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TechniTalk

This Issue

The latest by email

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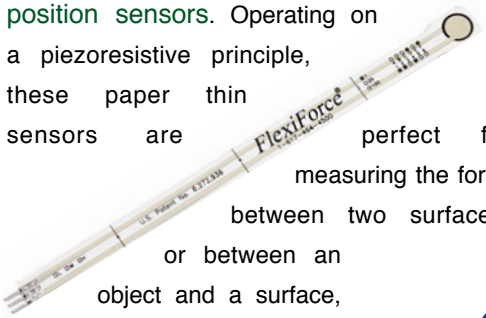
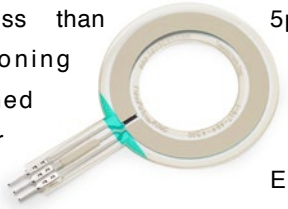
Introduction of Tekscan FlexiForce & FlexiPot

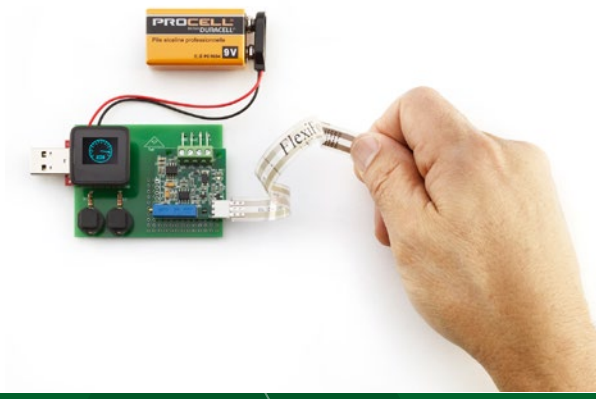
We are excited to introduce the FlexiForce™ and FlexiPot™ range of sensors from USA manufacturer Tekscan to complement our existing range of load, force and position sensors. Operating on a piezoresistive principle, these paper thin sensors are perfect for measuring the force between two surfaces, or between an object and a surface, or even used as push button controls in human-machine interfaces. A wide range of standard sensors are available for prototyping and initial development work and, as they are manufactured using a printing process, custom sensors are quick and cost effective to deliver. Force measurement range is from 4N up to 31kN with typical linearity of ±3% and response time less than 5µs. Signal conditioning can be performed either with USB or wireless (WiFi) E L F ™ (Electronic Load & Force) systems, or via straightforward user-built circuits with an OEM development kit available for fast proof-of-concept & prototyping.





FlexiPot™ sensors are available to sense tactile position and can be used for control or measurement applications. Linear strip and ring type versions are available as standard and customisation is possible. FlexiForce™ and FlexiPot™ sensors can be used in robotics, medical devices, dental measurements, inventory management, industrial process control, manufacturing, condition monitoring, sports & fitness training devices, interactive gaming and many, many other applications limited only by your imagination! If you have any applications requiring the measurement of load, force or position please get in touch and one of our engineers will be happy to discuss your application in detail and offer a solution.

Tekscan™



Airborne Sensors

Techni Measure supply a variety of sensors for use in aerospace applications.

Dytran Instruments have a range of accelerometers for vibration measurements in fixed & rotary wing, launch vehicles and space flight. CAN-MD® accelerometers have been developed with a digital interface and on-board processing, allowing raw vibration data to be reduced within the sensor itself and output as Condition Indicators over the CAN bus, without the need for a central system processor. This has potential applications in Health and Usage Monitoring Systems (HUMS), Flight Data Recorders (FDR's) and Airborne Flight Tracking Systems.

LORD Sensing – Stellar have a wide range of aerospace grade transducers for the measurement of load/force, pressure, temperature and displacement. Various output types are available, including digital, and customisation is possible. LORD Sensing – Microstrain have their LXRS wireless instrumentation system which has been used to greatly simplify instrumentation wiring in flight test applications.

We would be pleased to help with any airborne sensing application, please also visit our stand on the ADS Group Pavilion in Hall 1 of the Farnborough Airshow 2018.

ATEX Rated Acoustic Pressure Sensor

Dytran Instruments have introduced more sensitive versions of their rugged ATEX rated 2006V pressure sensor series, which cover ranges from ±50 to ±500psi. The new model 2006M1 offers a full-scale measurement range of ±5psi, whilst the 2006M2 can measure up to ±16.5psi. These sensors have a ¾-14 NPT mounting thread, and a rugged 5/8-24, 2-pin connector on the top for signal, power and ground. The whole sensor is internally ground isolated and hermetically sealed, and is manufactured in 300 series stainless steel, with the wetted parts being 316L. It weighs 135 grams and is 66mm long to the end of the connector. The sensors have a frequency response from 0.6 to 2500 Hz ±5% and a temperature range up to 121°C. The built-in electronics mean that they require a constant current voltage supply as the IEPE standard, and the charge converter has no voltage enhancing/generating parts. These acoustic level pressure sensors are ATEX Ex II 1G Ex ia IIC T4 Ga approved through Baseefa06ATEX0321, and these are marked on each sensor. These devices are designed for use in industrial acoustic studies, industrial pressure pulsations, pipeline leak detection, or general purpose industrial pressure measurement applications. If you have any applications, especially in hazardous environments, where dynamic pressure changes need to be measured, please let us know since we now have a good range of sensors to choose from.

New Strain Gauge Data-logger

The TDS-540 is a new data logger from TML, incorporating every function required for static strain measurement. It accepts strain gauges, strain gauge type transducers, dc voltage, thermocouples and Pt-RTDs as inputs.

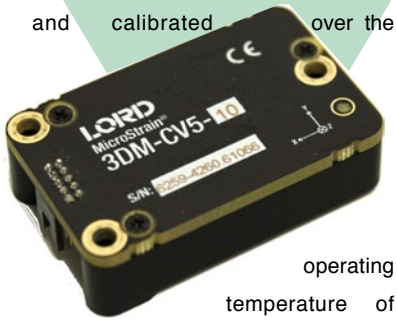
The unique measurement technique enables highly stable and accurate measurement by eliminating the effects of various thermoelectromotive forces, thermal zero shift of amplifier and power line noise. Strain measurement of up to 1000 channels is possible in 0.4 seconds by combining with optional high-speed external switching boxes, and a high-resolution mode of 0.1 microstrain is also possible. It is equipped with a newly developed remote data logger function which makes remote control possible through an internet browser and an optional wireless LAN allows measurement and monitoring of the data logger using a tablet terminal or smartphone. Other standard interfaces are Ethernet LAN, USB and RS-232C. You can easily configure a new strain measurement system according to your measurement needs with the TDS-540, and the onboard colour LCD with touch panel offers excellent intuitive operation. Often used functions are arranged in upper hierarchies, the input procedure for interval timer measurement has been simplified, and the sensor ID setting display has been improved to offer easy operation. A secure internal memory device is provided for backup of measurement data in case of SD card failure and an uninterruptible power supply circuit is provided for holding measurement data during unexpected power failure. The TDS-540 is equipped with a built-in switching box unit of 10 channels as standard and the number of internal units is expandable to 20 or 30 channels as a factory installed option, while using external switching boxes up to 1000 channels may be logged. The size of the unit is 320(W) × 130(H) × 440(D) mm, and it weighs approximately 8 kg with the standard 10 channel built-in switching box.

For further information please ask for a data sheet, or send us details of your application.

New OEM Inertial Family

The LORD Sensing 3DM-CV5 family of industrial-grade, board-level inertial sensors provide a wide range of triaxial inertial measurements and computed attitude and navigation solutions at a very competitive price. In all models, the Inertial Measurement Unit (IMU) includes direct measurement of acceleration and angular rate. In models that include computed outputs, sensor measurements are processed through an auto-adaptive extended Kalman estimation filter to produce high accuracy computed outputs under dynamic conditions. Compensation options include automatic compensation for magnetic anomalies, gyro and accelerometer noise, noise effects and temperature.

The computed outputs vary between models and can include pitch, roll, yaw, a complete attitude and heading reference solution (AHRS), or a complete position, velocity and attitude solution (PVA). All sensors are fully temperature compensated and calibrated over the



operating temperature of -40 to +85˚C. The units are built into an aluminium enclosure, are 38 mm x 24 mm x 9.7 mm in size and weigh just 8 grams. They can be directly mounted on a PCB or chassis mounted with ribbon cable and all come with a TTL serial communication, with the higher performance sensors also having a USB 2.0 connection.

The use of Micro Electro Mechanical System (MEMS) technology allows for highly accurate, small, light-weight devices. The free to download LORD Sensing MIP Monitor software can be used for device configuration, live data monitoring, and recording, or alternatively the MIP data communications protocol is available for development of custom interfaces and easy OEM integration. In order of sensor performance, the models available are 3DM-CV5-10, 3DM-CV5-15 and 3DM-CV5-25.

WSDA-2000 Wireless Gateway

LORD Sensing wireless sensor networks enable simultaneous, high-speed sensing and data aggregation from scalable sensor networks and are ideal for test and measurement, remote monitoring, system performance analysis, and embedded applications. The gateways are the heart of the LORD Sensing wireless systems, since they coordinate, maintain and synchronise transmissions across a network of distributed wireless sensor nodes. The new WSDA-2000 supports the latest LXRS+ wireless communication protocol as well as all LXRS enabled nodes, providing high-speed sampling, ±50 microseconds node-to-node synchronisation and lossless data throughput under most operating conditions. In addition to the USB connection it also allows Ethernet and J1939 CAN bus (output only) interfaces, and is configurable to operate with a static IP, a DHCP-

enabled LAN, or as a datalogger to local memory. For this, the unit is supplied with a 4GB Micro SD memory card with an optional upgrade to 8 or 16 GB. Free to download SensorConnect software enables remote configuration, acquisition, and display of sensor data, and it is easy to connect the gateway to a cellular or wi-fi modem for data access from around the world. Housed in a black anodized aluminium case measuring 147 mm x 110 mm x 23 mm without the antenna, it weighs 343 grams and requires a 9.0 to 30.0 V dc power supply. (A universal 15Vdc, 1.3A AC/DC converter is included with the starter kit). Hundreds of sensors can be managed from a single gateway, with the consequent reduction of cost & complexity associated with instrumentation wiring over long distances. Please ask for further details or share information about any wireless application, so that we can help to configure the best solution.

Rugged IMU

LORD Sensing MicroStrain are soon to release a new rugged inertial sensor aimed for off-road vehicle use but with applications in any inertial / orientation measurement application in an external or harsh environment. The MV5-AR has a CAN/J1939 interface and is housed in a IP67/69K package, 24x55x80mm. Internal shock and vibration isolation, as well as the proven on board auto-adaptive extended Kalman filter, mean that attitude/slope measurements remain reliable and stable even when the vehicle is on the move, with excellent dynamic accuracy. Temperature compensation is performed over the full operating temperature range of -40 to +85°C, with full 360degree measurement about all three axis.

MicroStrain are also about to introduce a further addition to their lower cost OEM range with the CX5 series. These utilise the same high performance sensors of the GX5 series with the OEM packaging of the CV5 series.

For further details on any of these products, please let us know so that we can send them when available.

Techni Measure Product Guide

The latest edition of our product guide is now available in both print and PDF format. Recent changes include our offerings now organised by measurement parameter and technology to assist with selection of the correct items. For more details and to request your copy please contact us.

Techni Measure On Show

We continue to exhibit at various shows across the country. We have a large selection of our current products along with live demonstrations available on our stand. Our team always welcome the opportunity to meet new and existing existing customers to discuss any products or applications where we may be able to assist. For information on which shows we will be attending please see the Exhibitions page on our website located in the 'About' section.

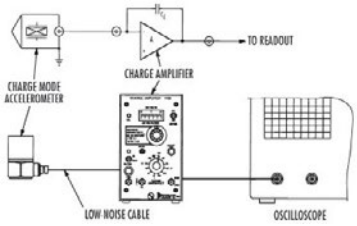
TechNote: Charge vs Voltage mode Piezoelectric Sensors

Piezoelectric sensors measure dynamic phenomena such as force, pressure and acceleration (including shock and vibration). Inside the sensor, piezoelectric materials such as quartz or man-made ceramics are stressed in a controlled fashion by the physical input of the specific phenomena to be measured. This stress "squeezes" a quantity of electrical charge from the piezoelectric material in direct proportion to the input, creating analogous electrical output signals. The task faced by the measurement system is to couple information contained within the small amount of electrical charge generated by the crystals, to the outside world without dissipating it or otherwise changing it. The quantity of charge generated by the piezo element is measured in units of picocoulombs (pC) and two types of systems have emerged as the main choices for dynamic measurements:

1. The Charge Mode System
2. The Voltage Mode (IEPE) System.

The Charge Mode System

Charge Mode sensors are usually

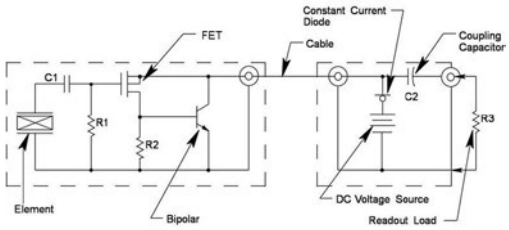


manufactured with either ceramic, eg. Lead Zirconium Titanate (PZT) or quartz piezoelectric elements. These sensors can be used with a Charge Amplifier, which is a special type of amplifier designed specifically to measure electrical charge. The charge mode system is thus composed of the charge mode sensor, the charge amplifier, and the interconnecting cable. The input stage of the charge amplifier utilises a capacitive feedback circuit to balance or "null" the effect of the applied input charge signal. The feedback signal is then a measure of input charge. Alternatively, there are in-line charge amplifiers now available which serve to condition the high impedance pC output from the sensor, to give a low impedance voltage from the amplifier, which is equivalent to a standard IEPE system. In this case the system sensitivity (mV/unit) is simply derived from the calibrated pC/unit output of the sensor, multiplied by the mV/pC output of the amplifier.

Due to the very high input impedance of the charge amplifier, the sensor must be connected to the amplifier input with low-noise coaxial cable, which is specially treated to minimise triboelectric noise, e.g., noise generated within the cable due to physical movement of the cable. Since there are no electronic components contained within the sensor housing, the upper temperature limit of charge mode sensors is much higher than the limit imposed by the internal electronics of IEPE sensors. The high temperature limit is set by the Curie temperature of the piezoelectric material or by the properties of insulating materials employed in the specific design.

The Voltage Mode System

A miniature IC metal oxide silicon field effect transistor amplifier built into the housing of the Voltage Mode sensor, converts the high impedance signal from the quartz or ceramic element to a much lower output impedance level, so the readout instrument and cable length (does not need to be low noise), have little effect on the signal quality. Because the high impedance input to the IC amplifier is totally enclosed and thus shielded by the metal housing, the voltage mode sensor is relatively impervious to external electrostatic interference and other disturbances. The sensitivity of the voltage mode sensor is fixed at time of manufacture by varying the total capacitance across the crystal element, and cannot be changed. External amplification performed in power units, or by other means can amplify or attenuate the signal but cannot change the fixed sensitivity (mV/g, mV/psi or mV/lbf) of the sensor. The Voltage Mode sensor does not require a charge amplifier, but rather a much simpler Current Source Power Unit. The power unit contains a DC power source (batteries or a regulated DC power supply), a current source element (constant current diode or constant current circuit), and a means of blocking or otherwise eliminating the DC bias voltage that exists at the centre terminal of the sensor



connector, so the signal may be conveniently coupled to the readout instrument, which may already have a built-in IEPE supply. Apart from the temperature limitation of the built-in electronics, most applications can use an IEPE sensor.

Please ask for advice if you are unsure about which is the most appropriate technology to use.

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