KUSAM-MECO®

An ISO 9001:2008 Company

DIGITAL TRMS MULTIMETER WITH HARMONICS INDEX MEASURMENT

11 FUNCTIONS 40 RANGES

Model KM 629

SPECIAL FEATURES :

- **Harmonics Index measurement**
- **T1- T2 Temperature measurement**
- **4mA-20mA loop Current Measurement**
- **Auto-ranging record Max, Min, Max-Min, Avg**
- **Auto-ranging relative zero mode**
- **42 Segments Bar Graph**
- **Data Hold & Auto power off Function.**

SAFETY :

- **Safety :** Meets EN61010-1, UL3111-1, CSA C22.2 NO.1010-1, and IEC1010-1 CAT III for 600V DC & AC, and CAT II for 1 kV DC & 750V AC
- **Transient protection:** 6.5kV (1.2/50 s surge)
- **Overload Protections :**
  V :1000V peak / 780V AC rms;
  A : 15A / 600V HBC F Fuse, IR 100kA;
  A, mA, & T2 : 0.16A/250V F Fuse, IR 1.5kA;
  Others : 600V DC / AC rms

ACCESSORIES

Test leads pair, Battery installed, Carrying Case, User's Manual & Holster.

OPTIONAL ACCESSORIES

Current Clamp CA 300, Current Clamp Adaptor CA500, CA1000, CA2000, High Voltage Probe PD-28.

GENERAL SPECIFICATIONS :

- **Sensing :** True RMS Sensing.
- **Basic Accuracy:** ±(0.15%rdg + 3dgts)
- **Display:** 4 digits 9999 counts LCD
- **Display size:** 13 mm
- **Polarity:** Automatic
- **Update Rate:**
  Data: 4 per second nominal;
  42 Segments Bar graph: 20 per second max
- **Low Battery:** Below approx. 7.2VDC
- **Operating Temperature:** 0°C to 35°C, 0-80% R.H.; 35°C to 40°C, 0-70% R.H.
- **Storage Temperature:** -20°C to 55°C, 0-80% R.H. (with battery removed)
- **Temperature Coefficient :** nominal 0.15 x (specified accuracy)/°C @ 0°C -18°C or 28°C - 40°C
- **Power Supply:** Single 9V battery
- **APO Timing:** Idle for approx. 17 minutes
- **APO Consumption :** 30 A Typical
- **Power Consumption :** 3.5mA Typical
- **Dimension :** 160(L)x82(W)x48(H)mm (with holster)
- **Weight :** Approx. 345gm.(with holster)

ELECTRICAL SPECIFICATIONS : KM 629

Accuracy is ±(% reading digits + No. Of digits) or otherwise specified, at 23°C±5°C less than 75% R.H.

DC CURRENT

Range	Resolution	Accuracy
40.00 A	0.01 A	±(0.25%rdg + 3dgts)
400.0 A	0.1 A	±(0.15%rdg + 2dgts)
4.000 mA	1 A	±(0.25%rdg + 3dgts)
40.00 mA	10 A	±(0.05%rdg + 3dgts)
4.000 A	1 mA	±(0.5%rdg + 4dgts)
10.00 A*	10 mA	±(0.3%rdg + 3dgts)

*10A Continuous ; 20A for 30 Second Max with 5 minutes cool down interval

AC CURRENT

Range	Resolution	Accuracy*
50Hz - 500Hz		
400.0 A	0.1 A	±(1.0%rdg + 3dgts)
40.00 mA	10 A	±(1.0%rdg + 3dgts)
10.00 A***	10 mA	±(1.0%rdg + 4dgts)**
500Hz - 2kHz		
400.0 A	0.1 A	±(1.5%rdg + 3dgts)
40.00 mA	10 A	±(1.5%rdg + 3dgts)
10.00 A***	10 mA	±(1.5%rdg + 4dgts)**

*True RMS Specified from 10% to 100% of range
**True RMS Specified from 25% to 100%of range
***10A Continuous; 20A for 30 second Max with 5 minutes cool down interval

TEMPERATURE - T_1 & T_2

Range	Accuracy
-20°C to 300°C	±(3°C+1d)
0°F to 572°F	±(6°F+2d)
301°C to 500°C	±(2%+1d)
573°F to 932°F	±(2%+2d)

Temperature Coefficient : nominal 0.2 x (specified accuracy/°C @ 0°C - 18°C or 28°C-40°C
Sensor : "K" Type Thermocouple, sensor accuracy not included

AUDIBLE CONTINUITY TESTER

Audible Threshold : Between 10 and 200
Response time : < 150 S

DC VOLTAGE

Range	Resolution	Accuracy
999.9 mV	100 V	±(0.15%rdg + 3dgts)
9.999 V	1 mV	
99.99 V	10 mV	
999.9 V	100 mV	±(0.4%rdg + 5dgts)

NMRR : > 50dB @ 50/60Hz
CMRR : >100dB @ DC, 50/60Hz, Rs = 1K
Input Impedance : 10M ,
30pF nominal (16M nominal for 999.9mV range)

HARMONICS INDEX™ HIX

Range	Input Voltage
0.0% to 99.9%	30mV AC to 750V AC

OHMS

Range	Resolution	Accuracy
999.9	100 m	±(0.5%rdg + 5dgts)
9.999 k	1	±(0.5%rdg + 2dgts)
99.99 k	10	
999.9 k	100	±(0.8%rdg + 2dgts)
4.000 M	1 k	
40.00 M	10 k	±(1.5%rdg + 2dgts)

Open Circuit Voltage :
Typical 1.3VDC (2.7VDC @ 999.9 Range)

CAPACITANCE

Range	Resolution	Accuracy
1.000 F	1 nF	±(1.0%rdg + 4dgts)
10.00 F	10 nF	±(1.0%rdg + 3dgts)
100.0 F	100 nF	±(1.2%rdg + 3dgts)
1.000 mF	1 F	±(1.5%rdg + 4dgts)
10.00 mF	10 F	±(4.0%rdg + 5dgts)

* Accuracies with film capacitors, or capacitors that have negligible dielectric absoption

AC VOLTAGE

Range	Resolution	Accuracy*
50Hz - 200Hz		
999.9 mV	100 V	±(2.5%rdg + 8dgts)
50Hz - 500Hz		
9.999 V	1 mV	±(1.1%rdg + 3dgts)
99.99 V	10 mV	
750.0 V	100 mV	
500Hz - 2kHz		
9.999 V	1 mV	±(1.8%rdg + 3dgts)**
99.99 V	10 mV	
750.0 V	100 mV	

CMRR : > 60dB @ DC to 60Hz, Rs = 1k
Input Impedance : 10M ,
30pF nominal (16M nominal for 999.9mV range)
Trms Crest Factor : < 3:1 at full scale, and < 6:1 at half scale
*TRMS specified from 5% to 100% of range
**True RMS Specified from 10% to 100% of range

FREQUENCY

Range	Resolution	Accuracy
9.999 Hz	0.001 Hz	±(0.05%rdg + 4dgts)
99.99 Hz	0.01 Hz	
999.9 Hz	0.1 Hz	
9.999 kHz	1 Hz	
50.00 kHz	10 Hz	

4 selectable trigger levels 1,2,3 & 4 (by Range button)
Input Signal : Sine wave or Square wave with duty cycle > 40% & < 70%

DIODE TESTER

Range	Test Current (typical)	Open Circuit Voltage
2.000V	0.5mA	< 3.5 VDC

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.