



## High Resolution Linear Displacement Gauging Module

INSPECTION

# MicroSense 6810



The MicroSense 6810, from KLA-Tencor's ADE division, is a high resolution distance measurement system ideal for measurement ranges up to 2 millimeters. When combined with one of KLA-Tencor's non-contact 6000 series capacitance sensors, the 6810 provides measurement resolution down to the sub-nanometer level. The 6810 instrument features user-selectable measurement bandwidth up to 100 kHz, and is optimized for "high dynamic" applications such as measuring axial and radial runout of high speed air bearing spindles, precision stages or fluid dynamic bearing motors.

## APPLICATIONS

Axial and radial runout measurement of high speed mechanisms including

- Hard disk drive motors
- Air bearing spindles
- Machine tool spindles

Precision stage straightness, flatness and vibration measurement

Fast tool servo loop feedback

Machine vibration measurement

Precision bearing measurement

Linear positioning sensing and servo feedback

Nanopositioning system feedback

## BENEFITS

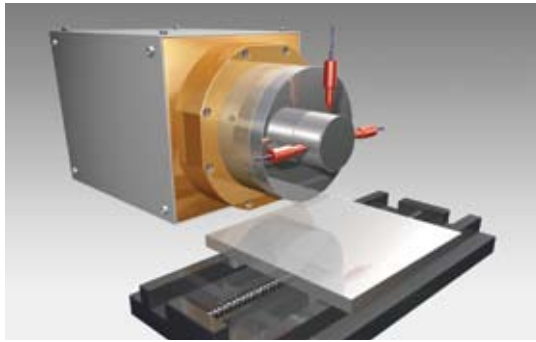
Advanced low noise design provides sub-nanometer measurement resolution

Displacement measurement using capacitive sensing – target material or reflectivity has no effect on measurement accuracy

High measurement bandwidth, up to 100 kHz for "high dynamic" applications

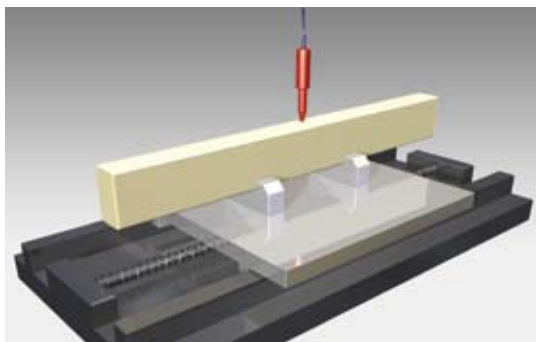
Completely non-contact design

# MicroSense 6810



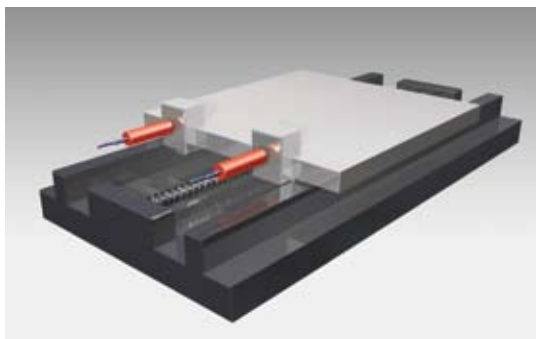
## SPINDLE RUNOUT MEASUREMENT

The KLA-Tencor MicroSense 6810 enables dynamic measurement of high speed spindle runout to verify spindle performance specifications. Since the 6810 is capable of nanometer resolution, data can be captured to measure and analyze both repeatable run out (RRO) and non-repeatable runout (NRRO). The non-contact measurement probes have standard sensors as small as 0.5 mm diameter so that measurements can be made at the toolpoint, using ground cylindrical targets.



## STRAIGHTNESS AND FLATNESS MEASUREMENT

The MicroSense 6810 provides a method for making direct measurements of straightness and flatness of high precision machine tools and stages, without the averaging errors found in laser interferometer based systems.



## REPEATABILITY AND VIBRATION MEASUREMENT

The MicroSense 6810 can directly measure machine repeatability and vibration. Compact measurement probes can directly measure at the point of interest. For example, vibration can be measured at the tooling mounting surface, such as a machine tool fixture or a wafer chuck mounted on a precision stage.

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### FEATURES

- High resolution, down to sub-nanometer level (0.25 nanometer rms@ 5kHz over 50 micrometer measurement range)
- User selectable measurement bandwidth (1 kHz, 5 kHz, 20 kHz, 100 kHz)
- Measurement range from 20 micrometers up to millimeters
- Industry standard  $\pm 10$  volt analog output
- Certified, NIST traceable calibration accuracy (calibration certificate supplied with every unit)
- Extremely compact, includes ADE isolated low noise power supply
- 3U Eurocard format available
- Compatible with KLA-Tencor's 6000 series sensors, available in a variety of sizes

### Advanced Distance Measurement Technology

The 6810 instrument is based upon KLA-Tencor's patented ultra-low noise capacitance sensing technology. Capacitive sensing is the most precise means of electrically measuring linear displacement, providing resolution equivalent to a laser interferometer at a fraction of the cost. It can be used with any conductive target material and special sensors are available for non-conductive targets such as glass or ceramic. Target material or target reflectivity has no effect on measurement accuracy. The 6810's advanced capacitance sensing circuitry provides precise displacement measurements even in applications with poorly grounded targets.

### Standard Analog Output

The 6810 tool features an industry standard  $\pm 10$  volt analog output, available through a convenient BNC connector on the front panel for connection to an oscilloscope, and through a rear panel connector for interface to an A/D card. A convenient output voltage meter and LED limit indicators are provided on the front panel of the 6810 for easy set up.

THE 6810'S ADVANCED  
CAPACITANCE SENSING  
CIRCUITRY PROVIDES  
PRECISE DISPLACEMENT  
MEASUREMENTS  
EVEN IN APPLICATIONS  
WITH POORLY  
GROUNDED TARGETS.



# MicroSense 6810

## SPECIFICATIONS

Standard Measurement Range	±25µm, ±50µm, ±100µm, ±250µm (calibration ranges from 10µm up to 2mm available)
Analog Output	±10 volts full scale, single ended and differential (options ±5 volts, 0 – 10 volts)
Sensor Input	KLA-Tencor's 6000 series probes and sensors
Measurement Bandwidth (@-3dB)	1 kHz, 5 kHz, 20 kHz, 100 kHz (jumper selectable)
Linearity	0.25% over full scale range
Stability	200 ppm/°C
Target Material	Any conductive material (sensors for non-conductive materials such as glass or ceramic also available)
Over Range Detection	TTL outputs and front panel LEDs indicate near and far limit condition
Front Panel Adjustments	Scale factor, zero offset, limit settings
Operating Environment (Temperature)	0 to 50°C
Operating Humidity	<85% RH, non-condensing
Power Requirements	90 to 240 VAC, 50/60 Hz
Size	175mm (L) x 110mm(W) x 40mm (H)
Weight	0.5kg, power supply is 0.8kg

## Measurement Resolution

Typical measurement resolution in nanometers, r.m.s., by filter setting

Probe Model	Sensor Diameter	Measurement Range	1kHz	5kHz	20kHz	100kHz
6504-01	0.5mm	±25µm	0.25nm	0.25nm	0.45nm	1.00nm
6504-01	0.5mm	±50µm	0.35nm	0.50nm	1.00nm	5.00nm
6501	1.0mm	±100µm	0.50nm	0.80nm	1.15nm	5.00nm
6501	1.0mm	±250µm	2.75nm	4.75nm	12.00nm	35.00nm

Note-Probe to target standoff at center of range is equal to total measurement range

## KLA-TENCOR SERVICE/SUPPORT

Customer service and support are an integral part of KLA-Tencor's yield optimization solution. Our vast customer support organization services our worldwide installed base and is responsible for customer support following shipment of equipment and software. Services include system installation, secure online monitoring, on-site repair, telephone support, relocation services, and selected post-sales applications.

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