

User Manual

SPD3000 LED Series

Programmable DC Power Supply

V1.0

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General Safety Summary

Please review the following safety precautions carefully to avoid personal injury or damage to this product or any product connected to it. To prevent potential danger, please use the instrument as specified.

Use proper power cord

Only the power cord designed for the instrument and authorized by local country could be used.

Power supply

AC Input Voltages: 100V/110V/220V/230V $\pm 10\%$, 50/60Hz.

Use proper fuse

The fuse types: 100V/110V(T6.3A/250V); 220V/230V(T3.15A/250V);

Make sure to use the correct type of fuse before turning on the instrument.

Do not connect the power cord before replacing the fuse.

Find out the reason why the fuse burned out before replacing the fuse.

Ground the instrument

The instrument is grounded through the protective terra conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to the earth. Make sure that the instrument is properly grounded before any inputs or outputs.

Observe all terminal ratings

To avoid fire or electric shock, please observe all ratings and symbols on the instrument. Read this guide carefully to know more details about the ratings before connection.

Keep proper ventilation

Inadequate ventilation may cause an increase of temperature, which will lead to further damage. Please keep proper ventilation and check the fan and air-vents regularly when using the instrument.

Operate condition

Location: indoor, no strong light, almost no Interfering pollution;

Comparative humidity: <80%

Altitude: <2000m

Temperature: 0℃ to 40℃

Do not operate in an explosive atmosphere

To avoid personal injury or damage to instrument, please do not operate in an explosive atmosphere.

Keep surface of the product clean and dry

To avoid dust or moisture in the air influence the performance of the instrument, please keep surface of the product clean and dry.

Safety Terms and Symbols

Terms may appear on the product:

DANGER: Indicates direct injury or hazard that may happen.

WARNING: Indicates potential injury or hazard that may happen.

CAUTION: Indicates potential damage to the instrument or other property that may happen.

Symbols may appear on the product:



**Hazardous
Voltage**



**Protective
Earth Ground**



Warning



**Earth
Ground**



**Power
Switch**

Brief Introduction

SPD3000 LED series Programmable DC Power Supply is convenient, flexible and multi-function. It is designed with three groups of independent output terminals, the output voltage of two groups is adjustable and another group is fixed to select: 2.5V, 3.3V, and 5V. The instrument also provides output short circuit and overload protection.



Main Features

- Three independent output channels, two of which are controllable, with a total power up to 195W;
- Compatible design for power voltage: 100V, 110V, 220V and 230V to satisfy different power network;
- Capable of saving and recalling set parameters;
- Perfect PC software to realize the real-time control through USBTMC.

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Chapter 1 Quick Guide

In this chapter, we mainly introduce the panel and display of SPD3000 LED, as well as the new machine inspection and attentions at first use. Reading the following steps will give you a quick understanding on operation.

General Inspection

1. Inspect the shipping container.

Keep the damaged shipping container or cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests.

The consigner or carrier will be responsible for damages to the instrument resulting from shipment. **SIGLENT** would not provide free maintenance or replacement.

2. Inspect the instrument.

If there are instruments found damaged, defective or failure in electrical and mechanical tests, please contact SIGLENT.

3. Check the accessories.

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

Safety Considerations

To ensure that the instrument can work normally, please conduct necessary inspection before using the SPD3000 LED.

Input Power Requirement

The SPD3000 LED series allows a 50Hz/60Hz frequency, and four levels of AC power: 100V/120V/220V/230V. You can select wanted power voltage with the “DIP Switch ” at the rear panel according to the actual demand.



Warning

To switch to the wanted power voltage, please disconnect the power cord first.

Electrical Check

Please use the power cord provided as accessory and connects the instrument to AC power. Check the power as the following steps.

1. Connect the power supply



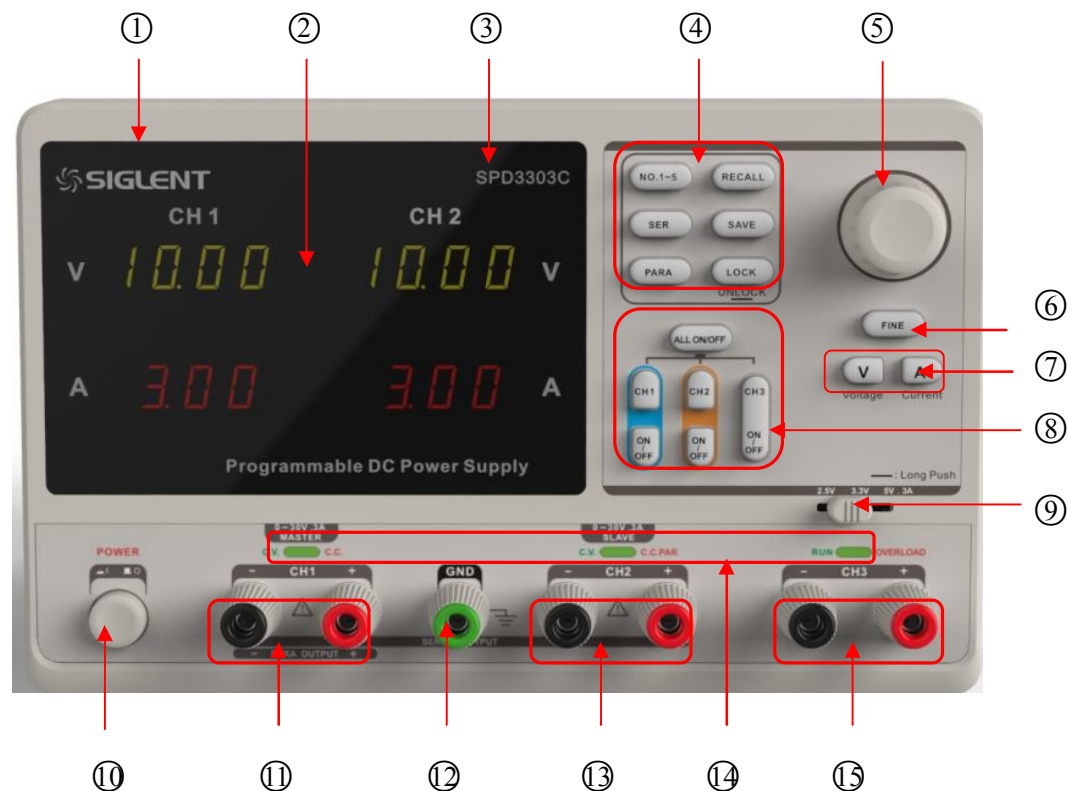
Warning

To avoid electric shock, please make sure that the instrument is grounded correctly.

2. Turn on the power switch

Press the button **POWER** to enter boot interface, and system return to the default settings after a while.

The Front Panel



NO.	Description	NO.	Description
1	Logo	9	CH3 DIP Switch
2	LED Display	10	Power Switch
3	Model	11	CH1 Output Terminal
4	System Parameter Configuration button	12	Ground Terminal
5	Multi-function knob	13	CH2 Output Terminal
6	Fine Adjust button	14	CV/CC Indicator Light
7	Voltage/Current button	15	CH3 Output Terminal
8	Channel Control button		

Instruction for Buttons

Buttons for setting parameters

- NO.1- 5** : Press the button to turn on/off the waveform display interface;
- SER** : Press the button to set series mode of CH1/CH2.
- PARA** : Press the button to set parallel mode of CH1/CH2.
- LOCK** : Long press the button to turn on/off the keylock function.
- SAVE** : Press the button to enter the storage system for saving files.
- RECALL** : Press the button to enter the storage system for recalling files.

Buttons for controlling the channel

- CH1** : Press the button to select CH1 as the current channel;
- CH2** : Press the button to select CH2 as the current channel;
- ON/OFF** : Press the button to turn on/off output of the current channel;
- CH3 ON/OFF** : Press the button to turn on/off the CH3 output.
- ALL ON/OFF** : Press the button to turn on/off all channels;

Other buttons

- FINE** : Press the button to open the fine adjust function and modify the parameter in the minimum step;
- V** **A** : To select between voltage and current.

The Front Panel Terminals



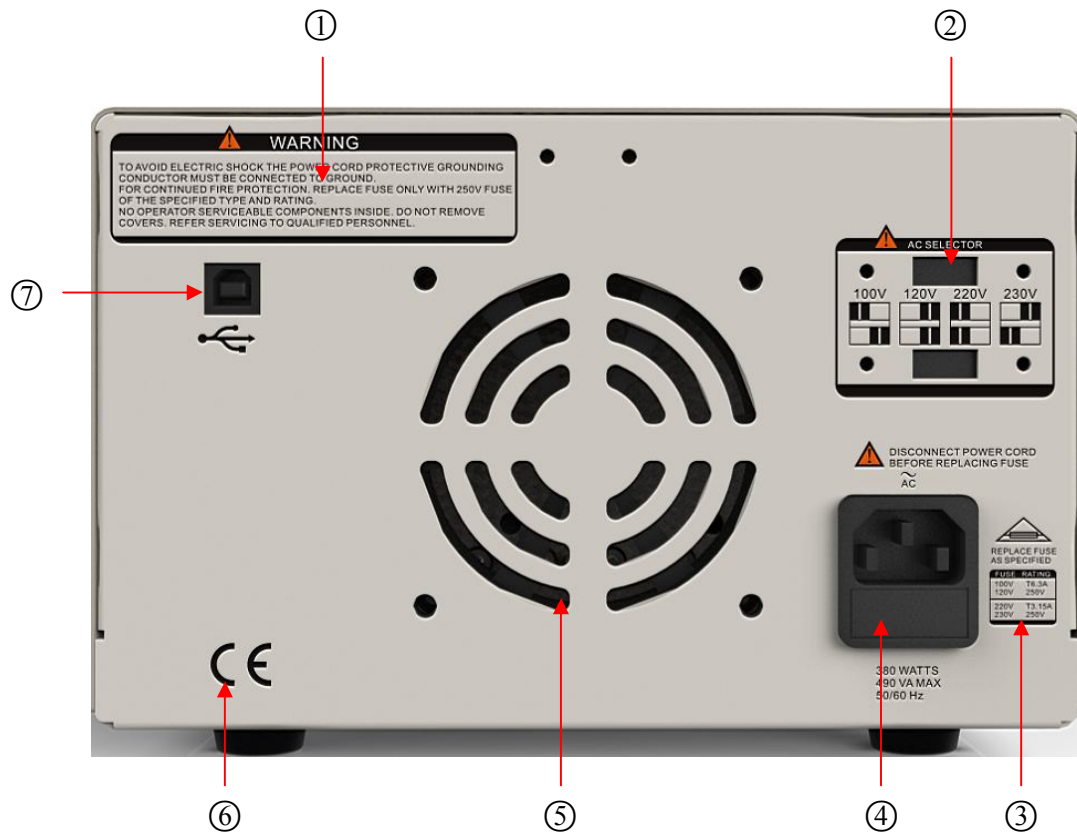
The positive/negative output terminals of CH1, CH2, CH3, and the common GND for CH1, CH2 are located on the front panel. Refer to later “control panel operation” for wiring method details.

User Interface



- ① Channel Logo;
- ② Voltage set/Readback value;
- ③ Current set/Readback value;

The Rear Panel



Description:

- ① Warning message
- ② AC power DIP switch
- ③ Instruction for the AC input voltage
- ④ AC power socket
- ⑤ Fan vent
- ⑥ CE certification mark
- ⑦ USB interface

Output Checking

To make sure the instrument can correctly respond to operation from the front panel, please perform the output checking, which includes voltage checking when all channels are with no load and current checking when short circuit occurs.

1. Output voltage checking

(1) With the instrument no load, turn on the power, and make sure the current value displaying is not zero;

(2) Check the output voltage of CH1/CH2

Turn on CH1/CH2 channel and the instrument acquiescently works in CV mode. Check whether the voltage value is adjustable from 0V to 32V.

2. Current output check

(1) Turn on the power.

(2) Check the output current of CH1/CH2.

Use an insulated wire to connect the positive and negative terminal of CH1/CH2;

Turn on CH1/CH2;

Select voltage and revolve the knob to set the value to 32V;

Select current and revolve the knob to set the value to 0A;

Check whether the current value is adjustable from 0A to 3.2A.

Chapter 2 Control Panel Operation

In this chapter, the function and operation of SPD3000 LED series control panel will be introduced in detail to give you an all-around understanding of it.

Brief introduction

Output Summary

CH1/CH2 Independent Output

CH3 Independent Output

Parallel Output

Series Output

Save and Recall

Output Summary

SPD3000 LED series is designed with three independent outputs, two of which are adjustable in voltage value and the other includes a set of selectable voltage values: 2.5V, 3.3V or 5.0V.

Independent/Parallel/Series

SPD3000 LED series has three output modes: independent, parallel and series that could be selected through the track switch on the front panel. In independent mode, the output current and voltage are controlled respectively. In parallel mode, the current value is twice that of single channel. In the series mode, the voltage value is twice that of single channel.

Constant Current/Voltage

In constant current mode (series/track mode), the current value is rated. The indicator light displays red and the voltage value are under its rating. The instrument will automatically turn to constant voltage mode when the current value gets less than its rating. (In parallel mode, the accessory channel remains in constant current mode neglecting shift of the current value.)

In constant voltage mode, the voltage value is rated. The indicator light displays green and the current value are under its rating. The instrument will turn to constant current mode when the current value gets up to its rating.

CH1/CH2 Independent Output

Instruction CH1 and CH2 are working in independent mode and insulated from the ground.



Output ratings 0~30V/0~3A (Max: 32V, 3.2A)

Operation steps

1. Make sure that parallel/series mode is off.
2. Connect load to the positive and negative terminals of CH1/CH2.
3. Set the voltage (current) value of CH1/CH2: Firstly, press V (or A) to select the voltage (current) parameter needed to modify. Then revolve the multi-function knob to set the wanted value (You could press FINE to make accurate adjusting).
Coarse adjusting: 0.1V or 0.1A each step.
Fine adjusting: the least precision each step.
4. Open output: Press ON/OFF button to turn on the output, the channel works in CC or CV mode and its indicator light gets lighted immediately.

CH3 Independent mode

Instruction CH3 works independently from CH1, CH2, and its voltage and current ratings are: 2.5V, 3.3V, 5V, 3A.



Output ratings 2.5V/3.3V/5V, 3A

Operation steps:

1. Connect the load to the positive and negative terminal of CH3 channel.
2. Select the wanted voltage value by moving the “DIP switch” of CH3.
3. Open the output: Press **ON/OFF** button to turn on the channel and the indicator light gets lighted immediately.

CV → CC

When the current value gets higher than 3A, the overload indicator light turns red and the working mode of CH3 turns to CC mode from CV mode.

Note: “Overload” does not mean abnormal operation.

CH1/CH2 Series Mode

Instruction In the series mode, CH1 and CH2 are linked internally into one channel controlled by CH1. The output voltage value is twice compared with that of single channel.



Output ratings 0~60V/0~3A (Max: 64V, 3.2A)

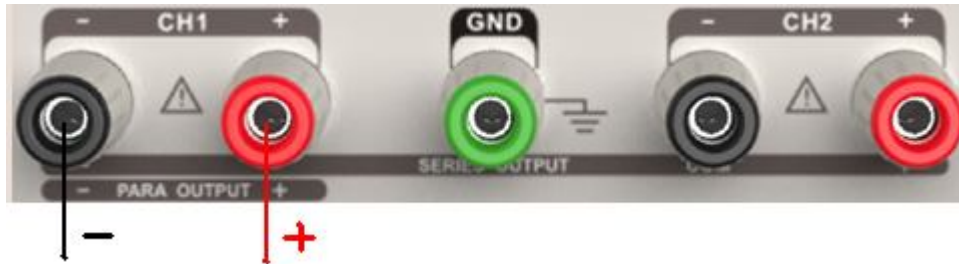
Operation steps:

1. Press the **SER** to start the Series mode, and the indicator light turns bright
2. Connect the load to the positive terminal of CH2 and the negative terminal of CH1;
3. Turn on CH1 and set its current value to 3A. In the default setup, the instrument works in "Coarse", you can turn to "Fine" by pressing **FINE**;
Coarse: 0.1V or 0.1A each step;
Fine: the least precision each step;
4. Turn on CH1 and set the output voltage/current value by revolving the multi-function knob;
5. Press **ON/OFF** button to open the output.

Note: You can identify the current working state "CC" or "CV" by referring to the indicator light. (red means CV, green means CC).

CH1/CH2 Parallel Mode

Instruction In the parallel mode, CH1 and CH2 are linked internally into one channel controlled by CH1. The output current value is twice as much as the single channel.



Output ratings 0~30V/0~6A (Max: 32V, 6.4A)

Operation steps:

1. Press the **PARA** button to start Parallel mode, and the indicator light turns bright immediately;
2. Connect the load to the positive and negative terminals of CH1;
3. Press **ON/OFF** button to open the output and the indicator light turns bright. Turn on CH1 and set its output voltage/current value by revolving the multi-function knob. In the default setup, the instrument works in “Coarse”, you could turn to “Fine” by pressing **FINE** button.

Note: You can identify the current working state “CC” or “CV” refer to the indicator light. (red means CV, green means CC). In parallel mode, CH2 only works in CC mode.

Save and Recall

Five groups of setups can be saved in memory. Contents of setups including:

- Independent/series/parallel mode
- Output voltage/current value

Steps for saving setup

1. Set the state needed to save;
2. Press **SAVE** to enter the save interface;
3. Select the wanted file group by pressing **NO.1-5**;
4. Press **SAVE** again to save the current state to the specified file group.

Steps for recalling setup

1. Press **RECALL** to enter the recall interface;
2. Select the wanted file group by pressing **NO.1-5**;
3. Press **RECALL** again to read the previously saved file.

Version Upgrade

The software of the instrument is upgraded with a fixed name file via PC management software with USBTMC. The upgrade method is below:

Upgrade in normal Interface

1. Open the EasyPower software after correct connection of the USB cable with the instrument.
2. Click the Upgrade option under the Version menu to enter the USB firmware upgrade interface. As shown in figure 1:

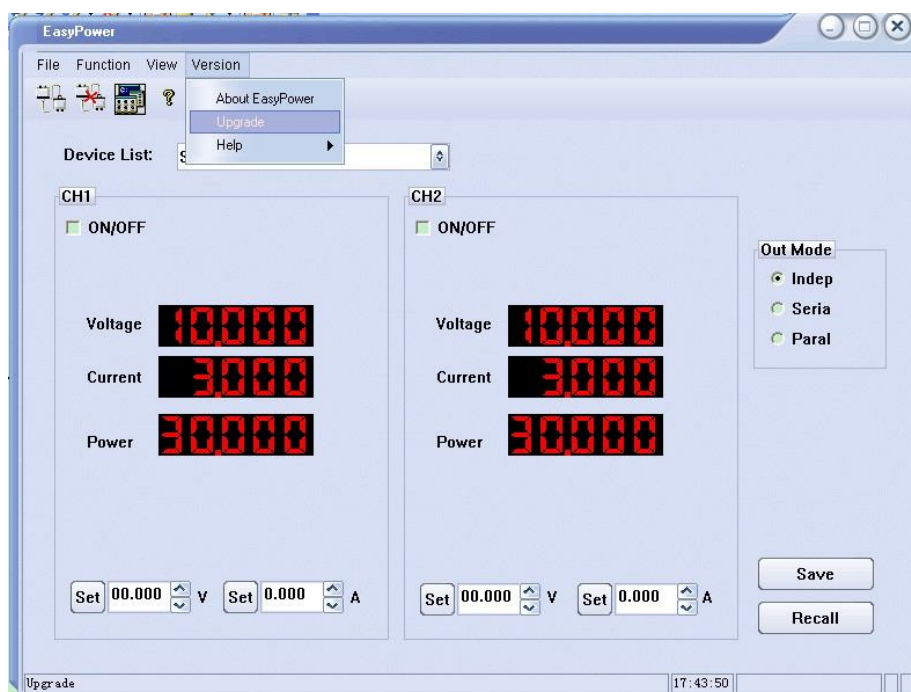


Figure 1

3. Click the “Normal Mode” option, then select the will upgrade file which is of “ugf” format.

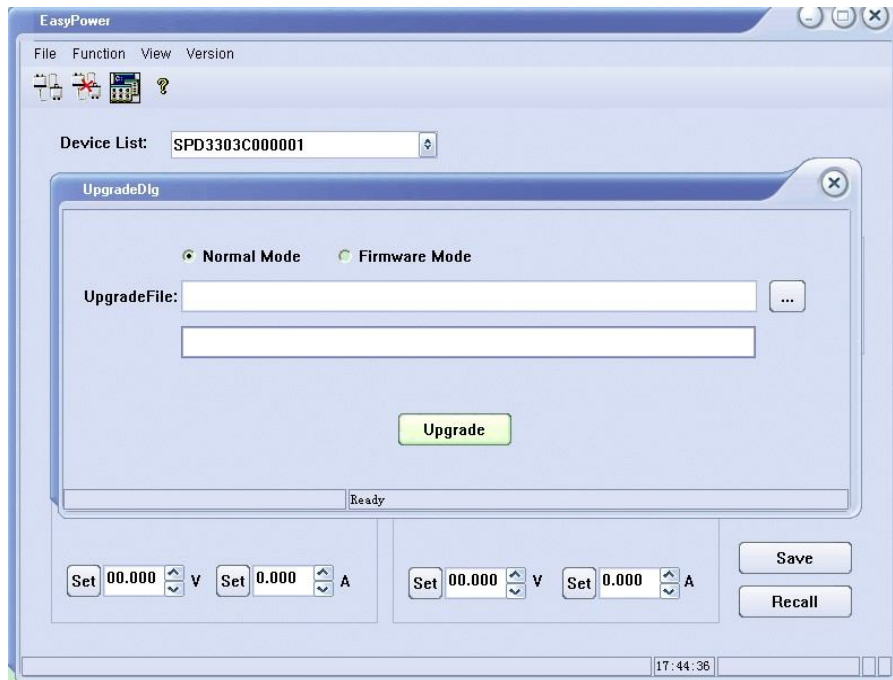


Figure 2

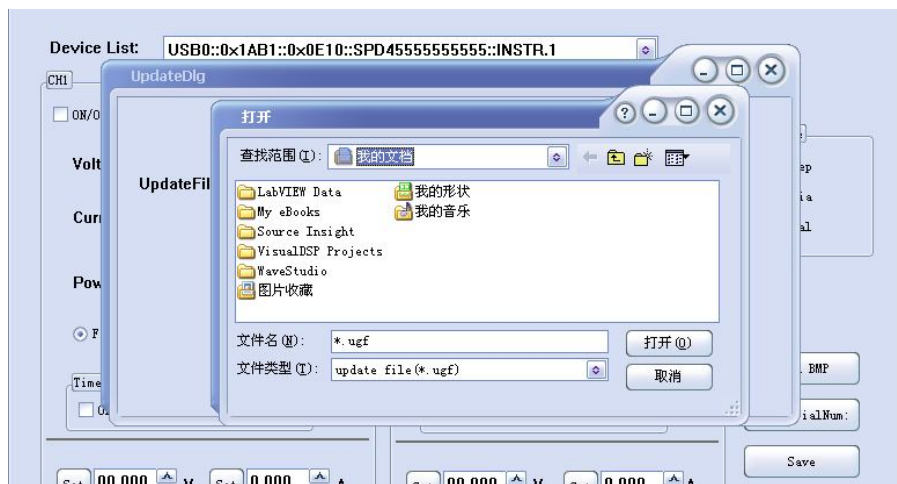


Figure 3

4. As it shows in figure 4, click the “Upgrade” to start upgrading. The instrument will run the upgraded software as soon as the upgrading completed.

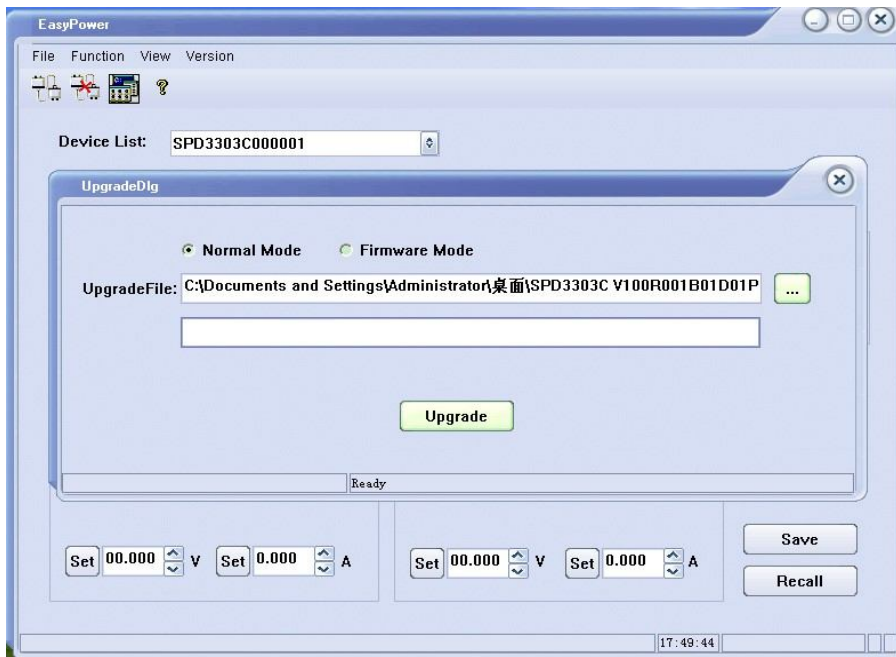


Figure 4

Upgrade via the Guiding Procedure

Upgrading via the guiding procedure can be used if the upgrading method above failed.

Specific steps:

1. Pressing the knob prior to power on the instrument to enter the guiding procedure mode.
2. As shown in figure 2, select the “Firmware Mode” option instead and the following upgrading steps are the same as method 1.

Chapter 3 Remote Control

SCPI Commands can be used to conduct remote control on the SPD3000 LED Power Supply through the USBTMC. To realize the remote control, the installation of EasyPower or NI (Measurement & Automation) software for the computer is required prior to connecting the instrument with it using an USB cable.

Command List

1. *IDN?
2. *SAV
3. *RCL
4. INSTRument {CH1|CH2}
5. INSTRument ?
6. MEASure:CURRent?
7. MEASure:VOLTage?
8. [SOURce:]CURRent <current>
9. [SOURce:]CURRent ?
10. [SOURce:]VOLTage <volt>
11. [SOURce:] VOLTage?
12. OUTPut
13. OUTPut:TRACK
14. SYSTem:ERRor?
15. SYSTem:VERSion?
16. SYSTem: STATus?

Command Description

1.*IDN?

Command format	*IDN?
Description	Query the manufacturer, product model, series NO. and software version.
Return Info	Manufacturer, product model, series NO., software version.
Example	Siglent, SPD3303C, SPD00001130025, 1.01.01.02.

2.*SAV

Command format	*SAV <name>
Description	Save the current state in nonvolatile memory with the specified name.
Example	*SAV 1

3.*RCL

Command format	*RCL <name>
Description	Recall state that previously saved.
Example	*RCL 1

4. INSTrument

Command format	INSTrument <CH1 CH2>
Description	Select the channel that will be operated.
Example	INSTrument CH1
Command format	INSTrument?
Description	Query the current operating channel

Example INSTRument?

Return Info CH1

5. MEASure

Command format MEASure: CURRent? < CH1|CH2>

Description Query current value for specified channel, if there is no specified channel, query the current channel.

Example MEASure: CURRent? CH1

Return Info 3.000

Command format MEASure: VOLTage? < CH1|CH2>

Description Query voltage value for specified channel, if there is no specified channel, query the current channel.

Example MEASure: VOLTage? CH1

Return Info 30.000

6. SOURce

Command format <SOURce:>CURRent <value>

<SOURce>:={CH1 | CH2}

Description Set current value for the current channel

Example CH1:CURRent 0.5

Command format <SOURce>: CURRent?

<SOURce>:={CH1 | CH2}

Description Query the current value for the current channel.

Example CH1: CURRent?

Return Info 0.5

Command format <SOURce>: VOLTage <value>
<SOURce>:={CH1 | CH2}

Description Set voltage value for the current channel

Example CH1: VOLTage 25

Command format <SOURce>: VOLTage?
<SOURce>:={CH1 | CH2}

Description Query the voltage value for the current channel.

Example CH1: VOLTage?

Return Info 25

7. OUTPut

Command format OUTPut <SOURce>, <state>
<SOURce>:={CH1 | CH2}; <state>:={ON | OFF}

Description Turn on/off the specified channel.

Example OUTPut CH1, ON

Command format OUTPut: TRACK <NR1>
<NR1>:={0[Independent] | 1[Series] | 2[Parallel]}

Description Select the operation mode

Example OUTPut: TRACK 0

8. SYSTem

Command format SYSTem: ERRor?

Description Query the error code and the information.

Command format SYSTem: VERSion?

Description Query the software version.

Example SYSTem: VERSion?

Return Info 1.01.01.02

Command format SYSTem: STATus?

Description Query the current working state.

Example SYSTem: STATus?

Return info 0x0224

Instruction The return info is in Hexadecimal format, which means that you must translate the return info into binary format. The correspondence relationship is as shown below.

Bit NO.	Corresponding State
0	0: CH1 CV mode; 1: CH1 CC mode
1	0: CH2 CV mode; 1: CH2 CC mode
2,3	01: Independent mode; 10: Parallel mode 11: Series mode
4	0: CH1 OFF 1: CH1 ON
5	0: CH2 OFF 1: CH2 ON

Chapter 4 Troubleshooting

Question 1: what to do if there occurs a short circuit on output terminal?

Answer1: There are over current protection and short circuit protection inside the power, so the current will be controlled in safety range.

Question 2: Is it abnormal that the CH3 overload indicator turns bright ?

Answer 2: No. That only means the current value reaches the maximum 3A. For better use, you'd better decrease the output load.

Question 3: Is it normal that in the series mode, the voltage and current value of one channel is respectively 0V and not 0A, while that of another channel proves not to be 0?

Answer 3: Yes. Because when the current output load gets higher than the limited, the working mode turns to CC from CV.

Question 4: what to do if upgrading fails?

Answer 4: please do it again.

Question 5: Is it normal that the practical value is a little different from the value you set (exceed performance standard), or even shifts slowly on startup?

Answer 5: Yes. During the startup, components inside the instrument are getting stable in 30 minutes, which lead to going up of the temperature.

Question 6: what if the circuit air switch turns off automatically when power on?

Answer 6: First of all, make sure if the rating of the air switch is proper (For instance: the rating of air switch B and C should be respectively over 16A and 10A). If the failure still exists beyond the reason, check if there occurs a short circuit, or return it to the factory to have it repaired by qualified personnel.

Chapter 5 Service and Support

Maintain Summary

SIGLENT warrants that the products that it manufactures and sells will be free from defects in materials and workmanship for a period of three years from the date of shipment from an authorized **SIGLENT** distributor. If a product or CRT proves defective within the respective period, **SIGLENT** will provide repair or replacement as described in the complete warranty statement.

To arrange for service or obtain a copy of the complete warranty statement, please contact your nearest **SIGLENT** sales and service office.

Except as provided in this summary or the applicable warranty Statement, **SIGLENT** makes no warranty of any kind, express or implied, including without limitation the implied warranties of merchantability and fitness for a particular purpose. In no Event shall **SIGLENT** be liable for indirect, special or Consequential damages.

Contact SIGLENT

MTR Add: 3/F, Building 4, Antongda Industrial Zone, 3rd Liuxian Road,
68 District, Baoan District, Shenzhen, P.R. CHINA

Tel: +86-755-36615186

E-mail: sales@siglent.com

[http: //www.siglent.com](http://www.siglent.com)

Specification

Test conditions: warm-up for about 30minutis, with temperature between +20℃~+30℃.

Output Ratings	CH1/CH2 independent	0~30V , 0~3A
	CH1/CH2 series	0~60V , 0~3A
	CH1/CH2 parallel	0~30V , 0~6A
	CH3	2.5V/3.3V/5.0V , 0~3A
Constant Voltage Mode	power change rate	≤0.01%+3mV
	Load change rate	≤0.01%+3mV(rating current ≤ 3A) ≤0.02%+5mV(rating current > 3A)
	Ripple and noise	≤2mVrms (5Hz ~ 1MHz)
	Recover time	≤100μs(50% load change ,minimum load 0.5A)
	Temperature coefficient	≤300ppm/℃
Constant Current Mode	Power change rate	≤0.2%+3mA
	Load change rate	≤0.2%+3mA
	Ripple and noise	≤3mA _{rms}
CH3	Power change rate	≤5mV
	Load change rate	≤15mV
	Ripple and noise	≤2mVrms (5Hz ~ 1MHz)
Tracking Operation	Track error	≤0.5%+10mV of Master(No Load)
Parallel Mode	Power change rate	≤0.01%+3mV
	Load change rate	≤0.01%+3mV(rating current≤3A) ≤0.02%+5mV(rating current>3A)
Series Mode	Power change rate	≤ 0.01%+5mV
	Load change rate	≤ 300mV
Resolution	Voltage	Voltage: 10mV
	Current	Current: 10mA
Display	Ammeter	3.2A full scale, 3 digits 0.4" LED display
	Voltmeter	32V full scale, 4 digits 0.4" LED display
Accuracy	Set precision	Voltage: ± (0.5% of reading + 1digit) Current: ± (0.5% of reading + 1digit)
	Readback precision	Voltage: ± (0.5% of reading + 1digit) Current: ± (0.5% of reading + 1digit)
Insulation	Between base and terminal	20MΩor above (DC 500V)

	Between base and AC 30MΩ or above (DC 500V) power cord	
Operating environment	Indoor	
	Altitude	≤2000 m
	Environment temperature	0 ~ 40℃
	Comparative humidity	80%
	Installation level	II
	Pollution level	2
Storage environment	Environment temperature	-10 ~ 70℃
	Comparative humidity	≤ 70%
Power supply	AC 100V/120V/220V/230V±10%, 50/60HZ	
Volume	275mm x 225mm x 136mm	
Weight	7.5kg	

Appendix A: Accessories

SPD3000 LED Series Programmable DC Power Supply Accessories:

- A User Manual
- A Certification
- A Guaranty Card
- A CD(including EasyPower software)
- A Power Cord that fits the standard of destination country
- An USB Cable