

The Simpson 260 Multimeter

NOTE: Thanks to Stephan Prata, College of Marin, for this handout.

The Simpson 260 analog multimeter can measure current, voltage, and resistance. Normally, the wire leads are connected to the two plugs at the bottom left of the meter; one plug is labeled “common” and “-”, and the other is labeled “+”. For DC measurements, the knob above the inputs should be set to “+D.C.” If, during a measurement, the dial pointer tries to move the wrong direction, either reverse the leads or else set the knob to “-D.C.” When storing the meter, set the central selection knob to “Transit”.



DC Voltage and Current Measurements

For measuring DC voltage and current, use the black scale labeled “D.C.” Note that there are three sets of black numbers below the black DC scale. How you read the scale depends on the setting of the central selector knob; the labels for this knob indicate full-scale readings. For example, if the knob is set to “2.5 V”, use the 0–250 labels and read the “250” mark on the scale as 2.5 V. If the selector knob is set to “50 V”, use the 0–50 labels to read the scale. If you use the 1 mA scale, use the 0–10 labels, but interpret 10 as 1.0 mA, 8 as 0.8 mA, and so on. Associate the number to the black scale.

Accuracy

The accuracy of the meter is claimed to be 2% of full scale. For example, if you get a reading of 4.2 on the 10 mA scale, the result is accurate to 2% of 10 mA, or 0.2 mA. Our meters have seen a lot of use and may not meet that standard.

Never place a meter in ammeter mode if the meter is connected in parallel with an element in a circuit. In ammeter mode the meter must be in series with at least one element of the circuit.

Resistance Measurements

For measuring resistance, use the top scale, which increases right to left. Note that the reading should be multiplied by the factor indicated by the selector knob. For example, if the needle points to 8 ohms and the selector is set to Rx100, then the actual value is 8x100 or 800 ohms. Also note that you need to zero the ohmmeter using the ZERO OHMS knob. The way to do this is set the selector to the desired ohm scale, connect a wire directly from the + input to the common (or -) input, and turn the zeroing knob until the ohm scale reads 0. If you change scales, you need to rezero the ohmmeter.

Do not try to measure a resistor that is part of an electrical circuit. You need to isolate the resistor first so that it is not connected to anything else.

Do not leave the meter in an ohmmeter mode, particularly if it is connected to something; this mode uses an internal battery that will run down.

Accuracy

The claimed accuracy for reading resistance is 2° of arc, which is approximately the separation between the 10 and the 11 marks on the Ohm scale.

Fluke 175 Multimeter

The Fluke 175 digital multimeter can measure current, voltage, and resistance. Normally, the wire leads are connected to the two plugs at the bottom right of the meter; one plug is labeled “COM”, and the other is labeled “V Ω ”.

Voltage, Current, and Resistance Measurements

Set the selector dial to the desired function. V indicates voltage, Ω indicates resistance, and A indicates current. A wavy line above the symbol indicates AC, and two straight lines, one solid, one dashed, indicates DC. The meter is autoranging, meaning that it will adjust the measurement scale to fit the magnitude of the quantity being measured. Therefore, take note of the units shown on the display. For example, a resistance reading might be displayed with the Ω unit, indicating a result in Ohms, or with $k\Omega$, indicating kiloOhms, or with $M\Omega$, indicating megaOhms. A resistance reading of 0L indicates infinite resistance; this usually indicates a bad connection somewhere. Do not try to measure a resistor that is part of an electrical circuit. You need to isolate the resistor first so that it is not connected to anything else.

Set the selector to OFF when not making a measurement.

Accuracy

The claimed accuracy for DC volts is $0.15\% + 2$ counts. That means 0.15% of the reading plus 2 of the rightmost units. For example, suppose the display reads 2.103 V. Then 0.15% of the reading is 0.003 V and 2 of the rightmost units is 0.002 V, so the total accuracy is to within the sum of these two values, or ± 0.005 V. The accuracy for ohms is $0.9\% + 1$ count, and the accuracy for DC current is $1.0\% + 3$ counts.



Never place a meter in ammeter mode if the meter is connected in parallel with an element in a circuit. In ammeter mode the meter must be in series with at least one element of the circuit. Otherwise there is a risk of blowing an internal fuse or burning out the meter.