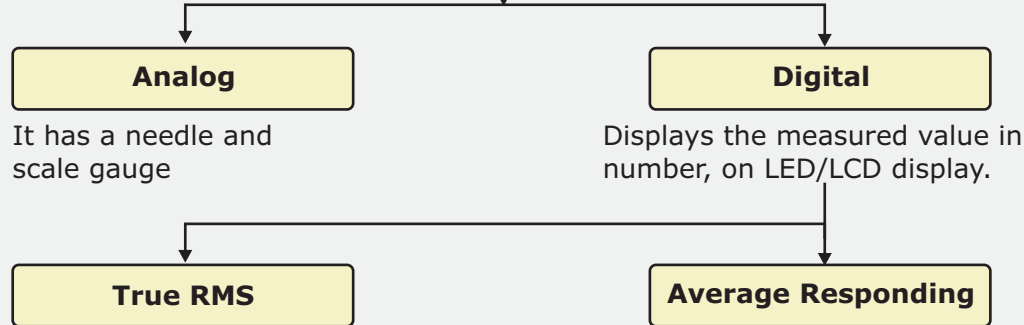


**Definition:** A multimeter is an electronics instrument that combines several measurement functions in one unit. It measures AC + DC voltage, AC + DC Current, Resistance, Capacitance, Frequency, Tests Diodes and Transistors, Continuity etc.

### Classification of Multimeter



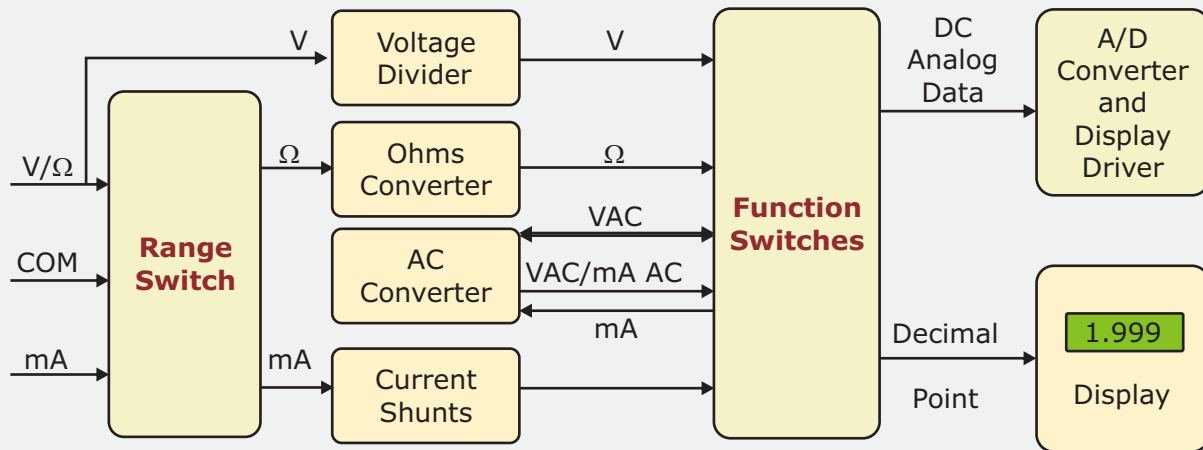
#### True RMS

! Measures all wave shapes accurately  
! Expensive

#### Average Responding

! Measures Sine wave accurately  
! Percentage error in other wave shapes in more  
! Economical

### Block Diagram of Digital Multimeter



### Display & Dial Settings

Digital Display shows measured value.

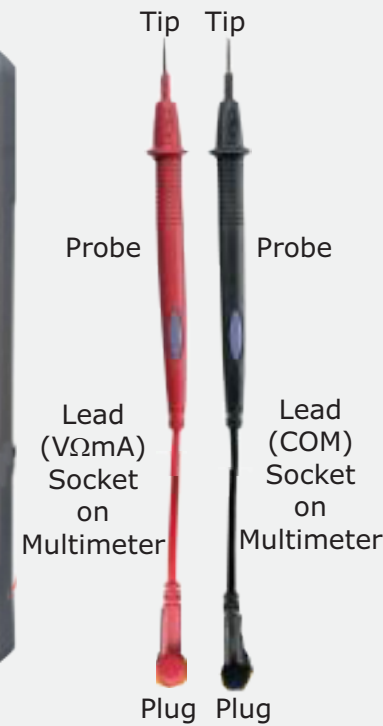
Meter dial selects Meter dial selects function and ranges

Panel Indicator shows each function and setting range

Probe Connections specific for each function



### Multimeter test leads



### Basic Terms

**Resolution:** The smallest amount of input signal change that the instrument can detect reliably, often specified in terms of digits displayed.

Thus a 3 ½ digits multimeter will display upto 1999, hence on a 2V range the lowest signal change that is detectable will be 1mV.

**Accuracy:** Closeness of the DMM's displayed measurement is to the actual value of the signal being measured.

This term is not related to resolution; however, it can never be better than the resolution of the instrument.

Specified as : Accuracy = ± (% of reading + offset)

± (1% +2), Therefore, for a display reading of 100, volts, the actual voltage would be between 98: , 8 volts and 101.2 volts.

**Precision:** A measure of the stability of the instrument an its capability of resulting in the same measurement over and over again for the same input signal.

**Root-Mean-Square (RMS) Voltage:** The equivalent DC value of an AC waveform. The RMS value of an AC sinusoidal waveform is 0.707 of the peak amplitude of the sine wave.

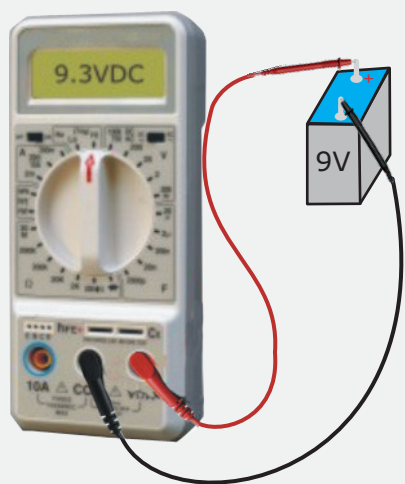
### RMS Vs, Peak Value

Waveform	Vrms	Vp
Sine	1.0	1.414
Triangle	1.0	1.733
Square	1.0	1.0

### Common DMM Symbols

~	AC Voltage	⊥	Ground
—	DC Voltage	— —	Capacitor
Hz	Hertz	μF	Microfarad
+	Positive	μ	Micro
-	Negative	m	Milli
Ω	Ohms	M	Mega
→	Diode	K	Kilo
•••	Audible Continuity	OL	Overload

### Measuring Voltage



To measure voltage connect the leads in parallel between the two points where the measurement is to be made. The multimeter provides a parallel pathway so it needs to be of high resistance to allow as little current flow through it as possible.

### Measuring Resistance

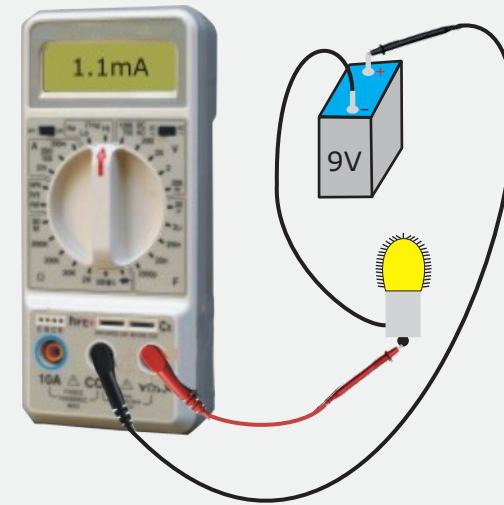


Carbon-Composition resistor

! Resistance is the opposition to current  
! Resistance is measured in Ohm's (Ω)  
! Disconnect power source before testing  
! Remove component or part from system before testing  
! Measure using lowest value, if OL move to next level

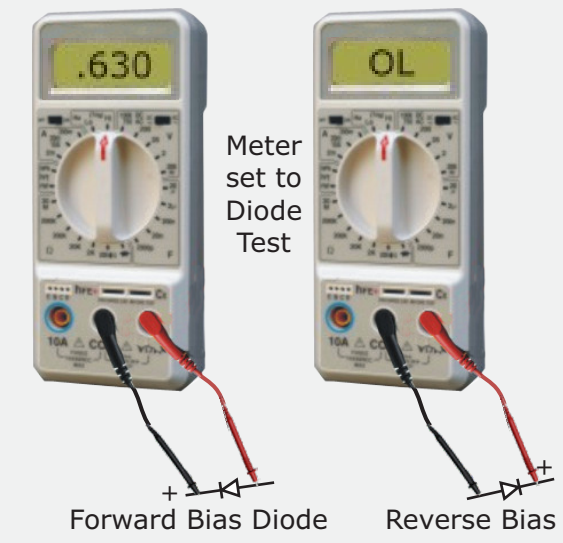
### Measuring Current

Circuit current now has to go through the meter



! Place Multimeter in series with circuit  
! Select highest current setting and work your way down.

### Testing Diodes



Meter set to Diode Test

Forward Bias Diode

Reverse Bias Diode

