

Model 3000 & 4900 Load Cells

APPLICATIONS

- Dam, excavation, construction projects
- Concrete and steel component monitoring
- Monitoring loads during pile testing

FEATURES & ADVANTAGES

- Rugged—Excellent long-term stability
- Waterproof
- Low temperature coefficients



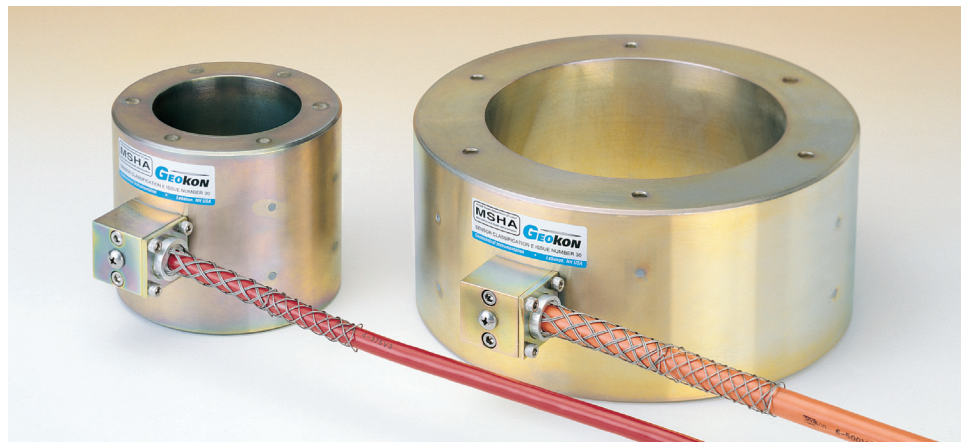
OPERATING PRINCIPLE

The Model 4900 Load Cell consists of a cylinder of high-strength steel with three to six vibrating wire strain sensors arranged to measure cylinder compression under load. The cylindrical shape allows the load cell to be used with tie-backs and rock bolts. The readings from the individual sensors are averaged and used in conjunction with a calibration factor, supplied with the load cell, to calculate the applied loads. The Model 3000 has the same annular design and is available in high-strength steel or aluminum. However, instead of vibrating wire sensors, the Model 300 utilizes electrical resistance strain gages cemented to the outside of the annulus. These are connected together in a Wheatstone Bridge Circuit so that there is a single mV/V output. Remote sensing techniques are used to minimize cable effects.

ADVANTAGES AND LIMITATIONS

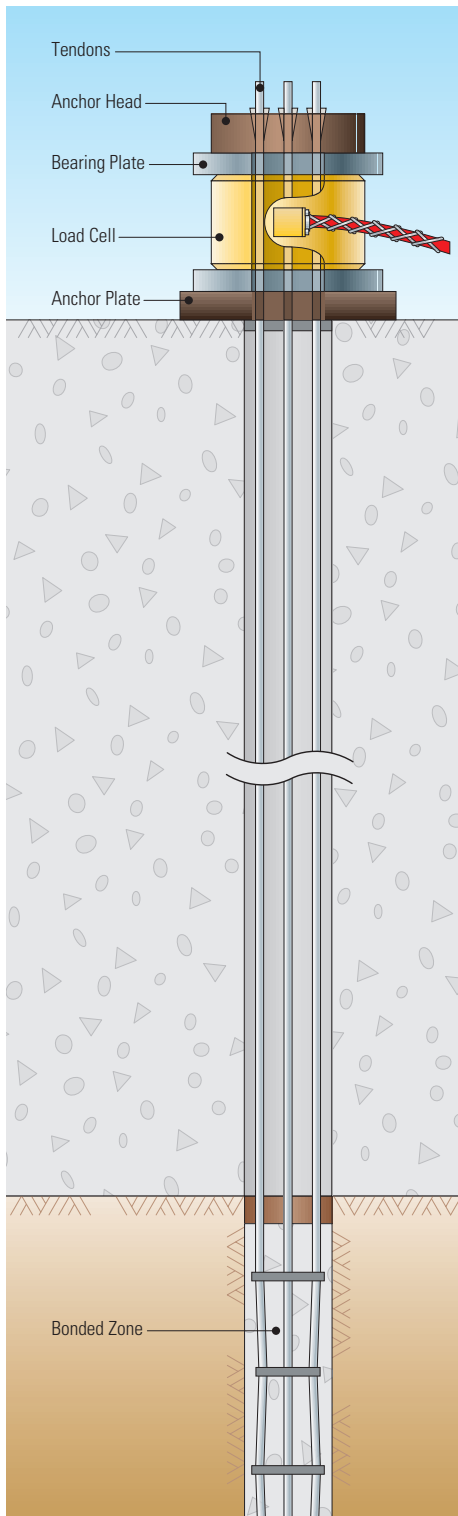
Vibrating wire load cells provide excellent long-term stability and can be used with long cables without adversely affecting the output frequency. They have also been used successfully in high radiation environments. Vibrating wire load cells are not, however, suitable for measuring dynamic loading. For dynamic applications it may be preferable to use the Model 3000.

Both Models are waterproof and have low temperature coefficients. Eccentric loading is

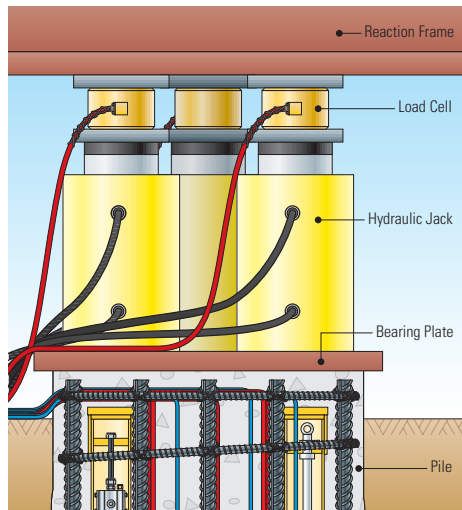


Model 4900 Vibrating Wire Load Cells.

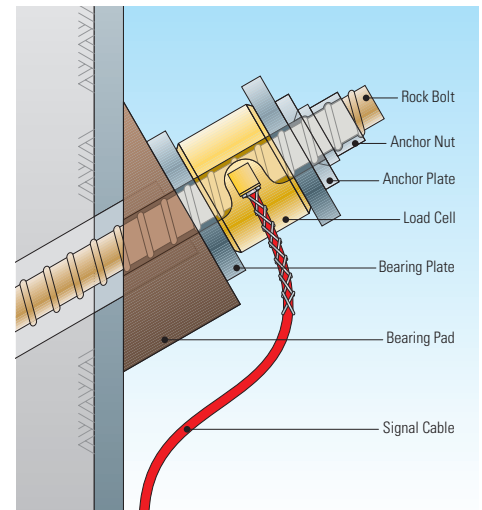
accounted for by averaging the readings from all the strain sensors. These units are easily datalogged, however, the multiplicity of sensors requires datalogging units to have a corresponding number of channels. The calibration of annular shaped load cells is very dependent on the end loading conditions. The flat-ness and/or thickness of bearing surfaces can cause bearing plates to bend, thereby affecting measurement accuracy. Size mismatches between load cells and the hydraulic ram may also cause similar effects. Calibration variations of as much as 15% have been observed. For the highest levels of accuracy, calibrations should be performed while duplicating or simulating actual field conditions.



Model 4900 used in concrete dam tie-down.



Load cells used in pile test.



Load cell used to monitor performance of tie-back in excavation.

SYSTEM COMPONENTS

Signals from the load cell are transmitted to the readout location by means of a multi-conductor shielded cable. This cable may be armored for extra protection. Kellems grips prevent the cable from being pulled from the load cell. Larger size load cells are supplied with lifting lugs. Readout of the Model 4900 is obtained via appropriate dataloggers. Manual readouts can be facilitated using a multichannel switch box connected to the end of the cable, or with our Advisor Vibrating Wire Readout unit. To minimize eccentric and uneven loading, the use of the thick machined-flat bearing plates and centralizer bushings (when necessary) are recommended. Bearing plates should be machined flat and large enough to cover the entire load bearing surface of the load cell. Bearing plate thickness is related to the load cell to hydraulic jack size mismatch: the greater the size disparity, the thicker the bearing plate. Typical thickness ranges from 25 mm to 75 mm. Centralizer bushings are recommended when the size of the tie-back or rock bolt is more than 30 mm smaller than the internal diameter of the load cell.

Technical Specifications

	3000	4900
Rated Capacities¹	100 to 10,000 kN	100 to 10,000 kN
Over Range²	150% F.S.	150% F.S.
Resolution	0.025% F.S.	0.025% F.S.
Accuracy³	±0.5% F.S.	±0.5% F.S.
Output	1.5 to 2.5 mV/V @ F.S.	1200-2800 Hz
Temperature Range	-20°C to +80°C	-20°C to +80°C
Cables	Multi-conductor shielded pairs with PVC outer jacket	
Internal Diameters¹	solid, 25, 50, 75, 100, 125, 150, 200, 250 mm	

¹Other capacities and diameters available on request.

Calibrations that exceed Geokon's NIST traceable capacity of approximately 4500 kN are subcontracted to an accredited testing laboratory.

²With no calibration shift.

³Established under laboratory conditions. System accuracy depends on end loading conditions.

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