LCR Handheld Bridge
Instruction for Use

Catalog

1.Safety

These security measures are applicable to the operation and maintenance personnel who should pay attention to them during service and maintenance.

- ***Do not use in explosive environments***

Avoid using it in dusty environment, in direct sunlight, in environment with high humidity or strong electromagnetic radiation or other harsh environments.

- ***Non-professional maintenance personnel should not open the back cover***

Maintenance, replacement of components or adjustment of the instrument should be done by professional maintenance personnel. Please contact the dealer and the service department of Hangzhou Zhongchuang Electronics Co., Ltd.

- ***Do not arbitrarily break down or modify the instrument***

Partial replacement or unauthorized modification may prevent the instrument from recovering its performance

- ***Security warning***

One should abide by the relevant terms in the manual regarding safety or injury to human body or damages to the product, as well as operation or environment which may result in test failure.

2. Instruction on safety

To allow safe use of equipment, follow these guidelines:

- The instrument is suitable for indoor use. In case of short-term outdoor use, prevent it from direct sunlight, water, electromagnetic radiation, dust, etc.
- Before the use, please read and understand the warning and safety information mentioned in this manual.
- Use the instrument according to the function specified in the manual.
- If the component needs measurement, make sure the circuit is turned off and all capacitors in the circuit are discharged before the measurement.
- Before the measurement, components such as capacitors shall be discharged.
- The instrument use 3.7V，3000mAh lithium battery, or power by USB cable through TypeC port. Equipped with rechargeable function.

Safety Symbols

 Security warning to remind the user to following the instruction in the manual

Environmental conditions

Environment Condition

Working environment: 0 ℃ ~ 40 ℃;

Humidity: 15% to 85% R.H;

Storage temperature: 0 ℃ ~ 40 ℃;

Pollution degree: 2;

3.Introduction

This Series handheld LCR is a portable hand-held measuring instrument for measuring the parameters of inductors, capacitors, resistors and other components. It is small and powered by lithium battery, suitable for table-type application. It is also portable and mobile.

This Series provides a resolution of four and a half digits for main parameters and aresolution of 0.0001 for secondary parameter. Its highest measurement frequency is 100kHz, and can measure the level of 1Vrms, 0.6Vrms, 0.3Vrms, and 0.1Vrms("100k Continuous Fr. Type" is 0～1.1V adjustable). Its automatic range can display the results in the fast, medium, or slow mode. It can automatically select the appropriate measurement parameters according to the characteristics of the component. Its measurement accuracy can reach 0.2%. It combines the convenience of a handheld instrument and good performance of a table-type one.

The operation is simple, and users can see the test frequency, parameters, and speed by pressing the corresponding key; it also has the recording mode, recording mode, Comparator mode to take readings; the convenient operation of open and short circuit correction function helps improve the measurement accuracy. The buzzer, automatic power off, languages, brightness, startup setting and color setting can be set on the configuration menu.

The standard instrument is equipped with remote communication function. The remote control and data acquisition are achieved by connecting it to the PC through TypeC terminal USB cable.

Packing List:

- a handheld LCR (lithium battery installed) ×1
- a guidance manual ×1
- TypeC-USB Communication cable ×1
- AC adaptor ×1
- red / black rubber plugs –alligator clip test ×1
- short-circuit bar ×1
- 4-terminal Kelvin test clip (optional for "10k Basic Type"&"100k Basic Type", and other models standard)

Please check according to the packing list after the box is opened, if any component is

missing, please immediately contact the company or the related dealer.

4.Overview of front panel

Figure 1 Front panel (with "100k Continuous Fr. Type" as an example)

4.1 Front panel

The front panel is described below, taking "100k Continuous Fr. Type" as an example. See figure 1 (Note: the long press in the manual indicates to press and hold the key for more than 2 seconds. There is the short press and long press for the multifunctional key, but only short press for other keys).

1 ***Display*** 2.8" TFT LCD screen, which displays all functions of the instrument.

2 ***Data holding recording multifunctional key*** short press to turn on or off the data holding function; long press to turn on or off the data recording function.

3 ***Power key*** long press it to turn on or off the instrument;

4 ***Main parameter shortcut key*** to switch the main parameters quickly

5 ***Relative and open/short circuit correction key*** short press to turn on or off the relative function, long press to turn on

6 ***Secondary parameter shortcut key*** to quickly switch the secondary parameters.

7 ***Frequency and DCR mode multifunctional key*** short press to fast switch the frequency of fixed points; long press to enter the DCR mode.

8 ***Level shortcut key*** to quickly switch the fixed-point level.

9 ***electrolytic capacitance mode multifunctional key*** short press to enter the electrolytic capacitance mode;

10 ***Equivalent shortcut key*** to quickly switch equivalents.

11 ***Systems setting key*** short press to enter or exit system setting interface.

12 ***Comparator switch and tolerance limits shortcut multifunctional key*** short press to quickly switch deviation tolerance limit; long press to turn on or off the comparator.

13 ***Measuring speed shortcut key*** to quickly switch the required measurement speed.

14 ***Range shortcut key*** to quickly switch the required range.

15 ***Arrow keys*** *left and right arrow keys* to control the movement of the cursor; up and down arrow keys to select the parameter.

16 ***Enter key*** to confirm the selection of a certain parameter or function.

17 ***5-terminal test notch***

18 ***3-terminal test jack***

Note:Please ***use the supplied adapter, or purchase the specified power adapter from our company. The use of other adapters may cause unnecessary damage.***

4.2.User's interface

4.2.1.Measurement interface

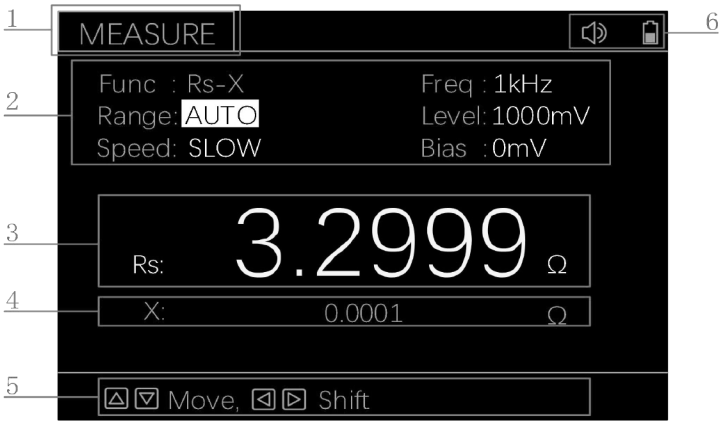


Figure 2 Measurement interface

1 **Page title** used to identify the page displayed.

2 Measurement parameter settings

3 Main parameter display

4 Secondary parameter display

5 Prompt bar Operation prompts

6 Status Column "🔊"indicates the buzzer is on;

"🔋"Battery power remaining prompt, prompt the remaining power in order to timely charge the instrument.

4.2.2.Systems setting interface

Figure 3 system settings interface

On the system settings interface users can view the product model, serial number and version number. The language, automatic power-off, brightness, power-on, buzzer and color can be set.

4.3.Test port

This Series uses the 3- and 5-terminal test ports at the same time, which is to combine convenience and high accuracy for the test. See figure 4 for the test terminal.

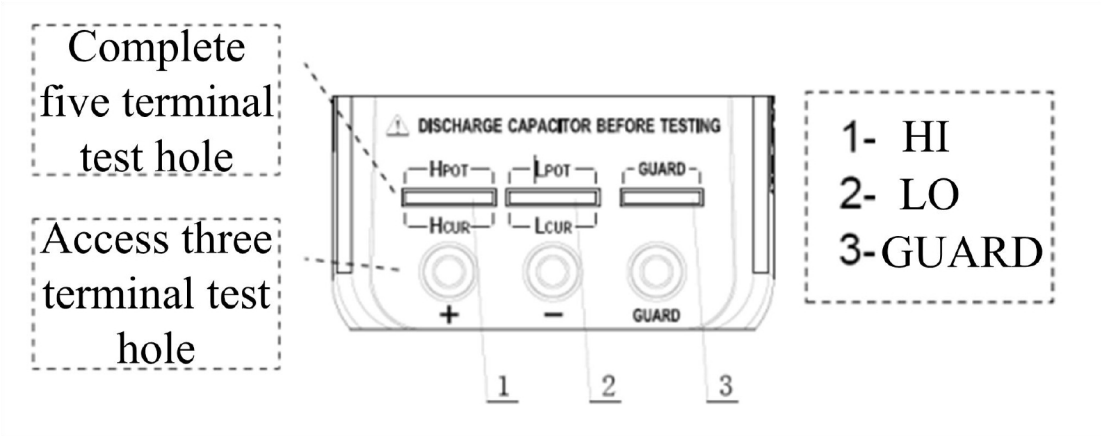


Figure 4 Test port

The three-terminal test port of the instrument uses the standard rubber jack; therefore the inexpensive rubber plug - alligator clip can be used as the test line. It is very convenient to apply the extended test, but it has the drawback of low testing accuracy.

To improve the accuracy of the test line when using the extension line, This Series is also equipped with the five-terminal test notch for dedicated test fixture. It renders possible the complete four-terminal measurement of the extension line, so as to ensure the high testing accuracy.

5.Operation instruction

5.1.Startup and shutdown

Long press the power key to start the instrument and the measurement interface is shown (default); press and hold the key (for more than 2 seconds) to turn off the instrument. In power-off status, plug in power cord, the device will enter into the interface with charging status indicated. If charging by power adaptor, press↑ key to switch charging current between 200mA or 500mA in standby interface.

5.2.Selection of parameter

5.2.1.Selection of frequency

This Series handheld LCR applies AC test signal to the DUT for measurement. Frequency is one of the main parameters of the AC source. Due to the presence of the non-ideal and distributed parameters of elements, and the impact of the distributed parameters between the test end and test cable, the same element may have different results with different test frequencies. Therefore, before the measurement the appropriate frequency should be selected.

There are three ways to change the test frequency:

Method One: press FREQ to switch between different preset frequencies, on the meanwhile, the cursor will jump to the corresponding frequent point selected(shown as Fig 5)

Method Two: Press the ↑ ↓ keys or FREQ to select frequency by moving cursor on the interface as shown in figure 5, and press the ← → keys to switch between the preset frequencies,

Method Two: Press the ↑ ↓ keys or FREQ to select frequency by moving cursor on the interface as shown in figure 5, then press ENTER key to enter into frequency editing mode, shown as Fig 6. Press ← →key to move the cursor and ↑ ↓ key to modify the values and unit, then press ENTER key exit the editing mode(only available for "100k Continuous Fr. Type").

Figure 5 Frequent selection

The following frequencies can be selected for different models:

"10k Basic Type": 100Hz、120Hz、1kHz、10kHz;

"100k Basic Type": 100Hz、120Hz、1kHz、10kHz、40kHz、100kHz;

"10k Enhanced Type": 100Hz、120Hz、1kHz、10kHz;

"100k Enhanced Type": 100Hz、120Hz、1kHz、10kHz、40kHz、100kHz;

"100k Continuous Fr. Type": 10Hz-100kHz, Continuously adjustable,a step of 0.01 Hz;

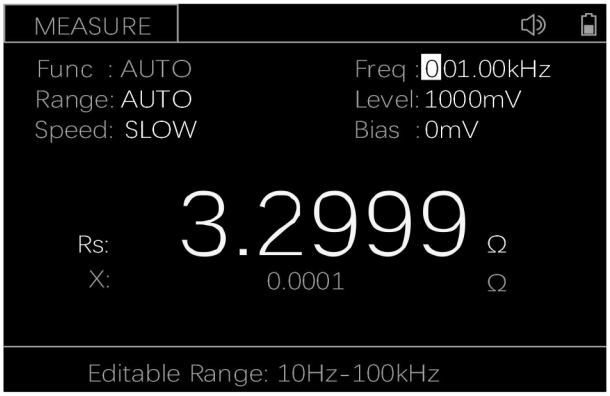


Figure 6 Frequent editing

5.2.2.Selection of level

This Series handheld LCR applies AC test signal to the DUT for measurement. Both the frequency and signal level can be changed.

There are three ways to change the test signal level:

Method One: press LEVEL to switch between different preset levels, on the meanwhile, the cursor will jump to signal level.

Method Two: Press the ↑ ↓keys or LEVEL keys to select level on the interface as shown in figure 6, and press ← → keys to switch preset levels.

Method Three: Press the ↑ ↓ keys or LEVEL keys to select levels by moving cursor on the interface as shown in figure 7, then press ENTER key to enter into level editing mode, shown as Fig 8. Press ← →key to move the cursor and ↑ ↓ key to modify the values and unit, then press ENTER key exit the editing mode(only available for "100k Continuous Fr. Type").

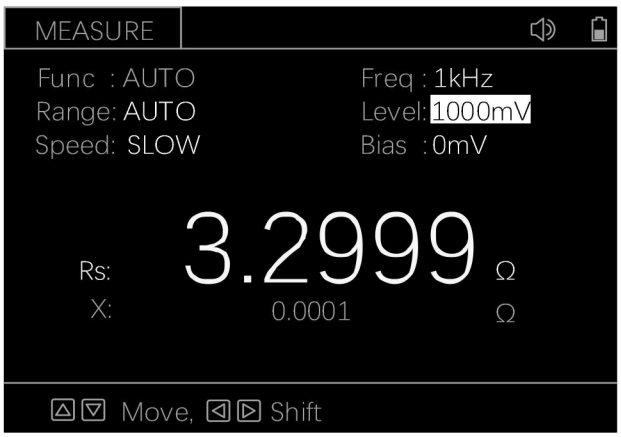


Fig 7 Level editing

The following levels can be selected for different models:

"10k Basic Type": 1Vrms、0.6Vrms;

"100k Basic Type": 1Vrms、0.6Vrms、0.3Vrms;

"10k Enhanced Type": 1Vrms、0.6Vrms、0.3Vrms、0.1Vrms;

"100k Enhanced Type": 1Vrms、0.6Vrms、0.3Vrms、0.1Vrms;

"100k Continuous Fr. Type": 0~1.1Vrms adjustable., 1mV stepping.

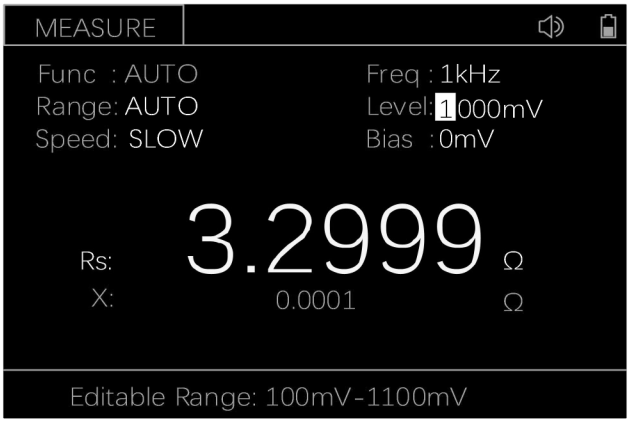


Fig 8 Level editing

5.2.3.Selection of internal bias

This Series offers internal bias except "10k Basic Type". In DCR mode, the internal bias indicates 1000mV.

There are two ways to change the bias voltage:

Method One: press ↑ ↓ keys to set the bias, and press ← → keys to switch between preset bias values.

Method Two: Press the ↑ ↓ keys to select bias on the interface as shown in figure 9, then press ENTER key to enter into bias editing mode. Press ← → key to move the cursor and ↑ ↓ key to modify the values, then press ENTER key exit the bias editing mode(not available for "100k Basic Type"and "10k Basic Type").

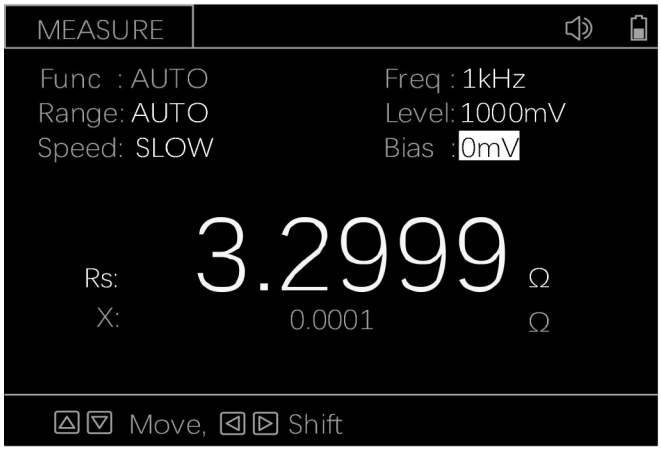


Fig 9 Bias Selection

5.2.4.Selection of range

There are two ways to change the range:

Method One: turn on the instrument and the measurement display is shown, press ↑ ↓ keys to move the cursor to the range, and ← → keys to switch the range (10Ω、30Ω、100Ω、300Ω、1kΩ、3kΩ、10kΩ、30kΩ、100kΩ、300kΩ、1MΩ).

Method Two: Press RANGE to switch directly to the auto range, and the cursor moves there. Then press RANGE key again to switch to manual range.and the range will be displayed as the current optimal range at this time. Press← → key to switch ranges in cycle.

5.2.5.Selection of measurement speed

Turn on the instrument and the measurement display is shown, press SPEED to switch to the next measurement speed (fast, medium, slow). Above the status bar the corresponding measurement speed is displayed. Fast (8 times / s), the speed (4 times / s), Slow (2 times / s).

5.2.6. Selection of L/C/R/Z main parameters

Select the type of measurement parameter, and first select the main parameter.

Press AUTO/R/C/L/Z to switch between the following main parameters in sequence:

R (resistance), C (capacitance), L (inductance), Z (impedance) and AUTO (automatic). When AUTO is selected for the main parameter, "Automatic Main Parameter" is displayed above the status bar.

5.2.7. Selection of X/D/Q/θ/ESR secondary parameters

When it's not in auto mode, press the secondary parameter key to select secondary parameters:

Press X/D/Q/θ/ESR to select the following secondary parameters:

D (loss), Q (quality factor), θ (phase angle), ESR (equivalent series resistance), X (reactance).

5.2.8.Selection of tolerance

There are three ways to set the tolerance:

Method One:

1. Turn on the instrument and the measurement display is shown, and long press TOL% to open the comparator switch, at this moment the hidden "tolerance," "nominal",”deviation percentage” and comparator result are displayed, as shown in Figure 10;

2. Short press TOL% to switch to the next tolerance (1%、5%、10%、20%、50%).

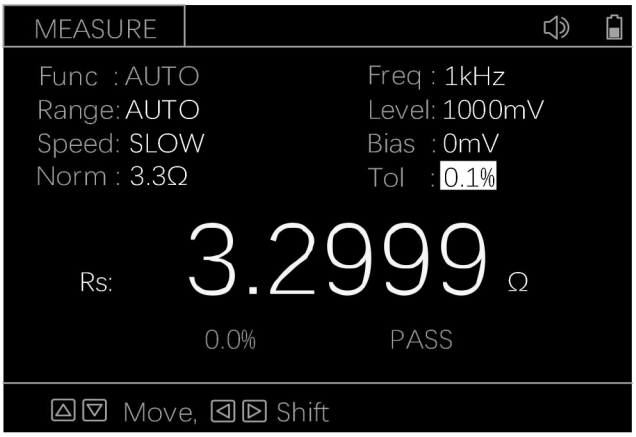


Fig 10 Tolerance Selection

Method Two:

1. The same as Method One;

2. Use ↑ ↓ keys to move the cursor at the tolerance, and then use ← → keys to switch between the preset tolerance.

Method Three:

1. The same as Method One;

2.Use ↑ ↓ keys to move the cursor at the tolerance, short press ENTER to enter the interface for custom tolerance((1% to 50%, resolution ratio of 0.1%). Refer to the custom settings of frequency for the setting method.

5.2.9.Selection of nominal

The method of setting the nominal is as follows:

1、Long press TOL% key to open comparator function, and press ↑ ↓keys to move the cursor to nominal, then press ENTER key to edit the nominal value. Refer to the custom settings of frequency for the setting method.

5.2.10.Selection of equivalent

Due to the non-ideal and distributed parameters of elements, the actual elements tend to be equivalent with the combination of ideal elements. LCR tester generally uses two simple equivalent models—series and parallel. Selecting the proper equivalent model will lead to better measurement results. In general, low-impedance elements (such as that below 100Ω) should use the series equivalent model; a high impedance element (such as that above 10kΩ) should use the parallel equivalent model; the equivalent model affects less the measurement result of the one in between the two above models. Press AUTO/SER/PAL to switch to the next equivalent (SER, PAL). When it's in "AUTO" mode, the AUTO/SER/PAL key is ineffective.

5.3.DCR mode

This Series has the DCR mode except for "100k Basic Type"/"10k Basic Type". Long press FREQ to enter the DCR mode, as shown in figure 11. Then long press the FREQ key or short press AUTO/R/C/L/Z key to exit the DCR mode.

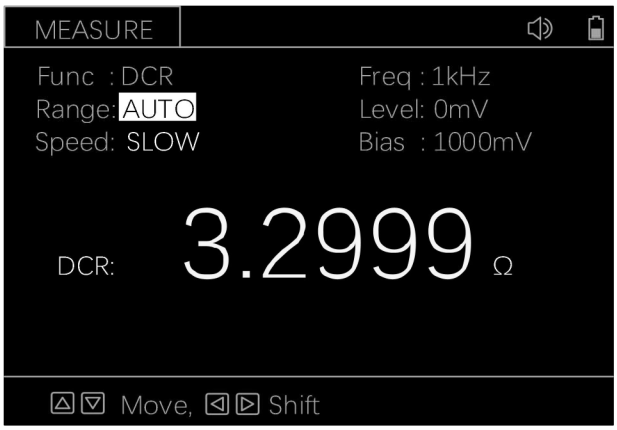


Fig 11 DCR mode

5.4.Electrolytic capacitance mode

This Series has the electrolytic capacitance mode except for "10k Basic Type". Short press -|(- key to enter into electrolytic capacitance mode, then short press-|(- key or AUTO/R/C/L/Zkey to exit electrolytic capacitance mode, shown as fig 12.

Fig 12 Electrolytic capacitance mode

5.5.Relative mode

Short press ▲NULL to turn on the relative measuring function. When press the key, the measurement result of the principal parameter is displayed as a reference value in the small character position of the measurement result display area. The large character position of the measurement result display area displays the deviation value between the real-time measurement result of the principal parameter and the reference value.

5.6.Reading hold mode (HOLD)

The data hold function is used to freeze the displayed data. The measurement is still in progress, but the data on the LCD is not updated as the measurements proceed.

Turn on reading hold:

To turn on the reading hold function, press the HOLD key, and lock icon will be shown on the

LCD to indicate that the data hold function is activated as shown in Fig 13. And measurement results for the main and secondary parameters are those displayed before pressing the HOLD key.

Turn off the recording function:

Short press HOLD key again to turn off data holding, and lock icon will disappear. The device back to normal measurement mode.

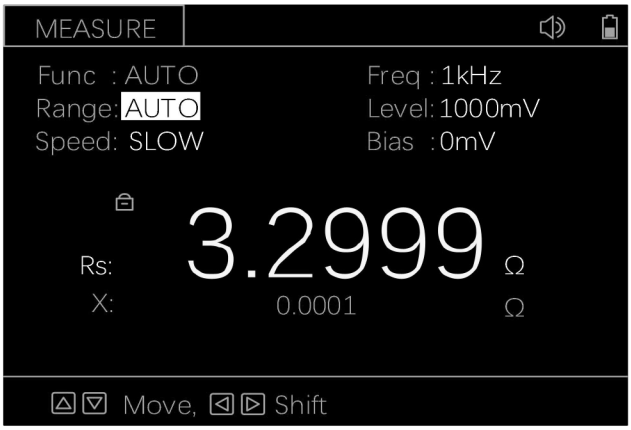


Fig 13 Data hold mode

5.7.Data recording function (maximum, minimum, average)

If the measurement data is with poor stability and fluctuate within a certain range, use the data recording mode to acquire the readings. In the data recording mode, the maximum, minimum and average can be dynamically obtained within a certain range.

Turn on the recording function:

Long press HOLD to turn on the data recording function, then the measurement result of main and secondary parameters, and maximum, minimum and average value of main parameter will be displayed on screen, as shown in Fig 14.

Turn off the recording function:Long press HOLD to turn off the data recording function.

Fig 14 Data recording function

5.8.Comparator function

See 5.2.8 Selection of tolerance and 5.2.9 Selection of nominal value.

5.9.Correction function

The correction function applies to the open and short circuit. By correcting it can effectively reduce the error of distributed parameters caused by the test line. The short circuit correction can reduce the impact of the contact resistance and lead resistance on the measurement of low impedance element; and the open circuit correction can reduce the impact of the distributed capacitance and resistance between the two ends of the test line on the measurement of high impedance element.

Both short circuit and open circuit together can reduce impact of all elements above, which is applied suitably to precision measurement.

The method of correction is shown as follows:

1. Before entering the correction function, please ensure that the test terminals are Open(test clips disconnected)- or short(with sheet metal connected)-circuited.Long Press ▲NULL to enter the correction interface, then the instrument automatically identify whether it is open or short circuit as shown in Figure 15. When the number in the lower right corner is reversed, the calibration is finished.

Note: Do not change the state of the test terminals during the correction.

Fig 15 Open circuit correction

6.System Setting Guidance

6.1.Interface switch

Long press power button to enter into measurement display interface, then press SET key to switch between measurement display interface and system setting interface.

6.2.Language selection

Press↑ ↓ to move cursor to "Language selection", then press← → to switch between

Chinese and English.

6.3.Auto power off

Press↑ ↓ to move cursor to :auto power off:, then press← → to set auto power off time("5mins", "15mins", "30mins"," 60mins", "off" for options)

6.4.Brightness adjustment

Press← → to move the cursor to "brightness adjustment", then press key to select brightness("20%"、"40%"、"60%"、"80%"、"100%"for options)

6.5.Turn-on setting

Press ↑ ↓key to move cursor to "turn-on setting", then press← → key to select the turn on setting as "default value" or "last value". When "last value" is chosen, the measurement parameter will be last set value after turn on device.

6.6.Buzzer

Press key to move cursor to "buzzer", then press buzzer scheme according to different requirement. There are "key tone + notification tone"、"notification tone only" and "turn off"

6.7.Color setting

Press ↑ ↓key to move cursor to "color setting", then press← → key to select one of colors scheme("Cyan", "Coral Red", "White" and "Custom") according to different requirement. The "Cyan", "Coral Red", "White" , 3 colors are fixed scheme.

If you select "Custom" color scheme, press ENTER to enter the color custom setting interface, as shown in Figure 16. Press↑to select the frame and label color. Press the ↓ key to select the main parameter color of the measurement result; Press ← to select the color of the measurement parameter; Press → to select a background color. Press ENTER to return to the system Settings interface. Color in the library are: "brown", "blue", "yellow", "purple", "green", "coral red", "golden", "orange" and "white", "gray", "50% ash", "black" for options.

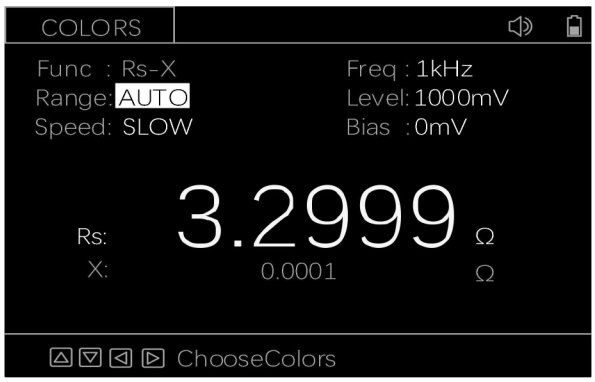


Fig 16 Color custom setting

7. Rapid application guide

Warning:

- **Do not measure the charged inductance and capacitor. Before measure, please ensure it is completely discharged , or it may cause damage to the instrument.**
- **In case of measurement of on-board devices, make sure the power is**
- **turned off. The active circuit cannot be measured directly.**
- **Turned off. The active circuit cannot be measured directly. When used in the dusty environment, the instrument is easy to gather dirt, so it should be cleaned periodically to protect the test port to prevent the dust from entering the instrument. The accumulation of dust will be conductive and affect the use of the instrument.**
- **Do not place the instrument directly in the environments with explosives, direct sunlight and excessive heat.**

Reminder: To achieve the proper measurement accuracy, refer to the "correction function" section for open and short circuit correction before the measurement. The test fixture can be rubber plug - alligator clip (see figure 17), Kelvin test fixture (figure 18), or the component can be directly inserted into the position 17 in figure 1 (notch). The rubber plug - alligator clips are mainly used in the following examples.

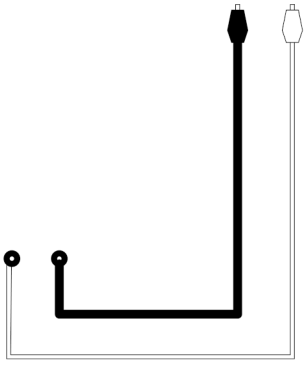


Fig 17 Rubber plug-alligator clips

Fig 18 Kelvin clips

7.1.Charge the instrument

1. Suggest use the power adaptor that comes with the instrument and USB cable with TypeC interface to connect the instrument to the power supply.
2. The charging interface is shown as Fig 19。 Charging icon will be displayed next to battery icon.
3. In standby screen, press ↑ key to switch between charging current at 200mA or 500mA.
Note: When connected to power adapter, choose current at 500mA; when to computer via USB cable, choose current at 200mA only.
4、After charging is complete, the charging icon will disappear, and battery icon will show the full state.

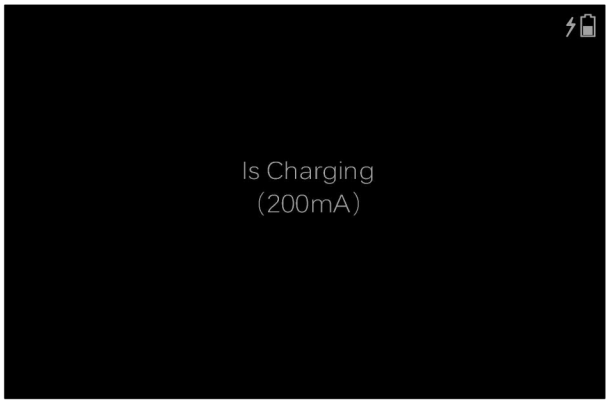


Fig 19 Idle screen charging interface

7.2.Start instrument

When there is enough battery power or powered by USB cable with TypeC port, long press power button to start the instrument, then press arbitrary button to enter into measuring interface.

7.3.Component measurement

Connection method is shown as Fig 20. Suggest do open circuit and short circuit calibration before measuring.

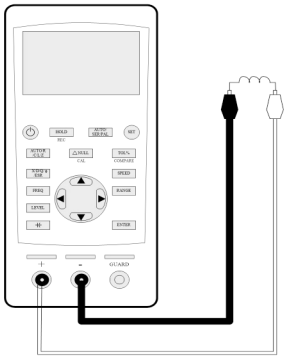


Fig 20 Measuring diagram

1. Start instrument to enter into measuring interface. If the default measuring parameter is shown as Fig 21, then next step, otherwise please refer to Chapter 5.2 to set the required measuring parameter. After completing, enter into next step.
2. Insert the component to be tested into the test slot, or select the appropriate test accessories (rubber plug-alligator clip, Kelvin test clip, etc.) into the device to be tested, the machine will automatically identify the component to be tested and give the corresponding measurement results.
3. Reading measuring result.

Fig 21 System default measuring paramter

8.Remote communication

Details please refer to 《SCPI V2.00.2414.001》.

9. Instrument parameter

Here are the general indicators and measurement accuracy indicators for This Series handheld LCR, which apply to the This Series.

Disclaimer: These parameters are subject to change without notice!

9.1.General parameters

Sheet 1

Model	10k Basic Type	100k Basic Type	10k Enhanced Type	100k Enhanced Type	100k Continuous Fr. Type
Testing frequency	100Hz,120Hz 1kHz, 10kHz	100Hz、120Hz 1kHz、10kHz 40kHz,100kHz	100Hz,120Hz 1kHz,10kHz	100Hz,120Hz, 1kHz,10kHz, 40kHz,100kHz	10Hz-100kHz continuous adjustment，0.01Hz stepping
Basic accuracy	0.3%	0.3%	0.2%	0.2%	0.2%
Display screen	2.8''TFT LCD screen				
Number of display digits	Principal parameter：4.5 digits， Secondary parameter：4.5 digits;				
Measured parameter:	Principal parameter: L/C/R/Z Secondary parameter: X/D/Q/θ/ESR				
Electrolytic capacitor mode	×	√	√	√	√
DCR mode	×	×	√	√	√
Measurement range	L:0.001uH～3999.9H, C:0.001pF～39.99mF, R:0.001Ω～39.99MΩ				
Measuring display speed	2 time/s（slow）, 4 time/s（medium ）, 8time/s（fast）				
Internal bias	×	100mV,300mV 600mV	0～1000mV adjustable, at a step of 1mV.		
Testing level	600mV，1000mV	300mV,600mV，1000mV	100mV，300mV，600mV，1000mV		0～1.1V adjustable, at a step of 1mV
Calibration function	Open circuit calibration, short circuit calibration				
Comparator function	To calculate the relative errors between measurement value and nominal value of components which is displayed in percentage and give the comparator result. The value of nominal value and tolerance value can be set, tolerance range can be set as 0.1%～99.9%				
Record function	To record current measured maximum value, minimum value, average value and display				
Test terminal configuration	3-terminal，5-terminal				
Output Impedance	100Ω				
Communication	USB-TypeC（virtual serial port）				
Others	Adjustment of backlight brightness, Chinese and English are optional,USB device and automatic power-off time				

9.2. Measurement Accuracy

R、C、L、Z、X accuracy（When Dx≤0.1 the accuracy of L, C, X is applied, **，when Qx≤0.1the accuracy of R is applied）**

The relative accuracy Ae is:

$$Ae = \pm Ac + (Ab + 100 * Kz + Kl) * Kt[\%]$$

Ac——calibration accuracy

Ab——basic accuracy

Kz——impedance scaling factor

Kl——cable length factor

Kt——temperature factor

The accuracy of D

The accuracy of D—De is:

when Dx≤0.1:

$$De = \pm Ae / 100$$

Dx-- D measured

Ae-- relative accuracy of R, C, L, Z, and X

DeWhen Dx> 0.1: multiply (1 + Dx) by De

The accuracy of Q (when Q * De<1)

The accuracy of Q—Qe is:

$$Qe = \pm \frac{Qx^2 * De}{1 \pm Qx * De}$$

Qx -- Q measured

De-- relative accuracy of D

The accuracy of θ

The accuracy of θ—θe is:

$$\theta e = \pm \frac{180 * Ae}{100\pi}[\deg]$$

Ae——relative accuracy of R, C, L, Z, and X

The accuracy of Rp (when Dx≤0.1)

Rpe—the accuracy of Rp is:

$$Rpe = \pm \frac{Rpx * De}{Dx \mp De}[\Omega]$$

Rpe --relative accuracy of Rp

Rpx-- measured Rp (Ω)

Dx-- D measured

De--relative accuracy of D

The accuracy of Rs (when Dx≤0.1)

Rse—the accuracy of Rs is:

$$Rse = \pm Xx * De[\Omega]$$

$$Xx = 2\pi fLx$$

Rse --relative accuracy of Rs

Dx-- D measured

Xx-- X measured (Ω)

De -- relative accuracy of D

f --test frequency (Hz)

Cx—measured C (F)

Lx—measured L (H)

The accuracy of ESR

ESR is the equivalent series resistance like Rs.

Basic accuracy

The basic accuracy of the instrument is 0.2; with the changes of the test frequency and the impedance of DUT, the basic accuracy will decline, the basic accuracy and its application are shown in the table below.

Slow mode

Test Frequency（Hz）	Scope of impedance				
	Less than 1Ω	1Ω to 10Ω	10Ω to 100kΩ	100kΩ to 1MΩ	Greater than 1MΩ
10~30	0.3	0.15	0.15	0.2	0.5
30~10k	0.3	0.1	0.05	0.1	0.3
10k~100k	0.5	0.1	0.05	0.15	0.5

Medium mode

Test Frequency（Hz）	Scope of impedance				
	Less than 5Ω	5Ω~10Ω	10Ω~20kΩ	20kΩ~100kΩ	Greater than 1MΩ
10~30	0.4	0.4	0.2	0.1	0.35
30~1k	0.8	0.2	0.15	0.15	0.3
1k~30k	0.5	0.4	0.3	0.3	1
30k~80k	1	0.6	0.3	0.6	3
80k~100k	2	1	0.4	0.9	5

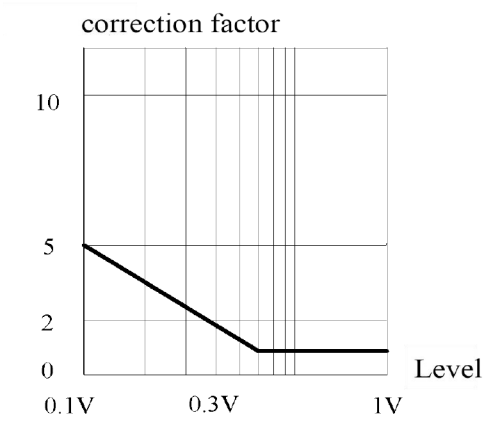
Fast mode

Test Frequency（Hz）	Scope of impedance				
	Less than 1Ω	1Ω~10Ω	10Ω~100kΩ	100kΩ~1MΩ	Greater than 1MΩ
10~30	0.6	0.3	0.3	0.4	1
30~10k	0.6	0.2	0.1	0.2	0.2
10k~30k	1	0.2	0.1	0.3	1

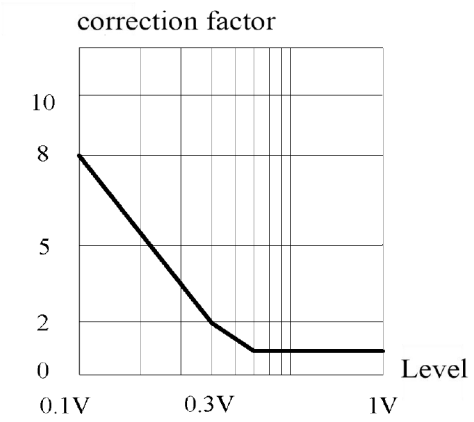
30k~100k	2	0.6	0.3	0.6	2

When the test level is less than 0.75V and greater than 0.5V, the basic accuracy is shown in the above table; in other cases, it needs to be multiplied by the level correction factor. The level correction factor is shown below:

Z>0.5Ω



Z≤0.5Ω



Accuracy factor

This section contains all the accuracy correction factors: Impedance scaling factor Kz, temperature factor Kc, calibration factor Kf, cable length factor Kl.

Frequency/Hz	Kz（Zm<500Ω）	Kz（Zm≧500Ω）
Less than 100	$(\frac{1*10^{-3}}{\lvert Zm\rvert})(1+\frac{200}{Vs})(1+\sqrt{\frac{100}{fm}})$	
100 ~100k	$(\frac{1*10^{-3}}{\lvert Zm\rvert})(1+\frac{200}{Vs})$	$\lvert Zm\rvert(5*10^{-9})(1+\frac{70}{Vs})$
Greater than 100k	$(\frac{1*10^{-3}}{\lvert Zm\rvert})(2+\frac{200}{Vs})$	$\lvert Zm\rvert(1*10^{-8})(1+\frac{70}{Vs})$

Note: fm in the table indicates the frequency of the test signal（unit：Hz），Zm is the impedance (unit: Ω), Vs the test level (unit: mV

Temperature factor Kc

$$Kc = 0.25*(T-20)$$ **(When Kc <1, Kc = 1)**

T- Room temperature

Calibration factor Kf

Range	Frequency /Hz	
	10~100	100~100k
10kΩ	0	0
1kΩ、100kΩ	0.02	0.01
100Ω	0.04	0.03

Cable length factor Kl

0m	1m	2m	4m

$5*10^{-4}*(1+0.05fm)$	0	$5*10^{-4}*(1+0.05fm)$	$1*10^{-3}*(1+0.05fm)$

Note: fm in the table indicates the frequency of the test signal（unit:

9.3.Accuracy indicator

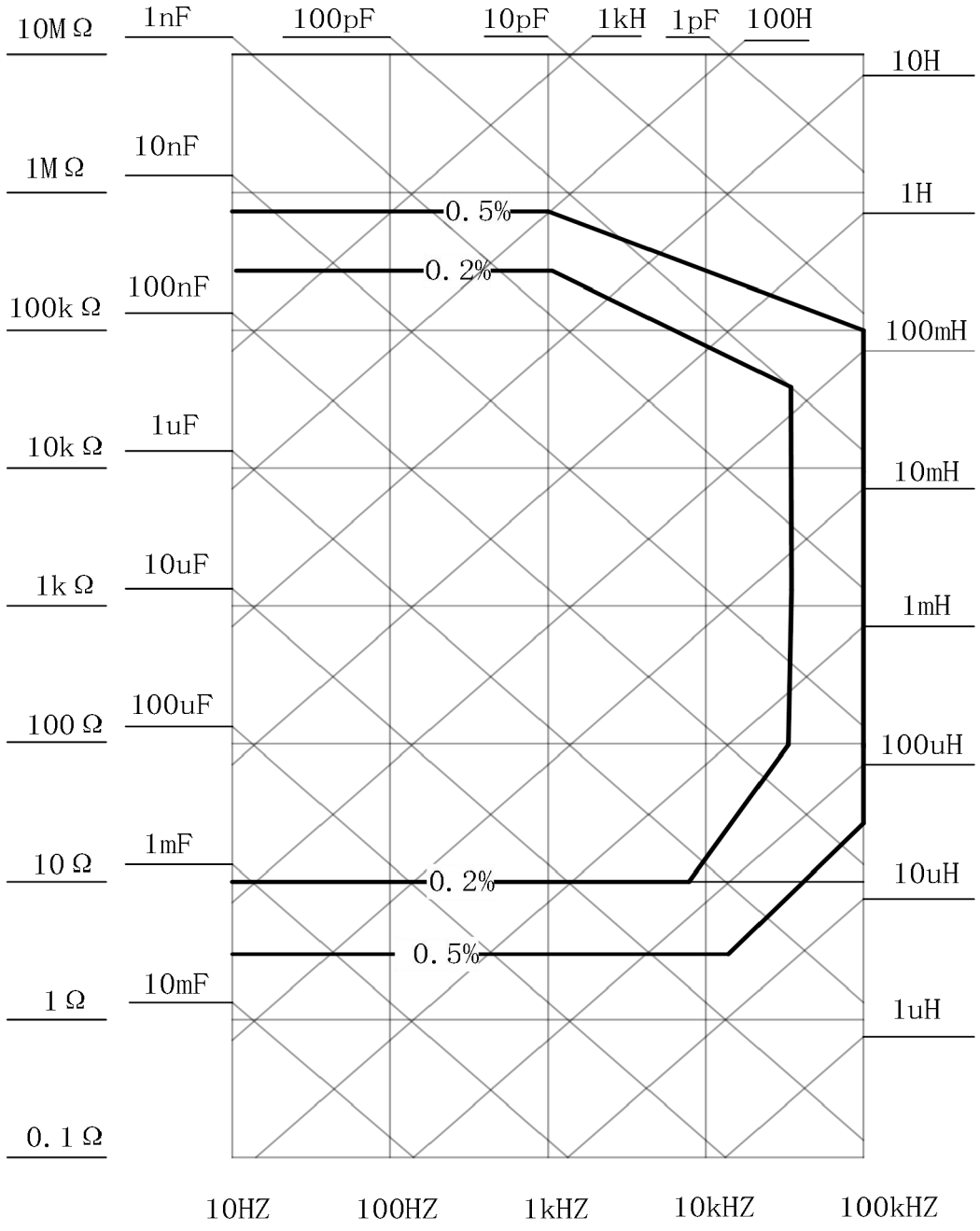
Notes:

- ***Ambient temperature: 20 ℃ ± 2 ℃, humidity: ≤80% R.H;***
- ***Preheat the instrument for at least 30 minutes before the test;***
- ***Test at the test notch on the end face of the instrument;***
- ***It is better to conduct open and short circuit correction before the test;***
- ***If the actual measurement of the instrument and the display exceeds the scope specified in the table, the accuracy of the excessive part will not be given;***
- ***The meaning of the subscript***

S- series equivalent; p- parallel equivalent;

- ***Some parameters cannot be given in the data table, and it can only be calculated based on the measurement results;***
-

9.3.1.Accuracy indicator("100k Continuous Fr. Type")



9.3.2.Accuracy indicator[2]("100k Enhanced Type"/"10k Enhanced Type")

➢ The following accuracy applies to the test level of 0.6Vrms, if the test level is 0.3Vrms, multiply the accuracy by 2; If the test level is 0.1Vrms, multiply the accuracy by 5 (Z> 0.5Ω) or by 8 (Z≤0.5Ω);

Capacitance C and loss D

■ 100Hz/120Hz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
20mF	4.000mF~ 20.000mF	5.00%+5digits	0.0500	Series
4mF	400.0μF~ 3.9999mF	1.00%+3digits	0.0100	Series
400μF	40.00μF~ 399.99μF	0.30%+2digits	0.0030	Series
40μF	4.000μF~ 39.999μF	0.20%+2digits	0.0020	Series
4μF	400.0nF~ 3.9999μF	0.20%+2digits	0.0020	----
400nF	40.00nF~ 399.99nF	0.2%+2digits	0.0020	Parallel
40nF	4.000nF~ 39.999nF	0.3%+3digits	0.0030	Parallel
4nF	0pF~ 3.999nF	1.2%+5digits	------	Parallel

■ 1kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
1000uF	400.0uF~ 999.99uF	2.00%+5digits	0.0200	Series
400μF	40.00μF~ 399.99μF	1.00%+3digits	0.0100	Series
40μF	4.000μF~ 39.999μF	0.30%+2digits	0.0030	Series
4μF	400.0nF~ 3.9999μF	0.20%+2digits	0.0020	----
400nF	40.00nF~ 399.99nF	0.2%+2digits	0.0020	Parallel
40nF	4.000nF~ 39.999nF	0.2%+3digits	0.0030	Parallel
4nF	400.0pF~ 3.9999nF	0.3%+3digits	0.0030	Parallel
400pF	0.0pF~399.9pF	1.2%+5digits	------	Parallel

■ 10kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
100μF	40.00μF~ 100.00μF	3.00%+5digits	0.0300	Series
40μF	4.000μF~ 39.999μF	1.0%+3digits	0.0100	Series
4μF	400.0nF~ 3.9999μF	0.30%+2digits	0.0030	Series

400nF	40.00nF~ 399.99nF	0.2%+2digits	0.0020	Series
40nF	4.000nF~ 39.999nF	0.2%+2digits	0.0020	------
4nF	400.0pF~ 3.9999nF	0.2%+2digits	0.0020	Parallel
400pF	40.00pF~399.99pF	0.3%+3digits	0.0030	Parallel
40pF	0.00pF~39.99pF	1.2%+5digits	------	Parallel

■ 40kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
100μF	40.00μF~ 100.00μF	4.00%+5digits	0.0400	Series
40μF	4.000μF~ 39.999μF	2.0%+3digits	0.0200	Series
4μF	400.0nF~ 3.9999μF	0.60%+2digits	0.0060	Series
400nF	40.00nF~ 399.99nF	0.3%+2digits	0.0030	Series
40nF	4.000nF~ 39.999nF	0.3%+2digits	0.0030	------
4nF	400.0pF~ 3.9999nF	0..3%+2digits	0.0030	Parallel
400pF	40.00pF~399.99pF	0.6%+3digits	0.0060	Parallel
40pF	0.000pF~39.999pF	1.5%+5digits	------	Parallel

■ 100kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
10μF	4.000μF~ 10.000μF	6.0%+20digits	0.0600	Series
4μF	400.00nF~ 3.9999μF	3.0%+10digits	0.0300	Series
400nF	40.00nF~ 399.99nF	0.8%+5digits	0.0080	Series
40nF	4.000nF~ 39.999nF	0.5%+2digits	0.0050	Series
4nF	400.0pF~ 3.9999nF	0.5%+2digits	0.0050	------
400pF	40.00pF~399.99pF	0.8%+2digits	0.0080	Parallel
40pF	4.000pF~39.999pF	1.5%+5digits	0.0150	Parallel
4pF	0.000pF~3.999pF	3%+10digits	------	Parallel

Inductance L and quality factor

■ 100Hz/120Hz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1000H	400.0H~ 999.9H	1.00%+3digits	0.0100	Parallel
400H	40.00H~ 399.99H	0.30%+2digits	0.0030	Parallel

40H	4.000H~ 39.999H	0.20%+2digits	0.0020	Parallel
4H	400.0mH~ 3.9999H	0.20%+2digits	0.0020	----
400mH	40.00mH~ 399.99mH	0.2%+2digits	0.0020	Series
40mH	4.000mH~ 39.999mH	0.3%+3digits	0.0030	Series
4mH	0uH~ 3.999mH	1.4%+5digits	------	Series

■ 1kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
100H	40.000H~ 100.00H	1.0%+3digits	0.0100	Parallel
40H	4.000H~ 39.999H	0.30%+2digits	0.0030	Parallel
4H	400.0mH~ 3.9999H	0.20%+2digits	0.0020	Parallel
400mH	40.00mH~ 399.99mH	0.2%+2digits	0.0020	------
40mH	4.000mH~ 39.999mH	0.2%+2digits	0.0020	Series
4mH	400.0uH~ 3.9999mH	0.4%+3digits	0.0040	Series
400uH	0.0uH~399.9uH	1.4%+5digits	------	Series

■ 10kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1H	400.0mH~ 999.9mH	0.80%+3digits	0.0080	Parallel
400mH	40.00mH~ 3.9.99mH	0.2%+2digits	0.0020	Parallel
40mH	4.000mH~ 39.999mH	0.2%+2digits	0.0020	------
4mH	400.0uH~ 3.9999mH	0.2%+2digits	0.0020	Series
400uH	40.00uH~399.99uH	0.4%+3digits	0.0040	Series
40uH	0.00uH~39.99uH	1.4%+5digits	------	Series

■ 40kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1H	400.0mH~ 999.9mH	1.0%+4digits	0.0100	Parallel
400mH	40.00mH~ 399.99mH	0.5%+2digits	0.0050	Parallel
40mH	4.000mH~ 39.999mH	0.5%+2digits	0.0050	------
4mH	400.0uH~ 3.9999mH	0.5%+2digits	0.0050	Series
400uH	40.00uH~399.99uH	0.8%+3digits	0.0080	Series
40uH	0.000uH~39.999uH	2.0%+5digits	------	Series

■ 100kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
100mH	40.00mH~ 399.99mH	1.2%+2digits	0.0120	Parallel
40mH	4.000mH~ 39.999mH	0.8%+2digits	0.0080	Parallel
4mH	400.0uH~ 3.9999mH	0.5%+2digits	0.0050	------
400uH	40.00uH~399.99uH	0.5%+2digits	0.0050	Series
40uH	4.000uH~39.999uH	0.8%+5digits	0.0080	Series
4uH	0.000uH~3.999uH	2.5%+10digits	------	Series

Note*: please calculate the quality factor according to the formula to calculate the accuracy of Q.

Impedance Z and phase angle

■ 100Hz、120Hz、1kHz、10kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	3.0%+5digits	1.1°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	1.2%+3digits	0.7°	Parallel
400kΩ	40.00kΩ~399.99kΩ	0.3%+3digits	0.2°	Parallel
40kΩ	4.000kΩ~39.999kΩ	0.2%+2digits	0.1°	------
4kΩ	400.0Ω~3.9999kΩ	0.2%+2digits	0.1°	Series
400Ω	40.00Ω~399.99Ω	0.2%+2digits	0.1°	Series
40Ω	4.000Ω~39.999Ω	0.3%+3digits	0.2°	Series
4Ω	0.4000Ω~3.9999Ω	1.2%+3digits	0.7°	Series
0.4Ω	0.0000Ω~0.3999Ω	3.0%+3digits	------	Series

■ 40kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	5.0%+10digits	1.4°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	2.0%+3digits	1.1°	Parallel
400kΩ	40.00kΩ~399.99kΩ	0.7%+4digits	0.4°	Parallel
40kΩ	4.000kΩ~39.999kΩ	0.7%+4digits	0.4°	------
4kΩ	400.0Ω~3.9999kΩ	0.3%+3digits	0.2°	Series
400Ω	40.00Ω~399.99Ω	0.3%+3digits	0.2°	Series
40Ω	4.000Ω~39.999Ω	0.5%+4digits	0.3°	Series
4Ω	0.4000Ω~3.9999Ω	1.8%+6digits	1.0°	Series
0.4Ω	0.0000Ω~0.3999Ω	4.5%+10digits	------	Series

■ 100kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	8.0%+20digits	4.6°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	3.0%+10digits	1.7°	Parallel
400kΩ	40.00kΩ~399.99kΩ	1.2%+4digits	0.7°	Parallel
40kΩ	4.000kΩ~39.999kΩ	0.8%+2digits	0.5°	Parallel
4kΩ	400.0Ω~3.9999kΩ	0.5%+2digits	0.3°	------
400Ω	40.00Ω~399.99Ω	0.5%+2digits	0.3°	Series
40Ω	4.000Ω~39.999Ω	0.8%+5digits	0.5°	Series
4Ω	0.4000Ω~3.9999Ω	2.5%+10digits	1.4°	Series
0.4Ω	0.0000Ω~0.3999Ω	6%+20digits	------	Series

9.3.3.Accuracy indicator[3]("100k Basic Type"/"10k Basic Type")

See 9.2 for notes.

Capacitance C and loss D

■ 100Hz/120Hz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
20mF	4.000mF~ 20.000mF	8.00%+5digits	0.0800	Series
4mF	400.0μF~ 3.9999mF	2.00%+3digits	0.0200	Series
400μF	40.00μF~ 399.99μF	0.60%+2digits	0.0060	Series
40μF	4.000μF~ 39.999μF	0.40%+2digits	0.0040	Series
4μF	400.0nF~ 3.9999μF	0.40%+2digits	0.0040	----
400nF	40.00nF~ 399.99nF	0.4%+2digits	0.0040	Parallel
40nF	4.000nF~ 39.999nF	0.5%+3digits	0.0050	Parallel
4nF	0pF~ 3.999nF	1.5%+5digits	------	Parallel

■ 1kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
1000uF	400.0uF~ 999.9uF	3.00%+5digits	0.0300	Series
400μF	40.00μF~ 399.99μF	1.50%+3digits	0.0150	Series

40μF	4.000μF~ 39.999μF	0.60%+2digits	0.0060	Series
4μF	400.0nF~ 3.9999μF	0.40%+2digits	0.0040	----
400nF	40.00nF~ 399.99nF	0.4%+2digits	0.0040	Parallel
40nF	4.000nF~ 39.999nF	0.6%+3digits	0.0060	Parallel
4nF	400.0pF~ 3.9999nF	0.6%+3digits	0.0060	Parallel
400pF	0.0pF~399.9pF	3%+5digits	------	

■ 10kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
100μF	40.00μF~ 100.00μF	4.00%+5digits	0.0400	Series
40μF	4.000μF~ 39.999μF	2.0%+3digits	0.0200	Series
4μF	400.0nF~ 3.9999μF	0.60%+2digits	0.0060	Series
400nF	40.00nF~ 399.99nF	0.4%+2digits	0.0040	Series
40nF	4.000nF~ 39.999nF	0.4%+2digits	0.0040	------
4nF	400.0pF~ 3.9999nF	0.4%+2digits	0.0040	Parallel
400pF	40.00pF~399.99pF	0.6%+3digits	0.0060	Parallel
40pF	0.00pF~39.99pF	2.5%+5digits	------	Parallel

■ 40kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
100μF	40.00μF~ 100.00μF	6.00%+5digits	0.0600	Series
40μF	4.000μF~ 39.999μF	4.0%+3digits	0.0400	Series
4μF	400.0nF~ 3.9999μF	1.0%+2digits	0.0100	Series
400nF	40.00nF~ 399.99nF	0.6%+2digits	0.0060	Series
40nF	4.000nF~ 39.999nF	0.6%+2digits	0.0060	------
4nF	400.0pF~ 3.9999nF	0.6%+2digits	0.0060	Parallel
400pF	40.00pF~399.99pF	1%+3digits	0.0100	Parallel
40pF	0.000pF~39.999pF	3%+5digits	------	Parallel

■ 100kHz

Range	Range of display	Accuracy Ce	Accuracy De	Equivalent mode recommended
10μF	4.000μF~ 10.000μF	8.0%+20digits	0.0800	Series
4μF	400.0nF~ 3.9999μF	5.0%+10digits	0.050	Series
400nF	40.00nF~ 399.99nF	1.5%+5digits	0.0150	Series
40nF	4.000nF~ 39.999nF	1%+2digits	0.0100	Series
4nF	400.0pF~ 3.999nF	1%+2digits	0.0100	------
400pF	40.00pF~399.99pF	1.5%+2digits	0.0150	Parallel
40pF	4.000pF~39.999pF	2%+5digits	0.0200	Parallel
4pF	0.000pF~3.999pF	5%+10digits	------	Parallel

Inductance L and quality factor

■ 100Hz/120Hz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1000H	400.0H~ 999.9H	2.00%+3digits	0.0200	Parallel
400H	40.000H~ 399.99H	0.60%+2digits	0.0060	Parallel
40H	4.000H~ 39.999H	0.40%+2digits	0.0040	Parallel
4H	400.0mH~ 3.9999H	0.40%+2digits	0.0040	----
400mH	40.00mH~ 399.99mH	0.4%+2digits	0.0040	Series
40mH	4.000mH~ 39.999mH	0.6%+3digits	0.0060	Series
4mH	0uH~ 3.999mH	3.0%+5digits	------	Series

■ 1kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
100H	40.00H~ 100.00H	2.0%+3digits	0.0200	Parallel
40H	4.000H~ 39.999H	0.60%+2digits	0.0060	Parallel
4H	400.0mH~ 3.9999H	0.40%+2digits	0.0040	Parallel
400mH	40.00mH~ 399.99mH	0.4%+2digits	0.0040	------
40mH	4.000mH~ 39.999mH	0.4%+2digits	0.0040	Series

4mH	400.0uH~ 3.9999mH	1%+3digits	0.0100	Series
400uH	0.0uH~399.9uH	3.0%+5digits	------	Series

■ 10kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1H	400.0mH~ 999.9mH	1.50%+3digits	0.0150	Parallel
400mH	40.00mH~ 399.99mH	0.4%+2digits	0.0040	Parallel
40mH	4.000mH~ 39.999mH	0.4%+2digits	0.0040	------
4mH	400.0uH~ 3.9999mH	0.4%+2digits	0.0040	Series
400uH	40.00uH~399.99uH	0.8%+3digits	0.0080	Series
40uH	0.00uH~39.99uH	3.0%+5digits	------	Series

■ 40kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
1H	400.0mH~ 999.9mH	2.0%+4digits	0.0200	Parallel
400mH	40.00mH~ 399.99mH	0.8%+2digits	0.0080	Parallel
40mH	4.000mH~ 39.999mH	0.8%+2digits	0.0080	------
4mH	400.0uH~ 3.9999mH	0.8%+2digits	0.0080	Series
400uH	40.00uH~399.99uH	1.5%+3digits	0.0150	Series
40uH	0.000uH~39.999uH	4.0%+5digits	------	Series

Note*: please calculate the quality factor according to the formula to calculate the accuracy of Q.

■ 100kHz

Range	Range of display	Accuracy Le	Accuracy De*	Equivalent mode recommended
100mH	40.00mH399.99mH	2.5%+2digits	0.0250	Parallel
40mH	4.000mH39.999mH	1.5%+2digits	0.0150	Parallel
4mH	400.0uH3.9999mH	1.0%+2digits	0.0100	------
400uH	40.00uH~399.99uH	1.0%+2digits	0.0100	Series
40uH	4.000uH~39.999uH	1.5%+5digits	0.0150	Series
4uH	0.000uH~3.999uH	4%+10digits	------	Series

Impedance Z and phase angle

■ 100Hz、120Hz、1kHz、10kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	3.0%+10digits	3.4°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	1.2%+3digits	0.7°	Parallel
400kΩ	40.00kΩ~399.99kΩ	0.3%+3digits	0.2°	Parallel
40kΩ	4.000kΩ~39.999kΩ	0.25%+2digits	0.1°	------
4kΩ	400.0Ω~3.9999kΩ	0.25%+2digits	0.1°	Series
400Ω	40.00Ω~399.99Ω	0.25%+2digits	0.1°	Series
40Ω	4.000Ω~39.999Ω	0.5%+3digits	0.3°	Series
4Ω	0.4000Ω~3.9999Ω	2.0%+3digits	1.1°	Series
0.4Ω	0.0000Ω~0.3999Ω	4.0%+3digits	------	Series

■ 40kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	7.0%+41digits	4.0°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	2.5%+3digits	1.4°	Parallel
400kΩ	40.00kΩ~399.99kΩ	1.0%+4digits	0.6°	Parallel
40kΩ	4.000kΩ~39.999kΩ	1.0%+4digits	0.6°	------
4kΩ	400.0Ω~3.9999kΩ	0.5%+3digits	0.3°	Series
400Ω	40.00Ω~399.99Ω	0.5%+3digits	0.3°	Series
40Ω	4.000Ω~39.999Ω	0.7%+4digits	0.4°	Series
4Ω	0.4000Ω~3.9999Ω	2.0%+6digits	1.1°	Series
0.4Ω	0.0000Ω~0.3999Ω	5.0%+10digits	------	Series

■ 100kHz

Range	Range of display	Accuracy Ze	Accuracy θ_e	Equivalent mode recommended
20MΩ	4.000MΩ~20.000MΩ	9.0%+20digits	5.2°	Parallel
4MΩ	400.0kΩ~3.9999MΩ	4.0%+10digits	2.3°	Parallel
400kΩ	40.00kΩ~399.99kΩ	1.5%+4digits	0.9°	Parallel
40kΩ	4.000kΩ~39.999kΩ	1.0%+2digits	0.6°	Parallel
4kΩ	400.0Ω~3.9999kΩ	0.7%+2digits	0.4°	------
400Ω	40.00Ω~399.99Ω	0.7%+2digits	0.4°	Series
40Ω	4.000Ω~39.999Ω	1.0%+5digits	0.6°	Series
4Ω	0.4000Ω~3.9999Ω	3.0%+10digits	1.7°	Series
0.4Ω	0.0000Ω~0.3999Ω	7%+20digits	------	Series

9.3.4.DCR Measuring accuracy (optional:10k Basic Type/100k Basic Type)

Range	Range of display	Accuracy Re
1MΩ	300.00kΩ-999.99kΩ	1.0%+5digits
300kΩ	100.00kΩ-299.99kΩ	0.5%+5digits
100kΩ	30.000kΩ-99.999kΩ	0.2%+5digits
30kΩ	10.000kΩ-29.999kΩ	0.2%+3digits
10kΩ	3.0000kΩ-9.9999kΩ	0.2%+3digits
3kΩ	1.0000kΩ-2.9999kΩ	0.2%+3digits
1kΩ	300.00Ω-999.99Ω	0.2%+3digits
300Ω	100.00Ω-299.99Ω	0.2%+3digits
100Ω	30.000Ω-99.999Ω	0.3%+3digits
30Ω	10.999Ω-29.999Ω	0.5%+5digits
10Ω	0.0000Ω-9.9999Ω	1.0%+5digits

10.Maintenance

Warning: Do not arbitrarily repair the instrument; it should be maintained and repaired by professionals.
Warning: keep the instrument away from liquid; do not leave articles especially conductive objects in the instrument.

10.1.Overhaul

If the equipment fails and cannot be switched on, you should first check the battery and external power supply, power jack, etc.; check whether the key is invalid;

If the test result is abnormal, first check if the test accessories have problems, and if there is damage of the spring in the test notch; at the same time review the specification to confirm if the operation is correct;

Do not arbitrarily replace the components and specific parts, please contact the relevant dealer or service company for problems which cannot be confirmed,.

10.2.Clean

Before cleaning, it must be shut down, the battery and external power supply should be removed.

Prevent water or other liquids from entering the instrument through the test slot, keys, or other joints, if it happens by accident, you should immediately stop using it and remove the power supply and battery.

Please clean with a soft cloth and diluted neutral detergent, and carefully wipe the dirty parts to prevent scratches on the surface.

After cleaning, the instrument should be completely dry before used.