

# CIRCUIT-TEST

## Switching Mode Power Supply with USB Remote Control

**PSC-4120**

1-20VDC / 5A

**PSC-4136**

1-36VDC / 3A

**PSC-4160**

1-60VDC / 1.6A

# OPERATION MANUAL



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Keep this manual in a safe place for quick reference at all times.

This manual contains important safety and operation instructions for correct use of the power supply. Read through the manual and pay special attention to the markings and labels of this unit and equipment to be connected.

Pay special attention to these two types of notices used in this manual

**WARNING:** 

**Failure to observe this warning may cause injury to persons and damage to power supply or connected equipment.**

**CAUTION:** 

**Failure to observe this warning may result in damage to equipment and improper functioning of the power supply.**

## **Warning**

1. Do not use this power supply near water.
2. Do not operate or touch this power supply with wet hands.
3. Do not open the casing of the power supply when it is connected to AC mains.
4. Refer all servicing to qualified service personnel only.
5. Before replacing the external AC fuse, determine and eliminate the cause first.
6. Replace the AC fuse with the same type and rating as the original fuse.
7. The maximum output voltage of Model no. PSC-4160 is 60VDC; avoid touching the metal portion of the output terminals.

## **Caution**

1. Use a grounded 3 pin AC source.
2. This unit is for indoor use only.
3. Do not operate or place this unit in a humid, dusty, direct sunlight location or near any heat source.
4. Before plugging into local AC mains, check the rating label at the back of the unit.
5. Do not block any ventilation openings of the unit.
6. This unit must be used within the specified rating; regular excessive continuous loading may cause damage to the power supply.
7. The gauge size of input power cable must be at least 0.75mm<sup>2</sup> and the total length of power cable must not exceed 3m.

## **Operation Environmental Condition**

- 10-80% R.H. Maximum relative humidity 80% for temperature up to 31°C decreasing linearly to 50% relative humidity at 40°C. Altitude up to 2000m
- Installation Category: CAT 2 Pollution degree: 2
- Mains supply voltage fluctuation up to  $\pm 10\%$  of the normal voltage.

## **Introduction**

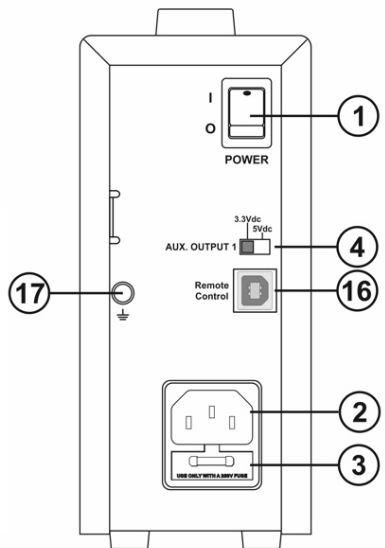
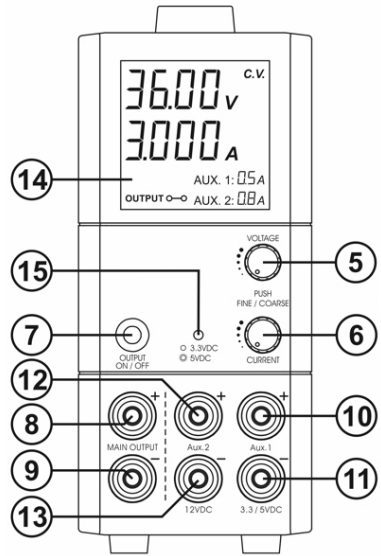
This family of Switching Mode Power Supplies offer current limiting control with high accuracy and a space saving compact design with easy portability. It features rotary encoder tuning with MCU for voltage and current control. The 4 digit LCD display's the voltage and current readings with high precision.

This power supply is ideal for trouble shooting circuit boards or devices that require two or three different input voltages such as 3V or 5V, 12V and 1-36V.

This power supply can provide 3 outputs at the same time. All three outputs are fully isolated so different cross connections of 2 or 3 outputs can provide various fixed or variable output voltages. Any output can be connected for positive or negative polarity. See as illustrated in connection diagrams.

## Controls and Indicators

1. Power Switch:
  - Turns the power supply ON/OFF, when it is ON the front display lights up
2. AC Input power socket
3. Fuse holder (ply open the cover to get to the fuse)
4. 3.3V/5VDC selection switch (for Aux output 1)
5. Output Voltage tuning knob. (Push the knob to toggle the coarse and fine tuning)
6. Output Current tuning knob. (Push the knob to toggle the coarse and fine tuning)
7. Output On/Off push button
  - For Main output: Push this button to turn the Main output ON/OFF
  - For Main output & Aux outputs: Push and hold this button for 3 seconds to turn the Main and Aux outputs OFF, push this button again to turn them ON
8. Main Output terminal Positive (+) Red
9. Main Output terminal Negative (-) Black
10. Aux Output 1 terminal Positive (+) Red (3.3VDC or 5VDC selectable)
11. Aux Output 1 terminal Negative (-) Black (3.3VDC or 5VDC selectable)
12. Aux Output 2 terminal Positive (+) Red (Fixed 12VDC)
13. Aux Output 2 terminal Negative (-) Black (Fixed 12VDC)
14. LCD Display panel indicating:
  - 4 digit Voltmeter, Ammeter, (CV) constant voltage mode, (CC) constant current mode,
  - Output terminal ON/OFF state  $\text{Output} \rightarrow \text{O}$
  - 2 digit Aux outputs Ammeter
15. Aux 1 Output voltage indicator
16. USB remote control
17. Ground Terminal



# Operations

## Basic Mode of Operation

This power supply is designed to operate as a constant voltage source or as a constant current source. Automatic crossover to either mode of operation occurs when the load condition changes as following:

### Constant Voltage (CV), Automatic crossover & Constant Current (CC)

The power supply functions as a constant voltage source (CV) as long as the load current is less than the preset current limiting value. When the load current is equal to or greater than the preset current limiting value, the power supply will automatically cross over to the constant current mode, voltage will drop, (CC) will show on the LCD display panel and it will operate as a constant current source.

When the load current drops below the preset current limiting value, the supply returns to constant voltage (CV) mode.

### Set the Output Voltage and Presetting Current Limiting Value (CC)

Turn the voltage or current knob to set the desired values.

Quick pushes on the knobs will move the decimal place for fast tuning.

Turn the knob when the desired number column flashes otherwise will need to repeat quick pushes again.

One quick push on the current knob will display the preset current limiting value.

### Aux. output 1 voltage selection

Move the switch (4) at the back of power supply for selection of 3.3 or 5 VDC.

At 3.3VDC setting, indicator (15) will be Off and at 5VDC setting indicator (15) will be ON.

### Connecting and Operating Procedure

1. Check the rating label and plug in to AC mains.
2. Switch on the power supply and the LCD display should be ON at the same time.
3. The (CV) icon will appear on the display.
4. Turn Current knob (6) to maximum clockwise if you do not require lower current limiting value, otherwise do the preset the (CC) limiting procedure.
5. Set your desired output voltage and then turn off the output terminal with push button (7).



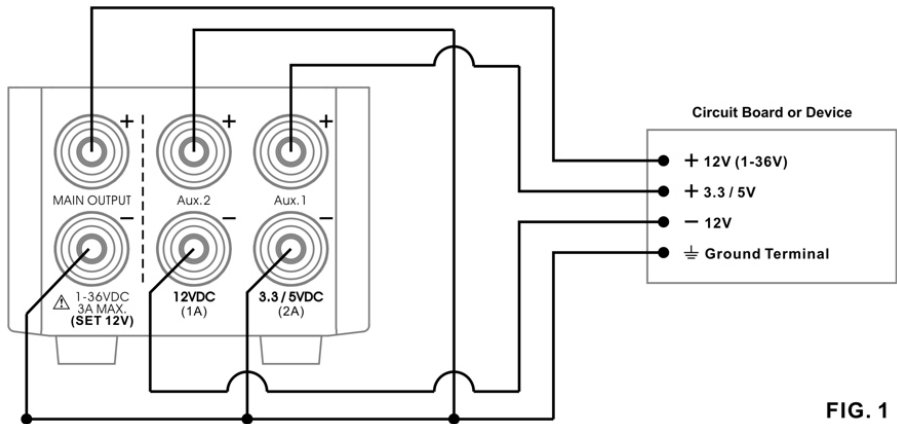
6. Connect to your load positive to positive and negative to negative.
7. Turn on the output terminal again and check if display shows (CV).
8. If display shows (CC), either your pre-set current limiting value is too low or your load requires more voltage and current. You need to re-access the voltage and current requirement of your load and increase the voltage or current accordingly until (CV) appears.

**Connecting the 3 outputs** (using PSC-4136, 1-36V, 0.25-3A as an example)

All the three outputs are fully isolated from ground and with each other so that it is possible to make cross connections to power a circuit board or device that requires for example: +3 or +5V, +12 V or -12V and 1-36V as shown in Fig.1.

The variable main output is set for 12V and it is assigned as the +12V source (available maximum current 3A) Note: the variable main output can be set for other voltage (1-36V) such as 16V.

The fixed 12V is made as the - 12V source (available maximum current 0.5A)  
 The fixed 5V is made as the +5V source. (available maximum current 0.5A)



**FIG. 1**

**Figure 1 Diagram showing Circuit Board or Device**

## Connecting outputs in series (using PSC-4136 as an example)

You can have a 17V fixed output by connecting the 5V in series with the 12V outputs.

The 2 outputs (Aux.1) can be connected in series to make a variable 5V to 41V with maximum current 2A (Fig. 2)

The 3 outputs can be connected in series to make a variable 17V to 53V with maximum current 1A, (Fig. 3)

There are other combinations of cross connections for different positive and negative output voltages.

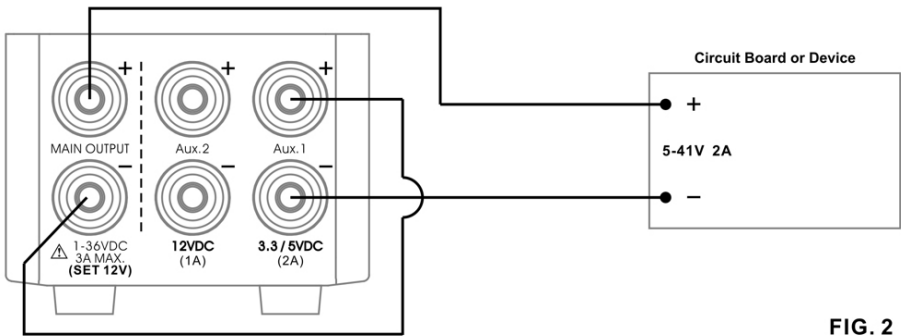


FIG. 2

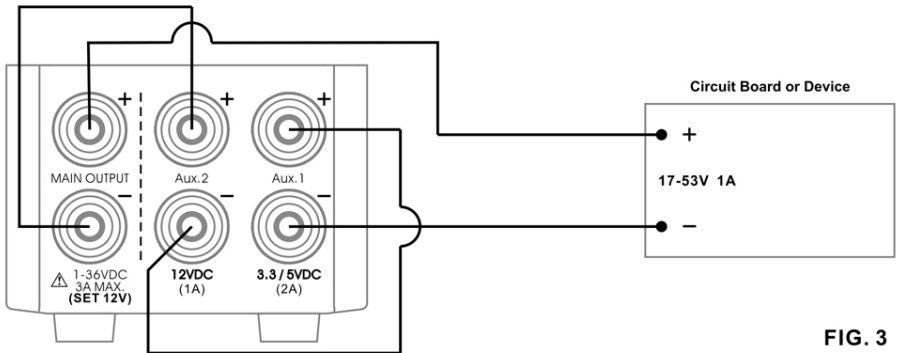


FIG. 3

## **Tracking Output Over Voltage Protection (OVP)**

This is to protect the connected load in the event that the output voltage control circuit malfunctions, the maximum output voltage will not exceed 30% of the adjusted voltage value at the time of the operation.

## **Over Temperature Protection**

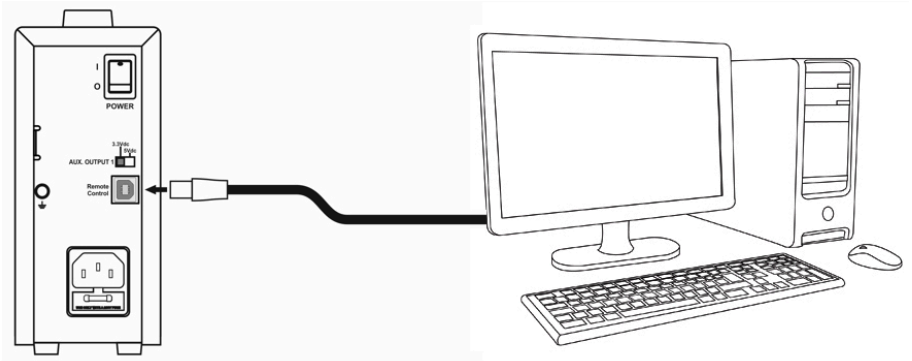
When the temperature inside the power supply becomes higher than a pre-determined value, the output voltage and current of the power supply will automatically decrease to zero to prevent damage to power supply. When the temperature inside the power supply returns to normal the power supply will automatically return to operation again.

## PC CONNECTION

This power supply with USB feature can be remotely controlled using Windows PC. Connect the power supply to PC using supplied USB cable.

There are two ways to remotely control this power supply; with the PC control software downloadable from the website [www.circuittest.com](http://www.circuittest.com) or with your own program using the command sets provided in this manual.

For detailed usage of driver and the PC software please refer to PC software manual downloadable from the website [www.circuittest.com](http://www.circuittest.com). Please make sure to download the appropriate driver and software for the respective power supply model.



## SPECIFICATIONS

	<b>PSC-4120</b>	<b>PSC-4136</b>	<b>PSC-4160</b>
Input Voltage	105 - 135VAC / 60Hz		
Full Load Input Current at 120Vac	1.3A		
Output Voltage Adjustable Range	1.0 - 20Vdc	1.0 – 36Vdc	1.0 - 60Vdc
Output Current Adjustable Range	0.25 - 5A	0.25 - 3A	0.25 - 1.6A
Voltage Regulation			
Load from 10% to 90% Variation	≤70mV		
Line from 105 to 135Vac Variation	≤25mV		
Ripple & Noise (peak to peak)	≤120mV	≤150mV	≤180mV
Current Regulation			
Load from 10% to 90% Variation	≤50mA		
Line from 105 to 135Vac Variation	≤20mA		
Ripple & Noise (peak to peak)	≤50mA		
Switching Operation Frequency	50KHz to 150KHz		
Aux output 1	Fixed 3.3 /5VDC. 1.8A continuous. 2A Max.		
Aux output 2	Fixed 12VDC, 800mA cont. 1A Max.		
Power Factor	>0.9		
Efficiency at Maximum Power	≥80.5%	≥80.5%	≥80.5%
Volt and Amp Control Type	Rotary Encoder		
Voltmeter and Ammeter Display	4 Digit LCD		
Voltmeter Accuracy	5 counts for range V<5V ±0.2% +5 counts for range V≥5V		
Ammeter Accuracy	15 counts for range I≤1A ±0.5% +6 counts for range I>1A		
LCD Indication	CC, CV, Amp, Volt, Output ON-OFF, Aux output current		
Protection	Short Circuit, Overload, Over Temperature, Tracking OVP		
Cooling System	Natural Convection		
Dimensions (WxHxD)	70 x 150 x 250mm / 2.8 x 6.0 x 9.8in.		
Weight	2Kgs / 4.4Lbs		

## COMMAND SET

Command code & Return Value	Description	Example
Input Command: SOUT<Output>[CR] Return Value: [OK][CR]	Set Output on/off Set Output off: <Output>=0 Set Output on: <Output>=1	Input Command: SOUT0[CR] Return Value: [OK][CR] Meaning: Set Output off
Input Command: GOUT [CR] Return Value: <Output> [CR][OK] [CR]	Get Output Status Output off: <Output>=0 Output on: <Output> =1	Input Command: GOUT[CR] Return Value: 0[CR][OK][CR] Meaning: Output is off
Input Command: SETD <VOLTAGE><CURRENT>[CR] Return Value: [OK][CR]	SET Voltage and Current <voltage> =0000~3640 <Current> =0000~5100	Input Command: SETD05001000[CR] Return Value: [OK][CR] Meaning: Voltage 5.00V Current 1.000A
Input Command: GETD [CR] Return Value: <Voltage><;><Current><;> <CV/CC Mode><;>[CR][OK][CR]	Get display Volt & display Curr & CV/CC mode <voltage> =0~9999 <Current> =0~9999 <CV mode> =0 CV Mode <CC mode> =0 CC Mode	Input Command: GETD [CR] Return Value: 500;1000;0;[CR][OK][CR] Meaning: The Display value is 5.00V and 1.000A It is CV mode
Input Command: GETS [CR] Return Value: <Voltage><;><Current><;>[CR] [OK][CR]	Get Setting Volt & Curr <voltage> =0~3640 <current> =0~5100	Input Command: GETS[CR] Return Value: 500;1000;[CR] [OK][CR] Meaning: The Memory set- ting voltage value is 5.00V and Current is 1.000A
Input Command: VOLT<Voltage>[CR] Return Value: [OK][CR]	Set output voltage	Input Command: VOLT 1000[CR] Return Value: [OK][CR] Meaning: Set voltage value is 10.00V
Input Command: CURR<Current>[CR] Return Value: [OK][CR]	Set output current	Input Command: CURR1000[CR] Return Value: [OK][CR] Meaning: Set Current value is 1.000A

<b>Command code &amp; Return Value</b>	<b>Description</b>	<b>Example</b>
Input Command: GMOD [CR] Return Value: <MODE>[CR][OK] [CR]	Get MODE <MODE>=NTP????	Input Command: GMOD[CR] Return Value: NTP5521[CR] [OK][CR] Meaning: Mode is NTP5521
Input Command: GVSH [CR] Return Value: <Voltage>[CR][OK] [CR]	Get voltage set high limit <voltage>=????	Input Command: GVSH [CR] Return Value: 3600 [CR] [OK][CR] Meaning: voltage set high limit is 36.00V
Input Command: GVSL [CR] Return Value: <Voltage>[CR][OK] [CR]	Get voltage set low limit <voltage>=???	Input Command: GVSL [CR] Return Value: 100 [CR][OK] [CR] Meaning: Voltage set low limit is 1.00V
Input Command: GISH [CR] Return Value: <Current>[CR][OK] [CR]	Get current set high limit <Current>=????	Input Command: GISH [CR] Return Value: 5500 [CR] [OK][CR] Meaning: Current set high limit is 5.500A
Input Command: GISL [CR] Return Value: <Current>[CR][OK] [CR]	Get current set low limit <Current>=???	Input Command: GISL [CR] Return Value: 250 [CR][OK] [CR] Meaning: Current set low limit is 0.250A
Input Command: GMAX [CR] Return Value: <Voltage><;><Current><;>[CR] [OK][CR]	Get voltage set high limit & current set high limit <voltage> =???? <current> =????	Input Command: GMAX [CR] Return Value: 3600;5500;[CR] [OK][CR] Meaning: Voltage set high limit is 36.00V & Current set high limit is 5.500A
Input Command: GMIN [CR] Return Value: <Voltage><;><Current><;>[CR] [OK][CR]	Get voltage set low limit & current set low limit <voltage> =??? <current> =???	Input Command: GMIN [CR] Return Value: 100;250;[CR] [OK][CR] Meaning: Voltage set low limit is 1.00V & Current set low limit is 0.250A

## **Warranty**

Circuit-Test Electronics warrants to the original purchaser that this product be free of defect in material or workmanship for a period of 2 years from the date of purchase.

Any product which has been subjected to misuse or accidental damage is excluded from the warranty. Except as stated above, Circuit-Test Electronics makes no promises or warranties either expressed or implied including warranties of merchantability or the fitness for any particular purpose.



Notes:

**CIRCUIT-TEST**  
**ELECTRONICS**

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