

# 10KV HIGH VOLTAGE DIGITAL INSULATION RESISTANCE TESTER

**WITH POLARIZATION INDEX & DIELECTRIC ABSORPTION RATIO****Model KM 6213AIN****SPECIAL FEATURES :**

- Variable High Voltage 500V-10kV DC.
- Automatically Switch tester OFF.
- Voltage Steps of 500V.
- Works from 8 x C size 1.5V Alkaline Battery.
- Shows Polarization Index (auto) & Dielectric Absorption Ratio.
- Very Low Power Consumption.
- Fast Calculation and Display.
- Guard Connection to reduce errors.
- Colour Coded Terminals-Test Leads.
- Lightweight, Robust & Compact
- Warning Voltage Detection.
- Automatic Discharge of Circuits
- Large LCD Display with timer.
- Low Battery Indication.
- Automatically Stops the Test.
- Includes AL-50 Red Test Leads (3 meter) as standard, Blue Test lead (1.25 meter) & Green Test lead (1.25 meter).

**FEATURES :**

- The KM 6213A IN is the KUSAM-MECO premium model of High Voltage Digital Insulation Resistance Testers.
- The KM 6213A IN has new added features with a low consumption High Performance processor.
- It displays results much faster and has more advanced features.
- The KM 6213A IN has Automatic Polarization Index and Dielectric Absorption Ratio Calculations.
- Results are displayed on the new High Contrast LCD. It's mounting angle makes it more readable for all users, in different working conditions.
- The user's manual reflects the new features and added benefits of this instrument.
- It has Auto-Off, Auto-Stop, EnerSave™ and is a non destructive tester.
- Once you start the tester, it waits for your selection. You can go up and down in voltage to select the voltage at which you want to test the insulation. Once you have selected that voltage, you need to connect the test leads to the Insulation Tester to measure. Then it measures voltage to ensure there is no voltage present on the equipment under test. If there is a voltage present, it will warn you to disconnect the circuit before proceeding. If it's free of any voltage, then you can proceed with the testing. This ensures that no damage is done to the Insulation Tester KM 6213AIN.
- One of the new innovation on this tester is also the way the new unique calibration process works. It's fully digital, has no moving parts and does not require expensive and complicated jigs or computers systems to be calibrated. It's cheaper to maintain than any other Digital HV Insulation tester on the market today. The KM 6213AIN is supplied standard with our Premium test Leads Kit, the AL-50.

**SAFETY :**

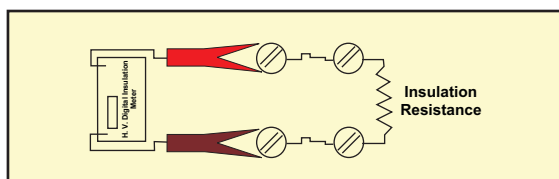
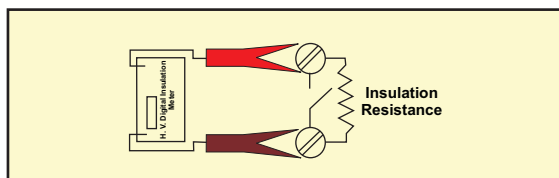
CE marking according to the Low Voltage Directive (2006/95/EC) and EMC Directive (2004/108/EC, 92/31/EEC, & 93/68/EEC) and found to comply with the essential requirement of the directives.

IEC/EN 61010-1: 2001. EN 61326-1, EN 55011+A1+A2, EN 61000-3-2+A2, EN 61000-3-3+A1+A2, EN 61000-4-2+A1+A2, EN 61000-4-3+A1, EN 61000-4-4, EN 61000-4-5+A1, EN 61000-4-6+A1, EN 61000-4-8+A1, EN 61000-4-11.

**AL-50 Red Test Lead standard****AL-30 TestLead****AL-30C TestLead**

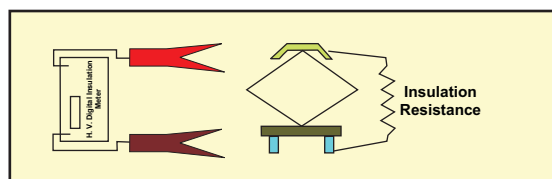
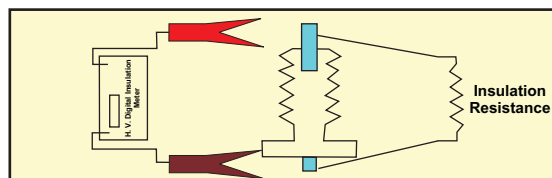
All Specifications are subject to change without prior notice

Measuring Insulation of Open Contacts of Circuit Breaker.



Measuring Insulation between contacts of Circuit Breaker.

Insulator



Insulator on Railway Coach

- The KM 6213AIN is the new Standard in "Best Value for Money" High Voltage Insulation Meters. It is a low cost tool for trend analysis.
- Use it to test Insulation Resistance; on Ceramic Insulators, between Bus Bars, between Open Circuit of contactors connections, of Insulating Materials.
- The KM 6213AIN is the best meter for maintenance in its category. It is mainly used for periodic measurements to ensure that user and equipment are safe.
- The new PI and DAR features are useful to schedule maintenance. The user keeps records of the PI and DAR results and analyze these results over time.
- Maintenance can be done according to analysis and downtime can be scheduled, so that production does not suffer, thus saving production down time & money.
- In the past, without the PI and DAR, user's could not do scheduled preventive maintenance and therefore, breakdown occurred randomly and production was down anytime without any alternative planning.
- The KM 6213AIN is portable, tough and rugged and can sustain industrial environment handling, it can test at voltage from as low as 500V up to as high as 10000V, adjustable with a 500V step.
- The Cover contains the test leads and the user's manual, all in one unit. Once the lid is open, a quick instruction panel can be read while using the instrument, thus, reducing user's mishandling.

#### ELECTRICAL SPECIFICATIONS :

Output Voltage Adjustment (500V Step)	From 500V To 10KV DC
Maximum Insulation Resistance (10KV)	600G Ohms
Accuracy	$\pm 5\%rdg \pm 1dgt$
Dielectric Absorption Ratio	R@1 Min / R@30sec
Polarization Index	R@10 Min / R@1Min
Power Output Limits	1W
Resistance Per Voltage	25G /500V
Pollution degree	2
Operating Temperature & Humidity	0 ~ 40°C ; 85% RH
Storage Temperature & Humidity	-10°C ~ 65°C; 85% RH
Live Warning Voltage	> 300VAC
Calibration	Eeprom
Calibrate Current	YES
Calibrate Voltage (using Cal. Resistors)	YES
Protections	Diodes
Over Voltage Class III	300V
Over Load Between All Terminals	300V
Low Battery Indicator	<8VDC
CAT III	300V
Battery	"C" Type 8x1.5V alkaline
Weight	Approx. 3.6kg
Dimension	330(L) x 160(W) x 255(H) mm

#### ACCESSORIES :

Anti-leakage, Color coded,  
Flexible silicone coaxial test lead with  
integrated guard, into the test probe,  
3 Test Leads, Manual, &  
Batteries installed.

All specifications are subject to change without prior notice.

**KUSAM-MECO®**  
An ISO 9001:2008 Company

G-17, Bharat Industrial Estate, T. J. Road, Sewree (W), Mumbai - 400 015. INDIA.  
Sales Direct.: 022 -24156638, Tel. : 022-241224540, 24181649, Fax : 022 - 24149659  
Email : kusam\_meco@vsnl.net, Website : www.kusamelectrical.com,



**DIGITAL, VARIABLE,  
HIGH VOLTAGE  
INSULATION TESTER  
MODEL KM 6213A IN**



17, Bharat Industrial Estate, T. J. Road, Sewree (W), Mumbai-400015. INDIA  
Tel.:(022)2412 4540, 2418 1649 **Sales Direct:** 24156638 **Fax:**(022)2414 9659  
**E-mail :** kusam\_meco@vsnl.net, **Website :**www.kusam-meco.co.in  
www.kusamelectrical.com

**INSTRUCTION MANUAL**

TABLE OF CONTENTS

SAFETY PRECAUTIONS.....1

SPECIFICATIONS.....5

OVERVIEW.....6

FEATURES.....7

CONNECTIONS.....8

FRONT PANEL LAYOUT.....9

FUNCTIONS.....10

SPECIAL FEATURES.....13

PREPARATION FOR MEASUREMENT.....15

INSIDE LID INSTRUCTIONS.....16

INSULATION RESISTANCE TESTING.....17

EXAMPLES OF MEASUREMENT.....18

MAINTENANCE AND CLEANING METHOD.....20

WARRANTY.....21

**BATTERY HAS TO BE CHARGE  
MAXIMUM 12 HOURS**

1. SAFETY PRECAUTIONS.

SAFETY RULES

CAUTION



RISK OF ELECTRIC  
SHOCK

This tester has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and / or lethal when lack of caution and / or poor safety practices are used.

Do not carry out field measurements on either the power system grounding, during periods of forecast lightning activity, or any non insulated system or non insulated circuit. In the event that lightning occurs, stop all testing and isolate and remove any temporarily installed test spikes or test leads.

Preparations for testing of power system grounding or close to it can leave personnel vulnerable to exposure caused by faults at or fed from the system under test, transferred potentials from remote test grounds, and inadvertent line energizations. **Always insulate the device under test.**

While the probability of the occurrence of one of these events is low, personnel safety will, nevertheless, be enhanced by the following :

When working near high tension systems rubber gloves and shoes should be worn.

Work on clean, dry crushed rock or an insulating blanket.

Avoid bare hand to hand contact between the tester and extended test leads.

When using the tester with test leads, ensure that they are safe and properly authorized.

Disconnect the tester from any external circuit when checking or changing the Fuse and / or batteries.

CAUTION



READ THE MANUAL

Follow the instructions in the Manual for every measurement. Read and understand the general instructions before attempting to use this tester.

**SAFETY CHECK**

Before using the tester check the condition of the test leads and the fuses, if using fused test leads.

The test leads must be free of cracks or any damages and must be insulated as when they were new.

Always disconnect the test leads when changing the batteries by removing the cover which give access to the batteries.

Always double check the lead connections before making any measurements. For increased safety, use fused test leads (optional).

**DON'T TOUCH**

Don't touch exposed wiring, connections or other "Live" parts of an electrical circuit. If in doubt, check the circuit first for voltage before touching it.

Do not use cracked or broken test leads.

**THIS INSTRUMENT SHOULD ONLY BE USED BY A COMPETENT, SUITABLY TRAINED PERSON.**

**REMEMBER**

**SAFETY IS NO ACCIDENT**



**CAUTION RISK OF ELECTRIC SHOCK**



**CAUTION READ THE MANUAL**

Electricity can cause severe injuries even with low voltages or currents. Therefore it is extremely important that you read the following information before using your Variable High Voltage Digital Insulation Tester.

- 1.1 This instrument must only be used and operated by a competent trained person and in strict accordance with the instructions and safety practices. We will not accept liability for any damage or injury caused by misuse or non compliance with instructions and safety procedures.
- 1.2 **This instrument must not be used on live circuits.** Ensure all circuits are de-energized before testing. See paragraph 1.7 for details of built in warning features should your Variable High Voltage Digital Insulation Meter be connected to a live system.
- 1.3 Never open your Variable High Voltage Digital Insulation Meter except for battery replacement. (See Battery Replacement section.)
- 1.4 Always inspect your Variable High Voltage Digital Insulation Meter and test leads before using for any sign of abnormality or damage. If any abnormal conditions exist (broken test leads, cracked case, display faulty etc...) do not attempt to take any measurement or use the tester. Return your Variable High Voltage Digital Insulation Meter to your nearest distributor for service.
- 1.5 Your Variable High Voltage Insulation Meter has been designed with your safety in mind. However, no design can completely protect against incorrect use. Electrical circuits can be dangerous and/ or lethal when a lack of caution or poor safety practice is used. Use caution in the presence of voltage above 24V as these pose a shock hazard.
- 1.6 Pay attention to cautions and warnings which will inform you of potentially dangerous procedures.

- 1.7 Your Variable High Voltage Digital Insulation Meter has a live circuit warning beeper. If it is connected to a live circuit, a rapid pulsating b e e p will be heard.  
DO NOT proceed to test and immediately disconnect the instrument from the circuit. In addition your tester will display the warning message.

2. SPECIFICATIONS

Test Voltage	From 500Vdc to 10KVdc Adjustable in 500V steps
Preset Buttons	1KV, 2.5KV, 5KV, 10KV
Measuring Range	800K -600G AUTO-RANGING
Accuracy	± 5% ± 2 Digits
Power	Rechargable Battery.
Output Power Limit	1W
Voltage Regulation	Selected Voltage + 20%-5% of nominal value Unless current limited. Meaning that if output Current is too high, the voltage will be lowered Automatically.
Standard Accessory :	1) Anti-leakage, Color coded, Flexible silicone coaxial test lead with integrated guard, Into the test probe. 2) Manual 3) Batteries installed.

### 3. OVERVIEW.

This digital insulation tester is a variable high voltage insulation meter from 500V to 10KV in 500V steps.

Its output voltage can be adjusted using 500V up or down steps.

The meter is menu driven and uses Dynamic Current Auto-ranging technology.

It is equipped with a bar-graph which displays the voltage stressing the insulation while the test is in progress.

This bar-graph is showing voltage output during the first 30 seconds of the test or during automatic discharge of circuits.

During the automatic discharge of the circuit tested, the bar-graph display the voltage decay.

The display shows the elapsed time since the start of the test.

Digital readout of the total time remains displayed even after testing has ceased.

A6 digit digital display shows the actual Insulation Resistance.

This instrument displays and sounds a voltage warning when AC or DC is present before injecting the test voltage.

The warning circuit can only detect when voltage is higher than 500V.

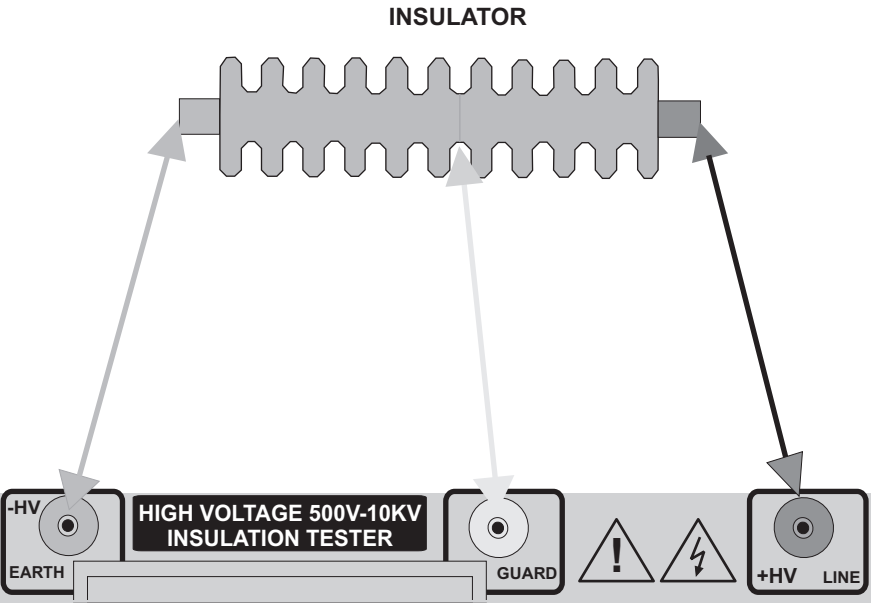
This variable High Voltage Digital Insulation Meter will buzz intermittently when high voltage is generated and this will remain until the circuit under test is fully discharged.

### 4. FEATURES.

- 2 X 16 characters, large, **High Contrast**, Intelligent **L. C. D.** Module.
- 20 Insulation test voltages  
500V, 1KV, 1.5KV, 2KV, 2.5KV, 3KV, 3.5KV, 4KV,  
4.5KV, 5KV, 5.5KV, 6KV, 6.5KV, 7KV, 7.5KV, 8KV,  
8.5KV, 9KV, 9.5KV, 10KV.
- Calculate **Dielectric Absorption Ratio** (DAR) Automatically.
- Calculate **Polarization Index** (PI) Automatically.
- Insulation resistance **Auto-Ranging** on all ranges.
- **Ener-Save™**
- **Bar graph** indicates test voltage. Rise and decay can be observed.
- **Warning** of external voltage presence (>500Vac or Vdc)..
- Overload protection.
- Low battery indicator (real time battery voltage Measurement).
- Measure insulation **time** duration of the test.
- Low battery consumption.
- Smart microprocessor controlled.
- One year factory warranty.
- Better than 10% accuracy on all ranges.
- **Auto off.**
- Compact and lightweight.

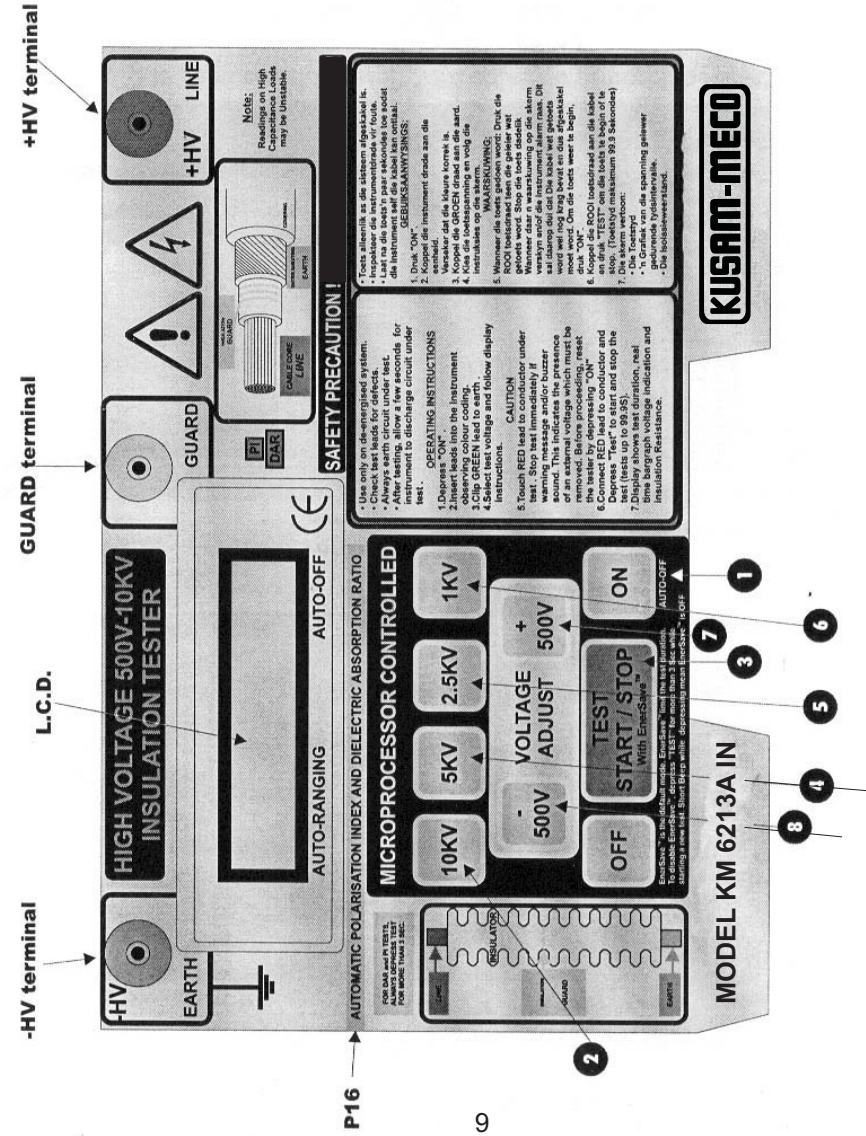


5. CONNECTIONS.



6. FRONT PANEL LAYOUT and INSIDE LID INSTRUCTIONS.

FRONT PANEL LAYOUT





**6. FUNCTIONS (see FRONT PANEL LAYOUT).**

**6.1 Power-On**

To switch your instrument on, press the “ON” button (!). The L.C.D. Will display the model number. Follow interactive instructions on L.C.D.

**6.2 Insulation Resistance Measurement @ 10KVdc.**

To Select 10KVdc test voltage, press 10KV button (2).

**6.3 Insulation Resistance Measurement @ 5KVdc.**

To Select 5KVdc test voltage, press 5KV button (4).

**6.4 Insulation Resistance Measurement @ 2.5KVdc.**

To Select 2.5 Kvdc test voltage, press 2.5KV button (5).

**6.5 Insulation Resistance Measurement @ 1KVdc.**

To Select 1KVdc test voltage, press 1KV button (6).

**6.6 Insulation Resistance Measurement @ Multiple of 500Vdc adjustment**

To add 500Vdc to the selected test voltage,

Press **+500V** button (7).

To subtract 500Vdc to the selected test voltage, press -500V

Button (8).

**6.7 Ener-Save™ mode.**

The Ener-Save™ mode saves battery life by automatically turning the instrument to low consumption (reducing the test duration).

The Ener-Save™ mode is the default mode of the instrument.

The Ener-Save™ mode is enabled when pressing the TEST button (3) for less than 3 seconds.

The Ener-Save™ mode is disabled when pressing the TEST button (3) for more than 3 seconds.

When Ener-Save™ mode is disabled, the instrument operates in continuous mode (up to 99.9s).

**6.8 Voltage Output Bar-Graph.** The bar-graph shows the voltage present on the leads. It also shows the voltage charging a cable or capacitive system under test and shows the decay during the automatic capacitive discharge of the system under test.

**6.9 Auto-Low Resistance Detect.**

While in insulation test mode, if the L. C. D. Module shows “LOW M ”, stops the test immediately. This could mean that the insulation has a breakdown, thus, you are now trying to inject very high voltage on a short circuit. Trying to inject high voltage on a short circuit could reset the instrument (specially if flashing occurs).

**6.10 Timer.**

The duration of the test is shown on the top right of the L. C. D. This is particularly useful to verify that insulation does not break down within a certain time or to make comparison. See Special Features (Pg.No.13) for more Timer Functions.

**6.11 Stop test.**

To stop the test in progress, press the TEST button (3). The test will immediately stop, discharge and the instrument will re-enable the Ener-Save™ mode automatically.

**6.2 Auto-Stop.**

Should the operator leaves the Instrument in the test mode with the Ener-Save™ disabled, the instrument will automatically stop the test after a duration of 99.9 Seconds. (Auto-off still applies).

**6.13 Auto Live / Voltage Warning.**

Should the leads be placed onto a live system before starting the test, a warning beeper will be automatically activated and your instrument will display “Live Warning ... Circuit Live ..” message. Let the instrument discharge the circuit (in the case of capacitive system) or make sure that the circuit under testing is not live.

**6.14 Auto-Discharge.**

At auto-stop or test completion, the instrument automatically discharges the system under insulation test so that the dangerous high voltage is discharged. The auto-discharge can be observed on the L. C. D.’s bar graph so that the operator only removes the leads when the discharge is complete. During discharge, a beep occurs so that the user does wait for the complete discharge of the system under test. This is indicated

by a one second long beep accompanied by the “HOLD” message on the display  
DO NOT REMOVE LEADS UNTIL THE HOLD MESSAGE APPEARS ON  
THE DISPLAY.

6.15 **“Replace Battery”** Warning Indicator.

If the battery energy is detected to be too low, the instrument will display  
the “Battery” warning.

The instrument cannot operate properly with a low battery.

Kindly Recharge the battery using the Adaptor.

6.16 **Auto-Off.**

The Auto-off is annunciated by a one second beep. The Auto-off timer is  
automatically enabled.

The instrument can also be switched off by pressing and holding the OFF  
key for more than 5 seconds.

## 7. SPECIAL FEATURES

7.1 **DAR = Dielectric Absorption Ratio.**

The dielectric Absorption Ratio is the ratio of the Insulation Resistance  
measured at 1 Min divided per the Insulation Resistance measured at 30  
Seconds.

30 Seconds after starting a test (with EnerSave disabled), the tester will  
beep, indicating the operator that the resistance value measured at 30  
second now has been saved internally.

1 Minute after starting a test (with EnerSave disabled), the tester will beep  
again, indicating the user that the DAR result is now computed, and  
change the display formate to now display the DAR result.

7.2 **PI = Polarization Index.**

The Polarization Index or PI is the ratio of the Insulation Resistance  
measured at 10 Minutes divided per the Insulation Resistance measured  
at 1 Minute.

10 Minute after starting a test (with EnerSave disabled), the tester will  
beep again, indicating the user that the PI result is now computed, and  
change the display format to now display the PI result.

The tester will Auto-Stop at 10 minutes.

7.3 **Digital Display.**

The digital Liquid Crystal Display is large size.

It measures (W) 98mm X (H)24mm and has a 2 Lines of 16 Characters.

7.4 **Automatic Battery Test.**

When the tester starts, it test it's batteries by drawing a heavy current from  
the batteries. During that heavy current, it measures the battery voltage  
and displays it for a few seconds on the display. During normal use, the  
tester monitors the battery voltage, but without drawing a battery test  
current. It just measures the battery while in normal use.

### 7.5 **Automatic Discharge of Capacitive and Inductive Circuits**

This tester will discharge automatically all circuits charged by the tester, after a test is done. Again this will only be activated if the test leads make contact at any time before, during and after the test.

**Please ensure proper contact of the leads at all times.**

Once a test is finished, the tester will automatically discharge capacitive or inductive circuit of their charge. The discharge can be observed on the display, in the form of a bar-graph. Again, do not disconnect the leads while discharging. Wait until completion of the discharge before removing any lead.

During discharge, the Buzzer will beep and the bar- graph will show some voltage. With some high charges, this may take some time. Be patient and let the instrument discharge completely before proceeding to removing the leads.

## 8. PREPARATION FOR MEASUREMENT

### 8.1 **Before testing, always check the following :**

At Power “ON”, read the display to make sure the “Replace Battery” message is not displayed.

Verify that there are no visual damage to the instrument or test leads.

Test leads continuity checking :

Using a Ohm-meter, check the resistance / continuity of the leads.

9. INSIDE LID INSTRUCTIONS

**ENERSAVE™ MODE**

- saves battery life by Automatically turning The Instrument to Low Consumption and reducing the test duration.
- is the default mode of the Instrument.
- is enabled when pressing the "TEST" button for less than 3 seconds while starting the test.
- is disabled when pressing the "TEST" button for more than 3 seconds while starting the test (user to disable for PI and DAR tests).

When The ENERSAVE™ Mode is disabled, the Instrument Operates Continuously (up to 99.9s). Testing can be interrupted at any time by depressing Test Start/Stop key.

Discharge Always Applied automatically.

**Insulation Tester Specified with Alkaline Batteries**

**WARNING!**

This instrument should not be used in explosive or inflammable environments, although there is unlikely to be a fire hazard from the instrument itself. However, arcing in faulty insulation, sparking caused when making or removing connections to equipment that has not been properly de-energized, or discharge of capacitance following tests, can all lead to explosion or fire hazard.

**SAFETY!**

- The circuit under test must be de-energized AND isolated before insulation test are made.
- Check Test Leads for Defects, they must have good, unbroken insulation, uncontaminated by grease, oil or dirt.
- For optimal results, only use supplied Test Leads.
- To avoid creating leakage path when insulation testing, it is advisable not to allow the leads to twist together nor trail across metalwork etc., more than is really necessary. If this can't be avoided, only the Optional, Proprietary, Very High Voltage, Coaxial Silicone Test Lead could give best results.
- Make sure to Earth Circuit under Test.
- Wait until display shows "HOLD" before removing the test Leads.

**CAUTION!**

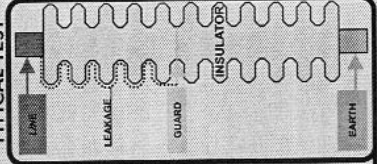
- Instrument used in dusty environment should be send only to an approved maintenance laboratory for periodic cleaning.
- The instrument contains static sensitive devices. If opened for any reason, the warranty will be invalidated.

**USE THE GUARD!**

This Instrument has an Integral Guard Circuitry to Minimise the measurement errors introduced by surface leakage current.

During Insulator testing, for example, a leakage path may exist between the connection to the line conductor and the connection to the earth conductor due to dirt or moisture contamination. Where this possibility exist, particularly when testing at higher voltages, a bare conductor may be bound tightly around the insulator and connected to the guard terminal as shown. The guard test lead is provided with alligator for this purpose. The leakage current is then sent into the guard connection instead of having it's path in parallel with the measurement. Without the Guard, Insulation resistance appears lower than with the Guard.

**TYPICAL TEST**



**DAR = RESISTANCE MEASURED AT 1 MINUTE**  
**RESISTANCE MEASURED AT 30 SECONDS**  
**PI = RESISTANCE MEASURED AT 1 MINUTE**

**PI = POLARIZATION INDEX**

**DAR = DIELECTRIC ABSORPTION RATIO**

**FOR DAR and PI TESTS, ALWAYS DEPRESS TEST FOR MORE THAN 3 SEC.**

*Preventative Maintenance:*  
when the results are entered into the logbook, a considerable variation between the tests could be noted. It is therefore important to test under similar conditions each time and to note the current weather status. Damp conditions can cause large reductions in insulation resistance, temperature of the equipment under test should also be noted.

10. Insulation Resistance Testing.

Warning : Insulation test should be conducted on circuits that are de-energized.

Ensure circuits are not live before commencing testing.

- Secure both test leads properly to the insulation to test and use guard lead to collect surface leakage.
- Good contacts are necessary to avoid flashing at high voltage or ionization or creation of carbon track type conductive material.
- If contacts are not properly secured, the tester may be corrupted temporarily by the high electromagnetic field present. Should this occur, let it reset itself.

**DO NOT USE DIRECT CONNECTION TO THE MAINS POWER. IT COULD LEAD TO FATAL ACCIDENTS.**

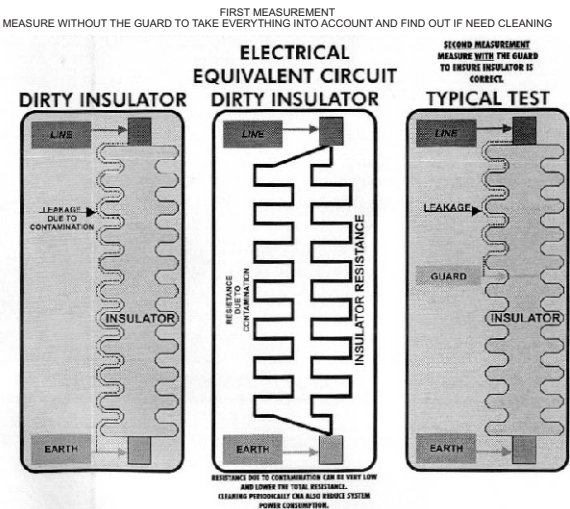
11. EXAMPLES OF MEASUREMENT

11.1 MEASURING AN INSULATOR

When measuring insulator, there are a few things to consider :

- 1. Most insulators collect dust and get contaminated over time with a mixture of Moisture, rain, dirt etc...
- 2 These contaminating matters lower the resistance of the insulator as they are in parallel with the insulator resistance.
- 3. It is recommended to measure the insulator first without the guard to verify that the total resistance is high. Should the total resistance not be high, that could mean that the amount of dirt on the surface of the insulator is too high and therefore, the insulator may require cleaning.
- 4. Should your insulator require cleaning, follow the procedures recommended by it's manufacturer.
- 5. For final Test and Measurement, use the Guard so that leakage surface current is collected and Insulator is intrinsically tested.

The insulator must not be connected to any live component or power source.  
Use a tied copper wire around the insulator at about its center to connect the guard.



11.2 MEASURING THE INSULATION OF A CONTACTOR OR CIRCUIT BREAKER

Contactor or Circuit breaker are switching devices which when closed, must do a good contact i.e. (have the lowest resistance possible) and when open, must be a good insulator i.e. (have the highest resistance possible).

As they get older, their characteristics may deteriorate due to many factors.

Their material porperties may deteriorate with time and frequency of use as well as stress put on to them.

One of the factors to be tested is their insulation when acting as an open circuit.

Contactors or circuit breakers may also get dirty as they are utilized in heavy duty environments, like factories, mines etc., which have climatic conditions which are harsh.

When they are dirty, their insulation may deteriorate due to the deposit of contaminating matters between the terminals (see previous page about parasitic resistance due to dirt contamination).

**The Contactor or Circuit Breaker must not be connected to any live component or power source during its testing.**

11.3 MEASURING INSULATING PAINT (VARNISH) or INSULATING MATERIAL

In many applications, paint (Varnish) is utilized as an important insulating material.

For example, transformers are painted or dipped with insulating varnish, large power transformers are painted with High Voltage insulating paint of very high specifications.

Many Applications uses insulating material to protect personal and equipments.

For example insulating blankets, insulating suits, insulating gloves, etc...

These materials can be quickly checked to general purpose, in day to day use, or before sending for further more in deep tests.

Testing these can be tricky and require proper test jigs, so we will just explain the principle of their testing for general knowledge.



## 12. MAINTENANCE AND CLEANING METHOD.

### 12.1 **Cleaning & Storage.**

Periodically wipe the case with a damp cloth and detergent.  
Do not use abrasives or solvents.  
If the meter is not to be used for long periods or longer than 30 days,  
remove the batteries and store them separately.

#### **Warning**

**To avoid electrical shock or damage to the meter,  
water should not get inside the case.**

**Store the meter in a dry environment.**

### 12.2 **Calibration & Servicing**

Both, calibration and servicing are performed only at an approved facility.  
Contact us about calibration certificate and servicing.  
Before returning the instrument, ensure that :  
The leads have been checked for continuity and any signs of damage.  
The batteries are in good condition.

# **TEST CERTIFICATE**

This Test Certificate that warranty 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 6213A IN

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.