

PISeca Capacitive Sensors

Single-Electrode Sensors with Excellent Position Resolution



D-510

- Noncontact distance measuring
- Absolute position sensing
- Vibration measuring
- Subnanometer resolution
- Flexible measuring range
- Easy integration

Highest accuracy and lifetime due to capacitive position sensors

In conjunction with the electronics for signal processing, a resolution can be reached in the subnanometer range for quasistatic applications. The bandwidth can be increased up to 10 kHz for high dynamics application, where a resolution in the 1 nm range can still be reached. The linearity error is under 0.1%.

Easy handling and integration

All PISeca sensor heads are equipped with a LEMO connector for easy mounting and replacement. The uniform shaft thickness ensures compatibility and flexibility. The cable for connecting to the evaluation electronics is available in several variants and must therefore be ordered separately.

Customized versions / two-electrode sensors

In addition to the standard sensors listed here, PI offers a series of application-specific custom versions where for example, the measuring range, geometry or material are adapted to customer requirements. Customized electronics are also available. The two-electrode sensors in the D-100 series are available for the highest demands on linearity and resolution.

Fields of application

Industry and research. Semiconductor manufacturing and inspection. Nanometrology. Active vibration absorber. Precision machining.

Specifications

	D-510.021	D-510.051	D-510.101
Sensor type	Single electrode, capacitive	Single electrode, capacitive	Single electrode, capacitive
Measurement accuracy	D-510.021	D-510.051	D-510.101
Nominal measuring range*	20 µm	50 µm	100 µm
Smallest measuring gap in the nominal measuring range*	10 µm	25 µm	50 µm
Largest measuring gap in the 5-times extended measuring range*	150 µm	375 µm	750 µm
Static resolution**	<0.001 % of the measuring range (RMS)	<0.001 % of the measuring range (RMS)	<0.001 % of the measuring range (RMS)
Dynamic resolution**	<0.002 % of the measuring range (RMS)	<0.002 % of the measuring range (RMS)	<0.002 % of the measuring range (RMS)
Linearity error***	<0.2 %	<0.1 %	<0.1 %
Mechanical properties	D-510.021	D-510.051	D-510.101
Sensor active diameter	3.8 mm	6 mm	8.4 mm
Sensor active area	11.2 mm ²	27.9 mm ²	56.1 mm ²
Sensor diameter	8 mm	12 mm	20 mm
Sensor area	50.3 mm ²	113.1 mm ²	314.0 mm ²
Mounting shaft diameter	8 mm	8 mm	8 mm
Miscellaneous	D-510.021	D-510.051	D-510.101
Operating temperature range	-20 to 100 °C	-20 to 100 °C	-20 to 100 °C
Material	Stainless steel	Stainless steel	Stainless steel
Mass	8 g (±5 %)	10 g (±5 %)	16 g (±5 %)
Suitable connecting cable	D-891.01x, D-891.02x	D-891.01x, D-891.02x	D-891.01x, D-891.02x
Recommended electronics	E-852.10, E-852.10A1, E-711.SE3, E-509.E03, E-509.E3	E-852.10, E-852.10A1, E-711.SE3, E-509.E03, E-509.E3	E-852.10, E-852.10A1, E-711.SE3, E-509.E03, E-509.E3

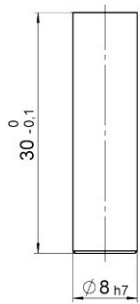
* Extended measuring range available with E-852.10, two measuring ranges are calibrated respectively. Extension factors: 1, 2, 2.5, 5.

** Static: Bandwidth 10 Hz, dynamic: Bandwidth 10 kHz, with E-852 evaluation electronics

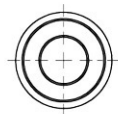
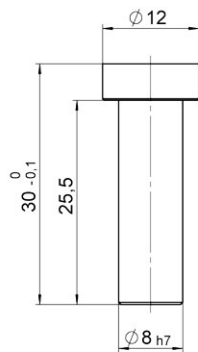
***Linearity error in the nominal measuring range

Drawings / Images

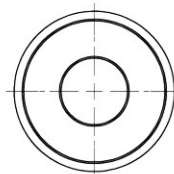
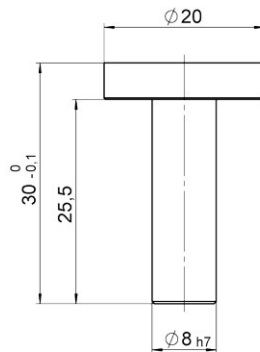
D-510.021



D-510.051



D-510.101



D-510.021, D-510.051 and D-510.101, dimensions in mm. Connector: LEMO FFC00.650.CLA.543, triaxial



D-510.021: Easy to mount due to LEMO connector

Ordering Information

D-510.021

PISeca Capacitive single-electrode sensor, 8 mm diameter, 20 µm nominal measuring range

D-510.051

PISeca Capacitive single-electrode sensor, 12 mm diameter, 50 µm nominal measuring range

D-510.101

PISeca Capacitive single-electrode sensor, 20 mm diameter, 100 µm nominal measuring range

Connecting Cables

D-891.01E

PISeca Sensor cable, 1 m

D-891.02E

PISeca Sensor cable, 2 m

D-891.01A

PISeca Sensor cable, 1 m, angled connector

D-891.02A

PISeca Sensor cable, 2 m, angled connector