

New Considerations for Industrial and Scientific Thermometry

What do you think about when considering the purchase of a thermometer for your industrial or scientific application?

Some of the most common considerations are:

- Initial cost
- Measuring range
- Accuracy
- ASTM E-1 compliance
- Calibration and certification

It's time to get more creative with the process. Think about a real alternative to the liquid-in-glass (L-I-G) thermometer you're used to. Here is a new list of considerations:

- Total Cost of Ownership
- Resolution and readability
- Versatility
- Reliability
- Features
- Safety
- ITS-90 conformance

And, finally, do better with that accuracy consideration you already have.

Total Cost of Ownership

When considering total cost of ownership (TCO), it's important to remember that the initial purchase price is frequently the least important factor. A new style digital thermometer can reduce TCO in several ways. 1) a single digital thermometer will replace many L-I-G thermometers, 2) only a single device needs to be recertified annually instead of many and 3) a digital thermometer will potentially last longer than a complete set of L-I-G thermometers.

One to Many Replacements

As stated above, you only need one digital thermometer to replace a complete set of old school liquid-in-glass thermometers. It's an obvious statement, but important nevertheless.

Accuracy

You pay quite a lot to get good accuracy from a L-I-G thermometer. After all, these things have to be made in a very craftsman-like way. You also need more than 1 to cover a reasonable range of temperatures. The real world accuracy performance of L-I-G thermometers is highly subject to ambient conditions and, especially, the skill and experience of the user. Not so much in the case of digital thermometers. Literally everything you need to know to use a digital thermometer can be learned in a matter of minutes.

Resolution and Readability

By using a set of thermometers with small measuring ranges, L-I-G thermometers are able to offer a relatively high degree of resolution, up to say 0.05°C. A quality, high performance digital thermometer, however, may offer a resolution of 0.001°C, which is 50 times better!

As for readability, there's no getting around the squint factor for glass thermometers. Even with the addition of a sliding magnifier, it takes training, skill and experience to get the most out of it. With digital thermometers, reading is easy, especially with a modern unit having a backlit display and characters with better than ½ inch in height.

Versatility

Glass thermometers are frequently designed and built for a special or certain purpose. Sure, you can probably use them in other applications if you're careful and skilled. Digital thermometers are more general purpose. You really only have to know the minimum/maximum insertion depth and protect the electronics from exposure to out of band ambient temperatures.

Reliability

Just how reliable do you think a long, slender glass rod is anyway? It's very reliable if you store it properly, don't expose it to out of range temperatures and aren't too clumsy. Digital thermometers with thin film sensors can take a lot of abuse although they should be kept properly stored and transported in a protective case. And, if a sensor fails in your digital thermometer, it can probably be replaced at a fraction of the cost of a new unit.

Properly designed, a digital thermometer also offers reliable calibration with accuracy that is maintained for a period well past a year.

Features

L-I-G thermometers don't offer much in the way of features. And, whatever features you choose are fixed once you buy it. You don't get any configuration choices; you can't add anything much on.

Digital thermometers, on the other hand, are all about features. Here's a short list of some features found in a typical model:

- Trend indication
- Multi-angle probe position
- Backlit display
- User adjustable resolution
- Selectable sampling rates
- User °C/F selection
- Data logging with data automatically captured and uploaded to a PC

That final bullet alone could be a real decision point when looking at thermometer selection. Data logging with glass thermometers is a fully manual operation which is tedious and prone to transcription errors at several points along the way.

Safety

L-I-G thermometers are safe, of course, unless they contain Mercury. Safe, in this instance, also means they're safe to use in hazardous areas.

For digital thermometers to be used in a hazardous area, it's necessary for it to have been approved for such a use by an approval body such as CSA or UL. Hazardous area use needs to conform to IEC or European standards for the best level of compatibility.

ITS-90 conformance

Electronic thermometry should conform to the standard established and known as ITS-90. The lack of accuracy and low resolution of glass thermometers is such that ITS-90 conformance is a non-issue.

Summary

There's a lot to think about when buying a new thermometry system. Considerations of Total Cost of Ownership, Versatility, Reliability and Accuracy mean that you may want to consider replacing the old liquid-in-glass system with a powerful, modern digital thermometer.