

# VW Piezometers & Pressure Transducers

## Applications

For the measurement of...

- Ground water elevations
- Pore water pressures
- Pump tests
- Uplift pressures in dam foundations
- Hydraulic pressures in tanks and pipelines
- Wick drain efficiency
- Water pressures behind tunnel linings



• Model 4500C, 4500S, 4500H, 4500DP and 4500HD Vibrating Wire Piezometers (front to back).

## Operating Principle

The transducer uses a pressure sensitive diaphragm with a vibrating wire element attached to it. The diaphragm is welded to a capsule which is evacuated and hermetically sealed. Fluid pressures acting upon the outer face of the diaphragm cause deflections of the diaphragm and changes in tension and frequency of the vibrating wire. The changing frequency is sensed and transmitted to the readout device by an electrical coil acting through the walls of the capsule.

Piezometers incorporate a porous filter stone ahead of the diaphragm, which allows the fluid to pass through but prevents soil particles from impinging directly on the diaphragm.

## Advantages and Limitations

The 4500 Series Vibrating Wire Piezometers and Pressure Transducers have outstanding long-term stability and reliability, and low thermal zero shift. Cable lengths of several kilometers are no problem and the frequency output signal is not affected by changing cable resistances (caused by splicing, changes of length, terminal

contact resistances, etc.), nor by penetration of moisture into the electronic circuitry.

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

All-stainless steel or titanium construction and evacuation of the capsule guarantees a high level of corrosion resistance. Integral gas discharge tubes inside the main housing protect against lightning damage.

Standard porous filters are made from sintered 316 stainless steel. High air-entry ceramic filters are available for use in applications requiring that air be prevented from passing through the filter.

Vented versions of all models are available to provide automatic compensation for barometric pressure fluctuations. Negative pressures up to 1 Bar can be measured.

Vibrating wire pressure transducers are not suitable for the measurement of rapidly changing pressures: for these purposes Model 3400 transducers should be used.

### Model 4500S, 4500AL(V) Standard Piezometers



• Model 4500S (front) and Model 4500AL (rear) Standard Piezometers.

The Model 4500S Standard Piezometer is designed to measure fluid pressures such as ground water elevations and pore pressures when buried directly in embankments, fills, etc. It is also suitable for installation inside boreholes, observation wells and standard (>19 mm diameter) piezometer riser pipe.

The Model 4500AL is designed for low-pressure ranges. The vented version (Model 4500ALV) provides automatic compensation for barometric pressure changes. Thermistors are included to measure temperatures.

### Model 4500B, 4500C Small Diameter Piezometers



• Model 4500C (front) and Model 4500B (rear) Small Diameter Piezometers.

These piezometers are designed to enable the automation of small diameter piezometer standpipes. The 4500B fits inside 19 mm pipe and the 4500C inside 12 mm pipe.

### Model 4500DP Drive Point Piezometers



• Model 4500DP Drive Point Piezometers.

The Model 4500DP Drive Point Piezometer has the transducer located inside a housing with an EW drill rod thread and removable pointed nose cone. When threaded onto the end of EW drill rods, the unit can be pushed directly into soft ground with the signal cable located inside the drill rod. This model is ideally suited for use in soft clays and landfills. The piezometer may be recovered at the end of the job.

Models are also available that are similar in construction to the 4500DP but which use standard metric threads allowing for installation using cone penetrometer and other drill rods with adapters.

### Model 4500HD Heavy Duty Piezometer



• Model 4500HD Heavy Duty Piezometer.

The Model 4500HD Heavy Duty Piezometer is designed for direct burial in fills and dam embankments. The 4500HD is used in conjunction with heavily armored cable to withstand earth movements during construction. Recommended for use in earth dams.

### Model 4500H(H) Pressure Transducers



● Model 4500H Pressure Transducer.

The Model 4500H and 4500HH Pressure Transducers are supplied with a ¼ -18 NPT male or female pipe thread fitting to permit the transducer to be coupled directly into hydraulic or pneumatic pressure lines. Other pipe thread sizes are also available.

### Model 4500HT High Temperature Piezometer



● Model 4500HT High Temperature Piezometer (shown coiled for shipping (inset)).

The Model 4500HT High Temperature Piezometer is designed for applications where the temperature may be as high as 230°C. Two versions are available, one for continuous use up to 200°C and one for up to 230°C. Teflon cables inside stainless steel tubing are normally supplied with these sensors.

### Model 4500Ti Titanium Piezometer



● Model 4500Ti Titanium Piezometer.

The Model 4500Ti is designed specifically for use in highly corrosive environments such as landfills and leach fields. Also used in critical areas where long term survivability is essential, for example, as in nuclear waste repositories and aggressive mine tailings. All exterior surfaces are made from titanium.

### Model 4580 Pressure Transducer



● Model 4580 Pressure Transducer.

The Model 4580 Pressure Transducers are designed for very low fluid pressure measurements, such as groundwater elevations in wells, water levels in streams, weirs, flumes, etc. Changes in water levels of as little as 0.2 mm can be measured. Non vented types can be used as a barometer to measure atmospheric pressure changes.

## Technical Specifications

Model	Standard Ranges	Over Range	Sensitivity	Accuracy	Linearity	Temperature Range <sup>1</sup>	Thermal Zero Shift	Diaphragm Displacement	Length x Diameter	Mass
<b>4500S</b>	350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	133 × 19.1 mm	0.12 kg
<b>4500AL/ALV</b>	70, 170 kPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	133 × 25.4 mm	0.25 kg
<b>4500B</b>	350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	133 × 17.5 mm	0.10 kg
<b>4500C</b>	350, 700 kPa	2 × rated pressure	0.05% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S.	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	165 × 11 mm	0.09 kg
<b>4500DP</b>	70, 350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	187 × 33.3 mm	0.90 kg
<b>4500HD</b>	70, 350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	203 × 38.1 mm	1.50 kg
<b>4500H</b>	350, 700 kPa; 1.0, 2.0, 3.0 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	140 × 25.4 mm	0.30 kg
<b>4500HH</b>	5.0, 7.5, 10, 20, 35, 75, 100 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	143 × 25.4 mm	0.30 kg
<b>4500HT</b>	350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5, 10, 25, 50, 75, 100 MPa	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	0°C to +200°C 0°C to +230°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	133 × 19.1 mm	0.12 kg
<b>4500Ti</b>	350, 700 kPa; 1.0, 2.0, 3.0, 5.0, 7.5 MPa <sup>1</sup>	2 × rated pressure	0.025% F.S. (minimum)	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	< 0.001 cm <sup>3</sup> at F.S.	125 × 25.4 mm	0.19 kg
<b>4580-1</b> (Barometer)	200 Mbar <sup>1</sup>	2 × rated pressure	0.025% F.S. <sup>2</sup>	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	n/a	110 × 63.5 mm	1.18 kg
<b>4580-2/2V</b>	17, 35 kPa	2 × rated pressure	0.025% F.S. <sup>2</sup>	±0.1% F.S.	< 0.5% F.S. (±0.1% F.S. optional)	-20°C to +80°C	< 0.05% F.S./°C	n/a	165 × 38 mm	0.86 kg
<b>4580-3V</b>	7 kPa	2 × rated pressure	0.025% F.S. <sup>2</sup>	±0.1% F.S.	< 0.5% F.S.	-20°C to +80°C	< 0.05% F.S./°C	n/a	165 × 63.5 mm	1.72 kg

**Note: PSI = kPa × 0.14503, or MPa × 145.03**

<sup>1</sup>Other ranges available on request.

<sup>2</sup>Depends on readout system.



**Geokon, Incorporated**  
48 Spencer Street  
Lebanon, NH 03766  
USA

☎ 1 • 603 • 448 • 1562  
☎ 1 • 603 • 448 • 3216  
✉ [geokon@geokon.com](mailto:geokon@geokon.com)  
🌐 [www.geokon.com](http://www.geokon.com)

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