

W9 STANDARD VIBRATING WIRE PIEZOMETER

Datasheet W9



Description

The Standard Vibrating Wire Piezometer provides accurate measurement of pore water pressures in fully or partially saturated soil.

The transducer is made from high quality 316 grade Stainless Steel and designed to handle pressure ranges from -50 to 4000 kPa. It incorporates an over voltage surge arrestor that offers protection from a lightning strike.

The piezometer may be fitted with either a low air entry sintered steel or high air entry ceramic filters.

A coned nose piece is available for push in installations.

An integral thermistor for temperature monitoring is included.

Features

- Small diameter
- Uses proven Vibrating Wire (VW) technology
- Manufactured from high grade 316 Stainless Steel for extended operation
- In built temperature compensation
- Hermetically sealed
- Suitable for long-term monitoring
- No electronic components in sensor module
- Capable of measuring negative pore pressures to -50 kPa
- Fitted with thermistors for temperature monitoring

Benefits

- Accurate, repeatable readings over long cable lengths
- Long working life, long-term stability and reliability
- Fast response to pressure changes
- Design prevents case stresses from affecting readings
- Over-voltage surge arrestor protects against electrical damage
- Connecting cable is strong, screened and flexible



Comprehensive information about this product and our full range is available at www.itmsoil.com
If you would like to speak with someone directly please call +44 (0)1825 765044 or email sales@itmsoil.com

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

The Standard Vibrating Wire Piezometer is designed for the accurate measurement of pore water pressures in fully or partially saturated soil.

The piezometer tip has an integral porous filter element containing a diaphragm type Vibrating Wire pressure transducer. A cable connects the transducer to a read-out, terminal unit or data logger.

The readout displays either frequency based units, or by inputting the instrument calibration factor, engineering units.

Applications

Piezometers are used in geotechnical, environmental, and hydrological applications. They can be installed in boreholes, placed in fill materials or open wells to measure water levels or pore water pressures to enable engineers to verify design assumptions and control placement of fill.

With a nose cone fitted the piezometer can also be pushed into soft ground with a CPT rig.

Typical applications include:

- **Environmental management including landfill sites**
- **Monitoring of aquifers**
- **Monitoring of tidal effects on coastal soils**
- **Dams**
- **Embankments**
- **Potential landslide sites**
- **Dewatering excavations**
- **Tailings lagoons**
- **Pumping tests**
- **Monitoring seepage**
- **Control placement of fill**

Associated products

For details on:

Catalogue code:

VWnote

RO-1 - VVNOTE

Datalogger

D1

Terminal and Junction box

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, itmsoil makes the following recommendations, for the skill level of the installation contractor.

ADDITIONAL SUPPORT

itmsoil offer installation and monitoring services to support this system. For more information please email : sales@itmsoil.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

| | |
|---------------------------------|---|
| Range (kPa) | 300 500 700 1000 1500 2000 4000 |
| Material | 316 grade Stainless Steel |
| Accuracy | ±0.1% full scale |
| Linearity | ±0.5% full scale |
| Resolution ¹ | 0.025% full scale (minimum) |
| Over range | 200% of full scale |
| Diaphragm displacement | < 0.001 cm ³ |
| Diameter | 19mm |
| Weight (without cable & filter) | 190g |
| Temperature range | -20° to +80°C |
| Excitation method | pluck or sweep |

Hermetic Sealing

| | |
|------------|---|
| Sensor | Vacuum sealed by electron beam welding |
| Piezometer | Cable gland / potting compound / "O" ring seals |

Thermistor

| | |
|-------------------------|---------|
| Type | NTC 3kΩ |
| Accuracy | 0.5°C |
| Resolution ¹ | 0.1°C |

| Filter Types | Ø | Length | Porosity |
|--------------------------|------|--------|-----------|
| HAE ceramic | 19mm | 15mm | 1 Micron |
| Sintered Stainless Steel | 19mm | 15mm | 50 Micron |

Cable (with thermistor)

| | |
|-----------|----------------------------------|
| Type | 4 Core screened PVC outer sheath |
| Diameter | 7.5mm |
| Weight /m | 73g |

¹Dependent on readout

Ordering information

Low Air Entry Stainless Steel Sintered Filter Vibrating Wire Piezometer

Low resistance to air entry (LAE), stainless steel sintered filter (50micron)

| | |
|-------------|--|
| W9-30-SS-T | 300kPa pressure range with thermistor |
| W9-50-SS-T | 500kPa pressure range with thermistor |
| W9-70-SS-T | 700kPa pressure range with thermistor |
| W9-100-SS-T | 1000kPa pressure range with thermistor |
| W9-150-SS-T | 1500kPa pressure range with thermistor |
| W9-200-SS-T | 2000kPa pressure range with thermistor |
| W9-400-SS-T | 4000kPa pressure range with thermistor |

High air entry ceramic filter vibrating wire piezometer

High resistance to air entry (HAE), ceramic filter (1micron)

| | |
|------------|--|
| W9-30-H-T | 300kPa pressure range with thermistor |
| W9-50-H-T | 500kPa pressure range with thermistor |
| W9-70-H-T | 700kPa pressure range with thermistor |
| W9-100-H-T | 1000kPa pressure range with thermistor |
| W9-150-H-T | 1500kPa pressure range with thermistor |
| W9-200-H-T | 2000kPa pressure range with thermistor |
| W9-400-H-T | 4000kPa pressure range with thermistor |

Heavy Duty Push-In Piezometers

| | |
|--------------|------------------------|
| W9P-30-SS-T | 300kPa pressure range |
| W9P-50-SS-T | 500kPa pressure range |
| W9P-70-SS-T | 700kPa pressure range |
| W9P-100-SS-T | 1000kPa pressure range |
| W9P-150-SS-T | 1500kPa pressure range |
| W9P-200-SS-T | 2000kPa pressure range |
| W9P-400-SS-T | 4000kPa pressure range |

Connecting Cables and Fittings

| | |
|-------------|---|
| CA-2.3-4-SC | 4 core, multicore cable, 16/0.020, screened, Priced per metre, PVC jacket, for instruments with thermistors |
| CA-4.1 | Joint sealing kit |

Installation Accessories

| | |
|-----------|--|
| W9-1.1-27 | Push-in stainless steel nose cone, For use with 15mm ceramic and stainless steel filters, 27mm outer diameter |
| W6-8.1 | Punner, To compact material in borehole. For use with W6-8.2 or W1-2.7 |
| W1-2.7 | Galvanised standpipe tubing, mild steel galvanised, includes coupling, 1metre length, 3/4inch nominal bore, 3/4inch BSP thread |
| W6-8.2 | Galvanised standpipe tubing, mild steel galvanised, includes coupling, 3metre length, 3/4inch nominal bore, 3/4inch BSP thread |
| W2-4.11 | Standard tool kit, tool kit includes: knife, 3 metre measuring tape, 8 inch adjustable spanner, 2 No flat screw drivers, combination pliers, ball hammer, 6 No English spanners 3/16 to 1inch. |

Spare Filters

| | |
|--------|---|
| W9-1.3 | Replacement ceramic HAE, high resistance to air entry (1micron) |
| W9-1.4 | Replacement sintered steel LAE filter, Low resistance to air entry (50micron) |

Manual

| | |
|---------|------------------------------------|
| MAN-106 | Vibrating Wire Standard Piezometer |
|---------|------------------------------------|

soil
INSTRUMENTS



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