LIST OF PRODUCTS

* Digital Multimeter
* Digital AC & AC/DC Clampmeter
* AC Clamp Adaptor
* AC/DC Current Adaptor
* 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
* Thermo Hygrometer
* Thermo Anemometer
* Wood & Paper Moisture Meter
* Distance Meter
* Digital Hand Held Temperature Indicators
* Digital Lux Meter
* Network Cable Tester
* Power Factor Regulator
* Maximum Demand Controller/Digital Power Meter
* Earth Resistance Tester

KUSAM-MECO®

An ISO 9001:2015 Company

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Website : www.kusamelectrical.com

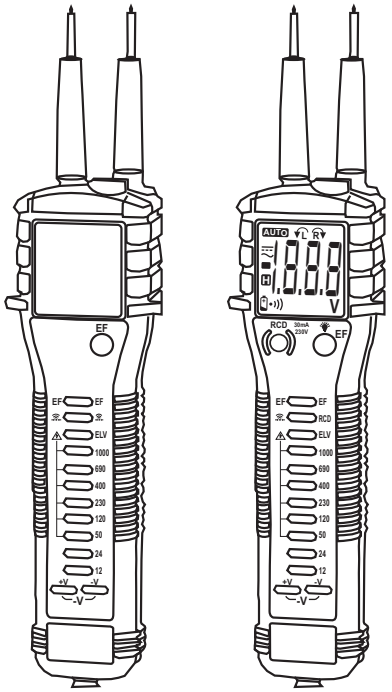
KUSAM-MECO®

VOLTAGE TESTER
MODEL
KM 66 / KM 69

OPERATION MANUAL

KUSAM-MECO®

VOLTAGE TESTER
MODEL -
KM 66 / KM 69



KUSAM-MECO®

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1) SAFETY

This manual contains information and warnings that must be followed for operating the tester safely and maintaining the meter in a safe operating condition. If the tester is used in a manner not specified by the manufacturer, the protection provided by the tester may be impaired. The tester is designed to be used by skilled persons and in accordance with safe methods of work.

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 **INSTRUMENT.**

WARNING

Observe proper safety precautions when working with voltages above 30 Vrms, 42.4 Vpeak or 60 VDC. These voltage levels pose a potential shock hazard to the user. Before and after hazardous voltage measurements, check the voltage function on a known source such as line voltage to determine proper tester functioning.

This CE version tester meets EN61243-3:2014, IEC/EN61010-1 Ed. 3.0, IEC/EN61010-2-033 Ed. 1.0 to Measurement CAT-III 1kV and CAT-IV 600V, AC & DC. It also meets water and dust protection IP65 per outdoor type requirements of IEC61243-3:2014. It is, however, not intended to

be used in wet locations!

Test probe assembly of this version is subjected to IEC61243-3:2014 regulation that implements <19mm limitations on exposed conductive test tip length for effective contacts on most IP2X designed low voltage boards and panels in CAT III and IV areas. The retractable shroud test tip option further provides IP2X degree of protection, when it is not in use, especially for tester version with RCD Leakage-Path feature.

Keep your hands/fingers behind the hand/finger barriers (of the tester and the test probe assembly, where applicable) that indicate the limits of safe access of the hand-held parts during measurements. Inspectlead wires, connectors, and probes for damaged insulation or exposed metal before using the tester. If any defects are found, replace them immediately. Only use the probe assembly provided with the tester or a Probe Assembly to the same tester ratings or better.

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. The different indicating signals of the voltage detector (including the ELV limit indication) are not to be used for measuring purposes.

CAUTION

Disconnect the test leads from the test points before changing functions.

International Electrical Symbols

- Marking of Electrical and Electronic Equipment (EEE). Do not dispose of this product as unsorted municipal waste. Contact a qualified recycler
- Caution! Refer to the explanation in this Manual
- Caution! Possibility of electric shock
- Earth (Ground)
- Meter protected throughout by Double Insulation or Reinforced insulation
- Fuse
- Direct Current (DC)
- Alternating Current (AC)
- 3~ Three-phase Alternating Current

Brief Information about Measurement Categories

Measurement Category IV is applicable to test & measuring circuits connected at the source of the building's low-voltage MAINS installation. Examples are measurements on devices installed before the main fuse or circuit breaker in the building installation.

Measurement Category III is applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation. Examples are measurements on distribution boards (including secondary meters), circuit-breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment such as stationary motors with permanent connection to the fixed installation.

Measurement Category II is applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation. Examples are measurements on MAINS CIRCUITS of household appliances, portable tools and similar equipment.

SAFETY ADVICES

Depending on the internal impedance of the voltage detector there will be a different capability of indicating the presence or absence of operating voltage in case of the presence of interference voltage.

A voltage detector of relatively low internal impedance, compared to the reference value of 100 kΩ, will notindicate all interference voltages having an original voltage value above the ELV level. When in contactwith the parts to be tested, the voltage detector may discharge temporarily the interference voltage to a level below the ELV, but it will be back to the original value when the voltage detector is removed.

When the indication "voltage present" does not appear, it is highly recommended installing earthing equipment before work.

A voltage detector of relatively high internal impedance, compared to the reference value of 100 kΩ, may not permit to clearly indicate the absence of operating voltage in case of presence of interference voltage.

When the indication “voltage present” appears on a part that is expected to be disconnected of the installation, it is highly recommended confirming by another means (e.g. use of an adequate voltage detector, visual check of the disconnecting point of the electric circuit, etc.) that there is no operating voltage on the part to be tested and to conclude that the voltage indicated by the voltage detector is an interference voltage.

A voltage detector declaring two values of internal impedance has passed a performance test of managing interference voltages and is (within technical limits) able to distinguish operating voltage from interference voltage and has a means to directly or indirectly indicate which type of voltage is present.

2) CENELEC DIRECTIVES

The instruments conform to CENELEC Low-voltage directive 2014/35/EC, Electromagnetic compatibility directive 2014/30/EU and RoHS directive 2011/65/EU.

SPECIAL FEATURES :

- EF-Detection;
- LCD indication (KM 69),
- AC-Detection Shaker (KM 69)
- RCD Leakage-Path (KM 69)
- RST Phase Rotation Detection (KM 69)

SPECIFICATION

GENERAL SPECIFICATION

- **LCD Display (KM 69) :** 3½ Digits1999 Counts
- **Display Update Rate (KM 69) :** 5 per second nominal
- **Sensing :** TRMS sensing for LCD indication;
- **Operating Temperature :** -10°C ~ 55°C
- **Relative Humidity :** ≤90%
- **Altitude :** Operating below 2000m
- **Storage Temperature :** -20°C ~ 65°C, ≤80% 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 (Certified by SGS UK)
- **Pollution Degree :** 2
- **Transient Protection :** 8KV lightning surge (1.2/50μs)
- **Overload Protection :** 1000VDC & VAC rms.
- **Low Battery :** Below approx. 2.6V;

- **Power Supply :** 1.5V AAA Size (NEDA 24A or IEC LR03) alkaline battery X 2
- **APO Timing:** Idle for 16 seconds
- **Power Consumption (typical) :**
  KM 66 : 1mA for Power-on ready 40mA for Buzzer on @ Continuity or EF function
  KM 69 : 2.7mA for Power-on ready & DCV 50mA for ACV (with shaker on) 105mA for RCD 40mA for Buzzer on @ Continuity or EF function 55mA for Resistance or Capacitance Add 30mA for Backlight on
- **APO Consumption (typical) :** 12μA (KM 69) 6μA (KM 66)
- **Dimension :** 278(L) x 57 (W) x 40 (H) mm
- **Weight :** Approx. 235gm
- **Safety :** Meets IEC/EN61010-1 Ed. 3.0, IEC/EN61010-2-033 Ed. 1.0, IEC/EN61243-3:2014 to CAT III 1000V & CAT IV 600V
- **E.M.C. :** Meets EN61326-1:2013
  For LCD display only: Total accuracy = Specified accuracy + 45d @ an RF Field of 3V/m.

ACCESSORIES: Batteries, User's manual, Screw-on stationary red probe and detachable leaded black probe.

ELECTRICAL SPECIFICATIONS :

Accuracy is given as ± (% of reading digits + number of digits) or otherwise specified @ 23°C ± 5°C. Maximum Crest Factor <2:1 at full scale & <4:1 at half scale, and with frequency components fall within the tester specified frequency bandwidth for non-sinusoidal waveforms

DC & AC Voltage (LED)

Voltage Marking	Typical Turn-ON Threshold	Typical Turn-OFF Threshold
12V	9.6V (80%)	7V
24V	19.2V (80%)	14V (116%)
50V	40V (80%)	33V (137%)
120V	96V (80%)	67V (134%)
230V	184V (80%)	140V (117%)
400V	320V (80%)	283V (123%)
690V	552V (80%)	490V (122%)
1000V	800V (80%)	760V (110%)

LED Threshold ON : < 85% of Voltage Marking.
LED Threshold OFF : > 110% of Pre-Voltage Marking.
Input Impedance : 12V, 24V, 50V Voltage Markings : 100kΩ, 160pF nominal 120V, 230V, 400V, 690V, 1000V Voltage Markings : 200k ~ 500kΩ vary linearly, 160pF nominal
ACV Frequency Response : 45Hz ~ 65Hz
Duty ratio : Continuous @ ≤300V
Time rating (tr) ON for 30 seconds & Recovery time (rt) OFF for 2 minutes @ >300V

DC & AC Voltage, LCD Numeric Indication (KM 69)

Range	Auto-power-ON Threshold	Accuracy
DC 199.9V, 1000V	> +27VDC or < -4.5VDC	1.5%+3d
AC 199.9V, 1000V	> 8VAC	2.5%+4d

Input Impedance : 12V, 24V, 50V Voltage Markings : 100kΩ, 160pF nominal 120V, 230V, 400V, 690V, 1000V Voltage Markings : 200kΩ ~ 500kΩ vary linearly, 160pF nominal
ACV Frequency Response : 45Hz ~ 65Hz
Duty ratio : Continuous @ ≤300V
Time rating (tr) ON for 30 seconds &
Recovery time (rt) OFF for 2 minutes
@ > 300V

AC-Detection Shaker (KM 69)
Shaker Threshold : Between 8V and 15V AC

Audible Continuity

Open Circuit Voltage : 0.7 DC Typical
Audible Threshold : between 1MΩ & 1.5MΩ (KM 66)
between 500KΩ & 750KΩ (KM 69)

Electric Field EF-Detection
Non-Contact EF-Detection : An antenna is located at the top-right side of the tester
Probe-Contact EF-Detection : Via Black (-) test probe for direct-contact detection. It is mainly for identification of live connections using maximum sensitivity.
Detection Frequency : 50/60Hz
Strength Indication : Signal strength is indicated by the

flashing rate of Continuity-LED accompanied with beep sound. KM 69 also display successive bar-graph segments proportional to the field strength on LCD. Typical Non-Contact EF-Detection values are shown in the following table.

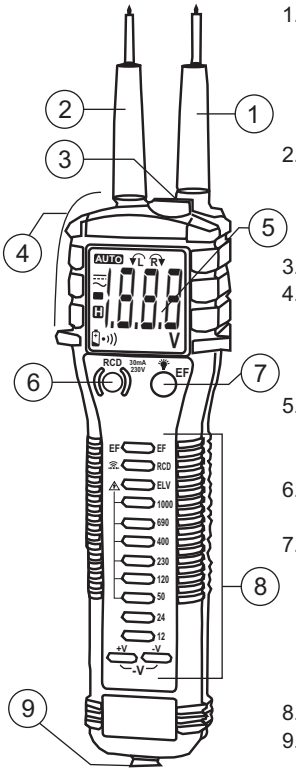
Typical Non-Contact Voltage Range		LCD Bar Graph Indication KM 69
KM 66	KM 69	
80V to 250V	15V to 55V	—
150V to 450V	30V to 95V	— —
300V to 700V	55V to 170V	— — —
Above 500V	Above 120V	— — — —

RCD Leakage-Path (KM 69)
RCD Circuit Breakers intended : 30mA/230Vac
Activation inhibited : at <201V or >264V
Activation indication : Flashing RCD-LED accompanied with beep sound
Path Impedance : 6.1kΩ nominal, PTC protected
Path Current : ≥30mA typical at 230V
Activation interval [1] **:** Maximum 5 seconds with automatic cutoff
[1] In the event of a full continuous 5 second activation interval, the protection PTC will heat up and affect the load current magnitude thereafter. Allow cooling for 120 seconds before the next activation then.

RST 3-Phase Rotation Detection (KM 69)
Voltage Range : 165V ~ 1000V
Frequency Range : 45Hz ~ 65Hz
Applications : Intended for Y-connection 3P4W and High-leg Δ-connection 3P3W systems. Not intended for Δ-connection 3P3W systems without an earth-ground neutral.

3) PRODUCT DESCRIPTION

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



1. Detachable Black test probe(-) for all functions (Common ground reference)
2. Screw-on stationary Red test probe (+) for all function.
3. Flashlight (KM 69)
4. EF- Detection (Non-contact Voltage) antenna area.
5. 3 ½ digits 1999 counts LCD display (KM 69)
6. RCD Leakage - Path button(KM 69)
7. Power-on / Backlight+Flashlight toggle (Momentary press, KM 69) & EF-Detection (press-and-hold) button
8. LED Indication
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

- Battery-operated functions and features work only with appropriate internal battery supply, and will not turn on when there is no battery power. Briefly, they are: LCD indication, RCD Leakage-Path, RST Phase Rotation Detection, Electric Field EF-Detection, AC-Detection Shaker, Audible Continuity, Resistance, Capacitance, Backlight & Flashlight etc.
- 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 backgroud 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.

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

As illustrated, connect test probes to voltage source and observe indication. Do not cover the indicating LEDs (and also the LCDs on KM 69) and

do not touch the contact electrode during use. The tester turns on automatically at threshold voltages as specified in the specification section.

LED Successive Indication, Battery-less

When significant operating ACV is being detected, **$\tilde{v}$** LEDs (**+$\overline{\overline{v}}$** LED & **-$\overline{\overline{v}}$** LED) turn on. When significant operating DCV is being detected, **+$\overline{\overline{v}}$** LED turns on for correct test probes polarity, and **-$\overline{\overline{v}}$** LED turns on for reversed polarity. Operating voltage levels are indicated as a series of LEDs in a successive indication manner. These indicating LEDs actually get power from the system under test without the need of internal battery supply (battery-less).

LCD Numeric Indication KM 69, Battery operated

Equip with a battery-operated LCD numeric display for complementary operating voltage indication.

WARNING

Test the tester on a known functioning circuit or component shortly before and after use to verify tester functioning.

ELV (Extra Low Voltage) Limit Indication

When an operating voltage above the ELV limit (50Vac and/or 120Vdc) is being detected, the ELV-LED turns on. The indicating LED gets power from the system under test without the need of internal battery supply (battery-less).

WARNING

This feature is to warn the user of the presence of a voltage above the ELV limit, not for its evaluation.

RCD (Residual Current Devices) Leakage-Path KM 69

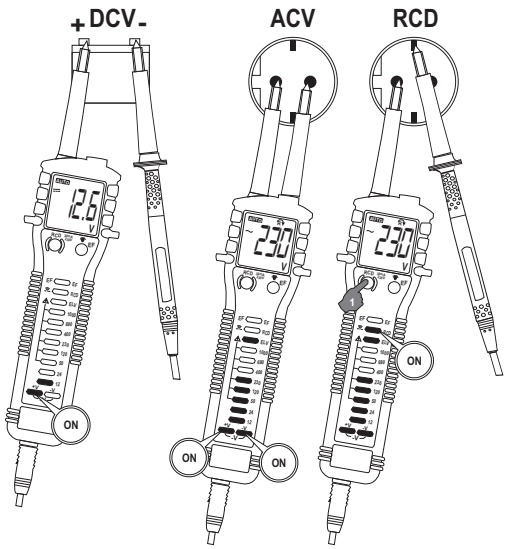
As illustrated, connect the tester to the receptacle under test by measuring the voltage across L and PE (live conductor and a protective earth ground) The tester should indicate proper line voltage level.

- RCD Leakage-Path activation is inhibited at <201V or >264V to avoid misuse.
- With proper line voltage level indicating, press momentarily the RCD button to activate. The tester gives flashing RCD-LED accompanied with beep sound as warning during activation. Each activation interval is automatically limited to 5 seconds maximum.
- If the RCD circuit breaker trips (line voltage is cut off), the flashing RCD-LED as well as the voltage indication should turn off.
- If the RCD circuit breaker does not trip (line voltage is still on) within a reasonable short period of time (mostly a fraction of a second), the breakeris either not working properly or there is a wiring problem.

WARNING

When activated, the tester actually connects to a low impedance load of nominal 6.1kΩ to draw a leakage current of ≥30mA typical at 230VAC to trip RCD circuit breakers. In the event of a full continuous 5 second activation interval, the protection PTC will heat up and affect the load current magnitude thereafter. Allow cooling for 120 seconds before the next activation then.

Note : This function is not intended to identify the effectiveness (trip current and trip time etc as specified by the breaker manufacturers) of breakers. Effectiveness of RCD circuit breakers should be checked by RCD testing, measuring or monitoring equipment under the scope of IEC61557-1 & IEC61557-6.



RST Phase Rotation Detection KM 69

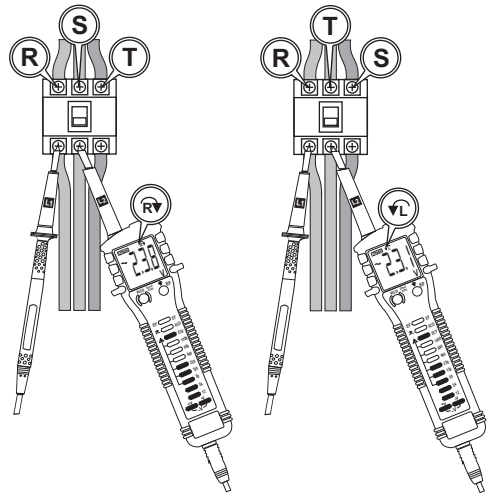
As illustrated, connect test probes to voltage source and observe indication. The tester should indicate proper operating voltage level for good connections. The Black probe (L1) connection is always considered as the Reference-Phase* R.

- If annunciator ↻R turns on, it indicates that a "Right" phase-rotation is being detected. The Red probe **(L2)** connection is then the 2nd Phase **S**. The remaining unconnected connection is the 3rd Phase **T.** Swap the two probe connections to get reversed annunciator ↺L, as for proper functioning verification
- If, however, annunciator ↺L turns on, it indicates that a "Left" phase-rotation is being detected. The Red probe **(L2)** connection is then the 3rd Phase **T.** The remaining unconnected connection is the 2nd Phase **S.** Swap the two probe connections to get reversed annunciator ↻R, as for proper functioning verification.

Note : This function works only on Y-connection 3P4W systems. It does not work on Δ-connection 3P3W systems that do not have an earth-ground neutral. It, however, can work on High-leg Δ-connection 3P3W systems by using the high-leg as the Reference-Phase **R** for Black probe **(L1)** connections. That is, simply test and find out the high-leg which has the highest voltage (√3 times to that of the other legs) with respect to earth-ground, and use it as the Reference-Phase **R** for Black probe **(L1)** connections. High-leg Δ-connection systems have a center-tapped neutral connected to earth-ground.

WARNING

It is important to swap the tester probe connections to get reversed annunciator indication for proper functioning verification.



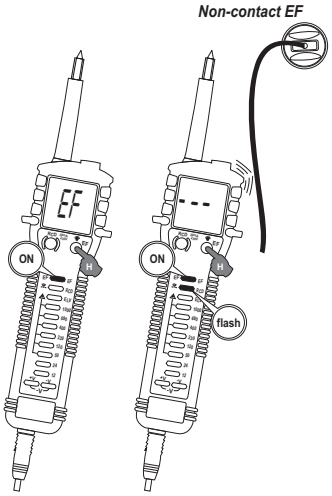
AC-Detection Shaker KM 69

The shaker turns on when significant ACV is being detected via the test probes.

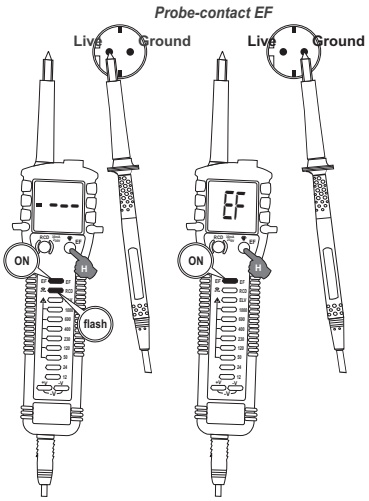
Electric Field EF-Detection

As illustrated, press-and-hold the **EF** button to enter and remain at EF-Detection feature. The EF-LED turns on. Signal strength is indicated by the flashing rate of Continuity-LED accompanied with beep sound. **KM 69** further display “EF” when they are ready, and display signal strength as successive bar-graph segments on the LCD.

- **Non-Contact EF-Detection :** An antenna is located along the top-right side of the tester, which detects electric field surrounds conductors. It is ideal for tracing live wiring connections, locating wiring breakage and to distinguish between live or earth connections.



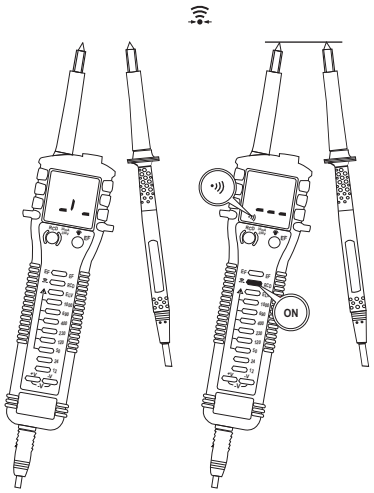
- **Probe-Contact EF-Detection :** For more precise indication of live wires, such as distinguishing between live and ground connections, use the Black (-) test probe for direct contact detection.



Audible Continuity Function

Short the two test probes together for quick power-on and continuity function verification. As illustrated, the Continuity-LED turns on accompanied with a continuous beep sound indicate a complete circuit.

During power-on, **KM 69** LCD further display "**_I _**" for open circuits and " _ _ _ " & " •)) " for complete circuits. Audible-Continuity is convenient for checking wiring connections and operation of switches.



Backlight & Flashlight KM 69

Press 💡 button momentarily to toggle on / off the backlight & flashlight.

Power ON / OFF For Battery-Operated Functions

The battery-operated portion of the tester turns on automatically when the two test probes are shorted together, or significant operating voltage level is detected. See specifications for power-on threshold details. Where available, momentary press the Resistance, Capacitance or Backlight button can also manually turn on the tester. The tester turns off automatically after no further significant testing or push-button activities for approximately 8 seconds for Resistance & Capacitance functions or 16 seconds for others.

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.

Low-Battery Indication

EF and Continuity LEDs flashing simultaneously to Indicate Low-Battery. **(KM 67)**

The LCD annunciator turns on to Indicate Low-Battery. **(KM 69)**

WARNING Always power-on the tester and check for low-battery status before using battery-operated functions. Replace low-batteries ASAP to maintain tester accuracy and functionality.

Battery Replacement

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

The tester uses 1.5V AAA Size (NEDA 24A OR IEC LR03) Alkaline Battery x 2

KUSAM-MECO®

MUMBAI

TEST CERTIFICATE

VOLTAGE TESTER

This Test Certificate warrantees 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. **KM 69**

SERIAL NO. _____

DATE: _____

ISO 9001:2015
REGISTERED

QC
KUSAM-MECO
PASS

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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.