Handheld Digital LCR Bridge

LCR · R / C / L Precision Measurement

HANDHELD DIGITAL LCR BRIDGE · USER MANUAL

Model **LCR-2**



■ LCR · R / C / L Precision Measurement

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About this manual

This manual describes the safe operation, functions and specifications of the LCR-2 handheld digital LCR bridge — a high-precision handheld instrument for measuring resistance, capacitance, inductance and their characteristic parameters, with a 2.8-inch TFT color display and four-terminal (Kelvin) measurement input.

1 Safety

To avoid possible electric shock, fire or personal injury, read the safety precautions before use. Use the product only for its intended purpose, otherwise the protection provided by the product may be impaired.

- Before use, check the case for cracks or missing plastic and carefully inspect the insulation near the input terminals.
- Use the correct input terminals and correct settings, and measure within the specified ranges as described in this manual.

- Do not use the product around explosive gas or vapor, or in damp environments.
- Do not use the product with the front cover or rear cover removed.
- Low battery voltage may affect measurement accuracy; charge the battery promptly.
- Make sure the circuit is not live before LCR measurement, and discharge capacitors before testing.

2 Parts and keys

2.1 Panel description

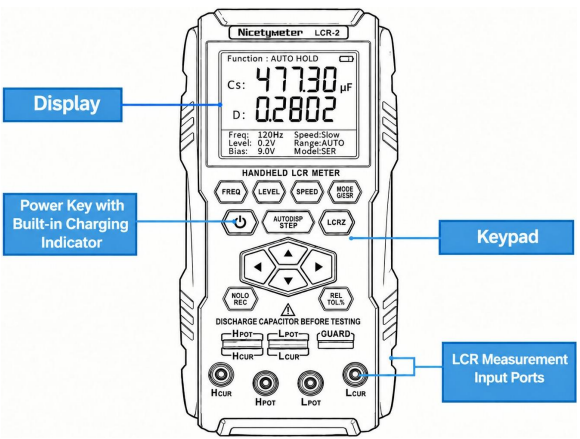


Fig. 1 Instrument panel

The top of the body is the USB charging port; the front contains the 2.8-inch display and the keypad; the bottom is the LCR measurement input; the power key has a built-in charging indicator.

2.2 Keypad

Key	Function
Power	Turns the instrument on or off
FREQ	Selects the measurement frequency
LEVEL	Selects the measurement level
SPEED	Selects the measurement speed
LCRZ	Switches the displayed secondary parameter
AUTO/S/P SETUP	Short press toggles the equivalent circuit mode; long press opens the system settings
X/D/Q Ω/ESR	Switches between measurement functions
Arrow keys	Up/down moves through menus; left/right changes settings
HOLD/REC	Short press holds the reading; long press enters recording mode
REL/TOL%	Short press enters tolerance mode; long press zeroes the main reading

3 Display description

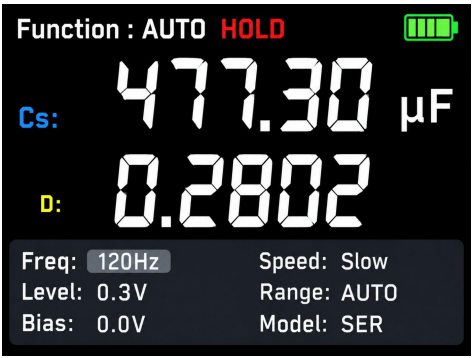


Fig. 2 Display

①	Function	Shows the measurement function: Auto, R, C, L, Z or ECAP
②	HOLD	Indicates data-hold mode
③	Battery symbol	Shows the battery level
④	Main reading	Shows the primary measurement value
⑤	Function symbol	Symbol of the current function; s = series, p = parallel equivalent
⑥	Unit symbol	Unit of the main reading
⑦	Secondary reading	Shows the secondary measurement value
⑧	Secondary parameter	Symbol of the current secondary parameter
⑨	Unit symbol	Unit of the secondary reading
⑩	Result	Pass/fail judgement in tolerance mode: PASS or FAIL

⑪	Frequency	Shows the set measurement frequency
⑫	Level	Shows the set measurement level
⑬	Nominal value	Nominal value set in tolerance mode
⑭	Speed	Shows the set measurement speed
⑮	Range	Shows the set measurement range
⑯	Tolerance limit	Allowed error range set in tolerance mode
⑰	Tolerance	Percentage error between measured and nominal values

4 LCR measurement

4.1 Measurement terminals



Fig. 3 LCR measurement input

①	High terminal	Gold-plated clip for the component lead; positive pin for polarized parts
②	Low terminal	Gold-plated clip for the component lead; negative pin for polarized parts
③	Guard	Ground terminal of the measurement cable

④	Hcur	High current sensing, red Kelvin lead
⑤	Hpot	High voltage sensing, red Kelvin lead
⑥	Lpot	Low voltage sensing, black Kelvin lead
⑦	Lcur	Low current sensing, black Kelvin lead

a. Component leads can be inserted directly into terminals ① and ②.
b. Terminals ④⑤⑥⑦ are four-wire inputs; use the supplied four-wire terminal to clip the component leads. c. Never apply voltage or measure live circuits at these terminals.

4.2 Measurement method



Fig. 4 Four-wire Kelvin measurement with insulating spacer

1. Power on and wait a few seconds for the internal circuit to stabilize.
2. Clip the four-wire Kelvin clips onto both ends of the component, or insert the leads directly into the clip terminals.
3. Read the value on the display.

a. Never apply voltage to the LCR terminals; make sure the component is not live and discharge capacitors first. b. For four-wire measurements, insert the supplied insulating spacer to separate the clips and improve accuracy. c. For low-impedance and high-impedance loads, the clip terminals are recommended (lower stray parameters). d. Choose a suitable frequency, level and equivalent mode for the component (see the recommended conditions table in 4.7).

4.3 Measuring resistance

1. Use AUTO mode or select the resistance mode and clip both ends of the resistor.
2. For small resistances ensure good surface contact; surface oxidation affects accuracy.
3. For very high or low resistances, the clip terminals are recommended.

4.4 Measuring capacitance

1. Use AUTO mode or select the capacitance mode and clip both ends of the capacitor.
2. Discharge the capacitor before testing to avoid damaging the instrument.
3. If the value exceeds the range, the display shows “OL”.
4. For capacitors above 1μF, 1KHz or 100Hz is suitable; below 1μF, 1KHz or 10KHz is suitable.

4.5 Measuring inductance

1. Use AUTO mode or select the inductance mode and clip both ends of the inductor.

2. For inductors above 1H, 1KHz or 100Hz is suitable; below 1H, 1KHz or 10KHz is suitable.
3. If auto ranging gives large errors on large inductors, switch to a suitable manual range.

4.6 Range / level / speed settings

Press the left/right arrows to select Range, then the up/down arrows to adjust it.

- Ranges: Auto, 100Ω, 1KΩ, 10KΩ, 100KΩ; Auto is suitable for most cases.
- Select a range manually to examine range-specific behaviour or for special-impedance parts.
- If the impedance is unknown, start at 100Ω and step up; results improve at higher ranges — if the reading jumps, step back one range.

Press the left/right arrows to select Level, then the up/down arrows or LEVEL to adjust it.

- Levels: 0.1V, 0.3V, 0.6V; 0.6V for normal use. For in-circuit measurement use 0.3V or 0.1V to avoid triggering other components.

Press the left/right arrows to select Speed, then the up/down arrows or SPEED to adjust it.

- Speeds: slow, medium, fast; slow gives the most stable results, choose as required.

4.7 Frequency settings and recommended conditions

Press the left/right arrows to select Frequency, then the up/down arrows or FREQ to adjust it.

- Frequencies: 100Hz, 120Hz, 1KHz, 10KHz, 100KHz; 1KHz is suitable for most cases.
- Press FREQ to compare component behaviour at different frequencies.

Component	Specification	Frequency	Mode
Capacitor	<1μF	≥1KHz	Auto, parallel
Capacitor	≥1μF (non-electrolytic)	≤1KHz	Auto, parallel
Capacitor	≥1μF (electrolytic)	≤1KHz	Auto, series
Inductor	<1H	≥1KHz	Auto, series
Inductor	≥1H	≤1KHz	Auto, series
Resistor	<10KΩ	1KHz	Auto, series
Resistor	≥10KΩ	1KHz	Auto, parallel

4.8 Equivalent mode

Press the left/right arrows to select Model, then the up/down arrows to adjust it.

- Modes: Auto, series, parallel; Auto is suitable for most cases.
- Press the left/right arrows to compare behaviour in different modes.

4.9 Tolerance mode

Tolerance mode compares the measured value against a nominal value and allowed error, and produces a pass/fail result with the tolerance percentage — ideal for batch screening.

1. Short-press REL/TOL% to enter or exit tolerance mode; the nominal and tolerance fields appear.
2. Press the up/down arrows to enter the nominal value; use left/right to move the decimal point and up/down to set the digits.
3. Press AUTO/S/P to confirm and exit.

4.10 Recording mode

1. Long-press HOLD/REC to enter automatic recording mode and toggle the PC software function.
2. The TYPE-C port supports SCPI instrument protocol for remote control and data logging.

4.11 System settings and calibration

Long-press AUTO to open the system settings: language, backlight, auto power-off, buzzer, calibration and factory reset. Use up/down to select an item and left/right to change it; long-press AUTO or short-press LCRZ to exit.

> Bridge calibration: select Bridge calibration in the settings and calibrate 0Ω, 10mΩ, 100mΩ, 1Ω, 10Ω, 100Ω, 1KΩ, 10KΩ, 100KΩ, 1MΩ, 10MΩ and OPEN individually or all together. a. Select the point with left/right, connect the standard resistor and press AUTO to start; calibration takes about 45 seconds. b. Green means OK, red means NG; press LCRZ to exit. c. Use non-inductive standard resistors (never wire-wound); use four-wire resistors for 10mΩ and 100mΩ; leave OPEN unconnected.

The instrument is 100% calibrated before shipment — no user calibration is required. If calibration values become inaccurate or corrupted, restore factory settings to return to the factory calibration.

4.12 Firmware upgrade

1. With the instrument off, hold X/D/Q and press the power key; “USB-Boot” appears on the display.
2. Connect to a computer with a TYPE-C cable; an LCR disk appears.
3. Copy the firmware file into the LCR disk; the upgrade runs automatically — do not operate the instrument during the upgrade.

4. The display returns to the measurement screen when the upgrade succeeds.

5 Specifications

5.1 General specifications

Item	Specification
Display (TFT)	2.8 inch, 320×240
LCD display size	58×48mm
Range	Auto
Material	ABS+TPE
Sampling rate	Adjustable
Data hold	Yes
Backlight	Yes
Low battery indication	Yes
Auto power-off	Yes

5.2 Mechanical specifications

Item	Specification
Dimensions	180×95×40mm
Weight	355g (with battery)
Battery	18650 / 2000mAh lithium battery ×1
Runtime	approx. 13 hours
Certification	CE, RoHS
Warranty period	One year

5.3 Environmental specifications

Item	Specification
Operating temperature	0~40℃
Operating humidity	<75%
Storage temperature	-20~60℃
Storage humidity	<80%

5.4 Functional specifications

Feature	Specification
Measurement functions	Auto, R, C, L, Z, ECAP
Primary parameters	L, C, R, Z
Secondary parameters	X, D, Q, θ, ESR
Equivalent circuit	Series, parallel
Inductance range	0~100H
Capacitance range	0~100000μF
Resistance range	0~10MΩ
Test frequency	100Hz, 120Hz, 1KHz, 10KHz, 100KHz
Test level	0.1V, 0.3V, 0.6V
Basic accuracy	0.3%
Measurement speed	1, 2 or 4 readings per second
Output impedance	100Ω
Languages	Chinese, English
Brightness	25%, 50%, 75%, 100%
Auto power-off	15, 30, 45, 60 minutes, off
Buzzer	On, off

Bridge calibration	Short, open
Battery life	13h

5.5 Accuracy reference table

Type	Range	100/120Hz	1KHz	10KHz	100KHz
Capacitance	1mF~100mF	5%±5	5%±5	—	—
Capacitance	1μF~1mF	1%±5	1%±5	—	—
Capacitance	1nF~1μF	2%±5	0.5%±5	0.5%±5	1%±5
Capacitance	1pF~1nF	—	1.5%±5	2%±5	2%±5
Inductance	1H~100H	3%±5	3%±5	—	—
Inductance	1mH~1H	0.5%±5	0.5%±5	—	—
Inductance	10μH~1mH	3%±5	0.5%±5	0.5%±5	1.5%±5
Inductance	1μH~10μH	—	3%±5	3%±5	4%±5
Resistance	100KΩ~10MΩ	5%±5	3%±5	—	—
Resistance	1KΩ~100KΩ	0.4%±5	0.3%±5	0.3%±5	0.5%±5
Resistance	1Ω~1KΩ	1.5%±5	0.3%±5	0.3%±5	0.5%±5
Resistance	0.01Ω~1Ω	4%±5	3%±5	3%±5	5%±5

5.6 Bridge symbol description

Symbol	Description	Symbol	Description
R	Resistance	LEVEL	Level
C	Capacitance	SPEED	Speed
L	Inductance	AUTO	Auto
Z	Impedance	SETUP	Setup
X	Reactance	HOLD	Hold
D	Dissipation factor	REC	Recording mode
Q	Quality factor	TOL	Tolerance mode
θ	Phase angle	REL	Relative value
ESR	Equivalent series resistance	Hpot	High voltage sensing
S	Series equivalent	Hcur	High current sensing
P	Parallel equivalent	Lpot	Low voltage sensing
ECAP	Electrolytic capacitor	Lcur	Low current sensing
FREQ	Frequency		

6 Maintenance

Except for battery replacement, do not attempt to repair or modify the instrument unless you are qualified and have the corresponding calibration, performance-test and service instructions.

6.1 Cleaning

Clean the case with a damp cloth and mild detergent; do not use abrasives or solvents. Dust or moisture in the test terminals may affect reading accuracy.

> Remove all input signals before cleaning.

6.2 Charging the battery

When the low-battery symbol appears at the top-right of the display, charge the battery promptly:

1. Connect the supplied TYPE-C cable to a DC 5V adapter.
2. The charging indicator shows red during charging.
3. The indicator turns green when fully charged.

7 Warranty

This product is covered by a one-year warranty from the date of purchase. The warranty does not cover damage to general accessories, or damage caused by accidents, negligence, misuse, modification, contamination or abnormal operating conditions.

If the instrument freezes or malfunctions during use, restart it.

8 Compliance

8.1 Waste disposal and environmental protection (WEEE)

This product must not be disposed of as unsorted municipal waste. To minimize potential pollution to the environment and risks to human health, separate this product from other waste and recycle it responsibly through an authorized local recycling facility.

8.2 Directives and standards

This product complies with the relevant EU directives and standards for CE certification, and with the RoHS directive (Restriction of Hazardous Substances).

Notes