

Here's How To Calibrate a Scace Device

by Greg Scace

Get a very large steaming pitcher or tall saucepan - one that can hold a couple liters of water at least. Fill it half full of distilled water (not Deionized). Put it on the stove and heat the crap out of it so that when it boils it's gonna boil vigorously. Suspend the Scace device upside down over the water, but inside the pitcher or pan. You can support it by looping some string around the filter flowmeter and tying it to something above the pitcher or saucepan, like a screwdriver placed across the top. Snake the thermocouple leads outside of the pitcher / saucepan and cover the pitcher / saucepan with aluminum foil. When the water starts boiling, read the Scace device temperature. It should be very stable. The region above the boiling water will be filled with both steam and condensing steam (fine water mist) The heat released by condensation keeps the steam hot, and makes the region from boiling water to foil cover extremely temperature stable - better than 0.05 Deg. C.

You'll know that things are working right if the measured temperature is stable as a rock. If not, then you have part of the device immersed in the water or the cover isn't fitting well over the pitcher / saucepan etc.,.

Finally, get the local barometric pressure by logging onto the local airport and getting their barometric pressure reading - which is used for correcting airplane barometers to local conditions. This number will be reasonably good for you to use, as long as the airport isn't on top of a mountain while you are in a valley (or vice versa). Look on the web for a boiling point conversion program such as this one: <https://www.thermoworks.com/bpcalc>. That should give you the local boiling point corrected for local barometric pressure. Compare the answer given by your readout device and the one given by the boiling point calculator to find out how close your Scace device is to reality.

Once you have this information, use it as a correction.

For example, let's say that you read 99.5 Degrees C and the boiling point calculator says that you ought to read 99.8. When you shove your Scace into an espresso machine, add 0.3Deg C to the measurement to get the corrected value. FWIW, if you do the calibration carefully, your Scace's accuracy will be within 0.1 Deg C for a short while after your calibration. I hesitate to say how long it will be good for. That depends on how careful you are with handling the device. Wire strain from winding the wires up, banging it around, and a host of other things can eventually degrade accuracy. But if you recalibrate in a month and the offset is the same, then you can try recalibrating every 2 months, and see how that goes etc.

If you plot the results, you'll get documentation of how good your device is over how long. Then you can recalibrate as needed and have more confidence in your measurements.

Finally, thermocouples normally work correctly or not at all. It's not usual that they give measurement answers outside of their uncertainty claims, unless they've been mistreated or used a whole lot. A couple things that make them go bad is - tightly coiling and uncoiling the wires strains the wires and changes their crystalline structure, which can change their response to temperature. Now you know what not to do.

For high temperatures, there can be migration of atoms away from the junction. In the case of the wires used in Scace devices, the materials are annealed high-purity copper, and constantan, which is a nickel alloy. Significant migration of the materials from one wire into the other can cause accuracy issues, but I don't believe that our usage would cause this unless you use the device daily for years.

[Read more](#) about the Scace Thermofilter Device