DX6200 Series power Supply

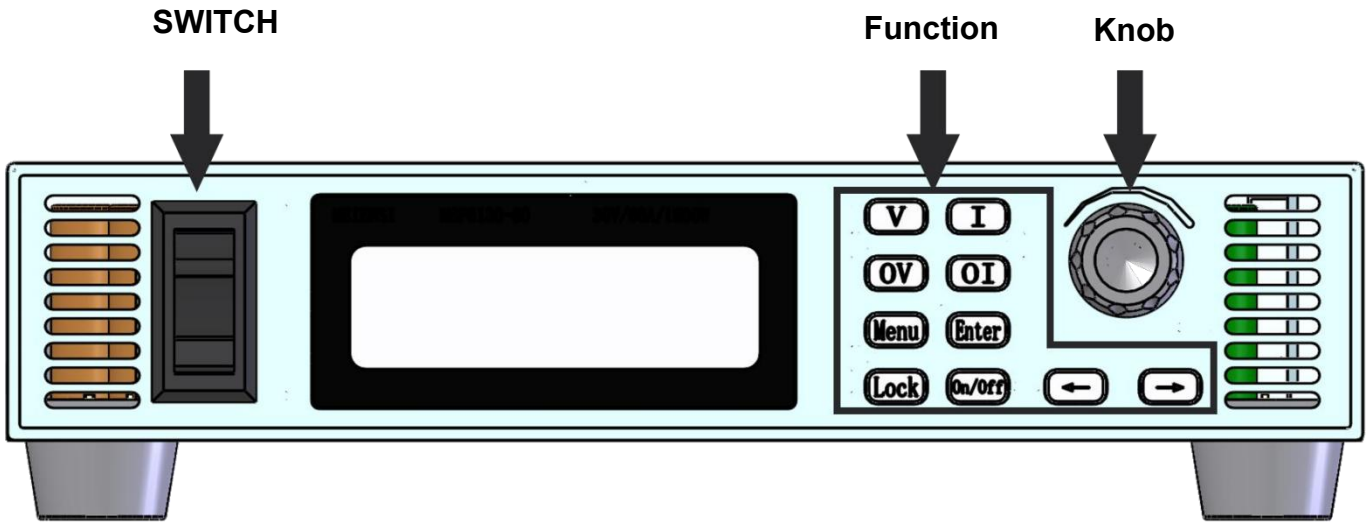
Xiamen Dexing Magnet Tech. Co., Ltd

Unit 409, 4/F, No. 992, Anling Road, Huli District, Xiamen, China 361012

Website: www.dexinmag.com/www.ydxcd.com

Introduction of product

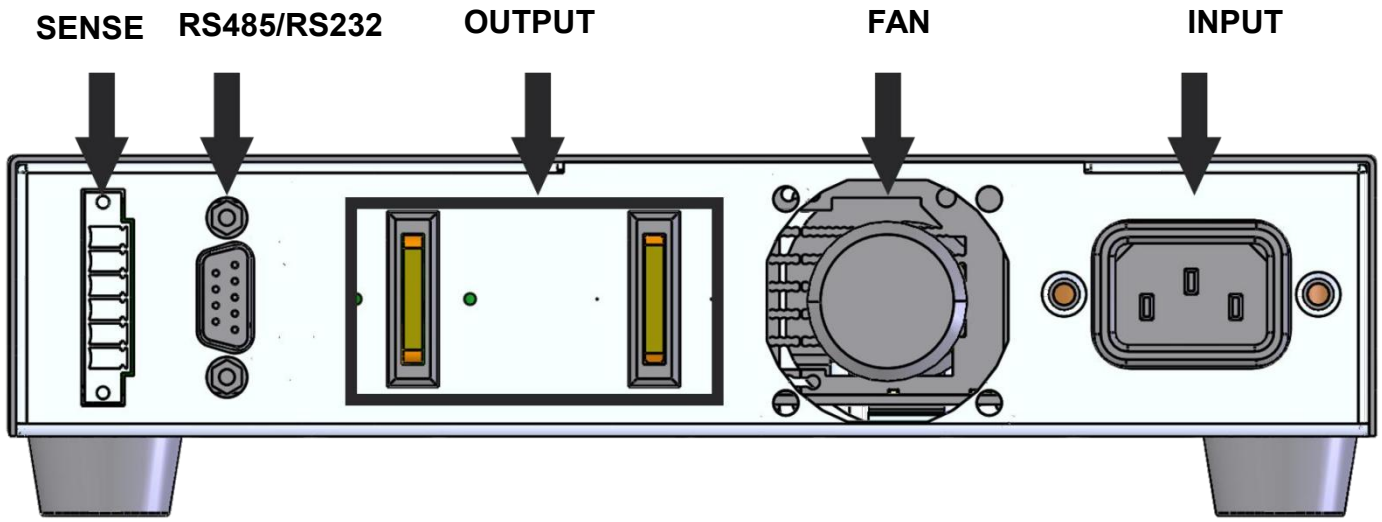
1.1 Front plate



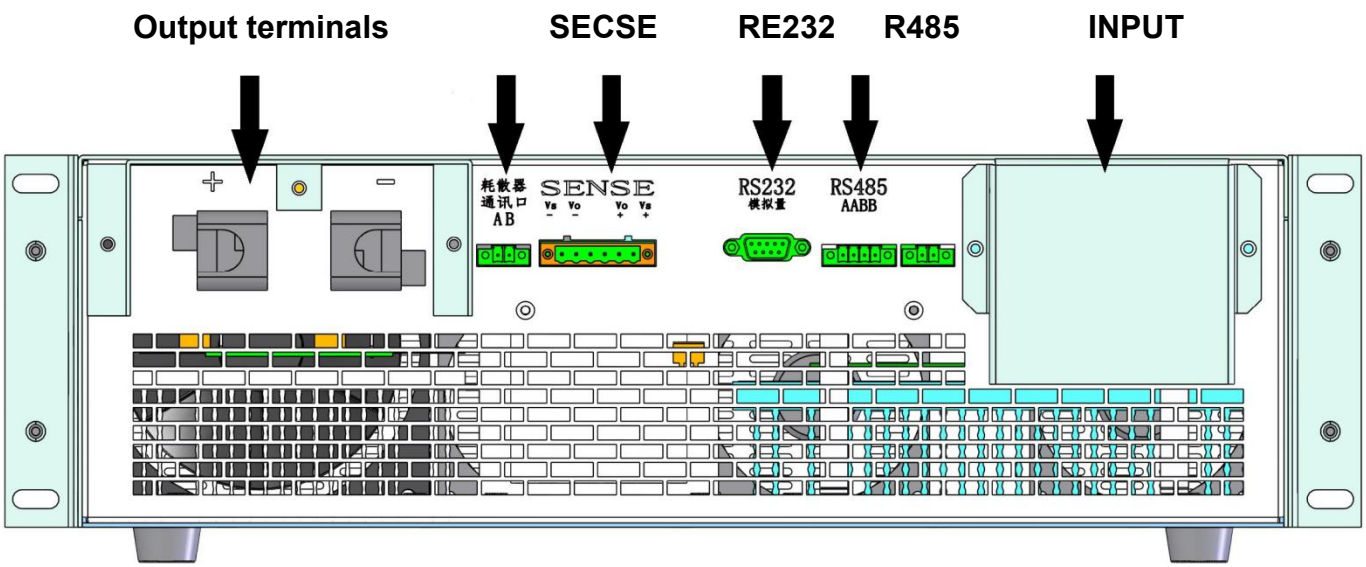
1.2 Introduction of Function Key

Function key	Purpose
V	Voltage setting key
I	Current setting key
OV	Overvoltage protection setting
OI	Overcurrent protection setting
Menu	Menu function key
Enter	Enter key
Lock	Local operation lock key; Switches to local mode when exiting remote operation mode
On/Off	Power on/off for voltage/current output
← →	Left/right arrow keys
Knob	used for numerical adjustment, selection of options, navigating up/down in menus, and confirming selections

1.3 Back Plate



1U MODEL



3U MODEL

1.4 DB9

The default communication interface for the power supply is a DB9 female connector, with the wiring sequence as shown in the diagram on the right. It can be configured into three functions: RS-485, RS-232, and analog (optional). See the table below for wiring instructions:

Pin Numbers	RS-485	RS-232	Analog
1			
2		Tx	
3		Rx	Vset：Output voltage setting line
4			Iset：Output current setting line
5		GND	Vdisp：Output voltage display line
6	B		Idisp：Output current display line
7	A		ON：Passive signal line for power supply start/stop control. When connected to GND, it represents start; when not connected, it represents stop.
8			RM：Passive signal line for external control of the power supply. It is checked when the power supply starts, and changes are invalid after startup. When connected to GND, it represents external control; when not connected, it represents internal control of the power supply.
9			GND：Common ground

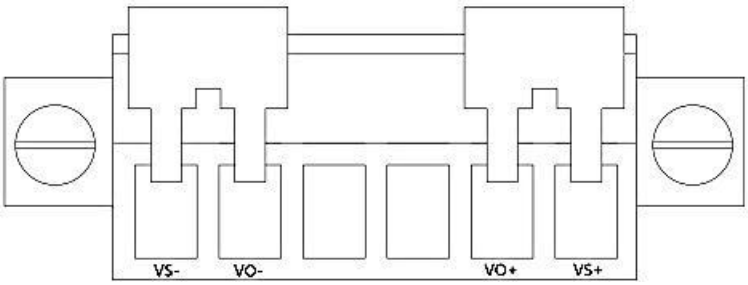
Note: Iset, Vset, Idisp, Vdisp have three setting options: 4-20mA, 0-5V, 0-10V, which are selected before leaving the factory; Vset, Iset have three setting options: only control voltage, only control current, control voltage and current, which are selected before leaving the factory. Please select the wiring method according to the customization requirements!

1.5 voltage compensation

When the power supply outputs large currents, or when the wires are long or thin, significant voltage drops can occur along the connecting wires between the load and the power supply output terminals. To ensure normal operation of the load, the power supply provides a remote measurement terminal on the rear panel. Users can use this terminal to measure the voltage at the load's output terminals. The power supply then increases the output to adjust the load-side

voltage to the user-set value.

Please refer to the diagram below for the connection terminals：



VS+: Remote measurement positive terminal

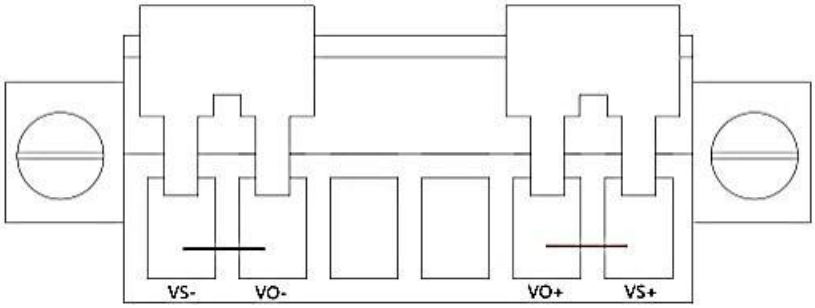
VO+: Output positive terminal

VS-: Remote measurement negative terminal

1.6 Local Measurement

When local measurement does not require compensating for wire voltage drop, use the short-circuit clamp provided on the instrument's back panel or directly connect wires between Vo+ and Vs+, as well as between Vo- and Vs-.

The local measurement wiring diagram is as follows:



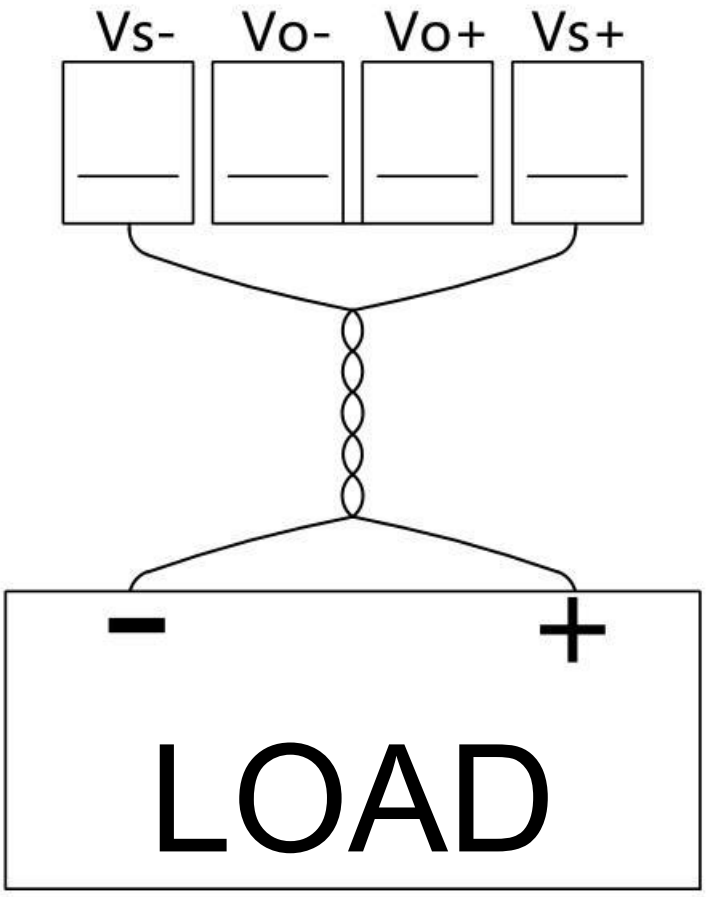
1.7 Remote Measurement

Remote Measurement Function allows compensation for voltage drops on the wires between the power supply output terminals and the load. Please use shielded twisted pair cable between the remote measurement terminals of the power supply and the load. Here are the operating steps:

1. Remove any jumpers or short-circuit clamps between the terminal connectors Vo+ and Vs+, as well as between Vo- and Vs- on the rear panel.

2. Connect a pair of sensing wires from Vs+ and Vs- to the load end.

The schematic diagram for remote measurement wiring is as follows:



Note:

1. The maximum voltage drop for voltage compensation is 5V.

2. Pay attention to polarity when wiring to avoid damaging the instrument!

3. When not using the voltage compensation function, do not leave the voltage sampling lines floating.

Add: Unit 409, No.992, Anling Road, Huli Dist. Xiamen,China. Zip code: 361012
Tel: 86-592-5237772 Email:sales09@china-dexing.com

Installation and Connection

This product is a universal DC power supply. To facilitate user operation, the adjustment devices provided in this series of products include only voltage adjustment and current adjustment knobs, which can meet the majority of users' requirements for DC power supply. The operation of this product is convenient and simple. Please follow the operation procedure requirements below for specific use.

2.1 Initial Power On

1. Carefully inspect whether the connections of the output control wires of this product are in accordance with the requirements, and ensure that the connections are correct.

2. Carefully inspect whether the AC input voltage matches the input voltage of this product, and ensure that the connections are correct.

3. Carefully inspect whether the connection of the load to the output terminals of this product is consistent, and ensure that the connections are correct.

2.2 Operation

Before powering on the machine, it is necessary to ensure that all connections including input and output are correct.

1. Turn on the circuit breaker and press the power button to power on the device.

2. Preset Mode: After the power is turned on, the device enters the preset mode, and the segment display shows the preset values.

2.3 Rotary Encoder Operation Instructions

1. The rotary encoder is equipped with a push-button switch. The knob can be pressed as a button to perform related functions.

2. Current Adjustment Knob, Voltage Adjustment Knob:

- In preset mode, rotate clockwise to increase the numerical value. It steps from the lowest digit to the highest digit, returning to the lowest digit after reaching the highest digit. The value ranges from 0 to 9 in a loop. If the voltage or current is adjusted to the maximum rated value and continues to rotate, the adjustment will not continue. Rotate counterclockwise to decrease the numerical value. It steps from the highest digit to the lowest digit, returning to the highest digit after reaching the lowest digit. The value ranges from 0 to 9 in a loop. If the voltage or current is adjusted to the minimum value and continues to rotate, the adjustment will not continue.

- The default adjustment starts from the lowest digit. The cursor indicates the digit being adjusted. When the knob is rotated, it adjusts the current digit. Press "→" to move the cursor to the next digit, and the knob adjusts the next digit. This process continues in a loop to adjust the voltage and current, achieving coarse and fine adjustment functions.

Power Supply Setting Operation

Due to partial letter display issues on the segment display screen of the power supply, discrepancies may occur between the displayed values and the actual settings.

3.1 Buzzer Enabled

In the default state, the buzzer is enabled. Pressing the "Menu" key, the first option in the menu is for the buzzer, displaying "BEEP ON" when the buzzer is enabled. To turn off the buzzer, rotate the knob until the screen displays "BEEP OFF". Press "Enter" to confirm and switch the buzzer status.

3.2 Reboot Settings

When the power supply is in the default state, the voltage and current settings will revert to the factory default upon reboot. Press the 'Menu' key, then use the '← →' keys. The screen will display 'POWER RESET'. At this point, the machine will reboot to the default state. To maintain the settings from before shutdown, rotate the knob until the screen displays 'POWER LAST'. When the power supply is rebooted, the voltage and current settings will be as they were before shutdown. Press 'Enter' to confirm the power supply reboot settings.

3.3 Communication Port Settings

When the machine is in the stopped output state, connect the DB-9 cable to the DB-9 socket on the rear panel. Press the 'Menu' key, then use the '← →' keys. When the screen displays 'PORT RS232', it indicates RS232 communication. To modify the communication port, rotate the knob to switch. Press 'Enter' to confirm. You have the option to choose between RS232 and RS485 communication protocols.

3.4 Baud Rate Settings

After selecting the communication protocol, press the "← →" keys. When the screen displays "BAUD 9.6K", the baud rate is set to 9600. To modify the baud rate, rotate the knob to switch. Press "Enter" to confirm. The power supply offers five baud rates for selection: 9600 (9.6K), 19200 (19.2K), 38400 (38.4K), 57600 (57.6K), and 115200 (115.2K).

3.5 Address Settings

When multiple machines communicate with the PC (via RS485 communication), device addressing is required. With the machine output turned off, press the "Menu" key, then use the "← →" keys. When the screen displays "ADDR 001", the communication address for this device is set to machine number 1. Press "Enter" to confirm. The maximum address for this machine is 247.

3.6 Communication Protocol Settings

When the power supply is in the closed output state, press the "Menu" key and then use the "← →" keys. When the screen displays "COMMU", select the communication protocol. The default state is "SCPI". To modify the communication protocol, rotate the knob to switch. Press "Enter" to confirm. You have the option to choose between "SCPI" and "RTU" protocols.

3.7 Reset Settings

When the power supply is in the output-on or output-off state, press the "Menu" key and then use the "← →" keys. When the screen displays "RESET NO", if you need to reset to factory settings, rotate the knob until the screen displays "RESET YES". Press "Enter" to confirm. The machine will close the output, and functions such as buzzer, voltage settings, circuit settings, overvoltage protection, and overcurrent protection will be reset.

3.8 View Version

When the power supply is in the output-off state, press the "Menu" key and then use the "← →" keys. When the left side of the screen displays "VERSI", it indicates the version interface, and the right side of the screen displays the current software version.

3.9 Voltage Settings

The voltage setting range is between 0V and the maximum output voltage. Press the "V" key,

and the cursor will stop at the 0.001V position. Use the "← →" keys and knob to set each digit of the voltage. Press "Enter" to confirm the output voltage setting. Press the "On/Off" key to turn the power supply on or off. When the power supply is in the output state, you can also adjust the voltage by using the "V" key, "← →" keys, and knob.

3.10 Current Settings

The current setting range is between 0A and the maximum output current. Press the "I" key, and the cursor will stop at the 0.001A position. Use the "← →" keys and knob to set each digit of the current. Press "Enter" to confirm the output current setting. Press the "On/Off" key to turn the power supply on or off. When the power supply is in the output state, you can also adjust the current by using the "I" key, "← →" keys, and knob.

3.11 Overvoltage Settings

Set the maximum voltage within the machine's output range according to different requirements. Press the "OV" key. The left side of the interface displays the OVP symbol, and the right side displays the highest voltage setting. Use the "← →" keys and knob to set the maximum output voltage of the power supply. Press "Enter" to confirm the maximum output voltage setting.

3.12 Overcurrent Settings

Set the maximum current within the machine's output range according to different requirements. Press the "OI" key. The left side of the interface displays the OCP symbol, and the right side displays the maximum current setting. Use the "← →" keys and knob to set the maximum output current of the power supply. Press "Enter" to confirm the maximum output current setting.

Summary of Menu Functions:

BEEP（BEEP）	ON（ON）	Buzzer On
	OFF（OFF）	Buzzer Off
POWER(POWER)	RESET（RESET）	Default Settings
	LAST（LAST）	Shutdown Previous Settings

PORT(PORT)	RS232（RS232）	RS232 Communication
	RS485（RS485）	RS485 Communication
Baud(BAUD)	9.6K（9.6K）	Baud Rate 9600
	19.2K（19.2K）	Baud Rate 19200
	38.4K（38.4K）	Baud Rate 38400
	57.6K（57.6K）	Baud Rate 57600
	115.2K（115.2K）	Baud Rate 115200
ADDR（ADDR）	ADDR 001	Machine Address for Communication is 1
RESET(RESET)	YES（YES）	Parameter Reset On
	NO（NO）	Parameter Reset Off
COMMU(COMMU)	SCPI(SCPI)	SCPI Instruction
VERSI(VERSI)	RTU(RTU)	Machine Software Version is V1.005
	VERSI V1.005	MODBUS RTU Instruction

Communication Protocol

Protocol Format

1. Serial Port

Data bits: 8 bits, Stop bits: 1 bit, Parity: None, Baud Rate: 9600, Default Value.

2. MODBUS Protocol

This device uses the MODBUS RTU communication format.

This device supports the following function codes: Read Multiple Registers (0x03), Read Input Registers (0x04), Write Multiple Registers (0x10), Write Single Register (0x06).

Reading or writing multiple registers can only be done for registers with consecutive addresses. If writing to a single register, the Write Multiple Registers function code can be used with the number of registers set to 1.

The register address is 1 word (16 bits) in length. The detailed contents are as follows:

The register content is 1 word (16 bits) in length by default, and it is unsigned.

This device only supports fixed-point numbers. The data related to voltage and current actually represents the number of digits according to the displayed resolution. Customers need to transform the data according to the number of decimal places displayed. Please refer to the display on the back panel of the power supply for the voltage and current decimal places. The decimal places are generated based on the power supply specifications and cannot be changed after leaving the factory.

For example: A 50V300A power supply with a 4-digit display, with 2 decimal places for voltage and 1 decimal place for current. A voltage reading of 5000 represents 50V, and a current reading of 3000 represents 300A. A 1000V10A power supply with a 5-digit display, with 1 decimal place for voltage and 3 decimal places for current. A voltage reading of 500 represents 50V, and a current reading of 3000 represents 3A.

3. MODBUS Protocol Explanation

Read Multiple Registers

Host Computer Sending			Power Supply Response		
Data Frame	Length	Content	Data Frame	Length	Content
Device Address	One Byte	1~100	Device Address	One Byte	1~100
Read Instruction Code	One Byte	0x03 or 0x04	Read Instruction Code	One Byte	0x03 or 0x04
Register Address	Two Byte	1000~2022	Number of Data Bytes	One Byte	Double Number of Register Quantity
Register Quantity	Two Byte	1~20	Data	N Byte	
Checksum	Two Byte	CRC	Checksum	Two Byte	CRC

Example 1: Taking a 50V300A power supply (with 2 decimal places for voltage and 1 decimal place for current, for other models, please refer to the decimal point displayed on the screen) as an example. Query the actual output voltage and output current of the power supply. 0X0ed8 converted to decimal is 3800, with 2 decimal places for voltage, indicating 38V. 0X0100 converted to decimal is 256, with 1 decimal place for current, indicating 25.6A.

Host computer sends: 01 04 03 e8 00 02 f1 bb

Power supply response: 01 04 04 0e d8 01 00 78 c7

Write Multiple Registers

Host Computer Sending			**Power Supply Response**		
Data Frame	Length	Content	Data Frame	Length	Content
Device Address	One Byte	1~100	Device Address	One Byte	1~100
Write Instruction Code	One Byte	0x10	Read Instruction Code	One Byte	0x10
Register Address	One Byte	2000~2022	Register Address	One Byte	2000~2022
Register Quantity	Two Byte	1~20	Register Quantity	Two Byte	1~20
Number of Data Bytes	One Byte	Double Number of Register Quantity	Checksum	Two Byte	CRC
Data	N Byte				
Checksum	Two Byte	CRC			

Example 2: Taking a 50V300A power supply (with 2 decimal places for voltage and 1 decimal place for current, for other models, please refer to the decimal point displayed on the screen) as an example. Set the voltage reference of the power supply to 38V and the current reference to 25.6A. With 2 decimal places for voltage, 38V is represented as 3800=0X0ed8. With 1 decimal place for current, 25.6A is represented as 256=0X0100.

Host computer sends: 01 10 07 d1 00 02 04 0e d8 01 00 9a 4c

Power supply response: 01 10

Start Output:

Host computer sends: 01 10 07 e0 00 01 02 ff ff c7 40

Power supply response: 01 10 07 e0 00 01 01 4b

4. CRC-16

CRC-16 uses the MODBUS RTU standard CRC algorithm with the calculation formula: \(x^{16} + x^{15} + x^2 + 1 \).

Appendix A: CRC-16 Calculation Code in C language version is available for reference.

5. Equioment address

The default device address for the power supply is set to 0x01 at the factory. Valid values range from 1 to 247, with 0 being the broadcast address. The method for changing the device address is done through setting register 2000.

Register Address and Function List

Register Address (Decimal)	Property	Meaning	Remarks
1000	Read-only	Output voltage	
1001	Read-only	Output current	
1007	Read-only	Device status	See status mode
2000	Writable	Device address	
2001	Writable	Reference voltage	
2002	Writable	Reference current	
2003	Writable	Overvoltage value	
2005	Writable	Overcurrent value	
2007	Writable	Baud rate	Valid values: 0:9600, 1:19200, 2:38400, 3:57600, 4:115200
2014	Writable	Operating mode	See operating mode
2015	Writable	Reserved	
2016	Writable	Output control	0 for stopping output, non-zero values to start output
2017	Writable	Reserved	
2020	Writable	Protocol type	0:RTU default; 65:SCPI
2021	Writable	Reference voltage	Power-down saving
2022	Writable	Reference current	Power-down saving

Note: 1. When the current or voltage reference is 0, starting the output will result in a fault. The default reference voltage and reference current may be 0. Please write the required voltage and current parameters before starting the output!

Status, Mode Registers

1007	Working Status
Bits 0	Output Off (0) / Output On (1)
Bits 1	Non-Constant Current Mode (0) / Constant Current Mode (1)
Bits 2	Non-Constant Voltage Mode (0) / Constant Voltage Mode (1)
Bits 3	Internal Control Mode (0) / External Control Mode (1)
Bits 4	Not Overheated (0) / Overheated (1)
Bits 5	Not Overcurrent (0) / Overcurrent (1)
Bits 6	Not Overvoltage (0) / Overvoltage (1)
Bits 12	Reserved
Bits 15	No Fault (0) / Fault (1)

2014	Working Model
Bits 0	overvoltage protection is disabled (0) or enabled (1).
Bits 2	overcurrent protection is disabled (0) or enabled (1).
Bits 10	High Range (0) / Low Range (Customized) (1)
Bits 11	buzzer sounds during an abnormal state (1) or remains silent (0).
Bits 12,13	Start without Output (0) / Full Output after All 1 (1)

Add: Unit 409, No.992, Anling Road, Huli Dist. Xiamen,China. Zip code: 361012
Tel: 86-592-5237772 Email:sales09@china-dexing.com

List of Instructions

Command: **[SOURce:]OUTPut[:STATe]**

This command is used to control the power supply's output on or off.

Command Syntax:

[SOURce:]OUTPut [:STATe] <bool>

Parameters:

0|1|ON|OFF

Query Syntax:

[SOURce:]OUTPut[:STATe]?

Returned Parameters:

0|1

Command: **[SOURce:]CURRent**

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

Command Syntax:

[SOURce:]CURRent <NRf>

Parameters:

<NRf>

Unit:

A

Query Syntax:

[SOURce:]CURRent?

Parameters:

None

Returned Parameters:

<NRf>

Command: **[SOURce:]CURRent:PROTection[:LEVel]**

This command is used to set the upper limit current value for overcurrent protection (OCP). If the peak output current exceeds the OCP upper limit, the power supply's output will be turned off and an alarm will be issued.

Command Syntax:

[SOURce:]CURRent:PROTection[:LEVel]

Parameters:

<NRf>

Unit:

A

Query Syntax:

[SOURce:]CURRent:PROTection[:LEVel]?

Returned Parameters:

<NR2>

Command: **[SOURce:]VOLTage**

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

Command Syntax:

[SOURce:]VOLTage <NRf>

Parameters:

<NRf>

Unit:

V

Query Syntax:

[SOURce:]VOLTage?

Parameters:

None

Returned Parameters:

<NRf>

Command: **[SOURce:]VOLTage:PROTection[:LEVel]**

This command is used to set the software voltage protection value of the power supply.

Command Syntax:

[SOURce:]VOLTage:PROTection <NRf>

Parameters:

<NRf>

Unit:

V mV uV

Query Syntax:

[SOURce:]VOLTage:PROTection?

Parameters:

None

Returned Parameters:

<NRf>

Command: **[SOURce:]APPLy {<Voltage>|MIN|MAX}[,{<Current>|MIN|MAX}]**

This command integrates the functionalities of the VOLTage and CURRent commands. When this command is sent to the instrument, if the parameters sent are within the previously set range, the output voltage and current values will immediately follow the parameters of the current command. The APPLy command only takes effect when the parameters are within the previously set range. If the parameters are outside the set range, an execution error will occur. You can also use MIN or MAX as special parameters for the command: MIN will set both voltage and current to 0, while MAX will set voltage and current to the highest value within the previously set range.

Command Syntax:

[SOURce:]APPLy <NRf>,<NRf>

Parameters:

<NRf>

Unit:

V, A

Query Syntax:

[SOURce:]APPLy?

Returned Parameters:

<NRf>,<NRf>

Command: MEASure[:SCALar]:CURRent[:DC]?

This command is used to read the input current of the power supply.

Command Syntax:

MEASure[:SCALar]:CURRent[:DC]?

Parameters:

None

Returned Parameters:

<NRf>

Unit of Returned Parameters:

A

Example:

MEAS:CURR?

Command: **MEASure[:SCALar]:VOLTage[:DC]?**

This command is used to read the input voltage of the power supply.

Command Syntax:

MEASure[:SCALar]:VOLTage[:DC]?

Parameters:

None

Returned Parameters:

<NRf>

Unit of Returned Parameters:

V

Example:

MEAS:VOLT?

Command: **MEASure:OUTPut:CONDition?**

This command is used to measure the current working status of the power supply, whether it's in CV (Constant Voltage) mode or CC (Constant Current) mode.

Command Syntax:

MEASure:OUTPut:CONDition?

Parameters:

None

Returned Parameters:

CV | CC

Appendix A: CRC-16 Calculation Code in C Language

```
#define     u8      unsigned char
#define     u16     unsigned int

u16 CRC16(u8 *buf, u8 len)
{
    u16 crc = 0xFFFF;
    u8 i = 0;
    u8 j = 0;
    u8 Data = 0;

    for (j = 0; j < len; j++)
    {
        crc=crc^*buf++;
        for (i=0; i<8; i++)
        {
            if((crc&0x0001) > 0)
            {
                crc=crc>>1;
                crc=crc^0xa001;
            }
            else
            {
                crc=crc>>1;
            }
        }
    }

    return crc;
}
```