LINEAR DC POWER SUPPLY

USER MANUAL

REGULATED LINEAR DC POWER SUPPLY

Please read this manual carefully before operating the power supply.

1. Introduction

The variable DC power supplies covered in this manual are regulated linear DC power supplies designed for laboratory, school and manufacturing applications. The output voltage and current can both be continuously adjusted from 0 to maximum rated value by means of the coarse and fine potentiometers. As linear power supplies, they have excellent ripple and load regulation, and are suitable for general electronic design work. These power supplies can be used as constant voltage source or constant current source. All of the models come with over-voltage, so you can also use them for electroplating, anodizing, battery charging, and DC motor testing, etc.

2. Specifications

2-1 General

AC Input：	110V/220V±10% 50/60 Hz (selectable)
Rating:	See Table 2-1
Operating environment:	Indoor use
	Altitude up to 2000 m
	Temperature: -10°C to 40°C
	Relative humidity: <80%

Storage environment: Temperature:-10^{0}C to 70^{0}C

Relative humidity: <70%

Table 2-1

Model	Max. Voltage	Max. Current	Fuse Rating	Dimension (mm)
HY1503D	15V	3A	5A/250V	270×128×145
GPS-1850D	20V	5A	5A/250V	270×128×145
HY3003D*	30V	3A	5A/250V	270×128×145
HY3005D*	30V	5A	5A/250V	270×128×145
HY3006D	30V	6A	5A/250V	270×128×145
HY6002D	60V	2A	5A/250V	270×128×145
HY6003D	60V	3A	5A/250V	270×128×145
HY3003DX	30V	3A	5A/250V	270×128×145
HY3005DX	30V	5A	5A/250V	270×128×145

*GPS-3050D and HY3005D are identical, while HY3003D and GPS-3030D are identical.

2-2 Front Panel Descriptions

(1) Digital voltmeter: Displays the actual output voltage; this equates to the set value when in CV mode.

(2) Digital ammeter: displays the actual output; this equates to the set value if in CC mode.

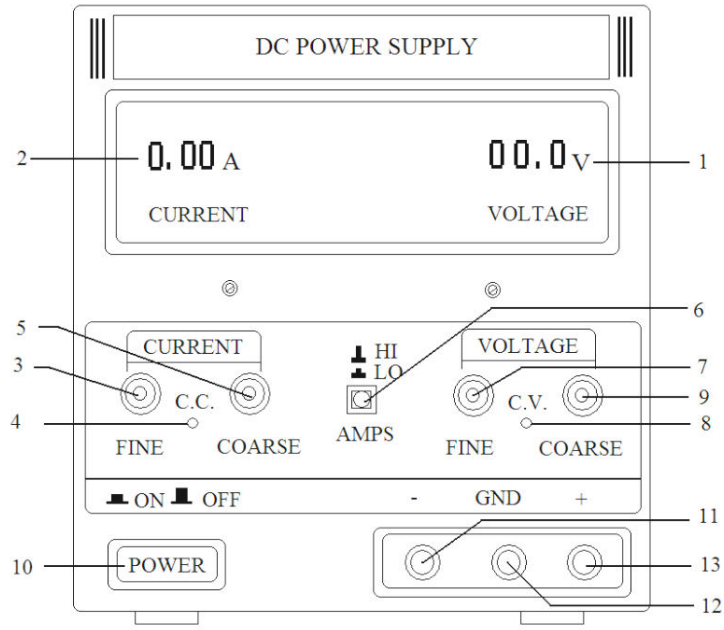


Figure 1

(3) Current fine: for fine adjustment of the current limit.

(4) CC indicator: lights when the current limit is set lower than the voltage limit, and the power supply operates in constant current (CC) mode.

(5) Current coarse: for coarse adjustment of the current limit.

(6) Current Range: When pushed to "In" position, the current limit is changed to half of the set value; when this button is in "Out" position, the current limit is at the full set value. This button is not available on all models.

(7) Voltage fine: for the fine adjustment of the voltage limit.

(8) CV indicator: lights when the voltage limit is set lower than the current limit, and the power supply is working in constant voltage mode.

(9) Voltage coarse: for the coarse adjustment of the voltage limit.

(10) On/Off button: When this button is pushed to "In" position, the power supply is turned on, and the display comes on; conversely, the power supply is off when this button is in the "Out" position.

(11) “-” output terminal: Negative polarity (black).

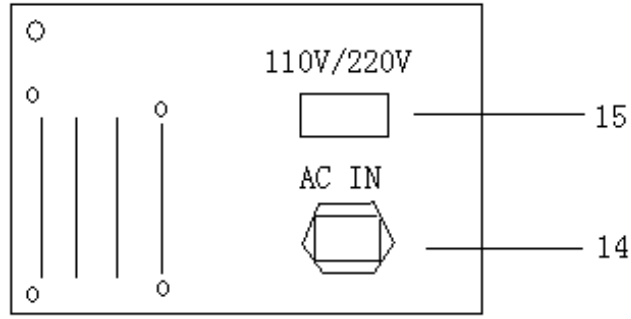
(12) “GND” terminal: Ground terminal (green). The GND terminal is connected to case and AC ground.

(13) “+” output terminal: Positive polarity (red).

2-2 Back panel

(14) Power socket

(15) AC voltage selection switch



2-3 Technical Parameters

1) CV mode:

Line regulation:	<0.01%+3mV
Load regulation:	< 0.01%+3mV (Max. current<3A)
Load regulation:	< 0.01%+5mV (Max. current>3A)
Ripple & noise :	< 0.5mVrms (5Hz-1MHz) (Max. current <3A)
	<1.0mVrms (5Hz-1MHz) (Max. current >3A)
Recovery time :	< 100μS (load-variant 50%, min. load current 0.5A)
Temperature coefficient:	< 300PPM/^{0}C

2) CC Mode:

Line regulation:	<0.2%+3mA
Load regulation:	< 0.2%+3mA
Ripple & noise :	< 3mArms

3) Display accuracy: ±1%±1 digit

3. Operation Instructions

3-1 Precaution

1) AC input

AC input should be within the range of line voltage of 110V/220V at 50/60Hz.

Before plugging the power supply into the wall outlet, make sure that the AC selection switch (located in the back) shows the correct value in the middle, i.e. if you are plugging into 120V AC outlet, the switch itself should show 110 in the voltage selector as shown in picture below:

Warning: To avoid electrical shock, the power cord protective grounding conductor must be connected to ground.

2) **Warning:** Do not connect any load to the power supply before it's turned on. Likewise, make sure to disconnect the load before shutting down the power supply. Damages to the power supply can happen if you do not follow this. Such damages are not under warranty.

3) **Warning:** If you are running an inductive load like magnetic coils, DC motors, stepper motors, etc., make sure to connect your load with the output set to zero and change the voltage/current slowly, and NEVER turn the power supply on or off with a inductive load connected!

4) Installation: For better heat dissipation, there should be enough space around the power supply. The two sides and back of the power supply should have 10cm space at least. All power supplies come with cooling fan, which comes on automatically when the power supply is turned on. To ensure proper operation, make sure the ambient temperature is below 40°C and there is sufficient ventilation.

5) Over-voltage protection: the power supply is disabled and in over-voltage protected state, if the power supply is connected to external voltage higher than the maximum rated voltage. When this happened, please follow procedures below (4-3) to reset it.

3-2 Setting Current Limit

1) With no load connected, turn all the knobs to minimum position. Turn the power supply on.

2) Temporarily short the (+) and (-) terminals of the power supply together with a test lead.

3) Adjust the COARSE VOLTAGE knob (knob 10) away from zero sufficiently for the CC indicator to light.

4) Adjust the coarse and fine CURRENT controls (knob 3 & 5) for the desired current limit.

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.

3-3 Constant Voltage / Constant Current Characteristics

The power supply is a regulated constant current / constant voltage (CC CV) power supply, and is characterized by automatic crossover from constant current (CC) to constant voltage (CV), or vise versa, depending on the load situation. At any moment, the power supply automatically determines whether to operate at CV or CC mode, depending on the voltage and current limit set, and the load connected (if no load is connected, it simply means that the load resistance is infinite, and if there is a short, the load resistance is zero.)

For example, if the load is such that the power supply is operating in the constant voltage mode (i.e., voltage limit is lower than current limit for the load connected), a regulated constant voltage output is provided. The output voltage remains constant as the load resistance decreases (i.e., current increases), up to the point that the preset current limit is reached. At that point, the output current becomes constant and the output voltage drops in proportion to the further decrease of the load resistance. The crossover point is reached when the voltage and current set points are reached simultaneously. At the crossover point, the indicator changes from CV

to CC.

Similarly, crossover from constant current to constant voltage mode automatically occurs when the resistance of the load is increased. A good example of this is charging a 12V lead acid battery. Initially, the open circuit voltage of the power supply may be set at 13.8V. A discharged battery may demand high charging current beyond the current limit set for the power supply, and it will operate at constant current mode, with the maximum charging current equal to the set current limit. As charging goes on and the battery becomes more charged, the voltage will increase, and eventually reach 13.8V. In the meantime, the current demand from the battery will drop and fall below the set limit. The crossover is signaled by the indicator light change from CC to CV.

3-5 Operating Procedures

1) **Constant Voltage (CV) Operations**

a) With the power turned off, make sure that line voltage is correct for the input voltage setting.

b) Plug power cord into the power outlet.

c) Turn power switch to "ON" position.

d) Adjust coarse current knob (knob 5) to slightly above zero so that CV indicator light is on, and set "Voltage" (knob 7 and 9) to the desired output voltage.

f) Connect the external load to the output terminals. Make sure both "+" and "-" terminals are connect

correctly.

g) Once the load is connected, turn the current knobs to maximum, to ensure that the power supply stays at CV mode. If you want to limit the current and operate at the CV mode, follow 3-2 first to set the current limit, and do not change the setting on current knob during this setup.

2) **Constant Current Operation**

a) With the power turned off, make sure that line voltage is correct for the input voltage setting.

b) Plug the power cord into the power outlet.

c) Turn Power switch to "ON" position.

d) Adjust "Voltage" control (knob 7 and 9) to maximum position, or set "Voltage" to the desired voltage limit (this is the upper limit for voltage and typically above the operating voltage).

e) Turn the coarse current knob (knob 5) down to slightly above zero so the CV light is still on, connect the external load to the output terminals. Make sure both "+" and "-" terminals are connect correctly in terms of polarity.

f) Once the load is connected, turn the current knobs (3 and 5) slowly up until you reach the desired current level, turn the voltage knobs up if needed to ensure CC indicator is on. Step d) and d) allows you to connect the load and then increase the current to desired level. If you want to set the desired current level before connecting the load, follow steps outlined in 3-2 and connect the load.

4. Maintenance

Warning: The following instructions are to be performed by qualified personnel only. To avoid electrical shock, do not perform any servicing other than the contained in the operation instructions unless you are qualified to do so. For further questions, please contact factory support at support@volteq.com.

4-1 Fuse Replacement

If the fuse is blown, the power supply will not turn on. Try to determine and correct the 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 where power cord is plugged into the device.

Warning: For continued fire protection, replace fuse only with 250V fuse of the slow blowing type with correct rating.

4.2 Line Voltage Conversion

The power supply will work with line voltage of 110AC or 220V AC. Change from one line voltage to another

is done by changing the selection switch in the back.

Warning: The default setting is 110V AC; to use the unit for 220V AC, make sure to perform the following procedures before plugging the power supply into AC outlet:

1) Make sure power cord is unplugged.

2) Change the AC selector switch to the desired line voltage position.

Caution: The desired voltage must be shown in the switch itself, not printed on the case.

Warning: If the line voltage selector is set incorrectly, the power supply will be damaged (set at 110V and plug into 220V AC), or the maximum output will not be reached (set at 220V and plug into 110V AC).

4-3 Recovery from OV Protection

To reset the power supply that's in the OV protected state, follow the procedures below:

1) Disconnect the load and turn the power supply off.

2) Without any load connected, turn the power supply on. The power supply is reset and will respond to the front panel controls.

5. Attachment

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Power cord	1