

How often should we actually calibrate flowmeters?

This question is frequently asked to the staff at TrigasFI GmbH in Neufahrn near Munich. And it's a good question, because in the age of ISO 9000 and increased quality demands, it is important that all measurements of physical quantities that are part of an industrial process are accurate and reliable.

Flowmeters are no exception. When in use, flowmeters must be in good working condition and have a valid calibration if they are to produce reliable and accurate readings. Good working condition is a matter of proper use and maintenance. However, in order for the calibration of any flowmeter to be valid, a number of important criteria must be met:

First of all, a somehow unsatisfactory statement: It is not possible to define general rules for the required frequency of calibration. It depends on many factors, such as measuring principle, manufacturer, age, but also the application. And the determination of the calibration intervals ultimately is up to the user himself, who is the only one who has this information and who can evaluate it.

Read how TrigasFI's 30+ years of experience in flow (the last 15 years as a DAkkS accredited lab) can help you.



Let's first list the key conditions for calibrating a flowmeter:

1.) The calibration should be done under the actual operating conditions.

It is always recommended to calibrate the flowmeters under conditions that are as close as possible to actual operating conditions. If this is not possible, appropriate compensation must be provided to ensure reliable results during operation.

To make the appropriate corrections, the operator must understand the procedure well and follow the manufacturer's recommendations for installation and use. However, caution should be exercised here as some marketing literature tends to exaggerate the flowmeter's ability to perform properly under challenging conditions. One should therefore also review independently published information or seek advice from sources such as consultants or calibration facilities which are not associated with manufacturers.

And most importantly, it should be kept in mind that despite occasional marketing literature claims to the contrary, all flowmeters require periodic recalibrations. Unusually long-time spans that are sometimes written in the documentation are often sales arguments trying to justify a higher selling price in exchange for presumed future savings on service and calibration. But flowmeters which are not periodically performance checked (the best way to do this is by calibration) can produce grossly inaccurate results.

2.) Calibration should be performed by a certified and traceable laboratory.

You do not believe the results of your three-year-old boy explaining you a complicated mathematical problem? And how do you test the competence of your calibration laboratory?

Trained and experienced personnel is only one requirement. Accreditation and documented traceability help insure that the accuracy claims made by a calibration laboratory are indeed met. Once a laboratory is identified which adheres to these standards, the laboratory's specifications must be reviewed to determine if they cover the needed range of measurement with the required accuracy.

Keep in mind that traceability by itself does not offer any assurances of accuracy. Traceability is remarkably easy to achieve and maintain, but the number of "measurement transfers" involved in attaining traceability to National Laboratories (PTB, LNE, NIST, etc.) can erode its usefulness as a measure of precision to the point where it is essentially worthless. Respectable calibration laboratories will be able to supply you upon request uncertainty analyses which document their claims for traceability and overall accuracy. So, ask for the certificate and take a closer look!

3.) The calibration of a flow meter must be valid at the time of use.

Now, finally, we come to the most difficult criteria and back to the question: How often should flowmeters be calibrated?

Time plays a big role in the accuracy of flow meters. All flowmeters tend to drift gradually over time. Changes can even occur if no external or internal damage can be detected. The sensors are creating in many cases low level measuring signals, which are later amplified for evaluation. Even slight mechanical changes to the device can cause a considerable drift to such a signal.

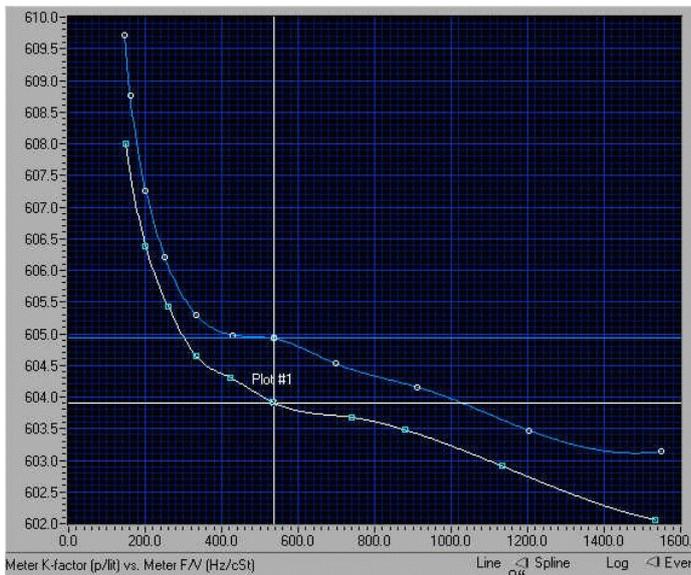


Figure 1 shows a drift of a flowmeter that was recalibrated in 12-month intervals without showing any signs of deterioration or damage between calibrations.

The reasons for changes in performance are complex. ([see special white paper](#))

Whether this device is still "good enough" or not, neither a manufacturer nor a calibration laboratory can tell you. In the best case, however, you will receive the honest evaluation of the measurement reliability of your device as it currently functions.

Now it's up to you to define the process requirements for your device.

If you only need to monitor the level of a value, the device might still be usable. However, if you calculate the consumption of an expensive media, this device may cause large losses for your company. And an "expensive media" can also be simple compressed air.

Therefore, calculate what a measurement error of 0.1% / 1% / 5% / 10% means for you per year. And then determine which measurement uncertainty you want to accept for which device in its particular application. Now you know what accuracy you are demanding and, hopefully, this is within the specification of the device you purchased.

A usual recommendation is that new flowmeters and flowmeters used in unfamiliar applications or environments be put on a 6-month recalibration schedule. Request the deviation reports from your calibration laboratory for an evaluation.

If you notice after 6 months acceptable deviations that are far below the values required by you, you can increase the intervals. If the deviations are already too significant, shorten them.

In cooperation with your competent calibration laboratory, you will receive a reliable database on which you can define the specifications for your calibration intervals. These will later serve as proof to certification bodies or to substantiate the accuracy of your own processes.

Laboratories which follow adequate metrological and record keeping procedures will be able to search their data base and produce historical data on any flowmeter that has been calibrated at the laboratory more than once (ISO 9000 procedures dictate that such record keeping is practiced).

TrigasFI will gladly assist you as a certified DAKKS laboratory for flow measurement of liquids and gases. With 30+ years of experience in the calibration business, our certificate includes one of the best accuracy standards in Europe, including: a. up to 0.03% for liquids and 0.24% for gases. We offer the calibration services not only for our own but also for almost all other makes and measuring principles. With good prices and short lead times, if necessary, our 24-hour-express-calibration, we are also happy to assist you in emergencies.

Find more information about our products and services: www.trigasfi.de