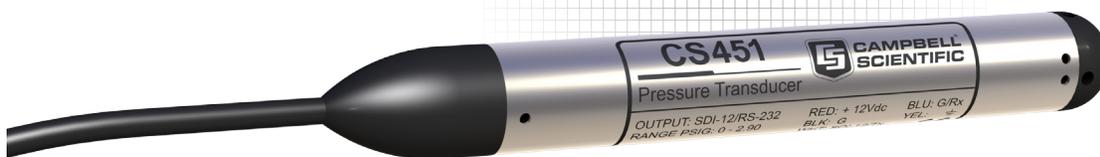




Rugged and Accurate

Ideal for long-term deployment
in harsh conditions



Overview

Campbell Scientific's CS451 and CS456 submersible pressure transducers provide reliable, accurate pressure and temperature measurements. Their rugged construction makes them suitable

for water level measurements in canals, wells, ponds, harbors, lakes, streams and tanks. The NPT nose cone option allows the CS451 and CS456 to be used in closed-pipe applications.

Benefits and Features

- › Output acceptable for recording devices with SDI-12 or RS-232 capability including Campbell Scientific dataloggers.
- › Static accuracies of $\pm 0.1\%$ full-scale range and $\pm 0.05\%$ full-scale range¹ available. Accuracies are over 0° to 60°C range.
- › Quality construction that ensures product reliability.
- › Rugged stainless steel or titanium case that protects piezoresistive sensor.
- › Fully temperature compensated.
- › Simultaneous 50/60 Hz rejection.
- › Low power sleep state between measurements that reduces power consumption.
- › Weighted nose cone option that adds 0.211 kg (0.465 lb.) to the transducer's weight. Additional weight makes submersion of the transducer easier.

CS451 and CS456

Submersible Pressure Transducers



Technical Details

Both transducers output either a digital SDI-12 or RS-232 signal to indicate observed pressure and temperature. This output is acceptable for recording devices with SDI-12 or RS-232 capability including Campbell Scientific dataloggers.

The transducers consist of a piezoresistive sensor and a temperature sensor housed in a metal case. The CS451 has a 316L stainless-steel case that can be submerged in most canals, wells,

ponds, lakes, and streams. The CS456 has a rugged titanium case that allows it to be used in saltwater or other harsh environments.

The CS451 and CS456 are fitted with a rugged Hytrel cable that remains flexible, even under harsh environmental conditions. The cable incorporates a vent tube to compensate for atmospheric pressure fluctuations. The vent tube terminates inside a desiccant tube, which prevents water vapor from entering the inner cavity of the transducer.

Ordering Information

Pressure Transducers

When ordering a CS451 or CS456, you must choose a range option and an accuracy option (see below).

- CS451-L** Pressure Transducer with Stainless Steel Case and user-specified length. Enter length, in feet, after the -L.
- CS456-L** Pressure Transducer with Titanium Case and user-specified length. Enter length, in feet, after the -L.

Range Options for CS451 and CS456 (choose one)

- 2** Pressure range of 0 to 2.9 psig (0 to 20 kPa) or up to 2 m of fresh water*.
- 7** Pressure range of 0 to 7.25 psig (0 to 50 kPa) or up to 5.1 m of fresh water.
- 14** Pressure range of 0 to 14.5 psig (0 to 100 kPa) or up to 10.2 m of fresh water.
- 29** Pressure range of 0 to 29 psig (0 to 200 kPa) or up to 20.4 m of fresh water.
- 72** Pressure range of 0 to 72.5 psig (0 to 500 kPa) or up to 50.9 m of fresh water.
- 145** Pressure range of 0 to 145 psig (0 to 1000 kPa) or up to 102 m of fresh water.

Accuracy Options for CS451 and CS456 (choose one)

- SA** Standard Accuracy. Provides $\pm 0.1\%$ FS over 0° to 60°C temperature range.
- HA** High Accuracy*. Provides $\pm 0.05\%$ FS over 0° to 60°C temperature range. Includes a calibration certificate.

Nose Cone Options for CS451 and CS456 (choose one)

- SN** Standard Nose Cone
- WN** Weighted Nose Cone
- NN** NPT Fitting

Optional Calibration Certificate (Standard Accuracy Only)

- CC** If specified, a calibration certificate that contains calibration information specific to the individual unit is shipped with a standard accuracy probe.

Common Accessories

- 25431** Split Mesh Cable Grip.
- 25366** Replacement Desiccant Tube.
- 25414** CS451 or CS456 Weighted Nose Cone that facilitates stand-alone submersion.
- A200** Sensor to PC Interface (for configuring sensor).



The CS451 and CS456 have three nose cone options. A CS451 with the standard nose cone is shown above.



The NPT nose cone allows the CS451 or CS456 transducer to be used in closed-pipe applications.



The weighted nose cone adds 0.2 kg to the transducer's weight. Additional weight makes submersion of the transducer easier.

Specifications

- › Power Requirements: 6 to 18 Vdc
- › Measurement Time: < 1.5 s
- › Outputs: SDI-12 (version 1.3) 1200 baud; RS-232 9600 baud
- › Measurement Ranges:

Pressure (psig)	Pressure (kPa)	Depth of fresh water
0 to 2.9	0 to 20	0 to 2.0 m (6.7 ft)
0 to 7.25	0 to 50	0 to 5.1 m (16.7 ft)
0 to 14.5	0 to 100	0 to 10.2 m (33.4 ft)
0 to 29	0 to 200	0 to 20.4 m (67 ft)
0 to 72.5	0 to 500	0 to 50.9 m (167 ft)
0 to 145	0 to 1000	0 to 102 m (334.5 ft)

- › Resolution: 0.0035% FS
- › Overpressure: 2 x pressure range
- › Dry Storage Temperature²: -10° to 80°C
- › Operating Temperature²: 0° to 60°C
- › Temperature Accuracy: ±0.2°C
- › Cable Type: 5 Conductor, 26 AWG, Hytrel Jacket
- › Top Cone Material: Delrin
- › Diameter 21.34 mm (0.84 in)
- › Length 213.36 mm (6.875 in)
- › Cable Weight: 0.421 kg/m (0.283 lb/ft)

Power Consumption

- › Quiescent Current < 50 µA
- › Measurement/Communication Current: 8 mA for 1 s measurement
- › Maximum Peak Current: 40 mA

Accuracy

- › Standard Option: ±0.1% full-scale range TEB³
- › High Option¹: ±0.05% full-scale range TEB³

Maximum Cable Length

- › SDI-12 (one transducer connected to a single port): ~457 m (1500 ft)
- › SDI-12 (10 transducers connected to a single port): 60 m (200 ft)
- › RS-232: 60 m (200 ft)

Distance from pressure sensor interface (black line etched on housing) to:

- › End of standard nose cone: 2.3 cm (0.9 in)
- › End of NPT Nose Cone: 2.54 cm (1 in)
- › End of weighted nose cone: 9.9 cm (3.9 in)

Air Gap

- › Standard and weighted nose cone: 0.653 cm (0.257 in)
- › NPT Nose Cone: 2.72 cm (1.07 in)

CS451

- › Body and Element Material: 316L stainless steel
- › Weight: 0.17 kg (0.37 lb)

CS456

- › Body Material: Titanium
- › Element Material: Hastelloy
- › Weight: 0.10 kg (0.23 lb)

¹ The high accuracy (±0.05% FS) option is not available for the 0 to 2.9 psig range option.

² WARNING: Sensor could be damaged if encased in frozen liquid.

³ Total Error Band (TEB) includes the combined errors due to nonlinearity, hysteresis, nonrepeatability, and thermal effects over the compensated temperature range, per ISA S51.1.

