FinePointe™ RC Application Manual

USER MANUAL

007508-001 Rev 05

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Essential Safety Notes

This section describes potential hazards which may exist in the operation of these units. These symbols are used to inform you of potential dangers which may exist or where caution is required. Before installing your new unit, please take time to familiarize yourself with these warnings and symbols.

Environmental Conditions

- Indoor use;
- Altitude up to 2000 m;
- Ambient temperature 4°C to 40°C
- 4°C to 40°C; 10% - 80% Rh, Non-condensing
- Mains supply voltage fluctuations not to exceed ± 10% of the nominal voltage;
- Supply voltage, voltage range: 100-240VAC, 50/60Hz, 4.0A, 180W Max.
- Overvoltage Category 2
- Pollution degree 2

Hazards and Warnings

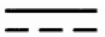
This instrument is subject to the following identified hazards:

DSI cannot guarantee the safety of this device if used other than intended or used by any procedures other than those described in this manual.

Only use a detachable power cord (AC/DC adapter) that allows for protective earthing and is a minimum of 18 AWG. This cord will need to have appropriate agency approvals, such as UL, CSA.

The AC/DC adapter requires connection to protective earthing (ground), only use with a power supply outlet and power supply cord that provides protective earthing.

Before installing your new unit, please take time to familiarize yourself with these warnings and symbols:



Direct Current (DC)

Caution

Welcome

Congratulations on joining the community of users worldwide who rely on DSI's products to perform preclinical physiologic research. Thank you for your interest in DSI products. We are committed to providing you with quality products and services.

This manual will help you get to know your FinePointe™ Resistance and Compliance (RC) system for mice, rats, and Guinea Pigs. The structure of the manual was designed to sequentially guide you through setting up your DSI system from set up to data acquisition.

What You Will Be Learning

1. Understand how respiratory data is collected to measure lung resistance and dynamic compliance in anesthetized animals via:
   Hardware
   Software

2. How to setup Mouse and Rat/Guinea Pig RC hardware.

3. How to use the FinePointe™ software to:
   a. Create a hardware configuration
   b. Create a study
   c. Calibrate hardware
   d. Acquire data
   e. Report data
   f. Review Data

4. How to care for and maintain the equipment.

Scientific Background

RC is an acronym for Resistance and Compliance. Resistance and Compliance is the original technique for evaluating lung function. By measuring lung pressure and airway airflow, lung function can be likened to a balloon with a tube through which air can enter and exit the balloon. Using this analogy, the single compartment lung model can be solved with related air flow and air volume to pressure across the lung as in the following equation (named the Single Compartment Lung Model):

$$P_{total} = \frac{V}{C_{dyn}} + R_l \dot{V}$$, Where:

- P_{total} is the total pressure across the lung
- V is the volume breathed in and out
- V' is the flow
- R_l is the resistance to air moving in and out of the lung
- C_{dyn} is the dynamic compliance of the lung

This technique is generally invasive to obtain the lung pressure.

In animals, the technique usually requires the subject to be anesthetized and trached or intubated. Ventilation is usually used, but it is not required. This system can be used to evaluate lung function for asthma, COPD, and is generally regarded as the gold standard lung function technique.

Application Overview

The FinePointe™ RC Site is a space saving solution that includes everything you need to study airway resistance and dynamic compliance in one animal. The FinePointe™ RC (Resistance/Compliance) stations have the following components built in, eliminating the need for separate products: plethysmograph, flow transducer, pressure transducer, esophageal reference, blood pressure transducer (optional), preamplifier, ventilator, in line aerosol components (optional).

This system is adaptable to different measurement models that include options for evaluating spontaneously breathing, ventilated, aerosol challenged, and IV challenged animals.

This system will measure the pressure changes that are driving respiration, and the resultant flows in and out of the airways. Whether an animal is spontaneously breathing or ventilated during measurements will dictate the method for obtaining pressure measurements. If the animal will be ventilated, there is a choice of pressure measurement options.

Pressure measurements can be obtained:

- by using the pressure transducer to measure the changes that are taking place at the airway, relative to atmospheric pressure, or
- by connecting the appropriate port of the pressure transducer to a water coupled tube that is fed into the esophagus, thereby giving a measure of the transpulmonary pressure changes that are taking place. This method of measuring pressure is required for spontaneously breathing animals but not for ventilated animals.

Flows are measured by a pneumotachograph located in the wall of the plethysmograph. The mice must be surgically implanted with an appropriate cannula that connects to the tracheal manifold. This manifold will either be open to atmosphere for a spontaneously breathing animal, or for ventilated animals, connected to the ventilator, and possibly to in-line aerosol components.

The FinePointe™ software analyzes the incoming data and presents you with instant reports.

System Components

In this section the system components necessary to perform RC studies for mouse, rat, and guinea pig are outlined. Additional components may be necessary depending upon study design and the desired endpoints; these will be discussed in dedicated sections.

The following components should be part of every FinePointe™ Mouse RC System installation:

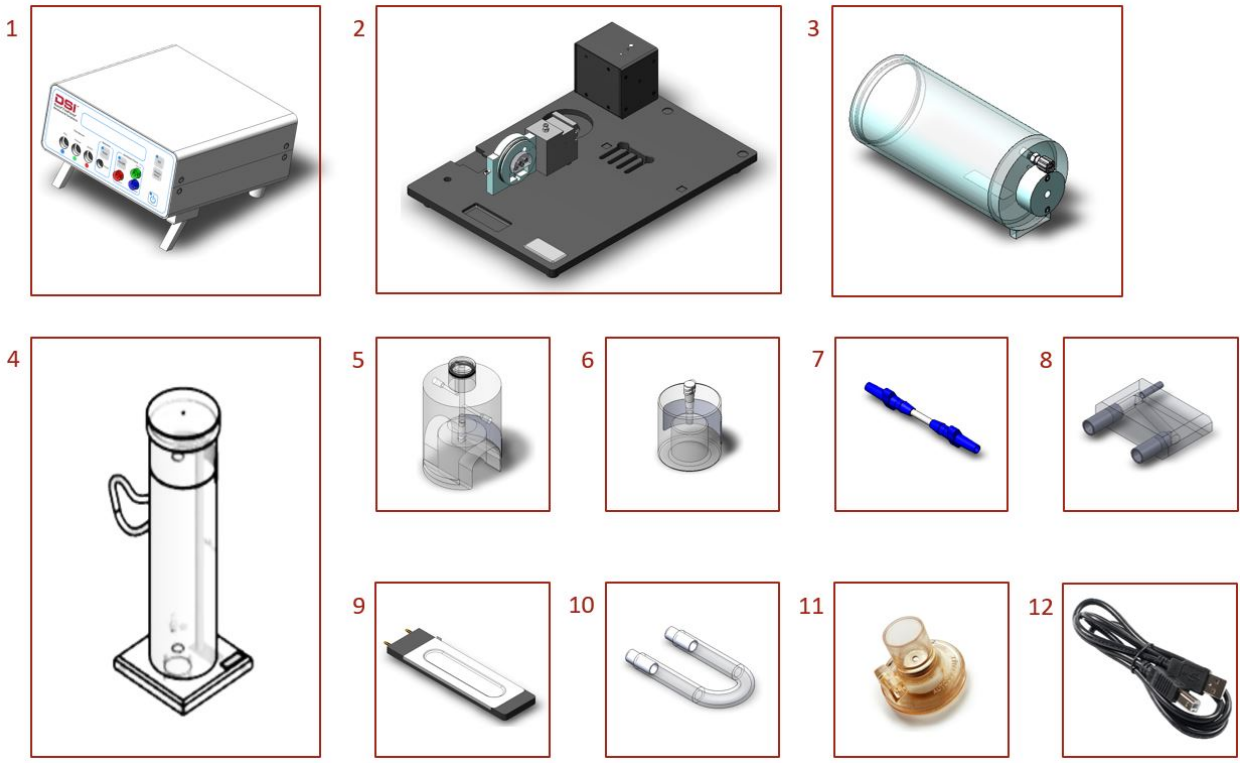


Figure 1. FinePointe™ Mouse RC system component diagram.

1 - FinePointe™ RC Controller.

The RC controller contains all the electronics and mechanical control hardware required to ventilate the subject, drive aerosol delivery, and acquire signals. Each RC site requires a dedicated controller If performing studies that include more than 1 subject, multiple controllers (up to 8) can be connected to the workstation for data acquisition.

A console is integrated into the front of the RC controller. This console permits control of the ventilation pumps and nebulizer. It also provides a user interface for calibrating the nebulizer heads. It may also be used by the FinePointe™ Software to provide data collection feedback and control.

2 - FinePointe™ RC Mouse Table.

The RC Mouse Table contains various components to keep the RC system neat and contained. Mounted to the table are the Heater Controller used to vary the temperature of the heated bed, the flow and pressure transducers used to obtain respiratory endpoints, and the plethysmography manifold used to manage access points into the closed chamber. Additionally, holders are available to properly align the aerosol block during exposures and to hold the plethysmograph chamber when loading or attending to the animal. The cable cutouts are used to expose the transducers and nebulizer cables for connection to the RC controller once routed under the table.

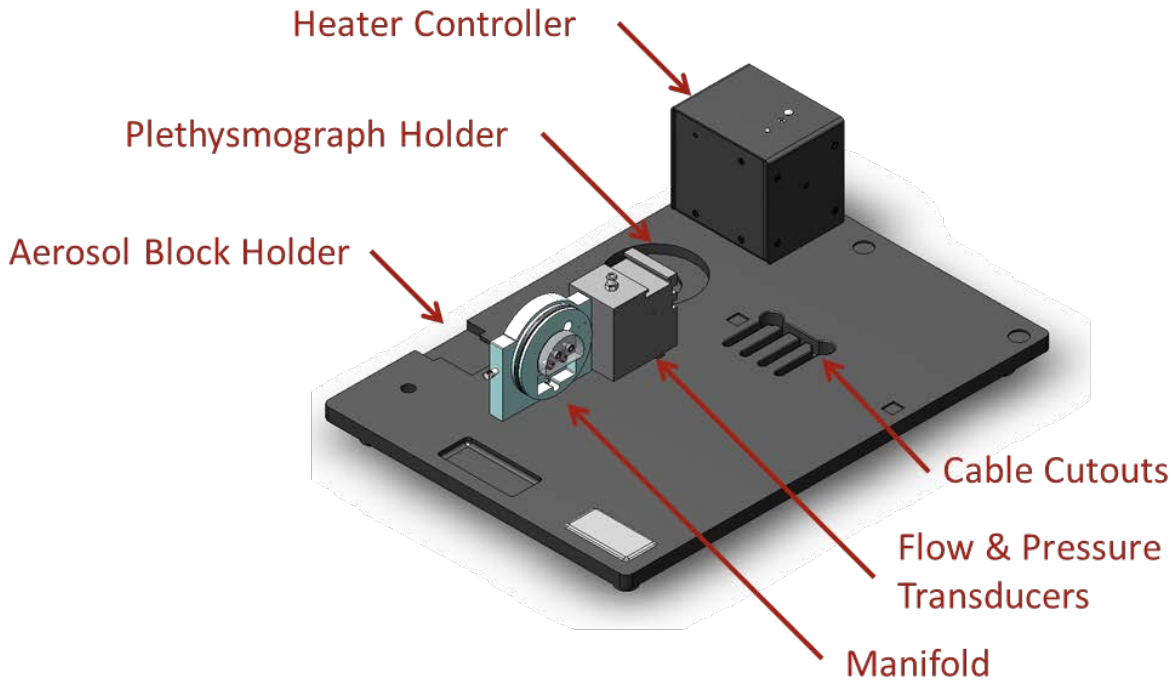


Figure 2. FinePointe™ Mouse RC table component diagram.

3 - FinePointe™ RC Plethysmograph.

The plethysmograph consists of a manifold, which is permanently mounted on the table, and the plethysmograph tube which slides over the heated bed and onto the manifold. Flows are measured by a pneumotachograph located in the wall of the plethysmograph. The mice must be surgically implanted with an appropriate cannula that connects to the tracheal manifold. This manifold will either be open to atmosphere for a spontaneously breathing animal, or for ventilated animals, connected to the ventilator, and possibly to in-line aerosol components.

4 - FinePointe™ Calibrator Column.

This component provides calibration standards for the automated flow calibration. The calibrator should be filled to the 20-cm fill line visible on the outside of the calibrator body using normal tap water. This will provide the system with the 20 cmH_20 pressure necessary to for the system to perform the automated system checks and calibration. Additionally, it provides the 7.4 milliliters (mL) of volume used to calibrate the transducers associated with the chambers.

5 - Aerosol Block.

The clear Plexiglas Aerosol Block (601-1106-001) is used to interface the Nebulizer Head to the Inspiratory Line of the ventilator. DSI recommends purchasing two aerosol blocks per site if several experiment runs will be

performed daily to ensure a clean, dry nebulizer is always available. Aerosol blocks need to be rinsed out and dried after each subject.

6 - Aerosol Cap.

The purpose of the Aerosol Cap is to interface the Calibrator Column to the Aerosol Block to permit automated calibration of the plethysmography chamber. The use of the Calibrator Cap will be discussed more in the **Mouse RC Calibration Setup** section of this manual.

7 – Aerosol Connect Tube.

This tube connects the Aerosol Block to the Manifold and is used during the calibration process, as well as when delivering aerosol to the animal during acquisition. When connecting, ensure the Aerosol Block is positioned such that the tube aligns properly with the appropriate aerosol block port (the tube should be level with the table if properly aligned).

8 – Trachea Needle Junction.

The trachea needle junction connects the Manifold to the trachea needle. It is used during the procedure to appropriately direct airflow to and from the animal during the acquisition. Ensure appropriate orientation when connecting to the Manifold, as described in the **Preparing and Loading the Animal** section of this manual.

9 - Heated Bed.

The heated bed plugs into the manifold. It is used to maintain the animal body temperature during the experiment. It can be adjusted to 3 different positions to accommodate animals of different sizes. The temperature of the heated bed may be adjusted using the screw on the top of the heater controller attached to the mouse table.

10 – Tracheal Blocking Tube.

This tube is used during the calibration process to ensure all airflow into and out of the plethysmography chamber is through the pneumotach. It does this by connecting the Manifold's inspiration port to its expiration port to close off this airflow pathway.

11 - Aerogen® Aeroneb Nebulizer Head (2 per controller recommended).

These consumable nebulizers provide the best means of nebulizing liquid compound and introducing it to the subject. Nebulizers are used when performing bronchoconstriction studies. It consists of a cup, a piezoelectric element, and an aperture plate with holes. When energy is applied, the plate vibrates rapidly, creating a micro-pumping action that generates a fine particle aerosol. It can aerosolize a broad range of formulations, including solutions, suspensions, small molecules, and macromolecules.

It is recommended to have two nebulizer heads per site for alternating use to allow for proper cleaning and drying without impacting the use of the system. The cable (not pictured) used to connect the nebulizer to the RC Controller is also provided with the RC unit.

DSI offers a two different nebulizer heads based on particle size and nebulization rate:

- 601-2306-001: 2.5 to 4µm (small) has a smaller particle size and a rate of approximately 100 µL/min.
- 601-2307-001: 4 to 6µm (standard) has a larger particle size and a rate of approximately 300 µL/min.

Understanding the Mouse Manifold and Chamber

The manifold guides airflow into and out of the chamber. It also provides access into the chamber for measuring instruments, chamber calibration, and heated bed control. This section outlines the various manifold access ports and chamber components.

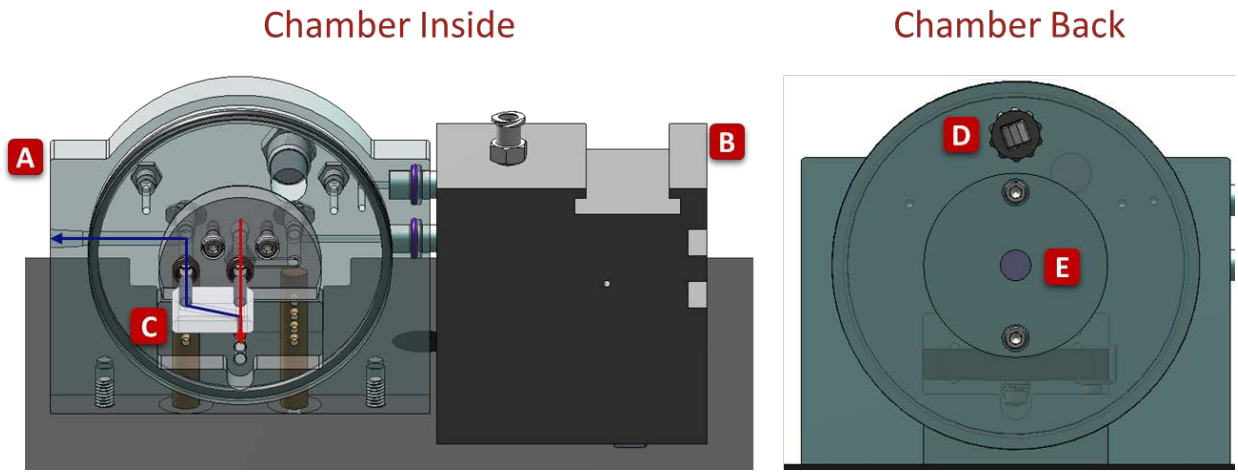


Figure 3. FinePointe™ Mouse RC chamber diagrams.

In the diagram above, the Manifold (A) is connected to the pressure and flow transducers (B) and the trachea needle junction (C). The back of the chamber contains the Exhaust port (D) used during calibration and the pneumotach (E).

The airflow through the manifold is indicated by the arrows:

- Red Arrow — Indicates air flow from the inspiration port (6 in diagram below) which delivers air, and optional aerosol, from the controller's ventilator inspiration port/aerosol block.

- Blue Arrow — Indicates air flow from the subject during expiration, which is diverted through the trachea needle junction, out through the expiration port (8 in diagram below) and to the controller's ventilator expiratory port.

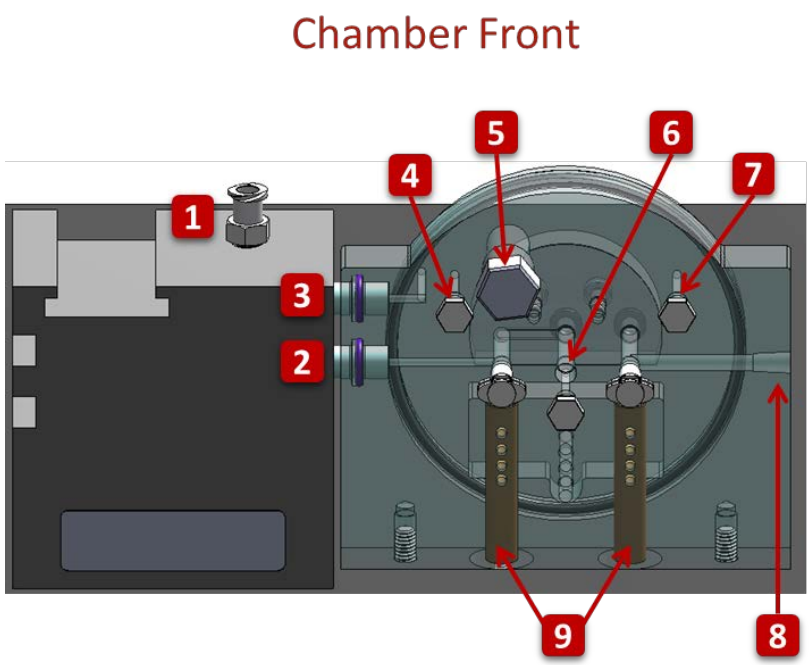


Figure 4. FinePointe™ Mouse RC faceplate diagram.

Callout #	Description
1.	Pressure Transducer reference port. This port is either open to atmospheric pressure or connected to esophageal tube. Please see the Mouse RC Setup **For Ventilated Animals using an Esophageal Reference Pressure** section of this manual.
2.	Pressure transducer access port used to measure tracheal pressure.
3.	Flow transducer chamber access port used to calculate airflow, once calibrated, into and out of the plethysmograph chamber.
4.	Chamber access port used during calibration process or for esophageal tube if using esophageal pressure as the reference. May also be used for optional Blood Pressure measurements. See Blood Pressure Monitoring.
5.	Chamber access port used to feed the ECG leads into the chamber. See ECG Monitoring
6.	Port used to connect the aerosol block to the chamber using the aerosol connect tube. If not delivering an aerosol, the ventilator's inspiration tube is connected here.
7.	Chamber access port for optional IV line. See Delivering IV Challenges.
8.	Expiratory port connected to the ventilator's expiratory tube.
9.	Conductive pins used to control the temperature of the heated bed.

Rat/GP RC Components

The following illustrates the necessary components of the FinePointe™ Rat/Guinea Pig RC System (not to scale):

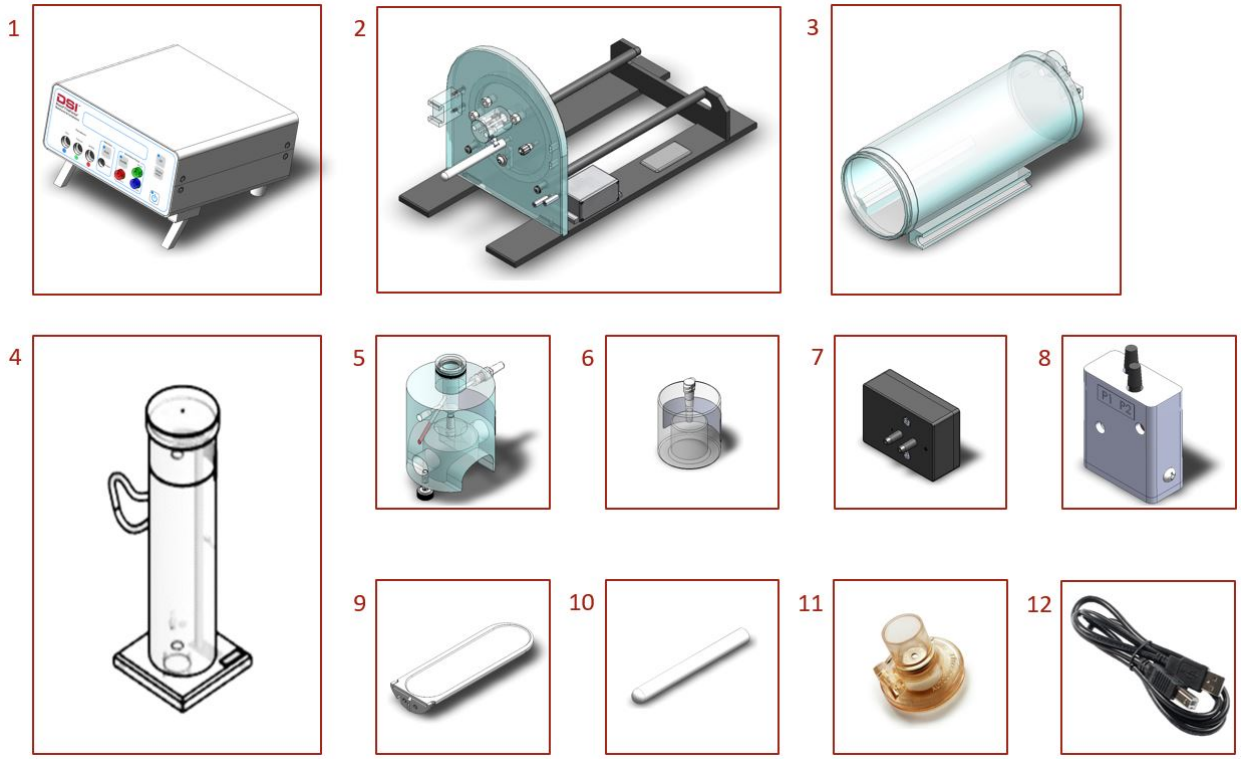


Figure 5. FinePointe™ Rat/GP RC system component diagram.

1 - FinePointe™ RC Controller.

The RC controller contains all the electronics and mechanical control hardware required to ventilate the subject, drive aerosol delivery, and acquire signals. Each RC site requires a dedicated controller If performing studies that include more than 1 subject, multiple controllers (up to 8) can be connected to the workstation for data acquisition.

A console is integrated into the front of the RC controller. This console permits control of the ventilation pumps and nebulizer. It also provides a user interface for calibrating the nebulizer heads. It may also be used by the FinePointe™ Software to provide data collection feedback and control.

2 - FinePointe™ RC Rat/GP Table.

The RC BP Table contains various components to keep the RC system neat and contained. The Heater Controller, used to vary the temperature of the heated bed, is mounted to the table. The flow and pressure transducers, used to obtain respiratory endpoints, and the plethysmography manifold, used to manage access points into the closed chamber, are mounted to the table separately. Additionally, plethysmography chamber guides are present to ensure proper alignment with the table faceplate.

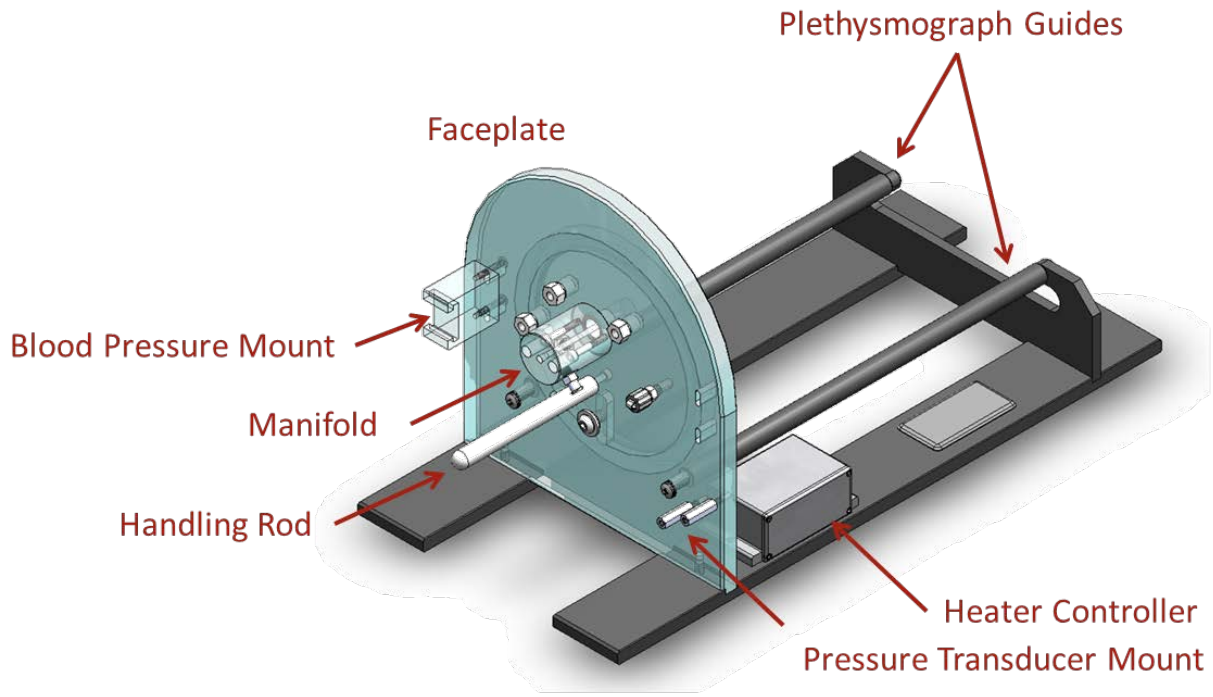


Figure 6. FinePointe™ Rat/GP RC table diagram.

3 - FinePointe™ RC Plethysmograph.

The plethysmograph consists of a manifold and the plethysmograph tube which slides over the heated bed and onto the faceplate. Flows are measured by a pneumotachograph located on the back wall of the plethysmograph. The subject must be surgically implanted with an appropriate cannula that connects to the tracheal manifold. This manifold will either be open to atmosphere for a spontaneously breathing animal, or for ventilated animals, connected to the ventilator, and possibly to in-line aerosol components.

4 - FinePointe™ Calibrator Column.

This component provides calibration standards for the automated flow calibration. The calibrator should be filled to the 20-cm fill line visible on the outside of the calibrator body using normal tap water. This will provide the system with the 20 cmH_20 pressure necessary to for the system to perform the automated system checks and calibration. Additionally, it provides the 7.4 milliliters (mL) of volume used to calibrate the transducers associated with the chambers.

5 - Aerosol Block.

The clear Plexiglas Aerosol Block (601-1105-001) is used to interface the Nebulizer Head to the Inspiratory Line of the ventilator. DSI recommends purchasing two aerosol blocks per site if several experiment runs will be performed daily to ensure a clean, dry nebulizer is always available. Aerosol blocks need to be rinsed out and dried after each subject.

6 - Aerosol Cap.

The purpose of the Aerosol Cap is to interface the Calibrator Column to the Aerosol Block to permit automated calibration of the plethysmography chamber. The use of the Calibrator Cap will be discussed more in the **Rat/GP RC Calibration Setup** section of this manual.

7 – Flow Transducer.

This transducer (601-2230-001) is mounted to the back panel of the plethysmograph chamber. When calibrated, the pressure changes measured by this transducer are linearly related to the flow of air moving in and out of the plethysmograph to obtain respiratory endpoints from the test subject.

8 – Pressure Transducer.

This transducer (601-2229-001) is mounted to the faceplate of the RC table. It is used to measure the subject's tracheal pressure, and to measure esophageal pressure, should it be used as a reference to remove chest wall resistance. Please see the **Hardware Setup** section of this manual.

9 - Heated Bed.

The heated bed plugs into the manifold. It is used to maintain the animal body temperature during the experiment. It can be adjusted to different positions to accommodate animals of different sizes. The temperature of the heated bed may be adjusted using the set point adjustment screw on the side of the heater controller.

10 – Handling Rod.

This rod is used secure the aerosol block to the RC table. Use the aerosol block thumb screw to tighten in place.

11 - Aerogen® Aeroneb Nebulizer Head (2 per controller recommended).

These consumable nebulizers provide the best means of nebulizing liquid compound and introducing it to the subject. Nebulizers are used when performing bronchoconstriction studies. It consists of a cup, a piezoelectric element, and an aperture plate with holes. When energy is applied, the plate vibrates rapidly, creating a micro-pumping action that generates a fine particle aerosol. It can aerosolize a broad range of formulations, including solutions, suspensions, small molecules, and macromolecules.

It is recommended to have two nebulizer heads per site for alternating use to allow for proper cleaning and drying without impacting the use of the system. The cable (not pictured) used to connect the nebulizer to the RC Controller is also provided with the RC unit.

DSI offers a two different nebulizer heads based on particle size and nebulization rate:

- 601-2306-001: 2.5 to 4µm (small) has a smaller particle size and a rate of approximately 100 µL/min.
- 601-2307-001: 4 to 6µm (standard) has a larger particle size and a rate of approximately 300 µL/min.

12 - USB 2.0 Cable.

The USB 2.0 cable (Type A to Type B) connects the controller unit to the computer. *Note*: Power cord is not displayed but comes with the system.

Understanding the Rat/GP Manifold and Chamber

The manifold guides airflow into and out of the chamber. It also provides access into the chamber for measuring instruments, and chamber calibration. This section outlines the various manifold access ports and chamber components.

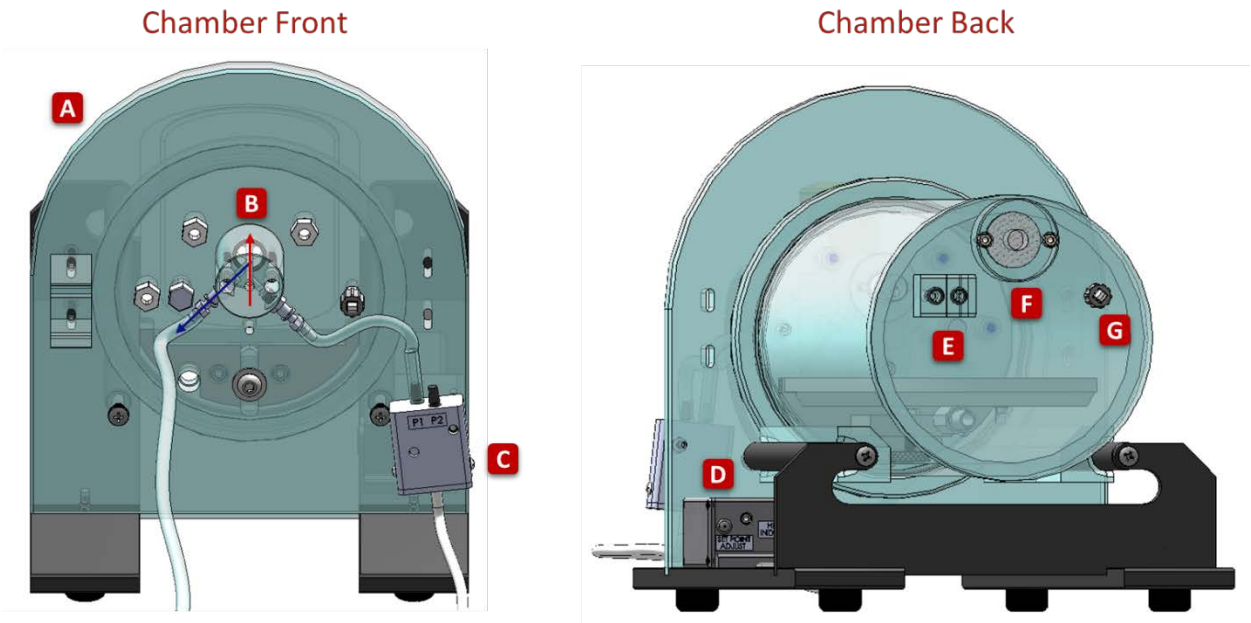


Figure 7. FinePointe™ Rat/GP RC chamber diagrams.

In the diagram above, the Manifold (B) and Pressure Transducer (C) are mounted to the Faceplate (A). The airflow through the manifold is indicated by the arrows:

- Red Arrow — Indicates air flow from the inspiration port (6 in diagram below) which delivers air, and optional aerosol, from the controller's ventilator inspiration port/aerosol block.
- Blue Arrow — Indicates air flow from the subject during expiration, which is diverted through the trachea needle junction, out through the expiration port (7 in diagram below) and to the controller's ventilator expiratory port.

When looking at the back of the chamber, the Heated Bed Controller (D) mounted to the table can be seen. The Flow Transducer ports (E), pneumotach (F), and Exhaust port (G) are located on the back of the chamber.

The following diagram includes find numbers for learn more about the different components of the Chamber Front.

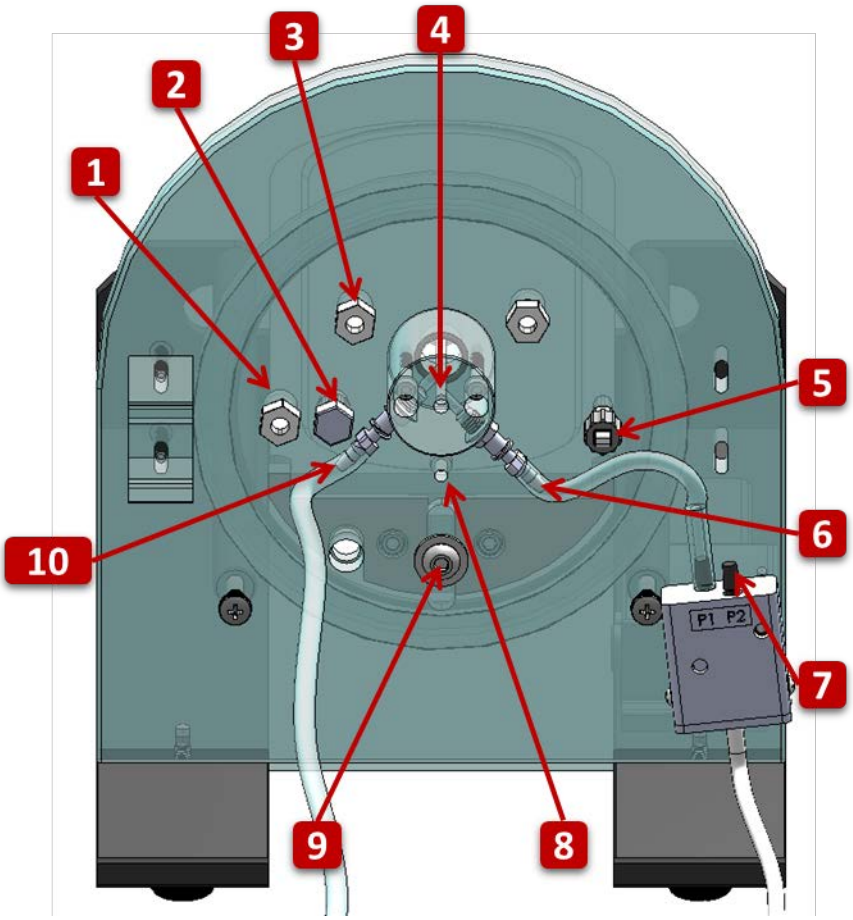


Figure 8. FinePointe™ Rat/GP RC faceplate diagram.

Callout #	Description
1.	Chamber access port for optional Blood Pressure measurement. Please see the Rat/GP RC Setup **Blood Pressure Monitoring.**
2.	Chamber access port used to feed the ECG leads into the chamber. Please see the ECG Monitoring section for more details.
3.	Chamber access port for optional IV line. See **Delivering IV** Challenges.
4.	Port used to connect the aerosol block to the chamber. If not delivering an aerosol, the ventilator's inspiration tube is connected here.
5.	Chamber access port used for esophageal tube if using esophageal pressure as the reference.
6.	Pressure transducer access port used to measure tracheal pressure.
7.	Pressure Transducer reference port. This port is either open to atmospheric pressure or connected to esophageal tube. Please see the Rat/GP RC Setup **For Ventilated Animals using an Esophageal Reference Pressure** section of this manual.

Callout #	Description
8.	Handling Rod connection site.
9.	Heated Bed height adjustment screw.
10.	Expiratory port connected to the ventilator's expiratory tube.

Controller

The RC Controller contains many inputs, ports, and buttons. In this section, the purpose of each is discussed based on physical location of the item on the Controller.

Front Panel Connections

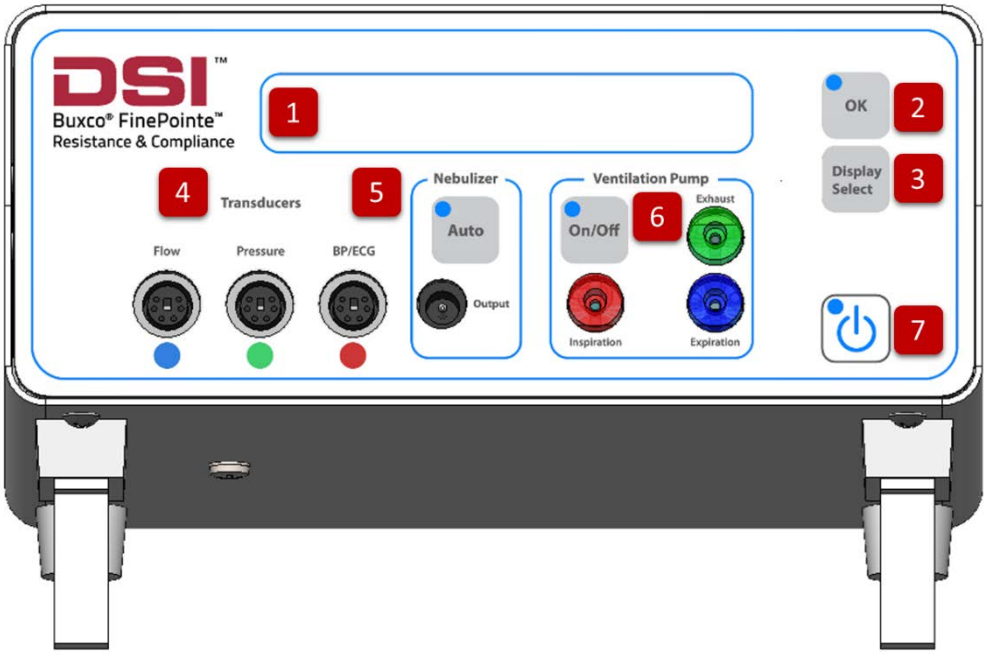


Figure 9. FinePointe™ RC Controller front panel connections diagram.

1 – Display Console.

This displays information about the RC Controller, as well as to communicate messages to the user.

2 – OK button.

Used to respond to the information in the display window. Push to complete a task or to acknowledge a request shown in the window.

3 – Display Select button.

Used to select the information shown in the display window. Push to display the version of firmware and serial number or to scroll through the screens that are set up in the host computer.

4 – Transducer Inputs.

Three color coded inputs connect to compatible transducers for Flow (blue), Pressure (green), and Blood Pressure/ECG (red).

5 – Nebulizer Output.

The Aerogen® Aeroneb Nebulizer Head gets connected to this jack allowing the system to control the start, stop, and rate of nebulization based on the user defined Study protocol.

Pressing the **Auto** button will toggle on and off the ability for the Controller to run the Nebulizer. The Display Console will indicate which setting is active when the button is pressed. In general, this should be set to 'On'.

6 – Ventilation Pump Ports.

Three ports (Inspiration, Expiration, and Exhaust) are provided for the ventilation pump tubing. Inspiration provides air to the lungs. Expiration accepts a passive breath (allows flow from the lungs). The Exhaust port gives you the option to sample expired air. Do not obstruct the exhaust line or you will cause resistance in the flow pattern. Leave it open to air if you're not sampling. The included Exhaust tubing should *only* be connected during Calibration, not during data acquisition.

The On/Off button for the Ventilation Pump shows a blue light when switched on. The blue light flashes with the beat of the pump. The light turns purple during inspiration and returns to blue during expiration.

7 – Power button.

If no light displays, the unit is switched OFF. When the unit is switched ON, colored lights indicate the USB connection status.

- Red - the unit is switched ON, but the USB is not connected.
- Purple - USB "full" speed (12 megabits per second).
- Blue - USB "high" speed (480 megabits per second).

Back Panel Connections

The back panel of the RC controller has the following connections.

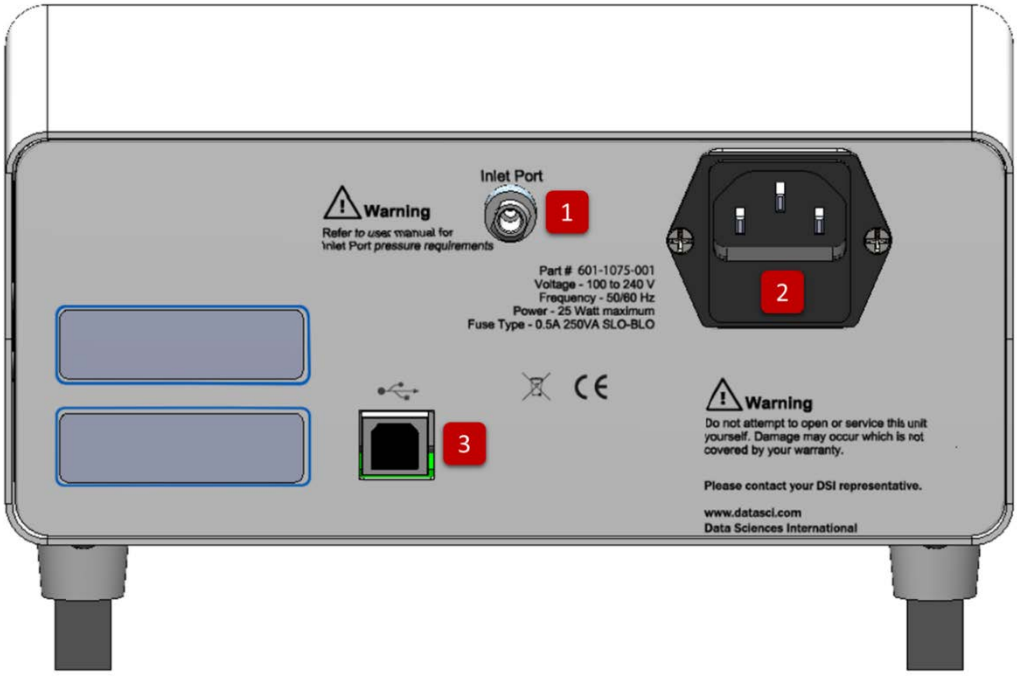


Figure 10. FinePointe™ RC Controller back panel diagram.

1 - Inlet Port.

The inlet port is left open to atmosphere.

2 – Power Input.

For use with the Mouse RC Table, connect to AC power using the power cable provided at the back of the heater controller on the table. The heater controller has a separate cord that plugs into an electrical outlet.

For use with the Rat/GP RC Table, connect to AC power using the power cable provided to plug directly into an electrical outlet.

3 – USB Input.

This USB jack accepts a standard non-powered USB cable (USB Type A to USB Type B) which is then connected to the PC. All data acquired from the controller and all control commands (from the PC) are sent through this connection.

Hardware Setup

Hardware setup consists of the making the physical connections of the chamber and computer to the apparatus. In addition, the hardware must be configured within the software to calibrate the apparatus and perform data collections.

Setup will differ depending on how you intend to measure pressure: from ventilated animal (*most common*) or a spontaneously breathing one (*very uncommon*).

With a ventilated animal, you can choose to measure either the airway opening pressure alone ("tracheal pressure"), or the airway opening pressure along with esophageal pressure ("trans-pulmonary pressure"). The choice between the two depends on whether you are interested in including the resistance of the chest wall in your calculations. Tracheal pressure alone *WILL* include the resistance of the chest wall, while tracheal pressure measured with esophageal pressure as a reference isolates the airway and does not include resistance from the chest wall in the resistance calculations.

Vast majority of researchers use tracheal pressure only with the mouse model. For animals larger than a mouse, using the esophageal pressure reference is the recommended approach; however, it is still most common to see researchers using the tracheal pressure only configuration.

If you are planning to monitor a spontaneously breathing animal (i.e. no ventilator, breathing on its own), you must reference the tracheal pressure to the esophageal pressure.

Configuration Overview:	Pressure Type	Aerosol Delivery	IV Challenge
Ventilated Animals Using Tracheal Pressure only	Total Pressure	Yes	Yes
Ventilated Animals referenced to esophageal	Trans-pulmonary	Yes	Yes
Spontaneously Breathing Animals	Trans-pressure	No	Yes

Mouse RC Setup

In the ventilated animal, you can choose to make the pressure measurement from either tracheal (airway) pressure or from esophageal pressure. As mentioned above, most researchers choose the tracheal pressure only approach and therefore, this setup is outlined below.

Again, note tracheal (airway) pressure only will include the resistance from the chest wall in the resistance calculations.

For setup instructions for using an esophageal pressure reference or for a spontaneously breathing subject, please see the **Additional RC Setup Configurations** section.

For Ventilated Animals using Tracheal Pressure Only

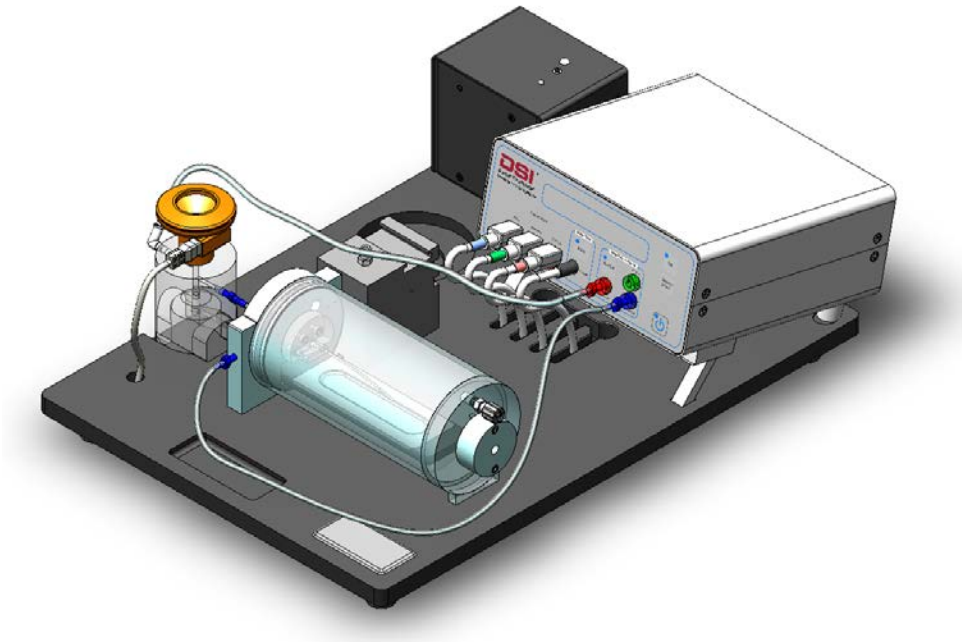
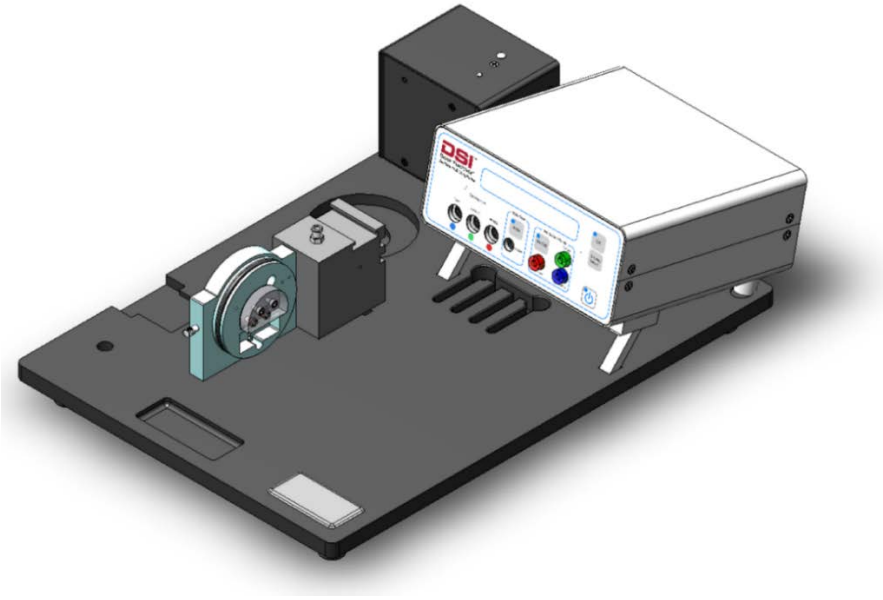


Figure 11. FinePointe™ Mouse RC system configured for ventilated animals using Tracheal Pressure.

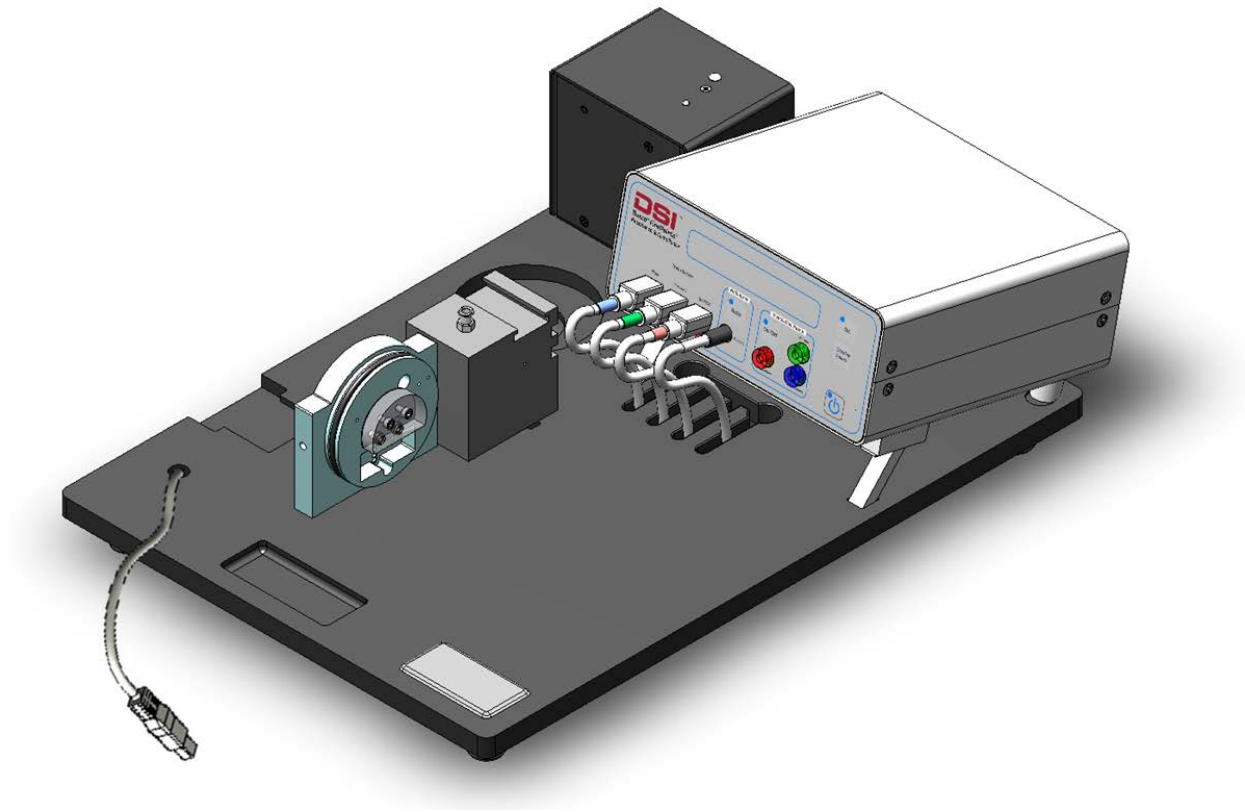
To setup the hardware:

1. Place the Controller on the Table.
   Please the legs of the controller in the small indentations on the table for proper stability.

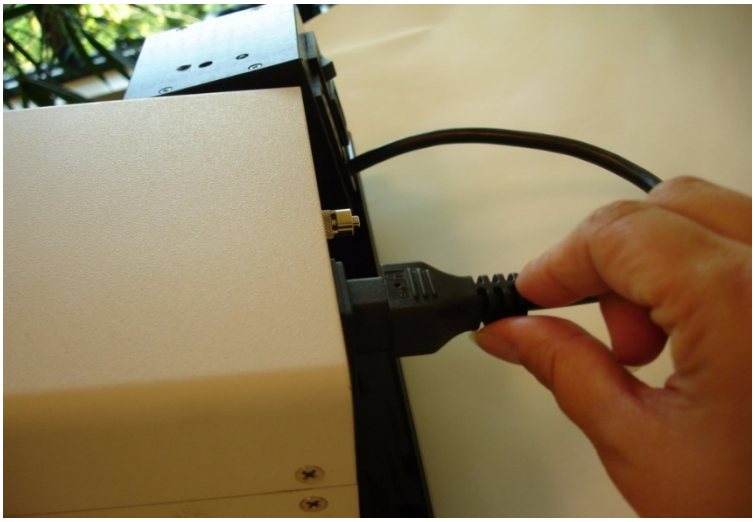


2. Attach the Flow, Pressure, and BP/ECG cables to the Controller.

NOTE: The cables are color coordinated with colored dots on the front of the controller. Match the colors for proper connection.

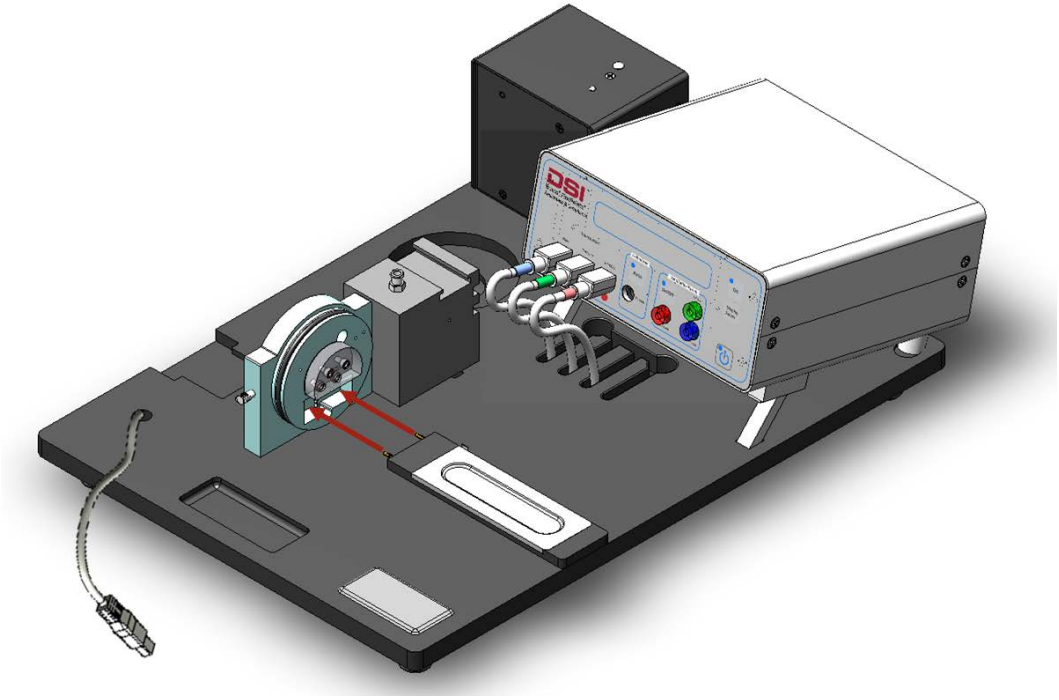


3. Connect power to the controller by connecting the black power cord from the table to the back of the controller.

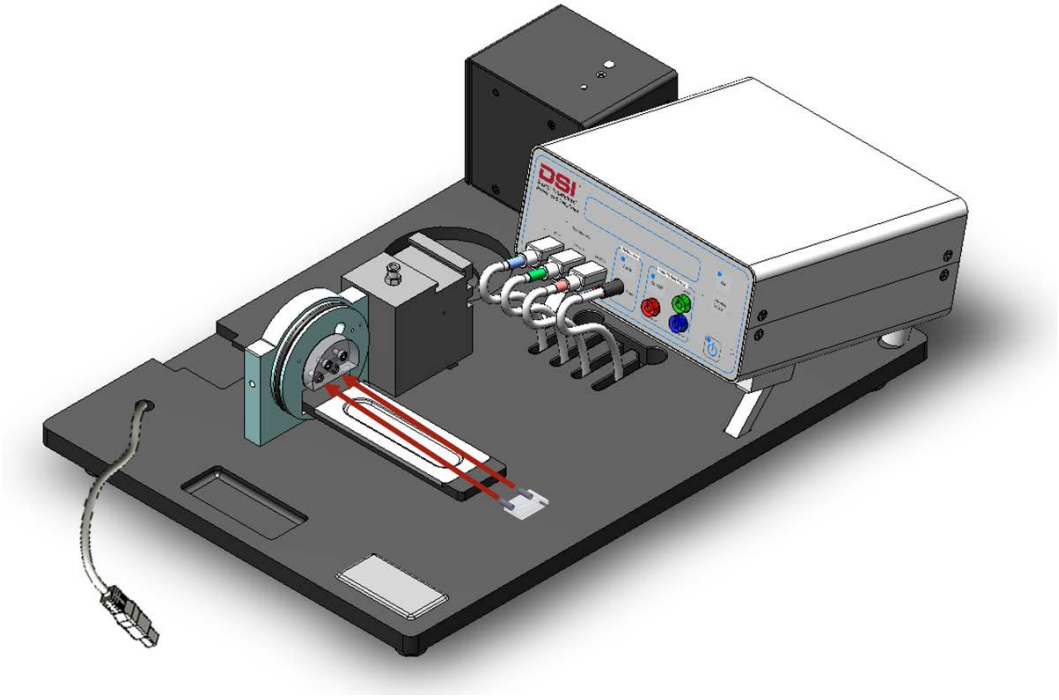


4. Attach the USB cable from the back of the controller to a USB port on the computer.

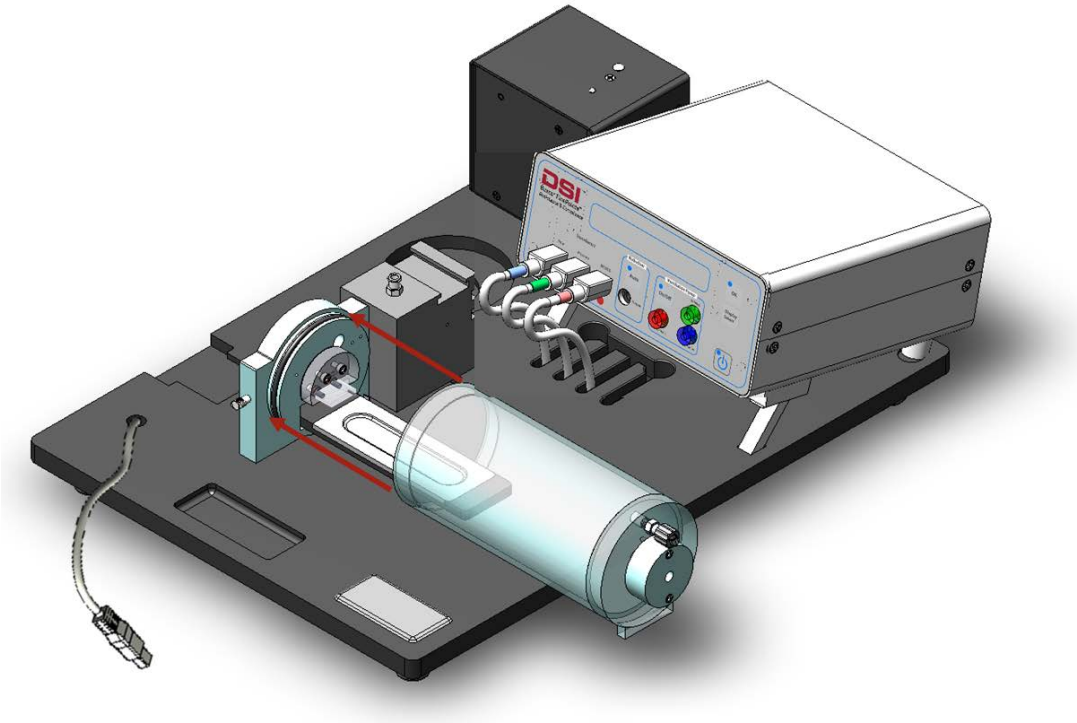
5. Attach the heated bed to the manifold by inserting the prongs into the manifold holes. Use the position which will best fit your animal's position.



6. Attach the Trachea Needle Junction to the manifold.

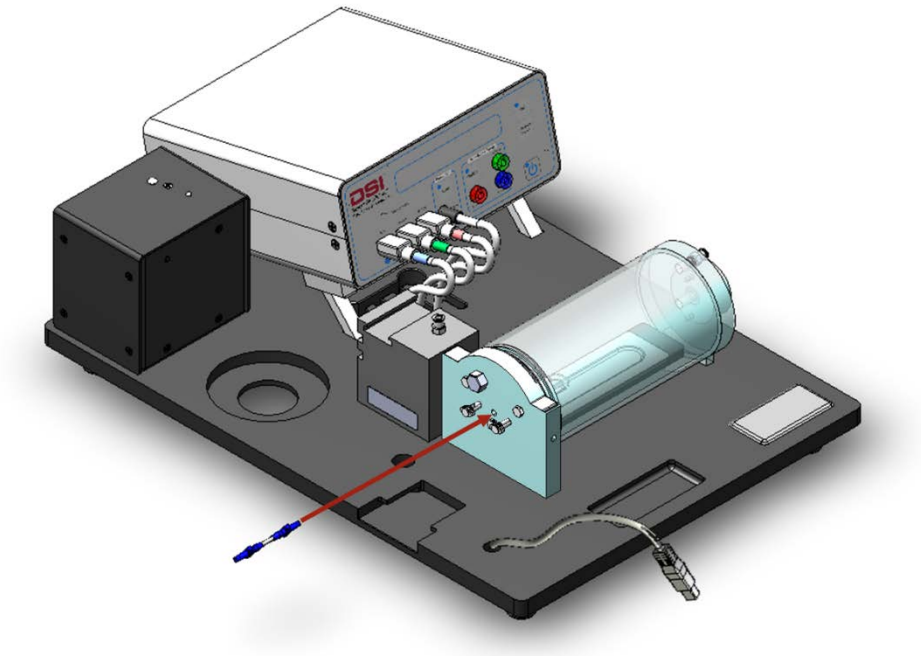


7. Slide the chamber into position.
   Note: the blue tape is used to protect the table from scratches during shipment and may be removed.



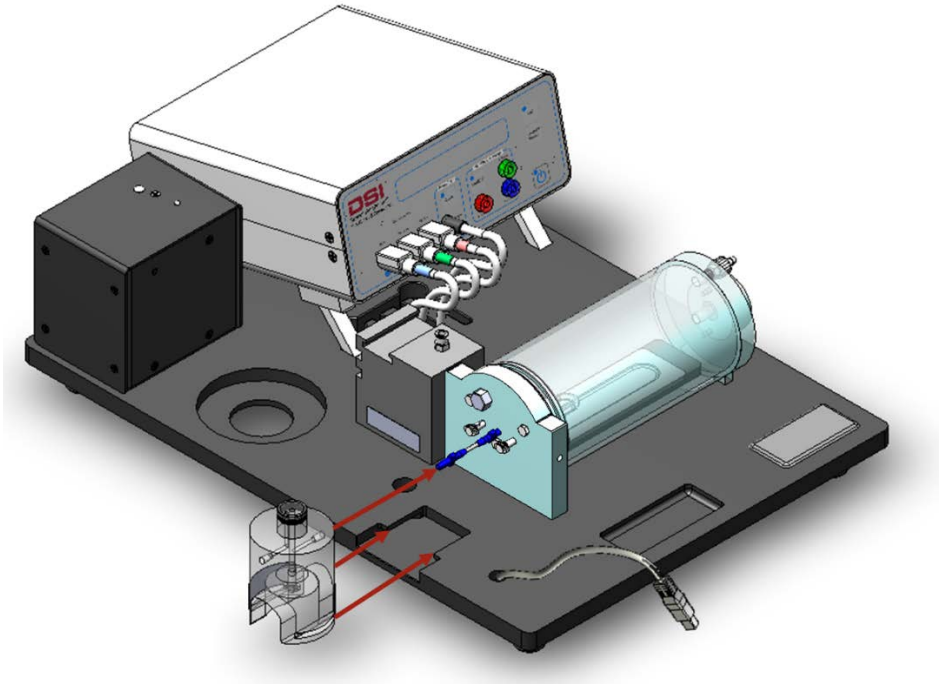
8. If delivering an aerosol (if not, skip to next step):

    a. Attach the rigid tube (601-2510-043) to the manifold's center port.

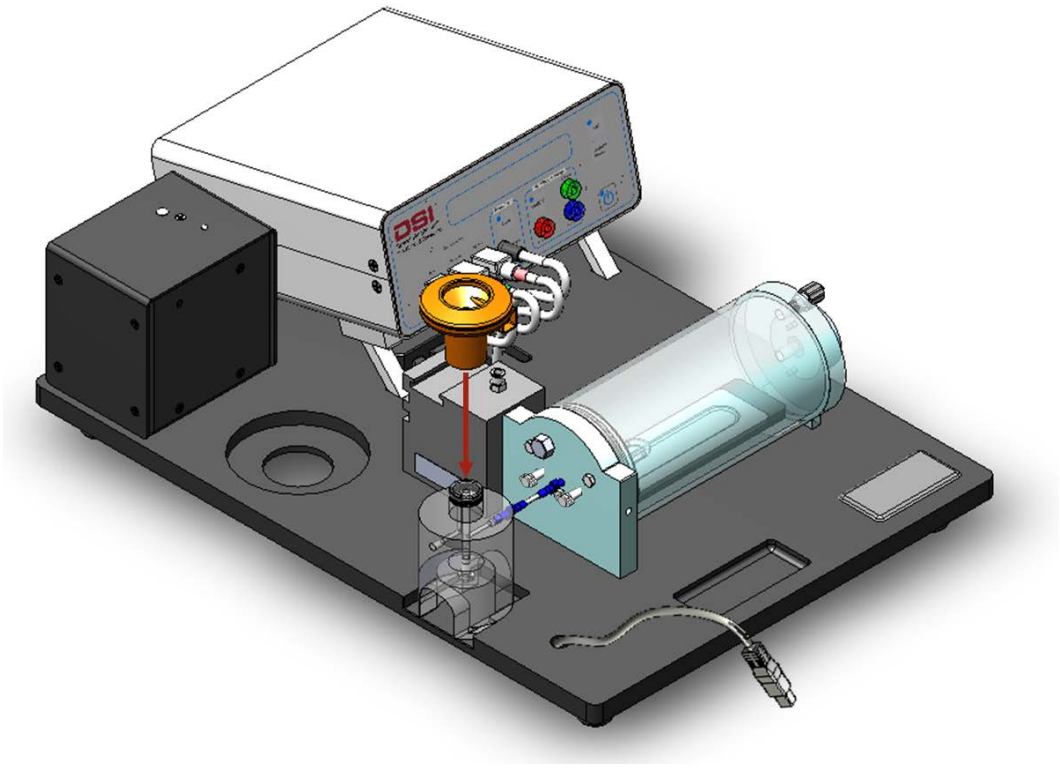


    b. Slide the aerosol block into its table positioning guides, connecting it to the rigid tube.

NOTE: Two ports exist on the aerosol block. Proper positioning of the aerosol block will align one of the ports with the rigid tube.



c. Attach the nebulizer head to the aerosol block.

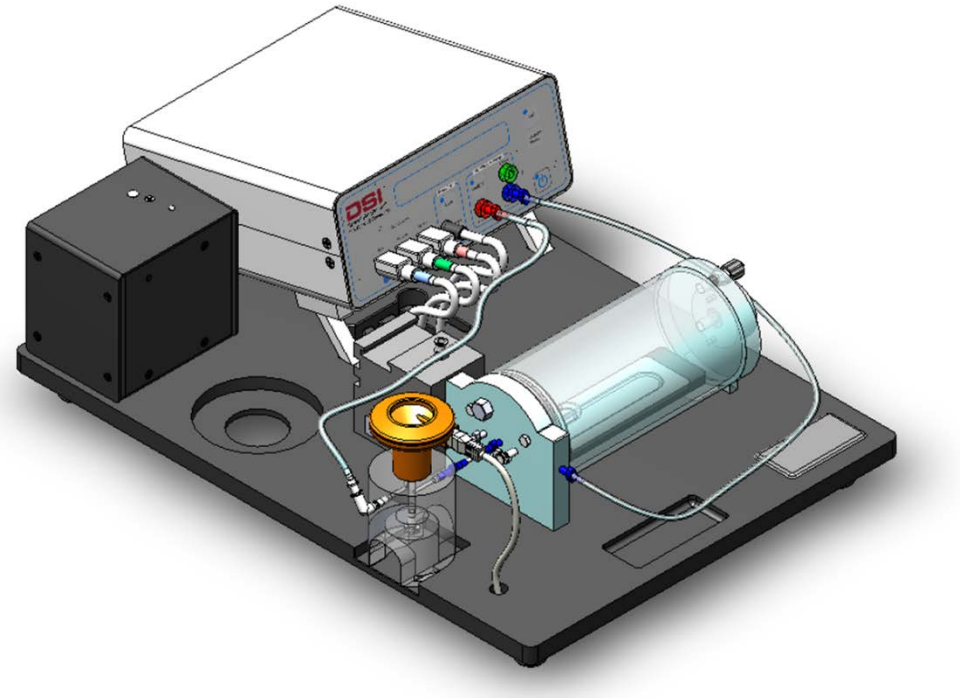


d. Connect power to the nebulizer head by plugging the cable from the controller **Nebulizer Output** jack into the nebulizer head.
For instructions on how to determine the current nebulizer head efficiency, please see the

e. **Nebulizer Head** Efficiency section.

f. Attach the aerosol block's rear port to the controller's **Ventilation Pump Inspiration** port using the tube with red fittings.

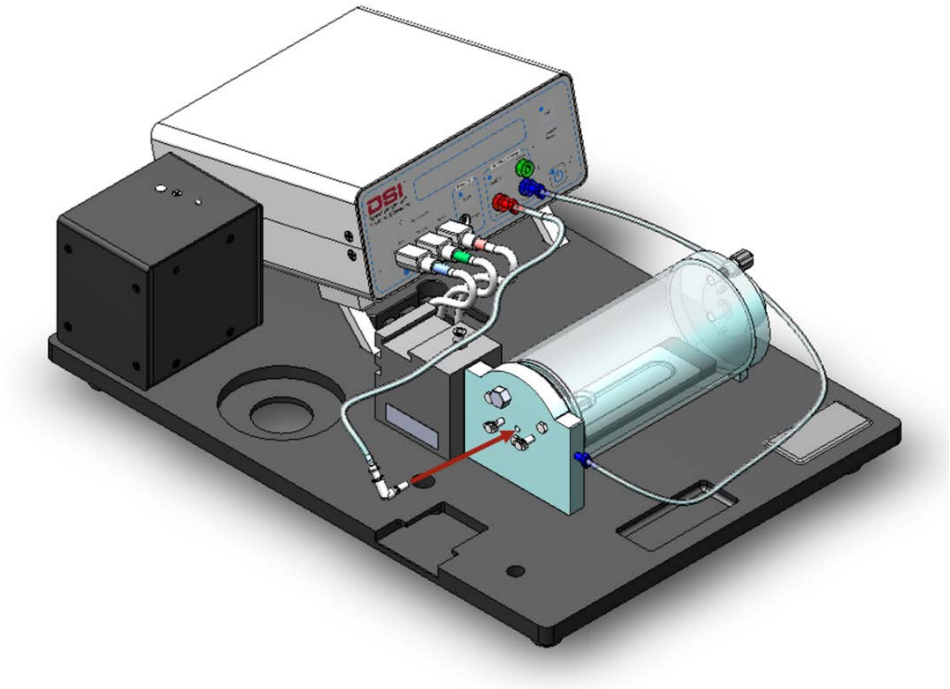
g. Attach the controller's **Ventilation Pump Expiratory** port to the manifold's side port using the tube with blue endings.



9. If NOT delivering an aerosol:

   a. Attach the controller's **Ventilation Pump Inspiration** port to the manifold's center port using the tube with red endings.

   b. Attach the controller's **Ventilation Pump Expiratory** port to the manifold's side port using the tube with blue endings



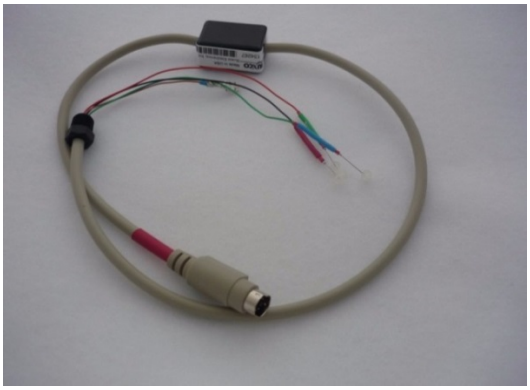
Optional Readings

ECG and Blood Pressure signals may be monitored during the experimental procedure to assess the health of the test subject. ***These signals are not recorded and analysis for cardiovascular endpoints cannot be performed.*** The following sections will outline the appropriate connections for these assessments.

NOTE: You can either take ECG OR blood pressure measurements. You cannot take both at the same time. **ECG is the far more common option due to its ease of use in comparison to the blood pressure option.**

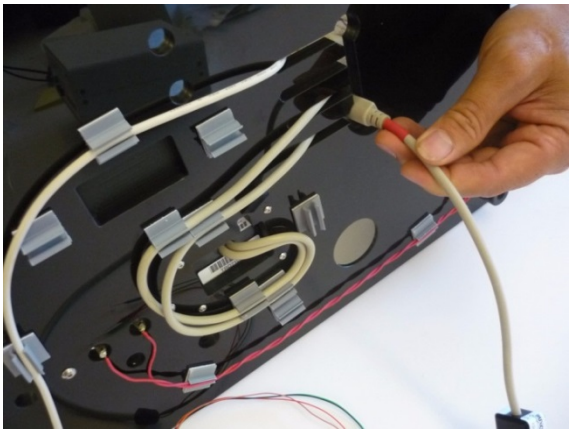
ECG Monitoring

For ECG monitoring, the ECG Transducer Cable (601-2225-001) is required – pictured below.

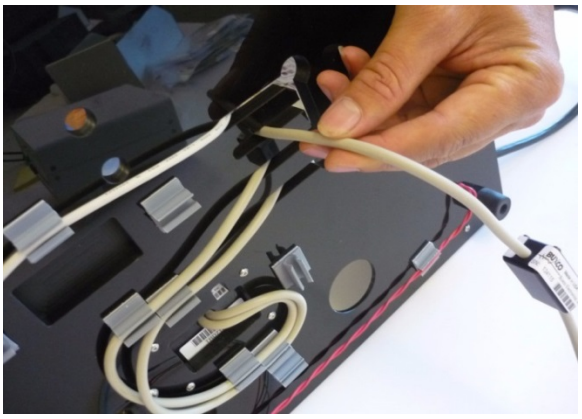


To connect the ECG transducer cable securely to the Mouse RC controller:

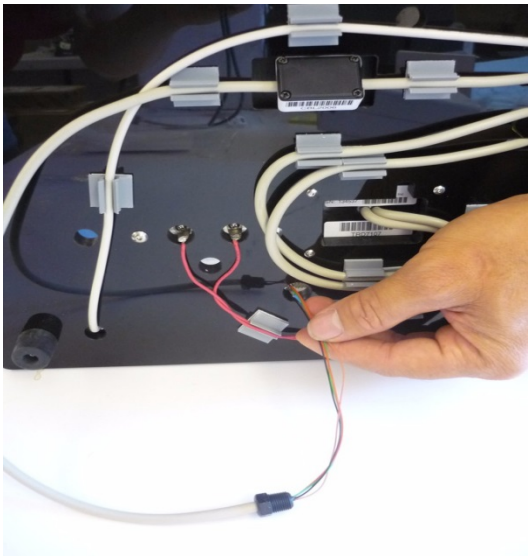
1. First, tilt the FinePointe™ table on its side to allow you to access the area underneath.
2. Insert the cable head into the opening shown below and push through to the other side.



3. Slide the cable up and over into the empty slot and line it up with the two clips as shown below. Center the transducer into the carved out well between the two clips and snap the cable into place.

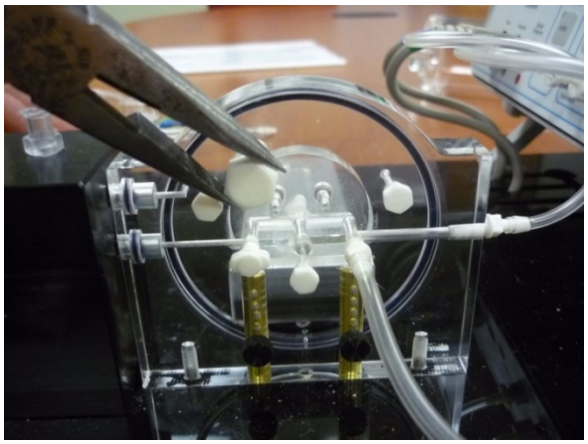


4. Thread the other end of the cable (ground wire and electrodes) through the hole as shown.

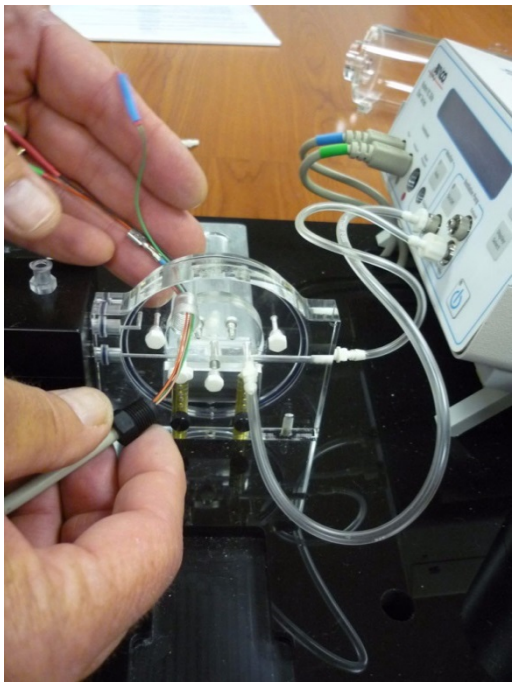


5. Lay the FinePointe™ table back down and insert the cable head into the BP/ECG port on the front of the RC Controller as shown.

6. Remove the largest white plug on the manifold.

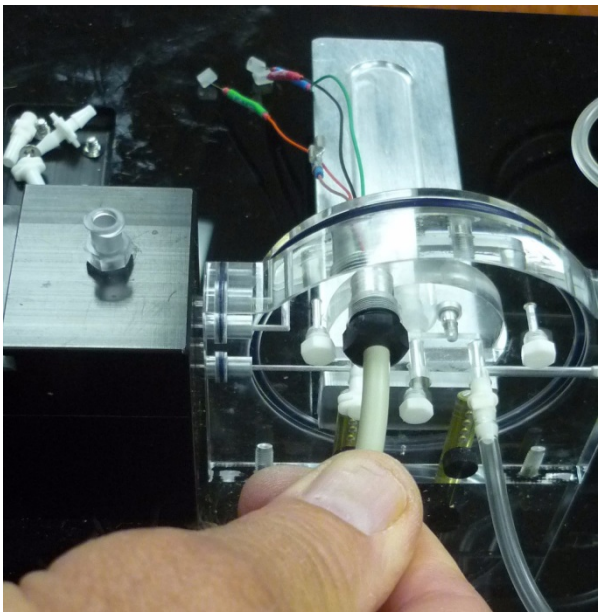


7. Thread the 4 wires on the ECG cable through the port in the manifold.



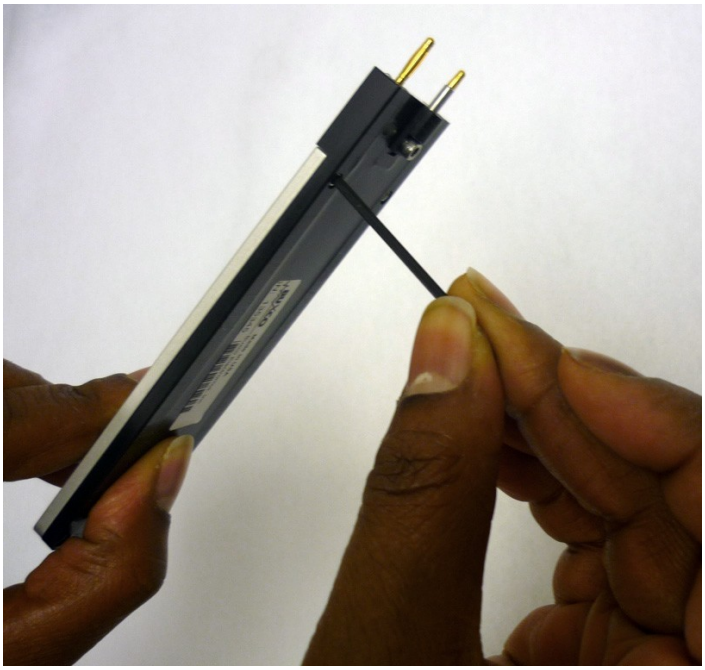
8. After inserting the wires, screw the cable into the port.

NOTE: To prevent over torquing the cable, we suggest you turn the cable counterclockwise as needed before inserting and screwing the cable into the port.

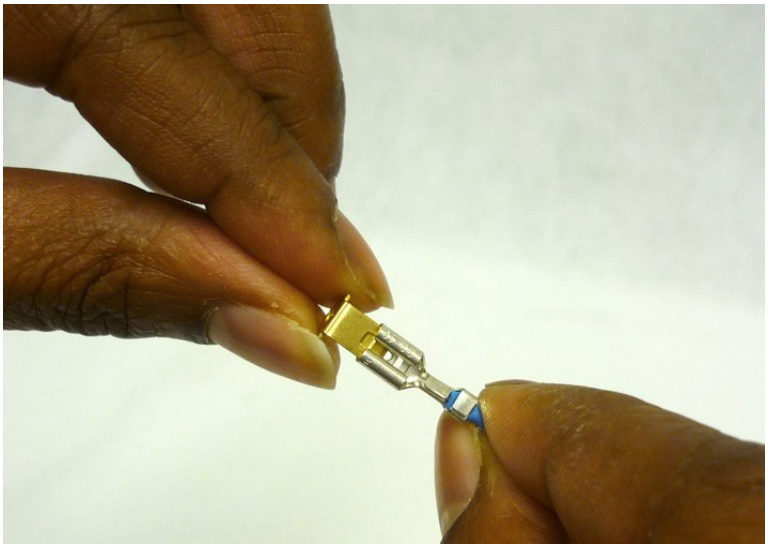


9. Unplug and remove the heated table from the manifold.

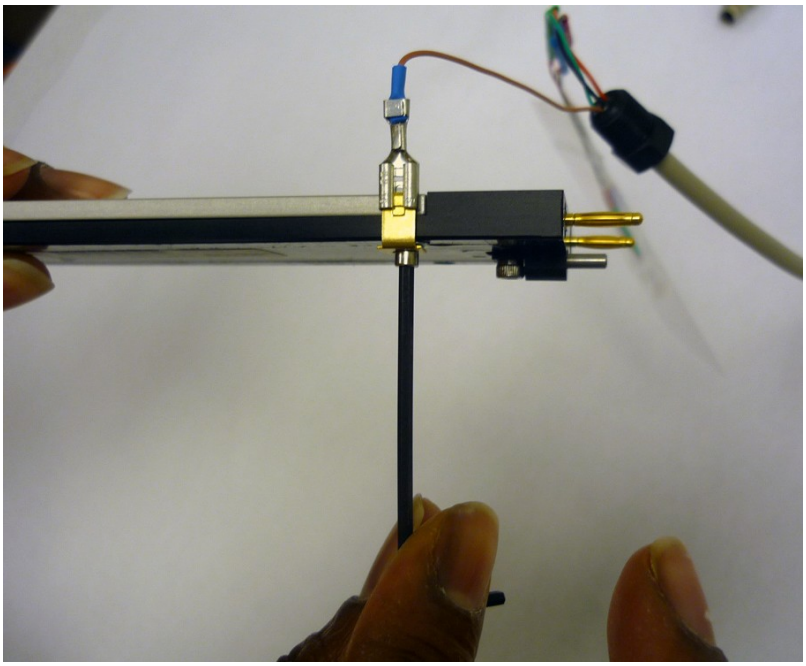
10. Using the Hex-Key wrench, remove the 1/8-inch-long screw from the underside of the table.



11. Identify the wire (the one with the Spade connector, the only one without a needle on it) on the ECG ground wire. Push the Spade connector onto the lug until it is about halfway down, as shown in the picture below.



12. Insert the 1/4-inch-long screw through the lug and through the washer provided. Screw the lug onto the heated table using the hex key. The lug should be angled out and away from the table to accommodate the ECG ground wire.



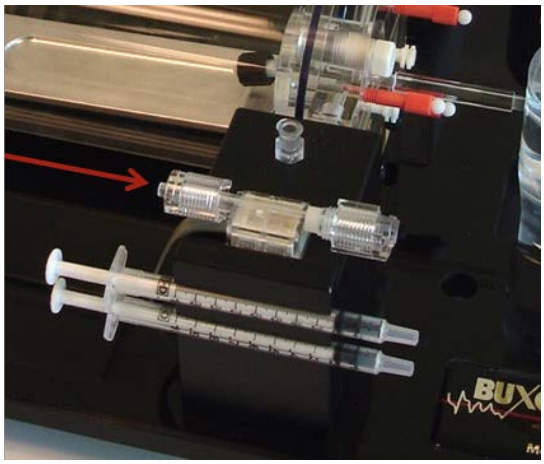
13. Plug the table back into the bulkhead.

14. Connect the ECG needles to your animal. Locations of the electrodes will vary depending on which lead configuration you are going to measure.

Blood Pressure Monitoring

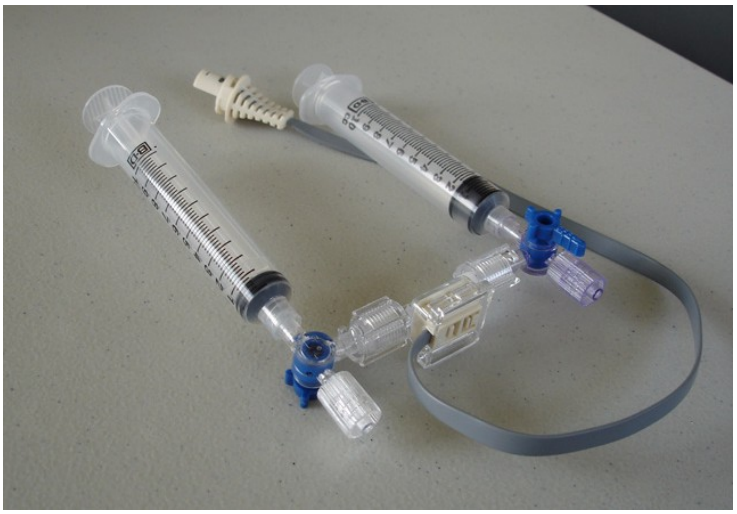
To connect the blood pressure transducer (601-2241-001) for monitoring:

1. Slide the blood pressure transducer into its dedicated place on the mounting table.



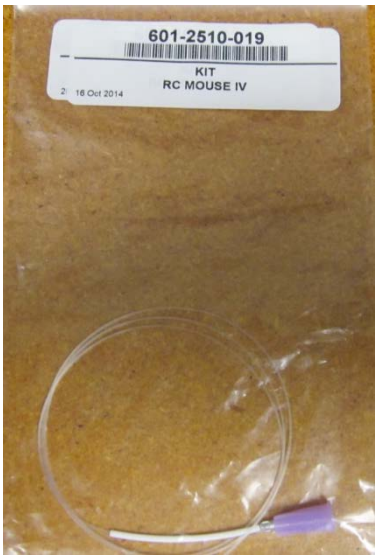
2. Attach a water coupled connection from the transducer, through a red Upchurch fitting on the manifold, to the animal.
3. Route the cable from the transducer under the transducer block, beneath the RC table, and back out in front of the controller and plug the cable into the **BP/ECG** port.
4. Pick the artery you want to use. This transducer measures arterial pressures.

NOTE: The blood pressure transducer is usually heparin coupled to prevent blood clotting. The two syringes are connected to the transducer as displayed below.



Delivering IV Challenges

There are ports in the manifold meant specifically for delivering IV drug. If you have an IV accessory kit (601-2510-019, shown below), then you should have all the tools necessary to make IV challenges. If you need a kit, please contact your DSI representative.



Use the kit to cannulate a vein on the animal. Run the tube out through the manifold to the drug source. Often a Spasmogen such as Methacholine is used to challenge an animal intravenously.

Rat/GP RC Setup

In the ventilated animal, you can choose to make the pressure measurement from either tracheal (airway) pressure or from esophageal pressure. As mentioned above, most researchers choose the tracheal pressure only approach and therefore, this setup is outlined below.

Again, note tracheal (airway) pressure only will include the resistance from the chest wall in the resistance calculations.

For setup instructions for using an esophageal pressure reference or for a spontaneously breathing subject, please see the **Additional RC Setup Configurations.**

For Ventilated Animals using Tracheal Pressure Only

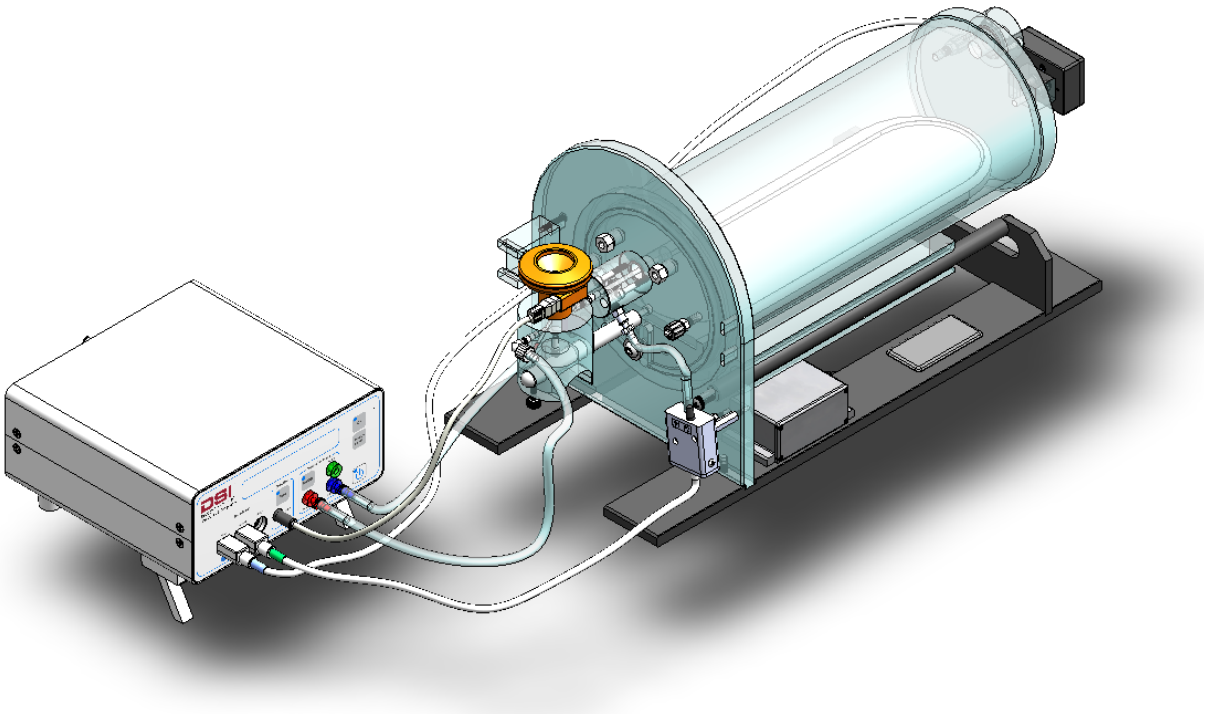
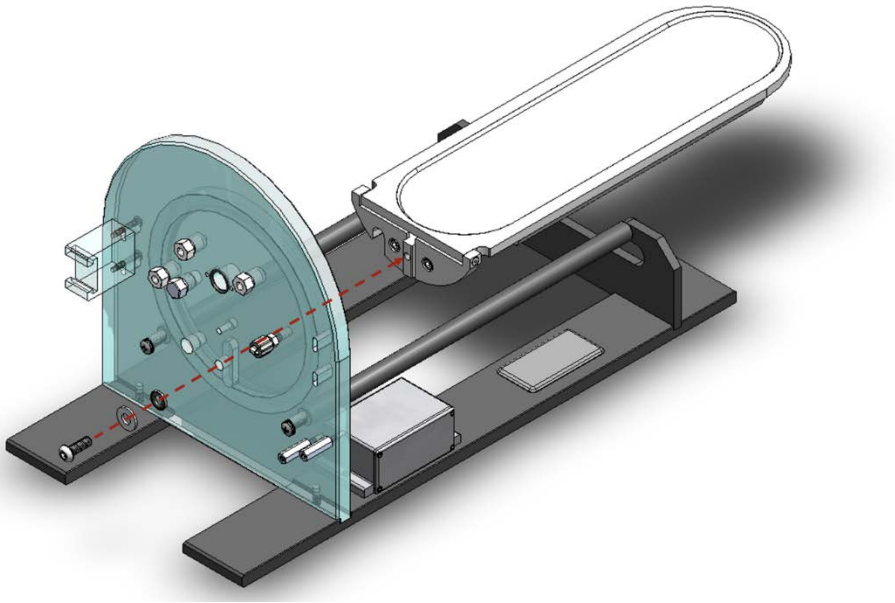


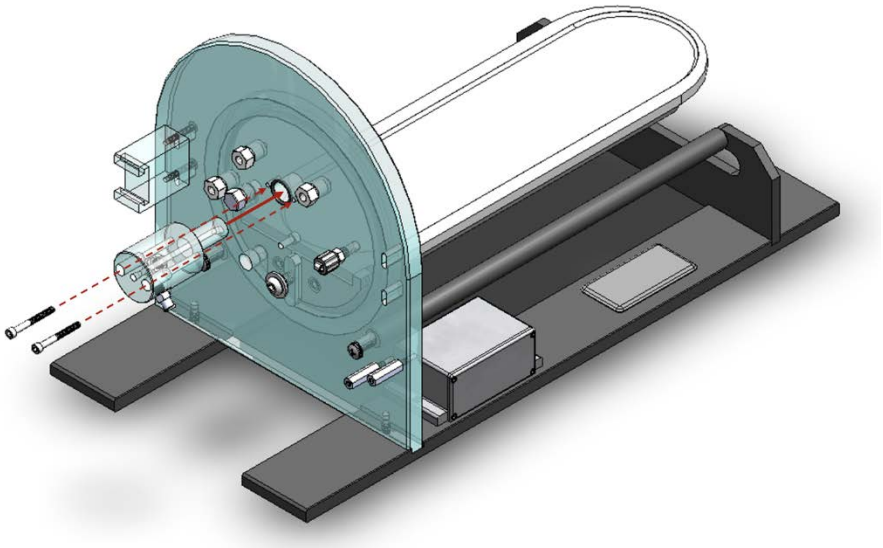
Figure 12. FinePointe™ Rat/GP RC system configured for ventilated animals using Tracheal Pressure.

To setup the hardware:

1. Place the Controller and Chamber on the table.
2. Attach the Heated Bed to the RC Chamber Faceplate.

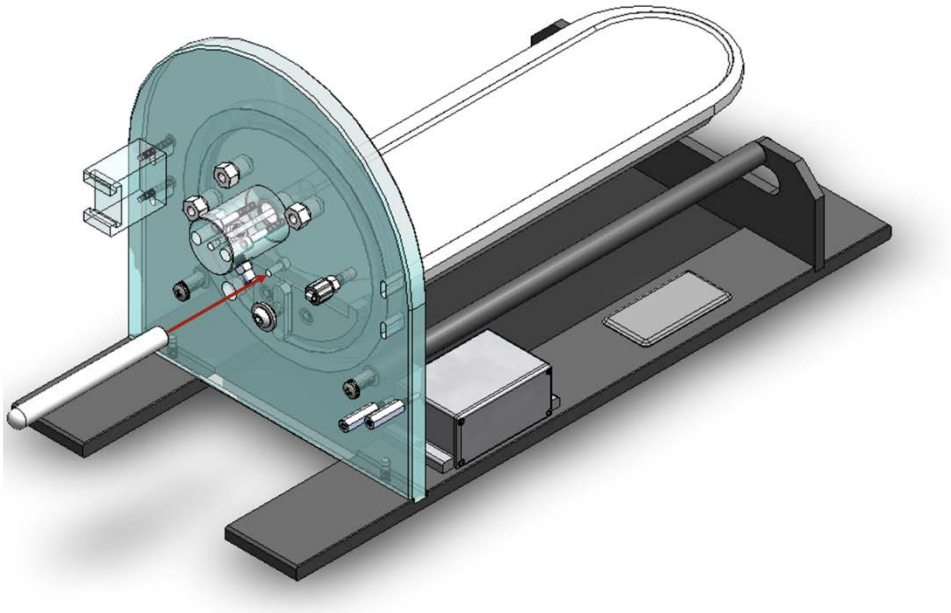


3. Attach the Manifold to the RC Chamber Faceplate.



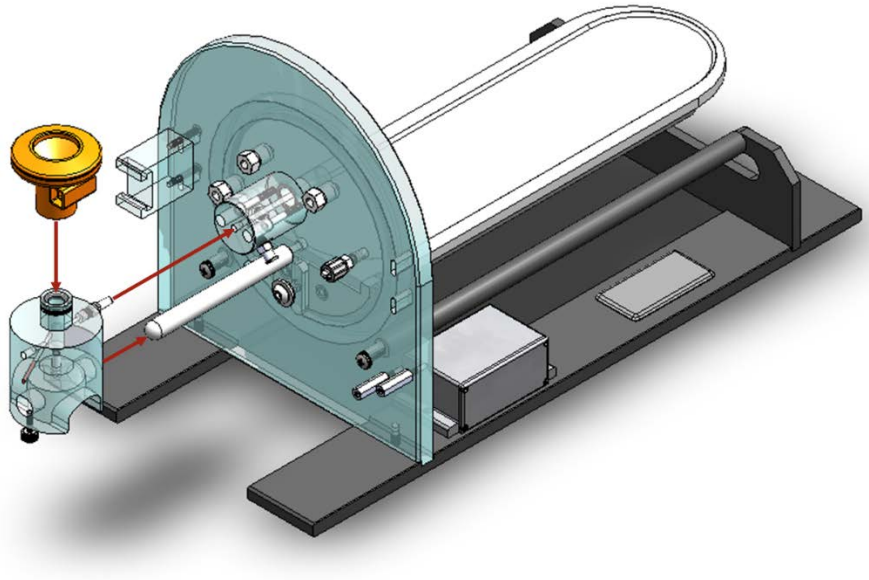
4. If delivering an aerosol (if not, skip to next step):

    a. Attach the Handling Rod to the Chamber Faceplate.



    b. Slide the aerosol block onto the metal perch and tighten with black screw.

    c. Attach the nebulizer head to the aerosol block.

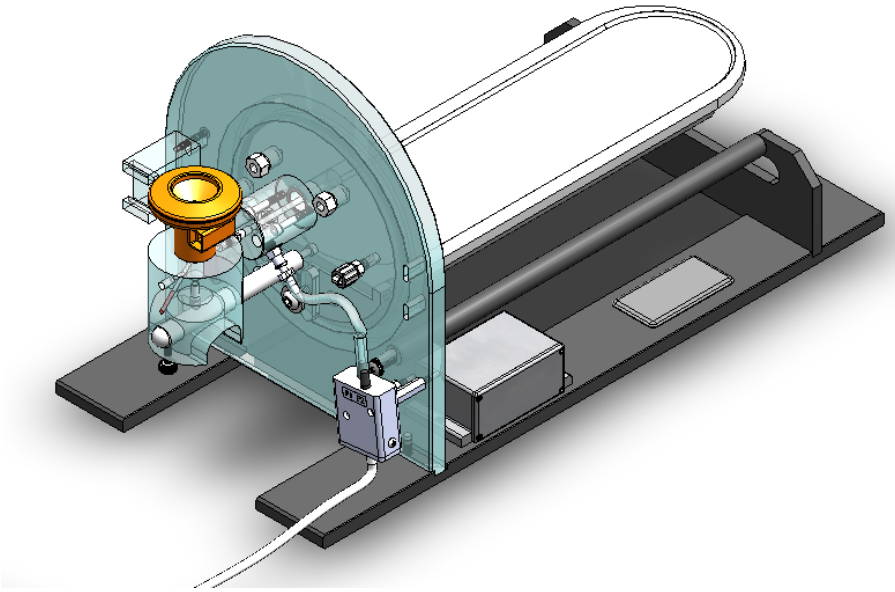


5. Attach the Pressure Transducer:

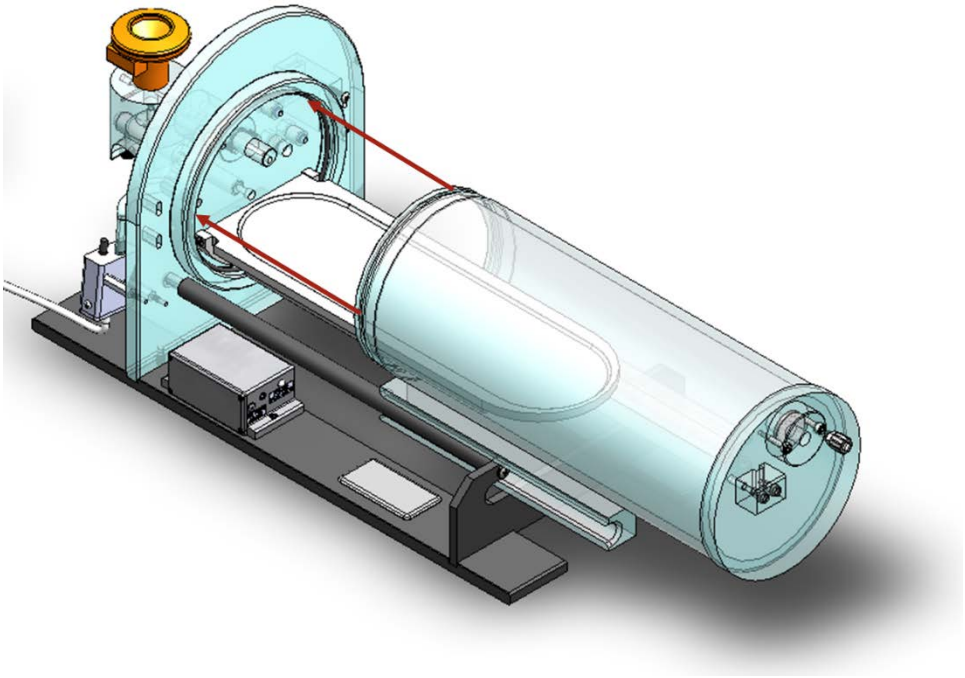
    a. Mount the Pressure Transducer to the chamber's Faceplate.

    b. Use a piece of tubing from the kit to attach P1 to the port on the right side of the manifold.

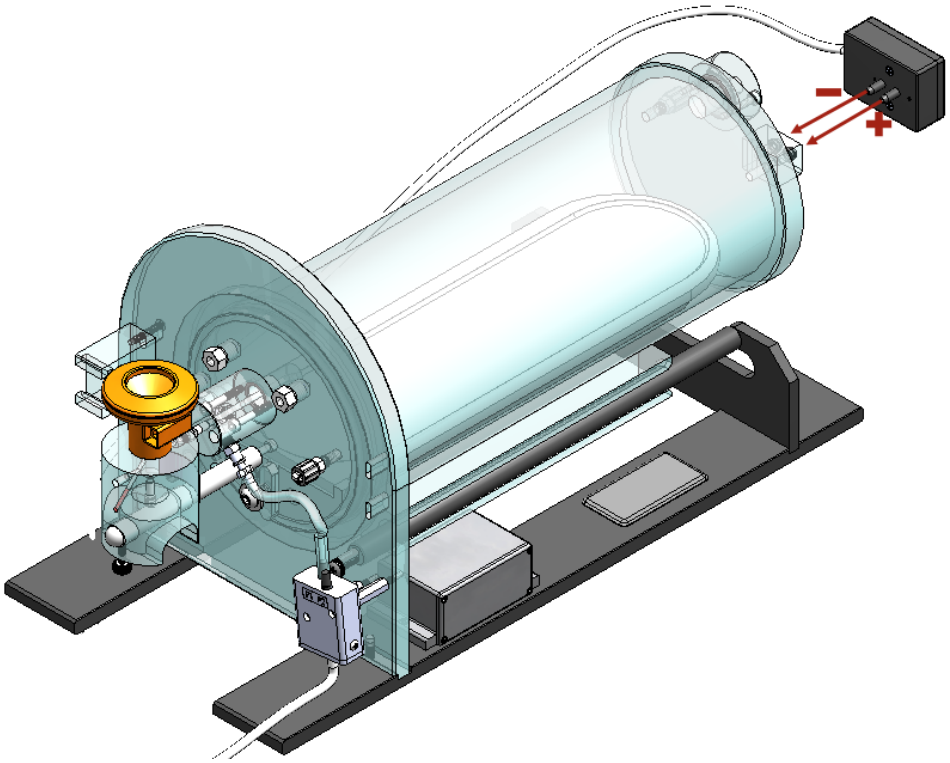
    c. Leave P2 open to air.



6. Connect the Plethysmography Chamber.



7. Connect the Flow Transducer to the ports on the Plethysmography chamber. Ensure the positive transducer port is inserted into the left chamber port.

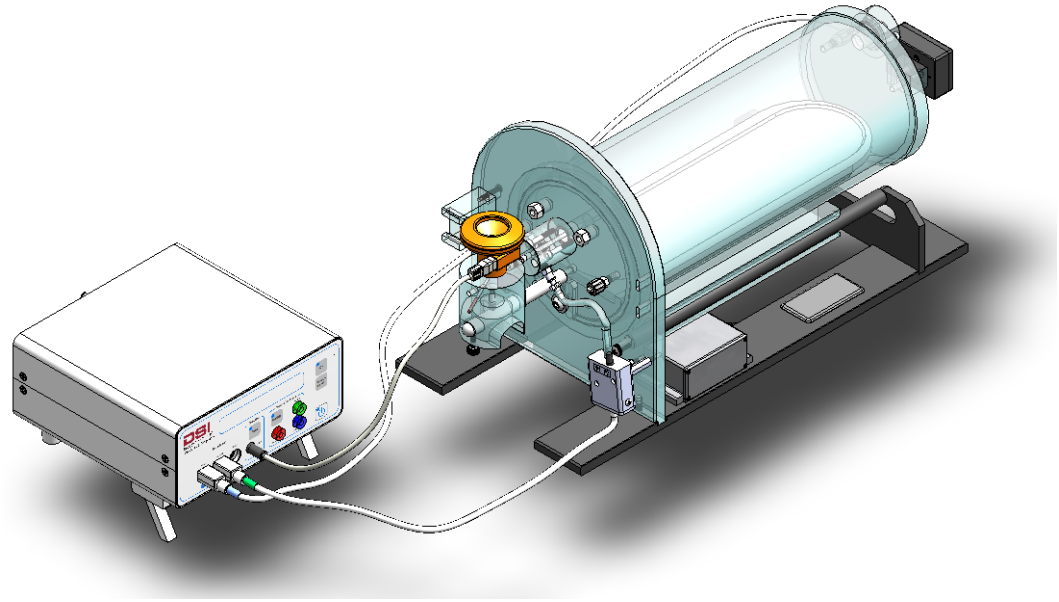


8. Attach the Flow, Pressure, and BP/ECG cables to the Controller.

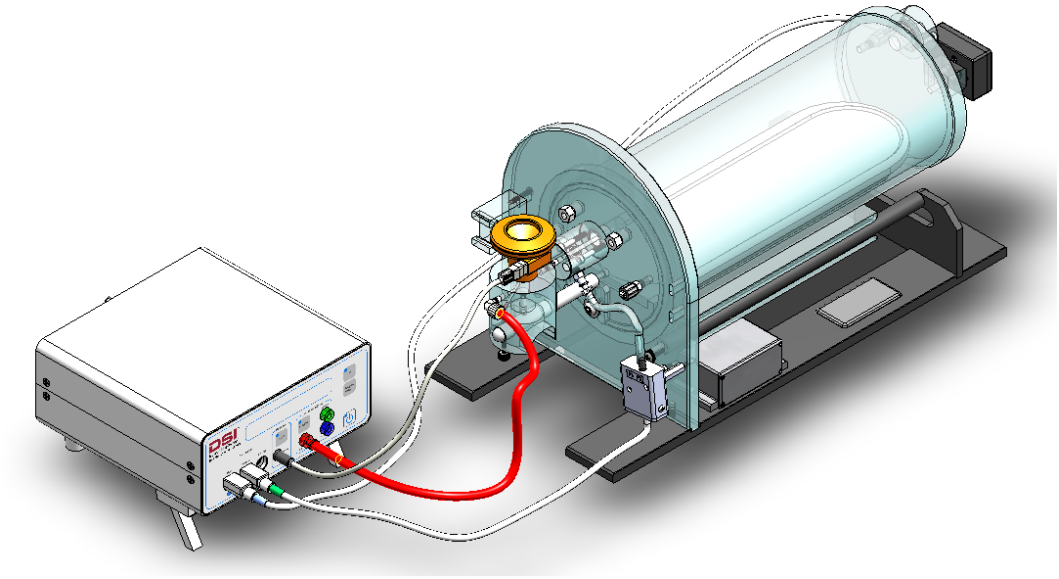
NOTE: *The cables are color coordinated with colored dots on the front of the controller. Match the colors for proper connection.*

9. Connect power to the nebulizer head by plugging the cable from the controller **Nebulizer Output** jack into the nebulizer head. For instructions on how to determine the current nebulizer head efficiency, please see the

10. **Nebulizer Head** Efficiency section.

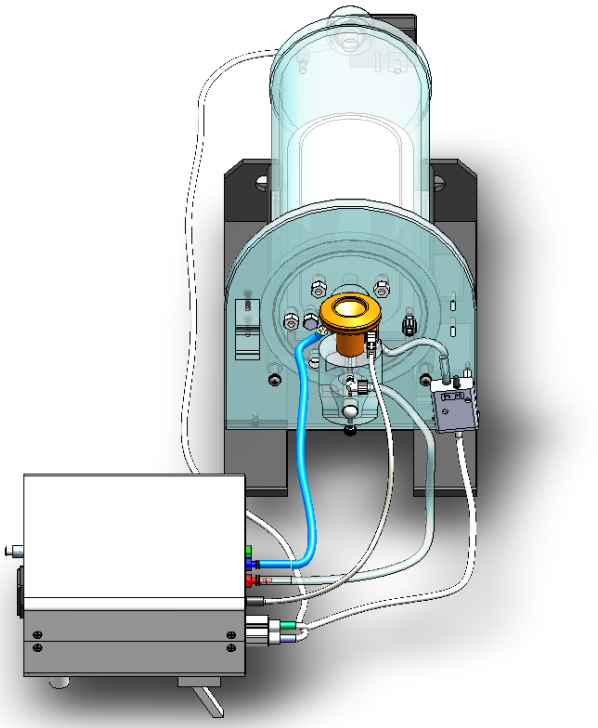


11. Attach the Inspiration tube from the Controller's **Ventilation Pump Inspiration** port (red) to the back port of the aerosol block.



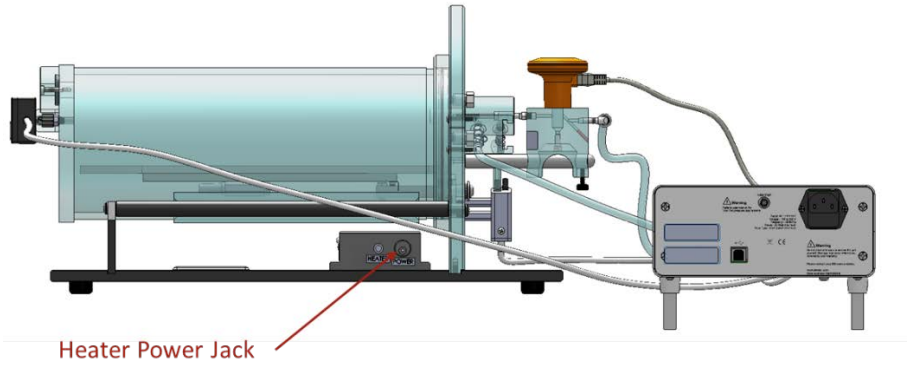
If **NOT** delivering an aerosol, attach the Inspiration tube from the Controller's **Ventilation Pump Inspiration** port to the manifold's center port.

12. Attach the Expiration tube from the Controller's **Ventilation Pump Expiration** port (blue) to the manifold's side port.



13. Connect power to the Controller.
14. Attach the USB Cable to the from the back of the Controller to a USB port on the computer.
15. Connect power to the Heater unit.

The heater unit plugs into the wall. When you plug the heater power in, it turns on. There is no on/off switch.



Optional Readings

ECG and Blood Pressure signals may be monitored during the experimental procedure to assess the health of the test subject. ***These signals are not recorded and analysis for cardiovascular endpoints cannot be performed.*** The following sections will outline the appropriate connections for these assessments.

Note: You can either take ECG measurements OR blood pressure measurements. You cannot take both at the same time. **ECG is the far more common option due to its ease of use in comparison to the blood pressure option.**

ECG Monitoring

For ECG monitoring, the ECG Transducer Cable (601-2226-001) is required.

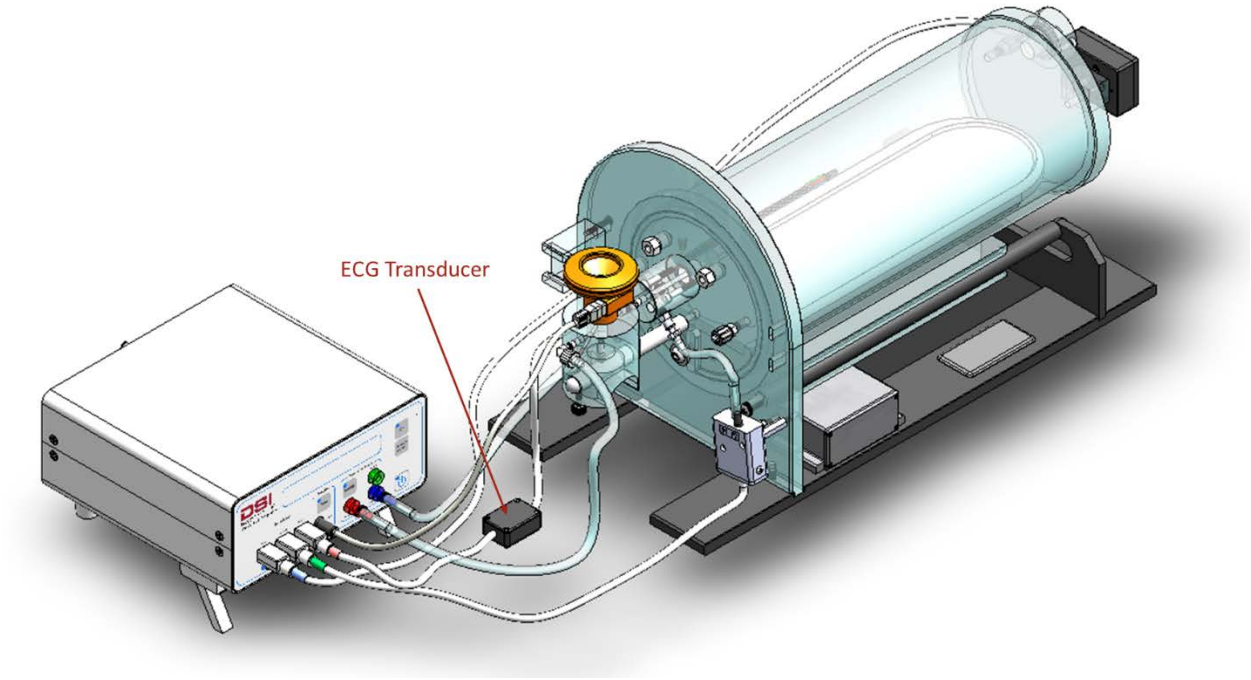
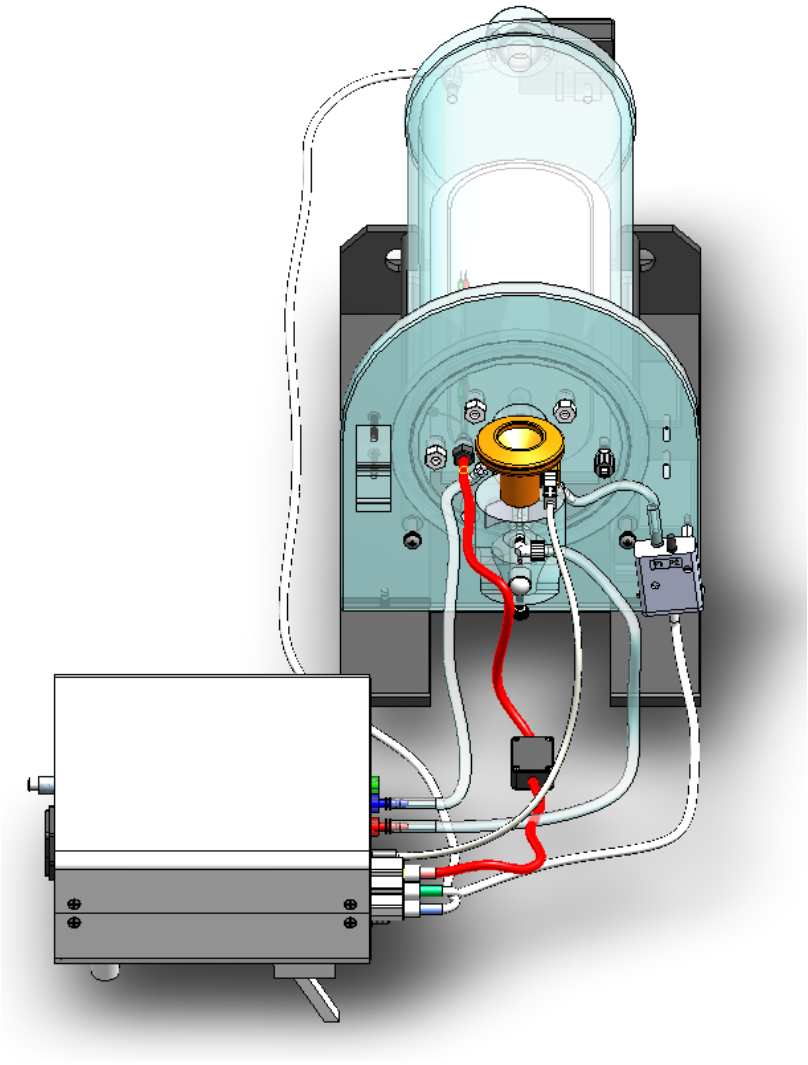


Figure 13. FinePointe™ Rat/GP RC configured with optional ECG Transducer cable.

To connect the ECG transducer:

1. Feed the ECG transducer through a port in the manifold.
2. Connect the ECG leads to the animal.
3. Plug the transducer into the **BP/ECG** input on the front panel of the Controller's front panel.



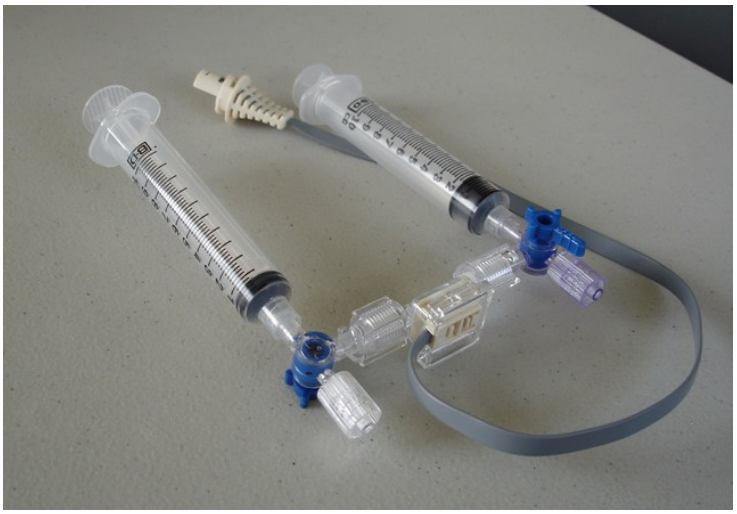
Note: You can either take blood pressure measurements or ECG measurements. You cannot take both at the same time. ECG is the far more common option, due to its ease of use in comparison to the blood pressure option.

Blood Pressure Monitoring

To connect the blood pressure transducer (601-2239-001) for monitoring:

1. Attach the blood pressure mount to the plethysmograph faceplate using an Allen wrench to screw it into position.
2. Use the blunt needle from the blood pressure kit (008099-001) to puncture the membrane in the port directly about the transducer mount.
3. The blood pressure cannula will be attached to the needle on the inside of the chamber once the animal has been cannulated. Slip the end of the tube onto the needle.
4. Slide the blood pressure transducer into the mount.
5. Tighten the luer lock onto the plastic tip of the needle.
6. Plug the blood pressure transducer cable into the **BP/ECG** input on the front panel of the Controller.
7. Using two syringes from the blood pressure kit, attach a water coupled connection from the transducer to the animal. Pick the artery you want to use. This transducer measures arterial pressures.

NOTE: The blood pressure transducer is usually heparin coupled to prevent blood clotting. The two syringes are connected to the transducer as displayed below.



Delivering IV Challenges

There are ports in the manifold meant specifically for delivering IV drug. If you have an IV accessory kit (601-2510-029, shown below), then you should have all the tools necessary to make IV challenges. If you need a kit, please contact your DSI representative.

Use the kit to cannulate a vein on the animal. Run the tube out through the manifold to the drug source. Often a Spasmogen such as Methacholine, is used to challenge an animal intravenously.

Create a Hardware Configuration

The FinePointe™ Control Panel is the administrator program used to manage the FinePointe™ system. Once the hardware is setup and connected to the PC, FinePointe™ Control Panel is used to configure the hardware within the software, enabling it to be calibrated and collect data.

Start by launching FinePointe™ Control Panel:

1. Double-click the FinePointe™ Control Panel desktop icon  or click **Start | All Programs | FinePointe™** to launch the **FinePointe™ Control Panel** application.
2. Log in using your *Windows Administrator* account.

NOTE: FinePointe™ Control Panel may be accessed from any Windows User account, but it requires the use of a Windows Administrator username and password to log in and configure hardware apparatuses.

3. Click **OK** to continue.

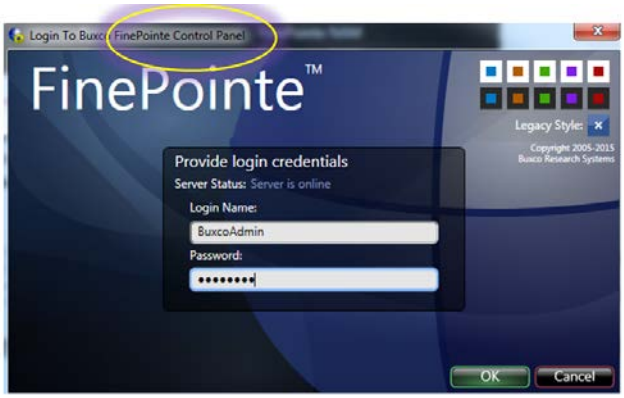


Figure 14. The FinePointe™ Control Panel login dialog.

RC Configuration

The following example will walk through the necessary steps to create an RC Mouse hardware configuration.

To create an RC configuration, click **Hardware Configuration** on the *Controller Home Page*.

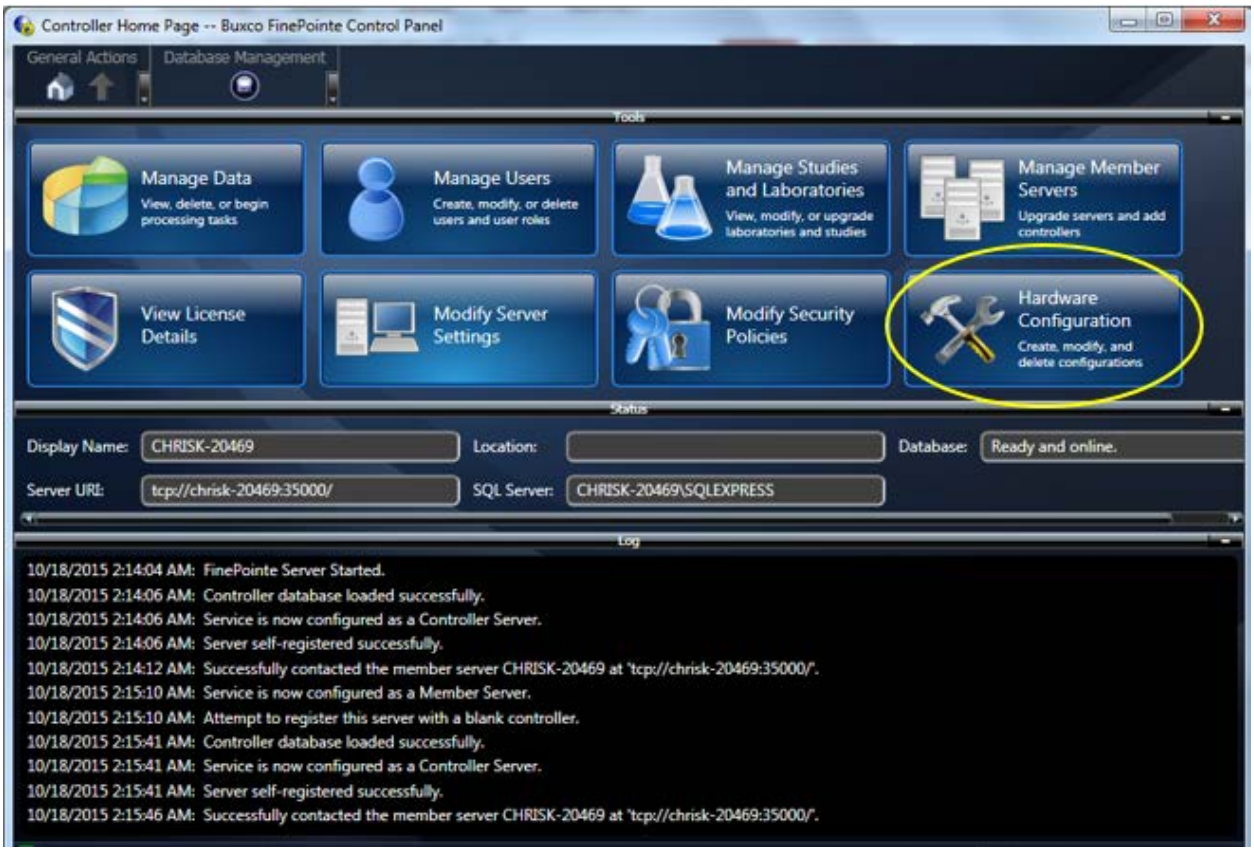


Figure 15. The FinePointe™ Control Panel Home Page. Click Hardware Configuration to configure your controller.

Then, click the **New Configuration** button to launch the Configuration Wizard.

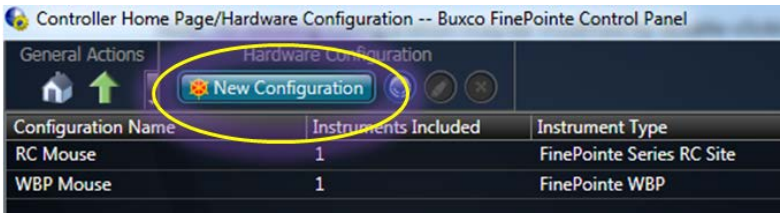


Figure 16. Displays the location of the New Configuration button within the Hardware Configuration dialog.

Step 1 – Select Hardware

1. Type in a Name for your Configuration. For this example, we use “Mouse RC”.
2. Select the appropriate hardware that will be used for data collection. For this example, we use FinePointe™ RC (serial number 139417).
    a. Ensure that all RC Controllers are turned On and plugged in via USB to the computer.
    b. If multiple RC sites will be used by one computer, select all of them here.
3. Click Next.

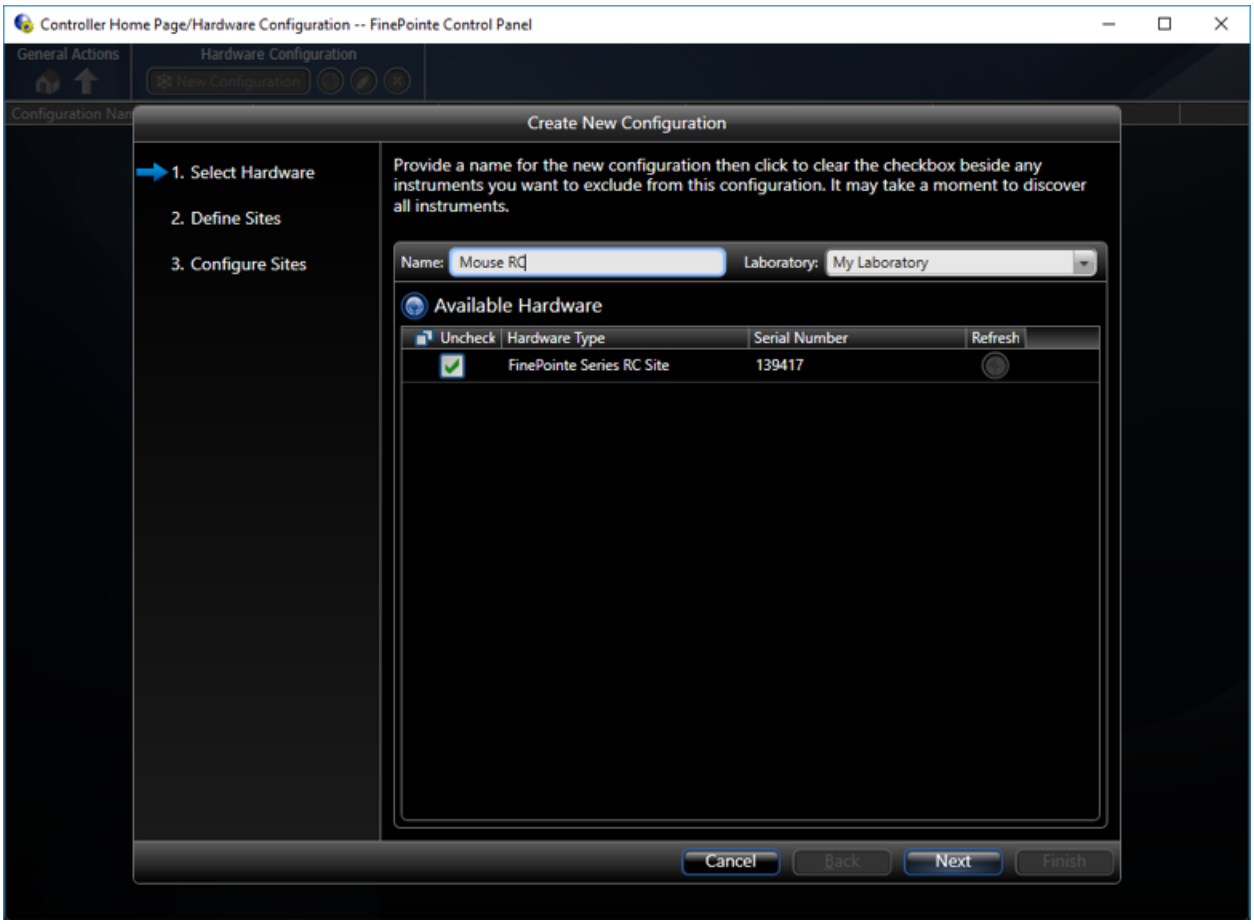


Figure 17. Displays the first step of the Create New Configuration dialog.

Step 2 – Define Sites

1. FinePointe™ automatically recognizes number of sites (RC chambers) available based the number of controllers selected in the previous step (maximum 8).

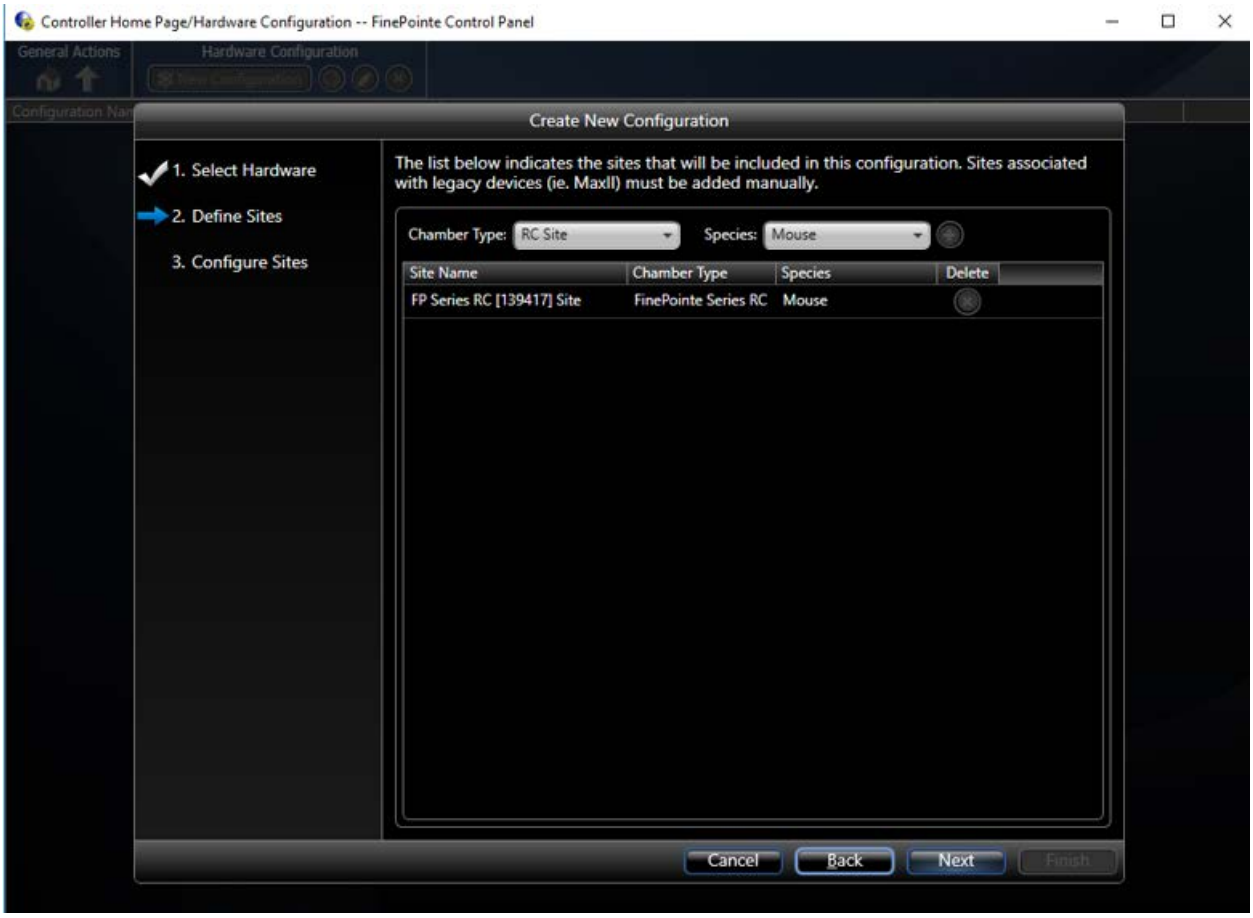


Figure 18. Displays the Step 2 of the Create New Configuration dialog.

2. Click **Next**.

Step 3 – Configure Sites

This page is divided into two sections:

Hardware sites (top) – presents the hardware sites and definitions for the sites defined in Step 2. A tab is available for each site configured. In this example, only one site is being used.
Apparatus (bottom) – presents the FinePointe™ hardware to be used.

FinePointe™ automatically maps the proper connection from the hardware site (top) to the apparatus (bottom) and provides default Bias Flow Rates for various species.

To complete site configuration:

4. The default description may be changed, though the default is typically used.
5. Choose the appropriate **Species** in the pull-down menu.

NOTE: The Species setting must be consistent across all sites being used. For example, you may not collect data from a rat and a mouse at the same time. A separate Hardware Configuration should be created for each species.

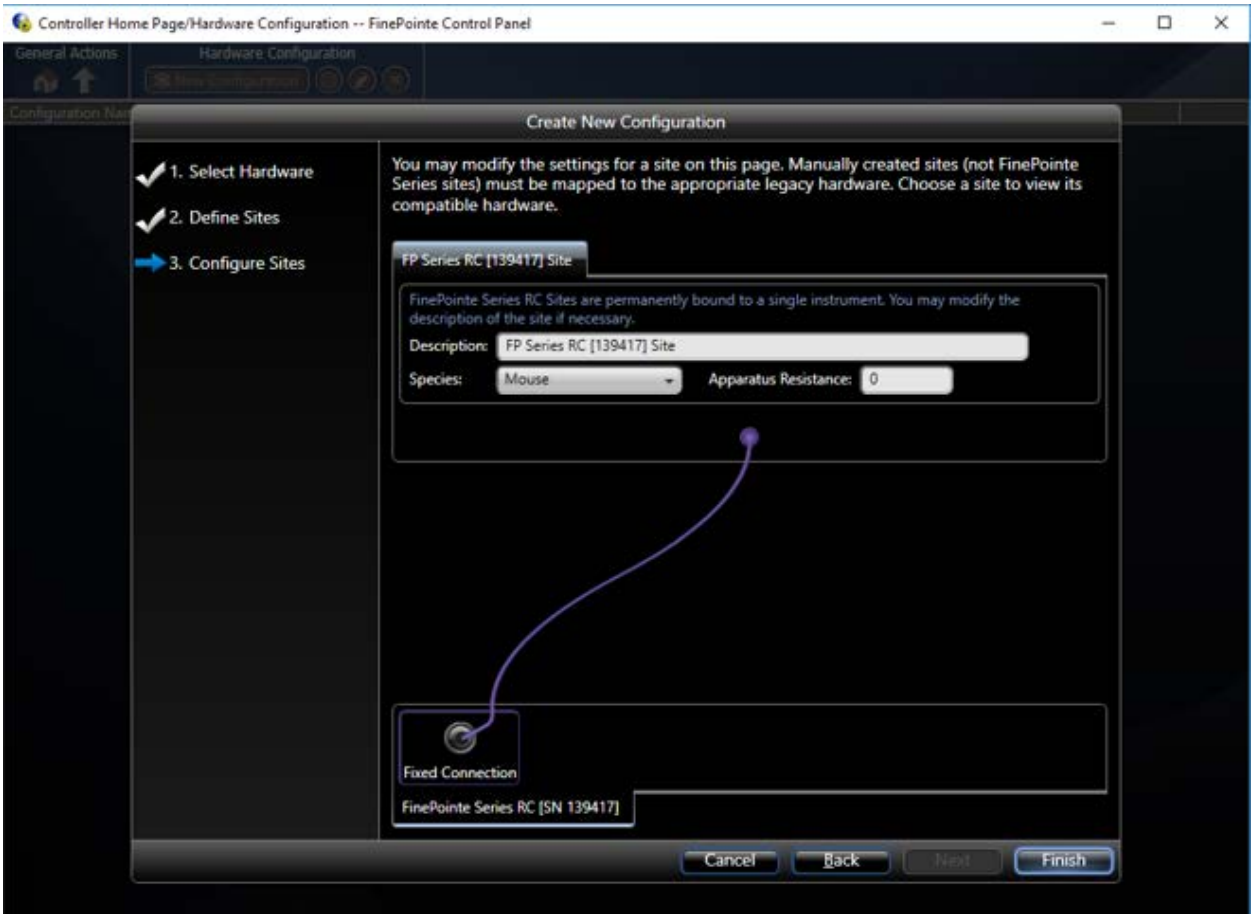


Figure 19. Displays the Step 3 of the Create New Configuration dialog where species selection and bias flow rates should be defined.

6. Repeat the steps above for each site by clicking on the appropriate tab.
7. Click **Finish** to complete the Configuration Wizard.

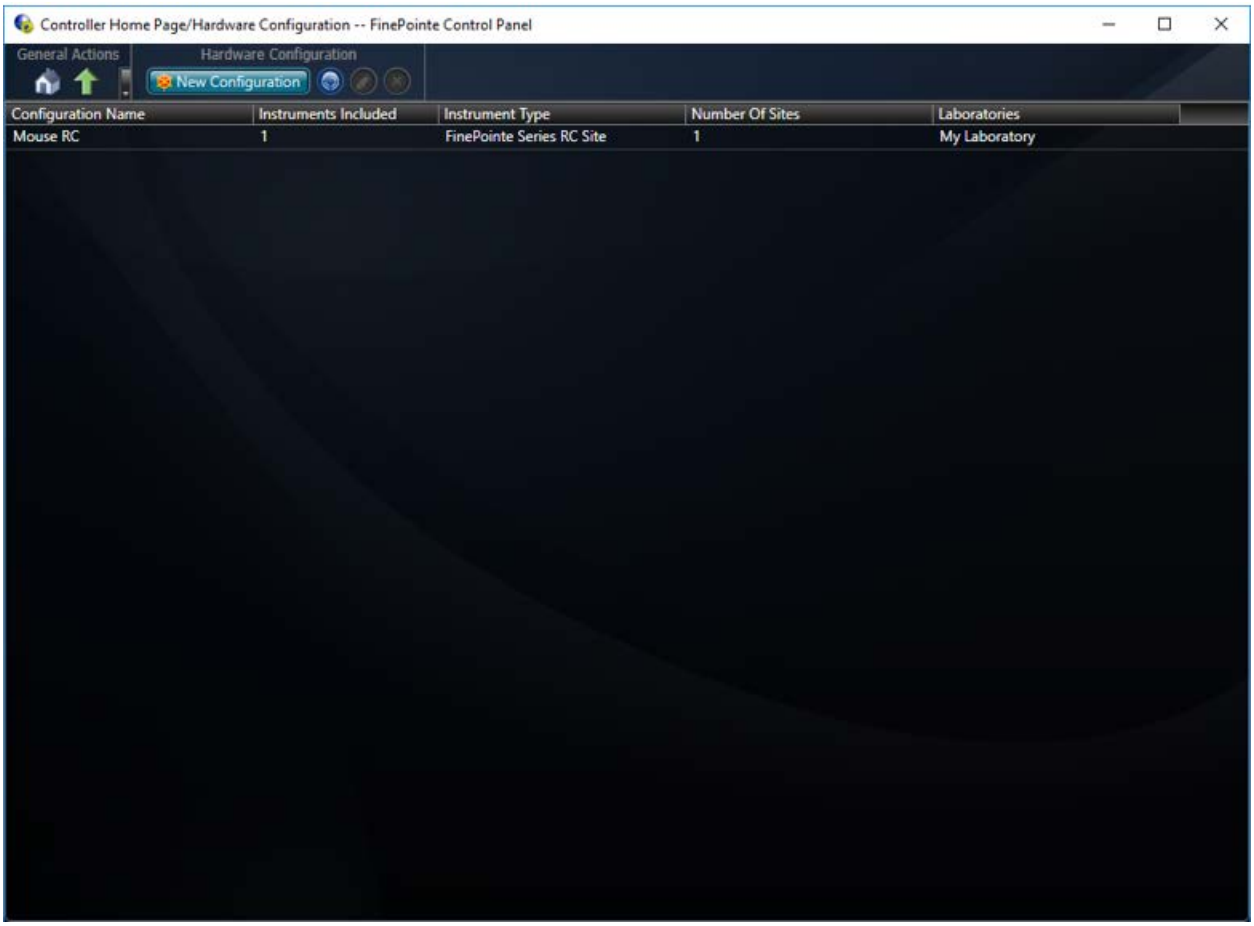


Figure 20. Displays the Hardware Configuration dialog after completing the Configuration Wizard. Notice, the Mouse RC controller is available.

The newly created Hardware Configuration will now appear in the FinePointe™ Laboratory View. You may now close FinePointe™ Control Panel.

FinePointe™ Software

Once the hardware is configured, the FinePointe™ software will be used to calibrate the apparatus, create, manage studies, collect, review, and report on study data.

To launch FinePointe™:

1. Either double-click the desktop icon,  , or select the **Windows Start menu | All Programs | FinePointe™ | FinePointe™**.

2. Log In
   When the Log In dialog box appears:

   a. Choose your correct server from the drop-down list.

   b. Fill in your username and password.

c. Click **OK** to continue.

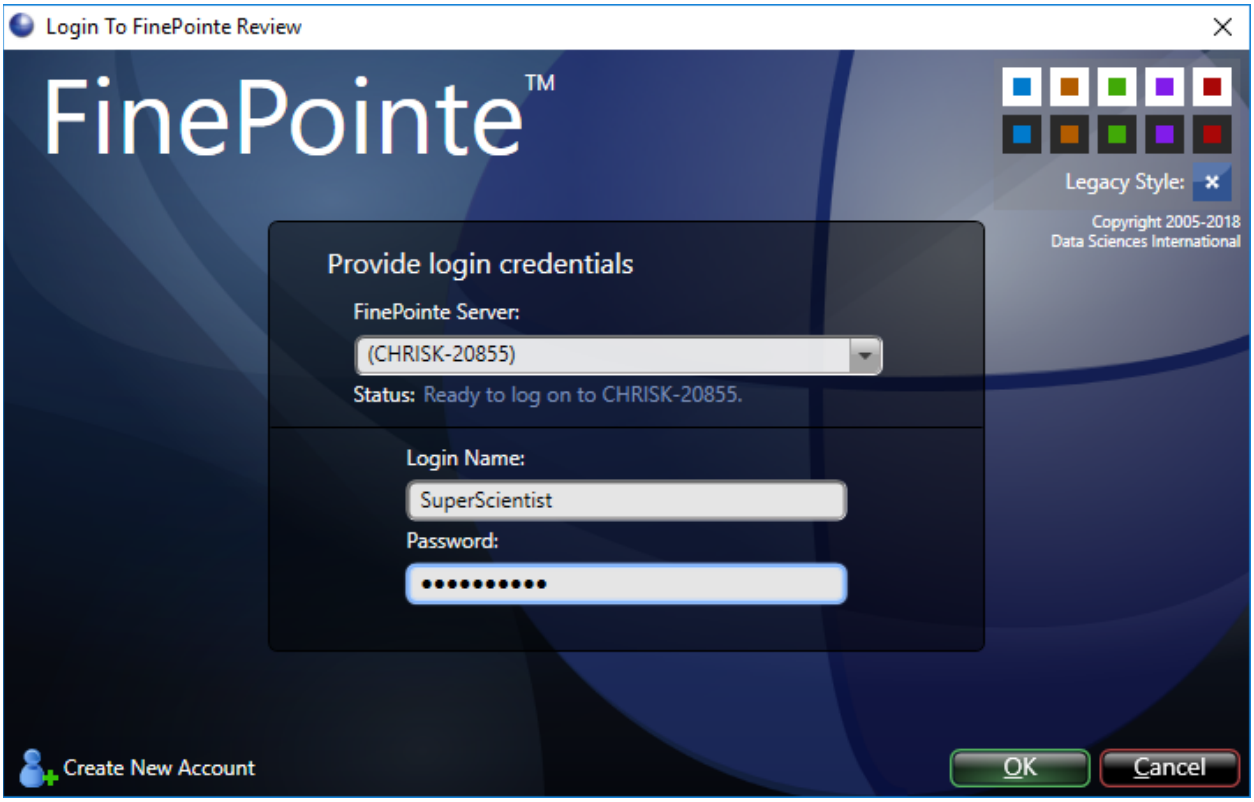


Figure 21. Displays the FinePointe™ software login dialog.

If logging in for the first time, a User ID may be created on the fly:

1. Type in a username and password. (The password is optional.) Click **OK**.
2. Click **Yes** to confirm user creation.

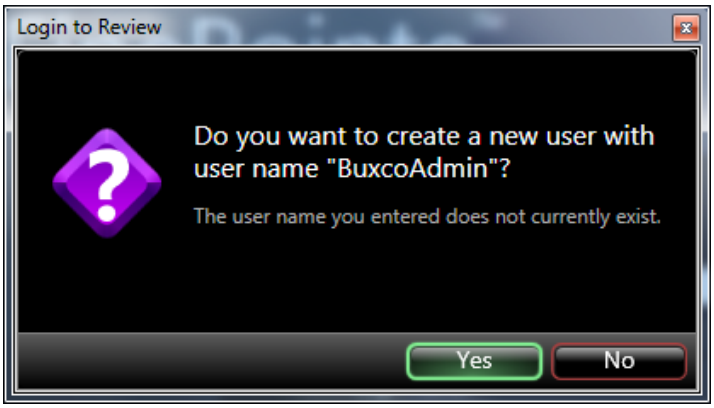


Figure 22. Displays the Create New User confirmation window.

3. You will be asked to confirm the password. Re-type it, and click **OK** to finish creating the User ID. If a password is not required based on your standard operating procedures, simply do not enter one and the new User ID will be created without a password.

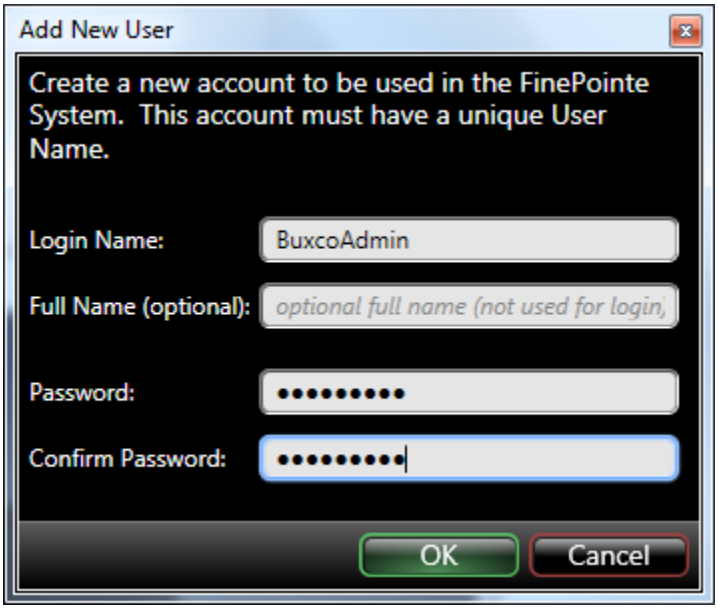


Figure 23. Displays the Add New User dialog used to confirm password entry.

4. A DSI representative can help you modify the settings in the log in panel if you would like to use Windows Authentication.

The first time you open the software, you'll be presented with an empty lab page, as displayed below:

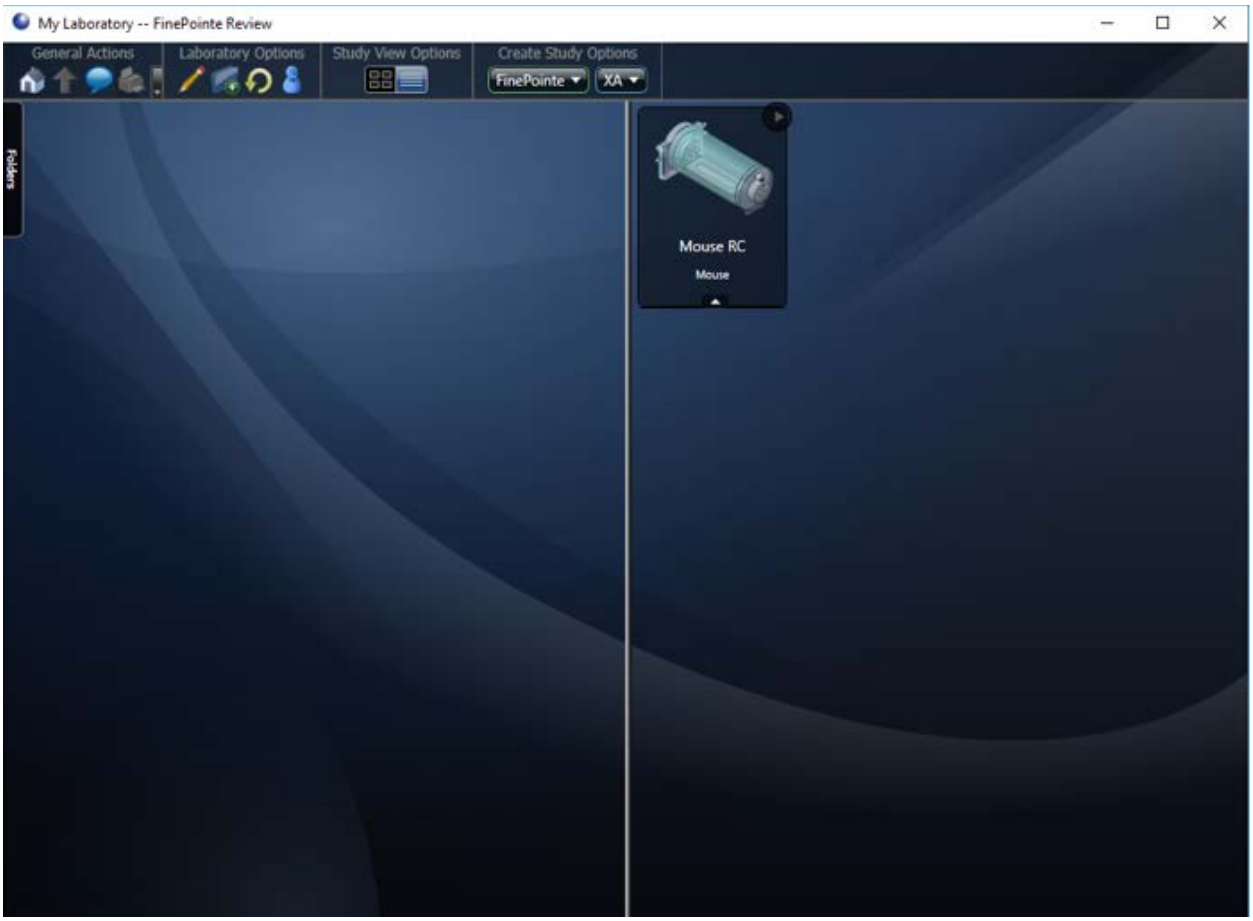


Figure 24. Displays the FinePointe™ software Home Page. Notice, the RC site hardware configuration is automatically loaded and available.

Hardware configurations will appear on the right side of the screen. Recall, hardware configurations are created using the **FinePointe™ Control Panel** discussed earlier.

As you create studies, the left side of the page will fill with study icons.

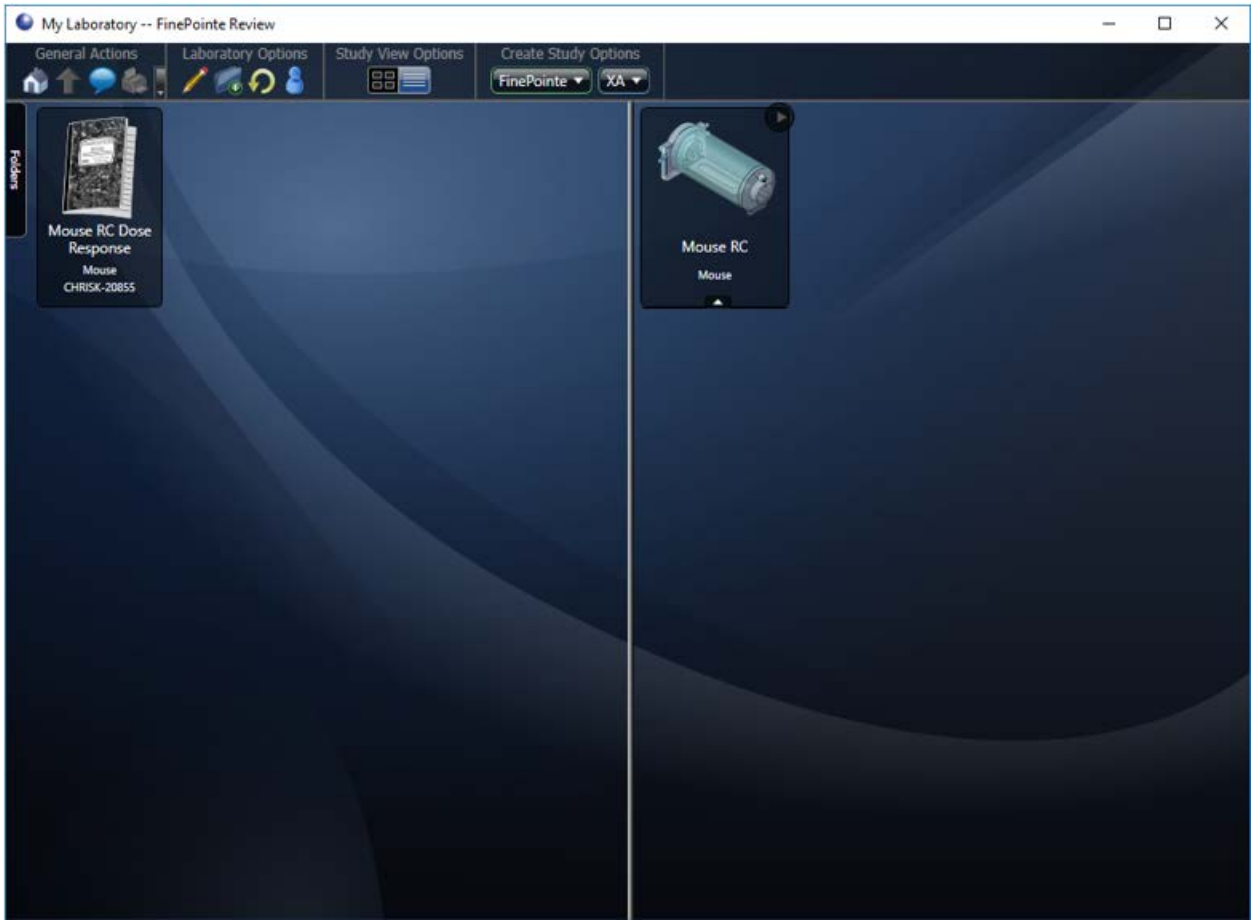


Figure 25. Example FinePointe™ software Home Page with Study folders on the left and Hardware Configurations on the right.

Once FinePointe™ is launched, it is recommended to calibrate your hardware apparatus sites.

Calibration

Calibration is made easy with the FinePointe™ Calibrator Column. Use the following instructions to calibrate the FinePointe™ RC Mouse site.

NOTE: It is recommended to calibrate your RC site once per day, prior to the commencement of your acquisitions for that day.

Prepare

Mouse RC Calibration Setup

Before you initiate calibration, please locating the following items:

- Calibrator
- Tracheal Blocking Tube
- Exhaust Tube

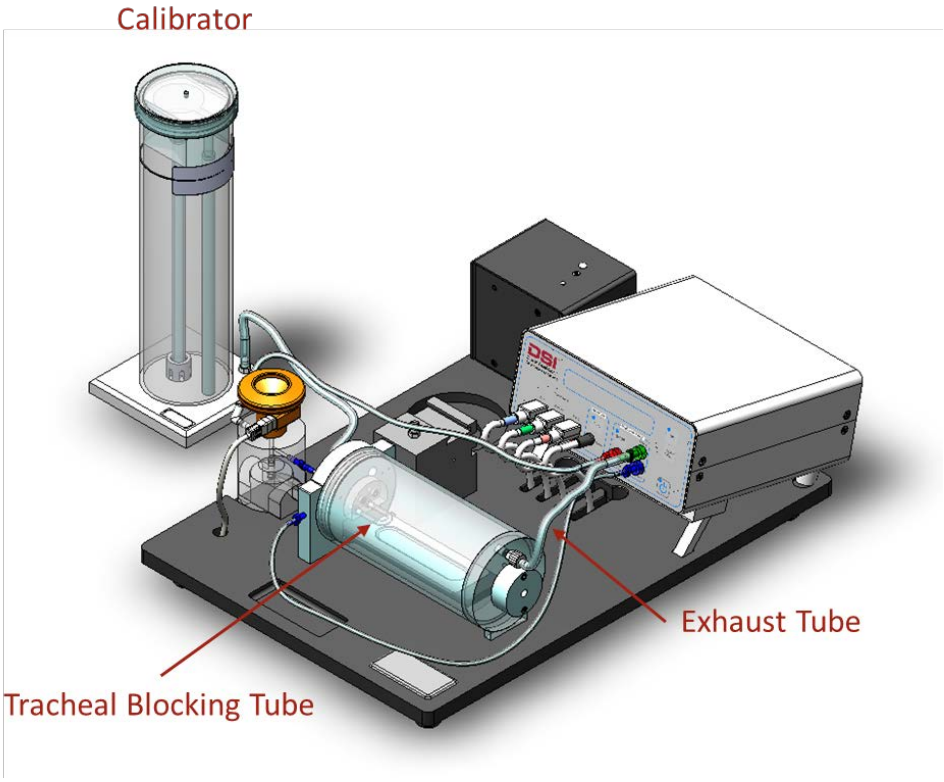
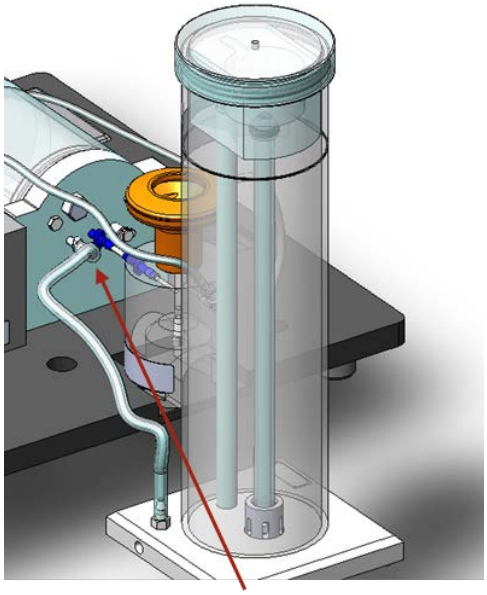


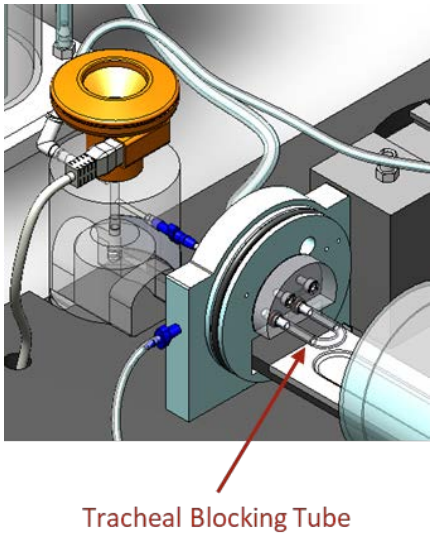
Figure 26. FinePointe™ Mouse RC system configured for Calibration by adding the Calibrator, Tracheal Blocking Tube, and Exhaust Tube.

Configure the Mouse RC system for calibration:

1. Ensure the plethysmograph is empty (no animal).
2. Connect the Calibrator.
    a. Ensure the Calibrator is filled to the Fill Line. Top off if necessary.
    b. Ensure no water is in the calibrator tubing. If there is, replace tubing or purge all water from the tubing and dry it out.
    c. Connect the calibrator directly to the chamber manifold in any unused luer connection in the ventilation line.

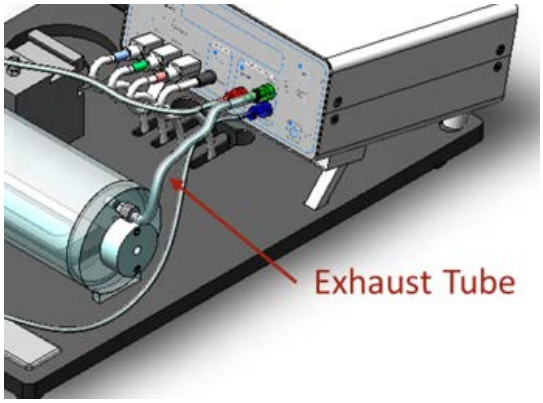


3. Insert the tracheal blocking tube to connect the inspiration port to the expiration port.



4. Reconnect the plethysmograph chamber onto the manifold.

5. Connect the Exhaust Tube from the controller's **Ventilation Pump Exhaust** port to the rear port on the plethysmograph chamber.



6. Ensure an applicable Hardware Configuration has been created and is visible on the FinePointe™ Home Page, as illustrated below. Please see the Create a Hardware Configuration section for more instructions.

Rat/GP RC Calibration Setup

Before you initiate calibration, please locating the following items:

- Calibrator
- Aerosol Cap
- Male Luer Plug
- Exhaust Tube

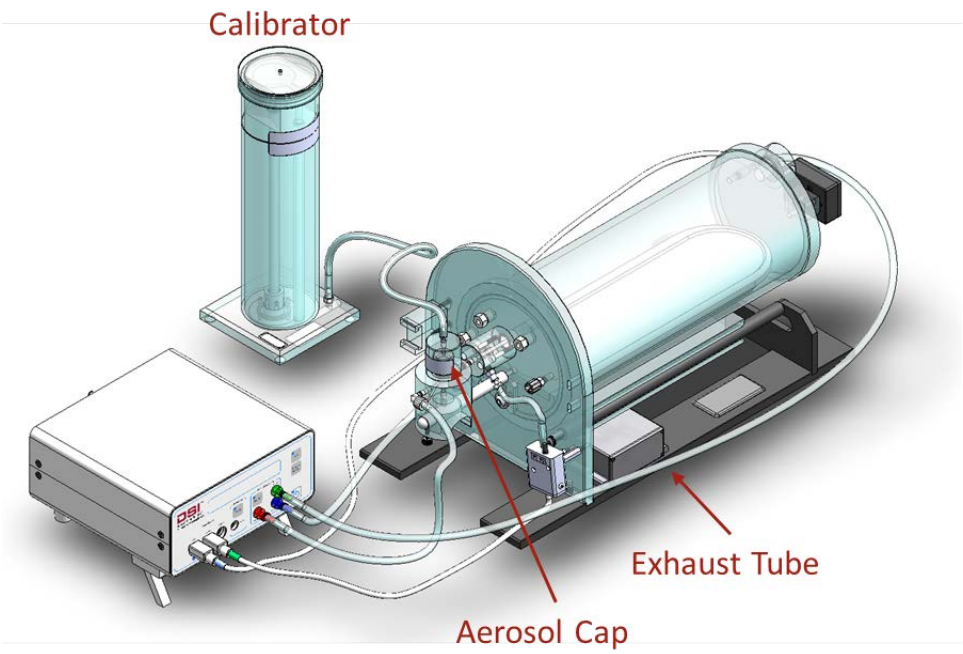
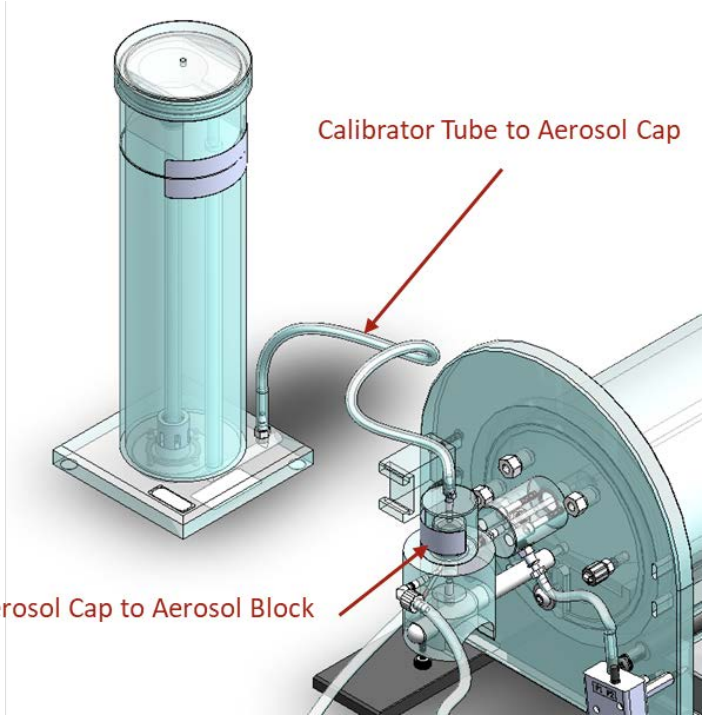


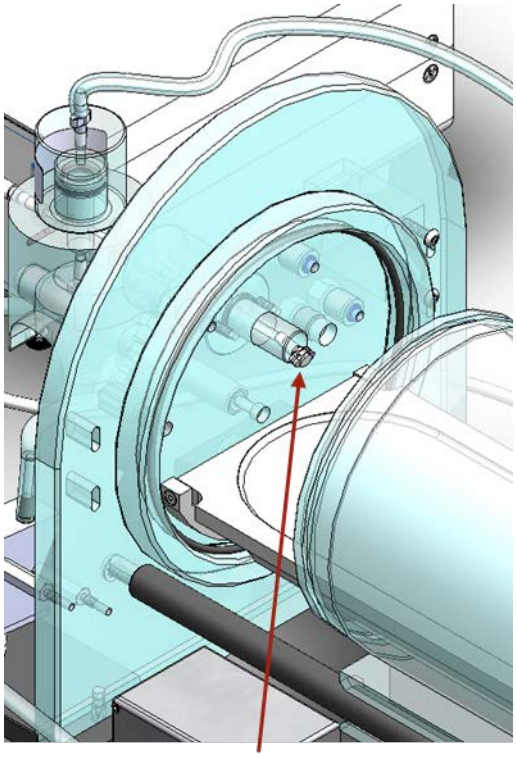
Figure 27. FinePointe™ Rat/GP RC system configured for Calibration by adding the Calibrator, Aerosol Cap Male Luer Plug (cannot be seen from this angle), and Exhaust Tube.

Configure the Rat/GP RC system for calibration:

1. Ensure the plethysmograph is empty (no animal).
2. Connect the Calibrator.
    a. Ensure the Calibrator is filled to the Fill Line. Top off if necessary.
    b. Ensure no water is in the calibrator tubing. If there is, replace tubing or purge all water from the tubing and dry it out.
    c. Replace the Nebulizer head with the Aerosol Cap.
    d. Connect the calibrator directly to the top of the Aerosol Cap.



3. Insert the Male Luer Plug into the manifold's inspiration port inside the chamber.

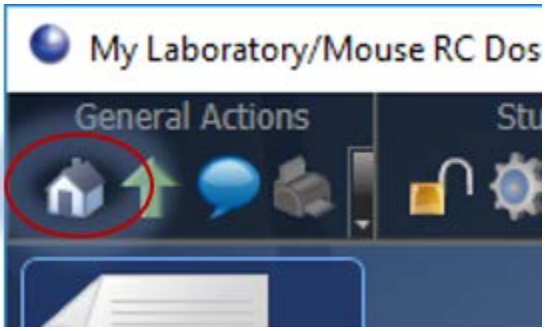


4. Connect the Exhaust Tube from the controller's **Ventilation Pump Exhaust** port to the rear port on the plethysmograph chamber.
5. Ensure an applicable Hardware Configuration has been created and is visible on the FinePointe™ Home Page. Please see the Create a Hardware Configuration section for more instructions.

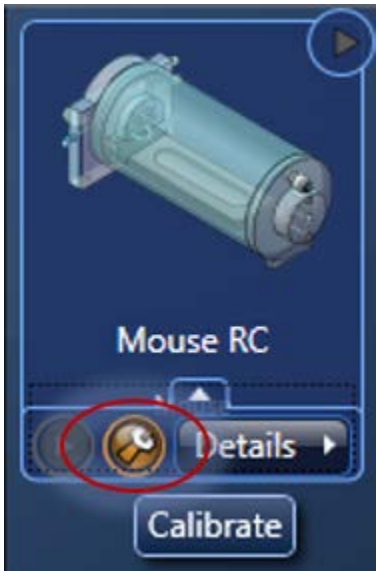
Start Calibration from FinePointe™

Once you have prepared the apparatus, perform the following to calibrate the RC site:

1. Open FinePointe™, click on the **Home** icon to return to the lab page.



2. Find the appropriate hardware configuration located on the right side of the screen, hover the mouse over the hardware configuration, and click the **Calibrate** button (orange wrench) on the station to bring up the calibrate page.



3. From the *Calibration* dialog that appears, click the **Calibrate** button. This will begin the calibration process.

   The FinePointe™ controller performs a thorough calibration and test sequence.

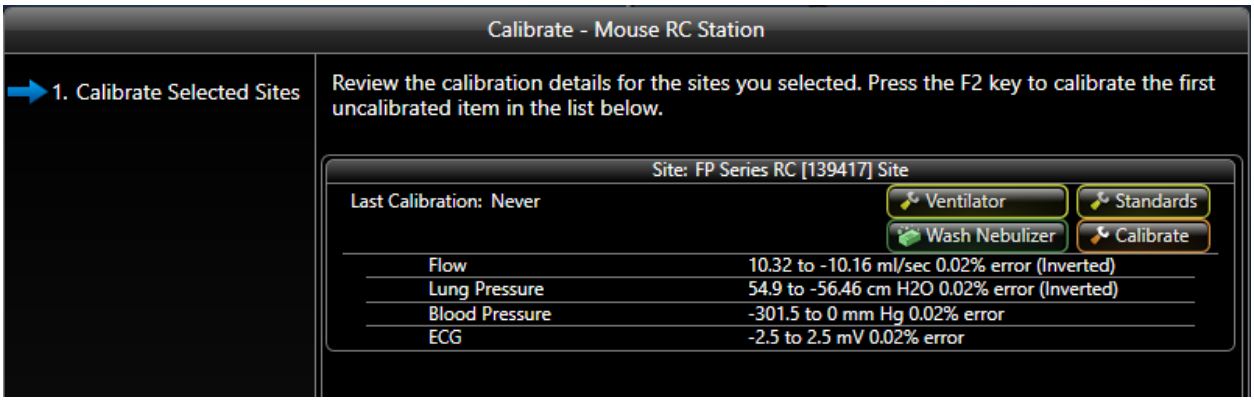


Figure 28. An example calibrate page in FinePointe™ software.

As FinePointe™ performs the tests, you will see the water levels in the Calibrator rise and fall.

A status screen indicating the calibration process will appear.

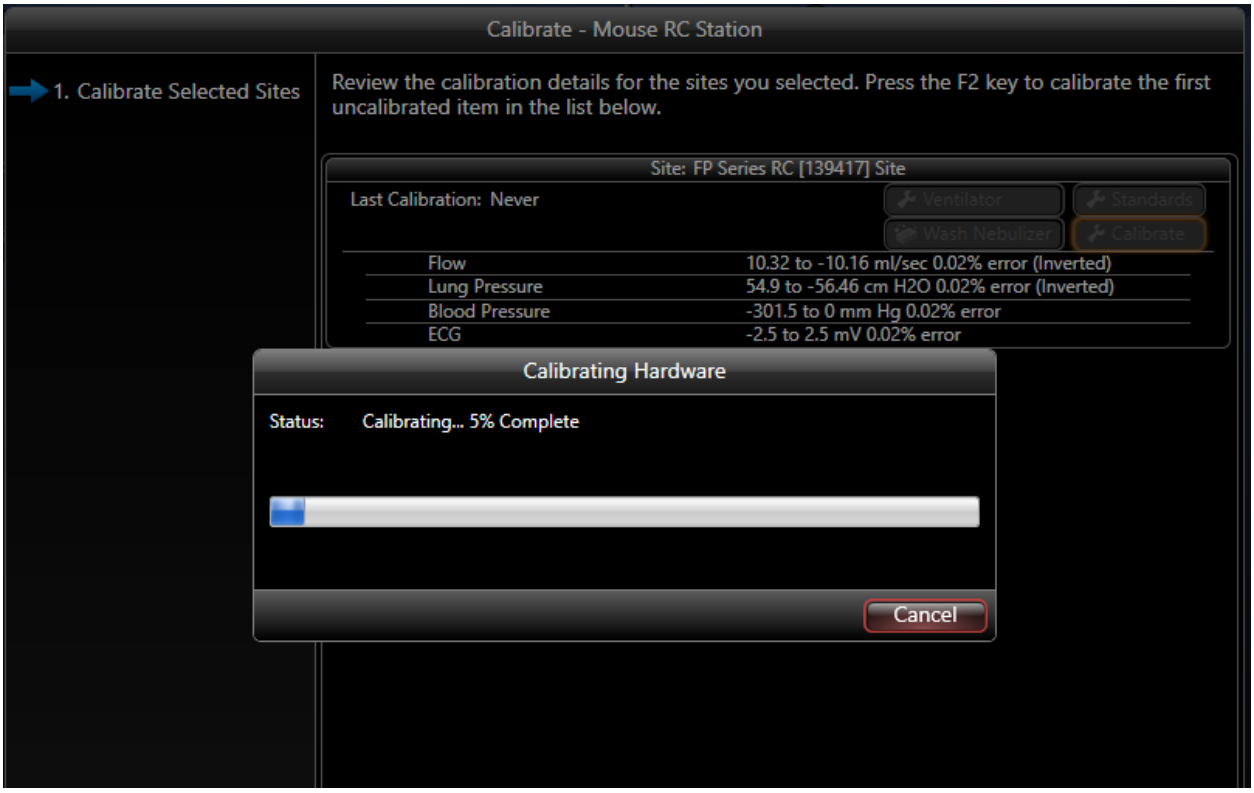


Figure 29. An example RC calibration progress indicator.

When the status bar reaches 100%, a proper calibration has been performed. Refer to the Appendix for a list of **Calibration Errors and Corrective Action**.

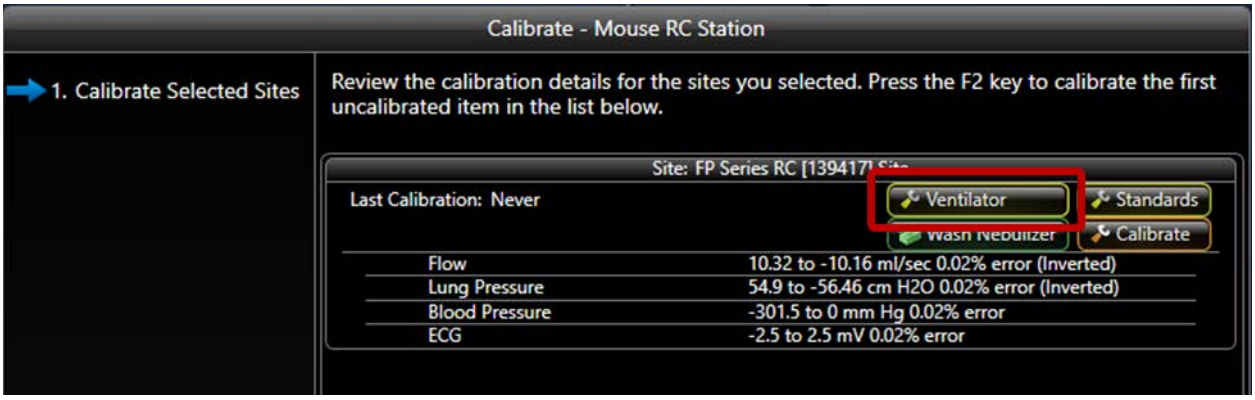
4. Once calibration of all sites is complete, click **Finish**.
5. Prepare the RC site for acquisition:
    a. Disconnect the calibrator and either place the nebulizer on the aerosol block or replace the plug where calibrator was connected directly to manifold.
    b. Remove the Exhaust Tube from the rear of the plethysmograph and unplug from controller. Plug the rear plethysmography port with the Luer fitting cap.
    c. Remove the Tracheal Blocking Tube or Male Luer Plug from inside the chamber.

Next, verify the ventilator settings.

Ventilator Settings

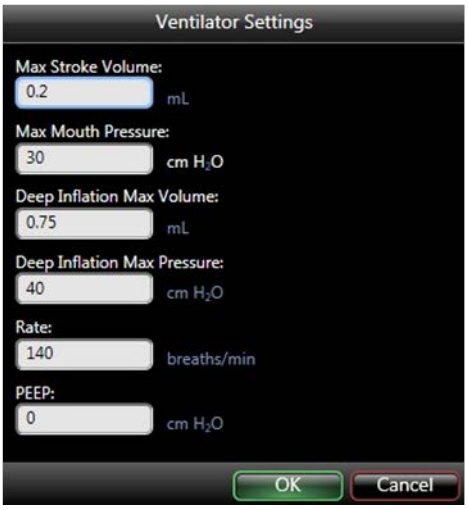
Ventilator settings should be verified prior to placing an animal on the table and starting data acquisition. Since the RC controller can be used for multiple species, it is important to enter the correct ventilator settings for the species being used.

To check the ventilator settings, click the **Ventilator** button.



This will bring up the Ventilator Settings menu. Shown below are starting points for mice and rats.

Typical Mouse Settings



Typical Rat Settings

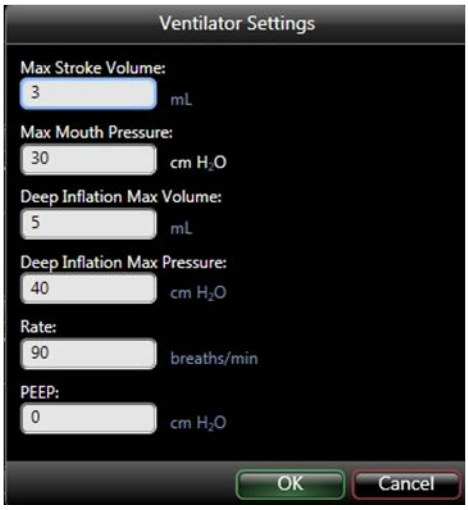


Figure 30. Default Ventilator settings for Mouse and Rat.

Max Stroke Volume:	The volume of air that the ventilator pushes for each breath. The measured Tidal Volume of the subject will be lower than this Stroke Volume due to the compression of air within the tubing and trach tube, as there is resistance on the animal side.
Max Mouth Pressure:	A safety measure to protect the subject from lung over inflation. When this pressure is reached, the ventilation valve will immediately flip to expiration, even if the frequency requirement has not been met
Deep Inflation Max Volume:	The volume the ventilator will push during the "Three Deep Breaths" step (selected in the Study Settings); same as Max Stroke Volume but only for those three deep breaths
Deep Inflation Max Pressure:	The maximum volume of the "Three Deep Breaths" step (selected in the Study Settings); same as the Max Mouth Pressure but only for those three deep breaths.
Rate:	The number of breaths per minute that the ventilator is set to.
PEEP:	Peak End Expiratory Pressure: the pressure that the ventilator will apply to the lungs at the end of a breath's expiration. This is particularly important when the subject's lungs are in danger of collapsing if there is no minimal pressure being applied.

Once, ventilator settings are configured as desired, click **OK** and then **Finish** to return to the FinePointe™ lab page.

RC Study Types

There are several common uses for the RC apparatus. The use dictates the procedure used to acquire and summarize the data. In FinePointe™, the study type is what describes the use in the broadest terms and is used to assist you with the data collection and reporting. While many study types are available, most researchers using the RC apparatus will use Dose Response study type.

With a Dose Response Study, subjects are challenged with increasing doses of Methacholine (Mch), or some other bronchoconstrictor, and the response to the constrictor is quantified and data are presented as a dose response curve. This study type is used with most dose response studies where various dose concentrations are delivered over a single acquisition. Measurement periods associated with each dose challenge are placed automatically by the software based on user defined durations.

The Dose Response study type may be performed using the standard Dose Response Study in FinePointe™ (most common), or through the Universal Study type. The standard Dose Response Study selection is the most straightforward approach and is outlined in the **Create a Dose Response Study** section below. However, the Universal Study type may be preferred if additional flexibility in study configuration is necessary.

For instance, the Universal Study is more suitable if:

1. Variable measurement, aerosol, and recovery durations between the various doses is desired.
2. It is desired NOT to include the active nebulization time within the dose measurement period.

Please see the **Create a Universal Study** section for more details on using this Study Type for Dose Response studies.

Note: Each time a study is created in FinePointe™, you need to specify the apparatus you will be using with that study. The apparatus defines the signals that will be acquired and the analyzer tables that will be produced. It will also dictate aspects of your data collection protocol.

When performing a study with the RC system, there are three apparatus options:

- **RC Ventilated:** Normal operation, where the subject is ventilated, and Dynamic Compliance (Cdyn) is measured.
- **RC Static:** The ventilator will deliver the Stroke Volume and then *hold* at a zero-flow state before expiration—compliance is measured at this time and is called Static Compliance (Cstatic).
- **RC Pneumotach:** An uncommon configuration, only used when not using a standard RC system and with external pneumotachs. Typically configured for larger animals, such as dogs or non-human primates.

Create a Dose Response Study

For this example, we will create a Dose Response study that is used when each chamber is using its own nebulizer head.

On the Home page, right click and choose **New Study | Dose Response.**

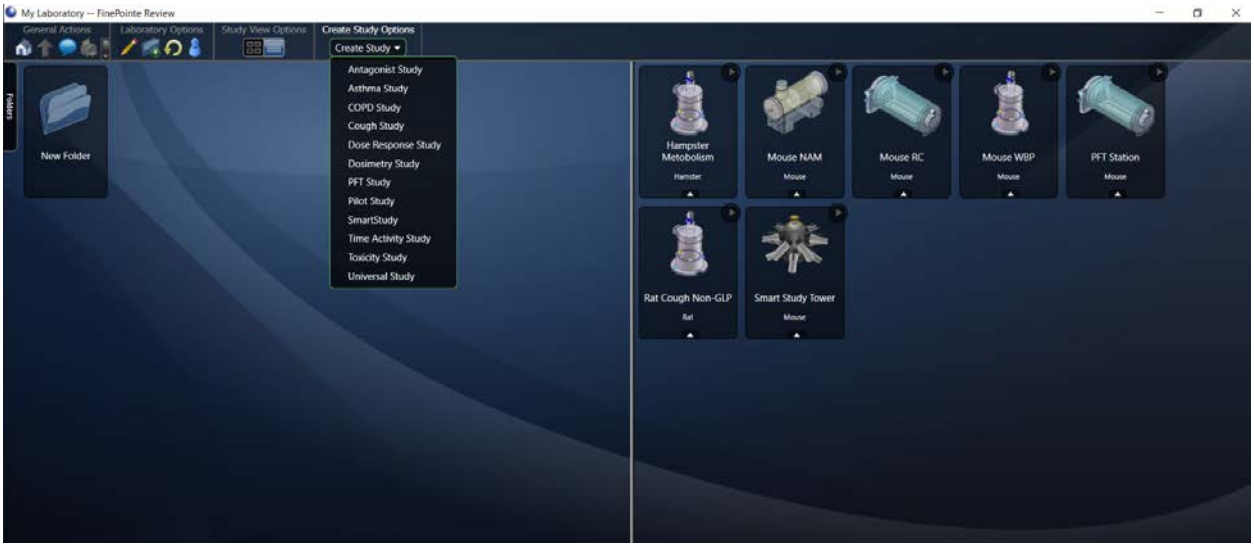


Figure 31. Displays the method used to create a New Study via right-click.

Or you can use the **Create Study Options** along the top of the screen by clicking the FinePointe™ dropdown and choosing the **Dose Response Study** button.

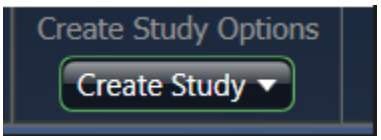


Figure 32. Displays the Create Study Options. Click FinePointe™ and choose the appropriate study time, e.g. Dose Response.

The step-by-step study-creation wizard will open to guide you through the study creation process. Follow the steps in the Create New Study wizard.

Step 1 - General Creation Information:

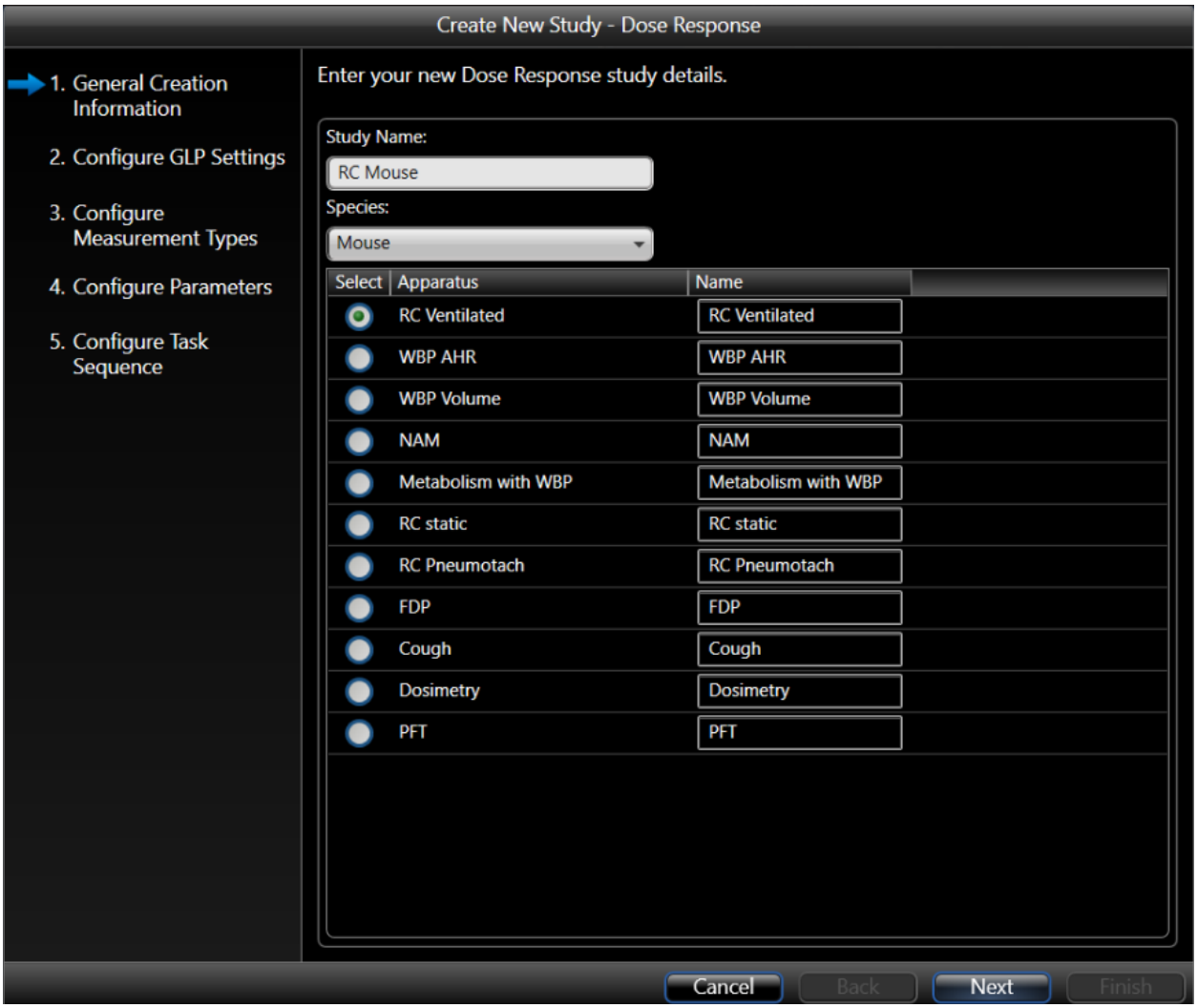


Figure 33. Step 1 of the Create New Study dialog with the required sections filled out.

In the first wizard page, you need to:

1. Type in a Study Name. For this example, we use “RC Mouse”.
2. Choose a species from the drop-down list. Here we chose “Mouse”.
3. Click to select the appropriate set of apparatus, or acquisition hardware. Choose “*RC Ventilated*”. You are free to give another name to the apparatus if you like.
4. Click **Next**.

Step 2 – Configure GLP settings (Optional):

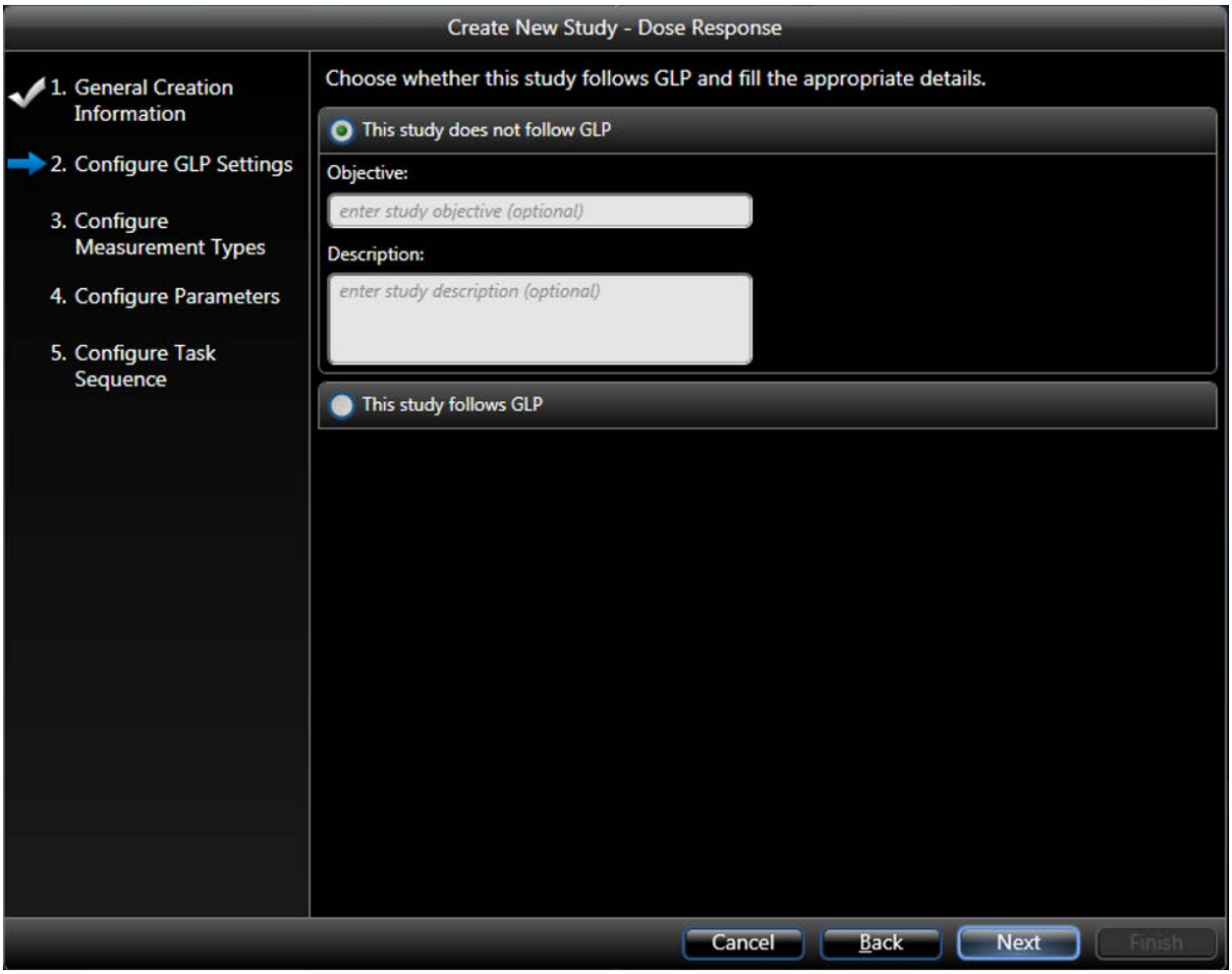


Figure 34. Step 2 of the Create New Study dialog.

This step is optional. If GLP options are enabled, this page permits the user to additional detail that may be required under a GLP environment. Click **Next** to continue to step 3. Please see ***FinePointe™ GLP Features User Guide*** for additional details.

Step 3 - Configure Measurement Types

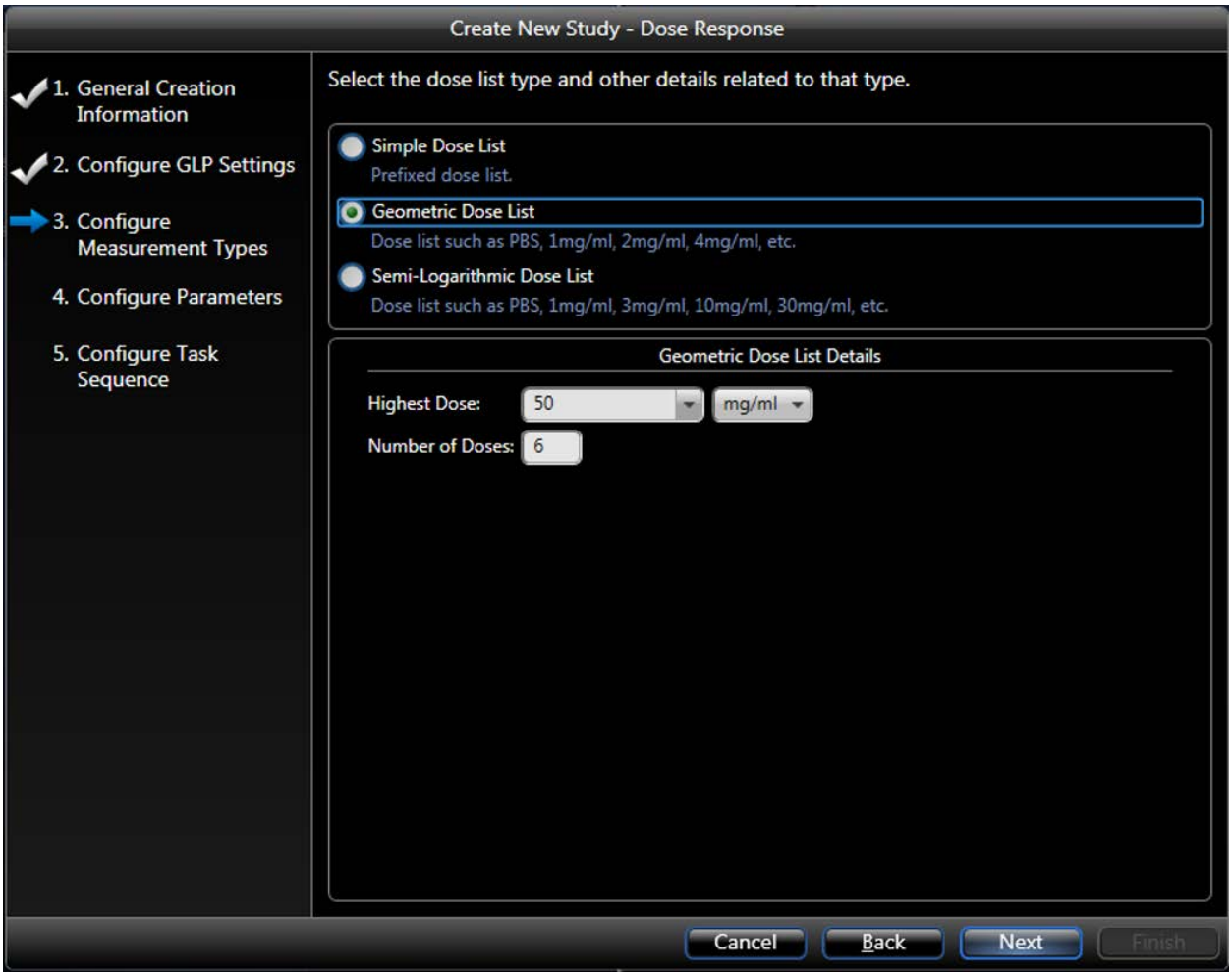


Figure 35. Step 3 of the Create New Study dialog configured with typical settings.

1. Choose a dose list type: Simple, Geometric, or Semi-logarithmic.

a.	Simple Dose	Names the doses with increasing indexes. Enter a name for the dose and enter the number of total doses (PBS included).
b.	Geometric Dose	Doubles each subsequent dose. Choose the high dose amount, the units, and the number of total doses (PBS included).
c.	Semi-Logarithmic Dose	Follows a common semi-logarithmic pattern. Choose the initial low dose, the units, and enter the number of total doses (PBS included).

Figure 35 shows a common choice, Geometric Dose ending at 50 mg/ml, for 6 total doses (PBS and 5 drug doses).

How to choose? In all cases you end up with a descriptive dose list. You can have the computer generate the list which you can then edit manually. Choose the pattern that most closely describes your sequence of doses. The next page allows you to edit the dose ids and concentrations, as well as specify parameters for the first report.

The dose list you choose helps populate the automatically generated *Task Sequence* list.

2. Click **Next** to continue.

Step 4 - Configure Parameters

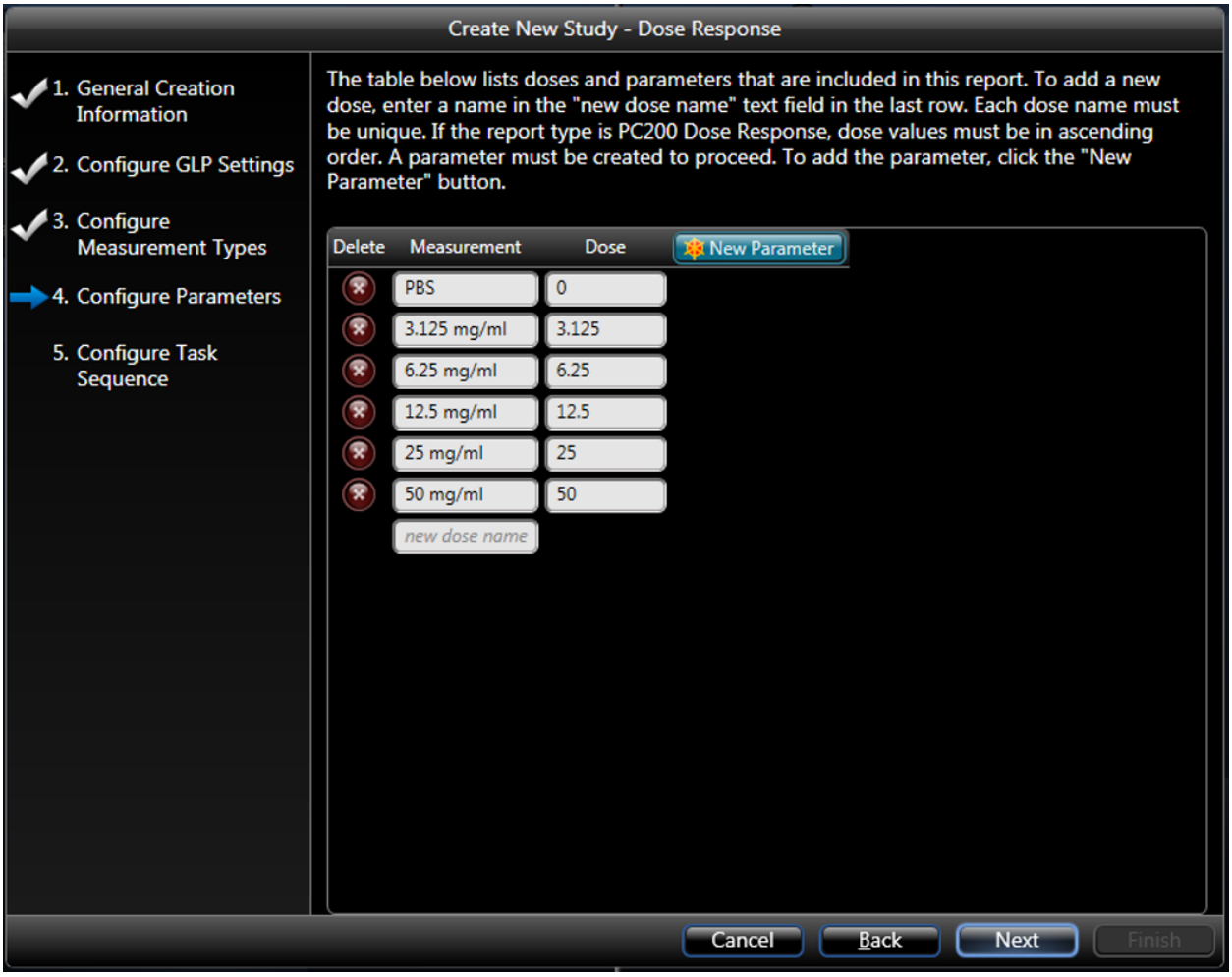


Figure 36. Step 4 of the Create New Study dialog. Add a New Parameter used to create the initial report.

This list reflects what you just chose as your list of doses. You can edit the Measurement and Dose columns or add additional Measurements by clicking in the empty **new dose name** field and typing in the next Measurement's name. The Dose is a numeric value which may be used if you generate certain reports such as PC-200 report. See **Reports** for more information about this report.

To finish this screen, you must create at least one parameter to display in the default Dose Response report.

NOTE: Additional reports containing other parameters may be created later.

1. Click the **New Parameter** button. This brings up the Parameter Builder.

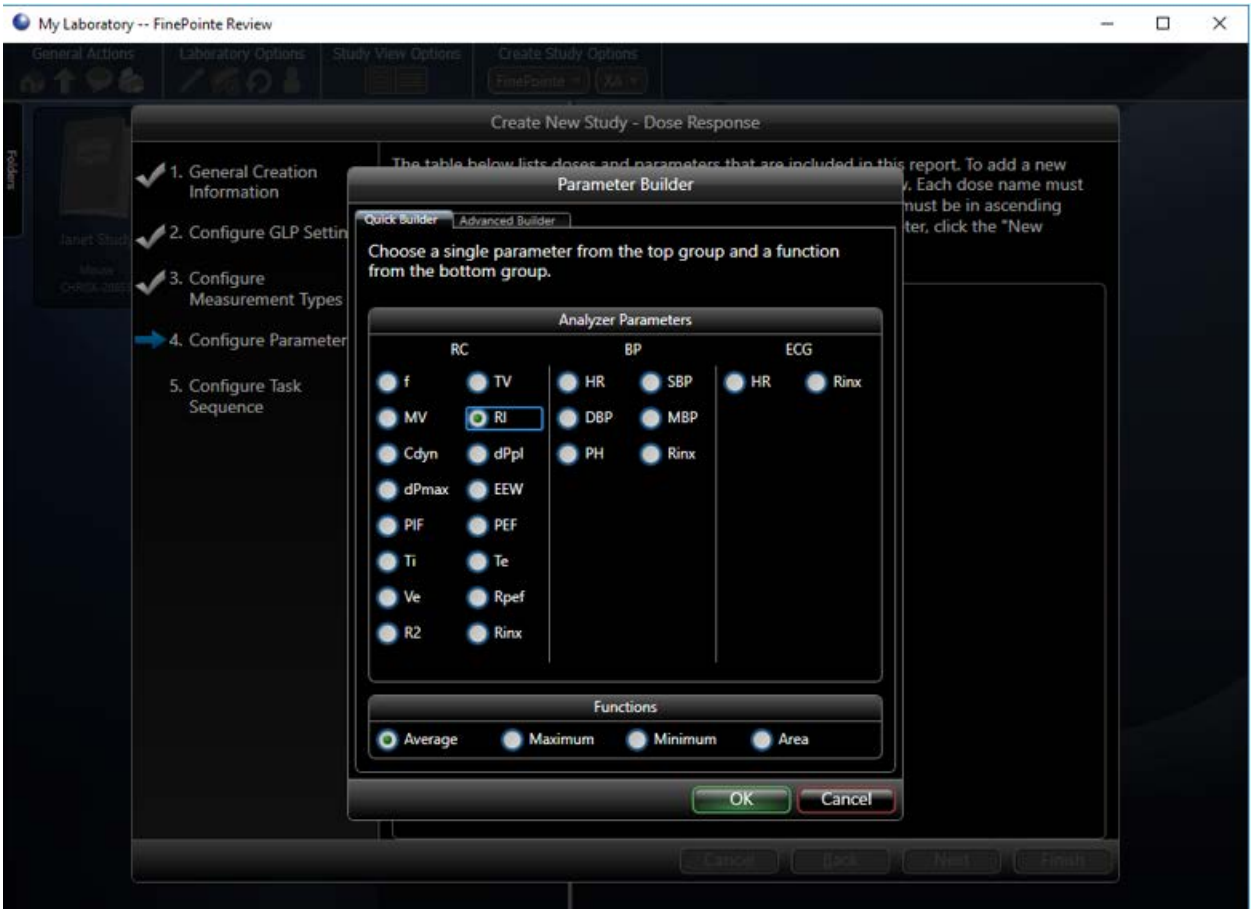


Figure 37. Parameter Builder dialog launched upon clicking the New Parameter button. Lung Resistance (RI) is a typical parameter selected for RC reports.

2. Click to choose one parameter from those listed.
3. Click to choose a function from the bottom of the screen.
4. Click **OK**.

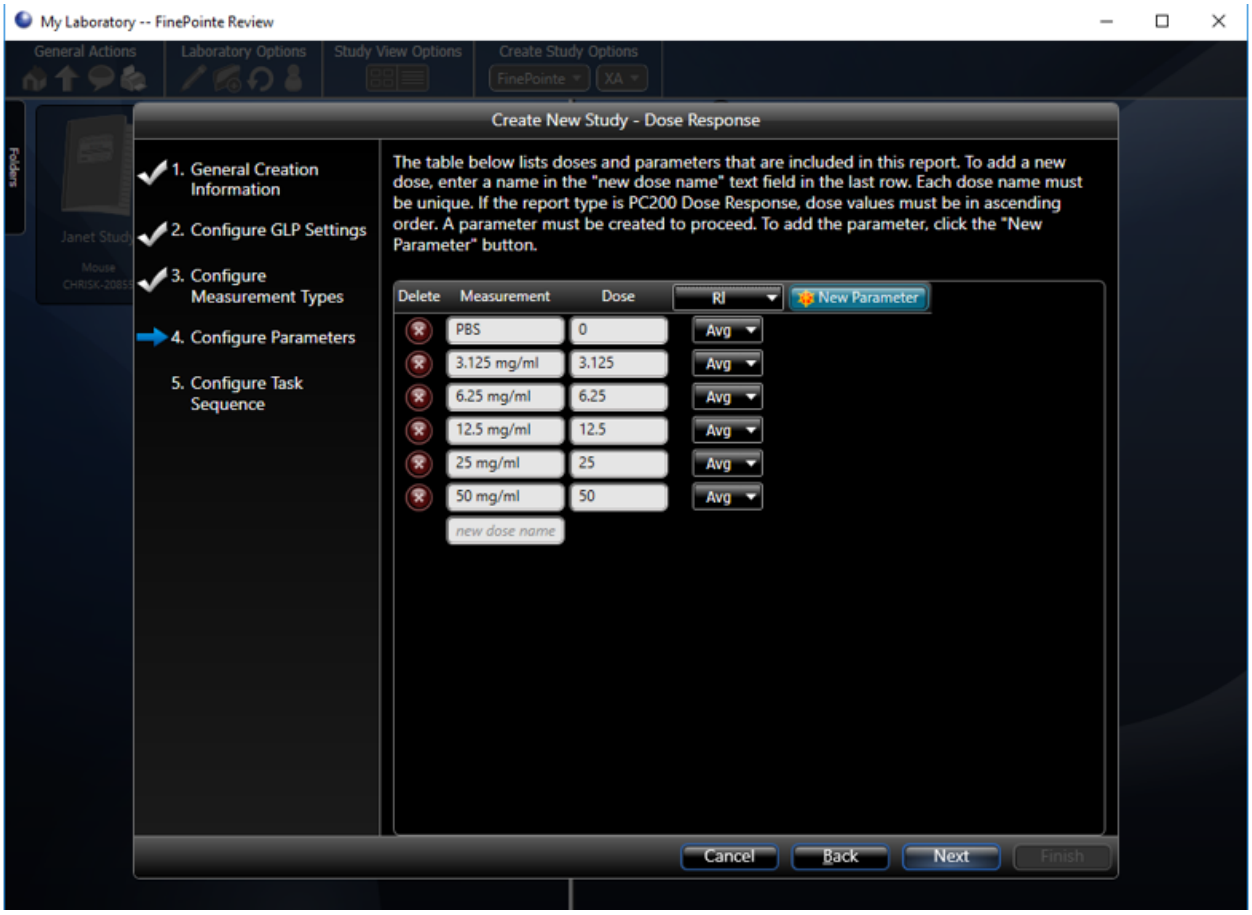


Figure 38. Step 4 of the Create New Study dialog with sRaw parameter added.

The new parameter has been added as a column to this screen. In the example above, we have added the parameter sRaw (Specific Airway Resistance).

5. To add an additional parameter, click the **New Parameter** button again.

6. When you are finished adding parameters, click **Next**. You can add up two parameters in a Dose Response report.

Step 5 - Configure Task Sequence

1. Adjustments can be made to modify the task sequence.

2. Read through the task sequence options. They apply to acclimation time, aerosol volume, delivery duration, dose response duration and recovery before the next dose.

3. When you are finished with your selections, click **Finish**.

NOTE: Nebulizer heads lose their efficiency over time. We recommend entering an Aerosol Volume value that is actually double of what you intend to deliver. This will ensure the intended dose is delivered in full within the specified Delivery Duration. Please see **Nebulizer Head Efficiency** section for more information.

Example: if you intend to deliver 0.010mL (10µL) to the test subject, enter 0.020mL (20µL) in the aerosol volume section of the task sequence.

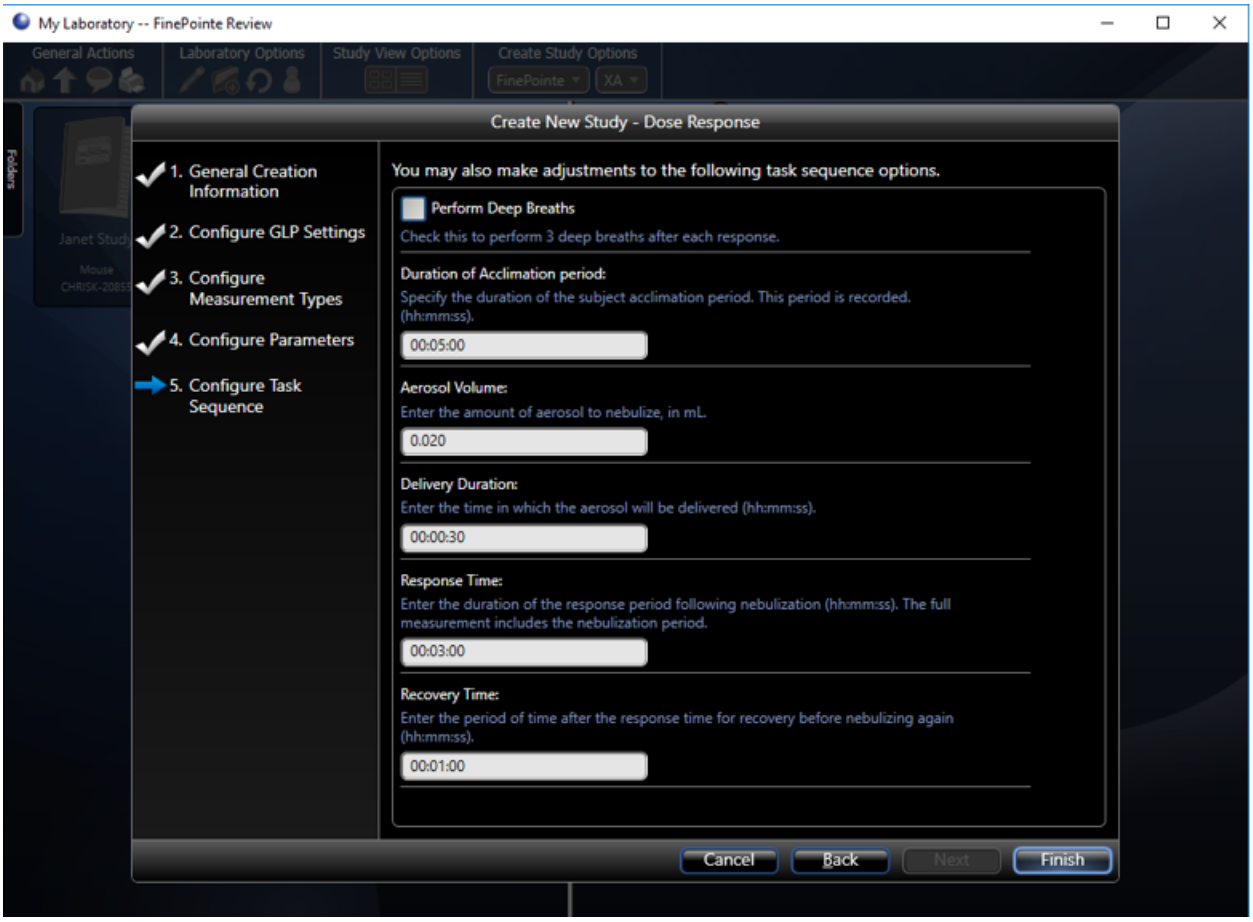


Figure 39. Step 5 of the Create New Study dialog configured with typical settings.

You will automatically be brought into the Study View. You will see an icon on the top left side of the screen indicating the system has just generated a default report for you with the parameter specified earlier.

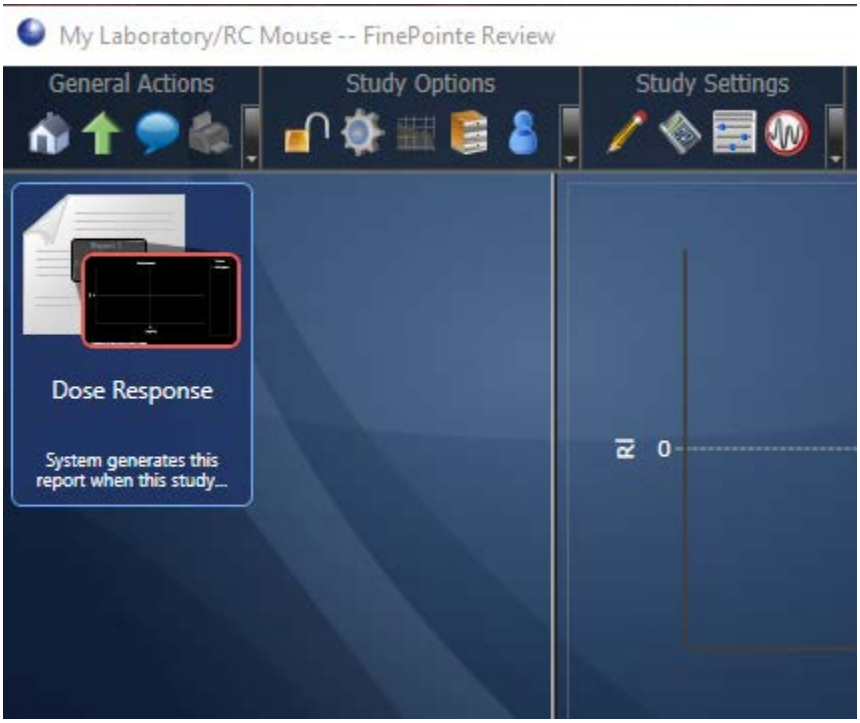


Figure 40. Once the Create New Study dialog is complete, the Study Page will be visible with the Dose Response report for RI available. Additional reports may be added later.

Create a Universal Study

The Universal study type provides greater control over the data collection procedure and allows you to mix data from Dose Response, Toxicity, and other study types. If you find one of the other study types serves your needs, you may want to stick with them, as fewer options generally lead to fewer mistakes.

Once you've created the Universal Study, FinePointe™ operates essentially the same way as it does with the other study types.

To create a Universal Study, begin on the Laboratory page and select **Universal Study** under the **Create Study Options**.

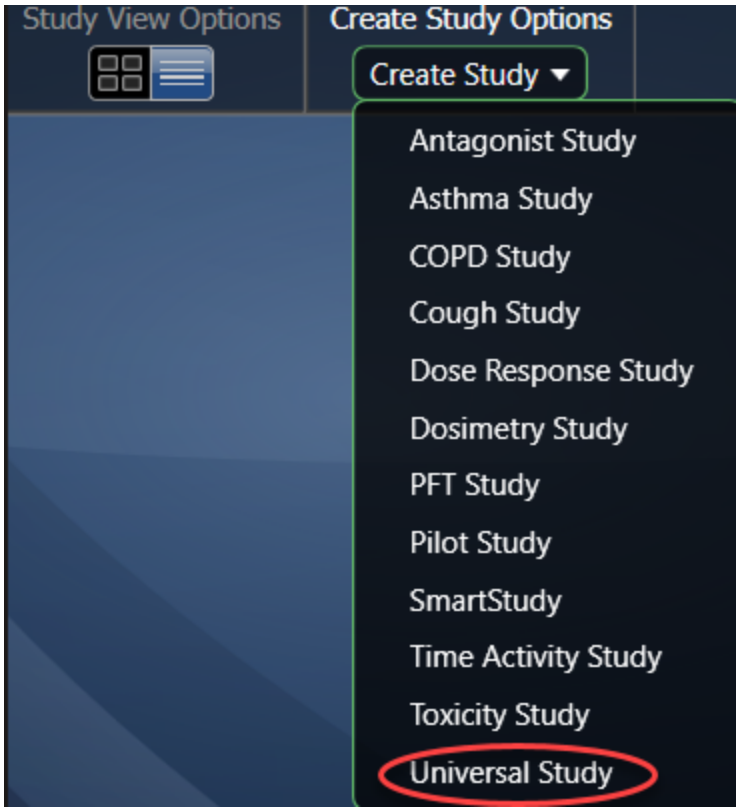


Figure 41. Select Universal Study by pulling down the FinePointe™ menu under Create Study Options.

This launches the **Create Universal Study** wizard.

Step 1 – General Creation Information

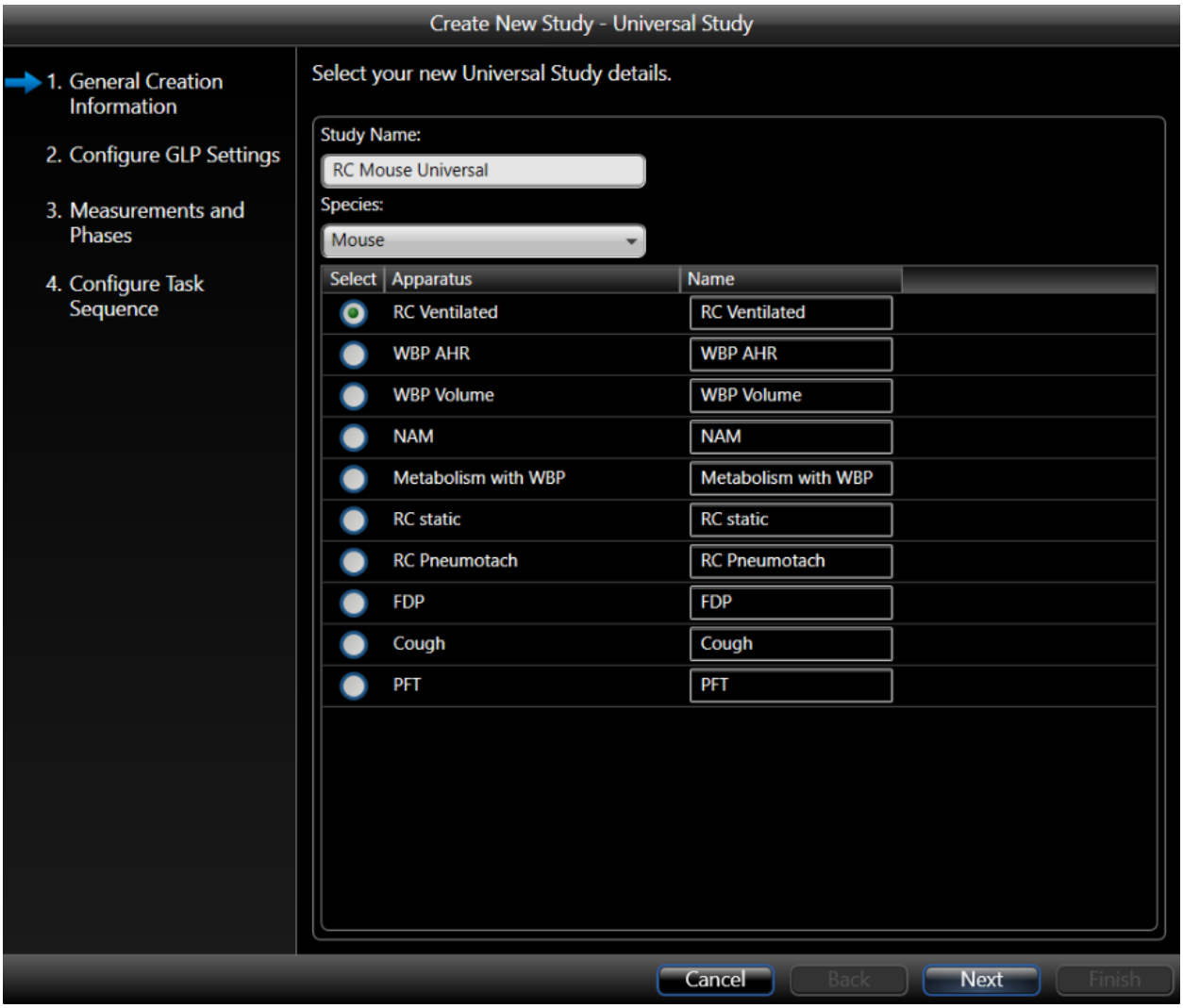


Figure 42. The first page of the Create Universal Study wizard.

In the first wizard page, you need to:

1. Type in a Study Name. For this example, we use “RC Mouse Universal”.
2. Choose a species from the drop-down list. Here we chose “Mouse”.
3. Click to select the appropriate set of apparatus, or acquisition hardware. Choose “RC Ventilated”. You are free to choose another apparatus if you like.
4. Click **Next**.

Step 2 – Configure GLP Settings

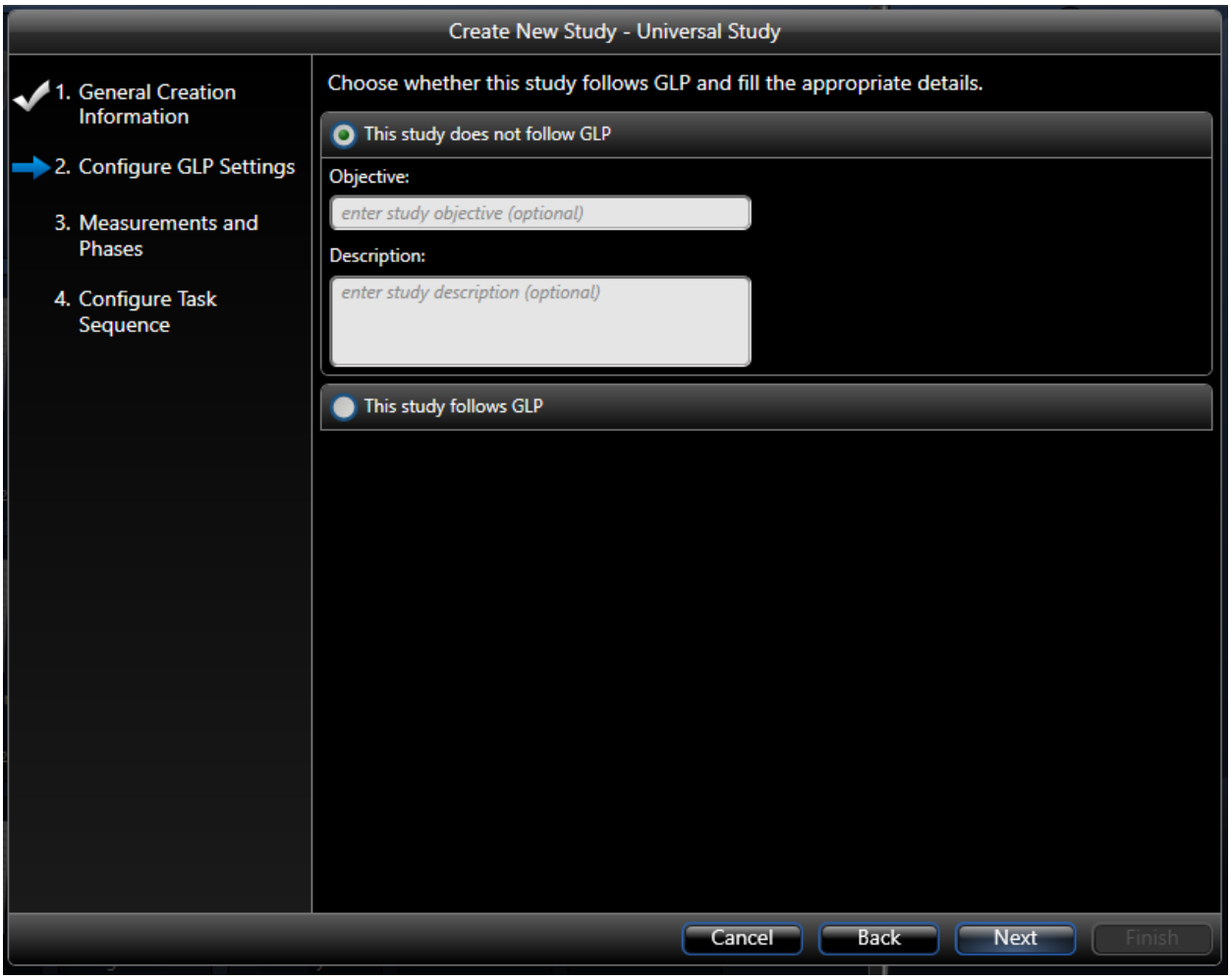


Figure 43. The second page of the Create Universal Study wizard.

This step is optional. If GLP options are enabled, this page permits the user to additional detail that may be required under a GLP environment. Click **Next** to continue to step 3. Please see ***FinePointe™ GLP Features User Guide*** for additional details.

Click **Next**.

Step 3 – Measurements and Phases

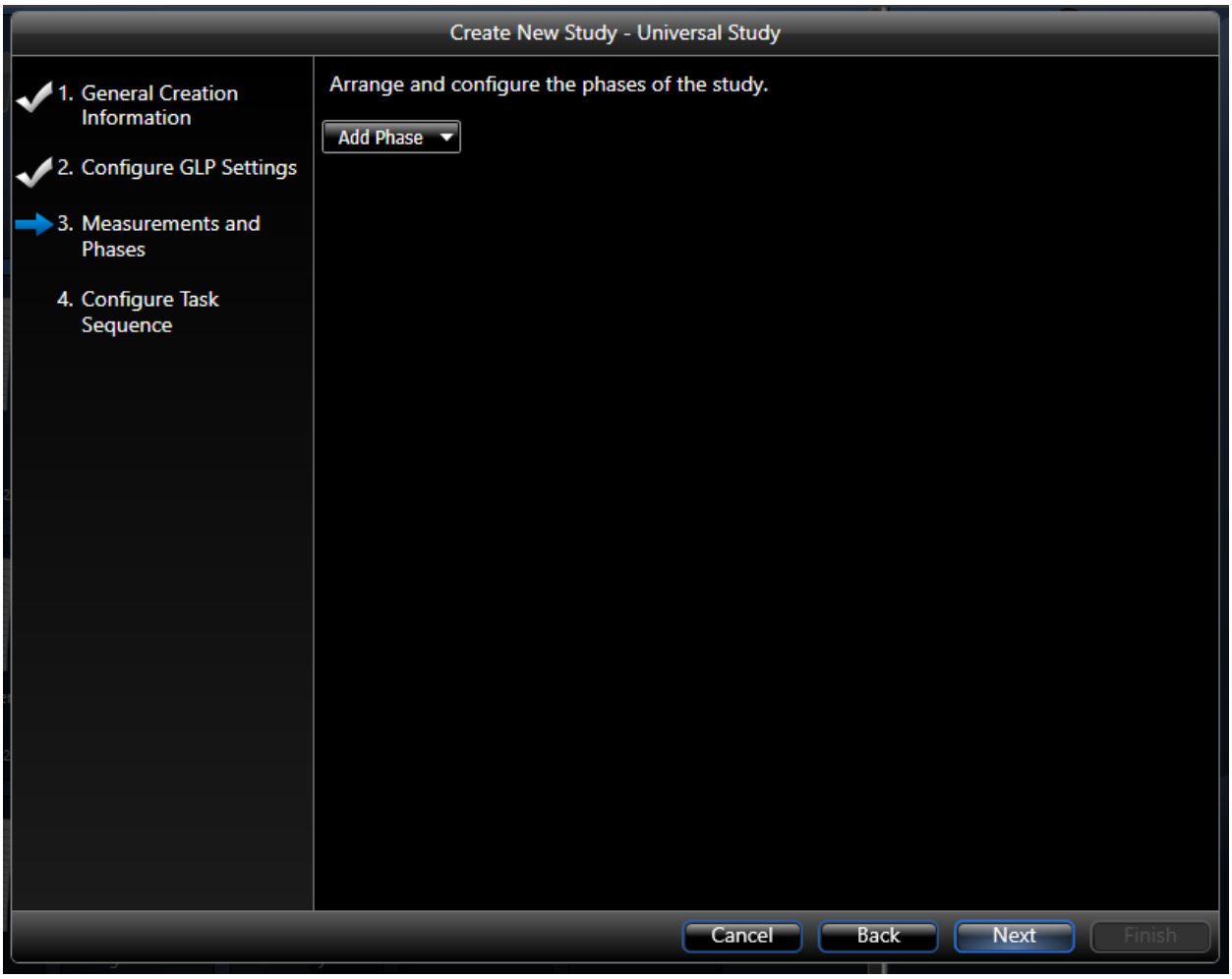


Figure 44. The third page of the Create Universal Study wizard.

The third wizard page allows you to setup the data collection you will perform. The page begins blank except for a single pulldown button which allows you to add a *phase*. A phase is a data collection session which describes data you will acquire on one or more subjects.

When you pull down **Add Phase**, you are presented with the following options:

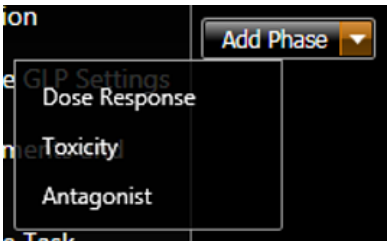


Figure 45. The various phase types you can add to the study.

You can create as many phases as needed. Each phase type suggests a specific data collection task sequence. When you define a phase, you define the specific measurements which will be taken in that phase and the data collection criteria used to acquire them.

Add Dose Response Phase

A Dose Response phase allows you to collect data like the Dose Response study does. This allows you to deliver a series of doses of a compound and measure the response to each delivery. Unlike the Dose Response study, you have the option to specify how each response is measured independently.

When you select **Add Phase | Dose Response**, you are presented with a form that allows FinePointe™ to quickly set up your initial doses:

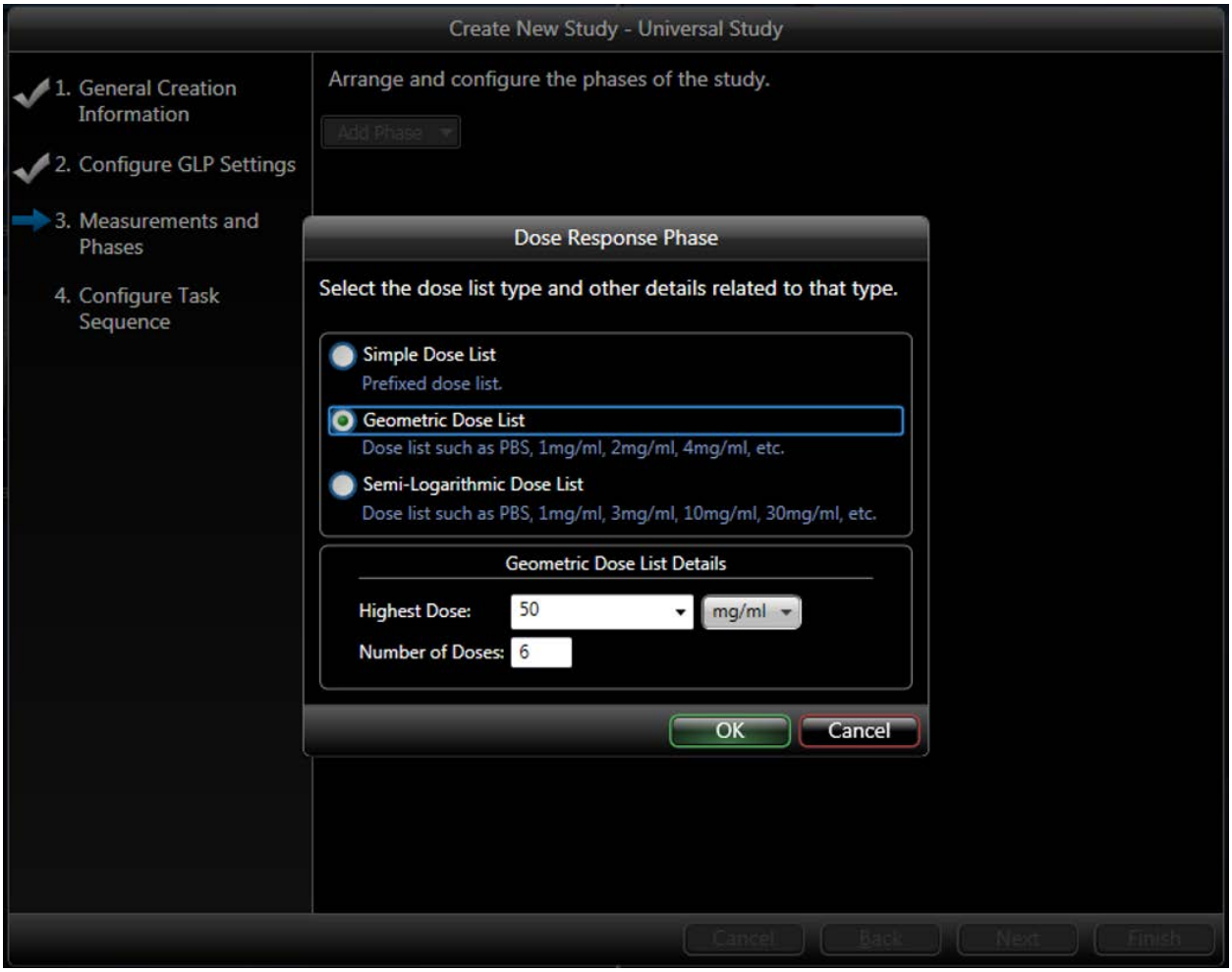


Figure 46. The Add Dose Response Phase form prompting you so that FinePointe™ can setup your initial doses.

The form presented is very similar to the third page of the Dose Response Study. Select either Simple Dose List, Geometric Dose List, or Semi-Logarithmic Dose List depending on which selection most closely matches the pattern of your dose sequence. If there is no real pattern, then the first option is probably best. The selections you make here are so that FinePointe™ can provide a good starting dose list, but you will have an opportunity to edit it later.

Click **OK** when done.

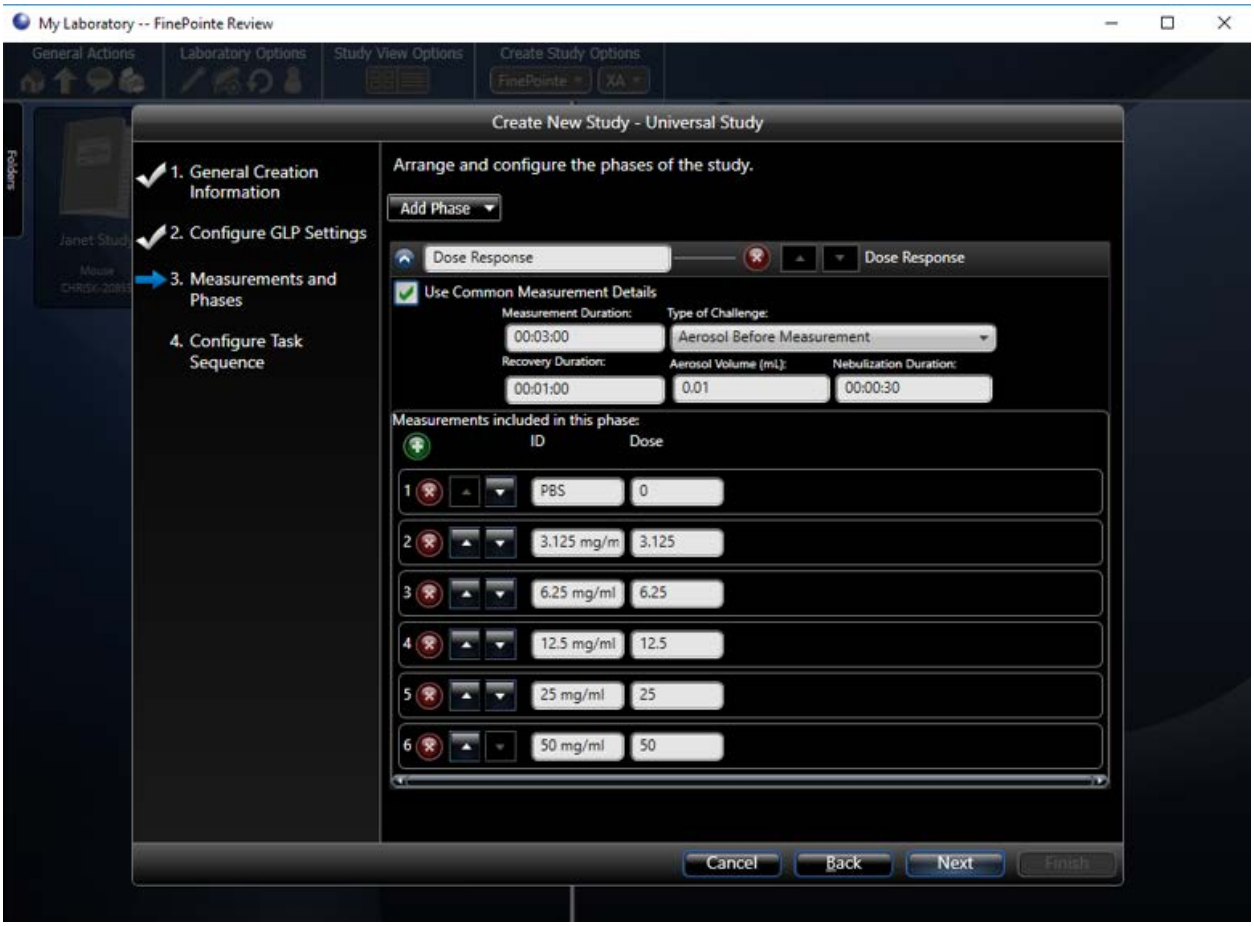


Figure 47: Dose Response phase added.

After you click OK, FinePointe™ creates a Dose Response phase and adds it to the list of phases below the **Add Phase** button. shows an example Dose Response phase. The name of the phase is defaulted to “Dose Response”. If you have more than one phase, you should change this to a name that is meaningful within the study. This is how you will select this phase when it is time for you to acquire data.

You can edit the **ID** or **Dose** of each measurement by changing the values in place. Also, you can delete measurements by clicking the beside the measurement. The Green button will add a new measurement to the end of the list.

If each dose should be administered and measured in the same way, then you want **Use Common Measurement Details** to be checked. Then you can set a single **Measurement Duration**, **Type of Challenge**, **Recovery Duration**, **Aerosol Volume** and **Nebulization Duration**. If you want to set these values separately for each dose, then you should uncheck this option.

The **Measurement Duration** is the width of the measurement placed following the challenge.

Type of Challenge describes how the challenge is administered and monitored. You can choose one of the following:

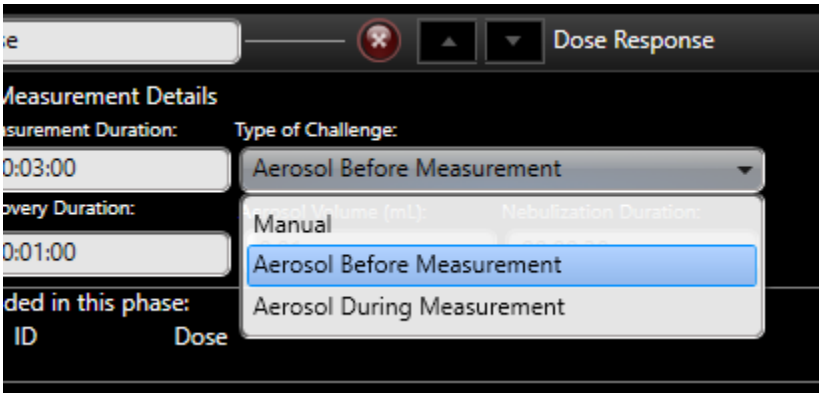


Figure 48. This shows the options available for the Type of Challenge selection.

Manual	FinePointe™ does nothing except wait for you to deliver the dose, and it continues when you press the ► button during data collection.
Aerosol Before Measurement	The aerosol is delivered by FinePointe™, and FinePointe™ places a measurement starting **after** the aerosol has been completely delivered. This is the default option and the option typically used for RC aerosol delivery.
Aerosol During Measurement	The aerosol is delivered by FinePointe™, and FinePointe™ places a measurement starting when the aerosol delivery begins.

The **Aerosol Volume** is the volume of liquid material that will be nebulized, assuming the aerosol head is accurately calibrated. Since the calibration of the aerosol head changes as it is used, and it is likely you will not calibrate it each time, you should specify a value here which is greater than you expect to deliver (perhaps as much as two times the amount to be delivered). By specifying a larger value, you will be sure to nebulize the entire volume. The volume of the dose will be the best way to ensure consistency of aerosol delivery. A value of 0.020mL (20µL) is a good value to set here, and you should fill the nebulizer head with 0.040mL (40µL) each time you deliver the dose. Use the same volume for each dose and vary the liquid concentration of the solution to deliver increasing concentrations.

The **Nebulization Duration** specifies how long FinePointe™ will take to deliver the Aerosol Volume you specify. For RC, you should set this to 30 to 60 seconds.

The **Recovery Duration** is the amount of time the subject is given to return to normal between doses. For Mch, it is common to have this duration set to 1 minute.

Figure 49. The same Dose Response phase but Use Common Measurement Details is unchecked. You have the ability to set up each dose's response details independently.

After you have added and configured the phases of the study, click **Next**.

Step 4 – Configure Task Sequence

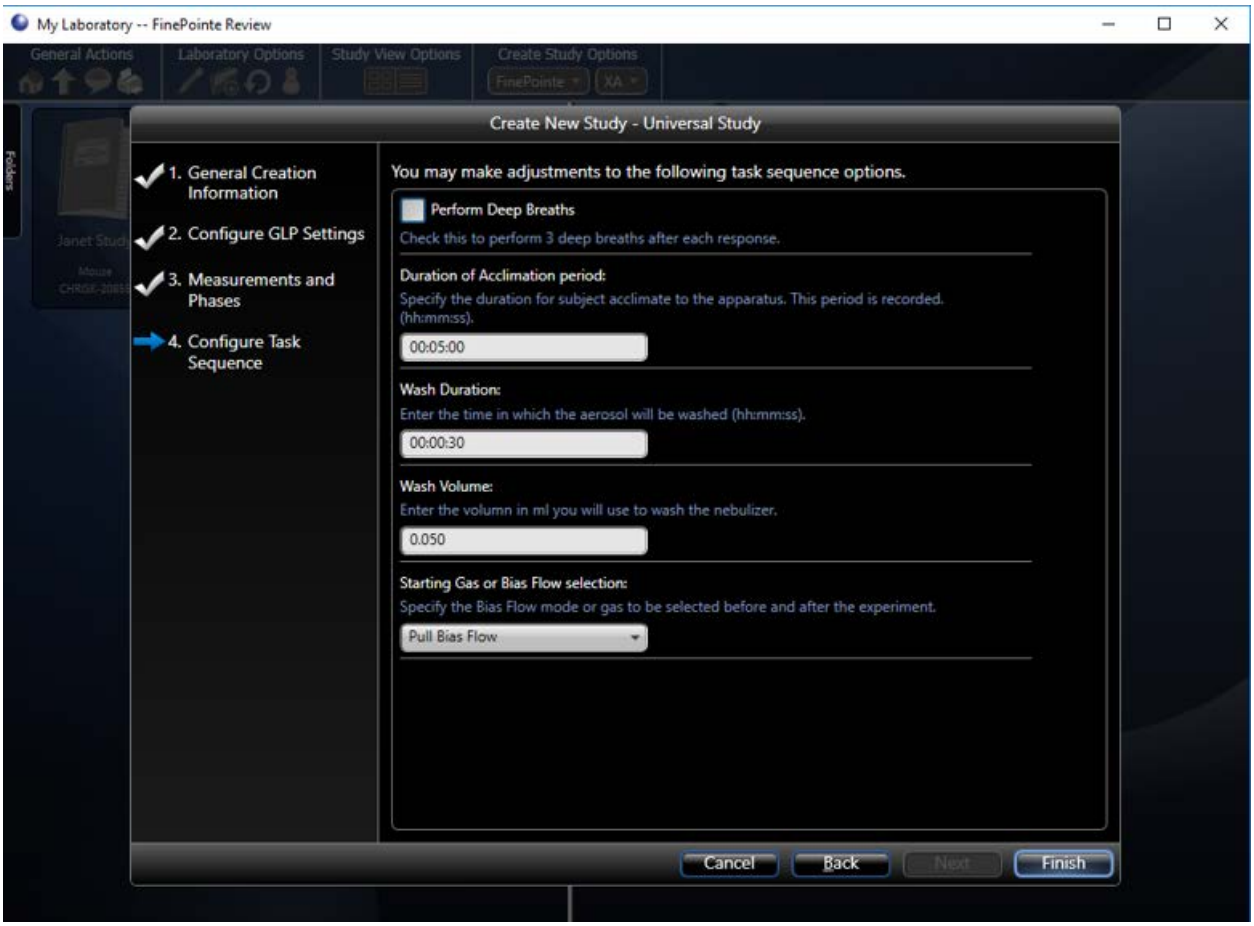


Figure 50. The last page of the Create Universal Study Wizard. This page lets you configure common task sequence settings.

At the beginning of each data collection, data is acquired while the subject acclimates to the data collection environment. This data is not used in the reporting but does give the investigator additional context which can be used qualitatively to evaluate the subject and the data. The operator can choose to terminate the acclimation period at his discretion during the acquisition.

The **Duration of the Acclimation Period** is the maximum duration of the acclimation phase. Note, that the acclimation phase may be ended early or skipped altogether.

The **Wash Duration** and **Wash Volume** are used to wash the nebulizer head out at the end of any collection period, prior to using with the next subject. Tap water should be used to wash out the nebulizer head. This process should be performed without a subject in the chamber.

The **Starting Gas or Bias Flow Selection** specifies what to deliver to the subject prior to starting the experiment and after the data collection is complete. *This field is irrelevant for RC studies.*

Once you are satisfied with these settings, click **Next**. The study is created and opened.

Subject and Group Creation

FinePointe™ provides a powerful reporting engine which allows you to obtain group summary reports. In addition to saving time and eliminating mistakes, making use of the built-in reporting features provides you with a fully annotated and traceable dataset—traceable back to the original signal data.

One major part of the reporting features is the ability to create subject groups. You can create as many groups as desired and have as many subjects in each group as you want. Also, subjects can belong to multiple groups, and you can add and remove subjects from groups at any time. If subjects are added or removed from a group, all reports that summarize that group are automatically recomputed.

When you define a report, you specify 3 key pieces of information: the groups to include in the report, the parameters (or parameter expressions) to summarize, and the measurements to use to select the data.

Although subjects and groups may be set up at any time, before or after data collection, it tends to be easier to define these upfront. This allows you to select the appropriate subject during acquisition and, once acquisition is stopped, will result in a report being populated.

Once you've created a study, FinePointe™ opens the new study to the main study page. An example of a fully populated Study Page is displayed in the Figure 51, along with descriptions of its main areas. Upon initial study creation, the Report Area will have a single report listed, while Report Preview and Recording List will be empty, as displayed in Figure 51.

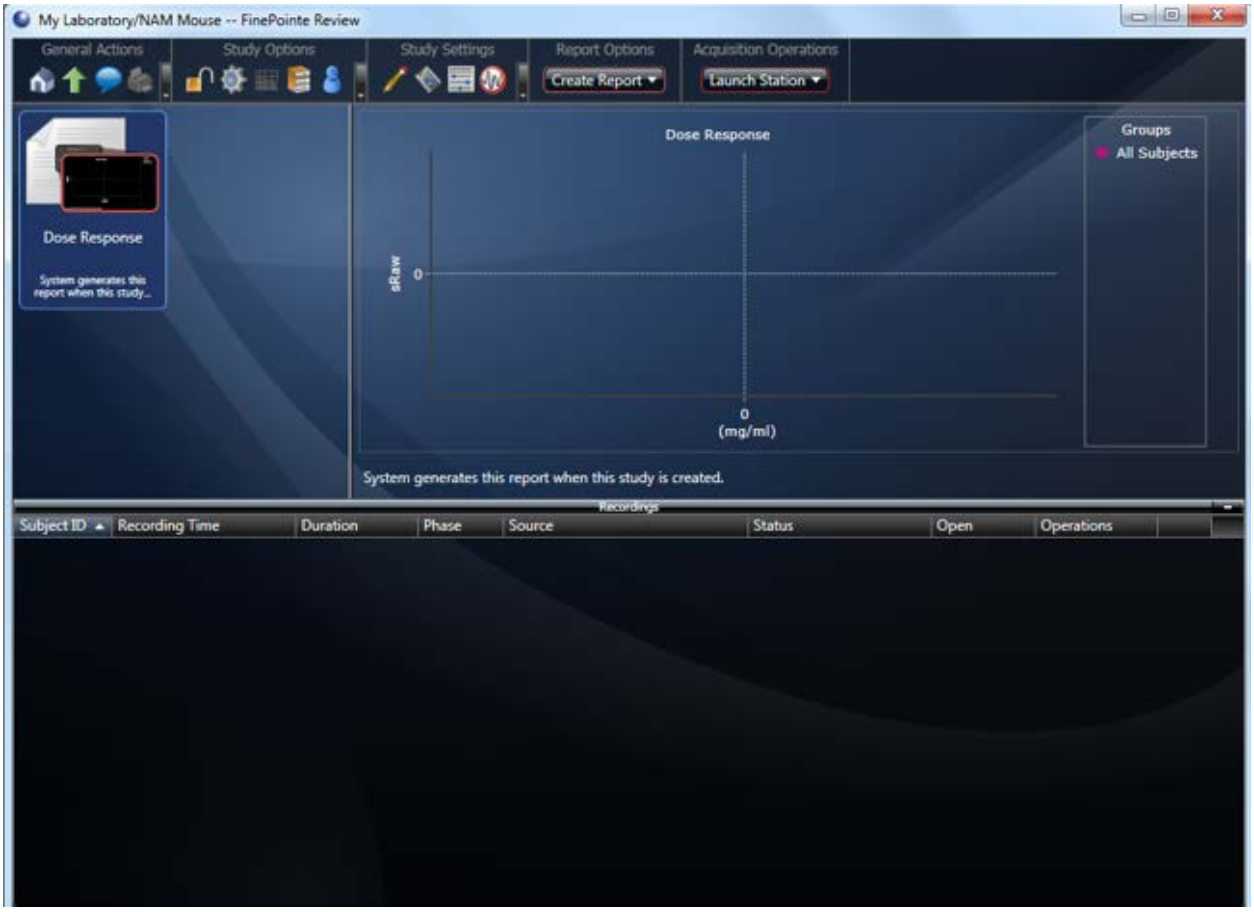


Figure 51. This shows the main study page as seen immediately after creating a study.

To create or modify subjects and groups, click the ***Manage Groups and Subjects*** button from the main study page, as shown in Figure 52.

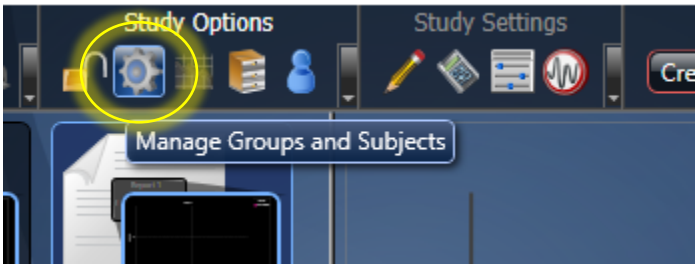


Figure 52. This shows the Manage Groups and Subjects button on the main study page.

The Groups and Subjects page is presented. This page shows you the groups and subjects that are currently defined in your study database.

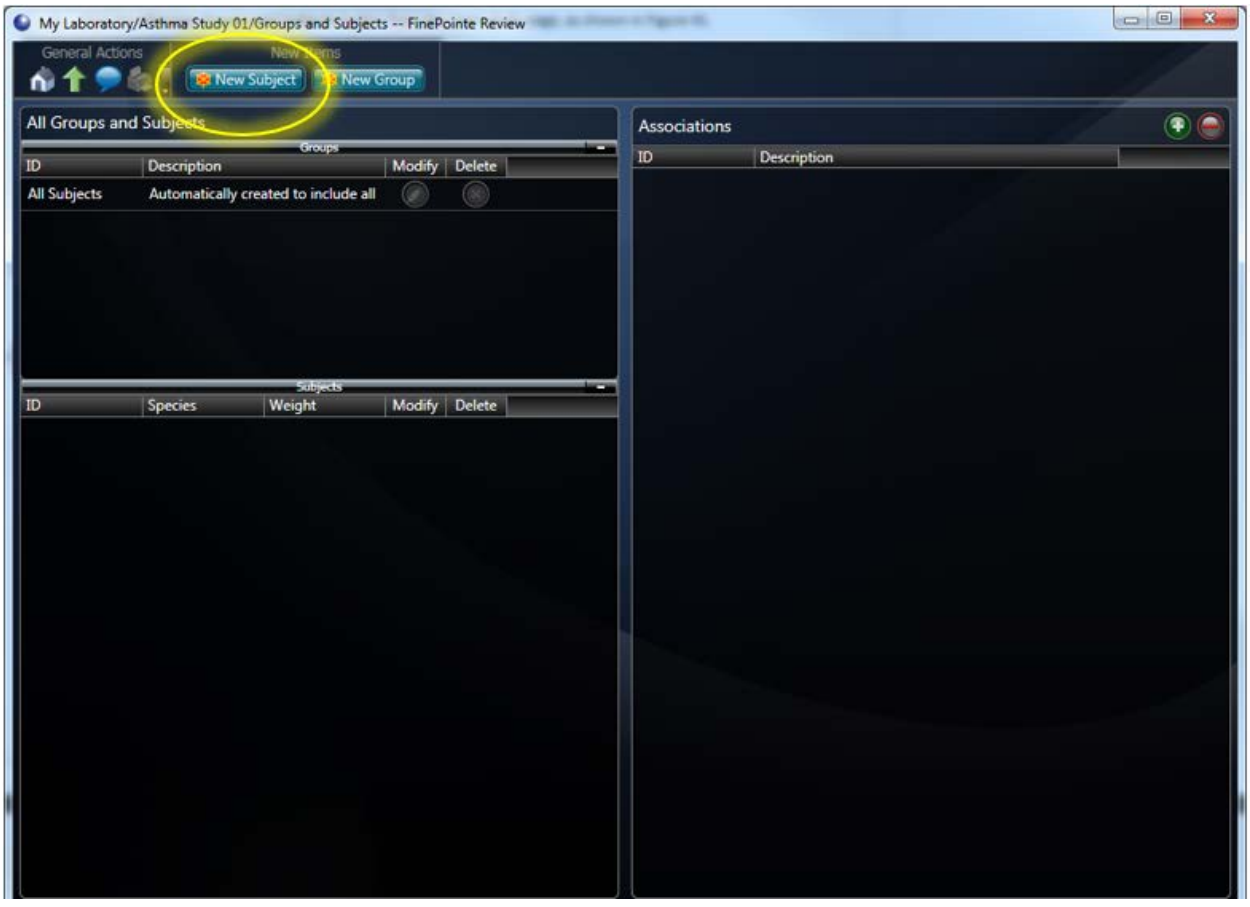
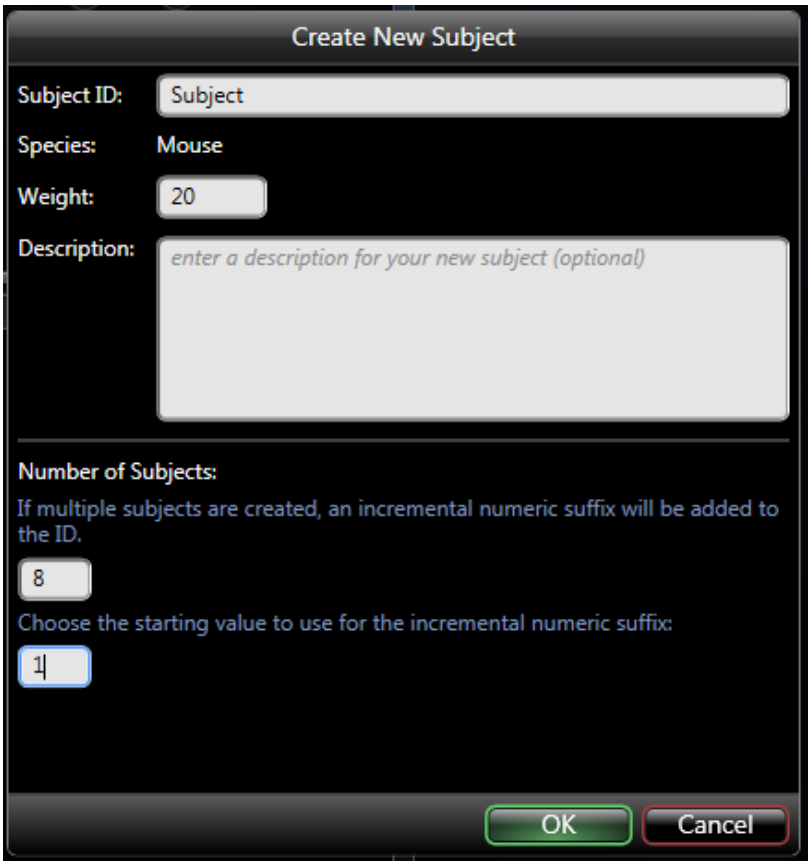


Figure 53. Select the New Subject button from the Manage Groups and Subjects page.

Create Subjects

To create Subjects for your study:

1. Click the **New Subject** button to start adding Subject IDs as indicated in Figure 53.
2. The *Create New Subject* form will be presented. Enter a **Subject ID**. Optionally, enter a **Weight** and **Description** of the new subject.



3. To quickly create multiple subjects, enter the number of Subjects desired in the first text box associated with the *Number of Subjects* header. Then, enter the starting value to increment the Subject IDs by in the second text field. In the example above, 8 subject will be created with the Subject ID prefix "Subject" starting with suffix "1". Alternatively, repeat steps 2 and 3 to create additional Subjects.
4. Click **OK** to create the subject(s).

Figure 54. This shows the Groups and Subjects page with 8 subjects configured.

Create Groups

By default, the All Subjects group is present, and all subjects added to the study are automatically added to this group.

To create your desired groups:

1. Click the **New Group** button located under *New Items* at the top of the page. A dialog box like the one show in Figure 55 is presented.

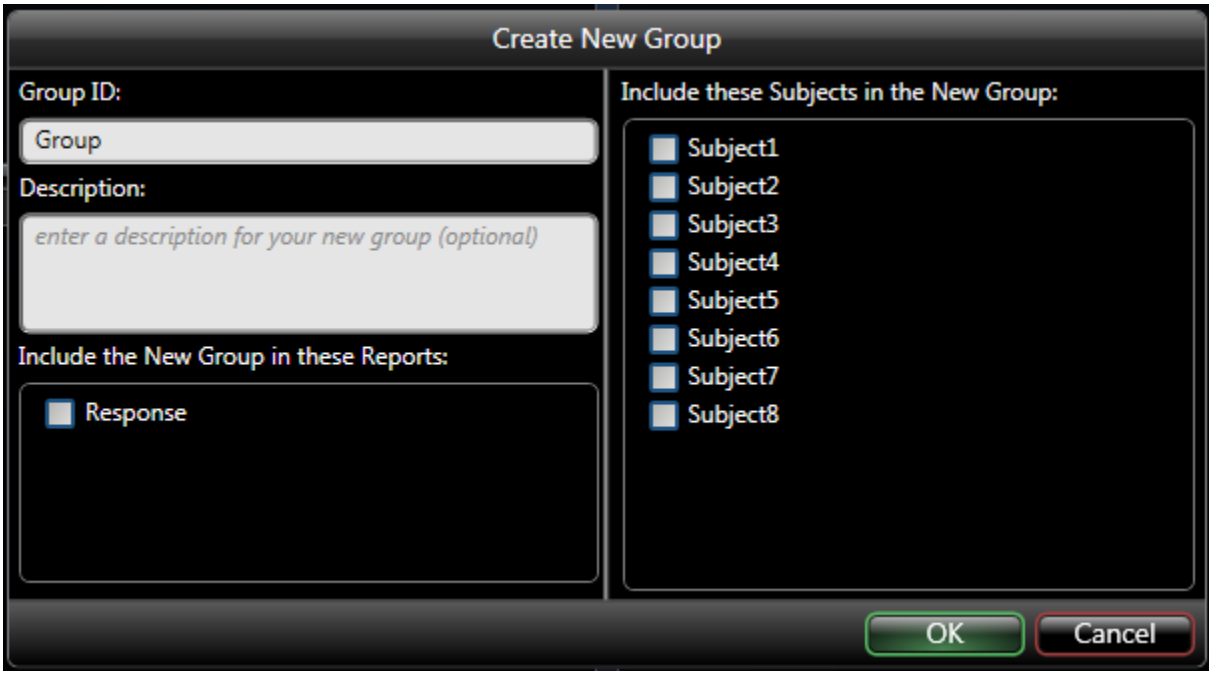


Figure 55. This shows the dialog box presented when you click the New Group button.

2. Enter a unique **Group ID**.
   The Group ID is a text identifier you will use to refer to this group in your reports. Choose an ID which is meaningful to you and unique from all the other groups. Description is optional.
3. Select the Subject(s) to include in this group from the list on the right, by checking the associated checkbox. The list on the right displays all the subjects currently defined in your study.
4. There is also a list of reports located under the description. Here, you can select the reports in to include this group. You can change this also by editing the report.
5. Click **OK**.

Figure 56. Example displaying a "Control" group containing subjects 1-4.

Once a group is defined, you can click on it in the *Groups and Subjects* page and the list on the right half of the page will be populated with the subjects that are members of that group. You can quickly change the membership by selecting the group and clicking the button above the list on the right.

When you click the button, a dialog box is presented that allows you to change the membership.

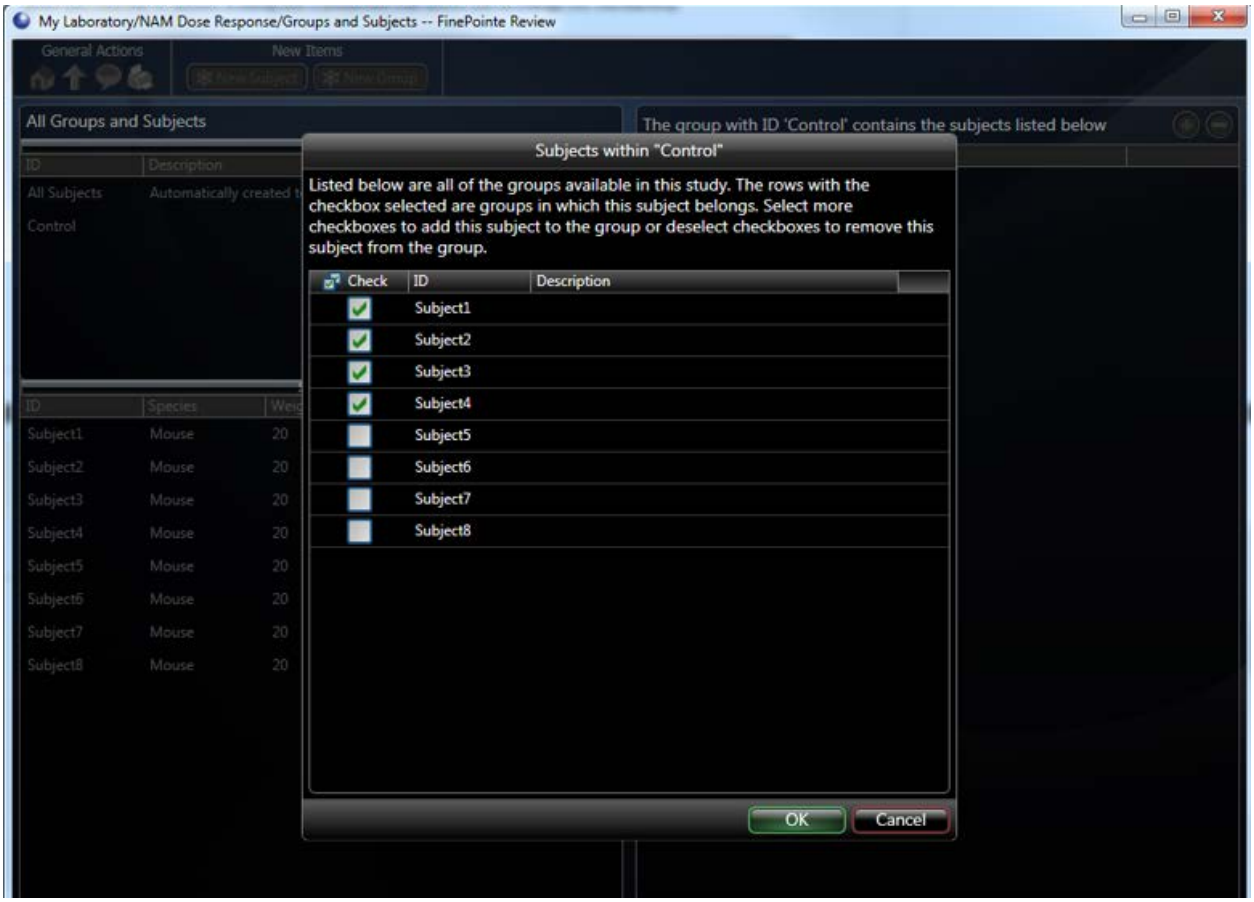


Figure 57. This shows the dialog box that allows you to change the subjects which are members of the group. Place a check by each subject which should be part of the group.

Select the subjects and click the **OK** button.

To remove a subject from the group, simply select the subject from the Group Subject List on the right and then select the delete button.

Once the study is created and you have created the subjects and groups that will comprise your study, the next steps are to calibrate your sites and collect data.

Preparing and Loading the Animal

This section depicts the various steps required to properly position and load the animal into RC chamber.

Animal Size Considerations

The Mouse and Rat/GP RC chambers are designed to accommodate adult subjects. Care should be taken to use the appropriate gauge tracheal tube based on the animal size to prevent damaging the trachea and to prevent leaks.

1. Prepare the Chamber

To open the chamber, simply pull the cover until it slides off. To close, slide the cover back on until you feel the seal fit snugly into the faceplate.

Turn on Heated Bed

It is recommended to use the heated table, as subjects tend to react better to experiments while being warmed to normal body temperature. To turn the heated table on, use the power switch on the back of the heater control. The table will increase in temperature until it reaches 36° C. The heater control will indicate when it has reached 36° C by blinking steadily.

To adjust the temperature of the heated bed, turn the set point adjustment screw:

- Increase temperature – turn screw clockwise.
- Decrease temperature – turn screw counterclockwise.

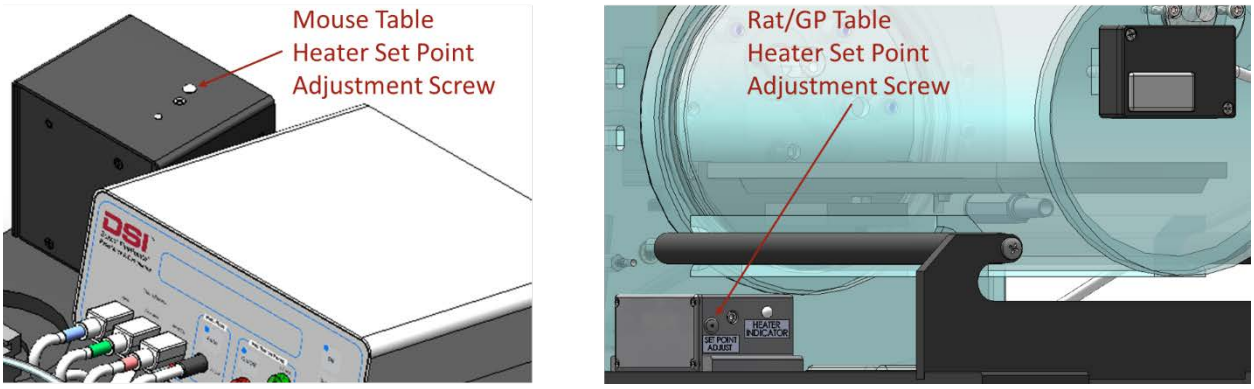


Figure 58. Mouse (left) and Rat/GP (right) heater adjustment screw locations.

Attach Trachea Needle (Mouse Only)

Ready the chamber by attaching the trachea needle junction and an appropriately sized trachea needle to the plethysmograph. Flush the esophageal cannula, if in use. Use the supplied 18- or 19-gauge trach needle (supplied in the 601-2510-043 bag) to attach to the manifold. Trachea needles should be shortened to minimize dead space. Consider positioning the anaesthetized animal on the table prior to starting the tracheostomy to approximate the required length of the trachea needle.

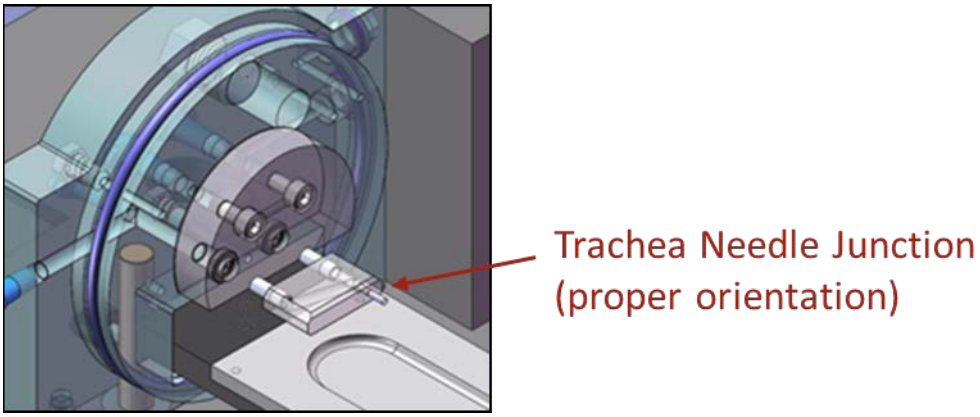


Figure 59. Illustrates the proper orientation of the Trachea Needle Junction.

2. Anesthetize the Animal

It has been suggested that a successful anesthesia mix is:

Mouse Administer together in one syringe:

- Ketamine – 80 mg/kg, concentration is 100 mg/ml
- Xylazine – 5 mg/kg, concentration is 20 mg/ml, make a 1:10 dilution

Re-dose with Ketamine at half of the initial dose if needed.

Rat/GP Administer together in one syringe:

- Ketamine: 45 mg/kg, concentration is 100mg/ml
- Xylazine: 2.5 mg/kg, concentration is 20mg/ml

Re-dose with Ketamine at half of the initial dose if needed.

The exact amount of tolerance for anesthesia differs per animal. Assess the depth of anesthesia using the pedal reflex and apply anesthesia as necessary.

3. Cannulate the Animal for Blood Pressure (optional)

If measuring blood pressure, cannulate the animal before placing it in the plethysmograph and make the proper connections once it is placed on the table.

4. Start Tracheostomy

1. Anesthetize the animal using injectable anesthesia.
2. Position the animal in dorsal recumbency with the head closest to the surgeon.
3. Make a longitudinal midline incision between the mandible and manubrium (Figure 60).

Figure 60. Ventral neck incision

4. Carefully separate the tissue planes with cotton tipped applicators or fine-tipped forceps until the trachea is located.
5. Using fine-tipped forceps or small scissors, separate the fibers of the sternohyoideus muscle to expose the cartilaginous rings of the trachea.
6. Place a length of silk suture underneath the trachea and gently pull the ends of the suture cranially to elevate the trachea (Figure 62). It may be advantageous to place a second suture caudally and put tension on this suture to elevate the trachea further (not shown).

5. Move Animal to Chamber

Move the animal to the heated bed and position it such that the end of the trachea needle is lined up with the trachea. Adjust the height of the table if necessary.

Mouse:

- Simply insert the bed into one of the four height positions appropriate for the animal.

Rat/GP:

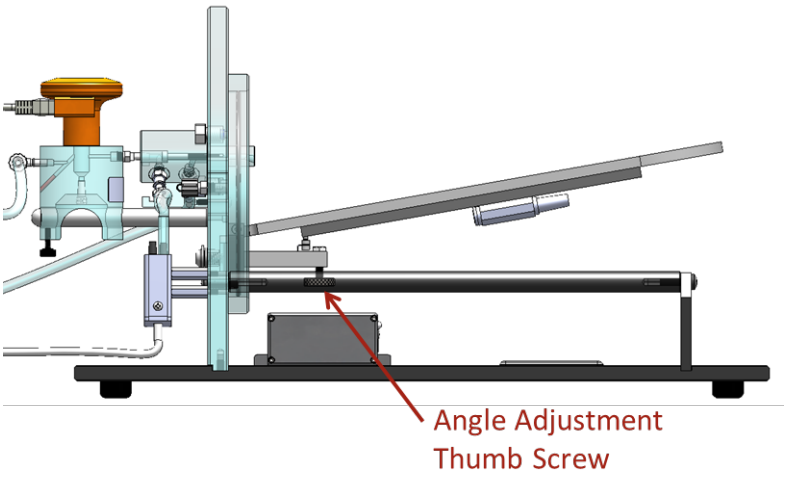


Figure 61. Illustrates the location of the Rat/GP heated bed angle adjustment thumb screw.

Height: Loosen then heated bed adjustment screw, while keeping a hand on the bed to prevent it from shifting down from gravity. Adjust bed up or down to appropriate position. Tighten the screw.

Angle: Slightly lift the heated bed and adjust the thumb screw.

6. Finish Tracheostomy

7. Make a small incision with Vannas scissors between two cartilaginous rings and insert the appropriately sized tracheal tube, bevel facing up (Figure 62a & b).

8. Once the tube is advanced to the desired position (just cranial to the tracheal bifurcation), release the suture, and slide it slightly caudal to the entry point of the tube (Figure 62c).

9. Ensure that the suture lies between two cartilaginous rings and tie the two ends of the suture around the tube and surrounding trachea to keep the tracheal tube in place (Figure 62d).

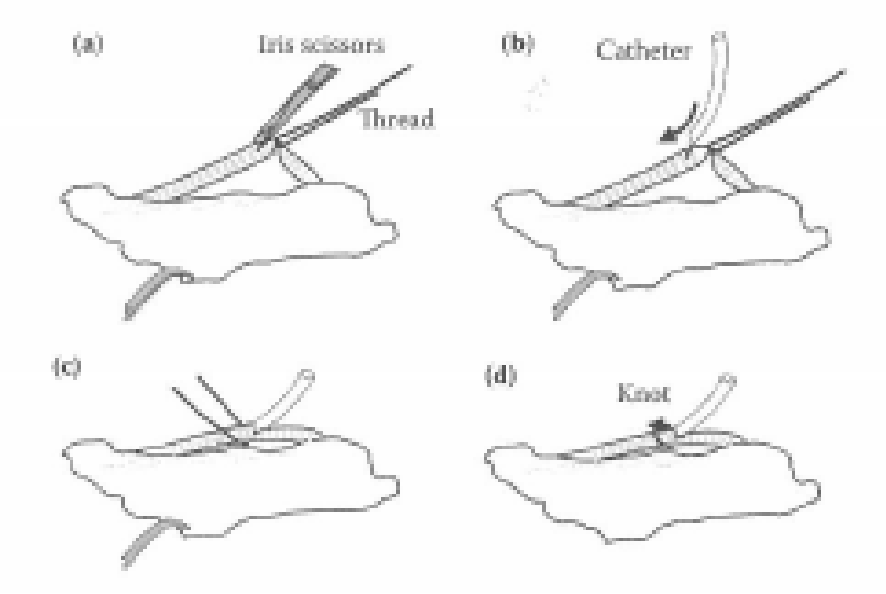


Figure 62. Tracheal tube insertion
Note: Procedure and pictures adapted from Rigalli & DiLoreto, Experimental surgical models in the laboratory rat (pp. 87-88).

The end of the trach tube has a diagonal bevel on it. Keep the longer end at the bottom or closer to the back of the animal. The shallower part of the tip should be facing the top or front of the animal. Be sure to tie a very secure suture around the trachea/tube junction. **This is THE MOST COMMON source of leaks.** Beware of blood or mucus plugging this tube.

NOTE: Some of the cannula included in your accessory bags are all beveled. Some researchers prefer to file the bevel down. A blunt, non-beveled end is less likely to puncture a vessel, though the beveled end is the more common use case. This is a matter of user preference.

Placing the trachea at the last moment and in place on the bed minimizes the possibility of damaging the trachea and shortens the time that the animal must breathe through the trachea needle's dead-space.

NOTE: If you are measuring transpulmonary pressure, insert the esophageal cannula at this point. See the

Inserting an Esophageal Tube section.

7. Check the Tracheal Connection

With the software running, watch the pressure signal on the computer screen. You should see a healthy pressure signal. If you do not, detach your animal and check the surgery site. This is a common place for a leak to occur.

8. Turn on Ventilator

Press the button on the front panel of the FP Controller. The ventilator only turns on and off by manual control.

Inserting an Esophageal Tube

If measuring transpulmonary pressure rather than tracheal pressure alone (via a trach tube), use the following instructions for inserting the esophageal tube.

Mark the esophageal tube at a depth that approximates the level of the lungs.

When inserting the tube, it is helpful to watch the pressure signal on screen. Turn the ventilator off temporarily for the best signal. A stronger signal indicates a good position. A signal with smaller deflections is less desirable. Make sure when you are looking for a strong signal that you are not actually looking at the heartbeat.

A good position typically is approximately at the lower 1/3 of the esophagus.

1. Measure (with the tube) the approximate length from the mouth to the stomach.
2. Put the tube in - down to the stomach.
3. Pull the tube out slowly while watching the pressure signal.

As you watch the screen, place the tube where you see the maximal pressure deflection and minimize heart artefact. Aim for a 3 to 5 cmH_2O deflection.

Acquisition

One of the greatest benefits of FinePointe™ software is the integrated reporting. FinePointe™ is aware of the types of reports you want to produce, so it can assist with data acquisition in a way that is unmatched by any other system available.

In assisting with your data collection, it helps ensure consistency of the data, freeing your hands up and your mind from details so that you can be more aware of other aspects of the experiment that may also impact consistency. As you acquire data, FinePointe™ automatically annotates the data so that you have a complete documented record of what took place, and it also places measurements which will be used for your reports.

Once you are done acquiring data for a subject, typically you only need to add that subject to its associated groups (if you have not already done so by creating subjects and groups ahead of time). FinePointe™ automatically imports the new data into your study and updates your reports.

In addition to all this automation, FinePointe™ allows you to manual operation and the ability to annotate your data yourself, whenever necessary. FinePointe™ Station is designed to offer automation where it helps and stay out of your way if you do not need it.

To acquire data, you will first calibrate (before you come here), then you will do the following:

- Launch FinePointe™ Station for the study where you will store the data
- Assign subject IDs to sites
- If running for the first time, you will set up your views.
- Acquire your data using the Task Sequence which walks you through your data collection procedure.
- End the session, which starts the upload to the database.

Launching FinePointe™ Station

To acquire data, launch FinePointe™ Station for the study on the hardware configuration you want to run on. There are 2 ways to do this, and they are both functionally equivalent.

To launch FinePointe™ Station using the “Drag-and-Drop” method, navigate to the laboratory page showing both the study you want to acquire data into and the Station configuration on the same view. Drag the study in which you want to store the data and drop it on the station from which you want to acquire.

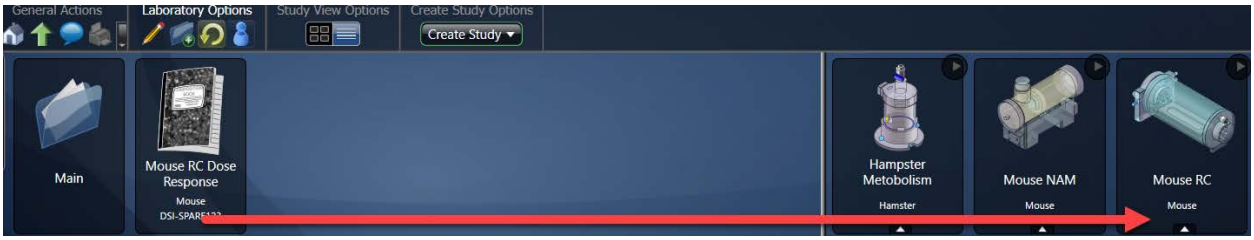


Figure 63. This illustrates how to launch FinePointe™ Station using the Drag-and-Drop method. Use the mouse to select and drag the study and drop it on the Station configuration.

An alternate way to launch FinePointe™ Station is to open the study in which you want to store the data and select the ***Launch Station*** button on the command bar of the Study page. Only station configurations which are compatible with the study are listed.

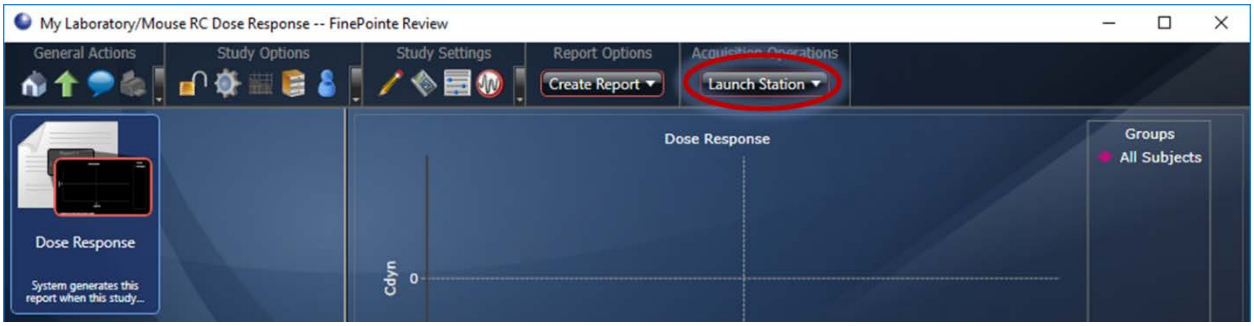


Figure 64. This illustrates where you can find the Launch Station button on the main Study page.

Assign Subjects to Sites

After you launch acquisition, FinePointe™ Station opens the Assign Subject IDs page. In this page, you identify the subject in the plethysmography chamber. The subject ID can be almost any nonblank text.

Note: The software skips the Configure Task Sequence step, as this was completed when initially creating the Dose Response Study. Click **Back** if the task sequence needs modification.

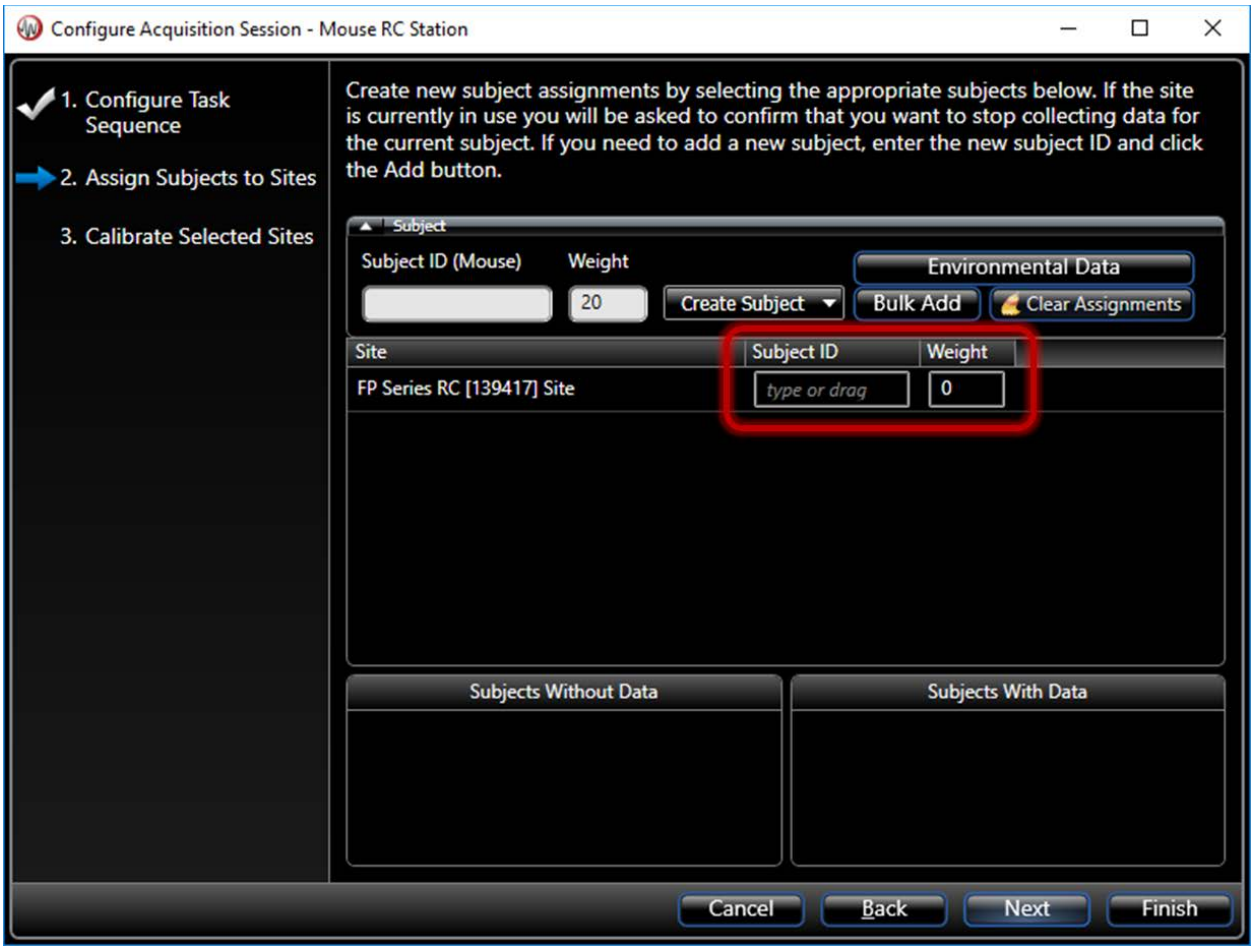


Figure 65. This shows the Assign Subject IDs page for an RC Mouse apparatus. The area marked with the yellow box indicates where you need to assign the subject IDs.

In Figure 65 the red box marks the area where you need to assign the subject IDs. The list labeled "Subjects Without Data" are subject IDs that you have already created but do not yet have recordings associated with them. Items in this list were created in the *Groups and Subject*s Page described earlier in this manual.

The list labeled "Subjects With Data" are subject IDs that already exist in your study, and there are already recordings in the study associated with them.

You can use the subject IDs in either of these bottom lists by dragging and dropping them on the appropriate site.

Alternatively, you can create new subject IDs by typing them in the ***Subject ID*** text box above the site list and clicking ***Create Subject***.

If you do not have any specific subject designation but want to make sure each subject ID is new and unique, you can type a subject ID root name into the ***Subject ID*** text box and click ***Bulk Add***. This will use the text you specify in the ***Subject ID*** text box and append a number onto it for each subject it creates.

Add the relevant subject weights for record-keeping purposes or if weight compensation is desired for parameter calculation purposes.

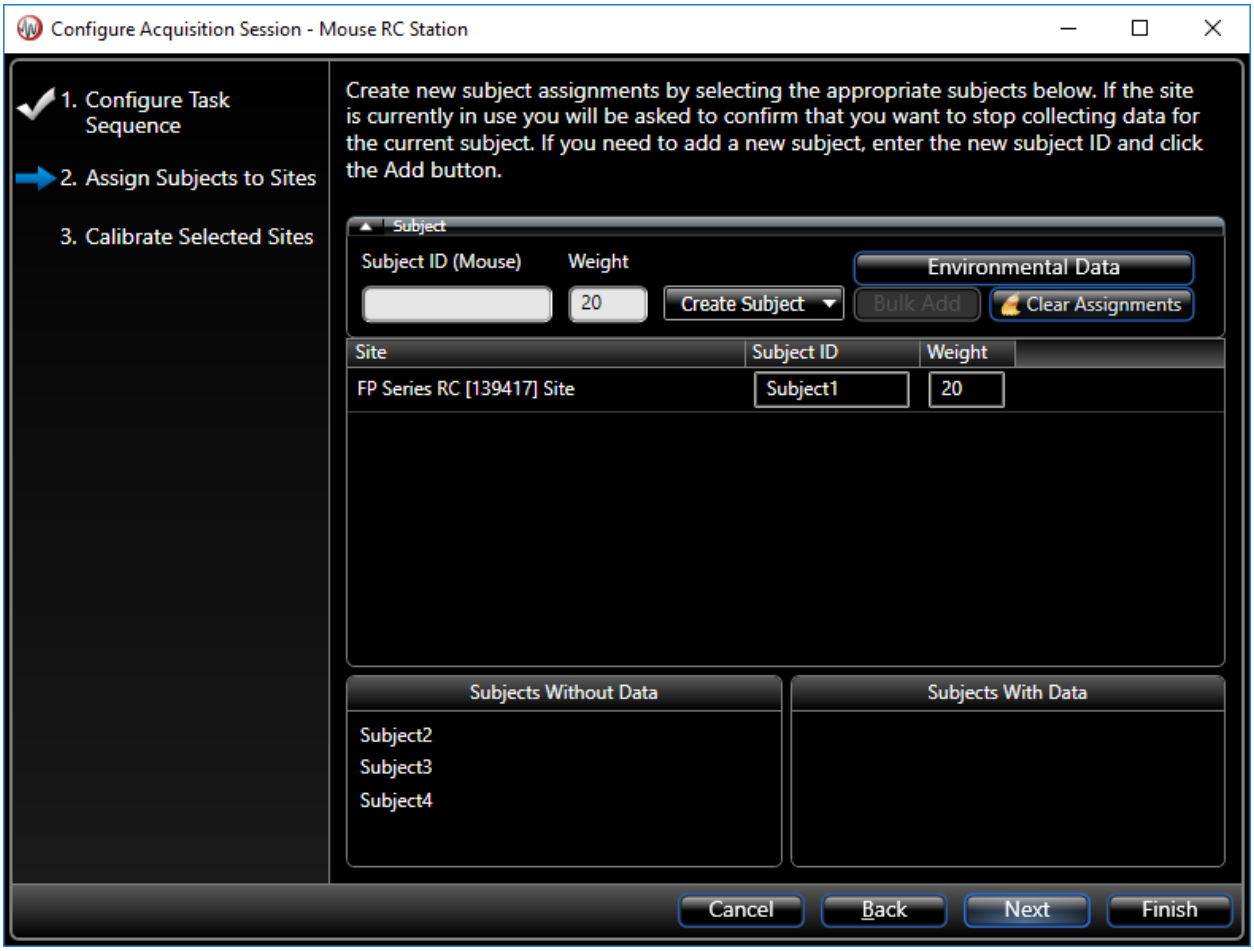


Figure 66. This shows the Assign Subjects to Sites form with a subject ID assigned to the RC site.

After you have assigned subject IDs to the sites you will run, click the ***Finish*** button. FinePointe™ Station will begin acquiring live data.

Note: Step 3 of the Wizard is hardware calibration which should have been performed prior to launching station. Since we've already calibrated the sites, there is no need to repeat the process.

Figure 67. Live data being acquired after completing Subject Assignment.

Configuring Views for the First Time

If you are running for the first time, you may need to arrange the views. While you should feel free to pick an arrangement that suites your needs best, the following is a recommended arrangement for RC applications.

1. Select **Charts | Signals** on the main menu on the summary display.

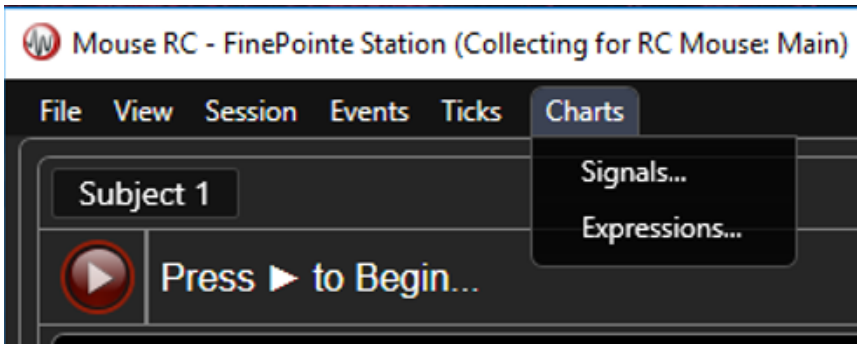


Figure 68. This picture shows you where to find the Chart | Signals menu.

2. Select the recommended Signal Options as indicated in Figure 69.

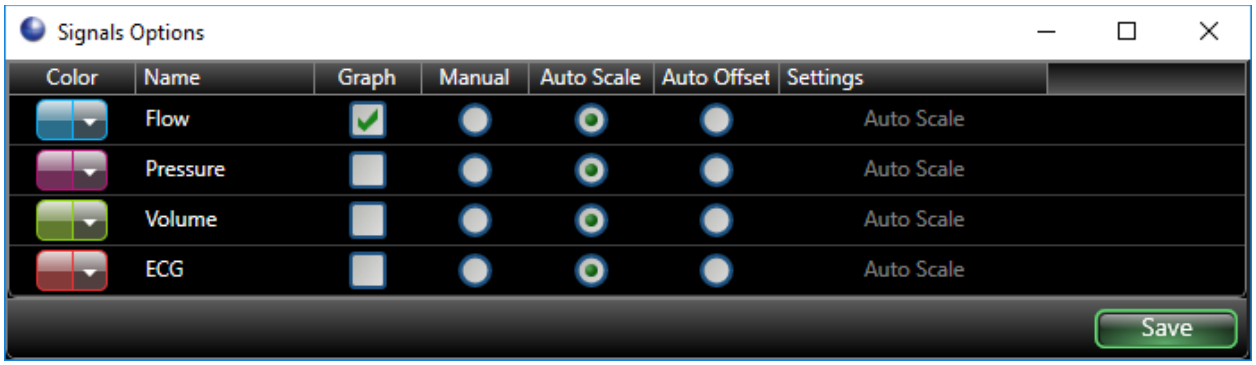


Figure 69. Recommended Signal Options for RC applications.

3. Next select **Chart | Expressions** from the main menu. This allows you to configure which parameters are shown on the dashboard and plotted on the trend chart.

4. Select the recommended Expression Options as indicated in Figure 70.
   See the **Derived Parameters** section of this manual for definitions of each parameter below.

Figure 70. Recommended Expression Options for RC applications.

FinePointe™ Station provides 2 kinds of views: summary view (only 1), and detail views (one for each site). The summary view shows you a summary of all your sites on a single page. The detail view shows full detail and content of a single site. With a 2-site station configuration, you have a possibility of arranging 3 windows on your

computer: 1 summary window, and 2 detail windows. They can be present all at once, or you can choose to have only some displayed at a time.

The View menu located on the summary view allows you to select from many predefined arrangements. You can even design and save your own if you choose.

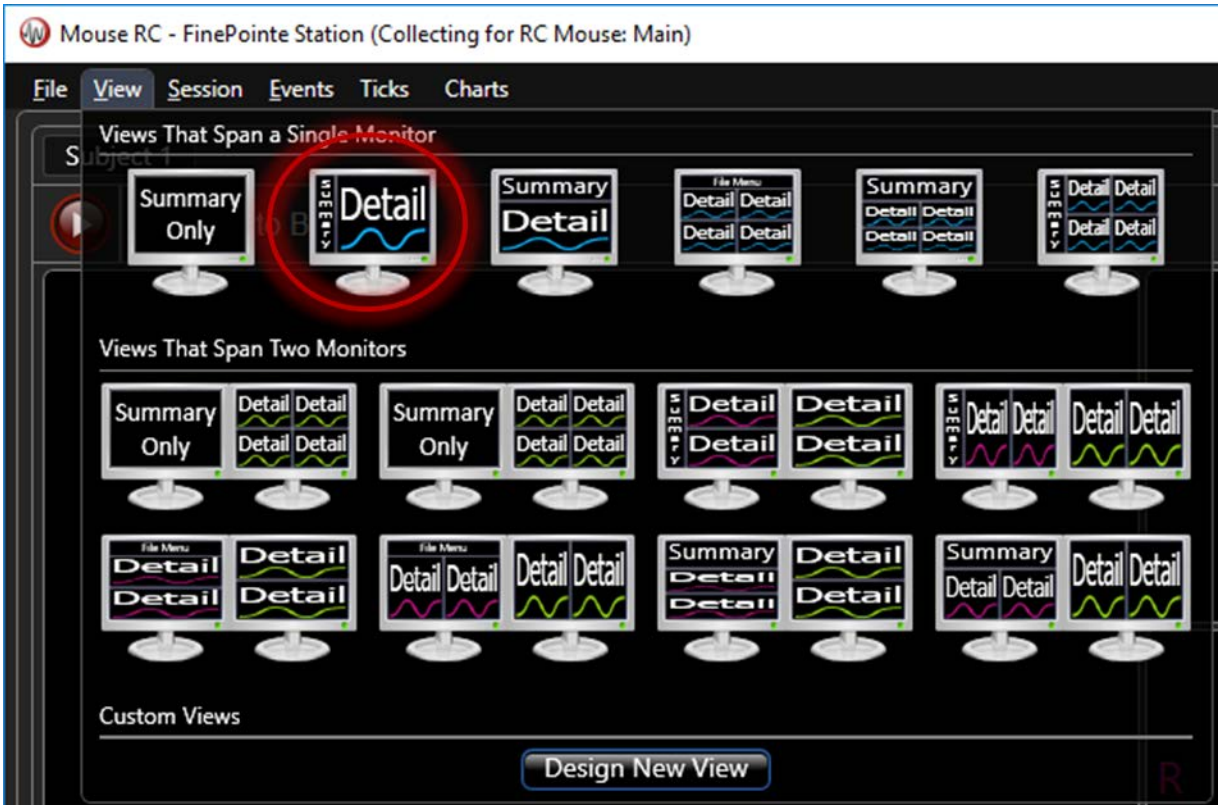


Figure 71. This shows the View menu for a computer with 2 monitors. If you have 4 or more monitors, additional views will also appear. If you have only one monitor, you will not see Views That Span Two Monitors

FinePointe™ Station populates the View menu content by examining the hardware attached to your computer. It offers arrangements based on the number of monitors you have installed on your computer. It is easiest to choose one of the layouts provided, or you can click the ***Design New View*** button to explore creating a layout of your own.

Figure 72 displays the layout of the Summary/Detail View in Figure 72.

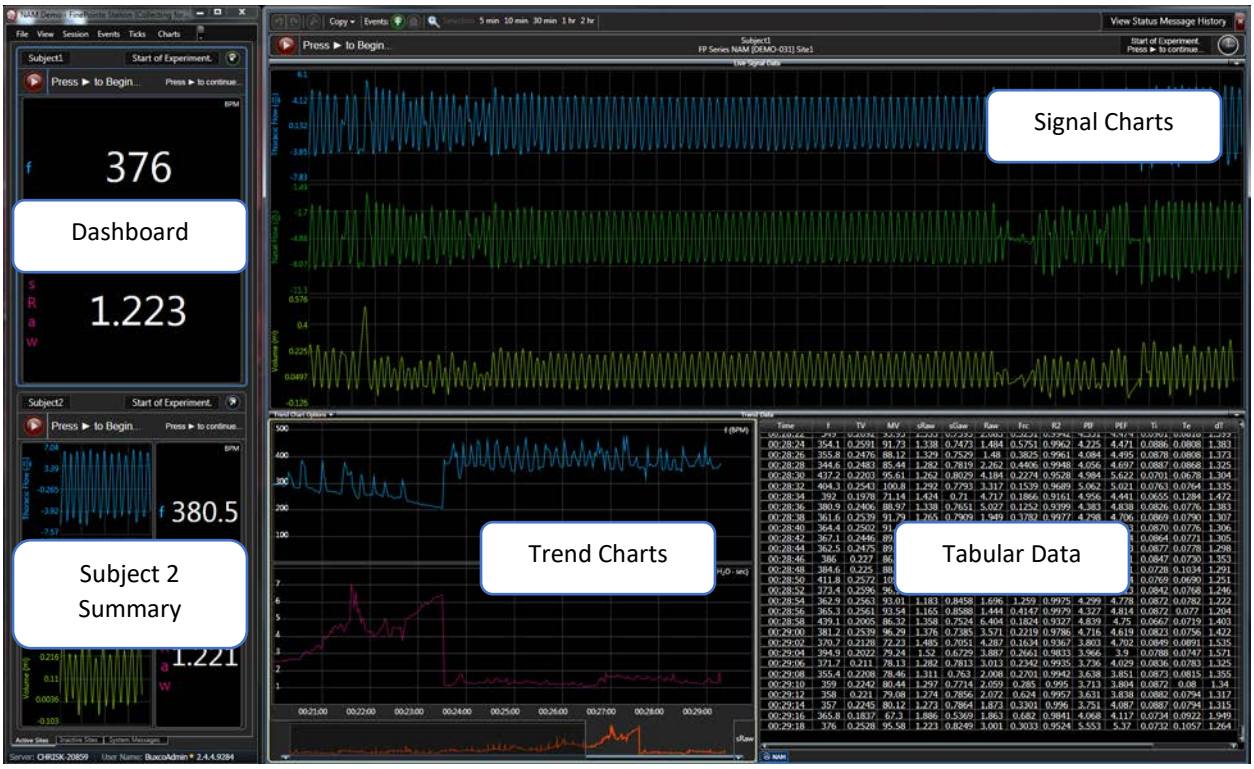


Figure 72. Displays the layout of the Summary/Detail View.

Walking Through the Task Sequence

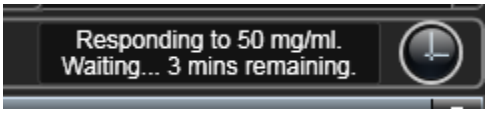
FinePointe™ Station provides a task sequence that allows FinePointe™ to walk through your data collection tasks with you. FinePointe™ manages acquisition from each site independently. Each site can be at a different point in the data collection task sequence at any given time.

On the summary view and on each detail view, FinePointe™ provides a task sequence control console.

Figure 73. An example FinePointe™ Station Task Sequence Control Console.

This console shows you:

- Where it is in the current task sequence (current task).
- What, if anything, you can do, and a button (***Play*** button) to say you've done it.
- If it is in the process of executing something, what is the progress. Usually, FinePointe™ displays the amount of time remaining for the current step here.



Note: Task Sequence status and action information for each site is also displayed on the FinePointe™ RC controller display.

In the example shown in Figure 73 the console says "Press ▶ to Begin…" This message tells you what you can do now. The Current Task is indicated as "Start of Experiment". Click on that text to open a dialog box displaying the complete task sequence. Click ***Cancel*** to close the window.

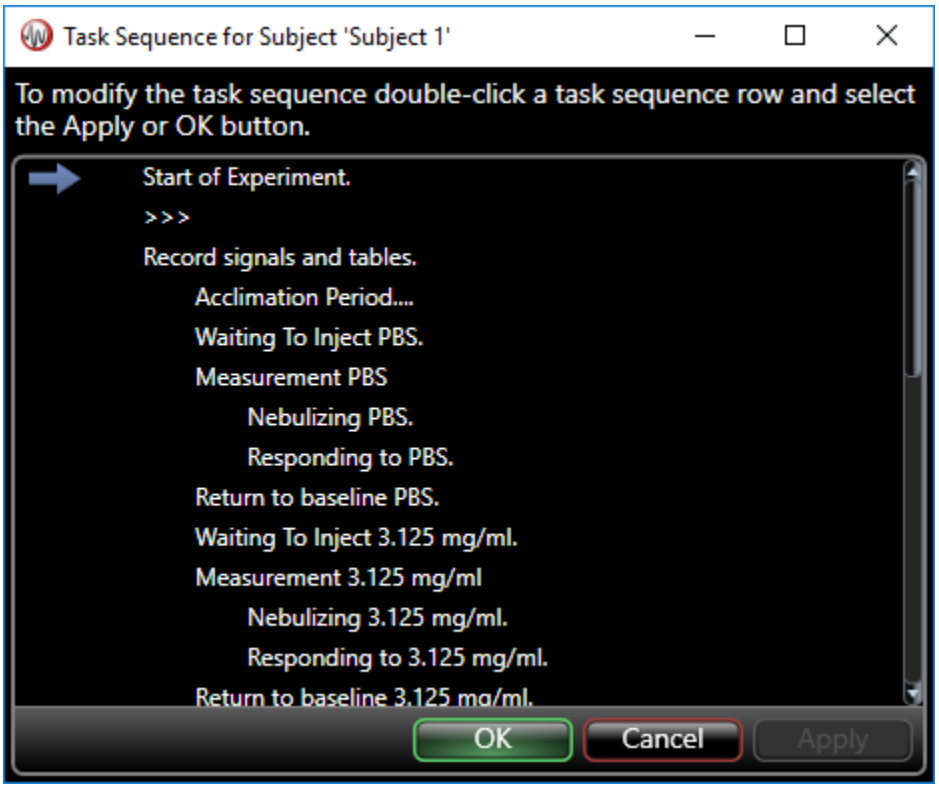


Figure 74. An example task sequence for a dose response study.

FinePointe™ executes the task sequence from the first step to the last step. By reading this, you can see what is needed to acquire data for this study. In this example, FinePointe™ waits for you to begin. At this point, you should make sure the apparatus is properly setup, and the data being acquired from the animals looks good.

When you are ready, click the ▶ (play) button. FinePointe™ starts the recording and begins timing the acclimation period. Some animals will benefit from the full acclimation period while others may acclimate quickly. If the animal has acclimated before the end of the period, you can manually interrupt the acclimation period by pressing the ▶ button again. Next, FinePointe™ waits again for you to deliver the first challenge (e.g. PBS).

Once you do, press the ▶ button again, and FinePointe™ delivers the aerosol and times the measurement interval. When done, it waits for you to load the nebulizer again with the next challenge concentration.

The arrow indicates the current task. You can select a task and click ***Apply*** if you want to skip to that task, but that should only be necessary in unusual circumstances.

If you need to run all the sites together, you can use the F12 button to hit ▶ on all the Sites at once. Make sure the summary window is selected, otherwise the F12 button press may end up going to another window (and FinePointe™ will not be aware of it).

Delivering Aerosol for Dose Response Protocol

Dosing

When loading the dose, carefully and slowly inject 10 µL of solution, in the center of the nebulizer head. Do not touch the membrane with the pipette. Pipette or inject compound in.

Use the white insert for larger doses.

Deliver 10 µL of each of the following suggested doses:

1. PBS
2. 3.125 mg/mL Mch
3. 6.25 mg/mL Mch
4. 12.5 mg/mL Mch
5. 25 mg/mL Mch
6. 50 mg/mL Mch

The task sequence in the software should be reminding you to deliver these at the appointed times. Follow the software's direction.

Between Doses

At the completion of aerosol doses, you may see one or several puffs of aerosol coming out of the nebulizer head, possibly pulsing to the beat of the ventilator. These final puffs usually indicate that the end of aerosolization is complete. There is nothing wrong with this; it is the action of the membrane in the nebulizer head.

Between Subjects

Between subjects, rinse the apparatus with water and dry it thoroughly.

It is vital to your data that you remove any Mch deposits which exist in the inspiratory line. Therefore, thoroughly rinse and dry the following:

- Aerosol block
- Connecting hard tube
- Trachea needle junction

Also, use the provided brushes to brush out the inspiratory port (central port) of the head plate of the chamber.

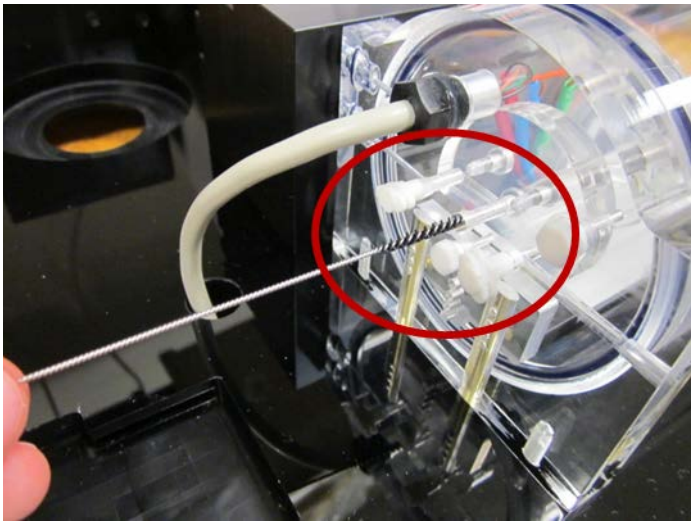


Figure 75. An example using the brush to clean the inspiratory port.

Finally, you should thoroughly dry out the expiratory tubing which connects the head plate of the chamber to the Expiration port on the controller.

If you are running several experiments a day, we recommend that you purchase an additional aerosol block and aerosol connect tube so that you can wash one set while running another subject.

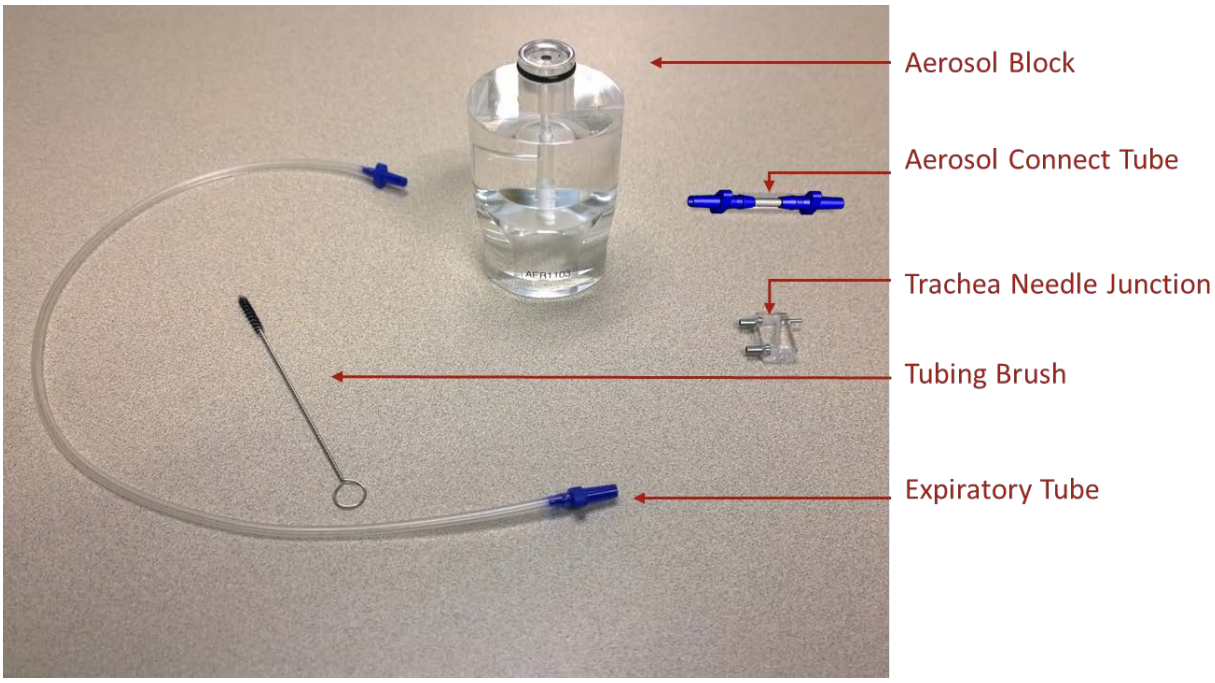


Figure 76. Diagram indicating the different piece parts needed for cleaning between studies.

Tips While Running

If you see a shift in pressure:

You may have water in your tubing somewhere. Look at the tubing to see if you have any small drops or bubbles of water. If so, you need to empty the water out. It will deliver erroneous data.

Before delivering new doses of Ketamine:

If you are delivering a booster dose of ketamine to keep the animal anesthetized, make sure to wait until there is NO measurement being taken by the software. You do not want to open the chamber when a measurement is being recorded.

If you suspect the animal is fighting the ventilator:

Turn off the ventilator and watch the animal's breathing. If he is breathing on his own immediately, then your anesthesia is too light, and you should consider increasing the dose.

If you suspect the animal is dead:

Turn off the ventilator and watch the animal's breathing. If you see no movement, no breathing after one minute, it is most likely that your animal is dead.

Consider using ECG or Blood Pressure monitoring to give you a more complete view of the health of the animal during the study.

Ending Data Collection

Once you have completed the data collection task sequence, select the **File| End Session** menu on the summary window.

The **End Session** wizard is presented:

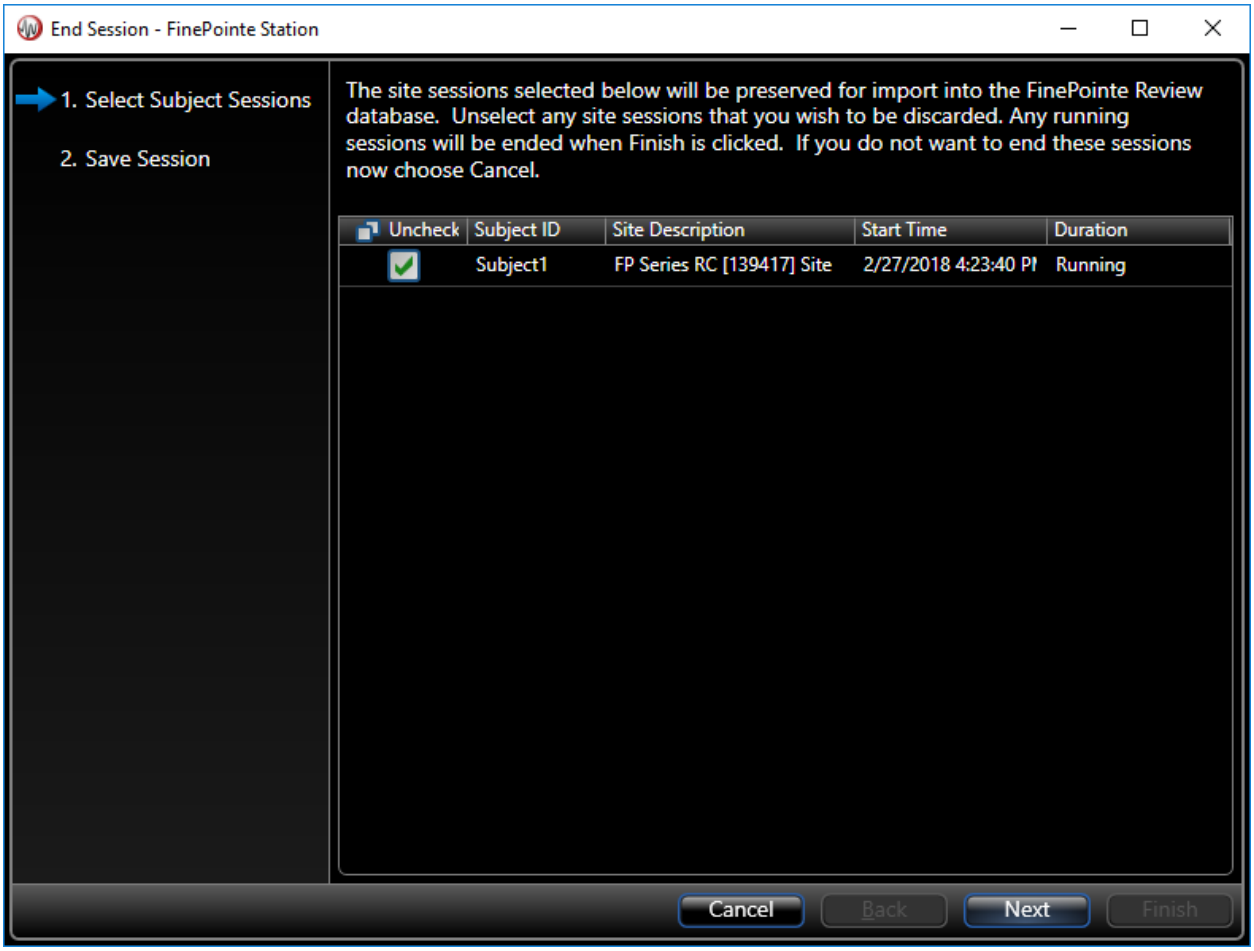


Figure 77. The first page of the End Session wizard. Select the subjects you want to save to the database. By default, they are all selected.

Usually, you will not do anything here since the default is to save all the data. The first page of the wizard does give you a chance to reject data. If you do, it will ***not*** be uploaded into the study database.

Click **Next**.

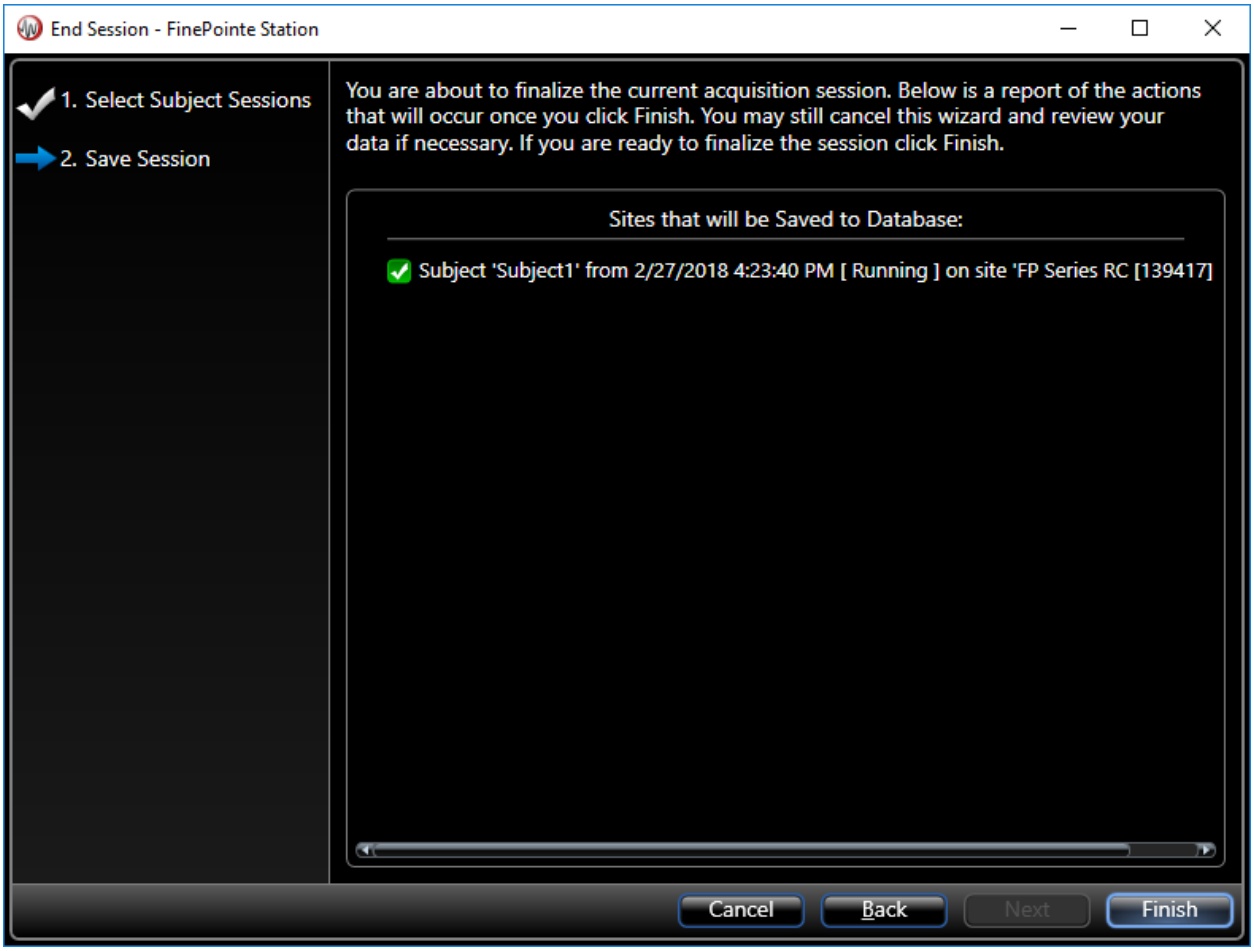


Figure 78. The final page of the End Session wizard. This page confirms what you selected on the first page.

The final page of the wizard confirms what you selected on the first page. If satisfied, click **Finish**. Otherwise, click **Cancel** or **Back**.

If you click **Finish**, FinePointe™ will begin the process of importing the data into the study. This can take a few minutes, but you can launch FinePointe™ Station again (even before the data is fully imported) and begin data collection with the next subject.

The status of the data importing process is provided at the bottom of the FinePointe™ main *Laboratory Page* (Figure 79).

Figure 79. Data import status located at the bottom of the main Laboratory Page.

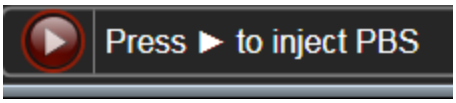
During the data import, you may see a **Pruning** status. When FinePointe™ Station is launched, data will start being acquired by the system. However, the task sequence you defined during your Study creation will not commence until you click the Acknowledge button ▶ to **Start Experiment**. Similarly, once the final task sequence step is complete, FinePointe™ will continue to acquire data until you **End the Session**. All data collected prior to the Start of the experiment and after the completion of the task sequence, will be pruned, or removed (not saved), prior to importing the experiment data.

Pruning will also remove any data collected during any **Acclimation** period included in the task sequence.

More about Executing the Experiment

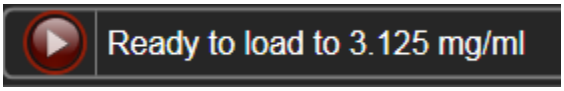
The experiment is designed to follow the Task Sequence that was created earlier. To ensure the experiment is properly conducted, some interaction by the researcher is required.

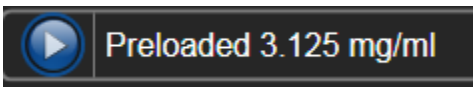
A red arrow ▶ indicates that the experiment will not continue unless the researcher acknowledges the task sequence by following the on-screen instructions. Some examples are shown below.



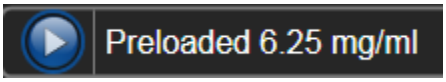
A blue arrow ▶ indicates that the researcher has acknowledged the next step in the task sequence and FinePointe™ will automatically execute the next step.

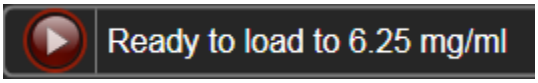
In the example below, FinePointe™ indicates the next step “Ready to load 3.125 mg/ml”. Once the researcher has preloaded the nebulizer head, they can acknowledge the next step by clicking on the red arrow ▶. Once acknowledged, the arrow turns blue ▶. FinePointe™ will proceed as outlined in the task sequence.





If you accidentally acknowledge the task sequence, you can click the blue arrow ▶ again. The arrow will turn back to red ▶ and the task sequence will not continue until acknowledge by the researcher.





Study Page

Once you’ve collected data, FinePointe™ returns to you to the main Laboratory Page. A summary of the data collected, and reports generated can now be viewed in the main Study Page.

To launch the Study Page, double-click the **Study Notebook** icon.

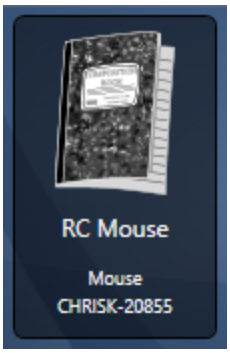


Figure 80. Example Study Notebook icon.

An example of a fully populated Study Page is displayed in Figure 81. Upon initial study creation, the Report Area will have a single report listed, while Report Preview and Recording List will be empty.

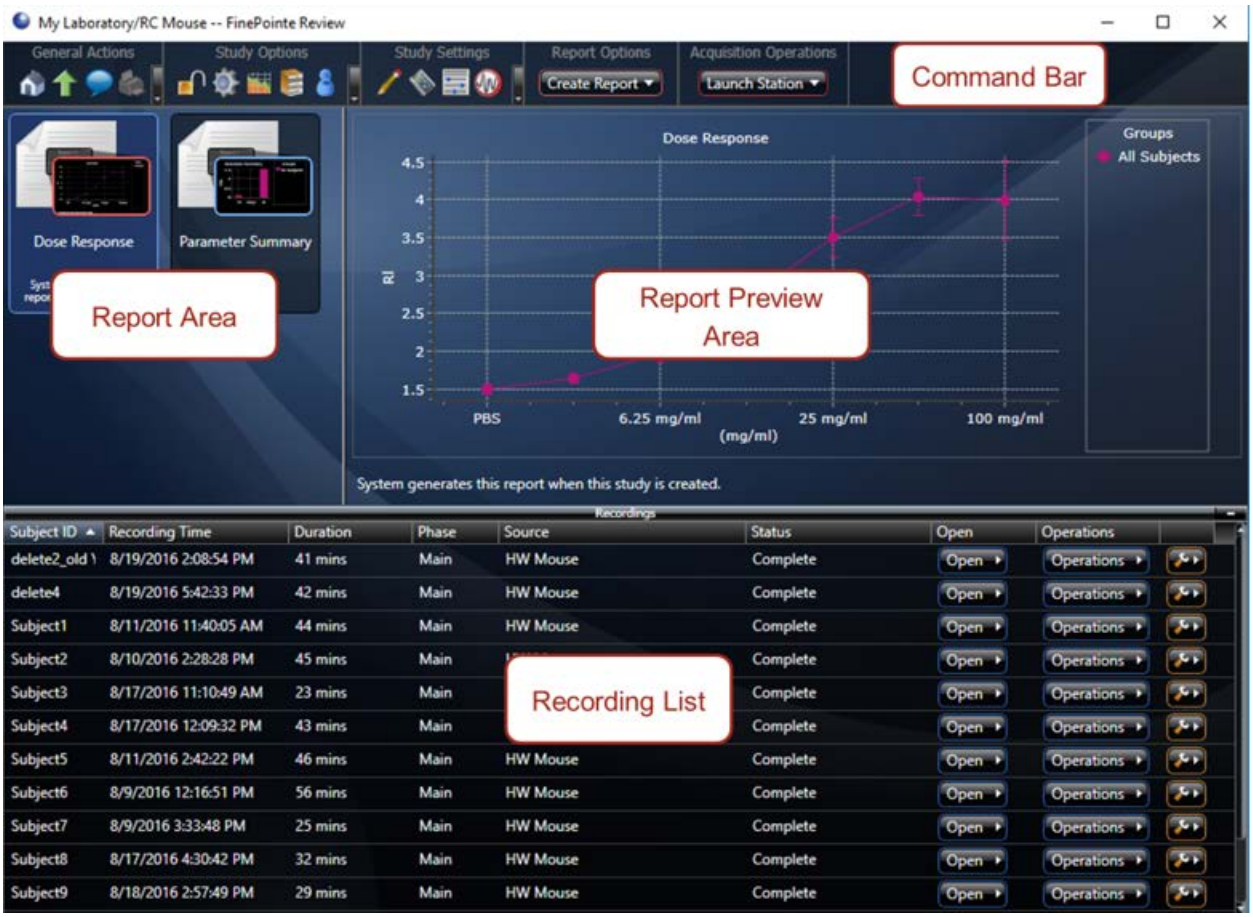


Figure 81. The main Study Page with the key areas indicated.

Report Area

New studies are generally created with one report. You can add as many as you want, and additional icons will appear in the Report Area. When you select a report by single-clicking on it, the Report Preview Area presents a preview of it. Double-click the icon to open the complete report.

Right-click on a report to get a context menu containing certain actions that can be performed, as described below:

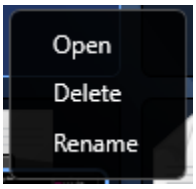


Figure 82. Report Area right-click context menu.

Menu Item	Description
Open	Same as double-clicking on the report. Opens it, presenting the complete report.
Delete	Delete the report.
Rename	Rename the report

Recording List

The Recordings list presents a row for each recording saved in the study. The columns provide details about the recording. The **Open** button opens the recording in the *Detail View*. See Reviewing Data for more details.

If you have reanalyzed a recording, you will have more than one recording set that you can open. In that case, Open may present options if you click on it.

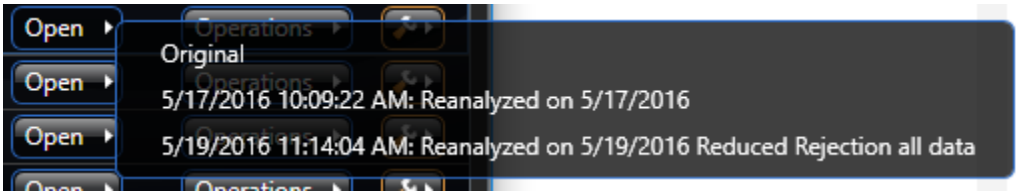


Figure 83. Example options available from the Open button. Options will depend on number of reanalysis times.

You can choose which recording set you want to review in the *Detail View.*

The **Operations** button opens a set of operations you can perform on the recording.

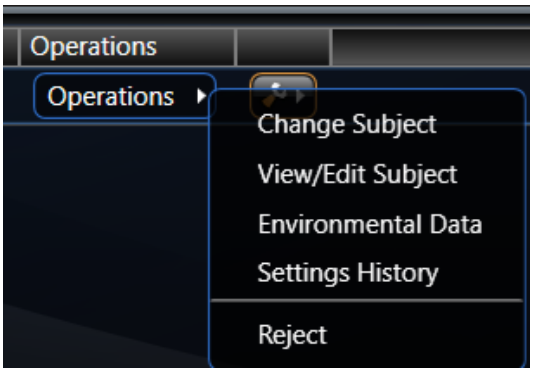


Figure 84. Displays the options available from the Operations button.

Menu Item	Description
Change Subject	Presents a form that allows you to change the subject associated with the recording. You might do this if the recording was not properly designated when you acquired it. In addition, you can change the weight which is associated with this recording.
View/Edit Subject	This brings up a form to edit the descriptive properties of the subject. Note: There is a weight value on this form, but that does not affect the weight value associated with the recording.
Environmental Data	This presents a form to edit the environmental data associated with the recording. This information is used with the PFT FRC test and will cause all the FRC tests associated with that recording to be recomputed. This information does not impact RC Studies.
Settings History	Snapshot of task sequence settings used in the analyzer settings in the study.
Reject	Reject the recording so that it will not be used by the reports.

The *Change Subject* form appears in Figure 85. In this form you can change the subject that the recording is associated with by selecting a different subject ID in the list. Specifying the Weight of Subject in this form allows the user to call the value in custom analyzer expressions, and report expressions, by using the **Weight** keyword.

Figure 85. An example Change Subject form.

The *Edit/View Subject* form presented in Figure 86 presents the subject record of the subject associated with the recording. This is the same record which is accessible from the Subjects and Groups page. When you change the weight in this form, you are only changing the weight which will be applied to subsequent recordings with this subject, and not the weight associated with the current recording.

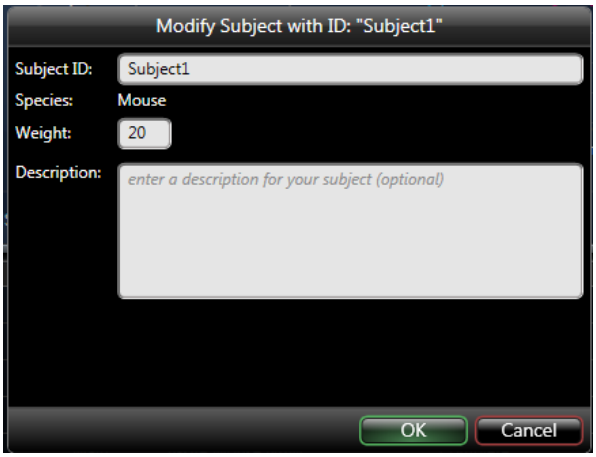


Figure 86. An example Edit/View Subject form.

The last column which has a **wrench** button on each row shows the calibration used for that recording.

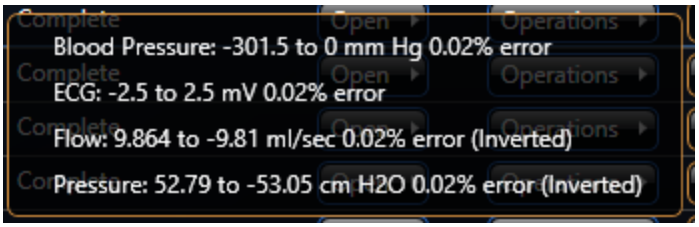


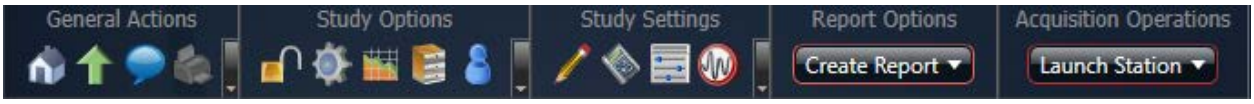
Figure 87. An example of information located in the Wrench button.

In this example, Box Flow for the Nasal side of the chamber has an effective range between 67.36 and -63.82 mL/sec, while that of the Thoracic side has an effective range between -70.32 and 71.92 mL/sec.

Command Bar

The command bar is a context-sensitive bar that provides buttons for navigation and information editing.

The command bar on the Study page is pictured below:



Each button is a command. The command will either bring up a dialog box or navigate you to another page. When you hover the mouse of each button, the tooltip provides a reminder of what the button will do.

On this command bar, there are 3 sub-command bars. Each sub-command bar is indicated by the small down bar:

Figure 88. This signifies a sub-command menu. When you click on it, it will reveal additional command buttons.

The following table summarizes each command button:

Table 1: Command Buttons

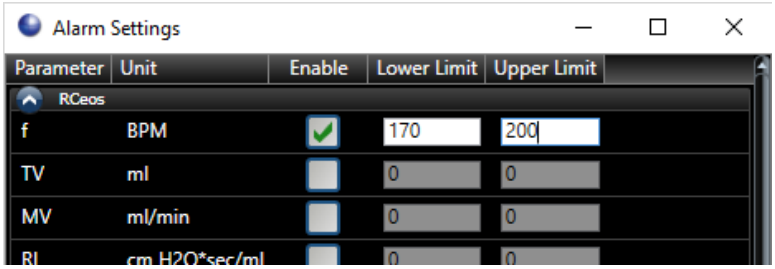
Icon	Name		Description
	Laboratory Home		Navigate to the main Laboratory Page
	Up One Level		Navigate to the next page up (or back)
	Chat Room		Bring up the FinePointe™ Chat room.
	Print		Print the current page (if the current page is a printable page)
	Release control of study		Since FinePointe™ is a network-based system and multiple users can access the data in the study simultaneously, FinePointe™ only permits one user to have control of the study and make certain changes at a time.
	Manage Groups and Subjects		Navigate to the Groups and Subjects page.

	View Data and Place Measurements		Navigate to the Place Measurements View.
	View Source Data for Measurements		Present a form that allows you to view the data selected by each measurement interval. This form allows you to audit the data used in the reports.
	Manage Study Users		Navigate to the Study Users page.
	Study Settings		Present a wizard that allows you to change the study descriptive information, measurements, phases, and task sequence settings. This wizard is similar to the Create Study wizard used to create the study.
	Analyzer Expressions		Present a form which edits the expressions of the columns of each analyzer table. This form allows you to decide what columns to compute, show and hide. It also allows you to create custom parameters by means of mathematical equations, which can then be viewed during data collection and reporting.
	Acquisition Settings		Present a form which allows you to set the default algorithm settings or save as a new profile for subsequent data acquisition. The value of Minimum TV will have a default value but can adjust this value to reanalyze the data.
	Reanalyze Recordings		Present a wizard that allows you to reprocess the stored waveforms of recordings to produce a new analyzer set. This does not delete previously stored analyzer sets, and you will have to select which analyzer set you wish to base the reporting on.

The following table is of the General Actions/Sub-Command Bar; each sub-command bar contains less frequently used commands.

Table 2: General Actions/Sub-Command Bar

Icon	Name		Description
	Transfer Collected Data to Server		When data is acquired using an Isolated Station, use this button to bring in the acquired data from a recording file stored on a flash drive.
	System Audit Trail		Present a form that shows the System Audit Trail.
	Calibration Audit Trail		Present a form that shows the Calibration Audit Trail.
	Save FinePointe™ Service Logs to the FinePointe™ Logs.zip on the Desktop		This button collects all service logs currently accessible on the server and all connected clients and saves them into a zip file on the desktop. This button is useful for collecting information for diagnostic purposes.
	Log off		Log out of FinePointe™.
	Change Password		Change your password.
	View Study Audit Trail		Present a form that shows the Study Audit Trail.
	View Study Information		Navigate to the Study Info page. This page provides a simple summary of the study.
	Verify Database Integrity		Present a form that scans the study database of modifications which took place outside of FinePointe™. It presents a list of changes.
	Repair Database		If changes were detected by Verify Database Integrity, this button will correct the change codes so that those changes will not be detected by future Verify Database Integrity operations. All corrected change codes are logged to the audit trail, so a record of those changes remains.
	Export Subject Data to Excel		Launches an export dialog which permit user selection of the subject, analysis set (e.g. original or reanalysis), and analyzer for data export to Excel.
	Export All Subject Data to Excel		Exports all recorded analyzer data from all subjects in the study to Excel. Depending on the size of the study (number of subjects and acquisitions) this operation may take an extremely long time and could fail since Excel may not be able to store all the data due to limitations of Excel.
	Export All Subject Data to Open Office		Exports all recorded analyzer data to Open Office.
	Copy Data to Study		Copies selected recordings into another study which is compatible.
	Export All Reports to Excel		Exports data from all defined reports in the study to Excel.
	Export to EDF+		Exports one or more subject's signal data into a new EDF+ format file. Exports data to European Data Format.
	**Study Settings Sub-command Bar**		

Icon	Name		Description
	Modify Reanalysis Descriptions		Present a form that allows you to modify the descriptions associated with each reanalysis set.
	Include/Exclude Reanalysis		Present a form that allows you to select which reanalysis sets to use in the reports.
	Annotation Hot Key Configuration		Present a form that allows you to set the descriptions of 4 manual events which are placed during data collection when F5, F6, F7, and F8 are pressed.
	Alarm Settings		Allows the user to define alarm conditions per derived parameter using low and high alarm limits. When the derived data goes above or below the defined alarm limits, an alarm will be triggered. During Acquisitions, a triggered alarm will generate an audible standard Windows alarm sound. In Acquisition and Review, a triggered alarm will be indicated in the Derived Parameter Table by updating the offending data cell's background color to red. For example, if the frequency (f) derived parameter alarm was configured to Low: 170 and High: 200.  This resulted in the following updates to the Derived Parameter Table to indicate these logged times met the alarm condition:  When exporting derived data from FinePointe™ Review, an Alarm column will be included with an asterisk in the row of the parameter to indicate an offending data.

In addition to the command buttons, the Command Bar provides a button for creating reports, and a button to launch data collection. Pull down the **Create Report** button to see the reports you can create. See

Creating a Report for more details.

Pull down the **Launch Station** button to select a station on which to acquire data. Only stations that can acquire data for this study are presented.

Reports

FinePointe™ provides an integrated report generation facility which helps you produce meaningful summaries of your data. When you acquire data in FinePointe™, you can easily record thousands of the derived data lines for a single subject in the RC table. Working with this data in Excel can be extremely cumbersome simply because of the sheer size of the data, but also it is usually more convenient to visualize the data graphically, annotated with event marks that inform you about what occurred at each moment. Excel does not make this easy – FinePointe™ does.

The reporting engine allows you to select and identify regions of data, reject noise, combine groups of subjects, and produce tables and graphs of your data. All this is done within the FinePointe™ Study database, creating a traceable result which is kept together with the raw data. In addition, you can acquire data from more subjects, and simply add those subjects to their appropriate groups to include them in existing reports.

Report Processing

FinePointe™ offers four report types: Dose Response (or Toxicity, COPD, Asthma, or Summary which are essentially the same report with a different name), PC Dose Report, Parameter Summary, and Time Course. The processing is very similar for each of these and summarized in the following table:

Report Type	Description
Dose Response	Summarizes one or two expressions for multiple measurements and multiple groups.
PC Dose Report	Generates the same content as a Dose Response report but also computes PC-n value for each group. Most common would-be PC-200 which is the concentration that yields 200% change.
Time Course	Summarizes an expression for multiple measurements, each subdivided into fixed intervals (specified by you) and multiple groups.
Time Course – 2 Parameter	Summarizes 2 expression for multiple measurements, each subdivided into fixed intervals (specified by you) and multiple groups.
Parameter Summary	Summarizes many expressions for a single measurement and multiple groups. The processing of this report is the same as that of Dose Response but permits many expressions.

When you create a report, you specify one or more groups, one or more measurements, and one or more expressions. From this information, the reporting engine is able to process the derived data, and for each group-measurement-expression combination FinePointe™ produces average, standard deviation, standard error and other calculations.

To illustrate the report processing, consider the following collection protocol:

1. Take a 5-minute baseline average (named “BASELINE”)
2. Deliver a compound
3. Take a 5-minute average 5 minutes after delivery (named “T5”)
4. Take a 5-minute average 10 minutes after delivery (named “T10”)
5. Take a 5-minute average 30 minutes after delivery (named “T30”)
6. Take a 5-minute average 60 minutes after delivery (named “T60”)
7. Take a 5-minute average 120 minutes after delivery (named “T120”)

If you visualize the data collection for a single subject, it might look something like the diagram in Figure 89.

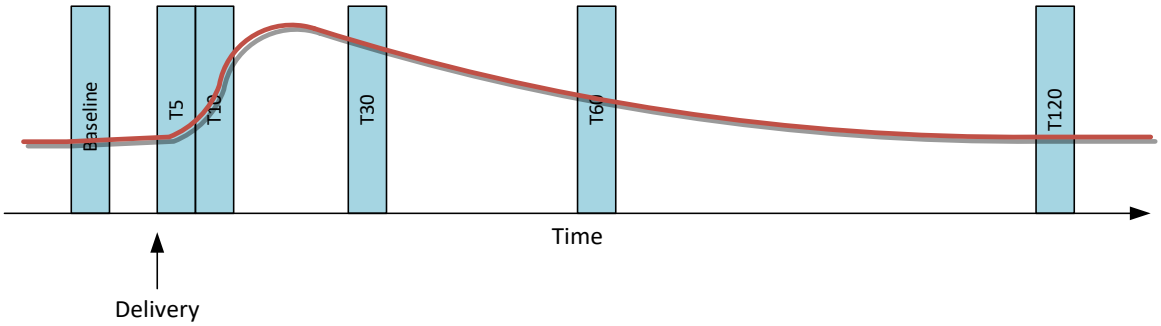


Figure 89. An example data collection protocol to be summarized by FinePointe™ reports.

The plot is of a parameter which represents the subject's response. The blue shaded areas are measurements. Each measurement has a name which identifies it.

In addition, imagine you acquire data for 8 subjects according to the data collection protocol, and the subjects are arranged in 2 groups of 4 subjects, Groups A and B. We have subjects A1, A2, A3, A4, B1, B2, B3, B4.

FinePointe™ station can place the measurements for you as you acquire the data, according to the data collection protocol. But you are free to adjust the placement of these measurements, both position and width (duration), from the Place Measurements View. Also, the Place Measurements View allows you to reject regions of data which you do not want considered for reporting. See the **Using the Place Measurement View** section of this manual for more details.

The processing FinePointe™ performs when producing a Dose Response, PC Dose Summary, and Parameter Summary report is as follows:

1. Determine all subjects of the report from all the groups associated with the report.
2. For each subject, remove rejected data, then compute the expressions on each measurement. The result of this is the subject summary data.
3. For each group, combine the data for each measurement (from the subject summary data). The result of this is the group summary data.

In the example above, for each subject referenced by the report, FinePointe™ computes the average of the data within the Baseline, T5, T10, T30, T60, and T120 measurements.

Within FinePointe™ the Subject summary data may look like the following table:

Subject								
Measurement	**A1**	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**
Baseline	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T5	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T10	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T30	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T60	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T120	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx

Next, FinePointe™ groups the data and produces a group summary table:

Group										
	A					B				
Measurement	**Average**	**Stdev**	**StdErr**	**N**	**CI+/CI-**	**Average**	**Stdev**	**StdErr**	**N**	**CI+/CI-**
Baseline	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T5	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T10	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T30	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T60	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
T120	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx

Additional calculations are also computed for the group summary, such as P value, and T Test.

Time Course Report

FinePointe™ also provides a special report named a “Time Course” report. The processing of the Time Course report is very similar except for one key difference. A Time Course report subdivides each measurement into fixed time intervals and treats each subdivided time interval as a separate measurement.

For example, you could produce a Time Course report of Baseline measurement, with a time interval of 1 minute. For the Baseline measurement, FinePointe™ would produce 5 values in the Subject summary data, one for each subdivision since the measurement is 5 minutes long.

Subject									
Measurement	**Interval**	**A1**	**A2**	**A3**	**A4**	**B1**	**B2**	**B3**	**B4**
Baseline	1	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	2	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	3	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	4	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	5	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx

And the Group summary data for the Baseline measurement would follow with 5 sets of numbers for each group.

Group											
		A					B				
Measurement	**Int**	**Average**	**Stdev**	**StdErr**	**N**	**CI+/CI-**	**Average**	**Stdev**	**StdErr**	**N**	**CI+/CI-**
Baseline	1	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	2	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	3	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	4	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx
Baseline	5	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx	xxx.xx

Creating a Report

To create a report:

1. Select the report you want to create from the **Create Report** button on the study page.

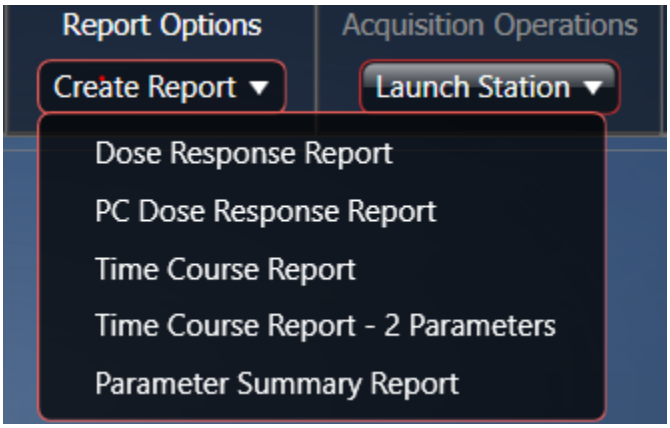


Figure 90. The available report options from a Dose Response or Universal study.

2. Select **Dose Response Report** to launch the Dose Response report wizard.

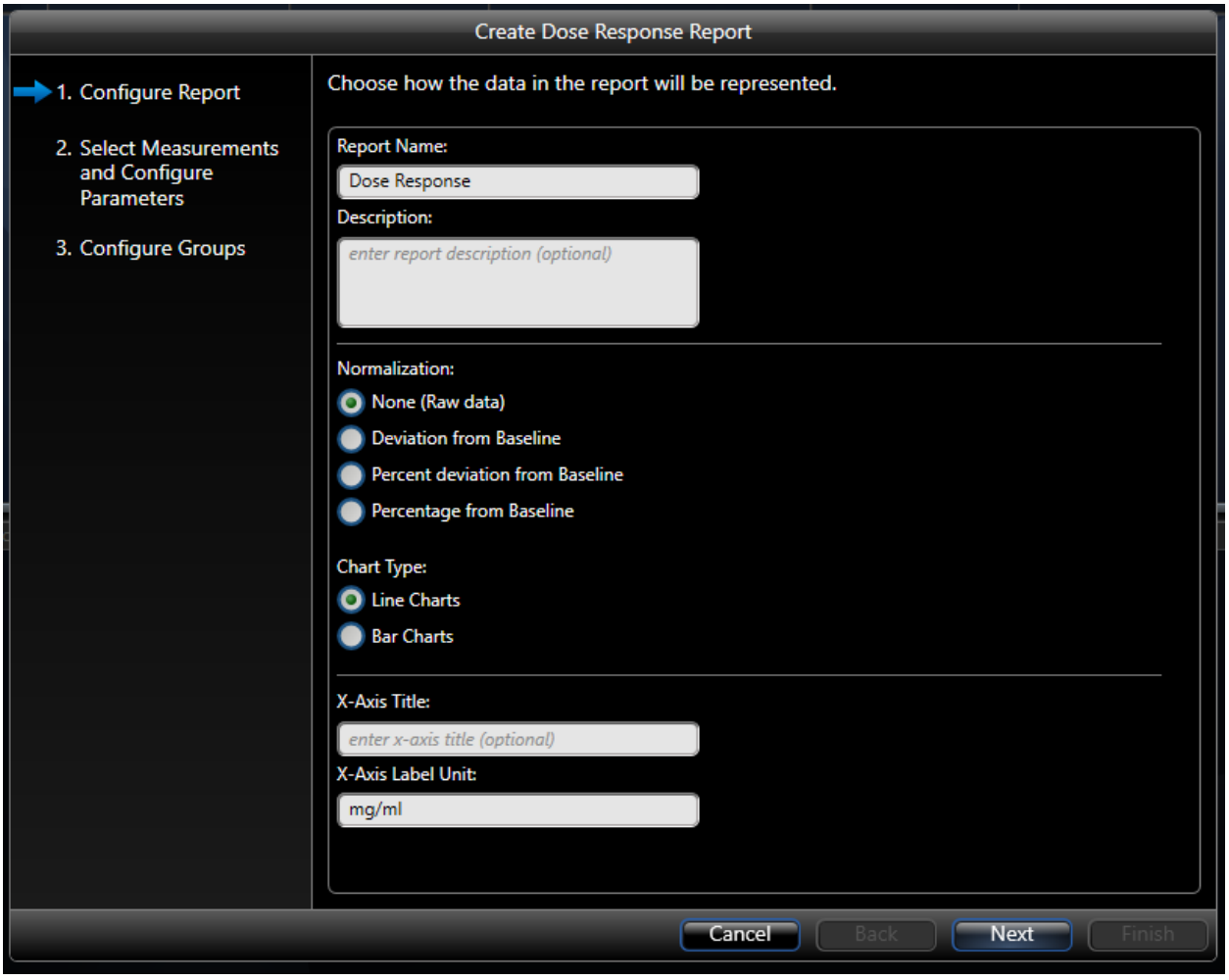


Figure 91. The first page of the Dose Response wizard. The Toxicity Report wizard is identical.

3. On the first page of the wizard, specify a report name which is unique within the study. You can also specify an optional description.

    a. Under the *Normalization* header, you can choose to have the data reported as a deviation from, percent deviation from, or a percentage of a designated baseline measurement, or just report the numbers without normalization.

    b. Since this report produces charts, you can choose between line or bar *Chart Types*.

    c. Finally, you can optionally specify a *Title* which will appear on the X-axis of the charts.

    d. Click **Next**.

Figure 92. The second page of the Create Dose Response report wizard.

4. On the second page of the wizard, select the measurements to include in the report.

    a. Place a check by each measurement you want included.

    b. If you chose to normalize the data on the previous wizard page, indicate which measurement is the baseline measurement.

    c. Specify the expressions to compute for each measurement. The expression can be different for each measurement if you choose, or they can be the same. Click the **New Parameter** button to bring up the form that allows you to edit the expression.

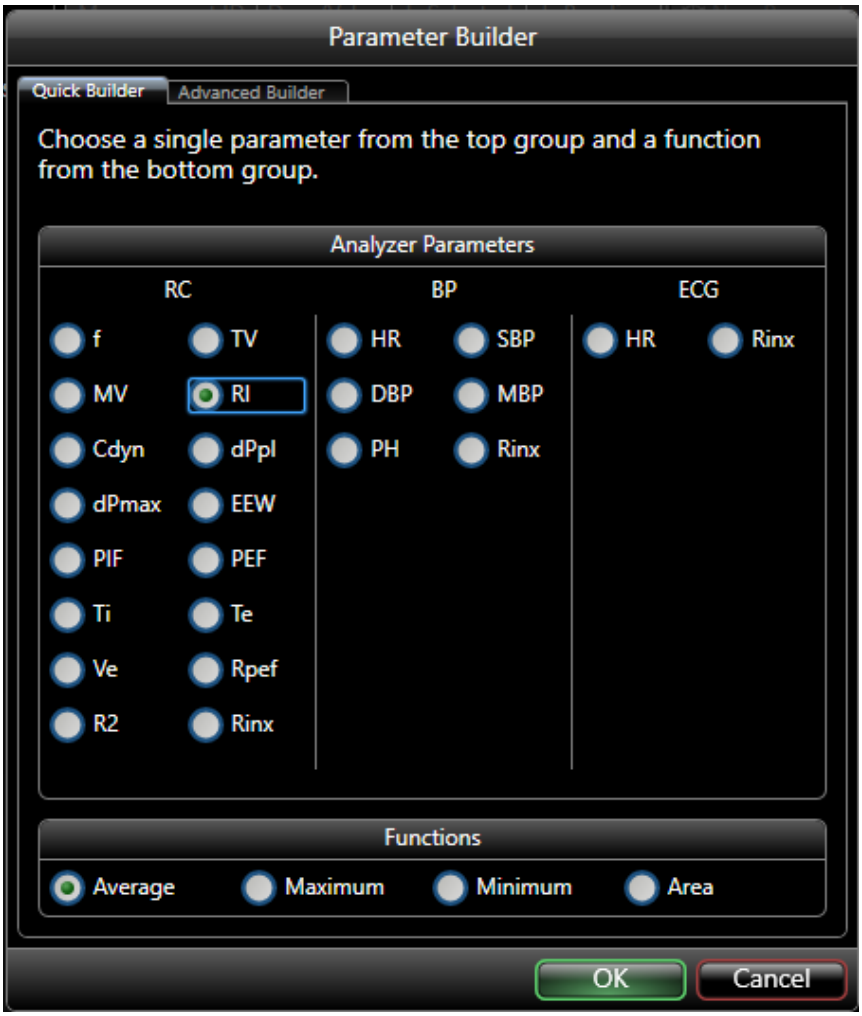


Figure 93. The Parameter Builder form which allows you to edit an expression which is computed for over the measurements.

d. The *Parameter Builder* assists you with specifying expressions which summarize each measurement. The parameter builder has two tabs: ***Quick Builder*** and ***Advanced Builder***. The ***Quick Builder*** tab allows you to make a couple simple selections, and it will create the expression for you. This can be used for many common expressions, especially expressions which are based on one parameter. The ***Advanced Builder*** allows you to build more complex algebraic combinations of parameters and functions.

e. Using the ***Quick Builder***, select one parameter from the available parameters and one of the common functions to compute on that parameter. For example, if you wanted the average lung resistance, click the **RI** parameter under *RC* and the **Average** function.

f. Click **OK** to return to the report wizard.

g. One additional New Parameter may be added (total of two parameters), if desired.
Note: One or two parameters are permitted, depending on report type.

h. Click **Next**.

Figure 94. The final page of the Create Report wizard.

5. The final page allows you to select which groups to summarize. The **All Subjects** group is always available, and if you have not yet created any groups yet, it will be the only group you see. You can always add groups later. In the example, Group 1, Group 2, Group 3, and Group 4 have been selected. You can change the order that the groups are summarized by clicking the up or down buttons beside each group.

6. Click **Finish**. The new report is created, and processing begins on that data that is already contained within the study.

Figure 95. A completed Dose Response Report.

Exporting Report Data

Once you have recorded data and generated a report, you can open the report to view and export it. In the example below, you can export directly to Excel, or you can copy the data to the clipboard, and paste it in somewhere else, such as a Word document.

Figure 96. Report export options available upon entry into the report.

The options that appear depend on what software you have installed on your computer. Options include:

- GraphPad Prism
- SPSS
- Excel
- Delimited Text

Note: Derived data may also be exported from the FinePointe™ Study level using the Study Options icons. Please see the table located in the Study Page **Command Bar** section of this manual for further descriptions on the following export options:

- Export Subject Data to Excel
- Export All Subject Data to Excel
- Export All Subject Data to Open Office
- Export All Subject Data to Text File
- Copy Data to Study
- Export All Reports to Excel
- Export to EDF+

Reviewing Data

Now that data has been acquired and reported on, it may be necessary to review the signal data and augment measurement placement.

The FinePointe™ study database stores all the data associated with the experiment. Data is stored by recording. Each recording stores a complete session for a single subject and is presented on the main study page. You can review the data using the same views you used when you acquired the data, and if you are interested in reviewing the placement of the measurements, a special Place Measurement view makes the process very efficient.

Using the Place Measurement View

The Place Measurements view allows you to quickly review, add, delete, or make adjustments to measurements. Any reports referencing the measurements that you adjust or add are automatically updated.

From the study page, click on the **Place Measurements View** icon located on the **Command Bar**.

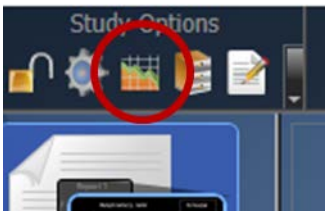


Figure 97. The Place Measurements View icon.

FinePointe™ navigates to the Place Measurements view.

Figure 98. An example Place Measurements view with data presented.

Pictured in Figure 98 is the Place Measurement View. The lists on the left are recordings you can choose to view. The bottom list shows the recordings, and the top list contains the groups. The group selection determines which recordings are shown in the recording list. If you select the **All Subjects** group, then you can choose from all subjects in the lower list.

The area on the right contains parameter plots of the recordings. Each recording is presented with a plot of a single parameter acquired in the recording. In this example, 3 recordings are presented. The selected items in the recordings list determine which recordings to show in plots in the area on the right. If you hold the <*Ctrl*> key down while clicking on the recording list, you can select multiple individual recordings. If you hold the <*Shift*> key down while clicking on the recording list, you can select a block of recordings.

On each plot, there are purple shaded regions. Each region is a measurement. If you hover the cursor over the measurement, the tooltip indicates the dose name associated with the measurement. You can adjust the position or width of these measurements by dragging either the body or the edge of the measurement, respectively.

On the button bar along the top of the view, you can change settings of the view.

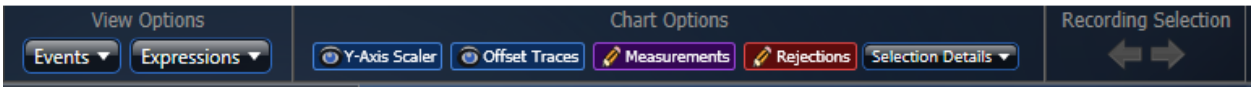


Figure 99. The Place Measurement view button bar.

View Options

The following outline the *View Options* available from the Button Bar:

The **Events** button allows you to select the classes of events you want to annotate on each plot. By default, none are selected. The events provide important clues about specific actions that took place during data collection. Since FinePointe™ walks through the data collection procedure with you, it records the precise time when you performed actions.

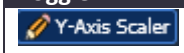
Event	Description
System	Displays instances of system level events chronologically on the plot; e.g. site acknowledgement changes.
Manual	Displays instances of manually placed events chronologically on the plot; e.g. events placed via right-click menus within the Place Measurement View or within FinePointe™ Review from the Historical Signal Charts.
Task Sequence	Displays task sequence events chronologically on the plot; e.g. nebulizing PBS.
Task Action	Displays task action events chronologically on the plot; e.g. nebulizer on: 0.02 ml for 30 seconds.
Antagonist	Displays antagonist events chronologically on the plot. Only used with Antagonist study type.
Time Zero	Displays the Time Zero marker on the plot.
Security	Displays any GLP security events that occurred throughout the acquisition.
Instrument	Displays events related to the instrument that occurred throughout the acquisition.

The **Expressions** button lets you select which parameter to plot on the recording plots. You can select from any parameter recorded. Also, you can choose whether to auto-scale the Y axis on the plots. The most common setting for this would be to check **Auto Scale** and **Zero Based**.

Chart Options

The following outline the *Chart Options* available from the Button Bar:

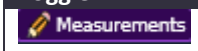
- **Y-Axis Scaler** is a toggle button which enables manual Y-axis scaling.

Toggle	Description
	Enable manual scaling on the Y-Axis. In this mode, you can drag the mouse along the Y-axis up or down to adjust the range.
	Lock scaling. In this mode, dragging the mouse up or down on the Y-axis does not adjust the range.

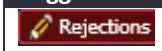
- **Offset Traces** is a toggle button which enables you to view or manually adjust the vertical placement of the trace on the plot.

Toggle	Description
	Enables manual scaling trace adjustment. In this mode, you can drag the trace with the mouse up or down.
	Lock trace offset. In this mode, dragging the mouse up or down on the trace does not adjust the vertical position.

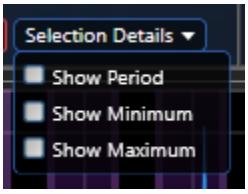
- **Measurements** is a three-way toggle button which controls the measurement interval presentation.

Toggle	Description
	Enable adjustment of measurements. In this mode, you can drag the edges of a measurement to change the width, or drag the body to change the position. Also, each measurement has a context menu which you can access by right-clicking on the measurement.
	Measurements are visible but locked. In this mode, you cannot adjust the size or position of a measurement.
	Hide the measurements.

- **Rejections** is a three-way toggle button which enables you to view, hide, or accept rejected regions (remove a rejected region). Rejected regions are shown as red regions. You can create a rejected region in any toggle position.

Toggle	Description
	Enable full manipulation of rejected regions. In this mode, you can remove or accept rejected regions. Also, each rejected region has a context menu that you can access by right-clicking on the rejected region.
	Rejected regions are visible but locked. In this mode, you cannot accept (or remove) any rejected regions.
	Hide the rejected regions.

- **Selection Details** allows you to see information about the trace when you select a range of the trace on a plot.



  - **Show Period** shows the width of the selected region.
  - **Show Minimum** shows the minimum of the trace data within the selection.
  - **Show Maximum** shows the maximum of the trace data within the selection.

    See the example interval and callouts to see what each check box enables.

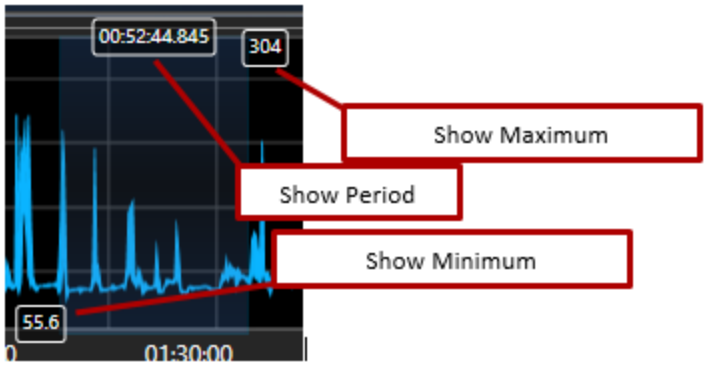


Figure 100. This shows a region of selected data on a plot. The Selection Details button allows you to control the details you see about your selection.

- The **Recording Selection** buttons (two arrows) selects the next or previous group of recordings in the Recordings List. These buttons provide a convenient way to step through all the recordings without having to manually select the recordings each time.

Right-click Options

When you select a range of data on a plot (by click-and-dragging on the plot area, not a measurement), you can right-click on the selected area to get a context menu as shown in Figure 101.

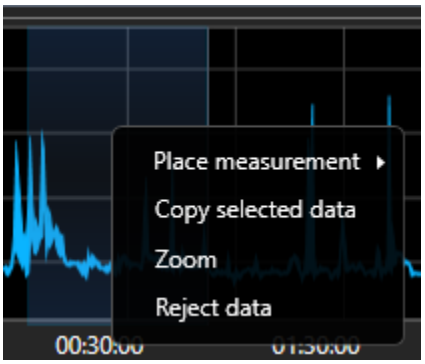


Figure 101. This shows a region of selected data on a plot. The Selection Details button allows you to control the details you see about your selection.

- **Place measurement** is a submenu that allows you to place any measurements that have not yet been placed on this recording. You can select the measurement you want to place, and the selected region will become that measurement.
- **Copy selected data** copies the selected data to the clipboard. The numeric data is placed in the clipboard as text. An image of the entire plot is also placed in the clipboard. You can paste this data into Excel or Word.
- **Zoom** adjusts the time axis so that the entire time axis is the width of the selected interval.

- **Reject data** creates a rejected interval to exclude the selected range from reporting. You will be prompted to enter an optional reason for your rejection.

If you right-click on the background of the plot (without having anything selected through a click-and-drag), you can access another context menu as shown in Figure 102.

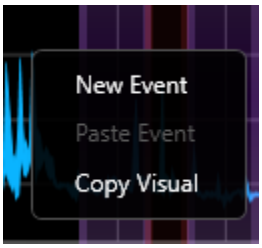


Figure 102. Context menu that appears when you right-click on the background of a plot.

- **New Event** allows you to enter a comment that is stored as an event with a **Manual** class.
- **Paste Event** allows you to paste an event that you previously copied. An event may be copied from the Event dialog displayed when entering a new event or editing an existing event (Figure 103).
- **Copy Visual** copies an image of the plot to the clipboard. This allows pasting the plot into a third-party application, e.g. Microsoft PowerPoint.

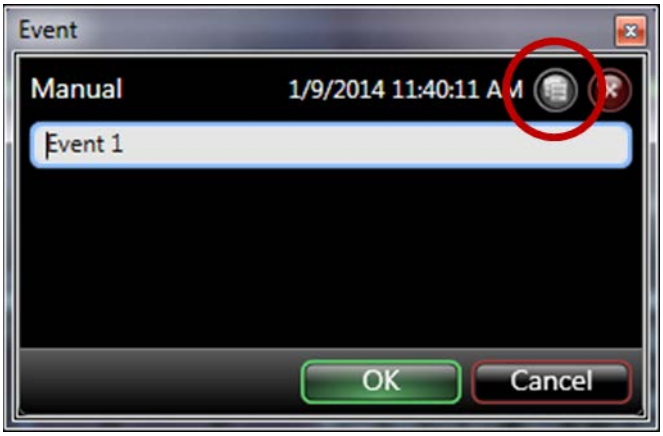


Figure 103. The Copy Event icon located in the Event dialog.

Additional options are available from the upper-right corner of each Recording Plot.

Figure 104. Measurement options available from the Recording Plot.

- The first drop down allows you to select the particular reanalysis to view.
- The **Undo** or **Redo** buttons allow you to undo or redo a preformed action (such as moving a measurement).
- **Restore** allows you to reposition all Measurements back to their originally placed locations as seen immediately after ending data collection and saving the data, thereby undoing any modifications that occurred after collection was finished.
- The bottom drop down allows you to Exclude or Include data.

Reviewing a Recording

From the main study page, double-click on a recording to open it up. You will be brought to the Detail page for that recording. This page is the same detail page presented when you acquired the data. shows an example view with the areas of the view labeled.

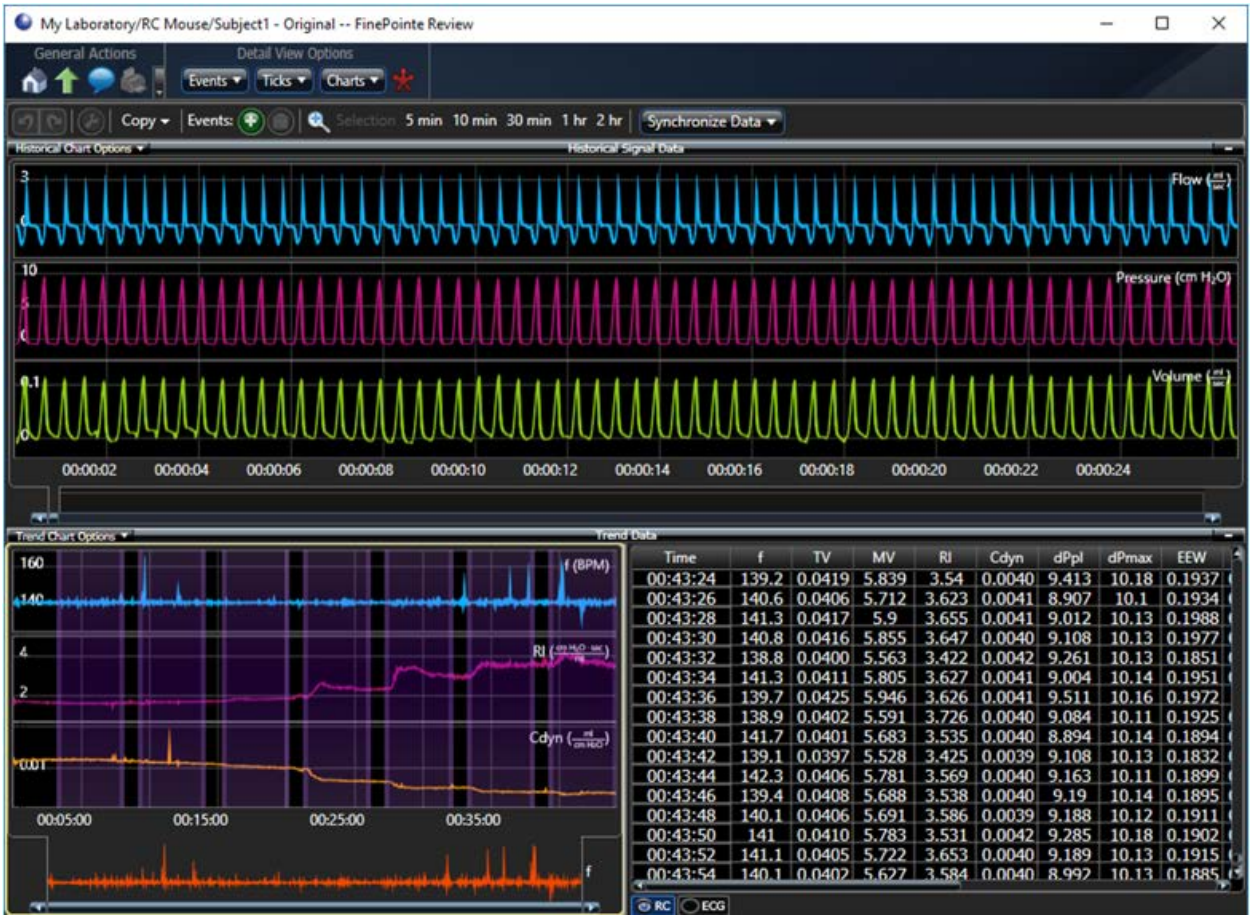


Figure 105. A Detail View of recording.

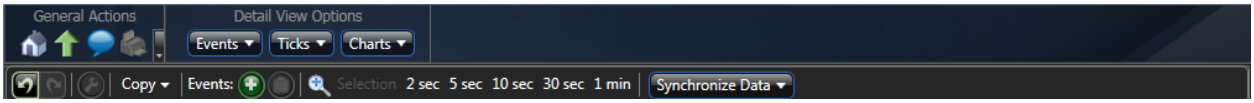


Figure 106. The Command Bar.

Review Command Bar

The FinePointe™ Review Command Bar (Figure 107) contains mostly view settings permitting efficient methods to configure how you would like to see and navigate through your data. The Review Command Bar is composed of two bars: main bar and the context bar. The main command bar provides overall page setup buttons and commands. The context bar provides commands which may change based on what data is selected on the page.

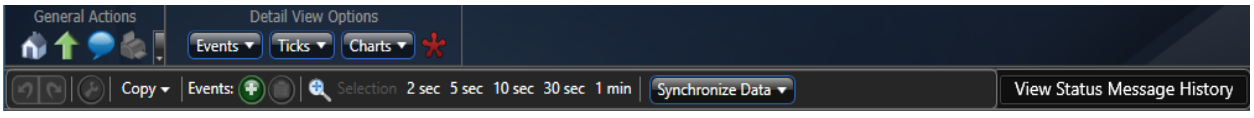
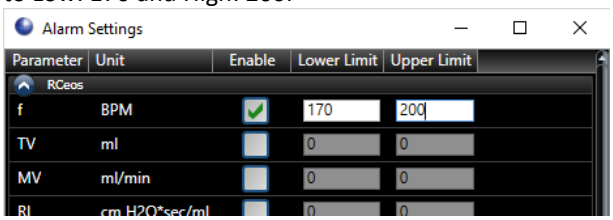
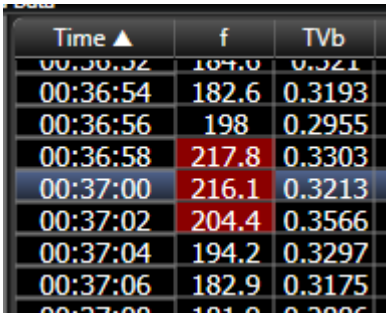
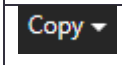
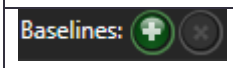
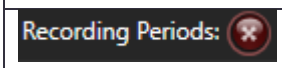
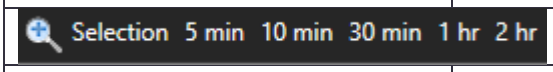
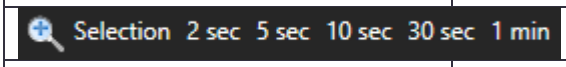
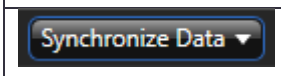
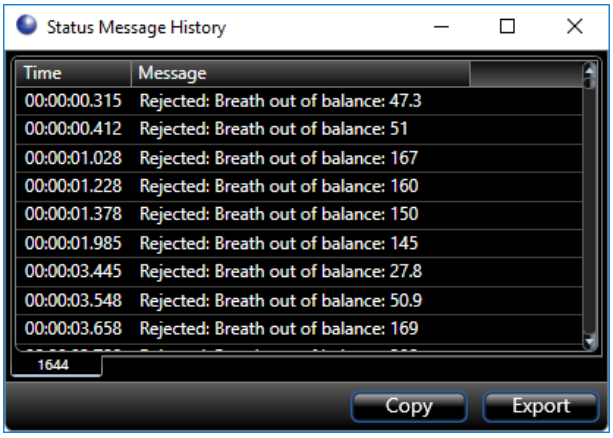


Figure 107. The Review Command Bar.

Button	Name	Description
General Actions (See		

Button	Name	Description
Review Command Bar)		
Detail View Options		
Events		Select which event classes to annotate the signals, trends and tables with.
Ticks		Select which Ticks to place on the signals.
Charts		Setup the Signals and Trends
	Alarm Settings	Allows the user to define new or manipulate existing alarm conditions per derived parameter using low and high alarm limits. When the derived data goes above or below the defined alarm limits, an alarm will be triggered. A triggered alarm will be indicated in the Derived Parameter Table by updating a data cell's background color updating to red. For example, if the frequency (f) derived parameter alarm was configured to Low: 170 and High: 200.  This resulted in the following updates to the Derived Parameter Table to indicate these logged times met the alarm condition: 
Context Bar		
	Undo	If a measurement or recording period has been changed, added, or deleted, this button will undo the operation.
	Redo	If you clicked the Undo button, you can "undo the undo" by clicking this button.
	Ventilator Settings	If acquiring data live with apparatus which is controlling a ventilator, this button allows you to change the ventilator settings. In review it is always disabled.
	Copy to clipboard	Depending on where the cursor is, this provides a menu of commands to copy data to the clipboard. You may be able to copy data from the signal chart, or the trend chart, or the table, or you can copy an image of the page, or an image of either chart.
	Modify Measurement	If a measurement is selected (the measurement tool of either the signal chart or the trend chart must enable adjustments of measurements), this button presents a

Button	Name	Description
		form which allows you to modify the baseline make-up of the measurement.
	Add/Delete Baseline	If measurements are in an editable state and then a measurement is selected, you can add or delete a baseline associated with that measurement by clicking these buttons.
	Delete Recording period	In FinePointe™ Station, recording periods determine which data is save in FinePointe™. If during data acquisition you have selected a recording period, you can delete it with this button. Deleting a recording period will cause FinePointe™ to remove the data within it and not save it in the study database. In review, this button does nothing. Note: Measurements must be in an editable state (pencil icon) to see this option.
	New/Paste Event	If a chart (either signal chart or trend chart) is selected, you can add a manual event at the cursor position by clicking the **New Event** button or by clicking the **Paste Event** button.
		
	Zoom	When the Trend chart is selected, these buttons will zoom the chart to the selected time width.
		
	Zoom	When the Signal chart is selected, these buttons will zoom the chart to the selected time width.
		This button places the view in a special mode that keeps all trend chart, signal chart, and table synchronized to the same data.
	View Status Message History	This button will open a dialog containing a list of rejected breaths, the time these breaths occurred, and the reason they were rejected. The information in this dialog may be exported to .csv or copied and pasted into another document to permit finding the breath in the historical signal chart and table area. 

Historical Signal Charts

The Historical Signal Charts present the waveforms acquired. You can collapse this area so that more display space can be used for the Trend Charts and the Table Area by clicking the – button in the upper right corner.

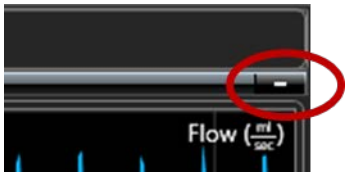


Figure 108. The collapse button you can click to collapse the Historical Signal Charts.

Signal Setup

Configure the content of these charts by pulling down the **Charts** button on the command bar and selecting **Signals…**

Signals presents a form that allows you to setup the Historical Signal Charts.

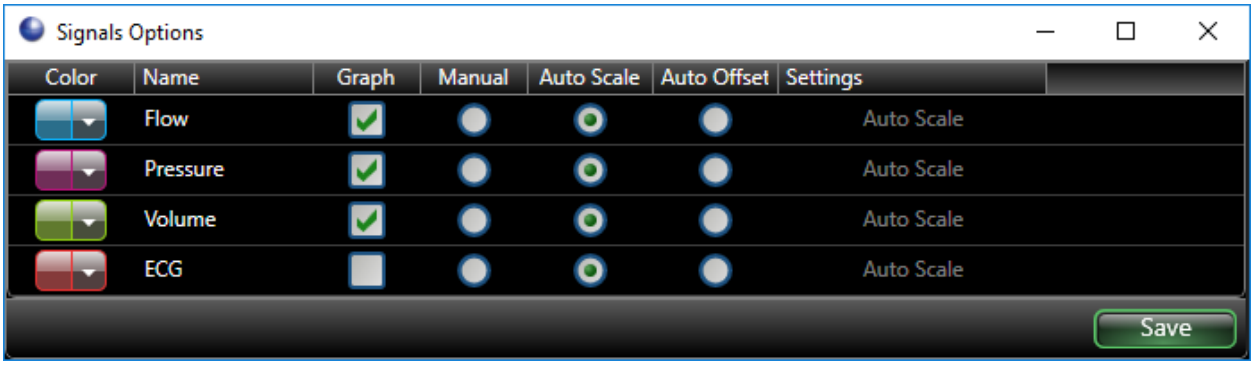


Figure 109. This form allows you to change the signals displayed in the Historical Signal Charts and how the graphs are scaled.

Place a check by each signal you want displayed in the Historical Signal Charts.

The columns to the right of the check boxes allow you to specify how the Y-axis is scaled. Choose **Manual** if you want to specify the extents of the Y-axis. Choose **Auto Scale** to scale the Y-axis to the data being plotted. Choose **Auto Offset** to specify a range and have the offset be adjusted according to the data.

You can also set the color by choosing a color from the *Color* column.

Click **Save** when done.

The Historical Chart Option (Figure 110) menu allows you to control the Y-Axis scaling and the display of measurements on the signals.

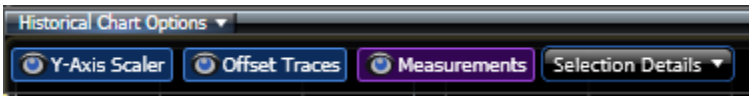


Figure 110. Historical Chart Options

- **Y-Axis Scaler** is a toggle button which enables manual Y-axis scaling.

Toggle	Description
Y-Axis Scaler	Enable manual scaling on the Y-Axis. In this mode, you can drag the mouse along the Y-axis up or down to adjust the range.
Y-Axis Scaler	Lock scaling. In this mode, dragging the mouse up or down on the Y-axis does not adjust the range.

- **Offset Traces** is a toggle button which enables you to view or manually adjust the vertical placement of the trace on the plot.

Toggle	Description
Offset Traces	Enable manual scaling trace adjustment. In this mode, you can drag the trace with the mouse up or down.
Offset Traces	Lock trace offset. In this mode, dragging the mouse up or down on the trace does not adjust the vertical position.

- **Measurements** is a three-way toggle button which controls the measurement interval presentation.

Toggle	Description
Measurements	Enable adjustment of measurements. In this mode, you can drag the edges of a measurement to change the width or drag the body to change the position. Also, each measurement has a context menu which you can access by right-clicking on the measurement.
Measurements	Measurements are visible but locked. In this mode, you cannot adjust the size or position of a measurement.
Measurements	Hide the measurements.

Signal Navigation

The scroll bar of the Historical Signal Charts allows you to adjust the position within the recording, as well as the zoom of the charts. Figure 111 illustrates how it works. Expanding the Zoom Handles will increase the amount of sampled signal data displayed in the Historical Signal Charts (zoom out), while compressing them will reduce the amount of data displayed (zoom in).

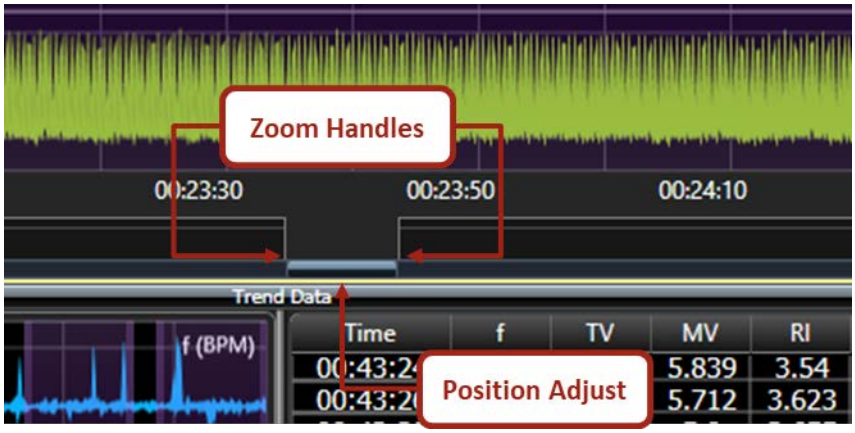


Figure 111. This shows the scroll bar of the Historical Signal Charts.

The Command Bar's "Zoom to" options provide a quick method to display exactly 2 seconds, 5 seconds, 10 seconds, 30 seconds, or 1 minute of data in the chart.

Note: The chart area selected (e.g. Historical Signals or Trend) will be the chart on which these "Zoom to" selections will operate.

The **Synchronize Data** button available from the Command Bar will automatically update the data position of the Chart/Table based on the selection. By default, **None** is selected. This means each Chart and Table can be positioned to various locations (time points) throughout the data, independently.

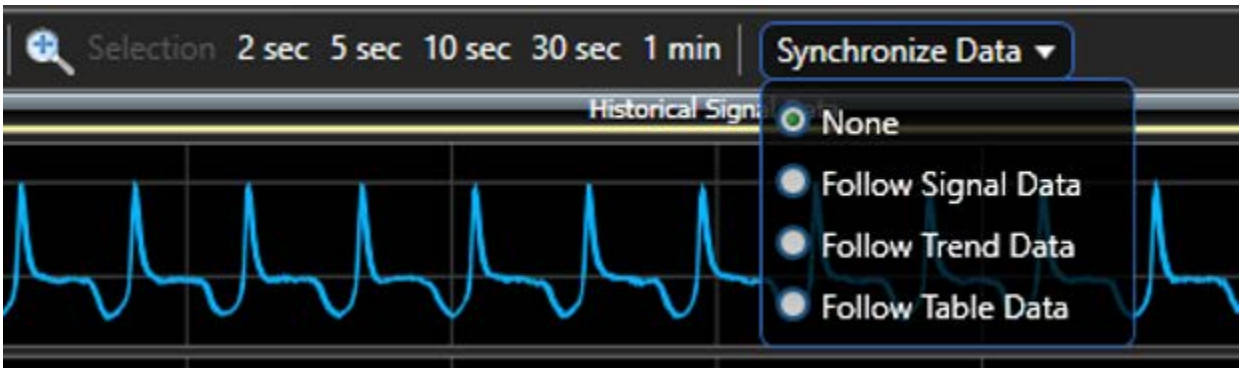


Figure 112. This shows the available Synchronize Data options.

Other options include:

- **Follow Signal Data** will automatically reposition the Trend Charts and Table Area based on the cursor position of the Historical Signal Charts.
- **Follow Trend Data** will automatically reposition the Historical Signal Charts and Table Area based on the cursor position of the Trend Charts.
- **Follow Table Data** will automatically reposition the Historical Signal and Trend Charts based on the displayed section of the Table Area.

Display Ticks

You may also choose to display algorithm **Ticks** on the Historical Signal Charts. Ticks provide context to how the algorithm marked the various points of interest on the signal. In Figure 113, the RC Inspiration Ticks are enabled and displayed as a highlighted section of data. This highlighted section represents the section of the signal marked by the RC algorithm. Similar marks are available for the entire breath, expiration, peak inspiratory flow (PIF), and peak expiratory flow (PEF).

Figure 113. Illustrates the RC Inspiration Ticks enabled on the Historical Signal Charts.

Display Events

The **Events** button allows you to select the classes of events you want to annotate on each plot. By default, none are selected. The events provide important clues about specifics actions that took place during data collection. Since FinePointe™ walks through the data collection procedure with you, it records the precise time when you performed actions.

Event	Description
System	Displays instances of system level events chronologically on the plot; e.g. site acknowledgement changes.
Manual	Displays instances of manually placed events chronologically on the plot; e.g. events entered using the Events button in the Command Bar or via right-click from the Historical Signal Charts.
Task Sequence	Displays task sequence events chronologically on the plot; e.g. nebulizing PBS.

Event	Description
Task Action	Displays task action events chronologically on the plot; e.g. nebulizer on: 0.02 ml for 30 seconds.
Antagonist	Displays antagonist events chronologically on the plot. Only used with Antagonist study type.
Time Zero	Displays the Time Zero marker on the plot.
Security	Displays any GLP security events that occurred throughout the acquisition.
Instrument	Displays error events that occurred throughout the acquisition.

Note: Enabled Events will be displayed in the Historical Signal Charts and the Trend Charts.

Right-click Options

The following outlines the right-click options available from the Historical Signal Data Charts:

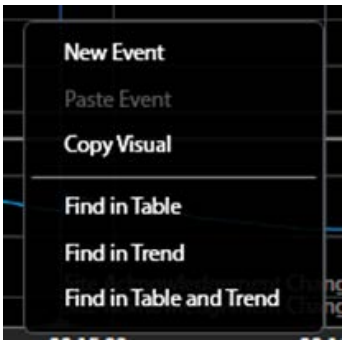


Figure 114. Displays the right-click menu of the Historical Signal Data Charts.

- **New Event** allows you to enter a comment that is stored as an event with a **Manual** class.
- **Paste Event** allows you to paste an event that you previously copied.
- **Copy Visual** copies an image of the plot to the clipboard. This allows pasting the plot into a third party application, e.g. Microsoft PowerPoint.
- **Find in Table** synchronizes the Table Area with the Historic Signal Charts, highlighting the row of parameter data in which the respiratory cycle associated with the cursor placement is contained.
- **Find in Trend** synchronizes the Trend Charts with the Historic Signal Charts, placing the cursor at the equivalent time in the Trend Chart.
- **Find in Table and Trend** synchronizes the Table Area and Trend Chart with the cursor position from the Historic Signal Charts.

The following will outline the right-click options, available from a selected area (click-and-drag), within the Historical Signal Charts:

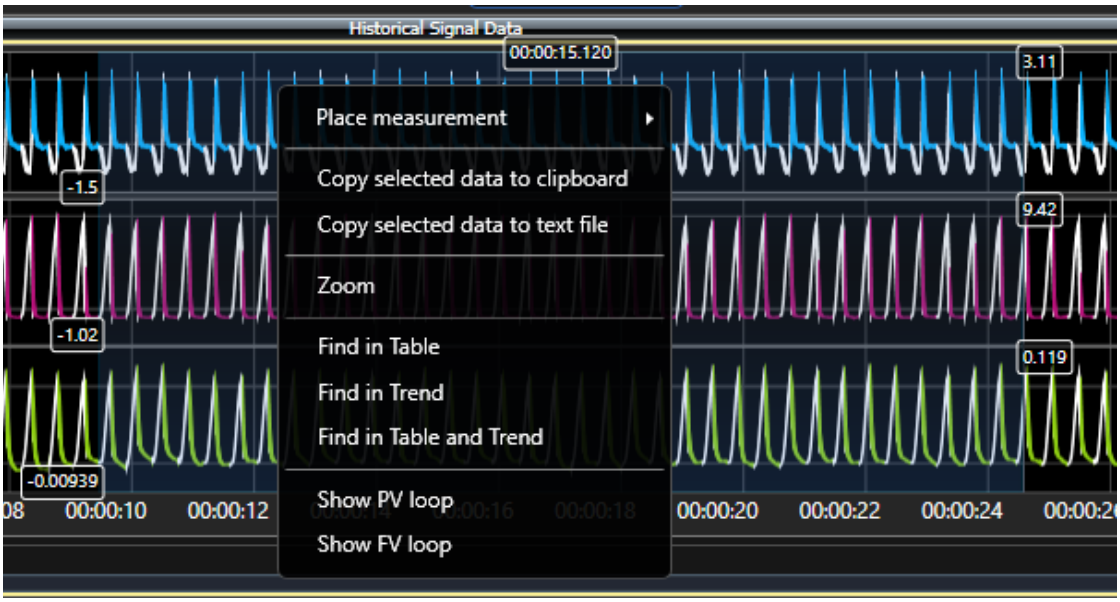


Figure 115. Displays the right-click menu options of a selected section of data from the Historical Signal Charts.

- **Place measurement** allows you to retroactively place measurements. Manual measurement placement is typically used when running a Pilot study.
- **Copy selected data to clipboard** copies the sampled signal data to the clipboard to paste into a third party application, e.g. Microsoft Excel.
- **Copy select data to text file** creates a text file (.txt) containing the sampled signal data. If select, you are presented with a Windows Explorer Save As dialog.
- **Zoom** expands the time axis (x-axis) to permit closer examination of the signal data in more detail.
- **Find in Table** synchronizes the Table Area with the Historic Signal Charts, highlighting the row(s) of parameter data in which the respiratory cycles associated with the selected signal data is contained.
- **Find in Trend** synchronizes the Trend Charts with the Historic Signal Charts, highlighting a selection of trend data equivalent in duration and placement as that selected in the Historical Signals Charts.
- **Find in Table and Trend** synchronizes the Table Area and Trend Chart with the data selection from the Historic Signal Charts
- **Show PV Loop** creates a Pressure - Volume graph of the select data. Right clicking the newly populated graph allows the graphic to be copied in order to paste into a third-party application.

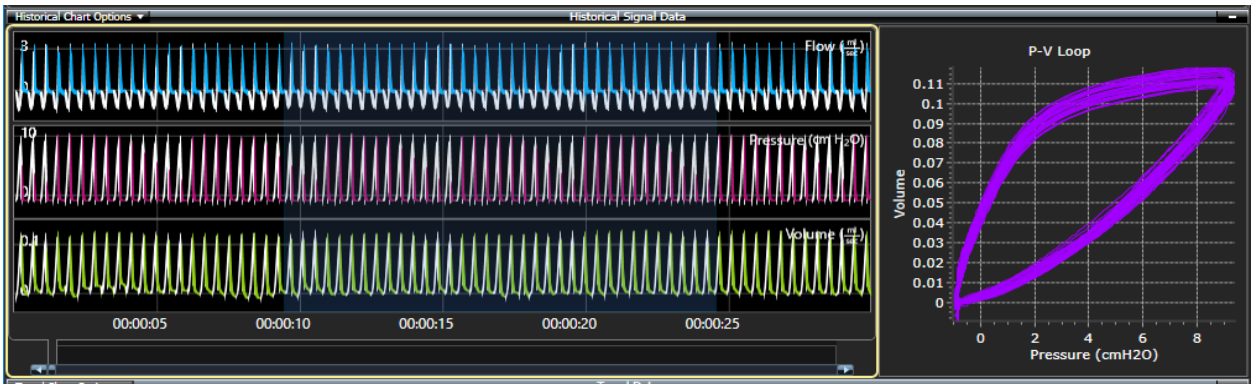


Figure 116. Displays the Pressure - Volume Loop graph of data highlighted from the Historical Signal Charts.

- **Show FV Loop** creates a Flow - Volume graph of the selected data. Right clicking the newly populated graph allows the graphic to be copied in order to paste into a third-party application.

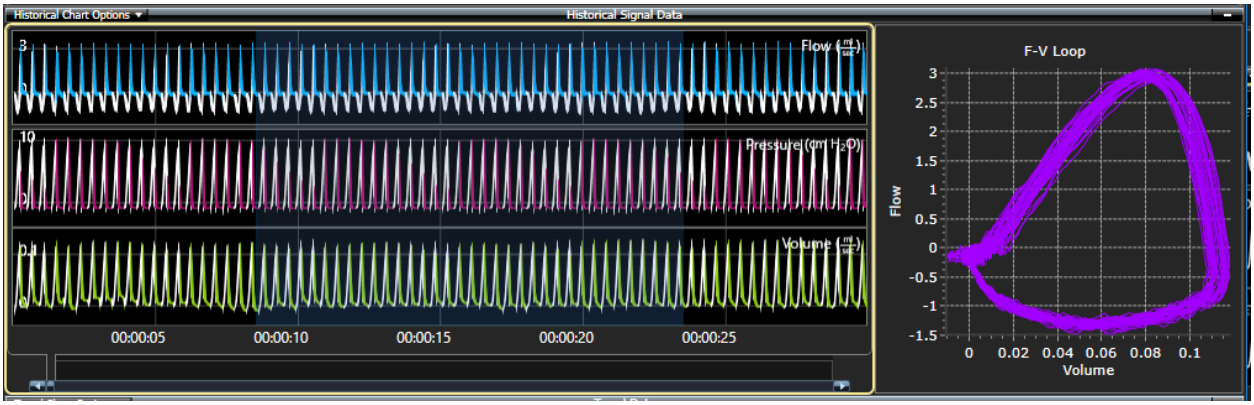


Figure 117. Displays the Flow - Volume Loop graph of data highlighted from the Historical Signal Charts.

Trend Charts

The Trend Charts display plots of the data from the Table Area columns.

Trend Setup

Configure the content of these charts by selecting **Expressions…** from the **Charts** button in the **Command Bar**.

Figure 118. The Expression Options form used to configure the Trend Charts.

You can choose which parameters are displayed in the Trend Charts area by placing a check in the Graph column. The columns to the right of the checkbox control how the Y-axis is scaled. Choose **Manual** if you want to specify the Y-axis limits. Choose **Auto Scale** to have the Y-axis automatically adjusted to fit the content. And if you choose **Auto Scale**, you can optionally choose **Zero Based** too. While **Auto Scale** alone adjusts both the maximum and the minimum of the Y-axis to fit the data, **Zero Based** chooses one axis limit to be zero. If the data is positive, then the minimum Y-axis limit will be zero. If the data is negative, then the maximum Y-axis limit will be zero.

Note: please see the **Derived Parameters** section in the **Appendix** of this manual for details on each parameter.

You can also set the color by choosing a color from the Color column.

Click **Save** when done.

Trend Charts Options (Figure 119) menu allows you to control the Y-Axis scaling, but also, it allows you to control the display of measurements on the signals.

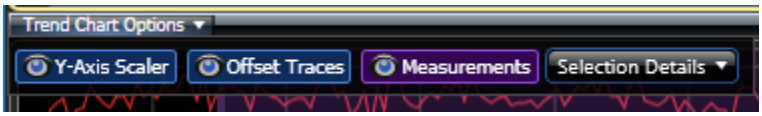


Figure 119. Trend Chart Options

Y-Axis Scaler is a toggle button which enables manual Y-axis scaling.

Toggle	Description
Y-Axis Scaler	Enable manual scaling on the Y-Axis. In this mode, you can drag the mouse along the Y-axis up or down to adjust the range.
Y-Axis Scaler	Lock scaling. In this mode, dragging the mouse up or down on the Y-axis does not adjust the range.

Offset Traces is a toggle button which enables you to view, or manually adjust, the vertical placement of the trace on the plot.

Toggle	Description
Offset Traces	Enable manual scaling trace adjustment. In this mode, you can drag the trace with the mouse up or down.
Offset Traces	Lock trace offset. In this mode, dragging the mouse up or down on the trace does not adjust the vertical position.

Measurements is a three-way toggle button which controls the measurement interval presentation.

Toggle	Description
Measurements	Enable adjustment of measurements. In this mode, you can drag the edges of a measurement to change the width or drag the body to change the position. Also, each measurement has a context menu which you can access by right-clicking on the measurement.
Measurements	Measurements are visible but locked. In this mode, you cannot adjust the size or position of a measurement.
Measurements	Hide the measurements.

Trend Navigation

The scroll bar of the trend charts allows you to adjust not only the position within the recording, but also the zoom of the charts. Figure 120 illustrates how it works.

Figure 120. This shows the scroll bar of the trend charts.

Right-click Options

The following outlines the right-click options available from the Trend Charts:

Figure 121. Displays the right-click menu of the Trend Charts.

- **New Event** allows you to enter a comment that is stored as an event with a **Manual** class.
- **Paste Event** allows you to paste an event that you previously copied.

- **Copy Visual** copies an image of the plot to the clipboard. This allows pasting the plot into a third-party application, e.g. Microsoft PowerPoint.
- **Find in Table** synchronizes the Table Area with the Trend Charts, highlighting the row of parameter data in which the respiratory cycle associated with the cursor placement is contained.
- **Find in Signals** synchronizes the Trend Charts with the Historic Signal Charts, placing the cursor at the equivalent time in the Historical Signal Charts.
- **Find in Table and Signals** synchronizes the Table Area and Historical Signal Charts with the cursor position from the Trend Charts.

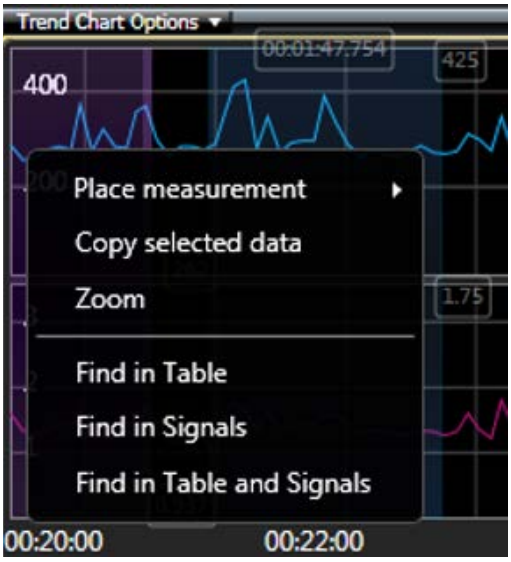
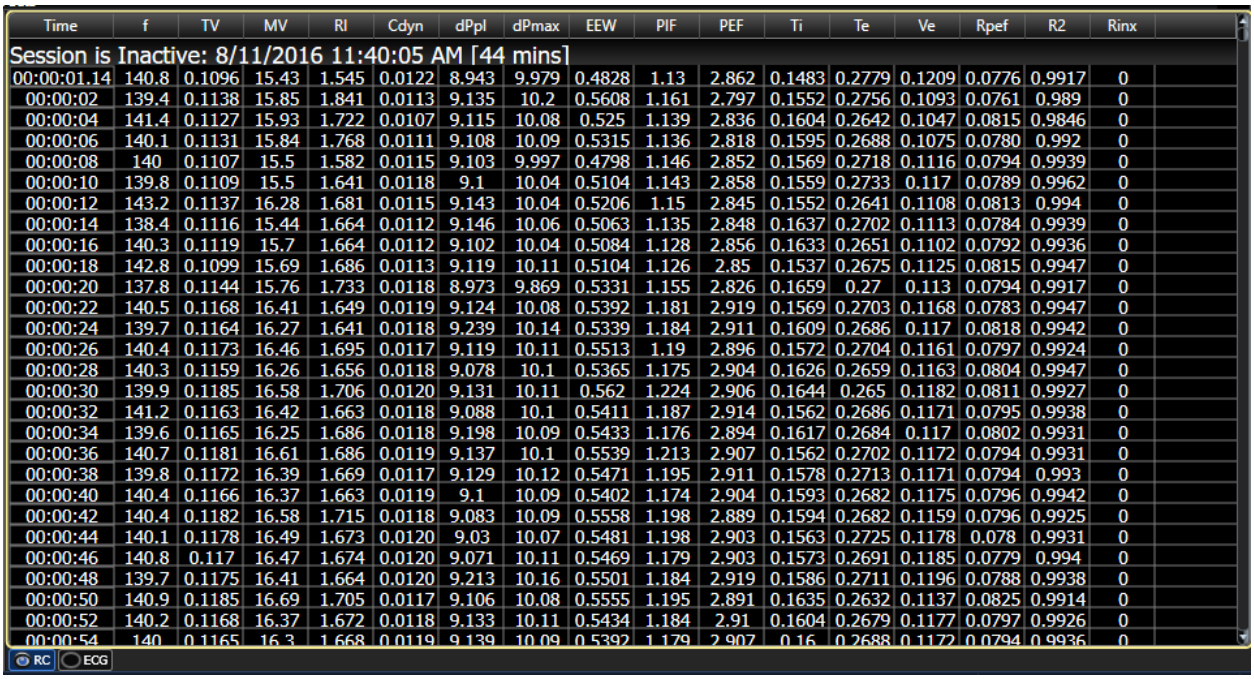


Figure 122. Displays the right-click menu options of a selected section of data from the Trend Charts.

- **Place measurement** allows you to retroactively place measurements. Manual measurement placement is typically used when running a Pilot study.
- **Copy selected data** copies the parameter trend data to the clipboard to paste into a third-party application, e.g. Microsoft Excel.
- **Zoom** expands the time axis (x-axis) to permit closer examination of the trend data in more detail.
- **Find in Table** synchronizes the Table Area with the Historic Signal Charts, highlighting the row(s) of parameter data in which the respiratory cycles associated with the selected signal data is contained.
- **Find in Signals** synchronizes the Trend Charts with the Historic Signal Charts, highlighting a selection of Historical Signal Chart data equivalent in duration and placement as that selected in the Trend Charts.
- **Find in Table and Signals** synchronizes the Table Area and Historical Signal Charts with the data selection from the Trend Charts

Table Area

The table area is where the analyzer tables display the derived parameter data. All parameters which the RC analyzer can calculate are displayed in this table.



Time	f	TV	MV	RI	Cdyn	dPpl	dPmax	EEW	PIF	PEF	Ti	Te	Ve	Rpef	R2	Rinx
Session is Inactive: 8/11/2016 11:40:05 AM [44 mins]																
00:00:01.14	140.8	0.1096	15.43	1.545	0.0122	8.943	9.979	0.4828	1.13	2.862	0.1483	0.2779	0.1209	0.0776	0.9917	0
00:00:02	139.4	0.1138	15.85	1.841	0.0113	9.135	10.2	0.5608	1.161	2.797	0.1552	0.2756	0.1093	0.0761	0.989	0
00:00:04	141.4	0.1127	15.93	1.722	0.0107	9.115	10.08	0.525	1.139	2.836	0.1604	0.2642	0.1047	0.0815	0.9846	0
00:00:06	140.1	0.1131	15.84	1.768	0.0111	9.108	10.09	0.5315	1.136	2.818	0.1595	0.2688	0.1075	0.0780	0.992	0
00:00:08	140	0.1107	15.5	1.582	0.0115	9.103	9.997	0.4798	1.146	2.852	0.1569	0.2718	0.1116	0.0794	0.9939	0
00:00:10	139.8	0.1109	15.5	1.641	0.0118	9.1	10.04	0.5104	1.143	2.858	0.1559	0.2733	0.117	0.0789	0.9962	0
00:00:12	143.2	0.1137	16.28	1.681	0.0115	9.143	10.04	0.5206	1.15	2.845	0.1552	0.2641	0.1108	0.0813	0.994	0
00:00:14	138.4	0.1116	15.44	1.664	0.0112	9.146	10.06	0.5063	1.135	2.848	0.1637	0.2702	0.1113	0.0784	0.9939	0
00:00:16	140.3	0.1119	15.7	1.664	0.0112	9.102	10.04	0.5084	1.128	2.856	0.1633	0.2651	0.1102	0.0792	0.9936	0
00:00:18	142.8	0.1099	15.69	1.686	0.0113	9.119	10.11	0.5104	1.126	2.85	0.1537	0.2675	0.1125	0.0815	0.9947	0
00:00:20	137.8	0.1144	15.76	1.733	0.0118	8.973	9.869	0.5331	1.155	2.826	0.1659	0.27	0.113	0.0794	0.9917	0
00:00:22	140.5	0.1168	16.41	1.649	0.0119	9.124	10.08	0.5392	1.181	2.919	0.1569	0.2703	0.1168	0.0783	0.9947	0
00:00:24	139.7	0.1164	16.27	1.641	0.0118	9.239	10.14	0.5339	1.184	2.911	0.1609	0.2686	0.117	0.0818	0.9942	0
00:00:26	140.4	0.1173	16.46	1.695	0.0117	9.119	10.11	0.5513	1.19	2.896	0.1572	0.2704	0.1161	0.0797	0.9924	0
00:00:28	140.3	0.1159	16.26	1.656	0.0118	9.078	10.1	0.5365	1.175	2.904	0.1626	0.2659	0.1163	0.0804	0.9947	0
00:00:30	139.9	0.1185	16.58	1.706	0.0120	9.131	10.11	0.562	1.224	2.906	0.1644	0.265	0.1182	0.0811	0.9927	0
00:00:32	141.2	0.1163	16.42	1.663	0.0118	9.088	10.1	0.5411	1.187	2.914	0.1562	0.2686	0.1171	0.0795	0.9938	0
00:00:34	139.6	0.1165	16.25	1.686	0.0118	9.198	10.09	0.5433	1.176	2.894	0.1617	0.2684	0.117	0.0802	0.9931	0
00:00:36	140.7	0.1181	16.61	1.686	0.0119	9.137	10.1	0.5539	1.213	2.907	0.1562	0.2702	0.1172	0.0794	0.9931	0
00:00:38	139.8	0.1172	16.39	1.669	0.0117	9.129	10.12	0.5471	1.195	2.911	0.1578	0.2713	0.1171	0.0794	0.993	0
00:00:40	140.4	0.1166	16.37	1.663	0.0119	9.1	10.09	0.5402	1.174	2.904	0.1593	0.2682	0.1175	0.0796	0.9942	0
00:00:42	140.4	0.1182	16.58	1.715	0.0118	9.083	10.09	0.5558	1.198	2.889	0.1594	0.2682	0.1159	0.0796	0.9925	0
00:00:44	140.1	0.1178	16.49	1.673	0.0120	9.03	10.07	0.5481	1.198	2.903	0.1563	0.2725	0.1178	0.078	0.9931	0
00:00:46	140.8	0.117	16.47	1.674	0.0120	9.071	10.11	0.5469	1.179	2.903	0.1573	0.2691	0.1185	0.0779	0.994	0
00:00:48	139.7	0.1175	16.41	1.664	0.0120	9.213	10.16	0.5501	1.184	2.919	0.1586	0.2711	0.1196	0.0788	0.9938	0
00:00:50	140.9	0.1185	16.69	1.705	0.0117	9.106	10.08	0.5555	1.195	2.891	0.1635	0.2632	0.1137	0.0825	0.9914	0
00:00:52	140.2	0.1168	16.37	1.672	0.0118	9.133	10.11	0.5434	1.184	2.91	0.1604	0.2679	0.1177	0.0797	0.9926	0
00:00:54	140	0.1165	16.3	1.668	0.0119	9.139	10.09	0.5392	1.179	2.907	0.16	0.2688	0.1172	0.0794	0.9936	0

RC ECG

Figure 123. An example RC trend table.

Algorithm Settings

Data Logging Mode

By default, data is logged to the table in 2 second averages. The Data Logging Mode may be changed to a different, user defined setting within the Acquisition Algorithm Settings. The Acquisition Algorithm Settings are accessible from the Study Page Command Bar, under the Study Settings. See Command Bar section for icon.

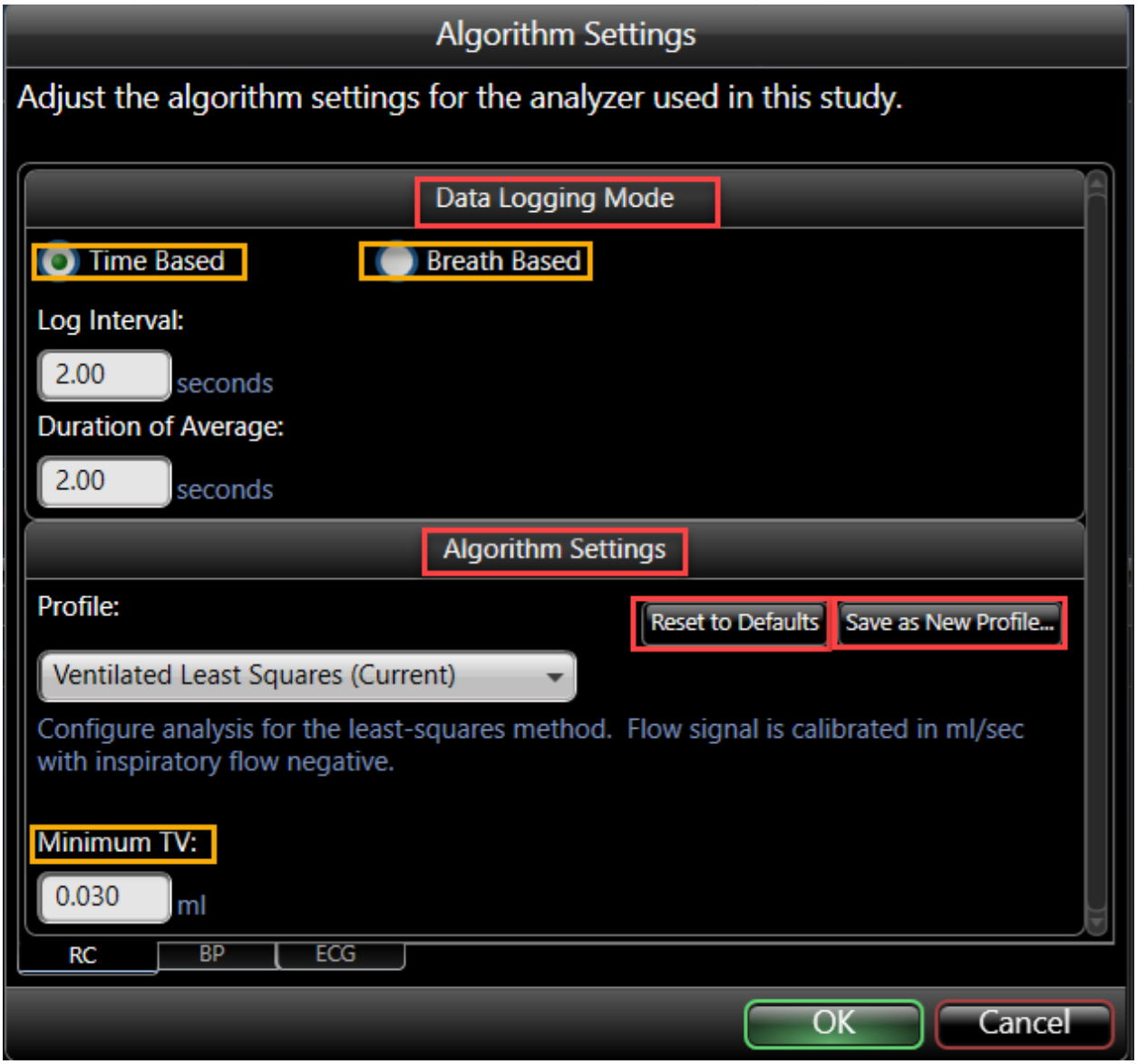


Figure 124. An example Algorithm Settings dialog with default Logging Interval set to 2 Seconds.

Data Logging Mode

You may choose between a time-based or breath-based logging mode. Once the method is chosen, define the new Log Interval and Duration of Average. If you would like an average data point every logged line, ensure the Log Interval and Duration of Average are equal. However, if you would like a moving average, then set the Log Interval to be smaller than the Duration of Average. For example, a 10 second moving average (Duration of Average) logged every 2 seconds (Log Interval).

Algorithm Settings

You will choose the least-square method for analysis as well as the minimum Tidal Volume (TV). You will have the option to save the minimum TV as a new profile or reset to defaults.

Note: If data has already been collected, you must reanalyze the data when a change is made to the Data Logging Mode and Algorithm Settings.

You can select one or more rows from the table and right click on the selected rows to see a context menu.

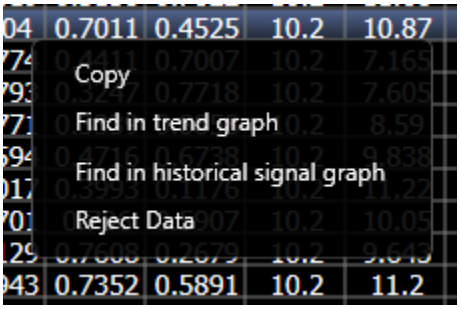


Figure 125. The context menu presented when you right-click on the table.

- **Copy** copies the selected rows to the clipboard. You can paste the copied rows into Excel or Word.
- **Find in trend graph** positions the cursor in the trend graph to that row.
- **Find in historical signal graph** positions the signal cursor to the time at end of that row.
- **Reject Data** rejects that single row from reporting.

Also, if you hover the mouse over a column heading, the tooltip will show you the units of the data in that column.

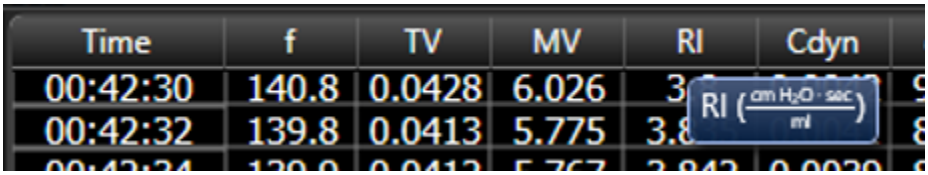


Figure 126. An example unit's tooltip when hovering the mouse over the column header.

Click the column header to sort highest to lowest or lowest to highest. To sort chronologically, click the Time header.

Nebulization Suggestions

The following are suggestions for nebulization parameters. Your final parameters may vary based on the species or strain of the subject and your treatment, but this should get you started.

Mch Concentration (mg/ml): PBS, 3.125, 6.25, 12.5, 25, 50

Nebulize 5-10µL over 30 seconds.

Nebulizer Head

The nebulizer head may be autoclaved and should be cleaned between each use. It consists of a cup, a piezoelectric element, and an aperture plate with holes. When energy is applied, the plate vibrates rapidly, creating a micro-pumping action that generates a fine particle aerosol. It is capable of aerosolizing a broad range of formulations, including solutions, suspensions, small molecules, and macromolecules.

DSI offers two different versions of nebulizer heads, one small and one standard, pictured here.

Replacement part numbers:

- 601-2306-001: 2.5 to 4µm (small) has a smaller particle size and a rate of approximately 100 µL/min.
- 601-2307-001: 4 to 6µm (standard) has a larger particle size and a rate of approximately 300 µL/min.

For precise nebulizer head efficiency rate determination, please refer to “Nebulizer Head Efficiency” section.

Delivering Aerosol for Dose Response Protocol

Dosing

When loading the dose, carefully and slowly inject the solution in the center of the nebulizer head. Do not touch the membrane with the pipette.

The task sequence in the software will remind you to deliver these at the appointed times. Follow the software’s direction.

Between Doses

At the completion of aerosol doses, you may see puffs of aerosol coming out of the nebulizer head. These final puffs usually indicate that aerosolization is complete. There is nothing wrong with this; it is the action of the membrane in the nebulizer head.

Between Subjects

Between subjects, rinse the apparatus with water and dry it thoroughly. Allow the nebulizer to dry on its side. This prevents liquid from sitting on the aperture plate, extending the life of the device.

It is vital to your data that you remove any Mch deposits that may exist.

If you are running several experiments a day, we recommend that you purchase an additional nebulizer head so that you can wash one set while running another subject.

Troubleshooting the Nebulizer Head

If a drop of liquid forms on the bottom of the micro-pump surface (the tiny dome shaped membrane in the center of the aerosol side of the nebulizer head), then it may fail to nebulize. Carefully dry the bottom surface with a paper towel by dabbing it.

If you don’t see any mist, and the unit has been on for at least 1 minute, there may be a problem. Please call DSI Technical Support for further assistance.

Maintenance

As you use your FinePointe™ RC system, some parts will wear out and may need to be replaced. Proper care and maintenance will help ensure consistent results and that your equipment investment will last for years.

Consider replacing/servicing the following components on a scheduled basis:

- Tubing
- Pneumotach Screens
- O-rings
- Nebulizers
- ECG Leads

The frequency of replacement will depend on a variety of factors that may include testing environment, frequency of use, aerosol exposure, and proper care of equipment throughout. Good Laboratory Practices (GLP) and routine equipment maintenance/servicing are recommended. At a minimum, tubing and screens should be replaced annually.

FinePointe™ RC Tool Kit

The FinePointe™ RC Tool Kit provides the necessary tools required for routine maintenance.

Replacement part number: 601-2510-010

The tool kit consists of the following items:

Item	Part Number	Description
Aerosol Cap for Calibration	008016-001	Provided for general purpose use.
Silicone Lubricant	601-2524-052	Use to lubricate chamber and restraint O-rings. **DO NOT** use on pneumotach O-rings, as the lubricant can clog the screens and alter resistance properties.
Pick Tool	007579-001	Use to remove and install O-rings.
Wire Brushes	008842-001, 008843-001, 008844-001, 008845-001	Use to clean the manifold and tubing.
Tweezers	008828-001	Use to handle pneumotach screens during replacement process. **DO NOT** use ungloved fingers to handle new pneumotach screens, as skin oils can clog screens and alter resistance properties.
Syringes (1cc, 10cc)	010073-001 010078-001	Use to push/pull air into the chamber for system testing.
Tub with fittings	n/a	Use to connect calibrator to chamber or aerosol cap for calibration.
Hex Wrenches	00830-001, 008831-001, 008832-001, 008833-001, 008834-001	Use to remove pneumotachograph cover to access screens for replacement.
Scissors	008855-001	Use to cut tubing to correct length, if necessary.

Item	Part Number	Description
Luer Tee	008652-001	
NE-020 Syringe Needle	010079-001	Use during esophageal reference pressure setup process.

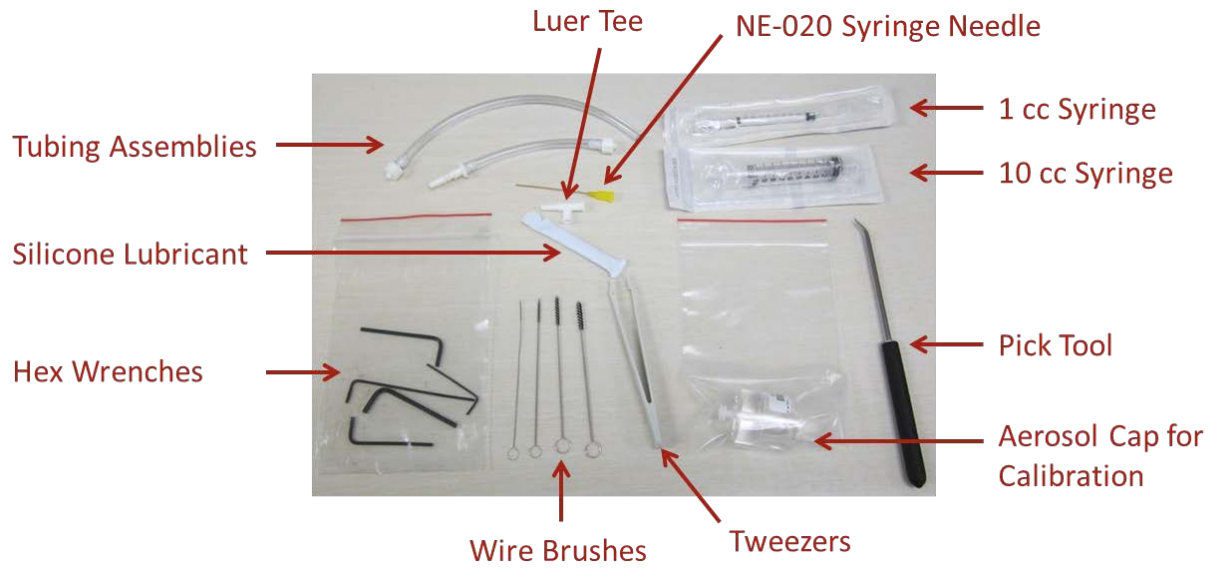


Figure 127. Basic Chamber Accessory Tool Kit with indicators.

RC Mouse Accessory Kit

The RC Mouse Accessory Kit contains several kits considered to be disposable. Each component is outlined below and is also individually available. Contact your DSI Sales Representative for more information.

Replacement part number: 601-2510-043

(Includes all items below)

Kit	Part Number	Quantity
18-gauge blunt tip Trach Tubing	601-2510-035	4
18-gauge beveled tip Trach Tubing	601-2510-013	4
19-gauge blunt tip Trach Tubing	601-2510-036	4
19-gauge beveled tip Trach Tubing	601-2510-014	4
RC Mouse IV kit ***(Tubing and syringe tip)***	601-2510-019	1
RC Mouse Esophageal kit ***(10 mL syringe and esophageal tubing assembly)***	601-2510-002	1
RC Mouse Table Accessory kit ***(Please see RC Mouse Table Accessory Kit below)***	601-2510-007	1

RC Table Maintenance kit ***(Please see*** **O-Rings** ***section below)***	601-2510-009	1

RC Mouse Table Accessory Kit

The RC Mouse Accessory Kit contains several kits considered to be disposable. Each component is outlined below.

Replacement part number: 601-2510-007

(Includes all items below)

Item Description	Part Number	Quantity
Exhaust Tubing	n/a	1
Expiration Tubing	n/a	2
Inspiration Tubing	n/a	2
Aerosol Connect Tubes	010329-001	2
Trachea Needle Junctions	601-1107-001	2
Upchurch and Red Ferrule Fittings	008721-001	3
Tracheal Blocking Tube	010536-001	1

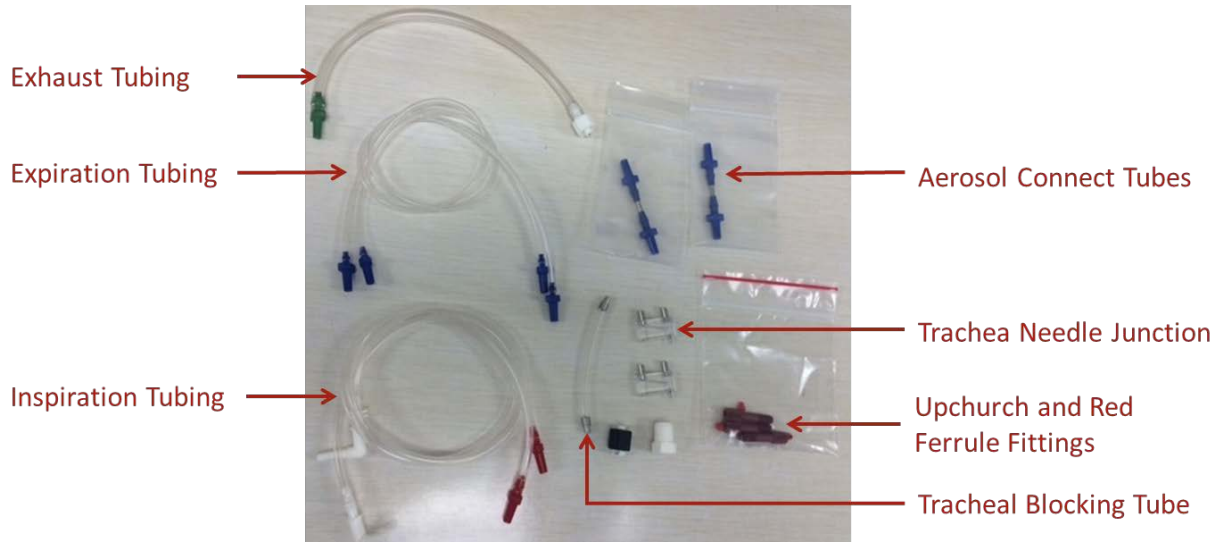


Figure 128. RC Mouse Table Accessory Kit with indicators

Rat/Guinea Pig RC Accessory Kit

The RC Rat/Guinea Pig Accessory Kit contains several kits considered to be disposable. Each component is outlined below and is also individually available. Contact your DSI Sales Representative for more information.

Replacement part number: 601-2510-044

(Includes all items below)

Kit	Part Number	Quantity
12-gauge Trach Tubing	601-2524-035	4
14-gauge Trach Tubing	601-2524-036	4
RC Bardic Feeding Tube ***(Length 15" with 1cm Depth Markings, 8 FR)***	601-1104-001	1
RC Rat/GP IV kit ***(Tubing and syringe tip)***	601-2510-029	1
RC Rat/GP Blood Pressure kit ***(2 x 10 mL syringe, tubing, and syringe tips)***	008099-001	1
RC Rat/GP Spontaneous Breathing kit ***(Short manifold kit)***	007090-001	1
RC Rat/GP Pulmonary Pressure kit ***(1 mL and 10 mL syringes, tubing assemblies, hex wrench, scissors, and silicone stopper)***	008346-001	1
RC Rat/GP Tubing kit ***(See*** **Tubing** ***section below)***	601-2510-026	1
RC Rat/GP Maintenance kit ***(See*** **O-Rings** ***section below)***	601-2510-030	1

Tubing

This section will depict the various tubing that may need to be replaced on your FinePointe™ RC System. Tubing should be free from cracks, moisture, and deposits.

Inspiration, Expiration, and Exhaust Tubing

Inspiration, expiration, and exhaust tubing are used (in part) to complete the respiratory circuit and properly

calibrate the apparatus.

Replacement kit part numbers:

- 601-2510-022 (mouse)
- 601-2510-026 (rat/guinea pig)

Each come with:

- 2 Inspiration Tubes
- 2 Expiration Tubes
- 1 Exhaust Tube

Calibrator Tubing

Calibrator tubing connects the Calibrator to the aerosol block, or any unused Luer connection in the manifold's ventilation line. It is used to properly calibrate the apparatus.

- Replacement part number: **601-2524-061** (Calibrator Tubing)

Tracheal Blocking Tube

Tubing should be free from cracks, moisture, and deposits. Metal tips should fit snug into the manifold.

- Replacement part number: **010536-001**

Pneumotach Screens

This section details the process used to replace pneumotach screens. These fine mesh screens mounted in the plexiglass pneumotachographs on the side of the animal chamber provide the stable resistance elements necessary to accurately monitor the breathing waveform of the animal. The resistance element is part of the transducer/preamplifier circuit that, when calibrated, provides a waveform that the software analyzes during the course of the experiment. When these screens become contaminated due to environmental dust and ordinary usage over an extended period, the resistance provided by the screens will change. As the resistance of the screen changes, the effective range obtained during calibration will change. When the effective range begins to shrink, this is a good indication that the pneumotach screens are dirty and should be replaced.

Replacement part numbers:

- 601-2524-060 (mouse – quantity 20)
- 601-2524-059 (rat/guinea pig – quantity 20)

Screen Replacement

To replace the pneumotach screens:

1. Use a hex wrench to remove the two stainless steel screws (Figure 129) that hold the pneumotachograph cover in place.

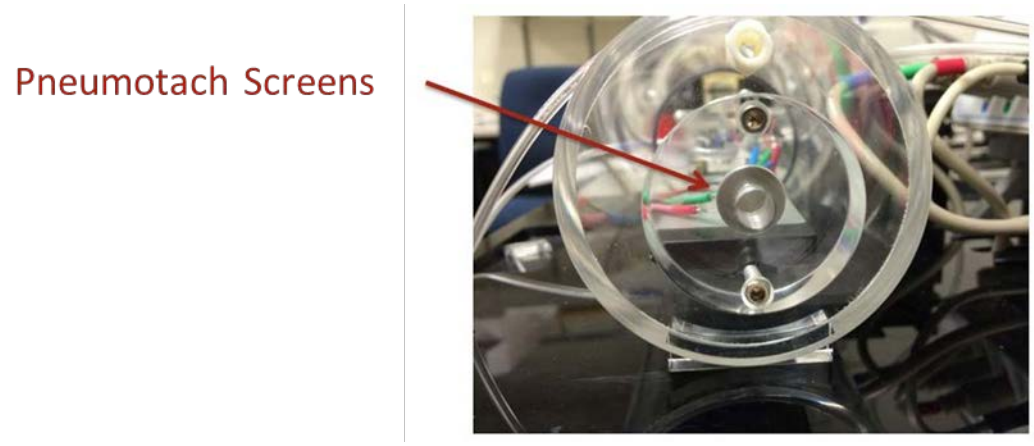


Figure 129. Mouse RC chamber location of Hex screws to be removed for pneumotach screen replacement.

2. Using tweezers, carefully remove pneumotach O-ring and Screens.

IMPORTANT!! Note the number of screens removed as the identical number of new screens will need to be inserted. Under most circumstances, there will be 2 screens associated with the mouse RC chamber and 4 screens associated with the rat/guinea pig RC chamber. However, if DSI has recommended a different number of screens be used, be sure to replace appropriately. Be careful not to crimp or bend the screens.

3. Insert the identical number of new screens.
4. Replace the pneumotach covering and screw it back into place.

O-Rings

O-rings provide a seal between two removable components. O-rings should be free from cracks, debris, and excessive wear.

Replacement O-rings can be found in the following kits:

Maintenance Kit	Kit Part Number	O-ring Location	Quantity	Dash #	DSI Part
Mouse Maintenance Kit	601-2510-009	Chamber	1	146	007148-001
		Manifold	2	006	009454-001
		Pneumotach	1	109	008903-001
		Aerosol Block	5	112	009444-001
Rat/Guinea Pig Maintenance Kit	601-5100-001	Chamber	1	158	007476-001
		Manifold	1	014	009452-001
		Pneumotach	1	210	009434-001
		Transducer	2	008	009459-001
		Aerosol Block	5	112	009444-001
Rat/Guinea Pig Pneumotach Kit	601-2524-023	Pneumotach	10	210	009434-001
Aerosol Block Kit	601-2524-034	Aerosol Block	25	112	009444-001

Replacement silicone grease tubes used to lubricate O-rings: part number 601-2521-052.

Note: Kits contain additional components that are not discussed in this section. Components may differ based on species and the type of chamber used.

The following illustrates the different kit O-rings and their location on the Mouse RC apparatus:

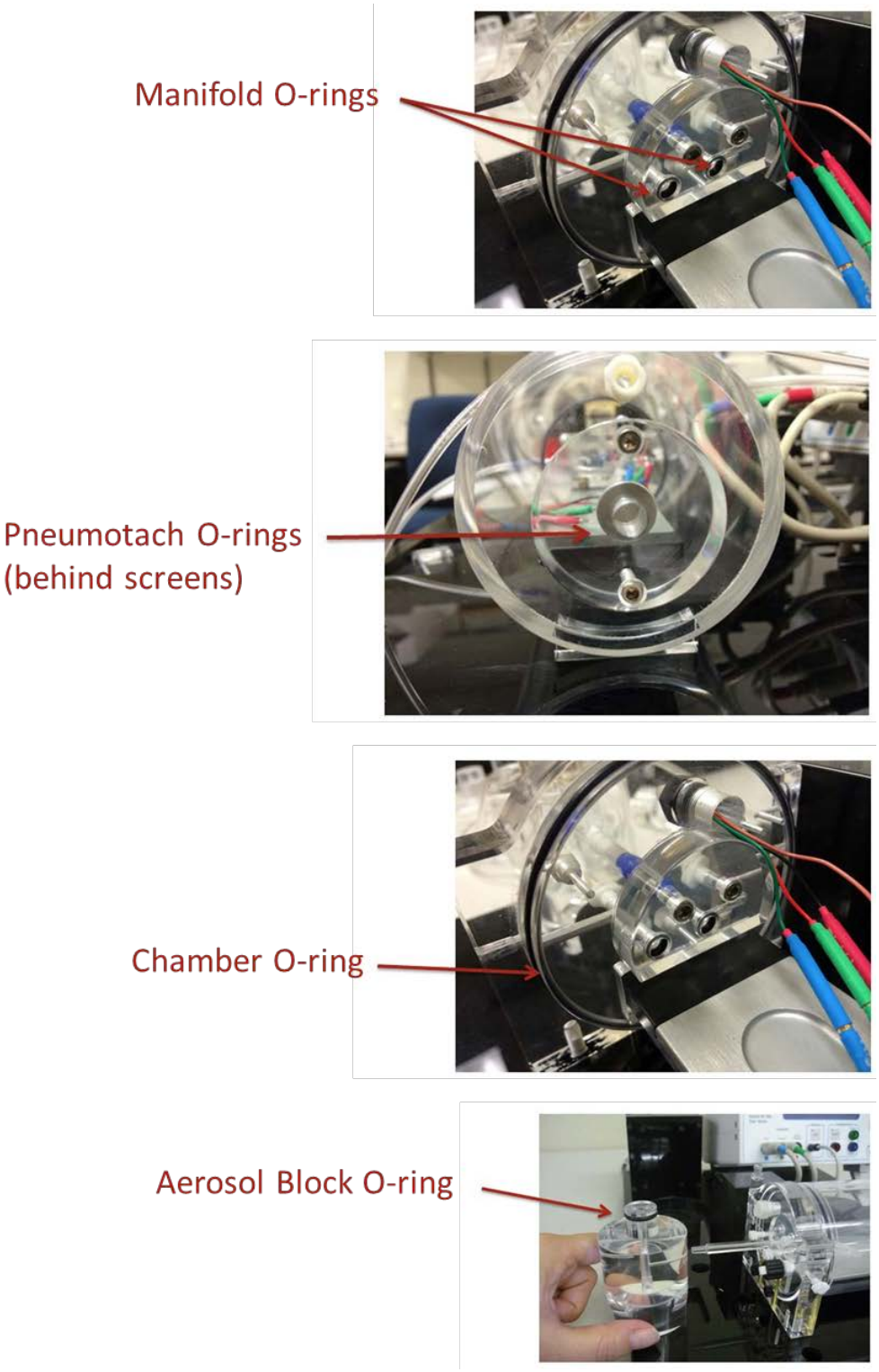
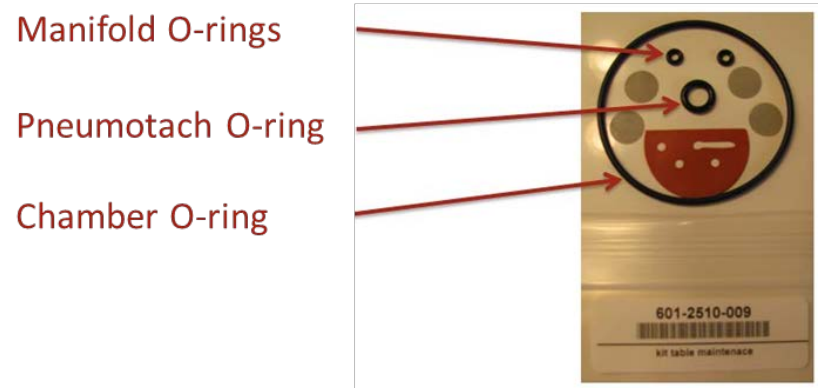
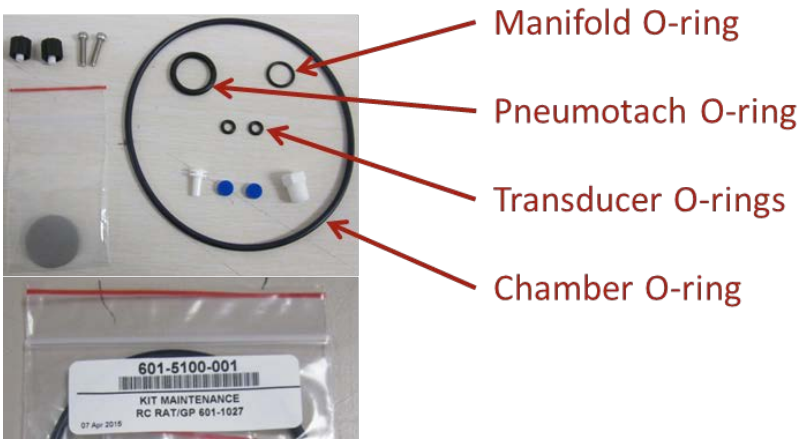


Figure 130. O-ring locations for Mouse RC table with indicators.

Mouse RC Maintenance Kit



Rat/Guinea Pig RC Maintenance Kit

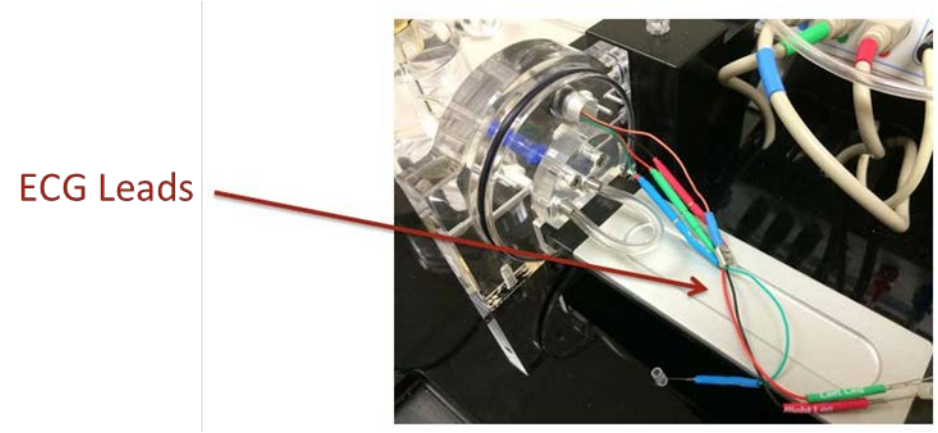


ECG Leads

ECG needles may become dull after repeated use causing irritation or harm to the animal.

Replacement kit part number:

- 601-2510-021 (mouse)
- 601-2510-027 (rat/guinea pig)



Blood Pressure Transducer and Kits

Transducer part numbers:

- 601-2241-001 (mouse)
- 601-2239-001 (rat/guinea pig)

Replacement kit*:

- 008099-001

**Note*: same kit used for mouse, rat, and guinea pig.

IV Accessory Kits

Replacement IV Accessory kit part numbers:

- 601-2510-019 (mouse)
- 601-2510-029 (rat/guinea pig)

Nebulizer Head Efficiency

Aerogen® Aeroneb Heads provide the best means for introducing controlled compound aerosols into the plethysmographs. Over time their ability to produce aerosol degrades. Proper care can extend the life, but eventually the performance will degrade to the point that they need to be replaced.

As the performance degrades, the system needs to correct for this degraded performance by applying more power to get the same aerosol. This is achieved by recalibrating the nebulizer heads for each site. The controller saves the calibration information specific to each site. Therefore, we highly recommend you label each nebulizer with the site number.

Nebulizer Calibration

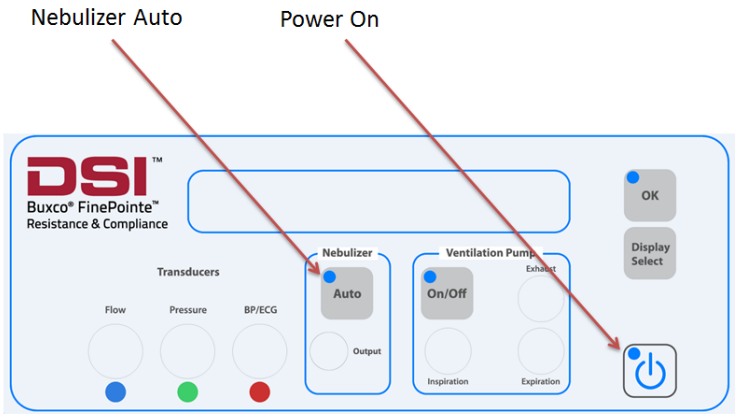
Calibrating nebulizer heads is easy to do.

What you will need:

- A small flask of normal tap water
- 500uL pipette

To begin calibrating:

1. Start by powering on the FinePointe™ RC Controller and connecting the associated chamber to the site. Connect each nebulizer you intend to calibrate to their respective sites and label each with the site number.
2. Select your first nebulizer head and make sure it is dry and free of any liquid inside. Hold it in your hand. You will need to watch the aerosol flow from the bottom of the head during this procedure.
3. You will need to push two buttons on the front panel to bring up the correct menu. Press and hold the Nebulizer **Auto** button, and then press and hold the Power on button, holding them down at the same time. The display will show you a current reading for the neb head efficiency, for example “Neb Flow is 0.152 ml/min To test load 100ul OK”.



4. Load 0.1 ml of liquid, by pipette or syringe, into the nebulizer head. Hold the neb head in your hand. Do not block the bottom.

5. On the controller, press the **OK** button. The display will say “Press OK when empty” and show you a running time value.
6. Watch the liquid nebulize. When all the liquid is gone (when mist stops coming out of the head) press **OK** again. A new, accurate rate will be displayed.
7. Press the **OK** button to accept this rate, or the **Display Select** button to reject this rate and test again.
8. For the gold neb heads, the rate should be close to 0.3 ml/min.
   For the purple neb heads the rate should be close to 0.1 ml/min.

Your nebulizer is now calibrated, and the rate is saved with that site.

For the small neb heads, the rate should be close to 0.3 ml/min.
For the standard neb heads the rate should be close to 0.1 ml/min.

Nebulizer Replacement

Although proper cleaning, drying, and storage will help extend the life of a nebulizer head, over time they will need to be replaced.

Replacement parts:

- 601-2306-001 (2.5 - 4 µm particle size)- Small
- 601-2307-001 (4 – 6 µm particle size) – Standard

Care and Cleaning

Cleaning and Decontamination of the Controller

If you are using aerosol, droplets will be left inside the tubing. We recommend that you clean the unit in between subjects. If you are using aerosol, make sure to nebulize some saline before you clean the controller. If you do not use aerosol, you should clean the controller unit once a month.

Perform the following cleaning procedure:

1. Switch the controller unit to **OFF**.

2. WASH

- Prepare 150ml of solution consisting of an alcohol-free soap mixed with warm, distilled water.
- Connect one end of the larger piece of tubing (from the CNS1029 Tool Kit) to the Exhaust port of the controller and submerge the other end in the soap solution.
- Connect the shorter piece of tubing from the Expiration port to the 60ml syringe.
- Pull the syringe to approximately 50ml, drawing the solution into the syringe. Push to empty the syringe and then repeat the process. Discard the soapy water solution.

3. RINSE

- Prepare another container with 250ml of warm, distilled water.
- Using the same tubing connections as before, pull the syringe until it is full of water. Disconnect the syringe from the tubing and discard the water in it.
- Repeat this process at least two more times or until the water that comes out no longer contains soap. Discard the water.

4. DRY

- Disconnect the syringe and dry it by doing a few fast injections.
- Pull the syringe to its maximum capacity, connect it to the expiration tube, and do a quick injection (some water might come from the end of the other tubing).
- Disconnect the syringe and repeat the previous process at least four times or until no more water comes out from the end of the other tubing.
- You may also use pressurized air to push through the system to dry it.

IMPORTANT: The system MUST be dry before you use it.

Cleaning the Chamber

Clean animal chamber of debris as needed by wiping with a cloth or rinsing with warm water. For a more thorough cleaning, use warm water and a mild dish detergent. It is best to let the chambers thoroughly air dry. Be certain that no water remains in any bias flow ports or tubing. If required, dry with a cloth towel.

- **DO NOT** submerge the chamber as this will affect pneumotach screens.
- **DO NOT USE WINDEX** or window cleaner to clean the plethysmograph. Continued use of Windex will eventually crack the Lucite material.
- **DO NOT** put the chamber in the dishwasher.
- **DO NOT** use alcohol-based cleansers.
- Use the tiny pipe brushes included in the maintenance kit to clean or remove clogs from the manifold tubing.
- Use the hex key included in basic accessory tool kit to disassemble the manifold from the table and clean it with warm soapy water.
- Use compressed air to dry the inner tubing.

Cleaning the Heated Table

Clean heated table of debris as needed.

- Detach the table from the manifold.
- Clean with warm soapy water and dry thoroughly.
- You may submerge this item if necessary.

Cleaning the Aerosol Block and Tubing

If several experiments will be run per day, it is recommended to purchase two aerosol blocks to help ensure a clean, dry block is available for the next run.

After each run, flush and dry your system.

Detach the aerosol block from the plethysmograph and nebulize saline for a few minutes to remove/dilute any methacholine deposits.

Hold the aerosol block under warm tap water until the water has run through all of the interior tubing for a minute. Leave it out to dry. For faster drying you can use compressed air to blow the water out.

Use compressed air to dry out the tubing also.

Cleaning the Nebulizer Head

DO NOT leave the head attached to the distribution reservoir overnight after use

Clean the nebulizing equipment after each use. To clean the nebulizer head, remove it from the plethysmograph or aerosol block and rinse it in warm, soapy water. Let it soak for a few minutes. It can be submerged.

DO NOT use a high-pressure water stream; let it run gently into the device.

DO NOT touch the metal membrane or attempt to brush it, as this may cause damage, but do rinse it from both the top and the bottom

DO NOT clean the head with alcohol. Alcohol will damage the metal membrane. It is best to use soapy water for all general cleaning.

CORRECT DRYING POSITION

To dry, shake off the excess water and wipe gently with a paper towel or Kimwipes®.

Set the head on its **SIDE** in a dry place.

INCORRECT DRYING POSITION

Do **NOT** stand the head up or place it in any inline circuit while not in use.

Trapped humidity may cause the metal membrane to discolor.

If you have a stubborn protein build up on the head, you may try Efferdent. Dissolve a tablet in a glass of water. Then filter the resulting solution with a simple syringe filter. Nebulize it for 10 minutes. Rinse thoroughly and air dry. You may pat gently with paper towels.

If you have been using a pathogen and wish to decontaminate, simply disconnect the head for the power cord, then autoclave it, using the “flash” steam sterilization cycle, 134C for 4 minutes.

Cautions

- To avoid mechanical or electrical damage, do not drop the nebulizer head or the control module.
- Do not use in the presence of devices generating high electromagnetic fields such as magnetic resonance imaging (MRI) equipment.
- Disconnect the nebulizer head from control module before cleaning.
- Do not immerse or autoclave the nebulizer control unit.
- Use only with components specified by Aerogen®.
- Inspect all parts before use, and do not use if any parts are missing, cracked or damaged. In case of missing parts, malfunction, or damage, contact your DSI representative.

  Do not use or store outside of specified environmental conditions.

Troubleshooting

Troubleshooting the System

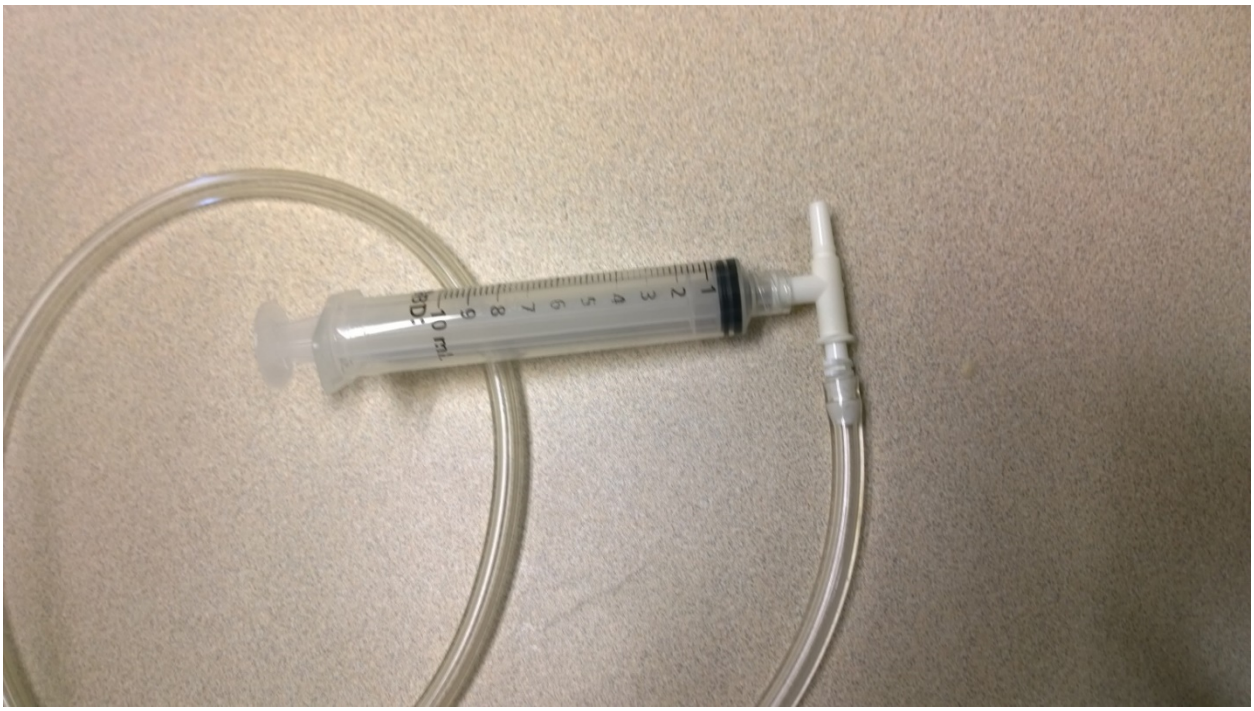
Check for Leaks - If the pressure signal does not rise substantially when you perform hyperinflation, you probably have a leak. The first place to check for leaks is the surgery site at the trachea. Make sure you have a snug suture around the trach tube and that the tip of the tube is inserted cleanly into the trachea. If you are sure the connection is airtight and you still have a leak, start checking the connections in the chamber. Is the trach tube firmly attached to the trachea needle junction and inserted snugly into the manifold?

Tracheal Pressure Drops - If the tracheal pressure signal goes negative while using a ventilator, increase the minute volume. You can accomplish this by either increasing the tidal volume or by increasing the rate. We recommend increasing the tidal volume.

Using the Calibrator to Find Leaks

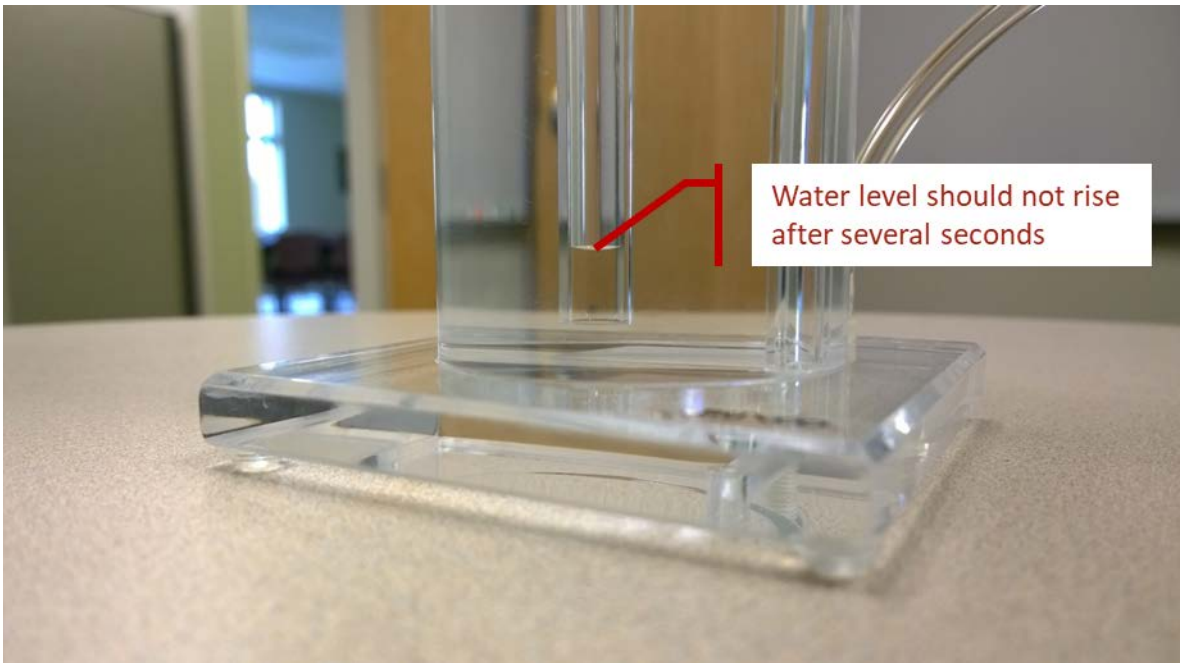
Disconnect the calibrator all other fittings and get a 10 ml syringe and a small luer T fitting like the one pictured. A stopcock can also be used.

Connect the tube with the male luer end of the calibrator and the syringe to the luer T as shown in the next picture:



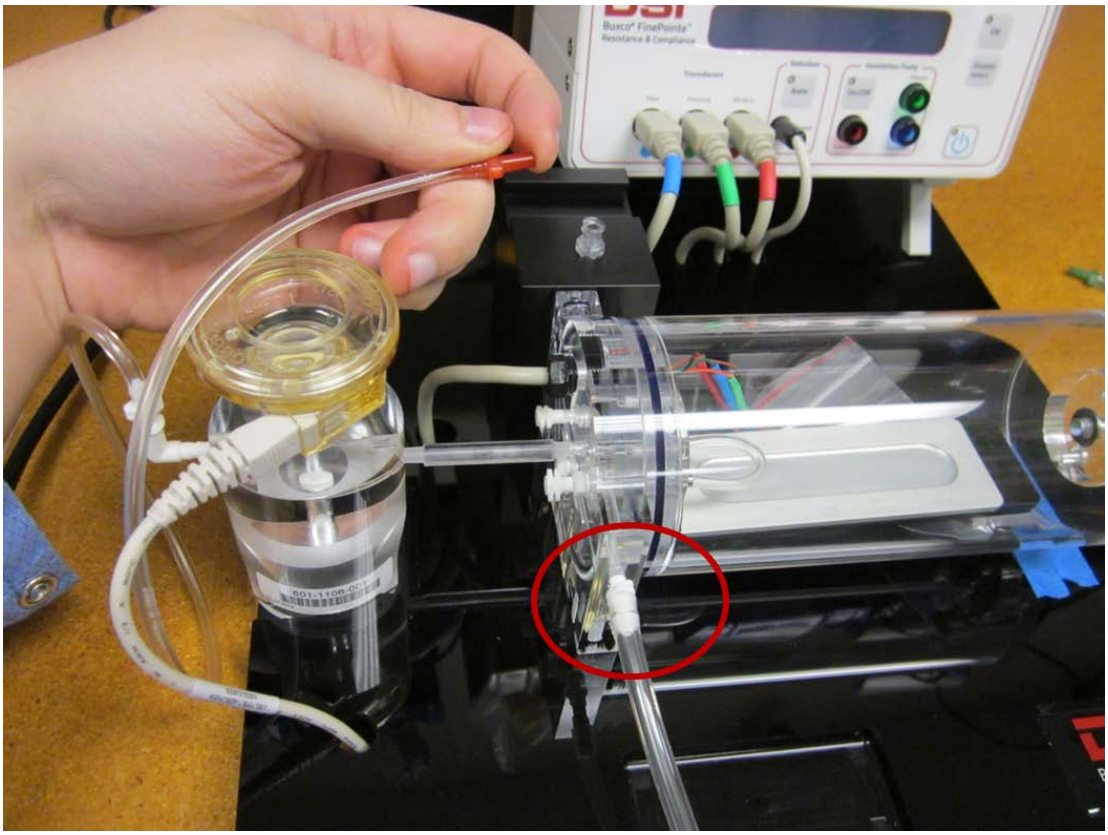
The first step is to confirm that the calibrator has no leaks. To do this, draw the syringe plunger back, then place your finger over the open end of the T, and slowly push the plunger all the way in.

Air will be forced down the inner column of the calibrator to the bottom and some will bubble up inside the calibrator. Hold it for several seconds. If the air remains near the bottom of the column and stops creeping up (it may creep up for several seconds as water inside the column continues to run down the sides of the inner column), then the calibrator has no leaks, and you can continue. If you find the calibrator has leaks, you may need to replace the calibrator if you are unable to fix the leak.



Next continue looking for leaks in the respiratory circuit by removing a tubing connection, inserting the open end of the T, pushing a full syringe of air into the calibrator, then watching to see if the water level in the inner column rises. If it does not rise, then there is no leak in that part of the circuit.

The following picture illustrates an example location to insert the open end of the luer. You can keep moving the open luer end to different ports in the respiratory circuit until you can localize the leak.



You can test if the leak is inside the unit by turning off the power to the controller and using the calibrator to see if there is a leak when the calibrator is applying pressure into the inspiration port. Also, with the power off, you should plug up the exhaust port with a luer plug and then use the calibrator to determine if the expiration port holds pressure.

Troubleshooting the Nebulizer Head

If a drop of liquid forms on the bottom of the micro-pump surface (the tiny dome shaped membrane in the center of the aerosol side of the nebulizer head), then it may fail to nebulize. Carefully dry the bottom surface with a paper towel by dabbing it.

If you don't see any mist, and the unit has been on for at least 1 minute, there may be a problem. Please call DSI Technical Support for further assistance.

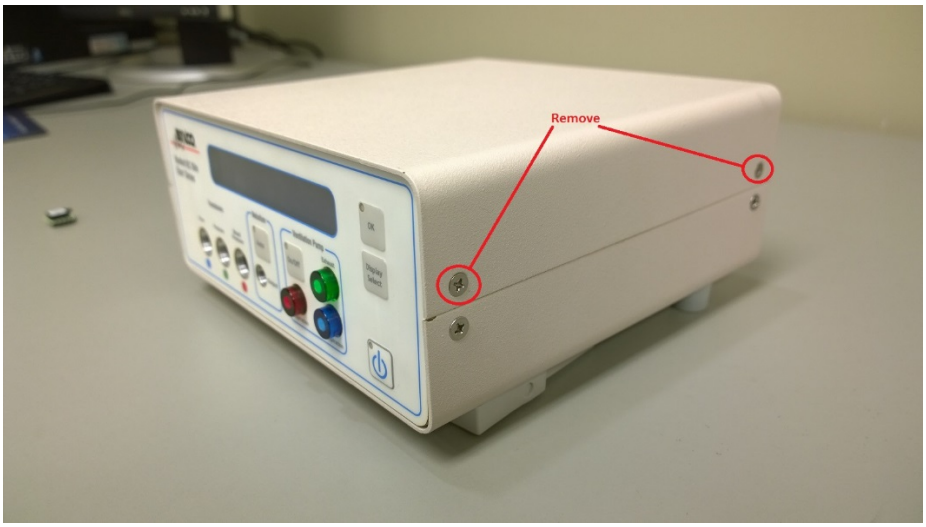
Replacing Internal Transducers

As you use your FinePointe™ RC controller, some parts will wear out and may need to be replaced. Internally there are 2 transducers which sometimes need to be replaced. Contact your service representative to obtain the replacement transducer and use the following instructions to replace it.

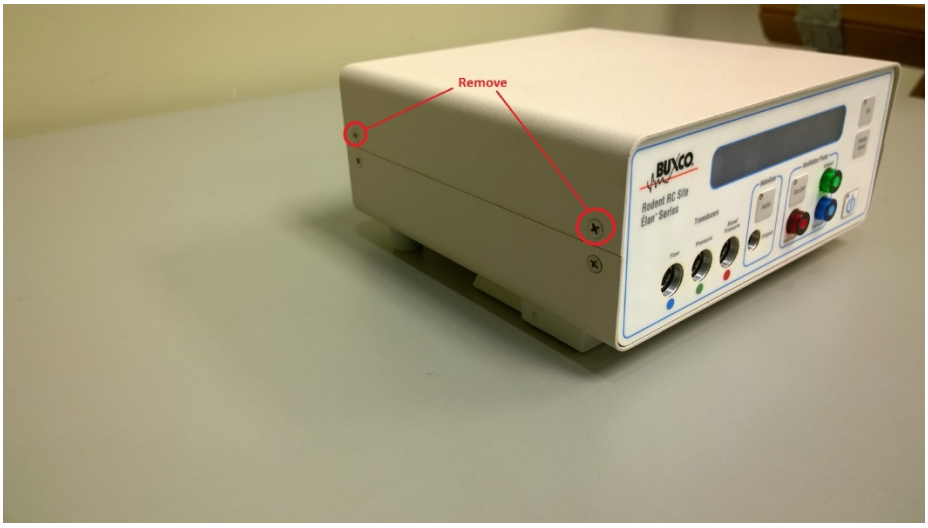
Both transducers are located next to each other, and they are different sensitivities, so you need to make sure you replace the right one (or you obtain the correct transducer for the one which has failed).

1. Unplug the RC system from the AC power connection. (Unplug it from the wall)
2. Disconnect all tubing and other items from the RC unit chassis.
3. Remove the RC unit chassis from the table. Place it in an area where you have a little room to work.

4. Fold the front feet so the unit sits flat on the table.
5. Remove the top two screws on the right side with a small Philips head screwdriver.

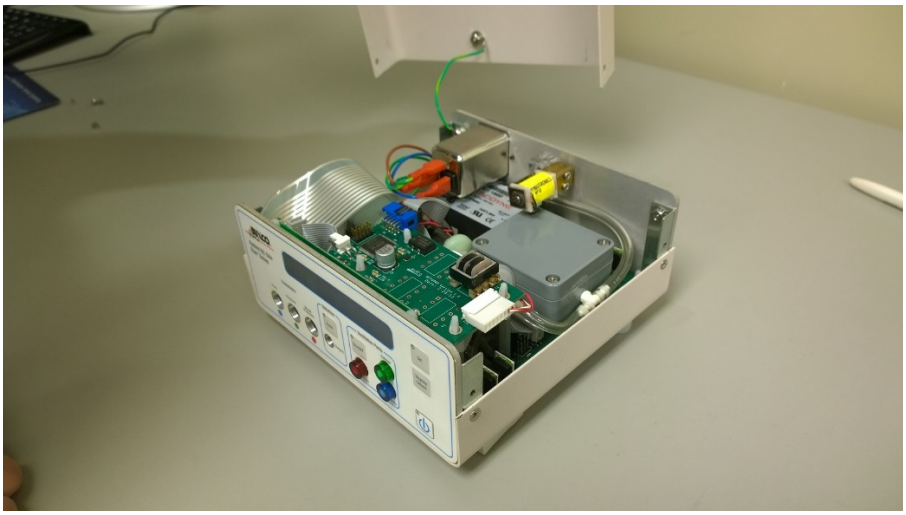


6. Remove the top two screws on the left side with a small Philips head screwdriver.

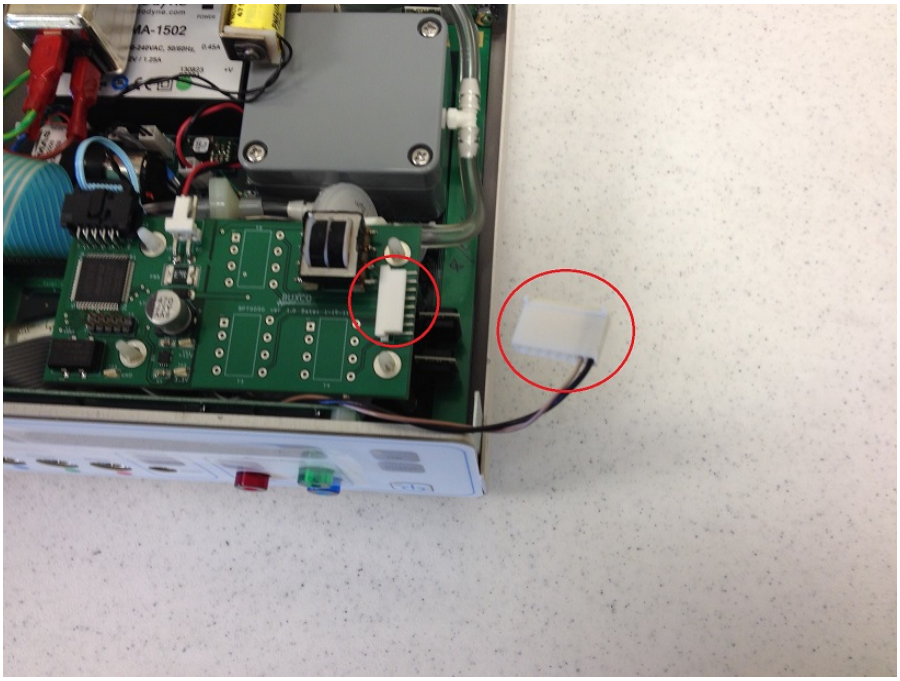


7. **IMPORTANT!!** Be careful when removing the cover. There is a ground wire attached that can break if pulled too hard. When removing, set the cover right behind the chassis.

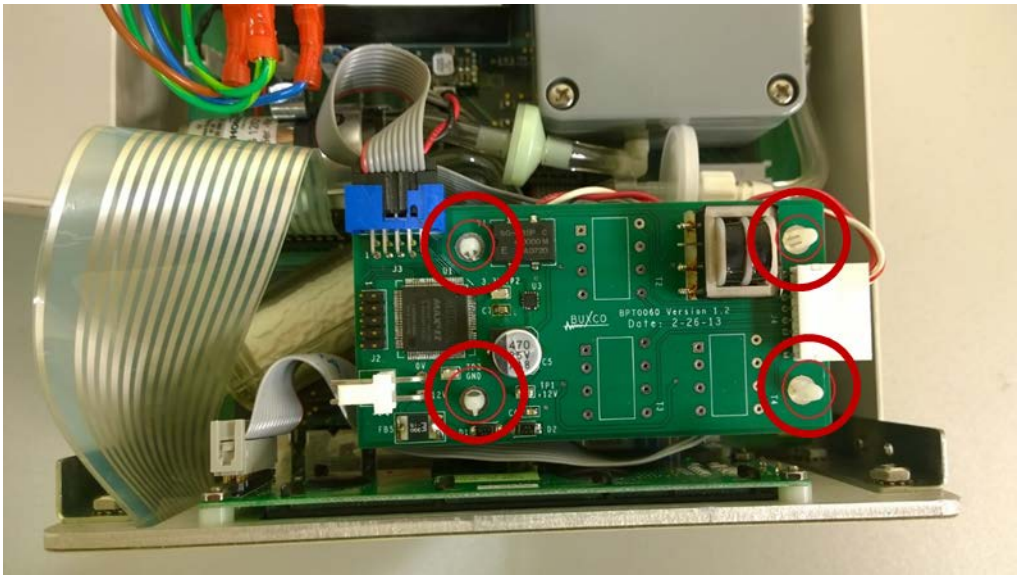
8. Gently remove the chassis cover and set it behind the RC chassis.



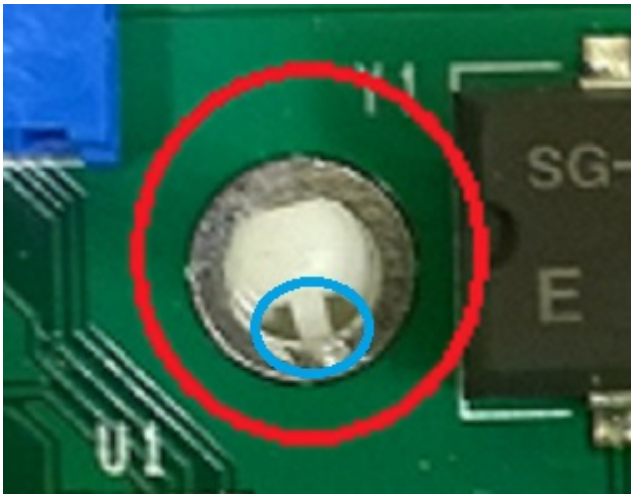
9. Remove the connector from the right side of the small board near the front of the RC unit chassis.



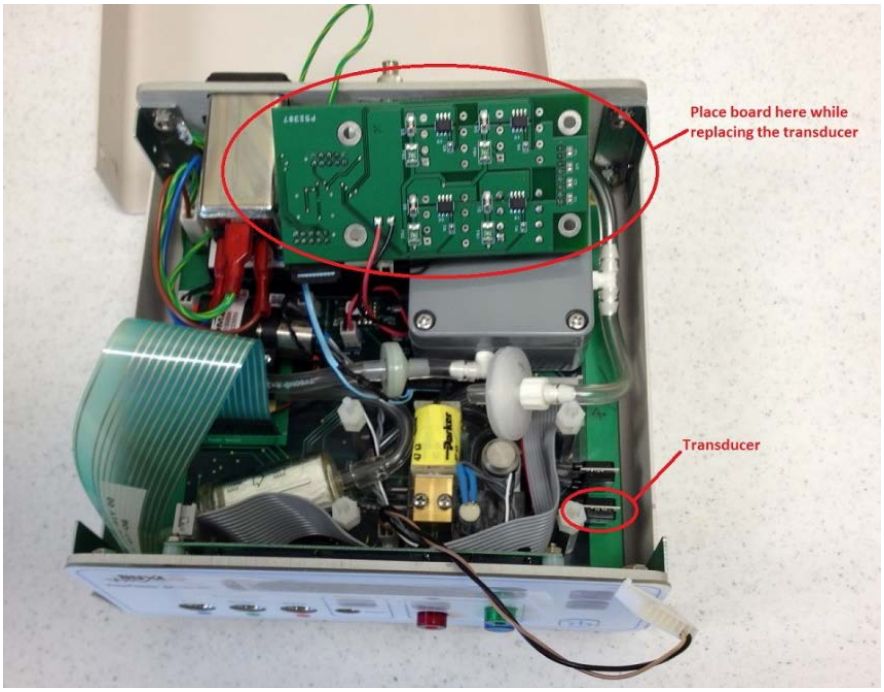
10. Locate the 4 plastic tabs sticking through the bottom of the small board. These tabs are locked to the board.



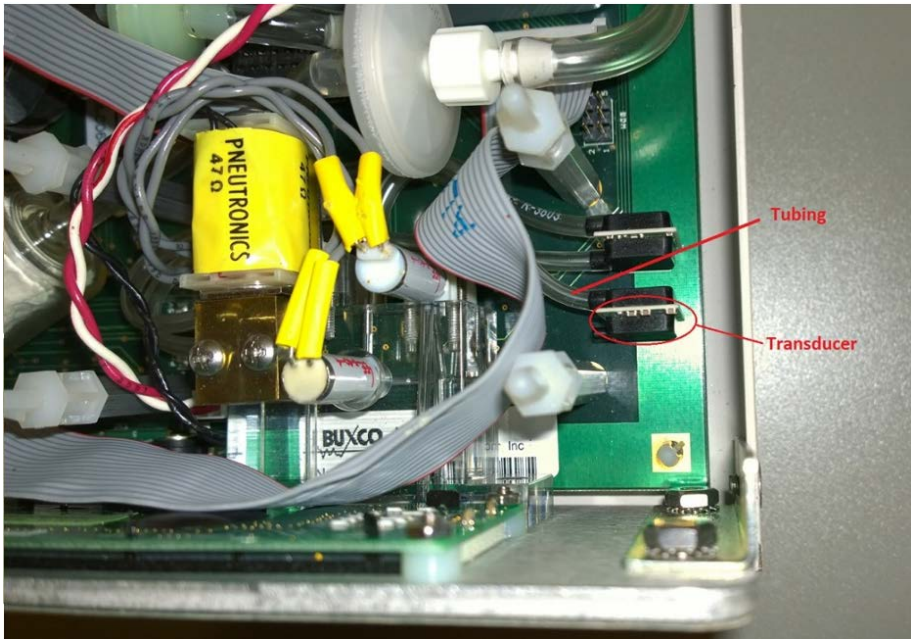
11. All four tabs will need to be unlocked, and the board will need to be removed from the tabs by gently pulling up on the board with your fingers. You can use your fingers to unlock the tabs if your hands are small. Or can you use a small set of needle nose pliers. **Be careful not to damage other components on the board when using pliers**!
12. To unlock each tab, squeeze in the smaller tab indicated with the blue circle in the picture below. As you loosen each plastic tab, pull up on the board a little so the smaller locking tab stays in place.



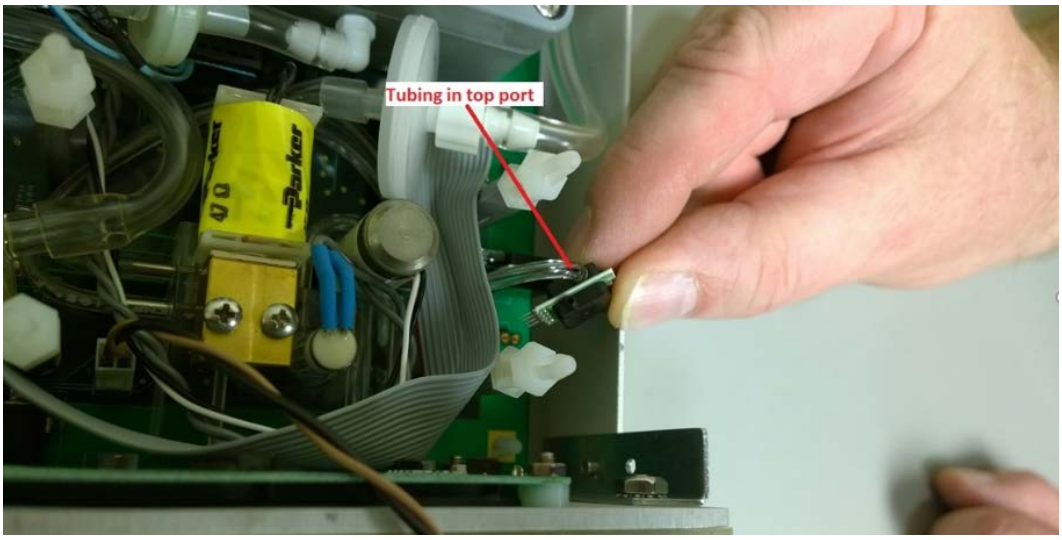
13. Work your way around the board and unlock all tabs. Then gently remove the board and set it in the position indicated in the picture below. **Be careful not to pull any of the wires loose from the board!** Also note the position of the transducer you will be replacing.



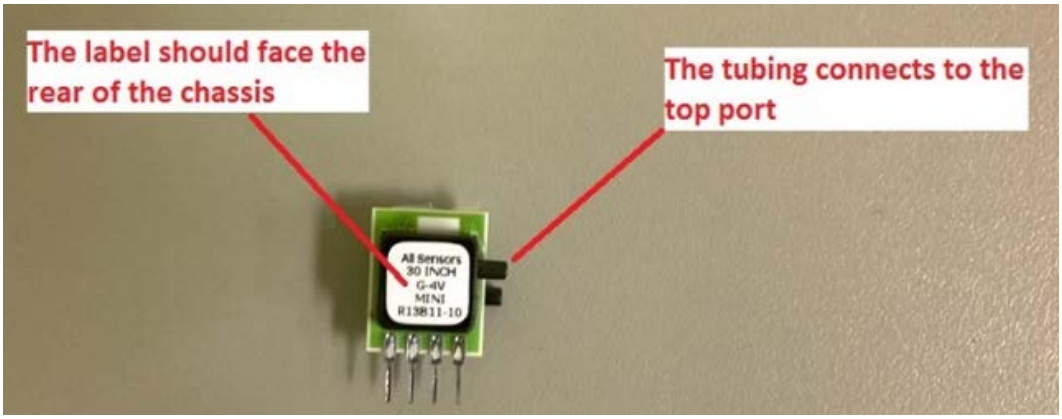
14. Note the position of the tubing that connects to the transducer. It connects to the top port on the transducer. This transducer does not need tubing connected to the bottom port.



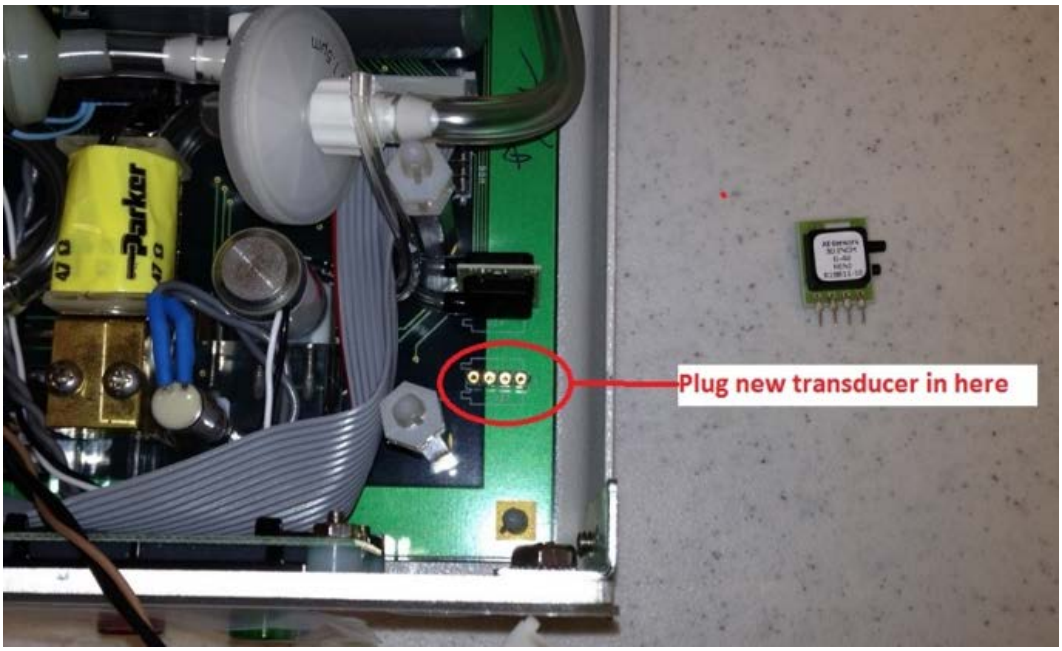
15. Gently pull up on the transducer with your fingers. It is easy to remove. You should not have to pull hard. Remove the tubing from the top port. Set it aside and be careful not to mix it up with the new transducer.



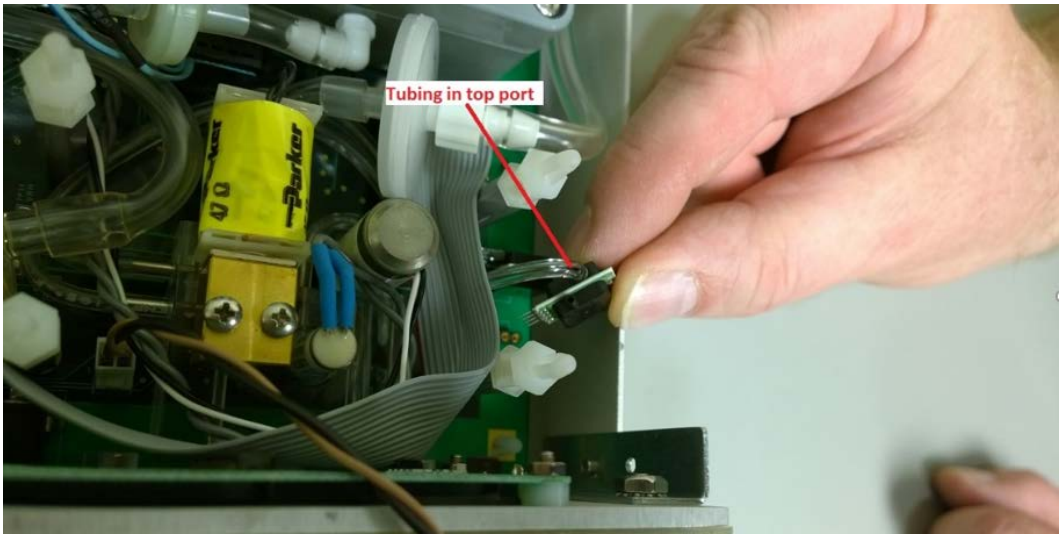
16. Note the position of the label and the top port on the new transducer. When installing, the tubing will connect to the top port and the label should face the back of the RC unit chassis.



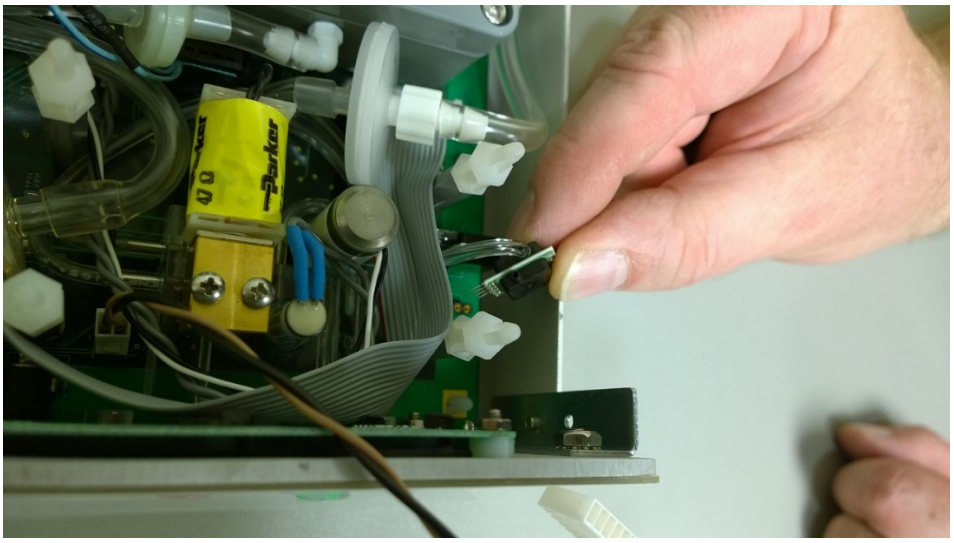
17. Next, note the position of the holes that you will plug the transducer into. **In the following steps, be very careful when plugging the transducer in. The pins on the bottom of the transducer bend very easily!**



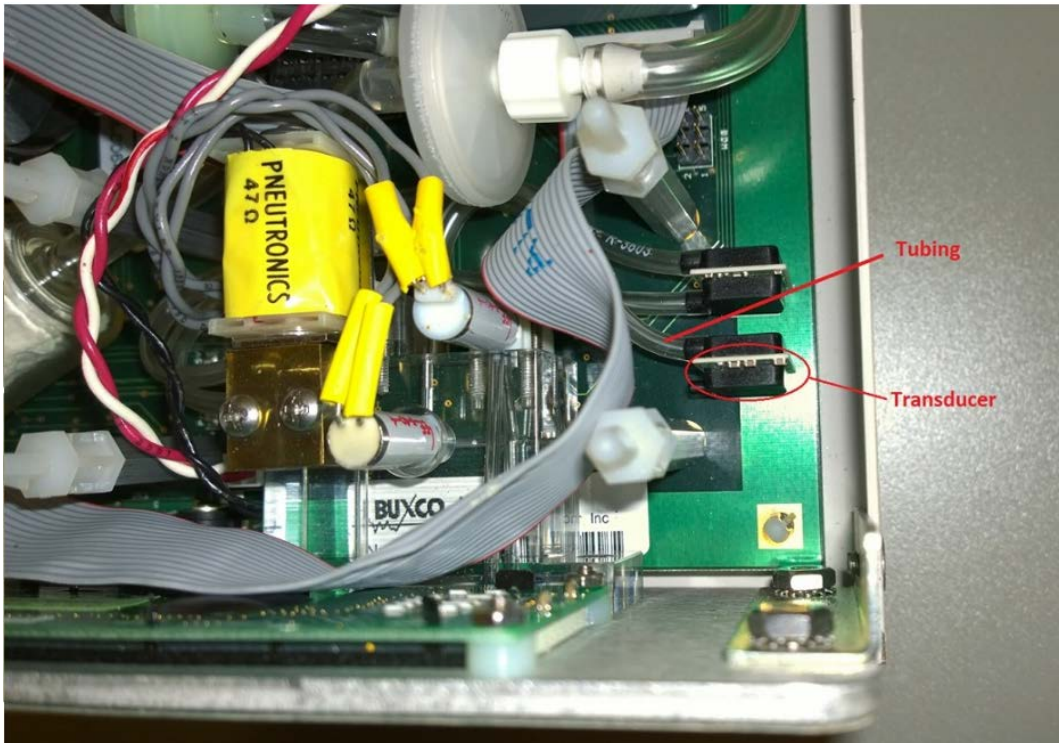
18. Orient the transducer with the pins down and the label facing the back of the RC unit chassis. Connect the tubing to the top port.



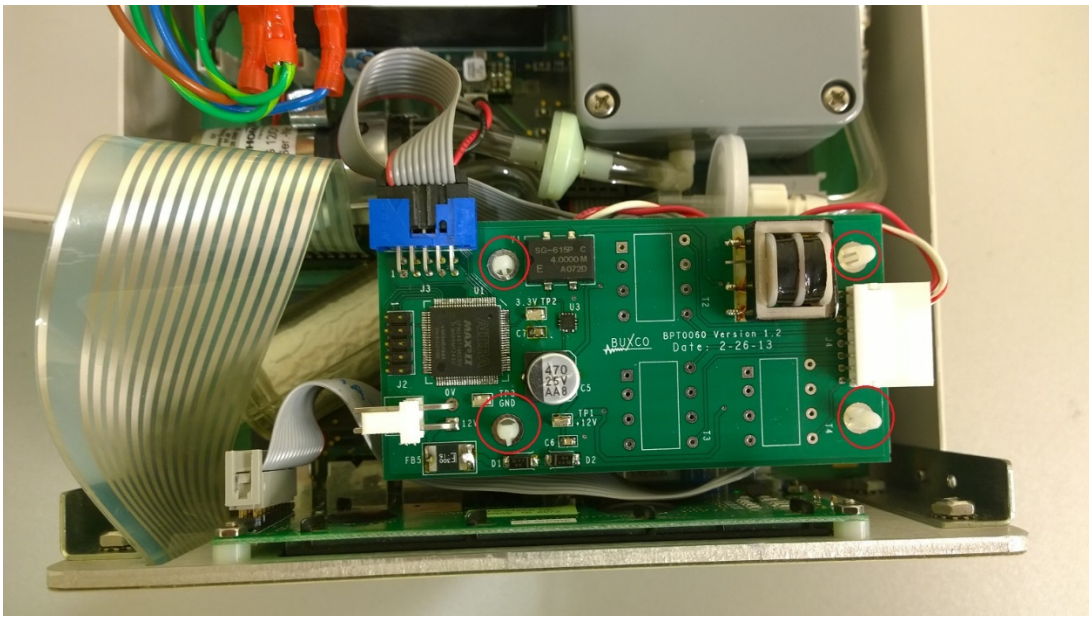
19. Gentle plug the new transducer in the board.



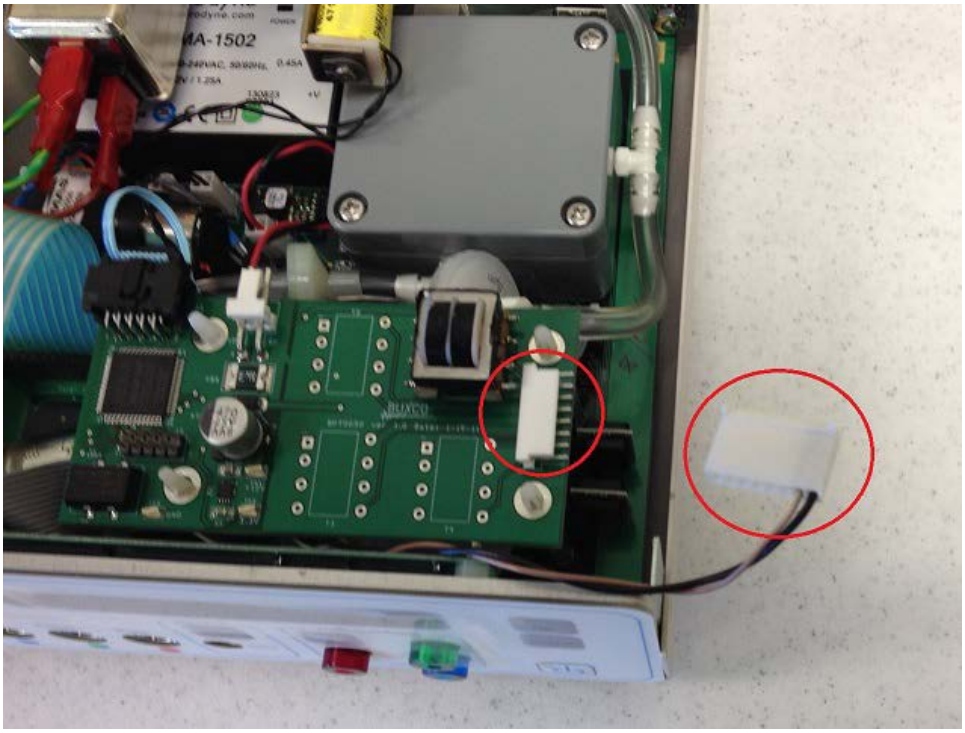
20. It should look like this when completed.



21. Reposition the small board over the 4 plastic pins. Gently push down a little on each corner of the board until it slides down the pins and locks into position.



22. Reconnect the plug on the right side of the small board.



23. Replace the chassis cover and the four small screws.
24. Reconnect to the RC table.
25. Reconnect the AC power.
26. Test the unit by calibrating. Contact DSI if the unit fails to calibrate.

Appendix

Additional RC Setup Configurations

Mouse

For Ventilated Animals using an Esophageal Reference Pressure

If you choose to measure pressure referencing esophageal pressure, then the resistance calculation will not include the chest wall resistance.

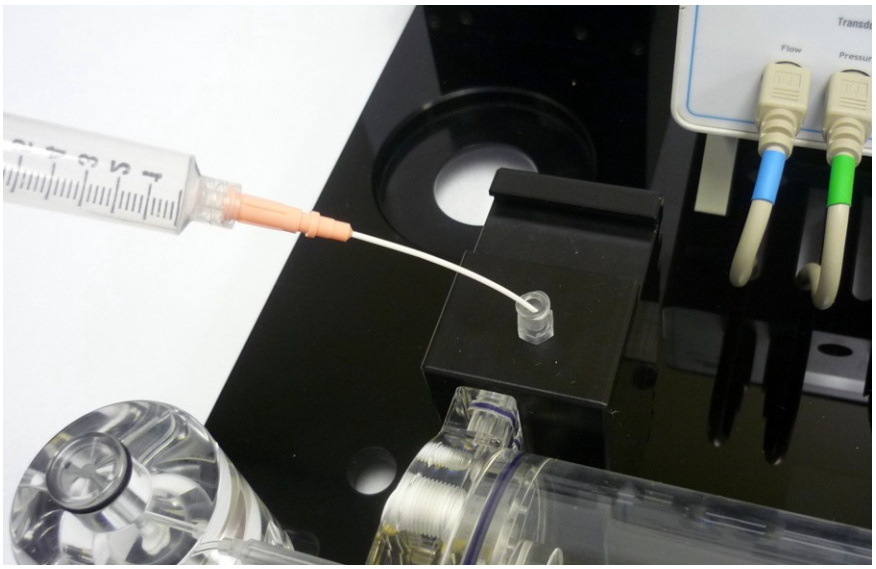
The following items are needed to prepare the Esophageal Pressure.

- 20 mL of water
- 5 mL of ethanol
- One empty container (small beaker)
- One 60 mL syringe with a luer lock cap
- One 10 mL syringe.

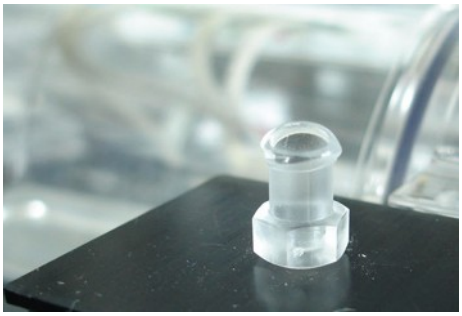
  Note: The 10 mL syringe from the accessory bag may be used for this. Remove the stopcock and replace it with the 010079-001 tip - pictured below (found in bag 601-2510-010) for filling the port.

To prepare the mouse RC apparatus for esophageal pressure:

1. Fill the Pressure Transducer Port P2.
   a. Add 5 mL of ethanol to the 20 mL of water.
   b. You must use water that has the least amount of air bubbles or dissolved gas to fill P2 and to fill the esophageal tube. Even the smallest air bubble in the system could adversely affect your data.
   c. Attach the syringe tip to the end of the 60 mL syringe.
   d. Insert the tip into port P2 of the transducer. Stop inserting when you feel the transducer inside. Do not insert any further or you may damage the transducer.



e. Slowly inject the ethanol water into the port. Gently remove the tip of the syringe when the port is full. Tap the transducer to remove any more air bubbles. If you see any bubbles in the port, keep tapping until they are gone.

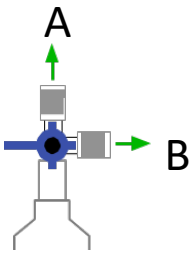


f. Leave a meniscus of water on top of the port when you are done filling. If you need to, use the tip of the syringe to top off the water in the port. Your goal here is to avoid getting any air bubbles in the system.

g. Empty the remaining degassed water from the large syringe into a container, slowly.

2. Attach the 10 mL syringe to the P2 Port.

   a. Fill the 10 mL syringe with the degassed water and put a stopcock (found in bag 601-2510-010) onto the end of the syringe, positioned as pictured.



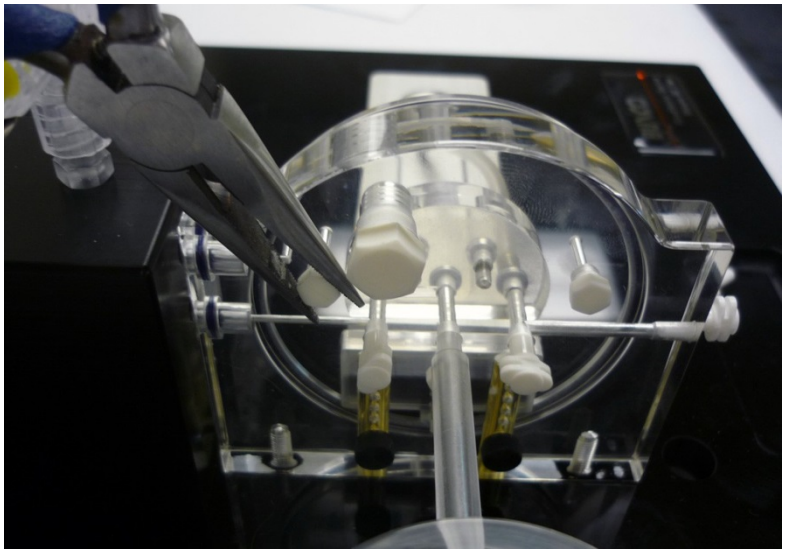
b. Hold one finger over end (A) of the stopcock. Push the water through the stopcock until it has flooded the stopcock. A meniscus should appear on the stopcock at (B). If not, push a little more water through until there is. Tip (B) towards port P2. Your goal here is to avoid getting any air bubbles in the system.

c. Press the menisci together without any air entering the system. Remove your finger. Press the stopcock down onto port P2 and turn the luer lock on (B) to screw them together.

3. Connect the Esophageal Tubing.

a. The esophageal tubing/syringe assembly is found in bag 601-2510-002 (the syringe was used to fill P2 with water).

b. On the faceplate of the manifold, remove the upper left white fitting.



c. Attach the esophageal assembly (Figure 131) to the end of the syringe.

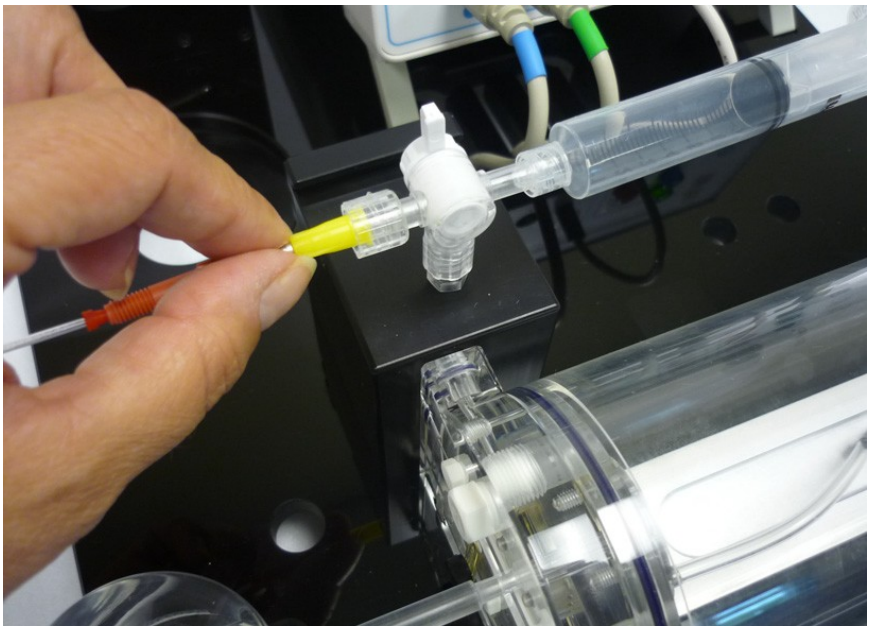
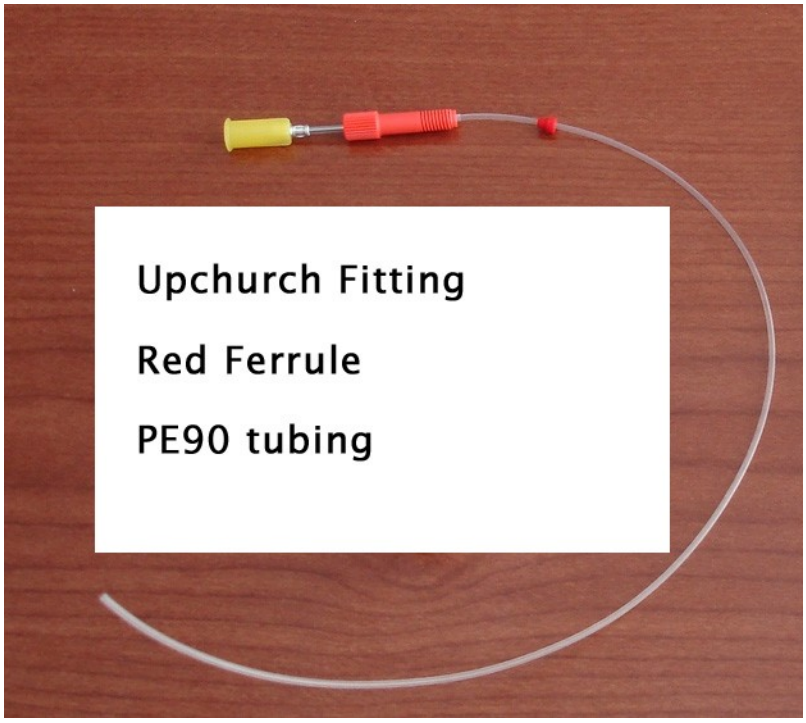


Figure 131. Syringe attachment to the esophageal assembly

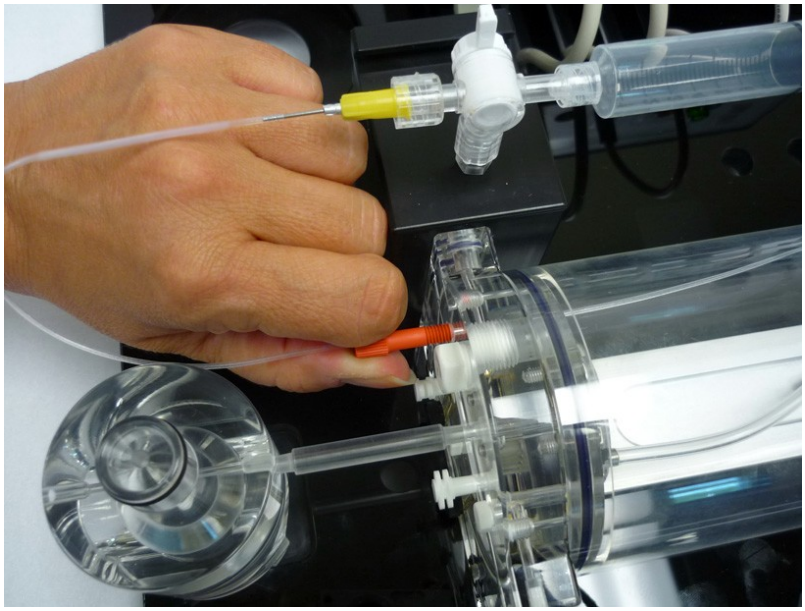
d.

e. Slide the red Upchurch fitting and the red ferrule and the sleeve of extra tubing all the way down to the faceplate of the plethysmograph.

f. Thread the tubing through the hole, ensuring that the red ferrule fitting and Upchurch fitting are over the sleeve. The sleeve creates a good seal between the Upchurch fitting and the PE90 tubing.



g. Screw the red Upchurch fitting into the faceplate.



4. Use the syringe to push water through the esophageal line until it reaches the end of the tube inside the chamber.

5. The open end of the esophageal line gets inserted into the animal. **Make sure this line is flushed every time it is used.** See also

6. **Inserting an Esophageal** Tube section.

For Spontaneously Breathing Animals

Follow the same instructions as above to prepare the esophageal pressure.

Rat/Guinea Pig

For Ventilated Animals using an Esophageal Reference Pressure

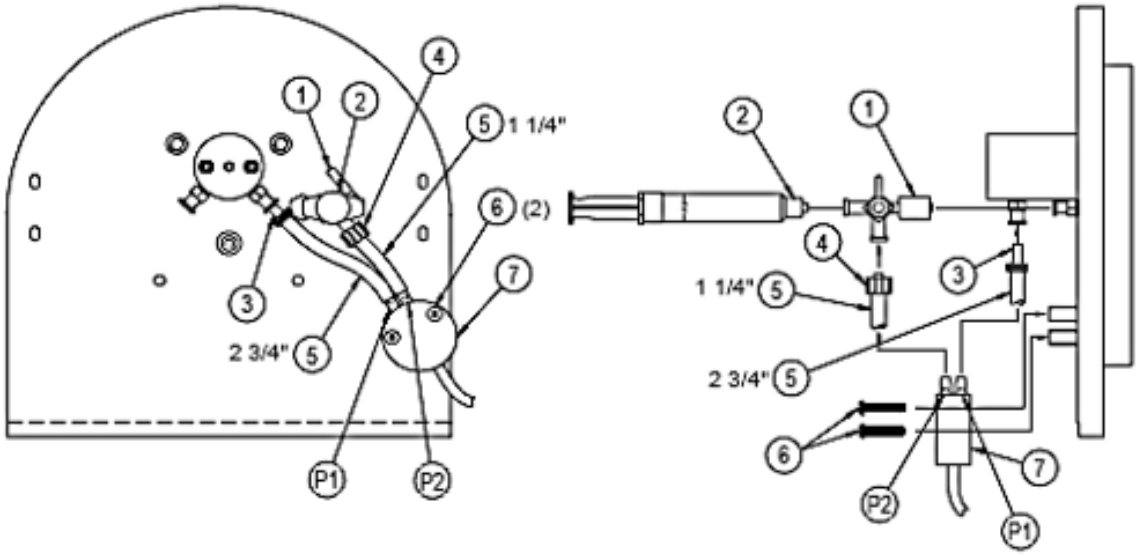
If you choose to measure pressure referencing esophageal pressure, then the resistance calculation will not include the chest wall resistance.

The following items are needed to prepare the Esophageal Pressure.

- 20 mL of water
- 5 mL of ethanol
- One empty container (small beaker)
- One 60 mL syringe with a Luer lock cap
- One 10 mL syringe.

  Note: The 10 mL syringe from the accessory bag may be used for this. Remove the stopcock and replace it with the 010079-001 tip - pictured below (found in bag 601-2510-010) for filling the port.

The following diagram shows what your pressure transducer should look like when it is completely set up using the Rat/GP Pulmonary Pressure kit (DSI part number 008346-001).



Item #	Part #	Qty.	Description
1	010203-001	1	4-way stopcock
2	010078-001	1	10 mL Syringe
3	601-2524-039	1	FTLL230-1 fitting
4	601-2524-044	1	Male Swivel Luer
5	601-2524-061	4”	Tubing, ¼” x 1/8” ID
6	905563-001	2	Screw, 6-32 x ¾”
7*	601-2229-001	1	Pressure Transducer

* Item 7 is a separate part, not included in kit 008346-001.

To prepare the rat/GP RC apparatus for esophageal pressure:

1. Fill the Pressure Transducer Port P2

    a. Add 5 mL of ethanol to the 20 mL of water.

    b. You must use water that has the least amount of air bubbles or dissolved gas to fill P2 and to fill the esophageal tube. Even the smallest air bubble in the system could adversely affect your data.

    c. Attach the syringe tip to the end of the 60 mL syringe.

    d. Insert the tip into port P2 of the transducer. Stop inserting when you feel the transducer inside. Do not insert any further or you may damage the transducer.

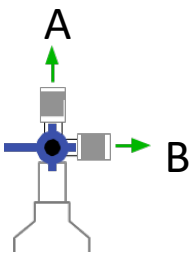
    e. Leave a meniscus of water on top of the port when you are done filling. If you need to, use the tip of the syringe to top off the water in the port. Your goal here is to avoid getting any air bubbles in the system.

    f. Empty the remaining degassed water from the large syringe into a container, slowly.

2. Attach the 10 mL syringe to the P2 Port.

    a. Fill the 10 mL syringe with the degassed water and put a stopcock (found in bag 008346-001)

onto the end of the syringe, positioned as pictured.



b. Hold one finger over end (A) of the stopcock. Push the water through the stopcock until it has flooded the stopcock. A meniscus should appear on the stopcock at (B). If not, push a little more water through until there is. Tip (B) towards port P2. The goal here is to avoid getting any air bubbles in the system.

c. Press the menisci together without any air entering the system. Remove your finger. Press the stopcock down onto port P2 and turn the luer lock on (B) to screw them together.

3. Connect the Esophageal Tubing.

   a. The esophageal tubing is found in bag

   b. On the inside of the faceplate of the plethysmograph, attach the open end of the esophageal tube to the exposed input to the luer fitting. The tubing simply fits over the plastic luer fitting. The fit will be snug.

4. Use the syringe to push water through the esophageal tubing until it reaches the end of the tube inside the chamber.

NOTE: Make sure this line is flushed every time it is used. See also the

Inserting an Esophageal Tube section.

For Spontaneously Breathing Animals

This method measures the trans-pulmonary pressure changes that occur by monitoring the pressure in the animal's esophagus. A fluid filled PE90 (I.D. 0.86mm, O.D. 1.27mm) length of tubing that is attached at a 3-way stopcock mounted on the P2 port of the pressure transducer, is fed through the faceplate, and then inserted into the animal's esophagus.

Install the short manifold. Make sure you have the correct manifold on the faceplate. The spontaneous breathing manifold is much shorter than the ventilated animal manifold, designed to eliminate any unnecessary dead space. If the larger ventilated manifold is attached, remove it using the appropriate Allen wrench and replace it with the smaller spontaneous breathing manifold. Also, your pressure transducer should be mounted securely on the box, with the P1 and P2 labels facing towards the box.

Follow the same instructions as above to prepare the esophageal pressure.

Derived Parameters

Parameter	Term	Units	Description	RC Vent	RC Static	RC Pneumo
F	Frequency	BPM	The instantaneous, breath-by-breath rate of breathing	X	X	X
TV	Tidal Volume	mL	The inspired volume of air per breath. The integral of the negative section of the flow curve	X	X	X
MV	Minute Volume	mL/min	The product of the tidal volume and the respiratory rate, calculated on a breath-by-breath basis	X	X	X
RI	Lung Resistance	cmH_2O*secs/mL	The Resistance to air moving in and out of the lung	X	X	X
Cdyn	Dynamic Compliance	mL/cm H_2O	The dynamic compliance of the lung	X	X	X
Cstatic	Static Compliance	mL/cm H_2O	The static compliance of the lung		X	
dPpl	Δ in Pleural Pressure	cm H_2O	The maximum pressure deflection from the start of the breath during inspiration	X		X
dPmax	dPmax	cm H_2O	The maximum pressure deflection over one breath	X		X
EEW	End Expiratory Work	cm H_2O*mL	Work of breathing. The integral of the pressure times flow dt (over the entire breath)	X	X	
PIF	Peak Inspiratory Flow	mL/sec	The maximum inspiratory flow that occurs in one breath	X	X	X
PEF	Peak Expiratory Flow	mL/sec	The maximum expiratory flow that occurs in one breath	X	X	X
Ti	Inspiratory Time	Sec	The time spent inhaling during each breath, from the start of inspiration to the end of inspiration (determined by interpolation of start of expiration). The time flow is negative	X	X	X

Parameter	Term	Units	Description	RC Vent	RC Static	RC Pneumo
Te	Expiratory Time	Sec	The time spent exhaling during each breath, from start of expiration to end of expiration (determined by interpolation back to zero). The time flow is positive	X	X	X
Ve	Expired Volume	mL		X		
R2	Coefficient of Determination	N/A	A value between 0 and 1 indicating how well the data fits the assumed model	X	X	X
Rinx	Rejection Index	%	Calculates the percentage of breaths rejected	X	X	X
EIW	End Inspiratory Work	cm H_2O*mL				X
E	Elastance	cm H_2O/mL			X	
PEEP	PEEP	cm H_2O	Positive End Expiratory Pressure		X	
Plateau	Plateau	cm H_2O	Pressure measured during an inspiratory pause		X	
HR	Heart Rate	mmHg	Heart rate (when ECG or BP is connected)	X	X	X
MBP	Mean Blood Pressure		Mean blood pressure (when BP is connected)	X	X	X
SBP	Systolic Blood Pressure	mmHg	Systolic blood pressure (when BP is connected)	X	X	X
DBP	Diastolic Blood Pressure	mmHg	Diastolic blood pressure (when BP is connected)	X	X	X

Calibration Errors and Corrective Action

The FinePointe™ RC controller has the ability to calibrate itself. During the course of calibration, the controller performs a series of diagnostics checks to ensure the system is functioning and will perform as expected. When problems are detected, it is usually due to something not properly connected outside the unit; or caused by parts that require cleaning or servicing.

Error Message	Explanation and Solution
Calibration aborted	The user pressed the **Cancel** button during the calibration. To avoid this error, do not cancel calibration. Calibration should be repeated after canceled; otherwise, the calibration may be undefined.
Can't calibrate with external pressure source	The equipment is connected to a gas source and is having trouble calibrating. Disconnect the gas. Turn the controller on and off. Reconnect and attempt to calibrate again.
Flow balance error	See description below for details
Pressure balance error	An internal error. First, check to make sure all connections are secure. If no change, call your DSI rep.
Inspiration flow zero out of range	An internal error. This means the flow transducer is malfunctioning and may need to be replaced.
Inspiration pressure zero out of range	An internal error. This means the flow transducer is malfunctioning and may need to be replaced.
Inspiration flow inverted	Call DSI for assistance.
Inspiration pressure inverted	Call DSI for assistance.
Reservoir pressure inverted	Call DSI for assistance.
Inspiration pressure out of range	Call DSI for assistance.
Reservoir pressure out of range	Call DSI for assistance.
Pump not working or internal leak	Call DSI for assistance.
Inspiration flow unresponsive	See description below for details
Inspiration pressure unresponsive	Most likely a leak in the tracheal line. Check surgery site. Check connections from trach tube to transducer.
Reservoir pressure unresponsive	Unit could need repair. Call DSI for assistance.
Flow saturation	Pneumotach screens are likely clogged. Replace the screens in the chamber pneumotach.
Pressure saturation	There is possible damage to the pressure transducer. Call DSI for assistance.
Reservoir valve error	Internal error. Call DSI for assistance.
Respiratory circuit leak detected	Make sure all connections are airtight. Check for leaks. Also check the connections to the controller unit.
Time out error	Internal error. Re-do your calibration.
Resistance in pump inlet found	There is a blockage in the Inlet port on the back of the controller. Make sure the Inlet port is open and unclogged.
Flow unresponsive	See description below for details
Pressure unresponsive	Make sure all connections are airtight. Check for leaks. Also check the connections to the controller unit.

Error Message	Explanation and Solution
Trachea unblocked	The plug inside the chamber is missing. See preparing for calibration above step 2.
Inspiration flow out of range	The pneumotach is blocked. The unit requires service. Call DSI for assistance.

Error: "Flow Unresponsive"

Do not confuse this error with "Inspiration flow unresponsive". They are different errors which refer to different transducers.

This error indicates that the plethysmograph flow did not respond to actions which should have caused a change in the flow. The following should be checked for possible causes:

- The tube which connects the exhaust (green connector) to the rear of the plethysmograph is disconnected, not properly seated, or completely obstructed.
- The expiration tube is disconnected or obstructed.
- The plethysmograph is not properly seated, or the O-ring is cracked and needs to be replaced
- The flow transducer plug (blue band) is disconnected, not properly seated, or plugged into the wrong jack.
- The sensing hole for the flow transducer inside the plethysmograph is obstructed. In the manifold near the transducer block (the black aluminum block), there is a hole which could be obstructed.
- If this error occurs almost instantly after you press calibrate, then it is possible the problem could be fixed by flashing the using with the latest version of firmware.

Error: "Inspiration flow unresponsive"

This error occurs when the flow transducer inside the controller unit which is used by the ventilator is not functioning properly. The following should be checked for possible causes:

- The Inspiration tubing is obstructed

If the error still occurs, the flow transducer may require service.

Error: "Timeout waiting for zero"

This error occurs when there is excessive resistance in the expiratory tubing or in the exhaust tubing. The following should be checked for possible causes:

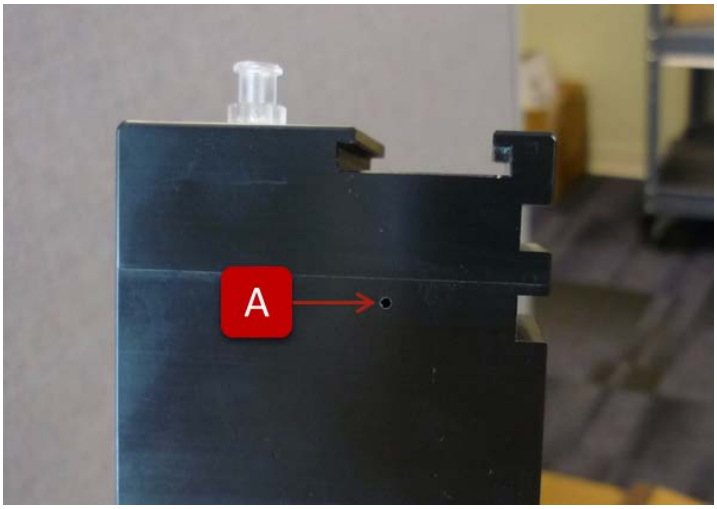
- There is water in the expiratory tubing which is preventing air from exiting without building up pressure.
- The calibrator has water in the calibrator tubing. If water is visible, you should drain the calibrator, remove the calibrator tubing, blow it out completely, blow out the water out of the calibrator itself, then reconnect the tubing and carefully refill the calibrator to the fill line and repeat the calibration.

- There is too much resistance in the exhaust tubing which connects the exhaust port to the rear of the plethysmograph. You could try flushing this tubing with water, then blowing it out to make sure it is dry.
- There is moisture in the exhaust valve within the ventilator. Turn the power of the controller off, then use a syringe to force air through the controller to make sure any water droplets are cleared. Then repeat calibration.

Error: "Flow Balance Error"

During calibration, if you keep getting a "flow balance" error, then try checking the important following items:

Check that reference port of the flow transducer is clear (see A below).



Port A is always supposed to be open to air, make sure there are no obstructions such as water, even a tiny droplet.

Check that the cable for the flow transducer is seated properly on the face of the controller unit. Make sure the cable is plugged in snugly and completely.

Error: “Respiratory Leak Detected”

This error is caused by a small leak in the respiratory circuit. The respiratory circuit is the air path from the inspiration port to the expiration port on the FinePointe™ RC controller. In addition, the part of the respiratory circuit extends inside the controller itself, and it is possible (though much less likely) for leaks to form inside. Typically, this is the most common reasons for leaks are the following:

- A cracked, worn out, or loose O-ring on the nebulizer block.
- A loose luer fitting. Luer fittings should be snug, and if you give the fitting a little twist after inserting it, it will be very tight

See **Using the Calibrator to Find Leaks** for instructions of how to localize leaks using the calibrator.

Contact Information

We are available to help you with your questions and concerns. Should you hit a roadblock or need some additional training, please feel free to visit the DSI Support Center at https://support.datasci.com to find articles and helpful information in our knowledge base, Chat with an agent, or setup time to receive one-on-one consultation. We are happy to help!

DSI Technical Support—North America

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