Measurement Specialties knows how to support OEMs

Measurement Specialties (MEAS) designs and manufactures sensors that measure pressure/force, position, vibration, temperature, humidity, torque and fluid properties. Used as embedded devices by original equipment manufacturers (OEMs) or as standalone sensors for test and measurement, our products are critical for feedback and control to enhance product functionality, efficiency and safety. We are the heart of many everyday products and provide a vital link to the physical world.

MEAS is an applications company and understands that embedded often means custom. Our portfolio includes technologies capable of measuring most physical characteristics and allows us to design the right sensor for the right application, including multi-parameter sensors. Physical property, electrical input/output and packaged configuration are all considerations when developing products that meet our customers’ needs.

We have expanded our technology portfolio and geographic reach in part, through the acquisition of strategically complimentary companies. Our operations in the US, Europe and China provide resources close to our customers. This global footprint allows us to offer the lowest cost of ownership to OEMs.

Our business is understanding your sensing needs and developing a solution that meets your performance and cost objectives. At MEAS, we are Sensing Your World.

About the Cover: Several technologically exciting products are featured. From top to bottom are the Trican pressure, temperature and relative humidity sensor—our industrial fluid/fuel properties sensor—a new stainless steel, hermetic pressure sensor for HVAC and rugged environments—the 3801A accelerometer for HUMS applications—a robust temperature sensor—front/back view of a 24-bit altimeter and our patented Piezo Film used in tamper, traffic and dynamic measurement applications.
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<td>Photo Optic</td>
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</tbody>
</table>
Measurement Specialties offers competitive programs for high volume automotive sensors using our TS16949 certified facilities in France, Germany and China. We understand the rigors and demands of on- and off-road vehicles used in the trucking, commercial vehicle, construction, agriculture, forestry and mining markets. Our sensors are manufactured to exacting specifications to tolerate the high temperature, vibration, shock, pressure and long life requirements for these working vehicles.

**Auto Braking System**
Pressure sensor is used in Electronic Stability Control systems to detect and measure applied brake pedal pressure to distinguish between normal and panic braking.

**Fluid Quality Monitoring**
Fluid property sensors directly monitor the key characteristics of oils, fuels and urea. They detect harmful contaminants and fluid condition in order to improve vehicle up-time and performance. Urea concentration and quality monitoring supports proper operation of urea SCR systems to insure NOx emissions compliance.

**Temperature Monitoring**
Stand alone or combined with other sensors, Measurement Specialties offers the largest range of temperature probes based on NTC, RTD Platinum or Nickel and Thermopile.

**Engine Control**
Humidity and temperature sensors are located at the air intake of internal combustion engines. The sensors are key components in systems designed to improve fuel efficiency and reduce emissions.
Vehicle

Sensors for Engine and Vehicle applications are RoHS compliant and are matched with applications to ensure appropriate ingress protection is designed into every product. Signal outputs are provided with protection against EMI/RFI interference and cable interfacing specified to reduce risk of failure due to fatigue or accident. Selection of all materials of construction and fittings are done carefully to minimize installation and routine inspection costs.

Electronic Braking
Tilt sensors measure inclination of vehicle and automatically apply parking brake.

Oil and Fuel Levels
Stand alone or combined with temperature and/or fluid quality sensors, Measurement Specialties’ level sensors are designed for off-highway, gear box, transmission, and tank applications.

Off-Road Mobile Hydraulics Control
Linear position and pressure sensors are used to provide open and closed loop control of electro-hydraulic systems for monitoring valve and actuator as well as hydraulics for articulating components.

Fogging Prevention and Cabin Energy Control
Humidity and temperature sensors are used to prevent windshield fogging, critical for safety, cabin comfort and energy management.
Medical

Measurement Specialties has proven capabilities supplying to the OEM medical marketplace that include applications for life-sustaining, implantable medical devices. We are FDA registered for medical device manufacturing and ISO 13485 certified. We work closely with our customers to pioneer the use of sensor technology in medical equipment, devices and probes. This technology is used for the diagnosis or treatment of many pathologies including heart disease, high blood pressure, respiratory illness, renal failure and sleep apnea.

Patient Monitoring
FDA-registered reusable and disposable temperature and pulse oximetry (SpO2) probes continuously monitor patient core body temperature, pulse, and blood oxygen saturation. Pressure sensors provide continuous, intravenous blood pressure measurement while MEAS piezo sensing technology is used to measure breathing patterns and patient movement.

Respiratory Devices
Temperature, humidity, pressure, and flow sensors are used to provide precise feedback for inspired, expired, and tank/wall-supplied gases in respiratory devices including sleep therapy (CPAP), oxygen concentrators, and critical care and anesthesia ventilators. Our sensors improve patient comfort and device accuracy and reliability.

Cardiovascular devices
Temperature and vibration sensors are used for invasive cardiac monitoring, cardiac rhythm management, angioplasty, and ventricular assist devices (VAD).

Infusion and Syringe Pumps
Pressure, Force and Position sensors are used to detect occlusions, medication bag voids and flow rates.

Pulse Oximeter
Photo Optic sensors provide continuous, non-invasive measurements of blood oxygen saturation.
General OEM/Industry

Measurement Specialties supports OEM customers in many industries; including Industrial, Consumer and Commercial. Our engineered sensing solutions meet the unique requirements of a wide variety of applications within the building products, HVAC, refrigeration, energy, process control, automation, altitude & depth measurements and beverage flow control markets. Our broad technology portfolio and willingness to customize make us the sensor supplier of choice for industrial OEMs. From VAV/HVAC to process control, pool and spa to gas pumps, we understand the need for sensors designed to meet challenging OEM specifications.
Consumer Goods and Home Appliance

Navigation
Height measurement based on a miniature barometric pressure sensor enables route profile calculation and logging for outdoor and recreational personal navigation devices. Difference in height measurements together with acceleration measurement are used in automotive after-market GPS to provide dead-reckoning in the absence of a GPS signal, such as in tunnels or urban canyons.

Sport Watches
Water depth for diving is accurately measured by gel-filled digital pressure sensors. Rate of ascent and descent can be accurately measured and used in conjunction with the appropriate gas mixture algorithm to ensure optimal diver safety and enjoyment. Altimeter watches use barometric pressure variation for height measurement and longer trend pressure trends for weather prediction—such as, warning of an approaching storm.

Personal Flight Instruments
Variometers measure rate of ascent and descent during flight as well as altitude based on barometric pressure. Micro-altimeter sensors form the heart of these instruments for use in aircraft, soaring and balloon flights.

Cycle Computers
Altimeters based on barometric pressure sensors enable measurement of route profiles and contribute to energy monitoring and fitness estimation.

Consumer Goods
Sensors are being used in a variety of consumer and recreational products to bring enhanced functionality and safety. Measurement Specialties has partnered with many manufacturers to break new ground in offering features and user benefits. Those devices are often selected due to their low power consumption.
Home Appliance
Sensors are increasingly being used by the home appliance industry to improve functionality and energy management. Measurement Specialties has partnered with many major appliance manufacturers to break new ground in the creation of “smart” appliances that can respond to human touch, sense vibration, adjust automatically to different loads and improve efficiency.

Refrigerator
Humidity control inside refrigerator keeps vegetables fresh while humidity monitoring outside refrigerator improves efficiency by avoiding costly defrost cycles.

Printers
The drying process of ink jet printers is improved by monitoring air and paper humidity content. Measuring air and toner humidity guarantees print quality in laser printers/copiers.

Washer/Dryer
Low cost/low power vibration sensor measures load imbalance to avoid “walking”. Humidity or thermopile sensors are used in dryers to automatically shut off when clothes are dry, extending the life of clothes and improving efficiency.

Dehumidifier
Humidity and temperature measurement improves air quality.

Cooking System
Measurement Specialties long-life, high-temperature oven probe operates to 700°C. Its high accuracy optimizes cooking control while protecting users.

Microwave Oven
Measurement Specialties infra-red temperature sensors monitor heating functions by directly sensing food temperature.

Home Appliance
Measurement Specialties partners with many major appliance manufacturers to break new ground in the creation of “smart” appliances that can respond to human touch, sense vibration, adjust automatically to different loads and improve efficiency.
Aircraft Flight Test
Aircraft manufacturers are constantly pushing the flight envelope of their designs to the new frontier. Unexpected test parameters become the norm rather than the exception, and standard off-the-shelf solutions are usually inadequate. These mission-critical test applications often require the best in DC accelerometers, load cells, and miniature pressure transducers, especially when it comes to thermal stability. Measurement Specialties has partnered with many major aerospace suppliers on customized solutions, breaking new ground in sensor developments in terms of reliability and time to market.

Motorsport
In auto racing, sensors provide real-time, critical feedback about vehicle dynamics to the engineering team that can often affect the outcome of a race. The high vibration and temperature test environments in an engine or drive train have always been challenging for typical sensing devices. Measurement Specialties has long been a favored supplier to Formula One teams for acceleration, pressure, force and other dynamic sensors. We offer the most advanced lines of accelerometer and pressure transducers and back it up with impeccable reliability records and customer service.
Safety Testing
A five-star-rated vehicle can only be designed when the test engineers have accurate crash test data. Measurement Specialties is the largest sensor supplier for auto safety testing, supplying high quality accelerometers and other sensor types to car manufacturers, dummy suppliers, and private and government test facilities worldwide. Applying our state-of-the-art MEMS and bonded gage technologies, we lead the way in product innovations and customer satisfaction.

Automotive Design & Test
From engine and transmission development to vehicle NVH testing, sensors are an integral part of the research and development cycle. Measurement Specialties provides the automotive industry with pressure transducers, load cells, accelerometers, LVDT’s, torque meters, temperature sensors, and fluid property analyzers for a wide variety of applications. The broad spectrum of sensing technologies available at our disposal has served our customers especially well in a cost-conscious economic environment.
Aerospace

Long development cycles and high qualification costs require aerospace firms to identify stable, reliable, cost-effective partners. Measurement Specialties’ AS9100 certified facilities in Virginia, Ohio, France and China support various Tier 1, 2 and 3 providers with a wide variety of critical sensor solutions for aerospace applications.

Satellite/Space
Measurement Specialties is the only sensor company who maintains both NASA and ESA qualifications. We developed the interchangeable glass encapsulated thermistor which today is a standard for aerospace hi-reliability applications. MEAS LVDT’s are used for mirror and antenna positioning.

Load Path Monitoring
Custom force load pins monitor secondary load path engagement in electro-mechanical flight control systems.

Gearbox Monitoring
MEAS high frequency accelerometers are used for critical Health and Usage Monitoring Systems (HUMS) for Helicopters.

Flight Controls/Instrumentation
MEAS LVDT’s and RVDT’s for cockpit controls and actuation systems. Flight recorders to detect loss of cabin pressure. Pitot tubes for air speed measurement. Variometers to indicate rate of ascent/descent.

Fuel Tank Level/Flow
MEAS custom glass thermistor/heater assemblies are an industry standard in fuel systems used to monitor and control fuel level, position and flow.

Engine Thrust Reverser
MEAS rugged LVDT’s provide feedback to the cockpit to ensure thrust reversers have properly deployed.

Load Path Monitoring
Custom force load pins monitor secondary load path engagement in electro-mechanical flight control systems.

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Combination Sensors

Measurement Specialties is a global innovator in the design and manufacture of two or more sensing technologies into one compact package. Our combination sensors provide OEMs and end-users with significant cost savings that start with the initial purchase and flow through their respective systems, as they realize economies of time, reduced space requirements and simpler assembly processes.

**Trican**
Multi-parameter modules measure pressure, temperature and relative humidity for engine management applications.

**Force and Torque**
The multi-axial FN7325 measures force along three axes as well as the corresponding torque.

**Pressure and Temperature**
Combined pressure and temperature sensing saves weight, space and reduces plumbing and electrical connections in various auto racing, aerospace and industrial applications.

**Fluid Property Sensor**
Novel fluid property sensor that directly and simultaneously measures the viscosity, density, dielectric constant and temperature of fluids for advanced fluid quality monitoring applications.

**HUMAF**
Various combined airflow, pressure, humidity and temperature modules. Fully calibrated sensor for accurate medical, home appliance and HVAC applications.
Measurement Specialties leads the industry with a wide array of standard and custom pressure products ranging from board level components to fully amplified and packaged transducers, based on piezoresistive microelectromechanical (MEMS) and silicon strain gauge (Microfused™) technology. Our products measure pressure ranging from inches of water (<5 mbar) to 30,000 psi (>2 kbar), making us ideally suited for medical, HVAC, off-road/heavy equipment and general industrial applications. We manufacture the world’s lowest power and smallest package pressure sensors for altimeter/NAV applications. Our sensors are signal conditioned, calibrated over temperature, and include digital or analog outputs. Customized packaging and electronics make MEAS the supplier of choice for OEMs.
### Silicon Die and Microstructures

**For OEM Applications**

![Silicon Die and Microstructures Image]

#### Unique Features
- Piezoresistive pressure die
- Silicon-pyrex construction
- Open bridge

#### Linearity
- ±0.1% FSO
- ±0.25% FSO
- ±0.05% FSO
- ±0.05% FSO (MS7121A)

#### Output / Span
- ±100 mV @ 1.5 mA
- ±125 mV @ 5 V
- ±125 mV @ 5 V
- ±150 mV @ 5 V

#### Pressure Range
- 0-2, 5, 10, 15, 30, 50, 250, 500 psi
- 0-50, 1000 psi (35, 70 bar)
- 0-1, 2, 7, 12, 18, 28, 36 bar
- 0-50 mbar (MS7305)
- 0-100 mbar (MS7310)

#### Overpressure
- 5X
- 5X
- 5X
- 5X

#### Operating Temp
- -40°C to 125°C
- -40°C to 85°C
- -40°C to 125°C
- -40°C to 125°C

#### Dimensions (mm)
- 3.0 x 4.0
- 3.3 x 3.3
- 1.35 x 1.79
- 1.95 x 1.63

#### Typical Apps
- Process control, automation, refrigeration
- Can be packaged in an isolated oil filled transmitter for harsh media.
- Tire pressure, High common-mode pressure industrial sensors, Altimeters & Variometers
- Braking systems, transmission systems, engine controls
- Heating ventilation & Air conditioning, medical, industrial controls

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### Disposable Medical Products

**mV Outputs**

All use piezoresistive silicon technology.

#### 1620, 1630

<table>
<thead>
<tr>
<th>Package</th>
<th>Invasive blood pressure monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Gage</td>
</tr>
<tr>
<td>Pressure Range</td>
<td>-30 to 300 mmHg</td>
</tr>
<tr>
<td>Output / Span</td>
<td>5 uV/V/mmHg</td>
</tr>
<tr>
<td>Unique Features</td>
<td>Low cost, disposable design, Supplied in tape and reel, Compliant to AAMI spec</td>
</tr>
<tr>
<td>Accuracy</td>
<td>1.0% FSO</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>10°C to 40°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>1620: 8.13 x 11.43 x 4.20, 1630: 5.08 x 12.7 x 3.94</td>
</tr>
</tbody>
</table>

| Typical Apps | Disposable blood pressure, surgical procedures, ICU, kidney dialysis machines, medical instrumentation |

#### Fully Assembled 1620 (Customized per customer specification)

Invasive blood pressure monitoring Gage

-30 to 300 mmHg

5 uV/V/mmHg

- Low cost, disposable design
- Compliant to AAMI spec
- ISO13485 Certified
- Custom designs available

1.0% FSO

10°C to 40°C

42.8 x 30.3 x 19.0

Disposable blood pressure, kidney dialysis machines, surgical procedures and intensive care units.

Ready to use, fully assembled disposable sensor units with cable, connector, stop cock, flush device in a plastic housing.
Board Mounted Pressure Sensors

All use piezoresistive silicon die technology and are suitable for non-corrosive gases.

<table>
<thead>
<tr>
<th>Package</th>
<th>13, 23, 33, 43, 17, 27, 37, 47</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>TO-8</td>
</tr>
<tr>
<td>Gage, Absolute, Differential</td>
<td></td>
</tr>
<tr>
<td>Pressure Range</td>
<td>0-1, 2, 5, 10, 15, 30, 50, 100, 250 psi</td>
</tr>
<tr>
<td>Output / Span</td>
<td>100 mV typical</td>
</tr>
<tr>
<td>Unique Features</td>
<td>Temperature compensated</td>
</tr>
<tr>
<td>High performance UltraStable die (17, 27, 37, 47)</td>
<td></td>
</tr>
<tr>
<td>Can gel fill for humid conditions</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.1% Non-linearity</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>Ø 11.4, height model dependent</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Medical instruments, air flow measurement, HVAC, process control, factory automation, leak detection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Package</th>
<th>50</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>TO-5</td>
</tr>
<tr>
<td>Absolute</td>
<td></td>
</tr>
<tr>
<td>Pressure Range</td>
<td>0-15, 30, 50, 100, 250, 500 psi</td>
</tr>
<tr>
<td>Output / Span</td>
<td>60 mV typical</td>
</tr>
<tr>
<td>Unique Features</td>
<td>Temperature compensated</td>
</tr>
<tr>
<td>High performance UltraStable die (17, 27, 37, 47)</td>
<td></td>
</tr>
<tr>
<td>Can gel fill for humid conditions</td>
<td></td>
</tr>
<tr>
<td>Low cost</td>
<td></td>
</tr>
<tr>
<td>Solid state reliability</td>
<td></td>
</tr>
<tr>
<td>Good for through hole</td>
<td></td>
</tr>
<tr>
<td>Compensated</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.25% Non-linearity</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>Ø 8.2 x 4.14</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Tire pressure sensor, consumer appliances, medical instruments, barometric pressure, altitude measurement</td>
</tr>
</tbody>
</table>

Board Level with mV Output

All use piezoresistive silicon die technology and are suitable for use with non-corrosive gases.

<table>
<thead>
<tr>
<th>Package</th>
<th>12, 20, 1230, 1240</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>8 pin DIL</td>
</tr>
<tr>
<td>Gage, Absolute, Differential</td>
<td></td>
</tr>
<tr>
<td>Pressure Range</td>
<td>0-5 &amp; 10&quot; H2O</td>
</tr>
<tr>
<td>0-1, 2, 5, 15, 30, 50, 100 psi</td>
<td></td>
</tr>
<tr>
<td>Output / Span</td>
<td>50mV &amp; 100mV typical</td>
</tr>
<tr>
<td>Unique Features</td>
<td>Temperature compensated</td>
</tr>
<tr>
<td>High performance UltraStable die (1230, 1240)</td>
<td></td>
</tr>
<tr>
<td>Current excitation (1210, 1230)</td>
<td></td>
</tr>
<tr>
<td>Voltage excitation (1220, 1240)</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.1% Non-linearity</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>Ø 11.4, height model dependent</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Medical instruments, air flow measurement, HVAC, process control, factory automation, leak detection</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Package</th>
<th>MS4415, MS4416, MS4425, MS4426</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>6 pin DIL</td>
</tr>
<tr>
<td>Gage, Absolute, Differential</td>
<td></td>
</tr>
<tr>
<td>Pressure Range</td>
<td>0-2, 4, 5, 10, 20, 30&quot; in H2O (MS4415, MS4416)</td>
</tr>
<tr>
<td>0-1, 5, 15, 30, 50, 100, 150, 300 psi (MS4425, MS4426)</td>
<td></td>
</tr>
<tr>
<td>Output / Span</td>
<td>60mV, 90mV, &amp; 100mV typical</td>
</tr>
<tr>
<td>Unique Features</td>
<td>Temperature compensated</td>
</tr>
<tr>
<td>High performance UltraStable die (MS4425, MS4426)</td>
<td></td>
</tr>
<tr>
<td>Low pressure (MS4415, MS4416)</td>
<td></td>
</tr>
<tr>
<td>Voltage excitation</td>
<td></td>
</tr>
<tr>
<td>Accuracy</td>
<td>±0.1% Non-linearity</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-25°C to 85°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>20.3 x 13.7</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Drop-in for 6 pin industrial sensor for PCB mounted medical, HVAC</td>
</tr>
</tbody>
</table>
### Board Mounted Pressure Sensors

**Miniature Board Level with mV Output**

All use piezoresistive silicon die technology and are suitable for use with non-corrosive gases.

<table>
<thead>
<tr>
<th>MS1451, MS1471</th>
<th>MS52xx, MS54xx</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Surface Mount</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Gage, Absolute</td>
</tr>
<tr>
<td><strong>Pressure Range</strong></td>
<td>0-5, 15, 30, 50, 100, 250, 500 psi</td>
</tr>
<tr>
<td><strong>Output / Span</strong></td>
<td>60 mV typical</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Low cost</td>
</tr>
<tr>
<td></td>
<td>- Coarse calibrated at room temp (MS1471)</td>
</tr>
<tr>
<td></td>
<td>- With gel to protect against moisture</td>
</tr>
<tr>
<td></td>
<td>- Tube or hole</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.25% Non-linearity</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>7.6 x 7.6, height model dependent</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Altitude measurement, barometric pressure, medical instrumentation, consumer appliances, tire pressure</td>
</tr>
</tbody>
</table>

### Board Level Amplified/Digital High Level Output Modules

<table>
<thead>
<tr>
<th>MS55xx</th>
<th>MS58xx</th>
<th>MS5536-PJU, MS5536-NJU</th>
<th>MS4525, MS4525DO</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Unique Features</strong></td>
<td>16-bit digital sensor, very low noise (±0.1 mbar), software calibration and temperature compensation, pressure and temperature measurement (35 ms / meas.). Low power, low voltage (2.2 to 3.6 V / &lt;4/0.1 μA). No external components required, Small SMD ceramic carrier. Gel provides water protection.</td>
<td>24-bit digital sensor, software calibration and temperature compensation (I²C &amp; SPI), no external components 1.8 to 3.6 V</td>
<td>Ratiometric analog output (MS4525P), I²C, SPI (MS4525DO), Single supply of either 3.3 or 5.0 Vdc. Small profile with Barbled Ports. J lead or Thru hole pins</td>
</tr>
<tr>
<td><strong>Linearity / Absolute accuracy</strong></td>
<td>±1.5 mbar @ 25°C 750 to 1100 mbar (MS5534, MS5540) -25 to +20 mbar @ 0°C to 40°C 0 to 5 bar (MS5535, MS5541)</td>
<td>±1 mbar @ 25°C (MS5803-01BA)</td>
<td>0.25% / 1% TEB</td>
</tr>
<tr>
<td><strong>Output / Span</strong></td>
<td>Digital 16-bit data word, 3-wire SPI like serial interface</td>
<td>Digital 24-bit 3-wire SPI or I²C protocol (MS4525DO)</td>
<td>0.5 to 4.5 V or 0.25 to 4.75 V (MS4525) 14-bit digital word SPI or I²C protocol (MS4525DO)</td>
</tr>
<tr>
<td><strong>Resolution</strong></td>
<td>0.1 mbar (MS5534, MS5540) 1.2 mbar (MS5535, MS5541)</td>
<td>12 μbar (MS5803-01BA)</td>
<td>0.1 mbar (MS4525DO-1 psi)</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Absolute</td>
<td>Absolute</td>
<td>Gage, Absolute, Differential, Compound</td>
</tr>
<tr>
<td><strong>Pressure Range</strong></td>
<td>10 to 1100 mbar (MS5534, MS5540) 0 to 14 bar (MS5535, MS5541)</td>
<td>1, 2, 5, 14, 30 bar</td>
<td>0-1, 5, 15, 30, 50, 150 psi</td>
</tr>
<tr>
<td><strong>Overpressure</strong></td>
<td>10 bar (for 1 bar modules) 30 bar (for 14 bar modules)</td>
<td>10 bar (for 1 &amp; 2 bar modules) 30 bar (for 5 &amp; 14 bar modules) 50 bar (for 30 bar modules)</td>
<td>10 bar</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-40°C to 85°C</td>
<td>-40°C to 85°C</td>
<td>-40°C to 85°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>6.4 x 6.2 x 2.88</td>
<td>6.4 x 6.2 x 2.9</td>
<td>6.4 x 10.16 x 10.6</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Mobile altimeter, barometer systems, weather monitoring systems, adventure or multi-mode watches, GPS receivers, diving computers and divers’ watches</td>
<td>Precision altimeter, altimeter, diving and multi-mode watches, in-building navigation, variometers / flight instruments</td>
<td>Medical instruments, air flow measurements, process control, leak detection</td>
</tr>
</tbody>
</table>
### MS5701

**Unique Features**
- 24-bit digital sensor
- Software calibration and temperature compensation (I²C & SPI)
- No external components
- Pressure and temperature measurement

**Linearity / Absolute accuracy**
0.3% of span / ±0.25 mbar @ 25°C

**Output / Span**
Digital 24-bit

**Resolution**
1 mbar (MS5701-05MG)

**Pressure**
±5 to ±50 mbar / ±2" to ±20" H₂O gage
±2.5 to 25 mbar / 1" to 10" H₂O gage

**Overpressure**
2 bar

**Operating Temp**
-40°C to 85°C

**Dimensions (mm)**
13 x 10 x 7

**Typical Apps**
HVAC (heating ventilation and air conditioning), respirators / ventilators, CPAP / sleep apnea instruments, variometers / flight instruments

### MS5740, MS5750

**Unique Features**
- Ratiometric analog interface (MS5740)
- I²C, SPI (MS5750)
- Supply voltages ranges 1.8 to 5V
- No external components
- Pressure and temperature measurement

**Linearity / Absolute accuracy**
0.3% of span / ±0.25 mbar @ 25°C

**Output / Span**
Ratiometric 0.25 to 4 V (MS5740)
Digital 24-bit (MS5750)

**Resolution**
1 mbar (MS5750-05MG)

**Pressure**
±5 to ±50 mbar / ±2" to ±20" H₂O gage
±2.5 to 25 mbar / 1" to 10" H₂O gage

**Overpressure**
2 bar

**Operating Temp**
-40°C to 85°C

**Dimensions (mm)**
33 x 25 x 20

**Typical Apps**
HVAC (heating ventilation and air conditioning), respirators / ventilators, CPAP / sleep apnea instruments, variometers / flight instruments

### MS4515, MS4515DO

**Unique Features**
- Ratiometric analog output (MS4515)
- I²C, SPI (MS4515DO)
- Single supply of either 3.3 or 5.0 Vdc
- No external components
- Pressure and temperature measurement

**Linearity / Absolute accuracy**
0.25% / 1% TEB

**Output / Span**
0.5 to 4.5 V or 0.25 to 4.75 V (MS4515)
14-bit digital word SPI or I²C protocol (MS4515DO)

**Resolution**
1 μbar (MS5701-05MG) 1 μbar (MS5750-05MG)

**Type**
Differential

**Pressure**
+5 to +50 mbar / +2" to +20" H₂O gage
±2.5 to 25 mbar / 1" to 10" H₂O gage

**Overpressure**
2 bar

**Operating Temp**
-40°C to 85°C

**Dimensions (mm)**
9.9 x 12.5

**Typical Apps**
Medical instruments, air flow measurements, process control, leak detection

---

### Ultra Small Digital Output Modules

#### MS5561

**Unique Features**
- 16-bit digital sensor
- Software calibration and temperature compensation (SPI like)
- Pressure and temperature measurement (35 ms / meas.)

**Linearity / Absolute accuracy**
±1.5 mbar @ 25°C

**Output / Span**
Digital 16-bit

**Resolution**
0.1 mbar

**Type**
Absolute

**Pressure Range**
10 to 1100 mbar

**Overpressure**
5 bar

**Operating Temp**
-40°C to 85°C

**Dimensions (mm)**
4.25 x 4.75 x 1.6

**Typical Apps**
Personal navigation devices, barometric compensation, cycle computers

#### MS56xx

**Unique Features**
- 24-bit digital sensor
- Software calibration and temperature compensation (I²C & SPI)
- No external components
- Pressure and temperature measurement

**Linearity / Absolute accuracy**
±1 mbar @ 25°C (MS5607-01BA)

**Output / Span**
Digital 24-bit

**Resolution**
12 μbar (MS5607-01BA)

**Type**
Absolute

**Pressure Range**
10 to 1200 mbar

**Overpressure**
10 bar

**Operating Temp**
-40°C to 85°C

**Dimensions (mm)**
3 x 5 x 1.6

**Typical Apps**
Smart phones, barometric compensation, air density compensation
Stainless Steel Media-Isolated Pressure Sensors

**O-Ring Mount**

All use UltraStable piezoresistive silicon die technology in a stainless steel package with oil-filled diaphragm and are suitable for use with liquids and gases. For other material like Hastelloy, Titanium etc. Please contact factory.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Pressure Range</th>
<th>Output / Span</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>82, 154N</td>
<td>Gage, Absolute</td>
<td>0-1, 5, 15, 30, 50, 100, 300, 500 psi</td>
<td>100 mV typical</td>
<td>High performance, high stability for OEM applications</td>
<td>±0.3% Non-linearity (1 psi) ±0.2% Non-linearity (5 psi) ±0.1% Non-linearity (≥15 psi)</td>
<td>-40°C to 125°C</td>
<td>82: Ø 19 x 6.35 154N: Ø 19 x 13.72</td>
<td>Process control, oceanography, refrigeration/ compressors, pressure transmitters, level systems</td>
</tr>
<tr>
<td>85 Flush Mount</td>
<td>Gage, Absolute</td>
<td>0-15, 30, 50, 100, 300, 500 psi</td>
<td>100 mV typical</td>
<td>High performance, high stability for OEM applications</td>
<td>±0.3% Non-linearity (1 psi) ±0.25% Non-linearity (≥15 psi)</td>
<td>-20°C to 125°C</td>
<td>Ø 17.2 x 11.43</td>
<td>Filter blockage, pressurized tank level, flow transmitters</td>
</tr>
</tbody>
</table>

**Type**

- Modular design
- High pressure, modular design

**Accuracy**

- ±0.25% Non-linearity

**Dimensions (mm)**

- 82: Ø 19 x 6.35
- 154N: Ø 19 x 13.72
- 85: Ø 22.23 x 25.15

**Typical Apps**

- Process control, oceanography, refrigeration/ compressors, pressure transmitters, level systems
- Hydraulic controls, process control, oceanography/ refrigeration/ compressors, pressure transmitters, level systems
- Level measurement, OEM transmitter and transducers, process control

**Threaded/ Weldable**

All use UltraStable piezoresistive silicon die technology in a stainless steel package with oil-filled diaphragm and are suitable for use with liquids and gases. For other material like Hastelloy, Titanium etc. Please contact factory.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Pressure Range</th>
<th>Output / Span</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>82, 85 with Fittings</td>
<td>Gage, Absolute</td>
<td>0-1, 5, 15, 30, 50, 100, 300, 500 psi</td>
<td>100 mV typical</td>
<td>Modular design</td>
<td>±0.2% Non-linearity (5 psi) ±0.1% Non-linearity (≥15 psi)</td>
<td>-40°C to 125°C</td>
<td>82: Ø 22.23 x 24.89 85: Ø 22.23 x 25.15</td>
<td>Medical, process control, refrigeration compressor, oceanography, level systems</td>
</tr>
<tr>
<td>87N, 89 Button</td>
<td>Sealed Gage, Absolute</td>
<td>0-1000, 3000, 5000 psi</td>
<td>100 mV typical</td>
<td>High pressure, modular design</td>
<td>±0.25% Non-linearity</td>
<td>-40°C to 125°C</td>
<td>87N: Ø 9.53 x 7.11 89: Ø 9.04 x 7.42</td>
<td>Medical, process control, refrigeration compressor, oceanography</td>
</tr>
<tr>
<td>89 with Fittings</td>
<td>Sealed Gage, Absolute</td>
<td>0-1000, 3000, 5000 psi</td>
<td>100 mV typical</td>
<td>High pressure, modular design</td>
<td>±0.25% Non-linearity</td>
<td>-40°C to 125°C</td>
<td>Air tank pressure, hydraulics, process control, robotics, refrigeration compressors, oceanography</td>
<td></td>
</tr>
</tbody>
</table>

**DP86 O-ring Mount**

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Pressure Range</th>
<th>Output / Span</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>86</td>
<td>Gage, Absolute</td>
<td>0-1, 5, 15, 30, 50, 100, 150 psi</td>
<td>0.5-4.5 Vdc</td>
<td>Small diameter, amplified output</td>
<td>±0.25% FSO</td>
<td>-20°C to 85°C</td>
<td>Ø 15.9 x 9.3, height model dependent</td>
<td>Level measurement, OEM transmitter and transducers, process control</td>
</tr>
<tr>
<td>86A Amplified</td>
<td>Gage</td>
<td>0-1, 2, 5, 15, 30, 50, 100, 150 psi</td>
<td>- Bar ranges available</td>
<td>Wet/Wet differential pressure</td>
<td>±0.25% Non-linearity</td>
<td>-20°C to 85°C</td>
<td>Ø 15.9 x 9.3, height model dependent</td>
<td>Level measurement, OEM transmitter and transducers, process control</td>
</tr>
</tbody>
</table>

**Accuray**

- ±0.2% Non-linearity (1 psi)
- ±0.1% Non-linearity (≥15 psi)

**Dimensions (mm)**

- 86: Ø 22.23 x 23.62
- 86A Amplified: Ø 22.23 x 23.62
- DP86 O-ring Mount: Ø 22.23 x 23.62

**Typical Apps**

- Medical, process control, refrigeration compressor, oceanography, level systems
- Medical, process control, refrigeration compressor, oceanography, level systems
- Filter blockage, pressurized tank level, flow transmitters

**Threaded/ Weldable**

All use UltraStable piezoresistive silicon die technology in a stainless steel package with oil-filled diaphragm and are suitable for use with liquids and gases. For other material like Hastelloy, Titanium etc. Please contact factory.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Pressure Range</th>
<th>Output / Span</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>87N, 89 Button</td>
<td>Sealed Gage, Absolute</td>
<td>0-1000, 3000, 5000 psi</td>
<td>100 mV typical</td>
<td>High pressure, modular design</td>
<td>±0.25% Non-linearity</td>
<td>-20°C to 125°C</td>
<td>Ø 22.23 x 23.62</td>
<td>Medical, process control, refrigeration compressor, oceanography</td>
</tr>
<tr>
<td>89 with Fittings</td>
<td>Sealed Gage, Absolute</td>
<td>0-1000, 3000, 5000 psi</td>
<td>100 mV typical</td>
<td>High pressure, modular design</td>
<td>±0.25% Non-linearity</td>
<td>-20°C to 125°C</td>
<td>Ø 22.23 x 23.62</td>
<td>Medical, process control, refrigeration compressor, oceanography</td>
</tr>
<tr>
<td>DP86 with Fittings</td>
<td>5/8” (16 mm) diameter fitting mount</td>
<td>Differential</td>
<td>100 mV typical</td>
<td>- Wet/Wet differential pressure</td>
<td>±0.3% Non-linearity (1 psi) ±0.25% Non-linearity (5 psi) ±0.1% Non-linearity (≥15 psi)</td>
<td>-20°C to 125°C</td>
<td>55.88 x 26.67 x 25.4</td>
<td>Filter blockage, pressurized tank level, flow transmitters</td>
</tr>
</tbody>
</table>

**Accuracy**

- ±0.2% Non-linearity (5 psi) ±0.1% Non-linearity (≥15 psi)

**Dimensions (mm)**

- 87N, 89 Button: Ø 22.23 x 23.62
- 89: Ø 22.23 x 23.62
- DP86 with Fittings: Ø 22.23 x 23.62

**Typical Apps**

- Air tank pressure, hydraulics, process control, robotics, refrigeration compressors, oceanography
- Air tank pressure, hydraulics, process control, robotics, refrigeration compressors, oceanography
- Filter blockage, pressurized tank level, flow transmitters

**Threaded/ Weldable**

All use UltraStable piezoresistive silicon die technology in a stainless steel package with oil-filled diaphragm and are suitable for use with liquids and gases. For other material like Hastelloy, Titanium etc. Please contact factory.
## Transducers & Transmitters

### Base Level and Custom Transducers and Transmitters

**Microfuse™ and UltraStable™ Technologies**

<table>
<thead>
<tr>
<th><strong>MSP100, MSP120</strong></th>
<th><strong>MSP300, MSP340</strong></th>
<th><strong>M5100, US100, DS100</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Small housing with O-ring and proprietary “Snap in” feature that lowers the total installed cost and customized housings for OEM applications.</td>
<td>Industrial stainless steel housing with a large selection of threaded fittings, electrical connectors, cable options and customized housings for T&amp;M applications.</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Gage</td>
<td>Gage, Sealed Gage, Absolute (US100)</td>
</tr>
<tr>
<td><strong>Pressure Range</strong></td>
<td>0-50 psi thru 0-500 psi</td>
<td>Differential wet-wet (DS100)</td>
</tr>
<tr>
<td><strong>Output / Span</strong></td>
<td>100 mV typical</td>
<td>0-50 psi thru 0-30K psi (M5100)</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Microfuse™ Technology, Low cost stainless steel isolated transducer, No threads needed for pressure connect, Highly customized for OEM application, Small size, Solid state reliability.</td>
<td>- Microfuse™ Technology, UltraStable™ technology (US100, DS100), High performance at a low cost, Solid state reliability, 1% Total error band (-20°C to 85°C all possible errors combined) (M5100, DS100), 0.75% Total error band (-20°C to 85°C all possible errors combined) (US100), Line pressure max 1000 lbs. (DS100).</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>0.5% FSO</td>
<td>0.25% FSO (M5100, DS100), 0.1% FSO (US100)</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>0°C to 55°C</td>
<td>-40°C to 125°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>12.7 x 24.38 x 20.32</td>
<td>M5100: 22.23 x 22.23 x 80.77</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Beverage dispensing systems, automation, HVAC controls, energy and water management, pumps, compressors, pneumatic equipment.</td>
<td>HVAC controls, energy and water management, pumps, compressors, pneumatic equipment, off road heavy equipment, agriculture equipment.</td>
</tr>
<tr>
<td><strong>Agency Approvals</strong></td>
<td></td>
<td>CE, UL 508</td>
</tr>
</tbody>
</table>

---

**US300**

- Small housing with a large selection of threaded fittings, electrical connectors, cable options and customized housings for OEM applications.
- Gage, Absolute
- Pressure Range: 0-5 psi thru 0-5K psi
- Output / Span: 0-100 mV, 0.5-4.5 Vdc, 1-5 Vdc, 4-20 mA
- Unique Features: UltraStable™ Technology, High reliability at a low cost, Highly customized for OEM applications, Small size, Solid state reliability, Various total error band choices 0.75% thru 3% typical (all possible errors combined)
- Accuracy: 0.15% FSO
- Operating Temp: -40°C to 105°C
- Dimensions (mm): 15.88 x 115.88 x 98.00
- Typical Apps: HVAC controls, refrigeration, energy and water management, pumps, compressors, pneumatic equipment, agriculture equipment.

**M7100, U7100**

- Stainless steel hermetic pressure ports and integral electrical connector.
- Gage (M7100), Gage, Absolute (U7100)
- Pressure Range: 0-100 psi thru 0-30K psi (M7100)
- Operating Temp: -40°C to 125°C
- Dimensions (mm): 26.7 x 26.7 x 50.0
- Typical Apps: HVAC refrigeration controls, off road vehicles engine control, compressors, hydraulic, energy & water management.

**US10000**

- Environmentally protected stainless steel housing with a large selection of threaded fittings, electrical connectors, cable options and customized housings for OEM applications.
- Gage, Absolute
- Pressure Range: 0-5 V, 0-10 V, 4-20 mA
- Unique Features: UltraStable™ Technology, High accuracy, Digitally compensated, Pressure calibration standard, IP66 Rated, 0.05% Accuracy, 0.25% Total Error Band from -25°C to 85°C
- Accuracy: 0.1% FSO
- Operating Temp: -25°C to 85°C
- Dimensions (mm): 25.4 x 25.4 x 104.65
- Typical Apps: Aerospace testing, calibration, high end machinery, automotive, industry.
Transducers & Transmitters

Miniature Pressure Transducers

**Unique Features**
- Dynamic & passive output
- Miniature threaded
- All-Titanium, flush diaphragm
- Bonded silicon gage, high frequency response (to 750 KHz)
- Optional integrated amplifier

**Non Linearity**
±0.25% to ±0.5% FSO

**Hysteresis**
±0.25% FSO

**Output / Span**
- 30 - 100 mV (4 V, 5 V optional)

**Pressure Range**
- 0-15, 30, 75, 150, 300, 500, 750, 1500 psi

**Overpressure**
- 2X to 5X

**Compensated Temp Range**
- -40°C to 120°C standard

**Operating Temp**
- 20°C to 80°C

**Dimensions (mm)**
- Hex 8 to Hex 15

**Typical Apps**
- Mil-Aero, hydraulic pressure systems, air bag testing, air pressure systems, depth measurements, engine inlet and turbine, biomedical fluid sample analysis equipment

**Accuracy**
- ±0.1% through 0.2% FSO ±0.3% F.S.

**Pressure Systems**
- Gage & Absolute

**Type**
- Gage & Absolute

**Output / Span**
- 0-5 Vdc, 0-10 Vdc, 4-20 mA

**Unique Features**
- High overpressure & shock rated
- Mechanical over pressure stops
- Compensation / calibration
- Advanced digital transducer (P9000)
- Heavy Industrial grade
- Shock & vibration resistant (10X over pressure)

**Operating Temp**
- -40°C to 120°C

**Dimensions (mm)**
- 3.2 to 7 outside diameter

**Typical Apps**
- Aerospace testing, wind tunnels, biomedical testing, aircraft body and wing dynamics, high frequency measurements

**Agency Approvals**
- CE, CENELEC (Intrinsically Safe)

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Transducers & Transmitters

Sub-Miniature Pressure Transducers

**Unique Features**
- High temperature operation
- Miniature threaded
- Recessed silicon diaphragm
- High temperature compensation / calibration
- Heavy Industrial grade
- Shock & vibration resistant (10X over pressure)

**Combining Non-linearity & Hysteresis**
- ±0.3 to ±0.5% FSO

**Output / Span**
- 2X to 3X

**Pressure Range**
- 0-15, 30, 75, 150, 1500 psi

**Compensated Temp Range**
- -40°C to 125°C (other temp ranges optional)

**Operating Temp**
- -40°C to 125°C

**Dimensions (mm)**
- Hex 11 to Hex 18

**Typical Apps**
- Severe environment where small size is required: aerospace, racing, engine performance, gear box pressure, oil pressure, cooling system pressure, brake pressure

**Agency Approvals**
- CE, CENELEC (Intrinsically Safe)
Measurement Specialties is a pioneer in the design and manufacture of precision sensors for electro-mechanical flight control applications, test & measurement applications and ultra-low cost OEM load cells for high volume applications. We are experts in developing sensors that require high performance or unique packaging.

Based on our proprietary piezoresistive silicon strain gauge (Microfused™) technology our OEM load cells combine outstanding durability and long-term stability in extremely low cost packages, perfectly suited for medium and high volume applications.

Our flight-qualified sensors monitor secondary load path engagement, and supply real time information from primary flight control forces to the Flight Data Recorder (Black Box). Other applications include force feedback for autopilot automatic disconnect function and flap jam detection systems.

MEAS’ OEM and T&M load cells are tailored for specific customer applications including custom packaging and electronics with analog or digital outputs, suited for both low and high force environments.
Load Cells
Low cost: OEM

**FX1901-0001**
- **Package**: Low profile “coin cell” design
- **Operating Mode**: Compression
- **Unique Features**:
  - Ultra low cost, low strain design
  - Essentially unlimited cycle life
- **Ranges (Lbf)**: 10, 25, 50, 100
- **Max Overload**: 2.5X
- **Output / Span**: 100 mV
- **Combined Linearity & Hysteresis**: ±1.0% FSO
- **Operating Temp**: -40°C to 85°C
- **Dimensions (mm)**: Ø 25.00 x 29.50 x 8.00
- **Typical Apps**: Consumer OEM, exercise machines, physical therapy, vending machines, appliances, pumps, medical devices

**FS20**
- **Unique Features**:
  - Load cell design operates at very low strains
  - Not subject to lead die fatigue
- **Ranges N (Lbf)**: 1.5, 3
- **Max Overload**: 10 lb.
- **Output / Span**: 1.0 to 4.0 V
- **Non Linearity**: ±1.0% FSO
- **Hysteresis**: ±1.0% FSO
- **Operating Temp**: 0°C to 70°C
- **Dimensions (mm)**: 30.708 x 17.272 x 8.255
- **Typical Apps**: Infusion pumps, contact sensing, medical devices, consumer appliances

**FC22**
- **Plastic housing, button, flange mounting**
- **Operating Mode**: Compression
- **Unique Features**:
  - Low cost button shape
  - Essentially unlimited cycle life
- **Ranges**: 25, 50, 100
- **Max Overload**: 2.5X
- **Output / Span**: 100 mV, 0.5 to 4.5 Vdc
- **Non Linearity**: ±1.0% FSO
- **Hysteresis**: ±1.0% FSO
- **Operating Temp**: -40°C to 85°C
- **Dimensions (mm)**: Ø 26.00 x 42.00 x 19.50
- **Typical Apps**: Infusion pumps, robotics end-effectors, exercise machines, contact sensing, appliances

**FC23**
- **Stainless steel housing button shape for higher weight loads**
- **Operating Mode**: Compression
- **Unique Features**:
  - Industry standard low profile all stainless steel design
  - Resistant to off-axis loads.
- **Ranges**: 250, 500, 1000, 2000
- **Max Overload**: 1.5X and 2.5X
- **Output / Span**: 100 mV
- **Non Linearity**: ±1.0% FSO
- **Hysteresis**: ±1.0% FSO
- **Operating Temp**: -40°C to 85°C
- **Dimensions (mm)**: Ø 31.75 x 10.20
- **Typical Apps**: Batch weighing, robotics, assembly line force, printing presses, pumps, winch & hoist

Load Cells
Test and Measurement

**ELPF**
- **Package**: Dual Stud
- **Operating Mode**: Tension and Compression
- **Unique Features**:
  - Low Cost
  - High immunity to off axis loads
  - Low deflection design for fast response and high cycle life
  - Optional external amplifier module
  - NIST traceable calibration provided
- **Ranges N (Lbf)**: 50 to 2.5K (10 to 500)
- **Max Overload**: 2.5X F.S.
- **Output/Span**: 100 mV (0.5-4.5 V optional)
- **Non Linearity**: ±0.25% F.S.
- **Hysteresis**: ±0.25% F.S.
- **Operating Temp**: -40°C to 120°C (-40°F to 248°F)
- **Dimensions (mm)**: T1 Ø 19.00 x 25.40
  - T2 Ø 25.40 x 29.10
  - T3 Ø 25.40 x 33.16
- **Typical Apps**: Research, materials test, medical instrumentation, physical therapy, weighing, thrust, biomechanical measurements, product validation test

**ELFF**
- **Unique Features**:
  - Load cell design operates at very low strains
  - Not subject to lead die fatigue
- **Ranges N (Lbf)**: 50 to 500 (10 to 100)
- **Max Overload**: 2.5X F.S.
- **Output/Span**: 100 mV (0.5-4.5 V optional)
- **Non Linearity**: ±0.5% F.S.
- **Hysteresis**: ±0.5% F.S.
- **Operating Temp**: -40°C to 120°C (-40°F to 248°F)
- **Dimensions (mm)**: B4 Ø 12.70 x 4.05
  - B2 Ø 12.70 x 16.35
  - T4 Ø 12.70 x 22.80
- **Typical Apps**: Robotics and effectors, dental and biomechanical parameter measurements, satellite and aerospace force feedback

**ELAF**
- **Package**: Button
- **Operating Mode**: Compression
- **Unique Features**:
  - Low Cost
  - Small, Low Profile Design
  - Low Off-Axis Response
  - Essentially Unlimited Life Cycle
  - NIST traceable calibration provided
- **Ranges N (Lbf)**: 25 to 10K (5 to 2K)
  - 1.5X to 2X F.S.
  - 100 mV (0.5-4.5 V optional)
  - ±0.25% F.S.
  - ±0.25% F.S.
- **Operating Temp**: -40°C to 120°C (-40°F to 248°F)
- **Dimensions (mm)**: B0 Ø 12.70 x 9.53
  - B2 Ø 31.75 x 11.20
  - B3 Ø 38.10 x 18.00
- **Typical Apps**: Theatrical rigging loads, assembly forces, weighing, thrust measurements, product validation testing
Load Cells

Test and Measurement

**XFC200R**
- Package: Small diameter load button
- Operating Mode: Compression
- Unique Features: - High stiffness - High overload capacity - Static and dynamic
- Ranges N (Lbf): 2 to 10K (0.4 to 2K)
- Max Over-range: 2 to 4X F.S.
- Output/Span: 100 mV
- Non Linearity: $\leq 0.5\%$ F.S.
- Hysteresis: $\leq 0.5\%$ F.S.
- Optimal operating Temp: $-40^\circ C$ to $150^\circ C$ (-40°F to 302°F)
- Dimensions (mm): Ø 10 to Ø 16
- Typical Apps: Material test, measuring tools, robotics and effectors

**XFL212R**
- Package: Low profile load button
- Operating Mode: Compression
- Unique Features: - Extremely flat - Integrated load button - Small diameter
- Ranges N (Lbf): 5 to 500 (1 to 100)
- Max Over-range: 2X F.S.
- Output/Span: 100 mV
- Non Linearity: $\leq 0.5\%$ F.S.
- Hysteresis: $\leq 0.5\%$ F.S.
- Optimal operating Temp: $-40^\circ C$ to $150^\circ C$ (-40°F to 302°F)
- Dimensions (mm): Ø 12.5 x 3.5
- Typical Apps: Dental and biomechanical, surface mount assembly system, production validation test

**XFL225D**
- Through hole
- Package: Compression
- Unique Features: - Strain relief spring - Very flat - Static and dynamic
- Ranges N (Lbf): 10 to 5K (2 to 1K)
- Max Over-range: 2X F.S.
- Output/Span: 100 mV
- Non Linearity: $\leq 0.5\%$ F.S.
- Hysteresis: $\leq 0.5\%$ F.S.
- Optimal operating Temp: $-40^\circ C$ to $150^\circ C$ (-40°F to 302°F)
- Dimensions (mm): Ø 25
- Typical Apps: Bolt loads, tool forces, biomechanical force measurement

**XFTC300 Series**
- Package: Low/high capacity dual stud
- Operating Mode: Tension and Compression
- Unique Features: - High stiffness - High overload capacity - Threaded male/female fitting
- Ranges N (Lbf): 2 to 2K (0.4 to 400)
- Max Over-range: 2X to 4X F.S.
- Output/Span: 100 mV
- Non Linearity: $\leq 0.5\%$ F.S.
- Hysteresis: $\leq 0.5\%$ F.S.
- Optimal operating Temp: $-40^\circ C$ to $150^\circ C$ (-40°F to 302°F)
- Dimensions (mm): Application Dependent
- Typical Apps: Material test, tool forces, robotics and effectors

Load Cells

Standard

**ELHM, ELHS**
- Package: High capacity dual stud or button style
- Operating Mode: Tension and Compression
- Unique Features: - Tension and compression or compression only - High stability metal foil strain gage (ELHM) - High output semiconductor strain gage (ELHS) - NIST traceable calibration provided
- Ranges N (Lbf): 1K to 50K (200 to 10K)
- Max Over-range: 1.5X F.S.
- Output/Span: 10 mV (ELHM), 200 mV FSO (ELHS)
- Non Linearity: 0.3% to 0.5% FSO
- Hysteresis: Combined with Linearity
- Optimal operating Temp: $-50^\circ C$ to $120^\circ C$ (ELHM), $-50^\circ C$ to $80^\circ C$ (ELHS)
- Dimensions (mm): Application Dependent
- Typical Apps: Robust general purpose, low deflection design: machine tool, linkage forces

**FN3002**
- Package: Very high capacity dual stud
- Operating Mode: Tension and Compression
- Unique Features: - Threaded male fitting - Integrated amplifier - Optional rod end
- Ranges N (Lbf): 10K to 2,000K (2K to 400K)
- Max Over-range: 1.5X F.S.
- Non Linearity: $\pm 20$ mV (4 V; $\pm 5$ V optional)
- Hysteresis: $\pm 0.25$% F.S.
- Optimal operating Temp: $-40^\circ C$ to $150^\circ C$ (-4°F to 302°F)
- Dimensions (mm): Application Dependent
- Typical Apps: Assembly forces, tool force, offshore

**FN2420**
- Package: Very high capacity load button
- Operating Mode: Compression
- Unique Features: - High stiffness - Optional load button - Optional high level output module
- Ranges N (Lbf): 20K to 5,000K (4K to 1,000K)
- Max Over-range: 1.5X F.S.
- Output/Span: 20 mV (4 V; 5 V)
- Non Linearity: $\pm 0.1\%$ F.S.
- Hysteresis: $\pm 0.1\%$ F.S.
- Optimal operating Temp: Application Dependent
- Dimensions (mm): Application Dependent
- Typical Apps: Calibration presses, robotics and effectors, laboratory and research

**FN1010**
- Package: Load pin design
- Operating Mode: Tension and Compression
- Unique Features: - Keyed antirotation slot - Bidirectional available - Optional watertight construction
- Ranges N (Lbf): 10K to 2,000K (2K to 400K)
- Max Over-range: 1.5X F.S.
- Non Linearity: $\pm 20$ mV (4 V; $\pm 5$ V; 4-20 mA optional)
- Hysteresis: $\pm 1$% F.S.
- Optimal operating Temp: $-20^\circ C$ to $80^\circ C$ (-4°F to 176°F)
- Dimensions (mm): Application Dependent
- Typical Apps: Crane monitoring, offshore, load-limited devices
## Load Cells

### S-Beam Standard

<table>
<thead>
<tr>
<th>Package</th>
<th>Operating Mode</th>
<th>Unique Features</th>
<th>Ranges N (Lbf)</th>
<th>Max Over-range</th>
<th>Output/Span</th>
<th>Non Linearity</th>
<th>Hysteresis</th>
<th>Optional operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN3030</td>
<td>Tension and Compression</td>
<td>Optional rod ends, S-beam technology, Low cost</td>
<td>50 to 100K (10 to 20K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S.</td>
<td>Combined with Linearity</td>
<td>-40°C to 150°C (-40°F to 302°F)</td>
<td>Application Dependent</td>
<td>Laboratory and research, process control, robotics and effectors</td>
</tr>
<tr>
<td>FN3060</td>
<td>Tension and Compression</td>
<td>Very low range, S-beam technology</td>
<td>250 to 2.5K (50 to 500)</td>
<td>1.5X F.S.</td>
<td>±15 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S.</td>
<td>Combined with Linearity</td>
<td>-40°C to 120°C (-40°F to 248°F)</td>
<td>50 x 25 x 60</td>
<td>Test bed, dynamic fatigue testing, robotics and effectors</td>
</tr>
<tr>
<td>FN3280</td>
<td>Tension and Compression</td>
<td>Very high accuracy, Mechanical stops</td>
<td>1 to 5 (0.2 to 1)</td>
<td>40X to 100X F.S.</td>
<td>±10 to 20 mV</td>
<td>±0.1% F.S.</td>
<td>Combined with Linearity</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>Application Dependent</td>
<td>Product validation tests, medical instruments, weighing</td>
</tr>
<tr>
<td>FN3148</td>
<td>Tension and Compression</td>
<td>High resolution, S-beam technology</td>
<td>10 to 2K (2 to 400)</td>
<td>5X to 100X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.05% F.S.</td>
<td>Combined with Linearity</td>
<td>-40°C to 120°C (-40°F to 248°F)</td>
<td>Application Dependent</td>
<td>Product validation tests, medical instruments, weighing</td>
</tr>
<tr>
<td>FN7110</td>
<td>Dual S-beam range</td>
<td>High resolution, Double range</td>
<td>10/100 to 1K/10K (2/20 to 200/2K)</td>
<td>1.2X F.S. of the higher range</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S. of each range</td>
<td>Combined with Linearity</td>
<td>-40°C to 120°C (-4°F to 248°F)</td>
<td>60 x 30 x 100</td>
<td>Product validation tests, process control, robotics and effectors</td>
</tr>
</tbody>
</table>

### Low profile and Pan-Cake

<table>
<thead>
<tr>
<th>Package</th>
<th>Operating Mode</th>
<th>Unique Features</th>
<th>Ranges N (Lbf)</th>
<th>Max Over-range</th>
<th>Output/Span</th>
<th>Non Linearity</th>
<th>Hysteresis</th>
<th>Optional operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN3050</td>
<td>Compression</td>
<td>High stiffness, 1.5X over-range</td>
<td>20K to 320K (4K to 64K)</td>
<td>1.5X F.S.</td>
<td>±15 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S.</td>
<td>Combined with Linearity</td>
<td>-40°C to 150°C (-40°F to 302°F)</td>
<td>Ø70 x 25</td>
<td>Robotics, process control, blot clamping for bridges</td>
</tr>
<tr>
<td>FN3000</td>
<td>Tension and Compression</td>
<td>Connector or cable gland output, Same housing all ranges, Optional high level output</td>
<td>100 to 20K (20 to 4K)</td>
<td>1.5X F.S. (10X F.S. with stops)</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S.</td>
<td>±0.1% F.S.</td>
<td>-40°C to 150°C (-40°F to 302°F)</td>
<td>107 x 25 x 35</td>
<td>Regulation, laboratory and research, robotics</td>
</tr>
<tr>
<td>FN3042</td>
<td>Pan-Cake</td>
<td>High stability, Aluminum or stainless steel, Optional high level output</td>
<td>10K to 1000K (2K to 200K)</td>
<td>1.5X F.S.</td>
<td>±15 mV (4 V; ±5 V optional)</td>
<td>±0.1% F.S.</td>
<td>±0.1% F.S.</td>
<td>-40°C to 150°C (-40°F to 302°F)</td>
<td>Ø70 x 25 x 35</td>
<td>Static fatigue tests, weighing calibration, robotics</td>
</tr>
<tr>
<td>FN7325</td>
<td>Custom Design/Ranges on request</td>
<td>Multiaxial Force and Torque, Measures Load/Toque in 3 directions, Fatigue rated, Minimal cross effects</td>
<td>5K to 500K (1K to 100K)</td>
<td>2X F.S.</td>
<td>±100 to 150 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>±0.1% F.S.</td>
<td>-40°C to 120°C (-4°F to 176°F)</td>
<td>Ø70 x 25 x 35</td>
<td>Aerospace test bed, dynamic fatigue tests, robotics and effectors</td>
</tr>
</tbody>
</table>
**Torque Meters**

Reaction and Rotary

<table>
<thead>
<tr>
<th>Package</th>
<th>Operating Mode</th>
<th>Unique Features</th>
<th>Ranges Nm (Lbf-ft)</th>
<th>Max Over-range</th>
<th>Output/Span</th>
<th>Combined Non Linearity &amp; Hysteresis</th>
<th>Optional operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>CS1060</td>
<td>Square male coupling</td>
<td>Reaction</td>
<td>±5 to ±7K (±4 to ±5.6K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>-20°C to 100°C (-4°F to 212°F)</td>
<td>Application Dependent</td>
<td>Non-rotating parts torque measurement, robotics and effectors, laboratory and research</td>
</tr>
<tr>
<td>CS1120</td>
<td>Keyed shaft connections</td>
<td>Reaction</td>
<td>±5 to ±2.5K (±4 to ±2K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>-20°C to 100°C (-4°F to 212°F)</td>
<td>Application Dependent</td>
<td>Non-rotating parts torque measurement, robotics and effectors, laboratory and research</td>
</tr>
<tr>
<td>CS1210</td>
<td>Collar mechanical fittings</td>
<td>Reaction</td>
<td>±160 to ±10K (±128 to ±8K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>-40°C to 150°C (-40°F to 302°F)</td>
<td>Application Dependent</td>
<td>Non-rotating parts torque measurement, robotics and effectors, laboratory and research</td>
</tr>
<tr>
<td>CD1050</td>
<td>Square male couplings</td>
<td>Dynamic Rotary</td>
<td>±5 to ±7K (±4 to ±5.6K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>Application Dependent</td>
<td>Engine efficiency, robotics and effectors, laboratory and research</td>
</tr>
<tr>
<td>CD1095</td>
<td>Keyed shaft connections</td>
<td>Dynamic Rotary</td>
<td>±5 to ±2.5K (±4 to ±2K)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V; ±5 V optional)</td>
<td>±0.25% F.S.</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>Application Dependent</td>
<td>Engine efficiency, process control equipment, laboratory and research</td>
</tr>
</tbody>
</table>

**Load Cells**

Automotive Sensors

<table>
<thead>
<tr>
<th>Package</th>
<th>Operating Mode</th>
<th>Unique Features</th>
<th>Ranges N (Lbf)</th>
<th>Max Over-range</th>
<th>Output/Span</th>
<th>Non Linearity</th>
<th>Hysteresis</th>
<th>Optional operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>FN4070 - FN4080</td>
<td>Seat Belt Buckle Sensor</td>
<td>Tension</td>
<td>250 to 50K (50 to 10K)</td>
<td>1.5X F.S.</td>
<td>±15 mV</td>
<td>±0.5% F.S.</td>
<td>Combined with Linearity</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>Application Dependent</td>
<td>Auto crash testing, tension at the belt receptacle</td>
</tr>
<tr>
<td>FN2317</td>
<td>Hand brake</td>
<td>Compression</td>
<td>500 to 1K (100 to 200)</td>
<td>1.5X F.S.</td>
<td>±20 mV (4 V optional)</td>
<td>±0.5% F.S.</td>
<td>Combined with Linearity</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>100 x 20 x 15</td>
<td>Hand brake, test bed</td>
</tr>
<tr>
<td>FN2114 - FN2570</td>
<td>Brake pedal</td>
<td>Compression</td>
<td>200 to 3K (40 to 600)</td>
<td>1.5X F.S.</td>
<td>±15 mV</td>
<td>±0.5% F.S.</td>
<td>Combined with Linearity</td>
<td>-20°C to 80°C (-4°F to 176°F)</td>
<td>Application Dependent</td>
<td>Brake pedal, clutch pedal, test bed</td>
</tr>
</tbody>
</table>
**Automotive Sensors**

**FN7080**
- Gear Stick design
- Operating Mode: Multi-axial
- Unique Features:
  - Measures force in three directions
  - Replaces gear knob
  - Ease of mounting

Ranges N (Lbf)
- 50 to 500 (10 to 100)
- 10 to 200 Nm (7 lbf-ft to 150 lbf-ft)
- 5K & 15K (1000 & 3200)

Max Over-range
- 1.2X F.S.
- ±10 V
- ±0.1% F.S.
- Combined with Linearity

Output/Span
- -20°C to 80°C (-4°F to 176°F)
- Ø 25 (0.98) spherical

Non Linearity
- <±0.3% F.S.
- ±0.1% F.S.
- Combined with Linearity

Hysteresis
- ±0.1% F.S.
- ±20°C to 80°C (-4°F to 176°F)

Dimensions (mm)
- Ø 195 x 50
- Ø 25 (0.98) spherical

Typical Apps
- Change gear force measurement, roughness of material
- On car road test, truck and buses steering test, armored vehicles steering test

**FCA7300**
- Steering Wheel adaptable
- Operating Mode: Multi-sensing
- Unique Features:
  - Dual Torque / Angle range
  - Steering velocity measurement
  - Fits all road vehicles

Ranges N (Lbf)
- 10 to 200 Nm (7 lbf-ft to 150 lbf-ft)
- 10X F.S.
- ±10 V
- ±0.1% F.S.
- Combined with Linearity

Max Over-range
- ±10 V
- ±0.1% F.S.
- ±20°C to 80°C (-4°F to 176°F)

Output/Span
- ±10 V dc or 4-20 mA with option
- ±15 bits, 20 sample/sec
- 10°C to 60°C (14°F to 140°F)

Non Linearity
- ±0.1% F.S.
- 0°C to 50°C (32°F to 122°F)
- 96 x 48 x 60

Hysteresis
- ±0.1% F.S.
- 0°C to 50°C (32°F to 122°F)
- 96 x 48 x 155

Dimensions (mm)
- 96 x 48 x 155
- High bandwidth test bed display, monitoring, laboratory and research, process control equipment

**EL20-S458**
- Special purpose design optimized for automotive crash test environments
- Operating Mode: Signal conditioning for Wheatstone bridge sensors
- Unique Features:
  - Suited for 1 to 4 strain gage sensors
  - 120 to 10000 Ohm bridge impedance
  - ±10 V Analogue or 0/4-20 mA current output
  - ±10 Vdc , ±15 bits, 20 sample/sec
  - 11 point scaling
  - Plug-in option boards

Ranges N (Lbf)
- Application Dependent

Max Over-range
- Application Dependent

Output/Span
- ±10 Vdc or 4-20 mA with option

Non Linearity
- ±0.1% F.S.

Hysteresis
- ±10 Vdc or 4-20 mA with option

Dimensions (mm)
- 99 x 17.5 x 112
- Test stands power plants, manufacturing systems, test and measurement, test bed regulation, automat interfaces

**Electronics / Displays**

**ARD154**
- Operating Mode: Signal conditioning for wheatstone bridge sensors
- Unique Features:
  - Suited for 1 to 4 strain gage sensors
  - 120 to 10000 Ohm bridge impedance
  - ±10 V Analogue or 0/4-20 mA current output
  - ±10 Vdc , ±15 bits, 20 sample/sec
  - 11 point scaling
  - Plug-in option boards

Ranges N (Lbf)
- ±10 V max: 4-20 mA or 0-20 mA

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 99 x 17.5 x 112
- Test stands power plants, manufacturing systems, test and measurement, test bed regulation, automat interfaces

**M2 10**
- Operating Mode: Signal conditioning and display meter
- Unique Features:
  - Analog output: ±10 V
  - 0°C to 50°C (32°F to 122°F)
  - 96 x 48 x 155

Ranges N (Lbf)
- ±10 Vdc or 4-20 mA with option

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 96 x 48 x 155
- High bandwidth test bed display, monitoring, laboratory and research, process control equipment

**M905**
- Operating Mode: Signal conditioning and display meter
- Unique Features:
  - Suited for process or strain gauge type sensors
  - 5 digits: -19999 to 19999
  - Front panel programming
  - 11 point scaling
  - Plug-in option boards

Ranges N (Lbf)
- ±10 Vdc or 4-20 mA with option

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 96 x 48 x 60
- Display on test bed, monitoring, laboratory and research

**ARD154**
- Operating Mode: Signal conditioning for wheatstone bridge sensors
- Unique Features:
  - Suited for 1 to 4 strain gage sensors
  - 120 to 10000 Ohm bridge impedance
  - ±10 V Analogue or 0/4-20 mA current output
  - ±10 Vdc , ±15 bits, 20 sample/sec
  - 11 point scaling
  - Plug-in option boards

Ranges N (Lbf)
- ±10 V max: 4-20 mA or 0-20 mA

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 99 x 17.5 x 112
- Test stands power plants, manufacturing systems, test and measurement, test bed regulation, automat interfaces

**M2 10**
- Operating Mode: Signal conditioning and display meter
- Unique Features:
  - Analog output: ±10 V
  - 0°C to 50°C (32°F to 122°F)
  - 96 x 48 x 155

Ranges N (Lbf)
- ±10 Vdc or 4-20 mA with option

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 96 x 48 x 155
- High bandwidth test bed display, monitoring, laboratory and research, process control equipment

**M905**
- Operating Mode: Signal conditioning and display meter
- Unique Features:
  - Suited for process or strain gauge type sensors
  - 5 digits: -19999 to 19999
  - Front panel programming
  - 11 point scaling
  - Plug-in option boards

Ranges N (Lbf)
- ±10 Vdc or 4-20 mA with option

Max Over-range
- ±10 Vdc or 4-20 mA with option

Output/Span
- ±10 Vdc or 4-20 mA with option

Accuracy
- ±10 Vdc or 4-20 mA with option

Optional operating Temp
- 10°C to 60°C (14°F to 140°F)

Dimensions (mm)
- 96 x 48 x 60
- Display on test bed, monitoring, laboratory and research
Measurement Specialties is the market leader in temperature measurement. We manufacture precision NTC thermistors, RTD components, thermocouples, thermopiles, and customized probe assemblies. Building on over 100 years of experience, we put to use our unique know-how to cover the largest range of temperature measurement, control and compensation applications in the industry. We offer the widest selection of products to meet the specific demands of temperature sensing OEM applications, including medical, aerospace, automotive, instrumentation appliances, and HVAC. Our long, extensive and successful experience supporting industries with very high quality and service expectations, as well as aggressive cost competitiveness, make Measurement Specialties the number one choice for your application.
### NTC Thermistor and Nickel RTD Components

<table>
<thead>
<tr>
<th><strong>NTC</strong></th>
<th><strong>Thermistor chips</strong></th>
<th><strong>Thermistor SMDs</strong></th>
<th><strong>Leaded Thermistors</strong></th>
<th><strong>Space Qualified (Hi-Rel)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Leadless Chips</td>
<td>SMD 0402, 0603, 0805</td>
<td>Radial, axial, beads</td>
<td>Radial, bead, custom</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Gold or Silver plated</td>
<td>Surface mounted</td>
<td>Epoxy or glass coated</td>
<td>Epoxy, glass, probes</td>
</tr>
<tr>
<td><strong>Resistance Range</strong></td>
<td>100 to 1MΩ</td>
<td>40 to 500kΩ</td>
<td>100 to 1MΩ</td>
<td>1kΩ to 100kΩ</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Wire bonding compatible</td>
<td>- End band SMD</td>
<td>- Interchangeable</td>
<td>- ESA and NASA approved</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±1% to 10%</td>
<td>±1% to 10%</td>
<td>- Moisture resistant</td>
<td>- High reliability and accuracy</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>-40°C to 125°C</td>
<td>-40°C to 125°C</td>
<td>- Stability</td>
<td>0.25% to 20%</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>1 x 1 x 0.25</td>
<td>0402: 1 x 0.5 x 0.7</td>
<td>-55°C to 280°C</td>
<td>0.5% to 10%</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Temperature compensation</td>
<td>Temperature compensation, PCB mounting temperature measurement</td>
<td>Temperature sensing for OEM, automotive, medical, HVAC, etc…</td>
<td>Instrumentation and compensation for aerospace applications</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>RTD</strong></th>
<th><strong>Nickel-RTD SMD</strong></th>
<th><strong>Glass Wire Wound Sensors</strong></th>
<th><strong>Ceramic Wire Wound Sensors</strong></th>
<th><strong>Thin Film Sensors</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>SOT 23</td>
<td>GO, GX</td>
<td>CWW600, CWW850, CWW1000</td>
<td>TFC, TFS, TFHT</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Surface mounted</td>
<td>Glass rod, radial leads</td>
<td>Ceramic rod, radial leads</td>
<td>Thin-film platinum deposited on ceramic substrate, glass coated, radial leads</td>
</tr>
<tr>
<td><strong>Resistance Range</strong></td>
<td>1kΩ</td>
<td>100Ω, (2x100Ω on few versions)</td>
<td>100Ω, (2x100Ω on few versions)</td>
<td>100Ω, 500Ω, 1000Ω</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Harsh environment compatible</td>
<td>- Aggressive environments (acid, oil, solvent…)</td>
<td>- High temperature</td>
<td>- Small dimensions</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>Class B according DIN 43760</td>
<td>Class W0.3, W0.15, W0.1 according IEC60751</td>
<td>Class W0.3, W0.15, W0.1 according IEC60751</td>
<td>Class F0.6, F0.3, F0.15, F0.1 according IEC60751</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>-55°C to 160°C</td>
<td>-200°C to 400°C</td>
<td>-200°C to 600°C (CWW600)</td>
<td>-200°C to 150°C (F0.6)</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>2.1 x 2.5 x 2.1</td>
<td>Ø 1.8 / Length 5mm to Ø 4.5 / Length 48mm</td>
<td>Ø 1.5 / Length 8 mm to Ø 4.5 / Length 30 mm to Ø 2.7 / Length 45 mm (CWW860)</td>
<td>Width 0.8 to 2.5 mm</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Automotive, compensation, OEM</td>
<td>Oil &amp; chemical industry, aviation, aeronautic, food industry</td>
<td>Process industry, laboratories, reference sensors</td>
<td>OEM, automotive, aerospace, medical</td>
</tr>
</tbody>
</table>
## Probe Assemblies

<table>
<thead>
<tr>
<th><strong>Ring Probe</strong></th>
<th><strong>Push-in Probe</strong></th>
<th><strong>Screw-In Probe</strong></th>
<th><strong>Pipe Clamp Probe</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Ring for surface assembly</td>
<td>Brass, copper or stainless steel closed-end tube</td>
<td>Plastic housing with metal insert, integrated connector</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Epoxy potted</td>
<td>Sensitive element potted into housing and cable prolongation or connection head</td>
<td>Overmolded or epoxy potted</td>
</tr>
<tr>
<td><strong>Sensor Range</strong></td>
<td>NTC, Pt, Ni sensor</td>
<td>NTC, Pt, Ni sensor</td>
<td>NTC, Pt sensor</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Surface mount temperature sensing</td>
<td>- Corrosion resistant</td>
<td>- Different pipe diameters available</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>- Custom tolerances available (NTC)</td>
<td>- Custom tolerances available (NTC)</td>
<td>- Custom tolerances available (NTC)</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>-40°C to 150°C</td>
<td>-40°C to 260°C</td>
<td>-40°C to 105°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>Ring hole dia. From 3 to 5 (custom dimensions available)</td>
<td>Custom lengths and diameters available</td>
<td>Custom diameters available</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Surface plates, heat exchangers, and fluid pumping systems</td>
<td>Boiler, liquid, HVACR, Industrial processes control, district heating/cooling, automotive</td>
<td>Pipe surface temperature sensing, HVACR</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Over Molded Probe</strong></th>
<th><strong>Patient Monitoring Probe</strong></th>
<th><strong>TLH Reference Probe</strong></th>
<th><strong>Flexible Surface Probe</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>PVC or TPE</td>
<td>Sensor with cable and connector</td>
<td>SP683</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Overmolded</td>
<td>Reusables &amp; disposables</td>
<td>Flexible Silicone moulding</td>
</tr>
<tr>
<td><strong>Sensor Range</strong></td>
<td>NTC, Pt sensor</td>
<td>400 Series, 700 Series</td>
<td>CPE option: silicone moulding on cable</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Mounting clips available</td>
<td>- Autoclave reusables</td>
<td>GAL option: rigid aluminium protection</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>- Custom tolerances available (NTC)</td>
<td>- Sterile disposables</td>
<td>Pt100 sensor</td>
</tr>
<tr>
<td><strong>Operating Temp.</strong></td>
<td>-40°C to 125°C</td>
<td>EN-12470 ± 0.1°C 25 to 45°C</td>
<td>- Stability</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>8 x 30, 6.5 x 25, 6 x 50, 6 x 5 x 15</td>
<td>Lab -40°C to 100°C, patient 0°C to 50°C</td>
<td>- Provide with calibration report option: calibration certificat by national committe for accreditation (COFRAC)</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>HVACR, industrial processes control</td>
<td>Reusables 3 m</td>
<td>Pt100 sensor</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Small thickness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>- Curved surface radius ≥25 mm</td>
</tr>
</tbody>
</table>

### Typical Apps

- HVACR, industrial processes control
- Laboratory, temperature sensors calibration by comparison
- Laboratory, temperature sensors calibration by comparison
- Chemical and pharmaceutical industry, process industry, laboratory, aerospace
** Probe Assemblies **

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Sensor Range</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>TPE / CPME</td>
<td>T01 / T11 / Spike / Profile / C01 / C06</td>
<td>Pt100 sensor</td>
<td>- Dielectric strength 3 KV (TPE), 5 KV (CPME)</td>
<td>Class B, A according to IEC60751</td>
<td>-20°C to 180°C</td>
<td>- 150 x 8 x 2 (TPE) - 60 x 10 x 2, 80 x 10 x 2.3, 80 x 7.5 x 2 (CPME) - Typical cable lengths = 5, 10, 15, 25 m</td>
<td>Power plants, measurement in stator windings (alternator, motor)</td>
</tr>
<tr>
<td>- Rigid flat/slot sensor with cable prolongation</td>
<td>- High Temperature</td>
<td>- Higher dielectric strength according to Type</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Pt element encapsulated into ceramic tube, with Rigid Stainless steel housing</td>
<td>- High temperature cable and connector</td>
<td>- Bendable sheath: Mineral Insulated and alloy sheath (T01)</td>
<td>- ATEX EExi according to type</td>
<td>- OD Ø 4 mm to Ø 6 mm,</td>
<td>- OD Ø 0.3 mm to Ø 8 mm for MI</td>
<td>- Custom immersion length (from few centimeters to many meters)</td>
<td></td>
</tr>
<tr>
<td>- Easy integration/installation</td>
<td>- Custom mechanical interface</td>
<td>- Custom cable length</td>
<td></td>
<td>- Immersion length 35mm to 100mm</td>
<td>- Custom cable length</td>
<td>- Multipoints (from 1 to 6) for Profile</td>
<td></td>
</tr>
</tbody>
</table>

** Thermocouples **

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Temp. Range</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>T01 / T11 / Spike / Profile / C01 / C06</td>
<td>T01 / T11 / Spike / Profile / C01 / C06</td>
<td>Depends on applied electronics and calibration, filter types optimal for object temperature range -40°C to 300°C</td>
<td>Depends on applied electronics and calibration</td>
<td>Depends on temperature range, typical 1.5% full scale</td>
<td>Ambient temperature range: -20°C to 85°C</td>
<td>9 x 9 x 17.6</td>
<td>Medical thermometer (ear, forehead), pyrometer</td>
</tr>
<tr>
<td>- Glass sheath, standard</td>
<td>- Digital output</td>
<td>- Small field of view</td>
<td></td>
<td>Depends on temperature range, typical 2% full scale</td>
<td>Ambient temperature range: -20°C to 85°C</td>
<td></td>
<td></td>
</tr>
<tr>
<td>- High signal output</td>
<td>- Digital output</td>
<td></td>
<td></td>
<td>Ambient temperature range: -20°C to 85°C</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>- Accurate reference sensors</td>
<td>- Digital output</td>
<td>- Small field of view</td>
<td></td>
<td>Ambient temperature range: -20°C to 85°C</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

** Thermopiles **

<table>
<thead>
<tr>
<th>TS Series</th>
<th>TSEV Series</th>
<th>TSEV Series</th>
<th>TPT Series</th>
</tr>
</thead>
<tbody>
<tr>
<td>TS128-3, TS128-5, TS120-10</td>
<td>TSEV03L55</td>
<td>TSEV03L08L39</td>
<td>TPT3030V</td>
</tr>
<tr>
<td>TO-18, TO-18, TO-5</td>
<td>OEM-module</td>
<td>OEM-module</td>
<td>IP65 stainless steel tube</td>
</tr>
<tr>
<td>Thermopile sensor components</td>
<td>Single-pixel thermopile module with integrated lens</td>
<td>8-pixels-linear array thermopile module</td>
<td>Thermopile system for industrial use</td>
</tr>
<tr>
<td>Depends on applied electronics and calibration</td>
<td>Object temperature range 0°C to 300°C</td>
<td>Depends on temperature range, typical 2% full scale</td>
<td>Object temperature range 0°C to 300°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Ambient temperature range: -20°C to 85°C</td>
<td>Depends on temperature range, typical 1% full scale</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Ambient temperature range: 0°C to 85°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>111 x 17 x 17</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Contactless temperature measurement, e.g. on moving parts or heated rolls, laminators, people detection, microwave oven, air conditioner</td>
</tr>
</tbody>
</table>

** Typical Apps **

- Medical thermometer (ear, forehead), pyrometer
- Contactless temperature measurement, e.g. on moving parts or heated rolls, laminators, people detection, microwave oven, air conditioner
- Contactless temperature measurement, e.g. on moving parts or heated rolls, control of assembly lines, paper fabrication, drying applications
Based on a robust patented capacitive technology, Measurement Specialties offers a complete range of calibrated and amplified products measuring relative humidity. Accurate dew point and absolute humidity measurement are made possible through the combination of relative humidity and temperature measurement. Our products are qualified for the most demanding applications including automotive, heavy truck, aerospace and home appliance. We offer a variety of output signals including digital (frequency, $I^2C$) and analog voltage, as well as customized and proprietary output including PWM, PDM, LIN and CAN.
### Humidity and Temperature (NTC) Components

Capacitive Humidity sensors with different housings

<table>
<thead>
<tr>
<th>Component</th>
<th>Package</th>
<th>Type</th>
<th>Operating RH Range</th>
<th>Operating Temp</th>
<th>Unique Features</th>
<th>Calibration</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HS1101LF</strong></td>
<td>Through hole TO39 with side opening plastic cap</td>
<td>CapacitiveHumidity</td>
<td>0 to 100% RH</td>
<td>-60°C to 140°C</td>
<td>- Very robust and recognized component capable to withstand most of the applications in the humidity world in very cost effective conditions</td>
<td>±3% @ 55% RH; ±0.2°C @ 25°C</td>
<td>10 x 10 x 19</td>
<td>Applications requiring a robust humidity sensor in automotive, home appliance, outdoor, HVAC, consumer, printer, meteorology</td>
</tr>
<tr>
<td><strong>HTS2030SMD</strong></td>
<td>Capacitive side opening</td>
<td>Capacitive Humidity &amp; NTC Temperature</td>
<td>0 to 100% RH</td>
<td>-60°C to 140°C</td>
<td>- Very tight and controlled thermal contact between RH and T sensors allows very accurate dew point computations</td>
<td>±1 pF at 68 pF for RH; ±1% NTC for T</td>
<td>13.6 x 6 x 27</td>
<td>Applications requiring a robust humidity sensor in automotive, home appliance, outdoor, HVAC, printer, radiosondes, meteorology, weather balloon and consumer application where dew point and accurate absolute humidity computations are needed</td>
</tr>
<tr>
<td><strong>HTS2230</strong></td>
<td>Miniature surface mount SMD + PTFE membrane</td>
<td>Capacitive Humidity &amp; NTC Temperature</td>
<td>0 to 100% RH</td>
<td>-60°C to 140°C</td>
<td>- Very tight and controlled thermal contact between RH and T sensors allows very accurate dew point computations</td>
<td>±1% NTC for T</td>
<td>7.9 x 4.5 x 1.4</td>
<td>Applications requiring a robust humidity sensor in automotive, home appliance, outdoor, HVAC, consumer applications where dew point and accurate absolute humidity computations are needed</td>
</tr>
<tr>
<td><strong>HTU11</strong></td>
<td>Cost effective calibrated small component</td>
<td>Digital output component</td>
<td>0 to 100% RH</td>
<td>-40°C to 85°C</td>
<td>- PTFE filter, surface mount direct PCB soldering</td>
<td>±3% RH @ 55% RH; ±0.3°C</td>
<td>9.5 x 4.9 x 2.3</td>
<td>Humidity and temperature plug and play transducers for OEM low cost consumer applications</td>
</tr>
</tbody>
</table>

### Humidity and Temperature (NTC) Sensors

Frequency Output Systems (Digital)

<table>
<thead>
<tr>
<th>Component</th>
<th>Package</th>
<th>Type</th>
<th>Operating RH Range</th>
<th>Operating Temp</th>
<th>Unique Features</th>
<th>Calibration</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HTF3226LF</strong></td>
<td>PCB with integrated connector</td>
<td>Frequency output for RH, direct NTC for T</td>
<td>0 to 100% RH</td>
<td>-30°C to 85°C</td>
<td>- JST connector - Very cost effective</td>
<td>±5% @ 55% RH and ±0.4°C @ 25°C</td>
<td>28.5 x 15 x 9</td>
<td>Reprography, humidifier, HVAC, home appliance</td>
</tr>
<tr>
<td><strong>HTF3000LF</strong></td>
<td>PCB for Board to Board</td>
<td>Frequency output for RH, direct NTC for T</td>
<td>0 to 100% RH</td>
<td>-40°C to 110°C</td>
<td>- Voltage supply from 3 to 8 Vdc - Through hole or SMD - T&amp;R available</td>
<td>±3% RH @ 55% RH and ±0.25°C @ 25°C</td>
<td>12.5 x 18.5 x 11.2</td>
<td>Passenger comfort improvement, hygrostat, HVAC, printer</td>
</tr>
<tr>
<td><strong>HTG343xCH/PVBL/WxGy</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 85°C</td>
<td>PTFE filter - Electronics fully protected with potting material (3.3 Volt or 5 Volt) - Multiple connector choices (JST, samtec board to board through hole)</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>±3% @ 55% RH; ±0.3°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in HVAC, home appliance, printer, medical, outdoor and automotive</td>
</tr>
<tr>
<td><strong>HTG383xCH/PVBL/WxGy</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 110°C</td>
<td>PTFE filter - Electronics fully protected with potting material - Multiple connector choices (JST, samtec board to board through hole and SMD)</td>
<td>±3% RH @ 55% RH; ±0.3°C @ 25°C</td>
<td>±3% @ 55% RH; ±0.25°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in home appliance, printer, medical, humidity, automotive</td>
</tr>
<tr>
<td><strong>HTG351xCH</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 85°C</td>
<td>Electronics fully protected with potting material (3.3 Volt or 5 Volt) - Multiple connector choices (JST, samtec board to board through hole)</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in home appliance, printer, medical, humidity, automotive</td>
</tr>
</tbody>
</table>

### Humidity and Temperature (NTC) Mini-Modules

Analog Voltage

<table>
<thead>
<tr>
<th>Component</th>
<th>Package</th>
<th>Type</th>
<th>Operating RH Range</th>
<th>Operating Temp</th>
<th>Unique Features</th>
<th>Calibration</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>HTF3226LF</strong></td>
<td>PCB with integrated connector</td>
<td>Frequency output for RH, direct NTC for T</td>
<td>0 to 100% RH</td>
<td>-30°C to 85°C</td>
<td>- JST connector - Very cost effective</td>
<td>±5% @ 55% RH and ±0.4°C @ 25°C</td>
<td>28.5 x 15 x 9</td>
<td>Reprography, humidifier, HVAC, home appliance</td>
</tr>
<tr>
<td><strong>HTF3000LF</strong></td>
<td>PCB for Board to Board</td>
<td>Frequency output for RH, direct NTC for T</td>
<td>0 to 100% RH</td>
<td>-40°C to 110°C</td>
<td>- Voltage supply from 3 to 8 Vdc - Through hole or SMD - T&amp;R available</td>
<td>±3% RH @ 55% RH and ±0.25°C @ 25°C</td>
<td>12.5 x 18.5 x 11.2</td>
<td>Passenger comfort improvement, hygrostat, HVAC, printer</td>
</tr>
<tr>
<td><strong>HTG343xCH/PVBL/WxGy</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 85°C</td>
<td>PTFE filter - Electronics fully protected with potting material (3.3 Volt or 5 Volt) - Multiple connector choices (JST, samtec board to board through hole)</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>±3% @ 55% RH; ±0.3°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in HVAC, home appliance, printer, medical, outdoor and automotive</td>
</tr>
<tr>
<td><strong>HTG383xCH/PVBL/WxGy</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 110°C</td>
<td>PTFE filter - Electronics fully protected with potting material - Multiple connector choices (JST, samtec board to board through hole and SMD)</td>
<td>±3% RH @ 55% RH; ±0.3°C @ 25°C</td>
<td>±3% @ 55% RH; ±0.25°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in HVAC, home appliance, printer, medical, outdoor and automotive</td>
</tr>
<tr>
<td><strong>HTG351xCH</strong></td>
<td>Cost effective small size mini-module</td>
<td>Analog voltage RH + NTC temperature</td>
<td>0 to 100% RH</td>
<td>-40°C to 85°C</td>
<td>Electronics fully protected with potting material (3.3 Volt or 5 Volt) - Multiple connector choices (JST, samtec board to board through hole)</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>±3% RH @ 55% RH; ±0.25°C @ 25°C</td>
<td>Humidity and temperature plug and play transducers for OEM demanding applications in HVAC, home appliance, printer, medical, outdoor and automotive</td>
</tr>
</tbody>
</table>
### Humidity and Temperature (NTC) Probes

**Analog Voltage**

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Operating RH Range</th>
<th>Operating Temp</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>HM1500LF</td>
<td>Probe / RH only</td>
<td>0 to 100% RH</td>
<td>-40°C to 60°C</td>
<td>Electronics fully protected with potting material</td>
<td>±3% @ 55% RH</td>
<td>57 x 11 x 11 (standard wire length of 200 mm)</td>
<td>Medical, telecommunication cabinets, green houses, process control, industrial</td>
</tr>
<tr>
<td>HM1520LF</td>
<td>Probe / RH only</td>
<td>0 to 100% RH</td>
<td>-40°C to 60°C</td>
<td>Electronics fully protected with potting material</td>
<td>±3% @ 55% RH; ±0.25°C @ 25°C</td>
<td>57 x 11.5 x 11.5 (standard wire length of 200 mm)</td>
<td>Medical, drying cabinets, low humidity, meteorology</td>
</tr>
<tr>
<td>HTM2500LF</td>
<td>Probe RH and T</td>
<td>0 to 100% RH</td>
<td>-40°C to 80°C</td>
<td>Electronics fully protected with potting material</td>
<td>Calibrated at low humidity (10% RH)</td>
<td>86 x 11.5 x 11.5 (standard wire length of 200 mm)</td>
<td>Hygrostat, data loggers, baby cabinets</td>
</tr>
</tbody>
</table>

### OEM Humidity Modules

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>H2TG35xy*</td>
<td>Cost effective module for automotive defogging application</td>
<td>27 x 32 x YY (depending on the connector, from 6 to 10.8 mm length)</td>
<td>Fogging and cabin energy control</td>
</tr>
<tr>
<td>HTM2500B6Cy*</td>
<td>Engine probe for truck and automotive</td>
<td>70 x 64.5 x 54.5 (integrated connector)</td>
<td>Humidity and temperature engine control</td>
</tr>
<tr>
<td>HTM4300C14B8</td>
<td>Engine probe for truck and automotive</td>
<td>46.8 x 40.4 x 36.6 (integrated connector)</td>
<td>Humidity and temperature automotive engine control</td>
</tr>
</tbody>
</table>

* Please consult us for specific request
Based on rugged mass air flow sensor elements, Measurement Specialties offers complete and fully calibrated air flow plug-and-play modules designed for OEM applications where reliable and accurate measurements are needed, such as medical, home appliance and HVAC applications. A universal digital I²C compliant protocol provides an easy-to-connect interface to the main MCU controller. A simple four-pin connector allows cost effective mounting options. Optional, additional sensors are offered for combination with the mass air flow sensor, such as humidity, pressure, and temperature.

### Mass Air Flow Modules

<table>
<thead>
<tr>
<th>Package</th>
<th>Compact user friendly module. Convenient integrated connecting pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I²C digital output</td>
</tr>
<tr>
<td>Air Flow range</td>
<td>-300 to +300 SCCM&lt;sub&gt;(1)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Operating RH range</td>
<td>5 to 99 % RH</td>
</tr>
<tr>
<td>Operating temp</td>
<td>-30°C to 85°C</td>
</tr>
<tr>
<td>Unique Features</td>
<td>- Air Flow Module&lt;sub&gt;*&lt;/sub&gt;</td>
</tr>
<tr>
<td>Calibration/Accuracy</td>
<td>±(1.6%FR+0.8%FS)&lt;sub&gt;(3)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>40.3 x 38 x 10.4</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Medical industries, home appliance, HVAC</td>
</tr>
</tbody>
</table>

HUMA2703

<table>
<thead>
<tr>
<th>Package</th>
<th>Compact user friendly module. Convenient integrated connecting pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I²C digital output</td>
</tr>
<tr>
<td>Air Flow range</td>
<td>0 to 10 SLPM&lt;sub&gt;(2)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Operating RH range</td>
<td>5 to 99 % RH</td>
</tr>
<tr>
<td>Operating temp</td>
<td>-30°C to 85°C</td>
</tr>
<tr>
<td>Unique Features</td>
<td>- Air Flow Module&lt;sub&gt;*&lt;/sub&gt;</td>
</tr>
<tr>
<td>Calibration/Accuracy</td>
<td>±(1.6%FR+0.4%FS)&lt;sub&gt;(3)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>64.6 x 38.4 x 14</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Medical industries, home appliance, HVAC</td>
</tr>
</tbody>
</table>

HUMA2710

<table>
<thead>
<tr>
<th>Package</th>
<th>Compact user friendly module. Convenient integrated connecting pipe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>I²C digital output</td>
</tr>
<tr>
<td>Air Flow range</td>
<td>0 to 300 SLPM&lt;sub&gt;(2)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Operating RH range</td>
<td>5 to 99 % RH</td>
</tr>
<tr>
<td>Operating temp</td>
<td>-30°C to 85°C</td>
</tr>
<tr>
<td>Unique Features</td>
<td>- Air Flow Module&lt;sub&gt;*&lt;/sub&gt;</td>
</tr>
<tr>
<td>Calibration/Accuracy</td>
<td>±(1.6%FR+0.4%FS)&lt;sub&gt;(3)&lt;/sub&gt;</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>101.9 x 42 x 26</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Medical industries, home appliance, HVAC</td>
</tr>
</tbody>
</table>

HUMA2730

(*) Optional additional sensor element humidity, temperature and pressure  
(1). SCCM = Standard Cubic Centimeter per Minute  
(2). SLPM = Standard Liter Per Minute  
(3). FR = Flow Rate  FS= Full Scale
Measurement Specialties is a leading manufacturer of industrial linear, angular, and tilt sensors. Both off-the-shelf and custom position sensing solutions are available featuring our core technologies including inductive, magneto-resistive, Hall Effect, electrolytic and capacitive sensing. Sophisticated designs and state-of-the-art manufacturing techniques provide reliable and cost effective designs for both standard and highly-customized solutions for a broad range of applications. MEAS applications range from automotive, power generation, subsea, hydraulics, medical, HVAC/R, process controls, factory automation, and many other industrial, to the most severe environments in Military/Aerospace and Nuclear. Measurement Specialties position sensors are available with analog and digital outputs. Our full range of signal conditioning instrumentation allows us to meet the specific needs of both OEMs and end users.
Anisotropic Magnetoresistive (or AMR) Sensor Components

Magnetor-Resitive
Anisotropic Magnetoresistive or AMR sensors offer robust non-contact measurement of changes in the angle of the magnetic field as seen by the sensor. This effect allows for the creation of sensors that can detect disturbance in extremely weak fields, as found in traffic detection sensors, to strong field sensors that are used in precision encoders.

<table>
<thead>
<tr>
<th>Package</th>
<th>MR174 B, KMY, KMZ</th>
<th>MS 32</th>
<th>KMT32B</th>
<th>KMT36H</th>
<th>MLS</th>
<th>MR-SP03</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>SOT-223, E-line 4 pin</td>
<td>TDFN 2.5 x 2.5</td>
<td>TDFN 2.5 x 2.5, SO-8</td>
<td>TDFN 2.5 x 2.5</td>
<td>Die, hybrid</td>
<td>System-in-package</td>
</tr>
<tr>
<td>Range</td>
<td>Linear low field sensor</td>
<td>Low field switch sensor</td>
<td>Angle sensor</td>
<td>Angle sensor</td>
<td>Angle sensor</td>
<td>Angle sensor</td>
</tr>
<tr>
<td>Unique Features</td>
<td>-2 +/−2 kA/m magnetic field</td>
<td>- 1 +/−3 kA/m magnetic field</td>
<td>- 180° angle</td>
<td>360° angle</td>
<td>Absolute within pole pitch, else incremental</td>
<td></td>
</tr>
<tr>
<td>Output</td>
<td>Ratiometric with output voltage range 20 mV/V</td>
<td>Ratiometric with output voltage range 10 mV/V</td>
<td>Sine / cosine signals with output voltage range 20 mV/V</td>
<td>Three 120° phase shifted output signals with output voltage range 20 mV/V</td>
<td>Sine / cosine signals with output voltage range 20 mV/V</td>
<td>Voltage 0-5 V</td>
</tr>
<tr>
<td>Resolution</td>
<td>typ. 0.1% of range</td>
<td>typ. 0.1% of range</td>
<td>typ. 1°</td>
<td>typ. 0.01° to 0.1°</td>
<td>typ. 0.01° to 0.1°</td>
<td>typ. 0.1°</td>
</tr>
<tr>
<td>Accuracy</td>
<td>typ. 1% of range</td>
<td>typ. 0.1% of range</td>
<td>-40°C to 150°C</td>
<td>-40°C to 150°C</td>
<td>-40°C to 125°C</td>
<td></td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-25°C to 85°C</td>
<td>-25°C to 85°C</td>
<td>-40°C to 150°C (175°C on request)</td>
<td>-40°C to 150°C</td>
<td>Die: 5.2 x 1.2 x 0.5</td>
<td></td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>SOT: 6.6 x 7.0 x 1.6</td>
<td>E-line: 16 x 4.2 x 2.4</td>
<td>TDFN: 2.5 x 2.5 x 0.8</td>
<td>TDFN: 2.5 x 2.5 x 0.8</td>
<td>HK: 7.6 x 5.3 x 1.4</td>
<td></td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Non-destructive material testing, spray arm detection in dish washers, magnetic imaging, brake pedal position</td>
<td>Piston position, switch, reed switch replacement</td>
<td>Steering position, flow meters, rpm meters, rotary encoders</td>
<td>Steering position, gauge readings, rotary encoders</td>
<td>Roller conveyors, circular saws, bending machines etc.</td>
<td></td>
</tr>
</tbody>
</table>

Angular Position Transducers/Inductive

Absolute
Measurement Specialties offers many different OEM and end-user, non-contact angular position solutions. We have a technology for virtually any automotive, industrial or mil-aero application. Absolute angular technologies include RVDT and RVIT, with outputs and packaging to match most application requirements.

<table>
<thead>
<tr>
<th>Package</th>
<th>RVIT-Z</th>
<th>R60D</th>
<th>R30A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resolution</td>
<td>Infinite</td>
<td>Infinite</td>
<td>Infinite</td>
</tr>
<tr>
<td>Excitation</td>
<td>Voltage</td>
<td>DC symmetrical +/-15 VDC</td>
<td>AC operated</td>
</tr>
<tr>
<td>Output</td>
<td>DC voltage , DC current , digital</td>
<td>0.125 VDC per degree</td>
<td>AC voltage</td>
</tr>
<tr>
<td>Range</td>
<td>Up to ±75 degrees</td>
<td>±60 degrees</td>
<td>±30° to ±60°</td>
</tr>
<tr>
<td>Unique Features</td>
<td>- Absolute position</td>
<td>- Absolute position</td>
<td>- Absolute position</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-25°C to 85°C</td>
<td>-25°C to 85°C</td>
<td>-55°C to 150°C</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>Custom</td>
<td>Aluminum case size 11 (Ø 25.4)</td>
<td>Aluminum case size 11 (Ø 25.4)</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Viscometers, valve position, robotics, HVAC vane position, ATM’s, joysticks</td>
<td>Dancer arm position, rotary actuator position feedback, throttle lever position feedback, ball valve position, textile manufacturing equipment, printing presses</td>
<td>Machine tool equipment, rotary actuator feedback, valve positioning, power generation, valve position</td>
</tr>
</tbody>
</table>
Angular Position Sensors / Encoders

Measurement Specialties designs and manufactures many absolute and incremental angular encoders based on our Magneto-Resistive technology. These encoders are designed to OEM specifications or standard off-the-shelf. Outputs are either analog or digital and we also have submersible packages.

### Absolute

**ED-18**
- **Package:** Medium duty with sleeve or ball bearing
- **Resolution:** Analog 1.4°
- **MAX speed:** 300RPM (sleeve bearing) 3000RPM (ball bearing)
- **Excitation:** 5 Vdc
- **Unique Features:** - Low profile
- **Output:** Voltage or current
- **Range:** 360°
- **Operating Temp:** -40°C to 70°C
- **Dimensions (mm):** 25.4 x 25.4 x 33.78
- **Linearity:** ±0.2% of range
- **Typical Apps:** Rotational feedback sensor or human machine interface device

**ED-22**
- **Package:** Medium duty with sleeve bearing
- **Resolution:** Analog 1.4°
- **MAX speed:** 300RPM
- **Excitation:** 5 Vdc
- **Unique Features:** - Encapsulated electronics/sealed unit
- **Output:** Voltage
- **Range:** 270°
- **Operating Temp:** -40°C to 85°C
- **Dimensions (mm):** Ø 19.05 x 38.1
- **Linearity:** ±0.5% of range
- **Typical Apps:** Low cost non contact HMI potentiometer replacement

**R36**
- **Package:** Heavy duty shaftless
- **Resolution:** Analog 0.5°
- **MAX speed:** NA
- **Excitation:** 5 Vdc
- **Unique Features:** - Rugged housing - Shaftless
- **Output:** Voltage
- **Range:** 180°
- **Operating Temp:** -40°C to 85°C
- **Dimensions (mm):** 38.1 x 25.4 x 7.62
- **Linearity:** ±0.25%(Voltage) to ±0.5%
- **Typical Apps:** Rotational feedback sensor or human machine interface device

**ED-19**
- **Package:** Medium duty with sleeve or ball bearing
- **Resolution:** 1024, 400, 256 CPR (others on request)
- **MAX speed:** 300 RPM (sleeve bearing) 3000 RPM (ball bearing)
- **Excitation:** 5 Vdc
- **Unique Features:** - Sleeve or ball bearing
- **Output:** Quadrature
- **Range:** 360°
- **Operating Temp:** -40°C to 85°C
- **Dimensions (mm):** Ø 31.75 x 33.78
- **Linearity:** ±0.25%
- **Typical Apps:** Rotational feedback sensor or human machine interface device

**ED-20**
- **Package:** Medium duty with ball bearing
- **Resolution:** 1024, 400, 256 CPR (others on request)
- **MAX speed:** 3000 RPM
- **Excitation:** 5 Vdc (NPN and LVD)
- **Unique Features:** - Resistant to contamination
- **Output:** Quadrature
- **Range:** 360°
- **Operating Temp:** -40°C to 85°C
- **Dimensions (mm):** Ø 31.75 x 33.78
- **Linearity:** ±0.25%
- **Typical Apps:** Rotational feedback sensor or human machine interface device

Many other models available. Please see MEAS web site library

### Incremental

**ED32i**
- **Package:** IP67 aluminum
- **Range:** Magnetic scale, 5mm pole pitch, typically up to 100 m absolute version up to 100 mm range on request
- **Excitation:** 5 V DC, 24 V on request
- **Output:** 5V TTL, RS485, ABZ differential Quadrature, USB Serial on request
- **Resolution:** Resolution: ≥ 10 μm; field programmable
- **Unique Features:** - Contactless incremental measurement
- **Operating Temp:** -25°C to 85°C
- **Dimensions (mm):** 60 x 20 x 10
- **Typical Apps:** Linear displacement measurement in industrial and medical applications

Linear Position Sensors

Incremental

Linear incremental encoders provide rugged low cost non contacting position feedback for demanding applications. This technology is not effected by dirt, oil, dust or other contaminants. It is also not effected by changes in ambient lighting conditions.
Linear Position Transducers

Absolute
Linear absolute technologies include LVDT’s for OEM and end-user applications and LCIT’s for low-cost OEM requirements. All of these sensors feature friction-free, non-contact inductive magnetic coupling for unlimited cycle life and virtually infinite resolution. Various off the shelf and custom packaging options are available for the most demanding application requirements.

<table>
<thead>
<tr>
<th>Package</th>
<th>Linearity</th>
<th>Excitation</th>
<th>Output</th>
<th>Ranges</th>
<th>Unique Features</th>
</tr>
</thead>
</table>
| HR Series     | ±0.25% of range | AC operated| AC voltage      | ±0.05 to ±1 inch | - Large bore to core clearance
|               |                 |            |                 |              | - Metric series
| M12           | ±0.25% of range | AC operated| AC voltage      | ±10 to ±100 millimeters | - High stroke to length ratio
|               |                 |            | AC or DC voltage| ±0.05 to ±10 inches | - Constant sum of secondaries
| HC Series     | ±0.25% of range | AC & DC operated versions | AC or DC voltage, 4-20mA loop, or RS485 | - Excellent temperature coefficient |
| XS-C Series   | ±0.25% of range | AC operated| AC voltage      | ±0.25, ±0.5 & ±1 inch | - Hermetically sealed
| DC-SE         | ±0.25% of range | AC operated| AC voltage      | 0.0 to 0.6 inches | - High pressure
| XS-U          | ±0.2% of range  | AC operated| AC voltage      | ±1 to ±10 inches | - Very high stroke to body length ratio |

Many other models available. Please see MEAS web site library

Dimensional Gauging Products
Our precision gauge heads are classified into several categories based on size, repeatability, accuracy and input/output.

<table>
<thead>
<tr>
<th>LBB, spring-extend series</th>
<th>LBB air-extend series</th>
<th>PCA 375 Series</th>
<th>GC Series</th>
<th>Ultimate-Precision Digital LBB</th>
</tr>
</thead>
<tbody>
<tr>
<td>Diameter</td>
<td>8 mm or 3/8 inch</td>
<td>8 mm or 3/8 inch</td>
<td>3/4 inch</td>
<td>Stackable gage system</td>
</tr>
<tr>
<td>Linearity</td>
<td>±0.2% of range</td>
<td>±0.2% of range</td>
<td>±0.5% of range</td>
<td>Accuracy ±0.2% of range</td>
</tr>
<tr>
<td>Excitation</td>
<td>AC operated</td>
<td>AC operated</td>
<td>AC operated</td>
<td>5 VDC USB (bus or external)</td>
</tr>
<tr>
<td>Output</td>
<td>AC voltage</td>
<td>AC voltage</td>
<td>AC voltage</td>
<td>RS485 Orbit® compatible; USB</td>
</tr>
<tr>
<td>Ranges</td>
<td>±0.02 to ±0.20 inch</td>
<td>±0.10 inch</td>
<td>±0.02 to ±1 inch</td>
<td>1, 2 and 5 mm</td>
</tr>
<tr>
<td>Unique Features</td>
<td>- Removable Tungsten</td>
<td>- Removable Tungsten</td>
<td>- Longer strokes</td>
<td>- Plug-and-play compatible with Orbis® bus</td>
</tr>
<tr>
<td></td>
<td>Carbide contact tip</td>
<td>Carbide contact tip</td>
<td>- IP65 cable exit</td>
<td>- 14-bit resolution</td>
</tr>
<tr>
<td></td>
<td>- Double shielded LVDT</td>
<td>- Double shielded LVDT</td>
<td>- Accepts industry standard contact tips</td>
<td>- COM libraries provided</td>
</tr>
<tr>
<td></td>
<td>- Repairable</td>
<td>- Repairable</td>
<td>- Heavy Duty Return Spring</td>
<td>- CE mark</td>
</tr>
<tr>
<td>Operating Temp</td>
<td>-40°C to 70°C</td>
<td>-40°C to 70°C</td>
<td>-20°C to 70°C</td>
<td>- Special tips available</td>
</tr>
<tr>
<td>Dimensions (mm)</td>
<td>Application Specific</td>
<td>Application Specific</td>
<td>Application Specific</td>
<td>- Air extend spring retract available</td>
</tr>
<tr>
<td>Typical Apps</td>
<td>Process standards, manufacturing on-line inspection, robotic, replaces dial indicators in manual measurement systems</td>
<td>Process standards, manufacturing on-line inspection, robotic, replaces dial indicators in manual measurement systems</td>
<td>High density gaging fixtures, resistance weld verification, pressing applications, X-Y stage position feedback, rough casting inspection</td>
<td>Harsh environments, environments requiring hermetic seal, high temperatures (150°C for ac units)</td>
</tr>
</tbody>
</table>

Many other models available. Please see MEAS web site library
Tilt Sensors

Single Axis
Measurement Specialties offers both capacitive and electrolytic tilt sensing technology in rugged die-cast aluminum or ceramic packaging. These products are available in ranges up to ±60 degrees and are provided with many analog as well as digital I/O options. Linearized and temp-compensated outputs are available. OEM and end-user packaging is available as well as raw sensors for high volume OEM applications.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Range</th>
<th>Output</th>
<th>Unique Features</th>
</tr>
</thead>
<tbody>
<tr>
<td>E-Series</td>
<td>Ceramic housing</td>
<td>±5°, ±15°</td>
<td>Voltage</td>
<td>- Easy to handle</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Minimal temperature drift</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Good long term stability</td>
</tr>
<tr>
<td></td>
<td>LCP housing</td>
<td>±45° to ±60°</td>
<td>Voltage</td>
<td>- Compact</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Low power</td>
</tr>
<tr>
<td></td>
<td>AccuStar®</td>
<td></td>
<td></td>
<td>- Vertical &amp; horizontal mount</td>
</tr>
<tr>
<td></td>
<td>Plastic housing</td>
<td>±20°, ±45°, ±90°</td>
<td>Analogue / digital</td>
<td>- Stand alone system</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- Separate System &amp; Sensor</td>
</tr>
<tr>
<td>APS System</td>
<td>AL housing IP 67</td>
<td>±10°</td>
<td>Switch</td>
<td>- Programmable</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>- EMC standard</td>
</tr>
<tr>
<td></td>
<td>AccuStar® IP 66</td>
<td>±3° to ±45°</td>
<td>Current</td>
<td>- High switch accuracy</td>
</tr>
</tbody>
</table>

Accuracy
±0.2° to ±0.5°

Operating Temp
-25°C to 85°C

Dimensions (mm)
29 x 17 x 16.5

Unique Features
- High resolution
- Minimal temperature drift
- Programmable

Accuracy
±0.05° to ±0.8°

Operating Temp
-40°C to 85°C

Dimensions (mm)
45 x 45 x 14

Unique Features
- High accuracy
- Rugged housing
- Programmable
- CE approved

Accuracy
±0.04° to ±0.8°

Operating Temp
-40°C to 85°C

Dimensions (mm)
84 x 70 x 46

Typical Apps
Road construction, building control, weighing systems, mobile and stationary cranes, platform leveling
Wheel alignment, construction, equipment, antenna positioning, robotics, crane Boom angle
Tower crane safety, RV and mobile trailer leveling, water and oil well drilling rigs, mining equipment
Lift platforms, building device control, rail train inclination control, position switch
Tower crane safety, RV and mobile trailer leveling, water and oil well drilling rigs, mining equipment
Laser leveling, weighing systems, mobile and stationary cranes, hydraulic leveling, building control, wind power
Fork lift, RV leveling, man lift, harvester, tip over protection, solar panel adjustment
Platform leveling, road construction machines, tunnel drilling, mobile leveling
Drilling machines, mobile and stationary cranes, wind power, satellite/radar leveling

Dual Axis
All of the same features of the Measurement Specialties single axis sensors and modules in a dual axis package.
**LVDT / RVDT Instrumentation**

Our OEM and end-user oriented LVDT/RVDT instrumentation signal conditioners and read-out devices are specifically designed to be compatible with all our Linear and Angular AC inductive sensors. These instruments provide everything needed to interface with our AC devices to control or data acquisition systems.

<table>
<thead>
<tr>
<th>Package</th>
<th>Supply</th>
<th>Output</th>
<th>Operating Temp</th>
<th>Unique Features</th>
</tr>
</thead>
</table>
| **LVM-110 LiM-420** | DC voltage  | DC voltage or current   | 0°C to 55°C    | - Master/slave for multi-up applications  
|                  |             |                         |               | - Dip switch selectable excitation frequencies  
|                  |             |                         |               | - Plug-in PCB or wire termination  
|                  |             |                         |               | - Small form factor  
| **LDM-1000**     | 10 to 30 VDC| DC voltage & current    | -25°C to 85°C | - Operates with 4, 5 & 6 wire LVDT/RVDTs  
|                  |             |                         |               | - Adjustable phase compensation  
|                  |             |                         |               | - CE mark  
| **ATA-2001**     | 115 or 220 VAC, 50-400 Hz| DC voltage & current| -40°C to 85°C | - Push button programmable  
|                  |             |                         |               | - Splash proof front panel  
|                  |             |                         |               | - LED status lights  
|                  |             |                         |               | - Mounting hardware included  
|                  |             |                         |               | - CE mark  
| **PML 1000**     | 90 to 265 VAC, 50-60 Hz| DC voltage & current    | 0°C to 55°C   | - Programmable set point controller  
|                  |             |                         |               | - Dual channel with math functions  
|                  |             |                         |               | - Digital I/O  
|                  |             |                         |               | - Large LCD display  
|                  |             |                         |               | - Splash proof front panel  
|                  |             |                         |               | - CE mark  
| **MP 2000**      | 100 to 240 VAC, 47-63 Hz| DC voltage & RS232    | 0°C to 55°C   | - Programmable set point controller  
|                  |             |                         |               | - Dual channel with math functions  
|                  |             |                         |               | - Digital I/O  
|                  |             |                         |               | - Large LCD display  
|                  |             |                         |               | - Splash proof front panel  

<table>
<thead>
<tr>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>42 x 55 x 45</td>
<td>OEM applications</td>
</tr>
<tr>
<td>115 x 99 x 23</td>
<td>Automotive test track instrumentation, gas &amp; steam turbine controls, factory automation</td>
</tr>
<tr>
<td>251 x 96 x 48</td>
<td>Precision metrology labs, power generation valve position monitoring</td>
</tr>
<tr>
<td>173 x 96 x 44</td>
<td>Remote monitoring stations, measurement test stands, process monitoring</td>
</tr>
<tr>
<td>195 x 91 x 91</td>
<td>LVDT based weighing systems, pass/fail parts sorting, quality inspection,</td>
</tr>
</tbody>
</table>

**LVM-110 LiM-420**

**LDM-1000**

**ATA-2001**

**PML 1000**

**MP 2000**
Measurement Specialties brings more than twenty years experience in the design and manufacture of accelerometers and vibration sensors based on our proprietary Micro-ElectroMechanical System (MEMS), bonded gauge and piezoelectric ceramic/film technologies.

Voltage mode piezoelectric is the most popular accelerometer design due to its high level output and its wide bandwidth. We offer voltage mode accelerometers in the traditional 3-wire or 2-wire (IEPE) configurations.

Charge mode piezoelectric accelerometers are designed for measuring shock and vibration in high temperature environments. In addition to its high temperature operating capability when used with a high quality charge amplifier, a charge mode accelerometer offers its users unmatched dynamic range scalability. To measure motion (velocity, displacement) accurately, an accelerometer with DC response is required. Incorporating state-of-the-art MEMS technologies and the latest analog and digital ASIC’s, Measurement Specialties’ DC accelerometers offer the best-in-class performance and exceptional value.
MEMS DC Accelerometers

**Embedded**
Uses patented piezoresistive silicon die technology with high over-range protection and broad frequency response.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>F.S.Range (g)</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
</table>
| 3022    | Pins or Pads | ±2, 5, 10, 20, 50, 100, 200 | - mV output  
- Temperature compensated  
- Pin or pad option |
| 3052    | Board Level | ±2, 5, 10, 20, 50, 100 | - Miniature DC response  
- Gas damping  
- Low power consumption |
| 3031    | Board Level | ±50, 100 | - Hermetically sealed  
- High over-range protection  
- Gas damping |
| 3038    | SMD        | ±50, 100, 200, 500, 2000, 6000 | - Low power  
- Hermetically Sealed  
- >200kHz resonant frequency |
| EGHS-M  | SMD        | ±30K, 60K | - Self test enabled  
- Gas damping  
- Bi-directional mounting |
| 3255A   | SMD        | ±25, 50, 100, 250, 500 | - Low Cost  
- Hermetically Sealed  
- Piezo-Ceramic |

**Piezoelectric Accelerometers**

**Embedded Single Axis**
Uses piezo-electric technology with broad frequency response for harsh applications.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>F.S.Range (g)</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
</table>
| 805/805M1 | TO-5       | ±50, ±500 / ±20, 200 | - Hermetically Sealed  
- Case Grounded Design  
- Bandwidth to 12kHz |
| 815/815M1 | Adhesive Mount | ±50, ±500 / ±20, 200 | - Hermetically Sealed  
- Case Grounded Design  
- Bandwidth to 10kHz |
| LDTC Family | Adhesive Mount | ±10 (typical) | - Very low cost  
- High sensitivity (1V/g)  
- Ultra-low power (self generating)  
- ±20% (typical)  
- -40°C to 70°C |
| 832/832M1 | SMD        | ±25, 50, 100, 200 | - Low Cost  
- Hermetically Sealed  
- Piezo-Ceramic |
| 834/834M1 | SMD        | ±2000, 6000 | - Low Cost  
- Hermetically Sealed  
- Piezo-Ceramic |

**Embedded Triaxial**

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>F.S.Range (g)</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
</table>
| 805/805M1 | TO-5       | ±50, ±500 / ±20, 200 | - Hermetically Sealed  
- Case Grounded Design  
- Bandwidth to 12kHz |
| 815/815M1 | Adhesive Mount | ±50, ±500 / ±20, 200 | - Hermetically Sealed  
- Case Grounded Design  
- Bandwidth to 10kHz |
| LDTC Family | Adhesive Mount | ±10 (typical) | - Very low cost  
- High sensitivity (1V/g)  
- Ultra-low power (self generating)  
- ±20% (typical)  
- -40°C to 70°C |
| 832/832M1 | SMD        | ±25, 50, 100, 200 | - Low Cost  
- Hermetically Sealed  
- Piezo-Ceramic |
| 834/834M1 | SMD        | ±2000, 6000 | - Low Cost  
- Hermetically Sealed  
- Piezo-Ceramic |
### DC Accelerometers

**Plug and Play, Unamplified**  
Uses piezoresistive MEMS technology with high over-range protection and application-specific packaging.

<table>
<thead>
<tr>
<th>52</th>
<th>52F</th>
<th>52M30</th>
<th>64B/64C</th>
<th>64D</th>
<th>1201/1201F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Plastic</td>
<td>Anodized Aluminum</td>
<td>Anodized Aluminum</td>
<td>Anodized Aluminum</td>
<td>Anodized Aluminum</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Adhesive Mount</td>
<td>Screw Mount</td>
<td>Adhesive Mount</td>
<td>Screw Mount</td>
<td>Adhesive/Screw Mount</td>
</tr>
<tr>
<td><strong>F.S.Range (g)</strong></td>
<td>±50, 200, 500, 2000</td>
<td>±50, 200, 500, 2000</td>
<td>±50, 100, 200, 500, 2000, 6000</td>
<td>±50, 100, 200, 500, 2000, 6000</td>
<td>±50, 100, 200, 500, 1000</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>Low cost - Gas damping - Over-range stops</td>
<td>Low cost - Gas damping - Over-range stops</td>
<td>Low cost - Gas damping - Over-range stops</td>
<td>±1.0% Non-linearity -40°C to 90°C</td>
<td>±1.0% Non-linearity -40°C to 90°C</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±1.0% Non-linearity</td>
<td>±1.0% Non-linearity</td>
<td>±1.0% Non-linearity</td>
<td>±1.0% Non-linearity</td>
<td>±1.0% Non-linearity</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-40°C to 90°C</td>
<td>-40°C to 90°C</td>
<td>-40°C to 121°C</td>
<td>-40°C to 121°C</td>
<td>-20°C to 85°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>9.65 x 4.83 x 3.3</td>
<td>9.65 x 4.83 x 3.3</td>
<td>12.19 x 4.83 x 4.83</td>
<td>12.19 x 4.83 x 4.83</td>
<td>8.89 x 8.89 x 9.4</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Vibration/shock monitoring, shock testing, safety impact testing, side-impact testing</td>
<td>Vibration/shock monitoring, shock testing, safety impact testing, side-impact testing</td>
<td>In-dummy crash and impact testing.</td>
<td>In-dummy crash and impact testing.</td>
<td>On-vehicle crash and impact testing, vibration and shock monitoring.</td>
</tr>
</tbody>
</table>

### DC Accelerometers

**Plug and Play, Unamplified**  
Uses piezoresistive MEMS technology with high over-range protection and application-specific packaging.

<table>
<thead>
<tr>
<th>3801A</th>
<th>3700</th>
<th>EGAX/EGAXT</th>
<th>EGCS-D0</th>
<th>EGCS-D1S</th>
<th>EGCS-S425</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
<td>Stainless Steel</td>
<td>Anodized Aluminum</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Stud Mount</td>
<td>Stud Mount</td>
<td>Adhesive/Screw Mount</td>
<td>Screw Mount</td>
<td>Screw Mount</td>
</tr>
<tr>
<td><strong>F.S.Range (g)</strong></td>
<td>±2, 10, 20, 50, 100, 200, 500, 2000</td>
<td>±5, through 2500</td>
<td>±5 through 5000</td>
<td>±5 through 5000</td>
<td>±50, 100, 250, 500, 1000</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>Hermetically sealed sensor - Gas damping - 10,000g over-range protection</td>
<td>- Sub-Miniature - Lightweight - 10,000 g over-range protection</td>
<td>- Rugged housing - Critically damped - 10,000 g over-range protection</td>
<td>- Rugged housing - Critically damped - 10,000 g over-range protection</td>
<td>Critically damped - Compact - Mechanical stops</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>±0.5% Non-linearity</td>
<td>±2.0% Non-linearity</td>
<td>±1.0 % Non-linearity</td>
<td>±1.0% Non-linearity</td>
<td>±1.0 % Non-linearity</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-54°C to 121°C</td>
<td>-54°C to 121°C</td>
<td>-40°C to 120°C</td>
<td>-40°C to 120°C</td>
<td>-20°C to 80°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>15.88 x 15.24</td>
<td>14.22 x 8.13 x 3.81</td>
<td>6.86 x 3.56 x 3.56</td>
<td>6.86 x 3.56 x 3.56</td>
<td>14.73 x 9.9 x 4.83</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Impact testing, structural testing, test and instrumentation, environmental testing</td>
<td>Impact and shock testing, structural testing, drop testing, aerospace testing</td>
<td>Flight test &amp; control, launch, crash, impact testing, robotics</td>
<td>General purpose, machine control, destructive testing, engine testing</td>
<td>Auto safety testing for side impact, on-vehicle, sled and in-dummy</td>
</tr>
</tbody>
</table>
### MEMS DC Accelerometers

#### Plug and Play, Amplified
Uses piezoresistive MEMS technology with digital temperature compensation.

<table>
<thead>
<tr>
<th>Model</th>
<th>Package</th>
<th>Type</th>
<th>F.S.Range (g)</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Excitation Voltage</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>201</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 30, 50</td>
<td>- Low noise</td>
<td>±1.0% Non-linearity</td>
<td>5-30 Vdc</td>
<td>-40°C to 125°C</td>
<td>25.4 x 21.59 x 9.65</td>
<td>Motorsports, seismic, wind turbine</td>
</tr>
<tr>
<td>4000A/4001A</td>
<td>Anodized Aluminum</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 50, 100, 200</td>
<td>- Integral connector</td>
<td>±0.5% Non-linearity</td>
<td>8-32 Vdc</td>
<td>-20°C to 85°C</td>
<td>18.54 x 18.54 x 8.64</td>
<td>Flight testing, flutter testing, road test, structural testing</td>
</tr>
<tr>
<td>4600/4602</td>
<td>Anodized Aluminum</td>
<td>Screw Mount</td>
<td>±2, 10, 30, 50, 100, 200, 500</td>
<td>- Exceptional temperature compensation</td>
<td>±0.5% Non-linearity</td>
<td>8-36 Vdc</td>
<td>-55°C to 125°C</td>
<td>21.08 x 21.59 x 7.62</td>
<td>Flight testing, motion control, modal analysis, flight testing, flutter testing, road test, structural testing</td>
</tr>
<tr>
<td>4610</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 50, 100, 200, 500</td>
<td>- Hermetically sealed sensor</td>
<td>±0.5% Non-linearity</td>
<td>8-36 Vdc</td>
<td>-40°C to 115°C</td>
<td>21.59 x 25.4 x 7.62</td>
<td>Flight testing, motion control, modal analysis, flight testing, flutter testing, road test, structural testing</td>
</tr>
<tr>
<td>4801A</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 30, 50, 100, 200, 500</td>
<td>- Hermetically sealed sensor</td>
<td>±0.5% Non-linearity</td>
<td>8-36 Vdc</td>
<td>-55°C to 125°C</td>
<td>13.33 x 20.83</td>
<td>Impact testing, structural testing, test and instrumentation, environmental testing</td>
</tr>
<tr>
<td>4810A</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 30, 50, 100, 200, 500</td>
<td>- Low noise</td>
<td>±0.5% Non-linearity</td>
<td>8-36 Vdc</td>
<td>-55°C to 125°C</td>
<td>29.21 x 25.4 x 21.08</td>
<td>Flight testing, trains, machine control</td>
</tr>
</tbody>
</table>

### DC Accelerometers

#### Plug and Play, Triaxial
Uses piezoresistive technology.

<table>
<thead>
<tr>
<th>Model</th>
<th>Package</th>
<th>Type</th>
<th>F.S.Range (g)</th>
<th>Unique Features</th>
<th>Accuracy</th>
<th>Excitation Voltage</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>EGAXT3</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±5 through 2500</td>
<td>- Sub-miniature</td>
<td>±1% Non-linearity</td>
<td>5-30 Vdc</td>
<td>-40°C to 120°C</td>
<td>12.7 x 12.7 x 12.7</td>
<td>Flight test, crash, shock monitoring</td>
</tr>
<tr>
<td>53/53A</td>
<td>Anodized Aluminum</td>
<td>Adhesive Mount</td>
<td>±50, 200, 500, 2000</td>
<td>- Low cost</td>
<td>±1.0% Non-linearity</td>
<td>-20°C to 85°C</td>
<td>18.29 x 13.21 x 7.11</td>
<td>Auto safety, passenger comfort, transportation, nvh analysis</td>
<td></td>
</tr>
<tr>
<td>63/68CM1</td>
<td>Stainless Steel</td>
<td>Screw Mount</td>
<td>±500, 1000, 2000</td>
<td>- World SID (68CM1)</td>
<td>±1.0% Non-linearity</td>
<td>-20°C to 85°C</td>
<td>12.7 x 12.7 x 12.7</td>
<td>Auto safety, in-dummy crash, on-vehicle crash</td>
<td></td>
</tr>
<tr>
<td>4630</td>
<td>Anodized Aluminum</td>
<td>Screw Mount</td>
<td>±2, 5, 10, 20, 50, 100, 200, 500</td>
<td>- Advanced temperature compensation</td>
<td>±0.5% Non-linearity</td>
<td>-40°C to 115°C</td>
<td>26.16 x 26.16 x 23.37</td>
<td>Road test, motion control, transportation, modal analysis, structural testing</td>
<td></td>
</tr>
<tr>
<td>4203</td>
<td>Anodized Aluminum</td>
<td>Screw Mount</td>
<td>±6, 7.5, 10, 20, 30</td>
<td>- EMI/RFI Protection</td>
<td>±1% Non-linearity</td>
<td>-40°C to 125°C</td>
<td>33.02 x 35.05 x 16</td>
<td>Motorsports seismic, shock monitoring</td>
<td></td>
</tr>
<tr>
<td>606M1</td>
<td>Nitrile Rubber Pad</td>
<td>Removable</td>
<td>±25</td>
<td>- 0.7 Damping ratio</td>
<td>±1% Non-linearity</td>
<td>-20°C to 85°C</td>
<td>199 x 4</td>
<td>Off-road equipment, amusement rides, commercial aircraft</td>
<td></td>
</tr>
</tbody>
</table>
### Voltage Mode, Piezoelectric (IEPE) Accelerometers

**Plug and Play**  
Uses piezo-electric technology with broad frequency response for harsh applications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Package</th>
<th>Type</th>
<th>Sensitivity (mV/g)</th>
<th>Unique Features</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>7100A</td>
<td>Stainless Steel</td>
<td>Through Hole Mounting</td>
<td>100, 10</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-55°C to 150°C</td>
<td>8.38 x 22.35</td>
<td>Flight testing, general purpose vibration monitoring</td>
</tr>
<tr>
<td>7101A</td>
<td>Titanium</td>
<td>Through Hole Mounting</td>
<td>100, 10</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-55°C to 125°C</td>
<td>5.84 x 14.48</td>
<td>Flight testing, modal testing, general purpose</td>
</tr>
<tr>
<td>7102A</td>
<td>Titanium</td>
<td>Adhesive Mounting</td>
<td>10</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-55°C to 125°C</td>
<td>5.08 x 11.94</td>
<td>Flight testing, modal testing, general purpose</td>
</tr>
<tr>
<td>7106A</td>
<td>Stainless Steel</td>
<td>Adhesive Mounting</td>
<td>100, 10, 2.5</td>
<td>- Single Axis, Shear Mode - Wide Bandwidth - Welded - Construction - Small Size</td>
<td>-55°C to 125°C</td>
<td>15.24 x 20.32 x 13.46</td>
<td>Vibration monitoring, modal testing, general purpose</td>
</tr>
<tr>
<td>7132A</td>
<td>Titanium</td>
<td>Adhesive/Study Mounting</td>
<td>100, 10, 2.5</td>
<td>- Triaxial, Shear Mode - &gt;12kHz Bandwidth - 4-Pin Connector - Hermetically Sealed</td>
<td>-55°C to 125°C</td>
<td>10.16 x 10.16 x 19.16</td>
<td>General purpose, modal testing, vibration monitoring</td>
</tr>
<tr>
<td>7120A/7122A</td>
<td>Titanium</td>
<td>Adhesive Mounting</td>
<td>1000, 10, 10</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-55°C to 125°C</td>
<td>10.16 x 10.16 x 19.16</td>
<td>Modal testing, vibration monitoring, small structures monitoring</td>
</tr>
</tbody>
</table>

### Charge Mode, Piezoelectric Accelerometers

**Plug and Play**  
Uses piezo-electric technology with broad frequency response for harsh applications.

<table>
<thead>
<tr>
<th>Model</th>
<th>Package</th>
<th>Type</th>
<th>Sensitivity (pC/g)</th>
<th>Unique Features</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>7500A</td>
<td>Stainless Steel</td>
<td>Through Hole Mounting</td>
<td>20, 13, 7</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 260°C</td>
<td>8.38 x 22.35</td>
<td>Gearbox vibration monitoring, flight test, high temp applications</td>
</tr>
<tr>
<td>7501A</td>
<td>Titanium</td>
<td>Through Hole Mounting</td>
<td>5.6</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 260°C</td>
<td>5.84 x 14.48</td>
<td>Gearbox vibration monitoring, flight test, high temp applications</td>
</tr>
<tr>
<td>7502A</td>
<td>Titanium</td>
<td>Adhesive Mounting</td>
<td>1.6</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 200°C</td>
<td>4.32 x 11.94</td>
<td>Gearbox vibration monitoring, flight test, high temp applications</td>
</tr>
<tr>
<td>7508A</td>
<td>Stainless Steel</td>
<td>Adhesive Mounting</td>
<td>5.6</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 260°C</td>
<td>9.53 x 10.16</td>
<td>Small structures monitoring, minimal mass loading, high temp applications</td>
</tr>
<tr>
<td>7514A</td>
<td>Stainless Steel</td>
<td>Stud Mounting</td>
<td>50, 30, 13</td>
<td>- Single Axis, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 260°C</td>
<td>14.99 x 14.99</td>
<td>Low frequency vibration, general purpose, high temp applications</td>
</tr>
<tr>
<td>7530A</td>
<td>Hard Anodized Aluminum</td>
<td>Screw Mounting</td>
<td>5.6</td>
<td>- Triaxial, Shear Mode - Hermetically Sealed - Wide Bandwidth</td>
<td>-73°C to 200°C</td>
<td>18.72 x 18.72 x 11.68</td>
<td>Vibration monitoring, drop testing, high temp applications</td>
</tr>
</tbody>
</table>

---

**Vibration**

44
## Voltage Mode, Piezoelectric Accelerometers

Plug and Play
Uses piezoelectric technology with broad frequency response for harsh applications.

<table>
<thead>
<tr>
<th>Package</th>
<th>Type</th>
<th>Sensitivity (mV/g)</th>
<th>Unique Features</th>
<th>Operating Temp</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>7202A</td>
<td>Stainless Steel</td>
<td>100,10</td>
<td>- Annular Shear Mode</td>
<td>-55°C to 130°C</td>
<td>13.34 x 19.05</td>
<td>HUMS applications, machinery monitoring, harsh environments</td>
</tr>
<tr>
<td>7204A</td>
<td>Stainless Steel</td>
<td>100, 10</td>
<td>- Annular Shear Mode</td>
<td>-55°C to 130°C</td>
<td>13.34 x 19.05</td>
<td>HUMS applications, flight testing, high frequency applications</td>
</tr>
<tr>
<td>8011</td>
<td>Stainless Steel</td>
<td>100, 10</td>
<td>- Industrial Accelerometer</td>
<td>-55°C to 125°C</td>
<td>22.23 x 48.26</td>
<td>Industrial applications, machine monitoring, intrinsic safety</td>
</tr>
<tr>
<td>8021</td>
<td>Stainless Steel</td>
<td>100, 10</td>
<td>- Industrial Accelerometer</td>
<td>-55°C to 125°C</td>
<td>22.86 x 53.01</td>
<td>Industrial applications, machine monitoring, intrinsic safety</td>
</tr>
</tbody>
</table>

## Electronics

Signal Conditioners
Easy-to-use instrumentation that ensures data integrity.

<table>
<thead>
<tr>
<th>Type</th>
<th># of Channels</th>
<th>Gain Range</th>
<th>Unique Features</th>
<th>Dimensions (mm)</th>
<th>Typical Apps</th>
</tr>
</thead>
<tbody>
<tr>
<td>101</td>
<td>Bench Top</td>
<td>3</td>
<td>- DC Signal Conditioner</td>
<td>235 x 210 x 84</td>
<td>Instrumentation labs, test stands, process monitoring</td>
</tr>
<tr>
<td>161</td>
<td>Bench Top</td>
<td>4</td>
<td>- Charge and IEPE Conditioner</td>
<td>310 x 180 x 115</td>
<td>Instrumentation labs</td>
</tr>
</tbody>
</table>
Piezoelectric fluoropolymer film produces voltage or charge proportional to strain. Exceptionally high strain sensitivity (15 mV/με); in-plane strain bandwidth from < 0.1Hz to >100KHz, ultrasound transmit and receive functionality to >100MHz, and dynamic range of 280dB characterize the very unique capabilities of Piezo Film. A highly versatile, enabling sensor technology, Piezo Film has thin cross section (28μm-110μm in thickness), is flexible, very robust, chemically inert, and can withstand temperatures up to 85°C (125°C with special processing). Piezo Film is also pyroelectric, capable of generating > 8V/°C. Simple printing with conductive ink defines the active electrode areas. This may be easily customized to give either single elements or complex arrays.

Piezo Cable is a coaxial sensor utilizing piezo film as the sensing material. Available in continuous lengths of 1km or longer, Piezo Cable possesses many of the attributes of Piezo Film in an extremely rugged and shielded form factor that is easy to deploy.
### Piezo Film

<table>
<thead>
<tr>
<th>DT1 &amp; SDT1</th>
<th>Piezo Cable</th>
<th>CM-01</th>
<th>FLDT1</th>
<th>LDTC Analog PCB</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Unshielded element with twisted pair or shielded element with shielded cable</td>
<td>Shielded Coaxial 20 gage Piezo Cable</td>
<td>Metalized plastic housing</td>
<td>Unshielded film element with screen printed leads</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Flexible film, adhesive mount</td>
<td>Polymer jacketing; armored jacketing</td>
<td>Contact Microphone</td>
<td>Flexible Film, adhesive mount</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>15 mV/με up to 1% strain</td>
<td>μPa sensitivity</td>
<td>40 V/mm; 8 Hz to 2.2 KHz</td>
<td>15 mV/με, up to 1% strain</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>- Thin, flexible, robust</td>
<td>- Continuous lengths to 1km</td>
<td>- Low noise</td>
<td>- Thin, Flexible</td>
</tr>
<tr>
<td></td>
<td>- Withstands up to 1% strain</td>
<td>- Shielded construction</td>
<td>- Vibration and impact sensing</td>
<td>- Leads screen printed on film</td>
</tr>
<tr>
<td></td>
<td>- Ultra-low power (self generating)</td>
<td></td>
<td>- High Sensitivity</td>
<td>- Connects to standard connector</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td>± 20% (typical)</td>
<td>± 20% (typical)</td>
<td>N/A</td>
<td>± 20% typical</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td>-40°C to 70°C (up to 125°C available)</td>
<td>-40°C to 85°C (up to 100°C available)</td>
<td>5°C to 60°C</td>
<td>-40°C to 70°C; higher available custom</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>Application Dependent</td>
<td>2 mm diameter; Continuous lengths</td>
<td>18 dia x 11 high</td>
<td>16 x 30 active; custom available</td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>Dynamic strain gage, contact microphone, acoustic pickup</td>
<td>Perimeter and fence security; geophone, impact sensors, intrusion detection, seat occupancy (e.g. airbag), patient bed vital signs monitor.</td>
<td>Electronic stethoscope, contact microphone, vibration and impact sensing</td>
<td>Event timing, dynamic strain, motion detection</td>
</tr>
</tbody>
</table>

### Laboratory Amplifier

| **Package** | Bench Top |
| **Type** | Piezo Film Lab Amp |
| **Range** | 0.1 Hz to 100 KHz |
| **Unique Features** | - Voltage or Charge Mode settings | - Multi-Pole High- and Low-Pass Filters | - Adjustable Gain |
| **Accuracy** | Application Dependent |
| **Operating Temp** | 0°C to 40°C |
| **Dimensions (mm)** | 150 x 100 x 100 |
| **Typical Apps** | Low frequency dynamic strain, pyroelectric signals, machine vibration, piezo cable and traffic sensor interface |

### 80 KHz Transducers

| **Package** | Pin Mounted |
| **Type** | Air Ultrasound transducer |
| **Range** | 80 KHz |
| **Unique Features** | - Small size | - Low Mechanical Q | - Shielded package |
| **Accuracy** | Application Dependent |
| **Operating Temp** | -20°C to 80°C |
| **Dimensions (mm)** | 6 dia x 9 |
| **Typical Apps** | Air Ranging, Ultrasonic Mouse, Digitizers |

### NDT-1

| **Package** | Adhesive Mounted |
| **Type** | High frequency ultrasound transducer |
| **Range** | 3 MHz |
| **Unique Features** | - Flexible | - High bandwidth, Low Q | - Low Impedance |
| **Accuracy** | Application Dependent |
| **Operating Temp** | -20°C to 60°C |
| **Dimensions (mm)** | 12 x 30 |
| **Typical Apps** | Thickness Measurement, Speed of sound measurement, pulse/echo NDT |

### Tamper Box

| **Package** | Flat film or box mounted |
| **Type** | Tamper detection sensor |
| **Range** | Application Dependent |
| **Unique Features** | - Low Power | - Custom Shapes and sizes | - High security |
| **Accuracy** | Application Dependent |
| **Operating Temp** | -40°C to 85°C |
| **Dimensions (mm)** | 18.80 x 13.21 x 6.10 |
| **Typical Apps** | Encryption modules, POS card readers, PIN entry devices |

### ACH01

| **Package** | Ceramic Base, Plastic Cover, Shielded Cable |
| **Type** | Adhesive Mount |
| **Range** | ±250g (typical) |
| **Unique Features** | - Extremely high bandwidth | - Low cost | - Ultra-low power |
| **Accuracy** | Application Dependent |
| **Operating Temp** | -40°C to 85°C |
| **Dimensions (mm)** | 19.05 x 6.35 x 6.35 |
| **Typical Apps** | Vibration sensing, gear box and high speed monitoring, high speed bearings and centrifuges, speaker motional feedback |

### LDTC Family

| **Package** | Piezo Film elements with or without mass, and pins |
| **Type** | Cantilever beam with vertical or horizontal pins |
| **Range** | ±10g (typical) |
| **Unique Features** | - Very low cost | - High sensitivity (1 V/g) |
| | - Ultra-low power (self generating) |
| **Accuracy** | ± 20% (typical) |
| **Operating Temp** | -40°C to 70°C |
| **Dimensions (mm)** | 19.05 x 6.35 x 6.35 |
| **Typical Apps** | Wake-up switch, load imbalance, antitheft devices, impact sensing, vital signs monitoring |
Based on patented tuning fork technology for the fluid property measurement of viscosity, density and dielectric constant, and coupled with their efficient software algorithms, the Fluid Property Sensor portfolio of products are specifically designed to provide a wide range of dedicated fluid quality and condition monitoring applications including oils, lubricants, fuels and DEF fluid monitoring. These sensors have a robust design that enables them to operate under diverse pressure, flow and temperature conditions to bring real time fluid monitoring to engines, fuel systems, SCR systems, compressors, transmissions, gear boxes and many other industrial applications.
### Fluid Property Sensor and Analyzer

**FPS, FPA**

Directly and simultaneously measure the fluid properties and temperature.

<table>
<thead>
<tr>
<th>FPS2810</th>
<th>FPS2X20/FPS2X30</th>
<th>FPS2851</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Package</strong></td>
<td>Fully integrated, stand-alone module combines sensor and processing electronics</td>
<td>Fully integrated sensor and processing electronics provide a single sensor solution for in-line or in tank fuel monitoring</td>
</tr>
<tr>
<td><strong>Type</strong></td>
<td>Oil quality sensor</td>
<td>Fuel quality sensor</td>
</tr>
</tbody>
</table>
| **Operating Range** | Viscosity from 0.5 to 50 mPa-s *  
Density from 0.65 to 1.5 g/cc  
Dielectric from 1.0 to 6.0 | Viscosity from 0 to 50 mPa-s  
Density from 0.65 to 1.5 g/cc  
Dielectric from 1.0 to 6.0 | Urea concentration from 5 to 62.5% mass  
-40°C to 125°C  
- Urea resistant DIN7070/ ISO22241 material  
- Tank or line mounting  
- CAN communication protocol (SAEJ1939 compliant) |
| **Operating Temp** | -40°C to 150°C | -40°C to 150°C | -40°C to 125°C |
| **Unique Features** | Rugged construction for high pressure and high flow environments  
- CAN communication protocol (SAEJ1939 compliant) | Rugged construction for high pressure and high flow environments  
- CAN communication protocol (SAEJ1939 compliant) | Urea resistant DIN7070/ ISO22241 material  
- CAN communication protocol (SAEJ1939 compliant) |
| **Calibration** | Factory calibrated with NIST traceable standards | Factory calibrated with NIST traceable standards | Factory calibrated in compliance with DIN70070 / ISO 22241 standards. |
| **Dimensions (mm)** | 73.3 x 30 x 30 | 73.3 x 30 x 30 | 81 x 30 x 30 |
| **Typical Apps** | Oil and lubricant quality monitoring for on and off road vehicles, HVAC&R, compressors, industrial equipments, turbines | Diesel, biodiesel, jet, gasoline and flexfuel monitoring, fuel type detection, fuel quality monitoring for engines, turbines, electric power generation, aviation, marine, etc. | Monitoring urea concentration and quality of diesel emission fluid (DEF) used in selective catalytic reduction systems (SCR), detection of unauthorized fluids for SCR systems application |

* FPS2810: special high viscosity range can go to 20,000 cP

---

**FPA2400BST**

- Robust ruggedized stainless steel probe with separate sensor control unit
- **Type**
  - Generic fluid property measurement sensor
- **Operating Range**
  - Fluid viscosities 0-75 mPa-s  
  - Density from 0.65 to 1.5 g/cc  
  - Dielectric from 1.0 to 6.0
- **Operating Temp**
  - -40°C to 150°C
- **Unique Features**
  - Flexible design enables a wide variety of industrial and process monitoring installations  
  - Datalogging of measured data  
  - Custom PC software provides real-time sensor operation and data management  
  - RS232/485/CAN communication protocols
- **Calibration**
  - Factory calibrated with NIST traceable standards
- **Dimensions (mm)**
  - probe: 82 x 15 x 15  
  - module: 130 x 61 x 25
- **Typical Apps**
  - Fluid properties measurement in compressors, refrigeration circuit, industrial machinery, and process applications such as distillations and process stream monitoring

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*  FPS2810: special high viscosity range can go to 20,000 cP
Solutions by Sensor type: Photo Optic

The MEAS line of Photo Optic Sensors includes both photo optic components and complete sensor solutions. Our component series features dual LED, bi-wavelength emitters and spectrally paired photo detectors. MEAS optics are ideally suited for medical applications for which the selection of peak wavelength is a priority, such as pulse oximetry (SpO2). We also package our optics into complete probe assemblies for pulse oximetry (SpO2) monitoring applications. The MEAS OEM pulse oximetry (SpO2) probe platform includes reusable finger clips, soft silicone boots, and a range of disposable sensors.
### Photo Optic Sensor

**Photo Optic Components and Pulse Oxyimetry Probe Platforms**

<table>
<thead>
<tr>
<th>Package</th>
<th>ELM-4000</th>
<th>EPM-4000</th>
<th>Disposable Sensor</th>
<th>Finger Clip Sensor</th>
<th>Soft Sensor</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type</strong></td>
<td>Lead Frame</td>
<td>Lead Frame</td>
<td>Biocompatible Sensor Platform</td>
<td>Biocompatible Sensor Platform</td>
<td>Biocompatible Sensor Platform</td>
</tr>
<tr>
<td><strong>Range</strong></td>
<td>Emitter Assembly</td>
<td>Detector Assembly</td>
<td>Adult/Neonatal</td>
<td>Adult</td>
<td>Adult/Pediatric</td>
</tr>
<tr>
<td><strong>Unique Features</strong></td>
<td>660 nm/880-940 nm</td>
<td>- Low Cost</td>
<td>- Low Cost</td>
<td>- Latex Free</td>
<td>- Silicon Boot</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Dual Drive</td>
<td>- Fast Response</td>
<td>- Lightweight</td>
<td>- Sensor Dependent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Clear Epoxy Lens</td>
<td>- High efficiency</td>
<td>- Microfoam/Cloth</td>
<td>- Sensor Dependent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Sensor Dependent</td>
<td>Sensor Dependent</td>
<td>- Soft Pads</td>
<td>- Sensor Dependent</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-55°C to 70°C</td>
<td>-55°C to 70°C</td>
<td>- Lightweight</td>
<td>-55°C to 70°C</td>
</tr>
<tr>
<td></td>
<td></td>
<td>4.4 x 5.1 x 1.9</td>
<td>4.4 x 5.1 x 1.8</td>
<td>- Easily Cleaned</td>
<td>-55°C to 70°C</td>
</tr>
<tr>
<td><strong>Accuracy</strong></td>
<td></td>
<td></td>
<td>Sensor Dependent</td>
<td>Sensor Dependent</td>
<td>Sensor Dependent</td>
</tr>
<tr>
<td><strong>Operating Temp</strong></td>
<td></td>
<td></td>
<td>-55°C to 70°C</td>
<td>-55°C to 70°C</td>
<td>-55°C to 70°C</td>
</tr>
<tr>
<td><strong>Dimensions (mm)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Typical Apps</strong></td>
<td>- Pulse Oximetry</td>
<td>- Pulse Oximetry</td>
<td>- Pulse Oximetry</td>
<td>- Pulse Oximetry</td>
<td>- Pulse Oximetry</td>
</tr>
<tr>
<td></td>
<td>- Finger/Ear Probes</td>
<td>- Finger/Ear Probes</td>
<td>- Disposable</td>
<td>- Disposable</td>
<td>- Disposable</td>
</tr>
<tr>
<td></td>
<td>- Disposable</td>
<td>- Disposable</td>
<td>- Disposable</td>
<td>- Disposable</td>
<td>- Disposable</td>
</tr>
</tbody>
</table>
Measurement Specialties is a unique sensor business that combines the strengths and experiences of several merged sensor companies to resolve challenging physical measurement problems. Our products have a proud lineage from the pioneering work of ICSensors in MEMS (micro electro-mechanical systems) technology and Schaevitz in inductive position sensing. During the last decade we have invested nearly $180 million to expand our product offering and enrich our technical capabilities through additional strategic acquisitions, including:

- Intersema Sensoric. Low power, MEMS pressure sensors, electronics and custom modules.
- Humirel. Capacitive humidity sensors and modules, as well as multi-parameter sensing assemblies.
- HL Planartechnik. Planar mass air flow elements, multi-layer magneto resistive sensors, thermopiles and various custom thin film MEMS structures.
- ENTRAN / FGP. Custom pressure, force, acceleration and torque sensors.
- BetaTHERM / YSI / Atexis. NTC, PTC and thermocouple temperature sensors and custom probes.

Today, united under the MEAS brand, our multinational workforce of 2500+ is dedicated to the design and manufacturing of sensors for customers in more than 60 countries. We have design engineering and manufacturing locations strategically positioned around the globe in order to put resources close to our customers.