HIGH PRECISION LCR METER USER MANUAL

MCR-8100H
MCR-8200H
MCR-8500H

MATRIX TECHNOLOGY INC.

Statement: in this paper, the content of the instrument. Our company have the right to the instrument performance, appearance, function, accessories, packing and so on to improve and improve without further instructions! The resulting manual do not agree with instruments of confusion, can contact us through the following ways.

Company: MATRIX TECHNOLOGY INC.
ADD: Building D, Huachuangda Culture and Technology Industrial Park, Haihui Road, Bao'an 49th District, Shenzhen, Guangdong, China
TEL: 0086 755 2836 4276
EMAIL: sales@szmatrix.com
WEBSITE: www.szmatrix.com

Chapter 1 Instrument inspection and preparation

Please be sure to check the receipt of the instrument, and must understand and have the condition before using the instrument.

1.1 The crates

- After receiving the product, it is found that the packing is badly damaged. Please keep it until it is normal for the whole machine and the accessories.
- Check the machine, if the instrument is damaged, please contact the dealer or the company in charge of the business.
- Please check the attachment, please check the attachment according to the packing list, if the attachment is missing or damaged, please contact your dealer or division to protect your rights and interests.

1.2 Power connection

(1) Power supply voltage range:

100 ~ 120 Vac (The power supply of the instrument rear panel is selected as 110V display)

198 ~ 242 Vac (The power supply of the instrument rear panel is selected as 220V display)

(2) Frequency range of power supply: 47 ~ 63 Hz。

(3) Power supply range: >= 50 VA。

(4) Wire-L、Wire-N、Groud-E should be the same as the power plug of the instrument.

The instrument has been carefully designed to reduce the interference caused by the input of the AC power supply side, but still should try to make it in low noise environment, if you can not avoid, please install the power filter.

Warning: in order to prevent leakage of equipment or artificial damage, the user must ensure that the power supply to the earth ground reliable.

1.3 Fuse and toggle switch

Instrument factory has been equipped with a fuse, the user should use the company equipped with a fuse.

Warning: you should pay attention to the position of the toggle switch is consistent with the power supply voltage range of power on before.

1.4 Environmental requirements

(1) Please do not use in the dust, vibration, direct sunlight, corrosive gases, such as the use of bad environment.

(2) Instrument is not used for a long time, please put it in the original packing box or similar to the box in the reservoir is 5 to 40 DEG C temperature, relative humidity is not more than 85% RH of the indoor ventilation, air should not contain harmful impurity in corrosion measurement instrument and should avoid direct sunlight.

(3) Please ensure that the instrument is in good ventilation condition, do not plug the instrument cooling and ventilation holes.

(4) In particular, the instrument is connected with the test wire of the test piece to be far away from the strong electromagnetic field, so as not to interfere with the measurement.

1.5 Test fixture requirements

Please use the company's test fixture or test cable, the instrument test fixture or test cable should be kept clean, the test device pin to keep clean, to ensure that the test device and the fixture is in good contact. The test fixture or test cable is connected to the HD, HS, LS and LD of the front panel of the instrument. The shield layer can be connected to the rear panel of the instrument, and the shield layer can be connected with the rear panel of the instrument.

User homemade or other company test fixtures or test cables may result in incorrect measurement results.

1.6 Accuracy guarantee

(1) In order to ensure the accurate measurement of the instrument, the heating time should be no less than 15 minutes.

(2) Do not frequent switching equipment, in order to avoid confusion caused by internal data.

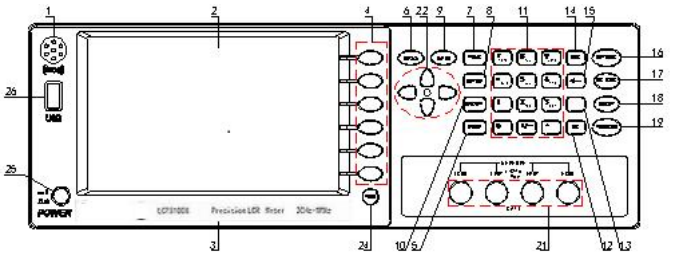
(3) Correct open circuit and short circuit operation.

Chapter 2 Introduction

A new generation of high precision and high stability of boutique LCR meter,the 7 inch 800*480 TFT display screen, display classical and intuitionistic.

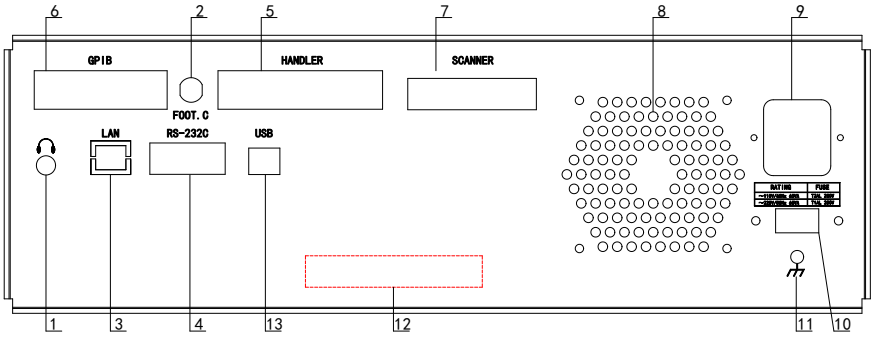
The series of equipment is highly applicable to the majority of manufacturers production inspection. And the series of equipment has a variety of output impedance model can be used for different manufacturers needs, its superior performance can be achieved business standards and military standards of a variety of tests (such as IEC and MIL).

2.1 Front panel description



1. Buzzer port
2. 7 inch TFT LCD screen
3. Instrument type label
4. Softkey
5. FILE, File management page shortcuts
6. PASS light，Qualified judgment lamp
7. MEAS, Measurement display page shortcut key
8. SETUP, Measurement set page shortcut key
9. FAIL light，Failure product judgment lamp
10. SYSTEM, System settings page shortcut keys
11. Alphanumeric keypad symbols
12. OK，Confirm input key
13. Blank, user correction function shortcut key
14. ESC, Cancel key
15. ←，Backspace key, used to delete the previous input
16. KEYLOCK, Keyboard lock shortcut key
17. DC BIAS, DC offset source shortcut key
18. RESET, Test status reset button
19. TRIGGER, Trigger measure key
21. Test terminal：LD、LS、HS、HD
22. Direction key
24. Tool key
25. Power switch
26. USB interface

2.2 Rear panel description



1. Earphone port
2. FOOT.C, Foot switch interface
3. LAN port
4. RS232C, serial port
5. HANDLER, Sorting interface
6. GPIB interface
7. SCANNER port
8. Fan cooling hole
9. Power supply socket
10. Power switch (110V/220V)
11. Ground
12. Instrument serial number
13. USB DEVICE

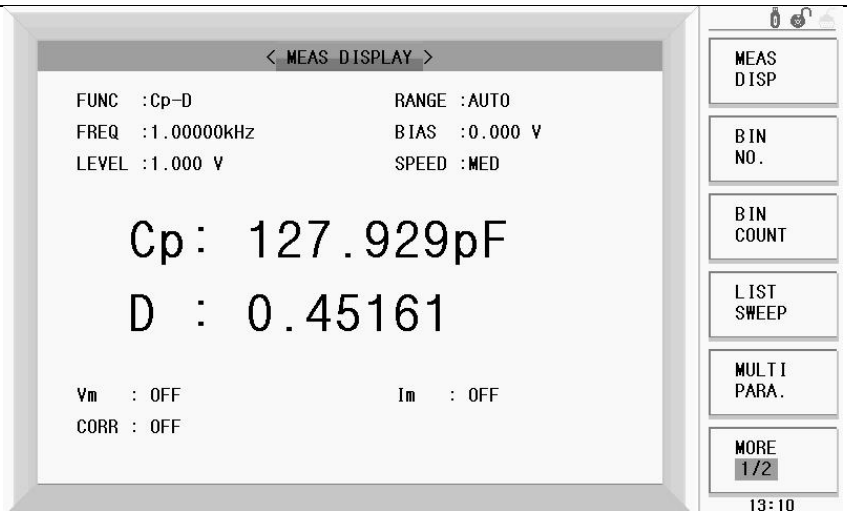
2.3 Basic operation

1. Direction key: used to move the cursor.
2. Soft keys, used to change the parameters set of features.
3. Shortcut menu: MEAS, SETUP, SYSTEM, FILE, press directly into the < MEAS DISPLAY >, < MEASURE SETUP >, < SYSTEM SETUP >, < INTER/EXT Files List> function page settings.
4. TOOL: Tool key, press it to print screen .

2.4 Each page features

1. MEAS DISPLAY

Press MEAS key to MEAS DISPLAY page.



The right side of the screen corresponds to the following functions:<MEAS DISP> <BIN NO.> <BIN COUNT> <LIST SWEEP> <MULTI PARA.> <MORE1/2> <SWEEP DISP> [Save Log] <MORE2/2>

Note: [Save Log] key can easily save the test data to U disk in every test page. In the process of saving data, the key is changed to "Save Stop", Users in the preservation of data, if not stop saving and directly pull U disk, data will be lost.

The saved data format is as follows:

- In MEAS DISPLAY,BIN NO.BIN COUNT pages.And if the Comparison is OFF,the <BIN> is not saved.

SN.NNNNNESNN , SN.NNNNNESNN , SN , SN or SNN NL

< Main parameter >< Secondary parameter >< state > <BIN> < Enter >

- In LIST SWEEP page.

SN.NNNNNESNN , SN.NNNNNESNN , SN , SN , N NL

< Main parameter >< Secondary parameter >< state > <Judge> <Dot> < Enter >

Explain:

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

<state>:

state	describe
-1	Data in buffer memory
0	No data
+1	Common measurement data
+2	Unbalanced analog Bridge
+3	A/D conversion does not work
+4	Signal overload or Adjustable constant voltage

<BIN> :

BIN	describe
0	OUT,FAIL no pass
+1	BIN1
+2	BIN 2
+3	BIN 3
+4	BIN 4
+5	BIN 5
+6	BIN 6
+7	BIN 7
+8	BIN 8
+9	BIN 9
+10	AUX

<Judge>:

Judge	describe
-1	Low
0	In, good
+1	High

<Dot>: Current scan point
N（N：0 到 9）

- In Multi DISPLAY

SN.NNNNNESNN , SN.NNNNNESNN , SN.NNNNNESNN , SN.NNNNNESNN , SN , SN , NL

< Parameter 1> < Parameter 2>< Parameter 3>< Parameter 4> <state> <Judge> <Enter>

The functions of MEAS DISPLAY are described as following:

FUNC: to select the test parameter.

RANGE: to select the test range.

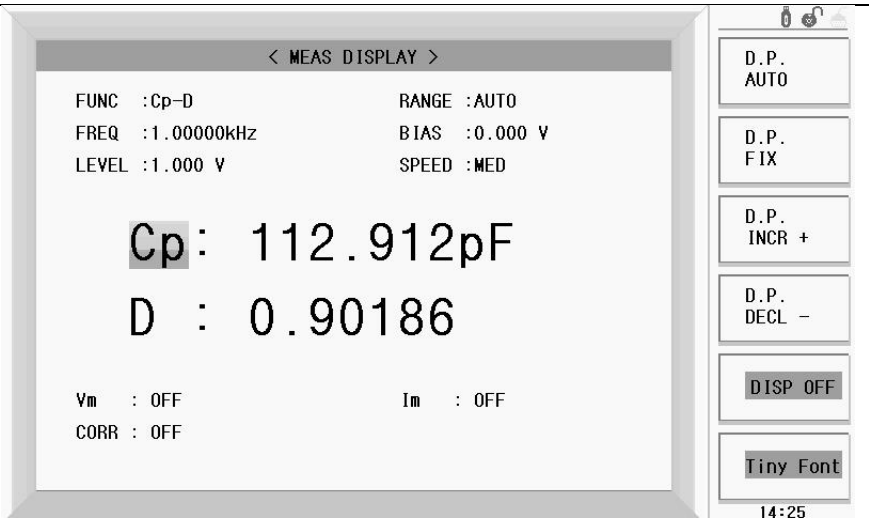
FREQ: to select or write the test frequency.

BIAS: to select the BIAS voltage ,and press the BIAS ON key to open ,press the BIAS OFF key to close.

LEVEL:to select or write the test voltage or current .

SPEED:to select the test speed.

If the cursor is in here as follow, the function is described as following:



D.P. FIX :Press this key to lock decimal,and the key change to D.P.AUTO. And press it again,unlock decimal,and the key change to D.P.FIX

D.P. INCR + :Press this key to increase Decimal.

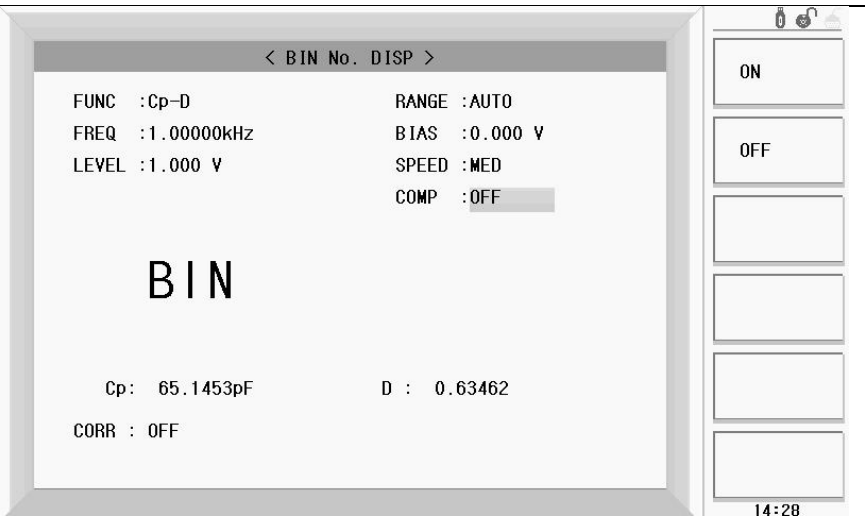
D.P. DECL - :Press this key to decrease decimal.

DISP OFF :Press this key to close display data,and the key change to DISP ON.And press it again to open display data.

Tiny Font:Press it to display font reduction,and this key change to Big Font.And prss it again to restore display font.

2. BIN No.DISP

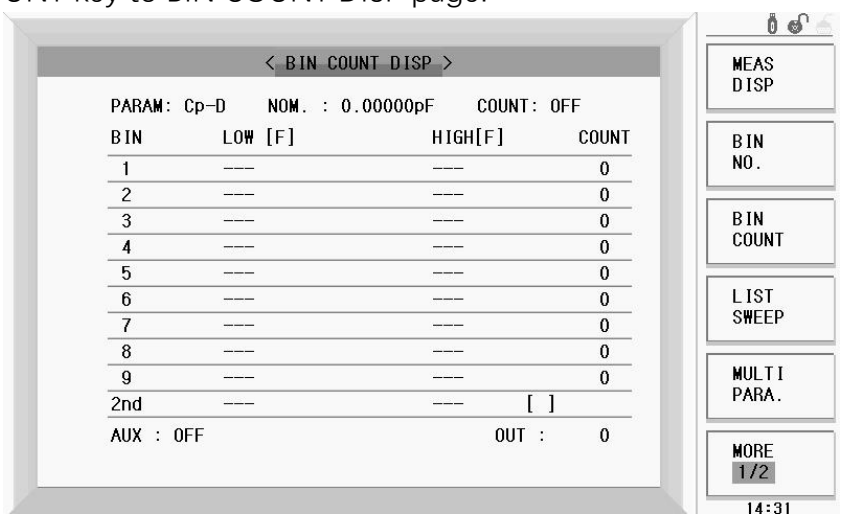
Press BIN NO. key to BIN No.DISP page .



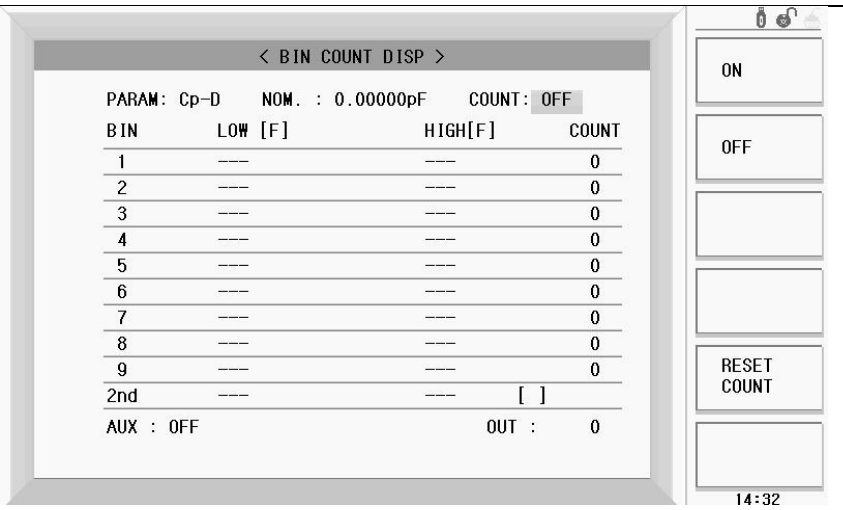
This page display the comparison results .We can select COMP ON to open comparison function ,or select COMP OFF to close comparison function.

3. BIN COUNT DISP

Press BIN COUNT key to BIN COUNT DISP page.

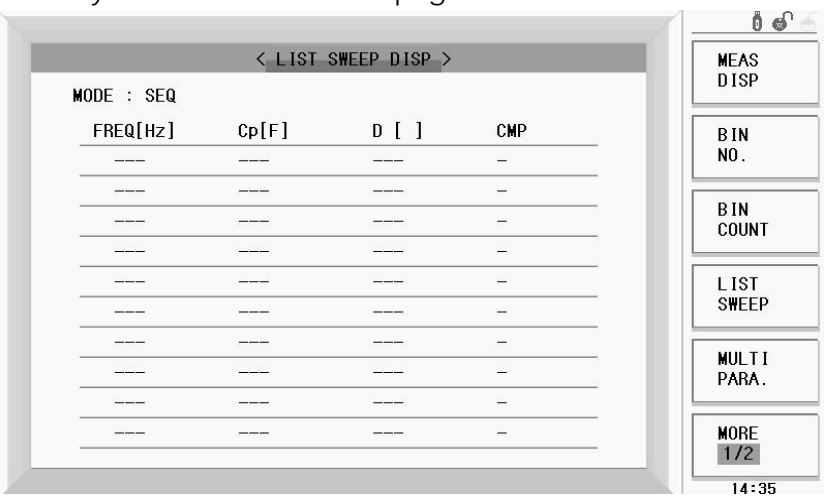


This page is used to record the number of every BIN that have been tested.
Move cursor to COUNT:OFF,can select ON or OFF key to open or close COUNT function. Select RESET COUNT key to set COUNT to 0 .



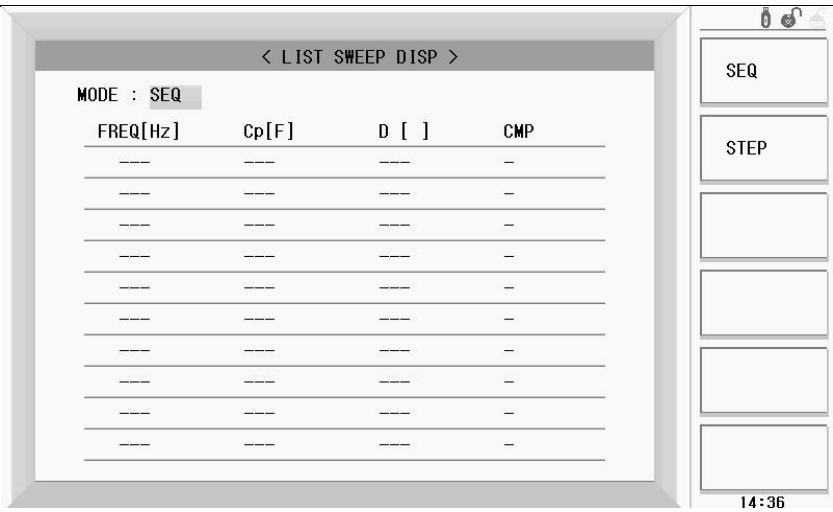
4. LIST SWEEP DISP

Press LIST SWEEP key to LIST SWEEP DISP page.



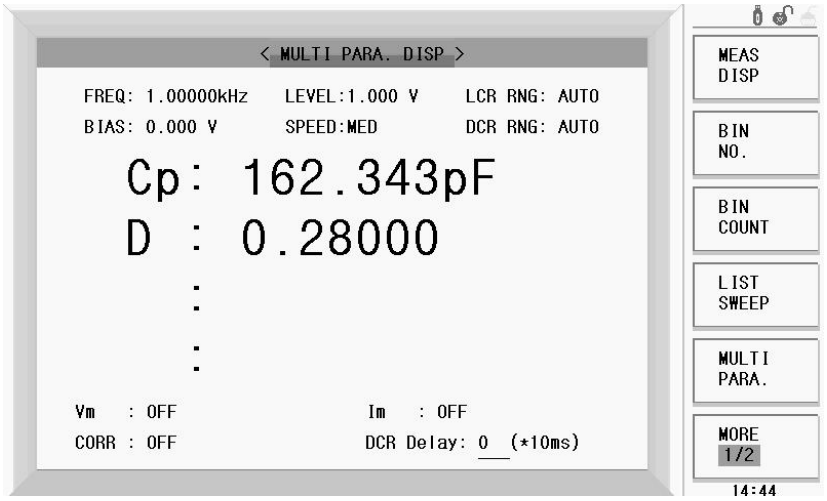
The function of this page: MODE .

Move cursor to MODE, select SEQ or STEP mode .If we select SEQ and the Trigger mode is MAN or EXT,all list dots will be tested when we trig the meter . And if we select STEP and the Trigger mode is MAN or EXT,only one dot will be tested when we trig the meter.



5. MULTI PARA DISP

Press MULTI PARA.key to MULTI PARA DISP page.



The functions of MULTI PARA DISP page are described as following:

FREQ: to select or write the test frequency.

LEVEL:to select or write the test voltage or current .

BIAS: to select the BIAS voltage ,and press DC BIAS key to open ,press DC BIAS key again to close.

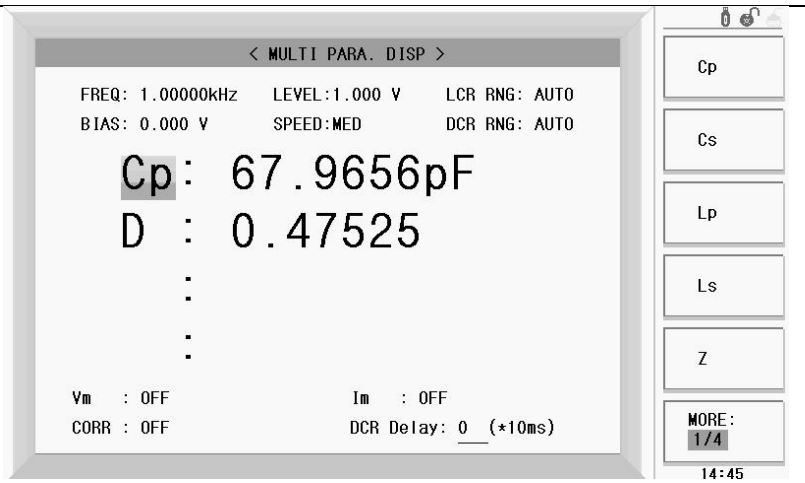
SPEED:to select the test speed.

LCR RNG: to select the LCR test range.

DCR RNG: to select the DCR test range.

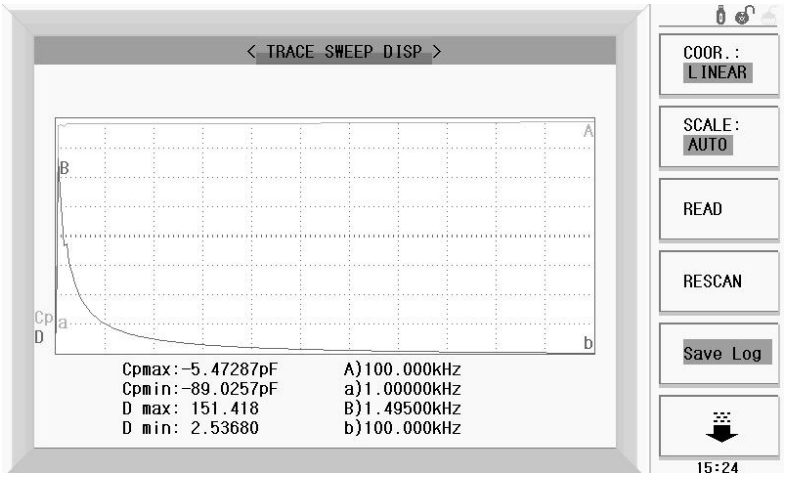
DCR Delay: to input the delay time of DCR test.

Move cursor to parameter,we can select the test parameter.



6. TRACE SWEEP DISP

In MEAS DISPLAY page,we press MORE1/2 key to display [SWEEP DISP] [Save Log] [MORE2/2],ande we press SWEEP DISP key to TRACE SWEEP DISP page.



In this page, we test and plot the measured pieces under preset conditions. And the results of the measurement were statistically analyzed.

NOTE: After the user sets the scan condition, you can use the front panel [TRIGGER] button to start scanning.

The parameters of the page are described below.

Amax is the maximum of the primary parameter, and the current test condition is A .

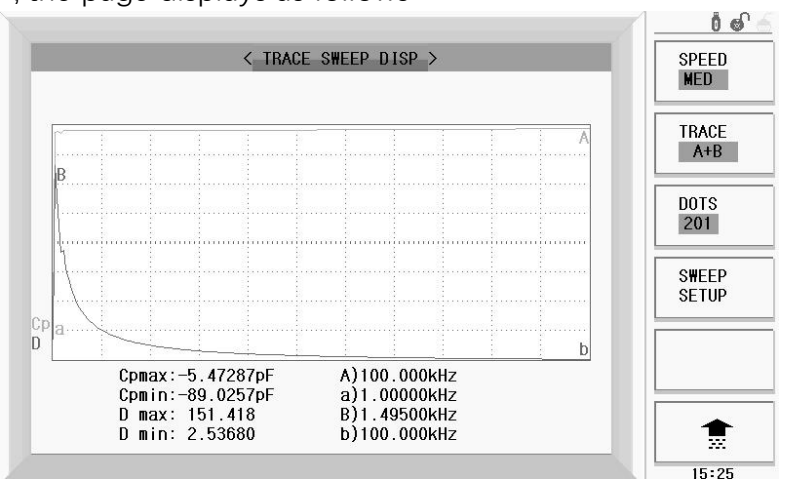
Amin is the minimum of the primary parameter, and the current test condition is a .

Bmax is the maximum of the secondary parameter, and the current test condition is B.

Bmin is the minimum of the secondary parameter, and the current test condition is b .

1) COOR.: LINEAR,LOG .Press this to exchange .
   - In the LINEAR mode, the horizontal ordinate is the test conditions are stepping in a linear way.
   - In the LOG mode, the horizontal ordinate is the test conditions are stepping in a logarithm way.
2) SCALE: It automatically adjusts the display coordinates in AUTO mode. It keeps the coordinates constant in HOLD mode.
   You can set the conditions in TRACE SWEEP SETUP page.
3) READ: Press this key ,when ▶ display, we can use the arrow keys to read the data of each test point .
4) RESCAN: When ▶ disappear , we can press this key to test again.
5) Save Log : press this key to save the results to U disk .

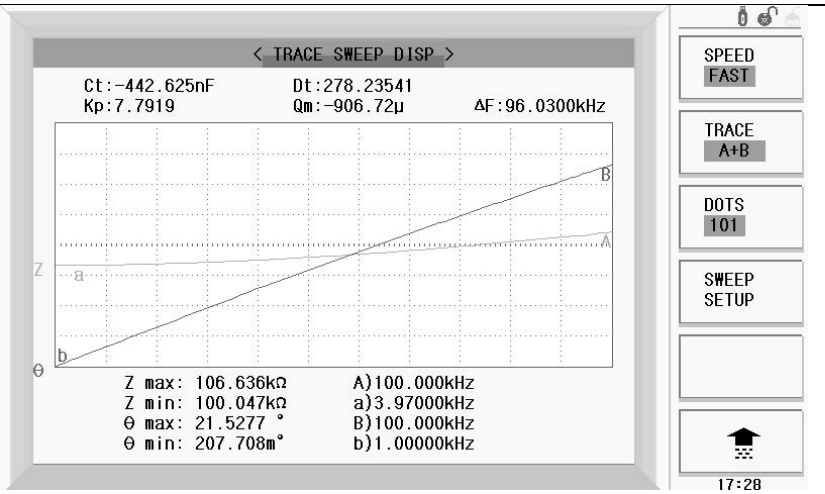
Press key , the page displays as follows



1) SPEED: Repeatedly pressing the soft key to change the scanning speed.
2) TRACE: A,B,A+B
   - A Draw only the primary parameter curve.
   - B Draw only the secondary parameter curve.
   - A+B Draw the primary and secondary parameter curves at the same time.
3) DOTS: Set test points . 101, 201, 401, 801
4) SWEEP SETUP: Press this key to TRACE SWEEP DISP page.

Testing of ultrasonic devices

When FUNC is Z-deg in MEAS DISPLAY page ,and the MODE is FREQ[Hz] in TRACE SWEEP SETUP page , the meter will automatically display some parameters of ultrasonic devices, so that users can analyze the ultrasonic devices conveniently.

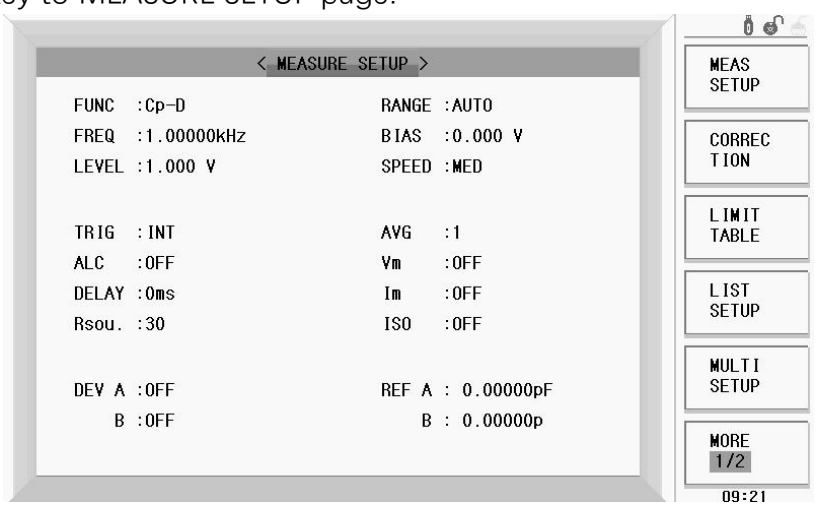


The parameters are as follows:

- Ct: Capacitance value at 1kHz.
- Dt: Capacitance loss at 1kHz.
- The minimum impedance Zmin and the corresponding frequency of fs. [fs] is resonant frequency. On screen, a is fs.
- The maximum impedance Zmax and the corresponding fp. [fp] is anti resonant frequency. On screen, A is fp.
- $k_p \approx \sqrt{\frac{f_p - f_s}{f_s} \times 2.51}$
- $Q_m \approx \frac{f_p^2}{2\pi f_s Z_{\min} Ct(f_p^2 - f_s^2)}$
- ΔF = fp – fs

7. MEASURE SETUP

Press SETUP key to MEASURE SETUP page.



The functions of MEASURE SETUP page are described as following:

FUNC: to select the test parameter.

RANGE: to select the test range.

FREQ: to select or write the test frequency.

BIAS: to select the BIAS voltage ,and press the BIAS ON key to open ,press the BIAS OFF key to close.

LEVEL:to select or write the test voltage or current .

SPEED:to select the test speed.

TRIG: to select the trigger mode. Test automatically when we select INT. Only test one time when we press TRIG key and the trigger mode is MAN. Only test on time when the meter give a trigger signal if we select the trigger mode EXT.

AVG: 1~255 . The results of the test are displayed on average

ALC: Select ON to open constant level test,select OFF to close this function.

DELAY:0~60s .It's the delay test time .

Vm:Select ON to monitor test voltage.And select OFF to close this function.

Im:Select ON to monitor test current.And select OFF to close this function.

Rsou: To select internal resistance mode . 100,30,10/100,10/CC

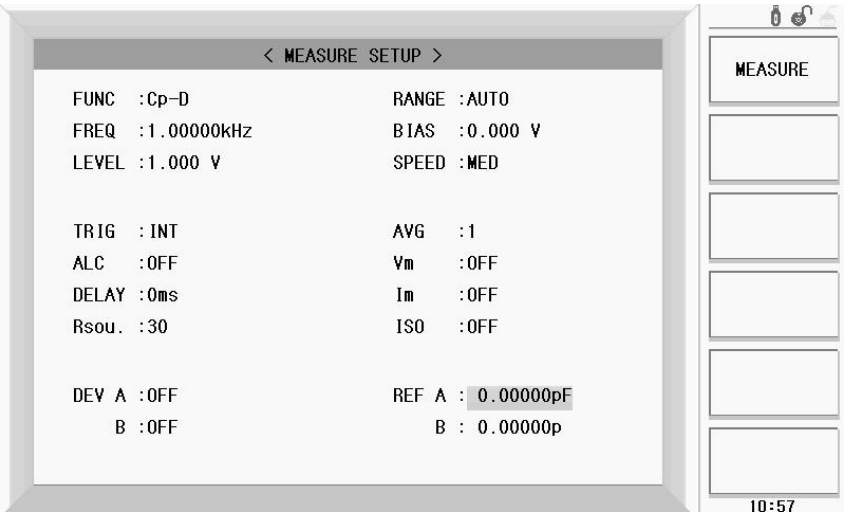
ISO: Isolation mode. This function is always open.

DEV A: Main parameter display mode.

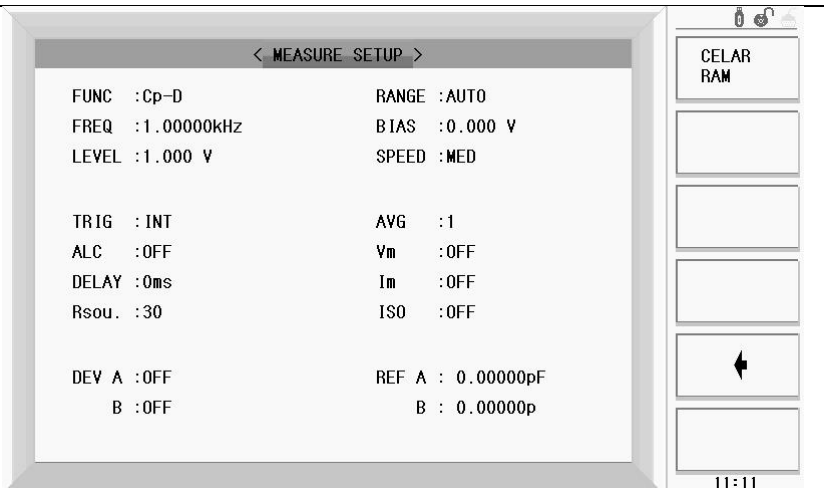
B: Sub parameter display mode.

REF A: Main parameter reference value.We can input it or press MEASURE key to get a test value.

B: Sub parameter reference value.We can input it or press MEASURE key to get a test value.



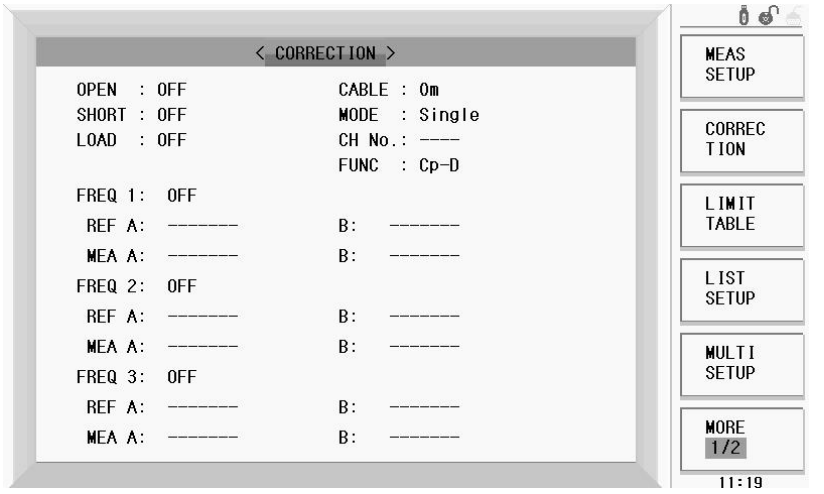
Utility: We can press MORE1/2 in MEASURE SETUP page . The Utility softkey will be displayed.When we press Utility key,the page will be displayed as follows .



If we press CLEAR RAM key,all settings will be restored to default settings.

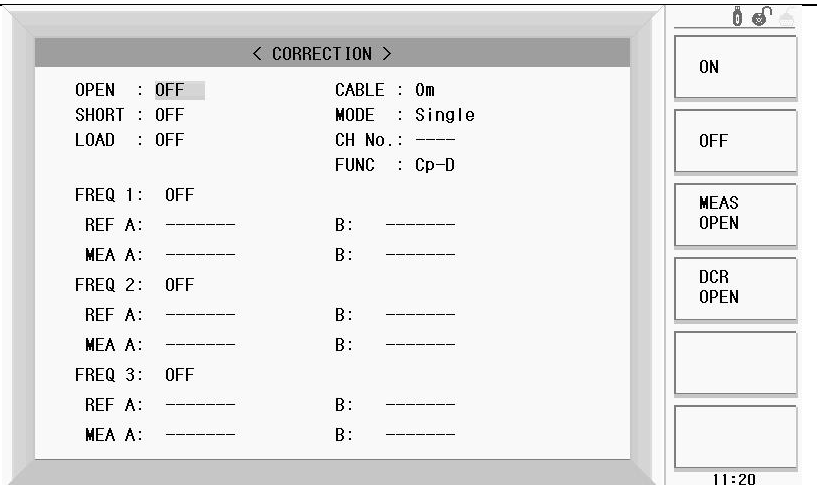
8. CORRECTION

Press CORRECTION key to CORRECTION page.



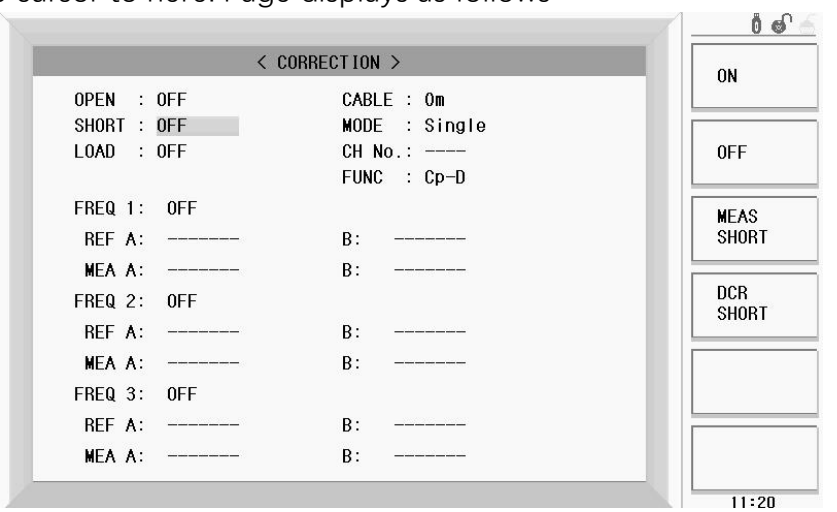
The functions of CORRECTION page are described as following:

OPEN:Move cursor to here. Page displays as follows



Press ON key to open the OPEN fuction. Press OFF key to close the OPEN function. Keep the test fixture open,then press MEAS OPEN key to do open circuit correction for all frequency. Keep the test fixture open,then press DCR OPEN key to do open circuit correction about DCR .

SHORT: Move cursor to here. Page displays as follows



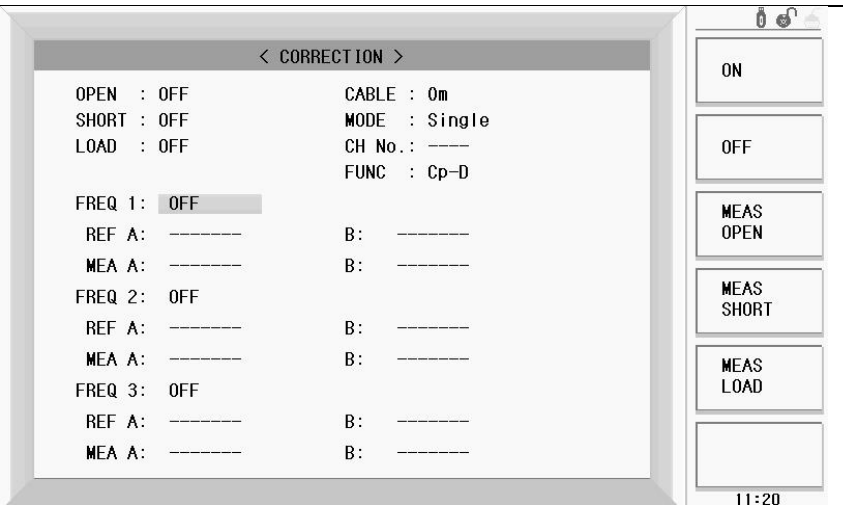
Press ON key to open the SHORT fuction. Press OFF key to close the SHORT function. Keep the test fixture short,then press MEAS SHORT key to do short circuit correction for all frequency. Keep the test fixture short,then press DCR SHORT key to do short circuit correction about DCR .

LOAD: Move cursor to here. Select ON key to open LOAD correction .Select OFF key to close LOAD correction.

CABLE,MODE,CH No. : Can not choose.

FUNC: Select the parameters to be corrected for load correction.

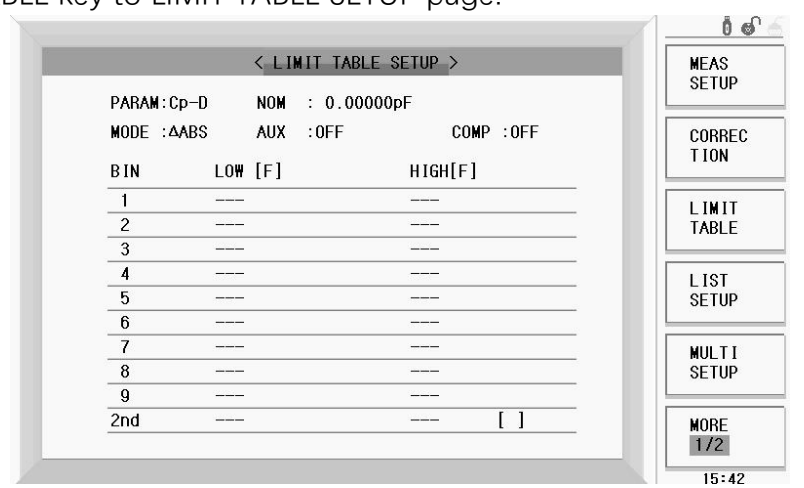
FREQ1,FREQ2,FREQ3: Move cursor to here. Page displays as follows



Press ON key to open the correction for this frequency.We can input the test frequency here. And press OFF key to close the correction. Keep the test fixture open,then press MEAS OPEN key to do open circuit correction for this frequency. Keep the test fixture short,then press MEAS SHORT key to do short circuit correction for this frequency. MEAS LOAD key must be used with REF A and B, otherwise it is easy to make mistakes.If we want to do load correction,we must move cursor to REF A and B first. Then we should input the reference value in REF A and B.Then move cursor to FREQ1,FREQ2 or FREQ3. Make test fixture reliable clamping standard parts,then press MEAS LOAD key to do load correction.

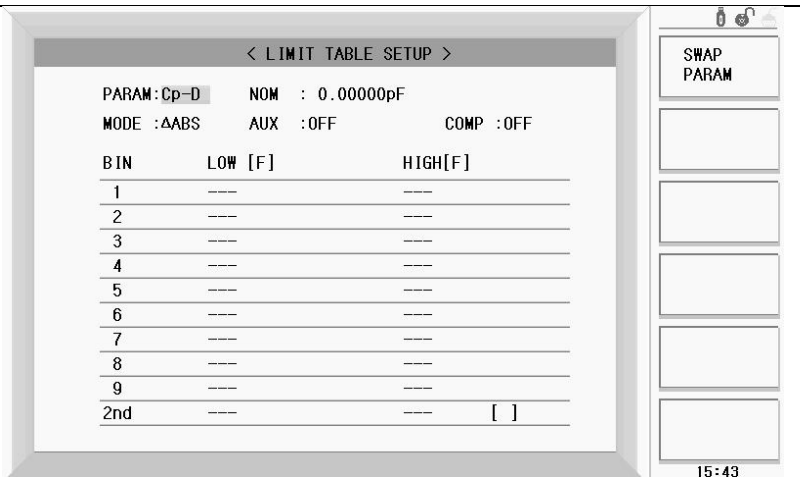
9. LIMIT TABLE SETUP

Press LIMIT TABLE key to LIMIT TABLE SETUP page.



The functions of LIMIT TABLE SETUP page are described as following:

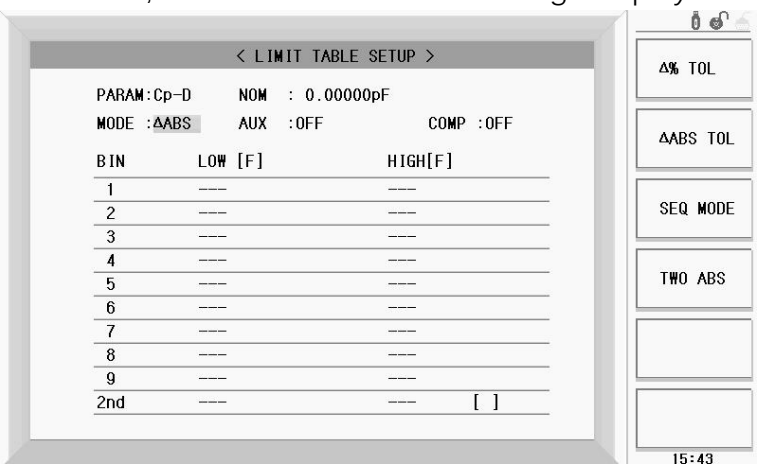
PARAM:Move cursor to here . Page displays as follows



If we press SWAP PARAM key , the primary and secondary parameters will be interchanged .Press SWAP PARAM key again, return to normal.

NOM: Input nominal value,here.

MODE:Ther are four mode,here.Move cursor to here. Page displays as follows

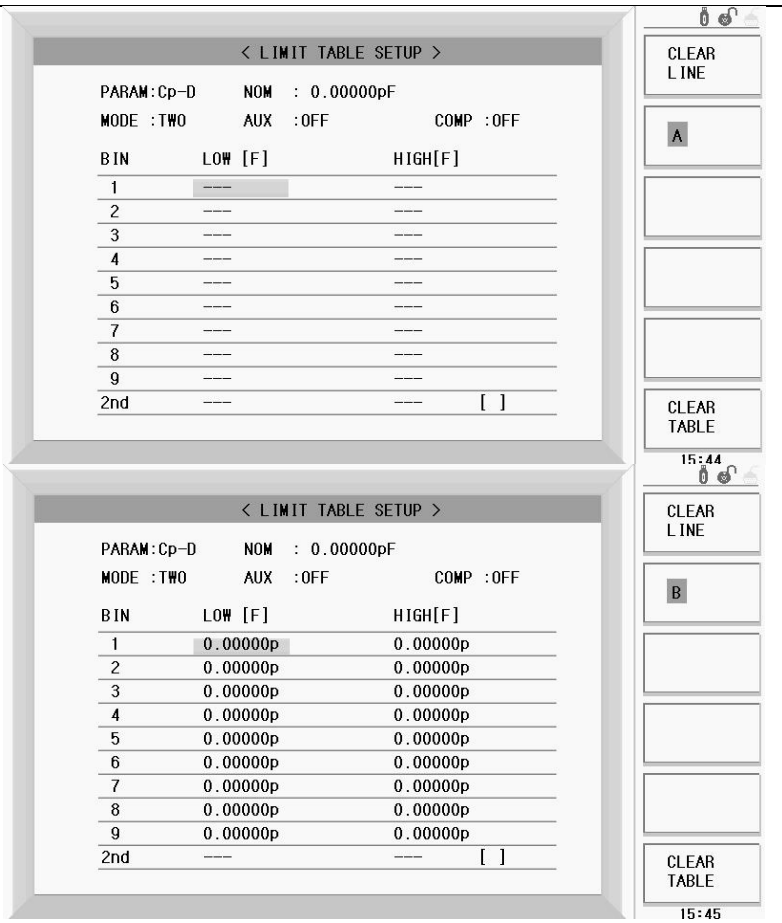


Δ% TOL :For example,if the lower limit is -10%, then only need to enter LOW in -10 . if the higher limit is +10%, then only need to enter HIGH in 10 .

ΔABS TOL: Relative absolute deviation. For example ,if the data is 2pF±0.2pF,then only need to enter LOW in -0.2pF,and to enter HIGH in 0.2pF.

SEQ MODE: BIN1's HIGH is BIN2's LOW, BIN2's HIGH is BIN3's LOW, and so on.

TWO ABS: The primary and secondary parameters are compared with absolute values. There are 9 BIN in primary and secondary parameters.



AUX: Auxiliary alarm. The main parameters are qualified, but the secondary parameters are not qualified.Press ON to open AUX,and press OFF to close it.

COMP: Comparison switch. Only open the switch, the data will be compared to determine.Press ON to open it,and press OFF to close it.

BIN,LOW,HIGH : Input the upper and lower limits in these tables.

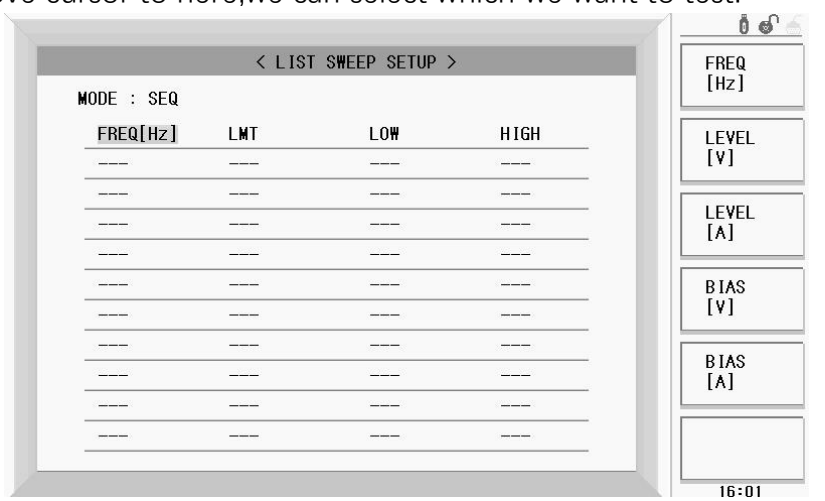
10. LIST SWEEP SETUP

Press LIST SETUP key to LIST SWEEP SETUP page.

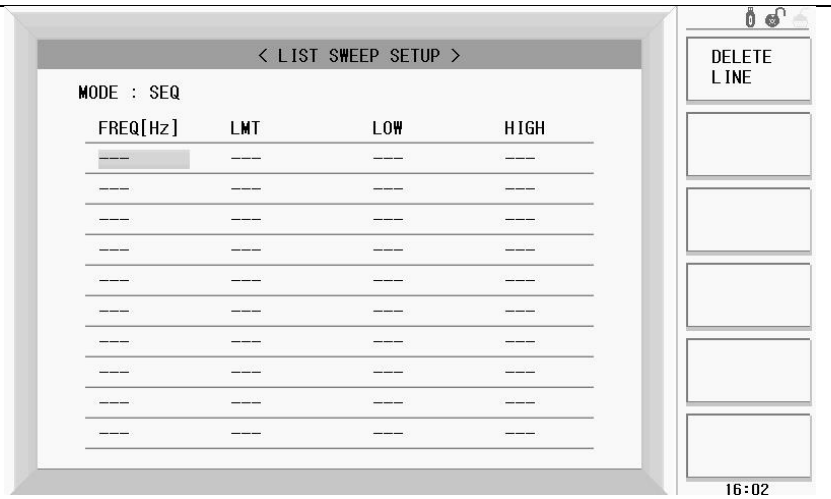
Move cursor to MODE,select SEQ or STEP mode .If we select SEQ and the Trigger mode is MAN or EXT,all list dots will be tested when we trig the meter . And if we select STEP and the Trigger mode is MAN or EXT,only one dot will be tested when we trig the meter.

Attention: The settings page cannot be tested and must be tested under the display page.

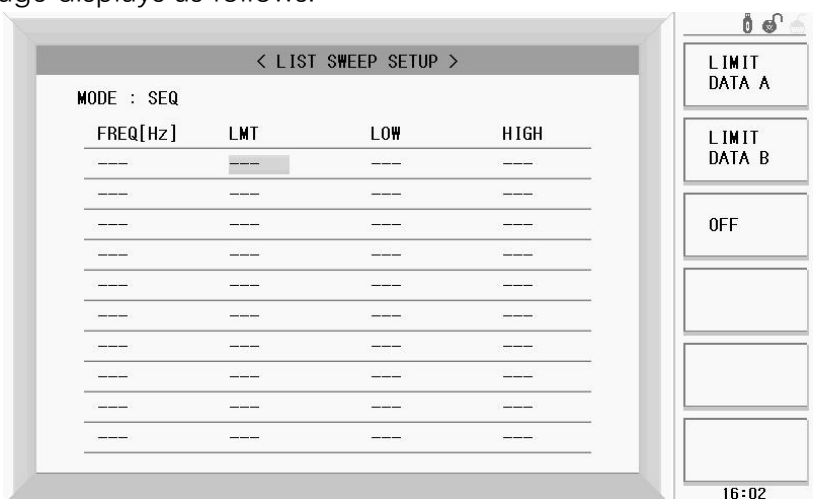
FREQ[Hz]: Move cursor to here,we can select which we want to test.



Select FREQ[Hz] key to do frequceny test .Select LEVEL[V] to do voltage test.Select LEVEL[A] to do current test. Select BIAS[V] to do DC voltage bias test. Select BIAS[A] to do DC current bias test.



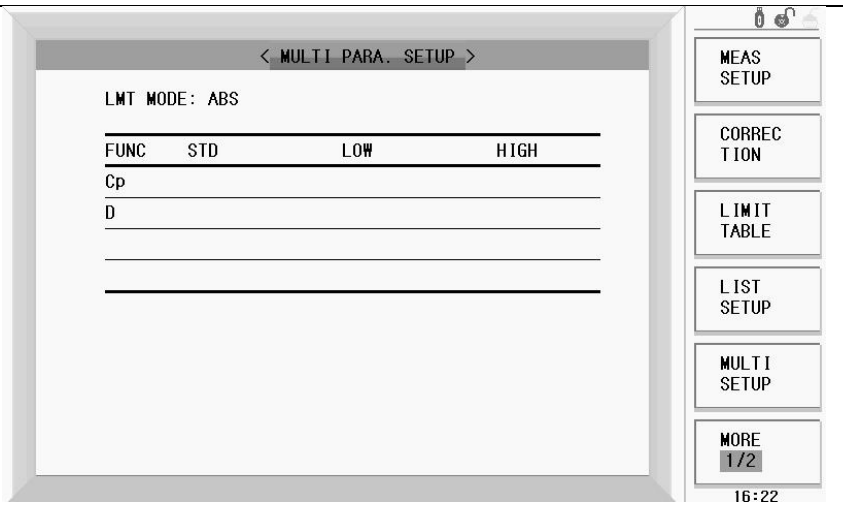
Move cursor to tables,as shown above.We can select DELETE LINE key to delete the data of the table.And we can select CLEAR TABLE key to delete data of all tables.And we can input the test condition in this table.Move cursor to LMT table,page displays as follows.



If we select LIMIT DATA A key, the upper and lower limits of the main parameters are compared.If we select LIMIT DATA B key, the upper and lower limits of the secondary parameters are compared.If we select OFF key, it does not compare.
LOW,HIGH:input the lower or upper limits .

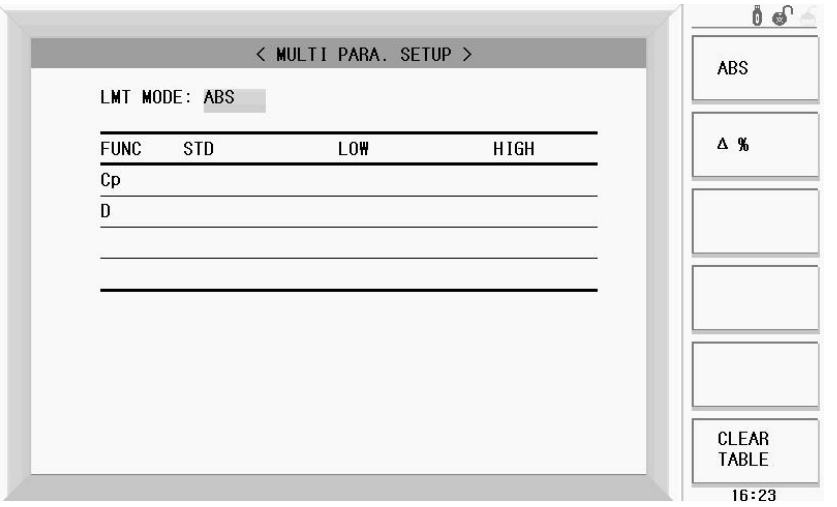
11. MULTI PARA SETUP

Now press MULTI SETUP key to MULTI PARA SETUP page.



The functions of MULTI PARA SETUP page are described as following:

MODE: Move cursor to here to select compare mode.



ΔABS: If **(NOM+LOW)<= Data of test <= (NOM + HIGH)** ,it is PASS,otherwise it is FAIL .

Δ % : If **NOM*(1+LOW))<= Data of test <= NOM*(1 + HIGH)** ,it is PASS,otherwise it is FAIL .

CLEAR TABLE: Press this key to clear data of all tables.

FUNC: In this table,we can select the test parameter.

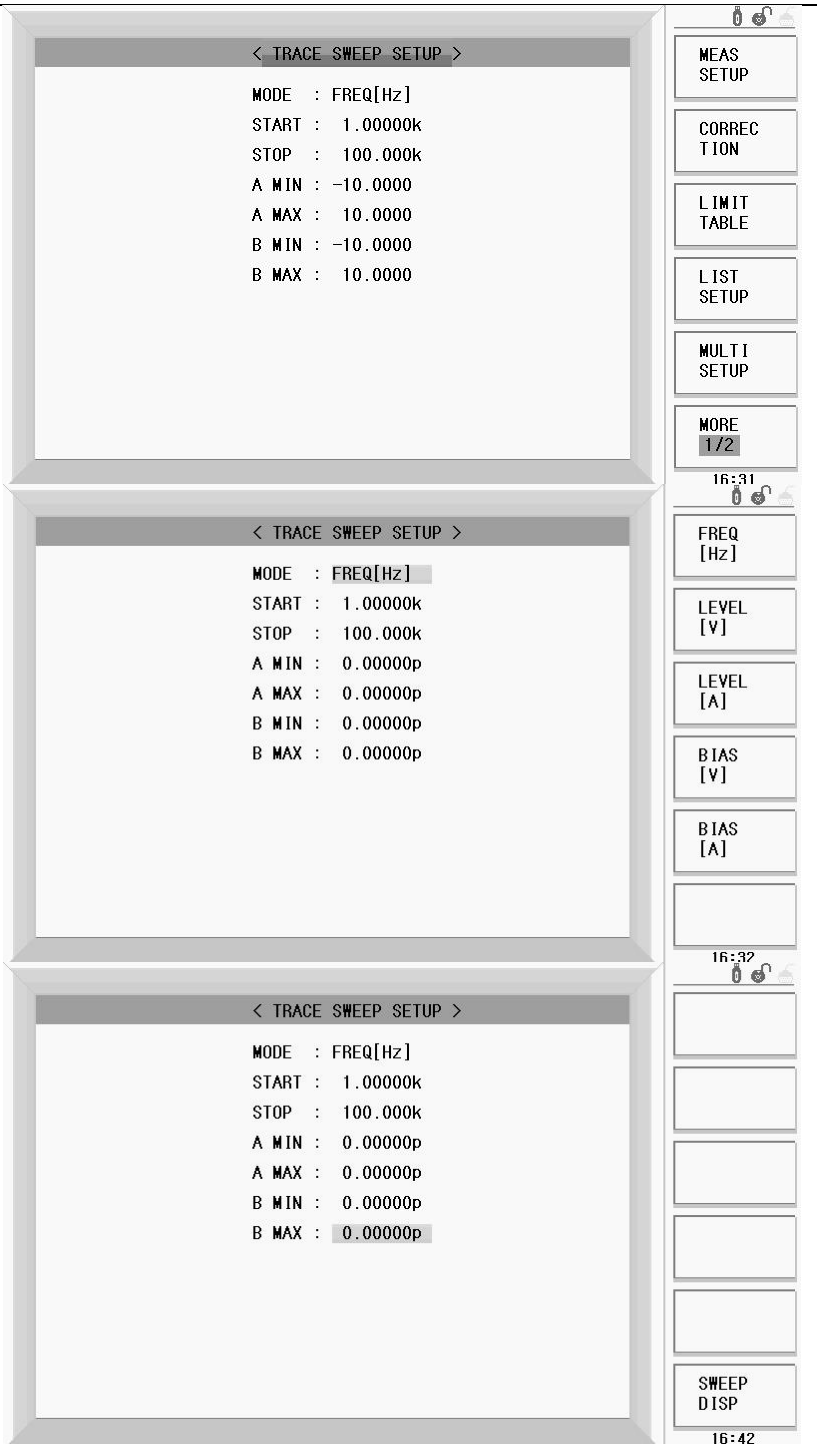
NOM : In this table, we can input the nominal values for each test parameter.

LOW : In this table, we can input the lower limit for each test parameter.

HIGH: In this table,we can input the upper limit for each test parameter.

12. TRACE SWEEP SETUP

Press SETUP key and press MORE1/2 softkey,now press TRACE SETUP key to TRACE SWEEP SETUP page.



The page is mainly used for curve scanning, analysis of the parameters settings. Details are as follows:

MODE: Select the test condition for the scan and select the drawing abscissa.They are FREQ[Hz],LEVEL [V],LEVEL[A],BIAS[V] and BIAS[A].

START: Used to set the starting value of the scan abscissa. Move cursor to START, and use numeric keys to enter data, and select rate units to confirm input or press key [OK]

to confirm.

STOP: Used to set the stop value of the scan abscissa.Move cursor to STOP,and use numeric keys to enter data, and select rate units to confirm input or press key [OK] to confirm.

Ordinate range setting： A MIN, AMAX,B MIN,B MAX.

A MIN is the minimum value for the primary parameter.

A MAX is the maximum value for the primary parameter.

B MIN is the minimum value for the secondary parameter.

B MAX is the maximum value for the secondary parameter.

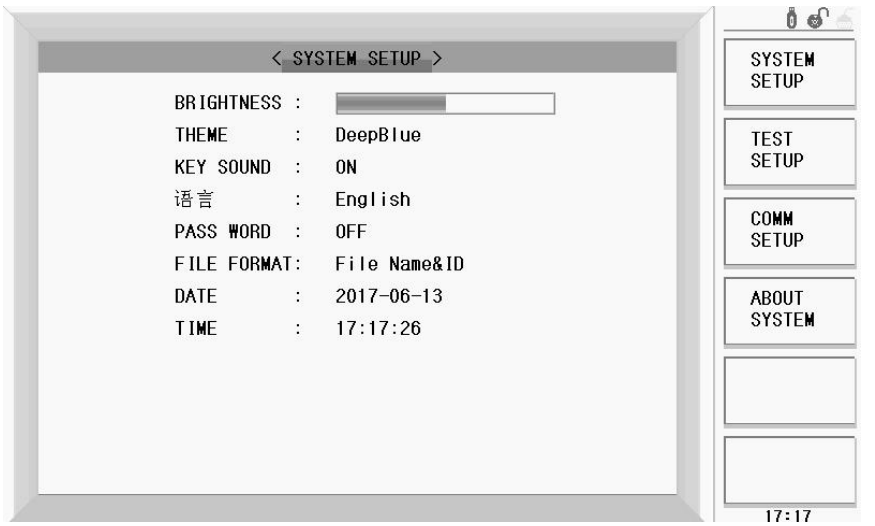
Move cursor to these place above,and use numeric keys to enter data,and select rate units to confirm input or press key [OK] to confirm.

NOTE: Only when SCALE is HOLD in TRACE SWEEP DISP page,these values can be used.

NOTE: When cursor is in A MIN,A MAX,B MIN or B MAX,we can press SWEEP DISP key to TRACE SWEEP DISP page.

13. SYSTEM SETUP

Press SYSTEM key on the instrument panel to SYSTEM SETUP page.



The functions of SYSTEM SETUP page are described as following:

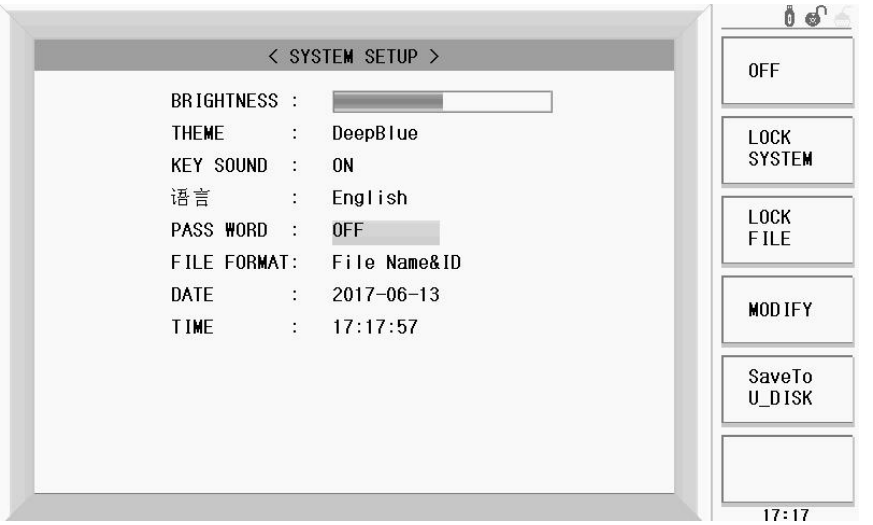
BRIGHTNESS: LCD screen brightness selection.

THEME: System display style .There are TRAD BLUE and TRAD BLACK .

KEY SOUND: Key sound selection.If we select OFF, then the key sound is turned off. If we select ON, then the key sound is turned on.

LANGUAGE: Instrument display language. There are two languages, one is English, the other is Chinese .

PASS WORD: Password protection function. Page are described as following:



Press OFF key to close password protection function.

LOCK SYSTEM: System encryption . If we select this,we should input the password when boot . And we should input the password when we want to LOAD file or STORE file ,or DELTE file .

LOCK FILE: File encryption . If we select this, we should input the password when we want to LOAD file or STORE file ,or DELTE file .

MODIFY: Modify password.If we want to modify password,we should input the old password first,then input the new password ,and input the new password again to confirm it.

Save To U_DISK: Save password to U disk. When you need to enter a password, you only need to insert the U disk on it.

Factory default password: Different models of the factory password is not the same.

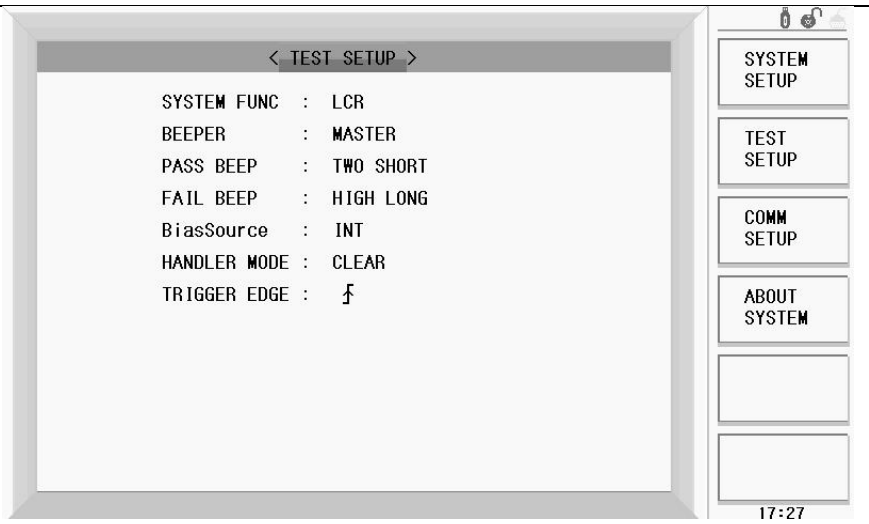
MCR-8100H:1000
MCR-8500H:5000

DATE: Date display and modification.

TIME: Time display and modification.

14. TEST SETUP

Press TEST SETUP key to TEST SETUP page.



The functions of TEST SETUP page are described as following:

SYSTEM FUNC: Select normal LCR test mode or TRANS SINGLE test mode.Press LCR key to select normal LCR test mode. Press TRANS SINGLE key to select single transformer test mode.

BEEPER: Buzzer select. There are three kinds.MASTER,AUXILIARY,EARPHONE .

PASS BEEP: Sound selection for PASS .Select OFF to close it. Select others to Open.

FAIL BEEP: Sound selection for FAIL . Select OFF to close it. Select others to Open.

BiasSource: Bias source selection.Select INT mode,only 0V,1.5V,2V .Select OPT mode , must use with IV-OP001 or IV-1A bias board.Select EXT mode , can be used together supporting the external bias current source.

IV-OP001: DC current:-100mA~100mA,DC voltage:-10V~10V

IV**-1A** : DC current: 0~1A

HANDLER MODE: Handler mode selection.

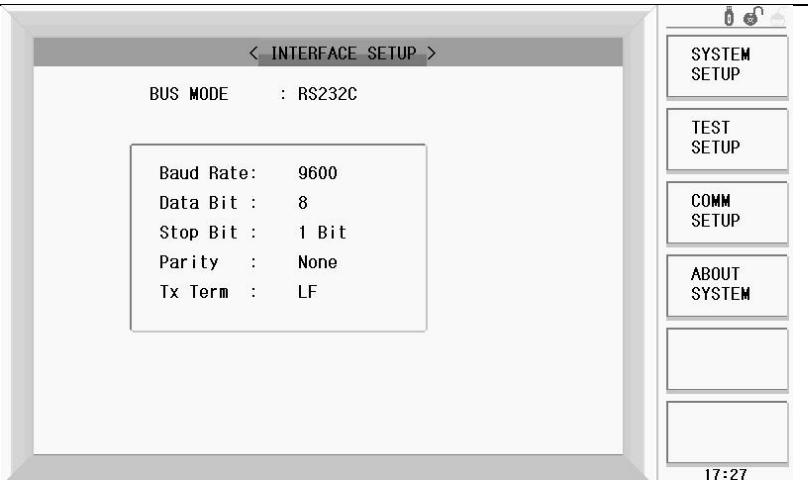
CLEAR: When the instrument receives the trigger signal, the comparison signal is reset,and output after the test.

HOLD: Maintain the comparison signal until the signal changes.

TRIGGER EDGE: Trigger edge selection.There are Rising Edge and Failing Edge.

15. INTERFACE SETUP

Press COMM SETUP key to INTERFACE SETUP page.



The functions of INTERFACE SETUP page are described as following:

BUS MODE: Move cursor to here.We can select the interface mode.There are RS232C,GPIB,LAN,USBTMC and USBCDC.

A.RS232C

Baud Rate: Baud rate must be the same as the computer serial port baud rate.

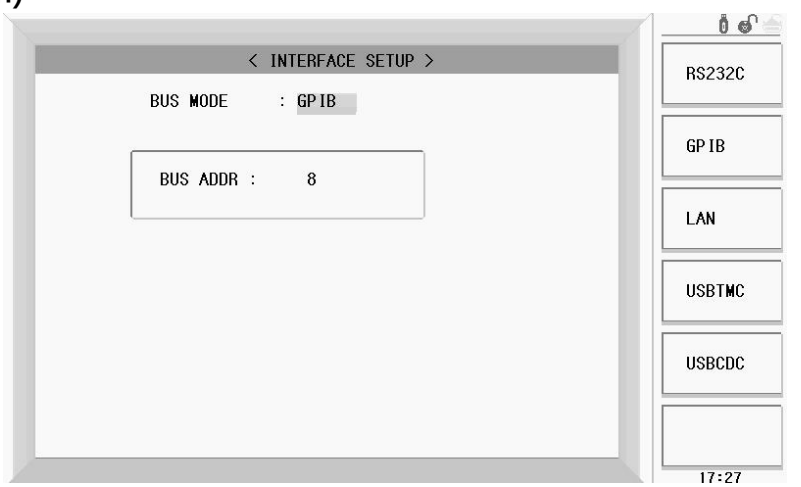
Data Bit : 6 ,7,8

Stop Bit: 1,1.5,2

Parity : None, Odd check, Even parity

Tx Term : LF,CR,LFCR（ ASCII: LF(0x0A), CR(0x0D）)

B.GPIB (Option)



BUS ADDR: Bus address. 0~31

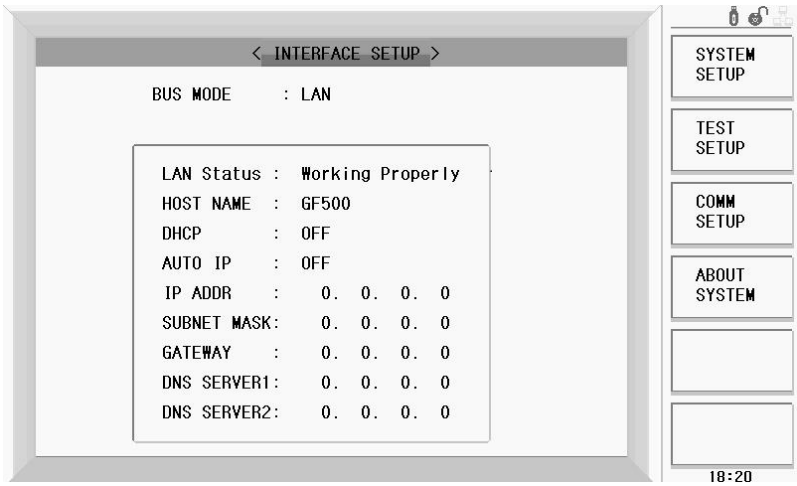
C.USBTMC

The model can be controlled by the USBTMC standard protocol, such as the control of the GPIB interface instrument to control the USB interface instrument.

D.USBCDC

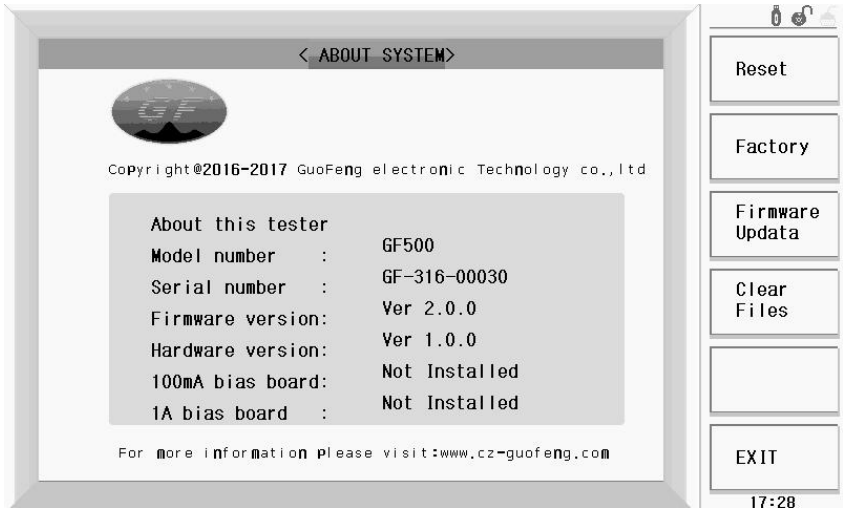
In this mode, the USB communication port of the instrument is used as serial port.

E.LAN(Option)



16. ABOUT SYSTEM

Press ABOUT SYSTEM key to ABOUT SYSTEM page.



This page displays the instrument identity information and some system functions.

Function keys are as follows:

Reset: Press Reset key to restart the instrument.

Factory: Press Factory key to reload the factory settings. Use this feature, you need to enter the password through the screen prompt.

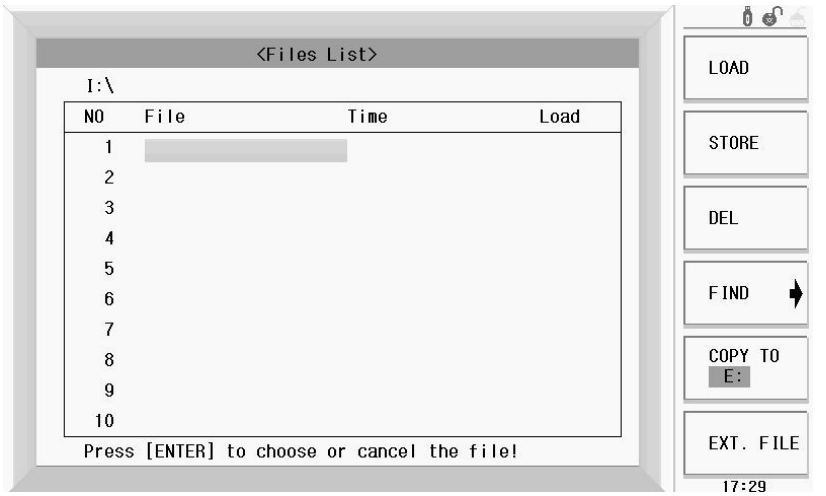
Firmware Update: Press Update key to upgrade the system. Insert the U disk with the upgrade file according to the screen prompt.

Clear Files:Use this key to clear all files in meter.You must input the password and press [OK] key to confirm.

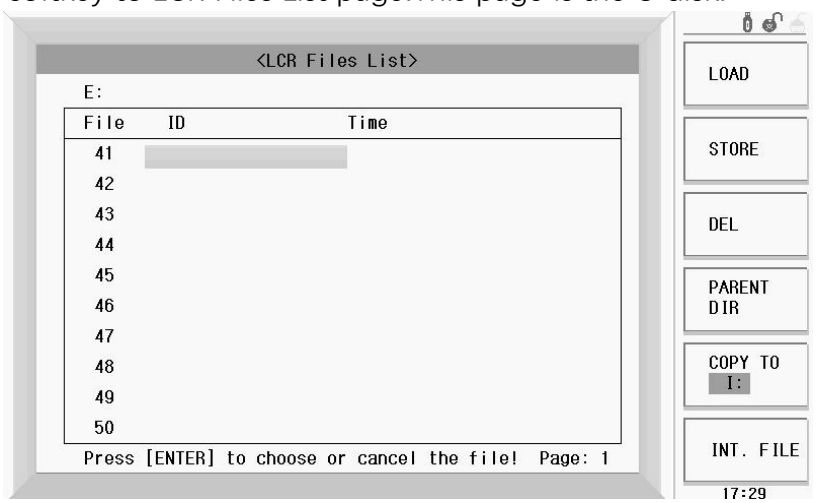
EXIT: Return to previous menu page.

17. FILE

Press FILE key to Files List page.



Press EXT.FILE softkey to LCR Files List page.This page is the U disk.



The parameters set by the user in form of a file stored in the instrument internal non-volatile memory, when the next time you want to use the same settings, users do not need to set these parameters, only need to load the appropriate file, the last set of parameters are obtained. Thus greatly saving the time for the user to re set the parameters and improving the production efficiency.

Operation procedure description:

A. Review existing files
   1) By using the upper and lower keys, one by one look.
   2) Use the left and right buttons, can look at the page.
   3) Input file number keys corresponding to the serial number, then press the

button [OK], can be directly read the required file.

B. Follow these steps to save the parameter to the file.
   1) The number at the cursor to need to save the file, press [STORE] softkey;
   2) Select softkey [YES] into the next step, select the key [NO] cancel the save operation;
   3) If step 2) select [YES], use the numeric keys to enter the file name and press [OK] to confirm. If the serial number is already in the file, you can override the file or cancel the operation according to the screen.

C. Follow these steps to load the parameters set in the corresponding file.
   1) Press the EXT.FILE key and INT.FILE to switch to the file management page.
   2) Move the cursor to the file location in the file list, or direct input file serial number.
   3) Press LOAD key.
   4) Select softkey YES, loading the current file, and return to the current page.

D. Follow the steps for copying files to E (U disk).
   1) Insert the U disk into the instrument front panel USB interface.
   2) Move the cursor to the file, press the soft key "copy to E:"
   3) According to the screen, press the soft key "YES" to copy.
   4) If U disk file with the same file name, screen prompt the need to cover, according to the soft key "YES" to continue copying, press the soft key "NO", cancel the copy.

Chapter 3 Performance

Accuracy

The accuracy of |Z|, L, C, R, X

The accuracy of Ae about |Z|, L, C, R, X is expressed by the following formula:

$$A_e = \pm[A + (K_a + K_b + K_f) \times 100 + K_L] \times K_c \quad [\%]$$

A: Basic measurement accuracy (See Figure 3-1)

K_a: Impedance scaling factor (See table 3-4), when using the impedance is less than 500 ohm .

K_b: Impedance scaling factor (See table 3-4), when using the impedance is greater than 500 ohm.

K_c: Temperature factor (See table 3-5)

K_f: Calibrated interpolation factor (See table 3-6)

K_L: Cable length factor (See table 3-7)

ⓘ **Be careful:** According to the impedance size,it is only one valid about Kb and Ka, and the other one is replaced by 0.

L, C, X accuracy conditions: D_x （Measured value of D） ≤0.1

R accuracy conditions: Q_x （Measured value of Q ） ≤0.1

When $D_x \geq 0.1$, A_e of L, C, X : $A_e = A_e * \sqrt{1+D_x^2}$

When $Q_x \geq 0.1$, A_e of R : $A_e = A_e * \sqrt{1+Q_x^2}$

Accuracy of D

The accuracy of De about D is expressed by the following formula:

$$D_e = \pm\frac{A_e}{100}$$

When $D_x \leq 0.1$, $D_e = D_e$

When $D_x > 0.1$, $D_e = D_e *(1+D_x)$

Accuracy of **Q**

The accuracy of Qe about Q is expressed by the following formula:

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

Here, Qx is the test value of Q.

De is the accuracy of D

It is effective,when $Q_x \times D_e < 1$

Accuracy of**θ**

The accuracy of θ is expressed by the following formula:

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

Accuracy of $\mathbf{R_P}$

When $D_x \leq 0.1$, the accuracy of R_p is expressed by the following formula:

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

Here, R_{px} is the test value of R_p . [Ω]

D_x is the test value of D.

D_e is the accuracy of D

Accuracy of $\mathbf{R_S}$

When $D_x \leq 0.1$, the accuracy of R_s is expressed by the following formula:

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

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

Here, X_x is the test value of X. [S]

C_x is the test value of C. [F]

L_x is the test value of L. [H]

D_e is the accuracy of D， f is the test frequence.

Accuracy factor

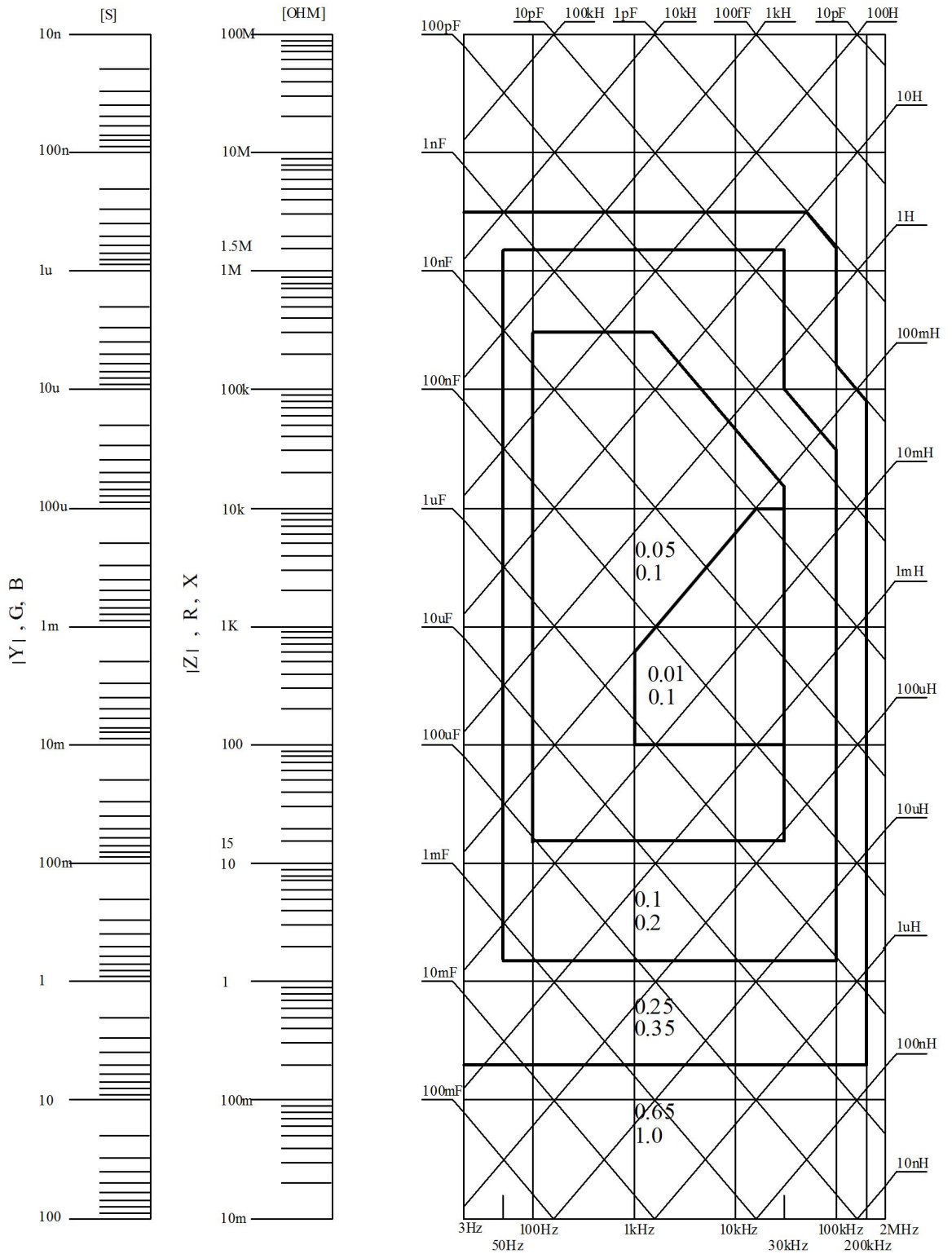


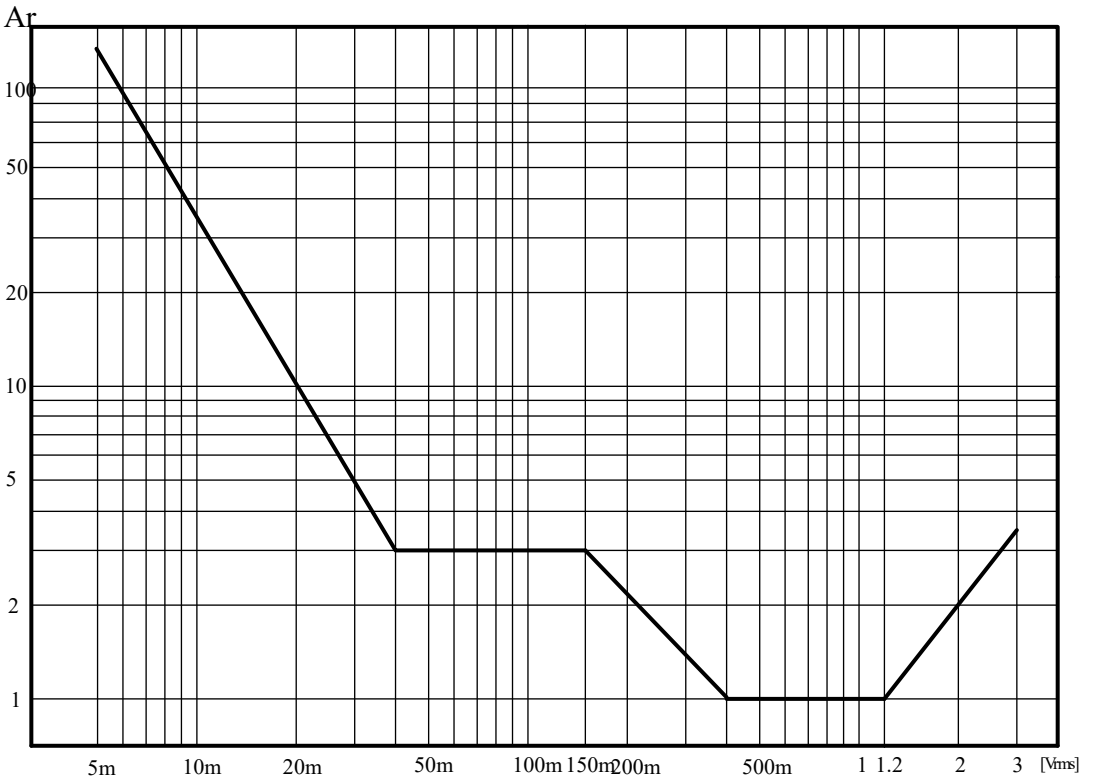
Figure 3-1 Basic measurement accuracy: A

Figure 3-1, in the junction line, can choose a smaller value. Figure 3-1, the value of the basic accuracy A selection method is as follows:

0.01 (Smaller value) is the value of A ,when $0.4V_{rms} \leqslant V_s \leqslant 1.2V_{rms}$ and the test speed is SLOW or MED.

0.1 (Larger value) is the value of A ,when $0.4V_{rms} \leqslant V_s \leqslant 1.2V_{rms}$ and the test speed is FAST .

Test level correction factor: Ar, According to Figure 3-1 select the basic accuracy A, A multiplied by Ar to get the level correction of the basic measurement accuracy. Here, Vs is the test signal voltage.



Basic accuracy level correction factor

Table 3-4 Impedance scaling factor :K_a、K_b

speed	frequency	K_a (Zm < 500Ω)	K_b (Zm > 500Ω)
MED, SLOW	fm<100Hz	$(\frac{1\times10^{-3}}{\lvert Z_m\rvert})(1+\frac{200}{V_s})(1+\sqrt{\frac{100}{f_m}})$	$\lvert Z_m\rvert(1\times10^{-9})(1+\frac{70}{V_s})(1+\sqrt{\frac{100}{f_m}})$
	100Hz≤fm ≤100kHz	$(\frac{1\times10^{-3}}{\lvert Z_m\rvert})(1+\frac{200}{V_s})$	$\lvert Z_m\rvert(1\times10^{-9})(1+\frac{70}{V_s})$
	fm>100kHz	$(\frac{1\times10^{-3}}{\lvert Z_m\rvert})(2+\frac{200}{V_s})$	$\lvert Z_m\rvert(3\times10^{-9})(1+\frac{70}{V_s})$

FAST	fm<100Hz	$(\frac{2.5\times10^{-3}}{\lvert Z_m\rvert})(1+\frac{400}{V_s})(1+\sqrt{\frac{100}{f_m}})$	$\lvert Z_m\rvert(2\times10^{-9})(1+\frac{100}{V_s})(1+\sqrt{\frac{100}{f_m}})$
	100Hz≤fm ≤100kHz	$(\frac{2.5\times10^{-3}}{\lvert Z_m\rvert})(1+\frac{400}{V_s})$	$\lvert Z_m\rvert(2\times10^{-9})(1+\frac{100}{V_s})$
	fm>100kHz	$(\frac{2.5\times10^{-3}}{\lvert Z_m\rvert})(2+\frac{400}{V_s})$	$\lvert Z_m\rvert(6\times10^{-9})(1+\frac{100}{V_s})$

Here，fm：Test frequency . [Hz]

Zm：Measured impedance. [Ω]

Vs：Test signal voltage .[mV_{rms}]

Table 3-5 Temperature factor: K_c

Temperature （℃）	5	8	18	28	38
K_c	6	4	2	1	2	4

Table 3-6 Calibrated interpolation factor : Kf

Test frequency	Kf
Typical frequency （Direct calibration）	0
Atypical frequency （Interpolation calibration）	0.0003

Note:At present, all types of frequency point is the typical frequency.

Table 3-7 Cable length factor

Test signal level	Cable length		
	0m	1m	2m
0.1Vrms ,0.3Vrms	0	$2.5\times10^{-4}(1+0.05fm)$	$5\times10^{-4}(1+0.05fm)$
1Vrms	0	$2.5\times10^{-3}(1+0.016fm)$	$5\times10^{-3}(1+0.05fm)$

Here,fm is the test signal frequency. [kHz]

Appendix: Parameter list

Test frequency	MCR-8100H : 20Hz – 1MHz , Minimum 0.0001Hz step MCR-8200H: 20Hz - 2MHz, Minimum 0.0001Hz step MCR-8500H: 20Hz – 5MHz , Minimum 0.0001Hz step
parameter	| Z|, |Y|, C, L, X, B, R, G, D, Q, θ ,DCR
Basic accuracy	0.05% , (0.1% for DCR test)
equivalent circuit	Series & parallel
Mathematics function	Absolute deviation, Percentage deviation
Range	Auto, Hold, Manual selection
Trigger mode	INT, MAN, EXT, BUS
Speed （≥1kHz)	FAST: 75 times/second, MED: 12 times/second, SLOW: 3 times/second
Average	1—255
Delay Time	0—60s
Calibration	open / short / load
Test terminal	Five terminal
List scan	10 point list scanning function
Comparative function	eleven BIN sorting function（BIN1~BIN9,AUX,OUT）
Multi parameter test	Yes
Display mode	Direct, Δ, Δ%, V/I
Monitor	800 x 480 RGB, 7 inch LCD TFT display
Output impedance	30 Ω, 100 Ω, 10 /100, 10 /CC
Test level	5 mV－2V , Accuracy：10% (Customizable maximum 10V) Constant level：10 mV－1 V Accuracy：5%
DC bias source	0V，1.5V，2V，Accuracy：1%
Display range	
|Z|, R, X	0.01mΩ — 99.9999 MΩ
DCR	0.001 mΩ — 99.9999 MΩ
|Y|, G, B	0.00001μS — 99.9999S
C	0.00001pF — 9.99999F
L	0.00001μH — 99.9999kH
D	0.00001 — 9.99999
Q	0.00001 — 9999.99
θ (DEG)	-179.999º — 179.999º
θ (RAD)	-3.14159 — 3.14159
Others	
size	375mm(W) *135mm (H) *350mm(L)
Net weight	About 7.2 kg

Warranty Card

What the warranty covered:

If the machine break down due to its defectiveness, MATRIX will provide free maintenance during warranty period. If the machine break down due to wrong operation or carelessness, then Matrix provide paid service within warranty period.

How long does this warranty last:

This warranty lasts for 3 years from the date of original purchase of all MATRIX branded products.

Who is covered:

This warranty covers only the original purchaser of this product. This warranty is not transferable to subsequent owners or purchasers of this product.

What do customers need to do to get repairs/service under the warranty policy?

If the machine get problem, please contact our local distributor. If you cannot find the local distributor, you can contact us directly, our email is service@szmatrix.com, our telephone No. is 0086 755 2836 4276.

What information do customers need to supply?

Model No.	
Serial No.	
Problem description	
Picture	
Video if necessary	