

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 full-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 data sheet.

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 data sheet.

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 PIEZOMETER

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. See separate datasheet for VW Data Recorder.



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 PIEZOMETER

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 piezometer. Adaptor screws onto the piezometer. Top of the adaptor has left-hand thread for easy disconnect. Length is 0.6 m (2'). Order one adaptor per piezometer. Optional coupling (pin) has left-handed thread for easy disconnection from adaptor. Coupling can be reused, 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: $\pm 0.1\%$ FS for 0.7 - 7 bar sensors, $\pm 0.3\%$ 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 $^{\circ}\text{C}$.

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. CR1000 requires AVW200 vibrating wire adaptor and AM416 multiplexer. Capacity of each multiplexer is 16 piezometers with temperature readings or 32 piezometers without temperature.