Calibration of Short Sanitary Sensors

Sanitary Flange Connections

Pharmaceutical, food, and beverage producers will employ sensors that connect into their process through the use of sanitary flange connections. These are required to allow them to be cleaned completely while installed in the process. The sanitary flange connection has no threads and has specifications for surface smoothness so that there is no risk for bacteria or other contaminants to flourish in the system.

These sensors serve to monitor that a process is operating as designed to maintain a system temperature as required for production. They also serve to document that the system has been properly cleaned and maintained. The typical calibration temperatures for these sensors are 0°C, 50 to 100°C, and 130 to 140°C. The last temperature is important as it is the clean-in-place or CIP temperature ensuring that no contaminants survive the cleaning process. The typical required accuracy is ±0.5°C.

Sanitary flanges pose a challenge to technicians tasked to perform calibrations because of the shape and size. Their odd configurations have dictated that they be calibrated in an oil bath. In addition to the oil bath, the technicians are also required to use an external temperature reference making the task even more complex.

Oil Bath Calibration Challenges

Oil baths have been a staple used in temperature calibration for a long time. However, they are not without their complications. First, the oil itself is expensive to obtain and to dispose; additionally, the persons using it or potentially in contact with the oil must be trained on handling the oil and the hazards associated with exposure to the oil. It is also

a spill hazard and that can be an issue because of the potential release of chemicals requiring a specified clean up procedure, the potential for slips and falls, and the possibility of someone being burned by hot or extremely cold fluid.

A final complication is introduced through the use of the external reference sensor. There is no assurance of consistency between operators, or even from one measurement to another, because there is no method of ensuring that the reference is placed in the same proximity to the sensor, or that it is even properly immersed in the bath such to give a proper reading.

Because of these factors, the process of calibrating these sensors takes quite a bit of time and care and the training is rigorous. In many cases, it is accomplished using multiple baths. While this does reduce the time required, it further complicates the process. It also greatly increases the probability of a spill or a burn. It also requires more of the expensive and potentially hazardous fluid.

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Sanitary Flange Connections

Our Solution

For smaller diameter flanges, JOFRA offers a sanitary kit designed to be used with the RTC-156 cooling dry-block calibrator. For larger flanges and more extreme temperatures, the general design has been adapted to inserts for the RTC-158 and RTC-250 convertible dry-block/wet baths. Both designs feature inserts that protrude above the well allowing surface-to-surface contact between the sensor flange face and the insert. There is also a port drilled to allow for a flexible reference sensor to be positioned at the same depth as the sanitary sensor tip. In the event that the penetration depth does not allow for proper immersion of the reference, JOFRA has a design that compensates by positioning the reference from the bottom of the insert to the depth of the sanitary sensor. Through this design process, the issues of proper immersion and consistent reference positioning are eliminated.

The calibrator can then be set to the desired temperatures for calibration using manual, auto-step, software, or the JOFRACloud solution. Multiple blocks may be used at specific temperatures to speed up the process. The use of dry-block calibrators eliminates the need for oil and thereby minimizes the potential for injury from extreme hot or cold fluids. It also negates the need to train personnel on hazardous fluids and spill proce-dures. In many cases, it will also speed up the procedure. Finally, the portability of the dry-block calibrators is much better than the fluidized baths allowing for less set-up time and easier positioning for in-process calibrations.

Ph: 805-595-5477 • **Email:** crystal@ametek.com • **Web:** ametekcalibration.com