

# 1320

## Triple Output High Resolution Power Supply

## User Manual



# **Safety Summary**

The following safety precautions apply to both operating and maintenance personnel and must be observed during all phases of operation, service, and repair of this instrument. Before applying power, follow the installation instructions and become familiar with the operating instructions for this instrument.

## ***GROUND THE INSTRUMENT***

To minimize shock hazard, the instrument chassis and cabinet must be connected to an electrical ground. This instrument is grounded through the ground conductor of the supplied, three-conductor ac power cable. The power cable must be plugged into an approved three-conductor electrical outlet. Do not alter the ground connection. Without the protective ground connection, all accessible conductive parts (including control knobs) can render an electric shock. The power jack and mating plug of the power cable meet IEC safety standards.

## ***DO NOT OPERATE IN AN EXPLOSIVE ATMOSPHERE***

Do not operate the instrument in the presence of flammable gases or fumes. Operation of any electrical instrument in such an environment constitutes a definite safety hazard.

## ***KEEP AWAY FROM LIVE CIRCUITS***

Instrument covers must not be removed by operating personnel. Component replacement and internal adjustments must be made by qualified service personnel. Disconnect the power cord before removing the instrument covers and replacing components. Under certain conditions, even with the power cable removed, dangerous voltages may exist. To avoid injuries, always disconnect power and discharge circuits before touching them.

## **DO NOT SERVICE OR ADJUST ALONE**

Do not attempt any internal service or adjustment unless another person, capable of rendering first aid and resuscitation, is present.

## **DO NOT SUBSTITUTE PARTS OR MODIFY THE INSTRUMENT**

Do not install substitute parts or perform any unauthorized modifications to this instrument. Return the instrument to Global Specialties for service and repair to ensure that safety features are maintained.

### **WARNINGS AND CAUTIONS**

A **WARNING** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in injury or death to personnel.

A **CAUTION** statement calls attention to an operating procedure, practice, or condition, which, if not followed correctly, could result in damage to or destruction of parts or the entire product.

**WARNING:** Do not alter the ground connection. Without the protective ground connection, all accessible conductive parts (including control knobs) can render an electric shock. The power jack and mating plug of the power cable meet IEC safety standards.

**WARNING:** To avoid electrical shock hazard, disconnect power cord before removing covers. Refer servicing to qualified personnel.

**CAUTION:** Before connecting the line cord to the AC mains, check the rear panel AC line voltage indicator. Applying a line voltage other than the indicated voltage can destroy the AC line fuses. For continued fire protection, replace fuses only with those of the specified voltage and current ratings.

**CAUTION:** This product uses components which can be damaged by electrostatic discharge (ESD). To avoid damage,

be sure to follow proper procedures for handling, storing and transporting parts and subassemblies which contain ESD-sensitive components.

## COMPLIANCE STATEMENTS

This product is subject to Directive 2002/96/EC of the European Parliament and the Council of the European Union on waste electrical and electronic equipment (WEEE), and in jurisdictions



adopting that Directive, is marked as being put on the market after August 13, 2005, and should not be disposed of as unsorted municipal waste. Please utilize your local WEEE collection facilities in the disposition of this product and otherwise observe all applicable requirements.



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# 1 Introduction

## 1. Overview

Global Specialties Model 1320 Triple Output High Resolution DC Power Supply provides two variable outputs (0 – 30V / 0 – 3A) and one fixed output (5V / 3A). The variable outputs can work independently, in series tracking, or parallel mode. Conveniently adjust voltage and current with independent front panel knobs and bright quad display. This power supply is ideally suited for applications in electronic test, production, and service, where multiple independent DC power supplies are required and bench space is at a premium.

## 2. Features

- Separate 4-digit displays for voltage and current on variable outputs
- Three independent outputs
- Individual control of voltage and current for variable outputs
- CV (constant voltage) / CC (constant current) mode operation
- LED indication for CV / CC mode
- Overload indication LED for fixed output
- Series tracking and parallel mode operation
- Power On/Off switch on front panel
- Input voltage selection on rear side (120 VAC/ 240 VAC)

# 2 Installation

## 1. Initial Inspection

This unit is tested prior to shipment. It is therefore ready for immediate use upon receipt. An initial physical inspection should be made to ensure that no damage has been sustained during shipment.

Inspect the packing box on receipt for any external damage. If any external damage is evident, remove the instrument and visually inspect its case and parts for any damage. If damage to

the instrument is evident, a description of the damage should be noted on the carrier's receipt and signed by the driver or carrier agent. Save all shipping packaging for inspection. Forward a report of any damage to the agent through which the unit is procured.

Retain the original packing in case subsequent repackaging for return is required. Use of the original packing is essential.

After the mechanical inspection, verify the contents of the shipment. The items included in this package are:

- 1320 Power Supply
- Power Cord
- User Manual
- Banana Plug to Alligator Clip Lead Wires (Black & Red)

## 2. Input Power Requirements

The instrument can operate on 120 V or 240 VAC source at 50 or 60 Hz. The line selector plug on the rear panel allows you to select the line voltage. Before connecting the power plug to an AC line outlet, be sure to check that voltage selector plug is set in the correct position corresponding to the line voltage in your location and the fuse rating is as shown in the table.

Selector	Line Voltage	Fuse
120 V	100~125 V, 50/60 Hz	6 A
240 V	220~240 V, 50/60 Hz	3 A

## 3. Ventilation

Before applying power to unit, make sure that input voltage setting is correct and the ventilation holes are not blocked. Ensure that the ventilation fan located on the rear panel is working well (it should turn on when powered on). Do not load the output if ventilation fan is not working otherwise it may cause the power supply to overheat.

### 3 Product Description

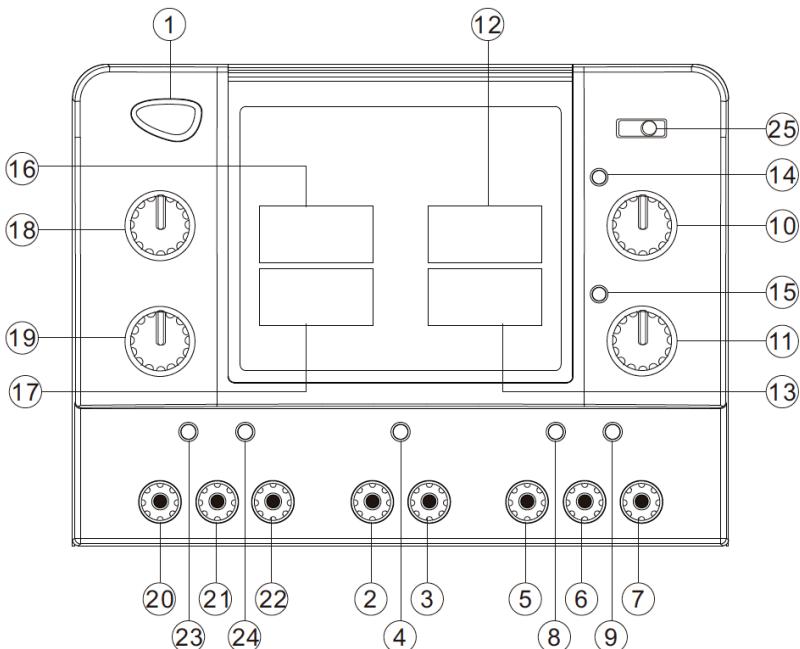


Figure 1. Front Panel

#### 1. Front Panel

1. Power switch
2. Negative output terminal of the fixed 5V/3A output (black)
3. Positive output terminal of the fixed 5V/3A output (red)
4. Overload indicator LED for the fixed 5V/3A output
5. Negative output terminal of the MASTER output
6. Ground terminal of the master output
7. Positive output terminal of the master output
8. CC mode LED for the master to indicate constant current
9. CV mode LED for the master to indicate constant voltage
10. Master voltage adjustment knob

11. Master current adjustment knob
12. Master voltage indicator display (4-digit green 0.36" LED)
13. Master current indicator display (4-digit red 0.36" LED)
14. Series mode indicator LED
15. Parallel mode indicator LED
16. Slave voltage indicator display (4-digit green 0.36" LED)
17. Slave current indicator display (4-digits red 0.36" LED)
18. Voltage adjustment knob for adjusting slave output voltage when master power is in CV mode
19. Current adjustment knob for adjusting slave output current when master power is in CC mode
20. Negative output terminal of the slave output
21. Ground terminal of the slave output
22. Positive output terminal of the slave output
23. CC mode LED for the slave to indicate constant current
24. CV mode LED for the slave to indicate constant voltage
25. Function mode switch: Select "IND," "SER," or "PAR" position for "Independent," "Serial Tracking," or "Parallel Mode," respectively.

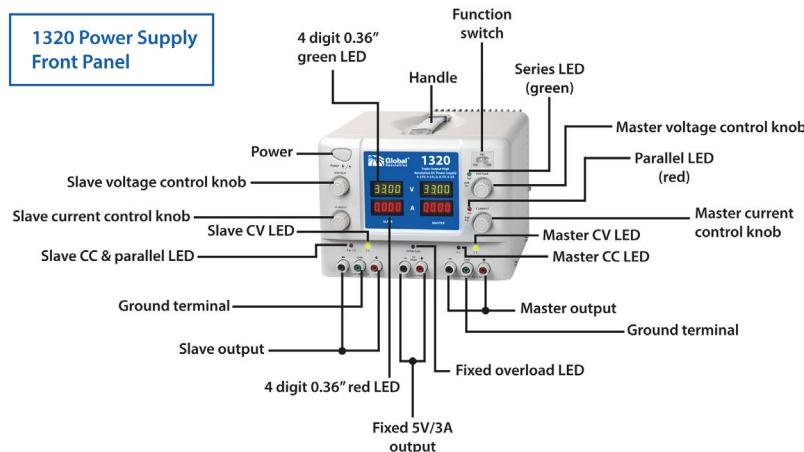


Figure 2. Front Panel Diagram

## 2. Rear Panel

- A. Heat sink: Heat dissipation for power transistor
- B. Ventilation Fan: 8" 24 VDC fan
- C. Power input socket
- D. Fuse holder and input voltage selector: The selected input voltage is set to the voltage shown near the  $\nabla$  mark which points to "E."
- E. The input power voltage indicator: The  $\blacktriangle$  mark points to the set input line voltage

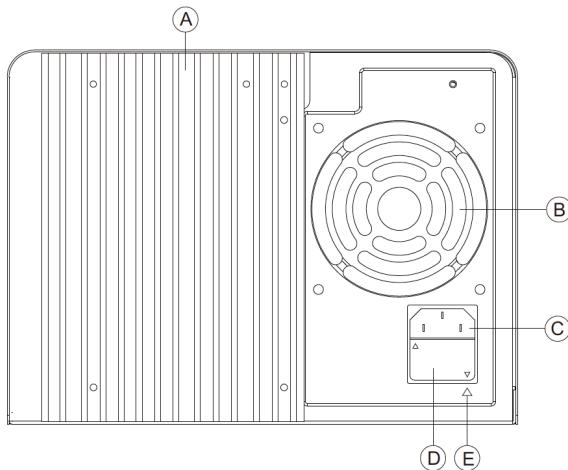


Figure 3. Rear Panel

## 4 Operating Instructions

### 1. Setting the Output Voltage and Output Current

1. As per load requirement, calculate the voltage and maximum current limit to be set on output. Note:  $V=IR$
2. Disconnect the load from output terminals.
3. For current limit adjustment, turn the current adjustment knob counter-clockwise to get minimum current output.
4. Short the circuit between the positive and negative output terminals by the accessory leads.
5. Vary the current adjustment knob clockwise until the current displays the required current limit. The CC LED

will be lit while adjusting the current limit. Remove the accessory lead after current limit adjustment.

- The voltage will be displayed again and the CV LED will be lit.
- Vary the voltage adjustment knob to get the desired output voltage on the display.

Depending on load condition, the power supply will work either in CV or in CC mode. The automatic changeover is indicated by the CV / CC LEDs.

## 2. Constant Voltage (CV) /Constant Current (CC) Mode

The working characteristic of this power supply 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. Figure 4 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 drops in proportion 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 off and the CC indicator comes on. Similarly, crossover from the constant current to the constant voltage mode automatically occurs from a decrease in load.

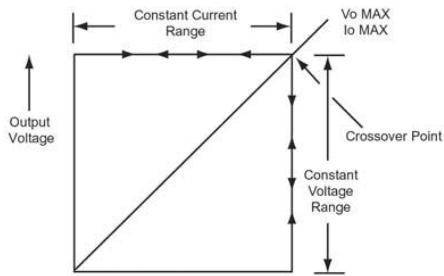


Figure 4. CC/CV Characteristics

### 3. System Configuration

Models 1320 has two variable outputs, which can work independently, in series tracking mode, or parallel mode by toggling the function mode switch. Users can also connect multiple units in series or parallel mode to increase their voltage or current.

#### a. Independent Mode

Ensure the function mode switch is in the “IND” position. Connect the appropriate load between the positive and negative terminal.

#### b. Series Tracking Mode

In this mode, the negative output terminal of the master gets connected internally to the positive output terminal of the slave.



Figure 5. Series Tracking Mode

1. Toggle the function mode switch to “SER”. The green LED will light up to indicate series tracking mode.
2. Set output voltage with the voltage adjustment knob of the master. The display of the master shows half the voltage of the actual output available across the positive output terminal of the master and the negative output terminal of the slave.
3. Connect the load across the positive output terminal of the master and the negative output terminal of the slave.

#### c. Parallel Tracking Mode

In this mode, the positive output terminal of the master gets connected internally to the positive output terminal of the slave and the negative output terminal of the master gets connected to

the negative output terminal of the slave. The output voltage will be the same as the master set value and the output current is twice the set master output current.



Figure 6. Parallel Tracking Mode

1. Toggle the function mode switch to “PAR”. The red “Par” LED and the red “Par.CC” LED of the slave output will light up to indicate parallel tracking mode.
2. Turn both the slave voltage adjustment knob and current adjustment knob clockwise to maximum.
3. Set the output voltage with master voltage adjustment knob. The output current will be twice that of the set master output current.

4. In parallel mode of operation, connect the appropriate load between the positive and negative terminals of the master (or between the positive and negative terminals of the slave).

#### d. Multiple Units in Series Mode

For achieving higher voltage, two or more units can be connected in series (**CAUTION**: 240 V max). The output voltage of the system will be the sum of all units. The output current will be the same for all units.

1. Switch all units to “SER” mode and adjust each to the same output voltages.
2. Connect the negative of the slave output terminal of unit 1 to the positive of the master output terminal of unit 2.
3. Connect the load between the positive of the master terminal of unit 1 and the negative of the slave terminal of unit 2.



Figure 7. Multiple Units in Series

### e. Multiple Units in Parallel Mode

Two or more units can be connected in parallel to obtain a higher current output (**CAUTION**: 24 A max). The output current of the system will be the sum of all units. The output voltage of the system will be the same for all units.

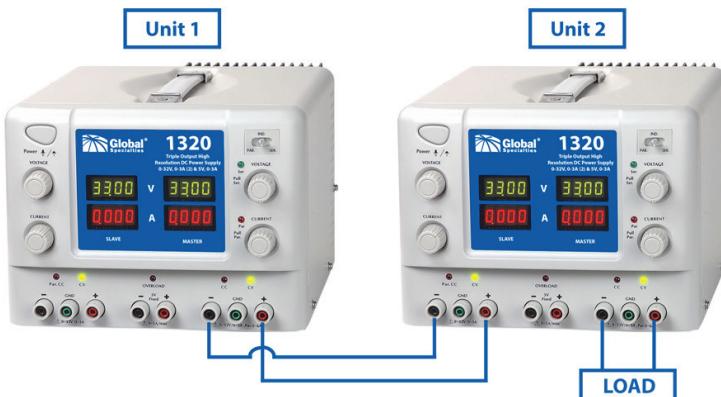


Figure 8. Multiple Units in Parallel

1. Switch all units to “PAR” mode.
2. CAUTION. Adjust all units to the same output voltages.
3. Make the parallel connection of the positive and the negative terminals of the master and slave outputs for all units.
4. Connect the load between the positive and negative of the master on the last unit.

#### f. Fixed 5V/3A Output

This is the standard 5V/ 3A power output provided for supplying the power to TTL logic circuits. When the load exceeds 3A, the red OVERLOAD LED will light up. The output voltage will be lowered and the power supply will switch to CC mode.

## 5 Specifications

All specifications apply to the unit after a temperature stabilization time of 15 minutes over an ambient temperature range of 25 °C ±5 °C.

1320 Power Supply	
<b>Output Parameters</b>	
Max Output Power	207 W
Number of Outputs	3 independent & electrically isolated outputs
Range	Variable: 0-30 VDC / 0-3 A (2) Fixed: 5 V / 3 A (1)
Max Continual Output Power	195 VA
<b>Load Regulation</b>	
CC Mode	<0.2% + 3 mA
CV Mode	<0.05% + 5 mV
<b>Line Regulation</b>	
CC Mode	<0.2% + 2 mA
CV Mode	<0.05% + 3 mV
<b>Ripple &amp; Noise</b>	
CC Mode	<2.5 mArms
CV Mode	<0.4 mVrms
Fixed 5 V Output	<1.5 mVrms
<b>Tracking Operation</b>	
Slave Tracking Error	<0.5% + 2 digits of the master
<b>Display Accuracy</b>	
Voltage & Current	<0.05% + 3 digits
Fixed 5 V Output	± 0.25 V
<b>General</b>	
AC Input	VAC 120/240 ±10%, 50/60Hz ±10%
Operating Temperature	50 °F to 104 °F (10 °C to 40 °C)
Operating Humidity	90% R.H.
Temperature Coefficient	<300 PPM / °C (voltage and current)
Dimensions (W x H x D)	9 x 7 x 12 in (230 x 170 x 310 mm)
Weight	17.6 lbs (8.0 kg)
Included Accessories	Power cord, user manual, one pair of test leads
Warranty	One Year Warranty

Specifications are subject to change without notice. To ensure the most current version of this manual, please download the current version from our website: [globalspecialties.com](http://globalspecialties.com).

# 6 Maintenance

## 1. Preventative Steps

Please follow these preventive steps to ensure the proper operation of your instrument.

- Never place heavy objects on the instrument.
- Never place a hot soldering iron on or near the instrument.
- Never insert wires, pins, or other metal objects into ventilation fan.
- Never move or pull the instrument with power cord or output lead. More importantly, never move the instrument when the power cord or output lead is connected.
- Do not obstruct the ventilation holes in the rear panel as this will increase the internal temperature.
- Do not operate the instrument with the cover removed unless you are a qualified service technician.
- Clean and recalibrate the instrument on a regular basis to keep the instrument looking nice and working well.
- Remove any dirt, dust, and grime whenever they become noticeable on the outside cover using a soft cloth moistened with a mild cleaning solution.

## 2. When the Unit is Not Turning On

Check if the power ON/OFF switch is turned ON. Check for blown fuse. If not, then check the power cord. Please make sure that the power cord is properly connected to the unit. Please also check the main switch and ensure that the AC supply at your site is the same as the one mentioned at the rear chassis of the unit.

## 3. Fuse Replacement

If the fuse blows, the LED will not light and the instrument will not operate. Replace only with the correct value fuse. The fuse is located on the rear panel adjacent to the power cord receptacle.

Remove the fuse holder assembly as follows:

- Unplug the power cord from the rear of the instrument.
- Insert a small screwdriver in the fuse holder slot (located between fuse holder and receptacle).
- When reinstalling fuse holder, be sure that the fuse is installed so that the correct line voltage is selected.

## 7 Service and Warranty Information

### 1. One Year Warranty

Cal Test Electronics warrants this product to be free from defective material or workmanship for a period of 1 year from the date of original purchase. Under this warranty, Cal Test Electronics is limited to repairing the defective device when returned to the factory, shipping charges prepaid, within the warranty period.

Units returned to Cal Test Electronics that have been subject to abuse, misuse, damage or accident, or have been connected, installed or adjusted contrary to the instructions furnished by Cal Test Electronics, or that have been repaired by unauthorized persons, will not be covered by this warranty.

Cal Test Electronics reserves the right to discontinue models, change specifications, price, or design of this device at any time without notice and without incurring any obligation whatsoever.

The purchaser agrees to assume all liabilities for any damages and/or bodily injury which may result from the use or misuse of this device by the purchaser, his employees, or agents.

This warranty is in lieu of all other representations or warranties expressed or implied and no agent or representative of Cal Test Electronics is authorized to assume any other obligation in connection with the sale and purchase of this device.

### 2. Calibration and Repair

If you have a need for any calibration or repair services, please visit us on the web at: [globalspecialties.com](http://globalspecialties.com). See the "Service" tab. Or contact us via the "Contact" tab.