Guarantee

The tester has been tested and checked by the company and assure that its performance and specification have reached a certain level.

The company guarantees one-year normal use of the tester from the date purchased in the company or distributors; the company will provide repair for free in circuit faults except the malfunctions resulted by following reasons:

1. Operation without following the operation steps or orders in the handbook;

2. Self-modification or adjusting.

Attention

1. **Warming-up before using:** when starting the instrument, you must warm up for more than 10 minutes to make the parameters of the inner circuit be stable and then user can make test.

2. **Zero and clearance function:** When using 20mΩ and 200mΩ ranges, you must clear it to zero and then test, other ranges doesn't need. Before test, the range shall be selected first, and then clamp the test clips properly such as "S+" with "S-", "D+" with "D-". If the instrument does not display Zero, please push the "OK/Clear".

For adopting four-terminal test method, user shall make "S+" directly contact with "S-", "D+" directly contact with "D-"when clearing to zero, so that two metal clips with leads contact directly, and two without lead contact directly. Otherwise for the over high plus of the instrument, the instrument will display extremely unstable base in the two ranges of 20mΩand 200mΩ.

3. **In the range of 20mΩand 200mΩ, instrument shall not be open circuit for a long time:** at this moment, the output test terminal is clamped at 0.8V, if it is open circuit for a long time, then tester cannot display "Over Range" in open circuit state when the range is shifted to high-resistance range, but the numbers jumping randomly.

4. **Discerner of current range:** There are 9 ranges from 20mΩto 20MΩin all. In order to choose right range, user shall learn how to distinguish the current range in the instrument. Firstly to see the digits of decimal and then the unit, if the current decimal digits are two（000.00），unit is mΩ, then the current range is 200mΩ.

5. For the calibrated parameters of all the inner components are stored in the integrated circuit AT24C02, user cannot replace them randomly; otherwise it will make the test imprecise for the parameters are different from stored ones.

Table of Contents

Chapter 1 Brief Introduction

CS2512 is an Intelligent DC Low-ohm Tester (Test for short hereinafter) is mainly used for test all kinds of resistance. It can test from 1μΩ to 2MΩ, CS2512A from 10μΩ to 200kΩ and CS2512B from10μΩ to 20kΩ

The tester adoptes constant current source as test power source, especially applies in the detection of contact resistances with all kinds of contacts and the checking and Comparator of resistors. The micro-resistance has high resolution（1 μΩ）, its test range is from 1μΩ to 2MΩ. The tester can be widely used in resistor producting factroies and researching and producing departments of white goods.

Characteristics of the tester:

1. Wide test range of resistance:
     CS2512: 20mΩ～2MΩ 9 ranges（display from1μΩ to 2MΩ）
2. Alterable measuring speed：Slow：3mea/sec   Fast：10mea/sec
3. High accuracy: basic error：±（0.05％readout+2counts）
4. Two display ways：Resistance value or percentage value
5. Panel key-press clearance function
6. RS232 interface
7. HANDLER interface

Chapter 2 Technology specification

1. Range and error voltage:

（18℃～28℃   RH≤75%）

Range	20mΩ	200 mΩ	2Ω	20Ω	200Ω	2kΩ	20kΩ	200kΩ	2MΩ
Accuracy	±0.1%+3	±0.05%+2							±0.1%+3
Open-circuit voltage	＜1.0VDC				＜4VDC				
Resolution	1μΩ	10μΩ	100μΩ	1 mΩ	10 mΩ	100 mΩ	1Ω	10Ω	100Ω
Temperature Modulus	100ppm	50ppm							100ppm

Note：CS2512 test range 1μΩ～2MΩ 9 ranges（display from1μΩ to 2MΩ）

2. Display：Maximum 20000 counts，character mode LCD，two lines display in all, each line can display 20 characters maximally (Character is 5*7 lattice).

3. Test terminal：4 terminals（2 voltage detecting terminals, 2 current drive terminals）.

4. Ranging Mode：Auto/Manual

5. Comparator：R/R%

6. Measuring speed(Mea/sec)：Fast: 10/s，Slow: 3/s。

7.Temperature：Working temperature：0～40℃，Storage temperature：-40～+75℃。

8. Humidity：0～85%R.H.。

9. Power：220V，50Hz

10. Weight：4kg

11. Warming-up time: 10 minutes

Chapter 3 Working theory

CS2512 Intelligent DC Low-ohm Tester is mainly made up of constant current source, voltage detecting, A/D convertor, CPU, display and keys etc.(Ref. picture1). Its basic working theory is to add the DC current generated by constant current source to the under test resistor, and then test the voltage of its two terminals, display the test value from CPU which processed the data A/D convertor sent. Thus it can be seen that this method eliminates the effect of contact resistance and improves the test accuracy.
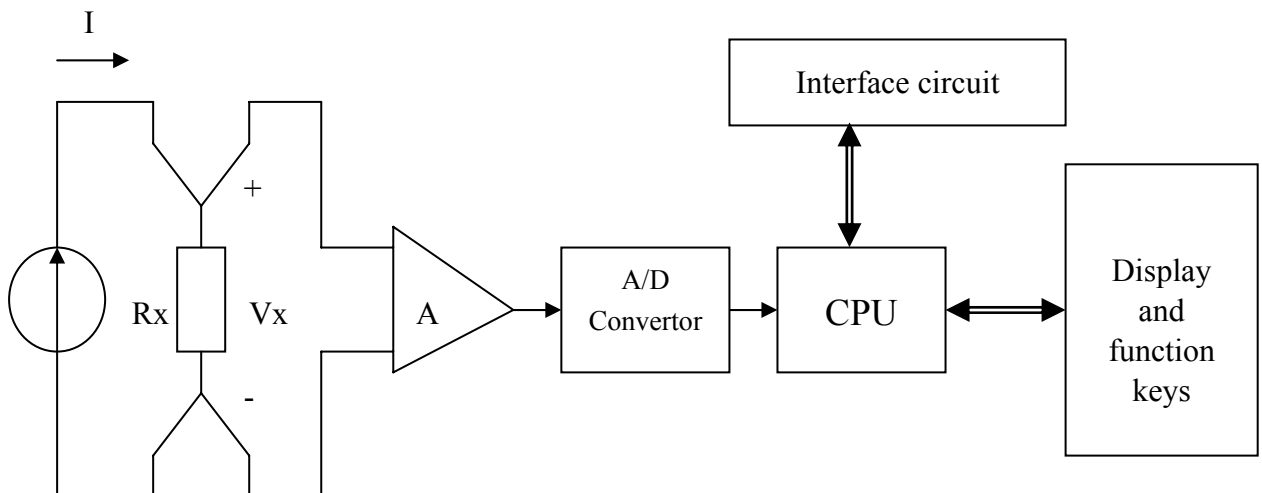
Chapter 4. Keys and indicator on front panel

1) Front panel statement

Keys and indicator on front panel and display
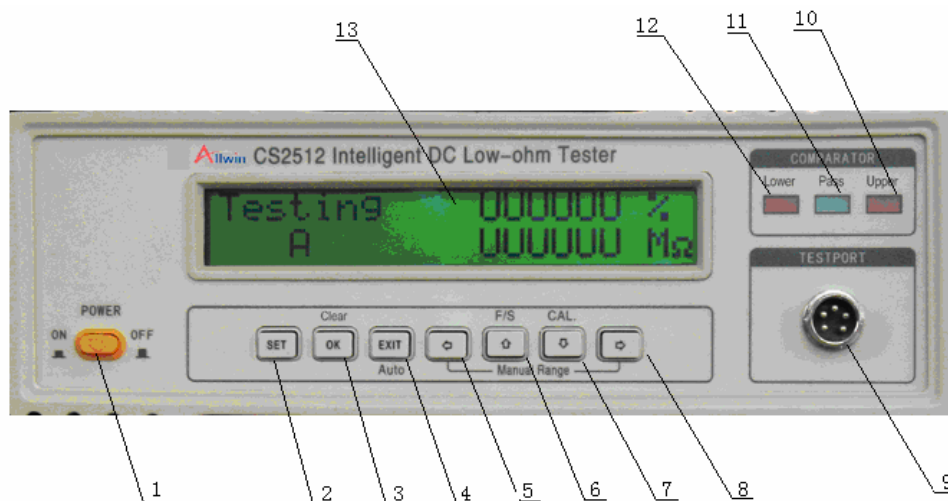
1. ON/Off -Power switch；

2. SET；

3. OK/Clear--Confirm/Clear (2nd function)；

4. EXIT/Auto (2nd function)；

5. Left/Manual Left key (2nd function)；

6. F/S--Up/Measuring speed key(F/S) (2nd function)；

7. CAL.--Down/Calibration (2nd function) ；

8. Right/Manual Right key (2nd function)；

9. Test port—Terminal for DUT；

10. Upper—Upper limit indicator light；

11. Pass—Eligible indicator light；

12. Lower—Lower limit indicator light；

13. LCD display;

2) Functions of keys and display

① ON/OFF-Power switch

Power switch is on the lower left of the instrument, it is used to open or close the power source.

② Data setting keys

The 7 keys can be used to set the test data.

● SET-Setting key（**1**）

Enter the data setting state, press it can enter "Comparator" state to set the parameters.

● Data inputting keys（**4**）

＜   Left key to set the digits of data

＞   Right key to set the digits of data

∧   Adding value in the digit

∨   Decrease value in the digit;

● Data confirmation key（**1**）

Input the setting value to memorizer;

● Exit setting key **（1）**

Pressing "EXIT"，the system will exit the setting and enters test.

③ **Second function key**   In testing, there are following functions: Confirmation key is Clear key:

● **Clear（Data confirmation）**

In the test range of 200mΩ and below, user shall clear first and then test, other range has no need to clear. Before test, the range shall be selected first, and then clamp the test clips properly such as "S+" with"S-", "D+" with"D-". If the instrument does not display Zero, please push the "OK/Clear". Then "C"will appear in the left side of LCD to express "clear". If user wants to cancel clear, please push "clear"key again, then "C" will disappear.

● **Auto key（EXIT）**

In the state of Manual range shift, in order to return back to Auto range shift test state, pressing **Auto** key can make it work. At this moment, "A" will appear in the left side of LCD to show "Auto".

● **＜Manual left key（＜Left）**

In the test state of Auto range shift, press it will enter Manual range shift test state and make the decimal move left for a digit, the resistance unit on right will make relevant change, meanwhile, display will show"H" in the left side to express"Hand".Each pressing of the key will make the decimal move left for a digit.

● **＞ Manual right key（＞Right）**

In the test state of Auto range shift, press it will enter Manual range shift test state and make the decimal turn right for a digit, the resistance unit on right will make relevant change, meanwhile, display will show"H" in the left side to express"Hand".Each pressing of the key will make the decimal move right for a digit.

● **∧Fast/Slow（∧Increase）**

It is used to change the measuering speed, the default speed is"S-Slow", and "S"will appear in the left side and shine slowly while enters slow measuring. If the fast measuring is needed, then press **∧Fast/Slow,** "F"will appear in the left side and shine fast while enters fast measuring. If it needs returning to slow measuring,please press the key again.

● **∨ Calibration（∨ Decrease）**

Press∨calibration key can enter the calibration state to calibrate the intstrument according to calibration steps, press it again, it will return back to test state.

④ **Indicator light**

There are three indicator lights on the front panel.

- Upper-Upper limit indicator light. The light turns bright means the tested resistance goes beyond the set limit value, the tested resistor is eligible.
- Pass-Eligible indicator light. The light turns bright means the system is eligible and Buzzer rings.
- Lower-Lower limit indicator light. The light turns bright means the tested resistance goes under the set limit value, the tested resistor is disqualified.

⑤ **LCD display**

The display adopts 20X2 character Liquid crystal module. It has several different display menu according to instrument's working state. Please refer to Operation statement part.
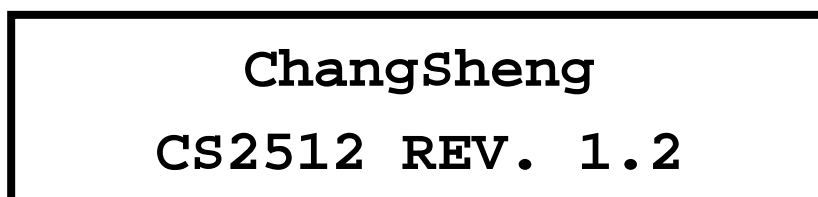
⑥ **Test port-Terminal for DUT**

On the lower right side of the front panel, there is a test terminal which is used to connect with the tested resistor.

Chapter 5 Operation steps

Firstly insert the enclosed power wire into the power socket on the rear board of the tester, and then connect the other end to the AC 220V power supply. Having finished all the preparation for starting, you can get power through after detecting connection.

1 ） **Starting**

Press the power supply button, the LCD screen turns bright, all the 3 LED indication lights shine once, while the Buzzer sounds one by one. LCD screen displays the following welcome page:

```
    ChangSheng
    CS2512 REV. 1.2
```

The upper line in the menu shows the company name, lower line displays the type of the instrument and the version of the software. After about 2 seconds, LCD display enters the preset menu for opening (Refer to the picture). It expresses the tester is under test.

```
Testing          UUUUUU %
S    A          XX.XXXmΩ
```

First line"UUUUUU" is the error of the tested resistor, in the state of comparator, the error of test resistor is showed.

Second line"XX.XXX" is the resistance value of test resistor in random,"Ω" is the unit,as well as"mΩ"、 "Ω"、 "kΩ"、 "MΩ", or when the test terminal opens circuit, LCD display shows overflow （UUUUUU）.

```
Testing           UUUUUU %

S    A         UUUUUUMΩ
```

The tester defaults in "Slow" and"Auto" two test states.

（1） Automatic Range Shift test: In the state of above "Default", connected the test clips to the two terminals of the resistor, the testing value can be read in the second line of the display. If you want to accelerate the test, you can press ∧ **Fast/ Slow** to get the result, while the left side of the second line will appear the turn from "S" into "F" with quick flash.

（2） Manual Range Shift test: You can move "＜" Left or "＞"Right to choose the proper test range according to the value of resistor under test. At this moment, please pay attention to the match of decimal and the unit of resistance value. Having selected the range, please connect the test clips to the two ends of the resistor under test; the test value will be displayed in the second line of the display. If you want to accelerate the test, you can press ∧ **Fast/ Slow** to get the result, while the left side of the second line will appears the turn from "S" into "F" with quick flash.

As the ranges are 20mΩ and 200mΩ， you must clear it before test. When you press "Clear" key, the display will show the character "C" on the left of the second line, that's to say the instrument has been cleared. Taking the current value as its OFFSET value, you can get a net one after deducting the OFFSET value. If you want to cancel the clearance, press the key once again, then the "C" disappears. The "clear" mode is only limited to the Manual Range Shift test in the range of 20mΩ and 200mΩ.

```
Testing           UUUUUU %

S    A   C       00.000mΩ
```

（3） Comparator test：Pressing "SET" , you can set Continuous（Irace）or Single （Shoot）test, select the proper test range via ∧ **Increase** or ∨**Decrease** according to the resistance value of the Resistor under test, such as its Criteria value（R Criteria）、 Upper Limit value (R Upper)、Lower Limit value（R Lower. After pressing "OK", Tester can enter Comparator test while pressing "EXIT", LCD shows the error value of the resistor under test in the first line, the test resistance value of resistor under test in the second line and the concerned LED indication light turns bright on the right side of the instrument. If the test value is between the Upper and Lower Limit range, the green "Pass" light turns bright and

buzzer sounds; if the test value goes beyond the Upper Limit range, the red light "Upper" turns bright without buzzer sound; if the test value goes beyond the Low Limit rang, the red light "Lower" turns bright without buzzer sound either. If you want to exit the Comparator test, press "EXIT" is available to return to the general test state.

2）**Comparator Parameter setting：**

Pressed "SET" , the LCD will display a list of two lines characters (See below) ,it means the system is under the function setting state.

```
Irace

Shoot
```

The"Irace" refers to internal trigger selection, it is generally for static resistor selection; the"Shoot" refers to external trigger selection, it can be used in manual trigger or the trigger connected with mechanical processing equipment, each trigger with one test.

Press ∧ or ∨ can select "Irace"（Internal trigger）or "Shoot"（External trigger）mode.

Press the "OK" key again, LCD displays:

The first line in the picture"Choose R Rang：0"， refers to manual range setting, it is divided into (0~8) 9 levels， （2512A/B has 7 levels）. The second line"Rang：XXXXXX—XXXXXX XΩ"， shows the resistance measurement range.

```
Choose R Rang:          0

Rang: 02.000－20.000mΩ
```
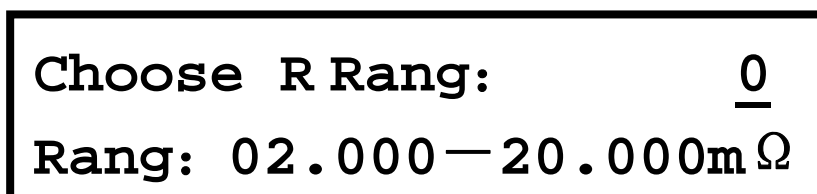
Pressing ∧ or ∨ can change the number on the cursor, each pressing of ∧ or ∨ with one level jumping among "0～8"， and then the content of the second line changes as follow. The corresponding relations are as following:

Level	Range	Unit
0	0～20.000	mΩ
1	020～200.00	mΩ
2	0.2000～2.0000	Ω
3	02.000～20.000	Ω
4	020.00～200.00	Ω
5	0.2000～2.0000	kΩ
6	02.000～20.000	kΩ
7	020.00～200.00	kΩ
8	0.2000～2.0000	MΩ

Chosen the range, preesing "OK" key will show following picture:

```
INPUT Mode:   1
0—R Value 1—Percent
```

To set the alert Upper and Lower Limit value as resistance value or error one, please refer to the following methods:

⑴ Press ∧ or ∨ can change the number on the cursor.

⑵ When the number is"0"，the set Upper and Lower Limit value is the resistance value.

⑶ When the number is "1", the input Upper and Lower Limit value is error value.

After selected, please press "OK" and the display shows:

```
R Criteria:   XXXXXXX Ω
Rang: XXXXXX－XXXXXXX Ω
```

In order to set the Criteria value of the resistance under test, please do as following:

（2） When the cursor is under some number（X），press ∧ or ∨ can change the number, each pressing of ∧ or ∨ results in one level change, changing range is"0～9".

（3） After confirmed, pressing ＜ or ＞ can move the cursor to the position of the under changing number, setting as above.

（4） After the Criteria value setting, press "OK" to enter the next layer with the LCD showing:

（If selected setting is for resistance value.）

```
R Upper        :   XXXXXXX Ω
Rang: XXXXXX－XXXXXXX Ω
```

This menue is for Upper Limit setting of the under sperate selecting resistor, the method is in below:

（1）When the cursor is under some number（X），press ∧ or ∨ can change the number, each pressing of ∧ or ∨ results in one level change, changing range is"0～9".

（2） After confirmed, pressing ＜ or ＞ can move the cursor to the position of the under changing number, setting as above.

（3） Other values need changing shall be operated as above methods.

（4）After the Upper Limit setting, press "OK" to enter the next layer with the LCD showing:

```
R Lower      :  XXXXXXX Ω
Rang: XXXXXX－XXXXXXX Ω
```

This menue is for Lower Limit setting of the under separate seletion resistor at this moment, the method is in below:

（1）When the cursor is under some number（$\underline{X}$），press ∧ or ∨ can change the number, each pressing of ∧ or ∨ results in one level change, changing range is"0～9".

（2）After confirmed, pressing ＜ or ＞ can move the cursor to the position of the under changing number, setting as above.

（3）Other values need changing shall be operated as above methods. （4）Finished the

Lower limit setting, Press"EXIT" to enter the Comparator state, LCD displays as

```
Testing        XXXXXXX%
S   A          XXXXXXX Ω
```

following:

（If chosen Upper or Lower Limit setting is error value）

This menue is for Upper Limit setting of the under comparator resistor's error, the method is in below:

（1）When the cursor is under some number（$\underline{0}$），press ∧ or ∨ can change the number, each pressing of ∧ or ∨ results in one level change, changing range is"0～9".

（2）After confirmed, pressing ＜ or ＞ can move the cursor to the position of the

```
R Upper      :  00.0%
Rang:       00.0－+50%
```

under changing number, setting as above.

（3）Other changes shall do according to above illustration, the maximum Upper Limit of error is 50%.

（4）Having finished the Criteria value setting, you can press "OK" to enter next layer of the menu. LCD display illustrates as following:

```
R Lower     :  00.0%
Rang:  -50.0－00.0%
```

This menu is to set the Lower Limit value for the under Comparator resistor's error. Methods are as following:

（1）When the cursor is under some number（0），press ∧ or ∨ can change the number, each pressing of ∧ or ∨ results in one level change, changing range is"0～9".

（2） After confirmed, pressing ＜ or ＞ can move the cursor to the position of the under changing number, setting as above.

（3） Other changes shall be made according to above illustration, the maximum Lower Limit of error is 50%.

（4） After Lower Limit value setting, you can enter the Comparator state by pressing "EXIT" , LCD display illustrates as following:

```
Testing      XXXXXXX%
S    A       XXXXXXX Ω
```

3） Handler interface signal specification（Handler）

Handler interface signal is a D-type 9-PIN optional equipment of connector,its output signal are in the below list:

PIN	Name	Statement
1	LOW	Low under error signal （＜Lower Limit）
2	HIGH	High beyond error signal (＞Upper limit）
3	PASS	Eligible（Good quality ）
4	EOT	Resistance test synchronization signal
5	EXT.TRIG	External trigger signal input(Low level trigger）
6	＋5V(VCC)	＋5V Power supply
7	N.C.	Not use
8	N.C.	Not use
9	GND	Ground terminal

Time distribution of Handler interface signal：
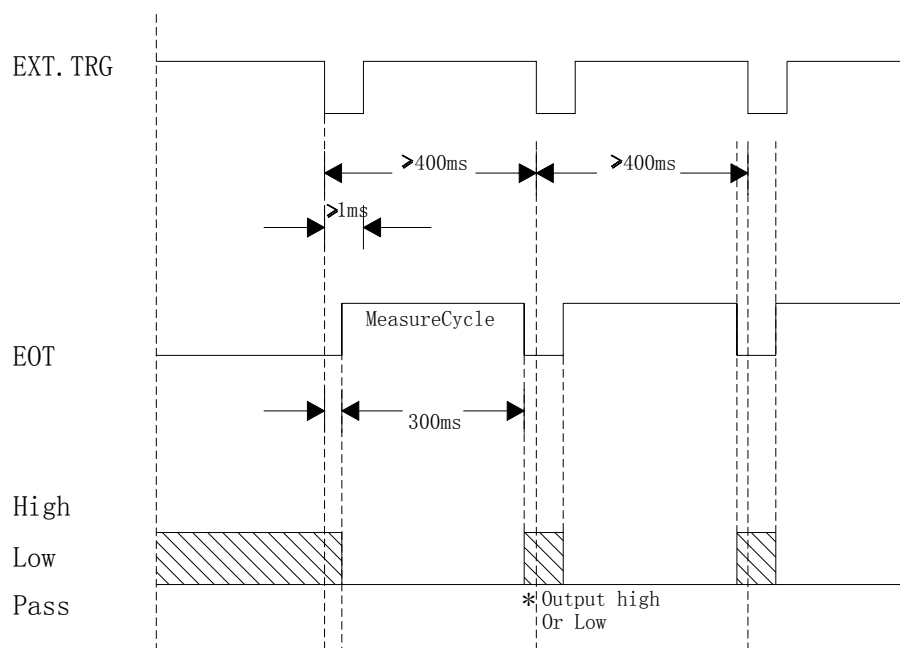
Handler Interface Timing picture

External trigger signal（EXT.TRIG）is triggering along the falling low level,but EOT is the test cycle of High level.

Handler interface signal can be made use of automatic test, while let the test components judge and test by themseves.

4）Calibration steps

（1） Open circuit voltage test：

Operating apparatus: a digital multimeter with 3 and half numbers,　　　accuracy ≥±1%.

Test steps：

a）Set the digital multimeter to DCV level, connect the test wires of CS2512/2512A to the two DCV ports of the meter.

b）Set　ther range of CS2512/2512A into 20mΩ level，next to 2MΩ level，and then record the open circuit voltage value when set into different resistance level.

Specification：20mΩ、200mΩ、2Ω、20Ω、200Ω、2kΩ、20kΩ、200kΩ、2MΩ, each open circuit voltage value ia samller than 5V.

（2） Accuracy calibration steps:

Operating apparatus: Standard resistances 10mΩ、100mΩ、1Ω、10Ω、100Ω、1kΩ、10kΩ、100kΩ and 1MΩ±0.01%　10ppm/℃。

Calibration steps：

a）After CS2512/2512A tester started, self-checked and warming-up for about 10 mins, the tester is set to 20mΩ level.

b）Connect the test wires of CS2512/2512A to the tester ports' socket, clamp the test clips in correct way (Be sure S+ contacts directly with S-，D+ with D-). If the displayed level is 0, please press "Clear" , otherwise the base at 20mΩ level will be instable.

c）After reset, clamp the clips to 10mΩ standard resistance and record the test result.

d）Set the range from 20mΩ to 200mΩ，reset again to test the 100mΩ standard resistance and record the test value.

e）Repeat shifting level, and test in sequence of 1Ω、10Ω、100Ω、1kΩ、10kΩ、100kΩ、1MΩ and so on standard resistances, and record their test values.

Standard Resistance	Indicative Tolerance range	2512 indication value	2512A indication value	2512B indication value	Error %
10mΩ	9.989～10.011		——		
100mΩ	99.94～100.06				
1Ω	0.9994～1.0006				
10Ω	9.994～10.006				
100Ω	99.94～100.06				
1kΩ	0.9994～1.0006				
10kΩ	9.994～10.006				
100kΩ	99.94～100.06			——	
1MΩ	0.9994～1.0006		——	——	

（3） Calibration

If the indication point goes beyond error in calibration, please calibrate as following methods:

a) Code

In the state of starting, press "∨"to enter the calibration, the LCD displays:

```
Password:

********
```

Calibration codes are"∧∧∨∨＜＜＞＞". If the input codes are correct, it will enter the next step, if wrong, it will have no operation. Please press "EXIT" to return to test.

b) Level selection

```
Choose R

Range:   0
```

Choose the level to calibrate in this menu, enter the next step after confirming.

c) 20mΩlevel、200mΩlevel and 2Ωlevel calibration

The calibration way is to find the straight line between two points, 20mΩlevel uses 1mΩ and 10mΩ, 200mΩ level uses 10mΩ and 100mΩ, 2Ωlevel uses 0.1Ω and 1Ω. Record the two points' value before calibrating when in testing. When calibrating, record the real test values of the two points. Take 20mΩlevel as example; firstly input the test value of 1mΩ in the first screen.：

```
R Criteria: 01.000 mΩ

Test Value: 01.000 mΩ
```

After Inputting the test value, it enters next step when pressing "OK".

```
R Criteria: 10.000 mΩ
Test Value: 10.000 mΩ
```

Having input the test value, it will return to level choosing by confirmation, and go back to test state via pressing "EXIT".

d)   Above 2Ω levels' calibration

All these levels shall adopt point to point calibration method, 19 points in all from 2~20. Before calibration, write down the test value of each point while testing. In calibration, input the corresponding test value in sequence. Take 2Ω of 20Ωlevel as an example:

```
R Criteria: 02.000 Ω
Test Value: 01.990 Ω
```

Having input the test value, press "OK" to enter the next calibration until all the 19 points have been input, and then you can return to level choosing by pressing "OK". In any state, pressing "OK" can return back to test state, if withdraw without confirmation, the input values are invalid.

（4） Handler interface test：

In order to ensure the Handler interface is normal for use, we suggest that you set up a testing circuit like following one which will help you finish the Handler test in a short time.
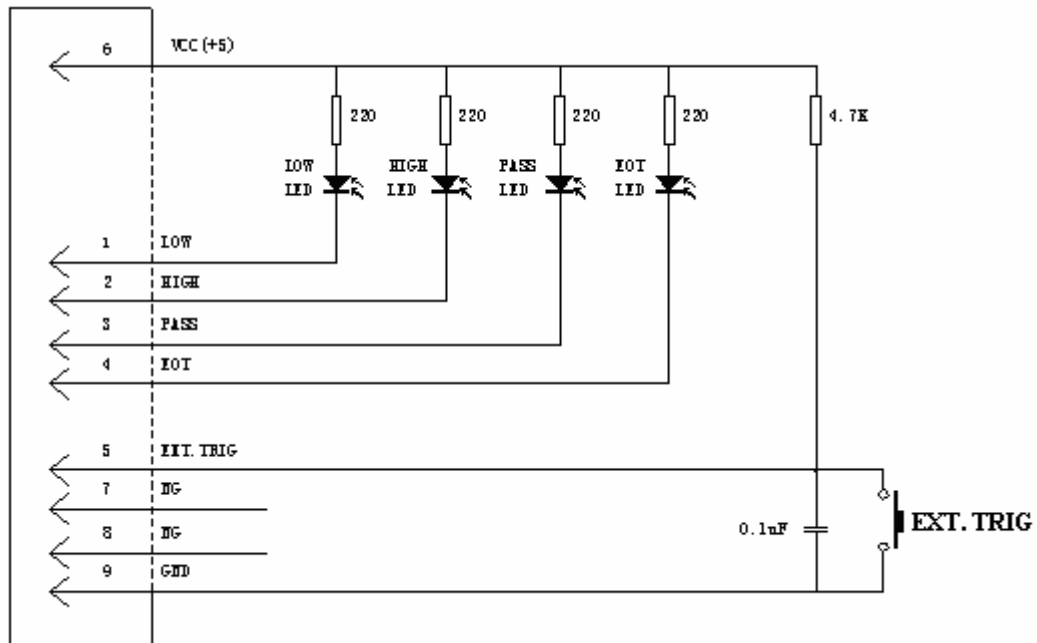
CS2512 Handler Interface function analog circuit

Connect the Handler analog circuit to the Handler interface of the instrument and set the Comparator criteria value, Upper Limit value and Lower Limit value and start it, then the results will be displayed directly in LOW、PASS and HIGH on the LCD in the analog circuit. so we can tell whether the Handler interface function is normal.

Chapter 6. Notice before use

1）Preparation

For the first using of this instrument, user must read the operation manual in details to acknowledge of the methods, or guide by people who is familiar with this tester. If any problem happens, please ask for help from somebody who know it or contact with the company.

2）Warming up

Please remember to warm it up for 10 minutes before testing which can assure the normal use.

3）Warning

Don't open circuit for a long time when tester is in the range of 20mΩ and 200mΩ.

4）Emergency disposal

Under such circumstance in use, such as striking fire in the instrument,smoking, smelling and so on, please cut off the power immediately and ask professional staff to deal with it. Notice: The repair of the instrument shall be taken over by professional personnel,or the maintenance station of the factory or distributor.

7. Accessories and Maintenance

Accessories：

1.	Power supply wire	1pc
2.	Test fixture	1set
3.	Operation manual	1pc
4.	Quality Warranty	1pc
5.	Product certification	1pc

Please open the package and check the above contents when received the instrument. If any shortage happens, please contact with the company or distributor.

Maintenance:

1.   Maintenance period：The instrument is warranted to be free from use for a period of 12 months from the date of shipment to the original end users in different sales spots.

2.   Maintenance：Please bring forth the warranty card while maintaining. The company provides lift-long maintenance service to all the shipped instruments.

3.   In this period, user is responsible for the maintaining fee if the

instrument is damaged by improper operation.

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