What are measurement errors with a pressure transmitter?

The pressure transmitter measurement error is the difference between the indicated value from the pressure sensor and the actual value of the measured variable. Errors in pressure transmitter measurement can be caused by five factors.

Pressure transmitter measurement error due to improper zero reference.

Firstly, the instrument may not have a correct zero reference, leading to inaccurate readings as the sensor's zero point shifts from its initial position. As electronic devices, pressure transmitters' zero reference signals may drift over time due to temperature, pressure, or changes in ambient conditions. To avoid this type of error, it's important to choose a pressure transmitter with good long-term stability. Otherwise, the transmitter will need to be calibrated more frequently.

Pressure transmitter measurement error due to full span shift

Secondly, errors can occur when the full span of the transmitter shifts from its original position. Several factors can contribute to span shift, including temperature changes, vibration, electrical interference in the process, or changes in the operating range of the process. To avoid this type of error, it is crucial to have a good understanding of the process and its operating conditions. Offsets can be compensated for by periodically recalibrating the sensor.

Pressure transmitter measurement error due to improper range

Thirdly, one of the most common causes of measurement error in pressure transmitters is selecting an inappropriate range. The measuring range of each sensor is determined by its cell type. This error occurs when the selected cell range is too small or too large for the application. For instance, if the rangeability (the ratio of maximum measurable pressure to minimum measurable pressure) is too low, the sensor cannot accurately measure low pressures, resulting in clipped measurement signals and distorted readings. For example, if a process operates in the range of 0 to 30 mbar, a pressure transmitter with a range of 0 to 30 bar and a 10:1 turndown ratio will not accurately measure such low pressures. To avoid this type of error, it is

important to select a pressure transmitter with an appropriate turndown ratio for the application.

Pressure transmitter measurement error due to process condition incompatibility

Fourth, the transmitter may not be compatible with the process conditions. For instance, certain devices may not endure the high temperatures or pressures present in specific industrial processes. Consider this scenario: a process currently operates within a range of 0 to 30 bar. However, adjustments in the application demand it to function within a new range from 0 to 300 mbar. To prevent such errors, it's crucial to thoroughly evaluate the sensor's traits concerning the process conditions before opting for a specific model tailored to the application's requirements.

Pressure transmitter measurement errors stemming from mechanical wear or damage

Fifthly, inaccuracies in sensor measurements may arise due to mechanical wear or damage to the diaphragm. Such damage can occur during installation, operation, or maintenance of the transmitter. Typically, rectifying this type of error necessitates repairing or replacing the pressure transmitter. To prevent such errors, it is essential to ensure proper installation, commissioning, operation, and maintenance of pressure transmitters. Regularly inspecting pressure transmitters for signs of mechanical wear or damage is crucial to mitigate this type of error.

A pressure transmitter that operates without errors contributes to effective process control. Achieving precise measurements enhances the likelihood of safe and efficient operation within the process. By comprehending the origins of measurement inaccuracies, you can implement measures to mitigate their effects, thus securing more precise pressure readings.