

SomnoSuite®

Low Flow Anesthesia System for Mice and Rats

User's Guide



SomnoSuite[®]

Anesthesia System

User's Guide

Technical Help: 860-626-1172

TABLE OF CONTENTS

Introduction

System Components	1
Navigating SomnoSuite.....	2

SomnoSuite®

Small Animal Anesthesia..... 3

Set Up Hardware	3
Initial Setup	8
Procedure for Use	8
Troubleshooting	12

System Customization

Custom Run Screen	13
Alarms.....	15

RoVent®

Set Up Hardware	17
Initial Setup	19
Procedure for Use	20
Raw Override Mode.....	24
Troubleshooting	25

MouseSTAT®

Set Up Hardware	28
Initial Setup	28
Procedure for Use	29
Troubleshooting	30
MouseSTAT Sensor Maintenance	30

CapnoScan®

Set Up Hardware	31
Initial Setup	32
Procedure for Use	33
Troubleshooting	34
CapnoScan Sensor Maintenance	34

RightTemp®

Set Up Hardware	35
Initial Setup	36
Procedure for Use	37
Troubleshooting	38
RightTemp Pad and Sensor Maintenance	38

Data Management

PC Connections	39
History - Internal Storage	40
Analog	42

General Information

Contact	43
Warranty	43
Satisfaction Guarantee	44
Specifications	44

Recommended Flow Rates..... 47

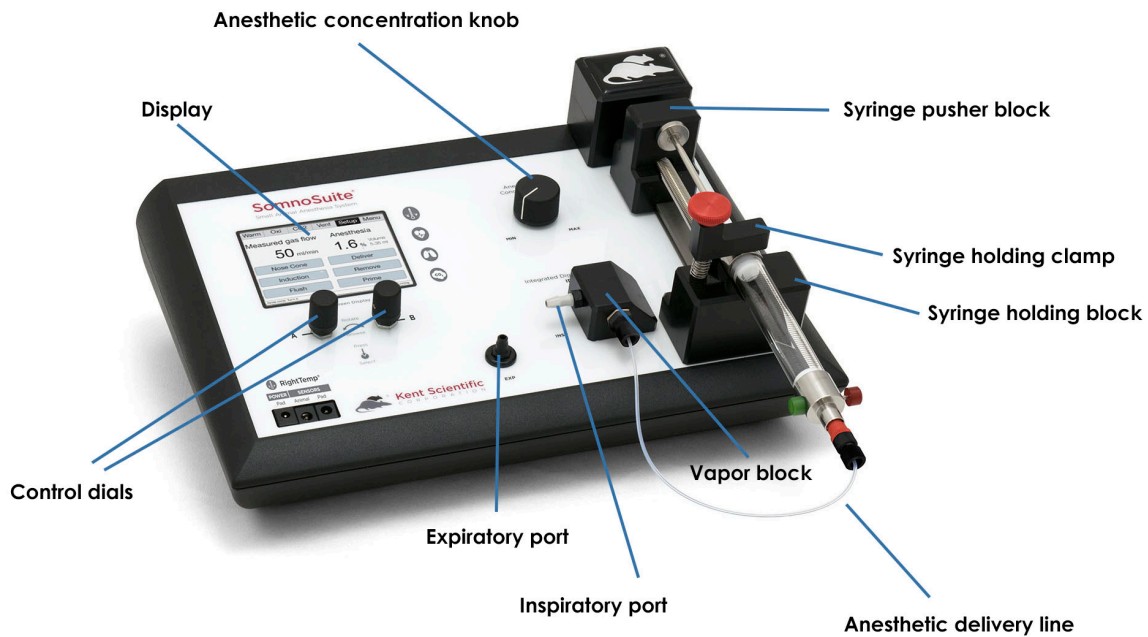
Index 48

Introduction

The SomnoSuite is not designed, intended, or authorized for use in human applications.

System Components

Front Panel



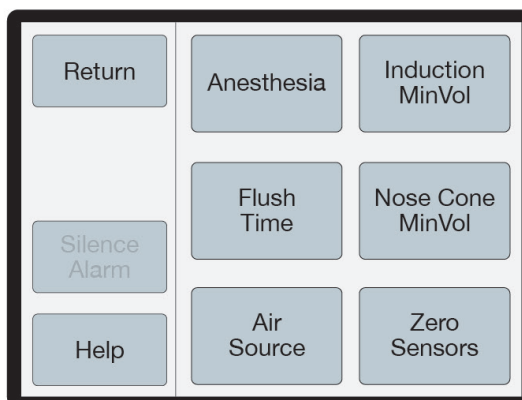
Back Panel



Navigating SomnoSuite®

Module Screens

The SomnoSuite Run screen has a designated screen for each installed module. Touch the tabs along the top of the screen to view the parameters and important settings for each module. Touch the tab again to open the module's extended Setup Menu.

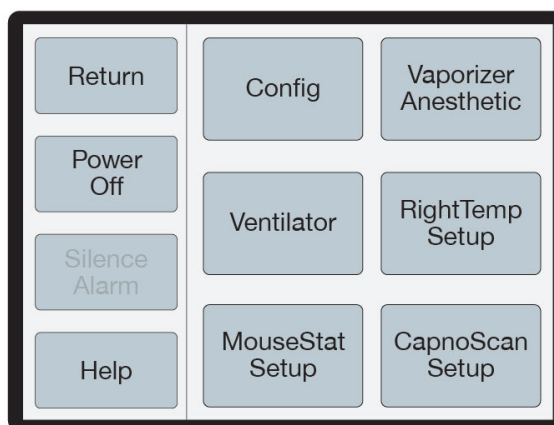


Anest Setup Menu

(Available menu options may differ based on module configuration.)

Touch Screen

SomnoSuite Menu offers quick access to most features and settings. Touch the Menu button on the top right corner of the Run Screen.



Menu

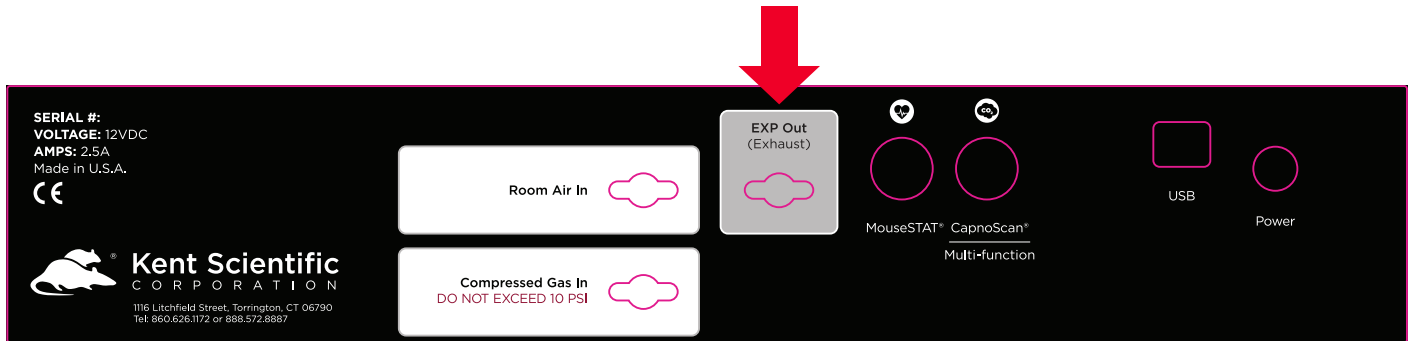
(Screen buttons may vary based on the modules installed.)

SomnoSuite® Small Animal Anesthesia

Set Up Hardware

Scavenging:

Connect a charcoal canister to the Exhaust port.



Rear Overlay

Air Source:

Using Room Air (internal pump):

Remove the red cap from the Air Inlet Port.
No additional hardware setup is necessary.

Using a Compressed Gas Source:

Connect the Compressed Gas tubing directly to the Compressed Gas port.

- Set gas pressure to 10-15 PSI .

Tip: If your gas source does not regulate to this range, connect a Kent Scientific Pressure Reducer between the gas source and the SomnoSuite.

Diagram showing Pressure Reducer connection:

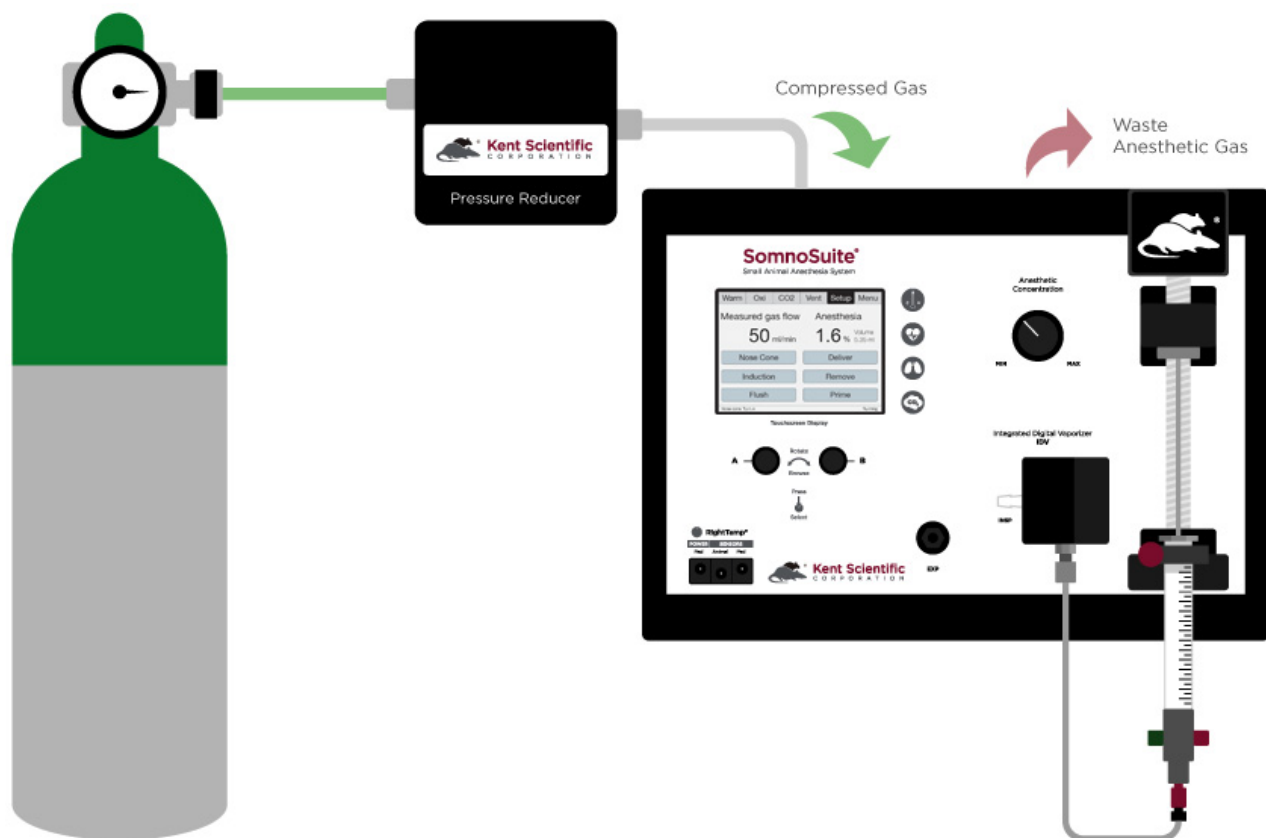


Diagram showing Pressure Reducer connection

Tubing Configurations:

Connecting an Induction Chamber and a Nose Cone

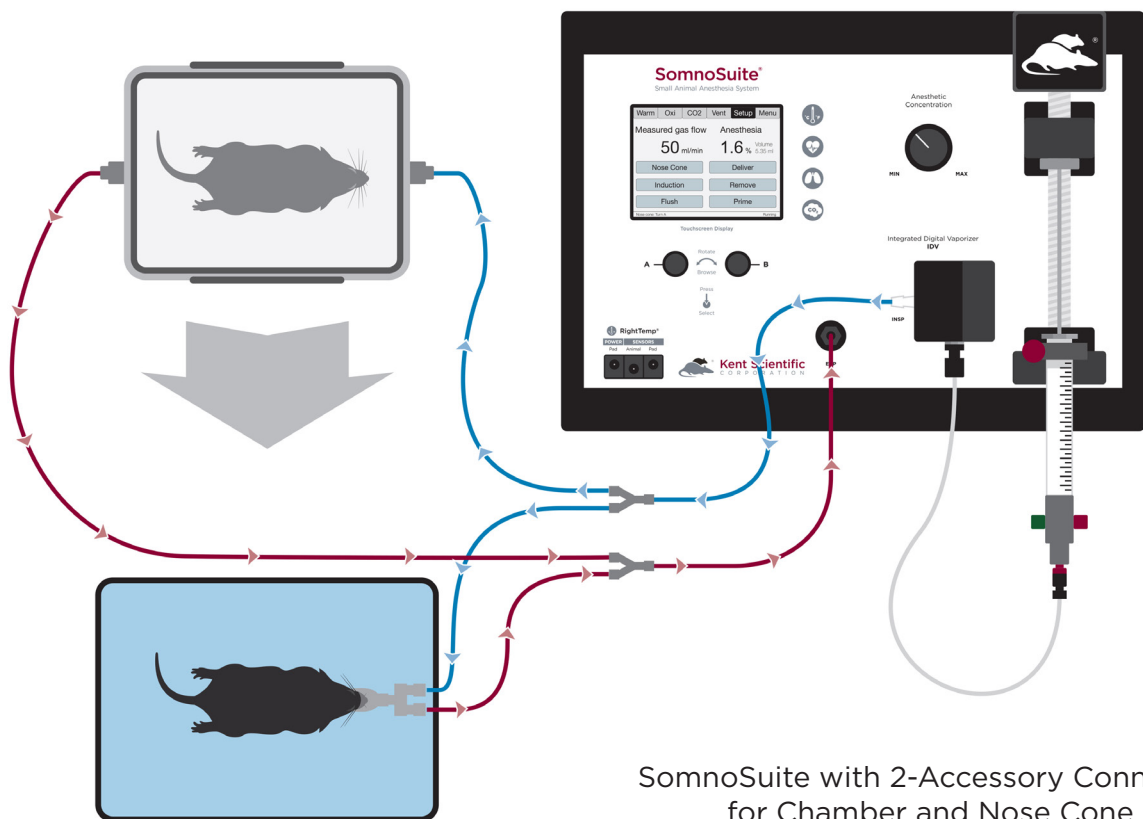
Depending on your specific module configuration, your SomnoSuite includes a set of 2-Accessory Connectors or 3-Accessory Connectors. These are used to divide the SomnoSuite's airflow to multiple stations or animals.

1. Connect:
 - 1) The white-labeled Accessory Connector to the inspiratory port (INSP).
 - 2) The black-labeled Accessory Connector to the expiratory port (EXP).
2. Designate one branch from each of the connectors to each accessory.

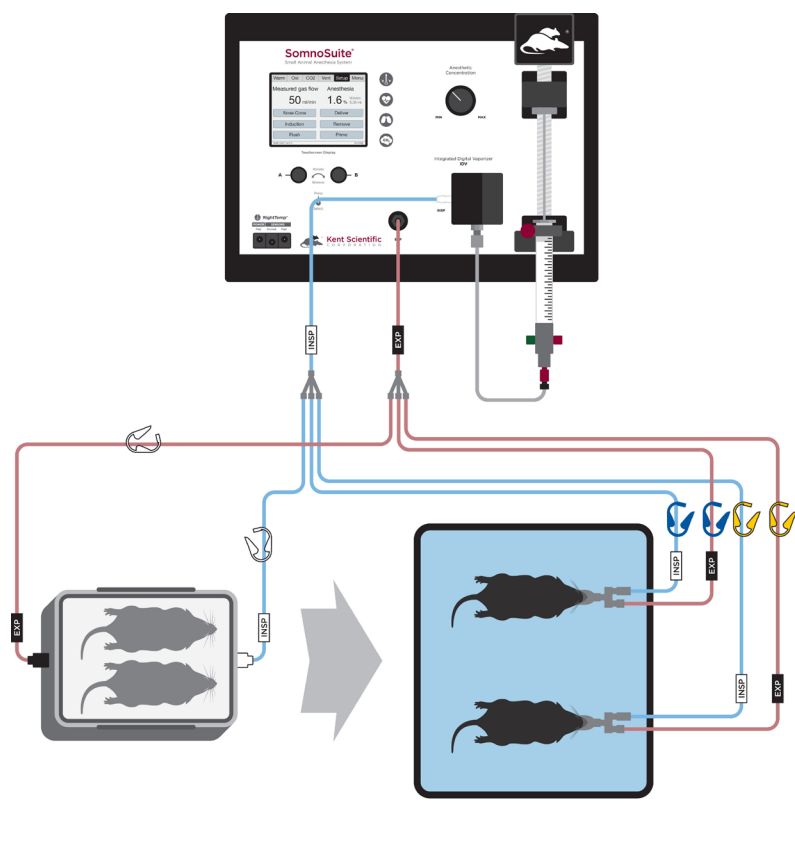
White Ports and Connectors	Inlet and Inspiratory Line
Black Ports and Connectors	Exhaust and Expiratory Line
Blue Clips	Branch 1
White Clips	Branch 2
Yellow Clips*	Branch 3

*3-Accessory Connectors only.

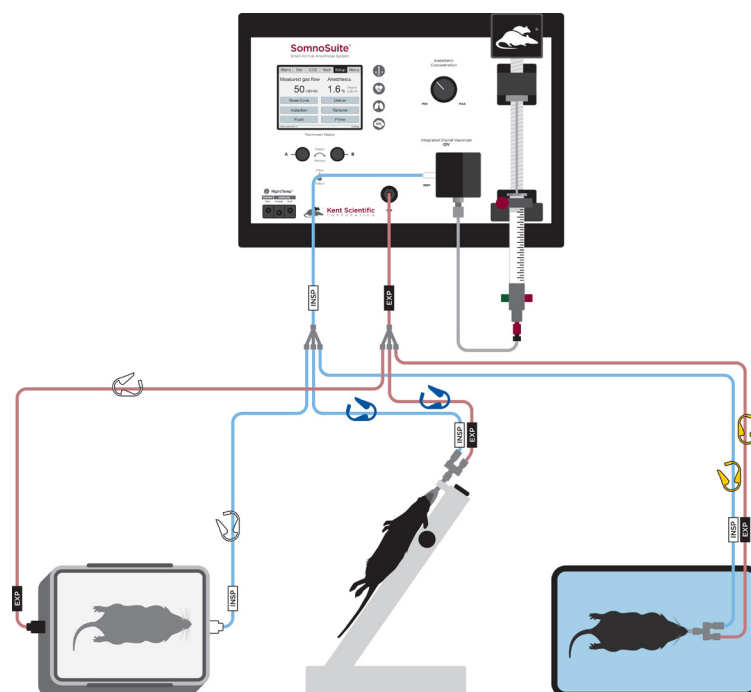
Setup Examples



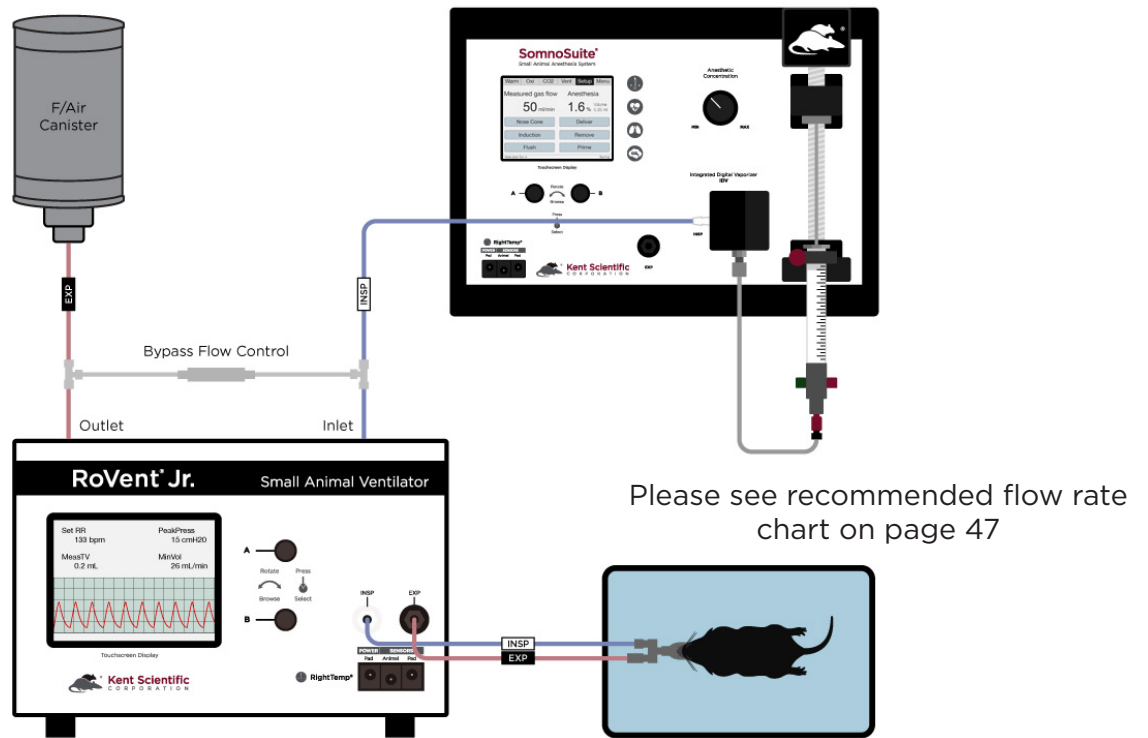
SomnoSuite with 3-Accessory Connector for Chamber and two Nose Cones



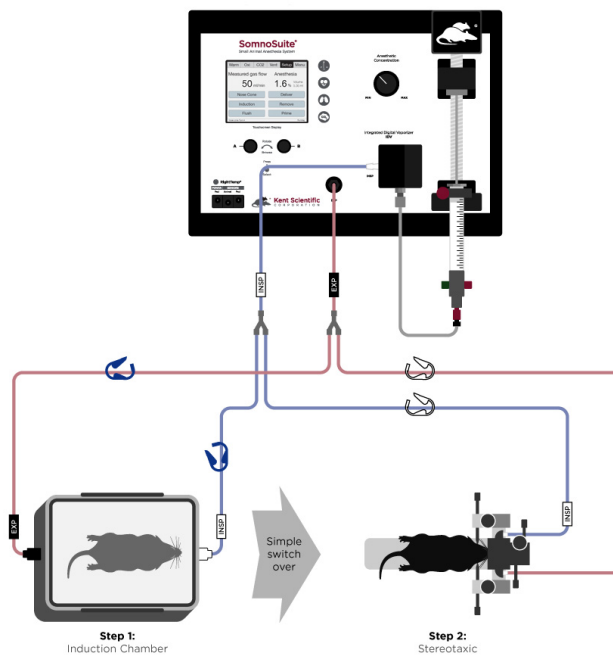
SomnoSuite with 3-Accessory Connector for Chamber, Intubation Stand, and RoVent



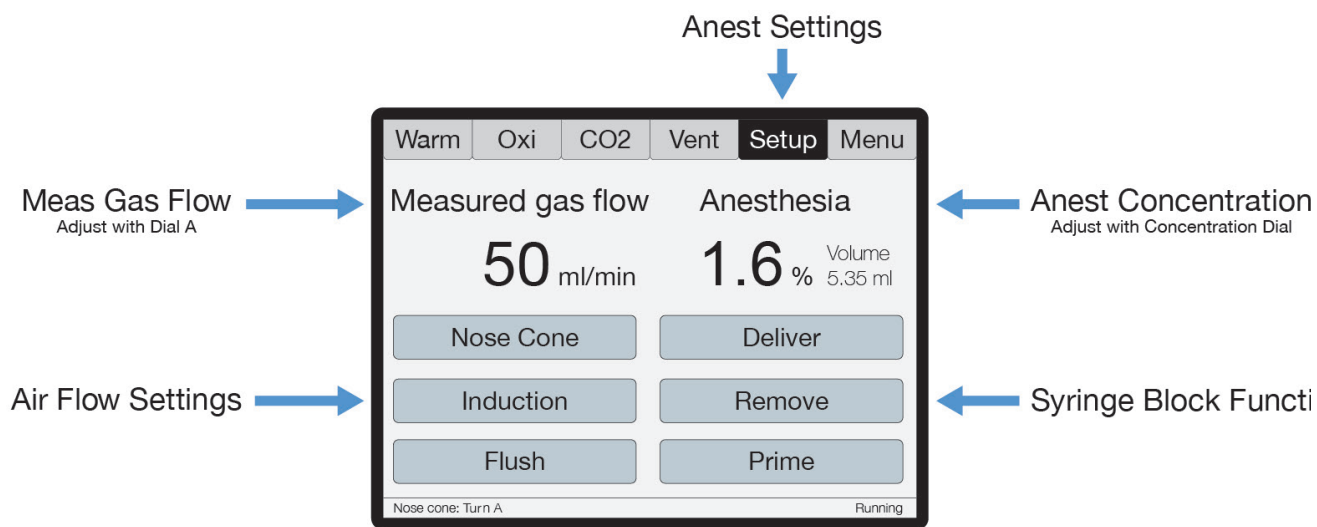
SomnoSuite with External Ventilator



SomnoSuite with Stereotaxic Mask



The SomnoSuite Run Screen



Initial Set-Up

The first time the SomnoSuite is used, or any time the accessories have changed, be sure to confirm the Anesthesia Delivery settings.

Procedure for Use

- 1) From the Anest Run Screen, touch Setup > Anesthesia to enter syringe settings:

Setting	Action
Remove Syringe	Moves block up
Prime Syringe	Moves block down
Syringe Size	Enter the size of the syringe
Type Anest	Enter the type of anesthetic agent
Calibrate Syringe	Resets the factory syringe calibration (preset)

- 2) Touch Setup > Air Source to choose the carrier gas source.

Room Air: Utilizes the SomnoSuite's internal pump to draw in surrounding air

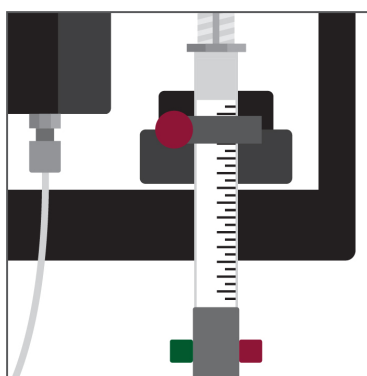
Compressed gas: Utilizes a 10-15 PSI gas source connected to the Compress Gas Port.

- 3) Install the filled syringe into the syringe block holder, tightening the Anesthetic Delivery tube to the syringe tip.

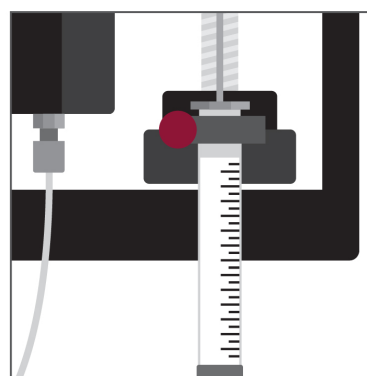
Tip:

Use **Remove** to move the block up if necessary.

- 4) Be sure that the L—bracket is tightened over the metal collar of the syringe rather than the glass barrel.



✗ **Incorrect**



✓ **Correct**

- 1) Touch Back, then Return to view the Anest Run Screen.
- 2) Touch and hold Prime to move the block towards the syringe plunger. Stop when the block touches the top of the plunger.

CAUTION

Do not overprime the delivery tube! Do not allow the pusher block to depress the syringe plunger or inject liquid anesthetic into the vaporizer block during this step.

Turn Dial B while holding the Prime button to adjust priming speed as needed.

-
- 3) Touch Deliver to enable anesthetic delivery.
 - 4) Place the animal in the induction chamber.
 - 5) From the Anest Run Screen, touch Induction.

Tip:

The SomnoSuite will deliver at a preset flow rate of 500mL/min. Try manually increasing the flow rate to reduce induction time.

Press then turn Dial A to adjust the gas flow.

- 6) Turn the Anesthesia Concentration Knob to the desired concentration for induction. The concentration value appears on the Anest Run Screen as you adjust the knob.
- 7) When the animal is sufficiently anesthetized, touch Induction to stop the air flow.
- 8) If you want to flush the chamber, touch Flush.

The Flush function automatically flushes the chamber with 0% anesthetic for 10 seconds and stops automatically.

You can repeat the Flush for larger induction chambers or you can touch Setup > Flush Time to increase the flush.

- 9) When the flush ends, adjust the tubing clamps to direct airflow to the animal.
- 10) Open the chamber and remove the animal. Immediately place the animal on the nose cone or an external ventilator. If you are using 2- or 3-Accessory Connectors, use the colored clamps to direct the airflow.
- 11) Touch Nose Cone to resume anesthesia delivery.
- 12) Turn the Anesthesia Concentration Knob to the desired concentration.

Tip: Some mask styles have more deadspace than others. If you notice that the anesthetic depth is too light, try manually increasing the flow rate.

Press then turn Dial A to adjust the gas flow. Refer to page 47 for recommended flow rates.

If anesthetizing more than one animal, use the highest recommended flow rate multiplied by two.

13) At the end of the procedure, reduce the anesthetic concentration to 0%.

14) Touch Nose Cone again to stop air flow. Allow the animal to recover.

Syringe Empty Position Calibration

The SomnoSuite syringe empty points are pre-calibrated. If you need to change the factory syringe calibrations:

1. Touch
 - 1) the Anest Setup button
 - 2) Anesthesia
 - 3) Calibrate Syringe

Place an empty, fully depressed syringe into the holding block.

2. Press Dial B to begin moving the pusher block. Turn Dial B to adjust the pusher block speed. When the block touches the top of the syringe plunger, press B again to stop the block.
3. Press B again to save the new empty point.

SomnoSuite® Troubleshooting

Problem	Possible Cause	Solutions
Anesthetic depth too light, or the animal wakes up	<ul style="list-style-type: none"> Flow rate is too low Incorrect syringe size Anesthetic Delivery Tube or Syringe is leaking 	<ul style="list-style-type: none"> Increase the flow rate in Anest Setup > Nose Cone Min Vol or Induction Min Vol Verify that the syringe size setting is correctly entered. Check that the Anesthetic Delivery Tube is tightly connected to the Syringe. Try using a different syringe to see if the problem improves.
Anesthetic depth too deep	<ul style="list-style-type: none"> SomnoSuite was incorrectly primed Flow rate is too low Incorrect syringe size 	<ul style="list-style-type: none"> Take care not to overprime the SomnoSuite. Liquid isoflurane should never be injected into the vaporizer block during priming. Increase the flow rate by pressing and then turning Dial A. Verify that the syringe size setting is correctly entered.
Minute volume displays 0mL/min.	<ul style="list-style-type: none"> Incorrect Air Source setting Blockage in tubing connection Compressed gas source not turned on or turned on at incorrect pressure Airflow not turned on 	<ul style="list-style-type: none"> Check that Air Source is set correctly, either to "Room air" or "Compressed Gas". Check all connections and ports for blockages. If using compressed gas, be sure the gas source is turned on and flowing properly. Pressure should be between 5 and 10PSI. Check that airflow is turned on, indicated by the word "Running" on the bottom right corner of the screen.
Pusher block isn't moving and Anest% shows "--%".	<ul style="list-style-type: none"> Anesthesia is disabled 	<ul style="list-style-type: none"> Be sure that the Deliver setting is selected from the Anest Run Screen.
Anesthetic agent remains in syringe although SomnoSuite shows 0mL VolLeft.	<ul style="list-style-type: none"> Syringe Empty point does not match syringe dimensions Using incorrect syringe 	<ul style="list-style-type: none"> Ensure that you are using the glass syringe included with your SomnoSuite. No other syringe should be used. Ensure that the Syringe Size setting is correct. Re-calibrate the Syringe Empty Position

System Customization

Custom Run Screen

SomnoSuite allows you to configure your own Run Screen, allowing a combination of parameters from any installed modules to appear on a single screen.

When using a Custom Run Screen, all settings need to be entered from the Menu or configured with Dial A and B. See Dial Functions on page 14.

To configure a Custom Run Screen:

1) From any Run Screen, touch Menu, then Config.

i Param Locations

Parameter locations allow you to decide where each parameter will be displayed on the screen. Turn Dial A to scroll through the list of available parameters, and turn Dial B to assign it to a location.

Press Dial A when finished.

ii Charts

Charts allow you to customize the graph that is displayed on the lower portion of the Custom Run Screen. You can customize two independent charts. Choose Chart Type to assign the parameter to be graphed, and Period to assign a graph time point.

Touch Back when finished.

iii Set Ranges

The Range setting allows you to customize the graph axis. The Ranges set here also apply to Analog Out. Turn Dial A to scroll through the list of available parameters, and then turn Dial B to adjust the range.

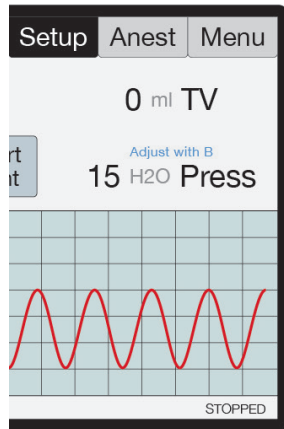
Press Dial A when finished.

iv Dial Menu

The Dial Menu allows you to assign a dial command for your Custom Run Screen. Turn Dial A to choose a setting you want to control for Dial A.

Touch >> to assign a setting to Dial B.

Touch Back when finished.



Small text on the run screen displays the assigned Parameter name for each Dial, if set, and its current value.

Run Screen with Dial Function Text

To use a dial command:

1. At the Run Screen, quickly turn the Dial assigned to the setting whose value you want to change. SomnoSuite beeps and the associated text becomes blue.
2. Turn the Dial to increase or decrease the value for the assigned setting. After 3 seconds, SomnoSuite beeps again and the command text returns to black.

As you turn a Dial, setting changes takes place immediately.

Alarms

SomnoSuite alarms alert you to certain conditions that might require attention while SomnoSuite is running.

There are two levels of alarms:

Level	Based On	Banner	Sound (If On)	Configurable
Warning	Parameters or other operating conditions	Yellow	1-beep pattern	Yes
Serious	Parameters or other operating conditions	Red	3-beep pattern	Yes except for system alarms

To configure a new Parameter alarm:

- 1) From any Run Screen, touch Menu then Config.
- 2) Touch Data Mgmt, then Alarms.

i Silence all Alarms

If you do not wish for the SomnoSuite to make an audible tone when an alarm is triggered, you can silence them. Turn Dial B to choose “Silence all Alarms” or “Allow Sound”. Touch Back when finished.

ii Parameter 1-4

Set a custom alarm based on any measured parameter. You may choose up to 4. Press A when finished configuring the following settings:

- Parameters: Choose a parameter to monitor by alarm
- Action: Choose how the alarm will alert you (message and/or sound)
- Type: Choose status to trigger alarm
- Value: Set the threshold value
- Delay: Choose how long the value must meet the threshold before triggering the alarm
- Clear: Choose how the alarm needs to be cleared

iii **Fixed Alarms**

The SomnoSuite includes a number of fixed alarms that alert you to scenarios that require attention. The number of Fixed Alarms are dependent on the number of modules installed. You may view and configure any of the Fixed Alarms by selecting it, then pressing Dial A to enter the Alarm Menu.

To clear a sounding alarm:

A triggered alarm produces a colored banner at the bottom of the screen describing the cause of the alarm.

To silence the alarm:

- 1) Navigate to the corresponding Screen
 - 2) Touch Setup, then Silence Alarm
- OR
- 1) Touch Menu from any Run Screen
 - 2) Touch Silence Alarm



Set Up Hardware

Please see the SomnoSuite instructions on page 3.

Scavenging:

Connect a charcoal canister to the Exhaust port on the back of the SomnoSuite.

Air Source:

If you are using a Compressed Gas Source:

1. Connect the Compressed Gas tubing directly to the Compressed Gas port on the back of the SomnoSuite.
2. Set gas pressure to 10-15 PSI.

Tip: If your gas source does not regulate to this range, connect a Kent Scientific Pressure Reducer between the gas source and the SomnoSuite. See Setup on page 4.

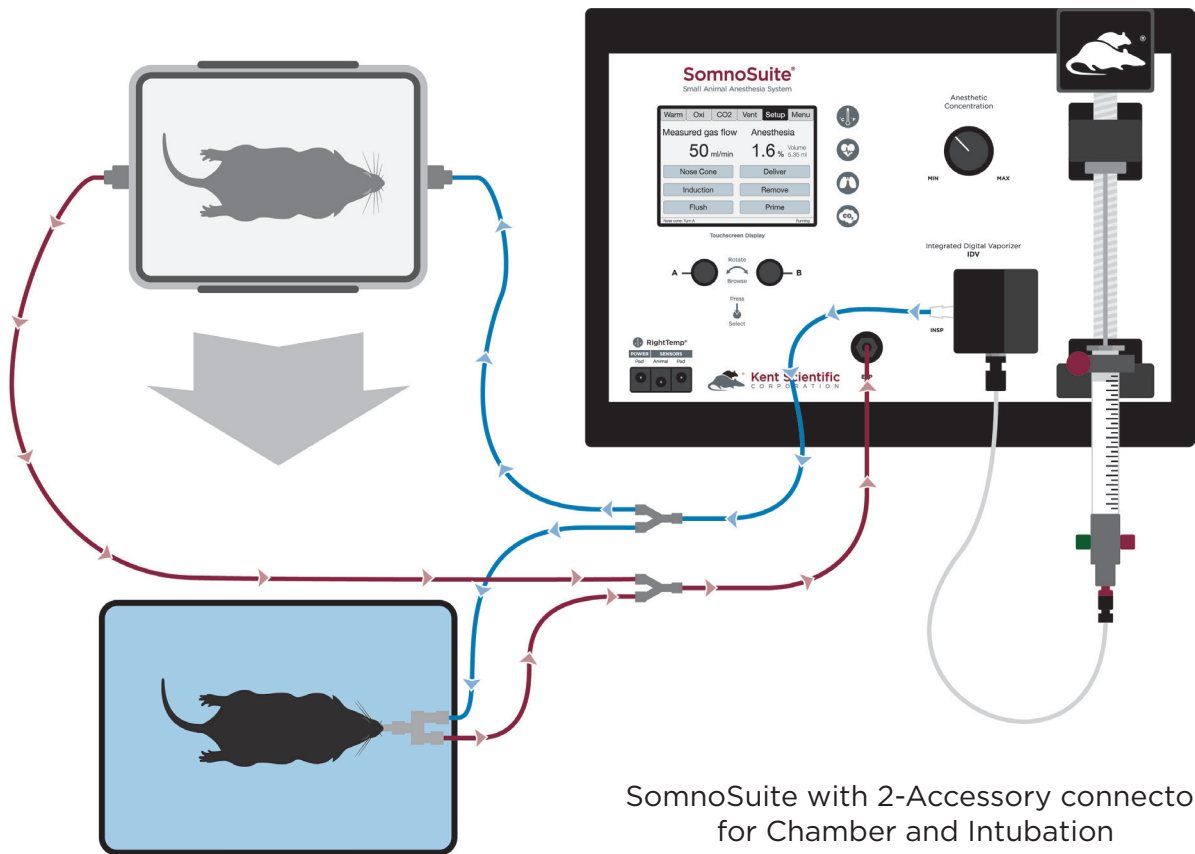
If you are using the Internal Pump:

No additional hardware setup is necessary.

Tubing Configurations:

Connecting an Induction Chamber and Ventilator Tubing to an Endotracheal Tube:

1. Connect one 2- or 3-Accessory Connector to the INSP port.
2. Connect the other 2- or 3-Accessory Connector to the EXP port.
3. Designate a clip color to each accessory, each with an INSP and EXP branch.
4. Connect one INSP-EXP set to the intubation connector tubing, mask tubing, and induction chamber.



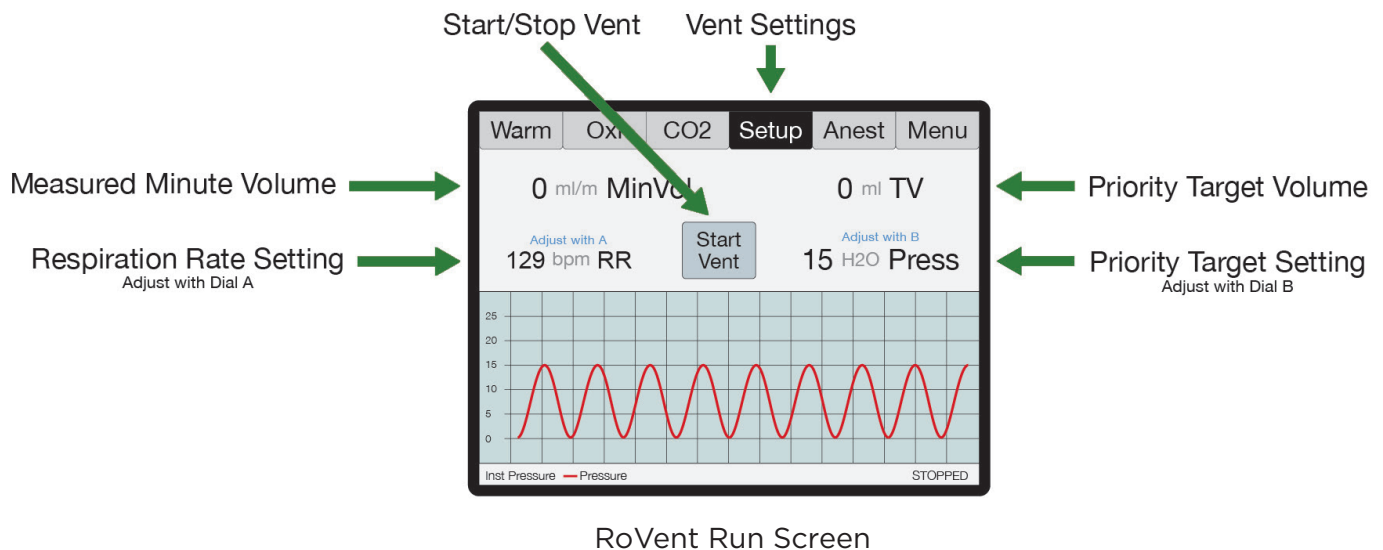
SomnoSuite with 2-Accessory connector for Chamber and Intubation

Connecting Ventilator Tubing Only to an Endotracheal Tube:

Connect the intubation connector tubing directly to the INSP and EXP ports on the front of the SomnoSuite.



The RoVent Run Screen:



Initial Setup

Ventilator Calibrations:

The first time the RoVent is used, or any time the accessories have changed, be sure to perform a Deadspace Calibration and verify the ventilator settings.

Note: Never perform these functions when an animal is connected to the ventilator.

1. Measure Deadspace

The Deadspace calibration will measure the volume of tubing between the SomnoSuite RoVent module and the animal. It is important that the Deadspace is recalibrated every time the tubing configuration is changed to maintain accurate tidal volume delivery.

- 1) Set up tubing.
- 2) Connect the cap to the anesthetic delivery tube.
- 3) From the Vent Run Screen, touch Setup then **More Ventilator**.
- 4) Touch **Calib & Tests**, then **Measure Deadspace**.
- 5) Firmly seal the end of the endotracheal tube connector with your finger or a cap, ensuring that there is no air leakage.
- 6) Press Dial B. When asked to confirm measurement, press Dial B again.



2. Zero Sensors

Zeroing the sensors ensures that the internal pressure and flow sensors are working properly, and calibrates them prior to the ventilation. It is important that the sensors are zeroed to ensure accurate inspiratory pressure delivery.

- 1) Set up tubing.
- 2) From the Vent Run Screen, touch **Setup** then **More Ventilator**.
- 3) Touch **Calib & Tests**, then **Zero Sensors**.
- 4) Press Dial B. When asked to confirm measurement, press Dial B again.

Procedure for Use

RoVent With SomnoSuite Anesthetic Delivery:

1. Place the animal in the induction chamber.
2. From the Anest Run Screen, enter all Setup settings. (See page 8.)
3. From the Vent Run Screen, touch Setup.
 - 1) Enter the ventilator settings.

Tip: The RoVent can ventilate based on a target Inspiratory Pressure, or by Tidal Volume. The Body Weight Setting will automatically calculate appropriate Respiratory Rate and tidal volume settings, dependent on your Priority Setting.

See page 23 for more Advanced Options in Vent Setup.

4. From the Anest Run Screen, touch Induction.

The Run Screen appears and airflow begins automatically at a preset flow rate of 500mL/min.



Tip: The SomnoSuite will deliver at a preset flow rate of 500mL/min. Try manually increasing the flow rate to reduce induction time.

From the Anest Run Screen, press and turn Dial A to adjust the air flow.

5. Turn the Anesthesia Concentration Knob to the desired concentration for induction. The concentration value appears on the screen as you adjust the knob.
6. When the animal is sufficiently anesthetized, touch Induction to stop the air flow.
7. If you want to flush the chamber, touch Flush.

The Flush function automatically flushes the chamber with 0% anesthetic for 5 seconds and stops automatically. The Flush button will count down until the flush has ended. You can repeat the Flush for larger induction chambers or you can touch Setup > Flush Time to increase the flush.

8. When the flush ends, open the chamber and remove the animal. Immediately intubate the animal and attach it to the intubation connector. Use clips to direct airflow to the endotracheal tube only.
9. From the Anest Run Screen, touch Vent to open the RoVent Run Screen.
10. Touch Start Vent to begin ventilation.

CAUTION

Do not start the ventilator before the animal is intubated and connected to the ventilator tubing.

11. Turn the Anesthesia Concentration Knob to the desired concentration.

SomnoSuite calculates the respiration rate and tidal volume using the animal's body weight. To change these settings, Use Dial A and B to make quick changes. Touch Setup from the Vent Run Screen to manually enter a Respiratory Rate, Target Pressure, Tidal Volume, or other advanced settings.



12. At the end of the procedure, set the anesthetic concentration to 0%.
13. Touch Ventilator again to stop air flow. Allow the animal to recover.

RoVent without SomnoSuite Anesthetic Delivery:

RoVent can ventilate an animal independent of anesthetic delivery, for cases where you will use injectable anesthesia, as an example.

1. Use clips to direct airflow to the endotracheal tube only.

CAUTION

If you choose to alter the tubing setup, be sure to recalibrate the deadspace. See page 19.

2. Touch Vent to open the RoVent Run Screen.
3. Touch Start Vent to begin ventilation.

CAUTION

Do not start the ventilator before the animal is intubated and connected to the ventilator tubing.

4. Enter the Anest Run Screen, and turn the Anesthesia Concentration Knob to the desired concentration.

SomnoSuite calculates the respiration rate and tidal volume using the animal's body weight.

To change these settings, turn Dial A or Dial B. Touch Setup from the Vent Run Screen to make other changes to Respiratory Rate, Target Pressure, Tidal Volume, or other advanced settings.

5. From the Vent Run Screen, touch Stop Vent to stop air flow.



Configure Settings

Configure all ventilator settings from the Vent Run Screen.

Pressure Priority : RoVent ventilates to a specified inspiratory pressure. The default target pressure is 15cmH₂O independent of body weight setting. To change the target pressure, touch **Set Target Pressure**.

Volume Priority: RoVent delivers an initial target pressure for the first breath, then delivers a target tidal volume. The default target tidal volume is calculated based on body weight. To change the target tidal volume, touch **Set Target Volume**.

Note: You can change the initial target pressure for the first breath, as well as the minimum and maximum allowed pressures to customize the ventilator's operating range as the ventilator delivers the set tidal volume.

The Vent Setup also allows you to make advanced ventilation settings:

- PEEP: Automatically add a positive end-expiratory pressure.
 - o Choose between 0cmH₂O and 9cmH₂O.
 - o Used to prevent alveolar collapse during open-chest procedures.
- Sigh Breath: Automatically add an intermittent breath with a larger tidal volume.
 - o Choose frequency and tidal volume of sigh breaths.
 - o Evenly distributes inspiratory pressure to prevent partial alveolar collapse.
- I/E Ratio: Change the breath mechanics.
 - o Choose the ratio of inspiratory to expiratory portions of a breath cycle.
 - o Useful to increase oxygenation in certain respiratory models.
- Inspiratory Pause: Change the breath mechanics.
 - o Choose the time between the end of active inspiration and the start of expiration.
 - o Useful to increase oxygenation in certain respiratory models.
- Assist Mode: Change the breath pattern.
 - o Choose how an animal is allowed to breathe at a spontaneous respiration rate, while the ventilator retains control of target inspiratory pressure or target tidal volume.
 - o Useful during recovery from long procedures, or in certain respiratory models.



Assist Mode settings override Respiration Rate settings as long as Assist Mode is enabled.

- Pulse Mode: Change the breath pattern.
 - o Choose how the ventilator structures the breath cycle.
 - o Useful to apply rapid high pressure to animal's airways to evenly distribute inspiratory pressure and prevent partial alveolar collapse.

Pulse Mode Menu settings override target pressure and target volume settings as long as Pulse Mode is enabled.

Trigger Command Settings:

You can assign RoVent-specific functions to either a Dial press or an external signal via remote cable.

To set a new Trigger Command:

1. From the Vent Run Screen, touch Setup, then More Ventilator.
2. Touch Triggers Menu.
3. Turn Dial B to choose an action.

Some actions will require additional settings. Please contact Kent Scientific if you need assistance in enabling a trigger function.

Raw Override Mode:

For setups where the RoVent's safety parameters are not desired, the RoVent can be set to Raw Override Mode. Raw Mode will ignore the RoVent's 30cmH₂O Inspiratory Pressure limit, allowing the user to customize the breath shape. To access Raw Mode, touch Setup from the Vent Run Screen.

Note: Raw Mode is a full ventilator override, and injury to the animal may occur.



RoVent Troubleshooting

Alarm Messages

Problem	Possible Cause	Solutions
Tube open to atmosphere	The highest measured pressure in a breath cycle is under 25% of the target and the tidal volume is over target.	<p>Check the tubing between the INS and EXP ports for leaks or loose connections.</p> <p>The ventilator circuit is open. Do not run the ventilator prior to connecting the animal.</p> <p>Verify that the Body Weight or Target tidal volume setting is correct and that the delivered tidal volume is an appropriate value for the animal's size.</p> <p>If the error persists, perform a Leak Test in the Calib & Tests section.</p>
Tube blocked	The highest measured pressure in a breath cycle is under 25% of the target and tidal volume is under target.	<p>Check the tubing for any kinks, blockages or foreign matter in the inspiratory, expiratory or exhaust tubing.</p> <p>Adjust the endotracheal tube to clear any accumulated fluid.</p> <p>If the error persists, perform a Leak Test and a system Purge in the Calib & Tests section.</p>
Exhaust blocked	The breath pressure fails to drop during the expiratory phase of a breath.	<p>Verify that the cap was removed from the exhaust port on the back of the system.</p> <p>If the error persists, perform a Leak Test and a system Purge in the Calib & Tests section.</p>
Out of regulation	Over five consecutive breaths, peak pressure was more than 25% or less than 75% of your target.	<p>Verify that the settings are correct.</p> <p>Perform a Deadspace Calibration in the Calib & Tests section.</p> <p>If the error persists, perform a Leak Test and a Zero Sensors calibration in the Calib & Tests section.</p>



Alarm Messages continued

Problem	Possible Cause	Solutions
Large rise in TV	Over the last four breaths, there was an increase of more than 25% in average tidal volume compared to that of the previous 16 breaths.	<p>Check the tubing between the INS and EXP ports for leaks or loose connections.</p> <p>Adjust the endotracheal tube to be sure it has not shifted or disconnected from the ventilator tubing.</p> <p>If the error persists, perform a Leak Test and a Zero Sensors calibration in the Calib & Tests section.</p>
Large drop in TV	Over the last four breaths, there was a decrease of more than 25% in average tidal volume compared to that of the previous 16 breaths.	<ul style="list-style-type: none">• There is a kink in the tubing.• There is foreign matter in the tubing or in the exhaust valve.• The exhaust outlet is blocked.• The endotracheal tube is not seated correctly.
Deadspace calib	Dead space calibration produced a negative tidal volume.	<ul style="list-style-type: none">• Deadspace calibration is incorrect for current tubing setup.

Diagnostic Procedures:

To access these diagnostic procedures, open the Vent Run Screen, touch Setup, then More Ventilator, and Calib&Tests.

Purge

Clears any accumulations from the valves using high pressure air flow.

Resulting Message	Meaning	Possible Action
Success	No leaks found.	None is needed.
Low baffle pressure	There is an internal RoVent problem.	Contact Kent Scientific.



Leak Test

Checks for internal and external leaks.

Resulting Message	Meaning	Possible Action
Test OK	No leaks found.	None is needed.
Tubing leaks	The tubing is open to the atmosphere through a loose connection or a crack or hole in the tubing.	Tighten all connections and ensure that the circuit is air tight. Run Leak test again. If the error recurs, contact Kent Scientific.
Low baffle pressure or Baffle leaks	There is an internal RoVent problem.	Retest making sure that the tubing is not flexed or moved. If the error recurs, contact Kent Scientific.



MouseSTAT Pulse Oximeter and Heart Rate Monitor

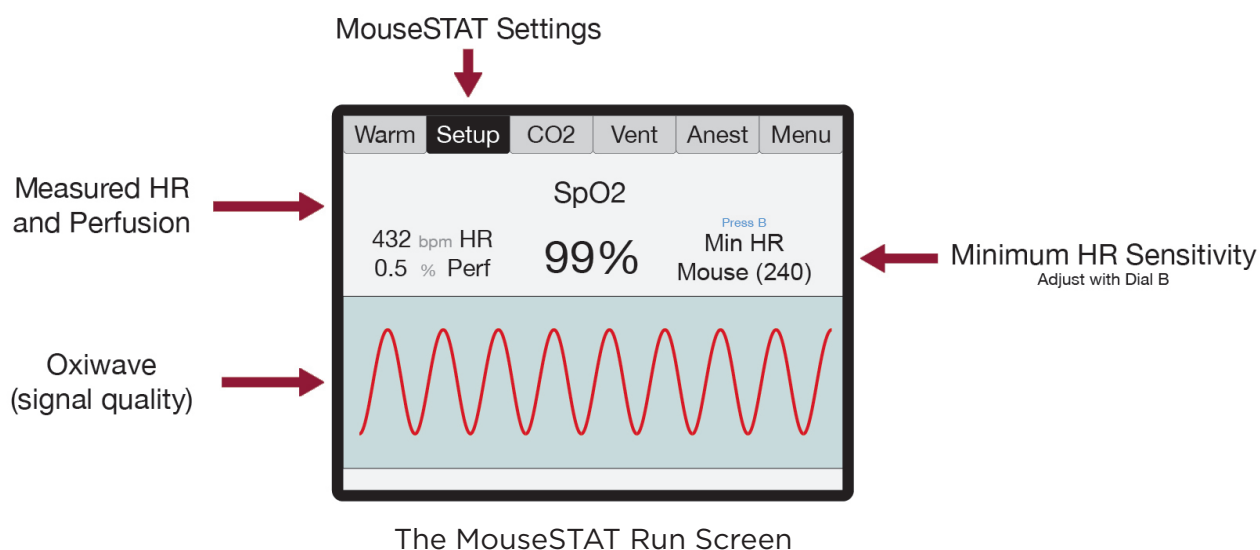


Set Up Hardware

Sensor:

1. Connect the interface cable to the MouseSTAT port on the back of the SomnoSuite.
2. Connect the sensor to the interface cable and ensure that the connection is secure.

The MouseSTAT Run Screen:



Initial Setup

MouseSTAT Settings

- 1) From the Oxi Run Screen, press then Turn Dial B to set the Minimum Heart Rate for your animal.



Procedure for Use

MouseSTAT Settings

- 1) Anesthetize the animal and place on the RightTemp warming pad.

Tip: Kent Scientific recommends the use of inhalant anesthetics. Injectable anesthetic agents have a greater effect on circulation, making pulse oximetry challenging. Always warm the animal to support circulation in the animal's extremities.

- 2) Align the sensor over the hind paw of the animal, centering the red light over the paw pad.



MouseSTAT sensor on animal

The sensor automatically begins readings. To monitor signal quality, view the Oxiwave graph on the Oxi Run Screen.

MouseSTAT with Optional Respiratory Rate Parameter allows you to monitor RR. To obtain RR, a strong pulse oximetry signal is required.



MouseSTAT Troubleshooting

Problem	Possible Cause	Solutions
There is no red light or blinking light in the sensor.	Sensor not fully connected	<ul style="list-style-type: none">• Ensure that all connections are tight, especially at the back of the controller.
	Damaged wire in sensor or interface cable	<ul style="list-style-type: none">• Replace the damaged cable.
Readings are inconsistent. or There are no readings.	Incorrect sensor placement	<ul style="list-style-type: none">• Reposition sensor on the animal's paw.
	Poor animal circulation	<ul style="list-style-type: none">• Investigate types and dosages of anesthetic and other drugs in use; reduce where possible.• Increase animal body temperature to encourage circulation.

MouseSTAT Sensor Maintenance

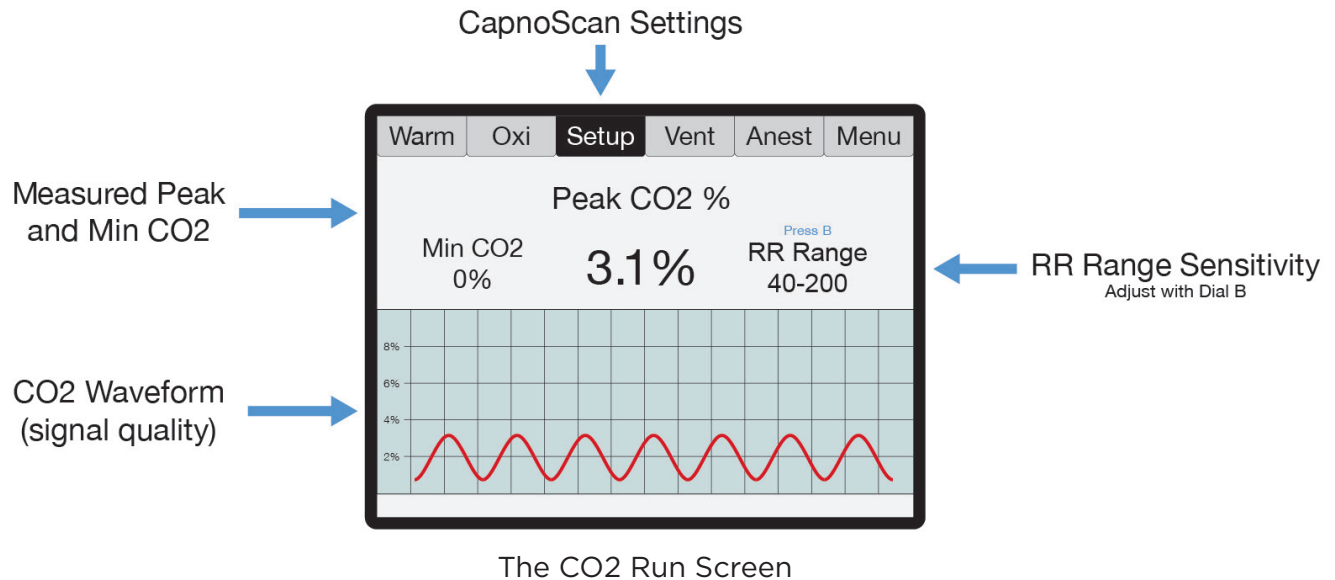
- Avoid any practice that creates tension or strain on the sensor cable or connections. MouseSTAT sensors are designed to be gentle on small paws.
- When the MouseSTAT sensor is not in use, gently coil it and store it in its package to prevent tangles or bends in the sensor wire.
- Gently wipe the sensor clean between uses.



CapnoScan End-Tidal CO2 Monitor



The CapnoScan Run Screen:



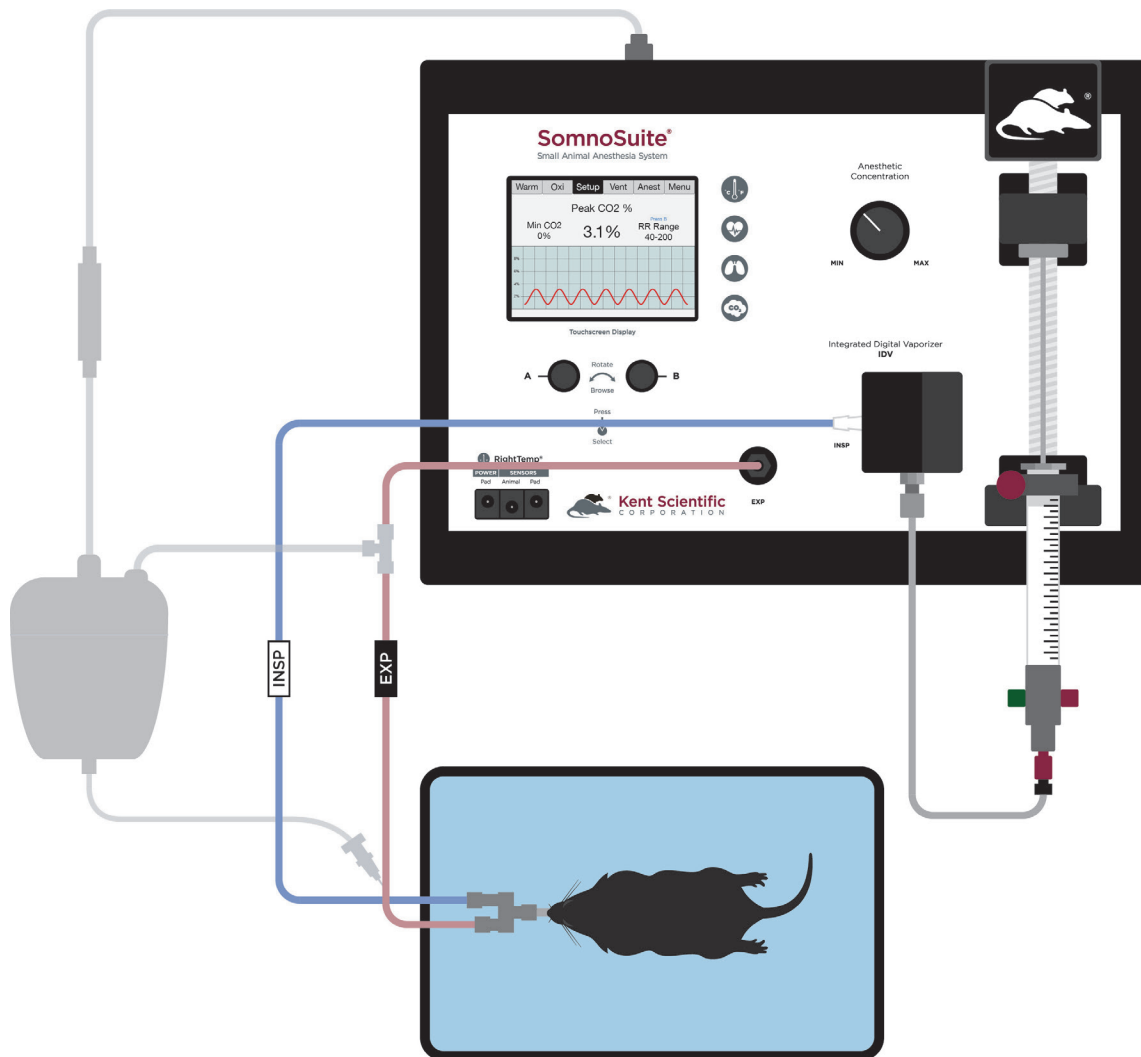
Set Up Hardware

Sensor:

1. Connect:
 - 1) the interface cable to the CapnoScan port on the back of the SomnoSuite.
 - 2) the side-stream sensor to the interface cable, ensuring that the connection is secure.
2. Insert:
 - 1) the sampling assembly into the back slot of the side stream unit.
 - 2) the sampling needle into the expiratory line of the ventilator as close to the animal as possible.
3. Attach the return line to the expiratory line, close to the ventilator.

For CapnoScan to accurately measure end-tidal CO2, the animal must be connected to a ventilator.

SomnoSuite CapnoScan Setup



Initial Setup

CapnoScan Calibration:

1. From the Co2 Run Screen, touch Setup.
2. Touch More CO2, then Calib CO2 Sensor. Press B to zero the sensor.

Procedure for Use

- 1) From the CO₂ Run Screen, touch Setup.
- 2) Enter the gas parameters.
 - **CO₂ units:** Choose mmHg or %.
 - **Measure RR:** Use CapnoScan to measure the animal's respiration rate. Choosing "Yes With Priority" will allow the CapnoScan's MeasRR readings to override MouseSTAT's MeasRR readings.
 - **RR range:** Choose the expected respiration rate range for your animal. (This can be adjusted from the CO₂ Run Screen by pressing and turning Dial B.)
 - **Gas temp:** Choose the temperature of the expiratory gas. When measuring an animal's ETCO₂, use the default value of 35°C.
 - **Pressure:** Set the current barometric pressure for the day.
 - **Percent O₂:** Estimate the concentration of O₂ in expired gas.
 - **Gas type:** Indicate the type of balance gas in use.
 - **Percent NO₂:** Set the concentration of NO₂ in the balance gas.

Note: Whenever these settings are changed, disconnect the CapnoScan from the SomnoSuite, then reconnect it. This will reinitialize the sensor so that the new settings take effect.

- 3) Connect the animal to the ventilator.
The sensor automatically begins readings

To monitor the CO₂ waveform, set the type for one of the charts to "InstCO₂". (See page 13.)

CapnoScan TroubleShooting

Problem	Possible Cause	Solutions
CO ₂ readings are low or incorrect.	Poor sampling needle placement	<ul style="list-style-type: none"> Place the sampling needle into the expiratory tubing as close to the animal as possible.
	Incorrect compensation settings	<ul style="list-style-type: none"> Enter all gas compensations as accurately as possible. Zero the CapnoScan relative to the airway adapter.
There are no readings.	CapnoScan not running or not connected	<ul style="list-style-type: none"> Ensure that all connections are tight, especially at the back of the SomnoSuite. Ensure that the CapnoScan is running.
	Sampling tube dirty or damaged	<ul style="list-style-type: none"> Ensure that the sampling tube is not wet, soiled or damaged. Remove the sampling assembly from the CapnoScan sensor and clean the window gently.

CapnoScan Sensor Maintenance

- Replace the sampling assembly if wet or soiled. CapnoScan sampling assemblies are designed to be disposable.
- When the CapnoScan sensor is not in use, gently coil the cables and store them in their package to prevent any dust or debris from entering the sampling assembly port.
- Gently wipe the sensor clean between uses.



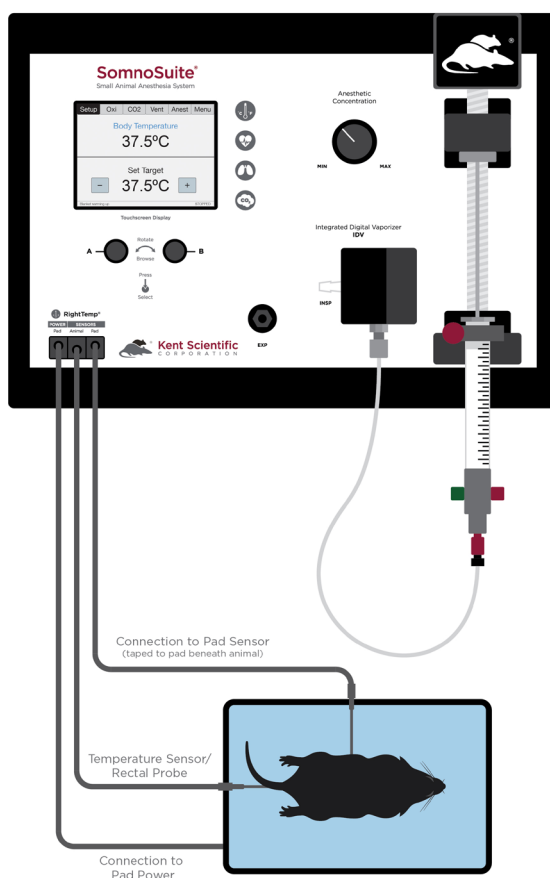
RightTemp Temperature Monitor and Homeothermic Warming



Set Up Hardware

1. Connect the warming pad to the **Pad Power** port on the front of the SomnoSuite.
2. Choose one probe as the body temperature sensor, and the other as the pad temperature sensor.
 - The probes are fully interchangeable.
3. Connect the body temperature sensor to the **Animal Sensor** port.
4. Connect the pad sensor to the **Pad Sensor** port

Pad and Body Temperature Sensors Connected to SomnoSuite®



5. Secure the pad temperature sensor in the center of the warming pad using tape, etc.

If using the included disposable pad covers, make sure the sensor is positioned prior to covering the pad.

6. We recommend that you secure the Pad Temperature Sensor to the warming pad directly beneath the animal. If surgical drapes or other barriers are used, place the sensor on the top layer closest to the animal.
7. Apply tape or other adhesives on the black portion of the cable. Taping over the white portion of the sensor may result in damage to the sensor.

Initial Setup

- 1) From the Warm Run Screen, touch Setup.
- 2) Touch Control Warming, and choose the warming method.
 - **Off:** temperature monitoring, no warming
 - **Warming Pad:** temperature monitoring with power adjustment
 - **Homeothermic:** temperature monitoring and control using animal sensor control

Pad Temperature Regulation:

Pad temperature regulation allows you to set and monitor the temperature of the warming pad. This mode requires the use of the pad temperature sensor.

To use Pad Temperature Regulation, connect the pad temperature sensor.

1. Use the – and + icons to set a warming level.
2. The pad will automatically begin to warm.
 - a. The Pad Temperature is displayed in the top half of the screen.

Note: If the sensor should fail during use, the RightTemp will alert you with a beep. The screen will display “No Sensor”, and warming will be reduced to 50% power.

To resolve, reconnect the sensor or touch Setup and then Silence Alarm.



Homeothermic Regulation:

Homeothermic regulation allows you to set and control the body temperature of the animal. The mode requires the use of the body and pad temperature sensors.

To use Unregulated Warming, connect both pad and body sensors.

1. Use the – and + icons to set the target body temperature of the animal.
2. The pad will automatically begin to warm.

Procedure for Use

1. Place the anesthetized animal on the warming pad directly on top of the Pad Sensor.
2. If using Homeothermic regulation, insert the animal temperature probe into the rectum of the animal. Secure the probe if necessary.

Always secure the pad temperature probe beneath the animal.

RightTemp Troubleshooting

Problem	Possible Cause	Solutions
Pad is not heating.	Incorrect settings	<ul style="list-style-type: none"> Ensure that all settings are properly enabled for warming and target temperatures are selected.
	Incorrect or loose connections	<ul style="list-style-type: none"> Ensure that the connection at the back of the SomnoSuite is tight.
Pad is overheating.	Incorrect settings	<ul style="list-style-type: none"> Ensure that all settings are properly enabled for warming and target temperatures are correctly selected. Enable a "Maximum Pad Temp" when type of warming is "Body temp regulated" to prevent overheating.
	Incorrect sensor placement	<ul style="list-style-type: none"> Place pad sensors directly beneath the animal. Place animal sensor rectally only.
"Lost Sensor" alarm	The sensor has been disconnected.	<ul style="list-style-type: none"> Reconnect the temperature sensors.
	Sensor failure	<ul style="list-style-type: none"> Contact Kent Scientific for assistance.

RightTemp Pad and Sensor Maintenance

- Use the disposable warming pad covers to prevent soiling the warming pad.
- Wipe the warming pad clean with a damp cloth if needed. Never saturate the warming pad.
- Gently wipe the sensors clean between uses.

Data Management

For PC Connections

Kent Scientific devices can collect and monitor data using a serial over-USB connection. The data can be uploaded to a variety of programs, including ADI's data acquisition software, LabChart®.

If you do not have LabChart, please contact Kent Scientific for recommended alternatives.

Kent Scientific devices are Windows® compatible only.

Driver Installation

The driver installs automatically the first time you connect your device to a PC via mini-USB cable. If the driver does not install automatically, you can install it manually from <http://www.ftdichip.com/Drivers/VCP.htm>.

COM Port Settings

Bits per second: 115200
Data Bits: 8
Parity: None
Stop bits: 1
Flow Control: DTR: green RTS: green

Upload to a PC

The Upload feature sends data at user-selectable time intervals to a PC through the USB port. SomnoSuite can upload data for up to 20 parameters simultaneously.

To upload data in real time to a PC:

1. Connect your Kent device to a PC.

Ensure drivers are installed, COM port settings have been adjusted, and the program you plan to use is running.

-
2. From any Run Screen, Touch:
 - 1) Menu, then Data Management, then Upload
 3. Choose:
 - 1) The Parameters to upload
 - 2) The timing
 4. Then touch Enable.

The “Always enabled” setting saves data as long as the controller is on. The “Enabled while running” setting is available only if your system contains a RoVent ventilator, and saves data only when the ventilator is running.

History - Internal Storage

The History feature stores parameters records in ASCII format, up to 1000 rows. You can send this data to a PC through the USB port at a later time. Each row can include up to 10 Parameters simultaneously at user-selected time intervals. You can view the data on screen or export the data to a computer after your study is complete.

Data record 1001 will overwrite data record 0001, and so on.

To save data to History:

1. From any Run Screen, Touch:
 - 1) Menu, then Data Management, then History
 2. Choose:
 - 1) The Parameters to save
 - 2) The timing
-

Tip: Changing these settings permanently deletes any data currently saved on the system. Be sure to Export any saved data to a PC prior to making changes.

3) Then touch Enable.

To view saved History:

1. Touch Menu, Config, Data Management, then History. Touch View.

Or

2. From the Menu, touch Return. The SomnoSuite will give you options for your return screen. Select Hist to view history recordings.

To export History to a PC:

1. Connect your Kent device to a PC.

Ensure drivers are installed, COM port settings have been adjusted, and the program you plan to use is running. Refer to the Data Management Guide for more information.

2. From any Run Screen, Touch:

1) Menu, then Data Management, then History

3. Choose:

1) Send New: export only new data since the last export

2) Send All: export all History saved to the device.

Analog

The Analog Output feature sends an analog signal corresponding to a single Parameter to external equipment via a remote cable.

Please contact Kent Scientific for a remote cable if you would like to use this feature.

To configure Analog Output

1. From any Run Screen, Touch:
2. Menu, then Data Management, then Analog Output.
3. Choose a Parameter to output.

The voltage output ranges from 0-3V, with 0V assigned to the low limit of the range, and 3V to the high limit.

See Custom Run Screen on page 13 to set a Range corresponding to the 0-3V output.

General Information

Thank you for purchasing a SomnoSuite. We truly appreciate your business. We strongly advise that you read and study this User's Guide to fully appreciate all the features, benefits, and capabilities of the SomnoSuite.

Contact Information

Kent Scientific Corporation
1116 Litchfield Street
Torrington, Connecticut 06790
E-mail: sales@kentscientific.com

Toll-Free: 888-5RATTUS (888-572-8887)
Outside US: 860-626-1172
Fax: 860-626-1179
Internet: www.kentscientific.com

Disclaimer

Kent Scientific Corporation makes no representations or warranties, expressed, statutory or implied, regarding the fitness or merchantability of the components of this system for any particular purpose. Further, Kent Scientific Corporation is not liable for any damages, including but not limited to, lost profits, lost savings, or other incidental or consequential damages arising from ownership or use of these products, or for any delay in the performance of its obligations under the warranty due to causes beyond its control. In no case shall Kent Scientific Corporation's financial obligation extend beyond the cost of or replacement of the Kent product in question. Kent Scientific Corporation also reserves the right to make any improvements or modifications to these products described in this manual at any time, without notice of these changes. All brand and product names used in this manual are the trademarks of their respective owners.

This product is not designed, intended or authorized for use in human applications.

Product Warranty

The SomnoSuite has a one (1) year warranty including all parts and labor charges. This warranty does not cover damage by any cause including, but not limited to, any malfunction, defect or failure caused by or resulting from unauthorized service or parts, improper maintenance, operation contrary to furnished instructions, shipping or transit accidents, modifications or repair by the user, harsh environments, misuse, neglect, abuse, accident, incorrect line voltage, fire, flood, other natural disasters, or normal wear and tear. Changes or modifications not approved by Kent Scientific Corporation could void the warranty. The foregoing is in lieu of all other expressed warranties. Kent Scientific Corporation does not assume or authorize any party to assume for it any other obligation or liability.

Satisfaction Guarantee

Should you experience difficulty with the SomnoSuite, our Technical Support Group will assist you in trouble-shooting and determining if the product needs to be returned to our facility. We will issue you a Return Manufacturer Authorization (RMA) number before the product is shipped back for repair. It is at the discretion of the manufacturer to replace or repair a defective part or product. Please call Customer Service at 888-572-8887 to obtain a Return Manufacturer Authorization number. Shipments without a RMA number will not be accepted. Please note that after our 30-day return policy period ends, we will be happy to assist you with your application, but cannot issue any credit or refund for a returned SomnoSuite.

Prior to shipment, please clean and decontaminate the product of any chemical, biological, or isotopic contamination. Please include a completed Product Return Form with the shipment. This form can be obtained by contacting Kent Scientific Customer Service at 888-572-8887 or 860-626-1172.

Specifications

Controller

Voltage	12V, 2.5A
Dimensions	29cm (11.41in) x 20cm (7.87in) x 7.6cm (2.97in)
Weight	Without ventilator module: 1.7kg; With ventilator module: 1.9kg

Power Supply

Input	100 to 240V, 50 to 60Hz, 1.0A
Output	12V, 2.5A

RoVent

Control Modes	Volume controlled, pressure controlled
I:E Ratio	1:1 to 1:5
PEEP	Built-in
Respiratory Assist	Automatic or Manual
Sigh Pressure	2cmH ₂ O to 30cmH ₂ O
Sigh Breath	Automatic or Manual
Respiratory Rate Range	20bpm to 400bpm
Tidal Volume Range	0.01 to 12.0mL
Weight Range	3g to 1,250g

MouseSTAT

Heart Rate	Up to 900bpm
Resolution	1%
SpO ₂ Range	70% to 100%
Alarms	5, programmable
Data Export	Yes
SpO ₂ Sensors	Mouse: Soft Touch paw sensor Rat: Soft Touch paw sensor, or large animal sensor Pup: Annular paw or body sensor MRI compatible sensors available

RightTemp Sensors

Resistance	2,252 ohms
Tolerance	+/- 0.2°C
Accuracy	25°C to 45°C
Operating Temperature	-40°C to 80°C
Sensor Diameters	Ball Tip Diameter: 1.65mm max Shaft: 1.5mm
Time Constant	10.0 seconds
Dissipation Constant	0.75m/W (°C)

CapnoScan Sensor

Transducer type	Sidestream CO2 Sensor
Principle of operation	Non-dispersive infrared (NDIR) single beam optics, dual wavelength, no moving parts
Initialization time	Capnogram displayed in less than 15 seconds at an ambient temperature of 25°C, full specifications within 2 minutes
CO2 measurement range	0mmHg to 120mmHg, 0% to 16%, 0kPa to 20kPa (at 760mmHg); Barometric Pressure supplied by host
Rise time	Less than 60ms
CO2 resolution	0.1mmHg at 0mmHg to 69mmHg 0.25mmHg at 70mmHg to 150mmHg
CO2 accuracy	±2mmHg at 0 to 150mmHg
CO2 stability	Short term drift: Drift over four hours shall not exceed 0.8mmHg max Long term drift: Accuracy specification will be maintained over a 120-hour period
Calibration	No routine user calibration required; an airway adapter zero is required when changing to a different style adapter
Airway adapter	< 1cc dead space adapter
Conditions	Operating: 0°C to 45°C, 10% to 90% RH, non-condensing Storage: -40°C to 70°C, <90% RH, non-condensing

SomnoSuite, RoVent, CapnoScan, MouseSTAT and RightTemp are registered trademarks of Kent Scientific Corporation.

Windows is a registered trademark of Microsoft Corporation.

LabChart is a registered trademark of ADInstruments Pty Ltd.







SOMNOSUITE RECOMMENDED FLOW RATES

SOMNOSUITE SERIAL NUMBERS ENDING IN -B

Refer to your User's Manual for complete instructions.

The SomnoSuite uses the Body Weight setting to adjust the flow rate for a Low Profile Face Mask. If another mask style is used, adjust the flow rates manually by navigating to *More Vaporizer > Nose Cone Min Vol.*

Body Weight	Low-Profile Nose Cone (mL/min)	Standard Face Mask (mL/min)	Stereotaxic Mask (mL/min)
Adjustment	DEFAULT	MANUAL	MANUAL
			
>15g	10-25	25-30	30-50
15-25g	25-35	30-60	50-70
25-35g	35-50	50-80	70-90
35-45g	44-55	60-90	90-110
45-60g	55-70	80-120	110-140
60-80g	70-90	90-150	140-180
80g-100g	90-100	120-180	180-210
100-120g	100-120	140-200	200-240
120-140g	120-130	150-220	240-270
140-160g	130-150	180-250	270-300
160-180g	150-160	200-270	300-330
180g-200g	160-180	220-300	330-350
200-300g	180-250	230-400	350-480
300g-400g	250-300	320-500	480-580
400-500g	300-360	400-600	600-720
500-600g	360-420	480-680	720-830
600-700g	420-460	550-770	830-920
700-800g	460-520	620-850	920-1000
800-900g	520-560	680-740	1000, with caution
900-1000g	560-610	740-1000, with caution	1000, with caution
1000-1100g	610-660	820-1000, with caution	Not Recommended
1100-1250	660-730	880-1000, with caution	Not Recommended

Index

airflow.....	4, 10, 12, 20-22	capnoscan setup	32	export	40, 41, 45
air source.....	3, 12, 17	charcoal	3, 17	external ventilator.....	7, 10
alarms	15, 16, 45	chart	8, 13	fixed alarms	16
always enabled.....	40	clamps	10	flow control	39
analog	13, 42	compensation.....	34	flow rate.....	10-12, 20, 21, 47
analog output	42	com port.....	39, 41	flush.....	10, 21
anest.....	2, 8-12, 20-22	compressed gas.....	3, 9, 12, 17	flush time.....	10, 21
anesthesia	8, 10-12, 21, 22	compressed gas port.....	3, 17	gas temp.....	33
anesthesia concentration knob	10, 21, 22	config.....	13, 15, 41	gas type	33
anesthetic.....	8-12, 19-22, 29, 30	control warming	36	glass syringe	12
animal sensor.....	35, 36, 38	data	15, 39-42, 45	hardware.....	3, 17, 28, 31, 35
assist mode.....	23, 24	data mgmt	15	history.....	40, 41
axis.....	13	deadspace.....	11, 19, 22, 25, 26	holding block	11
baffle leaks.....	27	default	23, 33, 47	induction chamber	4, 10, 17, 20
bits	39	dial	9-15, 19-22, 24, 28, 33	induction min vol.....	12
body temperature.....	30, 35, 37	dial command.....	14	inlet.....	3, 5
body temp regulated.....	38	dial function	14	inspiration	23
body weight	20-23, 25, 47	dial menu.....	14	inspiratory port	4
breath	23-25, 45	driver.....	39	inspiratory pressure....	20, 23, 24
breath cycle.....	23-25	empty points.....	11	insp port	17
calib & tests	19, 20, 25, 26	enable	38, 40, 41	interface cable.....	28, 30, 31
calib co2 sensor	32	enabled while running.....	40	internal pump	3, 9, 17
calibration	8, 11, 19, 25, 26, 32, 46	endotracheal tube	17-19, 21, 22, 25, 26	internal storage.....	40
canister.....	3, 17	exhaust.....	3, 5, 17, 25, 26	intubation connector tubing	17, 18
capnoscan port.....	31	exhaust port.....	3, 17, 25	isoflurane	12

kent device	39, 41	parameters.....	2, 13, 15, 33, 39, 40	righttemp	29, 36, 38, 45, 46
leak test	25-27	param locations	13	room air.....	3, 9, 12
low baffle pressure	26, 27	parity.....	39	rr range	33
maintenance.....	30, 34, 38, 43	pc connections.....	39	run screen	2, 8-10, 12-16, 19-24, 26, 28, 29, 31-33, 36, 40-42
maximum pad temp.....	38	peep	23, 45	sampling needle	31, 34
measure deadspace	19	percent no.....	33	scavenging.....	3, 17
measure rr.....	33	percent o	33	send all	41
metal collar.....	9	port.....	3, 4, 9, 17, 25, 28, 31, 34, 35, 39-41	sensor	28-38, 45, 46
minimum heart rate.....	28	positive end-expiratory pressure	23	set ranges.....	13
mini-usb.....	39	pressure	3, 4, 12, 17, 20-27, 33, 45, 46	set target pressure	23
minute volume.....	12	pressure priority	23	set target volume.....	23
modules	2, 13, 16	prime.....	8, 9	settings	2, 8, 13, 15, 19-25, 28, 29, 33, 34, 38, 39, 41
monitoring	36	prime syringe.....	8	side-stream.....	31
more co.....	32	probe.....	35, 37	sigh breath.....	23, 45
more vaporizer.....	47	profile.....	47	specifications.....	44, 46
more ventilator.....	19, 20, 24, 26	pulse mode	24	syringe.....	8, 9, 11, 12
mousestat	28-30, 45, 46	pusher block	9, 11, 12	syringe plunger	9, 11
nose cone.....	4, 5, 10-12, 47	range	3, 13, 17, 23, 33, 42, 45, 46	syringe size.....	8, 12
nose cone min vol.....	12, 47	recalibrate	22	target pressure.....	21, 22-24
off.....	36	recover	11, 22	target temperatures.....	38
overheating	38	rectum	37	temperature sensor	35, 36, 45
oxiwave	29	remote cable.....	24, 42	tidal volume.....	19-23, 25, 26, 45
pad power.....	35	remove syringe	8	timing.....	40
pad sensor	35, 37	respiration rate	21-24, 33	trigger.....	15, 24
pad temperature regulation	36			triggered alarm	16
param.....	13				

triggers menu	24
tubing configuration	4, 17, 19
tv	26
type anest	8
unregulated	37
upload.....	39, 40
usb connection.....	39
vaporizer.....	9, 12, 47
vaporizer block	9, 12
ventilator	7, 10, 17-26, 31, 33, 40
view	2, 9, 16, 29, 40, 41
volleft.....	12
volume priority.....	23
warming.....	29, 35-38
warranty.....	43
yes with priority.....	33
zero sensors	20, 25, 26
zero the capnoscan.....	34
zero the sensor	32



1116 Litchfield Street
Torrington, Connecticut 06790
Local: 860-626-1172 Toll-Free: 888-572-8887