





400 kV GAS INSULATED SWITCHGEAR (GIS) for PVUNL PATRATU TPS Project

PATRATU VIDYUT Utpadan Nigam LTD.

BHARAT HEAVY ELECTRICALS LTD

SIEYUAN ELECTRIC CO., LTD

ITEM	UNIT	QTY
E - Supply Item - Tools & tackle & Testing Equipment	lot	1
E.1 Filling pipe	Nos.	2
E.2 Hand shank for DS	Nos.	2
E.3 Hand shank for CB	Nos.	2
E.4 Herringbone ladder	Nos.	2
E.5 Spanner (10~100N.m)	Nos.	2
E.6 Spanner (100~500N.m)	Nos.	2
E.7 Lifting rope(4T, 4m)	Nos.	2
E.8 Lifting rope(2T, 4m)	Nos.	2
E.9 Trolley for SF6	Nos.	2
E.10 Density Meter	Nos.	3
E11.1 Hygrometer	Nos.	1
E11.2 Portable dust counter	Nos.	1
E11.3 Special gas mask for GIS maintenance	Nos.	5
E11.4 Vacuum meter	Nos.	1
E11.5 Digital contact resistance meter	Nos.	1
E11.6 Power operated insulation tester	Nos.	1
E11.7 Tong testers of suitable ranges	Nos.	1
E11.8 Contact resistance measuring set for micro ohms	Nos.	1

5	E.5	Spanner (10~100N.m)	
6	E.6	Spanner (100~500N.m)	
7	E.7	Lifting rope(4T, 4m)	
8	E.8	Lifting rope(2T, 4m)	
9	E.9	Trolley for SF6	
10	E.10	Density Meter	

UT333 BT

Mini Temperature Humidity Meter (Bluetooth Version) Operating Manual

1.Introduction

UT333 BT with Bluetooth function is a stable, safe, reliable mini digital temperature humidity meter, which is widely used in grain storage and transportation, file management, material management, forestry and animal husbandry, health care, teaching experiment, public sector, home, and others. This operating manual includes relevant safety information and warnings. Please read this manual carefully and observe all the cautions strictly.

Warning:
Before using the product, please read the operation safety rules carefully.

2.Out of Box Checking

Open the packing box and take out the meter. Please check carefully if items are missing or damaged.

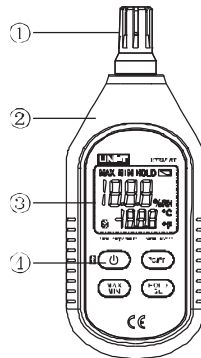
- 1.Blister -----1
2.Operating manual -----1

3.Operation Safety Rules

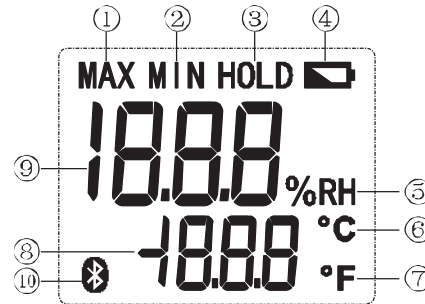
- 1.Please check the meter and the accessories before using and beware of any damage or abnormal phenomenon. If you find the case is damaged or the LCD shows nothing, or you consider that the meter could not work properly anymore, please stop using it.
- 2.Observe the operating instructions while measuring.
- 3.Do not open the meter at will or change internal wiring to avoid damages to the meter.
- 4.When the LCD displays " ", replace the battery timely. Remove the battery if the meter is not used for a long time.
- 5.Do not store or use the meter in high temperature, high humidity, flammable, combustible, or strong electromagnetic environment.
- 6.Please use soft cloth and neutral detergent to clean the case for maintenance. Do not use grinding agent and solvent to avoid case corrosion and damaging the meter.
- 7.This product has passed CE certification

4.Product Exterior

1. Temperature and humidity sensing module
2. Meter case
3. LCD display
4. Function keys



5. Display Interface



1	Maximum measurement
2	Minimum measurement
3	Data hold
4	Low battery
5	Relative humidity
6	Celsius
7	Fahrenheit
8	Temperature value
9	Humidity value
10	Bluetooth communication symbol indication

6. Key Functions and Setup

(remark: "short press" means: about 1 second continuous press; "long press" means: about 2 second continuous press)

1. ON/OFF / Bluetooth communication

Short press once to start up; short press again to power off.
Bluetooth communication: Under the state of boosting unit, long press to enter Bluetooth communication mode, and then long press again to quit Bluetooth communication mode.

2. °C/°F: Unit conversion key:

Short press this key to select Celsius or Fahrenheit at the time of measuring.

3. MAX/MIN:

Pressing this key can select maximum, minimum or normal value measurement; select maximum and the meter will always show the maximum reading; select minimum and the meter will show minimum reading.

4. HOLD/BL:

HOLD: Short press this key once to hold the measurement; short press this key again to exit data hold and continue normal measurement.
BL: Long press this key to turn on backlight; long press this key again to turn off backlight.

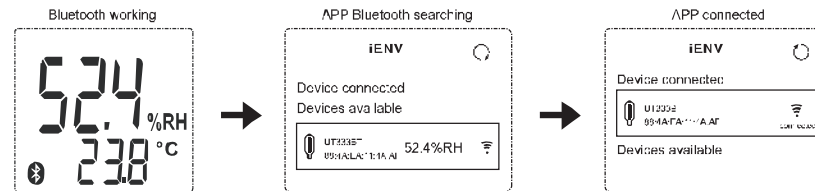
5. Automatic shutdown

No operation 5 minutes after, then shut down the unit automatically (the default mode is of automatic shutdown mode)

When you want to remove the automatic shutdown function, hold down the "Hold" + "ON" key to boot. LCD has a "APO OFF" character prompt, the automatic shutdown function will be removed.

7. Bluetooth APP specification

- To connect Bluetooth, you need to install the application (iENV APP) on the smartphone.
 - OS device access it in App Store, Android device access it in Play Store or Please login www.uni-trend.com to download.
 - Before Bluetooth APP and product are connected, you need to open the Bluetooth at the same time, and through the APP search the Bluetooth, and select the corresponding products to be connected in iENV APP.
- Compatibility:
- ios 8.4 or higher version
 - Android 4.3 or higher version
 - Bluetooth 4.0 or higher version
 - Memory 1G or more
- When in the working state, long press the power button to turn on or off the Bluetooth.
- Bluetooth icon is flashing, indicating that the product is not connected with APP.
 - Bluetooth icon isn't flashing, indicating that the product is connected with APP.



8. Performance testing

1. Technical parameter

Function	Range	Resolution	Accuracy	Remark
Humidity measurement	0~100.0%RH	0.1%RH	±5%RH	Ambient temperature: 23°C±5°C Ambient humidity: ≤90%RH
Temperature measurement	-10~60°C	0.1°C	±1.0°C	
	-4~140°F	0.2°F	±2.0°F	

2. General Type

- LCD: 1 digit LCD display
- Overload indication: When humidity is greater than 99.9%RH, "100.0%RH" will be displayed; when temperature is greater than 60°C or lower than -20°C, "OL" will be displayed.
- Low battery indication: Prompt "BAT".
- Sampling rate: 1s
- Sensor type: High-accuracy digital temperature and humidity module.
- Impact strength: Can withstand the impact of landing from 1 meter's height.
- Power requirement: 1.5V batteries (AAA) x3
- Power consumption: More than 12 hours with Bluetooth enabled
- Product size: 137×55×28mm
- Spec of thread to connect the product with three tripod: m3
- Weight: 102g

3. Environment Limitation

- Indoor use
- Maximum height: 2000m
- Pollution level: 2
- Working temperature and humidity: 0°C~40°C (not greater than 90%RH)
- Storage temperature and humidity: -20°C~60°C (not greater than 75%RH)

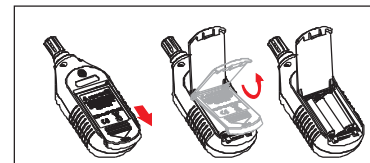
4. General Maintenance

Warning: please do not open the case of meter to avoid affecting device accuracy or damage to the meter.

- Maintenance and service of the meter should be accomplished by professional personnel or designated maintenance department.
- Clean the case by dry cloth periodically, but detergent with abrasive or solvent composition shall not be used.

5. Battery Installation and Replacement

- The meter uses 3 pieces of AAA 1.5V batteries. Please see figure below for steps of battery installation and replacement.
- Turn the panel down, push the battery cover open in the direction of the arrow, lift the cover and remove the batteries; install new batteries in accordance of polarity indications.
- Please use batteries of same type instead of improper ones.
- Close the cover tightly after installing new batteries.



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Particle Counter User Manual



Please read this manual before switching the unit on.
Important safety information inside.

Contents

1.Introduction..... 4

2.Features..... 4

3.Specification..... 4

4.Front Panel And Button Description..... 6

5.Power on or Power off..... 6

6.Measurement Mode..... 6

7.Particle Counter measurement mode..... 8

8.HCHO Measurement mode(The DT-9881 has the unique function)..... 10

9.CO Measurement mode(The DT-9881 has the unique function)..... 13

10.Storage File Browser..... 15

11.System Settings..... 15

1.Introduction

Thank you for purchasing this 4 in 1 Particle Counter instrument.This instrument is Particle Counter with 2.8'' color TFT LCD display & a MicroSD memory card for capturing imgs(JPEG) or video (3GP) for viewing on your PC. Proving fast,easy and accurate readings for particle counter, GAS (HCHO,CO) detectors,air temperature & relative humidity,most surface temperature measurements. It is the first combination of these measurements in global.Would be the best instrument for environment protection and energy save.The dewpoint temperature measurement will be very visiable for wet and dry proof.It is a good hand industrial measurements and data analyzing,the real scene and time can be displayed on color TFT LCD.Any memory readings can be recorded in MicroSD card.The user can be back in office to analyze the measured air quality under the support of software.

2.Features

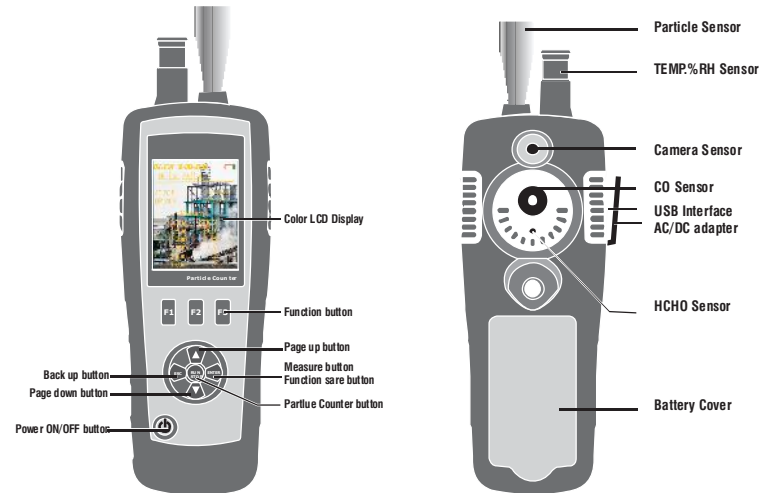
- 2.8" TFT Color LCD display
- 320*240 pixels
- Images(JPEG)& Video(3GP)
- MicroSD(max,use 8GB)memory card
- Air temperature and humidity
- Dewpoint & Wetbulb temperature
- Simultaneously measure and display 6 channel of particle sizes.
- HCHO detectors
- CO detectors
- MAX,MIN,DIF,AVG record,Date/time setup controls
- Auto Power Off

3. Specifications

Particle Counter	
Channels	0.3,0.5,1.0,2.5,5.0,10um
Flow Rate	0.1ft3(2.83L/min)
Counting Efficiency	50% @ 0.3 μ m; 100 % for particles > 0.45 μ m
Coincidence Loss	5% at 2,000,000 particles per ft3
Data Storage	5000 sample records (MicroSD card)
Count Modes	Cumulative, Differential,Concentration,
HCHO Measure	
Range	0.01~5.00PPM
Basic Accuracy	\pm 5%F.S
Display resolution	0.01ppm
CO Measure	
Range	10~1000PPM
Basic Accuracy	\pm 5%F.S
Display resolution	1ppm

Air temperature and Relative humidity measurement	
Air Temperature Range	0°C to 50°C(32°F to 122°F)
Dewpoint Temperature Range	0°C to 50°C(32°F to 122°F)
Relative Humidity Range	0 to 100%RH
Air temperature Accuracy	±0.5°C(0.9°F) 10°C to 40°C
	±1.0°C(1.8°F) others
Dewpoint temp. Accuracy	±0.5°C(0.9°F) 10°C to 40°C
	±1.0°C(1.8°F) others
Relative Hum. Accuracy	±3%RH 40% to 60%
	±3.5%RH 20% to 40% and 60% to 80%
	±5%RH 0% to 20% and 80% to 100%
Operating Temperature	0°C to 50°C(32°F to122°F)
Storage Temperature	-10°C to 60°C(14°F to 140°F)
Relative Humidity	10 to 90%RH non-condensing
Display	2.8"320*240 Color LCD with backlight
Power	
Battery	Rechargeable battery
Battery Life	About 4 hours continuous use
Battery Charge Time	About 2 hours with AC adapter

4. Front Panel And Button Description





5. Power on or Power off







On the power off mode, press and hold  button, until the LCD is on, then the unit will power on.
On the power on mode, press and hold  button, until the LCD is off, then the unit will power off.

6. Measurement Mode











This instrument has three modes

On the power on mode, the unit will display the three measure modes, and display three setup options. You can use  or  button to select any measure mode you need, and use function button F1, F2, F3 to enter the system interface.




Items	Description
 PARTICLE	Particle Counter measurement
 HCHO	HCHO Detector measurement
 CO	CO Detector measurement
	Memory Set
	System Set
	Help file

Symbols

Symbol	Description	Symbol	Description
	Cumulative mode		Differential mode
	Concentration mode		Scan
	HOLD		Alarm working
	CAM mode		CO detection mode
	Video mode		HCHO detection mode

7. ParticleCounter measurement mode

On the power on mode, you can use the ▲ or ▼ button to select , then press the ENTER button to enter the Particle Counter mode, Start to measure and display temperature and humidity.

Press RUN/STOP button to start detection of particles, when the sample time is up, the particle measurement will automatically stop, and the data will automatically save. You can also, press RUN/STOP button to stop the measurement when the sample time is not up. This mode can take picture and take video




7.1 Take picture function

On the particle counter mode, you can see  icon, and these icon corresponding to F1, F2, F3 button, press F1 button can enter picture taking,  icon will appear, you can press F2 button to take picture. Press "ESC" button to exit this mode.

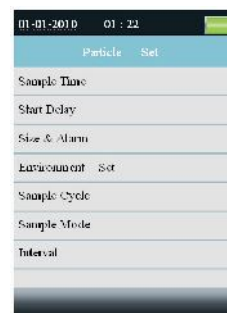
7.2 Take video function

On the particle counter mode, you can see  icon, and these icon corresponding to F1, F2, F3 button, press F2 button can enter video taking mode, Press the RUN/STOP button to start the particle measurement, the instrument start to measure the particle and take video. It can auto to save the file when the measure finished. Press ESC button to exit this mode.

7.3 Particle Setup mode

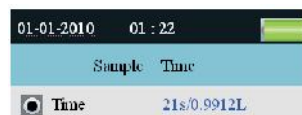
On the particle counter mode, you can see  icon, and these icon corresponding to F1, F2, F3, press F3 can enter the setup mode, on this mode, you can setup any parameter you want. Use the ▲ or ▼ button to select any option you want to setup.

Then press ENTER button to confirm the parameter.



Sample time

You can adjust the sample time use the ▲ or ▼ button to control the volume of measured gas.



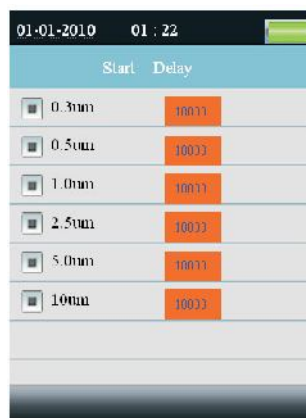
Start Delay

You can adjust the time use the ▲ or ▼ button to control start time.



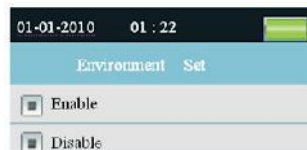
Size & Alarm

This setting is used to select the channel being displayed and the alarm set value channel. Use the ▲ or ▼ button to select channel and use ENTER button to confirm.

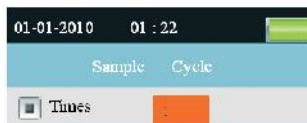


Environment Set




Choose this setting if the Air temperature and humidity are displayed.



Sample Cycle: This option is used to set the sampling period.





Sample Mode

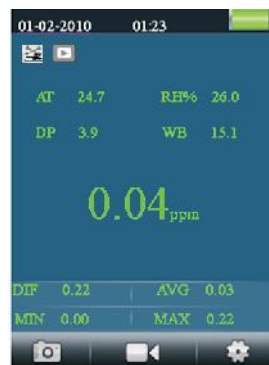
This setting to set the display mode of particle counter. When you select the cumulative mode, the particle measure will display  symbol. When you select the differential mode, the particle measure will display  symbol. When you select the concentration mode, the particle measure will display  symbol.

Interval





Set the time between samples for the sampling period is greater than one times.

8. HCHO Measurement mode(The DT-9881 has the unique function)




On the power on mode, you can use the  or  button to select,  then press ENTER button to enter the HCHO measure mode. Start to measure HCHO, air temperature and humidity after clearing a few seconds. Press RUN/STOP button to stop or open the measurement. This mode can take picture and take video.




8.1 Take picture function

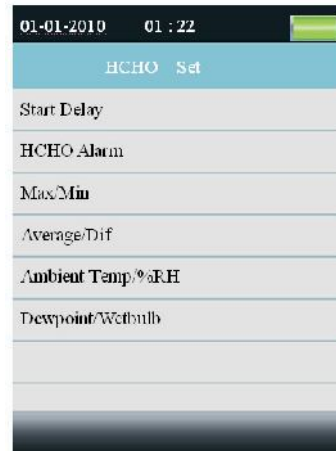
On the HCHO mode, you can see    icon, and these icon corresponding to F1, F2, F3 button, press F1 can enter picture taking mode.  Icon will appear, you can press F2 button to take picture. Press ESC button to exit this mode.

8.2 Take video function

On the HCHO mode, you can see    icon, and these icon corresponding to F1, F2, F3 button, press F2 can enter video taking mode, Press the RUN/STOP button to start the HCHO measurement, the instrument start to measure the HCHO and take video. It can auto to save the file when press RUN/STOP button again. Press ESC button to exit this mode.

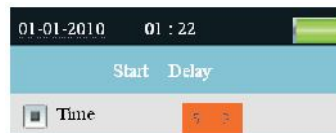
8.3 HCHO Setup mode

On the HCHO mode, you can see    icon, and these icon corresponding to F1, F2, F3 button, press F3 can enter the Setup mode, on this mode, you can setup any parameter you want. Use the ▲ or ▼ button to select any option you want to setup. Then press ENTER button to confirm the parameter.



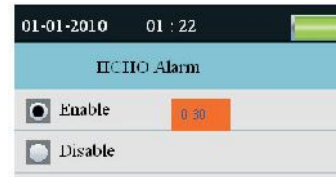
Start Delay

Set the waiting time before the start of measurement. Press ENTER button to select the time and adjust the time with the ▲ or ▼ button.



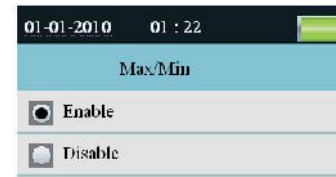
HCHO Alarm

Set the alarm value of HCHO. Optional alarm off and turn the alarm function. You can set the size of the alarm parameters.



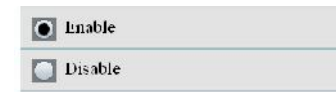
Max/Min

Set whether to display the measured maximum, minimum.



Average/Dif

Set whether to display the value of average or different.



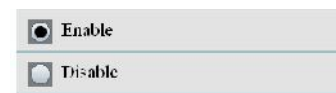
Ambient Temp/%RH

Set whether to display the air temperature and relative humidity.



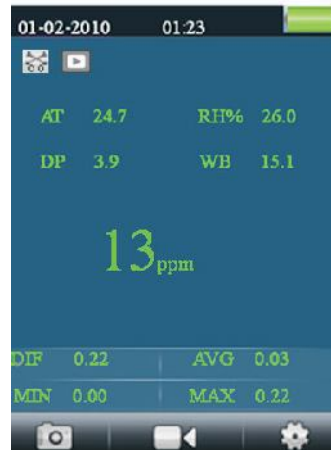
Dewpoint/Wetbulb

Set whether to display the dewpoint and wetbulb.





9.CO Measurement mode(The DT-9881 has the unique function)


On the power on mode,you can use the ▲ or ▼ button to select , then press ENTER button to enter the CO measure mode, Start to measure CO,air temperature and humidity after clearing a few seconds.Press RUN/STOP button to stop or open the measurement. This mode can take picture and take video.




9.1Take picture function

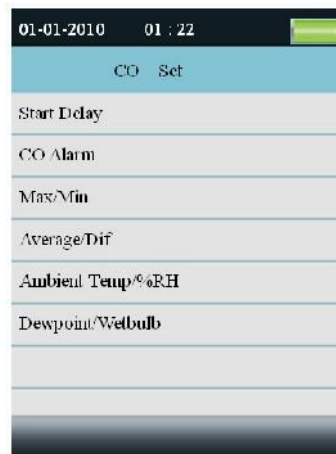
On the CO mode,you can see  icon,and these icon corresponding to F1, F2,F3 button,press F1 can enter picture taking mode.  icon will appear,you can press F2 button to take picture.Press ESC button to exit this mode.

9.2 Take video function

On the CO mode,you can see  icon,and these icon corresponding to F1, F2,F3 button,press F2 can enter video taking mode,Press the RUN/STOP button to start the CO measurement,the instrument start to measure the CO and take video.It can auto to save the file when press RUN/STOP button again.Press ESC button to exit this mode.

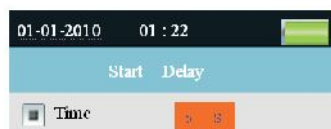
9.3 CO Setup mode

On the CO mode,you can see  icon,and these icon corresponding to F1, F2,F3 button,press F3 can enter the Setup mode,on this mode,you can setup any parameter you want.Use the ▲ or ▼ button to select any option you want to setup.Then press ENTER button to confirm the parameter.



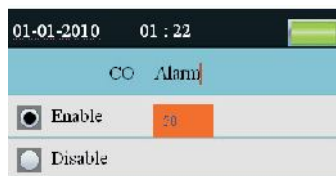
Start Delay

Set the waiting time before the start of measurement. Press ENTER button to select the time and adjust the time with the ▲ or ▼ button.



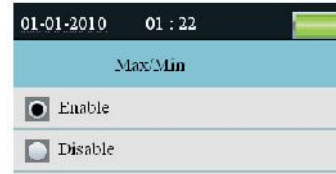
CO Alarm

Set the alarm value of CO. Optional alarm off and turn the alarm function. You can set the size of the alarm parameters.

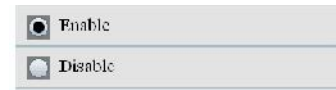


Max/Min

Set whether to display the measured maximum,minimum.

**Average/Dif**

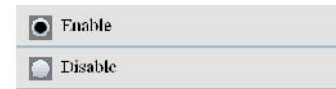
Set whether to display the value of average or different.




**Ambient Temp/%RH**

Set whether to display the air temperature and relative humidity.

**Dewpoint/Wetbulb**

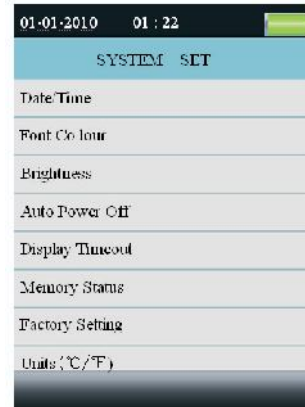
Set whether to display the dewpoint and wetbulb.

**10.Storage File Browser**

Turn the instrument on,below the LCD has a bar icon.  Click on the  icon to enter the data memory via the F1 button.on the Memory set mode,there are three options, press  or  button to select one and press ENTER button to enter this option.and then you can view the recorded data,images,and video information.If you do not save the information,it shows no file.

11. System Settings

Turn the instrument on, below the LCD has a bar icon. Click on the  icon to enter the  System Set Mode via the F2 button.

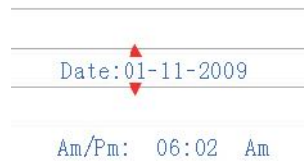


Items	Descriptions
Date/Time	Set date and time
Font Colour	Select the font colour
Brightness	Brightness adjustment
Auto Power Off	Select auto power off time
Display Timeout	Select display auto off time
Memory Status	Display the memory and MicroSD card capacity
Factory Setting	Restore factory settings
Units(°C/°F)	Select the temperature unit

Press the ▲ or ▼ button to select the items, Then press the ENTER button to enter

11.1 Date/Time

Press the ▲ or ▼ button to select the value, press ENTER button to set the next value, press ESC button to exit and save the date and time.



11.2 Font Colour

Press the ▲ and ▼ button to select the color, press the ESC button to esc and save.

- ☐ Orange
- ☒ Green
- ☐ Black
- ☐ Blue
- ☐ Gold
- ☐ Purple

11.3 Brightness

Press the ▲ and ▼ button to select the backlight brightness, press the ESC button to esc and save.

- ☐ 100%
- ☒ 90%
- ☐ 80%
- ☐ 70%
- ☐ 60%
- ☐ 50%
- ☐ 40%
- ☐ 30%

11.4 Auto Power off

Press the ▲ and ▼ button to select the auto power off time or never auto power off, press the ESC button to esc and save.

- ☐ Disabled
- ☒ 3 Min
- ☐ 15 Min
- ☐ 60 Min

11.5 Display Timeout

Press the ▲ and ▼ button to select the Display auto off time or never Display auto off, press the ESC button to esc and save.

<input type="radio"/>	Disabled
<input checked="" type="radio"/>	30s
<input type="radio"/>	1 Min
<input type="radio"/>	2 Min

11.6 Memory Status

Press the ▲ and ▼ button to select the memory (flash or microSD). Press the ESC button to esc and save.

<input checked="" type="radio"/>	Device Memory
<input type="radio"/>	SD Card

Total:	[49]MB
Used:	[0]MB
Free:	[49]MB (100)%

NOTE: If MicroSD card inserted, MicroSD card will be selected by default

Press the ENTER button to format the flash or MicroSD card, press **F3** button to cancel format, press **F1** button to confirm format.

<input checked="" type="radio"/>	Device Memory
<input type="radio"/>	SD Card

Total:	[49]MB
Used:	[0]MB
Free:	[49]MB (100)%

CONFIRM

NO

11.7 Factory Setting

Press the ▲ and ▼ button to select yes or no restore factory settings. Press the ESC button to esc and save.

<input type="radio"/>	No
<input checked="" type="radio"/>	Yes

11.8 Units(°C/°F)

Press the ▲ and ▼ button to select the unit, press the ESC button to esc and save.

<input type="radio"/>	° C
<input checked="" type="radio"/>	° F

OM.W640 SF₆ Special Respirator

1 Summary

W640 SF₆ Special Respirator shall keep personnel during electric power installation, commissioning and maintenance safe, and protect body from toxic gas and corrosive substance. It could be ensure that the breath system, eyes, faces and skin of personnel above avoid the injury of HF, SO₂, XF,...toxic, harmful and corrosive gas from decomposition in SF₆ high voltage equipment.



2 Characteristics

- Adopt the thermoplastic silicone elastic material, it's soft and comfortable.
- The sealing surface is designed by ergonomics AnthroCurve, which is suitable for different face types.
- The mask is designed by patented MultiFlex, and the pressure of the contact surface is uniform when worn.
- Adopt plastic filter case shell, light and compact, do not obstruct the field of vision, comply with environmental protection standard.
- After a period of time, please replace the canisters on both sides of the mask in time.

3 Technical parameters

- Against air flow resistance: <12.0 mm water column (118 Pa)
- SO₂ anti-virus time: no less than 20 minutes (8 mg / L)
- Adsorption acidity : 74.3PPMv (6 liters / min)
- Impurity S2F10O adsorption rate: harmful gas transmission rate is zero
- Adsorption rate of impurity SO₂F₂ is 131.5PPMv, and the transmittance is 1.4%
- Weight: less than 420g

Rotating Macraw's Vacuum Gauge

1. Principles and application

Macraw's vacuum gauge, also called as the vacuum gauge, also called as compression vacuum gauge, is designed as based on a special law of Boyle. Because the pressure can be calculated by its own parameters directly, it also can be used to check some relative vacuum gauge and vacuum gauge as absolute vacuum gauge, such as resistance thermocouple vacuum gauge, vacuum gauge and other films. It is widely used in industry, scientific research, chemical industry, refrigeration etc. because of its advantages.



PM-3(A)

2. Usage methods

2.1 The mercury shall be in the vacuum hose after unwrapping the packing. Please confirm that the equipment is not broken and then loose the hose clamp, let the mercury all back into the glass tube.(If the equipment is broken, please delivery it back.)

2.2 If the vacuum system environment measured is with lots of liquid, steam, high temperature, low temperature and other unfavorable factors, please install a high metal or glass vacuum gauge vacuum valves to ensure that the gas path could be cut off after measuring.

2.3 Before measuring, please remove hose mouth plug, coat it with vacuum grease, install a tightening ring, connect with valve pipe of vacuum system measured, tighten the clamp to prevent leakage, and had better take a high vacuum processing.

2.4 The value of pressure measured would be more exact if the vacuum system measured could exhaust the gas in the vacuum meter to low pressure(less than 1Pa), or exhaust the gas in it for a long time.

2.5 Please rotate the vacuum meter from horizontal status to vertical status slowly, the level of opening capillary mercury shall be on the "0" within 2mm.

3. Maintenance

3.1 The vacuum gauge shall be keep upright to prevent mercury flow away during transportation and usage.

3.2 During measurement, Please prohibit the atmosphere rush into the vacuum guage suddenly to prevent the glass tube is broken.

3.3 If the mercury beads is pasted into the top of capillary, please take the instrument by left hand and pat the lateral lightly. The vacuum pump could be used directly when the mercury beads is away from the top.

3.4 Please delivery the instrument back to manufactory to repair if it cannot be used because of dust, oil and other chemical pollution.

4. Technical parameter

Type	Range	Accuracy	Manufactory Standard
PM-3(A)	1000 ~ 0.1Pa	±25%	Q/supc 01-2001

Shanghai Jiajun Vacuum Guage Manufactorying Co. Ltd.

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UNI-T[®]

UT572



Operating Manual



Advanced Earth Resistance Tester



P/N:110401104516X



UT572 OPERATING MANUAL

Contents

I. Safety instruction-----	1
II. Product characteristics-----	4
III. Technical specification-----	5
IV. Instrument appearance and accessories-----	9
V. Preparation prior to test-----	11
VI. Test specification-----	13
VII. Storing, clearing and viewing data-----	21
VIII. Battery replacement-----	22
IX. Maintenance and repair-----	22

I. Safety instruction

The operation instruction includes the precautions and safety rules to be preserved to ensure the safety usage of instrument. Please read the instructions carefully prior to use and know well the operation methods.

Note:

1. Please read and understand the contents described in the operation instruction prior to use the instrument.
2. The operation instrument shall be preserved well for future use.
3. The instrument shall be tested in strict compliance with the testing methods specified in the operation instruction.
4. Familiarizing the safety-relating contents in the operation instrument shall be required.
5. Observe following safety rules strictly, or otherwise the possible accident or instrument damage will occur.

The safety symbol "△" herein contains three meanings to which special attention must be paid by the user.

△	anger- misoperation will possibly cause severe or fatal injury.
△	Warning- misoperation will cause severe or fatal injury.
△	Notice- misoperation will cause slight injury or instrument damage.

△ Danger

- Never use the instrument in the loop with ground voltage above AC/DC300V.
- Never test in the flammable and explosive environment, or the possible spark will cause explosion.
- Never conduct wiring operation when the instrument or your hands are damp.
- Never apply on the instruent the power exceeding its allowable limit or the testing range.
- Never open the battery cover while testing.





△ Warning

- Never conduct testing under abnormal condition such as rupture of gluey shell and exposure of metal wire, etc.
- Never change the testing range (gear change) if the testing pin is connected during testing.
- Never dismantle the instrument arbitrarily. Contact with our after-sale service department in case of any requirment for repair.
- Never replace the battery or open the battery cover when the instrument surface is wet. Drying is required before any operation.
- Never replace the battery or open the battery cover unless the instrument has been shut down.

Notice

- Prior to testing , please confirm the connecting plugs of testing wire have been inserted in the corresponding ports.
- Take out and perserve well the battery if does not use this instrument for long time.
- Never expose the instrument to the severe environment with extreme temperature and humidity.
- Always clean the instrument with dry cloth or neutra cleaning agent instead of grinding compound or solvent.
- The wet instrument must be dried before preservation.

The instrument has following graphical signs and the meaning of which are described below:

	Means the danger, warning and notice signs.
	Means the double insulation or reinforced insulation protection.
	CE compliance EU standard
	Low battery

II. Product characteristics

The instrument is controlled by intelligent micro-control chip, providing high precision and reliability; applicable to measuring the ground resistance value of various grounding devices such as the power facility wiring, electrical equipments and lightning proof devices (note: the instrument is not applicable to applications under severe outdoor environment conditions, like raining, lightning, etc.)

1. The 2, 3 and 4 wire testing and soil resistivity (ρ).
2. Test the signal frequency: 94Hz /128Hz is available.
3. Compensating resistance RK testing can be conducted.
4. Disturbance voltage Ust and disturbing frequency Fst testing can be conducted.
5. The distance setting range for soil resistivity (ρ): 1-40m.
6. Auxiliary grounding resistance RH and RS testing can be conducted.
7. Ust overlarge alarm function: the instrument is not allowed to perform testing when the disturbing voltage is excessively high.
8. Data storage function.
9. Battery detection and backlight function.
10. Automatic power-off function: press the button to select no-action in the state of power-on, and the instrument will automatically shut down to save power about 5min later.
11. Double insulation or reinforced insulation safety structure.

III. Technical specification

1. Testing range and testing error (when 20±5℃ and ≤75%R)

Function	Measurement Range/Testing Range	Resolution	Accuracy
Grounding resistance (Re) 2-wire testing 3-wire testing 4-wire testing	4Ω	0.01Ω	±(3%+15) Note ①
	40Ω	0.1Ω	±(3%+5) Note ①
	400Ω	1Ω	
	4KΩ	0.01KΩ	
	40KΩ	0.1KΩ	
Soil resistivity (ρ)	4Ω		$\rho=2\pi\times L\times Re$ Note ②
	40Ω		
	400Ω		
	4KΩ		
	40KΩ		
Disturbance voltage (Ust)	1- 50V	1V	±(3%+3) Note ③ (DCV/40~500Hz)
Disturbance frequency (Fst)	40~500Hz	1Hz	±(1%+2)

Note: ① the auxiliary grounding resistance is 100Ω, a data after rectified Rk.

Note: ② accuracy depends on the testing value of Re; the space (L) between auxiliary grounding pins is 1-40m.

Note: ③ the maximum testing range for disturbance voltage (Ust) is 50Vrms, therefore the instrument is not applicable to the mains voltage testing.

Note: ④ the testing value for auxiliary grounding resistance RH and RS is for reference only.

When the grounding resistance RH/RS is not 100Ω (and less than the maximum limit value), the testing accuracy of grounding resistance Re should be as follows:

Function	Gear/Measurement range	Resolution	Maximum limit value of RH/RS	Accuracy
Grounding resistance (Re) 2-wire testing 3-wire testing 4-wire testing	4Ω	0.01Ω	1kΩ	±(5%+15)
	40Ω	0.1Ω	4kΩ	±(5%+10)
	400Ω	1Ω	40kΩ	
	4KΩ	0.01kΩ	50kΩ	
	40KΩ	0.1kΩ	50kΩ	

Note: the testing accuracy of soil resistivity (ρ) depends on the testing value of Re.

2. Application standard:

EN 61010 -1 CAT III 300V Pollution Grade II

EN 61010 -2-033

EN 61010-031

3. Maximum testing range:

Grounding resistance: 40KΩ

Soil resistivity: 1000KΩm

Series interference voltage: 50V

4. Working environment:

Temperature: 0℃~ 40℃

Relative humidity: ≤80%RH (fogless)

Elevation: ≤2000m

5. Storage condition:

Temperature: -20℃~60℃

Relative humidity: < 75%RH (fogless)

6. Power supply: AA alkaline battery (1.5V) ×8

7. Overload protection: E-S, E-H, among each terminal, AC220V/10s

8. Insulation impedance: (1000V circuit to housing) ≥50MΩ

9. Withstand voltage: between circuit and housing, AC 3540V(50/60Hz)/5s, no jump-spark

10. Overall dimensions: 210mm x175mmx90mm

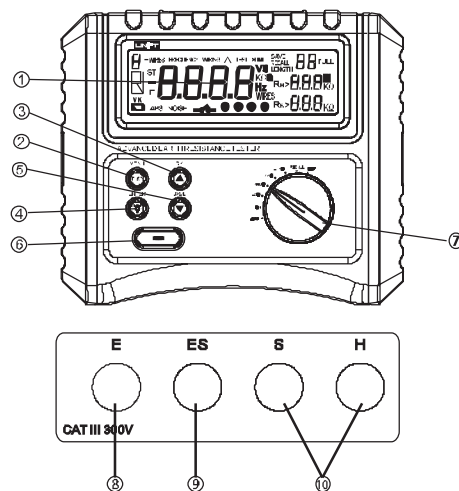
11. Weight: about 1,100g

12. Accessories:

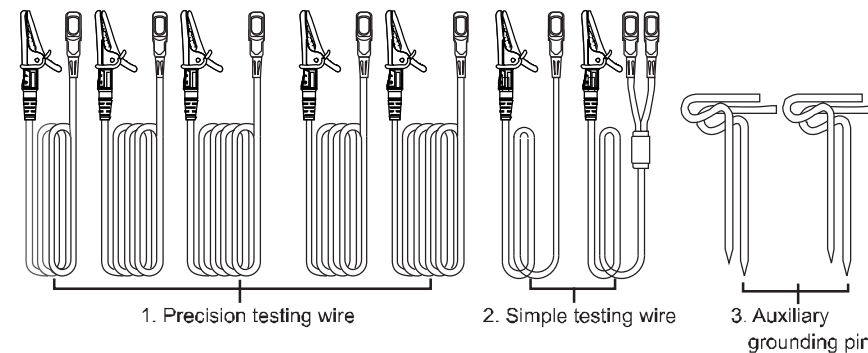
Green testing wire, 5m-----	1
Yellow testing wire, 10m-----	1
Red testing wire, 20m-----	1
Black testing wire, 20m-----	1
Red testing wire, 40m-----	1
Long pin for grounding test-----	4
Simple testing wire with alligator clip-----	1
AA alkaline battery -----	8
Operation instruction-----	1
Tool box/braces/cloth bag-----	1

IV. Appearance and accessories

1. LCD screen;
2. Display/menu key;
3. UP/RK key;
4. Backlight/Confirmation key;
5. DOWN/Storage key;
6. Testing key;
7. Function selection key;
8. Grounding terminal E;
9. Grounding detection terminal ES;
10. Auxiliary grounding terminal H and S.






Testing accessories are shown below:



V. Preparations prior to testing

1. Battery voltage check:

Prior to starting up the instrument, if LCD displays the battery symbol “”, it means the battery is in low battery condition (about less than 9.5V), it is required to replace the battery immediately or the instrument will not work normally.

Note: the instrument is not allowed to perform testing when LCD displays “” during the standby state of instrument; if LCD displays the low battery symbol “” during testing, it is also required to replace the battery or otherwise the instrument will not work normally.

2. Set the testing condition

After starting up the instrument, set the function selection switch at any one gear like the 4Ω/40Ω/400Ω/4KΩ/40KΩ. LCD will enter MENU setting screen after about 2s long press on “MENU” key; the default is the testing mode (wire number) setting state: 3-wire, at this time, “3” will flash; by using the key “▲” or “▼”, you can select 2-wire, 3-wire, 4-wire and soil resistivity (ρ -WIRE) mode after pressing “ENTER”; After this operation, the instrument will enter the testing signal frequency (FW) setting screen; you can also select the frequency: 128Hz or 94Hz by using the key “▲” or “▼” after pressing “ENTER”. If the previously selected testing mode (wire number) is soil resistivity (ρ -WIRE) mode, the instrument will enter the screen of setting spacing distance between auxiliary grounding pins, with default value (LENGTH) of 20m. The distance range, about 1-40m, may be regulated by using “▲” or “▼”, and after pressing “ENTER”, the setting screen will jump to the testing mode (wire number) setting state; if the previous selected testing mode

(wire number) is not the soil resistivity (ρ -WIRE) mode, there will be no setting of the spacing distance between auxiliary grounding pins. After setting, after another 2s long press on “MENU”, the instrument will exit the setting screen and enter RE testing state screen.

3. Testing of compensation resistance (RK)

Allow the function selection switch at 4Ω gear, then the testing mode (wire number) is 2-WIRE or 3-WIRE or 4-WIRE, after 2s long press on “RK”, the instrument enters RK testing state; clamp the testing wire alligator clips (short connection), press “TEST” to test and after testing, press “ENTER” to confirm, and then exit RK testing state and enter RE testing state screen. When the testing value exceeds 4Ω, press “ENTER” to confirm, check the testing wire for breakage or the plug for poor contact.

Note: the RK testing cannot be conducted under soil resistivity (ρ -WIRE) mode.

4. Backlight function

With short press on “”, backlight is turned on; after another short press, it is turned off.

5. Automatic shutdown

The instrument will automatically shut down to save power 5min later if no any key pressing or operation of function selection switch under the standby state.

6. Disturbance voltage (grounding voltage) testing function

While testing the grounding resistance (RE) and soil resistivity (ρ), the instrument will automatically detect the size of disturbance voltage (UST) and disturbance frequency (FST). When the disturbance voltage > 50V, LCD displays “OL V”, indicating the testing value is overranging. Please turn off the relevant electric equipments before any grounding resistance or soil resistivity testing when the disturbance resistance > 10V.

7. Auxiliary grounding resistance (RH and RS) testing function

The instrument can be used to test the auxiliary grounding resistance (RH and RS). Please check the testing wire for connection when the RH value or RS testing value is too large.

Note: Excessive high RH or RS testing value will affect the testing accuracy of grounding resistance RE and soil resistivity (ρ).

8. Connection of precision testing wire and simple testing wire

The precision and simple testing wire should be individually inserted in the corresponding port of instrument completely, and the poor or improper connection will cause testing error.

Note: if the key TEST is pressed when the testing wire has not yet connected, in the range above 400Ω , display screen will display other numbers other than OL, which does not mean the existence of fault.

VI. Test specification

Never apply voltage between the testing ports of instrument while performing the grounding resistance or soil resistivity testing.

1. Precision (3-wire) testing:

The method is the general testing method for grounding resistance. The port to be used: E, S and H port.

Testing wire: corresponding to E, S and H port respectively. Auxiliary grounding pin: 2

(1) Setting the testing mode (wire number)

Please set the 3-WIRE by referring to "Testing condition setting 2".

(2) Rk setting

① Allow three testing wires (green, yellow and red) to be inserted to the corresponding ports of instrument respectively.

② Select the range of 4Ω .

③ Allow the alligator clips of three testing wires to be short circuited.

④ Refer to the testing of compensation resistance (Rk) in 5.3.

Note: if "Rk=OL Ω " is also displayed after shorting-circuiting three testing wires, there would be testing wire breakage or poor contact.

(3) Use and wiring of auxiliary grounding pin

Place and deeply drive the auxiliary grounding pin corresponding to port S and H into the ground in a straight line, with a spacing distance of about 5-10m to the grounding body to be measured. Connect the port E, S and H of instrument to the grounding body to be measured, auxiliary grounding pin S and H respectively by using the testing wires (green, yellow and red). (See Figure 3)

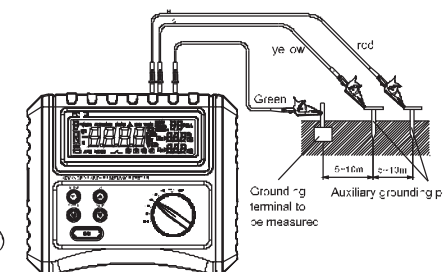


Figure 3

(4) Testing of grounding resistance

After wiring, select any one of the range and perform testing by pressing TEST.

Note: excessive high auxiliary grounding resistance (RH/RS) will affect the testing accuracy. Please check if the testing wire is poorly contacted.

If it is required to test in a dry or small pebble coated place and the sand, maintain the place or the and fully wet by sprinkling water at the place where the auxiliary grounding pin is driven. While performing testing on the concrete ground, it can be conducted by soaking the levelly-placed auxiliary grounding pin or binding the pin with wet cloth.

Stop testing when the disturbance voltage is quite high (greater than 10V). Please turn off relevant electrical equipments prior to any testing.

2. Precision (4-wire) testing:

It is a testing method with higher accuracy. The port to be used: E, ES, S and H port.

Testing wire: corresponding to E, ES, S and H port respectively. Auxiliary grounding pin: 2

(1) Setting the testing mode (wire number)

Please set the 4-WIRE by referring to "Testing condition setting 2".

(2) Rk setting

- ① Allow 4 testing wires (green, black, yellow and red) to be inserted to the corresponding ports of instrument respectively.
- ② Select the range of 4Ω .
- ③ Allow the alligator clips of 4 testing wires to be short circuited.
- ④ Refer to the testing of compensation resistance (Rk) in 5.3.

(3) Use and wiring of auxiliary grounding pin

Place and deeply drive the auxiliary grounding pin corresponding to port S and H into the ground in a straight line, with a spacing distance of about 5-10m between pins from the grounding body to be measured. Connect the port E, ES, S and H of instrument to the grounding body E to be measured, auxiliary grounding pin ES, auxiliary grounding pin S and to the auxiliary grounding pin H respectively by using the testing wires (green, black, yellow and red). The black wire for ES port and the green wire for port E is connected to the same grounding body to be measured (See Figure 4).

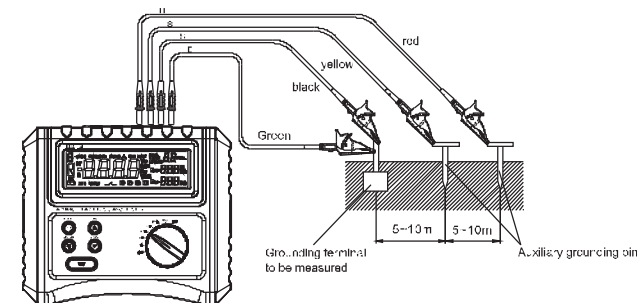


Figure 4

(4) Testing of grounding resistance

After wiring, select any range and press TEST.

Display screen displays the grounding resistance R_e value.

The operation is similar to that of 3-wire testing.

3. Simple (2-wire) testing:

Danger:

The instrument cannot be used to test the voltage of commercial power supply since it is not designed for the commercial power.

Conduct testing by the 2-port method by taking the grounding electrode of known minimum grounding resistance as the auxiliary grounding electrode. In addition, the available electrode may be the metal embedded components like metal pipeline, the common grounding of commercial voltage or the building and the type A grounding electrode (such as lightning rod).

Port to be used: port E, S and H.

Testing wire: simple testing wire.

Auxiliary ground rod: no.

(1) Set the testing method (wire number)

Please set 2-wire by referring to "5.2 testing condition setting".

(2) R_k setting

- ① Allow simple testing wires to be inserted to the corresponding ports of instrument respectively.
- ② Select the range of 4Ω .

③ Allow the alligator clips of 4 testing wires to be short circuited.

④ Refer to the testing of compensation resistance (R_k) in 5.3.

Note: if " $R_k=OL\Omega$ " is also displayed after shorting-circuiting the simple testing wires, there would be testing wire breakage or poor contact.

(3) Wiring

Perform wiring as per Figure 5.

Note: Port S and H must be short-circuited if the attached simple testing wire is not used.

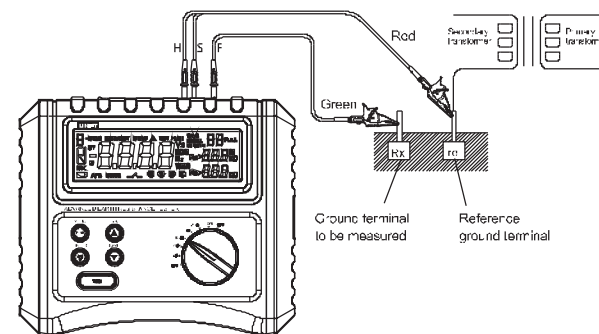


Figure 5

(4) Testing of grounding resistance

After wiring, select the high resistance range as much as possible, press **TEST**. After testing, LCD displays the grounding resistance R_e value. Switch to the next range for a more accurate testing if the grounding resistance is too low.

4. Testing of soil resistivity (ρ)

Determine the spacing distance between auxiliary grounding pins, and test the soil resistivity after driving 4 auxiliary ground rods in the earth with the same spacing distance.

Port to be used: E, ES, S and H. Testing wire: corresponding to port E, ES, S and H. Auxiliary grounding pin: 4

(1) Setting the testing mode (wire number)

Set ρ -wire by referring to "5.2 testing condition setting".

Note: it is unable to set R_k when testing the soil resistivity (ρ).

(2) Driving and wiring of auxiliary grounding pin

Drive 4 auxiliary grounding pins in the earth in a straight line with spacing distance of 1-40m. Then, the driving depth should be set as the value less than 5% of spacing distance between auxiliary grounding pins. (for example, when the spacing distance between auxiliary grounding pins is 5m, the driving depth should be 25cm). Excessive driving depth would cause testing value error of soil resistivity.

Note: the attached auxiliary grounding pin has a length of 20cm.

Drive in the auxiliary grounding pin, and connect the port E, ES, S and H to the auxiliary grounding pin respectively by using testing wire (20m red wire 10m yellow wire, 20m black wire and 40m red wire). (See Figure 6).

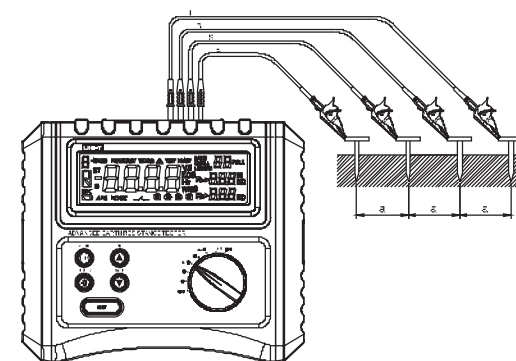


Figure 6

(3) Set the spacing distance between auxiliary grounding pins

By referring to "5.2 testing condition setting" and the **LENGTH** setting for auxiliary grounding pin during testing soil resistivity (ρ), set the spacing distance between grounding pins.

(4) Testing of soil resistivity (ρ)

After wiring, select any range, press **TEST**. After testing, LCD displays the soil resistivity (ρ).

VII. Storing, clearing and checking the data

1. Data storage

When the testing is completed and valid data is displayed under the 2-wire/3-wire/4-wire/p-wire mode, enter the data storage state by a long press on "SAVE" and save a group of testing data; at the data storage state, with a light press on "SAVE", save the second group of data, ... until the 20th group; when the memory is filled with data, with a light press on "SAVE", LCD will display "SAVE FULL" and the data cannot be saved unless some data are cleared. After another long press on "SAVE", exit the data storage state.

2. Data clearing

If want to clear the saved data, press "✖" before starting up the instrument, the LCD will display "CL".

3. Check the saved data

Put the function selection switch at the gear RECALL, then you can check the first group of data saved and view other parameters in the group by pressing "DISP"; after pressing "▲", you can check the second, third ... group of data; or pressing "▼", check the 20th group data (when the memory is filled with data), 19th ... group data. LCD will display "--- RECALL ---" under the gear when no any group of data is saved in the memory.

VIII. Battery replacement

1. Set the range switch as OFF, and take off the testing wires from the instrument.
2. Screw out the battery cover screws inside the instrument, and replace the battery after taking off the cover. 8 cells should be replaced.
3. Put the battery cover in place after replacement and then tighten screws.

IX. Repair and maintenance

1. Cleaning the housing

Since diluted liquids such as the alcohol is corrosive to the housing, particularly the view window, dry towel should be used to slightly wipe the housing. Instrument should be kept from moisture.

2. Maintenance

Please contact with the after-sale service center of the marketing department or the agent in case of any following problems:

- A. Instrument housing or the part is damaged
- B. Abnormal liquid crystal display;
- C. Abnormal data is detected during normal use;
- D. The key fails or gets into disorder;
- E. Noise occurs during testing.

The UNI-T logo is displayed in white text on a dark grey rectangular background.

UT572 OPERATING MANUAL

The UNI-T logo is displayed in white text on a dark grey rectangular background.

UT572 OPERATING MANUAL

The operating instruction is subject to change without any further notice.

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UT513A

Operating Manual



Insulation Resistance Tester

Introduction

Uni-Trend Vocal UT513A Insulation Resistance Tester (hereafter, the Meter) is a handheld instrument designed primarily to test resistance, insulation resistance measurement.

Unpacking the Meter

The Meter includes the following items:

Table 1: Unpacking Inspection

Item	Description	Qty
1	English Operating Manual	1 pc
2	One plug test lead to one alligator clip (-) (black)	1 pc
3	One plug test lead to one alligator clip (+) (green)	1 pc
4	Two plug test lead to one alligator clip (+) (red)	1 pc
5	1.5V Battery (LR14)	8 pcs
6	CD Rom	1 pc
7	USB Interface Cable	1 pc
8	Software	1 pc
9	Power Adapter (input voltage: 220V, 50/60Hz, 500mA output; DC 5V, 100mA) (optional, available at extra cost)	1 pc

It is recommended to select the specific 8pcs chargeable batteries (LR14) and a charger. In the event you find any missing or damaged part, please contact your dealer immediately.

Safety Information

The Meter complies with IEC61010 safety measurement requirement: Pollution Degree 2, Overvoltage Category (CAT. III 600V) and Double Insulation.

CAT III is defined as portable equipment, e.g., with shielded transient voltage overvoltages for CAT III.

Use the Meter only as specified in this operating manual, otherwise the protection provided by the Meter may be impaired.

Danger identifies conditions and actions that pose hazard(s) to the user.

Warning alerts the user to avoid electric shock.

Caution identifies conditions and actions that may damage the Meter and affect accurate measurement.

Operating Caution identifies conditions the user needs to take extra care during operating the Meter.



Use of instrument in a manual not specified by the manufacturer may impair safety features/protection provided by the equipment. Read the following safety information carefully before using or servicing the instrument.

- Do not apply more than 600V.
- Do not use the Meter around explosive gas, vapor or dust.
- Do not use the Meter in a wet environment.
- When using the test leads, keep your fingers away from the lead contacts. Keep your fingers behind the finger guards on the leads.
- Do not use the Meter with any parts or cover removed.
- When carrying out insulation measurement, do not contact the circuit under test.



- Do not use the Meter if it is damaged or metal part is exposed. Look for cracks or missing plastic.
- Be careful when working above 32V rms, 46V ac rms or 79V DC. Such voltages pose a shock hazard.
- Discharge all loading of circuit under test after measuring high voltage.

- Do not change battery when the Meter is in wet environment.
- Place test leads in proper input terminals. Make sure all the test leads are firmly connected to the Meter's input terminals.
- Make sure the Meter is turned off when opening the battery compartment.



- When performing resistance tests, remove all power from the circuit to be measured and discharge all the power.
- When servicing the Meter, use only the test leads and power adaptor with the same model or identical electrical specifications.
- Do not use the Meter if the battery indicator (1) shows a battery empty condition. Take the battery out from the Meter if it is not used for a long time.
- Do not use or store the Meter in an environment of high temperature, humidity, explosive, inflammable and strong magnetic field. The performance of the Meter may deteriorate after dampness.
- Soft cloth and mild detergent should be used to clean the surface of the Meter when servicing. No abrasive and solvent should be used to prevent the surface of the Meter from corrosion, damage and accident.
- Dry the Meter before storing if it is wet.

International Electrical Symbols

International symbols on the Meter and in this manual are explained in Table 2.

Table 2: International Electrical Symbols

	Risk of electric shock
	Equipment: protective double or reinforced insulation
	DC Measurement
	AC Measurement
	Grounding
	Safety Symbol
	Low Battery Indication
	Conforms to Standards of European Union

Battery Saver (Sleep Mode)

The Meter enters the Sleep Mode and blanks the display after 15 minutes' inactivity. This is done to conserve battery power. The Meter comes out of Sleep Mode when ON/OFF button is pressed and waits for 1 second.

Battery Indication

There is a battery indicator shown on the upper left corner of the display. Please refer to Table 3 for detailed explanation.

Table 3: Battery Indication

Battery Indicator	Battery Voltage
	>0V or less. It means the battery is empty, don't use the Meter as it cannot guarantee accuracy.
	0V~0.5V. It means the battery is almost empty, replacing battery is necessary. Under this status, the Meter can still output 500V and 1000V to measure, the measured accuracy will not be affected.
	0.5V~1.1V.
	>1.1V or more.

When charging battery is applied, the charging battery work mode should be selected at the startup. Press and hold USB button prior to startup, then press down ON/OFF. LCD screen will display CHA or GEN, and select to display CHA by pressing the up/down key, after pressing USB key to confirm, the Meter successfully enters the charging battery work mode. GEN means the general alkaline battery work mode.

The Meter Structure

Below Figure 1 and Table 4 shows the Meter front structure and description.

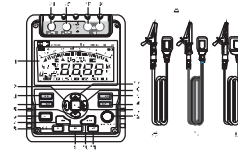


Figure 1: The Meter Front Structure

Table 4: Meter Front Description

1	CD
2	Arrow Button
3	Emergency Stop
4	Date/Store the Display Backlight Button
5	Arrow Button
6	On/Off Button
7	Compare Button
8	Insulation Resistance Button
9	AC Voltage measurement Button
10	Timer Button
11	AC Voltage measurement Button
12	Test Button
13	JS-H Button
14	Date/Store Button
15	Date Recall Button
16	Arrow Button
17	Arrow Button
18	LINE: High voltage input terminal (Connected to two-plug red test lead)
19	High voltage line shunting input terminal (Connected to two-plug red test lead)
20	GUARD: Grounding isolation test terminal (Connected to one-plug black test lead)
21	CART: High resistance measurement input terminal (Connected to one-plug test lead)
22	Testing Leads: Two-plug test lead to one alligator clip, One-plug black test lead to one alligator clip, One-plug green test lead to one alligator clip.

Below Figure 2 and Table 5 shows the Meter side structure and description.

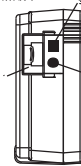


Figure 2: The Meter Side Structure

Table 5: Meter Side Description

1	Safety Symbol
2	Power Adapter Input Terminal
3	USB Port

Display

Table 6 and Figure 3 describe the display.

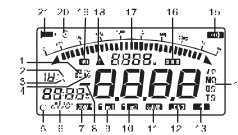


Figure 3: Display

Table 6: Display Description

Number	Meaning
1	Indicator for DC voltage
2	Indicator for data store (1)
3	Indicator for clearing
4	Indicator for AC voltage
5	Indicator for timer
6	Star symbol
7	Indicates selected possible compare value
8	Indicates for range vs. rating
9	Timer 1 symbol
10	Timer 2 symbol
11	Date store is on
12	Date recall is on

13	Indicator for polarization index
14	Unit symbol
15	The continuity buzzer's on
16	Compare feature pass
17	Analog bar graph
18	Risk of electric shock
19	Compare feature fail
20	Indicator for power adaptor
21	Battery life indication

Key Functions

Table 7: Key Functions

ON/OFF	Turn on or off the Meter. Press and hold the button for 1 second to turn the Meter on. Press again to turn off the Meter. The Meter defaults at 500V range and under continuous measurement of insulation resistance when turned on.
LIGHT	Press to turn on/off the backlight.
CLEAR	Press to clear the saved data.
SAVE	Press to save the current measurement value. The Meter can save up to 18 sets. When the stored readout memory is full, the Meter shows FULL and stop storing. Press and hold CLEAR to delete the saved values in order to store the next measurement value.
LOAD	<ul style="list-style-type: none"> Press once to recall the first stored value. Press again to recall Load feature. Load feature can only be used when there is no high voltage output.
▲	<ul style="list-style-type: none"> When the insulation resistance measurement has no testing voltage output, press to select previous voltage range. Under load mode: press to recall the previous saved value.
▼	<ul style="list-style-type: none"> When the insulation resistance measurement has no testing voltage output, press to select next voltage range. Under load mode: press to recall the next stored value.
◀	<ul style="list-style-type: none"> When setting the time for the measurement of insulation resistance or polarization index, press to decrement the time. The maximum length of time is 15 minutes and 30 seconds, the Meter will automatically carry out measurement. When compare function is enabled for insulation resistance measurement, press to decrement the resistance comparing value. After polarization index measurement, press to display polarization index, T1/T2 and T1/T2 time at or resistance values in sequence.
▶	<ul style="list-style-type: none"> When setting the time for the measurement of insulation resistance or polarization index, press to increment the time. The maximum length of time is 30 minutes and 30 seconds, the Meter will automatically carry out measurement. When compare function is enabled for insulation resistance measurement, press to increment the resistance comparing value. After polarization index measurement, press to display polarization index, T1/T2 and T1/T2 time at or resistance values in sequence.
USB	<ul style="list-style-type: none"> Press once to start the data transferring to the computer via USB. USB symbol shows on the display. Press again to stop the data transferring to the computer via USB. USB symbol disappears.
COMP	Set a pass/fail limit to insulation tests. The default value is 10MΩ.
TIME	Press to skip through compare, time and polarization index measurements in sequence.
TEST	Press to stop or start an insulation resistance test.
DCV	Press to initiate DC voltage measurement.
ACV	Press to initiate AC voltage measurement.

Measurement Operation

This section explains how to make measurements.

Press and hold ON/OFF to turn on the Meter, press again to turn off the Meter. The Meter defaults at 500V range and under continuous measurement of insulation resistance when turned on.

A. Measuring Voltage

UT200A/B Operating Instruction

I. Introduction

UT200A/B is a kind of 31.2 digital clamp ammeter (hereinafter called clamp meter) which is safe and reliable and has stable performance. The circuit design of the whole device takes large-scale integrated circuit double integral A/D transducer as its center, fully overload protecting circuit and unique appearance design make it a special electric meter with superior performance.

The clamp meter can be used to measure AC/DC voltage, alternate current, resistance, diode, make-and-break of circuit, etc.

This instruction contains relevant safety messages and warnings. Please read all the contents and abide by all the warnings and points for attention.

II. Unpacking inspection

Open the packing box and take the meter out. Please check whether the following items are lost or damaged:

- 1. Operating Instruction One copy
- 2. Instrument pen One

If anyone is lost or damaged, please contact with your supplier immediately.

III. Safe working rules

Please pay attention to the warning sign and warning messages. Warnings include the situation or actions which might threaten the user, or damage the meter or equipment tested.

This meter is designed and produced in strict accordance with GB4793 safety requirement to electronic measuring instrument as well as EN 61010-1, 61010-2-032, 61010-2-033, criterion, and meets the safety criterion of double insulation, measurement category CAT II 600V, CAT III 300V and pollution degree 2. If it's not used in accordance with relevant operating instructions, protective capability of the meter might be lost or weakened.

CAT II (MEASUREMENT CATEGORY II): Applicable to test and measuring circuits connected directly to utilization points (socket outlets and similar points) of the low-voltage MAINS installation.

Examples are measurements on MAINS CIRCUITS of household appliances, portable tools and similar equipment.

CAT III (MEASUREMENT CATEGORY): Applicable to test and measuring circuits connected to the distribution part of the building's low-voltage MAINS installation.

Examples are measurements on distribution boards (including secondary electricity meters), circuit breakers, wiring, including cables, bus-bars, junction boxes, switches, socket-outlets in the fixed installation, and equipment for industrial use and some other equipment such as stationary motors with permanent connection to the fixed installation.

Check the clamp meter and instrument pen before use, in case they are damaged or abnormally used. If the instrument pen and case insulation of the clamp meter are damaged, or LCD shows nothing, or if you think the clamp meter can no longer work normally, please stop using it.

The clamp meter can't be used if the back cap and battery cover are not well fixed; otherwise, there will be shock hazard.

In measuring, remember the finger shall not forereach the handle of the instrument pen, or touch the exposed wire, connector, input end not used, and the circuit measured, in case of electric shock.

Make sure the functional switch is in a right position before measuring; do not switch during measuring in case the meter is damaged.

Do not impose 600V or above voltage in between the terminal of clamp meter and grounding, in case of electric shock and damage to the clamp meter.

If the meter is working with 42V DC voltage or 33V AC available value voltage, the operator shall be very careful, because there might be electric shock at that time.

Do not measure the voltage or electric current which is higher than the allowable input value. If the range of value measured can't be determined, the functional range switch shall be placed at the maximum range. Before measuring on-line resistance, diode or make-and-break of circuit, cut off the power in the circuits and discharge all the capacitors. After the measuring, disconnect the instrument pen and circuit under test, and take off the instrument pen from the input end of the clamp meter and cut off the power of the clamp meter.

When LCD shows $\frac{0}{0}$, change the battery in time to guarantee the measurement accuracy. Take the battery out if the clamp meter is not used for a long time.

Please do not change the jointing internal lead of the clamp meter randomly, so as not to damage the meter or endanger the operator.

Do not use or place the clamp meter in very humid, inflammable, and explosive environment and environment with strong electromagnetic field environment or high temperature.

Please use soft cloth and neutral detergent to clean the meter case, but not abrasive materials and solvent, so as not to corrode the case, damage the meter or endanger the safety.

Probe assemblies to be used for MAINS measurements shall be RATED as appropriate for measurement category III according to IEC 61010-031 and shall have a voltage RATING of at least the voltage of the circuit to be measured.

IV. International electric symbol

	Double insulation		Grounding
	Warning		AC/Alternate current
	DC/Direct current		Buzzing make-and-break
	Diode		Insufficiency of battery in the meter
	AC or DC/Alternate current or direct current		
	Meeting the standard of European union		
	Application around and removal from HAZARDOUS LIVE conductors is permitted		

V. Composite indicator

- Maximum display: 1999 automatic polarity display
- Measuring method: double integral A/D transducer
- Overrange prompting: most significant bit of LCD shows "1"
- Sampling rate: two to three times per second
- Display of polarity: automatic
- Prompting of undervoltage battery: $\frac{0}{0}$
- Maximum size for opening the clamp heads: diameter: 26mm
- Predicted maximum size of the current lead: diameter: 26mm
- Error of test position: there might be $\pm 1\%$ error in reading the value when measuring the current because the part to be tested is not placed in an appropriate position.
- Type of sensor: AC measuring clamp transformer

- Working temperature: 0~40°C (32°F~104°F)
- Storage temperature: -10~50°C (14°F~122°F)
- Relative humidity: $\leq 75\%$ below 0°C -30°C; $\leq 50\%$ at 30°C~40°C

- Electromagnetic compatibility: at 1V/m radio-frequency field, overall accuracy = appointed accuracy + 5% of the measurement range; no appointed indicator at the radio-frequency field exceeding 1V/m

- Electric power supply: 9V battery (6F22)

- Overall dimensions: 208x76x30mm

- Weight: about 260g (including the battery)

VI. Outside structure figure (see Figure 1)

- Clamp head
- LCD display window
- Keys
- Input port
- Head trigger
- Functional measuring turnplate
- Hand Guards: to protect user's hand from touching dangerous area.

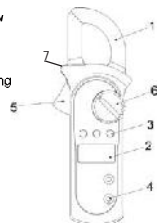


Figure 1

VII. Key functions

Switch position	Functional specification
POWER	Power key
	Backlighting key
HOI D	Data hold key

VIII. Measuring instructions

- Points for attention before operation:

1) Press POWER and check 9V battery; if the battery voltage is insufficient, $\frac{0}{0}$ will be shown in the display, and the battery needs to be charged.

2) Δ beside the plug hole of the test pen means the input voltage or electric current shall not exceed the indicating value in order to protect the internal wiring from being damaged.

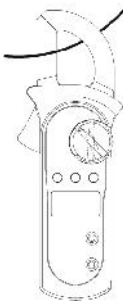
3) Before the test, the functional switch shall be placed at the required measurement range.

2. Measuring of alternate current (see Figure 2)

1) Place the turnplate's functional switch at appropriate position: 2A/20A/200A (UT200A) 20A/200A/600A (UT200B). If the tested value is not sure, please choose the maximum measurement range.

2) Seize a single measured lead wire with clamp heads; adjust the measured lead wire to make it vertical to the clamp head and in the geometric centre of the clamp head, and then make sure the clamp heads are well closed. If two or more conductors are measured at the same time, the indication might be wrong.

3) Then, LCD shows the value of alternate current measured.



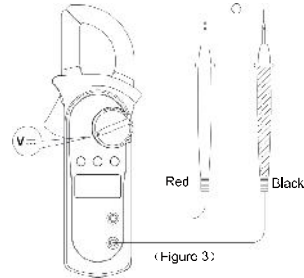
(Figure 2)

3. Shelve of direct voltage (see Figure 3)

1) Place the turnplate's functional switch at 600V.

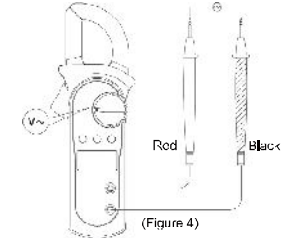
2) Insert the red instrument pen to "V" plug hole, and insert the black instrument pen to "COM" plug hole, and then connect the instrument pen

- to the load to be measured in parallel.
3) Then, the value shown by LCD is the value of direct voltage measured, and the end connected to the red instrument pen is positive.
4) If LCD shows "1", then the end connected to the red instrument pen is negative.



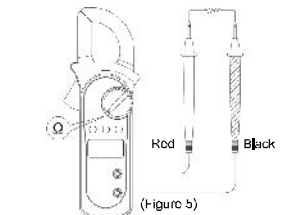
(Figure 3)

4. Shelve of alternating voltage (see Figure 4)
1) Place the turnplate's functional switch at 600V.
2) Insert the red instrument pen to "V" plug hole, and insert the black instrument pen to "COM" plug hole, and then connect the instrument pen to the load to be measured in parallel.
3) Then, LCD shows the value of alternating voltage measured.



(Figure 4)

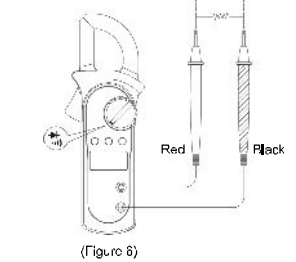
5. Resistance measurement (see Figure 5)
1) Place the turnplate's functional switch at 20kΩ.
2) Insert the red instrument pen to "Ω" plug hole, and insert the black instrument pen to "COM" plug hole, and then connect the instrument pen to the load to be measured in parallel.
3) Then, LCD shows the ohmic value measured. When the resistance measured is greater than 20kΩ or in open circuit, the most significant bit of LCD shows "1".



(Figure 5)

6. Diode and make-and-break test (see Figure 6)
1) Place the turnplate's functional switch at \rightarrow or \rightarrow .
2) Insert the red instrument pen to "H" plug hole, and the black instrument pen to "COM".
3) When measuring the diode, connect the red instrument pen to the positive terminal of the diode, and connect the black instrument pen to the negative terminal of the diode; then LCD shows the forward drop approximate value of the diode measured; silicon diode: 0.5~0.7V; germanium diode: 0.2~0.3V; inversely,

- the most significant bit of LCD shows "1".
4) When the resistance of the component measured or the loop resistance is less than 10Ω, the buzzer will sound; when in the open circuit, the most significant bit of LCD shows "1".



(Figure 6)

IX. Technical Index

Limit of error: \pm (% indication + word count);
guarantee period: 1 year
Ambient temperature: 15~28°C
Ambient humidity: not greater than 75%RH

1.Measurement of direct voltage

Measurement range	Resolution	Limit of error
600V	1V	$\pm(1\%+3)$

Input impedance: 10MΩ
Overload protection: 600Vp

2.Measurement of alternating voltage

Measurement range	Resolution	Limit of error
600V	1V	$\pm(1.5\%+5)$

Input impedance: the input impedance is about 10MΩ
Overload protection: 600Vp
Display: effective value of sine wave (response of mean value)
Frequency response: 50~400Hz

3.Measurement of alternate current UT200A

Measurement range	Resolution	Accuracy
2A	0.001A	$\pm(2.5\%+12)$
20A	0.01A	$\pm(2\%+5)$
200A	0.1A	$\pm(1.5\%+5)$

UT200B

Measurement range	Resolution	Accuracy
20A	0.01A	$\pm(2\%+5)$
200A	0.1A	$\pm(1.5\%+5)$
600A	1A	$\pm(2\%+8)$

Display: effective value of sine wave (response of mean value)
Frequency response: 50~60Hz

4.Resistance measurement

Measurement range	Resolution	Accuracy
20kΩ	1Ω	$\pm(1.0\%+4)$

Overload protection: 600Vp

5. Make-and-break test

Measurement range	Resolution	Note
\rightarrow	1mV	Showing forward voltage drop
\rightarrow	1Ω	When Ron is $\leq 10\Omega$, the buzzer in the machine sounds; when it $> 10\Omega$, it might sound or not and will show the approximate value of the resistance, with the unit being "Ω"

Overload protection: 600Vp

X. Maintenance and repair

△ Warning: before opening the back cap of the meter, make sure the power has been cut off, and the instrument pen has been away from the input port and circuit under test.

1. Ordinary maintenance and repair

- The meter can only be cleaned with camping cloth and a little detergent, and chemical solvent is prohibited to be used to wipe the meter case.
- If the meter goes wrong, stop using it immediately and send it for maintenance.
- If it's necessary to calibrate or repair the meter, invite qualified professional maintenance man or appointed maintenance departments to take charge of it.

- When the meter is not used, cut off the power; if it will not be used for a long time, take the battery out.

- The meter shall not be stored in places with humidity, high temperature and strong electromagnetic field.

2. Change the battery

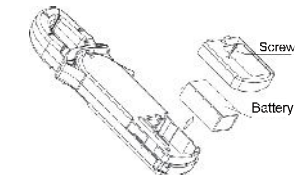
△ Warnings:

- If it displays nothing when powers on, it's suggested that the battery be changed first.
- When the battery voltage is $< 7.5V$ or LCD shows the undervoltage sign, change the battery immediately; otherwise, it might affect the measurement accuracy.

c. Specification of the battery: 9V battery(6F22)

Operational procedures: (see Figure 7)

- When the meter powers off, please move away the test lead at the input end.
- Place the faceplate of the meter downward and unscrew the screws of battery case; unplug the battery cover, and take the battery out.
- Place a new battery and fix the battery cover, and screw it tightly.



(Figure 7)

Contents of the manual are subject to change without notice.

ETL/cETL: Conforms to UL STD 61010-1,
61010-2-032 and 61010-2-033;
Certified to CSA STD C22.2 NO.61010-1,
IEC STD 61010-2-032, IEC STD 61010-2-033

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**OPERATION INSTRUCTION
OF
CR—III B CIRCUIT RESISTANCE TESTER**

XI'AN MULTIPOWER TECHNIC CO.,LTD

CR- III B type automatic circuit resistance tester is designed and manufactured by GB/T11022—1999 and the standard DL/T845.4 of the electric power profession , according to DC voltage falling to measure the contact resistance and circuit resistance of HV switchgear, which adopts advanced HF switch power to supply DC testing current above 100A. The technique of adopt the micro-computer makes to measure all of the processes to automate and measure, In measuring, the circuit current and the circuit resistance of the tested device can be made by putting on the power and pressing the measuring buttons, the circuit current and the circuit resistance can be tested automatically and giving the results. The measuring precision is ensured, furthermore, the testing results do not change with the variety of the testing current. Still have on-line from the check function, the customer is in the process of measuring an equipments in doubt the test data prohibit or that instrument contain problem, directly press from the check key under the circumstance of need not change test line, the instrument then gets into from check appearance, if measure of data and instrument top label mean of from check data consistent, explain that the instrument normally works.

1. Main technical data and parameters

Surrounding temperature: room temperature;

Relative humidity: <85%;

Measuring scope: 0---4000 $\mu\Omega$;

Displaying method: current, resistance are displayed in 4 numerals;

Min. resolving power: $0.1\mu\Omega$;

Error: $\Delta = \pm (0.5\%R_x + 0.1\%A_F)$

R_x =Measured resistance value , A_F =The maximum scale value

Measuring current: $>100A$;

Power: AC 220V $\pm 10\%$ 50Hz

Weight: 8.0 kg

Volume: 420 \times 280 \times 210mm

2. Working principal

The tester adopts HF switch power of pulse width modulate type to supply DC testing current above 100A; HF switch power outputs testing current over 100A as pressing testing button, meanwhile sampling circuit begin to work, the signal received is amplified by magnifier, transforming simulation signal into numerical one through A/D transducer, next for filtering, calculating, processing by micro-processor, finally sending to displayer to show the current and resistance value of the testing. The system will reset automatically after displaying for 5s.

The Min. resolving power is $0.1\mu\Omega$ in testing when the circuit resistance value being tested is smaller than $400\mu\Omega$; the Min. resolving power is $1\mu\Omega$ when the tested circuit resistance value is larger than $400\mu\Omega$.

3. Features

3.1 Fully intellectually, the circuit resistance value and the passing value can be measured just by pressing the measuring buttons;

3.2 Test and totally use one key from the check.

3.3 Have on-line from check function, wanted \sim only big electric current to output composing back track, regardless tested line to be placed in what appearance, press from check key 5 seconds, after check light and test light was bright in the meantime, the system means for the automatic manifestation label of be worth from the check.

3.4 Without distinguishing current and measuring signal polarity;

3.5 The circuit resistance value has nothing to do with the circuit resistance value being measured.

3.6 Wide measuring scope, 0----4000 $\mu\Omega$. The first span is 0---400 $\mu\Omega$, the second span is 401----4000 $\mu\Omega$.

3.7 The power is big, can make the big electric current output line to lengthen to 6 meters above.

3.8 Micro printing interface is fitted.

4. Operation sequence

4.1 All the wirings must be fixed closely in panel, no losing, especially for the output line of large current 100A.

4.2 The device is in testing condition by pressing power switch after inserting AC 220V power source, the current and resistance all display with "000. 0".

4.3 The tester begins to sample by pressing the measuring button; the results come out about 2s, i.e. the current and resistance value tested this time, the measuring value flashes 4 times after holding on for 2s. It is reset automatically after 10s or so, then holding on for measuring

condition.

4.4 If produce a doubt as a result to the diagraph, can press right away from check key 5 seconds, after check light and test light was bright, manifestation of from check value and label mean of consistent, elucidation instrument work normal.(The big electric current pliers deals with in being measured an equipments or is short it to connect at this time)

5. Notes

5.1 Regardless testing from the check is still a big electric current pliers to deal with in being measured an equipments or is short it to connect.

5.2 Second measuring is done after the tester restores automatically, no pressing manual resetting button for continuous measuring, avoiding too hot to affect the accuracy of tester.

5.3 Can't use big electric current line or the test line dalliance instrument, so as not to pull and break line.

5.4 Micro printer must be supplied with special one by seller.

6. Trouble and shooting

Trouble 1:

Current displays with 4-bit numerical tube flashing by pressing the measuring button, the resistance value closes to zero.

Shooting way:

Restore the tester by pressing the resetting button, checking whether high current output wire is fixed or not.

Trouble 2:

The resistance displays 4-bit numerical tube flashing.

Shooting way:

The resistance value of the circuit tested overpasses the measuring scope of tester.

Trouble 3:

The resistance value of the measuring circuit is clearly smaller than the resistance value measured.

Shooting way:

Check whether the measuring wire is fixed closely with the tested device or not.

Trouble 4:

The numerical tube of current and resistance displaying window keeps dim after opening power source.

Shooting way:

Check whether power fuse is burned or not.

Please contact the seller if having other troubles.

7. Appendixes of tester

Power line	1 set
Measuring line	1 pair
High current output line	1 pair
Fuse 3A	1 set



Provide high-grade service

Pursue excellence quality

Create leading brand

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Fax: ++86-29-84683769

Postcode: 710082

Email: sales@multipower.com.cn

Website: www.multipower.com.cn