

P10 VIBRATING WIRE CONCRETE STRESS CELL

Datasheet P10



Description

The Vibrating Wire Concrete Stress Cell measures radial and tangential stresses in shotcrete, concrete and rock, usually in tunnel linings.

The cell consists of a rectangular flat jack formed from two plates of steel welded together around the periphery.

The narrow gap between the plates is filled with hydraulic oil.

A Vibrating Wire Pressure Transducer is connected to the cell by a short length of steel tubing, forming a closed hydraulic system.

Features

- Uses proven Vibrating Wire technology
- Measures stress on and within linings of underground excavations
- Monitors the stress distribution within rock
- Compensation tube offsets the effects of concrete hydration shrinkage, restoring cell contact pressure
- Internal thermistor monitors temperature variations
- Stainless Steel cell construction

Benefits

- Accurate, repeatable readings over long cable lengths
- Long working life, long-term stability and reliability
- Suitable for remote reading and data logging
- Over-voltage surge arrestor protects against electrical damage
- Connecting cable is strong, armoured and flexible



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VIBRATING WIRE PRINCIPLE



A high carbon steel wire is held in tension between a fixed point and a movable point within the sensor.

The physical changes measured by the sensor result in small changes to the position of the movable point which results in a change to the tension of the wire.

The wire may be excited by either plucking or sweeping via a coil adjacent to the wire. The resulting resonant frequency (which is relative to the tension of the wire) is then recorded by the same coil. The reading can be displayed by instrument readout or recorded by data logging equipment.

Operation

Both cell and transducer are embedded in the medium to be monitored. As the concrete or shotcrete cures, the cell expands due to the rise in temperature.

Upon cooling, a slight gap forms between the cell and the concrete. The compensating tube allows adjustment of initial cell volume to offset concrete shrinkage. This forces extra oil into the cell, thereby expanding it to establish firm contact with the cooled concrete.

An armoured, screened cable connects the transducer to a terminal unit, a portable readout unit or data logger.

Cells can also monitor stress changes in the rock walls of underground works. In this case, slots are first machined by diamond wheel cutting or line drilling. The cell is then embedded in cement mortar within the preformed slot.

Applications

The Concrete Vibrating Wire Stress cell measures radial and tangential stresses in shotcrete, concrete and rock, usually in tunnel linings.

Typical monitoring applications include:

- Tunnel linings
- Mass concrete
- Rock

Associated products

For details on:

Catalogue code:

VWnote

RO-1-VWNOTE

Datalogger

D1

Terminal and Junction Boxes

RO TB-JB-TJ

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THE TECHNICAL RATING FOR THIS PRODUCT:

INTERMEDIATE



As the correct installation of any monitoring sensor or system is vital to maximise performance and accuracy, Soil Instruments makes the following recommendations, for the skill level of the installation contractor.

ADDITIONAL SUPPORT

We offer installation and monitoring services to support this system. For more information please email : sales@soilinstruments.com or call : **+44 (0) 1825 765044**

ADVANCED



The installer is trained and experienced in the installation of this type of instrument or systems, and is ideally a specialist Instrumentation and Monitoring contractor.

INTERMEDIATE



The installer already has previous experience and/or training in the installation of this instrument or system.

BASIC



As a minimum the installer has read and fully comprehends the manual, and if possible has observed these instruments or systems being installed by others.

Specifications

Sensor

STD Ranges (kPa)	300 500 700 1000 1500 2000 3000 4000 6000 10,000 15,000
Resolution ¹	0.025% full scale (minimum)
Accuracy ²	0.1% full scale
Linearity ²	0.1% full scale
Temperature Range	-20 to 80°C
Over Range	150% full scale
Material	Stainless Steel
Excitation Method	Pluck or sweep

Thermistor

Type	NTC 3K Ω
Accuracy	0.5°C
Resolution ¹	0.1°C

Weights & Dimensions

Cell Size Diameter	100 x 200mm	150 x 250mm	200 x 300mm
Thickness	6.25mm	6.25mm	6.25mm
Weight	2.9kg	3.7kg	4.7kg

Cables

	Without Thermistor	With Thermistor
Type	2 core armoured PVC outer sheath	4 core armoured PVC outer sheath
Diameter	12mm	13mm
Weight /m	220g	336g

¹Dependent on readout

²Of the pressure transducer

Ordering Information

Tangential, 100 x 200mm, Vibrating Wire Stress Cell

Oil filled, Stainless Steel stress cell

P10-1-SS-3	300kPa pressure range
P10-1-SS-5	500kPa pressure range
P10-1-SS-10	1000kPa pressure range
P10-1-SS-20	2000kPa pressure range
P10-1-SS-40	4000kPa pressure range
P10-1-SS-60	6000kPa pressure range
P10-1-SS-100	10000kPa pressure range
P10-1-SS-150	15000kPa pressure range
P10-1-SS-3-T	300kPa pressure range with thermistor
P10-1-SS-5-T	500kPa pressure range with thermistor
P10-1-SS-10-T	1000kPa pressure range with thermistor
P10-1-SS-20-T	2000kPa pressure range with thermistor
P10-1-SS-40-T	4000kPa pressure range with thermistor
P10-1-SS-60-T	6000kPa pressure range with thermistor
P10-1-SS-100-T	10000kPa pressure range with thermistor
P10-1-SS-150-T	15000kPa pressure range with thermistor

Ordering Information

Radial, 150 x 250mm, Vibrating Wire Stress Cell

Oil filled, Stainless Steel stress cell

P10-2-SS-3	300kPa pressure range
P10-2-SS-5	500kPa pressure range
P10-2-SS-10	1000kPa pressure range
P10-2-SS-20	2000kPa pressure range
P10-2-SS-40	4000kPa pressure range
P10-2-SS-60	6000kPa pressure range
P10-2-SS-100	10000kPa pressure range
P10-2-SS-150	15000kPa pressure range
P10-2-SS-3-T	300kPa pressure range with thermistor
P10-2-SS-5-T	500kPa pressure range with thermistor
P10-2-SS-10-T	1000kPa pressure range with thermistor
P10-2-SS-20-T	2000kPa pressure range with thermistor
P10-2-SS-40-T	4000kPa pressure range with thermistor
P10-2-SS-60-T	6000kPa pressure range with thermistor
P10-2-SS-100-T	10000kPa pressure range with thermistor
P10-2-SS-150-T	15000kPa pressure range with thermistor

Radial, 200 x 300mm, Vibrating Wire Pressure Cell

Oil filled, Stainless Steel stress cell

P10-3-SS-3	300kPa pressure range
P10-3-SS-5	500kPa pressure range
P10-3-SS-10	1000kPa pressure range
P10-3-SS-20	2000kPa pressure range
P10-3-SS-40	4000kPa pressure range
P10-3-SS-60	6000kPa pressure range
P10-3-SS-100	10000kPa pressure range
P10-3-SS-150	15000kPa pressure range
P10-3-SS-3-T	300kPa pressure range with thermistor
P10-3-SS-5-T	500kPa pressure range with thermistor
P10-3-SS-10-T	1000kPa pressure range with thermistor
P10-3-SS-20-T	2000kPa pressure range with thermistor
P10-3-SS-40-T	4000kPa pressure range with thermistor
P10-3-SS-60-T	6000kPa pressure range with thermistor
P10-3-SS-100-T	10000kPa pressure range with thermistor
P10-3-SS-150-T	15000kPa pressure range with thermistor

Installation Equipment

W6-8.4	Compensating tube crimping tool
W6-6.1	Cable ties. Pack of 100No

Connecting Cable and Fittings

CA-1.1-2-A	Armoured cable, 2 cores. Price per metre, 1.5mm ² , PVC jacket
CA-1.1-4-A	Armoured cable, 4 cores. Price per metre, 1.5mm ² , PVC jacket, for instruments with thermistors
CA-4.1	Joint sealing kit
CA-4.2	Coloured adhesive tapes. Set of 10No
CA-4.3	Crimping tool
CA-4.4	Crimping sleeves. Set of 100No
W6-6.1	Nylon ties. Price each, 150mm x 3.5mm. Pack of 100No
ST1-3.5	Nylon ties. Price each, 370mm x 4.7mm. Pack of 100No

Manual

MAN-170	Vibrating Wire Concrete Stress Cell
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