

# User Manual

MPS-3600H Series Programmable DC Power Supply

**MATRIX TECHNOLOGY INC.**

Version No.: 20200506V1

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# Chapter 1 Product Introduction

The MPS-3600H series is a new generation of high quality programmable DC power supply. This series of products is equipped with RS232 communication interface. The MPS-3600H series power supply has both desktop and system characteristics. It can be matched with other instruments at any time and integrated into a special function testing system to complete the measurement requirements under different situations, and it can bring great convenience to users through the panel keyboard editing program. It is a replacement product of ordinary programmable power supply, and has high cost performance advantages.

This series of power supply has the following characteristics:

Infinite servo, intelligent fan system

Multi-group data storage

Standard instrument rack design

Support RS232, newsletter

High resolution

# Chapter 2 Technical Specification

## 2.1 Main Technical Specifications

**MPS-3600H** series power supply specification sheet:

Model		MPS-3603H 36V/3A	MPS-3605H 36V/5A	MPS-6003H 60V/3A
Rated input voltage		AC220V/110V±5%		
Rated output voltage		0-36V		60V
Rated output current		0-3A	0-5A	0-3A
Voltage transformation mode		Linear power supply		
Load regulation rate	Voltage	<0.02%+5mV	<0.02%+8mV	<0.02%+5mV
	Current	<0.02%+5mA		
Power regulation rate	Voltage	<0.02%+5mV	<0.02%+8mV	<0.02%+5mV
	Current	<0.02%+5mA		

Setting resolution	Voltage	1mV		
	Current	0.1mA		
Setting accuracy (25 °C ± 5 °C)	Voltage	≤0.05%+8mV		
	Current	≤0.1%+2mA	≤0.1%+3mA	≤0.1%+2mA
Read back resolution	Voltage	1mV		
	current	0.1mA		
Read back precision (25°C±5°C)	Voltage	≤0.05%+8mV		
	current	≤0.1%+2mA	≤0.1%+3mA	≤0.1%+2mA
Temperature	Operating environment	0 to 40 °C ≤ 85 R.H.		
	Storage environment	-15 to 70 °C ≤ 85 R.H		
Size (W*H*D (mm))		214*108*305		214*108*365
Net weight		5.5Kg	5.9Kg	8.2Kg

## 2.2 Additional features

State memory capacity: 9 sets of operation states

Recommended calibration frequency: 1 / 1 times.

Cooling mode: forced air cooling

Operating environment temperature: 0 to 40°C

Storage environment temperature: -20 to 70°C

Use environment: indoor use design, pollution level 2, maximum humidity 90%.

## Chapter 3 Quick Start

This chapter will briefly introduce the appearance and basic functions of MPS-3600H series power supply, so that you can quickly understand the power supply of MPS-3600H series. At the same time, we will tell you the basic inspection to ensure the normal operation of this product after getting the power supply.

### 3.1 Front and back panel introduction

The front panel of MPS-3600H series power supply is shown below.



Figure 3.1

- (1) the upper part of the front panel is a black LED display and knob.
2. The lower part of the front panel is 0-9 numeric keys and ESC exit keys from left to right, function keys, up and down movement keys and Enter keys, input and output terminals.

MPS-3600H series rear panel layout, as shown below.

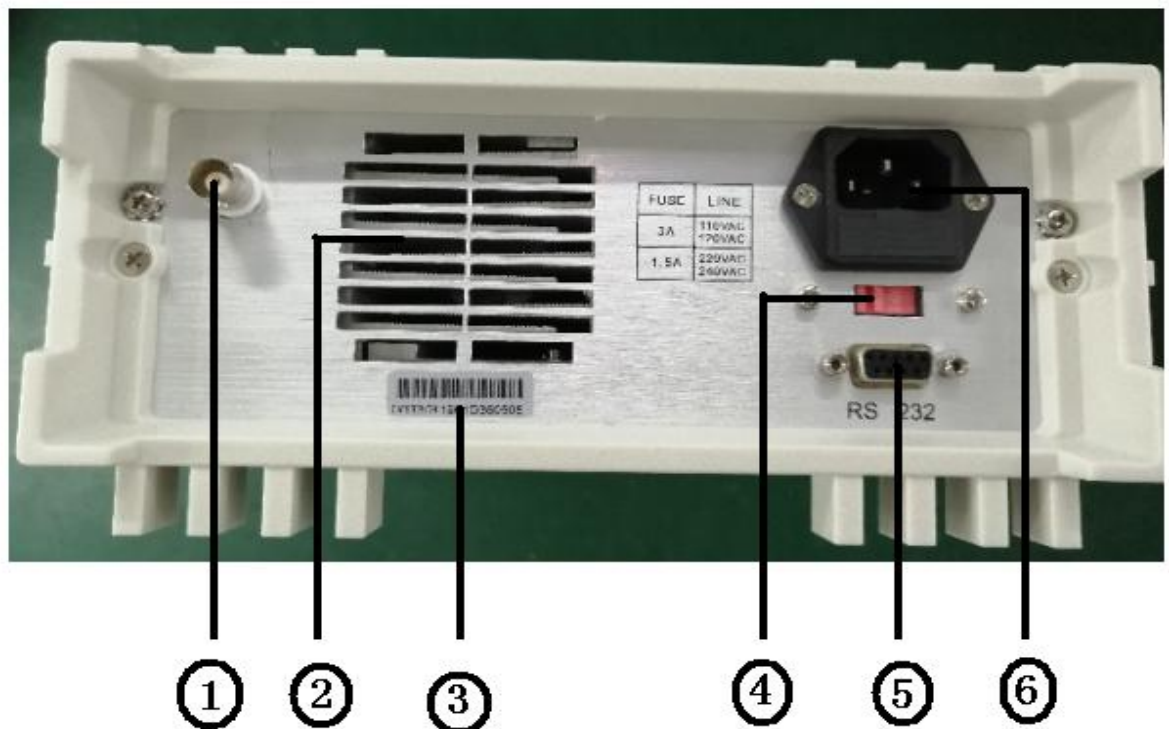


Fig. 3.2 rear panel of MPS-3600H series power supply

- ① Sense(remote range port)

- ② Cooling hole
- ③ Serial No.
- ④ Power input switching.
- ⑤ RS232 communication interface
- ⑥ Power input socket

### 3.2 Pre-check

Please check the power supply according to the following steps to ensure that the power supply can be used normally.

#### 1. inspection

Please check whether you receive the following attachments when you receive the power supply. If there is any missing, please contact your nearest dealer.

A power cord (in line with the voltage standards used in the region).

An operation manual (standard)

A certificate of qualification (standard)

#### 2. connect the power cord and turn on the power supply.

After power on, the power supply is self tested first, then enters standby mode.



**WARNING:** the power supply is equipped with three-cell power cord, so the power supply should be connected to three-cell socket. Before start up this machine, make sure it is grounded very well.

### 3.3 if the power fails to start

Use the following methods to solve the problems you may encounter when you turn on the power supply.

#### 1. check whether the power cord is connected properly.

Model	fuse value	
	230V	115V
MPS-3603H	3.15A	5A
MPS-3605H	5A	6A
MPS-6003H	10A	12A

## 2. ways to replace fuse

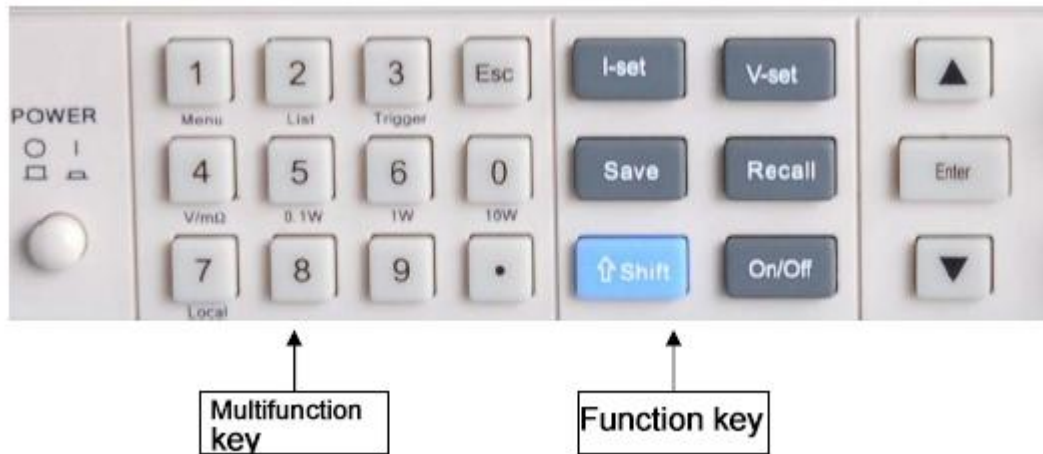
Use screwdriver to open the small plastic cover below the power input socket of the power supply, you can see the fuse, please use the fuse with the same specification.

# Chapter 4 Panel Operation.

This chapter will detail the operation of the power front panel, which is divided into the following parts:

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

## 4.1 Keyboard Arrangement



### Keynote description

Key position	Key function description
0-9:	Number key
Menu (number key "1"):	Menu settings (function when pressing with shift key, setting OVP/OCP, remote measurement, etc.)
Local (number key "7"):	Local operation (and shift combination is effective when pressed, disconnect from computer)
Battery (numeric key)	Battery charging early warning function, voltage and current upper and

"8"):	lower limit set (and shift combination is effective when pressed).
CRL (function word key "Save"):	Not open
I-Set	Set the maximum output current of the power supply.
V-Set	Setting the output voltage of the power supply
Save	Store the relevant parameters of the power supply to the specified storage location.
Recall	Set the power related settings parameters from the specified storage location.
Shift	Composite key, combined with multi function key.
On/off	Control power output state
▲	Up conversion key (select menu item in menu operation, increase output voltage at work interface)
▼	Down button (menu item is selected in menu operation, and output voltage can be reduced at work interface).
Enter	Acknowledgement key
knob	Used to change the supply voltage and current setting.

## 4.2 Front Panel Operation Introduction

Before using this power supply, please understand the following basic introduction to the key operation of front panel.

The C machine controls switching. When the operation mode changes, the output parameters of the power supply will not be affected.

## 4.3 Voltage Setting Operation

The voltage setting range is between 0V and the maximum voltage setting. You can use the following three ways to set the output voltage value through the front panel.

Method 1: after power supply is switched on, press voltage and key directly to change the voltage setting value.

Method two: press the V-Set key + 0 to 9 numeric keys, and press the Enter button to set the voltage value.

Method three: change the setting value of the voltage through the rotation of the knob. (the knob is pressed to the inside, the screen flickers can rotate and set the voltage and current. By pressing the knob, it can move the cursor position and press the "Enter" button to confirm and exit the setting mode. If the "Iset or Vset" button is pressed down, the knob will be locked.

## 4.4 Current Setting Operation

The setting range of constant current is between 0A and full rated output current.



Method 1: operation steps

- ①. Press the I-Set key.
- ②, press the 0 to 9 numeric keys to input the current value you need.
- ③. Press Enter key to confirm.

Method 2: change the setting value of the voltage through the rotation of the knob. (the knob is pressed to the inside, the screen flickers can rotate and set the voltage and current. By pressing the knob, it can move the cursor position and press the "Enter" button to confirm and exit the setting mode. If the "Iset or Vset" button is pressed down, the knob will be locked.

## 4.5 Access Operation

The power supply can store some commonly used parameters in 9 sets of non-volatile memory for users to quickly tune out. You can use the front panel Save and Recall keys to realize (0~9) access operation of group storage area.

Storage contents include: 1. voltage setting value 2. current setting value.

You can use the Save key + 0 to 9 numeric keys and press the Enter key to store the power parameters in the specified storage area.

You can use the Recall key + 0 to 9 numeric keys and press the Enter key to remove the parameters from the specified storage area.

## 4.6 Battery charging warning function, voltage / current upper and lower limit setting

Press shift and press the number key "8" to enter the battery charging warning function. The upper and lower limits of the current are set, and the screen is shown in sequence as follows:

U\_lx.xxxx (voltage lower limit)

U\_hx.xxxx (upper voltage limit)

C\_l x.xxxx (lower current limit)

C\_h x.xxxx (current limit)

Change the set value with the digital key, confirm with the "Enter" key, and alarm when it is not in range.

## 4.7 Menu setup

Press shift and the numeric key "1" to enter the menu setting function. Through the up and down key or the "Enter" key, the menu is displayed.

OUP off (overvoltage protection enable switch, on turn on, off close, set by knob)

OUP XXX (overvoltage protection value is set, set by numeric key, and "Enter" key is confirmed).

OCP off (overcurrent protection enable switch, on turn on, off close, set by knob)  
OVP XXX (overcurrent protection value setting, set by numeric key, confirm "Enter" key)  
Sense off (voltage remote measurement enable switch, on turn on, off close, set by knob)  
Beep on (buzzer sound enable switch, on turn on, off close, set by knob)  
Baud xxxx (communication baud rate setting, 4800-15200, set by knob)  
Add XXX (address setting, 0-255, knob left and right swirling change the set value, press the knob to move the set cursor position)

## Chapter 5 Remote Operation Mode.

### 5.1 Communication between power and mainframe

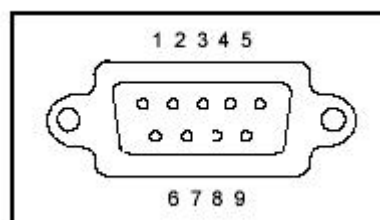
The power supply can be connected to the host interface through the level conversion circuit through the DB9 plug on the back panel. The following contents can help you understand how to control the output of the power supply through the host computer.

#### 1. Communication Settings

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

- (1) baud rate: 9600
- (2) check: none (3) data bits: 8, stop bits: 1 (fixed value).

#### 2. DB9 serial interface



The DB9 interface of the power rear panel can be connected to the host's interface.

#### 3. Interface pin definition

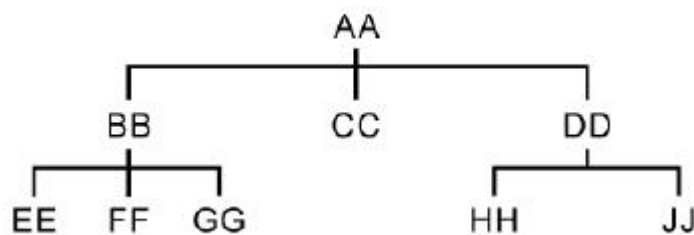
1	NC
2	RXD (receive)
3	TXD (send)
4	NC
5	GND (land)
6	NC
7	NC
8	NC
9	NC

## Chapter 6 SCPI communication protocol.

### 6.1 SCPI command overview

MPS-3600H series programmable DC power supply supports SCPI communication protocol. Scpi is a standard command for programmable instruments. It defines a set of command rules for communication. Commands for iv3600 series power are divided into two main categories: basic command (ieee-488.2 common command set) and MPS-3600H series specified command set.

The SCPI commands are arranged in a hierarchy of command trees. Each command contains many strings (mnemonic symbols), and the layers are separated by colon (:). The command at the top of the command tree is called "root command" or "root". To access the next command, a path must be specified. The structure of the command tree is as follows:



In the graph, AA represents the root path; BB, CC, DD represent the direct subpath. Ee under the root path, FF, GG represents the subpath. Hh under the subpath BB, and JJ is the subpath under the subpath DD.

Command description:

- 1) [:]aa:cc indicates that the root path is AA, and cc. is accessed under AA.
- 2) [[]aa:bb:ff] indicates that the root path is AA, and the ff. under the subpath BB under the AA root path is accessed.
- 3) [[]aa:dd:hh] indicates that the root path is AA, and the hh. under the subpath DD

under the AA root path is accessed.

This command can also send multiple commands at the same time, separating the commands with semicolons (;).

For example: [aa:bb:ee; FF; GG represents EE, FF, gg. under BB.

[:]aa:bb:ff:: aa:dd:hh represents hh. under FF and DD under BB access.

There are two types of mnemonic characters in SCPI language, that is, keywords, long format and short format. Short format is actually abbreviation for long format.

The short format mnemonic is composed of the first 4 characters of the long format mnemonic. If the length of the long format mnemonic character is less than or equal to 4, the length mnemonic is the same.

\* if the length of the long mnemonic is greater than 4 and the fourth character is vowel, the short mnemonic will discard fourth characters and turn the vowel into 3 characters.

For example, the short mnemonic of ERR or is ERR, not ERRO..

Some commands need parameters, such as set value command. At this point, a space between the command and its first parameter is required (ASCII code is 32).

For example, set the voltage value command [:]volt 12

There is a space between the parameters 12 and the volt command (ASCII code is 32).

The command set of SCPI is not sensitive to case, that is, the command is not case sensitive, and each command has a terminator for the EOI: instruction to end <LF> (which means ASCII code character 'n' ', that is, ASCII code line break, decimal 10, sixteen binary 0A).

Note: all the following instructions need to be added to the end of the instruction. The square brackets [<lf>.] below indicate that the string can be written in the command or not.

## 6.2 MPS-3600H Power command set

### 6.2.1 basic command (ieee-488.2 common command set)

This command includes general functions defined in the ieee488.2 standard, which are usually applicable to measuring instruments that support the ieee488.2 standard. This command is started with asterisk (\*) without hierarchical structure.

Command \*idn?

This command can read the relevant information of the power supply, such as manufacturer, product type, product serial number, firmware version number.

### 6.2.2 System command

The commands in this section are all commands under [SYSTem root path. The commands given are all in a short mnemonic format.

Order [SYSTem:ERRor:?

This command is used to read the error code and error message of the power supply.

Return command: error code, error message

Example: send the command to [:]

SYST:ERR?

<LF>

The power returned commands are "0,'No Error'", or "50,'Error Para Count'", or "70,'Invalid Command'" and so on.

Order [:]SYSTem:REM

The command is used to set up the power supply for remote control mode, that is, PC control mode.

Return command: None

Example: send the command to [:]

```
SYST:REM
<LF>
```

After the transmission is successful, the front panel of the power supply is set to the remote control mode. At this time, the key on the front panel is invalid. Only by pressing the Shift+ number 7 key, or sending the command []SYST:LOC: can the power supply be switched to the front panel of the power supply.

Order [:]SYSTem:LOC

The command is used to set the power supply to the panel control mode.

Return command: None

Example: if the power is in remote control mode (PC) at this time, send the command [:]

```
SYST:LOC
<LF>
```

After the transmission is successful, the front panel of the power supply has been set to the front panel control mode.

### 6.2.3 Measurement command

The commands in this section are all commands under [MEASure root path. The commands given are all in a short mnemonic format.

Order []MEASure:VOLTage:?

The command is used to read the output voltage value of the power supply.

Return command: numeric value

Return parameter unit: v

Example: the order sent is [:]

```
MEAS:VOLT?
<LF>
```

At this time, the power return command is: 12.560, which means the current value of the power supply is 12.560v.

Order []MEASure:CURRent:?

The command is used to read the output current value of the power supply.

Return command: numeric value

Return parameter unit: a

Example: the order sent is [:]

```
MEAS:CURR?
<LF>
```

At this point, the power return command is 1.245, which means the current supply current value is 1.245a.

Order []MEASure:VC:?

The command is used to read two measurements at a time: output voltage and output current.

Returns the command: numeric list, separated by commas in the middle.

Return parameters: V and a

Example: the order sent is [:]

```
MEAS:VCM?  
<LF>
```

At this time, the power return command is 10.0000,0.00000, that is, the output voltage value of the current power is 10.0000v, and the output current value is 0.00000a.

#### 6.2.4 Setup command

Order []OUTPut <bool>

1, the command is used to set the output of the power to turn on or not.

Return command: None

Parameters: type bool parameters, 0 - OFF, 1 - ON

Example: the sending instruction is [:]

```
OUTP 1  
<LF>
```

After the transmission is successful, the output of the power is set to open.

Order []VOLTage <Value>

1. The command is used to set the voltage value of the power supply.

Setting: v

Return command: None

Example:

1) send the command to [:]

```
VOLT 30.000  
<LF>
```

That means the current voltage of the set power is 30V..

Example:

1) If you want to inquire the voltage setting value of the power supply, that is, the order sent is [:]

```
VOLT?  
<LF>
```

Order []CURRent <Value>

1. The command is used to set the current value of the power supply.

Parameter: numerical |max|min

Setting: a

Return command: None

Example:

- 1) send the command to [:]  
CURR 3.000  
<LF>

That means the current value of the power supply is 3a..

2. Related commands: inquire about the current setting value of the power supply.

[:]CURR? MAX|MIN

Return command parameter: numeric value

Example:

- 2) If you want to inquire about the current setting value of the power supply, that is, the order sent is: [:]

CURR?  
<LF>

If the power return command is 1, the current setting value of the power supply is 1.0000a..

## Security

Do not install spare parts on the instrument or carry out any unauthorized modification. Please send the instrument to our maintenance department for maintenance so as to ensure its safe use.

Please refer to the specific warnings or precautions in this manual to avoid personal injury or instrument damage.

### SAFETY SIGN

#### Warning

It reminds users, be careful about the operation steps which can hurt people.

#### Attention

It reminds users to be careful about the operation step which may break equipment or lose data permanently



Grounding point



High Voltage(non-professionals are not allow to turn on the machine)



Read warnings and attentions carefully(wear gloves when the voltage is high, do not place the machine at dangerous situation)

## Certification and quality assurance

The MPS-3600H series of programmable DC power reaches all the technical specifications specified in the manual.

### QA

The company guarantees the quality and quality of this product for one year from the date of shipment.

## Maintenance service

If the product is to be repaired, please send the product back to the designated maintenance unit of our company. The customer must bear the one-way freight to send the repair product to our maintenance department. The company will be responsible for paying the return freight. If the product is returned to factory maintenance from other countries, all the freight, tariff and its duties must be borne by the customer.

## Quality assurance restriction

The above warranty does not apply to any damage caused by the following circumstances:

Customers are incorrect or improper in repairing products.

Customers use other software or interfaces.

Unauthorized modification or misuse;

Operate the product outside the designated environment, or configure and maintain it at a non designated maintenance point.

The damage caused by the circuit installed by the customer.

## Announcement

The contents of this manual are subject to change without prior notice, and the power of interpretation belongs to the company.