

SEMICONDUCTOR PIEZOMETERS AND PRESSURE TRANSDUCERS

MODEL 3400



Model 3400S Semiconductor Piezometer

APPLICATIONS

For the measurement of:

- Ground water elevations
- Pore water pressure
- Pumping and slug tests
- Uplift pressures in dam foundations
- Hydraulic pressures in tanks and pipelines
- Wick drain efficiency
- Water pressure behind tunnel linings
- Aquifer storage and recovery
- Watershed, drainage basin and recharge areas
- Groundwater network automation



Model 3400SV Vented Semiconductor Piezometer.

OPERATING PRINCIPLE

The 3400 Series Semiconductor Piezometers (3400S/SV) and Pressure Transducers (3400H) are intended for dynamic measurements of fluid or pore water pressure, or for static pressure measurements where the readout system or data acquisition system is incompatible with vibrating wire type transducers.

The transducers use molecularly bonded (CVD) high output strain gauges to provide 100 mV output for full pressure when used with a 10 VDC supply. The high output versions are fitted with an ASIC providing outputs

of 0–5 VDC or 4–20 mA, which are capable of being used in control and indicating loops without further amplification.

Piezometers incorporate a filter stone ahead of the diaphragm, which allows the fluid to pass through but prevents soil particles from impinging directly on the diaphragm. Standard porous filters are stainless steel. High air-entry ceramic filters are available for use in applications requiring that air be prevented from passing through the filter.

ADVANTAGES AND LIMITATIONS

The transducer is made from 17-4 stainless steel and is housed in a rugged stainless steel housing guaranteeing a high level of corrosion resistance, and providing long term reliable measurements in all applications.

Signal cables are attached via proprietary bulkhead seals providing a high integrity, waterproof assembly. A variety of cable types are available to suit particular user applications.

Vented piezometers, designed to eliminate the effect of barometric pressure changes on water level measurements, are also available. The space inside the transducer is connected via a tube (integral within the cable) to the atmosphere.

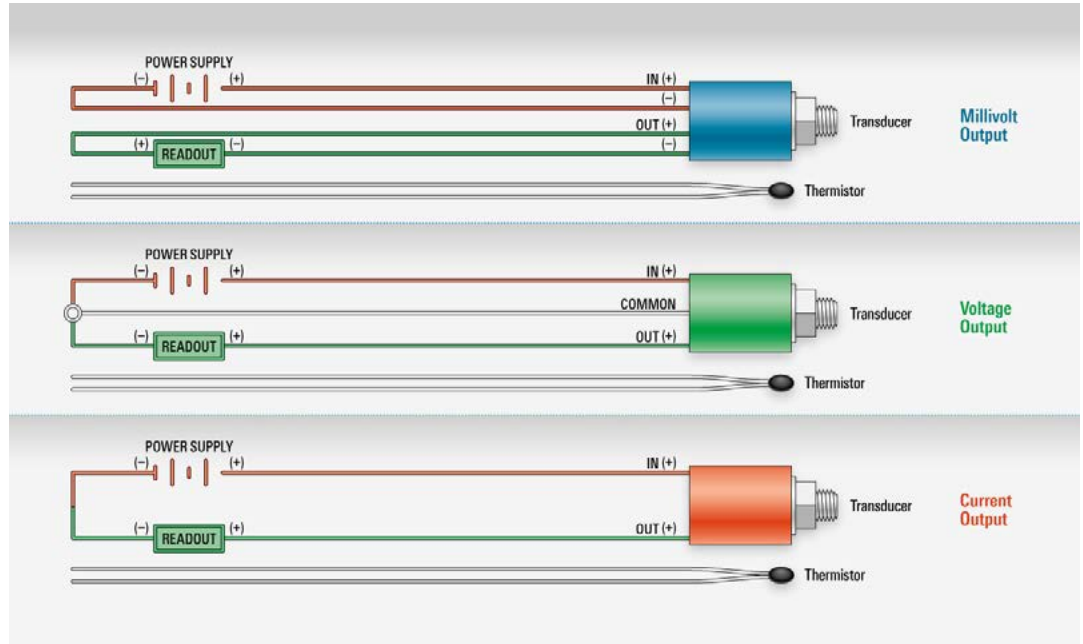
A chamber containing desiccant capsules is attached to the outer end of this tube to prevent moisture from entering the transducer cavity. A length of standard cable is spliced onto the end of the readout cable to allow for a standard connection.

Vented piezometers are better suited for water level monitoring applications, and typically not intended to be used to monitor pore pressures. Vented piezometers require more maintenance than unvented types, since moisture may find its way inside the transducer and ruin it.

A thermistor located in the housing permits the simultaneous measurement of temperature at the piezometer location.



Model 3400H and Dial Gauge Pressure Transducer on a tee fitting.



Model 3400 Series Semiconducter Piezometer wiring schematics.

TECHNICAL SPECIFICATIONS

Standard Ranges	100, 250, 400, 600 kPa; 1, 2.5, 6 MPa
Over Range	2 × rated pressure
Response Time	0.5 ms
Wetted Parts	(Transducer) 17–4 PH stainless steel
Output	10 mV/v, 4–20 mA, 0–5 V
Accuracy	<0.1% F.S. (dependent on readout)
Linearity	<0.5% F.S.
Shock	20 g, 11 ms (per MIL-STD.-810E Method 516.4 Proc 1)
Temperature Range	–20 °C to +80 °C
Dimensions (L × Ø)	194 × 32 mm

INPUT/OUTPUT SPECIFICATIONS

Model	Output Type	Input	Output
3400H-1, 3400S-1, 3400SV-1	Millivolt	10 VDC regulated	100 mV (10 mV/V)
3400H-2, 3400S-2, 3400SV-2	Voltage	6.5–35 VDC	0–5 VDC
3400H-3, 3400S-3, 3400SV-3	Current	24 VDC (7–35 VDC)	4–20 mA (2 wire)

CABLE SPECIFICATIONS

3400H-1, 3400S-1, 3400H-2, 3400S-2	04-375V9: 4 twisted pairs, Violet PVC Jacket, 9.53 mm Ø
3400SV-1, 3400SV-2	04-375VT1: 4 twisted pairs, Black PVC Jacket, integral vent tube, 9.5 mm Ø, transitions to: 04-375V9: 4 twisted pairs, Violet PVC Jacket, 9.5 mm Ø
3400H-3, 3400S-3	02-250V6: 2 twisted pairs, Blue PVC Jacket, 6.35 mm Ø
3400SV-3	02-335VT8: 2 twisted pairs, Yellow Polyurethane Jacket, integral vent tube, 8.51 mm Ø, transitions to: 02-250V6: 2 twisted pairs, Blue PVC Jacket, 6.35 mm Ø