W4 HEAVY DUTY VIBRATING WIRE PIEZOMETER

Datasheet W4

Description

The Heavy Duty Vibrating Wire Piezometer accurately measures pore water pressures in fully or partially saturated soil.

The heavy duty design prevents case stresses from affecting readings in extreme installations (dams and high ground stresses). The transducer is fitted with either a low air entry sintered steel or a high air entry ceramic filter. A cone shaped nose piece is available for push in installations.

The transducer is made from high quality 316 grade Stainless Steel and designed for pressure ranges from -50 to 15,000 kPa.

The Heavy Duty Vibrating Wire Piezometer incorporates an over voltage surge arrestor to offer protection from an indirect lightning strike. The piezometer is also available with a thermistor for temperature monitoring.

The W4 heavy duty piezometer flushable version is also available for applications where high suction is expected with an extended negative range.

Features

- **Heavy duty design**
- **Uses proven Vibrating Wire (VW) technology**
- **Manufactured from high grade 316 Stainless Steel for extended operation**
- **In built temperature compensation**
- **Hermetically sealed**
- **Highly accurate device**
- **Capable of measuring negative pore pressures to –50 kPa**
- **Available with thermistor for temperature monitoring**
- **Accurate, repeatable readings over long cable lengths**

Benefits

- **Long working life, long-term stability and reliability**
- **Works in extreme installations and pressures up to 15000kPa**
- **Fast response to pressure changes**
- **Advanced design prevents case stresses from affecting readings**
- **Over-voltage surge arrestor protects against electrical damage**
- **Connecting cable is strong, armoured and flexible**

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

VIBRATING WIRE PRINCIPLE

VW

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 Heavy Duty Vibrating Wire Piezometer is designed for the accurate measurement of pore water pressures in fully or partially saturated soil and rock.

The Piezometer tip comprises a porous filter element integral with 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.

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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Applications

Piezometers are used in geotechnical, environmental, and hydrological applications. They can be installed in boreholes, placed in fill materials or in open wells to measure water levels or porewater 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.**

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

Range (kpa)	150 | 300 | 500 | 700 | 1000 | 1500 | 2000 | 4000 | 6000 | 10000 | 15000
Material	316 grade Stainless Steel
Accuracy	±0.1% full scale
Linearity	±0.1% full scale
Resolution[1]	0.025% full scale (minimum)
Over range	200% of full scale
Diaphragm displacement	< 0.001 cm^3
Diameter	28mm
Weight (without cable & filter)	980g
Temperature range	-20° to +80°C
Excitation method	Pluck or sweep

Hermetic Sealing

Sensor	Vacuum sealed by electron beam welding / 'O' ring Seals
Piezometer	Cable gland / potting compound / 'O' ring Seals

Thermistor

Type	NTC 3k Ω
Accuracy	0.5°C
Resolution[1]	0.1°C

Filter Types

HAE Ceramic	28mm Ø	15mm long	1 Micron
Sintered Stainless Steel	28mm Ø	15mm long	50 Microns

Cable

Type	2 core armoured PVC outer sheath	4 core armoured PVC outer sheath
Diameter	12mm	13mm
Weight /m	220g	336g

[1]Dependant on readout

Ordering information

Low Air Entry Stainless Steel Sintered Filter Vibrating Wire Piezometer Low resistance to air entry (LAE), Stainless Steel sintered filter (50 microns)		High Air Entry Ceramic Filter Vibrating Wire Piezometer High resistance to air entry (HAE) ceramic filter (1micron)	
W4-15-S	150kPa pressure range	W4-15-H	150kPa pressure range
W4-30-S	300kPa pressure range	W4-30-H	300kPa pressure range
W4-50-S	500kPa pressure range	W4-50-H	500kPa pressure range
W4-70-S	700kPa pressure range	W4-70-H	700kPa pressure range
W4-100-S	1000kPa pressure range	W4-100-H	1000kPa pressure range
W4-150-S	1500kPa pressure range	W4-150-H	1500kPa pressure range
W4-200-S	2000kPa pressure range	W4-200-H	2000kPa pressure range
W4-300-S	3000kPa pressure range	W4-300-H	3000kPa pressure range
W4-400-S	4000kPa pressure range	W4-400-H	4000kPa pressure range
W4-600-S	6000kPa pressure range	W4-600-H	6000kPa pressure range
W4-1000-S	10000kPa pressure range	W4-1000-H	10000kPa pressure range
W4-1500-S	15000kPa pressure range	W4-1500-H	15000kPa pressure range
W4-15-S-T	150kPa pressure range with thermistor	W4-15-H-T	150kPa pressure range with thermistor
W4-30-S-T	300kPa pressure range with thermistor	W4-30-H-T	300kPa pressure range with thermistor
W4-50-S-T	500kPa pressure range with thermistor	W4-50-H-T	500kPa pressure range with thermistor
W4-70-S-T	700kPa pressure range with thermistor	W4-70-H-T	700kPa pressure range with thermistor
W4-100-S-T	1000kPa pressure range with thermistor	W4-100-H-T	1000kPa pressure range with thermistor
W4-150-S-T	1500kPa pressure range with thermistor	W4-150-H-T	1500kPa pressure range with thermistor
W4-200-S-T	2000kPa pressure range with thermistor	W4-200-H-T	2000kPa pressure range with thermistor
W4-300-S-T	3000kPa pressure range with thermistor	W4-300-H-T	3000kPa pressure range with thermistor
W4-400-S-T	4000kPa pressure range with thermistor	W4-400-H-T	4000kPa pressure range with thermistor
W4-600-S-T	6000kPa pressure range with thermistor	W4-600-H-T	6000kPa pressure range with thermistor
W4-1000-S-T	10000kPa pressure range with thermistor	W4-1000-H-T	10000kPa pressure range with thermistor
W4-1500-S-T	15000kPa pressure range with thermistor	W4-1500-H-T	15000kPa pressure range with thermistor

Ordering information

High Air Entry Ceramic Flushable Vibrating Wire Piezometer	
W4-15-HFT	150kPa pressure range with thermistor
W4-30-HFT	300kPa pressure range with thermistor
W4-50-HFT	500kPa pressure range with thermistor
W4-70-HFT	700kPa pressure range with thermistor
W4-100-HFT	1000kPa pressure range with thermistor
Connecting cables, Fittings and Tubes	
CA-1.1-2-A	Armoured cable, 2 core, price per metre, 1.5mm^2, PVC jacket
CA-1.1-4-A	Armoured cable, 4 core, price per metre, 1.5mm^2, PVC jacket (for instruments with thermistors)
W6-7.1	Water circulating unit
W6-7.2	De-aired water boiler; 240Vac, 50Hz electrical supply
W6-3.20	Male quick release coupling, 1/4 inch
W6-2.5	Twin 1/4 inch nylon tube, priced per metre
Installation Accessories	
W4-1.4	Push-in Stainless Steel nose cone, for use with 15mm ceramic and Stainless Steel filters, 38mm 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, ¾inch nominal bore, ¾inch BSP thread
W6-8.2	Galvanised standpipe tubing, mild steel galvanised, includes coupling, 3metre length, ¾inch nominal bore, ¾inch BSP thread
W4-1.6	Push in adaptor, threaded to fit ¾inch BSP tube
W3-4.3	Placing adaptor, threaded to fit ¾inch BSP tube
W2-4.11	Standard Tool Kit, includes: knife, 3metre measuring tape, 8inch adjustable spanner, 2 No flat screw drivers, combination pliers, ball hammer, 6No English spanners 5⁄16 to 1inch
Spare Filters	
W4-1.2	Replacement ceramic HAE fliter, high resistance to air entry (1micron)
W4-1.3	Replacement sintered steel LAE filter, low resistance to air entry (50micron)
Manuals	
MAN-33	Vibrating Wire Heavy Duty Piezometer

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