

# Calibration

02 • 2009

## WORLD

A photograph of two male technicians in an industrial setting. They are wearing hard hats (one yellow, one green) and safety glasses. The technician on the left is holding a green handheld electronic device. The technician on the right is pointing at something off-camera with his right hand and holding a probe or sensor in his left hand. They are both smiling and looking upwards.

### Why Calibrate? What is the risk of not calibrating?

### Customer success stories

Siemens Energy Fossil - Field Service, UK

Total Petrochemicals USA Inc., USA

Croda Chemicals Europe Ltd., UK

Nokian Tyres, Finland

Endress+Hauser, Germany

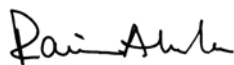
## The economics of calibration

**M**easurement and measurement-related operations have been estimated to account for between 3% and 6% of the GDP of industrial countries. The economic success of most manufacturing industries is critically dependent on how well products are made and measurement plays a key role in this.

With the financial meltdown of world markets and the ongoing economic recession, many companies have had increased pressure to find ways of reducing cost base in order to survive. Calibration is one of the cost items but still every measuring instrument used for a meaningful purpose needs to be calibrated at regular intervals to ensure it is performing within its specified limits. The risks and costs of erroneous measurements are in most cases much higher than the cost of calibration. In addition to that, many industry sectors are highly regulated and so calibration becomes even more critical.

In Spring 2009, Beamex conducted a global survey of process manufacturing companies in order to identify what the main challenges to calibration were within the different industry sectors. Most of the respondents came from oil, gas and petrochemicals, pharmaceuticals, power and energy, food and beverage, and service providers. The survey revealed clear areas for improvements as explained in more detail in a white paper of this magazine.

In spite of the general market climate Beamex has been fortunate to be able to continue to develop its own business according to the original plans. The R&D investments have remained at a very high level, the newest extension of the premises of the Beamex HQ was taken in use recently, the renovation of the older part of the factory building will be soon ready and several improvements to our internal processes and tools used are either completed or under work. We have also been able to launch a good number of new products lately and more is to come.



Raimo Ahola  
CEO, Beamex Group



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# Global survey identifies key challenges to instrument calibration



# Current market trends in calibration

**With the financial meltdown of world markets and the ongoing economic recession, most companies have had to find ways of reducing their cost base in order to survive.**

## Introduction

With the financial meltdown of world markets and the ongoing economic recession, most companies have had to find ways of reducing their cost base in order to survive.

Almost every type of business has been affected either by a fall in demand for its products or by the general financial uncertainty in the world economy. Credit is more difficult to obtain for capital expenditure projects and many companies cannot afford to look further than short term survival.

Process manufacturers – including food and beverage, pharmaceuticals, oil and gas, petrochemicals, chemicals, power and energy utility companies – have all been affected, some sectors more than others. To counter a fall in demand for their products, manufacturing plants need to become more efficient through headcount reductions, productivity improvements and by introducing more cost effective maintenance and asset management programmes across the organisation. If companies are finding it difficult to secure funds to invest in new capital equipment, then they need to be smarter about managing and maintaining their existing plant and machinery.

Processing plants typically possess a range of different instrumentation products that support their manufacturing processes. These include pressure transmitters, temperature sensors, RTDs, weighing scales,

frequency counters and flow meters.

These instruments need to be calibrated at regular intervals to ensure they are performing within their specified limits. Indeed, industry sectors such as nuclear, food and beverage and pharmaceuticals, are highly regulated and so calibration becomes even more critical in terms of meeting product quality, traceability and quality certifications.

## Global survey

In Spring 2009, Beamex conducted a global survey of process manufacturing companies in order to identify what the main challenges to calibration were within the different industry sectors. The survey also identified the number and type of instruments that required calibration within that particular plant, as well as how that company was managing its calibration process.

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*When it comes to calibration of instruments, the results from the survey showed that the greatest challenge for companies was to carry less equipment when calibrating instruments.*

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In total, there were 1,975 respondents to the survey from a variety of different industry sectors. Most of the respondents came from oil, gas and petrochemicals, pharmaceuticals, power and energy, food and beverage, and service providers.

When it comes to calibration of instruments, the results from the survey showed that the greatest challenge for companies was to carry less equipment when calibrating instruments. Almost half of all those surveyed (46.1%) agreed that this was their biggest challenge. Most companies want an all-in-one device that replaces several different items of equipment they currently use for measurement and calibration.

This problem becomes even more acute in the services and the oil and gas sectors, where a high percentage of respondents, 60.9% and 56.3% respectively, said they wanted to carry less calibration equipment because the instruments that require calibrating are usually located out in the field, in plants that are typically spread across a relatively large geographical area.

## Fieldbus ignored?

Another important challenge is in fieldbus instruments, which, although growing in popularity, are simply not being calibrated by some companies. Almost one in ten (9.9%) of those surveyed agreed that their fieldbus instruments were not being calibrated at all. The figure was even higher in oil, gas & petrochemicals (13.5%) and in the food and beverage sector (12.4%).

A high proportion of respondents also agreed that documentation relating to instrument calibration was taking a lot of time and effort. Of all those surveyed, 38.2% agreed with this statement. Documentation is clearly a growing concern for many organisations, particularly those that possess a relatively high number of instruments and who therefore need to perform a lot of calibrations at regular intervals. Two highly regulated industry sectors found this to be a key challenge for them, namely pharmaceuticals (44.0%) and oil, gas & petrochemicals (42.3%).









This problem is particularly acute in those industries where instrument calibration is managed manually (paper-based) or on a semi-manual basis (Microsoft Access, Excel, etc.). For example, in oil, gas & petrochemicals, 43.1% of respondents said that their calibration management system was semi-manual; with another 15.3% saying their system was paper-based. Only 22.8% in these industries said their system was managed by specialist calibration management software.

## Documentation errors

Another important challenge identified by respondents was 'documentation errors', which more than a third of respondents (33.7%) said were an issue for their organisation. Human error is inherent in both paper-based and semi-manual calibration management systems. Typos, lost or difficult-to-read notes and mis-keying of calibration data are common pitfalls of these systems.

Closely related to errors in documentation is the overall 'quality and accuracy of calibration records', another area identified as a key challenge by respondents (31%). Here, food and beverage companies (39.2%) and oil, gas & petrochemical plants (39.2%) both rated this area as a key concern for their sector.

Making sure that calibration data is easily accessible for audit purposes also proved difficult for many of those companies surveyed. Overall, 27.6% of those surveyed said that calibration data in their business was not readily available for audits. The problem becomes even greater if the company relies on a paper-based or semi-manual system to manage calibrations. The calibration data may be stored in multiple, different databases that are difficult to access. However, introducing a software-based calibration management system means that accessing the right files during an audit becomes relatively simple and fast.

Many survey respondents said that

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*Likewise, exporting calibration data from multiple, disparate spreadsheets and databases from semi-manual systems can be complicated, time consuming and may require special expertise, the cost of which can be prohibitive for many companies.*

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'streamlining their processes' was also a key priority for them at present. Even pharmaceutical and food & beverage companies indicated that they too were facing increasing pressure to reduce costs and streamline their business processes. These two industries are traditionally profitable, defensive sectors that do not react so quickly to fluctuations in economic activity. However, it appears that these sectors are also suffering at the hands of the global recession.

## System integration issues

More than a quarter (27.5%) of respondents said that their business had 'system integration' issues relating to instrument calibration. This challenge was a particular problem for the oil, gas & petrochemical sector (37.5%) and the food & beverage companies (35.1%). According to the survey results, 18.9% of oil, gas & petrochemical companies use some sort of software-based Maintenance Management System

(CMMS) such as SAP R/3, Maximo or Datastream.

Only 9.3% of food & beverage companies said they used a CMMS. However, their concerns about system integration issues may stem from the fact that they still rely heavily on manual calibration management systems. The survey found that 18.6% of food and beverage companies still manage their calibrations using a paper-based system.

Integrating a paper-based system into a CMMS can be an expensive, time-consuming process. The data has to be migrated from the paper system to a central database, which requires much re-keying of data. Likewise, exporting calibration data from multiple, disparate spreadsheets and databases from semi-manual systems can be complicated, time consuming and may require special expertise, the cost of which can be prohibitive for many companies.

14.4% of all respondents said that too many databases existed at their company. This relates closely to the system integration challenge and so can also act as a barrier to companies implementing a calibration management system.

Similarly, 22.1% of all respondents stated that moving to a paperless calibration management system was a key challenge for their company. This percentage increased to 29.8% in the oil, gas & petrochemicals sectors. Of course, the need to go paperless depends on whether the company can successfully integrate its paper-based records and/or multiple disparate databases around the organisation.









# Why Calibrate? What is the risk o





f not calibrating?



# Why Calibrate? What is the risk of not calibrating?

## How businesses benefit from calibration

**Calibration can be briefly described as an activity where the instrument being tested is compared to a known reference value. At the simplest level, calibration is a comparison between measurements – one of known magnitude or correctness made or set with one device, and another measurement made in as similar a way as possible with a second device. The device with the known or assigned correctness is called the standard. The second device is the unit under test or test instrument.**

Calibration is often required with a new instrument or when a specified time period or a specified number of operating hours has elapsed. In addition, calibration is usually carried out when an instrument has been subjected to an unexpected shock or vibration that may have put it out of its specified limits.

### **Calibration in industrial applications**

When a sensor or instrument experiences temperature variations or physical stress over time, its performance will invariably begin to decline, which is known as 'drift'. This means that measurement data from the sensor becomes unreliable and could even affect the quality of a company's production.

Although drift cannot be completely eliminated, it can be discovered and rectified via calibration. The purpose of calibration is to determine how accurate an instrument or sensor is. Although most instruments provide high accuracy these days, regulatory bodies often need to know just how inaccurate a particular instrument is and whether it drifts in and out of specified tolerance over time.

### **The costs and risks of not calibrating**

Unfortunately, calibration has costs

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*However, neglecting calibration can lead to unscheduled production or machine downtime, product and process quality issues or even product recalls and rework.*

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associated with it and in uncertain economic times, this activity can often become neglected or the interval between calibration checks on instruments can be extended in order to cut costs or simply through a lack of resources or manpower. However, neglecting calibration can lead to unscheduled production or machine downtime, product and process quality issues or even product recalls and rework.

Furthermore, if the instrument is critical to a process or is located in a hazardous area, allowing that sensor to drift over time could potentially result in a risk to employee safety. Similarly, an end product manufactured by a plant with poorly calibrated instruments



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could present a risk to both consumers and customers. In certain situations, this may even lead to a company losing its license to operate due to that company not meeting its regulatory requirements. This is particularly true for the food and beverage sector and for pharmaceutical manufacturers.

Weighing instruments also need to be calibrated regularly. Determining the correct mass of a product or material is particularly important for companies that supply steel, paper and pulp, power, aviation companies, harbours and retail outlets, who invoice customers based on the mass of what they supply (fiscal metering). These companies need to prove not only that the mass is accurate but also that the equipment producing the readings was correctly calibrated. Invoicing in these industries is often based on process measurements. There is therefore a growing need to have the metrological quality of these weighing instruments confirmed by calibration.

Product manufacturing also depends on accurate masses and so laboratories and production departments in the food and beverage, oil and gas, energy, chemicals and pharmaceuticals industries, also need to calibrate their weighing instruments.

### **Why is calibration important?**

Calibration ensures that instrument drift is minimised. Even the highest quality instruments will drift over time and lose their ability to provide accurate measurements. It is therefore critical that all instruments are calibrated at appropriate intervals.

The stability of an instrument very much depends on its application and the environment it operates in. Fluctuating temperatures, harsh manufacturing conditions (dust and dirt) and elapsed time are all contributing factors here. Even instruments manufactured by the same supplier can vary in their performance over time.





# Why Calibrate? What is the risk of not calibrating?



Calibration also ensures that product or batch quality remains high and consistent over time. Quality systems such as ISO 9001, ISO 9002 and ISO 14001 require systematic, well-documented calibrations with respect to accuracy, repeatability, uncertainty and confidence levels. This affects all process manufacturers.

Armando Rivero Rubalcaba is head of Instrumentation at beer producer Heineken (Spain). He comments: "For Heineken, the quality of the beer is a number one priority. All the plants in Spain have received ISO 9001 and ISO 14001 certifications, in addition to the BRC certificate of food safety. They must therefore ensure that all processes correspond to the planned characteristics, and the role of calibration is very important to ensure the quality and safety of the processes."

Pharmaceutical manufacturers must follow current Good Manufacturing Practices. cGMP requires that calibration records are maintained and calibrations have to be carried out in accordance with written, approved procedures. Typically, each instrument has a master history record and a unique ID. All product, process and safety instruments should also be physically tagged.

Furthermore, a calibration interval and error limits should be defined for each instrument and standards should be traceable to national and international standards. Standards must also be more accurate than the required accuracy of the equipment being calibrated.

On the people side, there must be documented evidence that employees involved in the calibration process have been properly trained and competent. The company must also have a documented change management system in place, with all electronic systems complying with FDA regulations 21 CFR Part 11.

In the power generation, energy and utilities industries, instrument calibration can help to optimise a company's production process or





to increase the plant's production capacity. For example, at the Almaraz Nuclear Power Plant in Spain, by improving the measurement of reactor power parameters from 2% to 0.4%, enabled the reactor power in each unit to be increased by 1.6%, which has a significant effect on annual production capacity.

Safety is another important reason to calibrate instruments. Production environments are potentially high risk areas for employees and can involve high temperatures and high pressures. Incorrect measurements in a hazardous area could lead to serious consequences, particularly in the oil and gas, petrochemicals and chemicals sectors. Similarly, manufacturers of food and beverage or pharmaceutical products could put their customers' lives at risk by neglecting to calibrate their process instruments.

Heikki Karhe is a measurement technician at tyre manufacturer Nokian Tyres. As he puts it: "Calibration is of great importance, especially from the viewpoint of production safety and quality of the final product. Preparation of the right rubber mixture is precision work and a sample is taken from each rubber mixture to ensure quality. Measuring instruments that yield wrong values could easily ruin the final product. The factory is also full of pressure instruments and so it is also important for the safety of the workers that those instruments show the right values."

Neglecting to calibrate process instruments can also affect a company's bottom line profits. This is particularly true if sales invoicing is based on accurate process measurements, for example, weighing scales or gas conversion devices.

Indeed, according to recent research by Nielsen Research/ATS Studies in 2006 and 2008, poor quality calibration is on average costing manufacturers more than 1.7 million US dollars every year. When only large companies with

revenues of more than 1 billion US dollars are considered, this figure rises dramatically to more than 4 billion US dollars per year.

Proper invoicing is therefore critical to energy and utilities companies. As Jacek Midera, measurement specialist at Mazovian Gas Company states: "Most importantly, accurate measurements ensure proper billing. The impact of even a small measurement error can be tremendous in terms of lost revenue. Customers want to pay for the exact amount of gas they've received. Therefore, gas conversion devices must be extremely accurate in measuring delivered gas. This means that requirements for the calibrators are especially high."

Today, controlling emissions is another critical factor for many process manufacturers. Calibrating instruments can help to make combustion more efficient in industrial ovens and furnaces. The latest Government regulations relating to carbon emissions may also require that companies calibrate specific instruments on a regular basis, including sensors used for measuring CO<sub>2</sub> and NO<sub>x</sub> emissions.

As Ed de Jong, Instrument Maintenance Engineer at Shell (Netherlands) explains: "Until recently, calibration was mainly driven by economic motives: even the smallest of errors in delivery quantities are unacceptable in Shell's operation due to the vast sums of money involved for both customers and governments [fiscal metering]. Nowadays, calibration has an important role especially for the license to operate. Government regulations demand that specific instruments must be calibrated, for example, instruments related to CO<sub>2</sub> and NO<sub>x</sub> emissions."

### Common misconceptions

There are some common misconceptions when it comes to instrument calibration. For example, some manufacturers claim that they

do not need to calibrate their fieldbus instruments because they are digital and so are always accurate and correct. This is simply not true. The main difference between fieldbus and conventional transmitters is that the output signal is a fully digital fieldbus signal. Changing the output signal does not change the need for periodic calibration. Although fieldbus transmitters have been improved in terms of their measurement accuracy when compared to analogue transmitters, this does not eliminate the need for calibration.

Another common misunderstanding is that new instruments do not require calibration. Again, this is not true. Just because a sensor is newly installed does not mean that it will perform within the required specifications. By calibrating an instrument before installation, a company is able to enter all the necessary instrument data to its calibration database or calibration management software, as well as begin to monitor the stability or drift of the instrument over time.

### When to calibrate

Due to drift, all instruments require calibrating at set intervals. How often they are calibrated depends on a number of factors. First, the manufacturer of the instrument will provide a recommended calibration interval. This interval may be decreased if the instrument is being used in a critical process or application. Quality standards may also dictate how often a pressure or temperature sensor needs calibrating.

The most effective method of determining when an instrument requires calibrating is to use some sort of history trend analysis. The optimal calibration interval for different instruments can only be determined with software-based history trend analysis. In this way, highly stable sensors are not calibrated as often as those sensors that are more susceptible to drift.

# The safest way to calibra

**Fieldbus is becoming more and more common in today's instrumentation. Fieldbus transmitters must also be calibrated just like conventional instruments. There are also industrial environments where the calibration of fieldbus instruments should not only be made accurately and efficiently, but also safely. When safety becomes a top priority issue in calibration, intrinsically safe fieldbus calibrators enter into the picture. Until now, no practical solutions have existed for calibrating fieldbus instruments in hazardous areas, but now Beamex introduces the safest way to calibrate fieldbus instruments.**

Conventional transmitters can deliver only one simultaneous parameter, one way. Each transmitter needs a dedicated pair of cables, and I/O subsystems are required to convert the analog mA signal to a digital format for a control system.

Fieldbus transmitters are able to deliver a huge amount of information via the quick two-way bus. Several transmitters can be connected to the same pair of wires. Conventional I/O systems are no longer needed because segment controllers connect the instrument segments to the quicker, higher-level fieldbus backbone. Being an open standard, instruments from any manufacturer can be connected to the same fieldbus as plug-and-play.

Currently, a large number of fieldbus installations already exist and the number is increasing at a huge rate. A large portion of new projects is currently being carried out using fieldbus. Critical applications and hazardous areas have also begun to adopt fieldbus.

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*Fieldbus transmitters must be calibrated as well, but how can it be done?*

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The Foundation Fieldbus and Profibus have begun to clearly dominate the fieldbus markets. Both Foundation Fieldbus and Profibus have reached such a large market share that both buses will most likely remain also in the future.

The development of new fieldbuses has slowed down and it is unlikely that new fieldbus standards will appear in the near future to challenge the position of Foundation Fieldbus or Profibus. Recent co-operation between Foundation Fieldbus and Profibus suppliers will further strengthen the position of these two standards.

## **Fieldbus benefits for industry**

Obviously process plants would not start utilizing fieldbus, if it would not offer them benefits compared to alternative systems. One important reason is the better return on investment. Although fieldbus hardware may cost the same as conventional, or even a little bit more, the total installation costs for a fieldbus factory is far less than conventional. This is caused by many reasons, such as reduction in field wiring, lower installation labour cost, less planning/drawing costs, and no need for conventional I/O subsystems.

Another big advantage is the on-line



# te fieldbus instruments



self-diagnostics that helps in predictive maintenance and eventually reduces the downtime, offering maintenance savings. Remote configuration also helps to support reduced downtime. The improved system performance is important criteria for some plants. There are also other advantages compared to conventional instrumentation.

## Fieldbus transmitters must also be calibrated

The main difference between a fieldbus transmitter for pressure or temperature and conventional or HART transmitters is that the output signal is a fully digital fieldbus signal.

The other parts of a fieldbus transmitter are mainly comparable to conventional or HART transmitters. Changing the output signal does not change the need for periodic calibration. Although modern fieldbus transmitters have been improved compared to older transmitter models, it does not eliminate the need for calibration. There are also many other reasons, such as quality systems and regulations that make the periodic calibrations compulsory.

## Calibrating fieldbus transmitters

The word "calibration" is often misused in the fieldbus terminology when comparing it to the meaning of the word in metrology. In fieldbus terminology, "calibration" is often used to mean the configuration of a transmitter. In terminology pertaining to metrology, "calibration" means that you compare the transmitter to a traceable measurement standard and document the results. So it is not possible to calibrate a fieldbus transmitter using only a configurator or configuration software. Also, it is not possible to calibrate a fieldbus transmitter remotely.

Fieldbus transmitters are calibrated in very much the same way as conventional transmitters – you need to place a physical input into the



# The safest way to calibrate fieldbus instruments

transmitter and simultaneously read the transmitter output to see that it is measuring correctly. The input is measured with a traceable calibrator, but you also need to have a way to read the output of the fieldbus transmitter. Reading the digital output is not always an easy thing to do. When fieldbus is up and running, you can have one person in the field to provide and measure the transmitter input while another person is in the control room reading the output. Naturally these two people need to communicate with each other in order to perform and document the calibration.

While your fieldbus and process automation systems are idle, you need to find other ways to read the transmitter's output. In some cases you can use a portable fieldbus communicator or a laptop computer with dedicated software and hardware.

Until recently, no practical way to calibrate field bus transmitters has existed. A modern Fieldbus Calibrator is a combination of a multifunction process calibrator and a fieldbus configurator. With such a calibrator you can calibrate a fieldbus pressure and temperature transmitter, as the calibrator can simultaneously generate/measure the transmitter input and also read the digital fieldbus output of the transmitter. A modern fieldbus calibrator can also be used to change the configurations of a fieldbus transmitter. If you find that the fieldbus transmitter fails in calibration, you can also use the calibrator to trim/adjust the fieldbus transmitter to measure correctly. Being a documenting calibrator, a fieldbus calibrator will automatically document the calibration results of a fieldbus transmitter in its memory, from where the results can be uploaded to calibration software. This eliminates the time-consuming and error-prone need for manual documenting using traditional methods.

When looking for a fieldbus calibrator, search for a compact, easy-

to-use and field compatible calibration solution. The calibrator should at least calibrate Foundation Fieldbus H1 or Profibus PA transmitters, which are the most common applications.

The most important advantage of a fieldbus calibrator is the possibility to calibrate, configure and trim the Foundation Fieldbus H1 or the Profibus PA transmitters using a single unit. Because it is a combination of a calibrator and a fieldbus configurator, a fieldbus calibrator is able to perform traceable calibration on fieldbus transmitters. Calibration can therefore be performed by one person instead of two. Fieldbus configurators and configuration software are not able to do this; they can only be used to read/change configurations.

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*A hazardous atmosphere is an area that contains elements that may cause an explosion.*

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## What is intrinsically safe calibration?

By definition, intrinsic safety (IS) is a protection technique for safely operating electronic equipment in explosive environments. The concept has been developed for safely operating process control instrumentation in hazardous areas. The idea behind intrinsic safety is to make sure that the available electrical and thermal energy in a system is always low enough that ignition of the hazardous atmosphere cannot occur. A hazardous atmosphere is an area that contains elements that may cause an explosion: source of ignition, a flammable substance and oxygen.

Hazardous area classifications in IEC/European countries are:





**Zone 0:** an explosive gas & air mixture is continuously present or present for a long time.

**Zone 1:** an explosive gas & air mixture is likely to occur in normal operation.

**Zone 2:** an explosive gas & air mixture is not likely to occur in normal operation, and if it occurs it will exist only for a short time.

An intrinsically safe calibrator is therefore designed to be incapable of causing ignition in the surrounding environment with flammable materials, such as gases, mists, vapors or combustible dust. Intrinsically safe calibrators are also often referred to being “Ex calibrators”, “calibrators for Ex Areas”, or “IS calibrators”. An Ex Area also refers to an explosive environment and an Ex calibrator is a device designed for use in the type of environment in question.

#### **Where is intrinsically safe calibration required?**

Many industries require intrinsically safe calibration equipment. Intrinsically safe calibrators are designed for potentially explosive environments, such as oil refineries, rigs and processing plants, gas pipelines and distribution centres, petrochemical and chemical plants, as well as pharmaceutical plants. Basically, any potentially explosive industrial environment can benefit from using intrinsically safe calibrators.

#### **What are the benefits of using intrinsically safe calibrators?**

There are clear benefits in using intrinsically safe calibration equipment. First of all, it is the safest possible technique. Secondly, the calibrators provide performance and functionality.

#### **Safest possible technique.**

Intrinsically safe calibrators are safe for employees, as they can be safely used in environments where the risk of an explosion exists. In addition, intrinsically safe calibrators are the only technique permitted for Zone 0 environments (explosive gas and air mixture is continuously present or present for a long time).

#### **Performance and functionality.**

Multifunctional intrinsically safe calibrators provide the functionality and performance of regular industrial calibration devices, but in a safe way. They can be used for calibration of pressure, temperature and electrical signals. A documenting intrinsically safe calibrator, such as the Beamex® MC5-IS, provides additional efficiency improvements with its seamless communication with calibration software. This eliminates the need of manual recording of calibration data and improves the quality and productivity of the entire calibration process.

#### **Are intrinsically safe calibrators technically different from regular industrial calibrators?**

Intrinsically safe calibrators are different from other industrial calibrators in both design and technical features. In view of safety, there are also some guidelines and constraints for how to use them in hazardous areas. Every intrinsically safe calibrator is delivered with a product safety note, which should be read carefully before using the device. The product safety note lists all the “do’s and don’ts” for safe calibration.

The differences in design and technical features were made with one purpose in mind – to ensure that the device is safe to use and is unable to cause an ignition. The surface of the device is made of conductive material. The battery of an intrinsically safe calibrator is usually slower to charge and it discharges quicker. Many times



# The safest way to calibrate fieldbus instruments

intrinsically safe equipment operate only with dry batteries, but the Beamex® intrinsically safe calibrators operate with chargeable batteries. When charging the battery, it must be done in a non-Ex area. External pressure modules can be used with IS-calibrators, but they must also be intrinsically safe. There are also usually small differences with electrical ranges compared to regular industrial calibrators (e.g. maximum is lower).

## **Making a calibrator safe and unable to cause ignition – typical technical differences:**

- Surface made of conductive material
- Constraints in using the device (listed in Product Safety Note)
- Small differences with electrical ranges (e.g. maximum is lower)
- Battery slower to charge, quicker to discharge
- Battery must be charged in a non-Ex area
- When using external pressure modules, they must be IS-versions

## **What are ATEX and IECEx?**

ATEX (“ATmosphères EXplosibles”, explosive atmospheres in French) is a standard set in the European Union for explosion protection in the industry. ATEX 95 equipment directive 94/9/EC concerns equipment intended for use in potentially explosive areas. Companies in the EU where the risk of explosion is evident must also use the ATEX guidelines for protecting the employees. In addition, the ATEX rules are obligatory for electronic and electrical equipment that will be used in potentially explosive atmospheres sold in the EU as of July 1, 2003.

IEC (International Electrotechnical Commission) is a nonprofit international standards organization that prepares and publishes International Standards

for electrical technologies. The IEC TC/31 technical committee deals with the standards related to equipment for explosive atmospheres. IECEx is an international scheme for certifying procedures for equipment designed for use in explosive atmospheres. The objective of the IECEx Scheme is to facilitate international trade in equipment and services for use

## *The Beamex® MC5-IS offers the safest possible technique for calibrating fieldbus transmitters.*

in explosive atmospheres, while maintaining the required level of safety.

As Beamex® MC5-IS Intrinsically Safe Multifunction Calibrator is certified according to ATEX and the IECEx Scheme, it ensures the calibrator is fit for its intended purpose and that sufficient information is supplied with it to ensure that it can be used safely.

## **Is service different for intrinsically safe calibrators?**

There are certain aspects that need special attention when doing service or repair on an intrinsically safe calibrator. The most important thing to remember is that an intrinsically safe calibrator must maintain its intrinsic safety after the service or repair. The best way to do this is to send it to the manufacturer or to an authorized service company for repair. Recalibration can be done by calibration laboratories (still preferably with ISO/IEC 17025 accreditation).

## **Safe fieldbus calibration with the Beamex® MC5-IS Intrinsically Safe Multifunction Calibrator**

The Beamex® MC5-IS Intrinsically Safe Multifunction Calibrator is a



**The Beamex® MC5-IS offers the safest possible technique for calibrating fieldbus transmitters.**





high accuracy, all-in-one calibrator for extreme environments. Being an all-in-one calibrator, the MC5-IS replaces many individual measurement devices and calibrators. The MC5-IS is also ATEX and IECEx certified. The MC5-IS has calibration capabilities for pressure, temperature, electrical and frequency signals. It is a documenting calibrator, which means that it communicates seamlessly with calibration software. Using documenting calibrators with calibration software can remarkably improve the efficiency and quality of the entire calibration process. The MC5-IS also has HART® communication. The MC5-IS can also be used for calibrating Foundation Fieldbus H1 or Profibus PA transmitters.

# Siemens Energy Fossil — Field

An improved method provides timesavings when performing tests for power genera

### The field service division of Siemens Energy Fossil performs service and repair of electrical power generators in the UK and worldwide.

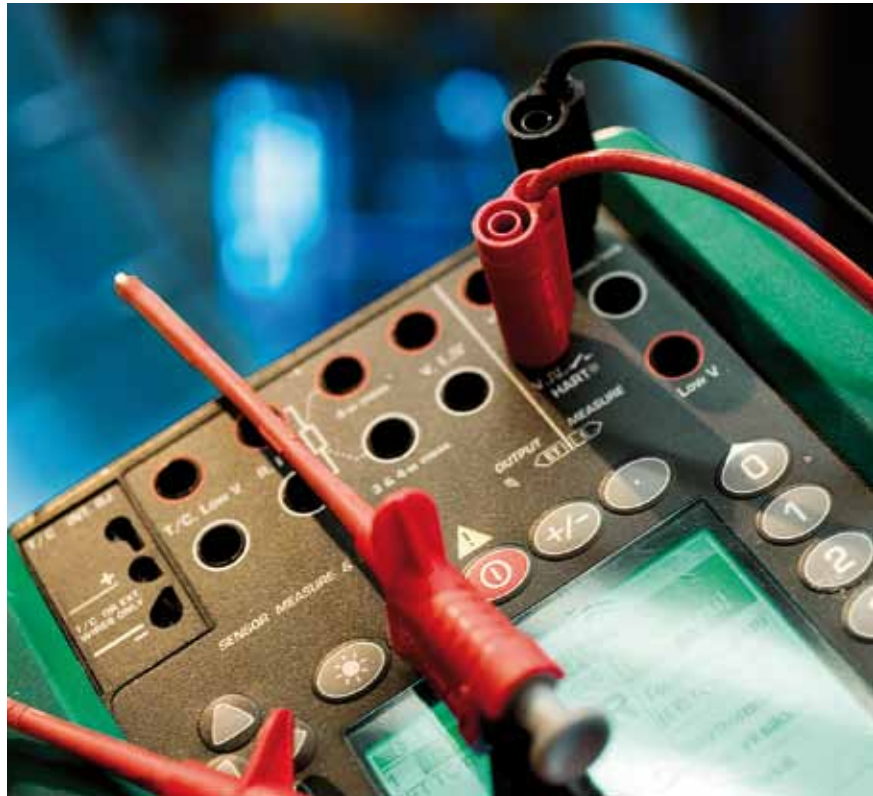
Siemens is one of the world's leading suppliers of components and systems to companies in the energy and electricity industry. With roughly 83,500 employees, Siemens Energy Sector had sales of over EUR 12 billion and received new orders for approximately EUR 22.6 billion in fiscal 2007. Siemens Energy Fossil is a division of Siemens Energy Sector. Siemens Energy Fossil - Field Service in Nottingham oversees the repair, service and upgrade of Siemens gas and steam turbine generators in the UK, including the Parsons steam turbine generators that are still in service across the globe, as well as other non-Siemens manufactured equipment. This work is undertaken primarily for electrical utilities and other industrial customers.

Specific tasks of the Siemens Energy Fossil – Field Service, are to service and repair hydrogen and water-cooled electrical power generators in the UK and worldwide. Andrew Reynolds is a service engineer at the Siemens Energy Fossil - Field Service.

#### The situation

Typical equipment serviced by the Siemens Energy Fossil - Field Service is the Siemens generator. These generators, with water-cooled stators and hydrogen-cooled rotors, are optimal for large steam and nuclear power plant applications ranging to more than 2000 MVA.

Explaining their testing requirements, Andrew explains, "As part of the service, and prior to commissioning of the machine following servicing, we



**"The benefits of using the Beamex® MC5 Multifunction Calibrators are improvements in efficiency, the ability of determining test failures early and taking corrective actions. This results in timesavings", Andrew summarizes.**

perform pneumatic and vacuum tests on the water cooling circuit. When in use, the water circuit generally operates at 3 bar, the water-cooling circuit is in an outer casing (pressure vessel), which is filled with hydrogen at a pressure of 3.5 to 4 bar creating a positive differential".

The pneumatic test the Siemens Energy Fossil – Field Service performs on the water circuit when drained, uses air, nitrogen or helium (for leak detection), or a combination of air and helium (for leak detection). This test simulates the operational pressures experienced during service and is an 'over pressure' test to ensure integrity of the system and sealing arrangements.

Then a pressure drop test is performed

to check whether the system as a whole meets parameters, and this requires the measurement of test pressure, barometric pressure and ambient temperature.

A vacuum test following the pneumatic test simulates the differential pressure as seen in service. The hydrogen will leak into the water system, normally called a 'gas in coolant' leak.

"With regard to the pressure drop, we aim for a zero leakage rate when corrected for changes in temperature and barometric pressure, although an accepted level is given, which is related to gas loss per day / 24 hr period for operational reasons", Andrew continues.

"Economically speaking, servicing

# d Service, United Kingdom

ators.

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*“Economically speaking, servicing a generator is usually a large project as well. The size of the projects varies from a simple overhaul costing £150K to major repair and refurbishment in the region of £3M”, Andrew explains.*

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a generator is usually a large project as well. The size of the projects varies from a simple overhaul costing £150K to major repair and refurbishment in the region of £3M”, Andrew explains.

## **The solution and main benefits**

The challenge was that the equipment used for the tests was not providing the desired performance. “We have found that when using analogue pressure and vacuum gauges they are susceptible to being knocked whilst in use affecting the reading displayed. Additionally, the analogue gauges have inherent errors, stiction, and parallax, and operator error. By moving towards a digital read out, these errors will be eliminated”, Andrew explains.

“The resolution accuracy of other products on the market did not meet our requirements over the scale range of the instrument”, Andrew continues. The Beamex® MC5

Multifunction Calibrators combine the three pressure/vacuum modules and the external barometric module and temperature recording element all in one unit and can be sited away from physical disturbance.

Moreover, the MC5 has a datalogging function so the equipment can be installed for testing and set to capture data at set intervals over the period of the test. The information can be manually recorded and also downloaded to a computer for interpretation. The advantage of the downloaded element is that it can be interpreted via the computer software to determine a point in time when the test fails or is about to fail. Furthermore, with the accuracy requirements, the prediction of a test failure can be highlighted earlier and can be addressed or detected way before an analogue gauge would respond to the failure. This gives us a chance to take action before the end of the test and, if necessary, make repairs and re-start the test.

What made Beamex® MC5 a good choice? “Having all of the test equipment in one device, the ability to log into the data. Siemens Energy Fossil – Field Service has several MC5s that are constantly in use”, Andrew explains. The criteria for choosing Beamex were therefore accuracy, datalogging capability, ease of use and the ability to determine a test failure before the test runs its course.

“The benefits of using the Beamex® MC5 Multifunction Calibrators are improvements in efficiency, the ability of determining test failures early and taking corrective actions. This results in timesavings”, Andrew summarizes.

## **Case story in brief**

### **Customer profile**

Siemens Energy Fossil – Field Service  
United Kingdom

### **Business Situation**

Siemens Energy Fossil – Field Service in Nottingham oversees the repair, service and upgrade of Siemens gas and steam turbine generators in the UK, including the Parsons steam turbine generators that are still in service across the globe, as well as other non-Siemens manufactured equipment. Specific tasks of the Siemens Energy Fossil – Field Service, are to service and repair hydrogen and water-cooled electrical power generators in the UK and worldwide. As part of the service, and prior to commissioning of the machine following servicing, the Field Service performs pneumatic and vacuum tests on the water-cooling circuit. The challenge was that the equipment used earlier for these tests was not providing the desired performance. The benefits of using the Beamex® MC5 Multifunction Calibrators are improvements in efficiency, the ability of determining test failures early and taking corrective actions. This results in timesavings.

### **Solution description**

- Beamex® MC5 Multifunction Calibrator

### **Main benefits**

- High accuracy calibration and measurement equipment that is easy to use and provides datalogging capability.
- All-in-one capability – the Beamex® MC5 replaces several measurement devices.
- Improved efficiency in field-testing.
- Timesavings.



# Total Petrochemicals USA, Inc.

Taking control of the calibration trend.

### The Total Petrochemicals USA Carville, LA site is the largest styrene monomer facility of its type in the world.

**T**otal Petrochemicals USA, Inc. is a world-scale petrochemical manufacturer with production facilities in Texas and Louisiana. The Carville, LA site is the largest styrene monomer facility of its type in the world; the plant was built in 1968 and is a 50/50 owned joint venture of Total Petrochemicals USA, Inc. (operator) and Saudi Basic Industries Corporation. The Instrumentation and Controls/Analyzer Department at the Carville site employs ten Technicians and two Analyzer Specialists along with a nested contract instrument technician.

Steve Brown is Analyzer Specialist at the Carville site. He has accumulated 24 years of experience in the instrumentation and controls field with the last 6 years here at the Total Petrochemicals USA, Inc. in Carville, LA. Steve's current responsibilities include Analyzer maintenance and calibration as well as being the ISO 9000 / ISO 14000RC program administrator. As the administrator, Steve maintains all calibration records for both of the programs. In addition to using Beamex® CMX Calibration Software in the Monomer Facility, Total Petrochemicals USA is in the process of implementing the calibration management system at their neighbouring Polystyrene Plant.

#### The situation

The role of the Instrumentation and Controls/Analyzer Department is to ensure that calibrations are performed on-time and the records maintained. Their main focus is to ensure that the instrument calibrations performed are accurate and traceability is maintained



**"From the first time I put the MC5 in my hands, I knew that this was going to be fun. The training that Beamex provided was intense and very rewarding. I still try to stump them from time to time, but their technical support is second to none. They are prompt with resolutions to my problems", Steve summarizes.**

throughout the life of the instrument. Therefore, calibration as such plays an important role for the business. "We are of a mindset that if your instrumentation does not perform well, your product will suffer", Steve explains.

As a calibration solution, the site utilizes the Beamex Integrated Calibration Solution made of Beamex® CMX Calibration Software and the Beamex® MC5 Multifunctional Calibrators. The role of the system has changed recently. The system now includes also safety critical instrumentation and other preventive maintenance calibrations as well as calibration gases that are used

throughout the plant. The CMX provides a simple means of maintaining the calibration gas records. The system provides easy access to relevant data at any given time, as these records can be viewed or printed at auditor's request. CMX is also versatile, as it communicates also with other process calibrators. The Pocket PC feature is especially beneficial. This feature enables the Calibration Gas cylinder inventory to be performed while making rounds without paper and pen. "We are still pushing the envelope with the MC5 to develop more testing processes to assist our department to maintain a technical edge on the rest of the

# c. (Carville, LA), USA

industry”, Steve visions. “We recently ran across a problem with a particular type of temperature transmitter. The current reading and temperature simulation signal was extremely unstable. Through the aggressive technical support from Beamex and the transmitter manufacturer, the problem was resolved and our procedures updated to reflect the changes in the calibration methodology”, Steve continues.

The site calibrates an array of instrumentation such as CEMS analyzers, LEL monitors, flow, pressure, temperature and level transmitters, in addition to flue gas analyzers and custody meters. Some of the calibrations are performed due to regulatory requirements, but the main objective is to reduce downtime and preventable repairs. In addition to the Beamex Calibration Solution, the site uses SAP® to trigger the calibration work orders.

## **The solution and main benefits**

The software-based calibration management system has an integral role in the site’s calibration process. “The CMX allows us to see trending data. This alone is important, because seeing the trend will allow us to fine tune equipment that result in a higher tier product”, Steve states.

Currently the site is using the MC5 Calibrators with external high-pressure modules, barometric modules and a vacuum pressure module. The calibrators are used to provide and capture precise calibration data on ISO 9001 and ISO 14000RC instrumentation and also the safety critical instrumentation.

Updating the calibration system to CMX was a natural choice for the site. “We were already recording calibration data with an existing Beamex product, so it seemed appropriate that we continue with

the next generation from them. I believe that it was a great choice”, Steve explains.

The Beamex system has proven to be a valuable investment. The system has enabled the site to provide documented calibration data for audits. There is even a security level that we created to allow an auditor unfettered access to records. The benefits provide also help for the daily routines. “The drag and drop aspect of the software for loading positions to the calibrator is quick and easy. This reduces the amount of test equipment and paper that

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has to go to the field”, Steve gives an example.

“From the first time I put the MC5 in my hands, I knew that this was going to be fun. The training that Beamex provided was intense and very rewarding. I still try to stump them from time to time, but their technical support is second to none. They are prompt with resolutions to my problems”, Steve summarizes.

## **Case story in brief**

### **Customer profile**

Total Petrochemicals USA, Inc.  
(Carville, LA) USA

### **Business Situation**

Total Petrochemicals USA, Inc. is a world-scale petrochemical manufacturer with production facilities in Texas and Louisiana. The role of the Instrumentation and Controls/Analyzer Department is to ensure that calibrations are performed on-time and the records maintained. Their main focus is to ensure that the instrument calibrations performed are accurate and traceability is maintained throughout the life of the instrument. The Beamex system has proven to be a valuable investment. The system has enabled the site to provide documented calibration data for audits. There is even a security level that we created to allow an auditor unfettered access to records. The benefits provide also help for the daily routines.

### **Solution**

- Beamex® CMX Calibration Software (with Pocket PC Option)
- Beamex® MC5 Multifunction Calibrator
- Beamex® Professional Services

### **Main benefits**

- Due to Beamex all-in-one calibrators less test devices need to be carried when making calibrations on the field
- Controlling the calibration trend results in higher tier products
- Calibration data easily accessible for audits
- No need for pen and paper
- Beamex® Professional Services provide ongoing support when the calibration system is in use



# Croda Chemicals Europe Ltd.

Major efficiency improvements with a total calibration solution.

**Croda is a supplier of speciality chemicals, has locations in 25 countries and employs more than 1,600 people.**

Croda International Ltd is a supplier of speciality chemicals to a wide range of market areas. Headquartered at the historic "Cowan Hall", a 17th-century listed manor house in East Yorkshire (UK), the business has developed to cover the international market. The company now has more than 1,600 employees in 29 companies located in 25 countries; it achieved worldwide sales of £300 million in 2004. One of Croda Chemicals Europe's manufacturing sites is located at Rawcliffe Bridge in East Yorkshire. The Engineering and Maintenance Department at the site supports the technical production facilities which amongst its product range produces "lanolin", a substance that, in its basic form, supports many of the products. Dave Wright is Senior Instrument Technician at the site's Engineering and Maintenance Department.

### The situation

Originally, the instrument calibration procedures at Rawcliffe Bridge were developed to meet both business needs and compliance with industry standards, archiving hard copy certificates within box files for each manufacturing area. This laborious task meant technicians had to support the shutdown maintenance programme by filling out certificates by hand to include primary standards used for each individual calibration. "When you have more than 6 manufacturing areas, with an average of some 250 instruments involved in each area, you can determine the time taken to complete



**Croda's Rawcliffe Bridge site utilizes Beamex's MC5-IS Intrinsically Safe Multifunction Calibrators.**

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*"Our focus was to improve our calibration methods and improve efficiency by producing calibration certificates automatically", Dave describes why Beamex was chosen.*

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this annual task," David introduces.

Beamex was approached to introduce their products and how they may be used to aid the annual calibration tasks at the Rawcliffe Bridge site. Instrument and Control Engineer, Stuart Marshall, aided by Dave, reviewed Beamex's products and forwarded a proposal to adapt their current system at Croda to Beamex's CMX calibration management software. "Our focus was

to improve our calibration methods and improve efficiency by producing calibration certificates automatically", Dave describes why Beamex was chosen.

"Our engineering procedures form part of the site's ISO 9002 accreditation, which enhances the need for improved calibration systems and documentation", Dave explains. The process control at the site relies on accurate data from field instrumentation. Tolerances of 0.5% error on total loop help in achieving production targets

### The solution and main benefits

The Engineering and Maintenance department at Rawcliffe Bridge site utilizes Beamex's MC5-IS Intrinsically Safe Multifunction Calibrators, CMX calibration management software and both PGV and PGM calibration hand-pumps. "Compared to competitive products, the ease-of-use, the price and support locally were determining factors in our choice", Dave reveals.

CMX also proved to have unmatched benefits. "Reliability, industry-accepted certificate formats, ease-of-use within production areas, adaptable database and good level of security", Dave describes why CMX meets their needs.

The differing tasks throughout the plant areas at Rawcliffe Bridge, their timing and tolerance levels, mean that we need criteria, which is easily changeable to each loop on the database. "Once trained and confident, the CMX system proved to be invaluable in helping us to achieve our target in the first year of use", Dave states. The benefits to Croda at Rawcliffe Bridge have been demonstrated to improve the time taken to complete a set list of tasks and file the relevant paperwork. The average savings of time per technician is 4 weeks in man-hours per year.

The instrument and electrical technicians at the site are deployed on a continuous 5-cycle shift pattern,

# United Kingdom



**“Reliability, industry-accepted certificate formats, ease-of-use within production areas, adaptable database and good level of security”, Dave describes why CMX meets their needs.**

*“Once trained and confident, the Beamex® CMX Calibration Software proved to be invaluable in helping us to achieve our target in the first year of use”, Dave states.*

performing routine preventive maintenance and responding to plant breakdowns and failures. This is supported by a number of technicians working on the day shift. The total number on the team is nine. According to Dave, Croda's experience with Beamex has been one of positive interaction, help with training, and also customer support has been first class. “Altogether a positive experience”, Dave ends.

## Case story in brief

### Customer profile

Croda Chemicals Europe Ltd.  
United Kingdom

### Business Situation

Croda International Ltd is a supplier of speciality chemicals to a wide range of market areas. Originally, the instrument calibration procedures at the Rawcliffe Bridge site were developed to meet both business needs and compliance with industry standards, archiving hard copy certificates within box files for each manufacturing area. Beamex was approached to introduce their products and how they may be used to aid the annual calibration tasks at the site. The focus was to improve the calibration methods at the site and improve efficiency in the management of documentation.

### Solution description

- MC5-IS Intrinsically Safe Multifunction Calibrator
- CMX calibration management software
- PGV calibration hand-pumps
- PGM calibration hand-pumps

### Main benefits

- Major time savings due to an efficient calibration system
- Ease-of-use and reliability of all equipment
- Availability of high-quality training and support services
- Calibration software that provides a good level of security, industry-accepted certificate formats and an adaptable database
- fast ROI for the new calibration system efficiency, and reduces risk of problems



# Nokian Tyres, Finland

Calibrating for ensuring high and consistent product quality.

**Nokian Tyres is the only tyre manufacturer in the world that specializes in the needs and products of customers in Nordic conditions.**

Nokian Tyres is the only tyre manufacturer in the world that specializes in the needs and products of customers in Nordic conditions. Products are marketed in regions with Nordic conditions, where demanding driving conditions and wear and tear on tyres are the result of snow, forest roads and seasonal changes. The company's main products include winter tyres for passenger cars and commercial vehicles and tyres for forestry machinery. Indeed, the company has the world's largest selection of winter tyres. Nokian Tyres has its own factory in Nokia, Finland and in Vsevolozhsk, Russia. Nokian Tyres' turnover for the year 2007 was 1.025 billion euros and the company employed ca. 3,500 persons. The factory in Nokia manufactures c. 18,000 passenger car tyres in a 24-hour period. Heikki Karhe and Ville-Matti Niemi work as measurement technicians in the calibration department of Nokian Tyres' Nokia factory.

### The situation

The calibration department falls under personnel management, which is not very common. "There were three choices from the beginning: maintenance, production quality organization, and personnel management. I suggested personnel management – this ensured that calibration would not be in a secondary position in the company and processes. Thanks to this organizational structure, we can focus one hundred percent on tasks related to calibration and the arrangement has worked out well," Heikki recalls.

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*"It would not be an exaggeration to say that Beamex® CMX Calibration Software has made documentation 50% faster and more efficient and has made the entire work process about 25% faster and more efficient than our previous system," Ville-Matti says.*

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Today, the factory has approximately 2,500 devices to calibrate. "In addition to our own equipment, we also calibrate instruments from the Vianor tyre store chain, which is also owned by Nokian Tyres. Once a year, Vianor sends us torque wrenches and tyre pressure gauges for calibration, a total of about 300 devices," Heikki summarizes. About 1,400 units are calibrated at the factory each year and the majority of the calibration is done in the field, where the instruments are installed. The primary calibrations are of temperature, pressure, mass and length. Field calibrations are made throughout the year on average 2–3 days per week; however during summer shut-downs, equipment which is used in production year-round is calibrated. The calibration interval for instruments vary between 6

weeks and 4 years, depending on how critical the calibration is for a particular device. An example of equipment with a six-week interval would be a scale that measures powdered substances. All instruments that come to the factory are also calibrated before installation – it would be wrong to think that every new instrument is automatically accurate.

Clarifying the role of calibration at Nokian Tyres, Heikki explains: "Calibration is of great importance, especially from the viewpoint of production safety and quality of the final product."

He continues and says, "Preparation of the right rubber mixture is precision work and a sample is taken from each rubber mixture to ensure quality. Measuring instruments which yield wrong values could easily ruin the final product."

The factory is also full of pressure instruments and it is also important for the safety of the workers that those instruments show the right values.

Calibration itself may also be done in demanding conditions – often it is necessary to creep, crawl or stretch to reach the equipment that needs to be calibrated. Moreover, the equipment that is being calibrated may be located near hot steam pipes and there may be another maintenance group working nearby. These conditions require that the calibration devices are durable, easy to use, and compact.

### The solution and main benefits

"We require that calibration devices are easy to use, precise and durable," Heikki says. Most calibrations are carried out with Beamex® MC5 Multifunction Calibrators, and Beamex® CMX Calibration Software is used for calibration planning, scheduling and documentation.

"The MC5 calibrator we use is equipped with three pressure modules



**Clarifying the role of calibration at Nokian Tyres, Heikki explains:**  
**“Calibration is of great importance, especially from the viewpoint of production safety and quality of the final product.”**

and it is convenient to use in the field, because we can use the same device for calibrating both pressure and temperature signals,” Heikki comments.

Calibrating with the MC5 is quick. “When calibrating pressure instruments, a proper calibration phase, which contains 5–6 calibration points, lasts from three to four minutes if the line is opened up first and connected to the MC5. The Beamex® PGXH high pressure pump is also suitable for our needs and we use it with the MC5 for producing pressure,” Heikki continues.

The MC5 is calibrated once a year in the Beamex calibration laboratory and during this period older Beamex devices are used at the factory for calibrations.

A work list is printed out from the Beamex® CMX Calibration Software which shows what needs to be calibrated. When calibrations have been completed, the information is stored in the CMX. All calibration information

and history is stored in CMX – there are no printed copies kept of calibration reports. “The use of CMX has made the documentation phase of calibration quicker and more efficient. It would not be an exaggeration to say that Beamex® CMX Calibration Software has made documentation 50% faster and more efficient and has made the entire work process about 25% faster and more efficient than our previous system,” Ville-Matti says.

According to his experience, the increase in efficiency and speed comes in the form of faster and easier search and processing functions, via device/position groups, the significantly better clarity and intuitiveness of the Explorer-type interface, and the considerably better versatility in general. CMX also has numerous small facilitating features, which, all combined, affect efficiency and speed. An example of this is the Check In / Check Out functions.

## Case story in brief

### Customer profile

Nokian Tyres  
Finland

### Business Situation

Calibration is of great importance, especially from the viewpoint of production safety and quality of the final product. The Nokian Tyres factory has approximately 2,500 devices to calibrate, 1,400 of which are calibrated every year. Calibration itself may also be done in demanding conditions – often it is necessary to creep, crawl or stretch to reach the equipment that needs to be calibrated. This requires that the calibration devices be durable, easy to use, and precise.

### Solution description

- Beamex® MC5 Multifunction Calibrator
- Beamex® CMX Calibration Software
- Beamex® PGXH, PGM and PGV Calibration Pumps

### Main benefits

- Accurate and easy-to-use calibrator
- Operation in demanding environments
- Documentation and planning significantly more efficient with calibration software



# Endress+Hauser: Beamex® MC5 an

Endress+Hauser is the leading international supplier of measuring instruments, ser

**Endress+Hauser is the leading international supplier of measuring instruments, services and solutions for process engineering. To this end, the company develops, produces and sells sensors and devices for the extraction, conveying and processing of process information. In 2008, the Group – which comprises 86 companies employing a staff in excess of 8,400 in 40 countries – achieved a turnover of EUR 1,211 billion.**

Clients in all manufacturing sectors use Endress+Hauser products and services to manage, monitor and operate their processes reliably so that they run economically, securely and sustainably. For a premium service supplier with 59 service technicians and 13 calibration engineers operating in Germany, Austria and Switzerland alone, premium equipment is indispensable. A business can only do justice to its own ambitions and those of its customers by having expert staff and the right equipment.

Since 2006, Endress+Hauser has relied on Beamex® process calibrators as well as the services provided by GERMEX GmbH, the local distributor of Beamex products in Germany and a Beamex Premium Partner. “Prior to this partnership, we were not satisfied with our situation. With the previous devices, there was downtime and we had long through-put times for recalibration,” according to Torsten Thiel, calibration service department manager of Endress+Hauser



# d MC2 defined as global standards

services and solutions for process engineering.

Messtechnik GmbH+Co. KG based in Weil am Rhein and serving Germany, Austria and Switzerland. "Then we had an initial chat with Ralph Hoster, business manager of GERMEX GmbH, and the very same year we acquired the first Beamex® MC5 devices for our calibration engineers."

In addition, it soon became apparent that the Beamex® MC5 – and later also the Beamex® MC2 – depending on the engineers' equipment – was able to take the place of three or four of the old devices, for example pressure calibrator, loop calibrator, temperature calibrator and portable temperature probe. This alone leads to considerable savings in costs and time when recalibrating devices. Previously, three or four different calibration certificates were required from three or four different suppliers, but now there is just one supplier and one certificate per device. Torsten admits that the original calibration devices were less expensive to buy, but factoring in the accuracy of the devices, their reliability and the fact that so much less effort is required for recalibration, the outlay on the Beamex solution is quickly recouped. "After three years at most, the acquisition costs have definitely been covered," Torsten continues.

However, there is another plus, besides high performance and accuracy: user-friendliness. "It's not always easy to implement another, new generation of devices," Torsten explains. "But when the first engineers got their new Beamex® MC5 devices, word got around so quickly about how good they were that the others could hardly wait!" Great for the industry and great for practical use seem to be the two comments that best describe the Beamex devices. The special purpose solutions and services provided by GERMEX are the icing on the cake of the service package and distinguish the company as a premium partner.



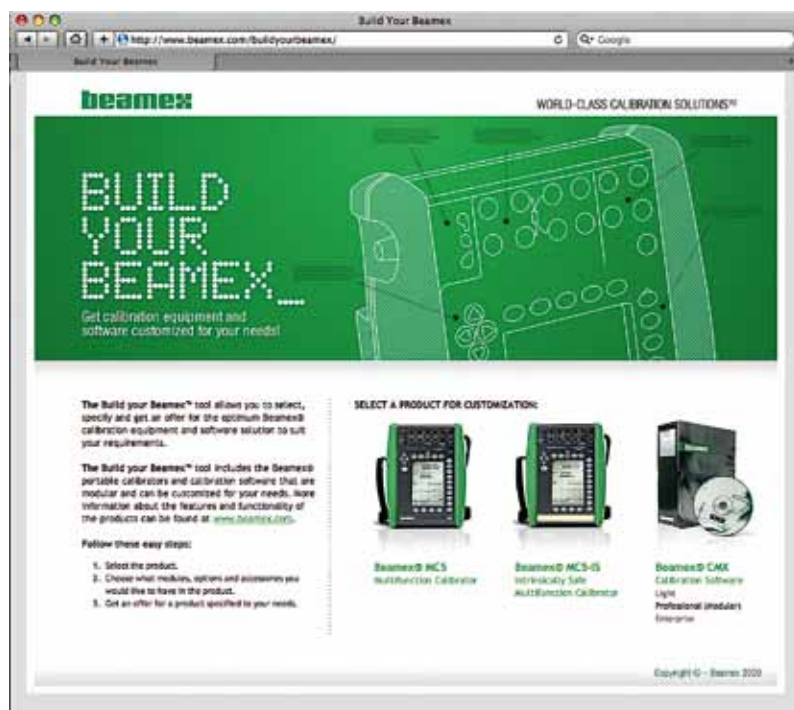
From March 2007, Endress+Hauser also began to equip field service engineers with Beamex calibration devices – in this case, with the Beamex® MC2, which strikes the right price-performance balance for this team's requirements. And they did not stop at that. Word travelled around the world so fast about the positive response to the Beamex® MC5 and Beamex® MC2 that other organisations gradually switched to Beamex calibration devices, too. Today, the Beamex® MC5 and Beamex® MC2 are defined as the global standard for Endress+Hauser, but worldwide service is provided by the German

premium partner GERMEX. "Short delivery times, absolute reliability, great expertise – with GERMEX, we know we're in good hands," Torsten enthuses. Ultimately, the quality of the products coupled with perfect service and support is the recipe for a successful partnership.

Recently, Endress+Hauser employees went to GERMEX for training on the Beamex software solution. The company already had its own calibration software implemented via SAP, but the Beamex system will now also be implemented for projects. There seems to be no end to this successful partnership...



## Build your own calibrator or calibration software!



Once you have finished the configuration, you can download a pdf file that contains all the specifications.

### Would you like to get a calibrator or calibration software configured to your specific needs? Beamex launches an online configuration tool called Build your Beamex™.

■ Customers can use the online tool to configure a calibrator or calibration software according to their specific needs and then request a quotation for that specific product. For starters, the online tool can be used for the configuration of Beamex® MC5 and MC5-IS calibrators as well as Beamex®

CMX Professional Calibration Software. Other Beamex products will be added later. The online tool allows the customer to select, specify and get an offer for the optimum Beamex® calibration equipment and software solution to suit the customer requirements.

The benefit for the customers is that they can customize the product for their requirements as well as choose only the functionality and features they really need and still preserve future upgrade possibilities. The Build your Beamex™ online tool includes the Beamex portable calibrators and calibration software that are modular and can be customized.

"Beamex is known for providing

➔ **STEP-BY-STEP**

**Build your own calibrator or calibration software, step-by-step:**

- Select the product.
- Choose what modules, options and accessories you would like to have in the product.
- Get an offer for a product specified to your needs.

Launch Build your Beamex at:  
[www.beamex.com/buildyourbeamex](http://www.beamex.com/buildyourbeamex)

calibration products that are highly modular offering wide configuration possibilities. We wanted to provide a tool that makes it easier for the customer to specify a product that exactly meets the requirements. This is also a way to improve the cost-efficiency of buying calibration products, as the customer can choose only the modules, options and accessories he or she really needs", Mr. Raimo Ahola, the CEO of Beamex Group, explains the reasons for developing the online configurator.

Launch Build your Beamex at:  
[www.beamex.com/buildyourbeamex](http://www.beamex.com/buildyourbeamex)



# Beamex introduces an intrinsically safe fieldbus calibrator

■ Fieldbus transmitters must also be calibrated just like conventional instruments. There are also industrial environments where the calibration of fieldbus instruments should not only be made accurately and efficiently, but also safely. When safety becomes a top priority issue in calibration, intrinsically safe fieldbus calibrators enter into the picture. Until now, no practical solutions have existed for calibrating fieldbus instruments in hazardous areas, but now Beamex introduces the safest way to calibrate fieldbus instruments.

Many industries require intrinsically safe calibration equipment. Intrinsically safe calibrators are designed for potentially explosive environments, such as oil refineries, rigs and processing plants, gas pipelines and distribution centres, petrochemical and chemical plants, as well as pharmaceutical plants. Basically, any potentially explosive industrial environment can benefit from using intrinsically safe calibrators.

Beamex is a forerunner in developing measurement devices



for the calibration and configuration of Foundation Fieldbus H1 and Profibus PA transmitters. In 2006, Beamex introduced the Beamex® MC5 Fieldbus Calibrator, a combination of a multifunction calibrator and a fieldbus configurator. Now Beamex introduces the Beamex® MC5-IS Intrinsically Safe Fieldbus Calibrator, the safest way for calibrating fieldbus transmitters.

"Fieldbus installations are growing rapidly, also in industrial environments that can be classified as hazardous. We are now offering a safe way

to calibrate fieldbus instruments in those environments, as also fieldbus instruments require periodic calibration", Mr. Heikki Laurila, Product Manager of Beamex, explains.

The Beamex® MC5-IS Intrinsically Safe Multifunction Calibrator is a high accuracy, all-in-one calibrator for extreme environments. Being an all-in-one calibrator, the MC5-IS replaces many individual measurement devices and calibrators. The MC5-IS can also be used for calibrating Foundation Fieldbus H1 or Profibus PA transmitters. The MC5-IS is also ATEX and IECEx certified. The MC5-IS has calibration capabilities for pressure, temperature, electrical and frequency signals. It is a documenting calibrator, which means that it communicates seamlessly with calibration software. Using documenting calibrators with calibration software can remarkably improve the efficiency and quality of the entire calibration process. The MC5-IS also has HART® communication.

## Awards obtained by Artvik for Beamex calibrators in Russia

■ Artvik, Beamex's long-time partner and distributor in Russia, obtained awards recently for Beamex calibrators in the Metrology 2009 exhibition held in Moscow. The Metrology 2009 exhibition was held between 19th and 21st of May, 2009 at VVC (Russian national exhibition center) in Moscow. The exhibition was organized by Federal Agency for Technical Regulation and Metrology (Rostechregulirovanie) – former Gosstandard of USSR.

During the exhibition National Metrologists' Symposium and

National Contest Program "For Unity of Measurements" was held. The expertise of the products participating in the Contest was made by "Rostest-Moscow" state certification center.

Within the Contest Program Artvik obtained the following awards for Beamex calibrators:

Gold Medal "For Unity of Measurements" was awarded to Beamex® MC5-R multifunction calibrator for high quality, reliability and convenience.

Quality Mark of Measurement

instruments was awarded to Beamex® MCx-R family of multifunction calibrator.

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## The new Beamex® POC6 Automatic Pressure Controller



■ The Beamex® POC6 is an accurate and user-friendly automatic pressure output controller, providing regulated output from vacuum to 70 bar (1015 psi).

The POC6 can be delivered as panel mounted to Beamex® MCS100 Workstation or as a portable desk top version. The POC6 can be used as a

stand-alone pressure controller or as integrated to the Beamex calibration system.

Together with the MC5 family and Beamex® CMX Calibration software, the POC6 offers a fully automated, integrated solution for performing, documenting and managing calibrations easily, efficiently and accurately.

The POC6 communicates with the Beamex® MC5P Calibration Host Module and with the portable Beamex® MC5 Multifunction Calibrator, enabling fully automatic calibration of pressure transmitters and other pressure instruments.

Main features of the Beamex® POC6 Automatic Pressure Controller:

**User friendly.** The POC6 is fast and efficient to use with its touch screen.

**Panel mounted into Beamex® Workstation.** The POC6 can be delivered and used as panel mounted into a Beamex® MCS100 Workstation.

**Portable desk top version.** The POC6 can also be used as a stand alone desk top pressure controller, which makes it a very mobile solution.

**Part of Beamex®. Integrated Calibration Solution.** Together with the Beamex® MC5 or MC5P calibrators as well as the Beamex® CMX Calibration Software, the POC6 offers an integrated, automated calibration system for performing, documenting and managing calibrations easily and efficiently.

## Beamex® CMX Calibration Software version 2.5 released

■ Beamex has released a new version of its Beamex® CMX Calibration Software (v2.5). The new version brings several new improvements and additions in terms of functionality and features of the product.

**Support for Lightweight Directory Access Protocol (LDAP).** Beamex® CMX LDAP is an additional option and it can be added to each CMX software license when required. This option makes it easier to manage the CMX user passwords and it is also one password less for the user to remember.

**Timestamp with Coordinated Universal Time (UTC) information in Audit Trail.** UTC is based on the Second (SI), as defined and recommended by the Consultative Committee on International Radio (CCIR), and maintained by the Bureau International des Poids et Mesures (BIPM). For most

practical purposes associated with the Radio Regulations, UTC is equivalent to mean solar time at the prime meridian (0° longitude), formerly expressed in GMT.

The CMX supports now three different ways of time stamping: 1) UTC based on the Database Server time (default

for new installations), 2) UTC based on the Beamex® CMX Client computer time and 3) Beamex® CMX Client computer time as it is in the older versions of Beamex® CMX (default for upgrades).

**Improved language support.** The improved language support makes it easier for the user to select the user interface language of the CMX.

**Document Manager.** The Document Manager makes it possible for the user to select between saving a file to the CMX database and having only the link to the file that is saved.

In addition to the LDAP support, timestamp with coordinated Universal Time information in Audit Trail, improved language support and the Document Manager, the CMX v2.5 includes multiple minor improvements and additions as well.





# Beamex's Ultimate Calibration handbook

■ Why calibrate? What are the elements of an efficient calibration program? How often instruments should be calibrated? How often calibrators should be recalibrated? Why Fieldbus instruments must also be calibrated? What is the safest way to calibrate? Ultimate Calibration, a new calibration handbook published by Beamex, provides answers to these and many other questions.

The content of the book is organized in two main parts, it has 170 pages and 16 different articles about calibration. In addition, it includes a calibration terminology from A to Z, covering definitions of 80 most common terms

in the field of calibration and metrology.

"This book, Ultimate Calibration, has two main purposes: firstly, to give some general information about industrial calibration, and secondly to give a deeper introduction to the 'world of integrated and automated calibration' in the form of independent articles. The content of the book has been selected and organized in such a way that as many readers as possible are able to find something useful and interesting in it", explains Raimo Ahola, CEO of Beamex Group.

Interested in the book? Visit: [www.beamex.com/ultimatecalibration](http://www.beamex.com/ultimatecalibration)

## CONTENTS OF ULTIMATE CALIBRATION

### PART 1 (generic introduction to calibration)

Quality standards and industry regulations  
A basic quality calibration program

### PART 2 (insightful articles about different topics in relation to calibration)

Traceable and efficient calibrations in the process industry  
How often should instruments be calibrated  
How often should calibrators be calibrated  
Automated calibration planning lowers costs  
Benefits of integrating calibration software with CMMS  
Fieldbus transmitters must also be calibrated  
Calibration of weighing instruments Part 1  
Calibration of weighing instruments Part 2  
Calibration in hazardous environments  
Improving power plant performance through calibration  
Calibration in the pharmaceutical industry  
The benefits of using a documenting calibrator  
The safest way to calibrate  
Why use software for calibration management?

APPENDIX: Calibration terminology A to Z

## Beamex expands to India

■ Beamex has recently opened a liaison office in Mumbai, India. The office is located in the same building with Beamex's local strategic partner and distributor, Waaree Industries Limited. The primary role of the established office is to act as a sales support office for the local partner.

Beamex has been present at the Indian market already for over 20 years, but the real breakthrough has happened during the past couple of years. "The market is large and it is growing rapidly. In addition, there are a lot of world-class industrial corporations in India, which are looking for calibration solutions that improve efficiency and quality. Especially the quality of our products and services has been valued by the customers in India",

explains Raimo Ahola, CEO of Beamex Group.

"It makes sense to establish this kind of presence in India. We can work together side-by-side with our local partner to provide high quality customer service. This is the right way to do it", reveals Juha Salimäki, Director of the Beamex India Liaison Office.

### Beamex India Liaison Office

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## GERMEX GmbH – the first Beamex Premium Partner

■ The connection between GERMEX and Beamex has endured for more than 30 years. In his role as Sales Manager of another company, Heinz Hoster, founder of GERMEX GmbH, was initially responsible for the sale of Beamex products on the German market. When he set up his own sales company in April 1989, the strong connection with Finland was upheld.

While the support of German Beamex customers was initially organised decentrally through various engineering firms, in June 1995 GERMEX GmbH took over responsibility for the largest market in Europe. Due to the continuous expansion of the brand name Beamex and the constantly increasing sales figures, in 2007 Beamex decided to name GERMEX GmbH as the world's first Beamex Premium Partner.



**Ralph Hoster is Managing Director of GERMEX GmbH.**

*"There are no better products and, above all, there is no manufacturer with such expertise."*

Today, GERMEX has a total of eight employees, of whom six are solely occupied with sales, marketing and service for Beamex in Germany. Ralph Hoster, Managing Director and the second generation of the family to be involved with the company, who also took part in the initial discussions about the founding of the company, likes to emphasise the expertise and many years of experience that his team possesses.

"Some of the contact partners for our customers have already been on

board for almost 15 years. And not only that, we are also specialists for all questions about and in all areas of calibration. It isn't the sales figures that distinguish this team, but the will and the ability to find the best solution for every customer." For this reason, GERMEX also strives to constantly bring new skills into the company. The latest example is a new Key Account Manager, who brings experiences from his time as Department Head of a DKD (German Calibration Service) Calibration Laboratory into the team.

GERMEX GmbH is domiciled in Grevenbroich, a town of 60,000 inhabitants located in the city triangle Düsseldorf – Cologne – Aachen. However, neither a regional concentration of customers nor an excessively obvious industry focus can be established.

"Although we traditionally did more business with power stations and the chemical and petrochemical industries, today we have customers from throughout the process industry", Ralph Hoster says.

In addition, Ralph Hoster is responsible for one of Beamex's largest,

internationally active customers in his role as Key Account Manager.

In response to the question as to why GERMEX has focussed on Beamex to this extent over the years, Ralph Hoster says: "There are no better products and, above all, there is no manufacturer with such expertise. It is no coincidence that the first fieldbus calibrator in the world is by Beamex. But quality and innovation are not what make our partnership so enjoyable and successful. Above all, it is the longstanding contacts, the short channels, in short, the personal, daily dealings with one another. The customers can feel this too".

*"It is no coincidence that the first fieldbus calibrator in the world is by Beamex."*

For the future, Ralph Hoster sees even greater potential. "More efficient processes and first-rate documentation mean clear potential for saving – our customers appreciate this. And the increasing fieldbus installations give rise to expectations that demand will rise in the medium term. In addition, we always keep track of our products and services in order to adapt them to demand. The next few months will be exciting and interesting".

# Would you like to optimize the calibration interval for your plant's instruments?

*"94% of CMX Calibration Software customers state that using Beamex products has improved the efficiency of their calibration procedures."*

*Beamex Customer Survey 2008*

## Beamex® CMX Calibration Software

**Reduce calibration costs and improve quality by planning the optimal calibration interval for instruments with Beamex® CMX Calibration Software.**

- Every calibration event is stored into the database; the history trend is made automatically.
- Analyze and determine the optimal calibration interval for instruments.
- Make decisions regarding increasing or decreasing the calibration interval.
- Graphical display of the history trend.
- Make conclusions concerning the quality of the instruments.

Portable calibrators  
Workstations  
Calibration software  
Professional services  
Industry solutions

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# Pressure calibration made fast and easy



## Beamex® POC6 Automatic Pressure Controller

The Beamex® POC6 is an accurate and user-friendly automatic pressure output controller, providing regulated output from vacuum to 70 bar (1015 psi). The POC6 can be delivered as panel mounted to Beamex® MCS100 Workstation or as a portable desk top version. The POC6 can be used as a stand-alone pressure controller or as integrated to the Beamex calibration system.

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# Beamex in brief

Beamex is a leading worldwide provider of calibration solutions that meet even the most demanding requirements of process instrumentation. Beamex offers a comprehensive range of products and services — from portable calibrators to workstations, calibration accessories, calibration software, industry-specific solutions and professional services. Through Beamex's partner network, their products and services are available in more than 60 countries.

## **Learn more about Beamex products and services:**

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

## **Brochures, product demonstrations and quotations**

[info@beamex.com](mailto:info@beamex.com)

[www.beamex.com/request](http://www.beamex.com/request) (online request form)

## **Software support**

[support@beamex.com](mailto:support@beamex.com)

## **Re-calibration and service**

[service@beamex.com](mailto:service@beamex.com)

## **Find your local Beamex sales office at:**

[www.beamex.com/contacts](http://www.beamex.com/contacts)

## **Interested in submitting an article to CALIBRATION WORLD?**

Contact: [villy.lindfelt@beamex.com](mailto:villy.lindfelt@beamex.com)

## **If you would like to remove your name from our mailing list:**

please visit [www.beamex.com](http://www.beamex.com) or send an e-mail to [info@beamex.com](mailto:info@beamex.com)

# Beamex products and services

## **Portable calibrators**

Beamex's range of portable MC calibrators for field calibration is known for their accuracy, versatility and also for meeting both high and uncompromised quality standards.

- MC5 Multifunction Calibrator
- MC5-IS Intrinsically Safe Multifunction Calibrator
- MC2 Series
- MC4 Documenting Process Calibrator
- MC2-IS Intrinsically Safe Multifunction Calibrator

## **Workstations**

A workstation can be considered ideal when most of maintenance and calibration tasks are performed in the workshop.

- MCS100 Workstation
- MC5P Calibration Host Module

## **Accessories**

Beamex's calibration accessories complete your investment into calibration equipment.

- External pressure modules
- Calibration hand-pumps
- Spare parts

## **Calibration software**

Plan, manage and document all your calibrations efficiently and safely using Beamex's calibration software.

- CMX Light
- CMX Professional
- CMX Enterprise

## **Professional services**

An essential part of a total calibration solution is Professional Services — service and re-calibration, installation and training, software support, validation services and integration services.

- Re-calibration and service
- Installation and training
- Software Service Agreement (SSA)
- Validation services (pharmaceutical industry)
- Integration services



# Carry less equipment on the field – use Beamex® all-in-one calibrators

## Beamex® all-in-one calibrators

Beamex offers a range of high-accuracy calibrators that provide wide capabilities and replace several individual measurement devices due to their all-in-one functionality. The Beamex® Calibrators are reliable and robust, high-quality calibrators providing calibration capability for many different instrument types (pressure, electrical, temperature) and transmitter protocols, including HART®, Foundation Fieldbus H1 and Profibus PA.



Read more at  
[www.beamex.com](http://www.beamex.com)



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