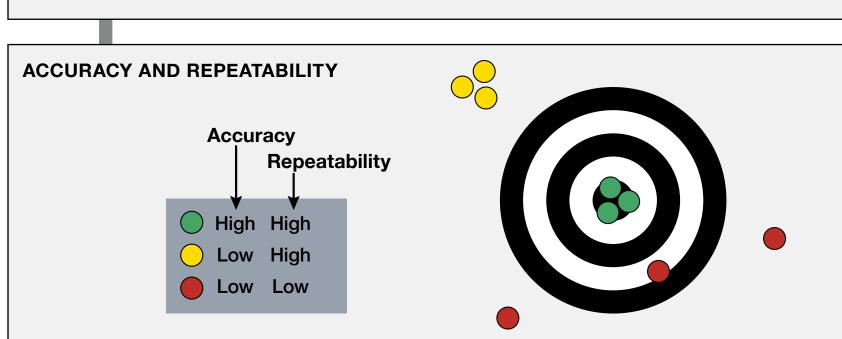
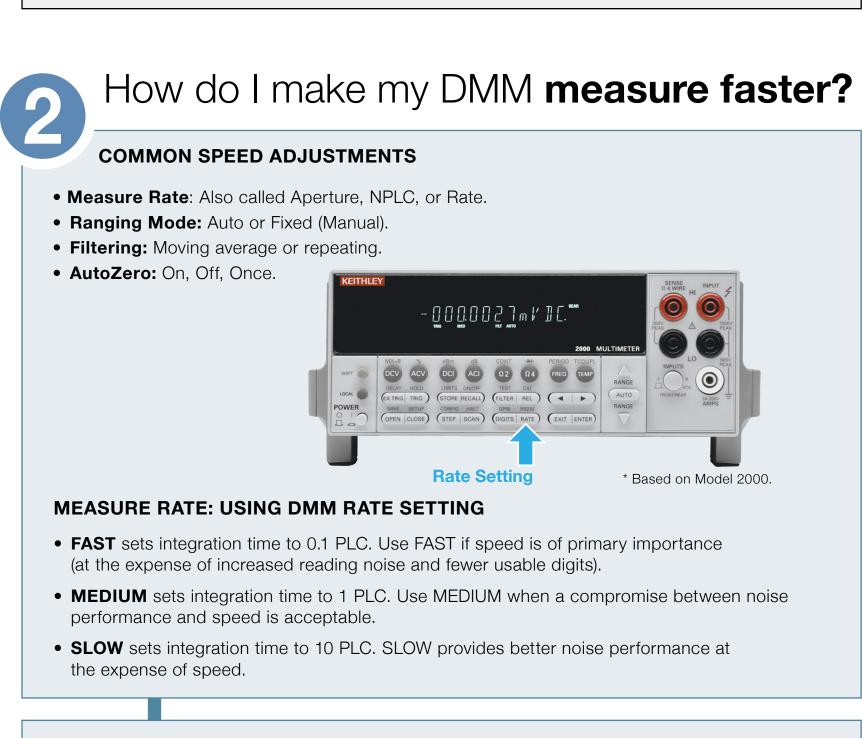
Digital Multimeter User Questions

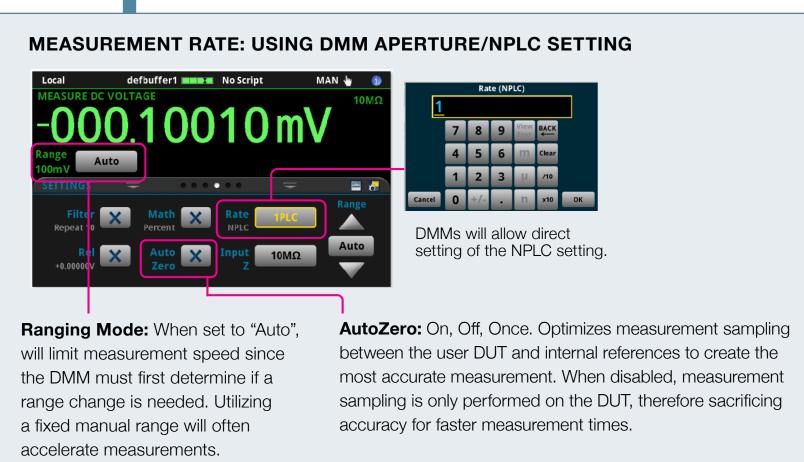
Answers and Antidotes from Our Panel of Application Engineers

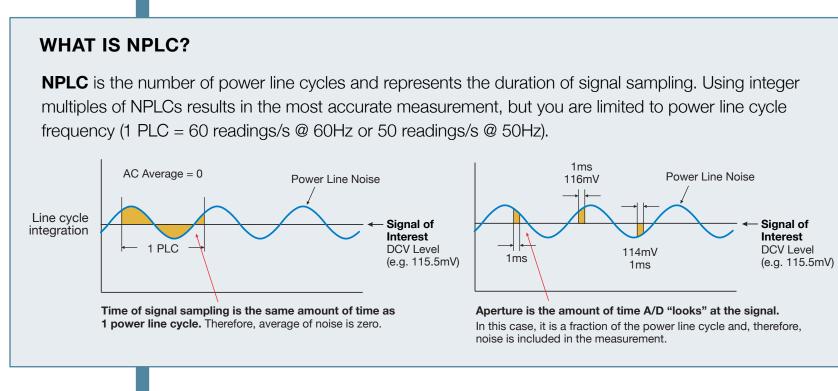


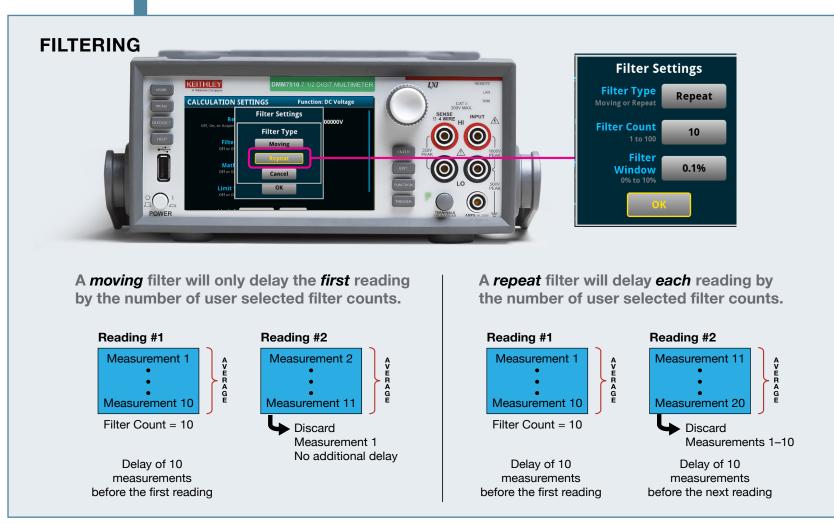


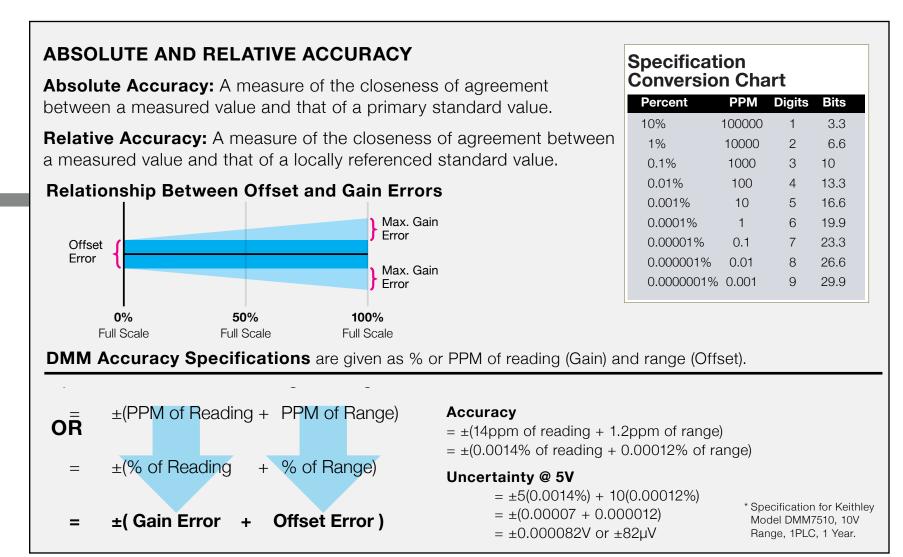


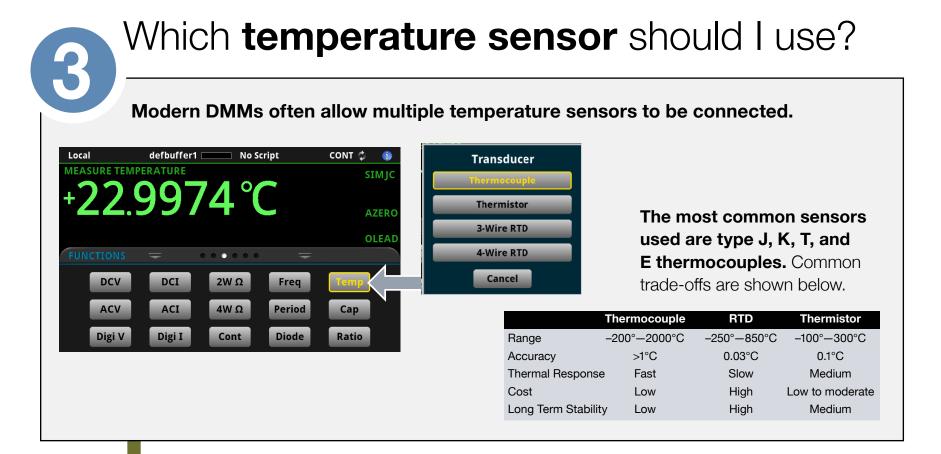


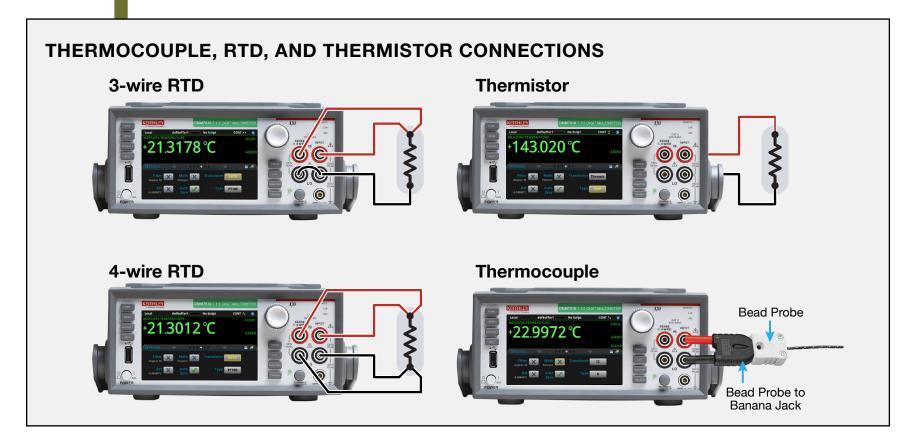




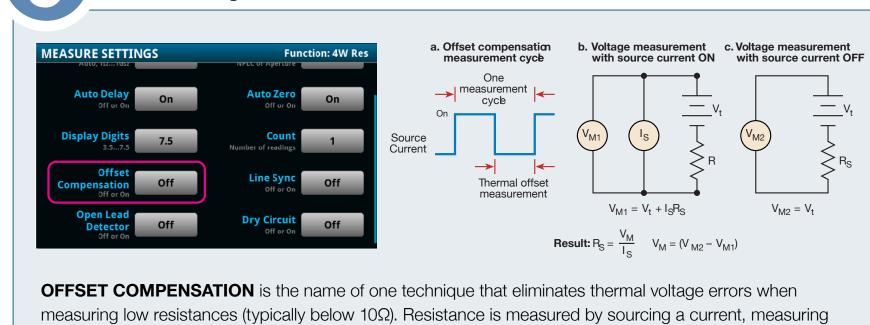








What are offset compensation and dry circuit mode?



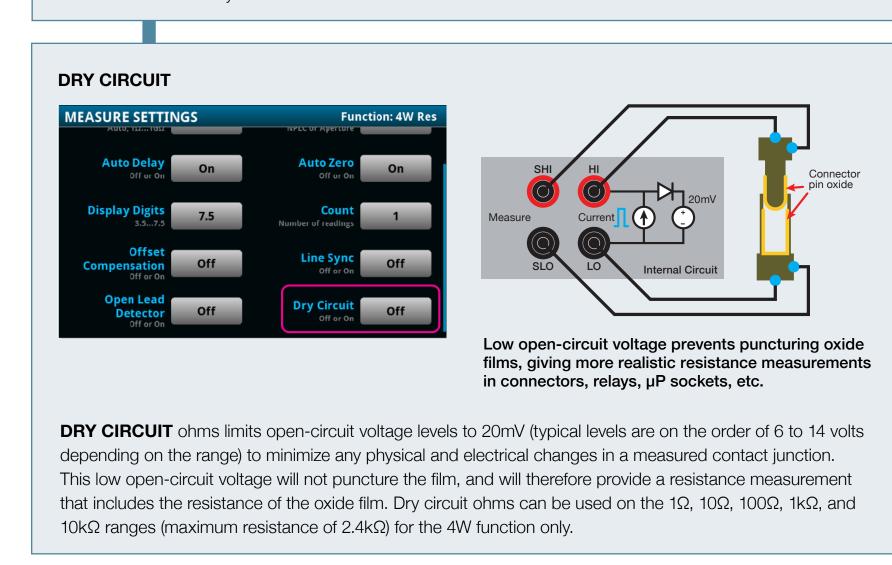
the resultant voltage, and then using Ohms' Law to calculate the unknown resistance.

In the offset compensation technique, the source current is alternated on and off and voltage measurements are made during both portions of the cycle. When the source current is on, the voltage measured is both the

are made during both portions of the cycle. When the source current is on, the voltage measured is both the thermal error voltage and the voltage across the device under test, as shown in part b of this figure. When the source current is off, there is no current through the device under test, and so the voltage measured is just the thermal error voltage as shown in part c.

Therefore, the voltage measured in part c can be subtracted from the voltage measured in part b. The correct

Therefore, the voltage measured in part c can be subtracted from the voltage measured in part b. The correct resistance can be calculated using this voltage VM and the level of source current during the on portion of the cycle. The technique is very useful as long as the thermal voltage error is not changing between the time that the source current is cycled on and off.



When and why do I need to use the four-wire resistance measurement function?

Resistance measurements are very commonly performed using bench multimeters. Many multimeters will include both two- and four-wire methods. The two-wire method should only be used when measuring resistance values beyond 10 Ohms because of the impact of lead resistance, which can add significant error (1% or more). The solution for more accurate low resistance measurements is the four-wire (also called Kelvin) connection method. This solution minimizes the impact of lead resistance by automatically removing the effect of lead resistance. With this configuration, the test current (I) is forced through the test resistance (R) via one set of test leads, while the voltage (VM) across the DUT is measured through a second set of leads (sense leads). Although some small current (typically less than 100pA) may flow through the sense leads, it is usually negligible and can generally be ignored for all practical purposes. The voltage drop across the sense leads is negligible, so the voltage measured by the meter (VM) is essentially the same as the voltage (VR) across the resistance (R). As a result, the resistance value can be determined much more accurately than with the two-wire method.

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