User Manual

Eco- EMS

Realtime Energy/CO2 monitoring system
Realtime wireless wattmeter and receiver

<Contents>

1. Monitoring system

Eco-EMS is real-time system to measure energy usages like electricity, gas, fuel and environmental factors like temperature, humidity, CO2 concentration, and to transmit these data to server for analyzing by wire and wireless. It can be interlocked with existing facilities like pulse out type meters, and also provide basic soft/hard ware for EnMS.

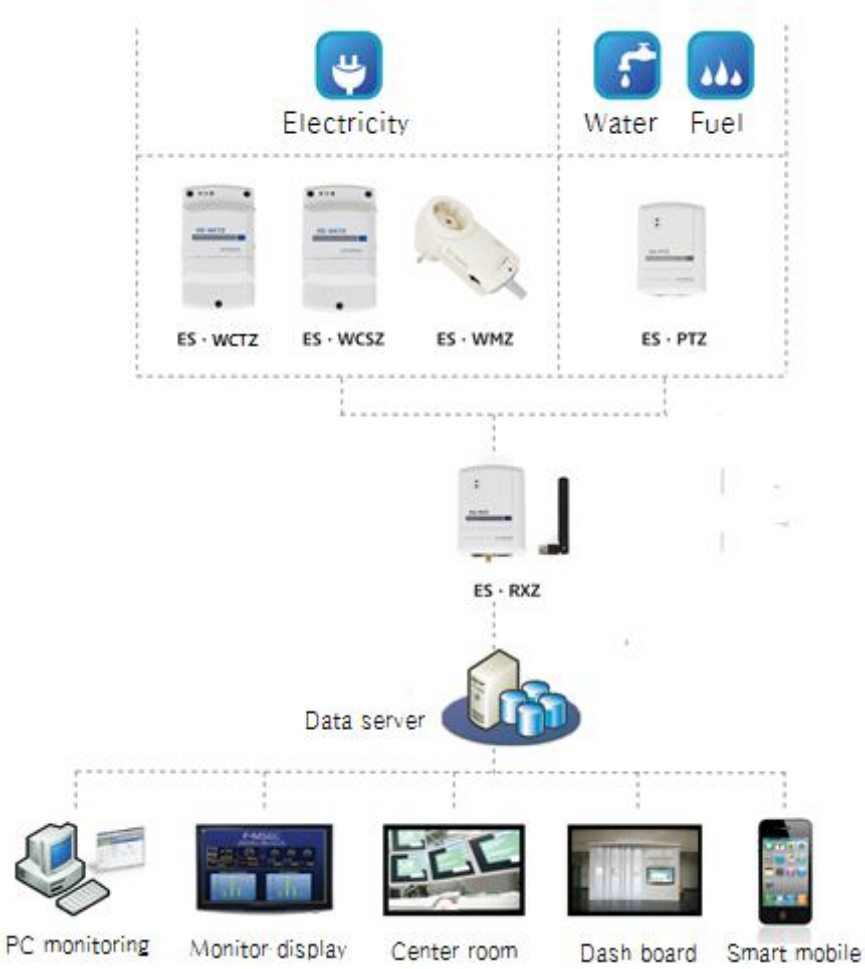


Fig.1-1 Mimetic diagram of energy monitoring system

2. Radio transmit set

2.1 ES-WCTZ4P(EcoSensor Wattmeter CT type Triple Phase 4 lines)

2.1.1 Appearance

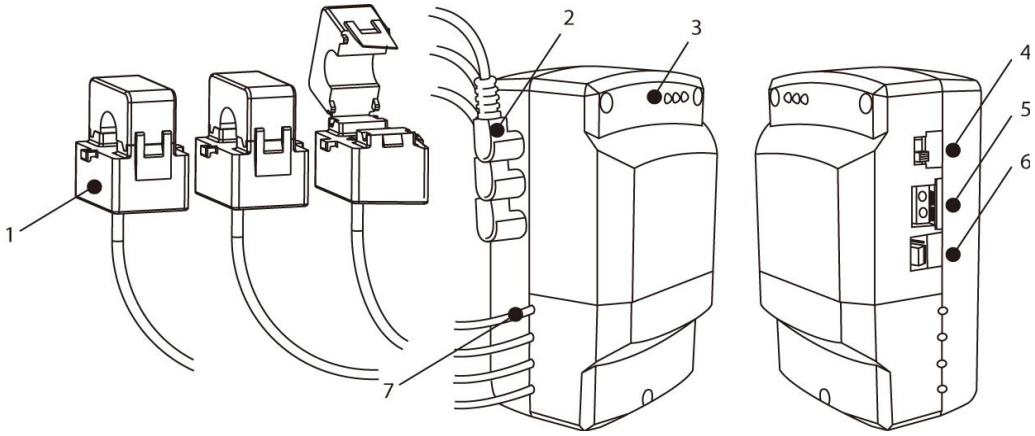


Fig.2-1-1 Appearance of ES-WCTZ4P(3Phases 4lines)

1. CT : Current Transformer
2. CT connector (R/S/T)
3. LED sign light
4. Power On/Off switch
5. RS485 line connector
6. RS485 communication setting jumper
7. PT connector (R/S/T/N)

※ ES-WCTZ4P using a special screw, individuals can't arbitrarily remove the screws.

2.1.2 Label design & Cross section

Fig.2-1-2 Label design of ES-WCTZ4P

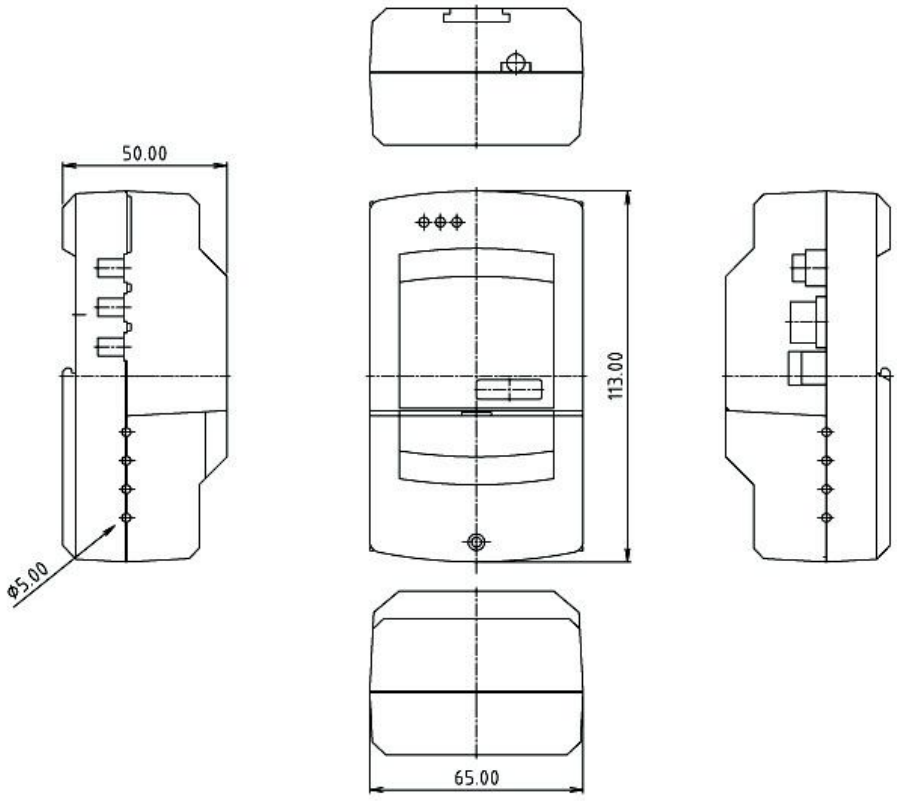


Fig.2-1-3 Cross section of ES-WCTZ4P

2.1.3 Functions

- measuring usage of 3phases 4lines(R, S, T, N) electric power
- active power(total, each of phase), reactive power(total, each of phase), the maximum value of electric power and current
- measuring level of month, day, hour, minute, second
- storage of previous data and supply drive electric power by oneself

2.2 ES-WCTZ3P (EcoSensor Wattmeter CT type Triple Phase 3 lines)

2.2.1 Appearance

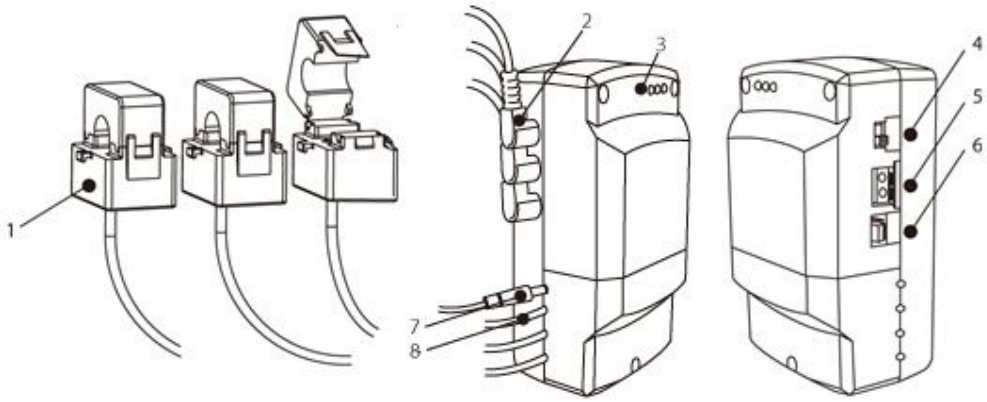


Fig.2-2-1 Appearance of ES-WCTZ3P(3phases 3lines)

1. CT : Current Transformer
2. CT connector (R/S/T)
3. LED sign light
4. Power On/Off switch
5. RS485 line connector
6. RS485 communication setting jumper
7. Power supply connector (DC 9V/1~2A)
8. PT connector (R/S/T)

※ ES-WCTZ3P using a special screw, individuals can't arbitrarily remove the screws.

2.2.2 Label design & Cross section

Fig.2-2-2 Label design of ES-WCTZ3P

The same as the ES-WCTZ4P.(2.1.2 Cross section)

2.2.3 Functions

- measuring usage of 3 Phase 3 line(R, S, T) electric power
- active power(total, each of phase), reactive power(total, each of phase), the maximum value of electric power and current
- measuring level of month, day, hour, minute, second
- storage of previous data

2.3 ES-WCSZ(EcoSensor Wattmeter CT type Single Phase)

2.3.1 Appearance

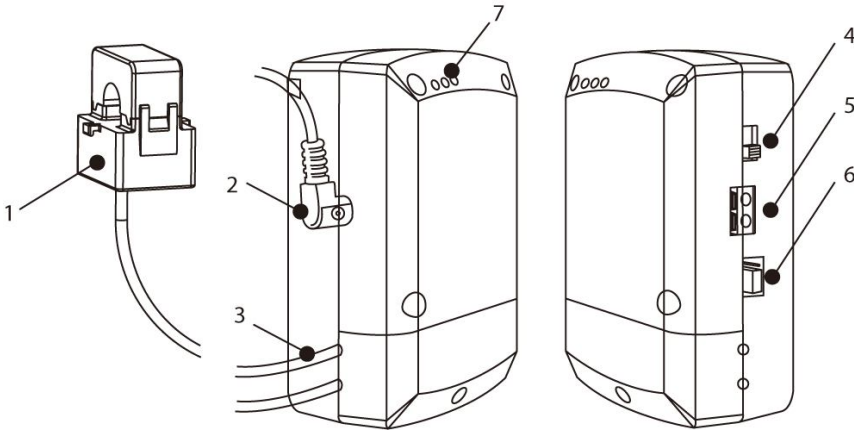


Fig.2-3 Appearance of ES-WCSZ

1. CT : Current Transformer
2. CT connector (one of R/S/T)
3. LED sign light
4. Power On/Off switch
5. RS485 line connector
6. RS485 communication setting jumper
7. PT connector (one of R/S/T, N)

※ ES-WCSZ using a special screw, individuals can't arbitrarily remove the screws.

2.3.2 Functions

- measuring usage of Single phase 2 line(one of R, S, T and N) electric power
- active power(total, each of phase), reactive power(total, each of phase), the maximum value of electric power and current
- measuring level of month, day, hour, minute, second

- storage of previous data and supply drive electric power by oneself

2.4 ES-PTZ(Pulse Transfer Zigbee)

2.4.1 Appearance

1. Pulse data transmitting point
2. 220V DC adapter
3. Power supply connector
4. LED sign light

※ ES-PTZ using a special screw, individuals can't arbitrarily remove the screws.

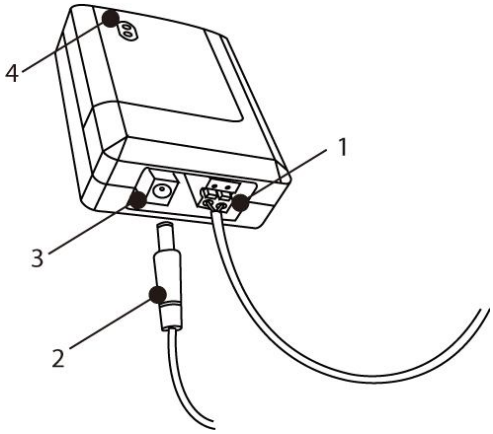


Fig.2-4 Appearance of ES-PTZ

2.4.2 Functions

- integrating Pulse data of Energy meter
- wire reception and wireless transmission

2.5 ES-ENVZ(EcoSensor Environment Zigbee)

2.5.1 Appearance

1. Data transmission point
2. Sensor of environmental factor
3. LED sign light

※ ES-ENVZ using a special screw, individuals can't arbitrarily remove the screws.

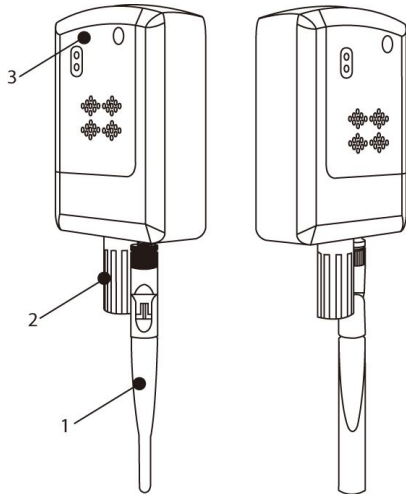


Fig.2-5 Appearance of ES-ENVZ

2.5.2 Function

- Measuring of Temperature, Humidity and Concentration of CO2(ppm)
- Wireless transmission of measuring data

2.6 ES-Wattmeter(EcoSensor Wattmeter)

2.6.1 Appearance

1. 220V socket connector
2. Hole of heat emission
3. LED sign light
4. Data transmission point
5. Power On/OFF switch

※ ES-Wattmeter using a special screw, individuals can't arbitrarily remove the screws.

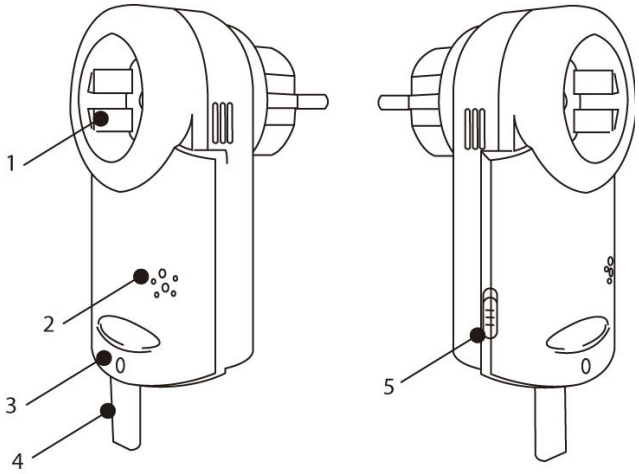


Fig.2-6 Appearance of ES-Wattmeter

2.6.2 Functions

- Measuring electric power usage of 220V socket type electric products
- Wireless transmission of electric power data

3. Radio repeater

3.1 ES-RXZ(EcoSensor Rx Zigbee)

3.1.1 Appearance

1. LED sign light
2. Data transmission point
3. Power supply point
4. 110V/220V DC adapter
5. Lan(TCP/IP) cable connector
6. RJ45 port

※ ES-RXZ using a special screw, individuals can't arbitrarily remove the screws.

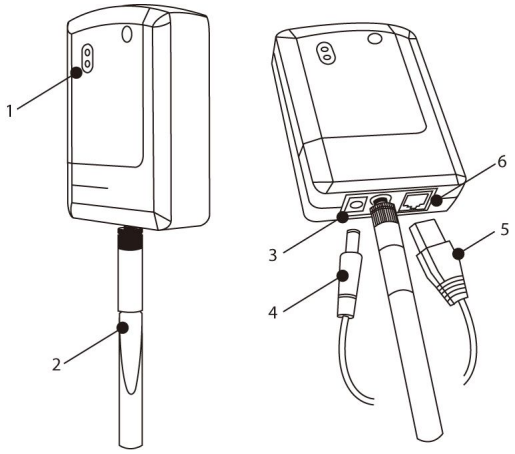


Fig.3-1-1 Appearance of ES-RXZ

3.1.2 Label design & Cross section

Fig.3-1-2 Label design of ES-RXZ

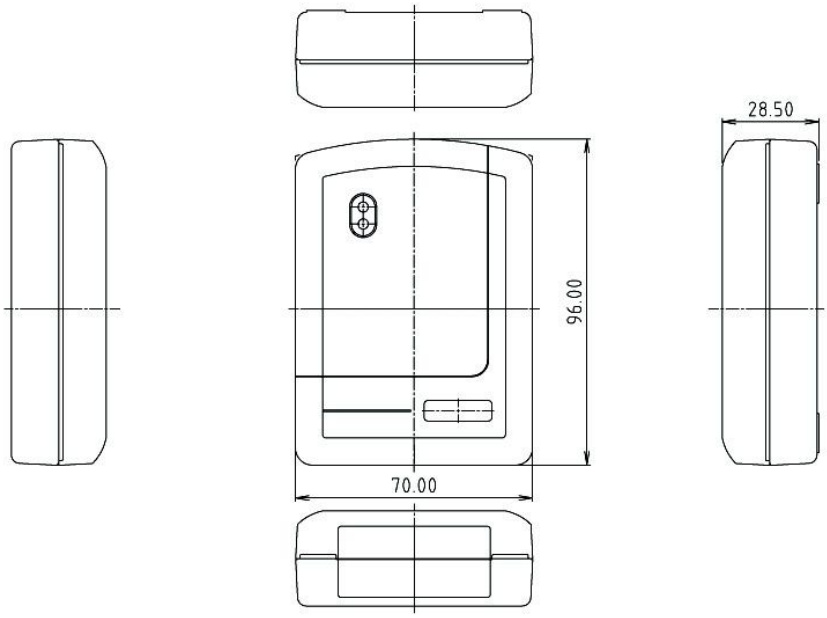


Fig.3-1-3 Cross section of ES-RXZ

3.1.3 Functions

- Receiving data from ES-WCTZ, WCSZ, PTZ, ENVZ and Wattmeter by wireless
- Transmitting data to server, PC by TCP/IP(wire)

4. NETWORK

4.1 Specifications

This Monitoring system use the Zigbee module(wireless) communication system and TCP/IP, RS485(wire) communication system.

4.2 Features

(1) Zigbee : It has used at communications between ES-WCTZs, WCSZ, PTZ, ENVZ, Wattmeter and ES-RXZ

(2) TCP/IP, RS485 : It have used at communications between ES-RXZ and server PC

4.3 Mimetic diagram

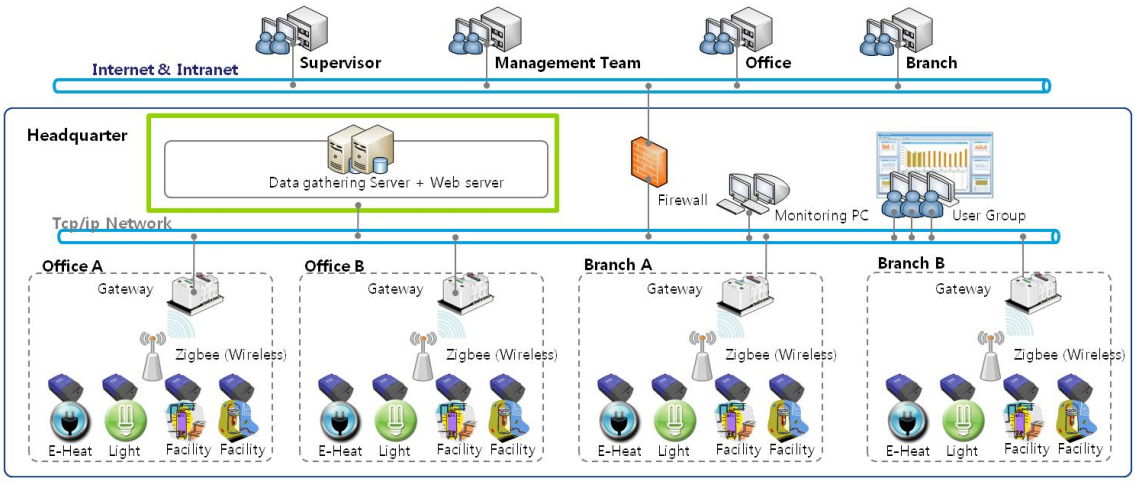


Fig.4-1 Mimetic diagram of Energy Monitoring System(example)

5. Installation

This chapter describes way of products installation and matters that require warnning and caution.

5.1 Products installation

5.1.1 ES-WCTZ4P, WCTZ3P, WCSZ

5.1.1.1 Fixing Channel(rail)

1. Channel has to be placed at point, products are going to be installed.
2. Channel is fastened by screw.

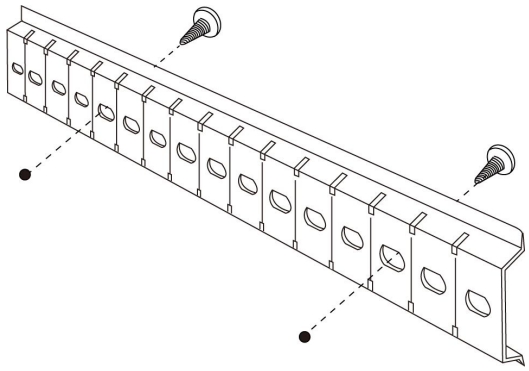


Fig.5-1 Fixing channel

WARNING

- Under construction, You must install products with caution, not to contacted channel with electric conductors.
- When constructor get an electric shock, it can be harmful to human body.(ex. fatal injury, death wound and even death) So, the constructor must be transferred to the hospital immediately with proper first aid.

Professional Installation Requirement: Please acknowledge your understanding that this device must be professionally installed.

5.1.1.1 WCTZ4P, WCTZ3P, WCSZ

1. WCTZs(WCSZ) can be fixed on channel with clip placed at back of product.
2. On the contrary to fixing, Seperation is possible by pulling the clip

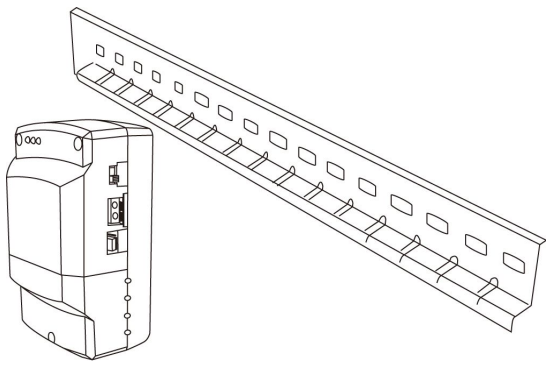


Fig.5-2 Fixing product with channel

CAUTION

- Site where the ES-WCTZs(WCSZ) be expected to be placed must have enough space to install. otherwise, during the installation, blackout can be caused like power failure. Like in this circumstance, by installing additional plastic box, let products be placed in the box.
- You must use proper ES-WCTZs(WCSZ) complying with data of site investigation. Otherwise, user can not get an accurate data from ES-WCTZs(WCSZ).

5.1.1.2 Installing Current Transformer(CT)

1. A Current Transformer(CT) must be hanged on each phase of R, S, T, N(ES-WCTZ4P/3phases 4lines), R, S, T(ES-WCTZ/3phases 3liness) and one of R/S/T, N(ES-WCSZ).(It is needed to confirm phase position and R, S, T mark on ES-WCTZs(WCSZ).)
2. Direction of arrows in below picture(Fig.3-18) indicate flow of current, it have to accord with direction of K → L(from K to L).
3. After identifying direction of current, constructor hang a current transformer on wire by fixing clip.(If constructor do not install a CT accord with direction of current, user can not get an accurate data from ES-WCTZs(WCSZ)

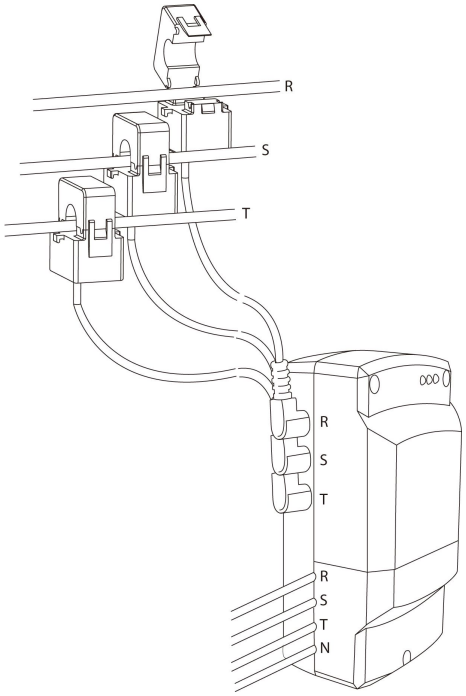


Fig.5-3 Installation of CT / PT

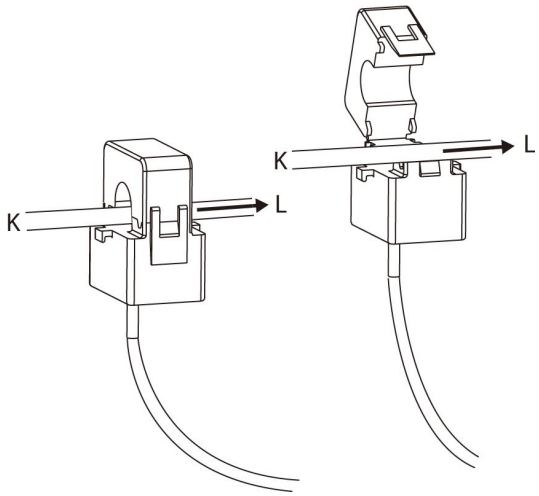


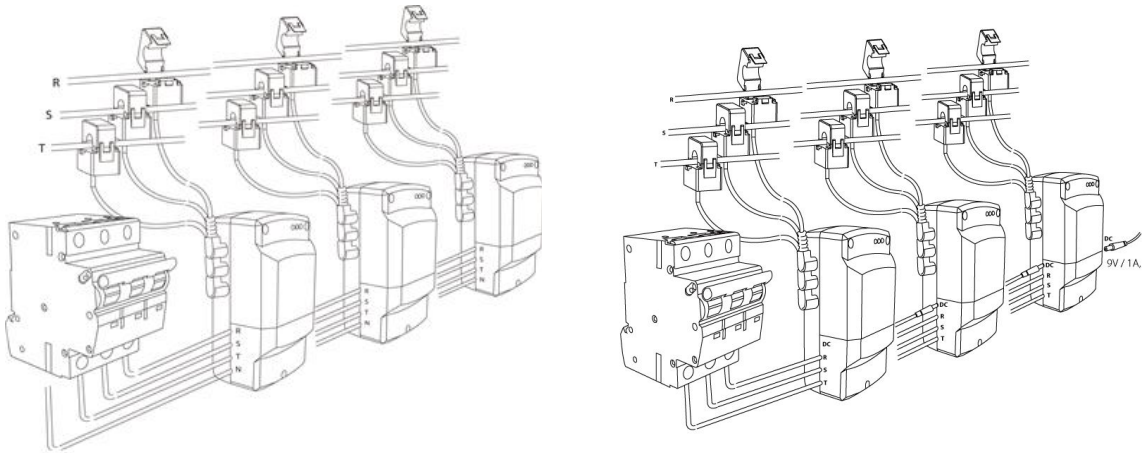
Fig.5-4 Installation of CT on wire

CAUTION

- If constructor open and close the clip on Current Transformer used on monitoring system so many times, it could be dropped and have a physical effect on other equipments. So, do not use Current Transformer by use of clamp meter.
- After installing Current Transformer, by using tie-down, constructor must prevent contact of Current Transformer and wire surface. Otherwise user can not get an accurate data from ES-WCTZs(WCSZ).

5.1.1.3 Installing voltage(PT)

1. If there is a spare molded circuit breaker, constructor can use it. But there is no spare molded circuit breaker, constructor have to overextend leading wires of R/S/T/N phases. (In case of none spare breakers, constructor must install additional molded circuit breaker.)
2. Constructor connect overextended leading wires of R/S/T/N phases to voltage part of ES-WCTZs(WCSZ).
   - In case of ES-WCTZ4P(3phases 4lines): R, S, T, N (wire standard : 2.1 ~ 3.3mm)
   - In case of ES-WCTZ3P(3phases 3lines): R, S, T (wire standard : 2.1 ~ 3.3mm) and DC power supply adapter(9V/1A~2A, wire standard : 3.1mm/1.4mm)
   - In case of ES-WCSZ: One of R, S, T and N (wire standard : 2.1 ~ 3.3mm)
3. Constructor can supply active power on plural ES-WCTZs(WCSZ)s by arranging wire in a row(parallel connected type). (wire standard : 2.1 ~ 3.3mm)



< ES-WCTZ4P(3phases 4lines), ES-WCSZ > < ES-WCTZ3P(3phases 3lines) >

Fig.5-5 Finished installing of ES-WCTZs(WCSZ)

WARNING

- Before installing ES-WCTZs(WCSZ), constructor have to check voltage with voltage tester, it is proper to install ES-WCTZs(WCSZ) or not.
- If constructor install ES-WCTZs(WCSZ) Without testing capacity of voltage, ES-WCTZs(WCSZ) can explode under higher than proper voltage.

Professional Installation Requirement: Please acknowledge your understanding that this device must be professionally installed.

5.1.2 ES-PTZ

1. After fixing about 6mm in diameter on the wall or surface where ES-PTZ be expected to be installed, then fixing ES-PTZ by putting the screw into back hole of ES-PTZ.
2. ES-PTZ can be operated by connecting DC 5V power supply and pulse data wire.

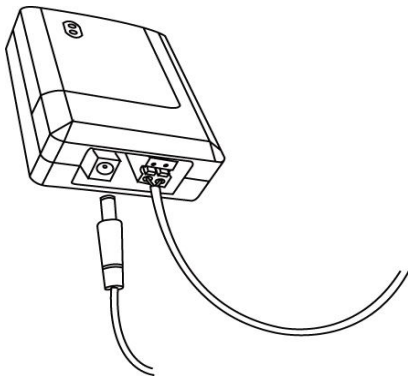


Fig.5-6 Connecting power
and pulse line

5.1.3 ES-ENVZ

1. After fixing about 6mm in diameter on the wall or surface where ES-ENVZ be expected to be installed, then fixing ES-ENVZ by putting the screw into back hole of ES-ENVZ. ES-ENVZ can be operated by connecting DC 5V power supply.

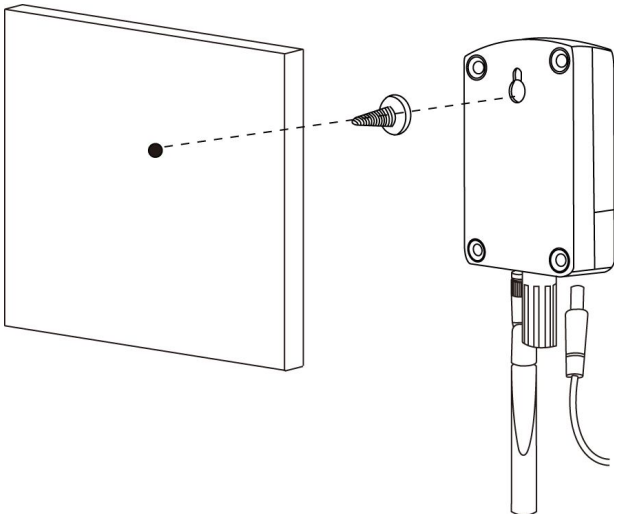


Fig.5-7 Installing ES-ENVZ on the wall

5.1.4 ES-Wattmeter

1. User easily can insert ES-Wattmeter into 220V socket with being connected electric installation to be needed knowing usage of electric power.

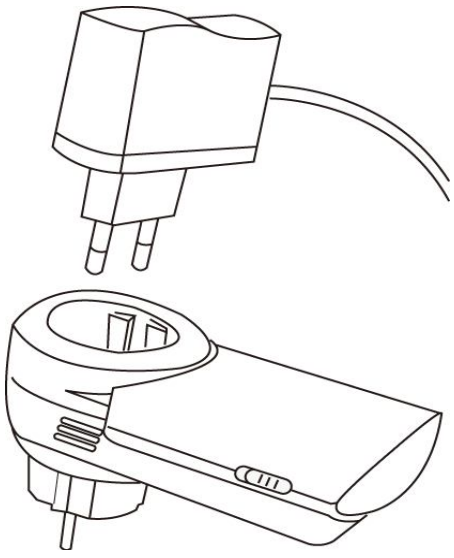


Fig.5-8 Connecting
ES-Wattmeter

5.1.5 ES-RXZ

1. After fixing about 6mm in diameter on the wall or surface where ES-RXZ be expected to be installed, then fixing ES-RXZ by putting the screw into back hole of ES-RXZ.
2. ES-RXZ can be operated by connecting DC 5V power supply and network cable(TCP/IP, RS485).

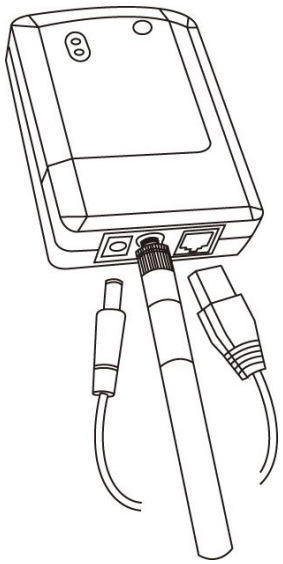


Fig.5-9 Connecting power and TCP/IP cable

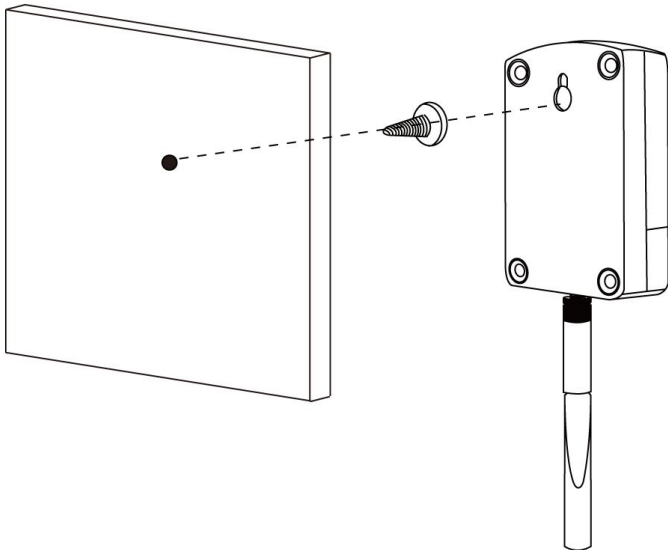


Fig.5-10 Installing ES-ENVZ on the wall

5.1.6 LED sign light

Table.5-1 LED sign light

LED type / Product	Green LED	Yellow LED	Red LED
ES-WCTZs (WCSZ)	Indicating state of radio communications on - RXZ sensing off - no RXZ sensing	Light on per 1W of electric usage	Indicating state of power supply on - power on off - power off
ES-OTZ	Indicating state of radio communications on - RXZ sensing off - no RXZ sensing	—	Indicating state of power supply on - power on off - power off
ES-PTZ	Indicating state of radio communications on - RXZ sensing off - no RXZ sensing	—	Indicating state of power supply on - power on off - power off
ES-ENVZ	Indicating state of radio communications on - RXZ sensing off - no RXZ sensing	—	Indicating state of power supply on - power on off - power off
ES-Wattmeter	—	—	Indicating state of power supply on - power on off - power off
ES-RXZ	Indicating state of radio communications on - RXZ sensing off - no RXZ sensing	—	Indicating state of power supply on - power on off - power off

6. Products specifications

6.1 ES-WCTZ4P

Table.6-1 ES-WCTZ4P specification

Classify	Item	Standard
MAIN	Model	ES-WCTZ4P
	RF MODULE	2.4GHz (zigibee)
	Accuracy	W:±1.0% FS±2digit
	LED	POWER LED, STATUS LED, SEND LED
	Wire type	RS485 (Half)
	Working Voltage	AC 85-264V (Free)
	Current Consumption	1.8wh
	Size(W*D*H) (mm)	65*113*50
	Connection type	3phases 4lines
	Weight(g)	About 198
	Range of voltage measurement	≤440V
	Max current measurement	1250A
RF MODULE	RF Frequency Range	2400 ~ 2485 MHz
	Output Power	17dBm (±1dB)
	Communication channel	16 Channels
	Channel width	5 MHz
	Transmit Data Rate	250Kbps
	Receiver Sensivity	<-98dBm

6.2 ES-WCTZ3P

Table.6-2 ES-WCTZ3P specification

Classify	Item	Standard
MAIN	Model	ES-WCTZ3P
	RF MODULE	2.4GHz (zigibee)
	Accuracy	W:±1.0% FS±2digit
	LED	POWER LED, STATUS LED, SEND LED
	Wire type	RS485 (Half)
	Working Voltage	DC 9V/ 1~2A
	Current Consumption	1.8wh
	Size(W*D*H) (mm)	65*113*50
	Connection type	3phases 3lines
	Weight(g)	About 176
	Range of voltage measurement	≤440V
	Max current measurement	1250A
RF MODULE	RF Frequency Range	2400 ~ 2485 MHz
	Output Power	17dBm (±1dB)
	Communication channel	16 Channels
	Channel width	5 MHz
	Transmit Data Rate	250Kbps
	Receiver Sensivity	<-98dBm

6.3 -RXZ

Table.6-7 ES-RXZ specification

Item	Standard	Note
Frequency Range	2400~2485MHz	
Occupied B.W	2MHz	
Output Power(Normal)	17dBm (±1dB)	
VSWR	<2.0 : 1	
Flatness	<1dBm	
Rx Sensitivity	<-98dBm	
Ethernet	10/100 Mbps (Full/Half duplex)	
Size(W*D*H) (mm)	70*96*28.5	
Weight(g)	About 96	

6.4Clamp On Current Transformer

6.4.1 WF-S16L

Table.6-8 WF-S16L specification

Item	Standard	Note
Current Ratio	120A : 40mA	
Rated Current	In = 120A (50Hz/60Hz)	
Max Current	200A	
Turns Ratio	3000 : 1	
DCR	250 ± 15 Ω	
Norminal Phase Angle Error	55 ± 20 min	
Norminal Ratio Error	1%	
Norminal Linearity	Within ± 0.5%	
Standard Accuracy	Class 1.0	
Operating Frequency	20Hz to 400Hz	
Protection Level	7.5Vp	
Weight	70g	
Insulation Resistance	DC 500V / 100 MΩ more	
WithStand Voltage	AC 1500V / 1 min	

Item	Standard	Note
Max Latch	about 100 times	
Operation Condition	-20℃ ~ +50℃ , ≤85% RH	
Storage Condition	-30℃ ~ +90℃ , ≤85% RH	

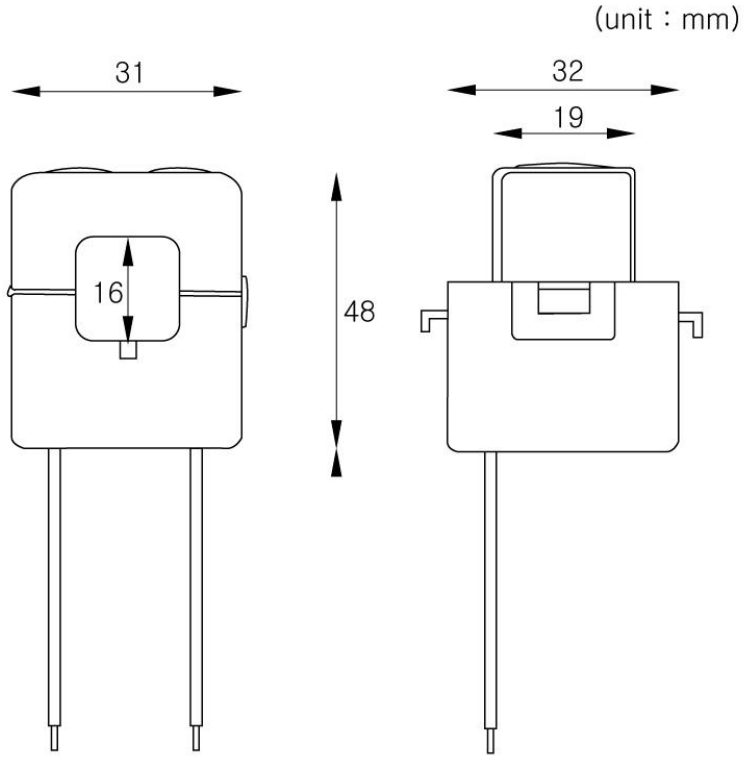


Fig.6-1 Cross section of WF-S16L

6.4.2 WF-S36L

Table.6-9 WF-S36L specification

Item	Standard	Note
Current Ratio	500A : 250mA	
Rated Current	In = 600Arms (50Hz/60Hz)	
Max Current	1000A	
Turns Ratio	2000 : 1	
DCR	39 ± 3 Ω	
Norminal Phase Angle Error	15 ± 5 min	

Item	Standard	Note
Norminal Ratio Error	0.30%	
Norminal Linearity	Within ± 0.5%	
Standard Accuracy	Class 1.0	
Operating Frequency	20Hz to 400Hz	
Protection Level	3.0Vp	
Weight	300g	
Insulation Resistance	DC 500V / 100 MΩ more	
WithStand Voltage	AC 2000V / 1 min	
Max Latch	about 100 times	
Operation Condition	−20℃ ~ +50℃ , ≤85% RH	
Storage Condition	−30℃ ~ +90℃ , ≤85% RH	

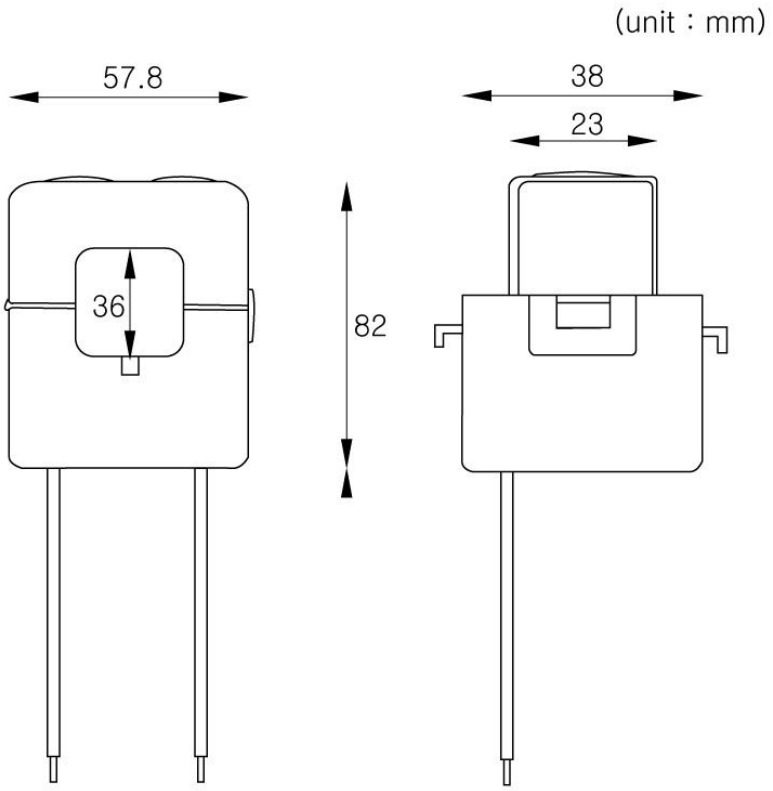


Fig.6-2 Cross section of WF-S36L