

Digital Regulated Multi-Channel DC Power Supply

DPS-3033T

DPS-3055T

DPS-6022T

USERS MANUAL V8.0

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CE Declaration of Conformity

We the manufacturer

Declare under sole responsibility that the below mentioned products
DPS-3033T, DPS-3055T, DPS-6022T

Meet the intent of the listed European EMC and LVD Directives.

1. INTRODUCTION

DPS series are multi-channel digital regulated DC power supply with the following features: continuously adjustable output voltage and current, automatic shift between constant voltage and constant current, high stability and reliability, high accuracy, 4 groups memory save using digital technology, panel lock, output ON/OFF function, and voltage¤t limit setting with password.

DPS series have three outputs: two with adjustable output voltage and one fixed output voltage(2.5V, 3.3V, 5V selectable for DPS-3033T only). The two adjustable outputs have three output modes: independent, tracking parallel and tracking series. When power on, the unit is under independent mode. The tracking parallel or series mode can be selected by press PARA (trackingparallel) or SER(tracking series) switch. When press the PARA or SER switch once again, the unit returns to independent mode.

As a constant voltage (CV)/constant current (CC) source, DPS series is able to, even at the maximum output current, provide a fully rated and continuously adjustable output voltage. For a big load, DPS series can be used as a constant voltage source; while for a small load, as a constant current source. When used as a CV source, the output current can be adjusted via a current regulator on the front panel;when used as a CC source, the max. output voltage can be controlled via voltage regulator on the front panel. That is to say, the power supply will automatically shift from CV source to CC source when the output current reaches the target value.



CAUTION:

1. The DC power supply must be operated under the rated line voltage. If the DC power supply is meant to work for a long time, it is suggested to use 60%~70% load so as to avoid rapid aging.
2. Avoid frequent short-circuit operations.
3. Do not turn on the DC power supply when the output terminal is with heavy load. Turn the output voltage adjustment knob to the lowest value, next connect the load, and then turn on the DC power supply. Adjust the voltage/current adjustment knob to set the wanted values.

2. GENERAL AND PRODUCT MODELS

2.1 General

Power source: 110V/220V \pm 10%, 50/60Hz

Operation environment: Indoor use

Altitude: <2000m

Relative humidity: <80%

Temperature: 1°C~40°C

Category: II

Polution degree: II

Storage temperature: -10°C~70°C

Storage humidity: <70%

2.2 Accessories

Power cord: 1 pcs

Users manual: 1 pcs

2.3 Product Models

Model	Max.Ouptut Voltage/Current			Fixed Output	Fuse	
	Indpendent	Parallel	Series		Input Voltage	
					110VAC	220VAC
DPS-3033T	32Vx2 3Ax2	64V 3A	32V 6A	2.5V, 3.3V 5V/3A	T6.3A 250V	T4A 250V
DPS-3055T	30Vx2 5Ax2	60V 5A	30V 10A	NO	T6.3A 250V	T6.3A 250V
DPS-6022T	60Vx2 2Ax2	120V 2A	60V 4A	NO	T6.3A 250V	T6.3A 250V

DPS-3055T and DPS-6022T: CH1&CH2 output power limit within 100W.

3. SPECIFICATION

Technical specifications of DPS series should be tested 30 minutes after power up.

Testing environment: +20°C~+30°C

Specifications are subject to changes without notice.

Model	DPS-3033T	DPS-3055T	DPS-6022T
Output	0~32V/3Ax2	0~30V/5Ax2	0~60V/2Ax2
Constant Voltage Operation			
Line regulation	CV≤0.01%+3mV	CV≤0.02%+3mV	CV≤0.02%+5mV
Load regulation	CV≤0.01%+3mV	CV≤0.02%+5mV	CV≤0.02%+5mV
Recovery time	≤100μS(50% load change, minimum load 0.5A)		
Ripple&Noise	≤2mV rms (5Hz~1MHz)	≤3mV rms (≤1MHz)	≤3mV rms (≤1MHz)
Temperature	≤300ppm/°C		
Constant Current Operation			
Line regulation	CC≤0.2%+3mA	CC≤0.3%+3mA	CC≤0.3%+3mA
Load regulation	CC≤0.2%+3mA	CC≤0.3%+5mA	CC≤0.3%+3mA
Ripple&Noise	≤3mA rms		
Tracking Parallel Operation			
Line regulation	CV≤0.01%+3mV	CV≤0.05%+3mV	CV≤0.05%+5mV
Load regulation	CV≤0.01%+3mV	CV≤0.05%+5mV	CV≤0.05%+5mV
Tracking Series Operation			
Line regulation	CV≤0.01%+5mV		
Load regulation	CV≤300mV		

Model	DPS-3033T	DPS-3055T	DPS-6022T
Output	0~32V/3Ax2	0~30V/5Ax2	0~60V/2Ax2
CH3 Output (DPS-3033T only)			
Regulation	Line regulation $\leq 5\text{mV}$		Load regulation $\leq 15\text{mV}$
Ripple&Noise	$\leq 2\text{mV rms}$		
Voltage range	2.5V, 3.3V, 5V (selectable)		
Output current	3A		
Insulation degree	between base and output terminal $\geq 20\text{Mohm}/500\text{VDC}$		
	between base and power cord $\geq 30\text{Mohm}/500\text{VDC}$		
Display accuracy	3 & 1/2 digits LED display $\leq \pm 0.5\% + 2\text{d}$		
Weight	7.0kg	8.0kg	8.0kg
Dimension	300L*220W*148H (mm)		

4. SAFETY INSTRUCTION

This sector contains important safety instructions. Read the following before any operation to ensure your safety and to keep the best condition for the power supplies.

4.1 Safety Symbols

The following symbols may appear in the manual or on the products:



DANGER Higher Voltage



Attention Refer to the Manual



Protective Conductor Terminal



Earth (ground) Terminal

4.2 Safety Guidelines

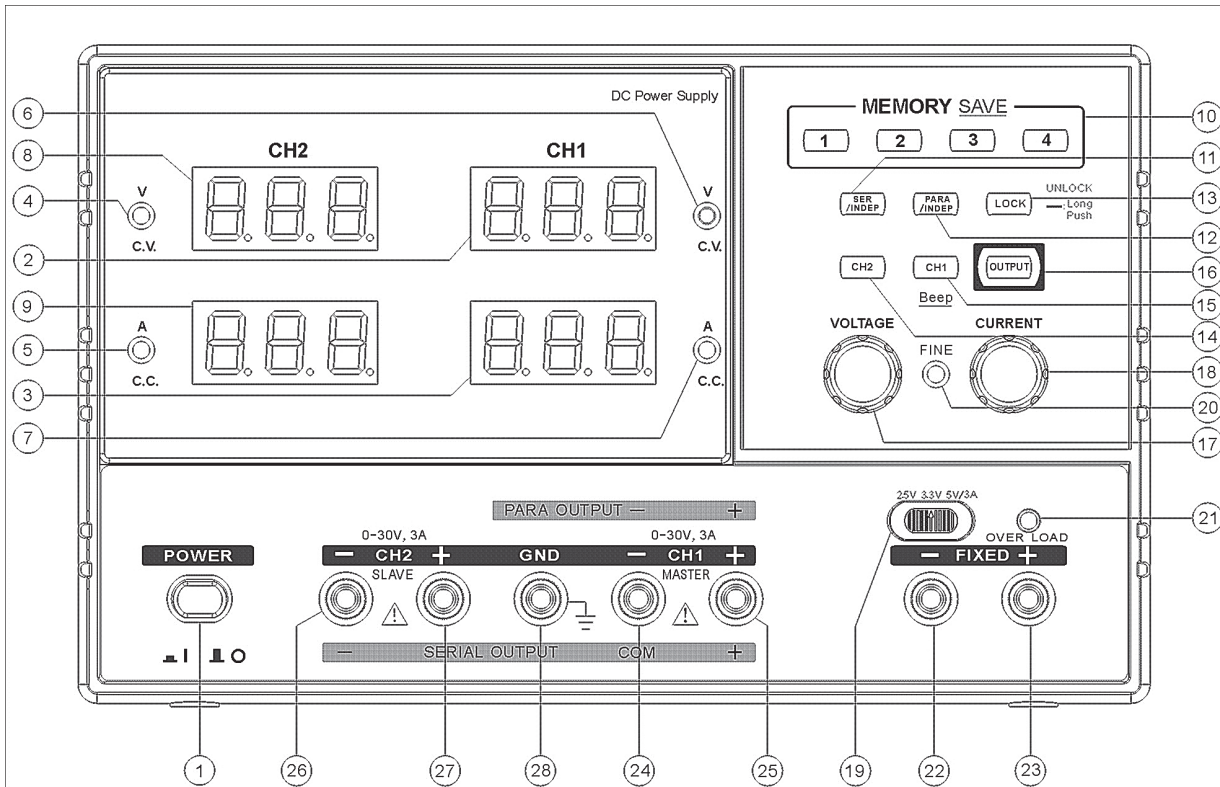
- Operation to power outlet and power cord: please use polarized power cord and polarized power outlet for the instrument to ensure the case, output terminal are properly grounded.
- To avoid damage, don't remove the upper case, front or rear panel during operation to the power supply.
- Do not touch the upper case or rear panel (heat sink). They are heating bodies and may cause scald.
- Operaton enviroment: The power supply should be operated in enviroment with good vantilation and with temperature at $23^{\circ}\text{C} \pm 5^{\circ}\text{C}$. Do not operate the power supply in environment with temperature over 40°C .
- Storage: Do not place any other instruments or inflammables on the power supply.
- Abnormal operation: Do not apply high voltage or current which is over the rated voltage to the power supply. Do not connect the positive and negative output terminals on the front panel continoursly in the way of instant short-circuit.
- Grounding: Make sure to connect the input and output terminals to earth during the operation to ensure your safety and the safety of nearby instruments.
- Fault shoting: In case of any abnormal phenomenon, please forward the power supply to qualified technical personnel.

4.3 About AC Input Voltage

The AC input voltage for DPS-3033 series is 110V/220V selectable $\pm 10\%$, 50/60Hz. When the power source higher than the rating voltage $+10\%$, please set the output current to 70%~80% of the rating output current to avoid damage to the power supply.

5. PANEL INSTRUCTION

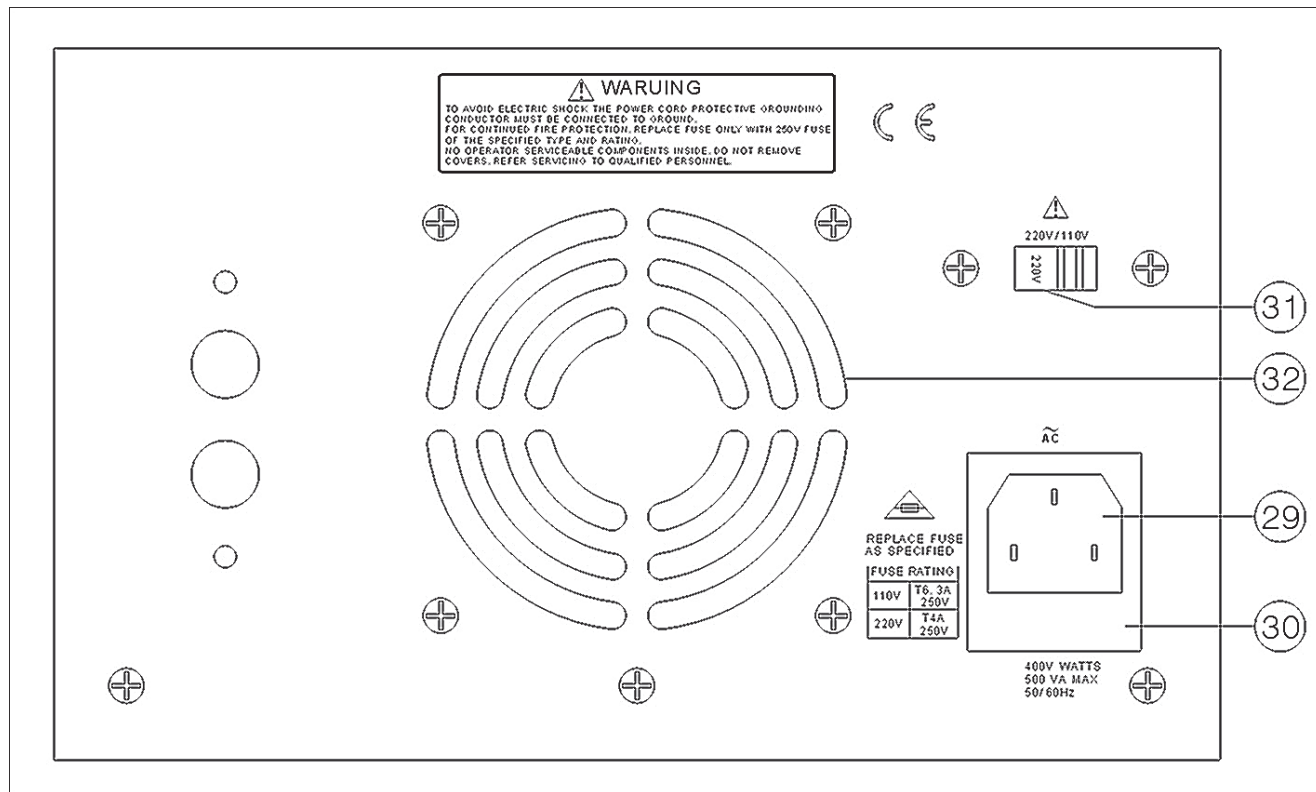
5.1 Front Panel



- 1) POWER : Power switch.
- 2) Meter V : Displays CH1 output voltage.
- 3) Meter A : Displays CH1 output current.
- 4) Meter V : Displays CH2 output voltage.
- 5) Meter A : Displays CH2 output current.
- 6) CV indicator : Indicates CH1 constant voltage when CH1 channel under independent, tracking parallel, or tracking series modes.
- 7) CC indicator : Indicates CH1 constant current when CH1 channel under independent, tracking parallel, or tracking series modes.
- 8) CV indicator : Indicates CH2 constant voltage when CH2 channel under independent, tracking parallel, or tracking series modes.
- 9) CC indicator : Indicates CH2 constant current when CH2 channel under independent, tracking parallel, or tracking series modes.
- 10) SAVE 1 2 3 4 : Saves or recalls panel settings. Press the key for 3 second to recall the saved settings while press for 1 seconds to save current settings. Indicator turns on after save or recall and turns off if there is any changes. All other set modes can be saved together, except OUTPUT mode.
- 11) SER/INDEP : Selector of series (SER) or independent (INDEP) mode.
 - Under series mode, the CH1 output voltage completely controls the output voltage of CH1 and CH2. When CH2 positive output terminal is connected with CH1 negative output terminal, the output voltage of CH2 positive output terminal & CH1 negative output terminal is 0~2 times of the rating voltage, and indicator turns on.
 - Under independent (INDEP) mode, CH1 and CH2 have independent output voltage, and indicator turns off.
- 12) PARA/INDEP: Selector for parallel (PARA) or independent (INDEP) mode.
 - Under parallel (PARA) mode, when CH1 and CH2 are connected with terminals positive to, positive, negative to negative, the maximum output voltage and current is controlled by CH1 output voltage and current respectively. In this case, the maximum output current is 0~2 of the rating current, and indicator turns on.

- Under independent (INDEP) mode, CH1 and CH2 have independent output voltage and current, and indicator turns off.
- 13) LOCK : Locks or unlocks the front panel settings, except OUTPUT key setting. When locks, the indicator turns on. The front panel operation is invalid. To unlock, press the LOCK key for 3 seconds (long push). The indicators turns off.
- 14) CH2 : For switch to CH2 mode to adjust output voltage and current.
- 15) CH1 : For switch to CH1 mode to adjust output voltage and current. Long push CH1 key, to turn on/off beep.
- 16) OUTPUT : Turns the output on or off. The indicator turns on when there is output.
- 17) VOLTAGE: : Adjusts the output voltage of CH1 & CH2.
- 18) CURRENT : Adjusts the output current of CH1&CH2.
- 19) 2.5V, 3.3V : Selector of 2.5V, 3.3V or 5V output voltage of CH3.
5V selector
- 20) FINE : Indicates switch between coarse and fine adjustment. Press the voltage/current knob, the indicator turns on, and it is under fine adjustment; press the voltage knob once again, the indicator turns off to go to coarse adjustment.
- 21) OVER LOAD : Indicators turns on when CH3 output current is over the rating current.
- 22) Output terminal: CH3 negative output terminal.
- 23) Output terminal: CH3 positive output terminal.
- 24) Output terminal: CH1 negative output terminal.
- 25) Output terminal: CH1 positive output terminal.
- 26) Output terminal: CH2 negative output terminal.
- 27) Output terminal: CH2 positive output terminal.
- 28) GND terminal : Grounding terminal.

5.2 Rear Panel



- 29) Power socket.
- 30) Fuse holder.
- 31) Voltage selector
- 32) Cooling fan

6. OPERATION INSTRUCTION

6.1 Power Source

Select suitable input voltage through the voltage selector according to local use. The input voltage is 110V/220V selectable $\pm 10\%$, 50/60Hz.



To avoid electronic shock, the power supply must be earthed.

6.2 Operation Instruction

6.2.1 Independent Mode

DPS series is under independent mode when turned on. CH1 and CH2 are two independent outputs, which can be used independently or simultaneously.

- a. Adjust the voltage and current knob to set the targeted CH1 or CH2 output voltage and current (limited value).
- b. Connect a load when CH1 and CH2 is used independently or simultaneously.
- c. Press OUTPUT key to turns on output; press OUTPUT key once again to turns off output.

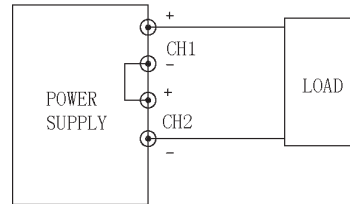
6.2.2 Series Mode

Press SER key to select series mode. CH2 positive output terminal will automatically connect with CH1 negative output terminal. In this case, the output voltage is doubled. The CH1 output voltage knob controls the CH2 output voltage, CH2 output voltage has the same change as CH1 output voltage.

- a. Press OUTPUT key to turns off output.
- b. Press SER key to select series mode.
- c. Adjust voltage and current knob to set the targeted CH1 output voltage and CH1/CH2 output current.
- d. Connect a load:

If a single channel power source is required, connect a load to the CH1 minus plus terminal and CH2 negative output terminal.

If a power source of positive and negative outputs with common ground is required, connect a load according to the following diagram, that is to use CH1 negative output terminal and CH2 positive output terminal as the GND terminal.



- e. Turns on OUTPUT to have output.



WARNING: A voltag of 60V DC can be of danger to users. If the output voltage is over 60V DC, the power supply must be earthed.

6.2.3 Parrallel Mode

Press PARA key to select parallel mode. CH1 and CH2 terminals will automatically connect as positive to positive and negative to negative in parrellel.

Under parallel mode, CH2 output voltage and current are controlled by and tracks the CH1 output voltage and current.

- a. Press OUTPOUT key to turns off output.
- b. Press PARA keyto select parallel mode.
- c. Adjust CH1 voltage and current knob to set the targeted voltage and current.
- d. The targeted voltage is displayed by CH1 voltage meter while the output current the sum of CH1 & current meter.

- e. Connect a load to CH1 positive and negative output terminals.
- f. Turns on OUTPUT to have output.

6.2.4 Memory Store and Recall Operation

Save keys “1, 2, 3, 4”:

- a. Press any one for 1 second to save current settings into current memory group. For example, press “Save 1” to save current settings into memory 1.
- b. Press any one for 3 seconds to recall previous saved settings from current memory group. For example, press “Save 1” to recall previous settings saved in memory 1.

6.2.5 CH3 Output

CH3 mode has the output of 2.5V, 3.3V, 5V ,maximum 3A.Output voltage can be selected using the voltage selector switch.

- a. Press OUTPUT key to turn off output.
- b. Connect a load to he CH3 positive and negative output terminal.
- c. Press OUTPUT key to turn on output.
- d. When the output current is over rating 3A (overload), the overlaod indicator turns red, and the output voltage and current gradually turns down to enable protection. To restore the CH3 output, lower the load and make the output current less than 3A untill the overload indicator turns off.

6.2.6 Output ON/OFF

OUTPUT key is a ON/OFF switch that controls the output of all CH1, CH2 and CH3 outputs. Press the key, to turns on output and the indicator turns on. Press the key once again to turns off the output, and the indicator turns off.

6.2.7 Voltage&Current Limit Setting with Password

When the front panel is unlock, OUTPUT at OFF, input password “022 022 011 011”. To input password, set the CH1 & CH2 voltage at 0.22V (preset) and current at 0.11A (present). Then press the LOCK key for 3 seconds to go into voltage¤t limit setting.

At this moment, there are reminder voice sound for 3 time and the LOCK indicator turns on, then the previously

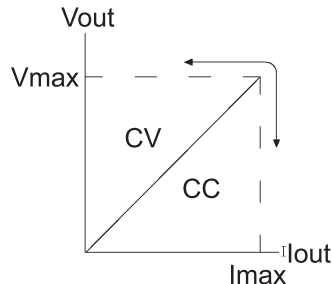
preset limits are recalled. The LOCK indicator turning on means that the power supply is under voltage¤t limit setting mode, adjust the front panel knob to set voltage¤t limits or recall previous settings.

Then the LED displays current limit settings that can be adjusted, but make sure that the output voltage $>0.50V$, output current $>0.50A$. Press LOCK key for 3 seconds to save current settings. There will be reminder voice sound for 3 times and the LOCK indicator turns off and the LED display maximum limit.

Under voltage¤t limit setting mode, press the LOCK key for 1 second to exit limit setting and to go into front panel lock mode. The limit settings will not be updated. (NOTE: if CH1 voltage $\leq 0.50V$, CH1 current $\leq 0.50A$, CH2 voltage $\leq 0.50V$, CH2 current $\leq 0.50A$, there will be limit function and limit setting will not be enabled.) Adjustment exceeds limit settings, there will be reminder voice.

6.3 Constant Voltage and Constant Current Characteristics

The DPS series automatically switches between constant voltage (CV) and constant current (CC) mode according to load condition. That is to say, when the output current reaches targeted value, DPS series will automatically switch to constant current mode; and vice versa. The CV mode and CC mode switch point is called crossover point. Below figure shows the relations between crossover point and load.



For example, if connect a load to the DPS series to make it work under CV mode to provide targeted output voltage, the output voltage keeps at a certain rating voltage level. Then increase the load to make the DPS series reach current limit point. At the current limit point, the output current becomes a constant current, and there will be

slight or even obvious voltage drop. On the front panel LED display, the C.C. indicator turns red under CC mode. Similarly, when the load gradually become smaller, the output voltage gradually turns back to a certain constant level. The crossover point will automatically switch from CC mode to CV mode. In this case, the C.C. indicator turns off but the C.V. indicator turns on, indicating the DPS series is under CV mode.

6.4 Operating Principles

A power supply consists of a AC input, a transformer, and two sets. One set contains rectifier, filter and reference voltage circuit. The other set contains a main rectifier, filter, series variable circuit, voltage comparator, current comparator, reference voltage amplifier, relay control and variable circuit.

The circuit shown in Fig.6-4 consists of several ICs, (U108, U112, U113, U114, U117, U118). Please refer to fig.6-4.

To have more discussions about the circuit, please kindly refer to description in the fig..6-4.

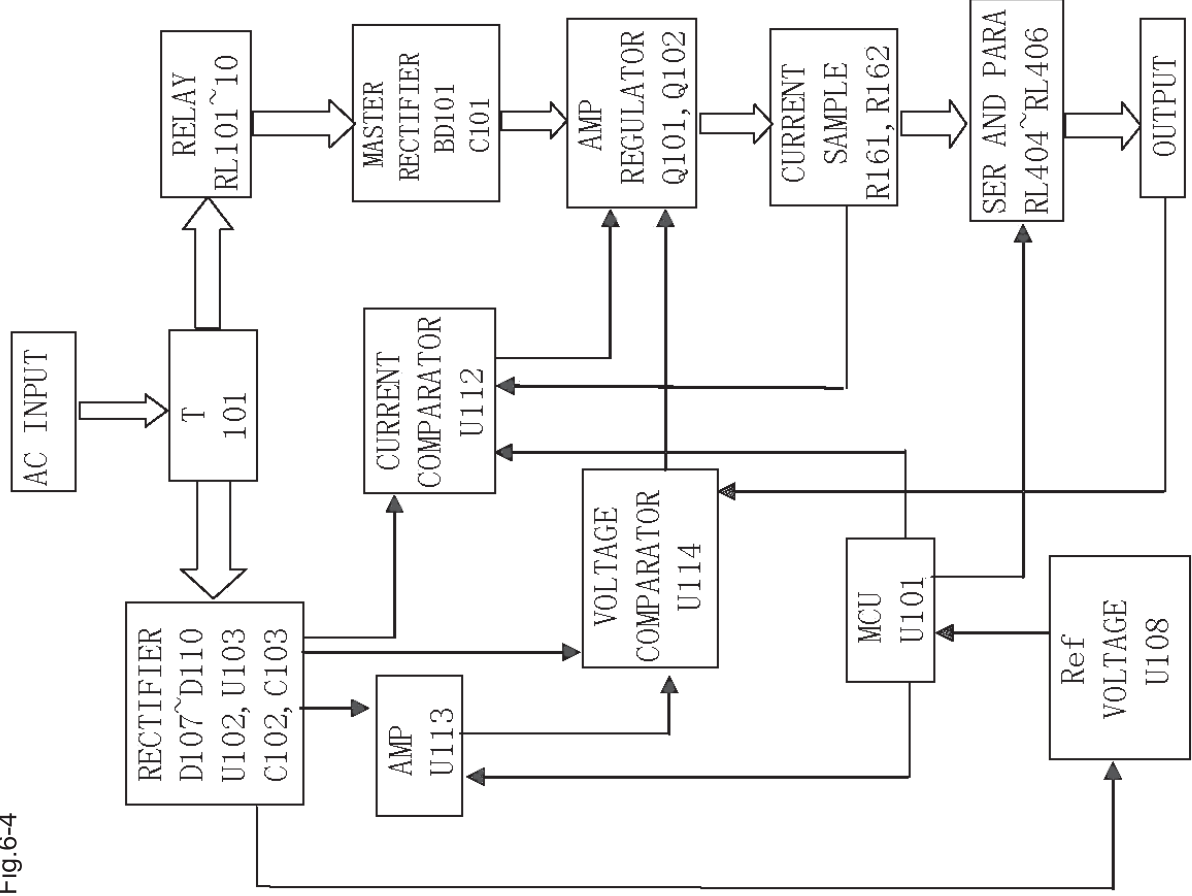
Auxiliary rectifiers D107~D110 cross filters C102 and C103, then go into U117 and U118 to regulate voltage.

Main rectifier is a bridge rectifier that crosses filter C101 then is regulated by a series variable regulator, goes into the output terminal.

U112 is a current limiter. When the output current exceeds output setting, U112 will reduce the current to the setting level. U108 generates a reference voltage. U113 is a reverse amplifier. U114 is a voltage comparator. It forwards the amplified voltage of U113 to U114 and then make comparison with the output voltage. When the output voltage higher than the amplified voltage of U113, U114 will reduce the output voltage.

Relay controls circuits, mainly for the purpose of reduce their loss.

Fig.6-4



7. MAINANENCE

To avoid electric shock, please refer the following operations to qualified personnel only.

7.1 The DPS series have complete current limit protection. When the output termianl is short, the output current will be limited at maximum rating and will not be increased any more. However, there still be high power loss on the transistor. So once there is short circuit, please turn off the power immediately and fingure out the failure get the power supply back to normal.

7.2 When power source correct, the C.V. indicator dose not turn on or LED dose not turn on, the fuse may have blown or other failures occur. In this case, power off the power supply immediately, take off the power plug and then figure out possible failurs or replace the fuse. The fuse for replacement must be with the same specifications as the blown one.



WARNING: To ensure your safety, fuse for replacement is limited to the same specification as the original one. Before replacement, make sure to power off the power supply and to take off the power plug from power socket.

7.3 Cleaning: Disconnect the power plug before cleaning. Use a soft cloth dampened in a solution of mild detergent and water. Do not spray any detergent or liquid on the power supply to prevent liquid leak into the case and damage the power supply.

