Choosing a Digital Multimeter – Quick Tips

These modern-day tape measures consolidate the functions of voltmeters, ammeters, and ohmmeters into a single unit.

As one of most widely-used electronic testing instruments, the digital multimeter (DMM) is more commonly known as the modern-day tape measure. But instead of being able to handle a single function (i.e., linear measurement), DMMs consolidate the functions of multiple instruments, such as voltmeters, ammeters, and ohmmeters into one unit.

DMMs are used in electrical engineering design, maintenance, quality control, inspection, and/or any application requiring electrical servicing and diagnostic testing. A basic DMM works with energized and de-energized electrical circuits and measures alternating current (AC), AC voltage, direct current (DC), DC voltage, resistance, continuity, and diodes. Advanced models measure capacitance, frequency, temperature, pressure, and vacuum (special accessories are required for some of these measurements).

Choosing a Multimeter

When selecting a DMM for a specific application, consider these three points:

- Resolution refers to how fine a measurement a meter can make. By knowing the resolution of a meter, you can determine if it is possible to see a small change in the measured signal. The terms digits and counts are used to describe a meter's resolution. DMMs are grouped by the number of counts or digits they display. A 3 ½-digit meter can display three full digits ranging from 0-9 and one-half digit, which displays only a "1" or is left blank. A 3 ½ digit meter will display up to 1,999 counts of resolution and a 4 ½ digit meter can display up to 19,999 counts of resolution. Some DMMs may have enhanced resolution offering

higher counts within their digit range.

- Accuracy is the largest allowable error in the readings. It's an indication of how close the DMM's displayed measurement is to the actual value of the signal being measured. Accuracy is generally expressed as a percent of the reading. An accuracy of one percent of the reading means that for a display of 100 volts, the actual value of the voltage could be somewhere between 99 and 101 volts.
- Autoranging (or "dialing"), is a useful feature that allows the user to quickly move from the instruments' various measuring scales while maintaining accurate readings.

Another important consideration to factor in when selecting a DMM is whether it is a True RMS (root mean square) meter or not. True RMS meters allow non-sinusoidal AC signals to be accurately measured. The typical DMM is not a True RMS meter, and the former will produce misleading voltage readings when used to measure anything other than DC signals or pure sine wave AC signals.

Regardless of which multimeter you chose, electrical test equipment should be used with caution, respect, and maintained in accordance with the manufacturer's guidelines. As with all electrical test equipment, individuals using a DMM should receive training in its proper operation.

It's important to use extreme caution anytime you work with current (AC or DC) and voltage. To avoid catastrophic consequences, an electrical safe work program should be established and followed whenever working with electricity.

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