Total Pressure Cells

Application

Total pressure cells are used to monitor the combined pressure of effective stress and pore-water pressure. Typical applications include:

- Understanding the magnitude, distribution, and orientation of stresses in embankments and fills.
- Monitoring total pressure exerted on a structure to verify design assumptions.

Types of Total Pressure Cells

Earth pressure cells have two sensitive surfaces. They are embedded in fills.

Contact pressure cells have one sensitive surface. They are fixed to structures.

Operating Principle

Total pressure cells are formed from two circular plates of stainless steel. The edges of the plates are welded together to form a cavity which is later filled with hydraulic fluid.

The hydraulic fluid transmits pressure acting on the plates to a pressure transducer. The transducer converts pressure to an electrical signal which is recorded by a data logger and processed later on a computer.

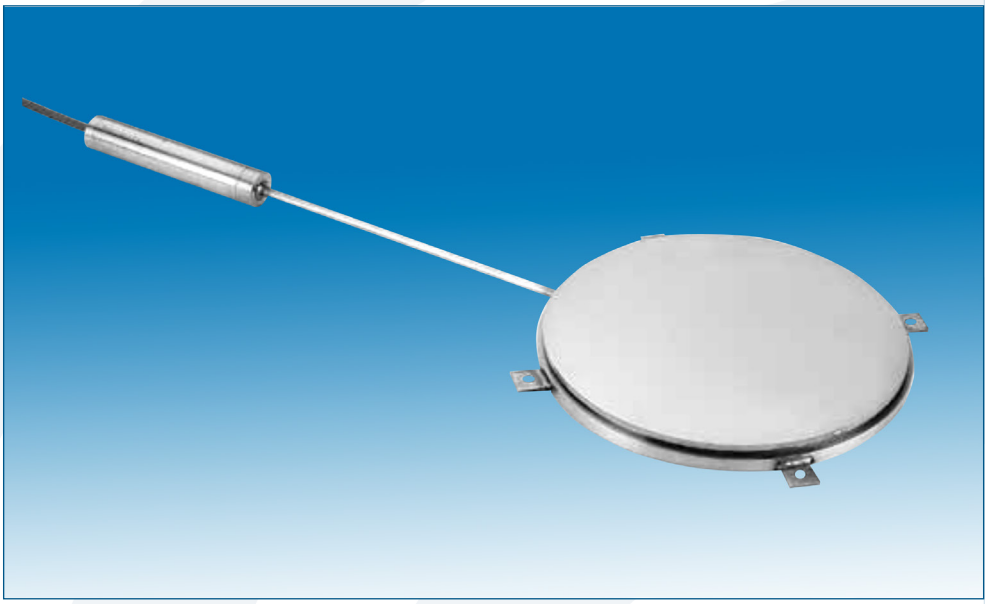
Advantages

Ideal Aspect Ratio: For consistent performance, these cells are designed with a diameter to thickness ratio of between 20:1 and 30:1.

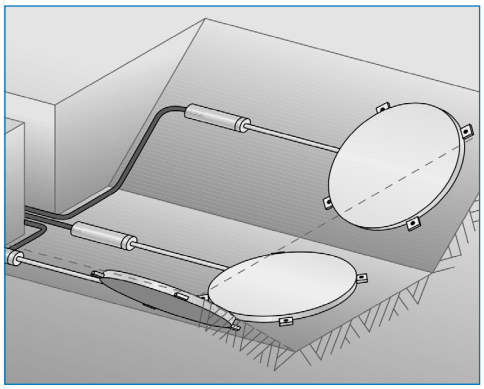
Excellent Stiffness: Maximum stiffness is achieved by using deaired hydraulic oil with less than 2 ppm dissolved gas.

Reliable Transducers: Vibrating wire transducers offer long term stability, reliable signal transmission, and insensitivity to moisture. In addition, each transducer has a thermistor for temperature measurements and a gas discharge tube for transient protection.

Earth pressure cells are sensitive on both sides. They are embedded in fills, sometimes in arrays with each cell in a different orientation.



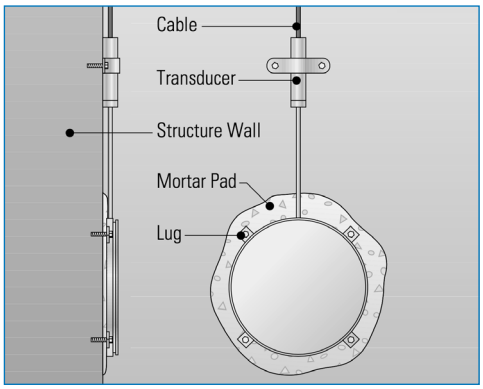
Contact pressure cells are sensitive on just one side. The other side is a rigid back plate which is fixed to a structure.



Earth Pressure Cells

Earth pressure cells are sensitive on both sides. They are embedded in fills, sometimes in arrays with each cell in a different orientation, as illustrated above.

Earth Pressure Cell Specifications	
Cell	0.24 x 9 inch (H x D)
Materials	Stainless steel
Transducer Type	Vibrating wire
Transducer L x D	6 x 1 inch (L x D)
Ranges	10, 25, 50, 100 . . . 2900 psi
Over-Range	1.5 x rated pressure
Resolution	± 0.025% FS
Accuracy	± 0.1% FS
Linearity	< 0.5% FS
Thermal Effect	< 0.05% FS
Long-Term Drift	< 0.02% FS/yr
Excitation Pluck	2.5-12 V swept square wave
Excitation Freq	1400-3500 Hz
Output	2000-3000 Hz
Temp Range	−20°C to +80°C



Contact Pressure Cells

Contact pressure cells are sensitive on just one side. The other side is a rigid back plate which is fixed to a structure, as illustrated above.

Contact Pressure Cell Specifications	
Cell	0.48 x 9 inch (H x D)
Materials	Stainless steel
Transducer Type	Vibrating wire
Transducer L x D	6 x 1 inch (L x D)
Ranges	50, 100 . . . 750 psi
Over-Range	1.5 x rated pressure
Resolution	± 0.025% FS
Accuracy	± 0.1% FS
Linearity	< 0.5% FS
Thermal Effect	< 0.05% FS
Long-Term Drift	< 0.02% FS/yr
Excitation Pluck	2.5-12 V swept square wave
Excitation Freq	1400-3500 Hz
Output	2000-3000 Hz
Temp Range	−20°C to +80°C