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Robust Flow Sensors Improve Uptime for Ventilators and Other Life-Saving Medical Systems

When it comes to life-saving medical systems, the only thing worse than a shortage of equipment is equipment that requires frequent down times for maintenance. In ventilators, for example, sensors play an essential role in controlling airflow delivery to the patient. But not all sensors are equally robust in the ventilator application.

The sensor's key enemy? Water condensation that causes blockages and impairment of sensor readings.

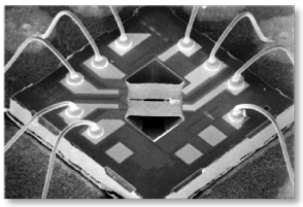
In fact, all sensors in ventilators are likely to encounter water condensation since the air that they use is delivered by a compressor. As the air is compressed, water condenses and is filtered out before it can do any damage to the downstream sensor components.

But what if there's a problem with the filtering system and water is allowed to pass over the sensor that keeps track of air flow? If that sensor depends for operation on a surface cavity or fragile membrane on the sensor chip, it is exceedingly vulnerable to clogging and damage as a result of water condensation. Ventilators using this type of air flow sensor typically need to be taken out of service in order to be repaired.

Solid-state mass air flow sensor products such as the PMF2000 and PMF4000 from Posifa Technologies change this equation. Instead of a surface cavity or fragile membrane, they use a structure on the sensor chip called "porous silicon" to achieve thermal isolation on the surface of the chip. Because porous silicon fabrication is compatible with the same CMOS microfabrication techniques used to make microprocessors and other solid-state electronics, Posifa air flow sensors are more manufacturable and scalable and have a more robust micro-structure. Proven in a wide variety of applications from industrial use to FDA-approved medical equipment, the platforms they are based on allow Posifa to offer a variety of flow ranges, output options, and mechanical interfaces to suit new and existing customer architectures.

The sensor die uses a pair of thermopiles to detect changes in temperature gradient caused by mass flow, delivering excellent signal-to-noise and repeatability. The porous silicon thermal isolation structure on the sensor die eliminates the need for surface cavity or fragile membrane used in competing technologies, making the sensor resistant to clogging and pressure shock.

FRAGILE



ROBUST

Traditional MEMS flow sensor technologies (left) rely on membranes and cavities for thermal isolation. Posifa Technologies' MEMS sensor technology (right) is significantly more robust since there's no fragile membrane to be damaged or cavity to get clogged up.

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Under normal circumstances, ventilators are used in a well-controlled hospital environment and another machine can be put into service if one ventilator becomes disabled due to a clogged sensor. However, as we've learned from the COVID-19 pandemic, circumstances are not always normal. Ventilators may be in short supply and they may need to be used in non-traditional settings such as field hospitals where it's difficult to implement any type of climate control.

Under these circumstances, the best solution sensor is the one that will be the most tolerant of the lapses in equipment maintenance (such as installing filters, changing filters, or draining condensed water) that are likely to occur when everyone needs to be focused on saving lives rather than the details of equipment maintenance.

PMF2000 Series

PMF4000 Series

Solid-state MEMS air flow sensors from Posifa Technologies eliminate the need for a surface cavity or fragile membrane on the sensor die, making the sensor resistant to pressure shock and clogging from water condensation or dust particles while providing superior accuracy and repeatability. Proven in a wide variety of applications from industrial use to FDA-approved medical equipment, the platforms they are based on allow Posifa to offer a variety of flow ranges, output options, and mechanical interfaces to suit new and existing customer architectures.

Throughout the COVD-19 pandemic, Posifa Technologies is continuing to ship production quantities of its mass air flow sensors that are a key component for ventilators and other medical equipment. With our PMF2000 and PMF4000 manufacturing based in Taiwan, we are happy to confirm that production of these vital components is proceeding without any interruption and with normal lead times for delivery.

To ask about using our MEMS sensor technology in your medical application, please contact Peng Tu, Posifa co-founder, at +1 650 465-4985 ptu@posifatech.com