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®

OFFICE ADDRESS / SERVICE CENTER

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Email : sales@kusam-meco.co.in **; Website :** www.kusamelectrical.com

KUSAM-MECO®

AN ISO 9001:2015 COMPANY

2/3/4- Wire Digital Earth Resistance Tester

MODEL - KM 2040

OPERATION MANUAL

KUSAM-MECO®

2/3/4- Wire Digital Earth Resistance Tester



MODEL - KM 2040

KUSAM-MECO®

TABLE OF CONTENTS

TITLE		PAGE NO.
A.	Introduction	01
B.	Safety Rules and Precaution	01-02
C.	Performance Features	02
D.	Technical Indicators	03
E.	Operation Diagram	03
F.	Operation Instruction	04-06
G.	Replacing Battery	07
H.	Accessories	07
I.	Test Certificate	08
J.	Warranty	09

A. SAFETY WARNINGS

This instrument has been designed, manufactured and tested according to IEC 61010: Safety requirements for Electronic Measuring apparatus, and delivered in the best condition after passing quality control tests. This instrument manual contrains warnings and safety rules which have to be observed by the user to ensure safe operation of the instrument and to maintain it in safe condition. Therefire, read throught these operating instructions before using the instrument.

⚠ WARNING

- Please carefully read this manual before use. Keep custody in order to access when needed.
- Please observe the instrument to use is specified in the manual. Understand and follow the safety instructions in the book. Must strictly comply with the above instructions. Failure to comply with instructions may result in injuries and accidents,

Instrument of ⚠ signs in order to use security, you must read the instruction manual.

⚠ DANGER: Indicates to ignore this flag to the operation of error, resulting in a high risk of death or serious injury.
⚠ WARNING: Indicates to ignore this flag is wrong operation may cause death or serious injury.
⚠ Note: to ignore this flag is wrong operation may cause death or serious injury and equipment and other items of damage.

⚠ The flag is divided into the following three kinds of attention to its content.

⚠ Danger

- Do not use loop-to-ground voltage AC/DC3c oV above.
- Do not measured in inflammable places, may spark and cause an explosion.
- Do not use instruments or with wet hands. Please note that the simple measurement not to cause the metal head of the test line and short-circuit of the power co rd. Doing so may cause personal injury.
- Do not exceed the test range test input. When the test lines are connected, do not press the test button Do not open the battery cover in the the testing process.

⚠ Warning

Use, if the instrument or the test line cracking or metal parts exposed to immediately stop the test The analyte connection with the test line, do not switch range.

- Do not remove the instrument to carry out the decomposition, alteration, replacement alternative parts.
- Repair or adjustment is required, please contact the us.
- When the instrument is wet, do not replace the battery,
- When using the test line, the plug is fully inserted.
- When open the battery cover and replace the batteries, please set the range switch to OFF.

Note

Before the test, make sure that the range switch is set in the appropriate range. After use, set the range switch to OFF, and remove the testing line. Remove the battery, if long time not in use.

Do not place the instrument in high temperature, humidity, dew and direct sunlight place.

Do not use abrasives or solvents to clean instrument. Please use the cloth to clean with neutral detergent or water. Keep dry storage. To ensure safety, please ues in the temperature range -10°C ~ 50°C height of 2000m or lees.

SYMBOLE

CAT.IV : The circuit from the service drop the service entrance, and to the power meter and primary over current protection device (distribution panel)

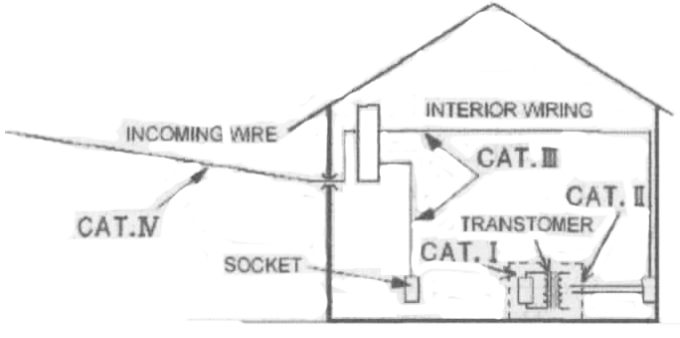
CAT.III : Primary electrical circuits of the equipment connected directly to the distribution panel, and feeders from the distribution panel to outlets.

⧈ : Instrument with double or reinforced insulation.

⚠ : User mus refer to the explanstions in the instruction manual.

This instrument meet CAT. III 300V / CAT.IV 150V. To ensure safe operation of measuring instrumens, IEC 61010 established safety standards for varous electrical enviinment , categorized as CAT.I TO CAT.IV, and called measurement categories.Highrt-numbered categories correspond to electrical environment with greater momentary energy than one designed for CAT.II

CAT.I : Secondary electrical circuits connected to an AC electrical outlet throught a transformer or similar device.
CAT.II : Primary electrical circuits of equipment connected to an AC electrical outlet by a power cord.



CAT.III : See above table
CAT.IV : See above table

2. FEATURES

This is a 2/ 3/ 4-Wire Digital Earth Resistance/ Earth Resistivity Tester equipped with a microcomputer and can measure earth resistances and calculate earth resistivities (p) instrument can measure earth resistances on power distribution lines, in-house wiring system and electrical appliances etc. due to the low output voltage: approx 10Vrms or less.

Designed to meet following safety standards.
IEC 61010-I (CAT.III 300V, CAT.IV 150V, Pollution degree 2)
IEC 61010-031(Requirements for hand-held Probes)
IEC 61557-1, 5 (Earth Resistance Tester)

Stable measurement results can be obtained under a noisy environment by introducing the FFT (Fast Fourier Transform) technology.

- LCD display
- Backlight function to view the test results in dimly areas
- Rk Function is available to cancel the residual resistance on the Test Leads.Battery Check Function - Auxiliary Earth Resistance Measurement Function

Auxiliary earth resistances are measured and displayed.

- Warning for Auxiliary Earth Resistance Measurements
  Warnings are displayed on the LCD when auxiliary earth resistances are too high and may result in inaccurate measurements.
- Auto-Power-Off Function The instrument is automatically powered off when 5 min passes without any Key operation.
- Data storage Save 1000 test data

3. SPECIFICATIONS

IEC 61010-1 (CAT.III 300V, CAT.IV 150V, Pollution degree 2)
IEC 61010-031 (Requirements for hand-held Probes)
IEC 61557-1, 5 (Earth Resistance Tester)
Test range (temperature and hnmidity23±5°C45~75 % RH)

Function	Range	Resolution	Testing range	Accuracy
Earth resistance Re (Earth resistanceρ=Rg)	2Ω	0. 01Ω	0.05~2.09 Ω	±(3%rdg.+5dgt) (Remarks 1)
	20Ω	0. 1Ω	0.5~20.9 Ω	
	200Ω	1Ω	5~209 Ω	
	2000Ω	10Ω	0.05~2.09 KΩ	
	20KΩ	100Ω	0.5~20.9 KΩ	
Auxiliary earth resistanceRh , Rs				(Re+Rh+Rs) 8%
Soil resistivity ρ (Remarks 3)	2Ω	0.3~393.7Ω.m		ρ= 2 x Π x a x Rg (Remarks 2)
	20Ω	3~3937Ω.m		
	200Ω	0.03~39.37Ω.m		
	2000Ω	0.3~393.7Ω.m		
	2KΩ	3~1999Ω.m		

(remarks 1) revised Auxiliary Earth Resistance loon Rk.
(remarks 2) Depending on the test value of Rg. Between the auxiliary ground rods[a]1.o-30.om
(remarks 3)Not available for voltage testing of commercial power.

- Ground resistance test methods
  Voltage drop method (Probe current and voltage testing)
- Test method of soil resistivity (p): 4-pole
- Output: Test voltage Urn Max: 10Vrms 125Hz
- Test current Im Max: 8omA/ Im x t Re+ Rh) < Um
- Data save: 1000
- LCD Display
- Earth resistance: max 209.9k
- Earth resistivity : 1Wm Series Interference Voltage : max 50.9V
- Low Battery Warning: Battery mark appears.
- Continuous Measurement: 400 times or more with manganese batteries; repeating measurements at every 30 sec with a load of 1W - Over-range Indication :OL
- Auto-Power-Off Function The instrument is automatically powered off when 5 min passes without any Key operation.
- Location for use: Indoor/ Outdoor use (Not completely waterproof), altitude 2000 m or less
- Applicable range: Testing earth resistance on power distribution lines, in-house wiring system and electrical appliances
- Temperature & Humidity range (guaranteed accuracy) : 23°C5°C,relative humidity 85% or less (no condensation)
- Temperature and humidity range: 0°C~40°C , relative humidity 85% or less (no condensation)
- Operating Temperature & Humidity range : -10? ~ 50? , relative humidity 75% or less (no condensation)

* Supplied Test leads cannot be used at o C or less.

- Storage Temperature & Humidity range :-20°C~60°C , relative humidity 75% or less (no condensation)
- Overload Protection : between E-S(P) and between E-H(C) terminals AC280V / 10 second

Withstand Voltage : between the electrical circuit and enclosure AC354oV (50/60Hz) 5 second

Insulation Resistance : between the electrical circuit and enclosure 50MW or more / DC1000 V

- Dimension: 167 (L) x 185 (W) x 89 (D) mm
- Weight:9oog(including batteries)
- Power source; DC12v:size AA manganese dry batteryaR6P)*8

**In a use of this instrument under low temperature below ot , a use of alkaline batteries with low temperature spec is recommended.

- Operating error Operating error (B)from the error within the rated operating conditions, the use of machinery inherent errors (A and variable error (En)is calculated.

$$B = \pm(|A| + 1.15\sqrt{E_2^2 + E_3^2 + E_4^2 + E_5^2})$$

A: Inherent error
E2: Changes by changes in supply voltage
E3: Changes by temperature changes
E4: Series interference voltage changes
E5: Change by the resistance of auxiliary earth electrode

- Range to keep the maximum operating error
  Measurement range within which the maximum operating error (±30%) applies.

2Ω Range : 0.5Ω ~ 2.099Ω
20Ω Range : 2Ω ~ 20.99Ω
200Ω Range :20Ω ~ 209.9Ω
2000Ω Range : 200Ω ~ 2099Ω
20kΩ Range : 20kΩ ~ 20.99kΩ

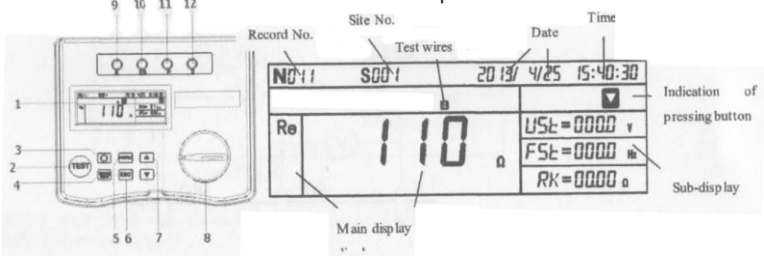
- Variation of Supply Voltage : until the Battery Warning mark appears
- Temperature Variation : -10°C ~ 50°C
- Auxiliary earth electrode resistance : within following range or 50kΩ

Rh, Rs limit

Re<0.40Ω : ≤ 1kΩ
0.40Ω ≤ Re < 1.00Ω : ≤ 2kΩ
1.00Ω ≤ Re < 2.00Ω : ≤ 3.5kΩ
2.00Ω ≤ Re : =Rex100+5kΩ (Rh Rs ≤50kΩ)

4. NAMES OF PARTS

1. LCD
2. Test
3. Background light
4. Enter/Save
5. Menu
6. Esc
7. Cursor Key
8. Range power
9. E port
10. ES port
11. S port
12. H port



5. Marks And Message Displayed on the LCD

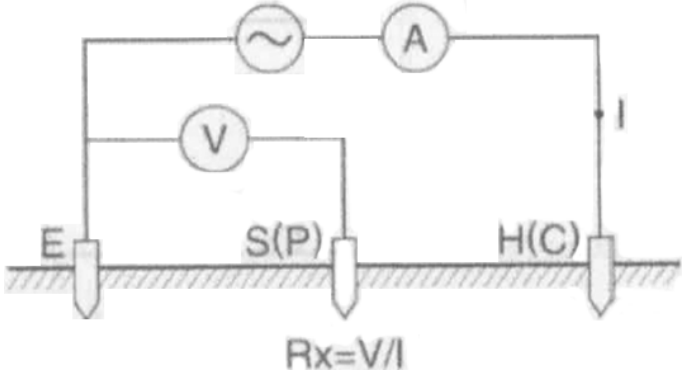
Marks and Message	Details
BATT	Low Battery .
MEASURING···	The meter is under measurmentment.
OL	Over Range.
- - -	Can not measure.
RK > LIMIT	Rk exceeds limit .
RANGE < 20	Setting for Rk can be made at 20Ω
2/3/4-W ONLY	Setting for Rk can be madeonly at 2w,3w,4w measurements.
VOLTAGE HIGE ⚠	Ust is Regulated value or more.
RH > LIMIT RS > LIMIT	Rh and rs values exceed the allowable range. Correct results might not be obtained.
MEM EMPTY	No saved data exists.
MEMORY FULL	Memory is full. No more data can saved.

dEL ONE ITEM?	A confirmation message before deleting the selected.
dEL ALL ITEM?	A confirmation message before deleting all selected.
dELEtE SUCCEEd	All items have been deleted.
N011/105	Nxxx is a memory no.,and the left message saying 105 data have been stored. (Displayed at the Data Review Screen.)
N011	Indicating the measured result is saved with Memory NO. 011.
S001	The character S stands for Site. Selectable from 000 to 999.
SAVE dATE SUCC	Data is successfully saved.

6. Measurement Principle

6.1 Principle of Earth Resistance Measurement

This instrument makes erath resistance measurement with fall-of-potential method, which is a method to obtain earth resistance value Rx by applying AC constant current I between the measurement object E (earth electrode) and H(current electrode) and finding out the potential difference V between E (earth electrode) and S (P) (potential electrode) see Fig.1.



6-2 Principle of Earth Resistivity

Accoring to the Wenner 4-pole method, apply AC current I between the E (earth electrode) and H (C) (current electrode) to find out the potential difference V between the potential electrode S (P) and auxiliary earth electrodes ES.

To Obtain the earth resistance "Rg (Ω)" where the interval between electrodes is a (m).Then use a formula $\rho=2\pi a$ Rg (mΩ)

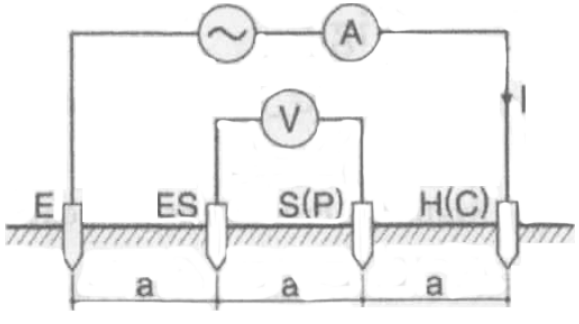


Fig2

7. Preparation For Measurement

7.1 Battery Voltage Check

Power on the instrument. If the display is clear without the Low Battery mark "LOW-B" showing battery voltage is sufficient. Measurement cannot be made, even the Test Button is pressed while the Low Battery Mark is displayed on the LCD. Measurement are hault when the Low Battery Mark appears on the LCD.

7.2 Test parameter setting

7.2.1 Setting Items

This instrument start with Measurement mode (Fig-3 Main Screen) when it is powered on while the Range has been set to the position other than OFF.



Fig.3

Measurement conditions should be set before starting measurements. Setting the data and time enables a saving measured data with time information. Press the MENU Key and enter into the SYSTEM_MENU.

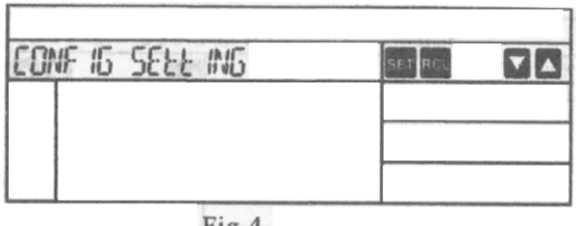


Fig.4

Then select CONFIG_SETTING with Cusor Keys, and press the ENTER/SAVE key to enter into the CONFIG_ SETTING mode.(Fig.5)

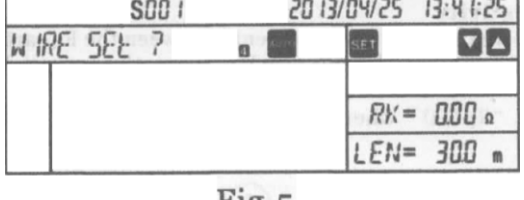


Fig.5

Pressing the ESC key twice exits from the CONFIG_SETTING mode and returns to Measurement mode.

Setting of following parameters can be made on this instrument
Wire : Measurement method (Wiring System) Freq: Measurement frequency
Site : Site (location) No
Lh : Interval of the auxiliary earth spikes at Earth resistivity ® measurement
Date/Time : Year/Month/Day, Time (24-hour display)
Rk : Residual resistance on the Test Leads

7-2-2 Setting for Measurement Method

Measurement method is selectable from: 2-wire (2-wire system), 3-wire (3-wire system),4-wire (4-wire system) and (earth resistivity).
Select Wirewith the Cursor key on the CONFIG_SETTING Screen and press the ENTER/SAVE Key to proceed to the Wiring Setting Screen.
Select the appropriate Wiring System with the Cursor Key and press the ENTER/SAVE Key. Then the CONFIG_SETTING Screen with the selected Wiring. System will be displayed.

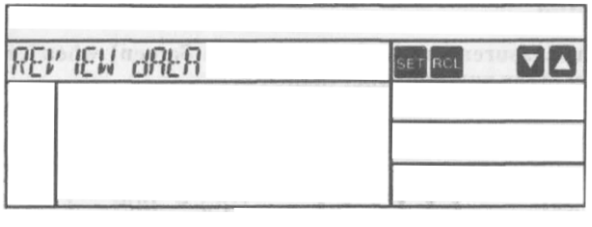
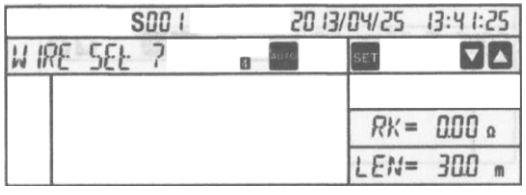


Fig.6

7-2-3 Site (location) no. setting

The site (location) where measurements done can be saved with numbers.Select site with the Cursor Key on the CONFIG_SETTING screen, and press the ENTER/SAVE key to display the site number setting screen.

Select any digit to be changed with the Cursor Key, and press the ENTER/SAVE Key Then the selected digot is highted and ready to be changed.(Fig.7)



Repeat this procedure to change the other didits. Press the ESC key when settings are done. Then the CONFIG-SETTING Screen (Fig.8) with the selected site No. will be displayed. Note) Site No. is selectable from 000 to 999.

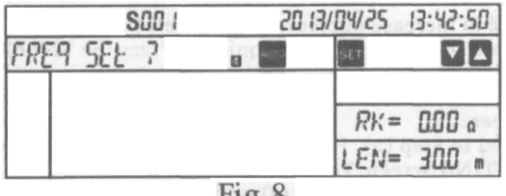


Fig.8

7-2-4 Setting for the interval between Auxiliary Earth Spikes at Earth Resistivity (ρ)

Making setting of the intervals between auxiliary earth spikes is necessary to measure earth resistivity. Select Lh With the Cursor Key on the CONFIG-SETTING Screen, and press the ENTER/SAVE key to dosplay the length Setting Screen. Select any digits to be changed with the Cursor Key, and press the ENTER/SAVE Key. Then the selected difits is highlighted and reasy to be changed.

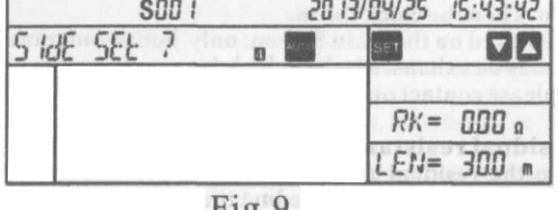


Fig.9

Press the Right Cursor Key ® to increase numbers and the Left Cursor Key-to reduce numbers. Keep the Cursor Key pressed down to change numbers quickly. Press the ENTER/SAVE Key to confirm a number.
Repeat this procedure to change the other digits. Press the ESC Key when settings are done. Then the CONFIG-SETTING Screen with a new interval will be displayed.
Note) Intervals van be set within a range of 1.0 to 30.0m. If a longer interval out of this range is entered at the Setting Screen, it automatically changed to 30.0m when pressing the ENTER/SAVE key.
Note) Intervals up to 30m can be selected with supplied with the supplied Test Leads.

7-2-5 Date and Time Setting

This instrument has a clock function and can save the mesaured data with time and date information. The clock will not be reset once it has been set even after powering off the instrument. A manual adjustment is required to keep the clock time always right.

Time setting can be gone in following procedure.
Select Date/Time the Cursor Key on the CONFIG-SETTING Screen, and press the ENTER/SAVE Key to display the Time and Date Setting Screen.

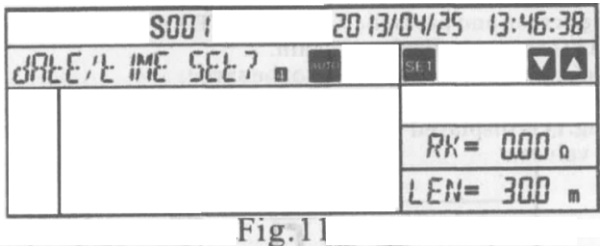


Fig.11

1. Time Setting

Put thecursor in Time and press the ENTER/SAVE Key, and display the time Setting Screen Select a parameter to be changed with the Cursor Key, and press the ENTER/SAVE Key .Then the selected digit is highlighted and ready to be changed. (Fig.21) The clock is 24-hour display.

Put the Right Cursor Key ® to increase numbers and the Left Cursor Key-to reduce numbers. Keep the oursor Key pressed down to change numbers quickly. Press the ENTER/SAVE Key to confirm a number.

Repeat this procedure to change the other digits. Pressing the ESC when setting are done return to the Time/Date Setting Screen.
To change the date, proceed to Step (2), Press the ESC Key again to exit from the setting mode and return to the CONFIG-SETTING Screen. Then the clock starts.
(2) Date Setting
Date is displayed in the following order: Month/Day/Year.
Put the cursor on Date and press the ENTER/SAVE Key to display the Date Setting Screen.
Selected digit is highlighted and ready to be changed. Press the Right Cursor key ® to increase number and the Left Cursor Key to reduce numbers. Keep the Cursor Key pressed dowen to change numbers quickly. Press the ENTER/SAVE Key to confirm a number.
Repeat this procedure to change the other digits. Pressing the ESC Key when settings are done returns to the Time/Date Setting Screen.
Press the ESC Key again to exit from the setting mode and return to the CONFIG-SETTING Screen. Then the clock starts.
Note) The second is not displayed on the Main Screen; only hours and minutes are displayed.
Note) The backup battery may be exhausted when clock becomes wrong after powering on/off the instrument. In this case, please contact our local distributor.
The life time of the backup battery is approx 2 years.

7-2-6 Setting for the residual resistance (Rk) on the Test Leads

This instrument can store the residual resistance (Rk) of the Test Leads before starting Re. measurement on 2/3/4-wire system, and can deduct the resistance from the measured result. The setting Rk can be done in following procedure.
Select Rk with the Cursor Key on the CONFIG-SETTING Screen, and press the ENTER/SAVE Key ti display the Rk Setting Screen (Fig.12)

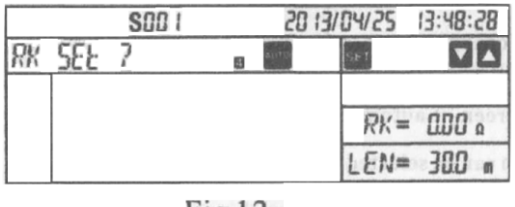


Fig.12

Press the Test Button to measure Rk. The measured results will not be saved until the ENTER/SAVE Button is pressed. The CONFIG-SETTING Screen is displayed when the data is saved.

The Rk value is being kept even powering off the instrument. To clear the saved Rk values, select Clear on the Rk Setting and press the ENTER/SAVE Key. Then the value restores to 0.000Ω. Then CONFIG - SETTING Screen is displayed again.

Note) Rk valnes exceeding following values cannot be saved.
2Ω Range: max 2Ω;20Ω Range: max9Ω;
A message shown in Fig.13 is displayed when the measured Rk is exceeding above values.

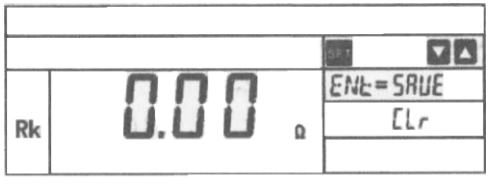


Fig.13

Note) The message shown in Fig.13 is also displayed when a fuse blows.
Following message appears and shows that the data cannot be saved when the ENTER / SAVE Key is pressed with above display.
Note) Following message appears and shows that the 200kΩ or upper Ranges. The Rk values saved at 2Ω and 20Ω Ranges are kept effective at 200kΩ.
Note) Following message appears and shows that the data cannot be saved when trying to save Rk at Wire (ρ)

7-3 Backlight

To facilitate working in dimly lit situations or night time, a backlight function is provided which illuminates the LCD.
Press the *Key to operate this function. The backlight will light up for about 30 sec and turned off automatically.
Pressing the *Key while the backlight is on can turn it off.

7-3 Auto-Power-Off

This instrument is automatically powered off about in 5 min after the last switch operation. To exit from the auto-power-off mode,set the Range Switch to OFF position once, and re-set it to the Rang at which a measurement to be conducted.

7-5 Auxiliary Earth Resistance Measurement

This instrument can measure and display the auxiliary earth resistances. (Rh, Rs). When the Rh or Rs. value is more than Regulated value or 50Ω, a warning message Rh>limit or Rs>limit appear. The LCD shows Rh=OLW or Rs=OL when the Rh or Rs values exceed 50kΩ.
These parameters are measured automatically at auxiliary earth resistance measurement and can be checked on the Result Display Screen.
Note) Rh and Rs stand for Auxiliary Earth Pole H (C)and the Auxiliary Earth Resistance of S (P) respectively.

7-6 Connection of Earth Test Leads and Simplified Measurement Probes

Connect the Earth Test Leads and Simplified Measurement Probes to the connect ors on the instrument firmly. Otherwise, a contact failure occurs and wrong results may be read out on the LCD.
Note) Some numbers other than 0L may be displayed on the LCD when making measurement without connecting any cord or probe at 200Ω or upper Ranges. This is not a malfunction.

8. MEASURMENT METHOD

8-1 Earth Resistance Measurement

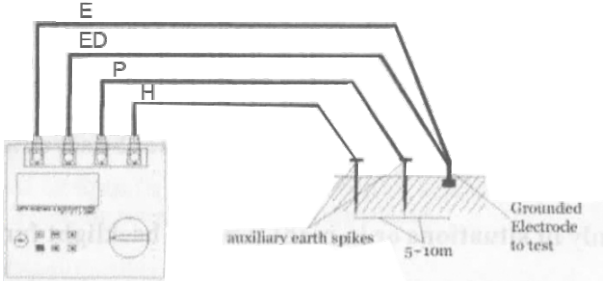
8-1-1 Precise Measurement (3-Wire) * with Earth Test Leads

This is a standard method to measure earth resistances. The measured earth resis tances are free of auxiliary earth resistances but the resistances on the E terminal are contained.
Terminal to be used : E,S (P), H(C)Terminals
Test Leads : Connect to the E,S(P), H(C)Terminals
Auxiliary Earth Spike : 2pcs ,connect to the S(P) and H(C)Terminals

1) Setting of Wiring System Select Wire (4) with reference

8-2-2 Setting for Measurement Method in this manual.
(2) Setting of RK
1. Firmly insert each plug of 3 test leads() green, yellow, red) to the corresponding connectors on the instrument.
2. Select the 2Ω or 20Ω Range.
3. Engage 3 Alligator clips to short-circuit all of them.

4. Save the Rk values with reference to
8-2-7 Setting for the residual resistance (Rk) on the Test Leads.
Note) A break in Test Leads or burnout off fuse is suspected when the LCD shows Rk=OLΩ While 3 Test Leads are being shorted.
3) Connection of Auxiliary Earth Spikes and Test Leads: Stick the Auxiliary Earth Spikes S(P) and H(C)into the ground deeply. They should be aligned at an interval of 5-10m from the earthed equipment under test. Connect the green Test Lead to the earthed equipment under test, the yellow Test Lead to the Auxiliary Earth Spike. S(P) and the red Test Lead to the ES Terminal should be connected to the earthed equipment under test. (fig.14)

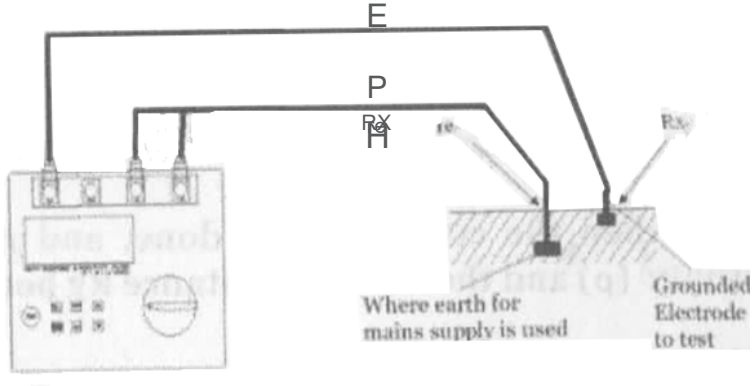


4) Earth Resistance Measurement

Select a Renge (any Range is ok) when the connection is done, and press the TEST Button. The measured erath resistance Re are displayed on the LCD.The operation procedure is same to that for 3-wire measurement.
Note) The reading may not correct when the auxiliary earth resistance is too high. Stick the Auxiliary Earth Spikes S(P) and H(C)in the moist part of the soil.
Note) If a message Rh＞limit or Rs＞limit appear on the LCD, auxiliary earth resistance is too high to make measure-ments.Recheck the connection of Test Leads.

8-1-2 Precise Measurement (4-wire)* with earth Test Leads

The ES terminal is also used with the other terminals used at the 3-wire Precise measurement, In this rase, more precise results can be obtained because auxiliary earth resistance of the measured earth resistances are excluded, moreover, resistance of the Test Leads connected of the E Terminal can be canceled. Terminal to be used: E, ES, S(P), H(C)Terminals Test Leads: Connect to the E, ES, S(P), H(C)Terminal (the ES Test Lead should be connected to the earthed equipment under test where the E Test Lead is connected)



Note) When the Supplied Simplified Measurement Probes are not used, the S (P) and H (C)Terminals should be shorted.
4) Earth Resistance Measurement : Select a high resistance Range when the connection is done, and press the TEST Button. Then the earth resistance values Re are displayed on the LCD. Select a lower Range for low earth resistances.
5) Measured resistance at simplified measurements : Two-Wire method is used for the simplified measurements. In this method, earth resistance of the earthed electrode (re) connected to the S(P) Terminal is added to the true earth resistance Rx and Shown as an indicated value Re.

Re (indicated value) = Rx + re

If the Re is known beforehand, true earth resistance value Ra is calculated as follows. **Rx = Re - re**

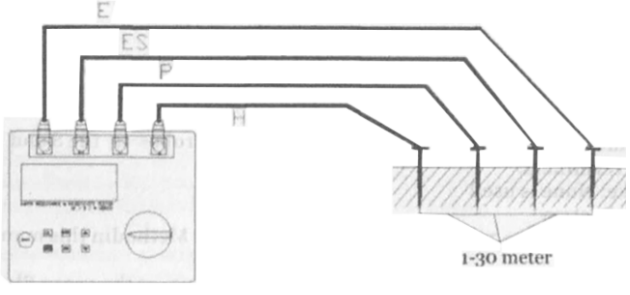
Note) The Re cannot be canceled by the setting of Rk.

8-2 Earth Resistivity (ρ) Measurement

Making a setting of the interval between Auxiliary Earth Spikes first and mesuring the earth resistance with the 4 Auxiliary Earth Spikes stuck into the ground at even intervals. Then the instrument can calculate and display earth resistivity on the LCD automatically.
Terminals to be used : E , ES, S(P), H (C) Terminal
Test Leads : connect to the E, ES, S(P) and H (C) Terminal
Auxiliary Earth Spike : 4pcs

1) Setting of Wiring System : Select wire (r) with reference to 8-2-2 Setting for meas -urement in this manual.
Note) The instrument doesn't accept any setting change on Rk while measuring earth resistvity (ρ)

2) Connection of Auxiliary Earth Spikes and Test Leads : Stick the four Auxiliary Earth Spikes into the ground deeply. They should be aligned at an interval of 1-30m. The depth should be 5% or less of the interval between the spikes.



(e.g The spike should be stuck in the depth of 25cm or less when the interval of the Auxiliary Earth Spikes is 5m.)
If the Spikes stuck too deep, it may result in inaccurate earth resistivity measurement.
Note) The supplied Test Leads can be used for the Spikes stuck at the interval of max 20m. Connect the green, black, yellow, Test Leads connected to the E, ES, S (P) and H(C) Terminals on the instrument to the Auxiliary Earth Spikes from the closest to the farthest in this order.

3) Setting of the Interval between Auxiliary Earth Spikes

The interval of the Spikes should be entered according to the setting made at the step of 8-2-5 Setting for the interval between Auxiliary Earth Spikes at Earth Resistivity(ρ)

4) Earth Resistivity(ρ) Measurement

Select a Range (any Rang is ok) when the connection is done, and press the TEST Button. Then the measured earth resistivity (ρ)and the earth resistance Rg between the ES-S Terminals are displayed.
Press the Key to return to the Main Screen. If the Rg value is too large, the display reads as shown. In this case, rotate the Range Switch and select an upper Range.

Pressing the Key while the measured result of 8-2-5 describes the detailed setting procedure.
Note) The depth should be 5% or less of the interval between the spikes.
If the Spikes stuck too deep, it may result in inaccurate earth resistivity measurement.
Note) Accurate earth resistivity measurement will be affected and errors in measured result becomes large if the Rg value is smaller than the full-scale value at the selected Range. When the Rg an ρ values vary widely at each Range, measurement should be made again at proper Rg Range.
Note) If a message Rh>limit or Rs>limit appear on the LCD, auxiliary earth resistance is too high to make measurements. Recheck the connection of Test Leads.

9. BATTERIES REPLACEMENT

- When the cover is wet, do not open the battery cover.
- Please do not replace the batteries when the instrument testing; Avoid electrical shock, Turn the range switch to OFF before replace the batteries, and remove the test leads and auxiliary grounding rods.
- Unscrew the battery cover screw and open the battery cover; Replace the new batteries, put the battery cover and tighten the screws.

10. Accessories

1 x Auxiliary Earth Spikes
4 x Earth Test Leads (one Red Earth Test Leads 15 meters, one Yellow Earth Test Leads 10 meters, one Green Earth Test Leads 5 meters, one Black Earth Test Leads 15 meters)
8 x 1.5V(AA) Batteries
1 x manual
1 x Bag

MUMBAI

TEST CERTIFICATE

2/3/4- Wire Digital Earth Resistance 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 2040**

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.

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.