

# SP-300 Series Programmable AC Power Supply & System

»» Application Guide



■ High Efficiency

■ High Precision

■ High Stability

# SP-300 Series Programmable AC Power Supply & System

## SP-300 Series Single-phase Programmable AC Power Supply



(2U)600W~1500W



(3U)2000W



(4U)3000W~5000W

Output			Model	Size	Standard Interface	Optional Information	Certificates
Voltage	Current	Power					
150V/300V	5.6A/2.8A	600W	SP300VAC600W	2U <sup>1</sup>	RS232/RS485/USB	(1) (2) (3)	CE/UL/CSA/FCC
150V/300V	9.2A/4.6A	1000W	SP300VAC1000W	2U <sup>1</sup>	RS232/RS485/USB	(1) (2) (3)	CE/UL/CSA/FCC
150V/300V	13.8A/6.9A	1500W	SP300VAC1500W	2U <sup>1</sup>	RS232/RS485/USB	(1) (2) (3)	CE/UL/CSA/FCC
150V/300V	16A/8A	2000W	SP300VAC2000W	3U <sup>2</sup>	RS232/RS485/USB/LAN	(4) (5)	CE/UL/CSA/FCC
150V/300V	27.6A/13.8A	3000W	SP300VAC3000W	4U <sup>3</sup>	RS232/RS485/USB/LAN	(4) (5)	CE/UL/CSA/FCC
150V/300V	32A/16A	4000W	SP300VAC4000W	4U <sup>3</sup>	RS232/RS485/USB/LAN	(4) (5)	CE/UL/CSA/FCC
150V/300V	46A/23A	5000W	SP300VAC5000W	4U <sup>3</sup>	RS232/RS485/USB/LAN	(4) (5)	CE/UL/CSA/FCC

## SPST Series Linked 3-Phase AC Power Supply System



(9U)1800W~4500W



(17U)6000W



(17U)9000W~15000W

Output			Model	Size	Standard Interface	Optional Information	Certificates
Voltage	Power	Output Mode					
150V/300V	1800W	Single/Three Phase	SPST300VAC1800W-2-9	9U <sup>4</sup>	RS232/RS485/USB	(1)	CE
150V/300V	3000W	Single/Three Phase	SPST300VAC3000W-2-9	9U <sup>4</sup>	RS232/RS485/USB	(1)	CE
150V/300V	4500W	Single/Three Phase	SPST300VAC4500W-2-9	9U <sup>4</sup>	RS232/RS485/USB	(1)	CE
150V/300V	6000W	Single/Three Phase	SPST300VAC6000W-3-17	17U <sup>5</sup>	RS232/RS485/USB/LAN	(4)	CE
150V/300V	9000W	Single/Three Phase	SPST300VAC9000W-4-17	17U <sup>6</sup>	RS232/RS485/USB/LAN	(4)	CE
150V/300V	12000W	Single/Three Phase	SPST300VAC12000W-4-17	17U <sup>6</sup>	RS232/RS485/USB/LAN	(4)	CE
150V/300V	15000W	Single/Three Phase	SPST300VAC15000W-4-17	17U <sup>6</sup>	RS232/RS485/USB/LAN	(4)	CE

\*This formula is the standard cabinet for SP-300 series 2U/3U/4U model. It is available to select cabinet with different specification according to exact situation. Detail please consults our area manager.

The output of the three phase power supply can be connected in two ways, including Wye connection and Delta connection. In the Delta connection mode, the output voltage can reach 520V.

## Dimensions & Weight



① 423.0x87.0x520.0 mm & 15.9kg



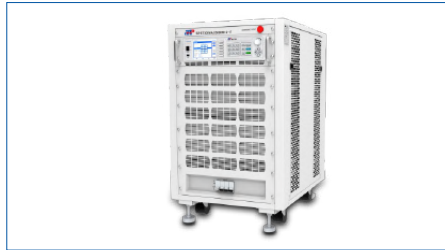
② 423.0x133.0x520.0 mm & 21.4kg



③ 423.0x177.0x520.0 mm & 29kg



④ 540.0x400.0x640.0 mm & 88.7kg



⑤ 560.0x754.0x700.0 mm & 134kg



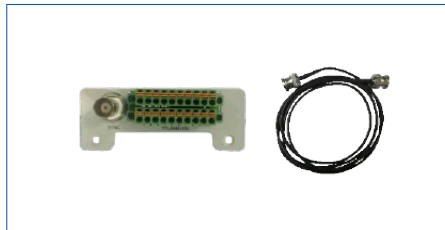
⑥ 560.0x754.0x700.0mm & 157kg

## Optional Information

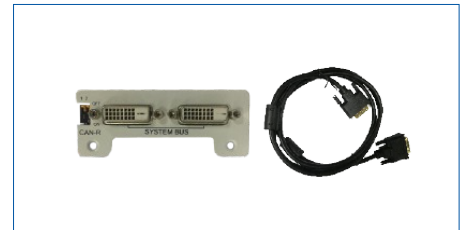
(1) LAN & GPIB interface card & cables



(2) Analog I/O interface card & cable



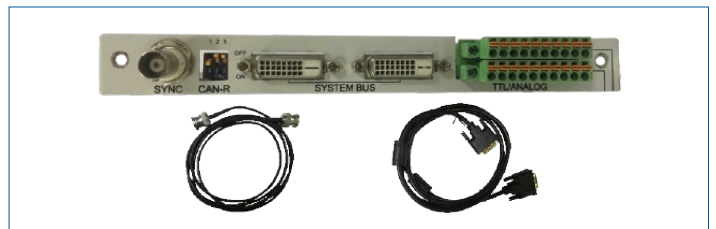
(3) Multiphase link card & cable



(4) GPIB interface card & cable



(5) Analog I/O & multiphase link card & cables



## Features

- Large color touch screen with intuitive interface, easy to operate
- Features AC, DC, AC+DC output modes, AC+DC output mode for voltage DC offset simulation
- Turn on, turn off phase angle control, 0-359.9°
- Output frequency: 15-1200Hz, programmable slew rate setting for changing voltage and frequency
- High output current crest factor which is ideal for inrush current testing
- Built-in power meter function, can real-time measure 15 electrical parameters such as RMS voltage, current, power, apparent power and etc. This series AC source can measure up to 40 orders of the voltage or current harmonics. Support LIST/PULSE/STEP modes to simulate all kinds of power line disturbance conditions
- Triac Dimmer function for dimming/governor simulation function
- Sweep function for efficiency testing and shows voltage and frequency value at max power
- Multiple current range to make current measurement more accurate
- Front panel USB interface supports CSV format to import waveform
- OCP/OVP/OPP/OTP/reverse current protection/short circuit protection
- Programmable voltage and current limit, support CC mode
- Support up to 2 units in series, 4 units in parallel
- Support three phase power output, can simulate three phase unbalanced output
- Support external analog input control and TTL electrical level output
- Two versions to meet the cost performance and different applications



# SP-300 Series Programmable AC Power Supply & System

## Difference between Advanced Version and Professional Version

Function description	Advanced Version	Professional Version
Output frequency range	15~1000Hz	15~1200Hz
Built-in IEC standards	IEC 61000-4-11	IEC 61000-4-11; IEC 61000-4-13; IEC 61000-4-14; IEC 61000-4-28
Programmable output impedance	Not supported	Support, meet IEC 61000-3-2/ IEC 61000-3-3 output impedance test requirements
Harmonic/inter-harmonic generation simulation and measurement function	Not supported	Support, the harmonic components can be up to 40 orders

## Panel Introduction

### 0.6 - 1.5kVA

① Power Switch (Up), USB Interface (Down)

② Color Touch Screen

③ Multifunctional Keys

④ Numeric and Functional Keys

⑤ Output Terminal

⑥ AC Input Terminal

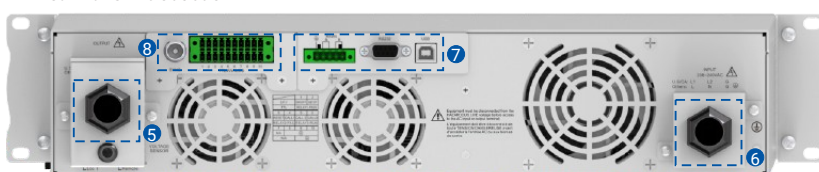
⑦ RS485/RS232/USB Communication Interface (LAN & GPIB Interface Card is Optional)

⑧ Analog I/O Interface Card (Optional)

#### Front Panel Introduction



#### Rear Panel Introduction



Note: If the LAN&GPIB communication card is selected, it will replace RS485/RS232/USB to be installed in the same position.

If parallel/multiphase interface card is selected, it will replace remote I/O interface card to be installed in the same position.

### 2 - 5kVA

① Power Switch (Up), USB Interface (Down)

② Color Touch Screen

③ Multifunctional Keys

④ Numeric and Functional Keys

⑤ Output Terminal

⑥ AC Input Terminal

⑦ RS485/RS232/USB/LAN Communication Interface

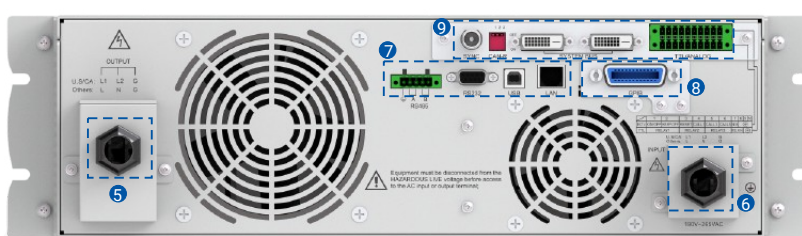
⑧ GPIB Communication Interface (optional)

⑨ Analog I/O & multiphase link card (optional)

#### Front Panel Introduction



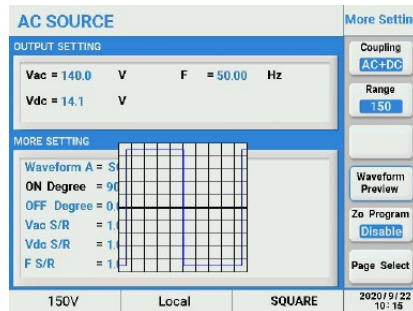
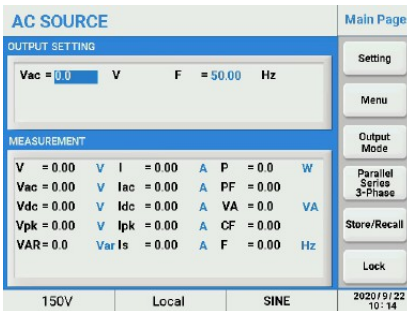
#### Rear Panel Introduction



## Function Introduction

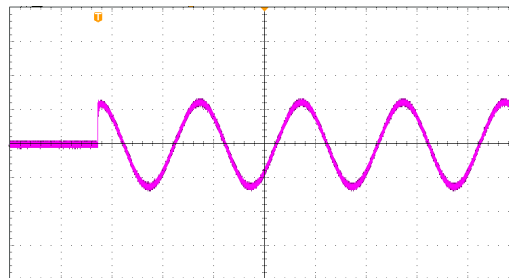
### Graphical User Interface

The large color touch screen provides simple and fast operation for customers, real-time update of display output data and power status, and graphical display makes it more intuitive.



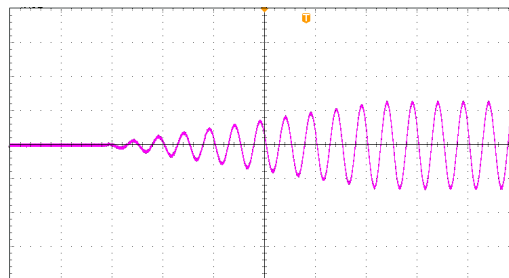
### Settable ON/OFF Phase Angle of Output Waveform

This series of AC power supply can set the ON phase and OFF phase of sinusoidal output waveform, suitable for the output test of switching power supply. Set the ON angle to 90 degrees for surge current testing, the power supply will show the measured value of surge current. Users can set when start to measure the surge current and the duration of the measurement.



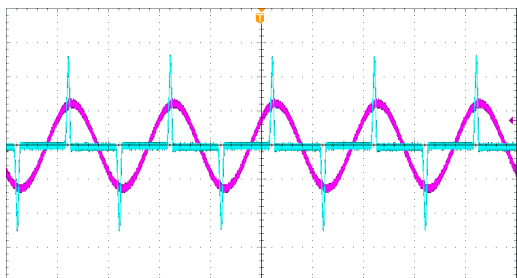
### Slew Rate Setting for Voltage and Frequency

This series AC power supply let users set the slew rate of voltage and frequency, in such application in order to reduce the inrush current during motor or compressor startup.



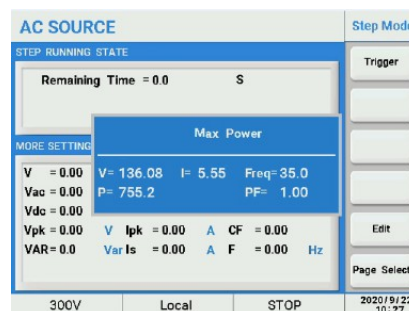
## High Output Crest Factor

This series AC power supply deliver up to 5~6 times of peak current from its RMS current, so it is suitable for testing switching power supplies and motor with high inrush current issue.



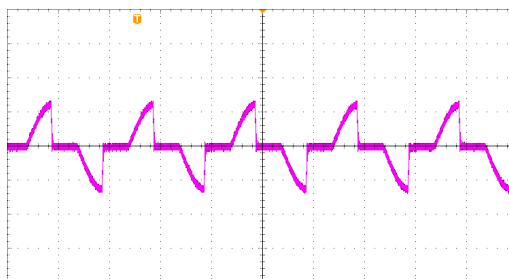
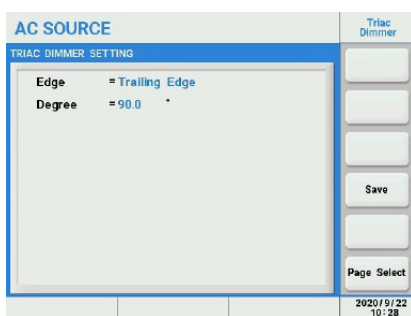
## Power Sweep Function

This series AC power supply can test the efficiency of switching power supply and capturing the voltage, current, power and frequency at the maximum power operating point, the measurements will be displayed at the end of the sweep.



## Triac Dimmer Function

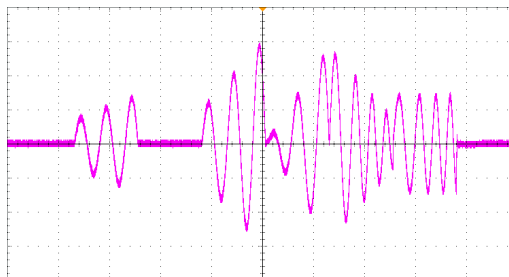
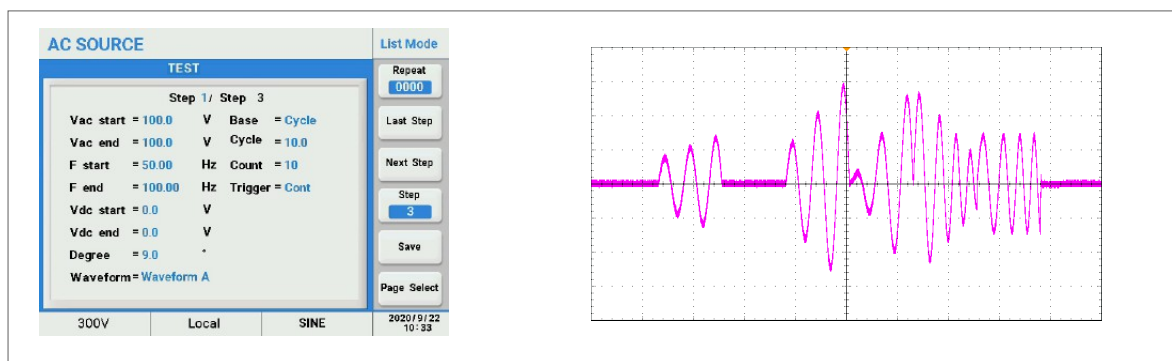
This series AC power supply built-in triac dimmer function, which is used to do dimming and speed regulating test for lamp or electric motor to ensure the products work well both in R&D and production testing.



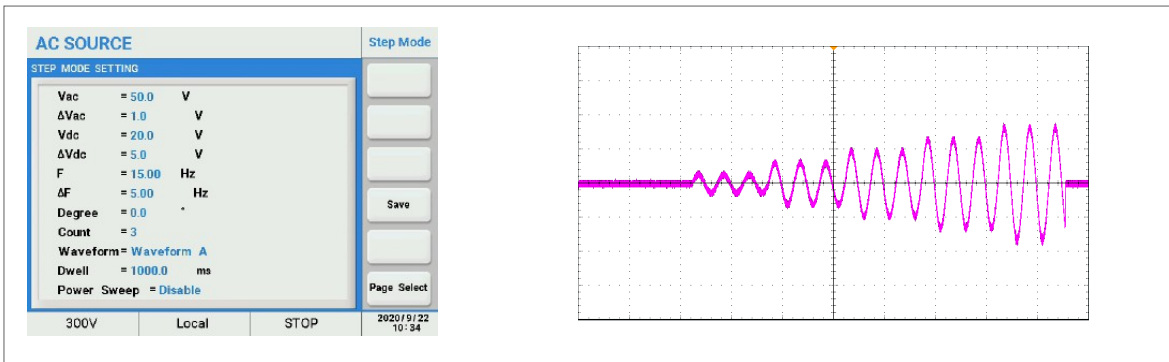
## Power Line Disturbance Simulation

This series AC power supply provides powerful function to simulate all kinds of power line disturbance conditions such as cycle dropout, transient spike, brown out and etc. This feature make this series AC power supply ideal for R&D labs, universities and certification labs.

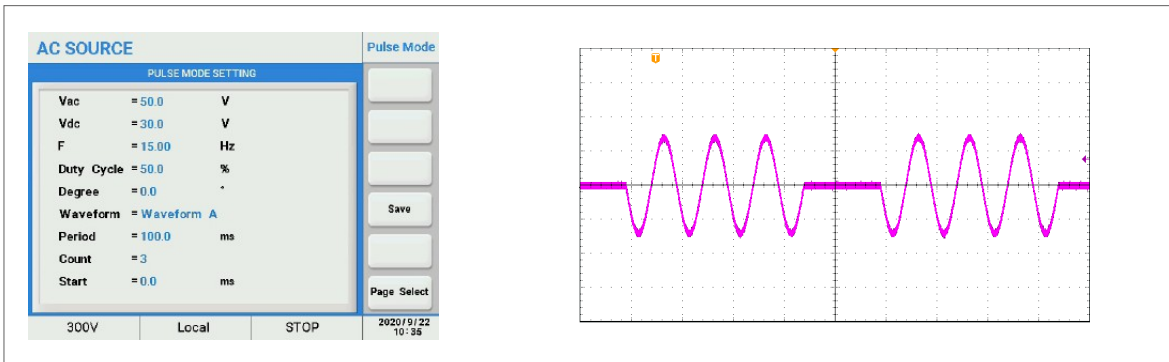
### LIST Mode



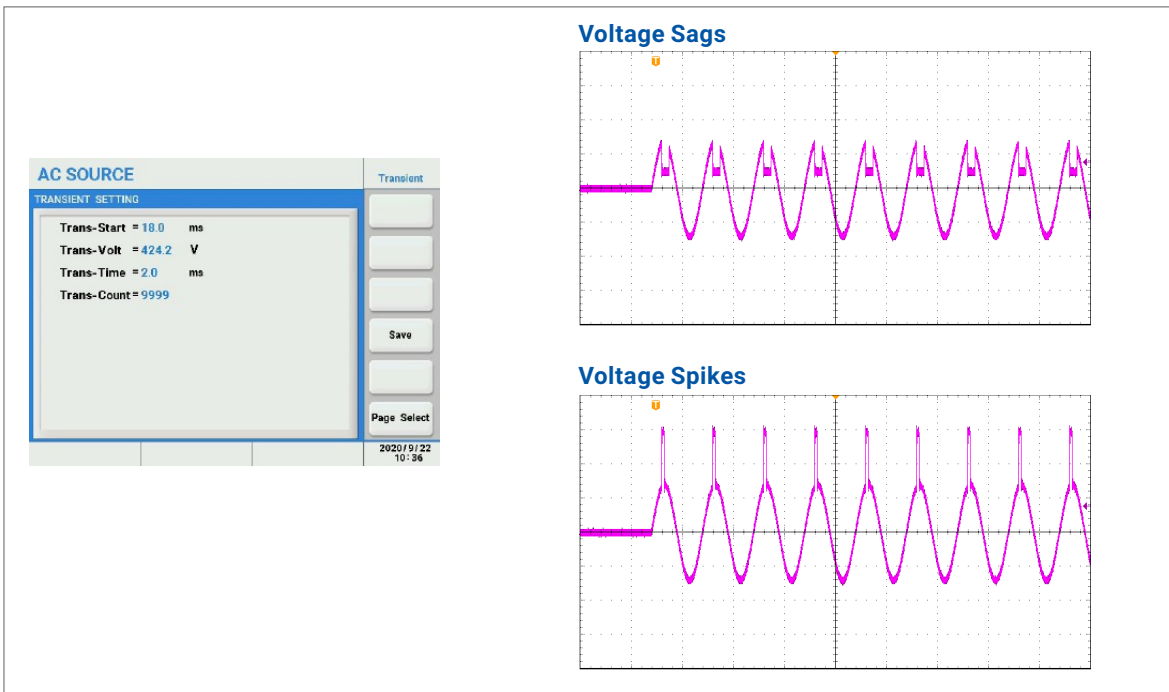
## STEP Mode



## PULSE Mode



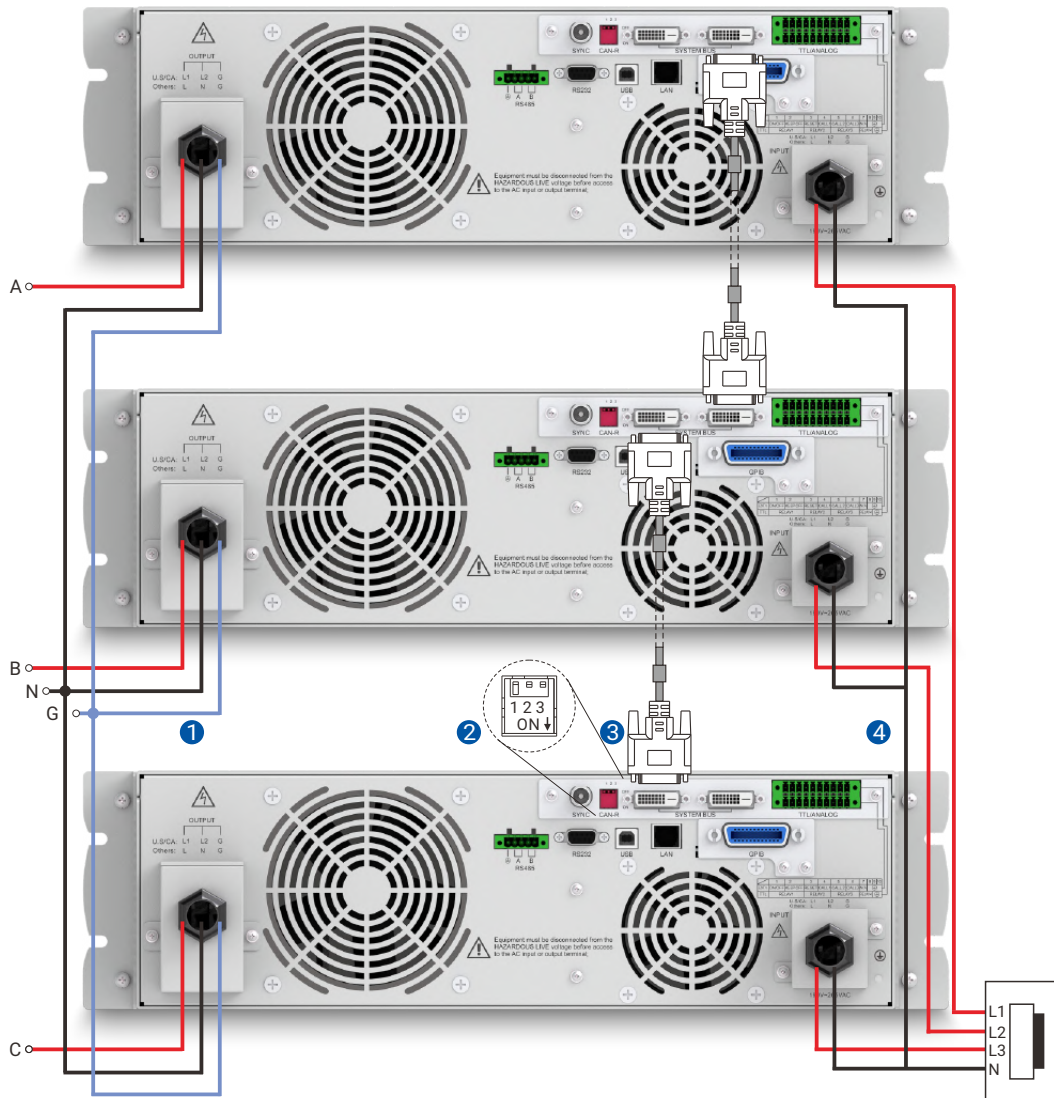
## Voltage Sags/Voltage Spikes







## Three-phase five-wire connection (Wye type)

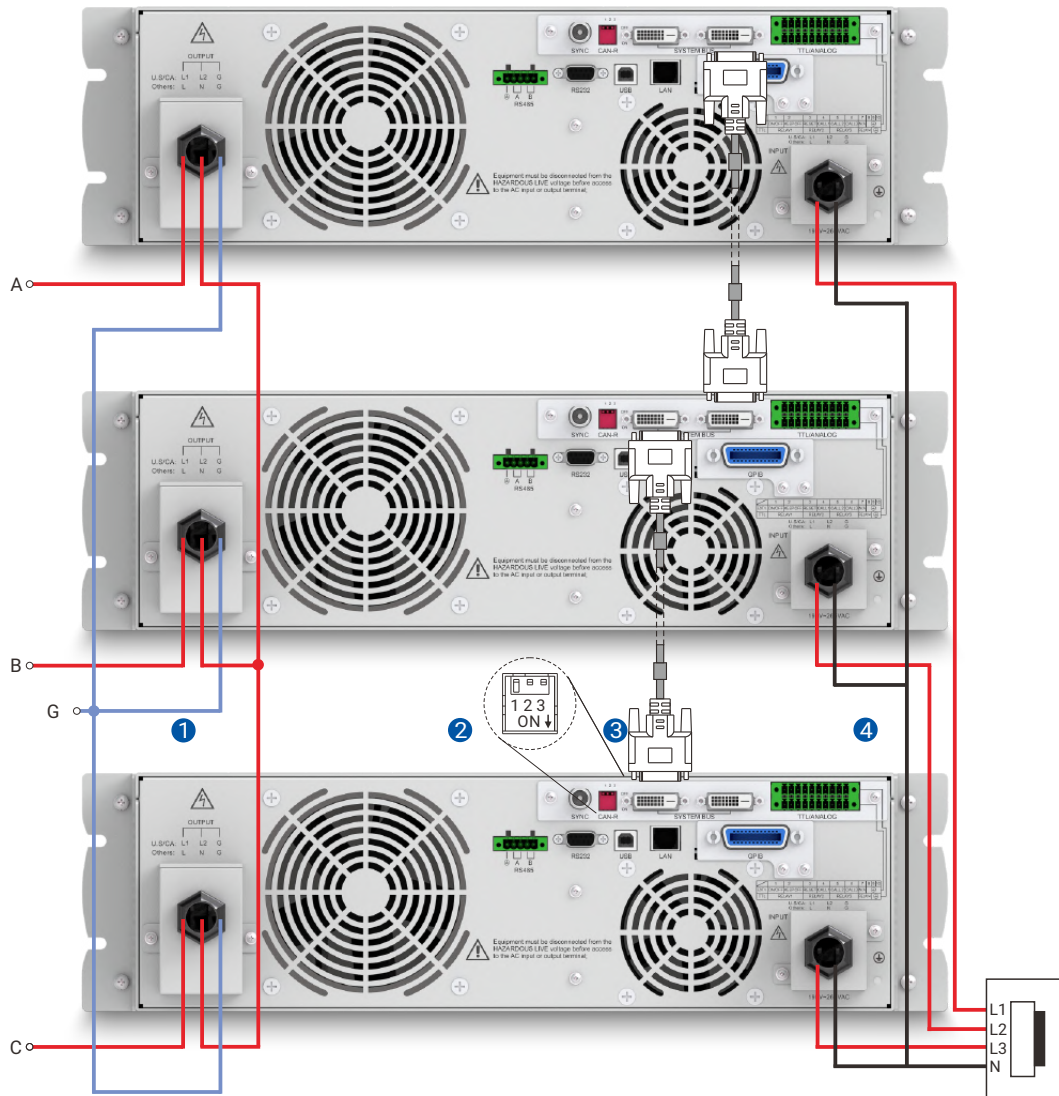


- ① Output connections
- ② Terminal resistance CAN-R, flip Dip switch 1 to ON position (Down)
- ③ System bus communication cable.
- ④ Only support three-phase five-wire connection

The output voltage range of three-phase five-wire (Wye type) connection is 0 ~ 300V.

# SP-300 Series Programmable AC Power Supply & System

## Three-phase four-wire connection (Delta type)



- 1 Output connections
- 2 Terminal resistance CAN-R, flip Dip switch 1 to ON position (Down)
- 3 System bus communication cable.
- 4 Only support three-phase five-wire connection

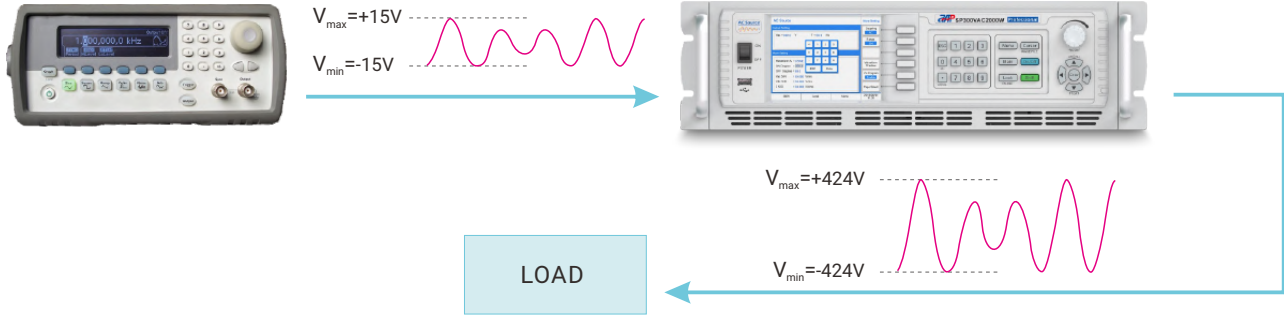
The output voltage range of three-phase four-wire (Delta type) connection is 0 ~ 519V

## External Control Function

By selecting Analog I/O card to achieve below function:

### 1) Amplifier Mode

In Amplifier mode, the power source acts as a power amplifier, taking a low-level analog signal and amplifying it by a fixed amount of gain.



### 2) External Control Instruction

Pin No.	Reference	Type	Description	Maximum
Pin1	ON/OFF	EXT.V	Control input for output on/off, low level (0~0.5V) disables the output, high level (4.5~5.5V) enables the output	6Vdc
Pin2	KEEP OFF <sup>[1]</sup>	EXT.V	Keep OFF function, low level (0-0.5V) disables the function, high level (4.5-5.5V) enables the function	
Pin3	RESET	EXT.V	High level (4.5 ~ 5.5V) will enable alarm clear function	
Pin4	CALL 1	EXT.V	0=low electrical level (0-0.5V), 1= high electrical level (4.5 ~ 5.5V)	
Pin5	CALL 2	EXT.V	0=low electrical level (0-0.5V), 1= high electrical level (4.5 ~ 5.5V)	
Pin6	CALL 3	EXT.V	0=low electrical level (0-0.5V), 1= high electrical level (4.5 ~ 5.5V)	
Pin7	N/A	EXT.V	Not Used	-
Pin8-10	⊕	EXT.V	GND	-

<sup>[1]</sup> If the KEEP OFF signal keeps high (enable) there will be always no output.

### 3) TTL Signal Instruction

Pin No.	Reference	Type	Description	Maximum	Electrical Parameters
Pin1-2	RELAY1-PASS	TTL	These two pins will connected internally when the unit passed the test mode	250VAC 3Amp/ 30VDC 3Amp	These pins without positive and negative polarity, do not share the ground neither.
Pin3-4	RELAY2-FAIL	TTL	These two pins will connected internally when the unit failed the test mode		
Pin5-6	RELAY3-RUN	TTL	These two pins will connected internally when the unit is running		
Pin7-8	RELAY4	TTL	Not Used	-	-
Pin9-10	⊕	TTL	GND	-	-

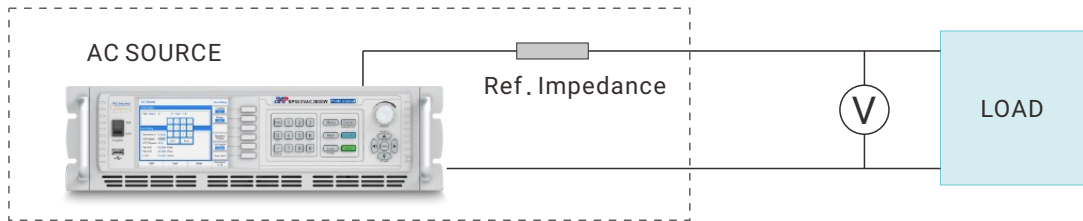
## Firmware Upgrade

This series AC power source supports firmware upgrade. The DSP firmware can be upgraded via RS232 communication, the display and remote firmware can be upgraded via the USB interface in the front panel. The upgrade process is very easy to operate. The upgrade feature keeps the latest software function supported by the power supply.

## Professional Version Power Supply Function

### Programmable Output Impedance Function

The low output impedance and low voltage harmonics of this series power supply make it ideal for IEC61000-3-2 standard testing. A current feedback control circuit makes the output voltage changed with load. This feature is suitable for IEC61000-3-3 Flicker tests. The user can set the resistance and inductance value according to the test requirement.



### More Built-in IEC Standard Test Waveforms

Professional version supports more built-in IEC standard test waveforms

IEC 61000-4-11, Testing and measurement techniques-Voltage dips, short interruptions and voltage variations immunity tests (AC,<16A)

IEC 61000-4-13, Testing and measurement techniques-Harmonics and inter-harmonics including mains signaling at AC power port, low frequency immunity tests

IEC 61000-4-14, Testing and measurement techniques-Voltage fluctuation immunity test

IEC 61000-4-28, Testing and measurement techniques-Variation of power frequency, immunity test for equipment with input current not exceeding 16 A per phase

The above standards can meet the power immunity test for products exported to Europe.

### IEC 61000-4-11

The screenshot shows the control interface for the AC SOURCE. The main display area is titled 'IEC 4-11 VOLT DIPS & SHORE INTERRUPTIONS'. It shows the following settings: Voltage Dips = Class 2, Volt Range = 300 V, Count = 5, Unom = 230.0, and Frequency = 50.00. Below these settings is a table with columns: Step, %, Cycle, Start, Degree, Repeat, Interval. The table contains three rows of data:

Step	%	Cycle	Start	Degree	Repeat	Interval
1	0	0.5	0.0	*	3	10 S
2	0	1.0	0.0	*	3	10 S
3	70	25.0	0.0	*	3	10 S

At the bottom of the screen, it shows '300V', 'Local', 'SINE', and the date '2020/9/22 13:24'. To the right of the settings is a graph showing a purple sine wave with a vertical dashed line indicating a voltage dip event.



IEC 61000-4-13

**AC SOURCE**

IEC 4-13 FLAT CURVE SETTING

Test Level = Class 1 | Class 1 | Age = 300 V

AMP = 95.0 | Class 2

Unom = 230.0 | Class 3

Frequency = 50.00 | User

Test Time = 10 S

300V | Local | SINE | 2020/9/22 13:26

IEC 61000-4-14

**AC SOURCE**

IEC 4-14 SETTING

Operation = Standard Volt Range = 300 V

Class = Class 2 | Class 2

Unom = 230.0 | Class 3

Frequency = 50.00 Hz

Cycle = 1

300V | Local | SINE | 2020/9/22 13:26

IEC 61000-4-28

**AC SOURCE**

IEC 4-28 SETTING

Operation = Standard Volt Range = 300 V

Test Level = Level 2 | Level 2

Unom = 230.0 | Level 3

Frequency = 50.00 | Level 4

tp = 10 S

Up Limit = 3 %

Down Limit = -3 %

300V | Local | SINE | 2020/9/22 13:27

### Harmonic/inter-harmonic Generation Simulation and Measurement Function

Support creating waveforms made up of a series of harmonics frequencies, amplitudes and phase shifts, up to 40 orders harmonics of 50Hz or 60Hz. The harmonics measurement function measures total harmonic distortion (THD), DC voltage and current and fundamental voltage and current for output settings of 50Hz or 60Hz. The measurement of 2~40 orders can be displayed in absolute values or in percent of the fundamental, the harmonics measurement will be displayed with a graphical representation.

**AC SOURCE**

SYNTHESIS WAVEFORM FUNDAMENTAL SETTING

Vac\_fund = 150.0 V | F\_fund = 50 Hz

Vdc = 10.0 V | Degree = 0.0 °

N	V	θ	N	V	θ
2	0.0	0.0	12	0.0	0.0
3	2.0	0.0	13	4.0	0.0
4	0.0	0.0	14	0.0	0.0
5	4.0	0.0	15	5.0	0.0
6	0.0	0.0	16	0.0	0.0
7	6.0	0.0	17	3.0	0.0
8	0.0	0.0	18	0.0	0.0
9	5.0	0.0	19	4.0	0.0
10	0.0	0.0	20	0.0	0.0
11	5.0	0.0	21	5.0	0.0

300V | Local | STOP | 2018/12/27 08:49

**AC SOURCE**

HARMONIC MEASUREMENT SETTING

THD = 8.2 % | DC = 6.92 V

Fundamental = 149.85 V

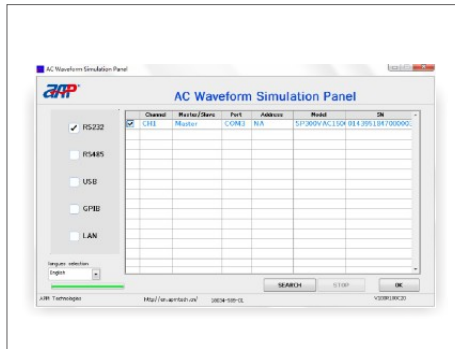
300V | Local | RUNNING | 2018/12/27 09:08

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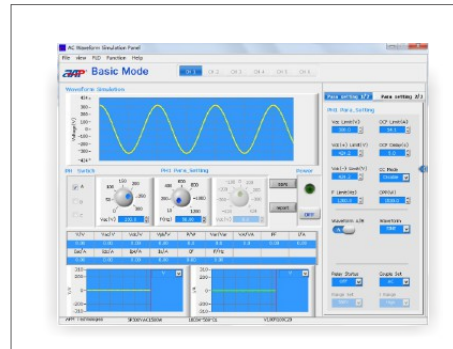
## Monitoring Software

AC Waveform Simulation Panel is a graphical user interface that provides extraordinary capabilities and convenience by delivering control of the unit remotely, which covers all functions of panel operation.

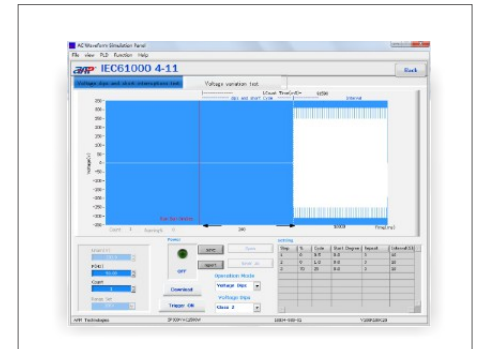
Login Interface



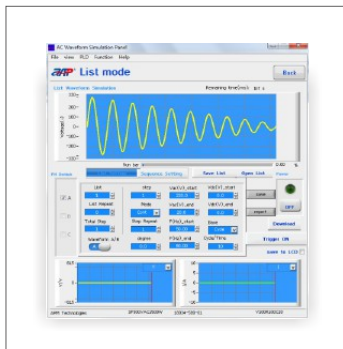
Basic mode(Main interface)



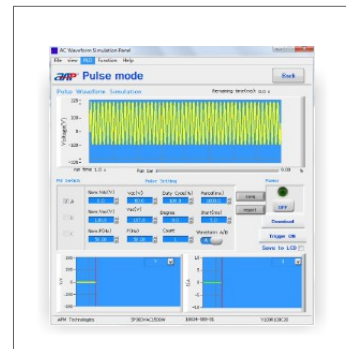
IEC61000 4-11 interface



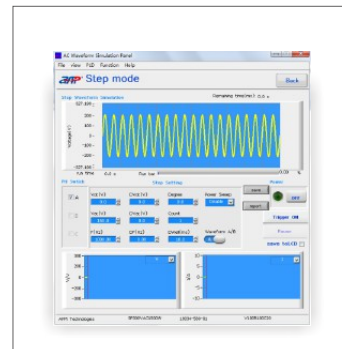
List mode interface



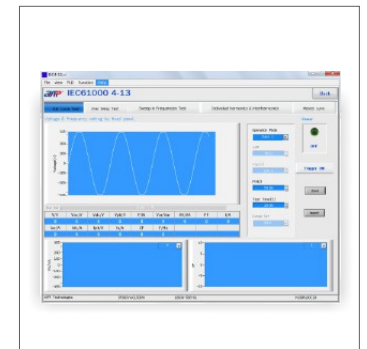
Pulse mode interface



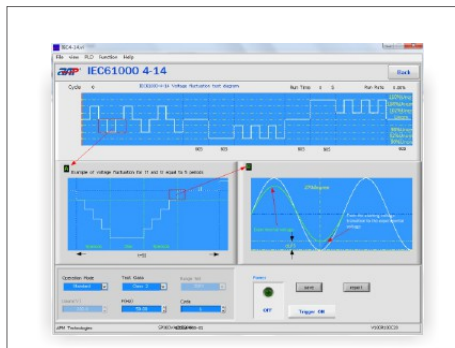
Step mode interface



IEC61000 4-13 interface



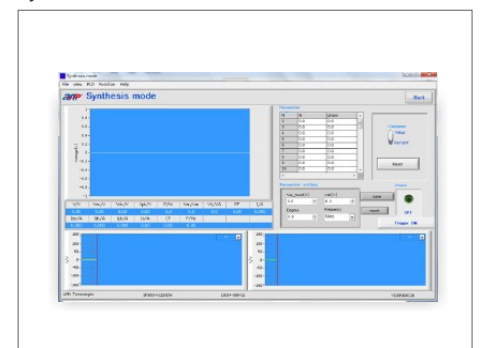
IEC61000 4-14 interface



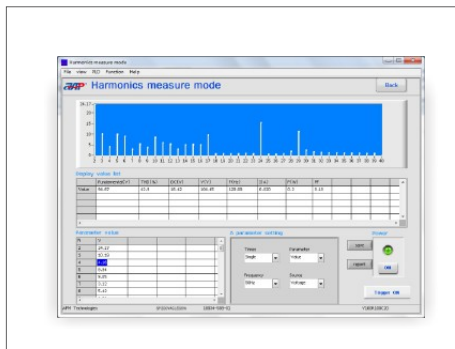
IEC61000 4-28 interface



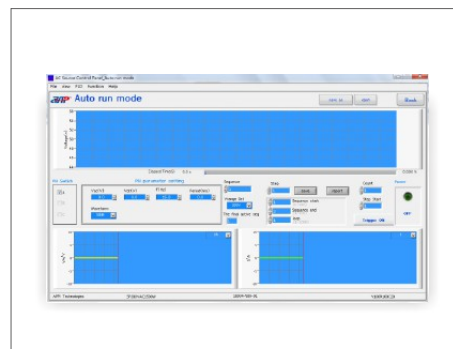
Synthesis mode interface



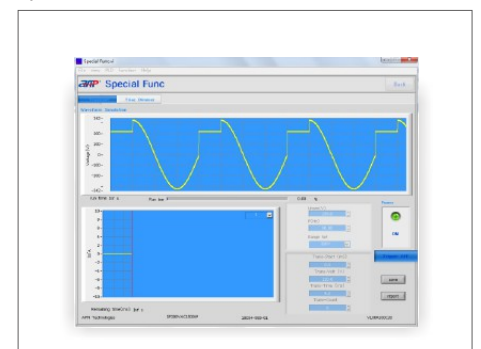
Harmonics Measure mode interface



Auto run mode interface



Special Func interface



## Web Server Function

This series AC power supply provides a built-in web server interface, then the user can configure and monitor the settings from the PC's Web browser.

The screenshots illustrate the web server interface for the AC Source Control Panel. The interface includes a navigation menu with 'Welcome Page', 'Browser Web Control', 'View & Modify Configuration', and 'Help with this Page'.

**AC Source Control Panel - Welcome to your AC Source**

Instrument:	AC Source Control
Model:	SP300VAC5000W
Serial Number:	011844162000000
Control Version:	V100R003C40
Display Version:	V100R003C31
Remote Version:	V100R002C21
Description:	Programmable AC Source
Hostname:	SP300VAC5000W
IP Address:	141.121.204.59
VISA TCP/IP Connect String:	TCP:PO-A-SP300V
Type:	Professional

**AC Source Control Panel - Current Setting / New Settings**

Manual LAN Settings - Used when IP Address is obtained manually

Obtain IP Address*	Auto	Manual
IP Address*	169.254.57.0	169.254.57.0
Subnet Mask*	255.255.0.0	255.255.0.0
Default Gateway*	0.0.0.0	0.0.0.0
DNS*	Auto	Manual
DNS Server - Used when DNS is manual		
DNS Server*	0.0.0.0	0.0.0.0
Naming Service*	NetBLOS, Dynamic DNS	NetBLOS
Host Name - Used when a Naming Service is selected		
Host Name*	SP300VAC5000W	SP300VAC5000W
Domain*		
Description	Programmable AC Source Power Supply	Programmable AC Source Power Supply
LAN Keepalive Timeout* (seconds)	1800, Enabled	1800
GPIOB Address	5	Front Panel
Change Password		(Enter Old)
Password Login	<input checked="" type="checkbox"/> Enable	

**AC Source Control Panel - PH1 Para\_Setting**

Vac(V) 230.0    F(Hz) 50.00    Vdc(V) 0.0    Power ON

Relay Status  ON  OFF    I Range  High  Middle  Low  mA  Auto

Range Set  150V  300V  Auto    Couple Set  AC  DC  AC+DC

Waveform A/B  A  B    Waveform  Sine  Square  Sine  Fixed  User

AMP/THD AMP AMP 0.0

Vac Limit(V) 300.0    OCP Limit(A) 0.2

Vdc(+) Limit(V) 424.2    OCP Delay(s) 0.2

Vdc(-) Limit(V) 424.2    CC Mode  Disable  Enable

F Limit(Hz) 1200.0    OPP(W) 30.0

Is Delay(ms) 1.0    Is Interval(ms) 1.5

Fs(Hz/ms) 0.001  Enable    Vs(V/ms) 0.001  Enable

DCs(V/ms) 1.000  Enable

OFF Degree  Disable  Enable

OFF Degree 0.0    ON degree 90.0

Program Zo  Disable  Enable

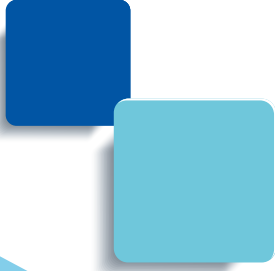
L(mH) 0.84    R(ohm) 0.40

Less

**Measurement**

V/V	0.00	Vac/V	0.00	Vdc/V	0.00
Vpk/V	0.00	P/W	0.00	Var/Var	0.00
VA/VA	0.00	FF	0.00	I/A	0.00
Iac/A	0.00	Idc/A	0.00	Ipk/A	0.00
Is/A	0.00	CF	0.00	F/Hz	0.00

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Add: #7, Link Information Industry Park, Shuilianshan Road, Nancheng, Dongguan City, 523000 Guangdong, China  
Tel: +86 769 2202 8588



**APM Technologies Ltd**

Add: #7, Link Information Industry Park, Shuilianshan Road,  
Nancheng, Dongguan, Guangdong, China

Tel: +86 769-2202 8588 ext: 2892 Fax: +86 769-2202 6771

E-mail: [overseas@apmtech.cn](mailto:overseas@apmtech.cn) Web: [en.apmtech.cn](http://en.apmtech.cn)



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