Carlson Stress Cells

Carlson Concrete Stress Cell

Carlson Soil Stress Cell

Carlson Stress Cells are 178 mm (7 in.) diameter plates with a strain-meter sensing element mounted on one face. The plate has a mercury film at its mid-thickness and a flexible rim with the result that any stress through the plate is applied to the mercury film. Extraneous deformation such as drying shrinkage have very little effect on stress through the plate (and the mercury) so the calibration is in terms of compressive stress per 0.01 per cent reduction in the resistance ratio of the sensing element. The sensing element is isolated from the concrete by having a free space around it. A thin walled PVC tube is attached to the main diaphragm in such a way that it surrounds the sensing element, but does not touch it.

The stress cell may properly be called an “interface” stress meter because it is adapted to the measurement of compressive stress against a surface. It is similar to the stress meter for concrete, but it has a much thicker plate to make it independent of the distribution of force against it. Although it is intended mainly for the measurement of soil pressure against a surface, it can be used wherever it is desired to measure force with minimum deformation. The deformation required to produce one least reading of force is less than one millionth of an inch. This is accomplished by having an internal diaphragm which is small compared to the whole plate, and it is the deflection of this small diaphragm by the strain-meter sensing element which constitutes the measurement of force against the larger plate.

Flexibility of the rim is obtained through the use of grooves in such a way that there is no unloaded ring at the outer edge as in the case of the concrete stress meter. Thus, this stress cell can be mounted in a concrete wall, for example, so that the bottom face is flush with the surface of the concrete and then the stress cell acts as a part of the wall. It is fully responsive to pressure without altering that pressure during measurement.

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applications

Measures soil pressure against a surface.

Measures force with minimal deformation.

specifications + ordering info

Carlson Stress Cells

cable specs

The cable most commonly used is heavy duty, neoprene rubber-covered, with either three or four conductors. Alternate cable types are available to suit site specific conditions and we invite your inquiries.

The Carlson MA7 and later series readout instruments, while compatible with both three and four wire systems, require only three conductors to monitor both temperature and resistance. Earlier versions of Carlson readouts require four conductors to monitor both parameters. We recommend that the total design length of cable be attached at the factory in order to assure system integrity. Should the final design length not be known at the time of order, specify the total length of cable to be supplied in bulk, and that a 1 m. (40 in.) length of either three or four conductor be attached. As conductor diameter is determined by lead length, please specify the approximate total length, to insure that the most appropriate cable is supplied.

While field splicing is possible, the instructions in the Carlson field manual must be followed.

operating principle

Carlson Instruments are elastic wire strain meters containing two coils of highly elastic steel wire, one of which increases in length and electrical resistance when a strain occurs, while the other decreases. The ratio of the two resistances is independent of temperature (except for thermal expansion) and therefore the change in resistance ratio is a measure of strain. The total resistance is independent of strain since one coil increases the same amount as the other decreases due to a change in length of the meter. Therefore, the total resistance is a measure of temperature.

specifications

DESCRIPTION	SOIL STRESS CELLS				CONCRETE STRESS CELLS		
	S25	S50	S100	S200	C400	C800	C1500
Range*	25 psi (170 kPa)	50 psi (345 kPa)	100 psi (690 kPa)	200 psi (1.4 MPa)	400 psi (2.8 MPa)	800 psi (5.5 MPa)	1500 psi (10.3 MPa)
Resolution	0.1 psi (0.7 kPa)	0.2 psi (1.4 kPa)	0.4 psi (2.8 kPa)	0.8 psi (2.8 kPa)	3 psi (20.68 kPa)	5 psi (34.47 kPa)	10 psi (68.95 kPa)
Resolution Temperature	0.1°F (.05°C)	0.1°F (.05°C)	0.1°F (.05°C)	0.1°F (.05°C)	0.1°F (.05°C)	0.1°F (.05°C)	0.1°F (.05°C)
Modulus of Elasticity	60,000 psi (400 MPa)	120,000 psi (800 MPa)	240,000 psi (1700 MPa)	480,000 psi (3300 MPa)	2×10^6	4×10^6	6×10^6
Effective Area of Meter	42 in^2 (271 cm2)	42 in^2 (271 cm2)	42 in^2 (271 cm2)	42 in^2 (271 cm2)	35 in^2 (226 cm2)	35 in^2 (226 cm2)	35 in^2 (226 cm2)

*Higher ranges are available upon special order. Contact RST for more information.

ordering info

DESCRIPTION	SOIL STRESS CELLS				CONCRETE STRESS CELLS		
	S25	S50	S100	S200	C400	C800	C1500
Part Number	CA115A0025	CA115A0050	CA1150100	CA115A0200	CA165A0400	CA165A0800	CA165A1500

GEOTECHNICAL . MINING . ENVIRONMENTAL . STRUCTURAL