KUSAM-MECO®

An ISO 9001:2008 Company

TRMS AUTO SCAN DIGITAL MULTIMETER

MODEL KM-DMM-41

20 Functions 37 Ranges

SPECIAL FEATURES :

- True RMS Measurement
- Auto Scan Mode
- LCD Backlight Display
- Non-Contact EF-Detection.
- Auto power Off
- Manual Ranging & Auto Ranging mode
- Data Hold Function
- Max / Min mode.
- Frequency Measurement.
- CE Approved.

Priliminary Data

GENERAL SPECIFICATIONS:

- **Display :** 3/5-6 digits 6000 Counts LCD display
- **Pollution degree :** 2
- **Altitude :** <2000m
- **Operating Temperature :** 0 ~ 40°C, 32°F ~ 122°F (<80%RH, <10°C non-condensing)
- **Storage Temperature :** -10 ~ 60°C, 14°F ~ 140°F (<70%RH, battery removed)
- **Temperature coefficient :** 0.1x (specified accuracy) / °C (<18°C or >28°C)
- **Max. Voltage between terminals & earthground :** 1000V AC rms or 1000VDC.
- **Fuse protection :** A & mA : F 0.63A / 1000V Ø 10.3 x 38; F 10A / 1000V Ø 10.3 x 38.
- **Sampling rate :** 3 times/sec for digital data.
- **Range Selection :** Automatic & manual.
- **Over range indication :** LCD will display "OL"
- **Low battery indication :** The "⊟" is displayed when the battery is less than the proper operation range.
- **Power Supply :** 9V battery.
- **Dimension :** 190(L) X 90(W) X 40(H) mm
- **Weight :** Approx. 500g. (including battery).

ACCESSORIES :

Test Leads pair, User Manual, Battery installed & Carrying case.

SAFETY :

Complies with IEC61010-1:2001, CAT III 1000V & CAT IV 600V.

ELECTRICAL SPECIFICATIONS : KM-DMM-41

Accuracy is specified for a period of year after calibration & at 18°C to 28°C with relative humidity at <80%.

DC VOLTAGE

Range	Resolution	Accuracy
600 mV	0.1 mV	±(0.5%rdg + 5dgts)
6 V	1 mV	±(0.8%rdg + 5dgts)
60 V	10 mV	
600 V	100 mV	
1000 V	1 V	±(1.0%rdg + 2dgts)

RESISTANCE

Range	Resolution	Accuracy
600.0	0.1	±(1.2%rdg + 2dgts)
6.000 k	1	
60.00 k	10	
600.0 k	100	
6.000M	1 k	
60.00M	10 k	±(2%rdg + 5dgts)

LINEAR FREQUENCY

Range	Resolution	Accuracy
6 kHz	0.001 Hz	±(0.05%rdg + 8dgts)
10kHz	0.01 Hz	

Above accuracy can be guaranteed within 10% ~ 100% of the full range.

DIODE TEST

Range	Resolution	Test Condition
2 V	0.001V	Forward DC Current: Approx. 1mA Reversed DC Voltage: Approx. 2.8V

AC VOLTAGE

Range	Resolution	Accuracy
		40Hz ~ 400Hz
600 mV	0.1 mV	**60Hz** ±(1.0%rdg + 3dgts)
6 V	1 mV	±(1.0%rdg + 3dgts)
60 V	10 mV	
600 V	100 mV	
1000 V	1 V	±(1.5%rdg + 5dgts)

Above accuracy can be guaranteed within 5% ~ 100% of the full range.
The True RMS meter has residual value within 10 counts when the test leads are shorten, but that will not affect the accuracy of measurement.

CAPACITANCE

Range	Resolution	Accuracy
6 nF	1 pF	±(5.0%rdg + 5dgts)
60 nF	10 pF	±(3.0%rdg + 3dgts)
600 nF	100 pF	
6 F	1 nF	
60 F	10 nF	±(5.0%rdg + 3dgts)
600 F	100 nF	
6 mF	1 F	
60 mF	10 F	Uncertainty

CONTINUITY CHECK

Function	Resolution	Resolution
•)))	600	0.1

Continuity Beeper : 30

DC CURRENT

Range	Resolution	Accuracy
600 A	0.1 A	±(1.0%rdg + 3dgts)
6000 A	1 A	±(1.5%rdg + 3dgts)
60 mA	10 A	
600 mA	100 A	±(1.8%rdg + 5dgts)
10 A	10 mA	

AC CURRENT

Range	Resolution	Accuracy
600 A	0.1 A	±(1.5%rdg + 5dgts)
6000 A	1 A	±(1.8%rdg + 8dgts)
60 mA	10 A	
600 mA	100 A	±(2%rdg + 8dgts)
10 A	10 mA	

Above accuracy can be guaranteed within 5% ~ 100% of the full range.
The True RMS meter has residual value within 10 counts when the test leads are shorten, but that will not affect the accuracy of measurement.
Overload protection : F 10A/1000V fuse for 10A range.
F 0.63A/1000V fuse for A & mA ranges.
Maximum input current : 600mA dc or 600mA ac rms for A & mA ranges. 10A dc or 10ac rms for 10A ranges.
For measurements > 6A, 4 minutes maximum ON to measure, 10 minutes OFF; above 10A unspecified.

All Specifications are subject to change without prior notice

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USE TRUE RMS WHEN MEASURING AC WAVEFORMS

The waveforms on today's AC power lines are anything but clean. Electronic equipment such as office computers, with their switching power supplies, produce harmonics that distort power-line waveforms. These distortions make measuring AC voltage inaccurate when you use an averaging DMM.

Average voltage measurements work fine when the signal you're measuring is a pure sine wave, but errors mount as the waveform distorts. By using true RMS measurements, however, you can measure the equivalent heating effect that a voltage produces, including the heating effects of harmonics. Table 1 shows the difference between measurements taken on averaging DMMs & those taken on true RMS DMMs. In each case, the measured signal's peak-to-peak value is 2V. Therefore, the peak value is 1V.

For a 1-V peak sine wave, the average & RMS values are both 0.707V. But when the input signal is no longer a sine wave, differences between the RMS values & the average readig values occur. Those errors are most prominent when you are measuring square waves & pulse waveforms, which are rich in harmonics.

Table 1. Average versus true RMS comparison of typical waveforms.

Waveform	Actual Pk-Pk	True RMS Reading	Average Reading	Reading Error
Sine Wave	2.000	0.707	0.707	0%
Triangle Wave	2.000	0.577	0.555	-3.8%
Square Wave	2.000	1.000	1.111	+11.1%
Pulse (25% duty Cycle)	2.000	0.433	0.416	-3.8%
Pulse (12.5% duty Cycle)	2.000	0.331	0.243	-26.5%
Pulse (6.25% duty Cycle)	2.000	0.242	0.130	-46.2%

One limitation to making true RMS measurements is crest factor, and you should consider crest factor when making AC measurements. Crest factor is the ratio of a waveform's peak ("crest") voltage to its RMS voltage. Table 2 shows the crest factors for ideal waveforms.

Table 2. Crest factors of typical waveforms.

Waveform	Crest Factor
DC	1.000
Square Wave	1.000
Sine Wave	1.414
Triangle Wave	1.732
Pulse (25% duty Cycle)	1.732
Pulse (12.5% duty Cycle)	2.646
Pulse (6.25% duty Cycle)	3.873

A DMM's specifications should tell you the maximum crest factor that the meter can handle while maintaining its measurement accuracy. True RMS meters can handle higher crest factors when a waveform's RMS voltage is in the middle of the meter's range setting. Typically, a DMM may tolerate a crest factor of 3 near the top of its scale but it might handle a crest factor of 5 that's in the middle of the range. Therefore, if you're measuring waveforms with high crest factors (greater than 3), you should adjust the DMM so the measured voltage is closest to the center of the measurement range.

Another limitation of true RMS is speed. If you're measuring relatively clean sine waves, then you can save time & money by using as averaging DMM. True RMS meters cost more than averaging meters and can take longer to produce measurements, especially when measuring millivolt-level AC signals. At those low levels, true RMS meters can take several seconds to stabilize a reading. Averaging meters won't leave you waiting.