

ELV60,90 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 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.
- 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.
- The power supply unit is for LED lamp load. The characteristic and the long-term reliability assumed LED load, carried out an evaluation. When used except LED lamp load, please take notice "Instruction Manual" and "ELC/ELV series power supply precautions for use", and please use power supply after confirm an enough evaluation and safety on the equipment.
- Protection class IP66 shows initial protection class against dust and water. Performance may degrade depending usage environment. In addition, for connection point of the input and output lines, take appropriate waterproofing. When the water enters inside the power supply from the connection point of the wire, there is a risk of electric shock or fire or smoke.

⚠ 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 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): OVC II and Class of equipment: Class I . This product is designed to be accessible only to service technicians as part of indoor use device.

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%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 minimum load.

< Criterion of warm up voltage condition >

(1)Implementation period : 1 year or above after the delivery

(2)Electrical continuity condition

Input voltage : Rating

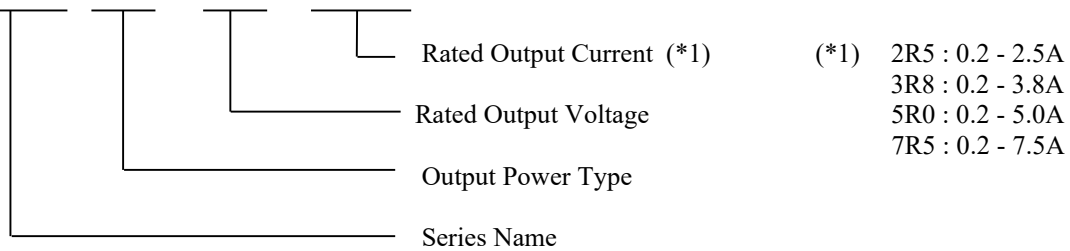
Load : Minimum load

Ambient temperature : Normal temperature

Time : 30 minutes or more

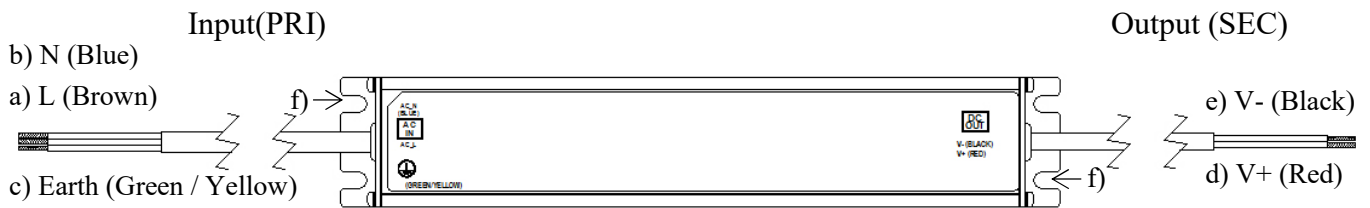
1. Model Name Identification Method

ELV 90 – 12 – 7R5



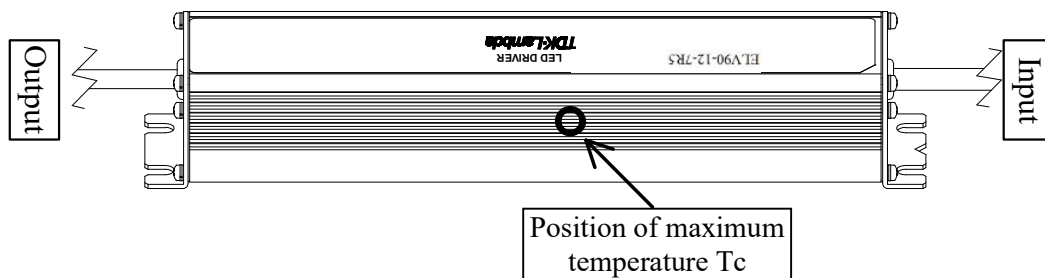
2. Terminal Explanation

- a) L : Input terminal (Brown) Live line (Fuse in line)
- b) N : Input terminal (Blue) Neutral line
- c) Earth : Earth terminal (Green / Yellow) Protective earth
- d) V+ : + Output terminal (Red)
- e) V- : - Output terminal (Black)
- f) Mounting Hole (Hole size : R3.0mm)

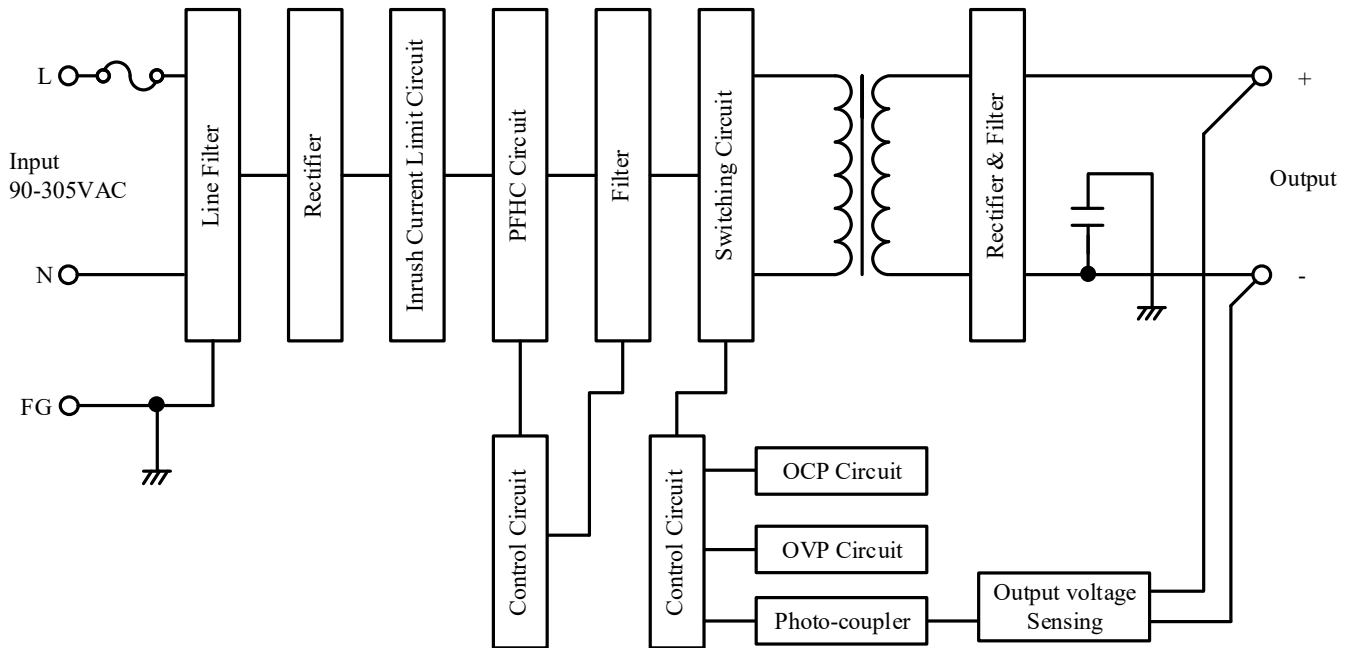


3. Tc point

Tc is position of the following figure. (Tc is position of the maximum temperature of the case.)

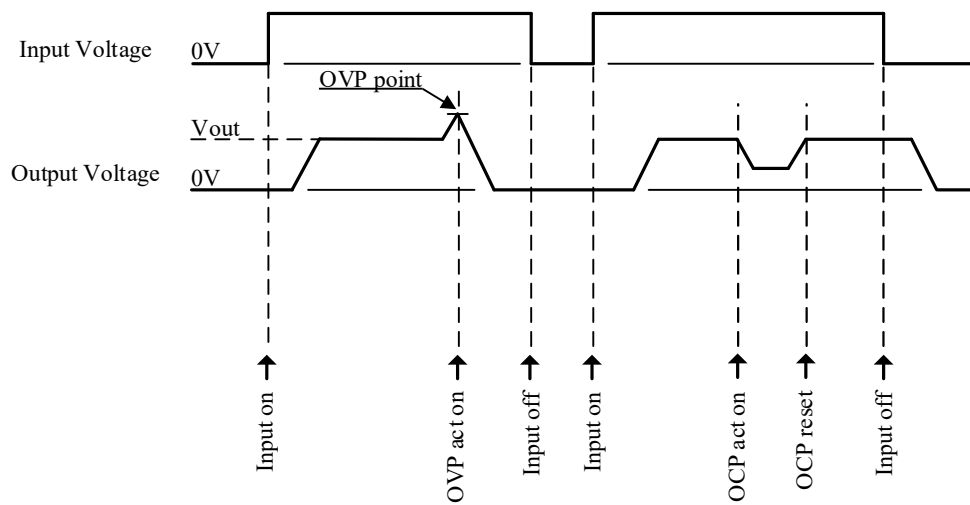


4. Block Diagram



- Circuit topology
 Switching Circuit : Flyback topology
 PFHC Circuit : Active filter
- Fuse rating :
 ELV60,ELV90 : 4A

5. Sequence Time Chart



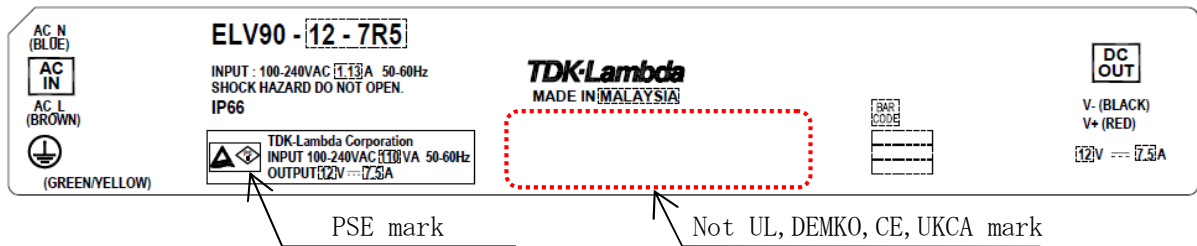
6. Terminal connecting method

Pay extra attention to the input wiring. Wrong connection may cause damage, electric shock or fire.
 Never connect output wire and input wire in reverse.

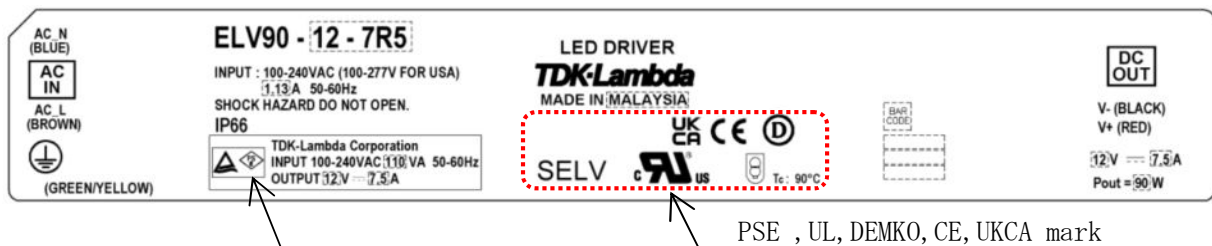
By the safety standard mark of the power supply, the wiring method of output terminal and earth terminal are different. Please refer to 6-1 about distinction of the safety standard mark.

6-1. Way to distinguish of the safety standard mark.

< Case of only PSE mark >



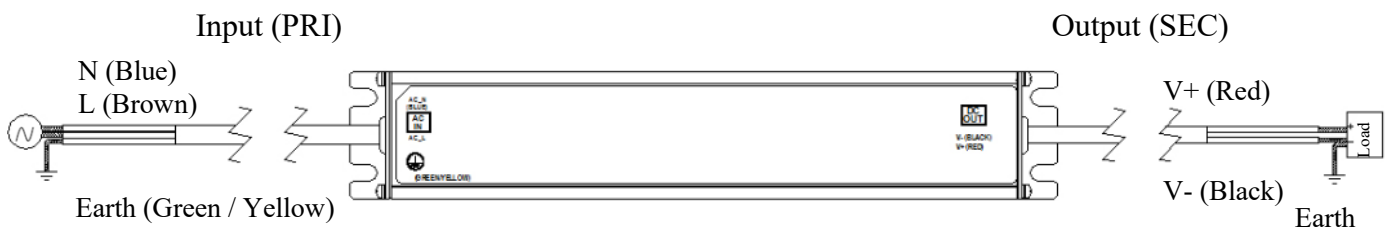
< Case of various safety standard marks >



6-2. Wiring method for only PSE mark

Be sure to connect the earthed line of the input terminal and V- of the output terminal to ground.

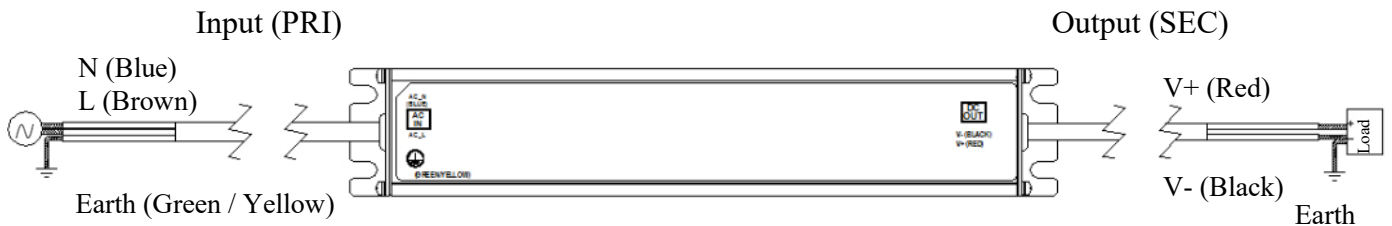
< Output(SEC) - FG >



6-3. Wiring method for various safety standard marks

Safety standard	Output (SEC) - FG
PSE	“Short” and “Open” are possible.
UL、EN	Only “Open” is possible.

< Output (SEC) - FG : Short >



< Output (SEC) - FG : Open >



6-4. Precaution of wiring method

- Input must be off when making connections.
- Input wire and output wire shall be separated.
- Take enough consideration to avoid electric shock.
- Do not subject the unit to scratch and undue stress such as bending or pulling the input and output wires.
- When connecting wire, connect firmly by ensuring no loose connection, omission, and no wire being pulled out.
- Input and output wire is not waterproof. If there is risk of contact with water, waterproofing is necessary.
- Do not connect product output in series and parallel connection.
- ELV series is a constant voltage output. When connecting to LED, connect current limiting circuit or electric current limiting resistor.
- Connect earth terminal of input wire to the earth.

7. Explanation of Functions and Precautions

7-1. Input Voltage Range

Input voltage range is single phase 90 - 305VAC(47 - 63Hz)

Using this unit outside the input voltage specification range might cause damage to unit. For cases where conformance to various safety specs are required, input voltage range will be 100 - 240VAC (for USA 100 - 277VAC) 50 - 60Hz.

7-2. Inrush Current

This series is equipped with Power thermistor to limit the inrush current. Since this series employs power thermistor method, inrush current increase at higher ambient temperature or input recycle condition.

7-3. Over Voltage Protection (OVP)

The OVP function will cause the output to shut down. In order to recover output during output shutdown, remove the AC input for a few minutes, then recycle AC input. OVP setting is fixed and cannot be adjusted externally.

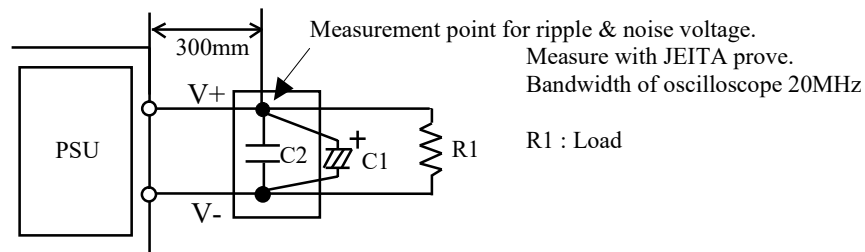
7-4. Over Current Protection (OCP)

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

But, when the output is shorted output voltage might shut down. For this case, in order to recover output during output shutdown, remove the AC input for a few minutes, then recycle AC input. Never operate the unit under over-current or shorted conditions. This might cause damage to the unit.

7-5. Output Ripple & Noise

For output ripple & noise measurement, attach electrolytic capacitor C1 (NIPPON CHEMI-CON, LXZ series equivalent) : 100 μ F, film capacitor C2 : 0.1 μ F to the end of output wire, and, measure the frequency bandwidth at 20MHz. In addition, use JEITA probe.

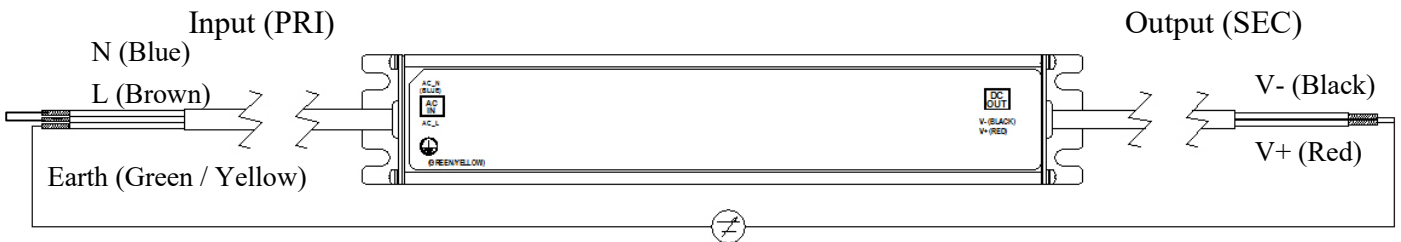


8. Isolation / Withstand Voltage

8-1. Isolation Resistance Test

Isolation resistance between output and earth shall 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. Short - circuit L and N of the input side.

Output - Earth : 500VDC 100MΩ or more

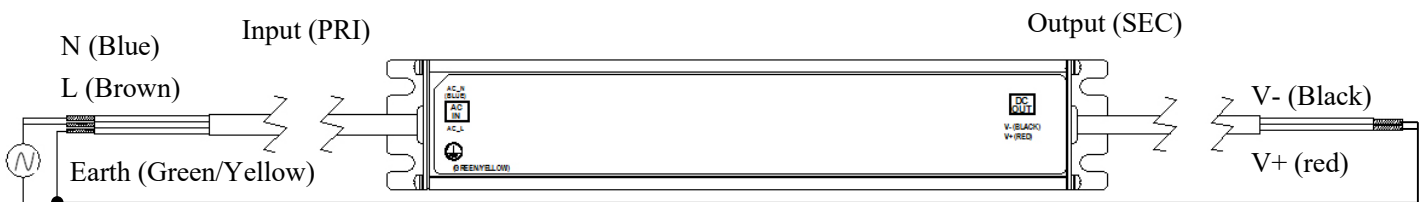


8-2. Withstand Voltage

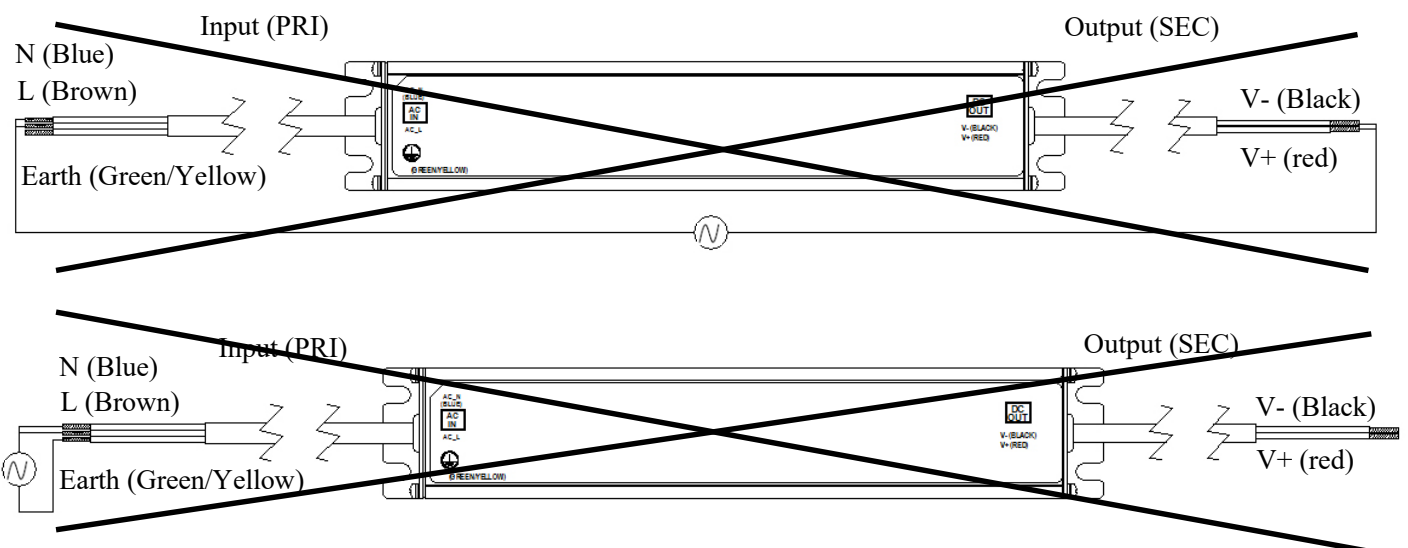
When testing withstand voltage, set current limit of withstand voltage test equipment at 10mA. The applied voltage must be gradually increased from zero to testing value and then gradually decreased for shut down. When timer is used, the power supply may be damaged by high impulse voltage during timer switch on and off. Connect input and output as follows.

< Case of only PSE mark >

Input - Output, Earth : 3kVAC, 1min (10mA)

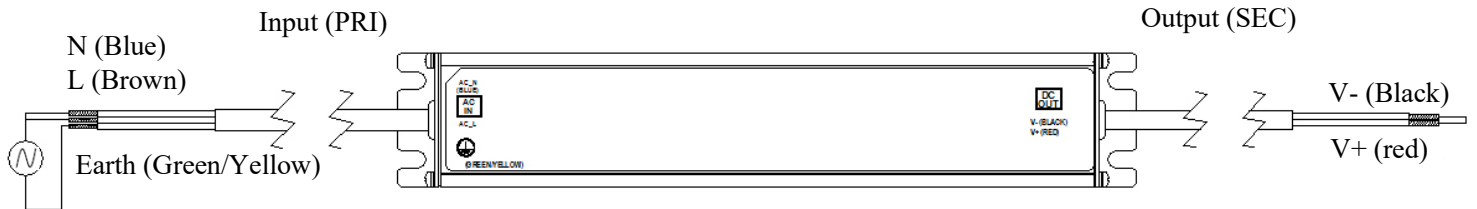


* Because a power supply is damaged, never test withstand voltage by connection as follows.

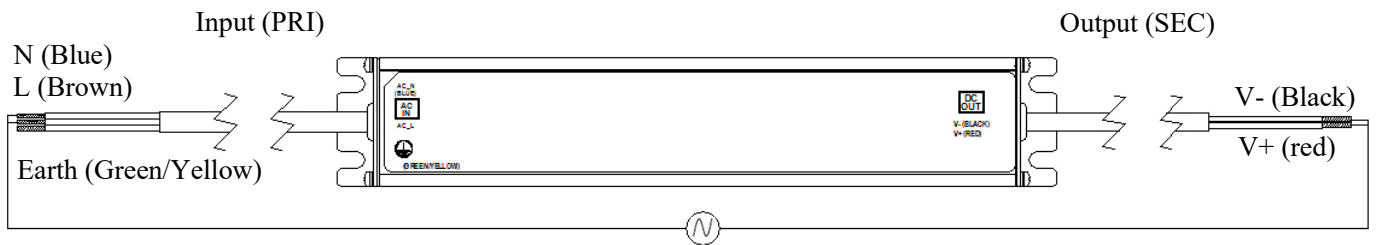


< Case of various safety standard marks >

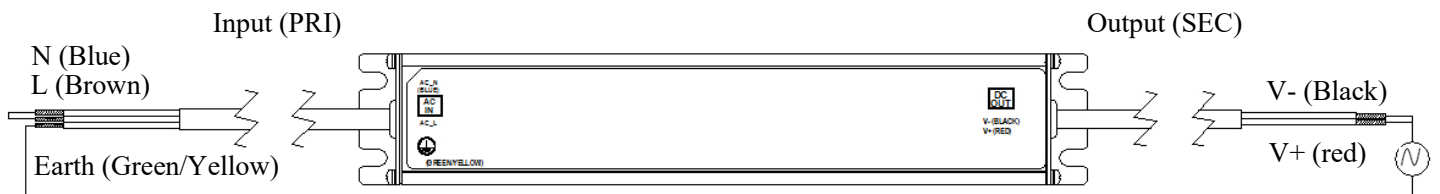
Input - Earth : 3kVAC, 1min (10mA)



Input - Output : 4kVAC, 1min (10mA)



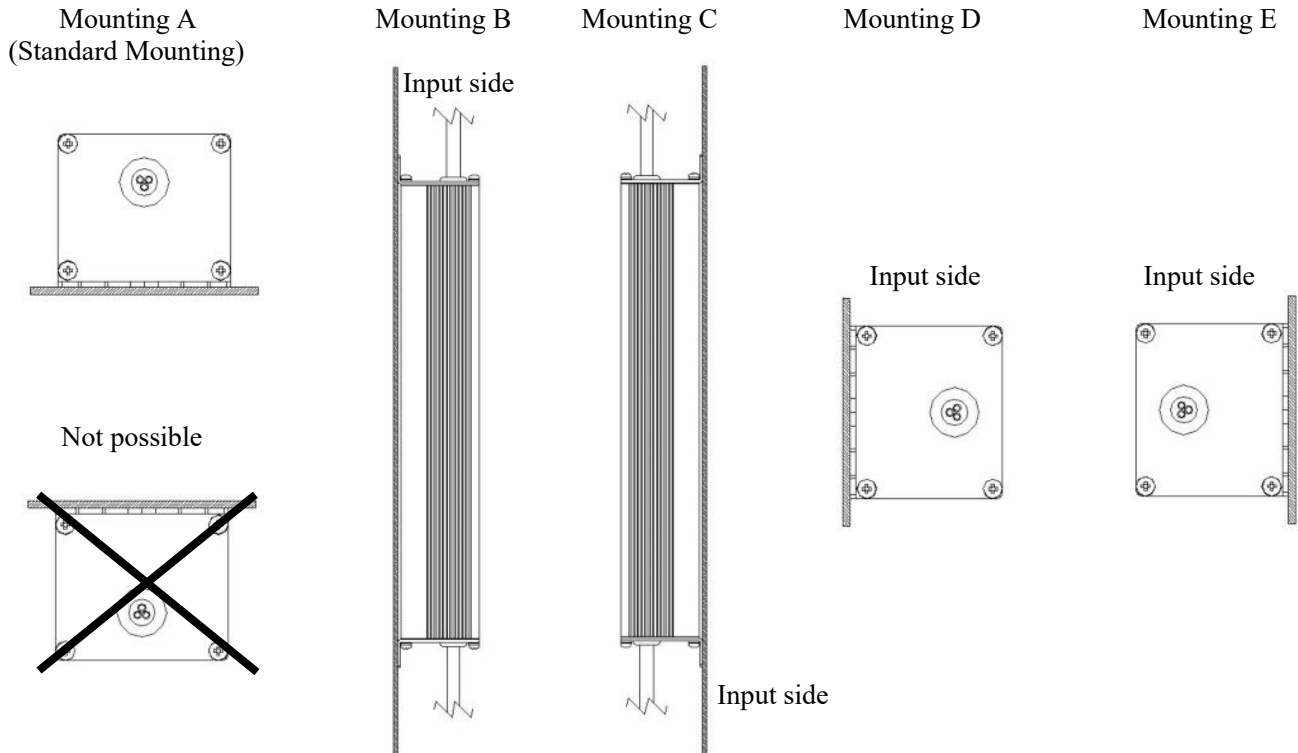
Output - Earth : 2kVAC, 1min (10mA)



9. Mounting Directions

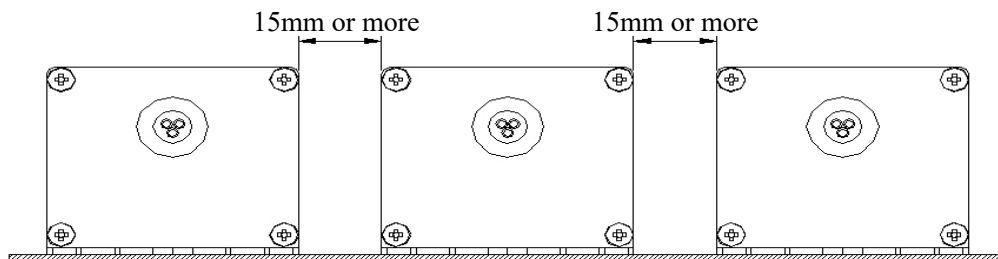
9-1. Mounting Directions

Recommended standard mounting methods is (A). Methods (B) - (E) are also possible.



9-2. Mounting Method

- (1) This is a convection cooling type power supply. The power supply itself generates heat. In consideration of the heat radiation and safety, keep a distance more than 15mm between the power supply and the peripheral parts. When lining up multiple units, be sure to place them 15mm or more apart from each other. Avoid unit layout that will prevent heat dissipation such as stacking or piling up one unit over the other. Even when operating ambient temperature is thought to be within the limits of power supply specification, if the power supply is enclosed in a sealed device or apparatus, components temperature in the power supply rises with increase in ambient temperature of the power supply remarkably, which might cause failure.



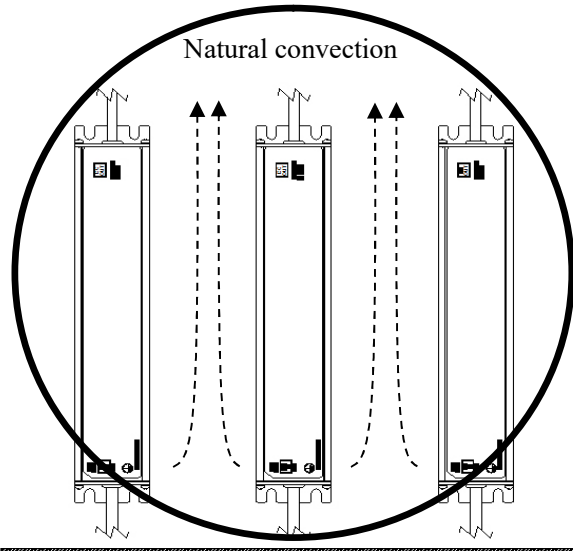


Fig. a

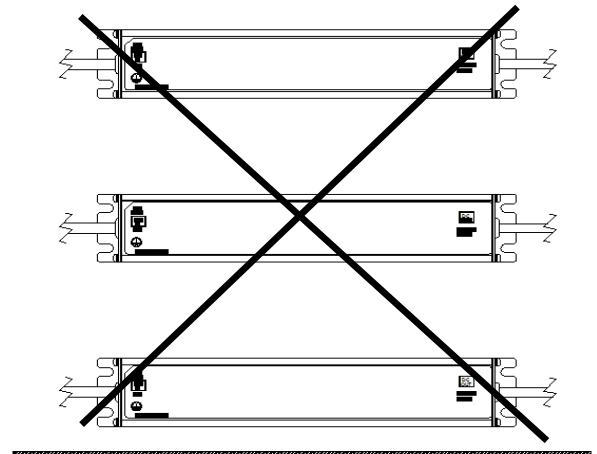


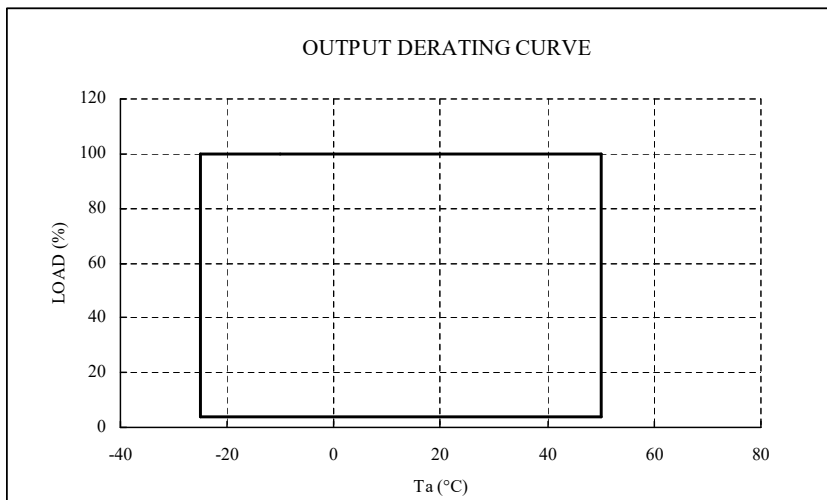
Fig. b

- (2) Recommended torque for mounting screw (M4 screw) : 1.27N·m (13kgf·cm)
- (3) Do not exceed the recommended torque to prevent mechanical stress on the enclosure.
- (4) Secure with the fixing holes in four places.
- (5) Fix the product to a plane surface without stress such as torsion, bend and shock.
- (6) About installed side of the power supply, use structure and materials that sufficiently capable tolerating weight or temperature of the power supply. Metal Plate is recommended as mounting surface due to its High Heat Dissipation Effect. It also has strength advantage.

9-3. Output Derating

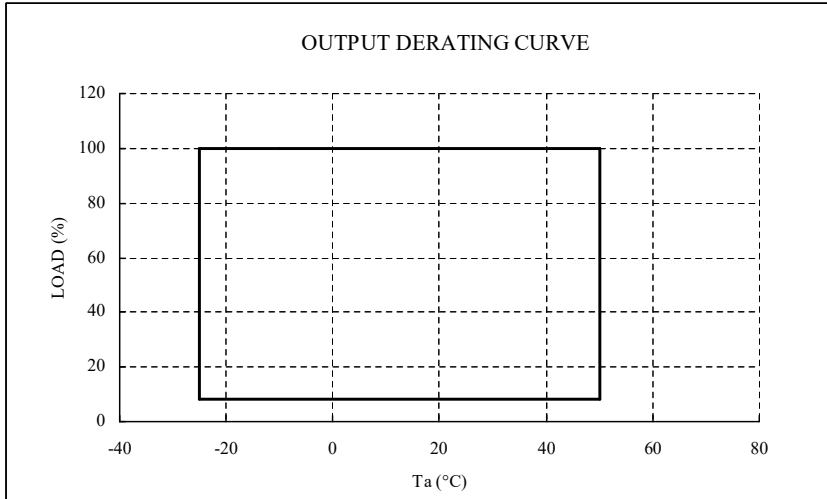
(1) ELV60-12-5R0

Ta (°C)	LOAD (%)
-25 - +50	4 - 100



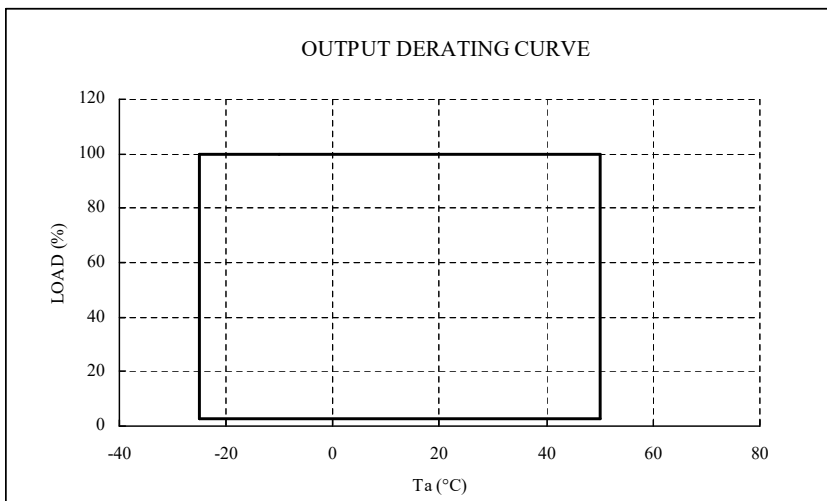
(2) ELV60-24-2R5

Ta (°C)	LOAD (%)
-25 - +50	8 - 100



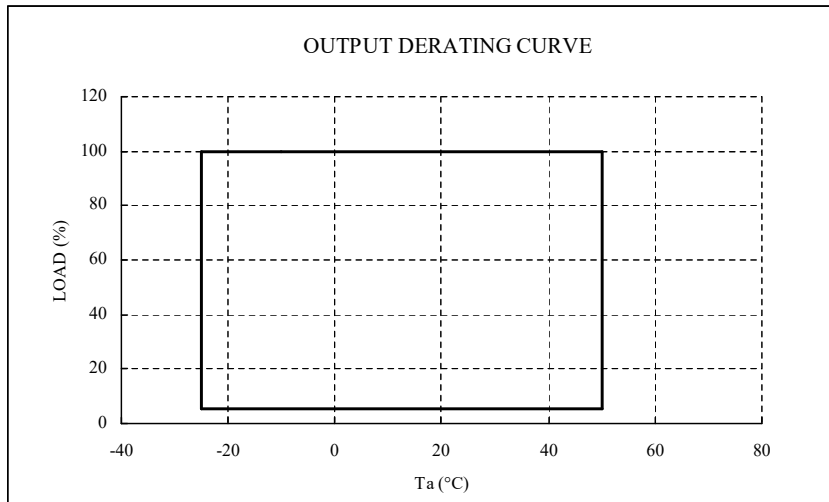
(3) ELV90-12-7R5

Ta (°C)	LOAD (%)
-25 - +50	2.7 - 100



(4) ELV90-24-3R8

Ta (°C)	LOAD (%)
-25- +50	5.3 - 100



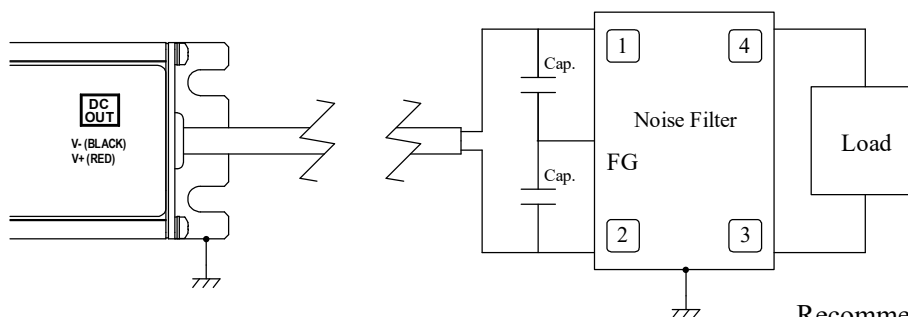
10. Wiring Method

- The output wire and input wire should be separated.
- Noise can be reduced by attaching a capacitor to the output wire terminals.
- The output wire and input wire should not be pulled in such a manner that it will render mechanical stress to the unit.
- If the input and output lines are long and thin, it may affect the operation of the power supply. Check thoroughly that there is no influence before using.

11. Noise application

Various Noise Tests are performed by using the application below.

- Conducted Emission, Radiated Emission, Disturbance Power :
 Attaching power supply to the metal plate might help reduce noise.
- If the conducted disturbance voltage at the load terminals of this product is required, it is recommended that the end of output wire of this product be provided with the following in order to satisfy the standard requirements.



Recommended Noise Filter :
 ELV60-24-2R5 RSEN-2003
 ELV60-12-5R0 RSEN-2006
 ELV90-12-7R5 RSEN-2010
 ELV90-24-3R8 RSEN-2006
 Cap. : 4700pF

12. Maximum Load Capacity

Attach capacitor to the load side within the following capacitance.

	Maximum External Capacitance			
Model	ELV60-12-5R0	ELV60-24-2R5	ELV90-12-7R5	ELV90-24-3R8
Capacitance(C1)	220 μ F	220 μ F	220 μ F	220 μ F

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

- Check if the rated input voltage is applied.
- Check if the wiring of output polarity is correct.
- Check if the output current and output wattage does not exceed the specification.
- Audible noise can be heard during Dynamic Load operation.
- Audible noise can be heard when input voltage waveform is not sinusoidal wave. (connecting UPS, etc.)
- Ensure that large capacitor is not connected on the output side. Use within maximum external capacitance Shown in "12. Maximum Load Capacity".

14. 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.

15. Maintenance

Structure of the product does not allow repair. Contact TDK-Lambda in case of failure.
 Also it is not possible to replace the input wire and output wire.

16. Warranty Period

This product is warranted for a period of 3 years from the date of shipment.
 For damages occurring at normal operation within this warranty period, repair is free of charge.

17. 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.