

1 Commands relating to 4W-resistance measurement

List of all commands that have affect on 4W resistance measurement.

These are from the manual "Remote control DMM6500-901-01B_Sept_2019_Ref_REMOTE SCPI GPIB.pdf".

Setting	Setting Description/reference R comments
Aperture	<p>Assigns a numerical value to measure the integration rate in seconds; see Using "aperture or NPLCs to adjust speed and accuracy" (on page 4-68). Available if Integration Unit is set to Aperture.</p> <p>Seems like a redundant, different way to control measurement integration time instead of NPLC, 0.02 = 20 ms. The potential overlap or conflict with NPLC command is not explained.</p> <p>:SENS:FRES:APER 0.020</p>
Auto Delay	<p>Applies a wait period at the start of a measurement to allow cables and circuitry to settle for best accuracy. Refer to Auto Delay (on page 4-48).</p> <p>I think it is better to use this than the #SLEEP or #WAIT Omega commands, the new touch panel interface on 6500 seems to exert more control over the switch card behavior than the old K2000 did, and Omega induced waits may not work as intended.</p> <p>:SENS:FRES:DEL:AUTO OFF</p> <p>:SENS:FRES:DEL:USER 1.2345</p> <p>Wait 1.2345 seconds between channel connect and measurement is how I understand this.</p>
Auto Zero	<p>Determines if internal reference points are used to maintain stability and accuracy. See Automatic reference measurements (on page 4-52).</p> <p>:SENS:FRES:AZER:STAT OFF</p>
Count	<p>Sets the number of aperture readings that are processed when a measurement is requested.</p> <p>I think the above refers to:</p> <p>:SENS:FRES:AVER:COUN 1</p>
Display Digits	<p>Sets the number of digits that are displayed for front-panel readings. It does not affect accuracy or speed. Refer to Setting the number of displayed digits (on page 3-59).</p> <p>Irrelevant</p>
Integration Unit	<p>Determines if number of power line cycles or aperture is used to set the amount of time the input signal is measured. See Using aperture or NPLCs to adjust speed and accuracy (on page 4-68).</p> <p>:SENS:FRES:NPLC 1</p>
Line Sync	<p>Enables or disables line synchronization. When it is enabled, it helps increase common-mode and normal-mode noise rejection. Refer to Line cycle synchronization (on page 4-67).</p> <p>:SENS:FRES:LINE:SYNC OFF</p>
NPLC	<p>Assigns a numerical value for the integration rate to count the number of power line cycles; see Using aperture or NPLCs to adjust speed and accuracy (on page 4-68). Available if Integration Unit is set to NPLC.</p> <p>:SENS:FRES:NPLC DEF</p>
Offset Compensation	<p>Enables or disables offset compensation. Auto is also available. When enabled, offset compensation reduces or eliminates thermoelectric EMFs in low-level resistance measurements. Refer to Offset-compensated ohms (on page 4-22). Offset-compensated ohms. The voltage offsets caused by the presence of thermoelectric EMFs (V EMF) can adversely affect resistance measurement accuracy. To overcome these offset voltages, you can use offset-compensated ohms. For 4-wire resistance measurements, when offset compensation is enabled, the measure range is limited to a maximum of 10 kΩ. When Auto is selected, the instrument automatically turns offset compensation on or off as appropriate for the selected range. For 2-wire resistance measurements, offset compensation is always set to off. For temperature measurements, offset compensation is only available when the transducer type is set to an RTD option. See Offset-compensated ohm calculations (on page 4-22) for additional detail on calculating offset-compensated ohms. Instrument operations, including offset-compensated ohms, are performed on the input signal in a sequential manner. For a normal resistance measurement, the DMM6500 sources a current (I) and measures the voltage (V). The resistance (R) is then calculated as $R = V/I$ and the reading is displayed. For offset-compensated ohms, two measurements are performed: One normal resistance measurement and one measurement using the lowest current source setting.</p> <p>:SENS:FRES:OCOM OFF</p>
Open Lead Detector	<p>Enables or disables open lead detection. When enabled, detects open test leads, which can lead to inaccuracies in 4-wire sensing.</p> <p>:SENS:FRES:ODET OFF</p>
Range	<p>Determines the full-scale input for the measurement; also affects the accuracy of the measurements and the maximum signal that can be measured. Refer to Ranges (on page 4-53).</p> <p>:SENS:FRES:RANG:AUTO OFF</p> <p>:SENS:FRES:RANG 0.12345</p> <p>You can assign any real number (instead of 0.12345) using this command. The instrument selects the closest fixed range that is large enough to measure the entered number. For example, for current measurements, if you expect a reading of approximately 9 mA, set the range to 9 mA to select the 10 mA range. When you read this setting, you see the positive full-scale value of the measurement range that the</p>

	instrument is presently using. This command is primarily intended to eliminate the time that is required by the instrument to automatically search for a range. When a range is fixed, any signal greater than the entered range generates an overrange condition. When an overrange condition occurs, the front panel displays "Overflow" and the remote interface returns 9.9e+37.
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These commands affect 4W resistance measurements on any and all channels. For channel specific instructions, the commands need to be appended with channel list, but should not be necessary to do 4W res measurement with varying settings in one experiment run.

Example:

:SENS:FRES:AVER:COUN 1, (@2,3)

Where this setting only applies to 4W Res measurement on channels 2 and 3.