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SCICON R&D, INC.

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**Developers of the next generation of affordable signal analysis software
And portable multi-channel data acquisition systems for
MAC & PC.**

Calibration Device

CAL110220

For Air Pressure & Air Flow

Calibration System Basics

CAL110220 is composed of a combination of pressure and flow mechanism in one unit. Flow is one side and pressure is on the other.

The power input is universal for 120-240 VAC.

In some areas, if the operation of the unit interferes with the X516 system, there may be a ground loop power problem. In such a case, plug the calibration unit into a power source that is different than the computer and the X516 system.

Apply power by plugging into a power source.

Use control valves knob for adjusting the flow rate.
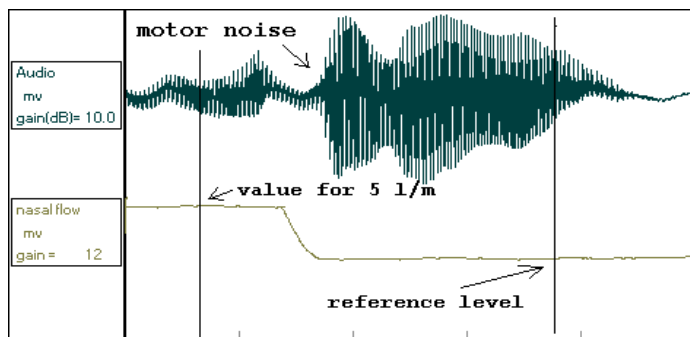
Flow Calibration Procedure
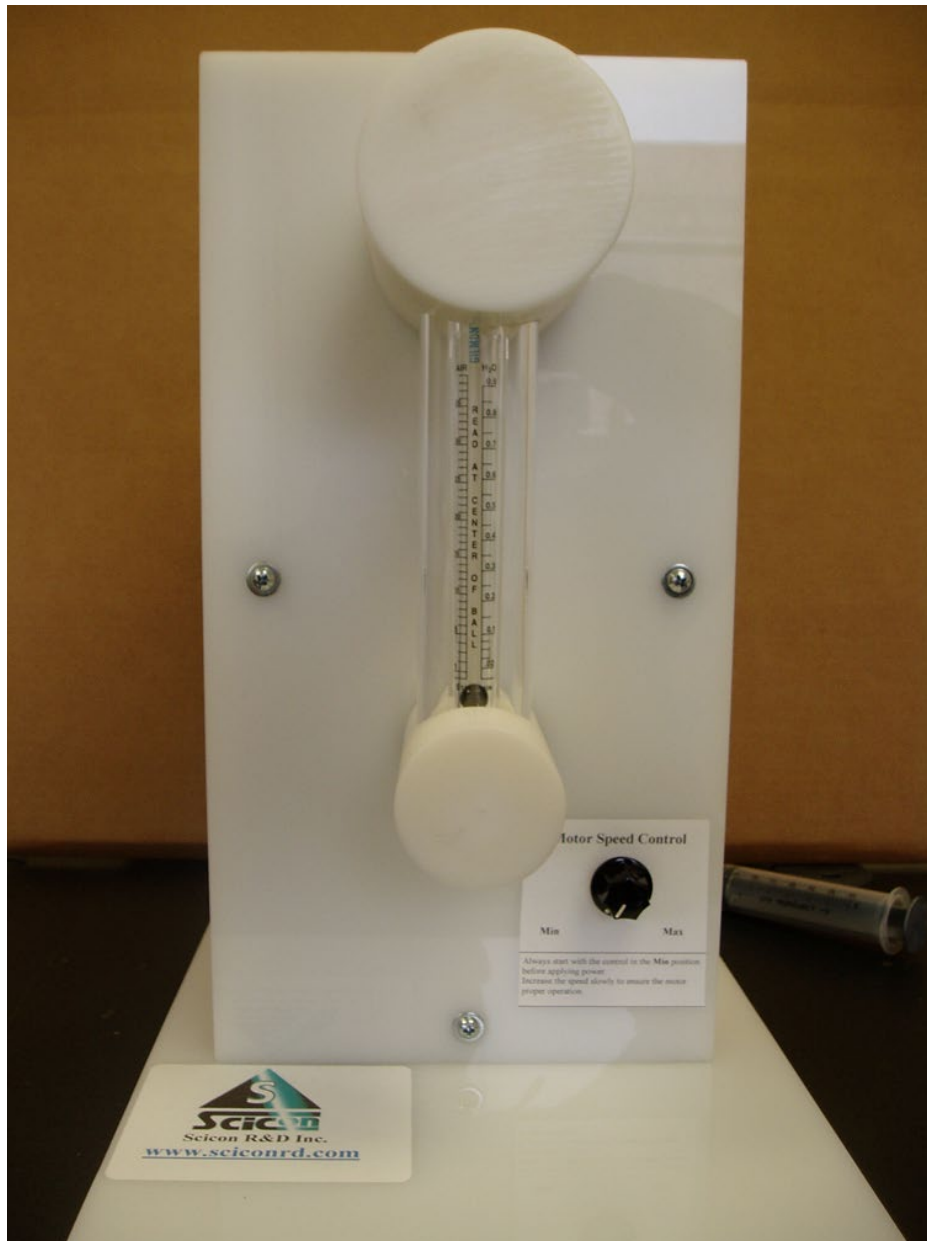
1. Place the oral or nasal mask on the adapter (large white rod) and hold it securely in place.
2. The oral mask should fit tightly against the contour of the rod and a little force is needed to seal the mask against the adapter so that there is no air loss.
3. The nasal mask should fit tightly against the contour of the rod. To ensure a good seal, press the mask firmly against the rod, make sure that the air hole is centered in the mask, and then secure it in place by means of the two Velcro straps.
4. If the fitment is an issue, remove the masks and place the oral or nasal bases directly on top of a black rubber insert on top of the large white rod.
5. The air control knob on the calibration unit is provided for controlling the airflow rate. Always start with the lower flow. Turning the knob **clockwise will DECREASE** and **counter clockwise will INCREASE** air flow.
6. Start the motor by means of On/Off switch, and adjust the flow rate.
7. The flow meter shows airflow rate **in generic scale from 10 to 150. Please review the table for the conversion factor for air. For example, at reading of 90, the air flow is 13094 ml/min or (divide by 60 to get ml/sec) 218 ml/sec**

| Scale (readings)	Flow (ml/min)
150	23105
140	21559
130	19813
120	18073
110	16440
100	14751
90	13094
80	11425
70	9798
60	8276
50	6752
40	5213
30	3737
20	2252
10	797

8.

9. Start a blank file and set the Record time to 10 seconds. Set the flow rate to a low value. While the motor is on and the ball is in the proper spot, start recording. Wait for about 5 seconds, then turn off the motor. When the recording has finished, the display should look like a step with a high value at the beginning and a low value at the end. If the data looks turbulent, click on the channel display in interest, (say ch#1 for oral flow), make a small selection, use the **Analysis->Average Ch:1 (or whichever you have clicked on)** menu to average out the data. This function will average out the selection, hence providing you with one number for the value.

10. Start a blank log file. Place the marker at the location when the motor was off (**reference level**), then use **Analysis->Set DC Channels Reference**. This will use this point as the **zero level**. Then place the marker at the middle of the portion when the motor was on, use **Log->Enter at marker** menu to enter the value at the marker in the log file. This number corresponds to the **5 l/m** of flow rate. (see figure 1)

11. Repeat this process for at least 4 to 5 rate values (e.g. 20, 25, and 30).

12. Save and close the log file.

13. Plot the data by hand or import the log file into any standard statistical program.

14. Depending on how linear the data looks, select either a straight line going through the data points and **the origin**, or a quadratic function.

15. Choose a **straight line**, then calculate the **slope of this line** (see figure 2). This slope is the **"B"** value in the calibration equation Physiological unit = Bx + C (where C is the intercept and should be set to 0) in the **Options->Channels Selection/Calibration** dialog box.

16. In the unit entry slot, type in **l/sec**.

17. Close the **Options->Channels Selection/Calibration** dialog box by clicking **OK**. Now all the data in that channel are converted into the **milliliters per second**.

The pictures are given as a guide, your result will vary.

Pressure Calibration Procedure
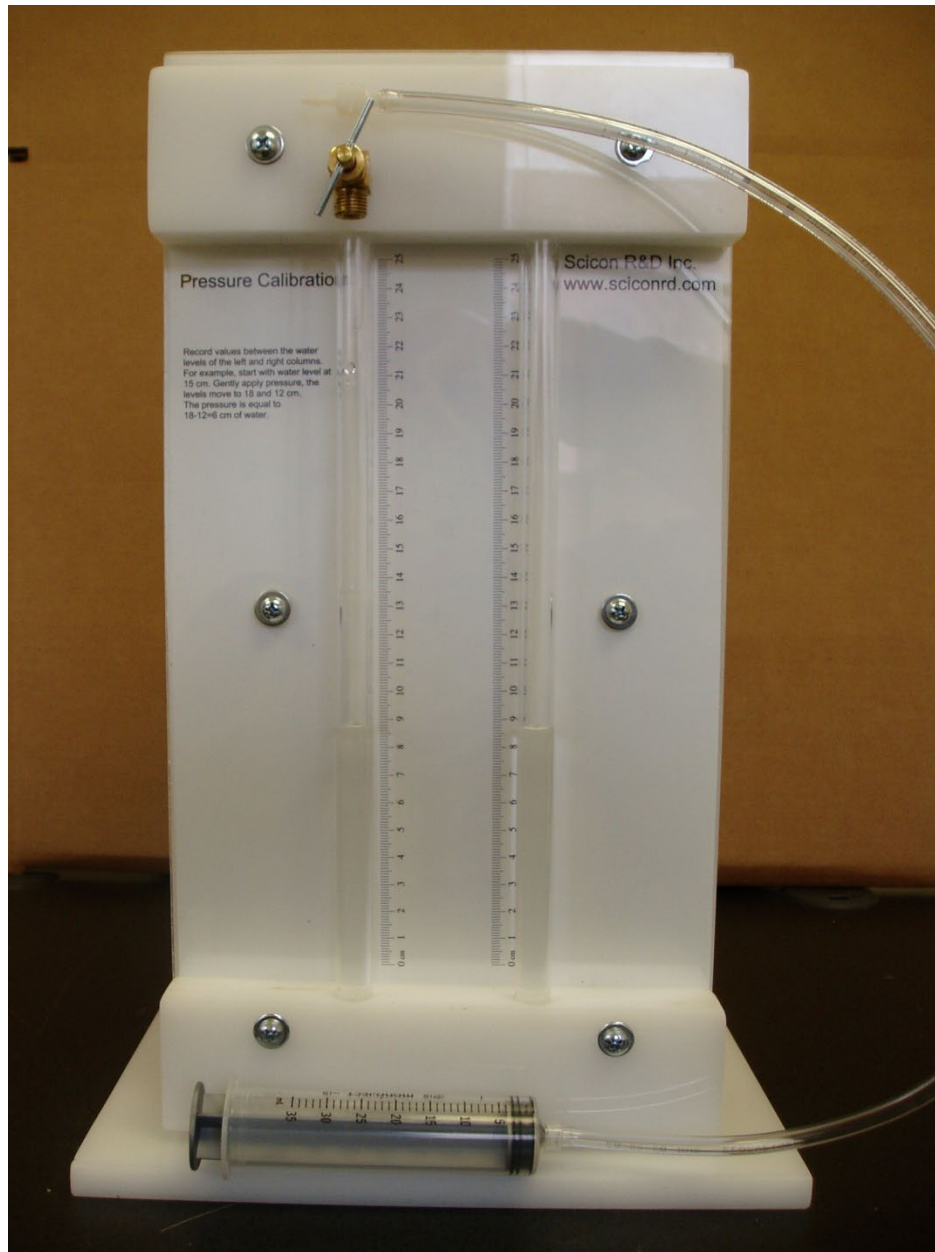
1. *1.* Fill half the **U-tube** with water. Make sure there are no bubbles in the water and the water levels are the same on both sides.
2. Connect the long tubing at the end of **U-tube** assembly to a pressure transducer.
3. Open the brass air valve to the external air pressure by turning it **counterclockwise** a few turns.
4. Pull the syringe to half way up, making sure the water levels are still the same.
5. Close the brass air valve to the external air pressure by turning it **clockwise** until it completely closes.
6. Gently press the syringe in, moving the water column, and read the water displacement in the tube. (**THE ACTUAL DISPLACEMENT IS 2 TIMES YOUR READING AS THE DIFFERENCE IN THE WATER LEVELS IS THE ACTUAL PRESSURE**). Due to some possible air leakage, you may need to apply a small pressure on the syringe to keep the water levels steady.
7. Start a blank file and set the record time to **10 seconds**. Set the water level displacement to **5 cm**. Start recording. Wait for about **5 seconds**, while recording still in progress, open the **brass air valve** to the external air pressure by turning it **counterclockwise** a few turns, which causes the water levels to be the same on both sides. The recorded file should now look like a step with a high value at the beginning and a low value at the end. (see figure below)
8. Start a blank log file. Place the marker at the location when the motor was off (**reference level**), then use **Analysis->Set DC Channels Reference**. This will use this point as the **zero level**. Then place the marker at the middle of the portion when the motor was on, use **Log->Enter At Maker** menu to enter

the value at the marker in the log file. This number corresponds to the **5 cm** of water pressure. (very similar to figure 1)

9. Repeat this process for at least 4 to 5 values (say 5, 10, 15, and 20 cm).
10. Save and close the log file
11. Add another data point **zero for zero cm** to the data file just created. **This is very important**, because there should not be any pressure without any displacement.
12. Plot the data by hand or import the log file into any standard statistical program.
13. Select a **straight line** going through the data points.
14. Calculate the **slope of this line** (see figure below). This slope is the **"B"** value in the calibration equation Physiological unit = Bx + C (where C must be 0) in the **Options->Channels Selection/Calibration** dialog box
15. In the unit entry slot, type in **cm/H2O**.
16. Close the **Options->Channels Selection/Calibration** dialog box by clicking **OK**. Now all the data in that channel are converted into the **cm of water**.