

Posifa PAV5000 MEMS Anemometers: Accurate, Durable, Low-Power, and Maintenance-Free

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A New Standard in Air Velocity Measurement

The world of air velocity measurement stands at a crossroads. While hot-wire anemometers have served us for decades, their inherent limitations are becoming increasingly apparent in today's demanding applications. As a result, many designers are turning to MEMS anemometers — a fundamental shift toward more durable and maintenance-free solutions.

The Challenges Facing Hot-wire Technology

The appeal of hot-wire anemometers lies in their accuracy and compactness. They operate by heating a thin wire element to a precise temperature above ambient conditions, then measuring how air flow affects that temperature differential. However, this approach also creates a cascade of operational challenges.

One of the biggest issues is that hot-wire anemometers require frequent calibration — typically every year — because their precision depends on the physical and electrical integrity of an extremely delicate heated sensing wire, often made from platinum or tungsten. Over time, exposure to airflow, contaminants, and temperature cycling causes the wire to oxidize, thin, and develop microscopic fractures, which alter its resistance and heat transfer characteristics and undermine measurement accuracy. Environmental

factors such as dust, moisture, chemical exposure, and mechanical vibration further degrade performance, and contamination buildup can alter readings within months or even weeks of installation.

Hot-wire anemometers are also notoriously fragile during handheld use. The sensing element is nothing more than an ultrafine wire suspended in air, so even light physical contact, accidental tapping, or exposure to sudden air blasts can cause permanent damage. Routine handling during fieldwork, transportation, or even battery replacement often leads to bent or broken wires, and the resulting failures are rarely repairable outside of a factory setting. This fragility translates into higher replacement costs and makes hot-wire units poorly suited for portable applications.

Equally problematic is their appetite for power. Because the wire must be continuously heated to a temperature above ambient, the instrument draws a steady current whether airflow is changing or not. This constant energy demand drains batteries quickly, making handheld meters impractical for extended use. Users often find themselves carrying spare batteries or chargers just to complete a day's work. The result is a technology that not only requires frequent calibration but also creates ongoing interruptions in the field due to both breakage and limited operating time.

MEMS Technology: Built for the Real World

MEMS anemometers take a fundamentally different approach. Instead of fragile heating elements, they employ solid-state silicon structures — in the case of the Posifa PAV5000, a micro heater and thermopiles made of silicon materials — to detect air flow.

Long-Term Accuracy Without Annual Calibration

The PAV5000 maintains specified accuracy for at least 10 years, as confirmed by high-temperature operating life (HTOL) testing at 85 °C. Once burned in under factory conditions at 90 °C, the micro heater and thermopiles are extremely stable over the long term. Layered semiconductor passivation films protect against moisture and other environmental degradation, ensuring consistent performance without the need for annual recalibration.

Proven Durability

The PAV5000 is designed to withstand conditions that quickly disable hot wire units. It has passed IEC 60068-2-27 mechanical shock testing, making it ideal for handheld equipment; we have seen no evidence that hot-wire units can survive this level of mechanical stress. The PAV5000 has also passed IEC 60068-2-7 vibration testing, proving its reliability in demanding fixed applications such as HVAC.

Ultra-Low Power Consumption

Hot-wire technology's constant heating requirement makes it inherently power-hungry. For example, the Testo 405i hot-wire anemometer uses three AAA

batteries (4.5 V total) and typically runs for about fifteen hours, corresponding to an average current draw of approximately 67 mA and a power consumption of roughly 300 mW. By comparison, the PAV5000 MEMS anemometer head draws only 3.6 mA on average with a two-second response time. Assuming a typical handheld meter draw of 12 mA, battery life can be four times longer on the same batteries, while delivering the same level of accuracy.

The PAV5000 Series: Proven MEMS Excellence

With over a decade of accuracy retention, resistance to vibration and contamination, and unmatched power efficiency, the PAV5000 sets a new standard in anemometry. For new installations, it delivers superior performance, a lower total cost of ownership, and future-proof technology. For existing hot-wire installations, scheduled upgrades offer an immediate path to reduced maintenance, longer battery life, and more reliable readings.

Contact Posifa Technologies to learn how the PAV5000 series can transform your air velocity measurement applications while lowering long-term costs.