Diaphragm seals

Application

Diaphragm seals are devices with a separating diaphragm which are used to separate the measuring unit from the medium to be measured. They extend the application ranges of pressure gauges, pressure switches and pressure transducers.

Diaphragm seals are used for the following:

- *Where the medium to be measured must not come into contact with the measuring element, for example: the medium is polluted or highly viscous, crystallizes or hardens.*
- *The medium is corrosive and special corrosion resistant materials would have to be used for Bourdon tubes, which is not always possible.*
- *The ambient temperatures at the measuring point or the temperature of the medium are extremely high.*
- *For hygienic reasons, there must be no „dead“ space.*
- *The site conditions do not allow for direct installation of a pressure gauge.*

Principle of operation

Diaphragm seals are used in conjunction with Bourdon tube pressure gauges, pressure transducers or pressure switches.
They are either mounted directly on to the measuring instrument or connected via a cooling element or a capillary tube.

The separating element is the main component of a diaphragm seal. It consists of either a diaphragm, a pipe or an immersion shaft. The diaphragm type is the most commonly used diaphragm seals.

It is always a sealed system in which the volume between the separating element and the measuring gauge (end of Burdon tube) is first evacuated and then filled with a pressure transmission liquid.

The medium to be measured is in contact with the separating element and causes it to bend which in turn causes a displacement of the volume within the system.

The element must have a displacement capacity which is sufficient to move the measuring element of the associated gauge.
The deflection must always take place in the elastic area of the separating diaphragm.
This is determined by the diameter, the material and the shape.

Temperature performance

The system is filled at ambient room temperature. Different temperatures will change the volume of the filling liquid causing differences in pressure readings. By specifying the exact operating temperatures at the time of order, we can counteract this effect by selecting the most suitable filling liquid. If the temperatures are higher than +100 °C, the gauge and the diaphragm seal at the measuring point should be separated by a capillary tube or the system should be equipped with a cooling element.

Response time

Using a diaphragm seal will generally result in a slightly delayed response of the pressure gauge. This effect can be useful for system damping purposes.

Filling liquid

The filling liquid for the diaphragm seal must be selected according to the minimum and maximum operating temperatures.
Furthermore, the filling liquid must be compatible with the medium to be measured as it cannot be ruled out that they may come into contact with each other, when a diaphragm seal is damaged.