Hantek®

User Manual

Programmable DC Power Supply
HDP3323

Copyright Notice

Contents

Safety Instruction

Read following general safety precautions before any operation to insure your safety and to keep the best condition for the DC power supply. These precautions must be followed when operating, storing and repairing the DC power supply. Hantek assumes no liability for the customer's failure to comply with these requirements.

Safety Guidelines

Warning

o   Verify that the DC power supply is set to match the available line voltage and that the correct fuse is installed.

o   Ensure the voltage fluctuation of the main power supply stays within 10% of the operating voltage range to avoid fire and electric shock.

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

o   Do not disassemble the device unless you are qualified as service personnel.

o   Do not utilize the power supply for the life support system or any other equipment with safety requirements!

o   Do not operate the device in an explosive atmosphere, or wet environments.

o   Avoid severe impacts or rough handling that leads to damaging the device.

o   Turn off the device before connecting to the output terminals.

o   Be careful when dealing with output voltage above 60VDC.

o   Do not block or obstruct the cooling fan vent opening.

o   Don not operate damaged or defective device.

o   Do not discharge static electricity to the device.

Caution

o   Disconnect the power cord before cleaning.

o   Clean the outside of the device with slightly dampened cloth.

o   Do not use detergent, volatile liquids, or chemical solvents.

o   Do not spray any liquid.

Safety Symbols

These safety symbols may appear in this manual or on the DC power supply.

Symbol	Meaning
⚠	Caution Risk of danger (refer to the manual for specific Warning or Caution information).
+	Plus Positive polarity
—	Minus Negative polarity
⏚	Earth (ground) terminal.
Warning	Denotes procedures or practices that could result in personal injury or loss of life.
Note	Denotes procedures, practices or conditions that are essential to highlight.

Regulatory Information

Symbol	Description
CE	The CE mark is a registered trademark of the European Community. This CE mark shows that the product complies with all the relevant European Legal Directives.
UKCA	The UKCA (UK Conformity Assessment) mark is the new UK product marking that will be required for certain products being placed on the market in Great Britain (England, Wales and Scotland). It covers most products that previously required the CE mark.
40	This symbol indicates the time period during which no hazardous or toxic substance elements are expected to leak or deteriorate during normal use. Forty years is the expected useful life of the product.
♻	Do not dispose this device as unsorted municipal waste. Please use a separate collection facility. Please make sure discarded electrical waste is properly recycled to reduce environmental impact.

Introduction

HDP3323 is a 3-channel output programmable linear DC power supply, using the key panel control, large LED display, high output resolution, 4 groups memory, LAN remote control, intelligent temperature control fan and other significant advantages. With SCPI and MODBUS instructions, it is convenient to establish an intelligent test platform.

Features

- Three channels
- Safety interlock
- Up to 3A or 30V output
- Computer control via LAN
- With initialization function
- Memory for up to 4 setups
- Low output ripple and noise
- 1mV/0.1mA/1mW resolution
- Adjustable brightness display
- Over voltage, over current protection
- LED display to indicate 5 digits voltage, current and power simultaneously

Package contents list

Inspect the following standard shipped items of the HDP3323 DC power supply.

- 1pc Power Supply
- 1pc Power Cord
- 3pairs Power Test Leads
- 1pc LAN Cable

Front panel
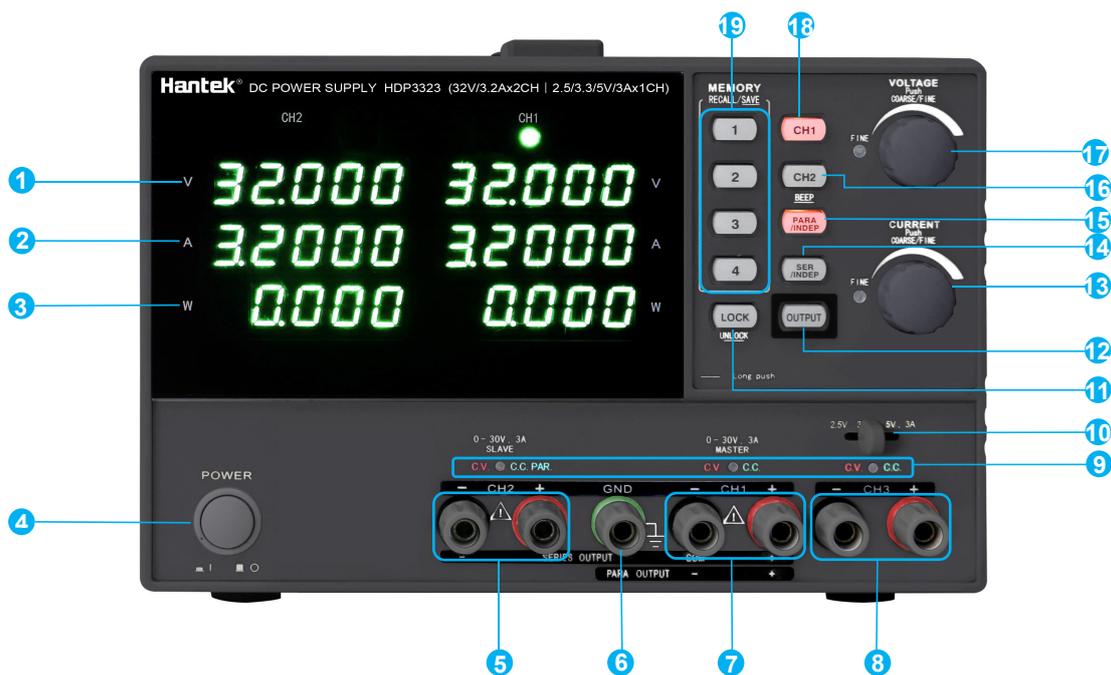
No.	Description
1	Voltage display
2	Current display
3	Power display
4	Power switch
5	Channel 2 output terminal
6	Earth ground reference point
7	Channel 1 output terminal
8	Channel 3 output terminal
9	Output indicator The green light indicates that the channel is in constant voltage mode, the red light indicates that the channel is in constant current mode
10	Channel 3 voltage selection switch
11	Lock/unlock front-panel keys (except OUTPUT) to prevent accidental changes during tests, or long press to exit the remote control
12	Output enable/disable switch to protect your DUT quickly
13	Current adjustment knob Rotate to adjust the set current value of the selected channel, and press the knob to toddle between fine and rough adjustment
14	Series key - Enable or disable the series operation
15	Parallel key - Enable or disable the parallel operation
16	Channel 2 selection key
17	Voltage adjustment knob Rotate to adjust the set voltage value of the selected channel, and press the knob to toddle between fine and rough adjustment
18	Channel 1 selection key
19	Memory save and recall keys

Rear panel

No.	Description
1	LAN interface
2	Cooling vents
3	Fuse slot
4	Power connector
5	110V/120V/220V/230V input voltage selector switch

Dimension

= airflow

140 mm

265 mm

210 mm

Setup the instrument

Place the power supply's feet on a flat horizontal surface. Connect output leads to the front panel, being careful not to short the leads together. Attach the power cord to the rear panel, then plug it into main power.

Connect LAN cable as desired. Before disconnecting cables and cords from the power supply, turn the power supply off using the front-panel power switch and disconnect from the supply source by unplugging the detachable power cord.

Options and fuse information

Warning Ensure you order the proper DC power supply model for the mains power that will be used for the DC power supply.

Model	Description
HDP3323	110/120 VAC ± 10% and 220/230 VAC ± 10%, 50Hz-60Hz input voltage

Ensure the correct AC input voltage and fuse settings

Use the proper switch settings

To change the input AC voltage selector on the power supply, use the two AC selector switches on the rear of the power supply as shown.

For example

To select 120 V, slide the upper red switch to the left and slide the lower switch to the right.

To select 100 V, slide both red switches to the right.

To select 230 V, slide both red switches to the left.

To select 220 V, slide the upper red switch to the right and slide the lower switch to the left.

Use the correct fuse

You must use a time delay 6.3-A fuse for 110- and 120-VAC inputs, and a time delay 3.15-A fuse for 220- and 230-VAC inputs:

Fuse	Application
Fuse 6.3 A	110V and 120V line voltage
Fuse 3.15 A	220V and 230V line voltage

To configure the correct fuse, follow the three steps shown below:

Pull the fuse holder out of the power supply with a screwdriver.

Remove and insert the proper fuse into the fuse holder.
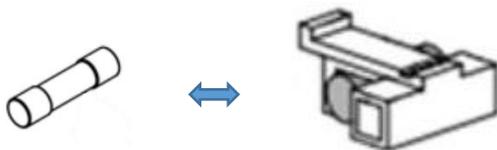
Re-insert the fuse holder into the power supply.
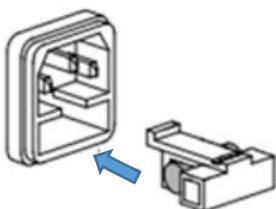
Power-on self-test

A successful self - test process indicates that the power supply purchased by the user meets the factory standards and can be used by the user. Before operating the power supply, it is essential to be familiar with the safety instructions.

- **Voltage Compatibility**: Always confirm that the power supply voltage is consistent with the supply voltage before powering on. Otherwise, the power supply may be burned out.
- **Grounding Requirement**: Be sure to connect the main power plug to a power socket with protective grounding. Before operating the power supply, you should first ensure that the power supply is properly grounded.
- **Polarity Attention**: Pay attention to the identification of the positive and negative poles before wiring, otherwise the power supply may be burnt out.

Self - test steps

1. Connect the power cord correctly, press the power switch button to turn on the power supply and start the self - test.

2. After the power supply self - test is completed, the LED display status is as follows.
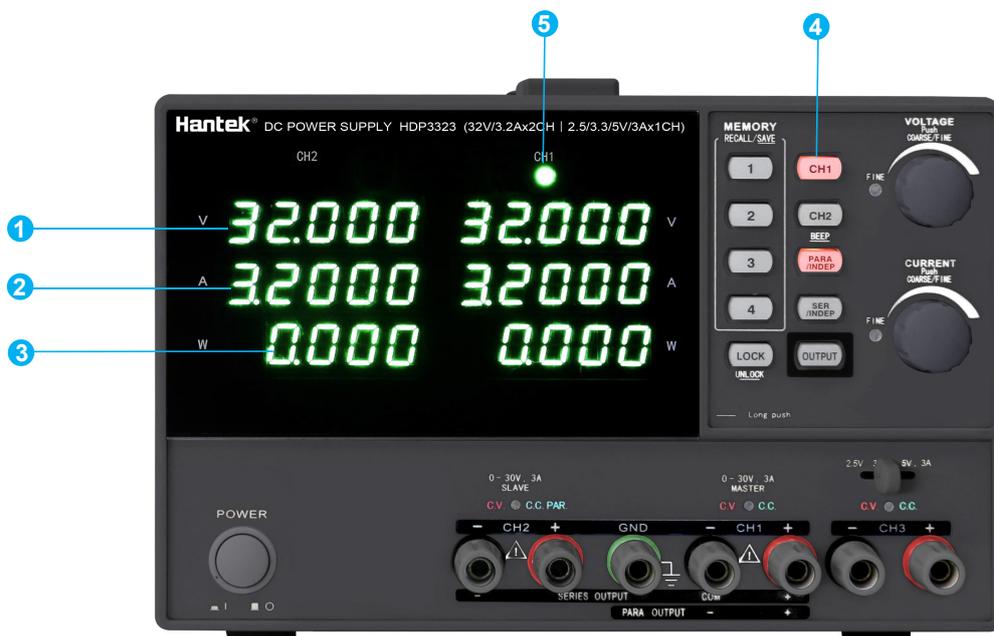
No.	Description
1	Voltage value
2	Current value
3	Power value
4	Channel 1 button backlight
5	Channel indicator light

Exception handling

When the power supply fails to start normally during startup, please refer to the following steps for inspection and handling:

1. **Power Cord Connection Check**: Check whether the power cord is properly connected and confirm that the power supply is in a powered - up state.
   - If the power cord is well - connected access, proceed to the next step of inspection.
   - If there is a power connection error, please reconnect the power cord to check if the exception is cleared.
2. **Power Switch Status Check**: Confirm whether the power supply is turned on, that is, whether the power switch button is in the on state.

   - If it is on , continue with the subsequent troubleshooting steps.
   - If it is not on , please press the power switch to turn on the power supply and check if the exception is cleared.
3. **Fuse Check**: Confirm whether the power supply fuse is burnt out. If burnt out, replace it as the Use the correct fuse shown.

Output check

This process confirms that the power supply reaches its rated output and that front - panel operations are performed correctly.

Output Voltage Verification

Verify the power supply's basic voltage function under no - load conditions:
1. Turn on the power supply.
2. Set the current to 0.1 A.
3. Enable the output (Press the **OUTPUT** button to illuminate the CV·CC indicator).
4. Set various voltages. Check whether the displayed voltage is close to the set value and if the displayed current is close to 0 A.
5. Ensure the voltage is adjustable from 0 V to the maximum output voltage.

Output Current Verification

Verify the power supply's basic current function during the output short - circuit:
1. Turn on the power supply.
2. Disable the output, ensuring the power is off and the **OUTPUT** button's backlight is off.

3. Connect an insulated wire between the (+) terminal and (-) terminal of a selected channel of the power supply (The connected wire must withstand the maximum output current of power supply).

4. Set the voltage to 1 V.

5. Enable the output.

6. Set different currents and check whether the displayed current matches the set value.

7. Ensure the current is adjustable from 0 A to the channel's rated full - output current.

8. Disable the output and remove the short - circuit wire.

Front Panel Operation

Series, parallel, independent output mode

CH1, CH2 independent mode
Note The outputs of CH1 and CH2 operate independently and are subject to individual control.

1. Ensure the parallel and series keys are turned off (backlight is off).

2. Connect the load to the front panel terminals of **CH1+/-**, **CH2+/-**.

3. Press the **CH1** key to turn on channel 1 (backlight in red) , and use the voltage and current knobs to set the output value of CH1 (same steps to set CH2).

4. Coarse adjustment mode is default of the voltage and current knobs. Press voltage or current knob to turn on its Fine mode (Fine indicator light in orange).

Coarse: 0.1 V or 0.1A each step.

Fine: 1 mV or 1mA each step.

5. Press OUTPUT key to turn on output (backlight lit in blue) , and display CC/CV mode .

CH3 independent mode
Note CH3 doesn't support series/parallel mode. CH3 output is not affected by CH1 and/or CH2 mode.

1. Connect the load to the front panel terminals of **CH3+/-**

2. Using the CH3 voltage selection switch to set its output voltage to 2.5V, 3.3V, or 5V.

3. Press **OUTPUT** key to turn on output (backlight lit in blue) .

4. When the output current exceeds 3.2A, CH3 transit from a constant voltage source to a constant current source .

CH1, CH2 series mode

There's a common terminal connected in series.

1. Press the **SER/INDEF** key to enable the serial mode (backlight lit in red).

2. Connect a load to the front panel terminals of **CH1+** and **CH2-**, and use **CH-** terminal as a common line connection.

3. Press the **CH1** key (backlight lit in red), and then use the voltage knob to configure the master - slave output voltage (both channels with the same values), and use the current knob to set the main output current.

4. Press **OUTPUT** key to turn on output (backlight lit in blue), and display CC/CV mode.

5. For the CV/CC status of the main (CH1) output value, refer to the header and indicator lights corresponding to CH1.

CH1 (Main) Voltage: Read the output voltage displayed on the CH1 meter. Under the above - mentioned situation, the actual output is 20.000V.

CH1 (Main) Current: Read the output current displayed on the CH1 meter. In the above - mentioned situation, the actual output current is 2.000A.

6. Press the **CH2** key (backlight lit in red), and use the current knob to set the main output current.

7. For the CV/CC status and output value of CH2, refer to the CH1/2 header and CH2 indicator indicator.

CH2 (Slave) Voltage: Read the output voltage displayed on the CH1 header. Under the above - mentioned situation, the actual output is 20.000V.

CH2 (Slave) Current: Read the output current displayed on the CH2 header. In the above - mentioned situation, the actual output current is 3.000A.

CH1, CH2 parallel mode

1. Press the **PARA/INDEF** key to enable the parallel mode (backlight lit in red).

2. Connect a load to the front panel terminals of **CH1+/-**.

3. Press **OUTPUT** key to turn on output (backlight lit in blue), and display CC/CV mode.

4. Press the **CH1** key (backlight lit in red), and then use the voltage knob and current knob to set the output voltage and current. CH2 control function is disable.

5. For the CV/CC status and output value, refer to the header and indicator light of CH1.

Voltage value: When reading the CH1 meter. Under the above - mentioned situation, the actual output is 20.000V.

Current value: When reading the CH1 current display value twice. The actual output current is 2.000Ax2=4.000A.

Set voltage and current

Note If you are in a menu, you must exit the menu before setting the voltage.

1. Select the required output channel mode (the key backlight and channel indicators are light).

2. Turn this voltage knob to the desired voltage value, pushing the knob to enable FINE adjustment.

3. Turn the current knob to the desired current value, pushing the knob to enable FINE adjustment.

Configure over voltage protection (OVP)

Long - press the VOLTAGE knob to access the function menu as following:

1. **OVP Parameter Setting**: Press the VOLTAGE knob to select the parameters to be modified (the display flashing). Adjust the setting value by rotating the VOLTAGE knob. The operation method is the same as that for voltage setting. Press the VOLTAGE knob to confirm. (Press the VOLTAGE knob to toggle between coarse and fine adjustment, and press the channel keys **CH 1/CH2** to select the channel to be set.)

2. **OVP Status Setting**: Press the VOLTAGE knob to select the status display area (flashing). OFF indicates the function is disabled, and ON indicates the function is enabled. Switch between the two states by rotating the VOLTAGE knob left or right.

Configure over current protection (OCP)

Long - press the VOLTAGE knob to access the function menu and switch to the OCP setting interface by VOLTAGE knob.

1. **OCP Parameter Setting**: Press the CURRENT knob to select the parameters to be modified (the display flashing). Adjust the setting value by rotating the VOLTAGE knob. The operation method is the same as that for current setting. Press the CURRENT knob to confirm. (Press the CURRENT knob to toggle between coarse and fine adjustment, and press the channel keys **CH 1/CH2** to select the channel to be set.)

2. **OCP Status Setting**: Press the CURRENT knob to select the status display area (flashing). OFF indicates the function is disabled, and ON indicates the function is enabled. Switch between the two states by rotating the CURRENT knob left or right.

Startup default parameter

Long - press the VOLITAGE knob to enter the function menu. And enter the power supply default parameter setting interface by turning the VOLTAGE knob. Rotate the CURRENT knob left or right to switch between ON and OFF. ON indicates the parameters of maintaining the last power failure; OFF indicates the recover the system's default parameters.

Startup output status settings

Long - press the VOLITAGE knob to enter the function menu, and switch to the power supply output status setting interface. Rotate the CURRENT knob left or right to toggle between ON and OFF. ON keeps the output on when the power supply is turned on; OFF keeps the output off when the power supply is turned on.

Setup beeper

Long - press the VOLITAGE knob to enter the function menu, and switch to the beeper interface. Rotate the CURRENT knob left or right to toggle between ON and OFF. ON is the power supply's beeper enabled; OFF is the beep is disabled.

Setup display brightness

Long - press the VOLITAGE knob to enter the function menu, and switch to the brightness interface. Rotate the CURRENT knob to set the display brightness from 1 to 6. 1 is the darkest, and 6 is the brightest.
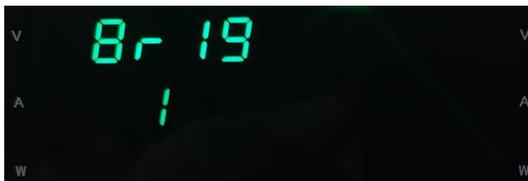
Setup communication address

Long - press the VOLITAGE knob to enter the function menu, and switch to the communication address interface. Select the address from 1 to 254 by turning the CURRENT knob.

Setup the communication baud rate

Long - press the VOLITAGE knob to enter the function menu, and switch to the power supply's communication baud rate interface. Adjust the parameters by turning the CURRENT knob. There are tally six port rates: 4800,9600,19200,38400,57600 and 115200.

Select the communication protocol type

Long - press the VOLITAGE knob to enter the function menu, and switch to the communication protocol type interface. Select the type between SCPI and MODBUS by turning the CURRENT knob.

Select the communication protocol termination symbol

Long - press the VOLITAGE knob to enter the function menu, and switch to the communication protocol termination symbol interface. Turning the CURRENT knob to select the symbol among: CR, LF, CRLF, CR and LFCR.

Initialization settings

Long - press the VOLITAGE knob to enter the function menu, and switch to the initialization settings interface. Rotate the CURRENT knob to toggle between NO and YES. NO is not initialized, and YES is initialized.

Menu Function Initialization Parameters

1. **Startup default parameter settings**: P - STON, default is ON.
2. **Power - on output state settings**: P - UP OFF, default is OFF.
3. **Beeper sound settings**: BEEP ON, default is ON.
4. **Display brightness settings**: BRIG 3, default value: 3.
5. **Communication address settings**: ADDR 001, default value: 001.
6. **Communication baud rate settings**: BAUD 9600, default value: 9600.
7. **Communication protocol type selection**: PLC SCPL, default is SCPL.

8. **Communication protocol terminal selection**: CEND LF, default is LF.

9. **Power supply initialization settings**: INIT NO, default is NO.

OVP Function Initialization Parameters

1. **OVP parameter settings**: OUP 33.000, default value: Max.

2. **OVP status settings**: OUP OFF, default is OFF.

OCP Function Initialization Parameters

1. **OCP parameter settings:** OCP 3.3000, default value: Max.

2. **OCP status settings:** OCP OFF, default is OFF.

Switch over the local/remote connection

The power supply supports both local and remote operation modes.

Entering Remote Connection

1. Connect a LAN cable between the PC and the power supply.

2. The PC sends valid commands to the power supply. Once received, the power supply automatically enters the remote - mode.

3. The lock - key indicator on the power supply turns on , and the front panel operation is locked.

Removing Remote Control

Execute the LOCAL remote command or long press the **LOCK** key until the its backlight turns off
Another option is to unplug the LAN cable from the rear panel.

Save or recall the power supply's voltage and current settings

The power supply allows you to save and recall the power supply voltage and current settings in one of 4 memory locations, labeled 1 through 4. This allows you to quickly configure the power supply for commonly used applications. Independent, series and parallel modes can be set respectively.

To save the power supply voltage and current settings
1. Setup voltage and/or current via the voltage and/or current knob and channel keys.
2. Press the desired channel key and the desired mode key (light on as shown as follow picture).

3. Press and hold an option from **1** to **4** key until the pressed option key's indicator light to store the present state of the power supply in the specified memory location.

To recall the power supply voltage and current settings
1. Press an option from **1** to **4** key to recall the state stored in one of four memory locations. When the setting is called, the output is automatically in turn off state. At this time press the **OUTPUT** key to restore the output.

Load cable connection

Banana plug

Insert the plug into the socket.
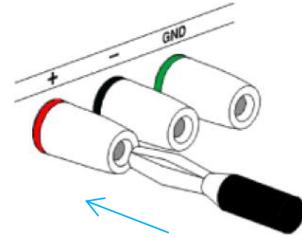
U Type plug

1 Turn the terminal counterclockwise
   And loosen the screw.

2 Insert the cable terminal.
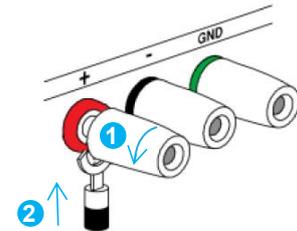
3 Turn the terminal clockwise and
   Tighten the screw.
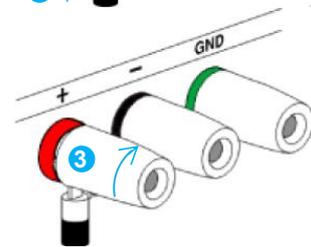
Wire type

When using load cables other than the attached, make sure they have enough current capacity for minimizing cable loss and load line impedance. Voltage drop across a wire should not excess 0.5V.
Following list the wire current rating at 450A/cm^2.

Wire Size			Max. Current (A)
Outer Diameter (mm)	Section Area (mm^2)	Resistance (Wkm)	
0.813	0.5189	33.9	2.5
1.02	0.8107	21.4	4
1.29	1.318	13.5	6
1.63	2.075	8.45	10
2.05	3.332	5.31	16

Specifications

The specifications apply when the power supply is powered on for at least 30 minutes under +20°C – +30°C.

Output Range

Voltage	CH1, CH2	0 to 30V
	CH3	2.5V, 3.3V, 5.0V
Current	0 to 3A	

Resolution

Voltage	1mV
Current	0.1mA
Power	1mW

Voltage Regulation

Load Regulation	≤0.01% + 3mV (rated current ≤ 3A) ≤0.02% + 5mV (rated current > 3A)
Line Regulation	≤0.01% + 3mV
Setting Accuracy (25 ± 5°C)	± (0.03% reading + 10 digits)
Readback Accuracy (25 ± 5°C)	± (0.03% reading + 10 digits)
Ripple & Noise	≤1mV$_{RMS}$ (5Hz to 1MHz)
Recovery Time	≤ 100µS (load change of 50%, minimum load of 0.5A)
Temperature Coefficient	≤300ppm/℃

Current

Load Regulation	≤0.2% + 3mA
Line Regulation	≤0.2% + 3mA
Setting Accuracy (25 ± 5°C)	± (0.3% reading + 10 digits)
Readback Accuracy (25 ± 5°C)	± (0.3% reading + 10 digits)
Ripple	≤3mA$_{RMS}$

Tracking Mode

Parallel Change Rate	Voltage Variation Rate	≤0.01% + 3mV
	Load Variation Rate	≤0.01% + 3mV (rated current ≤ 3A) ≤0.02% + 5mV (rated current > 3A)
Series Change Rate	Voltage Variation Rate	≤ 0.01%+5mV
	Load Variation Rate	≤ 300mV
Tracking Error		≤0.5%±10mV

General Characteristics

Remote Control Interface	LAN
Display	0.4' LED display to indicate 5 digits
Power Source	110/120 VAC ± 10% and 220/230 VAC ± 10%, 50/60Hz
Operating Environment	0℃ to 40℃, ≤80% relative humidity
Storage Environment	-20℃ to 70℃, ≤80% relative humidity
Cooling	Forced air cooling
Dimension	210 mm W x 140 mm H x 265 mm D
Weight	7 kg

Communication

The power supply has a LAN interface which user can establish communication with computers.

Communication configuration

Before performing any communication, you need to match the power supply with following parameters of the computer.

- **Baud Rate**: 4800, 9600, 19200, 38400, 57600, and 115200. The default value is 9600. You can access the system menu via the front panel of the power supply and configure the communication port rate.

- **Data Bits**: 8.

- **Stop Bits**: 1.

- **Parity Check**: NONE (8 data bits).

Start Bit	8 Data Bits	Parity=None	Stop Bit

Instructions and syntax
Note All instructions are not case sensitive.

Instruction Syntax			
Command Format	ISET<X>:<NR2> 1 2 3 4	1 - instruction title 2 - output channel 3 - delimiter 4 - parameters	
Output Channel		1: CH1, 2: CH2 etc.	
Parameter	Category	Description	Example
	<Boolean>	Boolean algebra	0 (off), 1 (on)
	<NR1>	Decimal integer	0, 1, 2, 3 …
	<NR2>	Decimal number	0.1, 3.14, 8.5
Error Message			
Content		Description	
Program mnemonic too long		Instruction length exceeds 15 characters	
Invalid character		Invalid character, inserted characters such as #, $, or%, e.g.: VOUT#	
Missing parameter		Missing parameters in the instruction, e.g. VSET: (must be parameterized)	
Data out of range		Parameter exceeds the specified range, e.g. VSET: 33 (must be to 30V)	
Command not allowed		Input commands are not accepted, e.g. the value of CH2 cannot be set in the case of parallel connection	
Undefined header		Instruction does not exist or has syntax errors	

Instructions list

● Each instruction details on the next page.

● "HELP ?" display all instructions except HELP itself and its meaning.

ISET\<X>:\<NR2>	Set current value
ISET\<X)?	Return the set current value
VSET\<X>:\<NR2>	Set voltage value
VSET?	Return the set voltage value
IOUT\<X>?	Return the actual current output value
VOUT\<X>?	Return the actual voltage output value
TRACK\<NR1>	Set operating mode
BEEP\<Boolean>	Turn on or off the buzzer
OUT\<Boolean>	Open or close the output
STATUS?	Return the status of the machine
*IDN?	Return the machine's identification code
RCL\<NR1>	Call setting value
SAV\<NR1>	Save set values
HELP?	Display command list
ERR?	Return instruction error message
BAUD\<NR1>	Set the baud rate for remote control
LOCAL	Return to local operation from remote control
REMOTE	Return to remote control from local operation
ISET\<X>:\<NR2>	Set current value

Note The instruction must be ended with (0x0A or 0x0D0A).

Instruction in details

ISET\<X>:\<NR2>

Description	Set the current value of the corresponding channel
X	Decimal integer, 1=CH1, (43038:3=CH3)
NR2	Decimal numbers, Range: 0 - 3.200A
Response time	Minimum value of 10 ms
Example	ISET1:2.234　　　Set the current value of CH1 to 2.234A

ISET\<X>?

Description	Return the corresponding channel current value set
X	Decimal integer, 1=CH1, 2=CH2 (4303S: 3=CH3)
Response time	Minimum value of 10 ms
Example	ISET1?　　Return the current setting value of CH1

VSET<X>:<NR2>

Description	Set the voltage value of the corresponding channel
X	Decimal integer, 1=CH1, 2=CH2 (43038:3=CH3)
NR2	Decimal numbers, Range: 0 - 32.000V
Response time	Minimum value of 10 ms
Example	VSET1:20.345 Set the voltage value of CH1 to 20.345V

VSET<X>?

Description	Return the corresponding channel voltage value set
X	Decimal integer, 1=CH1, 2=CH2 (4303S: 3=CH3)
Response time	Minimum value of 10 ms
Example	ISET1? Return the voltage setting value of CH1

IOUT<X>?

Description	Return the actual corresponding channel current output value
X	Decimal integer, 1=CH1, 2=CH2 (4303S: 3=CH3)
Response time	Minimum value of 10 ms
Example	IOUT1? Return the current output of CH1

VOUT<X>?

Description	Return the actual corresponding channel voltage output value
X	Decimal integer, 1=CH1, 2=CH2 (4303S:3=CH3)
Response time	Minimum value of 10ms
Example	IOUT1? Return the voltage output of CH1

TRACK<NR1>

Description	Select operation mode: independent, series or parallel
NR1	Decimal numbers, Range: 0 - 2
	0: Independent; 1: Series connection; 2: Parallel connection
Response time	Minimum value of 10 ms
Example	TRACK0 Select independent mode

BEEP<Boolean>

Description	Turn on or off the beeper
Boolean	Boolean algebra, 0 or 1
Response time	Minimum value of 10 ms
Example	BEEP1 Turn on the beeper

0UT<Boolean>

Description	Open or close the output
Boolean	Boolean algebra, 0 or 1
Response time	Minimum value of 10 ms
Example	0UT1 Open output

Description	Return the working status of the machine		
Response time	Minimum value of 10 ms		
Content	8-bit according to the following format:		
	Digit	**Content**	**Description**
	0	CH1	0=CC mode, 1=CVmode
	1	CH2	0=CCmode, 1=CVmode
	23	Tracking	01=independence, 11=series, 10=parallel
	4	Beep	0=OFF, 1=ON
	5	Output	0=OFF, 1=ON
	67	Baud	00=115200bps, 01=57600bps, 10=9600bps

HELP?

Description	Browse command list
Response time	Minimum value of 50 ms

Content

ISET<x>:<NR2>Sets the value of current.

VSET<x>:<NR2>Sets the value of voltage.

ISET<x>?Return the value of current.

VSET<x>?Return the value of voltage

IOUT<x>?Returns actual output current,

VOUT<x>?Returns actual output voltage.

TRACH<NR1>Sets the output of the power supply working on independent or tracking mode.

BAUD<NR1 >Set the value of baud rate.

RCL<NR1>Recal1 the setting data from the memory which previous

SAV<NR1>Saves the setting data to memory.

BEEP<Boolean>Sets the BEEP state on or off.

OUT<Boolean>Sets the output state on or off.

LOCAL Return to local mode

REMOTE Return to remote mode

*IDN?Returns instrument identification.

ERR?Returns instrument error messages.

STATUS?Returns the power supply state.

Note The response time of the above instructions is measured at the baud rate of 115200 bps.

Appendix

FAQ

1. Why the output can still be turned on or off after pressing the layout lock key?

Answer: For safety reasons, the output key is not controlled by the panel lock key.

2. Does the illumination of the CH3 overload indicator light indicate an error?

Answer: No, it doesn't. The illumination of the CH3 overload indicator light merely indicates that the CH3 output current has reached its maximum value of 3.0A, and the operation mode has switched from a constant voltage source to a constant current source. You can continue using the power supply. However, it is advisable to reduce the output load to prevent prolonged operation in the constant current mode, which may affect the performance and lifespan of the power supply or connected devices.

3. Why does the measured temperature not match the specification?

Answer: To obtain accurate temperature readings that align with the specifications, ensure that the power supply has been warmed up for at least 30 minutes. Additionally, the ambient temperature should be maintained within the range of +20 °C to +30 °C.

4. Why doesn't the saved settings record the output's open position?

Answer: For security purposes, the output state is predominantly saved or recalled in the "off" state.