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## Regulated/Constant Voltage and Current DC Power Supply Manual



Thank you for choosing our Regulated/Constant  
Voltage and Current DC Power Supply!

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Please strictly follow all warning and operating instructions illustrated on this manual and the machine, also please keep this manual in a safe place. Do not operate the machine before you finish reading the instruction for safety and operation.

### **Inspection before acceptance**

1. Before acceptance, customers must check the completion of the packaging; see if there are any leakages, cracks or wet etc.
2. Check if the product model and quantity is same as on the contract, if there's any mistake please contact our company or our distributors in time.
3. Compare with the packing list, check if the product accessories are complete.
4. If any issue mentioned above happens, please fill in the product model, contact name, telephone, and brief description of the problem to contact our company or our distributors.

### **Cautions**

#### **Operation Safety**

1. Please read carefully the Cautions before using this product to ensure the correct and safe operation, keep the instruction in a safe place.
2. Before use, please pay attention to all warning signs and operate according to requirements.
3. Please use this product while avoiding direct sunlight, rain and damp environment.
4. Do not install this product close to heat areas.
5. Please follow the instruction, ensure the safe distance and ventilation while installing this product.
6. This machine is with frosting surface, please wipe with dry tools while cleaning.

#### **Electrical Safety**

If you're not specialist please do not open the machine, ask authorized repairperson to do the operation.

1. Before connect to the power, please make sure the machine is grounded correctly, and check if the connection is correct.
2. Before moving or reconnecting the power supply, please disconnect all electrical connection of the power supply first to ensure it is turned off completely, otherwise there might be electricity near the output end still which may cause electric shock.
3. Please use authorized additional devices and accessories.
4. Be mindful of electric shock.
5. Do not turn off the machine directly in constant current state.

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While maintaining the machine with power supply, please disconnect the connection between this machine and the power.

While maintaining and installing the power input and output terminal, please shut down and disconnect all connections of the power supply.

### **Maintenance**

1. Using environment and storing methods could possible effect the lifetime and reliability of this product, please do not use this machine under working environment as follow:
  - A. Exceed the regulations of technical index;
  - B. Environment with high or low temperature and damp situation (temperature should be within 0℃~40℃, relative humidity should be within 20%~90%);
  - C. Working environment with vibration or easy to get hit;
  - D. Environment with metal dusts, corrosive substances, salt or flammable gases;
2. When out of use for long, please make sure the power supply is stored in a dry environment, storage temperature should be within -25℃~+55℃. Before turn on the power, make sure the environment is back above 0℃ and maintain such condition for at least 2 hours.

## **Introduction**

### **1. Product introduction**

DC power supply of PA series is controlled by high-efficient chips which adopt IGBT module adjustment mode with features such as high efficiency, high precision and high stability, etc., with equipping with a variety of auxiliary functions; this power supply is convenient and reliable. It is mainly used in scientific research units, laboratories, electronic production lines and automated assembly lines, etc. where high-efficient power supply testing is required. This power supply is an adjustable DC stabilized power supply, high-frequency switching power supply, precision testing use power supply, digital DC stabilized power supply and DC power supply.

### **Performance features**

1. With 19-inch standardized size, this power supply can be combined and placed on various types of working surfaces and racks;
2. Output display: voltage and current displayed with high precision on a 5-bit LCD;
3. Preset of voltage and currency: you can preset the voltage and current value on our pre-installed panel with presetting buttons;
4. Output switch function: you can switch on or off the power output without shut the power supply down.

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5. Constant voltage and current: automatically switch between output constant voltage and current to constantly do linearity control of the voltage and current values;
  6. Protect function: over voltage protection, over currency protection and over temperature protection;
  7. Short circuit characteristics: Long time short circuit is formed under the working state of this machine;
  8. Communication function: equipped with RS232/RS485 interface to do data control with computers or other devices.
  9. Sampling of external connection: external connecting compensation can be installed to this machine to reduce voltage reduction caused by long output circuit;
  10. Optional external control function: use input analog signal to control the power output (DC0-5V signal) (Optional)
  11. Optional external switch: use input switch to control the output and connection of the power supply (relay) (optional);
  12. Optional remote display: use output analog signal to display power supply status (DC0-5V signal) (optional);

#### **Advanced process**

1. Use improved circuits with optimized anti-interference performance to protect from all aspects;
2. Designed with active air passage to optimize the ventilation passage and effectively reduce the temperature rise and guarantee the stability of the performance;
3. Designed with U-style circuit to optimize the recti-filter technology and effectively reduce the ripple factor and high-frequency percussion;
4. Designed with integrated data transmission to optimize the signal transmission and effectively increase the precision of the power supply.
5. With high efficiency better than linear and silicon commutating power supply, this product is with a better energy conservation and higher efficiency.

#### **Application**

1. Motors: electric vehicle motor, electric vehicle controller, DC motor testing and aging etc.
2. Lamps and lanterns: LED aging testing and aging, energy-saving bulb testing and aging, lamp testing, tungsten gasification, etc.
3. Automotive: automotive electronics, high-power DC motors, automotive motor controllers, cigarette lighters, automotive audio and video test and aging etc.
4. Electronic devices: chips, capacitors, resistors, relays, transistors, sensors etc.

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5. Display: display screen, LCD, touch screen, car DVD, mobile phone display etc.
  6. Electrochemistry: electrolysis, electroplating, anodizing, non-ferrous metal research etc.
  7. Electrochemistry: electrolysis, electroplating, anodizing, research of nonferrous metal etc.
  8. Testing, researching and developing of other products that require DC power supply such as photovoltaic and magnetron etc. ...

**Before order**

Please notify us your upper limit of voltage and currency as well as product performance while ordering so that our specialist can recommend you the best power supply.

Simple version of host software can be provided for free.

## 2. DC Specification

|                                 |   |
|---------------------------------|---|
| AC input                        | 220V $\pm$ 10%, 380 $\pm$ 10%   |
| DC voltage output               | Voltage 0– V, adjustable;   |
| Current output                  | Current 0– A, adjustable  |
| Voltage stability precision     | Power effect: $\leq$ 0.3% effective value(output voltage rate of change caused by 10% change of input voltage)  |
|                                 | Time drift: $\leq$ 0.5% effective value(output voltage rate of change caused by power supply continuously working for more than 8 hours)                        |
|                                 | Temperature drift: $\leq$ 0.1% effective value/ $^{\circ}$ C (output voltage rate of change caused by the change of environment temperature in the environment) |
|                                 | Overload effect: $\leq$ 0.5% effective value(output voltage rate of change caused by power supply output current changing from 0 to rated value)                |
| Current stability precision     | Power effect: $\leq$ 0.3% effective value(output current rate of change caused by 10% change of input voltage)  |
|                                 | Time drift: $\leq$ 1% effective value(output current rate of change caused by power supply continuously working for more than 8 hours)                          |
|                                 | Temperature drift: $\leq$ 0.3% effective value/ $^{\circ}$ C (output current rate of change caused by the change of environment temperature in the environment) |
|                                 | Loading effect: $\leq$ 0.5% effective value(output current rate of change caused by power supply output voltage changing from 0 to rated value)                 |
| Current precision               | $\leq$ 0.1% FS  |
| Voltage precision               | $\leq$ 0.1% FS  |
| Output display                  | 4.5bit LCD, resolution $\geq$ 0.01  |
| Power supply control method     | Use rotary encoder on the panel to switch and adjust one byte of the resolution   |
| Voltage and current settings    | Rotary encoder  |
| Voltage and current presettings | Rotary encoder  |
| Communication function          | Equipped with RS232/RS485 interface to do data control with computers or other devices. (multiple devices can be connected at the same time)                    |

|  |  |
|--|--|
| Panel lock function                      | Panel lock   |
| Over voltage and over current protection | Set OV,OI protection   |
| Temperature protection                   | Built-in O.T.P protection with protect value of $85^{\circ}\text{C} \pm 5\%$ (radiator temperature), shut the output after protection.       |
| Output polarity                          | Output positive(+) and negative(-) can be grounded in anyway, (upper limit of voltage and current shall follow the electronic specification) |
| Heat dissipation                         | Forced-air cooling   |
| Operation environment                    | For indoor use, temperature: $0^{\circ}\text{C} \sim 40^{\circ}\text{C}$ ;humidity: 10%~85% RH   |
| Storage environment                      | Temperature: $-20^{\circ}\text{C} \sim 70^{\circ}\text{C}$ ;Humidity: 10%~90% RH   |

### 3. Indication and instruction of functional button of front panel:



#### Instruction of panel function

- 1. LOCK: LOCK Keyboard lock**  
When lock icon is shown, all buttons will be invalid(apart from LOCK button).
- 2. ADDR/BAUD:/ :Address / Baud rate**  
Voltage will be shown as address, current will be shown as the button value of corresponding location of baud rate (unit: K).
- 3. LV/LI: Under Voltage/ Under Current**  
Set protection value for output under-voltage and under-current (0means null).
- 4. OV/OI: Over voltage/Over Current**  
Set protection value for output over-voltage and over-current(warning, continuous output).
- 5. P: Power**
- 6. V/I:Voltage/current preset**  
Preset status of voltage and current, button value of corresponding location, press button to set carry.

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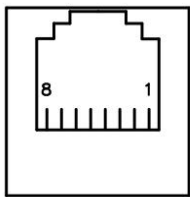
7. ON/OFF: turn on/off the machine

Switch on/off the machine

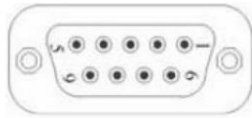
\* While adjusting corresponding button under output statues, you can set carry by press the button (2 figures maximum)



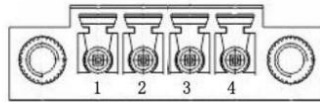
**Definition of communication interface:** users can choose the type of communication interface, definition of communication interface pin is as below.



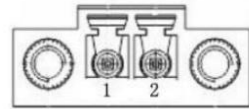
RJ45-8



DB9



WJ15EDGVM-4P

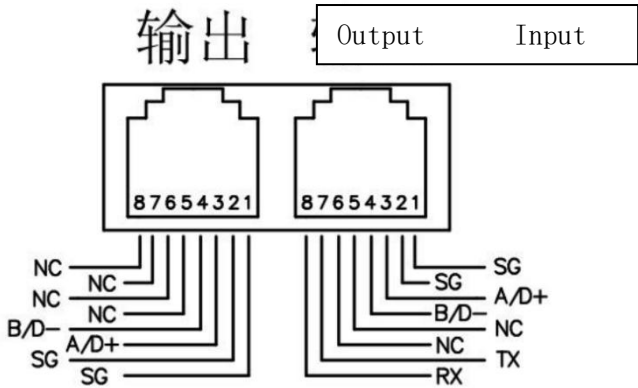


WJ15EDGVM-2P

|              |          | RS-485 Pin definition |       |       |       |    |    |    |    |    |
|--------------|----------|-----------------------|-------|-------|-------|----|----|----|----|----|
| DB9          | (female) | 1                     | 2     | 3     | 4     | 5  | 6  | 7  | 8  | 9  |
|              |          | A(D+)                 | B(D-) | NC    | NC    | NC | NC | NC | NC | NC |
| RJ45         |          | 1                     | 2     | 3     | 4     | 5  | 6  | 7  | 8  |    |
|              |          | SG                    | SG    | A(D+) | B(D-) | NC | NC | NC | NC |    |
| WJ15EDGVM-4P |          | 1                     | 2     | 3     | 4     |    |    |    |    |    |
|              |          | A(D+)                 | B(D-) | A(D+) | B(D-) |    |    |    |    |    |
| WJ15EDGVM-2P |          | 1                     | 2     |       |       |    |    |    |    |    |
|              |          | B/D-                  | A/D+  |       |       |    |    |    |    |    |

#### 4.1 RS-232/RS-485 connector of rare panel:/

RS-232/RS-485 interface can be connected by RS-232/RS-485 input and RS-485 output connector on the rare panel. The connector is RJ-45 8 pin interface; input and output connector can connect the power supply to the controller by RS-232 or RS-485. Input/output connector is as below:



#### Allocation of input/output connector pins on rare panel

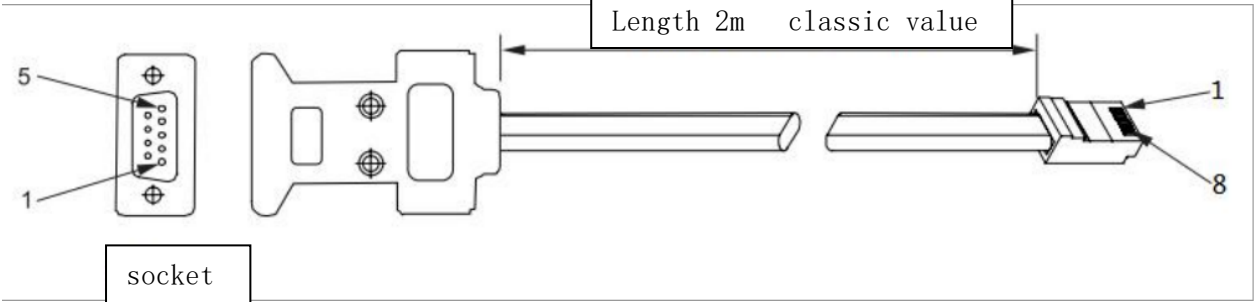
##### Remarks:

Tx and Rx pins are used for RS-232 communication.

A/D+ and B/D- pins are used for RS-485 communication.

#### 4.2 Connect RS-232 or RS-485 communication to power supply.

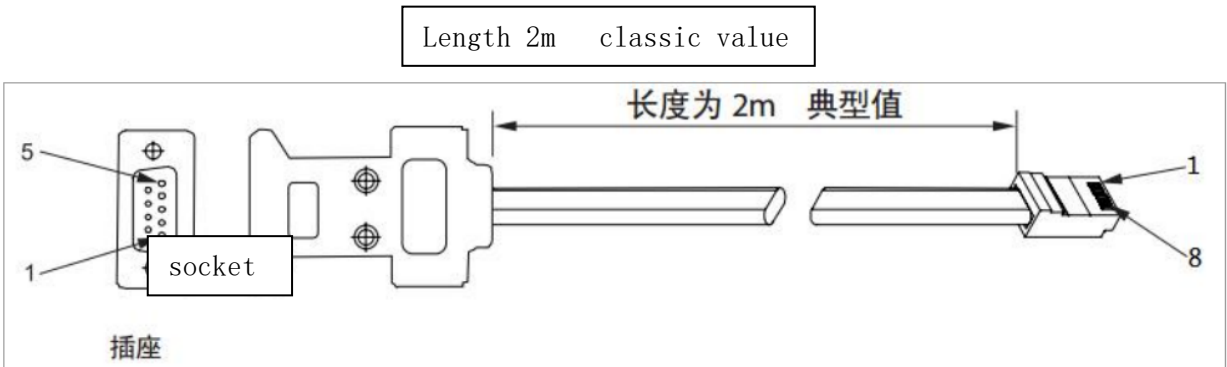
### 4.2.1 Single power supply



1. Automatically adapt RS-232 and RS-485, only one communication method can be selected.
2. Choose proper shielded wire to connect the input connector at the back to controller interface RS232 or RS-485. Follow the picture below to connect RS-232 or RS-485.

| DB-9 Connector (Female) |           | RJ-45 connector 8 pin(output OUT) |           | Remarks             |
|-------------------------|-----------|-----------------------------------|-----------|---------------------|
| Pin No.                 | Name      | Pin No.                           | Name      |                     |
| Shell                   | Screening | Shell                             | Screening |                     |
| 2                       | RX        | 7                                 | TX        | Twisted pair wiring |
| 3                       | TX        | 8                                 | RX        |                     |
| 5                       | SG        | 1                                 | SG        |                     |

RS- RS-232 cable with DB-9 connector



| DB-9 Connector (Female) |           | RJ-45 connector 8 pin(output OUT) |           | Remarks             |
|-------------------------|-----------|-----------------------------------|-----------|---------------------|
| Pin No.                 | Name      | Pin No.                           | Name      |                     |
| Shell                   | Screening | Shell                             | Screening |                     |
| 1                       | A/D+      | 3                                 | A/D+      | Twisted pair wiring |
| 2                       | B/D-      | 4                                 | B/D-      |                     |
| 5                       | SG        | 1                                 | SG        |                     |

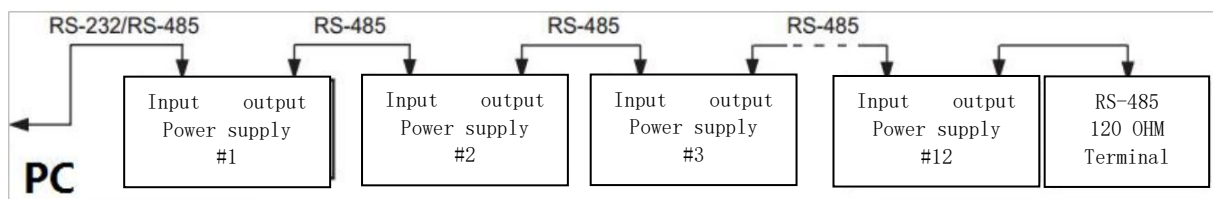
RS-485 cable with DB-9 connector

### 4.2.2 Connection between RS-232 or RS-485 communication and multiple power supply system

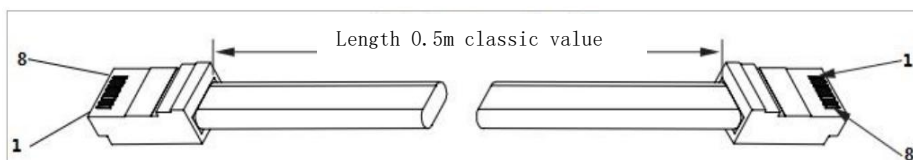
It's a connection formed by maximum 12 power supplies, the first power supply is connected with the controller by RS-232 OR RS-485, while other power supplies are connected together by RS-485.

1. Connection of the first power supply: for the connection between the first power supply and the controller please refer to instruction 5.2.1.
2. Connection of other power supplies: other power supplies on the bus are connected together by their own RS-485 as shown below.

**Suggestion:** while using multiple power supply system, please connect a 120ohm terminating resistor to the RS-485 output interface on the last power supply.



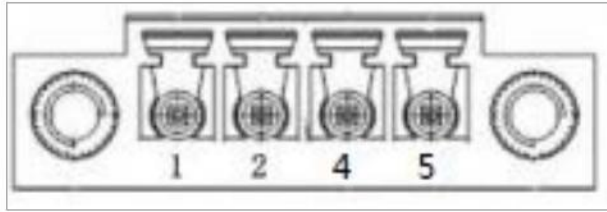
Connecting diagram of RS232 and RS-485 between multiple power supply system



| RJ-45 connector 8 pin (input IN) |           | RJ-45 connector 8 pin(output OUT) |           |
|----------------------------------|-----------|-----------------------------------|-----------|
| Pin No.                          | Name      | Pin No.                           | Name      |
| Shell                            | Screening | Shell                             | Screening |
| 1                                | SG        | 1                                 | SG        |
| 2                                | SG        | 2                                 | SG        |
| 3                                | A/D+      | 3                                 | A/D+      |
| 4                                | B/D-      | 4                                 | B/D-      |

RS-485 connecting cable used for multiple power supplies

② Voltage compensating terminal: while do internal sampling, short pin 1 to pin 2; short pin 3 to pin 4. When using external voltage compensation: connect pin 2 to the positive end of compensating signal, connect pin 3 to the negative end of compensating signal.



## WJ15EDGVM-5P

| Pin definition |     |    |    |    |     |
|----------------|-----|----|----|----|-----|
| WJ15EDGVM-5P   | 1   | 2  | 3  | 4  | 5   |
| 引脚定义           | LS+ | S+ | NC | S- | LS- |

**Warning:** Do not connect the compensating signal cable without connect the main power cable, or connect the voltage compensating signal cable reversely, for such operations will cause serious damage!

- ① Output positive;
- ② Output negative;
- ③ Input terminal.

From left to right: Single-phase power: live, null, earth; Three-phase power: A, B, C, earth.

**Attention:** Please choose connection method according to corresponding models!

### Installation and connection

As a general DC power supply, for users convenience, this series only provides users buttons to adjust voltage and current, which are able to satisfy the requirement of majority users in terms of DS power supplies. This product is easy and convenient to use, please follow the operation procedure as below.

#### I. Turn on the power initially

Check carefully if the output controlling line is connected correctly and as required.

Check carefully if the AC input voltage is in accordance with the input voltage of this product and connected correctly.

Check carefully if the overload is connected correctly and accordingly with the output interface of the product.

#### II. Operation:

Do not turn on the machine until it is confirmed that the connections of input and output etc. are correct.

1. Push the air-circuit breaker; press the power button to turn on the power.
2. Preset status:

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The machine will be on preset status once power on, with preset indicator lit on, preset values will show on the digital tube, you can switch the voltage and current button to adjust parameters under this circumstance.

### III. Instructions for rotary encoder

1、Rotary encoder is with a switch button, you can take the knobs as buttons by pressing them to realize relevant functions.

2、Preset button:

Press the button to enter the preset status, adjust rotary encoders to set voltage and current values. Press preset button again to quit the preset status, save the preset values so they won't be lost when the machine is turned off.

3、Current knob, voltage knob:

Under preset status, turn the knob clockwise to increase the number, and to carry from lower digit to higher digit, once reach the highest digit, turn the knob to switch back to the lowest digit, the value loops from 0~9. turn the knob counterclockwise to decrease the number, and to carry from higher digit to lower digit, once reach the lowest digit, turn the knob to switch back to the highest digit, the value loops from 0~9.

Under default mode, the adjustment starts from the lowest digits, when the lowest digit is highlighted, press the knob to highlight the higher digit, then rotate the knob to adjust the value, press the knob again to highlight the higher digit to do adjustment, press the knob again to go back to highlight the lowest digit. You can adjust the last three digits of voltage and current in this way to realize the function of adjusting values roughly or finely.

4、Output button

When finish the settings, press power output button to output the power, the output indicator, constant voltage and constant current indicators are lit on, actual output current and voltage values will be shown on the current digital tube and voltage digital tube. Press the output button again to turn the power to stand-by status which is without any power output, the output indicator, constant current and constant voltage indicators are all off, current digital tube and voltage digital tube both show that the actual output current and voltage values are 0.

5、Menu button

Press the button to set the over-voltage protection value, when the output voltage reach the over-voltage protection value, the over-voltage indicator will be on, the power will shut itself to stop the output.

### Warranty, after-sale, maintenance and service commitment

With a spirit of High quality, Best service and Seek for Development, a concept of Best-quality products, Reasonable price, Hearty service, as well as a principle of being responsible and open, we hereby make a commitment to you.

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## I. Service

1. All products come with quality certificate and instructions to ensure our users install and use our product in a correct way.
2. Service principle: Be high efficient, be responsible, solve problems.

II. Quality assurance: 12-month quality assurance for non-man-made damages.

## III. Warranty:

As to the materials and manufactures of our products, our company guarantees for 24 months since shipped out. After the warranty period, we provide maintenance service (charges: charges raw materials costs without labor costs). Within the warranty period, our company is only responsible for the product issues and the loss caused by such issues, our company does not take responsibility for all other joint loss.

### Guarantee limits:

Guarantees above are not applicable for damages caused when:

The customer violated the operating regulations in this manual;

The customer maintains this product in an incorrect or inappropriate way;

Unauthorized alter or misuse this product; operate this product in environment that is out of the safety range;

Force majeure regulated by relevant laws.

## Annex 1 Communication Protocol

### Protocol format

1. Interface: RSC485, Bps 9600(high Bps requires support from hardware), with 8 numbers of data bit 8, 1 number of stop bit 1, no check bit. Factory station NO.1, station number can be changed, station number register location 1999.

### 2. Use MODBUS protocol

This device uses MODBUS protocol with RTU format for communication.

This device supports three types of commands only: command to read multiple writable registers (0x03), command to read multiple read-only registers (0x04), command to write multiple registers (0x10).

By reading and writing multiple registers you can only read and write registers with a succession of addresses by one time. If you want to read and write only one register, you can use the command to read and write multiple registers and set 1 as the register number. Furthermore, this device is only with a 64bits serial interface buffer, which means an error will happen when a command with more than 64bits length is submitted. Also, an error will happen when the number of registers to be read exceeds 29.

This device is only able to show numbers, the values of voltage and current is shown according to the displayed resolution, customers will have to exchange

the values according to the decimal digits. i.e.: a 50V300A power supply, 4bits display, with 2 decimal digits of voltage and 1 decimal digit of current. Voltage 5000 means 50V, while Current 3000 means 300A.

**Remarks:** the number of decimal digits changes according to different types of devices; you can read the decimal digits from register 1003 and 1004; accordingly, same decimal digits need to be taken into consideration when setting voltage and current values.

|      |           |                           |  |
|------|-----------|---------------------------|--|
| 1003 | Read-only | Decimal digits of voltage |  |
| 1004 | Read-only | Decimal digits of current |  |

### 3. Description of MODBUS protocol

Read multiple registers

**Host computer sends:** id command addrH addrL amountH amountL CRCL CRCH

**Slave computer replies:** id command bytes dataH dataLCRCL CRCH

Write multiple registers

**Host computer sends:** id command addrH addrL amountH amountL bytes dataH dataL CRCL CRCH

**Slave computer replies:** id command addrH addrL amountH amountL CRCL CRCH

**Explanation:** id:power supply id Command: Command

addrL: lowest 8 digits of register address

amountL: lowest 8 digits of register amount

bytes: data length

crCH: highest 8 digits of the checksum

dataL: lowest 8 digits of the data

The example below assumes a 50V300A power supply, with 2 decimal digits of voltage and 1 decimal digit of current

**Example 1:** Check the actual output voltage and current of the power supply, find two read-only continuous register addresses 1000, 1001 referring to the address definition table (see the following page). Use command of reading multiple read-only registers (0x04). Transfer 1000 into a hexadecimal number which is 0x03e8. Use the command of reading 2 writable registers, set the ID of slave computer as 1, and register address =1000 to represent two registers with reading address of 0x03e8 and 0x03e9 in accordance with output voltage and current.

**Host computer sends:** id command addrH addrL amountH amountL crCL crCH  
01 04 03 e8 00 02 f1 bb

**Power supply replies:** id command bytes dataH dataL dataH dataL crCL crCH  
01 04 04 0e d8 01 00 78 c7

Transfer hexadecimal number 0ed8 to decimal number 3800, with 2 decimal digits of the voltage, hence 38V. Transfer hexadecimal number 0100 to decimal number 256, with 1 decimal digit of the current, hence 25.6A.

**Example 2:** Set 38V and 25.6A as standard voltage and current for the power supply. Find two continuous register addresses 2000, 2001 referring to the address definition table (see the following page). Use command of writing multiple read-only registers (0x10). Transfer 2000 into a hexadecimal number

which is 0x07d0. Use the command of reading 2 writable registers, set the ID of slave computer as 1, and register address 2000 to represent two registers with reading address of 0x07d0 and 0x07d1 in accordance with standard voltage and current. The voltage is with 2 decimal digits which transfers 38V to 3800, which is 0ed8 as hexadecimal number. The current is with 1 decimal digit which transfers 25.6A to 256, which is 0100 as hexadecimal number.

**Host computer sends:** id command addrH addrL amountH amountL bytes

```
01 10 07 d0 00 02 04
dataH dataL dataH dataL crcL crcH15
0e d8 01 00 5b 80
```

**Power supply replies:** id command addrH addrL amountH amountL crcL crcH

```
01 10 07 d0 00 02 41 45
```

Example 3: Turn on the power supply output. Find register address 2002 referring to the address definition table (see the following page). Use command of writing multiple read-only registers (0x10). Transfer 2002 into a hexadecimal number which is 0x07d2. Write ffff to open the output (0000 means to close the output).

**Host computer sends:** id command addrH addrL amountH amountL bytes

```
01 10 07 d2 00 01 02
dataH dataL crcL crcH
ff ff c3 52
```

**Power supply replies:** id command addrH addrL amountH amountL crcL crcH

```
01 10 07 d2 00 01 a0 84
```

If there is no output when the power supply is turned on, you'll have to input the needed voltage and current parameters!

01 10 07 d2 00 01 02 Address definition

| Register address | Property  | Definition                | Remarks    |
|------------------|-----------|---------------------------|------------|
| 1000             | Read-only | Output voltage            |            |
| 1001             | Read-only | Output current            |            |
| 1002             | Read-only | Device status             | See status |
| 1003             | Read-only | Decimal digits of voltage |            |
| 1004             | Read-only | Decimal digits of current |            |
| 1005             | Read-only | Rated voltage             |            |
| 1006             | Read-only | Rated current             |            |
| 1999             | Writable  | Device address            |            |
| 2000             | Writable  | Standard voltage          | Not saved  |



|      |          |                               |           |
|------|----------|-------------------------------|-----------|
| 2001 | Writable | Standard current              | Not saved |
| 2002 | Writable | Power on/off                  |           |
| 2003 | Writable | Over voltage protection value |           |

| Register address | Property  | Definition                     | Remarks   |
|------------------|-----------|--------------------------------|---|
| 1000             | Read-only | Output voltage                 |   |
| 1001             | Read-only | Output current                 |   |
| 1002             | Read-only | Device status                  | See status  |
| 1003             | Read-only | Decimal digits of voltage      |   |
| 1004             | Read-only | Decimal digits of current      |   |
| 1005             | Read-only | Rated voltage                  |   |
| 1006             | Read-only | Rated current                  |   |
| 1994             | Writable  | Voltage rise time              | Unit: 10mS  |
| 1995             | Writable  | Voltage descent time           | Unit: 10mS  |
| 1996             | Writable  | Short circuit shreshold        | While CC, under how much kilowatt-hour will it alert short circuit? |
| 1997             | Writable  | Baud rate                      | See baud rate definition  |
| 1998             | Writable  | Working mode                   | See mode  |
| 1999             | Writable  | Device address                 |   |
| 2000             | Writable  | Standard voltage               | Won' t be saved   |
| 2001             | Writable  | Standard current               | Won' t be saved   |
| 2002             | Writable  | Power on/off                   |   |
| 2003             | Writable  | Over voltage protection value  |   |
| 2004             | Writable  | Under voltage protection value |   |
| 2005             | Writable  | Over current protection value  |   |
| 2006             | Writable  | Under current protection value |   |
| 2007             | Writable  | Standard voltage               | Will be saved with lifetime limit                                   |
| 2008             | Writable  | Standard current               | Will be saved with lifetime limit                                   |

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**Status**

|        |   |   |
|--------|---|---|
| 1002   | Working status  |   |
| digits | 0 means   | 1 means   |
| 0      | Output closed   | Output opened   |
| 1      | Non constant current mode   | Constant current mode   |
| 2      | Non constant voltage mode   | Constant voltage mode   |
| 3      | Internal control mode   | External control mode   |
| 4      | Not short circuit   | Short circuit   |
| 5      | Not over voltage  | Over voltage  |
| 6      | Not over current  | Over current  |
| 7      | Not under voltage   | Under voltage   |
| 8      | Not under current   | Under current   |
| 9      | Not over heat   | Over heat   |
| 10     | Not a slowly rise voltage period                                  | A slowly rise voltage period                                  |
| 11     | Not a slowly descent voltage period                               | A slowly descent voltage period                               |
| 12     | Not a period of turning off the machine to slowly descent voltage | A period of turning off the machine to slowly descent voltage |
| 13, 14 | Save  | Save  |
| 15     | Normal working status   | Error   |

|         |  |   |
|---------|--|---|
| 1998    | Work status                                      |   |
| digits  | 0 means  | 1 means                                       |
| 0       | Alarm only when over voltage                     | Close output when over voltage                |
| 1       | Alarm only when under voltage                    | Close output when under voltage               |
| 2       | Alarm only when over current                     | Close output when over current                |
| 3       | Alarm only when under current                    | Close output when under current               |
| 4       | Only allow to input 0                            |   |
| 5       | Allow constant current mode                      | Close output once constant current mode is on |
| 6, 7, 8 | Only allow to input 0                            |   |
| 9       | To output directly while power on is not allowed | To output directly while power on is allowed  |
| 10-14   | Only allow to input 0                            |   |
| 15      | keep working while short circuit                 | Close output while short circuit              |

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Definition of baud rate(customers will have to make a statement while ordering if baud rate above 14400 is required, otherwise such baud rate wont be supported by the hardware )

|          |           |         |        |  |
|----------|-----------|---------|--------|--|
| 1: 1200  | 2: 2400   | 3:4800  | 4:9600 |  |
| 5: 14400 | 6: 19200  | 7:38400 | 8:     |  |
| 56000    |           |         |        |  |
| 9: 57600 | 10: 11520 |         |        |  |

Decimal digits of voltage: 30V and below:3 decimal digits;60V and below:2 decimal digits;100V and above:1 decimal digits;

Decimal digits of current: 2A and below:4 decimal digits;30A and below:3 decimal digits;60A and below:2 decimal digits;100A and above:1 decimal digits;

Tips: You can confirm the decimal digits by checking the display of the panel. If the panel shows the decimal digits of voltage is 2, then the actual decimal digits is 2!!

15 Explanation of corresponding interfaces of pin analog quantity

| 1  | 2  | 3                    | 4                    | 5   | 6                                    | 7   | 8                                    | 9  | 10  | 11   | 12  | 13         | 14   | 15                     |
|--|--|----------------------|----------------------|---|--------------------------------------|---|--------------------------------------|--|---|--|---|------------|--|------------------------|
| VRMT   | IRMT   | GND                  | +12V                 | VPGM-   | VPGM                                 | IPGM-   | IPGM                                 | VMON-  | VMON  | IMON-  | IMON  | NC         | SD-  | SD+                    |
| Voltage Program Control selection                              | Current Program Control selection                              | Isolated ground wire | Isolated output +12V | 0-5V control voltage output negative                                  | 0-5V control voltage output positive | 0-5V control current output negative                                  | 0-5V control current output positive | Output voltage simulation monitoring negative          | Output voltage simulation monitoring positive | Output current simulation monitoring negative          | Output current simulation monitoring positive | No contact | Remote switch negative   | Remote switch positive |
| Short pin 1 and 3 together means constant voltage control mode | Short pin 2 and 3 together means constant current control mode | Ground wire          | +12V                 | 0-5V control power supply output with constant voltage and full scale |                                      | 0-5V control power supply output with constant current and full scale |                                      | 0-5V output with full scale accordingly, do monitoring |   | 0-5V output with full scale accordingly, do monitoring |   |            | 5V to shut down, 0V to turn on, cut the signal remotely and isolate from main output ground wire of the power supply |                        |