DATASHEET W4

VIBRATING WIRE PIEZOMETER-HEAVY DUTY

Soil Instruments Ltd

PRODUCTS

FEATURES

The W4 Heavy Duty Vibrating Wire Piezometer provides accurate measurement of pore water pressures in rock, fully or partially saturated soil and is the culmination of our 30+ years of expertise in the design and manufacture of vibrating wire instrument technology. Built from high quality 316 grade stainless steel. The transducer is fitted with either a high or low air entry ceramic filter sleeve or a sintered stainless steel filter disc. For Push-in installations a coned nose piece is available. Designed for pressure ranges from -5 to 1500 metres head of water. The piezometer incorporates an over-voltage surge arrestor to offer protection from indirect lightning strike. The W9 piezometer can also be fitted with thermistors for temperature monitoring.

- High accuracy with excellent long term stability.
- Accuracy unaffected by cable length.
- Fast response to low volume pressure changes.
- Manufactured from high grade 316 stainless steel for extended operation.
- Hermetically sealed, ensures long working life of the instrument.
- Heavy duty design prevents case stresses from affecting readings in extreme installations (dams and high ground stresses).
- Connecting cable is strong, screened, flexible and can be used in lengths in excess of 1000m.
- Over-voltage surge arrestor fitted to protect against electrical damage.
- Available with thermistors for temperature monitoring.
- Capable of measuring negative pore pressures to –50 kPa.
- No electronic components in sensor module ensures long term reliability.

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SPECIFICATIONS

SENSOR			
Materials	316 Grade Stainless Steel		
Accuracy	±0.1% Full Scale		
Linearity	0.1% Full Scale		
Resolution †	0.025% Full Scale (minimum)		
Over Range	2 x Rated Pressure		
Diaphragm Displacement	< 0.001 cm^3 Full Scale		
Diameter	38mm		
Weight (without cable & filter)	1.3kg		
Temperature Range	-20° to 80°C		
Excitation Method	Pluck or Sweep		
HERMETIC SEALING			
Sensor	Vacuum Sealed By Electron Beam Weld / "O" Ring Seals		
Piezometer	Cable Gland / Potting Compound / "O" Ring Seals		
THERMISTOR			
Type	NTC 3k		
Accuracy	0.5°C		
Resolution †	0.1°C		
FILTER TYPES			
HAE Ceramic	38mm Ø	48mm Long	1 Micron
LAE Ceramic	38mm Ø	48mm Long	60 Micron
Sintered Stainless Steel	30mm Ø	3mm Thick	50 Micron
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	
† Dependent on Readout			

CONTACT DETAILS:

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TECHNICAL APPLICATIONS

The W4 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 datalogger. The Piezometer works on the vibrating wire principle whereby a tensioned wire is attached to a diaphragm, water or pore pressure acts on one side of the diaphragm, a direct relationship exists between the pressure on the diaphragm and 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 of vibration is then recorded by the same coil and displayed by an instrument readout. The readout displays either frequency based units, or by inputting the instrument calibration factor, engineering based units.
Piezometers are used in geotechnical, environmental, and hydrological applications. They can be installed in boreholes, placed in fill materials or open wells.

GEOTECHNICAL APPLICATIONS

Measurements from Piezometers enable engineers to:

- Control placement of fill material.
- Predict slope stability.
- Design and build for lateral earth pressures.
- Design and build for uplift pressures and buoyancy.
- Monitor seepage and verify models of flow.

ENVIRONMENTAL APPLICATIONS

Some of the Geotechnical applications are also relevant to environmental remediation and containment systems.

Other applications include the use of Piezometers to:

- Monitor surface water runoff.
- Monitor water levels at contaminated sites, to find the rate and direction of movement of the contamination plume.
- Measurement of pore water pressures for applications related to waste and environmental management including landfill sites, pollution control and pipeline leakage.

HYDROLOGICAL APPLICATIONS

Hydrological applications include the use of Piezometers to:

- Map subsurface water flow and to predict both the volume of water in an aquifer and its recharge rate.
- Monitor streams for forestry, agriculture, power companies and metropolitan water districts.
- Monitor tidal effects on coastal soils.
- Monitor the encroachment of salt water into fresh water aquifers.

SPECIFIC GEOTECHNICAL APPLICATIONS INCLUDE:

DAMS
EMBANKMENTS
POTENTIAL LANDSLIDE SITES
DIAPHRAGM WALL, SHEET PILE WALLS OR RETAINING WALLS.
DEWATERING EXCAVATIONS
TAILINGS LAGOONS
BURIED STRUCTURES (BOX STRUCTURES)
DYNAMIC COMPACTION
RECHARGE SYSTEMS
PILE TESTS
PUMPING TEST

SPECIFIC USES INCLUDE:

Monitor draw-down of water table.
Monitor pore-water pressures to determine shear strength.
Measure uplift pressures.
Monitor seepage.
Monitor consolidation before further construction.
Monitor ground water level to calculate soil mass.
Monitor pressure applied to wall.
Measure uplift to determine structural stability.
Assist design of pumping scheme.
Determine efficiency of pumping scheme.
Provide early warning of flooding.
Measure pore-water pressure during placement of tailings to determine shear strength and degree of consolidation.
Control placement of fill.
Determine uplift pressures.
Measure pressure of water acting on construction joints, etc.
Determine degree of consolidation prior to construction.
Measure effectiveness of recharge system.
Monitor load applied to wall.
Monitor excess pore-water pressures generated by pile driving.

For details on Heavy Duty Piezometer
See data sheet:. W4
For details on VW Logger
See data sheet: RO-1-VW-2
For details on VW Handheld Readout
See data sheet: RO-1-VW-3
For details on Terminal Boxes See data sheet: RO-TB

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Issue Date:31/07/2006

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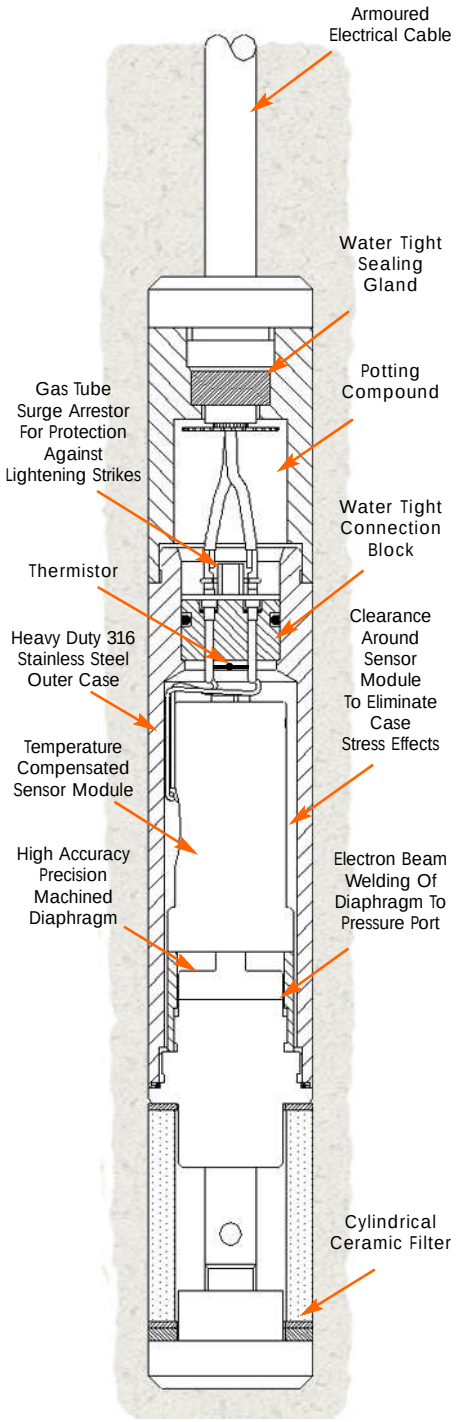
ORDERING INFORMATION

PART NO.		DESCRIPTION
WITH THERMISTOR	WITHOUT THERMISTOR	SS SINTERED DISC FILTER, 50 MICRON
W4-15-S-T	W4-15-S	Piezometer 150 kPa range
W4-30-S-T	W4-30-S	Piezometer 300 kPa range
W4-50-S-T	W4-50-S	Piezometer 500 kPa range
W4-70-S-T	W4-70-S	Piezometer 700 kPa range
W4-100-S-T	W4-100-S	Piezometer 1000 kPa range
W4-150-S-T	W4-150-S	Piezometer 1500 kPa range
W4-200-S-T	W4-200-S	Piezometer 2000 kPa range
W4-300-S-T	W4-300-S	Piezometer 3000 kPa range
W4-400-S-T	W4-400-S	Piezometer 4000 kPa range
W4-600-S-T	W4-600-S	Piezometer 6000 kPa range
10000-15000 kPa ranges available		HIGH ENTRY CERAMIC FILTER, 1 MICRON
W4-15-H-T	W4-15-H	Piezometer 150 kPa range
W4-30-H-T	W4-30-H	Piezometer 300 kPa range
W4-50-H-T	W4-50-H	Piezometer 500 kPa range
W4-70-H-T	W4-70-H	Piezometer 700 kPa range
W4-100-H-T	W4-100-H	Piezometer 1000 kPa range
W4-150A-H-T	W4-150-H	Piezometer 1500 kPa range
W4-200-H-T	W4-200-H	Piezometer 2000 kPa range
W4-300-H-T	W4-300-H	Piezometer 3000 kPa range
W4-400-H-T	W4-400-H	Piezometer 4000 kPa range
W4-600-H-T	W4-600-H	Piezometer 6000 kPa range
10000-15000 kPa ranges available		LOW ENTRY CERAMIC FILTER, 60 MICRON
W4-15-L-T	W4-15-L	Piezometer 150 kPa range
W4-30-L-T	W4-30-L	Piezometer 300 kPa range
W4-50-L-T	W4-50-L	Piezometer 500 kPa range
W4-70-L-T	W4-70-L	Piezometer 700 kPa range
W4-100-L-T	W4-100-L	Piezometer 1000 kPa range
W4-150-L-T	W4-150-L	Piezometer 1500 kPa range
W4-200-L-T	W4-200-L	Piezometer 2000 kPa range
W4-300A-L-T	W4-300-L	Piezometer 3000 kPa range
W4-400-L-T	W4-400-L	Piezometer 4000 kPa range
W4-600-L-T	W4-600-L	Piezometer 6000 kPa range
CONNECTING CABLES AND FITTINGS		
CA-1.1-2-A	Armoured cable, 2 cores	
CA-1.1-4-A	Armoured cable, 4 cores	
CA-4.1	Joint sealing kit	
CA-4.2	Coloured adhesive tapes	
CA-4.3	Crimping tool	
CA-4.4	Crimping sleeves	
INSTALLATION ACCESSORIES		
W6-8.1	Punner	
W6-8.2	Placing tube, 3metre length	
W1-2.7	Placing tube, 1metre length	
W4-14	Push-in nose cone	
W3-4.3	Placing adaptor	
W6-11	Bentonite pellets	
W6-12	Bentonite powder	
W6-13	Filter sand	



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