

Digital Multimeters

What is Digital Multimeter?

A digital multimeter is a convenient measuring instrument that allows by itself the measurement of DC voltage, AC voltage, DC current, AC current and resistance (Pocket type DMM normally cannot be used for the measurement of current for safety reasons). In addition to these basic measuring functions, most models are provided with features such as a diode test function and continuity buzzer. Some of recent products feature the measurement of frequency and capacitor capacity. Some have added functions of maximum and minimum value hold and relative value measurement as well as data hold and range hold functions. The PC series DMMs connect to a PC making it possible to let a PC assume the function of expensive recording meters and recorders.

Advantages of digital multimeters (DMMs)

1. Highly accurate measurement. Higher accuracy (1% or less) compared with an analog multimeter (approximately 3%).
2. Reduced measuring loss due to high internal impedance (low voltage drop between terminals).
3. No parallax reading error occurs as with an analog multimeter.

Four key points in choosing a suitable model

1. What are the necessary measuring functions?

Choose the necessary functions, except voltage and resistance measurement. (including need for the measurement of current (400mA, 10A, 12A, 20A), capacitor, frequency, temperature and measurement of 4-20mA, etc.)

2. Other necessary functions

Functions required differ depending on where the measurement is taken.

- 1) To record measured values concurrently with the process of measurement
 - To fix data by the data hold function.
 - To secure the test lead in the holster.
- 2) To check changes in measured values
 - Measurement of maximum values, minimum values, and relative values.

3. For measurements of waveforms of non-sine waves, choose a model supporting measurements by RMS values.

In measuring distorted sine and non-sine waves (square wave, triangular wave, pulse), significant errors occur in measurement by models making measurements by mean values.

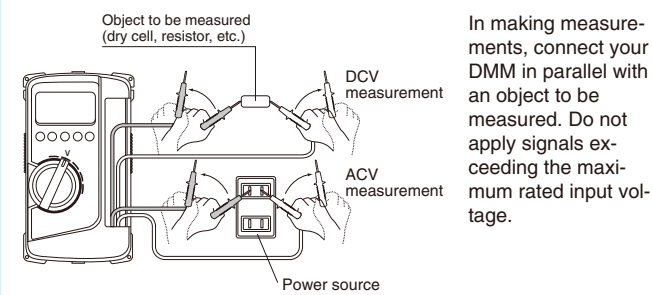
There are two types of RMS values.
 AC-Coupled true RMS value: Adapted to measurements of distorted sine and non-sine waves of the AC
 AC + DC-coupled true RMS value: Adapted to measurements of waveform containing a DC component.

4. Other functions

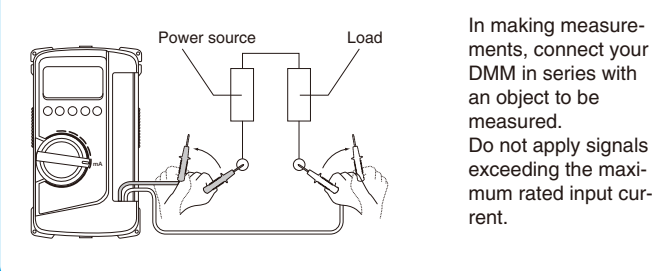
There are other types including a function to transfer data during measurement to a PC in real time and a function to record measured data in a built-in memory. To transfer data to a PC, optional connecting cables and data retrieval software (PC Link or PC Link Plus) are required in addition to a DMM of PC series.

Measurement

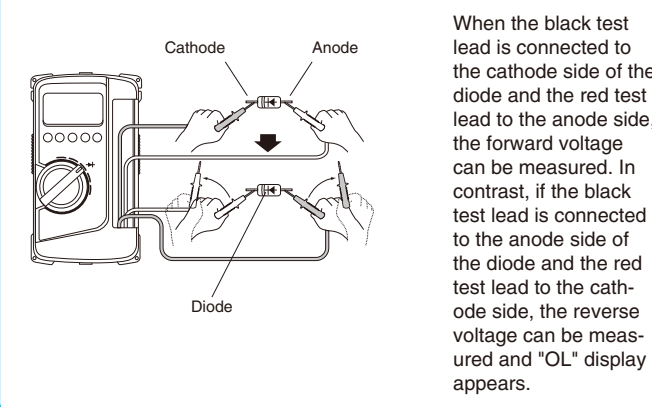
Voltage, Resistance measurement



Current measurement



Diode test



High accuracy & high resolution (PC Link)



PC5000

50000 & 500000 Count

- 4-4 / 5 digits 50000 count (Selectable 5-4 / 5 digits 500000 count for DCV & Hz)
 - 0.03% best accuracy
 - AC / AC + DC True RMS
 - Fast speed bar graph
 - Capacitance measurement (5000 count)
 - ※Not suitable for measurement of condensers with large leak current.
 - 4-20mA% measurement
 - dBm 20 selectable reference impedance
 - Line frequency (AC sine wave) measurement
 - Logic frequency measurement
 - Duty cycle measurement
 - Capture (peak hold) 0.8ms in duration
 - MAX, MIN, MAX-MIN recording mode
 - Peak hold
 - Data hold, Range hold
 - Relative value
 - Auto power off (17min.) (cancelable)
 - Alarm for improper test lead insertion to current terminal
 - Protective holster with wall hanger and lead holder
 - Tilt stand
 - Optical link RS232C / USB interface (optional)
- Display :** numeral display 50000 & 500000 selectable
 Bar graph 52 segments
- Sampling rate :** 5 times / sec. for 50000 count numeral display, 1.25 times / sec. for 500000 count numeral display 60 times / sec. for bar graph
- AC frequency bandwidth :** V : 45Hz~1kHz, 1kHz~20kHz (below 500V), A : 45Hz~1kHz
- Safety :** IEC61010-1 (EN61010-1) 2001-02 CAT.Ⅱ 600V Max. / CAT.Ⅲ 1000V Max.
- Battery life :** Approx. 120h (alkaline battery) at DCV range



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	500m/5/50/500/1000V	±(0.03%+2)	0.01mV	10MΩ
ACV	500m/5/50/500/1000V	±(0.8%+60)	0.01mV	
DCA	500μ/5000μ/50m/500m/5/10A	±(0.1%+20)	0.01μA	
ACA	500μ/5000μ/50m/500m/5/10A	±(1.0%+40)	0.01μA	
Resistance	500/5k/50k/500k/5M/50MΩ	±(0.2%+6)	0.01Ω	
Capacitance	50n/500n/5μ/50μ/500μ/9999μF	±(0.8%+3)	0.01nF	
Frequency	10Hz~200kHz	±(0.002%+4)	0.0001Hz	
Logic frequency	5Hz~2MHz	±(0.002%+4)	0.0001Hz	
Duty cycle	0.1%~99.99%	±(3d/kHz+2)		
dBm	-11.76dBm~54.25dBm at 600Ω	±(0.25dB+2)		
4~20mA%	4mA~0%, 20mA~100%	±25d	0.01%	
Continuity	Buzzer sounds at between 20Ω and 200Ω. Open voltage : approx. 3V			
Diode test	Open voltage : approx. 3.5V			
Bandwidth	V : 45Hz~1kHz, 1kHz~20kHz (below 500V), A : 45Hz~1kHz			
Fuse	12.5A/500V IR20kA φ6.3×32mm 0.63A/500V IR200kA φ6.3×32mm			
Battery	6LF22 (9V)×1			
Size / Weight	H179×W87×D55mm / 460g (including holster)			
Standard accessories included	Test lead (TL-82), Holster (H-50), Clip adapter (CL-13), Instruction manual			

Optional accessories

Software : PC Link, PC Link Plus
 Optical PC link cable : KB-RS2, KB-USB2
 Clamp probe : CL124, CL140, CL-20D, CL-22AD, CL33DC
 Temperature probe : T-300PC (PC Link software is necessary.)
 Test lead : TL-21M, TL-21, TLF-120
 Carrying case : C-CD

High accuracy & built-in memory (PC Link)



PC520M

43,000 points data logging in built-in memory

- 3-4 / 5 digits 5000 count
 - 0.08% best accuracy
 - Fast speed bar graph
 - Capacitance measurement
 - ※Not suitable for measurement of condensers with large leak current.
 - K type temperature -50°C~1000°C
 - ※Optional accessory K-AD is necessary.
 - ※K type temp. sensor K-250PC is included as a standard accessory.
 - Frequency measurement (AC sine wave only)
 - Data hold / Range hold
 - Auto power off (17min.) (cancelable)
 - Test lead resistance zero adjustment function
 - Alarm for improper test lead insertion to current terminal
 - Protective holster with wall hanger and lead holder
 - Tilt stand
 - Optical link RS232C / USB interface (optional)
- Data Logging Mode**
- 43,000 data points in built-in memory
 - Selection of measurement interval
 - 0.05s/1s/20s/40s/1min/2min/4min/8min (DCV, ACV, DCA, ACA)
 - 0.2s/1s/20s/40s/1min/2min/4min/8min (C, Ω)
 - 0.4s/1s/20s/40s/1min/2min/4min/8min (Hz)
 - Auto-standby mode during data logging to extend battery life
 - Auto-stop of data logging when batteries are low to guarantee accuracy of every logged datum
 - Export logged data to PC
- Display :** numeral display 5000, bar graph 52 segments
- Sampling rate :** 5 times / sec., 60 times / sec. for bar graph
- AC frequency bandwidth :** 40Hz~20kHz (below 500V), 40Hz~1kHz (ACA)
- Safety :** IEC61010-1 (EN61010-1) 2001-02 CAT.Ⅱ 600V Max. / CAT.Ⅲ 1000V Max.
- Battery life :** Approx. 150h (alkaline battery) at DCV range



Function	Measuring range	Best accuracy	Resolution	Input impedance
DCV	50m/500m/5/50/500/1000V	±(0.08%+2)	0.01mV	10MΩ
ACV	50m/500m/5/50/500/1000V	±(0.5%+3)	0.01mV	
DCA	500μ/5000μ/50m/500m/5/10A	±(0.2%+4)	0.1μA	
ACA	500μ/5000μ/50m/500m/5/10A	±(0.6%+3)	0.1μA	
Resistance	50/500/5k/50k/500k/5M/50MΩ	±(0.2%+2)	0.01Ω	
Capacitance	50n/500n/5μ/50μ/500μ/9999μF	±(0.8%+3)	0.01nF	
Temperature	-50°C~1000°C (thermocouple K type)	±(0.3%+3)	1°C	
Frequency	10Hz~125kHz	±(0.01%+2)	0.001Hz	
Continuity	Buzzer sounds at between 20Ω and 1200Ω. Open voltage : approx. 3V			
Diode test	Open voltage : approx. 3.5V			
Bandwidth	40Hz~20kHz (below 500V) 40Hz~1kHz (ACA)			
Fuse / Battery	12.5A/500V IR20kA φ6.3×32mm 0.63A/500V IR200kA φ6.3×32mm 6LF22 (9V)×1			
Size / Weight	H179×W87×D55mm/460g (including holster)			
Standard accessories included	Test lead (TL-82), Holster (H-50), Thermocouple K type (K-250PC), Clip adapter (CL-13), Instruction manual			

Optional accessories

Software : PC Link, PC Link Plus
 Optical PC link cable : KB-RS2, KB-USB2
 Clamp probe : CL124, CL140, CL-20D, CL-22AD, CL33DC
 Temperature probe : T-300PC (PC Link software is necessary.)
 K-8-250~800
 K type adapter : K-AD
 Test lead : TL-21M, TL-21, TLF-120
 Carrying case : C-CD