




# *KFV60-1 Series*

## *Instruction Manual*

### **BEFORE USING THE POWER SUPPLY UNIT**

Pay attention to all warnings and cautions before using the unit. Incorrect usage could lead to an electrical shock, damage to the unit or a fire hazard.

- **Warning Symbols**

<b>CAUTION</b>	
• DO NOT MODIFY, DISASSEMBLE THE POWER SUPPLY.	
• READ INSTRUCTION MANUAL BEFORE CONNECTING TO MAINS.	
• ELECTRIC SHOCK HAZARDOUS ON THE CONNECTOR SECTION.	

### **NOTICE:**

#### Installing/Storage Environment

1. Store the product with ambient temperature  $-40$  to  $+85$  °C, and relative humidity 5 to 95% (No Dewdrop).
2. Avoid operating the unit in over current, short circuit conditions or outside the specified input voltage range as damage may occur.
3. Confirm connections to input/output terminals are correct as indicated in the instruction manual.
4. Use the product where the relative humidity is 5 to 95% (No Dewdrop).
5. Avoid places where the product is subjected to direct sun light.
6. Avoid places where the product is subjected to penetration of liquid, foreign substance or corrosive gas.

7. Avoid places subject to shock or vibration.

A device such as a contact breaker may be a vibration source. Set the Power Supply as far as possible from possible sources of shock or vibration.

8. If the Power Supply is used in an area with excessive electronic noise, be sure to separate the Power Supply as far as possible from the noise sources.

9. Don't use the product in the environment with strong electromagnetic field, corrosive gas and conductive substance.

### Precautions in Using the product:

When the product is used under the circumstance or environment below, ensure adherence to limitations of the ratings and functions.

Also take countermeasures for safety precautions such as fail-safe installations.

1. Under the circumstances or environment which are not described in the instruction manual.
2. For nuclear power control, railway, aircraft, vehicle, incinerator, medical equipment, entertainment equipment, safety device etc...
3. For applications where death or serious property damage is possible and extensive safety precautions are required.
4. Don't recommend using input power source with large inductance, which may cause power supply operate unstably.

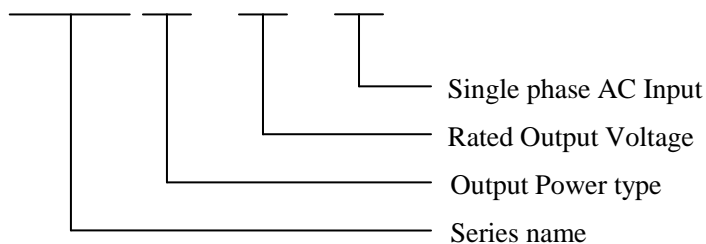
### Note: CE MARKING

CE Marking, when applied to a product covered by this handbook indicates compliance with:  
Restriction Of the use of certain Hazardous Substances Directive 2011/65/EU (RoHS2)  
Low Voltage Directive 2006/95/EC  
EMC Directive 2004/108/EC the low voltage Directive 2006/95/EC

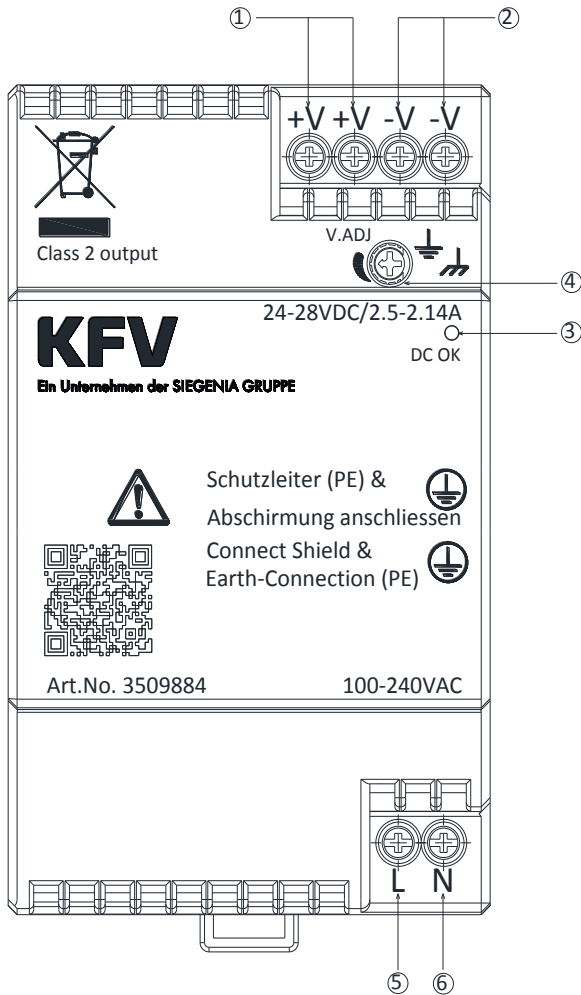
For further installations refer to the web link: [emea.tdk-lambda.com/CA818-04-01/KFV\\_](http://emea.tdk-lambda.com/CA818-04-01/KFV_)

### 1. Model name identification method

**KFV 60 –24 – 1**



**2. Terminal Explanation**



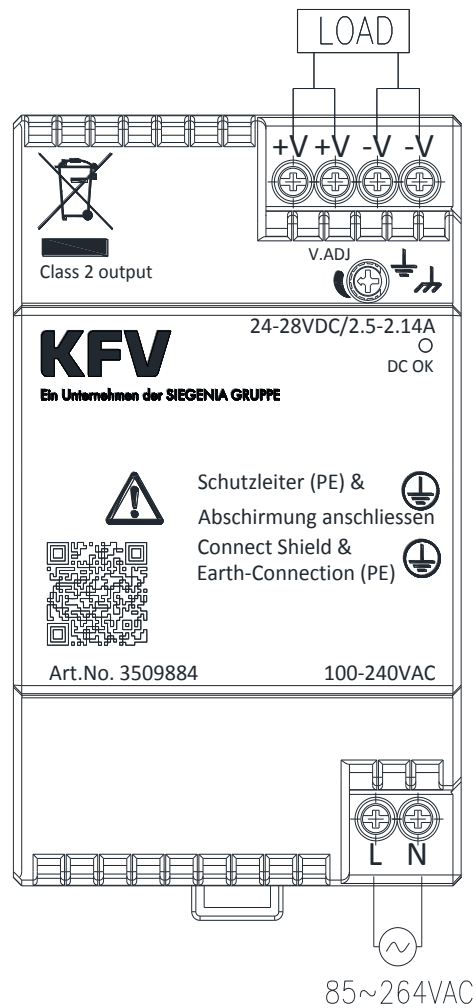
- ① +V: +Output terminal
- ② - V: - Output terminal
- ③ DC OK : Green LED lights when Output Voltage on
- ④ V.ADJ: Output voltage adjust trimmer  
The output voltage rises when a trimmer is turned clockwise.
- ⑤ L: AC Input terminal  
Live line (fuse in line)
- ⑥ N: AC Input terminal  
Neutral line

**3. Terminal 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.
- The output load line and input line shall be separated and twisted to improve noise sensitivity.

When connecting or removing input and output wire , do not apply stress to PCB.



**4. Explanation of Functions and Precaution**

**4-1. Input Voltage Range**

Input voltage range is single phase 85 ~ 264VAC (47~ 63 Hz) (not safety approved condition). For cases where conformance to various safety specs (UL, CSA, EN) are required, input voltage range will be 100 ~ 240VAC (50/60Hz). Power supply can withstand 300VAC surge for 5 seconds during operation. Input voltage which is out of specification may cause unit damage.

**4-2. Output Voltage Range**

Output voltage is set to the rated value at shipment. KFV60 V.ADJ trimmer on the front panel side can be used to adjust the output voltage within the range specified (refer to specifications for adjustable range). To turn 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 output voltage will be shut down.. Furthermore, when increasing the output voltage, reduce the output current so as not to exceed the maximum output power.

**4-3. Inrush Current**

This series has used Power Thermistor to protect the circuit from Inrush Current. Please carefully select input switch and fuse in cases of the high temperature and re-input the power.

**4-4. Over Voltage Protection ( OVP )**

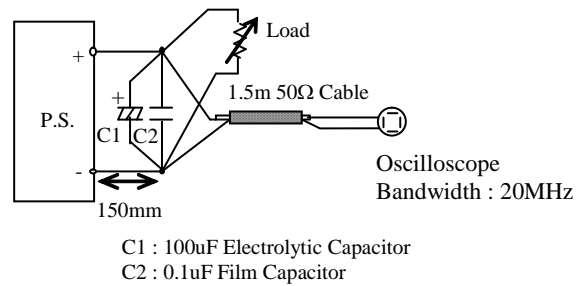
The OVP function (Inverter shutdown method, manual reset type) is provided. OVP function operates within specified range (refer to specification) . To reset OVP, remove the input of power supply for a few minutes, and then re-input. OVP value is fixed and not to be adjusted externally. Never apply more than rated output voltage to output terminal, which may leads to damage. In the case of inductive load, put protective diode in series to the output power line.

**4-5. Over Current Protection ( OCP )**

Hiccup mode with automatic recovery.  
OCP function operates when the output current exceeds OCP specification. The output will be automatically recovered when the overload condition is cancelled. Do not operate overload or dead short conditions for more than 30 seconds, which could result in damage or insulation failure. Due to internal protective function , output short causes KFV60 hiccup.

**4-6. Output Ripple & Noise**

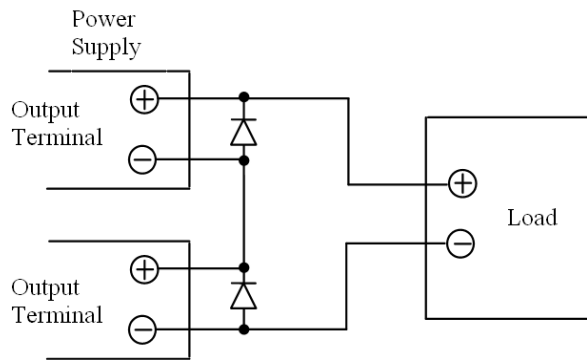
The standard specification for maximum ripple value is measured according to measurement circuit as below. When load lines are longer, ripple becomes larger. In this case, electrolytic capacitor, film capacitor, etc. might be necessary to use across the load terminal. The output ripple cannot be measured accurately if the probe ground lead of oscilloscope is too long.



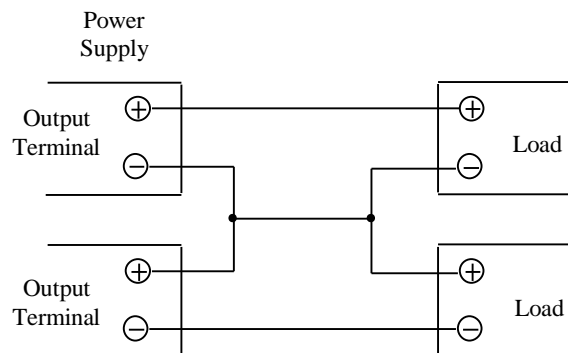
**4-7. Series Operation**

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

**Method ( A )**

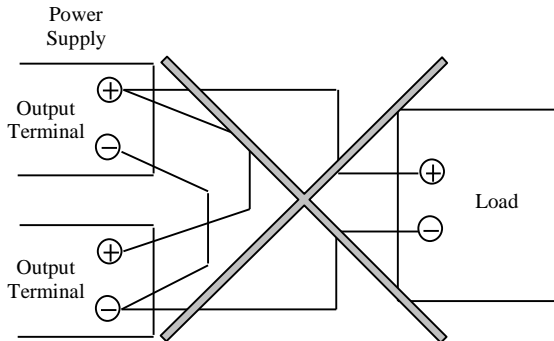


**Method ( B )**



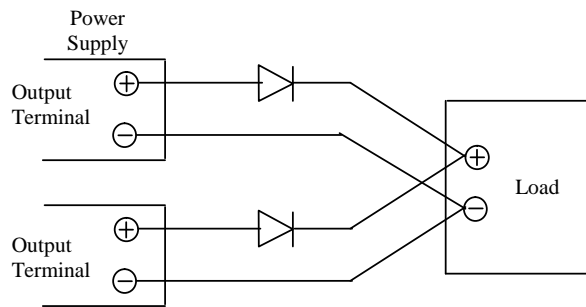
**4-8. Parallel Operation**

(A) To increase the output current is not possible.



(B) To use as Back-up Power Supply

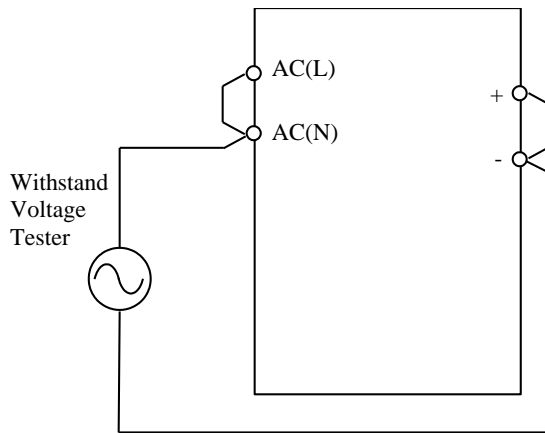
1. Set power supply output voltage higher by the forward voltage drop(VF) of diode
2. Adjust the output voltage of each power supply to be the same.
3. Use within the specifications for output voltage and output power.



**4-10. Withstand Voltage**

This series is designed to withstand 3.0kVAC between input and output for 1 minute. When testing withstand voltage, set current limit of the withstand voltage test equipment to 20mA. The applied voltage must be gradually increased from zero to the testing value and then gradually decreased for shut down. When timer is used, the power supply may be damaged by high impulse voltage at timer switch on and off. Connect input and output as follows.

Input ~ Output: 3kVAC 1min. ( 20mA )



**4-11. Class 2 limited power source**

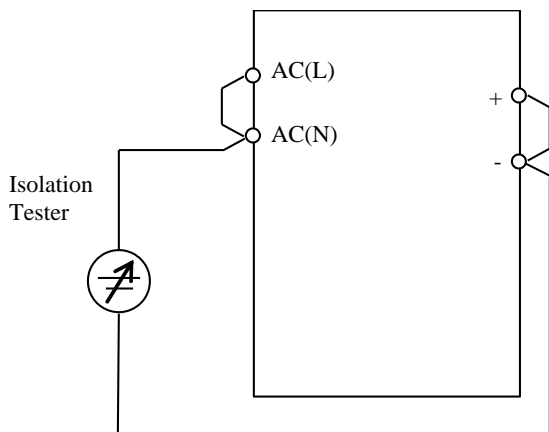
UL1310 class 2 approved models:

KFV60-24-1.

**4-9. Isolation Test**

Isolation resistance between input and output shall be more than 100MΩ 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.

Input ~ Output : 500VDC 100MΩ or more

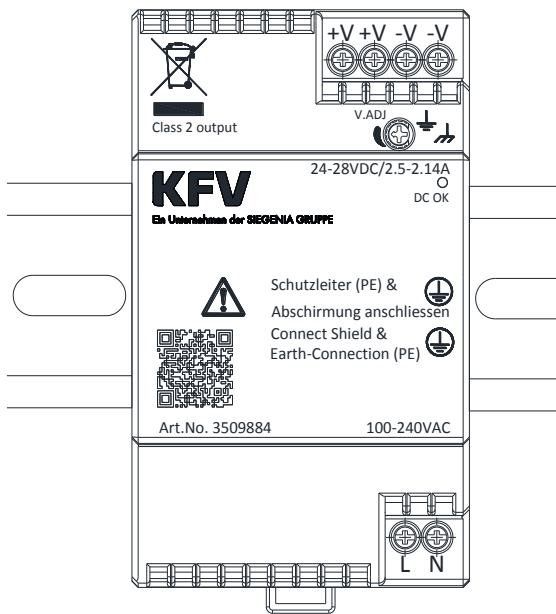


**5. Mounting Directions**

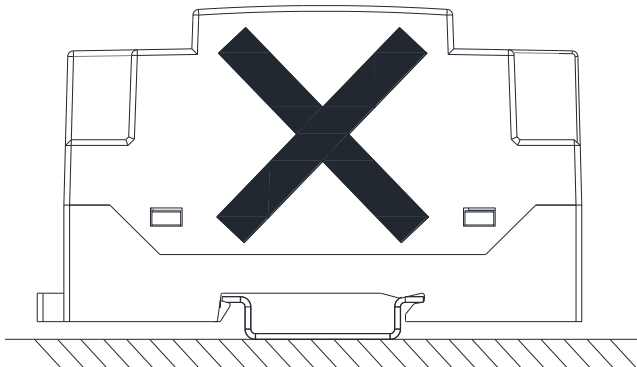
**5-1. Mounting Directions**

Recommended standard mounting method is ( A ). Please do not use installation method ( B ). Refer to the derating below. Do not exceed the load deratings. Keep ventilation holes at top and bottom clear, leave enough space for cooling. Please contact your local sales for particular application related to surrounding space.

**Normal mounting (A)**

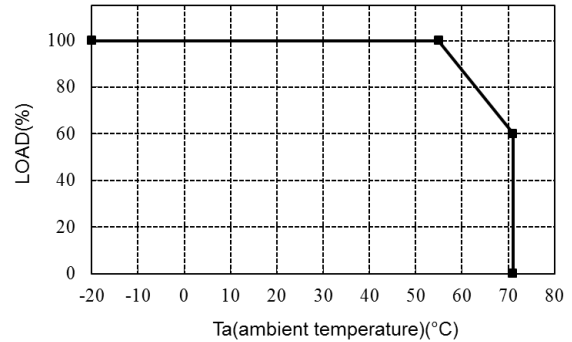


**Back Down Mounting (B)**



**5-2. Output Derating**

( Ta: measured at 50mm or less beneath the unit)



**6. Wiring Method**

- The output load line and input line shall be separated and twisted to improve noise sensitivity.
- Use all lines as thick and short as possible to make lower impedance.
- Noise can be eliminated by attaching a capacitor to the load terminals.
- EMI reduction performance by winding the cable around the toroidal ferrite core several times. Use any appropriate commercially available ferrite core from local vendor.
- Recommended wire type: solid and stranded, AWG 12~24(wire strip length:4~5mm , 5mm max).

**7. Internal and External Fuse Rating**

(1) Internal fuse information:

KFV60-1	2010T2A250V (Walter) (AC250V T2A)
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(2) External fuse rating:

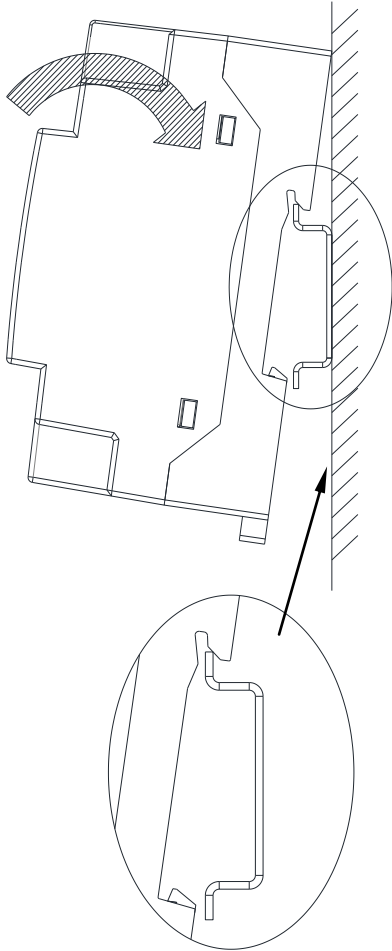
Refer to the following fuse rating when selecting the external fuses that are to be used on input line. Surge current flows when line turns on. Use slow-blow fuse or time-lag type fuse. Do not use fast-blow fuse. Fuse rating is specified by in-rush current value at line turn-on. Do not select the fuse according to input current (RMS.) values under the actual load condition.

KFV60-1	AC250V 2A~8A
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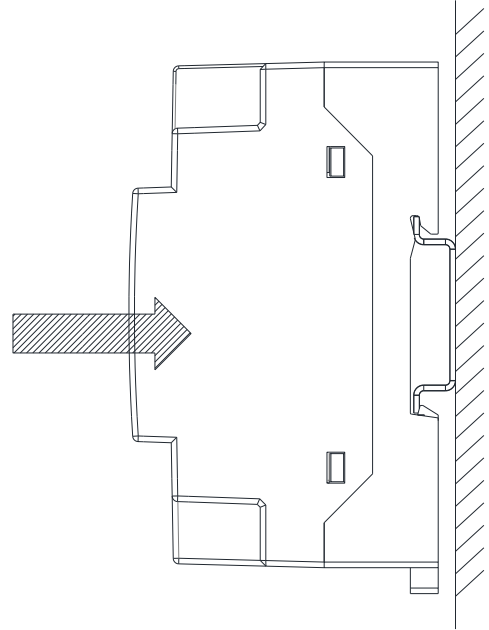
**8-1. Power supply mounting on DIN RAIL (TS35 or equivalent)**

Make sure input and output wire disconnected when mount power supply onto rail

- (1) Tilt the unit slightly rearwards, fit the unit over top hat rail.



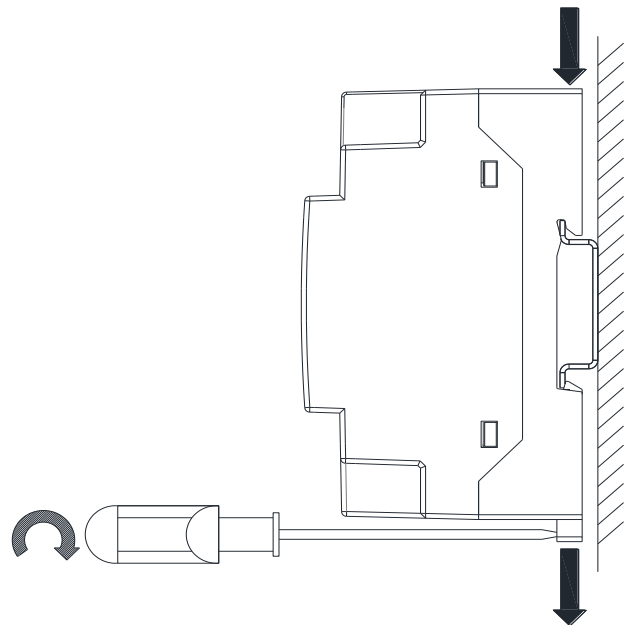
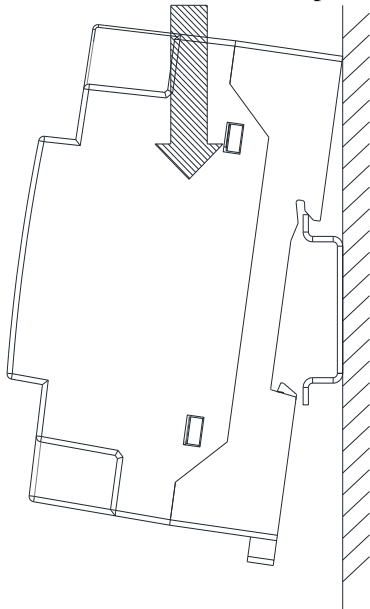
- (3) Press against the bottom front side for locking. Shake the unit slightly to check the locking action.



**8-2. Power supply removal from DIN RAIL**

Switch main power off and disconnect your system from the supply network. Move the removal hole on the rear down edge downwards by rotating screw driver. Gently lift lower front edge of the unit (tipping) and remove it.

- (3) Slide it downward until it hits the stop.



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

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

- Check if the rated input voltage is connected.
- Check if the wiring of input and output is correct.
- Check if the wire material is not too thin.
- Check if the output voltage control ( V.ADJ ) is properly adjusted.
- Check if the output current and output wattage do not over specification.
- Audible noise can be heard during Dynamic-Load operation.
- Audible noise can be heard when input voltage waveform is not sinusoidal wave.

## 10. Returns

Please contact your local sales office or visit our website to arrange return of any faulty product..

## 11. KFV60-1 Series UL508 Listed Condition

### 1) Wire Requirement

- Use minimum 75°C wire
- Use copper conductor only

Connector	Recommended Wire	Max. Torque
INPUT (L, N)	solid and stranded, AWG12~24(wire strip length:4~5mm , 5mm max).	0.51N.m (4.5Lb.inch)
OUTPUT (+V, -V)	solid and stranded, AWG12~24(wire strip length:4~5mm , 5mm max).	0.51N.m (4.5Lb.inch)

2) For use in a Pollution degree 2 environment only

3) These products are considered for use where maximum surrounding air temperature does not exceed 71°C. When installing these products please refer to section 5-2 for deratings.

4) Indoor use only

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