

HOW TO SELECT THE CORRECT PRESSURE SENSOR

A pressure sensor is a device which is able to provide an output signal relative to the pressure force being exerted upon it. Pressure sensors are continuous output devices and vary their output in relation to the applied pressure. They should not be confused with pressure switches which are designed to switch electrical contacts at predetermined pressure level(s), however pressure sensors used in conjunction with other devices such as trip amplifiers with relay outputs can be used to perform switching actions as well. The use of pressure sensors for measurement and control applications is widespread with pressure sensors available in many different types and configurations, each suited to different applications. Examples include the measuring of mains' water pressure to help conserve water and ensure the water supply networks run efficiently, measuring air pressure in race car engine induction systems, and using the hydrostatic pressure principle to accurately measure liquid levels in chemical storage tanks

Uses

For applications where a continuous output is required to indicate a measured pressure or depth of liquid in storage tank or reservoir, pressure sensors are often the measurement instrument of choice. Ranging from industrial process control to low power dataloggers, pressure sensors are a robust solution to pressure measurement applications. For example, submersible hydrostatic pressure sensors can be deployed in reservoirs to accurately monitor water levels and either be connected to a datalogger to store readings or a telemetry unit to give real-time level measurements. Specially designed pressure sensors can be deployed to monitor pipe line pressures submerged on the sea bed. Intrinsically safe ATEX approved pressure sensors can be used to monitor pressure in compressed gas storage tanks, whilst compact lightweight pressure sensors find uses for various pressure measurement tasks as part of a full race car telemetry system.

Function

Sensata | Cynergy3 pressure sensors use pressure sensor elements which utilise piezoresistive strain gauges deployed as a Wheatstone bridge circuit which are bonded or printed onto the pressure sensor diaphragm. When the sensor diaphragm flexes, the strain gauge produces a mV signal output. Cynergy3 pressure sensors offer a choice of two sensor element technologies each with their own benefits. Piezoresistive ceramic pressure sensor elements have the benefit of being a cost-effective way to measure pressure from 1 Bar up to 700 Bar, the Al₂O₃ Ceramic diaphragm material having excellent chemical compatibility when paired with an appropriate O-ring seal polymer. The Piezoresistive silicone sensor elements offer the enhanced resolution required for accurate low-pressure (mBar) and small tank level measurements. The 316 Stainless steel diaphragm parts and the standard Viton seal provide a broad range of chemical compatibility. These sensor elements also have excellent overpressure characteristics should an unexpected over-pressure



event occur.

Considerations

Sensata | Cynergy3 pressure sensors are highly configurable to the users' needs. When selecting a pressure sensor for a given measurement application, it is vital the user has clear understanding of the pressure sensing application and the pressurised media that needs to be measured. There are many factors that need to be considered, and in some cases, trade-offs will need to be made, to find the optimum pressure sensor configuration.

- Process media to be measured: gas, liquid, media temperature.
- Pressure range to be measured.
- Pressure datum: Absolute, Gauge or Sealed Gauge
- Overpressure requirements: Consider sources for pressure spikes such as pumps, valves and actuators.
- Electrical output: 0-100mV 4-wire, 4-20mA 2-wire, 0-5V 3-wire are just some examples.
- Accuracy: Typically $\leq \pm 0.25\%$ /FS/ BFL
- Electrical connection: A wide range of electrical connectors and cables are available to choose from.
- Process connection: 1/4" BSP or 1/4" NPT threads are stocked but other threads are available on request.
- O-ring seal material: The O-ring seal needs to be compatible with the process media, Choose from Viton, EPDM, Nitriles as well as Perfluoroelastomer and Fluorosilicone. Chemical compatibility of wetted parts: Housing material is Typically 316L or 303 Stainless Steel
- Ingress protection: Where is the sensor going to be used, what IP rating is required?
- Approvals: WRAS, ATEX, NSF, etc.