

# *SWS50-75-100-150 Series*

## *Instruction Manual*

### **BEFORE USING THE POWER SUPPLY UNIT**

Pay attention to all warnings and cautions before using the unit. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

### **WARNING and CAUTION**

- Do not modify.
- Do not touch the internal components, they may have high voltage or high temperature. You may get electrical shock or burned.
- When the unit is operating, keep your hands and face away from it, you may get injured by an accident.
- This power supply is primarily designed and manufactured to be used and enclosed in other equipment. Stick the WARNING label for users on the system equipment and describe the notice in the instruction manual.
- The EMC performance has to be tested on system level with end equipment. If necessary, additional filtering may be required which very much depend on end applications and installation methods.
- Never operate the unit under over current or short-circuit conditions for more than 30 seconds which could result in damage. There is no possibility of fire or burning.
- Confirm connections to input/output terminals are correct as indicated in the instruction manual.
- Do not drop or apply shock to power supply unit.
- This power supply has a possibility that hazardous voltage may occur in output terminal depending on failure mode. The outputs of these products must be earthed in the end use equipment to maintain SELV. If the outputs are not earthed, it must be considered hazardous and must not be made user accessible.

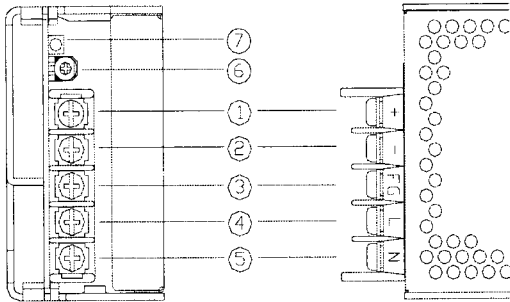
### **Note: CE MARKING**

CE Marking, when applied to a product covered by this handbook indicates compliance with the low voltage directive (2006/95/EC) in that it complies with EN60950-1.

<b>DWG NO. : CA732-04-01B</b>		
<b>APPD</b>	<b>CHK</b>	<b>DWG</b>
<i>tol</i> <i>&gt;6 Aug-09</i>	<i>Kevin HE</i> <i>26-Aug-09</i>	<i>Pamy</i> <i>25-Aug-09</i>

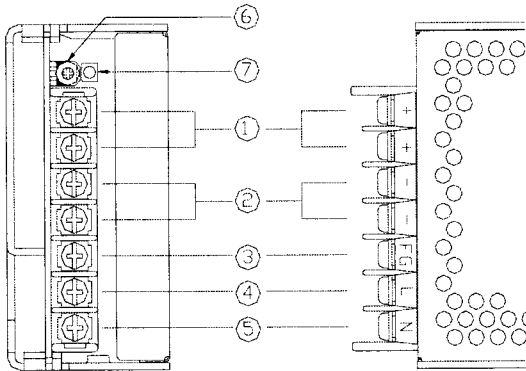
## 1. Terminal Explanation

### SWS50, SWS75



- (1) +V : + Output terminal
- (2) -V : - Output terminal
- (3) FG  $\perp$  : Functional Ground
- (4) L : Input terminal Live line (Fuse in line)
- (5) N : Input terminal Neutral line
- (6) Output voltage adjustment trimmer
- (7) Output monitoring indicator (Green LED)

### SWS100, SWS150

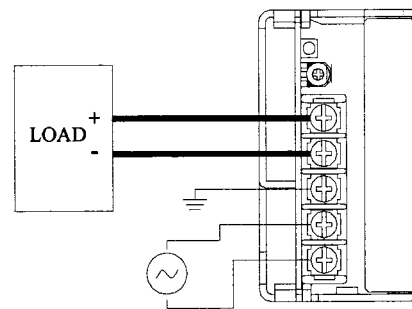


- (1) +V : + Output terminal  
( 20A max./ terminal)
- (2) -V : - Output terminal  
( 20A max./ terminal)
- (3) FG  $\perp$  : Functional Ground
- (4) L : Input terminal Live line(Fuse in line)
- (5) N : Input terminal Neutral line
- (6) Output voltage adjustment trimmer
- (7) Output monitoring indicator (Green LED)

## 2. Terminal connecting method

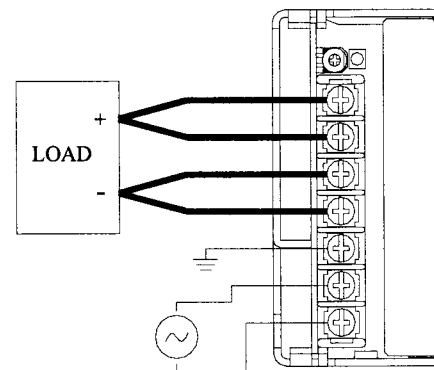
- Input must be off when making connection.
- Connect FG terminal to ground terminal of the equipment.
- Output current of each terminal pin of SWS150 must be less than 20A.
- The output load line and input line shall be separated and twisted to improve noise sensitivity.
- Remote sensing lines shall be twisted or use shielded wire.

### SWS50, SWS75



### SWS100, SWS150

Maximum output current of each output terminal is 20A.  
 If more than 20A, use 2 terminals.



### 3. Explanation of Functions and Precautions

#### 3-1. Input Voltage Range

Input voltage range is single phase 85 ~ 265VAC ( 47 ~ 63Hz ) or 120 ~ 330VDC. Input voltage which is out of specification may cause unit damage. For cases where conformance to various safety specs (UL, CSA, EN) are required, input voltage range will be 100~240VAC ( 50/60Hz ).

#### 3-2. Output Voltage Range

V.ADJ trimmer is for output voltage adjustment within the range of specifications. To turn the trimmer clockwise, the output voltage will be increased. Note over voltage protection ( OVP ) function may trigger if the output voltage is increased excessively.

#### 3-3. Inrush Current

Power Thermistor is built in to protect the circuit from Inrush Current. Please carefully select input switch and fuse in cases of the high temperature and re-input the power.

#### 3-4. Over Voltage Protection (OVP)

The OVP function ( Inverter shut down method, manual reset type ) is provided. When OVP triggers, the output will be shut down. The input shall be removed for a few minutes, and then re-input for recovery of the output. OVP setting is fixed and not to be adjusted externally.

#### 3-5. Over Current Protection (OCP)

Current limiting, automatic recovery. OCP function operates when the output current exceeds OCP specifications. The output will be automatically recovered when the overload condition is canceled. Do not operate overload or dead short conditions for more than 30 seconds, which could result in damage or insulation failure.

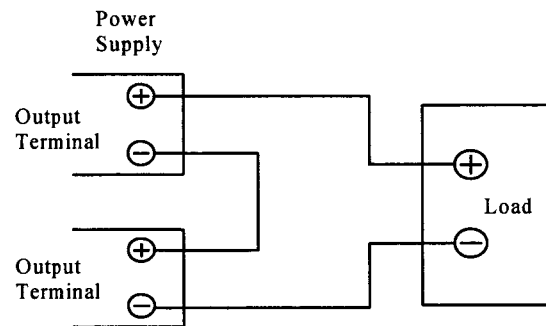
#### 3-6. Output Ripple & Noise

Ripple & noise are measured at 20MHz by using a 12'' twisted pair terminated with a 0.1uF & 47uF capacitor. When load lines are longer, ripple will become larger. In this case, electrolytic capacitor, film capacitor, etc. might be necessary to use across the load terminal. The output ripple cannot be measured accurately if the probe ground lead of oscilloscope is too long.

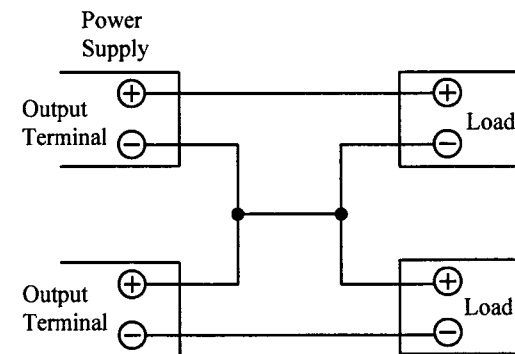
### 3-7. Series Operation

For series operation, either method ( A ) or ( B ) is possible.

#### Method ( A )

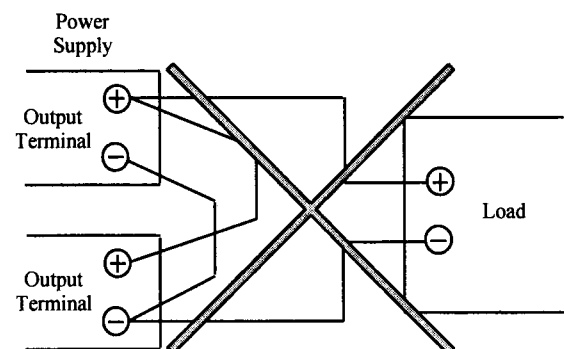


#### Method ( B )



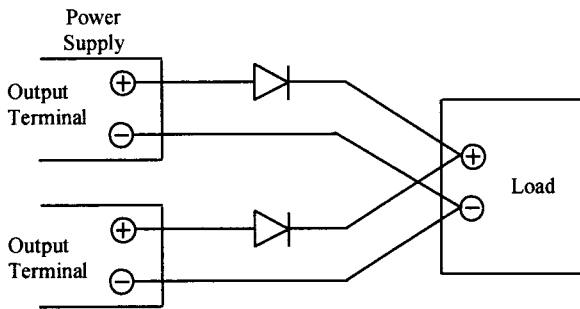
### 3-8. Parallel Operation

(A) Operation to increase the Output Current is not possible.



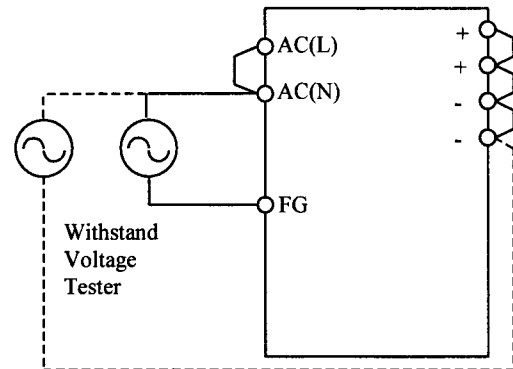
(B) Operation as a Backup Power Supply is possible as follows.

1. Set the power supply output voltage higher by the amount of forward voltage drop (  $V_f$  ) of the diode.
2. Please adjust the output voltage of each power supply to be the same.
3. Please use within the specifications for output voltage and output current.



creased for shut down. When timer is used, the power supply may be damaged by high impulse voltage at timer switch on and off. Connect input and output as follows.

- Input ~ FG ( chassis ) : solid line  
 2kVAC, 1min ( 20mA )  
 Input ~ Output : dotted line  
 3kVAC, 1min ( 20mA )

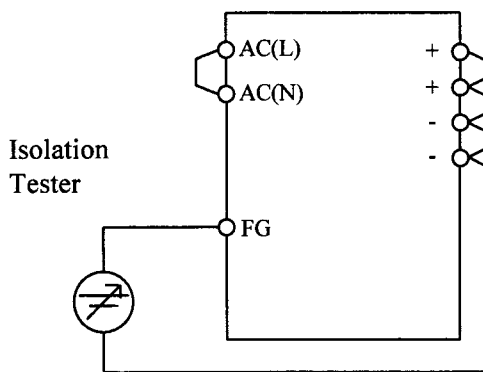


#### 4. Isolation / Withstand Voltage

##### 4-1. Isolation Test

Isolation resistance between output and FG ( chassis ) shall be more than 100M $\Omega$  at 500VDC. For safety, voltage setting of DC isolation tester must be done before the test. Ensure that the it is fully discharged after the test.

Output ~ FG ( chassis )



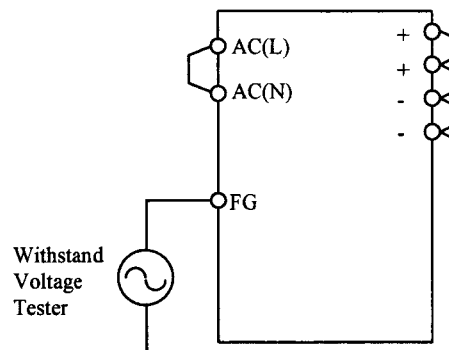
500VDC, 100M $\Omega$  or more

##### 4-2. Withstand Voltage

This series is designed to withstand 3.0kVAC between input and output, 2.0kVAC between input and FG ( chassis ) and 500VAC between output and FG ( chassis ) each for 1 minute. When testing withstand voltage, set current limit of withstand voltage test equipment at 20mA ( Output-FG ( chassis ) : 100mA ). The applied voltage must be gradually increased from zero to testing value and then gradually de-

Output ~ FG ( chassis )

500VAC, 1min ( 100mA )

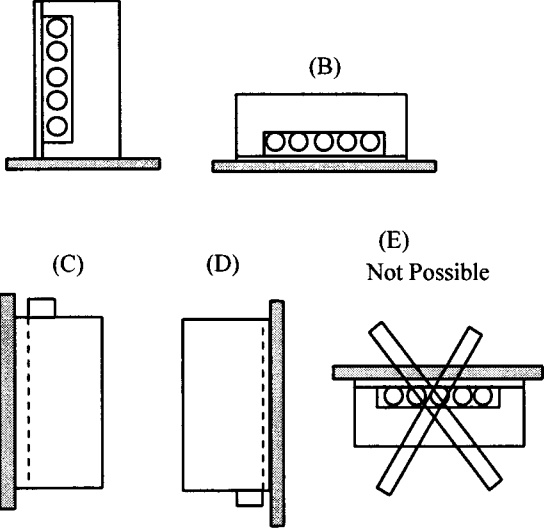


#### 5. Mounting Directions

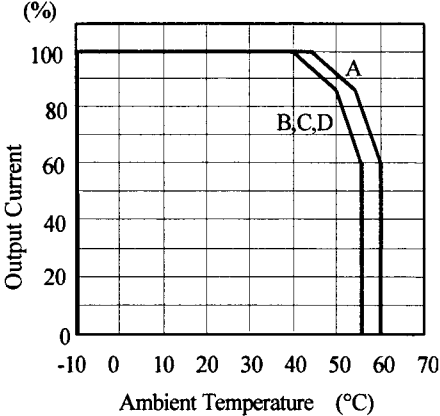
##### 5-1. Output Derating according to the Mounting Directions

Recommend standard mounting is method ( A ). Method ( B ) ( C ) and ( D ) are also possible. Refer to the derating below. Please do not use installation method ( E ), where the PCB will be on the topside and heat will be trapped inside the unit. In the following derating curve, the maximum output current is considered to be 100%.

**Standard Mounting ( A )**



**SWS75-12,24**

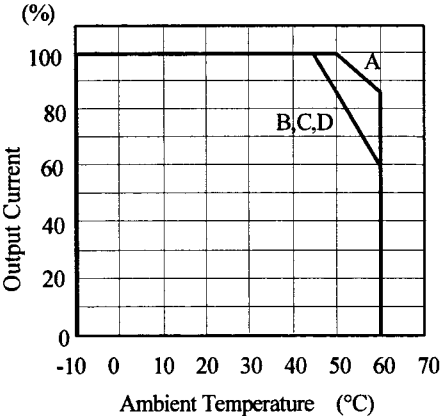


\*For SWS100 and SWS150, mounting (D) is not possible.

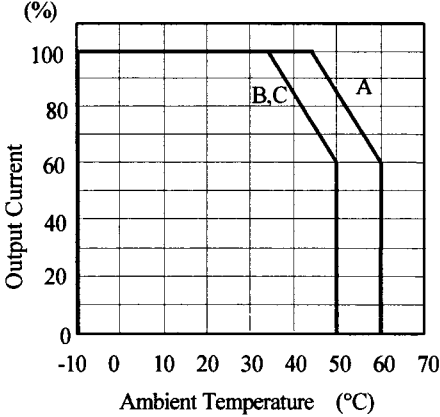
**Output Derating**

(A) Convection cooling

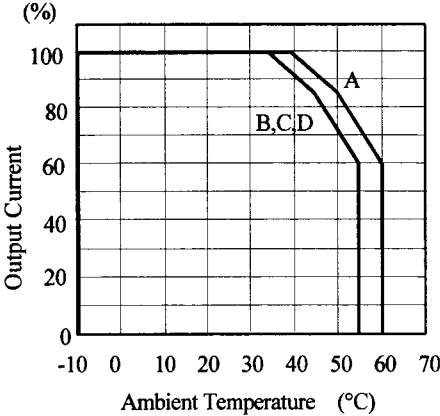
**SWS50-5, 12, 24**



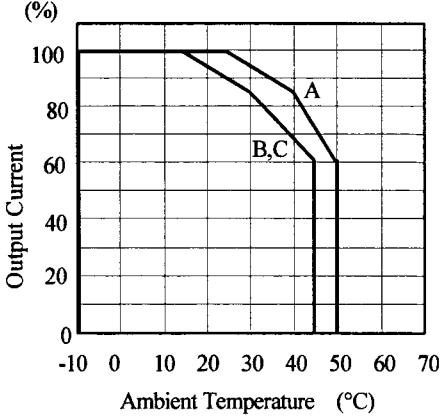
**SWS100-5, 12, 24**



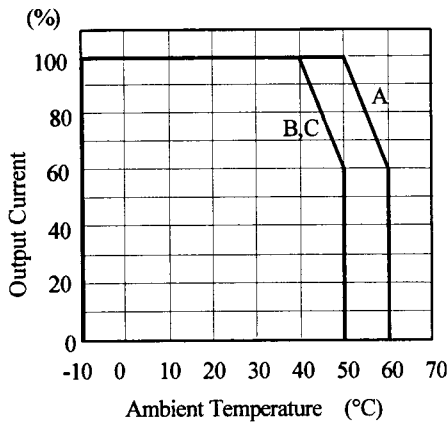
**SWS75-5**



**SWS150-5**



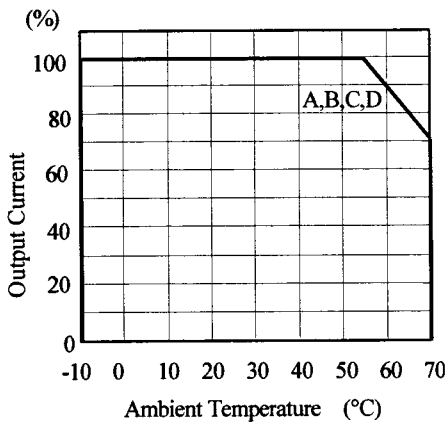
**SWS150-12,24**



**(B) Force air cooling**

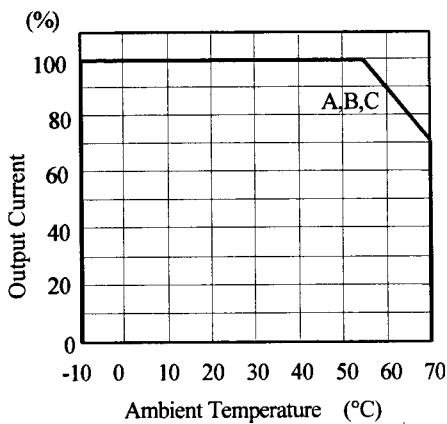
Recommended minimum air velocity is 1.2m/s, flow through the component side of power supply.

**SWS75-5, 12, 24**



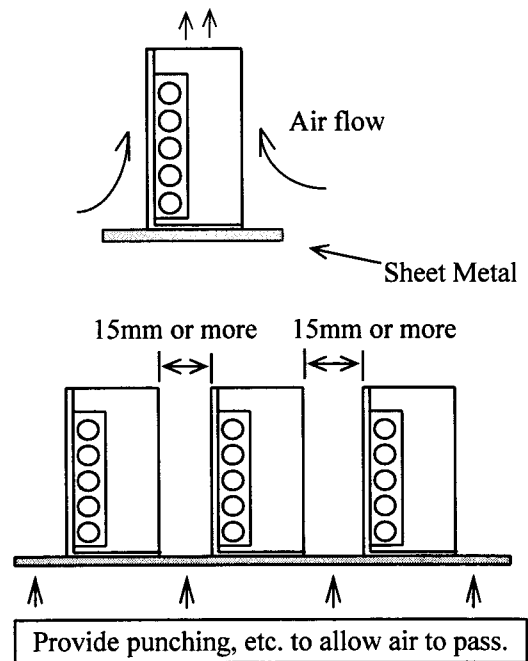
**SWS100 - 5, 12, 24**

**SWS150 - 5, 12, 24**



**5-2 Mounting Method**

- 1) This is convection cooling type power supply. In the consideration for the heat radiation and safety. Please keep a distance more than 15mm between the power supply and the peripheral parts. When lining up multiple units, please make sure to place them 15mm or more apart from each other.
- 2) The maximum allowable penetration of mounting screws is 6mm.
- 3) Recommended torque for mounting screw  
 SWS50, SWS75 (M3 screw) : 0.49 N·m  
 ( 5.0 kgf·cm )  
 SWS100, SWS150(M4 screw) : 1.27 N·m  
 ( 13.0 kgf·cm )



**6. Wiring Method**

- The output load line and input line shall be separated and twisted to improve noise sensitivity.
- Use all lines as thick and short as possible to make lower impedance.
- Noise can be eliminated by attaching a capacitor to the load terminals.
- In SWS150, the output current of each output terminal is limited to 20A. When it is more than 20A, please use 2 terminals together.
- For safety and EMI considerations, connect the FG terminal of SWS series to mounting set ground terminal.
- The recommended torque for the terminal piece:  
 (M3.5 Screws) : 0.74N·m  
 ( 7.5 kgf·cm )

## 7. EMC

This power supply is primarily designed and manufactured to be used and enclosed in other equipment. The installation, wiring, grounding and end application of the switching power supply in the equipment system may influence its EMC characteristics. Therefore, the EMC performance has to be tested on end system level. Additional filtering may be required depends on application and installation methods. Please refer to following application notes which may help to improve EMC performance.

- The output load line and input line shall be separated and twisted to reduce noise.
- Use all lines as thick and short as possible to make lower impedance.
- Noise can be eliminated by attaching a capacitor to the load terminals and between output terminals to earth (frame ground).
- Use of metal enclosure on system design. For safety and EMI considerations, connect the FG terminal of SWS series to earth terminal of equipment system where power supply unit is mounted on.

## 8. External Fuse Rating

Refer to the following fuse rating when selecting the external fuses that are to be used on input line. Surge current flows when line turns on. Use slow-blow fuse or time-lag fuse. Do not use fast-blow fuse. Fuse rating is specified by in-rush current value at line turn-on. Do not select the fuse according to input current (rms.) values under the actual load condition.

SWS50, SWS100 : 3.15A  
SWS75, SWS150 : 5A

## 9. Before concluding that the unit is at fault...

Before concluding that the unit is at fault, make the following checks.

- Check if the rated input voltage is connected.
- Check if the wiring of input and output is correct.
- Check if the wire material is not too thin.
- Check if the output voltage control (V.ADJ) is properly adjusted.
- Check if the output current and output wattage does not over specification.
- Audible noise can be heard during Dynamic-Load operation.
- Audible noise can be heard when input voltage waveform is not sinusoidal wave.

## 10. Notes

- 1) Overvoltage Category II
- 2) Radio Interference Suppression Test is not performed.