

Multiple Output Programmable Linear D.C. Power Supply



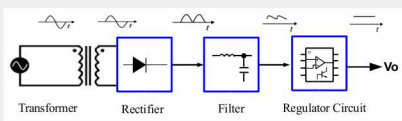
1. **Voltage/Current Knobs :**
Adjusts the output voltage/current level for the selected channel, Pressing the knob switches coarse and fine level setting
2. **Function Keys :**
Selects the output channel (CH1/3 and CH2/4) for level adjustment and tracking parallel operation or tracking series operation
3. **Save Keys :**
Saves or recalls panel settings
4. **Display :**
4 LED display, 3 digits after decimal point
5. **Operation Keys :**
Turns the output on or off and front panel lock/unlock
6. **Power Switch :**
Turns On or Off the main power
7. **Output Terminals :**
Outputs voltage and current terminals
8. **USB Connector :**
Accepts a USB slave connector for command-based remote control
9. **AC Selector :**
Selects AC voltage : 100V/120V/220V/230V
10. **Power Cord/Fuse Socket :**
The power cord socket accepts the AC mains : 115V/230V, 50/60Hz ; The fuse holder contains the AC main fuse

A Basic Concept

In our daily lives, most of the electronic equipment such as televisions, radios, computers and stereos use DC power for the internal components and circuits. It is true that these equipments use AC power supplied by power company, but this AC power will be converted into DC power inside of the box and further provide stable power supply to support the electronic devices. A DC Power Supply is used to convert the AC into DC power for the electronic applications. Even for the devices that use DC battery such as mobile phone, GPS navigator and digital camera, a DC power supply may replace actual batteries to test the products in the manufacturing factory.

In the marketplace, there are two basic categories of DC power supply, linear mode and switching mode. The linear power supply is composed of the transformer, diode rectifier, capacitor filter and regulator circuit. The power devices of linear mode are always in the conduction state which can offer stable output. Thus, it will cause the power devices continuing to consume the power resulted in decreased efficiency of the power output, and requires bigger heat sink. Therefore, the linear mode volume at the same power level will be bigger than the switching mode. However, the linear mode has simpler circuit design, higher stability, quicker response, low ripple and noise which provide better quality of output.

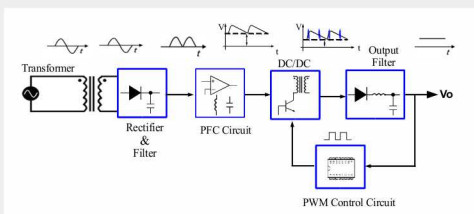
The basic block diagram of the linear mode DC power supply is illustrated as below.



- Transformer : Transfers electrical energy from one circuit to another
- Rectifier : Convert negative voltage into the positive voltage
- Filter : Reduce the noise and ripple.
- Regulator Circuit : Generate more precise DC voltage

As to the switching power supply, it is composed of the transformer, diode rectifier, capacitor filter, PFC circuit, DC/DC converter, output filter and PWM control circuit. It takes advantages of semiconductor switching devices and magnetic devices to control the power output. The difference from the linear mode is that the on/off of switching mode is controlled by PWM technique. Consequently, the switching devices can offer sustainable power output without continuous conduction and consumption of the power. Due to the stability of the output, the output efficiency of switching mode has been greatly enhanced compared to linear mode. Since the output of switching mode will be influenced by the noise and ripple greater than the linear mode during the switching on and off process, as a result, the design is more complicated than linear mode. Switching power supply has the advantages of higher power density, higher efficiency, smaller size and lighter in weight.

The basic block diagram of the switching mode DC power supply is illustrated as below.

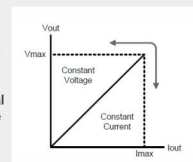


- PFC Circuit : Adjust power factor to improve the efficiency of the output
- DC/DC : Converts a source of direct current(DC) from one voltage level to another.
- PWM Control Circuit : In order to precisely reach the expected DC output voltage, the conduction time of the power switch will be controlled by changing pulse width.

B Introduction of Functions and Features

1. Constant Voltage Mode (CV mode) and Constant Current Mode (CC mode)

Most power supplies may automatically switch between CV and CC mode according to its load condition. When the output current is lower than the output limited setting, the power supply is operated under CV mode. On the contrast, If the current reaches the limit setting, the power supply will switch to CC mode, which means the current will be constrained to the setting and sources that limited amount of current ; However, the output Voltage level will be lower than the original setting. This is for preventing the occurrence of over power, so when the current returns to lower than the setting, it will switch back to CV mode.



2. Resolution

Resolution stands for the minimum voltage, current and measurement unit provided by power supplies. Consequently, the finer the resolution are, the more accurate settings, the more precise the voltage and current will be provided by the power supplies. The as below diagram on the right-hand side represents the resolution level at 1mV and 1mA.

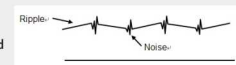


3. Regulation

There are two categories of regulation, Line Regulation and Load Regulation. Line regulation is the capability to maintain a constant output voltage level on the output channel of a power supply despite of the changes at to the AC input voltage level. Load regulation is the capability to maintain a constant voltage (or current) level on the output channel of a power supply despite the changes of the load.

4. Ripple/ Noise

When AC power is converted into DC power, it will generate some unnecessary elements. If the elements are of low frequency, it is called the ripple; if the elements are of high frequency, it is regarded as the noise. These elements will influence the ultimate power quality of power output.



5. Independent, Tracking Series and Parallel Mode



Independent Mode : CH1 and CH2 outputs work independently from of each other.



Tracking Series Mode : It doubles the voltage capacity of the power supply by internally connecting CH1 (Master) and CH2 (Slave) in series and result in one single channel for output.



Tracking Parallel Mode : It doubles the expected current capacity of the power supply by internally connecting CH1 and CH2 in parallel and result in one single channel for output.

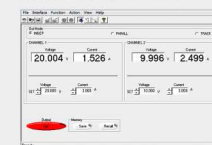
6. GND and Output Negative(-)

The GND (Ground) in the power supplies means Chassis Ground. It is connected to the chassis and AC power cord ground (it is not neutral). When the AC power cord ground is connected with earth ground, the GND becomes part of the earth ground. Negative is a reference point of the potential in the circuit in order to meet various demands. Users can choose negative output according to individual application to connect with GND.

C Programmable DC Electronic Load Application

1. Remote Control :

The power supply can be connected with computer via the USB. It can use PC software or self-designed program to control the output function



2. PC-Software Measurement and Data Log :

It can monitor and record the voltage/ current waveform via the PC-Software.

