GWS250 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 as you may be injured by flying debris in the event of a fault.
- This power supply is designed for use within an end product. Stick the WARNING label for users on the system equipment and notify in the system instruction manual.
- Never operate the unit under over current or short-circuit conditions for more than 30 seconds or outside its specified Input Voltage Range, 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.
- This power supply has a possibility for hazardous voltage to appear at output terminal depending on the type of failure. The outputs of these products must be earthed in the end equipment to maintain SELV.
  If the outputs are not earthed, they must be considered hazardous and must not be made user accessible.

Note: CE MARKING
CE marking, when applied to the GWS series products, indicates compliance with the Low Voltage Directive (2006/95/EC) in that it complies with EN60950-1 2nd Edition.

DWG NO. : PA589-04-01B		
APPD	CHK	DWG

1. Model name identification method

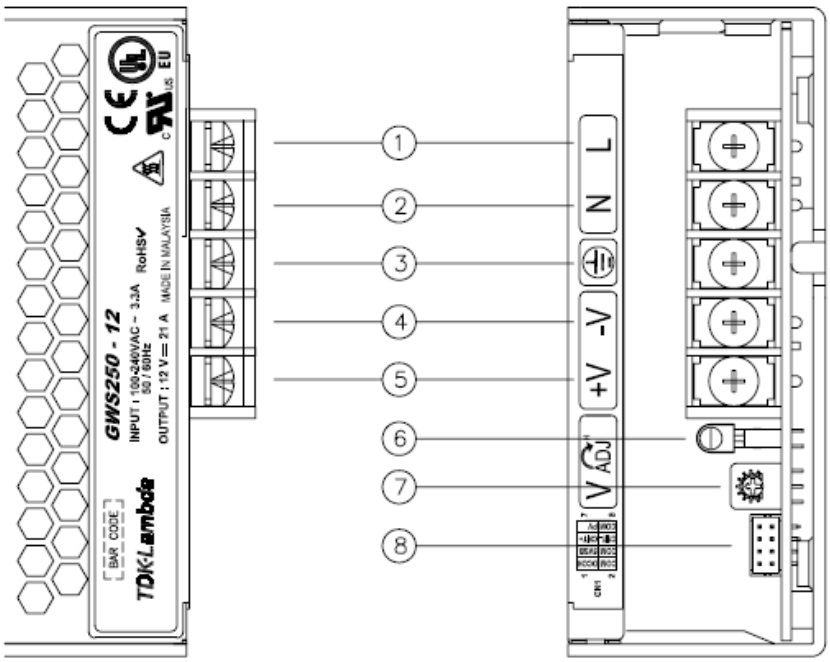
GWS 250 – 12

- 12 — Rated Output Voltage
- 250 — Output Power type
- GWS — Series name

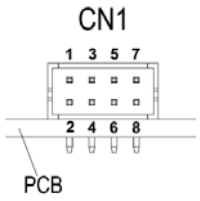
2. Terminal Explanation

2-1. Front Panel Explanation

(1) L : Input terminal Live line (Fuse in line)
(2) N : Input terminal Neutral line
(3) FG ⏚ : Frame Ground
(4) - V : - Output terminal
(5) +V : + Output terminal
(6) Output monitoring indicator (Green LED : ON)
(7) V.ADJ : Output voltage adjustable trimmer
(The output voltage rises when the trimmer is turned clockwise.)
(8) CN1: DC_OK, 5VSB, Remote On/Off and PV signals (Refer to 2.2)



2-2. CN1 Connector Pin Configuration and Function



Pin No.	Configuration	Function
1	DC_OK	DC_OK signal is an open collector output signal, referenced to pin2 (COM). As the output voltage drops, DC_OK signal will output "High".
2	COM	Return loop for DC_OK signal.
3	5VSB	Auxiliary voltage output, 4.75~5.25V, referenced to pin4 (COM). The maximum load current is 0.3A.
4	COM	Return loop for 5VSB signal.
5	CNT+	
6	CNT-	
7	PV	Output voltage external control terminal
8	COM	Return loop for PV signal.

CN1 Connector, Housing and Terminal Pins

PART DESCRIPTION	PART NAME	MANUFACTURER
PIN HEADER	S8B-PHDSS(LF)(SN)	JST
SOCKET HOUSING	PHDR-8VS	JST
TERMINAL PINS	SPHD-001T-P0.5 OR SPHD-002T-P0.5	JST
HAND CRIMPING TOOL	YRS-620 (SPHD-002T-P0.5) OR YC-610R (SPHD-001T-P0.5) Hand Crimp Tool for Milli-Grid and MicroBlade Crimp Terminals	JST

3. Terminal Connection Method

Please pay extra attention to the wiring. Incorrect connection may cause damage the power supply.

- When connecting input and output wiring, and CN1, input AC-Line should be OFF.
- The output load line and input line shall be separated and twisted to improve noise immunity.
- Connect FG terminal to ground terminal of the equipment.
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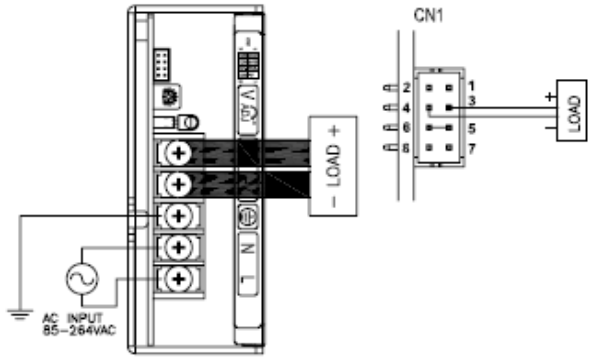
- Output current for each terminal screw shall be less than 30A.

GWS250

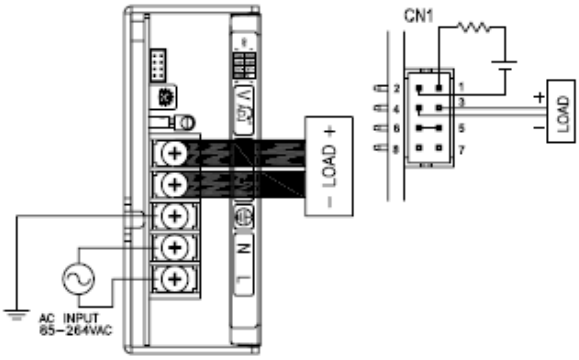
- Basic Connection

Connect “CNT+” terminal to “CNT-“ terminal with the attached connector.



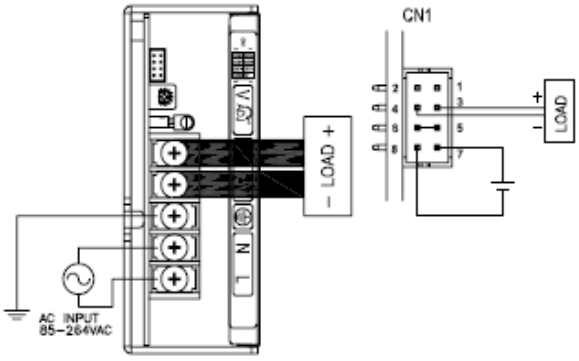
- DC_OK output signal required

Open collector method shown below shall be used
“COM“ terminal is ground for “DC_OK” terminal.



- PV control required

Inject external voltage between 3~6V
“COM“ terminal is ground for “PV” terminal.



4. Explanation of Functions and Precautions

4-1. Input Voltage Range

Input voltage range is single phase 85 ~ 264VAC (47 ~ 63Hz) or 125 ~ 373VDC.
Input voltage which is out of specification, may damage the unit. For cases where conformance to various safety specs(UL,CSA,EN) are required, input voltage range will be 100~240VAC (50/60Hz).

Note : GWS250 series is able to withstand Input Surge of 300VAC for 5 seconds.

4-2. Output Voltage Range

V.ADJ trimmer is for output voltage adjustment within the range of specifications. Turning the trimmer clockwise will increase the output voltage. Kindly note that over voltage protection (OVP) function may trigger if the output voltage is increased excessively. Please ensure that the output power is below the rated output power, and output current is below the maximum output current (12V & 48V) or below the peak output current (24V & 36V) when output voltage is raised.

4-3. Over Voltage Protection (OVP)

The OVP function will shutdown the output. To reset OVP, remove the input of power supply for a few minutes, and then re-input. Alternatively, use CNT reset (Remote ON/OFF: OFF to ON). OVP setting is fixed and cannot be adjusted externally.

4-4. Over Current Protection (OCP)

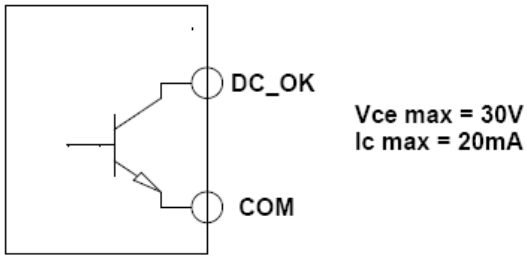
OCP function operates when the output current exceeds OCP specifications. OCP characteristic is constant current limiting for 24V ~ 48V while 12V has hiccup mode. The output will automatically recover when the overload condition is removed. Do not operate overload or dead short conditions for more than 30 seconds, which could result in damage. There is no possibility of fire or burning. OCP setting is fixed and not to be adjusted externally.

4-5. Over Temperature Protection (OTP)

Over Temperature Protection function (manual reset type) is available. When ambient or internal temperature rises abnormally, OTP function will shut down the output. To recover the unit, first shut down the AC input and let the unit cool down before turning ON the AC input.

4-6. Low Output Detection Circuit (DC_OK)

Low output voltage detection circuit is provided. DC okay (DC_OK) signal will turn "High" level to indicate abnormal status when the output voltage becomes less than approximately 80% of rated value caused by either the drop or brownout of the input voltage or OCP, OVP and OTP function generation. It uses the open collector method as shown below



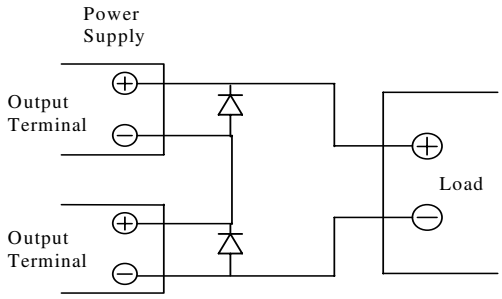
4-8. Output Ripple & Noise

Ripple & noise are measured at 20MHz by using a 300mm twisted pair of load wires terminated with a 0.1uF film capacitor & 47uF electrolytic capacitor. When load lines are longer, ripple becomes larger. The output ripple cannot be measured accurately if the probe ground lead of oscilloscope is too long. At low temperature, large ripple & noise may also be observed due to large ESR of the internal Electrolytic Capacitors especially at -25°C.

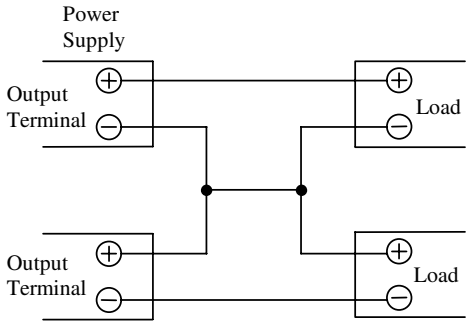
4-9. Series Operation

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

Method (A)



Method (B)

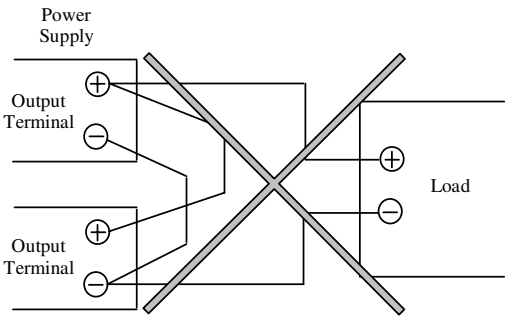


Note : In case of Method (A), please connect diodes to prevent the reverse voltage.

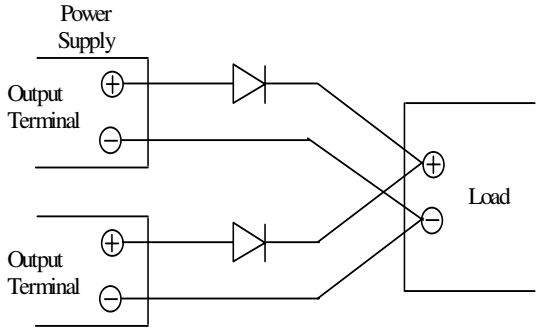
4-10. Parallel Operation

(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.

(A)



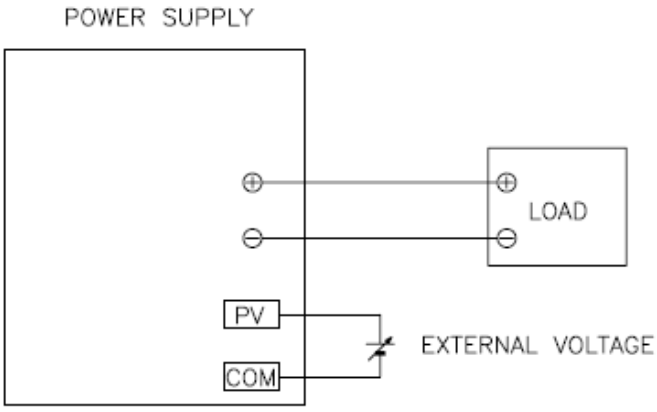
(B)



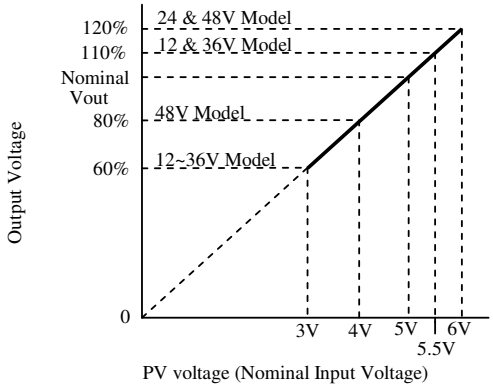
4-11. Output Voltage External Control (PV)

Output voltage external control function is available. Output voltage can be varied by applying an external voltage (3–6V) to "PV" terminal and "COM" terminal. Please consider the following characteristics.

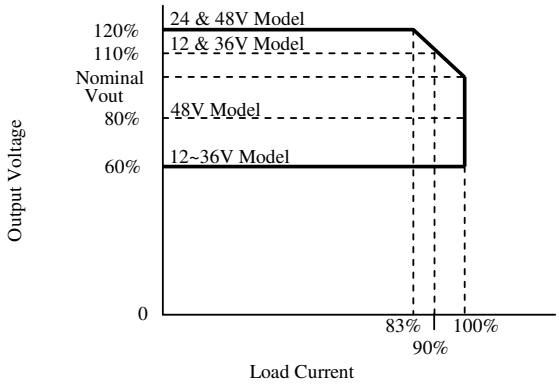
Connection method



Output Voltage Linearity



Output Voltage Derating



Note:
For 12V & 36V output model, limit output voltage variation range at 60% ~ 110%. At PV voltage variation 3V ~ 5.5V.
For 24V output model, limit output voltage variation range at 60% ~ 120%. At PV voltage variation 3V ~ 6V.
For 48V output model, limit output voltage variation range at 80% ~ 120%. At PV voltage variation 4V ~ 6V.

4-14. Auxiliary Supply

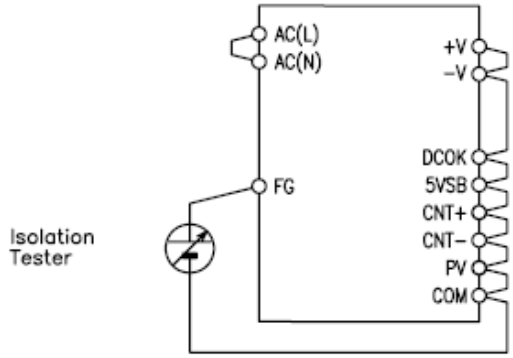
Auxiliary supply (5V, 0.3A max) is provided to ease customer application. Aux voltage is always available as long as input power in the specified voltage range is present.

5. Isolation / Withstand Voltage

5-1. Isolation Test

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

(a) Output ~ FG (chassis) : 500VDC, 100MΩ or more



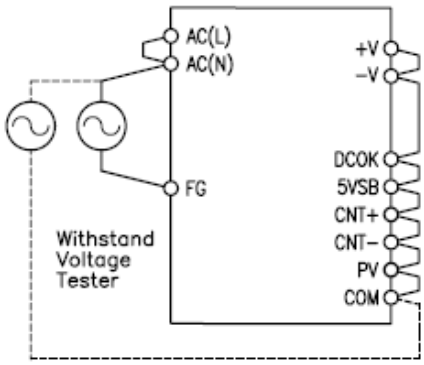
5-2. Withstand Voltage

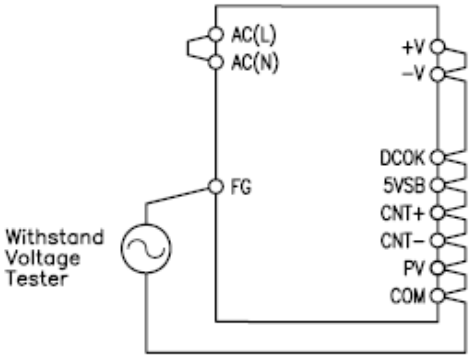
This series is designed to withstand 3.0kVAC between input and output, 1.5kVAC between input and FG (chassis) and 500VAC between output and FG (chassis) each for 1 minute. When testing withstand voltage, set current limit of withstand voltage test equipment at 20mA (Output-FG (chassis) : 100mA). The applied voltage must be gradually increased from zero to testing value and then gradually 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 :

(a) Input ~ FG (chassis) : solid line
1.5kVAC, 1min (20mA)

(b) Input ~ Output : dotted line
3kVAC, 1min (20mA)

(c) Output ~ FG (chassis) : 500VAC, 1min (100mA)



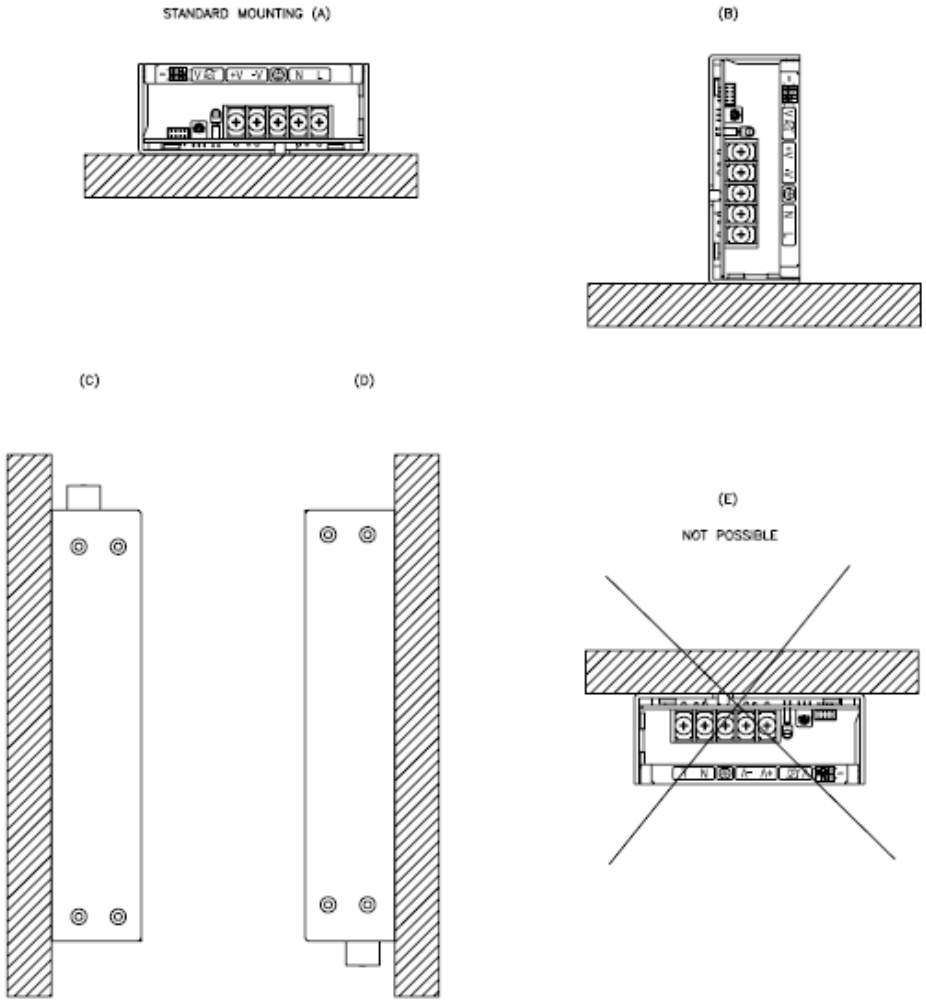


6. Mounting Directions

6-1. Output Derating according to the Mounting Directions

(a) Convection cooling, without external airflow (Standard type)

Recommended standard mounting is Method (A).
Methods (B), (C) and (D) are also possible.
Refer to the Output 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.

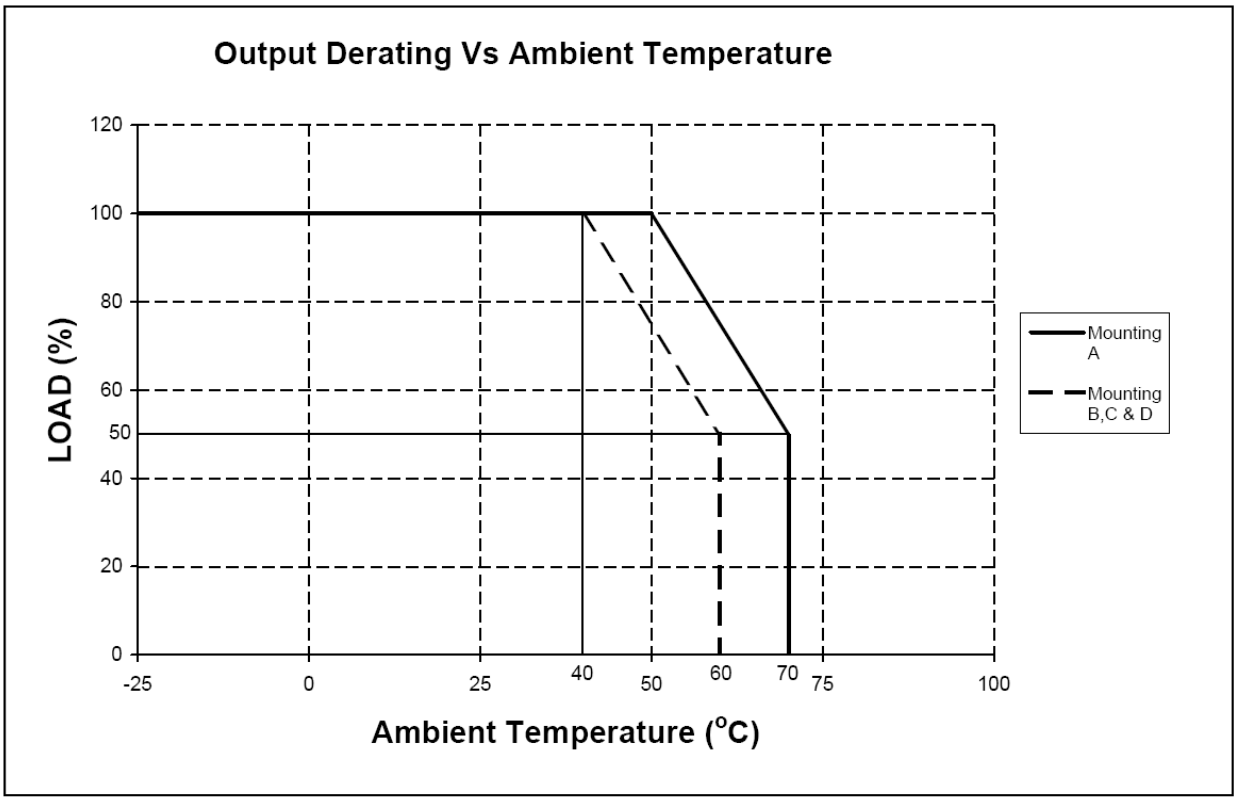


6-2. Output Derating according to ambient temperature and input voltage

(A) GWS250 series Output Derating versus Ambient Temperature

The system is convection cooling.
In the following derating curve, the maximum output current is denoted as 100%.

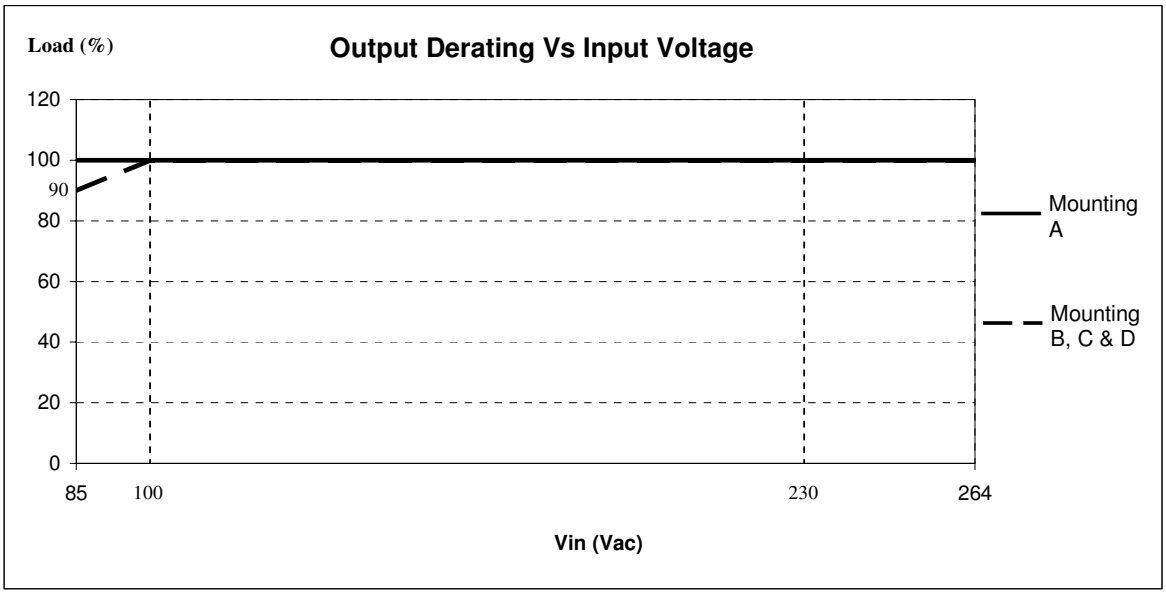
Output Derating versus Ambient Temperature (Convection Cooling)



(B) GWS250 series Output Derating versus Input Voltage

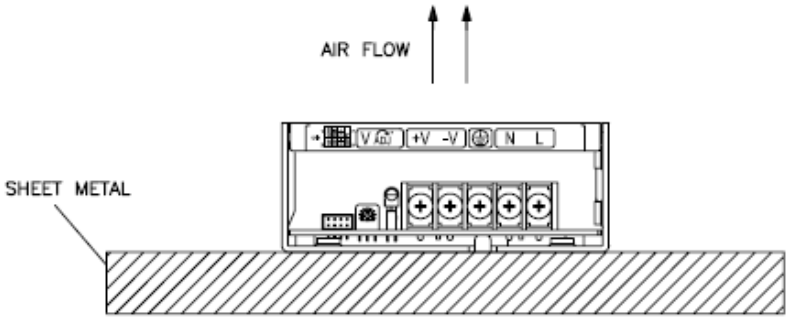
The system is convection cooling.
In the following derating curve, the maximum output current is denoted as 100%.

Output Derating versus Input Voltage (Convection Cooling)

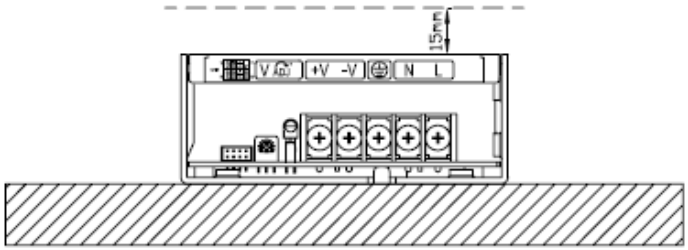


6-3 Mounting Method

1) This is convection cooling type power supply. In consideration of the heat radiation and safety, please keep a distance of more than 15mm between the power supply and the peripheral parts. When lining up multiple units, please make sure to place them 5mm or more apart from each other.
2) Maximum allowable penetration of mounting screws into the power-supply is 5mm.
3) Recommended torque for mounting screws (M4): 1.27 N·m (13.0 kgf·cm).



Provide clearance 15mm or more on top of the power supply.



7. Wiring Method

- The input and output load wires shall be separated and twisted to improve noise immunity.
- Both wires must be as thick and short as possible to have lower impedance.
- Noise can be reduced by connecting a film capacitor with 0.1uF capacitance across the load terminals.
- For safety and EMI considerations, connect the FG terminal of GWS250 series to mounting set ground terminal.
- The recommended wire type :

MODEL	Recommended Wire	Recommended torque	Recommended crimp-type terminal		
			D (MAX)	t (MAX)	Mounting Pieces (MAX)
GWS250	AWG14-22	M3.5 Screws 1.0 N·m (9.8 kgf·cm) ~ 1.4 N·m (13.7 kgf·cm)	6.8mm	0.8mm	2 pieces

Note 1 : When using separate loads, it is recommended to use 2 pieces of 0.8mm thick crimp-type terminal.
Note 2 : For recommended wire diameter, refer to wire maker recommended allowable current and voltage drop. For higher output current model like 12V, bigger diameter wire is recommended.

8. External Fuse Rating

Refer to the following fuse rating when selecting the external input fuse. Surge current flows when input turns on. Fuse rating is specified by Inrush Current value at input turn on. Do not select the fuse according to input current (rms) values under the actual load condition.

GWS250 : F6.3AH , 250V

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

Please make the following checks.

(1) Check if the rated input voltage is connected and within specification.
(2) Check if the wiring of input and output is correct.
(3) Check if the I/O terminal connection is properly tighten by required torque.
(4) Check if the wire thickness is enough.
(5) Check if the output voltage trimmer (V.ADJ) is properly adjusted. OVP might be triggered and output is shutdown.
(6) Is the chassis of power supply abnormally hot? The output is shutdown by OTP operation. Please disconnect or turn off the AC input and let the unit cool down sufficiently before turning ON the AC input again.
(7) Check if the output current and output wattage does not exceed the specification.
(8) Audible noise may be heard when input voltage waveform is not sinusoidal.
(9) Audible noise may be heard during dynamic load operation.
(10) Ensure that a large capacitor is not connected across the output terminals. Please use within maximum capacitance shown below.

	Maximum external capacitance			
MODEL	12V	24V	36V	48V
GWS250	10,000uF	5,000uF	1,000uF	

10. Warranty Condition

This product is under warranty for 5 years (based on 24 hours/day operation) from the date of shipment. During the warranty period, TDK-Lambda will, at it's option, either repair or replace products prove to be defective.

Warranty applies but not limited to the following.
(1) Average operating temperature (ambient temperature of the power supply unit) is under 40°C.
(2) Average load factor is 80% or less.
(3) Installation method : Standard installation.

Following cases are not covered by warranty.
(1) Improper usage and mis-handling like dropping or applying shock to the unit and defects from operation exceeding specification of the product.
(2) Defects resulting from natural disaster (fire, flood).
(3) Unauthorized modification or repair.