

# SENSORS FOR TEST AND MEASUREMENT



**PRESSURE  
TEMPERATURE**

**POSITION  
FLUID PROPERTIES**

**VIBRATION  
TORQUE AND FORCE**

# VIBRATION SENSORS

## DC Response (Static) Accelerometers

To measure motion (velocity, displacement) and static/near-static acceleration accurately, an accelerometer with DC response is required. Using state-of-the-art MEMS technologies and the latest ASIC in their designs, Measurement Specialties' DC accelerometers offer the best-in-class performance and exceptional value. Designed and fabricated in the US, Europe and Asia, our accelerometer products find themselves in many mission critical applications and are embedded in thousands of test & measurement equipment world-wide.



Featured Products	Description
52F, Unamplified	Miniature size, shielded cable. Range from 50 to 2000g Full Scale.
3700, Unamplified	Small rugged design for shock and impact testing. Range from 50 to 6000g Full Scale.
EGCS-S425, Unamplified	Critically damped designed for high frequency suppression. Range from 50 to 2000g Full Scale.
4801A, Amplified	Welded stainless steel construction, temperature compensated. Range from 2 to 500g Full Scale.
4000A, Amplified	Low profile, integral cable, temperature compensated. Range from 2 to 500g Full Scale.
4630, Triaxial, Amplified	Triaxial, rugged construction, temperature compensated. Range from 2 to 500g Full Scale.

## AC Response (Dynamic) Accelerometers

The output of a piezoelectric sensor is AC-coupled by design, and is therefore best suited for dynamic measurements. Voltage mode piezoelectric is the most popular AC accelerometer design due to its high level output and its wide bandwidth. The Integral Electronics PiezoElectric (IEPE) type offers the convenience of using the same two-wire or coaxial cable for power and signal transmission, running in a constant current configuration.

To measure shock and vibration in high temperature environments, a charge mode piezoelectric accelerometer may be needed. They come in various configurations to suit most application environments and are hermetically sealed to maintain their critical high impedance characteristics.



Featured Products	Description
7502A, Charge	Miniature size, 260°C, hermetically sealed. 12kHz bandwidth, titanium housing.
7514A, Charge	High output (50pC/g), 260°C, hermetically sealed. Wide bandwidth, stainless housing.
7100A, IEPE	Center screw allows 360° cable orientation, easy installation. 50 or 500g full scale range.
7108A, IEPE	Small size, light weight, adhesive mounting, ground isolated. 50 or 500g full scale range.
7132A, Triax, IEPE	Triaxial, single connector, hermetic, adhesive mounting. 50 to 2000g full scale range.
8011 Family, IEPE	Designed for industrial monitoring, rugged construction. MS type connector (MIL-C-5015).



# POSITION SENSORS

## LVDT & Gage Heads

Our AC operated LVDT's (Linear Variable Differential Transformers) are the first choice in linear position sensor when small size, hostile environments and/or low cost are required. When used in conjunction with MEAS signal conditioners, they offer the maximum amount of flexibility for outputs and scaling.

DC operated LVDT's have built-in signal conditioning electronics and do not require calibration or special signal conditioning. These LVDT sensors can be powered with uni-polar DC voltages or bi-polar DC voltages and have scaled DC voltage, current or digital outputs. Gage heads are LVDT's with spring-loaded plungers and bearing assemblies designed specifically for assembly lines and gaging stations. Ranges from +/-0.020" to +/-2.000" are available.



Featured Products	Description
DC SE Series LVDT	Operates from single-ended, Unregulated 8.5–28 VDC supply. CE certified.
M12 Series LVDT	Excellent stroke to length ratio. Ranges from $\pm 5$ mm to $\pm 150$ mm.
MP2000 Controller	Microprocessor based LVDT indicator and set-point controller
Digital LBB System	14-bit ultimate-precision digital LBB gaging inspection system
GCA Gage Heads	Resistant to harsh environments. MS type connector (MIL-C-5015)
GCD SE Gage Heads	Unipolar ranges: 0.1" to 2.0". Battery option ideal for portable applications.

## Tilt Sensors and Inclometers

Measurement Specialties' dual axis tilt sensors and inclinometers use fluid filled capacitance or conductive technology for measuring ranges between  $\pm 2^\circ$  up to  $\pm 45^\circ$  inclination in both the X- and Y-axis, which are extremely rugged transducer designs capable of functioning during and after severe shock loads and vibration. Our digital Protractor System offers remote measuring capability in a convenient package.



Featured Products	Description
D-Series Inclinometer	High accuracy, $\pm 5^\circ$ up to $\pm 30^\circ$ range, with analog and digital outputs, CAN interface.
DPG-Series Inclinometer	High accuracy, $\pm 5^\circ$ up to $\pm 30^\circ$ range, with analog voltage and digital RS232 output.
DQG-Series Inclinometer	Small size, up to $\pm 25^\circ$ range, with ratiometric voltage output, 7 to 30VDC power.
Anglestar® Protractor System	Battery or line powered, remote angle measurement indicator with digital display.

# PRESSURE SENSORS

## Miniature Size

Measurement Specialties' miniature pressure sensors employ a fully or half active Wheatstone Bridge consisting of piezoresistive strain gages using the best-in-class technologies specific to the applications. Sensor output sensitivity is ratiometric to the power supply voltage in the unamplified designs, or a built-in amplifier converts the mV output into high level signal suitable for driving long line. The miniature design and numerous options available for these sensors allow them to be easily installed in challenging applications such as flight testing, motorsports, space exploration, robotics, marine testing, wind tunnels and biomechanical research.



Featured Products	Description
EPB	Stainless steel, flush mount design for general media.
EPIH	Extremely small diameter for dynamic and high frequency measurements.
EPX	Threaded sensor with SS flush diaphragm for static and dynamic pressure
EPRB-2	100% stainless steel welded construction with amplified output.
XPCM10	For liquid media and high temperature. Low zero shift due to torque sensitivity.
XP1023	Customized design for on-board flight applications.

## UltraStable™ and Bonded Foil

Our UltraStable™ pressure transducers sets the performance standard for demanding applications where high accuracy is required. This series is suitable for measurement of liquid or gas pressure, even for difficult media such as contaminated water, steam, and mildly corrosive fluids.

Measurement Specialties' Bonded Foil Strain Gauge Pressure Transducers are constructed from media compatible 17-4 PH Stainless Steel or Inconel 625 to provide exceptional performance in extreme environments. Particularly suited to extreme applications where high cycle duty, transient pressure, or hydraulic hammer are a concern due to the unique construction including, mechanical over-travel stops, fatigue enhance diaphragms and digital compensation technology.



Featured Products	Description
D5100, UltraStable™	Differential configuration, 2 pressure ports, 0-1 to 500 PSI.
U5100, UltraStable™	Total error band of 9.75%, 100 V/m EMI protection, 0-15 to 10K PSI.
US10000, UltraStable™	Total error band of 0.25%, IP65, NEMA4, 0-5 to 10K PSI.
US300, UltraStable™	Low cost, compact, 3 X proof pressure, 0-15 to 5K PSI.
P700, Bonded Foil	Low and high level outputs. High overload protection, 0-10 to 10K PSI.
P900, Bonded Foil	High temperature operation. Welded construction, 0-10 to 10K PSI.
P1200, Bonded Foil	Wide compensated temperature range. Six pressure port options, 0-75 to 10K PSI.



# TORQUE SENSORS



Measurement Specialties, Inc utilizes leading strain gauge technologies in its static and dynamic torque sensors to satisfy demanding customer requirements. Solutions are offered for both reaction torque as well as rotating torque measurements. Also offered are combination sensors which simultaneously measure reaction torque and force with a single device. Optionally, sensors can be configured to detect angle position and provide velocity measurements. To ensure reliable data collection over long periods and in harsh environments our torque sensors feature integral mechanical stops that provide protection during mounting and operation. Our non-contact models are well suited for high RPM and temperature environments. MEAS torque sensors are often found in industrial settings requiring immunity to electromagnetic fields and long term reliability.

Featured Products	Description
CD1095	Measures in-line torque on rotating shafts. Excellent temperature stability.
CD1110T	Non-contact dynamic sensor with low torque ranges and high speed (>25 000 rpm) operation.
CD1140	Non-contact torque sensor offered in a small but very rugged package.
CS1060	Reaction torque sensor with optional on-board signal amplification for high level output.
CS1120	Rugged sensor for low static torque measurements.
CS1210	Stainless steel or aluminum housing. Operating ranges to 10 000 Nm (8000 lbf-ft).

# FORCE SENSORS

Measurement Specialties, Inc. offers a broad range of compression and tension force sensors for such diverse industries as entertainment, robotics, military, automotive testing, medical instrumentation, plant management, weighing, and process control. Given our breadth of experience in diverse applications, testing professionals often look to MEAS to design or customize sensors for specific uses and testing environments. For turnkey systems that need to work "out-of-the-box", our match components (sensor, power, amplifier and digital display) are formatted, calibrated and ready for immediate use. All force sensors use piezoresistive strain-gage technology for long term reliability, accurate performance over temperature and ease of customization.



Featured Products	Description
EL20-S458	Seat belt load cell for auto safety applications. Lightweight Titanium construction.
FN7325	Multi-component force and torque sensor. Dynamic and fatigue applications.
FN3000	Tension and compression. Ranges from 0-10kN to 0-1000 kN (2k lbf to 200k lbf).
FN3148	High accuracy with mechanical stops. Ranges from 0-10N to 0-2kN (2 lbf to 400 lbf).
FN7080	Multi-component force sensor. Designed for gear stick measurement.
XFTC320	Tension and/or compression mode in static and dynamic applications.
XFL212R	Slim design with a temp compensation module integrated into the output cable.

# TEMPERATURE SENSORS

Measurement Specialties is the market leader in critical temperature measurement and is a global provider of high precision NTC thermistors, temperature probe assemblies and thermopiles.

The TPKIT300-20VSU is a Non-Contact Infrared Thermometer for general test and monitoring applications where physical installation of temperature sensors is not practical. Featuring RS232, USB or analog voltage outputs, this non-contact sensor is calibrated to measure from -20°C to 300°C, and can be powered from 9-24 Vdc. The stainless steel housing offers complete protection against large and small particles as well as liquid protection against multi-directional low pressure water jets (IP65).

Our precision NTC Thermistor Thermometers offer high accuracy and user convenience. The 4610 NTC system is designed specially for our 4611/4612 probes. The 4610 uses one of 2 unique probes for maximum accuracy for biological and other critical applications.



Model	Description
TPKIT300-29VSU	Non-contact infrared thermometer, measures from -20°C to 300°C, IP65 rated
4610	Plug-&-Play convenience. ±0.05°C accuracy from 20°C to 50°C with 4611/4612 probes
4611/4612	Plug-&-Play convenience. ±0.05°C accuracy from 20°C to 50°C with 4611/4612 probes

# FLUID PROPERTIES SENSORS

Based on a novel fluid property sensor design, our Fluid Property Sensors will directly and simultaneously measure the viscosity, density, dielectric constant and temperature of fluids. Relying on a patented tuning fork technology, the sensor monitors the direct and dynamic relationship between multiple physical properties to determine the quality, condition and contaminant loading of fluids such as engine oil, fuel, transmission and brake fluid, hydraulic and gear oils, refrigerants and solvents. The multi-parametric analysis capability improves fluid characterization capabilities over competing single-parameter measurement devices. Two plug and play systems are available to allow the user to operate under diverse pressure, flow and temperature conditions:

1. FPP800KIT1, Data Viewer Kit – This kit is ideal for laboratory uses. It provides all the required tools to allow direct interface with the fluid property sensor and acquisition of measured data through the customer's PC.
2. FPP800KIT2, Data Logger Kit – Designed for field uses, this kit provides all the required tools for direct interface with the fluid property sensor and acquisition of measured data through the supplied data logger.



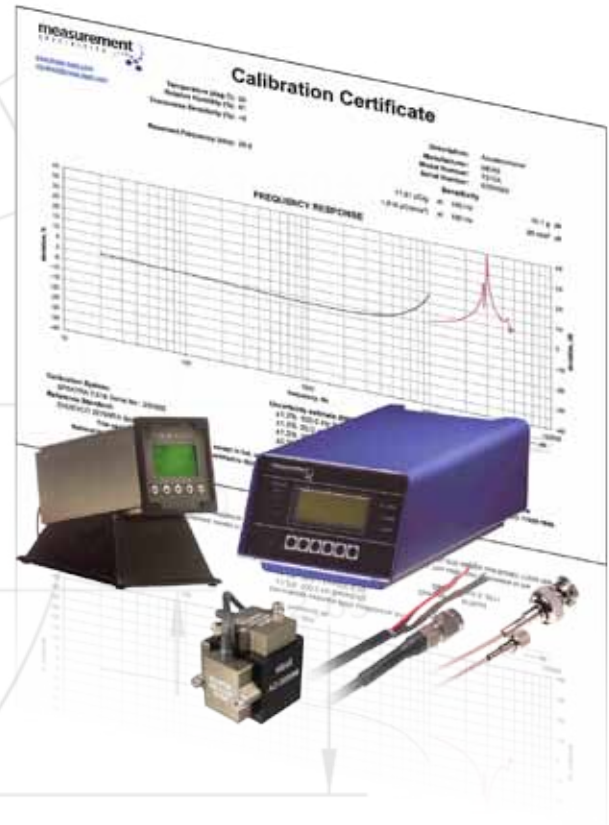
Multiple-Parametric Measurement	Min	Typical	Max	Unit	Symbol
Viscosity (Dynamic)	0.5	15	50	mPa-s (cP)	$\mu$
Density	0.65	0.85	1.5	gm/cc	$\rho$
Dielectric Constant	-1.0	2.0	6.0	-	$\epsilon$
Fluid Temperature	-40	-	150	° C	°



**The Test and Measurement (T&M) Division** of Measurement Specialties Inc. serves the needs of customers who are involved in product research, development, test and evaluation. We offers a broad range of sensors to measure vibration, pressure, position, tilt, force, torque, temperature, and fluid properties. While our OEM Division provides devices for imbedded applications, the T&M Division focuses on plug and play. These products are fully configured, shipped with individual calibration certificates and are ready to use “out of the box” with no additional modification required.

## Electronics and Accessories

To facilitate true plug & play operation, Measurement Specialties offers an extensive line of signal conditioners, power supplies, and amplifiers. From universal charge amplifiers for piezoelectric accelerometers, bridge type signal conditioners for pressure transducers, load cell and torque sensors, and dedicated digital indicators for LVDT and tilt sensors, these instruments are specially designed to match the characteristics of our sensors to bring you the best possible system performance. We also offers cable assemblies and mounting accessories for your convenience. Should you require periodic re-calibration of your sensors, our regional calibration facilities are fully equipped to satisfy your needs.



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