

***Study of method of calibrating the direct current
reference voltage standard***

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Direct current reference voltage standard of 10V plays an important role in the electronic measurement. It is very important for the most standard labs to calibrate the 10V of DCV. This article shows the method by which to calibrate FLUKE 732B/7001 using the chemical standard battery, standard voltage divider, digital direct-current standard voltage source and digital low-voltage meter, not using the Josephson Array. After the contrast verification, the uncertainty is less than 2×10^{-7} . The speciality of the method is not to use the special test equipment.

The general calibration procedure for the 10V is as follows: at the ration 10:1 of the standard divider calibrating the 10.186V of the digital direct current voltage standard source using the 1.0186v of the standard battery, then comparing with this voltage and the 10V reference voltage of the calibrated voltage. Then to measure the balance with the digital low-voltage meter.

The main problems of the calibration procedure are the error of the standard battery and the error of the standard voltage divider and the short-term stability of the digital direct voltage standard source and the error from measuring 186mV using digital low-voltage meter. Among them, we can find the standard battery whose 1-year stability is less than 1.5×10^{-7} . It is easy for the high-accuracy digital direct current standard source (for example, FLUKE 5700 calibrator). The difficulties are that the error of the voltage divider and the error from measuring 186mv using the digital low-battery meter. Here, to adopt the method of the reference voltage to calibrate the voltage divider. It make the uncertainty of voltage divider is less than 2×10^{-7} . Using the linearity of FLUKE 5700 calibrator at 10V calibrate the 10V reference voltage, avoiding measuring 186mv to eliminate the measurement error of the digital low-battery meter. After contrasting verification, the uncertainty of calibrating the 10V standard is less than 2×10^{-7} .