

LWT 15H-50H Series

Instruction Manual

BEFORE USING THE POWER SUPPLY UNIT

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.
- There are cases where high voltage charge remains inside the product. 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 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 dis-assembled.
- 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.

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

- 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 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.

 **NOTE**

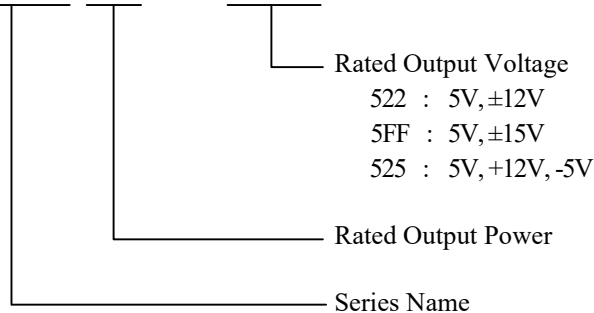
- Take note that traces of sheet metal processing be left in our power supplies.
- When disposing product, follow disposal laws of each municipality.
- Published EMI (CE, RE) or immunity is the result when measured in our standard measurement conditions and might not satisfy specification when mounted 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 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%RH
Please 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 aluminum 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 : CH1 Minimum load, CH2/CH3 No load
Ambient temperature : Normal temperature
Time : 30 minutes or more

1. Model name identification method

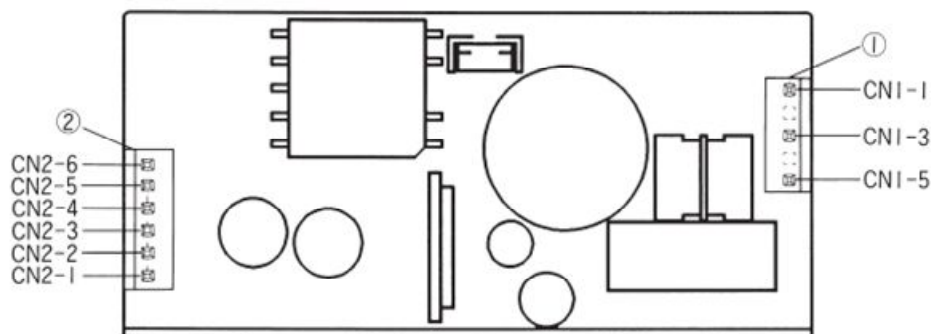
LWT 15H - 522



2. Terminal Explanation

- Use input/output connector (housing) attached.
- Input voltage terminal can use as is AC100V or AC200V without switching by connecting it between CN1-3 and CN1-5. (Fuse is built in to CN1-5 pin side.)
- The output terminals CN2-6 and CN2-7, CN2-4 and CN2-5 of LWT30H and LWT50H are short-circuited internally. The output current per terminal is less than 5A, so if you need more current, please use CN2-6 and CN2-7, CN2-4 and CN2-5 at the same time.

LWT15H



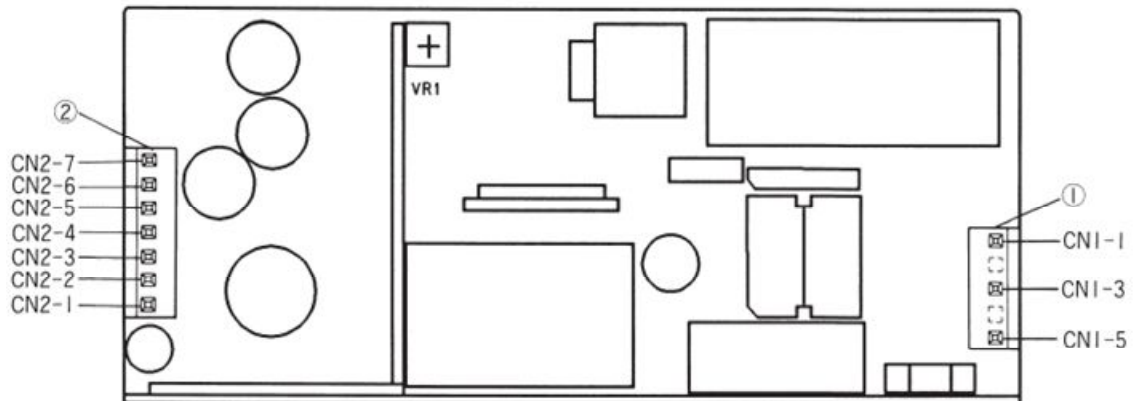
① CN1 (Input terminal)

- CN1-1 Frame Ground terminal (⊥) Connect to Earth
- CN1-3 85-265VAC Input terminal (N : Neutral line)
- CN1-5 85-265VAC Input terminal (H : Hot line (Fuse in line))

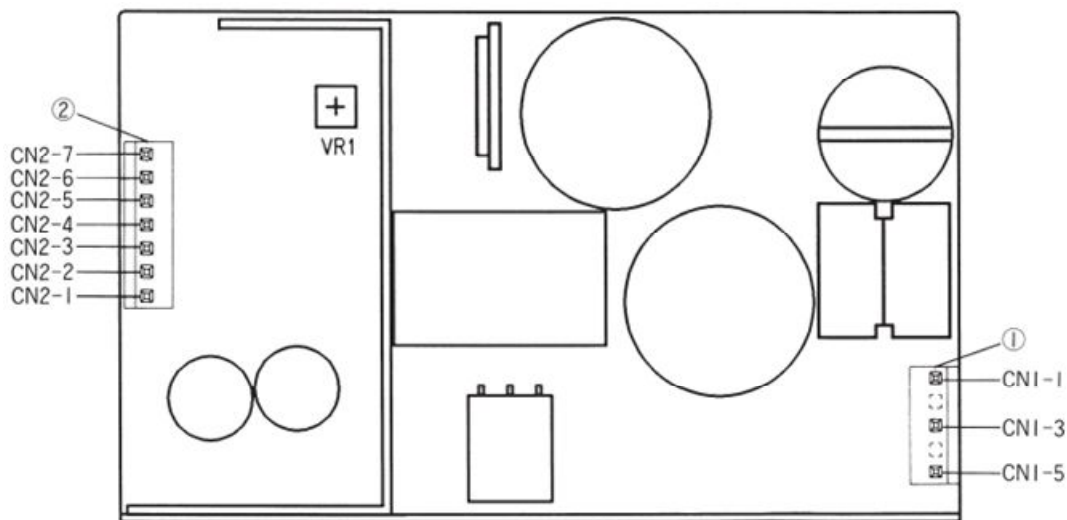
② CN2 (Output terminal)

- CN2-6 CH1 Ground terminal (G1) G1 is isolated from G2.
- CN2-5 CH1 (+5V) Output terminal
- CN2-4 CH3 (-□V) Output terminal
- CN2-2, 3 CH2, CH3 Ground terminal (G2) G2 is isolated from G1.
- CN2-1 CH2 (-□V) Output terminal

LWT30H



LWT50H



LWT30H, LWT50H

① CN1 (Input terminal)

- CN1-1 Frame Ground terminal (\perp) Connect to Earth
- CN1-3 85-265VAC Input terminal (N : Neutral line)
- CN1-5 85-265VAC Input terminal (H : Hot line (Fuse in line))

② CN2 (Output terminal)

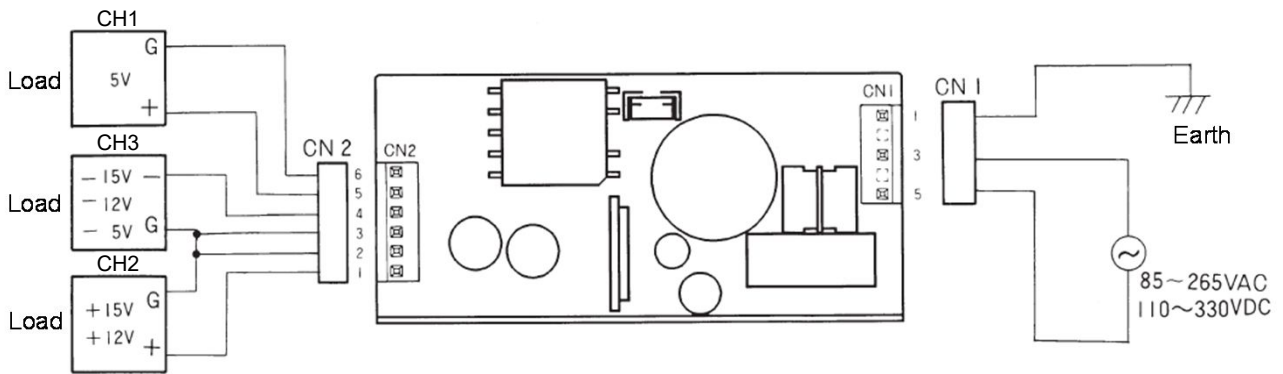
- CN2-6, 7 CH1 Ground terminal (G1) G1 is isolated from G2.
- CN2-4, 5 CH1 (+5V) Output terminal
- CN2-3 CH3 (-□V) Output terminal
- CN2-2 CH2, CH3 Ground terminal (G2) G2 is isolated from G1.
- CN2-1 CH2 (-□V) Output terminal

3. Connecting method

Pay attention to the input wiring. If it is connected to wrong terminal, the product 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.
- Use recommended crimping tool.

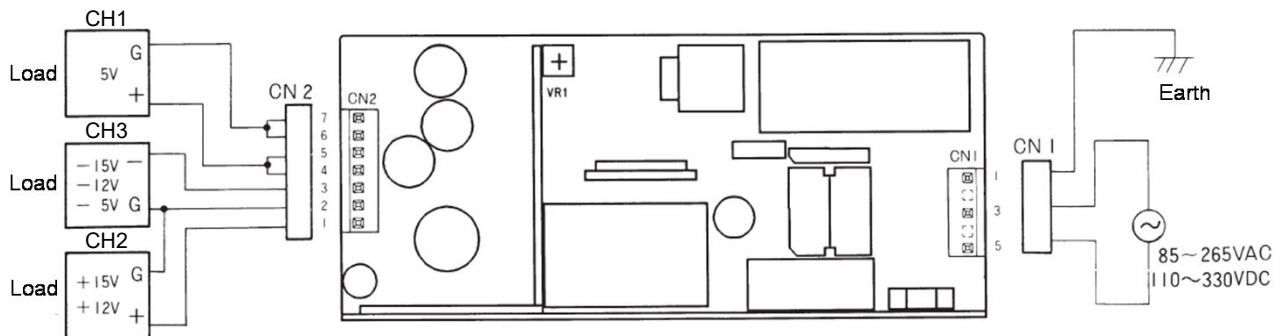
LWT15H



	Connector	Housing	Terminal Pin	Maker
Input (CN1)	B3P5-VH	VHR-5N	SVH-21T-P1.1	JST
Output (CN2)	B6P-VH	VHR-6N		

Hand Crimping Tool : YC-160R (JST)

LWT30H, LWT50H

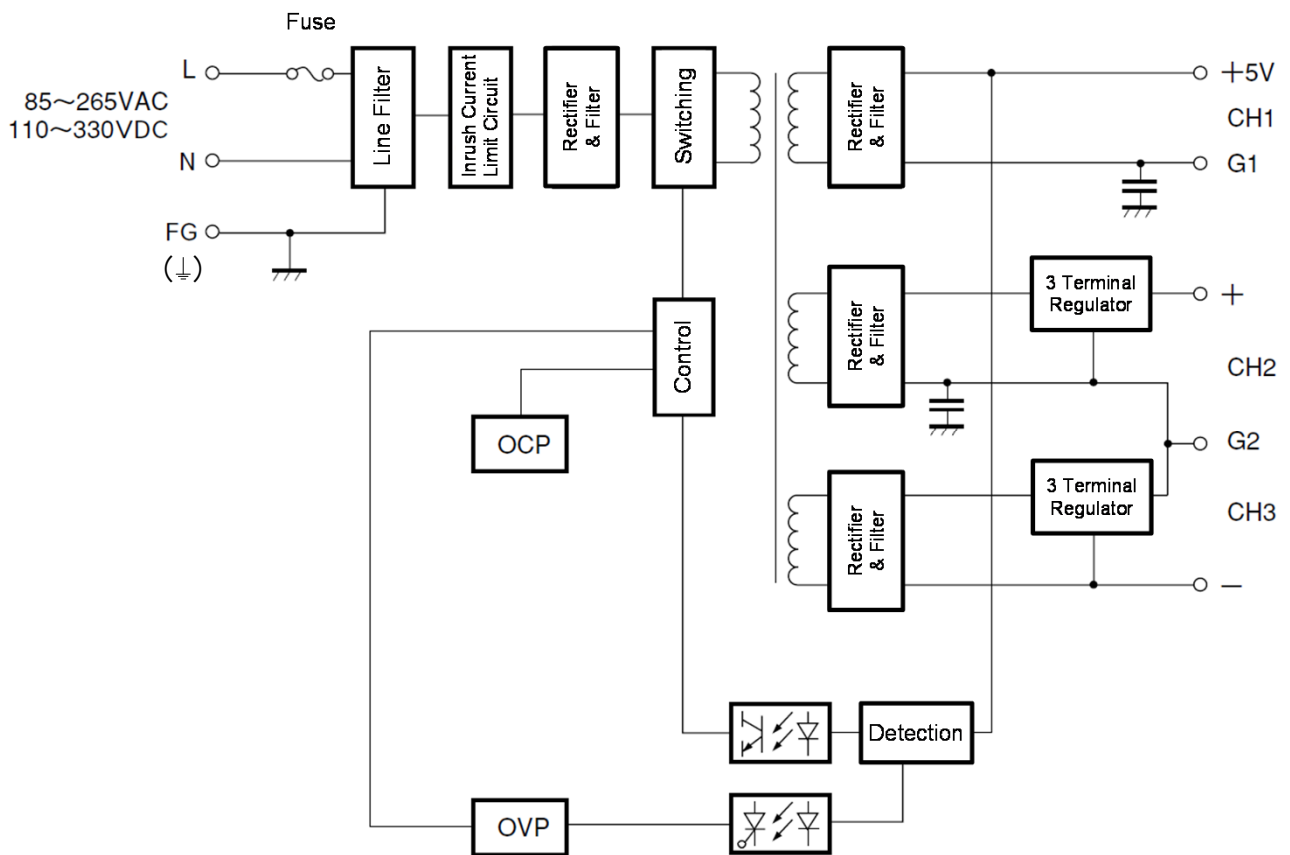


	Connector	Housing	Terminal Pin	Maker
Input (CN1)	B3P5-VH	VHR-5N	SVH-21T-P1.1	JST
Output (CN2)	B7P-VH	VHR-7N		

Hand Crimping Tool : YC-160R (JST)

4. Block Diagram

LWT15H, LWT30H, LWT50H



Circuit topology, switching frequency
 Flyback topology 110kHz (fixed)

Fuse rating :
 LWT15H : 2.5A
 LWT30H, LWT50H : 3.15A

5. Explanation of Functions and Precautions

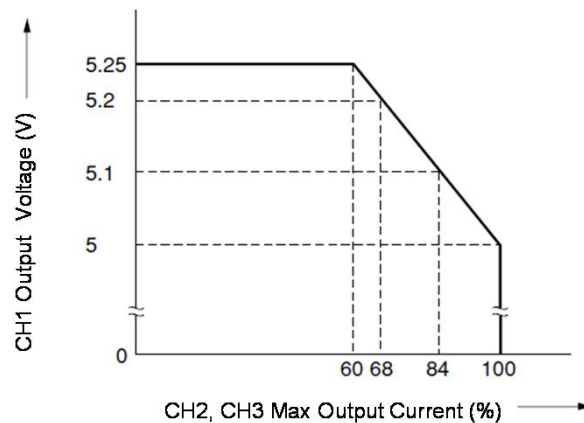
5-1. Output Voltage Range

Output voltage within the range of 5 – 5.25V can be adjusted by V.ADJ trimmer (VR1) only CH1(5V).

Turning the trimmer clockwise, the output voltage of CH1 will be increased.

However, when CH1 is used in excess of 5V, the maximum output current of CH2, CH3 are limited to the values shown in the specifications. The output voltage of CH2, CH3 is fixed, and the output voltage cannot be changed from the outside.

The maximum output power of CH1 and the total maximum output power of all CHs is not changed. Also, when the output voltage is increased, reduce the output current to the value specified by the maximum output power.



Example : LWT15H-522

CH1 Output		CH2 Output		CH3 Output		Total maximum output power
Voltage (Adjusted)	Maximum output power	Voltage (Fixed)	Maximum output current	Voltage (Fixed)	Maximum output current	
5V	15W	+12V	0.6A	-12V	0.4A	17W
5.1V			0.5A		0.33A	
5.2V			0.4A		0.27A	
5.25V			0.36A		0.24A	

5-2. Over Current Protection (OCP)

LWT-H series has OCP function with each channel, the outputs will be automatically recovered when the overload condition is removed. OCP setting is fixed and cannot be adjusted externally.

Never operate the unit under over current or output shorted conditions more than 30 seconds, which may lead unit damage.

5-3. Over Voltage Protection (OVP)

LWT-H series has OVP function. When OVP senses output voltage of CH1(5V) and reaches OVP function operating point, the output of all channels will be shut down.

To reset OVP, remove the input of the product for a few minutes, and then re-input.

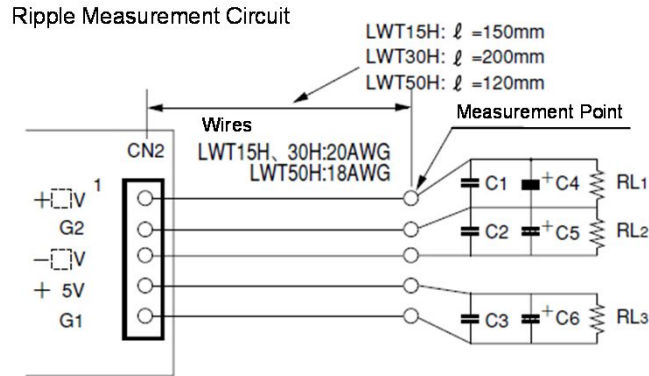
In addition, the setting value of OVP is fixed and not adjustable.

5-4. Output Ripple & Noise

The standard specification for maximum ripple value is measured according to measurement circuit specified. 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.

Also, CH1(5V) is specified the value of minimum current, be sure to connect the load more than specified.



	LWT15H	LWT30H	LWT50H
C1, C2, C3 : Film Capacitor	0.1uF	0.1uF	0.1uF
C4 : Electrolytic Capacitor	47uF	100uF	220uF
C5 : Electrolytic Capacitor	47uF	47uF	100uF
C6 : Electrolytic Capacitor	470uF	470uF	1000uF

5-5. Inrush Current

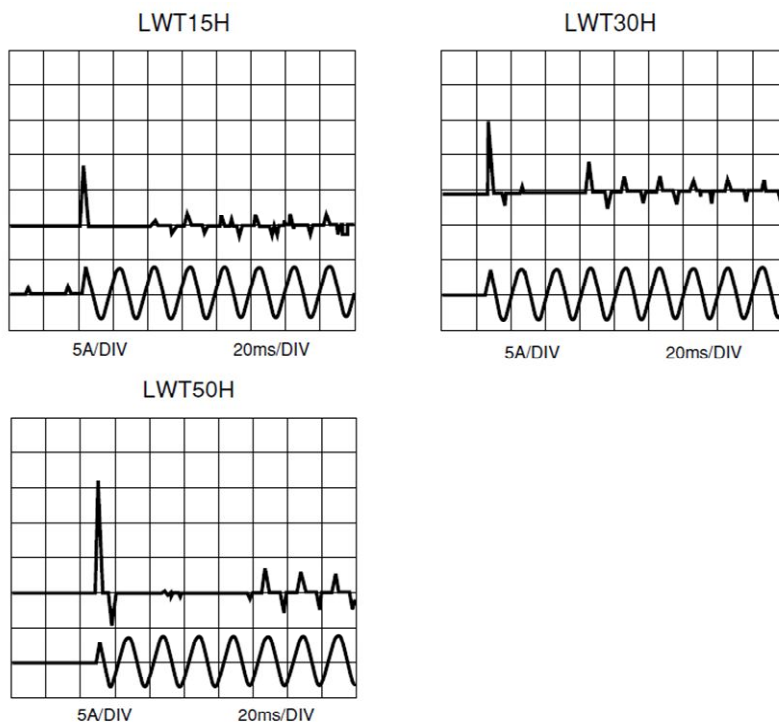
This series equipped Power thermistor to limit the inrush current.

In case of using multiple units, please select input switch or external fuse carefully.

Also, 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.

LWT15H, 30H, 50H Inrush Current waveform

(Input : 100VAC, Inrush phase angle : 90°, Load : 100%, Ta : 25°C)

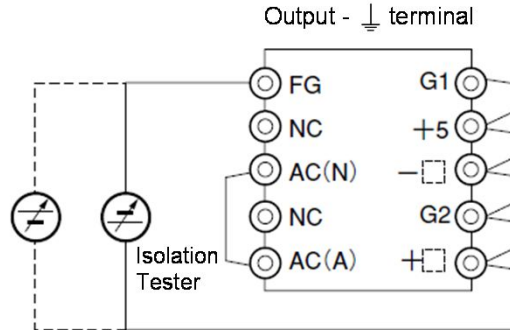


5-6. Isolation Test

Isolation resistance between Output - \perp terminal is more than 100M Ω at 500VDC.

Some of the Isolation tester may high voltage pulse when change voltage, so please check the kind of tester.

Ensure that the unit is fully discharged after the test.



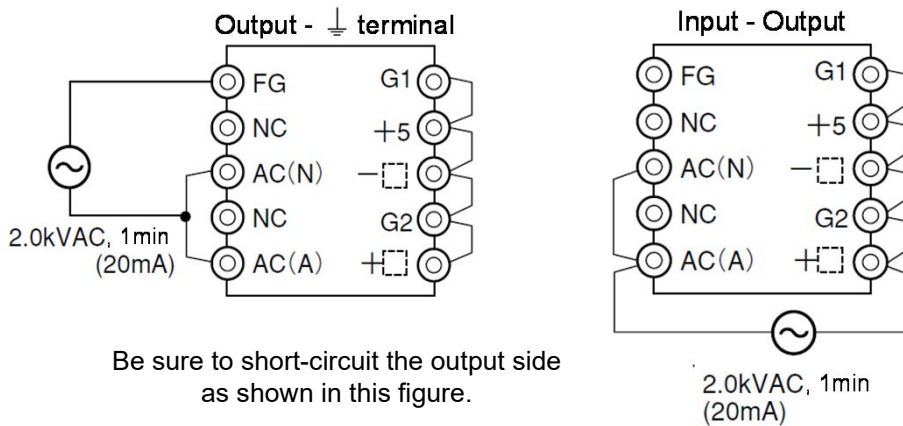
More than 100M Ω at 500VDC

Be sure to short-circuit the output side as shown in this figure.

5-7. 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.

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.



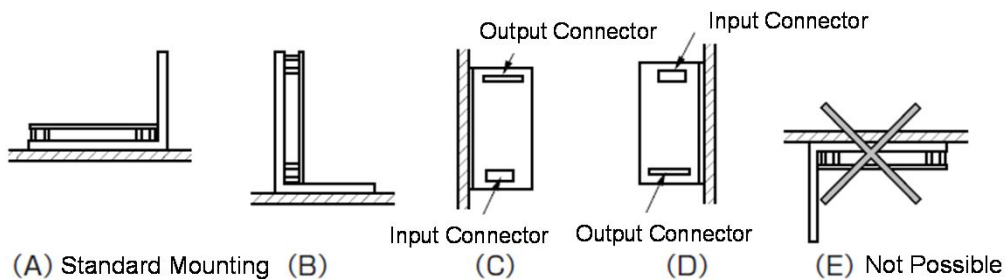
Be sure to short-circuit the output side as shown in this figure.

6. Mounting Method

6-1. Mounting Direction

The standard mounting is direction (A). Direction (B), (C) and (D) are also possible, please refer to the output derating below.

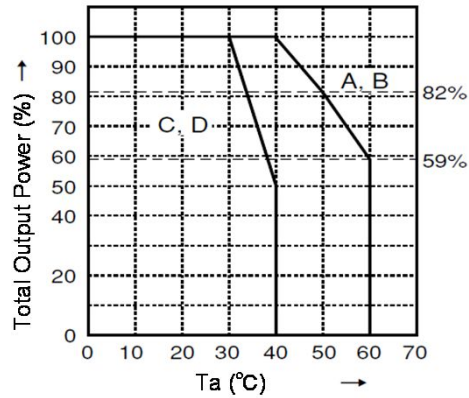
Never use as mounting direction (E) shown below.



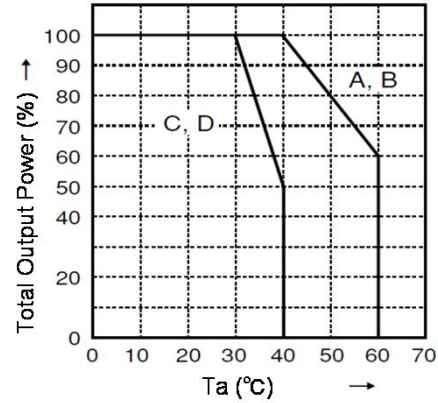
6-2. Output Derating

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

LWT15H



LWT30H, LWT50H



6-3. Mounting Method

- 1) The maximum allowable penetration of mounting screws is 4mm.
 Recommended torque for mounting screw : 0.49N·m
- 2) When using multiple units, keep a space more than 15mm from each other as shown below.
- 3) When LWT50H is mounted from the direction shown below, the value of vibratility resistance in the specifications will not meet, so avoid this mounting method.

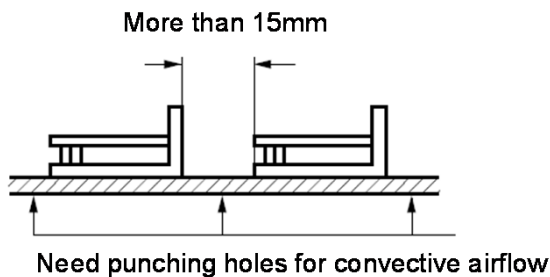


Figure 6-3. 2)

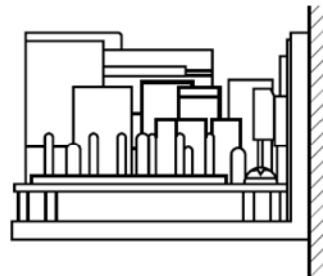


Figure 6-3. 3)

7. 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) Use proper wire type for housing and terminal pin of connector.
- (3) Noise can be eliminated by attaching a capacitor to the load terminals.

8. The life expectancy

The life of the power supply depends on the life of the built-in aluminum electrolytic capacitor. The 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”.

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.

9. 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-lug 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.

LWT15H : 2.5A

LWT30H, LWT50H : 3.15A

10. Before concluding that the product 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 connector pin and wiring is properly crimping.
- (4) Check if the wire size is not too thin.
- (5) Check if the wiring position of input and output connector is correct.
- (6) Check if CH1 setting is minimum output current. To maintain all of the output stable, set CH1 minimum output current.
- (7) Audible noise can be heard during Dynamic-Load operation.
- (8) 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
LWT15H	3500uF
LWT30H	6800uF
LWT50H	10000uF

11. Warranty Period

This product is warranted for a period of 2 years from the date of shipment.

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

Please read the General Safety Instruction before using the products.

12. 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 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 and Restriction of the Use of Certain Hazardous Substances in Electrical & Electronic Equipment Regulations.