



Guide to Pressure Transducer Selection

Most applications for pressure transducers are relatively straightforward. Install the transducer according to manufacturer's recommendations, and obtain an accurate reading from an exceptionally reliable device. But life does not always follow the straight narrow path. The purpose of this article is to provide some guidelines for helping a transducer user detect atypical conditions and compensate for them through the proper selection and application of the transducer.

Why Use a Transducer?

Pressure transducers are used to generate an electrical output for a variety of uses that may include computerized data collection, process monitoring and control, or electrical transmission of a pressure reading to a remote display.

Another reason for using transducers is their accuracy. Transducers provide accuracies ranging from 0.1% full scale, with a typical accuracy of 0.5%.

The greater the accuracy required, the more expensive the pressure measuring device. But since product quality in many processes is directly related to how accurately the pressure is maintained, the expense of a more accurate device will quickly be justified.

Dealing with Abnormal Conditions

Once the need for a pressure transducer has been determined, it is prudent to determine if there might be some out of the ordinary conditions that could upset transducer performance. The balance of this article will identify some of these conditions and what can be done to compensate for them.

Temperature Dynamics

Two sources of temperature variation can affect transducer performance-ambient conditions and the fluid medium itself. Ambient conditions include such things as abrupt changes in air temperature due to heating and cooling systems cycling on and off and the effects of radiant energy impinging on the transducer. Variations in the fluid temperature occur most often during start-up of a process as the fluid goes from room temperature to a higher operating temperature.

Dynamic temperature problems may arise because pressure transducers are calibrated under static conditions of both pressure and temperature. Dynamic temperature effects in the field, therefore, may be superimposed on a steady pressure condition and cause an unstable reading. The easiest solution to this problem is to wait for the temperature to achieve a steady state before making a pressure reading.

If accurate pressure readings must be made during large ambient temperature transitions, then corrective measures must be taken. Shielding the transducer may ameliorate ambient temperature shifts; you can build a baffle around it or wrap it with Styrofoam or some other insulating material.

One way to compensate for temperature effects of the media is to buffer the transducer by placing it at the end of a short length of stainless steel or copper tubing. The tubing dissipates excess heat at a rate determined by the material, diameter and length of the tubing. This tubing forms a constant and acceptable temperature link between the transducer and the main body of fluid media.

Media Compatibility

Most transducer media contact surfaces are made from stainless steel, either 17-4PH (precipitation hardenable) or 15-4PH. These are excellent special-purpose materials providing corrosion resistance similar to 303 and 304 grades of stainless steel. These materials handle most fluid media very well. If you know from previous experience, however, that these materials are unacceptable, then inform your transducer supplier. It is very likely that other options are available.

Dynamic Response

Most transducer users want to measure pressure in a steady state. They don't want to know what is happening to the pressure as changes take place. However, some users want to measure dynamic pressure changes in the system. For these users, it is very important that they tell their transducer supplier that this is what they want to do.

The dynamic response of a system is a very complicated subject. This complexity is further compounded by the sometimes-misunderstood usage of such terms as frequency response,

dynamic response, response to a step input, and rise time. These terms mean one thing when applied to the transducer and another when referring to the system. If dynamic measurements are required, it is wise to discuss the application with the manufacturer and seek his advice.

In addition to entering into a dialogue with your supplier, here are a few additional guidelines for using transducers to measure dynamic pressure:

Couple the transducer as near as possible to the measuring point.

Use a flush diaphragm transducer instead of a cavity type for better frequency response.

Avoid isolating the transducer with tubing or snubbers because system dynamics will change.

Handling and Installation

As mention earlier, today's pressure transducer is an exceptionally rugged device. Even so, it pays to exercise a little common sense during handling and installation. Here are a few easy-to-follow tips:

Be careful with the electrical termination. Damage to the electrical connector or cable could put the transducer out of service.

Never poke the diaphragm of a low-capacity transducer with a pencil point or other stiff objects. This could damage the diaphragm, which in turn would affect the transducer performance.

Do tighten the transducer well, making certain there is no leakage at the pressure connection.

Make sure the pressure fitting is made of a compatible material. Combining materials with different expansion characteristics (say a brass fitting and a steel transducer) could result in a leak.

If the transducer has a zero and span adjustment, position it so the adjustment can be reached with a screwdriver.

Upon installation of the transducer, check the entire system for proper wiring, integrity of connections and proper grounding.

Conclusions

Remember, experience has show that most problems are instrument-or-system related, not transducer related. Poor electrical connections and improper grounding could cause elusive intermittent problems. If the problem persists even after a thorough system check, it may be

reasonable to suspect that the transducer is faulty.

This article has addressed questions users most often ask about the selection and application of pressure transducers. If you have any of the problems mentioned here, then it might be wise to consult directly with your transducer supplier. Tell him what your application is and what you hope to achieve through pressure measurement. A little time spent up front talking with the supplier can identify and compensate for potentially expensive problems before they have a chance to materialize.



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