使用说明书

OPERATION MANUAL

RK2830/RK2837Precision LCR digital bridge

Points for attention:

This instruction is applicable to RK2837 series precision LCR digital bridge.

The information contained in this manual is subject to change without notice.

The latest electronic document of the manual can be downloaded from the company's website:

2013 年 06 月……..V1
2015 年 03 月……..V2
2018 年 03 月……..V3

This manual may not describe all the contents of the instrument. The company has the right to improve the performance, function, internal structure, appearance, accessories and packaging of the product without further explanation! If the instruction manual is inconsistent with the instrument, please contact our company.

Safety warning:

⏚ Instrument grounding	This instrument is a class I safety instrument. When connecting the power supply, please make sure that the power socket contains grounding wire. If it is not grounded, there is a risk of static electricity or induced electricity on the chassis and electric shock from the power inlet, which may cause personal injury!
↯ Danger of electric shock	Avoid electric shock during operation, test and instrument maintenance. Non professionals are not allowed to open the chassis without permission. Professionals who need to replace fuses or carry out other maintenance must first pull out the power plug and carry out it in the presence of personnel. Even if the power plug has been removed, the charge on the capacitor may still have dangerous voltage. It should be operated after discharging for a few minutes. Do not replace or adjust the internal circuit and components of the instrument without authorization!
~ Input power	Please use the power supply according to the power parameters of the instrument. The power input that does not meet the specifications may damage the instrument. Please use the same specification to replace the fuse
Stay away from the explosion Volatile gas environment	Electronic instruments can not be used in flammable and explosive gas environment or in environment containing corrosive gas or smoke, so as to avoid danger.
⚠ Other safety matters	Please do not apply external voltage source or current source to test terminal and other input and output terminals of this instrument. Isolation measures must be taken when testing with external bias current sources or voltage sources. The electrical parts with the device must be discharged

before testing.

In any process of using, operating and maintaining the instrument, all safety precautions must be observed. If these safety measures and the warnings in this manual are ignored or not observed, it will not only affect the performance of the instrument, but also directly damage the instrument and endanger personal safety. The company will not bear any consequence caused by non-compliance with these safety precautions.

目　录

Chapter 1 preparation for use

Thank you for purchasing and using our products. Before you use this instrument, please check and verify according to the random packing list. If there is any discrepancy, please contact our company as soon as possible to protect your rights and interests.

1.1 check shipment

After receiving this product, please carefully unpack and check according to the following process:

Warning: if the appearance of LCR meter (such as shell, front / rear panel, LCD screen, power switch and port connector) is damaged during transportation, do not connect the power supply and turn on the power switch, otherwise electric shock may occur.

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1. Check whether the packing box or damping material used for LCR table is damaged.

2. Check whether the packing items attached to LCR in the packing box are damaged or defective.

3. Check whether all packing items attached to LCR are specified accessories or options.

Standard configuration	Quantity	Remarks
RK2837 series LCR table	1	Model by order
Power line	1	Different from countries (regions).
Fixture U26004	1	1m test cable, random type is different
Instruction manual	1	
Inspection report / certificate	1	

If there are any problems in the above inspection, please contact our company or related dealers.

1.2 check the power supply

Check whether the power supplied to RK2837 meets the following requirements:

	Request
Voltage	100Vac~240Vac *1
Frequency	47~63.5Hz
Maximum power consumption	30VA

Note *1. RK2837 adaptive wide voltage range without manual switching.

1.3 install fuse⚠

Fuse specification: 250V / 500mA slow blow, 520mm small fuse

The fuse has been installed in the factory. Please replace it with the specified fuse!

To check and replace the fuse, pull out the power cord first, and then pull out the fuse holder.

1.4 connecting the power cord

Check the three core power line, one of which is grounded wire, connected to the grounded power socket, which can make the RK2837 body grounded, thereby protecting the user and avoiding the possibility of electric shock.

Please confirm that after the power line is intact, connect RK2837 to a reliable grounding power socket.

Warning: do not use the power cord with any sign of damage to avoid electric shock.

Warning: use the provided three wire power cord with grounding wire to ensure reliable grounding of the instrument.

1.5 environmental requirements

1. Please don't use it under the conditions of dust, vibration, direct sunlight and corrosive gas.

2. When the instrument works normally, the temperature should be 0 ℃～ 40 ℃, and the relative humidity should be ≤ 75%. Please try to use the instrument under this condition to ensure the accuracy of measurement.

3. The instrument has been carefully designed to reduce the clutter interference of the power supply. However, it should be used in a low noise environment as far as possible. If it cannot be avoided, please install a power filter.

4. If the instrument is not used for a long time, please store it in the original packing box or similar box in a ventilated room with a temperature of 5 ℃ ～40 ℃ and a relative humidity of not more than 85% RH. The air should not contain harmful impurities of the corrosion measuring instrument, and should avoid direct sunlight.

5. The instrument, especially the test wire connecting the tested part, should be far away from the strong electromagnetic field to avoid interference to the measurement.

6. Keep the proper ventilation space of the instrument to ensure the ventilation and cooling environment of the instrument and prevent the high temperature rise in the machine.

Moderate minimum space requirements: back > = 180mm, both sides > = 60mm

7. Electrostatic protection ESD: Although the instrument has been carefully designed to enhance the ability of anti-static impact, it should be equipped with a suitable working area to avoid electrostatic discharge

8. Provide enough space around the instrument so that the power line can be cut off quickly in case of emergency.

1.6 start the instrument

Press the power on key in the lower left corner of the instrument to make it in the retracted position, then turn on the power, self check the instrument, load the configuration information, load the initialization information and initialize the test conditions, and complete the startup process after everything is normal.

If the password protection is set to system, the password will be required.

If the instrument is not used for a long time, the power cord should be separated from the power socket, or the main switch of the power socket should be turned off.

Note: the default password is 123456. You can set password status and change password in system configuration.!

Note: all the status and test parameters of the instrument, including the display page, will be saved automatically, and will remain in the last shutdown state after startup.

1.7 use of fixtures

Appropriate test fixture or test line must be connected for measurement.

Please use the test fixture or test cable provided by our company. The user-made or other company's test fixture or test cable may lead to incorrect measurement results. The instrument test fixture or test cable shall be kept clean, and the pins of the device under test shall be kept clean to ensure good contact between the device under test and the fixture.

Connect test fixture or test cable to four test ends of Hcur, Hpot, Lcur and Lpot on the front panel of this instrument.
For the tested part with shielding shell, the shielding layer can be connected with instrument ground "  ".

Note: after power on, the instrument should be properly preheated for 15 minutes before measurement.

Chapter 2 summary

The main contents of this chapter are: introduction of basic parameters and functions of products, introduction of front and rear panels, LCD display summary, and basic operation methods.

2.1 product introduction

The RK2837 series is a universal high-performance LCR table for component receiving inspection, production line quality control and laboratory use.

RK2837 series LCR can provide normal range. ± 0.05% or ± The basic measurement accuracy of 0.0005, with 6-digit reading resolution or 1 / 100000 stable reading ability.

The instrument adopts high-resolution TFT LCD display, with intuitive display, rich information, menu application, Chinese and English interface and various display color matching styles.

The instrument has built-in comparator, which has tolerance and sequential limit mode. It can be divided into 4 stalls (BIN) and output comparator results to processor interface (Handler).

The instrument can measure C, l, R, Z, D, Q, x, G, B and other impedance parameters. It has two monitoring parameters and can display four measuring parameters at the same time.

The instrument is equipped with USB-Host interface, which can easily realize data recording function and support system firmware upgrade; The standard usb-device interface can realize automatic test and remote control of the system.

Model	Measurement parameters
RK2830/RK2837	L、C、R、Z、X、G、B、D、Q、θ、ESR

2.2Display range

Different types of parameters have different display ranges, as shown in the following table:

Parameter	Allowable display range of measured value
Ls、Lp	0.00001μH～99.9999kH
Cs、Cp	0.00001pF～99.9999mF
R、Rs、Rp、X、Z	0.00001Ω～99.9999MΩ
G、B	0.00001μS～99.9999S
ESR	0.00001mΩ～99.9999kΩ

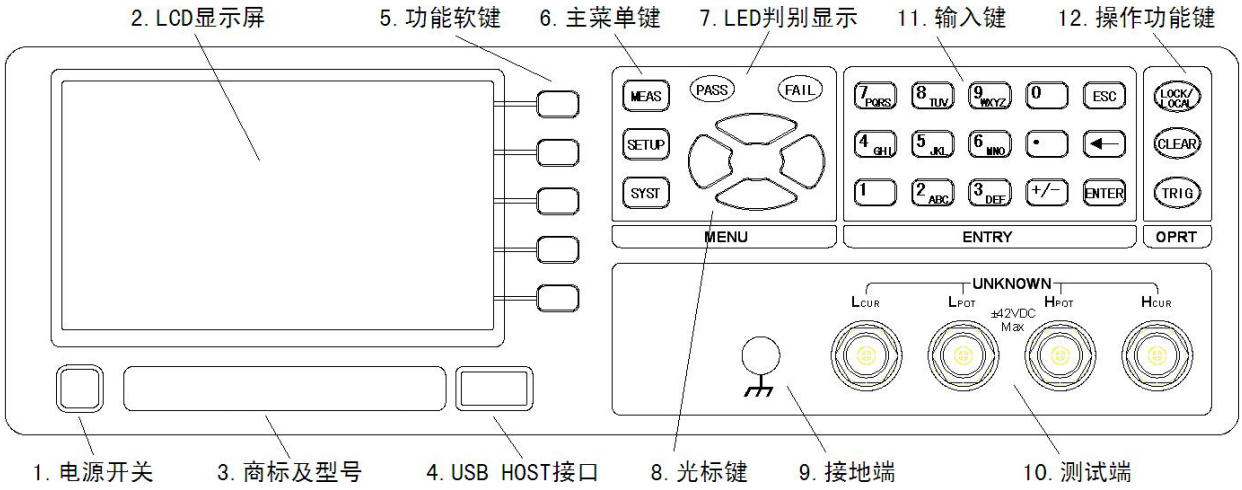
D	0.00001～99.9999
Q	0.00001～99999.9
θr	-3.14159～3.14159
θd	-180.000° ～180.000°
Δ%	-99.9999%～999.999%

If the measured data exceeds the display range, it will be displayed as “- - - - - -”

Note: the display range is not the measurement accuracy range of the instrument, the display range is much wider than the accuracy range of the instrument.

The accuracy range of the instrument is shown in Chapter 3 "measuring range".

2.3 Front panel introduction

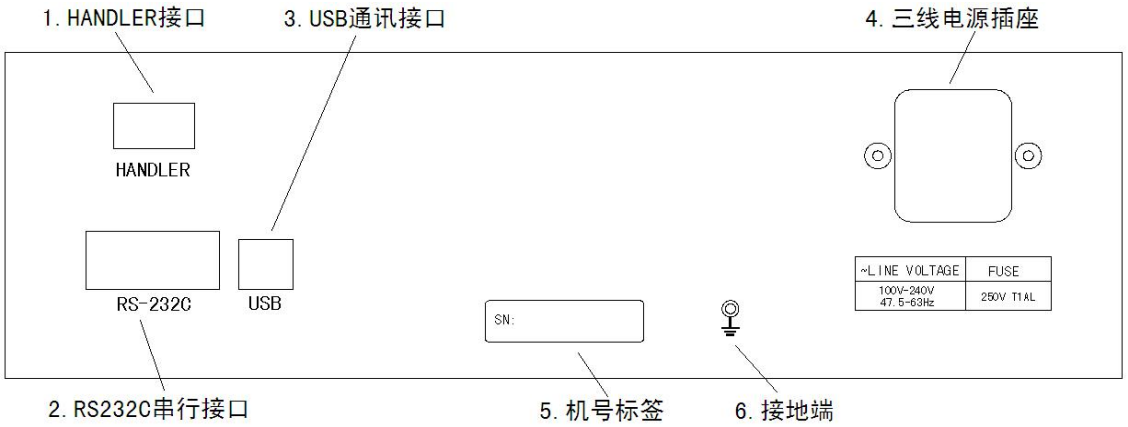


Serial number	***Name***	***Explanation***
1	Power switch	Turn on and off the power supply of the instrument. The retracted position is on and the ejected position is off.
2	LCD display	Display measurement results, test conditions, system information, etc.
3	Trademark and model	The model label will correspond to the final functional parameters of the instrument. Please refer to "functional parameters" in this chapter.
4	USB HOST interface	It is used to connect USB flash disk (U disk). FAT16 and FAT32 file systems are supported. Support firmware upgrade,

		record test data, store screen image, store and call test parameter file, etc.
5	Function soft key (SOFTKEY)	The functions of these six keys are "soft", that is, their functions are not fixed. They have different functions in different menus, and the corresponding functions are displayed in the menu area on the right side of the display screen.
6	Main menu key	Measurement key MEAS/ measurement: measurement results display page and selection. Set the key SETUP/ settings: test condition settings page and selection. System key SYST/ system: enter system setup page and select other system functions.
7	LED discriminant display	When the comparator works, the qualified and unqualified measurement results can be exported. The green light PASS is qualified, and the red light FAIL is not qualified. The result is consistent with that of the current comparator.
8	Cursor keys	The cursor key is used to move the field, and the current effective setting field is displayed in reverse color image.
9	Ground terminal	This terminal is connected with the instrument case, which can be used for measurement shielding and protection.
10	Test end	The four test terminals are connected to the tested parts (DUT) through suitable test fixtures.
11	Input key	The full function numeric / character keyboard is used to input data, or input characters when the file name and other remarks are required. The number key 0 is reused as a simple test key, which is used to directly enter the simple operation interface in the non data input state of the measurement display page. The decimal point key is reused as the save key, which is used to press this key to save (save CSV or image file) in the non data input state.
12	Operation function key	Zero key CLEAR: quickly clear out the zero menu and implement zero clearing operation. See "zero" in the measurement display for details. Keylock / unlock LOCK/LOCAL: lock or unlock keys on the panel. When in remote control mode, it can be used to cancel remote control. The TRIG key will not be locked by the keyboard, but will be locked by remote control.

		Trigger key TRIG: manual trigger mode can trigger instrument measurement.

2.4 Introduction to rear panel



9 core Handler interface

Serial number	***Name***	***Description***
1	HANDLER interface	Automatic test of the controller of the separator, the controller control instrument performs the measurement and obtains the comparison result signal.
2	RS232C Serial interface	Provide the serial communication interface, parameter setting and command of the instrument and the external equipment that can be set and obtained by the computer to realize the remote control of no instrument panel.
3	USB communication interface	USB TMC and USB CDC, support support 2.
4	Three-line power outlet	For AC power with fuse seat.
5	Machine number label	Instrument machine number (serial number), each instrument has a unique serial number. The serial number can be viewed on the System Information page, with the same agreement.
6	earth terminal	This terminal is connected to the instrument chassis for instrument grounding protection.

2.5 Display the area description

The LCD display is divided into relatively fixed areas showing specific information for each page.

serial number	***name***	***instruction***
1	Display the page	Indicates the page name of the currently displayed page.
2	The Tools menu	If the display page has a tool, the functional soft key tag area displays the corresponding operable tool when the field moves to the area.
3	The System icon displays	Display the system status as an icon The U disk is already connected; Remote control status; Data record status;
4	Menu display area	Display the function menu corresponding to the field or the shortcut key.
5	Information display area	Display operating information, working status or error information, remote control and error information, etc. When the data or character input mode, the area displays the content in the input cache。

6	update information	Displays the correction status.
7	Measurement results and parameter setting area	Displays the measurements, and the current test conditions. The measurement results can include: impedance measurement results, voltage and current monitoring. The resistance measurement is out of range: ------
8	Clock display area	Display the real-time clock, you can modify the date and time on the system configuration page, or turn off the clock display.

2.6 basic operation

The instrument uses the menu key (or shortcut key) + field guidance mode to set all the functional parameters.

The current active action field is displayed as a reverse color image.

Basic operating process

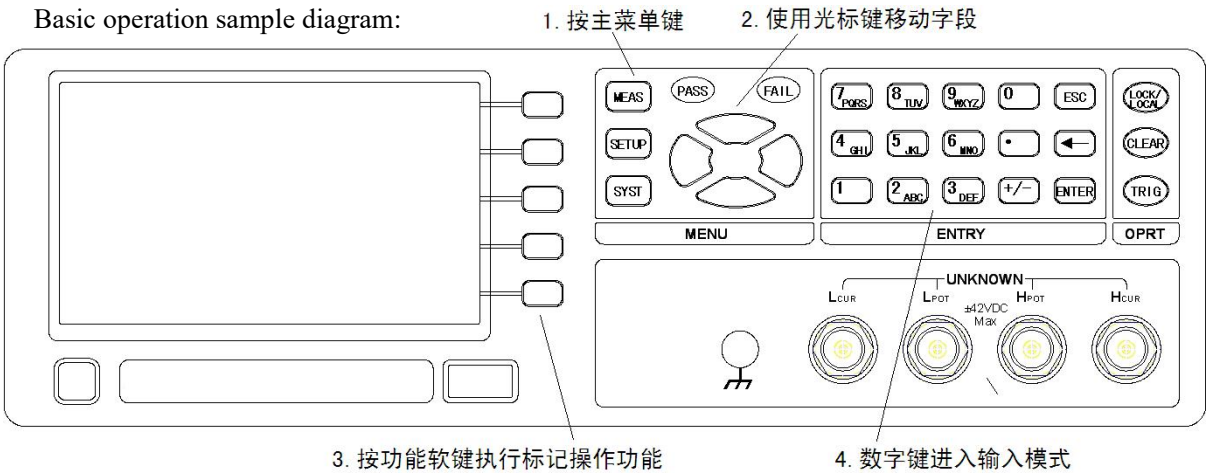
Operation 1: Press the main dish menu key to locate the main page or the operation;

Operation 2: Move the field using the cursor key;

Operation 3: Use the function soft key to perform the operation marked by the function soft key;

Operation 4: If the current field supports the input mode, press any valid digital key to input the data. In the input mode, the function soft key will have a different input ratio along with the field input nature, and the ratio function key also has the same function to confirm and end the input as the ENTER key.

Basic operation sample diagram:



Displays the parameters in the soft key area

Not all of the parameters are present in a field form in the parameter display area. A few state parameters are operated directly in the soft key area and displayed, and the current valid state parameters are displayed in different ribbons, such as the zero clearance menu.

Chapter 3 Measurement Display

Main contents of this chapter: describe the display information of the RK2837 series and their operation.

3.1 Measurement Display Page (MEAS DISP)

Press the Survey Display **MEAS** menu key to enter the Survey Display page, where you can set the most common basic test conditions, including:

Field name name	resume
(FUNC)	Standard combination display parameter type
(FREQ)	Current test of the signal frequency
(LEVEL)	Current test signal level
(RANGE)	Set up the measurement range
(SPEED)	Can be set up fast, medium speed, slow speed three gears
(RSOU)	Specifically, the source resistance, the output impedance is selected to be compatible with other LCR s

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Description: All of the above fields can also be set on the measurement settings page, <MEAS SETUP>.

Measurement display face available fields:

Multi-parameter display

The RK2837 series can set one combination parameter and two monitoring parameters, so you can flexibly configure different display parameters combinations, and up to four parameters can be

displayed on LCD simultaneously,

Select the monitoring parameter on the MEAS STEUP page.

The specific meanings of the impedance parameters are described as follows:

Impedance Parameters (Table I)	Meaning of the parameters
Cp	Capitance value measured using a parallel equivalent circuit model
Cs	Capitance values measured using a series equivalent circuit model
Lp	Inductance values measured using a parallel equivalent circuit model
Ls	Inductance values measured using a series equivalent circuit model
Rp	Equivalent parallel resistance measured by a parallel equivalent circuit model
Rs	Equivalent series resistance measured using a series equivalent circuit model
Z	Absolute value of the impedance
R	resistance
X	reactance
G	conduction
B	electrical susceptance
D	dissipation factor
Q	Quality factor (the countdown of the dissipation factor)
θ	phase angle

Close the display

If the measurements do not need to be displayed, you can turn the display off. Turn off the display to increase the measurement speed.

(Move the field to the Tools, and press the Display function soft key to switch the display switch.

When the display is turned off, the LCD data display area has the parameter name display. The instrument completes all the measurement process, including the measurement comparator, but the data results are not displayed on the LCD.

Simple test

The RK2837 series has a simple test display page, which displays the measurement results with large characters, and the digital key 1~9 corresponds to a measurement parameter, pressing the digital key to directly modify the corresponding measurement parameters; or can use the direction key to modify the current activity parameters (different color display).

(Move the field to the Tools, and press the Easy Test function soft key to switch to the Easy Test display page:

Description: In the non-data input field, press the **EASY** reuse shortcut at the digital keyboard to go directly to the simple test page.

Decdecimal lock

The RK2837 family can lock the decimal places and unit doubling rate of the measured parameters without the data range, suitable for continuous testing of bulk products, or remove unstable display bits.

(Move the field to the Tools, and press the following function soft key operating digits:

Function soft key	operating function
The decimal point locks out the A (D. P. FIX A)	Locks or move a decimal number of one parameter to the right, below a fixed decimal point With the "▲" tag, turn to the automatic mode when the decimal number moves to the far right;
The decimal point locks out the B (D.P. FIX B)	Locks or moves a decimal number of the secondary parameter to the right, below the fixed decimal point bit There is the '▲' tag that turns automatically when the decimal number moves to the far right

Display bit locking example:

Description: The locking mode is automatically reversed when the measurement parameters change.

Note: In the simple measurement display and split display pages, the decimal locking is also valid, but the split display page does not display the lock marks.

Test frequency(FREQ)

Test frequency range of the RK2830: 50Hz,60Hz,100Hz,120Hz,1kHz,10kHz

Test frequency range of RK2837: 50Hz~100kHz, continuous frequency, resolution: 0.01Hz

test level(LEVEL)

The test signal level refers to the effective value of the sinine test signal (RMS), the set value is the signal voltage output during the open circuit of the test end;

The test level of the RK2830/RK2837 is: 50mV ~ 2.0V

RANGE(RANGE)

In the range setting field, you can set the range range manually. The measuring range is defined uniformly by the impedance Z parameter.

The instrument is also different according to the model.

The optional impedance range are:10Ω，30Ω，100Ω，1kΩ，10kΩ，100kΩ

Or 10Ω，100Ω，300Ω，1kΩ，3kΩ，10kΩ，30kΩ，100kΩ

Note: Effectively improve the test speed when locking the range.

SPEED(SPEED)

The measurement speed can reflect the time needed for the instrument to complete a measurement cycle, the faster the speed, the shorter the measurement time, but the worse the measurement stability.

Evaluate the measurement speed when the following additional functions are switched off or set:

Complete basic measurement process include:

Trigger Start →Start AD→get data →impedance operations and transform →comparator and output →format and display

Measurement speed can be set to:

Slow speed SLOW, is about 2.5 times / s;

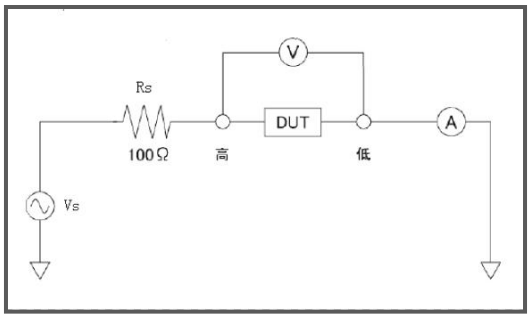
Medium-speed MED, is about 10 times / s;

Fast FAST, is about 40 times / s;

Note: As the measurement frequency decreases, the measurement time will extend significantly.

internal resistance (RSRC)

The internal resistance is the source or output impedance, which is connected between the signal source and the tested DUT to limit the maximum output current and signal source protection. As shown in Figure Rs below:



Due to the output impedance, the voltage Ⓥ or current level Ⓐ on the actual measured piece DUT is not the set test signal level Vs or Is, See Chapter III Definition of Test signal level:

Voltage level: Output voltage at open circuit at the test end; current level: output current at short circuit at the test end

voltage level ： $Idut = \frac{Vs}{|Rs + Rx + jXx|}$ $Vdut = Vs - Idut \times Rs$

Current level： $Idut = \frac{Is \times Rs}{|Rs + Rx + jXx|}$ $Vdut = (Is - Idut) \times Rs$

The instrument has three output impedances available:100Ω、50Ω、30Ω或者 100Ω、30Ω、10Ω。

The specific internal resistance random type is different.

CLEAR(CLEAR)

On the measurement display page, press CLEAR for quick zero clearance.
Zero clearance is used to reduce the test error caused by the clamp and the test lead stray impedance. Zero clearance is a part of the user correction system, which meets the basic measurement requirements through zero clearance. Zero clearance includes open circuit zero clearance and short circuit zero clearance.

NOTE: Make sure the test end is short / open circuit

Note: If the open / short circuit reset switch is off, the corresponding reset data is not used to correct the calculation.

After pressing zero CLEAR, the zero menu appears as follows:

Note: Press CLEAR again to restore the original field function soft key display.

Function soft key	operating function
(SPOT OPEN)	Use to open the frequency displayed in the current frequency field;
(SWEEP OPEN)	Open circuit clearance for all frequencies;
(OPEN)	Open circuit zero clearance switch for turning on or off the open circuit zero clearance function;
(SPOT SHORT)	For short circuit clearance to the frequency displayed in the current frequency field;
(SWEEP SHORT)	Short-circuit reset to all frequencies;
(SHORT)	Short circuit zero clearance switch for turning on or off the short circuit zero clearance function;

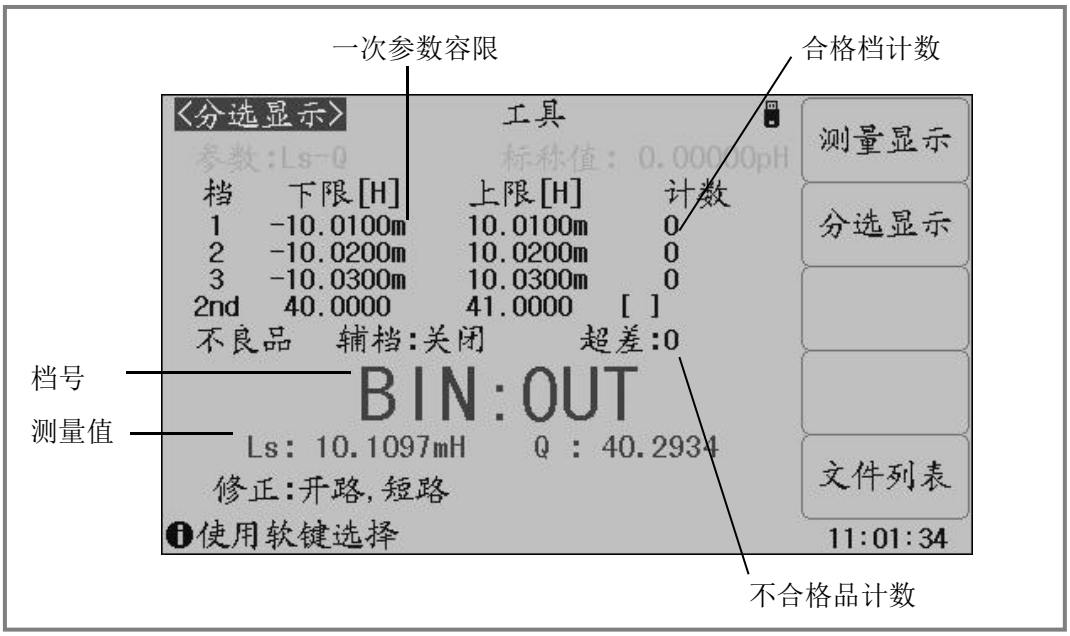
3.2 Select the display page(BIN DISP)

Press the measurement display MEAS menu key, and then press the soft key of "sorting display" function, and enter the sorting display measurement page, which can display the file number and make the gear count. The file number is highlighted by large characters, while the measurements are assisted by small characters.

The measurement and comparison process of the split display page is exactly the same, just the difference in the display content!

The split display page only has toolfields that can be set for switching the gear comparator and gear counter, and for counter reset.

Select the display page:



Display information

The display contents (non setting fields) of the sorting display page are as follows:

1. Parameter (func): display the measurement parameters of the current instrument;

2.Nominal value (NOM.): displays the nominal value set by the limit table

3. Limit parameter: display the limit of each gear;

4. Qualified file count: display the count value of each qualified file;

5. Count of unqualified products: display the count value of unqualified products;

6. File number: highlight the file number in large font;

7. Measured value: the parameter measurement results are displayed in small font;

8. Cor: display the information of open circuit and short circuit calibration switch

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Description: understand and set the comparator. Please go to the limit setting page <Limit Table>.

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gear comparator (COMP)

To use the comparator, you must turn the comparator switch on.
(Move the field to the Tools, and turn the comparator on or off using the feature soft key:

Function soft key	operating function
(ON)	Open the comparator
(OFF)	Turn off the comparator with no sorting

Description: The <Limit Table> can also set the comparator switch.

Range counter (COUNT)

The RK2837 series can count the selected gears, a total of 5 counters: 3 qualified, 2 unqualified (auxiliary AUX and differential OUT).

The maximum display per counter is 999999, exceeding the rear counter automatically returns to 0.

When the counter function is on, the * tag.

Count value will not be saved with the instrument, after the instrument is reset, the count returns to 0.

Move the field to the Tools and turn the counter on or off using the function soft key:

Function soft key	operating function
(ON)	Open the counter and display the * count tag, count generated if the comparator is on.
(OFF)	Turn off the counter

Counter reset operation:

☞Move the field to the Tools and use the counter zero function soft key to clear the counter value.

Count zero has an operation confirmation prompt to prevent misoperation.

Note: compare and count function states also work on the measurement display page, but not displayed.

Chapter 4 Measurement and Setting

This chapter describes detailed settings related to test conditions and extended test functions, including basic measurement settings and limit settings.

4.1 Reset the measurement settings

All settings for the instrument, including those from the SCPI command, are immediately stored in the internal battery life RAM, so the instrument always retains the status before shutdown for next startup.

☞**These operating procedures can reset the relevant settings:**

Reset the basic settings On the Survey Settings page, move the cursor to the Tools field, and press the Reset Settings function soft key.

Reset the limit list On the limit settings page:

1. moves the cursor to the Way field, and selects%, ABS, or SEQ;
2. Move the cursor to the Tools field, and press the Clear List function soft button;
3. Repeat 1-2 to clear the limit table of each limit mode respectively (operate as required);
4. Other settings above the manual reset limit table.

Reset all settings On the System Configuration page, move the cursor to the Tools field, and press the System Reset function soft key.

☞**Reset the settings using the SCPI sequence command:**

Single command reset basic settings: * RST

See the SCPI command table for other settings.

☞**Reset all measurement parameters by setting the file:**

Before setting up the instrument, users can first save a default setting file called <Default>, which contains all the test parameters that exist in the internal ROM without loss, and then they can load the default file at any time to reset the settings.

Description: For file saving operations, see section Save and Call

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☞**Fully initialize the reset settings (not recommended):**

Warning: The non-equipment maintenance and professionals do not open the chassis without authorization

Reset the instrument for all the parameters:

Shut off and pull off the power cord. After a few minutes, open the chassis and have a CR lithium battery on the front control circuit board to save the parameters of the instrument. Remove the battery seat for a moment and load it back in position.

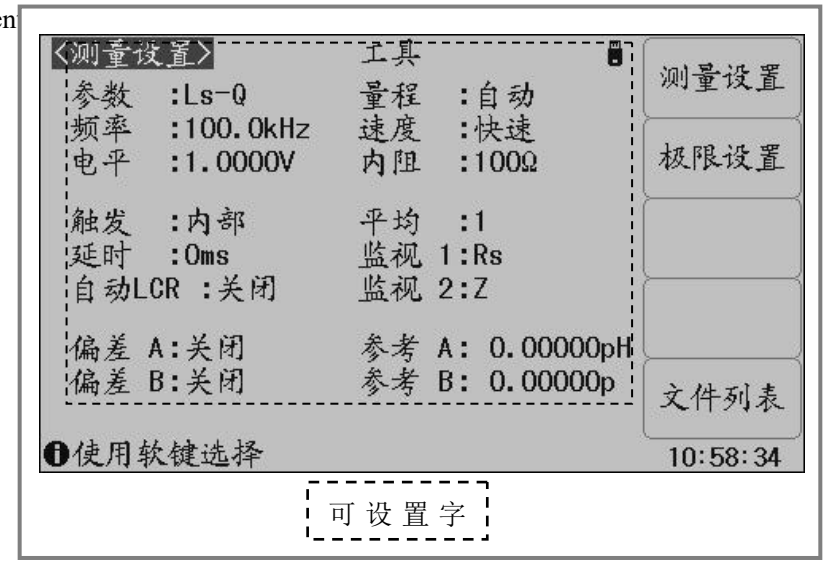
Reinstall the chassis, power on and power on. At this time, all the measurement setting parameters and system configuration status of the instrument are restored to the original factory value, including the system time.

4.2 The Measurement Settings page(MEAS SETUP)

Press the SETUP menu key to enter the measurement settings page. Use the cursor keys to move the settings to the following fields:

Field name	resume
Measurement parameters(FUNC)	Standard combination display parameter type
frequency(FREQ)	Current test of the signal frequency
electrical level(LEVEL)	Current test signal level
(RANGE)	Set up the measurement range
(SPEED)	Can be set up fast, medium speed, slow speed three gears
essential resistance(DC BIAS)	Specifically, the source resistance, the output impedance is selected to be compatible with other LCR s
Measurement parameters(FUNC)	Standard combination display parameter type
frequency(FREQ)	Current test of the signal frequency
注：The above fields can also be set on the measurement display page, and this section is no longer repeated, see Chapter 3.	
trigger(TRIG)	Set the trigger mode (the trigger source)
delayed(TRG DLY)	Set the trigger delay wait time
(AUTO LCR)	Set up the automatic component recognition function
average(AVG)	Setting the average number of times will decrease the measurement speed
Guard 1(MON 1)	Set the monitoring parameters
Guard 2(MON 2)	Set the monitoring parameters
Deviation A(DEV A)	Select the main parameter deviation mode
Reference A(REF A)	Set the main parameter deviation reference
Deviation B(DEV B)	Select the secondary parameter deviation mode
Reference B(REF B)	Set the secondary parameter deviation reference
(TOOL)	Restore the measurement settings to the default parameters

Measuremen



trigger(TRIG)

RK2837 has five trigger sources: Internal INT, Manual MAN, External EXT, device DUT, bus BUS.

The instrument ignores the trigger signal in the non-measurement page; the trigger signal in the non-current trigger mode is invalid.

trigger mode	functional description
Internal INT	The trigger signal is generated automatically, and the instrument is measured continuously
Manual MAN	The measurement is triggered by the panel TRIG key
External EXT	Trigger instrument from external BNC trigger terminal or measurement for HANDLER interface You can be set to rise or drop line trigger The trigger pulse width shall be greater than 10us, if jitter may cause excess trigger
Device DUT	The trigger measurement is generated after the tested DUT stably access to the test end. Nominal values need to be set in the limit table, and the DUT near the nominal values is considered valid access
Bus line BUS	Make a measurement after receiving the trigger command sent by the bus *1

Note * 1. BUS bus trigger must not be set in the instrument panel but only set by the bus command.

Note: The trigger signals during the measurement are remembered to the next measurement period, but repeated trigger signals are ignored.

(DELAY)

The trigger delay is a time before the start of the trigger signal, used to measure synchronization or waiting for the device to stabilize the connection. Tritrigger delay set time range is 0~60s, minimum unit ms.

(AUTO LCR)

Automatic LCR is an automatic element recognition function that automatically selects inductance, capacitive or resistance parameters display according to the properties of the element, including a series or parallel equivalent mode.

Intance parameters are automatically selected as：Ls-Q，Lp-Q

Capaciance parameters are automatically selected as：Cs-D，Cp-D

Resistance parameters are automatically selected as：Z-θr

Description: After changing the measurement parameters, the automatic LCR is automatically set to OFF.

Note: Automatic element recognition function should not be used simultaneously with the automatic DUT trigger function! Both are logically interfere in the criterion.

average(AVG)

Average refers to the continuous N measurements, with its average value as a measurement result. Set range is 1~255.

Monitor 1 / Monitor 2 (MON 1 / MON 2)

The monitoring function enables the instrument to achieve up to 4 measurement parameters simultaneously displayed on the LCD, which can be set as the impedance or voltage / current parameters.

When the monitoring parameter is a voltage, the actual voltage on the subject part, namely the Vm display, can be displayed on the basic measurement display page.

When the monitoring parameter is current, the actual current on the subject, the Im display, can be displayed on the basic measurement display page.

Monitoring parameters can also be the following impedance parameters:

Ls Lp Cs Cp Rs Rp Z Y D Q θr θ° R X G B

Deviation (DEV)

The deviation mode is used to control the measurement result display, which is by the difference between the measurement value and the set reference value. It can be used to assist in the observation of the measurement results with different test conditions or environmental conditions, or to auxiliary observe the measurement results when sorting the measurements (the deviation display mode, deviation reference are set to coincide with the limit tolerance mode, nominal values).

The deviation display can be applied to both the primary and secondary parameters, or both. Deviation display in two ways:

1．Absolute deviation display mode（ΔABS）

Display with the difference between the actual measurement and the deviation reference values, with the "Δ" mark before the parameter name.

ΔABS = X – Y

X ： Actual measurements

Y ： Deviation reference value

2．Percent deviation display mode（Δ%）

Display in the percentage of the difference between the actual measurement and the deviation reference values, with the 'Δ' tag in% before the parameter name.

Δ% = （X – Y）/ Y ×100（%）

Description: Deviation mode is valid for measurement display (including full screen display) and split display pages, other measurement pages.

Note: The deviation mode only affects the measurement results display, and not the measurement data used to select the comparison!

Reference (REF)

☞Move the field to Reference A "or Reference B", using the input key and doubling function soft key or use the function soft key to obtain existing measurements:

Function soft key	operating function
measure	The data of the measurement result buffer of the primary or secondary parameters is then directly applied to the deviation reference value. Before the setting, face the device on the measurement page.

(TOOL)

Use the tool to reset all the parameters of the measurement settings to the factory default state.

☞Move the fields to the Tools and operate with the functional soft key:

Function soft key	operating function
Reset the settings	Reset all measurement settings to the factory default state

4.3 (LIMIT TABLE)

比 The comparison function is to compare the current measured results with a preset set of data limits to make the qualified judgment (including the qualified file) and the unqualified, and output the results from the HANDLER interface to control the mechanical sorting system.

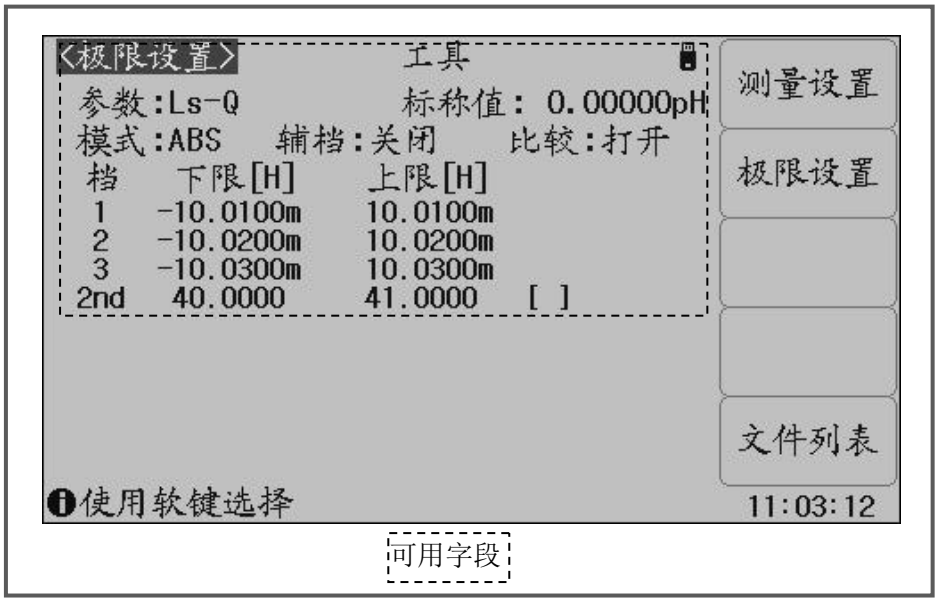
Press the measurement setting SETUP menu key, and then press the "limit setting" function soft key to enter the limit setting page.

On the limit settings page, you can configure the comparator parameters and set the limit data sheet:

Field name	resume
parameter (FUNC)	Extreme format for exchanging the primary and secondary parameters
nominal value (NOM.)	Set the nominal value of the main parameter
(MODE)	Set the limit comparison mode
Auxiliary gear(AUX)	Set the auxiliary gear switch
compare(COMP)	Set up the comparator switch
Limit data sheet	Set the tolerance and sequence limit data sheets, respectively
（TOOL）	Clear the limit sheet

The limit table can set the upper and lower limits of 3 groups of main parameters, and the upper and lower limits of 1 group of secondary parameters. The subject may be divided into BIN1 (BIN 3), a OUT, and the main parameter within the limit and vice outside the limit may be classified to the AUX.

The above points support HANDLER output, and they can also output super PLO and secondary parameter overdifference SREJ signals on the main parameters.



Parameter exchange (FUNC)

The parameter exchange function can exchange the limit tables of the primary and secondary parameters with each other. For example, when the measurement function is the Cp-D and when the parameter exchange function is used, when the parameter exchange field display becomes the D-Cp; exchange, the parameter D can have the 3 gear limit, while the parameter Cp is the 1 gear limit.

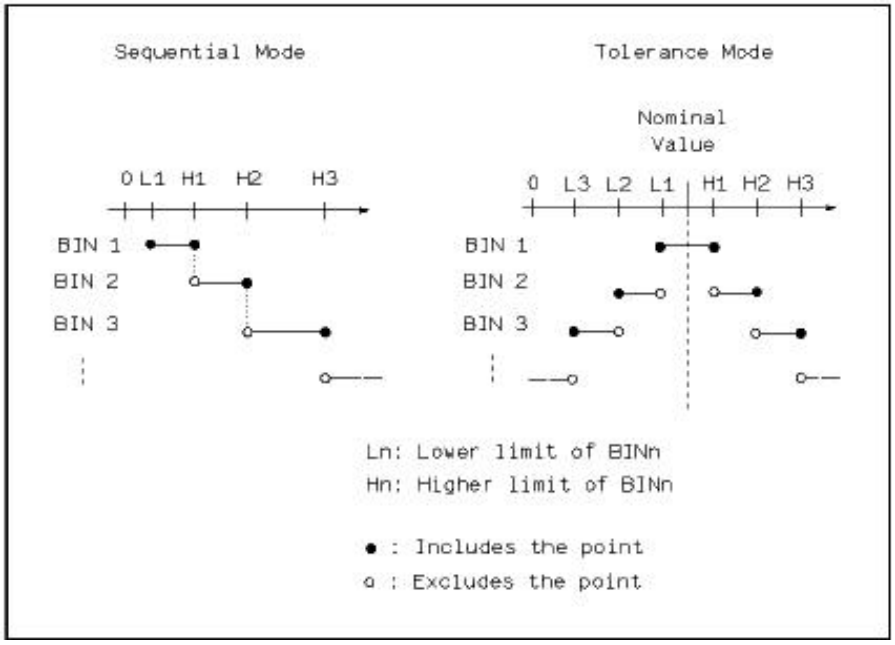
Note: Parameter exchange switches only the limit table form, and not the set data itself.

nominal value (NOM.)

Nominal values are used for the main parameters only. Nominal values are used only for tolerance mode and are not required for sequential mode.

(MODE)

The comparison function provides two main parameter limit setting modes:
TOL: Set the deviation from the nominal value to the comparison limit, along with percentage tolerance (% TOL) and absolute value tolerance (ABS TOL).
SEQ: Use the test value range as the comparison limit, which must be set from small to large.



Schematic diagram of the tolerance mode and the sequential mode

---

Note: When setting the limit value of the tolerance mode, the error range must be set from small to large. If the BIN1 sets the maximum range of errors, all the items tested are selected into the BIN1 gear.

Under the tolerance mode, the lower limit must not be less than the nominal value,

and the upper limit must not be greater than the nominal value. The limit ranges can be discontinuous or overlapping ranges.

●ABS TOL(Absolute value tolerance mode)

Comparing the measured value minus the nominal value. That is to say:

$$ABS = X - Y$$

X is the measurement value of the current subject piece.

The Y is the set nominal value.

● % TOL（Perctolerance mode）

Compare by the percentage of the measured value to the nominal value. That is to say:

$$\% = \frac{X - Y}{Y} \times 100\%$$

X is the measurement value of the current subject piece.

The Y is the set nominal value.

Auxiliary gear (AUX)

The main parameter is within the limit, while the secondary parameters are outside the limit, which can be classified both as OUT OF BIN (AUX).

☞Use the Secondary field to set the secondary gear switch：

Function soft key	operating function
(ON)	Qualified main parameters and unqualified auxiliary parameters shall be classified as AUX gear
(OFF)	Qualified main parameters and unqualified auxiliary parameters shall be classified as OUT gear

---

Note: When the secondary parameter is only set to the lower limit value, and the auxiliary gear is set to open. If the main parameter of the test part is within the limit set range, and the secondary parameter value is less than or equal to the lower value of the secondary parameter, the measured part is selected into the auxiliary gear. Similarly, when the auxiliary parameter only set the upper limit, and the auxiliary gear is set to open. If the main parameter of the test part is within the limit set range, and the auxiliary parameter value is greater than or equal to the upper limit value, the measured part is selected into the auxiliary gear.

Compare (COMP)

☞ Use the Compare field to open or close the comparator:

Description: Select the settings page <BIN DISP> can also set the comparator switch.

---

limiting data

The limit data should follow the principle of "from small to large, gear tolerance", otherwise the sorting result may not meet the expectations, not all the gear limit must be set, and the file without the data jumps in the ignored way.

If all 3 sets of limit data are not required, set the front gear as far as possible and the back file. If in neutral, the selection results may not meet the expectations.

☞Use the cursor key to move to each limit field, enter data using the input key and the soft key of the doubling function to enter data, or use the function soft key, "------" means that the limit is not set.

(TOOL)

Use the tool to clear the limit data tables in the current comparison mode.

☞Move the fields to the Tools and operate with the functional soft key:

Function soft key	operating function
Clear the list	Clear the limit data in the current comparison mode

---

Note: Only clear the limit data in the current comparison mode, and then perform the above functions after switching the mode.

Chapter 5 System Configuration

Main contents of this chapter: system function configuration, including style setting, interface setting, time and date management, system information view and system testing.

5.1 (SYSTEM SETUP)

The parameters in the system settings are saved independently, not related to the measurement settings, and the measurement settings file does not contain its contents.
Press the SYSTEM menu key to enter the system settings.
The available settings fields in the system settings are:

field	resume
显示风格（SKIN）	LCD color scheme
语言（LANGUAGE）	Display the switch in Chinese and English
通过讯响（PASS ALARM）	Qualified timing ringing mode * 1
失败讯响（FAIL ALARM）	Improper signal ringing mode * 2
按键音（KEY SOUND）	Switch over the key echo
密码（PASSWORD）	Set the password status and modify the password
保存类型（SAVE TYPE）	Set the save function for the shortcut save key
时间日期（TIME）	Set the system time and date
总线模式（BUS MODE）	Selection of the communication interface type
总线地址（BUS ADDR）	GPIB address or RS485 address in multimachine mode
波特率（BAUD RAGE）	Set the serial port communication baud rate
数据发送（FETCH MODE）	The measurements can be set to automatically send to the bus
HDL 触发边沿（HDL TRIG EDGE）	The rise edge is triggered by default
HDL 输出模式（HDL OUTPUT）	Set the HANDLER output hold or delay clearance
HDL 延时（HDL DELAY）	Set the HANDLER signal delay time
工具（TOOL）	Load the default settings or the system reset (soft restart)

统设置页面的显示及字段信息：

Display the style (SKIN)

Select LCD display color themes to meet different visual effects or adapt to different ambient light conditions.

(LANGUAGE)

Select the Chinese or English display interface.

(PASS ALARM)

(FAIL ALARM)

Set ringing mode when qualified / unqualified and turn panel PASS/FAIL indicator on / off.

(KEY SOUND)

Turn the key tone on or off. When the key tone is turned on, the system emits a "drops" sound if the buzzer only receives the button input message. (Use the Keytone field to select the keytone on or off:

(PASSWORD)

Set the password protection status, or modify the password. After setting the password protection, when the password needs to enter, the information display area prompts "Please enter the password:" and enter the password with the digital key.
There have three password protection levels:
(KEYLOCK(unlock): When the keyboard is unlocked, the password is required;
(SYSTEM(system): Enter a password when unlocking the keyboard and the system turns on (including soft start);
(FILE(file): Enter the password when unlocking the keyboard and entering the file management page;
Password protection can also be completely closed, where no password is required for any operation.
The password field also provides password modification function, any change of password protection status needs to enter the password for confirmation.
Note: Please remember your password! The system default password is 123456.

(SAVE TYPE)

Set the file type for the save operation. Save media is an effectively recognized U disk connected to the USB (HOST).
Save keys can achieve two types of save functions: save the measurement results (data record) and save the screen snapshot (screenshot).

Data record file is *. CSV format;
Screen snapshot file can be *. GIF format, *. BMP format or *. PNG format.

Description: For further understanding of the save functionality, see Storage and Call Description: The tool menu of each page has the start saving function soft key, the saving type is the file type set here; enter the SAVE reuse key in the keyboard to achieve a quick saving function.

(DATE & TIME)

The instrument has a built-in real-time clock, powered by a built-in CR lithium battery. The instrument meets the Gregorian calendar in 24-hour format.

(Move the field with the cursor key to year, month, day, time, minutes, seconds field respectively, use the input key to input the data, or use the function soft key to increase or decrease the time, but also can open or turn off the page time display function.

(HDL EDGE)

When the trigger mode is external (EXT), the trigger signal is input by an external BNC terminal or an HANDLER interface, and the trigger signal requires a TTL pulse with a width greater than 10 μs.

(Use the HDL Border field to select an RISE or FAIL to trigger the instrument measurement.

(HDL OUT)

Opening the comparator, the HANDLER interface outputs the split comparison results, which determines whether the signal is held on the interface until the next measurement.

☞Use the HDL Output field to select the HANDLER output signal mode:

保持（HOLD） The output signal remains until updated the next measurement

清除（CLEAR） The output signal cleared automatically after delay and the delay time is specified by the HDL Delay field

HDL delayed (HDL DLY)

When the HANDLER output mode is Clear, the delay time is specified by the field. Delay time range is 0 ~60s.

(Move the field to HDL Delay, enter data using the input key, or use the function soft key to increase or decrease the delay time.

(BUS MODE)

The instrument supports RS232C and USB (DEVICE) communication, when connected to the PC, with all instrument functions and data acquisition via compatible SCPI remote commands.

Description: Refer to the RK2837 Series Precision LCR Digital Bridges Programming Manual for communication commands.

Select the communication type before the remote instrument control.

(RS232C: Universal Aynchronous Serial Tranceiver (UART), which supports a variety of common baud rates and connects to PLC controllers. (USB (DEVICE): Universal Serial Bus with USB-CDC and USB-TMC modes.

USB-CDC mode (communication device class): Virtual the instrument as COM port (Vcom) enables the same communication mode as RS232C.

USB-TMC mode (test and measurement class): Compliance with USBTMC-USB488 and USB2.0 protocols for communication control as GPIB.

Bus address (BUS ADDR)

Set the local address with the GPIB interface (GPIB reserved settings) with an address range of 0 ~ 30.

BAUD RATE (BAUD RATE)

The Baud rate is the data transfer rate on the RS232C communication bus (also used for USB-CDC).

The instrument supports five commonly used baud rates:1200bps， 9600bps， 19200bps， 38400bps ， 115200bps。

FETCH MODE (FETCH MODE)

When the instrument communicates to PC through RS232C (or USB-CDC mode), GPIB, the measurements can be sent automatically or query to the bus:

●QUERY： After receiving the data read command sent by the upper machine, send the last valid measurement to the output buffer.

●AUTO：The measurement results will be sent to the output buffer.

Note: On the RS232C or USB-CDC bus, the data in the output buffer is always sent immediately, on the GPIB bus, the output buffer is sent after the instrument is appointed as the speaker.

TOOL (TOOL)

In the System Tool field, you can reset the instrument (soft start) or reset all the system configuration parameters.

☞Move the cursor fields to the Tools with the cursor keys and use the function soft keys to

select the send mode:

Function soft key	operating function
默认设置（Default Setting）	Reset all system parameters to the default value (time remains reserved) Including the password mode and password are also reset, so the password is required to allow this operation. After the reset, the default password is 123456
系统复位（System Reset）	Reset all measurement settings and soft start the system

System Default parameter table:

Display the style	（BLACK）
language	（CHINESE/English）
Through the message	（OFF），The PASS indicator light is turned on
Failure rang	（LONG），The FAIL indicator light is turned on
keypad tone	（ON）
Passmode	（OFF），Original Password 123456
Save the type	Data record CSV
HDL trigger edge	Rising line is made along the RISE
HDL output mode	Keep the HOLD
HDL time delay	0ms
Bus mode	RS232C
Bus address	8
Baud rate	9600
Data sending	inquiry（QUERY）

5.2 system information (SYSTEM INFO)

Press the system menu key, and then press the "system information" soft key to enter the system information display page.

This page displays the model number, serial number, firmware version, copyright and installation module of the machine.

5.3 (FIRMWARE UPDATE)

Upgrade is not enabled until the U disk connected to the USB (HOST) is effectively recognized.

The instrument can be easily upgraded to the curing software. If you have any software problems during the use process, you can contact us at any time.

☞Upgrade the curing software in accordance with the following procedure：

1：Download the upgrade file issued by the company, generally containing the instrument model, with an extension of 36U. If it is a compression package, please relieve it;

2：Copy it to the U root of the formatted FAT32 or FAT16;

3：With the upgraded instrument started, insert the U panel into the USB-HOST interface of the front panel;

4： After the U disk is successfully installed, press the SYSTEM menu key, then press the "firmware upgrade" function soft key, go to the firmware upgrade display page, display the list of upgrade files (up to 10) on the U disk, the long file name appears in 8.3 format.

Description: The instrument displays only up to 10 upgrade files and can be removed to the PC File Manager.

Note: Filfiles meet the upgrade file format can be displayed but installed by the instrument only when verified by the upgrade.

Note If the U disk contains multiple partitions failed to display the file, press the ENTER key to switch the partition.

5：Use the cursor keys to select the upgrade file suitable for the local machine, and press the "Upgrade" function soft key;

6：After confirming the upgrade operation, the instrument verifies the upgrade file, if correct, the upgrade file is installed in the FLASH ROM and automatically restarted after the installation.

You can go to the System Information page to see the latest updated firmware version.

Note: can not be cut off during the upgrade process, otherwise it will cause the instrument firmware damage and can not work, the need to return to the factory for maintenance.

Chapter 6 Storage and calls

This chapter: storage and calling functions of RK2837 series LCR

6.1 Storage-system overview

With storage and calling functions, you can instantly save parameters immediately, save the measurement settings to internal ROM or external USB memory, and measurement knots or screen snapshots to external USB memory.

memory function

Through the storage system of the instrument, the following saving functions can be realized:

Save the user correction data and settings in time;

Save the measurement setting parameters and system configuration parameters in time;

Save the measurement setting parameters in the form of file in internal ROM memory or external USB memory;

Save the screen snapshot file to USB memory (screen capture function);

Save the measurement results to USB memory (data recording function).

Call alling function

After storage, the following call functions can be achieved:

Immediately automatically call the user correction data and settings;

Immediately automatically call the measurement setting parameters;

Instant automatic call of the system configuration parameters;

Load the measurement settings files in the internal ROM or external USB memory through the file management function;

Storage media type

The instrument saves the information using the following media:

Media type	use
Internal RAM(battery supply)	Save the measurement parameters and the system configuration instantly
FLASH ROM	The User corrects the data and its settings, and measures the setting file
External USB memory (U disk)	Measurement settings file, screen snapshot file, data recording file

☞On the File List page, you can switch media using the ENTER key (between internal storage and U disks).

The U disk file structure

After connecting the USB memory to the instrument, the instrument organizes and uses the folders and files on the memory in a pre-determined structural scheme.

As shown in the following table：

document type	extension	Max. number of files * 1	File path * 2
The Measurement Setup file	EST	500	\U2836\SETUP
Data record file	CSV	200	\U2836\DATA
Screen on the snapshot file	GIF，BMP，PNG	200	\U2836\IMAGE
Upgrade the file	36U	10	root directory

Note * 1. The maximum number of names using the same extension; Note * 2. The folder varies according to the instrument model

---

Description: The folder is automatically created by the instrument, and in addition to the upgrade file, the file name is also generated by the instrument automatic number.

USB storage shall be FAT16 or FAT32 file systems and formatted using FAT16 or FAT32.
If there are U disks not recognized by the instrument, replace other formatted U disks.

Description: The Company is not responsible for data loss on U disks caused by using USB storage on this instrument.

6.2 Save the files to the U disk

After you connect the USB memory (U disk) to the device's USB (HOST) of the instrument, you can save the test results or snapshot to the U disk using the SAVE multiplexing key on the panel or the Start Save feature soft key in the tool menu on each page.

Save the measurements to the U disk

In the measurement display page, sorting display page, you can save the measurement results to the U disk, after saving can be downloaded to the PC machine to open and use these files.
To use a data buffer, the instrument can cache up to 256 measurements, 128 data caches by default, and the cache size can be set using the "MEMory:DIM" command.
A single CSV or TXT file can save up to 65,536 lines of test data, and the instrument automatically stops the data records after reaching this maximum data.

Description: Refer to the RK2837 Series Precision LCR Digital Bridge Programming Manual for command systems.

Data record format:

The data record format written to the U disk is organized as follows:

principal parameter	Secondary parameters	status	Fnumber
<DATA A>	<DATA B>	<STATUS>	<BIN NO.>

Note: <STATUS> is the operating state of the instrument, normal is 0 and other error information;

DATA uses a fixed-length ASCII format:

SN.NNNNNESNN (S: + / -, N:0~9, E: index symbol)

STATUS output in a 1~3-byte-length ASCII format:

SNN (S: + / -, N:0~9)

0: Normal measurement results

Other: Error in the measurement

BIN NO. output in a 1~3-byte-length ASCII format:

SNN (S: + / -, N:0~9)

0: No normal comparison results

1~3: Qualified gear BIN1~BIN3

10: Nonqualified gear OUT

11: Auxiliary gear AUX

☞Save the measurements by the following procedure:

1: Press the SYSTEM menu key and, in the Save Type field of the <system setup>, select the Save Type is CSV.

2: Connect the U disk and confirm that the instrument has successfully installed the U disk, press the mobile cursor to the tool, then select the Start Save function soft key or press the SAVE reuse shortcut. The instrument creates the corresponding files on the U disk, the system status area displays the data record icon, and the data buffer starts to work;

3: Only the measurement results of the measurement display page and the selected display page will be written to the cache. When the cache area is full, the data is batch written to the U disk file created in step 2;

4: Instrument automatic repeated cache-data recording process of U disk;

5: To stop saving, go to the Stop Save feature soft button in the tool menu or press SAVE reuse shortcut

Key, end after the remaining data of the cache area is written to the U disk.

WARNING: During writing data to the U disk, prohibit unplugging the U disk, or it may cause the U disk or the U disk file system damage.

Description: The data record file is numbered in EULCR000~EULCR199 order, and the user cannot specify and modify the stored file name; it takes some time that the data is written to the U disk, and there may be a short stop response during the process.

The data record is automatically ended in an abnormal manner when:

- Write data to the U disk failed
- The rows written to a file is out of range

Save the screen snapshot to the U disk

On any display page, you can save the current screen display content to the U disk in GIF/BMP/PNG format, and then it can be downloaded to the PC machine to open and use these files.

☞**Press the following procedure to save the screen snapshot:**

Step 1: Press the SYSTEM menu key, in the Save type field of the <system setting>, select the save type of GIF, BMP or PNG (image format file);

Step 2: Connect the U disk and confirm that the instrument has successfully installed the U disk;

Step 3: Switch to the screenshot-required page;

Step 4: Press the SAVE reuse shortcut or move the cursor to the tool menu to select the Start Save function soft button, the current screen

The screen snapshot is saved to the U disk in the specified image format file.

Description: The screen snapshot file is numbered in the EULCR000~EULCR199 order, and the user cannot specify and modify the stored file name.

6.3 (FILE LIST)

Survey settings profile

The test settings are the setting parameters related to the measurement, including the current page (or the page before entering the file list); all settings on the measurement settings page; and all settings on the limit settings page.

The instrument organizes the above settings as one file and can be saved and called overall; it can also specify a name (comment information) for the saved file, which can be saved along with the file.

The measurement settings file can be saved in the following media:

medium	Store the serial number	use
Internal RAM(battery supply)	0	File is not visible, saved instantly, and called automatically
FLASH ROM	1~50	Store and make calls through the file list
External USB memory	51~550	Store and make calls through the file list Storage location: \ RK2837\SETUP*1 File name: 51.EST~550.EST

Store / call the measurement settings

Press the menu button (MEAS,SETUP or SYSTEM), and then press the FILE LIST function soft key to enter the File List page.

Field information of file list page:

field	describe
number(No.)	Displays the stored setup file serial number, 1~50 for internal ROM memory, and 51~550 for external USB memory. Select the file serial number to operate through the cursor keys: Up and down cursor keys move field individually; left and right cursor keys press page to move field; The ENTER key stores the media selection
名称（NAME）	Displays the comment information for the stored settings file to name the measurement settings parameters, not to the file name stored on the U disk.
日期（DATE）	Displays the system time spent when being saved.
存储器（Memory）	Displays the currently valid storage media, using the ENTER key to switch the available media or U disk partition.

☞Move the field with the cursor key, select the file serial number to operate, and press the function soft key:

Function soft key	operating function
加载（LOAD）	Available when the file exists, calling the specified settings file Confirm operation during loading.
保存（SAVE）	Save the current measurement setting parameters, enter a file name before saving, can be named after the default <Unnamed>

Note: The file name required here is actually the comment information of the measurement setting file!

删除（DELETE）	Available when the file exists, delete the specified settings file Confirm operation during deletion.
复制（COPY）	Batch copy files, respectively enter the source file number, target file number, copy quantity, can perform batch file copy, mainly used for file exchange between internal and external memory.
退出（EXIT）	Exit the file list and return to the page before entering the file list.

Chapter 7 Technical indicators

Main contents of this chapter: measurement accuracy, performance test and general indicators, for basic technical parameters of instruments, please refer to Chapter II "Functional Parameters".

7.1 measurement accuracy

The measurement accuracy includes measurement stability, temperature coefficient, linearity, measurement repeatability and calibration interpolation.
The measurement accuracy of the instrument must be checked under the following conditions:
Warm up time: ≥ 20 minutes.

Correct the open circuit and short circuit after preheating.

When using the extension test cable, it is calibrated by the cable extension.

The measuring range of the instrument works in "auto" to select the correct measuring range.

Accuracy of the |Z|、|Y|、L、C、R、X、G、B

$Ae = \pm(Ab + Zm/Zo + Zs/Zm) \times Kt$ [%]

Ab: Basic measurement accuracy
Zm: Impedance under tested
Zo: Open-circuit impedance base
Zs: Short-circuit impedance base
Kt: temperature factor

L,C,X,B accuracy conditions: Dx (D measurement) ≤ 0.1
R,G precision usage: Qx (Q measurement) ≤ 0.1
When Dx ≥ 0.1, the L, C, X, B, precision factor Ae should be multiplied $\sqrt{1+D_x^2}$

When Qx ≥ 0.1, the R, G, precision factor Ae should be multiplied $\sqrt{1+Q_x^2}$

Accuracy of the D

The De is given by:

当Dx ≤ 0.1 时

$$De = \pm\frac{Ae}{100}$$

当Dx > 0.1 时, Multiply the (1 + Dx) by the De

Dx D value of the tested

Accuracy of the Q

The accuracy of the Q is given by the following formula:

$$Qe = \pm\frac{Q_x \times D_e}{1 \mp Q_x \times D_e}$$

Here, Qx is the Q value of the subject test.

The De is the relative accuracy of the D

Use conditions used above Qx×De < 1

Accuracy of the θ

The accuracy of the θ is given by the following formula:

$$\theta e = \frac{180}{\pi} \times \frac{A_e}{100} \quad [deg]$$

Ae is the relative accuracy of | Z |, | Y |, L, C, R, X, G, and B

Accuracy of the G

The accuracy of the G is given by the following formula:

Ge = Bx × De [S]

$$Bx = 2\pi fCx = \frac{1}{2\pi fLx}$$

Dx D value of the tested
Bx B value of the tested [S]
De Relative accuracy of the D
f Test frequency [Hz]
Cx C value of the tested [F]
Lx L value of the tested [H]

Accuracy of the Rp

When Dx (tested D value) ≤ 0.1

The accuracy of the Rp is given by the following formula:

$$Rp = \pm\frac{R_{px} \times D_e}{D_x \mp D_e} \quad [\Omega]$$

Rpx Rp value of the tested [Ω]。
Dx D value of the tested.
De Relative accuracy of the D.

Accuracy of the Rs

When Dx (tested D value) ≤ 0.1

The accuracy of the Rs is given by the following formula:

Rse = Xx×De [Ω]

$$Xx = 2\pi fLx = \frac{1}{2\pi fC_x}$$

Xx X value of the tested [Ω]。

Cx C value of the tested [F]。

Lx The L value being measured [H]。

De Relative accuracy of the D

f Test frequency [Hz]

Basic precision is Ab

Basic accuracy table (slow speed, medium speed):

	5mV~50mV	50mV~0.2V	0.2V~0.6V	0.6V~2V
20Hz~125Hz	0.3%×(50mV/Vs)	0.15%	0.1%	0.08%
125Hz~110kHz	0.15%×(50mV/Vs)	0.1%	0.08%	0.05%
110kHz~200kHz	0.25%×(50mV/Vs)	0.2%	0.15%	0.1%

Basic accuracy table (quick):

	5mV~50mV	50mV~0.2V	0.2V~0.6V	0.6V~2V
20Hz~125Hz	0.6%×(50mV/Vs)	0.4%	0.25%	0.2%
125Hz~110kHz	0.3%×(50mV/Vs)	0.2%	0.15%	0.1%
110kHz~200kHz	0.5%×(50mV/Vs)	0.3%	0.2%	0.15%

Basic accuracy correction-at low impedance

When the impedance is less than 30, the basic accuracy plus the following values:

frequency range	Impedance was measured		
	|Zx|≤1.1Ω	1.1Ω<|Zx|<11Ω	11Ω<|Zx|<30Ω
20Hz ~ 110kHz	0.08%	0.05%	0.03%
110kHz ~ 200kHz	0.15%	0.08%	0.05%

Basic accuracy correction-at high impedance

When the impedance is greater than 9.6k (the basic accuracy plus the following values:

frequency range	Impedance was measured		
	|Zx|>96kΩ	30kΩ<|Zx|<96kΩ	9.6kΩ<|Zx|<30kΩ
20Hz ~ 22kHz	0.05%	0.03%	0
22kHz ~ 110kHz	0.1%*1	0.05%	0.03%
110kHz ~ 200kHz	0.2%*2	0.1%*3	0.05%

Note * 1, * 2, * 3: already in the extended measurement range, see Chapter 3 Range.

Basic accuracy correction-Cable extension

When using an extended test cable, the basic accuracy adds the following values:

$0.02\times(Fm/100kHz)^2\times L^2$ [%]

Fm Test frequency [Hz]

L Measure the cable length [m]

Note: without the corresponding cable length calibration, it is not in the accuracy evaluation range

Basic precision correction-interpolation frequency

Basic accuracy plus: 0.03%

Open-circuit impedance base Zo

● The open circuit impedance base reaction is the high impedance extension measurement capacity.

frequency range	Measure the speed	
	high-speed	Medium speed and slow speed
20Hz~125Hz	2MΩ	5MΩ
125Hz~22kHz	5MΩ	8MΩ
22kHz~110kHz	1MΩ	1.6MΩ
110kHz~200kHz	300kΩ	500kΩ

● When testing the voltage level Vs <1, the open circuit impedance base Zo is multiplied by Vs

● After the cable length extends, the open circuit impedance base Zo is multiplied by the following table factor:

frequency range	Cable length			
	0m	1m	2m	4m
20Hz~22kHz	1	1	0.8	0.5
22kHz~110kHz	1	0.8	0.5	0.2
110kHz~200kHz	1	0.5	0.25	0.1

Short-circuit impedance base Zs

● The open circuit impedance base reaction is the low impedance extension measurement capability.

frequency range	Measure the speed	
	high-speed	Medium speed and slow speed
20Hz~55Hz	10Ω	3Ω
55Hz~125Hz	3Ω	1Ω
125Hz~1.1kHz	1.8Ω	660mΩ
1.1kHz~11kHz	1mΩ	330mΩ
11kHz~200kHz	330mΩ	110mΩ

● When testing the voltage level Vs <1, the short-circuit impedance base Zs is divided by Vs

● After the cable length extends, the short-circuit impedance base Zs is multiplied by the following table factors:

frequency range	Cable length			
	0m	1m	2m	4m
20Hz~22kHz	1	1	1.2	2
22kHz~110kHz	1	1.2	1.5	3
110kHz~200kHz	1	2	5	10

temperature coefficient Kt

Effect of the reaction ambient temperature on the measurement accuracy:

ambient temperature [℃]	Kt
0~8	4
8~18	2
18~28	1
28~38	2
38~48	4

7.2 performance testing

The tests shall be performed under the working conditions described in the accuracy assessment. This test is only included in the test of the main parts of the instrument, and the parameters not included in the other parts, the user can test under the specified conditions according to the indicators listed in this manual. If the test results are found to exceed the indicators, please send them to the special maintenance department or the company for maintenance.

Devices and equipment used for performance testing

serial number	Name of the instrument and equipment		technical requirement
1	standard capacitor	100pF	0.02% Loss D is known
		1000pF	
		10nF	
		0.1uF	
		1uF	
2	Communication Standard resistor	10Ω	0.02%
		100Ω	
		1kΩ	
		10kΩ	
		100kΩ	
3	standard inductor	100μH	0.02%
		1mH	
		10mH	
		100mH	
4	frequency meter		（0～1000）MHz

5	digital multimeter	0.5%

functional check

All function keys, displays and terminals of the instrument shall work normally, and all functions shall be correct

After power on, the system test function can be used for basic test

Connect the end clamp, use the resistance or capacitance measurement function to measure the resistance and capacitance, and the measurement result is normal

Open circuit reset correction is used, and CP or G-B parameters are used to check the open circuit condition, and the display base is normal

Use short-circuit reset correction, use Z, LS or R-X parameters to check the short-circuit condition, and the display base number has no obvious abnormality

Different test frequencies and levels are used for repeated verification and DUT measurement

Test the signal level accuracy test

The test signal level accuracy is: 10% ±5mVrms
Place the digital multimeter in the AC voltage range, where one test bar is connected to the Hc end of the meter and the other test bar to the ground end. Change level is: 0.1V,0.3V,1V,2V, Inspection test level.

Frequency accuracy test

Test signal frequency accuracy is 0.01%

Connect the ground end of the frequency meter to the ground end of the instrument and the frequency meter test end to the Hc end of the instrument. Change frequency is: 50Hz, 100Hz, 1kHz, 10kHz, 100kHz to check the main test frequency.

Capacity C, loss D precision test

function Cp-D
Test frequency 100Hz 1kHz 10kHz 100kHz Test them separately
electrical level 1V
range AUTO
polarization no
speed slow

Short circuit and open circuit clearance shall be conducted before testing. Access to standard capacitor 100pF, 1000pF, 10nF, 0.1uF, 1uF, change frequency, error capacity C between instrument readings and standard value and loss D shall be within the specified allowable error range.

Inductance volume L precision test

function Ls-Q
Test frequency 100Hz 1kHz 10kHz 100kHz Test them separately
electrical level 1V
range AUTO
polarization no
speed slow

Short circuit and open circuit clearance shall be performed before testing. Access to the standard inductor 100 μH, 1mH, 10mH, 100mH, changes the frequency, and the error between the instrument readings and the standard value shall be within the specified allowable error range.

Impedance Z precision test

function Z-θ
Test frequency 100Hz 1kHz 10kHz 100kHz Test them separately
electrical level 1V
range AUTO
polarization no
speed slow

Short circuit and open circuit shall be cleared before testing. Access the AC standard resistors 10,100,1kΩ, 10kΩ, 100kΩ, change the frequency, the error between the instrument reading and the standard value shall be within the allowable error range.

7.3 General indicators

Power supply requirements

	require
voltage	100Vac~240Vac
frequency	47.5~63Hz
maximum power dissipation	30VA

work environment

temperature	0°C 至 55°C
humidity （ ≤ 40°C ， No condensation）	15%至 85% RH
altitude	0 m 至 2000 m

Storage environment

temperature	-20°C 至 70°C
Humidity (≤ 60 C, without	0%至 90% RH

condensation)	
altitude	0 m 至 4500 m

Volume and weight

Wide × wide high × deep： 280*88*350 (mm)

Weight: about 3.5kg

safety requirements

This instrument is a Class I safety instrument

(1) Insulation resistance

Under the parameter operating conditions, the insulation resistance between the power supply terminal and the housing shall not be less than 50M (;

The insulation resistance between the power terminal and the housing shall not be less than 2M(;

(2) Insulation strength

Under the parameter operating conditions, the power terminal and the housing can withstand the AC voltage with a rated voltage of 1.5kV, frequency of 50Hz for 1 minute, with no breakdown and flying arc.

(3) Leak current current

leakage current is not more than 3.5mA.

electromagnetic compatibility

(1) Power supply transient sensitivity according to GB6833.4 requirements.

(2) Conduction sensitivity is as required by GB6833.6.

(3) Radiation interference is as required by GB6833.10.

Appendix A Remote Control

Main contents of this chapter: instruments can use RS232C serial interface, USB-CDC or USB-TMC for data communication and remote control of instrument-free panels, but not used simultaneously; they share the instrument standard SCPI instruction set, but use different hardware configurations and communication protocols. This chapter describes the use of interface. See the "RK2837 Precision LCR Digital Bridge Programming Manual" for interface command.

A.1 RS232C Remote control system

The instrument standard-configured RS232C interface can be used to communicate with the computer and PLC, providing the cheapest and convenient conditions for data collection and statistical analysis. The instrument provides a wealth of program control commands, through the RS232C interface, the computer can operate almost all functions on the instrument panel.

RS232C bus

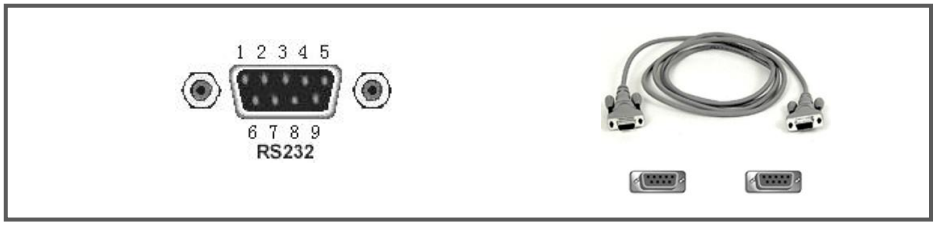
Although RS-232C can be completely replaced by the USB communication scheme, some industrial applications and PLC control are still being adopted, and they have a very wide application basis. The standard RS-232C interface uses a 25 core connector (basic obsolete) and a 9 core connector.

Like most serial ports in the world, the serial interface of this instrument is not strictly based on the RS-232 standard, but provides only a minimal subset. The table is shown below:

signal	symbol	Connector pin number
send data	TXD	3
receive data	RXD	2
ground connection	GND	5

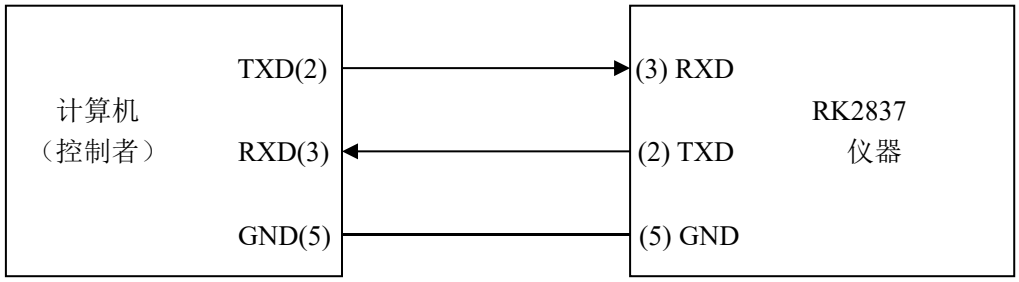
RS232C configuration

The instrument uses a standard 9-core pin DB connector with the connecting cable on the right:



Connect to the upper computer using the RS232C port serial communication cable, and the

most basic connection scheme is as follows:



RS232C parameter

transmission mode	Full-duplex asynchronous communication with start and stop bits
Baud rate	1200bps，9600bps，19200bps， 38400bps ，115200bps
data bit	8 BIT
stop bit	1 BIT
verification	无
tailed	CR、LF、CR+LF 可选
contact way	Software Contact
junctor	DB9 core

A.2 USBRemote control system

USB communication is one of the most widely used serial communication methods today.

USB communication bus

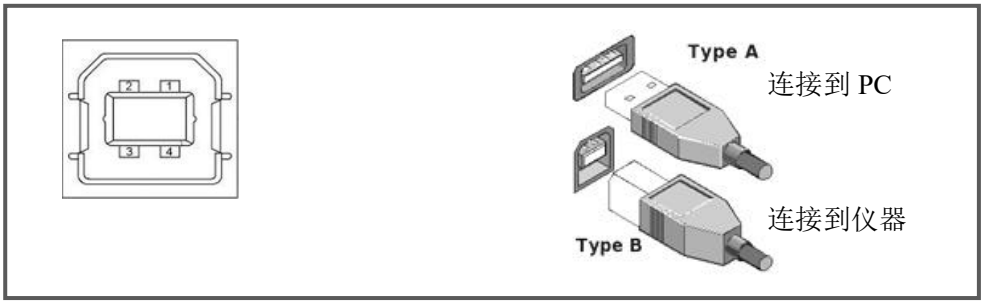
USB(Universal Serial Bus) Remote Control system controls the device via USB through interfaces meeting USBTMC-USB488 and USB 2.0 standards. The USB interface of the instrument supports two modes: USB-CDC and USB-TMC.

USB-CDC mode (communication device class) virtual the instrument as COM port (Vcom) to establish communication as RS232C.

The USB-TMC Mode (Test and Measurement Class) protocol is designed based on USB to establish communication with USB devices in a manner similar to GPIB.

USB configuration

The USB-DEVICE of the instrument adopts the USB-B type (square port) connector, and the USB communication line is the type USB A-B:



After connecting the instrument to PC through USB, different drivers should be installed on PC according to the USB communication mode. USB-CDC

After selecting usb-cdc communication mode, install the driver as follows:

- After the first connection, the computer finds new hardware and pops up the install new hardware dialog box. Select "no, not yet":
- Click "next" and select "install from list or specified location":
- Then click "next" to select the path containing the installation information files of eucol VCOM and usbser.sys drivers, and then click "next" to successfully install the USB CDC driver;
- After the installation, you can view the USB CDC device and its port number in the device manager of the computer

Description: The USB-CDC driver for the instrument, which can be downloaded from the company website

After the installation is successful, you can access and control the instrument in the

same way as using RS232C, without requiring repeated installation every time, but the computer may dynamically assign string slogans, please check in Device Manager!

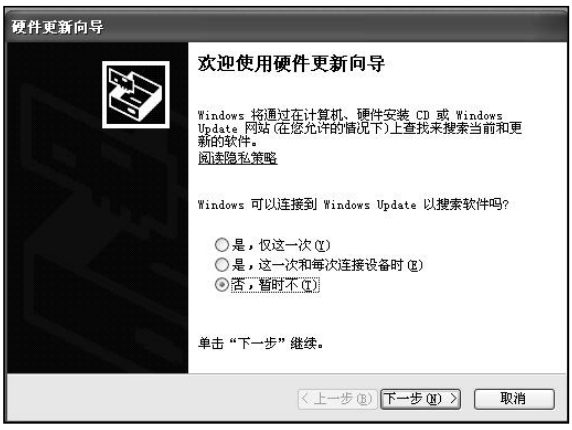
USB-TMC

To use USB-TMC mode, go to NI's website (http://www.ni.com/china) to download and install NI-VISA, The software contains the USB TMC driver.

After the instrument is first connected to the computer through the USB cable, the computer found the new hardware and the new hardware dialog box popped up:

Select No, temporarily No, click Next, if the NI-VISA, installed Wizard will search and display USB Test and Measurement Device″ Driver:

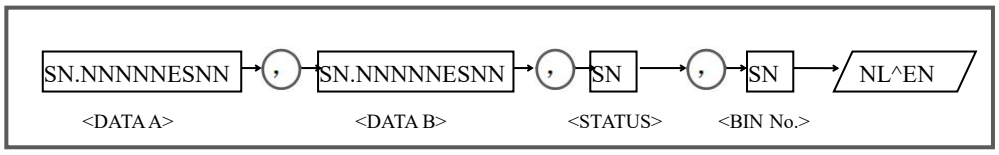
Select Auto Install Software and click Next for the computer to automatically complete the USB Test and Measurement Device″ -driven installation. When complete, you can view the installed device from the Device Manager:



A.3 data format

The instrument is transmitted in the ASCII string format when exporting the measurements to the bus.

In the measurement display, sorting display, and pass test page, the output data format is:



In the above figure, "," is the separator between data, NL is line end (0x0A), indicating the end of the string; ^ END is EOI(end of IEEE-488 bus) signal, and the GPIB drives the EOI signal while sending the line end. There is no this signal at RS232C, USB-CDC, USB-TMC, only the line terminator.

<DATA A>，<DATA B>，<STATUS>，<BIN No.>The format is described below：

● <DATA A>及<DATA B> Output measurement results:

<DATA A> is the main parameter measurement result, and <DATA B> is the secondary parameter measurement result, expressed in the exponential format, and composed of 12-bit ASCII

characters, namely:

SN.NNNNNESNN(S: + / -, N:0 to 9, E: index symbol)

- <STATUS> indicates the measurement status, normal return of 0 and other error
- <BIN No.>Output sorting and comparison results, and the output results are as follows:

numerical value	Select the results
0	No comparison
1~3	FnumberBIN1~3
10	NonqualifiedOUT
11	Auxiliary gearAUX
other	Illegal output

For non-valid measurement page, the output is invalid result:

+9.90000E+37,+9.90000E+37,-1,

Appendix C 9 Core HANDLER interface

Main contents of this chapter: the signal definition of the 9-core HANDLER processor interface

C.1 essential information

The instrument provides the user with a 9-core HANDLER interface (processor interface), which is mainly used for the output of the instrument sorting results and the synchronization with the signal of the system.

Synchronous signal includes two signals of TRIG(test start) and EOM(measurement end);

The sorting signal output is: BINn and NG.

Using these signals, the instrument can be convenient and system controller to form an automatic test system, components test, sorting and quality control, to improve production efficiency.

technical parameter

Select the split output signal Comparison result output signal: Photoelectric isolation, open collector (OC) output, low level effective; The pull-up power supply can select either an internal VCC or an external EXV / BINn: Qualified output
Control the output signal Photoelectric isolation, open collector (OC) output, low level effective; The pull-up power supply can select either an internal VCC or an external EXV / EOM: All measurement is complete and the HANDLER output signal is valid.
Control the input signal / TRIG: external trigger, pulse width ≥ 10 μs, rise trigger (customizable); Photoisolation, low level drive, current 5~10mA

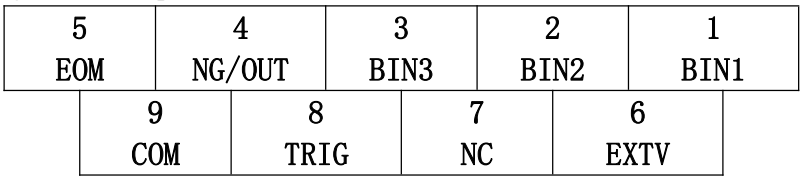
Description: The slash "/" in front of the signal name indicates that the signal is valid at a low level.

C.2 Signal line definition

The HANDLER port of RK2837 uses the DB9 hole connector, and the foot signal is defined in the following table:

Foot of the pipe number	Foot pipe name	**remarks**
1	/BIN1	Select the output and qualified gear 1
2	/BIN2	Select the output qualified gear 2
3	/BIN3	Select the output and qualified gear 3
4	/NG(OUT)	Nonqualified output
5	/EOM	Measure the end signal
6	EXTV	External pull-up power supply / control input power supply
7	NC	undefinition
8	/TRIG	Test start signal (trigger signal)
9	COM	Common end (external power supply ground)

Schematic diagram of foot position distribution of DB9 core connector for HANDLER interface:



C.3 Electrical characteristics

When connecting the HANDLER port to the external controller, refer to this section on the electrical features of the HANDLER interface.

The HANDLER interface board

Using the HANDLER interface board, the use of upper resistance, internal and external power supplies will be involved.

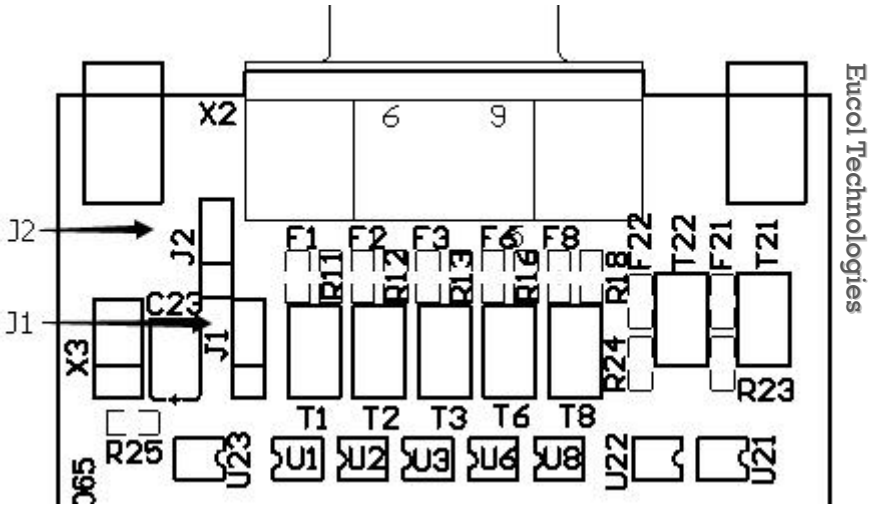
Note: The RK2837 is configured by default to use an external power supply and an external pull-up, and the voltage 5~24V, connects to a typical PLC controller without any configuration changes to the interface board.

Since the open collector cannot output a high level, the output must be connected through the pull-up resistance to the logical power supply.

The RK2837's HANDLER interface board has pull-up resistors, which are not installed by default.

To use internal pull-up, you also use pull-up power and co-connection, which changes the settings of the HANDLER interface board.

Refer to the position of drag resistance and position of jumper below:



The J1,J2: jumper to the above position is using external power by default

DC isolation output

Each DC output signal is a collector output isolated by the photoelectric coupler. The output voltage on each signal line is set by the pull-up voltage on the HANDLER interface board. The pull-up voltage can be provided by + 5V by setting cord or EXV: + 5~ + 24V.

DC isolation output is divided into comparison result output signal and control output signal. See the following table:

output signal	Output the rated voltage		maximum current	Circuit reference ground
	low level	high level		
Select the output /BIN1-3 /NG(OUT)	≤0.5V	+5V～ +24V	6mA	Internal pull-up power supply: Instrument Reference Place (GND) External Power Supply (EXV): COM.
Control the output /EOM	≤0.5V	+5V～ +24V	6mA	Internal pull-up power supply: Instrument Reference Place (GND) External Power Supply (EXV): COM.

Electrical schematic diagram of the sub-selected output signal:

DC isolation input

The DC isolation input is also photocoupled, enabling the signal input by driving the photocoupler.

The input signals are:

External Trigger / TRIG signal (including external BNC trigger input terminal)

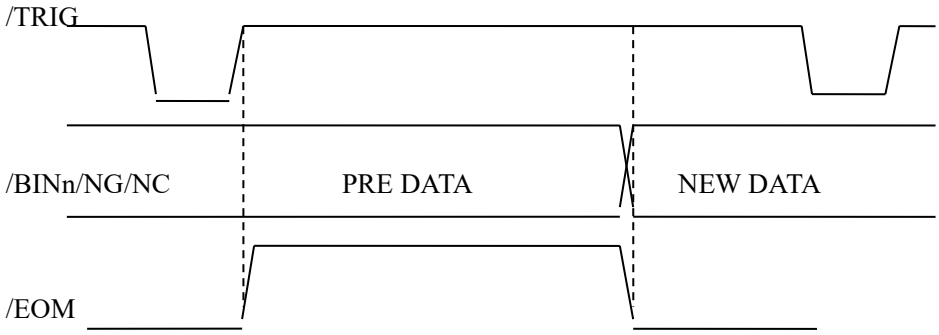
Electrical schematic diagram of the input signal:

The input signal is connected to the cathode of the LED in the optical coupling with a pull current of at least 5mA; the photocoupled LED anode connects an internal 5V or external EXV power supply

in a range of + 5~ + 24V. The U2836 interior uses a fixed 1.2k (flow limiting resistance allowing to string the resistance on the input signal during the external power operation above 12V to reduce the trigger current.

C.3 Time iming reference

Trigger the start and measurement



The trigger start signal rise edge is valid and can be configured to make the descent edge valid
Recommended effective pulse width:> 10us