

**Multiple Power Supply**  
**Sciencetech 4077**

**Learning Material**  
**Ver.1.1**



An ISO 9001:2008 company

**Sciencetech Technologies Pvt. Ltd.**

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We request you to use the Learning material in the CD form  
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Please remember that each paper manual requires 50-100 sheets of paper  
on an average.

Your CD learning material has

colourful diagrams,

plenty of theory,

detailed experiments with observation tables,

frequently asked questions, etc.

..... and more so sometimes videos as well.

**Sciencetech Eco Foundation**

# Certificate

Standard: **ISO 9001:2008**

Certificate Registr. No. **85 100 001 10182**

TÜV Rheinland India Pvt. Ltd.:

Certificate Holder: **Sciencetech Technologies Pvt. Ltd.**

Unit 1: 94 – 101, Electronics Complex, Pardeshi Pura,  
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Unit 2: 90 – 91, Electronics Complex, Pardeshi Pura,  
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Scope: **Design, Manufacture of Electronic Test & Measuring  
Instruments, Training Products for Electrical & Electronics  
Education and Providing Technology Training**

An audit was performed, Report No. 10182. Proof has been  
furnished that the requirements according to ISO 9001:2008  
are fulfilled.

The due date for all future audits is 04-10 (dd.mm).

Validity: The certificate is valid from **2010-12-13** until **2013-12-12**.



Bangalore, 2010-12-20

The Certification Body of  
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**Multiple Power Supply****Scientech 4077**

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**RoHS Compliance**

Scientech Products are RoHS Complied.

RoHS Directive concerns with the restrictive use of Hazardous substances (Pb, Cd, Cr, Hg, Br compounds) in electric and electronic equipments.

Scientech products are “Lead Free” and “Environment Friendly”.

It is mandatory that service engineers use lead free solder wire and use the soldering irons upto (25 W) that reach a temperature of 450°C at the tip as the melting temperature of the unleaded solder is higher than the leaded solder.

### **Safety Instructions**

Read the following safety instructions carefully before operating the instrument. To avoid any personal injury or damage to the instrument or any product connected to it.

**Do not operate the instrument if suspect any damage within.**

**The instrument should be serviced by qualified personnel only.**

#### **For your safety:**

**Use proper Mains cord** : Use only the mains cord designed for this instrument. Ensure that the mains cord is suitable for your country.

**Ground the Instrument** : This instrument is grounded through the protective earth conductor of the mains cord. To avoid electric shock the grounding conductor must be connected to the earth ground. Before making connections to the input terminals, ensure that the instrument is properly grounded.

**Observe Terminal Ratings** : To avoid fire or shock hazards, observe all ratings and marks on the instrument.

**Use only the proper Fuse** : Use the fuse type and rating specified for this instrument.

**Use in proper Atmosphere** : Please refer to operating conditions given in the manual.

- 1. Do not operate in wet / damp conditions.**
- 2. Do not operate in an explosive atmosphere.**
- 3. Keep the product dust free, clean and dry**

### Introduction

The **Sciencetech 4077 Multiple Power Supply** has been designed as a constant current (CC) and constant voltage (CV), source for laboratories, industries and field testing applications, featuring low power loss, compact and lightweight. It provides three floating independent DC output voltages and is ideally suitable for complex analog and digital testing.

The DC outputs 0- 30V and 0  $\pm$ 15V Dual Track, can be continuously adjusted, with coarse and fine controls. The other DC output 5V also can be adjusted between 4V and 6V. Current limit is also adjustable for all outputs. Any over loading for adjusted current limit, is indicated by OR LED. When the maximum setting is crossed or the overheating has occurred, the OR LED will lit up.

Two displays (one 3-digit display for voltage & other 3-digit for current) are used to read the instantaneous values. These two displays can be switched simultaneously for either of the DC outputs. It has low residual ripple and noise, as well as excellent line and load regulation. The **Sciencetech 4077 Multiple Power Supply** is provided with all protective circuits to ensure trouble free operation



### **Features**

- **Three floating, independent DC supply voltages**
- **DC Outputs**
  - A: 0 -30V, 2A**
  - B: 5V, 2 Amps**
  - C: 0 ± 15V (Dual Tracking) /1A each**
- **Constant voltage and constant current operation**
- **Short circuit protection**
- **Digital display for voltage and current**
- **Adjustable current limiter**

**Technical Specifications**

<b>DC Output</b>	<b>: A:</b> 0-30V, 2A <b>B:</b> 5V (4V to 6V), 2A <b>C:</b> 0 to $\pm$ 15V Dual Tracking, 1A
<b>DC Output A</b>	
<b>DC Output</b>	<b>:</b> 0-30V, continuous variable by means of coarse & fine controls
<b>Output Current</b>	<b>:</b> 2A (maximum)
<b>Current Limit</b>	<b>:</b> Adjustable between 100 mA to 2A
<b>DC Output B</b>	
<b>DC Output</b>	<b>:</b> 5V, adjustable from 4V – 6V for specific applications.
<b>Output Current</b>	<b>:</b> 2A (maximum)
<b>Current Limit</b>	<b>:</b> Adjustable between 100mA to 2A
<b>DC Output C</b>	
<b>DC Output</b>	<b>:</b> 0 to $\pm$ 15V, adjustable by means of coarse and fine controls
<b>Output Current</b>	<b>:</b> 1A
<b>Current Limit</b>	<b>:</b> Adjustable between 100mA to 1A
<b>Tracking Error</b>	<b>:</b> $\pm$ (0.1 % + 5mV)
<b>Other Information for all outputs</b>	<b>:</b> (30V/2A, 5V/2A, $\pm$ 15V/1A)
<b>Setting Resolution</b>	<b>:</b> Voltage: 10mV Current: 2mA
<b>Internal Resistance</b>	<b>:</b> $\leq$ 15m $\Omega$
<b>Stability</b>	<b>:</b> $\leq$ 2.5mV
<b>Recovery Time</b>	<b>:</b> $\leq$ 50 $\mu$ s
<b>Load &amp; Line Regulation</b>	<b>:</b> $\leq$ 0.05%
<b>Temperature Coefficient</b>	<b>:</b> $\leq$ 0.05% + 5 mV/ $^{\circ}$ C
<b>Ripple &amp; Noise</b>	<b>:</b> $\leq$ 1mVrms
<b>Display</b>	<b>:</b> 3digits for voltage, 3 digits for current LED indication for voltage & current
<b>Accuracy</b>	<b>:</b> $\pm$ (1% rdg + 1 dgt)

**General Information:**

Built in over voltage, overload, overheat & short circuit protection.

All outputs are floating.

**Insulation:**

**Between chassis and output terminal** : > 10 M $\Omega$  at 100VDC

**Between chassis and AC plug** : > 50 M $\Omega$  at 500VDC

**Power Supply** : 230V AC  $\pm$  10% 50Hz

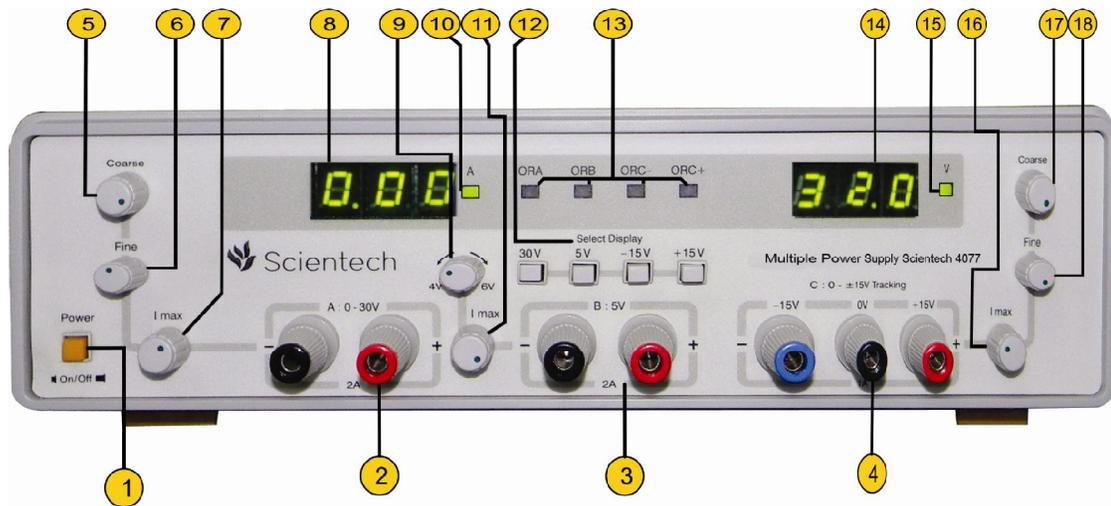
**Operating Conditions** : 0 - 40<sup>0</sup> C; 90% RH

**Dimension** : W 285 x H 75x D 385 mm

**Weight** : 5.5 Kgs. (approximately)

(Subject to Change)

**Front Panel Controls**



**Figure 1**

- 1 Power:** Push button switch for supplying power to instrument.
- 2 A: 0 - 30V (4mm banana terminals):** Output terminals for 4mm banana plugs or cable connection. The output voltages are short circuit protected.
- 3 B: 5V (4V – 6V) (4mm banana terminals):** Output terminals for 4mm banana plugs or cable connection for 5V output. The output voltages are short circuit protected.
- 4 C: 0 - ±15V Dual Tracking (4mm banana terminals):** Output terminals for 4mm banana plugs or cable connection. 0 to + 15V output is "Master" and 0 to -15V output is "Slave", which tracks the output voltage of Master. The output voltages are short circuit protected. .
- 5 & 17 Coarse (adjusting knob):** For the coarse setting of the output voltages at A & C respectively. Adjustment range: 0-30V and 0 - ±15V respectively.
- 6 & 18 Fine (adjusting knob):** For the fine settings of the output voltage for A & C output terminals. Adjustment range approximately 2.1V & 1V respectively.
- 7 & 16 I max (Adjusting knob):** For current limit setting of the outputs A & C respectively. Adjustment range 100mA -2A & 20mA - 1A each.
- 8 & 14 Digital Display (7-segment LED):** 3-digit readout for output voltage & 3 digit readout for output current.

- 9**      **4V – 6V:** Adjustment for setting the output voltage of the source B from 4V to 6V.
- 10 & 15 V & A Indicators:** Two LEDS indicate the unit of the display.
- 11**      **I max:** For current limit setting of the output B Adjustment range 100mA - 2A.
- 12**      **Select Display (Push Buttons):** Four push buttons can be pressed one at a time. When pressed each selects both displays (Voltage & Current) simultaneously for the respective voltage source to show the instantaneous values.
- 13**      **ORA, ORB, ORC-, ORC+ (Overload indicators):** LEDs for overload indication for respective DC outputs are provided. In case of overheating or output current in excess of set limit corresponding OR LED lits up.

## **Operating Instructions**

### **General Information:**

The logical front panel layout of **Scientech 4077** makes it easy to become familiar with the operation of the instruments. However, even experienced users should read the following instructions thoroughly before using the instrument.

After unpacking the instrument, check for any mechanical damage or loose parts inside. Should there be any transportation damage, inform the supplier immediately and do not put the instrument into operation.

### **Safety:**

The case chassis and all measuring parts are connected to the protective earth contact of the inlet. The mains plug shall only be inserted in a socket outlet provided with a protective earth contact. The protective action must not be negated by the use of an extension cord without a protective Conductor.

### **Warning !**

*Any interruption of the protective conductor inside or outside the instrument or disconnection of the protective earth terminal is likely to make the instrument dangerous. Intentional interruption is prohibited. The mains/line plug should be inserted before connections are made to measuring circuits.*

When removing the metal case or replacing, the instrument must be completely disconnected from the mains supply. If any measurement or calibration procedures are unavoidable on the opened-up instrument, these must only be carried out by qualified personnel acquainted with the danger involved.

### **Operating Conditions:**

The ambient temperature range during operation should be between 0° - 40°C; 90% RH and should remain within -20°C & + 70°C during transportation or storage. The operational position is optional; however, the ventilation holes on the **Scientech 4077** must not be obstructed. Prior to calibration a preheat run of approximately 30 minutes is required.

### **First Time Operation:**

After unpacking the instrument check for any mechanical damages. The instrument should be plugged in mains-plug of proper mains supply 230V ± 10%. Switch on the instrument. The power 'On' is indicated by lighting of displays.

### **Operation:**

**The Multiple Power Supply Scientech 4077** has three electrically isolated supply voltages. This permits easy series connection of output voltages. In case of series connection the maximum output voltage increases with a maximum current of 2Amp.

In the dual tracking supply, the negative (slave) Power Supply tracks the positive (master) supply voltage with 1% tracking error. The current limit setting is also common for both due to overload, if "Master" output voltage falls. The "Slave" will track it. But if "Slave" gets overloaded "Master" will not track the "Slaves" output voltage.

### **Functional Checks**

The **Scientech 4077** should regularly be tested to assure proper functioning. The following test checks out the power supplies performance and suggestions for adjusting specific values. The adjustment will only be meaningful if the below indicated or equivalent instruments are used. Prior to the functional test or adjustment, the instrument should be on for at least 30 minutes.

#### **Measuring Instruments required:**

1. 4 ½ Digit DMM
2. 20 MHz Oscilloscope e.g. Scientech model 201
3. Rheostat: 100Ω- 2A and 17Ω- 5.5A.

#### **Test Procedure:**

##### **A. 0.30V DC output**

1. **Check of maximum DC output voltage:** Set the Coarse and Fine knobs to maximum, the maximum DC output reading should be between 31V and 33V. This also can be verified on DMM.
2. **Check of minimum DC output voltage:** Set the Coarse and Fine knobs to minimum, the minimum DC output reading should be 00.0 Volts, which when measured on DMM will be approximately 25mV. For load resistor of < 10KΩ.
3. **Check of minimum current limit setting:** Set 30VDC output to 10V & short circuit the output terminals. Adjust current limit knob I maximum to minimum the reading on the display should be <100mA.
4. **Check of maximum output current:** Set the DC output voltage to 10V. Short-circuit the output terminals. Adjust the I max current limit knob to maximum, the reading on the display, should be between 2.01A and 2.2A.
5. **Check of over load indicators:** Set the instrument as in step 3 or 4. When the output terminals are short circuited, "ORA" LED should lit.
6. **Check of residual ripple and noise:** Connect any load on DC output 0-30 V, and adjust the I max, to maximum (maximum to 2000 mA), and check the ripple and noise on DMM. It should not be more than 1mVrms.

##### **B. 5V DC output:**

1. **Check of maximum DC output voltage:** Set 4V-6V knob to maximum the maximum DC output voltage should be  $\geq 5.5V$ , when measured on the DMM.
2. **Check of minimum DC output voltage:** Set 4V – 6V knob to minimum The minimum DC output voltage should be  $\leq 4.0 V$ , when measured on DMM.
3. **Check of maximum output current:** Set the current limit knob "I maximum" to 5V maximum Short circuit the output terminals. The reading on the current display should be 2.10A

4. **Check of minimum output current:** Set the current limit knob "I maximum" to minimum Short circuit the output terminals. The reading on the current display should be  $\leq 100\text{mA}$ .
5. **Check of over load indicators:** When the output terminals are short circuited, the beeper should start beeping and OR LED should lit.
6. **Check of residual ripple and noise:** Connect a suitable load, so that 2Amp current flows through it check the ripple and noise on the Oscilloscope, it should be less than  $1\text{mVrms}$ .

**C. 0 -  $\pm 15\text{V}$  Dual Tracking output:**

1. **Check of maximum DC output voltage:** Set the Coarse and Fine knobs of this section to maximum Select display for + 15V, then -15V. The maximum output voltage reading should be between 15.5 V and 16.5V in both + 15V & -15V sections, which also can be verified on DMM.
2. **Check of minimum DC output voltage:** Set the Coarse and Fine knobs of this section to minimum the minimum DC output reading should be 00.0 V for both +15V & -15V, which when measured on DMM will be  $< 25\text{ mV}$  for load resistor of  $<10\text{K}\Omega$ .
3. **Check of maximum tracking error:** Set 0 to +15V output to maximum by the "Coarse & Fine" Controls. Now Check that difference between output voltages at positive and negative output terminals (with respect to common) is not more than 0.15V.
4. **Check of minimum current limit setting:** Set the output to  $\pm 10\text{V}$ . Adjust the current limit knob I maximum to minimum Short circuit all the three terminals of this section. Select display for + 15V section then for -15V section. The reading on the display should be  $\leq 100\text{mA}$ .
5. **Check of maximum output current:** Set the output to  $\pm 10\text{V}$ . Adjust the current limit knob I maximum to maximum Short circuit all the three terminals of this section. Select display for + 15V section then for -15V section. The reading on the display should be between 1.01A and 1.1A in both cases.
6. **Check of over load indicators:** When, +, terminal is shorted to common terminal, the "ORC+" LED should lit. When '-' terminal is shorted to common terminal, the "ORC-" LED should lit.
7. **Check of residual ripple and noise:** Set the I maximum, to maximum Connect two equal loads of any value to both '+' and '-' outputs with respect to common terminal. Check the ripple and noise on DMM. It should not be more than  $1\text{mVrms}$  in both the sections.