

# White Paper

## What is Calibration?



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### What is Calibration?

Put simply, calibration is the process of comparing values displayed by a measuring device with corresponding reference values (standards). The result of this operation is documented in a calibration certificate.

One of the most time-consuming aspects of an instrument technician's work is to routinely check and calibrate quality critical instrumentation, providing optimum performance and traceability within the production process. In the past such checks were considered to be 'good practice', and carried out on an ad hoc basis, but today for many industries periodic testing of quality critical instruments has become mandatory.

### Why calibrate?

There are many reasons why you should calibrate:

- The performance of a measuring instrument and its ability to work accurately and repeatedly within a process environment is crucial and directly linked to the control, safety, quality and yield of a production plant. For this reason, the need to periodically check and calibrate instruments is a critical activity for the majority of organisations. This is especially important for any business seeking to maintain compliance to specific regulations such as ISO or the FDA.
- Calibration defines the accuracy and quality of measurements obtained using a piece of equipment. Over time there is a tendency for measurements to 'drift'. Therefore, to maintain confidence in the measurements, there is an ongoing need to re-calibrate equipment throughout its lifetime to ensure reliable, accurate and repeatable measurements.
- Accurate measurements improve overall plant reliability and safety.
- To achieve plant operational equipment effectiveness (OEE).
- To prevent any compromise being made to the quality of the final manufactured product via the negative influence of measurement inaccuracies.
- To help reduce higher material usage and plant energy costs due to poor measurement accuracy or improper control.

### Plan your calibrations

The first thing to consider when setting up a calibration schedule is the management of the activity: scheduling the appropriate time for calibration, arranging access to the process plant, allocating the resources, documenting the results, producing compliant calibration certificates and archiving the records. Here, access to an online resource such as Endress+Hauser's W@M lifecycle management tool is invaluable. This ensures effective management and control of the scheduling process and retrieval of the records that will satisfy the requirements of an FDA or ISO 9001 auditor.

### Assign your resources

The next thing to consider is the calibration itself. This requires skilled personnel, the right tools and standard operating procedures (SOPs) that everybody can follow to ensure consistency. In many instances, on-site calibration can be relatively easy to achieve. A variety of portable calibration and verification equipment offers us the opportunity to make either on-site checks or full calibrations on flowmeters, pressure transmitters, temperature systems, level sensors and analytical devices. Should you lack the resources to calibrate your own devices, you may consider outsourcing this task to an experienced third party such as Endress+Hauser.

### Count on us for calibration

Regular calibration not only ensures that the measuring instruments controlling your critical processes remain in spec but also gathers information about the current condition of the device. Measurement inaccuracies can impact on process stability and operating costs with potential legal and regulatory consequences. This is why Endress+Hauser offers a full range of calibration services, from laboratory calibration to on-site calibration and verification of process instrumentation. All our UK calibration facilities are traceable to national standards and meet the requirements of ISO 17025.

### Laboratory calibration for the highest accuracy

#### Flow:

Calibration performed in a laboratory offers the best calibration uncertainty and the widest calibration ranges. At our UK headquarters our water and air flow rigs incorporate the very latest developments in flow technology to provide high quality calibrations:

- Flowmeters from 1-100mm (or up to 80mm for vortex meters) are calibrated against Endress+Hauser Promass Coriolis dual reference meters. Calibration of your flowmeter can be carried out in volume or mass, with a calibration uncertainty of +/- 0.08%. Our flow rigs are suitable for any meter with DIN/ANSI flanges, screwed threads or hygienic process connections and flow ranges from 0.1m<sup>3</sup>/hr to 90m<sup>3</sup>/hr (100 to 90,000kg/hr)
- Flowmeters larger than 100mm in diameter are sent to our primary calibration facilities in Europe, so there's virtually nothing we can't handle. We also calibrate pressure and temperature devices, as well as test and measurement equipment at our laboratories in Manchester.

#### Pressure:

Our experienced technicians will calibrate your pressure device to your own metrological specifications in our state-of-the-art laboratory. We can calibrate device ranges from 25 mbar up to 250 bar to a certified uncertainty of  $\pm 0.015$  mbar in the range of 0 to 10 bar or  $\pm 0.05$  bar in the range 0 to 250 bar. Our computerised systems mean that our work is both rapid and flexible.

### **Temperature:**

Temperature measurement is a vital factor in the quality control of your final product. In our in-house laboratory we will calibrate your temperature device to your specific requirements (from -15°C up to 600°C).

### **On-site calibration**

On-site calibration is performed by highly trained engineers. Convenient and cost effective, it removes the need to send instruments off-site as our specialists come to you, keeping downtime to an absolute minimum. It also offers the highest flexibility as calibration can be scheduled according to the needs of your process. Our qualified and experienced field service engineers can perform adjustments, diagnose faults and recalibrate instantly where necessary, regardless of manufacturer. Our mobile rigs and test equipment are fully traceable to national standards.

### **On-site analytical calibration**

Using the latest advances in offline calibration, we can perform fully documented, traceable calibration of your pH/ORP, conductivity, dissolved oxygen and chlorine Memosens sensors. The final report includes all the sensor's calibration and operation history, including a chart showing historical slope and zero point – vital aids for predictive maintenance

### **Extend calibration intervals with verification**

Endress+Hauser's new Heartbeat Technology or Fieldcheck tool will check the health of your flowmeter, ensuring key device parameters remain within Endress+Hauser's original specification. Instruments can be verified and back in operation within seconds and are not required to be removed from the line.

### **Clamp-on flow verification**

Clamp-on verification is an ideal alternative when an electronic verification is not possible. It allows the instrument to be verified without process interruption while still remaining compliant to ISO 9001, by confirming the operation of your instrument and helping to extend the time period between calibrations. It's a completely safe, non-invasive technology suitable for a wide range of liquids.

### **Optimised calibration**

Our service team can help you draw up a calibration schedule, defining calibration specifics for the applicable parameters. By relying on us to implement an optimum and effective calibration process, you will enhance productivity, ensure compliance and maintain the quality of your product.

**Our calibration capabilities**

Endress+Hauser calibrates a range of instruments covering a variety of measuring principles:

Parameter	Equipment type	Calibration location
Temperature	<ul style="list-style-type: none"> <li>■ Resistance thermometer</li> <li>■ Probe and temperature transmitter</li> <li>■ Probe and display</li> <li>■ Thermocouples</li> </ul>	On-site or in the laboratory
Pressure	<ul style="list-style-type: none"> <li>■ Manometer</li> <li>■ Pressure sensors</li> <li>■ Pressure transmitters</li> </ul>	On-site or in the laboratory
Flow	<ul style="list-style-type: none"> <li>■ Electromagnetic flowmeters</li> <li>■ Vortex flowmeters</li> <li>■ Coriolis flowmeters</li> <li>■ Ultrasonic flowmeters</li> <li>■ Thermal flowmeters</li> <li>■ Mechanical flowmeters</li> </ul>	On-site or in the laboratory
Level/distance	Radar level gauge	In the laboratory
Conductivity	Conductivity measuring chain including cell, transmitter and cable	On-site
pH	pH measuring chain including cell, transmitter and cable	On-site
Other parameters	Vat calibration (strapping table) plus calibration of existing level device is required	

**Do you have a calibration plan?**

Every plant manager is looking to continuously improve productivity and keep costs down while maintaining regulatory compliance. But meeting those demands can be difficult due to financial pressures, tightening of regulations and the complexity of your installed base. Endress+Hauser can relieve your calibration and maintenance headaches, freeing you up to focus on your core business with total peace of mind.

A perfectly balanced calibration plan can not only improve plant performance but also boost profit. It is not just about cost savings but also about contributing to your bottom line, by improving your manufacturing processes. Through a unique partnership with Endress+Hauser, you can optimise your instrument performance and ultimately improve product quality.



### **Asset information management**

The first step in implementing a successful calibration plan is to get a clear view of your assets. This may seem a daunting task, with multiple measuring points and instrumentation from several suppliers to consider. But Endress+Hauser can help you determine which instruments are the most important for your application, the production environment and operator safety. Our Installed Base Analysis is a five-stage plan for all the instruments on your site that highlights the process-critical measuring points. Using this data we can make recommendations for maintenance improvements, meaning you can start to reap the benefits of optimum process control.

### **Calibration management solution**

Together we'll implement a calibration schedule to find the optimum point where costs and unplanned downtime are at a minimum. Our calibration management software, CompuCal™, will improve your calibration planning and at the same time satisfy the requirements of your auditors by providing traceable and auditable records.

CompuCal™ also provides links to W@M, Endress+Hauser's life cycle management solution. Using the serial number on your instrument, W@M allows you to download calibration certificates and technical information, find spare parts and even access prices and delivery times of spares or new devices.

These tools offer transparency and clarity of information about the activities that our service engineers are performing on site, as well as holding complete information on all your assets. The results are measurable in terms of cost savings, performance improvements and a higher quality product.