

SAFETY TERMS AND SYMBOLS

These terms may appear in this manual or on the product:



WARNING. Warning statements identify condition or practices that could result in injury or loss of life.



CAUTION. Caution statements identify conditions or practice that could result in damage to this product or other property.

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



DANGER
High Voltage



DANGER
Hot Surface



ATTENTION
refer to Manual



Protective
Conductor
Terminal



Equipotentiality

FOR UNITED KINGDOM ONLY

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 (Phase)



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 which is 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 the information detailed on this label.

EC Declaration of Conformity

We

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declare, that the below mentioned product

SPS-1820, SPS-3610, SPS-606

are herewith confirmed to comply with the requirements set out in the Council Directive on the Approximation of the Law of Member States relating to Electromagnetic Compatibility (89/336/EEC,92/31/EEC,93/68/EEC) and Low Voltage Equipment Directive(73/23/EEC).

For the evaluation regarding the Electromagnetic Compatibility and Low Voltage Equipment Directive, the following standards were applied:

EN 61326-1: Electrical equipment for measurement, control and laboratory use —				
EMC requirements (1997+A1: 1998)				
Conducted Emission	EN 55022	Class A	Electrostatic Discharge	EN 61000-4-2 (1995)
Radiated Emission	(1994)+A1(1995)+A2(1997)		Radiated Immunity	EN 61000-4-3 (1996)
Current Harmonic (1995)/A12(1996)/A13(1997)/A1(1998)/A2(1998)/prA14(2000)	EN61000-3-2	Class A	Electrical Fast Transients	EN 61000-4-4 (1995)
			Surge Immunity	EN 61000-4-5 (1995)
Voltage Fluctuation	EN61000-3-3	(1995)+A1(1998)	Conducted Susceptibility	EN 61000-4-6 (1996)
_____	_____	_____	Voltage Dip/Interruption	EN 61000-4-11 (1994)

Low Voltage Equipment Directive 73/23/EEC & amended by 9368/EEC	
Low Voltage Directive	EN 61010-1: 1990+A1: 1993+A2: 1995 EN 60950: 1992+A1+A2+A3+A4+A11

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. INTRODUCTION

The series of switching power supplies for measuring instrument have ruled out the inconvenience of big volume and heavyweight of a traditional power supply possess.

The output voltage and current is controlled by two variable resistors with coarse and fine regulation for more handy and precise adjustment.

Features:

- With more extensive range of input voltage at 97V~133V (for 115V) and 195V~265V (for 230V).
- With high frequency operation can reduce the size of power transformer.
- With small size, light weight and high density power.
- Entire efficiency rate higher up to 70%.
- Auto control the voltage and current mode.
- Zero adjustment for the output of voltage and current.



WARNING: To avoid personal injury, disconnect the power cord before removing the fuse holder.

3.3 Environment

The normal ambient temperature range of this instrument is from 0° to 40°C (32° to 104°F). Operation of the instrument above this temperature range may cause damage to the circuits.

Do not use the instrument in a place where strong magnetic or electric field exists as it may disturb the measurement.

3.4 Equipment Installation, and Operation

Ensure there is proper ventilation for the vents in the SPS power supplies case. If this equipment is used in a manner not according to the specification, the protection provided by the equipment may be impaired.



WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

I.THEORY OF OPERATION

- **Block Configuration of SPS- System**

The SPS-Series comprise a Bridge rectifier, a Pulse Width Modulation, a Driver Circuit, a Driver Transformer, a Rectifier Circuit, a Voltage Control Circuit, a Current Shunt, an Output Filter, a Voltage/Current Adjusting Circuit, a Buffer Circuit, an Error Amplifier, an Opto-Isolator, and an Auxiliary Switching Supply and etc.

- **Component List for each circuit configuration**

Bridge Rectifier:	BD101.
Pulse Width Modulation:	U102.
Driver Circuit:	T104, Q105~Q108.
Driver Transformer:	T301.
Rectifier Circuit:	D301~D302.
Voltage Control Circuit:	Q303.
Current Shunt:	R341.
Output Filter:	Common Choke L302, C325.
Voltage/Current Adjusting Circuit:	U302.
Buffer Circuit:	U302, Q301.
Error Amplifier:	U301, U303.
Opto-isolator:	U304.
Auxiliary Switching Supply:	U201, U202, T201.
OVP:	U401, U402
Remote Control:	RL401, D402

- | | | |
|------|-------------------|---|
| (18) | + sense terminal | Screw type + sense input terminal. |
| (19) | - sense terminal | Screw type - sense input terminal. |
| (20) | + output terminal | Screw type + output terminal. |
| (21) | - output terminal | Screw type - output terminal. |
| (22) | Ground terminal | Screw type ground terminal (connected to case chassis). |
| (23) | Remote Control | Short or open the remote control terminal for output on or off. |
| (24) | OVP ADJ | Adjust trimmer VR401 to set the OVP value. |

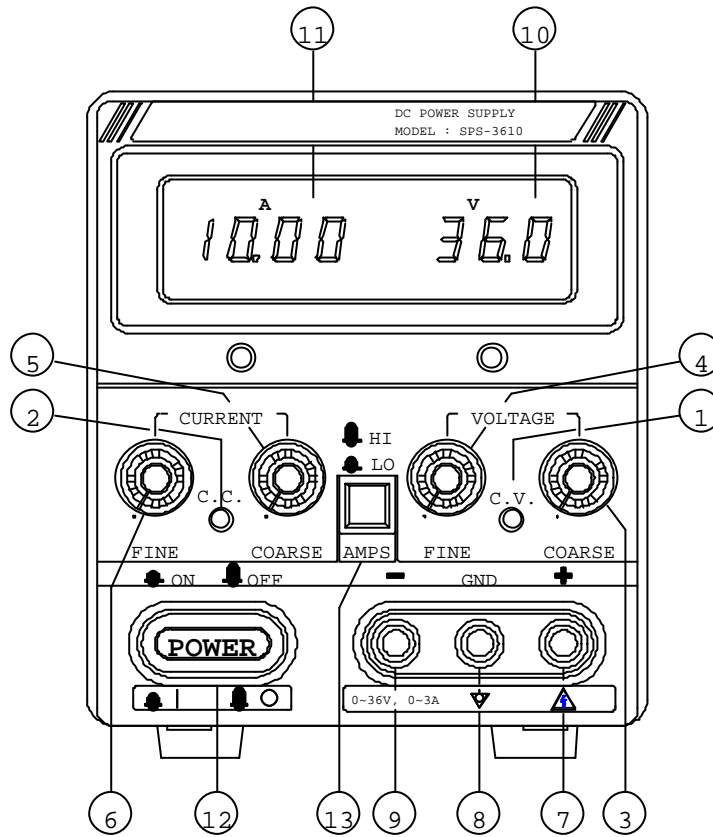


Fig. 4-1 Front Panel

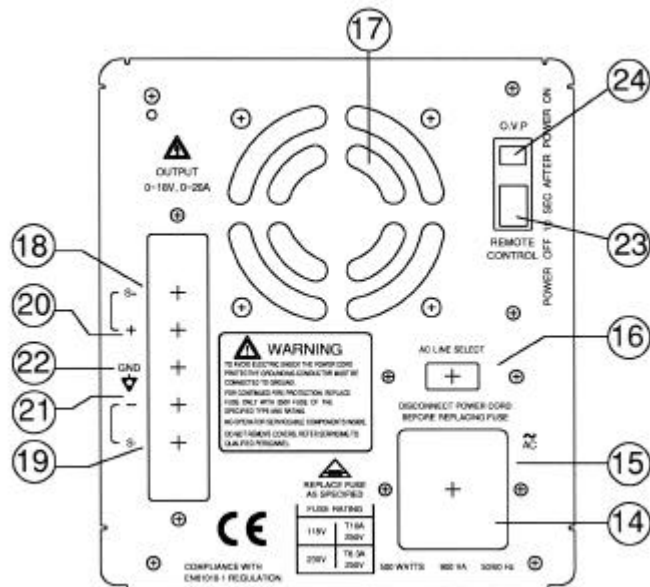


Fig. 4-2 Rear Panel

4) Output Test lead Selection:

The Selection of Output Test Lead and Feedback Test Lead:

For safety assurance, please select the adequate output test lead according to the following list:

UL (CSA) Model	Conductor				Maximum Conductive Resistor /km	Permissible Current A(amp)
	Wire No. AWG	Component pc/mm	Cross Section Area (mm) ²	Outer Diameter mm		
1015 TEW Twisted Wire)	24	11/0.16	0.22	0.64	88.6	7.64
	22	17/0.16	0.34	0.78	62.5	10.0
	20	21/0.18	0.53	0.95	39.5	13.1
	18	34/0.18	0.87	1.21	24.4	17.2
	16	26/0.254	1.32	1.53	15.6	22.6
	14	41/0.254	2.08	2.03	9.90	30.4
	12	65/0.254	3.29	2.35	6.24	40.6
	10	65/0.32	5.23	3.00	3.90	55.3

Remark:

1. The ambient temperature of “Permissible Current” is at 40 °C, the withstanding temperature of conductor is at 105 °C according to the condition of the distributed single wire.
2. The permissible current listed as above is suggested to be used under 70%.
3. If the feedback test leads are in need, the level above UL(CSA) AWG24, 22, 20... can be accepted. Besides, when the load is a capacitive load, please use the twine wire by twisting (+)output test lead with (S+) feedback test lead. Same way used on (-) output test lead and (S-) feedback test lead.
4. When the current value exceeds above suggestive list, can select more wires used in parallel according to above list.

6-2.Setting Current Limit

- (1) Determine the maximum safe current for the device to be powered.
- (2) Temporarily short the (+) and (-) terminals of the power supply together with a test lead.
- (3) Rotate the COARSE VOLTAGE control away from zero sufficiently to have the CC indicator lightened.
- (4) Adjust the CURRENT control for the desired current limit. Read the current value on the Ammeter.
- (5) The current limit (overload protection) has now been preset. Do not change the CURRENT control setting after this step.
- (6) Remove the short between the (+) and (-) terminals and hook up for constant voltage operation.

6-3.Constant Voltage / Constant Current Crossover Characteristic

The working characteristic of this series is called a constant voltage/constant current automatic crossover type. This permits continuous transition from constant current to constant voltage modes in response to the load change. The intersection of constant voltage and constant current modes is called the crossover point. Fig.5-1 shows the relationship between this crossover point and the load.

For example, if the load is such that the power supply is operating in the constant voltage mode, a regulated output voltage is provided. The output voltage remains constant as the load increases, up until the point where the preset current limit is reached. At that point, the output current becomes constant and the output voltage drop is proportioned to further increases in load. The crossover point is indicated by the front panel LED indicators. The crossover point is reached when the CV indicator goes out and the CC indicator is on.

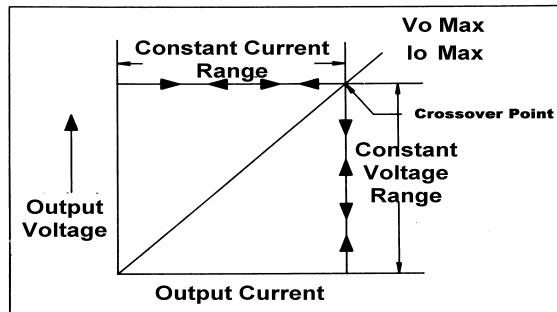


Fig. 5-1 Constant Voltage/Constant Current Characteristic.

7. MAINTENANCE

WARNING

The following instructions are used by qualified personnel only. To avoid electrical shock, do not perform any servicing other than the operating instructions of the manual unless you are qualified to do so.

7-1. Fuse Replacement

If the fuse blown, the CV or CC indicators will not light and the power supply will not operate. The fuse should not normally blow unless a problem has developed in the unit. Try to determine and correct cause of the blown fuse, then replace only with a fuse of the correct rating and type.

The fuse is located on the rear panel (see Fig. 4-2).



WARNING: For continued fire protection. Replace with 250V fuse of the specified type and rating, and disconnect the power cord before replacing fuse.

7-2. Line Voltage conversion

The primary winding of the power transformer is tapped to permit operation from 115/230 VAC, 50/60 Hz line voltage. Conversion from one line voltage to another is done by change AC selects switch as shown in Fig. 4-2.

To convert to different line voltage, perform the following procedure:

- (1) Make sure the power cord is unplugged.
- (2) Set the AC switch to the desired line voltage position.
- (3) The change of line voltage may also require a corresponding change of fuse value. Install correct fuse value according to the instruction shown on rear panel.

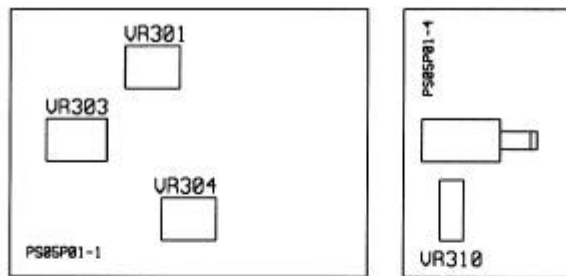


Fig. 6-1 Adjustment Location

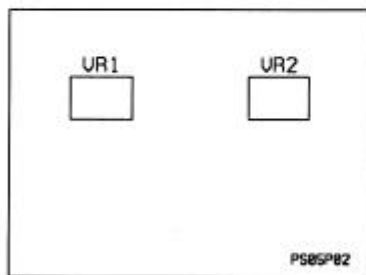


Fig. 6-2 Adjustment Location

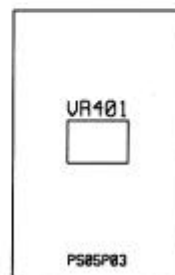


Fig. 6-3 Adjustment Location

7-4 Cleaning

To clean the power supply, use a soft cloth dampened in a solution of mild detergent and water. Do not spray cleaner directly onto the instrument, since it may leak into the cabinet and cause damage. Do not use chemicals containing benzine, benzene, toluene, xylene, acetone, or similar solvents. Do not use abrasive cleaners on any portion of the instrument.