MATRIX
— Since 2003

Programmable DC Power Supply

High-voltage User Manual

MATRIX TECHNOLOGY INC.

— Since 2003

Verification and correction statement

The Company hereby affirms that the instruments and equipment listed in this manual are fully in compliance with the specifications and characteristics specified in the Companys technical specifications. The instruments have been tested at the Companys factory prior to leaving the factory, and the procedures and steps of the testing are in compliance with the specifications and standards of the Electronic Testing Center.

Product quality assurance

Our company guarantees that all newly manufactured instruments have undergone strict quality verification and ensures that within one year after leaving the factory, if any construction defects or component failures are discovered, our company will provide free repairs. However, if users modify circuits, functions, or repair instruments and parts or damage the outer box themselves, our company will not provide free warranty services. If abnormal conditions occur due to failure to properly connect all ground wires or operating the machine in violation of safety regulations, our company will also not provide free warranty services.

This warranty does not cover the accessories of this instrument, such as the accessories not produced by our company.

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

If the unit fails under abnormal use, or due to human negligence, or due to non-human factors, such as earthquake, flood, riot or fire, etc., the Company will not provide free warranty service.

(The Company follows a sustainable development strategy and reserves the right to make improvements to the contents of this manual without prior notice)

catalogue

Chapter I Product Introduction

This series of programmable DC power supplies is a new generation of high-quality programmable linear DC power supplies, featuring multiple windows displaying parameters such as voltage, current, and power simultaneously. This product series is equipped with an RS232 communication interface, combining the characteristics of both desktop and system models. It can be arbitrarily paired with other instruments, integrating into a special-function testing system to meet measurement requirements in various scenarios. The user can edit the upper computer program through the communication protocol, providing great convenience for user operation. This product represents an upgrade from ordinary programmable power supplies and offers significant cost-performance advantages.

This series of power supplies has the following characteristics:

- Intelligent fan cooling system
- Multi-group data storage function
- Standard 19-inch 4U instrument architecture design
- Support RS-232 communication
- 0. 1V,0.01mA read-back resolution
- OCP, OVP, OTP and other protection functions
- Internal temperature detection function

Chapter II Technical specifications

2.1 Main technical specifications

Technical specification sheet:

Model		MDH-200H01
Input voltage		AC220V±10%50Hz/60Hz
Rated output	Voltage	0~ 200 0V
	Current	0~ 1 A
Load regulation rate	Voltage	≤0. 01% FS±2 digits
	Current	≤0. 01% FS±2 digits
Power regulation rate	Voltage	≤0. 3% FS
	Current	≤0. 3% FS
Set the resolution	Voltage	0. 1V
	Current	0.1 m A
Set accuracy	Voltage	≤0. 3% FS± 1 digit
	Current	≤0. 3% FS± 1 digit
Back-read resolution	Voltage	0. 1V
	Current	0. 0 1 m A
Readback accuracy	Voltage	≤0.0 5% + 3 digits
	Current	≤0.1%+ 0.5 mA
Ripple and noise	Voltage	≤0. 2% FS (measured at 20%-100% output)
Time of descent (2000V-50V)		≤ 300ms
Rising time (0-2000V)		≤ 500ms
work environment		0~40℃≤80%RH
Dimensions (WxHxD)	mm	430*100* 500
weight	kg	23.6

2.2 Supplementary characteristics

State memory capacity: 99 sets of operation status
Recommended calibration frequency: 1 year / 1 time
Heat dissipation method: forced air cooling
Operating environment temperature: 0 to 40℃
Storage environment temperature: -20 to 70℃
Usage environment: Indoor design, pollution level 2, maximum humidity 80%

Chapter 3 Quick Start

This chapter will briefly introduce the appearance and basic functions of the series of programmable DC power supplies to give you a quick understanding of the programmable DC power supply. It will also tell you what basic checks to do after receiving the power supply to ensure the normal operation of the product.

3.1 Introduction of front and rear panels

The front panel is shown in the figure above.

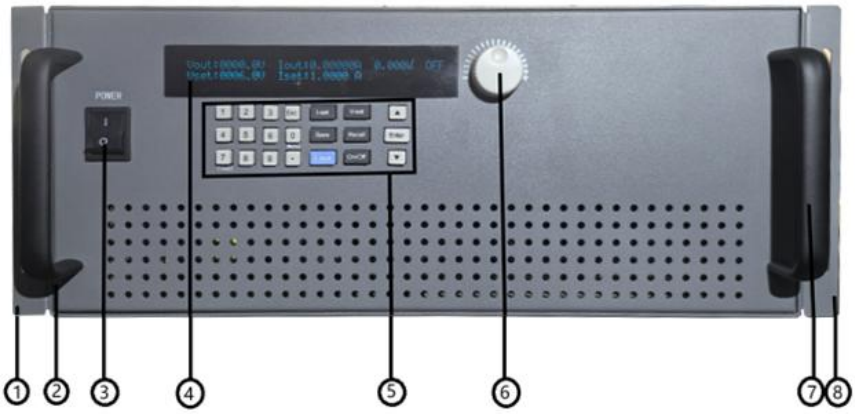
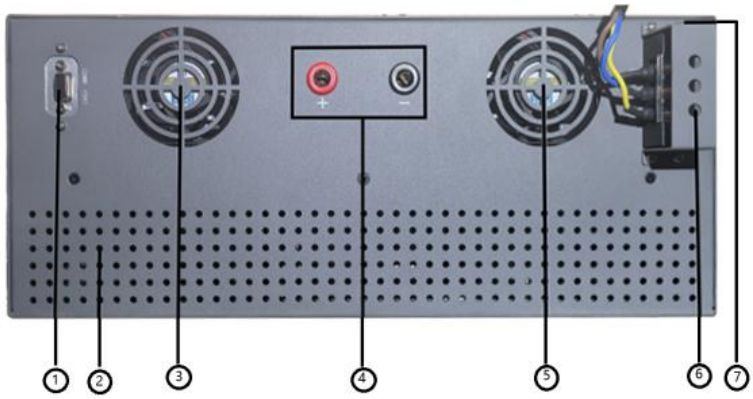


Figure 3.1 Power front panel

① ,⑧Standard 19-inch cabinet with fixed panels
② ,⑦Programmable DC power supply handle
③ Mains switch
④ LCD display screen,
⑤ From left to right, the numeric keys 0-9 and the ESC exit key, function keys, up and down movement keys and Enter key,
⑥ Regulating knob
The layout of the back panel of the programmable DC power supply is shown in the figure below.



①RS-232 communication interface
②③⑤heat emission hole
④leading-out terminal
⑥Power input terminals
⑦earth terminal

Figure 3.2 Power back panel

3.2 Pre-inspection

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

1. Inspection

Please check if you have received the following accessories when you receive the power supply. If any of them are missing, please contact your nearest dealer.

- ☑ A power cable (in line with the voltage standard used in this region)
- ☑ One operating manual (standard)
- ☑ A communication line (standard)
- ☑ One warranty card (standard)

2. Connect the power cable and turn on the power

After power-on, the power supply first performs a system self-test and then enters standby mode.

Warning: The power supply comes with a three core power cord, and your power supply should be connected to the three core junction box. Before operating this power supply, you should first ensure that the power supply is well grounded.

3.3 If the power supply does not start

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

1. Check if the power cable is connected properly
2. Whether the voltage meets the working voltage of the power supply

Chapter 4 Panel Operation

This chapter provides a detailed description of the front panel of the power supply, which is divided into the following sections:

- Keyboard layout
- Introduction to front panel operation
- Voltage setting operation
- Current setting operation
- Store operation
- Output on/off operation
- Keyboard lock function
- OVP/OCP function setting
- Menu operations

4.1 Keyboard arrangement

Button description:

Button location	Button function description
0-9:	numbering key
Esc:	Return
I-Set	Set the maximum output current of the power supply
V-Set	Set the power output voltage
Save	Store the current relevant parameters of the power supply to the specified storage location
Recall	Pull up the power related settings from the designated storage location
Shift	Composite keys, combined with multi-function keys
On/off	Control the power output status
▲	Up key (in menu operation, select menu items, in work interface can increase output voltage)
▼	The down flip key (select the menu item in the menu operation, and reduce the output voltage in the work interface)
Enter	Confirm button
Knob	Used to change the setting of power voltage and current

4.2 Basic operations of the front panel

Turn on the power, LCD display voltage, current, power and output status data,

1. Vout: 0.000V Output voltage value.
2. Vset:27.000V Set the voltage value.
3. Iout: 0.000A Output current value.
4. Iset:31.000A Set the current value.
5. 0.0000W output power.
6. OFF output state.

4.3 Voltage setting operation

The voltage setting range is between 0V and the maximum voltage setting value. You can set the output voltage value through the front panel in two ways.
Method 1: Press the V-Set key, press the number keys from 0 to 9 to input the voltage value, and press Enter to confirm the voltage value.

Method 2: Press the V-Set button and change the voltage setting value by rotating the knob left and right (the screen flashes and you can rotate the knob to set the voltage, press the knob to move the cursor position, press Enter to confirm and exit the set mode).

4.4 Current setting operation

The current setting range is between 0A and full rated output current. You can set the output current value through the front panel using the following two methods.

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

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

4.5 Access operations

The power supply can store some commonly used parameters in 99 groups of non-volatile memory for users to quickly retrieve and use.You can achieve this by using the Save and Recall keys on the front panel to perform access operations for groups (0~99).
The stored content includes: 1. voltage setting value. 2. current setting value. 3.OVP. 4.0CP.
You can press the Save button and then press the number keys from 1 to 9, and press Enter to store the power parameters in the specified storage area.
You can press the Recall key and then press the 1 to 9 number key, and press Enter key to take the parameters from the specified storage area for use.

4.6 Output on/off operation

When the power button On/Off is pressed while the power supply is on, the power output will be turned on, and the voltage and current output at the output terminal will be set. The "OFF" switch in the upper right corner of the screen will switch to "ON". When the power button On/Off is pressed while the power supply is off, the power output will be turned off, and the "ON" switch in the upper right corner of the screen will switch to "OFF". The voltage and current output at the output terminal will be turned off.

4. 7 Keyboard lock function

When the power is on, lightly press the composite key "Shift" and then press the output control key "On/Off", at this point the keyboard will be locked, and the screen will display "  ". When the power button is locked, lightly press the composite key "Shift" and then press the output control key "On/Off", at this point the keyboard will be unlocked.

4. 8 OVP/OCP function setting

OVP function Settings
Press the "shift" key and then the "V-set" key to enter the OVP Settings, which can be switched between set value and state Settings by pressing the ▲ and ▼ keys.

1. 

OVP set value can be changed by digital key and knob, the method is the same as voltage setting.

2. 

OVP status setting, OFF is the function closed, ON is the function open.

OCP function Settings

Press the "Shift" key and then the "I-set" key to enter the OCP setting, and switch between the set value and state setting with the ▲ and ▼ keys.

1. 

OCP set value can be changed by digital key and knob, which is the same as the current setting.

3. 

OCP status setting, OFF is the function closed, ON is the function open.

Note: 1. Exit by pressing "ESC" after setting.

2. When the power supply enters the OVP, OCP or OTP protection state, the output will be automatically closed and the display screen will show relevant prompt information. At this time, we can clear the screen prompt information by pressing the ON/OFF button after clearing the error.

4.9 Menu Settings

Press the shift compound key and press the number key "1" to enter the menu setting function, press the ▲ and ▼ keys to switch the menu options, press the "Enter" key to select this function option, the menu content is as follows:

Power Menu			
System Settings	Out State Output status Settings	off (keep Off)	
		Keep (Keep last shutdown state)	
	Out Param Output parameter Settings	Reset (default factory value, default value is 5.000V/1.000A)	
		Keep (keep last shutdown parameters)	
	Buzzer Beeper sound Settings	Off	
		On	
	Communication Communication connection Settings	Addres postal address	Addres=1(0-255)
		Baud Rate Communication baud rate	4800
			9600
			19200
			38400
			57600

			115200	
	Command Command category Settings	Modbus		
		SCPI	CR	End marker selection
			LF	
			CR+LF	
			LF+CR	
	Sense Voltage compensation Settings	Off		
		On		
	Reset Reset is the default value	No		
		Yes		
	Exit			
Config configure	Min Volt Adjust the voltage lower limit	Min Voltage=0.000V		
	Max Volt Adjust voltage upper limit	Max Voltage=31.000V		
	Min Curr Regulate the lower limit of current	Min Current=0.000A		
	Max Curr Regulate the upper limit of current	Max Current=51.000A		
List List test function	Load Load list test (5 files can be invoked)	List1		
		List2		
		List3		
		List4		
		List5		
	Edit Editing list test (5 files can be invoked)	List1	Step Number=100 Steps (1-100)	Cycles=0 Number of cycles (can be set between 0 and 60000,0 is infinite cycle.)
		List2		
		List3		
		List4		
		List5		
Exit				

Factory default value:

1.Out State(Output status): Off (stay in Off state)

2.Out Param (Output parameter): Keep (Keep last shutdown parameters)

3.Buzzer (beeper sound): ON

4. Addres (correspondence address): 1

5.Baud Rate : 9600

6.Command (Command Category) SCPI

7. Communication end symbol: LF

8.Sense (voltage compensation): OFF

4.8 LIST (List Test Function)

Press the "shift" key and the number key "1" in standby mode to enter the menu setting function. Press the ▲ and ▼ keys to switch to the "List" menu option, and press the "Enter" key to enter the "List" display as follows:

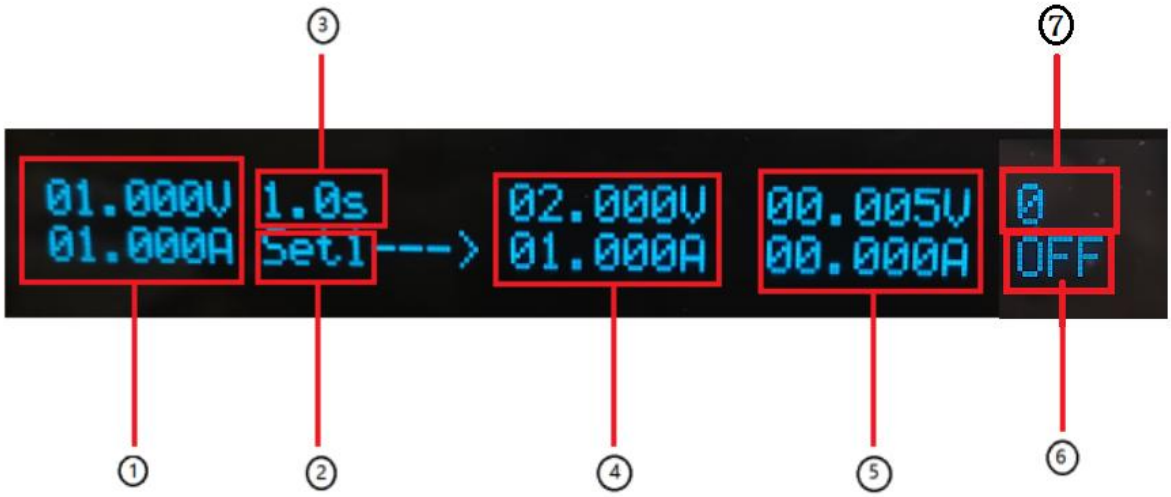
1. Load Load list test.

2. Edit Edit list test.

4.8.1 Load list test

When you select Load to enter the "List" loading options by pressing the Enter key, the following is displayed:(There are five groups of stored files for call, "List1-List5")

When you select any file in "List1-List5" and press the Enter key, it automatically enters "List" as follows:



①Current step parameters.
②Steps to be implemented.
③Current step parameter timing.
④The parameters to be implemented next.
⑤The actual voltage and current output at the current step.
⑥Current status indicator.
⑦Number of cycles displayed.

4.8.2 Editing list test

When you select Edit to enter the "Edit" list test option by pressing the Enter key, the following is displayed: (There are five groups of stored files available for editing: List1-List5)

When you select any of the files in "List1-List5" and press Enter, you will automatically enter the "Edit" list test option as shown below:

①Step Number = 5: The total list step consists of 5 steps (up to 100 steps can be edited)

After setting the total list steps, press the Enter key to automatically enter the list test cycle number setting, as shown below:

①Cycles = Number of cycles to be set (can be set between 0 and 60,000,0 is infinite cycle.)
After setting the number of test cycles in the list, press the Enter key to automatically enter the list parameter display as follows:

①The current editing list steps can be switched by pressing the ▲ and ▼ keys.
②List voltage parameters, modify parameters with numeric keypad, press Enter to confirm and enter the next parameter setting.
③List the current parameters, modify the parameters with a numeric keypad, press Enter to confirm and move on to the next parameter setting.
④Enter the step dwell time parameter (maximum 6000s) using a numeric keypad, press Enter to confirm and move on to the next parameter setting.

Chapter 5 Remote Operation Mode

5.1 Communication between power supply and host

The power supply can be connected to the PC host interface via the DB9 plug on the back panel. The following sections will help you understand how to control the power supply output from the host.

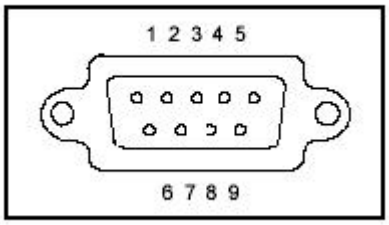
1. Communication Settings

Before performing communication operations, you should first match the following parameters between the power supply and the control host:

(1) Baud rate: 9600

(2) Check: NONE (3) Data bits: 8, stop bits: 1 (fixed value)

2. DB9 serial port



The DB9 port on the back of the power supply can be connected to the interface of the host.

3. Interface pin definitions

1	NC
2	RXD(receive)
3	TXD(transmit by radio)
4	NC
5	GND(the earth)
6	NC
7	NC
8	NC
9	NC

Security

Do not install replacement parts on the instrument or make any unauthorized modifications. Please send the instrument to our company's maintenance department for maintenance to ensure its safe use.
Please refer to the specific warning or caution information in this manual to avoid personal injury or instrument damage.

Safety sign

Warning

It reminds users of certain operating procedures, practices, conditions, and other matters that may lead to personal injury.

Caution

It warns the user of procedures, practices, conditions, etc. that may cause damage to the instrument or permanent loss of data.

 Grounding point today

 High voltage hazard. (Do not open the machine for non-expert personnel)

 Refer to the warnings in the related documents and pay attention to the tips. (High voltage, please wear gloves when operating, and do not use the machine for safety purposes).

Warranty Card

What the warranty covered:

If the machine break down due to its defectiveness, MATRIX will provide free maintenance during warranty period. If the machine break down due to wrong operation or carelessness, then Matrix provide paid service within warranty period.

How long does this warranty last:

This warranty lasts for 1 year from the date of original purchase of all MATRIX branded products.

Who is covered:

This warranty covers only the original purchaser of this product. This warranty is not transferable to subsequent owners or purchasers of this product.

What do customers need to do to get repairs/service under the warranty policy?

If the machine get problem, please contact our local distributor. If you cannot find the local distributor, you can contact us directly, our email is service@szmatrix.com, our telephone No. is 0086 755 2836 4276.

What information do customers need to supply?

Model No.	
Serial No.	
Problem description	
Picture	
Video if necessary	