

TM

TechniTalk

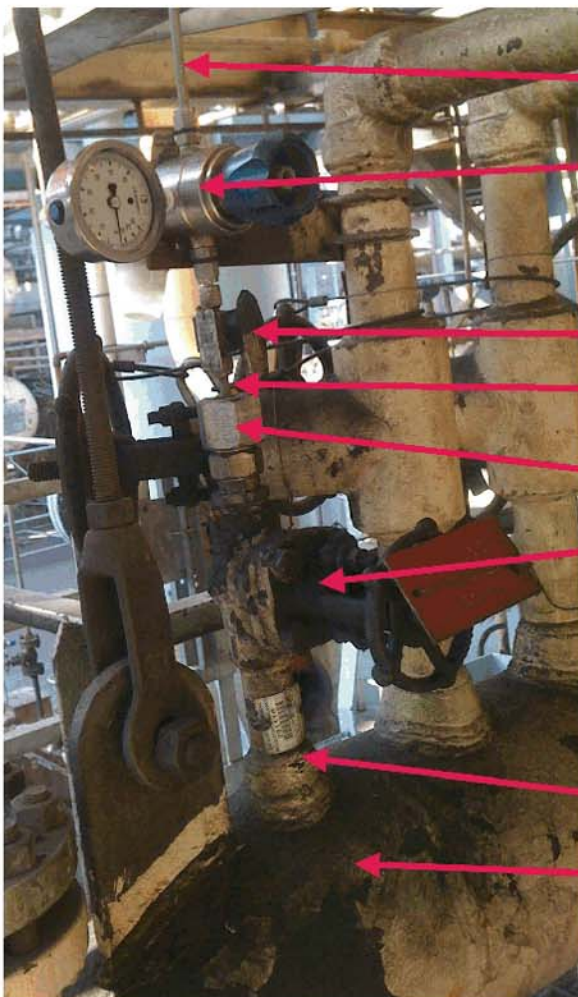
Winter 2013

Welcome to the Techni Measure Newsletter

Whether you are reading this for the first time or have been following our series of publications, we hope that our twenty first edition of **TechniTalk**, continues to inform readers of new products, whilst providing technical suggestions on how or where these products might be used. If you are reading this for the first time and want to be added to our contact list for future copies, or you would rather receive this publication electronically in the future, please let us know.

Sample Probe Installation

Taking samples of process media without stopping or interfering with the process, can be achieved with a system that allows a sample tube to be pushed into the process pipeline to extract a sample for analysis. The picture below shows a typical Sample Probe installation, with added notes pointing to the different components in the system. This actual application is for a 1/4" sample probe on a Reformer-Recycle Gas Moisture Analyser. The process pipeline is 8" diameter and it is operating at 640 psi and at 150°F. The cap of the sealing gland is loosened so that the Sample Probe tube can be inserted into the pressurised environment. Once the sample is taken, the Probe is then extracted from the process pipeline and the sealing gland tightened again. For further details of these Sample Probe Assemblies (SPA), please see the article inside this Newsletter.



Tubing carries Gas or Liquid Sample to Process Analyser

Pressure Regulator with Gauge

Needle Valve

Conax Sample Probe

Conax Packing Gland threaded into Valve

Process Isolation Valve with RED Warning Tag that reads:
WARNING
PROBE INSTALLED
DO NOT CLOSE

Process Pipeline Nozzle

Process Pipeline

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Issue 21

New DC Accelerometer



Dytran Instruments have just released a new version of their high performance, variable capacitance (VC) accelerometer. The 7700A series is a family of DC response accelerometers that were designed, utilizing a capacitive sensing element and an advanced ASIC, to simulate the operation of a strain gauge bridge in order to directly replace piezoresistive units in new or existing applications, but they also have the same form factor as a standard piezoelectric sensor.

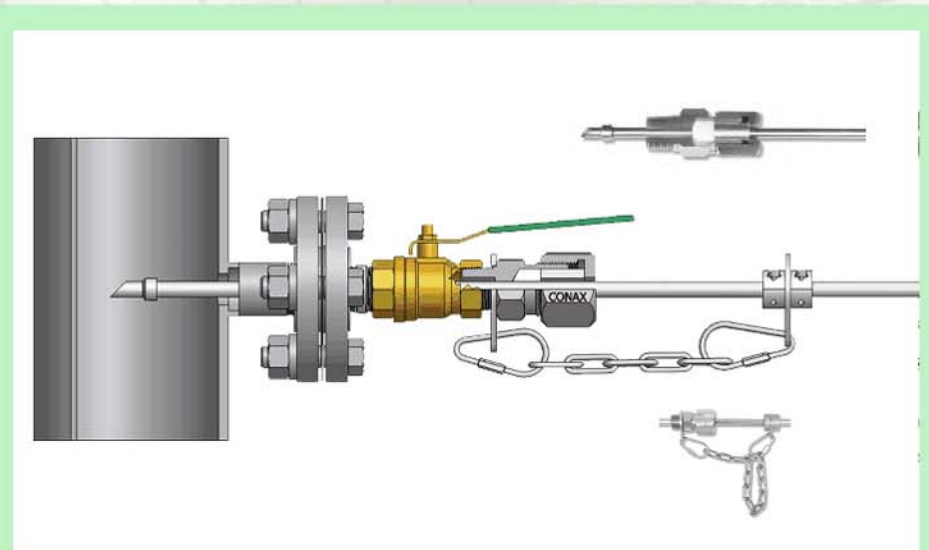
The 7700A series sensors are available in six models with ranges from 5g to 200g, and are tailored for zero to medium frequency instrumentation applications. The hermetically sealed titanium housing contains a micro-machined capacitive sensing element, a custom integrated circuit amplifier, and differential output stages. The sensor weighs 8 grams, incorporates a M4.5 X 0.35, 4-pin radial connector, and a 10-32 tapped mounting hole. On-board regulation is provided to minimize the effects of supply voltage variation, and it is relatively insensitive to temperature changes and thermal gradients. The cable shield is electrically connected to the titanium case, but the power and signal wires are isolated from the case. The unique benefit of the 7700A series is that while they utilize variable capacitance technology, they are powered with the same power supply required for piezoresistive and strain gauge sensors. The 7700A series of accelerometers respond to both DC and AC acceleration, with typical applications being for bump testing, air bag testing, ride quality, flight-testing and seismic monitoring. Please ask for further details on this new series of DC accelerometers, or for any advice you may need on any suitable applications.

Environmental Wireless System



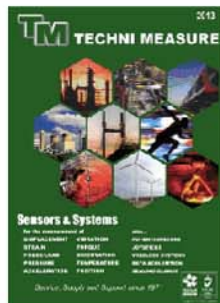
MicroStrain have introduced a new wireless system specifically designed for use with various environmental measurement sensors. The ENV-Link-Mini-LXRS accommodates a relative humidity/temperature (RHT) sensor, and 3 additional 0-5 VDC sensors. Possible sensors include pyranometer (light measurement), soil moisture, leaf wetness, rain gauge, wind speed and direction, water level, barometric pressure, conductivity, strain gauges, thermocouples, etc. Multiple units may be deployed up to 1km away (line of sight) from the wireless base station, and data is either stored locally or forwarded to a cloud server, providing analysis tools, scripting, alerts, and downloads. Long-life batteries allow long term unattended data acquisition. At the heart of a network of these nodes are the WSDA® base stations, which use exclusive beaconing protocols to synchronize precision timekeepers embedded within each sensor node in the network. The WSDA® also coordinates data collection from all sensor nodes. Users can easily program each node on the network for simultaneous, periodic, or burst mode sampling with the Node Commander® software, which automatically configures network radio communications to maximize the sample rate. Synchronized data collection, combined with LXRS data acquisition, allows users to select lower sampling rates, because there is no need to over sample. In many cases, users can also use reduced radio transmission power levels, which leads to longer battery life and enables energy harvesters to be used in lieu of primary batteries. Applications include environmental monitoring, precision agriculture, crop maintenance, and ecological research. For additional information on this new system, or for advice on any of the other wireless systems available from MicroStrain, please let us know details of any possible application.

Product News



Sample Probe Assembly

The Conax Technologies' Sample Probe Assembly (SPA) is used to hot-tap a probe into a process through a process isolation valve. The system is based on their PG series pressure sealing gland that is designed to seal a single tube against high pressure and at high temperatures. The use of flexible sealants, allows the gland to be loosened off whilst the probe is slid into the process media in order to take a sample. Temperature and pressure ratings for static conditions vary depending on the sealant material and the diameter of the tube to be sealed, but pressure ratings are reduced when the sealing gland cap is loosened to allow for the insertion or extraction of the Sample Probe. Optional materials for the Sample Probe Assembly and the Conax Technologies' Packing Gland (PG) body (wetted components) are available. Available material options include 316L SST, 316 NACE SST, 316L CRN, Monel 405, Hastelloy C276 and Inconel 600. Sample Probe Assemblies and/or PG Gland bodies can be supplied with a Silcosteel®-CR or Sulfinert® coating, and standard Sealants are Teflon®, PEEK™, and Grafoil®. Other sealants are available for special applications. The stop collar is plasma welded onto the sample tube, and there is an optional retaining chain kit to prevent the tube from fully retracting. Typically, when properly installed, the angled Sample Probe tip should have the long side upstream, thus reducing any particulates entering the Sample Probe and into the process analyzer filter. Applications include process analysis, flare stack emissions, waste or potable water sampling, and hot tapping of liquid or gas streams. For more information about this system, please ask for a copy of the SPA leaflet. We would be very pleased to discuss any application that you may have for high temperature and pressure sealing glands.



New Techni Measure Short-form

The latest edition of the Techni Measure short-form catalogue that contains a brief summary of all our products, is being prepared for publication later this month. These will be available on all exhibition stands throughout 2013, and will be carried by our engineers on any visit they make, but if anyone wants a copy sent to them when it is released, then please let us know.

3-Channel Capacitance System



Capacitec has introduced the Gapmaster3 Gen3, which features up to three newly designed capacitance amplifiers providing users with one to three non-contact displacement measurement sensor channels in the measurement system. Sensors can be selected from displacement sensors (HPB, HPC, HPT) or single point gap sensors (HPS, GPS). The Gapmaster3 Gen3 features a three-line display indicating the real-time measured gap distances in engineering units. The hand held meter is a fully portable package powered by 3 AA lithium batteries with a minimum battery life of 14 hours with continuous use. A Unit selector button allows inches, mils, millimeters or microns to be selected, to show on the bright blue alphanumeric Active Matrix OLED display. An industry standard USB Type A combination data output and external power port is included, and a simplified PC user interface is available via the supplied Gapman Reader software. With a compact form factor measuring just 56 x 220 x 28 mm and weighing approximately 450 grams, the Gapmaster3 Gen3 features improved high-precision capacitive sensing technology than its predecessor, and comes in an impact resistant highly rugged enclosure. The Gapmaster3 Gen3 conditions standard and custom sensor probes that are backwards compatible, and can be used to effectively measure gaps within a wider range of applications including semiconductor wafer parallelism, 2 to 3 point slot die coater to media parallelism, roller parallelism, engine fan blade gap measurement and generic 1, 2 or 3-point dimensional measurement. Please ask for further details on this new system, or for any advice you may need for any non-contact displacement or gap measurements.

Down-hole Orientation Sensor

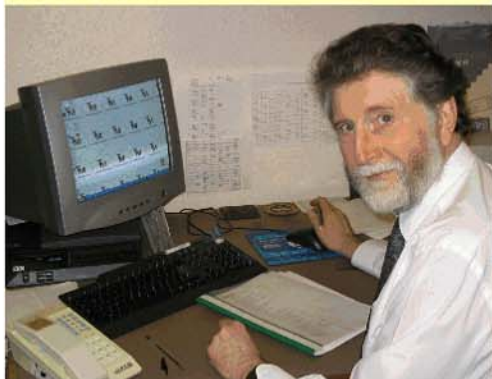


The MicroStrain 3DM-DH3™, is a downhole orientation sensor and datalogger. It incorporates acceleration sensors, magnetic field sensors, and temperature sensors, together with an on-board microprocessor, embedded software algorithm, non-volatile memory for configuration, flash datalogging memory, and a serial communication interface. Its form-factor, rated temperature range and power supply requirements are optimized for downhole applications. The 3DM-DH3™ provides accurate drill path measurements and can be deployed out of the box for immediate use in downhole operations, integrated into an existing system to provide an electronic measurement component, or incorporated into an OEM product. Physically, the 3DM-DH3™ is easily mounted into the drill string using its body's threading attachments. It can be tethered to an RS-422 communication cable for continuous real-time measurements to a host computer during drilling operations, or it can be remotely deployed and run as a datalogger, with data retrieval after it has been run through the drill path. The unit can be powered through the communication cable tether from a platform source, or by batteries. It is supplied with easy-to-use PC software which allows the user to configure and operate the instrument, view real-time measurements, or download logged data for post-processing. The 3DM-DH3™ comes with a Data Communications Protocol manual which provides the developer with a complete instrument command set so that custom applications can readily be developed in any coding language, and on any computing platform. We would be pleased to discuss any application where this module could be used.

Who's Where ?

We are showing again in this issue a picture of Peter Freeman. After being with us since 1993 he has finally reached retiring age and is now spending more time at home. He has agreed to come in once a week, to help out, so you may still have a chance to speak with him.

He joined Techni Measure for the specific task of helping us to achieve our ISO accreditation. However his knowledge of electronics was a great addition to our technical backup team, and he would often be found in what we call our "Lab", mending or making up cables, or testing for reported faults in sensors.



Techni Measure on Show...

Exhibitions booked so far for 2013 are listed below. We would be pleased to meet with anyone to discuss possible applications for our wide range of products and if you need tickets or further information, please let us know.

13-14th February
MANUFACTURING SOUTH at
Farnborough

12th March
EIS INSTRUMENTATION at
Silverstone

4th September
BSSM-EMEX at Cardiff University

25-26th September
SENSORS & INSTRUMENTATION at
Birmingham

12-13th November
ADVANCED ENGINEERING (Auto) at
Birmingham

Please remember that if it is not possible to attend any of these shows and you need a demonstration or explanation of any of our products, we will always be pleased to visit you instead.

Tech Note

What is ... Strain ?

Whilst reviewing the content of all our previous 20 Newsletters, we were surprised that there has been no real mention of our free 8 page leaflet "Introduction to Strain Gauging", that outlines what a strain gauge does and how it can be fixed to a surface and wired for different outputs. Since the supply of strain gauges is such an important part of our sales activities, and we often draw on our years of experience to give appropriate advice when required, this leaflet has been useful in helping many people who are starting out in the strain gauging field. A copy of the front page of this leaflet is shown below, and if you need your own copy, please contact us.



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INTRODUCTION TO STRAIN GAUGING

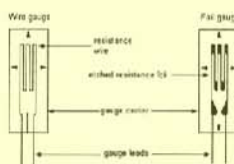
Strain Gauge Applications

Strain gauges are used to determine or verify component or structure stresses, or by manufacturers of load cells, pressure and torque transducers, etc., where they utilise the physical parameter being measured to strain a part of the transducer in a linear way.

Strain

Stress itself cannot be directly measured but strain can, and for many materials within their elastic limit, there is a linear relationship between stress and strain. For uniaxial loading conditions, stress divided by strain is a constant known as Young's Modulus of Elasticity for the material. Thus, if strain can be measured, stress can be calculated.

Strain is defined as the linear deformation of a material. It can occur as the result of the application of force or of temperature change. Unit Strain, ϵ , is the ratio of change in length divided by original length. This $\frac{\text{inch}}{\text{inch}}$ or $\frac{\text{mm}}{\text{mm}}$ ($\frac{N/L}{L}$) dimensionless ratio is generally a very small decimal fraction, and is therefore usually multiplied by 10^6 , becoming "microstrain", $\mu\epsilon$. Percentage strain is a term also used and the table below gives some conversions.



Strain $\frac{\text{mm}}{\text{mm}}$	Percent Strain	Microstrain
0.0005	0.05	50
0.005	0.5	500
0.01	1	1,000
0.2	2	20,000
1	10	100,000

Strain Measurement

Strain can be measured using many techniques, but the resistance strain gauge is generally the most direct and convenient tool. Once bonded to the surface of the material, any physical strain in the material is transmitted to the strain gauge's resistive element. This then experiences a proportional resistance change which in turn can be measured using appropriate instrumentation.

Strain Gauge Types and Construction

Both wire and foil strain gauges take the form of a grid pattern mounted within or onto an insulating carrier, capable of faithfully transmitting the strain from the specimen. Weldable gauges have their resistive elements mounted onto a metal carrier. Gauges can often be supplied with their elements heat treated to provide temperature compensation for use on different materials.

The foil gauge consists of a metallic alloy film laminated onto an insulating carrier. In a similar way to printed circuit manufacturing techniques, this metallic deposit is masked and then etched to leave a resistance