

August 2014

## ROTRONIC WHITE PAPER

### Issue 1



**Rotronic is a Swiss based international manufacturer of precision measurement instrumentation.**

[www.rotronic.com](http://www.rotronic.com)

## Save time and money with modern monitoring and calibration

Companies across many industries needing to perform regular monitoring and calibration have never faced a more challenging environment. Stricter compliance requirements mean companies are under greater pressure to deliver accurate and reliable data, whilst internal budget restrictions demand the most cost effective and efficient solutions.

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### *Can modern measurement and calibration techniques help your business operations?*

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It is well known that accurate measurements reduce energy use and improve product consistency. Instrument users, calibration laboratories and manufacturers are constantly looking for smarter ways of operating and are responding with innovations that are transforming the measurement and calibration industry.

### **New ways of working**

Industrial environments are now more automated and interconnected than ever before and companies need to ensure that their infrastructure and processes have the ability to respond and adapt to industry changes. With the introduction of newer, more complex instrumentation, organisations can often be slow to recognise the additional business benefits that can be achieved by replacing a traditional method that (offers a short term result) with a more modern method (that delivers a longer term sustainable solution). Implementing a new approach can also help re-position the calibration process from being viewed simply as a cost to business to one that helps deliver improved process and energy efficiencies with a return on investment.

### **Industry advancements**

Historically, in-situ calibration has been the standard approach; however, advances in technology means that there is now a viable alternative whilst still maintaining the growing demand for on-site services. With the market moving away from analogue to digital signal processing, interchangeable digital sensors are proving to be a more practical solution for both large and small organisations alike. As businesses look for greater automation and productivity, modern interchangeable digital sensors are allowing calibration to be achieved much more quickly without the costly implications of operational downtime and on-site maintenance.

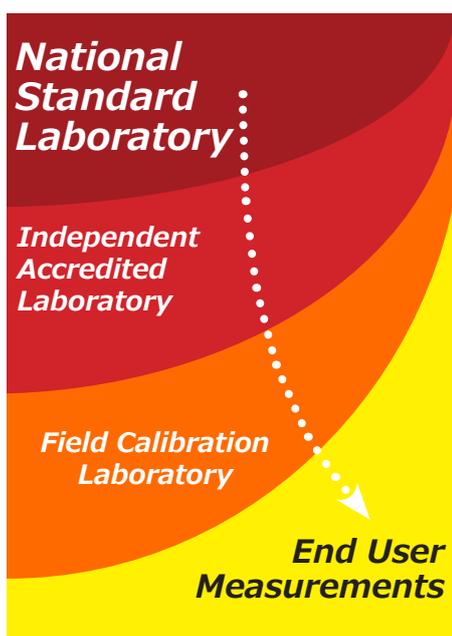
# MEASUREMENT SOLUTIONS

## Why calibrate? - The only way to confirm performance

In unsettled economic times it can be tempting to simply extend the intervals between calibration cycles or to forgo calibration altogether. However, neglecting system maintenance and calibration will result in reduced performance and a loss of measurement confidence, ultimately leading to a failure to meet compliance standards. Measurement drift over time negatively impacts on processes and quality. Regular, accredited calibration demonstrates compliance, but equally importantly, sends a message to customers that quality is taken seriously and that they can be confident in both the process and the final product.



*A check can help in assessing whether a hygrometer is functioning as expected, and whether repair or recalibration is needed.*



*What is your route to traceability?*

## Traditional In-Situ Sensor Calibration

Until recently most humidity calibrations were performed on-site in-situ. Larger organisations with multiple instruments generally found it more convenient to have their own in-house calibration instruments with dedicated technicians working on-site. Smaller organisations unwilling or unable to invest in on-site calibration equipment had the option to engage the services of a commercial calibration provider.

In most cases, trained instrument technicians are required for in-situ calibration work; the equipment is brought to the probes and generally only one probe can be calibrated at a time. One of the main disadvantages of this process is the impact that it has on production downtime, as typically a salt or chamber based calibration can take more than three hours. Moreover, as the processes or control systems are interrupted during calibration, the actual conditions can be unknown.

## Modern Ex-Situ Sensor Calibration

Companies keen to avoid the impacts of in-situ calibration and/or operational downtime caused by the replacement of failed hard wired instruments are opting instead for the flexibility and convenience of interchangeable sensors and modern portable calibration generators. Instead of bringing in equipment to calibrate in-situ, the technician brings pre-calibrated probes directly from the laboratory (on-site or external). Using interchangeable digital sensors, the pre-calibrated probes can be exchanged with the in-situ probes in seconds (known as hot swaps), saving time and avoiding operational disruption. If a wider system loop calibration is required, digital simulators are applied and provide any fixed values exactly and instantly. The old probes are then taken back to a calibration laboratory and calibrated accordingly. This adds the benefit that an external accredited laboratory can be used without issue.

## Improved accuracy and traceability?

By ensuring that all calibrations are performed within dedicated laboratories as opposed to ad-hoc locations, better procedures and instrumentation can be utilised. In addition, time pressures are usually reduced as processes and monitoring systems are unaffected during calibration. As such calibrations are typically performed to a higher standard leading to lower associated measurement uncertainty (every calibration will have an uncertainty associated with it - whether it is defined or not). Overall in most circumstances these methods deliver greater reliability, improved traceability and importantly, reduces on-site workload and limits operational downtime.

## CASE STUDY Meeting the demands at the National Physical Laboratory, London.



When the National Physical Laboratory (NPL) in London needed to replace their entire building management system (BMS), they turned to Rotronic Instruments (UK) for an integrated solution to the sensors and calibration. The NPL was looking for both a complete range of temperature and humidity sensors and instrumentation, and the fulfilment of the calibration and commissioning needs of these instruments. Working closely with the project stakeholders, the Rotronic Instruments (UK) team developed a tailored solution, matching the instruments and service to the project requirements.

The decision by the NPL to replace the BMS was brought about by the need for tighter control, greater reliability and easier calibration. One of the key elements in achieving these objectives was the use of interchangeable probes. This immediately limited time-consuming and disruptive on-site sensor calibration to a minimum. Every probe's digital output was calibrated in Rotronic Instruments' (UK) UKAS accredited laboratory, and each transmitter's analogue output was calibrated using a simulated digital input. To resolve any measurement errors in-situ between the calibrated sensors and uncalibrated BMS, each installed high accuracy instrument was loop calibrated and adjusted. Typical installations errors corrected for to date on the brand new BMS are  $\pm 0.5\%$  rh and  $\pm 0.25^\circ\text{C}$ ; a significant result for labs requiring tolerances of better than 1 %rh and  $0.1^\circ\text{C}$ .

Whilst the use of high performance instruments was essential, not every sensor location or application could justify this approach. However, mindful of the NPL's long term objectives, even the lowest specification thermistor products were customised to provide long-term performance and low drift. Additionally, a robust commissioning procedure and training for key personnel was developed to enable ongoing commitment to delivering quality measurements. Finally, it was effective communication and regular on-site interaction with all the stakeholders that helped deliver a successful outcome to this substantial project.

# MEASUREMENT SOLUTIONS

## Summary

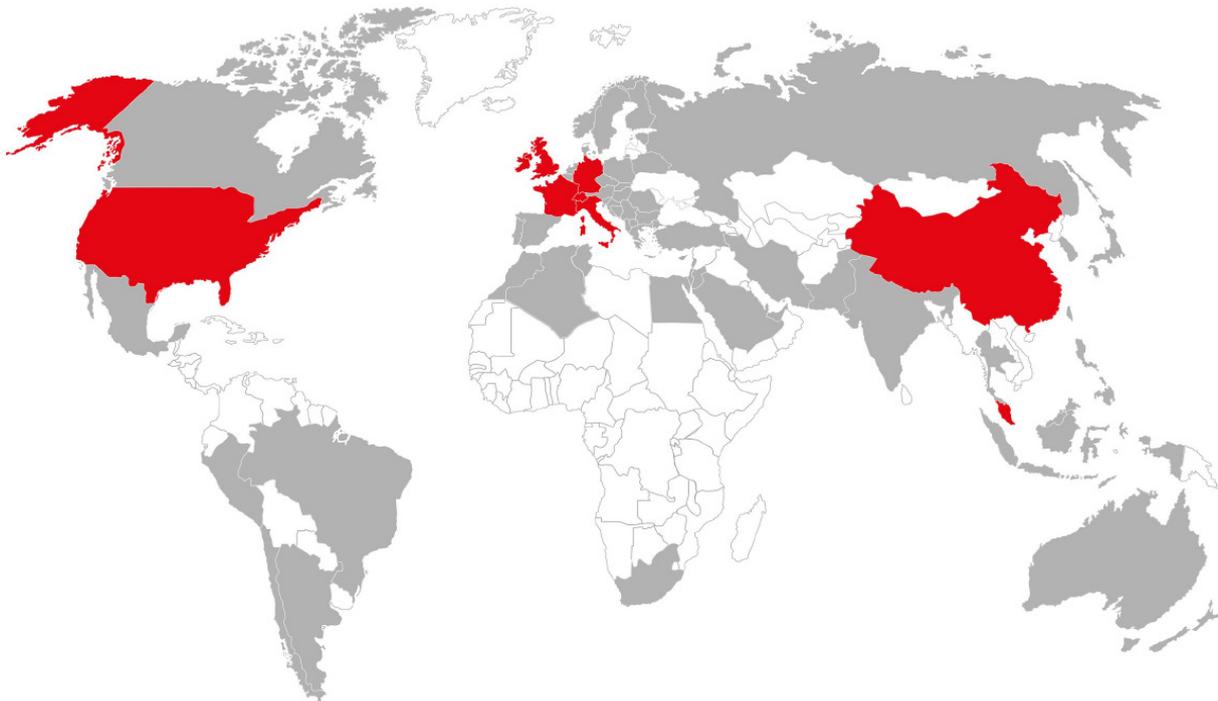
All companies that need to perform regular monitoring and instrument calibration should be constantly reviewing their processes and questioning whether their operations and procedures are delivering the maximum return for their business. As increased regulatory compliance and demands for improved energy efficiencies continue to grow, traditional processes may no longer offer the optimum solution. An organisational mindset change may be needed to move calibration from being seen as a fixed cost to a process that can help deliver business objectives through ongoing cost and energy efficiencies.

With the advent of calibration methods that can significantly reduce in-situ disruption, downtime is minimised, labour costs are reduced and productivity improved. Using interchangeable digital systems increases the accuracy and traceability of calibrations, resulting in higher quality product.

Choosing the right calibration methodology may require new thinking and a different approach, but those companies that get it right will end up with a modern, flexible system that both achieves compliance and delivers long term cost and energy efficiencies to their business.

For more information on the NPL case study or how your business can develop innovative and efficient monitoring solutions please contact us.

Rotronic is represented in more than 40 countries around the world. An up to date list of all our partners is available at [www.rotronic.com/international](http://www.rotronic.com/international)



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MEASUREMENT SOLUTIONS

ROTRONIC AG, Grindelstrasse 6, CH - 8303 Bassersdorf, Tel. +41 44 838 11 11, Fax +41 44 836 44 24, [www.rotronic.ch](http://www.rotronic.ch)  
ROTRONIC Instruments (UK) Ltd, Crompton Fields, Crompton Way, Crawley, West Sussex, RH10 9EE, UK, Phone +44 (0)1293 571000, [www.rotronic.co.uk](http://www.rotronic.co.uk)  
ROTRONIC Instrument Corp, 135 Engineers Road, Hauppauge, NY 11788, USA, Phone, +1 631 427-3898, Fax, +1 631 427-3902, [www.rotronic-usa.com](http://www.rotronic-usa.com)