Calibrating Capillary Thermometers

As societies and technologies continue to expand, the pressures on our energy infrastructure is rapidly increasing. Take electronic vehicles as one example. While EVs have positive environmental considerations, the need to charge them is bringing excess power demands to already stretched power grids. These grids depend on powerful transformers to create the energy, and if these transformers are extended or overloaded, they can lead to power outages or even costly equipment failure.

Understanding the importance of temperature to a transformer is critical to protecting the equipment and maximizing efficiency. The most common cause of reduced transformer life is excess temperature. While an extreme over-temperature event could cause an explosion, even continuous moderate over-temperature events can shorten the life of a transformer. Many transformers also include insulation which helps to maintain maximum efficiency. Wide temperature swings can damage the insulation, resulting in a less efficient transformer.

Transformers produce excess heat during the process of creating the energy we need. While this heat production is not avoidable, it is controllable. Energy producers use temperature equipment to monitor the transformer temperature and warn technicians when they reach certain limits. Even as companies introduce advanced digital equipment to improve this warning process, most energy producers still rely on capillary temperature thermometers with a display as their last line of defense from an over-temperature event.

These capillary thermometers include extended probes (4 - 6 inches / 100 - 150 mm) that technicians insert into the transformer to measure the oil temperature. A liquid-filled capillary delivers the result to a readout dial with alarm warnings. Some systems include multiple warning steps, so a technician receives several notifications as the temperature reaches critical levels.

Because of the potential issues that excess temperature creates, having an accurate reading from the capillary thermometer is essential. Even one degree wrong could cause huge energy downfalls. However, this equipment degrades and should be routinely checked and calibrated with trusted equipment. But, because of the length of the temperature probe and the fact that the entire probe is part of the sensing element, finding the right equipment to calibrate correctly is essential.

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Our Solution

We have a solution with our JOFRA CTC-652. We designed the CTC-652 with this particular application in mind. It features the deepest calibration well in an industrial temperature calibrator at 190 mm / 7.48 inches. The deep well allows a technician to place the entire capillary sensing probe inside the calibrator. This avoids the problem other calibrators face when half of the probe is sticking out of the well and subjected to ambient temperature. In addition to the entire probe fitting inside the well, the CTC-652 provides a homogenous temperature throughout the well, further increasing the calibration accuracy. We even implemented an automatic switch test function, for multiple test runs.

In addition to the deep well, we designed the CTC-652 to be compact, lightweight, and easy to carry and transport. Its size and shape mean technicians can use it in a laboratory or carry it to a field location and complete on-site calibrations. To further protect the instrument under test, it also includes a feature to limit the upper-temperature limit (maximum of 652°) to match that of the capillary thermometer.

Our CTC series also includes Mains-Power Variance Immunity (MVI) to improve temperature stability. Unstable mains power supplies are a major contributor to calibration inaccuracies. Traditional temperature calibrators often become unstable in industrial environments where large electrical motors, heating elements, and other devices are periodically cycled on and off. The cycling of supply power can cause lower quality temperature regulators to perform inconsistently, leading to both inaccurate readings and unstable temperatures. The CTC series employs the MVI, thus avoiding such stability problems. The MVI circuitry continuously monitors the supply voltage and ensures a constant energy flow to the heating elements.

For more information on the CTC-652, please visit our CTC webpage here.