DATASHEET W9
VIBRATING WIRE PIEZOMETER-STANDARD

Soil Instruments Ltd

PRODUCTS

FEATURES

The W9 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 400 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.

- Accurate and small with excellent long term stability. Accuracy unaffected by cable length.
- Available with thermistors for temperature monitoring.
- 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.
- Advanced design prevents case stresses from affecting readings.
- 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.
- 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	0.5% Full Scale		
Resolution †	0.025% Full Scale (minimum)		
Over Range	2 x Rated Pressure		
Diaphragm Displacement	< 0.001 cm^3 Full Scale		
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 Potting Compound / Double “O” Ring Seals		
THERMISTOR			
Type	NTC 3k		
Accuracy	0.5°C		
Resolution †	0.1°C		
FILTER TYPES			
HAE Ceramic	19mm Ø	50mm Long	1 Micron
LAE Ceramic	19mm Ø	50mm Long	60 Micron
Sintered Stainless Steel	12.5mm Ø	3mm Thick	50 Micron
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	
† Dependent on Readout			

CONTACT DETAILS:

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TECHNICAL APPLICATIONS

The W9 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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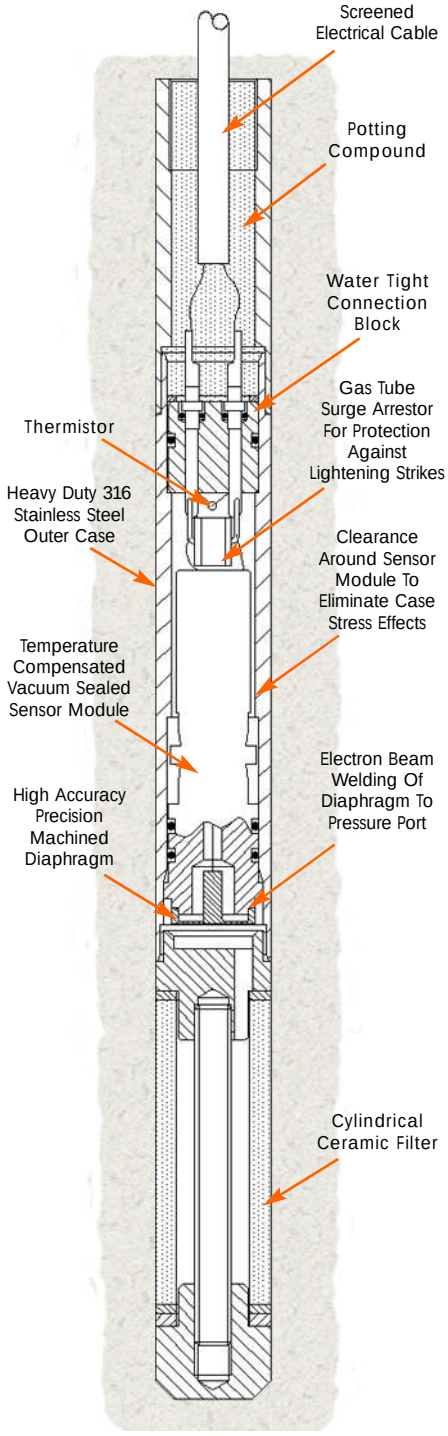
ORDERING INFORMATION

PART NO.		DESCRIPTION
WITH THERMISTOR	WITHOUT THERMISTOR	SS SINTERED DISC FILTER, 50 MICRON
W9-30-SS-T	W9-30-SS	Piezometer 300 kPa range
W9-50-SS-T	W9-50-SS	Piezometer 500 kPa range
W9-70-SS-T	W9-70-SS	Piezometer 700 kPa range
W9-100-SS-T	W9-100-SS	Piezometer 1000 kPa range
W9-150-SS-T	W9-150-SS	Piezometer 1500 kPa range
W9-200-SS-T	W9-200-SS	Piezometer 2000 kPa range
W9-400-SS-T	W9-400-SS	Piezometer 4000 kPa range
		LOW AIR ENTRY FILTERS, 60 MICRON
W9-30-L-T	W9-30-L	Piezometer 300 kPa range
W9-50-L-T	W9-50-L	Piezometer 500 kPa range
W9-70-L-T	W9-70-L	Piezometer 700 kPa range
W9-100-L-T	W9-100-L	Piezometer 1000 kPa range
W9-150-L-T	W9-150-L	Piezometer 1500 kPa range
W9-200-L-T	W9-200-L	Piezometer 2000 kPa range
W9-400-L-T	W9-400-L	Piezometer 4000 kPa range
		HIGH AIR ENTRY FILTERS, 1 MICRON
W9-30-H-T	W9-30-H	Piezometer 300 kPa range
W9-50-H-T	W9-50-H	Piezometer 500 kPa range
W9-70-H-T	W9-70-H	Piezometer 700 kPa range
W9-100-H-T	W9-100-H	Piezometer 1000 kPa range
W9-150-H-T	W9-150-H	Piezometer 1500 kPa range
W9-200-H-T	W9-200-H	Piezometer 2000 kPa range
W9-400-H-T	W9-400-H	Piezometer 4000 kPa range
CONNECTING CABLES AND FITTINGS		
CA-2.3-2-SC	2 core, multicore cable, 16/0.020, screened	
CA-2.3-4-SC	4 core, multicore cable, 16/0.020, screened	
CA-4.1	Joint sealing kit	
CA-4.2	Coloured adhesive tapes	
CA-4.3	Crimping tool	
CA-4.4	Crimping sleeves	
CA-4.5	Cable plug and cap	
RO-1-VW-2.5	Cable plug flylead for RO-1-VW-2	
SPARE FILTERS		
W9-12	Replacement ceramic LAE- Low resistance to air entry (60micron)	
W9-13	Replacement ceramic HAE - High resistance to air entry (1micron)	
W9-14	Replacement sintered steel filter - Ss sintered disk (50micron)	
INSTALLATION ACCESSORIES		
W9-11	Push-in nose cone	
W6-8.1	Punner	
W6-8.2	Placing tube, 3metre length	
W1-2.7	Placing tube, 1metre length	
W6-11	Bentonite pellets	
W6-12	Bentonite powder	
W6-13	Filter sand	
For Terminal Boxes, see datasheet RO-T / For VW Readout Units, see datasheet RO-VW		
For Dataloggers, see datasheet D1		



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