Trigas DM
Durchflussmesser-Manufaktur

Erdinger Str. 2b
85375 Neufahrn
Germany

Tel.: +49-8165-9999 300
Fax: +49-8165-9999 369
info@trigasfi.com
info@trigasdm.com

Trigas FI
Flow Measurement & Calibration

Why does the accuracy of my flowmeter deteriorate over 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 is visible. 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

Deposits on internal surfaces. Layers of salts, minerals, oxidation, etc. can have a measurable effect in performance even if the meter seems to be operating properly. All types of flowmeters are affected, even ones without moving parts inside the flow path, such as Coriolis, Vortex, Ultrasonic, etc.

Contamination can have a severe effect on flowmeters with moving parts as well as ones without moving parts. It can for example affect the by-pass path of Thermal Mass meters, or partially block the flow paths of LFEs (Laminar Flow Elements).

Chemical attack even of the smallest scale has an effect on flowmeters, especially ones with moving parts. Any change in the geometry of the turbine meter rotors for example, will affect performance.

Abuse (such as shock, over speeding, etc.), accidental or otherwise, even if it does not visibly damage the flowmeters, it will most likely change their performance characteristics.

Aging of the flowmeters causes changes, sometimes even improvements in flowmeter performance.
Electrical changes occur as a result of aging or gradual burn-in of components affecting the output quality of flowmeters.

Erdinger Str. 2b
85375 Neufahrn
Germany
Tel.: +49-8165-9999 300
Fax: +49-8165-9999 369
info@trigasfi.com
info@trigasdm.com

Mechanical changes to meter performance due to bearings, usually occur soon after manufacture of the meters or bearing replacement and are the result of bearing run-in (as the bearings are exercised, they run smoother) and continue at a much slower pace for the life of the meter.

Fluid property differences can be a major factor. If a meter has been calibrated in one type of fluid and used in another, significant performance changes may occur. All types of flowmeters are affected by changes in fluid properties to some extent or another. In many cases, corrections can be applied to flowmeters to compensate for the effects of such changes. The performance characteristics of most of the popular types of flowmeters have been intensely studied. Consequently, information and recommendations are usually available from manufacturers as well as other independent sources. In the case of Turbine flowmeters for example, fluid change (viscosity) effects can be at least partially compensated by using “Universal Viscosity” Calibration methods.

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. Examples of inappropriate (or careless) installations include but are by no means limited to:

- Irregular upstream configurations such as bends and elbows or other piping irregularities near the measuring location
- Gaskets or other protrusions into the flow path
- Incorrect orientation of a flow sampling sensor into the flow stream
- Installation in the wrong flow direction
- Etc.

.

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.

Signal-to-noise ratio is an issue with some flowmeter types such as Coriolis or Magnetic Flowmeters which inherently produce low level analog measuring signals, which must be electronically amplified in order to be interpreted reliably to evaluation electronics. Understandably, such meters are more susceptible to outside influences that flowmeters that produce a digital high-level output signal like turbine or vortex flowmeters.

Fluid property differences, improper installation and external influences do not fit into the category of gradual changes in flowmeter performance over time. They are often however the cause of unpredictable performance shifts once a flowmeter is installed in its operating location because they are usually not present in the controlled environment of a calibration laboratory.

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 a comprehensive application analysis resulting in identification of appropriate remedies to restore reliable flow measurement. The truth remains however that performance influencing factors can indeed be eliminated with a new calibration of your flowmeter, thereby restoring the required accuracy in your process.

Erdinger Str. 2b
85375 Neufahrn
Germany
Tel.: +49-8165-9999 300
Fax: +49-8165-9999 369
info@trigasfi.com
info@trigasdm.com

TrigasFI, as your DAkkS ISO 17025 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.

by: Anita Renc, director sales & marketing, TrigasFI GmbH / TrigasDM GmbH