

BENCHTOP INSTRUMENT



**Programmable
DC Power Supply
Operation Manual V1.0**

CE

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Use of Operation Manual

Please read through and understand this Operation Manual before operating the product. After reading, always keep the manual nearby so that you may refer to it as needed. When moving the product to another location, be sure to bring the manual as well.

Calibration Notification

We notify that the instruments included in this manual are in compliance with the features and specifications as stated in this manual. Before shipment, the instrument has been calibrated in factory. The calibration procedures and standards are compliant to the national regulations and standards for electronic calibration.

Warranty

We guarantee that the instrument has been passed strict quality check. We warrant our instrument's mainframe and accessories in materials within the warranty period of one year. We guarantee the free spare parts for products which are approved defective in this period. To get repair service, please contact with your nearest sales and service office. We do not provide any other warranty items except the one being provided by this summary and the warranty statement. The warranty items include but not being subjected to the hinted guarantee items related to tradable characteristics and any particular purpose. We will not take any responsibility in cases regarding to indirect, particular and ensuing damage, such as modifications to the circuit and functions by the users, repairing or component replacement by the users, or damage during transportation.

For product improvement, the specifications are subject to change without prior notice.

SAFETY INSTRUCTION

This chapter contains important safety instructions that you must follow when operating the instrument and when keeping it in storage. Read the following before any operation to insure your safety and to keep the best condition for the instrument.

Safety Symbols

The following safety symbols may appear in this manual or on the instrument:

	WARNING	Identifies conditions or practices that could result in injury or loss of life.
	CAUTION	Identifies conditions or practices that could result in damage to the instrument or to other properties.
	DANGER	High voltage
	ATTENTION	Refer to the manual
		Protective conductor terminal
		Earth (ground) terminal
		Chassis ground terminal

Safety Guidelines

General Instruction



CAUTION

- Do not place heavy objects on the casing.
 - Avoid serious impact or improper handling to prevent damage to the instrument.
 - Preventive measures for releasing static electricity should be taken when connecting the instrument.
 - Do not block the air ventilation holes on the two sides and on the back of the chassis.
 - Do not disassemble the instrument unless you are professionals.
-

Power supply



WARNING

AC Input voltage: 110V/220V±10%, 50/60Hz

Connect the protective grounding conductor of the AC power cord to an earth ground to avoid electrical shock.

Fuse



WARNING

- Make sure the correct type of fuse is installed before power up.
 - Replace the AC fuse with the same type and rating as the original fuse.
 - Disconnect the power cord before fuse replacement. Make sure the cause of fuse blowout is fixed before fuse replacement.
-

Cleaning

- Disconnect the power cord before cleaning.
 - Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any liquid.
 - Do not use chemicals or cleaner containing harsh material such as benzene, toluene, xylene, and acetone.
-

Operation environment

- Location: indoor, no direct sunlight, dust free, almost non-conductive pollution (note below).
- Relative humidity: <80%
- Altitude: <2000m
- Temperature: 0°C ~ 40°C

(Pollution Degree) EN 61010-1:2001 specifies the pollution degrees and their requirements as follows. The instrument falls under degree 2.

Pollution refers to “addition of foreign matter, solid, liquid, or gaseous (ionized gases), that may produce a reduction of dielectric strength or surface resistivity”.

Pollution degree 1: No pollution or only dry, non-conductive pollution occurs. The pollution has no influence.

Pollution degree 2: Normally only non-conductive pollution occurs. Occasionally, however, a temporary conductivity caused by condensation must be expected.

Pollution degree 3: Conductive pollution occurs, or dry, nonconductive pollution occurs which becomes conductive due to condensation which is expected. In such conditions, equipment is normally protected against exposure to direct sunlight, precipitation, and full wind pressure, but neither temperature nor humidity is controlled.

Storage environment	● Location: indoor
	● Relative humidity: <70%
	● Temperature: 10°C ~ 70°C

Power cord for the United Kingdom

When using the power supply series in the United Kingdom, make sure the power cord meets the following safety instructions.

NOTE: This lead/appliance must only be wired by competent persons.



WARNING: THIS APPLIANCE MUST BE EARTHED.

IMPORTANT: The wires in this lead are coloured in accordance with the following code:

Green/Yellow:	Earth
Blue:	Neutral
Brown:	Live



As the colours of the wires in main leads may not correspond with the colours marking identified in your plug/appliance, proceed as follows:

- The wire which is coloured Green & Yellow must be connected to the Earth terminal marked with the letter E or by the earth symbol  or coloured Green or Green & Yellow.
- The wire which is coloured Blue must be connected to the terminal marked with the letter N or coloured Blue or Black.
- The wire which is coloured Brown must be connected to the terminal marked with the letter L or P or coloured Brown or Red.

If in doubt, consult the instructions provided with the equipment or contact the supplier.

This cable/appliance should be protected by a suitably rated and approved HBC mains fuse: refer to the rating information on the equipment and/or user instructions for details. As a guide, cable of 0.75mm² should be protected by a 3A or 5A fuse. Larger conductors would normally require 13A types, depending on the connection method used.

Any moulded mains connector that requires removal/replacement must be destroyed by removal of any fuse & fuse carrier and disposed of immediately, as a plug with bared wires is hazardous if engaged in live socket. Any re-wiring must be carried out in accordance with information detailed on this label.

1. PRODUCT INTRODUCTION

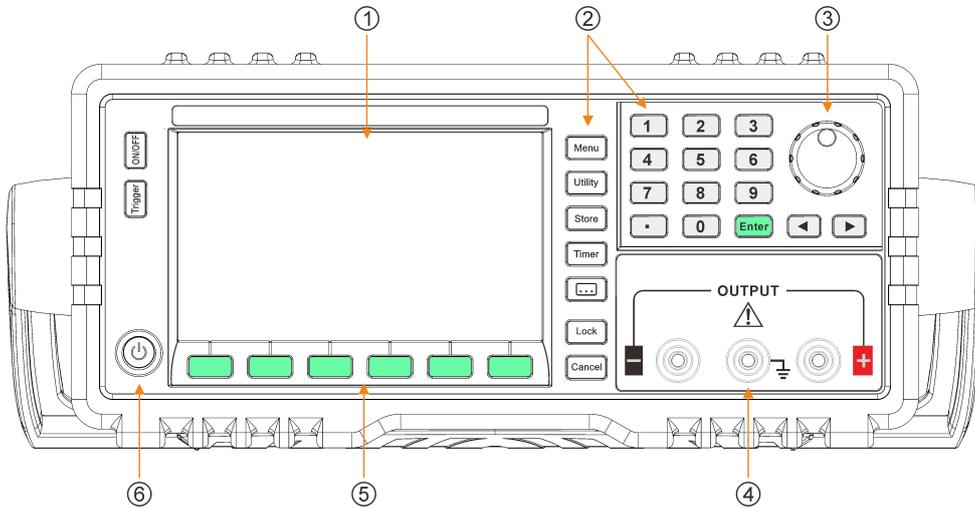
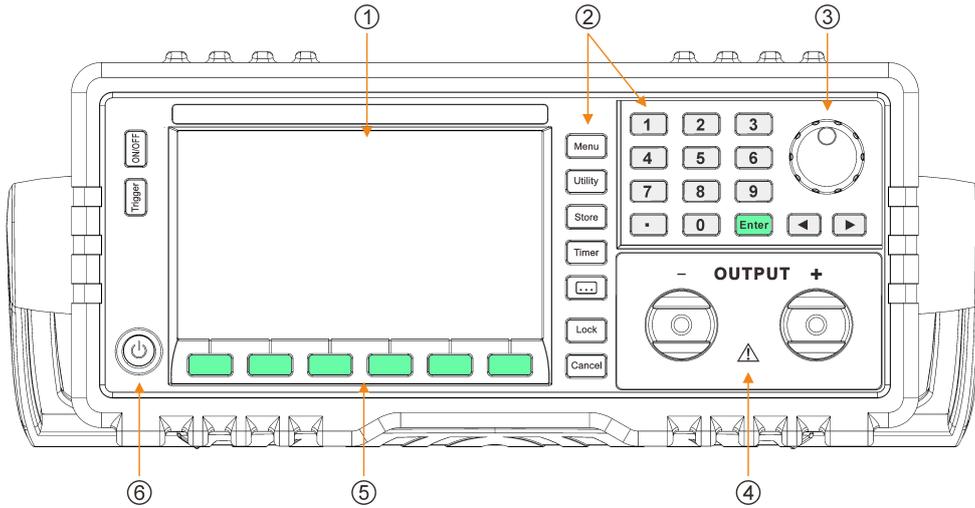
1-1. Description

PPW/PPM series are high accuracy, high precision programmable DC power supply with single output. MPU control, RS232/RS485/USB interface for PC control, the PPW/PPM series facilitates auto test and auto control. The commands of the PPW/PPM series are compliant with SCPI commands. Users can easily develop programs to facilitate different applications in auto test and auto control. Digital input fulfilled by rotary dial and keypad input makes input fast and accurate. Voltage and current regulations by software, avoids human error and makes the PPW/PPM series more accurate.

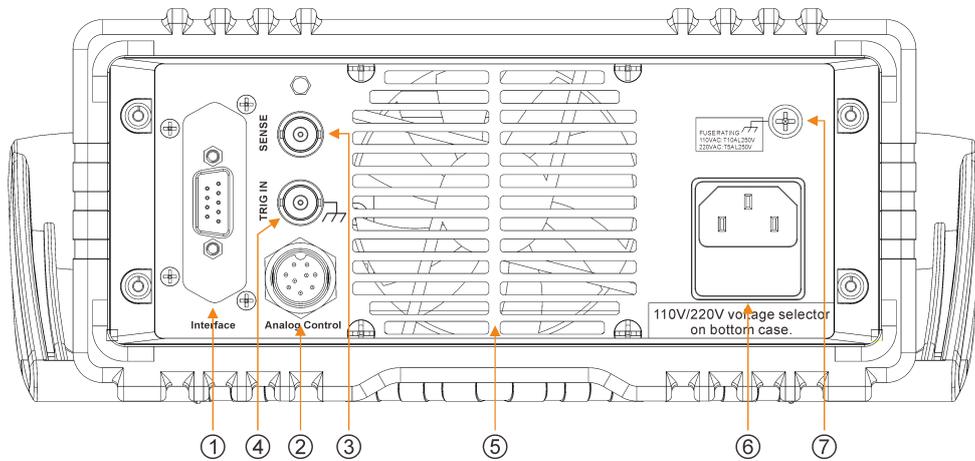
1-2. Features

- High accuracy, high resolution 1mV/1mA
- 4.3 inches backlit LCD display
- Over load, over voltage, over current, over temperature and reverse polarity protections
- CV and CC operations, auto CV and CC switch
- High speed rotary dial and keypad input
- Built-in beeper alarm
- Panel lock and output ON/OFF function
- 100 sets save & recall for voltage, current and time setups, easy use in auto test
- Timing output function and support infinite and specified number of cycles of output
- Dual range output (only for PPM-3603D, PPM-3605D)
- Remote sense function (except PPM-3H12, PPM-5H07)
- Low resistance measurement function, display load resistance value
- Battery charge mode
- Smart cooling fan achieving low noise
- Standard RS232 interface, support SCPI commands, support Labview
- Optional RS485 interface, support Modbus
- Optional RS232 to USB cable
- Optional 0-5V analog control (except PPM-3H12, PPM-5H07)

1-3. Front and Rear Panel



- | | | |
|---------------------|---------------------------------------|-----------------|
| 1. LCD display | 2. Function button and Numeric button | 3. Rotary knob |
| 4. Output terminals | 5. Menu softkey | 6. Power switch |



- | | | |
|-------------------------------|----------------------------------------|-----------------------------|
| 1. RS232 interface | 2. Analog control interface (optional) | 3. Remote sensing terminal |
| 4. Trigger input | 5. Cooling fan | 6. Power cord / fuse socket |
| 7. Ground terminal of chassis | | |

1-4. Key Description

There are 30 buttons on the front panel (not including POWER button). Press the button directly to use the basic function.

Key name	Main function
0	Input digit 0
1	Input digit 1
2	Input digit 2
3	Input digit 3
4	Input digit 4
5	Input digit 5
6	Input digit 6
7	Input digit 7
8	Input digit 8
9	Input digit 9
.	Input decimal point
◀ ▶	Move flash digit to the left/right
Rotary knob	Adjust setting value
Enter	Confirm input
Menu	Select menu
Utility	Set system configuration
Store	Store / Recall parameters
Timer	Set timing output
⋮	Expanded function key
Lock	Lock the front panel 2. Switch to local operation
Cancel	Cancel key
Voltage	Set voltage
Current	Set current
O.V.P Level	Set Over Current Protection value
O.C.P Level	Set Over Voltage Protection value
O.V.P Status	Set O.V.P on/off status
O.C.P Status	Set O.C.P on/off status
On/Off	Turn on/off output
Trigger	Trigger key

2. OPERATION INTRODUCTION

2-1. Front Panel Operation

- 1) The applied Voltage/Current Unit for this series instruments is Volt (V) and Amp (A).
- 2) The factory setting is in panel operation mode that enable user to operate the instruments directly from panel control knob.
- 3) When the remote controller is on line, the **[Lock]** button backlight turns on and the operation can only be proceed through it. But the **[On/Off]** button is still available for operation. All other button operations are closed unless press **[Lock]** button again to unlock the front panel. The **[Lock]** button backlight turns off.
- 4) The output of power supplies is always at OFF status after power on.

2-2. How to Input

2-2-1. Input via Numeric buttons

Use numeric buttons from 0 to 9 and decimal point to input targeted values, and then press **[Enter]** button to confirm input. If the input value is wrong, press **[Cancel]** button to clear the present values, then input correct values.

2-2-2. Input via Rotary Knob

In some applications, it requires to adjust the output signal continuously. It is convenient to use rotary knob to make adjustment. Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the knob to the right to continuously increase the cursor-located digit by 1 and make the carry to a higher unit position. Rotate the knob to the left to continuously decrease the cursor-located digit by 1 and make the carry to a lower unit position. The modified value is validated immediately without pressing the **[Enter]** button.

2-3. Output Voltage Setting

Press button **[Voltage]**, the cursor of voltage parameter flashes.

Setting method 1: Press **[numeric buttons 0-9] [Decimal Point] [Enter]** to set output voltage.

Setting method 2: Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set output voltage to 32.000V.

Press **[Voltage] [3] [2] [.] [0] [0] [0] [Enter]**.

2-4. Output Current Setting

Press button **[Current]**, the cursor of current parameter flashes.

Setting method 1: Press **[numeric buttons 0-9] [Decimal Point] [Enter]** to set output current.

Setting method 2: Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set output current to 3.200A.

Press **[Current] [3] [.] [2] [0] [0] [Enter]**.

2-5. Over Voltage Protection Setting

The Over Voltage Protection (O.V.P) function protects the power supply and DUT from damage caused by voltage over the setup voltage. Before operation, set the O.V.P function ON and set the O.V.P value. When the output voltage exceeds this value, the output will be shut down and “O.V.P” sign will be displayed on the LCD. With O.V.P function ON, the output voltage is restricted within the O.V.P range.



WARNING To avoid damage to the power supply, the O.V.P setting range **MUST NOT** exceed 120% of rated voltage.

When the power supply is under O.V.P mode, firstly clear external causes. And then turn on the output again.

2-5-1. O.V.P Value Setting

Press [**O.V.P Level**], the cursor of O.V.P parameter flashes.

Setting method 1: Press [**numeric buttons 0-9**] [**Decimal Point**] [**Enter**] to complete O.V.P setting.

Setting method 2: Press buttons [**◀**] or [**▶**] to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set over voltage protection value to 33.0V.

Press [**O.V.P Level**] [**3**] [**3**] [**.**] [**0**] [**Enter**].

2-5-2. O.V.P Status Setting

Press [**O.V.P Status**] to turn on or off the O.V.P function.

2-6. Over Current Protection Setting

The Over Current Protection (O.C.P) function protects the power supply and DUT from damage caused by current over the setup current. Before operation, set the O.C.P function ON and set the O.C.P value. When the output current exceeds this value, the output will be shut down and “O.C.P” sign will be displayed on the LCD. With O.C.P function ON, the output current is restricted within the O.C.P range.

2-6-1. O.C.P Value Setting

Press [**O.C.P Level**], the cursor of O.C.P parameter flashes.

Setting method 1: Press [**numeric buttons 0-9**] [**Decimal Point**] [**Enter**] to complete O.C.P setting.

Setting method 2: Press buttons [**◀**] or [**▶**] to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set over current protection value to 3.30A.

Press [**O.C.P Level**] [**3**] [**.**] [**3**] [**0**] [**Enter**].

2-6-2. O.C.P Status Setting

Press [**O.C.P Status**] to turn on or off the O.C.P function.

2-7. Output Delay Time Setting

Press **[Menu]** button until "PARAME DELAY" is shown on the LCD.

Setting method 1: Press **[numeric buttons 0-9] [Enter]** to complete delay time setting.

Setting method 2: Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set the delay time to 99999s.

Press **[Menu] [9] [9] [9] [9] [9] [Enter]**.

Note: The Delay setting is effective only under the Auto running operation. Delay setting will be saved to the memory address simultaneously.

2-8. Function Setup

Press **[Utility]** button to proceed to "Utility" function setting, then press **[Menu]** to select the options under this function.

2-8-1. Power On Setting

Press **[Menu]** button until "Utility INIT" is shown on the LCD. Set all sets as factory setting. Turn on or off factory setting via rotary knob.

Press **[Menu]** button until "Utility LAST" is shown on the LCD. Set output status during the instrument is powered on. Turn on or off factory setting via rotary knob.

- ON: Set the output status as memory status when the instrument is powered off in the last time of use.
- OFF: Set the output status as default.

2-8-2. OP Associative Setting

Press **[Menu]** button until "Utility OP LIM" is shown on the LCD. Set O.V.P and O.C.P associative with voltage and current. Use rotary knob to turn on or off the associative setting.

- ON: When O.V.P is ON, the maximum input voltage value is O.V.P value. When O.C.P is on, the maximum current input value is O.C.P value.
- OFF: O.V.P and O.C.P are not associative with voltage and current.

2-8-3. RS232 Baud Rate Setting

Press **[Menu]** button until "Utility Baud" is shown on the LCD, use the numeric buttons or rotary knob to modify the corresponding code of baud rate to make sure that the baud rate meets the requirement of the PC remote control.

The table below shows the corresponding code of baud rate.

Code	0	1	2	3	4	5	6	7	8	9
Baud rate	1200	2400	4800	9600	14400	19200	28800	38400	57600	115200

Setting method 1: Press **[numeric buttons 0-9] [Enter]** to set baud rate.

Setting method 2: Rotate the rotary knob to choose a code.

2-8-4. Beeper Setting

Press **[Menu]** button until “Utility Beep” is shown on the LCD, use the rotary knob to turn on or off the beeper.

2-8-5. Hotkey Setting

Press key **[Menu]** until “Utility HotKey” is shown on the LCD. Use the rotary knob to turn on or off the hotkey function. After the hotkey function is set ON, the numeric button 0 to 9 means the setting data of index number 0 to 9 in memory bank. So the setting data of index number 0 to 9 can be recalled by pressing the corresponding number.

2-8-6. Voltage Self-test Setting

Press **[Menu]** button until “Utility VselfTe” is shown on the LCD. Use the rotary knob to turn on or off the voltage self-test function. Users can enable this function to improve the voltage accuracy and get the accurate setting voltage at the output terminal.

2-8-7. Instrument Address Setting

Press **[Menu]** button until “Utility Address” is shown on the LCD. Use the numeric buttons to input the instrument address, then press **[Enter]** to complete the input.

2-8-8. Save the Setting Data

The frequently used parameters can be stored into the 100 sets of Non-Volatile Memory in the power supply. User can easily recall those data for use. Parameters to be stored include Output voltage value, Output current value, Over Voltage Protection level, Over Current Protection level, Over Voltage Protection status, Over Current Protection status and the Delay time.

Press **[Store]** button until “Utility Store” is shown on the LCD. Use the numeric buttons to input the memory address to save the data, then press **[Enter]** to complete the store.

For example: Store the setting data to the memory address of 5.

Press **[5] [Enter]**.

2-8-9. Recall the Setting Data

Press **[Store]** button until “Utility Recall” is shown on the LCD. Use the numeric buttons to input the memory address to recall the data, then press **[Enter]** to complete the recall.

For example: Recall the setting data from the memory address of 5.

Press **[5] [Enter]**.

Note: When a setting is recalled, the output automatically turns off.

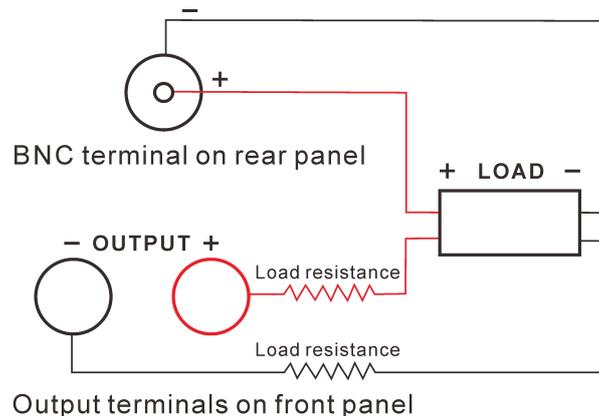
2-8-10. Remote Sense Setting

When the load is consuming large current, there will be voltage drop on the connecting cable between terminals of power supply and the load. In Constant Voltage mode, the remote sense function automatically compensates voltage drop on the connecting cable.

Before using the remote sense function, make sure that the power supply is under remote sense mode. Before set on the remote sense function, the output must be turned OFF. The remote sense cable is suggested not to twist the remote sense cable with connecting cable of the load.

Press **[Menu]** button until "Utility Sense" is shown on the LCD. Use the rotary knob to turn on or off the remote sensing function.

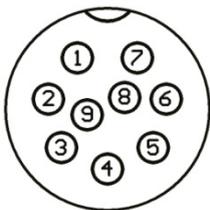
Connecting illustration for remote sense:



2-8-11. Analog Control Function (Optional)

Press **[Menu]** button until "Utility EXT CT" is shown on the LCD. Use the rotary knob to turn on or off the analog control function.

There is a 9pin aviation plug used as analog control interface on the rear panel. It can enable you to control the output voltage and current, and realize the parallel connection among many power supplies that have the identical voltage and current ratings.



The definitions for the pins are shown as below:

- 1 +5VDC, provides 5V reference voltage.
- 2 To adjust the output voltage: externally connect 0-5V voltage or 0-5K Ω resistance to adjust 0-100% voltage maximum ratings.
- 3 To adjust the output current: externally connect 0-5V voltage or 0-5K Ω resistance to adjust 0-100% current maximum ratings.
- 4 GND: Common ground
- 5 When "Analog Ctrl" is set to ON, controlling the ON/OFF, short Pin5 and GND, the output is ON, on the contrary the output is OFF. When "Analog Ctrl" is set to OFF, controlling the output signal, the output is ON and the output voltage is 0V, and the output voltage is 5V when the output is OFF.

- 6 Power supply OK, to indicate the output status: if the power supply is OK, the output is 5V; if the power supply is protected or damaged, the output is 0V.
- 7 To Indicate CV/CC mode: connect Pin7 to GND, in CV mode, the voltage is 5V and the voltage is 0V in CC mode.
- 8 To monitor the corresponding voltage of actual output voltage: 0-5V voltage to monitor 0-100% voltage maximum ratings.
- 9 To monitor the corresponding voltage of actual output current: 0-5V voltage to monitor 0-100% current maximum ratings.

2-8-12. Trigger Source Selection

Press **[Menu]** button until “Utility TRISOU” is shown on the LCD. Use the numeric keys or rotary knob to select the trigger source.

- 0 EXT is the external key trigger.
- 1 PULSE is TTL trigger on the rear panel.
- 2 IMM use the “TRIGger:IMMediate” as trigger source. All other triggering methods become invalid.
- 3 BUS is the communication interface trigger.

2-8-13. Trigger Function Selection

Press **[Menu]** button until “Utility TRIFUN” is shown on the LCD. Use the rotary knob to select the trigger function.

- 0 OUTPUT: switch the output status.
- 1 TIME: Single timing output procedure under step running mode.

2-8-14. LCD Backlight Control

Press **[Menu]** button until “Utility LIGHT” is shown on the LCD. Use the numeric buttons or rotary knob to adjust LCD backlight brightness.

2-8-15. LCD Contrast Control

Press **[Menu]** button until “Utility CONTRA” is shown on the LCD. Use the numeric buttons or rotary knob to adjust LCD contrast.

2-8-16. Parameter Display Selection

Press **[Menu]** button until “Utility DISP” is shown on the LCD. Use the numeric buttons or rotary knob to input parameters, and select the third displayed parameter, by power, load resistance or output timer.

- 0 POWER: The third parameter displayed as power.
- 1 RESIS: The third parameter displayed as load resistance.
- 1 TIME: The third parameter displayed as output time.

2-8-17. Cumulative Boot Time

Press **[Menu]** button until “Utility UPTIME” is shown on the LCD. The LCD display cumulative boot time of the instrument.

2-9. Save/Recall Operation

2-9-1. Save the Setting Data

The frequently used parameters can be stored into the 100 sets of Non-Volatile Memory in the power supply. User can easily recall those data for use. Parameters to be stored include Output voltage value, Output current value, Over Voltage Protection level, Over Current Protection level, Over Voltage Protection status, Over Current Protection status and the Delay time.

Press **[Store]** button until "Utility Store" is shown on the LCD. Use the numeric buttons to input the memory address to save the data, then press **[Enter]** to complete the store.

For example: Store the setting data to the memory address of 5.

Press **[5] [Enter]**.

2-9-2. Recall the Setting Data

Press **[Store]** button until "Utility Recall" is shown on the LCD. Use the numeric buttons to input the memory address to recall the data, then press **[Enter]** to complete the recall.

For example: Recall the setting data from the memory address of 5.

Press **[5] [Enter]**.

Note: When a setting is recalled, the output automatically turns off.

2-10. Auto Running Operation

2-10-1. Setting Status

Press **[Timer]** until "Auto Status" is shown on the LCD. The power supply enters auto run mode. Press **[Menu]** button to select functions in this menu. Use the rotary knob to turn on or off the functions.

2-10-2. Start Memory Address Setting

Press **[Menu]** until "Auto Start" is shown on the LCD.

Setting method 1: Press **[numeric buttons 0-9] [Enter]** to set start memory address.

Setting method 2: Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set the start memory address to 0.

Press **[0] [Enter]**.

2-10-3. End Memory Address Setting

Press **[Menu]** button until "Auto End" is shown on the LCD.

Setting method 1: Press **[numeric buttons 0-9] [Enter]** to set end memory address.

Setting method 2: Press buttons **[◀]** or **[▶]** to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set the end memory address to 8.

Press **[8] [Enter]**.

2-10-4. Cycle Times Setting

Press [Menu] button until "Auto Cycle" is shown on the LCD.

Setting method 1: Press [numeric buttons 0-9] [Enter] to set cycle times from number 0 to 99999. Number 0 represents infinite loop.

Setting method 2: Press buttons [◀] or [▶] to move the cursor left or right. Rotate the rotary knob left or right to increase or decrease the digit on cursor.

For example: Set the cycle times to 99.

Press [9] [9] [Enter].

2-10-5. Running Mode Setting

Press [Menu] button until "Auto MODE" is shown on the LCD to set running mode. Use the rotary knob to select the running mode. "0 Conti" represents continuous running mode; "1 Step" represents step running mode, run a step as a trigger occurs.

2-10-6. Enter/Exit Auto Running Operation

Set "Auto Status" ON, the "TIME" sign lights on. It means the instrument has entered the auto running operation.

If under continuous running mode, the third parameter shown on the LCD represents the left time of running settings on the present parameter group. Press [On/Off] to start output.

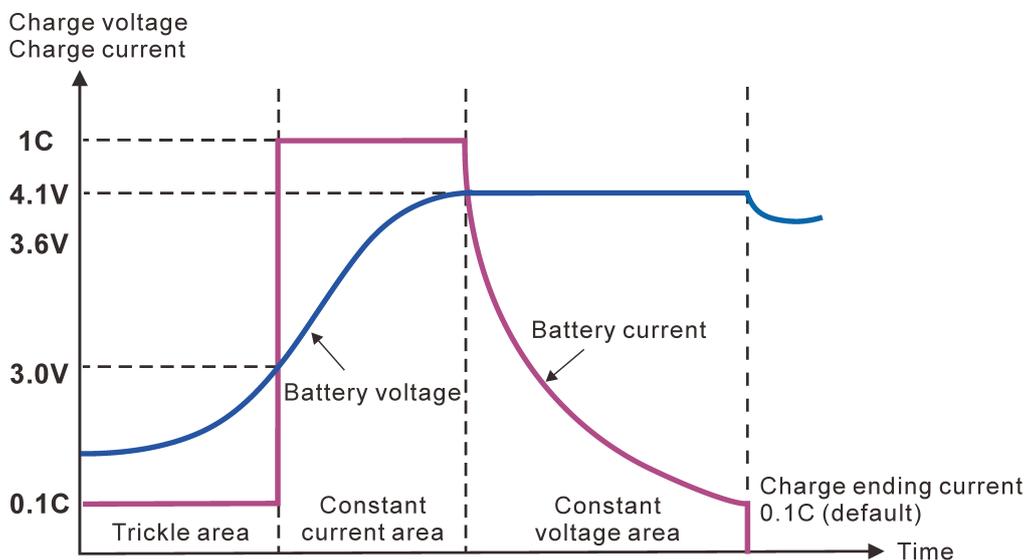
If under step running mode, press [On/Off] to start output. The instrument outputs a set of updated data as a trigger occurs.

2-11. Auxiliary Function

The auxiliary function contains battery charge function and can expand other functions according to user's need. Press [•••] to enter auxiliary function setting interface, the button lights on.

2-11-1. Battery Charge Function

This instrument provides battery charge function as shown in the figure below. It can effectively protect the battery.



Operation steps:

Press **[...]** button until "BATTER STATUS" is shown on the LCD. Use the rotary knob to turn on the battery charge function. **[...]** Button lights on. Press **[Menu]** button to select the following functions.

Parameters	Menu
Trickle charge voltage threshold	UNDERV
Floating charge voltage	STATUV
Trickle charge current	TRICKL
Standard charge current	CHARGE
Terminated current threshold	I OFF
Charge time	TIME

2-12. Output On/Off

The Output **[On/Off]** button on front panel is used to turn on or off the output.

2-13. Panel Lock

The **[Lock]** button on front panel is used to lock the front panel from wrong input. Press **[Lock]** button, then the button backlight lights on, meaning the front panel is locked. All the other buttons and rotary knob are disabled except **[Lock]** button and **[On/Off]** button.

2-14. Rotary Knob

Press the rotary knob to switch the cursor position.

2-15. Protection Function

This power supply is built with Over Voltage Protection (O.V.P), Over Current Protection (O.C.P), Over Power Protection (O.P.P) and Over Temperature Protection (O.T.P).

O.V.P and O.C.P level can be set via the **[O.V.P Level]** and **[O.C.P Level]** buttons on the front panel respectively.

O.P.P function protects the power supply when the output power exceeds rated power. The output is shut down under O.P.P mode.

O.T.P function protects the power supply when the instrument produces abnormal high temperature during operation process. The output is shut down under O.T.P mode.

2-16. Operation Mode

2-16-1. Constant Voltage Operation

- 1) Connect load to output terminal.
For the safety, turn off the output before connecting the load to output terminals of (+) and (-).
- 2) Set the current limit value.
Press **[Current]**, the panel operation is set to current value input mode. Set the desired value by using the number buttons or the rotary knob.
- 3) Set the desired output voltage value.
Press **[Voltage]**, the panel operation is set to voltage value input mode. Set the desired change value by using the number buttons or the rotary knob.
- 4) Start the output.
Press **[On/Off]** to enable output. Now, the meter displays the actual output measurement value.
- 5) Constant voltage mode confirmation.
Check whether the CV sign is shown or not to make sure the output operation is under the constant voltage mode. If the CC sign is shown, it needs to increase its current limit value to ensure that the output operation is under constant voltage mode.

2-16-2. Constant Current Operation

- 1) Connect load to output terminal.
For the safety, turn off the output before connecting the load to output terminals of (+) and (-).
- 2) Set the voltage limit value.
Press **[Voltage]**, the panel operation is set to voltage value input mode. Set the desired change value by using the number buttons or the rotary knob.
- 3) Set the desired output current value.
Press **[Current]**, the panel operation is set to current value input mode. Set the desired change value by using the number buttons or the rotary knob.
- 4) Start the output.
Press **[On/Off]** to enable output. Now, the meter displays the actual output measurement value.
- 5) Constant current mode confirmation.
Check whether the CC sign is shown or not to make sure the output operation is under the constant current mode. If the CV sign is shown, it needs to increase its voltage limit value to ensure that the output operation is under constant current mode.

2-16-3. CV/CC Switch

When the output current level reaches the setting with the Output ON, the CC sign is lighted. The instrument operates in Constant Current mode. When the output voltage level reaches the setting, the CV sign is lighted. The instrument operates in Constant Voltage mode. The instrument automatically switches between Constant Current mode and Constant Voltage mode, according to load condition.

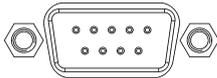
3. REMOTE CONTROL

With the remote control function provided, this series power supply can communicate with PC by RS232 interface and enable all the panel operations by series port software.

3-1. Interface Setting

3-1-1. Interface

The RS232 interface is installed on the real panel of instrument.



RS232 interface

3-1-2. COM Port Setting

Set up the COM port inside PC according to the following list

- 1) Baud rate: 9600
- 2) Parity bit: None
- 3) Data bit: 8
- 4) Stop bit: 1
- 5) Data flow control: None

Note 1: If the power supply has no response under the remote control, please check the following items.

- Check whether the connection cable is broken off or not.
- Check whether the connection cable is crossover cable or not.
- Check whether the pin connection among interface cable, power cord and PC is correct or not.
- Check whether the interface cable is properly connected or not.
- Check whether the communication parameters setup is compliant to COM port setting or not.
- Check whether the end character is line break or not (hexadecimal 0X0A).

Note 2: When the remote controller is on line, the **[Lock]** button backlight turns on and the operation can only be proceeded through it. At this time, all the panel operations are closed unless the **[Lock]** button is pressed again.

3-2. SCPI Commands

For detailed SCPI commands, please refer to the programming software in the CD ROM attached to the instrument.

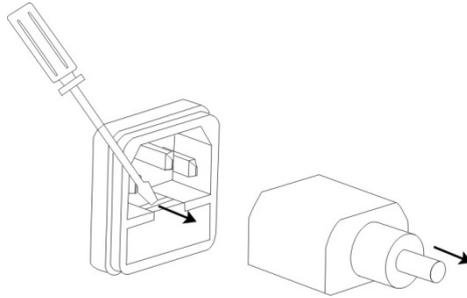
4. MAINTENANCE

4-1. Inspection

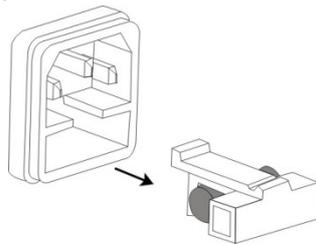
- Inspect the instrument at regular intervals so that it maintains its initial performance for a long time.
- Check the input power cord for damage of the vinyl cover and overheating of the plug and cord stopper. Check the terminal screws and binding posts for loosening.

4-2. Fuse Replacement

- Step 1) Take off the power cord and remove the fuse socket using a minus driver.



- 2) Replace the fuse in the holder.



Fuse rating

Model	220VAC rated input	Model	220VAC rated input	110VAC rated input
PPW-1560	T8AL/250V	PPM-0830	T6.3AL/250V	T12AL/250V
PPW-2045	T8AL/250V	PPM-1820	T6.3AL/250V	T12AL/250V
PPW-3030	T8AL/250V	PPM-12003	T6.3AL/250V	T12AL/250V
PPW-6015	T8AL/250V	PPM-3H12	T6.3AL/250V	T12AL/250V
PPW-8011	T8AL/250V	PPM-5H07	T6.3AL/250V	T12AL/250V
PPW-2030	T4AL/250V	PPM-2010	T4AL/250V	T8AL/250V
PPW-3010	T4AL/250V	PPM-3010	T6.3AL/250V	T12AL/250V
PPW-3020	T4AL/250V	PPM-6005	T6.3AL/250V	T12AL/250V
PPW-6010	T4AL/250V	PPM-7503	T5AL/250V	T10AL/250V
PPW-8008	T4AL/250V	PPM-7505	T6.3AL/250V	T12AL/250V
		PPM-12001	T2AL/250V	T4AL/250V
		PPM-3603D	T2AL/250V	T4AL/250V
		PPM-3605D	T3.15AL/250V	T6.3AL/250V
		PPM-3603	T2AL/250V	T4AL/250V
		PPM-3605	T3.15AL/250V	T6.3AL/250V
		PPM-6003	T3.15AL/250V	T6.3AL/250V

5. TECHNICAL SPECIFICATIONS

The specifications apply when the power supply series are powered on for at least 30 minutes under regulated temperature.

Specifications (900W)

Model	PPW-1560	PPW-2045	PPW-3030	PPW-6015	PPW-8011
Rated output (0°C~40°C)					
Voltage	0~15V	0~20V	0~30V	0~60V	0~80V
Current	0~60A	0~45A	0~30A	0~15A	0~11A
O.V.P	0.1~18V	0.1~24V	0.1~34V	0.1~64V	0.1~88V
O.C.P	0.1~62A	0.1~50A	0.1~34A	0.1~17A	0.1~12A
Constant Voltage Operation					
Line regulation	≤0.01%+4mV				
Load regulation	≤0.1%+5mV				
Ripple & Noise (20Hz~20MHz)	2mVrms, 30mVpp				
Recovery time	≤1.5ms (50% load change)				
Constant Current Operation					
Line regulation	≤0.2%+3mA				
Load regulation	≤0.2%+5mA				
Ripple & Noise	≤10mArms				
Display					
Voltmeter	5 digits LCD display				
Ammeter	5 digits LCD display				
Setting resolution	1mV/1mA				
Reading resolution	1mV/1mA				
Setting accuracy (25±5°C)	Voltage	±(0.03% of reading + 10mV)			
	Current	±(0.3% of reading + 10mA)			
Reading accuracy (25±5°C)	Voltage	±(0.02% of reading +5mV)			
	Current	±(0.3% of reading +10mA)			
General					
Protection	Over load, over voltage, over current, over temperature and reverse polarity protections				
Panel lock	Provided				
Remote sense function	Maximum compensation voltage 0.1V@ Maximum output				
Battery charge	Lithium battery curve charge				
Interface	RS232 interface, Support SCPI commands				
	Optional RS485 interface, support ModBus				
	Optional RS232 to USB cable				
	Optional 0-5V analog control				
Memory	100 sets				
Insulation	Between base and terminals: ≤60VDC				
Operating environment	Indoor use	Altitude: ≤2000m	Ambient temperature: 0~40°C		
	Relative humidity: ≤80%	Installation category: II	Pollution degree: 2		
Storage environment	-10°C~70°C, ≤70%RH				
Power source	AC220V±10%, 50/60Hz				
Accessories	Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1				
Dimension (WxHxD)	215x89x412mm				
Weight	5.5kg				

Specifications (600W)

Model	PPW-2030	PPW-3010	PPW-3020	PPW-6010	PPW-8008
Rated output (0°C~40°C)					
Voltage	0~20V	0~30V	0~30V	0~60V	0~80V
Current	0~30A	0~10A	0~20A	0~10A	0~7.5A
O.V.P	0.1~24V	0.1~34V	0.1~34V	0.1~64V	0.1~88V
O.C.P	0.1~34A	0.1~12A	0.1~24A	0.1~12A	0.1~8.8A
Constant Voltage Operation					
Line regulation	≤0.01%+4mV				
Load regulation	≤0.1%+5mV				
Ripple & Noise (20Hz~20MHz)	2mVrms, 30mVpp				
Recovery time	≤1.5ms (50% load change)				
Constant Current Operation					
Line regulation	≤0.2%+3mA				
Load regulation	≤0.2%+5mA				
Ripple & Noise	≤10mArms				
Display					
Voltmeter	5 digits LCD display				
Ammeter	5 digits LCD display				
Setting resolution	1mV/1mA				
Reading resolution	1mV/1mA				
Setting accuracy (25±5°C)	Voltage	±(0.03% of reading + 10mV)			
	Current	±(0.3% of reading + 10mA)			
Reading accuracy (25±5°C)	Voltage	±(0.02% of reading +5mV)			
	Current	±(0.3% of reading +10mA)			
General					
Protection	Over load, over voltage, over current, over temperature and reverse polarity protections				
Panel lock	Provided				
Remote sense function	Maximum compensation voltage 0.1V@ Maximum output				
Battery charge	Lithium battery curve charge				
Interface	RS232 interface, Support SCPI commands				
	Optional RS485 interface, support ModBus				
	Optional RS232 to USB cable				
	Optional 0-5V analog control				
Memory	100 sets				
Insulation	Between base and terminals: ≤60VDC				
Operating environment	Indoor use	Altitude: ≤2000m	Ambient temperature: 0~40°C		
	Relative humidity: ≤80%	Installation category: II	Pollution degree: 2		
Storage environment	-10°C~70°C, ≤70%RH				
Power source	AC220V±10%, 50/60Hz				
Accessories	Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1				
Dimension (WxHxD)	215x89x352mm				
Weight	4.5kg				

Specifications (240W ~ 360W)

Model	PPM-0830	PPM-1820	PPM-12003	PPM-3H12	PPM-5H07
Rated output (0°C~40°C)					
Output	0~8V	0~18V	0~120V	0~300V	0~500V
Output	0~30A	0~20A	0~3A	0~1.2A	0~0.7A
O.V.P	0.1~10V	0.1~21V	0.1~140V	0.1~360V	0.1~550V
O.C.P	0.1~32A	0.1~22A	0.1~3.5A	0.01~1.32A	0.01~0.8A
Constant Voltage Operation					
Line regulation	≤0.01%+3mV				
Load regulation	≤0.01%+3mV (I≤3A); ≤0.02%+5mV (I>3A)				
Ripple & Noise (5Hz~1MHz)	≤1mVrms	≤1mVrms	≤2.5mVrms	≤10mVrms	≤10mVrms
Recovery time	≤100us (50% load change, minimum load 0.5A)				
Constant Current Operation					
Line regulation	≤0.2%+3mA				
Load regulation	≤0.05%+3mA (I≤3A); ≤0.05%+5mA (I>3A)				
Ripple & Noise	≤10mAms	≤5mAms	≤1mAms	≤1mAms	≤1mAms
Display					
Voltmeter	5 digits LCD display				
Ammeter	5 digits LCD display				
Setting resolution	1mV/1mA	1mV/1mA	10mV/1mA	10mV/0.1mA	10mV/0.1mA
Reading resolution	1mV/1mA	1mV/1mA	10mV/1mA	10mV/0.1mA	10mV/0.1mA
Setting accuracy (25±5°C)	Voltage	±(0.03% of reading + 10mV)			
	Current	±(0.2% of reading + 20mA)	±(0.2% of reading + 5mA)	±(0.2% of reading + 1mA)	
Reading accuracy (25±5°C)	Voltage	±(0.02% of reading +5mV)			
	Current	±(0.05% of reading +10mA)			±(0.05% of reading +5mA)
General					
Protection	Over load, over voltage, over current, over temperature and reverse polarity protections				
Panel lock	Provided				
Remote sense function	Max. compensation voltage 0.1V@ Max. output			X	X
Battery charge	Lithium battery curve charge				
Interface	RS232 interface, Support SCPI commands				
	Optional RS485 interface, support ModBus				
	Optional RS232 to USB cable				
	Optional 0-5V analog control			X	X
Memory	100 sets				
Insulation	Between base and terminals: ≥20MΩ/500VDC Between base and AC power cord: ≥30MΩ/500VDC				
Operating environment	Indoor use		Altitude: ≤2000m	Ambient temperature: 0~40°C	
	Relative humidity: ≤80%		Installation category: II	Pollution degree: 2	
Storage environment	-10°C~70°C, ≤70%RH				
Power source	AC110V/220V±10% selectable, 50/60Hz				
Accessories	Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1,		Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1, Test lead x1		
Dimension (WxHxD)	215x89x412mm				
Weight	9.8kg	9.8kg	9.8kg	10.2kg	10.2kg

Specifications (120W ~ 375W)

Model		PPM-2010	PPM-3010	PPM-6005	PPM-7503	PPM-7505	PPM-12001
Rated output (0°C~40°C)							
Output		0~20V	0~30V	0~60V	0~75V	0~75V	0~120V
Output		0~10A	0~10A	0~5A	0~3A	0~5A	0~1A
O.V.P		0.1~24V	0.1~34V	0.1~64V	0.1~80V	0.1~80V	0.1~132V
O.C.P		0.1~11A	0.1~11A	0.1~5.5A	0.1~3.5A	0.1~5.5A	0.1~1.1A
Constant Voltage Operation							
Line regulation		≤0.01%+3mV					
Load regulation		≤0.01%+3mV (I≤3A); ≤0.02%+5mV (I>3A)					
Ripple & Noise (5Hz~1MHz)		≤1mVrms (I≤3A); ≤2mVrms (I>3A); ≤3mVrms (V≥75V)					
Recovery time		≤100us (50% load change, minimum load 0.5A)					
Constant Current Operation							
Line regulation		≤0.2%+3mA					
Load regulation		≤0.2%+3mA (I≤3A); ≤0.2%+5mA (I>3A)					
Ripple & Noise		≤3mArms (I≤3A), ≤6mArms (I>3A)					
Display							
Voltmeter		5 digits LCD display					
Ammeter		5 digits LCD display					
Setting resolution		1mV/1mA	1mV/1mA	1mV/0.1mA	2mV/0.1mA	2mV/0.1mA	10mV/0.1mA
Reading resolution	Voltage	1mV	1mV	1mV	1mV	1mV	≥100V: 10mV <100V: 1mV
	Current	1mA	1mA	0.1mA	0.1mA	0.1mA	0.1mA
Setting accuracy (25±5°C)	Voltage	±(0.03% of reading + 10mV)					
	Current	±(0.2% of reading + 10mA)					
Reading accuracy (25±5°C)	Voltage	±(0.02% of reading +5mV)					
	Current	±(0.05% of reading +5mA)					
General							
Protection		Over load, over voltage, over current, over temperature and reverse polarity protections					
Panel lock		Provided					
Remote sense function		Maximum compensation voltage 0.1V@ Maximum output					
Battery charge		Lithium battery curve charge					
Interface		RS232 interface, Support SCPI commands					
		Optional RS485 interface, support ModBus					
		Optional RS232 to USB cable					
		Optional 0-5V analog control					
Memory		100 sets					
Insulation		Between base and terminals: ≥20MΩ/500VDC					
		Between base and AC power cord: ≥30MΩ/500VDC					
Operating environment		Indoor use		Altitude: ≤2000m		Ambient temperature: 0~40°C	
		Relative humidity: ≤80%		Installation category: II		Pollution degree: 2	
Storage environment		-10°C~70°C, ≤70%RH					
Power source		AC110V/220V±10% selectable, 50/60Hz					
Accessories		Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1, Test lead x1					
Dimension (WxHxD)		215x89x352mm					
Weight		8kg	8.5kg	8kg	8kg	8.5kg	6.8kg

Specifications (90W ~ 180W)

Model	PPM-3603D		PPM-3605D		PPM-3603	PPM-3605	PPM-6003
Rated output (0°C~40°C)							
Output	0~36V	0~15A	0~36V	0~15A	0~36V	0~36V	0~60V
Output	0~3A	0~6A	0~5A	0~10A	0~3A	0~5A	0~3A
O.V.P	0.1~40V		0.1~40V		0.1~40V	0.1~40V	0.1~64V
O.C.P	0.1~6.5A		0.1~11A		0.1~3.5A	0.1~5.5A	0.1~3.5A
Constant Voltage Operation							
Line regulation	≤0.01%+3mV						
Load regulation	≤0.01%+3mV (I≤3A); ≤0.02%+5mV (I>3A)						
Ripple & Noise (5Hz~1MHz)	≤1mVrms (I≤3A); ≤2mVrms (I>3A)						
Recovery time	≤100us (50% load change, minimum load 0.5A)						
Constant Current Operation							
Line regulation	≤0.2%+3mA						
Load regulation	≤0.2%+3mA (I≤3A); ≤0.2%+5mA (I>3A)						
Ripple & Noise	≤3mArms (I≤3A), ≤6mArms (I>3A)						
Display							
Voltmeter	5 digits LCD display						
Ammeter	5 digits LCD display						
Setting resolution	1mV/0.1mA		1mV/1mA		1mV/0.1mA	1mV/0.1mA	1mV/0.1mA
Reading resolution	1mV/0.1mA		1mV/1mA		1mV/0.1mA	1mV/0.1mA	1mV/0.1mA
Setting accuracy (25±5°C)	Voltage	±(0.03% of reading + 10mV)					
	Current	±(0.2% of reading + 10mA)					
Reading accuracy (25±5°C)	Voltage	±(0.02% of reading + 5mV)					
	Current	±(0.05% of reading + 5mA)					
General							
Protection	Over load, over voltage, over current, over temperature and reverse polarity protections						
Panel lock	Provided						
Remote sense function	Maximum compensation voltage 0.1V@ Maximum output						
Battery charge	Lithium battery curve charge						
Interface	RS232 interface, Support SCPI commands						
	Optional RS485 interface, support ModBus						
	Optional RS232 to USB cable						
	Optional 0-5V analog control						
Memory	100 sets						
Insulation	Between base and terminals: ≥20MΩ/500VDC						
	Between base and AC power cord: ≥30MΩ/500VDC						
Operating environment	Indoor use		Altitude: ≤2000m		Ambient temperature: 0~40°C		
	Relative humidity: ≤80%		Installation category: II		Pollution degree: 2		
Storage environment	-10°C~70°C, ≤70%RH						
Power source	AC110V/220V±10% selectable, 50/60Hz						
Accessories	Power cord x1, Operation manual x1, RS232 cable x1, Software CD x1, Test lead x1						
Dimension (WxHxD)	215x89x352mm						
Weight	8kg		8kg		6.8kg	8kg	8kg

For the purpose of product improvement, specifications are subject to change without prior notice.



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