

# Ultima Dual Airflow Pressure Sensor™ Kit

## Model 0580Pes

### User Guide



A  
Braebon Medical Corporation  
Product

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# Intended Use

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is intended for use during sleep disorder studies as a measure of esophageal pressure and/or respiratory airflow for recording onto a data acquisition system.

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is a battery-powered pressure transducer that uses state-of-the-art-miniaturized technology to detect and reproduce waveforms associated with either esophageal pressure or respiratory airflow from both the nose and mouth. Respiratory pressures are converted into voltage signals compatible with a variety of data acquisition systems.

The differential pressure system uses either Cooper Surgical's single-use air-filled, esophageal catheters (Cooper Model 47-9005 or BRAEBON Model 0591) with the custom BRAEBON safety filter and adapter (Model 0583Pes); custom BRAEBON cannulas (Model 0589, 0588, 0582s, or others); or standard O<sub>2</sub> cannulas with the BRAEBON safety filter (Model 0583). The 0.2-micron hydrophobic safety filters used with the esophageal catheter and cannulas prevent the spread of contaminants between patients and prevents moisture damage to the pressure sensor. The esophageal catheter connects to the oral input only. The cannula attaches to either the positive nasal or oral input of the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes).




The sensor detects and amplifies pressure swings from the cannula using a stable pressure transducer capable of detecting differential pressures in the  $\pm 50$  cm H<sub>2</sub>O range. The corresponding voltage is then output for data acquisition.

# Safety Information

For your personal safety, please read the safety conventions and the warnings and cautions in this manual.

## Safety Conventions

These are the safety conventions for this manual. The table below lists the safety symbol, the name for the symbol, and the meaning of the symbol.

	<b>Warning</b>	The <b>Warning</b> message appears in the manual before procedures or tasks that must be strictly observed to avoid patient injury or harm.
	<b>Caution</b>	The <b>Caution</b> message appears in the manual before procedures or tasks that must be strictly observed to avoid damage to the product.
	<b>Note</b>	The <b>Note</b> message contains important information to help the operator complete a procedure or task correctly.



## Warnings

- The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is for diagnostic use only; it is **NOT** intended as an apnea monitor, and it is **NOT** to be used in life sustaining situations.
- U.S. Federal law restricts this device to sale by or on the order of a physician.
- Always use a new single-use Cooper Surgical Esophageal Catheter (Cooper Model 47-9005 or BRAEBON Model 0591) with a new BRAEBON safety filter and adapter (Model 0583Pes) to prevent the spread of contaminants between patients.
- Always use a new single-use Ultima Airflow Pressure Cannula (Model 0589, 0588, 0582s, or others) and a new BRAEBON safety filter (Model 0583) with each patient to prevent the spread of contaminants between patients.
- Always use a new single-use BRAEBON safety filter with each patient. The BRAEBON safety filter is required to prevent the spread of contaminants between patients and to prevent moisture damage to the pressure sensor. Failure to use the BRAEBON safety filter will void the warranty.
- To prevent dust contamination to the pressure sensor always keep safety filters attached to the unit and change the safety filters immediately prior to next patient use.



## Cautions

- Use only the BRAEBON approved single-use esophageal catheters (Model 0591) (manufactured by Cooper Surgical Model 47-9005) to obtain esophageal pressure signals (PES) or damage may occur to the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes).
- Use only isopropyl alcohol pads to clean the pressure sensor.
- Do **NOT** immerse the pressure sensor (Model 0585Pes) in any liquids.
- Do **NOT** steam autoclave or gas sterilize the pressure sensor or damage will result.
- Use two 1.5V AA batteries or damage to the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) will result. Do **NOT** mix battery types. Do **NOT** insert the batteries backwards.
- If mounting the pressure sensor on the wall, mount the unit upside down to minimize the likelihood of bending/kinking the cannula tubing.

# Features of the Ultima Dual Airflow Pressure Sensor™

- **Esophageal catheter compatible using oral input** The oral input on the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is compatible with single-use air-filled esophageal catheters
- **Six Outputs**
  - Nasal Airflow & Snoring Output Pure or raw nasal airflow pressure with superimposed snoring signal
  - Nasal Airflow Output Filtered nasal airflow pressure with no snoring signal
  - Nasal Snoring Output Snoring signal from upper airway pressure vibrations
  - Oral Airflow & Snoring Output Esophageal pressure when using an esophageal catheter **OR** Pure or raw oral airflow pressure with superimposed snoring signal when using a cannula
  - Oral Airflow Output Filtered oral airflow pressure with no snoring signal
  - Oral Snoring Output Snoring signal from upper airway pressure vibrations
- **Three Inputs**
  - Nasal Input Facilitates combining nasal and oral breathing on one channel by connecting a BRAEBON Ultima Oral/Nasal Cannula (Model 0589) to the nasal input only  
Facilitates recording nasal breathing only using any nasal cannula with a BRAEBON Safety Filter (Model 0583) connected to the nasal input only
  - Differential Nasal Input Port Facilitates connection to a CPAP circuit
  - Oral Input Compatible with single-use air-filled esophageal catheters  
Facilitates recording nasal and oral breathing on separate channels by connecting a BRAEBON Ultima Oral & Nasal Dual Lumen Cannula (Model 0588) to both the oral and nasal inputs
- **Gain and Baseline Adjustment**
- **Battery Status Indicator LED** Blinks green every 10 seconds to indicate the batteries are OK  
Blinks red every two seconds to indicate the batteries are low
- **ON/OFF Switch** Auto-Off (after 10 hours run-time)
- **Battery Powered** 2 AA Alkaline Batteries

# Dual Airflow Pressure Sensor™ Kit (0580Pes) Contents

- One Ultima Airflow Pressure Sensor (Model 0585Pes) — Measures esophageal pressure and/or respiratory airflow
- Two Cooper Surgical Esophageal Catheters (Cooper Model 47-9005 or BRAEBON Model 0591)
- One adult dual lumen nasal & oral cannula with hydrophobic filter (Model 0588)
- One adult nasal/oral cannula with hydrophobic filter (Model 0589)
- Two adult nasal micro cannulas with hydrophobic filter (Model 0582s)
- 2 packages of BRAEBON safety filters with adapters (Model 0583Pes 2 pack)
- One AC Interface cable (Model 0592)
- One DC Interface Cable (Model 0594)
- Two 1.5 volt AA alkaline batteries (installed when shipped from factory)
- One User Guide

# About the Ultima Dual Airflow Pressure Sensor™

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is a differential pressure transducer that detects and amplifies pressure swings in the  $\pm 50$  cm of H<sub>2</sub>O range. The voltage corresponding to the differential pressure is output for data acquisition.

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) has three inputs and six outputs with an output range of  $\pm 5$  volts. With the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes), you can adjust the gain and baseline controls for both the nasal and oral output channels. The output range will vary according to the gain and baseline settings you used during recording.



**Figure 1** The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes)



## Inputs

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) has three inputs: nasal input, nasal differential input (CPAP connection), and oral input.

### Nasal Input

With the nasal input, you can either **combine** oral and nasal breathing into one channel using a single lumen, oral/nasal cannula connected to the nasal input or you can record **nasal** breathing **only** using any nasal cannula connected to the nasal input.

### Nasal Differential Input

With the nasal differential input, you can subtract a known pressure from the nasal baseline by connecting your CPAP circuit to the nasal differential input.

The nasal differential input is your baseline for the nasal input. If you do not connect anything, then you are using atmospheric pressure as your baseline for your nasal input. However, if you attach a CPAP circuit to the nasal differential input, then you are using the CPAP pressure as the baseline instead of atmospheric pressure.







### Oral Input

With the oral input, you can record esophageal pressure using an esophageal catheter or record oral and nasal breathing on **separate** channels using a dual lumen, oral and nasal cannula connected to both the oral and nasal input.

## Outputs

On the left side of the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes), there are six outputs — three nasal outputs and three oral outputs. See Table 1 Output Types. You may choose to record from one to six outputs from the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes).

**Table 1 Output Types**

Output Name	Signal Type	Example of Signal
<ul style="list-style-type: none"> <li>Nasal Airflow &amp; Snoring Output</li> </ul>	Pure or raw nasal airflow pressure with superimposed snoring signal	 <p>Nasal Airflow and Snoring (Unfiltered)</p>
<ul style="list-style-type: none"> <li>Nasal Airflow Output</li> </ul>	Filtered nasal airflow pressure with no snoring signal	 <p>Nasal Airflow (Snoring Filtered Out)</p>
<ul style="list-style-type: none"> <li>Nasal Snoring Output</li> </ul>	Snoring signal from upper airway pressure vibrations	 <p>Nasal Snoring (Airflow Filtered Out)</p>
<ul style="list-style-type: none"> <li>Oral Airflow &amp; Snoring Output</li> </ul>	Esophageal pressure <b>OR</b> Pure or raw oral airflow pressure with superimposed snoring signal	 <p>Oral Airflow and Snoring (Unfiltered)</p>
<ul style="list-style-type: none"> <li>Oral Airflow Output</li> </ul>	Filtered oral airflow pressure with no snoring signal	 <p>Oral Airflow (Snoring Filtered Out)</p>
<ul style="list-style-type: none"> <li>Oral Snoring Output</li> </ul>	Snoring signal from upper airway pressure vibrations	 <p>Oral Snoring (Airflow Filtered Out)</p>

## Gain and Baseline Adjustment Screws

On the right side of the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes), there are four, 20-turn screws that allow you to adjust both the gain and baseline settings for both the nasal and oral outputs. Under most circumstances, however, you will **NOT** need to make adjustments.

### Gain adjustment screws

There are two gain adjustments screws: a nasal gain screw and an oral gain screw. The nasal gain screw allows you to adjust the gain for all the nasal outputs. Similarly, you can adjust the gain for all the oral outputs with the oral gain screw.

By adjusting the gain or sensitivity, you enlarge or reduce the size of the waveform on the display of your recording system. You do not change the actual recorded signal.

By turning the gain screw clockwise, you increase the sensitivity to make the signal larger. By turning the gain screw counterclockwise, you decrease the sensitivity to make the signal smaller.

### Baseline adjustment screws

There are two baseline adjustments screws: a nasal baseline screw and an oral baseline screw. The nasal baseline screw allows you to adjust the baseline for all nasal outputs. Similarly, you can adjust the baseline for all the oral outputs with the oral baseline screw.



**Caution:** Do **NOT** adjust the baseline without a voltmeter.

When you turn the baseline adjustment screw, you change the position of the waveform on the display of your recording system. You move the waveform further up or further down on the display so you can view the signal peak-to-peak. The baseline is set to zero volts in the factory.

By turning the baseline screw clockwise, you move the baseline higher; that is, increase the baseline voltage. By turning the baseline screw counterclockwise, you move the baseline lower; that is, decrease the baseline voltage.

## Battery Status Indicator LED

Centred on the face of the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes), there is a Battery Status Indicator LED. The LED flashes either green or red to indicate the status of the batteries in the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes). See Table 2 Battery Status.

Usually, the batteries will last about 30 - 50 nights (8-hour recordings) depending on the battery type used. When the Battery Status Indicator LED blinks red, replace your batteries with new AA alkaline batteries. See the Troubleshooting section, if the LED is not blinking.

**Table 2 Battery Status**

LED Color	Period	Status
One Green Blink, One Red Blink	At Start-up Only	Pressure Sensor is ON
GREEN	Every 10-15 Seconds	Battery OK
RED	Every 2 Seconds	Battery LOW

# Connecting the Ultima Dual Airflow Pressure Sensor™



**Warning:** With each patient, always use either a new single-use Cooper Surgical Esophageal Catheter (Cooper Model 47-9005 or BRAEBON Model 0591) with a new safety filter and adapter (Model 0583Pes) or a new single-use Ultima Airflow Pressure Cannula (Model 0589, 0588, 0582s, or others) with a new safety filter (Model 0583). The safety filter is required to prevent the spread of contaminants between patients and to prevent moisture damage to the pressure sensor.



**Caution:** To prevent dust contamination to the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes), keep safety filters attached to the unit at all times and change the safety filters immediately prior to patient use.



**Note:** For esophageal catheter insertion instructions, refer to the documentation accompanying the Cooper Surgical Esophageal Balloon Catheter Set (Cooper Model 47-9005 or BRAEBON Model 0591).

Connecting the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) to your sleep system and to the patient consists of four steps:

STEP 1: Connect the pressure sensor to your sleep recording system.

STEP 2: Connect the safety filter on the esophageal catheter or cannula to the pressure sensor inputs.

STEP 3: Insert the esophageal catheter OR position the cannula on the patient.

STEP 4: Adjust the gain, if necessary.

# STEP 1: Connect the pressure sensor to your sleep recording system.

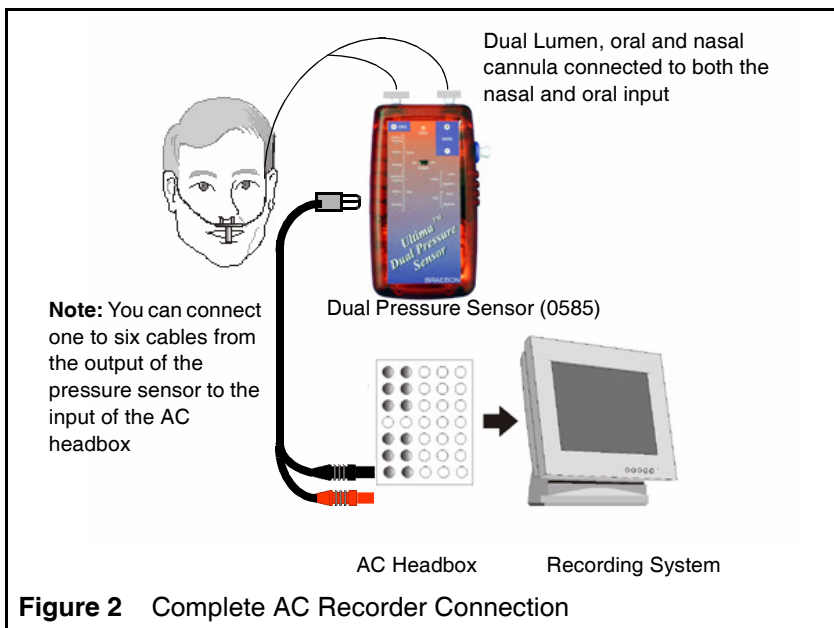
The connection set-up and recorder settings for the pressure sensor depend upon the sleep recording system you are using and whether you plan to use an esophageal catheter. For esophageal pressure recordings, you must use a DC amplifier, DC input, or a multiplexer connection.

<ul style="list-style-type: none"> <li>• <b>AC Amplifier</b></li> </ul>	See "To connect to an AC amplifier" on page 14.
<ul style="list-style-type: none"> <li>• <b>DC Amplifier, DC Input, or Multiplexer connection</b></li> <li>• <b>Using an esophageal catheter</b></li> </ul>	See "To connect to a DC amplifier, DC Input, or Multiplexer connection and/or record esophageal pressure" on page 16.
<ul style="list-style-type: none"> <li>• <b>Alice<sup>a</sup></b></li> </ul>	See "To connect to Alice (Respironics)" on page 18.

a. Alice is a registered trademark of Respironics Inc.

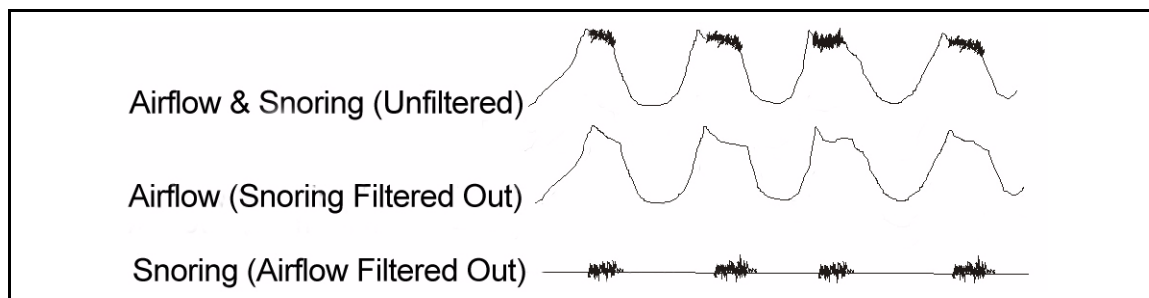
## To connect to an AC amplifier

1. Using the AC Interface cable (Model 0592), connect a 1 mm keyhole connector to each of the outputs you would like to record. You may choose to record from one to six outputs.
2. Connect the 1.5 mm safety pin connectors to your headbox.
3. Use the BRAEBON recommended AC recorder settings listed in Table 3 AC Recorder Settings.



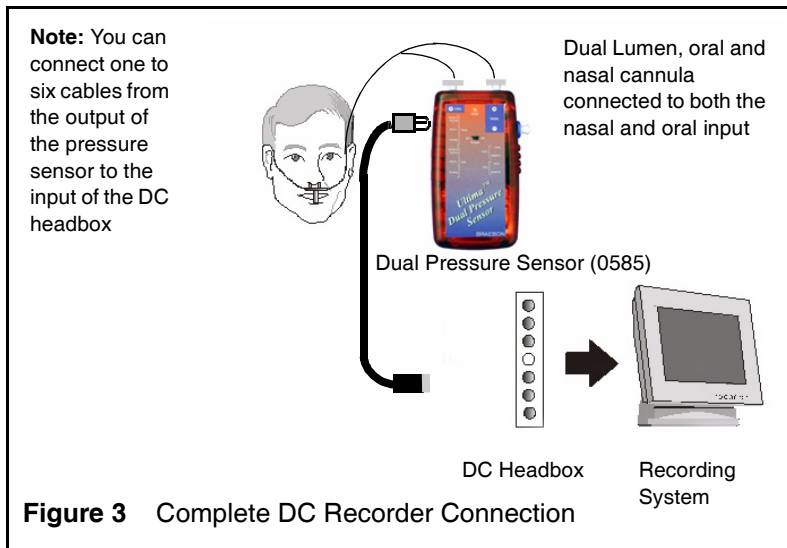
**Table 3 AC Recorder Settings**

Channel Output	Low Frequency Filter (time constant)	High Frequency Filter	Gain/Sensitivity	Sampling Rate
Airflow & Snoring Output	0.05 Hz or lower (3 seconds or longer)	70 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	100 Hz or greater
Airflow Output	0.05 Hz or lower (3 seconds or longer)	10 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	20 Hz or greater
Snoring Output	10 Hz or lower (0.16 seconds or longer)	70 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	100 Hz or greater



## To connect to a DC amplifier, DC Input, or Multiplexer connection and/or record esophageal pressure

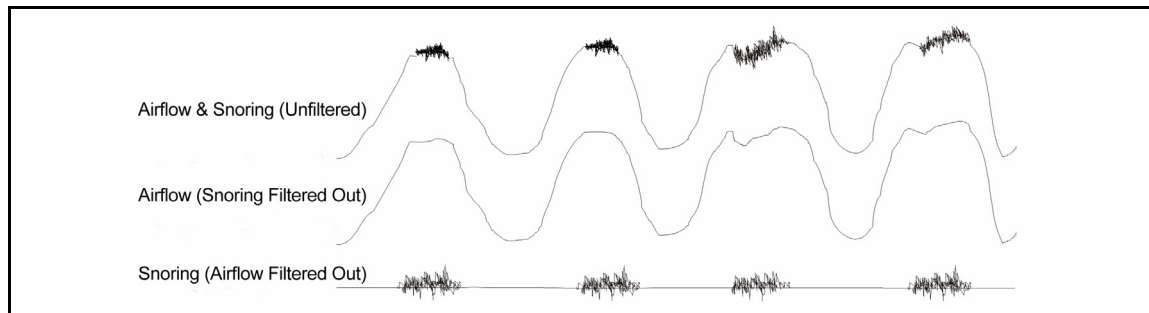
- Using the DC Interface cable (Model 0594), connect a 1 mm keyhole connector to each of the outputs you would like to record. **Note:** For esophageal pressure recordings, plug a 1 mm keyhole connector into the oral airflow and snoring output. See Figure 4 for a diagram of a complete esophageal catheter connection.
- Connect the 1/8 inch female stereo connector to your DC amplifier.



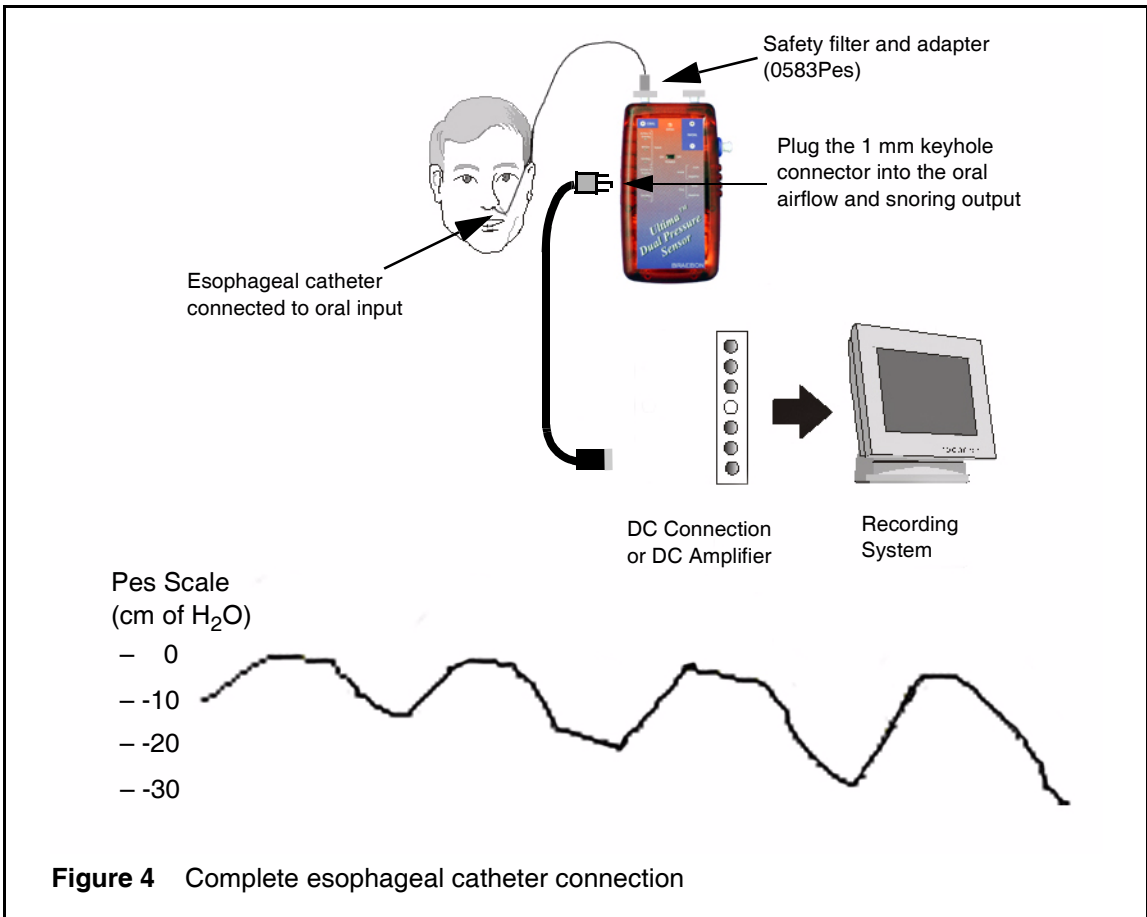
- Use the DC recorder settings listed in Table 4 DC Recorder Settings.

**Table 4 DC Recorder Settings**

Channel Output	Low Frequency Filter (time constant)	High Frequency Filter	Gain/Sensitivity	Sampling Rate
Airflow & Snoring Output	N/A	70 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	100 Hz or greater
Airflow Output	N/A	10 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	20 Hz or greater
Snoring Output	N/A	70 Hz or higher	20 mV/cm or 1000 x increase or decrease as necessary	100 Hz or greater

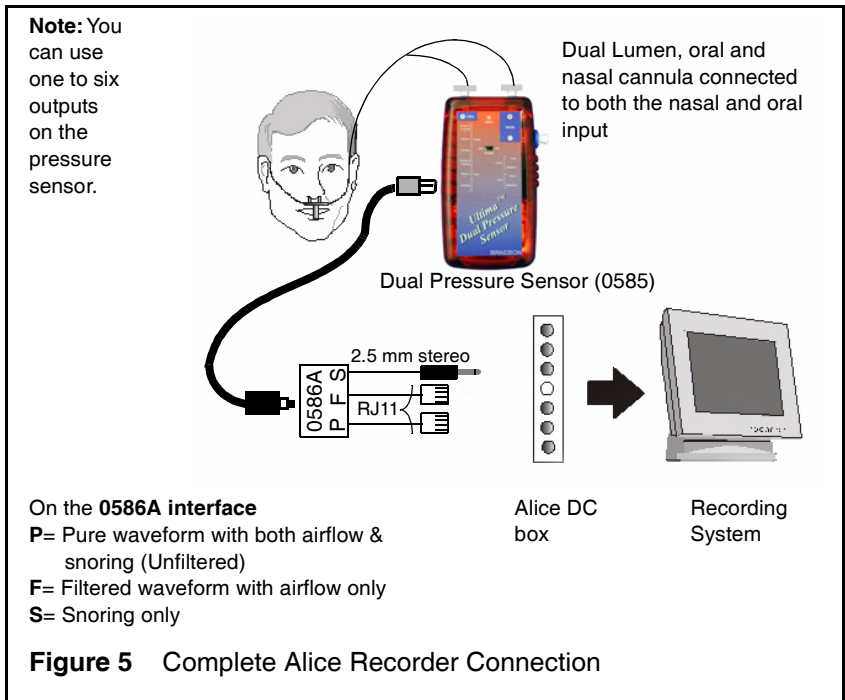






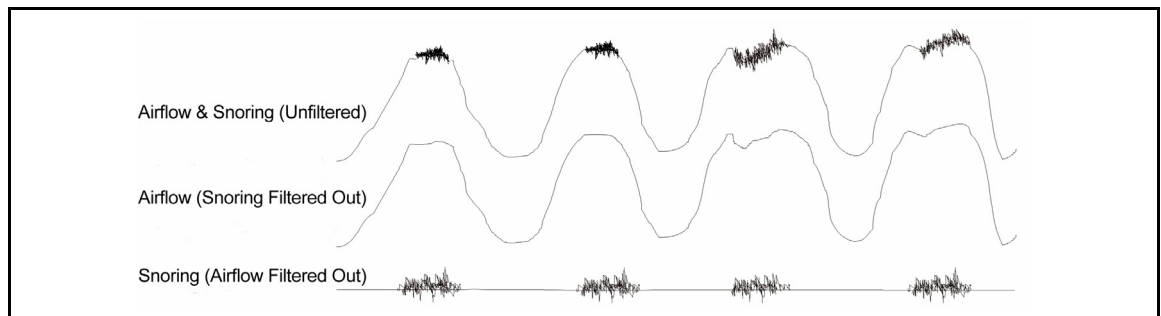
## To connect to Alice (Respironics)

- Using the Alice Interface cable (Model 0593), connect a 1 mm keyhole connector to each of the outputs you would like to record. You may choose to record from one to six outputs.
- Connect the RCA connector to the 0586A interface.
- Plug the RJ11 connectors into your Alice DC box.
- Use the recorder settings listed in Table 5 Alice Recorder Settings.



**Table 5 Alice Recorder Settings**

Channel Output	Low Frequency Filter (time constant)	High Frequency Filter	Gain/Sensitivity	Sampling Rate
Airflow & Snoring Output	N/A	70 Hz or higher	7	N/A
Airflow Output	N/A	10 Hz or higher	7	N/A
Snoring Output	N/A	70 Hz or higher	7	N/A

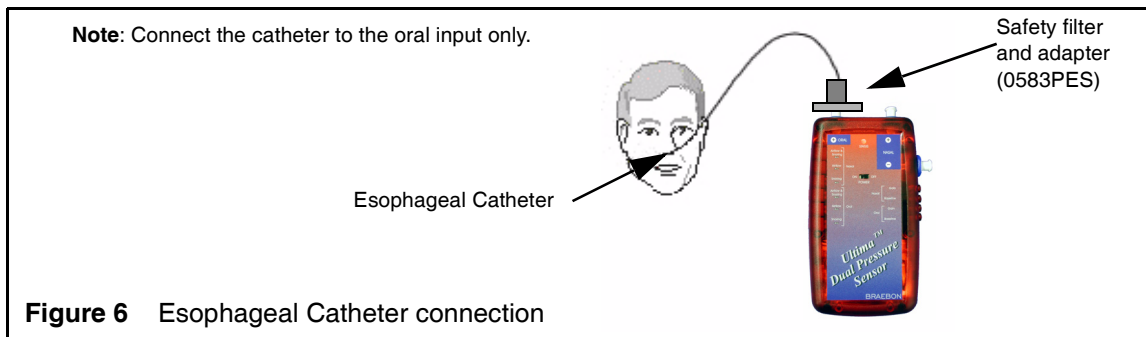


## STEP 2: Connect the safety filter on the esophageal catheter or cannula to the pressure sensor inputs.

The inputs you use on the pressure sensor depend upon whether you plan to record esophageal pressure, record nasal and oral breathing on separate channels or on a single channel, record nasal breathing only, or perform a CPAP titration study in which you subtract a known pressure from the nasal baseline.

- **Record esophageal pressure** Using a new single-use Esophageal Catheter (Cooper Model 47-9005 or BRAEBON Model 0591) connected to a BRAEBON safety filter and adapter (Model 0583PES), connect to the oral input. See Figure 6 for an illustration of the catheter connected to the oral input.
- **Record nasal and oral breathing on separate channels** Using a BRAEBON Ultima Oral & Nasal Dual Lumen Cannula (Model 0588), connect the safety filters on the cannula to the nasal and oral input ports.
- **Combine nasal and oral breathing into one channel** Using a BRAEBON Ultima Oral/Nasal Cannula and filter (Model 0589), connect the safety filter on the cannula to the nasal input port only.
- **Record nasal breathing only** Using any cannula with a BRAEBON Safety Filter (Model 0583) attached, connect to the nasal input port only.
- **Subtract a known pressure from the nasal baseline**
  1. Connect the CPAP circuit to the BRAEBON Safety Filter (Model 0583). See Figures 7, 8, and 9 for illustrations of different CPAP connection options.
  2. Connect the safety filter to the nasal differential port on the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes).

**NOTE:** You will only be able to affect the baseline on the nasal output signals.





**Figure 7** CPAP adapter connection and connection to the nasal differential input



**Figure 8** CPAP mask connection and CPAP tee connection to the nasal differential input



**Figure 9** CPAP mask connection

## STEP 3: Insert the esophageal catheter OR position the cannula on the patient.



**Warning:** With each patient, always use either a new single-use Cooper Surgical Esophageal Catheter (Cooper Model 47-9005 or BRAEBON Model 0591) with a new safety filter and adapter (Model 0583Pes) or a new single-use Ultima Airflow Pressure Cannula (Model 0589, 0588, 0582s, or others) with a new safety filter (Model 0583) to prevent the spread of contaminants between patients and to prevent damage to the pressure sensor.



**Note:** For esophageal catheter insertion instructions, refer to the documentation accompanying the Cooper Surgical Esophageal Balloon Catheter Set (Cooper Model 47-9005 or BRAEBON Model 0591).

1. Position the Ultima Pressure Sensor Cannula (Model 0589, 0588, 0582s, or others) on the patient and place the cannula sensor tips into the nose and in front of the mouth as illustrated in Figure 10.
2. Once the nasal/oral prongs are comfortably placed, slide the cannula tubing over the patient's ears and down the front of the chest.
3. Slide the cinch tubing toward the neck for a comfortable fit under the chin.



**Figure 10** Positioning the cannula



**Caution:** If you are mounting the pressure sensor on the wall, mount the unit upside down to minimize the likelihood of bending/kinking the cannula tubing.

4. Mount the pressure sensor on the wall or bedside table.

## STEP 4: Adjust the gain, if necessary.

The Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) contains four 20-turn screws which allow for precise adjustment of both gain and baseline settings for the nasal and oral outputs. Under most circumstances, you will **NOT** need to make any adjustments.

### Adjusting the gain

By turning the gain screw clockwise or counterclockwise, you enlarge or reduce the size of the waveform on the display. You do not change the actual recorded signal when you increase or decrease the gain.

#### To adjust the nasal or oral gain

1. To increase the gain, turn the appropriate gain screw clockwise.
2. To decrease the gain, turn the appropriate gain screw counterclockwise.

### Adjusting the baseline

When you turn the baseline adjustment screw, you change the position of the waveform on the display of your recording system. By turning the screw clockwise or counterclockwise, you move the waveform further up or further down on the display so you can view the signal peak-to-peak. The baseline is set to zero volts in the factory.



**Caution:** Do **NOT** adjust the baseline without a voltmeter.

#### To adjust the nasal or oral baseline

1. Using the interface cable appropriate to your recording system, connect a 1 mm keyhole connector to either the Nasal Airflow and Snoring output or the Oral Airflow and Snoring output.
2. Connect the voltmeter to the interface cable.
3. Do the following:
  - To move the baseline higher, that is increase the baseline voltage, turn the appropriate baseline screw clockwise.
  - To move the baseline lower, that is decrease the baseline voltage, turn the appropriate baseline screw counterclockwise.

# Calibrating the Ultima Dual Airflow Pressure Sensor™

The quantitative data you require for esophageal pressure recording can be obtained when you calibrate the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) with a water manometer. The pressure sensor is already calibrated when it leaves the factory, but you may want to perform additional calibration.

## To calibrate the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes)

1. On the water manometer adjust the baseline water level to 0 cm of H<sub>2</sub>O.
2. Connect the pressure sensor to the voltmeter as shown in Figure 11.
3. Using the voltmeter, verify that the oral and nasal baselines for the pressure sensor are set to the proper value. This is usually zero volts DC.
4. Connect a safety filter (Model 0583) to input on the pressure sensor, and then connect the safety filter to the Pressure Adjust Syringe on the water manometer as shown in Figure 11.
5. Move the Pressure Adjust Syringe until the manometer reads the correct pressure — usually  $\pm 10$  cm H<sub>2</sub>O.
6. Adjust the gain on the pressure sensor until the voltage is set to the proper value — usually  $\pm 0.75$  volts DC is set to equal  $\pm 10$  cm H<sub>2</sub>O.
7. Repeat steps 5 and 6 for the remaining inputs.

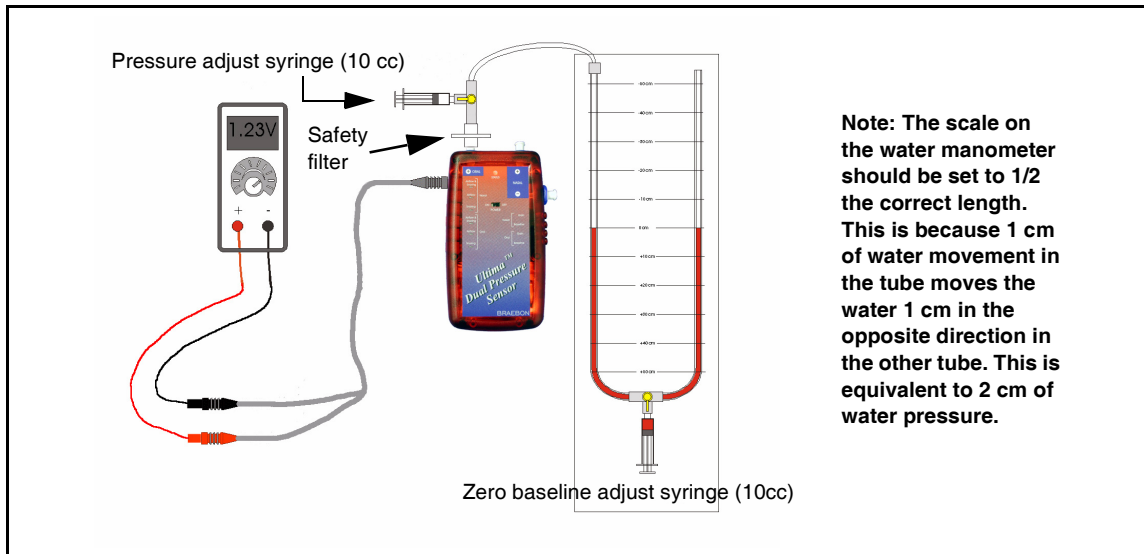


Figure 11 Calibration schematic

# Maintaining the Ultima Dual Airflow Pressure Sensor™



**Warning:** With each patient, always use either a new single-use Cooper Surgical Esophageal Catheter (Cooper Model 47-9005 or BRAEBON Model 0591) with a new safety filter and adapter (Model 0583Pes) or a new single-use Ultima Airflow Pressure Cannula (Model 0589, 0588, 0582s, or others) with a new safety filter (Model 0583). The safety filter is required to prevent the spread of contaminants between patients and to prevent moisture damage to the pressure sensor.



**Caution:** To prevent dust contamination to the pressure sensor always keep safety filters (Model 0583) attached to the unit and replace the safety filters immediately prior to the next patient.



**Caution:** Use only isopropyl alcohol pads to clean the pressure sensor. Never immerse the pressure sensor (Model 0585Pes) in any liquids. Do **NOT** steam autoclave or gas sterilize the pressure sensor or damage will result.

Continued use of BRAEBON safety filters (Model 0583) is the best way to maintain your pressure sensor. The safety filter extends the life of the pressure sensor because it prevents particulates and moisture from damaging the pressure sensor.

## To maintain your Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes)

1. Attach a safety filter and adapter (Model 0583Pes) to **EVERY** esophageal catheter you connect to the pressure sensor.
2. Attach a safety filter (Model 0583) to **EVERY** cannula you connect to the pressure sensor.
3. When you store the pressure sensor, connect a safety filter (Model 0583) to each input on the pressure sensor to prevent dust contamination.
4. Replace your esophageal catheter (Model 0591), Ultima Airflow Pressure Cannula (Model 0589, 0588, 0582s, or others), and safety filters (Model 0583 or Model 0583Pes) after each use to prevent the spread of contaminants between patients.
5. Only clean the pressure sensor with isopropyl alcohol pads.

For additional information, refer to the APIC guidelines for selection and use of disinfectants (American Journal of Infection Control, Vol. 18, number 2, April, 1990).



# Replacing the Battery

The batteries will last about 30 - 50 nights (8-hour recordings) depending on the battery type used.



**Caution:** Use only 1.5V AA batteries or damage to the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) will result. Do **NOT** mix battery types. Do **NOT** insert the batteries backwards or damage may occur to the pressure sensor.



**Caution:** Before inserting the batteries, note the polarity of the batteries indicated at the bottom of the battery compartment. Do **NOT** insert the batteries backwards or damage may occur to the pressure sensor.

## To replace the batteries

1. Press down and slide out the battery cover.
2. Remove the old batteries from the compartment.
3. Insert the new 1.5 volt AA batteries according to the positive (+) and negative (-) polarities indicated at the bottom of the battery compartment.
4. Slide the battery cover back onto the casing, ensuring the edges are sealed.

# Troubleshooting

If you have difficulty using this product, please verify the following:

Problem	Solution
LED blinks Red every two seconds	<ul style="list-style-type: none"><li>• Replace the batteries.</li></ul> <p>The batteries will last between 30 to 50 nights (8-hour recordings) depending on the batteries used (i.e., Alkaline vs. Lithium).</p>
LED does not blink	<ul style="list-style-type: none"><li>• Switch off the unit. Wait 10 seconds, and then switch on the unit again.</li><li>• Replace the batteries.</li><li>• Contact technical support at 1-888-462-4841. When you call, have your model number, serial number, and a pen and paper ready.</li></ul>
Spikes in the signal every 10 seconds	<ul style="list-style-type: none"><li>• Replace the batteries.</li></ul>
Poor signals	<ul style="list-style-type: none"><li>• Verify that the Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) is properly attached to both the patient and the headbox.</li><li>• Verify that all amplifier recorder connections are functional.</li><li>• Verify that the gain and filter settings are correct.</li></ul>

# Product Specifications

<b>Sensor Technology</b>	Two Differential Pressure Transducers (with built-in circuit overload protection)
<b>Input Types</b>	Esophageal (Oral Input Only)  Nasal  Nasal Differential (CPAP)  Oral
<b>Output Types</b>	Nasal Airflow and Snoring (Unfiltered)  Nasal Airflow (Snoring filtered out)  Nasal Snoring (Airflow filtered out)  Esophageal Pressure <b>OR</b> Oral Airflow and Snoring (Unfiltered)  Oral Airflow (Snoring filtered out)  Oral Snoring (Airflow filtered out)
<b>Maximum Output Range</b>	±5 Volts
<b>Gain and Baseline</b>	Variable
<b>Input Pressure Range</b>	±50 cm H <sub>2</sub> O
<b>Esophageal Catheter</b>	Single-use esophageal balloon catheter set manufactured by Cooper Surgical (Cooper Model 47-9005 or BRAEBON Model 0591)
<b>Size (L x W x H)</b>	5.0 x 2.8 x 0.9 inches (125 x 70 x 24 millimeters)
<b>Weight in grams (including battery)</b>	150
<b>Battery Type</b>	2 x AA batteries
<b>Estimated Battery Life (# of 8-hour nights)</b>	250 hours (30)
<b>Auto-off (after 10 hours run-time)</b>	✓

# Warranty

BRAEBON MEDICAL CORPORATION warrants to the first consumer that this Ultima Dual Airflow Pressure Sensor™ (Model 0580Pes) (the "Sensor"), when shipped in its original container, will be free from defective workmanship, performance and materials and agrees that it will, at its option, either repair the defect or replace the defective Sensor or part thereof at no charge to the purchaser for parts or labor for a time period of one year from the date of purchase. The warranty described herein shall be the sole and exclusive warranty granted by BRAEBON MEDICAL CORPORATION and shall be the sole and exclusive remedy available to the purchaser. Use of the Sensor constitutes total and complete acceptance of this warranty. Correction of defects, in the manner and for the time period described herein, shall constitute complete fulfillment of all liabilities and responsibilities of BRAEBON MEDICAL CORPORATION to the purchaser with respect to the Sensor and shall constitute full satisfaction of all claims, whether based on contract, negligence, strict liability or otherwise. In no event shall BRAEBON MEDICAL CORPORATION be liable, or in any way responsible, for any loss of revenues or damage, direct, incidental, or consequential, including property damage, loss of profit, or personal injury resulting from the use or misuse of, or the inability to use this product. Nor shall BRAEBON MEDICAL CORPORATION be liable, or in any way responsible, for any damages or defects in the Sensor which were caused by abuse, misuse, tampering, neglect, incorrect battery type, or repairs or attempted repairs performed by anyone other than an authorized servicer. Specifications subject to change without notice.



**Caution:** Failure to use the correct battery type as stated in this User Guide will void the warranty. Failure to use the BRAEBON hydrophobic filter (Model 0583 or Model 0583Pes) will void the warranty.

## In the US:

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1-888-462-4841  
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