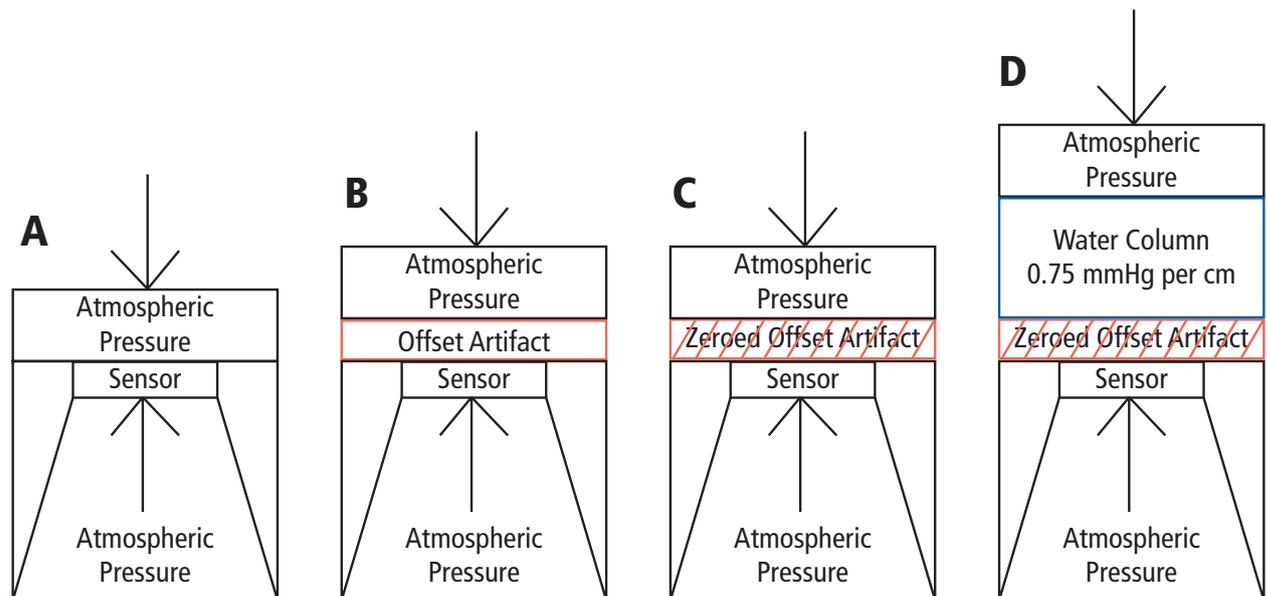


Scisense Pressure Technical Note

Pressure Sensor Calibration: Balancing the Sensor Before Use

Scisense Pressure Catheters are built with piezo resistive strain gauges that detect pressure through a flexible rubber membrane. Due to the mechanical properties of the rubber and the nature of gauge pressure sensors, proper use requires an understanding of how to properly balance the sensor.



(A) Ideal Pressure Sensor referenced to atmospheric pressure. The forces on both sides of the sensing membrane balance so the output is zero. (B) In the real world, there is always a mechanical or electrical factor that is going to cause an imbalance across the pressure sensing membrane. The artifact will vary between catheters and associated amplifiers. (C) For this reason, each control box comes with an offset correction control which can be used to counter balance the offset artifact. This electronically zeros the output. (D) The Sensor can then be submerged in a beaker of water to a given depth. Since the artifact has been cancelled out and the atmospheric pressure is equal on both sides, the Sensor will output 0.75 mmHg for each centimeter of water depth it is submerged.

Scisense Pressure Sensor Calibration Cont.

BALANCING YOUR CATHETER BEFORE USE:

1. **Air Calibration:** Calibrating the Sensor in air should provide the best result. There are however two things to consider:
 - a. Since the Catheter should have been soaked in fluid for some time, it will be wet when exposed to air. The exothermic effects of evaporation could exceed the temperature compensation features that are built in to the Catheter.
 - b. Since the Catheters are very sensitive, any motion might be detected when holding the Catheter. Combined with exothermic events, this can result in a wandering signal. If the software used to analyze the signal is in an auto-gain mode, the effect is exaggerated even further.
2. **Calibrating the Sensor in saline:** Body temperature saline used to soak the Catheter is the best environment for the Catheter calibration. However, the user needs to be aware of the offset value that the saline will create. If the Catheter is zeroed under a 5 cm column of saline, when it is removed from the water, the reading will be -3.5 mmHg. Inserting the Catheter into a ventricle with this offset would result in a negative EDV value. **The best way to calibrate the Catheter is to hold it just under the surface (meniscus) of the body temperature saline as it is being balanced.** The offset should be minimal for a Catheter under a few mm of water. Any minor signal wandering as the Catheter is transferred to the blood vessel can be ignored as either motion or temperature artifact.



Transonic Systems Inc. is a global manufacturer of innovative biomedical measurement equipment. Founded in 1983, Transonic sells "gold standard" transit-time ultrasound flowmeters and monitors for surgical, hemodialysis, pediatric critical care, perfusion, interventional radiology and research applications. In addition, Transonic provides pressure and pressure volume systems, laser Doppler flowmeters and telemetry systems.

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