KUSAM-MECO®

AN ISO 9001:2015 COMPANY

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KUSAM-MECO®

AN ISO 9001:2015 COMPANY

DIGITAL, VARIABLE, HIGH VOLTAGE INSULATION TESTER

MODEL KM 6213A IN



INSTRUCTION MANUAL

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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 9001:2015 REGISTERED

QC
KUSAM-MECO
PASS

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.

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.

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 of 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

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.

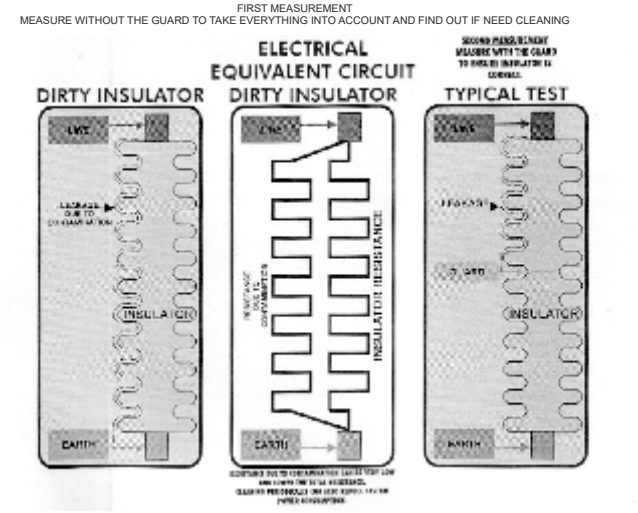
11. EXAMPLES OF MEASUREMENT

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 arround the insulator at about its center to connect the guard.



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.

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.

9. INSIDE LID INSTRUCTIONS



2. SPECIFICATIONS

Test Voltage	From 500Vdc to 10KVdc Adjustable in 500V steps
Preset Buttons	1KV, 2.5KV, 5KV, 10KV
Measuring Range	800KW-600GW AUTO-RANGING
Accuracy	± 5% ± 2 Digits
Power	1.5V "C" x 8 Alkaline Batteries.
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) B atteries 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.

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.

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.

4. FEATURES.

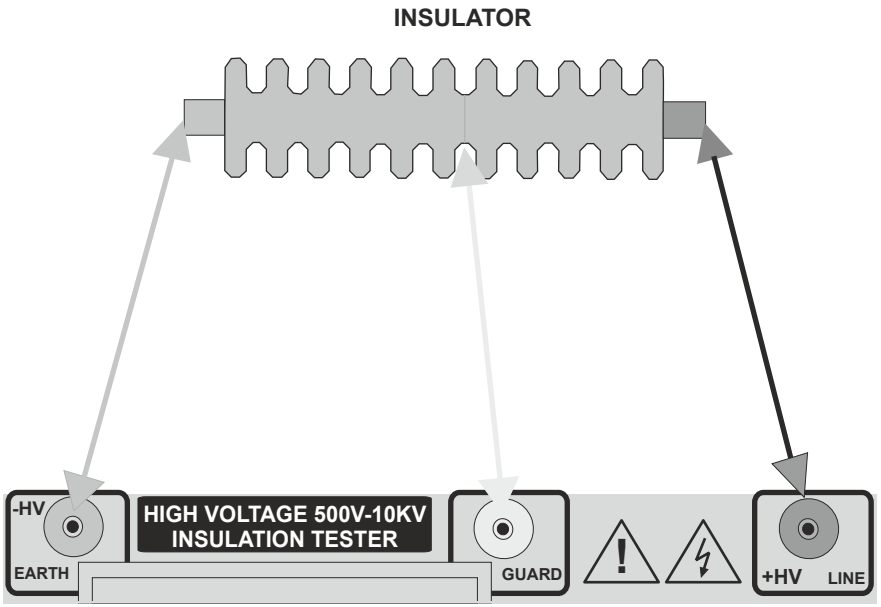
- 2 X 16 characters, large, **High Contrast,** Intelligent **L. C. D.** Module.
- 20 Insulation test voltages

  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.



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.

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.

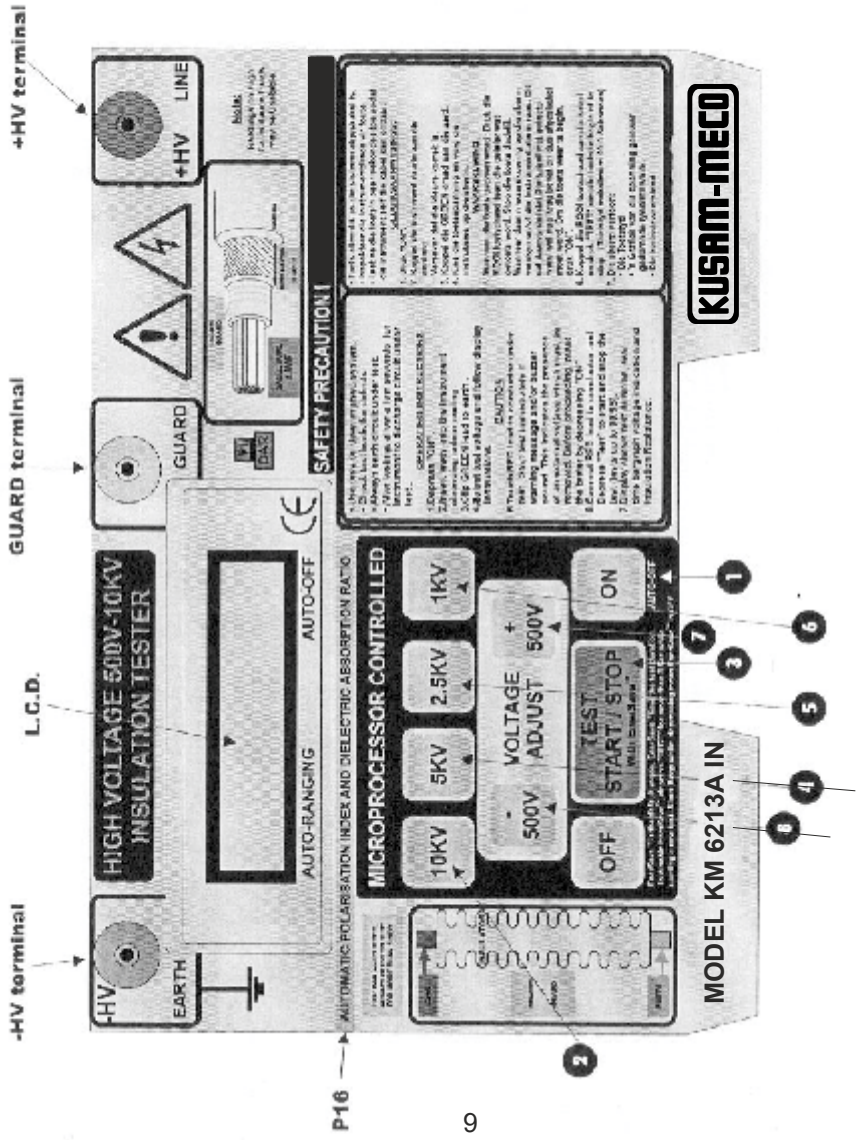
6.16 **Auto-Off.**

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.

0. 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 MW", 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