OPERATION MANUAL

CH9720 Series Programmable DC Electronic Load

BEICH

BEICH ELECTRONIC TECHNOLOGY CO.,LTD.

Note：

The manual is available for CH 9720 Series Programmable DC Electronic Load

Any information contained in the manual is subject to change without notice
The latest version can be downloaded from our website：
http://www.beich.com.cn

June, 2017 ……..1st Edition
September, 2017……..2st Edition

Declaration

The descriptions contained in this manual may not cover all information about this instrument. Introductions to the improvements of the instrument in performance, function, internal structure, outer appearance, accessories, packing material, etc. are subject to change without notice. If you find any inconformity of this manual with our instruments, please contact us for further consultation by the address listed on the cover.

Content

Chapter 1 Unpacking

Thanks for your purchase, please inspect the packing list along with the product, if anything missed, please contact us.

1. 1Unpacking

Inspect the shipping container for damage after unpacking it. It is not recommended to power on the instrument in the case of a damage container.
If the contents in the container do not conform to the packing list, notify us or your dealer.

Standard Accessary	QTY	Note
CH972X DC Load	1	According to order
Power plug	1	Different in different countries
Fuse	2	250V/1A,Slow-Blow
Manual	1	
Test report	1	

1. 2Power supply

Inspect the following items：

	Requirement
Voltage	220/110(1±10%)V AC
Frequency	47～63Hz
Max. Power consumption	30VA

1.3 Fuse ⚠

Specification：250V/1A (Slow-Blow),5×20mm
The fuse is a standard configuration, so use the included custom fuse please.

1. 4Power connection

1) Power supply: 90V to 240V (dependable on the voltage setup on the rear panel).
2) Power supply frequencies: 50Hz and 60Hz
3) Power supply power range: ≤30VA
4) L (line wire), N (neutral wire) and E (earth ground wire) of the power supply input socket should correspond to the power plug of the instrument.
5) The instrument has been specially designed for decreasing noise jamming caused by the input in AC power terminal, but it is also recommended to use it in the environment of low noise. If

noises cannot be avoided, install a power source filter please.

WARNING: To avoid injury to personnel and damage to the instrument resulting from electric shock, do sure that the earth ground wire is safely grounded.

1.5 Environment

1. Do not store or use the instrument where it could be exposed to many dusts, great vibration, direct sunshine and corrosive gas.
2. The instrument should operate under the temperature ranging from 0℃ to 40℃, relative humidity of no greater than 75%. For high accuracy, use the instrument in the environment above mentioned.
3. For high accuracy, do not block the left air vent so as to ensure good ventilation.
4. The instrument has been specially designed for decreasing noise jamming caused by the AC power input, but it is also recommended to use it in the environment of low noise. If noise cannot be avoided, install a power filter please.
5. If the instrument will not be used for a long time, please place it in the original or a similar packing box. The environment temperature should be kept in the range of 5℃ to 40℃, and the relative humidity should not be greater than 85%. The box should be located in an airy room where it could be exposed corrosive impurities and direct sunlight.
6. Test leads on the instrument that are connected to DUTs should be kept away from strong electromagnetic fields to avoid interference.

1.6 Startup

Press the start key on the left corner, then the power is connected, then self-inspection, load the configuration information and initialization.

Please remove the power plug from the socket when not using for long time.

Chapter 2 Description

2.1 Product introduction

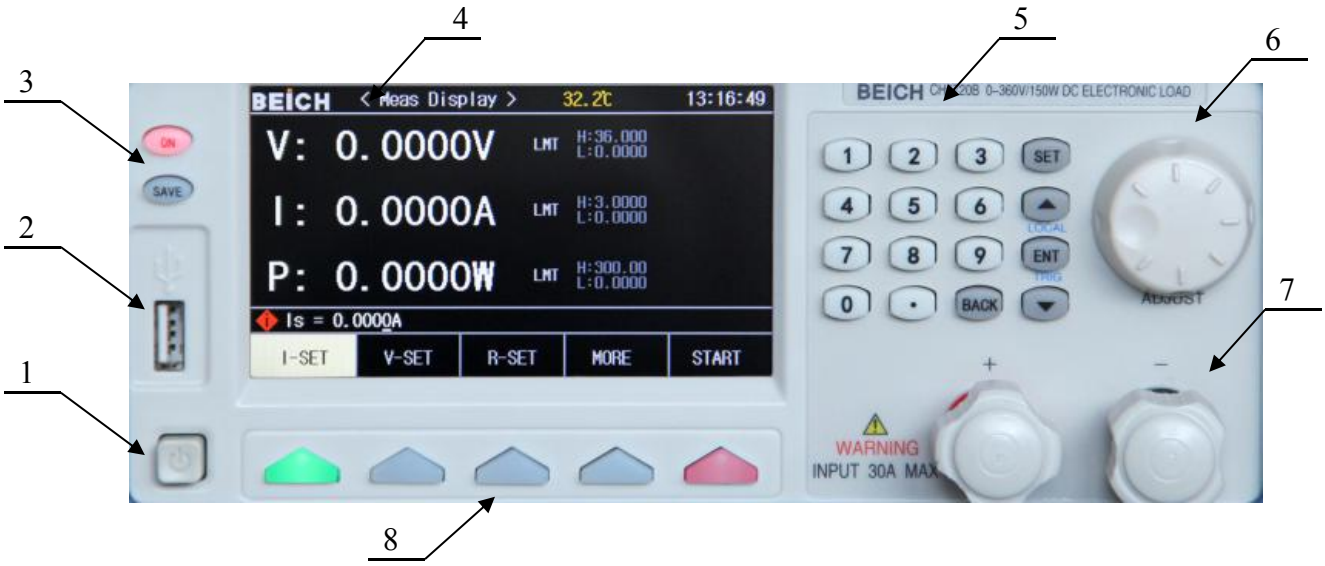
CH9720X series electronic load is the new generation high performance multi-function DC electronic load based on the professional accumulation in the field of electronic load and wide users. The high performance ARM processor with high speed sampling AD is adopted, so it can simulate the load feature of different power supply. 4.3 inch TFT display supports Chinese&English operation, matched with guided menu, make the operation easier. The displayed information is rich and direct. With the resolution of 0.0001, the voltage and current details can be monitored more accurate.USBHOST(available for 9720BU/9720CU) can be used to save data,also for firmware update. The comparator function with HANDLER interface can ensure the batch test and systemization test. The load function is rich: CC, CV, CP, CR, CR-LED(Simulate the characteristic of driver),battery discharge function(Display the real-time discharge curve), transient test(Test the dynamic output performance of power supply) , list test(Test the performance of the power supply under different condition). The flexible soft and hard frame can meet the demand of group test so that to improve the test efficiency. The smart fan control and excellent dispersion performance with the protection alarm steps like over voltage, over current, over power, over heat and reverse voltage polarity can make the instrument more reliable and safer. It is easier to connect with computer for real time sampling collection and control with SCPI.

The electronic load can be widely applied for the production line of power transformer, charger, switch power and battery, and the research field like lab.

2.2 **Technical parameter**

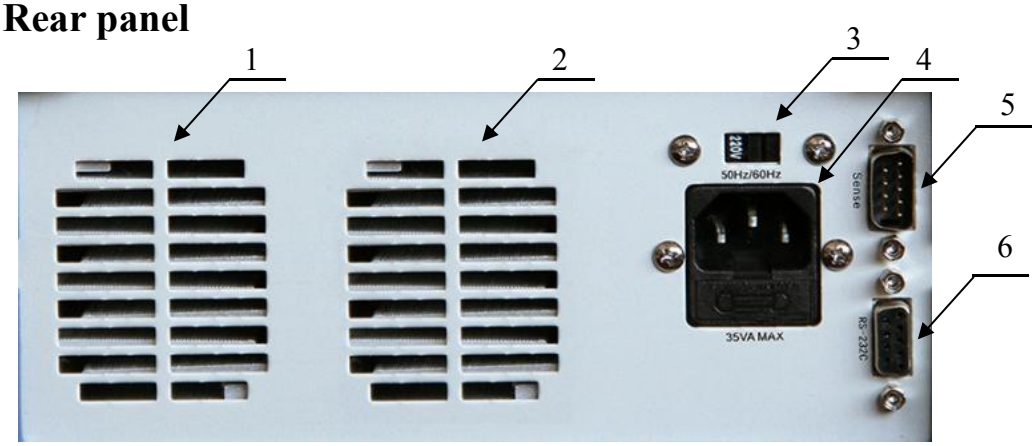
Model		CH9720B	9720BU	CH9720C	CH9720CU
Rated value	Input voltage	0~360V			
	Input current	1mA~30A			
	Input power	150W		300W	
	Range	Accuracy		Resolution	
Load accuracy	0-36V	± (0.05%+0.03%FS)		1mV	
	0-360V	± (0.05%+0.03%FS)		10 mV	
	0-3A	± (0.05%+0.05%FS)		0.1 mA	
	0-30A	± (0.05%+0.05%FS)		1 mA	
CV mode	1.5V-36V	± (0.05%+0.03%FS)		1mV	
	1.5V-360V	± (0.05%+0.03%FS)		10mV	
CC mode	0-3A	± (0.05%+0.05%FS)		0.1 mA	
	0-30A	± (0.05%+0.05%FS)		1mA	
CR mode(when input voltage and current ≥ 10%FS)	0.05Ω-5Ω	± (0.2%+0.2%FS)		0.001Ω	
	0.5Ω-50Ω	± (0.1%+0.1%FS)		0.01Ω	
	5Ω-500Ω	± (0.1%+0.1%FS)		0.1Ω	
	500Ω-5KΩ	± (1%+1%FS)		1Ω	
CP mode(when input voltage and current ≥ 10%FS)	0-50W	± (0.1%+0.1%FS)		1 mW	
	0-150W	± (0.1%+0.1%FS)		10 mW	
	0-300W	± (0.1%+0.1%FS)		0.1 W	
Voltage test accuracy	0-9.9999V	± (0.05%+0.03%FS)		0.1mV	
	10.000-99.999V	± (0.05%+0.03%FS)		1mV	
	100.00-360.00V	± (0.05%+0.03%FS)		10mV	
Current test accuracy	0-9.9999A	± (0.05%+0.05%FS)		0.1 mA	
	10.000-30.000	± (0.05%+0.05%FS)		1mA	
U-disk Data Save		Unavailable	Available	Unavailable	Available
U-disk Firmware update	Available				
Battery test function	Input voltage= 0.8-360V Max.Capacity= 999A/H Resolution=0.1mA Discharge time=1~*60000*sec				
Transient test mode	T1&T2 (Test time of value A or B): 0.1mS-999S Error＜2.5% + 0.1mS				
Protective range	＞rated condition 5%				
Input impedance	≥200KΩ				
Dimension	W*H*D 230mm*100mm*350mm				
Weight	CH9720B/BU 6Kg CH9720C/CU 6.5Kg				

2.3 Front panel



No.	*Name*	*Description*
1	Power	Turn on and off the load.
2	USB HOST	Connect USB disk. Support FAT16 and FAT 32.Firmware update, data storage and load, save screen imagine(Only available for CH9720BU/9720CU)
3	Operation	ON：Start up the load test. SAVE：Save the data to U disk, the light is blinding when data is recording (Only available for CH9720BU/9720CU)
4	LCD display	Display test result, condition and system information.
5	Input	Full-functional numerical keyboard, used to input data, or character for file name.
6	Knob	Right-left adjustment for setting data and menu operation
7	Input terminal： red is positive and black is negative	**ⓘ Reversed polarity input will cause big current, dangerous**
8	Soft key	The function of 5 keys is changed as function page, which is not fixed. In different menu, there is different function. The function is displayed on the top of the key .

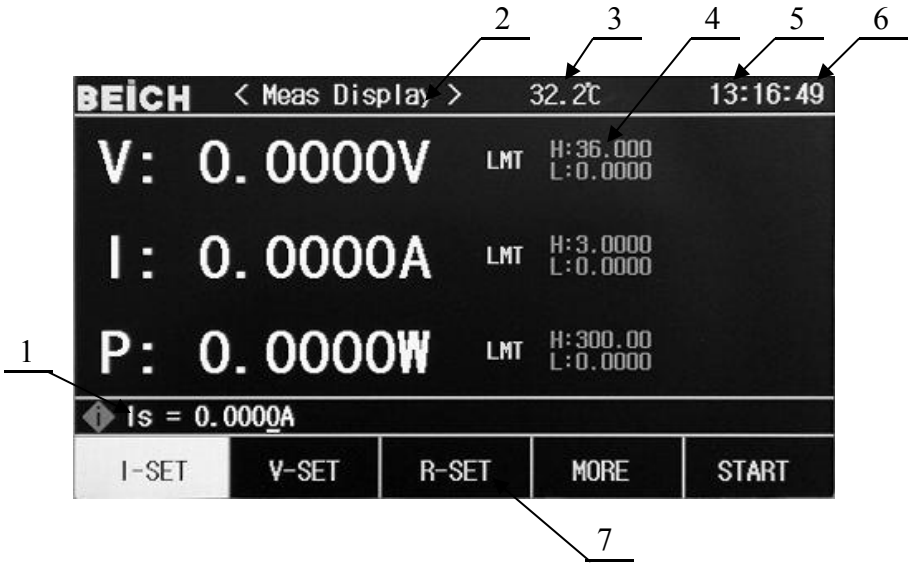
2.4 Rear panel



No.	*Name*	*Description*
1,2	Cooling hole	ⓘ**Please not block and keep cooling**
3	Voltage switcher	Switch 110V and 220V
4	AC input	1A fuse is inside of
5	Remote test and trigger input interface	The configuration of pin is referred to appendix A
6	RS232C interface	Communicate with external device, parameter setting and command can be set and obtained by PC to realize remote control.

2.5 Display

LCD display is divided into fixed zones, the information is as below.

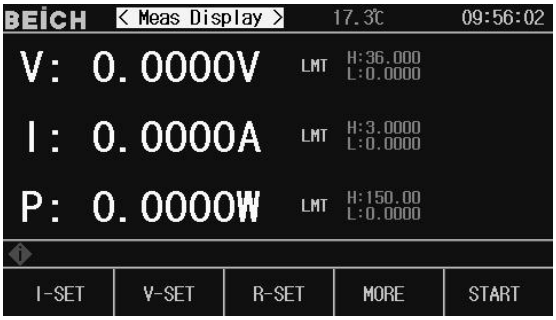


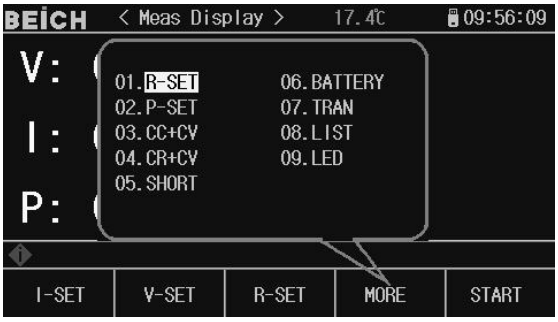
No.	***Name***	
1	Parameter setting and status indication	Parameter setting with load and help hints in menu setting
2	Primary parameter	Display real-time voltage, current and power
3	Internal temperature in device	Display the monitored internal temperature
4	Limit alarm setting value	Set the high and low limit in normal test model, alarm when over the limit, more details in 3.2.2
5	System display	Display system information by means of icon U disk is available； remote control；
6	Clock display	Display real-time clock, change the date and time in system interface or turn off the display.
7	Load mode	Select load mode

Chapter 3 Menu operation

In this chapter, the menu information and operation is described in details

3.1 Normal page



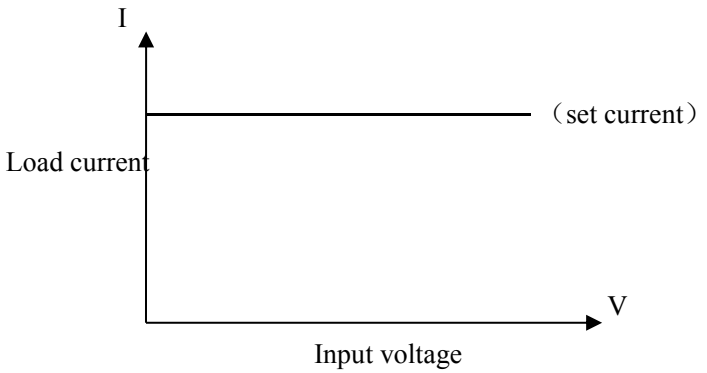


Name	Description
Constant current CC （Fixed）	No matter the input voltage is changed or not, the DC load consumes a constant current
Constant voltage CV （Fixed）	The DC Load consumes enough current to fix the input voltage in the set value
Flexible definition key	The item is flexible, which is decided by more options in menu
More	Press the key and there will be more optional pages, including CR， CP，CC+CV，CR+CV， SHORT，battery test, dynamic test, list test, LED test, scanning test, which can be selected by cursor or input number, after selection ,it will be displayed in the flexible definition key
Start	Turn on and off load

3.1.1Test operation in normal page

Constant current mode (CC)

No matter the input voltage is changed or not, the DC load consumes a constant current



Press 【CC】to enter CC mode, the key is light, input the current value, and the number is displayed in status bar 

and press 【Ent】to confirm. Press【Start】or【ON】to start the load test.

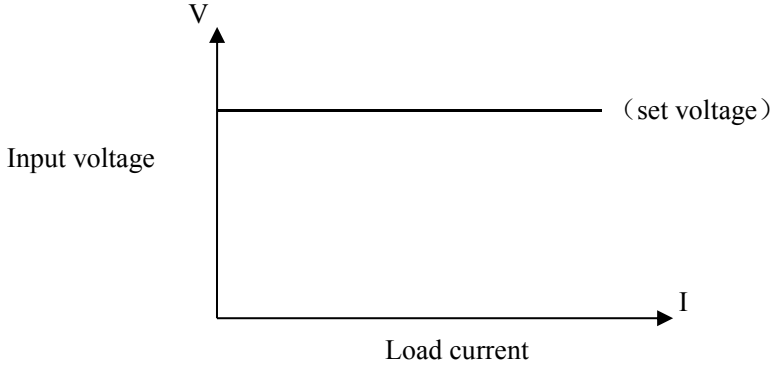
E.g.: Set current value to 1.2345A。

In CC mode, input 1.2345， and press【Ent】to confirm

In the load startup status, use【▲】or【▼】to move cursor, or knob to change the parameter, or use number key to reset the parameter, the load will follow up the changed value.

Constant voltage mode (CV)

The DC Load consumes enough current to fix the input voltage in the set value



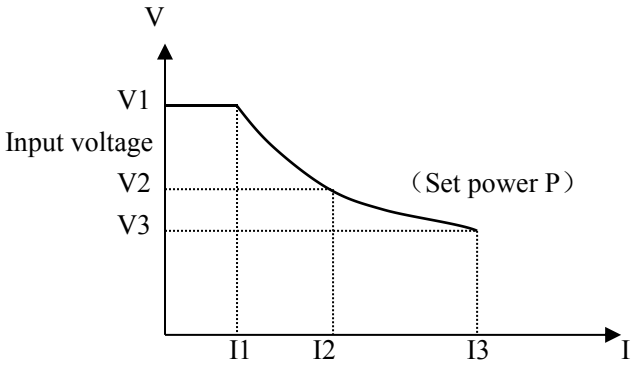
Note: Please refer to the current setting for voltage setting

Note：When the source voltage is smaller than set value, the load can't operate CV.

Note： The difference value of source voltage and set value lands on the source and lead resistance, then the load may consume bigger current!

Constant power mode (CP)

In CP mode, the DC Load consumes a constant power. When the input voltage is changed, the load adjusts current to maintain the power



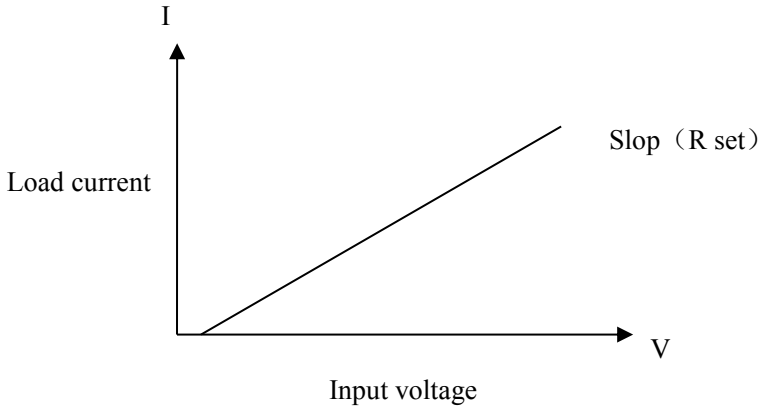
In other load mode, press【More】to enter menu to select power mode，and use【Start】to start or stop working.

When the load is not started, use cursor and knob to set value, or press【CP】to use number key to input the new value.

Note: Please refer to current setting to set the power

Constant resistance mode (CR)

In CR mode, load is equivalent as an constant resistance, load consumes the changed current as the change of voltage



Note: Please refer to the current set to set resistance

CC+CV mode

CC+CV mode is CC plus CV, which function is to protect tested source not to be damaged by over charge.

Setting and test：

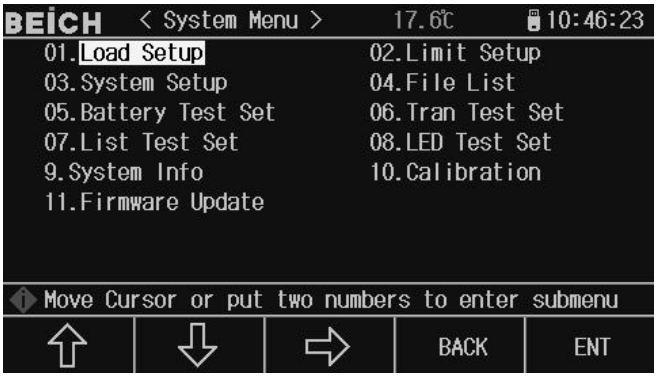
1. In more test mode, move cursor to CC+CV and press【ENT】to confirm，press【CC】to set current, press【CV】to set the parameter of CV.
2. Press start to test, if DC Load judges the current can be loaded to the set value, then the DC Load is in CC mode, if the source current can't be output to set value, then turn to CV mode, now the Max. Output current is displayed.

CR+CV mode

The function of CR+CV mode is same as CC+CV，please refer to the setting of CC+CV mode.

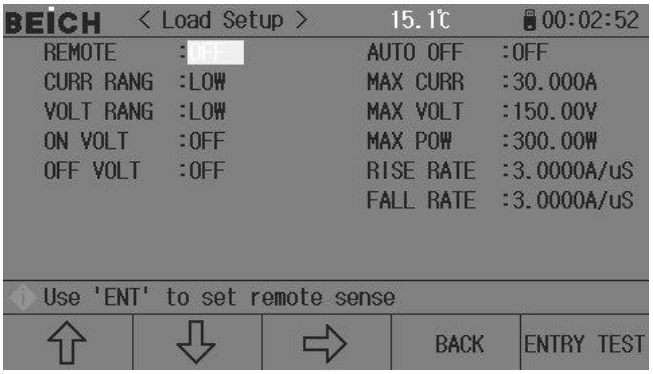
3.2 Set page

Press【SET】to enter the menu, use direction key, rotate knob to move cursor or input the front two numbers to enter the menu.



3.2.1Load Setup

Move cursor to select load, and press【ENT】or input 01 to enter



Remote test

In CV，CR，CP mode，the accuracy of voltage sampling affect the working accuracy of DC load. When the load consumes bigger current, there is voltage drop in the connection cable between tested sources to DC Load. In order to ensure the test accuracy, DC Load provides a remote test terminal on the rear panel; user can use it to test the voltage from output terminal.

Use【ENT】to change the setting, press【ENT】once, and ON and OFF is switched

Voltage remote test=On： turn on the remote test, the voltage is sampled from remote test terminal on the rear panel

Voltage remote test=Off：turn off remote test, the voltage is sampled from input terminal on the front panel

Note: the pin configuration of Sense interface is referred to appendix A.

Auto off

Auto off can be used in CV,CC,CP,CR mode. If delay off is turned on, the load will be off automatically after delay time in the unit of second.

Input number, and press【ENT】to confirm，0 is off

Note: unit is second（s），range1 ～ 99999s。

Note: if set value is 0 or closed to 0，then delay off is “Off”，which means the function is off.

Current range

For test accuracy, load current is divided as high and low range, in the system of Max.30 A, 0-3A is low range, and 3-30 A is high range, in the system of Max.60A, 0-6A is low range and 6-60A is high range.

Use 【ENT】 to switch，when switching to low range, the Max. current is adjusted to 3A or 6A（60A system）。

Note: Press【ENT】to switch range

Max. Current

There are 2 functions of Max. load current：

1. The set current value（Is=）is limited below Max. current；

2. In CV，CP，CR and short test, when the load current is over the Max.current, the device alarms and display over current protection （OC），if the current lasts to over Max. current, the load will be off.

Note: Input number to set Max. Current, and press【ENT】to confirm.

Voltage range

For test accuracy, the load voltage is divided to high and low range, in the system of Max.150V, 0-18V is low range, 18-150V is high range, in the system of Max. 500V, 0-50V is low range; 50-500V is high range.

Use【ENT】to switch，when switching to low range, the Max. voltage is adjusted to 18V or 50V（60A system）.

Note: press【ENT】t o switch range.

Max. Voltage

There are 2 functions of setting the Max. Input voltage：

1. The set CV value（Vs=）is limited below the Max. Current；
2. The DC Load alarms when the input voltage is over the Max.voltage and display “Exceed Voltage!!!”，and the load is off；

Note: Input number to set Max. Voltage, and press【ENT】to confirm.

Max. Power

It means the Max. Power that the load can consume, if the real consumption is over the value, the device alarms and display（OP），and may cause the load is off.

Note: Input number to set Max. Power, and press【ENT】to confirm.

On voltage

The Min. Startup voltage can be used in CV, CC, CP and CR mode. If Min. Startup voltage is turned on, after load, once the input voltage is less that it, load is on hold and display “。。。。”，once over it, the load is started.

E.g.: If the Min. Startup voltage is set as 1.25V，select the Min. startup voltage and input【1】【.】【2】【5】，press【Ent】to confirm，the default unit is V.

Note: If the set value is 0 or closed to 0, the Min. startup voltage is “Off” which means the function is off.

Note: In list test mode, if set the startup voltage then the self startup function, when the device judges the input voltage is higher than the set voltage, list test is on, and off when the list test is finished, which can realize the auto test without using keyboard .

Off voltage

The Min. off voltage can be used in CV, CC, CP and CR mode. If the auto cut-off voltage is turned on, after load, when the input voltage is less than it then the load is off

Note: The setting is same as Min. Startup voltage.

Note: If the set value is 0 or closed to 0, the Min. startup voltage is “Off” which means the function is off.

Rise rate

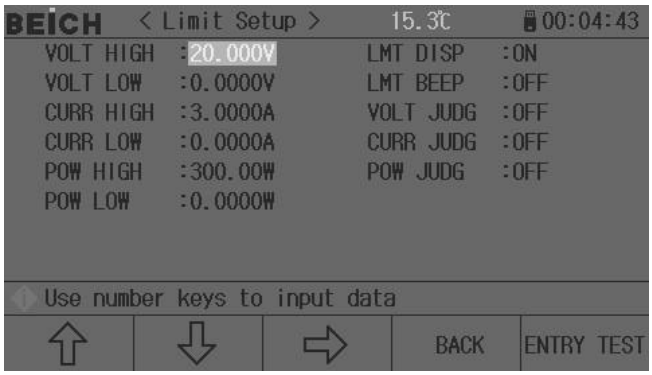
Used to set the rise speed, which to decrease the over current shock under some condition. Input data and press【Ent】to confirm，the Max. set current is 3.000A/uS。

Fall rate

Used to set the time from the normal working to unload. Input data and press【Ent】to confirm，the Max. set current is.000A/uS。

Note: After all setting is over, then press【ENTRY TEST】to the main test page or press【BACK】.

3.2.2 Limit Set



On this page, the voltage, current and power parameter can be set, and display the result in the test interface. If over the set value, then display in red.

Note: Mover cursor to the set position, input number and press【Ent】to confirm, list judge can be set on or off by pressing【Ent】，after setting, press【ENTRY TEST】to the main test page or press【BACK】.

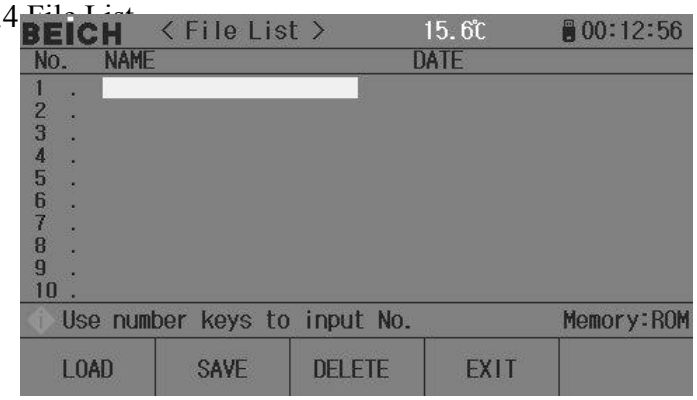
3.2.3 System Setup Page

On the page , the system style and application can be set，press【Ent】to switch the menu，input umber to set date and time then press【Ent】to confirm

Menu	Secondary Menu
Theme	GRAY
	CYAN
	BLACK
	BLUE
Trigger Source	（MAN）:Triggered by“TRIG”key
	（EXT）:External trigger，triggered by Sense on the rear panel
	（BUS）:Triggered by command via RS232C interface
Language	中文
	ENGLISH
Comm mode	RS232C
	USB-CDC
	USB-TMC
Poweron set	Default
	Last
Local Addr	Input number and press【Ent】to confirm
Key sound	On
	Off
Baud rate	4800 9600 19200 38400 57600
Key loack	On Lock 0-9 key when ON
	Off
Multi Mode	SEPAR
	MULTI
Knob Lock	On
	Off
Defaul Mode	Reset Restore to factory setting after confirmation, please be note
Acquis Freq	Used to set the sampling time for USB storage
Date	Input number key to press【Ent】to confirm，move cursor to next

	item
Time	Input number key to press【Ent】to confirm，move cursor to next item

3.2.4 File List



Save and load

By this function , the parameter can be saved, and the setting can also be saved to internal ROM or external USB storage， the test result and screen shot can be saved to external USB storage

Save

The function is as below：

- Save the revised data and setting；
- Save the setting parameter and system parameter；
- Save the setting to internal ROM storage or external USB storage by means of file；
- Save the screenshot to USB storage；
- Save test result to USB storage（Data recording）.

Load

After save, then realize the following load function：

- Auto load the revised data and setting；
- Load the setting parameter；
- Load the system parameter；
- Load the setting file in internal ROM storage or external USB storage；

Saved Media Type

The saved media is as：

Type	Function
Internal RAM （ Powered by Battery）	Save the test parameter and system configuration
Internal FLASH ROM	Revised data and setting, setting file

External USB storage（U disk）	Setting, screenshot and data recording

Note: on File list page, input serial No. directly，0-100 is RAM，above 100 is U disk，the storage type is displayed on the right side of operation bar, input the file code and press save key to save.

U disk file structure

After U disk is connected with device, the device will organize and use the folder and file based on the pre-confirmed structure.

Table：

Type	Extension name	Max. File*1	File routine*2
Setting	EST	500	\CH9720\SETUP
Data recording	CSV	200	\CH9720\DATA
Screenshot	GIF，BMP，PNG	200	\CH9720\IMAGE
Update	36U	10	Root Directory

Note*1. The Max. numbers that use the same extension name； note*2. The folder is different as different models.

Note：***The folder is created by tester automatically; the file name is same except the firmware file***

USB storage should fit FAT16 or FAT32 system，and use FAT16 or FAT32 to format.

If tester can't identify the U disk, please use another one.

Note：***Beich is not responsible for the data loss caused by the USB device***

Save file to U disk

After USB device is connected with USB(HOST)，then use【SAVE】to save the test result or screen shot to U disk.

Save the test result to U disk

On any page, press【SAVE】key then 【PICTURE】【DATA】 is displayed，press【DATA】to save the test result to U disk in the form of CSV，press 【PICTURE】to save the screen shot，【SAVE】key is blinding in process of saving，press【SAVE】 key again to finish，in【PICTURE】【SAVE】key is keeping blinding and off after saving，then you can open or use the file in PC.

Each CSV or TXT file, Max. 65536 lines of test data can be saved, once reach the Max. data, the tester will stop recording automatically.

Warning：in process of writing data, the U dike is forbidden to be removed, otherwise the U disk or file system will be damaged.

Note：***Data file is numbered in the sequence of BEICH000~BEICH199，user can't appoint and revise the file name；in data writing, U disk will take some time, in such process, there maybe a short-time response stopping.***

Under the conditions below, the data recording is discontinued：

- Fail to write to U disk
- Data line over range

Save screen shot to U disk

On any page, the displayed contents in screen can be saved to U disk in the form of picture based on BMP format. Then the file can be used in PC after storage.

☞**Screen shot save procedure：**

Step 1：Connect U disk，then there is U disk picture when connection is succeed；

Step 2：Select the page ；

Step 3：Press【SAVE】key, then【PICTURE】【DATA】key is displayed，press【PICTURE】to save，【SAVE】key is lighting and off after save, then the screen shot can be saved to U disk in the appointed format

Note：***Screen shot file is numbered in the sequence of BEICH 000-BEICH 199，user can't appoint and revise the file name.***

File list

Test Setup file

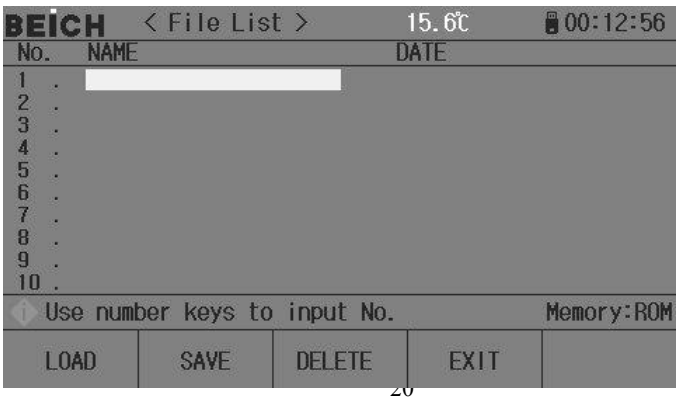
Test setup about the parameter for testing, the parameter includes: current page（or page before entering the file list)；all setups on test setup page；all setups on limit setup page.

The tester organizes a file from the setups above, which can be saved and loaded completely, meanwhile, can appoint the name to the saved file, name is saved as file.

Test setup files can be saved in the following medias by serial number：

Media	Serial No.	Function
Internal RAM（Powered by battery）	0	File is unknown, save timely, load automatically
Internal FLASH ROM	1~100	Save and load by file list
External USB storage	101~550	Save and load by file list Save position：\CH9720\SETUP*1 File name：51.EST~550.EST

Save/Load test setup



The information in file list：

Character	Description
No.	Display the serial No. of the saved file，1~100 is internal ROM，101~550 is external USB storage Use cursor or input number to select the file： 【SAVE】is used for the media selection
NAME	Display the note of the setup file, which is used to name the setup file，not mean the file name saved in U disk.
DATE	Display the system time in save
Memory	Display the valid memory media, and switch according the file number

☞Use cursor to move the character, and select the file number, then press function soft key to operate：

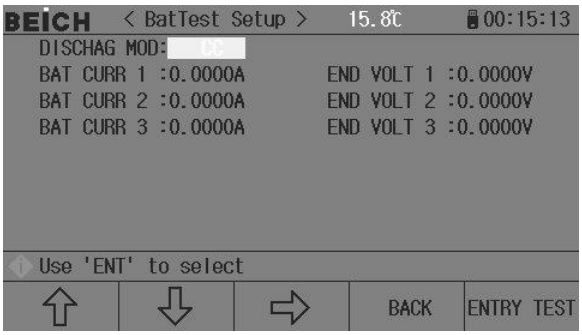
Soft key	Function
LOAD	Available when file existing, load the appointed setup file Confirm when loading.
SAVE	Save the test setup parameter, input file name before saving， or confirm directly in the default<Unnamed> to name

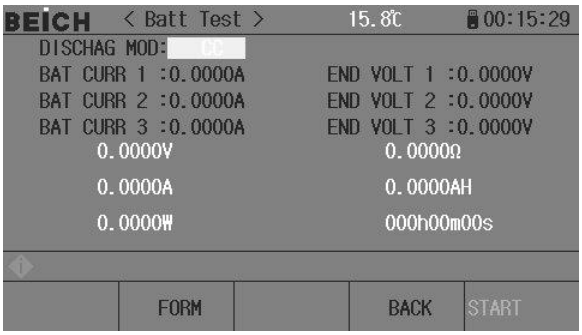
---

Note：*File name here is actually the note of the test setup file!*

DELETE	Available when file existing, delete the appointed setup file Confirm when deleting
EXIT	Exit the file list, back to the page before file list

3.2.5Battery Test Set





Discharge mode can work by means of CC or CR to test the discharge time and capacity of the power supply like battery. In the process of discharging, the voltage of battery is following, when the input voltage is less than the set value, discharge test stops automatically, then the load can display the discharge time and capacity. The tester can set Max. 3 bins of discharge current & end voltage in order to simulate the situation that the battery works in different current application. Discharge current 1 will switch to 2 to 3 when reaching certain conditions, so when setting the end voltage, it should follow the voltage falling grads, end voltage 3 can't higher than 2 or 1.

Battery test setting procedure：

Step 1：select DISCHAG MOD，press【ENT】to select CC or CR；

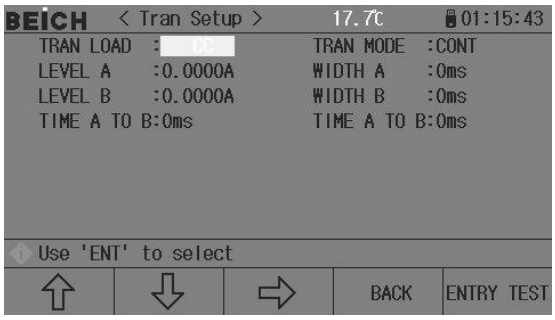
Step 2：set the discharge current and end voltage, input number to press【ENT】to confirm；

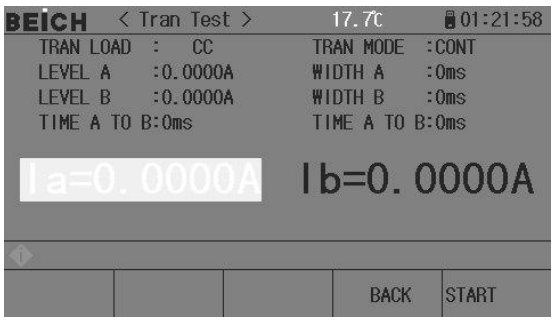
Step 3：press key to enter test, now the load is in discharge mode, press START to run, in display, discharge voltage, current, power, resistance, capacity, discharge time are displayed, after discharge, press FOAM to display the discharge curve.

Note：the discharge parameter can be saved in U disk simultaneously, insert U disk in testing, then press【SAVE】to select the data, now all discharge data is recorded in U disk, and the discharge curve can be saved in the form of picture.

Note：The foam can only be displayed after discharge, now press foam to check the complete discharge curve

3.2.6 Tran test (Dynamic Test)





In tran test, the load can switch 2 kinds of voltage or current, which can test the dynamic feature of power supply.

Tran test procedure：

Step 1：Select tran load, press【ENT】to select CC or CV：

Step 2：Select tran mode，input number key to press【ENT】to confirm；

CONT：load switches automatically after delay time；

TRIG：pulse is unavailable, load switches in trigger signal

PULS：load works by value A，after triggering, switch to value B, delay pulse B back to value A；

Step 3：set the value of point A，after entering menu A, input number directly to press【Ent】, unit is depended on the load type is A or A or V.

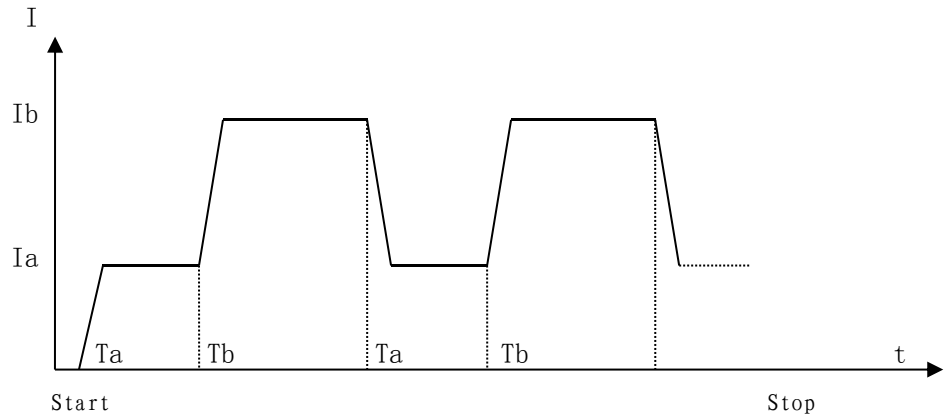
Step 4：set the pulse of point A，after entering pulse A, input number directly to press【Ent】 to confirm，the unit is 1ms.

Step 5： set the value and pulse of point B

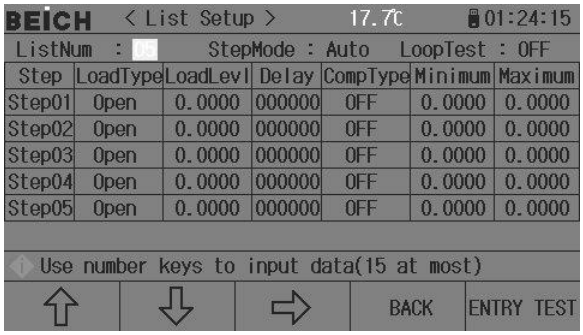
Step 6：set the edge AB and BA，set the load time from point A to B, press 【Ent】to confirm, the unit is ms.

Step 7：when the set is over, press ENTRY TEST to test page and press Start to test

When the tran test is started, load will switch from value A and B, and hold the pule width of A and B.



3.2.7 List Test



List test can realize the auto switch in different load mode based on set time

For the power supply and charger, by means of multi parameter test, it can know the working feature that the tested product works in different application.

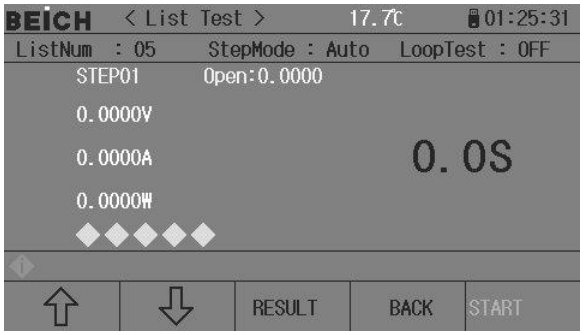
The tester can set Max. 15 steps of load with different types or size，single auto test time 1 ～ 60000s， and can compare the parameter of current, voltage or power to judge the test result （PASS/FAIL），all test steps is passed then it is PASS，any step is failed, then it is FAIL.

In list test mode, set the Min. start voltage, then it can test automatically in the whole procedure without any operation. When the load judges there is a voltage higher than Min. start one, then the test starts, and stops when the test sequence is finished

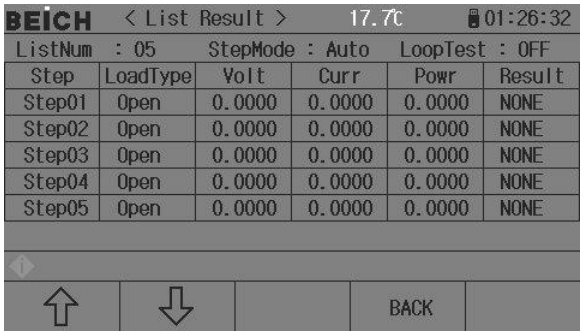
Name	Secondary menu	
List Num	Press number to input total steps and press【Ent】to confirm，Max. 15 steps	
Step Mode （press【Ent】to switch）	Auto：after delay time, switch to next step	
	Trig：after delay time, switch to next step after trigger signal	
Loop test （press【Ent】to switch）	On：Loop test until press Stop key	
	Off：Stop according to set step	
	Open	
	Short	

Load type	CC	Press【Ent】to select
	CV	
	CR	
	CP	
Load level	Press【Ent】to confirm	
Delay	Input number and press【Ent】to confirm，unit is 0.1s	
Comp Type	Off：not compare test data	
	In Volt：compare test data in voltage	
	In Curr：compare test data in current	
	In Pow：compare test data in power	
Minimum	Input number to press【Ent】to confirm	
Maximum	Input number to press【Ent】to confirm	

Note: move cursor to enter test page after all data is finished

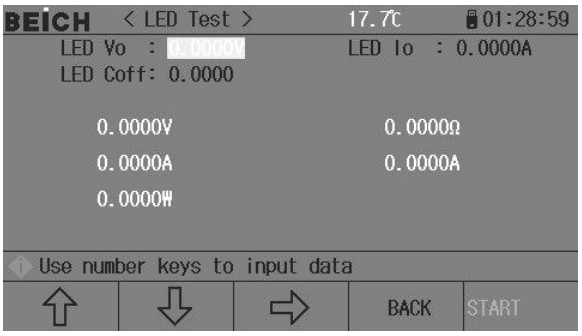


Note: enter test page to start test, the page displays the test and compare result of current test step.



Note: on test result page, the test data and compare result of each step is displayed

3.2.8LED Test

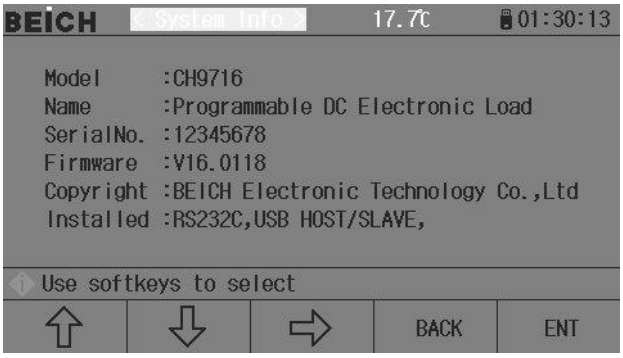


In CR-LED, it can simulate the feature of LED light， by adding the on-state voltage of diode, it can fully simulate the working theory of diode, which can make the voltage and current to reach a normal stable value and avoid the instability or shake caused by voltage and current in traditional CR mode, then reflect the actually situation of LED driver with load

Parameter	Description
LED Vo	Output voltage reference value of LED power supply
LED Io	LED rated output current
Rd Coeff	Rd factor ，usually set as 0.1-0.3

Press Start to test after all parameter is set, the voltage, current, resistance and power value are displayed.

3.2.9 System Info

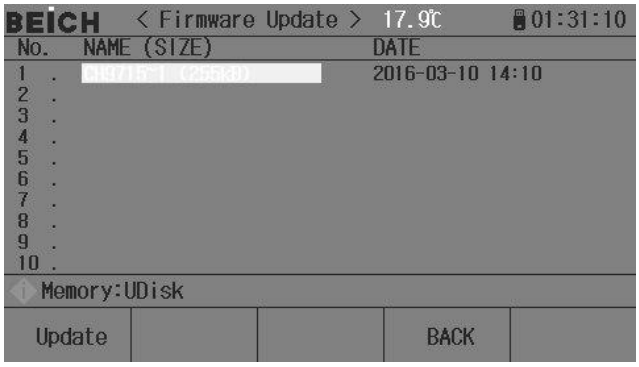


Display the full system information and installed module of the tester, any change is unavailable

3.2.10 Calibration

The calibration is used for data inspection before-delivery, it needs password to enter.

3.2.11 Firmware update



When the U disk is connected to USB(HOST)，then start the update.

The firmware can be easily updated, any problems, please contact Beich

☞Update procedure：

Step 1：Download the firmware file, the name includes the model，and extension name is 97F. If it is ZIP, release the file；

Step 2：Copy to the root directory of formatted FAT32 or FAT16 U disk；

Step 3：Turn on the tester，and insert the U disk to USB-HOST interface.；

Step 4： When U disk is installed, ,select “UPDATE”, on update page, the firmware file is listed(Max. 10 files), the file name is displayed by model and update time.

Note：***Only 10 update files can be displayed, delete invalid files in PC***

Note：***Any files meet the update format can be displayed, only after identification, the tester can install.***

Step 5：Use cursor to select the update file and press “UPDATE”；

Step 6： When the update is confirmed, tester identifies the file, if pass, the update file is installed into FLASH ROM. Restart automatically after update，

Check the latest firmware version in “System Info”.

Note： The power can’t be cut in procedure of update, otherwise the tester hardware will be damaged, then send back to us to repair

Appendix A　Remote test and trigger

A1 Remote test

When the load consumes big current, then there is voltage drop between tested power supply to the connection cable of load, which will affect the test accuracy. In CV, CR, CP mode, the voltage sampling accuracy will affect the accuracy of load.

The aim of remote test is to test voltage on the input terminal but on the 2 test cables connected.

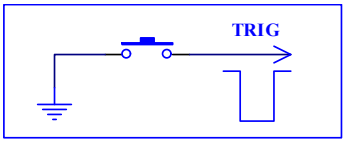
The 2 sampling cables are via the Sense interface on the rear panel

Turn on the remote test in setting.

A2 External trigger

There are 3 trigger modes of manual, external and bus and the external trigger is on Sense interface.

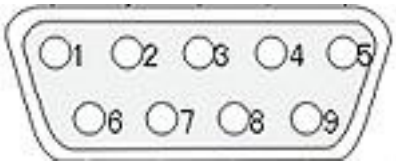
Input a low level with the width less than 100us on the input terminal to trigger one time.



The shake of switch may cause trigger also.

A3 Pin configuration

The DB9 core pin type connector is used in Sense，the function of pin is as：



ⓘ **Pin** 6 and 7is used for sense, pin 6 is the positive terminal and 7 is negative terminal,please note.

ⓘ **Pin** 5 and 9 is used for trigger, no any external power supply!

ⓘ **Pin** 4 and 9 is used for external start， no any external power supply!

ⓘ **Pin** 1 and 3 is used to output pass signal， no any external power supply!

ⓘ **Pin** 2 and 3 is used to output fail signal， no any external power supply!

Appendix B Remote control

The main content of this chapter is: remote control by RS232 interface, USB-CDC or USB-TMC, the interface can't be used at the same time. They share the standard SCPI command list, but with different hardware configuration and protocol. Only the use of interface is introduced in this chapter, please refer to CH9720 program protocol for command.

A.1 RS232C remote control system

RS232C Bus

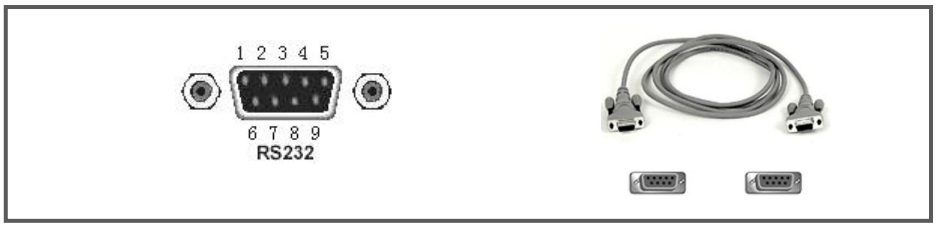
Although RS-232C can be replaced by USB communication, but it is still applied in industry and PLC control. The standard RS232 interface adopts 25-core connector (Discontinued) and 9-core connector.

As most serial interfaces, the serial interface of CH9720 is also not strictly based on RS-232 standard but only uses the smallest subset of this standard. The signals are listed in the following table.

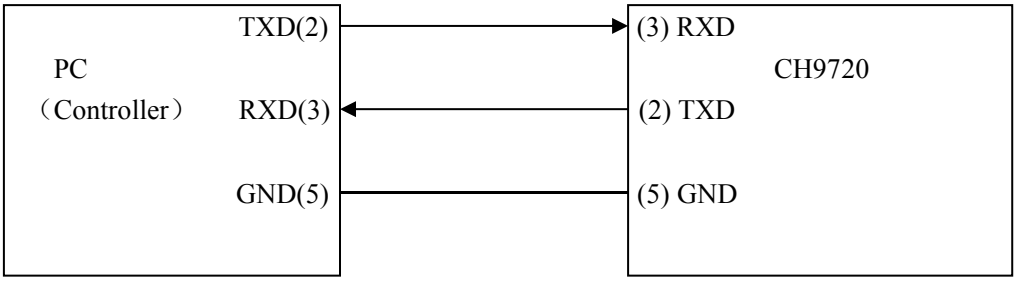
Signal	Code	Connector Pin Number
Transmitted Data	TXD	2
Received Data	RXD	3
Signal Ground Common	GND	5

RS232C configuration

The instrument uses 9-core pin type DB connector, the right picture is the connection cable：



Use RS232 interface to connect to PC, the basic solution is：



RS232C parameter

Transmission mode	full-duplex asynchronous communication including start bit and stop bit
Baud Rate	1200bps，9600bps，19200bps， 38400bps ，115200bps
Date Bits	8 Bits
Stop Bits	1 Bit
Parity Bit	None
Endof Sequence	CR、LF、CR+LF
Tie mode	Software
Connector	DB9

A.2 USB remote control system

USB communication is one of widely-used way.

USB Bus

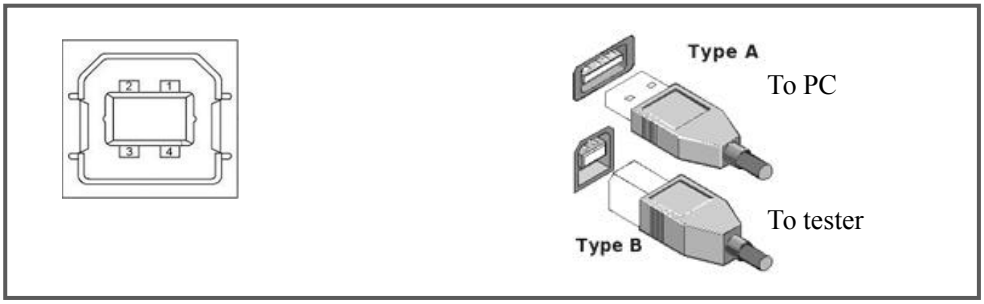
USB (Universal Serial Bus) remote control system controls the instrument through the USB interface. This connection conforms to USBTMC-USB488 and USB2.0 protocols.

USB-CDC(Communication), the tester is considered as COM（Vcom），which can realize the same communication way as RS232C

USB-TMC（Test&measurement）, the protocol is based on USB to realize the communication with USB device by means of GPIB.

USB Configuration

USB-DEVICE adopts USB-B type connector，USB cable is USB A-B type：



After tester is connected to PC by USB, then it can work after installing the 将 driver.

USB-CDC

After USB-CDC is selected, the procedure is as below：

- First connection, the PC identifies the new hardware, and select “No, not now”
- Click “Next”，Select “From a list, or specify the location to install”：

- Then click “Next”， select the routine of BEICH Vcom and usbser.sys driver then click “Next”the installation is finished；
- Then you can check the USB CDC device and terminal No.：

Note：the driver of USB-CDC can be downloaded from www.beich.com.cn

When the installation is succeed, you can use RS232 to visit and control the 安装 tester, no need to install every time

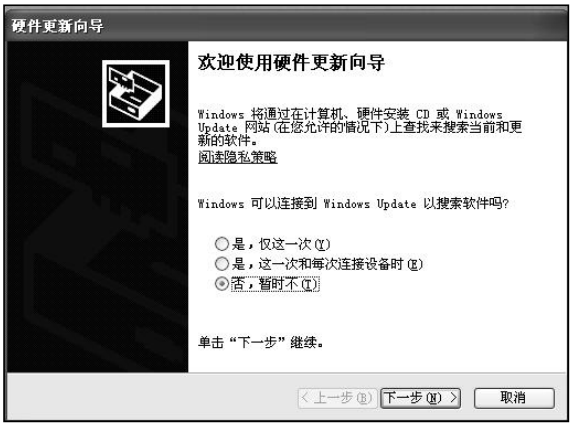
USB-TMC

If you want to use USB-TMC， please download and install NI-VISA from http://www.ni.com/china，which the USB TMC driver is included.

when connecting to PC by USB cable, the PC identifies the new hardware, and dialog box is jumped：

Select“No, not now”，and click next, if NI-VISA is installed, then “USB Test and Measurement Device” can be searched and displayed：

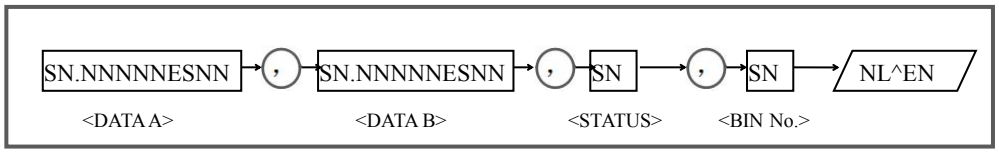
Select“Install the software automatically”，and click next, then “USB Test and Measurement Device”driver is installed. You can check the device in the device manager：



A.3 Data format

The tester transmits the test result to bus by means of ASCII code.

On the test, sorting, and test pass page, the output data is：



In the table above，“，” is the isolation code, NL is end character（0x0A），means the character is end； ^END is the signal of EOI in IEEE-488， the EOI signal is drove when sending end character by GPIB.

There is no such signal by RS232C、USB-CDC、USB-TMC.

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

● <DATA A> and <DATA B> output test result：

<DATA A> is test result of primary parameter，<DATA B> test result of secondary parameter，displayed in the format of index，and composed by 12 ASCII codes：

SN.NNNNNESNN（S：+/-，N：0 to 9，E：index）

● <STATUS> means test status, the normal return is 0，other is error

● <BIN No.>outputs the sorting result, as below：

Value	Result
0	No compare
1~3	BIN1~3
10	OUT
11	AUX
Other	Illegal output

If there is data query on the invalid test pate, the invalid result is output：

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