CAMPBELL SCIENTIFIC
WHEN MEASUREMENTS MATTER

CS451 and CS456

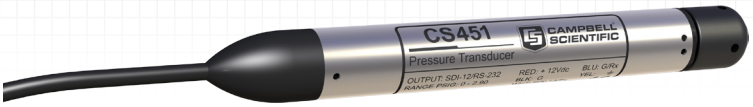
Submersible Pressure Transducers

standard nose cone

Rugged and Accurate

Ideal for long-term deployment in harsh conditions

weighted nose cone



¼ inch NPT nose cone

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.

These 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.

Benefits and Features

- Output acceptable for recording devices with SDI-12 or RS-232 capability including Campbell Scientific dataloggers.
- Static accuracies of ±0.1% full-scale range and ±0.05% full-scale range[1] 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 available for easier submersion. Adds 0.211 kg (0.465 lb) to the transducer's weight.
- NPT nose cone option available for closed-pipe applications.

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 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.

Options[a]

- Cable length: 15 ft, 30 ft, 50 ft, 75 ft, 100 ft, 200 ft, or user-specified
- Accuracy: standard 0.1% full-scale range TEB[b] or high 0.05% full-scale range TEB[b]
- Pressure ranges: up to 2.9 psig[c], 7.25 psig, 14.5 psig, 29 psig, 72.5 psig, or 145 psig
- Nose cone: standard, weighted (for easier submersion), or ¼ inch NPT (for closed-pipe applications)

Accessories[a]

- Split Mesh Cable Grip (pn 25431)
- Replacement Desiccant Tube (pn 25366)
- A200 Sensor to PC Interface (for configuring sensor)
- A150-L Single Sensor Terminal Case, Vented with Desiccant
- Heyco Cable Grip (pn 31648) for mating with a 1 in. PVC pipe

The A150-L desiccated case allows the CS451 or CS456 to be connected to a prewired enclosure or connected to a CWS900 and used in a wireless sensor network.

Specifications

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

Pressure (psig)	Pressure (kPa)	Depth of fresh water
0 to 2.9[c]	0 to 20[c]	0 to 2.0 m (6.7 ft)[c]
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% full-scale range
- Overpressure: 2 x pressure range
- Dry Storage Temperature[d]: -10° to 80°C
- Operating Temperature[d]: 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: 0.0421 kg/m (0.0283 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 TEB[b]
- High Option: ±0.05% full-scale range TEB[b]

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)

[a]For more information about the options and accessories, refer to: www.campbellsci.com/cs451-ordering or www.campbellsci.com/cs456-ordering

[b]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.

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

[d] WARNING: Sensor could be damaged if encased in frozen liquid.