Product Documentation

ECSPD[Electric Capture Smart Protector Device]

GD-2000(Multifunction grounding leakage current shielding device)

Jun, 2020

ENERPARK CO. LTD.

01. Product Development Backgrounds

Increase in electric shock accidents

- Deterioration of existing electrical facilities.

→ Increase in short circuit accident increase in electrical fire accident.

- Widespread use of electrical machine.

→ Increase in electric shock accident.

→ Human body malfunction due to the electromagnetic waves etc.

- Increase in electric shock accident by streetlight pole.
- Accident by careless use of electrical machines.

→ Increase in children electric shock accident.

- Increased electric shock damage to vinyl house.

→ Electric shock occurs.

- Increased electric shock due to industrialization Human injury occurred

ECSPD

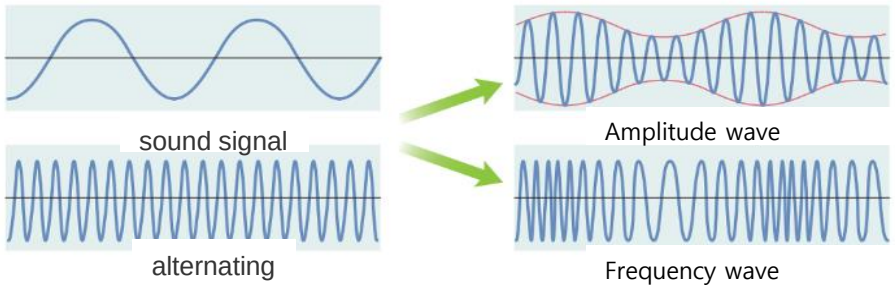
Technology using "apparent power (voltage, current) abnormal state detection" and "frequency compensation control device"

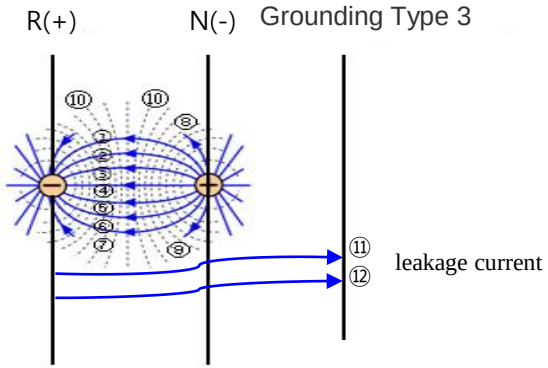
ECSPD [Electric Capture Smart Protector Device]

02. Product Introduction

Principle of the Technology

● Waveform improvement point by **apparent power (voltage, current) abnormal state detection and frequency compensation control device**





● **Principle of ECSPD**

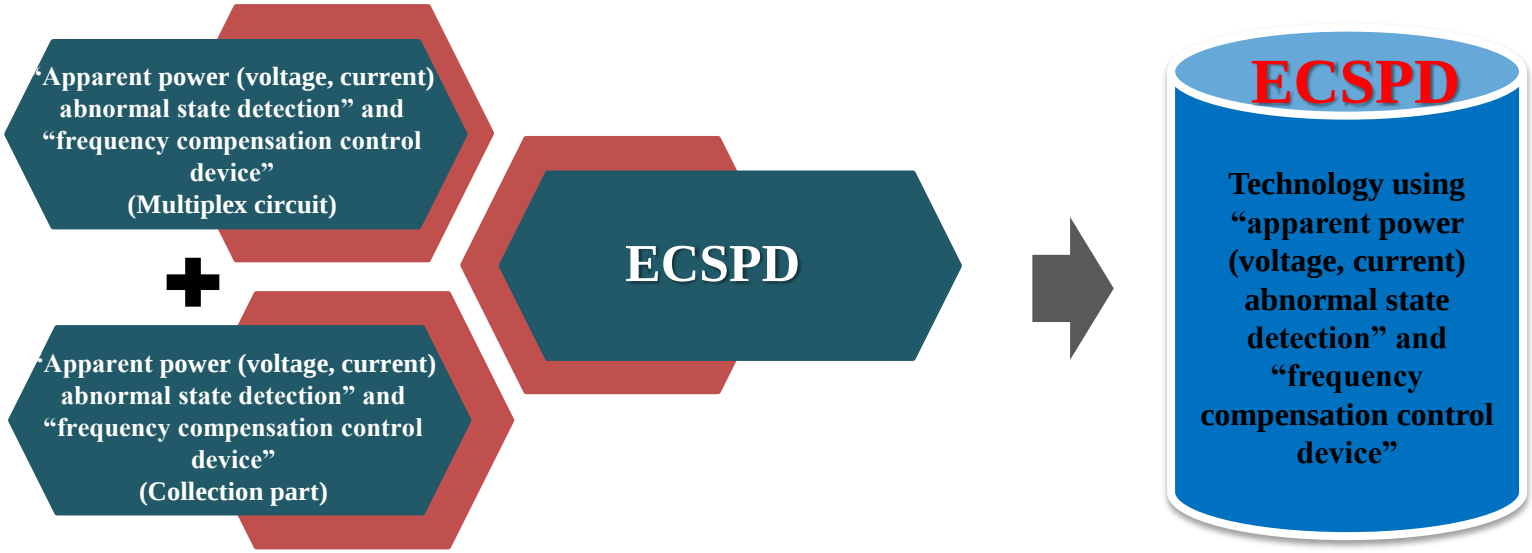
1. ECSPD compensates frequency with **"apparent power (voltage, current) abnormal state detection and frequency compensation control device"** that utilizes a wavelength band based on the equipotential phenomenon between phases.
This converts the frequency to a sine wave shape and a constant amplitude without external interference.
Through this process, the electric power lines are arranged electronically so that there is no potential difference.
In other words, it is a principle to prevent leakage current from flowing through "zero potential".
As a result, it is a principle to help prevent electric shock accidents by shielding, absorbing and reducing leakage current.

Therefore, it is possible to prevent electric shock by shielding and reducing leakage current without external interference through apparent power (voltage, current) abnormal state detection and frequency compensation control device.

Therefore, it is not related to short circuit and overload.

02. Product Introduction

Product Composition

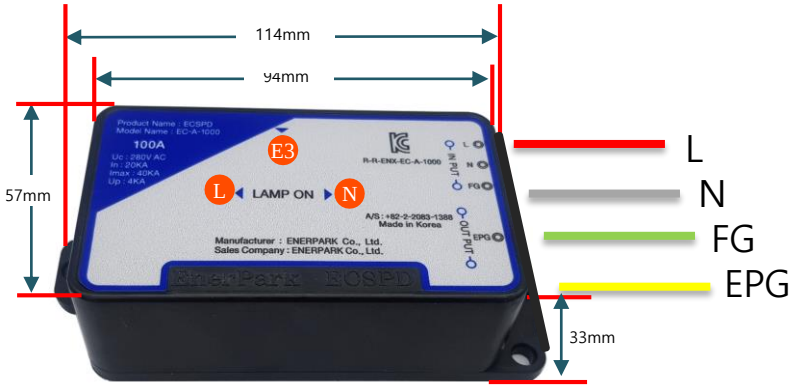


● **Basic Specifications of ECSPD Technology & Customizing**

Range of voltage/Current	Customizing
-Voltage : AC110V / AC220V / AC380V / other voltage / DC voltage -Current : applicable to the required level depending on the customized structure	Various sizes available according to the surrounding structure

02. Product Introduction

Functions of Product - ECSPD



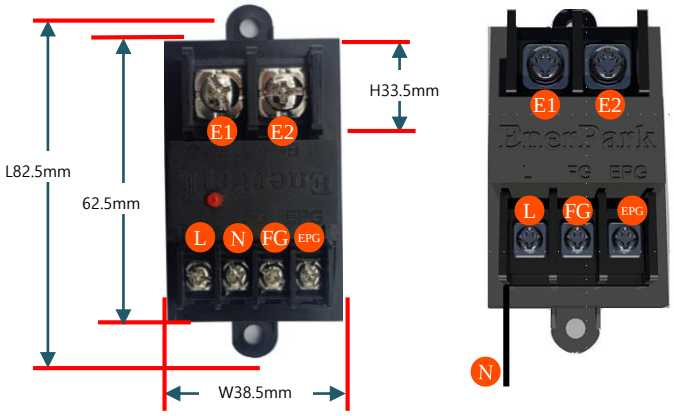
Name	AC ECSPD (For single phase)
Model No.	• EC-A-1000
Rated current	• 30A (AC 30A or less) : Leakage current shielding, absorption and reduction amount: 10mA • 100A (AC 100A or less) : Leakage current shielding, absorption and reduction amount: 30mA
Voltage	• 90V ~ 264V.
Frequency	• Does not matter whether 50HZ or 60HZ (110V / 220V compatible)
Range	• Installation distance : within about 10~50cm in panel board. within about 10~50cm in terminal power supply part. • Install the ECSPD by attaching it directly to the terminal load (motor, equipment).(The closer the distance is, the better it is)
Main function	• Prevention of electric shock by shielding, absorbing and reducing leakage current
Additional function	• Shielding lighting surge.(40KA - 8/20μS)
Precaution	• L, N, and E3 lamps turn on when the power is turned on. • The polarity must be corrected by using an inspector or a multi-tester before installation and demonstration. • Install suitable products depending on the purpose of installation and the installation location.

Ground terminal	Function
L / N	(+) / (-)
FG(E3) EPG(Load case)	• Shielding and reducing leakage current.

02. Product Introduction

Function of Product - Multifunction grounding leakage current shielding device

GD-2000 maintains the grounding state normally before electricity is supplied. And in conjunction with ECSPD, ENSPD, it transforms the signal in the form of constant voltage and sinusoidal voltage and frequency. In this manner, the terminal block capture leakage current and shields grounding current.



How to connect GD-2000(Sub grounding and ECSPD)

GD	SUB E3	GD	ECSPD
E2	Output connection	EPG	EPG connection
		FG	FG connection
E1	Input connection	N	N connection
		L	L connection

Product Name	Multifunction grounding leakage current shielding device
Name.	• GD-2000
Role / Reason	• Grounding leakage current shielding. • Grounding divider role. • Designed to enable connect FG-E1 and EPG-E2 to utilize 100% of ECSPD functions.
Caution	• E1 : Connect E1 and load ground wire. • E2 : Connect E2 and load. ➔ If there are lots of load ground wire, additional ground dividers may be installed to connect the sub ground wires. (Change the existing load ground connection to the new ground terminal) ※ E1 and E2 can be connected according to the ground wire capacity.
Thickness of ground wire	• Thickness of ground wire = capacity of circuit breaker (rated current) ×0.0496 ex) capacity of circuit breaker 50A is 50 × 0.0496 = 2.48 (i.e. 4SQ), capacity of circuit breaker 100 A is 100 × 0.0496 =4.96 (i.e. 6 SQ) capacity of circuit breaker 250A is 250 × 0.0496 = 12.4 (i.e. 16SQ). • Use an ground wire that is one size larger than that calculated for safety considerations. • Proper thickness of ground wire shall be selected considering the function and protection level of the installation site. • Comply with the Electrical Facilities Technical Standards and the Consumer's Electrical Installation Guide

02. Product Introduction

Features

- When electric equipment such as power line, electrical equipment box under Electrical Appliances and Consumer Products Safety Control Act (K 60990 [IEC 99-08]), is submerged in water, only micro current is generated that human body can't feel (equipment box 5mA or less).
- Electrical Appliances Safety Certificate (KC Certificate) exceptional product (related grounds : Article 3 of Electrical Appliances and Consumer Products Safety Control Act Enforcement Rules)
- By applying the wavelength principle to the zero potential as " apparent power (voltage, current) abnormal state detection frequency compensation control system", shielding and reducing leakage current can prevent electric shock.

Electric Shock -Free Test

• According to the Electrical Appliances and Consumer Products Safety Control Act (K 60990 [IEC 99-08]), when the AC 220V terminal is submerged in the water tank, the amount of current leaking into the water as shown in [Figure 1]is connected in parallel with the type 3 grounding to make sure it is less than 5mA.

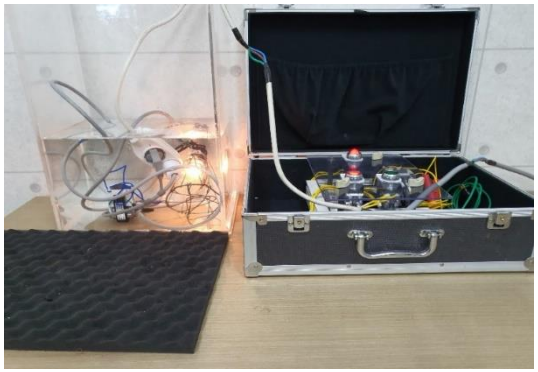


Figure 1

Check leakage current with 220V + ground wire
Check the amount of leakage in accordance with Electrical Appliances and Consumer Products Safety Control Act(K 60990 [IEC 99-08])

In case of forced leakage of 44mA using 5KΩ random resistor
: Installing ECSPD reduces 44mA-> 2.14mA.
(I = V / R = 220V / 5,000Ω = 0.044A = 44mA)
It can be installed in any place by preventing electric shock by absorbing and reducing leakage current.

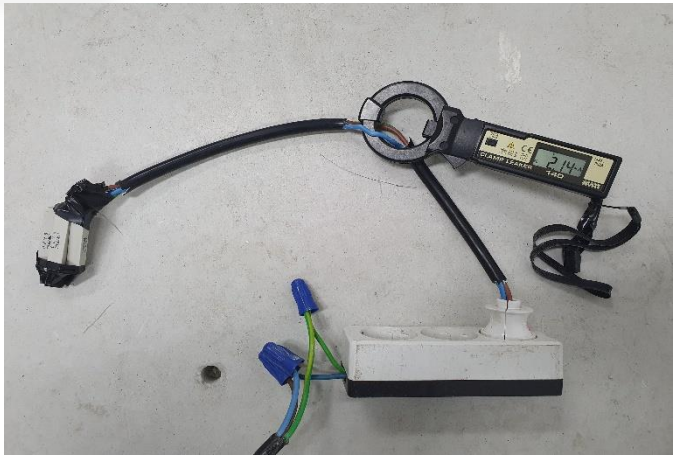
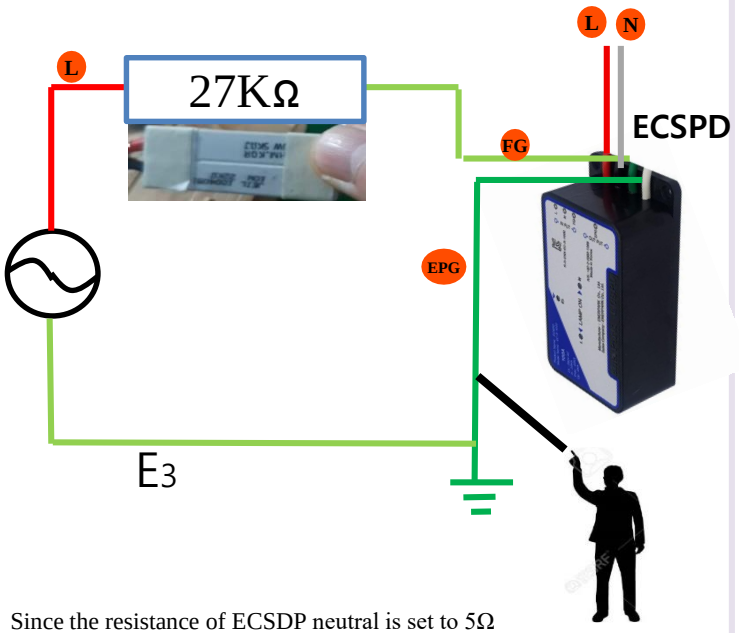


Figure 2

02. Product Introduction

Electric shock accident prevention experiment

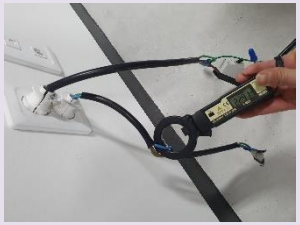
- Connecting a resistance (27KΩ) to the equivalent circuit produces a leakage current of 8 mA.
- Connecting the ECSPD to this circuit reduces the leakage current of 8 mA to 0.83 mA..



Since the resistance of ECSDP neutral is set to 5Ω
If it is over 5Ω, it does not affect the human body

Before installing ECSPD
(7.92mA)

After installing ECSPD
(0.83mA)



Before installing ECSPD
(22.9mA)

After installing ECSPD
(2mA)

03. 제품의 종류 및 설치 방법

■ 제품의 종류, 설치방법

1. Products for distribution board

   1) Single phase product. 2) 3 phase 4 wire type (integrated type) exclusive product.

2. Products for load.(to be released in July)

3. Installation method:

   1) Basic installation: 1-phase 2-wire type: 1 distribution panel ECSPD + 1 load ECSPD installation (1 to 1 installation)

   3-phase 4-wire type: 3 distribution panel ECSPD + 3 load ECSPD installation (3 to 3 installation)

   2) Additional installation: ECSPD are installed on the distribution panel to shield leakage current.

   (For equipotential and zero potential)

   Additionally, ECSPD for load products are installed in the load.

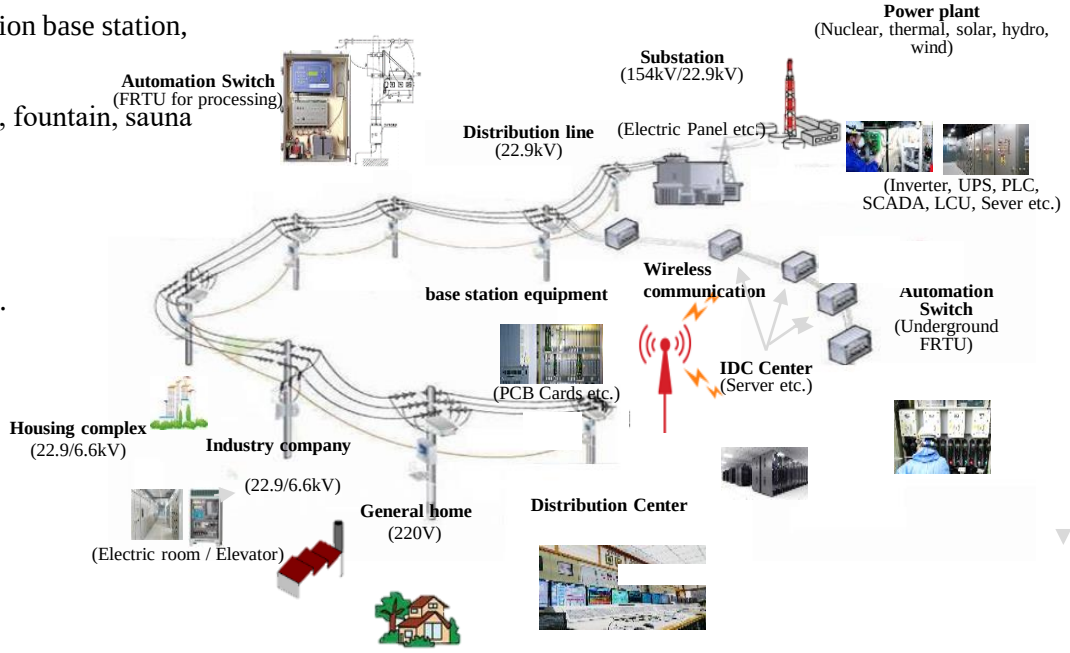
■ 제품의 스펙

Area	• 30A (AC 30A or less) : About 132m² (1 distribution panel + 1 load) - for family use, for factory use • 100A (AC 100A or less) : About 132m² (1 distribution panel + 1 load) - for factory use
Distance	• 30A (AC 30A or less) : 100m - for family use, for factory use • 100A (AC 100A or less) : 100m - for factory use

03. Applicable Fields

❖ Applicable for all fields which use electricity

- Power plant (hydroelectric, nuclear, thermal , solar, wind, tidal) instrumentation and controls, electric switchboard
- National or local government facility management control & switchboard
- Railway or subway signal equipment
- Control unit of broadcasting station , communication base station, military communication retransmitting station
- Water supply facility, swimming pool, water park, fountain, sauna
- Elevator control panel.
- Road traffic VMS, streetlight pole
- Industrial field-automatic control system, motor
- Refinery, gas station, chemical plant, shipyard etc.
- Control panel of shed (Korean native cattle, hog raising, chicken raising etc.)
- Apartment, buildings, housing management & switch board
- Bank, hospital, museum switch board etc.
- UPS, Inverter, CCTV, DCS, PLC, SCADA

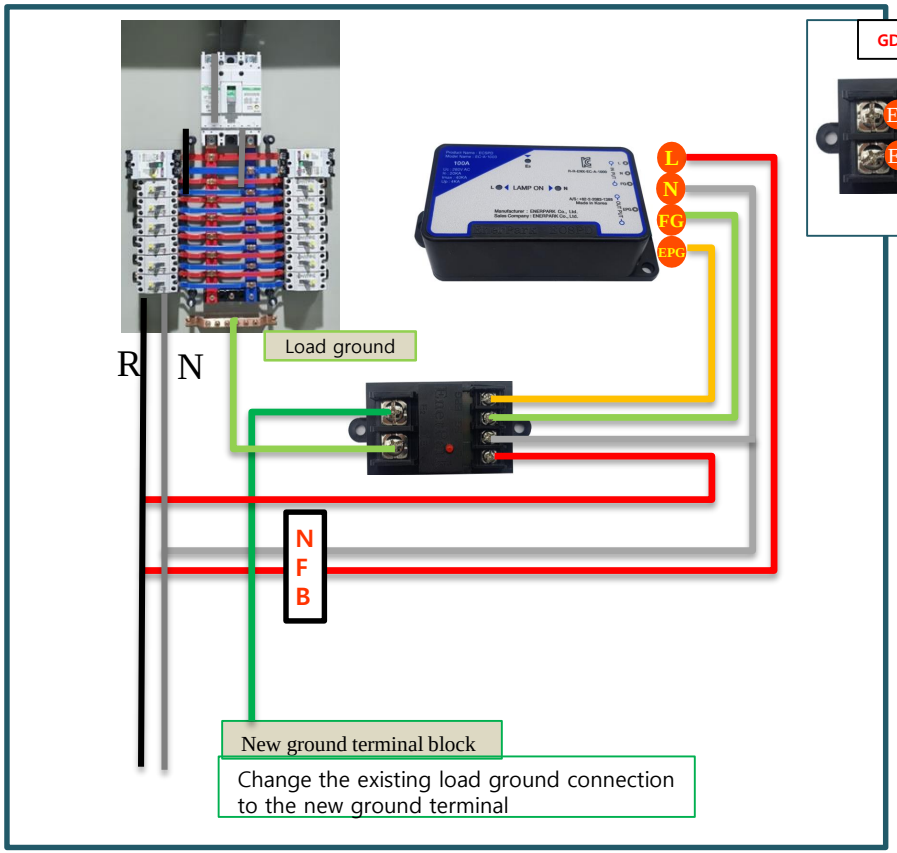


❖ Possible to develop a combination product that remedy the shortcoming of existing products by combining ECSPD with existing products.

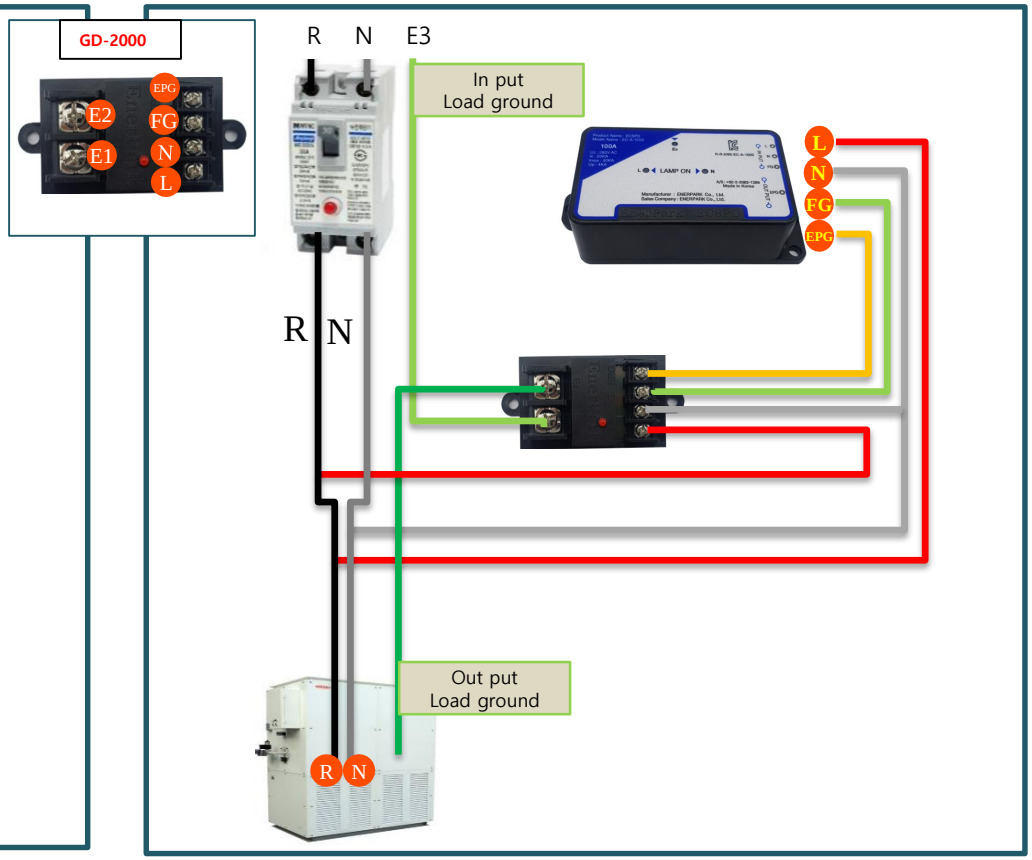
➔electric shock-free welding machine, electric shock-free electric car charger, electric shock-free steam car washer etc.

04. Installation Method - in case there is an ground (For shielding leakage current)

❖ **Distribution board (1 phase 2-wire system)**

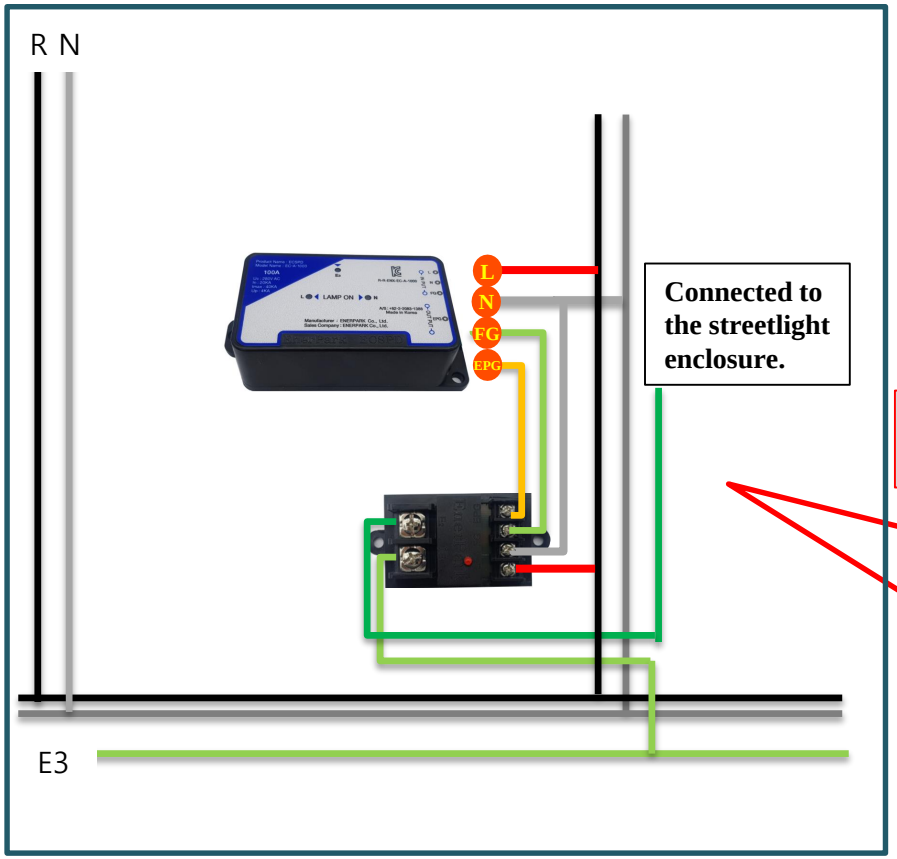


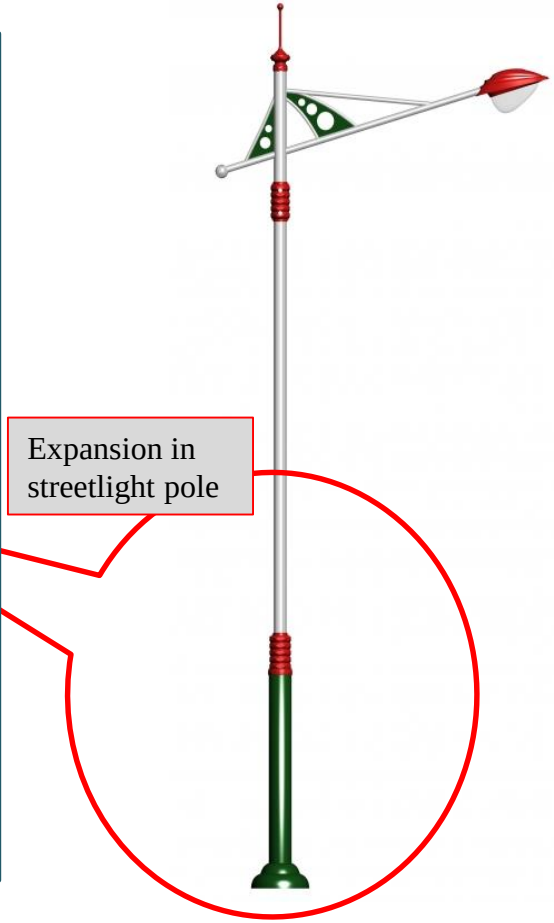
❖ **Load (1 phase 2-wire system)**



04. Installation Method - in case there is an ground (For shielding leakage current)

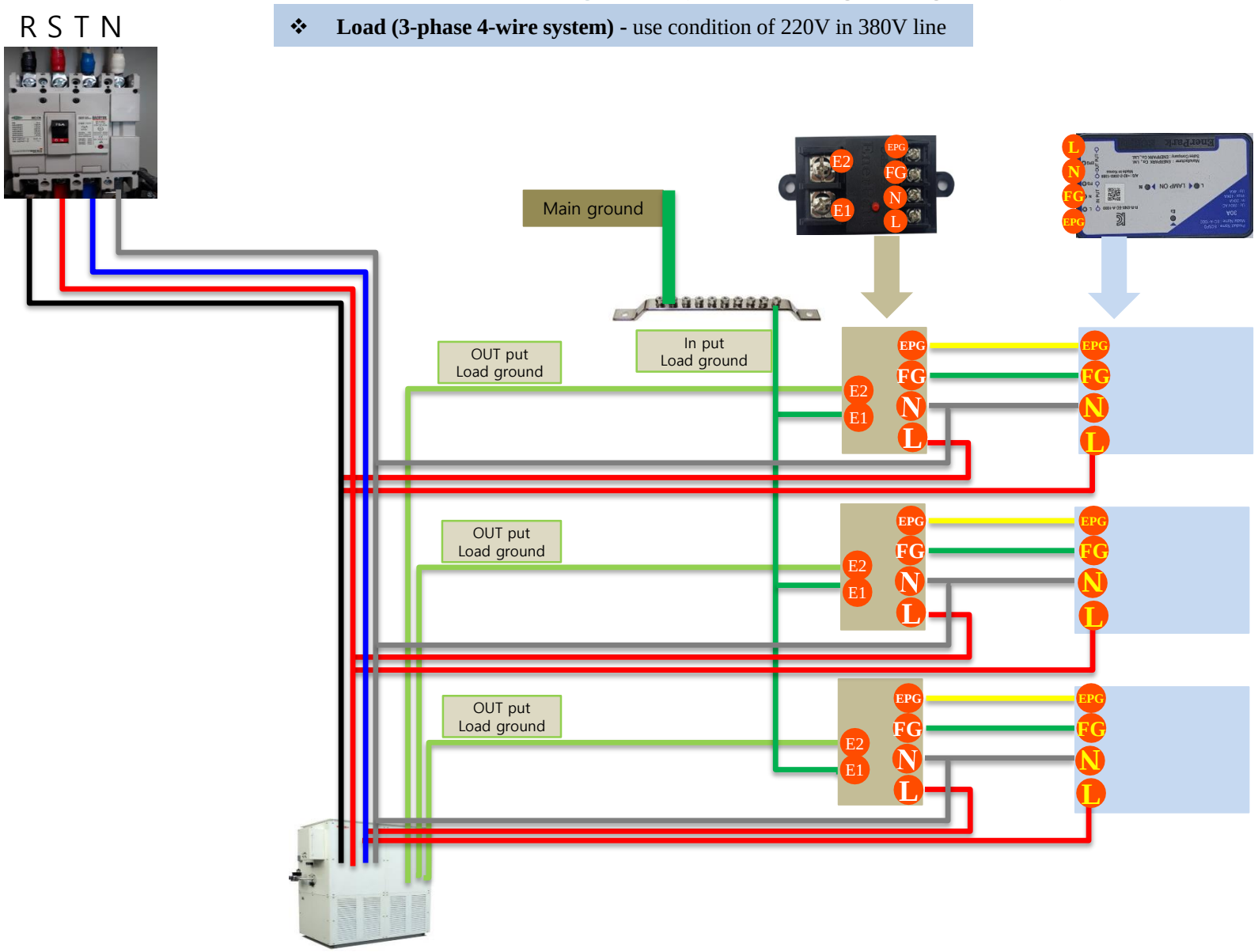
❖ **Installation method o f streetlight pole (1 phase 2-wire system)**





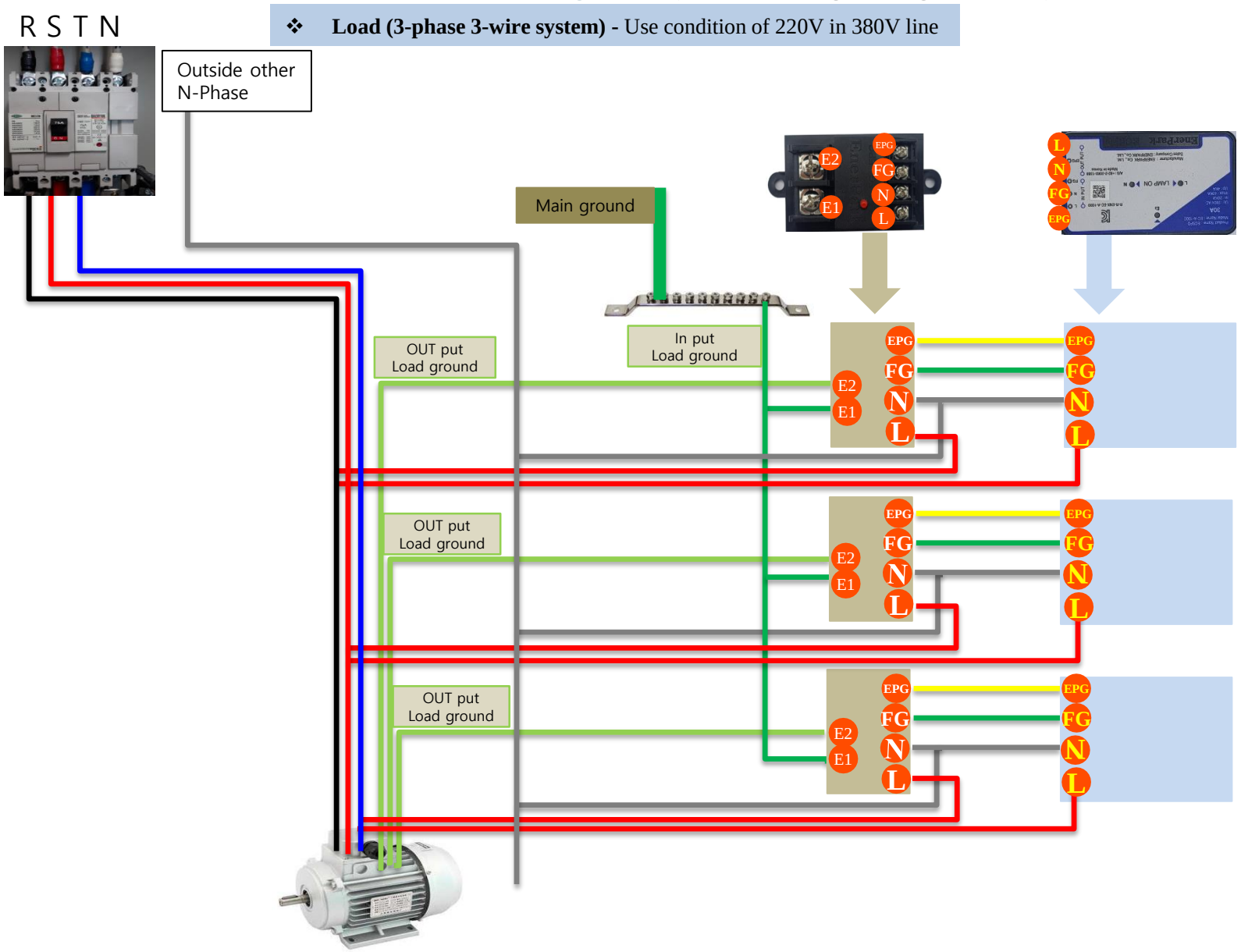
04. Installation Method - in case there is an ground (For shielding leakage current)

❖ **Load (3-phase 4-wire system) -** use condition of 220V in 380V line



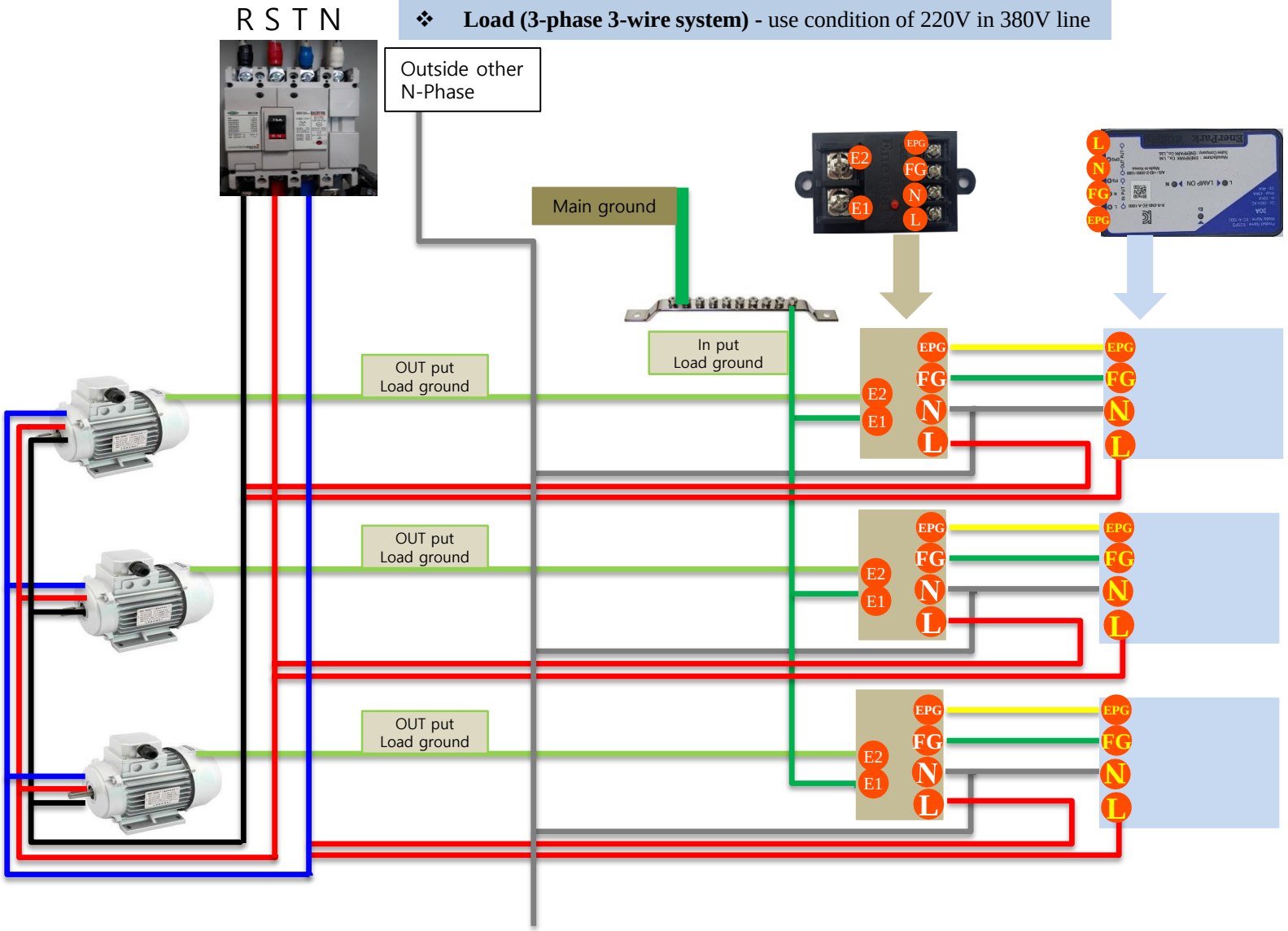
04. Installation Method - in case there is an ground (For shielding leakage current)

❖ **Load (3-phase 3-wire system) -** Use condition of 220V in 380V line



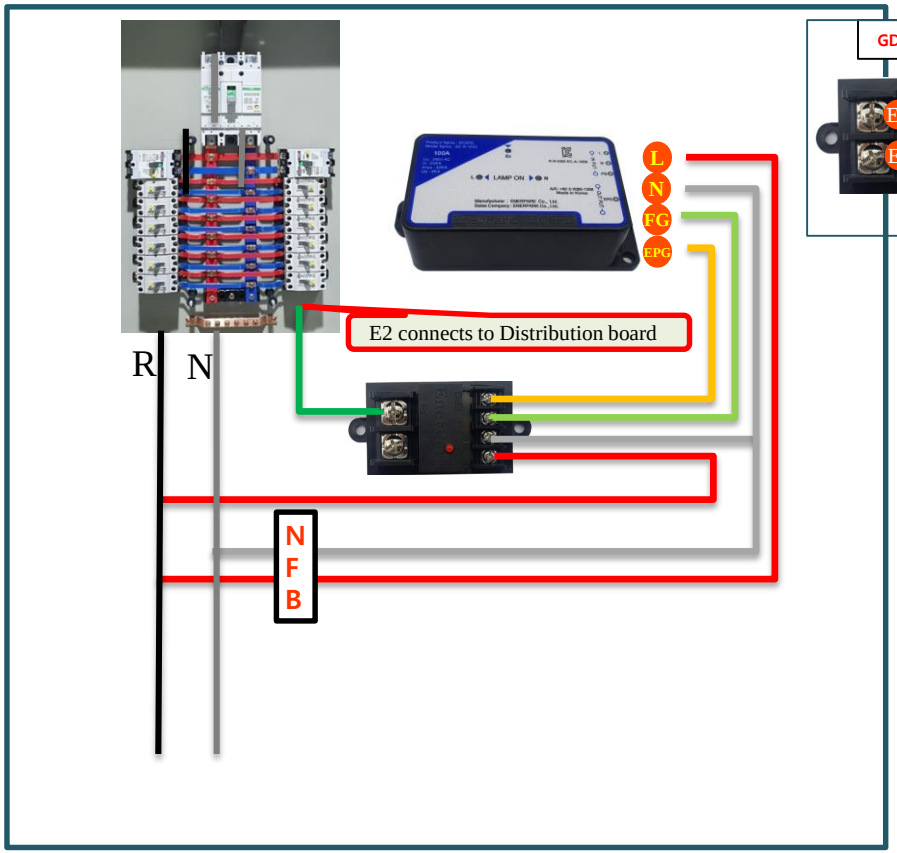
04. Installation Method - in case there is an ground (For shielding leakage current)

❖ **Load (3-phase 3-wire system) -** use condition of 220V in 380V line

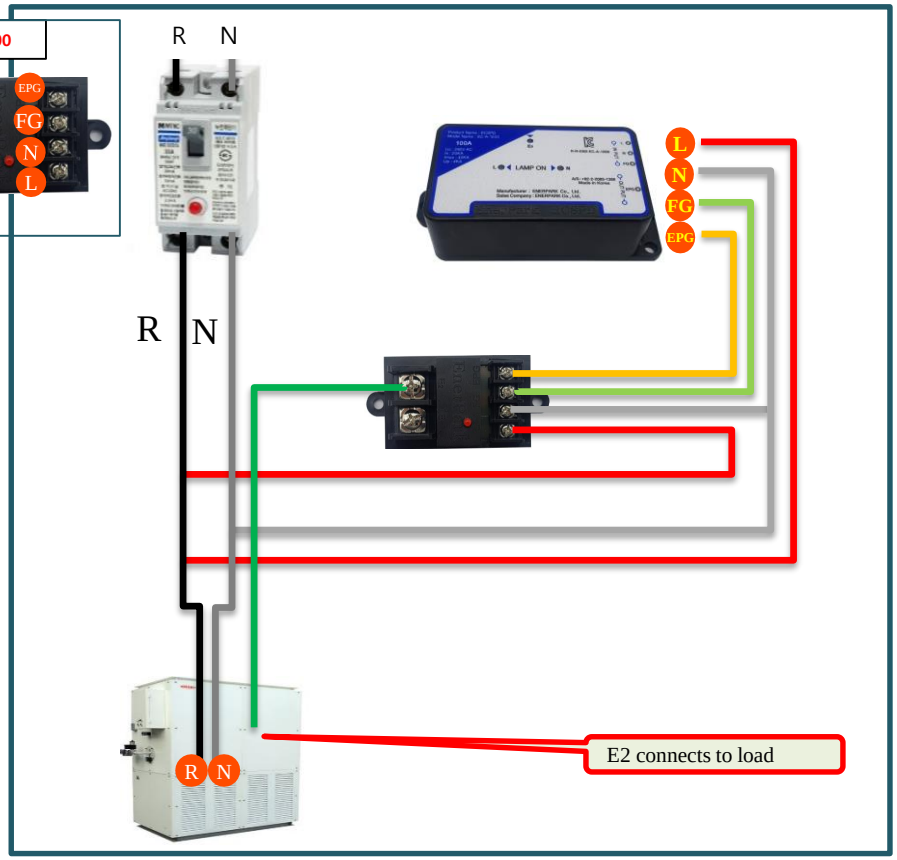


05. Installation Method - in case there is no ground (For shielding leakage current)

❖ **Distribution board (1 phase 2-wire system)**

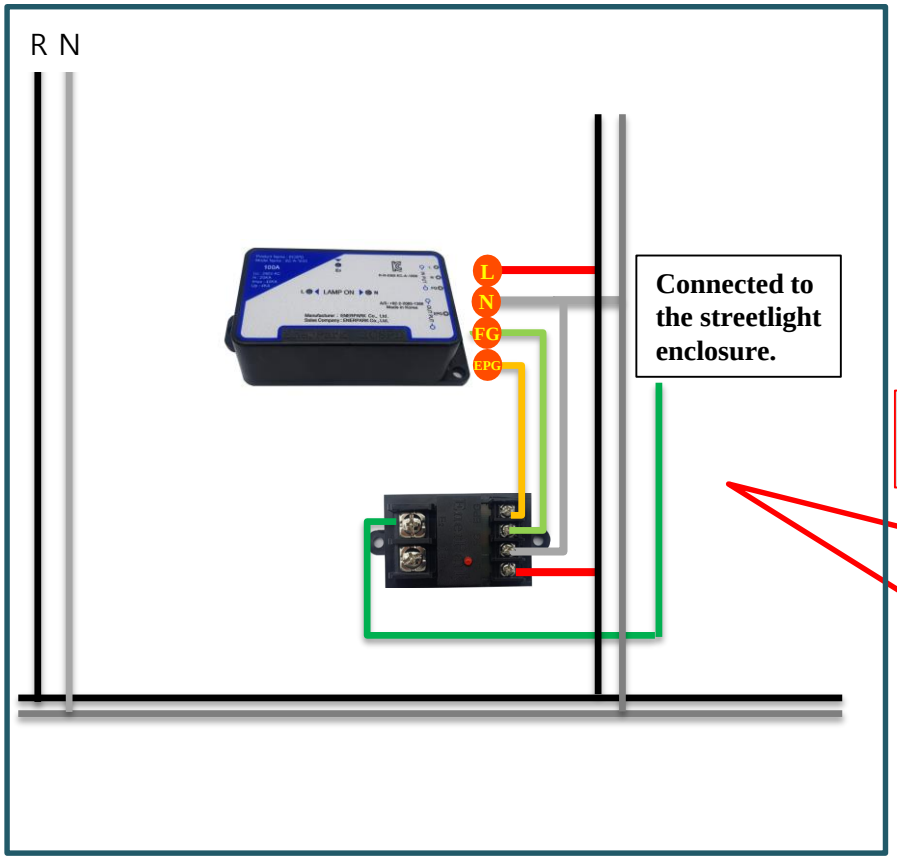


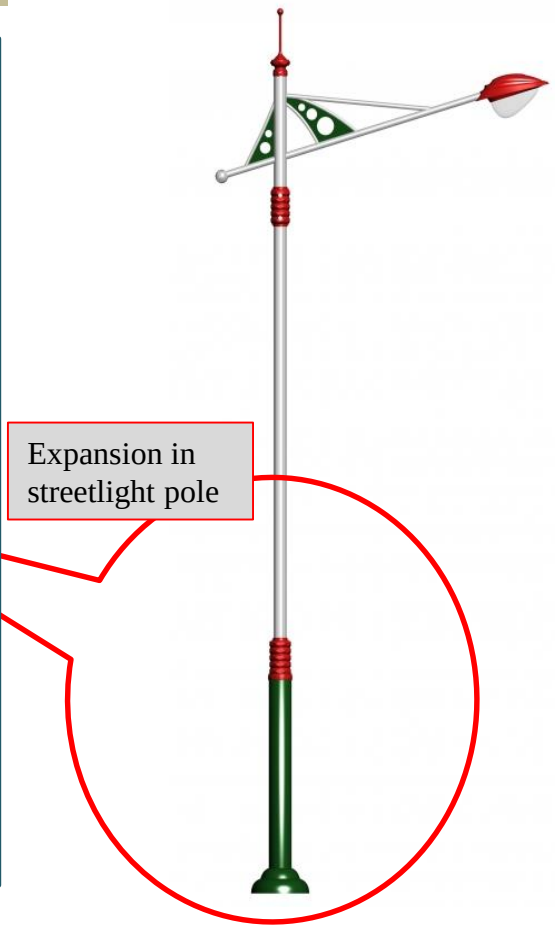
❖ **Load (1 phase 2-wire system)**



05. Installation Method - in case there is no ground (For shielding leakage current)

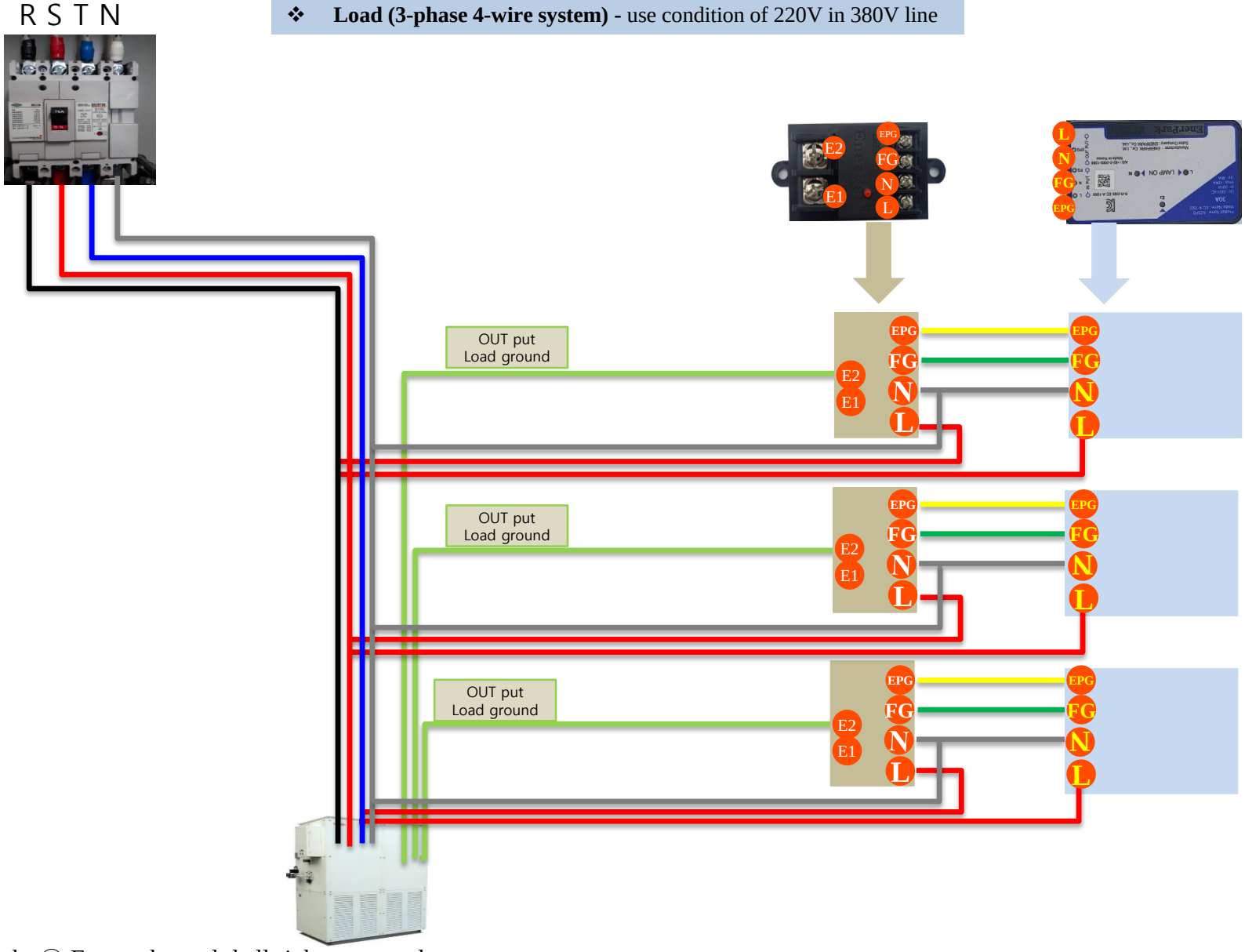
❖ **Installation method o f streetlight pole (single phase 2-wire system)**





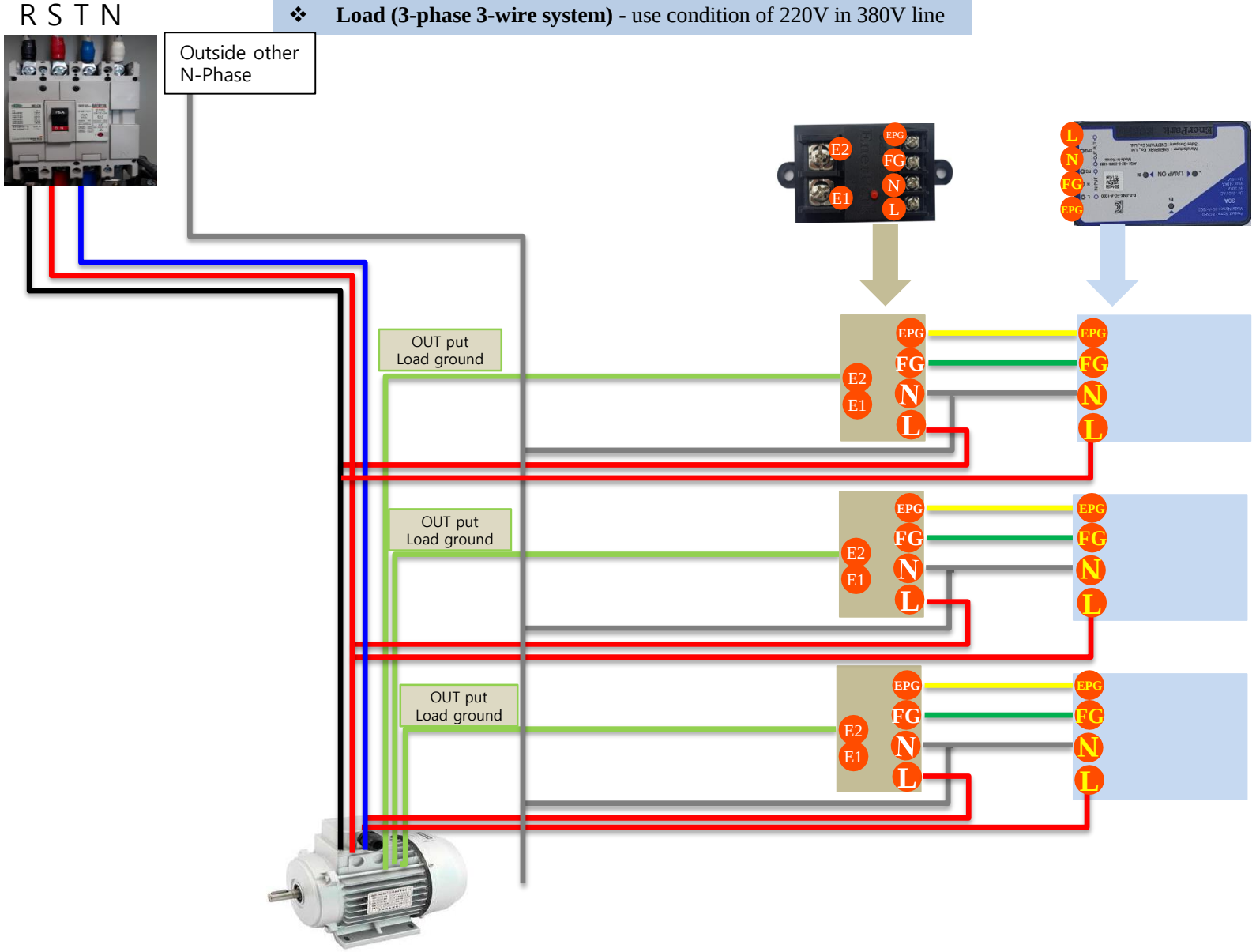
05. Installation Method - in case there is no ground (For shielding leakage current)

❖ **Load (3-phase 4-wire system) -** use condition of 220V in 380V line



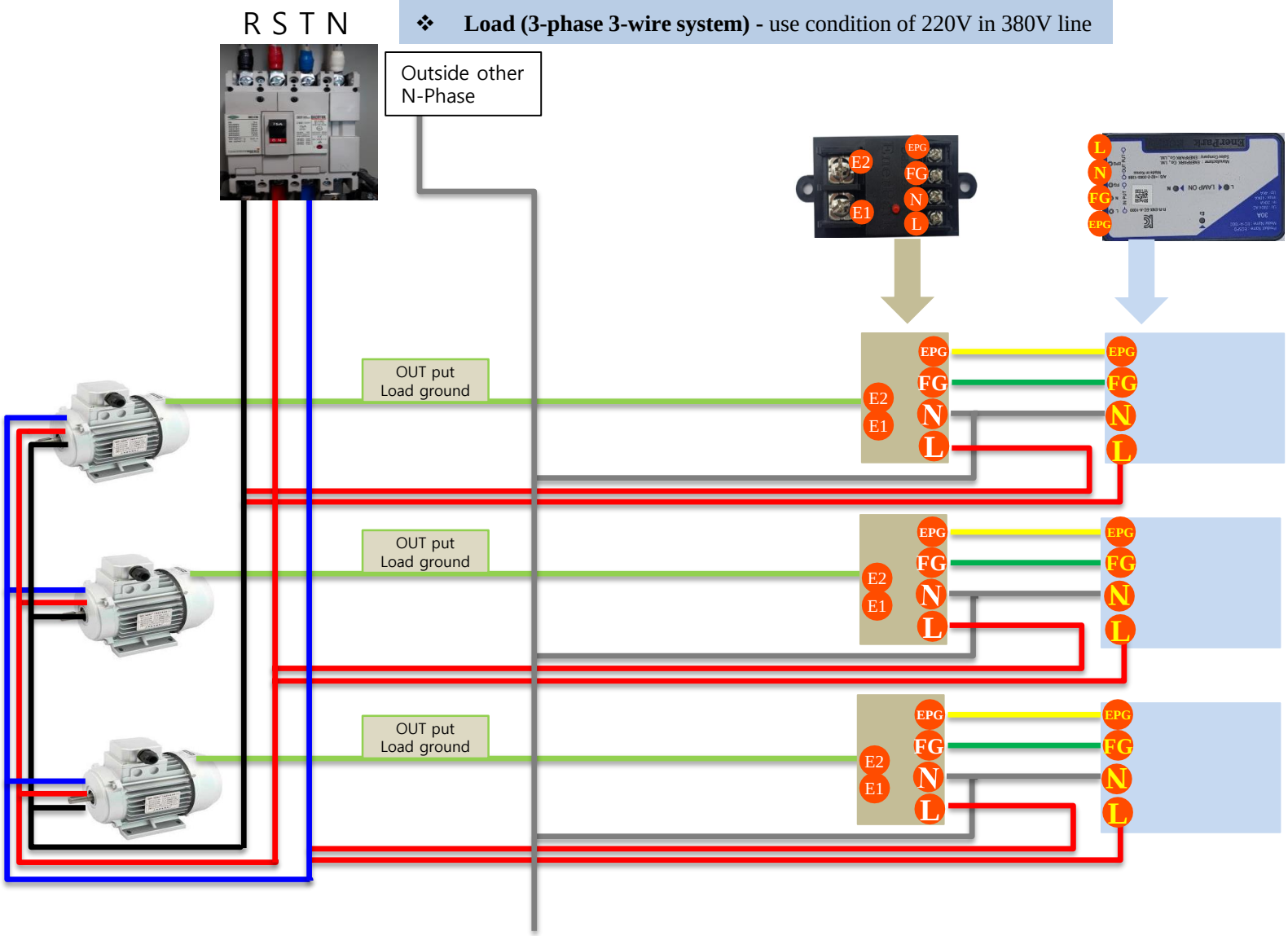
05. Installation Method - in case there is no ground (For shielding leakage current)

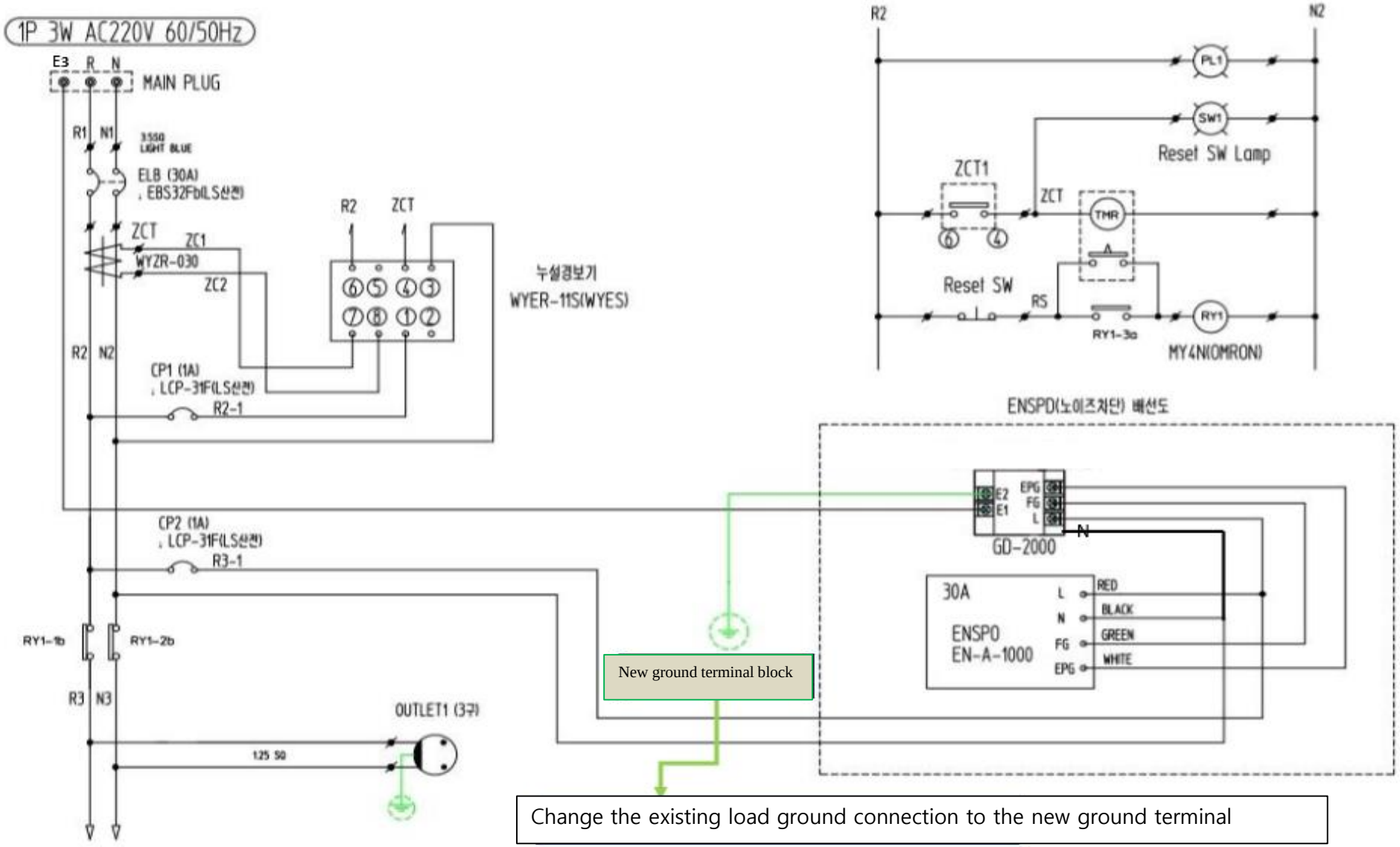
❖ **Load (3-phase 3-wire system) -** use condition of 220V in 380V line



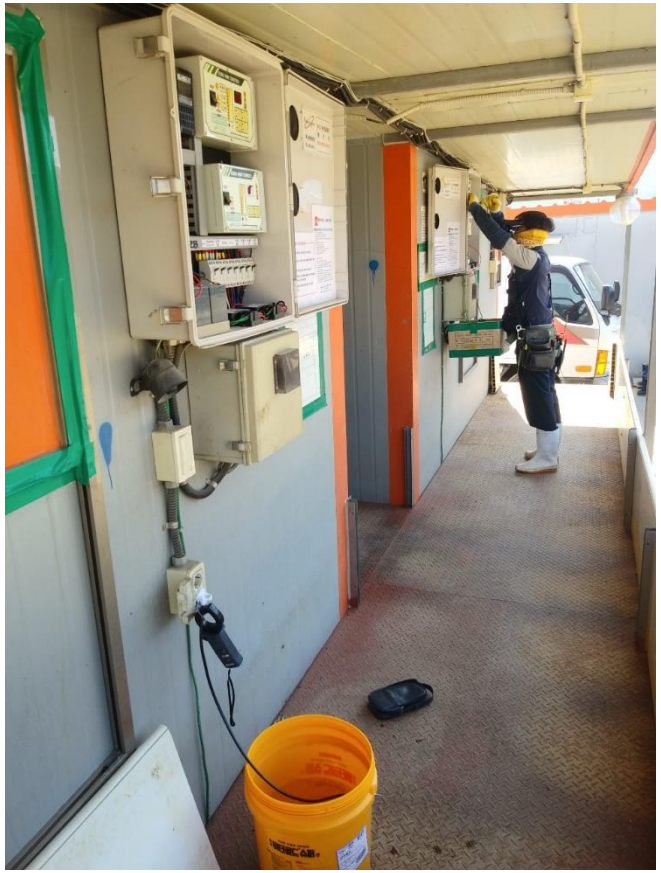
05. Installation Method - in case there is no ground (For shielding leakage current)

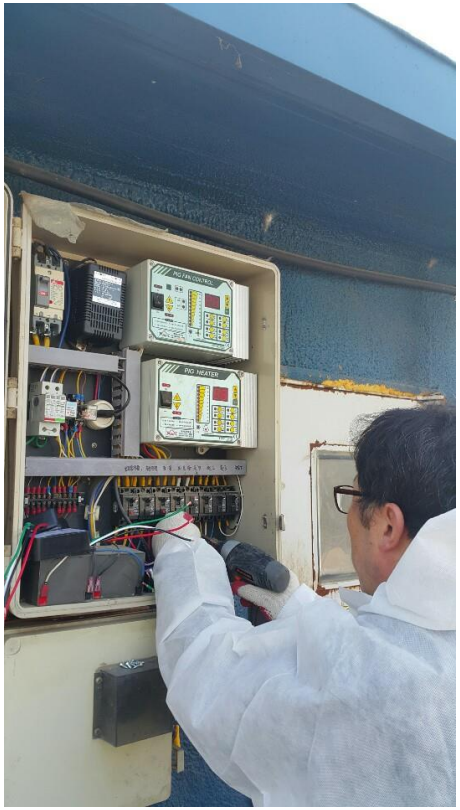
❖ **Load (3-phase 3-wire system) -** use condition of 220V in 380V line

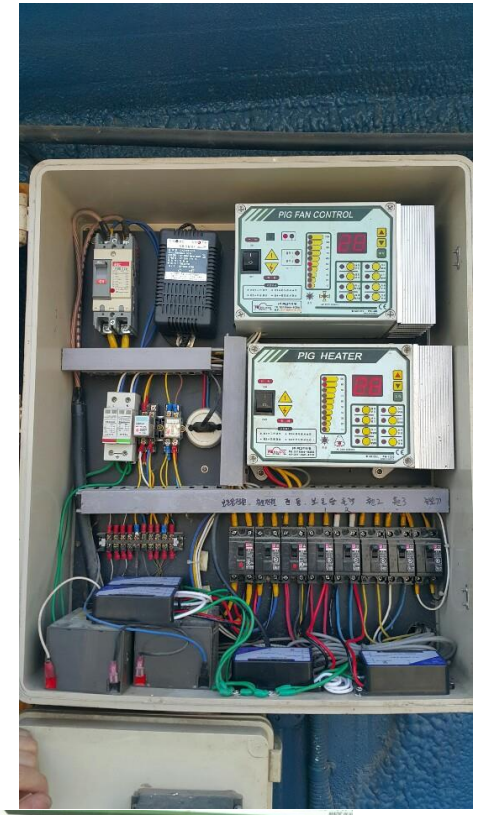


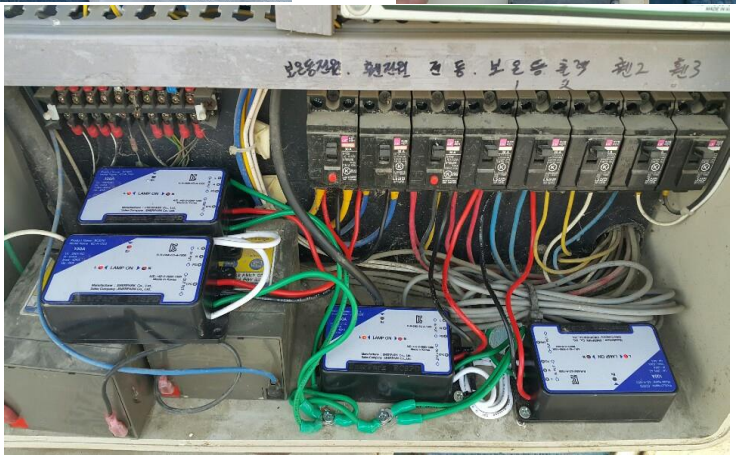


06. Installation case (Pig farm)

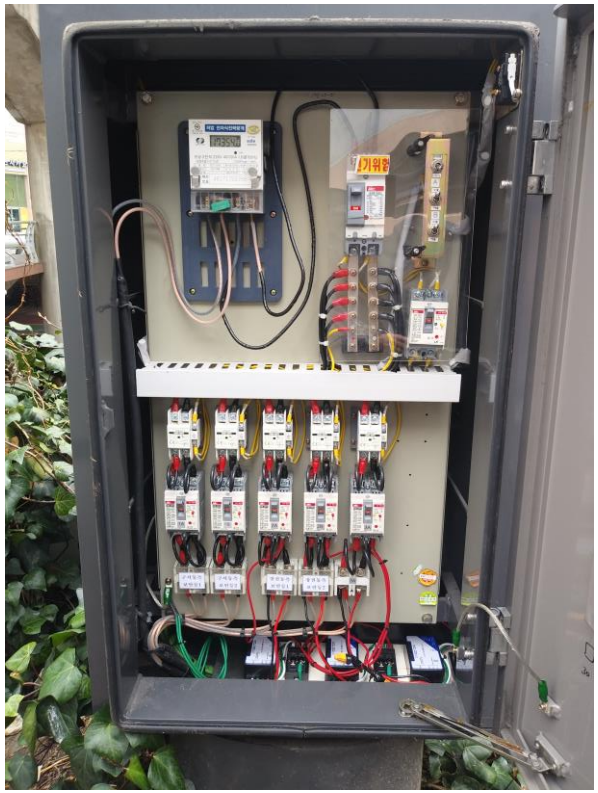


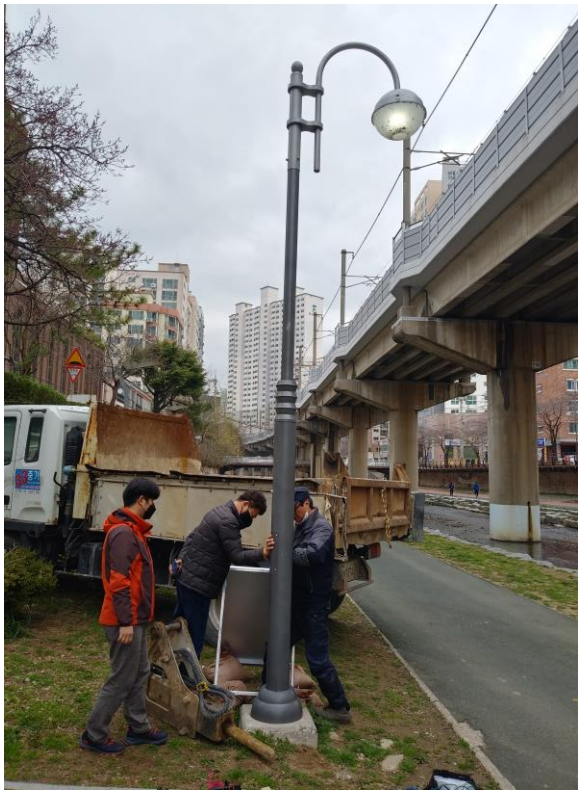




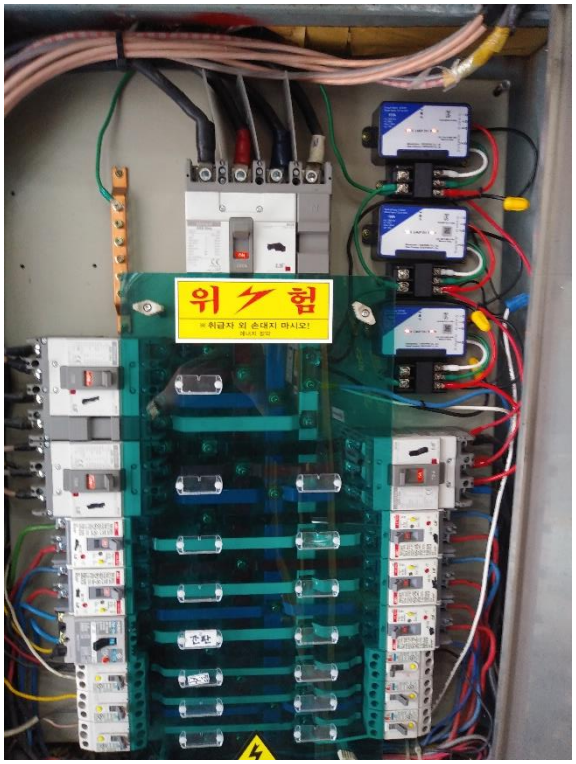


06. Installation case (Street light, security light)

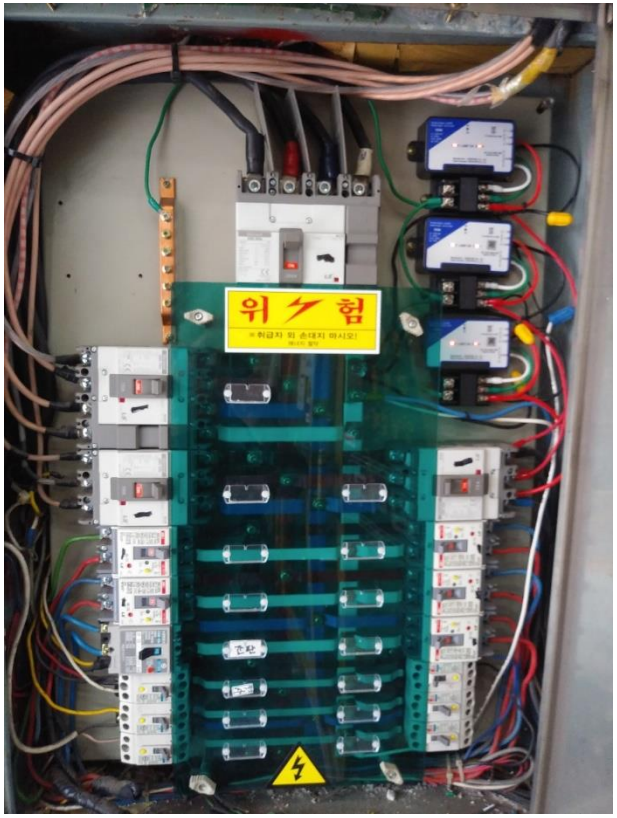




06. Installation case (Restaurant)



06. Installation case (Vinyl house)



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THANK YOU!

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