KUSAM-MECO® KM 2031 Operating Manual

I. General instruction

This is digital earth resistance tester is the new-generation electrician test instrument successfully developed by the company in recent years. It improves the circuit, structure and process of the traditional earth resistance tester. With the artistic and practical fashion, the functions are more complete, the accuracy degree is higher, the operation is more convenient and reliable, and it is more suitable for outdoor use. It can be used to measure the grounding resistance value of various electric power systems, electrical equipment, lightning protection equipment and other grounding systems, and can also measure the resistance value, AC voltage and DC voltage of the low-resistance conductor.

II. Safety information and warning

This manual is composed of the description for instrument use, safety operation warning and how to maintain it. The instrument may be damaged if it is not used in accordance with the manual. This instrument is designed and manufactured according to safety requirements set out by the IEC61010-1 standards. Its design and manufacture is strictly based on the provision in the 1000V CAT III of IEC61010-1 and the Stipulation of 2-Pollution Grade.

1. Before use of the instrument firstly check up if there is and crack on the outer shell or if it lacks any plastic part, and check up whether the testing line is damaged or has any exposed metal. the instrument can be used only if no any insulating problem be found.
2. Before the test, confirm that the function switch has been set within the appropriate measuring range.
3. During the measurement, one shall not touch the bare wire, connector or the circuit being measured.
4. Confirm that the connect plugs of the conducting wire has been closely inserted into the terminal.
5. In the wet state, one shall not use the instrument or replace the battery.
6. Do not rotate the function switch during measurement.
7. Do not apply the DC voltage above 1500V between the V test port and COM test port. Otherwise, the instrument will be damaged.
8. Do not use this instrument at the flammable place. The spark may cause explosion.
9. If the instrument is damaged or the test line is broken, causing exposed metal, the use shall be stopped.
10. The instrument shall not be placed or kept in the place with high temperature, moisture or condensation and under the direct sunlight.
11. The function switch shall be switched to OFF after use.

III. Electric Symbols

DCV (⎓V)	DC voltage
ACV(~V)	AC voltage or grounding voltage
Ω	Earth resistance
work	Earth resistance measurement indicato
OK	Test the connection OK indicator
	Low battery display
⚠	Warning, be careful
⚠	Danger of being shocked by high-voltage

IV. Feature

1.Measuring range of the earth resistance: 0-2000Ω.
2.Normal working state of LED lamp indication.
3.Display mode: LCD display, maximum display 1999;
4. Auto power off: 10 minutes after it is turned on if no key is pressed or the knob is not turned. press HOLD to wake up in sleep mode.
5.Response time: measure the earth resistance for about 5 seconds. measure the grounding voltage for about 1 second.
8.Batteries.14500-3.7V×2
9.External dimensions:189×89×55mm.
10.Weight: about400g(including the battery).
11.Environmental conditions:
operating temperature: 0℃ to 40℃ relative humidity <80%
Storage temperature: -10℃ to 50℃ relative humidity <80%
Ensure accurate temperature: 23℃±5℃ relative humidity <75%

V. Technical index

1. Earth resistance

Measuring range	Accuracy degree	Resolution
20Ω	±2%+0.1Ω	0.01Ω
200Ω	± (2%+3)	0.1Ω
2000Ω		1Ω

Overload protection: AC 250V effective value

2. Grounding voltage or AC voltage

Measuring range	Accuracy degree	Resolution
200V	± (1.2%+5)	0.1V
1000V		1V

Overload protection: 1500V peak value. Input impedance: 10MΩ frequency scope: 40 to 400Hz

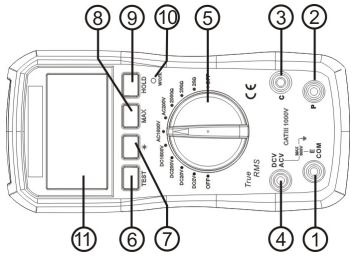
3. DC voltage

Measuring range	Accuracy degree	Resolution
2V	± (0.5%+5)	1mV
20V		10mV
200V		100mV
1500V	± (1%+5)	1V

Overload protection: 1500V peak value. Input impedance: 10MΩ

VI. Schematic diagram of operation

1. "E/COM " port (grounding pole/ negative terminal of voltage measurement)
2. "P" port (potential pole)
3. "C " port (current electrode)
4. "DCV /ACV" port (positive terminal of voltage measurement)
5. Function switch
6. "TEST" test button
7. Back light
8. Max test button
9. "HOLD"data hold button
10. "POWER" indicator lamp
11. LCD screen



VII. Operation instructions

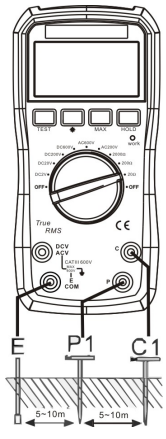
7-1. Normal earth resistance test method

⚠ Danger: during the measurement of the earth resistance, the maximum voltage of 50V will be generated between E-C or E-P terminal! Do not touch the test wire, to avoid electrical shock.

Confirm that the plug of the test lead has been inserted into the test port thoroughly before measurement. Too loose connection will lead to error in the test results.

1） Connection of the test line

As shown in the Figure, hit the auxiliary grounding rod P1 and C1 underground, the distance between P1 and C1 must be more than 5 meters and less than 10 meters, connect the green test wire to the instrument Terminal E, yellow test wire to Terminal P, and red conducting wire to Terminal C.
Note: please insert the auxiliary grounding rod into the ground with high water content. In case of dry, sandy or pebbly ground, add water to maintain moisture of the place where the auxiliary grounding rod is hit. In case of cement ground, lay the auxiliary grounding rod horizontal, and cover the auxiliary grounding rod with the wet towel for measurement.



In the figure, E is connected to the grounding port.
P is connected to the potential electrode port.
C is connected to the current electrode port.
DCV/ACV is connected to the voltage electrode port

2) Working power supply and connection inspection

Press "Test" key, the work indicator light is on. if the " " is display, it indicates that the voltage of 3.7V lithium battery is low. Please timely charge it.

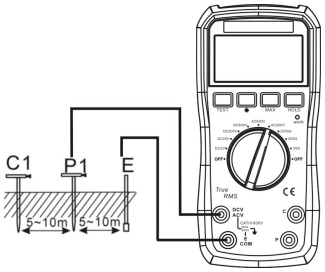
If the screen displays the OK symbol, it indicates that the connection status between the conducting wire and Terminal E and Terminal C is good, and the auxiliary earth resistance is within the allowable range. If the lamp is not on, check up the conducting wire

connected with Terminal E and C, or reduce the auxiliary earth resistance to an appropriate level by changing the position of the ground pole or by wetting the ground with water. The spring clip on the terminal of the red and green conducting wires can be short-circuited, to inspect whether there is any break.

⚠Note: When measuring the ground resistance, the screen does not show the symbol, showing the value is not meaningful.

3) Measurement of the grounding voltage

Firstly, turn the function switch to the AC voltage position. Confirm that the voltage value is below 10V. If the voltage value is above 10V, there might be error in the measured value of the earth resistance, in this case, cut off the power supply of the equipment using the measured grounding port, to reduce the grounding voltage, and then go on the measurement.



In the figure, E is connected to the port of the grounding port.
P is connected to the potential electrode port.
C is connected to the current electrode port.
DCV/ACV is connected to the voltage electrode port

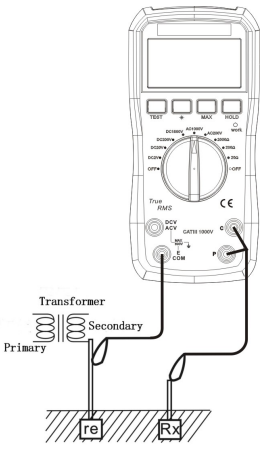
4) Measurement of the earth resistance

Turn the function switch to the 2000Ω position, then press "TEST" key. If the displayed value is too small, turn the function switch in accordance with the sequence of 200Ω/20Ω, and the displayed value at the moment is the measured earth resistance value.

⚠Note: the test wires shall be separated during connecting the wires. If it is tested in the status of intertwining and misconnected of the test wires, the mutual inductance will be caused, which will influence the measured value. The auxiliary ground impedance is too large, and there will be error in the displayed value. It shall be ensured that the auxiliary grounding rod P and C are hit into the wet ground, and every connecting parts are completely contacted.

7-2 Simple earth resistance measurement method

This measurement method is the convenient test method set in the occasion that the auxiliary grounding rod cannot be hit. In the measurement method, the existing grounding electrode with small ground impedance can be used to replace the auxiliary grounding rod C and P, such as the metal tube ,commercial power system, the grounding terminal of the building and so on.



1) connection of the method

The simple test wires shall be connected in accordance with the following figure. If the simple test wires is not the test wires attached in the instrument, please short circuit C and P.

⚠ Danger: if the commercial power system grounding method is used, please be careful of the electrical shock.

2) Measurement of the grounding voltage

Turn the function switch to AC voltage position. Make sure that the voltage value must be below 10V. If the voltage is above 10V, there might be an error in the measured value of the earth resistance. In this case, cut off the power supply of the equipment using the measured grounding body, to reduce the grounding voltage, and then conduct measurement.

3) Measurement of the grounding resistance

Turn the function switch to the 20Ω position, then press "TEST" key. If the screen displays the OK symbol, it indicates that it is being measured. If the displayed value is OL, turn the function switch in accordance with the sequence of 200Ω/2000Ω. In this case, the displayed value is the earth resistance value. Then click the TEST or HOLD button to stop the measurement and hold the measurement data.

⚠Note: the measured current is about 2mA. Therefore, even if the leakage circuit breaker is connected, the circuit breaker will not take an action.

· The true earth resistance value RX must be calculated through the following formula:

RX=RE-Re

Re: the earth resistance of the commercial power system and other common earth resistance, RE: measured earth resistance value of the instrument.

VIII. Battery replacement and charging

Do not replace the battery during the test. In addition, in order to avoid electric shock, please close the range switch before replacing the battery, and remove the test wire first. Loosen the screw on the battery cover of the machine and open the battery cover. Replace the rechargeable battery, close the battery cover and tighten the screw. Note: The battery should not be installed with the wrong polarity.

When receiving the meter, please first use our company with the charging adapter and mobile phone charger (DC5V-USB output: 1A or above charger is available) to charge the lithium battery, fully charged before loading into the meter for use. The charging adapter will limit the maximum charging current to about 350mA, and when the battery shows the battery symbol in the meter, the time to fully charge is about 2 hours.

Before charging, please check that the battery is not broken, the battery polarity should not be inverted, the indicator light does not light when the charging base is inverted, the indicator light does not light when the battery is installed, please immediately check whether the battery is inverted or broken short circuit, and remove the battery in time. When charging, the red light indicates that the Li-ion battery is charged, and the green light indicates that the battery is full or not connected. When the battery symbol is displayed or the meter is not powered on, charge the LI-ion battery first, and then install the machine to check whether it is normal.

Lithium batteries should avoid overcharging and over-discharging, mechanical damage, and being used in high-temperature environments to prevent external or internal short circuits of the batteries, which may lead to thermal runaway, combustion, and explosion. When the meter is not used for a long time, the lithium ion battery should be fully charged storage. It is recommended not to charge it more than 3 months.

IX. Instrument maintenance

1. keep meter and watch pen clean, dry and lossless, available clean cloth or detergent to clean the case, do not use abrasive or organic solvent.
2. Avoid mechanical damage, vibration, impact, corrosion, avoid high temperature position and strong magnetic field.

X. Accessories

1)Auxiliary grounding rod 2 pieces
2)Test line 1 set
(Including; the red test line 15m / piece, the yellow test line 10m / piece, and the green test line 5m / piece)
3)Simple Test line 1 set
(Including; the red test line 1.6m / piece, and the green test line 1.6m / piece)
4)Test lead 1 pair
5) Manual one
6) Cloth bag one
7) Charging transfer seat one

Safety warning

1. The tester must be used by the competent and trained personnel, and shall be operated strictly according to the description in this manual.
2. For the damages to the instrument or the personnel injury caused due to misuse or measurement not conducted in accordance with the safety procedures in the manual, the company will not assume any responsibility.
3. One must read and understand the safety provisions in the manual, and strictly comply with them when using the tester.