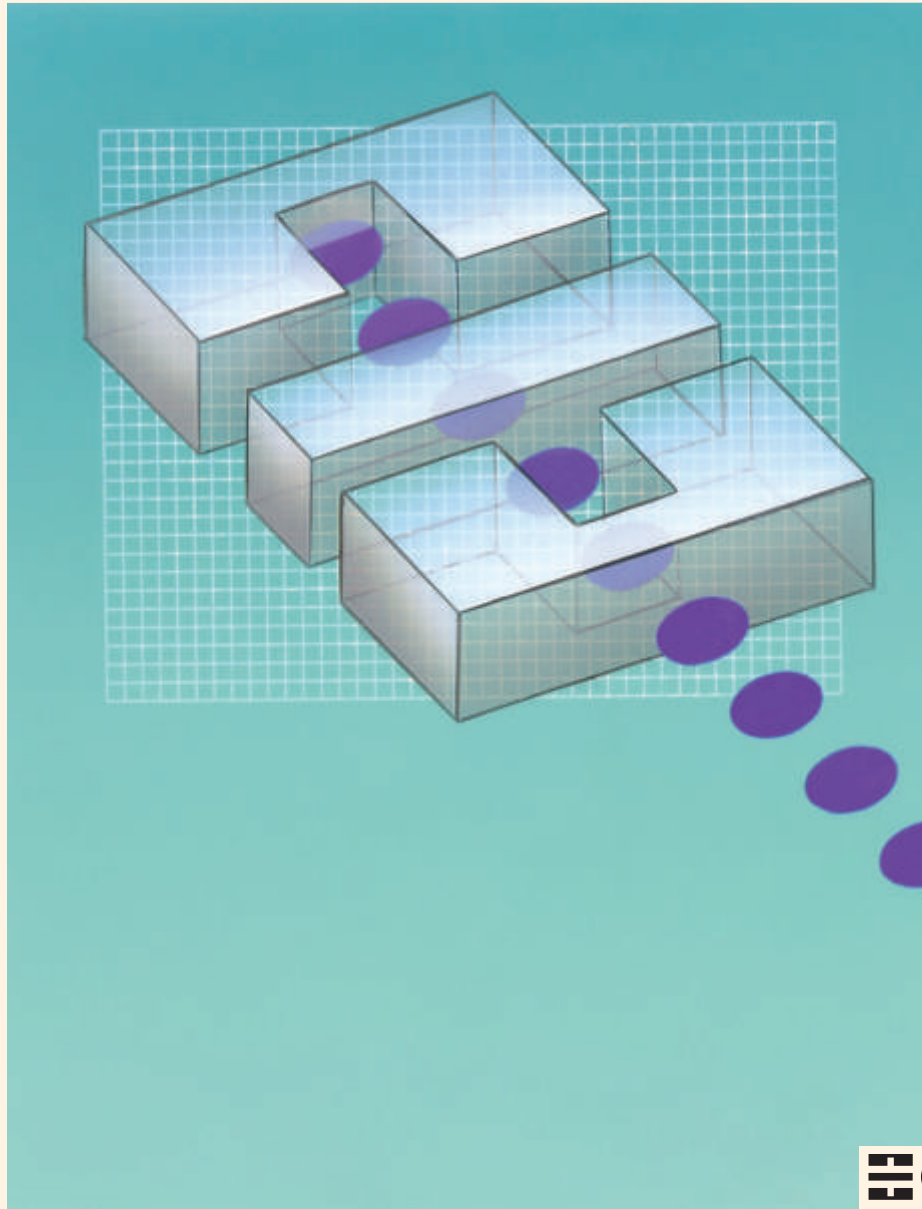


N O N - C O N T A C T D I S P L A C E M E N T



 Capacitec

S T A N D A R D P R O D U C T S



THIN GAPS

Engineers have long been searching for reliable and repeatable methods to measure thin gaps between 0.010" (0.254mm) and 0.125" (3.18mm). Mechanical contact methods such as feeler gauges, shims and calipers had long been the only available method to measure gaps, even in areas where damage could be caused to polished or sensitive surfaces. Capacitec has eliminated the requirement for the operator's "feel" inherent in feeler gauges by developing a broad line of non contact industrial gap sensors as well as a new portable gap measurement tool named GAPMAN®. These modern Capacitec non contact methods now provide engineers with excellent repeatability with the added ease of digitally stored data for use in today's advanced quality control systems.

MAJOR APPLICATIONS:

- Adhesive coatings
- Film manufacturing
- Plastic extrusions
- Automotive & Aircraft assembly
- Packaging materials
- Nuclear fuel rod gaps
- Photocopiers/Printing
- Tooling dimensions



HIGH TEMPERATURE

Significant scientific and engineering enhancements in advanced materials, Pre-and In-Process production methods and in-situ testing methods are driving the demand for displacement sensors that can handle extremely high temperatures up to 1832°F (1000°C). Contemporary producers of continuous flow steel, plate glass and plastics now use off-the-shelf high temperature Capacitec sensor solutions for in-process applications to control the quality of their production on a real time basis. Qualification testing of disc brakes, jet engine dynamics and high speed shaft rotations also rely on Capacitec sensors. Advanced materials for automobiles, structural components, and aircraft are also tested for strength and durability with the use of Capacitec's line of extensometers and clip gauges.

MAJOR APPLICATIONS:

- Disc brake testing
- Silicon Wafer processing
- Metal and Glass forming
- Jet engine thermal expansion
- Material strength testing
- Mold separation
- Turbine testing

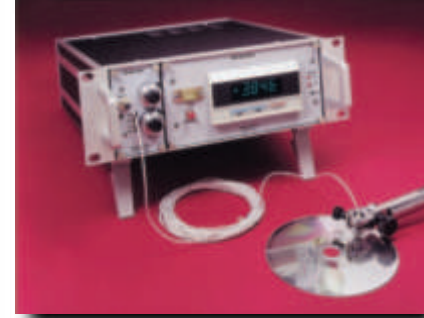


EXTREME ENVIRONMENT

Maintaining the perfect alignment of a particle detector in a gap measuring only 0.050" (1.3mm), at 300°F (150°C) and in a chamber exposed to 2 tesla magnetic field along with 10⁷ RADS of radiation is not a job for your average displacement sensor. Fortunately, Capacitec is not a supplier of average displacement sensors - our sensors thrive in harsh environments. Capacitec model HPB sensors were indeed installed directly in the chamber of this particle accelerator at CERN where the sensors have performed flawlessly since the late 1980s. Another nasty sensor environment can be found inside a gas turbine engine rotating from 30k to 150k rpm. Here again Capacitec sensors sustain this challenging environment while taking critical blade tip clearance measurements at 1600°F (871°C).

MAJOR APPLICATIONS:

- Particle accelerators
- Linear inductive motors
- Diesel fuel injectors
- Gas turbine blade tip clearance
- Vibration measurements to 200 kHz
- Turbochargers
- High vacuum and Cryogenic Processes



NON INTRUSIVE ALIGNMENT

Microprocessor chips have found their way into a surprisingly high number of products that are around us every day in our home, car and office. This explosion in worldwide demand has forced semiconductor manufacturers to enhance quality and thru-put in ways never before imagined. Capacitec's microinch level positioning sensing systems assist chip processing and handling equipment manufacturers to sense silicon wafers for exact positioning prior to deposition, etching and other processing. This is accomplished without coming into contact or damaging their highly sensitive surfaces. Other industries where sensitive surfaces must be measured, damage free, are printing presses, photocopier rollers, computer hard disc drives and molten materials.

MAJOR APPLICATIONS:

- Silicon Wafer deposition & etching
- Silicon Wafer proximity
- Wafer cutting/processing
- Robot arm control
- Computer hard disc drives
- Printing Press/Photocopiers
- Tooling parallelism/alignment

CAPACITEC is a global technology company dedicated to advancing the capacitive principle of measurement physics to its highest level in sensor design. Our scientific and industrial customers depend on us for precision movement detectors, part-dimensional sizing, thin gap sensors and strain extensometry for material strength testing. Over eighteen years of product line history has demonstrated Capacitec's strong support in all markets where a more sophisticated ruler is required and in areas where traditional sensors cannot fit or survive the environment.

A realized claim of extremely high sensitivity to minute physical/mechanical changes and exceptional amplifier output stability support capacitive sensor applications especially in severe environments of temperature, magnetic fields, high radiation and non-contact, non-intrusive applications. An aggressive research and development program continues to drive Capacitec's advances in instrumentation, digital circuitry and demonstrated longevity in rugged packaging design. These investments combined with updated manufacturing techniques enable us to consistently provide products of superior performance, stability and economy of packaging and pricing.



Courtesy of DTIC/MTDC



Courtesy of Pratt+Whitney Aircraft



Courtesy of Xerox Corporation



Capacitec GAPMAN®



GAPMAN_{GEN3}

Gapman® Portable Electronic Feeler Gage

Gapman_{Gen3} is the latest generation high precision, non-contact, portable electronic gap measurement gage. Features include:

- A dual capacitive sensor for position-compensated measurement
- Easy insertion into very thin gaps down to 0.0075" (0.190 mm) in a wide range of parallel and roller gap applications
- Micro-controller based and application software driven
- Gapman records and stores data points for easy transfer to support Six Sigma and other quality programs



Gapman_{Gen3} with flexible GPD-4.5-A-250



Gapman_{Gen3} shown with spring contact wand

Applications

Aircraft assemblies: wings, fuselage

Composite structures: CFRP

PowerGen: rotor/stator, steam, gas, hydro

Coaters/extruders: slot die, extrusion dies

Roller gaps: copiers, high volume printers

Industrial machinery: set up tools, alignment



520 SERIES

Capteura® Series Non-Contact Displacement Sensing System

Capteura 520 Amplifier

New ultra stable, low noise, non-contact capacitive displacement measurement system

- New 520-XL dual channel amplifier card with a 2U, 55.5 x 100 mm size
- ESD protected inputs
- Easy push button calibration
- 0.05% accuracy
- New 208 and 216 electronic racks are three times smaller than the previous generation



Model 208 (8-channel rack) with (4) 520-XL amplifiers and (1) 200-C oscillator card



Capteura® 200 Series modular 8-channel design versus legacy 8-channel system

- Better than 65,000:1 resolution (38nm) with HPC-150E-A-L2-1-B sensor, 200Hz bandwidth and 2.5mm range (double the range of competitive systems)

- Customer selectable frequencies, 200Hz, 4KHz, or 16KHz

- Cable length changes of $\leq 10'$ (3.05m) result in $<0.2\%$ change in output

Lab and field testing has confirmed that the new **Capteura 520** has the industry best performance combining small sensor size and large displacement range with long cable lengths



200 SERIES

Capteura® 200 Series Non-Contact Displacement Sensing System

Capteura 200 Series

New ultra stable, low noise, non-contact capacitive displacement measurement system

- New 220-SL dual channel amplifier card with a 2U, 55.5 x 100 mm size
- New 208 and 216 electronic racks are three times smaller than the previous generation
- ESD protected inputs



Model 208 (8-channel rack) with (2) 220-S amplifiers, (2) 220-SL amplifiers and (1) 200-C-DAQ clock card with USB data acquisition



Capteura® 200 Series modular 8-channel design versus legacy 8-channel system

- Better than 100,000:1 resolution (20nm) with HPC-150E-A-L2-1-B sensor, 200Hz bandwidth and 2.5mm range (double the range of competitive systems)

- 12KHz bandwidth option available

- Extremely long cable length with a capacitive load of 1500 pF

Lab and field testing has confirmed that the new **Capteura 200 Series** family has the industry best performance combining small sensor size and large displacement range with long cable lengths

PROBE PART NUMBER FORMAT

HPX

Shape

C: Cylindrical
B: Button
T: Threaded
R: Rectangular
S: Flat
D: Dual Flat

-XXX

Sensor Diameter

Thousandths"
mm (.0254)

X

Probe Length

A: 0.500" (12.7)
B: 0.625" (15.9)
C: 0.750" (19.1)
D: 0.875" (22.2)
E: 1.000" (25.4)
F: 1.250" (31.7)
G: 1.500" (38.1)
H: 1.750" (44.5)
I: 2.000" (50.8)

-X

Operating Temperature

A: 32 to 300°F
(0 to 150°C)
E: -100 to 400°F
(-73 to 205°C)
H: -100 to 1000°F
(-73 to 538°C)
V: -100 to 1600°F
(-73 to 871°C)

-XX

Cable Type

L2: .093 (2.4)
L3: .063 (1.6)
I2: .125 (3.2)
N: .125 (3.2)
ND: .165 (4.2)
T: .063 (1.6)

-XX

Cable Length

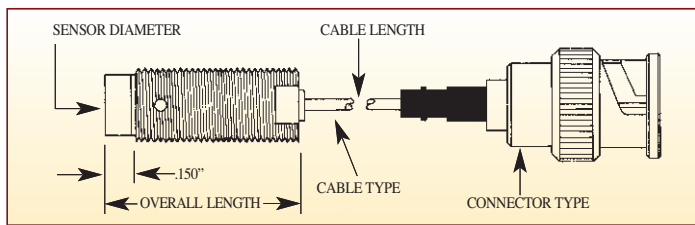
In feet
(about 0.3m)

-X

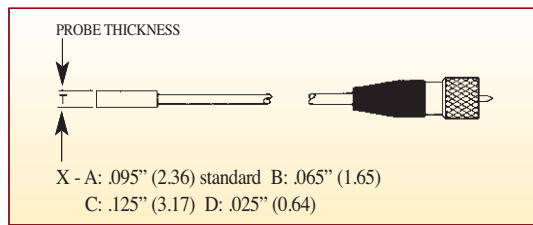
Connector Type

M: 10-32
Microdot
B: BNC
FX:MCX
Female
MX:MCX
Male

EXAMPLE (1) : HPT-150X-A-L2-5-B



EXAMPLE (2) : HPB-75X-E-L3-5-M



SPECIFICATIONS & PROBE ORDERING NOTES

DIMENSIONS: All dimensions are shown as typical only. Please contact the factory for exact dimensions.

MAXIMUM RANGE: Same as the diameter of the sensor element. (Minimum range is touch or 0.1% of full scale.)

LINEAR RANGE: Two thirds (0.67) times the sensor diameter typical.

PROBE INTERCHANGEABILITY: ±10% of full scale maximum change, ±2% typical.

PROBE MATERIAL COMPOSITION: A and E, stainless 303; V, Inconel 600, other materials available.

CALIBRATIONS: There are 21 numbered, standard calibrations available, please consult factory and specify when ordering.

RANGE:

- Standard listed ranges are ratios from 0-10.000VDC analog output, but each probe may be calibrated with several range versus sensitivity calibrations. Calibration sensitivity from 0.001VDC/0.001" (0.0254mm) to 10.000VDC/0.001" (0.0254mm) are available.
- Range is defined as from touch to full scale reading, ±50% of range = ±10.000VDC calibration optional.

GROUNDING: "-D" dip coatings are available to prevent the electronically driven sensor/guard elements from being accidentally earth grounded and shorted.

EXTENSION CABLES: Many extension cables are available depending upon connector types. Consult factory for proper part numbers.

Example: EC-D-L2-5 is a standard 5 foot extension cable with female BNC to male BNC connectors.

EXCEPTIONS: Not all probe combinations are available (consult factory).

CABLE SPECIFICATIONS

Cable Temperature Range for "A" & "E" Probes, -65°F to 446°F (-54°C to 230°C)

Type L2	OD .093" (2.4)	Teflon	~ 30 pF/ft (90/m)
Type L3	OD .063" (1.6)	Teflon	~ 26 pF/ft (78/m)
Type I2	OD .125" (3.2)	Teflon	~ 14 pF/ft (42/m)

Cable Temperature Range for "V" Probes, -98°F to 1600°F (-72°C to 870°C)

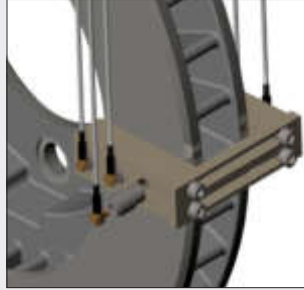
Type T	OD .063" (1.6)	Semi-rigid Inconel 600 powder filled	~ 60 pF/ft (180/m)
Type N	OD .142" (3.6)	Flexible Inconel Braided	~ 20 pF/ft (60/m)
Type ND	OD .165" (4.2)	Low Impedance Shield Version of N	~ 35 pF/ft (105/m)

CABLE TYPE: 99.9% shielded low noise coaxial with driven braided shield (maximum potential 20 volts P-P), 5 feet (1.5m) standard. 2000pF maximum probe capacitive load.

Probes and Accessories



Capacitive Displacement Sensors
Full line of standard cylindrical, threaded and button sensors



Disc Brake Wear Analysis Sensors
The model HPC-150C-H-IC-00 sensor assembly combines the benefits of small size and high temperature 750°F (400°C)



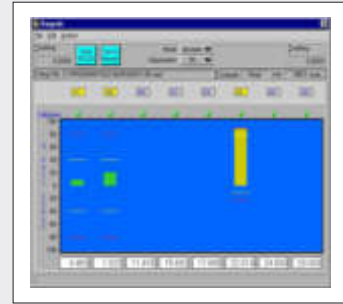
Calibration Stands
Calibration stands and micrometers



Thin Capacitive Probes
Standard models from .004" [0.1mm] thickness with .100" [2.54mm] linear range



Wand Holders
Wand holders with adjustable insertion length and slot guides.



BargrafX™
LabView® based data acquisition, linearization and display software.



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