Pressure transducers

Application

Pressure transducers are used for electronic pressure measurement in many industrial and building applications. Various measuring principles, output signals, materials, pressure transmission liquids and process connections allow pressure transducers to be used in almost any application. Pressure transducer versions are available for abrasive, pure, highly viscous, viscous or crystallising media as well as special models for hygienic processes.

Typical applications areas

- Pneumatic/hydraulic
- Gas industry
- Process engineering
- Pharmaceutical and biotechnology applications
- Chemical industry and petrochemical industry
- Medical technology
- Laboratory applications
- Food applications
- Water treatment
- Waste water applications
- Mechanical and plant engineering
- Automation
- Filter monitoring
- Heating, refrigeration, air conditioning
- Automotive industry

Connection technology with numerous versions, diffusion-tight and extremely robust: pressure transducer DMU 02 Vario

Description

Pressure transducers convert physical pressure into an electrical signal proportional to the pressure. Different pressure transducer versions are available which use a variety of measuring principles serving as the basis for sensing the pressure.

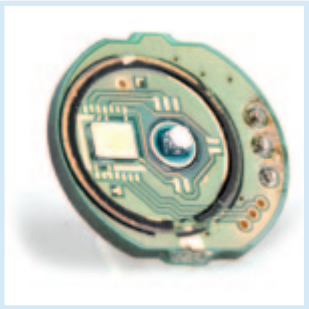
Measuring principle and measuring cell

Piezo-resistive polysilicon stainless steel measuring cell
An isolation layer made of non-conductive silicon oxide is coated to the stainless steel diaphragm (a high-precision part calculated in view of the force path) on the side facing away from the medium; after that, polysilicon is deposited. Semiconductor resistors are etched from this layer; a gold layer provides contacts. When pressure is applied and causes a deflection, the resistance changes. As compared to conventional strain gauges (conductors), polysilicon semiconductor sensors have a higher output signal.
Since the measuring cell is made of stainless steel, it can be directly welded to the process connection. This helps to prevent leaks caused by fatigue of the sealing material. These robust measuring cells are insensitive to shock and vibration and have a high resistance to overloads. They are used for pressure measurements from 600 mbar up to several thousand bar.

Pressure transducers with polysilicon stainless steel measuring cells:
DMU 02, 02 Vario

Benefits
- Robust measuring cell
- High resistance to chemicals
- No seal
- No internal transmission liquid
- High output signal
- High long-term stability
- Shock- and vibration-resistant

Measuring principle and measuring cell



Piezo-resistive silicon measuring cells

The function principle of piezo-resistive silicon measuring cells is based on a silicon chip with measuring resistors in the diaphragm. When pressure is applied and causes a deflection of the diaphragm, the resistance changes.

As opposed to open measuring cells which can only be used with certain, non-corrosive media, the silicon chips of encapsulated measuring cells are contained in a gas-evacuated protective housing filled with transmission liquid; this housing is closed with an elastic diaphragm at the pressure side.

If the diaphragm is deflected as a result of the application of pressure, the transmission liquid is displaced towards the sensor.
Silicon measuring cells are highly sensitive and have a high output signal. This allows for measurements at very low pressures and provides for high chemical resistance.

Pressure transducers with encapsulated silicon stainless steel measuring cells:
DMU 03, 04, 05, 08, 11, 12, 13, 14

Pressure transducers with open silicon measuring cells:
DMU 10 D, 600/20

Benefits
- High resistance to chemicals
- High output signal
- Very small measuring ranges possible
- High accuracy

Measuring principle and measuring cell

Ceramic measuring cells

Aluminium oxide (Al_2O_3) that is resistant to almost all chemicals is used for ceramic measuring cells. Piezo-resistive thick-film measuring cells consist of a base and a diaphragm made of aluminium oxide ceramic. During the production process, measuring resistors are burnt into the side of the diaphragm facing away from the medium; they change when pressure is applied to the diaphragm and causes a deflection. Ceramic thick-film measuring cells are used for medium pressure from 1 bar to up to 400 bar.

Capacitance ceramic measuring cells use a ceramic base and a ceramic diaphragm which are gold-coated on the side facing away from the pressure. The gold coating forms the electrode pair of a capacitor; they are positioned at a distance of just a few µm away from each other. Pressure causes a deflection of the diaphragm and the capacitance changes. Capacitance ceramic measuring cells are used for low pressures from 100 mbar to up to 60 bar; they have a high overload resistance.

Both measuring cell types are mounted to the process connection via elastomer seals. The use of ceramic measuring cells is only limited by the chemical resistance of the seals. Different pressure loads and pressure measuring ranges can be obtained by varying the thickness of the diaphragm.

Pressure transducers with piezo-resistive thick-film measuring cell:
DMU 01K, 01, 01 VM and DIM 20

Pressure transducers with capacitance ceramic measuring cell:
DMU 07, 09

Benefits
- Robust measuring cell
- High resistance to chemicals
- Abrasion-resistant
- No internal transmission liquid
- No chemical seal required