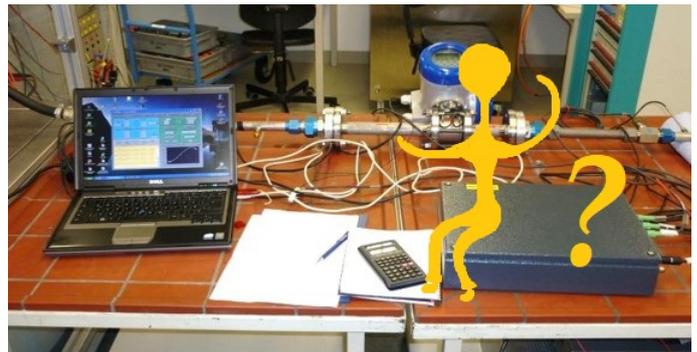


Why is my meter more inaccurate after some time?

Time plays a big role in the accuracy of flow meters. All flowmeters tend to drift gradually over time and sometimes unbeknownst to their user, influence the measurement process. Changes can occur even if no external or internal damage can be detected. The sensors are creating in some cases low level measuring signals, which must be electronically amplified in order to be readable by evaluation electronics. Even slight changes to the device can cause considerable drift to such a signal. But what causes such a drift of accuracy in detail?

When we look at the different root causes, one thing stands out in particular: there is no measuring device which is not subject to performance drift over time - no matter what the marketing literature sometimes claims.

Read why.



Root causes of accuracy drift in measuring instruments

Interior Surface Deposits: Very thin deposits of salt, minerals, oxidation, etc. can have a measurable effect on accuracy even if the flowmeter appears to be working properly. All types of flowmeters are affected, including those without moving parts such as Coriolis, Vortex, ultrasonic, etc.

Contamination can greatly affect flowmeters with or without moving parts. For example, the bypass of a thermal mass flow meter will clog or there may be partial blockage of LFE's (Laminar Flow Elements). Such a blockage that can affect performance greatly is not necessarily noticed immediately, as long as the pump is able to overcome the additional pressure loss.

Chemical attacks: even slight corrosion can affect a flow meter long before an error message is displayed. For example, changes of measuring tubes in shape or roughness or changes of geometries of rotors affect the accuracy.

Incorrect handling: Measuring devices react differently to incorrect handling, depending on the type. This is one of the reasons to study the user manuals carefully before putting a device in use. Incorrect connection, over-tightening of fittings, dropping, but also sudden opening of the valves and associated pressure surges, can have a noticeable and lasting effect on the characteristics of the measuring device.

Aging can affect all flowmeters. "Run in" of measurement equipment can sometimes even improve results after production or after repair. It is in fact strongly recommended that in such cases, smaller mechanical flowmeters are run-in for several hours before calibration. Mechanical components will then move smoothly by the time the flowmeters are calibrated, ensuring accurate flow measurement.

Usually however, aging of measuring devices results in long term, gradual deviations. Electrical changes occur as a result of aging or gradual burn-in of components that affect the quality of the output signal.

Mechanical changes occur through normal wear. Even measuring principles without moving parts are subject to vibrations or have electrodes which are exposed to the measuring media and thus to a certain aging.

Application changes: Actually, this should not be the cause of an inaccurate measurement, since most users are in principle aware that a device was selected, scaled and also calibrated for a specific application. In practice, however, it often happens that the customer's process changes over time. A different lubricating oil or another coolant is chosen. New additives are added to the process media or the process temperature is changed. And often the effect of these changes on the flowmeter that was initially selected is not taken into account. But all this can cause significant deviations as the flowmeter may not have been calibrated for these conditions.

In some cases, compensation for these effects is possible. Extensive studies are available on the deviations in the most common flowmeters and compensation methods. Information and recommendations are usually available from the manufacturers or also from independent sources. In the case of turbine flowmeters, for example, TrigasDM offers a special calibration using a UVC (Universal Viscosity Curve) curve, which is compensating such effects very well in certain defined ranges.

If no corrections are possible, the only solution remaining is the recalibration of the device, taking into account the current operating conditions.

Inappropriate or incorrect installation is one of the most common reasons for the deviation between the specified manufacturer accuracy and the actual performance in the application. This fact is given special attention in the relevant literature. Examples of inappropriate installations range from incorrect inlet sections, seals, bends and elbows, or other built-in devices in the piping near the installation location or even installation in the wrong flow direction.

External influences can affect all types of measuring instruments. Coriolis or vortex meters are directly affected by vibrations. Other measuring principles are subject to the influence of pressure and temperature. Electromagnetic interference (for example by a motor or frequency converter near to the installation place) has a potential impact on all flowmeters, even those with a purely visual indication, like float type Variable Area flowmeter.

Conclusion:

Of course, changes in fluid properties, inappropriate installation and external influences cannot be eliminated by calibration, and neither can be damage to the device. They must be examined as part of the application analysis and appropriate protection applied as required.

However, many factors can indeed be eliminated with a new calibration of your flowmeter that can restore the required accuracy in your process.

TrigasFI, as your DAkkS certified flow calibration laboratory for fluids and gases, can tell you exactly if your device is back in specification after calibration or not. On most devices, in addition to calibration, we are also able to make certain adjustments to bring the device back to its accuracy range and even perform most minor repairs.

This of course depends on the condition of the device as well as the accessibility of the mechanical components and the adjustment allowed by the manufacturer.

We are happy to support you with your next calibration project.