MATRIX
MATRIX TECHNOLOGY INC.

Four-channel programmable DC power supply instruction manual

Preface

respected user:

　　Hello! Thank you for purchasing a new Avetech instrument. In order to use this instrument correctly, please read this manual carefully before using this instrument, especially the section on "Safety Precautions".

　　If you have read the full text of this manual, it is recommended that you keep this manual in a safe place and place it with the instrument or in a place where you can read it at any time for future reference.

Copyright Information

Verification and Correction Statement

The company specifically declares that the instruments and equipment listed in this manual fully conform to the specifications and characteristics stated in the company's technical specifications. This instrument has passed the factory calibration of the company before leaving the factory, and the calibration procedures and steps are in line with the specifications and standards of the electronic inspection center.

Product quality assurance

The company guarantees that the new instruments produced and manufactured have undergone strict quality confirmation, and at the same time guarantees that within one year of leaving the factory, if any construction defects or parts failures are found, the company is responsible for repairing them free of charge. However, if the user changes the circuit, function, or repairs the instrument and parts or the outer box is damaged, the company does not provide free warranty service. If all ground wires are not properly connected in accordance with regulations or the machine is not operated in accordance with safety regulations and abnormal conditions occur, our company will not provide free warranty services.

This warranty does not include accessories that are not produced by our company, such as accessories for this instrument.

During the one-year warranty period, please return the faulty unit to our maintenance center or the dealer designated by our company, and our company will properly repair it.

If the unit fails under abnormal use, human negligence, or under human control, such as earthquakes, floods, riots, or fires and other factors beyond human control, the company will not provide free warranty services.

(The company follows the sustainable development strategy and reserves the right to improve the contents of this manual without prior notice)

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Chapter Ⅰ Product Introduction

Four-channel programmable DC power supply is a new generation of high-quality programmable linear DC power supply. All four channels can independently adjust voltage and current. This series of products is equipped with RS232 communication interface, which has the characteristics of desktop and system type, and can be arbitrarily matched with other instruments , integrated into a test system with special functions to meet the measurement requirements in different occasions, and the host computer program can be edited through the communication protocol, which brings great convenience to the user's use. It is a replacement product of ordinary programmable power supplies. price-performance advantage.

This series of power supplies has the following characteristics:
• Smart fan system
• Multiple sets of data storage
• Standard 19-inch 3U instrument architecture design
• Support RS232, communication
• 1mV, 0.1mA high resolution
• OCP, OVP, OTP and other protection functions
• All four channels can independently adjust voltage and current

Chapter Ⅱ Technical Specifications

2.1 Main technical specifications

Four-channel programmable DC power supply technical specification table:

Model		IV-6054				IV-3104			
Rated input voltage		AC220V±5%							
aisle		CH1	CH2	CH3	CH4	CH1	CH2	CH3	CH4
Rated output voltage		0-60V				0-30V			
Rated output current		0-5A				0-10A			
Transformer way		Linear power				Linear power			
Load regulation rate	Voltage	≤0.02%+5mV				≤0.02%+5mV			
	Current	≤0.02%+5mA				≤0.02%+5mA			
Power regulation rate	Voltage	≤0.02%+5mV				≤0.02%+5mV			
	Current	≤0.02%+5mA				≤0.02%+5mA			
Set value resolution	Voltage	1mV				1mV			
	Current	0.1mA				0.1mA			
Ripple and Noise	Voltage	3mVrms				8mVrms			
	Current	3mArms				5mArms			
Set value accuracy (25℃±5℃)	Voltage	≤0.05%+5 digits				≤0.05%+5 digits			
	Current	≤0.2%+2mA				≤0.2%+2mA			
Readback resolution	Voltage	1mV				1mV			
	Current	0.1mA				0.1mA			
Readback accuracy (25℃±5℃)	Operating environment	≤0.05%+5 digits				≤0.05%+5 digits			
	Storage environment	≤0.2%+2mA				≤0.2%+2mA			
Temperature	Voltage	0 to 40 ℃ ≤ 80 R.H.							
	Current	-15 to 70 ℃ ≤ 80 R.H							
Dimensions (W*H*D(mm))		380 (including the handle 40mm) * 484 (including the ears on both sides 44mm) * 150 (including the foot pad 18mm)							
Net weight (kg)		28Kg				28.5Kg			

2.2 Supplementary Features

State memory capacity: 9 groups of operating states

Recommended calibration frequency: 1 year/1 time

Cooling method: forced air cooling

Operating ambient temperature: 0 to 40 ℃

Storage ambient temperature: -20 to 70 ℃

Use environment: indoor use design, pollution level 2, maximum humidity 80%

Chapter Ⅲ Quick Start

This chapter will briefly introduce the appearance and basic functions of the four-channel programmable DC power supply, so that you can quickly understand the four-channel programmable DC power supply. At the same time, it will tell you the basic inspections to be done after getting the power supply to ensure the normal operation of this product.

3.1 Introduction of front and rear panels

The front panel of the four-way programmable DC power supply is shown in the figure below.
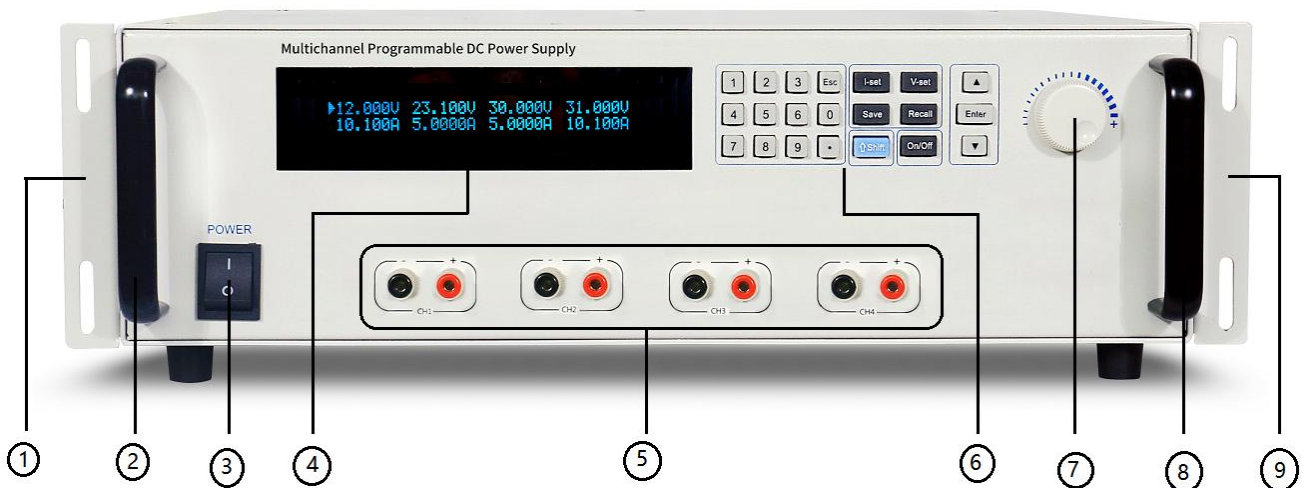
Picture 3.1

①, ⑨ standard 19-inch cabinet fixing ears

②, ⑧ four-way programmable DC power supply handle

③ Power switch

④ LCD display,

⑤ Front output terminal,

⑥ From left to right are 0-9 number keys and ESC escape key, function keys, up and down movement keys and Enter key,

⑦ Adjustment knob ,

The rear panel layout of the four-way programmable DC power supply is shown in the following figure.
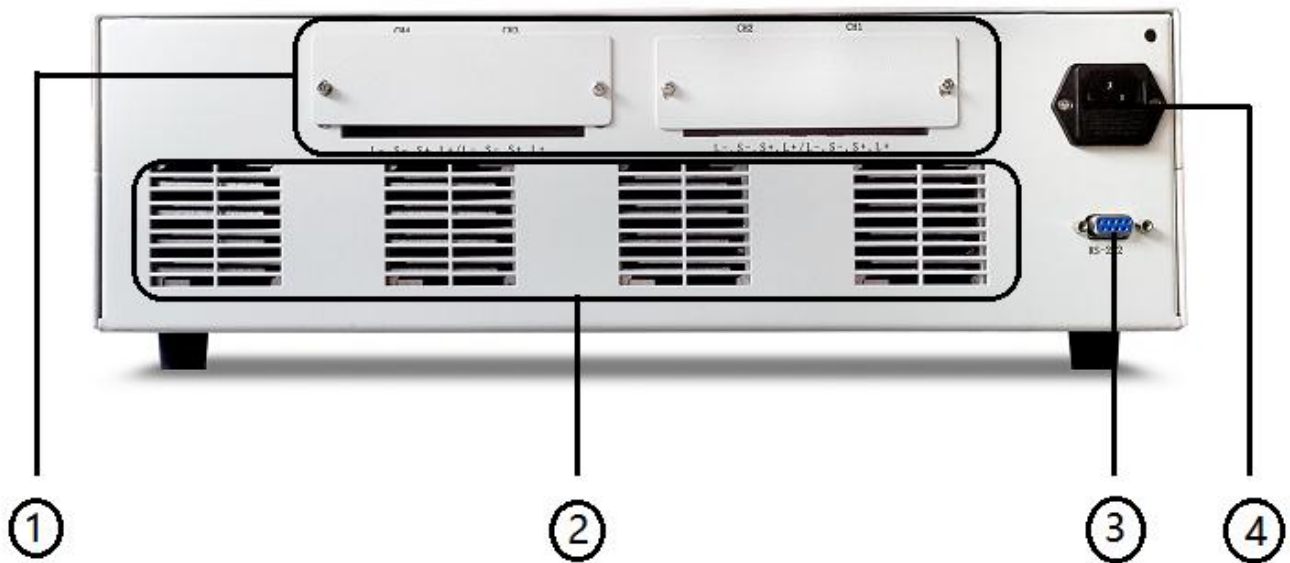
Picture 3.2 Four-channel programmable DC power supply rear panel

① Rear output terminal and SENSE (remote range port) "L" is the rear output terminal, "S" is SENSE,
② Heat dissipation hole
③ RS232 communication interface
④ Power input socket

3.2 Pre-check

Please follow the steps below to check the power supply to ensure that the power supply can be used normally.

1. Inspection
Please check whether you have received the following accessories when you receive the power supply. If any is missing, please contact your local distributor or our sales.
☐ A power cord (conforms to the voltage standard used in the country)
☐ An operation manual (standard configuration)
☐ A warranty card (standard configuration)

2. Connect the power cord and turn on the power
After power on, the power supply system first check and test itself, and then enters the standby state.

⚠ Warning: The power supply ships with a three-conductor power cord, and your power supply should be connected to the three-conductor terminal block. Before operating this power supply, you should first make sure that the power supply is well grounded.

3.3 If the power does not start

Use the following methods to solve the problems you may encounter when turning on the power.
1.   Check whether the power cord is connected properly

Model	Fuse specifications	
	230V	
IV-6054	15A	
IV-3104	15A	

2. How to replace the fuse

Use a screwdriver to open the small plastic cover below the power input socket on the rear panel of the power supply, and you can see the fuse. Please use a fuse that matches the specification.
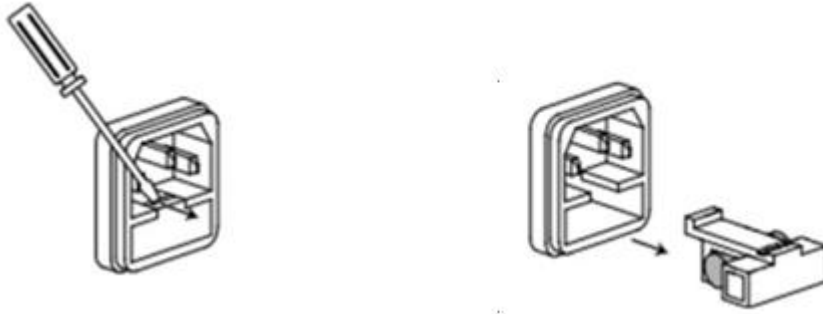
Chapter Ⅳ Panel Operation

This chapter will introduce the operation of the front panel of the power supply in detail, divided into the following parts:

- Keyboard arrangement
- Front panel operation introduction
- Voltage setting operation
- Current setting operation
- Storage operation
- Menu operation
- Output on/off operation

4.1 Keyboard introduction

Key Description

| Button position	Button function description
0-9 :	Number key
Esc :	Number key input and exit
I-Set	Set the maximum output current
V-Set	Set power supply output voltage
Save	Power storage current correlation parameter to a specified storage location set
Recall	Recall power-related setting parameters from the designated storage location
Shift	Compound key, used in combination with multi-function key
On/off	Control power output status
▲	Up key (select a menu item in the menu operation, the output voltage can be increased in the work interface)
▼	Down key (select menu item in menu operation, the output voltage can be reduced in working interface)
Enter	Enter
Knob	Used to change the power supply voltage and current settings

4.2 Front panel Basic Operation

Turn on the power, the LCD displays the voltage and current data of the four channels, from left to right: CH1, CH2, CH3, CH4, the first row displays the voltage value, and the second row displays the current value. When the current channel of the instrument is in the output state, The decimal point of the voltage window flashes, and the current window displays the actual output current value. When the instrument is turned off, the current window displays the set current value. Press the ▲ and ▼ keys to switch the parameter settings of CH1 to CH4, the cursor indicates that the parameters of the current channel can be set.
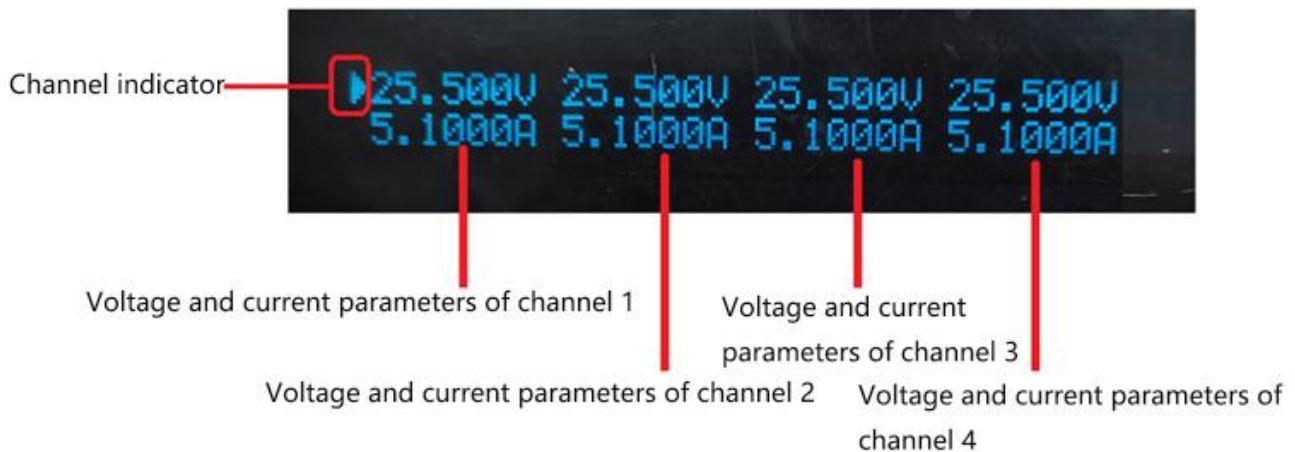
4.3 Voltage setting

The voltage setting range is between 0V and the maximum voltage setting value. You can use the following two methods to set the output voltage value through the front panel. The set voltage is the value of the channel indicated by the current cursor.

Method 1: Press the V-Set key, then press the number keys 0 to 9 to input the voltage value, and then press the Enter key to confirm the voltage value.

Method 2: Press the V-Set key, and then turn the knob left and right to change the voltage setting value. (When the screen flashes, you can turn the knob left and right to set the voltage. Press the knob to move the setting cursor position, and press the "Enter" key. to confirm and exit setting mode).

4.4 Current setting

The setting range of the current is between 0A and the full rated output current. You can use the following two methods to set the output current value through the front panel. The set current is the value of the channel indicated by the current cursor.

Method 1: Press the I-Set key, then press the number keys 0 to 9 to input the current value, and then press the Enter key to confirm the current value.

Method 2: Press the I-Set key, and then turn the knob left and right to change the voltage setting value. (When the screen flashes, you can turn the knob left and right to set the current value, and press the knob to move the setting cursor position, and press "Enter" key to confirm and exit the setting mode).

4.5 Access operation

The power supply can save some commonly used parameters in 9 groups of non-volatile memory for users to quickly recall. You can use the Save and Recall keys on the front panel to access (0~9) groups of memory areas.
The storage contents include:
1. Voltage setting value
2. Current setting value
3. OVP
4. OCP
You can press the Save key, then press the number keys 1 to 9, and press the Enter key to store the parameters of the power supply in the designated storage area.
You can press the Recall key, then press the number keys 1 to 9, and press the Enter key to retrieve the parameters from the specified storage area for use.

4.6 OVP/OCP/V SENSE function setting

Press shift and then press the number keys "1 to 4" to enter the OVP/OCP/V SENSE parameter settings of CH1 to CH4 respectively. Press the ▲ and ▼ keys to move the cursor to the parameter position to be modified.

OVP ON/OFF (overvoltage protection enable switch, ON is turned on, OFF is turned off, the default value is "OFF", change the setting with the knob, press the "Enter" key to save the setting,)

OVP value (overvoltage protection value setting, set by numeric keys or knob,)

OCP ON/OFF (overcurrent protection enable switch, ON is turned on, OFF is turned off, the default value is "OFF", use the knob to change the setting, press the "Enter" key to save the setting,)

SENSE ON/OFF (remote compensation enable switch, ON is turned on, OFF is turned off, the default value is "OFF", use the knob to change the setting, press the "Enter" key to save the setting,)

As shown in the figure: (CH1-CH4 setting method is the same)
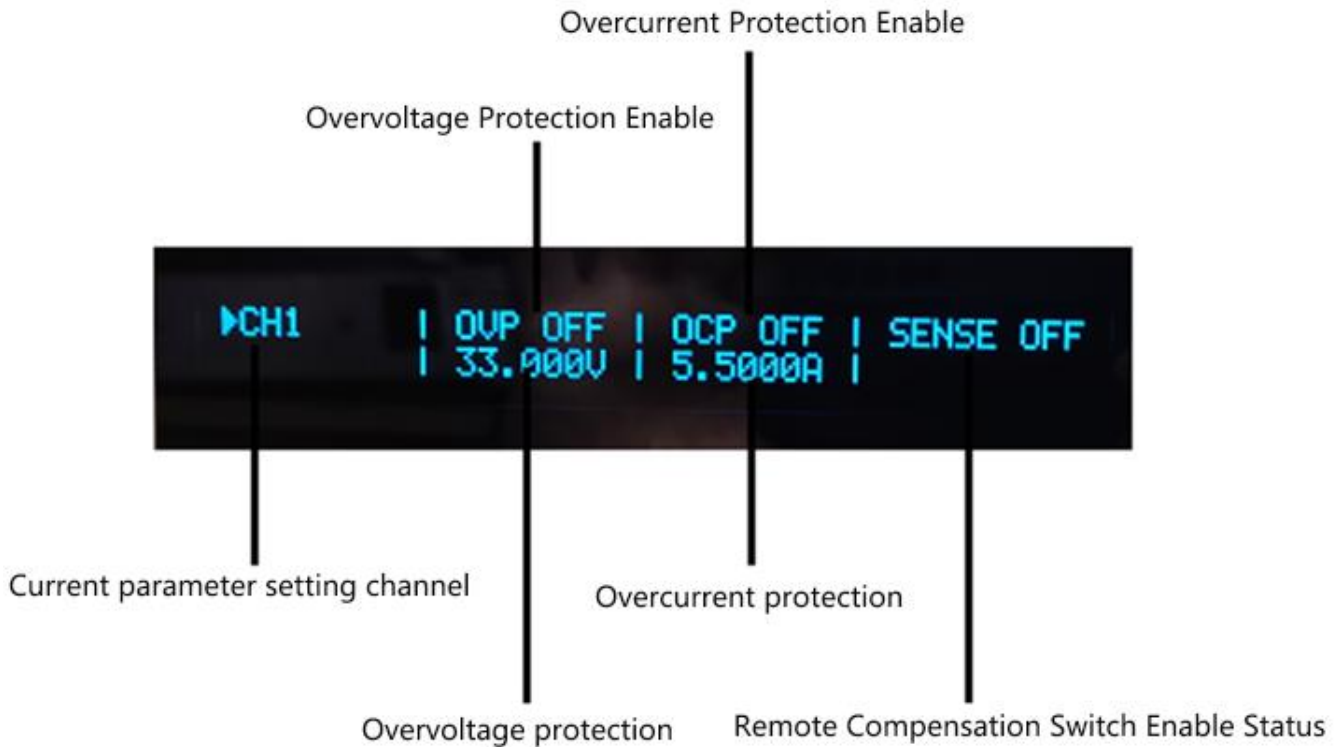
Note: After setting, press "ESC" to exit or wait about 10 seconds to exit automatically.

4.7 Menu setting

Press shift and then press the number key "0" to enter the menu setting function, press the ▲ and ▼ keys to switch options, the screen will display as follows:

1．P-UP ON/OFF (Enable switch in power-on state, ON is turned on, OFF is turned off, set by the knob, and confirm by the " **Enter** " key. When set to ON, the output will be automatically output while the power is turned on. If set to **OFF**, while the power will be turned on, the power supply will not be output automatically)

2.P-ST ON/OFF   (Power-on parameter memory switch, ON is turned on, OFF is turned off, set by the knob, and confirm by the " **Enter** " key. When set to ON, the parameters of the last power-off will be maintained after the power is turned on. If set to OFF, while the power is turned on, the system default parameters will be recalled,)

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3. Key Beep Set ON/OFF (beeper enable switch, ON is turned on, OFF is turned off, the default value is "ON", use the knob to change the setting, press the "Enter" key to save, when the button is set to ON, there is a sound, No sound when set to OFF button,)
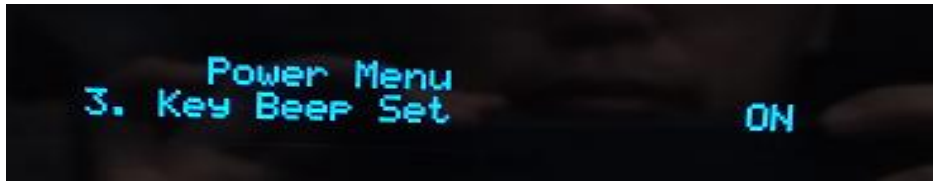
4. Baud Rate Select 9600 (Communication baud rate setting, the default value is "9600", change the setting with the knob, press the "Enter" key to save, the baud rate is: 4800, 9600, 19200, 38400 for selection,)

5.Modbus Machine Address 1 (address setting, selectable between 1-250, the default value is "1", change the setting parameters by turning the knob left and right, press "Enter" key to save,)

6. Commad Version Select SCPI (command/communication protocol version selection, the default value is "SCPI", change the setting by turning the knob left and right, press the "Enter" key to save, the command has two options of SCPI and MODBUS)

7. SCPI End Char Set LF(0A) (The selection of the end character during SCPI communication, the default value is "LF(0A)", change the set value by rotating the knob left and right, press the "Enter" key to save,)

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8. Reset Power NO (factory initialization setting, turn the knob left and right to change the selection, press the "Enter" key to confirm, NO means no initialization, YES means initialization, all parameters will be set to factory defaults after initialization.)
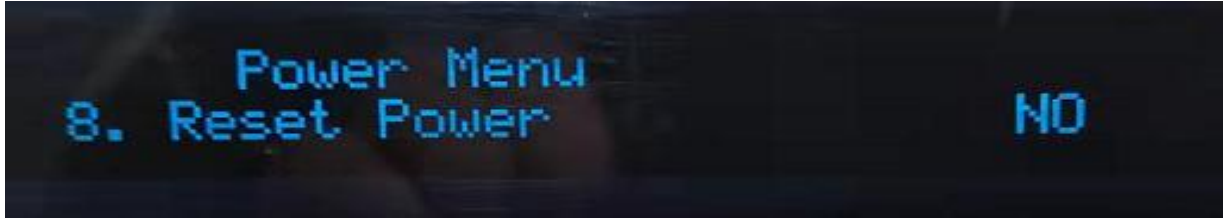
Chapter V Remote operation mode

5.1 Communication between power supply and PC

The power supply can be connected to the PC interface through the DB9 plug on the rear panel. The following content can help you understand how to control the power output through the PC host.
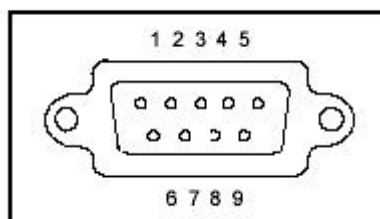
1. Communication setting

Before communication operation, you should first match the power supply with the following parameters of the control host:

(1) Baud rate：9600
(2) Calibration：NONE
(3) Data bits：8，Stop bits：1 (fixed value)

2. DB9 Serial interface

The DB9 interface on the rear panel can be connected to the interface of the host.

3.Interface pin definition

1	NC
2	RXD（accept data）
3	TXD（send data）
4	NC
5	GND（ground）
6	NC
7	NC
8	NC
9	NC

Chapter VI SCPI communication protocol

Command format

According to the SCPI command syntax, the short mnemonic uppercase format is supported.

1. The braces ({}) contain the parameter options of the given command string. The braces are not sent with the command string.

2. The vertical bar (|) separates multiple parameter choices for a given command string. For example, in the above command, {0|1|OFF|ON} means you can specify "0", "1", "OFF", "ON". The vertical bar is not sent with the command string.

3. Angle brackets (<>) indicate that a value must be specified for the parameter inside the brackets. For example, VOLTage {<voltage value>}, the angle brackets are not sent with the command string. You must specify a value for the parameter. Such as: VOLT 1.23.

4. The colon (:) is used to separate the command keyword from the next level keyword. For example: SYST:LOC

5. Question mark (?)　You can check the current value of a parameter by adding a question mark (?) to the command. For example: MEAS:VOLT?

6. Space　You must use blank characters, [TAB] or [space] to separate the parameter from the command keyword.

7. End character　The command string sent to the instrument must end with a \r\n(0X0D,0X0A) character. The command string termination always resets the current SCPI command path to the root level.

Remote interface connection

The power supply can be connected to the RS-232 interface through the level conversion circuit through the DB9 plug on the rear panel. The following content can help you understand how to control the output of the

power supply through a PC.

Communication set

Before operation, you should first match the power supply with the following parameters of the PC.

Baud rate：4800/9600/19200/

Data bits：8

Stop bits：1

Calibration: None

IEEE 488.2 common demand

*IDN?

This query command reads the identification string of the power supply.

Return parameters: manufacturer name, product model, hardware version No., software version No..

SYSTem command

SYSTem Commands are used to set and check system related status.

SYSTem: LOCal

This command sets the power supply to local operation mode.

Example: SYST:LOC

SYSTem: REMote

This command sets the power supply to remote operation mode.

Example: SYST:REM

SYSTem: BEEPer {0 | 1 | OFF | ON}

This command can enable or disable the power prompt sound.

Example: SYST:BEEP OFF "Disable Beep sound "

SYST:BEEP 1 "Enable power beep"

SYSTem: BEEPer?

This command can check the tone status of the power supply.

Example: SYST:BEEP? Return parameter: 0 (Disable prompt sound) | 1 (Enable prompt sound)

APPly command

APPly Commands are used to simultaneously set or read the voltage value, current value, output status, and SENSE status of 5 channels.

APPly: VOLTage {<CH1 Voltage >, <CH2 Voltage >,<CH3 Voltage, <CH4 Voltage >,<CH5 Voltage >}

This command sets the voltage value of 5 channels simultaneously.

For example：APP:VOLT 12,5,3,20.1,30.5

Set the output voltage as 12V,5V,3V,20.1V,30.5V

APPly: VOLTage?

This command checks the set voltage value of 5 channels simultaneously.

For example： APP:VOLT?

Return parameters: CH1 set voltage (X.XXX), CH2 set voltage (X.XXX), CH3 set voltage (X.XXX) CH4 set voltage (X.XXX), CH5 set voltage (X.XXX))

APPly: CURRent {<CH1 Current >, <CH2 Current >,<CH2 Current >, <CH4 Current >,<CH5 Current >}

This command set current value of 5 channels simultaneously.

For example ： APP:CURR 3,1,3,2.123,5,

Set output current as 3A,1A,3A,2.123A,5A

APPly: CURRnet?

This command check the set current value simultaneously.

For example： APP:CURR?

Return parameters: CH1 set current (X.XXX), CH2 set current (X.XXX), CH3 set current (X.XXX), CH4 set current (X.XXX), CH5 set current (X.XXX) XXX)

APPly:OUTput {<0 |1 |ON|OFF>, <0 |1 |ON |OFF >,<0 |1 |ON|OFF >}

This command sets the output status of 5 channels simultaneously.

For example： APP:OUT OFF,0,1， ON,0

Set the output status of 5 channels as OFF、 OFF、 ON,ON,OFF

APPly:OUTput?

This command checks the output status of 5 channels simultaneously.

For example: APP:OUT?

Return parameters: CH1 output status (0|1), CH2 output status (0|1), CH3 output status (0|1), CH4 output status (0|1), CH5 output status (0|1)

APPly:SENSEput {<0 |1 |ON|OFF>, <0 |1 |ON |OFF >,<0 |1 |ON|OFF >}

This command sets the SENSE status of 5 channels simultaneously.

For example:APP:SENS OFF,0,1， ON,0

Set 5-channel SENSE status to be OFF,OFF,ON,ON,OFF

APPly:SENSe?

This command queries the SENSE status of 5 channels simultaneously.

For example: APP:SENS?

Return parameters: CH1 SENSE status (0|1), CH2 SENSE status (0|1), CH3 SENSE status (0|1), CH4 SENSE status (0|1), CH5 SENSE status (0|1)

MEASure command

MEASure command is used to check the actual output voltage and current value.

MEASure: VOLTage?

This command checks the actual output voltage value of the channel.

For example:MEAS:VOLT?

Return parameter: actual voltage value (X.XXX)

MEASure:VOLTage:ALL?

This command simultaneously checks the actual output voltage value of 5 channels.

For example: MEAS:VOLT:ALL?

Return parameters: CH1 actual voltage value (X.XXX), CH2 actual voltage value (X.XXX), CH3 actual voltage value (X.XXX), CH4 actual voltage value (X.XXX), CH5 actual voltage value (X.XXX) XXX)

MEASure: CURRent?

This command checks the actual current output value of the channel.

For example: MEAS:CURR?

Return parameter: actual current value (X.XXX)

MEASure: CURRent:ALL?

This command simultaneously checks the actual output current values of 5 channels.

For example: MEAS:CURR:ALL?

Return parameters: CH1 actual current value (X.XXX), CH2 actual current value (X.XXX), CH3 actual current value (X.XXX), CH4 actual current value (X.XXX), CH5 actual current value (X.XXX) XXX)

OUTPut command

The OUTPut command is used to set and check the output.

OUTPut {<0 | 1 | OFF | ON>}

This command enables or disables the output status of the channel.

Example: OUTP OFF "Disable power output"

OUTP 1 "Enable power output"

OUTPut?

This command can check the output status of the channel.

Example: OUTP?

Return parameter: 0 (disable output) | 1 (enable output)

VOLTage command

The VOLTage command is used to set and check the set voltage value.

VOLTage {<voltage>}

This command is used to set the output voltage value of the channel.

For example: VOLT 12.345

Set the voltage to be 12.345V.

VOLTage?

This command is used to check the voltage's set value of the channel.

For example:VOLT?

Return parameter: voltage setting value (X.XXX)

CURRent command

The CURRent command is used to set and check the set current value.

CURRent {<current>}

This command is used to set the output current value of the channel.

For example: CURR 2.345

Set the output current value of the current channel of the power supply to 2.345A.

CURRent?

This command is used to check the set current value of the channel.
Example: CURR?
Return parameter: The current setting value of the channel (X.XXX)

INSTrument command
INSTrument command is used to switch the channel.

INSTrument {<1|2|3|4|5|>}
This command is used to switch the channel.
Example: INST 1
Set power supply CH1 channel as selected channel.

INSTrument?
This command is used to check which channel is the selected channel.
Example: INST?
Return parameter: selected channel of power supply (1|2|3|4|5)

Safety
Do not install substitute parts on the instrument by yourself or perform any unauthorized modification. Please send the instrument to our company's maintenance department for repair to ensure that it can be used safely. Please refer to the specific warning or caution information in this manual to avoid personal injury or damage to the instrument.

Safety signs
Warning
It reminds users to pay attention to certain operating procedures, practices, conditions and other matters that may cause personal injury.

Notice
It reminds users of operating procedures, practices, or conditions that may cause damage to the instrument or permanent loss of data.

Ground point.

High voltage danger (non-profession als are not allowed to open the machine).

Refer to the warnings in the relevant documents and pay attention to the tips. (The voltage is high, please wear insulating gloves when operating, beware of electric shock, and do not use the machine in relevant safety situations)

Certification and quality assurance
IV3600H series programmable DC power supply fully meets the technical indicators stated in the manual.

Quality assurance
The company provides a one-year quality guarantee for the materials and manufacturing of this product from the date of shipment.

Maintenance service

If this product needs to be repaired, please return the product to the repair service center designated by our company. The customer shall bear the one-way freight for sending the repaired product to the maintenance department, and our company will be responsible for paying the return freight. If the product is returned to the factory for repair from other countries, all freight, duties and other taxes must be born by the customer.

Quality Assurance Limits

The above guarantee does not apply to damage caused by the following conditions:

Customer's incorrect or inappropriate repair of the product;

Customers use other software or interfaces;

Unauthorized modification or misuse;

Operate this product outside the designated environment, or perform configuration and maintenance at a non-designated maintenance place.

Damage caused by the circuit installed by the customer.

Notice

The contents of this manual are subject to change without notice, and the right of explanation belongs to our company.