OPERATION MANUAL

CH9721P+/CH9722P/CH9723P+/CH9733P+

Quick Charge PD Automatic Tester

BEICH

BEICH ELECTRONIC TECHNOLOGY CO.,LTD.

Note：

This manual is suitable for CH9721P+ fast charge PD automatic tester
This manual is suitable for CH9722P fast charging PD automatic tester
This manual is applicable to CH9723P+ fast charge PD automatic tester
This manual is applicable to CH9723P+ fast charge PD automatic tester

The information contained in this manual may be revised at any time without notice.
The latest electronic documentation of the manual can be downloaded from the official website of Beich Electronics:
http://www.beich.com.cn

August 2017……..First Edition
November 2017 ……..Second Edition
October 2018 ……..Third Edition
May 2019……..… Fourth Edition
October 2020……5th Edition
January 2021……..Sixth Edition
October 2021 ……..Seventh 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.

Safety Warning:

Electric Shock Hazard

Beware of electric shock during operation, testing and maintenance of the instrument. Non-professionals are not allowed to open the case without authorization. If professionals need to replace the fuse or perform other maintenance, they must first unplug the power plug and do so with the company of a person.

Even if the power plug is unplugged, the charge on the capacitor may still contain dangerous voltages, and it should be discharged after a few minutes before operation.

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

Input Power

Please use the power supply according to the power supply parameters specified by the instrument. The power supply input that does not meet the specifications may damage the instrument.

Replace the fuse with the same specification

Keep away from explosions Sexual gas environment

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

Other safety matters

Please do not arbitrarily apply an external voltage source or current source to the test terminals and other input and output terminals of this instrument.

Do not input AC voltage at the input terminal.

During any process of using, operating and maintaining this instrument, be sure to observe all safety precautions. If you ignore and fail to observe these safety measures and the warnings in this manual, it will not only affect the performance of the instrument, but also lead to direct damage to the instrument, and may endanger personal safety. For the consequences of failure to comply with these safety precautions, Beich Electronic Technology Co., Ltd. will not be responsible for any consequences.

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
Main engine	1	According to order
Test connection board CH9721P-A1	1	CH9721P+ standard
Test connection board CH9722P-A1	1	CH9722P standard
Test connection board CH9723P-A1	1	CH9723P+/CH9733P+ standard
Fast charging bilateral test cable (double CC cable, 8 cores)	1	CH9722P/CH9723P+/CH9733P+ standard
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.

1.4 Power 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

As a new type of charger, fast charging is widely promoted in the market. This series of fast charging automatic testers integrates our company's professional accumulation in the field of electronic loads for many years and extensive customer feedback and needs. The latest new generation of high-performance multi-function program control DC electronic load.

The host adopts high-performance ARM processor with high-performance high-speed sampling AD; 4.3-inch TFT color screen supports Chinese and English interface, with well-designed guided menu, easy to operate; display information is rich and comprehensive, load operation and fast charging voltage selection are displayed at the same time; The higher display resolution of 0.0001 can more accurately monitor the voltage and current details of the product under test; USB HOST can easily use U disk for data storage and firmware upgrade; the comprehensive comparator function and HANDLER interface make the production line batch test and system. The chemical test is more guaranteed; it has rich and comprehensive load functions: constant current CC, constant voltage CV, constant power CP, constant resistance CR, battery discharge test (the screen can display real-time discharge curve), dynamic test (test power dynamic output performance) , list test (test the performance of the power supply under various load conditions); the flexible hardware and software architecture can meet the requirements of user-customized combined test functions, thereby improving the test efficiency of the production line; intelligent fan control and excellent heat dissipation performance, with Various complete protection and alarm measures such as overvoltage, overcurrent, overpower, overheating and reverse voltage polarity make the instrument more reliable and safe; all instruments are equipped with RS232 interface as standard, with a rich SCPI command set , which can be easily connected to a computer for real-time data acquisition and instrument control.

Electronic loads with superior performance can be widely used in power transformers, chargers, switching power supplies, various batteries and other industries in production line testing, product maturity and laboratory testing and research and development fields.

Main Feature

★ Built-in various fast charging protocol detection and deception: PD, QC, HUAWEI, OPPO, VIVO, SAMSUNG, MTK, etc.

★ Support CC line front and back test, PD packet comparison.

★ Support D+/D- double-sided A/B test, built-in E-marker chip, realize the front and back side test of CC line in charger 5A mode (only CH97x3P+).

★ 500KHz synchronous sampling, adjustable filtering speed, 10uA, 0.1mV stable resolution output.

★ Voltage/current ripple (Vpp/Ipp), peak value (Vp+/Ip+), valley value (Vp-/Ip-) measurement.

★ Support over-current protection test (OCP) and maximum power point capture (Pmax).

★ 50KHz dynamic load mode (DYNA) and peak valley measurement.

★ SCPI protocol, convenient for program-controlled load and protocol.

★ 4.3-inch TFT high-definition color screen display, Chinese and English operation interface optional.

★ U disk software upgrade function, always keep the latest version

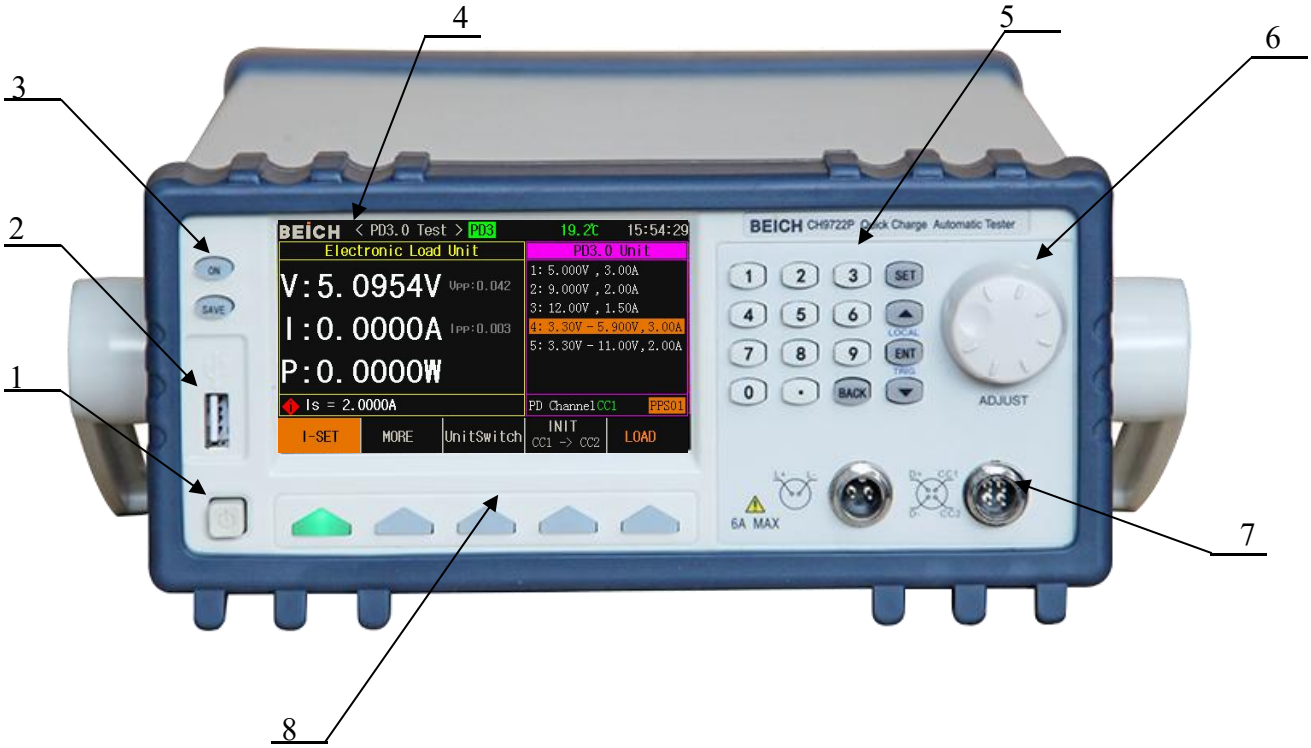
★ USB data storage function, convenient for data recording

★ Standard Handler and electrical isolation RS232 interface, convenient for signal output and data communication

2.2 **Technical parameter**

Model		CH9721P+	CH9722P	CH9723P+	CH9733P+
Rated value	Input power	150W			300W
	Input voltage	0 ~ 60V		0 ~ 150V	
	Input Current	0.1mA ~ 6A		0.1mA ~ 30A	
	Range	Precision	Resolution		
Voltage accuracy	0-15V	±（0.05%+0.03%FS）	0.1mV		
	15V-150V	±（0.05%+0.03%FS）	1mv		
Current accuracy	0-3A	±（0.05%+0.05%FS）	0.01mA		
	3-30A	±（0.05%+0.05%FS）	0.1mA		
Fast charge protocol part	D+D- voltage	BC1.2/APPLE 2.4A			
	PD protocol	PD2.0/PD3.0/PPS			
	QC protocol	QC2.0/QC3.0/QC4+			
	MTK protocol	PE1.1/PE2.0			
	Samsung Agreement	none	AFC		
	Huawei Agreement	none	FCP/SCP		
	OPPO Protocol	none		VOOC/SVOOC	
	VIVO Protocol	none		VSFCP	
	Spreadtrum Agreement	none		SFCP	
	UFCS	none		UFCS	
	Infinix	none		TFCP	
Function	CC line auto flip	CC1/CC2 auto flip			
	D+/D- auto flip	none		D+/D-auto flip	
	E-marker chip	none		built-in	
	Ripple test	none	have		
Other	Dimensions	215mm*88mm*350mm			
	Power requirements	198-242VAC 99V-121VAC 47.5-63Hz			
	Power consumption	≤40VA			

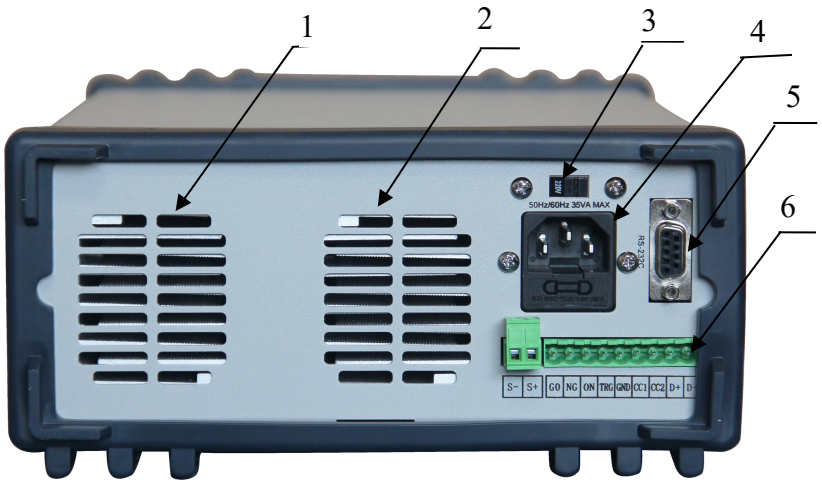
2.3 Front panel(CH9721P+/CH9722P)



Front panel(CH9723P+/CH9733P+)

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 .

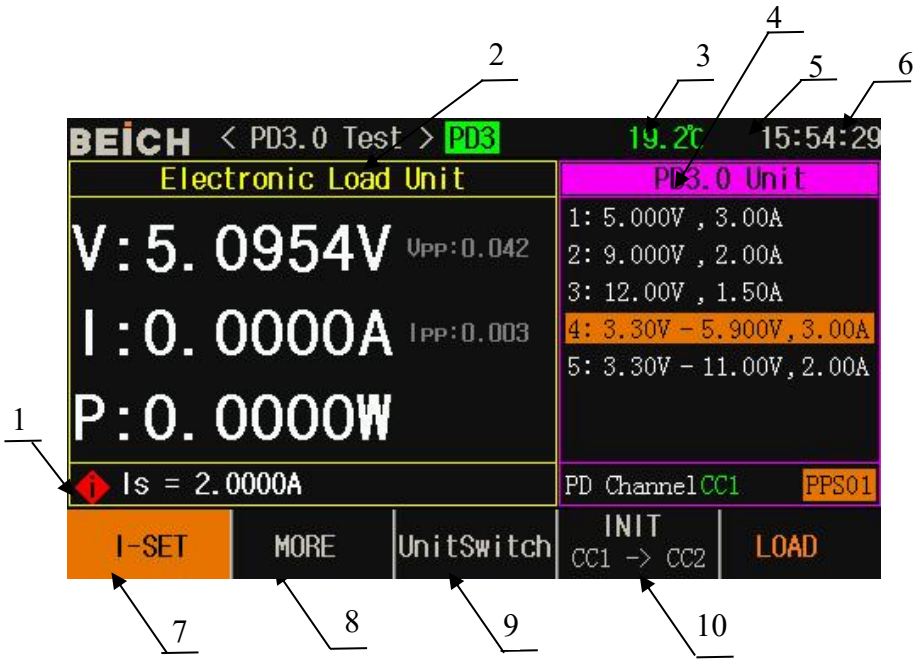
2.4 Rear panel



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	RS232C interface	Communicate with external device, parameter setting and command can be set and obtained by PC to realize remote control.
6	Terminals	Please connect according to the printed logo

2.5 Display

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



serial number	*name*	*instruction*
1	Setting parameters and status prompt bar	Help prompt when setting the load parameters and menu settings
2	Electronic load unit	Display load part voltage, current, power parameters
3	Machine internal temperature	Real-time temperature monitoring display inside the machine
4	Quick Charge Voltage Control Unit	PD, QC2.0 and QC3.0 voltage control, D+D- voltage value is displayed during DPDN test, common load is set for upper and lower limits
5	System icon display	Display system status as icons U disk is connected ； remote control status
6	Clock display area	Display the real-time clock, you can modify the date and time in the system configuration page, you can also turn off the clock display.
7	Load status	current constant mode
8	More	select constant mode
9	Unit switching	Switching electronic loads and fast charging units
10	Initialization	Display messages, switch channels

Chapter 3 Menu operation

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

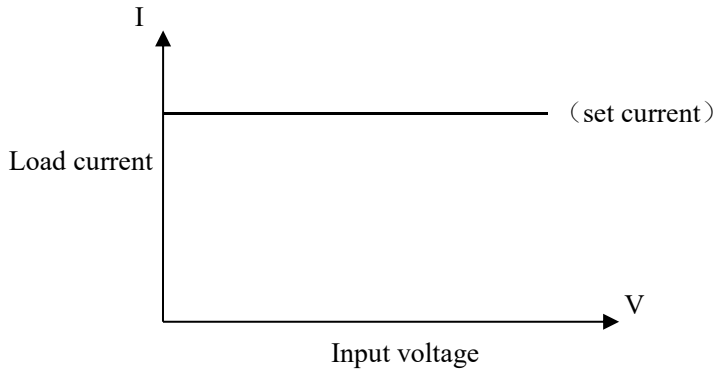
3.1 Normal page

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.

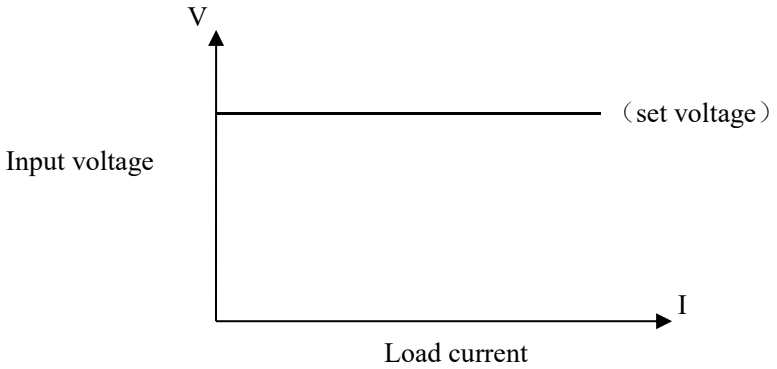
E.g.: Set current value to 1.2345A。

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

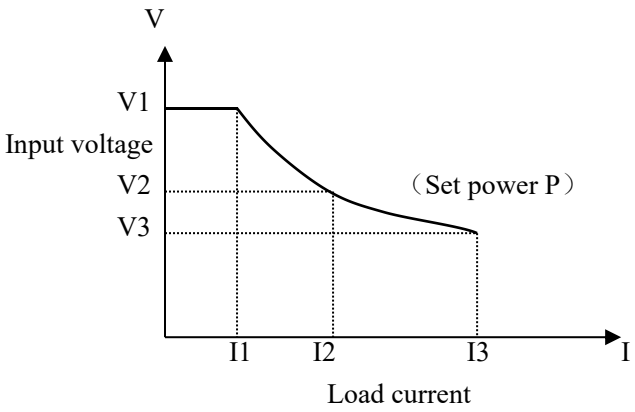
Note：When the source voltage is smaller than set value, the load can’t operate CV.

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



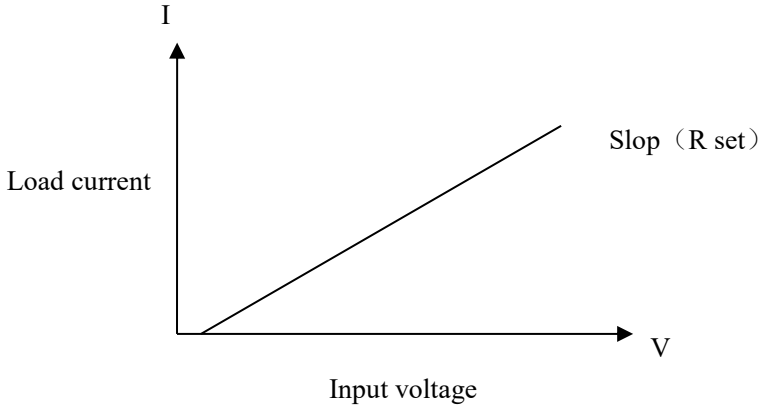
In other load mode, press【More】to enter menu to select power mode，and use【Start】to start or stop working.

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.

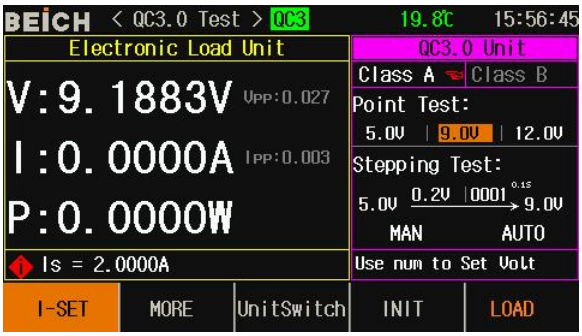
CR+CV mode

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

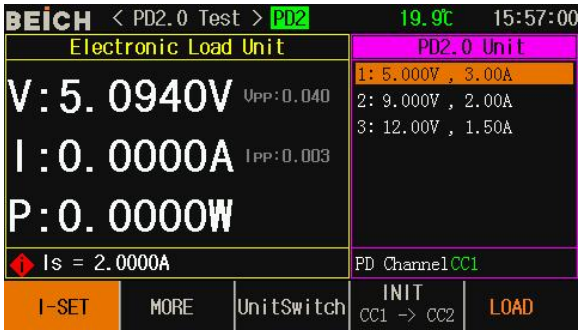
3.1.2 Fast charge test page

QC2.0 Test

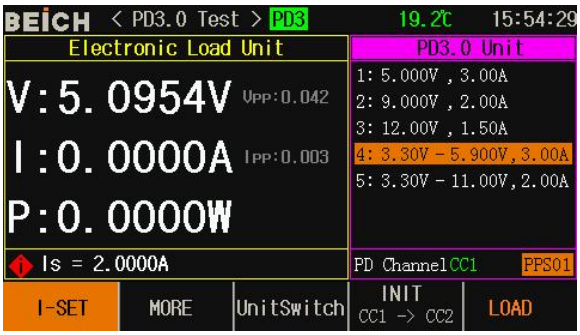
QC3.0 Test



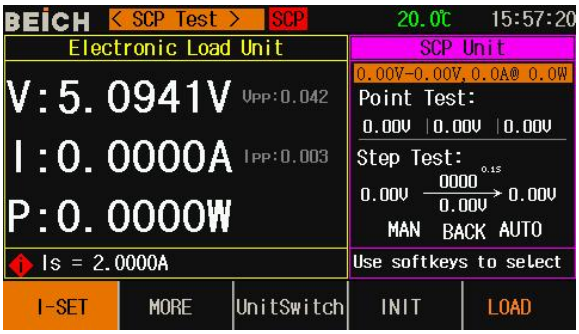
PD 2.0 Test



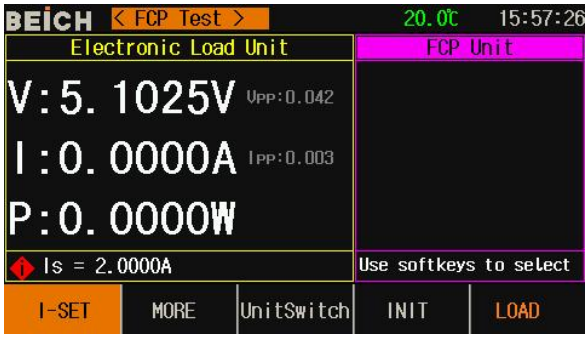
PD 3.0 Tese



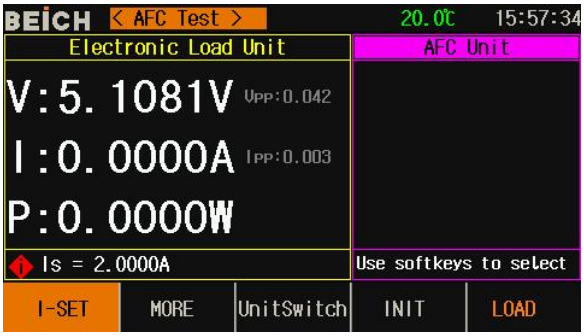
SCP Test



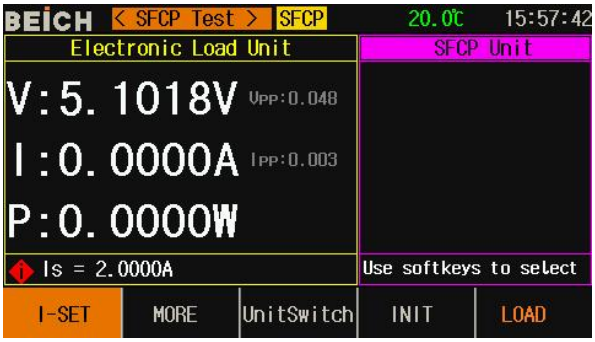
FCP Test



AFC Test



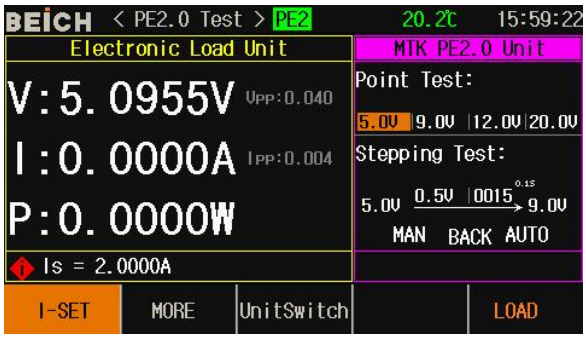
SFCP Test



VOOC Test

SVOOC Test

PE2.0 Test



VSFCP Test

The fast charging page can be selected through the mode selection in the fast charging setting menu or by pressing the BACK button on the normal page to select it through the shortcut buttons at the bottom of the screen. The content displayed in different fast charging menus is different. After the initialization is successful, the charger message will be displayed. The electronic load unit and the fast charging unit can be switched by the unit switch key, and the corresponding bright bar will be indicated in the selection unit. At this time, the data of the changed unit can be set, and the voltage can be selected by the knob【▲】or ▼】button, 【ENT】 Press the key to confirm the voltage selection, and the selected voltage will be displayed directly on the load unit. For chargers that support any voltage input type, you can directly press the number key to input the voltage. At this time, it is the no-load state when the fast charge triggers the voltage, and the loaded state can be switched. Go to the electronic load unit, select the constant current input value, press the [ENT] key to confirm, and select load.

3.1.3 DPDN (D+D- Voltage Test) Test Page

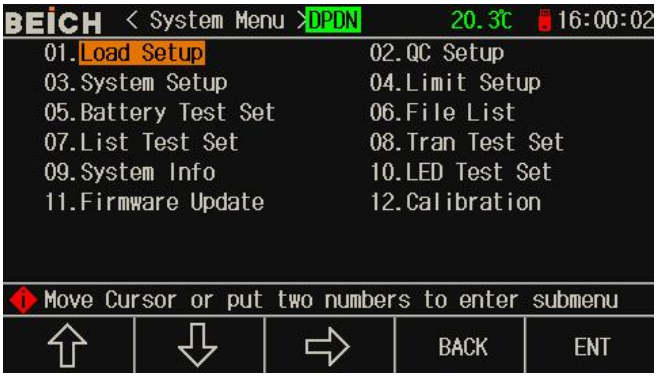
Under this page, the D+D- voltage of the ordinary charger can be tested synchronously, and the 3.3V voltage can be input by the machine for testing to test whether it is short-circuited to the ground. Press the corresponding button to select the D+ short-circuit test or the D- short-circuit test. In the list, you can select The D+D- voltage is used together as a judgment condition for judgment.

3.1.4 Protocol detection test page

Under this page, you can automatically detect that the charger carries QC, PD, PPS, FCP, SCP, PE and other protocols, and connect the charger with the fast charge tester. After connection, it will automatically detect, and stop. The red font shows that the relevant protocols are not detected, and the green font shows that the detection has passed.

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 Quick Charge Settings Page

Mode selection: You can set the type of fast charge on this page, you can choose normal test (normal load mode) or any fast charge mode supported by the instrument.

QC initialization: It is used to select the speed of QC initialization. It is mainly used for some chargers with slow initialization. If the voltage trigger is abnormal in the fast state, you can use medium speed or slow speed.

Wake-up current: This menu setting is mainly used in mobile power supply and other products that require a certain current to have an output voltage. Directly press the number key to input the current, generally set to 0.05A-0.1A, and input 0 is no load.

Initialization current: It is mainly used in some PD chargers that require a certain current to have output.

Dual CC mode: It is used for the front and back switching test of the CC cable. When using this function, please ensure that there are two CC cables in the charger cable used, otherwise the measurement will fail.

Dual DPDN mode: It is used for the front and back switching test of D+D-. When using this function, please make sure that there are two D+D- lines in the charger cable used, otherwise the measurement will fail.

PE trigger current: Set the trigger current of MTK PE2.0, generally set to 0.3A-0.5A.

3.2.3 System settings page

In this interface, you can set and change the instrument system style and application, press the [Ent] key to switch the menu content at the cursor, directly press the number key for the date and time, and then press the [Ent] key to confirm.

Menu name	Secondary menu content
Display Style	Grey
	Green
	Black
	Blue
Trigger source	Manual (MAN): Triggered by the "TRIG" key on the instrument panel
	External (EXT): external trigger, triggered by the Sense interface on the rear panel
	Bus (BUS): Triggered by the program control command on the RS232C interface
Language	CHINESE
	ENGLISH
Communication mode	RS232C
	USB-CDC
	USB-TMC
Boot settings	Defaults
	last value
local address	After entering the number, press【Ent】key to confirm
Touch-tone	Open
	Close

Baud rate	4800 9600 19200 38400 57600
Keyboard lock	Open Lock 0-9 numeric keypad when open
	Close
Multi-machine mode	Stand-alone
	Multi-machine
Knob lock	Open
	Close
Factory settings	Restore After confirming the restoration, all settings will be restored to factory defaults, please operate with caution
Collection frequency	It is used to set the data collection time when the U disk data is saved.
Date	Press the number key directly and then press【Ent】key to confirm, move the cursor to the next item
Time	Press the number key directly and then press【Ent】key to confirm, move the cursor to the next item

3.2.4 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】.

3.2.5 Battery 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

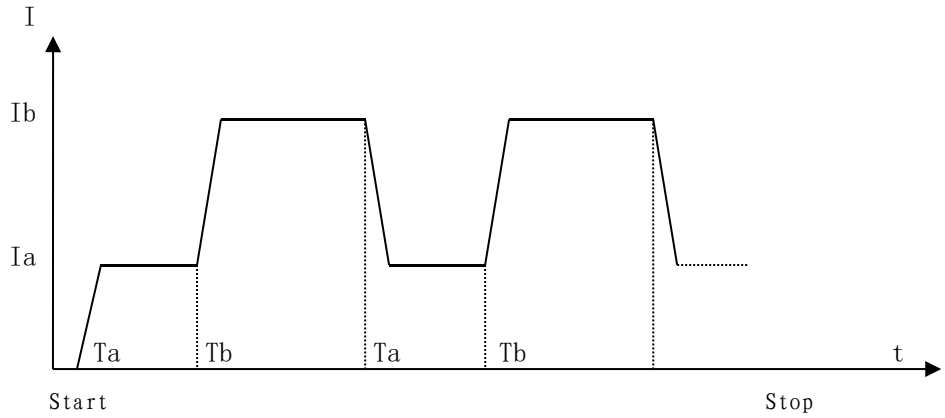
confirm，the unit is 1ms.

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

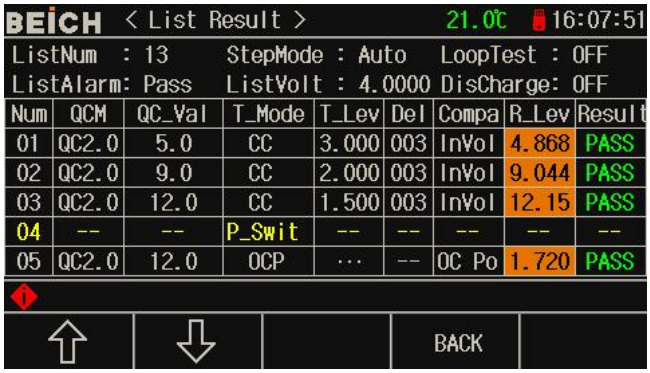
Name	Secondary menu	
List Num	Press number to input total steps and press【Ent】to confirm，Max. 15 steps	
Step Mode （press【Ent】to switch）	Auto：after delay time, switch to next step	
	Trig：after delay time, switch to next step after trigger signal	
Loop test （press【Ent】to switch）	On：Loop test until press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

The test page contains the comparison status and comprehensive judgment results of each step. After the test is completed, you can press [▲] or ▼] to look through the judgment results of each step, or press the test results button to view all the results. When it is necessary to test the charging protocols of multiple ports, please add a step of port switching after testing all protocols of each port. When all the steps of testing a single port are finished, the instrument will wait for port switching. At this time, please unplug the test

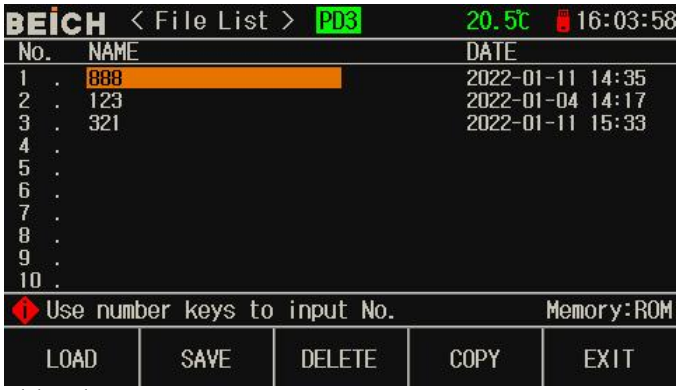
line on the test board and connect the port to be tested later. After that, the instrument will continue to test the remaining steps. Counting function: record test quantity, qualified and unqualified quantity.

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

3.2.8 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

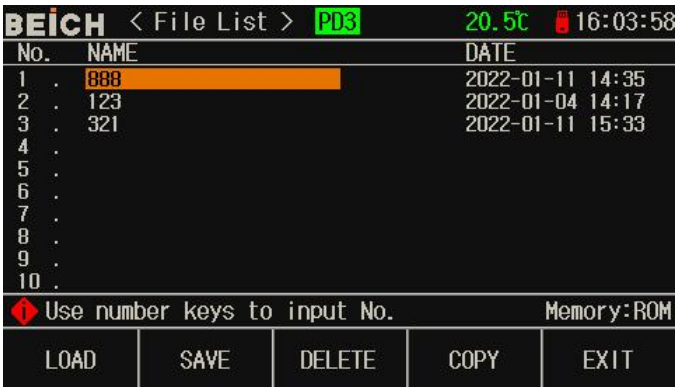
Test setup about the parameter for testing, the parameter includes: current page（or page before entering the file list）； all setups on test setup page； all setups on limit setup page.

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

3.2.9 LED 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.

3.2.10 System Info

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

3.2.11 Calibration

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

3.2.12 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.

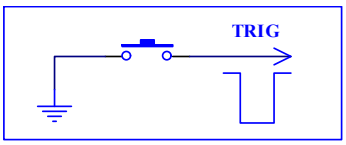
The 2 sampling cables are via the Sense interface on the rear panel

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.

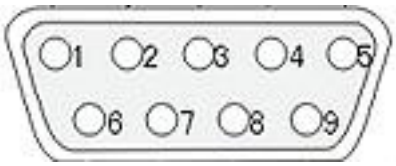
Input a low level with the width less than 100us on the input terminal to trigger one time.



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

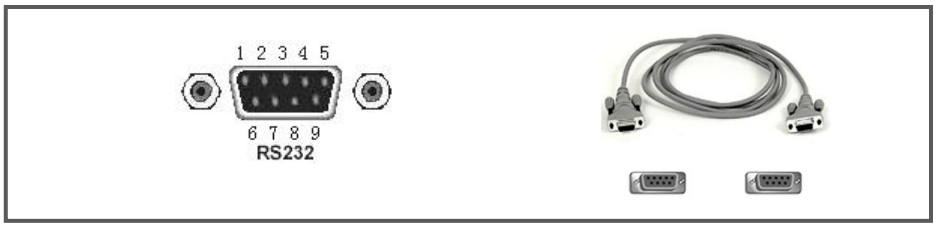
Although RS-232C can be replaced by USB communication, but it is still applied in industry and PLC control. The standard RS232 interface adopts 25-core connector (Discontinued) and 9-core connector.

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.

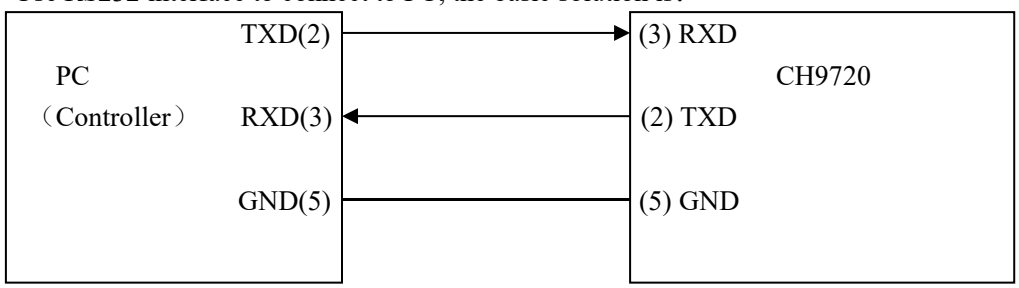
Signal	Code	Connector Pin Number
Transmitted Data	TXD	2
Received Data	RXD	3
Signal Ground Common	GND	5

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