Energy Measuring Unit

▶ General Specifications

Item			Specifications		
Model			EMU4-BD1-MB	EMU4-HD1-MB	EMU4-FD1-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, three-phase 3-wire and three-phase 4-wire (Settings switching)	
Instrument ratings	Voltage circuit	Single-phase 2-wire 3-phase 3-wire	110V, 220V AC Common[*1]	110V, 220V, 440V AC Common[*2]	
		Single-phase 3-wire	110V AC(between wires 1 and 2, and 2 and 3), 220V AC (between wires 1 and 3)		
		3-phase 4-wire	—	Min.: 63.5V/110V AC , Max.: 277 V/480V AC[*3]	
	Current circuit		50A, 100A, 250A, 400A, 600A AC (Dedicated split current sensor is used. All values indicate primary current values of current sensor.) 5A AC (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 6,000 A.)[*4]	1A, 5A AC	
	Frequency		50 Hz to 60 Hz (Automatic frequency selection)		
Auxiliary power rating			100V—240V AC (+10%, -15%) 50Hz/60Hz		
No. of measurement circuits			1		
Consumption VA	Voltage circuit		For each phase: 0.1 VA (110V AC), 0.2 VA (220V AC), 0.4 VA (440V AC)		
	Auxiliary power circuit		110V AC : 9VA 220V AC : 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%	Current, voltage, power, reactive power, apparent power, frequency: ± 0.5% (relative to rated input) Electric energy: Class0.5S(IEC62053-22) Reactive electric energy: Class2S(IEC62053-23) Harmonic current, harmonic voltage: ± 2.5%	
Data update cycle			250 ms *Electric energy and reactive electric energy are always sampled (following short-cycle load fluctuation also).		
Demand time limit setting			0 sec, 10 sec, 20 sec, 30 sec, 40 sec, 50 sec, 1-15 min. (per 1 min.), 20 min, 25 min and 30 min.		
External input specifications	Input signal format		—	Non-voltage contact, 1 input (Select from the below functions)	
	Functions		—	Set to pulse input: Pulse count (0 to 999,999 count)	
			—	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 DC 5 V/7 mA current that flows in the contacts.	
	Input conditions	Pulse	—	Pulse-on time: 30 ms or more Pulse-off time: 30 ms or more Chattering time: 3 ms or less	
		Contacts	—	Contact on time: 30 ms or more Contact off time: 30 ms or less Chattering time: 3 ms or less	
External output specifications	Output signal type		—	Non-voltage contact, 1 output (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		—	DC35V,75mA AC24V,75mA(Power factor = 1)	
Pulse Output specifications	Output item		—	Electric energy	
	Output signal type		—	Non-voltage contact, 1 output · 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		—	DC35V,75mA AC24V,75mA (Power factor = 1)	
	Output pulse width		—	0.1~0.15s	
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		Specifications		
Model		EMU4-BD1-MB	EMU4-HD1-MB	EMU4-FD1-MB
Compatible standards		EMC:EN-61326-1:2006 U L:UL61010-1 Safety:EN-61010-1:2010		
Operating environment	Operating temperature range	-5°C~+55°C (daily average temperature of 35°C or less)		
	Operating humidity range	30%~85%(no condensation)		
	Storage temperature range	-10°C~+60°C(daily average temperature of 35°C or less)		
	Altitude	2,000 m or less		
Commercial-frequency withstand voltage		Applies to all terminals(excluding communication and frame GND terminals), between external boards: 2,000V AC for 1 min.		
		Applies to all current/voltage inputs, between auxiliary powers: 2,000V AC for 1 min.		
		Applies to all current/voltage inputs and auxiliary power terminals, between all digital/pulse input, pulse/alarm output and communication terminals: 2,000V AC for 1min.		
Insulation resistance		In the same locations described above: 10 MΩ or more(500V DC)		
Compatible wiring	Auxiliary power/Voltage input terminal	AWG24-16(Single/Stranded wire) (Single wire: φ0.52 toφ1.29 mm, Stranded wire: 0.21 to 1.30 mm²)	AWG26-14(Single/Stranded wire) (Single wire: φ0.41 toφ1.62 mm, Stranded wire: 0.13 to 2.0 mm²)	
	Current input and input/output terminal	AWG22-16(0.3~1.25mm²) (Single/Stranded wire) (Single wire:φ0.65-φ1.62mm, Stranded wire:0.3-1.3mm²)		AWG22-14(0.3~2.0mm²) (Single/Stranded wire) (Single wire:φ0.65-φ1.62mm, Stranded wire:0.33-2.0mm²)
Tightening torque	Auxiliary power/Voltage input terminal screw	0.8N·m	0.8~1.0N·m	
	Current input and input/output terminal screw	0.5~0.6N·m		
	Board installation screw	0.63N·m		
Weight		0.2kg	0.3kg	
External dimensions (units: mm)		75(W)×90(H)×75(D) (Excluding protruding parts)		

*1: 110V, 220V, 440V AC can connected to this unit directly. For the circuit over this voltage, transformer (VT) is necessary(Primary voltage of VT can be set up to 6600V, and secondary voltage of VT can be set up to220V as optional setting).Star- delta connection and delta-star connection transformer of cannot measure definitely to be out of phase. Please use a transformer of the same connection.

*2: 63.5/110V – 277/480V AC can connected to this unit directly. For the circuit over this voltage, transformer (VT) is necessary (Primary voltage of VT can be set up to 6600V, and secondary voltage of VT can be set up to220V as optional setting).Star- delta connection and delta-star connection transformer of cannot measure definitely to be out of phase. Please use a transformer of the same connection.

*3: 63.5 V / 110 V - 277 V / 480 V 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 6,600 V).

*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 6,000 A. However, the CT secondary side is fixed at 5 A.)

*5: Refer to "Specifications: Options (Split Current and 5A Current Sensors)" on P.17 for the current sensor error ratios.

*6: Do not connect together more than one EMU4-FD1-MB on the secondary side of a current transformer. Do not connect together other units and EMU4-FD1-MB on the secondary side of a current transformer.

► Specifications of MODBUS RTU Communication

Item	Specifications
Physical interface	RS-485 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: 19,200 bps)
Data bit	8
Stop bit	1,2(default: 1)
Parity bit	ODD,EVEN,NONE(default:EVEN)
Slave address	1~255(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	31 devices
Recommended cable	SPEV(SB)-MPC-0.2×1P or more (Mitsubishi cable industries)

4

Specifications