



Jinko 金科

JK283X series LCR Meter

JK2830/2831/2832 user manual

Matters needing attention:

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This specification is suitable for JK283X series LCR digital bridge.

The information contained in this instruction may be modified at any time without prior notice.

The latest instructions can be downloaded from Kim Allianz's website:
<http://www.JK17.com>

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Company statement

This instruction may not describe all the contents of the instrument. Jin Ailian Company has the right to improve and improve the performance, function, internal structure, appearance, accessories and packaging of the product without further explanation.The confusion caused by the inconsistency between instructions and instruments can be contacted with our company.

Security Warning:



Instrument
grounding

This instrument is class I safety instrument. When connecting the power supply, please make sure that the power socket contains grounding wire. If not grounded, there is a risk of electrostatic or inductive electricity and electric shock from the power supply inlet on the chassis, which may cause personal injury.



Electric
shock hazard

Operations, testing and instrument maintenance should be guarded against electric shock. Non-professionals should not open the chassis without authorization. If professionals need to replace fuses or other maintenance, they must first unplug the power plug and carry out it with the company of personnel.

Even if the power plug has been removed, the charge on the capacitor may still have a dangerous voltage, which should be operated after a few minutes of discharge.

Do not replace and adjust the internal circuit and components of the instrument without authorization!



Input
power supply

Please use the power supply according to the power supply parameters specified in this instrument. Power input that does not conform to the specifications may damage this instrument.

Replacement of fuses using the same specifications

Keep away from
explosive gas
environment

Electronic instruments should not be used in flammable and explosive gases or in environments containing corrosive gases or soot to avoid danger.

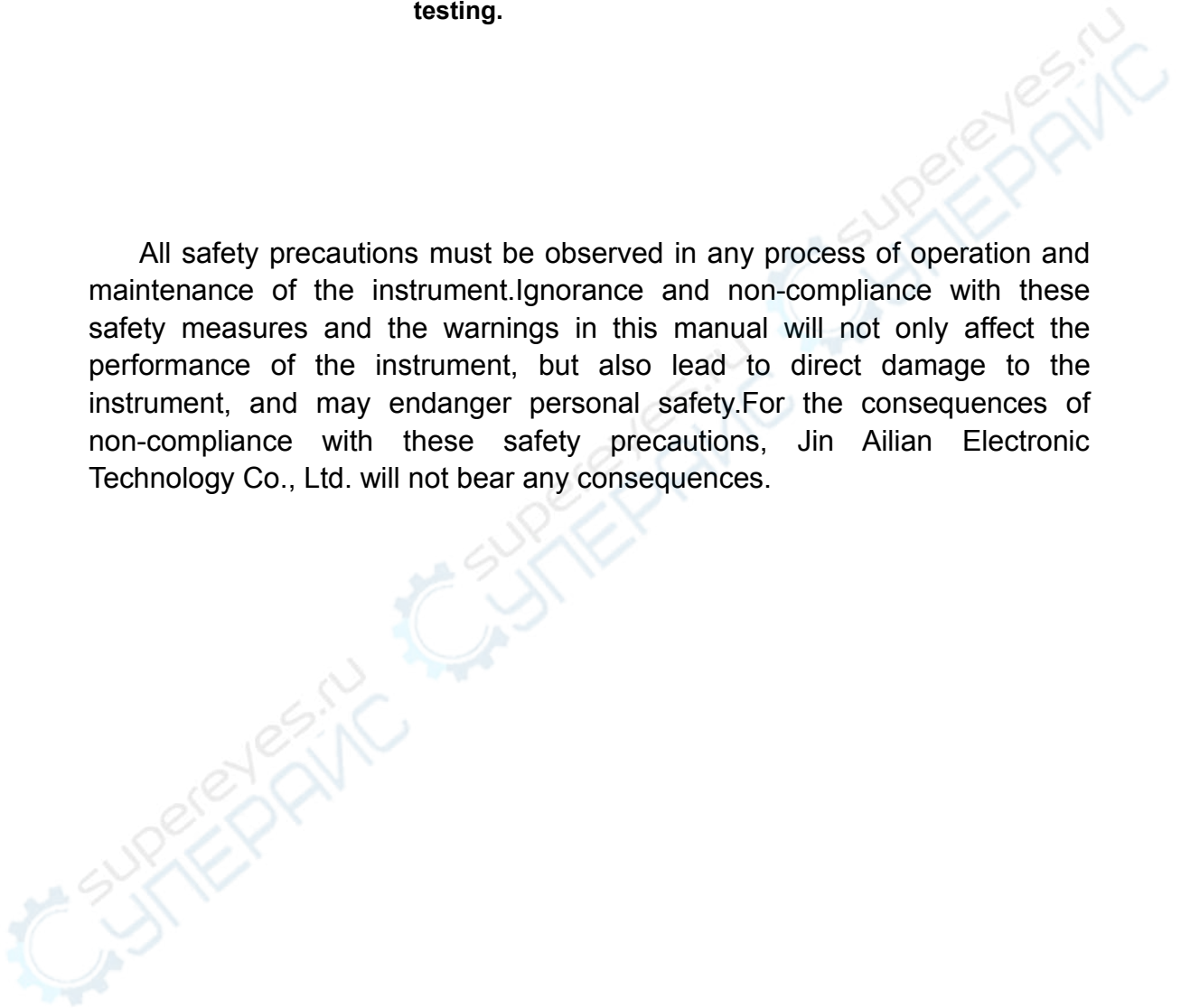


**Other
security
matters**

Do not apply external voltage or current source to the test terminal of this instrument and other input and output terminals at will.

When using external bias current source or voltage source for testing, isolation measures are necessary. Electrical appliances must be discharged before testing.

All safety precautions must be observed in any process of operation and maintenance of the instrument. Ignorance and non-compliance with these safety measures and the warnings in this manual will not only affect the performance of the instrument, but also lead to direct damage to the instrument, and may endanger personal safety. For the consequences of non-compliance with these safety precautions, Jin Ailian Electronic Technology Co., Ltd. will not bear any consequences.



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Chapter I Prepares to Use

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

1.1 Check shipment

After receiving this product, please carefully unpacking and inspecting according to the following procedure:

1. Check whether the packing box or shock absorber used for packing LCR watches is damaged or not.
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 designated attachments or selections.

Standard configuration	quantity	Remarks
JK283X Series LCR Meter	1	Type by order
Power cord	1	It differs from country to region.
Test fixture JK26011	1	1m test cable
instruction manual	1	
Inspection Report/Qualification Certificate	1	

If you have any questions about the above inspection, please contact our company or relevant distributors.

1.2 Check power supply

Check whether the power supply to JK283X meets the following requirements:

Voltage	99Vac~243Vac *1
frequency	47 ~ 63Hz
Maximum power consumption	30VA

Note * 1. JK283X Series Adaptive Wide Voltage Range without manual switching.

1.3 Install fuses

Fuse specification: 250V/1A Slow-Blow, 520mm small fuse

The fuse has been installed in the instrument factory. To check and replace the fuse, the power cord should be pulled out first, and then the fuse holder should be pulled out. Please replace the fuses with specified specifications.

1.4 Connect power cord

Check the three-core power cord, one of which is grounding wire, connected to the power socket with grounding, can make the JK283X body grounding, thereby protecting users and avoiding the possibility of electric shock.

Make sure that the power cord is intact, and then connect JK283X to a reliable grounded power outlet.

Warning:Do not use power lines with any signs of damage to avoid being shocked.

Warning:Use the three-wire power supply line with grounding wire provided to ensure the reliable grounding of the instrument.

1.5 Environmental requirements

1. Do not use under dusty, vibration, direct sunlight and corrosive gas.
2. When the instrument is working normally, the temperature should be $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$, and the relative humidity should be $\leq 75\%$. Please use the instrument under these conditions as far as possible to ensure the accuracy of measurement.
3. This instrument has been carefully designed to reduce the clutter interference at the power end, but it should be used in low noise environment as far as possible. If it is unavoidable, please install the 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 the ventilation chamber with temperature ranging from 5 to 40 C and relative humidity not more than 85% RH. The harmful impurities of the corrosion measuring instrument should not be contained in the air, and direct sunlight should be avoided.
5. Instruments, especially test wires connected to the tested parts, should be far away from strong electromagnetic fields in order to avoid interference to the measurement.
6. Maintain proper ventilation space to ensure ventilation and cooling environment and prevent excessive temperature rise in the machine.
Moderate Minimum Space Requirements: Backside $\geq 180\text{mm}$, Both sides $\geq 60\text{mm}$
7. Electrostatic protection ESD:Although the instrument has been carefully designed to enhance the anti-static impact ability, it should be equipped with suitable working areas to avoid electrostatic discharge.
8. Provide enough space around the instrument so that the power cord can be cut off quickly in case of emergency.

1.6 Starting instrument

Press the power switch key in the upper right corner of the instrument and turn off the power indicator, then turn on the power supply, self-check the instrument, load the configuration information, load the initialization information and initialize the test conditions, and complete the start-up process after all is normal.

If password protection is set to System (SYSTEM), the password will be required to be entered.

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

Note: The default password is 123456. The system configuration can set the password status and change the password.

1.7 Use fixture

Measurements must be made by connecting the appropriate test fixture or test line.

Please use the test fixture or test cable equipped by our company. **The test fixture or test cable made by users or other companies may lead to incorrect measurement results.** Instrument test fixture or test cable should be kept clean, the pins of the tested device should be kept clean to ensure good contact between the tested device and fixture.

Connect the test fixture or test cable to the four test terminals of Hcur, Hpot, Lcur and Lpot on the front panel of the instrument.

For the tested parts with shielding case, The shielding layer can be connected to the

instrument .

Note: After booting, the instrument should be properly preheated for 15 minutes before measuring.

Chapter 2 Overview

This chapter mainly introduces the basic parameters and functions of the product, the front and rear panels and LCD display outline, as well as the basic operation methods.

2.1 Display range

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

parameter	Permissible display range of measurements
Ls、Lp	0.00001 μ H \sim 99.9999kH
Cs、Cp	0.00001pF \sim 99.9999mF
R、Rs、Rp、X、Z	0.00001 Ω \sim 99.9999M Ω
G、Y、B	0.00001 μ S \sim 99.9999S
ESR	0.00001 Ω \sim 99.9999k Ω
D	0.00001 \sim 99.9999
Q	0.00001 \sim 99999.9
θ_r	-3.14159 \sim 3.14159
θ_d	-180.000 $^\circ$ \sim 180.000 $^\circ$
$\Delta\%$	-99.9999% \sim 999.999%
DCR	0.1m Ω \sim 999.999M Ω

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

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

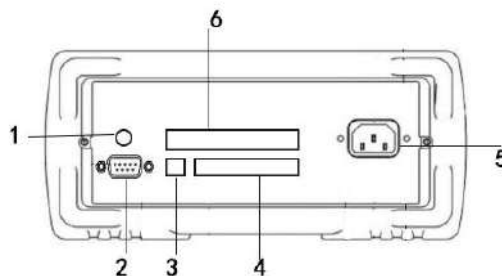
2.2 Front panel introduction



Serial number	Name	Explain
1	Trademark and Model	The model label will correspond to the final functional parameters of the instrument.
2	LCD LCD Display Screen	Display measurement results, test conditions, system information, etc.
3	Main menu key	Measure key : Measurement results display page and selection. Set up key : Switch between measurement settings page and system settings page.
4	Cursor key	Cursor keys are used to move fields, and fields are currently set effectively to display anti-color images.
5	Input key	Full-featured numeric/character keyboard for input data, Or enter characters when required to enter notes such as file names. The decimal point key is multiplexed as a save key to perform a save operation (save CSV or image file) by pressing this key in a non-data input state. Note: In data input, trigger keys can replace ENTER keys to confirm input.

6	Operating function key	<p>clear key: Quickly call out the clearing menu and carry out the clearing operation.</p> <p>Key lock key: Lock or unlock the key on the panel. In remote control mode, it can be used to cancel remote control.</p> <p>trigger key: It will not be locked by keyboard, but will be locked by remote control.</p> <p>trigger key: When the manual trigger mode is used, the instrument measurement can be triggered.</p> <p>Bias key: Switching on and off of DC offset output.</p>
7	Power switch	Turn on and off the instrument. Note: When the instrument is closed, there is still a power supply inside.
8	Function soft key (SOFTKEY)	The functions of the six keys in this part are not fixed. They have different functions in different menus. The corresponding functions are displayed in the menu area under the display screen.
9	Test end	Four test terminals are connected to the tested part (DUT) by suitable test fixture.
10	USB HOST Interface	Used to connect USB flash disk (U disk). Supports FAT16 and FAT32 file systems. Support firmware upgrade, record test data, store screen images, store and call test parameter files, etc.
11	Qualified and Unqualified Indicator light	Used to indicate that the test is qualified or unqualified, pass/fail

2.3 Rear panel introduction



Serial	Name	Explain
---------------	-------------	----------------




<i>number</i>		
1	TRIGGER interface	External trigger devices such as foot control can be connected
2	RS232 interface	The serial communication interface between instrument and external equipment, parameter setting and command can be set and acquired by computer to realize remote control without instrument panel.
3	USB DEVICE interface	USB Communication Interface to Realize Online Communication with Computer
4	IEEE-488 (GPIB) interface	GPIB Interface to Realize Online Communication with Computer
5	Power socket (no fuse, fuse inside the instrument).	It is used for connecting AC power supply and embedded fuse holder.
6	HANDLER interface	HANDLER interface realizes the sorting and output of test results.

2.4 Introduction to Display Area

LCD display screen is divided into several relatively fixed areas, displaying specific information of each page.



<i>Serial number</i>	<i>Name</i>	<i>Explain</i>
1	Display page	Indicates the page name of the current display page.
2	Menu display area	Displays functional menus corresponding to fields or shortcuts.
3	Measurement results and parameter setting	Display the measurement results and current test conditions. The measurement results can include: impedance

	area	measurement results, voltage and current monitoring. When the resistance measurement results exceed the range, it shows that:-----
4	update information	Display the correction status.
5	System icon display	Display system status by Icon  U disk is connected;  Remote control status;  Data recording status;

2.5 Basic operation

The instrument adopts menu key (or shortcut key) +field guide mode to set various functional parameters.

The current valid operation field is displayed as an anti-color image.

Basic operating procedures

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

Operation 2: Use cursor keys to move fields;

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

Operation 4: If the current field supports input mode, you can input data by pressing any valid numeric key. In the input mode, the function soft key will have different input multiples according to the input nature of the field. The function key also has the same function as ENTER to confirm and terminate the input.

Basic operation example diagram:



Display parameters in soft key area

Not all parameters exist as fields in the parameter display area. A few state parameters operate directly in the soft key area and are displayed. The current valid state parameters are displayed with different ribbons, such as the zero-clearing menu.



Chapter 3 Measurement Display

The main contents of this chapter: The display information and operation of all measurement display pages of JK283X series are described in detail.

3.1 Measurement Display Page (MEAS DISP)

Press the **measure** menu key, Enter the measurement display page, where you can set the most commonly used basic test conditions, including:

Field name	Description
Parameter (FUNC)	Standard combination display parameter type
Frequency (FREQ)	Test signal frequency at present
Level (LEVEL)	Test signal level at present
Range (RANGE)	Setting up measurement range
Speed (SPEED)	Can be set up fast, medium and slow three gear
internal resistance (RSOU)	It is Source resistance, The output impedance is chosen to be compatible with other LCR.

Note: All the above fields can also be set on the Measurement Settings page <MEAS SETUP>.

Multi-parameter display

JK283X series can set one combination parameter and two monitoring parameters, so it can flexibly configure different display parameter combinations, and at most four parameters can be combined to display on LCD at the same time.

Select the monitoring parameters on the MEAS SETUP page.

The specific meaning of impedance parameters is described as follows:

Impedance parameters (Table 1)	Parameter implication
Cp	Capacitance Value Measured by Parallel Equivalent Circuit Model
Cs	Capacitance Value Measured by Series Equivalent Circuit Model
Lp	Inductance values measured by parallel equivalent circuit model
Ls	Inductance value measured by series equivalent circuit model
Rp	Equivalent Parallel Resistance Measured by Parallel

	Equivalent Circuit Model
Rs	Equivalent Series Resistance Measured by Series Equivalent Circuit Model
Z	Absolute value of impedance
R	Resistance
X	Reactance
G	conductance
B	electrical susceptance
D	Dissipation factor
Q	Quality factor (reciprocal of dissipation factor)
θ	phase angle

Close display

If you do not need to display the measurement results, you can turn off the display. Closing the display can improve the measurement speed.

On the measurement display page, press "more than 1/2" and then press the "display" function soft key to switch the display on or off.

When the display is turned off, the LCD data display area has 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

JK283X series has a simple test display page, which displays the measurement results in large characters, and the number keys 1-9 correspond to one measurement parameter respectively. Pressing the number keys can directly modify the corresponding measurement parameters. You can also use directional keys to modify the current active parameters (different color display).

On the measurement display page, press "More 1/2" and then "Simple Testing" to switch to Simple Testing Display Page:

<测量显示>		成功安装U盘	
参数	: Cp-D	量程	: 自动
频率	: 1.0000kHz	速度	: 中速
电平	: 1.000 V	内阻	: 100 Ω
Cp: 10.1832pF D: 0.00405			
修正: 关闭			
	测量 显示	分选 显示	列表 扫描
	文件 列表	更多 1/2	

Decimal locking

JK283X series can lock the decimal digits and unit multiples of measurement parameters so that they do not vary with the data range. It is suitable for continuous testing of batch products or removal of unstable display bits.

On the measurement display page, press "More 1/2".

Function soft key	Operation function
Decimal point locking A (D.P. FIX A)	Lock or move one decimal of a parameter to the right, below a fixed decimal point There is a "▲" mark, when the decimal moves to the rightmost, turn to automatic mode;
Decimal point locking B (D.P. FIX B)	Lock or move a decimal of a quadratic parameter to the right, below a fixed decimal point There is a "▲" mark, when the decimal moves to the rightmost, turn to automatic mode;

Description: When the measurement parameters change, the locking mode is automatically cancelled.

Note: In simple measurement and sorting display pages, decimal locking is equally effective, but sorting display pages do not display lock markers.

Test frequency(FREQ)

JK2830 provide 50Hz — 100kHz frequency ,0.01Hz step

JK2831 provide 50Hz — 200kHz, 37 points

JK2832 provide 20Hz — 200kHz frequency, 0.01Hz step

Test level (LEVEL)

The test signal level refers to the RMS of the output sinusoidal test signal.The setting value is the RMS of the output signal voltage when the test end is open.

The test level of JK283X series instruments is: 10mV~2Vrms continuous level.

RANGE(RANGE)

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

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

Note: Locking the range can effectively improve the test speed.

SPEED (SPEED)

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

worse the measurement stability.

Evaluate measurement speed with the following additional features turned off or set:

The complete basic measurement process includes:

Trigger start → start-up AD → get data → Impedance operation and transformation → Comparator and output → Format and display

The measuring speed can be set to:

SLOW, about 167 ms;

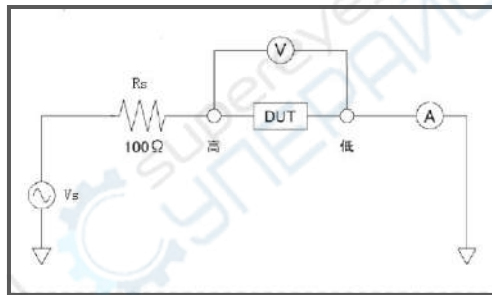
MED, about 83 ms

FAST, about 12.5ms;

Explain: *With the decrease of test frequency, the measurement time will be significantly prolonged.*

Internal resistance (RSRC)

Internal resistance is the source or output impedance. Serially connected between the signal source and the DUT of the measured piece, it is used to limit the maximum output current and the protection of the signal source. As shown in Figure Rs below:



Because of the existence of output impedance, Voltage Level (V) or current level

(A) on DUT of Actual Measured Parts, Not the set test signal level Vs or Is, See Chapter 3

Definition of Test Signal Level:

Voltage level: Output Voltage of Test End Open Circuit;

Current level: Output Current of Test End Short Circuit

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

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

The instrument has two kinds of output impedance to choose from: 100Ω, 30Ω.

CLEAR(CLEAR)

In the measurement display page, pressing the clear key can implement quick clear operation.

Zero clearing is used to reduce test error caused by stray impedance of fixture and test lead. Zero clearing is a part of user correction system, which can meet the basic measurement requirements. The clearing includes open clearing and short circuit clearing.

Notes: Before performing open/short-circuit zero-clearing operation, make sure that the test end is in open/short-circuit state.

Notes: If the open/short circuit zero-clearing switch is closed, the corresponding zero-clearing data are not used for correction calculation.

The clearing menu appears after pressing the clearing key as follows:



Notes: The soft key display of the original field function can be restored by pressing the zero-setting key again.

Function soft key	Operation function
SPOT OPEN(SPOT OPEN)	Open-circuit zeroing is performed on the frequency displayed in the current frequency field.
SWEEP OPEN(SWEEP OPEN)	Open-circuit zeroing is performed on all frequencies.
OPEN(OPEN)	Open-circuit zero-clearing switch for opening or closing open-circuit zero-clearing function;
SPOT SHORT(SPOT SHORT)	Short-circuit zeroing is performed on the frequency displayed in the current frequency field.
SWEEP SHORT(SWEEP SHORT)	Perform short circuit zero clearing for all frequencies.
SHORT(SHORT)	Short-circuit zero-clearing switch is used to turn on or off short-circuit zero-clearing function.

3.2 BIN DISPLAY(BIN DISP)

Press the menu key of measurement, then press the soft key of "sorting and displaying" function, and enter the sorting and displaying measurement page, which can display the file number and count the BIN. The BIN number is highlighted with large characters, while the measurement results are displayed with small characters.

The measurement and comparison process of sorting display pages and measuring display pages is exactly the same, only the difference in display content!

Cursor in the sorting display page, press the "more 1/2" function key, the corresponding function key for the switch comparer and the file counter, and counter zero.

Notes: *The instrument can be displayed at three or nine levels of qualified BIN. The default is to display at three levels of qualified BIN.*



Grade 3 Qualified BIN Display Page

档号		一次参数容限		合格档计数
<分选显示> ① 使用软键选择				
参数: Cp-D	BIN	LOW [%]	HIGH[%]	COUNT
标称: 100.000nF	1	-10.000	10.000	0
BIN 1	2	-20.000	20.000	0
	3	-30.000	30.000	0
	4	-40.000	40.000	0
	5	-50.000	50.000	0
	6	-60.000	60.000	0
	7	-----	-----	0
	8	-----	-----	0
	9	-----	-----	0
	Cp: 100.230nF	2nd	0.00000	0.01000 []
D : 0.00613	REJECT	AUX: OFF	OUT: 0	
修正: 关闭				
测量显示	分选显示	列表扫描	文件列表	更多 1/2
测量值		不合格品计数		

Grade 9 Qualified BIN Display Page

display information

The display content (Non-set field) of the BIN display page is as follows:

1. parameter(FUNC): Display the current instrument measurement parameters;
2. Nominal value(NOM.): Display the nominal values set by the limit table
3. Limit parameter: Display the limit of each BIN.
4. Qualified BIN Counting: Display the number of qualified BINs.
5. unqualified BIN Counting: Display the number of unqualified BINs;
6. BIN number: Highlight the BIN number in large font.
7. measured value: Small font display parameter measurement results;
8. Correct (CORR): Display information of open circuit and short circuit calibration switch

Tip: To understand and set up the comparator, please go to the Limit Settings page.<Limit Table>.

BIN COMPARE(COMP)

To use the comparator, the comparator switch must be turned on.

After entering the sorting display page, press the "More 1/2" button and use the function soft key "Comparison Switch" to turn on or off the comparator:

Explain:Limit Settings page<Limit Table> can also set comparator switch.

BIN counter(COUNT)

JK283X series can count the selected BINS. Three or nine qualified ,Two unqualified (Auxiliary AUX and overshoot OUT)

The upper limit of counting display of each counter is 999999, after exceeding it, the counter automatically returns to 0.

After the counter function is turned on, the * mark is displayed on the side of COUNT.

The counting value will not be saved with the instrument. After the instrument is reset, the counting will be returned to 0.

After entering the sorting display page, press the "more 1/2" button and use the soft key "counting switch" to turn on or off the counter:

count clear

After entering the sorting display page, press the "More 1/2" button.The counter value can be cleared by using the soft key of "counting zero" function.

There are operation confirmation prompts for counting clear to prevent misoperation.

Notes:Comparing and counting function status, in the measurement display page is also working, but not displayed.

3.3 List sweep page (LIST SWEEP)

The list scan of JK283X series has the ability of synthetically scanning many parameters, including impedance parameter type, frequency, level and bias. It provides a more simple and intuitive measurement method for the Synthetical Measurement of multi-parameter components.

JK2830 can set up up to 200 scanning points, each scanning point can be compared to the limit.The comparison results of the first 10 scanning points can be output from the HANDLER processor interface.

Notes:The output of list comparison results requires HANDLER hardware support.

Press the menu key of measurement, and then press the "list scan" soft key to enter

the list scan test page.

As long as there is a trigger signal, the scan will run automatically.

No.	FUNC	FREQ[Hz]	LEV[V]	BIAS[Lx]	RESULT	COMP
1	OFF					
2	OFF					
3	OFF					
4	OFF					
5	OFF					
6	OFF					
7	OFF					
8	OFF					
9	OFF					
10	OFF					

未设置扫描数据
扫描模式 : 连续 不合格时 : 继续

测量显示 分选显示 列表扫描 文件列表 更多 1/2

List scan page can set scan mode (Stepping mode and disqualification Mode of execution), The scanning parameter setting of the scanning point should go to the list settings page.

Display information

From left to right, the list scan measurements show the following:

1. Sweep NO (No.)

Display scan serial number, automatic page turning, the current scanning measurement point before the "*" mark

2. Sweep parameter type (FUNC)

Displays the type of impedance parameter set at the scan point. If the parameter is closed, the scan point is closed.

3. Sweep frequency (FREQ)

Display the measurement frequency corresponding to the scanning point.

4. Sweep level (LEV)

Display the test level corresponding to the scanning point (Voltage level V or current level A).

5. Sweep bias (BIAS)

Voltage bias and current bias can be selected only one of them, or can be turned off without scanning this item.

6. Sweep point measurement results (RESULT)

Display the results of scanning measurement, corresponding to the type of impedance parameters specified by "FUNC".

7. Comparison results (COMP)

According to the upper and lower limits set by the list, the results of each scanning point are compared.

Notes: *Detailed Scan Point Settings, see List Settings<List Setup>*



Chapter 4 Measurement Settings

4.1 Measurement Settings Page(MEAS SETUP)

Press the Settings menu key to enter the Measurement Settings page. Use cursor keys to move to the following fields for relevant settings:

Notes:The “setting” key is the common key of the two pages “Measure Settings” and “System Settings”. Press the setting key and switch back and forth between the two pages.

〈测量设置〉		i 使用软键选择	
参数	: Cp-D	量程	: 自动
频率	: 1.00000kHz	速度	: 慢速
电平	: 1.000 V	内阻	: 100Ω
触发	: 内部	平均	: 1
触发延时	: 0ms	监视 1	: OFF
自动LCR	: 关闭	监视 2	: OFF
偏差 A	: 关闭	参考 A	: 0.00000pF
偏差 B	: 关闭	参考 B	: 0.00000
步进延时	: 0ms	直流偏置	: 0.000 V
	测量设置	极限设置	用户修正
			列表设置
			更多 1/2

Field name	Explain
Parameters (FUNC)	Standard combination display parameter type
Frequency (FREQ)	Current test signal frequency
Level (LEVEL)	Current test signal level
Range (RANGE)	etting up measurement range
Speed (SPEED)	Can be set up fast, medium and slow
IR (DC BIAS)	Source internal resistance, The output impedance is chosen to be compatible with other LCR.
Note: The above fields can also be set on the measurement display page. This section is no longer repeated. See Chapter 3.	
Trigger (TRIG)	Setting trigger mode (trigger source)
Trigger delay(TRG DLY)	Setting trigger delay waiting time
Auto LCR(AUTO LCR)	Setting Component Automatic Recognition Function

Average (AVG)	Setting the average number of times will reduce the speed of measurement
MON 1(MON 1)	Setting monitoring parameters
MON2(MON 2)	Setting monitoring parameters
Deviation A(DEV A)	Selecting the deviation mode of the main parameter
Reference A(REF A)	Setting main parameter deviation reference
Deviation B(DEV B)	Selection of Auxiliary parameter Model
Reference B(REF B)	Setting up reference for deviation of auxiliary parameters
STEP DLY(STEP DLY)	Set up test signal setup time (waiting signal stabilization time)
DC BIAS(DC BIAS)	Setting bias voltage or bias current

Trigger (TRIG)

JK283X series has four trigger sources:INT,MAN, EXT, BUS.

The trigger signal of the non-measuring page is ignored by the instrument.The trigger signal in the non-current trigger mode is an invalid trigger.

Trigger mode	Function description
INT	The trigger signal is automatically generated and the instrument is continuously measured.
MAN	Triggered measurement by panel TRIG key
EXT	Measurement from external BNC trigger terminal or HANDLER interface trigger instrument Can be set to rise or fall edge trigger The trigger pulse width should be greater than 10us. If there is jitter, it may cause redundant trigger.
BUS	Take a measurement after receiving the trigger command sent by the bus*1

Notes :*1.BUS bus trigger can not be set in the instrument panel, it can only be set by bus command.

Notes:*The trigger signal during the measurement period is memorized to the next measurement period, but the repeated trigger signal is ignored.*

Trigger delay (DELAY)

Trigger delay is a period of time before the start of measurement after inserting the trigger signal. It is used to measure synchronization or wait for stable connection of devices during testing. The trigger delay is set in the range of 0~60 s, the smallest unit ms.

Automatic LCR(AUTO LCR)

Automatic LCR is an automatic component identification function, which can automatically select inductance, capacitance or resistance parameters to display according to component properties, including series or parallel equivalent modes.

The inductance parameters are automatically selected as :Ls-Q, Lp-Q

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

The resistance parameters are automatically selected as:Z- θ r

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

Note: Automatic component identification function and automatic DUT trigger function should not be used at the same time! There is interference between the two in the criterion logic.

Average (AVG)

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

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

The monitoring function enables the instrument to display up to four measurement parameters simultaneously on the LCD. Monitoring parameters can be set as impedance parameters or voltage/current parameters.

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

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

The monitoring parameters may also be the following impedance parameters:

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

Deviation (DEV)

The deviation mode is used to control the display mode of measurement results. The deviation display is to display the difference between the measured value and the reference value. It can be used to assist in observing the changes of measurement results

with different test conditions or environmental conditions, It can also be used for assistant observation of measurement results in sorting measurement (deviation display mode, deviation reference set to be consistent with limit tolerance mode and nominal value).

Deviation display can be applied to main and secondary parameters, or both. There are two ways of displaying deviations:

1. Absolute deviation display mode (Δ ABS)

The difference between the actual measured value and the reference value of the deviation is shown. The parameter name is preceded by a " Δ ".

$$\Delta\text{ABS} = X - Y$$

X : Actual measurements value

Y : Deviation reference value

2. Percentage deviation display mode ($\Delta\%$)

The percentage difference between the actual measured value and the reference value of the deviation is shown. The parameter name is preceded by a " Δ ", unit is %.

$$\Delta\% = (X - Y) / Y \times 100 (\%)$$

Explain: *Deviation mode is only valid for measurement display (including full screen display) and sorting display pages, other measurement pages are invalid.*

Notes: *The deviation mode only affects the results of measurement, but does not affect the data used for sorting and comparison.*

Reference (REF)

☞ Move the field to "Reference A" or "Reference B", Input keys and multiplying power function soft keys with multiplier function are used to input data. Or use the function soft key "measurement" to obtain the existing measurement results:

Function soft key	Operation function
measure	The data of measurement results buffer of primary or secondary parameters are directly applied as deviation reference value. Before setting, The device should be correctly measured on the measurement page.

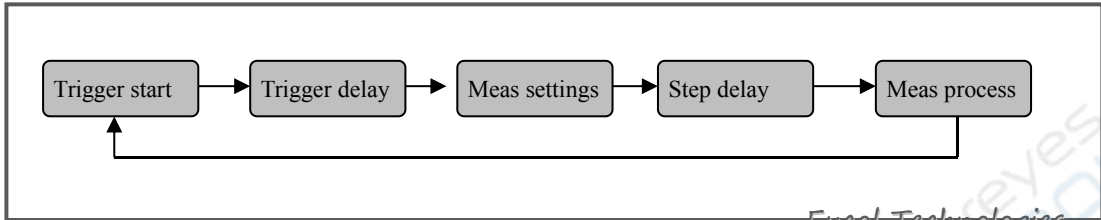
STEP DELAY(STEP DLY)

The step delay time is a waiting time after the test signal transformation, It is used to wait for the test signal to stabilize before measuring. so as to improve the stability of the

measurement results.

When AC impedance-DC resistance test, list scan test, graph scan test, and superposition bias are carried out, the appropriate step delay time can achieve remarkable measurement improvement effect.

In impedance measurement, measurement delay and measurement process:



When DCR measurement is included, the positive DC test level and the negative DC test level will be set. Therefore, when L-DCR alternate measurement is carried out, will be step delays three times .

DC BIAS(DC BIAS)

DC bias can be set as voltage bias or current bias, the range depending on the effective bias source.

voltage bias: The setting value of DC bias is the output voltage when the test end is open.

current bias: The setting value of DC bias is the output current value of the short circuit at the test end.

Notes: *In current bias mode, the output impedance is automatically set to 100Ω.*

4.2 Limit Settings Page (LIMIT TABLE)

The comparator function is to compare the current measured results with a set of preset data limits. the judgement of qualifications (including qualified) and non-qualifications can be made. The comparison results can be output from the HANDLER interface to control the mechanical sorting system.

Press the Settings menu key, then press the "Limit Settings" function soft key to enter the Limit Settings page.

In the limit setting page, you can configure the comparator parameters and set the limit data table:

Field name	Explain
Parameter (FUNC)	Limit format for exchanging primary and auxiliary parameters
Nominal value(NOM.)	Setting the nominal value of the main parameter
Mode (MODE)	Setting Limit Comparisons mode
Auxiliary (AUX)	Setting up auxiliary gear switch
compare(COMP)	Setting comparator switch
Limit Data Table	Set tolerance and sequential limit data tables separately

Limit table can set three or nine groups of upper and lower limits of main parameters and one group of lower and lower limits of auxiliary parameters. The tested parts can be divided into three or nine qualified (BIN1 BIN3 or BIN1 BIN9). An Unqualified (OUT). In addition, the measured parts whose main parameters are within the limit and whose auxiliary parameters are beyond the limit can be classified into auxiliary files (AUX). The above sorting supports the output of HANDLER. At the same time, it can output the super PHI signal of the main parameter, the super PLO signal of the main parameter and the super SREJ signal of the auxiliary parameter.

Notes: Grade 3 or 10 qualified grade sorting output needs corresponding HANDLER hardware support. Default grade 3 qualified BIN.



Level 3 Qualified BIN Limit Setting Page

<极限设置>		① 使用软键选择		
参数: Cp-D	档	下限[%]	上限[%]	
标称: 100.000nF	1	-10.000	10.000	
模式: 百分比	2	-20.000	20.000	
辅档: 关闭	3	-30.000	30.000	
比较: 打开	4	-40.000	40.000	
	5	-50.000	50.000	
	6	-60.000	60.000	
	7	-----	-----	
	8	-----	-----	
	9	-----	-----	
	2nd	0.00000	0.01000	[]
测量设置	极限设置	用户修正	列表设置	文件列表
				更多 1/2

Level 9 Qualified BIN Limit Setting Page

Parameter (FUNC)

The parameter exchange function can exchange the limit tables of main and secondary parameters. For example, when the measurement function is Cp-D and the parameter exchange function is used, the parameter exchange field display becomes D-Cp. After switching, parameter D can have three or nine BIN limits, while parameter Cp is BIN 1 limit.

Notes: *Parametric exchange only exchanges the form of limit tables, Instead of exchanging the set data itself.*

Nominal value (NOM.)

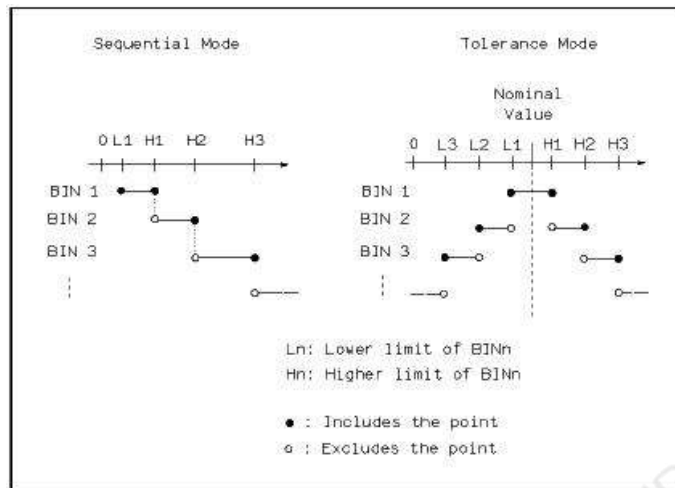
Nominal values are used only for primary parameters. **Nominal values are only used in tolerance mode, and sequential mode does not need to use nominal values.**

Mode (MODE)

The comparison function provides two main parameter limit setting modes:

Tolerance mode (TOL): The deviation value of nominal value will be set as the comparison limit value, and the tolerance can be divided into percentage tolerance (% TOL) and absolute tolerance (ABS TOL).

sequential model (SEQ): The range of test values is regarded as the comparison limit, which must be set in order from small to large.



Schematic diagram of tolerance mode and sequential mode

Notes: When setting the limit value of tolerance mode, the error range must be set from small to large. If the BIN1 settings have the largest error range, then all the tested parts will be sorted into the BIN1 file.

In tolerance mode, the lower limit is not necessarily less than the nominal value, and the upper limit is not necessarily greater than the nominal value. The limit ranges of each gear can be discontinuous or overlapping.

The limit ranges of each gear can be discontinuous or overlapping.

ABS TOL(Absolute Value Tolerance Mode)

The measured values of the tested parts are subtracted from the nominal values and then compared. is:

$$ABS = X - Y$$

among: X is the measured value of the current test piece.
Y is the nominal value set.

% TOL (Percentage Tolerance Model)

The percentage difference between the measured value and the nominal value is compared. is:

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

among: X is the measured value of the current test piece.
Y is the nominal value set.

Auxiliary BIN (AUX)

The main parameters are within the limit, while the auxiliary parameters are beyond the limit. They can be classified as Unqualified BIN (OUT OF BIN), classified as auxiliary BIN (AUX).

✎ Use the Auxiliary File field to set the Auxiliary File Switch:

Function soft key	Operation function
-------------------	--------------------

ON(ON) If the main parameters are qualified and the secondary parameters are not qualified, they shall be classified as AUX BIN

OFF(OFF) If the main parameters are qualified and the secondary parameters are not qualified, they shall be classified as OUTBIN

Notes: *When the auxiliary parameter is set to a lower limit, the auxiliary file is set to open. If the main parameters of the tested part are within the limit range, and the auxiliary parameters are less than or equal to the lower limit of the auxiliary parameters, the tested part is sorted into the auxiliary BIN. Similarly, when the auxiliary parameters are only set to the upper limit and the auxiliary BINs are set to open, if the main parameters of the tested part are within the limit set range, When the value of the auxiliary parameter is greater than or equal to the upper limit of the auxiliary parameter, the measured part is sorted into the auxiliary BIN.*

Compare (COMP)

✎ Open or close the comparator using the Compare field:

Explain: *BIN display<BIN DISP>The comparator switch can also be set.*

Limit data

Limit data should follow the principle of "from small to large, BIN number inclusive", Otherwise, the sorting results may not meet the expectations, not necessarily all gear limits should be set, BIN with no data set are skipped in an overlooked manner.

If all three sets of limit data are not required, The front gear should be set as far as possible and the rest should be left behind, If there is a spare BIN in the middle, The sorting results may not meet expectations.

✎ Use cursor keys to move to the limit fields, use input keys and multiple function soft keys to input data, or use function soft keys to delete the limit, "-----" means that the limit is not set.

Clear form

When the cursor is in the "limit setting", press the "more 1/2" function key to clear the limit data table in the current comparison mode.

Explain: *Only the limit data in the current comparison mode are cleared. If all the data need to be cleared, the functions mentioned above will be performed after switching the mode.*

4.3<User Correction Page> Correction

User correction can compensate additional errors caused by test fixture, test lead and scanning channel by open circuit, short circuit zero clearing and load correction, so as to improve the consistency and repeatability of measurement, or to correct measurement errors.

User correction page is a high-level operation of user correction function, and "quick zero-clearing" operation can complete the basic operation of user correction, which is a part of user correction page function.

Press the setting menu key, then press the "user correction" function soft key, you can enter the user correction page.

User modification can operate on the following fields:

Field name	Explain
Open circuit correction(OOPEN)	Open-circuit correction status and full-frequency open-circuit zero-clearing operation
Short circuit correction(SHORT)	Short Circuit Correction State and Full Frequency Short Circuit Zero Clearing Operation
Load correction(LOAD)	Load Correction State
Cable length(CABLE)	Select the length of pre-calibrated test cables (not calibrated optional)
Correction function(FUNC)	Selection of parameter combinations for correction
Channel mode(CH MODE)	Channel Correction Mode Switch Based on Scanning Point
Modified Point Number(SPOT No.)	Select the correct point number currently displayed
Correction Point Frequency(SPOT FRQ)	Set the current correction point frequency
Open/Short Circuit/Load Measurements and Reference Values for Correction Points	Setting the reference value of the correction point and setting or measuring the open/short circuit/load data of the correction point

User Modified Page Screen:



Reference revision data

The user correction system of JK2830 combines complex correction data with concise structure and intuitive operation.

The revised data include open-circuit clearing, short-circuit clearing and load correction. The reference of these data is based on the following three principles:

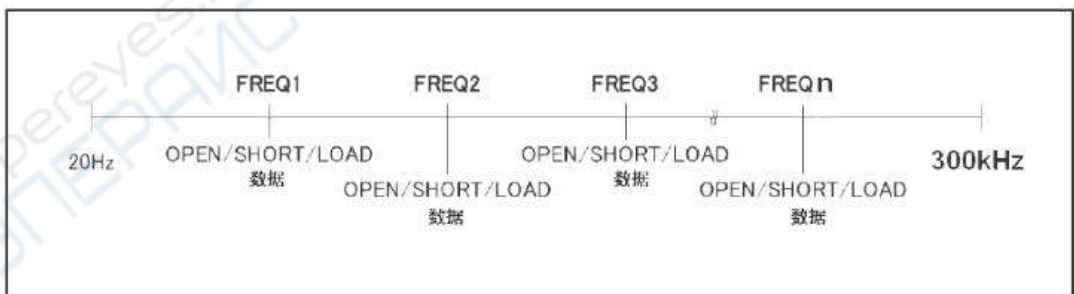
- ✎ Correction Based on Designated Frequency Point
- ✎ Correction Based on Typical Frequency Points

1. Correction Based on Designated Frequency Point

The priority of corrected data at specified frequency points is the highest. If the current test frequency is the same as the specified frequency, the open-circuit and short-circuit zero-clearing data at the specified point are preferred.

Load correction exists only at specified frequency points.

On the user correction page, 10 different correction points can be opened and used:



Explain: Frequency clearing of shortcut points is equivalent to setting the specified serial number 0 quickly.

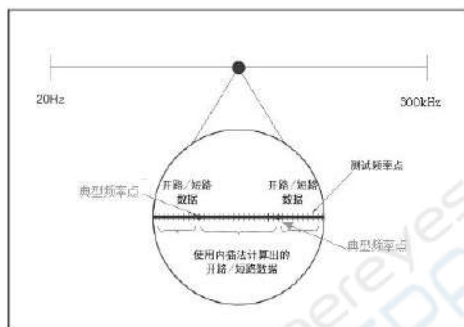
2. Correction Based on Typical Frequency Points

The reference priority of modified data of typical frequency is lower than that of specified frequency point.

When the specified frequency point does not match, JK2830 searches open-circuit and short-circuit zero-clearing data using typical frequencies. After full-frequency open-circuit and short-circuit zero-setting, typical frequency zero-setting data are available. Full-frequency zeroing can be done through the fields of "quick zeroing" or "open zeroing" and "short-circuit zeroing" of user correction page.

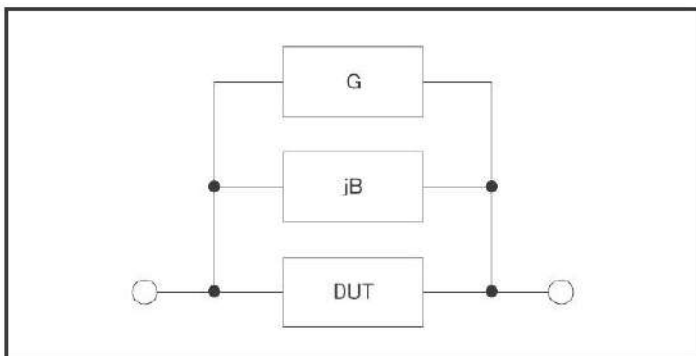
The revision based on typical points can be divided into two cases as follows:

- 1) Correction using typical frequency data: When the measured frequency is equal to the typical frequency
- 2) Using Interpolation Method to Correct: When the measured frequency is not equal to the typical frequency, it is corrected by interpolation of two adjacent typical frequencies



Open correction(OPEN)

Test fixture or test cable will bring stray admittance. The open circuit correction function is used to compensate the stray admittance (G , B) existing between the end of the instrument and the test connection point.



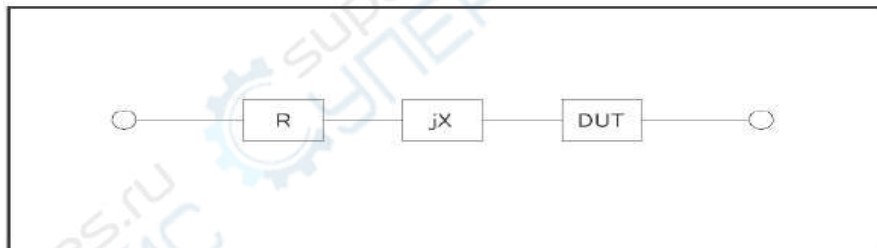
✎ Move the field to Open Clearing, and use the function soft key to operate (quick clearing can be equivalent to completing the function here):

Function soft key	Operation function
OFF	Close open-circuit clearing, all open-circuit clearing data should not be used for measurement operations
ON	enable Open-circuit clearance .Search or interpolate open-circuit clearing data according to matching principle.
Full-frequency open-circuit clearing	Open-circuit zeroing is performed according to all typical frequencies. In the process of zeroing, the soft key of "cancel zeroing" function is displayed, and the open-circuit correction can be cancelled.

Explain:After canceling the clear, the clear that has been executed is still valid, but it will not be saved to memory and will be lost after restarting.

Short circuit correction (SHORT)

Test fixture or test cable will bring stray impedance. Short-circuit correction function is used to compensate stray impedance (R, X) existing between instrument end and test connection point.



✎ Move the field to "Short Circuit Zero Clearing" and use the function soft key to operate (quick Zero Clearing can be equivalent to completing the function here):

Function soft key	Operation function
OFF	Close short-circuit zero-clearing, all short-circuit zero-clearing data should not be used for measurement operation.
ON	Enable short-circuit zero-clearing, search or interpolate short-circuit zero-clearing data according to matching principle.
Full Frequency Short Circuit Clearing	Short-circuit zero-setting is performed at all typical frequencies. In the process of zero-setting, the soft key of "cancel zero-setting" function is displayed, which can cancel short-circuit correction.
DCR Short Circuit	DCR Short Circuit Clearing

Explain: *After canceling the clear , the clear that has been executed is still valid, but it will not be saved to memory and will be lost after restarting.*

Load correction (LOAD)

Only the specified frequency points can have the load correction function.

Load correction can further compensate measurement error on the basis of open/short circuit correction.

Load correction uses the known standard value of the standard device as reference value, calculates the correction coefficient with the actual measurement value (calculated according to the measurement function specified in the "correction function" field), and then uses the correction coefficient to compensate the measurement error.

✎ Move the field to Load Correction and use the Functional Soft Key to open or close Load Correction:

Function soft key	Operation function
-------------------	--------------------

OFF	Close load correction.Invalid load and reference settings for all specified frequency points
-----	--

ON	When load correction is enabled, the load and reference settings of the open specified frequency points are valid, which will affect the measurement node of the same test frequency.
----	---

Notes: *Unless it is determined that load correction is used, load correction should be set to OFF under normal circumstances to avoid erroneous measurement caused by incorrect setting of load correction data.*

Explain: *When setting the data of specified frequency points, if no load correction is needed, the load measurement results are set equal to the reference values.*

Cable length (CABLE)

Selection of pre-calibrated test cable length JK2830 can preset four sets of

calibration data, which can be applied to 0m, 1m, 2M and 4m test cables respectively. However, the manufactured instruments generally only calibrate the end face (0m), and the others are additional options.

☞ Move the field to "Cable Length" and select the calibrated length using the function soft key:

Function soft key	Operation function
0m	Selective end face calibration
1m	Selection of calibrated 1m test cables
2m	Selection of calibrated 2m test cables
4m	Selection of calibrated 4m test cables

Explain: *Uncalibrated length, corresponding function soft keys can not be operated*

Channel mode (CH MODE)

Channel mode is closed by default.

Correction function(FUNC)

The correction function is only used for displaying correction data and calculating correction coefficients. It has no corresponding relationship with measurement parameters. It can be the same or different, and the correction coefficients do not change with the change of correction function.

☞ Move the field to "Correction Function" and use the function soft key to select the combination of primary and secondary parameters.

Explain: *The optional parameters refer to Chapter 2 "Functional parameters", and only include impedance parameters, not DCR parameters.*

The correction function is also the type of data display in the "reference" and "load" fields.

assigned frequency point Correction

The modification based on the specified frequency points refers to the user can make open/short circuit/load modification according to the specified frequency points. A maximum of 10 frequency points can be specified as required.

Set the specified frequency point correction data to use the following fields:

- Correction Point Number (SPOT NO.)
- Correction Point Frequency (SPOT FRQ)
- Reference (REF A, REF B)
- Open (OPEN A, OPEN B)
- Short (SHORT A, SHORT B)
- Load (LOAD A, LOAD B)

The open/short circuit/load data can be obtained by measurement. can also enter data by entering keys.

Explain: The display type of open-circuit data is limited to G-B, and the display type of short-circuit data is limited to R-X.

The display type of reference and load data is specified by "Correction function" FuNC field.

☞ Follow these steps to set the specified frequency correction (if there is load correction, the correction function should be set in advance):

Step1: On the user correction page, use cursor keys to move to the "correction point number" field.

Step2: Use the function soft key or input key to input data and select the serial number to be set:

Function soft key	Operation function
INCR (+ +)	Amendment serial number increase 10
INCR (+)	Amendment serial number increase 1
DECR (-)	Amendment serial number decrease 1
DECR (- -)	Amendment serial number decrease 10

Explain: Do not use the serial number 0 as much as possible, because the shortcut frequency clear will automatically update its data.

Step3: Use cursor keys to move to the "Correction Point Frequency" field.

Step4: The input key is used to input the frequency to be set. When the correction

point is not opened, the frequency is not displayed, but the input is valid.

Step5: Use the function soft key to perform the operation of the current specified point:

Function soft key	Operation function
OFF	Close the current correction point
ON	Open the correction point, and the open/short circuit/load data of the correction point will be valid only after the correction point is opened.

Point Frequency Open Circuit Clearing

Connect the test fixture, keep the test end open and press this function soft key. The instrument performs open-circuit zero-clearing measurement for the specified frequency. Measurement results are entered into the "open circuit" field

Point Frequency short Circuit Clearing Connect the test fixture, press the soft key of this function after the short connection of the high end and the low end of the test, and the instrument performs the short-circuit zero-clearing measurement for the specified frequency. Measurements are entered into the "Short Circuit" field

Load measurement Connect the test fixture, connect the standard fixture with the known standard value and press the function key. The instrument performs the measurement at the specified frequency. Measurements are entered into the "Load" field

Explain: *If the load correction function is not used, load measurement is not necessary.*

Before load measurement, open-circuit and short-circuit clearing at specified frequency points should be completed first!

Step6 : Skip this step when load correction is off. Use cursor keys to move to reference fields A and B, and use input keys to enter standard value data.

Step7: Repeat steps 1 to 6 to set up other correction points

Step8 : To open the open-circuit correction, use the cursor key to select the "open-circuit correction" field, press "ON" Function soft key.

Step9: To open short-circuit correction, use the cursor key to select the "short-circuit correction" field. press "ON" Function soft key.

Step10: To open load correction, use the cursor key to select the Load Correction field. press "ON" Function soft key.

Open-circuit/short-circuit/load data can be obtained from instrumental measurements

and modified by input data when necessary:

✎ Use cursor keys to move to the corresponding fields, and use input keys and multiple function soft keys to input data.

Notes: Please confirm the need to input and modify these data and verify that the source of the data is available.

If the load correction is turned on, only part of the correction points are applied, while the other correction points are undetermined or the data source is not corrected, Set its load measurement and reference values to be equal, but avoid all data being 0, such as

$$REF A = LOAD A = 1.0$$

$$REF B = LOAD B = 0.0$$

In this way, even if there are load correction arithmetic, the measurement results will not be affected by load correction!

When some scattered designated correction points are set up and it is difficult to check their validity one by one, these correction points should be closed. You can look it up in the Amendment Point Number field and close it in the Amendment Point Frequency field.

When the cursor is in the < User Correction > field, press the "More 1/2" function key, and operate the "Point Frequency Turn-off" key. All correction points can be closed by one key.

List Setup

To use list scanning, the scanning point parameters should be set first.

JK2830 can set 201 point list scanning, each scanning point can set the following scanning parameters independently (fields):

SWEEP MODE (SWEEP MODE)

FAIL MODE (FAIL MODE)
 Sweep Point Number (No.)
 Sweep Parameters (FUN)
 Sweep frequency (FREQ)
 Sweep level (LEV[V] or LEV[A])
 DC offset (BIAS[V]、BIAS[A])
 Step delay (DELAY)
 Lower limit of comparison (LMT: LOW)
 Upper limit of comparison (LMT: HIGH)

Press the Settings menu key, then press the "List Settings" function soft key to enter the List Settings page.

No.	FUN	FREQ[Hz]	LEV[V]	BIAS[x]	DELAY	LMT:LOW	LMT:HIGH
1	OFF	-----	----	----	----	-----	-----
2	OFF	-----	----	----	----	-----	-----
3	OFF	-----	----	----	----	-----	-----
4	OFF	-----	----	----	----	-----	-----
5	OFF	-----	----	----	----	-----	-----
6	OFF	-----	----	----	----	-----	-----
7	OFF	-----	----	----	----	-----	-----
8	OFF	-----	----	----	----	-----	-----
9	OFF	-----	----	----	----	-----	-----
10	OFF	-----	----	----	----	-----	-----

测量设置 极限设置 用户修正 列表设置 更多 1/2

Sweep mode

One-step: Step-by-step mode, where each trigger signal starts only one scan point

Continuous: Continuous mode, a complete list of trigger signal start-up sweep

FAIL MODE

Operating mode when any scanning point is not qualified:

Continue: Continue on to the next point when fail

Pause: Wait for manual or other valid external triggers before continuing to scan

Retry: Automatic retest of unqualified scan points

Stop: Wait for the next trigger to restart the scan

Scan number

In the serial number field, you can turn to the next scan page and adjust the order of scanning points.

Functional Soft Keys	Operating Functions
shift up	shift up the current scan point one step
shift down	shift down the current scan point one step
next page>>	Page turning
<<Previous page	Page turning

Sweep parameters

Set up the scanning function (the type of parameters that the scanning point needs to display), through the setting of this field, you can open or close the scanning point.

In the "FUN" control field, the function soft key "close" closes all scanning points.

In the scan parameter setting field, use the function soft key to set or close the scan point.

Explain: *Scanning parameters exist in a single parameter mode, and list scanning does not set combination parameters.*

Sweep frequency

Set the Sweep point test frequency.

✎ Functional soft keys in the "FREQ" control field:

Function soft key	Operating Functions
Default setting	Setting the frequency of all scanning points to measure the frequency of the display page

✎ In the Scanning Point Frequency Settings field, use the Functional Soft Key to set the frequency, or use the Input Key and the Multiplier power Function Soft Key to input the frequency data.

Sweep level

Set the scanning point test level.

✎ Functional soft keys in the "LEV" control field:

Function soft key	Operation function
level (V)	Set it to the voltage level mode
level (A)	Set it to the current level mode
Default setting	Setting the level of all scanning points to measure the level of the display page

✎ In the Scanning Point Level Settings field, use the Functional Soft Key to set the level, or use the Input Key and the Multiplier power Function Soft Key to input the level data.

BIAS

Set DC bias sweep.

✎ In the BIAS bias control field, you can use the function soft key to select the scanning type:

Function soft key	Operation function
BIAS (V)	Sweep DC bias voltage
BIAS (A)	Sweep DC bias current
OFF	Close these sweep items

✎ Set field offset at scan point, use function soft key to set data, or use input key and multiplier function soft key to input data.

Step delay

Each scan point of the list scan can be set up with an independent step delay to coordinate the stability of the measurement results, especially when it includes DCR measurement, offset scanning and low frequency scanning.

When measuring by list scanning, the step delay of list scanning will synchronously update the "step delay" of the measurement settings page.

Explain:For the recommended settings for step delay, please refer to "Measurement Settings - Step Delay"

✎ Functional soft keys in the "DELAY" control field:

Function soft key	Operation function
Default setting	Set the step delay of all scanning points to the step delay setting of the measurement settings page

✎ Setting the field of step delay at scan point, setting delay with function soft key, or using input key and multiplier function soft key to input delay time

Comparative limit

Each scan point of list scan can set an independent lower and upper limit of comparison. The limit exists in the form of absolute value without nominal value.

If the upper and lower limits of a scanning point are not set (0), this scanning point will not be compared after measurement, and no comparison results show ,HANDLER output comparison value is 0.

✎ In the "LMT" control field, you can switch the limit setting to the channel setting (when installing scanner options)

✎ In the Scanning Point Limit Settings field, the input key and the soft key of the multiplier function are used to input the limit data directly.

When the cursor is in the < List Settings > field, press the "More 1/2" function key and operate the "Clear Table" key to clear the list data of all settings.

Chapter 5 SYSTEM SETUP

5.1 SYSTEM SETUP (SYSTEM SETUP)

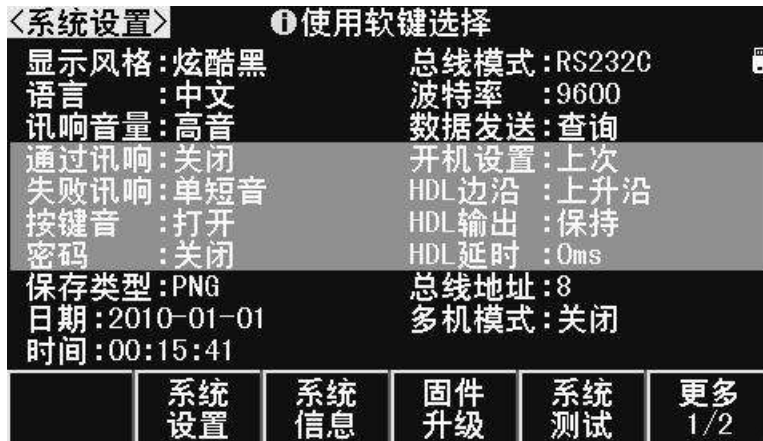
The parameters in the system settings are saved independently, which is not related to the measurement settings, and the measurement settings file does not contain its contents.

Press the Settings menu key to enter the system settings. The settable fields in the system settings are:

Notes : The “setting key” is the common key of the two pages <Measurement Settings> and <System Settings>. Press the “setting”key and switch back and forth between the two pages.

Field	Explain
SKIN (SKIN)	LCD color scheme
LANGUAGE (LANGUAGE)	Display switching between Chinese and English
ALM VOL (ALM VOL)	Set Volume Size
PASS ALM (PASS ALM)	Pass alarm Mode*1
FAIL ALM (FAIL ALM)	Fail alarm mode ²
KEY SOUND (KEY SOUND)	Switch key echo
PASSWORD (PASSWORD)	Setting Password Status and Modifying Password
SAVE TYPE (SAVE TYP)	Setting up the saving function of the shortcut save key
BUS MODE (BUS MODE)	Selection of Communication Interface Types
BAUD RAGE (BAUD RAGE)	Setting Baud Rate of Serial Port Communication
Data sending (FETCH)	The measurement results can be set to send automatically to the bus.
LOAD SET (LOAD SET)	Set the settings file to be invoked on boot
HDLE DGE (HDL EDGE)	Fixed to HDL Edge Trigger
HDL OUT (HDL OUT)	Setting HANDLER Output Hold or Delay Clear
HDL DLY (HDL DLY)	Setting HANDLER Signal Delay Time
BUS ADDR(BUS ADDR)	RS485 address in multi-computer mode
Multi machine mode(MULTI)	Converting RS232C to RS485 Mode and Implementing Multi-computer Communication

System Settings Page



Display style (SKIN)

Choosing LCD to display color theme can satisfy different visual effects or adapt to different environmental light conditions.

Simple grey, cool black, elegant blue, light blue optional

LANGUAGE (LANGUAGE)

Select Chinese or English display interface.

Alarm volume(ALM VOL)

Set the signal to treble, Alto or bass.

PASS ALARM (PASS ALARM)

FAIL ALARM (FAIL ALARM)

Set up the alarm mode when qualified or unqualified.

Alarm mode includes:OFF (OFF) ,SHORT (SHORT) ,TWO SHORT (TWO SHORT) ,LONG (LONG) .

KEY SOUND(KEY SOUND)

Turn on or off the key tone.When the key tone is turned on, the buzzer will emit "dropping" sound as long as the input information of the key is received by the system.Use the "Key Tone" field to select whether to turn on or off the key tone.

PASSWORD (PASSWORD)

Set the password protection status, or modify the password.After setting up

password protection, when it is necessary to enter a password, the information display area prompts "Please enter a password:" and enters a password with a digital key.

There are three levels of cryptographic protection for instruments:

✎KEYLOCK(KEYLOCK): When unlocking the keyboard, the password is required.

✎SYSTEM (SYSTEM): When the keyboard is unlocked and the system is booted (including soft startup), the password is required.

✎FILE (FILE): When you unlock the keyboard and enter the file management page, you need to enter the password.

Password protection can also be completely turned off, that is, no password is required for any operation.

The password field also provides the function of password modification. Any operation that changes the password protection state needs to be confirmed by entering the password.

Note: Please remember the password! The default password is 123456.

SAVE TYPE (SAVE TYPE)

Set the file type for save operation. The saved media is an effectively recognized U disk connected to the USB (HOST).

Save keys can save two kinds of functions: saving measurement results (data records) and saving screen snapshots (screenshots).

The data record file is in *. CSV format.

Screen snapshot files can be in *. GIF format, *. BMP format or *. PNG format.

Explain: For more information on save functions, see Storage and Call

Explain: The menu of each page has soft keys to start saving. The type of file saved here is the type of file set. Entering SAVE multiplexing keys in the keyboard can achieve fast saving function.

BUS MODE (BUS MODE)

The instrument supports the communication between RS232C and USB (DEVICE). After connecting to PC, all the functions of the instrument and data acquisition can be implemented through compatible SCPI remote commands.

Explain: For communication commands, please refer to "JK283X Series LCR Meter Programming Manual".

Communication type should be selected before remote instrument control.

✎RS232C : Universal Asynchronous Serial Transceiver (UART) supports multiple

baud rates and can be connected to a PLC controller.

✎USB(DEVICE): Universal serial bus, including USB-CDC and USB-TMC mode.

USB-CDC mode(Communications equipment): Virtual instrument as COM port (Vcom) can realize the same communication mode as RS232C.

USB-TMC mode(Test and Measurement): Complying with USBTMC-USB488 and USB2.0 protocol, it can realize the same communication control as GPIB.

BAUD RATE (BAUD RATE)

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

This instrument supports five common baud rates:1200bps,9600bps,19200bps, 38400bps ,115200bps.

Data sending(FETCH MODE)

When the instrument communicates with PC through RS232C or USB-CDC mode, the measurement results can be sent to the bus automatically or inquiringly:

✎Query (QUERY) : After receiving the data reading command sent by the host computer, the last valid measurement result is sent to the output buffer.

✎Auto (AUTO) : Every time the instrument measures, the measured results are sent to the output buffer.

LOAD SET(LOAD SET)

Set up the settings file that will be called when the instrument is restarted.It can be as follows:

✎Last time: Call the settings data used in the last shutdown.

✎File: According to the number of the file used last time, the settings data is transferred from the file.

✎Default: Use default initial settings.

HDL EDGE(HDL EDGE)

When the trigger mode is external (EXT), the trigger signal is input by the external BNC terminal or HANDLER interface. The trigger signal is required to be a TTL pulse with a width of more than 10 μ s and the instrument is fixed as a rising edge trigger.

HDL OUT(HDL OUT)

When the comparator is opened, the HANDLER interface will output the sorted comparison results, which determines whether the signal is maintained on the interface keep the next measurement.

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

HOLD (HOLD) The output signal is maintained until the next measurement is updated.

CLEAR (CLEAR) The output signal is automatically cleared after delay, which is specified by the "HDL Delay" field.

HDL delay (HDL DLY)

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

✎ Move fields to "HDL Delay", enter data using input keys, or use functional soft keys to increase or decrease delay time.

BUS ADDRESS (BUS ADDR)

Used to set local address. GPIB interface and RS485 mode use this address. Address ranges from 0 ~ 31.

✎ Move fields to Bus Address with cursor keys, input data with input keys or operate with functional soft keys.

MULTI MODE (MULTI MODE)

多 Computer communication mode is applied to extend RS232C to RS485 mode, which is convenient for one host to control multiple RS232C devices (using RS232C-RS485 converter). Bus address (0-31) should be used in multi-machine mode.

✎ Use cursor keys to move fields to "multi-machine mode", and use functional soft keys to open or close multi-machine mode.

Configuring System Time

Use cursor keys to move fields to year, month, day, hour, minute and second fields, use input keys to input data, or use functional soft keys to modify time.

System reset

The cursor is in the < System Settings > field. Press the "More 1/2" button, and the corresponding button can reset the system settings parameters or reset the instrument.

Default setting (DEFAULT SETTING): All system parameters are reset to default

values (time is still reserved), including password mode and password are reset, so password input is required to allow this operation.

After reset, the default password is 123456

SYSTEM RESET(SYSTEM RESET): Reset all measurement settings and soft-start the system

System default parameter table:

Display style	BLACK (BLACK)
language	CHINESE (CHINESE)
Alarm volume	HIGH (HIGH)
pass alarm	OFF (OFF)
Fail alarm	SHORT (SHORT)
Keypad tone	ON (ON)
Password	OFF (OFF) , Original password 123456
Save type	Data recording CSV
Bus mode	RS232C
baud rate	9600
Data sending	QUERY (QUERY)
power on setting	LAST (LAST)
HDLTrigger edge	RISE (RISE)
HDL output mode	HOLD (HOLD)
HDL delay	0ms
Bus address	8
Multi mode	OFF (OFF)

5.2 FIRMWARE UPDATE (FIRMWARE UPDATE)



Upgrade can only be enabled after the U disk connected to the USB (HOST) is effectively identified.

The instrument can be easily upgraded and solidified software. If there are software problems in the use process, you can contact Jin Ailian Electronics Co., Ltd. at any time.

☞ Upgrade the curing software according to the following process:

Step1 : Download the upgrade file issued by our company. The name of the file generally includes the model of the instrument and the extension is 31U.

If it is a compressed package, please decompress it.

Step2: Copy it to the U root directory of FAT32 or FAT16 which has been formatted.

Step3 : When the upgraded instrument is booted, the U disk is inserted into the USB-HOST interface of the front panel.

Step4 : After the U disk is successfully installed, press the “Settings” menu key to enter the <System Settings> page, Then press the "firmware upgrade" function soft key to enter the firmware upgrade display page, Displays a list of upgraded files on the U disk (up to 10), and long file names are displayed in 8.3 format.

Explain: *The instrument only displays 10 upgrade files at most, and can use PC file manager to delete some invalid files.*

Explain: *Files that conform to the format of the upgrade file can be displayed, but they will be installed only after they have passed the upgrade validation. Note: If the U disk contains multiple partitions and fails to display files, press “TAB” to switch partitions.*

Step5: Use the cursor key to select the upgrade file suitable for this machine, press the "upgrade" function soft key;

Step6: After confirming the upgrade operation, the instrument verifies the upgrade file, if it is correct, Then install the upgrade file into FLASH ROM and restart automatically after installation.

Step7: After upgrading the program, press the "Settings" key to enter the system settings page, press the "More 1/2" key, operate the "System Reset" key, restart the instrument.

Upon completion of the upgrade, you can go to the "System Information" page to view the latest upgraded firmware version.

Notes : *During the upgrade process, the power can not be cut off, otherwise the firmware of the instrument will be damaged and unable to work, requiring repairs to the factory.*

Chapter 6 Storage and invoking

The main content of this chapter: JK283X series LCR storage and invoking function

6.1 Overview of Storage Systems

Through storage and invocation functions, parameters can be saved instantly, measurement settings can be saved to internal ROM or external USB memory, and measurement nodes or screen snapshots can be saved to external USB memory.

Storage function

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

- ✎ Instantly save user correction data and settings;
- ✎ Immediately save the measurement setting parameters and system configuration parameters in real time.

✎ The measurement setting parameters are stored in internal ROM memory or external USB memory in file form.

- ✎ Save screen snapshot files to USB memory (screen capture function);
- ✎ Save the measurement results to USB memory (data recording function).

invoking function

After storage, the following invoking functions can be realized:

- ✎ Immediately and automatically invoke the user to correct data and settings.
- ✎ The parameters of measurement setting are automatically invoked immediately.
- ✎ Immediately automatic call system configuration parameters;
- ✎ Loading measurement settings files in internal ROM or external USB memory

through file management function;

✎ On the file list page, you can switch media (between internal memory and U disk) using the TAB key.

U-disk file structure

After connecting the USB memory to the instrument, the instrument organizes and uses the folders and files on the memory according to the predetermined structure.

As shown in the table below:

file type	Extension name	Max number of files ^{*1}	File path ^{*2}
Measurement setup file	EST	500	\\JK2830\\SETUP

Data Record File	CSV	200	\\JK2830\\DATA
Screen snapshot file	GIF , BMP , PNG	200	\\JK2830\\IMAGE
Upgrade file	31U	10	root directory

Note *1. Refers to the maximum number of uses of the same extension;

Note *2. Folders vary according to instrument type

Explain: *Folders are created automatically by instruments. In addition to updating files, file names are also generated by automatic number of instruments.*

USB memory should be formatted using FAT16 or FAT32.

If there are U disks that cannot be recognized by the instrument, please replace them with other formatted U disks.

Explain: *JinAilian is not responsible for the loss of U disk data caused by the use of USB storage devices in this instrument.*

6.2 Save files to U disk

After connecting the U disk to the instrument's USB (HOST), you can save the test results or screen snapshots to the U disk using the decimal point multiplexing key on the panel or the "Start Save" function soft key on each page.

Save the measurement results to U disk

In the measurement display page and sorting display page, the measurement results can be saved to the U disk in CSV format, and then downloaded to the PC to open and use these files.

Data buffer is used to save measurement results. The instrument can cache up to 256 measurement results. By default, 128 data buffers are used. The size of the buffer can be set by "MEMory: DIM" command.

A single CSV or TXT file can save up to 65536 rows of test data, and automatically stop recording after reaching the maximum.

Explain: *For command system, please refer to "JK283X column LCR Meter programming manual".*

Data Recording Format:

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

DATA A	DATA B	STATUS	BIN NO
<DATA A>	<DATA B>	<STATUS >	<BIN NO.>

Explain: < STATUS > is the working state of the instrument, normal 0, and the other is the error information.

DATA uses fixed length ASCII format:

SN.NNNNNNESNN (S: +/-, N: 0~9, E:Index sign)

STATUS output ASCII format of 1-3 byte length:

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

0: Normal measurement results

Others: measurement errors

BIN NO. Output 1-3 byte length ASCII format:

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

0: No normal comparison results

1~3: PASS BIN BIN1~BIN3

10: fail BIN OUT

11: Auxiliary BIN AUX

Save the measurement results according to the following procedure:

Step1 : Press the Settings menu key and in the "Save Type" field of <System Settings>, select the Save Type as CSV.

Step2: Connect the U disk and confirm that the instrument has successfully installed the U disk. In the field of Measurement Display, press the "More 1/2" key, then select the "Start to Save" function soft key or press the decimal point multiplexing shortcut key. The instrument creates the corresponding files on the U disk, displays the data record icon in the system state area, and the data buffer starts to work.

Step3: Only the results of measuring and sorting display pages will be written into the cache. When the buffer is full, the data will be written in batches into the U disk file created in step 2.

Step4: The instrument automatically repeats the data recording process of buffering and writing to U disk.

Step5: To stop saving, select the "stop saving" function soft key or press decimal point multiplexing shortcut key. After the remaining data of the buffer is written to the U disk, the data record is completed.

warning: In the process of writing data to U disk, it is forbidden to pull out U disk, otherwise it may cause damage to U disk or U disk file system.

Explain: Data record files are numbered in the order of EULCR000~EULCR199.

Users cannot specify and modify the file names stored. It takes some time to write data to the U disk, during which the measurement may stop responding for a short time.

The following conditions will automatically end the data record in an abnormal way:

✎ Failed to write data to U disk

✎ Data rows written to a file are out of range

Save the screen snapshot to the U disk

On any display page, you can follow GIF/BMP/PNG format. Save the content of the current screen display to the U disk in an image way, and then download it to the PC to open and use these files.

 **Save the measurement results according to the following procedure:**

Step1: Press the Settings menu key and in the "Save Type" field of the <System Settings> page, select one of the save types (image format file) as GIF, BMP or PNG.

Step2: Connect the U disk and confirm that the instrument has successfully installed the U disk.

Step3: Switch to pages that need screenshots;

Step4: Press the decimal point multiplexing shortcut key or select the "Start Save" function soft key, the current screen snapshot is saved to the U disk in the specified image format file.

Explain: *Screen snapshot files are numbered in the order of EULCR000~EULCR199. Users cannot specify and modify file names.*

6.3 FILE LIST (FILE LIST)

Summary of Measurement Settings File

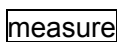
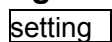
Test settings are set parameters related to measurement, which include: The current page (or the page before entering the file list); Measure all settings on the Settings page; limit all settings on the Settings page.

The instrument organizes the above settings into a file, which can be saved and invoked as a whole. At the same time, you can specify a name (note information) for the saved file, and the name is saved with the file.

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

Media	Storage sequence number	Use
Internal FLASH ROM	1~100	Store and invoking through file list
External USB Memory	101~600	Store and invoking through file list Storage location: \JK2830\SETUP *1 Fail name: 101.EST~600.EST

Store/invoking measurement settings

Press the menu key ( or ), then press "FILE LIST"(FILE LIST) Function soft key, enter the file list page.



FIELD INFORMATION OF FILE LIST PAGE:

FIELD	Description
No.(No.)	Display the serial number of the stored settings file, 1 ~ 50 is internal ROM memory, 51 ~ 550 is external USB memory. Select the file number to operate by cursor key: Up and down cursor keys move fields step by step. The left and right cursor keys move fields by page. “TAB “ Key Storage Media Selection
NAME (NAME)	Displays the information of the stored settings file for naming the measurement settings parameters, not the file name stored on the U disk.
Memory (Memory)	Display the current effective storage media, switch the available media or U disk partition with TAB key.

☞ Move the field by cursor key, select the serial number of the file to be operated, and operate by soft key.

Function soft key	Operation function
-------------------	--------------------

LOAD (LOAD)	When the file exists, the specified settings file can be invoked and the confirmation operation can be performed when loading.
-------------	--

SAVE (SAVE)	Save the parameters of current measurement settings. Before saving, you need to enter the name of the file. You can confirm that the default name is < Unnamed >
-------------	--

Notes : *The name of the file you need to input here is actually the annotation information of the measurement settings file.*

DELETE (DELETE)	When the file exists, delete the specified settings file, and confirm when deleting.
-----------------	--

- COPY (COPY) Bulk copy file, input source file serial number and target file serial number respectively. after the number of copies, you can execute batch copy. It is mainly used for file exchange between internal and external memory.
- FIND (FIND)** Find existing files.
- EXIT (EXIT) Exit the file list and return to the page before entering the file list.



Chapter 7 Technical Indicators

The main contents of this chapter are: measurement accuracy, performance testing and general indicators.

7.1 measurement accuracy

The measurement accuracy includes measurement stability, temperature coefficient, linearity, measurement repeatability and calibration interpolation errors.

Inspection of the measuring accuracy of the instrument must be carried out under the following conditions:

- ✎ Start-up preheating time: ≥ 20 minutes.
- ✎ After preheating, open circuit and short circuit corrections should be corrected correctly.
- ✎ When using the extended test cable, the cable is extended and calibrated.
- ✎ The range of the instrument works in "AUTO" to select the correct measurement range.

Accuracy of |Z|、|Y|、L、C、R、X、G、B

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

Ab: Basic measurement accuracy

Zm: Impedance of measured piece

Zo: Open circuit impedance cardinality

Zs: Short-circuit impedance cardinality

Kt: Temperature factor

L, C, X, B accuracy usage conditions: Dx (D measurement value) ≤ 0.1

R, G accuracy usage conditions: Qx (Q measurement value) ≤ 0.1

When $Dx \geq 0.1$, For L, C, X, B, the accuracy factor Ae should be multiplied by

$$\sqrt{1 + D_x^2}$$

When $Qx \geq 0.1$, for R, G, the accuracy factor Ae should be multiplied by $\sqrt{1 + Q_x^2}$

Accuracy of D

The Accuracy of D is given by the following formula:

Dx D Value of the Measured Component

$$\text{When } D_x \leq 0.1, D_e = \pm \frac{A_e}{100}$$

When $D_x > 0.1$, Multiply $(1 + D_x)$ by D_e

Accuracy of Q

The accuracy of Q is given by the following formula:

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

Here, Q_x is the Q value of the test piece, and D_e is the relative accuracy of D.

Above formula Conditions of Use $Q_x \times D_e < 1$

Accuracy of θ

The accuracy of θ is given by the following formula:

$$\theta_e = \frac{180}{\pi} \times \frac{A_e}{100} \quad [\text{deg}]$$

A_e is relative accuracy of |Z|, |Y|, L, C, R, X, G and B.

Accuracy of G

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

$$G_e = B_x \times D_e \quad [S]$$

$$B_x = 2\pi f C_x = \frac{1}{2\pi f L_x}$$

D_x D Value of the Measured Component

B_x B Value of the Measured Component [S]

D_e accuracy of D

f test frequency [Hz]

C_x C Value of the Measured Component [F]

L_x L Value of the Measured Component [H]

Accuracy of R_p

When D_x (Value of the Measured Component) ≤ 0.1 ,

The accuracy of R_p is given by the following formula:

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

R_{px} R_p Value of the Measured Component $[\Omega]$ 。

D_x D Value of the Measured Component

De The relative accuracy of D.

Accuracy of Rs

When D_x (D value of measured piece) ≤ 0.1 ,

The accuracy of R_s is given by the following formula:

$$R_{se} = X_x \times D_e \quad [\Omega]$$

$$X_x = 2\pi f L_x = \frac{1}{2\pi f C_x}$$

X_x X Value of the Measured Component $[\Omega]$ 。

C_x C Value of the Measured Component $[F]$ 。

L_x L Value of the Measured Component $[H]$ 。

D_e Relative accuracy of D

f Test frequency $[Hz]$

Basic accuracy Ab

Basic Accuracy Table (Slow, Medium Speed):

	10mV~50mV	50mV~0.2V	0.2V~0.6V	0.6V~2V
50Hz~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 (Fast):

	10mV~50mV	50mV~0.2V	0.2V~0.6V	0.6V~2V
50Hz~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 Precision Correction - Low Impedance

When the impedance is less than 30Ω , the basic accuracy is added with the following values:

Frequency range	Measured impedance		
	$ Z_x \leq 1.1\Omega$	$1.1\Omega < Z_x < 11\Omega$	$11\Omega < Z_x < 30\Omega$

50Hz ~ 110kHz	0.08%	0.05%	0.03%
110kHz ~ 200kHz	0.15%	0.08%	0.05%

Basic Precision Correction - high Impedance

When the impedance is greater than 9.6kΩ, the basic accuracy is added with the following values:

Frequency range	Measured impedance		
	$ Z_x > 96k\Omega$	$30k\Omega < Z_x < 96k\Omega$	$9.6k\Omega < Z_x < 30k\Omega$
50Hz ~ 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%

Notes *1,*2,*3: within the extended measurement range, Refer to Chapter 3 "Range Range".

Basic Precision Correction-Cable Extension

When using extended test cables, the basic accuracy is added with the following values:

$$0.02 \times (F_m / 100\text{kHz})^2 \times L^2 \text{ [%]}$$

F_m Test frequency [Hz]

L Measuring cable length [m]

Note: When the length of the cable has not been calibrated, it is not within the scope of accuracy evaluation.

Basic Precision Correction-Interpolation Frequency

When atypical frequencies are used, the basic accuracy is added:0.03%

Open circuit impedance cardinality Zo

↪ Open-circuit impedance cardinality response is a high impedance elongation measurement capability.

Frequency range	Measuring speed	
	Fast	Med and slow
50Hz~125Hz	2MΩ	5MΩ
125Hz~22kHz	5MΩ	8MΩ
22kHz~110kHz	1MΩ	1.6MΩ
110kHz~200kHz	300kΩ	500kΩ

↪ When the test voltage level $V_s < 1$, the base number of open circuit impedance Z_o multiplied by V_s

↪ After the cable length is extended, the open circuit impedance base Z_o is

multiplied by the following table factors:

Frequency range	Cable length			
	0m	1m	2m	4m
50Hz~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 cardinality Z_s

✎ The open circuit impedance cardinality response is the low impedance elongation measurement capability.

Frequency range	Measuring speed	
	Fast	Med and slow
50Hz~55Hz	10 Ω	3 Ω
55Hz~125Hz	3 Ω	1 Ω
125Hz~1.1kHz	1.8 Ω	660m Ω
1.1kHz~11kHz	1m Ω	330m Ω
11kHz~200kHz	330m Ω	110m Ω

✎ When the test voltage level $V_s < 1$, the base number of short-circuit impedance Z_s divided by V_s

✎ When the cable length is extended, the short-circuit impedance Radix Z_s is multiplied by the following table factors:

	Cable length			
	0m	1m	2m	4m
50Hz~22kHz	1	1	1.2	2
22kHz~110kHz	1	1.2	1.5	3
110kHz~200kHz	1	2	5	10

temperature coefficient K_t

Effect of Reaction Environment Temperature on Measurement Accuracy:

Environment Temperature [$^{\circ}\text{C}$]	K_t
0~8	4
8~18	2
18~28	1
28~38	2
38~48	4

7.2 performance testing

All tests shall be carried out under the working conditions specified in the accuracy assessment. This test is only included in the main part of the instrument indicators test, other parts are not included in the parameters, users can according to the indicators listed in the manual under the specified conditions for testing. If it is found that the test results are beyond the target range, please send them to the special maintenance department or our company for maintenance.

Devices and Equipment for Performance Testing

Serial number	Name of instrument and equipment	technical requirement
1	Standard capacitor	100pF
		1000pF
		10nF
		0.1uF
		1uF
2	AC Standard Resistor	10Ω
		100Ω
		1kΩ
		10kΩ
		100kΩ
3	Standard inductor	100μH
		1mH
		10mH
		100mH
4	Frequency meter	(0~1000) MHz
5	Digital multimeter	0.5%

Function check

The function keys, monitors and terminals of the instrument should work normally. All functions are correct:

- ✎ After booting up, you can use the system test function for basic testing.
- ✎ Connect the end fixture, use resistance or capacitance measurement function to measure the resistance and capacitance, the measurement results are no abnormality.
- ✎ Using open-circuit clearing correction and checking open-circuit status with Cp or G-B parameters, there is no obvious abnormality in the display base number.

✎ Short-circuit zero-clearing correction and Z, Ls or R-X parameters are used to check the short-circuit status. There is no obvious abnormality in the display base number.

✎ Duplicate checking and DUT measurement using different test frequency and level

Accuracy Testing of Test Signal Level

The accuracy of the test signal level is: $10\% \pm 5mV_{rms}$

The digital multimeter is placed in the AC voltage range. One of the test rods is connected to the Hc end of the meter, and the other is connected to the ground end. Change the level to 0.1V, 0.3V, 1V, 2V, check the test level.

Frequency Accuracy Testing

The frequency accuracy of the test signal is 0.02%.

The grounding end of the frequency meter is connected with the grounding end of the instrument, and the testing end of the frequency meter is connected with the Hc end of the instrument. Change frequency: 50Hz, 100Hz, 1kHz, 10kHz, 100kHz check the main test frequency.

Accuracy Testing of Capacitance C and Loss D

Function	Cp-D					
Test frequency level	100Hz	1kHz	10kHz	100kHz	Test separately	
Range	1V					
Bias	AUTO					
Speed	no					
	slow					

Short circuit and open circuit clearing should be done before testing. Access standard capacitor 100pF、1000pF、10nF、0.1uF、1uF, When the frequency is changed, the error capacitance C and loss D between the instrument reading and the standard value should be within the prescribed allowable error range.

Accuracy test of inductance L

Function	Ls-Q					
Test frequency level	100Hz	1kHz	10kHz	100kHz	Test separately	
Range	1V					
Bias	AUTO					
Speed	no					
	slow					

Short circuit and open circuit clearing should be done before testing. Access standard

inductor 100 μ H、1mH、10mH、100mH, change the frequency, the error between the instrument reading and the standard value should be within the prescribed allowable error range.

Accuracy test of impedance Z

Function	Z- θ
Test frequency level	100Hz 1kHz 10kHz 100kHz Test separately
Range	1V
Bias	AUTO
Speed	0V
	slow

Short circuit and open circuit clearing should be done before testing. Access standard AC resistors 10 Ω 、100 Ω 、1k Ω 、10k Ω 、100k Ω , change the frequency, and the error between the instrument reading and the standard value should be within the allowable error range.

7.3 General index

Power supply requirements

	requirements
Voltage	99Vac~243Vac
frequency	47~63Hz
Maximum consumption	power 30VA

work environment

Temperature	0°C ~ 55°C
Humidity ($\leq 40^{\circ}\text{C}$, non-condensing)	15% ~ 85% RH
Height	0 m~ 2000 m

Storage environment

Temperature	-20°C ~ 70°C
Humidity ($\leq 60^{\circ}\text{C}$, non-condensing)	0% ~ 90% RH
Height	0 m ~ 4500 m

Volume and weight

Width * height * depth: 215mm*105mm*363mm

Weight : 3.9 kg

Safety specification

This instrument is class I safety instrument.

(1) insulation resistance

Under the reference working conditions, the insulation resistance between the power terminal and the outer shell is not less than 50M Ω ;

Under hot and humid transportation conditions, The insulation resistance between the power supply terminal and the housing is not less than 2M Ω ;

(2) Insulation strength

Under the reference working conditions, the rated voltage between the power terminal and the outer shell is 1.5 kV, and the AC voltage with frequency of 50 Hz is 1 minute. There is no breakdown and arc phenomenon.

(3) leakage current

Leakage current is not more than 3.5mA.

electromagnetic compatibility

(1) The transient sensitivity of power supply is required by GB6833.4.

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

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

Appendix A Remote Control

The main contents of this chapter are as follows: The instrument can use RS232C serial interface, USB-CDC or USB-TMC for data communication and remote control without instrument panel, but it can not be used at the same time. They share standard SCPI instruction sets of instruments, but use different hardware configurations and communication protocols. This chapter introduces how to use the interface. The use of interface commands is detailed in "JK283X Series LCR Digital Bridge Programming Manual".

A.1 RS232C Remote Control System

RS232C interface can be used to communicate with computer and PLC, which provides the cheapest and convenient way for data acquisition and statistical analysis. Through RS232C interface, the computer can operate almost all functions on the instrument panel.

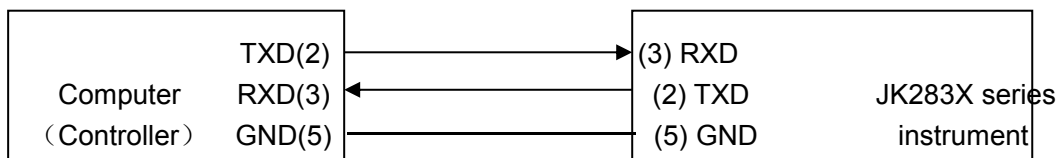
Like most serial ports in the world, the serial interface of this instrument is not strictly based on RS-232 standard, but only provides a minimal subset. The following table is as follows:

Signal	Symbol	Connector pin number
send data	TXD	3
receive data	RXD	2
Earthing	GND	5

This instrument adopts standard 9-core needle DB connector. The connecting cable is shown on the right.



Using RS232C port serial communication cable to connect to the upper computer, the most basic connection scheme is as follows:



RS232C parameters

baud rate	1200bps, 9600bps, 19200bps, 38400bps , 115200bps
Data bits	8 BIT
Stop bit	1 BIT
check	no
Terminator	CR、LF、CR+LF optional
Contact mode	Software liaison

A.2 USB Remote Control System

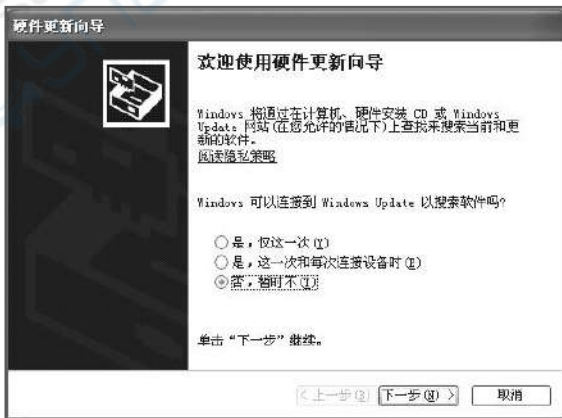
USB Communication bus

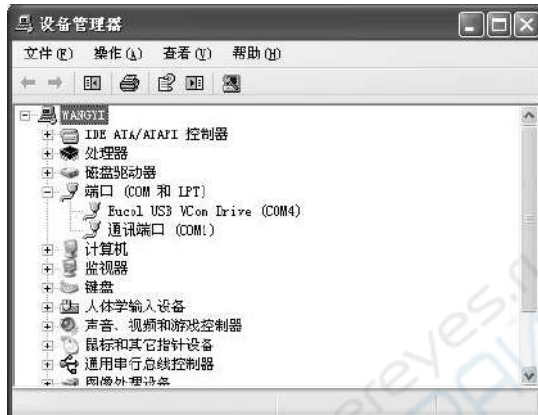
The remote control system of USB (Universal Serial Bus) is controlled by USB, which is accomplished by the interface conforming to the standard of USBTMC-USB488 and USB 2.0. The USB interface of the instrument supports two modes: USB-CDC and USB-TMC.

USB-CDC(Virtual serial port)

The function of USB CDC (virtual serial port) is equivalent to a serial port. After installing the driver, the instrument can be operated like a serial port. Follow the following steps to install the driver:

- After the first connection, the computer discovers the new hardware and pops up the dialog box to install the new hardware. Select "No, temporarily no":
- Click Next and select Install from List or Designated Location:
- Then click Next to select the path that contains the JINKOL Vcom and usbser.sys driver installation information files. and then click Next to install the USB CDC driver successfully.
- After installation, you can view the USB CDC device and its port number in the device manager of the computer:





After successful installation, the instrument can be accessed and controlled in the same way as RS232C, without repeated installation every time, but the computer may dynamically allocate serial passwords, please check in the Device Manager!

USB-TMC

To use the USB-TMC mode, download and install NI-VISA from NI's website (<http://www.ni.com/China>), which includes the USB TMC driver.

After connecting the instrument to the computer through USB cable for the first time, the computer finds new hardware and pops up the dialog box for installing new hardware: Select "No, temporarily no" and click Next. If NI-VISA has been installed, the wizard will search and display the "USB Test and Measurement Device" driver:

Select "Automatic Installation Software" and click Next, the computer will automatically complete the installation of "USB Test and Measurement Device" driver. Upon completion, you can view the installed device from the Device Manager:

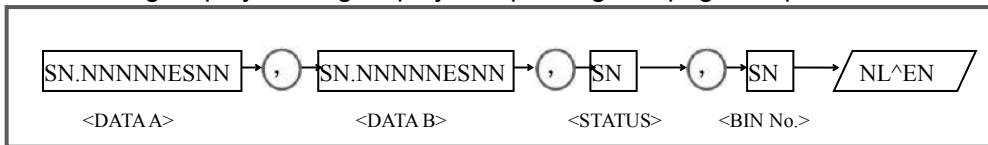


A.3 data format

When the instrument outputs the measurement results to the bus, it transmits them in

ASCII string format.

在 Measuring display, sorting display and passing test page, output data format is:



In the figure above, the "," number is the delimiter between data, and NL is the line terminator (0x0A), which indicates the end of the string.^END is the EOI (End) signal of the IEEE-488 bus. The information sent by this instrument from GPIB is to drive the EOI signal while sending the end symbol.RS232C, USB-CDC, USB-TMC do not have this signal, only the line terminator.

<DATA A>, <DATA B>, <STATUS>, <BIN No.>The format is as follows:

✎ <DATA A> and <DATA B> Output measurement results:

<DATA A> was the main parameter of the measurement results.<DATA B> is the measurement result of the auxiliary parameter.Expressed in exponential format, it is composed of 12 bits of ASCII characters, namely:SN.NNNNNNESNN (S: +/-, N: 0 to 9, E: Index sign)

✎ <STATUS>Represents the state of measurement. Normal return is 0. Others are errors.

✎ <BIN No.>Output sorting comparison results, output results are as follows:

0-No comparison;1~3 (or 1-9) -Qualified BIN,BIN1~3 (or BIN1~9) ;

10-unqualified BIN OUT; 11-Auxiliary BIN AUX; Other values are illegal output.

Invalid measurement pages output invalid results if data queries occur:

+9.90000E+37,+9.90000E+37,-1,0

Appendix B 36-core HANDLER interface

The main contents of this chapter are as follows: Signal Definition of Interface of 36 Core 9 Grade Qualified HANDLER Processor

B.1 Essential information

This instrument provides users with a powerful HANDLER interface (processor interface), which is mainly used for the output of sorting results and synchronization with the system signal.

Synchronization signals include TRIG (test start)、IDX(AD conversion end) and EOM (measurement end) three kinds of signals;

The output sorting signal includes: Qualified BIN (BIN1-3) , auxiliary BIN (AUX) and unqualified BIN (OUT) .When unqualified, there are still others Primary parameter High (PHI) 、 Primary parameter low (PLO) and secondary parameter Unqualified (SREJ) signal output.

With these signals, the instrument can conveniently form an automatic test system with the system controller to test, sort and control the quality of components, so as to improve the production efficiency.

Technical parameters

Sorting output signal

The comparison results output signals:

Photoelectric isolation, open collector (OC) output, low level effective;

Pull-up power supply can choose internal VCC or external EXV1

Output signal:

/BIN1-9: 1-9 qualified BIN

/OUT: unqualified

/AUX: auxiliary BIN, Primary parameter qualified, but secondary parameter Unqualified

/PHI/PLO/SREJ: Primary parameter High/Primary parameter low/secondary parameter Unqualified

Control Output Signal

Photoelectric isolation, Open collector (OC) output, low level effective;

Pull-up power supply can choose internal VCC or external EXV2

/IDX: End of A/D Conversion (End of Analog Measurement)

/EOM: All measurements are completed and the HANDLER output signal is valid.

Input signal

/TRIG : External trigger, pulse width $\geq 10\mu\text{s}$, Rise or fall edge trigger (default rise edge)

Photoelectric isolation, low level drive, current $5\sim 10\text{mA}$

Explain:The slash "/" before the signal name indicates that the signal is valid at low levels.

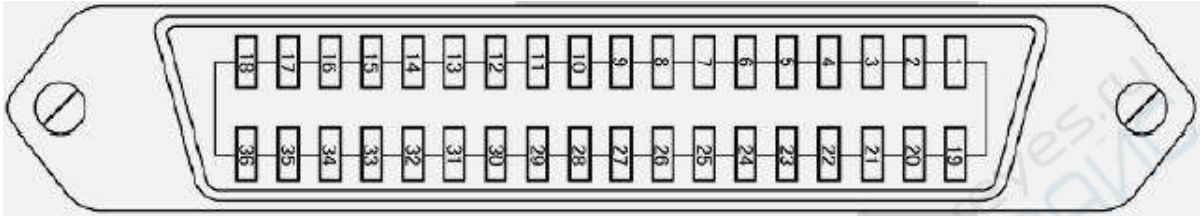
B.2 Signal line definition

HANDLER signals are defined differently under different functions

Pin number	Tolerance mode	Remarks
1	/BIN1	Sorting output
2	/BIN2	Sorting output
3	/BIN3	Sorting output
4	/BIN4	Sorting output
5	/BIN5	Sorting output
6	/BIN6	Sorting output
7	/BIN7	Sorting output
8	/BIN3	Sorting output
9	/BIN9	Sorting output
10	/OUT	Sorting output
11	/AUX	Sorting output
12-13	/TRIG	Input signal, external trigger
14-15	EXV2	Pull-up power supply for controlling output signal
16-18	VCC	Internal + 5V power supply
19	/PHI	Sorting output
20	/PLO	Sorting output
21	/SREJ	Sorting output
22-26	NC	Empty pin
27-28	EXV1	Pull-up power supply for sorting output signals
29	NC	Empty pin
30	/IDX	Control output
31	/EOM	Control output

32-33	COM2	EXV2 Public Places
34-36	COM1	EXV1 Public Places

HANDLER Interface pin diagram



B.3 Sequence diagram

The time sequence diagram is used to represent the time process of instrument measurement and the relationship between its input and output signals.

The HANDLER interface uses the following signals to represent the measurement process and synchronize the timing:

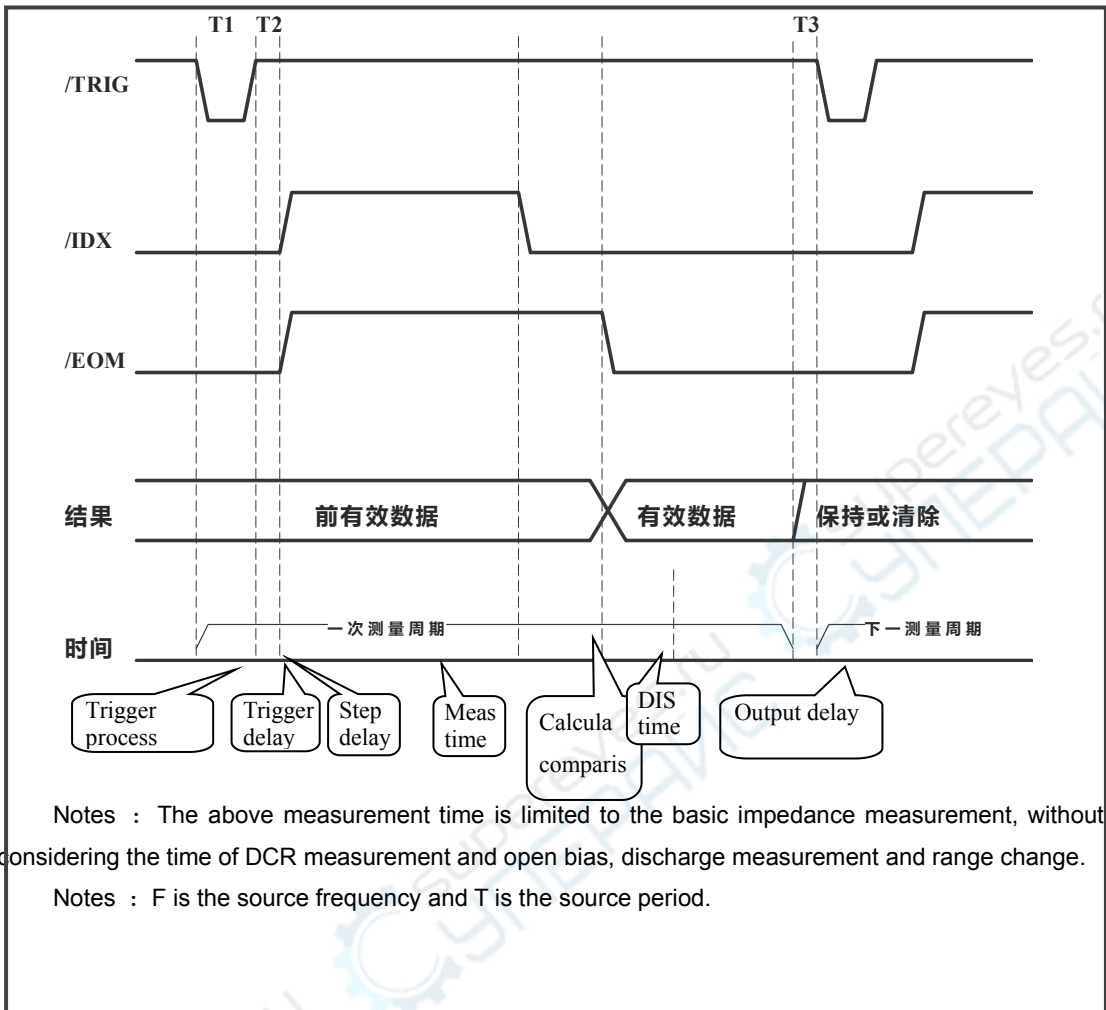
Trigger signal /TRIG

Simulation Measurement finish Signal/IDX(When IDX is valid, it means that the tested part can leave the test end.)

End of complete measurement/EOM(Including data processing, display, comparison after analog measurement, etc.)

Output signal of comparison result

Output sequence diagram of sorting measurement



Time	Min value	Max value
T1 Trigger pulse width	10us	---
T2 measurement set + step delay	200us	2ms+ Step Delay Settings
T3 Trigger waiting time	0us	At the beginning of this measurement, the next effective trigger is remembered.
Test time—fast	8ms+9T	f<1kHz: 20T
—med	320ms+4	f<1kHz: 20T
—slow	T	f≥1kHz: 320ms+9T
Computing and processing time	1~2ms	---
Display time	3~5ms	---
Measurement delay	0ms	60s

B.4 Electrical characteristics

When connecting the HANDLER port to the external controller, please refer to the introduction of the electrical characteristics of the HANDLER interface in this section.

The use of HANDLER interface board will involve the use of pull-up resistance, internal power supply and external power supply.

Since the open collector can not output high level, the output must be connected to the logic power supply through pull-up resistance.

The HANDLER interface board of the instrument is reserved with pull-up resistors, which are not installed by default.

Notes : By default, the instrument is configured to use external power supply and external pull-up, voltage 5-24V. When connected to a typical PLC controller, it can be used without any configuration changes to the interface board.

DC Isolated Output

Each DC output signal is a collector output isolated by a photocoupler. The output voltage of each signal line is set by the pull-up voltage on the HANDLER interface board. The pull-up voltage can pass through Setting up jumpers is provided by internal power supply (+5V), Or by external voltage (EXV: +5~+24V) provide. **The factory default is provided by external voltage.**

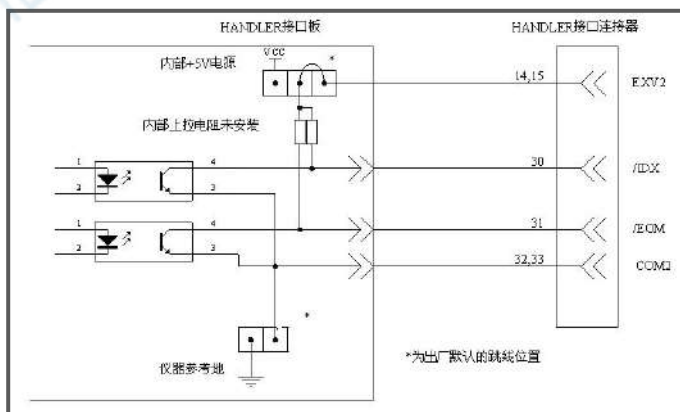
the DC isolated output can be divided into two types: the comparison result output signal and the control output signal. See table below:

output signal (Take the tolerance model as an example)	Output rated voltage		Max current	Circuit Reference Ground
	Low level	High level		
Sorting output /BIN1-9 /OUT /AUX /PHI /PLO /SREJ	≤0.5V	+5V~ +24V	6mA	Internal pull-up power supply: Instrumentation Reference (GND) External power supply (EXV1) : COM1

Control output /IDX /EOM	$\leq 0.5V$	+5V~ +24V	6mA	Internal pull-up power supply: Instrumentation Reference (GND) External power supply (EXV2) : COM2
--------------------------------	-------------	--------------	-----	--

Electrical schematic diagram of sorting output signal:

Electrical schematic diagram of control output signal:



DC Isolated Input

DC isolation input is also photoelectric coupling, and signal input is realized by driving photoelectric coupler.

The input signals are:

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

Electrical schematic diagram of input signal:

The input signal is connected to the cathode of the LED in the optocoupler, which needs to provide at least 5mA pull current. The photoelectric coupled LED anode connects the internal 5V or the external EXV2 power supply. Power supply range +5~+24V. Current Limiting Circuit in the Power Supply Range of +24V, so no external current limiting resistor is needed when connecting.

Appendix B 9-core HANDLER interface

The main content of this chapter: signal definition of interface of 9-core and 3-level qualified HANDLER processor

B.5 basic information

See Appendix B.1 for basic information.

B.6 Signal line definition

HANDLER signals are defined differently under different functions

Pin NO.	Tolerance mode	Remarks
1	/BIN1	sorting output
2	/BIN2	sorting output
3	/BIN3	sorting output
4	/OUT	sorting output
5	/EOM	Control output
6	EXV	Pull-up power supply positive stage for sorting output signal
7	/TRIG	Input signal, external trigger (standby)
8	/TRIG	Input signal, external trigger
9	COM	The ground wire of EXV

B.7 Sequence diagram

See Appendix B.3 Sequence Diagram for details.

B.8 Electrical characteristics

DC Isolated Output

Each DC output signal is a collector output isolated by a photocoupler. The output voltage of each signal line is set by the pull-up voltage on the HANDLER interface board. The pull-up voltage can be provided by setting jumpers by internal power supply (+5V) or by external voltage (EXV:+5~+24V). **The factory default is provided by external voltage.**

Output signal electrical schematic diagram:

DC Isolated Input

DC isolation input is also photoelectric coupling, and signal input is realized by driving photoelectric coupler.

The input signals are:

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

Electrical schematic diagram of input signal:

