

Energy Measuring Unit Extension Model for Pulse Input Energy Measuring Unit Extension Model for Analog Input **MODEL**



User's Manual (Details)

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

Safety precautions

Thank you for purchasing the Energy Measuring Unit.

- This manual describes setup and usage for the Energy Measuring Unit. Before using the product, please read this manual carefully to ensure correct use. Especially, in the case of where this unit is to be installed, please read "1. Precautions for Use" to ensure correct use.
- · Make sure that the end users read this manual and then keep the manual in a safe place for future reference.
- · Make sure to deliver this manual to the end-user.
- If you are considering using this unit for special purpose such as nuclear power plants, aerospace, medical care or passenger vehicles please refer to our sales representative. (For details, please see at the end of this manual.)

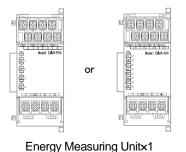
■Notations in this manual

Use the following marks in this manual.

Mark	Meaning of the icons		
<u></u> <u> </u> <u> </u> <u> </u> <u> </u> Danger	Indicates that incorrect handling may result in death or severe injury, ignoring this marking.		
	Indicates that incorrect handling may result in injury or property damage, ignoring this marking.		
✓ Supplement	Indicates that precautions to avoid a malfunction and to work the unit properly.		
6	Indicates that the pages described that related matters.		

Checking package contents

This following items for this device and included in package. Check that no items are missing.





User's Manual (Digest) x1

Related materials

Refer to the following documents as necessary. You can download them from the Mitsubishi FA Global site.

Title	Ref. No.
Energy Measuring Unit EcoMonitorLight/EcoMonitorPlus Series MODBUS I/F Specification	LSPY-9025
Energy Measuring Unit Programming Manual (CC-Link) For ver.1 remote device station	LEN160305
Energy Measuring Unit Programming Manual (CC-Link) For ver.2 remote device station	LEN160316
Energy Measuring Unit Programming Manual (CC-Link IE Field Network Basic) (SLMP)	LEN180123

Trademark

- · MODBUS is a trademark of Schneider Electric USA Inc.
- Other company and product names herein are trademarks or registered trademarks of their respective owners.
- In the text, trademark symbols such as "TM" and "®" may not be written.

Feature

- (1) Pulse Input Unit
- •This unit is the option device of Energy Measuring Unit (EcoMonitorPlus).
- •Extension this unit is capable to measure maximum of four pulse/contact input.
- •When data exceeded the established upper limit value, indication of LEDs and contact outoput are performed.

(2) Analog Input Unit

- •This unit is the option device of Energy Measuring Unit (EcoMonitorPlus).
- Extension this unit is capable to measure maximum of four analog inputs.
- •When data exceeded the set upper limit value, indication of LEDs and contact outoput are performed.

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1. Precautions for Use

1.1 Precautions for Operating Environment and Conditions

This unit is premised on being used in pollution degree 2 (Note 1) environment. When used in higher pollution degree, protect this unit from pollution on another device side to be incorporated.

This unit is used in combination energy measuring unit (EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB or EMU4-CNT-MB), energy measuring unit expansion product for electric energy monitoring (EMU4-A2 or EMU4-VA2). Over voltage category of measuring circuit in conbination unit is CAT III (Note 1).

Do not use this product in the places listed below. Failure to follow the instruction may cause malfunctions and a life decrease of product.

Places the Ambient temperature exceeds the range -5 - +55°C. Places the Relative humidity exceeds the range 30-85% or places with dewfall.

Dust, corrosive gas, saline and oil smoke exist. Places exposed to rain or water drop. Places the average daily temperature exceeds 35°C. Vibration and impact exceed the specifications.

Places exposed to direct sunlight. Places in strong electromagnetic field or places large amounts of external noise exist. Altitude exceeds 2000m.

Places metal fragments or conductive substances are flying.

Note 1: For the definition of the pollution degree and the over voltage category, refer to EN61010-1/2010.

1.2 Matters concerning the precaution before use

- Use the unit in the specified usage environment and conditions.
- To set this unit, dedicated energy measuring unit (EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB or EMU4-CNT-MB) is necessary. For the setting method, refer to User's manual (Details) of the energy measuring unit.
- To set this unit, dedicated small-size display unit (EMU4-D65) is necessary. For the setting method, refer to User's manual (Details) of the display unit.

1.3 Installation and Wiring Precautions

⚠Danger	 Shut off the external power supply for the unit in all phases before installing or wiring. Failure to do so may cause an electric shock or damage of this unit. Work under the electric outage condition when installing and wiring. Failure to do so may cause electric shock, a failure of the unit, a fire etc.
1	

▲Caution

<Precautions for Electric work>

• Any person who is involved in the installation and the wiring of this unit should be fully competent to do this work.

- Keep the space around this product (all directions except the back) is 30 mm or more (100 mm or more for UL standard compliance).
- When tapping or wiring, take care not to entering any foreign objects such as chips and wire pieces into this unit.
- · Check the connection diagram when wiring. Wrong wiring may cause failure of the unit, a fire or electric shock.
- For protection against noise, <u>transmission lines and input/output lines shall not be placed close to or bound</u> together with the power lines and high-voltage lines.
- The wires to be connected to this unit shall be placed in a duct or fixed together by cramping. If the electric wires are
 not placed in the duct or cramped together, loosen wires or their movement or careless stretch may cause a breakage
 of the unit or wire or a malfunction due to poor contact of electric wires.
- If transmission lines and input/output lines are placed close to or bound together with the power lines and high-voltage lines, keep distance as below between them. (Except for the input side of terminal block) If there is concern about the influence of noise even if the distance is as follows, we recommend using a shielded cable.

Condition	Distance	
Power line 600V or less	300mm or longer	
Other power line	600mm or longer	

<Connection of terminal block>

- Strip the wires with proper length. Overlong stripping length may cause short to next wire. Shorter stripping length may cause contact failure.
- · Take care not to short to next terminal by a filament. (Do not plate the wires with solder.)
- · Do not connect three or more wires to one terminal of a terminal block for preventing loose contact and wires dropout.
- Use appropriate size of electric wires. If inappropriate size of electric wire is used, it may cause a fire due to generated heat.
- Tighten the screw within the specified torque. Under tightening can cause drop of the screw, short circuit or malfunction. Over tightening can damage the screw and/or unit, resulting in drop, short circuit or malfunction.
- After tightening the screws, be sure to check all the screws tightened. Loose screw may cause malfunction of the unit, a fire or electric shock.
- · Be sure to attach the terminal cover to prevent electric shock.
- Use the crimp-type terminal appropriated for the size of electric wires. If inappropriate crimp-type terminal is used, a wire breakage or a contact failure may occur, which may cause a device malfunction, a failure, a burnout or a fire.
- Frame GND terminal must be grounded according to the D-type ground (ground resistance is not exceed 100Ω).
- · Do not directly touch any conductive part of the unit. Doing so can cause electric shock, failure or malfunction of the unit.
- · Do not input voltage and current at NC terminals. Doing so can cause failure or malfunction of the unit.

<Connection with the current sensor>

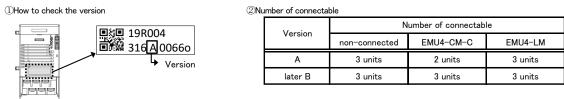
- When using this product, make sure to use it in combination with current sensor (EMU-CT**, EMU-CT**-A. EMU2-CT5 and EMU2-CT5-4W). <u>This product cannot connect with the secondary side (5A) of current transformer.</u> Please not to exceed the rating of this product for input of current sensor. For further details, please refer to current sensor manual to maintain the functionality and the accuracy of this product.
- The dedicated current sensor (EMU-CT**, EMU-CT**-A) is used only for low voltage circuit. It cannot be used for a high voltage circuit. EMU2-CT5 and CT5-4W should be used with the secondary side (5A) of transformer transfixed. If it is connected with a high-voltage circuit by mistake, it may cause a burnout of the device and a fire. It is critically dangerous. For the allowable maximum voltage of current sensor, refer to instruction manual (detail) of Energy Measuring Unit (EMU-BM1-MB, EMU4-HM1-MB)
- · The dedicated current sensor has a polarity (directionality). Be careful about it when installing the unit.
- If the wires connected to this unit are strongly pulled off, it may cause a malfunction or a breakage to the unit or the wire. <Connection of frame GND terminal>
- Do not exceed the specified voltage when doing an insulation resistance test and a commercial frequency withstand voltage test.
- · Frame FG terminal must be grounded according to the D-type ground.
- To prevent persons with little knowledge about electric equipment from electric shock, panel must be taken either following measure.

Lock the panel so that only those who get an education about electric equipment and have sufficient knowledge can unlock, or shut off power supply automatically by opening the panel.

Cover the dangerous part of this unit.

1.4 Precautions for Use

- Before operating the product, check that active bare wire and so on does not exist around the product. If any bare wire
 exists, stop the operation immediately, and take an appropriate action such as isolation protection.
- In the event of a power outage during the setting by Display unit / Communication line, the Energy Measuring unit is not set correctly. Please set again after power recovery.
- When use Energy Measuring Unit Analog Input Model (Model : EMU4-AX4)/ Energy Measuring Unit Pulse Input Model (Model : EMU4-PX4) with Option units(Model : EMU4-CM-C, EMU4-LM), number of connectable show in the tables below.



Caution On ot disassemble or modify this unit. It may cause failure, malfunction, injury or fire. Use this unit within the ratings specified in this manual. If it is used outside the ratings, it may cause not only malfunction or failure but also fire burnout. I.5 Maintenance Precautions Use a soft dry cloth to clean off dirt of the unit surface. Do not let a chemical cloth remain on the surface for an extended period of time nor wipe the surface with thinner or benzene. Check for the following items to use this unit properly for long time. (1) Daily maintenance (a) No damage on this unit (b) No abnormality with LCD indicators (c) No abnormal noise, smell or heat (2) Periodical maintenance (Once every 6 months to 1 year) - No looseness with installation and wire connection

Caution Do periodical maintenance under the electric outage condition. Failure to do so may cause electric shock failure of the unit or a fire. Tighten the terminal regularly to prevent a fire.

1.6 Storage Precautions

- To store this unit, turn off the power and remove wires, and put it in a plastic bag.
- For long-time storage, avoid the following places. Failure to follow the instruction may cause a failure and reduced life of the unit.
 - Places the Ambient temperature exceeds the range -10 +60°C.
 - Places the average daily temperature exceeds 35°C.
 - Places the Relative humidity exceeds the range 30-85% or places with dewfall.
 - Vibration and impact exceed the specifications.
 - Dust, corrosive gas, saline and oil smoke exist.
 - Places metal fragments or conductive substances are flying.
 - Places exposed to rain or water drop.

1.7 Disposal Precautions

When disposing of this unit, treat it as industrial waste.

1.8 About packaging materials and this manual

For reduction of environment load, packaging materials are produced with cardboard, and this manual is printed on recycled paper.

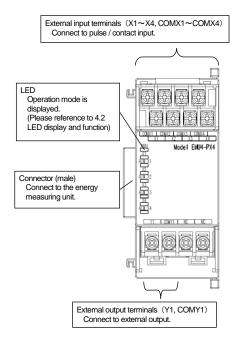
2. Disclaimer

- It is prohibited to reprint or copy all contents of this document in any form without our permission.
- The contents of this document will be updated to follow revisions to software and hardware, however under unavoidable circumstances it may not be synchronized.

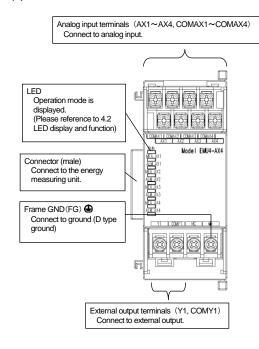
3. Name and function of each part

3.1 Name of each part

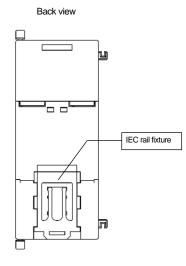
(1)EMU4-PX4

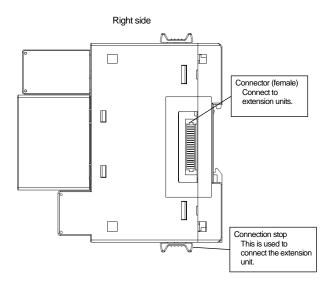


(2)EMU4-AX4



(3)Back view and side view





3.2 Indication and function of LEDs

The names and operations of LEDs are as follows. (1) EMU4-PX4

Name	Color	Function	Status
RUN LED	Red	Indicate operating status of this unit.	ON: Normal operation
			OFF: Power off or hardware failure ^{*1}
X1 LED	Red	Indicate measuring status of this circuit X1.	ON: Contact state is ON
			Blink: In the middle of measuring the
			pulse
			OFF: Other
ALM X1 LED	Red	Indicate occurance status of upper limit alert of the	ON: An error occurs ^{*1}
		circuit X1.	Blink *2: Upper limit alert is issued
			OFF: No alert
X2 LED	Red	Indicate measuring status of this circuit X2.	ON: Contact state is ON
			Blink: In the middle of measuring the
			pulse
			OFF: Other
ALM X2 LED	Red	Indicate occurance status of upper limit alert of the	ON: An error occurs ¹
		circuit X2.	Blink ^{*2} : Upper limit alert is issued
			OFF: No alert
X3 LED	Red	Indicate measuring status of this circuit X3.	ON: Contact state is ON
			Blink: In the middle of measuring the
			pulse
			OFF: Other
ALM X3 LED	Red	Indicate occurance status of upper limit alert of the	ON: An error occurs ^{*1}
		circuit X3.	Blink ^{*2} : Upper limit alert is issued
VALED			OFF: No alert
X4 LED	Red	Indicate measuring status of this circuit X4.	ON: Contact state is ON
			Blink: In the middle of measuring the
			pulse
	Ded	Ladiante environne etetue ef une en lies (t 1- at f. (t	OFF: Other ON: An error occurs ^{*1}
ALM X4 LED	Red	Indicate occurance status of upper limit alert of the	
		circuit X4.	Blink ^{*2} : Upper limit alert is issued
			OFF: No alert

(2) EMU4-AX4

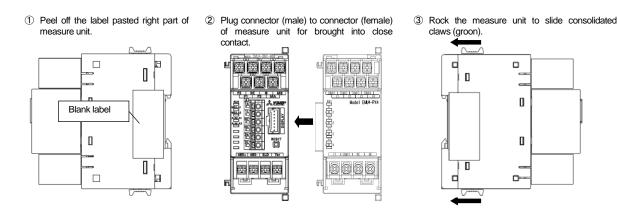
Name	Color	Function	Status	
RUN LED	Red	Indicate operating status of this unit.	ON: Normal operation OFF: Power off or hardware failure ^{*1}	
MEA. AX1 LED	Red	Indicate measuring status of this circuit AX1.	ON: In the middle of measuring OFF: Other	
ALM. AX1 LED	Red	Indicate occurance status of upper limit alert of the circuit AX1.	ON: An error occurs ^{*1} Blink ^{*2} : Upper/lower limit alert is issued OFF: No alert	
MEA. AX2 LED	Red	Indicate measuring status of this circuit AX2.	ON: In the middle of measuring OFF: Other	
ALM. AX2 LED	Red	Indicate occurance status of upper limit alert of the circuit AX2.	ON: An error occurs ^{*1} Blink ^{*2} : Upper/lower limit alert is issued OFF: No alert	
MEA. AX3 LED	Red	Indicate measuring status of this circuit AX3.	ON: In the middle of measuring OFF: Other	
ALM. AX3 LED	Red	Indicate occurance status of upper limit alert of the circuit AX3.	ON: An error occurs ^{*1} Blink ^{*2} : Upper/lower limit alert is issued OFF: No alert	
MEA. AX4 LED	Red	Indicate measuring status of this circuit AX4.	ON: In the middle of measuring OFF: Other	
ALM. AX4 LED	Red	Indicate occurance status of upper limit alert of the circuit AX4.	ON: An error occurs ¹¹ Blink ¹² : Upper/lower limit alert is issued OFF: No alert	

*1: Reference to \P [9.1 In case you think the unit is in failure].

*2: Repeat 500msec lighting and 500msec extinction.

Any person who is involved in the installation and the wiring of this unit should be fully competent to do this work.

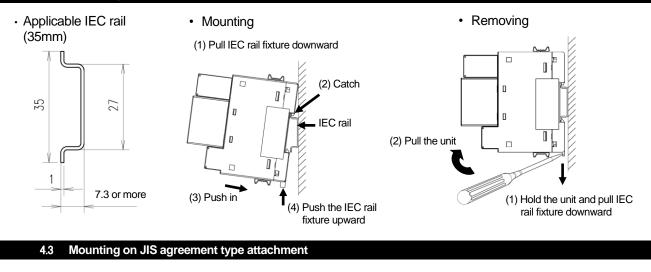
How extension to measure unit 4.1



※EMU4-BM1-MB, EMU4-HM1-MB, EMU4-LG1-MB, EMU4-CNT-MB are the connectable unit. The number of extension units that can be connected to one base unit depends on the connection the product version and the CC-Link communication unit of the base unit.(1.4 Precautions for Use)

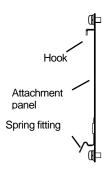
Do not disassemble or modify this unit. It may cause failure, malfunction, injury or fire.

4.2 Mounting on IEC rail



· JIS agreement type attachment

Mounting

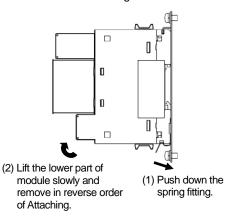


0 П (2) Hitch 3 chases at upper part of the module to the hook on the attachment plate. Π

(1) Push the stopper of the IEC rail above.

(3) Push the module down and fit in the spring fitting in chases at the lower part of the module.

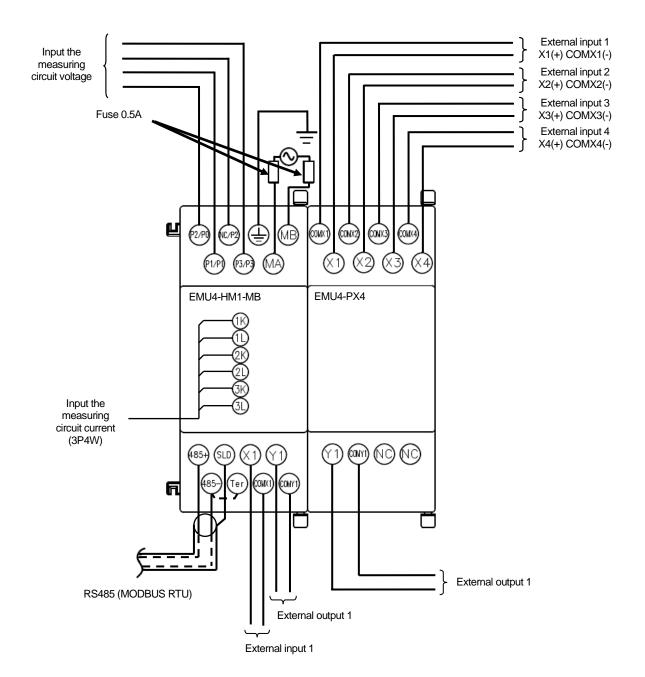
• Removing



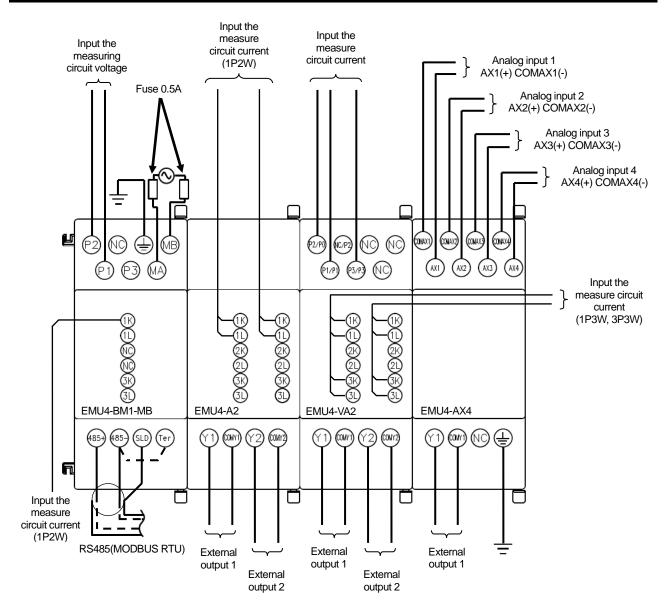
5. Procedure for wiring

Follow the wiring example for external connections of this unit.

5.1 Wiring for EMU4-PX4



Structure	Unit	Model
Measure unit	Energy Measuring High Performance Model	EMU4-HM1-MB
Extension unit 1	Extension Model for Pulse Input	EMU4-PX4
Extension unit 2	-	-
Extension unit 3	-	-



Structure	Unit	Model
Measure unit	Energy Measuring High Performance Model	EMU4-BM1-MB
Extension unit 1	Extension Model for Same Voltage System	EMU4-A2
Extension unit 2	Extension Model for Different Voltage System	EMU4-VA2
Extension unit 3	Extension Model for Analog Input	EMU4-AX4

5.3 Precautions for the connection wire

 For protection against noise, transmission lines and input/output lines shall not be placed close to or together with the power lines and high-voltage lines. Keep distance as below between them. (excep terminal block) If there is concern about the influence of noise even if the distance is as follows, we recommend using a shielded cable. 							
	Condition Distance						
∆ Cautions		High-voltage line 600V or less	300mm or more				
	Other high-voltage line 600mm or more						
	 For the actual usage, connect the FG terminal to ground. (D-type ground: Type 3) Connect it directly to the ground terminal. 						
	Do not connect to FG terminal during the insulation resistance test and pressure test. Refer to "User's manual (Details)" Chapter 11 "Specifications" for the applying place.						

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For MODBUS communication wiring, recommended to have the extra length wires about 200mm (When extended to B / NET transmission from MODBUS communication, use of MODBUS communication wiring is possible).

 External input / Analog input terminals has polarity. Please do not mistake the connection. Xn/AXn terminals is anode, and COMXn/COMAXn is cathode. (n = 1~4)

In unused channels, if the circuit between two terminals is kept open, an undefined digital value may be output.
 To prevent this phenomenon, set the AD conversion enable or disable setting ([AD CONV.]) in the unused channel to disable.
 The default of setting is enable. Refer to "User's manual (Details)" Chapter 6.1 "Setting data".

5.3.1 How to connect wire

<External input/output terminals>

- Use appropriate crimp-type terminal. Applicable crimp-type terminal is shown in the tables below.
- Use electric wires as below, and tighten the terminal screws by the torque as below.

[EMU4-PX4/EMU4-AX4]

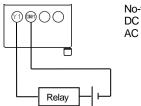
	Applicable wire	Tightening torque	Applicable crimp-type terminal
External input terminals	Stranded wire: AWG22-16	0.5 - 0.6 N·m	For M3 screw of external
	(0.3mm ² – 1.3mm ²)		diameter below 6.1mm
Analog input terminals	Single wire: AWG22-16		
	(φ0.65mm -φ1.25mm)		

	Applicable wire	Tightening torgue	Applicable crimp-type terminal
	Applicable wire	rightening torque	Applicable chimp-type terminal
Contact output terminals	Stranded wire: AWG26-18	0.5 - 0.6 N∙m	For M3 screw of external
	(0.12mm ² - 0.8mm ²)		diameter below 6.1mm
FG terminals (EMU4-AX4 only)	Single wire: AWG26-18		
	(φ0.4mm -φ1.0mm)		

5.3.2 Connection of external output

In case using external output, refer to the following.

External output: For the case of contact output



No-voltage a-contact DC 35V 75mA or, AC 24V 75mA (power factor : 1)

 Wiring length of pulse input (Reference value) The wire length for each wire diameter is below. Please refer to wiring.
 ※Polyethylene insulating vinyl sheath cable FCPEV wire.

Wire diameter [mm]	Resistivity[Ω/km]	Wiring length[m]
0.5	94	300
0.65	56.8	400
0.9	29.2	750
1.2	16.5	1000

6. Setting

6.1 Setting data

To set this unit, dedicated small-size display unit (EMU4-D65) is necessary. For the setting method, refer to User's manual (Details) of the display unit.

The data can be setup is shown below. The underline means the default of setting.

Setting item	Setting value	Details	Corresponden	
	J. J	Set the measurement type of external input.	EMU4-PX4	EMU4-AX4
Input	Non, Contact, <u>Pulse</u>	It can be set for each CH.	•	-
CONV.Rate	0.001 ~ 10000 (<u>1.000</u>)	Set the conversion rate per pulse for conversion from pulse to other units, when input setting value is Pulse. It can be set for each CH.	٠	-
Unit	<u>Non</u> , Wh, kWh, MWh, J, m ² ,m ³ , L, kL, sec, min, hour, piece, set, g, kg, t, ¥, \$	Set the unit of pulse conversion, when input setting value is Pulse. It can be set for each CH.	•	-
Input Reset Mode	Auto, Hold	Set the reset method of contact state, when input setting value is contact. It can be set for each CH. (For details, refer to 8.1.3 Contact state.)	•	-
OP.Time	<u>Off</u> , On	Set the enable or disable the measuring operation time, when input setting value is contact. It can be set for each CH.	•	-
MEA.Mode	50ms SAMP. 1ms SAMP.	Set the measuring interval.	-	•
AD CONV.	Off, <u>On</u>	Set the enable or disable the AD conversion. If AD converted is off, do not measuring AD conversion value and scaling value. It can be set for each CH.	-	•
Range	Current, Voltage	Set the analog input range to current input or voltage input, when AD CONV. setting value is on. It can be set for each CH.	-	•
Moving average	001 ~ 100(<u>1</u>)	Set the number of times to perform the moving average of AD conversion, when AD CONV. setting value is on. It can be set for each CH. (For details, refer to 8.2.3 Number of times exceeding the Limit.)	-	•
Scaling Upp.	-32767 ~ 32767 (04095)	Set the upper range of scaling value. It can be set for each CH, when AD CONV. setting value is on. Example 1: In the case of Range=Current, Analog input=20mA, Scaling Upp / Low=4095/0	-	•
Scaling Low.	-32767 ~ 32767 (0)	Scaling value=-4095 Example 2: In the case of Range=Current, Analog Input=20mA, Scaling Upp / Low=0/4095 Scaling value=0	-	•

Setting item	Setting value	Details	Corresponder	
_			EMU4-PX4	EMU4-AX4
Scaling Unit	<u>Non</u> , A, mA, kA, V, kV, W, kW, MW, Hz, N, kN, Pa, kPa, MPa, C, deg, %	Set the unit of scaling value, when AD CONV. setting value is on. It can be set for each CH.	-	•
Limit	Scaling Low. ~ Scaling Upp. (Scaling Low. *1)	Set the any value to measuring the number of times exceeding the limit. Number of times exceeding the limit is measuring the number of times scaling value exceeding the any value. (For details, refer to 8.2.3 Number of times exceeding the Limit.)	-	•
Factor	<u>x1</u> , x10, x100, x1000	Set the monitoring factor for number of times exceeding the limit. It can be set for each CH.		•
Output	Non, Alarm, Contact	To set the output type of contact output terminals. Alarm : Contact is output when an alarm occurs. Contact : It is possible to control the contact in communications.	•	•
Alarm	EMU4-PX4: <u>Off</u> , On EMU4-AX4: <u>Non</u> , Upp., Low., Upp. & Low.	Set the enable or disable the alarm. If the unit is EMU4-PX4, monitoring type is only upper limit. It can be set for each CH. (For details, refer to 7.2 Upper/lower limit monitoring function.)	•	•
Alarm target CH	<u>Non</u> , CH1, CH2, CH3, CH4	Set the CH to output the alarm state from contact output terminals.	•	•
PLS.Upp.	0.001 ~ 999999000 (<u>100000</u>)	Set the upper limit alarm value of pulse conversion. It can be set for each CH.	•	-
Scaling alarm value Upp.	Scaling Low. ~ Scaling Upp. (Scaling Upp. *²)	Set the upper limit alarm value of scaling value. It can be set for each CH. Can not set a value less than Scaling alarm value Low.	-	•
Scaling alarm value Low.	Scaling Low. ~ Scaling Upp. (<u>Scaling Low. *1</u>)	Set the lower limit alarm value of scaling value. It can be set for each CH. Can not set a value larger than Scaling alarm value Upp.	-	•
Delay	Osec, 5sec, 10sec, 20sec, 30sec, 40sec, 50sec, 1min, 2min, 4min, 5min	Set the time to detect the alarm. It can be set for each CH. (For details, refer to 7.2 Upper/lower limit monitoring function.)	-	•
Alarm Reset Mode	Auto, Hold	Set the reset method of alarm state. It can be set for each CH. (For details, refer to 7.2 Upper/lower limit monitoring function.)	-	•

*1: If you set Scaling Upp. < Scaling Low., the default is Scaling Upp..
 *2: If you set Scaling Upp. < Scaling Low., the default is Scaling Low.

6.2 Initialization of related item by changing the setup

Setup value and measured data is initialized after change the setup value according to table 6.2.1, 6.2.2, 6.2.3 and 6.2.4. Please setup again.

							/ \		ged	
	Setup items	Input	CONV.Rate	Unit -	Input Reset Mode	OP.Time	Output	Alarm	PLS.Upp	Alarm target CH
	Input									
(pe	CONV.Rate		$\overline{\ }$							
alize	Unit			$\overline{\ }$						
niti	Input Reset Mode				$\overline{\ }$					
i)ər	OP.Time					$\overline{\ }$				
valı	Output						$\overline{\ }$			
Setup value(initialized)	Alarm	0	0							
Se	PLS.Upp	0	0						\searrow	
	Alarm target CH									\sum

Table 6.2.1 List of initialization when changing setup value (setup data) (EMU4-PX4)

O... Initializes the settings of CH that have vhanged the settings.

Table 6.2.2 List of initialization when changing setup value (Measured data and operating data) (EMU4-PX4)

		001		Set	up v	alue	e to l	be c	han	ged	
		Setup items	Input	CONV.Rate	Unit	Input Reset Mode	OP.Time	Output	Alarm	PLS.Upp	Alarm target CH
/alue ed)	alue	Pulse count	0								
Measured value (initialized)	Integral value	Pulse convertion	0								
Mea: (in	Inte	Operating time									

O... Initializes the settings of CH that have vhanged the settings.

			-		<u> </u>	9			-		e to l	-								
	Setup items			Range	Moving average	Scaling Upp	Scaling Low	Scaling Unit	Output	Alarm	Scaling alarm value Upp	Scaling alarm value Low	Delay	Alarm Reset Mode	Alarm target CH	Limit A	Limit B	Limit C	Limit D	Factor
	MEA.Mode	\geq																		
	AD CONV.		\geq																	
	Range																			
	Moving average				\geq															
	Scaling Upp			0		\geq														
	Scaling Low			0			\geq													
ਿਹ	Scaling Unit			Ο				\geq												
lize	Output								$\overline{\ }$											
litia	Alarm			Ο		Ο	0			\geq										
e(ir	Scaling alarm value Upp			Ο		Ο	0				\frown									
valu	Scaling alarm value Low			0		0	0					$\overline{\ }$								
Setup value(initialized)	Delay												$\overline{\ }$							
Set	Alarm Reset Mode													Χ						
	Alarm target CH														$\overline{\ }$					
	Limit A			Ο		0	0									$\overline{\ }$				
	Limit B			0		0	0										\smallsetminus			
	Limit C			Ο		0	0											$\overline{\ }$		
	Limit D			0		0	0												$\overline{\ }$	
	Factor																			

Table 6.2.3 List of initialization when changing setup value (setup data) (EMU4-AX4)

O... Initializes the settings of CH that have vhanged the settings.

											alue										
	Se	tup items	MEA.Mode	AD CONV.	Range	Moving average	Scaling Upp	Scaling Low	Scaling Unit	Output	Alarm	Scaling alarm value Upp	Scaling alarm value Low	Delay	Alarm Reset Mode	Alarm target CH	Limit A	Limit B	Limit C	Limit D	Factor
(þe	Max	AD conversion level		0	0	0															
Measured value(initialized)	IVIAA	Scaling level		0	0	0	0	0													
initi	Min	AD conversion level		0	0	0															
lue(IVIIII	Scaling level		0	0	0	0	0													
d va	Number of	Limit A		0	0	0	0	0									0				
urea	times	Limit B		0	0	0	0	0										0			
leas	exceeding	Limit C		0	0	0	0	0											0		
Σ	the Limit	Limit D		0	0	0	0	0												0	

Table 6.2.4 List of initialization when changing setup value (Measured data and number of times exceeding the limit data) (EMU4-AX4)

O... Initializes the settings of CH that have vhanged the settings.

7. Operation

7.1 Measurement

Measurement elements are showed below table in each unit. Please setting below for measurement.

• ... Measured elements

Measuring elements	Setup items	EMU4-PX4	EMU4-AX4
Pulse count	Input	•	-
Pulse conversion	Input, CONV.Rate	•	-
Contact state	Input, Input Reset Mode	\bullet	-
Operating time	Input, OP.Time	•	-
AD conversion value *1	AD CONV., Range	-	
Scaling value	AD CONV., Range, Scaling Upp, Scaling Low	-	•
Number of times exceeding the Limit	Limit *2	-	•

*1: Can not be displayed in display unit_o can get in communication.

*2: Please set only the items necessary in LevelA~LevelD.

The measurement elements that can be monitored by the display unit, some communication and logging units are shown below.

In the case displaying in Display unit.

Displayed items	_	EMU4-PX4	EMU4-AX4
Pulse count	Present		_
Pulase converted	Present	•	_
Operating time	Present	•	_
Contact input state	Present	•	—
	Present		
AD coverted value	Max, Min	_	—
Casling value	Present		
Scaling value	Max, Min	_	•
Number of times exceeding the Limit	Present	—	•
Time	Present	● ^{**1}	● ^{**1}
Error	-	•	•

••• Measured data

— ··· Not measured data

In the case monitoring with various communications

The supported communications are as follows.

- CC-Link communication
- CC-Link IE Field Basic communication
- SLMP communication
- MODBUS communication

Monitored items		EMU4-PX4	EMU4-AX4
Pulse count	Present	•	_
Pulase converted	Present		—
Operating time	Present	•	—
Contact input state	Present	•	_
AD coverted value	Present		•
AD coverted value	Max, Min	—	0
Cooling uplus	Present		•
Scaling value	Max, Min		0
Number of times exceeding the Limit	Present	_	•
Time	Present	—	_
Error	-	•	•

lacksquare ... Monitorable data

O … Monitorable data only MODBUS

 $-\cdots$ Not monitorable data

In the case logging using EMU4-LM

Monitored items		EMU4-PX4	EMU4-AX4
Pulse count	Present	•	—
Pulase converted	Present	•	—
Operating time	Present	—	—
Contact input state	Present	•	_
	Present		•
AD coverted value	Max, Min	_	_
Casling value	Present		•
Scaling value	Max, Min		—
Number of times exceeding the Limit	Present	—	•
			1.1

• ··· Loggable data

— … Not loggable data

7.2 Upper/lower limit monitoring function

7.2.1 How to use upper/lower limit alarm function

This device can set the upper/lower limit alarm value for each measured value individually.

< Monitoring items >

	EMU4-PX4	EMU4-AX4
Upper limit item	Pulse conversion	Scaling value
Lower limit item	-	Scaling value

< Alarm setting >

EMU4-PX4 and EMU4-AX4

Upper limit value...... Set the upper limit of measured value. For setting value and setting range,
 6.1.12 Setup for upper and lower limit alarm

EMU4-AX4 only

6.1.12 Setup for upper and lower limit alarm

• Delay...... Set the value in case you want to remove the inrush current of the load, etc. from the objects of monitoring. Alarm does not occur when the measured value goes below the upper limit or goes over the lower limit within the configured time. For setting value and setting range.

6.1.12 Setup for upper and lower limit alarm

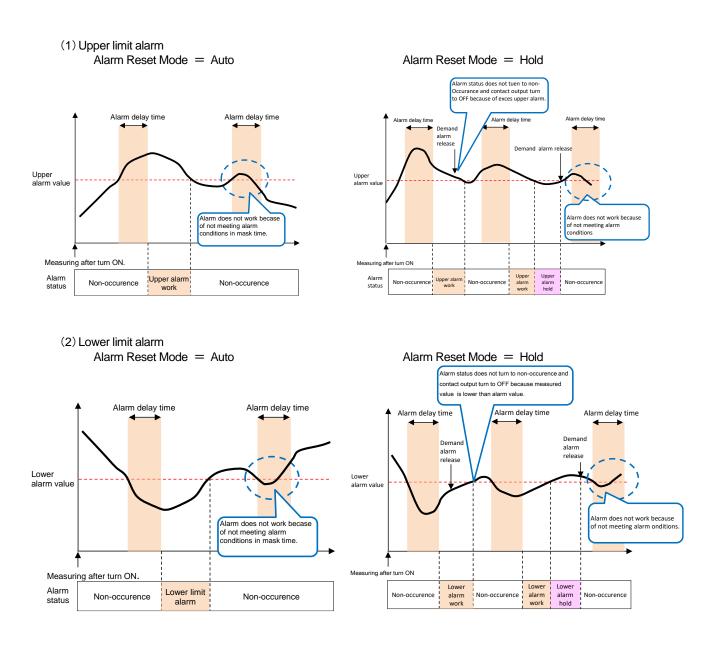
 Alarm Reset Mode Alarm recovery operation is different according to the alarm reset mode. In the case of EMU4-PX4, Alarm reset method is Auto-reset.

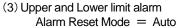
Reset Mode	Alarm recovery operation		
Auto-reset	Reset the alarm automatically if the measured value goes below the upper limit or goes over the		
(Auto)	lower limit.		
Self-retention	The alarm is held after the measured value goes below the upper limit or		
(Hold)	goes over the lower limit. Alarm is cleared by alarm reset.		
For setting	6.1.12 Setup for upper and lower limit alarm. For alarm reset operation, refer to manual (Detail) of		

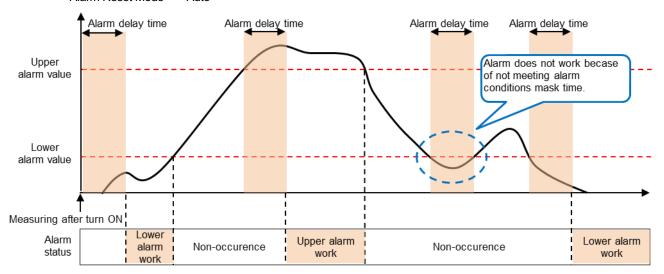
Display Unit (EMU4-D65).

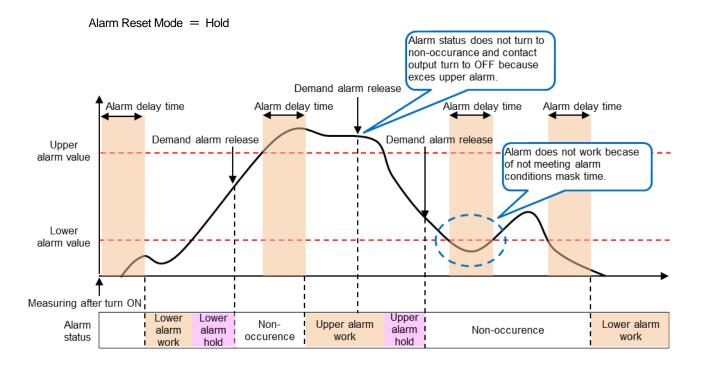
< Alarm occurrence / recovery condition >

Alarm Reset Mode	Alarm	status	Alarm occurrence / recovery condition
	Upper limit	Occurrence	Measured value > configured upper limit (Alarm delay time is available)
Auto-reset	alarm	Recovery	Measured value < configured upper limit
(Auto)	Lower limit alarm	Occurrence	Measured value < configured lower limit (Alarm delay time is available)
		Recovery	Measured value ≥ configured lower limit
	Upper limit monitoring Re Lower limit monitoring	Occurrence	Measured value > configured upper limit (Alarm delay time is available)
		Retention	Until alarm reset, after alarm occurrence
Self-retention		Recovery	Measured value < configured upper limit AND Alarm reset
(Hold)		Occurrence	Measured value < configured lower limit (Alarm delay time is available)
		Retention	Until alarm reset, after alarm occurrence
		Recovery	Measured value > configured lower limit AND Alarm reset









8.1 Pulse Input Unit(EMU4-PX4)

8.1.1 Pulse count

Measure the input pulse.

Measure the output pulse of equipment by connecting it.

Measuremet Range	Unit
0~999999	pulse

8.1.2 Pulse conversion

Measure the value computed by multiplying Pulse count by CONV.Rate.

The resolution of pulse conversion is determined as follows according to the CONV.Rate.

By connecting other measuring unit and setting the CONV.Rate, you can caputure the measuring data of other to EMU4-PX4.

Measurement Range	Setting value of CONV.Rate	Resolution	Unit
	0.001 ~less than 0.01	3 decimal places	
	0.01~less than 0.1	2 decimal places	
	0.1~less than 1	1 decimal places	Defende 0.4
0.001~999,999,000	1∼less than 10	Integer	Refer to 6.1 Setting data
	10~less than 100	×10	Oetting data
	100~less than 1000	×100	
	1000 over	×1000	

Example: In the case of Pulse count = 61, CONV.Rate = 4.0

Pulse conversion = [Pulse count] × [CONV.Rate]

 $= 61 \times 4.0 = 244$ (displayed value is 24.4 \times 10)

8.1.3 Contact state

Measuring the contact input state.

By connecting other equipment, you can capture the contact output on it such as alarm to EMU4-PX4.

Contact state operation is different according to the input reset mode.

<Input Reset Mode>

If external input is contact input, you should set the contact state operation (ON \rightarrow OFF).

Reset Mode	Contact state ON \rightarrow OFF operation	
Auto-reset	Reset the alarm automatically if the measured value goes below the upper limit or goes over the	
(Auto)	lower limit.	
Self-retention	The alarm is held after the measured value goes below the upper limit or	
(Hold)	goes over the lower limit. Alarm is cleared by contact input reset.	

For contact input reset operation, refer to manual (Detail) of Display Unit (EMU4-D65).

8.1.4 Operating time

Measuring the time duling contact input is ON.

You can measure the anothe equipment operating time by connecting it.

Measuremet Range	Unit
0~999999	Hour

8.2 Analog Input Unit(EMU4-AX4)

8.2.1 AD conversion value

Input analog value converted to digital value.

AD conversion is obtained by divided by set value of Moving average from sum of measured value.

* In the case, measured value means the AD converted value from the input analog value.

You can measure analog output of other equipment.

Measurement Range	Unit
0~4095	digit

Example: In the case of Moving average = 4

						Now
Measured value	2009	2000	2106	2122	2119	2141
AD conversion value	2001	2004	2032	2059	2087	2122

AD conversion value = (The sum of the measured values(Range of the number of moving average)) / Moving

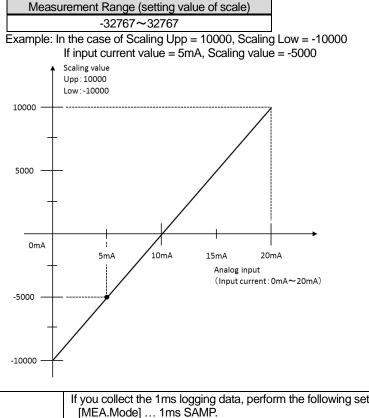
agerage = (2141 + 2119 + 2122 + 2106) / 4

- = 8488 / 4
- = 2122

8.2.2 Scaling value

AD conversion value converted to another scale value.

You can measure analog output of other equipment as any value. You can set any scale.



	If you collect the 1ms logging data, perform the following settings and collect data by MODBUS communication.
	[MEA.Mode] 1ms SAMP.
∆ Caution	[AD CONV.] CH1: On, CH2~4: Off
	(For details, refer to MITSUBISHI Energy Measuring Unit EcoMonitorLight/EcoMonitorPlus Series MODBUS
	I/F specification.)

8.2.3 Number of times exceeding the Limit

Measure the number of times that scaling value exceeds any value (limit).

For example, you can monitoring the Equipment state by connecting the thermometer.

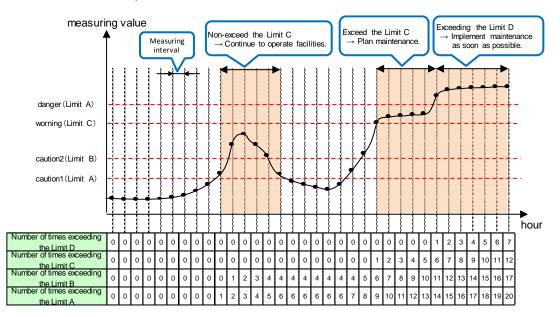
Measurement Range	Unit
	-

0~999,999,999 times

If displayed on monitoring unit, display the value included factor.

Example: In the case of Number of times exceeding the Limit A = 15 times, Factor = x10 Number of times exceeding the Limit A(on monitoring unit) = 15 x10

Please reference to example of use.



This chapter explains the ways of dealing when you think the unit is in failure, Q&A, etc.

9.1 In case you think the unit is in failure

If an abnormal sound, bad-smelling smoke, fever break out from this unit, switch it off promptly and don't use it. If you think the unit is in failure, check the following before sending for repair.

9.1.1 Pulse Input Unit (EMU4-PX4)

Extinction RUN LED

Please turn OFF/ON the measuring unit. Unit may be in failure if RUN LED extinction happens again. Contact our sales representative near you.

Not counting the input pulse

Please check the X1 LED, X2 LED, X3 LED, X4 LED are blinking. If LEDs are not blinking, the main body is not wired or is wired incorrectly. Check whether the short circuit or disconnection is present.

Lighting ALM X1, ALM X2, ALM X3, ALM X4

Error is occurred. Please check the error number in display unit.

About error, refer to User's manual (Details) of the display unit.

9.1.2 Analog Input Unit (EMU4-AX4)

Extinction RUN LED

Please turn OFF/ON the measuring unit. Unit may be in failure if RUN LED extinction happens again.

Contact our sales representative near you.

Scaling value is not change from 0.

Please check the X1 LED, X2 LED, X3 LED, X4 LED are on. If LEDs are not on, the main body is not wired or is wired incorrectly. Check whether the short circuit or disconnection is present.

Lighting ALM AX1, ALM AX2, ALM AX3, ALM AX4

Error is occurred. Please check the error number in display unit.

About error, refer to User's manual (Details) of the display unit.

9.2 After-sales service

If you have any questions or the product is broken down, contact our sales representative near you. (For details, refer to the end of this manual.)

- Gratis warranty is effective until the earlier of 1 year after the date of your purchase or 18 months after manufacturing.
- The gratis warranty shall apply if the product fails even though it is being used properly in the conditions, with the methods and under the environments in accordance with the terms and precautions described in the catalogs, the instruction manual, caution label on the product, etc.
- · Repair shall be charged for the following cases even during the gratis warranty period.
 - Failures occurring due to your improper storage or handling, carelessness or fault.
 - Failures due to faulty workmanship
 - Failures due to faults in use and undue modification
 - Failures due to accidental force such as a fire, abnormal voltage, etc. and force majeure such as an earthquake, wind, flood, etc.
 - Failures due to matters unpredictable based on the level of science technology at the time of product.
- Our company shall not be liable to compensate for any loss arising from events not attributable to our company, opportunity loss and lost earning of the customer due to failure of the product, and loss, secondary loss, accident compensation, damage to other products besides our products and other operations caused by a special reason regardless of our company's predictability

9.3 Q&A

■EMU4-PX4, EMU4-AX4

Э I	Is the setting required?
	Please set to match the circuit to be connected.
A	To set this unit, dedicated small-size display unit (EMU4-D65) is necessary.
ว	If you enter the wrong setting, does it cause a breakdown?
4	It does not cause breakdown. However, measurement values will be totally incorrect.
I-A)	X4 only
	•
U4-AX Q	X4 only To what degree is the unit durable against overvoltage and over current?
Q	•
	To what degree is the unit durable against overvoltage and over current?
Q	To what degree is the unit durable against overvoltage and over current?

Q Is error of the external input device included? A Accuracy of the external input device is not included in accuracy of unit. A maximum value of tolerance is obtained by summing tolerance of the unit and that of the external input device.

Q Is it possible to connect with sensor that analogue output is 4-20mA? It is possible to connect. Please setup upper of scaling value and lower of scaling value according to below procedure. Example. Setup measurement temperature from 0 to 100°C and current output is from 4-20mA. Please setup max value of measured value of sensor is max of scaling value. 1 In the case of example, please setup upper scaling value is 100 and scaling unit is °C. Please setup lower of scaling value when 0mA as the line connecting upper of scaling value and lower of scaling value passes 2 over the (min value of analogue output, min value of scaling value) In the case of example, please setup lower scaling value to -25 and setup scaling unit to °C. Example of upper of scaling value and lower of scaling value Scaling value ① Upper of scaling value (20mA,100°C) Α 100°C (4mA,0°C) 20mA Current input 4mA 5mA 10mA 15mA -25°C 2 Low of scaling value

10. Requirement for the compliance with EMC Directives EMC

EMC Directives prescribe both "Emission (electromagnetic interference): Do not radiate strong electromagnetic waves outside" and "Immunity (electromagnetic susceptibility): Do not be influenced by electromagnetic waves from outside". This section compiles the precautions for the compliance of the system incorporating the energy measuring unit (target model: EMU4-PX4 and EMU4-AX4) with the EMC Directives. The following description is based on the requirement of the regulations and the standards we understand, but we do not guarantee to comply with the directives above for the whole system built in

accordance with this description. The manufacturer of the system finally needs to evaluate the way of the compliance with EMC Directives and whether the system complies with them or not.

(1)Harmonized standard for EMC Directives: EN61326-1:2013

(a)Compatibility condition for harmonized standard

The energy measuring unit is the open type device (i.e. the device incorporated in other device), and needs to be installed in the conductive control panel. The unit is tested with installed in the control panel for the emission and the immunity out of the test items for the standard.

(2)Recommended condition for installation in the control panel

(a)Control panel

- Control panel needs to have conducting property.
- When bolting the top panel, bottom panel etc. of the control panel, mask the grounding part of the panel so as not to be painted.
- In inner panel, keep the conductivity in as large area as possible by masking the bolting part to the main panel to keep the electric contact to main panel.
- Ground the main panel by the thick wire so as to keep high impedance even for high-frequency wave.

(b)Installation of power line and ground line

 Set up the ground point to the control panel near the energy measuring unit, and ground the frame GND terminal of the unit to the ground terminal of the control panel (PE) by as thick and short wires as possible. (wire length is 30cm or shorter)

(3)Cable

(a)Auxiliary power, Input voltage, CC-Link cable, MODBUS cable, Small display unit cable

When it is necessary to comply with the EMC Directive (EN-61326-1), attach ferrite cores to each cable. Ferrite cores used in our testing is below.

- Auxiliary power KITAGAWA INDUSTRIES CO.,LTD., RFC-H13 KITAGAWA INDUSTRIES CO.,LTD., TRM-31-20-15E-WE
- Input voltage KITAGAWA INDUSTRIES CO., LTD., RFC-H13
- CC-Link cable, MODBUS cable KITAGAWA INDUSTRIES CO., LTD., RFC-20
 - Small display unit cable

KITAGAWA INDUSTRIES CO., LTD., RFC-H13

(b)External input signal line, External output signal line

Wiring of each connection wire should satisfy the following conditions.

- For wiring inside buildings, the wiring length should not exceed 30 m.
- Do not route wiring from the inside of the building to the outside of the building.

	ltem		Item Specifications			
-	Model		Model EMU4-PX4 EMU4-AX4			EMU4-AX4
	Number		4 inputs			
	Signaling	system	No voltage a contact, Open collector	differential input(0-+5V, 0-20mA)		
	Isolation system		Photo coupler isolation *4			
	loolation by otom			Voltage : $0+5V(input resistor 1M\Omega)$		
	Rated inpu	ıt		Current : $0-20$ mA(input resistor 250 Ω)		
	voltage/cu		6.5V DC 10mA	* Switching every input Channel		
	Voltago, ou	inon ((switching by the setting)		
	-		Pulse ON time: more than 30ms			
		e conditions	OFF time : more than 30ms			
	input puist	o on lattor io	Chattering time : less than 3ms			
External input			Pulse input : pulse conversion, pulse count			
			Contact input : operating time, contact state	AD conversion values, scaling values,		
	Measurem	nent item	*Switching every input Channel	number of times exceeding limit		
			(switching by the setting)			
	Range of r	managurad	Pulse conversion : 0~999999	AD conversion value : 0-4095		
	values	neasureu	Pulse count : 0.000~999,999,000	scaling value : -32,767-32,767		
		ant	Fuise courit . 0.000** 999,999,000			
	Measurem	ient	-	AD conversion value : $\pm 1.0\%$ of the full scale (23°C ± 10 °C)		
	accuracy					
	Data upda	te interval	100ms	1ms × number of CH^{*2}		
				50ms × number of CH ^{*2}		
	Output sig	nal	No voltage a-contact 1 output			
		Alarm		Upper and lower limit monitoring of scaling value,		
		elements	Upper limit monitoring of pulse convertion	Upper limit monitoring of scaling value,		
	Function			Lower limit monitoring of scaling value		
External output	1 directori	Alarm				
		reset	Auto-reset	Selectable from either auto-reset or self-retention		
		mode				
	Rated swit	ching	35V DC, 75mA			
	voltage an	d current	24V AC, 75mA (power factor = 1)			
	Isolation		By semiconductor relay			
	Operating	temperature	-5 - +55°C (Daily average temperature is 35°C o	r lower)		
Usage	Operating	humidity	30 - 85%RH (No condensation)			
environment	Storage temperature		-10 - +60°C			
	Operating		2000m or below			
Commercial freque	i i		B/w all terminals (current input, voltage input / au	xiliary power) in base unit or extension unit*3 and		
				e GND terminal) in anarog input unit or pulse input unit*		
			:2200V AC, 1min	· · · · · · · · · · · · · · · · · ·		
			At 110V AC : 2.0VA			
Consumption VA (standalone)		At 220V AC : 2.5VA			
Mass			0.2kg			
			37.5(W)×90(H)×92.9(D) (expect for the protrudin	a portions)		
External dimension	ns (unit: mm)		(Maximum dimension including the protruding p			
	External in	put	Stranded wire AWG22-16 (0.3mm ² – 1.25mm ²)			
	terminals		Single wire AWG22-16 (φ 0.65mm – φ 1.2mm)	-		
				Stranded wire AWG22-16 (0.3mm ² – 1.25mm ²)		
	Analog inp	out terminals	-	Single wire AWG22-16 (ϕ 0.65mm $-\phi$ 1.2mm)		
Applicable wire	Contact ou	Itout	Single wire AWG22-16 (w.comin – w1.2mm) Stranded wire AWG26-18 (0.12mm ² – 0.8mm ²)			
	terminals		Stranded wire AVVG26-18 (0.12mm ² – 0.8mm ²) Single wire AVVG22-16 (ϕ 0.4mm – ϕ 1.0mm)			
				Stranded wire AWG26-18 (0.12mm ² – 0.8mm ²)		
	FG termina	als	-	Single wire AWG22-16 (0.121111 – 0.01111) Single wire AWG22-16 (0.04mm – 0.0111)		
	External in	put	0.5. 0.01			
	terminals	,	0.5 – 0.6 N·m	-		
		out terminals	-	0.5 – 0.6 N·m		
Tightening torque	Contact ou		<u> </u>			
	terminals		0.5 – 0.6 N·m			
	FG terminals	ale	-	0.5 – 0.6 N·m		
Compensation		213	- Setting values, max value, min value	Setting values, pulse count, pulse converted		
Compensation Stored items		ns	•			
for now or failure	1		(stored in the nonvolatile memory) (stored in the nonvolatile memory)			
	1			01010.1		
Standard *1		1	CE Marking (EMC: EN-61326-1: 2013) UL:U	_61010-1		
for power failure Standard *1 The number of inse the units	ert and remo	ve between	CE Marking (EMC: EN-61326-1: 2013) UL:UI 100 times	_61010-1		

*1:When combine it with a B/NET Communication Unit (Model : EMU4-CM-B), it becomes out of a conformity standard.

*2: Data update interval is changed by setting value of AD CONV. Show in the table below.

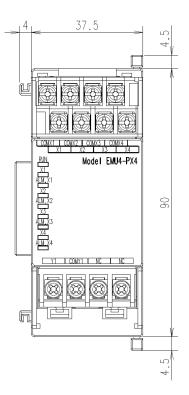
Number of AD setting value which is On		1	2	3	4
MEA.Mode	1ms	1ms	2ms	3ms	4ms
	50ms	50ms	100ms	150ms	200ms

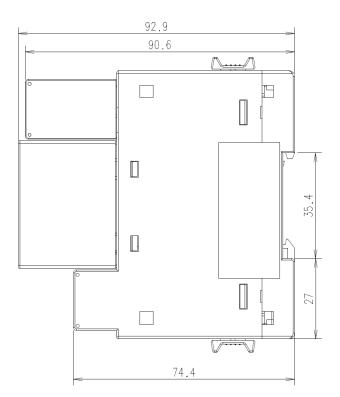
*3: When two or more extension units are connected, it means one of the units.

*4:Refer to "Commercial frequency withstand voltage" for the applying place.

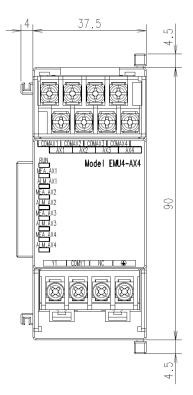
Between analog input channels for EMU4-AX4 and between external input channels for EMU4-PX4 are no isolation.

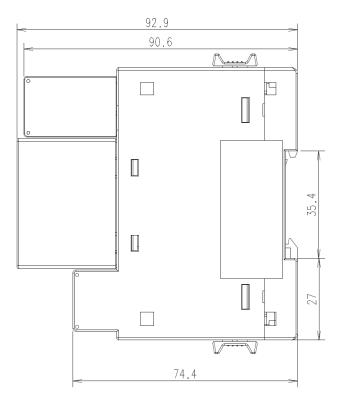
Model EMU4-PX4





Model EMU4-AX4





Unit: mm

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Energy Measuring Unit Extension Model for Pulse Input Energy Measuring Unit Extension Model for Analog Input

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AU IOMA IION (THAILAND) CO.,LTD Thailand +662-092-86 Tunisia MOTRA Electric 3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia +216-71 474	Thailand		101, True Digital Park Office, 5th Floor, Sukhumvit Road, Bangchak, Phara Khanong, Bangkok, 10260	
Tunisia MOTRA Electric 3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia +216-71 474				+662-092-8600
Tunisia MOTRA Electric 3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia +216-71 474				
	Tunisia		3, Résidence Imen, Avenue des Martyrs Mourouj III, 2074 - El Mourouj III Ben Arous, Tunisia	+216-71 474 599
	Turkey	Mitsubishi Electric Turkey A.Ş.	Şerifali Mahallesi Kale Sokak No: 41, 34775 Ümraniye, İstanbul, Turkey	+90-216-969-2666
				+44 (0)1707-276100
	oruguay	FIENU VIGNUII S.A.		+598-2-902-0808
Mitsubishi Electric Vietnam Co.,Ltd. Head Office 11th & 12th Floor, Viettel Tower B, 285 Cach Mang Thang 8 Street, Ward 12, District 10, Ho Chi Minh +84-28-3910		Mitsubishi Electric Vietnam Co. Ltd. Head Office		+84-28-3910-5945
Vietnam City, vietnam	Vietnam			2 00 10 00 00
Mitsubishi Electric Vietnam Co., Ltd. Hanoi 24th Floor, Handico Tower, Pham Hung Road, khu do thi moi Me Tri Ha, Nam Tu Liem District, Hanoi +84,24,3037				+84-24-3937-8075
Branch City, Vietnam +84-24-393/	1	Branch		+04-24-3331-0013

MITSUBISHI ELECTRIC CORPORATION HEAD OFFICE: TOKYO BUILDING, 2-7-3, MARUNOUCHI, CHIYODA-KU, TOKYO 100-8310, JAPAN