



**MODELS 3203L, 3205L, 3303L AND 3305L**

**DUAL AND TRIPLE OUTPUT POWER SUPPLIES**

**OPERATORS MANUAL**

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## 1.Introduction

These instruments consist of two identical, independently adjustable supplies (the 3303L and 3305L have an additional fixed 5V @ 3ADC power supply). The variable outputs can be used independently or in a series or parallel tracking mode selected by two front panel tracking buttons. The 2 variable supplies consist of a master and a slave supply and are connected internally depending if Series or parallel operation is selected. The master controls the amplitude of both the Master and the Slave unit. The Slave unit tracks the Master in a 1 to 1 relationship when series or parallel tracking is selected.

These power supplies are completely solid state and are a well-regulated, constant voltage/constant current supply that delivers a continuously variable DC voltage and current to a load up to the rated output voltage and current via the front panel voltage and current limit controls. The supplies are short circuit protected by limiting the current to a value set by the current limiting control.

Each supply has its own Voltmeter for setting and display the voltage and monitoring the resultant current. The output may be disconnected from the Load using the output ON/Off switch

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## 2 Specifications

### 2-1 General

AC input: 110/220  $\pm$  10% 50/60Hz switch selectable

Operating Temperature: 0°C to 40°C (32°F to 104°F) at < 80% R.H

Storage Temperature -10°C to 70°C (14°F to 158°F) at a < 70% R.H

Accessories:

Power cord.....1ea

Operation manual.....1ea

### Available models

Model Number	Variable outputs		Fixed output
	Output voltage	Output Current	
3203L	2H 0 to 30V	2H 0 to 3Amps	
3205L	2H 0 to 30V	2H 0 to 5Amps	
3303L	2H 0 to 30V	2H 0 to 3Amps	5V @3Amp
3305L	2H 0 to 30V	2H 0 to 5Amps	5V @3Amp

Dimensions: 10.2" ( W) x 6.3" (H) x13" (D)

Weight: 15.4 lbs

## 2-2 Specifications electrical

### 2-3 Operating modes

Independent	Both variable outputs are independent and the output is 0 to the rated output			
Series	Output Volts is 0 to twice the rated voltage of the master. Output current is 0 to the rated value of a single supply			
Parallel:	Output volts is 0 to rated voltage of the master supply Output current is the sum of both variable supplies			
Outputs				
Model	3203L	3205L	3303L	3305L
Var. Output Voltage	2x 0 to 30V	2x 0 to 30V	2x 0 to 30V	2x 0 to 30V
Output amps	2x 0 to 3A	2x 0 to 5A	2x 0 to 3A	2x 0 to 5A
Fixed out put	N/A	N/A	5V @ 3A	5V @ 3A

### 2-4 Constant Voltage mode

Load Regulation	$\leq 0.01\% + 3\text{mV}$	$\leq 0.02\% + 5\text{mV}$	$\leq 0.01\% + 3\text{mV}$	$\leq 0.02\% + 5\text{mV}$
Line Regulation	$\leq 0.01\% + 3\text{mV}$			
Noise and Ripple	$\leq 2.0\text{mV rms}$			
Recovery Time	$\leq 100\ \mu\text{S}$			
Temp Coefficient	$\leq 300\text{ppm}/^\circ\text{C}$			

### 2-5 Constant Current mode

Line Regulation	$\leq 0.2\% + 3\text{mA}$
Load Regulation	$\leq 0.2\% + 3\text{mA}$
Ripple	$\leq 3\text{mA rms}$

### 2-6 Series/Parallel/ Tracking

Parallel operation				
Load Regulation	$\leq 0.01\% + 3\text{mV}$	$\leq 0.02\% + 5\text{mV}$	$\leq 0.01\% + 3\text{mV}$	$\leq 0.02\% + 5\text{mV}$
Line Regulation	$\leq 0.01\% + 3\text{mV}$			
Series Operation				
Line Regulation	$\leq 0.01\% + 3\text{mV}$			
Load Regulation	$\leq 300\text{mV}$			
Tracking error	Slave tracking error: $\leq 0.5\% + 10\text{mV}$ of the master			

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Specifications continued

### 2-7 Meter:

No. Digits	3 digits
Accuracy	$\pm(0.5\% + 2\text{dgt})$
Volts Resolution	100mV
Ammeter Resolution	10mA

### 2.8 Fixed supply specifications

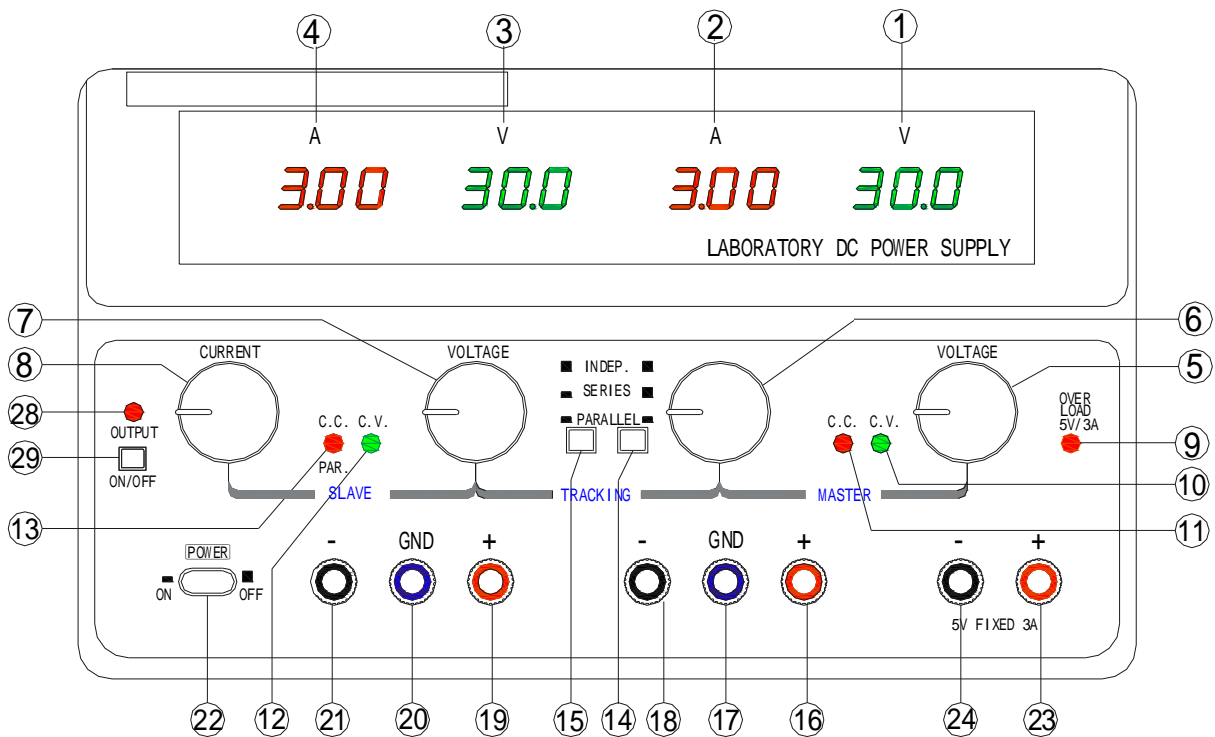
Voltage	5Volts $\pm$ 0.25V
Current	3 amps
Ripple and Noise	$\leq 2\text{mV rms}$ 5Hz to 1MHz

### 2.9 Insulation Resistance

Chassis to output terminals	$\geq 20\text{M}\Omega$ DC to 500V
Chassis to AC inputt	$\geq 300\text{M}\Omega$ DC to 500V

### 3.0 Panel controls and indicators

Fig 3-1



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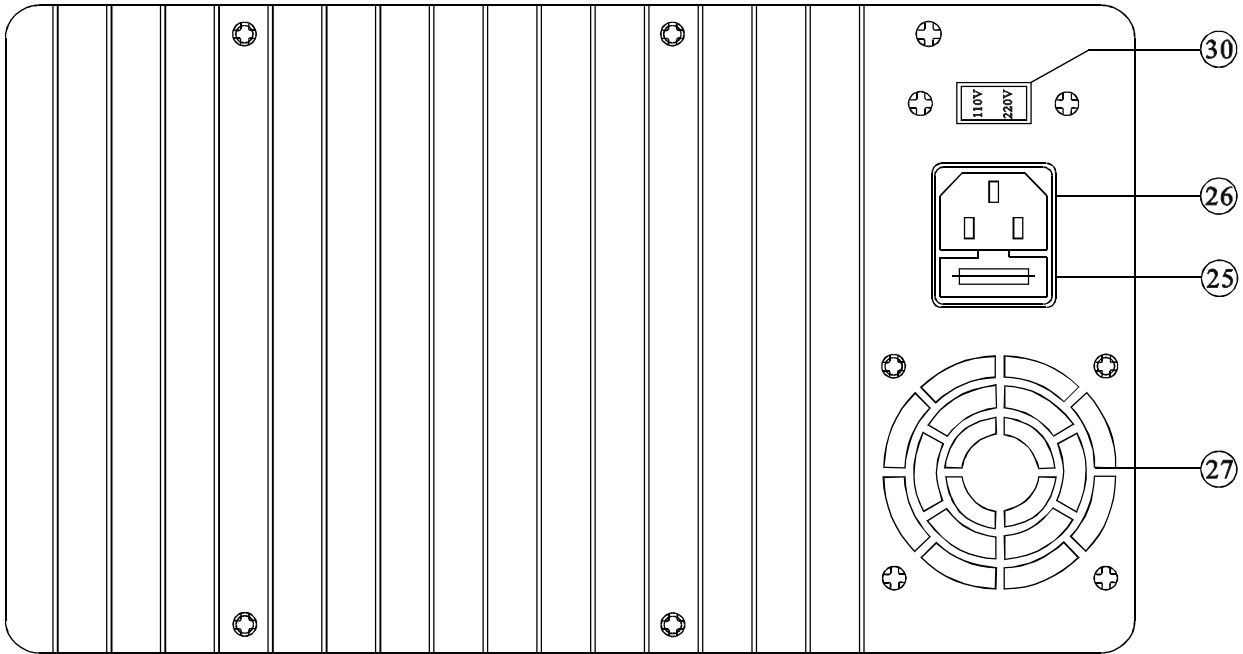
#### 3-1 Front panel

- (1) (3) Voltmeter Led displays: display the output voltage
- (2) (4) Ammeter Led displays: Displays the load current
- (5) (7) Voltage control: Adjusts the Voltage to the required value
- (6) (8) Current limit control: Sets the current limit value
- (9) Fixed supply overload indicator: Lights when the fixed supply load current exceeds 3 amps
- (10) (12) CV indicator: Lights when the supply is in the constant voltage mode
- (11) (13) CC indicator: lights when the supply is in the constant current mode
- (14) (15) Tracking select buttons:
  - (A) when both tracking buttons are out Independent mode is selected
  - (B) When Tracking button (15) is pressed in and (14) is press out, Series operation is selected
  - (C) When tracking button (14) and (15) are both pressed in Parallel operation is selected
 Note: When in series or parallel modes the right side power supply is the Master and the left side is the slave.
- (16) (19) Positive output terminals of the variable supplies
- (17) (20) Chassis ground terminal of the variable supplies
- (18) (21) Negative out terminals of the variable supplies
- (22) Power on/off switch
- (23) Positive terminal of the 5V fixed supply (3303L and 3305L)
- (24) Negative terminal of the 5V fixed supply (3303L and 3305L)
- (29) Output On/Off: When pressed, enables the variable outputs; the Voltage and Current meters will display values and the Output indicator is lit. When released the variable output are disabled and Volt and ammeter read Zero.

#### 3-2 Rear panel

- (25) Fuse holder 10A/250V for 3305L/3205L and 6.3V/250V for 3303L/3305v
- (26) AC voltage input: AC power connector: The AC input voltage is applied to this connector

Fig 3-2 Rear panel



(27) Fan: Models 3205L and 3305L

(29) AC voltage select: Selects the AC input voltage. 110V or 220V AC may be selected:

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#### 4. Independent Operation instructions

##### 4-1 Precautions for all modes

- 1 Be sure the AC line selector (29) is set to appropriate AC line voltage
- 2 To avoid electrical shock, be sure the chassis ground of the unit is connected the AC input ground terminal.
- 3 Do not use the unit when the ambient temperature exceeds  $40^{\circ}\text{C}$  ( $104^{\circ}$ ). Allow sufficient ventilation space for the heat sinks located in rear of the unit.
- 4 The outputs of these units are floating; the appropriate output terminal must be grounded for a positive or negative voltage output

##### 4-2 Setting the output voltage

**Note:** The procedure in 4-2 and 4-3 applies only to the variable output supplies

- 1 Fig 4-1 illustrates connecting the loads when the supply is in the independent mode. Both the Master and Slave supplies are in the independent mode
- 2 Press the tracking buttons (14) & (15) to the out position
- 3 Remove all test leads from the output terminals to the load
- 4 Turn the power supply on with the Power On/Off switch (22)
- 5 Press the Output/on/off button (29), the Out INDICATOR (28) should turn on
- 6 Rotate the Current control (6) (8) clockwise until the CV indicator (10) (12) is lit
- 7 Rotate the Voltage (5) (7) control to the required output voltage as displayed on the Voltmeter (1) (3)

##### 4-3 Setting the Current limit

- 1 Determine the maximum safe load current for each supply
- 2 Press the Output on/off button (29) to the out position (out indicator will turn off)
- 3 Short the + and - output terminals (16) & (18) or (19 & 21) with a test lead
- 4 Press the Output on/off button (29) in. The CC indicator (11) or (13) should be lit and the CV indicator (10) or (12) should go off
- 5 Rotate the Current control (6) (8) to the maximum safe load current as displayed on the ammeter (2) (4)
- 7 Press the Output/standby button (29) to the out position (out indicator off)

- 8 Remove the short circuit from the output terminals and connect the load to the output terminals
- 9 Press the Output/On/Off (29) in. The CV indicator (10) (12) should be lit and the CC Indicator (11) (13) should be off
- 10 The voltage displayed on the voltmeter (1) (3) should read what was set in 4-2 and the ammeter should (2) (4) read the load current
- 11 If the CC INDICATOR is lit repeat 4-2 and 4-3

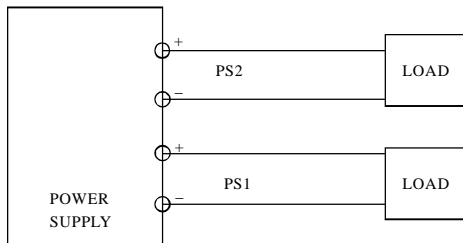


Fig 4-1 Independent operation

### 5.0 Series connected power supply

Pressing the left Tracking button in (15), the 2 power supplies are series connected. The connection between the 2 power supplies is internal. The Master (the right side power supply) Voltage control varies both supplies simultaneously in a one to one tracking relationship. When the master and slave are in the series mode, the total sum of the voltage is twice the reading of the Master supply's voltmeter and the current supplied to the load is equal to what is displayed on the Master or Slave Ammeter. A load connected to the power supply connected as a series supply is shown in Fig 5-1

The procedure for setting the supply voltage and current limit is the same as explained in 4-2 and 4-2 on page 8 for independent operation with the following modifications:

- 1) Set the current limit of the Slave supply fully clockwise and use the Master's current limit to set the current limit

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- 1) The Master's Voltage control will vary the output of both supplies and the output voltage will be double of what is displayed on the Master's or Slave's Voltmeter. example: If the master and slave voltmeters are reading 20Volts and the ammeters read 3 amps the voltage to the load is 40 volts and the current is 3amps

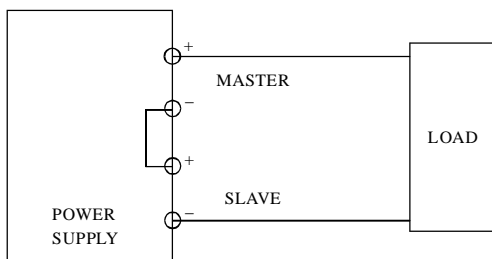


Fig 5-1 Series connected power supply

### 5.1 A positive and negative supply

Two power supplies connected in series used as a Plus and Minus tracking power supply is shown in fig 5-2. The Positive terminal of the Slave and the Negative terminal of the Master which is connected internally are then connected to the ground terminal.

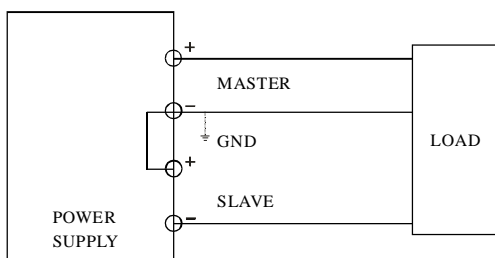


Fig 5-2 Positive and Negative power supply

## 6.0 Parallel connected power supply

When both Tracking buttons are pressed in (14) (15), the 2 power supplies are parallel connected. The connections between the 2 power supplies are internal as shown in Fig 6-1. The Master's Voltage control varies both supplies simultaneously in a one to one tracking relationship. When the master and slave are in parallel, the voltage is the same for both supplies as read on the Master's voltmeter and the current supplied to the load is double of what is displayed on the Master or Slave Ammeter. Example: if the Master and slave is set to 10 volts and each ammeter is reading 4 amps, the voltage to the load is 10V and the current is 8 amps

The procedure for setting the supply voltage and current limit is the same as explained in 4-2 and 4-2 on page 8 or independent operation with the following modifications:

- 1) The current limit and voltage control of the Slave supply is disabled, only the Master's Voltage control and current limit control is used.
- 2) The output voltage of the power supply is the same for both supplies and the load is connected to the Master supply.
- 3) The Current delivered to the load is twice the current that is displayed on the Master or Slave's ammeter

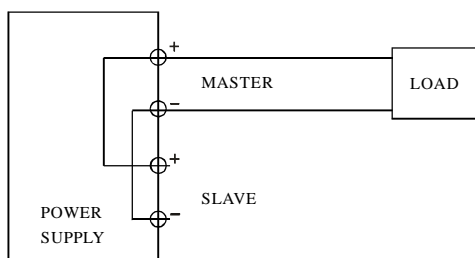


Fig 6.1 Parallel connected power supply

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## 7.0 5Volt, 3 amp fixed power supply

The 5 volt, 3 amp power supply delivers a fixed 5 volts and up to 3 amps to a load connected to its terminals. This supply is ideal for connecting TTL or Cmos ICs. This supply has an overload Indicator which lights when the load current exceeds 3 amps.

## 8. Maintenance

### Warning

The following instructions are for use by qualified personnel only. To avoid electrical shock, Do not perform any servicing other than what is set forth in the operating instructions unless You are a qualified to do so.

A) If the fuse blows, the CV or CC indicators nor the ammeter and voltmeter will be inoperative. The fuse should not blow under normal operating conditions. Try to determine the cause of failure, correct the problem and then replace the fuse (25) with one with the correct ratings.

B) If the mode is Constant voltage but the set voltage is incorrect and the CC indicator is lit, the unit is in the Constant current mode. Check the connections to the load or the determined current value (see 4-2) and correct.

**When the line voltage is change, set the AC line voltage selector switch (30) to the correct position and replace the fuse with the correct value.**

C) If the mode is Constant current but the ammeter is reading a lower value of current than what was determined and the CV indicator is lit, the unit is in the Constant voltage mode. Recheck the connections to the load and the current setting that was performed in (4-3)

D) If the output is unstable check if the line voltage is below the published specification