携手同心 惠及未来

Instruction Manual

OPERATION MANUAL

TH6700
Programmable Switching Power Supply

TH6700 DC Programmable Switching Power

V1.4@2020.11

Table of Contents

Chapter 1 Overview

Thank you for purchasing and using our products. Before you use this instrument, please first confirm the matters in Chapter 8 of the manual " Set and Warranty", if there is any discrepancy, please contact us as soon as possible to protect your rights and interests.

1.1 Introduction

TH6700 series is a programmable switching DC power supply. This series of instruments is powerful, superior performance, and the LCD display, clear display, operation menu, fast and convenient, can well adapt to the needs of rapid operation at the production site and the needs of high precision and high stability in the laboratory, while the RS232C interface, USB interface and LAN port provided by the instrument for the use of remote operation of the computer provide the conditions.

he special features and advantages of the instrument are as follows:

- 480X272 pixels, 16-bit color, 4.3-inch color TFT LCD screen for setting test conditions and displaying measurement results, etc.
- Numeric keypad operation
- High accuracy and high resolution
- Low ripple and low noise
- Intelligent fan control to save energy and reduce noise
- Software control and detection via computer
- Precise fine-tuning of values by knob and cursor
- High current, high power, and high stability

1.2 Conditions of use

1.2.1 Power supply

Supply voltage: 88~265V

Power frequency: 50Hz/60Hz (1±5%)

Power consumption: <50VA

1.2.2 Environmental Temperature and Humidity

Normal operating temperature: 0℃～40℃, humidity: < 90%RH

Reference operating temperature: 20℃±8℃, humidity: < 80%RH

Transport environment temperature: 0℃～55℃, humidity: 93%RH

1.2.3 Warm-up

Warm-up time after power on: ≥ 30 minutes

Chapter 2 A Few Points to Note

Please do not use it in adverse environment such as dusty, vibrating, direct sunlight and corrosive gases.

If the instrument is not used for a long time, please store it in the original packing box or similar box in a ventilated room with temperature from 5℃ to 40℃ and relative humidity not more than 85% RH. The air should not contain harmful impurities that corrode the measuring instrument and should be protected from direct sunlight.

The instrument has been carefully designed to reduce noise interference from the AC power supply input; however, it should still be used in a low noise environment as much as possible, and if this cannot be avoided, please install a power supply filter.

This instrument has a cooling fan at the back and cooling ventilation holes on the left and right to avoid the internal temperature rising and affecting the accuracy, please make sure the instrument is under good ventilation.

Do not switch the instrument on and off frequently to avoid loss of stored data.

2.1 Volume & Weight

Volume(W*H*D): 215mm*130mm*420mm

Weight: max approx. 7.5kg

2.2 Safety Requirements

This instrument is a Class I safety instrument

2.2.1 Insulation Resistance

The insulation resistance between the power terminals and the housing is not less than 50MΩ under reference operating conditions;

Under hot and humid transportation conditions, the insulation resistance between the power terminals and the housing is not less than 2MΩ.

2.2.2 Dielectric Strength

Under reference operating conditions, the power terminal and the housing can withstand the rated voltage of 2.1kV DC voltage for 1 minute without breakdown and flying arc phenomenon.

2.2.3 Leakage Current

The leakage current is not more than 3.5mA.

2.3 Electromagnetic Compatibility

Power transient sensitivity according to the requirements of GB6833.4.

Conductivity sensitivity according to the requirements of GB6833.6.

Radiation interference according to the requirements of GB6833.10.

Chapter 3 Panel Description

The content of this chapter is only a general description, the specific operation and detailed explanation refer to the corresponding content of Chapter 4.

3.1 Front Panel Description

The front panel diagram is shown in Figure 3-1.

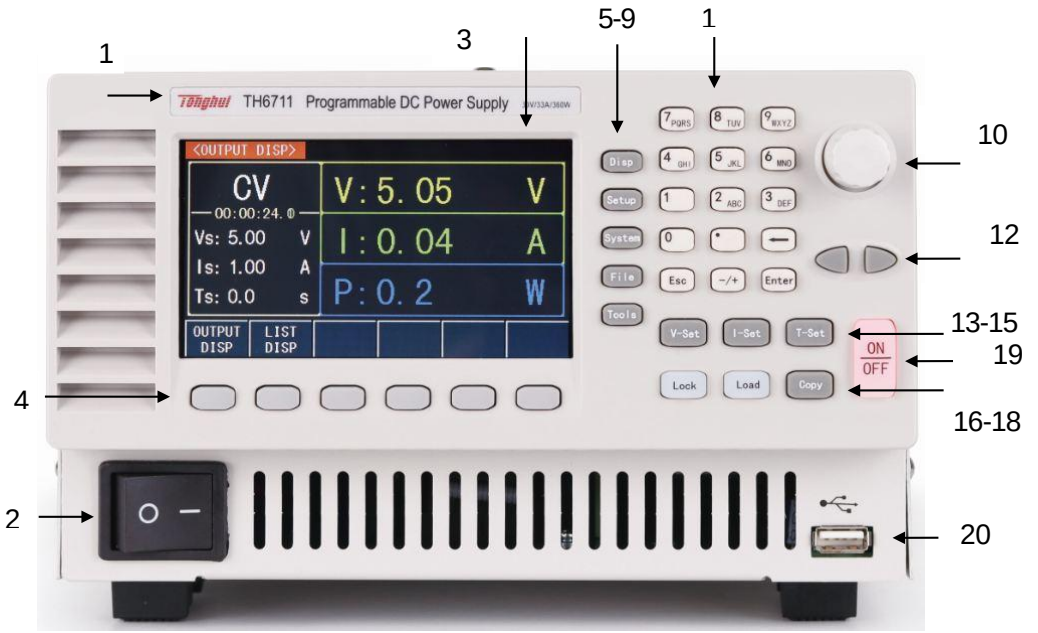

Figure 3-1

The introduction is shown in Table 3-1:

1	Trademark and model	Display trademark, model number and power supply parameters
2	Power switch (POWER)	Turn on or turn off the 220V mains power, when in O position, turn off the power; when in — position, turn on the power.
3	LCD display screen	480*272 TFT LCD display showing all measurement parameters, status, measurement results, etc.
4	Soft key	The functions of the six keys in this section are "soft", i.e., their functions are not fixed and have different functions in different menus. Conveniently, their current functions are displayed accordingly in the "soft key" display area below the LCD.
5	DISP main menu key	Used to access the measurement display page.

6	SETUP main menu key	Used to access the measurement setup page.
7	SYSTEM main menu key	Used to access the system setup page.
8	FILE main menu key	Used to access the file setup page.
9	TOOLS main menu key	Used to access the tool setup page.
10	Knob	Used to adjust the size of the value and move the cursor or arrow.
11	Numeric keypad	Used to enter numbers or, if needed, characters (file names).
12	Arrow key	Left and right arrow keys for moving the cursor.
13	VSET key	Used to quickly set the voltage value.
14	ISET key	Used to quickly set the current value.
15	TSET Key	Used to quickly set the timer time.
16	LOCK key	Used to lock keys or light up when remote control.
17	LOAD key	Used to load files.
18	COPY key	For screenshot
19	ON/OFF key	Output on or off
20	USB Interface	HOST interface for USB

Table 3-1

3.2 Rear Panel Description

The TH671X, TH672X series rear panel schematic is shown in Figure 3-2.

Figure 3-2

The introduction is shown in Table 3-2:

1	External port	Used for external input control, inline, etc.
2	Output terminal	For output voltage, current
3	Fan	For heat dissipation
4	RS-232C	Serial communication for remote control
5	USB	USB DEVICE interface for remote control
6	LAN	LAN port for remote control
7	Three-wire power outlet	Access to power
8	Nameplate	Record model, batch number, etc.

Table 3-2

The TH673X, TH674X series rear panel schematic is shown in Figure 3-2-1.

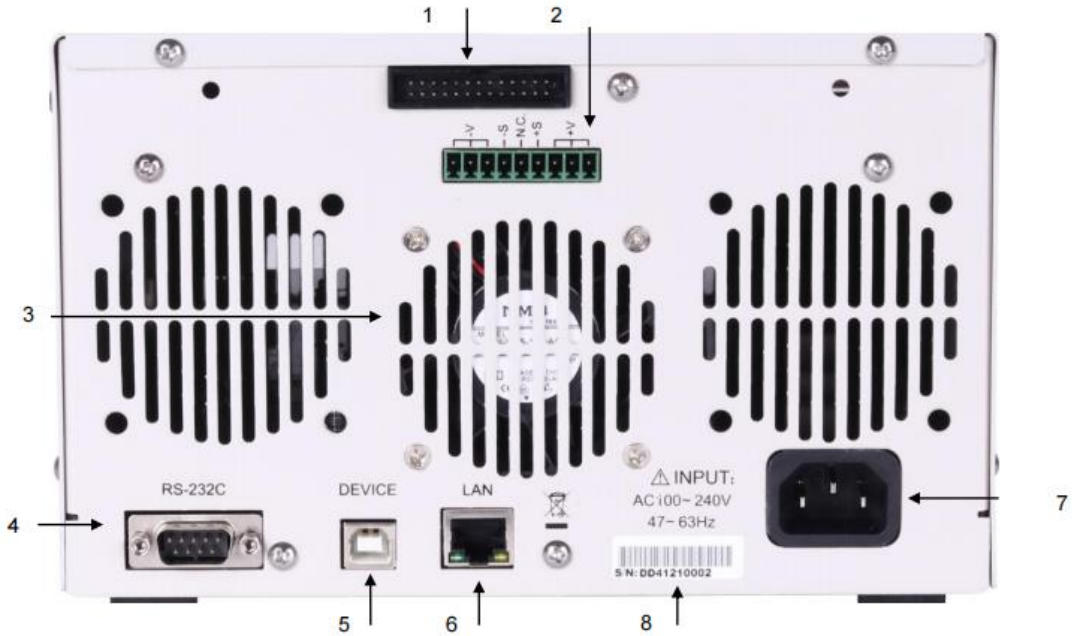

Figure 3-2-1

The introduction is shown in Table 3-2-1

1	External port	Used for external input control, inline, etc.
2	Output terminal	For output voltage, current, see 5-1 for details
3	Fan	For heat dissipation
4	RS-232C	Serial communication for remote control
5	USB	USB DEVICE interface for remote control
6	LAN	LAN port for remote control
7	Three-wire power outlet	Access to power
8	Nameplate	Record model, batch number, etc.

Table 3-2-1

3.3 Display Area Description

The display area diagram is shown in Figure 3-3

Figure 3-3

(1) **Display page menu area:** This area shows the name of the currently displayed page.

(2) **Prompt and warning message area:** This area displays a prompt message when the instrument is running or operating incorrectly.

(3) **Interface Lock and USB display area:** Displays lock icon and USB icon.

(4) **Output mode display area:** Displays the current output mode and timing time.

(5) **Output setting area:** Displays the current output voltage, current, and timer time.

(6) **Output display area:** Displays the current output voltage, current and power level.

(7) **Softkey menu area:** The content of this area is not fixed and shows the function corresponding to the current softkey.

3.4 Display Page Overview

- Output Display (OUTPUT DISP)
  This page is the default page for power-up and displays the basic setup parameters and measured display values.
- List Output (TRIG OUTPUT)
  This page displays the list output information and optionally loads the output list file.
- List Display (TRIGLIST DISP)

This page displays the list output information and optionally loads the output list file.

- General Settings (GENERAL SET)
  This page displays general setup parameters such as overvoltage protection, voltage rise time, etc.
- Power Failure Setting (POWER SET)
  This page displays the control mode, online mode, and other setting parameters.
- List Setup (LIST SET)
  This page displays the list file information.
- System Setup (SYSTEM SET)
  This page displays the system parameters such as system sound, language, and other settings.
- Communication Setup (BUS SET)
  This page displays the remote-control method and setting parameters.
- Internal Files (INTER FILE)
  This page displays information about the internal files and operations of this instrument.
- External Files (EXTER FILE)
  This screen displays information and operations for external (USB) files.
- Tools (TOOLS DISP)
  This page displays user calibration information, software upgrades, etc.

Chapter 4 Operating Instructions

4.1 Output Display Page

Press the front panel DISP key to enter the output display interface, as shown in Figure 4-1

Figure 4-1

4.1.1 Voltage Setting

The voltage setting range is from 0 to the maximum value. The voltage can be set by the VEST key on the front panel. When the voltage value is selected, a blue cursor is displayed and the voltage value can be set in two ways:

Method 1: Press the knob, select the number of bits by the left and right arrow keys, then select the size with the knob, press the knob to confirm, generally used for fine tuning.

Method 2: Enter the specific value directly through the numeric keys, select the unit below, and ENTER key to confirm.

4.1.2 Current Setting

The current setting range is from 0 to the maximum value. The current can be set by the ISET key on the front panel. When the current value is selected, the blue cursor is displayed and the current value can be set in two ways:

Method 1: Press the knob, select the number of bits by the left and right arrow keys, then select the size with the knob, press the knob to confirm, generally used for fine tuning.

Method 2: Enter the specific value directly through the numeric keys, select the unit below, and ENTER key to confirm.

4.1.3 Timer Setting

Timer setting can be set through the TEST key on the front panel. When the timing time value is selected, the blue cursor is displayed, and the specific value is entered directly through the numeric keys, and confirmed by the ENTER key.

4.1.4 Output

When the current, voltage and time are set, press the ON/OFF key to output, and the key shows red when outputting. The interface shows the output voltage, current and power display value.

If the timer is turned on, the instrument turns off the output when the time is up, and the red light of ON/OFF key goes off.

4.1.5 Data Save

The instrument has data saving function, insert the USB disk, press the Data Save key, the instrument starts to record data, including current, voltage, time (not open output, time is 0), the rate is 1 time/s, the maximum can record 5000 times. Press the End Save key, the instrument will save the data to the USB flash drive, open it in the computer with Excel (under CSV folder), as shown in the figure

	A	B	C
1	OVoltage	Current	Time
2	5.02	0.51	0000:00:02
3	5.02	0.5	0000:00:03
4	5.02	0.57	0000:00:04
5	5.02	0.57	0000:00:05
6	5.02	0.56	0000:00:06
7	5.02	0.57	0000:00:07

Note: After each shutdown, the data file number will be cleared to zero, so it should be saved in time, otherwise it will overwrite the last file with the same name when you turn on the computer again next time.

4.2 List Output Page

Press List Display under the output display page to enter the list output page, as shown in Figure 4-2.

Figure 4-2

4.2.1 File Selection

Move the cursor to the current list and enter the list file number by the numeric keys, as shown in Figure 4-2-1.

Figure 4-2-1

4.2.2 File Load

After selecting the file, you can press the LOAD key or page selection load to load the file, the key will light up red, and the page will show the output result after opening the output, as shown in Figure 4-2-2.

Figure 4-2-2

4.3 General Setup Page

Press the SETUP key to enter the general setup page, as shown in Figure 4-3.

Figure 4-3

4.3.1 Overvoltage Protection

Protection parameter for the instrument output, when the sampled output voltage value exceeds the overvoltage protection value, the instrument output shuts down to ensure the safety of the instrument and the load. It can be changed by numeric keyboard input.

4.3.2 Overcurrent protection

Protection parameter for the instrument output, when the sampled output current value exceeds the overcurrent protection value, the instrument output shuts down to ensure the safety of the instrument and the load. It can be changed by numeric keypad input.

4.3.3 Startup Delay

Add a time delay when the instrument turns on the output, and when the ON/OFF key is pressed to turn on the output, the time delay is then output.

4.3.4 Stop Delay

Add a delay time when the instrument turns off the output, and when the ON/OFF key is pressed to turn off the output, the delay time is then turned off.

4.3.5 Conversion Speed

The rising speed of the setting value is divided into four modes:

constant voltage high speed, constant current high speed, constant voltage settable and constant current settable, and different modes can be selected through the panel.

Constant voltage high speed: set voltage value immediately to be sent to DA converter, output.

Constant current high speed: set current value immediately to be sent to DA converter, output.

Constant voltage settable: set the voltage value to be sent to DA conversion at the set rate and output. For example: voltage is set to 20V, voltage rise is set to 5V/s, turn on the output, and after 4s, the voltage rises to 20V.

Constant current can be set: set the current value to be sent to DA conversion at the set rate and output. For example: current setting 20A, electric. The current rise is set to 5A/s, the output is turned on, and the current rises to 20A after 4s.

4.3.6 Voltage Rise

The rate of voltage rises when the instrument is turned on the output, and the conversion speed is available when the **constant voltage can be set**.

4.3.7 Voltage Drop

The rate of voltage drops when the instrument is turned off the output, and the conversion speed is available when the **constant voltage can be set**.

4.3.8 Current Rise

The rate of current rises when the instrument is turned on the output, and the conversion speed is available when the **constant current can be set**.

4.3.9 Current Drop

The rate of current drops when the instrument is turned on the output, and the conversion speed is available when the **constant current can be set**.

4.3.10 Measurement Average

Sampling speed, with low speed, medium speed, and high speed, can be selected according to the page display.

1.Low speed: slow sampling speed, high accuracy

2.Medium speed: between low speed and high speed

3.High speed: fast sampling speed, slightly lower accuracy

4.3.11 Simulated Internal Resistance

The internal resistance used as a voltage source can be changed via the numeric keypad input.

4.3.12 Drain Resistance

The instrument's dummy load, which can be selected on or off, allows for rapid discharge of the constant voltage mode no-load off output when the drain resistor is on.

4.4 Power Failure Setting Page

Under the General Setup Page, press Power Off Settings to enter the Power Off Settings page. As shown in Figure 4-4.

Note: Change the parameters within the power-off setting need to be selected immediately after the power-off, and the parameters will be changed after the next power-on.

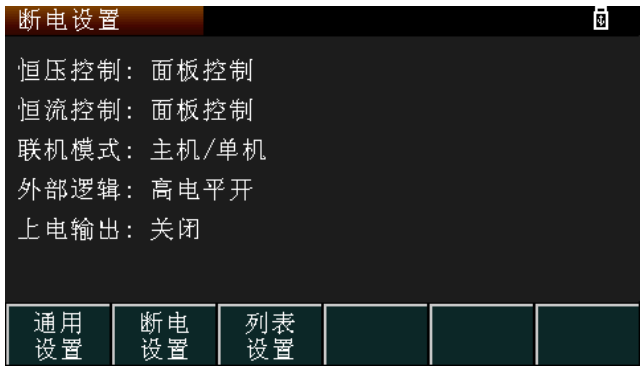

Figure 4-4

4.4.1 Constant Voltage Control

The selection of input setting control method in constant pressure mode is selected by the page display.

Panel control: Internal control, voltage setting can be set by the local digital keys.

External voltage: The instrument panel control is disabled, the voltage source input is accessed from the external port, the size of the voltage source is used as the input of the machine, the input range 0~10V, corresponding to the output of the machine 0~max.

External resistance rise: The instrument panel control is disabled, and

the resistance is accessed from the external port, the resistance size is used as the input of the machine, the resistance range 0~10KΩ, corresponding to the input of the machine 0~max.

External resistance drop: The instrument panel control is disabled and the resistor is accessed from the external port, the size of the resistor is used as the input of the machine, the resistance range 0~10KΩ, corresponding to the input of the machine max~0V.

4.4.2 Constant Current Mode

The selection of input setting control method in constant current mode is selected by the page display.

Panel control: Internal control, current setting can be set by the local digital keys.

External voltage: The instrument panel control is disabled, the voltage source input is accessed from the external port, the size of the voltage source is used as the input of the machine, the input range 0~10V, corresponding to the output of the machine 0~max.

External resistance rise: The instrument panel control is disabled, and the resistance is accessed from the external port, the resistance size is used as the input of the machine, the resistance range 0~10KΩ, corresponding to the input of the machine 0~max.

External resistance drop: The instrument panel control is disabled and the resistor is accessed from the external port, the size of the resistor is used as the input of the machine, the resistance range 0~10KΩ, corresponding to the input of the machine max~0V.

4.4.3 Online Mode

This series of instruments can be connected in multiple units for superimposed power. You can choose series or parallel connection according to your needs, and each instrument can choose the following modes according to different situations.

Host stand-alone: Only one machine or two instruments in series as the host.

Slave tandem: Act as a slave when connected in series. (TH671X, TH672X only, series connection can only be two units, including host in series)

Host one parallel: Two instruments are connected in parallel as the host.

Host two parallel: Three instruments are connected in parallel as the

host.

Slave parallel: Two or three instruments are connected in parallel as slaves. (Up to three units in parallel, including the host)

Note: Only the same type of instrument can be connected when online! The instrument does not accept commands when it is used as a slave!

4.4.4 External Logic

High level on, low level on can be selected via the page (factory default high for the instrument)

High level open: panel controllable output, when the external is high, the output is open, when it is low, the output is closed, and the panel cannot open the output.

Low level on: The panel is not controllable output, when the external is low, the output is on, when it is high, the output is off.

4.4.5 Power-up Output

Whether to output directly at power on, select on or off according to the page.

4.5 List Setting Page

Under the general setup page, press List Setup to enter the list setup page, as shown in Figure 4-5.

Figure 4-5

The instrument can be set up with up to 10 list files.

4.5.1 List Setting Editor

Press Edit to edit the list, as shown in Figure 4-5-1

Figure 4-5-1

Press Voltage Setup to enter the Voltage Setup page, as shown in Figure 4-5-1-1

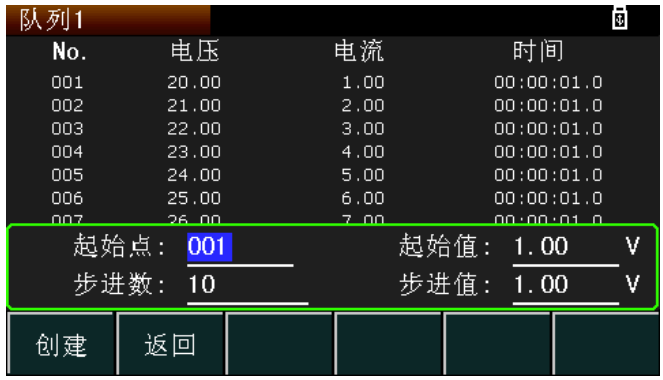

Figure 4-5-1-1

Starting point: from the first column of No.;

Starting value: the value of the starting point;

Number of steps: the total number of steps set from the starting point;

Step value: the value between every two consecutive points;

When setting parameters, the list follows the limit of each parameter not exceeding the upper and lower limits and not exceeding the power, if exceeded, the instrument will set itself to the allowed internal limit value.

Press Create for quick setup. Current and time are set in the same way as voltage.

The set list can also be modified by individual values, as shown in Figure 4-5-1-2.

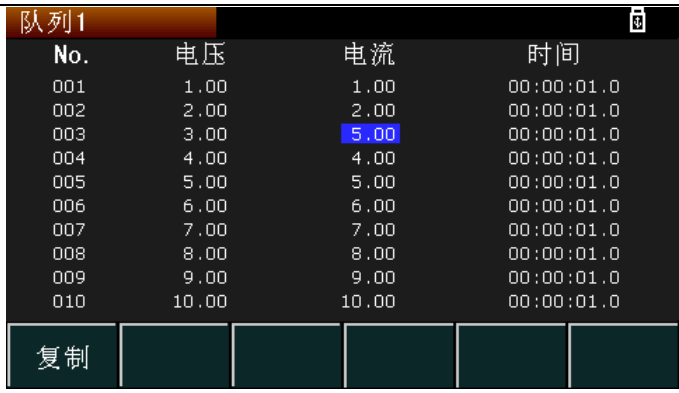

Figure 4-5-1-2

4.5.2 List Output Setting

When the list output, you can also set the list output, the trigger number is the NO. number of the list output, you can also loop some of these NO., just set the loop number, set the number of loops that the loop number of NO. loops several times.

Set the cycle number must be within the trigger number, such as trigger number 2-8, cycle number 3-9, the instrument will report an error because 9 is not triggered, need to change the cycle number to 3-8.

4.5.3 List Save and Clear

Press Clear to clear the current list, press Save to save the current list settings.

4.6 System Setup Page

Press SYS key to enter the System Setup Page, as shown in Figure 4-6.

Figure 4-6

4.6.1 System Sound

The instrument key sounds and is turned on or off by page selection.

4.6.2 System Language

Instrument language, select Chinese or English through the page.

4.6.3 System Password

Instrument password, user calibration and other uses, select open or close through the page, can be modified, the factory original password is 6700, universal password is 67006700.

4.6.4 System Date

The instrument date, which can be set from the page or by the numeric keys.

4.6.5 System Time

Instrument time, which can be set according to the page or by the numeric keys.

4.7 Communication Setup Page

Select Communication Setup under the System Setup page to enter the Communication Setup page, as shown in Figure 4-7.

Figure 4-7

The cursor moves to bus mode to select RS232, LAN, USBTMC, USBCDC, LXI and other communication methods.

4.7.1 RS232

4.7.1.1 Bus Mode

Select the bus mode to RS232 via the page, as shown in Figure 4-7.

4.7.1.2 Baud Rate

Increase or decrease by page selection, baud rates are 9600, 19200, 28800, 38400, 96000, 115200.

4.7.1.3 Instrument Address

If using MODBUS protocol, select local address increase or decrease through the page, range 1~32.

4.7.1.4 Parsing Protocol

The instrument supports both SCPI and MODBUS protocols by selecting the protocol from the page.

4.7.2 LAN

4.7.2.1 Bus Mode

Select the bus mode to LAN via the page, as shown in Figure 4-7-2-1.

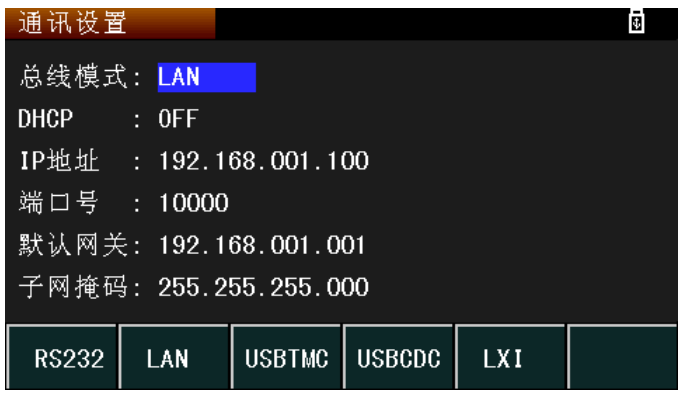

Figure 4-7-2-1

4.7.2.2 DHCP

Assign IP addresses automatically, with the option to turn them on or off via the page.

4.7.2.3 IP Address

Enter the IP address via the numeric keys and arrow keys.

4.7.2.4 Port Number

Enter the port number via the numeric keys, range 1025~65534.

4.7.2.5 Default Gateway

Enter the default gateway via the numeric keys and arrow keys.

4.7.2.6 Subnet Mask

Enter the subnet mask via the numeric keys and arrow keys.

4.7.3 USBTMC

Select the bus mode as USBTMC via the page.

4.7.4 USBCDC

Select the bus mode as USBCDC via the page.

4.7.5 LXI

4.7.5.1 Bus Mode

Select the bus mode as LXI via the page, as shown in Figure 4-7-5-1.

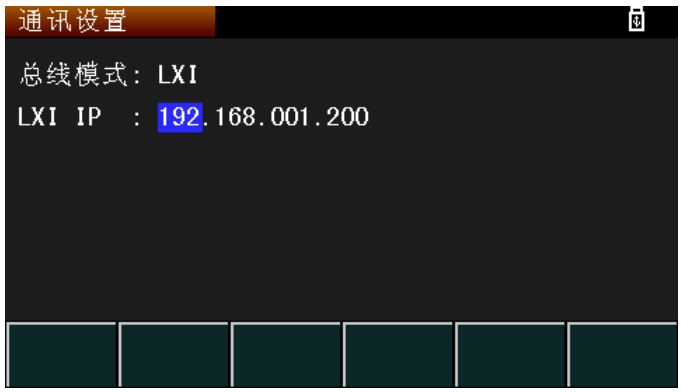

Figure 4-7-5-1

4.7.5.2 LXI IP

Enter the LXI IP via the numeric keys and arrow keys.

4.8 Internal File Page

Press the FILE key to enter the Internal File page, as shown in Figure 4-8.

Figure 4-8

4.8.1 File Save

Move the cursor to the serial number column to be saved, press Save, confirm Yes, enter the file name, letters, and numbers according to 9

keyboard input, press ENTER to confirm the input, the file will be suffixed with STA.

The current save file includes general settings, power-off settings, communication settings, system settings, etc.

4.8.2 File Load

If you want to load a saved file, move the cursor to the file and click Load, which will load all the settings in the file, and the next time you turn on the computer, it will keep the state when you turned off the computer last time, so you don't need to reload it.

4.8.3 File Dump

Files saved in the instrument can be copied to an external device (USB flash drives, etc.).

4.9 External File Page

Under the Internal File page, press External File to enter the External File page, as shown in Figure 4-9.

Figure 4-9

4.9.1 File Load

If you want to load an external file, find the file by page operation, move the cursor to the file and click Load, which loads all the settings within that file.

4.9.2 File Copy

Move the cursor to the file you want to copy and click Copy I to copy it to the inside of the instrument.

4.10 Tools Page

Press TOOLS to enter the External File page, as shown in Figure 4-10.

Figure 4-10

4.10.1 User Calibration

If the instrument is used for a period of time or the environmental temperature deviation is large, the user can calibrate the data of the instrument. Data calibration is divided into output calibration and display calibration. Output calibration must be performed first before display calibration and display calibration or simultaneous calibration cannot be performed first. The password 6700 is required to open the calibration.

4.10.1.1 Output Calibration & Display Calibration

The output calibration interface is shown in Figure 4-10-1-1.

Figure 4-10-1-1

Enter the calibration value according to the calibration point, turn on the output, record the actual output value, enter it to the measured voltage or measured current, and confirm the calibration. Current and voltage can be calibrated separately. The display calibration method is the same as the output calibration.

4.10.1.2 Clear Calibration

If the calibration data is wrong or the data needs to be updated, you need to select clear calibration data through the page and re-calibrate, otherwise the data is not accurate.

4.10.2 System Reset

The system performs a reset and does not clear the data.

4.10.3 Restore Factory

When the instrument is restored to the factory, all setting values are cleared and returned to the original state at the factory.

4.10.4 Upgrade

Use this function when the instrument software needs to be upgraded.

Chapter 5 Correct Output of Instrument

(1) Connect to the power supply and press the power switch.

(2) The instrument is turned on and preheated for 30 minutes.

(3) According to the actual demand, choose the appropriate connection cable and connect the load to the [+, -] port on the rear panel of the instrument with the connection cable.

(4) Set the operating mode and output parameters of the instrument and press ON/OFF key to output.

5.1 Output Terminal

Since the TH671X and TH672X series have the same rear panel, they can be connected directly to the output.

Whereas the TH673X and TH674X series have the same rear panel, as described below, such as Figure 5-1-1 for the instrument jack, to output to be inserted into Figure 5-1-2 output terminal.

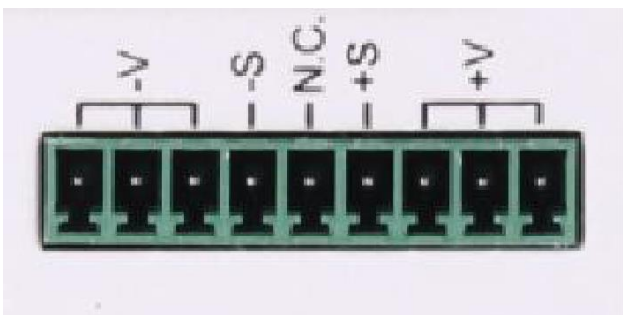

Figure 5-1-1

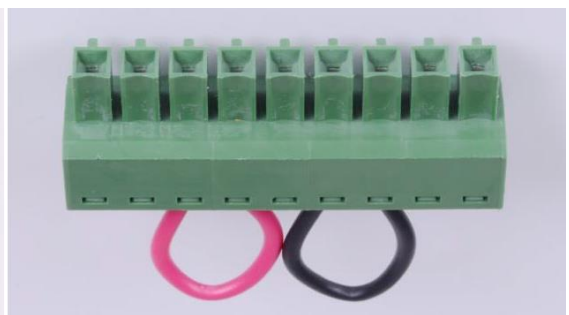

Figure 5-1-2

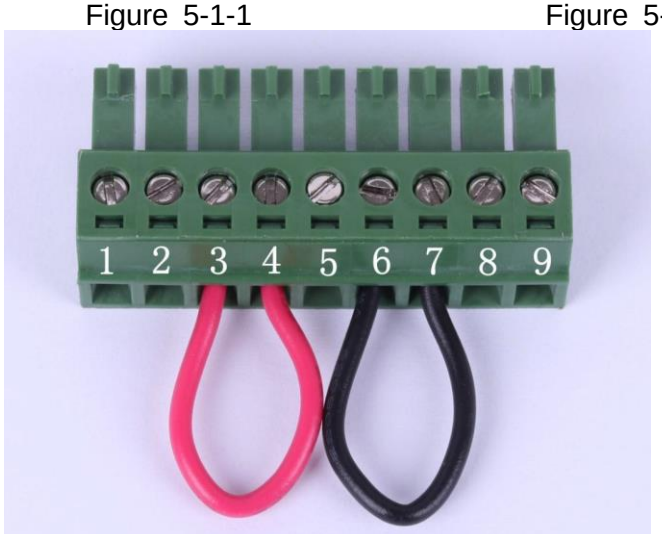

Figure 5-1-3

As seen in Figure 5-1-3, the output interface has 9 outputs, which are described in Table 5-1-3.

Pin Position	Function	Description
1	+V	U, I input + terminal
2	+V	
3	+V	
4	+S	SENSE+
5	N.C.	Empty Foot
6	-S	SENSE-
7	-V	U, I output - terminal
8	-V	
9	-V	

Table 5-1-3

5.2 Interface Schematic

The instrument rear board interface pins are shown in Figure 5-2

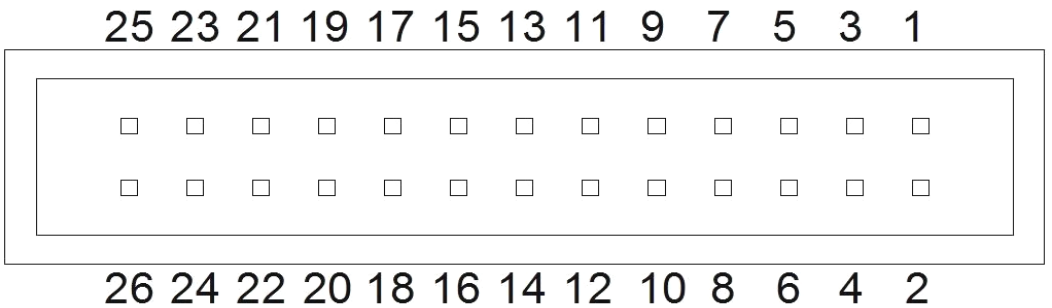

Figure 5-2

Pin Name	Pin Number	Description
CURRENT SHARE	1	Used when operating 2 or more power supplies in parallel
D COM	2	Connect to the (-S)sense- terminal for remote sampling, and to the negative output terminal for non-remote sampling
CURRENT SUM OUT	3	Total current output signal in parallel mode

EXT-V CV CONT	4	External voltage controls the voltage output. 0~10V is used to control the full-scale voltage output of the instrument. (0%~100%)
EXT-V CC CONT	5	External voltage controls the current output. 0~10V is used to control the full-scale current output of the instrument (0%~100%)
EXT-R CV CONT Pin1	6	External resistor controls the voltage output. 0~10kΩ voltage is used to control the full-scale voltage output of the instrument (0%~100%)
EXT-R CV CONT Pin2	7	External resistor controls the voltage output. 0~10kΩ voltage is used to control the full-scale voltage output of the instrument (0%~100%)
EXT-R CC CONT Pin1	8	External resistor controls the current output. 0~10kΩ voltage is used to control the full-scale current output of the instrument (0%~100%)
EXT-R CC CONT Pin2	9	External resistor controls the current output. 0~10kΩ voltage is used to control the full-scale current output of the instrument (0%~100%)
V MON	10	Voltage detection output, voltage 0~10V corresponding to full scale output 0%~100%
I MON	11	Current detection output, voltage 0~10V corresponding to full scale output 0%~100%
SHUTDOWN	12	The shutdown signal turns off the output or power when a TTL low signal is used. Shutdown Signal is raised to 5V, 10kΩ pull-up resistor
CURRENT_SUM_1	13	The current total input signal to the host from the first slave CURRENT SUM OUTPUT. Used in parallel mode only
CURRENT_SUM_2	14	The current total input signal to the host from the second slave CURRENT SUM OUTPUT. Used in parallel mode only
FEEDBACK	15	Parallel control signals in master-slave parallel operation
A COM	16	Common terminal for analog signals. For remote sampling, it is connected to the sense- terminal. For non-remote sampling, connect to the negative output terminal
STSTUS COM	17	Common status signals 18, 19, 20, 21 and 22
CV STATUS	18	On in CV mode (opto-coupled open collector output)
CC STATUS	19	On in CC mode (opto-coupled open collector output)
ALM STATUS	20	Turn on when any protection mode (OVP, OCP) is tripped off or when a shutdown signal is input
OUTPUT ON STATUS	21	Open when output is on (opto-coupled open collector output)
POWER OFF STATUS	22	Turn on when power is off
N.C.	23	No connection
OUT ON/OFF	24	(Default setting) Turns on/off the output when a TTL low level

CONT		signal is used. Internal circuitry is boosted to 5V, 10kΩ pull-up resistor
SER SLV IN	25	Serial slave machine input for master-slave serial operation
N.C.	26	No connection

5.3 Instrument Series Output

This series instrument can output two instruments of the same model in series, the instrument as the host will change the online mode to host single in the power failure setting page, and the instrument as the slave will change the online mode to slave series in the power failure setting page, the actual voltage *2 and current will be unchanged after turning on the output, the voltage displayed by the host will be the voltage of the host single, and the power will be the power of the host single.

Note: Only TH671X and TH672X series have series output function.

The online schematic is shown in Figure 5-3.

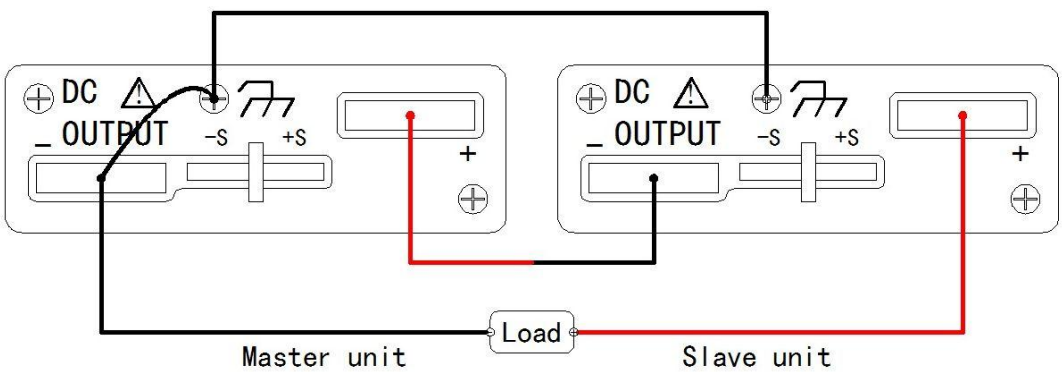

Figure 5-3

The schematic diagram of pin position of series connection is shown in Figure 5-3-1

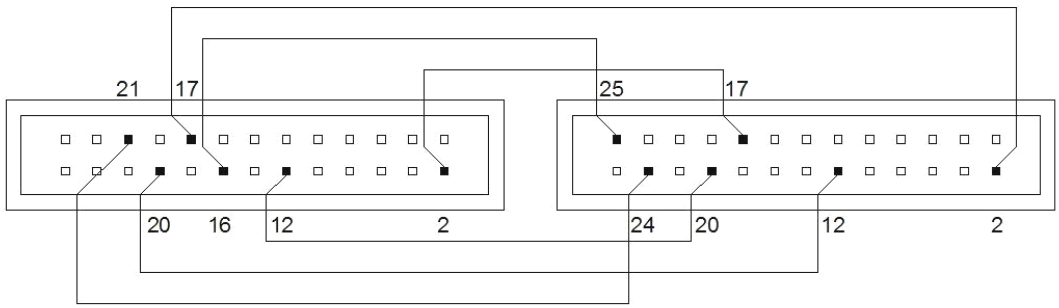

Figure 5-3-1

Host Pin Position		Serial Slave Pin Position
16 -- A COM	----------	25 --SER SLV IN
21 --OUTPUT ON STATUS	----------	24 --OUT OFF/ON CONT
20 --ALM STATUS	----------	12 --SHUTDOWN
17 --STATUS COM	----------	2 --D COM
12 --SHUTDOWN	----------	20 --ALM STATUS
2 --D COM	----------	17 --STATUS COM

5.4 Instrument Parallel Output

5.4.1 Host One Parallel

Output two instruments of the same model in parallel, the instrument as the host will change the inline mode to the host one and the instrument as the slave will change the inline mode to the slave parallel in the power failure setting page, the actual voltage will be unchanged and the current *2 after the output is turned on, the host shows the current as the total current of the two instruments and the power as the total power of the two instruments.

The online schematic is shown in Figure 5-4.

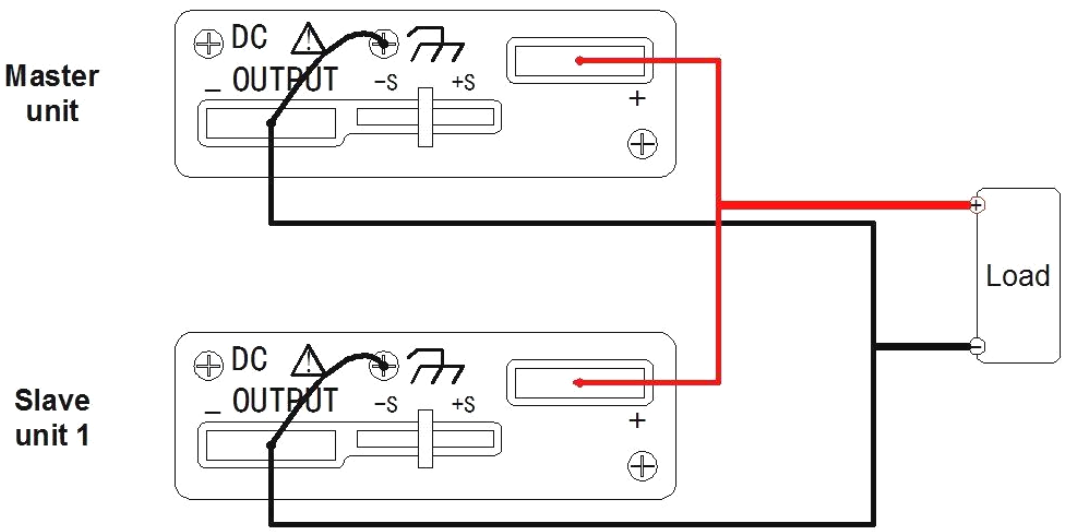

Figure 5-4

The schematic diagram of pin position of parallel connection is shown in Figure 5-4-1

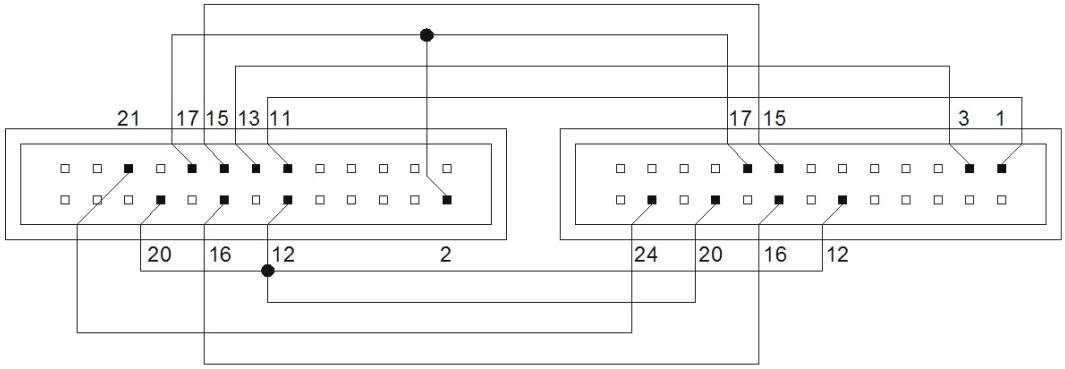

Figure 5-4-1

Host Pin Position		Slave Pin Position
11 -- I MON	----------	1 -- CURRENT SHARE
21 --OUTPUT ON STATUS	----------	24 --OUT OFF/ON CONT
20 --ALM STATUS	----------	12 --SHUTDOWN
12 --SHUTDOWN	----------	20 --ALM STATUS
17 --STATUS COM	----------	17 --STATUS COM
2 ---D COM		
15 --FEE DBACK	----------	15 --FEE DBACK
13 --CURRENT_SUM_1	----------	3 --CURRENT SUM OUT
16--A COM	----------	16 --A COM

5.4.2 Host Two Parallel

Output three instruments of the same model in parallel, as the host instrument in the power failure setting page to change the inline mode to the host two parallel, as the slave two instruments in the power failure setting page to change the inline mode to the slave parallel, turn on the output after the actual voltage remains unchanged, current *3, the host display current for the total current of the three instruments, power for the total power of the three.

The online schematic is shown in Figure 5-4-2.

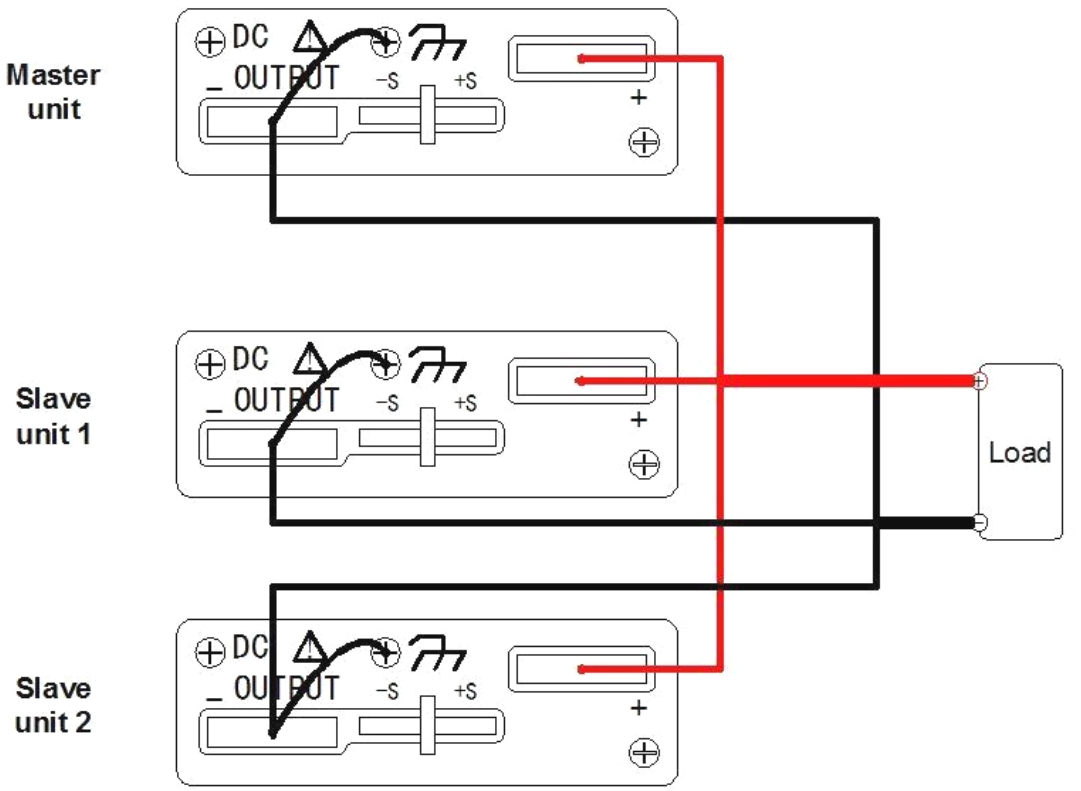

Figure 5-4-2

The schematic diagram of pin position of parallel connection is shown in Figure 5-4-2-1

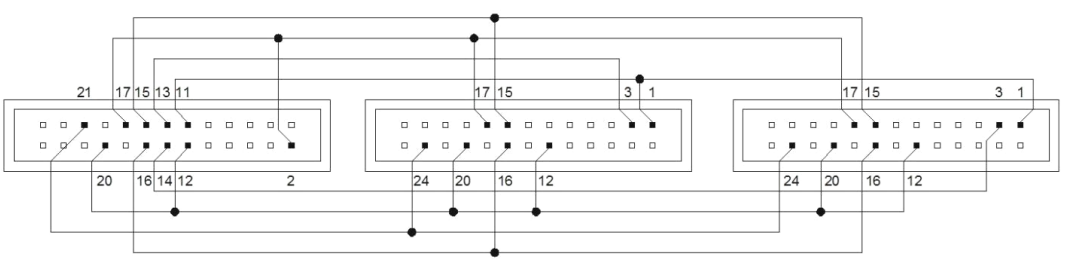

Figure 5-4-2-1

Host Pin Position	Slave pin 1	Slave pin 2
11 -- I MON	------- 1 --CURRENT	------- 1--CURRENT SHARE
21 --OUTPUT ON STATUS	------- 24 --OUT OFF/ON CONT	------- 24 --OUT OFF/ON CONT
20 --ALM STATUS	------- 12 --SHUTDOWN	------- 12 --SHUTDOWN
12 --SHUTDOWN	------- 20 --ALM STATUS	------- 20 --ALM STATUS

17 --STATUS COM ------- 17 --STATUS COM ------- 17 --STATUS COM

2 ---D COM

15 --FEE DBACK ------- 15 --FEE DBACK ------- 15 --FEE DBACK

14 ---CURRENT_SUM_2 ---------- 3 ---CURRENT SUM OUT

13 --CURRENT_SUM_1 ------- 3 --CURRENT SUM OUT

16--A COM ------- 16 --A COM -------- 16--A COM

5.5 External Control Output

This series of instruments can not only set parameters through the panel, but also directly control the output voltage or current by accessing the voltage source and resistor through the socket on the rear panel of the instrument.

The instrument voltage and current settings can be changed by adjusting the external access voltage source size or resistor size.

5.5.1 CV External Voltage

Change the constant voltage control to external voltage within the power failure setting, when the external voltage input is 0~10V, corresponding to the instrument voltage setting of 0~30V.

The rear panel voltage source wiring is shown in Figure 5-5-1

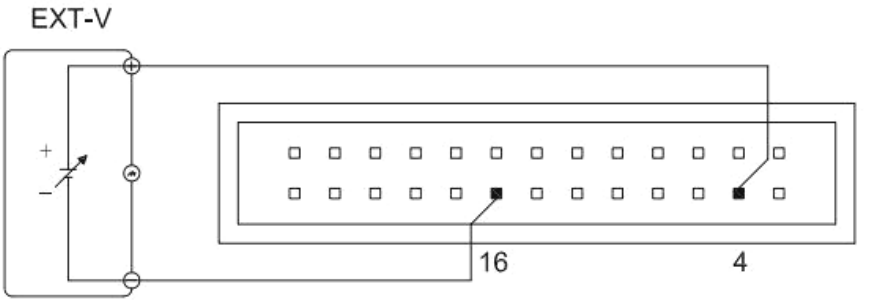

Figure 5-5-1

5.5.2 CV External Resistance Rise

Change the constant voltage control to external resistance rise within the power failure setting, when the external resistance is 0~10kΩ, corresponding to the instrument voltage setting 0~30V.

The rear panel resistor wiring is shown in Figure 5-5-2

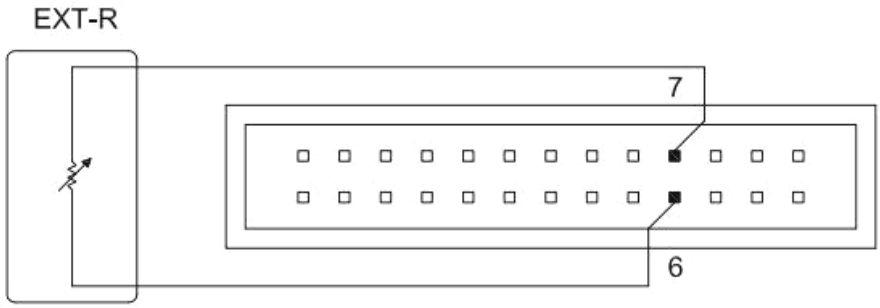

Figure 5-5-2

5.5.3 CV External Resistance Drop

Change the constant voltage control to external resistance drop within the power failure setting, when the external resistance 0~10kΩ, corresponding to the instrument voltage setting of 30~0V.

The rear panel resistor wiring is shown in Figure 5-5-3

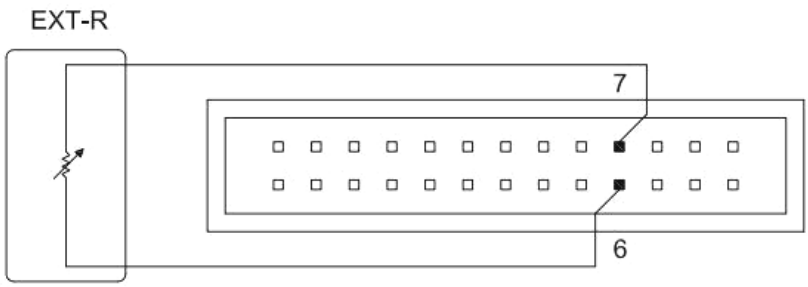

Figure 5-5-3

5.5.4 CC External Voltage

Change the constant current control to external voltage within the power failure setting, when the external voltage input is 0~10V, corresponding to the instrument voltage settings 0~36A (TH6711), 0~72A (TH6712), and 0~108A (TH6713).

The rear panel voltage source wiring is shown in Figure 5-5-4

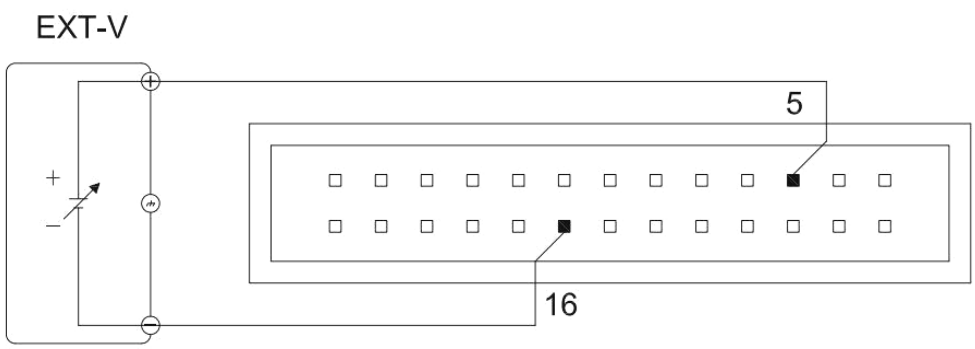

Figure 5-5-4

5.5.5 CC External Resistance Rise

Change the constant current control to external resistance rise within the power failure setting, when the external resistance 0~10kΩ, corresponding to the instrument voltage setting 0~36A (TH6711), 0~72A (TH6712), 0~108A (TH6713).

The rear panel voltage source wiring is shown in Figure 5-5-5.

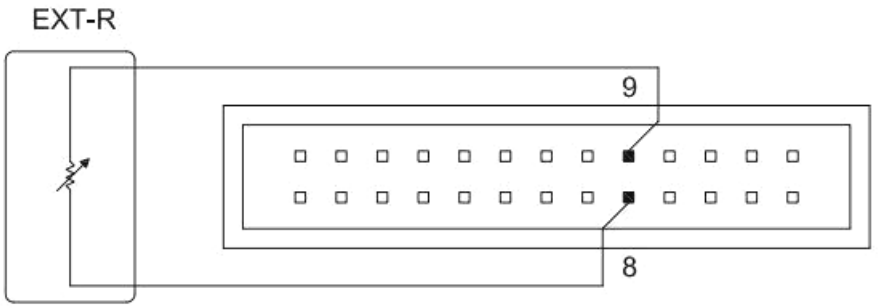

Figure 5-5-5

5.5.6 CC External Resistance Drop

Change the constant current control to external resistance drop within the power failure setting, when the external resistance 0~10kΩ, corresponding to the instrument voltage setting of 36~0A (TH6711), 72~0A (TH6712), 108~0A (TH6713).

The rear panel voltage source wiring is shown in Figure 5-5-6

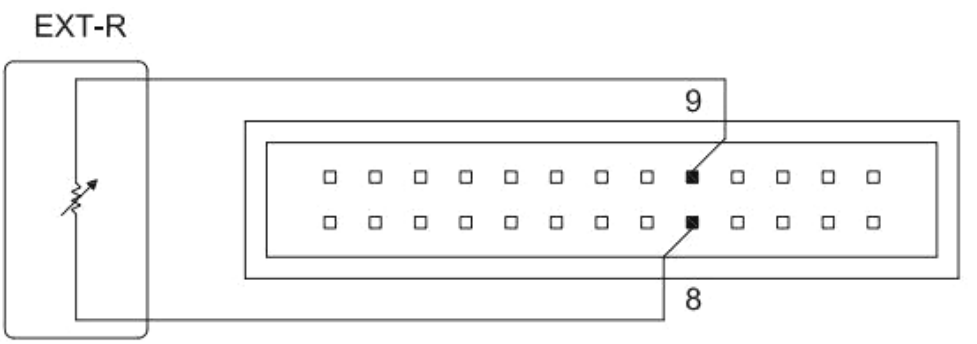

Figure 5-5-6

Chapter 6 Interface & Communication

The instrument can use RS232C serial interface, LAN port and USB interface for data communication and remote control without instrument panel, but all three cannot be used simultaneously; they have the same program control commands, but use different hardware configurations and communication protocols.

6.1 RS232

6.1.1 RS232 Interface Description

The RS232 interface provided by the instrument can be used to communicate with the computer, providing plenty of programmable commands. Through the RS232 interface, the computer can implement almost all functional operations on the instrument panel, compatible with SCPI commands and MODBUS commands of this instrument.

6.1.2 RS232 Interface Introduction

The widely used serial communication standard is RS-232, which can also be called asynchronous serial communication standard, and is used to implement data communication between computers and computers and between computers and peripherals. RS is the abbreviation of "Recommended Standard", 232 is the standard number, the standard is the American Electronics Industry Association (EIA) in 1969 officially published the standard, it provides a bit at a time by a data line transmission.

The configuration of most serial ports is usually not strictly based on the RS-232 standard: 25-pin connectors are used at each port (IMB AT uses 9-pin connectors). The most commonly used RS-232 signals are shown in Table 6-1:

Signal	Symbol	25-pin Connector Pin Number	9-pin Connector Pin Number
Request to send	RTS	4	7
Clear send	CTS	5	8
Data setup preparation	DSR	6	6
Data carrier detection	DCD	8	1
Data terminal preparation	DTR	20	4
Send data	TXD	2	3
Receive data	RXD	3	2

Grounding	GND	7	5

Table 6-1

As with most serial ports in the world, the serial interface of this instrument is not strictly based on the RS-232 standard, but rather provides only a minimal subset of it. This is shown in Table 6-2 below:

Signal	Symbol	Connector Pin Number
Send data	TXD	3
Receive data	RXD	2
Grounding	GND	5

Table 6-2

This is the easiest and cheapest way to communicate using the serial port.

Note: The serial port pin definition of this instrument is basically the same as the pin definition of the standard 9-pin RS232C connector.

The RS232C connector of this instrument uses a 9-pin DB-type socket with the following pin sequence as shown in Figure 6-1:

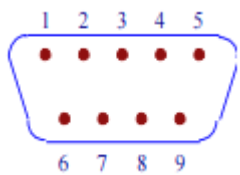

Figure 6-1

The standard DB type 9-hole plug can be used to connect directly to it.

⚠**Warning:** To avoid electrical shocks, power should be turned off when plugging or unplugging connectors.

⚠**Warning:** Do not short the output terminals or short them to the case arbitrarily to avoid damaging the device.

6.1.3 Communication with Computer

The instrument is connected to the computer as shown in Figure 6-2:

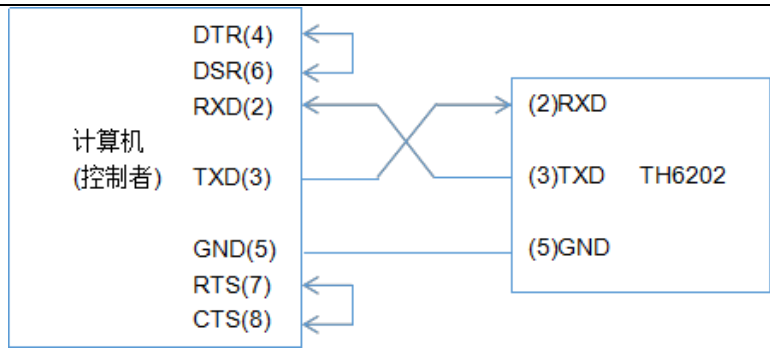

Figure 6-2

As shown in the above diagram, the pin definition of this instrument is the same as the pin definition of the serial interface of the 9-pin connector used by the IMB AT compatible machine. Users can make their own three-wire connection cable (length should be less than 1.5m) with two-core shielded wire as shown in the diagram or purchase the serial interface cable between the computer and the instrument from Tonghui Electronics Co. Ltd. or buy the standard DB9-core cable directly (crossover cable).

When making your own connection cable, note that pins 4 and 6 should be shorted and pins 7 and 8 should be shorted on the computer connector.

Serial port main parameters

Transmission Method	Full duplex asynchronous communication with start and stop bits
Baud Rate	------bps
Data Bit	8 BIT
Stop Bit	1 BIT
Calibration	None
Terminator	NL (Line feed, ASCII code 10)
Contact Information	Software Contact
Connector	DB9 Core

Table 6-3

6.2 LAN

6.2.1 LAN Remote Control System

LAN (Local Area Network) remote control system is used to control the device via LAN interface. It is compatible with SCPI command of this

instrument.

6.2.2 System Configuration

Connect the LAN port on the rear panel of the TH6700 series instrument to the computer's network port via a network cable. Set the IP and port to be ready for use, as shown in Figure 6-4.

6.3 USBTMC

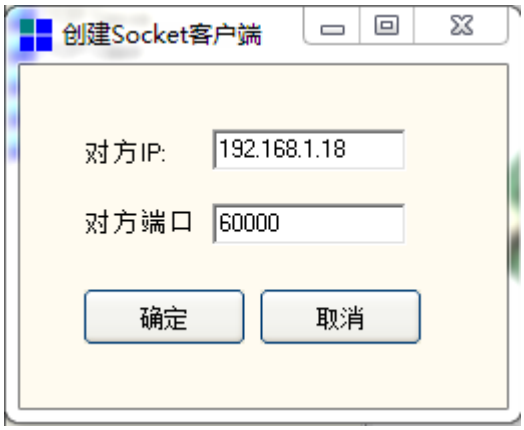

Figure 6-4

6.3.1 USBTMC Remote Control System

The USB (Universal Serial Bus) remote control system controls the device via the USB interface and is compatible with the SCPI commands of this instrument.

6.3.2 System Configuration

Connect the USB port on the rear panel of the TH6700 to the USB port on the host computer via the USB cable, and the Device Manager appears as shown in Figure 6-5.

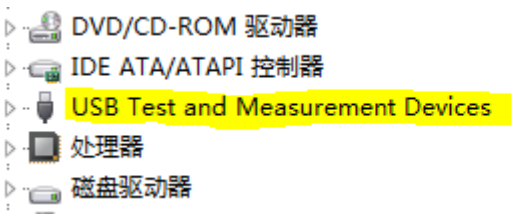

Figure 6-5

Computer device display USB Test and Measurement Devices

6.4 USBCDC

6.4.1 USBCDC Virtual Serial Port

The USB interface can be configured as a virtual serial port (VCom) by selecting the bus method "USBCDC". It is compatible with SCPI commands.

6.4.2 System Configuration

Connect the USB port on the rear panel of the TH6700 series instrument to the USB port on the host computer via the USB cable.

6.4.3 Driver Installation

The first time you connect the TH6700 to the computer with the USB cable, the computer will prompt in the lower right corner of the desktop: “New Hardware Found", followed by a dialog box asking for driver installation, select "Install from list or specified location", and then click "Next", select the correct path of the driver file (the path where the niusbtmc.inf file is located provided by the same company), as shown in Figure 6-5, click "Next" to successfully install the TH6700USBCDC driver.

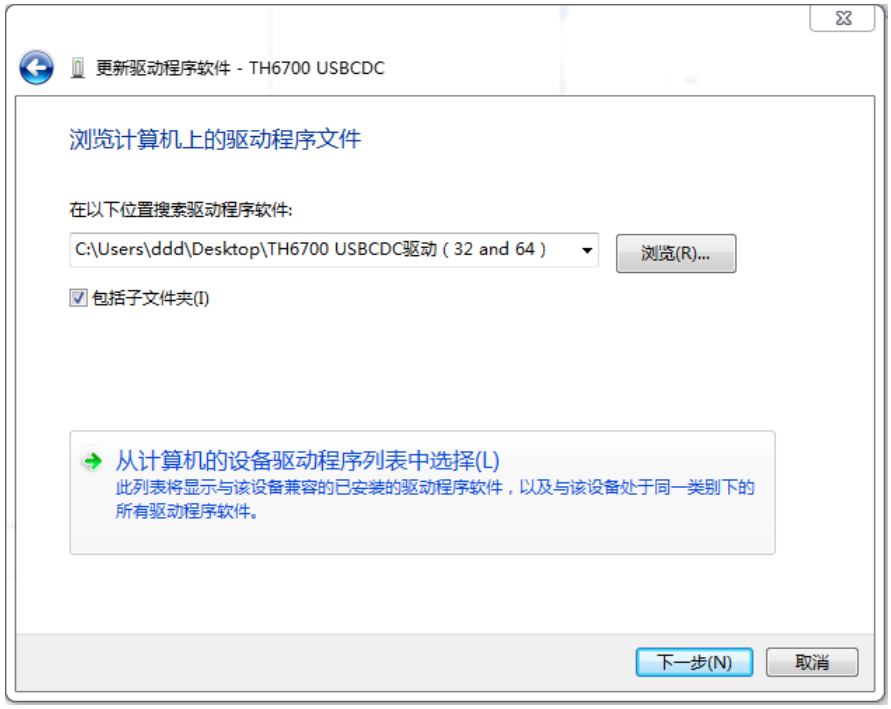

Figure 6-5

After the driver is installed, users can see the "TH6700 USB VCom PORT" in the device manager of the computer. As shown in Figure 6-6:

Figure 6-6

In this case, the usb VCom port is equivalent to a serial port. When the PC does not have a serial port, the user's previous serial-based communication software can be used in this mode with the USB port as a virtual serial port.

6.5 LXI

6.5.1 LXI Remote Control System

LXI is a modular LAN-based test platform standard. LXI modules are computer-controlled and do not require instrument displays, keys, and knobs, and are compatible with this instrument's SCPI commands.

6.5.2 System Configuration

Connect the LAN port on the rear panel of the TH6700 series instrument to the computer’s network port via a network cable. Set the LXI IP to be ready for use, as shown in Figure 6-7.

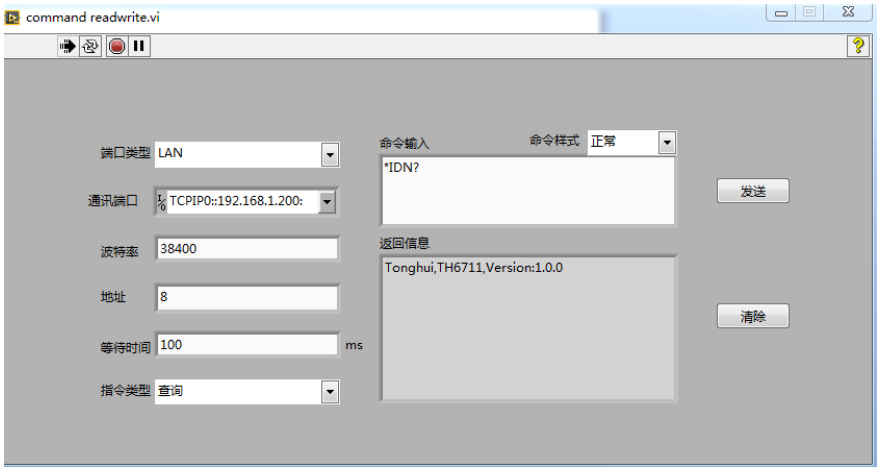

Figure 6-7

6.6 Communication Command

This instrument references SCPI (Standard Commands for

Programmable Instruments) commands and MODBUS commands. SCPI commands are tree-structured and can have up to three levels, where the highest level is called a subsystem command. Only when a subsystem command is selected, the layers under that command can be valid, using a colon to separate the command hierarchy.

6.6.1 Communication Command SCPI

SCPI commands are tree-structured and can have up to three levels, where the highest level is called a subsystem command. Only if a subsystem command is selected, the layers under that command are valid, using colons to separate the command hierarchy.

6.6.1.1 Basic Rules of Instruction Structure

(1) Ignore the case.

(2) The space is used to separate the command and the parameter of the command, before the space is the command, after the space is the parameter of the command.

(3) Some commands have no parameters.

(4) Spaces (_ indicates a space) cannot be placed before or after a colon.

(5) Commands can be abbreviated or spelled out in their entirety (lowercase letters may be omitted in subsequent command narratives).

(6) Command followed immediately by a question mark (?) executes a query corresponding to that command.

(7) The two commands are separated by a semicolon.

6.6.1.2 Instrument Subsystem Commands

- Public Commands
- DISPlay Page switch
- OUTPut Output
- VOLTage Voltage setting
- CURRent Current setting
- TIMer Timer setting
- APPLy Voltage and current compound setting
- FETCh Query
- NORmalSET General setting
- POWerSET Power failure setting
- TrigLIST List setting

- SYSTem System setup
- FILEs File operation

6.6.1.3 Public Commands

(1) *IDN?

Query instrument model, factory date and other information

(2) *RST

Reset instrument

6.6.1.4 DISPlay Subsystem Command Set

(1) DISPlay:PAGE OPD

Output display page

(2) DISPlay:PAGE TFD

List setup page

(3) DISPlay:PAGE TLD

Queue setup page

(4) DISPlay:PAGE TOPD

List output page

(5) DISPlay:PAGE NORD

General setup page

(6) DISPlay:PAGE SHUTD

Power failure setup page

(7) DISPlay:PAGE SYSD

System setup page

(8) DISPlay:PAGE FILE

Internal file page

(9) DISPlay:PAGE EFILE

External file page

(10) DISPlay:PAGE TOOLD

Tools page

(11) DISPlay:PAGE SEQ1

The list corresponds to the page, SEQ1~SEQ10 corresponds to the 10 list files in the instrument

(12) DISPlay?

Query current page

6.6.1.5 OUTPut Subsystem Command Set

(1) OUTPut ON/1

Turn on output

(2) OUTPut OFF/0

Turn off output

(3) OUTPut?

Query output status

6.6.1.6 VOLTage Subsystem Command Set

(1) VOLTage 20

Set the voltage setting value to 20V

(2) VOLTage MIN

Voltage setting value is minimum

(3) VOLTage MAX

Voltage setting value is maximum

(4) VOLTage?

Query voltage setting value

6.6.1.7 CURRent Subsystem Command Set

(1) CURRent 20

Set the current setting value to 20A

(2) CURRent MIN

Current setting value is minimum

(3) CURRent MAX

Current setting value is maximum

(4) CURRent?

Query current setting value

6.6.1.8 TIMer Subsystem Command Set

(1) TIMer 20

Set the timer time to 20s

(2) TIMer MIN

Set timer minimum value

(3) TIMer MAX

Set timer maximum value

(4) TIMer?

Query timer time

6.6.1.9 APPLy Subsystem Command Set

(1) APPLy 1.1,2.2

Set the voltage setting value and current setting value at the same time, voltage setting is 1.1V, current setting is 2.2A

(2) APPLy?

Query voltage setting value and current setting value simultaneously

6.6.1.10 FETCh Subsystem Command Set

(1) FETCh:VOLTage?

Query the current actual voltage value

(2) FETCh:CURRent?

Query the current actual current

(3) FETCh:POWer?

Query the current actual power

(4) FETCh:TIMer?

Check the current remaining time

6.6.1.11 NORmalSET Subsystem Command Set

(1) NORmalSET:OVP 33

Set overvoltage protection value to 33V

(2) NORmalSET:OVP MIN

Set the minimum value of overvoltage protection

(3) NORmalSET:OVP MAX

Set the maximum value of overvoltage protection

(4) NORmalSET:OVP?

Query the current overvoltage protection value

(5) NORmalSET:OCP 34

Set overcurrent protection value to 34A

(6) NORmalSET:OCP MIN

Set the minimum value of overcurrent protection

(7) NORmalSET:OCP MAX

Set the maximum value of overcurrent protection

(8) NORmalSET:OCP?

Query the current overcurrent protection value

(9) NORmalSET:OPTONDLY 20

Set the start-up delay time to 20s

(10) NORmalSET:OPTONDLY MAX

Set the maximum value of start-up delay time

(11) NORmalSET:OPTONDLY MIN

Set the minimum value of start-up delay time

(12) NORmalSET:OPTONDLY?

Query the current start-up delay time

(13) NORmalSET:OPTOFFDLY 30

Set the stop delay time to 30s

(14) NORmalSET:OPTOFFDLY MAX

Set stop delay time max.

(15) NORmalSET:OPTOFFDLY MIN

Set stop delay time min.

(16) NORmalSET:OPTOFFDLY?

Query the current stop delay time

(17) NORmalSET:SLEWRATE CVHighSpeed

Conversion speed is set to constant voltage high speed

(18) NORmalSET:SLEWRATE CCHighSpeed

Conversion speed is set to constant current high speed

(19) NORmalSET:SLEWRATE CVSlewRate

Conversion speed is set to constant voltage settable

(20) NORmalSET:SLEWRATE CCSlewRate

Conversion speed is set to constant current settable

(21) NORmalSET:SLEWRATE?

Query current conversion speed

(22) NORmalSET:VOLTRISE 20

Set the voltage rise rate to 20V/s

(23) NORmalSET:VOLTRISE MAX

Set the maximum voltage rise rate

(24) NORmalSET:VOLTRISE MIN

Set the minimum voltage rise rate

(25) NORmalSET:VOLTRISE?

Query the current voltage rise rate

(26) NORmalSET:VOLTFALL 20

Set the voltage drop rate to 20V/s

(27) NORmalSET:VOLTFALL MAX

Set the maximum voltage drop rate

(28) NORmalSET:VOLTFALL MIN

Set the minimum voltage drop rate

(29) NORmalSET:VOLTFALL?

Query the current voltage drop rate

(30) NORmalSET:CURRRISE 20

Set the current rise rate to 20A/s

(31) NORmalSET:CURRRISE MAX

Set the maximum current rise rate

(32) NORmalSET:CURRRISE MIN

Set the minimum current rise rate

(33) NORmalSET:CURRRISE?

Query current current rise rate

(34) NORmalSET:CURRfall 20

Set the current drop rate to 20V/s

(35) NORmalSET:CURRfall MAX

Set the maximum current drop rate

(36) NORmalSET:CURRfall MIN

Set the minimum current drop rate

(37) NORmalSET:CURRfall?

Query the current current drop rate

(38) NORmalSET:BLEEDRES ON

Drain resistor open

(39) NORmalSET:BLEEDRES OFF

Drain resistor off

(40) NORmalSET:BLEEDRES?

Query the current drain resistor open status

(41) NORmalSET:INTRES 0.2

Set the simulated internal resistance to 0.2Ω

(42) NORmalSET:INTRES MAX

Set the maximum simulated internal resistance

(43) NORmalSET:INTRES MIN

Set the minimum simulated internal resistance

(44) NORmalSET:INTRES?

Query the current simulated internal resistance value

(45) NORmalSET:MEASAVR LOW

Set measurement average to low speed

(46) NORmalSET:MEASAVR MID

Set measurement average to medium speed

(47) NORmalSET:MEASAVR HIGH

Set measurement average to high speed

(48) NORmalSET:MEASAVR?

Query the current measurement average speed

POWerSET Subsystem Command Set

(1) POWerSET:CVMODE PANEL

Constant voltage control is set to panel control

(2) POWerSET:CVMODE EXTVOLT

Constant voltage control is set to external voltage

(3) POWerSET:CVMODE EXTRES+

Constant voltage control is set to external resistor rise

(4) POWerSET:CVMODE EXTRES-

Constant voltage control is set to external resistor drop

(5) POWerSET:CVMODE?

Query the current constant voltage mode

(6) POWerSET:CCMODE PANEL

Constant current control is set to panel control

(7) POWerSET:CCMODE EXTVOLT

Constant current control is set to external voltage

(8) POWerSET:CCMODE EXTRES+

Constant current control is set to external resistor rise

(9) POWerSET:CCMODE EXTRES-

Constant current control is set to external resistor drop

(10) POWerSET:CCMODE?

Query the current constant current mode

(11) POWerSET:ONLINEMODE M/S

Online mode is set to host single

(12) POWerSET:ONLINEMODE M/P1

Online mode is set to host parallel

(13) POWerSET:ONLINEMODE M/P2

Online mode is set to host two parallel

(14) POWerSET:ONLINEMODE S/P

Online mode is set to slave parallel, and does not accept commands after acting as a slave

(15) POWerSET:ONLINEMODE S/S

Online mode is set to slave in series, and does not accept commands after acting as a slave

(16) POWerSET:ONLINEMODE?

Query the current online mode

(17) POWerSET:EXTLOGIC HIGHON

External logic is set to high level on

(18) POWerSET:EXTLOGIC LOWON

External logic is set to low level on

(19) POWerSET:EXTLOGIC?

Query the current external logic

(20) POWerSET:POWERONOPT ON

Power-up output on

(21) POWerSET:POWERONOPT OFF

Power-up output off

(22) POWerSET:POWERONOPT?

Query the current power-up output status

6.6.1.12 TrigLIST Subsystem Command Set

(1) TrigLIST:LOAD 1

Load list file 1

(2) TrigLIST:LOAD?

Query the current loading file

(3) TrigLIST:UNLOAD

Cancel loading files

(4) TrigLIST:EDIT 1

Select the file number to be set before setting

(5) TrigLIST:EDIT?

Query the file number of the currently selected file

(6) TrigLIST:EMPTY 1

Clear file settings

(7) TrigLIST:SAVe 1

Save file settings

(8) TrigLIST:STArt 1

Trigger sequence number starting point

(9) TrigLIST:END 10

Trigger sequence number end point

(10) TrigLIST:RePeaTSTArt 1

Cycle number starting point

(11) TrigLIST:RePeaTEND 10

Cycle number end point

(12) TrigLIST:RePeaT 10

Set the number of cycles

(13) TrigLIST:VOLTage 1,2

The selected file NO.1 voltage is set to 2V

(14) TrigLIST:VOLTage? 1

Query the voltage setting value of the selected file NO.1 to be set

(15) TrigLIST:CURRent 1,2

The selected file NO.1 current is set to 2A

(16) TrigLIST:CURRent? 1

Query the current setting value of the selected file NO.1 to be set

(17) TrigLIST:TIMEr 1,61

The selected file NO.1 time is set to 61s

(18) TrigLIST:TIMEr? 1

Query the time setting value of the selected file NO.1 to be set

6.6.1.13 SYSTem Subsystem Command Set

(1) SYSTem:BEEPer ON

Set the system sound on

(2) SYSTem:BEEPer OFF

Set the system sound off

(3) SYSTem:BEEPer?

Querying the system sound status

(4) SYSTem:LANGuage CHiNese

System language is set to Chinese

(5) SYSTem:LANGuage ENglish

System language is set to English

(6) SYSTem:YEAR 19

Set up 2019

(7) SYSTem:MONth 5

Set up May

(8) SYSTem:DAY 21

Setup 21

(9) SYSTem:HOUR 8

Set up 8 o'clock

(10) SYSTem:MINute 23

Set up 23 minutes

(11) SYSTem:SECond 24

Set up 24 seconds

6.6.1.14 FILEs Subsystem Command Set

(1) FILEs:LOAD 1

Load the file with internal serial number 1

(2) FILEs:UNLOAD 1

Unload the file with internal serial number 1

(3) FILEs:DELETE 1

Delete the file with internal serial number 1

(4) FILEs:STORe 1,123

Save file to internal, 1 is serial number, 123 is file name

(5) FILEs:_COPY 1

Save the file with internal serial number 1 to external

6.6.1.15 TOOLs Subsystem Command Set

(1) TOOLs:RESET

System reset

(2) TOOLs:FACtorySET

Restore factory settings

(3) TOOLs:UPDATE

Software upgrade

6.6.2 Communication Command MODBUS

6.6.2.1 Command Format

(1) Write command

Send Format

Instrument Address	Function Code	Address High	Address Low	Register number high	Register number low	Total number of bytes	Data byte 1	.....	Data bytes n	CRC Low	CRC High

Return Format

Instrument Address	Function Code	Address High	Address Low	Register number high	Register number low	CRC Low	CRC High

(2) Read command

Send Format

Instrument Address	Function Code	Address High	Address Low	Register number high	Register number low	CRC Low	CRC High

Return Format

Instrument Address	Function Code	Total number of bytes	Data byte 1	.....	Data bytes n	CRC Low	CRC High

1. Instrument address: It is the local address of the instrument, which can be set in the communication setting interface of the instrument, and the value range is: 1~32
2. Function code: This command can write one data or multiple data, so its code is: 0x10.
3. Address High and Address Low: The address where the data is stored in the instrument, which can be either the real storage address or the mapped address.
4. Register number high and low: It indicates the number of registers written for this operation, and the size of each register is 2 bytes.
5. Total bytes: It indicates the total number of bytes written in this operation.
6. Data byte 1~Data byte n: It is to write these data contents to the instrument.
7. CRC high and CRC low: CRC 16-bit checksum, we use the table lookup method to perform CRC checksum

6.6.2.2 Command List

Parameter Address	Parameter Name	Write data	Status	Description
0x0001	Voltage setting	FLOAT	write	
			read	
0x0002	Current setting	FLOAT	write	
			read	
0x0003	Timer setting	FLOAT	write	
			read	
0x0004	Output switch setting	FLOAT	write	
			read	
0x0010	Page display	0 (U16)	write	Output display page
		1 (U16)	write	List file 1
		2 (U16)	write	List file 2
		3 (U16)	write	List file 3
		4 (U16)	write	List file 4
		5 (U16)	write	List file 5
		6 (U16)	write	List file 6
		7 (U16)	write	List file 7

		8 (U16)	write	List file 8
		9 (U16)	write	List file 9
		10 (U16)	write	List file 10
		11 (U16)	write	List setup page
		12 (U16)	write	List display page
		13 (U16)	write	List output page
		14(U16)	write	General setup page
		15(U16)	write	Power failure setup page
		16(U16)	write	System setup page
		17(U16)	write	Communication setup page
		18(U16)	write	Internal file page
		19(U16)	write	External file page
		20(U16)	write	Tools page
			read	
0x0020	Overvoltage protection setting	FLOAT	write	
			read	
0x0021	Overcurrent protection setting	FLOAT	write	
			read	
0x0022	Start-up delay	FLOAT	write	
			read	
0x0023	Stop delay	FLOAT	write	
			read	
0x0024	Conversion speed	0 (U16)	write	Constant voltage high speed
		1(U16)	write	Constant current high speed
		2(U16)	write	Constant voltage settable
		3(U16)	write	Constant current settable
			read	
0x0025	Measurement average	0 (U16)	write	Low speed
		1(U16)	write	Medium speed
		2(U16)	write	High Speed
			read	
0x0026	Voltage rise	FLOAT	write	

			read	
0x0027	Voltage drop	FLOAT	write	
			read	
0x0028	Current rise	FLOAT	write	
			read	
0x0029	Current drop	FLOAT	write	
			read	
0x002A	Simulated internal resistance	FLOAT	write	
			read	
0x002B	Drain resistance	0 (U16)	write	Off
		1(U16)	write	On
			read	
0x0030	System sound	0 (U16)	write	Off
		1(U16)	write	On
			read	
0x0031	System language	0 (U16)	write	Chinese
		1(U16)	write	English
			read	
0x0032	System date Year	(U16)	write	
			read	
0x0033	System date Month	(U16)	write	
			read	
0x0034	System date Day	(U16)	write	
			read	
0x0035	System time hour	(U16)	write	
			read	
0x0036	System time minute	(U16)	write	
			read	
0x0037	System time second	(U16)	write	
			read	
0x0040	Constant voltage control mode	0 (U16)	write	Panel control
		1 (U16)	write	External voltage
		2 (U16)	write	External resistance rise

		3 (U16)	write	External resistance drop
			read	
0x0041	Constant current control mode	0 (U16)	write	Panel control
		1 (U16)	write	External voltage
		2 (U16)	write	External resistance rise
		3 (U16)	write	External resistance drop
			read	
0x0042	Online mode	0 (U16)	write	Host single
		1 (U16)	write	host parallel
		2 (U16)	write	Host two parallel
		3 (U16)	write	Slave in parallel
		4 (U16)	write	Slave in series
			read	
0x0043	External logic	0 (U16)	write	High level on
		1 (U16)	write	Low level on
			read	
0x0044	Power-up output	0 (U16)	write	Off
		1 (U16)	write	On
			read	
0x0050	List file loading	0 (U16)	write	Unload
		1--10 (U16)	write	Load list file 1-10
			read	
0x0051	Set the file number to be edited	1--10 (U16)	write	
			read	
0x0052	Set the file number to clear the settings	(U16)	write	
0x0053	Set the file number to save the settings	(U16)	write	
0x0054	Set the starting point of the trigger number of the edited file	(U16)	write	
0x0055	Set the end of the trigger number of the edited file	(U16)	write	
0x0056	Set the starting point of the cycle number of the edited file	(U16)	write	

0x0057	Set the end of the cycle number of the edited file	(U16)	write	
0x0058	Set the number of cycles of the edited file	(U16)	write	
0x0060	Load internal files	(U16)	write	File number
0x0061	Unload internal files	(U16)	write	
0x0062	Delete internal files	(U16)	write	
0x0063	Save as	(U16)	write	
0x0070	System reset	1(U16)	write	
0x0071	Restore factory	1(U16)	write	
0x0072	Software upgrade	1(U16)	write	
0x0075	Actual voltage		read	
0x0076	Actual current		read	
0x0077	Actual power		read	
0x0078	Timer time remaining		read	
0x0079	Query local address	(U16)	read	

Chapter 7 Technical Specifications

TH671X

Parameters	TH6711	TH6712	TH6713
Rated Voltage	30V		
Rated Current	33A	66A	100A
Rated Power	360W	720W	1080W
Maximum Voltage	31.5V		
Maximum Current	36A	72A	108A
Power Limit	Approx. rated power*105%		
Voltage Setting Range	0~31.5V		
Current Setting Range	0~36A	0~72A	0~108A
Timer Setting Range	0~9999999s		
Start-up Delay Setting Range	0~99.99s		
Stop Delay Setting Range	0~99.99s		
Voltage Rise Setting Range	0.01~60V/s		
Voltage Drop Setting Range	0.01~60V/s		
Current Rise Setting Range	0.01~72A/s	0.1~144A/s	0.1~216A/s
Current Drop Setting Range	0.01~72A/s	0.1~144A/s	0.1~216A/s
Simulated Internal Resistance Setting Range	0~0.833Ω	0~0.417Ω	0~0.278Ω
CV Power Regulation Rate	≤18mV		
CC Power Regulation Rate	≤41mA	≤77mA	≤113mA
CV Load Regulation Rate	≤20mV		
CC Load Regulation Rate	≤41mA	≤77mA	≤113mA
CV Ripple and Noise (20Hz-2MHz)	≤60mVp-p and 7mVrms	≤80mVp-p and 11mVrms	≤100mVp-p and 14mVrms
CC Ripple and Noise (20Hz-2MHz)	≤72mArms	≤144mArms	≤216mArms
Rise Time (full load)	≤50ms		
Rise Time (no load)	≤50ms		
Drop Time (full load)	≤50ms		
Drop Time (no load)	≤500ms		
Dynamic Recovery Time (recovery to 0.1% + 10mV)	≤2ms		
Overvoltage Protection Setting Range	3~33V		
Overvoltage Protection Accuracy	Rated voltage*±2%		
Overcurrent Protection Setting Range	3.6~37.8A	5~75.6A	5~113.4A
Overcurrent Protection Accuracy	Rated current*±2%		
Overtemperature Protection (shutdown output)	Internal temperature rise decision		
Voltage Setpoint Resolution	10mV		

Current Setpoint Resolution	10mA	10mA	100mA
Voltage Setpoint Accuracy 25℃±5℃ (>0.1V)	≤0.1%+10mV		
Current Setpoint Accuracy 25℃±5℃ (>0.1A)	≤0.1%+30mA	≤0.1%+60mA	≤0.1%+100mA
Voltage Readback Resolution	10mV		
Current Readback Resolution	10mA	10mA	100mA
Voltage Readback Accuracy 25℃±5℃ (>0.1V)	≤0.1%+20mV		
Current Readback Accuracy 25℃±5℃ (>0.1A)	≤0.1%+40mA	≤0.1%+70mA	≤0.1%+100mA
External Voltage Control CV Accuracy 25℃ ±5℃	Rated output voltage ±0.5%		
External Voltage Control CC Accuracy 25℃ ±5℃	Rated output current ±1%		
External Resistance Control CV Accuracy 25℃ ±5℃	Rated output voltage ±1.5%		
External Resistance Control CC Accuracy 25℃ ±5℃	Rated output current ±1.5%		
Parallel Units	Up to three units with host (of the same model)		
Tandem Units	Up to two units with host (of the same model)		
Power Factor 100VAC (full load)	0.99		
Power Factor 200VAC (full load)	0.97		
Efficiency 100VAC (full load)	75%		
Efficiency 200VAC (full load)	77%		

TH672X

Parameters	TH6721	TH6722	TH6723
Rated Voltage	80V		
Rated Current	12.5A	25A	37.5A
Rated Power	360W	720W	1080W
Maximum Voltage	84V		
Maximum Current	13.5A	27A	40.5A
Power Limit	Approx. rated power*105%		
Voltage Setting Range	0~84V		
Current Setting Range	0~13.5A	0~27A	0~40.5A
Timer Setting Range	0~9999999s		
Start-up Delay Setting Range	0~99.99s		
Stop Delay Setting Range	0~99.99s		
Voltage Rise Setting Range	0.1~160V/s		
Voltage Drop Setting Range	0.1~160V/s		
Current Rise Setting Range	0.01~27A/s	0.01~54A/s	0.01~81A/s
Current Drop Setting Range	0.01~27A/s	0.01~54A/s	0.01~81A/s

Simulated Internal Resistance Setting Range	0~5.926Ω	0~2.963Ω	0~1.975Ω
CV Power Regulation Rate	≤43mV		
CC Power Regulation Rate	≤18.5mA	≤32mA	≤45.5mA
CV Load Regulation Rate	≤45mV		
CC Load Regulation Rate	≤18.5mA	≤32mA	≤45.5mA
CV Ripple and Noise (20Hz-2MHz)	≤60mVp-p and 7mVrms	≤80mVp-p and 11mVrms	≤100mVp-p and 14mVrms
CC Ripple and Noise (20Hz-2MHz)	≤27mArms	≤54mArms	≤81mArms
Rise Time (full load)	≤50ms		
Rise Time (no load)	≤50ms		
Drop Time (full load)	≤50ms		
Drop Time (no load)	≤500ms		
Dynamic Recovery Time (recovery to 0.1% + 10mV)	≤2ms		
Overvoltage Protection Setting Range	8~88V		
Overvoltage Protection Accuracy	Rated voltage*±2%		
Overcurrent Protection Setting Range	1.35~14.18A	2.7~28.35A	4.05~42.53A
Overcurrent Protection Accuracy	Rated current*±2%		
Overtemperature Protection (shutdown output)	Internal temperature rise decision		
Voltage Setpoint Resolution	10mV		
Current Setpoint Resolution	10mA	10mA	100mA
Voltage Setpoint Accuracy 25℃±5℃ (>0.1V)	≤0.1%+10mV		
Current Setpoint Accuracy 25℃±5℃ (>0.1A)	≤0.1%+10mA	≤0.1%+30mA	≤0.1%+40mA
Voltage Readback Resolution	10mV		
Current Readback Resolution	10mA	10mA	100mA
Voltage Readback Accuracy 25℃±5℃ (>0.1V)	≤0.1%+20mV		
Current Readback Accuracy 25℃±5℃ (>0.1A)	≤0.1%+20mA	≤0.1%+40mA	≤0.1%+50mA
External Voltage Control CV Accuracy 25℃ ±5℃	Rated output voltage ±0.5%		
External Voltage Control CC Accuracy 25℃ ±5℃	Rated output current ±1%		
External Resistance Control CV Accuracy 25℃ ±5℃	Rated output voltage ±1.5%		
External Resistance Control CC Accuracy 25℃ ±5℃	Rated output current ±1.5%		
Parallel Units	Up to three units with host (of the same model)		
Tandem Units	Up to two units with host (of the same model)		
Power Factor 100VAC (full load)	0.99		
Power Factor 200VAC (full load)	0.97		
Efficiency 100VAC (full load)	76%		

Efficiency 200VAC (full load)	78%

TH673X

Parameters	TH6731	TH6732	TH6733
Rated Voltage	250V		
Rated Current	4.2A	8.4A	12.6A
Rated Power	360W	720W	1080W
Maximum Voltage	262.5V		
Maximum Current	4.5A	9A	13.5A
Power Limit	Approx. rated power*105%		
Voltage Setting Range	0~262.5V		
Current Setting Range	0~4.5A	0~9A	0~13.5A
Timer Setting Range	0~9999999s		
Start-up Delay Setting Range	0~99.99s		
Stop Delay Setting Range	0~99.99s		
Voltage Rise Setting Range	0.1~500V/s		
Voltage Drop Setting Range	0.1~500V/s		
Current Rise Setting Range	0.001~9A/s	0.01~18A/s	0.01~27A/s
Current Drop Setting Range	0.001~9A/s	0.01~18A/s	0.01~27A/s
Simulated Internal Resistance Setting Range	0~55.55Ω	0~27.77Ω	0~18.51Ω
CV Power Regulation Rate	≤128mV		
CC Power Regulation Rate	≤9.5mA	≤14mA	≤18.5mA
CV Load Regulation Rate	≤130mV		
CC Load Regulation Rate	≤9.5mA	≤14mA	≤18.5mA
CV Ripple and Noise (20Hz-2MHz)	≤80mVp-p and 15mVrms	≤100mVp-p and 15mVrms	≤125mVp-p and 15mVrms
CC Ripple and Noise (20Hz-2MHz)	≤10mArms	≤20mArms	≤30mArms
Rise Time (full load)	≤100ms		
Rise Time (no load)	≤100ms		
Drop Time (full load)	≤150ms		
Drop Time (no load)	≤1200ms		
Dynamic Recovery Time (recovery to 0.1% + 10mV)	≤2ms		
Overvoltage Protection Setting Range	20~275V		
Overvoltage Protection Accuracy	Rated voltage*±2%		
Overcurrent Protection Setting Range	0.45~4.72A	0.9~9.45A	1.35~14.17A
Overcurrent Protection Accuracy	Rated current*±2%		
Overtemperature Protection (shutdown output)	Internal temperature rise decision		
Voltage Setpoint Resolution	100mV		

Current Setpoint Resolution	1mA	1mA	10mA
Voltage Setpoint accuracy 25℃±5℃ (>0.1V)	≤0.1%+200mV		
Current Setpoint accuracy 25℃±5℃ (>0.1A)	≤0.1%+5mA	≤0.1%+10mA	≤0.1%+15mA
Voltage Readback Resolution	100mV		
Current Readback Resolution	1mA	1mA	10mA
Voltage Readback Accuracy 25℃±5℃ (>0.1V)	≤0.1%+200mV		
Current Readback Accuracy 25℃±5℃ (>0.1A)	≤0.1%+5mA	≤0.1%+10mA	≤0.1%+20mA
External Voltage Control CV Accuracy 25℃ ±5℃	Rated output voltage ±0.5%		
External Voltage Control CC Accuracy 25℃ ±5℃	Rated output current ±1%		
External Resistance Control CV Accuracy 25℃ ±5℃	Rated output voltage ±1.5%		
External Resistance Control CC Accuracy 25℃ ±5℃	Rated output current ±1.5%		
Parallel Units	Up to three units with host (of the same model)		
Tandem Units	None		
Power Factor 100VAC (full load)	0.99		
Power Factor 200VAC (full load)	0.97		
Efficiency 100VAC (full load)	77%		
Efficiency 200VAC (full load)	79%		

TH674X

Parameters	TH6741	TH6742	TH6743
Rated voltage	800V		
Rated current	1.32A	2.64A	3.96A
Rated Power	360W	720W	1080W
Maximum Voltage	840V		
Maximum Current	1.44A	2.88A	4.32A
Power Limit	Approx. rated power*105%		
Voltage Setting Range	0~840V		
Current Setting Range	0~1.44A	0~2.88A	0~4.32A
Timer Setting Range	0~9999999s		
Start-up Delay Setting Range	0~99.99s		
Stop Delay Setting Range	0~99.99s		
Voltage Rise Setting Range	1~1600V/s		
Voltage Drop Setting Range	1~1600V/s		
Current Rise Setting Range	0.001~2.88A/s	0.001~5.76A/s	0.001~8.64A/s
Current Drop Setting Range	0.001~2.88A/s	0.001~5.76A/s	0.001~8.64A/s

Simulated Internal Resistance Setting Range	0~555.5Ω	0~277.8Ω	0~185.1Ω
CV Power Regulation Rate	≤403mV		
CC Power Regulation Rate	≤6.44mA	≤7.88mA	≤9.32mA
CV Load Regulation Rate	≤405mV		
CC Load Regulation Rate	≤6.44mA	≤7.88mA	≤9.32mA
CV Ripple and Noise (20Hz-2MHz)	≤150mVp-p and 30mVrms	≤200mVp-p and 30mVrms	≤200mVp-p and 30mVrms
CC Ripple and Noise (20Hz-2MHz)	≤5mArms	≤10mArms	≤15mArms
Rise Time (full load)	≤150ms		
Rise Time (no load)	≤150ms		
Drop Time (full load)	≤300ms		
Drop Time (no load)	≤2000ms		
Dynamic Recovery Time (recovery to 0.1% + 10mV)	≤2ms		
Overvoltage Protection Setting Range	20~880V		
Overvoltage Protection Accuracy	Rated voltage*±2%		
Overcurrent Protection Setting Range	0.144~1.512A	0.288~3.024A	0.432~4.536A
Overcurrent Protection Accuracy	Rated current*±2%		
Overtemperature Protection (shutdown output)	Internal temperature rise decision		
Voltage Setpoint Resolution	100mV		
Current Setpoint Resolution	1mA	1mA	1mA
Voltage Setpoint Accuracy 25℃±5℃ (>0.1V)	≤0.1%+400mV		
Current Setpoint Accuracy 25℃±5℃ (>0.1A)	≤0.1%+2mA	≤0.1%+4mA	≤0.1%+6mA
Voltage Readback Resolution	100mV		
Current Readback Resolution	1mA	1mA	1mA
Voltage Readback Accuracy 25℃±5℃ (>0.1V)	≤0.1%+20mV		
Current Readback Accuracy 25℃±5℃ (>0.1A)	≤0.1%+2mA	≤0.1%+4mA	≤0.1%+6mA
External Voltage Control CV Accuracy 25℃ ±5℃	Rated output voltage ±0.5%		
External Voltage Control CC Accuracy 25℃ ±5℃	Rated output current ±1%		
External Resistance Control CV Accuracy 25℃ ±5℃	Rated output voltage ±1.5%		
External Resistance Control CC Accuracy 25℃ ±5℃	Rated output current ±1.5%		
Parallel Units	Up to three units with host (of the same model)		
Tandem Units	None		
Power Factor 100VAC (full load)	0.99		
Power Factor 200VAC (full load)	0.97		
Efficiency 100VAC (full load)	78%		

Efficiency 200VAC (full load)	80%

- Power regulation rate (88-132VAC and 170-265VAC, constant load)
- Load regulation rate (no load - full load, constant input voltage)
- Rise time (10%-90% of rated output voltage with rated resistive load)
- Drop time (90%-10% of rated output voltage with rated resistive load)
- Dynamic recovery time (time for the output voltage to recover within 0.1% + 10mV of the rated output when the load varies from 50% to 100% of the rated output current)

Chapter 8 Warranty

Warranty period: The warranty period is two years for those who use the instrument purchased from the Company since the date of shipment from the Company, and for those who purchase from the operating department since the date of shipment from the operating department. The warranty should be issued to the instrument warranty card. During the warranty period, if the instrument is damaged due to improper operation by the user, the repair cost shall be borne by the user. The instrument is responsible for the lifetime maintenance by the company.

The repair of this instrument requires professional and technical personnel for maintenance; please do not replace the internal components of the instrument without permission during the repair; after the repair of the instrument, it needs to be remeasured and calibrated to avoid affecting the test accuracy. Due to the user's blind repair, replacement of instrument parts caused by damage to the instrument is not covered by the warranty, the user should bear the maintenance costs.

The instrument should be protected from sunlight and moisture and should be used properly in the environment described in 1.2.

If the instrument is not used for a long time, it should be packed and sealed in the factory box.

Chapter 9 Appendix

V1.2: Add U disk data saving function, see 4.1.5

V1.3: Add TH672X series parameter index

V1.4: Add TH673X/TH674X series rear panel description (see 5.1) and parameter index

同惠网址

常州同惠电子股份有限公司 400-624-1118
地址：江苏省常州市新北区天山路3号(213022)
电话：0519-85132222　传真：0519-85109972
Http://www.tonghui.com.cn　Email: sales@tonghui.com.cn