

Calibration

BEAMEX CORPORATE MAGAZINE • 2022

WORLD

AUTOMATED BUSINESS IS SMARTER BUSINESS

Why automate your
calibration processes?

SIEMENS COLLABORATION

Beamex CMX and Siemens
LMS join forces

BEAMEX PEOPLE

Alex Maxfield
reveals the secrets
of our success

FROM PAPER BASED TO CLOUD BASED

The evolution of
calibration
documentation

beamex

CEO'S LETTER

Last year we put a great deal of time and effort into crystallizing our strategy and purpose in order to define Beamex as a company and what we stand for. We decided that the purpose of Beamex is to contribute to creating "a safer and less uncertain world". In hindsight, considering that in addition to the ongoing global pandemic we are now facing war in Europe and increased geopolitical instability, this purpose is more relevant today than we could ever have imagined.

I believe that we as an industry have a very important role to play in making the world safer and less uncertain. In this issue of Calibration World we share many inspiring stories about how both Beamex and our customers are using accurate measurements, reliable data, and traceability to help protect each other, our businesses, and the planet. A particular favorite of mine is the article on the evolution of calibration documentation, which describes how reliable and connected calibration data helps to ensure that your instrument management process is efficient, predictable, and complies with industry best practices that will improve plant performance and uptime. In a nutshell, the message is this: if you want to succeed and make the world a better place at the same time, calibrate for yourself, not your auditors!

Enjoy this issue, and remember that we very much appreciate your feedback!

Jan-Henrik Svensson
CEO, Beamex Group



CALIBRATION WORLD

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THE EVOLUTION OF CALIBRATION DOCUMENTATION



Humans have evolved and **documentation has evolved**, and with it the way in which we manage calibration



Our modern history is defined by the advent of writing. Writing is humankind's principal technology for collecting, manipulating, storing, retrieving, communicating, and disseminating information. Before we learned to write, we lived in an era referred to as pre-history, or prehistoric times. As humans evolved, began cultivating land, and started living a less nomadic existence, the documentation of events became more sophisticated. Cave drawings gave way to hieroglyphics; stone tablets evolved into scrolls and then into bound books; the invention of typeset documents gave more and more people access to the written word.

Today, we can send emails, text messages, and a variety of other digital communication around the world in a matter of seconds. Humans have evolved and documentation has evolved, and with it the way in which we manage calibration.

In the beginning, there was no way to document calibration findings other than with a pen and paper. This information was brought back from the field, entered into a form, and filed away. Just as in the Library of Alexandria (one of the largest and most significant libraries in the ancient world) with its thousands of papyrus scrolls, managing hundreds or even thousands of paper calibration documents comes with the inherent risk of misplaced, lost, or damaged documents - in the case of the Alexandria library, caused by a fire allegedly started by Julius Caesar. Additionally, a paper and pen system is labor-intensive, time-consuming, prone to errors, and provides little to no opportunity to analyze historical trends.

“

A paper and pen system is labor-intensive, time-consuming, prone to errors, and provides little to no opportunity to analyze historical trends.”





DIGITAL SYSTEMS ENTER THE SCENE

Over time, more digitalized systems of calibration management have emerged including the use of spreadsheets and databases. While certainly a step in the right direction, this method of documentation still has its drawbacks. Similar to the pen and paper method, this form of recording calibration data is still time-consuming and error prone. It also lacks automation in that reminders and tasks cannot be set up on instruments that are due for calibration.

SOFTWARE SYSTEMS

The use of software to manage calibration reports was the next giant leap. The calibration module within some maintenance management software allows instrument data to be stored and managed efficiently in a plant's database. But again, this method falls short due to lack of automation, limited functionality, and often non-compliance with regulatory requirements (for example, FDA or EPA requirements) for managing calibration records.

DEDICATED CALIBRATION SOLUTIONS

Advances in technology seem to come faster and faster. Today, dedicated calibration software is the most advanced solution available to support and guide calibration management activities. With calibration software, users are provided with an easy-to-use, web-browser like interface. The software manages and stores all instrument and calibration data. This includes the planning and scheduling of calibration work; analysis and optimization of calibration frequency; production of reports, certificates, and labels; communication with smart calibrators; and easy integration with maintenance management systems such as SAP and Maximo. The result is a streamlined, automated calibration process that improves quality, plant productivity, safety, and efficiency.

In order to understand how this type of software can help better manage process plant instrument calibrations, it is important to consider the typical calibration management tasks that companies undertake.

THERE ARE FIVE MAIN AREAS HERE:

- **Planning and decision-making**
- **Organization**
- **Execution**
- **Documentation, and**
- **Analysis**

PLANNING AND DECISION-MAKING

Instruments and measurement devices should be listed and classified into 'critical' and 'non-critical' devices, with calibration ranges and required tolerances identified for each individual device. The calibration interval, creation, and approval of standard operating procedures (SOPs) as well as the suitable calibration methods and tools should also be defined. Finally, the current calibration status for every instrument should be identified.

ORGANIZATION

Organization involves training the company's calibration staff to use the chosen tools and follow the approved SOPs. Resources should be made available and assigned to carry out the scheduled calibration tasks.

EXECUTION

The execution stage involves staff carrying out assigned calibration activities and following the appropriate instructions before calibrating a device, including any associated safety procedures.

DOCUMENTATION

Unlike many of the more archaic methods, calibration software generates reports

automatically, and all calibration data is stored in one database rather than multiple, disparate systems. Calibration certificates, reports, and labels can all be printed out on paper or sent in electronic format. The documentation and storage of calibration results typically involves electronically signing or approving all calibration records generated.

ANALYSIS

Improvements in documentation lead to improvements in analysis. Using specialized calibration management software enables faster, easier, and more accurate analysis of calibration records as well as the identification of historical trends. Also, when a plant is being audited, calibration software can facilitate both the preparation process and the audit itself. Locating records and verifying that the system works is effortless when compared to traditional, paper-based calibration record keeping. Regulatory organizations and standards such as the FDA and EPA place demanding requirements on the recording of calibration data. Calibration software has many functions that help in meeting these requirements, such as change management, audit trail, and electronic signature functions.



Today, dedicated calibration software is the most advanced solution available to support and guide calibration management activities.”



Based on the results, analysis should be performed to determine if any corrective action needs to be taken. The effectiveness of calibration needs to be reviewed and calibration intervals checked. These intervals may need to be adjusted based on archived calibration history. If, for example, a sensor drifts out of its specification range, the consequences could be disastrous for the plant, resulting in problems such as costly production downtime, safety issues, or batches of inferior-quality goods being produced which may then have to be scrapped.

Just as advancements in tools and the proliferation of the written word has helped shape the evolution of humans, advancements in calibration documentation shape the efficiency and productivity of plants using these technologies. By replacing manual procedures with automated, validated processes, efficiencies should improve. Reducing labor-intensive calibration activities will reduce costly production downtime, while the ability to analyze calibration results will optimize calibration intervals, saving time and increasing productivity. Every type of process plant, regardless of industry sector, can benefit from using calibration management software. Compared to traditional, paper-based systems, in-house legacy calibration systems, or calibration modules of maintenance management systems, using dedicated calibration management software results in **improved quality and increased productivity**, and reduces the cost of the entire calibration process.

Calibration software also gives users access to data and historical trends, and these insights help plant personnel to make better decisions. For example, when a piece of equipment needs to be upgraded it can be difficult to get approval based on speculation. Being able to show data of the inconsistencies and malfunctions makes the approval process much easier. In addition, as the volume of work for calibration technicians increases, having insights into the process can facilitate a more streamlined and efficient work schedule. This will in turn improve reliability, make it easier for technicians to manage their workflow, and contribute to a safer and more well-organized process.

As we become a more advanced society our need to share information progresses, as do our methods of collecting, manipulating, storing, retrieving, communicating, and disseminating information. While simply writing calibration data down with a pen and paper is still an effective way of collecting information, it lacks efficiency and hinders the ability of people further down the line to retrieve and process the information.

While databases and maintenance management software are certainly steps in the right direction, they still miss the mark when it comes to disseminating data in a useful and streamlined way. Implementing calibration software makes it easier to collect, store, analyze, retrieve, and share information. Until the next technological leap forward, calibration software remains the most advanced solution available to support and guide calibration management activities.



Every type of process plant, regardless of industry sector, can benefit from using calibration management software.”



Using dedicated calibration management software results in improved quality and increased productivity, and reduces the cost of the entire calibration process.”

PRODUCT NEWS

LOOKING FOR QUICK, EASY PRESSURE GENERATION?

LOOK NO FURTHER THAN THE BEAMEX ePG ELECTRICAL PRESSURE GENERATOR

Our customers asked us for an easier way to perform pressure calibrations, and we delivered. The revolutionary new Beamex ePG electrical pressure pump for industrial pressure calibration applications is the latest addition to our successful PG family of pumps. This robust, portable battery-operated pressure pump enables easy and quick pressure generation from near vacuum up to 20 bar (300 psi), and features a long-lasting, field-replaceable battery pack so users can perform multiple pressure calibrations on a single charge.

The Beamex ePG can be used together with any existing pressure calibrator as a direct replacement for manual hand pumps, which are laborious to use, especially when performing multiple calibrations or pumping to higher pressures. When used together with the Beamex MC6 family of calibrators, the Beamex ePG enables fully automatic pressure calibration.

VISIT OUR WEBSITE TO LEARN MORE ABOUT THE BEAMEX ePG, WATCH OUR INTRODUCTION VIDEO, AND DOWNLOAD THE BROCHURE:

www.beamex.com/calibrators/beamex-epg/



PRODUCT NEWS

FASTER IMPORTING FOR LOGICAL

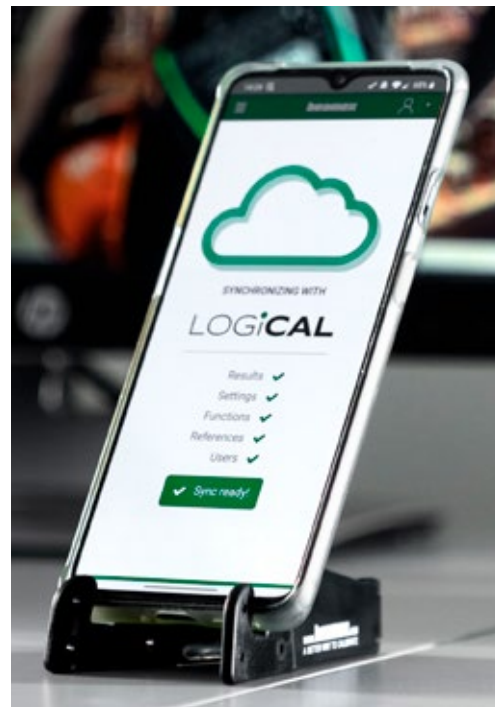
NEW FEATURE MAKES GETTING STARTED WITH LOGICAL EVEN EASIER

LEARN MORE ABOUT LOGICAL: www.beamex.com/logical

WATCH OUR LOGICAL VIDEO: www.beamex.com/videos/whatwhen-and-how-to-calibrate-with-beamexlogical-software

Getting started with Beamex LOGICAL Calibration Management Software is now even easier thanks to the new import feature, which lets you import Excel spreadsheets with instrument and reference data to quickly populate your LOGICAL database.

As a cloud-based solution, LOGICAL makes it easy to cooperate and work at multiple locations and removes the need for expensive IT infrastructure. You'll know what needs calibrating and when, and with no more manual data entry needed your calibration process will become faster and more reliable.



MOBILE MIRACLE

BEAMEX TEMPERATURE CALIBRATION TROLLEY PUTS EVERYTHING WITHIN EASY REACH

Our CENTRICAL product family has been expanded with the introduction of the Beamex Temperature Calibration Trolley, designed for use with the state-of-the-art Beamex MC6-T Multifunction Temperature Calibrator and Communicator. The trolley is an ergonomic mobile station for temperature calibration that puts all the tools technicians need within easy reach. It can also be equipped with pressure calibration capabilities by adding the new External Pressure Module for CENTRICAL.

The trolley includes adjustable support for temperature calibrators, a heat-resistant silicon shelf mat, and a dedicated power socket for calibrators. The instrument panel is configurable with options for five different mains power supply modules, and the trolley can also be customized for specific needs.



MC6-T

MULTIFUNCTION TEMPERATURE CALIBRATOR AND COMMUNICATOR



THE BEAMEX MC6-T
A BETTER WAY FOR TEMPERATURE CALIBRATION

THE MC6-T is an extremely versatile portable automated temperature calibration system. It combines a state-of-the-art temperature dry block with multifunction process calibrator technology to offer a level of versatility that no

other temperature calibrator available today can match. Robust, lightweight, and easy to carry, the MC6-T provides superior metrological performance and accuracy for temperature calibrations in the field.

“The Beamex MC6-T is a powerful and versatile device that brings together high-accuracy reference measurements and simulations with HART and FOUNDATION Fieldbus communicator functionalities.

Nothing else on the market comes close to offering this level of functionality in a single device.”

Antti Mäkynen,
Product Manager at Beamex

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www.beamex.com/calibrators/beamex-mc6-t

beamex

PRODUCT NEWS

QUICK LOADING

SAVE TIME, REDUCE ERRORS, AND BOOST DATA QUALITY WITH BEAMEX CMX DATA LOADER

The Beamex CMX Data Loader Tool is a quick and easy way to add or edit large numbers of instruments in your CMX database, saving time, reducing the risk of typing errors, and promoting high-quality and harmonized data. Combining the Beamex CMX Data Loader Tool with Beamex Expert Services ensures a flexible and efficient CMX implementation or site deployment. Let Beamex experts help you with best practices and complement your database with Data Loader. Contact us to find out more!



READ MORE ABOUT BEAMEX CALIBRATION SOFTWARE: www.beamex.com/software

GO MOBILE

CALIBRATE ON THE GO WITH bMOBILE

The Beamex bMobile Calibration Application is an intuitive, multi-platform solution for guided execution and documentation of field calibrations. Download the app and give it a try! It is available for iOS, Android, and Windows 10 platforms and includes a demonstration mode so you can test it out for free even if you're not yet a Beamex Calibration Management Software customer.



ePG

ELECTRIC PRESSURE PUMP & CONTROLLER



A UNIQUE APPROACH TO FIELD PRESSURE CALIBRATION

The BEAMEX ePG is a robust, portable, battery-operated pressure pump and controller that makes it quick and easy to generate pressures from near vacuum up to 20 bar (300 psi).

The long-lasting, field-replaceable battery pack makes it possible to perform a large number of pressure calibrations on a single charge.

The Beamex ePG can be used together with any existing pressure calibrator as a direct replacement for manual hand pumps.

When the Beamex ePG is used together with the Beamex MC6 family of calibrators, it enables fully automatic pressure calibration where the MC6 calibrator automatically controls the ePG.

A BETTER WAY FOR PRESSURE GENERATION

“Calibrations in the process industry are often performed in the field using a manual hand pump to generate pressure. This is a laborious process, especially if you need to perform several calibrations or generate high pressures. The Beamex ePG has

been developed as a direct result of requests from our customers for an easier way to perform pressure calibrations.”

Antti Mäkynen,
Product Manager at Beamex

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beamex

AUTOMATING

THE CALIBRATION MANAGEMENT ECOSYSTEM



Calibrations are **at the core** of process industries – but every industry also has their own unique requirements

Calibration is a vital component of process industries, and most process plants have some sort of system in place for managing instrument calibration operations and data. However, the systems and processes can be very different even within the same company across different plants. Methods often differ greatly in terms of cost, quality, efficiency, accuracy of data, and level of automation.

In many plants, calibration is still done manually with paper certificates – a time-consuming process that increases the possibility of human error while limiting the ability to perform analysis. Automating the calibration ecosystem to produce traceable calibration data reduces errors and increases efficiency. An automated process also makes it easier to analyze data to implement preventive maintenance, maintain quality, and reduce costs while ensuring compliance.

The calibration ecosystem is about technology, services, and expertise with a focus on traceability of results. This means knowing what device was calibrated, who performed the calibration, what equipment they used, and when they did it. Creating an automated ecosystem requires both hardware and software combined with expertise – both on the part of the solution provider as well as those training the personnel who will use the system. The end result is a range of benefits, from assured compliance and improved quality to better efficiency and cost savings.





MARKET BACKGROUND

All process plants need to manage the calibration process ecosystem, including storing calibration assets, defining and documenting calibration processes and procedures, carrying out calibration, and storing and analyzing calibration data.

Traditionally, engineers and technicians used pen and paper to record calibration results while out in the field. On returning, notes were tidied up or transferred to another paper document, after which they were archived. This resulted in thousands of pieces of paper stored in binders, which risked being misplaced, lost, or damaged.

Using a manual, paper-based system like this is very labor intensive and means that errors are commonplace. It also means that historical trend analysis is very difficult to carry out as the calibration data is not easily accessible – even drawing trend data for a single calibrator can take a matter of hours or even days.

The real issue is one of ensuring traceability. Traceability means that you can quickly and easily find what device was calibrated and know who did the calibration, using what equipment, and when it was done. When everything is

recorded on paper in binders in a storage room, traceability suffers and calibrations become merely very accurate measurements – meaning that the potential to use this data for the benefit of the business is lost.

DIGITALIZING THE PROCESS

The trend of digitalization is affecting most industries, and process industries are no exception. Automating, streamlining, and avoiding errors in the calibration process is key to improving efficiency. To do this, process industry players have attempted to integrate calibration data with maintenance management systems, typically by entering calibration data manually into a spreadsheet or database. The data is stored electronically, but the recording of calibration information is still time-consuming and typing errors are common. Also, the calibration process

itself isn't automated. For example, automatic alarms cannot be set up on instruments that are due for calibration.

Some use the calibration module of their maintenance management software for calibration management. In this kind of setup, plant hierarchy and work orders can be stored, but calibration cannot be automated because the system can't communicate with 'smart' calibrators.

To move beyond the limitations of such a system, an automated calibration ecosystem is key. In general, a calibration management system allows calibration certificates to be generated and calibration data to be delivered to external systems.

KEY ELEMENTS IN THE AUTOMATED CALIBRATION ECOSYSTEM

The calibration ecosystem is made up of everything that's connected to the calibration process, including the actual calibration data from field calibration, calibration management software, compliance, services to ensure everything works smoothly, and the expertise of the people involved in the process.

EXPERTISE

Calibrations are at the core of process industries – but every industry also has its own unique requirements. Expertise on the part of the calibration provider is necessary to ensure that all requirements are met. To take just one example, in the pharmaceuticals industry compliance with the Food and Drug Administration's Good Manufacturing Practice (GMP) requirements is critical. The GMP requirement 21 CFR Part 11, which regulates how the calibration certificate is documented and signed electronically, must be adhered to in order to create a compliant process. Obviously, such requirements need to be taken into account by the vendors designing automated calibration processes.

Expertise also allows a calibration provider to be a trusted advisor. It's important to ask the right questions and ensure that the system being delivered meets the unique process needs of a given company. Understanding change management and having a set process is also essential to ensuring a smooth roll out of new processes and technology.



The trend of digitalization is affecting most industries, and process industries are no exception.”

BENEFITS OF AUTOMATED CALIBRATION INFRASTRUCTURE

BETTER PLANNING AND DECISION-MAKING

With software-based calibration management, planning and decision-making improve. Procedures and calibration strategies can be planned and all calibration assets managed by the software. Instrument and calibrator databases are maintained, while automatic alerts for scheduled calibrations can be set up.

ENSURE COMPLIANCE

Regulatory organizations and standards such as FDA and EPA place demanding requirements on the recording of calibration data. Easily traceable calibration data is important for audits and for ensuring calibrators are in tolerance. For regulated industries, managing user permissions and the integrity of calibration data is highly important, which is enabled by a calibration management system.

INCREASED EFFICIENCY THAT LEADS TO TIME SAVINGS

With an automated system, calibration is more efficient and errors are eliminated. Smart devices guide technicians through the calibration so they know exactly what needs to be done. This increases trust in the results of the calibration as what needs to be done and what has already been done is transparent and clear to all technicians and managers in the ecosystem. Using software-based calibration management systems in conjunction with documenting calibrators means that calibration results can be stored in the calibrator's memory, then automatically uploaded into the calibration software. There is no re-keying of calibration results from a notebook to a database or spreadsheet. Human error is minimized and the whole process takes less time, meaning technicians are freed up to perform more strategic analyses or other important activities.



The calibration ecosystem is made up of everything that's connected to the calibration process.”



Calibration software provides users with an easy-to-use interface.”



In addition to expertise on the part of the solution provider, personnel using the calibration ecosystem need to be trained to use it. One benefit of modern digital systems is that such training can be built in as on-system guidance for users, allowing them to use the system to full effect. Calibration instructions are created using the software to guide engineers through the calibration process. These instructions can also be downloaded to a technician's handheld documenting calibrator while they are in the field.

HARDWARE

Unsurprisingly, calibrators are at the heart of the calibration ecosystem. A modern documenting multifunction calibrator can act as an all-in-one solution for basic needs, especially when using instrument-based calibration management. The calibrator provides a traceable calibration reference.

SOFTWARE

Calibration software provides users with an easy-to-use interface. The software manages and stores all instrument and calibration data and processes. This includes:

- **planning and scheduling of calibration work**
- **analysis and optimization of calibration frequency**
- **production of reports, certificates, and labels**
- **communication with smart calibrators**
- **easy integration with maintenance management systems such as SAP and Maximo**

Software as a service (SaaS) is increasingly being offered with cloud-based solutions, meaning companies need to invest less in backend systems to keep everything running and instead subscribe and scale up services as needed.

RECALIBRATION AND SERVICE

Even the best device will occasionally drift and need to be recalibrated. Regular inspection – or even better, using data and analysis to determine if a device is starting to drift so targeted maintenance can be performed – is key.



AUTOMATED CALIBRATION AND DOCUMENTATION

The system generates reports automatically and all calibration data is stored in one database rather than multiple disparate systems. Calibration certificates, reports, and labels can all be sent in electronic format. Everything is documented and saved, which is important for compliance and audit purposes.

ANALYSIS CAPABILITIES OF CALIBRATION DATA

With traceable calibration data, analysis becomes easier. Engineers can optimize calibration intervals using the software’s trending function. In addition, when a plant is being audited, calibration software can facilitate both the preparation and the audit itself. Locating records and verifying that the system works is effortless when compared to traditional calibration record keeping. Business benefits arise from being able to analyze data and compare the performance of different shifts or production facilities.

CONDITION-BASED MAINTENANCE

Rather than rely on the manufacturer’s recommendation for calibration intervals, plants may be able to adjust these intervals by looking closely at historical trends provided by calibration management software. Instrument drift can be monitored closely over a period of time and then decisions made with respect to amending the calibration interval.

QUALITY ASSURANCE

With all calibrators in tolerance, easy traceability, and the ability to fix calibrators before they drift out of tolerance, the quality of a given process can be assured.

COST REDUCTION

Implementing software-based calibration management means overall plant costs will be reduced. These savings come from fully digitalized calibration procedures that are paperless with no need for manual documentation.



Regulatory organizations and standards such as FDA and EPA place demanding requirements on the recording of calibration data.”



With traceable calibration data, analysis becomes easier.”





IMPLEMENTING AN AUTOMATED CALIBRATION ECOSYSTEM STEP BY STEP

Implementing an automated calibration ecosystem includes several steps, from planning to execution.

PLANNING AND DECISION-MAKING

There are two main ways to manage calibrations:

- Process-based calibration management is mainly concerned with where a measurement task must be performed. Users want to ensure the accuracy of the measurement tasks performed in a given location.
- Instrument-based calibration management is mainly concerned with the physical devices that are used to perform measurement tasks. Users want to ensure the accuracy of the measurement tasks performed with a given device.

Whichever method is chosen, all plant instruments and measurement devices need to be listed and classified into critical and non-critical devices. Once these have been set up, the calibration ranges and required tolerances are

identified. Decisions then need to be made regarding the calibration interval for each instrument.

The creation and approval of standard operating procedures (SOPs) for each device should be defined, followed by the selection of suitable calibration methods and tools to execute

these methods. Finally, the current calibration status of every instrument across the plant needs to be identified.

Having a trusted advisor at this step is critical as they can ask the right questions and identify potential areas for improvement and where key decisions need to be made. While final decisions are made by the customer, an advisor can help ensure that all relevant information is taken into account.



Without training, there is a risk that new assets will not be fully utilized, meaning the full benefits of the investment won't be realized."

Organization-related needs

The next stage involves training calibration staff – typically maintenance technicians, service engineers, process and quality engineers, and managers – in using the chosen tools and how to follow the approved procedures. Without training, there is a risk that new assets will not be fully utilized, meaning the full benefits of the investment won't be realized. Resources also need to be made available to carry out the scheduled calibration tasks.

Execution and analysis

When executing the automated calibration ecosystem, the assigned calibration tasks must be supervised. Staff carrying out these activities must follow the appropriate instructions before calibrating the device, including any associated safety procedures. The calibration is then carried out according to the plan, although further instructions may need to be followed after calibration.

The documentation and storage of calibration results typically involves electronically signing or approving all calibration records generated. Based on the results, analysis should be performed to determine if any corrective action needs to be taken.

THE BEAMEX INTEGRATED CALIBRATION SOLUTION (ICS)

The Beamex ICS is a combination of software, hardware, and calibration expertise that delivers an automated and paperless flow of calibration data.

When upgrading from a traditional calibration system to an integrated one, the calibration process is automated and all error-prone manual steps are eliminated. Upgrading typically decreases how long the entire calibration process takes while improving the quality of calibration records and ensuring quick and easy retrieval for audits.





Creating an automated calibration ecosystem requires a combination of software, hardware, services, and expertise.”



The Beamex solution is a combination of software, hardware, and calibration expertise that delivers an automated and paperless flow of calibration data.”

Creating an automated calibration ecosystem is not just about buying another piece of software or more hardware. Beamex uses its expertise to support successful change management, helping customers to evaluate their current calibration processes and find areas for improvement using a set process. We can then help to ensure a smooth and efficient transition to a new and optimized calibration process.

Beamex CMX Calibration Management Software

Beamex CMX is calibration software located on the customer’s premises. When combined with a documenting calibrator, it means users can entirely remove paper from their calibration process. All records are safely stored in a database resulting in new possibilities for analyzing calibration data and improving processes.

Beamex LOGiCAL Calibration Management Software

Beamex LOGiCAL is a subscription-based calibration software using cloud technology. It is easy to start using LOGiCAL and the costs are scalable based on usage. Users can start with a low-cost monthly fee and still benefit from a digitalized paperless calibration environment. Because LOGiCAL is cloud based, users can access it anywhere there is an internet connection, meaning no expensive IT infrastructure is needed and updates are automatic.

Beamex bMobile Calibration Application

Beamex bMobile is an application for mobile devices that allows paperless calibration, documentation, and inspection activities in the field. Beamex bMobile works offline and in conjunction with the online Beamex CMX calibration management software to support users who don’t always have a reliable network connection when working.

Harnessing new technologies

Beamex is continuing to develop our calibration management ecosystem to take advantage of emerging technologies that further automate the process and increase data quality. These include artificial intelligence, machine vision, and augmented reality, among others. The goal is to harness these technologies in a way that delivers concrete benefits – ensuring that the right person uses the right tools to calibrate the right equipment in the most efficient way possible.



CONCLUSION

Creating an automated calibration ecosystem requires a combination of software, hardware, services, and expertise. When such a system is in place, traceable calibration data is automatically created when a calibration is performed and digitally stored, reducing the need for error-prone manual steps. Data can also be easily found for audit purposes or analyzed to discover trends, to perform targeted maintenance when needed, or

used to find areas for improvement – ultimately increasing efficiency and reducing costs.

Learn more about Beamex products and services: www.beamex.com

Beamex worldwide contacts: www.beamex.com/beamex-worldwide/

WITH DIGITAL IN OUR DNA, WE'RE READY FOR ANYTHING –

ALEX MAXFIELD TALKS SALES, ONLINE MEETINGS, AND SUCCESS IN THE FACE OF COVID



“

With over three decades under his belt working in a variety of technical and commercial environments, Beamex's Senior Vice President of Sales and Marketing Alex Maxfield has seen it all. With the global sales organization having successfully navigated the worst of Covid to deliver extremely strong results in 2021, he unpicks the trials, tribulations, and teamwork behind this success and the role that Beamex's digital DNA has played.

Aside from a fascination with all things technical at work, outside of office hours Alex is a motorcycle enthusiast who likes to get his hands dirty as well as sit in the saddle. “Restoring and riding motorcycles is a big passion of mine, which is no surprise given my engineering background,” he says. “It’s time away from the busy schedule at work, where I’m the person tasked with setting and executing our sales strategy and with overall responsibility for marketing. In terms of the latter, we have fantastic cooperation between sales and marketing, so with our global marketing team I know things are in great hands.”

The Beamex group of companies boasts a sales presence in ten countries, with teams on the ground in Finland, France, Germany, UK, USA, Canada, UAE, China, India, and Mexico. With around 100 members, the global sales team accounts for approximately 35% of Beamex’s total workforce. The sales network is strengthened by close, long-term relationships with business partners across the globe, enabling Beamex to support customers in more than 80 countries.

LASER-FOCUSED ON CUSTOMER SATISFACTION

“What ties our group companies together is the commitment and professionalism of our people, not only in terms of efficient order handling and quality assurance, but also in terms of taking care of customer satisfaction and providing a top-quality after-sales experience for customers,” Alex explains. “Our service-related business has been growing year on year because we are laser focused on making sure the customer always has traceable accuracy in their hands.”

Our service-related business has been growing year on year because we are laser focused on making sure the customer always has traceable accuracy in their hands.”



An increasingly important part of the sales structure at Beamex is the Calibration Solutions Group (CSG), which provides both helpdesk-type support and expert consulting services for concepting, designing, specifying, and implementing full-chain calibration solutions comprising hardware, software, and related services. “Our CSG experts provide a vitally important link with our customers because they make sure that our solutions are specified, designed, and implemented so that they perfectly address the customer’s needs and help them achieve their business goals,” says Alex. “It is this kind of capability that makes Beamex unique in this marketplace. There are hundreds of companies offering calibration hardware and related products, but none who can offer the holistic project-type capabilities that we can.”





DIGITAL DNA HELPS TO OVERCOME THE CHALLENGES OF COVID

Face-to-face contact has naturally always been a hugely important part of how Beamex engages with and supports its customers and how employees connect, bond, and celebrate successes. With Covid almost entirely removing the possibility to network in person, things could have looked very different through 2021 had it not been for Beamex's forward-thinking IT organization.

"We are lucky enough to be well versed in digital working and to have the tools we need to meet customers and collaborate remotely, so for us moving online didn't feel like as big a jolt as perhaps it did in other companies," highlights Alex. "Our people had access to Skype, Teams, and other communication tools so they simply got on with the job. The networks we have built and the strong relationships between our people across different countries have certainly paid off in the world of remote working. We had some great examples of not only working together remotely but also socializing remotely as well. A virtual coffee morning in Finland became a global event with people from all over the world joining, and we even had an online sales meeting with a magician joining remotely to provide some light entertainment!"

Throughout the Covid pandemic it has, to a large extent, been business as usual for Beamex, with orders being filled and customer connections being maintained without disruption. "Thanks to stringent measures at our facility in Finland our production and logistics operations have remained open as normal," Alex says. "Excellent sales forecasting meant we knew we were where we needed to be in terms of the numbers, so we had no need to take measures such as reducing employees' working hours. We were able to maintain an excellent spirit throughout 2021 and, despite the challenges, managed to achieve our best ever year in terms of sales, largely thanks to the way the whole team pulled together."

AN OPPORTUNITY TO EXPAND THE DIGITAL TOOLBOX

When the Covid pandemic was still in its early stages Beamex was already in the process of launching new digital services and improving

existing platforms to support customers. "Training is a good example of where we have adapted and stepped up our game," Alex explains. "We revisited all our customer training courses so we could adapt them for fully online delivery instead of simply replicating our face-to-face process online. Also, all our offices are now equipped with state-of-the-art AV setups so that we can develop and execute professional-quality training and demos for online use."

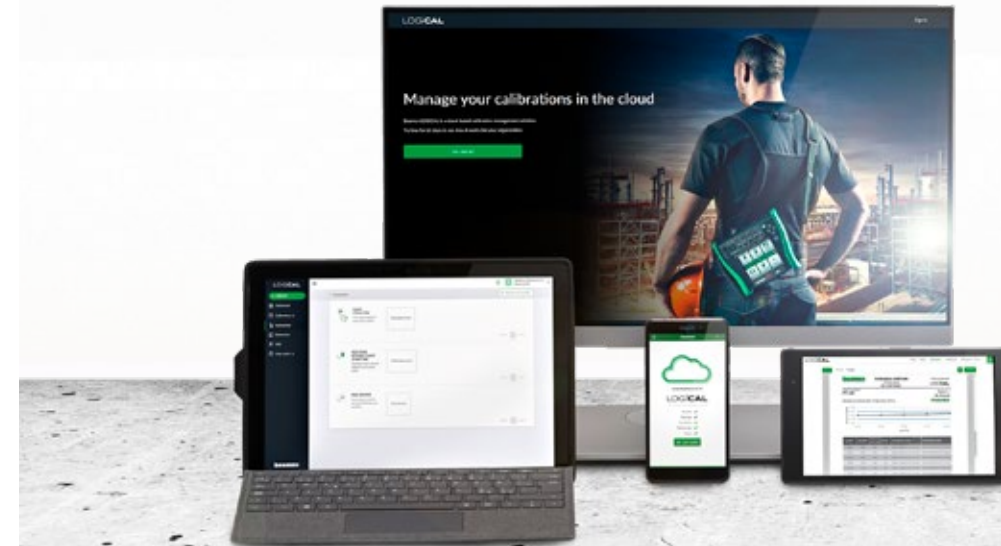
Beyond eLearning, Beamex has continued to develop its webshop, where customers can purchase spare parts and accessories for Beamex calibrators, while the Beamex Service Portal lets customers arrange the return of their equipment for calibration. "With the webshop we have slashed order processing and dispatch times from days to minutes, while the service portal is helping to make our after-sales service as efficient as possible and ensuring that the customer journey at this critical stage is the best it can possibly be," Alex says. "We also launched an eCommerce portal for LOGICAL, our cloud-based calibration software-as-a-service product, which eliminates the need for customers to invest in their own expensive IT infrastructure to manage and execute their calibration activities."

In the midst of the pandemic Beamex also introduced the MC6-T multifunction process calibrator and communicator, a launch that also benefitted hugely from digital tools and technologies. "With no opportunity to showcase this disruptively innovative solution face to face, as an organization we had to think outside the box," says Alex. "Thanks to virtual and augmented reality technologies we were able to build an environment where customers could experience and explore the new product and its capabilities online."

"Beamex is a technology-focused and digitally driven business, but it is our people who make us who we are. Without their professional attitude, commitment to working together as a team, and 'keep calm and carry on' approach, we would not be in the position we are in coming into 2022. As we look to the future, we see a continued culture of strong teamwork focused not on selling but on deep cooperation with our customers to ensure we provide exactly what they need to meet their business goals and continue to support them throughout the life cycle of their Beamex solutions and services."

LOGICAL

SUBSCRIPTION-BASED CALIBRATION SOFTWARE



▶ **WEBINAR:**
[An easy and cost-efficient way to digitalize your calibration process](#)

WHY USE CLOUD-BASED CALIBRATION SOFTWARE?

- Using cloud-based software like LOGICAL is extremely cost-effective.
- Cloud-based software can be accessed from any device with an internet connection.
- There is no need to invest in expensive IT infrastructure or install applications on your own servers or laptops – you simply pay according to usage.

“Using Beamex LOGICAL has allowed us to switch to fully paperless calibration certificates, which means our field service technicians are

approximately 30 to 40% more efficient. Automating our calibration process has also helped reduce potential errors.”

Richard O'Meara, Contracts Manager, Douglas Calibration Services, Jones Engineering Group

info@beamex.com
www.beamex.com/logical



CASE STORY



BEAMEX AND SIEMENS COLLABORATE TO ENABLE PAPERLESS CALIBRATION WORKFLOWS

Thanks to close cooperation between Beamex and Siemens, customers using Siemens Lifecycle Management Suite (LMS) can now take advantage of integration with Beamex CMX Calibration Management Software.

The integration, which is introduced with the launch of version 1.3 of LMS, enables Siemens LMS customers to generate a paperless flow of calibration data, save time, and reduce the risk of errors in their calibration documentation with an automated and digitalized workflow. There are also considerable benefits for CMX users as a result of the integration with Siemens LMS such as instrument data synchronization, ensuring the correct instrument information is always used for the calibration.

“We are pleased to have found Beamex, a partner whose professional calibration software we could integrate into our Siemens Lifecycle Management Suite”, says Kathrin Kolberg, Head of Sales and Marketing, Services for Process Automation, Siemens AG.

“Our combined Software as a Service offering is a good example of a solution where the whole is far greater than the sum of its parts. It helps customers in the process industry to effectively support the digital transformation of their asset management and calibration processes,” says Antonio Matamala, Country Manager, Beamex Germany.

To learn more about Beamex CMX Calibration Management Software, visit www.beamex.com/cmz



The integration enables Siemens LMS customers to generate a paperless flow of calibration data, save time, and reduce the risk of errors in their calibration documentation.”



UNDERSTANDING PRESSURE CALIBRATOR ACCURACY SPECIFICATIONS



Not all **pressure calibrators** are the same. What should you think about when choosing one?

Comparing the accuracy specifications of pressure calibrators can be a challenging task because different manufacturers specify accuracy in different ways. This means that you can't simply compare the numbers given in the specification – you need to understand how these numbers are calculated and what they mean in practice.

This white paper looks at the different ways pressure calibrator accuracy specifications are presented, explains what they mean, and compares them. It also briefly covers other aspects that should be considered when choosing a pressure calibrator.

ACCURACY SPECIFICATIONS

First, let's look at the different ways accuracy specifications are provided by manufacturers and how to interpret them.

1. PERCENT OF FULL SCALE

Percent of full scale (sometimes written also “% of full scale”, or “%FS”) is one of the most common ways to specify pressure measurement accuracy, and many process instruments use this kind of accuracy specification. As the name suggests, you calculate the given percentage value from the full scale of the pressure range, with full scale being the maximum pressure the module can measure.





With percent of full scale, measurements have the same (absolute) accuracy (or error) throughout the whole range. This specification is obviously an easy one to calculate and understand. It is best suited to technologies where the zero and full scale have a similar likelihood for error or drift, and where it is not possible for the user to easily make a zero correction during normal usage.

Percent of full scale

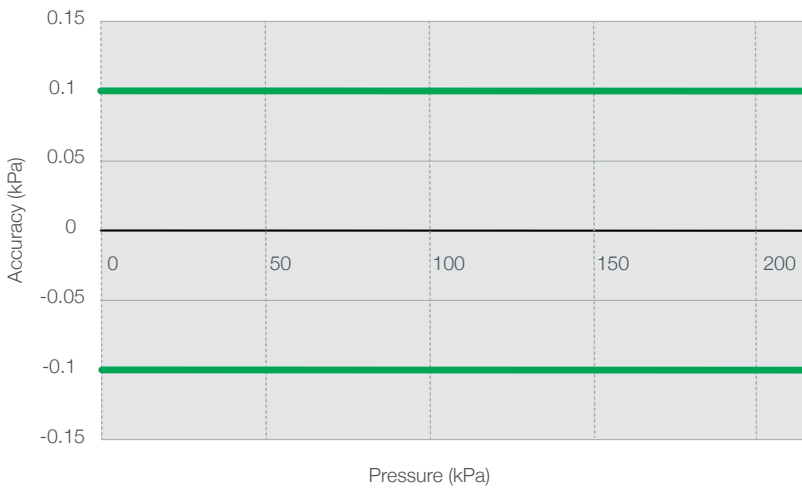


Figure 1 – Percent of full scale accuracy specification with accuracy shown in engineering units on the Y-axis

Percent of full scale (with % of reading on Y axis)

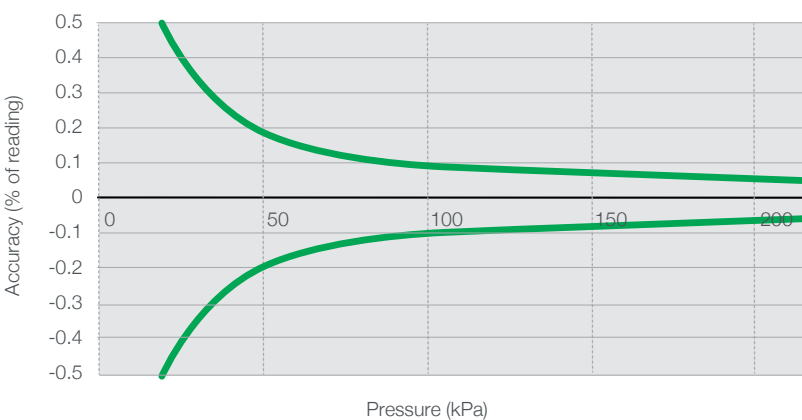


Figure 2 – Percent of full scale accuracy specification with accuracy in percent of reading on the Y-axis

With most modern electrical pressure measurement devices, the user can perform zeroing of the pressure measurement by having the pressure measurement open to atmospheric (ambient) pressure and performing a zeroing function. This makes it easy for the user to correct for any zero errors before and after a measurement is taken. Therefore, %FS is not the most suitable accuracy specification for modern electric pressure measurement equipment.

EXAMPLE

For clarification, let's look at some examples with graphs for all the different specification methods, starting with the "percent of full scale" method.

- **Pressure range: 0 to 200 kPa**
- **Accuracy specification: 0.05% of full scale (%FS)**

As we can see in Figure 1, the accuracy specification is a flat line and remains the same in engineering units (0.1 kPa) throughout the pressure range whether we use %FS or kPa on our Y-axis.

But if we look at the accuracy specification as the accuracy of the measured pressure point (or accuracy as a "percent of reading" value), then the situation is different.

Figure 2 shows the percentage of the accuracy reading on the Y-axis. This shows what is happening in practice when you measure a certain pressure with this kind of module, showing how accurate that measurement is compared to the pressure being measured.

We can see that the error of the actual measured pressure will increase pretty quickly if we are measuring a pressure smaller than the full scale. A %FS specified pressure measurement should be mainly used with pressures close to the upper end of the module, as it loses accuracy pretty quickly at lower pressures. If you measure very low pressures the error of that measured pressure can be huge.

For example, when measuring a pressure in the middle of the range (at the 50% point), the error of that reading is already double that of the error at the full scale point. Measuring at 25% of the range point, the error is quadrupled! If you have pressure modules with %FS accuracy specification, you end up needing several modules as the accuracy deteriorates quickly when measuring lower pressure.

ACCURACY EXPRESSED IN PPM OR ENGINEERING UNITS
These two methods are very close to the percent of full scale method.

Sometimes the accuracy can be expressed in ppm (parts per million) of the full scale. Obviously, as the percentage is 1/100 and ppm is 1/1 000 000, there is a multiplier of 10 000 between the two.

For example, 0.05%FS equals 500 ppm FS, so it is very similar to the %FS way of expressing accuracy. Of course, ppm can also be used for reading error, but more on that later.

Sometimes accuracy is also expressed in engineering units. For example, in the above example, the accuracy could have also been expressed as ±0.1 kPa, instead of ±0.05%FS.

2. PERCENT OF SPAN

Percent of span is similar to the percent of full scale method, but instead of calculating the percentage from the maximum range value (full scale), it is calculated from the whole range.

Naturally, if the range starts from zero, there is no difference between %FS and percent of span accuracy.

A pressure measurement range is anyhow often a "compound" range, i.e. it starts from the vacuum side and continues to the positive side. So, for example, the measurement range could be from -100 kPa to +200 kPa. In this case, the percentage is calculated from the whole span (300 kPa, the difference between the minimum and maximum values) instead of the full scale (200 kPa).

For a fully symmetric pressure range (e.g. -1 bar to +1 bar, or -15 to +15 psi), an accuracy specification of "±0.05% of span" has twice the error of a "±0.05% of full scale" specification.

EXAMPLE

- **Pressure range: -100 kPa to +200 kPa**
- **Accuracy specification: ±0.05% of span**

Figure 3 illustrates this example.

In practice, a compound range is most often not fully symmetrical, with the positive side of the range typically larger than the vacuum side. Of course, the vacuum side can never exceed a full vacuum, but the positive side can be any size. With a compound range, the positive side does not typically measure to very high pressure, because if a high-pressure sensor is used it will not be accurate on the vacuum range.

3. PERCENT OF READING

With percent of reading accuracy specification (sometimes written "% of reading", "% of rdg", or "%rdg"), accuracy is always calculated from the measured pressure value.

With this kind of specification, the absolute size of the error (accuracy) changes as the measured pressure changes. Obviously, this also means that at zero the accuracy specification is zero, and at very close to zero it is very small or negligible. So in practice, it is very unlikely that you will see a percent of reading specification used on its own.

Traditional dead weight testers commonly have accuracy specified as a percent of reading. In practice, the lowest pressure that can be generated with a dead weight tester is limited by the smallest available weight, or the lowest pressure at which the accuracy specification of the dead weight tester has been specified.

Percent of span

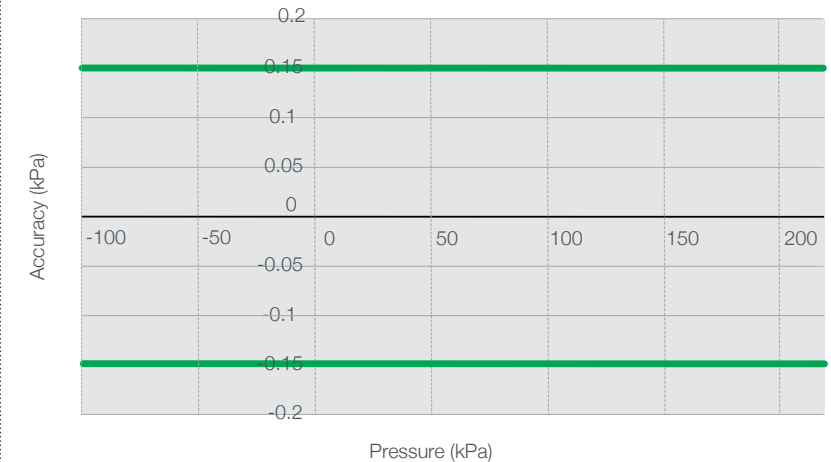


Figure 3 – Percent of span accuracy specification with accuracy shown in engineering units on the Y-axis





A pure percent of reading accuracy specification is not well suited to electronic pressure measurement devices or calibrators because the accuracy gets very small close to zero, and the accuracy is zero at zero pressure. That is not practical, as there is always some noise or zero drift, so it is not realistic to provide only a percent of reading accuracy specification for electronic calibrators. If this is the only specification provided, then the range minimum, i.e. the limit below which the accuracy specification is no longer valid, should also be specified.

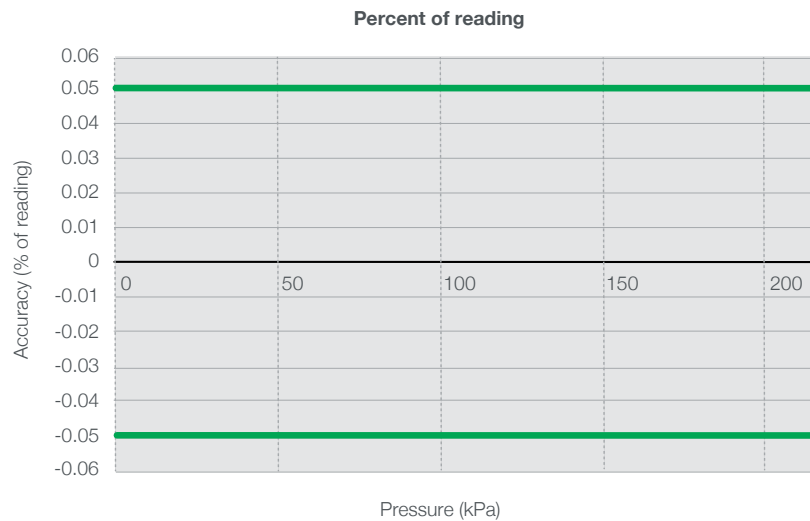


Figure 4 – Percent of reading accuracy specification with accuracy shown in percent of reading on the Y-axis

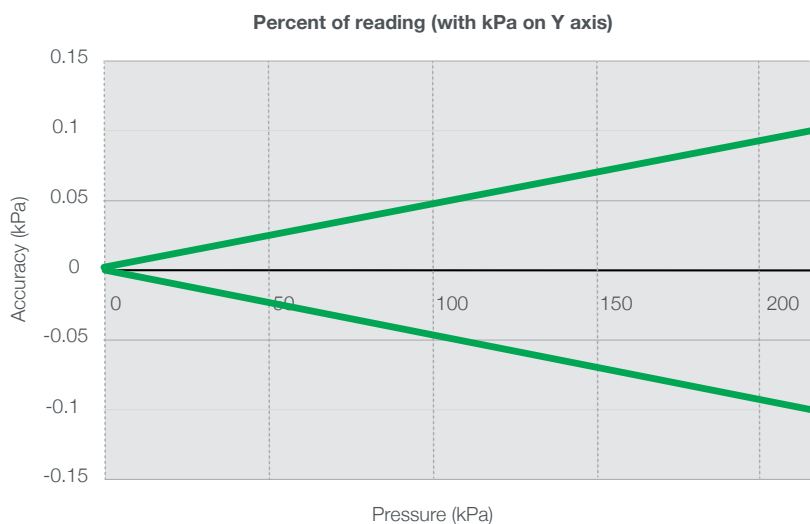


Figure 5 – Percent of reading accuracy specification with accuracy shown in engineering units on the Y-axis

Percent of reading may also be given as a ppm specification. This is more practical with high-precision instruments (e.g. dead weight testers) as a percentage figure would soon start to have many zeros. As explained earlier, converting a percentage figure to ppm means multiplying the percentage by 10 000.

EXAMPLE

- **Range: 0 to 200 kPa**
- **Accuracy specification: ±0.05% of reading**

Figure 4 has the Y-axis as “% of reading”, which is obviously a straight line.

Figure 5 shows a “% of reading” accuracy, with the absolute accuracy (engineering units, kPa in this case) on the Y-axis. We can see that when the pressure value is small, the absolute error is small. As the pressure increases, the absolute error increases.

4. A COMBINED ACCURACY (PERCENT OF FULL SCALE AND PERCENT OF READING)

This means that the accuracy specification is a combination of percent of full scale and percent of reading. The percent values of each may be different. For example, the accuracy specification can be expressed as ±(0.01% of full scale + 0.05% of reading).

In practice this means that the “% of full scale” part ensures that there is a valid accuracy specification at zero and close to zero, while the “% of reading” part means that the absolute accuracy specification grows as the pressure grows.

This kind of specification is pretty common for electrical pressure measurement devices.

The following example – illustrated in Figure 6 – describes this type of specification.

EXAMPLE

- **Pressure range: 0 to 200 kPa**
- **Accuracy specification: ± (0.01% of full scale + 0.04% of reading)**

READ THE BLOG IN FULL AT blog.beamex.com

We also discuss other important factors to bear in mind when choosing a pressure calibrator and share some of our products that can help.

In this example, the combined accuracy at the full scale value is ±0.1 kPa, which is the same as for the ±0.05% of full scale specification, so the accuracy at the full scale point is the same.

However, because part of this specification is given as percent of reading, the module is more accurate at lower pressure than a 0.05% of full scale module.

So, this kind of pressure calibrator is better at performing calibrations at lower pressures without sacrificing accuracy than a calibrator with only a percent of full scale accuracy specification. Also, with this kind of combined specification you end up needing fewer different range pressure modules as they are more accurate on a wider pressure range.

5. A SPLIT RANGE ACCURACY

This means that the lower part of the pressure range has a fixed accuracy (% of full scale, % of span, or engineering unit) and the upper part has a percent of reading specification.

This is another way for manufacturers of electrical calibrators to ensure that they can provide credible accuracy specifications at and close to zero, and also that the absolute accuracy specification increases as the pressure increases.

The lower part of the range may be specified as a percent of full scale, part of the scale, or as a percent of a (fixed) reading. It may also be given in engineering units.

In practice this means that the lower part is “flat” and the upper part is growing. The following example – illustrated in Figure 7 – describes this concept.

EXAMPLE:

- **Pressure range: 0 to 200 kPa**
- **Accuracy specification: “0.01% of full scale” for the first third of the range plus “0.05% of reading” for the rest of the range**

You can read more about understanding pressure calibrator accuracy specifications in our blog, including other things to consider such as:

- **long-term stability**
- **uncertainty vs. accuracy**
- **TAR & TUP vs. calibration uncertainty**
- **environmental specifications**
- **additional components**

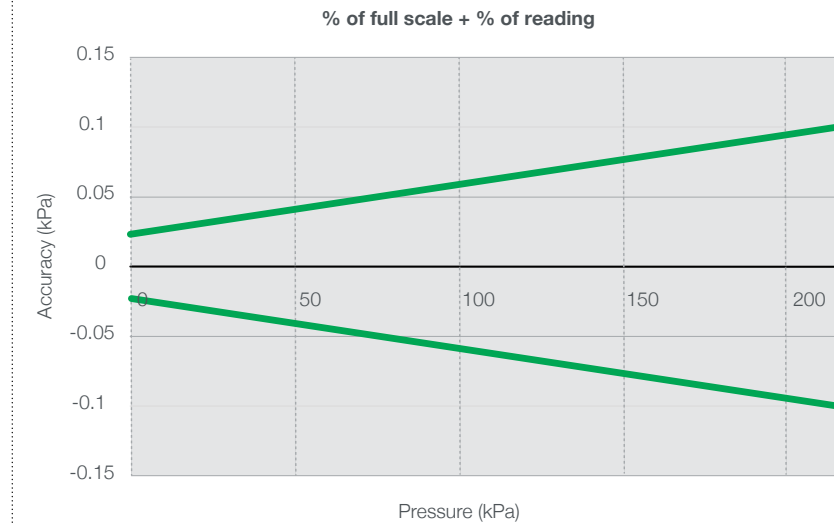


Figure 6 – Combined accuracy specification with accuracy in engineering units shown on the Y-axis

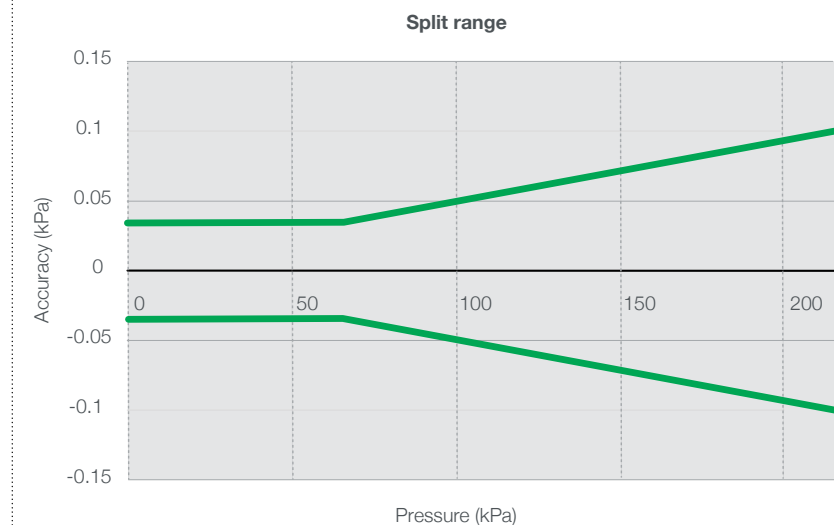


Figure 7 – Split range accuracy specification with accuracy shown in engineering units on the Y-axis

LATEST NEWS

bENGAGED DELIVERS WORLD-CLASS ONBOARDING EXPERIENCE FOR NEW EMPLOYEES

The week-long onboarding process, renamed bEngaged week after an internal naming competition, returned in April 2022 after an enforced two-year break due to the global pandemic. Fourteen employees took part including Malcolm Sabre from France, who joined Beamex as Marketing Manager in October 2021. "I'm very happy and grateful to have found Beamex. There is a very positive attitude, a good working environment, and great colleagues. "I really looked forward to the onboarding week as it was a chance to meet these new colleagues in person."

The Beamex onboarding process consists of ten steps, including IT and information security and training on Beamex products, calibration, and ESD. Holding this kind of training on site rather than online provides an opportunity for employees to see for themselves how our products and laboratory processes work. This is something that Malcolm

also looked forward to: "I was excited to discover more about what my colleagues in Finland and other countries do and how our products are built; I also wanted to learn more about Finnish culture."

"The One Beamex concept is at the core of our group HR activities and helps to provide a consistent onboarding experience for all our employees regardless of role or location. Finding new talent is becoming increasingly challenging for companies both locally and globally, so it is crucial that all our new employees get off to the best possible start when they join. This is why bEngaged week is an essential part of creating a One Beamex employee experience," says Tina Ademola, HR Director, Beamex Group.

Malcolm felt that the best thing about his week in Pietarsaari is getting to know the Beamex family and learning about the company values. "I got to meet amazing people from different departments and learn how everyone collaborates. When you come from a subsidiary or different country you don't often get to see 'backstage' so to speak, so having this opportunity to deep dive into everything was fantastic," he concludes.

The next bEngaged weeks will be held in June and September 2022.



The One Beamex concept helps to provide a consistent onboarding experience for all our employees regardless of role or location."



PARTNERSHIPS

BEAMEX WELCOMES POLCO AS A NEW PARTNER

We were pleased to welcome Colombian enterprise Polco as a new Beamex partner in October 2021. Founded in the 1970s, Polco

exclusively markets equipment for chemical analysis. Their solutions are used in quality control, production, and research and development applications. Welcome to the Beamex family, Polco!

Learn more: www.beamex.com/beamex-worldwide/



