BREATHE DEEP: Not just for respirators, Clippard's EVP valve can control flowing gas chromatographs and anesthesia machines as well.

PNEUMATICS

Proportional Valve Could Improve Respirators

Cutting parts count boosts accuracy, life

Designers of ventilators, respirators, and blood pressure monitors could benefit from a new proportional pneumatic valve that reportedly offers greater air flow control accuracy.

The new valve, introduced by Clippard Instrument Laboratory, Inc. (Cincinnati, OH; www.clippard.com) and known as the EVP, uses a design that incorporates only one moving part to improve accuracy and boost its life.

"We have a maximum flow accuracy of ±10%," notes Paul Gant, International Sales Manager. "And at a minimum, we expect its life to be between 200 million and 300 million cycles," he adds.

Clippard executives say they foresee the new pneumatic valve being employed in mass flow controllers, gas chromatographs, and anesthesia machines, in addition to respirators and ventilators. The valve's long life could make it particularly desirable in such applications where human lives could depend on its ability to keep operating. The EVP joins other small (20-25 l/min flow rate) proportional pneumatic valves in providing a variable output flow that is proportional to an input current. The company says that its valve differs, however, in its ability to consistently and accurately meter flow.

"Valves currently on the market can have a hysteresis as high as 15% that can wreak havoc in a closed loop control system," Gant says.

The company claims that such problems can undermine flow accuracy, thus placing a burden on equipment designers to make their products adapt to those weaknesses.

Clippard engineers say they solved those problems by employing a variation on a time-tested design that the company has employed in its other pneumatic valves. By using a diaphragm-like device that the company calls a "spider", Clippard engineers say they were able to create a valve that offers a variable output flow that is truly proportional to input current.

The flat, circular "spider" accomplishes that by acting as a spring in the one direction and a magnet in the other. Made from a magnetic material, it is attracted to the force of a magnetic field. As a result, when current is applied to the electrical coil in the valve, the spider is drawn away from the closed orifice of the valve When current is removed, the spring force causes the spider to flex back to its original position, thus closing the valve's orifice. "The more current that is applied to the coil, the more the spider moves away from the closed orifice," Gant explains.

The orifice's opening is always proportional to the amount of current applied. Clippard engineers claim that their new proportional valve's hysteresis is less that 10% of full current over its entire flow regime. Moreover, they say that the use of only one moving part eliminates sliding friction inside the valve, causing it to be consistently accurate throughout its useful life.

"Mechanical friction causes accuracy problems, which we eliminate because the spider is our only moving part," Gant says. "That's the real benefit of this valve: It's accurate throughout its life."

SPIDER INSIDE: Using Clippard's magnet/spring "spider" accurately proportions valve opening to input current.