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MODEL 1140A AS A DC SOURCE

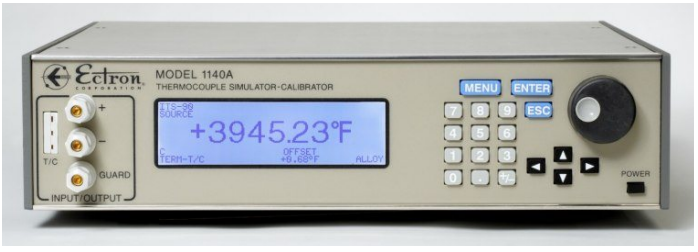
A review of the specifications will show the superior features of the Model 1140A as a thermocouple simulator. But this instrument is also a superior dc source and dc digital voltmeter.

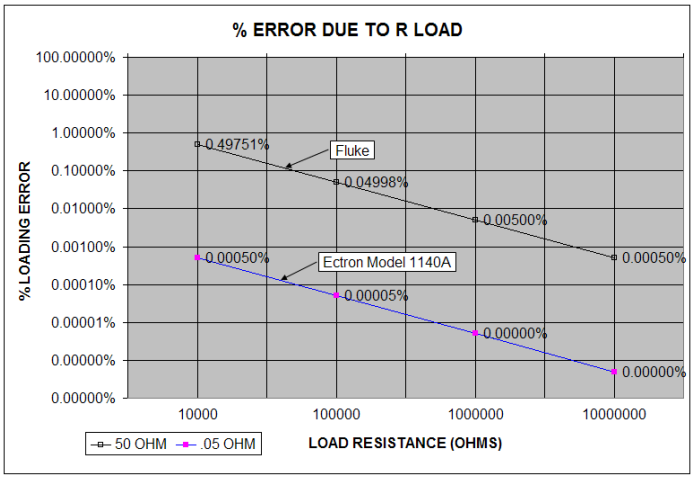
First of all, the one-year dc accuracy specification of the 1140A is 30 ppm (of the voltage) + 2.5 µV. If we have the 1140A output a 100 mV signal it will be accurate to 5.5 µV for one year without re-zeroing the output. Because it has a resolution of 7 digits we can change the output in 0.1 µV increments when producing 100 mV. With these specs alone we have few competitors in the dc source arena. But the 1140A has one more important feature that really sets it apart.

What if you needed to connect a precise 100 mV voltage to a 1,000 Ω load? Try using a big and very expensive ($40,000) Fluke Model 5720A calibrator, a superb do-all calibrator with the best possible accuracy, 9 ppm + 0.5 µV (voltages less than 220 mV). You dial up 100 mV and connect to the load and OOPS, the voltage at the output terminals of the 5720A is only 95.24 millivolts! What can be wrong? You check everything and finally, as a last resort you check the manual. Lo and Behold the 5720A has a 50 Ω output impedance.

What does a 50 Ω output impedance do for our test? Well, instead of 100.0000 mV at the output terminals the voltage is almost 5% off when coupled to a 1 kΩ load. A quick check with ohms law confirms the problem. So rather than the quoted accuracy of 9 ppm + 0.5 µV for the 220 mV range, we have a gross error. In fact, to equal the quoted accuracy for 100 mV, the load must exceed 5 MΩ and even with this load we double the inaccuracy of the instrument.

Let's now try the 1140A. With an output resistance of only 0.05 Ω the voltage is now 99.9950 mV, a loading error of only 5 µV or 0.005% of the 100 mV. In other words, when we want to produce a voltage below 220 mV into loads below 1 MΩ we should use the Ectron Model 1140A instead of the Fluke 5720A. Many other precision dc sources have this same problem. The chart below indicates the amount of error for various load resistances vs. voltage for source resistances of 50 Ω and 0.05 Ω. Other advantages of the Ectron for dc operation include a stability of 5.5 µV for one year without re-zeroing, 7-digit resolution allowing 0.1 µV adjustment on the 0 mv to 999.9999 mV range, and IEEE-488.2, Ethernet, and USB interfaces.





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