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 long 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 applications, 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.

Application fields
Industry and research. Semiconductor manufacturing and inspection. Nanometrology. Active vibration absorbers. Precision machining.

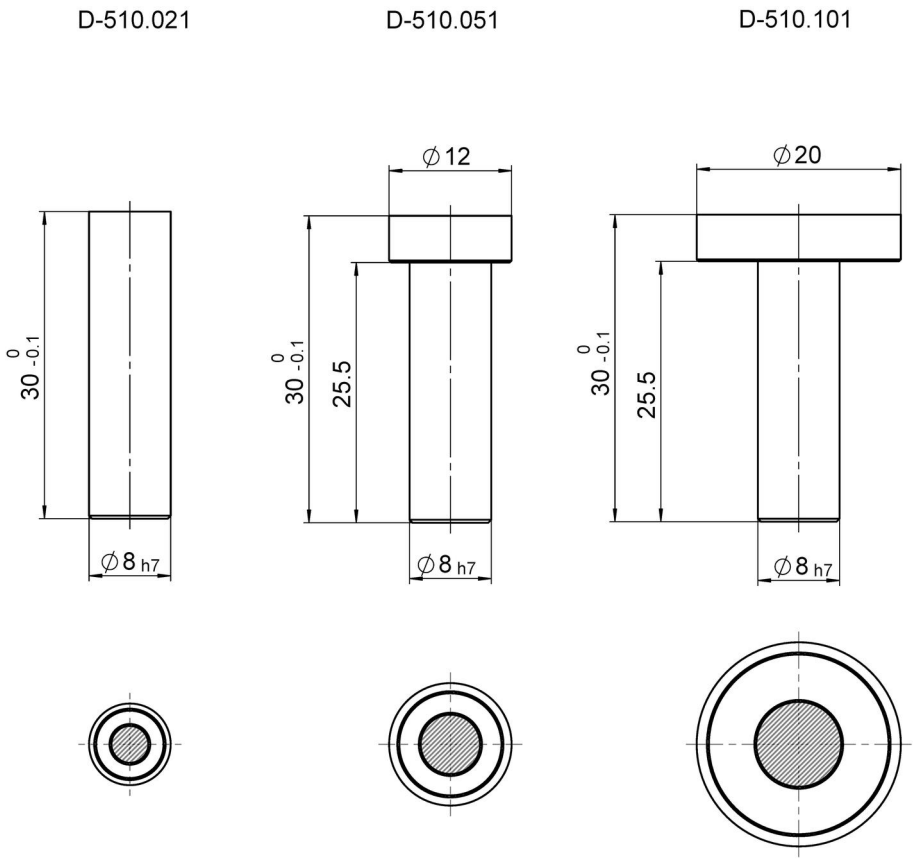
Sensor	Unit	D-510.021	D-510.051	D-510.101
Temperature stability	nm/K	—	53	—
Sensor type		Single electrode, capacitive	Single electrode, capacitive	Single electrode, capacitive
Nominal measuring range	µm	20	50	100
Linearity error in the nominal measuring range	%	0.2	0.1	0.1
Smallest measuring gap in the nominal measuring range	µm	10	25	50
Largest measuring gap in the 5-times extended measuring range	µm	150	375	750
Static resolution in the nominal measuring range, RMS	%	<0.001	<0.001	<0.001
Dynamic resolution in the nominal measuring range, RMS	%	0.002	0.002	0.002
Sensor active area	mm²	11.2	27.9	56.1

Miscellaneous	Unit	D-510.021	D-510.051	D-510.101
Operating temperature range	°C	-20 to 100	-20 to 100	-20 to 100
Overall mass	g	8	10	16
Suitable connecting cable		D-891.01E, D-891.02E, D-891.01A, D-891.02A	D-891.01E, D-891.02E, D-891.01A, D-891.02A	D-891.01E, D-891.02E, D-891.01A, D-891.02A
Material		Stainless steel	Stainless steel	Stainless steel
Recommended evaluation electronics		E-852.10, E-852.10A1, E-711.SE3	E-852.10, E-852.10A1, E-711.SE3	E-852.10, E-852.10A1, E-711.SE3

Nominal measuring range and measuring gaps: Extended measuring range available with E-852.10, two measuring ranges are calibrated respectively. Extension factors: 1, 2, 2.5, 5.
Static resolution: Bandwidth 10 Hz with E-852 evaluation electronics.
Dynamic resolution: Bandwidth 10 kHz with E-852 evaluation electronics.

Tolerances:
Linearity error in the nominal measuring range: max.
Dynamic resolution in the nominal measuring range, RMS: max.
Overall mass: ±5 %

Drawings / Images



D-510.021, D-510.051, and D-510.101, dimensions in mm. Connector: LEMO FFC00.650.CLA.543, triaxial.
The sensor's active area is marked by the hatched area in the center of the sensor.

Drawings / Images

D-510.021: Easy to mount due to LEMO connector

Order 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