

Automated field calibration for the oil and gas industry

How to save time and money and reduce risk:

White Paper

Technicians that maintain and troubleshoot process automation systems used in refineries, pipeline custody transfer applications, or pumping operations know that there are thousands of sophisticated devices required to perform countless critical operations ceaselessly, accurately, and reliably. Those devices require regular inspection, testing, calibration, and repair to protect the health and safety of the public. Businesses and governments require highly specific documentation of those maintenance and calibration tasks performed on these critical assets.

Traditional calibration and documentation practices are labor-intensive and in today's downsized environment there simply aren't the resources to keep up. However, automated calibration practices are proving a practical alternative because they require smaller teams, increase productivity and operational reliability at a lower overall cost.

Increased safety and productivity. Reduced costs

Whether you're installing a new device, changing the settings of an existing device, or reinstalling a repaired device, calibration is the only way to ensure that the device meets performance requirements. This is important for:

- **Safety.** When valves and gauges are not regularly calibrated, they can fail, cause an unsafe condition possibly leading to an explosion, loss of life and cause great damage to infrastructure.
- **Quality.** To perform at the highest efficiency and quality, equipment must be well maintained and adjusted.



- **Revenue.** Calibration of the devices that make custody transfer measurements, are necessary to insure that purchased products, such as gasoline or natural gas, are measured and taxed correctly.

- **Compliance.** Government regulation and enforcement agencies often require calibration and documentation to verify that devices conform to rules and standards. Poor calibration documentation can put the manufacturer at risk of government fines and loss of production.

- **Cost savings.** With automated calibration and documentation a lean team can complete twice as many calibrations in the same amount of time, which lowers the cost per calibration significantly. Regular calibration can also reduce the risk of lost revenue from accidents; if a disaster strikes, good calibration records can support a strong defense against legal action.

Dispelling myths

In the oil and gas industry there is a widespread belief that fieldbus (digital) field devices do not require calibration. This is not

true. A fieldbus signal provides diagnostic information; it does not provide information about the accuracy of the device, nor does it verify that the device is reporting the process accurately and precisely.

For example, a Foundation fieldbus differential pressure transmitter can report diagnostic information about the transmitter, but it cannot report on the physical condition of the orifice plate across which it is measuring pressure. Consequently, even if the electronics are operating perfectly, the flow reading transmitted may be inaccurate. Calibration is required to ensure the flow reading is accurate.

Addressing documentation challenges

Traditionally, documenting a calibration has meant hand writing the results on a clipboard or in a log book. Pencil-and-paper documentation both produces and perpetuates errors. The data in handwritten records is often illegible or insufficient. And, facilities that use a computerized maintenance management system (CMMS), must allot additional time to manually enter the

handwritten data into the system, which creates additional possibilities for errors.

Another challenge is that many facilities store field data in more than one database. Calibration data entered in the operations database may not be populated into or accessible by the maintenance database. These challenges are being addressed by:

- Installing more digital instruments and valves
- Using interconnected asset management software to help manage documentation
- Using handheld documenting process calibrators to automate field calibrations and upload digital documentation to a CMMS
- Using route-based calibration

Doing more with less

Budget cuts and the retirement of experienced workers, substantially reduced engineering, maintenance, and operations staffs. Those leaner staffs make it harder to have a large group of technicians to do rounds. As a result, calibration rounds often fall by the wayside.

Those reductions in team size also mean that experienced team members have less time for mentoring and on-the-job-training. This means that equipment and system-specific knowledge is not being successfully transferred from the individual to the institution. As older operators and engineers retire, they take this knowledge with them.

Automating calibration and documentation

You can mitigate losing the benefit of that experience and knowledge by using multi-function documenting process calibrators and a new generation of handheld pressure calibration tools. Most of these devices feature recording and memory functions so you can log measurements and upload them to a PC for reporting and analysis. Multifunction calibrators consolidate multiple calibration steps and functions into a single handheld device that sources, simulates and measures pressure, temperature, and a wide variety of electrical

and electronic signals. Likewise handheld pressure calibrators combine pressure and temperature measurements and in some cases an integrated electric pump, which saves hand pumping and extra baggage.

These multifunction tools are instrumental in:

- Reducing the number of tools you have to carry and learn to use
- Collecting multiple data sets with one tool.
- Replacing many manual calibration steps with automated procedures
- Allowing just one person to perform calibrations in most cases
- Limiting the calculated error to a single tool rather than multiple tools
- Isolate a device from the process, verify that it's depressurized, and apply signals with an electric pump.

Using calibration routes

The biggest savings from using a documenting calibrator comes in the route management tool built into the device. The technician can load up a 'round' of calibrations that walks the techs consistently through the steps of each procedure. Using a single set of permits and paperwork for an entire route of calibrations for maybe 20 instruments reduces the cost per calibration considerably compared to performing one-off calibrations.

Reducing maintenance costs and risk

Because documenting process calibrators automatically record the as-found and as-left state of each field device, in situ, and can be operated by a single technician, route-based documenting calibrators can save as much as 50% of the time and cost of traditional manual, single-device calibration methods. Besides saving maintenance costs, this process can help companies avoid the legal costs and lost revenue from accidents. Good calibration maintenance practices help reduce the probability of accidents that can exceed \$100 million per incident. And, if a disaster strikes, good calibration records can

be a part of a facility's legal defense.

The big picture

In summary, implementing route-based calibration, paperless documentation, and CMMS data management:

- Makes it more practical and affordable for companies to perform calibrations more consistently
- Reduces risk and liability exposure
- Supports knowledge transfer from the individual to the team and to the institution
- Helps to increase both productivity and quality



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