

P9 VIBRATING WIRE PUSH-IN PRESSURE CELL

Datasheet P9



**Description**

The Vibrating Wire Push-In Pressure Cell measures total earth pressures in all soil types. A piezometer within the unit allows the measurement of pore water pressure and therefore the derivation of effective pressure.

The cell is formed from two sheets of steel welded around the periphery, with the narrow gap between the plates being filled with oil.

A Vibrating Wire pressure transducer is connected by a short steel tube, forming a sealed hydraulic system.

A porous filter disc is incorporated in the cell and is connected to a second Vibrating Wire transducer, together forming an integral piezometer. The two Vibrating Wire transducers are mounted in tandem behind the spade-shaped cell and protected within the installing pipe.

**Features**

- Uses proven Vibrating Wire technology
- Designed to be pushed into all soil types
- Recoverable push-in casing
- Additional, integral pore pressure sensor allows derivation of effective pressure
- Measures total earth pressures in all soil types
- Fast response to low volume pressure changes
- Fitted with thermistor for temperature monitoring
- Strong, screened and flexible connecting cables

**Benefits**

- Push-in design facilitates perfect contact with the soil
- Accurate, repeatable readings over long cable lengths
- Long working life, long-term stability and reliability
- Over-voltage surge arrestor protects against electrical damage
- Design prevents case stresses from affecting readings
- Suitable for manual or remote monitoring



Comprehensive information about this product and our full range is available at [www.soil.co.uk](http://www.soil.co.uk)  
If you would like to speak with someone directly please call +44 (0)1825 765044 or email [sales@soil.co.uk](mailto:sales@soil.co.uk)

## 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

A borehole is formed to a depth just short of the installation level. The Push-In Pressure Cell is lowered to the base of the borehole via the push-in casing. Once at the base, the orientation of the cell is checked before pushing it to its final elevation below the base of the borehole. The temporary push-in casings are then removed leaving the cell in-situ.

After the removal of the push-in casings, the borehole is grouted.

The sensor cables connect the transducers to either a terminal unit or data logger.



### Applications

The Vibrating Wire Push-in Pressure Cell monitors changes in earth pressure associated with the construction of excavations, embankments and dams. The instrument is capable of providing total pressure, earth pressure and ground water pressure readings.

Vibrating Wire Pressure cells are often installed in stiff clay behind and in front of retaining walls, in soft puddle clay cores of old embankment dams and in glacial till adjacent to sea cliffs.

Typical applications include:

- Measuring the total horizontal stresses in vertical boreholes
- Measuring horizontal and vertical stresses in horizontally drilled boreholes, such as around tunnels and cliff faces
- As a site investigation tool to measure the in situ stresses in the ground prior to any disturbance or construction
- Measuring total pressure within tailings dams
- Measuring foundation bearing pressures.



### 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:

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@soil.co.uk](mailto:sales@soil.co.uk) or call : **+44 (0) 1825 765044**

#### ADVANCED



#### ADVANCED



#### INTERMEDIATE



#### BASIC



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.

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

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   4000
Resolution <sup>1</sup>	0.025% full scale (minimum)
Accuracy <sup>2</sup>	0.1% full scale
Linearity <sup>2</sup>	0.5% full scale
Temperature Range	-20 to +80° C
Over Range	150% full scale
Material	Powder Coated Steel Cell
Excitation Method	Pluck or Sweep

### Thermistor

Type	NTC 3K Ω
Accuracy	0.5°C
Resolution <sup>1</sup>	0.1°C

### Weights & Dimensions

Length Including Protective Pipe	1000mm
Width	100mm
Diameter of Protective Pipe	50mm
Weight Excluding Cable	7.5kg

### Cables

	Without Thermistor	With Thermistor
Type	2 Core Screened PVC Outer Sheath	4 Core Screened PVC Outer Sheath
Diameter	6.0mm	7.5mm
Weight /m	50g	73g

<sup>1</sup>Dependent on readout

<sup>2</sup>Of the pressure transducer

## Ordering Information

### Push-In Vibrating Wire Pressure Cell/Piezometer Combination

**Oil filled, mild steel pressure cell. Combination pressure cell requires cable for two transducers**

P9-1.1	Pressure Cell 300kPa : Piezometer 300kPa
P9-1.2	Pressure Cell 500kPa : Piezometer 300kPa
P9-1.3	Pressure Cell 1000kPa : Piezometer 300kPa
P9-1.4	Pressure Cell 2000kPa : Piezometer 300kPa
P9-1.5	Pressure Cell 4000kPa : Piezometer 300kPa
P9-1.6	Pressure Cell 500kPa : Piezometer 500kPa
P9-1.7	Pressure Cell 1000kPa : Piezometer 500kPa
P9-1.8	Pressure Cell 2000kPa : Piezometer 500kPa
P9-1.9	Pressure Cell 4000kPa : Piezometer 500kPa
P9-1.10	Pressure Cell 1000kPa : Piezometer 1000kPa
P9-1.11	Pressure Cell 2000kPa : Piezometer 1000kPa
P9-1.12	Pressure Cell 4000kPa : Piezometer 1000kPa
P9-1.1-T	Pressure Cell 300kPa : Piezometer 300kPa with thermistors
P9-1.2-T	Pressure Cell 500kPa : Piezometer 300kPa with thermistors
P9-1.3-T	Pressure Cell 1000kPa : Piezometer 300kPa with thermistors
P9-1.4-T	Pressure Cell 2000kPa : Piezometer 300kPa with thermistors
P9-1.5-T	Pressure Cell 4000kPa : Piezometer 300kPa with thermistors
P9-1.6-T	Pressure Cell 500kPa : Piezometer 500kPa with thermistors
P9-1.7-T	Pressure Cell 1000kPa : Piezometer 500kPa with thermistors
P9-1.8-T	Pressure Cell 2000kPa : Piezometer 500kPa with thermistors
P9-1.9-T	Pressure Cell 4000kPa : Piezometer 500kPa with thermistors
P9-1.10-T	Pressure Cell 1000kPa : Piezometer 1000kPa with thermistors
P9-1.11-T	Pressure Cell 2000kPa : Piezometer 1000kPa with thermistors
P9-1.12-T	Pressure Cell 4000kPa : Piezometer 1000kPa with thermistors

## Ordering Information

### Push-In Vibrating Wire Pressure Cell

Oil filled, mild steel pressure cell

P9-2-3	300kPa pressure range
P9-2-5	500kPa pressure range
P9-2-10	1000kPa pressure range
P9-2-20	2000kPa pressure range
P9-2-40	4000kPa pressure range
P9-2-3-T	300kPa pressure range with thermistors
P9-2-5-T	500kPa pressure range with thermistors
P9-2-10-T	1000kPa pressure range with thermistors
P9-2-20-T	2000kPa pressure range with thermistors
P9-2-40-T	4000kPa pressure range with thermistors

### Installation Accessories

P9-3.1	Left hand to right hand threaded coupling
P9-3.2	Installing tube, 1metre length. 2inch nominal bore, includes coupling
P9-4.7	Installing tube, 2metre length. 2inch nominal bore, includes coupling
P9-3.3	Pushing adaptor
S10-3.3	Pushing cap
P9-4.2	Hand Punner. 150mm diameter punner, 500mm handle
P8-3.9	Push-in vibrating wire pressure cell tool kit. Includes tool box, piezometer filter priming aid, tube cutter, steel rule, 8inch & 6inch adjustable spanners, screw drivers and a ball hammer.

### Connecting Cable and Fittings

CA-2.3-2-SC	2 core, multicore cable, 16/0.020, screened. Price per metre, PVC jacket
CA-2.3-4-SC	4 core, multicore cable, 16/0.020, screened. Price per metre, 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-157	Push-in Vibrating wire pressure cell
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FM 611948

Bell Lane, Uckfield, East Sussex  
TN22 1QL United Kingdom

t: +44 (0) 1825 765044  
f: +44 (0) 1825 744398

e: [info@soil.co.uk](mailto:info@soil.co.uk)  
w: [www.soil.co.uk](http://www.soil.co.uk)

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