



Energy Measuring Unit (EcoMonitorPro)

MODEL

EMU2-VS1-P

User's Manual (Details)

- Before operating the instrument, you should first read thoroughly this operation manual for safe operation and optimized performance of the product.
Deliver this user's manual to the end user.

Energy Measuring Unit (EcoMonitorPro)

Model: EMU2-VS1-P

Instruction Manual: Detailed



Introduction

EcoMonitorPro measures the various amounts of electricity flowing the power line through the current sensor. This manual explains the installation method and the usage. Please use this equipment correctly in accordance with this manual. Please be sure to read "safety precautions", and especially in case you install this equipment, deal with it correctly before using.

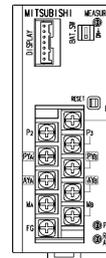
■ safety notice & others

The following marks are used with this manual.

Mark	Meaning
 DANGER	Indicates an imminently dangerous situation that, if not heeded, may result in death or serious injury.
 CAUTION	Indicates a potentially dangerous situation that, if not heeded, may result in injury or damage to the equipment.
 SUPPLEMENTARY REMARK	Indicates the precautions to prevent failures of the equipment and to properly operate the equipment.
	Indicates the page number where the relevant items are documented.

■ Check for Packaged Items

The following items are packaged in the packing case. Please check up all the items.



Main body x1



Instruction Manual (detailed)
(CD) x1



Instruction Manual (simplified)
x1

This equipment cannot be used as a measuring device for power rates transactions and apportionment of power rates.

Feature

- EcoMonitorPro measures the various amounts of electricity flowing the power line through the exclusive current sensor.
- By combining with the transformer for meters, or current transformer, it can respond to various primary side voltage values and a primary side current value.
- The instant fall of circuit voltage is detected and the point-of-contact output of the alarm is carried out. A maximum of four kinds of alarm levels can be set up simultaneously, and the correspondence to the semiconductor-fabrication-machines-and-equipment SEMI standard F47 is possible.
- The amount of electric power (addition value) is outputted to the higher rank equipment which carries out pulse measurement.

Safety Precautions

Precautions concerning working environment and conditions

- Avoid using the equipment in the locations under the following conditions. It may result in malfunction or deterioration of service life.
- Ambient temperature exceeds the specified range (-5 → 55°C)
 - Humidity exceeds the specified range (30 – 80%RH), or condensation occurs.
 - There is a substantial amount of dust, corrosive gas, salinity, or lampblack.
 - There is a strong magnetic field or a substantial amount of external noise.
 - Metal pieces and inductive materials are released.
 - Daily average temperature exceeds +35 °C.
 - There is severe vibration or impact.
 - Exposed to direct sunlight.
 - Exposed to rain and water droplets.

Items concerning preparations before using the equipment

- An installation place should keep the environment and an operating condition.
- Please perform various setup, such as a wiring of this equipment, a primary voltage value, and a primary current value, before using.

An optional exclusive a logging display unit (EMU2-D65-M) are required for a setup. Please set and order this equipment in the case of a purchase.

Precautions concerning installation and connection

Before installing or connecting the equipment, be sure to read this instruction manual.

For safety reasons, assign the personnel with expertise such as electric work to carry out installation and connections.

CAUTION

<Notes on construction>

- the voltage input circuit of this product and the current input circuit are un-insulating. When you perform wiring work, please do not perform live-line work. It becomes the cause of failure of an electric shock accident and equipment, a fire, and an electric shock.
- When executing thread processing or wiring work, exercise added care to prevent chips and fragments of wires from entering the equipment.
- Check the wiring diagram thoroughly and make connections. Inappropriate connections cause failures of the equipment, fire, or electric shock.
- In order to prevent noise from entering, do not bind the transmission signal lines and input/output signal lines together or place them near the power line or high-tension wires.
- Please attach the protection-against-dust sheet stuck on this equipment, carry out during wiring work, attached and be sure (to remove it after the completion of construction).
- When you open and close a terminal cover, be careful not to apply too much power.

<Connection of a terminal stand>

- Use wires of proper size (1.25 mm²). Use of wires of inappropriate size causes fire by heat generation.
- Use crimp contacts that are suitable for the size of the wire (bare round type for M3.5; outer diameter 7.2 mm or less) Use of inappropriate crimp contact results in a break of wire or bad contact, which causes malfunction, failure, or burning of the equipment, or fire.
- Clamp at the specified torque (0.49 – 0.78 N·m). Excessive torque breaks terminals and screws.
- After clamping, be sure to check for unclamped locations. Failure to clamp the all required locations causes malfunction of the equipment, fire, or electric shock.

<Connection with a current sensor>

- in case using this product, be sure (to use it) combining the current sensor of exclusive use.

● **EMU-CT50/100/250/400/600 are only for low-pressure circuits (highest voltage 460V). It cannot be used for a high-pressure circuit. When using EMU2-CT5 for a circuit directly, it should be up to 200V circuit (highest voltage 260V). If it connects with a high-pressure circuit accidentally, it becomes damage by fire of equipment, and the cause of a fire, and is very dangerous.**

- When using it for a single phase 3 wire and a 3 phase 3 wire circuit, two current sensors are required.
- The exclusive cable for current sensors can connect to two current sensors by one.
- The electric wire which connects this product and a current sensor should wire by the exclusive cable.
- Split current sensor(Direct sensor) for Energy Measuring Unit cannot install it in the plain-looking woman bar.

<Connection of FG terminal>

- Please ground FG terminal in the state of real use.
- Please do not connect FG terminal at the time of an insulation resistance examination and voltage-proof test implementation.
- Between MA-FG and MB-FG, the high-voltage protection element is contained. If the high voltage is impressed by voltage-proof examination etc., a protection element operates and between MA-FG and MB-FG will be in a short circuit state.

Items concerning usage

- **EcoMonitorPro cannot be used for transactions of the electric power prescribed in Weight and Measure Act.**
- Before starting an operation of the equipment, check thoroughly for live naked wires in the vicinity. If live naked wires are present, stop the operation immediately and take an appropriate measure such as insulation protection.
- The equipment has an integrated clock. Set the current date and time before using the equipment. The clock has the accuracy of approximately 1-minute monthly deviation. Adjust the time as necessary.
- When a setup of a clock and others is performed or it changes, there is a case where it becomes impossible to take adjustment with the maximum and maximum generating time, and the alarm generating value and alarm generating time which are held now. In this case, please perform maximum reset operation and clear the past maximum generating time.
- If a power failure occurred while setting up the main unit, the setting cannot be completed properly. When the power is recovered, set it up again.

CAUTION

- Do not disassemble or modify the equipment. It causes failures, electric shock, or fire.
- Please use it by rated within the limits given in this book. Use out of the rated range not only causes failure of malfunction or equipment, but has fear of ignition and damage by fire.
- The protection circuit of secondary terminal opening is built in the secondary side of EMU2-CT5 and EMU-CT50/CT100/CT250 to opening during a wiring work period, it is satisfactory. However, please do not carry out continuation energization in the state of opening for safety.

Items concerning maintenance and inspection

- If the surface is dirty, wipe it off with soft dry cloth. Do not allow a contact with a chemical duster and the like for a long period of time. Do not wipe the equipment off with benzene or thinner.
- In order to use the equipment properly for a long period of time, carry out inspections of the following items:
 - 1) Check for damage in the equipment.
 - 2) Check for abnormality in LED and LCD displays.
 - 3) Check for abnormal noise, odor, and heat.
 - 4) Check for looseness in installation, attachment of the terminal block, and connectors (please completely shut the main power off for this inspection).

Items concerning storage

- To store the equipment, turn off the power, disconnect the wiring, and put it in a plastic bag or the like.
- When the power is going to be turned off for a long period of time, set the battery switch (BAT.SW) to OFF. (The total guarantee time for power supply of the battery is 1/2 year.)
- When storing the equipment for a long period of time, avoid locations under the following conditions. It may result in failures or deterioration of service life.
 - Ambient temperature exceeds the specified range (-10 → +60°C)
 - Humidity exceeds the specified range (30 – 80%RH) or condensation occurs.
 - There is a substantial amount of dust, corrosive gas, salinity, or lampblack.
 - Metal pieces and inductive materials are released.
 - Daily average temperature exceeds +35 °C.
 - There is severe vibration or impact.
 - Exposed to rain and water droplets.

Items concerning disposal

Dispose of the equipment as general industrial waste.

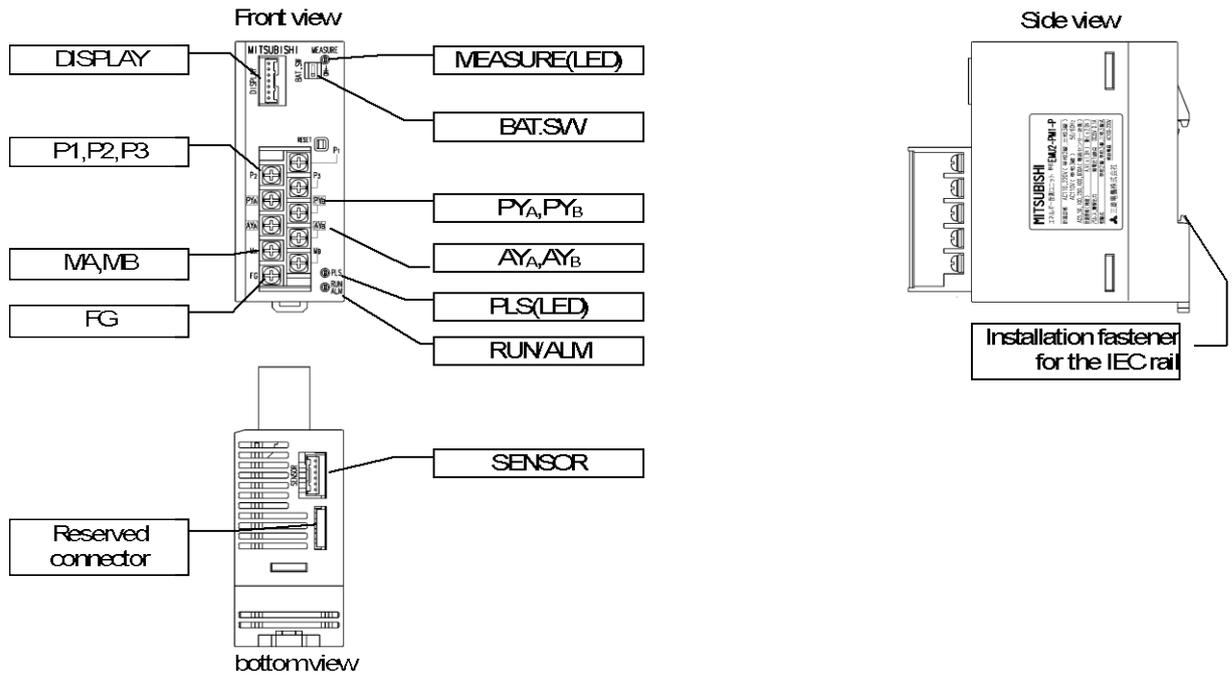
 CAUTION
In throwing away a lithium battery, be careful about the mentioned below. <ul style="list-style-type: none">● The lithium battery is soldered. Be careful of removal.● Electric capacity may remain in the removed battery. Since other metal is contacted and there are generation of heat and a burst, and a possibility of igniting, please be sure to cover a terminal (+, -) with adhesive insulating tape etc.

LIMITED WARRANTY

- Although this book and this equipment are shipped through a severe quality control and product inspection, when the defect by the cause on manufacture is in this equipment or a instruction manual, I should do correspondence of substitute exchange. Please contact me to the store of a purchase. However, about failure by the natural disaster or the mistaken usage, damage, etc., it is not set as the object of a guarantee.
- Please understand beforehand that our company does not take any responsibility of the about the failure produced during the trouble on the system by the visitor or the third person, the problem on law, the use error of this equipment, or use, and the damage which it was able to suffer from other faults.
- the gratis term of a guarantee of a product -- your company -- after supplying after purchase or the appointed place -- the inside within after [less than one year or our company factory shipments] 18 months (it measures from manufacture years) -- either -- I will consider as the shorter one
- I use the gratis term of a guarantee of a repair article is not updated.
- A part or all of the contents of this book is refused to our company, there is nothing and reproducing or reproducing in any forms refuses firmly.
- Although it is trying to follow revision of software and hardware hard, the written contents of this book are produced also when it cannot synchronize reluctantly.

The name and function of each part	5
How "to cling"	5
The wiring method.....	6
Voltage line, sensor cable and sensor connection.....	6
Extension of a current sensor cable.....	6
Installation of current sensors for direct connection (EMU-CT50/CT100/CT250)	7
Installation of current sensors for direct connection (EMU-CT400/CT600).....	7
Installation of 5A current sensors (EMU2-CT5).....	8
Pulse, alarm output	8
Display unit (EMU2-D65-M)	8
The setting method	9
A setup of a battery switch.....	9
A setup of rating	9
Phase and wiring.....	9
Primary voltage.....	9
Sensor classification and primary current.....	9
Demand time	9
Voltage sags and duration (of voltage sags)	10
Pulse unit setting value	10
Meter operation.....	11
Measurement function	11
Voltage sag alarms	11
How to use a voltage sag alarms function.....	12
Resolution of measurement data	14
Voltage effective value	14
Amp and Amp Demand effective value	14
Vsag voltage effective value	14
power factor	14
Electric power and the energy	14
The restriction matter of measurement data	15
Reference.....	16
In case a failure is suspected	16
Q&A	17
Specification.....	18
Measuring, Electrical and mechanical specifications	18
Voltage sag detection specification.....	19
Pulse output specification.....	19
Peripheral equipment	20
Outline dimensions	21
Service Network.....	23

The name and function of each part



P1,P2,P3	-----	The voltage of a measurement circuit is connected.
PYA,PYB	-----	Pulse output. The measured amount of electric power(energy) is outputted.
AYA,AYB	-----	Alarm output. It turns on, if voltage sag is detected.
MA,MB	-----	It is the power supply which operates this equipment.
FG	-----	It is used grounding in the state of real use.
DISPLAY	-----	Display unit(EMU2-D65-M) is connected.
SENSOR	-----	The connector of a current sensor is connected.
BAT.SW	-----	When backing up the data and the clock which were measured, it turns ON.
MEASURE	-----	A measurement state is displayed. Lighting or blink = under measurement
PLS	-----	A pulse output is interlocked with and it blinks.
RUN/ALM	-----	The light is switched on during operation and it blinks during alarm generating. - Lighting: Under operation. With no alarm generating *After a power supply injection before switching on the light, it takes about 10 seconds. - Blink: Under operation. Under alarm generating - Putting out lights: Power supply OFF

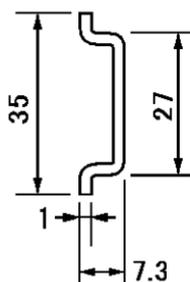
⚠ CAUTION

Remove the cable from terminal FG, when conducting insulation resistance or withstanding voltage test

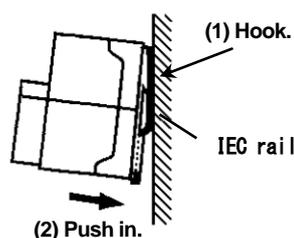
How "to cling"

- Please bind attachment of an IEC rail tight every 25-100mm with M4 or M5 screw.
- When you remove from an IEC rail and you attach again, please attach the stop implement for IEC rail attachment in the state where it pushed in upwards.

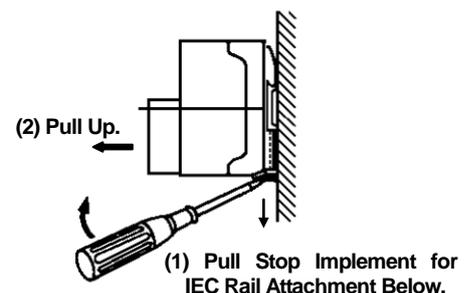
Application IEC rail (35mm)



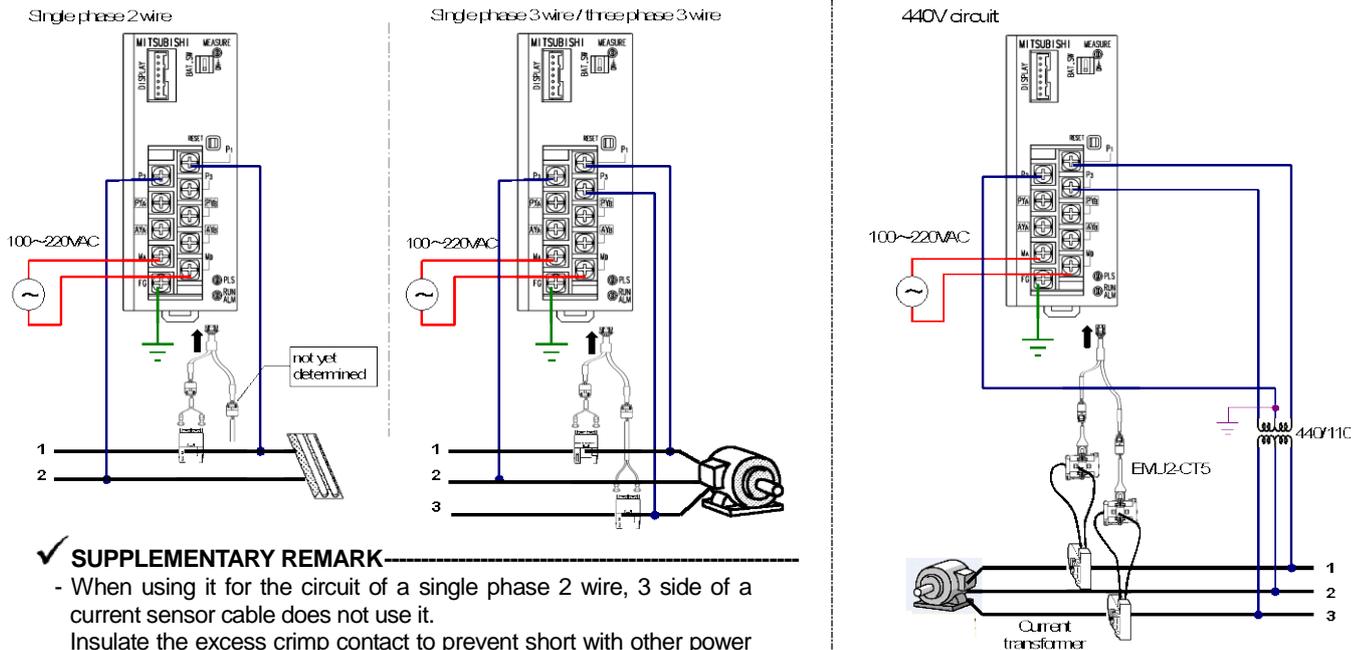
Attachment



Removal

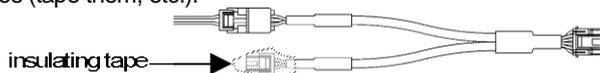


Voltage line, sensor cable and sensor connection



✓ SUPPLEMENTARY REMARK

- When using it for the circuit of a single phase 2 wire, 3 side of a current sensor cable does not use it. Insulate the excess crimp contact to prevent short with other power supplies (tape them, etc.).

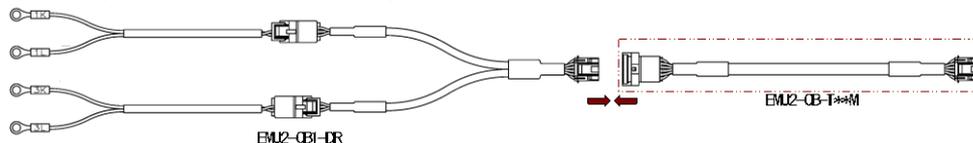


- For the 440V circuit, connect the potential transformer (440/110V). The secondary side of the potential transformer is connected to terminal P1, P2 and P3.

Extension of a current sensor cable

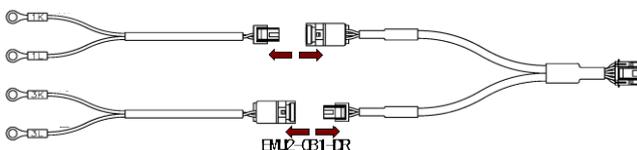
The current sensor cable [EMU2-CB1-DR/EMU2-CT5] is extensible in the following ways

- It extends by EMU2-CB-T**M (standard type).

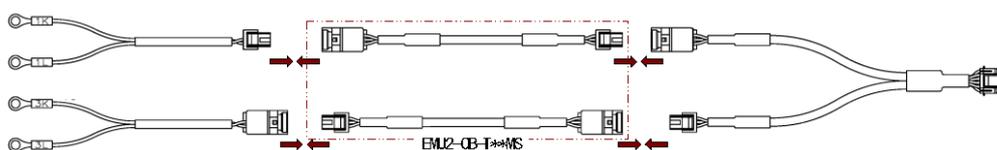


- It extends by EMU2-CB-T**MS (separate type).

1) Remove a connector.



2) Connect EMU2-CB-T**MS for extension.



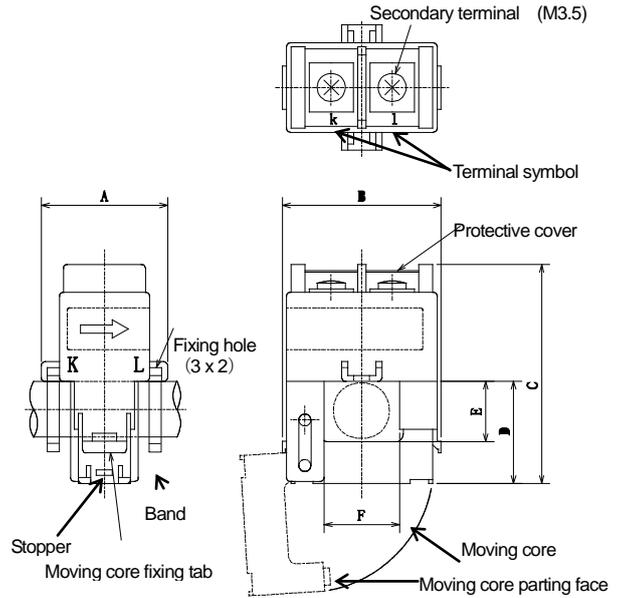
✓ SUPPLEMENTARY REMARK

- Extension of EMU-CT50/100/250/400/600 and PEM-CT100/PEM-CT250 is to 50m (up to the 50.5m of the total wiring length).
- Extension of EMU2-CT5 is to 10m (up to the 10.5m of the total wiring length).

Installation of current sensors for direct connection (EMU-CT50/CT100/CT250)

Install the current sensor to the cable of the circuit to be measured by the following method.

- 1) Check the configuration of the circuit to be connected, and connect all of the cables.
 - For the connection of the potential transformer, see the instruction manual for the potential transformer.
- 2) Draw the cable of the circuit to be measured through the center hole of the current sensor.
 - Before drawing the cable through the hole, check the installation direction of the current sensor. There is an arrow indicating K→L.
- 3) To fix the current sensor, draw a band through the fixing hole located on both sides of the sensor, and lightly fix them together with the cable.
 - See the instruction manual for current sensors.
 - Avoid excessive tightening.
 - Use 2 bands to tie both sides.
- 4) Cut off the excess length of the bands by nipper or the like.



Electric wire size which can be penetrated (reference) should refer to the following table.

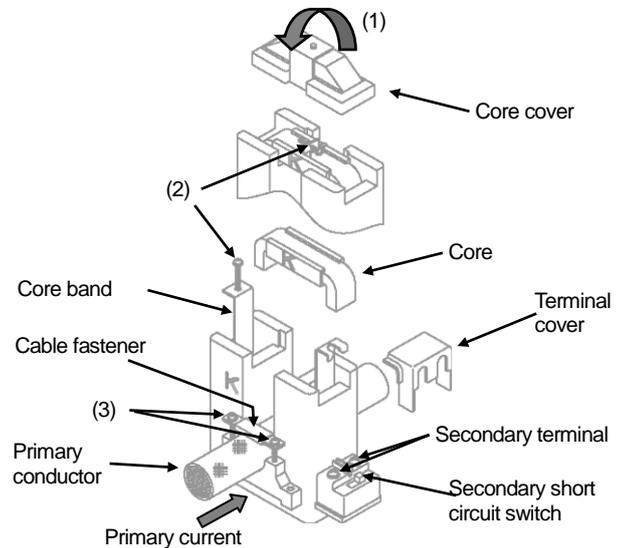
	EMU-CT50	EMU-CT100	EMU-CT250
IV line	less or equal [60mm ²]	less or equal [60mm ²]	less or equal [150mm ²]
CV line	less or equal [38mm ²]	less or equal [38mm ²]	less or equal [150mm ²]

- 5) In the case of two cables carrier, please use an attached screw

Installation of current sensors for direct connection (EMU-CT400/CT600)

Install the current sensor to the cable of the circuit to be measured by the following method.

- 1) Take off the band (1) to the direction such as arrow indicating, and remove core cover.
- 2) Take off the terminal cover, and turn the secondary short circuit switch to "Short".
- 3) Loosen screw (2), and take off the core by opening the core band.
- 4) After loosening screw (3) and drawing the cable through main body, fix the cable using cable fastener by fastening screw (3). Pay attention not to bend the cable fastener.
- 5) Making uniform the direction of "K" side of core and "K" of main body, put back the core and fasten the core band by screw (2).
- 6) Fasten the core cover, and fix by the band (1).
- 7) After connecting secondary terminal and multi-circuit electric measuring unit, turning the secondary short circuit switch to "Open", and fasten the terminal cover.



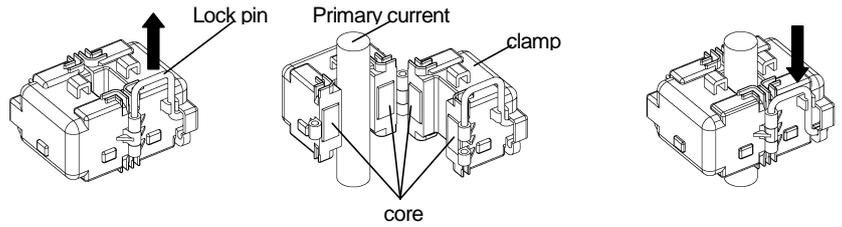
✓ SUPPLEMENTARY REMARK

- Before drawing the cable through the hole, check the installation direction of the current sensor. There is an arrow indicating K→L.
- K: Power supply side L: A load side is shown.
- In the case of two cables carrier, please use an attached screw

Installation of 5A current sensors (EMU2-CT5)

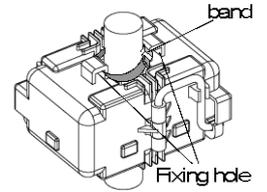
Install the current sensor to the cable of the circuit to be measured by the following method.

- 1) Please let me slide a lock pin in the direction of an arrow.
- 2) It lets an electric wire pass in a clamp, and close a clamp again.
- 3) Please hold a clamp in the fully close state with a finger, and push in until a lock pin is locked.

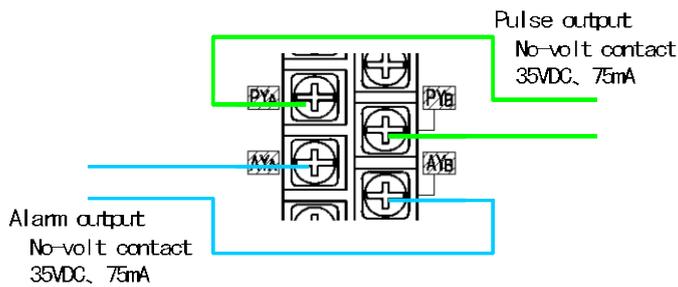


✓ SUPPLEMENTARY REMARK

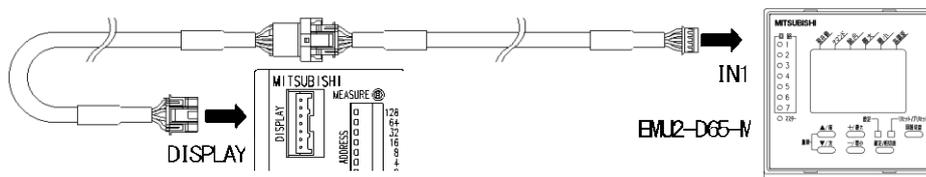
- A lock pin is metal. Keep in mind that the contact to a charge part has failure of an electric shock accident and equipment and fear of a fire.
- There is a possibility of damaging if a shock is given to a core portion. Keep in mind that it influences a performance directly.
- A core unites, and if a detailed thing also has a bite lump of a foreign substance, since a performance is influenced directly, it should be careful of a field that a measurement value decreases etc.
- If impossible power is applied where a clamp is opened, there is fear of breakage. Normal measurement cannot be performed if a direction is mistaken.
- A thing W= 2.6mm or less should be used for the union band used when it fixes the electric wire and sensor to penetrate. When it fixes, a union band is fixed to one place of the hole for current sensor fixation with a through cable. Be careful not to fasten too much by the grade which stops lightly (a total of four holes for current sensor fixation is in both sides of a current sensor).
- In the case of two cables carrier, please use an attached screw



Pulse, alarm output



Display unit (EMU2-D65-M)



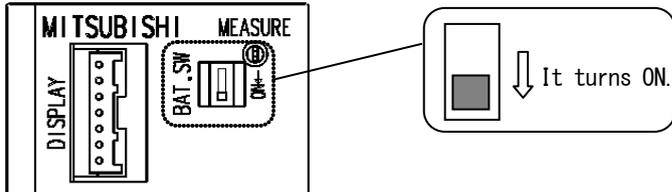
✓ SUPPLEMENTARY REMARK

- Please read the Instruction Manual of a display unit for details.

The setting method

A setup of a battery switch

A battery switch needs to be set up to perform backup of clock and Voltage sag history data. Please turn ON "BAT.SW" for this equipment before use.



✓ SUPPLEMENTARY REMARK

- keep in mind that there is a possibility of damaging if a shock is given to a switch portion.
- Please do not use a mechanical pencil, when you switch a switch. The heart and powder which broke disperse on an internal circuit, and cause malfunction and failure.
- Backup time is total power failure time about six months (at 25 degree C). The time of storage etc. should turn OFF "BAT.SW", in not using it for a long period of time, while the electric current had been cut off.

A setup of rating

An optional exclusive logging display unit (EMU2-D65-M) is required for a setup. Please set and order this machine in the case of a purchase.

Phase and wiring [initial value: three phase 3 wire]

The following setup is possible.

Single phase 2 wire, single phase 3 wire, three phase 3 wire

Primary voltage [initial value: 220V]

The following setup is possible.

110V, 220V, 440V

✓ SUPPLEMENTARY REMARK

- A wiring should use it by primary voltage setting value 110V in the circuit of a single phase 3 wire type.
- 110V and 220V are connectable direct. 440V need the transformer(440/110V) for meters for the exterior.

Sensor classification and primary current [initial value: A direct sensor /100A]

It becomes as follows by sensor classification. It bases on a model and is common.

Sensor	Primary current setting value
EMU-CT50	50A
EMU-CT100	100A
EMU-CT250	250A
EMU-CT400	400A
EMU-CT600	600A
EMU2-CT5	5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A

✓ SUPPLEMENTARY REMARK

- In use of EMU2-CT5, please set up the rating of CT(Current Transformer) by the side of primary.

Demand time [initial value: 2 minute]

The Amp demand value and the Watt demand value can be set up individually.

Item	Setting value
Amp Demand	0 or 10 seconds, 20 seconds, 30 seconds, 40 seconds, 50 seconds, 1 - 15 minutes (1-minute unit), 20 minutes, 25 minutes, 30 minutes
Watt Demand	0 or 10 seconds, 20 seconds, 30 seconds, 40 seconds, 50 seconds, 1 - 15 minutes (1-minute unit), 20 minutes, 25 minutes, 30 minutes

Voltage sags and duration (of voltate sags) [initial value: refer to the following table]

Four kinds of alarm levels to A-D can be set up individually.

Surveillance	Voltage Sag	duration (of voltate sags)
A	0% - 100% : 1% unit (Initial value 20%)	20 - 10000ms : 10ms unit (Initial value 1000ms)
B	0% - 100% : 1% unit (Initial value 30%)	20 - 10000ms : 10ms unit (Initial value 500ms)
C	0% - 100% : 1% unit (Initial value 50%)	20 - 10000ms : 10ms unit (Initial value 200ms)
D	0% - 100% : 1% unit (Initial value 100%)	20 - 10000ms : 10ms unit (Initial value 20ms)

Pulse unit setting value

The range which can be set up with total load electric power becomes as follows.

Total load electric power (kW)	The pulse unit which can be set up (kWh/pulse)			
Less than 12	1	0.1	0.01	0.001
Less than [12 or more] 120	10	1	0.1	0.01
Less than [120 or more] 1200	100	10	1	0.1
Less than [1200 or more] 12000	1000	100	10	1
Less than [12000 or more] 120000	10000	1000	100	10

✓ **SUPPLEMENTARY REMARK**-----

- Change of a setting value initializes a setting value and measurement data according to the following tables. Please set up again.

setting item initialization		Wiring	Sensor	Primary voltage	Primary current	demand	Voltage sag		Pulse unit	Clock
							Sag level	Duration		
Setting value	Sensor	initialization	/	/	/	/	/	/	/	/
	Primary voltage	initialization	/	/	/	/	/	/	/	/
	Primary current	initialization	Initialization	/	/	/	/	/	/	/
	Demand					/	/	/	/	/
	Sag level						/	/	/	/
	Duration							/	/	/
	Pulse unit	initialization	Initialization	Initialization	Initialization				/	/
Clock									/	
Measurement data	Energy									
	Voltage Sag information	initialization		Initialization			Initialization	Initialization		

Meter operation

Measurement function

A measurement element is shown in the following table.

Measurement item	
	Details
Amp	R
	S (notes 1)
	T (notes 1)
	average
Amp Demand	R
	S (notes 1)
	T (notes 1)
Voltage	R-S
	S-T (notes 1)
	T-R (notes 1)
	average
Vsag Voltage	R-S
	S-T (notes 1)
	T-R (notes 1)
Active Watt(Power)	
Watt Demand	The present value
Power factor	The present value
Active Energy	

Notes 1: When a wiring is set as single phase 2 wire, don't measure.

✓ SUPPLEMENTARY REMARK

- average Amp value: In the case of a single phase 2 wire circuit (at the time of 1P2W setup), it is comprehensive Amp =phase R Amp.
In the case of a three phase 3 wire circuit and a single phase 3 wire type circuit, it is comprehensive Amp = (R+ T)/2.
- average voltage value: In the case of a single phase 2 wire circuit, it is the voltage between comprehensive voltage =R-S.
In the case of a three phase 3 wire circuit and a single phase 3 wire type circuit, it is comprehensive voltage = (voltage R-S + S-T)/2.

Voltage sag alarms

A surveillance element is shown in the following table.

Surveillance item	
	Details
Voltage sag	(Sag generating) time of day
	Sag value
	Duration
	Sag phase
	Sag history data

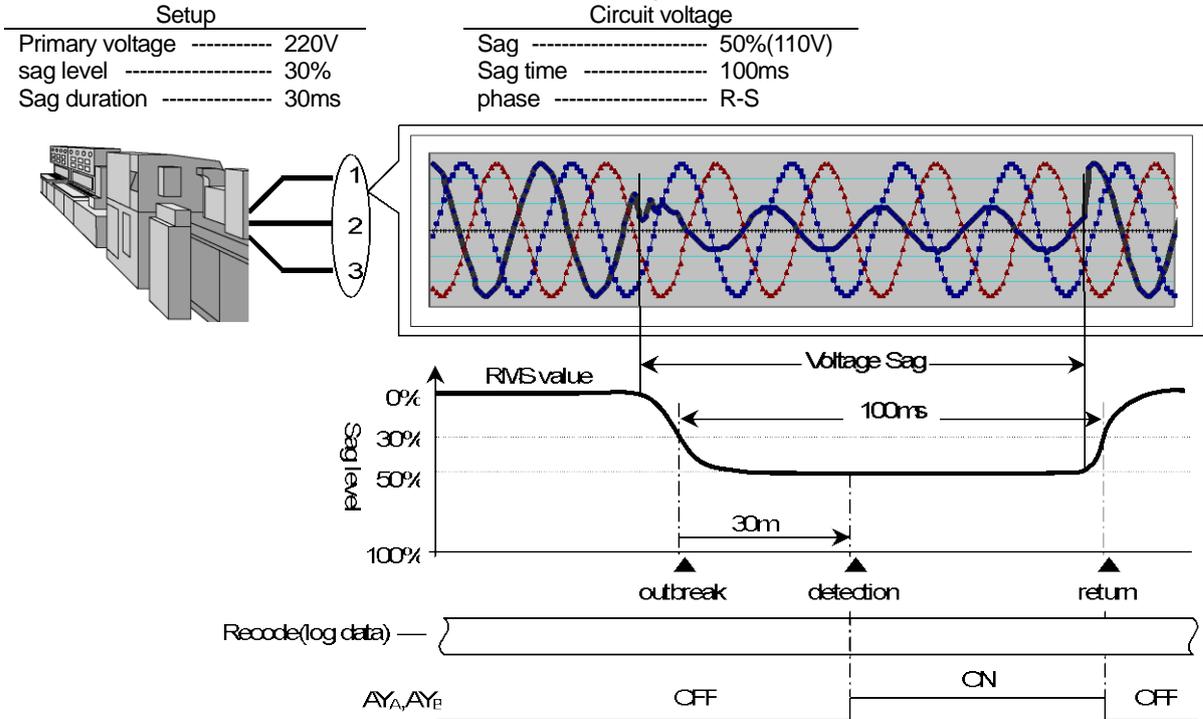
How to use a voltage sag alarms function

EcoMonitorPro detects the instant fall of circuit voltage, and carries out the point-of-contact output of the alarm. More than <<duration>> to which <<voltage level>> and <<duration>> to rated voltage were set, and the effective value of input voltage was set, the instant fall of voltage is detected because it is less than <<voltage level>>. A maximum of four kinds of alarm levels can be set up simultaneously, and the correspondence to the semiconductor-fabrication-machines-and-equipment SEMI standard F47 is possible.

The instant fall of voltage supervises and detects the effective value of circuit voltage by all waves. It is regarded as alarm generating below on the set-up sag level, and simultaneously, the voltage effective value currently supervised begins to supervise the duration of sag, and detects it above the set-up sag duration.

Example

When a setup of sag continuation time is set to 30ms for a setup of an instant sag level 30%, an example when the voltage between R-S of a three phase 3 wire circuit falls 50% to rated voltage 220V is shown.

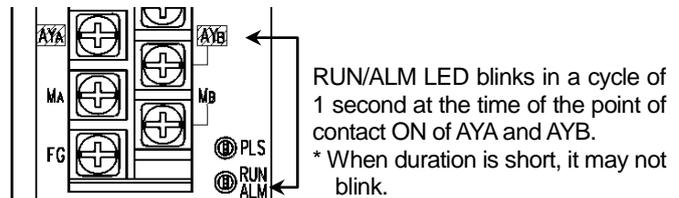


According to the above-mentioned input conditions, EcoMonitorPro records and outputs the following information.

AYA, AYB ----- For [ON] about 70ms (it turns on until it carries out a return from the time of carrying out detection)
 (Sag generating) time of day ---- Time at the time of detection
 Sag value ----- The voltage value at the time of detection point
 Sag duration ----- About 100ms (time from generating to a return)
 History data ----- The voltage effective value for [maximum order] 1 second of detection point

✓ SUPPLEMENTARY REMARK

- AYA and AYB are set to OR of the alarm detected on condition that [each] Surveillance A - D.)



About history data

The voltage effective value of order is saved as history data focusing on the point of having detected. The saved history data can read and check a personal computer kit (EMU2-PK3) because you use it (it cannot check on the screen of a display unit).

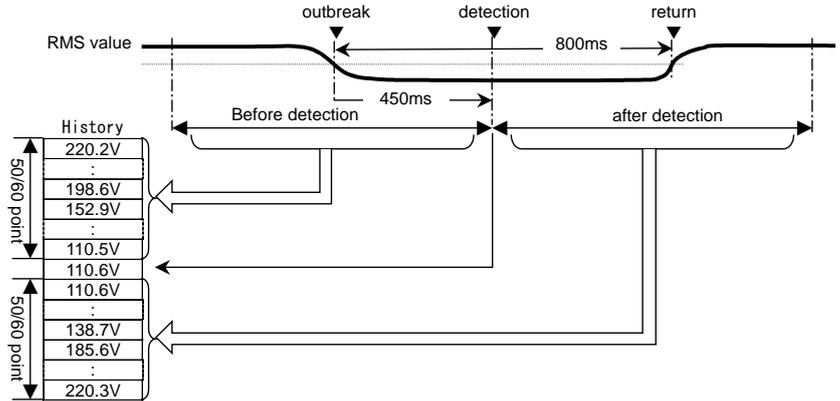
The number of the maximum data of the history data which can be saved per detection changes with frequency and the setting values of sag continuation time.

The number of the maximum data of history data

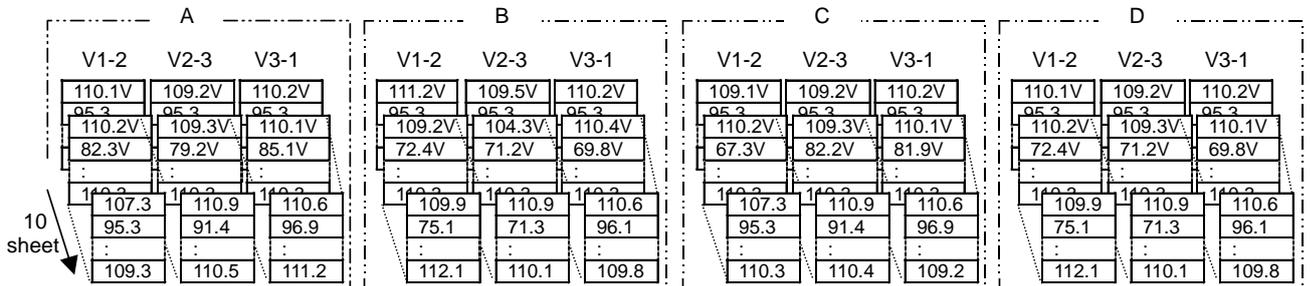
Clock frequency	The setting value of sag duration			
	20msec(s) - 1000msec		1001msec(s) - 10000msec	
50Hz	50 points(Before detection) (20 msec interval)	50 points(after detection) (20 msec interval)	50 points(Before detection) (200 msec interval)	50 points(after detection) (20 msec interval)
60Hz	60 points(Before detection) (16.7 msec interval)	60 points(after detection) (16.7 msec interval)	60 points(Before detection) (166.7 msec interval)	60 points(after detection) (16.7 msec interval)

For example, The history data at the time of setting continuation time as 450ms is shown in the right figure. In addition to the voltage effective value of the point which detected the voltage sag, there is history data before and behind it for 1 second at the maximum.

There is the number of the history data in 50Hz by the 50 maximum.



History data is saved for every phase of voltage to surveillance A - B, respectively. Moreover, the history data detected in the past can save the history for 10 time at the maximum. For example, the history data at the time of using it to surveillance A - D by the three phase 3 wire is as follows.



✓ SUPPLEMENTARY REMARK

- The sampling interval which judges voltage sag is shown below.
60Hz: 0.52msec, 50Hz: 0.625msec
- Setting change is possible for an instant sag level in 0 - 100% (1% unit) of range.) However, if it sets up to 0%, it will not detect (an alarm output is not carried out, either).
- Setting change is possible for sag continuation time in the range for 20 - 10000ms (10ms unit).) 2.5% or less of rated voltage is judged as low input processing at the time of 100% fall to be 0V.
- At the time of a return, it is considered that +2% of values set up on the instant sag level is return voltage.
- Measurement of sag continuation time is ended in 1 second after instant fall generating.

Example

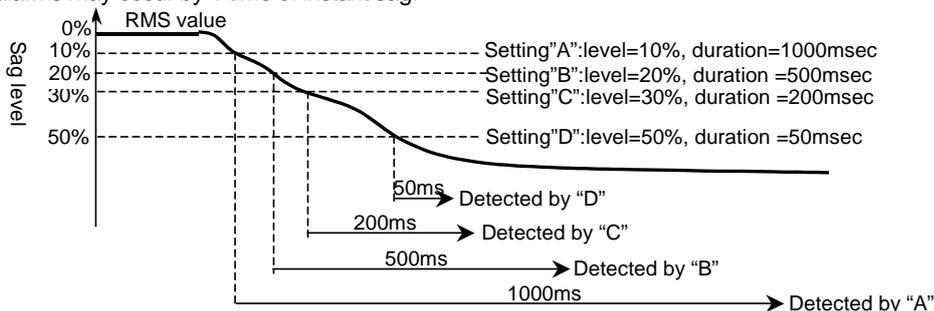
When the setting values of sag duration are 30msec(s)

Record of duration is 1.03 seconds maximum.

When the setting values of sag duration are 10000msec(s)

Record of duration is 11 seconds maximum.

- Two or more alarms may occur by 1 time of instant sag.



Resolution of measurement data

The resolution of measurement data is as follows.

■ Voltage effective value

Rated primary voltage setting value	Resolution
110V, 220V	0.1V
440V	1V

■ Amp and Amp Demand effective value

Rated primary current setting value	Resolution
5A-30A	0.01A
40A-300A	0.1A
400A-3000A	1A
4000A-30000A	10A

■ Vsag Voltage effective value

Rated primary voltage setting value	Resolution
110V, 220V, 440V	0.1V

■ Power factor

0.001

■ Active Watt, Watt Demand, Active Energy

Single phase 2 wire

	Primary voltage		
	110V	220V	440V
5A			
6A			
7.5A			
8A	W :0.001kW		
10A	Wh :0.01kWh		
12A			
15A			
20A			
25A			
30A			
40A			
50A			
60A			
75A			
80A			
100A			
120A			
150A	W :0.01kW		
200A	Wh :0.1kWh		
250A			
300A			
400A			
500A			
600A			
750A			
800A			
1000A			
1200A			
1500A	W :0.1kW		
1600A	Wh :1kWh		
2000A			
2500A			
3000A			
4000A			
5000A			
6000A			
7500A			
8000A			
10000A			
12000A			
15000A	W :0.1kW		
16000A	Wh :1kWh		
20000A			
25000A			
30000A			

W :1kW
Wh :10kWh

Single phase 3 wire

	Primary voltage	
	110V	
5A		
6A		
7.5A		
8A		
10A	W :0.001kW	
12A	Wh :0.01kWh	
15A		
20A		
25A		
30A		
40A		
50A		
60A		
75A		
80A		
100A		
120A	W :0.01kW	
150A	Wh :0.1kWh	
200A		
250A		
300A		
400A		
500A		
600A		
750A		
800A		
1000A		
1200A		
1500A	W :0.1kW	
1600A	Wh :1kWh	
2000A		
2500A		
3000A		
4000A		
5000A		
6000A		
7500A		
8000A		
10000A		
12000A		
15000A	W :0.1kW	
16000A	Wh :1kWh	
20000A		

3 phase 3 wire

	Primary voltage		
	110V	220V	440V
5A			
6A			
7.5A			
8A	W :0.001kW		
10A	Wh :0.01kWh		
12A			
15A			
20A			
25A			
30A			
40A			
50A			
60A			
75A			
80A			
100A	W :0.01kW		
120A	Wh :0.1kWh		
150A			
200A			
250A			
300A			
400A			
500A			
600A			
750A			
800A			
1000A	W :0.1kW		
1200A	Wh :1kWh		
1500A			
1600A			
2000A			
2500A			
3000A			
4000A			
5000A			
6000A			
7500A	W :1kW		
8000A	Wh :10kWh		
10000A			
12000A			
15000A			
16000A			
20000A			
25000A			
30000A			

W :1kW
Wh :10kWh

Note1 The notation of "W, Wh" in a list is not a unit, expressed W(electric power), Wh(electric energy).

The restriction matter of measurement data

- EcoMonitorPro does not carry out measurement operation, while [several seconds] being in an operation state, after switching on a power supply.
- Moreover, it is immeasurable for several seconds immediately after setting up and changing rating to EcoMonitorPro.
- The restriction matter about operation of measurement is as follows.

Measurement element	Operation of EcoMonitorPro (The display of a display unit: EMU2-D65-M)
Amp Amp Demand	It is set to 0A when an input is less than 0.5% of a rated current value. When an input exceeds 140% of a rated current value, it becomes a fixed value 140%.
Voltage	at the time of a 220V direct setup It is set to 0V when the input voltage to EcoMonitorPro is less than [30V]. When the input voltage to EcoMonitorPro exceeds 315V, it becomes a 315V fixed value. at the time of other setup It is set to 0V when the input voltage to EcoMonitorPro is less than [15V]. When the input voltage to EcoMonitorPro exceeds 157.5V, it becomes a 157.5V fixed value.
Active Watt Watt Demand	A voltage display value is set to 0kW and 0kvar when 0V or a current display value is 0A. Moreover, it is set to 0kW and 0kvar also at the time of less than 0.4% of total load electric power. When 140% of total load electric power is exceeded, it becomes a fixed value 140%.
Power Factor	A voltage display value is set to 1.000 when 0V or a current display value is 0A.

* Input voltage shows the voltage value inputted into EcoMonitorPro. It is not in the primary side of VT.

✓ SUPPLEMENTARY REMARK-----

- When rated setup / setting change to EcoMonitorPro is made, before operation is stabilized, it will take for several seconds. Measurement operation is not performed in the meantime (MEASURE LED puts out the light).

Here, the solution when thinking failure kana ?, Q&A, etc. are explained.

In case a failure is suspected

If abnormal noise, odor, smoke, or heat generation was observed from EcoMonitorPro, turn off the power immediately.

If a failure is suspected, before sending the equipment for a repair, check the following:

Discrepancies in the measured values

- Even when the Amp value is indicated, the power amount (integrated value) is not measured.
- Measured values differ from the measurement taken by other measuring device.

Check the polarities of the current sensors and the wiring method.

- Check that the R phase current sensor and the T phase current sensor are not changed places.
- Check that the K terminal and the L terminal of the current sensors are properly connected.
- Check the current line through the current sensor for wrong direction. Check the direction of the arrow printed on the faceplate (arrow indicated from the power supply side to the load side).
- Check for loose fitting of the current sensors.

Check the wiring of the voltage lines.

Check that the wiring to be connected to P1, P2, and P3 are not switched.

Check both the EcoMonitorPro and the circuit connections.

Check for short and break in the wiring.

The Amp value differs from the value measured by other measuring device (exceeding the tolerance).

Check that the measuring device used for comparison takes accurate measurements of effective values. EcoMonitorPro indicates the effective values.

If the measuring device used for comparison takes measurements of average values instead of effective values, when there is a distortion in the current of the circuit to be measured, the measurement comes to markedly different values.

If Mitsubishi's split type current transformer CW-5S(L) is connected, check that the secondary short switch is not short-circuited.

The only current sensors that can be connected to EcoMonitorPro are the dedicated current sensors. Check for connections of other current sensors.

■ **General**

Q	How much tolerance does the equipment have for overvoltage and overcurrent? Are external protective circuits required?
A	Instantaneous* :Max 20 times of the rated current and 2 times of the rated voltage Continuous :Max 1.1 times of the rated current and the rated voltage * Pass the current for 0.5 seconds 9 times in 1-minute intervals, then pass it for 5 seconds once.
Q	Can EcoMonitorPro be used as a watt-hour meter?
A	The equipment can be used for the purpose of measuring the amount of power and managing the consumed amount of power. But it cannot be used for transactions of the amount of power stipulated in the Weight and Measure Act or as the measuring device for the purpose of apportionment of power rate.

■ **Q&A concerning specification**

Q	With respect to what is “measuring accuracy $\pm 1.0(2.0)\%$”?
A	For the amount of power, the range of allowable error with respect to the reading of measurement is indicated. For example, if the reading is 10 KWh, the error is ± 0.2 KWh. For the measuring factors other than the amount of power, the range of allowable error with respect to the rated input is indicated. For the current, if the rated current 250 A is set, the allowance is $\pm 1.0\%$ of 250 A.
Q	Is the accuracy of the current sensor included?
A	The accuracy of the current sensor is not included in the accuracy of EcoMonitorPro. The maximum value of the allowable error is the sum of the allowable error of EcoMonitorPro and the error of the current sensor.

■ **Q&A concerning installation**

Q	What are the diameters of the wires that can install the current sensors?
A	The nominal cross sectional areas of the conductors of the 600 V vinyl wires that can pass through are as shown below (reference only): <ul style="list-style-type: none"> ● IV wire (600 V vinyl insulated wire) 60 mm² (EMU-CT50/CT100); 150 mm² (EMU-CT250) ● CV wire (600 V vinyl insulated wire) 38 mm² (EMU-CT50/CT100); 150 mm² (EMU-CT250: 100 mm² recommended) The nominal sectional areas indicate the diameters of the conductors. The wires may not go through depending on the finished shape of the vinyl insulator and distortion of the wire (bend). Check in the field.
Q	How do you fix the current sensors?
A	-Models EMU-CT50/CT100/CT250 have two holes on the main bodies for fixing. Draw the supplied insulock through the holes and fix the sensors to the conductors. - In the case of two cables carrier, please use an attached screw

■ **Q&A concerning connections**

Q	Any precautions to avoid incorrect wiring?
A	Check the polarities of the primary current of the current sensors. “K” is indicated on the power supply side of the circuit, and “L” is indicated on the load side. An arrow is indicated from K to L (K→L). For the 3-wire circuits, check that the current sensors for the circuit 1 and the circuit 3 are not switched by mistake and connected to the equipment.

■ **Q&A about a setup**

Q	If the rated current of the current sensors to be connected is different from the set value of the primary current, would it break the equipment?
A	It would not break or burn the equipment, but the results of measurement come out to be entirely different values.

Specification

Measuring, Electrical and mechanical specifications

Item		Specification
Phase wire system		Single-phase 2-wire, single-phase 3-wire, and 3-phase 3-wire
Rated input	Voltage circuit (1P2W & 3P3W)	110 V, 220 V, or 440 V When set at 440 V, external 440/110V potential transformer is required. Star- delta connection and delta-star connection transformer of cannot measure definitely to be out of phase. Please use a transformer of the same connection.
	Voltage circuit (1P3W)	Only 100V circuit
	Current circuit	600,400,250,100,50A, or 5 A (Use dedicated current sensors) Use the 5 A sensor in combination with the current transformer (CT) (Primary current can be set to the max of 30,000 A. Note 1)
	Frequency	50Hz / 60Hz (frequency automatic distinction)
Auxiliary power supply rating		AC100V-220V (+10%, -15%) 50Hz / 60Hz
Allowance of the main body (current sensors not included)		Amp, voltage, Active Watt :±1.0% (with respect to the rated input) Power factor :The amount of ±3.0% Active Energy :±2.0% (5 - 100% of the rating, at PF=1) Voltage sag :±2.5%
Power failure compensation	Wh(energy) setting data	Stored in EEPROM (non-volatile memory).
	Voltage sag history data	Stored in SRAM (volatile memory; backed up by battery) total power failure time about six months (at 25 °C).
	Backup time	
	Clock	Clock IC backed up by battery.
Backup time		total power failure time about six months (at 25 °C).
Accuracy of the clock		About 1 minute/month deviation
Consumed VA	Voltage circuit	each phase 0.1VA (at 110VAC) -- each phase 0.2VA (at 220VAC)
	Current circuit	each phase 0.1VA (current sensor primary side)
	Auxiliary power MA-MB	100VAC: 2.5(4.5)VA 220VAC: 3.5(5.5)VA *The inside of () is a value in the state where D65 was attached.
Working temperature range		5 – +55°C (Daily average temperature 35°C or less)
Working humidity range		30 – 80%Rh (No condensation allowed.)
Storage temperature range		20 → 60°C
Power-frequency withstand voltage	Between electric circuit batch and casing	1500 V AC 1 minute
	Between a current circuit (current sensor primary side) and a voltage circuit package-auxiliary power supply	1500 V AC 1 minute
	Between a current circuit (current sensor primary side) and a voltage circuit package-output package	1500 V AC 1 minute
	Between voltage circuit package-current circuit (current sensor primary side) packages	1500 V AC 1 minute
Insulation resistance		10 MΩ (500 V DC) or more at the same locations as the withstand voltage
Compatible wires and compatible crimp contacts		Compatible wire: 1.25 mm ² Compatible crimp contact: For M3.5 of φ7.2 mm or less(e.g.: R1.25 - 3.5 bare round)
Terminal clamping torque		0.49 - 0.78N·m
Mass		0.5kg

Primary current that can be set for the EMU2-CT5:

5A, 6A, 7.5A, 8A, 10A, 12A, 15A, 20A, 25A, 30A, 40A, 50A, 60A, 75A, 80A, 100A, 120A, 150A, 200A, 250A, 300A, 400A, 500A, 600A, 750A, 800A, 1000A, 1200A, 1500A, 1600A, 2000A, 2500A, 3000A, 4000A, 5000A, 6000A, 7500A, 8000A, 10000A, 12000A, 20000A, 25000A, 30000A

Voltage sag detection specification

Item		Specification
detection system		All wave effective value voltage detection
detection judging cycle		0.52msec(60Hz) 0.625msec (50Hz) Detection operation of under a judging cycle cannot be performed.
detection voltage accuracy		±2.5% of rated voltage (setting value)
AYA,AYB operation time accuracy		Duration setting value ±5msec
Return operation	Return voltage	+2% of values set up on the surveillance level
	Return operation time	±5msec
relay contact outputs		The maximum impression voltage :DC35V load capacity :75mA point-of-contact specification : semiconductor relay use(no-volt contact) *A point of contact turns on at the time of alarm generating.

Pulse output specification

Item	Specification																																			
Pulse output	The maximum impression voltage : DC35V load capacity : 75mA point-of-contact specification : semiconductor relay use(no-volt contact) Pulse width 0.1-0.15sec																																			
Output pulse unit	<table border="1"> <thead> <tr> <th>Total load electric power (kW)</th> <th colspan="4">The pulse unit which can be set up (kWh/pulse)</th> </tr> <tr> <th></th> <th>1</th> <th>0.1</th> <th>0.01</th> <th>0.001</th> </tr> </thead> <tbody> <tr> <td>Less than 12</td> <td>1</td> <td>0.1</td> <td>0.01</td> <td>0.001</td> </tr> <tr> <td>Less than [12 or more] 120</td> <td>10</td> <td>1</td> <td>0.1</td> <td>0.01</td> </tr> <tr> <td>Less than [120 or more] 1200</td> <td>100</td> <td>10</td> <td>1</td> <td>0.1</td> </tr> <tr> <td>Less than [1200 or more] 12000</td> <td>1000</td> <td>100</td> <td>10</td> <td>1</td> </tr> <tr> <td>Less than [12000 or more] 120000</td> <td>10000</td> <td>1000</td> <td>100</td> <td>10</td> </tr> </tbody> </table>	Total load electric power (kW)	The pulse unit which can be set up (kWh/pulse)					1	0.1	0.01	0.001	Less than 12	1	0.1	0.01	0.001	Less than [12 or more] 120	10	1	0.1	0.01	Less than [120 or more] 1200	100	10	1	0.1	Less than [1200 or more] 12000	1000	100	10	1	Less than [12000 or more] 120000	10000	1000	100	10
Total load electric power (kW)	The pulse unit which can be set up (kWh/pulse)																																			
	1	0.1	0.01	0.001																																
Less than 12	1	0.1	0.01	0.001																																
Less than [12 or more] 120	10	1	0.1	0.01																																
Less than [120 or more] 1200	100	10	1	0.1																																
Less than [1200 or more] 12000	1000	100	10	1																																
Less than [12000 or more] 120000	10000	1000	100	10																																

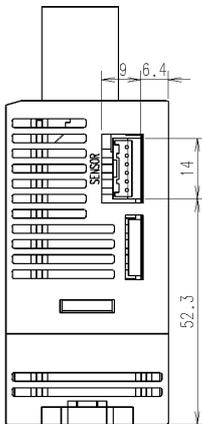
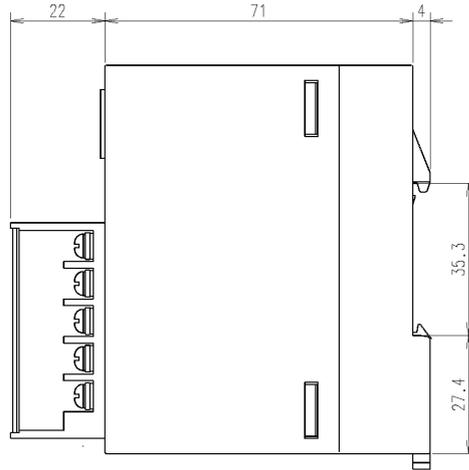
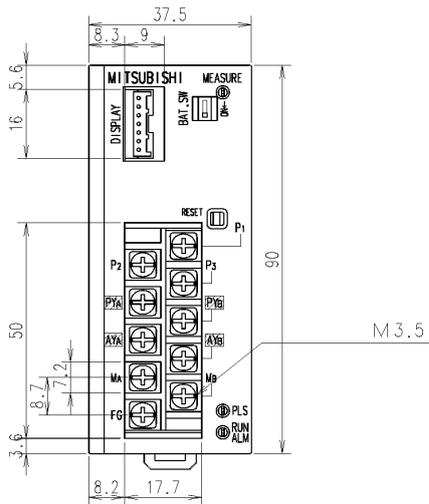
Peripheral equipment

The following products may be used.

Product	Model	Remark	
Current sensor	EMU-CT50	50A	
	EMU-CT100	100A	
	EMU-CT250	250A	
	EMU-CT400	400A	
	EMU-CT600	600A	
	EMU2-CT5	5A	A divided type, 5A sensor x2 and 0.5m cable one
	PEM-CT100	100A	Clamped type
	PEM-CT250	250A	Clamped type
Current sensor cable	EMU2-CB1-DR	0.5m	
	EMU2-CB1-CL	0.5m	
	EMU2-CB-T1M	1m	(standard type).
	EMU2-CB-T5M	5m	(standard type).
	EMU2-CB-T10M	10m	(standard type).
	EMU2-CB-T20M	20m	(standard type).
	EMU2-CB-T1MS	1m	(separate type)
	EMU2-CB-T5MS	5m	(separate type)
	EMU2-CB-T10MS	10m	(separate type)
Display unit	EMU2-D65-M	a logging display unit	

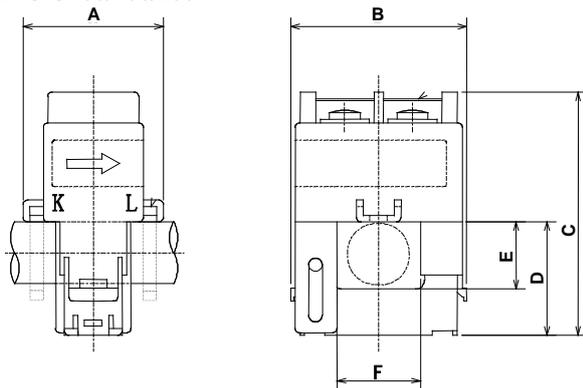
Outline dimensions

Notes: The unit of a number is mm.

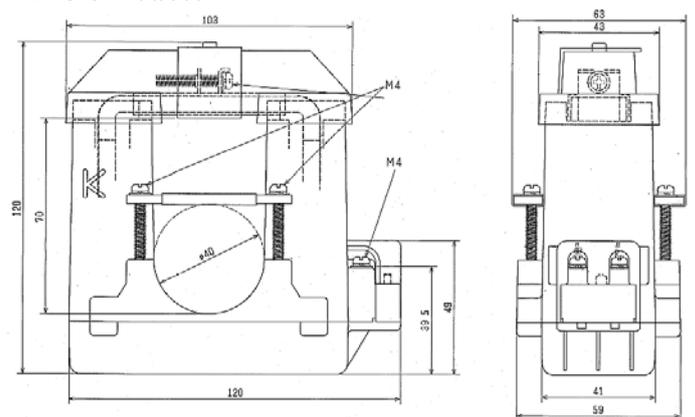


Peripheral equipment

Current sensor
EMU-CT50/100/250

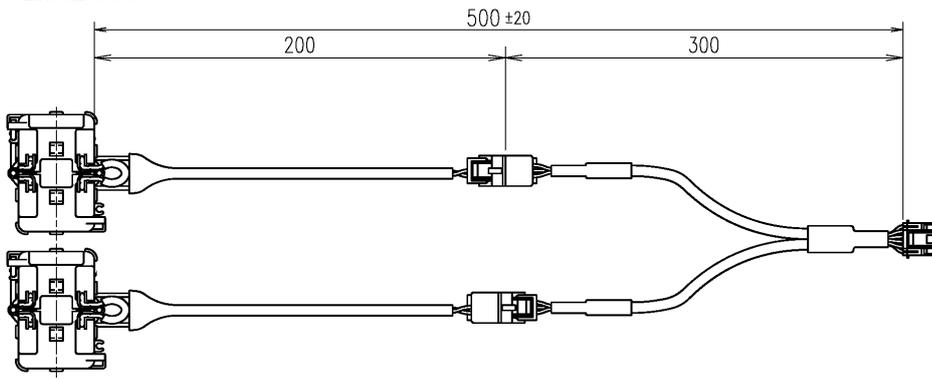


EMU-CT 400/600

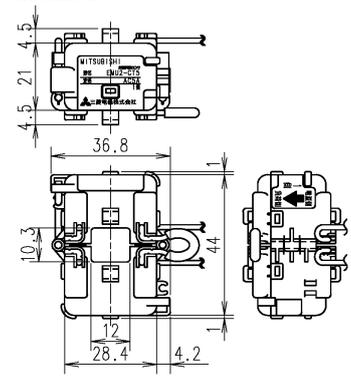


model	A	B	C	D	E	F
EMU-CT50/CT100	31.5	39.6	55.2	25.7	15.2	18.8
EMU-CT250	36.5	44.8	66	32.5	22	24

EMU2-CT5

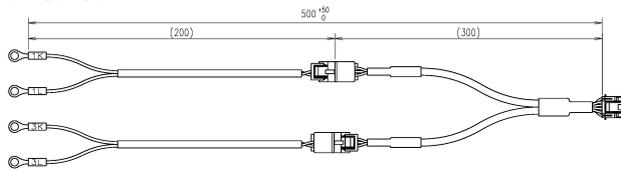


detailed



cable

EMU2-CB1-DR



EMU2-CB-T**M



Model	L
EMU2-CB-T1M	1000 ⁺⁵⁰ ₀
EMU2-CB-T5M	5000 ⁺¹⁵⁰ ₀
EMU2-CB-T10M	10000 ⁺²⁵⁰ ₀
EMU2-CB-T20M	20000 ⁺⁵⁰⁰ ₀

EMU2-CB-T**MS



Model	L
EMU2-CB-T1MS	1000 ⁺⁵⁰ ₀
EMU2-CB-T5MS	5000 ⁺¹⁵⁰ ₀
EMU2-CB-T10MS	10000 ⁺²⁵⁰ ₀

Service Network

Country/Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty, Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	612-9684, 7586
Belgium	Emac S.A.	Industrialaan 1, B-1702 Groot-Bijgaarden, Belgium	32-(0)2-4810211
Chile	RHONA S.A.	Vte. Agua Sante 4211 Casilla 30-D (P.O. Box) Viña Del Mar, Chile	(56-32)-610896
China	SHANGHAI SETSUYO TRADING CO. LTD.	Building of Innovation Center, Room No. 406A, 680 Guiping Road Shanghai, P.R. China	021-6485-6611
	RYODEN INTERNATIONAL LTD.	(Shanghai) 3F, Block 5, 103 Cao Bao Road, Shanghai, China	021-6475-3228
Colombia	Proelectrico Representaciones S.A.	Cra 53 No. 29C-73 U.I.C.-Medellin. COLOMBIA	574-235-00-28
Denmark	Louis Poulsen CO. A/S	Germinivej 32, DK-2670 Greve, Denmark	45-43-95-95-95
Egypt	CAIRO ELECTRICAL GROUP	9 Rostoum Street Garden City, APT. 5, P.O. Box 165-11516, Cairo-Egypt	20-2-7961337
Germany	Mitsubishi Electric Europe B.V. German Branch	Gothaer Strasse 8, 40880 Ratingen, Germany	49-2102-4860
Greece	Antonios Drepanias, S.A.	52, ArkadiasSTR GR 121 32 Peristeri Athens Greece	30(1)5781599, 30(1)5781699
Hong Kong	RYODEN AUTOMATION LIMITED	10/F Manulife Tower 169 Electric Road North Point, Hong Kong	28878870
Indonesia	P.T. SAHABAT INDONESIA	JL. Muara Karang Selatan Blok A/Utara No. 1 kav. NO. 11 P.O. Box 5045/Jakarta/11050, Jakarta Indonesia	021-6621780
Ireland	Mitsubishi Electric Europe B.V. Irish Branch	Westgate Business Park, Ballymount, Dublin 24, Ireland	353-1-4505007
Italy	Mitsubishi Electric Europe B.V. Italy	C.D. Colleoni-P. Perseo Ing. 2, Via Paraceiso 12 1-20041 Agrate Brianza (MI)	39-(0)39 60 531
Korea	HAN NEUNG TECHNO Co., Ltd.	2Fl. Dong Seo Game Channel Bldg., 1F 660-11 Deungchon-Dong, Kanguseo-ku, Seoul, 157-030 Korea	82-2-3668-6567
Kuwait	SALEM MAL NISF ELECTRICAL CO. W. L. L.	P.O. Box 4784, Safat. 13048 Kuwait	965-484-5660
Lao PDR	SOCIETE LAO IMPORT-EXPORT	43-47 Lane Xang Road P.O. BOX 2789 VT Vientiane Lao PDR.	21-215043, 21-215110
Lebanon	COMPTOIR D'ELECTRICITE GENERALE INTERNATIONAL	Cebaco Center-Block A, Autostrade Dora, P.O. Box 90-1314 Beirut-Lebanon	961-1-240430
Myanmar	PEACE MYANMAR ELECTRIC CO., LTD.	NO. 216, Bo Aung Gyaw Street, Botataung 1161, Yangon, Myanmar	951-295426
Nepal	Watt & Bolt House Co., Ltd.	KHA 2-65, Volt House Dilli Bazar Post Box: 2108, Katmandu, Nepal	977-1-411330
New Zealand	Melco Sales (N.Z.) Ltd.	1 Parliament Street Lower Hutt, New Zealand	644-569-7350
Norway	SCANELEC	Leivikasen 43B, P.O. box 55, 5074 Godvik, Norway	47-55-506000
Pakistan	Prince Electric Co.	16 Brandreth Road Lahore 54000, Pakistan	042-7654342
Peru	I.T.E.	Ingenieros s.a. Paseo de la Republica 3573 Lima 27, Peru	(1)221-2710
Philippines	EDISON ELECTRIC INTERGRATED, INC.	24th Fl. Galleria Corporate Center Edsa Cr. Ortigas Ave. uezon City, Metro Manila, Philippines	02-643-8691
Poland	MPL Technology Sp zo.o	30011 Krakow Ul. Wroclawska 53 Poland	48-(0)12 632 28 85
Saudi Arabia	CENTEFI OF ELECTRICAL GOODS	Al-Nabhaniya Street-4ThCrossing, Al-Hassa Road, P.O. BOX+ 15955, Riyadh 11454, Saudi Arabia	966-1-4770149
Singapore	MITSUBISHI ELECTIC ASIA PTE LTD.	307 Alexandra Road #05-01/02 Mitsubishi Electric Building Singapore 159943	65-473-2308
Slovenia	INEA	Ljubljanska 80, SI-61230 Domzale, Slovenia	386-(0)17 21 8000
South Africa	Circuit Breaker Industries LTD.	Private Bag 2016, Isando 1600, Johannesburg, South Africa	27-11-928-2000
Spain	Mitsubishi Electric Europe B.V. Spanish Branch	Caretera De Rubi 76-80, 08190-Sant Cugat Del Valles (Barcelona) Spain	34-93-565-3131
Sweden	Euro Energy Components AB	Box 103 48 S-434 24 Kungbcka, Sweden	46-(0)300-69 00 40
Switzerland	Trielec A G	Mühlentalstrasse 136, 8201 Schaffhausen, Switzerland	41-52-6258425
Taiwan	Setsuyo Enterprise Co., Ltd.	6F, NO. 105 Wu-Kung 3rd rd., Wu-Ku Hsiang, Taipen Hsien Taiwan	02-2298-8889
Thailand	UNITED TRADING & IMPORT CO. LTD.	77/12 Bumrungmuang Road, Klong Mahanak, Pomprab Bangkok 10100	223-4220-3
The Netherlands	Imtech Marine & Industry	Postbox 5054, NL-3008 AB-Rotterdam, Netherlands	31-(0)10 487 19 11
Turkey	HEDEF DIS Tic. Ve Musavirlık LTD. STI	Barbaros Bulvari Gaziumurpasa sok. 9/4, TR-Balmumcu-Istanbul Turkey	90-212-2754876
U.K.	Mitsubishi Electric Europe B.V. UK-Blanch	Travellers Lane, Hatfield, Herts, AL 1D 8xB, U.K.	44-1707-276-100
Uruguay	Fierro Vignoli S.A.	P.O. box 20022/Suc Upae, Montevideo Uruguay	598-2-92-08-08
Venezuela	ADESCO C.A.	Lle 8, Calpon Elinsu, La Urbina-EDO, Miranda P.O. Box 78034 Caracas 1074A, Venezuela	58-2-241-7634
Vietnam	Sa Giang Techno Co., Ltd.	207/4 Nguyen Van Thu St., Dist 1, Ho Chi Minh City, Vietnam	848-821-6453

Safety Tips : Be sure to read the instruction manual fully before using this product.



FACTORY AUTOMATION SYSTEM:
OFFICE TOWER "Z" 14F
8-12 1chome, Harumi CHUO-KU, TOKYO 104-6212, JAPAN

IB63259B

Energy Measuring Unit (EcoMonitorPro)

■ Service Network

Country / Region	Company	Address	Telephone
Australia	Mitsubishi Electric Australia Pty. Ltd.	348 Victoria Road, Rydalmere, N.S.W. 2116, Australia	+ 61-2-9684-7777
USA	Mitsubishi Electric Automation Inc.	500 Corporate Woods Parkway Vernon Hills, IL 60061, USA	+ 1-847-478-2100
Brazil	MELCO-TEC Rep. Com. e Assessoria Tecnica Ltda.	Av. Paulista, 1439-Cj.72, Cerqueira Cesar CEP 01311-200, Sao Paulo, SP, CEP:01311-200, Brazil	+ 55-11-3146-2200
Chile	Rhona S.A.	Agua Santa 4211 P.O. Box 30-D Vina del Mar, Chile	+ 56-32-2-320-600
China	Mitsubishi Electric Automation (CHINA) Ltd.	No. 1386 Hongqiao Road, Mitsubishi Electric Automation Center Shanghai China, 200336	+ 86-21-2322-3030
China	Mitsubishi Electric Automation (HongKong) Ltd.	10/F., Manulife Tower, 169 Electric Road, North Point, Hong Kong	+ 852-2887-8810
Colombia	Proelectrico Representaciones S.A.	Carrera 53 No 29C-73 - Medellin, Colombia	+ 57-4-235-30-38
Egypt	Cairo Electrical Group	9, Rostoum St. Garden City P.O. Box 165-11516 Maglis El-Shaab, Cairo - Egypt	+ 20-2-27961337
Europe	Mitsubishi Electric Europe B.V.	Gothaer Strasse 8, D-40880 Ratingen, Germany	+ 49-(0)2102-486-0
India	Mitlite Electric Company Pvt Ltd	Plot No-32, Sector-6, IMT Maneser,	+ 91-124-4695300
Indonesia	P. T. Sahabat Indonesia	P.O.Box 5045 Kawasan Industri Pergudangan, Jakarta, Indonesia	+ 62-(0)21-6610651-9
Korea	Mitsubishi Electric Automation Korea Co., Ltd	1480-6, Gayang-Dong, Gangseo-Gu, Seoul, Korea	+ 82-2-3660-9572
Laos	Societe Lao Import Co., Ltd.	43-47 Lane Xang Road P.O. BOX 2789 VT Vientiane Laos	+ 856-21-215043
Lebanon	Comptoir d'Electricite Generale-Liban	Cebaco Center - Block A Autostrade Dora, P.O. Box 11-2597 Beirut - Lebanon	+ 961-1-240445
Malaysia	Mittrich Sdn Bhd	5 Jalan Pemberita U1/49, Temasya Industrial Park, Glenmarie 40150 Shah Alam, Selangor, Malaysia	+ 603-5569-3748
Myanmar	Peace Myanmar Electric Co.,Ltd.	NO137/139 Botataung Pagoda Road, Botataung Town Ship 11161, Yangon, Myanmar	+ 95-(0)1-202589
Nepal	Watt & Volt House	KHA 2-65, Volt House Dillibazar Post Box: 2108, Kathmandu, Nepal	+ 977-1-4411330
Middle East Arab Countries & Cyprus	Comptoir d'Electricite Generale-International-S.A.L.	Cebaco Center - Block A Autostrade Dora P.O. Box 11-1314 Beirut - Lebanon	+ 961-1-240430
Pakistan	Prince Electric Co.	1&16 Brandreth Road, Lahore-54000, Pakistan	+ 92-(0)42-7654342
Philippines	Edison Electric Integrated, Inc.	24th Fl. Galleria Corporate Center, Edsa Cr. Ortigas Ave., Quezon City Metro Manila, Philippines	+ 63-(0)2-634-8691
Saudi Arabia	Center of Electrical Goods	Al-Shuwayer St. Side way of Salahuddin Al-Ayoubi St. P.O. Box 15955 Riyadh 11454 - Saudi Arabia	+ 966-1-4770149
Singapore	Mitsubishi Electric Asia Pte. Ltd.	307, Alexandra Road, #05-01/02 Mitsubishi Electric Building, Singapore 159943	+ 65-6473-2308
South Africa	CBI-electric: low voltage	Private Bag 2016, Isando, 1600, South Africa	+ 27-(0)11-9282000
Taiwan	Setsuyo Enterprise Co., Ltd	6th Fl., No.105, Wu Kung 3rd, Wu-Ku Hsiang, Taipei, Taiwan, R.O.C.	+ 886-(0)2-2298-8889
Thailand	United Trading & Import Co., Ltd.	77/12 Bamrungmuang Road, Klong Mahanak, Pomprab Bangkok Thailand	+ 66-223-4220-3
Uruguay	Fierro Vignoli S.A.	Avda. Uruguay 1274, Montevideo, Uruguay	+ 598-2-902-0808
Venezuela	Adesco S.A.	Calle 7 La Urbina Edificio Los Robles Locales C y D Planta Baja, Caracas - Venezuela	+ 58-212-241-9952
Vietnam	CTY TNHH-TM SA GIANG	10th Floor, Room 1006-1007, 255 Tran Hung Dao St., Co Giang Ward, Dist 1, Ho Chi Minh City, Vietnam	+ 84-8-8386727/28/29

MITSUBISHI ELECTRIC CORPORATION