Vibrating Wire Piezometers

Applications

VW piezometers are used to monitor pore-water pressure. They can also be used to monitor water levels. Typical applications include:

- Monitoring pore water pressures to determine safe rates of fill or excavation.
- Monitoring pore water pressures to determine slope stability.
- Monitoring the effects of dewatering systems used for excavations.
- Monitoring the effects of ground improvement systems such as vertical drains and sand drains.
- Monitoring pore pressures to check the performance of earth fill dams and embankments.
- Monitoring pore pressures to check containment systems at land fills and tailings dams.
- Monitoring water levels in stilling basins and weirs.

Operation

The VW piezometer converts water pressure to a frequency signal via a diaphragm, a tensioned steel wire, and an electromagnetic coil.

The piezometer is designed so that a change in pressure on the diaphragm causes a change in tension of the wire. An electro-magnetic coil is used to excite the wire, which then vibrates at its natural frequency. The vibration of the wire in the proximity of the coil generates a frequency signal that is transmitted to the readout device.

The readout or data logger stores the reading in Hz. Calibration factors are then applied to the reading to arrive at a pressure in engineering units.

VW Piezometers: Standard, Low-Pressure, and Push-In (bottom)

Types of VW Piezometers

Standard: The standard piezometer is suitable for most applications. It operates equally well in fully-grouted boreholes or sand-filter zones.

Heavy-Duty: This piezometer has a strong, double-wall housing and is supplied with armored signal cable.

Push-In: This piezometer has a pointed housing that allows it to be pushed a short distance into soft soils.

Multi-Level: This piezometer has a special housing designed to ease the installation of multiple sensors in a borehole. See separate datasheet.

Low-Pressure: This piezometer is designed to monitor very small changes in pore-water pressure.

Vented: This piezometer is designed to monitor water levels in open standpipes and wells. The vent mechanism automatically compensates for changes in barometric pressure. See separate datasheet.

Advantages

Groutable: VW piezometers can be installed in fully-grouted boreholes and do not require sand filter zones. This greatly simplifies the installation of multiple sensors in the same borehole. It also makes it possible to install piezometers with inclinometer casing within the same borehole.

High Resolution: VW piezometers provide a resolution of 0.025% FS.

High Accuracy: Slope Indicator's automated, precision calibration system ensures that these sensors meet or exceed specifications.

Rapid Response: VW piezometers respond very quickly to changes in pore-water pressure.

Reliable Signal Transmission: With properly shielded cable, signals from the VW piezometer can be transmitted long distances.

STANDARD VW PIEZOMETERS

3.5 bar (50 psi) Piezometer 52611020
7 bar (100 psi) Piezometer 52611030
17 bar (250 psi) Piezometer 52611040
35 bar (500 psi) Piezometer 52611050
Signal Cable 50613524

The standard VW piezometer is suitable for most applications. The piezometer can be installed without a sand filter when the borehole is backfilled with bentonite-cement grout.

VW PIEZOMETERS WITH CABLE

Standard VW Piezometers, 3.5 bar (50 psi)
with 15 m (50') cable 52611028
with 30 m (100') cable 52611024
with 45 m (150') cable 52611027
with 60 m (200') cable 52611026

Standard VW Piezometers, 7 bar (100 psi)
with 30 m (100') cable 52611033
with 45 m (150') cable 52611034
with 60 m (200') cable 52611035
with 90 m (300') cable 52611036

HEAVY-DUTY VW PIEZOMETERS

3.5 bar (50 psi) Piezometer 52610520
7 bar (100 psi) Piezometer 52610530
17 bar (250 psi) Piezometer 52610540
35 bar (500 psi) Piezometer 52610550
Signal Cable, Armored 50613586

This piezometer features a strong double wall housing and is normally supplied with armored signal cable.

LOW-PRESSURE VW PIEZOMETERS

0.7 bar (10 psi) Piezometer 52611610
1.8 bar (25 psi) Piezometer 52611625
Signal Cable 50613524

The low-pressure piezometer is designed to monitor very small changes in pore-water pressure. It can also be used to monitor water levels.

PUSH-IN VW PIEZOMETERS

3.5 bar (50 psi) Piezometer 52621020
7 bar (100 psi) Piezometer 52621030
17 bar (250 psi) Piezometer 52621040
35 bar (500 psi) Piezometer 52621050
Signal Cable 50613524
Adapter for EW Drill Rod 50718042
EW Coupling 50718010

The push-in piezometer is a variant of the standard VW piezometer. It has a special housing that allows it to be pushed a short distance into soft, cohesive soils.

DRILL ROD ADAPTOR

Optional adaptor for EW drill rod provides better sealing for push-in piezometers. Adaptor screws onto the piezometer. Top of adaptor has left-hand thread for easy disconnect. Length is 0.6 m (2'). Order one adapter per piezometer.

Optional coupling (pin) has left-hand thread for easy disconnect from adapter. Coupling can be re-used, so only one is required.

VW PIEZOMETER SPECIFICATIONS

Sensor Type: Pluck-type vibrating wire sensor with built-in thermistor or RTD.

Resolution: 0.025%FS.

Accuracy: ±0.1% FS for 0.7 - 7 bar sensors, ±0.3% FS for 17 and 35 bar sensors.

Maximum Pressure: 1.5 x rated range.

Filter: 50-micron sintered stainless steel.

Temperature Coefficient: < 0.04% FS per °C).

Resolution: 0.025%FS.

Filter: 50-micron sintered stainless steel.

Temperature Coefficient: < 0.04% FS per °C).

Materials: Stainless steel.

Size: Standard: 19 x 195 mm (0.75 x 7.75")
Low-Pressure: 29 x 191 mm (1.125 x 7.5").
Heavy-Duty: 29 x 191 mm (1.125 x 7.5").
Push-In: 35 x 270 mm (1.385 x 10.5").

Weight: Standard: 0.16 kg (0.3 lb).
Low-pressure: 0.45 kg (1 lb).
Heavy-Duty: 0.8 kg (1.75 lb).
Push-in: 1.2 kg (2.75 lb).

SIGNAL CABLE SPECIFICATIONS

Signal Cable 50613524

Shielded cable with four 22-gauge tinned-copper conductors and polyurethane jacket.

Armored Signal Cable 50613586

Shield cable with four 22-gauge tinned-copper conductors, inner polyurethane jacket, steel braid armor, and outer high-density, polyethylene jacket. For heavy duty piezometer only.

READOUT & TERMINAL BOXES

VW Data Recorder 52613500
Jumper Cable for Terminal Box . . .52613557
Terminal Box for 6 sensors 57711606
Terminal Box for 12 Sensors 57711600
Terminal Box for 24 Sensors 97711624

See separate datasheet for VW Data Recorder. Terminal boxes provide terminals for 6, 12, or 24 sensors. Sensors are selected by rotary switch. 6-sensor box is 240 x 190 x 120 mm (9.5 x 7.5 x 4.75"). 12 and 24-sensor boxes are 290 x 345 x 135 mm (11.5 x 13.5 x 5.25").

DATA LOGGERS

VW MiniLogger for 1 Sensor 52613310
VW Quattro Logger for 4 Sensors .52614000
Campbell Scientific Data Loggers

See separate datasheets for each logger. CR100 requires AVW2000 vibrating wire adaptor and AM416 mulitplexer. Capacity of each mulitplexer is 16 piezometers with temperature readings or 32 piezometers without temperature.

Durham Geo Slope Indicator, 12123 Harbour Reach Drive, Mukilteo, WA, 98275 USA
Tel: 425-493-6200 Tel: 866-916-0541 Fax: 425-493-6250 Email: solutions@slope.com

DGSI
DURHAM GEO SLOPE INDICATOR