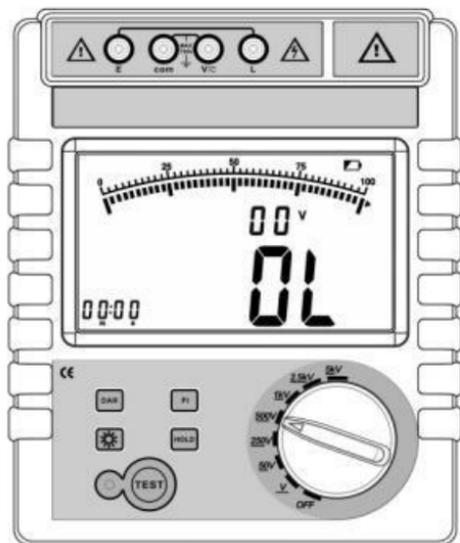


INSULATION RESISTANCE TESTER

3480A
3480B



MANUAL

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Precaution for Use

Thanks you for purchasing our product **VKCR3480 series Insulation Resistance Tester**. Before you use this tester for the first time, to avoid the possible electric shock or personal injury, please be certain: **Read carefully and strictly follow the safety rules and precautions listed in this manual. In any case, should pay special attention to safety for using this instrument.**

- ◆ This instrument is designed, produced and tested according to IEC61010 safety specification.
- ◆ During the measurement, the high frequency signal generator such as mobile phone do not used beside the instrument to avoid causing errors.
- ◆ Pay attention to the text and symbols on the instrument.
- ◆ Before usage, please make sure that the instrument and accessories are in good condition, the insulation layer of the instrument and test wires are not damage, bare or broken wire.
- ◆ During the measurement, prohibit to touch the bare conductor or the measuring circuit.
- ◆ Make sure the connecting plug of the conductor is tightly inserted into the instrument interface.
- ◆ Do not measure in flammable areas, sparks may cause explosions.
- ◆ During usage, please stop to using when exposed metal is caused by outside shell or test wires broken.
- ◆ Do not place and store the tester for a long time under high-temperature and humidity, condensation and direct sunlight.
- ◆ When replacing the battery of the instrument, please make sure that the test line has been removed from the instrument and the instrument is shut down state.
- ◆ Do not measure when the battery cover is opening or when it is thundering.
- ◆ Pay attention to the specified measuring range and operating environment of this instrument.
- ◆ Use, disassembly, calibration, and repair of this tester must be performed by authorized personnel.
- ◆ Due to the reason of this instrument, if it is dangerous to continue to using, should be stopped and sealed immediately, and handled by an authorized institution.
- ◆ The safety warning sign  in the manual must be safely operated by the user in strict accordance with these manual contents.
- ◆ The instrument output high voltage, please be sure to connect the test line first and test line connection plug has been tightly inserted into the instrument interface. Press the test button to testing after the hand is away the test line, otherwise there is danger of electric shock.

1. Introduction

VKCR3480 series Insulation Resistance Tester, also known as megohm meter, insulation resistance tester, for insulation resistance testing. This instrument is a high performance digital type instrument, with LCD large screen with backlight display, data hold, automatic discharge, automatic shutdown and other functions. The instrument has the functions of test timing and voltage monitoring. When the loop voltage is higher than 36V, the instrument will forbid tested to protect the safety of the tested objects and personnel. The instrument easy to operation, insulation resistance value, test time and output voltage display with the same screen, also have the test functions of dielectric absorption ratio test (DAR), polarization index test (PI), AC voltage testing. This series instrument maximum output voltage 5000V, the biggest test resistance value 1000G Ω , maximum short-circuit current 2mA.

VKCR3480 series Insulation Resistance Tester complete appliance is beautiful, wide range, high precision, high resolution, easy to operate, convenient to carry, accurate and reliable, stable performance, strong anti-interference ability. And with the shockproof, dustproof, moisture-proof structure, which is the telecommunication, the electric power, the meteorology, the computer room, the oil field, the mechanical and electrical installation and the maintenance and uses the electric power as the industrial power or the energy industry enterprise department commonly used but essential instrument. It is suitable for measuring the resistance of various insulating materials and the insulation resistance of transformers, motors, cables and electrical equipment.

2. Model Category

Product Model	Rated Voltage	Insulation Resistance Range	Voltage Range
VKCR3480A	2500V	0.1M Ω ~200G Ω	0V~750V
VKCR3480B	5000V	0.1M Ω ~1000G Ω	0V~750V

3. Range and Accuracy

3.1. The temperature and humidity values that ensure the testing accuracy of insulation resistance

Insulation Resistance Range	The humidity values that ensure the testing accuracy of insulation resistance	The temperature values that ensure the testing accuracy of insulation resistance
1M Ω ~100M Ω	<85% RH	23°C \pm 5°C
101M Ω ~20G Ω	<75% RH	
21G Ω ~1000G Ω	<65% RH	

3.2. Range and Accuracy

Measure Function	Output Voltage	Measure Range (Ω)	Accuracy	Resolution
Insulation Resistance	50V	0.10M~1M	$\pm 3\%rdg\pm 5dgt$	0.01M
		1M~1G	$\pm 5\%rdg\pm 5dgt$	0.1M
		1G~4G	$\pm 10\%rdg\pm 5dgt$	0.1G
	250V	0.5M~1M	$\pm 3\%rdg\pm 5dgt$	0.01M
		1M~1G	$\pm 5\%rdg\pm 5dgt$	0.1M
		1G~20G	$\pm 10\%rdg\pm 5dgt$	0.1G
	500V	1M~1G	$\pm 5\%rdg\pm 2dgt$	0.1M
		1G~40G	$\pm 10\%rdg\pm 5dgt$	0.1G
	1000V	2M~1G	$\pm 5\%rdg\pm 5dgt$	0.1M
		1G~80G	$\pm 10\%rdg\pm 5dgt$	0.1G
	2500V	10M~1G	$\pm 5\%rdg\pm 5dgt$	0.1M
		1G~100G	$\pm 10\%rdg\pm 5dgt$	0.1G
		100G~200G	$\pm 10\%rdg\pm 10dgt$	1G
	5000V	50M~1G	$\pm 5\%rdg\pm 5dgt$	0.1M
		1G~100G	$\pm 5\%rdg\pm 5dgt$	0.1G
100G~1000G		$\pm 10\%rdg\pm 10dgt$	1G	
AC Voltage	AC/DC: 0.0V~750V		$\pm 5\%rdg\pm 5dgt$	0.1V

Note: Conversion of common electrical units

1 T Ω (Tera ohm) = 1000G Ω = 10^{12} Ω

1 G Ω (Giga ohm) = 1000M Ω = 10^9 Ω

1 M Ω (Mega ohm) = 1000K Ω = 10^6 Ω

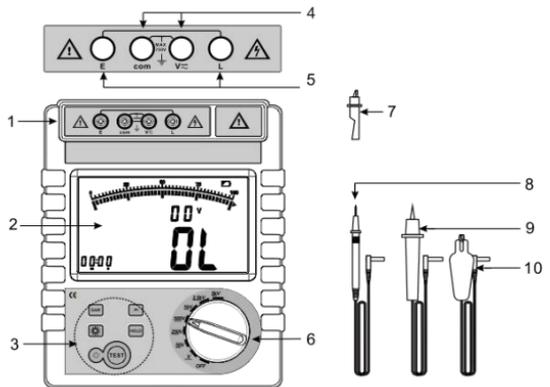
4. Technical Specification

Function	Insulation resistance test, AC/DC voltage test
Power Supply	DC9V Alkaline dry battery 1.5V LR14X6PCS
Rated Voltage	VKCR3480A: 50V;250V;500V;1000V;2500V VKCR3480B: 50V;250V;500V;1000V;2500V;5000V
Output Voltage Accuracy	(5%~10%) $\pm 10V$

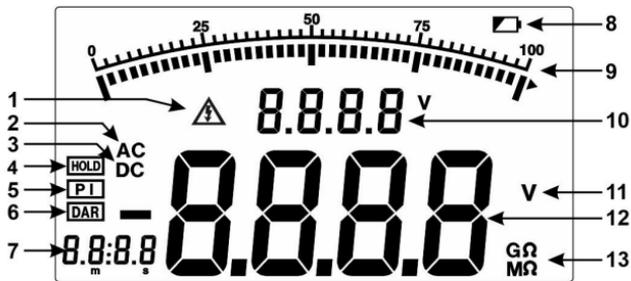
Insulation Resistance Range	VKCR3480A: 0.1M Ω ~200G Ω ; VKCR3480B: 0.1M Ω ~1000G Ω
Voltage Range	AC/DC 0V~750V
Output Short Circuit Current	\leq 2mA
Max Capacitive Load	1 μ F
Dielectric Absorption Ratio Test (DAR)	YES
Polarization Index Test (PI)	YES
Shift	Turn the shift rotary knob to select the appropriate gear
Backlight	Controllable off-white backlight, suitable for dark places
Display Mode	4 digital LCD display, contrast clear
Measurement indication	LED flicker and buzzer ring in measurement
LCD Size	128mmX75mm ; Display area: 124X67mm
Meter Dimension	212mmX175mmX85mm
Test Wires	High voltage bar test wire: Red 1PCS; Probe test wire: Black 1PCS; Alligator clip test wire: 1PCS; Alligator clip: 1PCS
Test Time	The single test time is 10 min. During the test, the user can stop automatically or automatically stop after 10 min, and the screen display measurement data
Battery Voltage	Battery voltage symbol display, when battery voltage is low will remind to replace the battery in time
Automatic Discharge	Automatic release the voltage of the measured object, During discharging, symbol flash. Discharge completion symbol extinguish
Auto Shutdown	15 minutes after boot up, the meter shuts down automatically without any operation
Power Consumption	Standby: about 40mA(backlight off); Start up with backlight: about 50mA; Measurement: about 100mA(backlight off)
Weight	2.4kg(include packing)
Working Temperature and Humidity	-10 $^{\circ}$ C~40 $^{\circ}$ C; below 80%RH
Storage Temperature and Humidity	-20 $^{\circ}$ C~60 $^{\circ}$ C; below 70%RH
Suitable Safety Standard	IEC61010-1(CAT III 300V, CAT IV 150V, Pollution 2)

5. Tester Structure

- 5.1. Host
- 5.2.LCD display screen
- 5.3. Button and indicator
- 5.4.AC voltage test interface
- 5.5.Insulation resistance test interface
- 5.6.Gear selection switch
- 5.7.alligator clip
- 5.8.Probe type test line
- 5.9.High voltage probe test line
- 5.10.Alligator clip test lead



6. LCD Screen



- 6.1.Discharge symbol
- 6.2. AC symbol
- 6.3. DC symbol
- 6.4. Data hold symbol
- 6.5. PI symbol
- 6.6. DAR symbol
- 6.7. Test time
- 6.8. Battery power symbol
- 6.9. progress bar
- 6.10. Voltage test value
- 6.11. Voltage unit symbol
- 6.12. Resistance/voltage test value
- 6.13. Resistance unit symbol

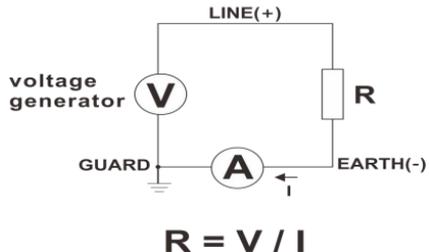
7. Button Function

TEST	Test button, press to starting the test, press again to stop the test
DAR	Dielectric Absorption Ratio Test (DAR) button
PI	Polarization Index Test (PI) button

	Backlight on/off button
	Data hold button

8. Measurement Principle

Insulation resistance measurement use a voltage generator to generate a voltage V , which is applied to both ends of the measured resistance. By measuring the current I flowing at both ends of the resistance, the insulation resistance value R is calculated according to the formula $R=V/I$.



9. Measurement Method

9.1. Start Up/Shut Down

Start up the instrument by adjusting the knob to any non-OFF gear, and shut down the instrument by adjusting the knob to OFF position. If there is no operation for a long time after starting up or you forget to shut down the instrument, the system will start the internal timer, and the instrument will shut down automatically after 15min. When you need to restart after the automatic shutdown, first adjust the knob switch to the OFF gear and then set to the target voltage gear to start up again.

9.2. Battery Voltage Checking

After start up, if the LCD displays the battery undervoltage symbol "  ", indicating that the battery is low, please replace the battery in time.

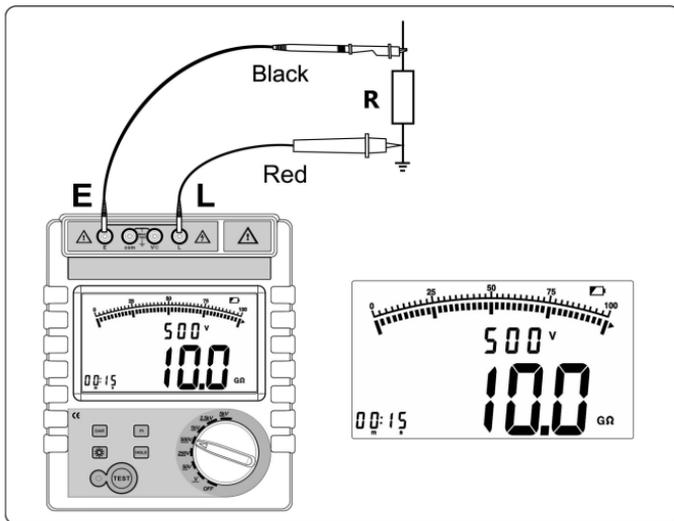
Note: Only sufficient battery power can ensure the measurement accuracy.

9.3. Insulation Resistance Test

	The insulation resistance test can only be carried out on non-electricity load. Before the test, please check whether the test line and wires are in good condition and whether the tested circuit is live. If the tested loop circuit is live, the measurement accuracy may be affected or the instrument may be damaged.
	Please check whether the battery is undervoltage before the test. If there is a battery undervoltage symbol on the screen, the battery needs to be replaced, otherwise the test accuracy will be affected
	During the test, it cannot change the gear with live electricity. If you need to change the gear, must stop the output. it can change the gear when the voltage drops below the safety voltage.
	After the test, the meter will discharge automatically. At this time, the test loop circuit cannot be disconnected, the test operation cannot be carried out, and the

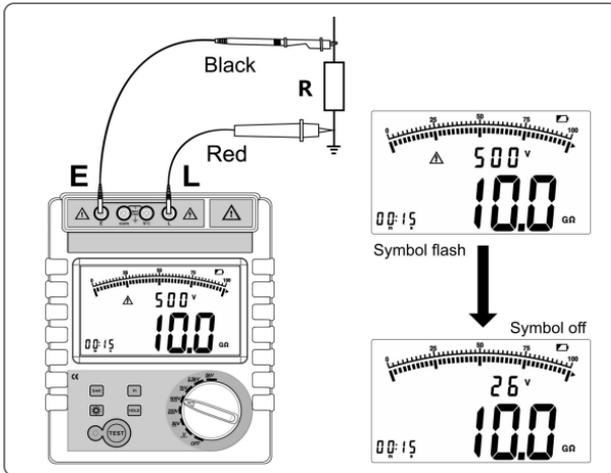
	gear cannot be shifted. The test can only continue until the discharge symbol is disappear.
	When measuring insulation resistance, press the test button, it will generate high voltage between the metal part of the test line and the tested loop circuit. Please pay attention to avoid touching.
	Do not touch the circuit immediately after the test. The stored charge may cause electric shock accident.
	After press the test button, start the test, and then finish the test immediately, indicate that the tested resistance exceeds the lower limit of the range of the voltage gear, so it is necessary to change the low voltage gear for measurement.
	It is recommended to test the resistance by the voltage of sampling test from low to high, so as to prevent the use of high voltage gear directly and the test of small value resistance resulting in the burning of the meter and other accidents.

Specific test process is as follows: before the test, check the test loop circuit whether with electricity, test lines are in good condition, whether the battery is undervoltage etc., after the check, as follow figure to connect the test lines, turn knob and switch to the non-OFF target voltage gear, and then press the **(TEST)** button to begin testing, at this time will have high voltage output, the screen display is the insulation resistance of the test circuit, at the same time display the test time and output voltage (display alternately), press again the test button to stop testing, the screen keep test results. Refer to the following figure for the test process:



(Insulation Resistance Diagram)

The instrument has automatic discharge function, automatically releases the terminal voltage of the measured object after the testing. When discharging, the LCD **⚠** symbol flashes. At this time, the instrument cannot test, the tested circuit cannot be disconnected, and the gear cannot be shifted. The symbol shall be extinguished after discharge to the safe voltage (36V) or lower and **⚠** symbol disappear, then can continue to test or operate.



(Discharge Symbol Diagram)

9.4. Data Hold

This instrument has data hold function. After measuring AC voltage or insulation resistance value in the test, can press the **HOLD** key to realize data hold. The measured value and **HOLD** indicator symbol will be displayed on the screen for convenient analysis and recording. Press again **HOLD** button cancel data hold and normal test. If in the hold state, press the test button to automatically cancel the hold state and enter the test state.

9.5. Backlight Control

After starting up, test in a poorly lighting environment. If the screen display cannot be seen clearly, press "" button to turn on the backlight, and press the button again to turn off the backlight. If the user does not press the backlight button again, it will be automatically turned off after 30s, backlight function suitable for dim place. Every boot default backlight off.

9.6. Dielectric Absorption Ratio (DAR) & Polarization Index (PI)

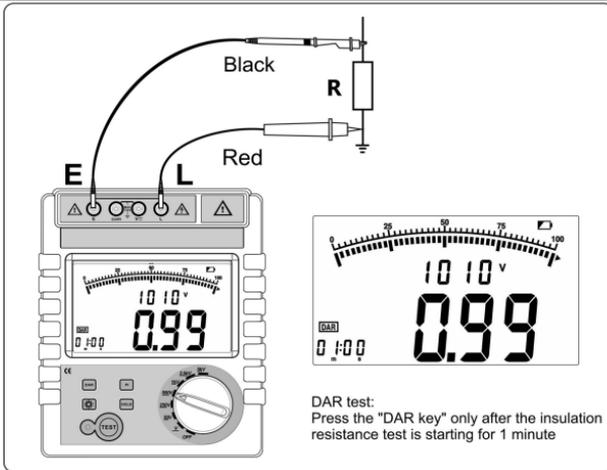
Since the time length of applying DC voltage to the equipment is different, the influence on the humidity of the insulator is different. Therefore, by comparing the ratio of the two parameters, it can be determined whether the insulation resistance is affected by the humidity of the insulator. Absorption ratio and polarization index are independent of the shape and size of the insulator and vary with the humidity of the insulator. Therefore, the detection of absorption ratio and polarization index is very important in the cable insulation diagnosis.

Dielectric Absorption Ratio refers to the ratio of insulation resistance between 1 minute and 15 seconds. Dielectric absorption ratio need to complete within 1 minute. Therefore, for all insulation

tests less than 1 minute, the measurement data will be stored as invalid data. When the insulation test time is 1 minute or longer, the absorption ratio measurement is included in the results.

$$DAR = \frac{R_{1min}}{R_{15s}}$$

Dielectric Absorption Ratio (DAR)	>1.4	1.25~1.0	<1.0
Insulation State	Very Good	Good	Bad

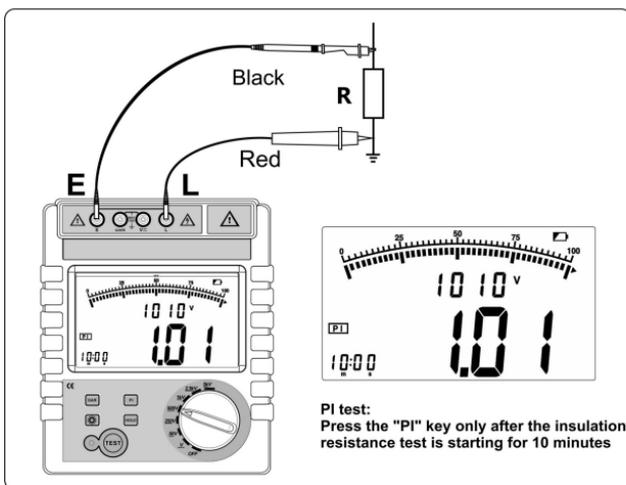


Dielectric Absorption Ratio Diagram

Polarization Index (PI) refers to the ratio of insulation resistance between 10 minutes and 1 minute. The polarization index test took 10 minutes to complete. The polarization test will be completed and saved when the insulation test is 10 minutes or longer.

$$PI = \frac{R_{10min}}{R_{1min}}$$

Polarization Index (PI)	>4	4~2	2.0~1.0	<1.0
Insulation State	Very Good	Good	Problems	Bad



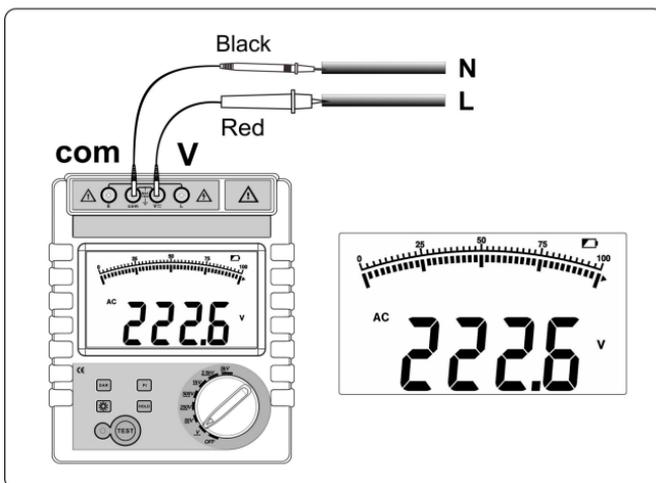
Polarization Index Diagram

9.7. Voltage Test

When measuring, rotate the knob switch to V gear, connect the red probe to the L terminal, and the black probe to N terminal, then the LCD will display the real-time AC voltage value. The test process is shown in the figure below:



The voltage input to instrument cannot exceed 750V.



(Voltage testing diagram)

10. Battery Description

The meter is powered by 6 X1.5V LR14 AM2 dry batteries. When the battery power decreases and the voltage drops to 8V, the power symbol "" will be displayed. Please replace the battery in time. The measurement accuracy is affected when the voltage is lowered. If the meter is not used for a long time, the battery should be removed.

11. Accessories

Tester	1 PCS
High Voltage Probe Test Line(Red, line length about 2m)	1 PCS
Probe Test Line(black, line length about 2m)	1 PCS
Alligator Clip Test Line(Black, line length about 2m)	1 PCS
Alligator Clip (black)	1 PCS
Alkaline Battery(1.5V, LR14)	6 PCS
Instrument Bag	1 PCS
Manual/ Warranty Card / Qualification Certificate	1 SET

The company is not responsible for other losses caused by use.

The contents of this user manual cannot be used as a reason to use the product for special purposes.

VKCR reserves the rights to change specifications or designs described in this manual without notice and without obligations.