

IMPROVING DRY-WELL CALIBRATIONS

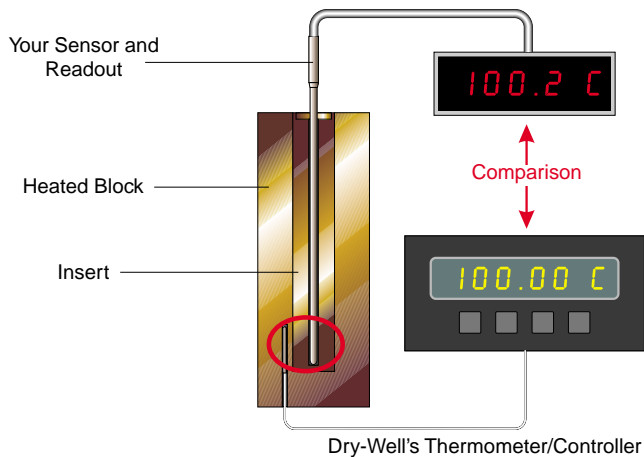


Fig. 1
Dry-Well as Reference Standard

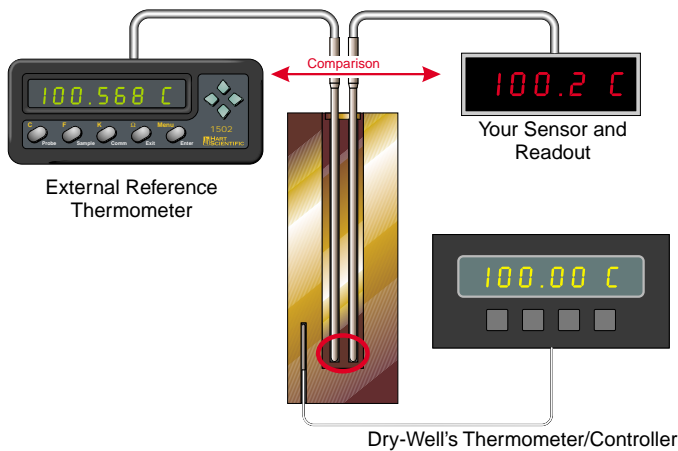


Fig. 2
External Reference Standard

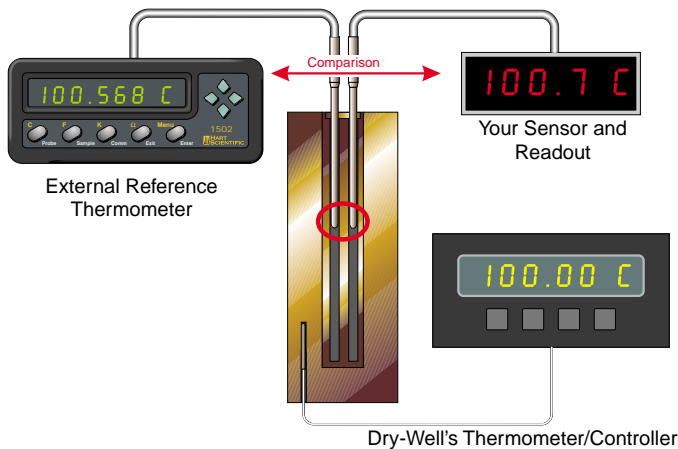


Fig. 3
Calibrating Short Probes

Many customers use a dry-well as both a heat source and a reference thermometer. In other words, they put their thermometer or sensor to be tested in the well and compare its reading to the temperature on the display of the dry-well as shown in figure 1. The dry-well displays both the temperature the user set and the actual temperature measured by the dry-well's own control sensor. If this is your practice, be aware of the following cautions.

First, several dry-well manufacturers don't actually calibrate this display. When quoting the "accuracy" of their dry-well, some manufacturers actually give you the "potential" calibration accuracy if you use an adequate external thermometer to read the dry-well's temperature during the calibration. You can only guess what the actual accuracy of the dry-well's display is.

Second, several manufacturers who do calibrate their displays and print specifications for display accuracy don't include a traceable calibration report with the dry-well. You have to pay extra to get one. Both of these practices seem irresponsible to us. Hart dry-wells all feature a calibrated display of the well's temperature, and we include a traceable calibration report with every dry-well at no extra charge. If you're buying a calibration instrument, why should you pay extra for the piece of paper that makes your instrument a valid calibration tool?

The first two cautions don't apply if you buy a Hart dry-well. We design the electronics and sensor package for each dry-well to provide traceable accuracy that is reasonably adequate for many applications. However, your accuracy can be improved, even in a Hart dry-well, if you use a more accurate reference thermometer during your calibrations. Most of our blocks feature multiple holes, and you can order two-hole inserts for our other models. This allows you to put your reference thermometer in close proximity to the sensor you're testing as shown in figure 2.

Third, all dry-wells have some temperature gradient along the depth of the well. In a Hart dry-well these gradients are lower than competing units. However, if you're calibrating a short sensor that doesn't reach the bottom, it may not be exposed to the exact same temperature shown on the dry-well's display. You'll get more accurate results by using an external reference thermometer, as shown in figure 3, with its probe immersed in an adjacent well at the same depth as the unit under test.

Hart's model 1502A Tweener Thermometer is a perfect companion to a Hart dry-well. This traceable reference thermometer (page 39) is accurate to $\pm 0.009^\circ\text{C}$ at 100°C . The 1529 Chub-E4 (page 46) does even more by serving as both the reference thermometer and a meter to read the sensors you're testing. Using one of these thermometers as the reference during your calibrations can improve your total calibration accuracy to $\pm 0.03^\circ\text{C}$ or better.