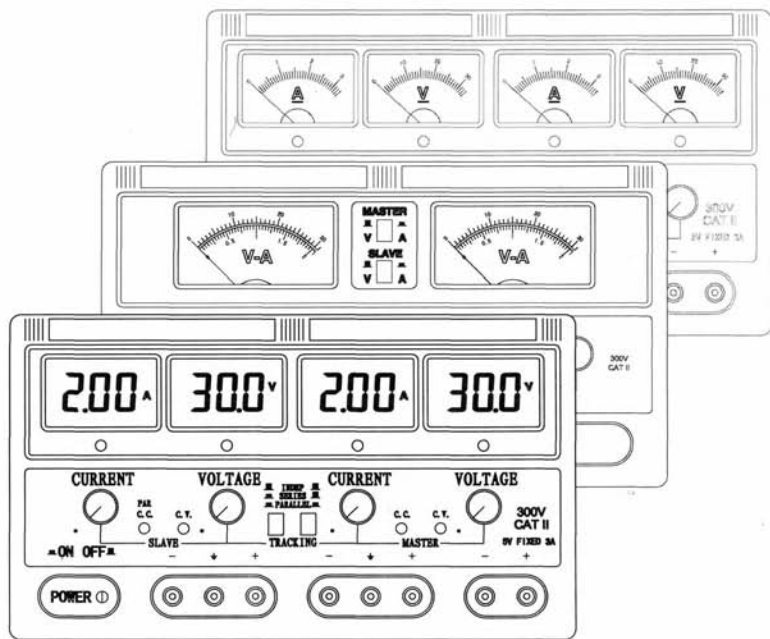


# DC POWER SUPPLY

**HY3000-HY5000**

**double series**

Users Manual





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## **Chapter 1** **Introduction**

This manual contains information and warnings, which must be followed to ensure safe operation and retain the DC power supply in safe condition.



### **WARNING**

**READ " SAFETY INFORMATION " BEFORE USING,  
INSTALLING OR MAINTENANCE THE INSTRUMENT.**

**HY3000X-X and HY5000X-X DC power supply series** are a bench multiple output power supplies. Their output voltage and output current can be all adjusted continuously by turn the regulator on panel. Constant voltage and current can be transformed automatically as well. They are a kind of high - steady multiple output DC power supply.

**HY3000X-X and HY5000X-X DC power supply series** have been designed according to IEC1010-1 concerning safety requirements and comply with.

#### **About the output voltage and current for HY3000X-X and HY5000X-X series:**

1. There are double output voltage and double output current and its output voltage and current can be adjusted continuously for the DC power supply.
2. There are triple outputs, one of output is double output voltage and double output current and its output voltage and current can be adjusted continuously, besides with a fixed 5V3A output for the DC power supply.

#### **About the display of output voltage and current for the DC power supply series:**

There are four display types for the DC power supply series monitoring output voltage and current. They are LCD, LED, two pointer meters and four pointer meters.

1. **LCD display:** double output voltage and current can be all display simultaneously.
2. **LED display:** display output voltage or current respectively by transforming switch on panel for each unit (master or slave unit).
3. **Two pointer meters display:** display output voltage or current respectively by transforming switch on panel for each unit (master or slave unit).
4. **Four pointer meters display:** double output voltage and current can be display simultaneously.

One of them is equipped to the DC power supply. See figure 4-3 to figure 4-6.

**NOTE: There is no display for fixed 5V3A output.**

The output voltage and current range and equipped display type of **HY3000X-X** and **HY5000X-X** DC power supply series as follows:

MODEL	OUT VOLTAGE regulated	OUT CURRENT regulated	OUT FIXED	DISPLAY TYPE
HY3002-2	(0~30V) ×2	(0~2A) ×2	NO	LED
HY3002D-2	(0~30V) ×2	(0~2A) ×2	NO	LCD
HY3002C-2	(0~30V) ×2	(0~2A) ×2	NO	two point meters
HY3002S-2	(0~30V) ×2	(0~2A) ×2	NO	Four point meter
HY3003-2	(0~30V) ×2	(0~3A) ×2	NO	LED
HY3003D-2	(0~30V) ×2	(0~3A) ×2	NO	LCD
HY3003C-2	(0~30V) ×2	(0~3A) ×2	NO	two point meters
HY3003S-2	(0~30V) ×2	(0~3A) ×2	NO	Four point meter

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MODEL	OUT VOLTAGE regulated	OUT CURRENT regulated	OUT FIXED	DISPLAY TYPE
HY3005-2	(0~30V) ×2	(0~5A) ×2	NO	LED
HY3005D-2	(0~30V) ×2	(0~5A) ×2	NO	LCD
HY3005C-2	(0~30V) ×2	(0~5A) ×2	NO	two point meters
HY3005S-2	(0~30V) ×2	(0~5A) ×2	NO	Four point meter
HY3002-3	(0~30V) ×2	(0~2A) ×2	5V3A	LED
HY3002D-3	(0~30V) ×2	(0~2A) ×2	5V3A	LCD
HY3002S-3	(0~30V) ×2	(0~2A) ×2	5V3A	Four point meter
HY3003-3	(0~30V) ×2	(0~3A) ×2	5V3A	LED
HY3003D-3	(0~30V) ×2	(0~3A) ×2	5V3A	LCD
HY3003S-3	(0~30V) ×2	(0~3A) ×2	5V3A	Four point meter



<b>MODEL</b>	<b>OUT VOLTAGE</b> regulated	<b>OUT CURRENT</b> regulated	<b>OUT FIXED</b>	<b>DISPLAY TYPE</b>
HY3005-3	(0~30V) x2	(0~5A) x2	5V3A	LED
HY3005D-3	(0~30V) x2	(0~5A) x2	5V3A	LCD
HY3005S-3	(0~30V) x2	(0~5A) x2	5V3A	Four point meter
HY5002-2	(0~50V)x2	(0~2A) x2	NO	LED
HY5003-2	(0~50V)x2	(0~3A) x2	NO	LED

These difference models of the DC power supply are available for choice of user.

**MODEL EXPLANATION:** HY XX XX X—X  
①            ②            ③            ④            ⑤

- ① Products of MASTECH
- ② Output voltage numbers
- ③ Output current numbers
- ④ **no:** LED display.  
**D:** LCD display.  
**C:** two pointer meters display.  
**S:** four pointer meters display.
- ⑤ **2:** double output voltage current regulated  
**3:** double output voltage current regulated + fixed 5V3A

## ***Unpacking and Inspection***

The packing should include the following items:

1. DC power supply
2. Power line cord
3. Instruction manual
4. Spare fuse

Please check to see that all of the above items are included.

 **Safety Precautions**

1. Before applying power to your DC power supply, make sure that power select switch is correctly setting for you applicable AC power supply.
2. Connect the instrument to an AC power supply using the power line core provided.
3. Do not connect a voltage that is greater than the current output voltage to the terminals of the instrument.
4. Never ground yourself when taking electrical measurements. Keep your body isolated from ground by using dry clothing; rubber shoes, rubber mat, or any approved insulating material.
5. Never touch exposed wiring, connections or any live circuit when attempting to take measurements.
6. Avoid shorting circuit the output of DC power supply.
7. Set the voltage and current adjustment knobs as you desire.
8. The unit should be stored in a dry well ventilated place and the power cord removed if storing for long periods.

## **Safety Information**

**HY3000X-X and HY5000X-X DC power supply series** has been designed according to IEC1010 – 1 concerning safety requirements for electrical measuring instruments with an overvoltage category (300V CAT II) and pollution 2.

## **Safety Symbols**



Important safety information, refer to the operating manual.



DC – Direct current.



Earth ground.



Caution! Hot surface. Avoid contact.



Conforms to European Union directives.

## Instrument Front panel

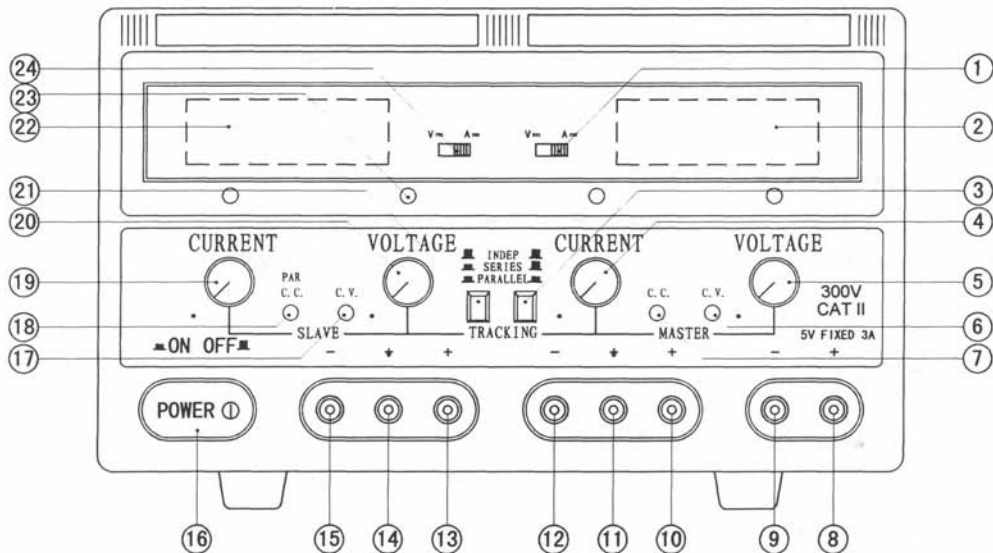


Figure 1-1

**1. DISPLAY CHOOSE SWITCH (master unit)**

Choose & display output voltage or current value of the master unit. Only is LED or two pointer meters display type is available.

**2. OUTPUT INDICATOR (master unit)**

**LCD and four pointer meters model:**

Show output voltage and current of the master unit output terminals simultaneously. (Two indicators for the master unit and the other two for the slave unit.)

**LED and two pointer meters model:**

Show master unit output voltage or current through setting display chooses switch of the master unit.

**3. CONTROL SWITCH**

Double power control switch for independent, series and parallel operation.

**4. CURRENT REGULATOR (master unit)**

Adjusting output current of master unit and delivered from the master unit.

**5. VOLTAGE REGULATOR (master unit)**

Adjusting output voltage of the master unit.

**6. C.V. INDICATOR (master unit)**

Constant voltage mode indicator

## **DC Power Supply**

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7. **C.C. INDICATOR(master unit)**  
Constant current mode indicator
8. **FIXED 5V3A OUTPUT POSITIVE TERMINAL OR NO.** (by purchase order )
9. **FIXED 5V3A OUTPUT NEGATIVE TERMINAL OR NO.** (by purchase order)
10. **POSITIVE OUTPUT TERMINAL(master unit)**
11. **GROUND OUTPUT TERMINAL(master unit)**
12. **NEGATIVE OUTPUT TERMINAL(master unit)**
13. **POSITIVE OUTPUT TERMINAL(slave unit)**
14. **GROUND OUTPUT TERMINAL(slave unit)**
15. **NEGATIVE OUTPUT TERMINAL(slave unit)**
16. **POWER ON/OFF SWITCH**  
This is the main power switch of the instrument.
17. **C.V. INDICATOR (slave unit)**  
Constant voltage mode indicator
18. **C.C. INDICATOR(slave unit)**  
Constant current mode indicator
19. **CURRENT REGULATOR (slave unit)**  
Adjusting output current of slave unit and delivered from the slave unit.



**20. VOLTAGE REGULATOR (slave unit)**

Adjusting output voltage of the slave unit.

**21. CONTROL SWITCH**

Double power control switch for independent, series and parallel operation.

**22. OUTPUT INDICATOR (slave unit)**

**LCD and four pointer meters model:**

Show output voltage and current of the slave unit output terminals simultaneously. (Two indicators for the slave unit and the other two for the master unit.)

**LED and two pointer meters model:**

Show slave unit output voltage or current through setting display chooses switch of the slave unit.

**23. POINT METER ZERO (only pointer meter display)**


Each pointer meter has a mechanical screw adjustment for setting the zero point. Using a small screwdriver, turn off the power and adjust the screw under the meter respectively to read zero. There is only pointer meter model.

**24. DISPLAY CHOOSE SWITCH (slave unit)**

Choose & display output voltage or current value of the slave unit. Only is LED or two pointer meters display type is available.

## **Instrument Back Panel**

### **1. HEAT SINK**

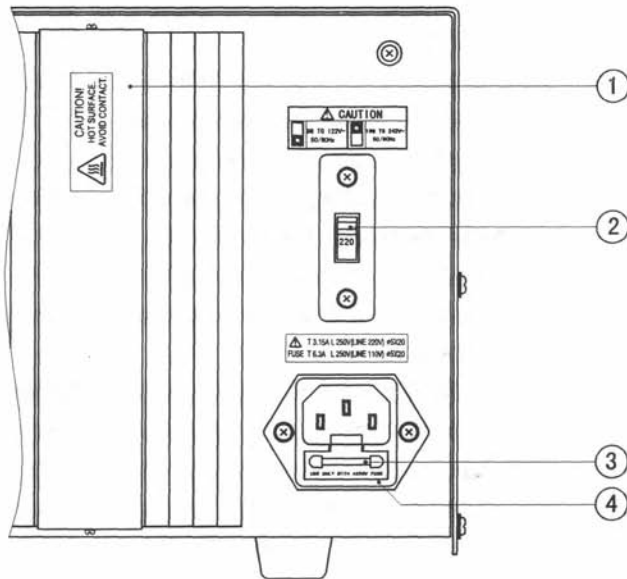
There is an  on the heat sink. It indicates "caution! Hot surface avoid contact".

### **2. POWER SELECT SWITCH**

Two kinds of power 220VAC and 110VAC 50Hz/60Hz can be supplied to the instrument. According to the user's needs, setting it.

### **3. FUSES**

There are two fuses in the AC power input socket. One is in use and the other is for spare part.



**Figure 1-2**

The fuse of HY3000X-X and HY5000X-X DC power supply series as follows:

OUT VOLTAGE regulated	OUT CURRENT regulated	OUT FIXED 5V3A	FUSE TYPE line 220VAC	FUSE TYPE line 110VAC
(0~30V) ×2	(0~2A) ×2	NO	T 2.5A L 250V	T 5A L 250V
	(0~3A) ×2	NO	T 3.15A L 250V	T 6.3A L 250V
	(0~5A) ×2	NO	T 5A L 250V	T 10A L 250V
(0~30V) ×2	(0~2A) ×2	•	T 3.15A L 250V	T 6.3A L 250V
	(0~3A) ×2	•	T 3.15A L 250V	T 6.3A L 250V
	(0~5A) ×2	•	T 5A L 250V	T 10A L 250V
(0~50V) ×2	(0~2A) ×2	NO	T 4A L 250V	T 8A L 250V
	(0~3A) ×2	NO	T 5A L 250V	T 10A L 250V

**WARNING**

Replace it only with same type of fuse.

**4. AC POWER INPUT SOCKET**



**WARNING**

To avoid user for injury and the instrument for damage, the voltage value of AC power must be examined with same the power requirements of instrument before connect power cord to live power source and the power select switch is set correct.



**WARNING**

To avoid electrical shock, disconnect power cord from live power source and remove the test leads and any input signals before replacing the power fuses. Replace it only with the same type of fuses.

## **Chapter 2** **Operation**

### **Introduction**



#### **WARNING**

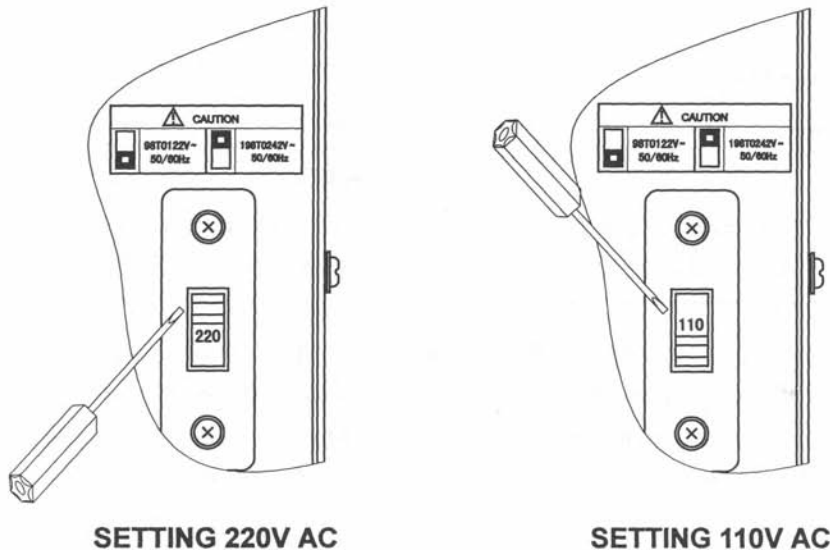
To avoid electric shock or personal injury, read “Safety Precautions” and “Safety Information” before Operation.

Before making any operation always examine the DC power supply and accessories used with it for damage, contamination (excessive dirt, grease, etc.) and defects. Examine the test leads for cracked or frayed insulation and make sure the lead plugs fit snugly into the output jacks. If any abnormal exist do not attempt to make any operation.

## **Line Power Supply Setting**

Two kinds of AC line, 220VAC 50Hz/60Hz or 110VAC 50Hz/60Hz, can be supplied to the instrument. Set it with a screwdriver to adapt your AC line.

**Figure 2-1**



 **WARNING**

**Check to be sure that power select switch on back panel is switched to correct line voltage. Check to be sure that fuse is correct rating current.**

 **CAUTION**

The applicable AC power supply range is:

220VAC  $\pm$  10% (198 to 242V~) 50Hz/60Hz or 110VAC  $\pm$  10% (98 to 122V~) 50Hz/60Hz.

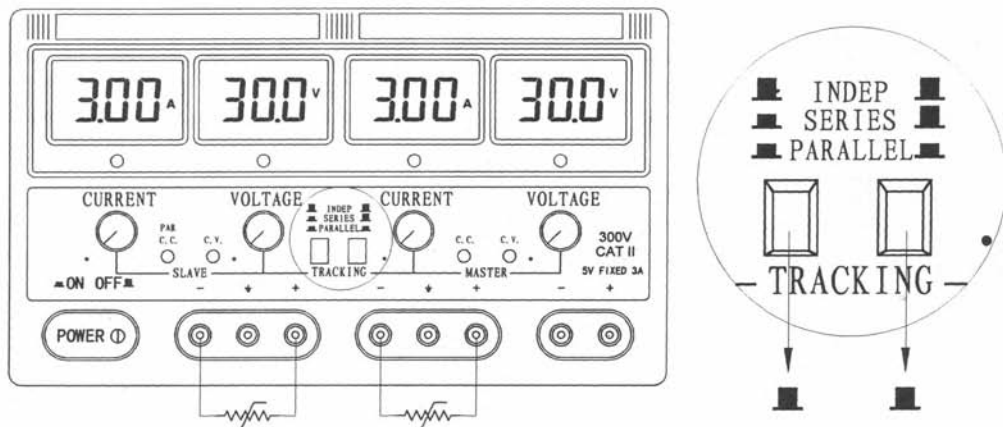
## DC Power Supply

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## Operating Procedure

**DOUBLE ADJUSTABLE SUPPLY USED INDEPENDENTLY.**

Figure 2-3





Put the control switch 3 & 21 on the position where is bounced up. The master power supply and slave power supply are all independently output voltage and current.

### **1. CONSTANT VOLTAGE MODE**

- 1.1 Turn the current regulator 4 & 19 clockwise to maximum position.
- 1.2. Turn the voltage regulators 5 & 20 anti-clockwise to minimum position.
- 1.3 Put the display choose switch 1 & 24 to the voltage display position (The operation is only LED and two pointer meters model).
- 1.4 Press the power ON/OFF switch to ON.
- 1.5 Turn the voltage regulators 5 & 20 clockwise respectively to get the output voltage value of master unit and slave unit as your desire.
- 1.6 Connect the positive output terminal and negative output terminal with a load or similar component.
- 1.7 The indicators show the output voltage and output current appeared on the output terminals.

#### **2. CONSTANT CURRENT MODE**

- 2.1 Turn the voltage regulators 5 & 20 clockwise to maximum position.
- 2.2. Turn the current regulator 4 & 19 anti-clockwise to minimum position.
- 2.3 Put the display choose switch 1 & 24 to the current display position (The operation is only LED and two pointer meters model).
- 2.4 Press the power ON/OFF switch to ON.
- 2.5 Connect the positive output terminal and negative output terminal with a load or similar component.
- 2.6 Turn the current regulators 4 & 19 clockwise respectively to get the output current value of master unit and slave unit as your desire.
- 2.7 The indicators show the output voltage and output current appeared on the output terminals.

#### **3. RESTRICTED CURRENT PROTECTION MODE**

- 3.1 Press the power ON/ OFF switch to ON.
- 3.2 Turn the current regulators 4 & 19 anti-clockwise to minimum position then clockwise a little and the C.C. lamp is not lighted.

- 3.3 Turn the voltage regulator 5 & 20 clockwise to an appropriate output voltage level position (approx. 1.5V).
- 3.4 Put the display choose switch 1 & 24 to the current display position (The operation is only LED and two pointer meters model).
- 3.5 Link the positive and negative output terminals with a wire.
- 3.6 Turn the current regulator 4 & 19 clockwise to get the current level at which the restricted current protection will be activated as you desire.
- 3.7 Remove the wire linked to the positive and negative output terminals. Connect the positive output terminal and negative output terminal with a load or similar component.
- 3.8 When the output current achieves the setting value of restricted current protection, the C.C. indicator is lighted and the restricted current protection is active.

**NOTE:** After setting of the restricted current protection, if the current regulator is turned again, the restricted current protection range will be changed.

#### **C.C. AND C.V. INDICATOR**

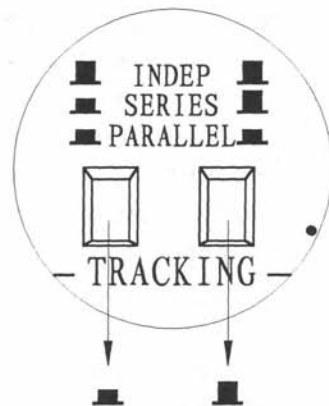
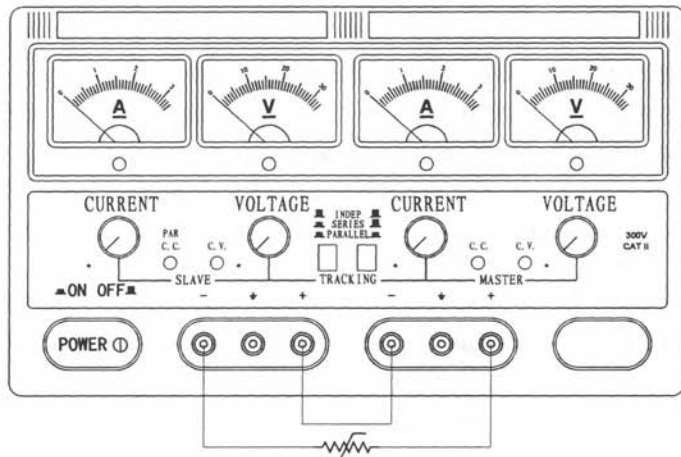
The C.C. indicator is controlled by the constant current mode. Otherwise C.V. indicator is controlled by the constant voltage mode.

## DC Power Supply

### Users Manual

#### DOUBLE ADJUSTABLE SUPPLY IN SERIES CONDITION.

Figure 2-4



Put the control switch 3 on the position where is bounced up. Pressing down the control switch 21. The slave power supply is interconnected in series with master power supply.

**1. NO RESTRICTED CURRENT PROTECTION POINT**

Turn the current regulators 19 clockwise to maximum position. Turn the master voltage regulator 5 and current regulator 4 clockwise to get the output voltage and current as you desire. In this mode, the output voltage and current of slave unit will trace the output voltage and current of master unit. The voltage regulator of the slave (20) is inactive.

The maximum output voltage will be the sum of regular value of two groups. It is the voltage between the positive output terminal of master unit and negative output terminal of slave unit.

**2. RESTRICTED CURRENT PROTECTION OF SLAVE UNIT**

Turn the current regulator 19 clockwise but not to the maximum position. It is on somewhere of a kind of restricted current protection. Turning the master current regulator 4 or voltage regulator 5 and the load current reaches this restricted point of slave unit, the C.C. indicator of slave unit is lighted. In this case the output voltage of slave unit will do not trace that master unit.

The voltage regulator of the slave (20) is inactive.

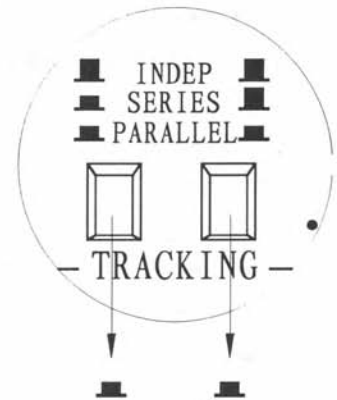
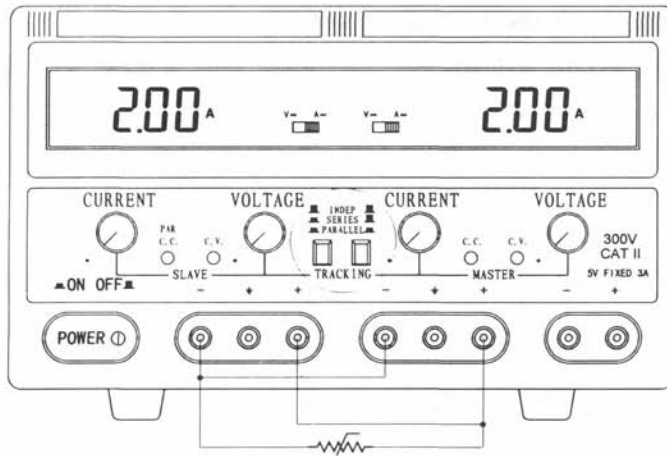
## ***DC Power Supply***

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#### **NOTE:**

1. In this series operation, if the output current is more, to avoid the machinery switch of instrument from damage, the negative output terminal of master unit and the positive output terminal of slave unit should be connected reliably with a thick conductive wire.
2. In this series operation, must not connect the negative output terminal to the ground output terminal whether it is of master or of slave unit, because the connection will bring short-circuit of the subsidiary circuit.

**DOUBLE ADJUSTABLE SUPPLY USED IN PARALLEL CONDITION.****Figure 2-5**

Pressing down the control switch 3 & 21. The slave power supply is interconnected in parallel with master power supply.

## **DC Power Supply**

### *Users Manual*

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1. In parallel operation, The adjusting of the slave voltage regulator 20 is inactive. The current regulator 19 of slave unit will not take effect in parallel condition.
2. Turn the voltage regulator 5 clockwise, the output voltage of two - circuit is changed identically. The C.C. indicator of the slave unit is lighted as well.
3. The current of master and slave unit will be controlled only master unit current regulator 4.
4. The biggest output current is the sum of regular value of two groups.

#### **NOTE:**

In this parallel operation, if the output current is more, to avoid the machinery switch of instrument from damage, you should:

1. The positive output terminal 10 of master unit and positive output terminal 13 of slave unit should be connected reliably with a thick conductive wire.
2. The negative output terminal 12 of master unit and negative output terminal 15 of slave unit should be connected reliably with a thick conductive wire.



### FIXED 5V3A

This is a fixed regular, voltage output 5V and current output 3A. Output voltage and current do not be displayed.

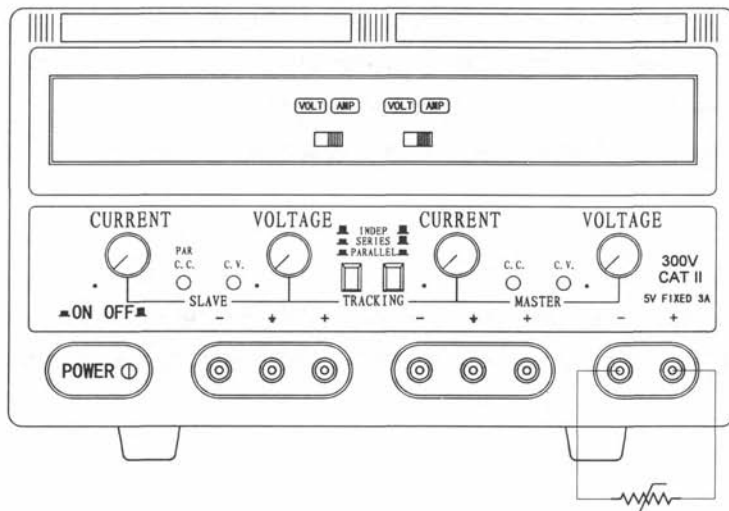


Figure 2-6

 **CAUTION**

1. **HY3000X-X and HY5000X-X DC power supply series** has perfect restricted current protection, Even so, when the output terminal is short - circuit, the DC power supply should be turned off and the short-circuit should be removed before continuing operation because the power transistors in the instrument will bear heavy.
2. The AC power must be switched off before servicing and only the professional can do it.

 **CAUTION**

Using this appliance in an environment with a strong radiated radio - frequency electromagnetic field (approximately 3V/m) may influence its measuring accuracy.

## **Chapter 3**

### **Specifications**

#### **General Specifications**

<b>Safety:</b>	Designed to comply with IEC 1010 -1 specifications. CAT. II 300V
<b>Temperature:</b>	0°C to 40°C for operating, -10°C to 50°C for storage
<b>Relative Humidity:</b>	20% to 80% RH (0°C to 40°C).
<b>Protection:</b>	constant current and short - circuit protection
<b>Size:</b>	365(L) × 265(W)× 164(H) mm

**Weight:**

OUT VOLTAGE regulated	OUT CURRENT regulated	OUT FIXED 5V3A	WEIGHT
(0~30V) ×2	(0~2A) ×2	NO	Approx. 7kg
	(0~3A) ×2	NO	Approx. 9kg
	(0~5A) ×2	NO	Approx. 12kg
(0~30V) ×2	(0~2A) ×2	•	Approx. 8kg
	(0~3A) ×2	•	Approx. 10kg
	(0~5A) ×2	•	Approx. 13kg
(0~50V) ×2	(0~2A) ×2	NO	Approx. 10kg
	(0~3A) ×2	NO	Approx. 12kg

### ***Technical Parameters***

**Input voltage :** 220V/110V AC  $\pm 10\%$  50Hz/60Hz  $\pm 2\text{Hz}$

**Voltage indication accuracy:**

LED display and LCD display  $\pm 1\% \pm 2\text{digits}$ , Pointer meter display 2.5%

**Current indication accuracy:**

LED display and LCD display  $\pm 2\% \pm 2\text{digits}$ , Pointer meter display 2.5%

**Output Voltage and Current: (Double adjustable power supply)**

OUTPUT VOLTAGE (regulated)	OUTPUT CURRENT(regulated)
0~30V	0~2A
	0~3A
	0~5A
0~50V	0~2A
	0~3A

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#### Double adjustable power supply:

<b>Source Effect:</b>	$CV \leq 0.01\% + 2\text{mV}$	
(Line regulation)	$CC \leq 0.2\% + 2\text{mA}$	
<b>Loading Effect:</b>	$CV \leq 0.01\% + 3\text{mV}$ ( $I_{\text{out}} \leq 3\text{A}$ )	$CC \leq 0.2\% + 3\text{mA}$ ( $I_{\text{out}} \leq 3\text{A}$ )
(Load regulation)	$CV \leq 0.01\% + 5\text{mV}$ ( $I_{\text{out}} > 3\text{A}$ )	$CC \leq 0.2\% + 5\text{mA}$ ( $I_{\text{out}} > 3\text{A}$ )
<b>Ripple and noise:</b>	$CV \leq 0.5\text{mV r.m.s}$ ( $I_{\text{out}} \leq 3\text{A}$ )	$CC \leq 3\text{mA r.m.s}$ ( $I_{\text{out}} \leq 3\text{A}$ )
	$CV \leq 1.0\text{mV r.m.s}$ ( $I_{\text{out}} > 3\text{A}$ )	$CC \leq 6\text{mA r.m.s}$ ( $I_{\text{out}} > 3\text{A}$ )

#### FIXED 5V 3A:

<b>Output Voltage:</b>	$5\text{V} \pm 2.5\%$
<b>Output Current:</b>	3A
<b>Source Effect:</b>	$CV \leq 0.02\% + 2\text{mV}$
<b>Loading Effect:</b>	$CV \leq 0.1\%$
<b>Ripple and noise:</b>	0.5mV r.m.s

To obtain the stability guarantee of source and loading effect, allow the instrument to warm up for at least 15 minutes.

## **Chapter 4**

### **Maintenance**

#### ***Introduction***

Do not attempt to repair or service your instrument unless you are qualified to do so and have the relevant calibration, performance test, and service information.

#### ***Replacing the Fuse***



#### **WARNING**

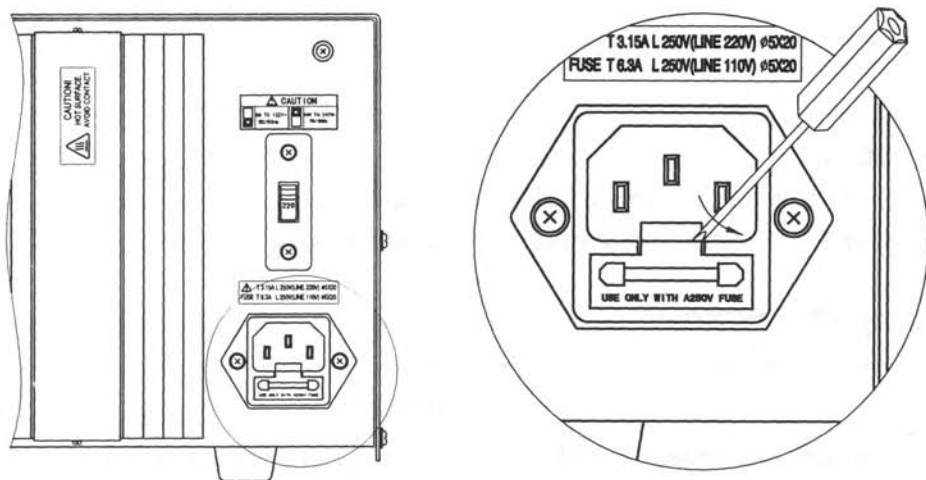
Turn off the power switch, remove the power line cord from the power socket and disconnect the test leads at output terminals before replacing the fuse. Replace it only with same type of fuse.

## DC Power Supply

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Figure 4-1





**Figure 4-2**

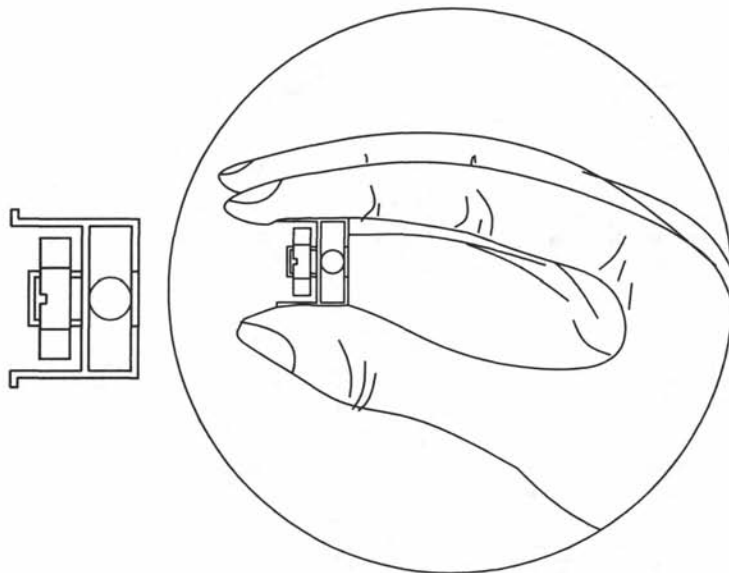


Figure 4-3 (LCD display)

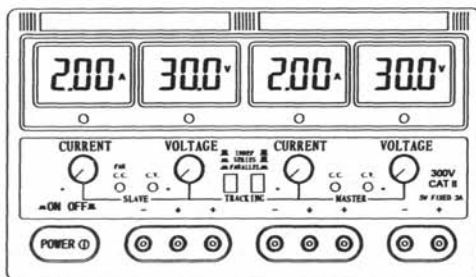


Figure 4-4 (LED display)

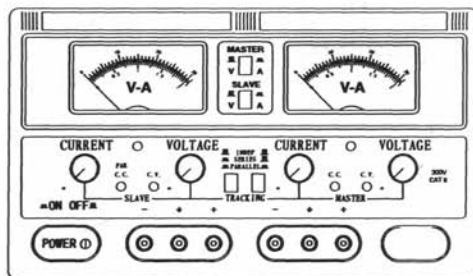
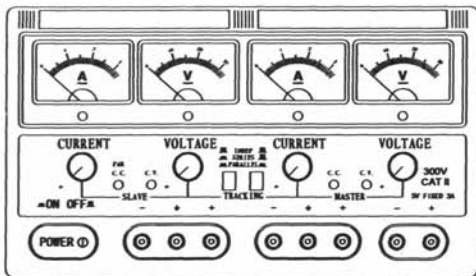
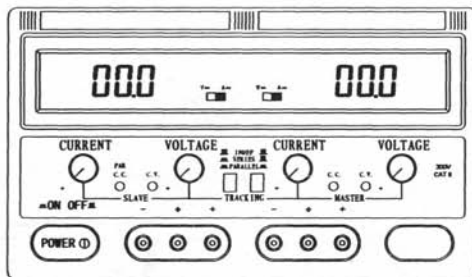


Figure 4-5 (Four pointer meters display)

Figure 4-6 (Two pointer meters display)