

RWS 50B-600B Series

Instruction Manual

BEFORE USING THE POWER SUPPLY UNIT (Common)

Be sure to read this instruction manual thoroughly before using this product. Pay attention to all cautions and warnings before using this product. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

⚠ DANGER

- Never use this product in locations where flammable gas or ignitable substances are present.

⚠ INSTALLATION WARNING

- When installing, ensure that work is done in accordance with the instruction manual. When installation is improper, there is risk of electric shock and fire.
- Installation shall be done by Service personnel with necessary and appropriate technical training and experience. There is a risk of electric shock and fire.
- Do not cover the product with cloth or paper etc. Do not place anything flammable around. This might cause damage, electric shock or fire.

⚠ WARNING on USE

- Do not touch this product or its internal components while circuit in operation, or shortly after shutdown. You may receive a burn.
- While this product is operating, keep your hands and face away from it as you may be injured by an unexpected situation.
- For products with no cover, do not touch them as there are high-voltage and high temperature parts inside. Touching them might cause injury such as electric shock or burn.
- There are cases where high voltage charge remains inside the product immediately after the input is cut off. Therefore, do not touch even if they are not in operation as you might get injured due to high voltage and high temperature. You might also get electric shock or burn.
- Do not make unauthorized changes to this product nor remove the cover as you might get an electric shock or might damage the product. We will not be held responsible after the product has been modified, changed or disassembled.
- Do not use this product under unusual condition such as emission of smoke or abnormal smell and sound etc. Please stop using it immediately and shut off the product. It might lead to fire and electric shock. In such cases, please contact us. Do not attempt repair by yourself, as it is dangerous for the user.
- Do not operate and store these products in environments where condensation occurs due to moisture and humidity. It might lead fire and electric shock.
- Do not drop or apply shock to this product. It might cause failure. Do not operate these products mechanical stress is applied.
- When necessary, this products is to be repaired only by us or our authorized agents. It is important that this product cannot be used in hazardous environments (facilities such as nuclear power control system or life support equipment) without our written consent.

⚠ CAUTION on MOUNTING

- Confirm connections to input/output terminals are correct as indicated in the instruction manual before switching on.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged.
- Input line, please use the wires as short and thick as possible.
- Do not use this product in special environment with strong electromagnetic field, corrosive gas or conductive substances and direct sunlight, or places where product is exposed to water or rain.
- Mount this product properly in accordance with the instruction manual, mounting direction and shall be properly be ventilated.
- Please shut down the input when connecting input and output of the product.
- When installing in environment where conductive foreign, dust and liquid may be present, please consider penetration of above foreign material in the power supply by installing filter, to prevent trouble or malfunction.

⚠ CAUTION on USE

- Product individual notes are shown in the instruction manual. If there is any difference with common notes individual notes shall have priority.
- Before using this product, be sure to read the catalog and instruction manual. There is risk of electric shock or damage to the product or fire due to improper use.
- Input voltage, Output current, Output power, ambient temperature and ambient humidity should be kept within specifications, otherwise the product will be damaged, or cause electric shock or fire.
- If the built-in fuse is blown, do not use the product even after replacing the fuse, as there is risk of abnormality inside. Be sure to request repair to our company.
- For products without built-in protection circuit (element, fuse, etc.), insert fuse at the input to prevent smoke, fire during abnormal operation. As for products with built-in protection circuit, depending on usage conditions, built-in protection circuit might not work. It is recommended to provide separate proper protection circuit.
- For externally mounted fuse do not use other fuses aside from our specified and recommended fuse.
- This product was made for general purpose electronic equipment use and is not designed for applications requiring high safety (such as extremely high reliability and safety requirements. Even though high reliability and safety are not required, this product should not be used directly for applications that have serious risk for life and physical safety. Take sufficient consideration in fail-safe design (such as providing protective circuit or protective device inside the system, providing redundant circuit to ensure no instability when single device failure occurs).
- When used in environments with strong electromagnetic field, there is possibility of product damage due to malfunction.
- When used in environment with corrosive gas (hydrogen sulfide, sulfur dioxide, etc.) , there is possibility that they might penetrate the product and lead to failure.
- When used in environments where there is conductive foreign matter or dust, there is possibility of product failure or malfunction.
- Provide countermeasure for prevention of lightning surge voltage as there is risk of damage due to abnormal voltage.
- Connect together the frame ground terminal of the product and the ground terminal of the equipment for safety and noise reduction. If these ground is not connected together, there is risk of electric shock.
- Parts with lifetime specifications (built-in fan electrolytic capacitor) are required to be replaced periodically. Set the overhaul period depending on the environment of usage and perform maintenance. Also, note that there are cases when EOL products cannot be overhauled.
- Take care not to apply external abnormal voltage to the output. Especially, applying reverse voltage or overvoltage more than the rated voltage to the output might cause failure, electric shock or fire.
- This product is designed under condition Material group IIIb, Pollution Degree (PD): PD2, Over Voltage category (OVC): OVCII and Class of equipment: Class I. This product is designed to be accessible only to service technicians as part of indoor use device.

- The outputs of this product may, under fault conditions, exceed SELV voltage limits. Therefore the outputs must be protected in the end equipment to maintain SELV.
- RWS50B, RWS100B, RWS150B, RWS300B has used Power Thermistor to protect the circuit from Inrush Current. Frequent repetition of input might cause damage to internal components because of generating surge current.
- The output power of RWS300B, RWS600B is considered to be a hazardous energy level (The voltage is 2V or more and the power is 240VA or more). It must not be made accessible to users. Protection must be provided for Service Engineers against indirect contact with the output terminals and/or to prevent tools being dropped across them. While working on this product, the AC input power must be switched off and the input and output voltage should be zero.
- RWS300B, RWS600B have a builtin fan for aircooling. Do not block the air intake and exhaust as this might lead to fire.

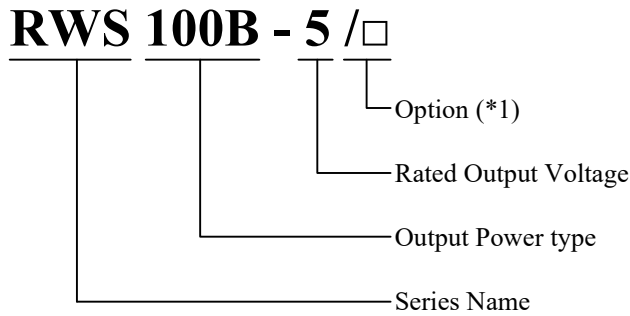
Note

- Take note that traces of sheet metal processing be left in our power supplies.
- When disposing product, follow disposal laws of each municipality.
- Published EMI (CE, RE) or immunity is the result when measured in our standard measurement conditions and might not satisfy specification when mounted and wired inside end-user equipment. Use the product after sufficiently evaluating at actual end-user equipment.
- When exporting our products, apply for necessary permissions as required by rules and regulations of Foreign Exchange and Foreign Trade Control Act.
- Catalogue, contents of the instruction manual may be changed without a prior notice. Refer to latest catalogue or instruction manual.
- Reproduction or reprinting the instruction manual or its portion is forbidden without our permission.

LONG-TERM STORAGE METHOD AND LONG-TERM STORAGE PERIOD

- Please keep the product in carton box.
 - Please do not apply excessive vibration, shock or mechanical stress applied directly to the product.
 - Please keep away from direct sunlight.
 - For long-term storage temperature and humidity, the following conditions shall be used as a guideline :
 - Temperature range : 5°C~30°C
 - Humidity range : 40%~60%RHPlease keep away from the places where temperature and humidity can change drastically. It can cause condensation on the product or deterioration.
 - For long-term storage period, we recommend to use within 2 years after receiving the product.
 - There is tendency that the leakage current of an aluminium electrolytic capacitor may increase when stored without using for a long time.
 - This phenomenon can be improved by applying voltage to the aluminum electrolytic capacitor to reduce the increased leakage current through the self-recovery effect of the electrolyte.
 - For reference, before using products that have been stored for a very long time, please warm-up first for 30 minutes or more without taking load.
- < Criterion of warm up voltage condition >
- (1)Implementation period : 1 year or above after the delivery
 - (2)Electrical continuity condition
 - Input voltage : Rating
 - Load : 0A
 - Ambient temperature : Normal temperature
 - Time : 30 minutes or more

1. Model name identification method



- (*1) Blank : Standard
 /R : With remote ON/OFF control model.
 (Option of RWS300B, RWS600B)
 /FO : With remote sensing
 Low output voltage (LV) signal
 Parallel Operation
 (Option of RWS600B)
 /RFO : With remote sensing, remote ON/OFF control
 Low output voltage (LV) signal
 Parallel Operation
 (Option of RWS600B)
 /DIN : DIN rail mountable
 (Option of RWS50B, RWS100B,
 RWS150B, RWS300B)
 /CO2 : With coating on both sides of PCB model

Note : For “/CO2” model, to improve resistance against humidity and dust environment, both sides of assembled PCB are coated. However, complete effect is not guaranteed because some areas on the board are not coated.

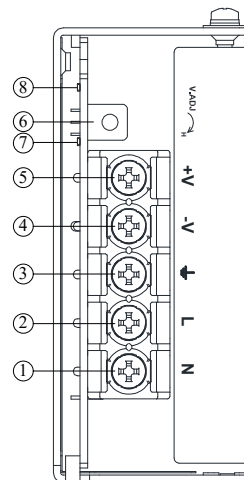
2. Terminal Explanation

RWS50B, RWS100B, RWS150B, RWS300B

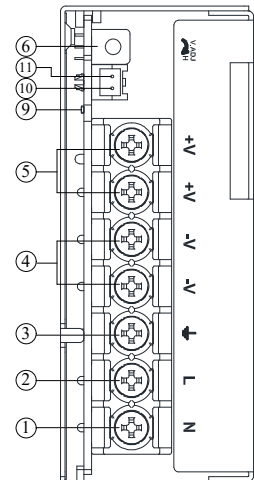
- ① N : Input terminal Neutral line
- ② L : Input terminal Live line (Fuse in line)
- ③ ⊥ : Earth terminal
- ④ -V : - Output terminal
(30A max. / terminal)
- ⑤ +V : + Output terminal
(30A max. / terminal)
- ⑥ Output voltage adjustment trimmer
- ⑦ Output monitoring indicator (Green LED)
(RWS50B, RWS100B)
- ⑧ Output monitoring indicator (Green LED)
(RWS150B)
- ⑨ Output monitoring indicator (Green LED)
(RWS300B)

*All screws size is M3.5

RWS50B, RWS100B, RWS150B



RWS300B



RWS300B/R

- ⑩ -R : Remote ON/OFF control terminal
 - ⑪ +R : Remote ON/OFF control terminal
- *Remote ON/OFF control Connector (JST)

Connector	Housing	Terminal Pin
S02B-XASS-1	XAP-02V-1	SXA-001T-P0.6 (AWG22 ~ 28) or SXA-01T-P0.6 (AWG20 ~ 24)

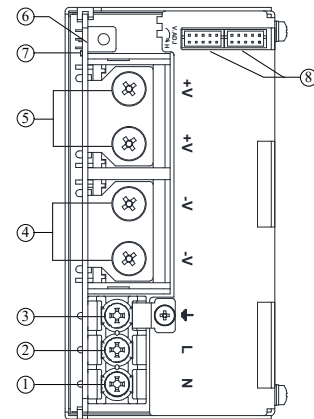
Hand Crimping Tool : YRS-692 (SXA-001T-P0.6) (JST) or YRS-701 (SXA-01T-P0.6) (JST)

Use maker recommended crimping tool.

Matching housing and terminal pin are not included in the product.

RWS600B

- ① N : Input terminal Neutral line (M3.5 screw)
- ② L : Input terminal Live line (Fuse in line) (M3.5 screw)
- ③ ⊥ : Earth terminal
- ④ -V : -Output terminal
(50A max. / terminal, M5 screw)
- ⑤ +V : +Output terminal
(50A max. / terminal, M5 screw)
- ⑥ Output voltage adjustment trimmer
- ⑦ Output monitoring indicator (Green LED)



RWS600B/FO, RWS600B/RFO

- ⑧ CN81, CN82 : Remote sensing, LV signal, Parallel operation setup
Remote ON/OFF control (Only /RFO)

CN81, CN82 Connector pin Configuration and Function

CN81 and CN82 are same pin configuration and function.

They are connected to each other in this power supply unit.

When the pin of CN81 side is shorted, the same function pins of CN82 side are also shorted.

Please note that the function cannot be separately set with CN81 and CN82.

	No.	Configuration	Function
	1	+Vm	Output monitor terminal (+V). Internally connected to +Output terminal. (+Vm terminal can not supply load current.)
	2	+S	Remote sensing terminal for +output. (For remote sensing function, which compensates for line drop between power supply terminals and load terminals. Connect to +Vm terminal when remote sensing function unnecessary.)
	3	+R	Remote ON/OFF control terminal (Only /RFO). No connection for /FO.
	4	-R	Remote ON/OFF control terminal (Only /RFO). No connection for /FO.
	5	+LV	Low output voltage detection signal (LV signal) terminal. (Open collector output. As the output voltage drops, "LV" signal will be "High".)
	6	-LV	GND for LV signal.
	7	+P	Parallel operation setup terminal. (Connect to -P terminal for parallel operation.)
	8	-P	Parallel operation setup terminal. (Connect to +P terminal for parallel operation.)
	9	-Vm	GND for Output monitor terminal. Internally connected to -Output terminal. (-Vm terminal can not supply load current.)
	10	-S	Remote sensing terminal for -output side. (For remote sensing function, which compensates for line drop between power supply terminals and load terminals. Connect to -Vm terminal when remote sensing function unnecessary.)

* CN81, CN82 Connector (JST)

Connector	Housing	Terminal Pin
S10B-PHDSS	PHDR-10VS	SPHD-002T-P0.5 (AWG24 ~ 28) or SPHD-001T-P0.5 (AWG22 ~ 26)

Hand Crimping Tool : YRS-620 (SPHD-002T-P0.5) (JST) or YC-610R (SPHD-001T-P0.5) (JST)

Use maker recommended crimping tool.

"+Vm" terminal (Pin No.1) to "+S" terminal (Pin No.2), and "-Vm" terminal (Pin No.9) to "-S" terminal (Pin No.10) are connected by short pieces at time of shipment.

RWS600B/R

⑧ CN81 : Remote ON/OFF control

No.	Configuration	Function
1	NC	No connection.
2	NC	No connection.
3	+R	Remote ON/OFF control terminal.
4	-R	GND for Remote ON/OFF control terminal.
5	NC	No connection.
6	NC	No connection.
7	NC	No connection.
8	NC	No connection.
9	NC	No connection.
10	NC	No connection.

* CN81 Connector (JST)

Connector	Housing	Terminal Pin
S10B-PHDSS	PHDR-10VS	SPHD-002T-P0.5 (AWG24 ~ 28) or SPHD-001T-P0.5 (AWG22 ~ 26)

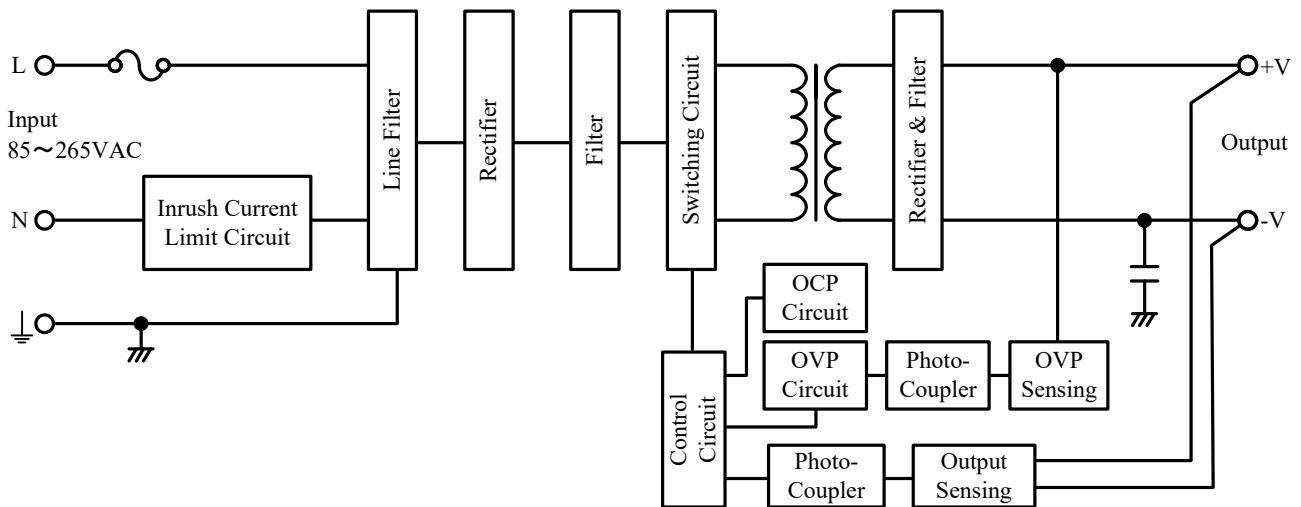
Hand Crimping Tool : YRS-620 (SPHD-002T-P0.5) (JST) or YC-610R (SPHD-001T-P0.5) (JST)

Use maker recommended crimping tool.

Matching housing and terminal pin are not included in the product.

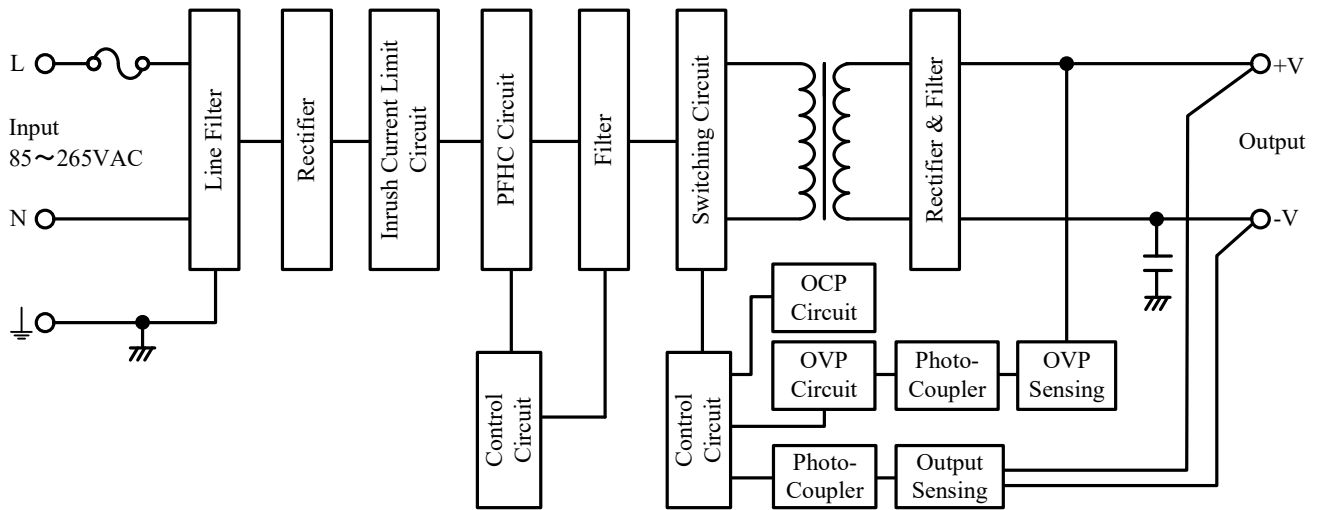
3. Block Diagram

RWS50B



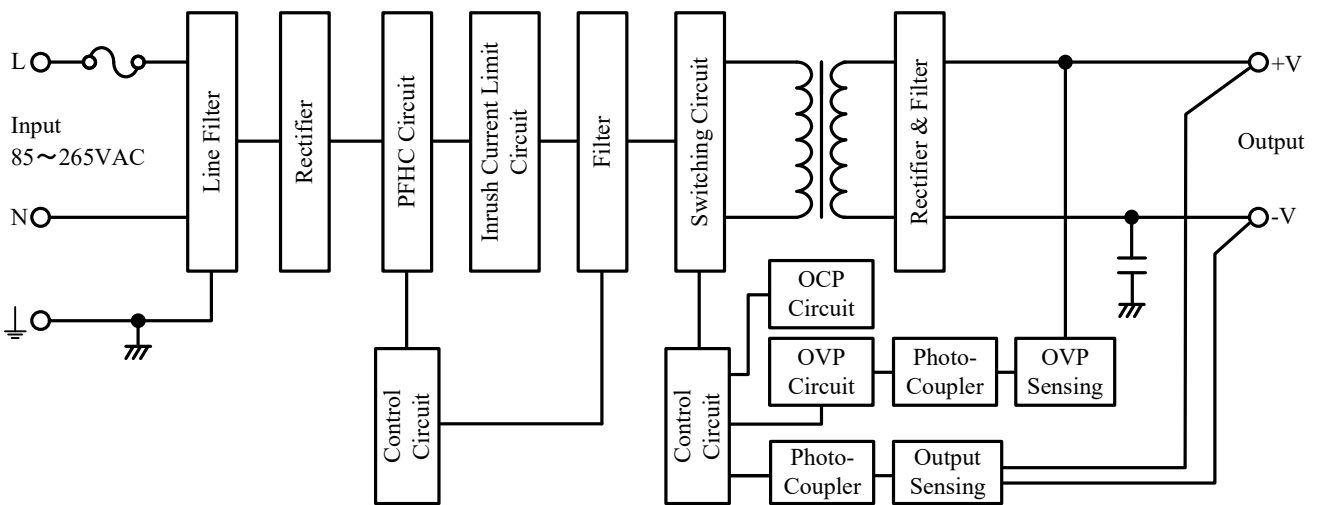
- Fuse rating 3.15A
- Circuit topology • Switching frequency
Flyback topology 100kHz

RWS100B



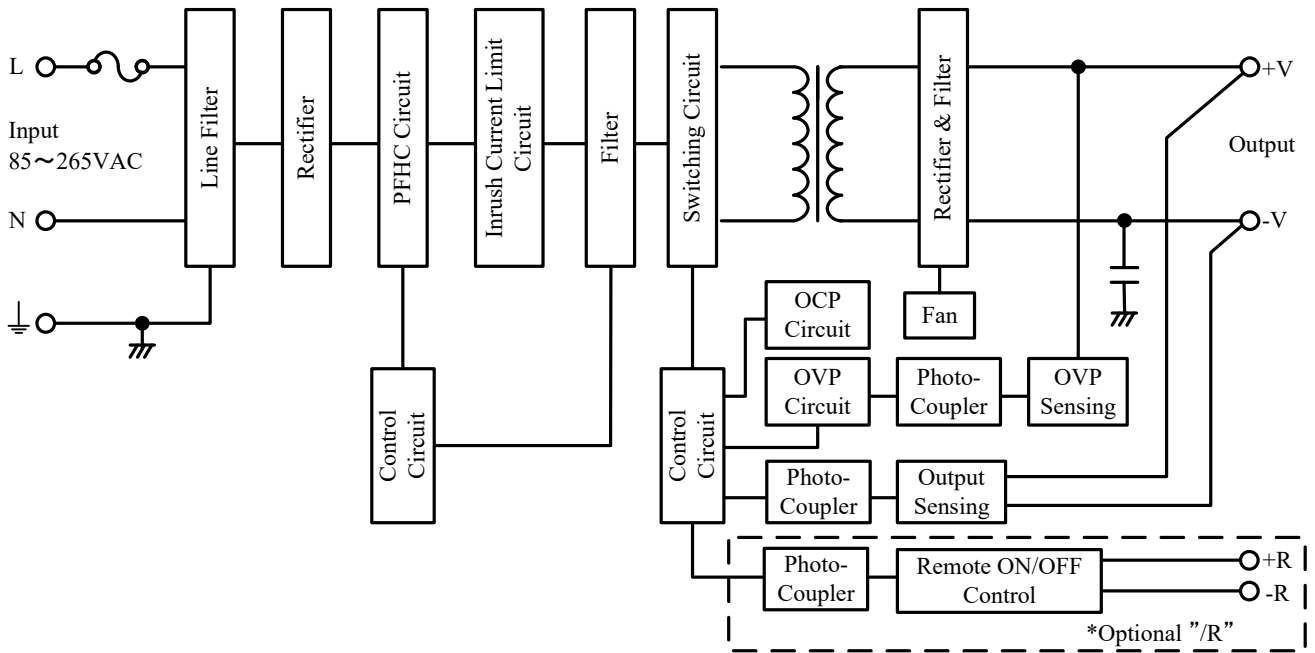
- Fuse rating 3.15A
- Circuit topology • Switching frequency
 Single-ended forward topology 120kHz
 PFHC circuit : Active filter 65kHz (fixed)

RWS150B



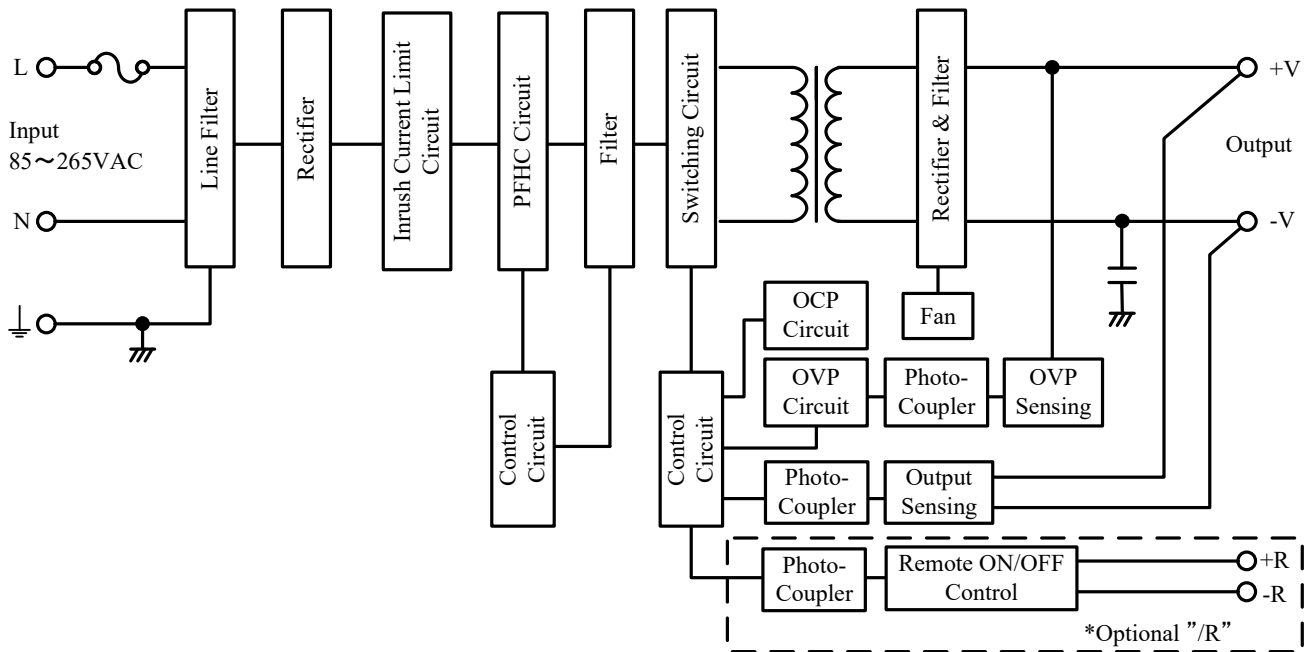
- Fuse rating 5A
- Circuit topology • Switching frequency
 Single-ended forward topology 120kHz
 PFHC circuit : Active filter 65kHz (fixed)

RWS300B, RWS300/R

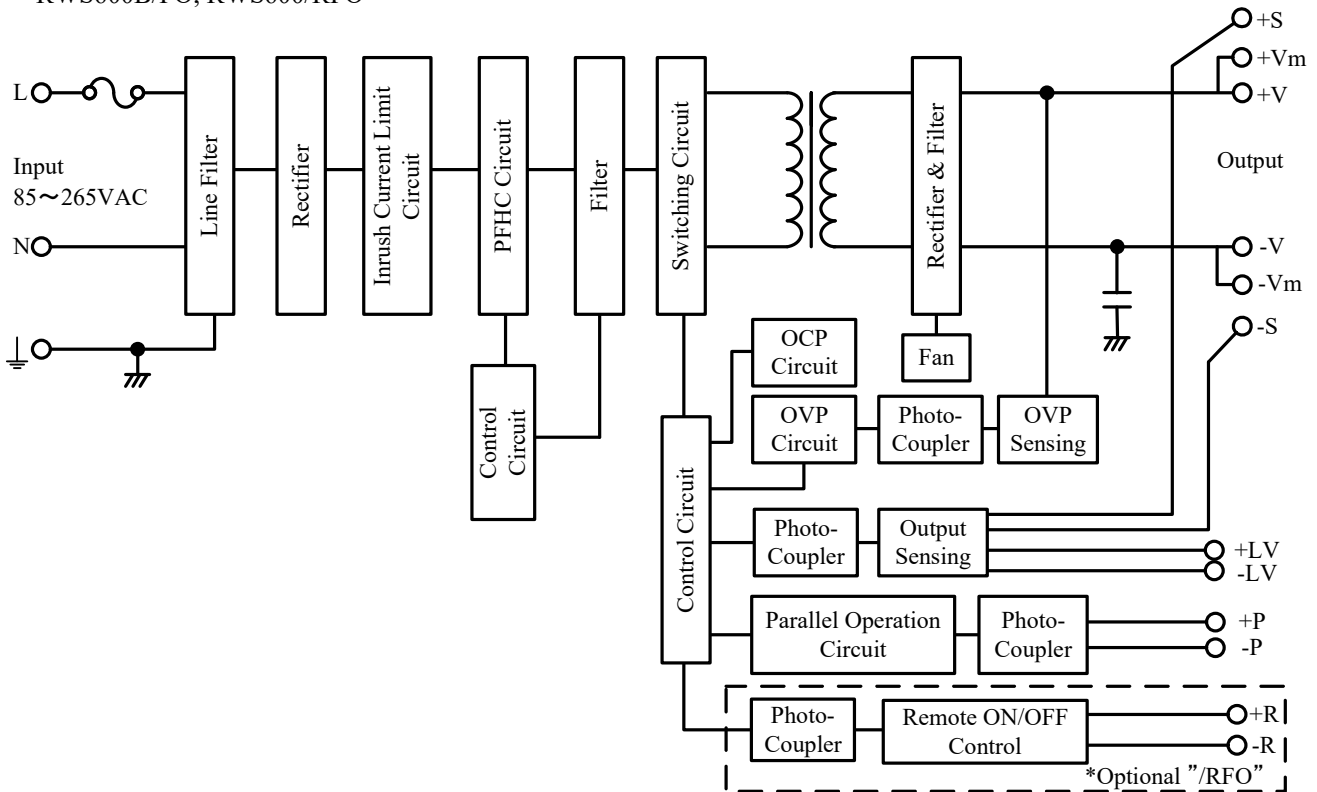


- Fuse rating 10A
- Circuit topology • Switching frequency
 Single-ended forward topology 120kHz
 PFHC circuit : Active filter 65kHz (fixed)

RWS600B, RWS600/R

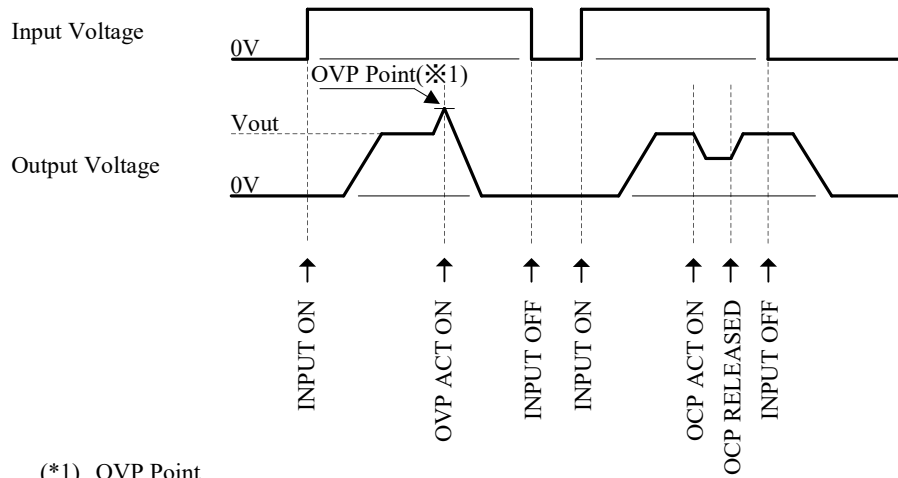


RWS600B/FO, RWS600/RFO



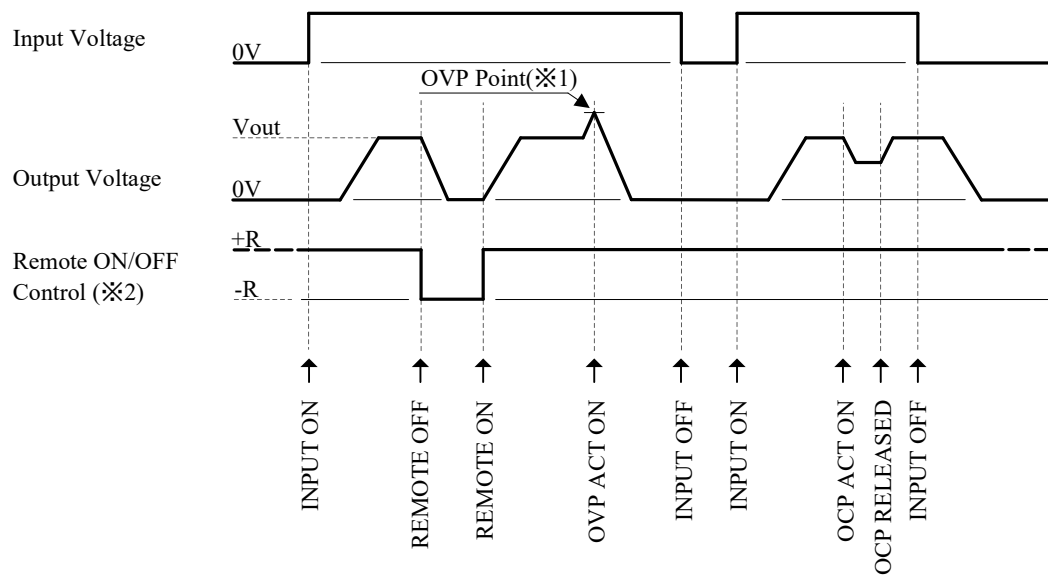
- Fuse rating 15A
- Circuit topology • Switching frequency
 Cascade forward topology 190kHz
 PFHC circuit : Active filter 50kHz-70kHz (spread)

4. Sequence Time Chart RWS50, RWS100B, RWS150B



(*1) OVP Point
5V - 24V : 120% - 140%
48V : 115% - 135%

RWS300B



(*1) OVP Point
5V - 36V : 120% - 140%
48V : 115% - 135%

(*2) Target option : /R

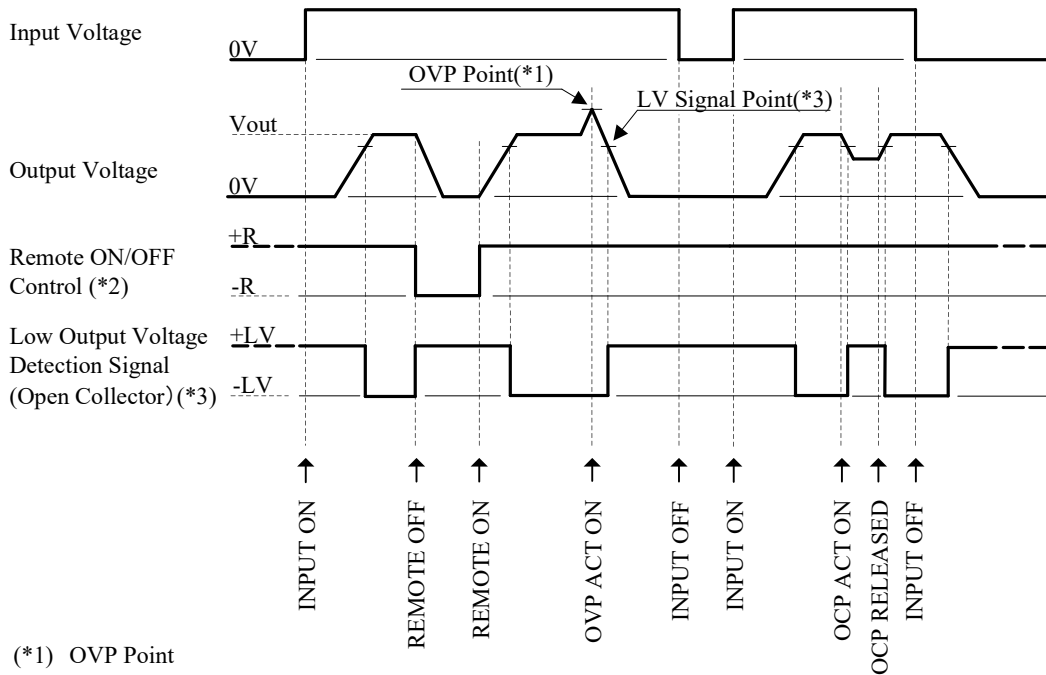
Level

Higher than 4.5V : Output on

Lower than 0.5V : Output off

This sequence is using external voltage.

RWS600B



(*1) OVP Point

5V - 36V : 120% - 140%
 48V : 115% - 135%

(*2) Target option : /R, /RFO
 Level

Higher than 4.5V : Output on
 Lower than 0.5V : Output off

This sequence is using external voltage.

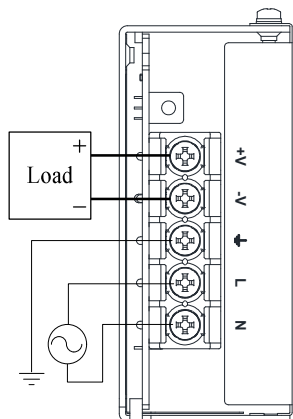
(*3) Target option : /FO, /RFO

5. Connecting method

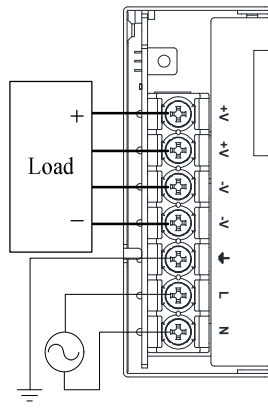
Pay attention to the input wiring. If it is connected to wrong terminal, the power supply will be damaged.

- Input must be off when making connections.
- Connect \perp terminal to earth (frame ground of the equipment etc.) by thick wire for safety and improvement of noise sensitivity.

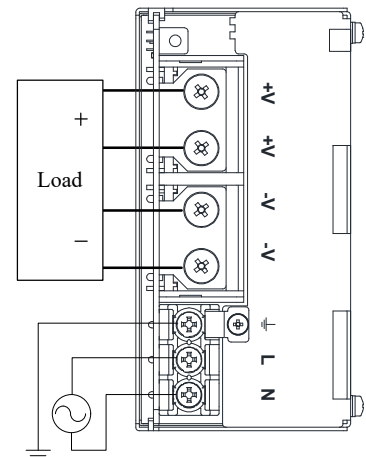
RWS50B, RWS100B, RWS150B



RWS300B



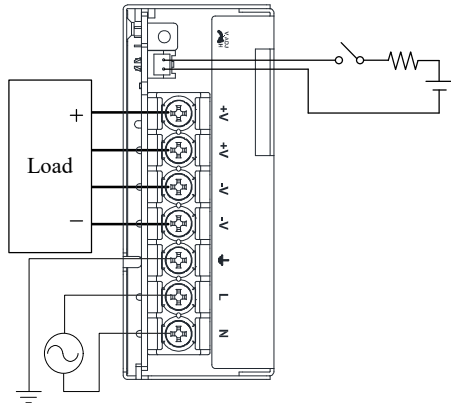
RWS600B



Recommended torque : RWS50B~RWS600B M3.5 screw 1.0N·m (10.2kgf·cm) ~ 1.6N·m (16.3kgf·cm)
 RWS600B M5 screw 2.2N·m (22.4kgf·cm) ~ 2.8N·m (28.6kgf·cm)

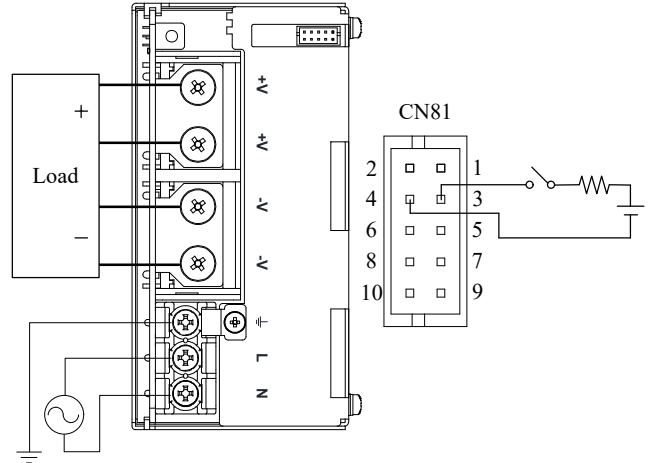
RWS300B/R

Connect external voltage between "+R" terminal and "-R" terminal for remote ON/OFF control. (ON/OFF control lines shall be twisted.)



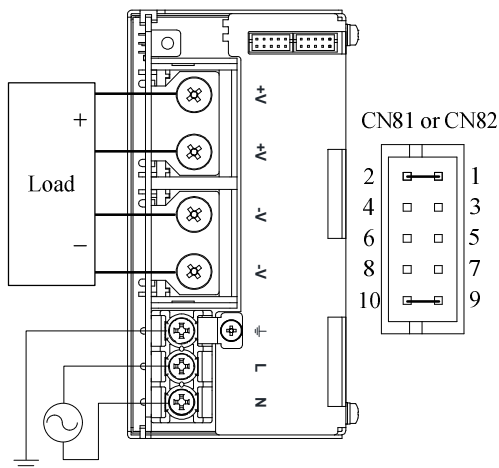
RWS600B/R

Connect external voltage between "+R" terminal (Pin No.3) and "-R" terminal (Pin No.4) for remote ON/OFF control. (ON/OFF control lines shall be twisted.)

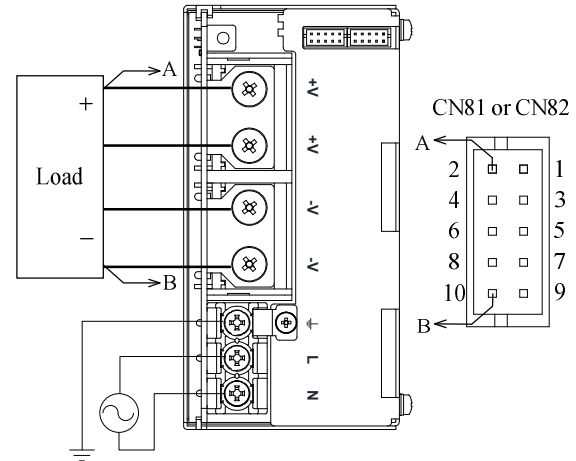


RWS600B/FO

- Basic connection (Local sensing)
 Connect "+S" terminal (Pin No.2) to "+Vm" terminal (Pin No.1), and "-S" terminal (Pin No.10) to "-Vm" terminal (Pin No.9) with the attached short pieces. (Short pieces are mounted at time of shipment.)

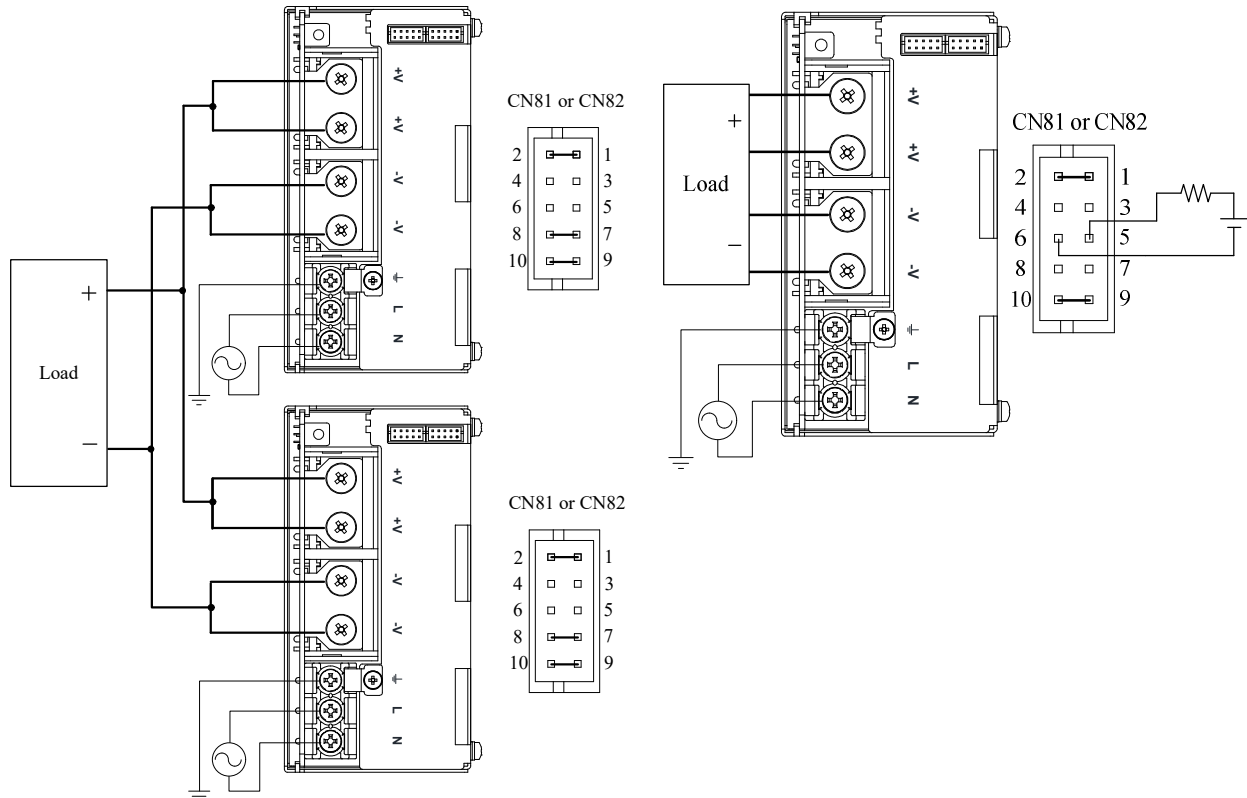


- Remote sensing connection
 - 1) Connect "+S" terminal (Pin No.2) to "+" output terminal of load with wires.
 - 2) Connect "-S" terminal (Pin No.10) to "-" output terminal of load with wires. (Sensing lines shall be twisted.)



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

- Parallel operation
 Connect "+P" terminal (Pin No.7) ~ "-P" terminal (Pin No.8) for parallel operation.
- LV signal output
 LV signal is open collector output.
 Use as shown below.
 (Signal lines shall be twisted.)



6. Explanation of Functions and Precautions

6-1. Input Voltage Range

Input voltage range is single phase 85-265VAC (47-63Hz) or 120-370VDC (RWS600B : 120-330VDC).

Input voltage, which is out of specification, might lead unit damage. For cases where conformance to various safeties required, described as 100-240VAC (50-60Hz).

Output derating is required for AC input voltage less than 110VAC.

Note :RWS-B series is able to withstand input of 300VAC for 5 seconds (No damage). Please note that to satisfy the electrical characteristics, the input voltage must be within 85-265VAC.

6-2. Output Voltage Range

Output voltage is set at the rated value. Output voltage within the range specified can be adjusted by V.ADJ trimmer. Output voltage range is within +15% / -10% (48V : $\pm 10\%$) of nominal output voltage.

Turning the trimmer clockwise, the output voltage will be increased. Take note when the output voltage is increased. excessively, over voltage protection (OVP) function may trigger and voltage will be shut down. Furthermore, when increasing the output voltage, reduce the output current as not to exceed the maximum output power.

When the trimmer turns quickly at no load condition, the output voltage might become unstable. To maintain the output voltage stable, flow the output current, or remove the input of power supply until the output be shut down, and then re-input. Please turn the trimmer slowly during the output voltage adjustment.

6-3. Inrush Current

Power thermistor or Thyristor is used for limiting the inrush current.

RWS50B, RWS100B, RWS150B, RWS300B

Power thermistor method is used for these models. Higher current will flow at higher ambient temperature or re-input condition. Please select input switch or external fuse carefully. The inrush current value specified in the specification is under cold start condition (at 25°C).

RWS600B

Thyristor method is used for RWS600B. Higher current may flow when input turn on interval is short.

First inrush current and second inrush current flow.

The inrush current value in the specification is first inrush current. Please select input switch and external fuse carefully.

6-4. Over Voltage Protection (OVP)

The OVP function is inverter shut down method and manual reset type. OVP function operates within 120-140% (48V : 115-135%) of nominal output voltage.

When OVP triggers, the output will be shut down. To reset OVP, remove the input of power supply for a few minutes, and then re-input. In addition, the setting value of OVP is fixed and not adjustable. Never apply higher voltage externally to the output terminal to avoid unit failure. In case of inductive load, put protective diode in series to the output power line.

6-5. Over Current Protection (OCP)

RWS50B : Fold back limit and Hiccup mode with automatic recovery.

RWS100B, RWS150B, RWS300B, RWS600B :

5V-15V : Constant current limit and hiccup with automatic recovery.

24V-48V : Constant current limit with automatic recovery.

OCP function operates when the output current exceeds 105% of maximum DC output current of specification.

The outputs will be automatically recovered when the overload condition is removed. Never operate the unit under over current or shorted conditions, which may lead unit damage. OCP setting is fixed and cannot be adjusted externally.

6-6. Over Temperature Shut Down (RWS300B, RWS600B)

Over temperature shut down function is provided.

When ambient or internal temperature rises abnormally, over temperature shut down function operates and output will be shut down.

After shut down, remove the input and cool it down to reset over temperature shut down, and then re-input.

Over temperature shut down function operates at out of the specification area.

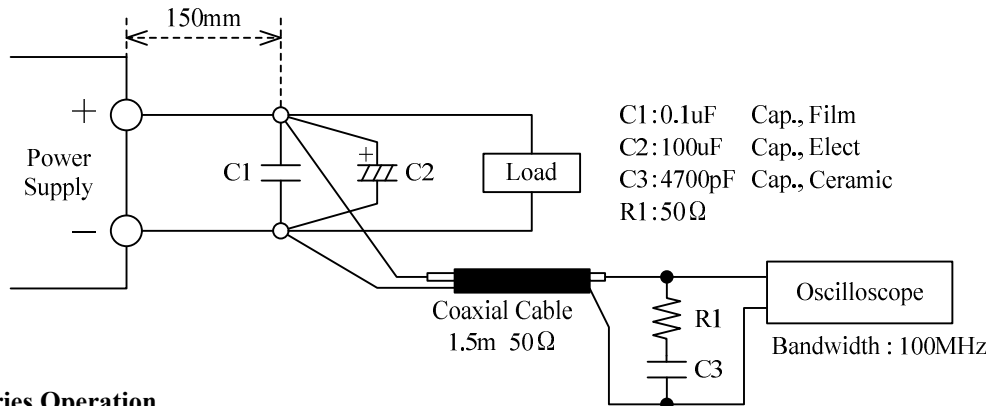
This function may not activate or cannot avoid power supply damage depending on the situation.

6-7. Output Ripple & Noise

The standard specification for maximum ripple value is measured according to measurement circuit specified by JEITA-RC9131B. 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.

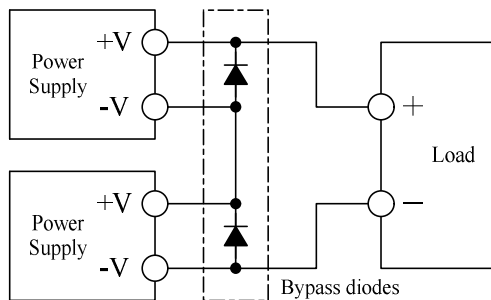
The output ripple cannot be measured accurately if the probe ground lead of oscilloscope is too long.



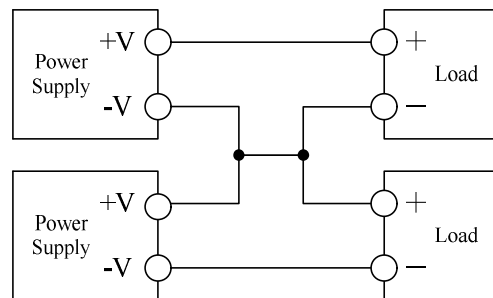
6-8. Series Operation

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

Method (A)



Method (B)



Note : In case of method (A), connect bypass diodes. If not, the unit might cause damage.

Please select a bypass diode with maximum forward current rating more than output load current.

And maximum reverse voltage must withstand each power supply output voltage.

RWS100B, RWS150B, RWS300B, RWS600B :

Series operation also can be used without bypass diode. But ensure that all units must be in operation.

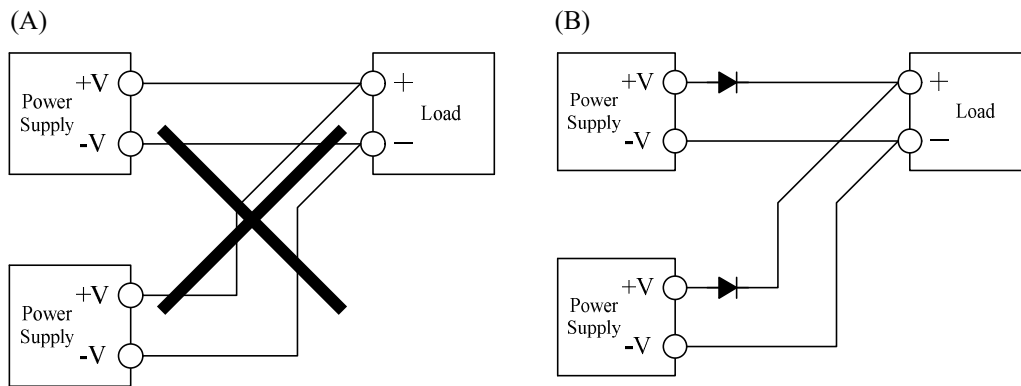
(Never use in condition that one of the unit is not operated.)

6-9. Parallel Operation
RWS50B-RWS600B

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

(B) Operation as a Backup System is acceptable.

1. Adjust the output voltage higher by the value of forward voltage drop (VF) of the diode.
2. Adjust each power supply output to same voltage.
3. Output voltage and output power should be used within specifications.
4. Use blocking diode to prevent reverse current. Diode current rating must be more than output load current.

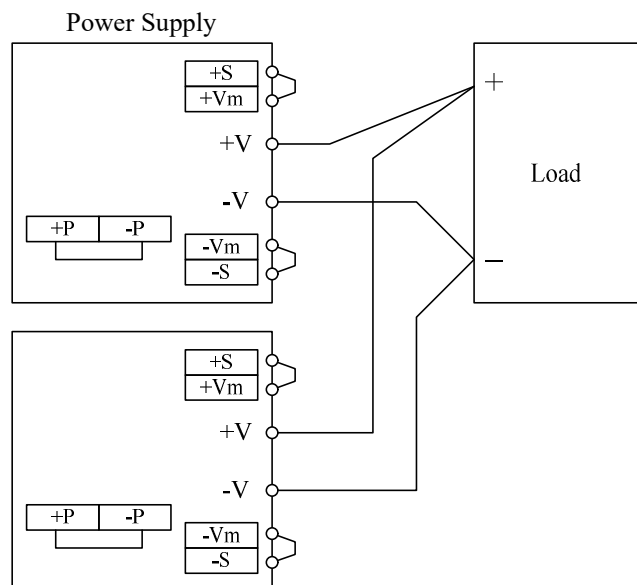


RWS600B/FO, RWS600B/RFO

Operation to increase the Output Current is provided on option model /FO and /RFO.

By connecting +P terminal (Pin No.7) and -P terminal (Pin No.8), parallel operation is possible.

1. Before connect, adjust the output voltage of each power supply.
Each voltage must be within 1% of rated output voltage.
If not, output current will not be balanced and unit might cause damage.
2. Connection wires between power supply and load should be same type and same length.
3. Use the maximum output current value of parallel operation as shown below.
[Maximum output current of parallel operation]
 \leq [Rated output current of each power supply] x [Number of unit] x 85%
Output current of each power supply must be within output derating.
4. Parallel connection is acceptable up to 5 units maximum.
5. The purpose of parallel operation is to increase the static maximum output current.
There is a possibility that output voltage dips at dynamic load change.
6. There might be a step in the output rise waveform during parallel operation.

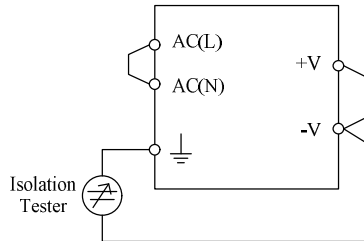


6-10. Isolation Test

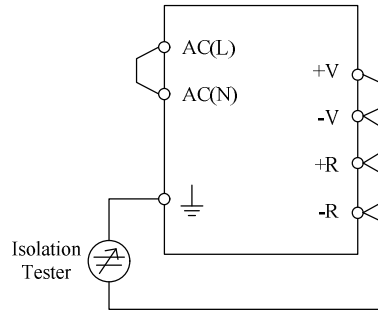
Isolation resistance between Output - \perp terminal is more than 100M Ω at 500VDC. For safety operation, voltage setting of DC isolation tester must be done before the test. Ensure that the unit is fully discharged after the test.

- Output - \perp terminal : 500VDC More than 100M Ω

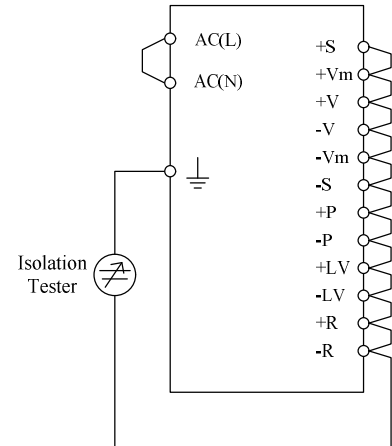
(A) RWS50B, RWS100B, RWS150B



(B) RWS300B



(C) RWS600B

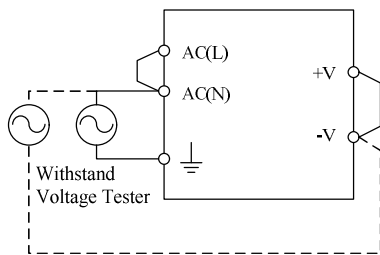


6-11. Withstand Voltage

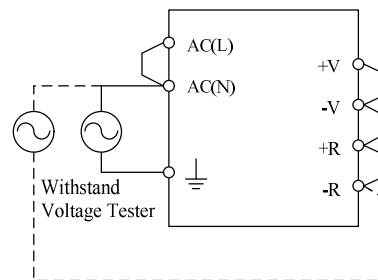
This series is designed to withstand 3.0kVAC between input and output, 2.0kVAC between input and \perp terminal and 500VAC between output and \perp terminal each for 1 minute. When testing withstand voltage, set current limit of withstand voltage test equipment at 20mA (Output - \perp terminal : 100mA). 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 switch on and off timing. Connect input and output as follows.

- Input - Output (dotted line) : 3.0kVAC, 1min (20mA)
- Input - \perp terminal (solid line) : 2.0kVAC, 1min (20mA)

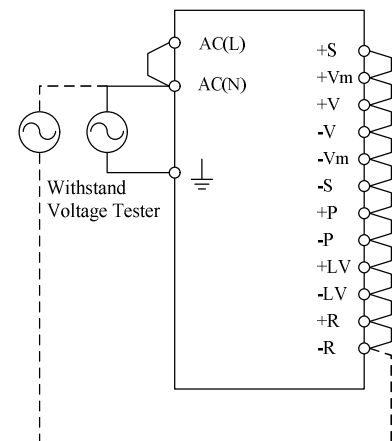
(A) RWS50B, RWS100B, RWS150B



(B) RWS300B

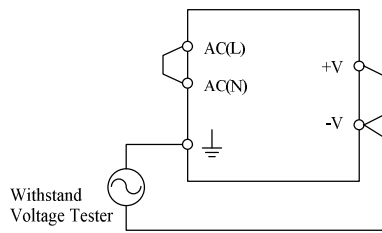


(C) RWS600B

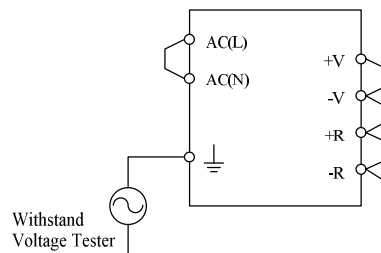


■ Output - \perp terminal : 500VAC, 1min (100mA)

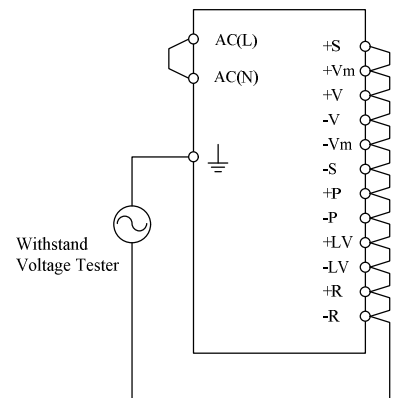
(A) RWS50B, RWS100B, RWS150B



(B) RWS300B



(C) RWS600B



Note 1 : This product have monolithic ceramic capacitor in secondary circuit to \perp terminal.

Some of the withstand voltage tester may generate high voltage at the matching with monolithic ceramic capacitor and may cause the unit damage.

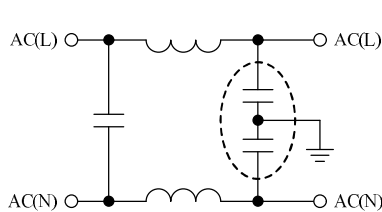
So, please check the waveform of applied voltage.

Note 2 : In case of using external noise filter, capacitance between "Input and \perp terminal" might be increased.

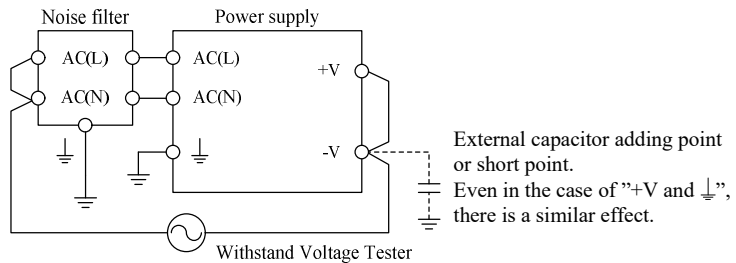
When testing withstand voltage between "Input and Output", there is a possibility exceeding withstand voltage between "Output and \perp terminal" (500VAC). Please check the voltage between

"Output and \perp terminal". If the voltage exceeding withstand voltage, please add external capacitor to "Output and \perp ". It can decrease the voltage.

On the other hand, no need to check the voltage in case of "Output and \perp terminal" is shorted.



The example of noise filter circuit that may increasing capacitance value between "Input and \perp terminal".
 (Capacitance value dashed line is added.)



External capacitor adding point or short point.
 Even in the case of "+V and \perp ", there is a similar effect.

6-12. Remote Sensing (+S, -S terminal) (RWS600B Option)

Remote Sensing function is provided on option model /FO and /RFO.

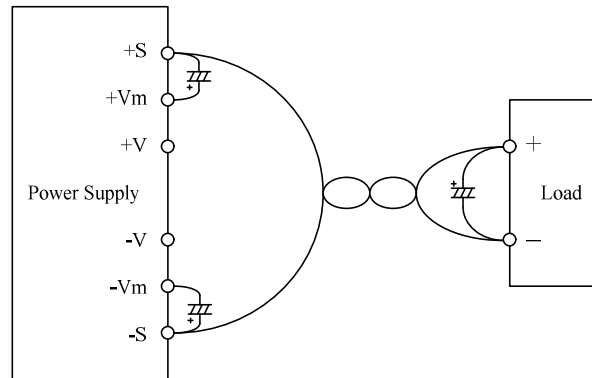
This function compensates voltage drop of wiring from output terminals to load terminals. Connect "+S" terminal to "+" terminal of load and "-S" terminal to "-" terminal of load with sensing wires.

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 recommended to connect electrolytic capacitor in the following locations:

- 1) Across the load terminal,
- 2) Between "+S" terminal and "+Vm" terminal,
- 3) Between "-S" terminal and "-Vm" terminal.

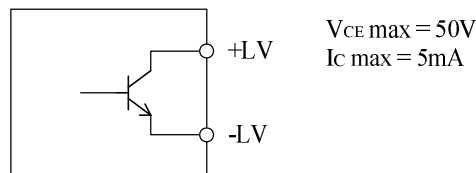
Connect "+S" terminal to "+Vm" terminal, "-S" terminal to "-Vm" terminal with short pieces when remote sensing function is not used. If disconnected, OVP may be triggered.



6-13. Low Output Voltage Detection Signal (LV Signal) (RWS600B Option)

Low output voltage detection signal function is provided on option model /FO and /RFO. LV signal will turn "High" level to indicate the abnormal status when the output voltage drop by either brownout of the input voltage, OCP or OVP operation. The LV signal is isolated from input and output by a photo-coupler. LV signal is open collector method as shown in below. This circuit is in the secondary side of the power supply unit.

Never connect to primary side.



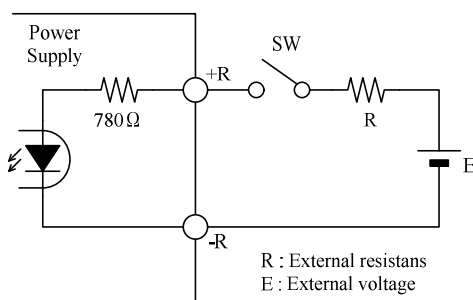
6-14. Remote ON/OFF Control (RWS300B, RWS600B Option)

Remote ON/OFF control function is provided on option model /R and /RFO.

Using this function allows the user to turn the output on and off without having to turn the AC input off and on.

It is controlled by the external voltage applied to +R and -R. This circuit is in the secondary side of the power supply unit.

Never connect to primary side.



+R & -R terminal condition	Output condition	Fan condition
SW ON (Higher than 4.5V)	ON	Operate
SW OFF (Lower than 0.5V)	OFF	Not Operate

External voltage : E	External resistance : R
4.5 ~ 12.5VDC	No required
12.5 ~ 24.5VDC	1.5kΩ

6-15. DIN rail mountable (Option of RWS50B, RWS100B, RWS150B, RWS300B)

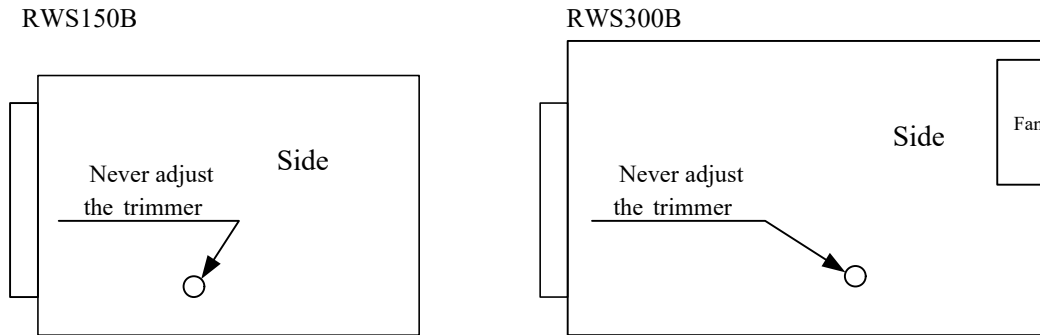
DIN rail mountable product is provided on option model /DIN.

Vibration specification is different from standard model.

Vibration specification of /DIN : At no operating, 10 - 55Hz (Sweep for 1min) 9.8m/s² Constant, X,Y,Z 1hour each.

6-16. Unadjustable trimmer

Absolutely never adjust the trimmer shown below. It might cause power supply damage, if the trimmer is turned.

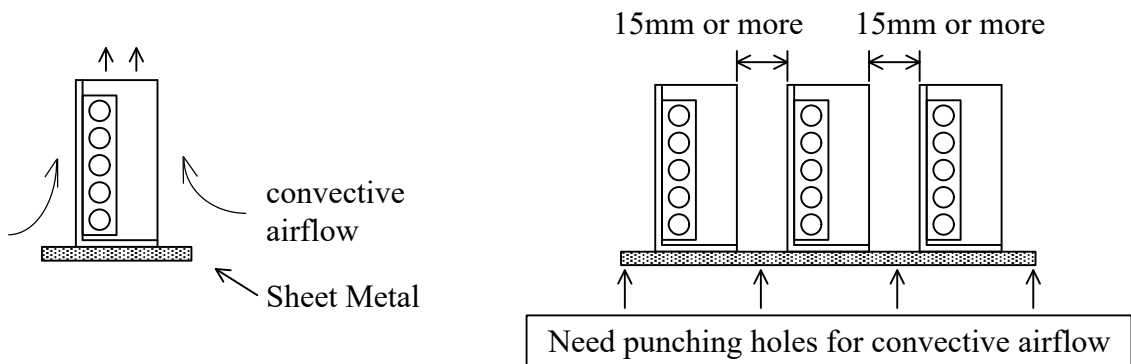


7. Mounting Method

7-1. Mounting Method

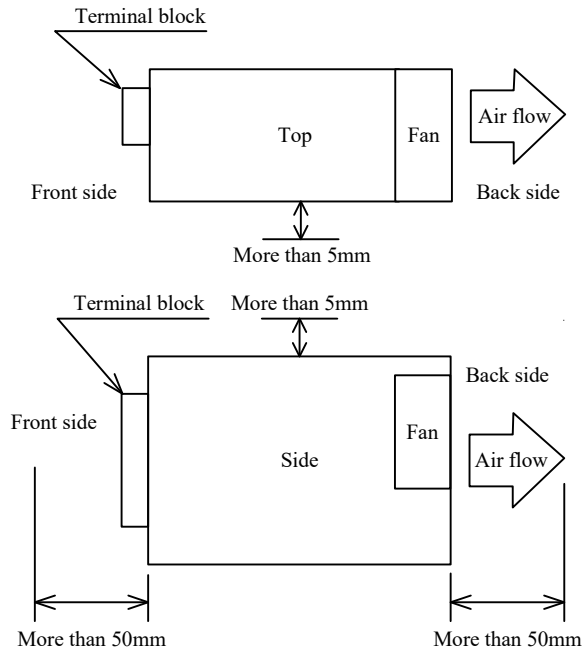
RWS50B, RWS100B, RWS150B

- (1) These models are convection cooling type power supply. As consideration for the heat radiation, keep a space more than 15mm between the power supply and the peripheral parts. Also when using multiple units, keep a space more than 15mm from each other. Option /DIN are also same.
- (2) The maximum allowable penetration of mounting screws is 6mm.
- (3) Recommended torque for mounting screw
RWS50B, RWS100B, RWS150B (M3 screw) : 0.49N·m (5.0 kgf·cm)



RWS300B, RWS600B

- (1) These models are forced air cooling type power supply. This power supply has ventilating holes. Keep a space more than 50mm between front side and back side of the power supply from the peripheral parts. Also keep a space more than 5mm between other surfaces and the peripheral parts. Never use in the dusty environment.



- (2) The maximum allowable penetration of mounting screws is 6mm.
 (3) Recommended torque for mounting screw
 RWS300B(M3screw) : 0.49N·m (5.0kgf·cm)
 RWS600B(M4 screw) : 1.27N·m (13.0kgf·cm)

7-2. Output Derating according to the Mounting Directions

The standard mounting is direction (A). Direction (B), (C) and (D) are also possible. Please contact us for other mounting directions.

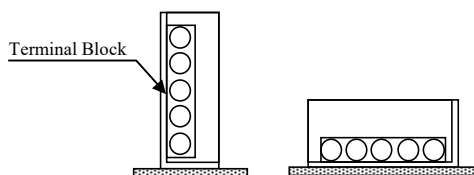
Never use as mounting direction (E) and (F) shown below.

Refer to the output derating below, load (%) is percent of maximum output current value in a rated output voltage.

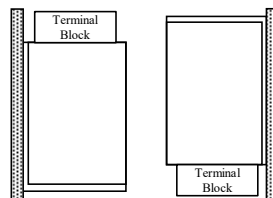
■ Mounting direction

RWS50B, RWS100B, RWS150B

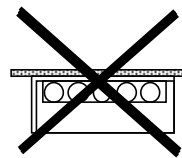
(A) Standard Mounting (B)



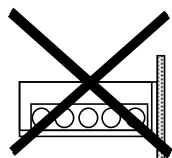
(C) (D)



(E) Not Possible

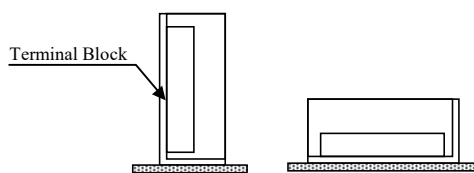


(F) Not Possible

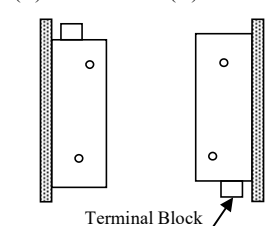


RWS300B, RWS600B

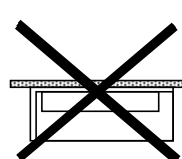
(A) Standard Mounting (B)



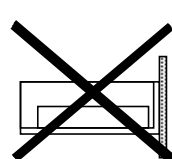
(C) (D)



(E) Not Possible

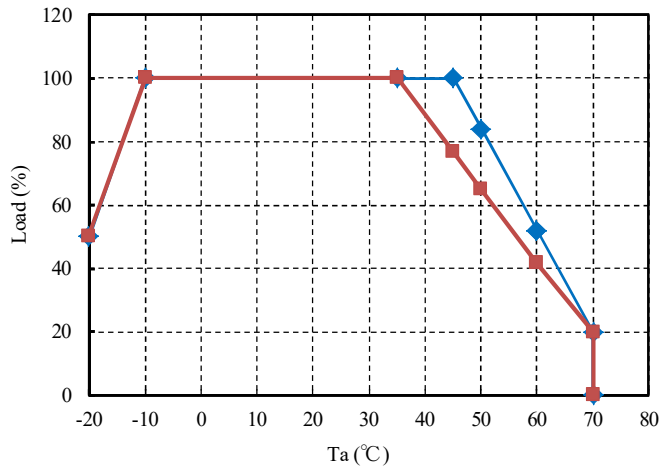


(F) Not Possible



■ Output Derating

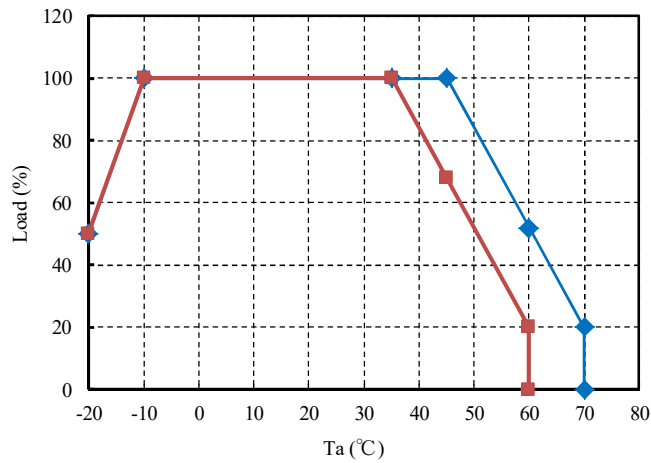
RWS50B



◆ Mounting (A)
 ■ Mousing (B),(C),(D)

Ta (°C)	Load (%)	
	Mounting (A)	Mousing (B),(C),(D)
-20	50	50
-10 - +35	100	100
45	100	77
50	84	65
60	52	42
70	20	20

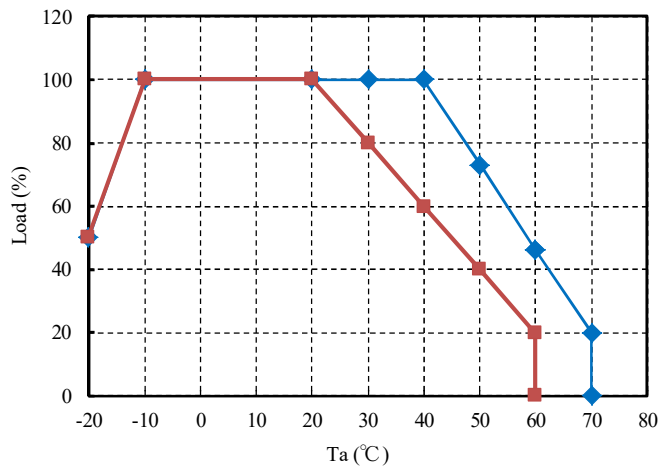
RWS100B



◆ Mounting (A)
 ■ Mousing (B),(C),(D)

Ta (°C)	Load (%)	
	Mounting (A)	Mousing (B),(C),(D)
-20	50	50
-10 - +35	100	100
45	100	68
60	52	20
70	20	-

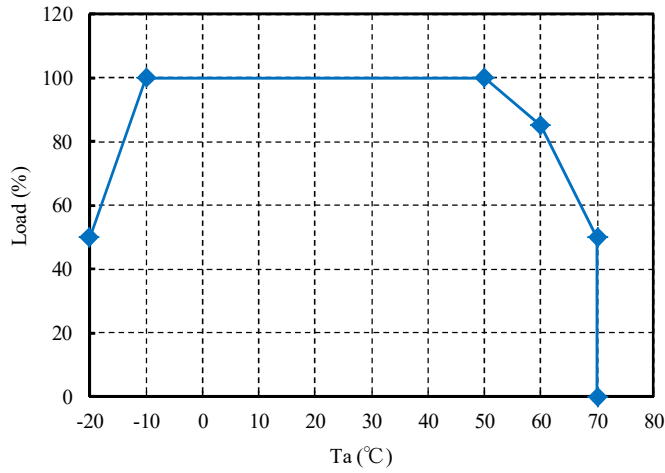
RWS150B



◆ Mounting (A)
 ■ Mousing (B),(C),(D)

Ta (°C)	Load (%)	
	Mounting (A)	Mousing (B),(C),(D)
-20	50	50
-10 - +20	100	100
30	100	80
40	100	60
50	73	40
60	46	20
70	20	-

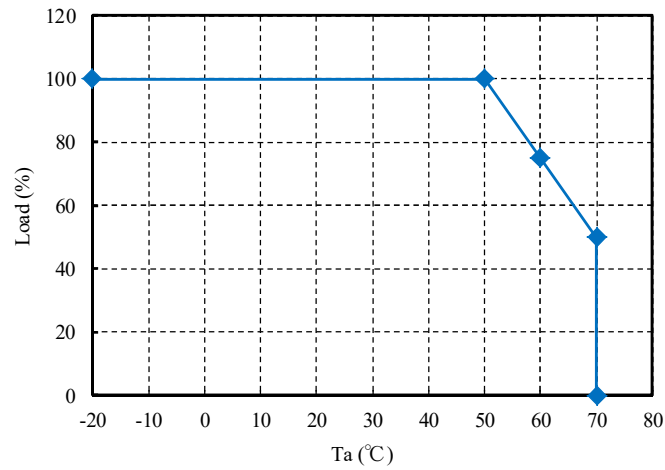
RWS300B



—◆— Mounting (A)-(D)

Ta (°C)	Load (%)
	Mounting (A)-(D)
-20	50
-10 - +50	100
60	85
70	50

RWS600B

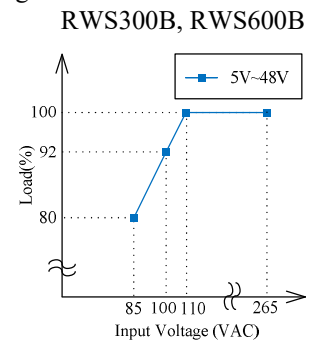
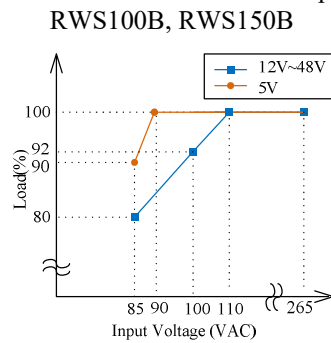
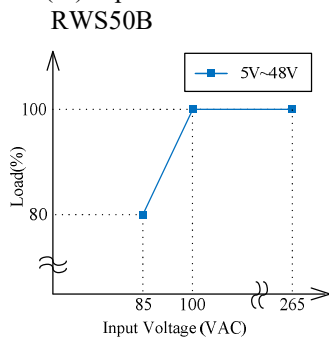


—◆— Mounting (A)-(D)

Ta (°C)	Load (%)
	Mounting (A)-(D)
-20 - +50	100
60	75
70	50

7-3. Output Derating according to the Input Voltage

Load (%) is percent of maximum output current value in a rated output voltage.



8. Wiring Method

- (1) The output load line and input line shall be separated, and use all lines as thick and short as possible to make lower impedance. The output load line and input line shall be twisted or use shielded wire to improve noise sensitivity.
- (2) Remote sensing lines and remote ON/OFF control lines shall be twisted and separated from the output lines.
- (3) Noise can be eliminated by attaching a capacitor to the load terminals.
- (4) The recommended wire type, torque and crimp-type terminal :

MODEL	Recommended Wire	Recommended torque	Recommended crimp-type terminal		
			D (MAX)	t (MAX)	Mounting pieces (MAX)
RWS50B RWS100B RWS150B	AWG12-22	M3.5 Screws $1.0\text{N} \cdot \text{m}(10.2\text{kgf} \cdot \text{cm}) \sim 1.6\text{N} \cdot \text{m}(16.3\text{kgf} \cdot \text{cm})$	8.1mm	1.0mm	1 piece
		0.8mm		2 pieces	
RWS300B	-	Output terminal M3.5 Screws $1.0\text{N} \cdot \text{m}(10.2\text{kgf} \cdot \text{cm}) \sim 1.6\text{N} \cdot \text{m}(16.3\text{kgf} \cdot \text{cm})$		1.0mm	1 piece
				0.8mm	2 pieces
	AWG12-22	Other terminal M3.5 Screws $1.0\text{N} \cdot \text{m}(10.2\text{kgf} \cdot \text{cm}) \sim 1.6\text{N} \cdot \text{m}(16.3\text{kgf} \cdot \text{cm})$	1.0mm	1 piece	
			0.8mm	2 pieces	
RWS600B	-	Output terminal M5 Screws $2.2\text{N} \cdot \text{m}(22.4\text{kgf} \cdot \text{cm}) \sim 2.8\text{N} \cdot \text{m}(28.6\text{kgf} \cdot \text{cm})$	-		
	AWG12-22	Other terminal M3.5 Screws $1.0\text{N} \cdot \text{m}(10.2\text{kgf} \cdot \text{cm}) \sim 1.6\text{N} \cdot \text{m}(16.3\text{kgf} \cdot \text{cm})$	8.1mm	1.0mm	1 piece
				0.8mm	2 pieces

Note 1 : When using separate loads, use of two pcs. of 0.8mm thick crimp-type terminal is recommended.

Note 2 : For recommended wire type, refer to wire maker recommended allowable current and voltage drop.

Especially for 5V models, output current is large.

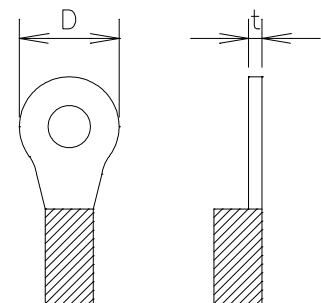
Thick diameter wire is recommended.

Recommended wire type and crimp-type terminal for RWS600B

vary depending on use conditions. Choice most

appropriate wire type and crimp-type terminal by refer to wire

maker recommended allowable current and voltage drop.

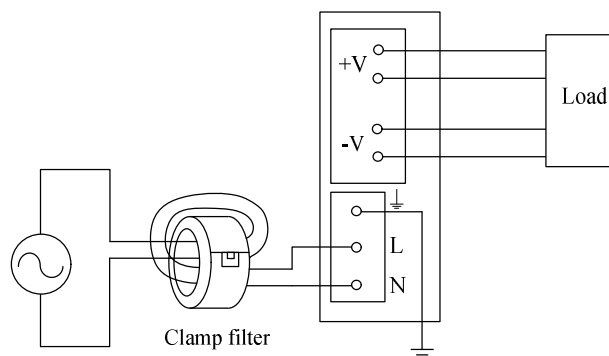


(5) Radiated Emission (RWS600B)

It is recommended to use the clamp filter to meet EN55011/EN5502-B, FCC-ClassB, VCCI-B.

The unit might meet the standard without using the clamp filter depend on wiring and mounting unit installed conditions (for example, by using other external input filter or using at light load etc.).

Evaluate well by the system is recommended.



Note : Recommended clamp filter is ZCAT3035-1330 (TDK). Winding input wire around the clamp filter 2 turn.

9. The life expectancy

The life of the power supply depends on the life of the built-in aluminum electrolytic capacitor being used and fan mounted products will depend on fan life. Each life is described in reliability data.

The life of the aluminum electrolytic capacitor varies depending on the method of mounting the power supply, the load current, and the ambient temperature. Please refer to "Electrolytic Capacitor Lifetime".

The life of the fan depends on the fan intake or exhaust temperature. Please refer to "Fan Life Expectancy".

Please do not use the product which passed over the life expectancy. There is a risk of unexpected output shutdown and specifications may not be satisfied.

Please contact us for maintenance or exchange the product which passed over the life expectancy.

10. External Fuse Rating

Refer to the following fuse rating when selecting the external input fuse.

Surge current flows when input turn on. Use slow-blow fuse or time-lag fuse. Fast-blow fuse can not be used.

Fuse rating is specified by inrush current value at input turn on.

Do not select the fuse according to actual input current (rms.) values.

RWS50B, RWS100B	: 3.15A
RWS150B	: 5A
RWS300B	: 10A
RWS600B	: 15A

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

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

- (1) Check if the rated input voltage is connected.
- (2) Check if the wiring of input and output is correct.
- (3) Check if the wire size is not too thin.
- (4) Check if the output voltage control (V.ADJ) is properly adjusted.
- (5) Check if the Remote ON/OFF control connector is not opened, when use Remote ON/OFF control function.
- (6) Check if the output current and output power does not over specifications.
- (7) Audible noise can be heard when input voltage waveform is not sinusoidal wave.
- (8) Audible noise can be heard during Dynamic-Load operation.
- (9) Ensure that large capacitor is not connected on the output side.

Please use within maximum capacitance shown below.

If connecting more than the following capacitance value is required, please contact us for details.

MODEL	Maximum external capacitance			
	5V	12V	24V	48V
RWS50B	10,000uF		3,300uF	400uF

MODEL	Maximum external capacitance	
	5V ~ 48V	
RWS100B, RWS150B RWS300B, RWS600B	10,000uF	

- (10)RWS300B, RWS600 :

The built-in fan speed is reduced or stop at light load (about 5% or less of rated output current).

The built-in fan is stopped due to output shut down. (Such as OVP or ON/OFF control, etc.)

12. Warranty Period

This product is warranted for a period of 5 years from the date of shipment.

For damages occurring at normal operation within this warranty period, repair is free of charge.

13. CE MARKING/UKCA MARKING

CE MARKING

CE Marking, when applied to a product or packing material for a product covered by this handbook, indicates compliance with the Low Voltage Directive, EMC Directive and RoHS Directive.

UKCA MARKING

UKCA Marking, when applied to a product or packing material for a product covered by this handbook, indicates compliance with the Electrical Equipment (Safety) Regulations, Electromagnetic Compatibility Regulations and Restriction of the Use of Certain Hazardous Substances in Electrical & Electronic Equipment Regulations.