

MODEL DP48K SERIES



Model DP48K Earth Pressure Cell (front), Model DP482K Jackout Pressure Cell (center) and Model DP481K Contact Pressure Cell (rear).

APPLICATIONS

Earth Pressure Cells are used to directly measure total pressure, which includes both effective soil stress and pore water pressure, in or on:

- Bridge abutments
- Diaphragm walls
- Fills and embankments
- Retaining walls surfaces
- Sheet piling
- Slurry walls
- Tunnel linings
- Foundations (e.g., foundation slabs, footings, and pile tips)

OPERATING PRINCIPLE

Earth Pressure Cells consist of two stainless steel plates welded along the edges, with a small gap between them filled with hydraulic fluid. External pressure compresses the plates, and this pressure is transferred to the hydraulic fluid inside. A pressure transducer then converts the fluid pressure into an electrical signal, which can be read and recorded.

ADVANTAGES AND LIMITATIONS

- **Vibrating Wire Technology:**
The DP48K series Earth Pressure Cells are equipped with vibrating wire transducers, providing long-term stability, reliability over long distances, and resistance to moisture intrusion.
- **Thermistor for Temperature Monitoring:**
All models include a built-in thermistor for temperature measurements and are equipped with a gas discharge tube for protection against lightning.
- **Dynamic Stress Measurement:**
For applications involving dynamic stress changes, a semiconductor-based pressure transducer can be used, such as the DP35K series.

Performance of the cells depends heavily on the surrounding soil properties. Achieving optimal performance typically requires calibrating the cells in the specific soil type of the application. For best results, cells with maximum stiffness and high aspect ratios ($D/t > 10$, where D is the cell's diameter and t is its thickness) are recommended. In practice, Dustin cells, which use hydraulic oil with less than 2 ppm of dissolved gas, have shown over-registration of soil pressure by less than 5%.

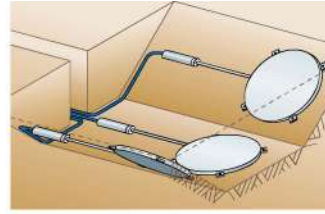
MODEL DP48K, DP4815K EARTH PRESSURE CELLS



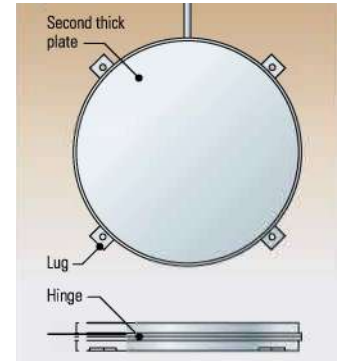
Model DP48K Earth Pressure Cell.

Model DP48K Earth Pressure Cells: These pressure cells are constructed using two thin, pressure-sensitive stainless steel plates. They can be placed in different orientations within the fill to measure soil pressure in two or three directions. For applications in earth dams, special armored cables are recommended for durability.

Model DP4815K: This special design is ideal for reducing the impact of point loading when used in granular materials. It incorporates two thick plates welded together with a flexible hinge, which ensures a more uniform pressure distribution.



Model DP48K Earth Pressure Cells installed in fill for soil pressure measurement in three directions.



Model DP4815K pressure cell, with two thick plates, for use in granular materials.



Model DP48K Earth Pressure Cell with a Bourdon Tube Pressure Gauge.

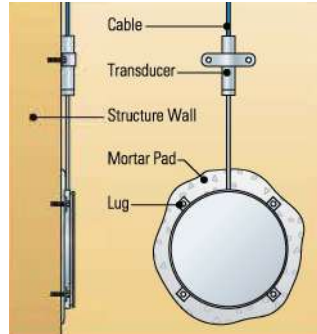
OTHER DEVICES:

MODEL DP481K CONTACT PRESSURE CELLS

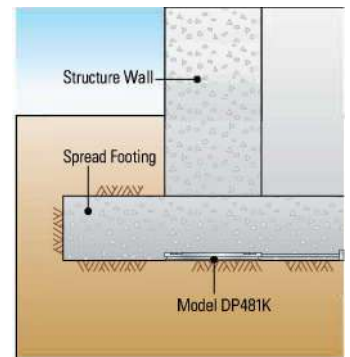


Model DP481K Contact Pressure Cell for attachment to existing concrete surfaces.

- DP481K Contact Pressure Cell:** Designed for measuring soil pressures on structures, these cells feature a thick backplate that prevents warping and a thin pressure plate for high sensitivity to soil pressure changes. They are equipped with mounting lugs and can be attached to various surfaces.

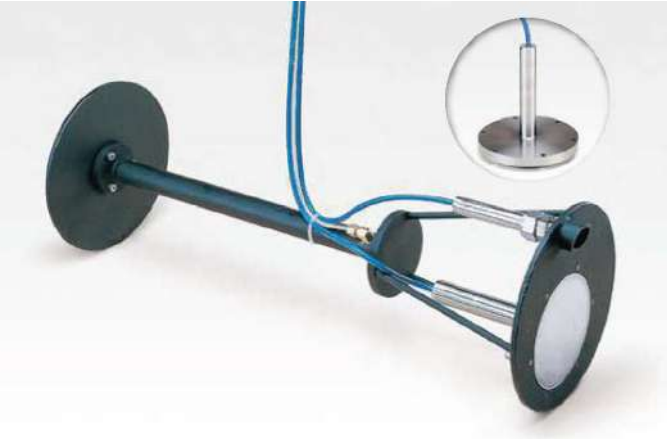


Side and frontal views of the Model DP481K installed on existing structure.



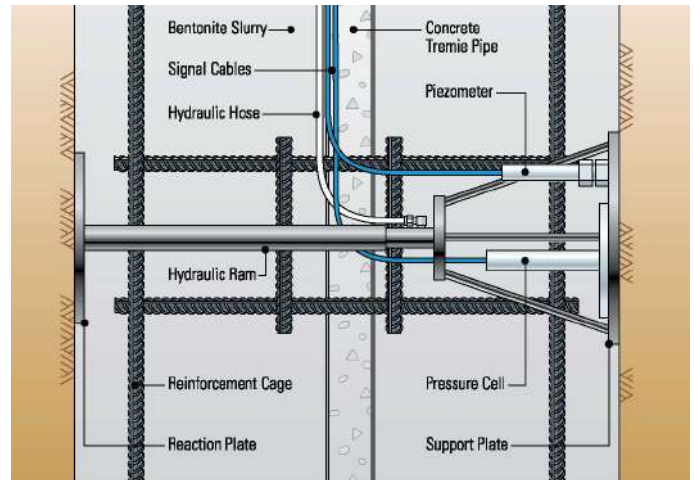
Model DP481K installation in a spread footing.

MODEL DP482K JACKOUT PRESSURE CELLS



Model DP482K shown in hydraulic ram assembly with piezometer and alone (inset).

- DP482K Jackout Pressure Cell:** This model is used in diaphragm (slurry) walls to monitor soil pressure during excavation. The cell is mounted on a support plate and connected to a hydraulic ram, allowing for precise pressure application as the wall is built.



Jackout Pressure Cell assembly installed in diaphragm wall.

MODEL DP483K PUSH-IN PRESSURE CELL



Model DP483K Push-In Pressure Cell.

- DP483K Push-In Pressure Cell:** Designed for measuring total pressure in soils and earth fills, this model can be pushed into place using rods or pipes. It can be fitted with an integral piezometer when effective stress measurements are needed.

MODEL DP4855K PILE TIP PRESSURE CELL



Model DP4855K Pile Tip Pressure Cell.

- DP4855K Pile Tip Pressure Cell:** This model is used to measure pile-tip loads in cast-in-place concrete piles. It is designed to closely match the pile diameter and includes a mechanism for remote "crimping" to ensure proper contact between the cell and the surrounding concrete.

TECHNICAL SPECIFICATIONS

| | DP48K* | DP481K* | DP4815K* | DP482K* | DP483K* | DP4855K* |
|------------------------------------|---|---|---|---|--|-------------------------------|
| Transducer Type | Vibrating Wire | Vibrating Wire | Vibrating Wire | Vibrating Wire | Vibrating Wire | Vibrating Wire |
| Output | 2000–3000 Hz | 2000–3000 Hz | 2000–3000 Hz | 2000–3000 Hz | 2000–3000 Hz | 2000–3000 Hz |
| Standard Ranges ¹ | 70, 170, 350, 700 kPa; 1, 2, 3, 5, 7.5, 10, 20 MPa | 70, 170, 350, 700 kPa; 1, 2, 3, 5, 7.5, 10, 20 MPa | 70, 170, 350, 700 kPa; 1, 2, 3, 5, 7.5, 10, 20 MPa | 70, 170, 350, 700 kPa; 1, 2, 3, 5, 7.5, 10, 20 MPa | 70, 170, 350, 700 kPa; 1, 2, 3, 5 MPa | 2, 3, 5, 7.5, 10, 20 MPa |
| Over Range | 1.5 × rated pressure | 1.5 × rated pressure | 1.5 × rated pressure | 1.5 × rated pressure | 1.5 × rated pressure | 1.5 × rated pressure |
| Resolution | ±0.025% F.S. | ±0.025% F.S. | ±0.025% F.S. | ±0.025% F.S. | ±0.025% F.S. | ±0.025% F.S. |
| Accuracy ² | ±0.1% F.S. | ±0.1% F.S. | ±0.1% F.S. | ±0.1% F.S. | ±0.1% F.S. | ±0.1% F.S. |
| Linearity | < 0.5% F.S. | < 0.5% F.S. | < 0.5% F.S. | < 0.5% F.S. | < 0.5% F.S. | < 0.5% F.S. |
| Typical Long-Term Drift | < 0.02% F.S./yr | < 0.02% F.S./yr | < 0.02% F.S./yr | < 0.02% F.S./yr | < 0.02% F.S./yr | < 0.02% F.S./yr |
| Cell Dimensions (H×D) ³ | 7 × 230 mm | 15 × 230 mm | 26 × 230 mm | 19 × 150 mm | 10 × 203 mm | varies |
| Transducer Dimensions (L×D) | 133 × 32 mm (≤ 170 kPa) 133 × 25 mm (≥ 350 kPa) | 133 × 32 mm (≤ 170 kPa) 133 × 25 mm (≥ 350 kPa) | 133 × 32 mm (≤ 170 kPa) 133 × 25 mm (≥ 350 kPa) | 133 × 32 mm (≤ 170 kPa) 133 × 25 mm (≥ 350 kPa) | 310 × 51 mm (≤ 170 kPa) 208 × 51 mm (≥ 350 kPa) | 133 × 25 mm |
| Excitation Voltage | 2.5–12 V swept square wave | 2.5–12 V swept square wave | 2.5–12 V swept square wave | 2.5–12 V swept square wave | 2.5–12 V swept square wave | 2.5–12 V swept square wave |
| Excitation Frequency | 1400–3500 Hz | 1400–3500 Hz | 1400–3500 Hz | 1400–3500 Hz | 1400–3500 Hz | 1400–3500 Hz |
| Material | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel | Stainless Steel |
| Temperature Range ¹ | –20 °C to +80 °C | –20 °C to +80 °C | –20 °C to +80 °C | –20 °C to +80 °C | –20 °C to +80 °C | –20 °C to +80 °C |

Note: PSI = kPa × 0.14503, or MPa × 145.03.

*Also available with mv/V, 0-5 V or 4-20 mA outputs Cell dimensions are the same. Transducer dimensions are 199 × 32 mm, except for the Model DP483K (please contact DUSTIN for details). ¹Other ranges available on request.

²Stated accuracy is for the pressure transducer alone. The total system accuracy (pressure transducer + pressure cell) is subject to site-specific variables.

³Other sizes available on request.