Calibration of pressure measuring instruments

Necessary evil or quality driver?

Calibration is often viewed as a secondary task in plant operation. Against the backdrop of the demands imposed by quality management systems – a new guideline from the German accreditation body (DAkkS) and current efforts to push back the limits of plant efficiency ever further – it is time to view calibration from a different angle. Wika's multifunctional calibrators can prove traceability up to the national standard for pressure measuring instruments.

Mechanical, chemical and thermal influences have an impact on the functionality of measuring instruments. Continued wear can cause an instrument to age and affect the accuracy of the reading. Regular calibrations provide information on the instrument's metrological characteristics. They either confirm the measured value or they flag up a change in good time. When discussing the importance of calibrating measuring instruments, calibration frequency is a question that automatically arises. When it comes to TÜV or verifications by the Bureau of Standards, German legislation defines clear time periods. However, these do not apply to measuring instruments in industry. The testing intervals generally depend on the type of instrument, its task and the particular application.

The following rule of thumb has been adopted for pressure measuring instruments, for example: the more electronics and the higher the accuracy, the more frequently the instrument should be calibrated. Such general statements, which are based on broad practical experience, provide a good starting point for deriving calibration requirements and intervals. The leeway which has traditionally been stretched to the limit for reasons of cost is now much smaller since quality assurance systems came into being. ISO 9001, GMP (Good Manufacturing Practice) and FDA (US Food and Drug Administration) regulations contain detailed rules for calibrating and documenting measuring instruments. However, these standards do not specify particular calibration intervals. They merely require a certain regularity, which the plant operator must define in the QA documentation. The German accreditation body (DAkkS) has issued recommendations for calibration intervals in this context. For pressure measuring instruments, for example, these intervals can range from once a year (e.g. for pressure transmitters with an electrical output and 0.5 % accuracy of the span) to as long as every five years (deadweight tester / pressure balance).

To maintain the functionality of measuring instruments, they have to be calibrated regularly

Proof of traceability

In short, calibration means comparing the display of a test item with the value measured by a reference instrument, which has itself been tested against a national or international standard. In Germany, the national metrology institute (PTB) maintains the national standard to which all calibration results can be traced via a chain of comparisons. Regarding proof of traceability, a transformation has taken place. The DAkkS certificate is meanwhile a condition of most QA audits. DAkkS now specifies the requirements in greater detail: factory certificates from accredited laboratories are no longer accepted as proof of traceability. According to the new regulation, they are merely classified as "result reports without an accreditation symbol", i.e. as a simple proof of functionality – in contrast to DAkkS certificates, which are now officially designated as "calibration certificates with an accreditation symbol".

The principle of traceability remains unaffected by the change of title. In practice, this means that the chain of comparative measurements up to the national standard must be unbroken. The measurement uncertainty of each reference in the chain must be known in order to calculate the overall uncertainty for a test item. Higher-level measuring instruments should generally have three to four times better accuracy than lower-level ones. All steps in the chain of comparisons, including the results of the measurements, must be documented. Plant operators are increasingly asking for DAkkS calibration certificates, mainly because of QA requirements. Furthermore, in the wake of agreements between the European co-operation for Accreditation (EA), to which DAkkS is affiliated, and the International Laboratory Accreditation Cooperation (ILAC), the certificate is globally recognised.

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