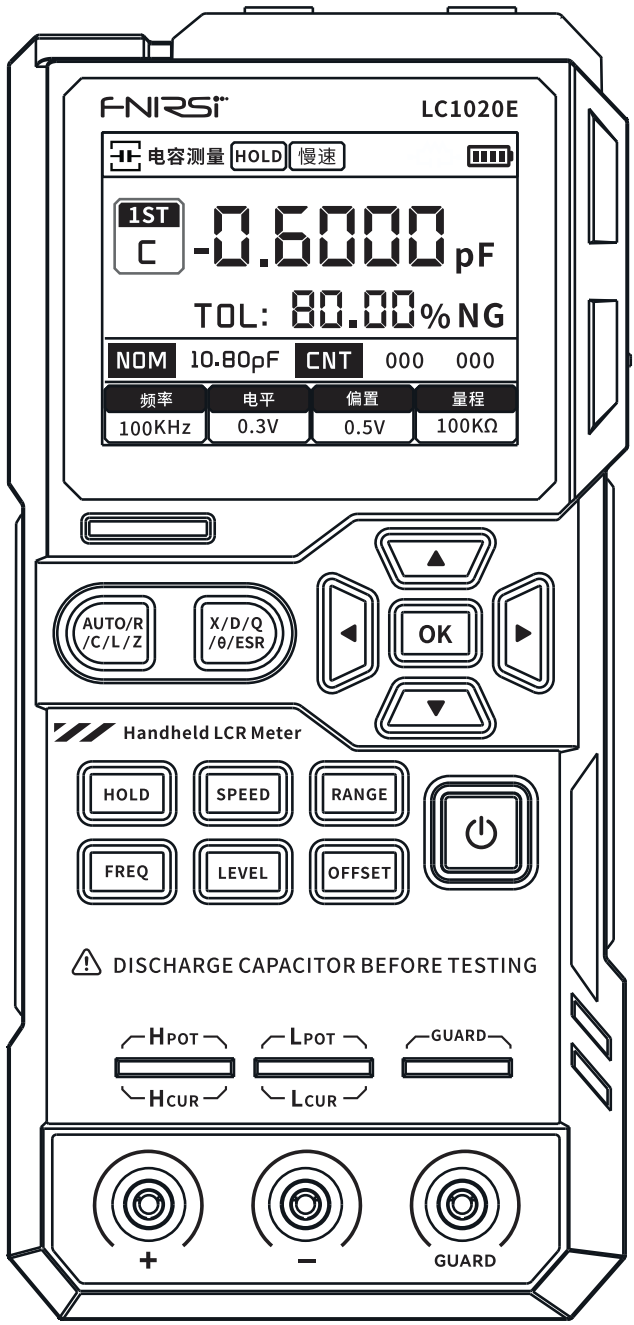
FNIRSI 菲尼瑞斯

LC1020E

LCR高精度手持电桥产品说明书V1.0

HIGH-PRECISION HANDHELD LCR METER MANUAL



※使用产品前请仔细阅读本说明书，并妥善保管。

※Please read this instruction manual carefully before using the product and keep it properly.

CONTENTS

1. SAFETY

These safety measures apply to operators and maintenance personnel. Pay attention to these precautions during operation, service, and maintenance.

●Do not use in flammable or explosive environments

Avoid using in harsh environments such as dusty areas, direct sunlight, high humidity, and strong electromagnetic radiation.

●Do not open the rear cover if you are not a professional technician

Maintenance, component replacement, or instrument adjustments should be performed by professional technicians. Please contact relevant distributors or the product's after-sales service department.

●Do not disassemble or modify the instrument arbitrarily

Some unauthorized replacements and modifications may result in the instrument's performance being permanently compromised.

●Safety Warning

For operations that involve safety or personal injury risks, or actions that could damage the product and lead to poor test results, relevant statements will be provided in the manual. Strict adherence to these guidelines is required.

2.SAFETY GUIDE

To ensure the safe use of the instrument, please follow these guidelines:

●For short outdoor use, take precautions against direct sunlight, water, moisture, electromagnetic radiation, dust, and explosion risks.

●Before use, read and understand the warnings and safety information mentioned in this manual.

●Use the instrument according to the methods specified in the manual.

●If measuring circuit components, ensure the power is turned off and all capacitors and inductors are discharged before measurement.

●Before measuring, discharge components like capacitors and inductors that may be charged.

●The instrument is powered by a 3.7V, 3000mAh lithium battery or via a Type-C USB cable, with charging functionality.

3.PRODUCT INTRODUCTION

Product Introduction

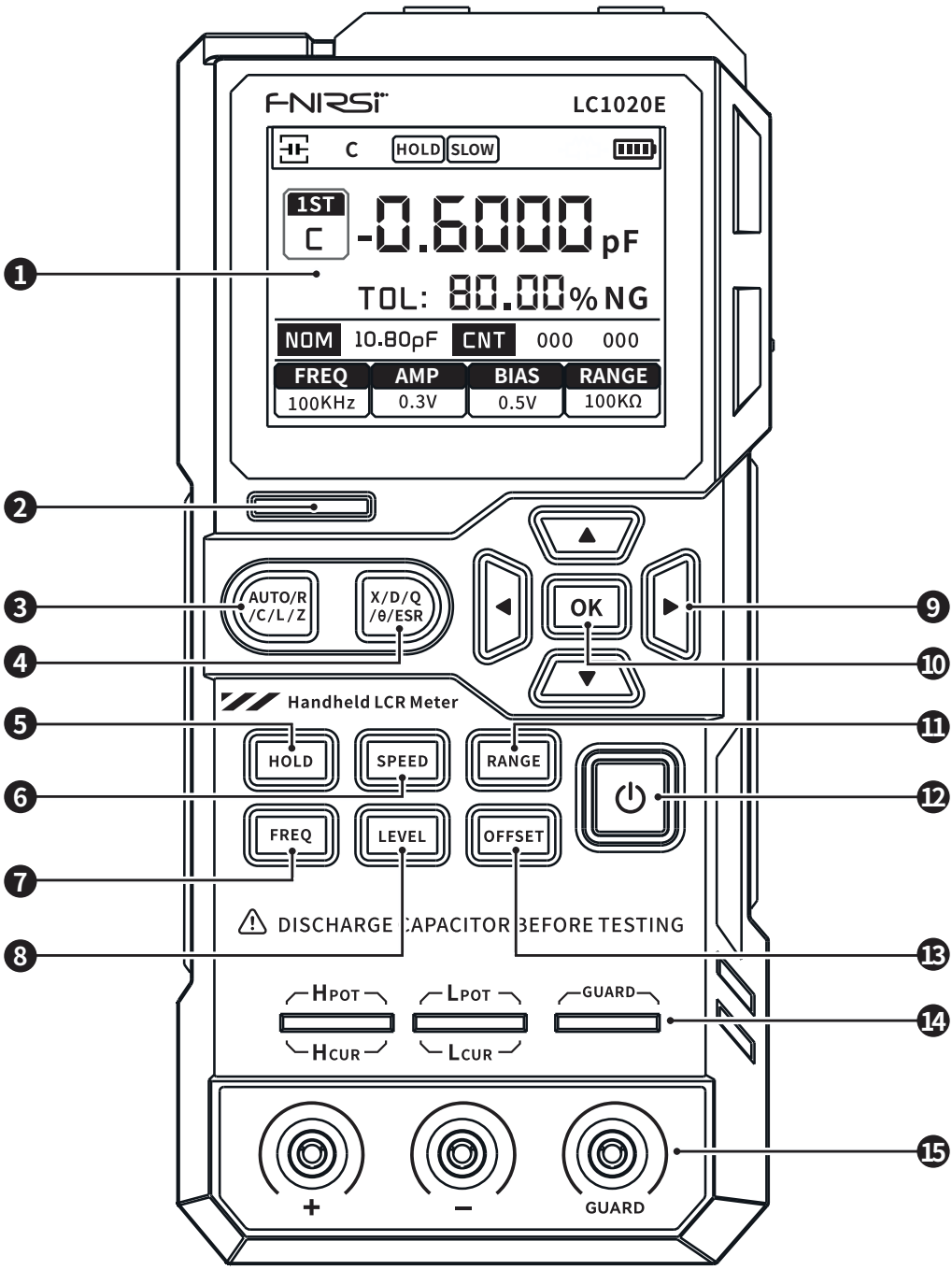
The High-Precision Handheld LCR Meter is an electronic component testing tool that integrates high precision, portability, and intelligence. It is designed for engineers, technicians, and electronics enthusiasts, meeting the precision measurement needs in various scenarios such as laboratories, production lines, and on-site maintenance.

Featuring a 2.8-inch high-definition TFT color display, it supports multiple parameter combinations such as L/Q, C/D, R/D measurements, and is compatible with series/parallel equivalent circuit models. The preset threshold values allow for quick determination of good/bad components, with audio and visual prompts to significantly enhance batch testing efficiency, facilitating efficient sorting and quality control.

With a maximum testing frequency of 100 kHz, it can easily handle high-frequency parameter analysis of components such as inductors, capacitors, and resistors, covering a broader range of applications. The compact body, combined with a long-lasting battery, eliminates the need for cables, making it easy to carry in your pocket and enabling precise measurements anytime and anywhere.

4.FRONT PANEL OVERVIEW

4.1 Front Panel



①**Display Screen:** 2.8-inch TFT LCD display showing all the functions of the instrument.

②**Indicator Light**

③**Main Parameter Switch Key:** Quickly switch the main parameters.

④**Secondary Parameter Switch Key:** Quickly switch the secondary parameters.

⑤**Data Hold and Record Key:** Short press to toggle the data hold function on/off; long press to toggle the data recording function on/off.

⑥**Measurement Speed Switch Key:** Quickly switch the required measurement speed.

⑦**Frequency Selection Key:** Quickly switch to a fixed frequency point.

⑧**Level Selection Key:** Quickly switch to a fixed level point.

⑨**Directional Keys:** Left and right keys to move the cursor, up and down keys to select parameters.

⑩**OK Key:** Long press to enter or exit the system settings menu; short press to confirm the selection of parameters or a function.

⑪**Range Switch Key:** Switch between manual range and auto range.

⑫**Power Key:** Long press to power on when the instrument is off; long press to power off when the instrument is on.

⑬**Offset Switch Key:** Quickly switch to a fixed offset point.

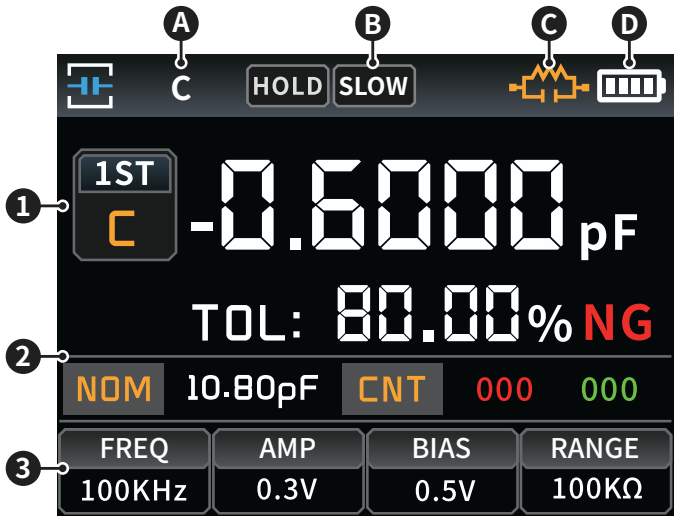
⑭**Five-Terminal Test Slot**

⑮**Three-Terminal Test Socket**

⚠ **Note:** Please use the included adapter or purchase a specified power adapter from our company. Using other replacement adapters may cause unnecessary damage.

4.2 User Interface

▶ 4.2.1 Measurement Interface



Status Bar Area:

A: Displays the main parameter currently selected for measurement

B: Displays the current measurement speed selected

C: Long press the【SPEED】key to display the current circuit connection method (Auto, Series, Parallel)

D: Battery level indicator, showing the remaining battery power to remind users to charge the device in time

Parameter Area:

① Main parameter display

② Secondary parameter display

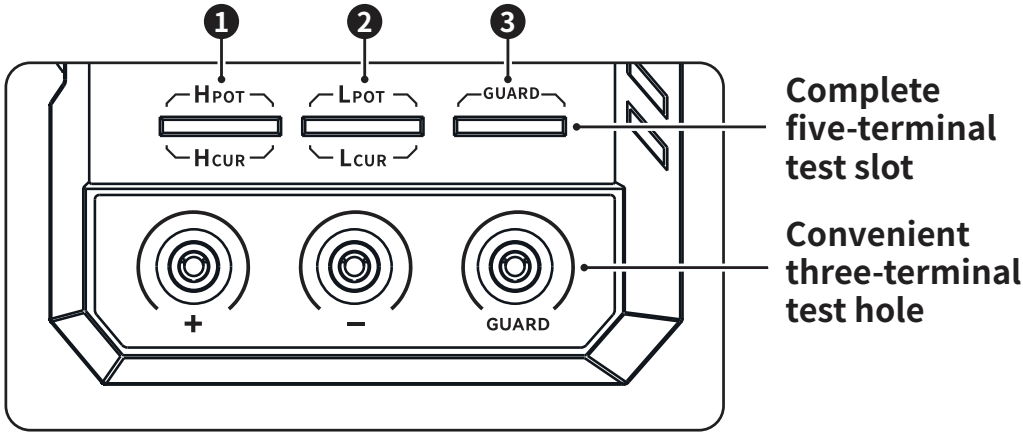
③ Measurement parameter settings

▶ 4.2.2 System Settings Interface

The System Settings interface allows for sorting and adjustment settings, as well as setting the product language , screen brightness, sound settings, auto power-off, calibration settings, and system information (for detailed operations, refer to "Section 6: System Settings Guide").

4.3 Test Ports

The LC1020E adopts a solution that integrates both three-terminal and five-terminal test ports, meeting the requirements for both convenient testing and high-precision measurements. The test ports are shown below:



①High terminal ②Low terminal ③Protection terminal

The three-terminal test port of this instrument uses standard rubber sockets, making it convenient to use inexpensive rubber plugs, such as alligator clips, for test leads. This is easy for expanding testing applications, but its downside is lower testing accuracy.

To improve the accuracy when using external test leads, the LC1020E series is also equipped with a five-terminal test slot. With professional test fixtures, it allows for complete four-terminal measurement using external leads, thereby ensuring higher testing accuracy.

5.OPERATION GUIDE

5.1 Power On and Off

Long press the power button ⏻ to turn on the device, and it will enter the measurement interface (default). To power off, long press the power button ⏻ for more than 2 seconds while the device is on.

5.2 Parameter Selection

▶ 5.2.1 Frequency Selection

The LC1020E series handheld LCR meter applies an AC test signal to the component under test (DUT) for measurement. Frequency is one of the main parameters of the AC signal source. Due to the non-ideal nature of components and the presence of parasitic elements, as well as the effects of test ports and test lead parasitics, the same component may show different measurement results when tested at different frequencies. Therefore, before measurement, it is important to choose an appropriate frequency.

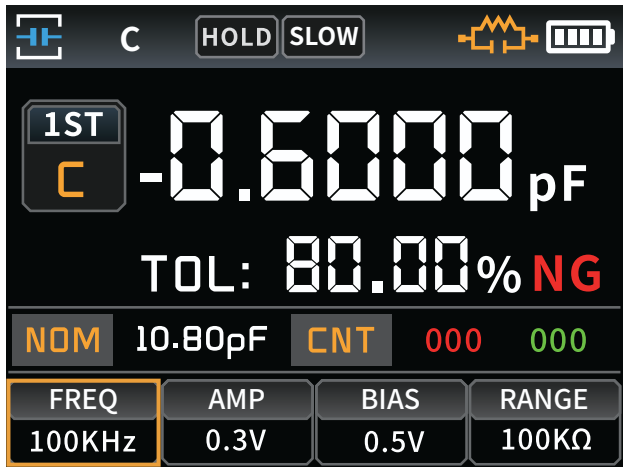
There are two methods to change the test frequency:

Method 1: Press **FREQ** button to cycle through the preset frequency points in order. The cursor will automatically move to the frequency setting, and the selected frequency will be highlighted

(background highlighted), as shown in the figure.

Method 2: Use ◀ ▶ buttons or press **FREQ** button to move the cursor to the frequency setting, select the frequency, and then press ▲ ▼ buttons to cycle through the preset frequency points in order.

Selectable frequency points: 100Hz, 120Hz, 1KHz, 10KHz, 100KHz



Frequency Selection

▶ 5.2.2 Level Selection

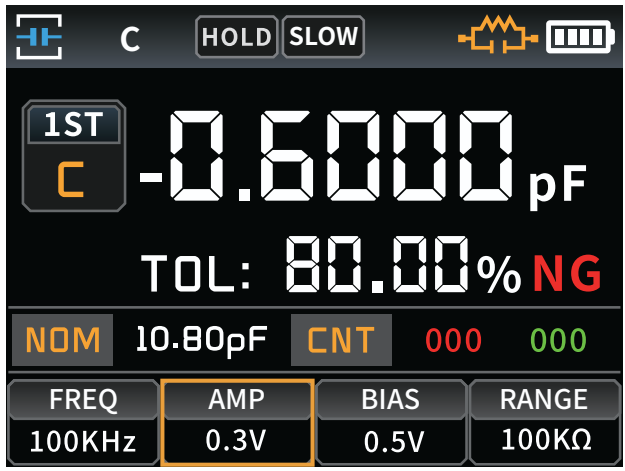
The LC1020E series handheld LCR meter applies an AC test signal to the component under test (DUT). Not only can the frequency point be changed, but the test signal level can also be adjusted.

There are two methods to change the test signal level:

Method 1: Press the **LEVEL** button to cycle through the preset level points in order. The cursor will automatically move to the level setting, and the selected level will be highlighted (background highlighted), as shown in the figure.

Method 2: Use ◀ ▶ buttons or press **LEVEL** button to move the cursor to the level setting, select the level, and then press ▲ ▼ buttons to cycle through the preset level points in order.

Selectable level points: 0.1V, 0.3V, 0.6V



Level Selection

▶ 5.2.3 Internal Bias Selection

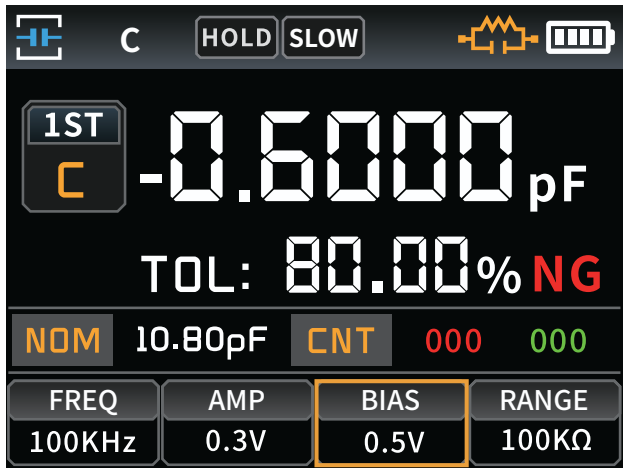
This handheld LCR meter can provide an internal DC bias voltage.

There are two methods to change the internal bias voltage:

Method 1: Press **OFFSET** button to cycle through the preset bias points in order. The cursor will automatically move to the bias setting, and the selected bias will be highlighted (background highlighted), as shown in the figure.

Method 2: Use ◀ ▶ buttons or press **OFFSET** button to move the cursor to the bias setting, select the bias, and then press ▲ ▼ buttons to cycle through the preset bias points in order.

Selectable bias points: 0.0V, 0.5V



Internal Bias Selection

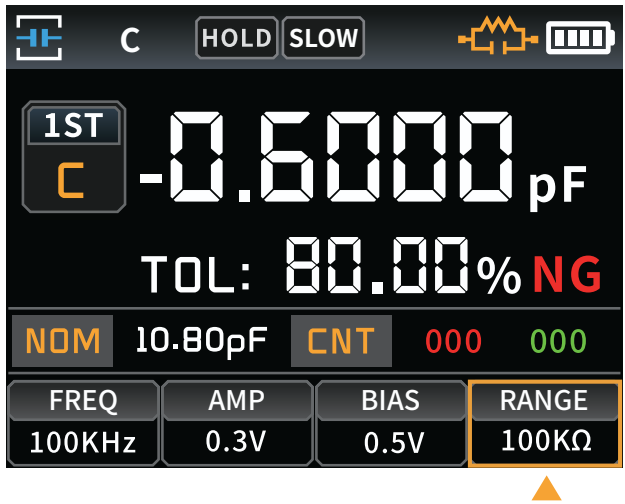
▶ 5.2.4 Range Selection

There are two methods to change the range:

Method 1: Press **RANGE** button to cycle through the preset range points in order. The cursor will automatically move to the range setting, and the selected range will be highlighted (background highlighted), as shown in the figure.

Method 2: Use ◀ ▶ buttons or press **RANGE** button to move the cursor to the range setting, select the range, and then press ▲ ▼ buttons again to cycle through the preset range points in order.

Selectable range points: AUTO, 100Ω, 1KΩ, 10KΩ, 100KΩ



Range Selection

▶ 5.2.5 Measurement Speed Selection

Upon powering on, the device enters the measurement display interface. Press **SPEED** button to cycle through the measurement speeds in order: Fast (4 times/s), Medium (2 times/s), Slow (1 time/s)

▶ 5.2.6 AUTO/R/C/L/Z Main Parameter Selection

To select the measurement parameter type, you should first choose the main parameter.

Press **AUTO/R/C/L/Z** button to cycle through the following parameters in order: R (Resistance), C (Capacitance), L (Inductance), Z (Impedance), and AUTO (Automatic). When the main parameter is set to AUTO, the display will show "Automatic".

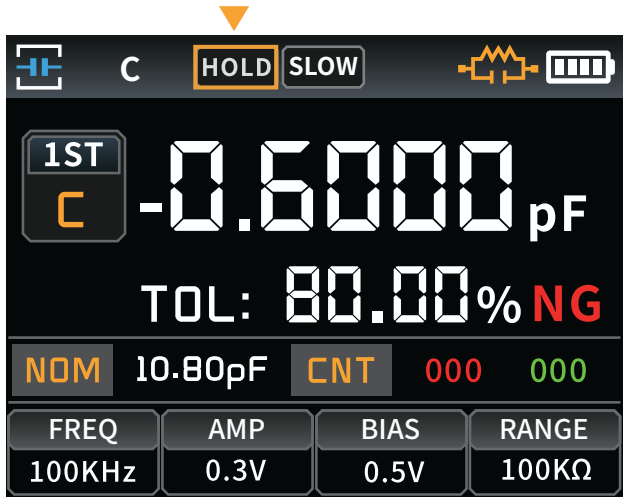
▶ 5.2.7 X/D/Q/θ/ESR Secondary Parameter Selection

To select the measurement parameter type, you should first choose the main parameter.

Press the **X/D/Q/θ/ESR** button to choose the following secondary parameters:X(Reactance),D (Dissipation Factor),Q (Quality Factor),θ (Phase Angle),ESR (Equivalent Series Resistance)

5.3 Hold Mode (HOLD)

The data hold function is used to lock the displayed data, making it easier to read. Measurement continues, but the data on the screen does not update during testing.



Turning on Data Hold:

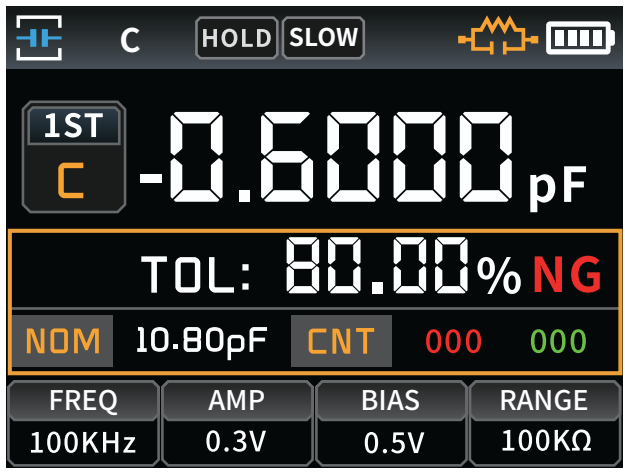
To activate the data hold function, press **HOLD** button briefly. The status bar on the screen will display the **HOLD** icon, indicating that the data hold function is active, as shown in the figure. At this time, the main and secondary parameters on the screen will show the measurement results prior to pressing **HOLD** button.

Turning off Data Hold:

To deactivate data hold, press **HOLD** button again briefly. The **HOLD** icon in the status bar will disappear, and the device will return to normal measurement display mode.

5.4 Data Logging Function

In data logging mode, you can check if the measured component's data meets the set nominal values and tolerance limits, and record the number of successful and failed measurements.



Turning on the Data Logging Function:

To activate the data logging function, long press the **HOLD** button. The screen will display the main parameter measurement data, along with the set nominal values and the status and counts of successful and failed measurements, as shown in the figure.

Turning off the Data Logging Function:

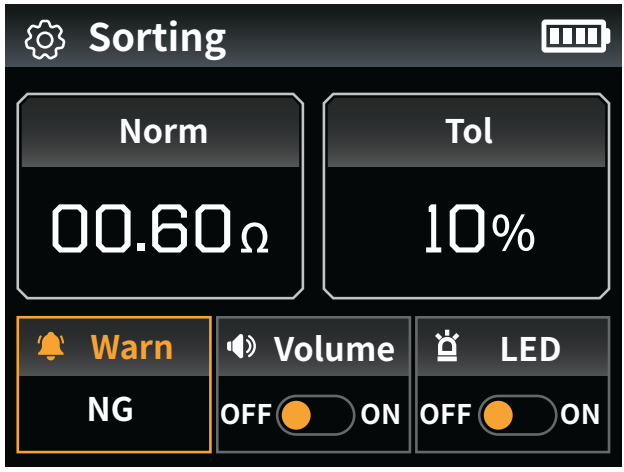
Long press **HOLD** to deactivate the data logging function.

6.SYSTEM SETTINGS GUIDE

6.1 Interface Switching

Long press the power button ⏻ to turn on the device and enter the measurement display interface. Then Long press **OK** button to switch between the measurement display interface and the system settings interface.

6.2 Sorting Settings



Sorting Settings

Press ▲ ▼ buttons to move the cursor to the "Sorting Settings" option, then press **OK** button to enter the sorting settings, as shown in the figure.

Press ◀ ▶ buttons to move the cursor and select "Nominal Value," "Indicator Light," "Tolerance Value," "Alarm Type," and "Alarm Sound." Press **OK** button to enter the selected function, where you can use the [Arrow] buttons to adjust the value parameters. Long press **OK** button to return to the previous level.

6.3 Language Settings

Press ▲ ▼ buttons to move the cursor to the "Language Settings" option, then press ◀ ▶ buttons to switch between Chinese and English.

6.4 Screen Brightness

Press ▲ ▼ buttons to move the cursor to the "Screen Brightness" option, then press ◀ ▶ buttons to select the brightness level. The brightness has 10 levels, with the brightest being level 10 and the lowest being level 1.

6.5 Sound Settings

Press ▲ ▼ buttons to move the cursor to the "Sound Settings" option, then press ◀ ▶ buttons to select the volume level. The volume has 10 levels, with the maximum being level 10 and the minimum being level 1.

6.6 Auto Power Off

Press ▲ ▼ buttons to move the cursor to the "Auto Power Off" option, then press ◀ ▶ buttons to switch the auto power-off time. The available options for auto power-off time are: "Off," "5 minutes," "15 minutes," and "30 minutes."

6.7 Calibration Settings

Press ▲ ▼ buttons to move the cursor to the "Calibration Settings" option, then press **OK** button to enter the calibration settings. Press ◀ ▶ buttons to select "Open" or "Short" calibration. Press **OK** to start the calibration.

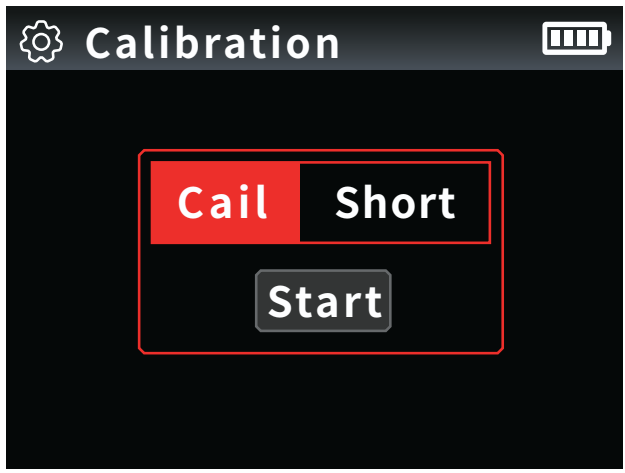
The calibration function includes two types: open-circuit calibration and short-circuit calibration. Calibration effectively reduces the parasitic errors caused by the test leads. Short-circuit calibration helps reduce the effects of contact resistance and lead resistance on low-impedance measurements (suitable for low-impedance component measurements). Open-circuit calibration helps reduce the effects of parasitic capacitance and resistance between the test leads on high-impedance measurements (suitable for high-impedance component measurements).

Performing both calibrations together effectively reduces the impact of these factors, ensuring accurate and precise measurements.

Calibration Method:

Before entering the calibration function, please ensure that the two test ends are either open (test fixtures are disconnected) or shorted (test fixtures are connected to a shorting piece). Press **OK** button to start the calibration, and the calibration status will be displayed. Once the calibration is complete, the word "Complete" will appear, as shown in the figure. After calibration is finished, long press **OK** button to exit.

⚠ **Note:** Do not change the status of the two test ends during the calibration process.

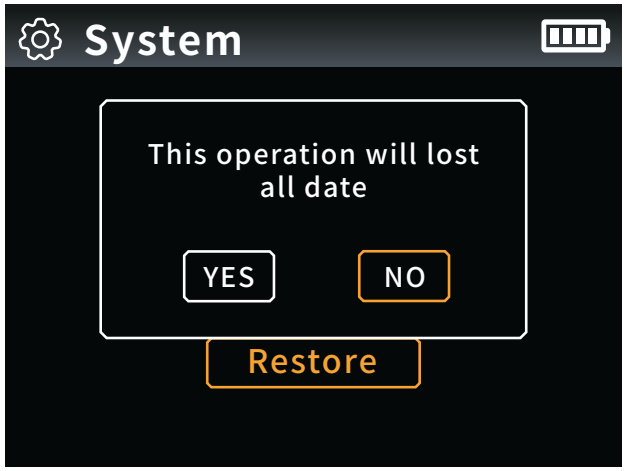


Calibration Settings

6.8 System Information

Use ▲ ▼ buttons to move the cursor to "System Information," then press **OK** button to enter the system information, which will display the device details as shown in the figure. Press the **OK** button to choose whether to restore the factory settings, as shown in the figure. Long press **OK** button to return to the previous level.

System Information



Factory Reset

7.QUICK APPLICATION GUIDE

⚠ Warning:

①Do not measure charged capacitors or inductors; they must be discharged before measurement, or it may cause damage to the instrument.

②If measuring onboard components online, ensure the component is powered off and not directly measuring the power circuit.

③When used in dusty environments, the instrument may become dirty. It should be cleaned regularly to protect the test ports and reduce dust entry. Accumulated dust, due to its conductivity, can affect the instrument's performance over time.

④Do not place the instrument directly in explosive, direct sunlight, or overheated environments.

※**Tip:**To achieve accurate measurements, perform open and short-circuit calibration as described in the "Calibration Function" section before measuring. Test fixtures can use rubber plug crocodile clips or Kelvin test clips.

7.1 Operation Recommendations

●Range Selection:

①Usually, the auto range is sufficient.

②For comparing characteristics at different ranges or if specific impedance components are not measured accurately, you can manually adjust the range.

③When the impedance of the device is uncertain, start with the 100 Ω range and then increase the range. Higher ranges give more accurate results.

④If the results suddenly change, the range is too high, so switch to the previous range.

●Frequency Recommendations:

①**Resistance:** Use 1kHz, 0.6V for most cases. For large wound resistors, use 100Hz to reduce inductive effects.

②**Capacitance:** Use 1kHz, 0.6V, and for electrolytic capacitors, use 120Hz. A general rule is to use high frequencies for small capacitors and low frequencies for large capacitors.

③**Inductance:** Use 1kHz, 0.6V. The general rule is to use high frequencies for small inductors and low frequencies for large inductors.

●Bias Voltage:

Typically used for measuring electrolytic capacitors. At this time, the output level can only be 0.1V or 0.3V.

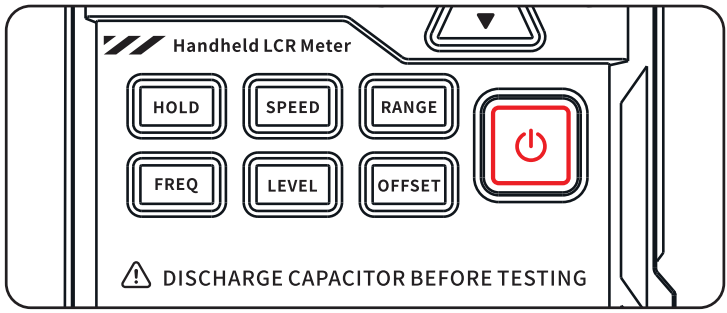
●Output Amplitude:

Typically, 0.6Vrms is used, while for online measurements, 0.1V is used.

7.2 Charging the Instrument

①Connect the instrument to the power source using the included power adapter and Type-C USB cable.

②After connecting to the power source, the power button indicator on the front panel of the device will light up red, as shown in the image:



Power Charging Indicator

7.3 Instrument Power On

When the battery has sufficient charge or when powered using a Type-C USB cable, press and hold the power button to turn the instrument on. The instrument will display the brand animation during startup, as shown in the image:

7.4 Component Measurement

It is recommended to perform open and short circuit calibration before measurement.

①After the instrument powers on and enters the test interface, the system's default parameters (main parameter set to automatic measurement, range set to automatic measurement) will be applied. Insert the device under test into the test slot, or use appropriate testing accessories (such as rubber plug-crocodile clips, Kelvin test clips, etc.) to connect the component under test. The instrument will automatically recognize the component and provide the corresponding measurement result.

②Read the measurement result from the screen.

7.5 Firmware Upgrade

①**Enter Bootloader Mode:** In the powered-off state, first press and hold ▲ button, then press ⏻ button. When the screen shows "Bootloader," it means the device has entered firmware upgrade mode.

②**Connect to the Computer:** After entering bootloader mode, connect the device to the computer using a Type-A to Type-C data cable. The computer will recognize a new drive.

③**Copy the File:** Open the firmware ZIP file downloaded from the official website, and drag the .bin firmware file into the drive. The upgrade will begin automatically. The process is quick, and you can monitor the progress on the instrument's screen.

④**Reboot After Upgrade:** Once the upgrade is complete, press and hold ⏻ button to restart the device, completing the firmware upgrade.

8. INSTRUMENT PARAMETERS

The following are the general specifications and measurement accuracy parameters for the LC1020E handheld LCR bridge, applicable to the LC1020E model.

8.1 General Parameters

Model	LC1020E
Test Frequency	100Hz、120Hz、1KHz、10KHz、100KHz
Basic Accuracy	0.3%
Display	2.8-inch TFT LCD display
Display Digits	Main Parameter: 4.5 digits; Secondary Parameter: 4.5 digits
Measurement Parameters	Main Parameters: AUTO/R/C/L/Z; Secondary Parameters: X/D/Q/θ/ESR
Measurement Range	L: 0-100H C: 0-100mF R: 0-10M
Internal Bias	0.0V、0.5V
Test Level	0.1V、0.3V、0.6V
Calibration Functions	Open circuit calibration, Short circuit calibration
Comparison Function	Used to calculate the relative error between the component measurement value and the nominal value, displayed as a percentage, and provides filtering results. Nominal values and tolerance can be set, with tolerance range adjustable from 0.1% to 99.9%
Record Function	Checks if the measured component data meets the set nominal value and tolerance, recording the number of successful and failed measurements

Test Terminal Configuration	Three-terminal, Five-terminal
Output Impedance	100Ω
Communication Interface	USB-TypeC (Virtual serial port)
Others	Language settings, Screen brightness, Sound settings, Auto power-off, Calibration settings, System information

8.2 Measurement Accuracy

⚠ Precautions:

①The ambient temperature should be maintained at 20°C ± 2°C, and the humidity should be ⩽ 80% R.H.

②The instrument should be preheated for at least 30 minutes before testing.

③Testing should be performed at the instrument's test slots on the front panel.

④It is recommended to perform open-circuit and short-circuit calibration before testing.

Capacitance (C)

Range	100Hz	1KHz	10KHz	100KHz
1mF-100mF	5% ± 5 digits	3% ± 5 digits		
1uF-1mF	1% ± 4 digits	0.5% ± 5 digits	2% ± 5 digits	3% ± 4 digits
1nF-1uF		0.3% ± 2 digits	0.4% ± 2 digits	1% ± 4 digits
1pF-1nF		1% ± 2 digits	1.5% ± 2 digits	2% ± 4 digits

Inductance (L)

Range	100Hz	1KHz	10KHz	100KHz
1H-100H	2% ± 5 digits	2% ± 5 digits		
1mH-1H	0.4% ± 5 digits	0.3% ± 2 digits	0.4% ± 3 digits	2.5% ± 5 digits
10uH-1mH	3% ± 5 digits	0.5% ± 4 digits	0.5% ± 3 digits	1.5% ± 5 digits
1uH-10uH		2% ± 5 digits	2% ± 5 digits	4% ± 5 digits

Resistance (R)

Range	100Hz	1KHz	10KHz	100KHz
1MΩ-10MΩ	5% ± 4 digits	3% ± 3 digits		
1KΩ-1MΩ	0.4% ± 4 digits	0.2% ± 2 digits	0.3% ± 3 digits	0.6% ± 5 digits
1Ω-1KΩ	1.5% ± 4 digits	0.3% ± 2 digits	0.3% ± 3 digits	0.6% ± 5 digits
10mΩ-1Ω	4% ± 4 digits	2% ± 5 digits	2% ± 5 digits	5% ± 5 digits

9.MAINTENANCE AND CARE

⚠ Warnings:

①Do not attempt to repair the instrument by yourself. Only qualified professionals should maintain and repair the instrument.

②Be cautious of liquids entering the instrument and ensure that no foreign objects, especially conductive materials, are left inside.

9.1 Troubleshooting

①If the instrument fails to turn on, check the battery, external power supply, and power socket. Also, verify if any buttons are unresponsive.

②If the test results are abnormal, first inspect the test accessories for any issues. Check if the spring contacts inside the testing slot are damaged. Also, carefully review the user manual to ensure that you are using the instrument correctly.

③Do not replace components or specific parts without proper knowledge. For repairs that cannot be identified, please contact the authorized distributor or our after-sales service.

9.2 Cleaning

①Before cleaning, ensure the instrument is turned off, and disconnect both the external power supply and the battery.

②Prevent water or other liquids from entering the instrument through the testing slots, buttons, or seams. If liquid enters the device, immediately stop using it and remove the power and battery.

③Use a soft, clean cloth dampened with diluted neutral detergent to gently wipe any dirt or stains. Avoid scratching the surface. After cleaning, allow the instrument to dry completely before using it again.

10.CONTACT US

Product Name: LCR High-Precision Handheld Bridge
Brand/Model: LC1020E
Manufacturer: Shenzhen Fnirsi Technology Co., Ltd.
Address: 8th Floor, West Side, Building C, Weihua Da Industrial Park, Dalang Street, Longhua District, Shenzhen, Guangdong
Service Hotline: 0755-28020752
Service Email: support@fnirsi.com
Business Email: business@fnirsi.com
Official Website: www.fnirsi.com
Execution Standard: GB/T 11151-1989

http://www.fnirsi.com/

11.WARRANTY INFORMATION

※**This page is the basic warranty card. Please keep it.**

Thank you for choosing our company's products. The warranty period of this product starts from the date of sale. During the product warranty period, if the product is installed and used in accordance with the product manual and used in normal environment and conditions, and the fault is caused by defects in the original materials and processing, you can enjoy free repair services according to the content of this warranty clause. Please keep this warranty card properly as a warranty certificate. No reissue will be issued if it is lost.

The following situations will incur paid repair services:

- ●Unable to present the original valid warranty card.
- ●Damage caused by improper installation not meeting product requirements, standards, or relevant specifications.
- ●Damage caused by accessories in the installation environment not meeting product requirements, standards, or relevant specifications.
- ●Damage caused by improper use, improper storage, unauthorized disassembly, or unauthorized repairs by the user.
- ●Expiration of the warranty period.

保修卡

产品型号	LC1020E	**数量**	
渠道商名称 （购买商店）			
联系方式			
渠道商地址			
发票号 （订单号）			
购买时间	**年　　月　　日**		
客户姓名:	**地址:**		
联系方式:	**故障说明:**		

Warranty Card

Product Model	LC1020E	**Qty.**	
Distributor Name (where to buy)			
Contact			
Address			
Invoice Number (Order Number)			
Purchase Date (as per invoice)	**Year**	**Month**	**Day**

User Name:	**Address:**
Contact:	**Fault Description:**

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