitates initial anesthetizing of animal before placing on surgical bed for procedure. (Pictured with a chamber warmer to maintain animal body temperature.)

**Oxygen Flush** purges the induction chamber of anesthetic gas to ensure that no anesthetic is released into the room when transferring animals from the chamber to the surgical bed.

**Breathing Device** delivers precisely controlled anesthetic gas to the animal.

**Nosecone** provides a secure fit for the delivery of anesthetic gas from the breather to the animal and minimizes the escape of gas into the room.

**Surgical Bed** acts as a stable surface for procedures and may be water-heated for precise control of body temperature during procedures.

**Water Heating Pump** provides precisely controlled, circulating heated water to the surgical bed and the induction chamber warmer.

**Charcoal Filter Canister** captures anesthetic gas from all components preventing escape of gas into the room.

## SETUP PROCEDURES

1. Attach the regulator to the oxygen tank.
  - A. To mount the EZ-320 oxygen regulator to the oxygen tank, attach regulator fitting to the Oxygen tank output and tighten the black handle wheel



CAUTION: BE SURE THE OXYGEN TANK IS SECURED AND STABLE BEFORE ATTACHING REGULATOR.

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- B. Use the EZ-330 oxygen regulator for small medical oxygen tanks that use a yoke fitting.
2. Attaching the oxygen source to the vaporizer. To connect the regulator hose to the vaporizer, connect the 6-foot green oxygen hose from regulator output to vaporizer input.
3. Connecting the vaporizer gas source to the chamber.
  - A. Connect the 6-foot chamber hose from the chamber output just below the green oxygen flush button to the induction chamber input.

- B. Attach air filter canister to the white plastic filter adaptor at the end of the large diameter exhaust line coming from the chamber.
  - C. Slide the air filter canister onto the stainless steel canister stand.
4. Connect the breathing device.
    - A. Connect the inflow tube with the metal female quick connect to the manifold.
    - B. Connect the outflow tube with the white plastic filter adaptor to the air filter canister.
    - C. Slide the air filter canister onto the stainless steel canister stand.
  5. Attach and adjust the nose cone (N/A for stereotaxic breathers).

Gas delivery mask choices:

Model #	Length	Diameter
EZ-110 mouse mask	2"	3/4"
EZ-112 rat/guinea pig	2"	1"
EZ-115 rabbit	3 1/2"	2 1/4 "

- A. Slide the nose cone onto the breather device mask port. The mask port is a standard size that can also accommodate large animal masks. Insert the black breather plug into nose cone. The plug should remain in place until the animal is ready for treatment.

## Water Pump And Surgical Pump Setup

1. Connect both tubes from the surgical bed to the two water pump tubes.
2. Before filling the pump, be sure the in/out water tubes between the pump and surgical bed are connected.
3. For proper performance, the pump should be positioned at or above the surgical bed level, not below. Placing the pump below the bed can result in water overflow and water possibly leaking on to the floor, or it could reduced the motor life.
4. Open the cap on the top of the pump. Fill the pump with room temperature water to just above the operating water level indicator line on the side of the pump and replace cap.
5. Turn on the pump to begin circulating water to the surgical bed and choose appropriate temperature setting. The recommended setting for one or two beds is LOW. For three or more beds, the recommended setting is HIGH.
6. The operating water level will quickly diminish. If the water level falls below the indicator line, turn off the pump, remove cap and add water up to the indicator line. Do not exceed the indicator line level. Replace the cap and operate the



pump. Repeat steps 4 and 5 until the water stabilizes at the line level.

7. Once the system is stabilized at the line level, run the pump continuously. The bed will reach the temperature set point in approximately twenty minutes.

NOTE: Multiple surgical beds can work with one water pump.

- A. Connect pump output to first bed input.
- B. Connect first bed output to second bed input.
- C. Connect second bed output to pump input.
- D. Additional beds may be added following this basic procedure.

## Isoflurane Vaporizer Setup

Pay attention to all warnings and cautions, as these draw attention to potentially harmful or dangerous results.

### Cautions and Warnings

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**CAUTION:** The vaporizer must **ONLY** be used with Isoflurane. No other agent is acceptable and may be dangerous.

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**CAUTION:** Isoflurane should only be used by licensed personnel. Wear appropriate facemask and follow safety procedures as recommended by OSHA and your facility safety officers. If you have any questions regarding safety, please contact WPI for assistance.

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**WARNING: PREGNANT WOMEN SHOULD NOT BE EXPOSED TO ISOFLURANE.**

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**CAUTION:** During use, frequently check that the Isoflurane level is between the minimum and maximum marks on the sight glass level indicator. Refill the vaporizer before the liquid level reaches the minimum mark.

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**CAUTION:** The vaporizer must **NEVER** be modified, dismantled, calibrated or serviced by unauthorized personnel. The vaporizer **MUST** be serviced at an approved Service Center. The unit should be serviced for cleaning and calibration every one to two years.

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**CAUTION:** The vaporizer **MUST** be connected so that the flow of gas to the animal is as indicated by the arrows on the device. The incorrect flow direction will result in wrong dosage.

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**CAUTION:** Before use, **ALL** connections must be checked for leaks and functional tests **MUST** be performed, as is the normal procedure for an anesthetic device.

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**CAUTION:** Keep the vaporizer upright at all times and do not carry the vaporizer by holding the dial control.

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## Filling the Vaporizer

1. The control dial must be in OFF position. Press the lock button to turn the dial. Always keep the dial in the OFF position when the unit is not in use.
2. Verify that the drain plug is closed.
3. Remove the filler cap by turning it counterclockwise.
4. Verify that the liquid agent is Isoflurane.
5. Slowly pour the agent into the opening.
6. Observe the proper level through the sight glass on front of the vaporizer.
7. Replace the filler cap and tighten it securely.

## OPERATING THE SYSTEM

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**CAUTION:** Before using the system, verify that all elements are set up and functioning properly, following safety checks as recommended by OSHA and your safety officer. Check the system for gas leaks. Be sure that the water tubes and fittings are not leaking.

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**WARNING: HIGH ISOFLURANE TO OXYGEN RATIO CAN RESULT IN HARM OR DEATH TO ANIMALS.**

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**IMPORTANT:** The following Isoflurane flow and mix rates are a suggested starting point for developing your protocols. All settings should be refined and adjusted based on your own lab testing. Factors specific to your laboratory context may impact protocols. Protocols should be developed based on your requirements and careful observation of animals during anesthesia. Check the reflexes of the animal before transferring them to the surgical table.

## Prior to Operation

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**WARNING: THE SYSTEM MUST BE PROPERLY SET UP BEFORE TURNING ON ANY GAS.**

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NEVER disconnect any hoses until the oxygen has been shut off and the vaporizer is shut off. Failure to precisely follow these instructions could result in injury. Back pressure can cause the vaporizer hoses to pop, and it can cause Isoflurane to backup and leak into the manifold and possibly the flowmeter, therefore affecting system performance and accuracy.

1. Verify that all tubes are properly connected.
2. Check that water pump is operating and surgical bed is at proper temperature.



**WARNING: IMPORTANT! MAKE SURE THE SMALL BLACK PLUG IS INSERTED INTO BREATHING DEVICE NOSECONE. THE OPERATOR COULD FACE EXPOSURE TO ISOFLURANE IF THE PLUG IS NOT INSERTED PROPERLY.**

3. Check that the inlet flowmeter on the vaporizer stand is fully closed by turning it clockwise.
4. Connect the desired components to be used with the system (for example, breathing devices and chamber). At least one component must be connected before turning on any gas.
5. If the induction chamber is to be used for initial anesthesia, verify that the secondary flow meter is turned fully counterclockwise to open.
7. Fully open the oxygen tank valve.
8. Turn the inlet flowmeter knob counterclockwise to open and adjust it to:
  - Mice: 1 liter/min.
  - Rats: 1.5 liter/min.
  - Guinea Pigs: 3 liter/min.
9. If you are using the induction chamber, check for oxygen flow through the secondary flowmeter. The secondary flow meter should read between 1-3 liters/Min. depending on the species.

## Induction

1. Place animals into the induction chamber and latch the lid.
2. Set the vaporizer concentration to 5% until the animals become immobile.
3. Then, reduce the vaporizer setting to the species-appropriate level. Set the Isoflurane vaporizer dial to:
  - Mice: 1.5%
  - Rats <300gms: 2%
  - Rats >300gms: 2 – 3%
  - Guinea Pigs: 5%

**NOTE:** Guinea pigs should be anesthetized at 5%. Reduce the vaporizer setting to 3% before transferring the animal to the surgical bed.

**NOTE:** When performing surgery longer than one hour, it may be necessary to reduce the Isoflurane vaporizer dial setting by 0.5-1.0% to prevent the animals from being exposed to too much gas.

4. To be sure of complete anesthesia, animals should remain in the induction chamber for 3–5 minutes after initial induction before moving them to the surgical breathing unit. Animals in the induction chamber will remain anesthetized for as long as the gas flow continues.

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## MAINTENANCE

1. Once animals are ready to be moved to the breathing unit, be sure that the desired breathing units are connected to the manifold.
2. Reduce the secondary flowmeter setting to zero, then press the oxygen flush button for 5-10 seconds to flush anesthetic from the chamber.



**WARNING: ONLY USE THE CHAMBER FLUSH WITH CHAMBERS SPECIFICALLY DESIGNED FOR THIS PURPOSE. CHAMBER MUST HAVE A POSITIVELY SEALING GASKET BETWEEN THE LID AND BODY OF THE CHAMBER.**

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3. Quickly open the lid, remove the desired animals and place them on the surgery surface.
4. Remove the black plug from the nosecone and gently slide the animal into the nosecone. Be sure that the animal's face has a tight fit inside the nosecone.
5. If animals are to remain in the induction chamber, open the secondary flowmeter to half of the total inlet flow (For example, 0.5 liters/min. for mice).
6. If no animals remain in the induction chamber, be sure that the secondary flowmeter is turned fully clockwise to the OFF position.

NOTE: Use only the EZ-104 Versaflex Breathing Device for animals weighing more than 500g. The other units cannot handle the tidal volume of larger animals.

## Shutting Down And Flushing The System

1. Turn the vaporizer dial to the OFF position, making sure it is locked. Allow the oxygen to flow for 2 minutes to flush the gas from the host cages and breathing chambers.
2. Shut off the oxygen tank.
3. Allow the oxygen to flow until the pressure has been bled from the tank.
4. Flush the line:
  - **EZ-7000/EZ-150C; EZ-FF9000/EZ-190F** – Push the green oxygen flush button to be sure no pressure remains in the flush line.
  - **EZ-B800/EZ-108SA** – Turn the chamber lever to CHAMBER FLUSH to be sure no pressure remains in the flush line.
5. Turn the water pump switch to the OFF position.
6. To drain the fluid system, see Cleaning and Maintenance procedures (page 9).

## CLEANING AND MAINTENANCE PROCEDURES

### Draining the Vaporizer

Every two weeks, the vaporizer should be drained into appropriately marked containers and disposed of properly. Less frequent intervals may be used when the anesthetic agent does not contain additives or a stabilizing agent.



**CAUTION:** Do not drain the vaporizer into a container that is not properly marked.

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1. Set the control dial in the OFF position.
2. Remove the filler cap from the fill cylinder to reveal the bottom drain plug.
3. Place a suitable container under the drain outlet under the fill cylinder.
4. Slowly unscrew the drain plug until the liquid begins to flow into the container. DO NOT completely unscrew the drain plug.
5. When all of the liquid agent has been drained, tighten the drain plug and replace the filler cap.

### Servicing the Vaporizer

The vaporizer must be fully serviced and calibrated at least every three years. Servicing must be done by an authorized service technician. Contact WPI at 941.371.1003 or [TechnicalSupport@wpiinc.com](mailto:TechnicalSupport@wpiinc.com) for instructions



**CAUTION:** DO NOT MODIFY, TAMPER WITH OR DISASSEMBLE THE VAPORIZER. THIS UNIT MUST ONLY BE SERVICED BY AUTHORIZED PERSONNEL.

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### Removing Water from the Surgical Bed

Water in the fluid system should be changed monthly or more often depending upon use.

1. Hold the surgical bed in a vertical position with the fittings facing upward.
2. Disconnect the tubes from the pump.
3. Hold the tubes in a vertical position with the fittings facing upward.
4. Hold the tubes over a sink and remove the fittings from the tubes, allowing the water to drain into the sink.
5. Turn the surgical bed vertically with the fittings end down, allowing the water to flow from the surgical bed into the sink.

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## Removing Water from the Water Pump

1. Be sure the tubes are disconnected from the pump.
2. Unscrew the cap on the top of the water pump and tip the pump over a sink until all the water is emptied from the pump.
3. Replace the cap on the pump.

## Disinfecting the Water Pump and Surgical Bed

The water pump and surgical bed fluid system should be disinfected monthly, using the following procedure:

1. Drain the water from the system following previous instructions.
2. Add a quaternary disinfectant solution to the pump reservoir, following the instructions for filling the system from “Water Pump And Surgical Pump Setup” on page 4.
3. Set the pump temperature to its lowest setting and run the system for one hour.
4. Drain the system of disinfectant solution and refill it with distilled water.

## Cleaning the Surface of the Pump

Choose one of the following methods for cleaning the surface of the pump:

- Use a damp cloth with soapy water.
- Use Fantastik® spray cleaner.
- Use a mild, non-bleach abrasive, such as Soft Scrub®.

## WARRANTY

WPI (World Precision Instruments) warrants to the original purchaser that this equipment, including its components and parts, shall be free from defects in material and workmanship for a period of one year\* from the date of receipt. WPI's obligation under this warranty shall be limited to repair or replacement, at WPI's option, of the equipment or defective components or parts upon receipt thereof f.o.b. WPI, Sarasota, Florida U.S.A. Return of a repaired instrument shall be f.o.b. Sarasota.

The above warranty is contingent upon normal usage and does not cover products which have been modified without WPI's approval or which have been subjected to unusual physical or electrical stress or on which the original identification marks have been removed or altered. The above warranty will not apply if adjustment, repair or parts replacement is required because of accident, neglect, misuse, failure of electric power, air conditioning, humidity control, or causes other than normal and ordinary usage.

To the extent that any of its equipment is furnished by a manufacturer other than WPI, the foregoing warranty shall be applicable only to the extent of the warranty furnished by such other manufacturer. This warranty will not apply to appearance terms, such as knobs, handles, dials or the like.

WPI makes no warranty of any kind, express or implied or statutory, including without limitation any warranties of merchantability and/or fitness for a particular purpose. WPI shall not be liable for any damages, whether direct, indirect, special or consequential arising from a failure of this product to operate in the manner desired by the user. WPI shall not be liable for any damage to data or property that may be caused directly or indirectly by use of this product.

## Claims and Returns

Inspect all shipments upon receipt. Missing cartons or obvious damage to cartons should be noted on the delivery receipt before signing. Concealed loss or damage should be reported at once to the carrier and an inspection requested. All claims for shortage or damage must be made within ten (10) days after receipt of shipment. Claims for lost shipments must be made within thirty (30) days of receipt of invoice or other notification of shipment. Please save damaged or pilfered cartons until claim is settled. In some instances, photographic documentation may be required. Some items are time-sensitive; WPI assumes no extended warranty or any liability for use beyond the date specified on the container

Do not return any goods to us without obtaining prior approval and instructions from our Returns Department. Goods returned (unauthorized) by collect freight may be refused. Goods accepted for restocking will be exchanged or credited to your WPI account. Goods returned which were ordered by customers in error are subject to a 25% restocking charge. Equipment which was built as a special order cannot be returned.

## Repairs

Contact our Customer Service Department for assistance in the repair of apparatus. Do not return goods until instructions have been received. Returned items must be securely packed to prevent further damage in transit. The Customer is responsible for paying shipping expenses, including adequate insurance on all items returned for repairs. Identification of the item(s) by model number, name, as well as complete description of the difficulties experienced should be written on the repair purchase order and on a tag attached to the item.

*\* Electrodes, batteries and other consumable parts are warranted for 30 days only from the date on which the customer receives these items.*



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