POWER MONITORING PRODUCTS

Power Management Measuring Devices

Energy Saving Supporting Devices

High-performance and reliable support equipment for power management, monitoring, control equipment, and energy-saving activities

Power Management Measuring Devices

The pursuit of ease-of-use and enhanced visibility;
Mitsubishi electronic indicating instrument

Product details **P.910**

Energy Saving Supporting Devices

"Visualization" is achieved through our energy-saving support devices and solutions, providing simplified measurement, collection, and analysis of energy consumption.
A perfect choice to your energy-saving activities to drive productivity and cost reduction.

Product details P.920

Electronic Multi Measuring Instruments

Improved Measurement Functions

Improved accuracy of active energy, reactive energy and power factor and expanded measurement ranges of harmonics and demand values have been realized.

■Line-up

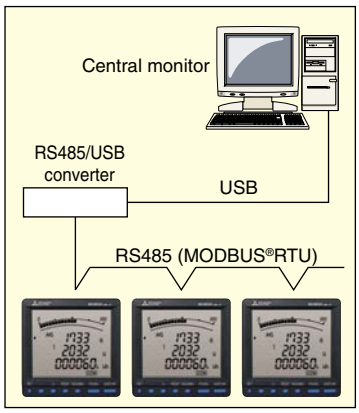
Model name	Transmission/Option specifications	Main measurement items
ME96SSHA-MB (High-performance class)	MODBUS® RTU communication Plug-in module (options) • Analog/Pulse/Contact output/input • CC-Link communication • Digital input/output (for MODBUS® RTU communication) • Backup (on SD card) • MODBUS® TCP communication	A, DA, V, Hz = ±0.1% W, var, VA, PF = ±0.2% Wh = class 0.5S (IEC62053-22) varh = class 1S (IEC62053-24) Harmonics = 31st-deg (max) Rolling demand = W, var, VA
ME96SSRA-MB (Standard class)	MODBUS® RTU communication Plug-in module (options) • Analog/Pulse/Contact output/input • CC-Link communication • Digital input/output (for MODBUS® RTU communication) • Backup (on SD card) • MODBUS® TCP communication	A, DA, V = ±0.2% Hz = ±0.1% W, var, VA, PF = ±0.5% Wh = class 0.5S (IEC62053-22) varh = class 1S (IEC62053-24) Harmonics = 19th-deg (max) Rolling demand = W, var, VA
ME96SSEA-MB (Economy class)	MODBUS® RTU communication	A, DA, V = ±0.5% Hz = ±0.2% W, PF = ±0.5% Wh = class 0.5S (IEC62053-22) Harmonics = Only total

■Optional Plug-in Modules

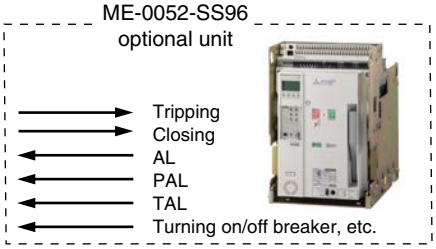
Model name	Analog output	Pulse/Alarm output	Contact input	Contact output	Transmission function	Used with
ME-4210-SS96	4	2	1	–	–	ME96SSHA-MB ME96SSRA-MB
ME-0040C-SS96	–	–	4	–	CC-Link	
ME-0052-SS96	–	–	5	2	–	
ME-0000BU-SS96	–	–	–	–	SD CARD	
ME-0000MT-SS96	–	–	–	–	MODBUS® TCP	

*1: Optional Plug-in Module can not be used with ME96SSEA-MB.

MODBUS® RTU System (ME96SSHA-MB/ME96SSRA-MB with ME-0052-SS96 (optional plug-in module))



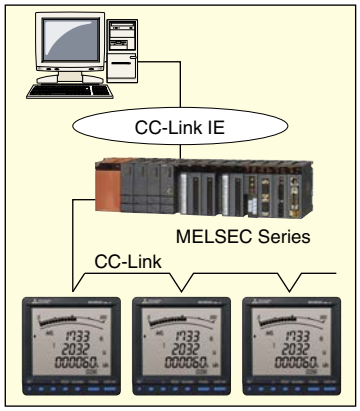
- MODBUS® RTU communication system optimizes computer monitoring operations
- Attachment of ME-0052-SS96 (optional) enables remote monitoring of the contact input signal and on/off control of the contact output signal
- Digital input signals can be latched for over 30ms, and there is no need for external latch circuits



<MODBUS® RTU Interface Specifications>
- Max. Baud rate: 38.4kbps
- Max. Connection Distance: 1,200m
- Max. Connection Units: 31

<Optional Plug-in Module ME-0052-SS96>
- Digital Input: 5 points (24VDC)
- Digital Output: 2 points (35VDC)

CC-Link System (ME96SSHA-MB/ME96SSRA-MB with ME-0040C-SS96 (optional plug-in module))

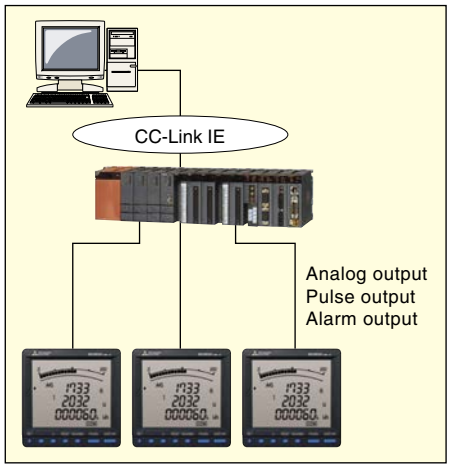


- Optimum transmission system for remote monitoring using Mitsubishi PLC
- Contact signals can be remotely monitored by installing the optional module ME-0040C-SS96. This is helpful in wiring and space saving.
- Digital unit signal can be latched for over 30ms, and there is no need for external latch circuits

← Abnormal Signal (Facility)
← Abnormal Signal (Earth Leakage)
← Abnormal Signal (Temperature)
← Circuit Breaker Status Signal, etc.

<CC-Link Interface>
- Max. Baud rate: 10Mbps
- Max. Connection Distance: 100m (10Mbps)~ 1,200m (156kbps)
- Max. Connection Units: 42
- Digital Input: 4 points (24VDC)

Analog/Pulse/Alarm Output System (ME96SSHA-MB/ME96SSRA-MB with ME-4210-SS96 (optional plug-in module))



- Applicable to analog output, pulse output and alarm output with the aid of the optional module ME-4210-SS96
- Remote monitoring of A, DA, V, W, var, VA, PF, Hz, Harmonics Current RMS value and Harmonics voltage RMS value at 4 to 20mA output (max. 4 outputs)
- Active energy, reactive energy, apparent power and periodic energy (ME96SSHA-MB) can be monitored by pulse output (max. 2 pulses)
- Can remotely monitor upper/lower limit alarm by contact output (max. 2 points)

<Analog output specifications>
- 4-20mA
- 4 outputs
- Resistance load 600Ω or less

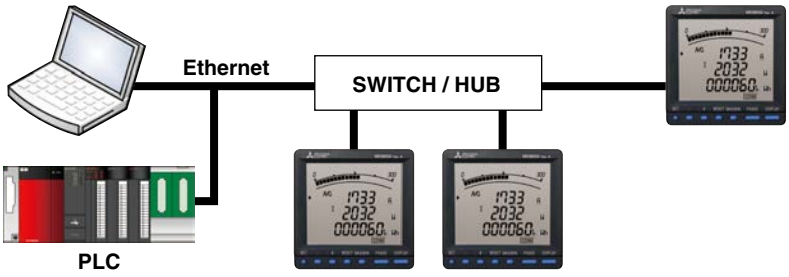
<Pulse output specifications>
- No-voltage a contact point
- 35VDC, 0.1A
- Select output from pulse widths of 0.125, 0.5 or 1s

<Alarm output specifications>
- No-voltage a contact point
- 35VDC, 0.1A

<Digital input specifications>
- 1 point (24VDC)

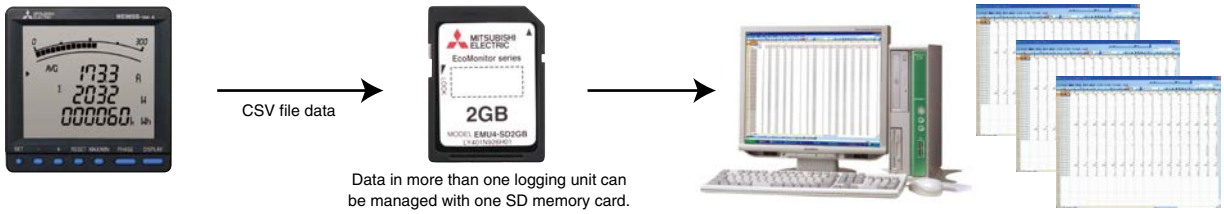
MODBUS® TCP Communication (ME96SSHA-MB/ME96SSRA-MB with ME-0000MT-SS96 (optional plug-in module))

There is available an optional module usable not only for the conventional MODBUS® RTU (RS-485) communication and CC-Link communication, but also for MODBUS® TCP communication in an Ethernet environment.



Data Logging (ME96SSHA-MB/ME96SSRA-MB with ME-0000BU-SS96 (optional plug-in module))

There is available an optional module which can retain data even when communication cannot be established.



Data in more than one logging unit can be managed with one SD memory card.

Note: Use the SD memory card (EMU4-SD2GB) made by Mitsubishi Electric.
Use of any memory card other than our product (EMU4-SD2GB) is not covered by the warranty.

Specifications

■ME96SSHA-MB/RA-MB/EA-MB

Model name			ME96SSHA-MB	
Phase wire			Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)	
Rating		Current	5AAC, 1AAC (common use)	
		Voltage	Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)	
		Frequency	50-60Hz (common use)	
			Measurement items	Class
Measurement items and accuracy	Current (A)		A1, A2, A3, AN, A_{AVG}	±0.1%
	Current demand (DA)		DA1, DA2, DA3, DAN, DA_{AVG}	±0.1%
	Voltage (V)		V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.1%
	Active power (W)		W1, W2, W3, ΣW	±0.2%
	Reactive power (var)		var1, var2, var3, Σvar	±0.2%
	Apparent power (VA)		VA1, VA2, VA3, ΣVA	±0.2%
	Power factor (PF)		PF1, PF2, PF3, ΣPF	±0.2%
	Frequency (Hz)		Hz	±0.1%
	Active energy (Wh)		Imported, Exported	class 0.5S (IEC62053-22)
	Reactive energy (varh)		Imported lead, lag Exported lead, lag	class 1S (IEC62053-24)
	Apparent energy (Vah)		—	±2.0%
	Harmonic current (HI)		Total, 1st to 31st degree (odd number degree only)	±1.0%
	Harmonic voltage (HV)		Total, 1st to 31st degree (odd number degree only)	±1.0%
	Rolling demand (DW)		Rolling block, fixed block	±0.2%
	Rolling demand, reactive power (Dvar)		Rolling block, fixed block	±1.0%
	Rolling demand, apparent power (DVA)		Rolling block, fixed block	±1.0%
	Periodic Active energy (Wh)		Periodic active energy 1, 2	class 0.5S (IEC62053-22)
	Operating time		Operating time 1, 2	(Reference)
Analog output response time			2s or less (HI, HV: 10s or less)	
Measuring method		Instantaneous value	A/V: RMS calculation, W/ var/ VA/ Wh/ varh/ VAh: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT	
		Demand value	DA: Thermal type calculation DW, Dvar, DVA: Rolling demand calculation	
Display	Indicator		LCD with LED backlight	
	No. of display digits and segments	Digital display	6 digits each at upper, middle, and lower line	
			A, DA, V, W, var, VA, PF, DW, Dvar, DVA: 4 digits Hz: 3 digits Wh, varh, VAh: 9 digits (6 or 12 possible) Harmonic distortion ratio, content ratio: 3 digits Harmonic RMS: 4 digits Operating time: 6 digits Contact input/output: I/O	
		Bar graph	21 segment bar graph, 22 segment indicator	
	Display updating time interval		0.5s or 1s (selectable)	
Communication			MODBUS® RTU communication	
Available optional plug-in module			ME-4210-SS96 ME-0000BU-SS96 ME-0040C-SS96 ME-0000MT-SS96 ME-0052-SS96	
Power failure compensation			Non-volatile memory used (items: setting value, max/min value, active/reactive energy, apparent energy, periodic active energy, rolling demand, operating time)	
Consumption (VA)	VT		Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
	CT		Each phase 0.1VA (5AAC)	
	Auxiliary power circuit		7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)	
Auxiliary power			100-240VAC (±15%), 100-240VDC (-30% +15%)	
Weight			0.5kg	
Dimensions			96 (H) × 96 (W) × 90 (D)	
Installation method			Embedded	
Operating temperature			-5~+55°C (average operating temperature: 35°C or less per day)	
Operating humidity			0~85% RH (non condensing)	
Storage temperature			-25~+75°C (average temperature: 35°C or less per day)	
Storage humidity			0~85% RH (non condensing)	

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±1.0%.
*3: Harmonic current cannot be measured without voltage input.

ME96SSRA-MB		ME96SSEA-MB	
Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)		Three phase 4-wire, Three phase 3-wire (3CT, 2CT), Single phase 3-wire, Single phase 2-wire (common use)	
5AAC, 1AAC (common use)		5AAC, 1AAC (common use)	
Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)		Three phase 4-wire: 277/480VAC (max) Three phase 3-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max) Single phase 3-wire: 220/440VAC (max) Single phase 2-wire: Delta connections: 220VAC (max), Star connections: 440VAC (max)	
50-60Hz (common use)		50-60Hz (common use)	
Measurement items	Class	Measurement items	Class
A1, A2, A3, AN, A_{AVG}	±0.2%	A1, A2, A3, AN, A_{AVG}	±0.5%
DA1, DA2, DA3, DAN, DA_{AVG}	±0.2%	DA1, DA2, DA3, DAN, DA_{AVG}	±0.5%
V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.2%	V12, V23, V31, V_{AVG} (L-L) V1N, V2N, V3N, V_{AVG} (L-N)	±0.5%
W1, W2, W3, ΣW	±0.5%	W1, W2, W3, ΣW	±0.5%
var1, var2, var3, Σvar	±0.5%	—	—
VA1, VA2, VA3, ΣVA	±0.5%	—	—
PF1, PF2, PF3, ΣPF	±0.5%	PF1, PF2, PF3, ΣPF	±0.5%
Hz	±0.1%	Hz	±0.2%
Imported, Exported	class 0.5S (IEC62053-22)	Receiving	class 0.5S (IEC62053-22)
Imported lead, lag Exported lead, lag	class 1S (IEC62053-24)	—	—
—	±2.0%	—	—
Total, 1st to 19th degree (odd number degree only)	±1.0%	Total	±2.0%
Total, 1st to 19th degree (odd number degree only)	±1.0%	Total	±2.0%
Rolling block, fixed block	±0.5%	—	—
Rolling block, fixed block	±1.0%	—	—
Rolling block, fixed block	±1.0%	—	—
Periodic active energy 1, 2	class 0.5S (IEC62053-22)	—	—
Operating time 1, 2	(Reference)	Operating time 1, 2	(Reference)
2s or less (HI, HV: 10s or less)		—	
A/V: RMS calculation, W/var/VA/Wh/varh: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT		A/V: RMS calculation, W: Digital multiplication, PF: Power ratio calculation, Hz: Zero-cross, HI/HV: FFT	
DA: Thermal type calculation DW, Dvar, DVA: Rolling demand calculation		DA: Thermal type calculation	
LCD with LED backlight		LCD with LED backlight	
6 digits each at upper, middle, and lower line		6 digits each at upper, middle, and lower line	
A, DA, V, W, var, VA, PF, DW, Dvar, DVA: 4 digits Hz: 3 digits Wh, varh: 9 digits (6 or 12 possible) Harmonic distortion ratio, content ratio: 3 digits Harmonic RMS: 4 digits Operating time: 6 digits Contact input/output: I/O		A, DA, V, W, PF: 4 digits Hz: 3 digits Wh: 9 digits (6 or 12 possible) Relative harmonic content: 3 digits Harmonic RMS value: 4 digits Operating time: 6 digits	
21 segment bar graph, 22 segment indicator		21 segment bar graph, 22 segment indicator	
0.5s or 1s (selectable)		0.5s or 1s (selectable)	
MODBUS® RTU communication		MODBUS® RTU communication	
ME-4210-SS96 ME-0000BU-SS96 ME-0040C-SS96 ME-0000MT-SS96 ME-0052-SS96		—	
Non-volatile memory used (items: setting value, max/min value, active/reactive energy, apparent energy, periodic active energy, rolling demand, operating time)		Non-volatile memory used (items: setting value, max/min value, active energy, operating time)	
Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)		Each phase 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
Each phase 0.1VA (5AAC)		Each phase 0.1VA (5AAC)	
7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)		7VA (at 110VAC), 8VA (at 220VAC), 5W (at 100VDC)	
100-240VAC (±15%), 100-240VDC (-30% +15%)		100-240VAC (±15%), 100-240VDC (-30% +15%)	
0.5kg		0.5kg	
96 (H) × 96 (W) × 90 (D)		96 (H) × 96 (W) × 90 (D)	
Embedded		Embedded	
-5~+55°C (average operating temperature: 35°C or less per day)		-5~+55°C (average operating temperature: 35°C or less per day)	
0~85% RH (non condensing)		0~85%RH (non condensing)	
-25~+75°C (average temperature: 35°C or less per day)		-25~+75°C (average temperature: 35°C or less per day)	
0~85% RH (non condensing)		0~85%RH (non condensing)	

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±1.0%.
*3: Harmonic current cannot be measured without voltage input.

*1: Class values based on 100% of rated value.
*2: Harmonic measurements where distortion ratio (content rate) is 100% or more may exceed ±2.0%.

Standards Compliance

Electromagnetic Compatibility		
	Emissions	
	Radiated Emission	EN61326-1/CISPR 11, FCC Part15 Subpart B Class A
	Conducted Emission	EN61326-1/CISPR 11, FCC Part15 Subpart B Class A
	Harmonics Measurement	EN61000-3-2
	Flicker Meter Measurement	EN61000-3-3
	Immunity	
	Electrostatic discharge Immunity	EN61326-1/EN61000-4-2
	Radio Frequency Electromagnetic field Immunity	EN61326-1/EN61000-4-3
	Electrical Fast Transient/Burst Immunity	EN61326-1/EN61000-4-4
	Surge Immunity	EN61326-1/EN61000-4-5
	Conducted Disturbances, Induced By Radio Frequency Fields Immunity	EN61326-1/EN61000-4-6
	Power Frequency Magnetic Field Immunity	EN61326-1/EN61000-4-8
	Voltage Dips and Short Interruptions	EN61326-1/EN61000-4-11

Safety		
	Europe	CE, as per EN61010-1
	U.S. and Canada	cRUus as per UL61010-1, IEC61010-1
	Installation Category	III
	Measuring Category	III
	Pollution Degree	2

MODBUS® RTU Communication Specifications

Item	Specification
Interface	RS-485 2-wire half-duplex transmission
Protocol	RTU (binary data transfer)
Transmission method	Asynchronous
Connection type	Multi-point bus
Baud rate	2400, 4800, 9600, 19200, 38400bps
Data bit	8
Stop bit	1, 2
Parity	ODD, EVEN, NONE
Address	1 to 255 (0: for broadcast mode)
Distance	1,200m (max)
Max. connectable units	31 units
Terminal Resistance	120Ω 1/2W
Recommended Cable	Shielded twisted-pair AWG24 to 14

■ For more information on data, please refer to the following document.
· Electronic Multi-Measuring Instrument ME series MODBUS® Interface specifications…LMS-0492

CC-Link Communication Specifications

Item	Specification
No. of occupied stations	1 Station Remote device station
CC-Link version	CC-Link Ver 1.10 / Ver 2.00
Baud rate	10Mbps / 5Mbps / 2.5Mbps / 625kbps / 156kbps
Transmission method	Broadcast polling system
Synchronous method	Frame synchronous system
Encoding method	NRZI
Transmission path format	Bus format (EIA RS485)
Transmission format	HDLC
Error control system	CRC ($X^{16} + X^{12} + X^5 + 1$)
Number of connectable units	42 units (max, remote device station)
Remote station numbers (station numbers)	1 to 64

■ For CC-Link connection cables, please use the dedicated cables.
For information regarding dedicated cables, please refer to the CC-Link Partner Product Catalog published by the CC-Link Partner Association or CC-Link Partner Product Information on the CC-Link Partner Association website (http://www.cc-link.org).
Notes 1. Dedicated CC-Link cables compatible with Ver. 1.00 cannot be used in tandem with dedicated CC-Link high-performance cables compatible with Ver. 1.00.
Notes 2. In the case of systems consisting of units compatible with Ver. 1.00, 1.10 or 2.00 used in tandem with Ver. 1.00 or 1.10 cables, Ver. 1.00 specifications will apply for the maximum total cable length and length of cables between stations.
Notes 3. For terminal resistance, be sure to use 110 Ω ±5% (1/2W product) when using dedicated CC-Link cables or 130 Ω ±5% (1/2W product) when using dedicated CC-Link high-performance cables.
■ For more information on data, please refer to the following document.
· Electronic Multi-Measuring Instrument programming manual (CC-Link)……LEN080334
· Electronic Multi-Measuring Instrument programming manual (CC-Link)(For ver. 2 remote device station)…LEN130391

Input/Output Specifications

Item	Specification	Optional Plug-in Module type
Analog output	4-20mA (0~600 Ω)	ME-4210-SS96
Pulse/Alarm output	No-voltage “a” contact Capacity: 35VDC, 0.1A	ME-4210-SS96
Digital input	19-30VDC 7mA or less	ME-4210-SS96, ME-0040C-SS96, ME-0052-SS96
Digital output	No-voltage a contact Capacity: 35VDC, 0.2A	ME-0052-SS96

MODBUS® TCP Communication Specifications

Item		Specification
Interface		1 port (10BASE-T/100BASE-TX)
Transmission method		Base band
Number of stages connected in cascade		Max. 4 stages (10BASE-T), max. 2 stages (100BASE-TX) (when repeater hub is used)
Max. distance between nodes		200m
Max. segment length		100m
Connector applicable to external wiring		RJ45
Cable	10BASE-T	Cable meeting IEEE802.3 10BASE-T standard (Unshielded twisted pair cable (UTP cable), category 3 or higher)
	100BASE-TX	Cable meeting IEEE802.3 100BASE-TX standard (Shielded twisted pair cable (STP cable), category 5 or higher)
Protocol		MODBUS® TCP (port No.502)
Max. number of connections		4
Support functions		Auto-negotiation function (automatic recognition of 10BASE-T/100BASE-TX) Auto-MDIX function (automatic recognition of straight cable/cross cable)

■ For more information on data, please refer to the following document.
Electronic Multi-Measuring Instrument ME series MODBUS® Interface specifications…LMS-0492

Logging Specifications

Item		Specification
Logging mode		Automatic updating by overwriting (not provided with a function to automatically start according to the start time setting)
Kinds of logging data	Detailed data	Measurement data is stored at the specified “detailed data logging interval” (1 min, 5 min, 10 min, 15 min or 30 min). Note: The data will be output as a detailed data file. Note: As the integrated values, not the difference values, but the values displayed on the multi indicating instrument will be output.
	1-hour data	Measurement data is stored at a one-hour interval. Note: The data will be output as a one-hour data file or a one-day data file. Note: As the integrated values, not the difference values, but the values displayed on the multi indicating instrument will be output.
Number of logging elements	Detailed data	Max. 6 elements
	1-hour data	Max. 6 elements
Internal memory logging period	Detailed data	Detailed data logging interval: 1 min for 2 days Detailed data logging interval: 5 min for 10 days Detailed data logging interval: 10 min for 20 days Detailed data logging interval: 15 min for 30 days Detailed data logging interval: 30 min for 60 days
	1-hour data	400 days (about 13 months)
SD memory card (2GB) logging period		10 years or more
System log data		1200 records
Logging data / system log data output format		CSV format (ASCII code)
Power failure compensation		Backup by built-in lithium battery Total power interruption backup time: 5 years (at daily average temperature of 35°C or less) (The life of the lithium battery is 10 years (at a daily average temperature of 35°C or less).) The battery cannot be replaced by the customer. Please consider updating the module.
Set values (logging ID, logging elements and detailed data logging interval)		Stored in FRAM (non-volatile memory) Note: The data will not be deleted even if power interruption is caused by battery voltage drop (BAT. LED is on).
Logging data and system log data		Stored in SRAM (volatile memory) Note: The data will be deleted if power interruption is caused by battery voltage drop (BAT. LED is on).
Clock operation		Note: The clock operation will stop if power interruption is caused by battery voltage drop (BAT. LED is on). After power restoration, the clock operation will start from 00:00 on Jan. 1, 2016.
Clock accuracy		1 min / month
Output data storage medium		SD memory card (SD or SDHC)
Optional accessory		SD memory card (EMU4-SD2GB) *1

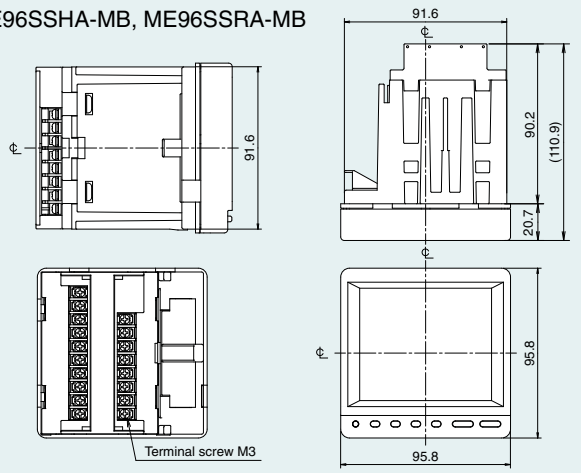
*1: Use the SD memory card (EMU4-SD2GB) made by Mitsubishi Electric.
Use of any memory card other than our product (EMU4-SD2GB) is not covered by the warranty.

■ For more information on data, please refer to the following document.
Logging specifications…LMS-0551

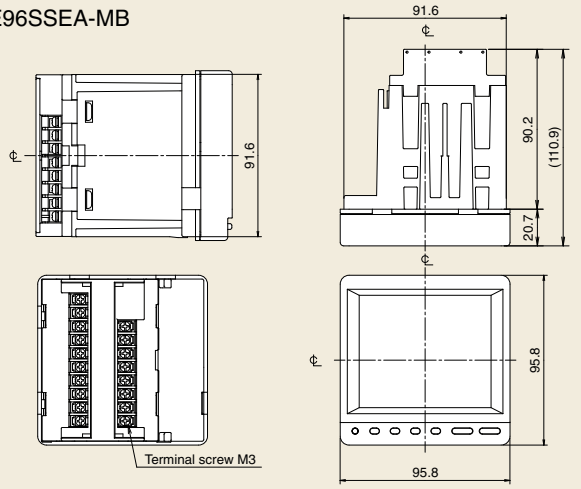
External Dimensions/Installation/Connections

■Dimensions

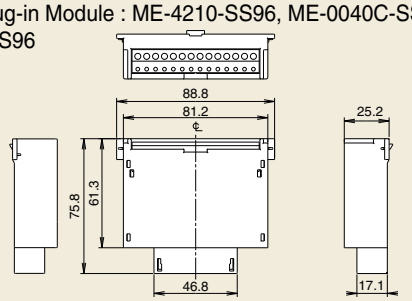
●ME96SSHA-MB, ME96SSRA-MB



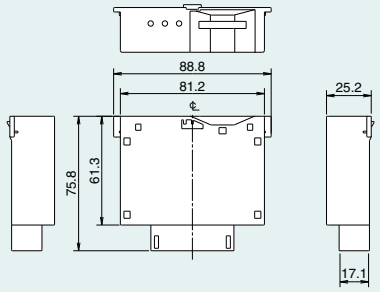
●ME96SSEA-MB



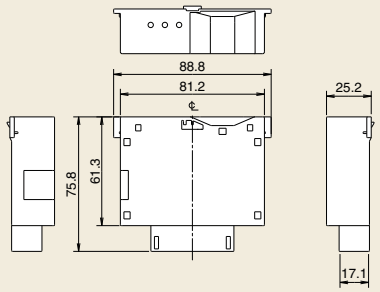
●Optional Plug-in Module : ME-4210-SS96, ME-0040C-SS96, ME-0052-SS96



●Optional Plug-in Module : ME-0000BU-SS96



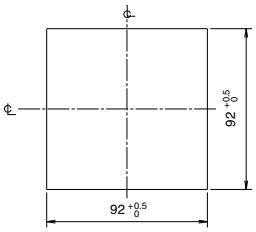
●Optional Plug-in Module : ME-0000MT-SS96



■Mounting

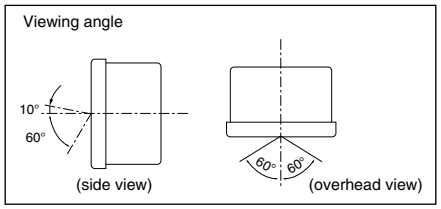
1 Dimension of panel

Panel hole dimensions are as shown in the following figure. It can be attached to a panel with thickness of 1.6 to 4.0mm.



2 View Angle

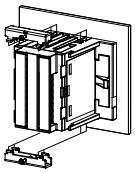
The contrast of the display changes at view angle. Mount it at the position that is easy to see.



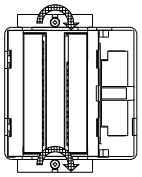
3 Attachment

For attachment of the basic device into the panel hole, attach according to the following procedure.

①The attachment lug is installed in two holes of the top and bottom of the basic device.



②Tighten the screws of the lug, and fix onto the panel.



Note

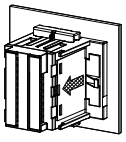
To prevent damage to the panel and screws, do not fasten screws too tightly.
Recommended torque for these products: 0.3~0.5N·m (approx. half of standard torque)
Also, please tighten the upper and lower screws at the same time.

Main unit mounting screws: M3

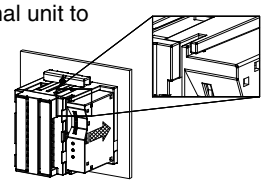
4 Installing Optional Plug-in Module

When installing the optional plug-in module onto the basic device, install according to the following procedure.

①Remove the optional cover.



②Attach the optional unit to the main unit.

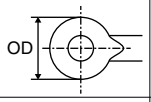


Fit the protruding part of the optional unit into the slot in the main unit.

■Wiring

1 Applicable Cable Size

The table on the right describes the applicable wire size.

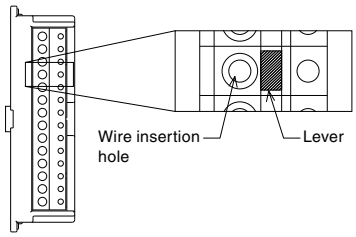
Part	Screw type	Wire specifications	Tightening torque
Product main body (auxiliary power supply, voltage input, current input and MODBUS® RTU communication terminals)	M3	• Use of crimp-style terminals: AWG26 to 14 (2 wires can be connected.) Applicable crimp-style terminal: OD of 6 mm or less, for screw M3 	0.6 to 0.8 N·m
Optional unit terminal (ME-0052-SS96, ME-0040C-SS96, ME-4210-SS96)	Screwless	• Single wire and stranded wire: AWG24 to 14 (Rod terminal can be used together with stranded wire.) Wire stripping length: 10 to 11 mm *1: To conform to UL Standard, use in accordance with the following requirements. • Single wire and stranded wire: AWG24 to 18 •Use of a bar terminal is not allowed. *2: When using a bar terminal for inserting two wires, select a terminal whose insertion part into the terminal block is 12 to 13 mm long.	–

2 Wiring

■Optional Plug-in Module Terminal

①Remove the wire casing at the end of the wire and solder to the rod terminal.
②With the lever pushed in, insert the wire and then release the lever to connect.

■Optional Plug-in Module Terminal



3 Confirmations

After wiring, make sure the following:
☐All wiring is connected
☐There is no mistake in wiring

Note

Protective sheet

There is a protective sheet covering the LCD screen to prevent scratching during panel installation. Please remove the sheet before using the meter. When removing the sheet, the LCD may turn on due to the static electricity generated. This is not abnormal; the LCD will turn off after a short time.

Installation position

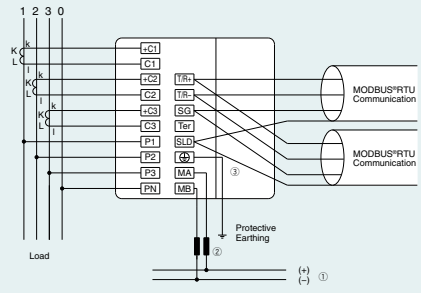
If installing the unit at the panel edge, choose an installation position where there is sufficient space for wiring work.

Optional unit

Turn the auxiliary power supply off before attaching the optional unit. If attached with the power on, the main unit will not recognize the optional unit. To remedy this, turn off/restart the auxiliary power supply or execute the “instrument restart” operation.

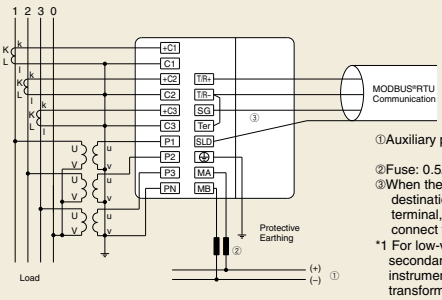
■Wiring Diagrams

●Three phase 4-wire system: Direct input



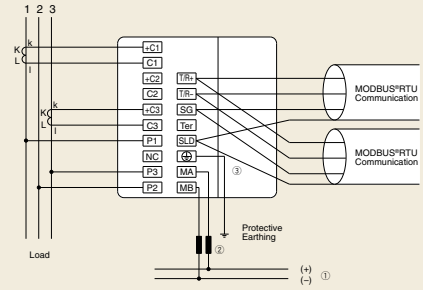
①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.

●Three phase 4-wire system: With VT



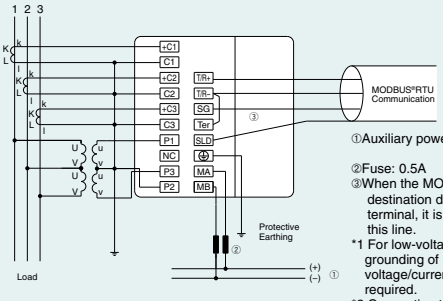
①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.

●Three phase 3-wire system: Direct input, 2CT



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

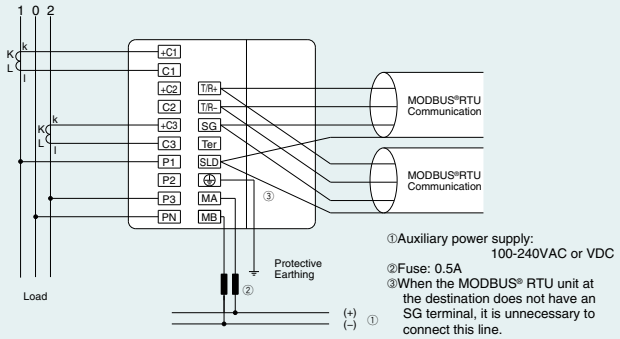
●Three phase 3-wire system: With VT, 3CT



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

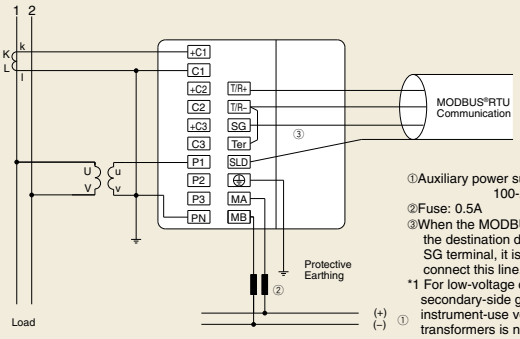
Wiring Diagrams (Continued)

●Single phase 3-wire system



①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

●Single phase 2-wire system: With VT

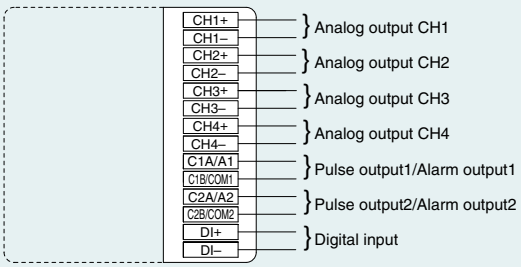


①Auxiliary power supply: 100-240VAC or VDC
②Fuse: 0.5A
③When the MODBUS® RTU unit at the destination does not have an SG terminal, it is unnecessary to connect this line.
*1 For low-voltage circuits, secondary-side grounding of instrument-use voltage/current transformers is not required.
*2 Connection to NC terminal is prohibited.

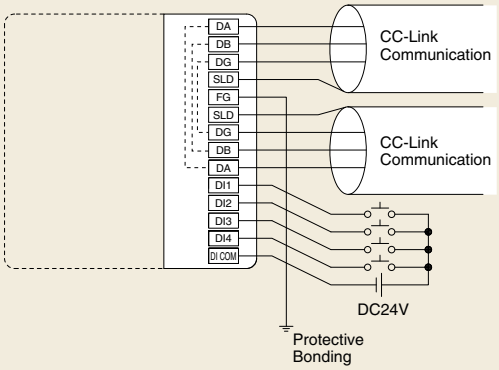
Note

1. The voltage input terminal will vary depending on if it is a 3-phase, 3-wire system or otherwise.
2. VT/CT polarity errors will cause incorrect measurement.
3. Always use the grounding terminal (⏚) in a grounded state. Perform grounding with a grounding resistance of 100Ω or less. Insufficient grounding may cause erroneous operation.
4. Use shielded twisted-pair cables for transmission signal lines.
5. Use terminal resistance (120Ω) for devices at both ends of the MODBUS® RTU communication transmission line. These meters can be terminated at 120Ω by short-circuiting the "T-" and "Ter" terminals.
6. Use the thickest possible grounding wire to ensure low impedance.
7. MODBUS® RTU transmission signal cables must not be in close proximity or bundled with high-voltage cables.

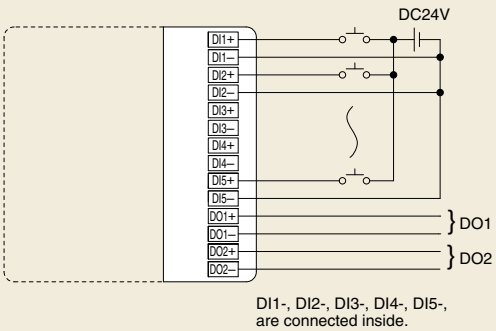
●Optional Plug-in Module: ME-4210-SS96



●Optional Plug-in Module: ME-0040C-SS96

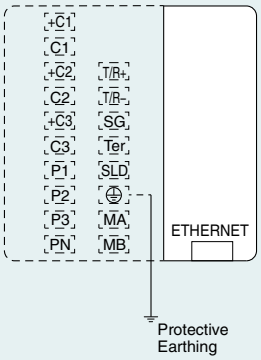


●Optional Plug-in Module: ME-0052-SS96

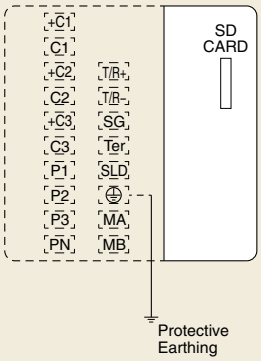


DI1-, DI2-, DI3-, DI4-, DI5-, are connected inside.

●Optional Plug-in Module: ME-0000MT-SS96



●Optional Plug-in Module: ME-0000BU-SS96



Wiring Diagrams (Continued)

Note

1. Pulse output, alarm output, and contact input/output cables must not be in close proximity or bundled with power cables or high-voltage cables. When laid parallel, separate by the distance shown in the following table.

Condition	Distance
Power lines under 600V/600A	More than 30cm
Other power lines	More than 60cm

2. Analog output cables must not be in close proximity or bundled with other power cables or input cables (e.g., VT, CT, auxiliary power supply). In addition, to prevent noise, surge and induction, use shielded cables or twisted-pair cables. Make sure that cables are as short as possible.
3. There is no insulation between the MODBUS® RTU communication portion and the optional module ME-4210-SS96, ME-0040C-SS96 or ME-0000MT-SS96.
4. Use only designated cables when connecting the CC-Link (see communication specifications). CC-Link dedicated cables cannot be used at the same time as CC-Link dedicated high-performance cables. Normal data transmission cannot be guaranteed if used at the same time.
   The terminal resistance value varies depending on the type of dedicated cable.
5. For cables connecting the CC-Link, connect shielded cables to “SLD” and ground “FG” cables. “SLD” and “FG” cables are connected inside the unit.
6. CC-Link transmission lines are small signal circuits: separate from strong electrical circuits by a distance of 10cm or more, or 30cm or more if laid in parallel over a long distance.
   Ground the terminal before use.
7. For CC-Link transmission, always use dedicated lines and comply with conditions for total wiring distance, distance between stations and terminal resistance values according to the communication speed. Not doing so may prevent normal communication (see the CC-Link Master Unit Operations Manual for information on dedicated lines and wiring conditions).
8. The terminal resistance supplied with the CC-Link Master Unit must always be used for the units at both ends of the CC-Link transmission line. If the meter is at the end of the CC-Link transmission line, connect it between the DA and DB terminals.
9. Communication errors may occur under the influence of high-frequency noise from other devices in the installation environment during high-speed communication (100 Mbps) via 100BASE-TX connection of MODBUS® TCP.
   Measures to be taken when the network system is configured to avoid the influence of high-frequency noise are shown below.
   (1) Wiring connection
   • When laying a twisted pair cable, do not bundle the cable together with any main circuit line or power line or lay it close to such a line.
   • Keep the twisted pair cables in the duct.
   (2) Communication method
   • Increase the number of communication retries as needed.
   • Replace the hub to be used for connection with that for 10 Mbps, and communicate at a data transmission speed of 10 Mbps.
10. Do not connect any terminal or RJ45 connector in the live state.
11. Do not insert or remove the SD memory card in the live state.

Rated voltage for each phase/wire system

Phase/Wire	Connection	Rated voltage	Figure
Three phase 4-wire	Star	Max. 277VAC (L-N)/480VAC(L-L)	1
Three phase 3-wire	Delta	Max. 220VAC (L-L)	2
	Star	Max. 440VAC (L-L)	3
Single phase 3-wire	–	Max. 220VAC (L-N)/440VAC(L-L)	4
Single phase 2-wire*	Delta	Max. 220VAC (L-L)	5
	Star	Max. 440VAC (L-L)	6

* The circuit derived from the three-phase 3-wire delta connection and the single-phase 2-wire transformer circuit have the maximum rating of 220 VAC.
The circuits derived from the three-phase 4-wire and three-phase 3-wire star connections and single-phase 3-wire connection have the maximum rating of 440 VAC.

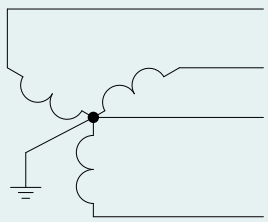


Fig. 1. Three phase 4-wire (star)

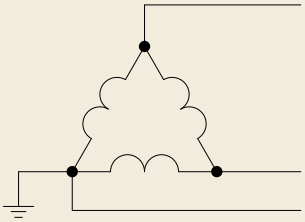


Fig. 2. Three phase 3-wire (delta)

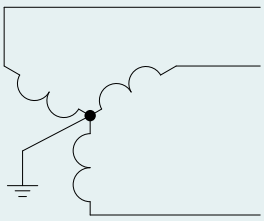


Fig. 3. Three phase 3-wire (star)

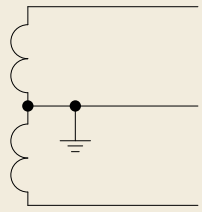


Fig. 4. Single phase 3-wire

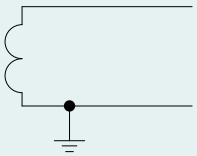


Fig. 5. Single phase 2-wire (delta)

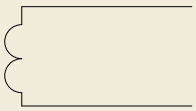


Fig. 6. Single phase 2-wire (star)

Device features

Energy Measuring Module

Measure Various Energy Data Easily: Simply Insert Directly into PLC Slot

■Line-up

QE81WH

QE84WH

QE81WH4W

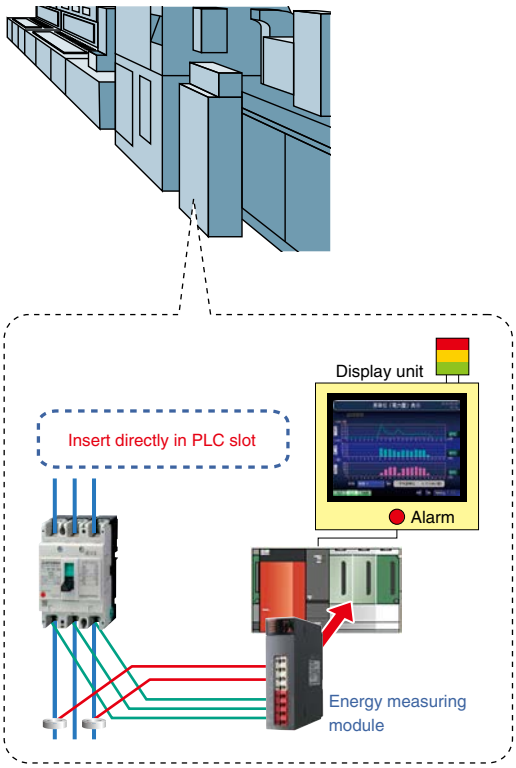
QE83WH4W

■General specifications

	Energy measuring module			
Model name	QE81WH	QE84WH	QE81WH4W	QE83WH4W
Phase Wire system	Single-phase 2-wire, single-phase 3-wire, 3-phase 3-wire		3-phase 4-wire*	
Measurement items	Electric energy (consumption, regenerative), reactive energy, current, voltage, power factor, frequency, etc.			
No. of measurement circuits	1	4	1	3

*A voltage converter (QE8WH4VT) is always required when use for 3-phase 4-wire circuit.

Usage Diagram



Insert into MELSEC-Q PLC

Modules can be inserted directly into a MELSEC-Q PLC, removing the need for a separate communication module or cable and realizing energy measurements with reduced wiring and set-up work. In addition, productivity-based energy management is possible through linking production data to detailed data on the energy use of manufacturing equipment.

Simplified Measurement of Various Energy Data

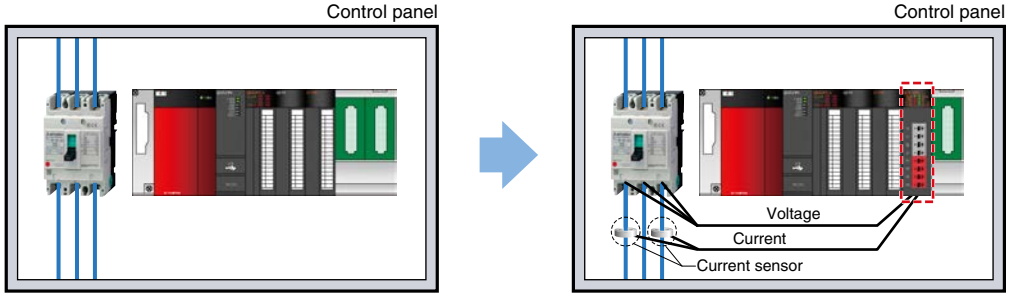
Energy measuring module can be used for diverse applications as they enable measurements of current, voltage and power consumption as well as other items such as frequency, power factor and reactive power. Choose from our extensive line-up designed for various circuits and phase/wire types.

Use Energy Data Effectively for Preventive Maintenance and Quality Control

Power-based faults in production equipment and quality defects can be detected through measuring energy data. This enables onsite personnel to take actions in advance and effectively manage maintenance and quality.

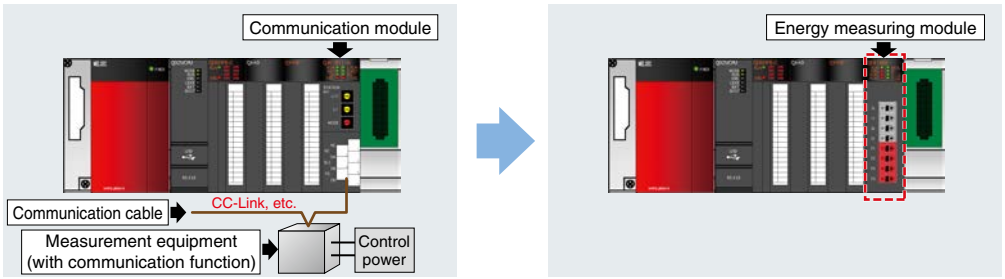
1 No Additional Space Required

●There is no need to change the layout of the control panel; simply insert the energy measuring module into an open slot of the base unit.



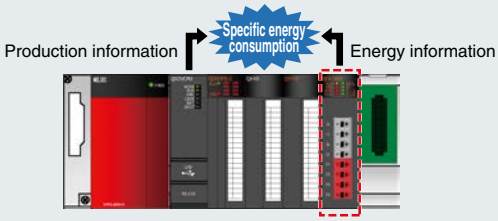
2 Less Wiring and Set-up Work

●Previously, installing an energy measuring device required a communication unit, cable and creation of a communication program. The energy measuring module eliminates this need, realizing reduced wiring and workload as well as lower costs.



3 High-speed (250ms or 500ms), Detailed Energy Measurements

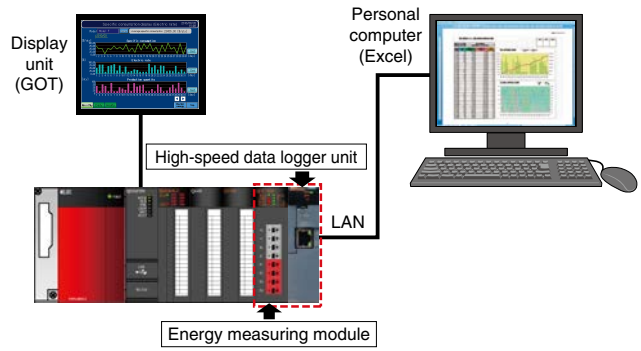
●Specific energy consumption*1 can be calculated by combining the production data of the PLC's CPU and the energy data of the energy measuring module.
●The data is collected at the high speed of 250ms (single circuit models) or 500ms (multi-circuit models) and stored in a buffer memory, supporting detailed management of specific energy consumption.
●In the current measurement mode of multi-circuit models, the module can measure the current on 8 circuits.



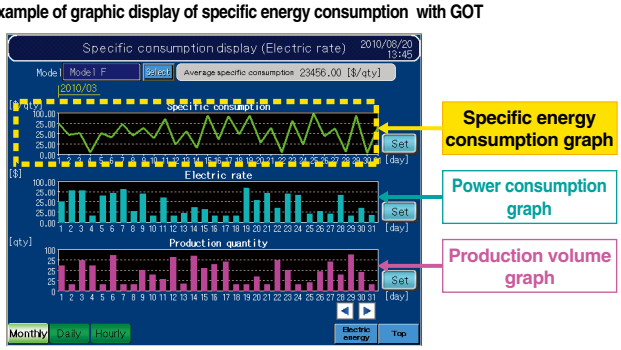
*1: Specific energy consumption is equal to energy consumption divided by production volume. It is a measure of energy productivity. Improving specific energy consumption leads to improvements in productivity.

4 Simple Visualization of Energy Use

●Visualization of the specific energy consumption can be easily achieved through use of a graphic operation terminal (GOT) installed on the control panel at the manufacturing site.
●Analysis is also possible using a computer combined with a high-speed data logger unit (QD81DL96).



Example of graphic display of specific energy consumption with GOT

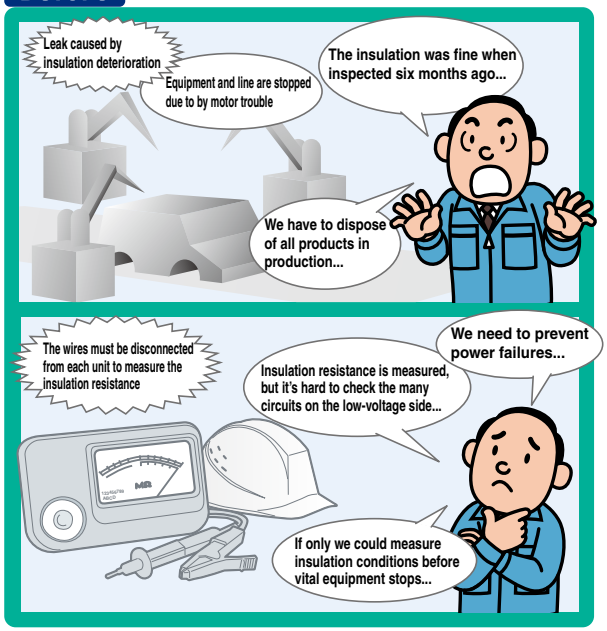


Device features

Insulation Monitoring Module

Insulation monitoring by PLC. Insulation deterioration in equipment can be detected without omission.

Before



After

Insulation deterioration is constantly monitored for each unit/load

Insulation Monitoring Module
QE82LG

- Prevention of sudden failure of machines and lines
- Reduction of downtime caused by insulation deterioration
- Cost reduced by ending defective product disposal due to sudden line stoppage
- Reduction of maintenance hours for periodic inspections
- Detection of insulation deterioration (earth leakage) at early stage

Advantages of Introducing the Insulation Monitoring Module

■Conventional systems

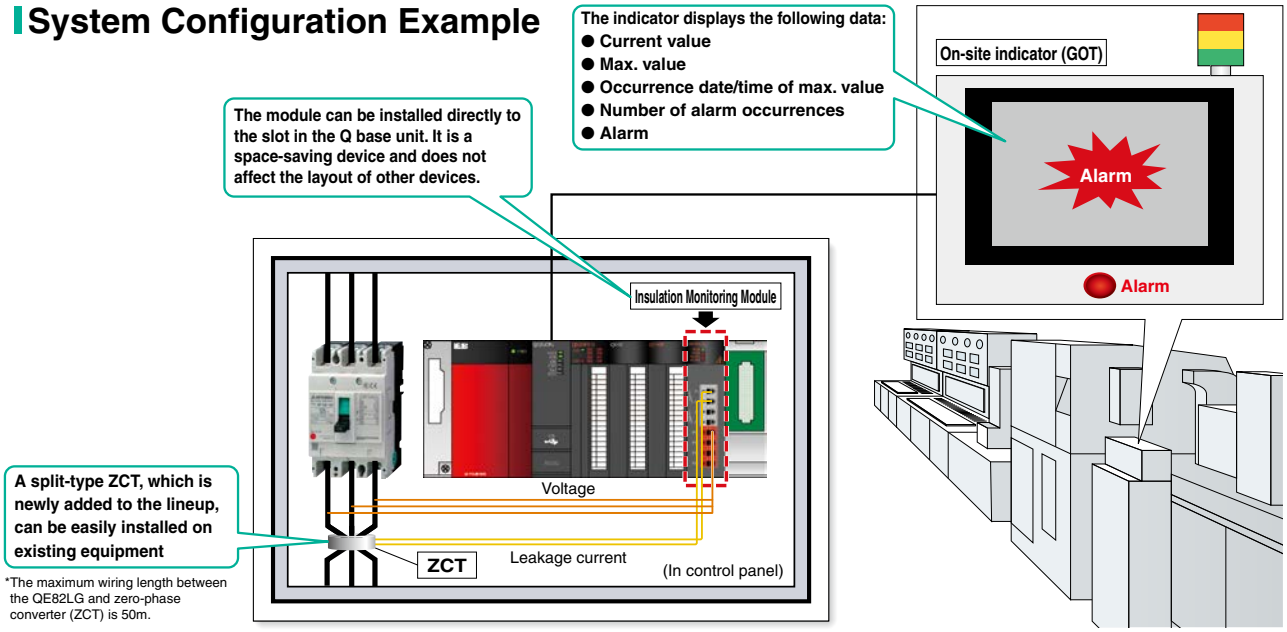
- Measurement of insulation resistance with wiring disconnected during inspection
- Power must be suspended to set the equipment in the non-voltage state
- When leakage current is detected, power supply stops suddenly
- Insulation deterioration cannot be detected easily due to the loc component

■Insulation Monitoring Module

Constant monitoring of leakage current during operation

- Reduction of labor for insulation resistance test
- No need to suspend power supply to equipment
- Early detection of insulation deterioration signs
- Improvement of availability and reduction of product loss through measures taken before sudden stop

System Configuration Example



*The maximum wiring length between the QE82LG and zero-phase converter (ZCT) is 50m.

1 Early Detection of Insulation Deterioration in Production Equipment

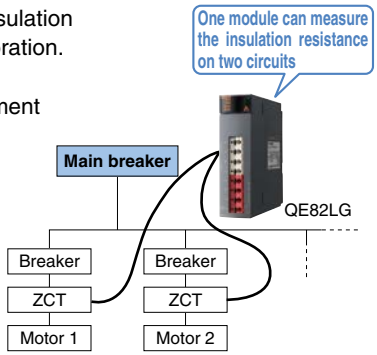
- Since this module is connected directly to the PLC in the control panel, leakage current from points close to loads can be measured easily without the need for additional installation space.
- The module can detect troubles caused by earth leakage (ground fault) and monitor the insulation of motor loads in the production equipment. It does not overlook ongoing insulation deterioration.
- Upper-limit monitoring values for alarms can be set in two stages. Insulation deterioration/condition is detected at each stage, enabling countermeasures before equipment stoppage/malfunction.

Conventional insulation monitoring equipment

System where leakage occurs can be identified, but it's not possible to detect insulation deterioration in equipment.

Insulation Monitoring Unit

Insulation monitoring pinpoints the problematic equipment, making it possible to recognize deteriorated insulation location early on!



2 Constant Monitoring for Insulation Deterioration of Equipment Using Ior Method

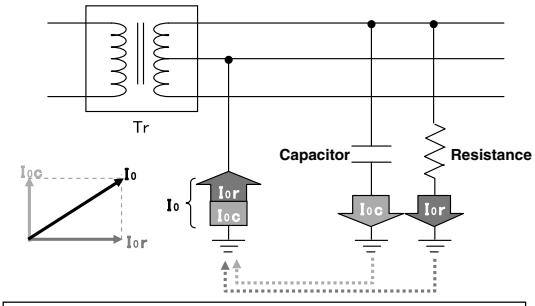
- The module can measure resistive-component leakage current (Ior). Even on circuits which cannot be monitored for insulation using the conventional Io method, such as inverter circuits on which capacitor component leakage current (Ioc) is large, the module removes the Ioc component and can correctly monitor the leakage current caused by insulation deterioration.
- The module constantly measures the resistive-component leakage current (Ior) even while equipment is running. It detects any sign of insulation deterioration without power interruption.

*A correct measurement cannot be made with the inverter or servo amplifier's binary value. Always measure with the primary value.

The Ior method stated in the "Standard Specifications for Public Works Construction (Electric Equipment Work)" edited by the Ministry of Land, Infrastructure, Transport and Tourism is used.

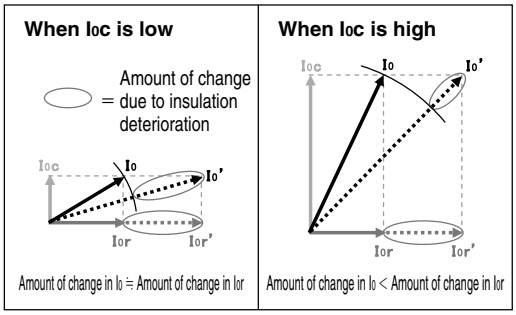
Since leakage current (Io) is affected by the Ioc of the whole equipment, the Ior measurement is effective for insulation deterioration diagnosis

■Method of leakage current measurement (Io and Ior measurements)



Ior : Leakage current caused by insulation deterioration (leakage current from resistive component)
Ioc : Leakage current flowing even in good insulation condition (leakage current from electrostatic capacity)
Io : Leakage current obtained by synthesizing Ior and Ioc (vector synthesis)

- The Ioc fluctuates on equipment with long wiring distance or inverter devices and filters.



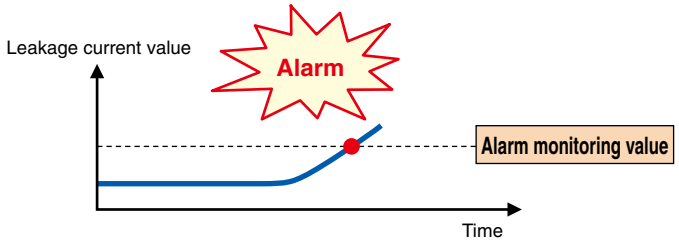
Insulation Monitoring Module Solution Example

Preventive Maintenance

From Corrective to Preventive Maintenance as a Result of Insulation Monitoring

Constant measurement of leakage current (Io or Ior) can prevent sudden trouble and reduce production loss due to equipment stoppage.

Example: Increase in leakage current is detected based on the preset alarm monitoring value, so maintenance of deteriorated insulation is performed.



Monitoring of upper limit alarm (leakage current) (Monitoring of equipment trouble)

↓ Alarm

Equipment maintenance and repair

↓

Reduction of production loss due to equipment stoppage

Device features

Energy Measurement Unit

EcoMonitor Pro

With a product line-up that offers effective utilization of panel space and saves wires, workability is enhanced! And with W-logging (offline/online) you can achieve energy management!

■Basic Specifications

Exterior	Series	Transmission (Output)	Model	Measurement Number of circuits	Measuring Items
EMU2-RD3-C	High performance products	CC-Link	EMU2-HM1-C	1circuit	Current, voltage, power, amount of electrical energy, power factor
	Single-phase 2-wire/ single-phase 3-wire/3-phase 3-wire (shared)	None	EMU2-RD3-F	3circuits	Current and voltage Power and reactive power Amount of electrical energy and amount of reactive energy Power factor and frequency Harmonic current and harmonic voltage
			EMU2-RD5-F	5circuits	
			EMU2-RD7-F	7circuits	
EMU2-RD5-C		CC-Link	EMU2-RD1-C	1circuit	
			EMU2-RD3-C	3circuits	
			EMU2-RD5-C	5circuits	
			EMU2-RD7-C	7circuits	
EMU2-RD7-C	Exclusive 3-phase 4-wire products	None	EMU2-RD2-F-4W	2circuits	Current and voltage Power and reactive power Amount of electrical energy and amount of reactive energy Power factor and frequency Harmonic current and harmonic voltage
			EMU2-RD4-F-4W	4circuits	
		CC-Link	EMU2-RD2-C-4W	2circuits	
			EMU2-RD4-C-4W	4circuits	

Note: The display is a selection of 4 elements from current and electrical energy + measuring items.

Optional Products for Energy Measuring Units

Split type current sensor

50A, 100A, 250A products

Split state

5A Current Sensor (EMU2-CT5)

400A, 600A products

5A Current Sensor (EMU2-CT5-4W)

Split state

Split form current sensor (low voltage use only)

Items	Specifications					
Model	EMU-CT5-A	EMU-CT50/EMU-CT50-A	EMU-CT100/EMU-CT100-A	EMU-CT250/EMU-CT250-A	EMU-CT400-A	EMU-CT600-A
Rated primary current	5A	50A	100A	250A	400A	600A

Items	Specifications	
Model	EMU2-CT5	EMU2-CT5-4W
Phase wire system	Single-phase 2-wire/single-phase 3-wire/ 3-phase 3-wire	For 3-phase 4-wire use only
Rated primary current	5A	

When measuring medium-voltage circuits, or when using an existing CT, it becomes a 2-stage configuration combining a secondary CT (✻/5A) and a 5A split-form current sensor.

Data collection PC Kit

* Data collection computer kit for energy measuring unit (EMU2-PK3-EN).
Used in combination with logging display unit (EMU-D65-M).

Items	Specifications
Model	EMU2-PK3-EN
Equipment configuration	Data collection software (CD-ROM Disc1), USB communication cable (3m), LOCAL communication cable (3m), RS-232C conversion cable (2m)

Display unit

■Model
EMU4-D65

■Bundled
Connecting cable (1m)

Logging display unit

■Model
EMU2-D65-M

■Bundled
Connecting cable (1m)

Basic Specifications

Items			Specifications		
Item			Display unit	Logging display unit	
Model			EMU4-D65	EMU2-D65-M	
Rating			9VDC (see note 1)		
Auxiliary power supply			–		
Consumed VA			–		
Display			LCD (with backlight)		
Renewal cycle display			500ms		
Measuring value display	Wh+A+4 items		Electrical energy, current, 4 selected items		
	High freqency details		All measured data		
Alarm display	Alarm status		Upper and lower limit alarm, voltage sag alarm status, relay output status		
	Alarm value		Upper and lower limit alarm value, time upon occurrence, voltage sag alarm voltage value, time upon occurrence, length		
Settings	EMU settings		Phase wire, primary voltage, primary current, sensor, demand time, limit, pulse unit, measuring mode		
	Logging settings		–	Set logging items and logging operation	
	Clock settings		Set built-in clock	Set built-in clock in main body and display unit	
	Alarm settings		Upper and lower limit alarm value, voltage sag level, voltage sag length		
	Display settings		LCD contrast, backlight option settings		
Data reset			Maximum value, minimum value, upper and lower limit alarm value, voltage sag alarm value, electrical energy/reactive energy and logging data (see note 3)		
Data preset			Electrical energy/reactive energy		
Logging	Logging cycle		–	1second, 1minute, 1hour	
	Logging period	1second data (see note 4)	–	1circuit products	48hours
				2circuit products, 3circuit products	12hours
				4circuit products, 5circuit products	4hours
				7circuit products	2hours
		1minute data	–	10days	
		1hour data	–	131days	
	Logging data		–	Store logging data	
	Logging-capable measurement data		–	Electrical energy + selected 3 items (see note 5)	
Connection to energy measuring unit			With dedicated cable (included). Maximum cable length : 10m		
Number of maximum connected devices			7devices		
Mounting method			IEC rail mounting or mounting		
Operational temperature range			–5°C to 55°C		
Operational humidity range			30% to 80%RH or below (no condensation allowed)		
Storage temperature range			–10°C to 60°C		
Weight			0.1kg		

Note 1: Supply from energy measurement unit. When connecting to two or more devices, use display unit for power source (optional).
Note 2: Maximum and minimum values and upper and lower limit alarm data not displayed.
Note 3: Reset of logging data only available with EMU2-D65-M.
Note 4: Please refer to the number of circuits on the page 924 model table.
Note 5: Can be selected from the data displayed on the logging display unit (excluding maximum and minimum values). It is possible to set the logging element for each circuit.
Note 6: When connecting to 2 or more devices, please use the display unit between the connecting cables (optional). If you wish to extend the cable, please use the extension cable (optional).

Product Lineup

Energy Measuring Unit

EcoMonitor Light

The lineup consists of two types of measuring unit to make it simpler to easily visualize energy consumption.

EMU4-HD1-MB

EMU4-BD1-MB

High Performance Model

EMU4-HD1-MB

For customers who need more advanced functions than those of the standard model such as three-phase 4-wire measurement, pulse count and contact input!

①Same basic functions as the Standard Model.
②Three-phase 3-wire 440V direct voltage input is available.
③Three-phase 4-wire 277V/480V direct voltage input is available.
④Able to display harmonic current and voltage, apparent power, power consumption and CO_2 conversion.
⑤Equipped with pulse and contact input/output functions.

Product	Energy Measuring Unit [High Performance Model]
Model	EMU4-HD1-MB

Standard Model

EMU4-BD1-MB

For customers who want to start measuring energy in a simple and low-cost manner!

①Equipped with basic energy measurement functions such as for current, voltage, power and electric energy.
②Standard-equipped with MODBUS® RTU communication.

Product	Energy Measuring Unit [Standard Model]
Model	EMU4-BD1-MB

Optional Units

Logging Unit

For customers who want to easily manage data using SD memory cards!

CC-Link Communication Unit

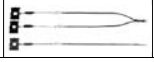
For customers who want to connect to CC-Link communication!

Optional Units

Product	Logging Unit	CC-Link Communication Unit
Model	EMU4-LM	EMU4-CM-C

Options

Split-type Current Sensor

Product name	Model	External view	UL/CE compatibility
Split-type current sensor	EMU-CT5-A		×
	EMU-CT50-A		×
	EMU-CT100-A		×
	EMU-CT-250-A		×
	EMU-CT400-A		○
	EMU-CT600-A		○
	EMU-CT50		○
	EMU-CT100		○
	EMU-CT250		○
	EMU2-CT5		○
	EMU2-CT5-4W		○

*1 Use commercially available cables for the connection of current sensors.
Compatible cable: AWG22-14
(Single wire: ϕ0.65 to ϕ1.62 mm^2, Stranded wires: ϕ0.33 to ϕ2.0 mm^2)
*2 Current sensor cable can be extended up to 50 m.
For the 5A current sensor (EMU2-CT5,EMU2-CT5-4W), cable can be extended to 10.5 m.
*3 In divided split-type Current Sensor (EMU2-CT5(4W)) usa, EMU2-CB-Q5A(4W) is needed.

Options for 5A Current Sensor (Current Sensor Cable)

Product name	Model	External view
5A Current sensor cable	EMU2-CB-Q5A (Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire)	
	EMU2-CB-Q5A-4W (Three-phase 4-wire)	
Extension cable (Standard type)	EMU2-CB-T1M(1m) EMU2-CB-T5M(5m) EMU2-CB-T10M(10m)	
Extension cable (Separate type)	EMU2-CB-T1MS(1m) EMU2-CB-T5MS(5m) EMU2-CB-T10MS(10m)	

Options for Logging Unit

Product	Model	External View
SD memory card for logging unit	EMU4-SD2GB	
Lithium battery for logging unit*	EMU4-BT	

*Logging units include one lithium battery for logging unit when purchased.

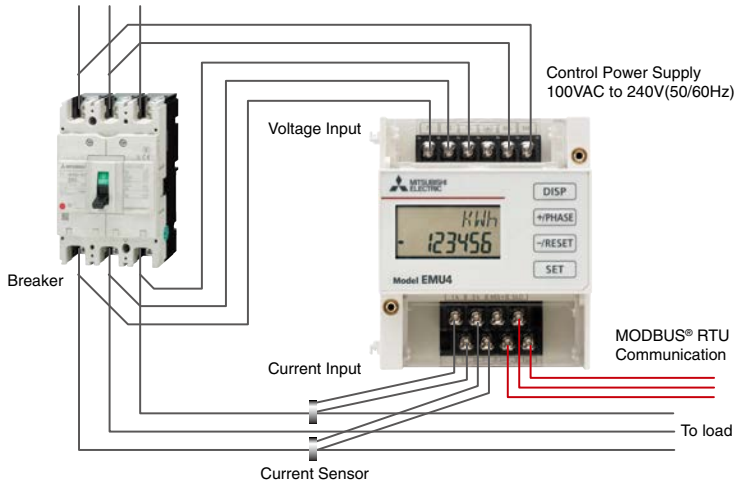
Panel Mounting Installation Option

Product	Model	External View
Panel mounting attachment	EMU4-PAT	

Examples of EcoMonitorLight Applications

1 Configuration Example of Measuring Devices

■Basic Installation



○You can use a general-purpose cable between the measuring unit and dedicated split current sensor. (Except for (EMU2-CT5(-4W))
○Always use in combination with a dedicated split current sensor.
○Give consideration to the rated current of the installation location for the dedicated split current sensor and select a model accordingly.

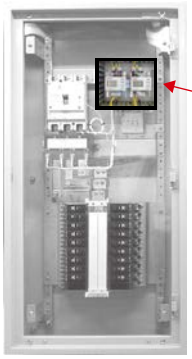
2 Examples of Measuring Unit Application

■Visual checking and management

For customers who want to visually check measured values with distribution boards!

●Installation inside a Board

For customers who want to install the unit inside a board for visual management of measured data!



Example of installation inside board

Key Point

Customers visually checking power use with a mechanical Watt-Hour meter can achieve board size reduction and space savings.

*Cannot be used for billing.

Example of Current Sensor Installation

Two split current sensors installed to secondary side of a breaker

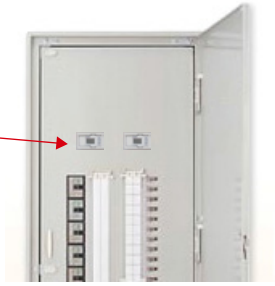
*For three-phase 3-wire, Single-phase 3-wire.

●Panel Installation

For customers who want to install the display screen on the board surface for monitoring of measurement data.

Key Point

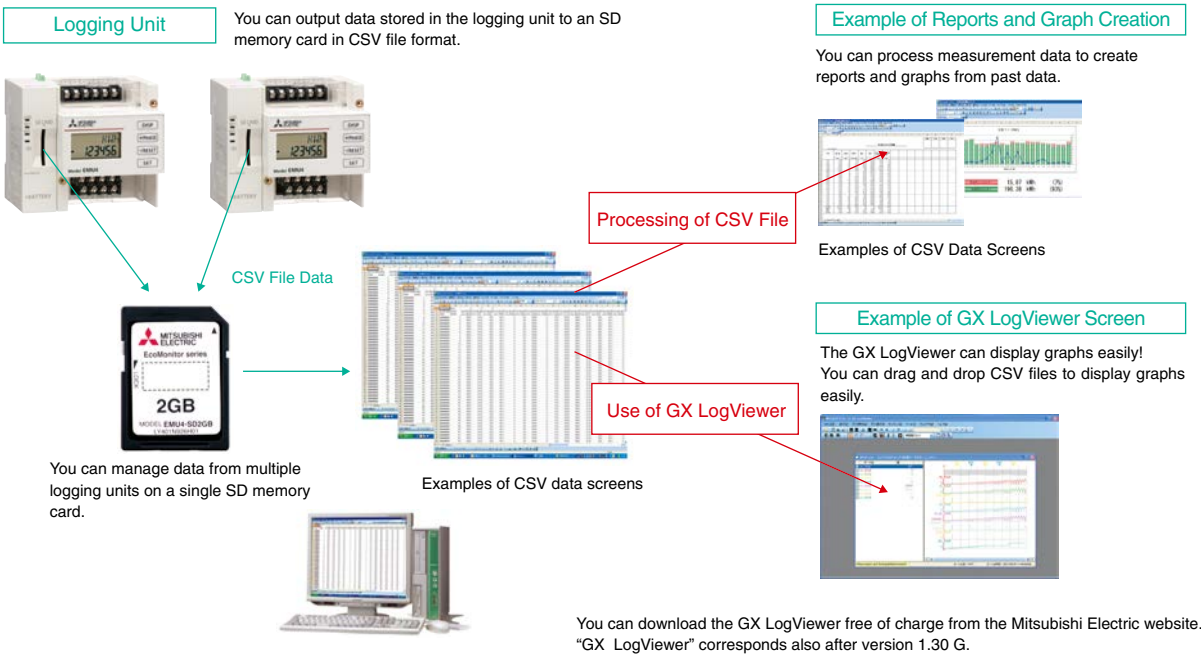
If you do not want the board surface installation screws to be exposed in the board surface, you can use the installation attachment (EMU4-PAT) to cover the screws.



3 Example of Logging Unit Applications

■Easy Management of Measurement Data of Measurement Points

For customers who want to periodically collect and easily manage energy measurement data!



You can download the GX LogViewer free of charge from the Mitsubishi Electric website.
"GX LogViewer" corresponds also after version 1.30 G.

Features of Logging Unit

(1)Easy Data Management with SD Memory Card

●You can output various types of measurement data (such as voltage, current and power) of the EcoMonitorLight stored in the logging unit to an SD memory card. The measurement data saved by saving carrying about and CSV data in a single SD memory card at two or more sets of logging units is collectable.

* It is necessary to always specify logging ID when collecting measurement data from multiple logging units on a single SD memory card. Refer to the operation manual for details.

●The logging unit features a two-step structure in which measurement data is saved for a specified period and output to an SD memory card. This prevents the loss of measurement data and provides secure and reliable data management.

(2)Managing Measurement Data in CSV Format

●The logging unit outputs measurement data to an SD memory card in CSV file format. The data can be processed freely using a personal computer in order to create graphs and manage results.

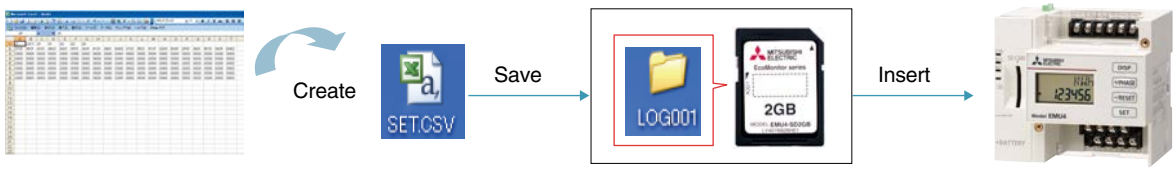
●Measurement data output to an SD memory card can be checked using Microsoft Excel or GX LogViewer (version 1.30G or later)*, and these can be used to display and analyze energy graphs from the data.

(3)Easy Expansion

●Customers already using the EcoMonitorLight can easily add the logging unit.

●Logging Settings

Able to freely create CSV file formats freely create CSV file formats by adding setting data files to an SD memory card in advance.



Specify settings such as logging start time, group number and channel number for the specified location in the setting data file (CSV file).

Change the name of the CSV file.

Specify the file name and save to SD memory card*.

*It is necessary for the folder name to match the logging ID of the logging units.

Data is logged using the specified format.

4 Examples of Data Acquisition Software (EMU4-SW1) Applications

■For customers who want to perform real-time energy monitoring from remote locations and energy management with a simple data acquisition system structure.

Using Data Acquisition Software EMU4-SW1 + MODBUS® RTU Communication

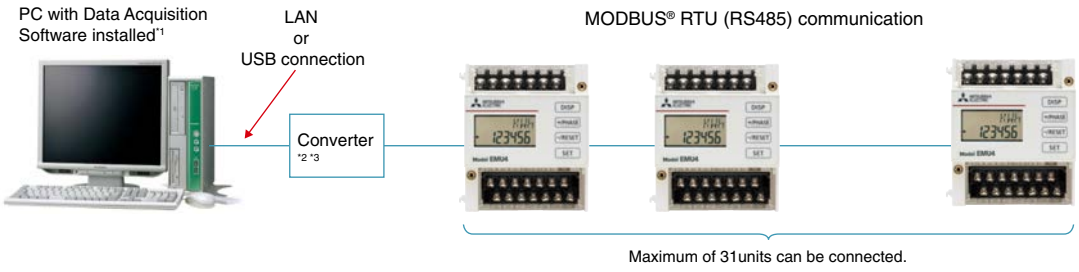
Energy management software (EMU4-SW1) performs data acquisition from energy measuring units equipped with a MODBUS® RTU communication interface.

* Data Acquisition Software (EMU4-SW1) carries out free download, and gets from the “design supportive tool data” of the Mitsubishi Electric site (http://www.MitsubishiElectric.co.jp/haisei/lvs/) energy-saving supporting aircraft machine menu.

Features of the Data Acquisition Software

(1)Capable of collecting a maximum of 124 items of measurement data from measurement devices and displaying corresponding current values.
(2)Capable of logging measurement data in designated cycles. (one minute or one hour)
(3)Logging data is output in Excel format.
(4)You can specify basic settings of energy measuring units connected for communication.

* The above features are some of the main ones of the data collection software (EMU4-SW1). Be sure to refer to the operation manual for details regarding all the features and other functions.



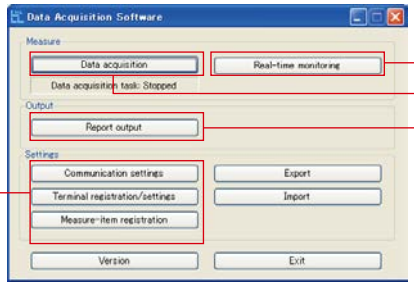
*1: One PC per each system is required.
*2: Converter used can be a LAN⇔RS485 converter or USB⇔485 converter.
*3: Connectable devices: LINEEYE SI-65 (LAN⇔RS485 converter) and LINEEYE SI-35USB (USB⇔485 converter)

●Examples of Data Acquisition Software (EMU4-SW1) Display Screens

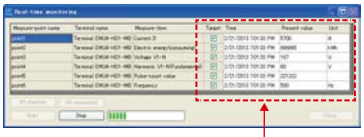
Converter
*2 *3

PC with Data Acquisition software installed*1

Main Screen



(1)Current Values Display



Selected measurement items are displayed in real time.

Current values are updated every one second.

(2)Measurement data is logged in the specified cycle.

Data Storage

Data is logged in CSV format every one minute or one hour.

(3)Logging data is output in Excel format.

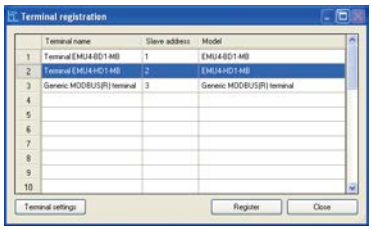
Monthly, daily and detailed (one minute) data is output in Excel format.

You can output any reports you want by saving data in a report format to the specified folder.

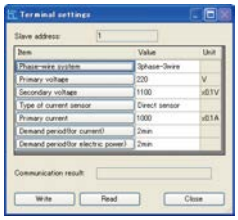
(4)Communications are used for settings

Communication Settings

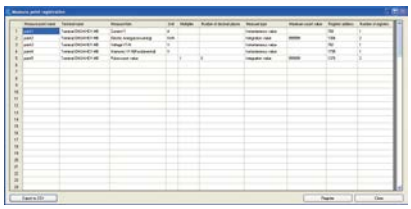
Terminal Registration



Terminal Settings



Measurement Point Registration



Note: (1) Display of current values and (2) Measurement data logging cannot be performed at the same time.

5 Examples of GOT1000 Series Applications

■On-site Visualization of Energy Data

For customers who want on-site visualization of energy consumption, and to manage the correlation of Production and energy!
[GOT1000 Series + MODBUS® RTU (RS485) Communication Application]

You can directly connect to the Mitsubishi GOT* by using MODBUS® RTU communication.
Displaying various energy information on a GOT installed on-site allows you to improve on-site energy-conservation awareness and perform production management to fit the energy conditions.

MODBUS® RTU
(RS485) Communication

GOT1000 Series

You can use MODBUS® RTU communication to directly connect to a Mitsubishi GOT*.

*Compatible with GOT1000 series units that are standard-equipped with an RS485 serial port.

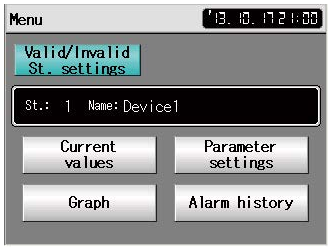
●Sample Screen

A sample Mitsubishi GOT*1 screens are provided.
You can view current values of various energy information such as power, current and voltage, and also display graphs of current and electric energy*2.
You can download the sample GOT screen free of charge from the Mitsubishi Electric FA website.

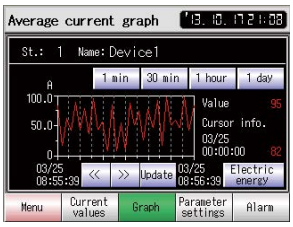
*1: GT14**-Q, GT1030 *2: Only compatible with GT14**-Q.

■GT14

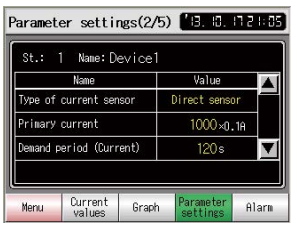
Main Screen



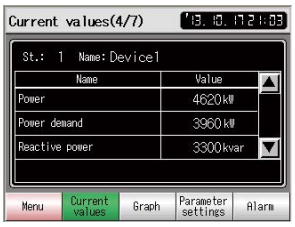
Graph Screen



Parameters Settings Screen



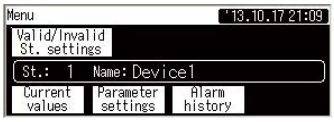
Current Value Screen



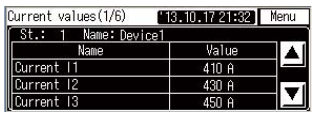
Alarm Screen

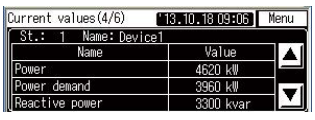
■GT10

Main Screen



Current Values Monitor Screen



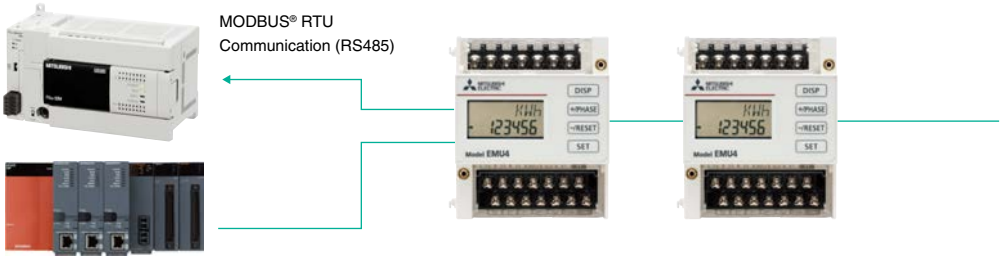


6 Connection to PLC System

■Energy Management with PLC

For customers who want to capture energy information in the PLC system, and manage production information and other types of data in an integrated manner.
Available uses include preventive equipment maintenance by using energy amount measurement and real-time measurement of each piece of production equipment, and linking of quality control indicators with production information.

●MODBUS® RTU (RS485) Communication Connection*



*In order to connect with a PLC, a module that is compatible with MODBUS® RTU (RS485) communication is required.

●CC-Link Communication Connection*

*In order to connect with a PLC, a unit that is compatible with CC-Link communication is required.

7 Connection to EcoWebServerⅢ System

■EcoWebServerⅢ

EcoWebServerⅢ (Energy-Saving Data Collecting Server) and CC-Link Communication Unit Application

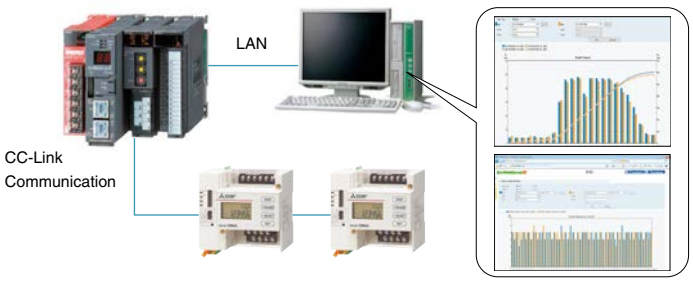
Adding a communication unit to an already installed energy measuring unit allows you to use the EcoWebServerⅢ system to visualize energy and perform simple analysis of measurement data.

What is EcoWebServerⅢ?

EcoWebServerⅢ is a device that collects the data of various measurement terminals using CC-Link communication network, and displays graphs of measurement data (such as power, current and voltage) and current value data in a Web browser.

Features of EcoWebServerⅢ

(1)Reduces unnecessary labor and cost by collecting energy information from various measurement terminals, and storing and visualizing data without the need for programming.
(2)Measurement data can be viewed in graphs of zoom (1 minute and 5 minutes), daily, monthly and annual formats.
(3)Production information can be captured to display specific consumption rate graphs.

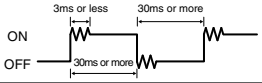
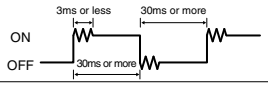


EcoWebServerⅢ
(Energy-Saving Data Collecting Server) Catalog

Specifications

Energy Measuring Unit

General Specifications

Item			Specification	
Model			EMU4-HD1-MB	EMU4-BD1-MB
Phase wire system			Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire (Settings switching)	Single-phase 2-wire, single-phase 3-wire and three-phase 3-wire (Settings switching)
Instrument ratings	Voltage circuit	Single-phase 2-wire Single-phase 3-wire	110V, 220V, 440VAC Common (*2)	110V, 220VAC Common (*1)
		3-phase 3-wire	110VAC(between wires 1 and 2, and 2 and 3), 220VAC (between wires 1 and 3)	
		3-phase 4-wire	Min.: 63.5V/110VAC , Max.: 277V/480VAC (*3)	–
	Current circuit		50A, 100A, 250A, 400A, 600A AC (Dedicated split current sensor is used. All values indicate primary current values of current sensor.) 5AAC (Dedicated 5A current sensor is used. A transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 6,000A.) (*4)	
	Frequency		50Hz to 60Hz (Automatic frequency selection)	
Auxiliary power rating			100V-240VAC (+10%, -15%) 50Hz/60Hz	
No. of measurement circuits			1	
Consumption VA		Voltage circuit	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	
		Auxiliary power circuit	110VAC : 9VA 220VAC : 10VA	
Measured items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (consumption, regenerative), reactive electric energy and operating time	
			Apparent power, harmonic current, harmonic voltage, pulse count value, periodic electric energy and CO_2 conversion value	–
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0% (in 5 to 100% range of rated values; Power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; Power factor = 0) Harmonic current, harmonic voltage: ±2.5%	
Data update cycle			250ms *Electric energy and reactive electric energy are always sampled (following short-cycle load fluctuation also).	
Demand time limit setting			0sec, 10sec, 20sec, 30sec, 40sec, 50sec, 1-15min. (per 1min.), 20min, 25min and 30min.	
External input specifications	Input signal format		Non-voltage a contact, 1input (Select from the below functions)	–
	Functions		Set to pulse input: Pulse count (0 to 999,999count)	–
			Set to contact input: Contact monitoring only During contact monitoring + Electric energy measurement during operation (contact on)	–
	Insulation type		Photocoupler insulation	–
	Rated input voltage/current		Use a voltage/current that is appropriate for this switching due to the 5VDC/7mA current that flows in the contacts.	–
	Input conditions	Pulse	Pulse-on time: 30ms or more Pulse-off time: 30ms or more Chattering time: 3ms or less 	–
		Contacts	Contact on time: 30ms or more Contact off time: 30ms or more Chattering time: 3ms or less 	–
External output specifications	Output signal type		Non-voltage a contact, 1output (Select from the below functions)	–
	Functions		Monitoring of current demand upper limit Monitoring of current demand lower limit Monitoring of voltage upper limit Monitoring of voltage lower limit Monitoring of power demand upper limit Monitoring of power demand lower limit Monitoring of power factor upper limit Monitoring of power factor lower limit Monitoring of pulse count upper limit Automatic reset/Self-retention can be selected	–
	Insulation type		Semiconductor relay insulation	–
	Rated switching voltage/current		35VDC, 75mA 24VAC, 75mA (Power factor = 1)	–
Pulse Output Specifications	Output item		Electric energy	–
	Output signal type		Non-voltage a contact, 1output •Pulse units (kWh/pulse): 0.001, 0.01, 0.1, 1, 10, 100 Refer to the operation manual of a main unit for the details of a pulse setup.	–
	Insulation type		Semiconductor relay insulation	–
	Rated switching voltage/current		35VDC, 75mA 24VAC, 75mA (Power factor = 1)	–
	Output pulse width		0.1 to 0.15s	–
Power interruption backup	Recorded items		Set values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, pulse count value and operating time (Stored in the nonvolatile memory)	

Item			Specification	
Model			EMU4-HD1-MB	EMU4-BD1-MB
Compatible standards			EMC:EN-61326-1:2006 Safety:EN-61010-1:2010	
Operating environment		Operating temperature range	-5℃ to +55℃ (average daily temperature of 35℃ or less)	
		Operating humidity range	30% to 85% (no condensation)	
		Storage temperature range	-10℃ to +60℃	
		Altitude	2,000m or less	
Commercial-frequency withstand voltage			Applies to all terminals (excluding communication and frame GND terminals), between external boards: 2,000VAC for 1min.	
			Applies to all current/voltage inputs, between auxiliary powers: 2,000VAC for 1min.	
			Applies to all current/voltage inputs and auxiliary power terminals, between all digital/pulse input, pulse/alarm output and communication terminals: 2,000VAC for 1min.	
Insulation resistance			In the same locations described above: 10MΩ or more (500VDC)	
Compatible wiring	Auxiliary power/Voltage input terminal		AWG24-14 (Single/Stranded wire) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wire: 0.13 to 2.0mm^2)	AWG24-16 (Single/Stranded wire) (Single wire: ϕ0.52 to ϕ1.29mm, Stranded wire: 0.21 to 1.3mm^2)
	Current input and input/output terminal		AWG22-14 (Single/Stranded wire) (Single wire: ϕ0.65 to ϕ1.62mm; Stranded wire: 0.35 to 2.0mm^2)	
Tightening torque	Auxiliary power/Voltage input terminal screw		0.8 to 1.0N•m	0.8N•m
	Current input and input/output terminal screw		0.5 to 0.6N•m	
	Board installation screw		0.63N•m	
Weight			0.3kg	0.2kg
External dimensions (units: mm)			75(W)×90(H)×75(D)(Excluding protruding parts)	

*1: 110V and 220V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*2: 110V, 220V and 440V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*3: 63.5V / 110V - 277V / 480V can be connected directly. An externally mounted voltage transformer (VT) is needed for voltages greater than those (primary voltage of up to a maximum of 6,600V).
*4: The settable primary current when using a 5A current sensor is as follows:
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
(The CT primary side can be freely specified up to 6,000A. However, the CT secondary side is fixed at 5A.)
*5: Refer to "Specifications: Options (Split Current and 5A Current Sensors)" on page 939 for the current sensor error ratios.

Specifications of MODBUS®RTU Communication

Item	Specification
Physical interface	RS485 2wires half duplex
Communication protocol	MODBUS® RTU mode
Transmission method	Asynchronous
Transmission wiring type	Multi-drop bus (either directly on the trunk cable, forming a daisy-chain)
Baud rate	2400, 4800, 9600, 19200, 38400bps (default: 19,200bps)
Data bit	8
Stop bit	1,2 (default: 1)
Parity bit	ODD, EVEN, NONE (default:EVEN)
Slave address	1 to 255 (FFh) (default: 1) 0: Broadcast
Response time	1s or shorter from completion of receiving query data to response transmission
Terminating resistor	120Ω 1/2W
Transmission distance	1,200m
Maximum connectable devices	31devices
Recommended cable	SPEV(SB)-MPC-0.2×3P (Mitsubishi cable industries)

Logging Unit

General Specifications

Item		Specification
Model		EMU4-LM
Auxiliary power rating		6.4VDC (Power supplied from energy measuring unit)
Power interruption backup		Total power interruption backup time of the lithium battery (EMU4-BT) is one year (avg. daily temp. of 35°C or less); Mitsubishi Electric recommends replacing the battery every three years.
	Set values	Saved in FRAM (non-volatile memory) *Data is not deleted if there is a power outage.
	Logging data System log data	Saved in SRAM (volatile memory) *Data is deleted if there is a power outage when the battery voltage is low (BAT.LED lights up).
	Timer operation	*Timer operation is initialized if there is a power outage when the battery voltage is low (BAT.LED lights up). After the power is recovered, timer operation starts from the time of 2013/01/01 00:00:00.
Clock accuracy		1min./Month difference
Output data storage media (*1)		SD memory card (SD, SDHC)
Compatible model		Energy measuring unit (EcoMonitorLight) EMU4-BD1-MB, EMU4-HD1-MB
Compatible standard		EMC:EN-61326-1:2006
Operating environment	Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
	Operating humidity range	30% to 85%RH (no condensation)
	Storage temperature range	-10℃ to +60℃
	Altitude	2,000m or less
Weight		0.1kg *Weight of the logging unit only.
Dimensions (units: mm)		25(W) x 99(H) x 60(D) *Dimensions of the logging module only.
Expected product life		10years (Under operating environment conditions)
Parts sold separately		SD memory card (EMU4-SD2GB) (*1)
Consumables sold separately		Lithium battery for logging unit (EMU4-BT) (*2)

*1: Please contact local sales representative.
*2: The lithium battery for logging units is attached at the one time of logging unit purchase.

Logging Specifications

Item		Specification
Logging mode	Automatic refresh	Automatic overwrite/refresh
	Date/Time designation	Automatic start based on start time setting
Logging data type	Detailed data	Measurement data is memorized according to the specified “Detailed Data Logging Cycle” (1sec., and 1, 5, 10, 15 and 30-minute cycles)* Output as a detailed data file.
	1-hour data	Measurement data is memorized in 1-hour cycles. *Output as 1-hour and 1-day data files.
Amount of logging element	Detailed data	Detailed data logging cycle: 1sec. → Max. of 4elements Detailed data logging cycle: Other than 1sec. → Max. of 10elements
	1-hour data	Max. of 10elements
Internal memory logging period	Detailed data	Detailed data logging cycle: 1sec. → 20hours Detailed data logging cycle: 1min. → 20days Detailed data logging cycle: 5min. → 100days Detailed data logging cycle: 10min. → 200days Detailed data logging cycle: 15min. → 300days Detailed data logging cycle: 30min. → 600days
	1-hour data	620days (approx. 20months)
SD memory card (2GB) Logging period (*4)		Detailed data logging cycle: 1sec. →10months Detailed data logging cycle: 1, 5, 10, 15 and 30-min. → 10years or more
System log data		3,600records
Output format of logging and system log data		CSV format (ASCII code)

*4: The period indicated is that until the capacity of a 2GB SD memory card is exceeded when it is constantly connected. The data amount varies depending on the amount of characters.
The logging period indicates output at maximum capacity.

CC-Link Communication Unit

Basic Specifications

Item		Specification
Model		EMU4-CM-C
Auxiliary power rating		6.4VDC (6.4VDC Power supplied from energy measurement unit)
Compatible model		Energy measuring unit (EcoMonitorLight) EMU4-HD1-MB, EMU4-BD1-MB
Compatible standard		EMC EN-61326-1:2006
Operating environment	Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
	Operating humidity range	30% to 85%RH (no condensation)
	Storage temperature range	-10°C to +60°C
	Altitude	2,000m or less
Weight		0.1kg *Weight of the CC-Link communication unit main unit only.
Dimensions (units: mm)		25(W)×99(H)×60(D)
Expected product life		10years (Under operating environment conditions)

CC-Link Communication Specifications

Item	Specification
Number of Occupied Station	1Station Remote device station (I/o)data and word data can be transmitted
CC-Link Ver 1.10 Ver. 2.00 (Set by Version change switch)	Ver. 1.10, Ver. 2.00 (Set by version change switch)
Remote Station Number (Station Number)	1 to 64
Baud Rate	156K, 625K, 2.5M, 5M, and 10Mbps (Changes according to setting) (The interstation cable length and maximum total cable extension distance vary according to the transmission speed.) *100m (10M) to 1,200m (156k)
Max.connected device	A maximum of 42units can be connected if configured using only this module.
Cable terminating resistance	Use a specified cable for CC-Link communication connection. Resistance values for terminating resistance are different according to the type of specialized cable used.

Optional Parts

Split-type Current Sensor

Item	Specifications					
Model	EMU-CT50-A	EMU-CT100-A	EMU-CT250-A	EMU-CT400-A	EMU-CT600-A	EMU-CT5-A
Rated primary current	50AAC	100AAC	250AAC	400AAC	600AAC	5AAC
Rated secondary current	16.66mA	33.33mA	66.66mA	66.66mA	66.66mA	1.66mA
Maximum operating voltage	260VAC	500VAC	300VAC	460VAC	460VAC	460VAC
Measurement category	–			Ⅲ		–
Degree of contamination	–			2		–
Operating temperature range	-10 to +55°C (ave. daily temp. of 35°C or lower)					
Operating humidity range	25% to 95%RH (no condensation)					30% to 85%RH (no condensation)
CE marking compatible standard	–			EN61010-2-32		–
Maximum voltage compatible with CE marking	–			460V		–
Weight (1unit)	0.1kg	0.1kg	0.2kg	0.3kg	0.4kg	0.05kg

Split-type Current Sensor

Item	Specifications		
Model	EMU-CT50	EMU-CT100	EMU-CT250
Rated primary current	50AAC	100AAC	250AAC
Rated secondary current	16.66mA	33.33mA	66.66mA
Rated load	0.1VA		
Maximum use voltage	460VAC		
Ratio error	±1% (5 to 100% of rating, RL ≤ 10Ω)		
Phase difference variation	±30 min. (5 to 100% of rating, RL ≤ 10Ω)		
Measurement category	Ⅲ		
Degree of contamination	2		
Operating temperature range	-5 °C to +55 °C (daily average temperature of 35°C or less)		
Operating humidity range	5% to 95% RH (no condensation)		
CE marking compatible standard	EN61010-2-32		
Maximum voltage compatible with CE marking	460VAC		
Weight (1unit)	0.1kg		0.7kg

5A Current Sensor

Item	Specifications
Model	EMU2-CT5, EMU2-CT5-4W
Rated primary current	5AAC
Rated secondary current	1.66mA
Rated load	0.1VA
Maximum use voltage	260VAC
Ratio error	±1% (5 to 100% of rating)
Phase difference variation	±30min. (5 to 100% of rating, RL ≤ 10Ω)
Measurement category	Ⅲ
Degree of contamination	2
Operating temperature range	-5°C to +55°C (daily average temperature of 35°C or less)
Operating humidity range	5% to 95%RH (no condensation)
CE marking compatible standard	EN61010-2-32
Maximum voltage compatible with CE marking	260VAC
Weight (1unit)	0.1kg

SD Memory Card for Logging unit

Item	Specifications
Model	EMU4-SD2GB
Memory capacity	2GB
Weight	2g

Lithium battery for logging unit

Item	Specifications
Model	EMU4-BT
Type	Manganese dioxide lithium battery
Nominal voltage	3V
Capacity	220mAh
Weight	9g

*It is attached at the one time of logging unit purchase.

Software

Data Acquisition Software (EMU4-SW1)

Item		Specifications
Recommended system environment	Operating System	•Microsoft Windows 7 Professional(32bit or 64bit)SP1 •Microsoft Windows Vista Ultimate 32bit SP2 •Microsoft Windows XP Professional 32bit SP3
	Microsoft. NET Framework	•Microsoft. NET Framework 2.0 (Required)
	Microsoft Excel	•Microsoft Excel 2003 SP3/2007 SP3/2010 SP1
Basic specifications	Max. amount of connections	31units (Maximum connected units of MODBUS® RTU communication)
	Languages	Japanese, English
Data collection functions	Periodic collection	Data is collected and logged in 1-min. or 1-hour cycles. (Operated in background by the OS task scheduler.)
	Current value display	Constant communication is performed to display current values (Cannot be displayed during periodic collection.)
	Max. amount of collection points	124items
Setting functions	Communication settings	MODBUS® RTU communication settings (such as baud rate, stop bit length and parity bit)
	Terminal registration	Register the terminal performing data collection
	Terminal settings	Terminal settings functions (such as phase wire, rated current and rated voltage)
	Measured items registration	Measured items of collected data are registered.
	Export/Import	Set values of communication, terminals and measured items are saved in or read out from a file.
Report output	Output format	Paste aggregate data in an Excel template file. (Excel template files can be freely edited.)
	Output types	Monthly, daily and detailed (1-min intervals)

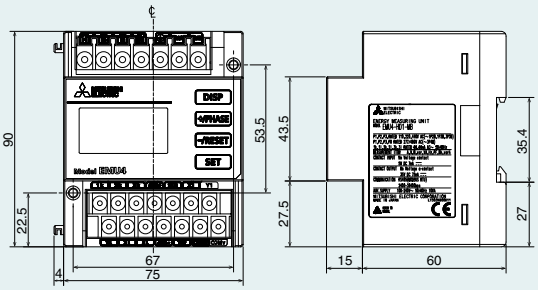
* Data Acquisition Software (EMU4-SW1) carries out gratis download, and gets from the “design supportive tool data” of the Mitsubishi Electric web site (http://www.MitsubishiElectric.co.jp/haisei/lvs/) energy-saving supporting aircraft machine menu.

External View

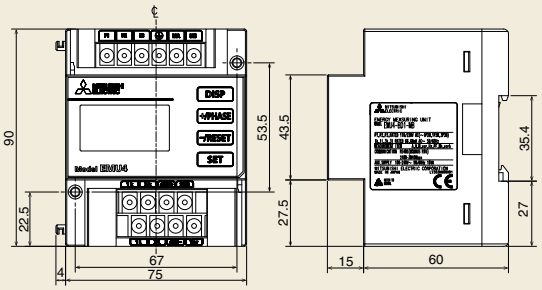
Energy Measuring Unit

Units (mm)

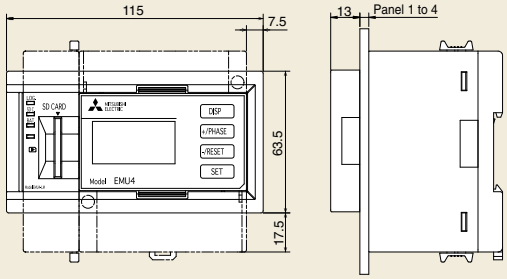
●[High Performance Model] EMU4-HD1-MB



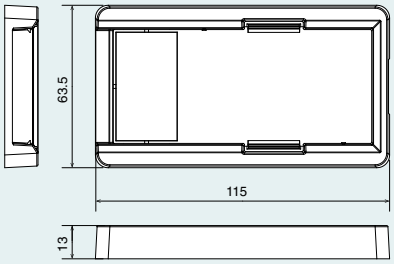
●[Standard Model] EMU4-BD1-MB



●Panel Mounting Attachment (EMU4-PAT) when Installed



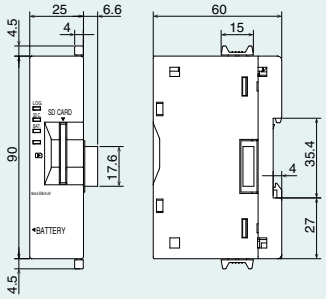
●Panel Mounting Attachment (EMU4-PAT)



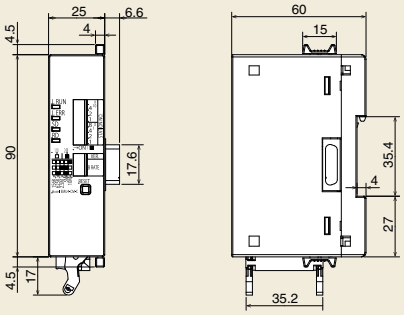
Logging/Communication Unit

Units (mm)

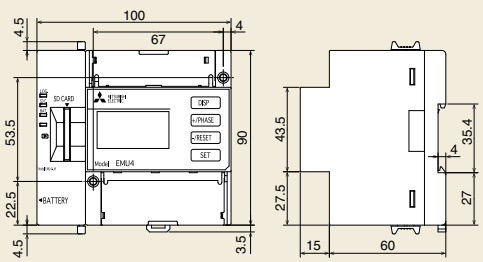
●Logging Unit
(EMU4-LM)



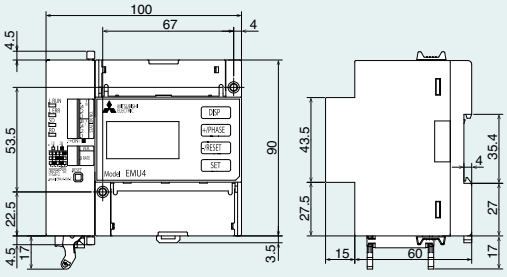
●CC-Link Communication Unit
(EMU4-CM-C)



●Energy Measuring Unit + Logging Unit



●Energy Measuring Unit + CC-Link Communication Unit

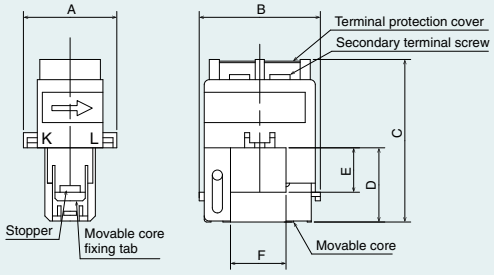


Optional Parts

Units (mm)

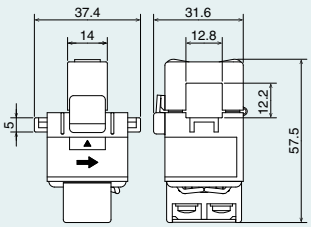
●Split-type Current Sensor

Split-type Current Sensor EMU-CT50, EMU-CT100, EMU-CT250

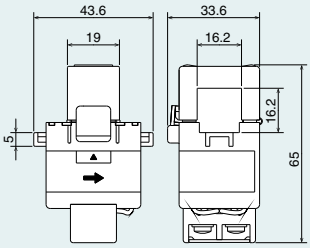


Model	A	B	C	D	E	F
EMU-CT50/CT100	31.5	39.6	55.2	25.7	15.2	18.8
EMU-CT250	36.5	44.8	66.0	32.5	22.0	24.0

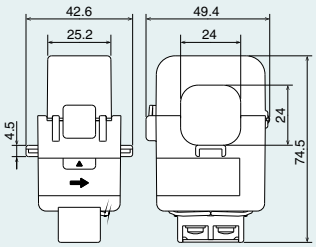
Split-type Current Sensor EMU-CT5-A, EMU-CT50-A



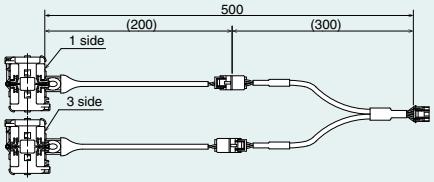
Split-type Current Sensor EMU-CT100-A



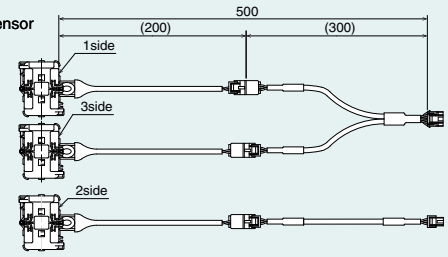
Split-type Current Sensor EMU-CT250-A



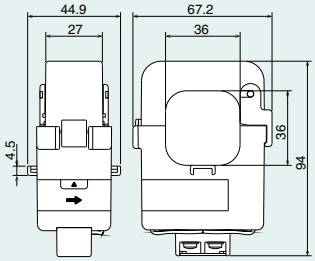
5A Split-type Current Sensor



5A Split-type Current Sensor

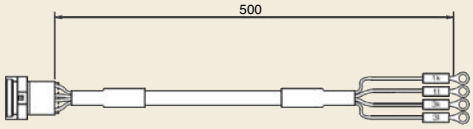


Split-type Current Sensor EMU-CT400-A, EMU-CT600-A

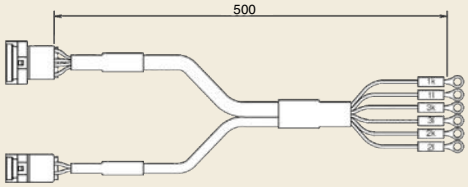


●Current Sensor Cable

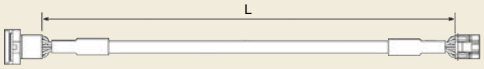
5A Split-type Current Sensor Cable EMU2-CB-Q5B



5A Split-type Current Sensor EMU2-CB-Q5B-4W

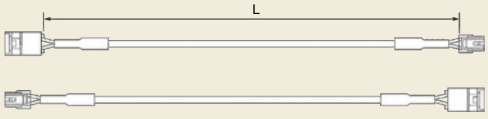


5A Split-type Current Sensor Extension Cable (Standard Type) EMU2-CB-T**M



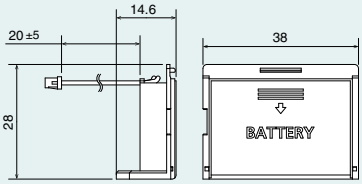
Model	EMU2-CB-T1M	EMU2-CB-T5M	EMU2-CB-T10M
L dimension	1m	5m	10m

5A Split-type Current Sensor Extension Cable (Separate Type) EMU2-CB-T**M

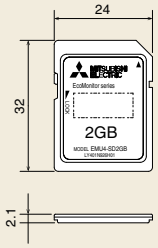


Model	EMU2-CB-T1MS	EMU2-CB-T5MS	EMU2-CB-T10MS
L dimension	1m	5m	10m

●Logging Unit Lithium Battery



●Logging Unit SD Memory Card

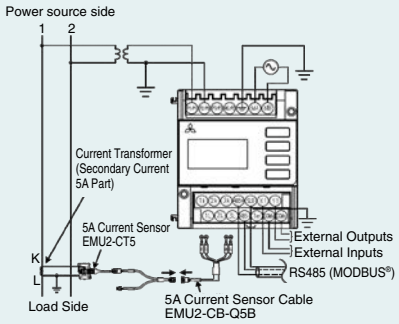


Configurations

Connection Configurations

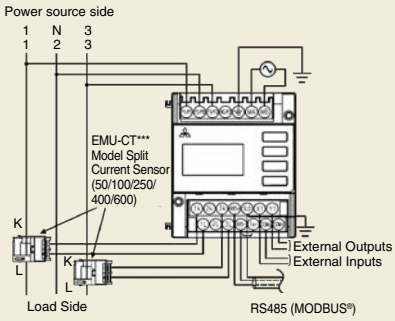
For EMU4-HD1-MB

●1P2W (For high-voltage circuit)



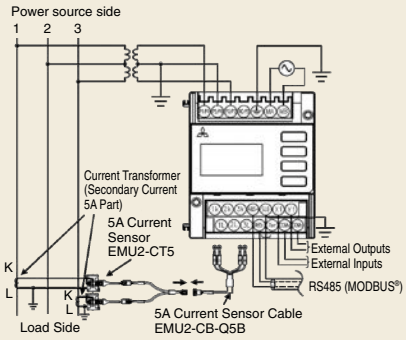
Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

●1P3W/3P3W (For low-voltage circuit)



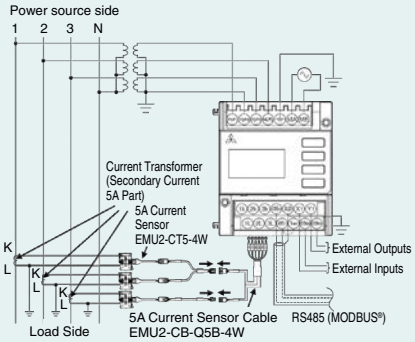
Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	2

●3P3W (For high-voltage circuit)



Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

●3P4W (For high-voltage circuit)

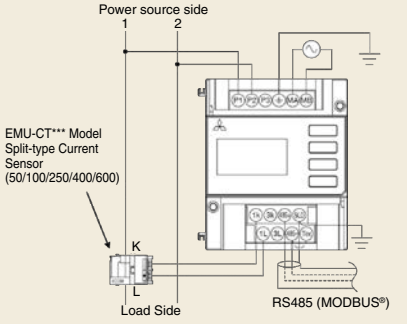


Name	Model	Amount
EcoMonitorLight [High Performance Model]	EMU4-HD1-MB	1
Split-type Current Sensor	EMU2-CT5-4W	1
5A Current Sensor Cable	EMU2-CB-Q5B-4W	1

Note:
- The cable (electrical wire) for between EMU-CT*** and the Split-type Current Sensor is provided by the customer.
- If installing to a low-voltage (600 V or less) circuit, it is not necessary to connect the secondary electrical circuit of the voltage transformer to ground.

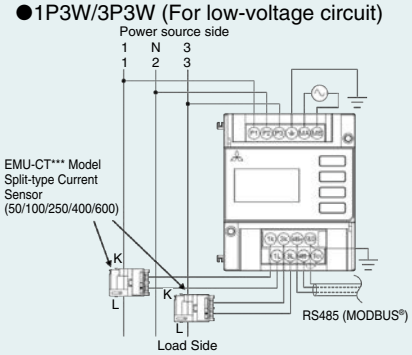
For EMU4-BD1-MB

●1P2W (For low-voltage circuit)



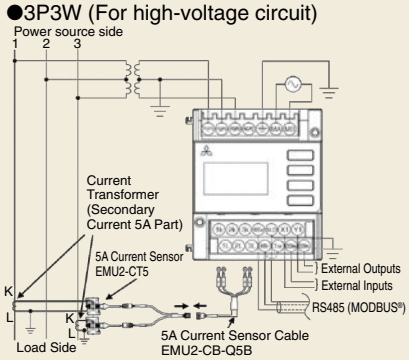
Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	1

●1P3W/3P3W (For low-voltage circuit)



Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU-CT***(50/100/250) EMU-CT***-A(50/100/250/400/600)	2

●3P3W (For high-voltage circuit)



Name	Model	Amount
EcoMonitorLight [Standard Model]	EMU4-BD1-MB	1
Split-type Current Sensor	EMU2-CT5	1
5A Current Sensor Cable	EMU2-CB-Q5B	1

Product Lineup

Energy Measuring Unit

EcoMonitorPlus

Three types of basic measuring unit*1 are available.
You can select the most suitable model according to the application.

*1: Basic unit cannot be used as an extension unit.

EMU4-BM1-MB

Energy Measuring Standard Model

Suitable for visualization of "energy" in a simple way!

EMU4-HM1-MB

Energy Measuring High Performance Model

In addition to the functions of the Standard Model, this model comes with additional functions for the measurement of 3-phase 4-wire and pulse count.

EMU4-LG1-MB

Insulation Monitor Model

Capable of Measuring Leakage Current.

Energy Measuring Unit (Extension Unit*1*2)

Two types of extension energy measuring unit are available.
You can select the most suitable model according to your need, such as measurement of same voltage or measurement of different voltages.

*1: Up to three extension units can be connected.
*2: Each extension unit can measure two circuits, but the circuits must be of the same voltage system. Different voltage system cannot be measured.

EMU4-VA2

EMU4-A2

Optional Units*1

*1: One basic unit can be connected with one optional unit.

EMU4-LM

For customers who want to easily manage data using SD memory cards!

EMU4-CM-C

For CC-Link communication

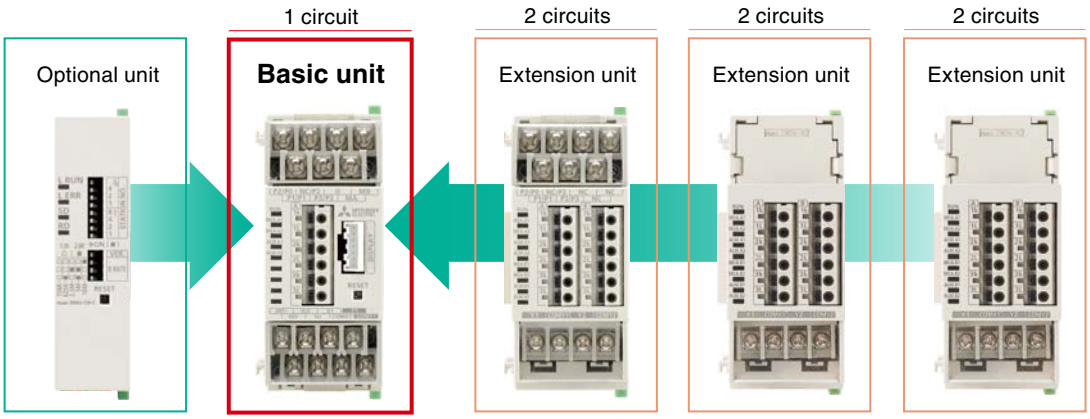
Features

Want to expand the energy-saving system in phases!

You can start measurement at locations where you want to achieve energy saving.
Expanding the system by adding more units as the number of measurement circuits increases.

Maximum

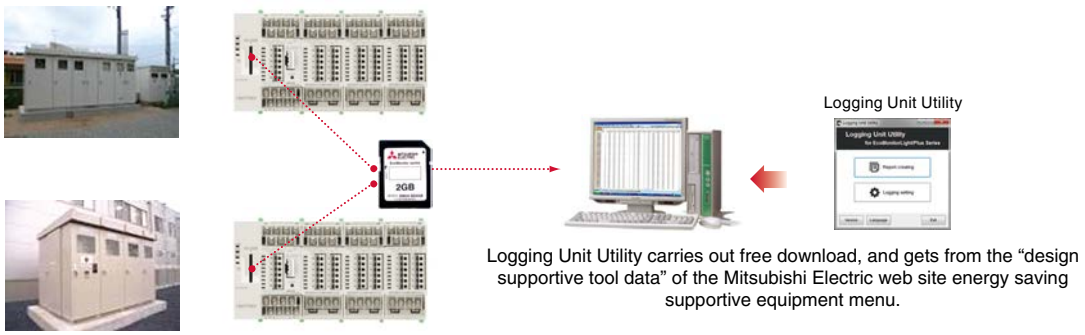
Number of measurement circuits
14 circuits (Singie-phase 2-wire)
7 circuits (Single-phase 3-wire,three-phase 3-wire,three-phase 4wire)



Basic unit cannot be used as an extension unit.
Up to three optional units can be connected.
On basic unit can be connected with only one optional unit.

Want to create reports and graphs for simplified management of measurement data!

Using the logging unit, you can collect data without a host application program such as a PC-based application.
Documentation software (Logging Unit Utility) enables easy creation of reports and graphs.

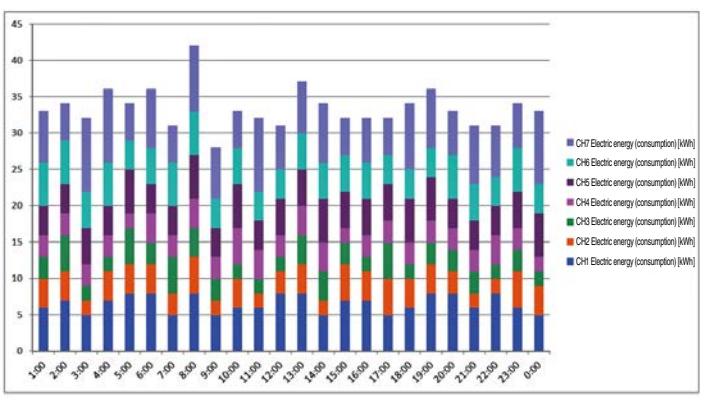


Logging Unit Utility carries out free download, and gets from the “design supportive tool data” of the Mitsubishi Electric web site energy saving supportive equipment menu.

Sample of report

2015/4/20

Time	CH1 Electric energy (consumption) [kWh]	CH2 Electric energy (consumption) [kWh]	CH3 Electric energy (consumption) [kWh]	CH4 Electric energy (consumption) [kWh]	CH5 Electric energy (consumption) [kWh]	CH6 Electric energy (consumption) [kWh]	CH7 Electric energy (consumption) [kWh]
1:00	6	4	3	3	4	6	7
2:00	7	4	5	3	4	6	5
3:00	5	2	2	3	5	5	10
4:00	7	4	2	3	4	6	10
5:00	8	4	5	2	6	4	5
6:00	8	4	3	4	4	5	8
7:00	5	3	5	3	4	6	5
8:00	8	5	4	4	6	6	9
9:00	5	2	3	3	4	4	7
10:00	6	4	2	5	6	5	5
11:00	6	2	2	4	4	4	10
12:00	8	3	2	3	5	4	6
13:00	8	4	4	4	5	5	7
14:00	5	2	4	4	6	5	8
15:00	7	5	3	2	5	5	5
16:00	7	4	2	3	5	5	6
17:00	5	5	5	3	5	4	5
18:00	6	4	2	3	6	4	9
19:00	8	4	3	3	6	4	8
20:00	8	3	3	3	4	6	6
21:00	6	2	3	3	4	5	8
22:00	8	2	2	4	4	4	7
23:00	6	5	3	3	5	6	6
0:00	5	4	2	2	6	4	10
Daily total	158	85	74	77	117	118	172
Daily maximum	8	5	5	5	6	6	10
Daily minimum	5	2	2	2	4	4	5
Daily average	6.6	3.5	3.1	3.2	4.9	4.9	7.2



Want to use the EcoMonitorPlus for purposes other than energy saving!

Measurement of leakage current

①Capable of measuring even extremely low levels of leakage current.

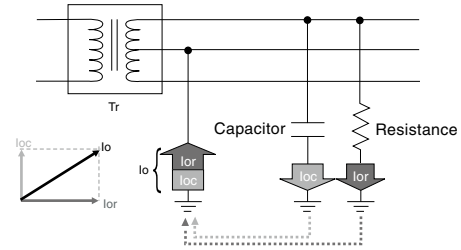
Insulation monitor unit (EMU4-LG1-MB)Leakage current resolution: 0.01mA

⇒Capable of measuring leakage current in equipment groups, such as motors.

②Monitoring of equipment insulation degradation using Ior system

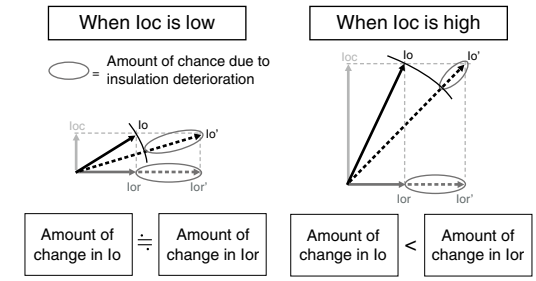
Since leakage current (Io) is affected by the Ioc of the whole equipment, the Ior measurement is effective for insulation deterioration diagnosis.

■Method of leakage current measurement(Io and Ior measurements)



Ior : Leakage current (resistive leakage current) which flows due to degraded insulation
Ioc: Leakage current (leakage current from electrostatic capacity) which flows even if the insulation condition is sound
Io : Composite leakage current of Ior and Ioc (composition of vectors)

Ioc fluctuates on equipment with long wiring distance or inverter devices and filters.



■Zero-phase Current converter

Product name	Model	External view
Split-type zero-phase current converter	CZ-22S	
	CZ-30S	
	CZ-55S	
	CZ-77S	
	CZ-112S	
Through-type zero-phase current converter	ZT15B	
	ZT30B	
	ZT40B	
	ZT60B	
	ZT80B	
	ZT100B	
Zero-phase current transformer with primary conductor	ZTA600A	* See the external view.
	ZTA1200A	
	ZTA2000A	

■Compact Display Unit

Product name	Model	External view
Compact display unit	EMU4-D65	
Compact display unit connecting cable	EMU2-CB1-DP	
Compact display unit power cable	EMU4-CB-DPS	

*1: Commercially available DC power supply units are required for the connection of multiple EMU4-D65 units.
Compatible product: Cosel PBA15F-9-N1.
*2: Compact display unit connecting cables are required for the connection of multiple display units.
*3: Up to seven compact display units can be connected.

Specifications

Energy Measuring Unit

Basic Unit

Item			Specification		
Model			Energy Measuring Standard Model EMU4-BM1-MB	Energy Measuring High Performance Model EMU4-HM1-MB	Insulation Monitor Model EMU4-LG1-MB
Phase wire system			Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire common	Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common	Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ three-phase 4-wire common
Instrument ratings	Voltage circuit	Single-phase 2-wire/ 3-phase 3-wire	110V, 220VAC common (*1)	110V, 220V, 440VAC common (*2)	110V, 220V, 440VAC common (*2)
		Single-phase 3-wire	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3)	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)
		3-phase 4-wire	–	Minimum: 63.5V/110VAC, Maximum: 277V/480VAC (*3)	
	Current circuit		50A, 100A, 250A, 400A, 600A (Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.) 5A (Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4)		1A (Mitsubishi ZCT is used. Primary current value of ZCT is indicated.)
	Frequency		50/60Hz (automatic frequency selection)		
Auxiliary power rating			100V – 240VAC (+10%, -15%) 50/60Hz		
No. of measurement circuits			1circuit	1circuit	1circuit
Consumption VA	Voltage circuit		For each phase: 0.1VA (110VAC), 0.2VA (220VAC)	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)
	Current circuit		For each phase: 0.1VA (current sensor primary side)		
	Auxiliary power circuit (*10)		110VAC:2.0VA AC220V:3.0VA		
Measurement items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time		–
			–	Apparent power, periodic electric energy, harmonic current, harmonic voltage, pulse count value, pulse conversion value, electric energy conversion value	Leakage current, demanded leakage current, resistance leakage current (*8), demanded resistance leakage current (*8), resistance leakage current difference conversion value (*8)
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0)	Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) Harmonic current, harmonic voltage: ±2.5%	Low sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5% (relative to 10 to 100% of rating) Leakage current Io, resistive leakage current Ior: ±2.5mA (relative to 10% of rating or lower) High sensitivity mode Leakage current Io, resistive leakage current Ior: ±2.5mA
Data update cycle			100msec		Leakage current: 2sec, resistive leakage current: 2sec
External input specification	Input signal format		–	Non-voltage a contact, 1 input (Select function from below)	–
	Function		–	Contact/pulse input	–
		Contact input	–	Monitoring of contact and measurement of electric energy during operation (when contact is ON)	–
		Pulse input	–	Counting of input pulse (count: 0 to 999,999)	–
	Rated input voltage/current		–	5VDC, 7mA	–
External output specification	Output signal format		–	Non-voltage a contact, 1 output (Select function from below)	
	Function		–	Alarm/pulse output	Alarm
		Alarm output	–	Contact output of alarm generating status Select monitoring target from below. Monitoring of current demand upper limit, monitoring of current demand lower limit Monitoring of N-phase current demand upper limit Monitoring of line voltage upper limit Monitoring of line voltage lower limit Monitoring of phase voltage upper limit Monitoring of phase voltage lower limit Monitoring of power demand upper limit, monitoring of power demand lower limit Monitoring of power factor upper limit, monitoring of power factor lower limit Monitoring of pulse conversion value upper limit Monitoring of current imbalance rate upper limit Monitoring of voltage imbalance rate upper limit	Contact output of alarm generating status Select monitoring target from below Leakage current first stage alarm Leakage current second stage alarm Resistance leakage current first stage alarm Resistance leakage current second stage alarm Limit alarm of number of first stage alarm occurrences of leakage current Limit alarm of number of second stage alarm occurrences of leakage current Limit alarm of number of first stage alarm occurrences of resistance leakage current Limit alarm of number of second stage alarm occurrences of resistance leakage current
		Plus output	–	Pulse output of electric energy Select pulse unit from below. 0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6)	–
	Rated switching voltage/current		–	35VDC 75mA, 24VAC 75mA (Power factor = 1)	
Power interruption backup	Recorded item		Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory)		•Setting values •Number of alarm occurrences •Maximum value (Stored in the nonvolatile memory)
Compatible standard			EMC: EN-61326-1:2013, Safety: EN-61010-1:2010		
Operating environment	Operating temperature range		-5°Cto +55°C (ave. daily temp. of 35°C or lower)		
	Operating humidity range		30% to 85%RH (no condensation)		
	Storage temperature range		-10°C to +60°C (ave. daily temp. of 35°C or lower)		
	Altitude		2,000 m or lower		
Commercial-frequency withstand voltage			Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min		
			Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min		
Insulation resistance			At the same locations as above: 10 MΩ or more (500VDC)		
Compatible wire	Auxiliary power/voltage input terminal		AWG26-14 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wires: 0.13 to 2.0mm^2)		
	Current input		Single wire: AWG24-17, Stranded wires: AWG20-26 (*9) (Single wire: ϕ0.5 to ϕ1.2mm, Stranded wires: 0.5 to 1.3mm^2)		
	Input/output terminal		–	AWG26-16 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.29mm, Stranded wires: 0.13 to 1.3mm^2)	
Weight			0.2kg		
External dimensions (unit: mm)			37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts)		

* 1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
* 4: The settable primary current when using the 5A current sensor is as follows: 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(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
* 5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
* 6: Refer to the instruction manual for the detail on the setting of pulse unit.
* 7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
* 8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
* 9: Recommended bar terminal: Nichihu TGV TC-1.25-11T.
*10: Connected with optional units, it increases AC110V:4.5VA, AC220V:5.0VA. Connected with display units, it increases AC110V:1.5VA, AC220V:2.0VA.

Extension Unit

Item			Specification	
Model			Energy Measuring Extension Unit for Different voltage system EMU4-VA2	Energy Measuring Extension Unit for Same Voltage System EMU4-A2
Phase wire system			Single-phase 2-wire/single-phase 3-wire, 3-phase 3-wire/ 3-phase 4-wire common	(Same as the unit connected on the left side)
Instrument ratings	Voltage circuit	Single-phase 2-wire/ 3-phase 3-wire	110V, 220V, 440VAC common (*2)	
		Single-phase 3-wire	110VAC (between wires 1 and 2, and wires 2 and 3), 220VAC (between wires 1 and 3) 220VAC (between wires 1 and 2, and wires 2 and 3), 440VAC (between wires 1 and 3)	
		3-phase 4-wire	Minimum: 63.5V/110VAC, Max.: 277V/480VAC (*3)	
	Current circuit		50A, 100A, 250A, 400A, 600A (Dedicated split-type current sensor is used. All values indicate primary current values of current sensor.) 5A (Dedicated 5A current sensor is used. Current transformer (CT) is used in two-step configuration together with the 5A current sensor in order to allow a maximum primary current value setting of 30,000A) (*4)	
	Frequency		50/60Hz (automatic frequency selection)	
Auxiliary power rating			(Same as basic unit)	
No. of measurement circuits			2circuits	2circuits
Consumption VA		Voltage circuit	For each phase: 0.1VA (110VAC), 0.2VA (220VAC), 0.4VA (440VAC)	–
		Current circuit	For each phase: 0.1VA (current sensor primary side)	
		Auxiliary power circuit (*10)	AC110V:1.0VA AC220VA:1.5VA	
Measurement items			Current, demanded current, voltage, power, demanded power, reactive power, power factor, frequency, electric energy (regenerative, consumption), reactive electric energy (*7), current imbalance rate, voltage imbalance rate, operating time	
			Apparent power, harmonic current, harmonic voltage, electric energy conversion value	
Main unit tolerances (*5)			Current, voltage, power, reactive power, apparent power, frequency: ±1.0% (relative to rated input) Power factor: ±3.0% Electric energy: ±2.0%(in 5 to 100% range of rated values; power factor = 1) Reactive electric energy: ±2.5% (in 10 to 100% range of rated values; power factor = 0) Harmonic current, harmonic voltage: ±2.5%	
Data update cycle			100msec	
External input specification	Input signal format		–	–
	Function		–	–
		Contact input	–	–
		Pulse input	–	–
	Rated input voltage/current		–	–
External output specification	Output signal format		Non-voltage a contact, 1 output (Select function from below)	
	Function		Alarm/pulse output	
		Alarm output	Contact output of alarm generating status Select monitoring target from below. Monitoring of current demand upper limit, monitoring of current demand lower limit Monitoring of N-phase current demand upper limit Monitoring of line voltage upper limit Monitoring of line voltage lower limit Monitoring of phase voltage upper limit Monitoring of phase voltage lower limit Monitoring of power demand upper limit, monitoring of power demand lower limit Monitoring of power factor upper limit, monitoring of power factor lower limit Monitoring of current imbalance rate upper limit Monitoring of voltage imbalance rate upper limit	
		Plus output	Pulse output of electric energy Select pulse unit from below. 0.001/0.01/0.1/1/10/100/1000/10000/100000(kWh/pulse) (*6)	
	Rated switching voltage/current		35VDC 75mA, 24VAC 75mA (Power factor = 1)	
Power interruption backup	Recorded item		Setting values, electric energy (consumption, regenerative), reactive electric energy, periodic electric energy, operating time, pulse count value, pulse conversion value, electric energy conversion value, maximum value, minimum value (Stored in the nonvolatile memory)	
Compatible standard			EMC: EN-61326-1:2013, Safety: EN-61010-1:2010	
Operating environment	Operating temperature range		-5°Cto +55°C (ave. daily temp. of 35°C or lower)	
	Operating humidity range		30% to 85%RH (no condensation)	
	Storage temperature range		-10°C to +60°C (ave. daily temp. of 35°C or lower)	
	Altitude		2,000 m or lower	
Commercial-frequency withstand voltage			Between all terminals (excluding communication circuit and frame GND terminal) and external casing: 2,000VAC for 1min	
			Between all current/voltage inputs and all auxiliary power terminals: 2,000VAC for 1min	
			Between all current/voltage inputs, auxiliary power terminals and all contact/pulse inputs, pulse/alarm outputs, communication terminals: 2,000VAC for 1min	
Insulation resistance			At the same locations as above: 10 MΩ or more (500VDC)	
Compatible wire	Auxiliary power/voltage input terminal		AWG26-14 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.62mm, Stranded wires: 0.13 to 2.0mm^2)	–
	Current input		Single wire: AWG24-17, Stranded wires: AWG20-26 (*9) (Single wire: ϕ0.5 to ϕ1.2mm, Stranded wires: 0.5 to 1.3mm^2)	
	Input/output terminal		AWG26-16 (single wire/stranded wires) (Single wire: ϕ0.41 to ϕ1.29mm, Stranded wires: 0.13 to 1.3mm^2)	
Weight			0.2kg	
External dimensions (unit: mm)			37.5 (W) x 90 (H) x 94 (D) mm (excluding protruding parts)	

*1: 110V and 220V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 11,000V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*2: 110V, 220V and 440V can be connected directly. Externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*3: 63.5V/110V – 277V/480V can be connected directly. An externally mounted voltage transformer (VT) for instrument is needed for voltages greater than those (primary voltage can be set to up to 6,600V, and secondary voltage can be set between 1 and 220V). For details, see the instruction manual.
*4: The settable primary current when using the 5A current sensor is as follows:
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(CT primary side can be set freely up to 30,000A. However, CT secondary side is fixed at 5A.)
*5: Refer to the specifications of options (split-type current sensor, 5A current sensor) on page 939 for the current sensor error rates.
*6: Refer to the instruction manual for the detail on the setting of pulse unit.
*7: Measurements are conducted based on a setting other than 2-circuit measurement mode with single-phase 2-wire setting.
*8: It measures only in the case of Single-phase 2-wire, Single-phase 3-wire, 3-phase 3-wire.
*9: Recommended bar terminal: Nichifu TGV TC-1.25-11T.

Split-type Zero-phase Current Transformer

Item	Specification				
Model	CZ-22S	CZ-30S	CZ-55S	CZ-77S	CZ-112S
Hole diameter (mm)	22	30	55	77	112
Allowable current (A)	50	100	300	600	1.000
Weight (kg)	0.5	0.6	1.8	2.8	2.8
Rated short-time current	50kA (peak-to-peak value: 100kA)				

Through-type Zero-phase Current Transformer

Item	Specification					
Model	ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
Hole diameter (mm)	15	30	40	60	80	100
Allowable current	Refer to the following table, "Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current."					
Weight (kg)	0.2	0.4	0.6	2.0	2.6	3.3
Rated short-time current	50kA (peak-to-peak value: 100kA)					

Zero-phase Current Transformer with Primary Conductor

Item	Specification		
Model	ZTA600A	ZTA1200A	ZTA2000A
Allowable current (A)	600	1200	2000
Weight (kg)	6.5	11	27
Rated burden	3		
Number of polarities	AC600V		
Rated short-time current	100kA (peak value)		

Zero-phase Current transformer (ZCT) inside Diameter, Maximum Through-wire Diameter and Allowable Current

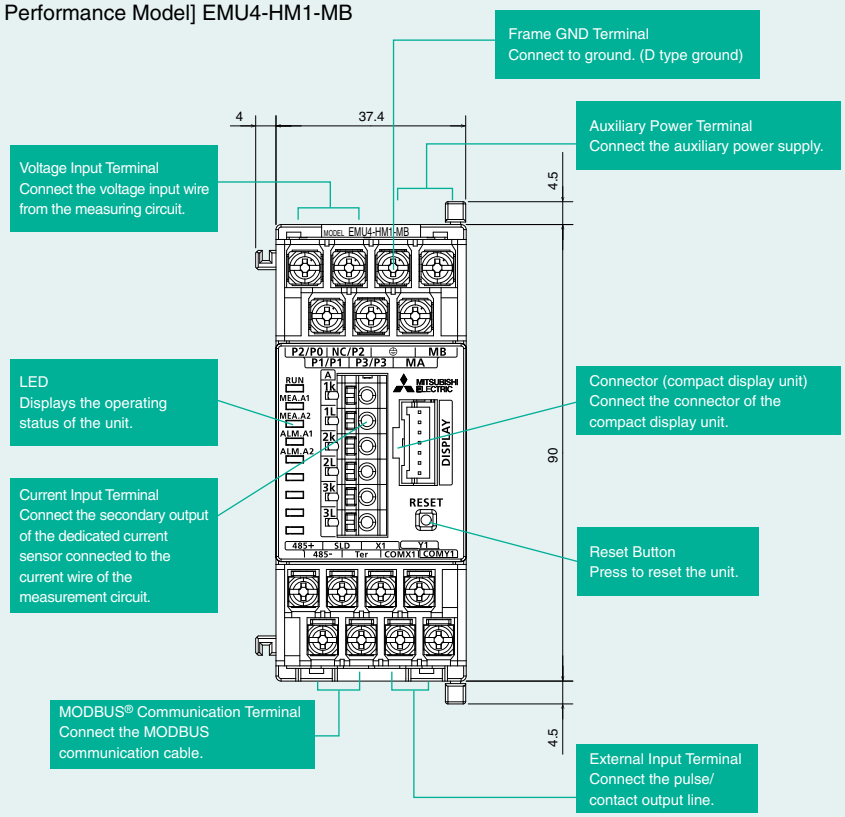
Wiring			Maximum through-wire diameter (mm²) (Allowable current (A) of wire)										
			Split type					Through type					
Phase wire	No. of wires	Wire type	CZ-22S	CZ-30S	CZ-55S	CZ-77S	CZ-112S	ZT15B	ZT30B	ZT40B	ZT60B	ZT80B	ZT100B
Single-phase 2-wire	2	600V polyvinyl-insulated wire (IV)	22 (115)	60 (217)	250 (556)	500 (842)	–	14 (88)	60 (217)	150 (395)	325 (650)	600 (992)	800 (1185)
		600V cross-linked polyethylene-insulated wire Single-core wire (CV wire)	22 (130)	38 (190)	200 (545)	500 (920)	1000 (1465)	2 (33)	38 (190)	60 (260)	250 (655)	400 (870)	600 (1140)
Single-phase 3-wire 3-phase 3-wire	3	600V polyvinyl-insulated wire (IV)	22 (115)	38 (162)	200 (496)	500 (842)	–	8 (61)	38 (162)	100 (298)	250 (556)	500 (842)	725 (1095)
		600V cross-linked polyethylene-insulated wire Single-core wire (CV wire)	14 (100)	22 (135)	150 (455)	325 (760)	800 (1285)	2 (33)	22 (135)	60 (260)	200 (560)	325 (760)	600 (1140)

*1: Note that the wire thickness may vary slightly depending on the manufacturer.
*2: The IV wire applies to cases where insulators are used.
*3: The IV wire applies to cases where insulation in a covered conduit in air.
(Cables of 600mm² or more have various structures. The values are shown for reference.)

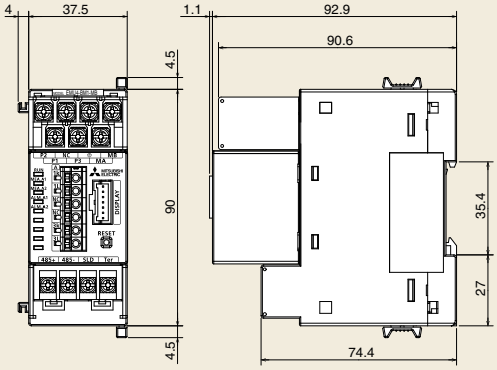
External View

Units (mm)

●[Energy Measuring High Performance Model] EMU4-HM1-MB

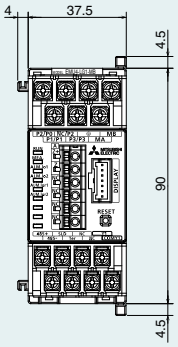


●[Energy Measuring Standard Model] EMU4-HM1-MB

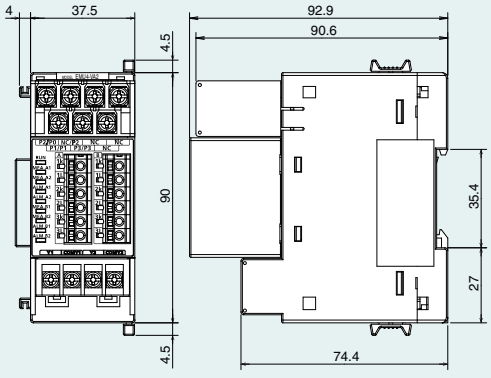


* This side view also applies to other basic unit models (EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB).

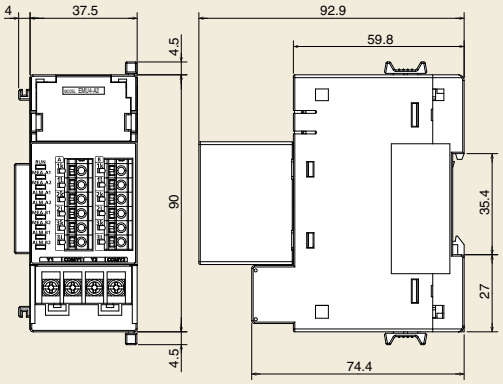
●[Insulation Monitor Model] EMU4-LG1-MB



●[Energy Measuring Extension Unit for Different Voltage System] EMU4-VA2



●[Energy Measuring Extension Unit for Same Voltage System] EMU4-A2



MEMO

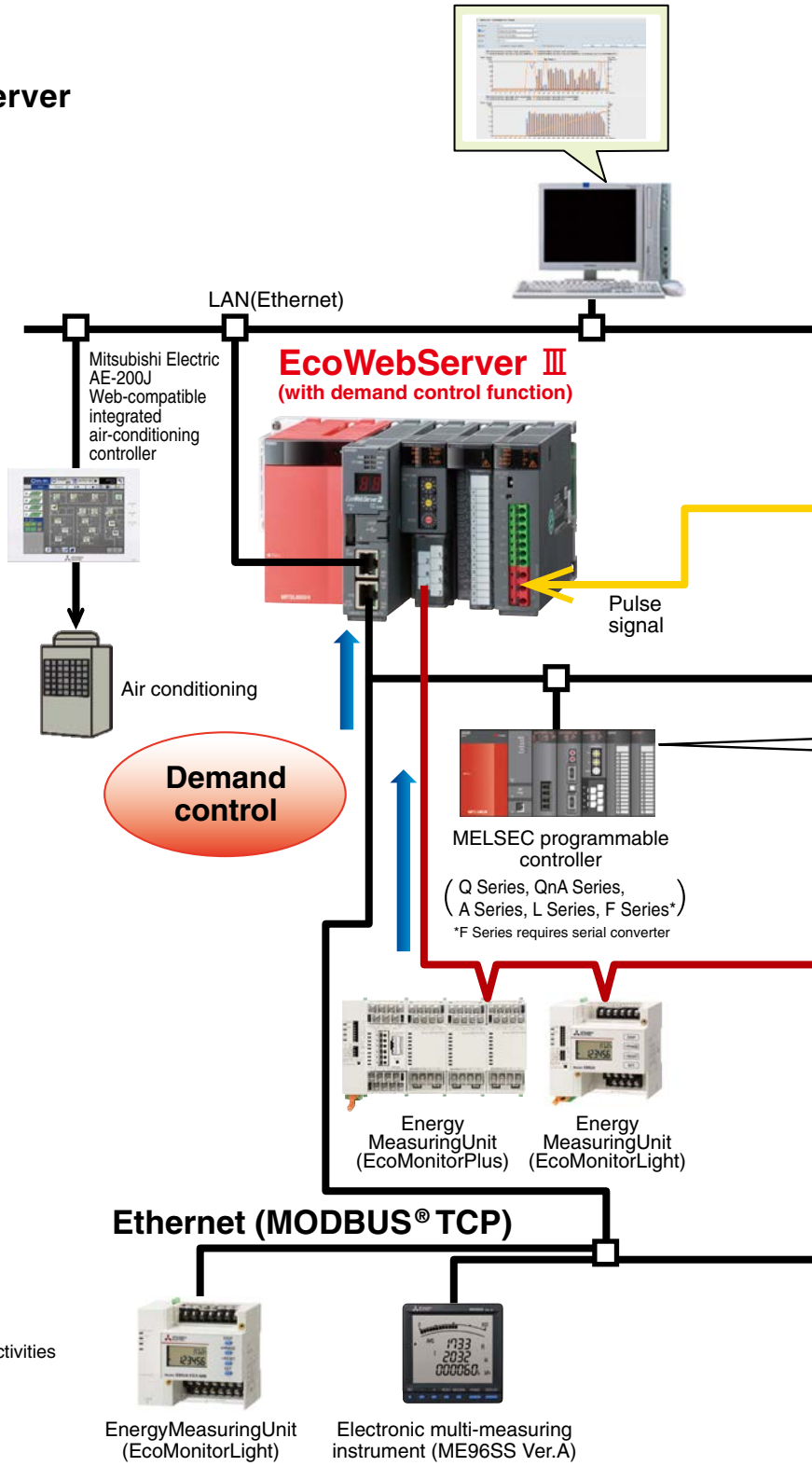
System Configuration Example

Energy Management System

Energy-saving Data Collection Server

EcoWebServerⅢ

Support factory, building and school energy-saving activities.
Build visualized environments and manage energy effectively.
Support to energy conditions at all times and quickly resolve energy loss problems.
Finaly reduce energy loss, increase productivity and cut production costs.



Energy-saving method

Plan Comparatively high specific consumption (waste of energy, negative influence on productivity)
Ex) △kWh of electricity per day can be saved with improvement.

Do
- Facilities start-up too fast
- After investigation and deciding appropriate start-up time, implement countermeasure

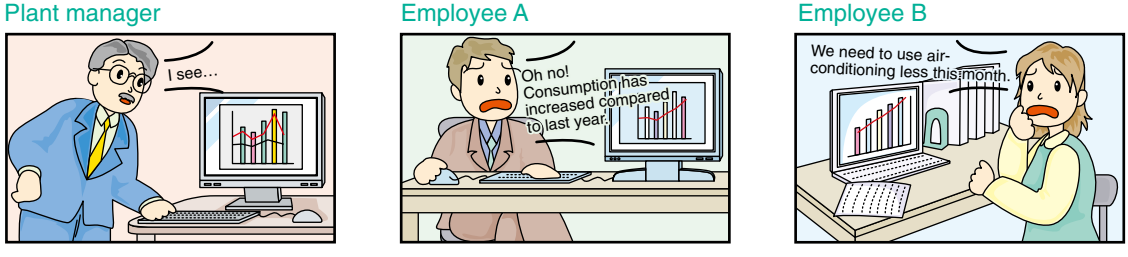
Check Compare data before and after implementing countermeasure (△kWh reduced per day)

Action Implement similar countermeasures for other facilities

Support energy-saving activities using "Visible Management"

1. Monitor/Manage energy by department
2. Specific consumption-based management of energy-saving activities
3. Monthly/Annual target-based management
4. Monitor equipment operating status
5. Manage/Record energy data

Entire factory



E-mail notification
(abnormal upper/lower limits, operating status, target value over specific consumption, over planned energy value, error information)

Transfers files in CSV format
(zoom (1 or 5 min), daily, monthly, annual, facility (daily), specific consumption, demand (daily, monthly, annual), demand alarm, control, operation history, system log file)

Acquire time information
Adjust EcoWebServer Ⅲ clock

FTP server
(File server)

SMTP server
(Mail server)

SNTP server
(Time server)

Receving point

Demand measurement

Electronic multi-measuring instrument (ME96SS Ver.A)

Data collection inside inner register

Measurement data written to inner register

Ethernet (MELSEC communication protocol)

Collects production data

Up to 32 units

QE81WH QE82LG

MELSEC-Q Series
Energy measuring module / Insulation monitoring module

MITSUBISHI GOT

Check demand information and alarm records onsite

Network monitoring lamp

Specific consumption management

Collects energy data

CC-Link

MDU breaker

Electronic multi-measuring instrument (ME96SS Ver.A)

Analog input
Temperature input
Contact output
(Enables remote control of load at locations far from EcoWebServer Ⅲ)

Air circuit breaker (AE-SW Series)

Target-based management

MODBUS® TCP ⇔ MODBUS® RTU Protocol converter

RS-485 (MODBUS® RTU)

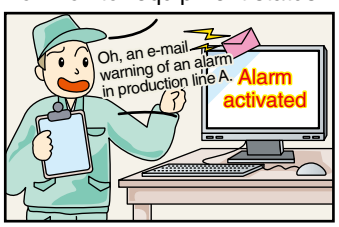
Electronic multi-measuring instrument (ME96SS Ver.A)

EnergyMeasuringUnit (EcoMonitorLight)

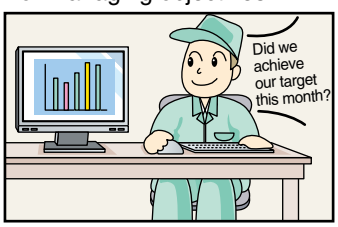
EnergyMeasuringUnit (EcoMonitorPlus)

Production line

For monitor equipment status



For managing objectives



For improvement activities

Importance of Visualizing Energy

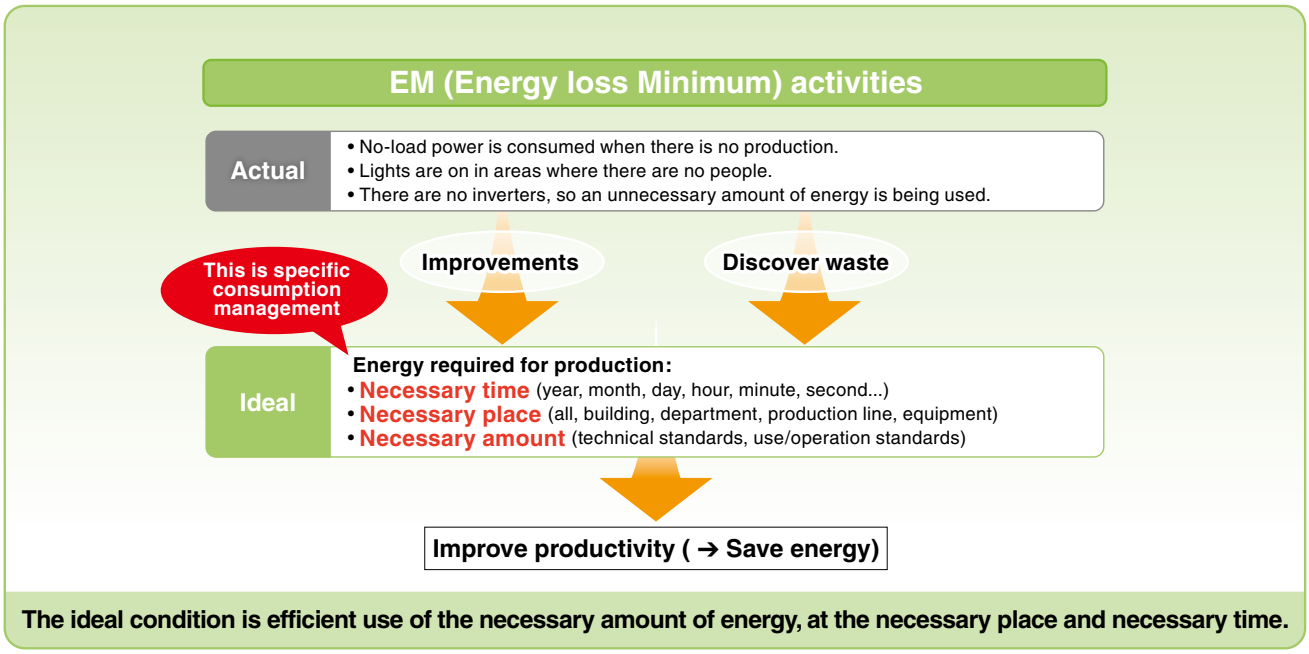
Essentials Issues for Saving Energy

●Target Value Management

Managing objectives is a very important issue when practicing energy savings.
"Target value management" is the process of transforming actual conditions into ideal conditions, and thereby requires understanding the actual situation and how much "unseen" waste there is. For this reason, target value management involves performing detailed management of operations, moving from months to days and lines to equipment, and evolving from "seeing" waste to "understanding" it.
Additionally, when using target value management, it is necessary to construct and put into practice an organization that values "people who set objectives (manage)," "people who find things" and "people capable of thinking of improvements and implementing them."

●Specific consumption management

In lines where there is a large difference in production volume, it is difficult to save energy and improve productivity using energy management alone.
By understanding specific consumption —energy consumed per product— waste in energy and production processes can be clarified, and it becomes easier to implement countermeasures.
Rather than simply not using energy, it's important to use energy efficiently when, where and how much needed.



Importance of Demand Monitoring

Energy Saving by visualizing demand

●What is “Demand”....?

Demand is average electric power at a specified period. This period for demand differs for each country and the way of management method.

Electric fee is basically determined based on the highest demand in one year(→contract demand).

The highter the contract demand is, the more expensive the electric basic charge is.

There are two types of basic demand management method as below.

(1) Fixed block demand management method

The demand period consists of only an interval.

(2) Rolling block demand management method

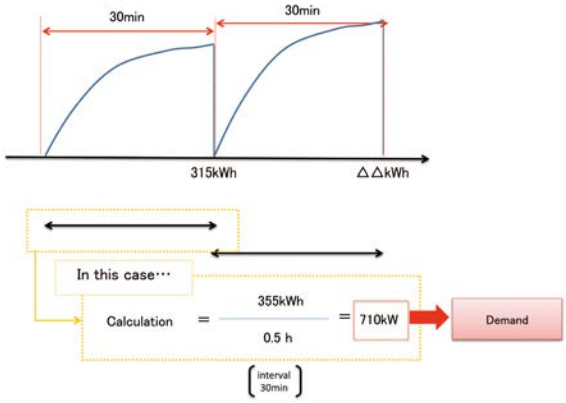
The demand period consists of interval and sub interval.

Interval is the period for caluclation of average electric.

Sub interval is the period for updata the calculation.

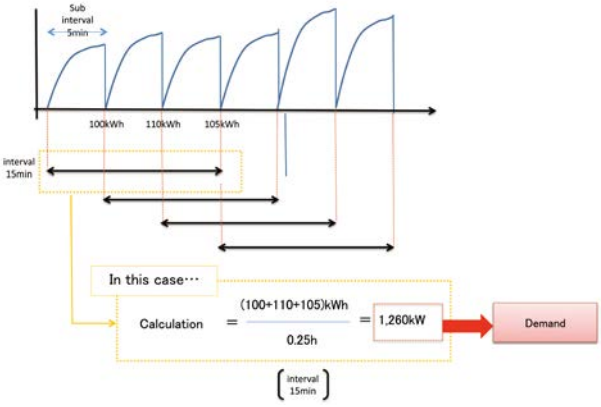
Fixed block demand management

Ex) Interval:30min



Rolling block demand management method

Ex) Interval:15min, Sub interval 5min



EcoWebServerⅢ with demand monitoring function comply with the Fixed block demand management method. Interval can be selected from 15min or 30min.

Subtotal Volume
- Demand (power demand) is computed and calculated by taking pulses from the multi-measuring meter (transaction meter) for power demand.

Estimation
- The value at the end of the 30-minute time limit is estimated from the measured demand (power demand).

Warning
- Based on the results of the estimation, an alarm is output and a notification sent when the objective demand has been exceeded.
- The alarm notification can be a buzzer, display lamp, etc., which is sent through the contact output.

Load interruption
- Load interruption may be necessary depending on power use.
- A control output signal can be used to automatically interrupt the load.

Reduce demand

||

Reduce basic free

Realize visualization of energy and demand management with one EcoWebServer Ⅲ.

Lineup

Energy-saving Data Collection Server EcoWebServer Ⅲ

Product name	Energy-saving Data Collection Server
Model no.	MES3-255C-EN
Communication	CC-Link, MODBUS® (TCP, RTU*)

Product name	Energy-saving Data Collection Server (with demand control function)
Model no.	MES3-255C-DM-EN
Communication	CC-Link, MODBUS® (TCP, RTU*)

*MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.

Network Specifications (CC-Link)

Item		Specifications
CC-Link communications section	Transmission speed	156kbps / 625kbps / 2.5Mbps / 5Mbps / 10Mbps
	Maximum total cable length (maximum transmission distance)	Transmission speed: 156kbps — Cable length between stations: 20cm or more — Maximum total cable length: 1200m 625kbps — 900m 2.5Mbps — 400m 5Mbps — 160m 10Mbps — 100m
	Maximum number of connected units	64 units However, conditions on the right must be met 1. Total number of stations a+b×2+c×3+d×4≦64 a: 1 station occupied, b: 2 stations occupied, c: 3 stations occupied, d: 4 stations occupied 2. Number of units connected 16× (A+D) +54×B+88×C≦2304 A: Number of remote I/O stations …64 max B: Number of remote device stations …42 max C: Number of local stations, intelligent device stations …26 max D: Number of reserve stations * * Unregistered station numbers from station 1 to the maximum number of stations are counted as reserve stations.
	Communication method	Broadcast polling method
	Synchronization method	Frame synchronization method
	Encoding method	NRZI method
	Transmission route format	Bus (RS-485)
	Transmission format	HDLC compatible
	Error control method	CRC ($x^{16}+x^{12}+x^{15}$)
	Connecting cable	CC-Link Ver1.10-compatible dedicated cable

Function Comparison/System Environment

Functions

Product Name			MES3-255C-EN	MES3-255C-DM-EN
Demand function			—	○
Connection device	CC-Link terminal device		Number of remote I/O stations≦64, Number of remote device stations≦42, Number of local stations≦26	
	MODBUS® terminal device		Number of MODBUS® TCP terminals≦255 Number of MODBUS® RTU terminals≦31 for each gateway Number of total MODBUS® terminals≦255	
	MITSUBISHI PLC, GOT		MC protocol connection (LAN CH2 used) * device read/write CC-Link unit (local) connection * device read	
Number of measuring points	Measuring points		255 points	
		Number of operation measuring points	32 points (includes 255 measuring points)	
	Virtual measuring points		128 points	
	Specific consumption measuring points		64 points	
	Connection point output		32 points	
	Demand monitoring	Receiving demand	—	2 points (fixed) whole day, timeframe 1-10
		Receiving electric energy	—	2 points (fixed) whole day, timeframe 1-10
Data saving function * CSV format	Zoom (every 1min) data		62-day amount	
	Zoom (every 5min) data		14-day amount	
	Daily data (on the hour or every 30min)		186-day amount	
	Monthly data (specified time (00min) once a day)		60-month amount	
	Yearly data (specified time (00min) once a month)		5-year amount	
	Virtual measuring point data (daily)		186-day amount	
	Virtual measuring point data (monthly)		60-month amount	
	Virtual measuring point data (yearly)		5-year amount	
	Specific consumption measuring point data (daily)		186-day amount	
	Specific consumption measuring point data (monthly)		60-month amount	
	Specific consumption measuring point data (yearly)		5-year amount	
	Equipment data (daily)		186-day amount	
	Operating history data		64KB×4 files	
	System log		256KB×8 files	
	Demand data (daily)		—	186-day amount
	Demand data (monthly(daily maximum))		—	60-month amount
	Demand data (yearly(monthly maximum))		—	5-year amount
	Demand alarm/Control log		—	128KB×62 files
Display function	Real-time	Demand monitor	—	• Displays current time limit demand load curve • Displays graph of same day demand results
		Current value monitor	The current value of the specified measuring points are displayed in the units registered for groups and display lists Displays differential display mode function/differential values for specified measuring points (time differential: amount used from previous hour to present time, daily differential/monthly differential: amount used from previous summary time to present)	
		Connection point output monitor	Displays connecting point output status	
	Graph display	Demand trend graph	—	Displays demand trend graph
		Measuring point comparison graph	Displays comparison of multiple measuring point data for specified display intervals/time displayed	
		Daily comparison graph	Displays comparison of specified measuring points for desired date	
		Specific consumption graph	Displays graph after dividing energy volume by number produced	
		Equipment graph	Displays graph of equipment efficiency, number of defects and equipment energy volume	
	Data file		Download measuring point data, virtual measuring point data, specific consumption data, equipment data, operating history data, system log, demand data *, alarms/control log * (*only for products with demand monitoring functions)	
	Equipment values list		Displays measuring points, connection point output and content of email notifications set for EcoServerⅢ	
Monitoring functions	Email notification function		Transmits main unit error notifications, periodic notifications, upper/lower limit notifications, operating status notifications, specific consumption objective value notifications, energy plan value notifications and demand notifications * to the specified SMTP Server (*only for products with demand monitoring functions)	
	Connection point output		Outputs connection points for EcoWebServerⅢ connection point output module or combined CC-Link input/output module	

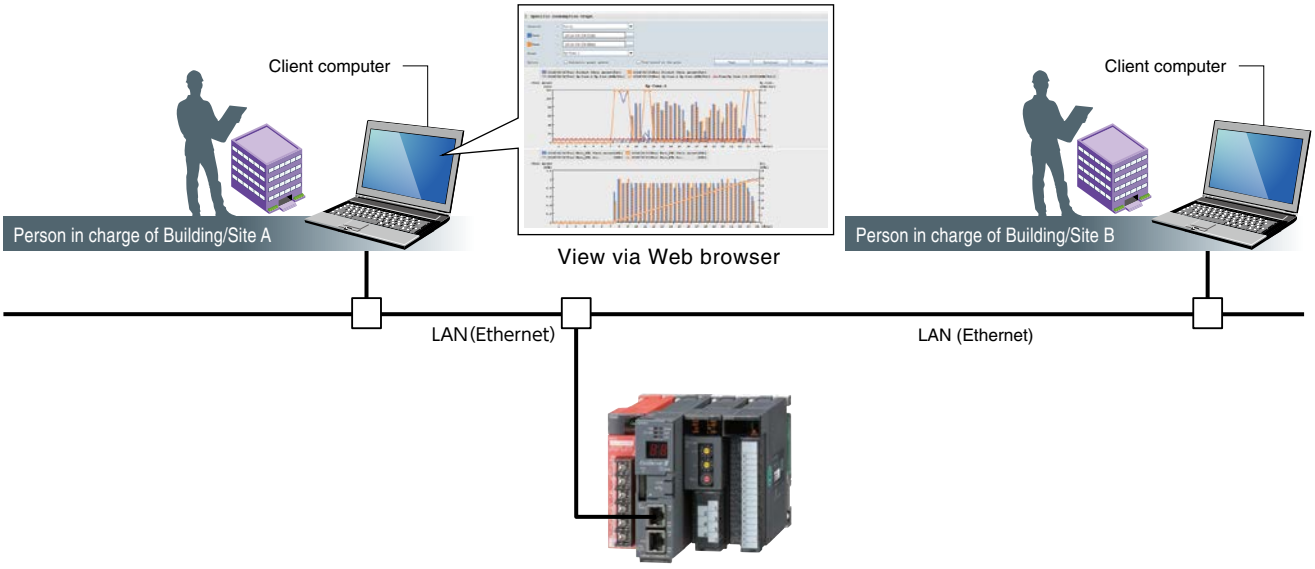
Recommended system environment

Item	Specification
OS (basic software)	Microsoft Windows Vista® Business (32bit) SP2, Microsoft Windows 7 Professional (32bit, 64bit) SP1 Microsoft Windows 8.1 Pro (32bit, 64bit), Microsoft Windows 10 Pro (32bit, 64bit)
CPU	Pentium® 1GHz processor or faster, or compatible microprocessor (DOS/V-compatible device)
Memory	1GB or more
Hard-disk	If data accumulated by EcoWebServerⅢ is saved to a computer, that storage capacity is required.
CD drive	1 group or more (required for installing setup software)
Display resolution	1280×1024 pixels or more
Display colors	65536 colors or more
Input device	Mouse and keyboard
External interface	10BASE-T / 100BASE-TX
Web browser	Internet Explorer® 7, 8 (32bit), 9 (32bit), 10 (32bit), 11 (32bit)
Java plug-in	Oracle Jave™ 8 JRE 8 (32bit), Oracle Java™ 7 JRE 7 (32bit), Oracle Java™ 6 JRE 6 (32bit)

Features

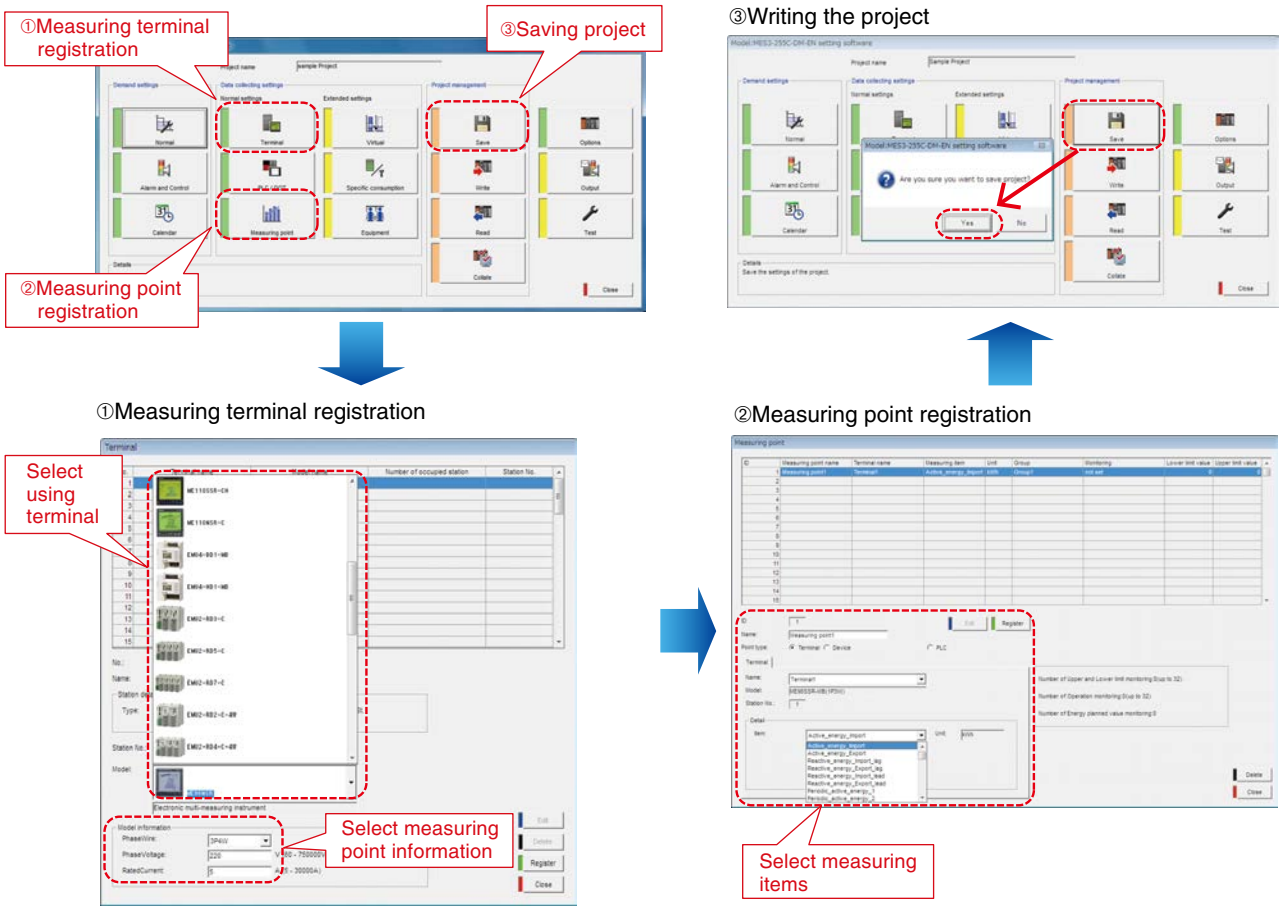
Measured data can be displayed on a Web browser with graphs without any programing.

Using the HTTP Server function, the collected data is transmitted via Ethernet across the Internet/Intranet so that all employees can confirm and understand amount of energy used in real-time.



Easy setting by using dedicated setting software.

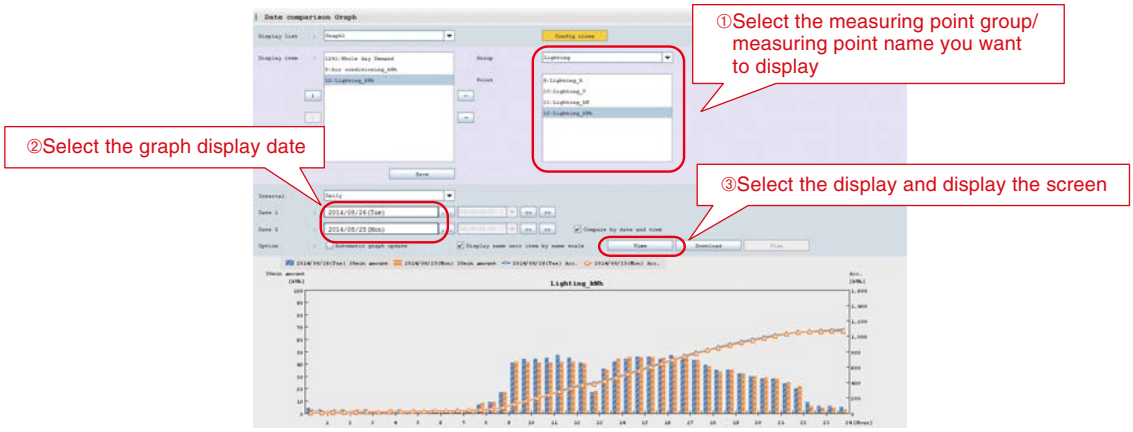
The minimum required registering configuration on the measuring is
"①Measuring terminal registration" → "②Measuring point registration" → "③Writing the project" only.



Add new comparison screens according to the scenario. Strong support provided for analyzing activities.

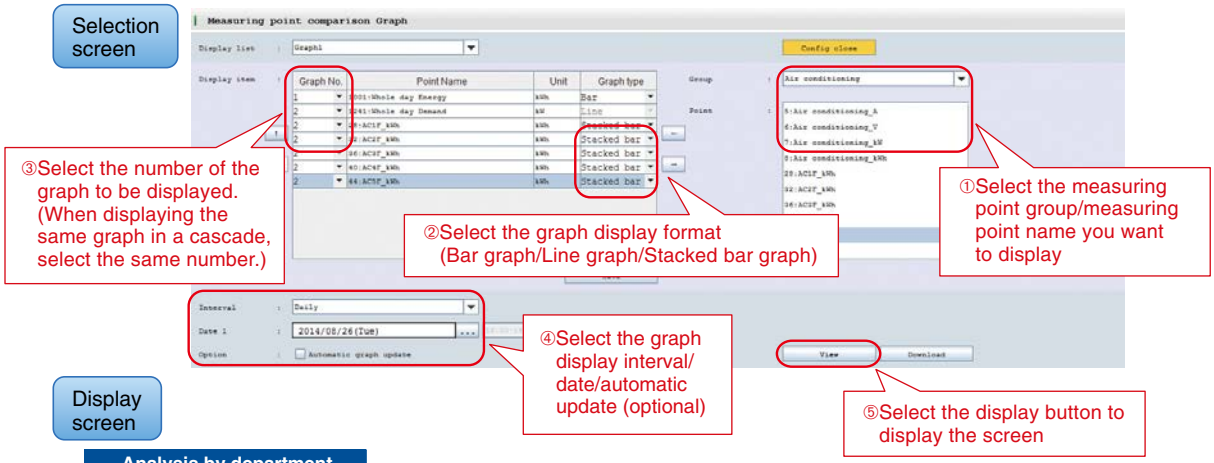
1 Date comparison graph

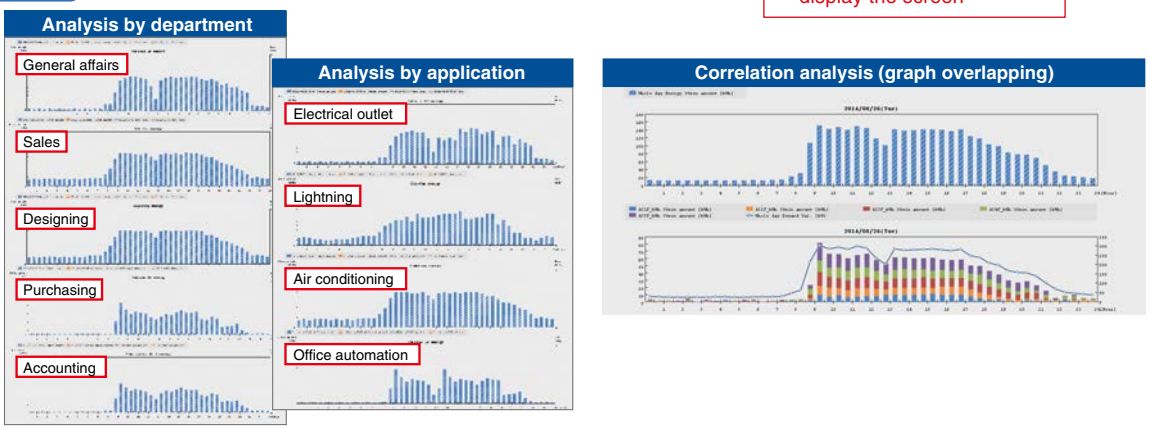
●The display procedure is select “①Measuring point group/name → ②Graph display date” and select “③Display” only.
●A comparison of the specified date and items can be displayed.



2 Measuring point comparison graph

●The display procedure is to select “①Measuring point group/name → ②Graph display format → ③Graph No. → ④Graph display intervals etc.” and select “⑤Display” only.
●It’s possible to select graphs and display various graphs in the format of your choice. It’s also possible to display the same graph, making it easy to understand graph correlations.

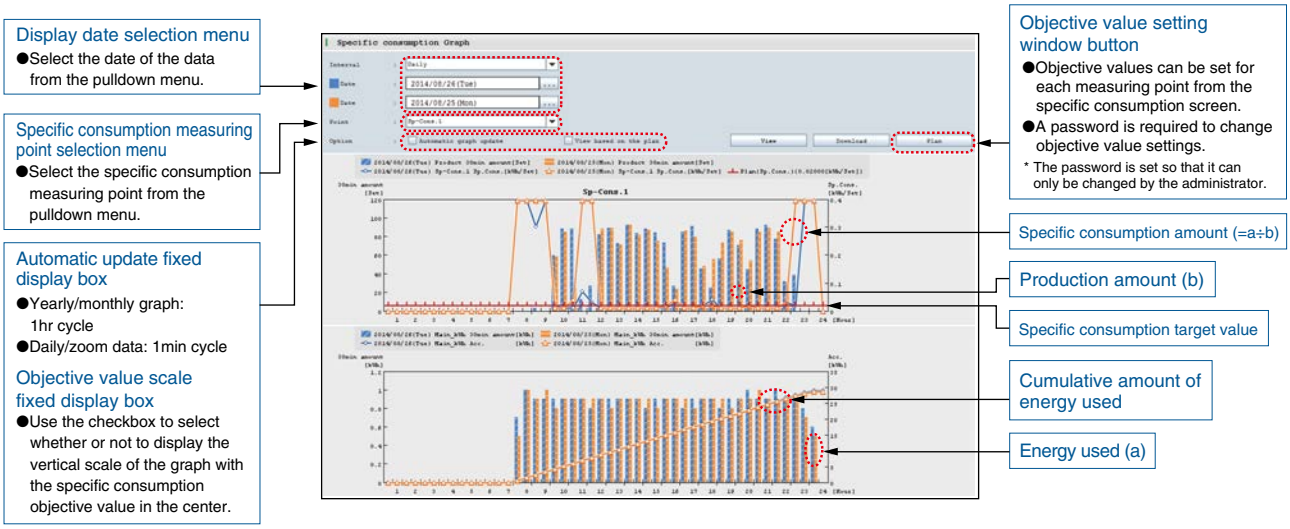




Easily understand productivity by confirming the specific consumption graph

●By integrating the production volumes from the measuring terminal and PLC, the specific consumption graph can be easily displayed and points related to the drop in specific consumption can be easily understood.

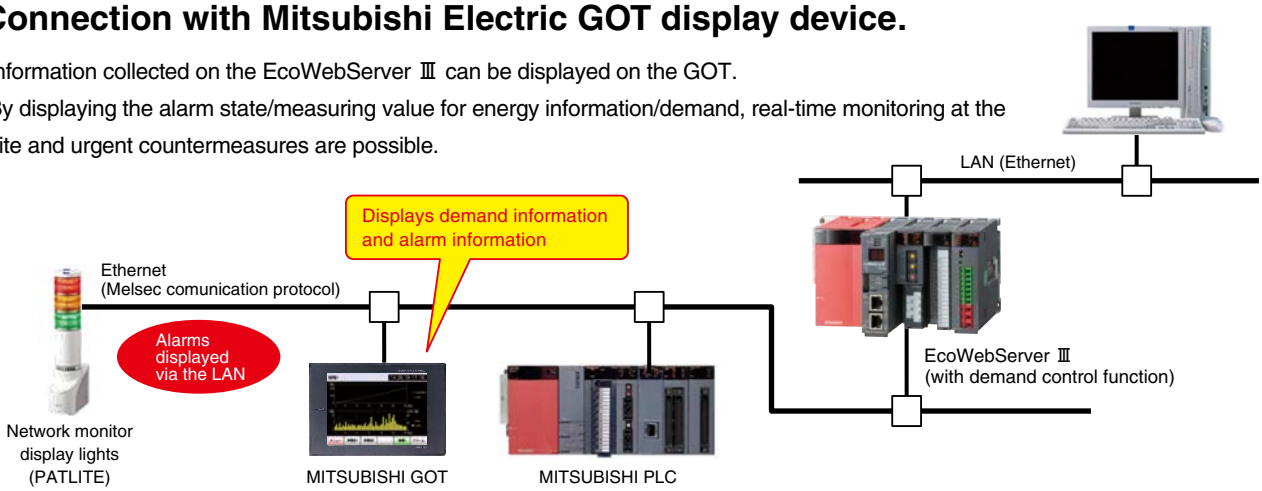
●Additionally, by comparing two specific consumption graphs at the same line, it is possible to confirm the benefits at the time the countermeasure was implemented.



Connection with Mitsubishi Electric GOT display device.

●Information collected on the EcoWebServer Ⅲ can be displayed on the GOT.

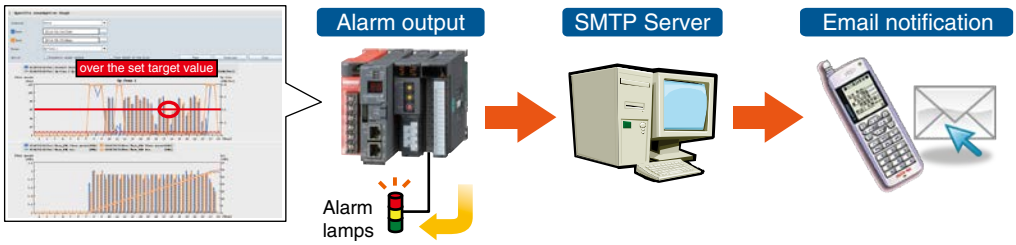
●By displaying the alarm state/measuring value for energy information/demand, real-time monitoring at the site and urgent countermeasures are possible.



Alarm output/email notification through a variety of monitoring functions.

●Objective values (upper/lower) and error information can be transmitted through email notifications/alarm output, and changes in status can be recognized immediately. The result of the careful target value management and monitoring the status monitoring ensure that problems occurring at the site are not overlooked.

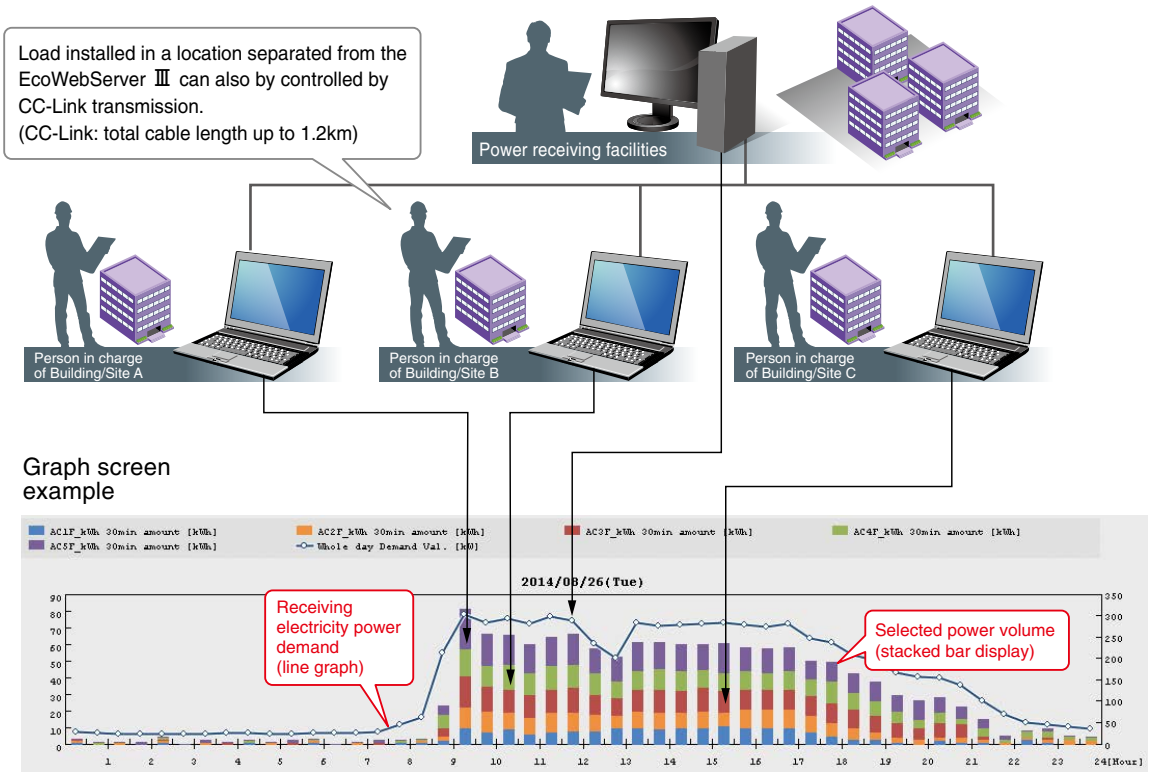
<Items monitored>
- Energy plan value
- Specific consumption objective value
- Upper/lower irregularity
- Change in operating state
- Error information
- Demand alarm



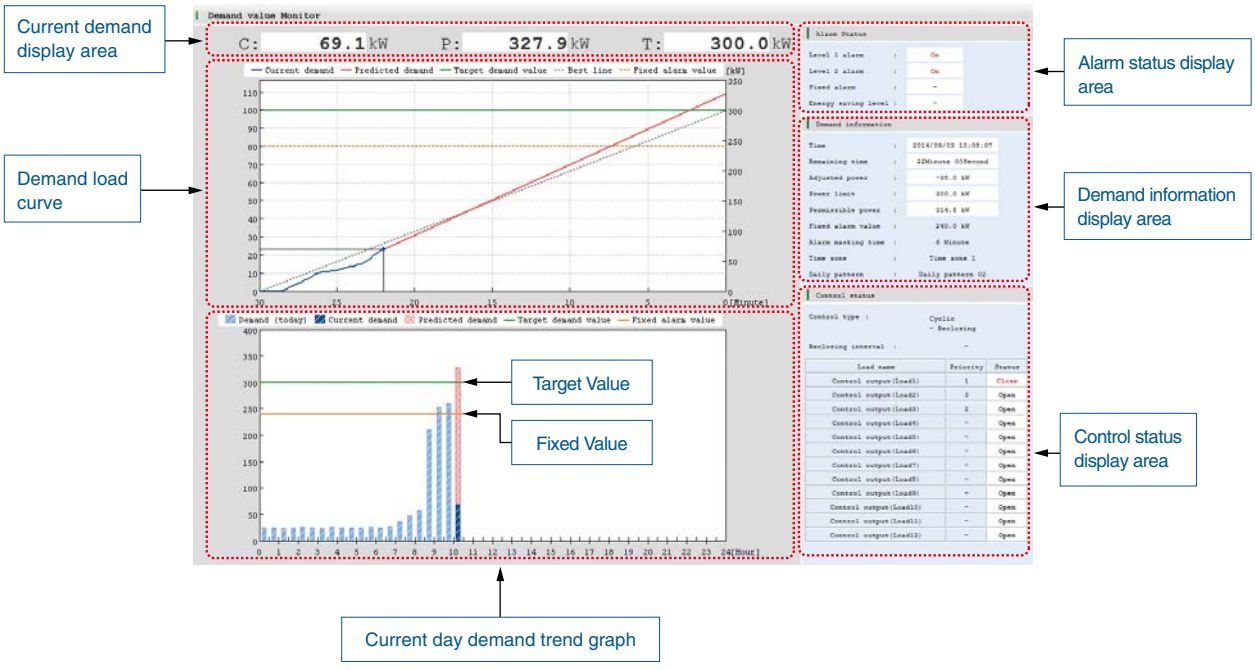
Simultaneously visualize demand trends and energy consumption per building/load

Compatible model: MES3-255C-DM-EN only

●As the breakdown of power demand (load balance) can be easily understood from the power demand trends and stacked bar graphs for each regional substation and operating equipment can be reviewed, and operations can be planned and proposed based on the analysis results, which enable peak shift/peak cut.



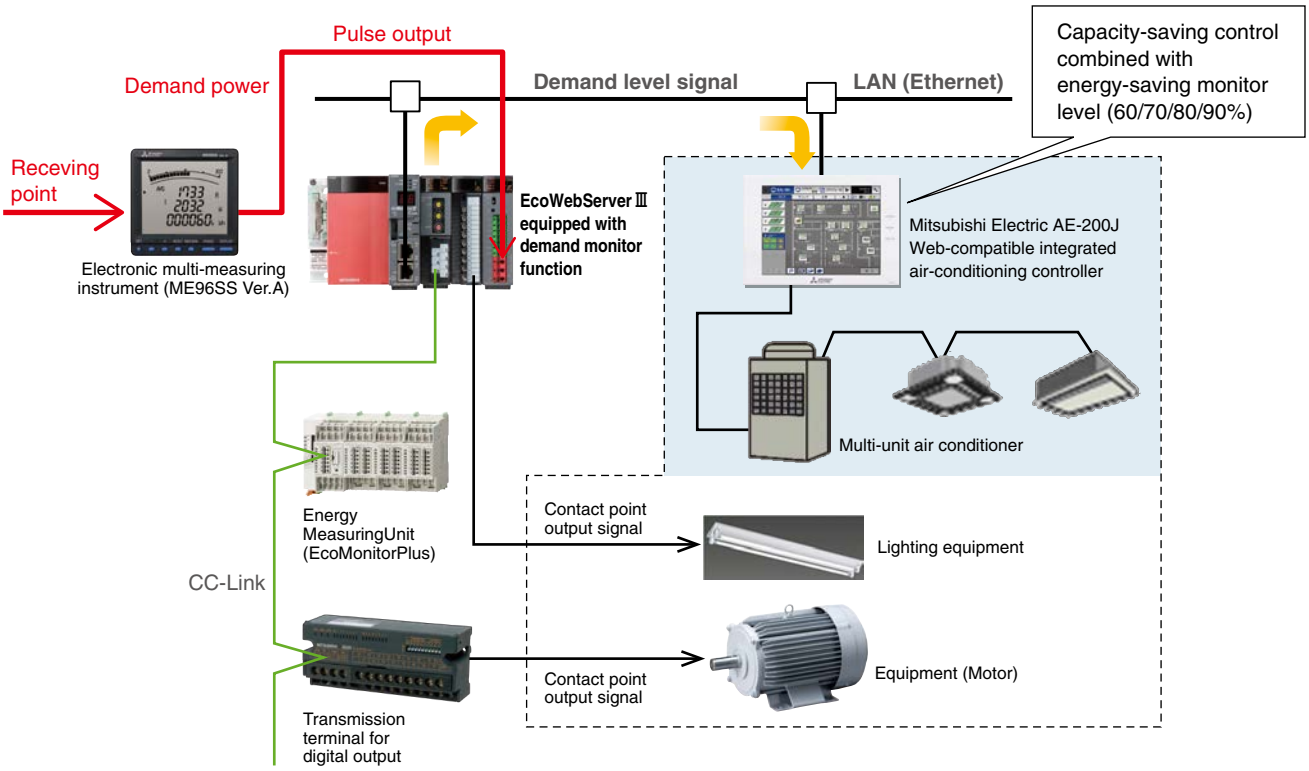
●Demand monitor screen



Energy-saving air conditioning operation realized by interconnecting with integrated air-conditioning controller.

Compatible model: MES3-255C-DM-EN only

●Demand control possible by interconnecting with Mitsubishi Electric Web-compatible integrated controller—AE-200J, G-150AD, etc.
Additionally, automatic control of load possible through contact point output via main unit of EcoWebServer Ⅲ and CC-Link.

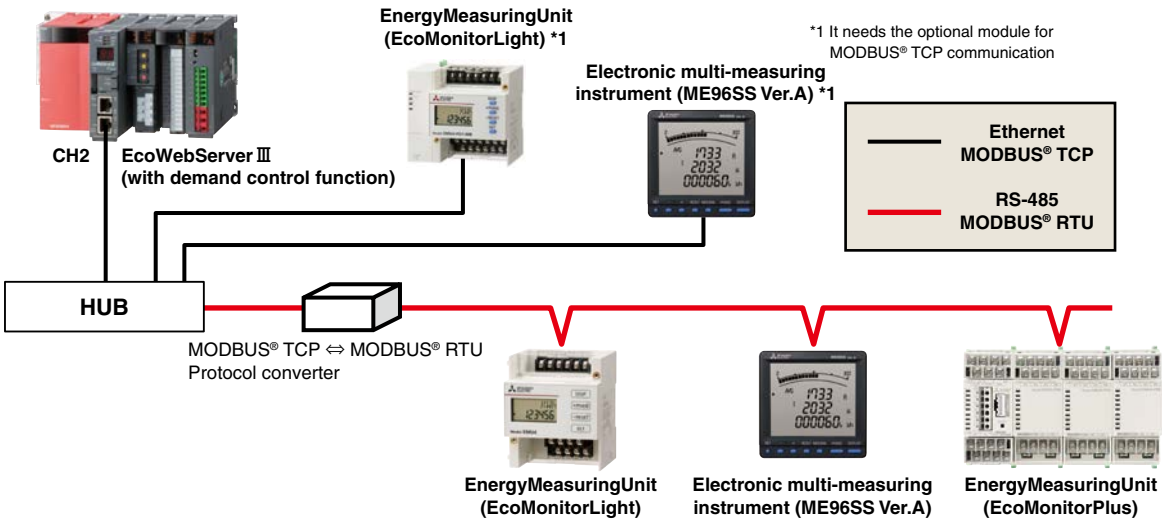


It can be connected at MODBUS® RTU/TCP communication

●Using the LAN interface (CH2) of EcoWebServer Ⅲ, **realize MODBUS® TCP communication.**
(As with the case of MC protocol communication)

●Using the LAN CH2 of EcoWebServer Ⅲ, via MODBUS® TCP ⇔ MODBUS® RTU converter,
realize **MODBUS® RTU communication.**

✻MODBUS® TCP ⇔ RTU converter is required for MODBUS® RTU communication.
MODBUS® TCP ⇔ RTU converter (SI-485 MB) is produced by LINEEYE CO.,LTD.



Main Unit Specifications

MES3-255C-EN front

7-segment LED display
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

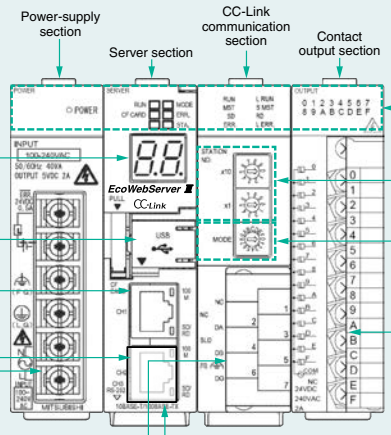
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

Power-supply terminal block
Connect power supply. (Note 1)

CC-Link terminal block
Connect CC-Link communication cable.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

LED display
Display each status.

MES3-255C-DM-EN front

7-segment LED display
Displays an error code when an error is detected. In addition, in IP address display mode, the preset IP address is displayed at start-up.

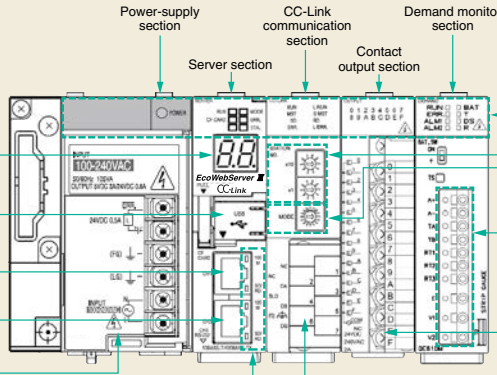
USB interface
Not used.

LAN interface CH1
Use connected to a computer network.

LAN interface CH2
Use when connected to a programmable controller network, MITSUBISHI GOT, MODBUS® communication.

Power-supply panel
When you open the panel, you will see the power-supply connection terminal. (Note 1)

LED display
Display each status.



LED display
Display each status.

CC-Link station number setting switch
Set CC-Link station number.

CC-Link transmission speed setting switch
Set CC-Link transmission speed.

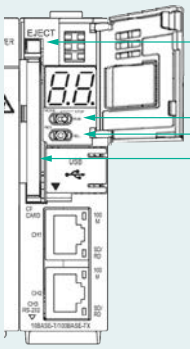
Demand monitor section connection terminal
Connect cable to pulse input, alarm output and control output for demand monitoring. (Note 2)

Contact output terminal block
Closed when conditions monitoring function conditions are met.
Connect external equipment such as buzzers and lamps.

CC-Link terminal block
Connect CC-Link communication cable.

Front surface (cover of Server section opened)/bottom surface (CC-Link transmission device)

●Front surface (cover of Server section opened)



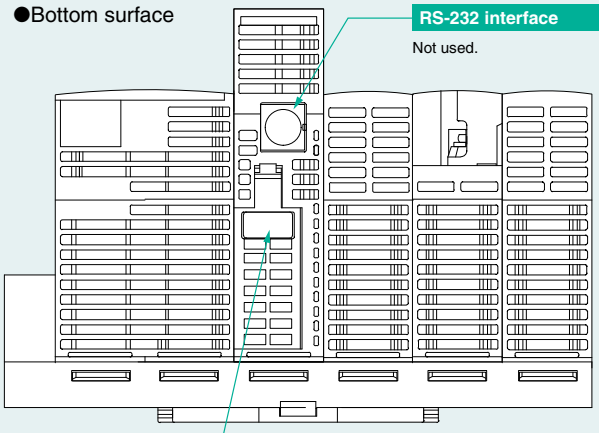
CompactFlash™ memory card EJECT button
Push the button and remove the CompactFlash™ memory card.

MODE/STOP/RUN switch
Normally, used in RUN state.

RESET/SELECT switch
Used when resetting the main unit.

CompactFlash™ memory card
Stores programs for collecting and displaying data. Data collected is also saved to it. (Note 3)

●Bottom surface



RS-232 interface
Not used.

Battery storage compartment
Store the battery.
Remove the cover and connect the connector. (Note 4)

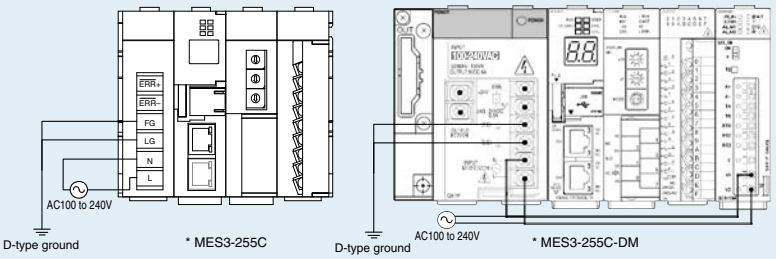
(Note 1) Connect to AC100-240V(+10%, -15%) 50/60Hz(±5%). Do not connect to a power supply other than that specified as this may cause an accident.
(Note 2) A separate power supply is required for the demand monitor section when using. When using the main device, AC100-240V(+10%, -15%) 50/60Hz power is required for the demand monitor connector terminals V1, V2. It is possible to connect power from the power-supply module.
(Note 3)
- CompactFlash™ memory cards are used in a constantly attached state. If they are removed while the power is on or the memory card is being accessed, this product will malfunction.
- When removing the card from the memory card slot, be sure to place the RESET/SELECT switch in the SELECT position and remove it only after turning off the power supply and the CF CARD LED has turned off.
- Do not use the CompactFlash™ memory card with any other product. This could corrupt the internal data.
- Do not insert a CompactFlash™ memory card other than the one included in the package in this device. If a different card is inserted, the system will not operate correctly.

(Note 4) Be sure to exchange the battery within three minutes after turning off the power. If more than three minutes passes after the battery is removed, the final one hour of data may be lost or the clock may initialize. (Data or configuration settings from more than one hour before will not be initialized). If the clock initializes, please set again after backing up the data.
Refer to the operating manual (hardware edition) for the battery replacement procedure.

Connection Diagram

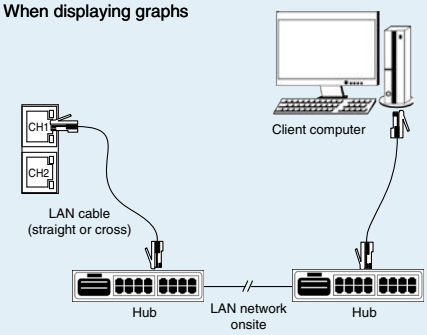
Model: MES3-255C-EN, MES3-255C-DM-EN

●Power-supply section

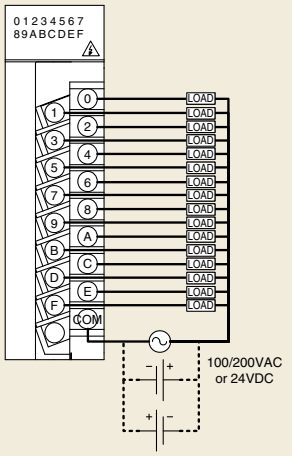


●Server communications section (LAN interface)

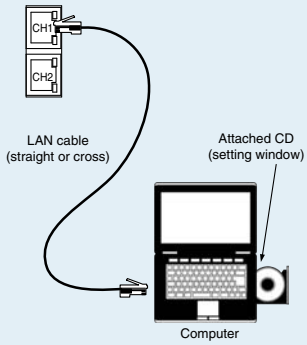
When displaying graphs



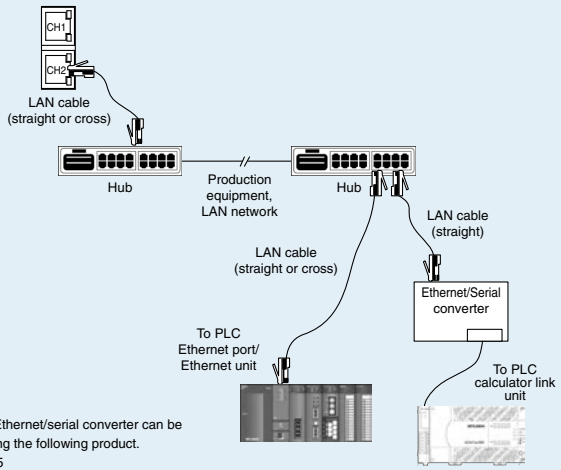
●Connecting point output section



When setting (CH1)

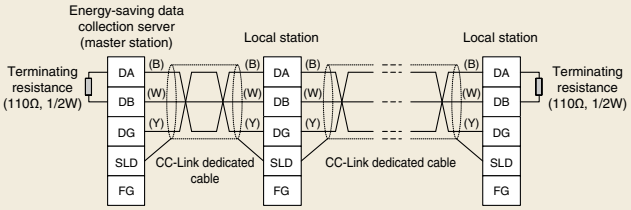


When connecting the PLC (CH2)



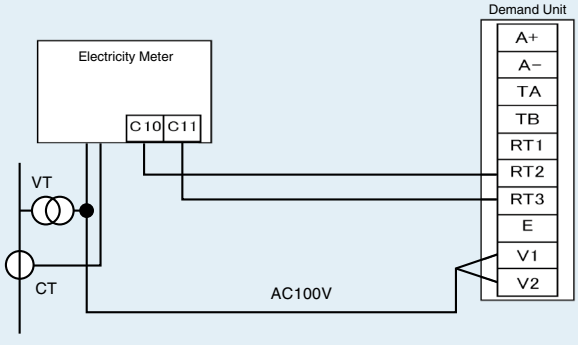
Operation of Ethernet/serial converter can be confirmed using the following product.
Line Eye SI-65

●CC-Link communication section



Demand monitor section

Where the transaction meter of the multi-measuring power demand meter is 10,000pulse/kWh

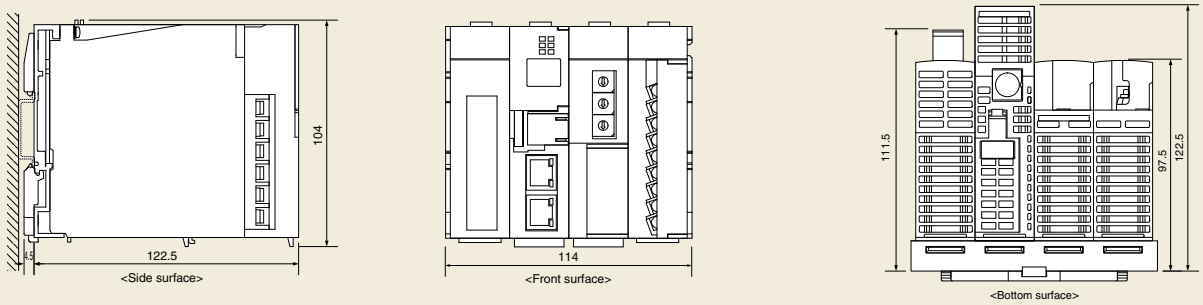


External Diagram/Bundled Products List

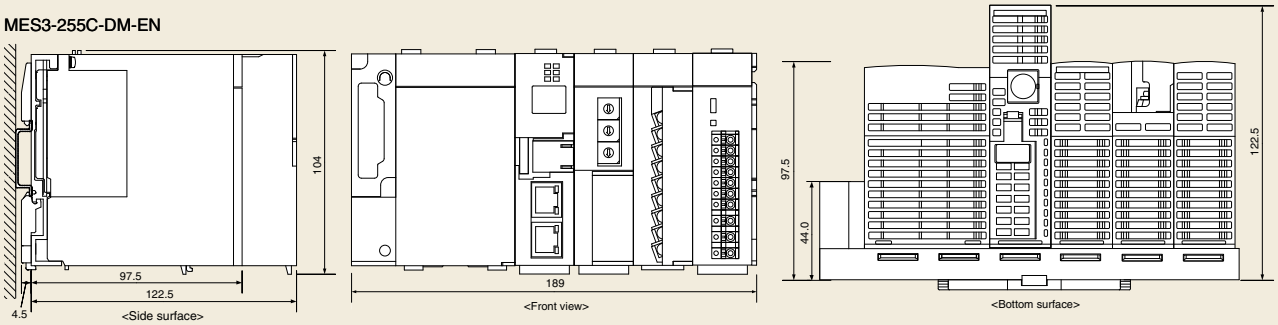
●External dimensions

Unit : mm

MES3-255C-EN



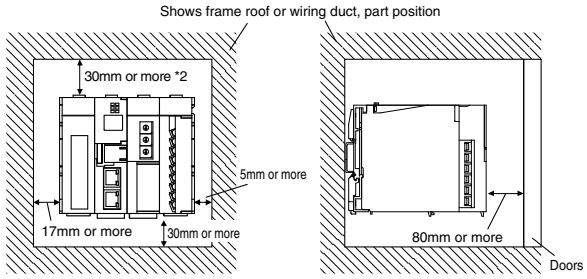
MES3-255C-DM-EN



●Peripheral installation conditions

MES3-255C-EN

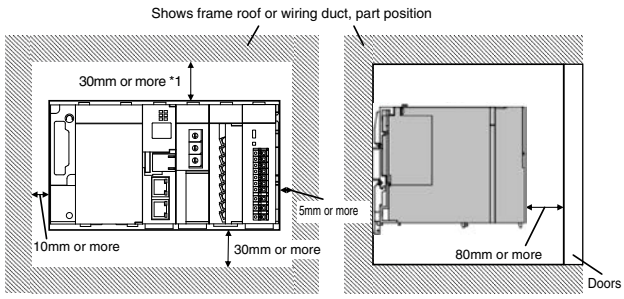
Peripheral installation conditions *1



*1 These are the conditions when considering radiation. At the same time, please secure enough space to replace the battery in the lower layer of the main unit.
*2 When height of the wiring duct is 50mm or less. Others are 40mm or more.

MES3-255C-DM-EN

Peripheral installation conditions



*1 When height of the wiring duct is 50mm or less. Others are 40mm or more.

■Bundled Products List

Product Name	CC-Link communication product	
	MES3-255C-EN	MES3-255C-DM-EN
Energy-saving Data Collection Server (main unit)	1	
CompactFlash™ memory card (software)	1	
Setup software (CD-R)/operating manual collection	1	
Battery (installed in lower surface of main unit battery section) *1	1	
Frame attachment screw	4 (M4 × 12)	4 (M4 × 14)
CC-Link terminal resistance (black: 110Ω/2W) (white: 130Ω1/2W)	Black: 2 White: 2	
IEC rail attachment adapter	Small 2 Large 2	
IEC rail attachment screw (M5 × 10)	2	
IEC rail attachment corner washer	2	
IEC rail attachment stop metal clamp	2	
Operating manual hardware edition	1	

*1 To purchase a replacement battery (model name: Q6BAT), inquire at the dealership where you purchased the main product.

Support Terminal

MES3-255C-EN, MES3-255C-DM-EN (CC-Link)

Product Name	Icon/type name		Station type	Number of occupying stations
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W)	EMU4-BD1-MB		Remote device station	1 station occupied
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1-MB		Remote device station	1 station occupied
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB		Remote device station	1 station occupied
Energy measuring standard model *1	EMU4-BM1-MB		Remote device station	1 station occupied
Energy measuring high performance model *1	EMU4-HM1-MB		Remote device station	1 station occupied
Insulation Monitoring model *1	EMU4-LG1-MB		Remote device station	1 station occupied
Energy measuring extension model for same voltage system *2	EMU4-A2		Remote device station	*3
Energy measuring extension model for different voltage system *2	EMU4-VA2		Remote device station	*3
Energy measuring extension model for analog input *2	EMU4-AX4		Remote device station	*3
Energy measuring extension model for pulse/digital input *2	EMU4-PX4		Remote device station	*3
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 3 circuits))	EMU2-RD3-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 5 circuits))	EMU2-RD5-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (standard product 7 circuits))	EMU2-RD7-C		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 2 circuits))	EMU2-RD2-C-4W		Remote device station	1 station occupied
EnergyMeasuringUnit (Power reception and distribution monitoring (3P4W 4 circuits))	EMU2-RD4-C-4W		Remote device station	1 station occupied
EnergyMeasuringUnit	EMU3-DP1-C		Remote device station	1 station occupied
MDU breaker (WS-V)	MDU(WS-V)	NF250-SEV/HEV with MDU	Remote device station	1 station occupied
MDU breaker (WS)	MDU(WS)	NF400-SEP/HEP with MDU NF600-SEP/HEP with MDU NF800-SEP/HEP with MDU	Remote device station	1 station occupied
Low-voltage air circuit breaker (AE-SW with CC-Link interface unit)	AE-SW(BIF-CC)		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSHA-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSRA-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSH-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96SSR-MB		Remote device station	1 station occupied
Electronic multi-measuring instrument	ME96NSR		Remote device station	1 station occupied
Electronic multi-measuring instrument with transmission function	ME110SSR-C(H)		Remote device station	1 station occupied
Electronic multi-measuring instrument with transmission function	ME110NSR-C		Remote device station	1 station occupied
Thermocouple temperature input unit	AJ65BT-68TD		Remote device station	4 station occupied
Platinum resistance temperature sensor Pt 100 temperature input unit	AJ65BT-64RD3		Remote device station	4 station occupied
Analog-digital conversion unit	AJ65BT-64AD		Remote device station	2 station occupied
Terminal block type 24 VDC input unit (8 points)	AJ65SBTB1-8D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (16 points)	AJ65SBTB1-16D		Remote I/O station	1 station occupied
Terminal block type 24 VDC input unit (32 points)	AJ65SBTB1-32D		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 8 points, Output 8 points)	AJ65SBTB1-16DT		Remote I/O station	1 station occupied
Terminal block type DC input transistor output combined unit (Input 16 points, Output 16 points)	AJ65SBTB1-32DT		Remote I/O station	1 station occupied
CC-Link master/local unit (Local station)	QJ61BT11N		Intelligent device station	1 station occupied
CC-Link master/local unit (Local station)	LCPU/LJ61BT11		Intelligent device station	1 station occupied

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.
*3 Conbination of main unit and extension unit occupied 1 station.

MES3-255C-EN, MES3-255C-DM-EN (MODBUS®)

Product Name	Icon/type name
Electronic multi-measuring instrument	ME96SSHA-MB
Electronic multi-measuring instrument	ME96SSRA-MB
Electronic multi-measuring instrument	ME96SSEA-MB
Electronic multi-measuring instrument	ME96SSH-MB
Electronic multi-measuring instrument	ME96SSR-MB
Electronic multi-measuring instrument	ME96SSE-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W)	EMU4-BD1-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-HD1-MB
EnergyMeasuringUnit (1P2W, 1P3W, 3P3W, 3P4W)	EMU4-FD1-MB
Energy measuring standard model *1	EMU4-BM1-MB
Energy measuring high performance model *1	EMU4-HM1-MB
Insulation Monitoring model *1	EMU4-LG1-MB
Energy measuring extension model for same voltage system *2	EMU4-A2
Energy measuring extension model for different voltage system *2	EMU4-VA2
Energy measuring extension model for analog input *2	EMU4-AX4
Energy measuring extension model for pulse/digital input *2	EMU4-PX4

*1 EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB are main units of EcoMonitorPlus.
*2 EMU4-A2, EMU4-VA2, EMU4-AX4, EMU4-PX4 are extension units of EcoMonitorPlus.

Related Products

EcoMeasureⅢ daily/monthly report specific consumption analysis software

This software supports the specific consumption analysis graph and ledger preparation of daily reports, monthly reports and annual reports from CSV files collected and output by the Mitsubishi Electric EcoWebServerⅢ Energy-saving Data Collection Server.
* The supporting product version, EcoWebServerⅢ with demand monitoring function, for EcoMeasureⅢ, will be released soon.

Features

(1) Easily create daily, monthly and annual reports.

- Ledger prepared ledger is saved as an Excel file in user-designated place.

(2) Easily perform specific consumption management as the index of energy-saving activities.

- Possible to manually input production volume and perform specific consumption management of energy information from EcoWebServerⅢ and E-Energy.
- Possible to prepare each specific consumption graph (zoom, daily, weekly and monthly).

(3) Easily collect data.

- CSV files stored in EcoWebServerⅢ and E-Energy can be downloaded with simple operations.

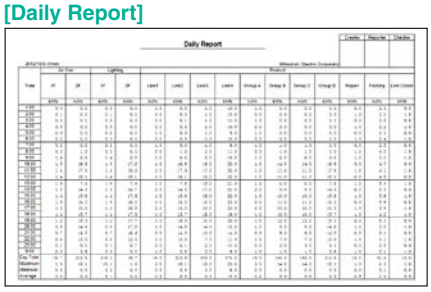
Product Appearance

Specifications

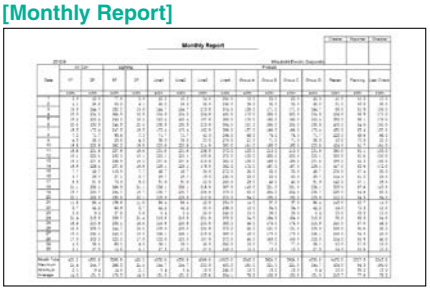
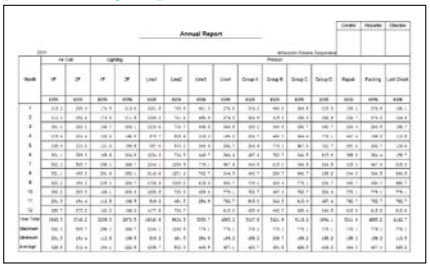
Item		Specifications	
Model name		MES3-SW1-DR-FR	
Language		English, Chinese *1	
Connection devices	Number of units	8 units maximum (combination of following target devices)	
	Target devices	EcoWebServerⅢ	
Number of virtual measurement points		Maximum 95 points (Total of 95 points including virtual measurement points for calculating measurement management points and virtual measurement points for input.) * Four arithmetic operations of up to 64 measurement management points (including constants) can be registered in the virtual measurement points for calculation.	
Number of virtual measurement point groups		Maximum five groups *Addition/Subtraction calculations for up to 32 virtual measurement points can be registered in the virtual measurement point groups.	
Ledger creation function	Ledger creation	Daily report creation, monthly report creation, annual report creation	
	Maximum number of items	The daily, monthly and annual reports can have up to 2,250 output items.	
	Calculation items	Analog (including specific consumption)	Maximum, minimum, average
		Pulse	Total, maximum, minimum, average
		Demand	Maximum
Specific consumption management function	Specific consumption display	Daily specific consumption, weekly specific consumption, monthly specific consumption and zoom specific consumption *2	
	Number of specific consumption	Maximum 100 points	
	Specific consumption target value	Can set by each specific consumption	
	Graph display	Specific consumption, target value, production volume, power used (kWh), accumulated power volume (kWh) * The specific consumption/target value/production volume units can be set freely.	
		Auto-scale function	
	List display	Daily/weekly/ monthly specific consumption	Power volume (kWh), production volume, specific consumption, accumulated power volume (kWh), accumulated production amount, specific consumption target value
		Zoom specific consumption	Power volume (kWh), production volume, specific consumption, power use/hour
	Automatic updating	Daily/weekly/ zoom specific consumption	Contents of display newly updated at designated time once per hour each hour
		Monthly specific consumption	Contents of display newly updated at designated time once per day each day
Operation environment	OS (basic software)	Microsoft Windows Vista® (32bit) (SP2) Home Basic / Home Premium / Business / Enterprise / Ultimate Microsoft Windows Server 2003(32bit) (SP2) Standard Microsoft Windows 7(32bit/64bit)(SP1) Professional Microsoft Windows 8.1 Pro（32bit/64bit） Microsoft Windows 10 Pro（32bit/64bit）	
	Required software	Microsoft Excel 2003(SP3) / 2007(SP3) / 2010(32bit/64bit)(SP1)	
	CPU	If using Windows XP : Pentium processor of 400MHz or higher or a compatible microprocessor (DOS/V- compatible) If using Windows Vista® or Windows 7 : As recommended for the operating system	
	Memory *3	As recommended for the operating system	
	Hard-disk *3	Software: Approx. 100MB or more	Data: 8GB or more *4
	CD-ROM drive	1 drive (for installing software)	
	LAN	10/100/1000BASE-T ×1	
	USB connector (Type A)	1 connector (for connecting hardware key)	
	Display resolution	800×600 pixels or more	
	Display color	256 colors or more	
Number of licenses (number of computers installed in)		• 1 license per 1 client • Hardware key attached (USB) (1 unit)	

*1 It needs to start in the Chinese version of Microsoft operating system (OS).
*2 If virtual measurement points for input or measurement points for E-Energy are included, no zoom specific consumption is displayed.
*3 Note that the required memory and available hard-disk space may vary depending on the system environment.
*4 Shows the capacity required when used with maximum eight subsystems connected.

[Daily Report]



[Monthly Report]



[Annual Report]