ACCESS my LIBRARY
Search Information that Libraries Trust

Magazine

Pressure transducers find wider use in HVAC control; better maintenance, accuracy offered.

Energy User News | August 6, 1984 | Burton, Peter

Pressure Transducers Find Wider Use In HVAC Control

Differential pressure transducers are coming into wide use in energy conservation as contractors and manufacturers develop a variety of strategies for expanded system control and equipment protection using the units, according to industry sources.

The devices measure pressure and convert the reading into an electrical signal that can be read by a controller. They were originally development for process control applications but have been adapted increasingly as an additional level of HVAC control, the sources added.

By constantly monitoring system pressure, users can detect indications of inefficient system operation or, in extreme cases, damage to refrigeration or HVAC equipment.

A pressure transducer contains a diaphragm that changes position with changes in the pressure of the substance being measured. The diaphragm is indirectly connected to a chip that also bends slightly, changing its electrical resistance. This results in an electrical signal that can be read by an EMS.

Another factor affecting the wider acceptance of the technology was the development of devices that can read very low differential pressures. These applications usually require measurements below 5 water column inches and some measure as low as 0.25 water column inch. A water column inch is roughly equivalent to four pounds per square inch (psi) of pressure.

The transducers can be used to measure differential pressure in: variable air volume systems; main air systems used to operate building pneumatic systems; air conditioner tubes to detect corrosion or leakage, and cleanliness of duct filters; and vital air flow such as induced air in boilers or across electric heating elements.

The most common use of differential pressure transducers is to monitor air flow systems for proper fan operation and to check on the condition of the filter.

This is done by placing two pitot tubes or small orifice plates into an air duct. One is placed upstream from the fan or filter and attached to the low-pressure port of the transducer and the other is placed downstream and attached to the high-pressure port. The transducer will sample the differential pressure in the duct as a function of velocity.

If the fan fails of when the filter clogs restricting air flow, the transducer will inform the controller of the condition. If, for example, a fan stopped blowing air across a resistive heating element, the element could become damaged by overheating. In this application, the controller could shut off the element or the transducer could be wired to a local contact switch to turn the element off.

In large air handlers equipped with roll bank filters, which mechanically feed fresh filter into a duct as needed, the transducer can directly activate the roll bank to advance the required amount of new filter into the duct.

Differential pressure measurements are also used to optimize variable air volume (VAV) HVAC systems. In the system, temperature sensors relay ambient conditions to the EMS, which determines the correct air velocity the system should supply. To ensure the air velocity is accurate, differential pressure readings, again measured as a function of velocity across a pitot tube, are needed by the EMS to closely control the motor's speed and run-time for optimum efficiency and air circulation.

The devices can also be used to monitor corrosion and detect leakage in chiller tubes. A pressure tranducer can be attached to the system and keep an EMS up-to-date on pressure changes. As the tubes begin to corrode, blocking water flow, the system pressure will rise. By monitoring this, maintenance personnel will know when the corrosion has reached the point when the tubes need to be replaced. If the tubes begin to leak, a loss in pressure will be detected and the system can be quickly repaired.

Pressure transducers range in price from roughly $100 to $500 depending on the accuracy, materials used and whether they are electro-mechanical or more expensive solid-state units, according to sources.

Some of these operations can be partially achieved with cheaper local mechanical safety switches or electro-mechanical pressure switches, but these only offer shut-off functions when critical conditions are reached and they can not be tied to central controllers. In addition, reliance on these are only recommended in applications where accuracy is not critical and where the condition being measured is always stable. Otherwise it would be necessary to recalibrate the switch setpoints locally for changes in weather or other relevant variables.

"Use of pressure is more difficult than temperature or humidity, but it is the fastest growing application,' said S. Asim Gul, president of Mamac Systems, a Minneapolis transducer manufacturer. "A few years ago only engineers were contacting us about pressure. Now we get calls from contractors and even from people who know very little about them but recognize their potential.'

Transducers for these applications are available from: Mamac Systems, Minneapolis; Dwyer Instruments Inc., Michigan City, Ind; Validyne Engineering Corp., North Ridge, Calif.; and Setra Systems, Acton, Mass.

COPYRIGHT 1984 BNP Media. This material is published under license from the publisher through the Gale Group, Farmington Hills, Michigan. All inquiries regarding rights should be directed to the Gale Group.

©2009 Gale, a part of Cengage Learning. All rights reserved.
www.accessmylibrary.com