

LIST OF PRODUCTS

- * Digital Multimeter
- * Digital AC & AC/DC Clampmeter
- * AC Clamp Adaptor
- * AC/DC Current Adaptor
- * Thermo Anemometer
- * Thermo Hygrometer
- * Distance Meter
- * Digital Lux Meter
- * Network Cable Tester
- * Power Factor Regulator
- * Earth Resistance Tester
- * Digital Panel Meters
- * DC Power Supplies
- * High Voltage Detector
- * Calibrators
- * Gas Analysers
- * Frequency Counter
- * Function Generator
- * Phasing Sticks
- * Battery Tester
- * Waterproof Pen Testers
- * Solar Power Meter
- * EMF Detector
- * Wood, Paper & Grain Moisture Meter
- * Transistorised Electronic Analog & Digital Insulation Resistance Testers(upto 10 KV)
- * Digital Sound Level Meter & Sound Level Calibrator
- * Digital contact & Non-contact Type Tachometer
- * Digital Non-contact (infrared) Thermometer
- * Maximum Demand Controller/Digital Power Meter
- * Digital Hand Held Temperature Indicators

KUSAM-MECO[®]

**VOLTAGE TESTER
MODEL
KM 66 / KM 69**

**OPERATION
MANUAL**

VOLTAGE TESTER MODEL - KM 66 / KM 69

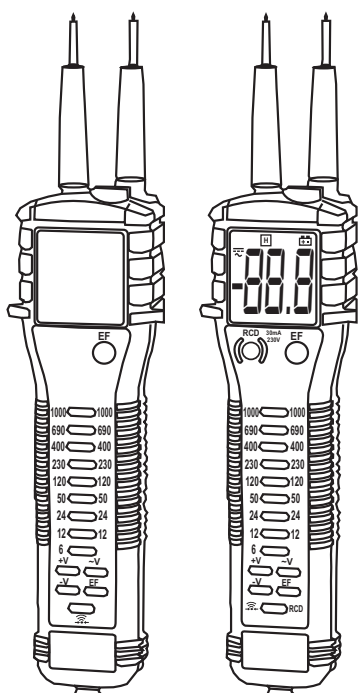


TABLE OF CONTENTS

TITLE	PAGE
Safety Information.....	01
Features.....	03
General Specifications.....	03
Electrical Specification.....	05
Electrical Symbols.....	08
Product Description.....	09
Operation.....	10
Maintenance.....	18
Test Certificate.....	20
Warranty.....	21

1. SAFETY INFORMATION

Terms in this manual

WARNING Identifies conditions & actions that could result in serious injury or even death to the **USER**.

CAUTION Identifies conditions & actions that could cause damage or Malfunction in the **UNIT**.

This manual contains information & warnings that must be followed for operating the tester safely & maintaining the tester in a safe operating condition. If the tester is used in a manner not specified by us, the protection provided by the tester may be impaired. This tester meets water & dust protection IP65 per outdoor type requirements of IEC61243-3 (1998). Do not use in rainfall ! The tester is protected, against the users, by double insulation per EN61243-3(1998) & EN61010-1 2nd Ed to CAT III 1000 & CAT IV 600V.

Per IEC61010-1 and IEC60664 :

Measurement Category IV (CAT IV) is for measurements performed at the source of the low-voltage installation. Examples are electricity meters & measurements on primary overcurrent protection devices and ripple control units.

Measurement Category II (CAT II) is for measurements performed on circuits directly connected to the low voltage installation. Examples are measurements on household appliances, portable tools and similar equipment.

WARNING

To reduce the risk of fire or electric shock, do not expose this product to rain or moisture. To avoid **electrical** shock hazard, observe the proper safety precautions when working with voltages above 60VDC or 30 VAC rms. These **voltage** levels pose a potential shock hazard to the user.

Keep your hands / fingers behind the hand / finger barriers of the test probes that indicate the limits of **safe** access of the hand-held part during measurement. Inspect test probes, connectors, and probes for damaged insulation or **exposed** metal before using the tester. If any defects are found, replace them immediately.

The voltages marked on the tester are nominal voltages or nominal voltage ranges. The tester shall only be used on installations with the specified nominal voltages or nominal voltage ranges.

2) CENELEC DIRECTIVES

The tester conforms to CENELEC Low-voltage directive 73/23/EEC and Electromagnetic compatibility directive 89/336/EEC.

Features :

- High Input Impedance
- Indicator Self- Test
- Auto-Hold
- Overload-Alert Warning
- EF-Detection
- AC-Detection Shaker (**KM 69**)
- Bi-Color LED Hazardous Live Warning and RCD Trip Test (**KM 69**).

SPECIFICATION

GENERAL SPECIFICATION

- **Sensing** : Average sensing
- **Display** : 3 digits 1000 Counts
- **Update Rate** : 5 per second nominal
- **Operating Temperature** : -10°C ~ 55°C
- **Relative Humidity**: 20% ~ 96%
- **Altitude** : Operating below 2000m
- **Storage Temperature** : -10°C ~ 55°C, 20% ~ 96% R.H. (With battery removed)
- **Temperature Coefficient** : Nominal 0.15 x (specified accuracy) / °C @ (-10°C ~ 18°C or 28°C ~ 55°C), or otherwise specified.
- **Measurement Category**: CAT III 1000V & CAT IV 600V AC & DC
- **Type of Protection** : IP65
- **Pollution Degree** : 2

- **For both models** : Performance is specified in an RF Field of 3V/m. Performance above 3V/m is not specified.
- **For KM 69 LCD display only** : In an RF field of 3V/m, total accuracy = Specified accuracy + 45d. Performance above 3V/m is not specified.
- **Transient Protection** :
8KV lightning surge (1.2/50 s)
- **Overload Protection** : 1000VDC & VAC rms.
- **Low Battery**: Below approx. 2.4V;
Below approx. 2.6V for KM 69 with shaker ON
- **Power Supply**: Standard 1.5V AAA size x 2;
or 1.5V AAA size alkaline battery x 2
- **APO Timing**: Idle for 15 seconds
- **Power Consumption (typical)** : 3mA at Power-on ready; 25mA at 1000VAC full LED indication. 75mA at 1000VAC with shaker ON (**KM 69**)
- **APO Consumption (typical)** : 10 A
- **Dimension** : 233 (L) x 57 (W) x 40 (H) mm
- **Weight** : Approx. 220gm
- **Safety** : Meets En61243 voltage class B, EN61010-1 and IEC61010-1 2nd Edition to CAT III 1000V & CAT IV 600V.
- **E.M.C.** : Meets EN61326 (1997, 1998/A1), EN61000-4-2 (1995), & EN61000-4-3 (1996):

ACCESSORIES: Batteries installed, User manual, Test leads pair.

ELECTRICAL SPECIFICATIONS :

Accuracy is given as +/- (% of reading digits + number of digits) or otherwise specified @ 23°C +/- 5°C and less than 75% R.H.

DC & AC Voltage (LED)

DCV MARKING	ACV MARKING	TYPICAL THRESHOLD
6V		4.8V
12V	12V	9.6V
24V	24V	19.2V
50V	50V	40V
120V	120V	96V
230V	230V	184V
400V	400V	320V
690V	690V	552V
1000V	1000V	800V

LED Threshold : < 85% of Voltage marking.
Typical @ 80%

Input Impedance : 460K , 160pF nominal.

ACV Frequency Response : 45Hz ~ 65Hz

Duty Ratio : Continuous duty.

AC Detection Shaker Threshold (KM 69 only)

Shaker ON	> 15VAC
Shaker OFF	< 8VAC

Audible Continuity

Open Circuit Voltage	0.4 VDC typical
Audible Threshold	between 50K & 2000K .

DC & AC Voltage (KM 69 LCD only)

Range	Threshold	Accuracy
DC 999V	> +4.5VDC or < -4.5VDC	±(1.0%rdg + 2dgts)
AC 999V (50Hz/60Hz)	> 8VAC	±(2.5%rdg + 4dgts)

Input Impedance : 460K , 160pF nominal

Duty Ratio : Continuous duty

Non-Contact EF-Detection

Indication : EF LED flashing & audible beep tones proportional to the field strength

Detection Frequency : 50/60Hz

Detection Antenna : Top-right side of the meter

Probe-Contact EF-Detection : For more precise indication of live wires, such as distinguishing between live & ground connections, use the Red(+) test probe for direct contact measurements.

KM 69 also displays Bar graph segments proportional to the field strength on LCD. Typical Values are shown in the following table :







Typical Non-Contact Voltage Range	LCD Bar Graph Indication KM 69
15V to 55V	—
30V to 95V	— —
55V to 170V	— — —
Above 120V	— — — —

RCD Leakage-Path (KM 69 only)

Load Current	30mA typical at 230V
Path Impedance	7.7 k nominal, PTC protected

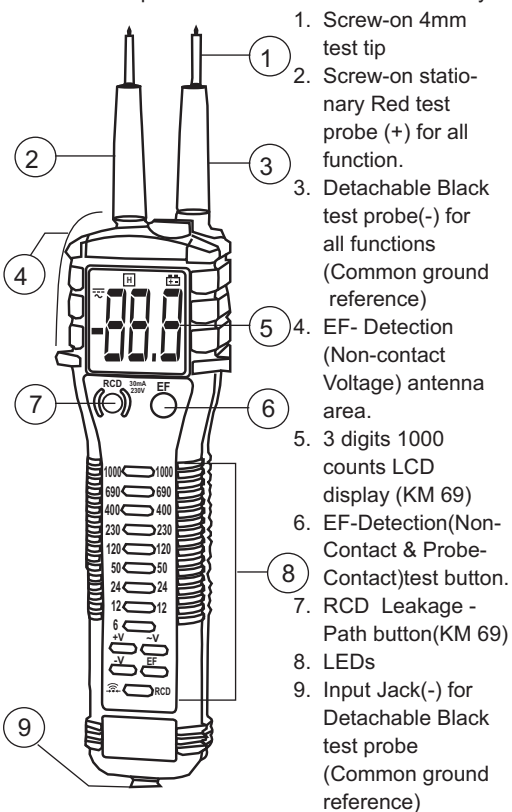
RCD Leakage-Path feature is intended for 230V nominal Circuits only.
It is disabled above 270V and below 120V.

INTERNATIONAL ELECTRICAL SYMBOLS

	Caution ! Refer to the explanation in this Manual.
	Caution ! Risk of electric shock
	Earth (Ground)
	Double Insulation or Reinforced insulation
	Fuse.
	AC--Alternating Current
	DC--Direct Current

3) PRODUCT DESCRIPTION

Note : The model is used as representative for illustration purpose. Please refer to your respective model for function availability.



1. Screw-on 4mm test tip
2. Screw-on stationary Red test probe (+) for all function.
3. Detachable Black test probe(-) for all functions (Common ground reference)
4. EF- Detection (Non-contact Voltage) antenna area.
5. 3 digits 1000 counts LCD display (KM 69)
6. EF-Detection(Non-Contact & Probe-Contact)test button.
7. RCD Leakage - Path button(KM 69)
8. LEDs
9. Input Jack(-) for Detachable Black test probe (Common ground reference)

OPERATION

Note : All function operations described hereafter are via the stationary “Red” probe for positive (+) polarity and the detachable “Black” probe for Ground reference (-), or otherwise specified.

WARNING

- Accurate indication is assured only when use within the specified operating temperature range.
- Before using the Audible Continuity & EF-Detection features at locations with a high background noise level, it shall be determined whether the audible signal is perceptible. The audible indication is for information only; do not rely on it, especially in high background noise.
- The functioning of the tester shall be checked shortly before and after a test. If indication of one or more steps fails, or if no functioning is indicated, the tester shall no longer be used.

Indicator Self-Test

Short the two test probes together, the tester enters continuity function. The continuity LED will turn on and the beeper will sound. With the probes still shorted, press the EF button momentarily. The LEDs will illuminate for full indication check. On the KM 69, five voltage indicating bi-color LEDs will change from green to red, and the LCD will turn on for full segment check. The $\rightarrow \leftarrow$, $+V$, $-V$, & $\sim V$ LEDs flash twice additionally when the battery voltage is low. After the Self-test is finished in approx. 2 to 3 seconds, the tester resumes normal functions.

ACV ($\sim V$) and DCV (\overline{V}) functions

Perform Indicator Self-Test as described. Test the tester on a known functioning circuit or component before and after performing measurements.

Connect test probes to voltage source and observe indication, as shown. Do not cover indicating LEDs (and also LCD on KM 69) and do not touch the contact electrode before and during the tests. The tester turns on automatically at threshold voltages as specified in the specification section.

When significant ACV is being tested, $\sim V$ LED turns on. When significant DCV is being tested, $+V$ LED turns on for correct test probes polarity, and $-V$ LED turns on for reversed polarity. Significant voltage levels are indicated as a series of LEDs in an autoranging manner. No manual-ranging selection is required. KM 69 also indicates voltage levels on the automatic backlit LCD.

Note : The voltage indicating LEDs are all powered by the internal batteries, not by the system under test. The input impedance on voltage testing function is as high as 460K Ω , and hence the influence of the measuring current on the system under test is negligible. The peak occurring current/s at the highest rated voltage 1000VAC is :

$$I_s = 1000V \times 1.414 / 460000 = 2.5mA$$

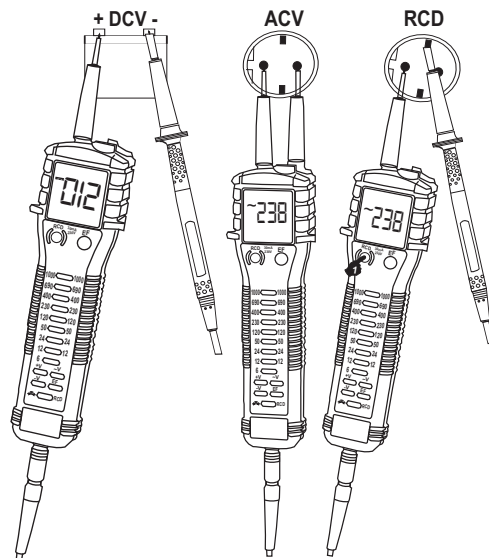
RCD Leakage-Path (KM 69 only)

The tester equips with an RCD Leakage-Path feature to load 230VAC / 30mA RCD (Residual Current Devices) circuit breakers. An internal leakage load path is provided when this feature is activated. Nominal load impedance is 7.7K Ω to provide typical leakage current of 30mA at 230VAC.

- Connect the tester to the receptacle under test by measuring the voltage across L and PE (live conductor and a protective earth ground). The tester should indicate proper line voltage level. (RCD Leakage-Path feature is disabled above 270V and below 120V).
- With the proper line voltage level still indicating, press and hold the RCD button on the tester. The tester continuity / RCD LED will turn on to indicate the internal leakage load path is being connected.
- The LED will turn off when the RCD circuit breaker trips (line voltage is cut off). If an RCD circuit breaker does not trip (within a fraction of a second) under such a leakage load condition, it is pretty sure that the breaker is not working properly or there is a wiring problem.

Note : This feature merely provides a handy leakage load path to load RCD circuit breakers. It is not intended to identify the effectiveness (trip current & trip time etc as specified by the breaker manufacturers) of breakers even though the breakers trip under the above mentioned leakage conditions.

Effectiveness of RCD circuit breakers should be checked by RCD testing, measuring or monitoring equipments under the scope of IEC61557-1 & IEC61557-6.



Overload-Alert Warning

When the measured voltage exceeded 1000V AC or DC, the 1000V LED flashes. The KM 69 LCD also displays "OL". Disconnect the test probes from the signal immediately to avoid hazards.

Bi-Color LED Hazardous Live Warning (KM 69 only)

This voltage LEDs are red if the measured voltage is above 70VDC /33VAC. These levels are deemed to be hazardous live in normal condition. Below these levels, the LEDs are green.

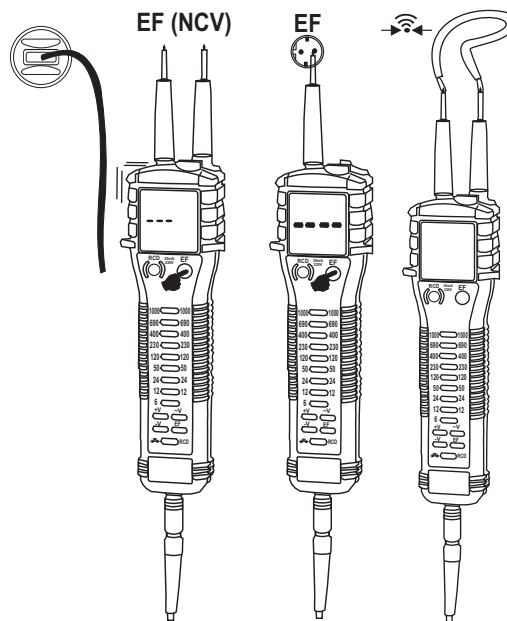
Auto-Hold

The LEDs flash the last significant measured value for approx. 10 seconds after a voltage measurement is made and removed via the test probes. The KM 69 LCD also flashes the last significant measured value. Both test probes should be removed from the test points at about the same time (<0.5 second in time difference) or else lower (intermittent) voltage might be measured.

AC-Detection Shaker (KM 69 only)

The shaker signals that significant ACV is being measured via the test probes.

With no input, press and hold the RCD button and then followed by the EF button to toggle the shaker On/OFF. The shaker will remain on until the buttons are released to confirm that the AC-Detection Shaker feature is enabled. The shaker will turn on briefly to signal that this feature has been disabled.



Electric Field EF-Detection :

Press and hold the EF button to enter and stay at EF-Detection feature. The EF-indicating LED will turn on briefly, and the beeper will give a short beep for EF indication check. Signal strength is indicated by beep tone and flashing of the EF LED. The KM 69 also display "EF" when it is ready, and displays signal strength as a series of bar-graph segments on the LCD.

- **Non-Contact EF-Detection** : An antenna is located along the top-right side of the meter which detects electric field surrounds current-carrying conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.
- **Probe-Contact EF-Detection** : For more precise indication of live wires, such as distinguishing between live and ground connections, use the Red (+) test probe for direct contact measurements.



Audible Continuity Function

Short the two test probes together for continuity function check as described in indicator Self-Test section. The continuity LED turns on together with a continuous beep tone indicates a complete circuit is being detected via the test probes. Audible-Continuity is convenient for checking wiring connections and operation of switches.

Auto Power On & Auto Power Off (APO)

The tester turns on automatically within 1 second when making significant measurement or push button activity. Allow this delay on the "wake-up" measurement.

The tester turns off intelligently after approx. 15 seconds of neither significant measurement nor button / switch activity.

MAINTENANCE

WARNING

To avoid electrical shock, disconnect the tester from any circuit and remove the test probes from the input jacks before opening the case and / or the battery access door. Do not use the tester with open case and / or the battery access door. Do not attempt to repair this unit. It contains no user-serviceable parts. Unauthorized persons shall not disassemble the tester.

Cleaning and Storage

Periodically wipe the case with a damp cloth and mild detergent; do not use abrasives or solvents. The tester should be kept dry and clean. If the tester is not to be used for periods of longer than 60 days, remove the batteries and store them separately.



Trouble Shooting

If the tester fails to operate, check batteries, probes etc., and replace as necessary. Double check operating procedure as described in this user's manual.

If the tester voltage-continuity input has subjected to high voltage transient (mostly caused by lighting or switching surge to your system) by accident or abnormal conditions of operation, the series fusible resistors will be blown off (become high impedance) like fuses to protect the user and the

tester. Most measuring functions through this input will then be open circuit. The series fusible resistors and the spark gaps should then be replaced by qualified technician.

Battery replacement

The batteries should be checked before use. When the battery voltage is low, the  $+V$, $-V$, $\sim V$ or LED flashes under normal significant measurements. KM 69 also displays low battery icon  on the LCD under normal significant measurements. Replace the batteries ASAP to maintain tester accuracy and functionality. The tester uses two 1.5V batteries : Standard 1.5V AAA size battery X 2; or 1.5V AAA size alkaline battery X 2.

Loosen the 2 screws from the battery access door of the case bottom. Lift the battery access door up. Replace the batteries. Refasten the screws.

MUMBAI

TEST CERTIFICATE VOLTAGE TESTER

This Test Certificate warrants that the product has been inspected and tested in accordance with the published specifications.

The instrument has been calibrated by using equipment which has already been calibrated to standards traceable to national standards.

MODEL NO. _____

SERIAL NO. _____

DATE: _____

**ISO 9001
REGISTERED**





WARRANTY

Each "KUSAM-MECO" product is warranted to be free from defects in material and workmanship under normal use & service. The warranty period is one year (12 months) and begins from the date of despatch of goods. In case any defect occurs in functioning of the instrument, under proper use, within the warranty period, the same will be rectified by us free of charges, provided the to and fro freight charges are borne by you.

This warranty extends only to the original buyer or end-user customer of a "KUSAM-MECO" authorized dealer.

This warranty does not apply for damaged Ic's, fuses, burnt PCB's, disposable batteries, carrying case, test leads, or to any product which in "KUSAM-MECO's" opinion, has been misused, altered, neglected, contaminated or damaged by accident or abnormal conditions of operation or handling.

"KUSAM-MECO" authorized dealer shall extend this warranty on new and unused products to end-user customers only but have no authority to extend a greater or different warranty on behalf of "KUSAM-MECO".



"KUSAM-MECO's" warranty obligation is limited, at option, free of charge repair, or replacement of a defective product which is returned to a "KUSAM-MECO" authorized service center within the warranty period.

THIS WARRANTY IS BUYER'S SOLE AND EXCLUSIVE REMEDY AND IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO ANY IMPLIED WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE. "KUSAM-MECO" SHALL NOT BE LIABLE FOR ANY SPECIAL, INDIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OR LOSSES, INCLUDING LOSS OF DATA, ARISING FROM ANY CAUSE WHATSOEVER.

All transaction are subject to Mumbai Jurisdiction.



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