Multi-Level VW Piezometer

Application

The multi-level VW piezometer is used to monitor pore-water pressure at multiple zones in a borehole.

Operation

The VW piezometers are standard units. Each is attached to a short length of plastic pipe, as shown in the photo above.

Longer lengths of pipe, measured to place each piezometer at its intended depth, are assembled as the system is installed. Signal cable from each piezometer run through the pipe up to the surface.

In addition to providing a way to place the piezometers, the pipe also protects signal cable as drill casing or augers are removed, serves as a grout delivery pipe, and prevents channeling of water along the length of the cables.

When the components of the system are in place, bentonite-cement grout is pumped through the pipe to back-fill the entire borehole, including the area surrounding each piezometer.

When the grout cures, each piezometer is isolated from the zones above and below it, but is highly responsive to changes in pore-water pressures at its own elevation.

Advantages

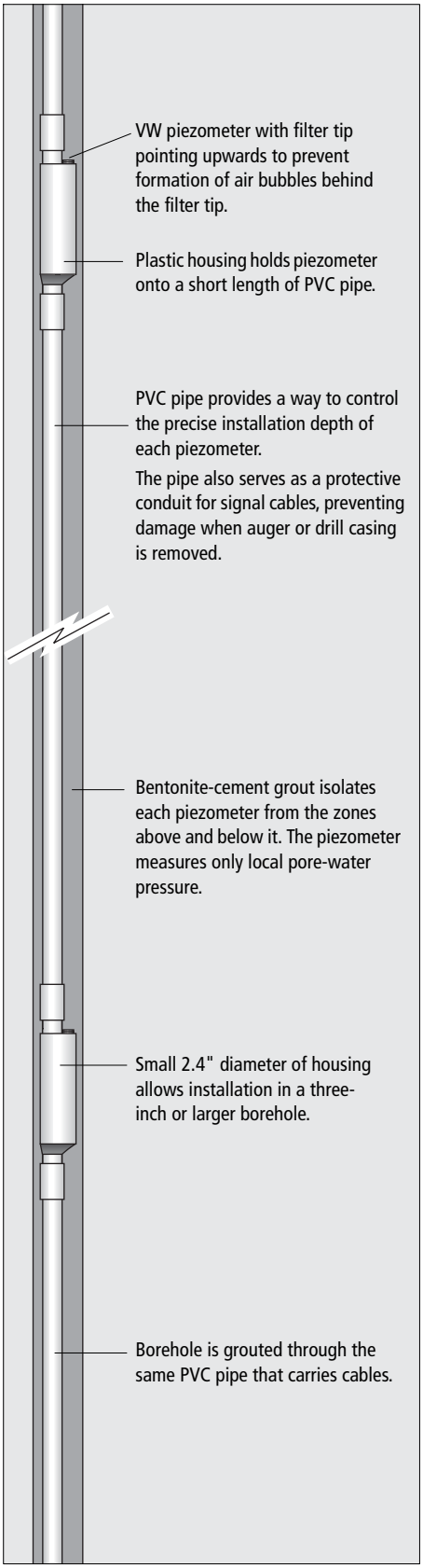
Simple Installation: The grout-in technique is simple and quick. It eliminates the need for sand intake zones and bentonite seals.

Precise Placement: The depth of each piezometer is controlled by the plastic pipe.

Protected Cables: Signal cables are enclosed in pipe and protected when the drill casing or auger is removed. This eliminates twisted or pulled out cables.

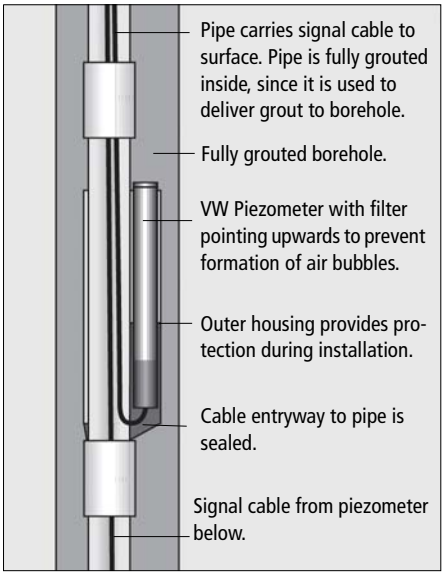
Superior Isolation: Since cables are sealed inside a pipe, the pipe is grouted, and the borehole is grouted, water cannot flow between the zones intersected by the borehole.

Easy to Automate: To automate readings, simply connect signal cables to a data logger.



ORDERING INFORMATION

Three components must be ordered: a multi-level housing, a VW piezometer, and signal cable. The three are assembled into one unit at the factory.



ABOUT GROUT-IN INSTALLATION

The references below discuss the theory and practice of grout-in installation of piezometers.

McKenna, G.T. (1995), "Grouted-in Installation of Piezometers in Boreholes," Canadian Geotechnical Journal, Volume 32, pp 355-363.

Mikkelsen, P.E. and Slope Indicator (2000), "Grouting-in Piezometers" in Technical Notes available from Slope Indicator website.

Penman, A.D.M. (1961), A Study of the Response Time of Various Types of Piezometer," in Pore Pressure and Suction in Soils, British Geotechnical Society, Butterworks, London, pp 53-58.

Tofani, G.D. (2000), "Grout In-Place Installation of Slope Inclinometers and Piezometers," in Seminar on Geotechnical Field Instrumentation held at the University of Washington by the ASCE Seattle Section, Geotechnical Group.

Vaughan, P. R. (1969), "A Note on Sealing Piezometers in Boreholes," Geotechnique vol 19, No 3, pp 405-413.

MULTI-LEVEL HOUSING

Multi-Level Housing 52611100

Length: 305 mm (12").

Diameter: 71mm (2.8").

Couplings: 1.25" schedule 40 slip coupling.

Pipe Requirements: 1.25 inch, schedule 40 PVC pipe can accommodate signal cables for a maximum of six piezometers and offers convenient handling to depths of 30 m (100').

Weight: 0.64 kg (1.4 lb).

VW PIEZOMETER FOR HOUSING

3.5 bar (50 psi) piezometer 52611020
7 bar (100 psi) piezometer 52611030

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

Range: 3.5 or 7 bar (50 or 100 psi).

Resolution: 0.025%FS.

Accuracy: ±0.1% FS.

Maximum Pressure: 1.5 x rated range.

Filter: 50-micron sintered stainless steel.

Temperature Coefficient: < 0.04% FS per °C.

Materials: Stainless steel.

SIGNAL CABLE

Signal Cable 50613324

Small diameter shielded cable with two twisted pairs of 24-gauge wire and polyurethane jacket.

PVC PIPE

1.25" schedule 40 PVC pipe, slip couplings, and PVC cement and can be purchased economically at local plumbing or hardware stores.

GROUT FITTING

Grout Fitting 52611150

Optional grout fitting provides a convenient way to keep cables out of the way while grouting the borehole. Fits 1.25" schedule 40 PVC pipe.

TERMINAL BOXES

Terminal Box for 6 sensors 57711606
Terminal Box for 12 Sensors 57711600
Terminal Box for 24 Sensors 97711624

Sensors are selected by rotary switch. The Small 6-sensor box measures 240 x 190 x 120 mm (9.5 x 7.5 x 4.75"). Larger 12 and 24-sensor box measures 290 x 345 x 135 mm (11.5 x 13.5 x 5.25").

READOUTS

VW Data Recorder. 52613500

This easy to use readout displays and records VW sensor data in Hz or Hz^2, and thermistor or RTD data in degrees C. See separate data sheet for details.

DATA LOGGERS

Campbell Scientific Data Loggers

The Campbell Scientific data logger with a VW interface and the AM16/32 multiplexer can accommodate 16 piezometers with temperature readings or 32 piezometers without temperature readings. See separate datasheet.

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