

**KUSAM-MECO**

An ISO 9001:2008 Company

# TRMS DIGITAL MULTIMETER WITH VFD, EF-DETECTION 3PHASE ROTATION-R & 3PHASE ROTATION-M Model KM 237R

**SPECIAL FEATURES :**

- Auto V(LoZ), VFD V & Hz Function
- EF-Detection (NCV)
- Paper White Backlight Display
- Auto Power Off
- Auto-ranging MAX/MIN/AVG record
- Diode & Continuity Test
- BeepLit Continuity, Features Audible Beep & Visible Backlight Effects
- Beep-Jack Input warning against improper A-terminal plug in
- Auto-ranging Relative Zero Mode
- 3phase rotation-R(Regular-sensitivity mode) for supply systems(probe-contact)
- 3phase rotation-M (Hi-sensitivity mode) for Motors (probe-contact)
- Rugged Fire retarded casing.
- Display Hold
- Low Battery Indication

**GENERAL SPECIFICATIONS :**

- \* Sensing : TRUE RMS AC conversion
- \* Display : 3-5/6 digits 6000 counts LCD display
- \* Update Rate : 5 per second nominal
- \* Operating Temperature : -10°C to 45°C
- \* Relative Humidity : Maximum relative humidity 80% for temperature upto 31°C decreasing linearly to 50% relative humidity at 45°C
- \* Altitude : Operating Below 2000m.
- \* Storage Temperature: -20°C to 60°C, <80% R.H. With battery removed from meter.
- \* Pollution Degree : 2
- \* Temperature Coefficient : nominal 0.15 x (specified accuracy) /°C @ (-10°C~18°C or 28°C~45°C), or otherwise specified.
- \* Low battery : Below approx. 2.5V
- \* Power Consumption : Typical 3.2mA
- \* APO Consumption : Typical 10µA
- \* APO Timing : Idle for 30 minutes
- \* Power Supply : 1.5V AAA battery x 2
- \* Dimension : 161(L) X 80(W) X 50(H) mm (with Holster)
- \* Weight : Approx. 334 gm ( with Holster)

**SAFETY :**

- **Safety** : Double insulation per IEC/UL/EN61010-1 Ed. 3.0, IEC/UL/EN61010-2-030 Ed. 1.0, IEC/UL/EN61010-2-033 Ed. 1.0, IEC/UL/EN61010-031 Ed. 1.1 & the corresponding CAN/CSA-C22.2 regulations to measurement CAT II 1000V, CAT III 600V and CAT IV 300V AC & DC.
- **E. M. C. :** Meets EN61326-1:2013
  - In an RF field of 3V/m :
  - Ohm function :
  - Total Accuracy = Specified Accuracy + 15 digits
  - Other function ranges :
  - Total Accuracy = Specified Accuracy
  - Performance above 3V/m is not specified.
- **Transient Protection** : 6.0kV lightning surge (1.2/50µs)
- **Terminals (to COM) Measurement Category :**
  - V/ mAµA / A/L3 : CAT II 1000 Volts, CAT III 600V and CAT IV 300 Volts AC & DC.
- **Overload Protections :**
  - A : 11A / 1000V DC/AC rms, IR 20kA, F fuse or better
  - V, Auto V & L3 : 1100V DC/AC rms
  - mV, Ω & Others : 1000V DC/AC rms

**ACCESSORIES :**

Test leads pair, Alligator clip set, Batteries installed, User's Manual.

**OPTIONAL ACCESSORIES :**

Magnetic Hanger, Carrying case.  
Current Clamp CA300, Current Clamp Adaptor CA500, CA1000, CA2000, High Voltage Probe PD-28.

**Magnetic Hanger**

All Specifications are subject to change without prior notice.

## ELECTRICAL SPECIFICATIONS - KM 237R

Accuracy is  $\pm$  (% reading digits + number of digits ) or otherwise specified, at 23°C  $\pm$  5°C

ACV & ACA accuracies are specified from 1% to 100% of range or otherwise specified. Maximum Crest Factor <2:1 at full scale & <4:1 half scale, and with frequency components fall within the meter specified frequency bandwidth for non-sinusoidal waveforms.

### DC VOLTAGE

| Range    | Resolution  | Accuracy                |
|----------|-------------|-------------------------|
| 60.00 mV | 10 $\mu$ V  | $\pm(0.3\%rdg + 2dgts)$ |
| 600.0 mV | 100 $\mu$ V |                         |
| 6.000 V  | 1 mV        |                         |
| 60.00 V  | 10 mV       |                         |
| 600.0 V  | 100 mV      |                         |
| 1000 V   | 1 V         |                         |

Input Impedance : 10M $\Omega$ , 54pF nominal

### AC VOLTAGE

| Range                 | Resolution  | Accuracy                |
|-----------------------|-------------|-------------------------|
| <b>50Hz -- 60Hz</b>   |             |                         |
| 6.000 V               | 1 mV        | $\pm(0.7\%rdg + 3dgts)$ |
| 60.00 V               | 10 mV       |                         |
| 600.0 V               | 100 mV      |                         |
| 1000 V                | 1 V         |                         |
| <b>45Hz -- 440Hz</b>  |             |                         |
| 6.000 V               | 1 mV        | $\pm(2.0\%rdg + 3dgts)$ |
| 60.00 V               | 10 mV       |                         |
| 600.0 V               | 100 mV      |                         |
| 1000 V                | 1 V         |                         |
| <b>10Hz -- 500Hz</b>  |             |                         |
| 60.00 mV              | 10 $\mu$ V  | $\pm(1.0\%rdg + 3dgts)$ |
| 600.0 mV              | 100 $\mu$ V |                         |
| <b>500Hz -- 800Hz</b> |             |                         |
| 60.00 mV              | 10 $\mu$ V  | $\pm(2.0\%rdg + 3dgts)$ |
| 600.0 mV              | 100 $\mu$ V |                         |

Input Impedance : 10M $\Omega$ , 54pF nominal

### LINE FREQUENCY

| Function  | Sensitivity (Sine RMS) | Range        |
|-----------|------------------------|--------------|
| 60 mV     | 50 mV                  | 10Hz - 50kHz |
| 600 mV    | 50 mV                  | 10Hz - 50kHz |
| 6 V       | 3 V                    | 10Hz - 50kHz |
| 60 V      | 5 V                    | 10Hz - 50kHz |
| 600 V     | 50 V                   | 10Hz - 1kHz  |
| 1000 V    | 500 V                  | 10Hz - 1kHz  |
| VFD 600 V | 50 V                   | 10Hz - 1kHz  |
| VFD 1000V | 500 V                  | 10Hz - 1kHz  |
| 6 A       | 8 A                    | 50Hz - 1kHz  |
| 10 A      | 8 A                    | 50Hz - 1kHz  |

Accuracy : 0.03%+2d

### BEEPLIT CONTINUITY TESTER

|                        |                                      |
|------------------------|--------------------------------------|
| Continuity Threshold : | Between 30 $\Omega$ and 480 $\Omega$ |
| Response time :        | 64ms                                 |
| Latch time :           | 128ms                                |
| Audible Response :     | Beep sound                           |
| Visible Response :     | LCD Backlight                        |

### DIODE TESTER

| Range   | Resolution | Accuracy                |
|---------|------------|-------------------------|
| 3.000 V | 100mV      | $\pm(0.9\%rdg + 2dgts)$ |

Test Current : 0.3mA typical.

Open Circuit Voltage : <3.2VDC typical.

### DC CURRENT

| Range                 | Resolution | Accuracy                | Burden Voltage |
|-----------------------|------------|-------------------------|----------------|
| 6.000 A               | 1 mA       | $\pm(0.7\%rdg + 3dgts)$ | 0.04 V / A     |
| 10.00 A <sup>1)</sup> | 10 mA      |                         | 0.04 V / A     |

<sup>1)</sup> 10A continuous, >10A to 20A for 30 Sec. Max with 5 minutes cool down interval  
Overload Protection type : HBC fuse

### AC CURRENT

| Range                 | Resolution | Accuracy                | Burden Voltage |
|-----------------------|------------|-------------------------|----------------|
| <b>50Hz -- 400Hz</b>  |            |                         |                |
| 6.000 A               | 1 mA       | $\pm(1.0\%rdg + 3dgts)$ | 0.04 V / A     |
| 10.00 A <sup>1)</sup> | 10 mA      |                         | 0.04 V / A     |

<sup>1)</sup> 10A continuous, >10A to 20A for 30 Sec. Max with 5 minutes cool down interval  
Overload Protection type : HBC fuse

### VFD AC VOLTAGE (with Low Pass Filter)

| Range                              | Resolution | Accuracy <sup>1)</sup>  |
|------------------------------------|------------|-------------------------|
| <b>10Hz -- 440Hz (fundamental)</b> |            |                         |
| 600.0 V                            | 100 mV     | $\pm(2.0\%rdg + 3dgts)$ |
| 1000 V                             | 1 V        |                         |

<sup>1)</sup> Not specified for fundamental frequency >440Hz

### AUTOV\_ AC VOLTAGE

| Range                | Resolution | Accuracy <sup>1)</sup>  |
|----------------------|------------|-------------------------|
| <b>45Hz -- 440Hz</b> |            |                         |
| 600.0 V              | 100 mV     | $\pm(2.0\%rdg + 3dgts)$ |
| 1000 V               | 1 V        |                         |

<sup>1)</sup> Not specified at <1VAC

Threshold : >1VAC nominal

Input Impedance : Initially approx. 2.1k $\Omega$ , 164pF nominal;  
Impedance increases abruptly within a fraction of a second as display voltage is above 50V (typical).

Ended up impedances vs display voltages typically are:

12k $\Omega$  @100V

100k $\Omega$  @300V

240k $\Omega$  @600V

580k $\Omega$  @1000V

### AUTOV\_ DC VOLTAGE

| Range   | Resolution | Accuracy <sup>1)</sup>  |
|---------|------------|-------------------------|
| 600.0 V | 100 mV     | $\pm(2.0\%rdg + 3dgts)$ |
| 1000 V  | 1 V        |                         |

<sup>1)</sup> Not specified at <1VAC

Threshold : > + 1.0VDC or < -1.0VDC nominal

Input Impedance : Initially approx. 2.1k $\Omega$ , 164pF nominal;

Impedance increases abruptly within a fraction of a second as display voltage is above 50V (typical).

Ended up impedances vs display voltages typically are:

12k $\Omega$  @100V

100k $\Omega$  @300V

240k $\Omega$  @600V

580k $\Omega$  @1000V

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## ELECTRICAL SPECIFICATIONS - KM 237R

### CAPACITANCE

| Range    | Resolution | Accuracy            |
|----------|------------|---------------------|
| 2000 nF  | 1 nF       | ±(1.5%rdg + 2dgts)  |
| 20.00 µF | 10 nF      |                     |
| 200.0 µF | 100 nF     |                     |
| 2000 µF  | 1 µF       |                     |
| 10.00 mF | 10 µF      | ±(4.5%rdg + 10dgts) |

Accuracies with film apacitor or better

### NON-CONTACT EF-DETECTION

| Bar-Graph Indication | EF-H (Hi Sensitivity)       | EF-L (Lo Sensitivity) |
|----------------------|-----------------------------|-----------------------|
|                      | Typical Voltage (Tolerance) |                       |
| -                    | 10V (3V ~ 19V)              | 40V (16V ~ 71V)       |
| --                   | 20V (10V ~ 38V)             | 80V (32V ~ 142V)      |
| ---                  | 40V (21V ~ 79V)             | 160V (63V ~ 285V)     |
| ----                 | 80V (40V ~ 156V)            | 300V (105V ~ 608V)    |
| -----                | 160V (>80V)                 | 500V (>300V)          |

**Indication** : Bar-graph segments & audible beep tones proportional to the field strength

**Detection Frequency** : 50/60Hz

**Detection Antenna** : Top left end of the meter

**Probe-Contact EF-Detection** : For more precise indication of live wires, such as distinguishing between live and ground connections, use direct contact testing with one single test-probe via an input terminal COM or V. The COM terminal (Black) has the test sensitivity.

### OHMS

| Range <sup>1)</sup>    | Resolution | Accuracy                         |
|------------------------|------------|----------------------------------|
| 600.0 Ω                | 100 mΩ     | ±(0.3%rdg + 3dgts)               |
| 6.000 kΩ               | 1 Ω        |                                  |
| 60.00 kΩ               | 10 Ω       | ±(0.5%rdg + 3dgts)               |
| 600.0 kΩ               | 100 Ω      |                                  |
| 6.000 MΩ <sup>2)</sup> | 1 kΩ       | ±(0.9%rdg + 2dgts) <sup>4)</sup> |
| 60.00 MΩ <sup>3)</sup> | 10 kΩ      |                                  |

<sup>1)</sup> Open Circuit Voltage : 1.6VDC typical.

<sup>2)</sup> Constant Test Current : 0.2µA Typical

<sup>3)</sup> Constant Test Current : 0.02µA Typical

<sup>4)</sup> 5% + 20d @ > 30MΩ.

### Ⓜ 3-PHASE ROTATION FUNCTION

| Hi-sensitivity mode (Ⓜ) |              |
|-------------------------|--------------|
| Voltage Range           | 0.4V ~ 1000V |
| Frequency Range         | 3Hz ~ 400Hz  |

### Ⓡ 3-PHASE ROTATION FUNCTION

| Regular sensitivity mode (Ⓡ) |              |
|------------------------------|--------------|
| Voltage Range                | 65V ~ 1000V  |
| Frequency Range              | 35Hz ~ 400Hz |

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