ISSUE 28
Autumn / Winter 2016

TechniTalk

This Issue

The latest by email

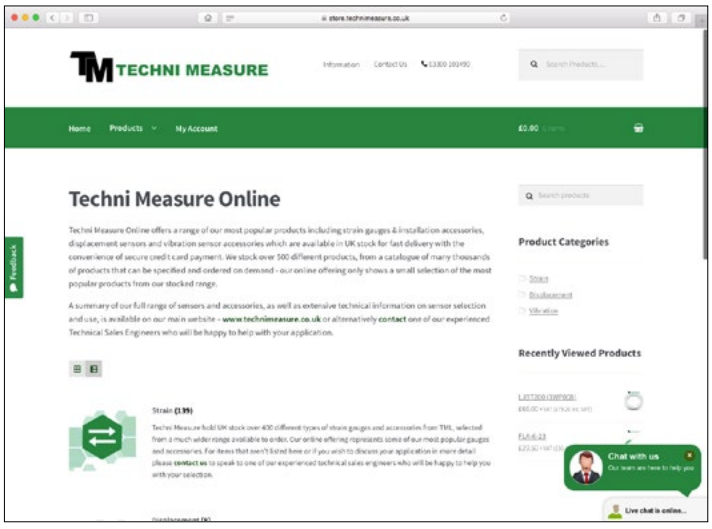
To ensure you always get the latest news on products and innovations we offer our popular updates by email option which includes the biannual TechniTalk.

Make sure you are always up to date by signing up via our website contact page or email sales@technimeasure.co.uk.

www.technimeasure.co.uk

New Techni Measure Online Store

As part of our continual aim to improve our service offering we are excited to announce the launch of our new online store. Techni Measure Online offers a simple way to purchase strain gauges, displacement sensors and accessories with live stock information, fast delivery and the convenience of secure credit card payment. In-stock items are shipped the same day for all orders placed before 2pm, via fully tracked next day courier with a timed delivery slot notification.



Currently the new store may be used to purchase a selection of our most popular strain gauges, linear potentiometric displacement sensors and a variety of installation accessories such as adhesives, cables and accelerometer mounting studs. We aim to increase the Techni Measure Online product offering over time, based on customer use and feedback. The store is designed for ease of navigation with measurement parameter being the top level category and sensor type as the sub-category, which is aligned with our new product guide.

If you require any assistance whilst browsing then you can either call us via telephone or we have now included a new live chat feature that is embedded within the store as well as on our main website for any technical information or advice on product selection or on your specific application. If the product that you require is not listed on the on-line store then do make sure to contact us as we hold a much wider range of sensors and accessories in UK stock and available on back order - we currently list a very limited product selection within Techni Measure Online.

We hope that our new online store can streamline and simplify the ordering experience for both new and existing customers and we will welcome any feedback as we continue to develop our services.

Multi-Channel Capacitive Amplifier

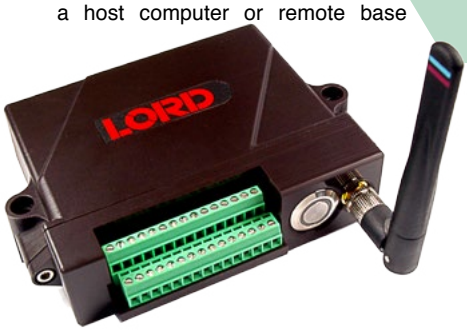
Capacitec have recently announced a brand new line of switching multi-channel amplifiers for use with their extensive range of capacitive non-contact displacement, gap and bore sensors. The new 508-SW multiple channel signal conditioner returns excellent linearity & stability across up to 8 channels with power & data output

via USB as standard and optional Ethernet or Bluetooth interfaces. Each unit has an integral 18bit analogue to digital converter with 0.05% FS linearity and is manufactured according to user specification from 1 to 8 channels with the switching frequency being up to 500Hz. Thus the 8 channel version allows 62.5Hz per channel with 5 channels being 100Hz per channel. A total of 8 displacement or 4 gap sensor calibrations can be stored internally. This switching configuration is ideal for a large number of industrial process displacement, gap and bore measurements such as parallelism of nip roller tools or accurate gap adjustments in many devices such as high speed inkjet printer heads. We will be happy to give advice and information about capacitive or other non-contact sensing systems.

New V-Link-200 Wireless Node

LORD Sensing MicroStrain has introduced a new version of their popular wireless multi-channel node. The V-Link-200 Wireless 8-Channel Analogue Input Sensor Node features 4 differential input channels with optional single strain gauge bridge completion, 4 single ended ±10 volt input channels, and an internal temperature sensor channel.

This new design V-Link allows a typical accuracy of 0.1% of full scale, and supports a wide range of user-supplied Wheatstone bridge and analogue sensors including strain gauges (≥ 120 Ohms), load cells, torque, pressure, acceleration, vibration, displacement, geophones and more, and enables measurement and monitoring in remote applications. The node can log data to its internal memory, which is now increased to 8 million data points, or transmit real-time data to a host computer or remote base



station at user programmable data rates. The new LORD Sensing SensorConnect software supports configuration of the wireless node including a new programmable anti-aliasing filter, initialisation, radio frequency, sample rate, reading/ writing to node EEPROM, calibrating node sensors, managing node power including sleep, wake, and cycle power, and upgrading node firmware.

The node comes packaged in a 127 x 100 x 33mm (plus antenna) moulded polycarbonate housing with DIN rail mounting and bolt-down holes, which also houses four replaceable 3.6V lithium AA batteries. External power can be supplied if required. The standard version is designed for indoor use and an IP-67 option will be available soon. The V-Link is compatible with any of the LORD Sensing WSDA base stations, and applications would include rotating component monitoring, health monitoring of aircraft, structures and vehicles, and experimental test and measurement.

For more information about this wireless sensor node, please ask for a copy of the new V-Link-200 leaflet. We would be very pleased to discuss any application that you may have for wireless sensor monitoring.

New LORD Sensing Stellar Range

Techni Measure is pleased to announce the addition of LORD Sensing Stellar to our product range. Stellar manufacture a large range of strain gauge type transducers for measuring load and pressure along with sensors for temperature and also LVDT's for displacement measurements.

In addition to the standard mV/V outputs, many ranges of both their pressure and load cell sensors are also available with amplified outputs to provide voltage, 4-20mA, or digital RS232 or CANbus interfaces. Wireless sensors are also available, compatible with the LORD Sensing – Microstrain wireless instrumentation system. Stellar can provide custom engineered solutions where their standard products will not quite meet a required specification, but already within their standard range are several unique designs. Load cells are supplied with ranges from a few grams to over 900,000 kg tension or compression operation, with accuracies possible up to 0.03% FS. Stellar can provide submersible

LORD SENSING
Stellar Technology

units, fatigue-rated designs and load cells with multiple outputs, as well as intrinsically safe models.

Pressure sensors are supplied with ranges from 1 to 100,000 psi and with absolute, gauge, differential, vacuum and barometric references.

We would be pleased to offer our help in defining which sensor would be best to use in any given situation. Typical application areas for these types of sensors would include aerospace, automotive, marine, industrial automation and power generation.

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Ground Isolated 538°C Accelerometer

The latest addition to the Dytran range of high temperature accelerometers is the model 3316C2, which is an electrically isolated ultra-high temperature piezoelectric charge mode sensor designed to operate reliably in temperatures up to 538°C. This workhorse accelerometer is characterised by its small size and by an internal electrical isolation design that eliminates the need for an additional isolated mounting block to prevent ground loop interference.

A unique, single-crystal, planar shear charge mode sensing element mounted in a miniature hermetically sealed Inconel housing enables the 3316C2 to operate at extremely high temperatures over long periods of time. Model 3316C2 employs Silver Window ™ technology, a Dytran patented feature. A “silver window” on the top cover of the accelerometer housing allows a diffused oxygen molecule to pass through at high temperatures, replenishing oxygen to the crystal while maintaining the hermetic seal integrity. This innovative feature assures continued high temperature operation with no loss of insulation resistance due to oxygen deprivation. The Dytran model 3316C2 weighs 13g and has a height of just 12.5mm, making it ideal for use in tight locations that are inaccessible to larger accelerometers. The calibrated sensitivity is between 1 and 2 pC/g with the exact sensitivity being provided on the calibration certificate supplied with each sensor, and the upper frequency response is 5kHz (±10%). The 3316C2 has a 10-32 tapped hole for mounting, and 10-32 side cable connector. Typical applications for this sensor would be for turbine engine test cell and exhaust manifold testing, nuclear reaction cooling tubes and automotive engine vibration studies.

We would be pleased to offer our advice on the use of these sensors, or for any other vibration sensor in the extensive Dytran range.

Introducing CAN-MD™ Digital Network

Dytran Instruments and Sage Machinery Diagnostics have formed a partnership to bring a new generation of advanced diagnostics systems to the vibration health monitoring (VHM) field.

The result of this collaboration is the innovative CAN-MD™ (Controller Area Network – Machinery Diagnostic) platform, a bus-based, digital smart accelerometer network with configurable software for machinery health monitoring and diagnostics. Bus-based digital sensors eliminate the need for individual cables from each analogue sensor to a central box, since CAN-MD™ spreads the digital signal processing (DSP) over the entire network. Raw acceleration data is processed within each sensor and results are reported as condition indicators via CAN bus. Standard IEPE type sensors can also be incorporated by using the in-line interface module 4760A. The analysis software on board each sensor is user-configurable so it can be optimized for any application.

Due to its success in the automotive sector, CAN technology has attracted the attention of manufacturers in other industries, including process control, textiles and medical instruments. CAN has also been adopted within aerospace applications because of its cost effective and efficient networking capability. CAN-MD™ reduces installed weight, simplifies wiring runs, and reduces the complexity of the vibration portion of Health and Usage Monitoring Systems (HUMS) on rotorcraft. It is also used on fixed-wing aircraft, industrial off road machinery and heavy equipment vehicles. CAN bus operates at data rates of up to 1 Mbit/s for cable lengths less than 40 meters, and the data signal is normally transmitted on a twisted pair of wires. Looking ahead, CAN-MD™ is ideal for autonomous vehicle monitoring where no operator is present to identify impending mechanical issues that could affect vehicle safety or operation.

Please let us know if you want to learn more about CAN-MD™ advanced machinery diagnostic technology.

High Sensitivity Triaxial Accelerometers

Dytran have recently introduced a 500mV/g lower cost triaxial accelerometer. The models 3583AT and 3583BT offer high sensitivity with a low noise output. Both are IEPE type sensors and are TEDS compatible, with the 3583AT being adhesive mount, and the 3583BT being stud mount. These accelerometers utilise shear design piezoelectric ceramic sensing elements which, coupled with low

noise electronics, give an excellent signal to noise ratio with a noise floor of 0.0002g RMS and a frequency response of 0.25Hz to 4kHz. Both models are packaged in a base isolated 20.3mm cube epoxy sealed red anodised aluminium housing, have a 4-pin titanium alloy connector and weigh 27grams. These sensors are ideal for modal analysis, general triaxial vibration measurements, squeak & rattle and NVH measurements, where high sensitivity coupled with a good frequency response are an important consideration. A useful addition to the already large Dytran range of triaxial accelerometers; we will be very pleased to discuss any application that you may have for triaxial vibration measurements.

Techni Measure Product Guide

The latest edition of our newly formatted 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.

ISO 9001

Techni Measure is proud to be ISO 9001 accredited to help us ensure the best possible quality of service to all our customers. More information along with a copy of our latest certificate is available on our website.

ISOQAR REGISTERED
UKAS MANAGEMENT SYSTEMS 0026

Cert Number 1960
ISO 9001

In our last Newsletter earlier this year, we discussed the use of the 4-20mA current loop to help in the transmission of signals over long lead wires, and it was stated that when sending voltages over long distances, lower voltages will be received at the other end of the cable due to wiring and interconnect resistances. This is particularly true for the very low voltages involved in strain gauge circuits, and especially for single gauge measurements. In order to help record accurate strain measurements it would be important to take into account the total resistance of the connecting wire, by calculating the effect on the gauge factor of the strain gauge and adjusting that as necessary. 2-wire and 3-wire systems would have a slightly different calculation as shown in figure 1.

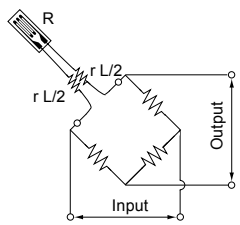
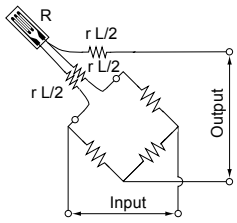
Quarter Bridge with 2-wire	Quarter Bridge with 3-wire
	
Correction coefficient of lead-wire : A $A = \frac{R}{R + r\,L}$ Corrected Gauge Factor : K_0 $K_0 = \frac{R}{R + r\,L}\ K = A \cdot K$	Correction coefficient of lead-wire : A $A = \frac{R}{R + \frac{r\,L}{2}}$ Corrected Gauge Factor : K_0 $K_0 = \frac{R}{R + \frac{r\,L}{2}}\ K = A \cdot K$
where R : Nominal gauge resistance in Ω r : Total resistance per meter of leadwire (Ω/m) K : Gauge Factor shown on package L : Length of leadwire in meter	

Figure 1

Back in TECH*note* issue 14 (2008) we reported details of the single gauge 4-wire system that TML have developed to overcome voltage loss due to long wires or poor connections - please ask for further details of this method if required.

Signal degradation is also possible when using long lead wires in other voltage systems such as the IEPE circuit used for piezoelectric sensors. Since these are AC type signals the degradation usually consists of voltage amplitude reductions, wave shape changes and phase or delay changes. As with strain gauge wiring, smaller diameter cables will cause greater losses, but large cables can add expense and weight to an installation, so the choice is often a compromise.

In an IEPE circuit the cable capacitance appears directly across the source terminal of the amplifier, so cable capacitance can become a significant factor when long cables are being used. This capacitance loads the amplifier and can cause signal distortion, especially at higher frequencies (see figure 2).

This type of distortion is caused by “slew rate limiting” as seen in operational amplifier circuits when the specification is exceeded. Figure 2b shows a result of insufficient drive current as it might affect the result of a waveform that might be generated by a shock tube wave-

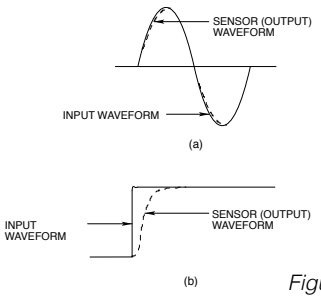


Figure 2

front acting on an IEPE pressure transducer.

The solution to these problems is to increase the sensor drive current sufficiently to eliminate the distortion. See figure 3 to note the effect of changing the drive current for longer lead wires.

However the drive current should only be increased if needed since the integrated circuit (IC) amplifier used in most IEPE sensors is necessarily very small, and its heat dissipation properties are limited. Low values of drive current also keep junction temperatures low, minimising thermal stress and prolonging amplifier life. Another factor associated with drive current is that the background noise level of the IC amplifier is lowest when drive current is low. Other solutions for long lead wire problems could be to employ a wireless system, a CAN bus system or even to use a fibre optic sensor if possible. If you have any questions about using long cables then please ask for our advice.

Drive Current	Cable Length @30 pF/ft	Frequency Response ±5% Output Signal Amplitude	
mA	Ft.	± 1V	± 5V
2	10	500 KHz	50 KHz
	100	80 KHz	16 KHz
	1000	8 KHz	1.7 KHz
5	10	600 KHz	200 KHz
	100	150 KHz	50 KHz
	1000	25 KHz	5 KHz
10	10	700 KHz	300 KHz
	100	300 KHz	100 KHz
	1000	40 KHz	10 KHz
20	10	1300 KHz	900 KHz
	100	500 KHz	150 KHz
	1000	70 KHz	20 KHz

Figure 3

TECHNI MEASURE

Measurement and control systems for industrial and research applications