



## Titanium

Ideal for long-term deployment in harsh conditions

### Overview

The CS456 is a pressure transducer for water-level measurements in canals, wells, ponds, harbours, lakes, streams and tanks. It has a rugged titanium case that allows it to be used in saltwater and other harsh environments. The CS456 outputs either a digital SDI-12 or RS-232 signal to indicate observed pressure and temperature. This output can

be read by many of our dataloggers. The CS456 replaces the CS455 transducer. The new transducers have a smaller gap between the water ports and the diaphragm so that less air is trapped that the user must remove during deployment. Trapped air causes the transducer's readings to drift as the air slowly dissolves into the water.

### Benefits and Features

- › Rugged titanium case protecting the piezoresistive sensor and allowing it to be used in saltwater and other harsh environments
- › Quality construction to ensure product reliability
- › Fully temperature-compensated
- › Low-power sleep state between measurements to reduce power consumption
- › Optional weighted nose cone to facilitate submersion
- › Compatible with most Campbell Scientific data loggers
- › Optional NPT nose cone to enable usage in closed-pipe applications
- › Quick shipment after receipt of order (ARO)

### Technical Description

The CS456 consists of a piezoresistive sensor and a temperature sensor housed in a titanium case. It has 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.

The CS456 has several pressure range options and two accuracy options (see Ordering Info). The standard accuracy option provides  $\pm 0.1\%$  FS TEB over the  $0^\circ$  to  $60^\circ\text{C}$

temperature range. The high accuracy option provides  $\pm 0.05\%$  FS TEB over the  $0^\circ$  to  $60^\circ\text{C}$  temperature range and includes a calibration certificate. TEB is the combined errors due to nonlinearity, hysteresis, non-repeatability, and thermal effects over the compensated temperature range, per ISA S51.1. Please note that the high accuracy option is not available for the 0 to 2.9 psig range option.

Campbell Scientific offers the [A151 Vented, Single Sensor Terminal Case](#) that allows the CS456 to be connected to a prewired enclosure (see [Ordering Information](#)).



## Specifications

Measurement Time	< 1.5 s
Output Options	SDI-12 (version 1.3) 1200 bps; RS-232 9600 bps
Water-Level Resolution	0.0035% FS
Worst-Case Temperature Resolution	0.006°C
Dry Storage Temperature Range	-10° to +80°C WARNING: Sensor could be damaged if encased in frozen ice.
Operating Temperature Range	0° to 60°C WARNING: Sensor could be damaged if encased in frozen ice.
Temperature Accuracy	±0.2°C
Overpressure	2 x pressure range
Power Requirements	6 to 18 Vdc
Cable Type	Hyrel Jacket, five conductor, 26 AWG
NPT Fitting	1/4-in. NPS
Top Cone Material	Delrin
Body Material	Titanium
Element Material	Hastelloy
Distance	<ul style="list-style-type: none"> <li>› 9.9 cm (3.9 in.) Distance from black line etched on housing to end of weighted nose cone</li> <li>› 2.54 cm (1 in.) Distance from black line etched on housing to end of NPT fitting</li> <li>› 2.3 cm (0.9 in.) Distance from black line etched on housing to end of standard nose cone</li> </ul>
Ingress Protection	Exceeds IP68
Diameter	21.34 mm (0.84 in.)
Length	213.36 mm (6.875 in.)
Cable Weight	0.0421 kg/m (0.0283 lb/ft)
Weight	0.10 kg (0.23 lb) without cable

### Power Consumption

Quiescent	< 50 µA
Measurement/Communication	8 mA (1 s measurement)

Maximum 40 mA

### Measurement Ranges at Fresh Water Depths

0 to 2.0 m (6.7 ft)	<ul style="list-style-type: none"> <li>› 0 to 20 kPa The high accuracy (±0.05% FS) option is not available for the 0 to 2.9 psig range option.</li> <li>› 0 to 2.9 psig The high accuracy (±0.05% FS) option is not available for the 0 to 2.9 psig range option.</li> </ul>
0 to 5.1 m (16.7 ft)	<ul style="list-style-type: none"> <li>› 0 to 7.25 psig</li> <li>› 0 to 50 kPa</li> </ul>
0 to 10.2 m (33.4 ft)	<ul style="list-style-type: none"> <li>› 0 to 14.5 psig</li> <li>› 0 to 100 kPa</li> </ul>
0 to 20.4 m (67 ft)	<ul style="list-style-type: none"> <li>› 0 to 200 kPa</li> <li>› 0 to 29 psig</li> </ul>
0 to 50.9 m (167 ft)	<ul style="list-style-type: none"> <li>› 0 to 500 kPa</li> <li>› 0 to 72.5 psig</li> </ul>
0 to 102 m (334.5 ft)	<ul style="list-style-type: none"> <li>› 0 to 145 psig</li> <li>› 0 to 145 psig</li> </ul>

### Accuracy

*-NOTE-* Includes the combined errors due to nonlinearity, hysteresis, nonrepeatability, and thermal effects over the compensated temperature range, per ISA 551.1.

Standard Accuracy Option	±0.1% full-scale-range TEB
High Accuracy Option	±0.05% full-scale-range TEB The high accuracy (±0.05% full-scale range) option is not available for the 0 to 2.9 psig range option.

### Maximum Cable Length

SDI-12	<ul style="list-style-type: none"> <li>› ~457 m (1500 ft) 1 sensor connected to a single port</li> <li>› 60 m (200 ft) 10 sensors connected to a single port</li> </ul>
RS-232	60 m (200 ft)

### Air Gap

Standard & Weighted Nose Cone	0.653 cm (0.257 in.)
NPT Fitting	2.72 cm (1.07 in.)

For comprehensive details, visit: [www.campbellsci.eu/cs456](http://www.campbellsci.eu/cs456) 