P235S

PIEZO-RESISTIVE

PIEZOMETERS

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SISGEO

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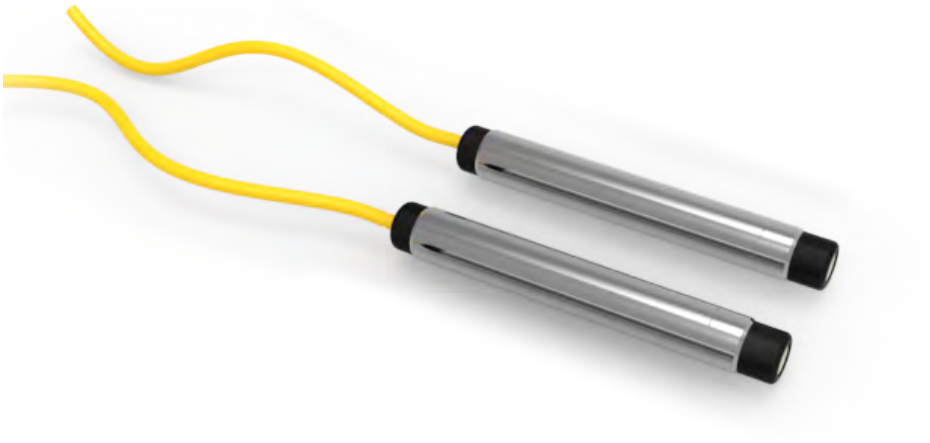


PIEZO-RESISTIVE PIEZOMETERS

Piezo-resistive piezometers are highly accurate pressure transducers suitable for high-frequency readings and short-term monitoring applications.

Available with 4-20 mA or mV/V output, they are easy to integrate into manual or automated monitoring systems. The 4-20 mA output is suitable for long-distance transmission, while the mV/V version is typically used with wireless nodes.

They can be connected to seismic dataloggers to monitor rapid changes in pore-water pressure, such as those induced by earthquakes.

APPLICATIONS

- Pore pressure monitoring in deep excavations
- Dynamic pore pressure monitoring
- Dewatering activities
- Hydraulic gradient monitoring in natural or cut slopes

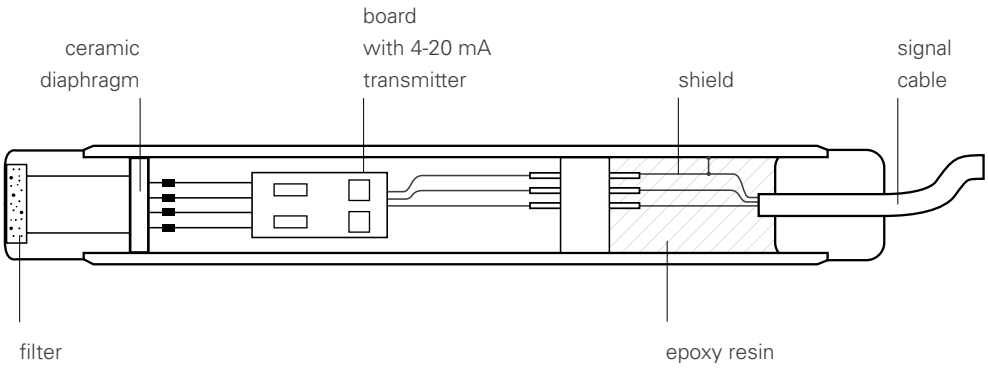
FEATURES

- High accuracy and stability
- Compatible with most readout units and data loggers on the market
- Built-in thermistor available on request
- Capable of measuring negative pressures

CE *Meets the essential requirements of the EMC Directive 2014/30/EU*

WORKING PRINCIPLE

The piezo-resistive pressure sensor incorporates a chemically inert ceramic diaphragm. A precise Wheatstone bridge strain gauge is deposited on the dry side of the diaphragm. Water pressure applied to the wet side of the diaphragm causes its deflection, generating an electrical signal proportional to the applied pressure. Depending on the selected version, the sensor is available with mV/V output or with an electronic circuit that converts the bridge output into a robust 4-20 mA signal for transmission over long distances to remote readouts or data acquisition systems.



Typical configuration of 4-20 mA version

FILTER UNITS

Piezo-resistive piezometers have a filter tip that prevents fine soil particles from entering the chamber in front of the diaphragm. The pores in the filter allow water to enter while preventing soil particles from passing through.
This type of filter is standard on most piezometers and is known as an LAE filter, to distinguish it from an HAE filter. In some environments, the gas pressure in the soil is higher than the water pressure. This can adversely affect the accurate measurement of pore-water pressure. In such cases, a filter with very small pores is required. When the filter is saturated, surface tension at the pores effectively prevents air from entering while still allowing water to pass through. Air can enter only under very high pressure; therefore, this filter is known as an HAE filter, meaning High Air Entry filter.

Both LAE and HAE filters must be saturated. For an LAE filter, saturation is required simply to ensure that no air bubbles remain in the chamber in front of the diaphragm. Such bubbles could slow the response time of the piezometer. For an HAE filter, saturation is required to produce the surface tension effect, and a special saturation device is available for this purpose.
In general, LAE (standard) filters are suitable for most applications. An HAE filter should be considered for unsaturated soils, where gas pressure might affect the pore-water pressure reading.

Saturation of HAE filter with saturation device

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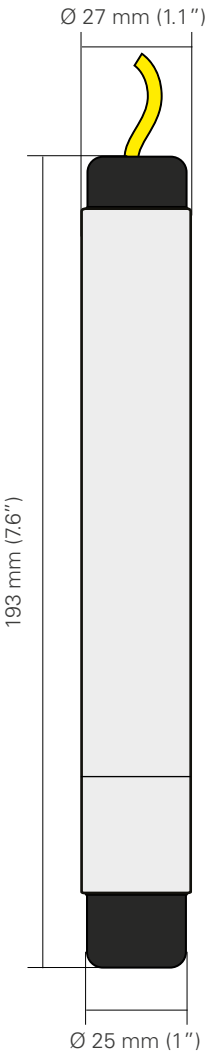
TECHNICAL SPECIFICATIONS

MODEL	0P235S4	0P235S1
Description	piezo-resistive piezometer with LAE filter	piezo-resistive piezometer with HAE filter
Available full scales (FS)	200 kPa, 500 kPa, 1.0 MPa, 2.0 MPa, 5.0 MPa (29 psi, 72.5 psi, 145 psi, 290 psi, 725 psi)	
Overload	1.3 x FS (200 kPa range) 2 x FS (for all other ranges)	
Sensitivity	See individual Calibration Report	
Resolution	0.01% FS	
Total Accuracy (1) Lin. MPE Pol. MPE	 < ±0.25% FS < ±0.20% FS (for 100 and 200 kPa FS) < ±0.15% FS (all other FS)	
Signal output	4-20 mA current loop (mV/V output available as an option up to 1 MPa)	
Electric supply	12 to 40 V DC	
Thermal zero shift	0.00025 % FS / °C	
Electrical insulation	4 kV	
Operating temperature range	-20 to +80 °C	
Temperature sensor	built-in thermistor, available on request	
Material	stainless steel	
Dimensions	Ø 27 mm (1.1 in), length 193 mm (7.6 in)	
Weight	0.5 kg (1.1 lb)	



FILTER UNIT	LAE filter	HAE filter
Type		
Material	stainless steel or Vyon	ceramic
Pore size	40-50 µm	0.25 µm

SIGNAL CABLES	
0WE102KEOZH	standard 2-wire cable with LSZH jacket and Kevlar stress member (for 4-20 mA output)
0WE104K00ZH	4-wire cable with LSZH jacket, used for mV/V output and when a thermistor is included
0WE104K00PV	4-wire cable with PVC jacket, used for mV/V output and when a thermistor is included
Max. cable length to logger (2)	1000 m with 4-20mA output 40 m with mV/V output (for more information see FAQ#77)

(1) MPE is the Maximum Permitted Error over the full-scale range (FSR). In the Calibration Report, the accuracies of the sensor are calculated using both linear regression (≤ Lin. MPE) and polynomial correction (≤ Pol. MPE). (2) refer to the FAQ section of Sisgeo website: www.sisgeo.com/faq

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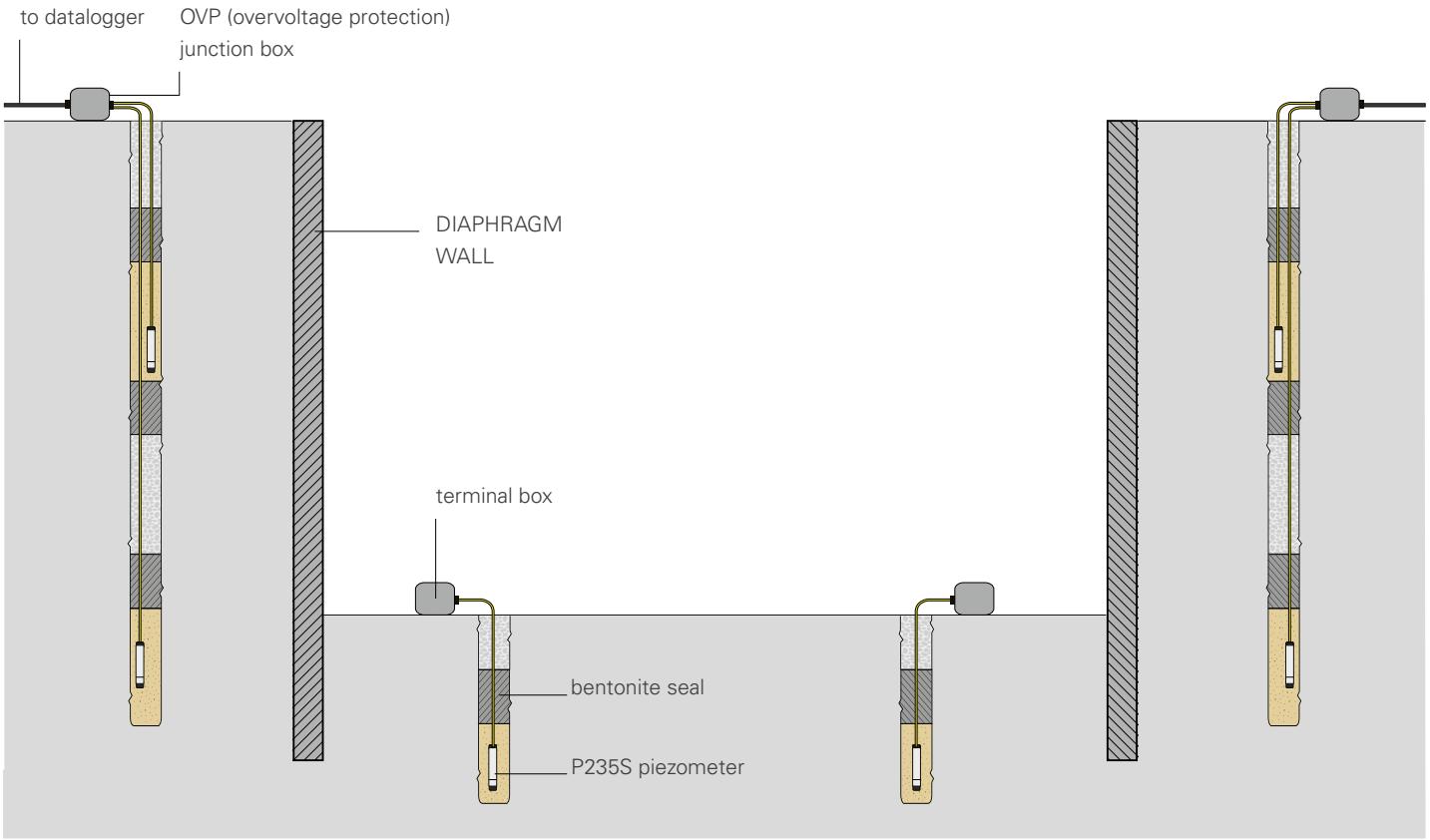
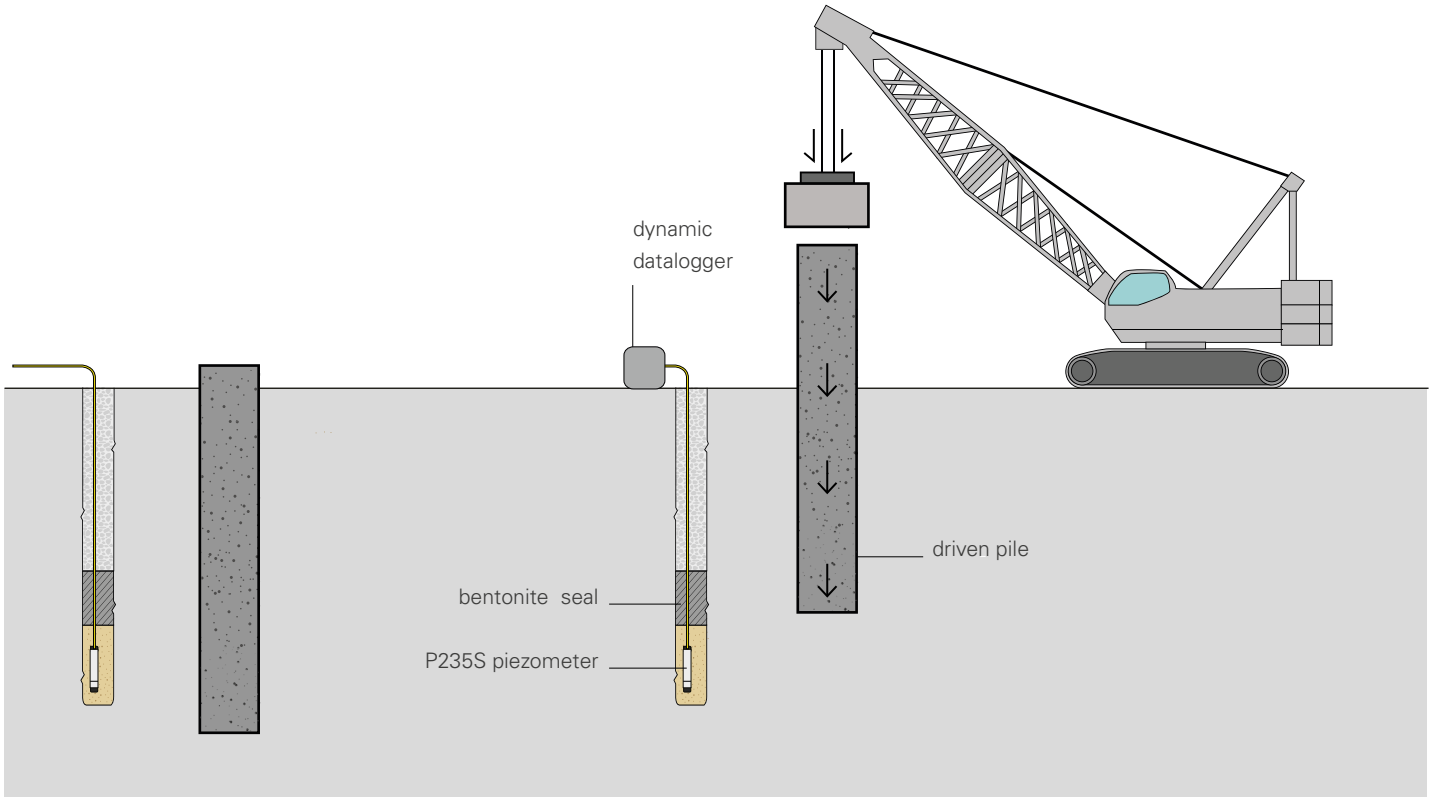
APPLICATION IN DEEP EXCAVATIONS



DYNAMIC APPLICATION WITH DRIVEN PILES



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ACCESSORIES AND SPARE PARTS

PROTECTIVE PIEZOMETER CAP 0P100CH1000

Protective cap for piezometers with data plate and survey pin.

FILTER SATURATION DEVICE 0PF01SAT000

Stainless steel pump for saturating HAE ceramic filters. Includes pump, 10 bar pressure gauge, and a threaded connection for the filters.

LAE STEEL FILTER 0PF40D20000

Spare LAE sintered steel filter for P2354S4 piezometers, pore size 40/50µm

LAE VYON FILTER 0PF40D2000P

Spare LAE Vyon (polyethyilene) filter for P235S4 piezometers, pore size 40/50µm.

CABLE SPLICING KIT 0EGSM0K0000

Splice kit for extending or repairing cable.

P235 HAE CERAMIC FILTER 0PF01D16000

Spare HAE ceramic filter for P235S1 piezometers, pore size 0.25µm.

BENTONITE PELLETS 1000BE20025K

10 mm bentonite pellets supplied in 25 kg bag.

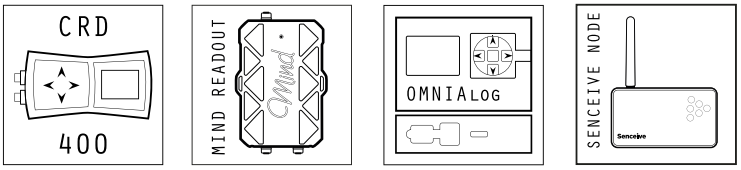
SINGLE INSTRUMENT OVP JB 0EPDP002W00

IP67 plastic box with 3-level Over Voltage Protection (OVP) board for connection of one 2-wire instrument. Note that OVP requires connection to an adequate earth ground.

OVP JUNCTION BOX 0EPDP000W00

IP67 plastic box with 3-level Over Voltage Protection (OVP) boards for connection of up to 15 instruments. Note that OVP requires connection to an adequate earth ground

READABLE BY



For further information, refer to the relevant readout datasheets.

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TECHNICAL ASSISTANCE

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