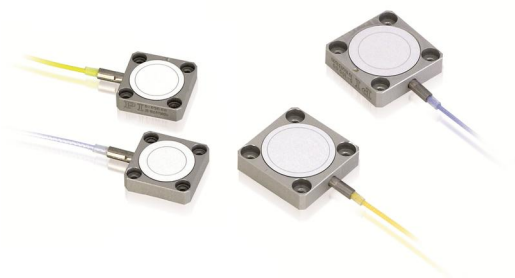


## Capacitive Sensors

### Subnanometer-Resolution Position Sensors



### D-050 • D-100

- For applications with the highest precision requirements
- Measuring range to 300  $\mu\text{m}$
- Resolution to 0.01 nm
- Linearity error to 0.01% with digital controller
- E-509.CxA control electronics, compatible with E-500 piezo controller system

#### Resolution

Capacitive sensors achieve resolutions into the picometer range over shorter distances. The theoretical measuring resolution is unlimited. In practice, scatter radiation, geometrical effects, and the measuring electronics noise influence the achievable accuracy. In conjunction with the E-509.C1A electronics, the effective noise factor of the D-100.00 sensors (100  $\mu\text{m}$ ) is 0.02 nm/√Hz. Corresponds for example, to a resolution of 0.2 nm with 100 Hz bandwidth. The jumper-adjustable bandwidth of the electronics is up to 3 kHz.

In addition to the standard sensors listed here, PI offers customized versions, e.g., in measuring, geometry, material, electronics etc.

#### Application fields

High-precision positioning.

	Unit	Tolerance	D-050.00	D-100.00
Sensor type			Capacitive	Capacitive
Nominal measuring range	$\mu\text{m}$		50	100
Extended measuring range	$\mu\text{m}$		150	300
Resolution			0.001% of the measuring range	0.001% of the measuring range
Linearity error	%		0.01	0.01
Sensor active area	$\text{mm}^2$		56.5	113.1
Thermal drift	ppm/K		50	50
Material			Aluminum	Aluminum
Cable length	m		1	1
Operating temperature range	$^{\circ}\text{C}$		-20 to 80	-20 to 80
Recommended evaluation electronics			E-509.CxA	E-509.CxA
Connector			LEMO FFA.00.250.CTLC31	LEMO FFA.00.250.CTLC31

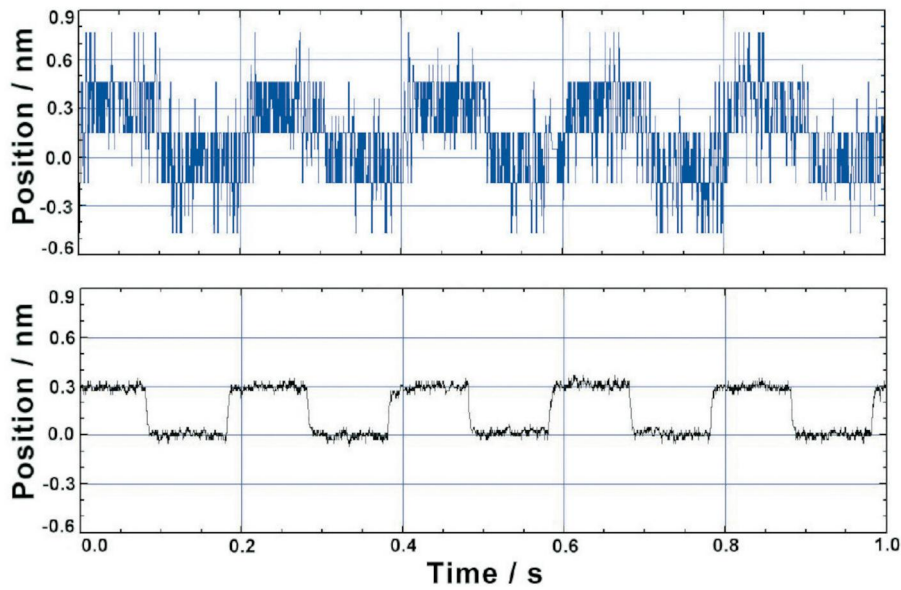
Resolution: At 3 kHz, with E-509.C3A.

Linearity error: With digital controller; to 0.05 % with E-509 analog controller.

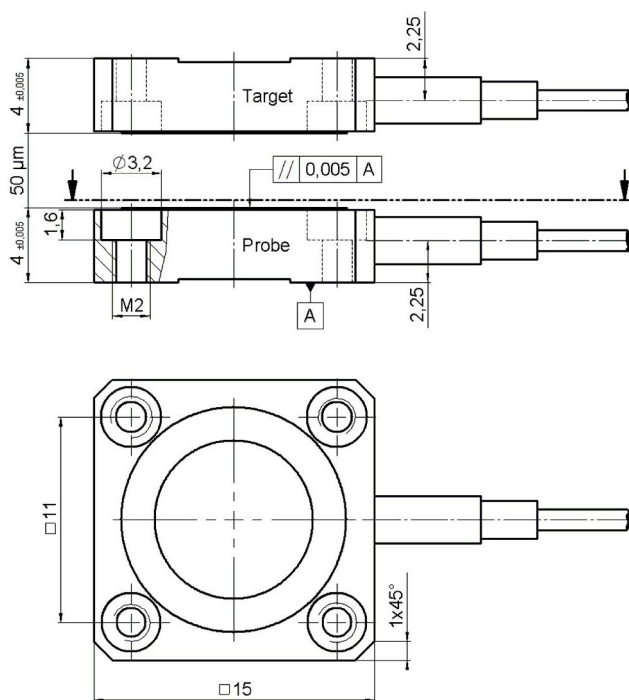
Thermal drift: Change of active surface size in ppm (parts per million), refers to measuring range.

Ask for custom materials.

## Drawings / Images

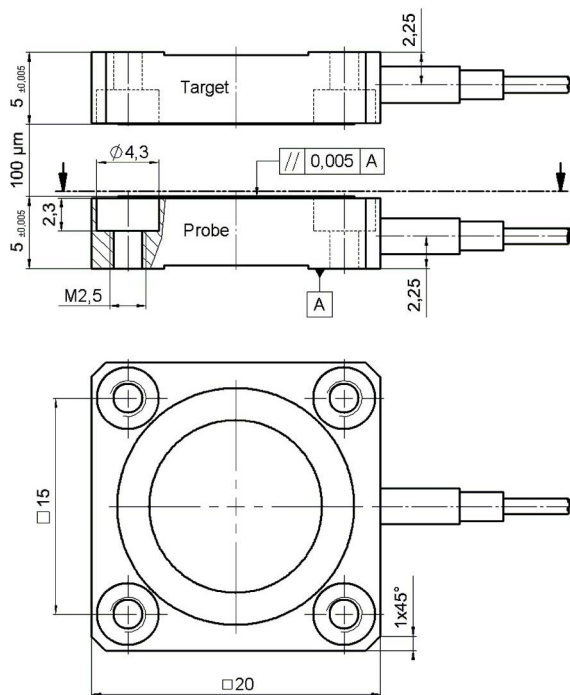


Motion of a piezo nanopositioning system with 0.3 nm steps, measured with a capacitive sensor from PI (lower curve) and with a highly accurate laser interferometer (model Zygo ZMI 2000, upper curve). The capacitive sensor shows a significantly higher resolution than the interferometer.



D-050.00, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

## Drawings / Images



D-100.00, dimensions in mm. Note that a comma is used in the drawings instead of a decimal point.

## Order Information

### D-050.00

Capacitive two-plate position sensor, 50 µm nominal measuring range, aluminum

### D-100.00

Capacitive two-plate position sensor, 100 µm nominal measuring range, aluminum