



MATRIX TECHNOLOGY

Programmable DC Power Supply

HPS Series

User Manual

Version 1.2

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MATRIX TECHNOLOGY INC.

[Http ://www.szmatrix.com](http://www.szmatrix.com)

Warranty

MATRIX adhere to the tenet of “Quality first, Customer foremost”. All MATRIX instruments are warranted against defects in material and workmanship for a period of one year after date of shipment. Within the period, the maintenance cost are free of charge. MATRIX guarantees to repair defects and damage in the instruments that we design, manufacture and sell for free under normal use. During the warranty period, the company is responsible for maintenance when the following situations occur, but the maintenance fee shall be charged according to the actual situation.

1. Products not sold by the company or the authorized agents of the MATRIX company.
2. The products damage as a result of irresistible disasters or misuse by the user who does not follow the user manual.
3. The products damage as a result of disassembly, repair or modification without authorization or improperly adds of components or circuits.

During the warranty period, for the failed or damaged instruments, user should contact the company or the agent’s business first. The delivery of the failed instruments to the company’s designated place should be made after prior authorization by the MATRIX , the cost of transportation shall be borne by the user. After repaired, MATRIX will arrange to return instruments to the user or the designated place. The cost of the transportation is to be paid by MATRIX.

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Safety Instruction

The following general safety precautions must be observed during all phases of operation, service, and repair of this instrument. Failure to comply with these precautions or specific WARNINGS given elsewhere in this manual will violate safety standards of design, manufacture, and intended use of the instrument. The company take no liability for the customer's failure to comply with these requirements.

BEFORE APPLYING POWER

Verify that the power is set to match the requirement of product design.

PROTECTIVE GROUNDING

Make sure to connect the protective grounding to prevent an electric shock before turning on the power.

NECESSITY OF PROTECTIVE GROUNDING

Never cut off the internal or external protective grounding wire, or disconnect the wiring of protective grounding terminal. Doing so will cause a potential shock hazard that may bring injury to a person.

FUSE

Only fuses with the required rated current, voltage, and specified type (normal blow, time delay, etc.) should be used. Do not use repaired fuses or short-circuited fuse holders. To do so could cause a shock or fire hazard. Warning: Make sure to unplug the power cord before replacing the fuse.

DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE

Do not operate the instrument in the presence of flammable gases or fumes.

DO NOT REMOVE THE COVER OF THE INSTRUMENT

Operating personnel must not remove the cover of the instrument. Only qualified service personnel can perform component replacement and internal adjustment.

Safety Symbols

	<p>DANGER -High Voltage</p>
	<p>Explanation: To avoid injury, death of personnel, or damage to the instrument, the operator must refer to an explanation in the instruction manual.</p>
	<p>Protective grounding terminal: This symbol indicates that the terminal must be connected to ground before operation of equipment.</p>
<p>CAUTION</p>	<p>The CAUTION sign denotes a hazard. It calls attention to a procedure, practice, or the like, which, if not correctly performed or adhered to, could result in personal injury. Do not proceed beyond a CAUTION sign until the indicated conditions are fully understood and met.</p>
<p>WARNING</p>	<p>The WARNING sign denotes a hazard. It may result in personal injury or death if not noticed timely. It calls attention to procedures, practices and conditions.</p>

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1. Overview

1.1 Introduction

The HPS Series series programmable DC power supply introduced by MATRIX Technology is a high-precision, full-featured high-power density programmable DC Power Supplies. It can provide wide-range, low-ripple and stable DC output which is used for DC input Products and components function testing and experimental simulation.

1.2 Product Appearance

The MATRIX HPS Series series products have high power density and small size, and can provide 15kW of power in 3U height. The appearance of the product is as follows:



Figure 1-1 HPS Series Appearance

1.3 Feature

(1) Unique voltage loop control technology: Able to provide stable and quick responded output, CC / CV loop automatic switching;

- (2) The settable slew rate of output voltage and current: Users are able to set the rising/descending slew of output voltage and current according to Different product power supply requirements;
- (3) High power density: Maximum output power is 15kW at 3U height;
- (4) High-accuracy survey: The internal control and sampling chips are all 16 bit for the accuracy of the equipment;
- (5) Low-ripple: Unique output filter design for small output ripple;
- (6) Quick Response: The voltage drop recovery time is less than 8ms, and the output rise time is less than 10ms under the circumstance of load variation;
- (7) Quick discharge: The voltage output time to zero is less than 1S under the circumstance of external no-load;
- (8) Editable mode for output waveform: Able to edit multiple output voltage and current combinations to satisfy different tests;
- (9) Remote compensation: Set the remote compensation to automatically compensate the line loss of the output circuit;
- (10) multiple control mode: Via Rotary knob and numeric keyboard control on the front panel to do local operation or via GPIB/ RS-232C interface to do remote communication Control;
- (11) Friendly display: All datas are displayed on the 3.5-inch LCD industrial screen;
- (12) Perfect protection: The conventional protection mechanism and fan fail, reversed output and output flowing backWards protection mechanism to make use safer.

1.4 System Functions

1.4.1 Operate Mode

(1) Local operation is performed by the numeric keyboard and vernierrotary knob on the front panel.

(2) Remote control is done via GPIB, RS-232Cor RS485 interface.

1.4.2 Protection Function

(1) Conventional protection functions: over/under input voltage, over output voltage, over current, over power, over temperature and etc.

(2) Advanced protection functions: fan fail, remote compensation fail, reversed output and etc.

(3) Automatic temperature control fan circuit is adopted to make sure of quiet, stable and reliable output.

1.4.3 Output/Indication

(1) Auxiliary power output (12V/24V/5V);

(2) Output signal (DC ON);

(3) Protection: over voltage, over current, over power, fan fail, over temperature, Input abnormal, locking state;

(4) CV/CC status indicators;

(5) Output status LED lamp;

1.4.4 Input Control Signal

(1) Remote compensation: Remote Sense;

1.4.5 Measuring & Programming

(1) Measurement for voltage, current and power;

(2) 100 programs and 1000 parameters setting file saving to edit voltage/current waveform output;

1.5 Product Model

The MATRIX HPS Series series programmable DC power supply can be divided into three series of 3kW/5kW / 10kW and 15kW according to the output power, and each power level can be divided into various specifications such as 300V / 600V / 1000V according to the output voltage and current. The product specifications of each different model are listed in the table below.

≤3kW series product selection table

Model	Voltage	Current	Power
HPS-4080A	0-40.000V	0-80.000A	1200W
HPS-6050A	0-60.000V	0-50.000A	1200W
HPS-8030A	0-80.000V	0-30.000A	1200W
HPS-10025A	0-100.00V	0-25.000A	1200W
HPS-16010A	0-160.00V	0-10.000A	1200W
HPS-40100B	0-40.000V	0-100.00A	1800W
HPS-8040B	0-80.000V	0-40.000A	1800W
HPS-10030B	0-100.00V	0-30.000A	1800W
HPS-16015B	0-160.00V	0-15.000A	1800W
HPS-30010B	0-300.00V	0-10.000A	1800W
HPS-6005B	0-600.000V	0-5.0000A	1800W
HPS-40120C	0-40.000V	0-120.00A	2400W
HPS-8050C	0-80.000V	0-50.000A	2400W
HPS-10040C	0-100.00V	0-40.000A	2400W
HPS-16020C	0-160.00V	0-20.000A	2400W
HPS-30015C	0-300.00V	0-15.000A	2400W
HPS-6008C	0-600.00V	0-8.0000A	2400W
HPS-40120D	0-40.000V	0-120.00A	3000W
HPS-8060D	0-80.000V	0-60.000A	3000W
HPS-10050D	0-100.00V	0-50.000A	3000W
HPS-16030D	0-160.00V	0-30.000A	3000W
HPS-30020D	0-300.00V	0-20.000A	3000W
HPS-60010D	0-600.00V	0-10.000A	3000W

5kW series product selection table (Three-phase input 380V)

Model	Voltage	Current	Power
HPS-32020E	0-320.00V	0-20.000A	5000W
HPS-45015E	0-450.00V	0-15.000A	5000W
HPS-60010E	0-600.00V	0-10.000A	5000W
HPS-80010E	0-800.00V	0-10.000A	5000W
HPS-10008E	0-1000.0V	0-8.0000A	5000W

10kW series product selection table (Three-phase input 380V)

Model	Voltage	Current	Power
HPS-30040F	0-300.00V	0-40.000A	10000W
HPS-45025F	0-450.00V	0-25.000A	10000W
HPS-60020F	0-600.00V	0-20.000A	10000W
HPS-80015F	0-800.00V	0-15.000A	10000W
HPS-100016F	0-1000.0V	0-16.000A	10000W

15kW series product selection table (Three-phase input 380V)

Model	Voltage	Current	Power
HPS-30060G	0-300.00V	0-60.000A	15000W
HPS-45030G	0-450.00V	0-30.000A	15000W
HPS-60030G	0-600.00V	0-30.000A	15000W
HPS-80020G	0-800.00V	0-20.000A	15000W
HPS-100020G	0-1000.0V	0-20.000A	15000W

1.6 Front Panel

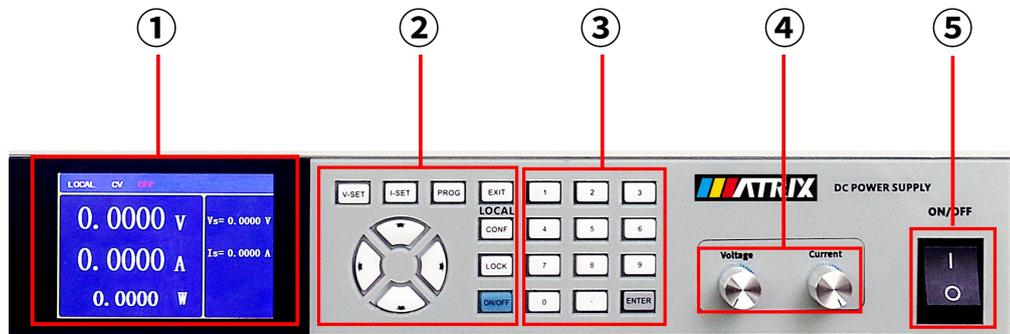


Figure1-2 Front Panel

The front panel structure of the HPS Series series programmable DC power supply is shown in Figure 1-2 , and the function description is as follows.

1. DISPLAY AREA: It shows the status information, Input information of user parameters and measured result during equipment working.

2. Function Keyboard: It is made of keys with different functions, and the description of each key is as follows.

V-SET Voltage Setting Key: Press this key to enter voltage setting mode. Users can use numeric keys input voltage values.

I-SET Current Setting Key: Press this key to enter current limit setting mode. Users can use numeric keys to input current limit values.

PROG Program Key: Press this key to enter program mode. Users can edit, call and run program and each program is composed of output parameters.

EXIT EXIT Key: The key has two functions. First, exit the remote mode; second, exit the function page to MAIN PAGE.

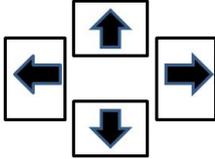
CONF CONF Key: Press this key to enter to system parameter settings.

LOCK

LOCK Key: Press “LOCK ” for 3 seconds to Disable the system keyboard; then press “LOCK ” for 3 seconds to release it.

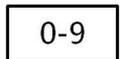


Output key: Output ON /Output OFF the dc power supply.

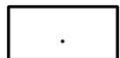


Arrow keys: Main function is to move the cursor; left Arrow can also delete the input value.

3. Information Input Keyboard Area: It is made of keys with different functions, and the description of each key is as follows.



Numeric key: Input digit 0 to 9



Decimal Point key: Input decimal



ENTER key: Confirm key. Press this key to confirm the input info valid



4. ROTARY Knob: Voltage / current vernier adjustment knob: Under the output state, finely adjust the output voltage or current



5. Power Switch: It switches the power on or off

1.7 Rear Panel

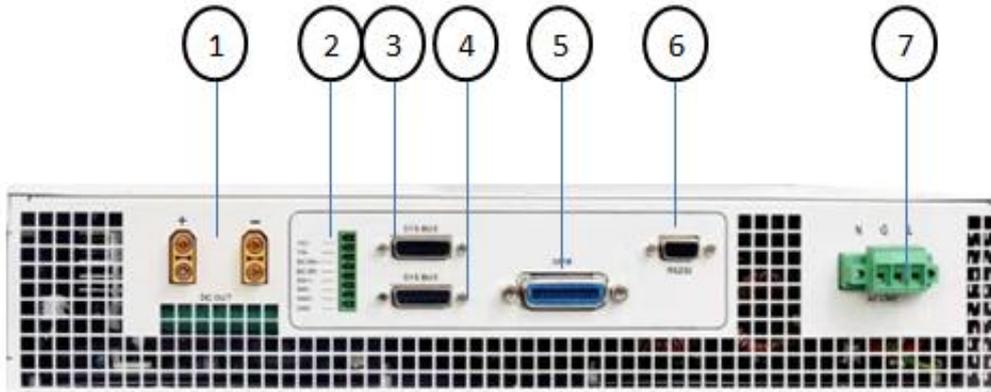


Figure1-3 Rear Panel

The rear panel structure of the HPS Series series programmable DC power supply is shown in Figure 1-2 , and the function description is as follows.

1. Output terminal: The output terminals of DC Power Supply. There are two independent interfaces, positive and negative.

2. Signal terminal: 8PIN terminal, for the external signal connection of the device, each terminal is defined as follows:

VS+ : The default connection is to the positive output terminal of the power supply. The user needs to compensate the voltage drop on the line and connect the other end of this port to the input positive stage of the power supply of the product under test.

VS- : The default connection is to the negative output terminal of the power supply. The user needs to compensate the voltage drop on the line and connect the other end of this port to the input negative stage of the power supply of the product under test.

DC ON+ : DC_ON signal output. When the output of DC power supply is to the rising edge setting threshold, the port will send TTL H signal. When the output of DC power supply is OFF and the voltage is to falling edge setting threshold, the port will send TTL L signal.

DC ON- : DC_ON signal reference ground.

SH1+ : When the equipment is used in parallel, this port is the H terminal of parallel current-sharing control signal. When used stand-alone or in series, this port cannot be wired, otherwise it will cause crash.

SH1- : When the equipment is used in parallel, this port is the L terminal of parallel current-sharing control signal. When used stand-alone or in series, this port cannot be wired, otherwise it will cause crash.

SH2+ : When the equipment is used in parallel, this port is the H terminal of parallel current-sharing control signal. When used stand-alone or in series, this port cannot be wired, otherwise it will cause crash.

SH2- : When the equipment is used in parallel, this port is the L terminal of parallel current-sharing control signal. When used stand-alone or in series, this port cannot be wired, otherwise it will cause crash.

3. SYS\BU: 15PIN D type female. As signal transmission when multiple device in parallel or series connection.

4. SYS\BU: 15PIN D type female. As signal transmission when multiple device in parallel or series connection.

5. GPIB : Telecommunication ports. The standard communication line IEEE488.2 is used to connected to the PC.

6. RS232 : Telecommunication ports. 9PIN D type female. Connect to PC with serial port line.

7. AC Input: Mains input port. The input is three-phase four-wire connected to the mains. L1,L2,L3,G.

2. Installation

2.1 Overview

How to install HPS Series series of programmable DC power supply and notes is described in this chapter.

2.2 Inspection

Check if there is any damage caused by shipment after unpacking it. Please keep all of the packing materials in case the device has to be returned for need. If any damage is found, please lodge a claim with the delivery company immediately. Shipment of the product to the

company should not be made without prior authorization from the company : Shenzhen MATRIX Technology Co. Ltd.

In addition to this manual, please make sure that the following items are completely received: shipping order, warranty card, and a set of output screws.

ATTENTION

The standard packaging of the equipment does not include input / output line. If the customer has special requirements, it should be mentioned when purchasing.

2.3 Operating Environment

- (1) In door use.
- (2) Temperature 0°C to 45°C.
- (3) Input Mains Voltage Range:380V±10%.
- (4) Transient over voltage is impulse withstand CAT II.

The instrument must be installed in an enough area to keep air-circulate and facilitate heat dissipation of the machine.

2.4 Requirements of Input

2.4.1 Requirements of Input Power

- (1) 5kW Model -Max. Power: 12KVA
- (2) 10KV Model -Max. Power: 21KVA
- (3) 15KV Model-Max. Power: 29 KVA

The current for input varies with the Series Models as shown below:

Model	5kW	10kW	15kW
Rated Input voltage	380V	380V	380V
The maximumInputcurrent /phrase	22A	37A	50A

Table 2-1 Input Current

2.4.2 Input Line Connection

- (1) The Power input terminal is located at the right of rear panel.
 - (2) The power line must be 85°C rated at least.
 - (3) The power cable specifications must be matched as current requirements in Table 2-1.
 - (4) execute the following steps to assemble it:
 - a. Remove the input terminal safety cover of DC Power Supply.
 - b. Scrape off the skin of power cable tip (the bare portion is about 1cm) and clamp the O-terminal.
 - c. secure the DC power terminal and the O-terminal of power cable with a Phillips screwdriver.
 - d. Lock the safety cover of DC input terminal to avoid electric shock.
-

⚠ ATTENTION

- 1. The input wire connected to the earth must be connected to the GND terminal of DC power and make sure the input terminal is properly grounded.**
 - 2. Installation of the power cord must be done by a professional and compliant WithOperation Standard.**
 - 3. Please select the input cable with suitable withstand voltage according to the power grid used in different countries.**
 - 4. To avoid electrical shock, do not live line connection and make sure the input mains is effectively disconnected before wiring.**
-

2.5 RemoteCompensation Connection

This series of programmable DC power supply has remote automatic compensation function. The purpose is to effectively compensate the line loss on the output line of the

product and ensure that the voltage output to the user terminal is the set voltage. The DC Power Supply is able to compensate 0-5 voltage drop.

The remote compensation line has connected to the negative and positive output terminal of DC power supply at the time of ex-factory. The user should remove the positive and negative terminals connected to the DC power supply and connect it to the actual product input terminal based on usage the during use. This can compensate for the line loss between the DC power supply and the customer product input terminal. Be aware the correct polarity when connecting. The diameter of input wire need to be greater than10AWG and must meet the pressure requirements.

⚠ ATTENTION

- 1. The remote compensation line must be effectively connected, or it will cause no output of the DC power protection or crash.**
- 2. The polarity of remote compensation must be connected correctly.If the polarity is connected reversely, it will cause DC powerprotection and prompt an error message “SENSE FAULT”.**
- 3.The voltage range of remote compensation is 0V to 5V.**

2.6 Output Connection

The output connector of the HPS Series series is located in the upper left part of rear panel. The output line should be connected according to the prompting polarity “+” and “-”, and pay special attention to the polarity when connecting to the product input terminal.

Do the following step to connect output wire it:

- (1) The output terminal is located on the upper left part of rear panel.
- (2) The power line must be 85°C rated at least.
- (3) Scrape off the skin of output cable tip (the bare portion is about 1cm) and clamp the O-terminal. Secure the output terminal and output cable with a Phillips screwdriver.

⚠ ATTENTION

- 1.Do not touch the output terminal to avoid electric shock during the DC power supply working.**
-

2. The output line must meet the maximum output current of the product by at least 10%, and must meet the temperature and pressure requirements.

3. The output wires are best to be intertwined with each other to prevent external signal interference.

2.7 Power Supply On Self Test

Before turning on the DC power supply, please check the following items:

(1) Whether the input line of the device is well connected and whether the input electrical specifications meet the requirements.

(2) Whether the device is properly grounded.

Turn on the power switch on the power switch on the front panel. After turning on, the power supply will first automatically run self-test procedure to check whether the various functional components inside the power supply are normal.

The self-test shows as below:

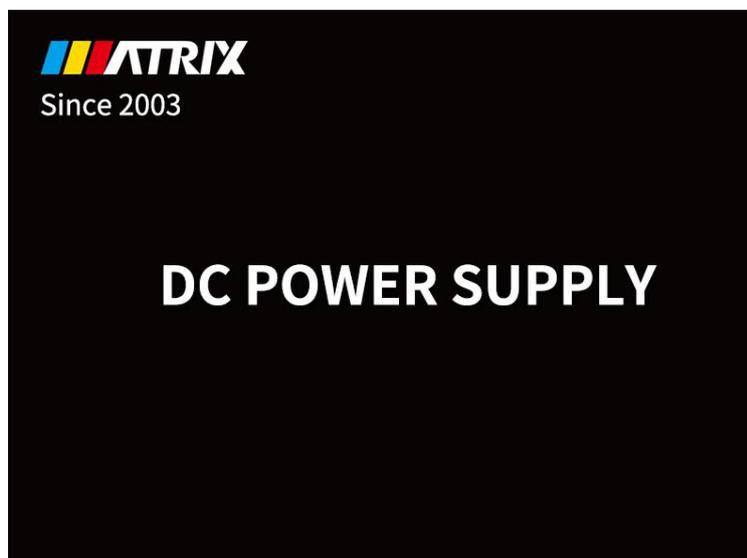


Figure 2-1 Boot Self-test Screen

When the self-tests are done, the device which works properly will enter to MAINPAGE automatically as shown below:



Figure 2-2 Working Page

If the device failed during self-test, the alarm information will prompt. The device will enter the operating interface after finishing the self-test, but the product is in a protected state and cannot be output at this time. Users need to contact the original factory to assist.

3. Local Operation

3.1 Overview

DC Power Supply can be operated locally or remotely. See section 5 for the remote control. The local operation mode is described in this chapter. The default setting of the device is local mode.

3.2 Voltage Setting

There are two ways to set the output as Figure



are two ways to set voltage (CV MODE) 3-1 shows:

Figure 3-1 Voltage setting Interface

Method 1.

1. Press“ V-SET ”key, the V_SET column on MAIN PAGE is activated.
2. Press“number” (0~9) key to set value, press“ ENTER ”key to complete the voltage setting.
3. Press“ ON/OFF ”key to output the set voltage.

**** Be noted that in order to remain the power supply in CV mode the current setting must be larger than the load current, otherwise the power supply will be in CC mode or even have no output.**

Method 2: Fine-tuning

1. The power supply is in the output ON state.
2. Press “up arrow”key, the cursor for V(V) on MAIN PAGE blinks and user can move light or right arrow key to choose the place where to change the voltage value, then turn the rotary knob to change the present voltage value. When the rotary knob is rotated one grid, the voltage value changes one number. Turn right to increase the value and turn left to decrease as Figure 3-2 shows.



Figure 3-2 Voltage Fine-tuning Interface

3.3 Current Limit Setting

There are two ways to set the power supply current limit value as Figure 3-3 shows:



Figure 3-3 CurrentSetting Interface

Method 1:

1. Press “I-SET ”key, the I(A) current limit value column on MAIN PAGE is activated.
2. Press “number” (0~9) key to set value, press “ ENTER ”key to complete the current setting.
3. Press “ ON/OFF ”key to output the set voltage.

****Be noted that the current value is set as the output current value in Constant Current Mode.**

Method 2: (Fine-tuning)

1. The power supply is in the output ON state.
 2. Press “up arrow”key, the cursor for I(A) on MAIN PAGE blinks and user can move light or right arrow key to choose the place where to change the current value, then turn the “CURRENT rotary knob” to change the present current value. When the rotary knob is rotated one grid, the current value changes one number. Turn right to increase the value and turn left to decrease as Figure 3-4 shows.
-



Figure 3-4 Current Fine-tuning Interface

3.4 CONF Setting

The system configuration setting function allows users to set the system functions for the DC Power Supply. The system functions that can be edited by CONF include:

1. Output Setup: To set various parameters including voltage/current slew rate, DC_ON signal threshold and etc.
2. Protection Setup: To set output parameter limits for the power supply. Users can set value within specification to their own needs.
3. Communication Setup: To set remote communication parameters, data display refresh rate and etc.
4. Basic Setup: To set native basic settings. (on-plant use)
5. Initialization: To restore factory setting parameters.
6. Data Calibration: To calibrate the each index of the DC Power Supply. (on-plant use)
7. Alarm Information Setup: To set each alarm function of the DC Power Supply. (on-plant use)
8. Product Basic Information: To display the information of the DC Power Supply: software version, Production date and etc.

Following explains the way to set CONF:

Press“ CONF ”key , enter to Options interface of system Configuration Page as Figure 3-5 shows.

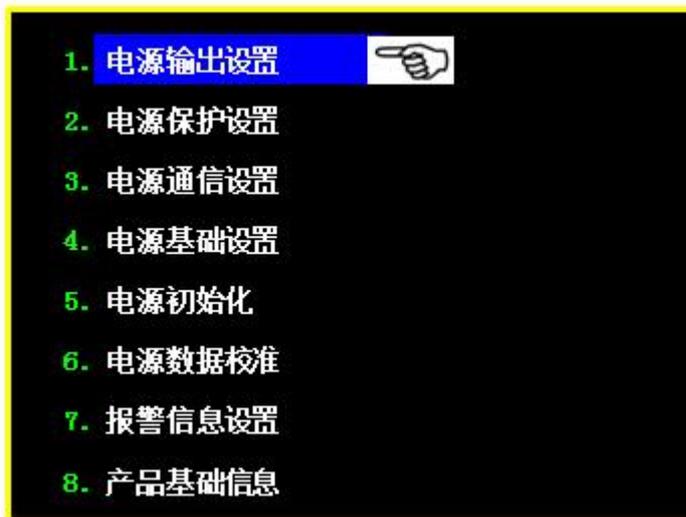


Figure 3-5 CONF Interface

1. Use “up and down arrow” keys to choose item to be set“
2. Press“ENTER”to confirm.
3. Press“EXIT ”key to return to MAIN PAGE.

NOTICE: 1. To cancel the setting, press“EXIT”to return to MAIN PAGE.

2. Press “EXIT” in any page can return to MAIN PAGE.

3.4.1 Power Supply Output Setting

To enter it:

In CONF setup page, press “ENTER ” will enter Output Setup Page as Figure 3-6 shows.

Use ”up and down arrow” keys to move the cursor to the options to be set.



Figure 3-6 Output Setup Interface

3.4.1.1 Voltage Gear

In OutputSetup page, use“up and down arrow”keys to move to the settings for voltage gear, use“left and right arrow”keys to select the low or high gear. This gear is selected for voltage measurement of the DC power supply.

High Gear: The range is 0- rated voltage

Low Gear: The range is 0- 10%rated voltage

3.4.1.2 Current Gear

In OutputSetup page, use“up and down arrow”keys to move to the settings for voltage gear, use“left and right arrow”keys to select the low or high gear. This gear is selected for current measurement of the DC power supply.

High Gear: The range is 0- rated current

Low Gear: The range is 0- rated current

3.4.1.3 VOLTAGE SLEW RATE SETTING

1. Use “up and down”keys to move the cursor to the place to be set as Figure 3-7 shows.



The screenshot shows a menu with six items. The third item, '1.3. 电压爬升斜率 (V/ms)', is highlighted with a blue background. The values for each item are shown in a column to the right of the menu items.

1. 1. 电压档位设置	高档
1. 2. 电流档位设置	高档
1. 3. 电压爬升斜率 (V/ms)	1.000
1. 4. 电流爬升斜率 (A/ms)	0.100
1. 5. DCON_H (V)	3.000
1. 6. DCON_L (V)	3.000

Figure 3-7 Voltage Slew Rate Setup Interface

2. Use “number” (0~9) keys to set the value and the unit is V/ms.
3. Press “ENTER”key to confirm.
4. Press “ENTER”key to return to previous menu .

This option is to set the voltage slew rate of the DC power supply as Figure 3-8 shows. The maximum input Slew Rate is various according to different models. The maximum input Slew Rate is 10V/ms and the minimum is 0.01V/ms. The output of DC Power Supply will follow the slew rate to raise to the set output voltage while the down slew rate is limited by load.

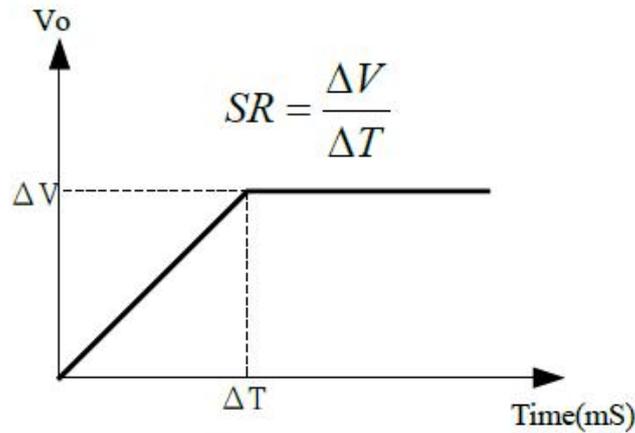


Figure 3-8 Voltage Slew Rate Diagram

3.4.1.4 CURRENT SLEW RATE SETTING

1. Use “up and down arrow”keys to move the cursor to the place to be set as Figure 3-9 shows.

1. 1. 电压档位设置	高档
1. 2. 电流档位设置	高档
1. 3. 电压爬升斜率 (V/ms)	1.000
1. 4. 电流爬升斜率 (A/ms)	0.100
1. 5. DCON_H (V)	3.000
1. 6. DCON_L (V)	3.000

Figure 3-9 Current Slew Rate Setup Interface

2. Use “number” (0~9) keys to set the value and the unit is A/ms.
3. Press “ENTER”key to confirm.
4. Press “ENTER”key to return to previous menu.

This option is to set the current slew rate of the DC power supply as Figure 3-10 shows. The maximum input Slew Rate is 0.1A/ms and the minimum is 0.0001A/ms. The output of DC Power Supply will follow the slew rate to raise to the set output current. The current slew rate is effective when the DC power supply is active in CC MODE.

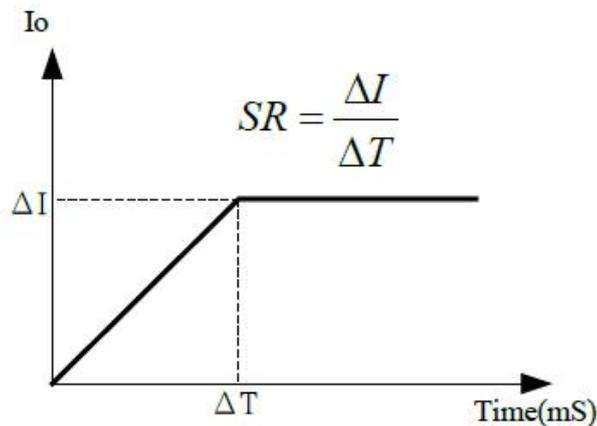


Figure 3-10 Voltage Slew Rate Diagram

3.4.1.5 Power ON Signal Setting (DC_ON/OFF)

This series of DC power supply can provide DC_ON / DC_OFF signal. The setting method is to set the power supply rising edge threshold VDC_R . When the output of DC power supply is ON and the voltage is over VDC_R , the 8PIN terminal DC_ON pin3 on the rear panel will send TTL H signal. When the output of DC power supply is OFF and the voltage is lower than VDC_F , the 8PIN terminal DC_ON pin3 on the rear panel will send TTL L signal as Figure 3-9 shows.

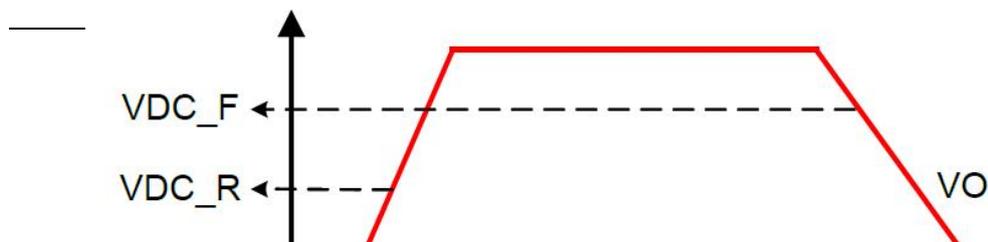


Figure 3-9 DC_ON/OFFSignal Diagram

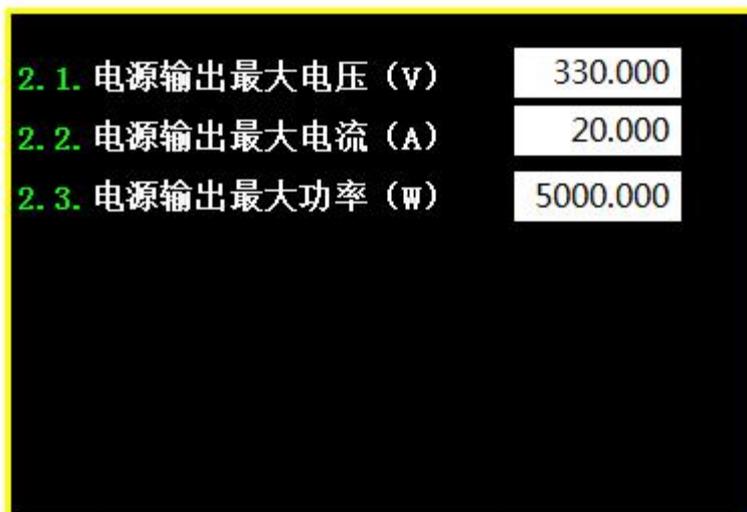
Set DC_ON as described below:

1. Use “up and down arrow”keys to move the cursor to the column to be set as Figure 3-10 shows.
2. Use “number” (0~9) keys to set the value. The lower limit value is 1%Vmax and upper limit is 99%Vmax.

3.4.2 Power Supply Protection Setup

To enter it:

Press”down arrow ”key to move the cursor to the protection setup column on Configuration (CONF) Page. Press “ENTER“ to enter the Power Supply Protection Setup page as Figure 3-10 shows.



2. 1. 电源输出最大电压 (V)	330.000
2. 2. 电源输出最大电流 (A)	20.000
2. 3. 电源输出最大功率 (W)	5000.000

Figure 3-10 Protection Setup Interface

This series of DC power supply allows users to set the output over voltage, over current and over power protection points of the software protection according to the actual use of the product. The hardware protection of the power supply is fixed at the factory.

This function allows the user to limit the output state of the DC source when debugging the product. Make sure that the commissioning product does not exceed the allowable value and the safety of the commissioning product.

3.4.2.1 Over Voltage Protection Setup

1. Use "up and down arrow" keys to move to the Over Voltage Protection Setup column on ProtectionSetup page.

2. Use the numeric (0 ~9) keys to input set value.

3. Press "ENTER" to confirm.

4. Press "ENTER" key to return to previous screen.

This function sets the maximum output voltage value of the product.

When the user sets the voltage, the input value cannot exceed this setting value. Once the voltage exceeds the range, it will turn off the input value from user. The power supply will prompt an error message " Voltage is out of range" and not output. The hardware over voltage protection value does not need to be set, and the protection point is 110% Vmax. During hardware protection, the power supply interface is displayed as Figure 3-11 shows, and the power supply output will be turned off at the same time. The user can now press the "EXIT" key to exit the alarm information interface. Recheck the use conditions and environment, and continue to use it when there is no problem.



Figure 3-11 Hardware OVP Protection

3.4.2.2 Over Current Protection Setup

1. Use "up and down arrow keys" to move to the Over Current Protection Setup column on ProtectionSetup page.

2. Use the numeric (0 ~9) keys to input set value.

3. Press "ENTER" to confirm.

4. Press "ENTER" key to return to screen one level up.

This function sets the maximum output current value of the product. When the user sets the current, the input value cannot exceed this setting value. Once the current exceeds the range, it will turn off the input value from user. The power supply will prompt an error message "Current is out of range" and not output. The hardware over current protection value does not need to be set, and the protection point is 110% I_{max}. During hardware protection, the power supply interface is displayed as Figure 3-12 shows, and the power supply output will be turned off at the same time. The user can now press the "EXIT" key to exit the alarm information interface. Recheck the use conditions and environment, and continue to use it when there is no problem.



Figure 3-12 Hardware OCP Protection

3.4.2.3 Over Power Protection Setup

1. Use "up and down arrow keys" to move to the Over Power Protection Setup column on ProtectionSetup page.

2. Use the numeric (0 ~9) keys to input set value.

3. Press "ENTER" to confirm.

4. Press "ENTER" key to return to screen one level up.

This function sets the maximum output power value of the product. When the user sets the voltage and current, the product of input two numbers cannot exceed this setting value. Once the product exceeds the range, it will turn off the input value from user. The power supply will prompt an error message " Power is out of range" and not output. The hardware over power protection value does not need to be set, and the protection point is 110% Pmax. During hardware protection, the power supply interface is displayed as Figure 3-13 shows, and the power supply output will be turned off at the same time. The user can now press the "EXIT" key to exit the alarm information interface. Recheck the use conditions and environment, and continue to use it when there is no problem.



Figure 3-13 Hardware OPP Protection

3.4.3 Power Supply Communication Setup

To enter it:

Press "down arrow" key to move the cursor to the remote Setup column on Configuration(CONF) page. Press "ENTER" to enter Setup page as Figure 3-14 shows.



Figure 3-14 Communication Setup Interface

The HPS Series DC Power Supply can be controlled remotely via GPIB or RS-232 port. The function is to set Relevant parameters.

3.4.3.1 GPIB ADDRESS Setup

This power supply is available for remote operation. Be sure to set the GPIB address before using it for remote control.

1. Use "up and down" arrow keys to move the cursor to GPIB ADDR column as Figure 3-14 shows.

2. Use the numeric (0 ~9) keys to set the address.

3. Press "ENTER" to confirm.

4. Press "EXIT" key to return to MAIN PAGE.

NOTICE: The address setting range is 0~30.

3.4.3.2 RS232 Port Setup

This power supply is available for remote operation via RS-232. Be sure to set the RS-232 baudrate and Parity check before using it for remote control. The setting method is the same as GPIB ADDRESS.

1. Use "arrow keys" to move the cursor to BAUDRATE column.
2. Use "left and right arrow keys" to set the BAUDRATE.
3. Press "ENTER" to confirm.
4. Press "EXIT" key to return to MAIN PAGE.

NOTICE: The RS-232 has 3 baudrates 9600/19200/115200 for setting.

3.4.3.3 Parity Setup

This option is set for parity

1. Use "arrow keys" to move the cursor to Parity column.
2. Use "left and right arrow "keys to choose parity mode.
3. Press "ENTER" to confirm.
4. Press "EXIT" key to return to MAIN PAGE.

NOTICE: The data parity has 3 modes none parity check/odd parity check/even parity check for setting

3.4.3.4 Data Display Speed Setup

This option is to set the refresh rate of the sample data. Users can choose different display data speeds for actual needs to complete data collection and judgment.

1. Use "arrow "keys to move the cursor to data display speed column.
2. Use "left and right arrow "keys to choose data display speed.
3. Press "ENTER" to confirm.
4. Press "EXIT" key to return to MAIN PAGE.

NOTICE: The data display has 3 speeds HIGH/MEDIUM/LOW for setting.

3.4.4 Power Supply Basic Setup

The option is an item for factory use of equipment and is not open to users. Here is no explanation about related settings.

3.4.5 Power Supply Initialization

The user can use the function of restoring the factory default Settings when the parameter setting is disordered which causes the device abnormal. Once this function is adopted, all the setting data of the power supply will be restored to the factory default settings. Before restoring data, there will be a message prompt in the window.



Figure 3-15 Initialization Interface

3.4.6 Power Data calibration

The option is an item for factory use of equipment and is not open to users. Here is no explanation about related settings.

3.4.7 Alarm Information Setup

The option is an item for factory use of equipment and is not open to users. Here is no explanation about related settings.

3.4.8 Product Basic Information

To enter it:

Use "up arrow" keys on Configuration page to move the cursor to basic information setup of product. Press "ENTER" to enter to query interface.



8. 1. 面板程序版本	: 2. 13
8. 2. 通信指令版本	: 2. 03
8. 3. 控制程序版本	: 2. 10_2. 13
8. 4. 设备名与型号	: BRD333020
8. 5. 最大支持电压	: 330V
8. 6. 最大支持电流	: 20A
8. 7. 最大支持功率	: 5000W
8. 8. 产品生产序列	: 200006
8. 9. 产品生产日期	: 2020. 05. 09

Figure 3-16 Product Basic Information

Show product basic information:

Panel program version: Display and keyboard control board software program version number of the device

Communication command version: Communication module software program version number of the device

Control program version: Control module software program version number of the device

Device name and model: The mode of the device

Maximum permissible voltage: The maximum output voltage of the device

Maximum permissible current: The maximum output current of the device

Maximum permissible power: The maximum output power of the device

Product production sequence: Serial number of the device

Production date: Production date of the device

4. Remote Mode

4.1 Overview

The HPS Series Series DC Power Supply can be controlled remotely via GPIB or RS-232 port. GPIB interface is an 8-bit parallel data bus that synchronizes with the host bus

commands. RS-232C interface is a serial bus, thus the function is less powerful but users can do remote control easily via simple programming.

4.1.1 Setting GPIB& RS-232C Parameters

See section 3.4.3.1 and 3.4.3.2.

4.1.2 Connecting RS-232C

The default baudrate of HPS Series DC Power Supply is 9600 and the parity check is set to “none”. For RS-232C interface, only TxD and RxD signal can be used for data transmission. The connector of S-232C is a 9-pin D type small female connector. The table 4-1 / 4-2 lists the definition of RS-232C PIN and the connection method with PC.

PIN NO. INPUT/OUTPUT Description

PIN NO.	INPUT/OUTPUT	Description
1	NA	--(useless)
2	INPUT	RxD
3	OUTPUT	TxD
4	NA	--
5	NA	GND
6	NA	--
7	NA	--
8	NA	--
9	NA	--

Table 4-1 Definition of RS-232C PIN

PIN NO.	DC Power Supply	PC
1	NA 	--(useless)
2	RxD 	RxD
3	TxD	TxD

4	NA	--
5	DGND	GND
6	NA	--
7	NA	--
8	NA	--
9	NA	--

Table 4-2 Connection between DC Power Supply RS-232C and PC

4.2 Programming Introduction

All commands and response messages are transmitted in ASCII codes. The response messages must be read completely before a new command is sent, or the remaining response messages will be lost and occur a query interrupt error.

Commands consist of two distinctive types, common command and specific command. Specific command is divided into simple command, compound command, and query command. Generic command belongs to simple command. For RS-232C communication, the commands all end with the <\ n> symbol (hex 0x0A).

The command data consists of one or several subject words (command mnemonics).

Subject Word

The subject word composed of ASCII word is the command mnemonic. It is divided into long subject words and short subject words. Generally, long subject word is a complete English word, and short subject word is abbreviated form of long subject word. Generally, take first 3-4 letters or term abbreviations to represent specific functions. This manual specifies the capitalization of the first few characters of the subject word as its abbreviated form. We try to use English words that match the command function. Like ask about the measured voltage value ": MEAS: VOLT?". This system can accept both long subject words and short subject words, but the form of all subject words in one command must be consistent.

Simple Command.

The simple command includes only one subject word, and can be followed by the parameters of the command. When connecting parameter, the parameter and the preceding subject word are separated by space.

Example TRIG

Compound Command

The compound instruction consists of two or more subjects, separated by ‘.’. Generally, the last subject is an optional parameter of the command. The usage of the parameter is the same as above.

Example CONF:VOLT:RANG High

Query Command

The inquiry command consists of the above simple instruction or the compound instruction on appeal, but the last subject of the command is ? .

Example :MEAS: VOLT?

4.3 Numerical Representation

Symbol	Description	Example
NR1	It is a digit without decimal point.	123, 0123
NR2	It is a digit with a decimal point.	123., 12.3, 0.123, .123
NR3	It is a digit with a decimal point and an exponent.	1.23E+3, 1.23E-3
NRf	Flexible decimal format including NR1, NR2 or NR3	123, 12.3, 1.23E+3

Table 4-3 Representation of Command Numerical Data

4.4 Separator

Separator	Description	Example
space	It separates parameter from the preceding subject word	REMOte ON
:	It separate subject words, indicating that the preceding subject word is located at a higher level in the instruction	CONF:VOLT:ON 5 <\n>

	tree.	
;	It separates two different commands and is used when there are multiple commands in one instruction sequence	RES:RISE 100;I1 400 <\n>

Table 1-1 Command Data Separator

4.5 Commands Set

Command Description	Command Format
Turn Remote Mode ON	REM:ON\n
Turn Remote Mode OFF	REM:OFF\n
Query Device Information	*IND?\n
Setting Output Voltage	SOUR:VOLT XXX\n
Setting Output Current	SOUR:CURR XXX\n
Setting OCP Voltage	SOUR:PORT:VOLT XXX\n
Setting OCP Current	SOUR:PORT:CURR XXX\n
Setting Voltage Slew_rate	SOUR:VOLT:SLEW XXX\n
Setting Current Slew_rate	SOUR:CURR:SLEW XXX\n
Query Output Voltage	MEAS:VOLT?\n
Query Output Current	MEAS:CURR?\n
Query Output Power	MEAS:POW?\n
Turn Output ON	CONF:OUTP:ON\n
Turn Output OFF	CONF:OUTP:OFF\n

It is defined by the IEEE488.2 standard. The RS232-C command set is the same as the GPIB command.

(1) Turn Remote Mode ON/OFF

Description: It sets the remote mode to ON or OFF .

Syntax: REM: <CHAR>\n

Parameter: ON / OFF

Example: REM:ON\n turn the remote control mode on
 REM:OFF\n turn the remote control mode off

(2) Query Device Information

Description: This query requests the 62000P to identify itself.

Syntax: *IDN?\n

Return <String>

Example: *IDN? \n

String	Information
MATRIX	Manufacturer
HPS-32020E	Model name
12345678	Sequence number
01.00	Software version

Return Example: MATRIX,HPS-32020E,12345678,01.00

(3) Setting OutputVoltage

Description: It sets the output voltage value of the product.

Syntax: SOUR:VOLT <NRf+>\n

Parameter: Refer to individual spec for valid numeric range.

Example: SOUR:VOLT 100\n It sets the output voltage to 100V
 SOUR:VOLT 5\n It sets the output voltage to 5V.

(4) Setting Output Current

Description: It sets the output current value of the product.

Syntax: SOUR:CURR <NRf+>\n

Parameter: Refer to individual spec for valid numeric range.

Example: SOUR:CURR 0.5\n It sets the output current to 0.5A.

SOUR:CURR 15\n It sets the output current to 15A.

(5) Setting Output Voltage Slew_rate

Description: It sets the slew rate of output voltage.

Syntax: SOUR:VOLT:SLEW <NRf+>\n

Parameter: Valid Numeric Range (0.001-10V/ms)

Example: SOUR:VOLT:SLEW 0.5\n It sets the output voltage slew rate to 0.5 V/ms.

SOUR:VOLT:SLEW 5\n It sets the output voltage slew rate to 5 V/ms.

(6) Setting Output Current Slew_rate

Description: It sets the slew rate of output current.

Syntax: SOUR:CURR:SLEW <NRf+>\n

Parameter: Valid Numeric Range (0.001-0.1A/ms)

Example: SOUR:CURR:SLEW 0.05\n It sets the output current slew rate to 0.05 A/ms.

SOUR:CURR:SLEW 0.1\n It sets the output current slew rate to 0.1 A/ms

(7) Setting Output OCP Voltage

Description: It sets the Over-voltage protection value of output.

Syntax: SOUR:VOLT:PORT <NRf+>\n

Parameter: Valid Numeric Range (0-110%Vmax)

Example: SOUR:VOLT:PORT 330\n It sets output voltage protection point to 330V.

(8) Setting Output OCP Current

Description: It sets the Over-current protection value of output.

Syntax: SOUR:CURR:PORT <NRf+>\n

Parameter: Valid Numeric Range (0-110%Imax)

Example: SOUR:CURR:PORT 20\n It sets output current protection point to 20A.

(9) Get Output Voltage

Description: It gets the real time output voltage of the product.

Syntax: MEAS:VOLT? \n

Return Parameter: <NRf+>

Example: MEAS:VOLT? real time voltage
 100.000000e+02 100.00V

(10) GetOutput Current

Description: It gets the real time output voltage of the product.

Syntax: MEAS:CURR? \n

Return Parameter: <NRf+>

Example: MEAS:CURR? real time current
 10.000000e+03 10.000A

(11) GetOutput Power

Description: It gets the real time output power of the product.

Syntax: MEAS:POW? \n

Return Parameter: <NRf+>

Example: MEAS:POW? real time power
 1050.000000e+01 1050.0W

(12) Turn Output ON/OFF

Description: It sets the output to ON or OFF of the DC power supply.

Syntax: CONF:OUTP: <CHAR>\n

Parameter: ON / OFF

Example: CONF:OUTP:ON \n turn the output on
 CONF:OUTP: OFF\n turn the output off
