

# DirectShear™ CS-0510 Sensor Head

## 1 Features

- Micromachined floating element shear stress sensor that enables time-resolved, one-dimensional, direct shear stress measurements
- Large dynamic range: < 0.1 mPa to 10 Pa
- Small sensing element: 2 mm x 0.5 mm
- Non-intrusive: minimal flow disturbance
- Shoulder and key for precision alignment
- Removable shielded sensor cable
- Compact, robust sensor package for flush mounting
- Optimized Capacitive Sensor Unit (CSU) for high dynamic range and bandwidth



Figure 1-1: DirectShear Capacitive Sensors

## 2 Applications

- Time-resolved, direct mean and fluctuating wall shear stress measurements
- Differential capacitive shear stress sensors for subsonic and transonic applications
- Instrumentation-grade skin friction sensing
- Aerodynamic drag research
- Detection of flow separation
- Wind tunnel instrumentation

## 3 Description

The IC2 DirectShear™ model CS-0510 Capacitive Shear Stress Sensor is a micromachined, floating element device that enables time-resolved, one-dimensional, direct mean and fluctuating wall shear stress measurements. The sensor is packaged on a PCB endcap and installed in a cylindrical stainless-steel housing. A removable shielded cable with LEMO push-pull connectors is used to connect the sensor head to a designated Capacitive Sensor Unit (CSU).

## 4 Ordering Information

CS-0510 must pair with one of the following control units:

- CSU-1001-H2U
  - Half Width 2U Rack Mounted Control Unit
- CSU-1001-PXI
  - CompactPCI cards compatible with cPCI and PXI chassis

All DirectShear Sensing Systems come with an IC2 standard 2m cable. Custom cable lengths and sensor mounting options are also available.

## 5 Certifications





## 6 Specifications

	MIN	TYP	MAX	UNIT
<b>Performance Specifications</b>				
Maximum Shear Stress		10		Pa
Dynamic Sensitivity @ 1.00 kHz		100		mV/Pa
Minimum Resolution @ 1.00 kHz			0.1	mPa
Dynamic Range @ 1.00 kHz	114			dB
Bandwidth	DC		0.75	kHz
DC Offset		2.6		V
DC Measurement Accuracy over 10 Minutes			0.1	% F.S.
DC Measurement Accuracy over 60 Minutes			0.5	% F.S.
Operating Temperature Range	0 (32)		50 (120)	°C (°F)

Figure 6-1: Specifications Table

## 7 Mechanical Specifications

	TYP		UNIT	
Weight (Sensor Head Only)	50	(0.11)	g	(lb.)
Diameter (Head)	12.7	(0.5)	mm	(in.)
Length (Head)	6.4	(0.25)	mm	(in.)
Diameter (Shoulder)	15.9	(0.63)	mm	(in.)
Total Length	52.3	(2.1)	mm	(in.)
Sensor Flushness	< ±25	(0.001)	µm	(in.)
Cable Length	2	(6.6)	m	(ft.)

Figure 7-1: Mechanical Specifications Table

## 8 Revision History

20191218.0 – Initial Updated Release, previous document content incorporated.

20200814.0 – Initial Public Release