

SWS 600HV-120

Instruction Manual

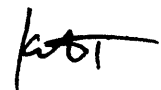
BEFORE USING THE POWER SUPPLY UNIT

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

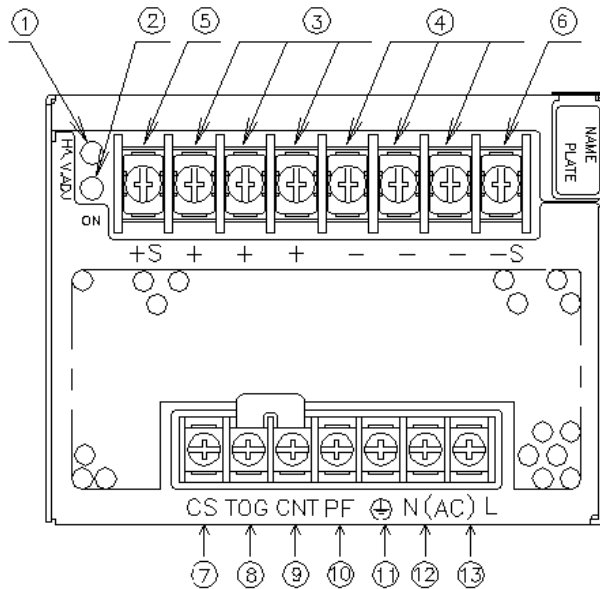
- **This power supply delivers hazardous output voltage. All outputs(including control signals) are considered as hazardous secondary voltage. These outputs need to be protected so that inadvertent contact by a service person cannot occur. Output circuits must be protected from the operator by reinforced insulation in accordance with EN60950.**
- Do not modify nor remove cover.
- 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 depends on end applications and installation methods.
- Never operate the unit under over current or shorted conditions for 30 seconds or more and out of input Voltage range in specification which could result in damage or insulation failure or smoking or burning
- Confirm connections to input/output terminals are correct as indicated in the instruction manual..
- This power supply is capable of providing hazardous energy output (240VA), the end equipment manufacturer must provide protection to service personal against inadvertent contact with output terminals. These terminals must not be user accessible


DWG NO. : CA750-04-01

APPD	CHK	DWG
 4.AUG.2005	Kevin 4.AUG.2005	PYLi 4.AUG.2005

1. Front Panel Explanation

SWS600HV-120 Panel



- | | |
|---|---|
| <p>(1) V.ADJ : Output voltage adjustment trimmer
(For factory output voltage setting only, and should not be adjusted by user. Output voltage is 120V±1% fixed at shipment.)</p> <p>(2) ON : Output (Power On) indication LED
(The indicator turns on when the power supply output is in normal operating condition.)</p> <p>(3) + : + Output terminal (M4 screw x 3)</p> <p>(4) - : - Output terminal (M4 screw x 3)</p> <p>(5) +S : Remote sensing terminal for + output
(Remote sensing is optional and not provided for standard model. +S terminals is internally short to +V.
For remote sensing option, it compensates for line drop between power supply terminals and load terminals.)</p> <p>(6) -S : Remote sensing terminal for - output
(Remote sensing is optional and not provided for standard model. -S terminals is internally short to -V.
For remote sensing option, it compensates for line drop between power supply terminals and load terminals.)</p> | <p>(7) CS : Current sensing terminal
(For Sensing Output current. CS to -S voltage indicates output current.)</p> <p>(8) TOG : Ground for CNT and PF signal</p> <p>(9) CNT : ON/OFF control terminal
(for power supply output on and off control with an external signal.)
A metal piece is mounted on terminal strip between “CNT” and “TOG” at time of shipment.</p> <p>(10) PF : Power fail signal output terminal.
(As the output voltage drops, “Power Fail” terminal will output “High”.)</p> <p>(11)  : Safety Earth (Frame ground)</p> <p>(12) AC input terminal N : Neutral line</p> <p>(13) AC input terminal L : Live Line (Fuse in line)</p> |
|---|---|

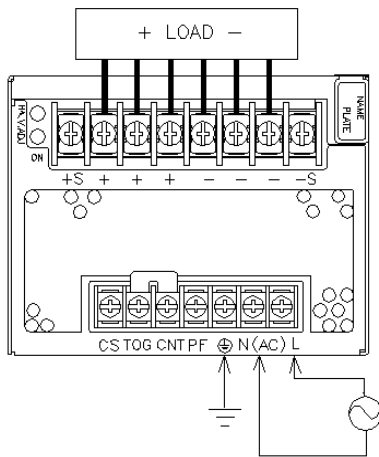
2. Terminal Connection Method

- Input must be off when making connection.
- Connect \oplus terminal to ground terminal of the equipment.
- The output load line and input line shall be separated and twisted to improve noise sensitivity.

SWS600HV-120 Panel Side

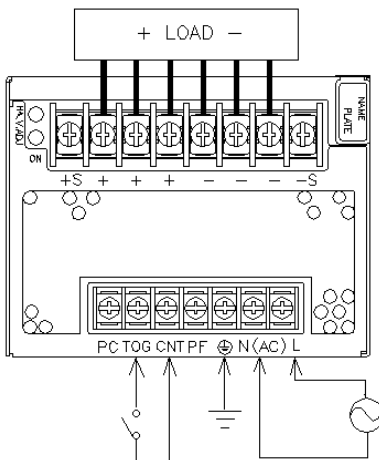
■ Basic connection

Do not connect load wires on +S and -S terminals



■ ON/OFF control required

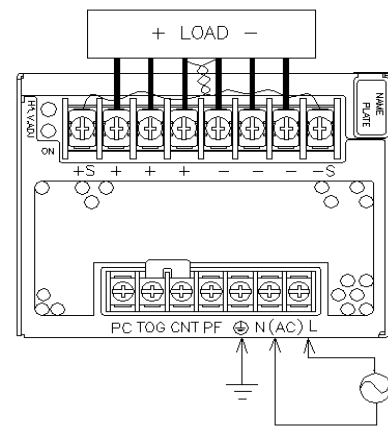
Remove the short piece on "CNT" and "TOG".
"TOG" terminal is Ground for CNT.



- Remote sensing (optional) lines shall be twisted or use shielded wire.
- Remote ON/OFF control lines shall be twisted or use shielded wire.

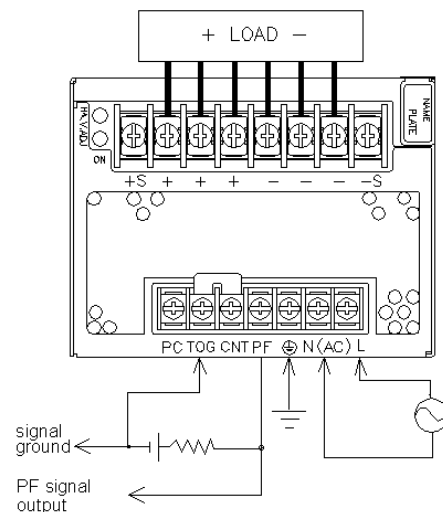
■ Remote sensing required

Remote sensing is available for optional model. Connect "+S" terminal to "+" terminal of load and "-S" terminal to "-" output terminal of load with wires. When remote sensing terminal are opened, output is shut down.



■ PF signal output required

Open collector method shown below shall be used.
"TOG" terminal is ground for "PF" terminal.



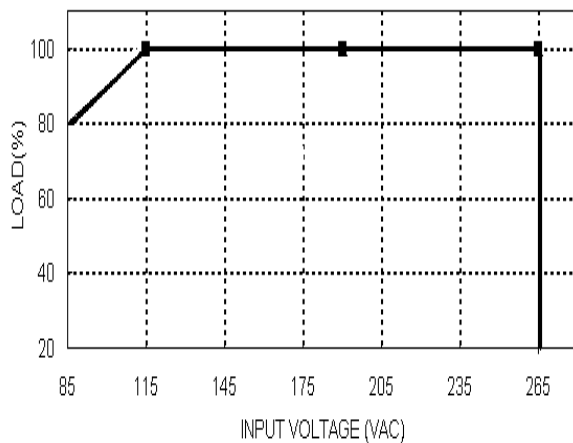
3. Functions and Precautions

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).

Maximum output power is derated linearly if input voltage is less than 115Vac.

Output derating vs Input voltage.



3-2. Output Voltage Range

Output voltage is set to 120V±1% fixed at shipment and V.ADJ trimmer should not be adjusted by user.

3-3. 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.

3-4. Over Current Protection (OCP)

Constant 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 cancelled. Do not operate overload or dead short conditions for more than 30 seconds, which could result in damage or insulation failure.

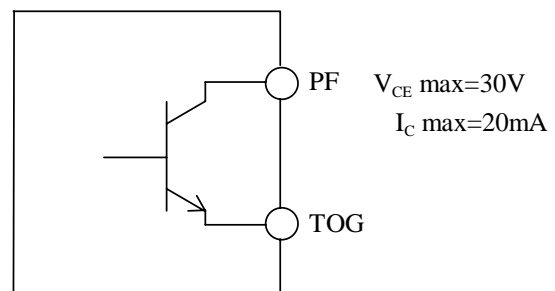
3-5. Over Temperature Protection (OTP)

Over temperature protection function is provided. When ambient or internal temperature rises abnormally, OTP will shut down the output. After shut down, first remove the input and cool it down before re-input.

3-6. Low Output Detection Circuit

Low output detection circuit is provided. PF signal will turn “High” level to indicate the abnormal status when the output voltage is below 80% of rated value caused by either the drop or brown out of the input voltage or OCP, OVP and OTP function operation.

The PF signal is insulated by a photo coupler. It uses the open collector method shown as below.



3-7. Remote Sensing (+S, -S terminal)

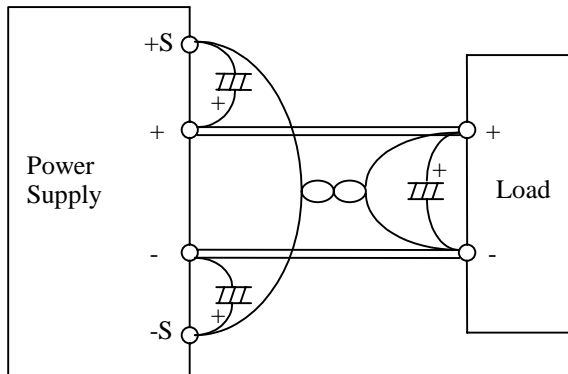
This function is only available for optional model. It compensates voltage drop of wiring from output terminals to load terminals. Connect “+S” terminal to “+” terminal of load and “-S” terminal to “-” terminal of load with sensing wires.

The total line voltage drop (+ side line and - side line) shall be less than 0.3V. In case that sensing line is too long, it is necessary to put an electrolytic capacitor in following 3 places.

- 1) Across the load terminal,
- 2) Between “+S” terminal and “+” terminal,
- 3) Between “-S” terminal and “-” terminal.

If remote sensing terminals are opened, the output will rise and OVP be triggered.

Note: For standard model, the remote sensing is not provided. The +S, -S terminals are internally shorted to +V, -V.



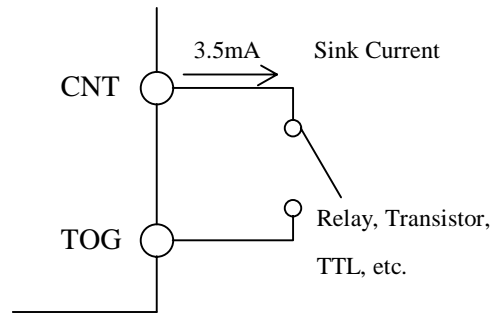
3-8. Remote ON/OFF Control

Remote ON/OFF control is provided. Using this function, output on/off is allowed to control without input voltage on/off. The output is turned to ON when TOG and CNT terminals are shorted: the output is turned to OFF when these terminals are opened. When the function is not used, connect TOG and CNT terminals with short piece. The standards for this function are as follows.

- (1) TTL compatible. The maximum input voltage to CNT terminal is 12V, and the maximum allowable reverse voltage is -1V. The sink current of CNT terminal is 3.5mA.
- (2) A switch and relay or a transistor can be used as an ON/OFF switch.
- (3) This circuit is isolated from the input and output by a photo-coupler. Connect TOG terminal to ground of control signal.

Control mode is shown below.

CNT Level for TOG Terminal	Output Condition
Short or L (0V ~ 0.8V)	ON
Open or H (2.4V ~ 12V)	OFF



3-9. 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 becomes 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.

3-10. Output Current Sensing

Output current can be monitored by voltage between CS to -S terminals. CS to -S voltage to output current ratio is 1V/A. CS voltage accuracy is within 10% (4.5~5.5V) at output current is 5A.

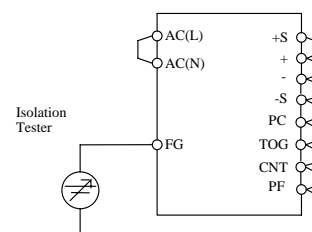
4. Isolation/Withstand Voltage

4-1. Isolation Test

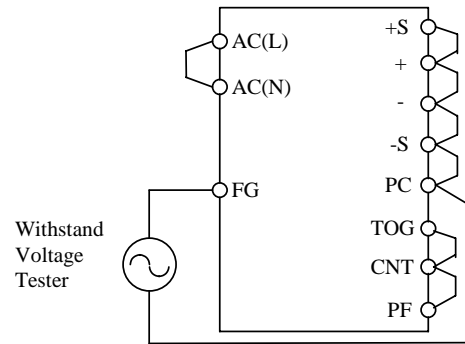
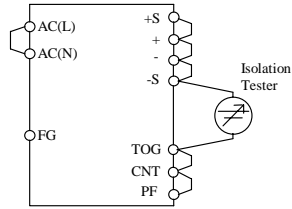
Isolation resistance between output and FG (chassis) shall be more than 100MΩ at 500VDC and between output and control shall be more than 10MΩ at 100VDC. For safety operation, voltage setting of DC isolation tester must be done before the test. Ensure that it is fully discharged after the test.

Output ~ FG (chassis)

500VDC 100MΩ or more



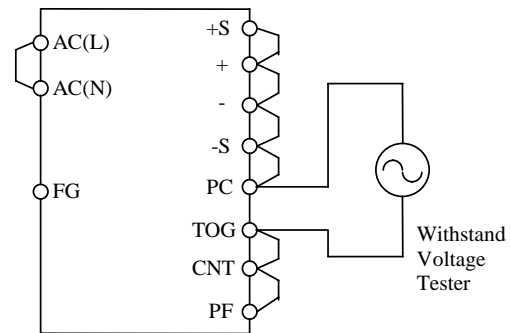
Output ~ Control
 100VDC 10MΩ or more



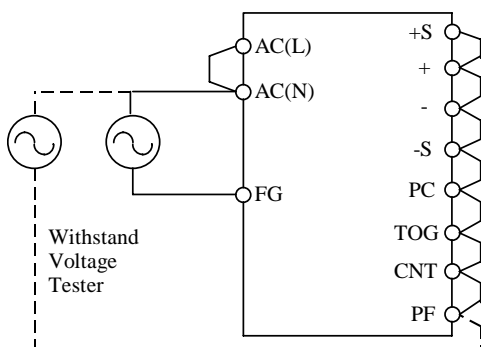
4-2. Withstand Voltage

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

Output ~ Control
 100VAC 1min. (100mA)



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



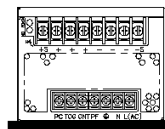
Output ~ FG (chassis)
 1kVAC 1min. (100mA)

5. Mounting Directions

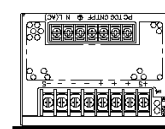
5-1. Output Derating according to the Mounting Directions

Recommended standard mounting method is (A). Method (B) and (C) are also possible. Refer to the derating below.

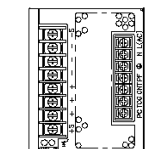
(A) Standard Mounting



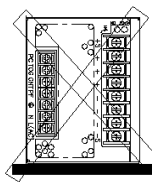
(B)



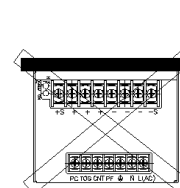
(C)



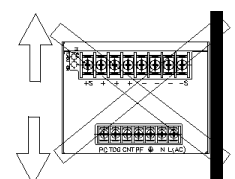
(D) Inhibit



(E) Inhibit

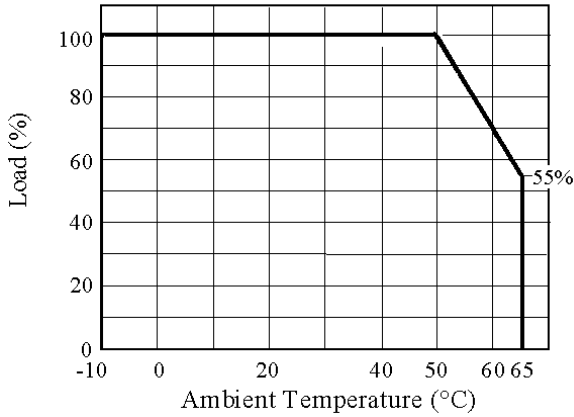


(F) Inhibit



Output Derating Curve

(Vin: 115~265VAC)



Ta(°C)	LOAD(%)
-10 ~ +40	100
50	100
55	85
65	55

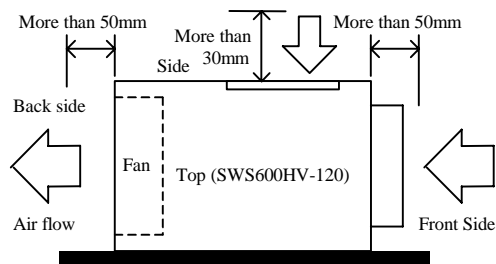
For Vin=85~115Vac, refer to section 3-1 for Input Voltage Derating factor.

For example:

At Vin=85Vac:

Ta (°C)	Output current derating (%)
-10 ~ +40	80
50	80
55	68
65	44

5-2. Mounting Method



(Example: Mounting C)

- (1) Forced air cooling type power supply. This power supply has ventilating holes on the front, back, and side panels. Keep these three areas freely as much as possible.
- (2) The maximum allowable penetration of mounting screw is 6mm.
- (3) Recommended torque for mounting screws:
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.
- The sensing lines shall be twisted and separated from the output lines.
- 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.
- For safety and EMI considerations, connect Ⓧ terminal to the mounting set ground terminal.
- Recommended torque for the terminal pieces:
Output terminal (M4 screw):
1.27 N • m (13.0 kgf • cm)
Input and signal terminal (M3.5 screw):
0.74 N • 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.

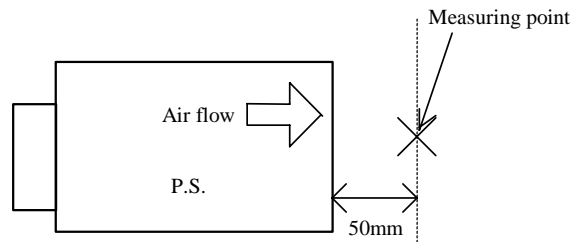
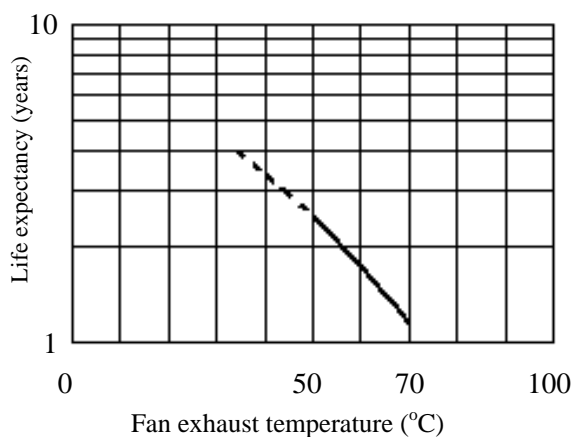
8. External Fuse Rating

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.

SWS600HV-120 : 15A

9. Fan life expectancy

The Fan-life has limitation. Therefore, periodic maintenance by exchanging the life-expired fan is required. The following figure shows the life of fan.



Measuring point of fan exhaust temperature.

10. 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.
- If use function of the Remote ON/OFF control, Check if the Remote ON/OFF control connector is not opened.
- 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.

11. Notes

1. Over-voltage Category
2. Radio Interference Suppression Test is not performed.