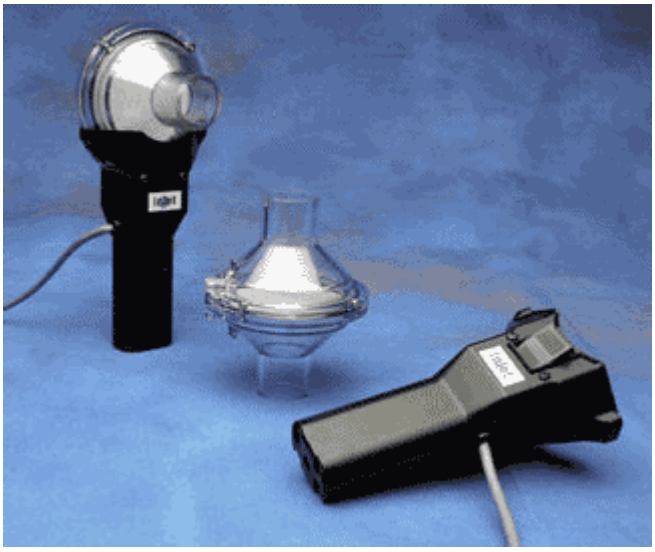
TSD117 Medium-flow Pneumotach Transducer



The TSD117 can be used to measure respiratory flow over a wide range of subjects and conditions. The TSD117 includes an optically clear detachable flow head (RX117) for easy cleaning and inspection. As the detachable flow head is snapped into the TSD117 handle, the flow head plugs directly into an integral, precision low-differential pressure transducer. Accordingly, the TSD117 will output an electrical signal proportional to respiratory flow. The TSD117 plugs directly into the DA100C amplifier module. The RX117 detachable flow head can be cold sterilized, autoclaved (220° F max), or placed in a dishwasher.

- For air flow and lung volume measurements, use the TSD117 with the AFT2 mouthpiece and the AFT1 bacterial filter.
- For measurements of expired gases, use the TSD117 with the AFT22 non-rebreathing T valve with AFT10 facemask and the AFT15A or AFT15B mixing chambers.

All connections can be performed with AFT12 (22mm ID) tubing and AFT11 series couplers (page 132).

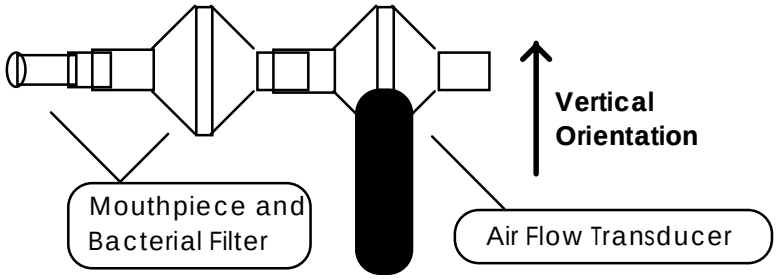
Please note the following:

a) The bacterial filter and mouthpiece are disposable and are “one per person” items. Please use a new disposable filter and mouthpiece each time a different person is to be breathing through the airflow transducer.

b) For more effective calibration, use a bacterial filter between the calibration syringe and the airflow transducer.

c) Either the bacterial filter and mouthpiece are inserted into the airflow transducer or the calibration syringe (with attached filter) is inserted into the airflow transducer.

Normal measurement connections:



For the most accurate lung volume recording, be sure to use a noseclip to prevent airflow through the nose. Also, be sure not to remove the airflow transducer assembly from your mouth during the recording. All air leaving or entering your lungs must pass through the airflow transducer during the lung volume measurement.

Use the following measurement procedure for determining lung volume:

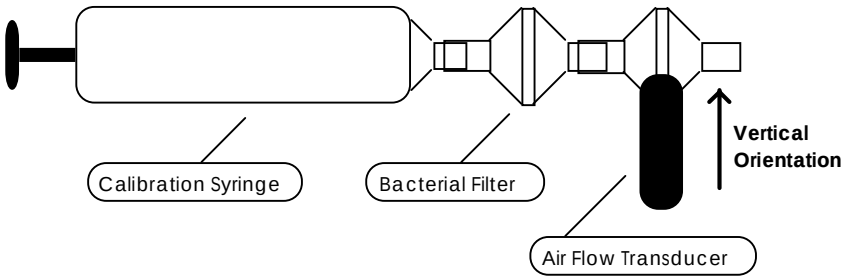
1. Breathe normally for 3 cycles (start on inspire)
2. Inspire as deeply as possible
3. Return to normal breathing for 3 cycles
4. Expire as deeply as possible
5. Return to normal breathing (end on expire)

Data Processing

When integrating the collected data to determine lung volume, it's important to integrate from the starting point of the first inspire, to the end point of the last expire. Before integration, you will need to determine the mean of the selected (air flow) data and then subtract the mean from the record. This process insures that the integral will have the same starting and ending point.

TSD117 Calibration

Calibration connections:



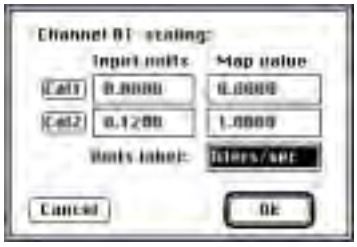
After the calibration process, please remove the calibration syringe and attach a new bacterial filter and mouthpiece to the airflow transducer.

It's very important that each individual use his/her own mouthpiece and bacterial filter.

Place the narrow end of the bacterial filter and mouthpiece assembly into either side of the airflow transducer. You are now ready to begin recording airflow data. For best results, hold the airflow transducer vertically.

Calibration Procedure Options

The TSD117 can be roughly calibrated without using the calibration syringe. Using the TSD117's nominal output of 60µV per liter/sec (normalized to 1 volt excitation), the following calibration factors can be entered in the Acq*Knowledge* Scaling window.



Scaling Factors for Rough Calibration of the TSD117

The following equation illustrates why 0.12 volts maps to 1.00 liter/sec :

Calibration Constant • Amp Gain • Amp Excitation = Scale Factor

thus

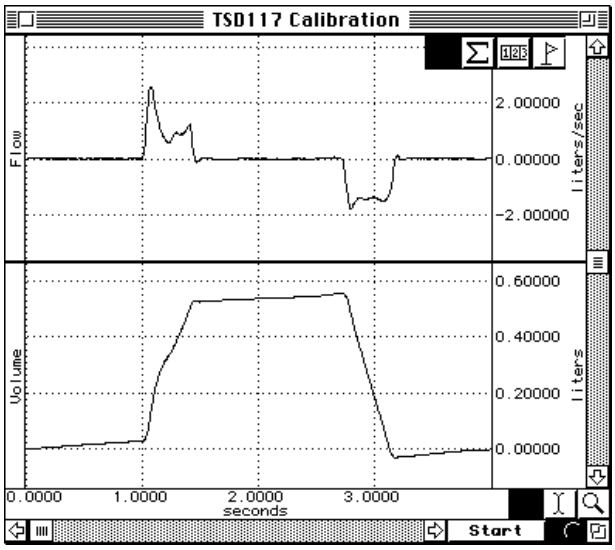
60 µV/[liter/sec] • 1000 • 2 Volts = 0.12 V / [liter/sec]

Data can now be collected directly. Prior to analyzing the data, remember that there will always be some offset recorded in the case of zero flow. It's possible to largely trim this offset out, using the ZERO potentiometer on the DA100 amplifier, but some residual will always remain.

To remove residual offset after the flow data has been collected, select a portion of the baseline (zero flow reading) and calculate the mean value using the popup measurements. Subtract this mean value from the raw data to obtain a mean corrected flow signal.

Now, the integral of the mean can be calculated as shown in this graph →

In this case, a 600ml-calibration syringe was used to check the rough calibration of the TSD117 airflow transducer. The rough calibration indicates a syringe volume of about 550ml, so this method may only be expected to be accurate within ±10% of the real reading.



Flow Measurement and Volume Calculation

To achieve a more exact calibration, start with the above scaling factors and then boost or drop them slightly as indicated by the rough calibration. In this case, if the map value correlating to 0.12 volts were boosted about 10% to 1.10 (from 1.0 liters/sec), the resulting calibration would be fairly accurate.

Also see DA100C Calibration options on page 38.

TSD117 Technical Specifications

Flow Rate:	±300 Liters/min highest linearity ≤ 5 Liters/sec)
Nominal Output:	60 µV/[liters/sec] (norma1ized to 1V excitation)
Dead space:	93ml
MRI Compatible:	Yes (no ferrous parts)
1/4" 25 TPI mounting nut:	standard camera mount
Flow Bore (Ports):	22mm (ID), 29mm (OD)
Flow Head Dimensions:	82.5mm (dia) x 101.5mm (long)
Flow Head Weight:	80 grams
Flow Head Construction:	Clear Polycarbonate
Handle Dimensions:	127mm (long) x 23mm (thick) x 35mm (wide)
Handle Weight:	85 grams
Handle Construction:	Black ABS
Cable Length:	3 meters, shielded
Interface:	DA100C—see page 36
TEL100C Compatibility:	SS11A—see page 179

RX117 Replacement Air Flow Head

The RX117 is a sterilizable air flow head for the TSD117 pneumotach transducer. Multiple RX117 heads help eliminate equipment downtime during cleaning procedures. To reduce the cost of disposable items, use the RX117 with the AFT8 sterilizable mouthpiece. (22mm ID/30mm OD)