

Eco POWER METER

KW2M-A/KW2M-X

User's Manual



Cautions for Your Safety

Read the manual carefully before installing, running and maintenance for proper operation. Before using, master the knowledge of the equipment, safety information and all of other notes.

This manual uses two safety flags to indicate different levels of danger.



WARNING

A handling error could cause serious physical injury to an operator and in the worst case could even be fatal.

- Apply appropriate personal protective equipment (PPE) and follow safe electrical work practices. In the USA, see NFPA 70E.
- Always take precautions to ensure the overall safety of your system, so that the whole system remains safe in the event of failure of this product or other external factor.
- Do not use this product in areas with inflammable gas. It could lead to an explosion.
- Exposing this product to excessive heat or open flames could cause damage to the lithium battery or other electronic parts.
- Do not open the secondary side of CT during power on the primary side current. It might cause electric shock or CT breakdown.



CAUTION

A handling error could cause serious physical injury to an operator or damage to the equipment.

- To prevent abnormal exothermic heat or smoke generation, use this product at the values less than the maximum of the characteristics and performance that are assured in these specifications.
- Do not dismantle or remodel the product. It could lead to abnormal exothermic heat or smoke generation.
- Do not touch the terminal while turning on electricity. It could lead to an electric shock.
- Use the external devices to function the emergency stop and interlock circuit.
- Connect the wires or connectors securely. The loose connection might cause abnormal exothermic heat or smoke generation.
- Do not allow foreign matters such as liquid, flammable materials, metals to go into the inside of the product. It might cause exothermic heat or smoke generation.
- Do not undertake construction (such as connection and disconnection) while the power supply is on.
- Never remove the terminal block under applying current to load. It might cause electric shock or CT breakdown.
- Do not use at secondary side circuit of inverter. It might cause exothermic heat or damage.

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Introduction

Thank you very much indeed for purchasing the KW2M-A
Eco-POWER METER.

In this manual, we explain the usage of KW2M-A
Eco-POWER METER in detail.

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Chapter 1 Cautions before using

■ About this product

Eco-POWER METER is designed chiefly to manage saving energy.
It cannot be legally used for billing.

■ Installation environment

◇Do not use the unit in the following environments.

- Where the unit will be exposed to direct sunlight and where the ambient temperature is outside the range of -10 to 50°C.
- Where the ambient humidity is outside the range of 30 to 85% RH (at 20°C), non-condensing and where condensation might occur by sudden temperature changes
- Where inflammable or corrosive gas might be produced
- Where the unit will be exposed to excessive airborne dust or metal particles
- Where the unit will be exposed to water, oil or chemicals
- Where organic solvents such as benzene, paint thinner, alcohol, or strong alkaline solutions such as ammonia or caustic soda might adhere to the product
- Where direct vibration or shock might be transmitted to the product, and where water might wet the product
- Where the place near high-voltage cable, high-voltage device, power line, power device.
- Where the place near a machinery with transmission function such as amateur radio.
- Where the place near a machinery which occurs the big switching surge

◇Please use the Unit according to the specifications described in this manual. Otherwise, it may malfunction or cause fire and an electric shock.

- Connect to the power supply in compliance with the rating.
- Refer to the wiring diagram to ensure proper wiring for the power supply, input and output.
- Use the wire that conforms to the rated current.
- Do not perform wiring or installation with a live line. It may also lead to circuit burnout or fire by way of the secondary CT side opening.

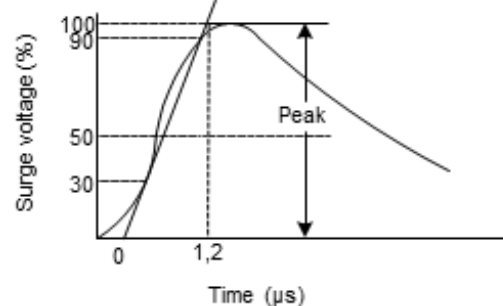
■ Installation

- Eco-POWER METER is designed to be used in a control panel.
- If the additional noise effects the power supply line, incorrect measurements may result.
- Installation and wiring must be performed by expert personnel for electrical work or electric piping.
- Do not add an excess power to the display. It might break the inner liquid crystal.
- Although the case is made from fireproof resin, do not mount it next to flammable materials. Also, avoid placing it directly on top of materials that catch fire easily.
- If the operating power supply surge exceeds the following value, the internal circuit could be destroyed, so be sure to use a surge absorption element.

Surge voltage	6,000V
---------------	--------

Standard surge waveform
The above value is the surge-voltage resistance at $\pm (1.2/50)\mu\text{s}$ of single-polarity full-wave voltage.

Surge wave form
 $[\pm (1.2/50) \mu\text{s}$ single-polarity full-wave voltage]



- External noise up to the level shown below is treated as noise voltage, but levels higher than this could lead to malfunctioning or damage to the internal circuit. Although the case is made from fireproof resin, do not mount it next to flammable materials.

	Between operating power supply terminals
Noise voltage	1,500V

Noise wave form (noise simulator)

Rise time: Pulse width: 1μs, 50ns

Polarity: Cycle: 10ms

Note) Accurate measurement may not be possible if excessive noise gets added to the input line.

- This product is designed to be used only with our options.
Options from other companies are not compatible.

■ Measurement accuracy

- If there is some distortion by harmonic or waveform, it may not measure correctly.
Please check with the actual system before adopts it.
- It might not measure an instantaneous current such as an inrush current or an welding machine.
- When measuring the below loads, it might not satisfy with the accuracy guarantee: Out of rating current, load with low power factor, load with winding current, load with ferromagnetic field
- Power factor operation is a method assuming balanced load. The error might be big when it measures unbalanced load.
- If the voltage to be measured is not the rated frequency (commercial frequency), it may take time to stabilize THD (total harmonic distortion).

■ Static electricity

- Discharge static electricity touching the grounded metal etc. when you touch the unit.
- Excessive static electricity might be generated especially in a dry place.

■ Cleaning

- Wipe dirt of the main unit with soft cloth etc. When thinner is used, the unit might deform or be discolored.

■ Power supply

- Connect a breaker to the voltage input part for safety reasons and to protect the device.
The breaker that connects to the voltage input part must arrange at the position easily reached, and display shows it is the breaker of the equipment.
- Do not turn on the power supply or input until all wiring is completed.

■ Before power on

Please note the following points when turning on power at the first time.

- Confirm there are neither wiring rubbish nor especially an electrical conduction when installed.
- Confirm neither the power supply wiring, the I/O wiring nor the power-supply voltage are wrong.
- Tighten the installation screw and the terminal screw surely.
- Use an electric wire applicable to the rated current.

■ Before change the setup

Set the password carefully.

In order to avoid unexpected change the settings, it can set password. However, if you forget the password you can't change the settings.

We recommend you to note the password when you set and change the password.

■ Precautions on using networks

This product supports various network connections therefore it is likely to be subject to the following security risks.

1. Leakage and outflow of information via this product
2. Illegal operation by third party with malicious acts
3. Interference and shut down by third party with malicious acts

It is recommended to take network security measures such as below for protecting against these risks under your responsibility.

- Use this product on the network that has been ensuring safety by using firewall
- Check and extermination against the infection of computer viruses and unauthorized program are you make sure that you have performed regularly
- To protect against unauthorized attacks, set the user name and password, and to limit the users who can log in.
- Restrict access by user authentication so that authentication information (user name, password) and network configuration information and equipment inside information is not leak on the network.
- Before you access this product via browser, close other windows.
- After you access this product via browser, close all browsers.
- Change password regularly.
- Do not install the place where it can be disassembled or remodeled easily.

We do not accept liability for the following cases.

- 1) Guarantee for any kind of damages to the things/products, caused by physical defects of the product.
- 2) When the other conditions than the ones specified in these specifications exist for handling, storage and transportation of the product after the delivery.
- 3) When damage is caused by the unpredictable phenomena with the technique that was practiced before the product delivery.
- 4) When damage is caused by natural disasters such as an earthquake, flood, fire, war and artificial disasters.
- 5) When necessary countermeasures are not taken to establish a system despite the precautions described in this specifications.

Chapter 2 Introduction

With the KW2M-A Eco-POWER METER, electrical power (voltage, current, etc.), power factor, frequency, etc. are measured using AC voltage and AC current input via one of the following systems: single-phase two-wire system, single-phase three-wire system, three-phase three-wire system or three-phase four-wire system.

In addition, the KW2M-A measures harmonics and THD for power quality measurement.

By connecting the expansion unit to the main unit you can measure up to 8 circuits (up to 24 circuits of single-phase 2-wire system). One unit can measure 2-circuits.

■ Eco-POWER METER is designed chiefly to manage and help save energy. It is neither intended nor can it be legally used for billing.

2.1 Model number

Model name	Model number
KW2M-A Eco-POWER METER main unit	AKW263100A
KW2M-A Eco-POWER METER expansion unit (power measurement)	AKW272100A

* It is not possible to take measurement with only the expansion unit. Every expansion unit must be connected to a main unit.

2.2 Measurement specifications

Phase/Wire system	Single-phase two-wire (1P2W) Single-phase three-wire (1P3W) Three-phase three wire (3P3W) Three-phase four-wire (3P4W) (common)	
Applicable power system	100V system, 200V system, 400V system	
Measurement circuit	Main unit	1-system 2-circuit (when measuring 1P2W: 1-system 6-circuit)
	Expansion unit	1-system 2-circuit (when measuring 1P2W: 1-system 6-circuit)
Input measurement voltage	0 to 690V AC *0 to 300V for UL61010-1	
Input measurement current	1 to 65,535A	
Applicable current sensor	Secondary side output: 1A or 5A	

2.3 Measurement values

Item		Unit	Display data range (see note)	
Instantaneous power	Active	W	-999.99G to 999.99G	Present value Max. value Min. value
	Reactive	var		
	Apparent	VA		
Total integral power (import)	Active	Wh	0.000k to 9999.9P	Present value
	Reactive	varh		
	Apparent	VAh		
Total integral power (export)	Active	Wh	0.000k to 9999.9P	Present value
	Reactive	varh		
Current		A	0.000 to 99.999k	Present value Max. value Min. value
Voltage		V	0.00 to 999.99k	
Power factor			-1.000 to 0.000 to 1.000	
Frequency		Hz	0.00 to 99.99	
Pulse count value			0.000 to 999999999	Present value
Power conversion value			0.000 to 999999999	Present value

Note: The heading "Display data range" refers to the range than can be shown on the main unit display. It does not refer to the range of values that can be measured.

•Power Quality

Item		Display data range	
Unbalanced current	Each phase	0.00 to 300.00%	Present value Max. value Min. value
Unbalanced voltage	Each phase		
Current THD (total harmonic distortion)	Each phase	0.00 to 400.00%	Present value
Voltage THD (total harmonic distortion)	Each phase		
Current harmonics (2 nd to 31 st)	Each phase		
Voltage harmonics (2 nd to 31 st)	Phase		
	Line		
Hour meter	ON-time	0.0 to 99999.9 h	
	OFF-time		
	Stand-by time		
	Maintenance time		

Note: If the voltage to be measured is not the rated frequency (commercial frequency), it may take time to stabilize the THD (total harmonic distortion).

•Demand

Item		Unit	Display data range	
Present demand *1	Active	W	0.000k to 999.9M	Present value Max. demand
	Reactive	var		
	Apparent	VA		
	Active (export)	W		
	Reactive (export)	var		
	Current	A		

Note: Please use this demand function as your standard. The demand value calculated with this function is not guaranteed.

<Glossary>

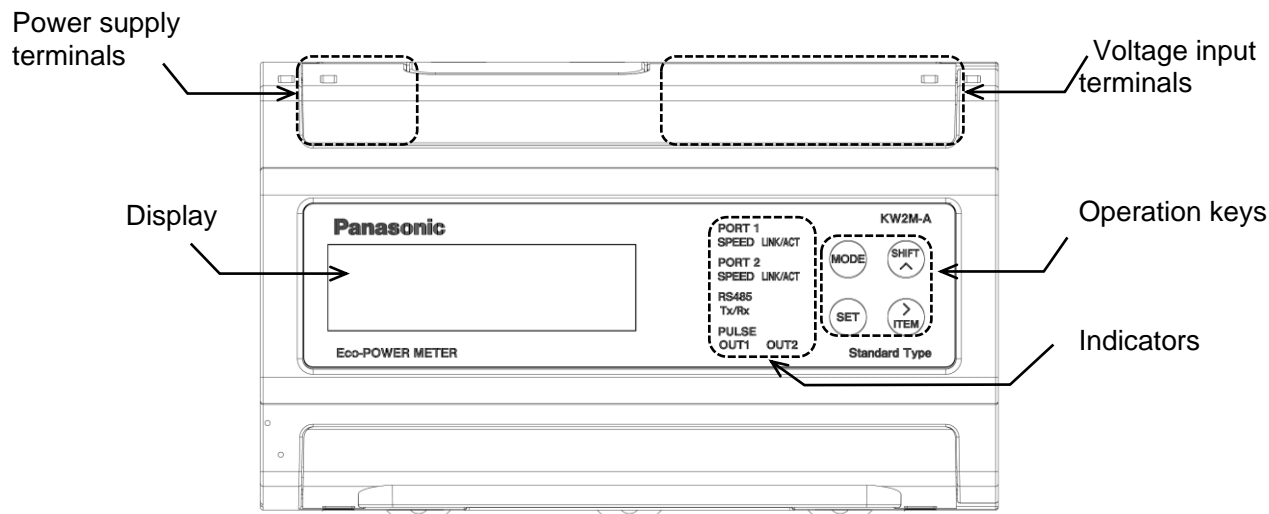
The following term definitions apply:

THD (total harmonic distortion)	Ratio of harmonic distortion (voltage or current) to the fundamental frequency. The lower the value, the less distortion.
Harmonics	Sinusoidal wave other than the fundamental frequency. Its frequency is a whole-number multiple of the fundamental frequency. The frequency that has 2 times frequency (half wavelength) is called 2 nd -order harmonics.
Voltage unbalancing	The difference between all phases minus voltage due to the load unbalancing. It is calculated as shown below. $\frac{ \text{Max. (Min.) voltage of all phases} - \text{average voltage} }{\text{Average voltage}} \times 100 (\%)$
Current unbalancing	The difference between all phases minus current due to the load unbalancing. It is calculated as shown below. $\frac{ \text{Max. (Min.) current of all phase} - \text{average current} }{\text{Average current}} \times 100 (\%)$
Power interruption	Voltage under 5% of rating is kept for min. 5ms.
Under voltage	Set the ratio for the rated voltage and it is used for threshold. Voltage under the set ratio is kept for min. 5ms and will be judged as under voltage.
Under current	Set the ratio for the rated current and it is used for threshold. Current under the set ratio is kept for min. 5ms and will be judged as under current.
Over current	Set the ratio for the rated current and it is used for threshold. Current over the set ratio is kept for min. 5ms and will be judged over current.
Demand by IEC61557-12	Based on IEC61557-12 Performance measuring and monitoring devices (PMD)
Sliding block interval demand	The device calculates by measured power via CT for the interval you have set. The interval can be set from 1 to 60 (min.) in 1-minute increments (the increment is defined in "power demand interval 2"). The device calculates the demand during the latest finished interval and displays the value.
Fixed block interval demand	The device calculates by measured power via CT for the interval you have set. The interval can be set from 1 to 60 (min.) The device calculates the demand during the latest finished interval and displays the value. After one interval finishes, the next interval starts.
Current demand	The device calculates the current demand based on a thermal demand meter. It measures an average current (current demand) within the setting interval and the max. value is considered as the max. current demand.

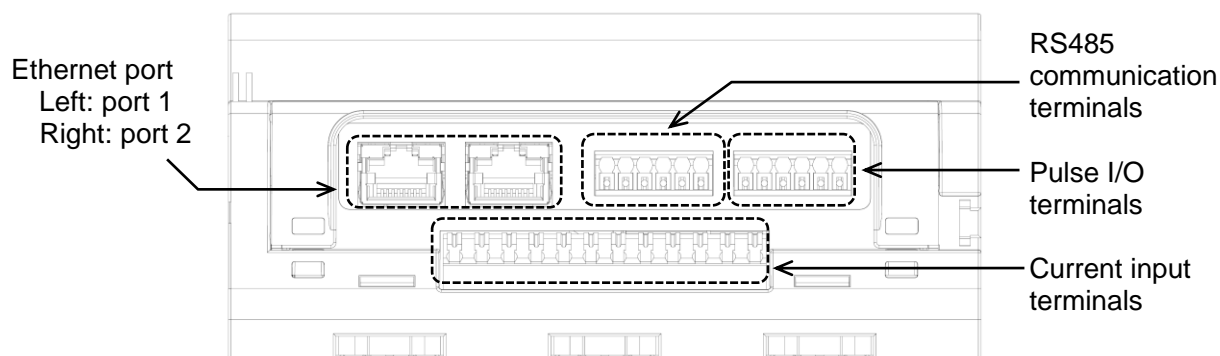
Chapter 3 Part description

3.1 Parts Names

<Front>



<Bottom view>



3.2 Key functions

Key	Functions	
<MODE>	Measuring mode	Switches the device to setting mode
	Setting mode	Switches the device to setting confirmation mode and measuring mode
<SET>	Setting mode	Saves setting items and setting values
<SET> (press and hold for 3seconds)	Measuring mode	Activates lock mode
	Demand mode	
<SHIFT/Λ> <ITEM/>>	Measuring mode	Selects a measuring item to display
	Setting mode	Select a setting value
	Demand mode	Selects a demand item to display
<MODE>+<SET>	Measuring mode	Selects unit to display
	Demand mode	
<MODE>+<SHIFT/Λ>	Measuring mode	Switches to demand mode
	Demand mode	Switches to measuring mode

● Lock mode

In this mode, all keys are locked. No input can be made. When you press <SET> continuously for about 3 seconds, lock mode is activated and the lock mark is displayed. Press <SET> continuously for about 3 seconds again to deactivate lock mode.

Chapter 4 Wiring

Make sure to wire the device correctly according to the terminal arrangement and the wiring diagrams. Please connect a fuse or a breaker to the power supply for safety reasons and to protect the device. The device has no built-in power switch, circuit breaker or fuse for measured voltage input parts. Therefore, it is necessary to install them in the circuit near this unit. Do not turn on the power supply or input until all wiring is completed.

4.1 Main unit terminal arrangement

Power supply terminals

Terminal number	1	2
Functions	L +	N -
	Power supply	

Voltage input terminals

Terminal number	1	2	3	4	5	6	7
Functions	V1	NC	V2	NC	V3	NC	Vn
	Measured voltage	V ACant	Measured voltage	V ACant	Measured voltage	V ACant	Measured voltage

*Do not use NC (V ACant) terminals.

Current input terminals

Terminal number	1	2	3	4	5	6	7	8	9	10	11	12
Functions	K	L	K	L	K	L	K	L	K	L	K	L
	CH1(CT1)		CH1(CT2)		CH1(CT3)		CH2(CT1)		CH2(CT2)		CH2(CT3)	
	Measured current (CH1)						Measured current (CH2)					

RS485 communication terminals

Terminal number	1	2	3	4	5	6
Functions	+	+	-	-	END	END

*Each terminal is connected internally.

Pulse I/O terminals

Terminal number	1	2	3	4	5	6
Functions	+	-	+	-	+	-
	Pulse input		Pulse output (CH1)		Pulse output (CH2)	

* OUT1 and OUT2 are insulated.

 **The input voltage to each terminal is as follows.**

Terminal	Phase and wire system	Terminal No.	Input voltage
Power supply	Single-phase two-wire	1 - 2 (L+ - N-)	100-240V AC
Voltage input terminals			
Measured voltage input	Single-phase two-wire	1 - 7 (V1-Vn)	0-690V AC (L-L)
	Single-phase three-wire	1 - 5 - 7 (V1-V3-Vn)	0-690V AC (L-L) 0-345V AC (L-N)
	Three-phase three-wire	1 - 5 - 7 (V1-V3-Vn)	0-690V AC (L-L)
	Three-phase four-wire	1 - 3 - 5 - 7 (V1-V2-V3-Vn)	0-690V AC (L-L) 0-398V AC (L-N)

◆Applicable wire (a crimp-type terminal is recommended.)

•Stripping length: 7 to 8mm

•Power supply/Measured voltage

Screw type: M3

Tightening torque: 0.5 to 0.6N·m

Sectional area: single /stranded wire 0.13 to 6mm² (AWG26 to12)

•for 2pcs.

single/stranded wire 2pcs. × 0.5 to 2.5mm² (AWG20 to 12)

•Measured current (CT input)

Screw size: Push-in type

Sectional area: single /stranded wire 0.13 to 1.5mm² (AWG24 to16)

*Use a wire suitable for the current to be measured.

•RS485 communication

Screw size: Push-in type

Sectional area: single /stranded wire 0.13 to 1.5mm² (AWG24 to16)

*Use a shielded wire for RS485 communication.

•Output/Input

Screw size: Push-in type

Sectional area: single /stranded wire 0.13 to 1.5mm² (AWG24 to16)

4.2 Measured circuit

•It is possible to use two different measurement voltages (2 circuits of same system with 1 unit).

•Each unit (main unit, expansion unit (power measurement, power measurement + pulse output)) can measure 2 circuits of a single-phase two-wire system, and 1 circuit of a single-phase three-wire system or three-phase three-wire system. Each unit can be used with a different phase and wire system. However, check the wiring carefully.

•It is not possible to take measurement with only the expansion unit. Every expansion unit must be connected to a main unit.

Up to 3 expansion units can be connected to 1 main unit.

*Power source system

•The power source system is the electrical power system from one power source (normally one transformer).

•KW2M-A can measure 1-system max. 24-circuit of 1P2W system and 1-system max. 8-circuit of 1P3W and 3P3W system by connecting a main unit and expansion units.

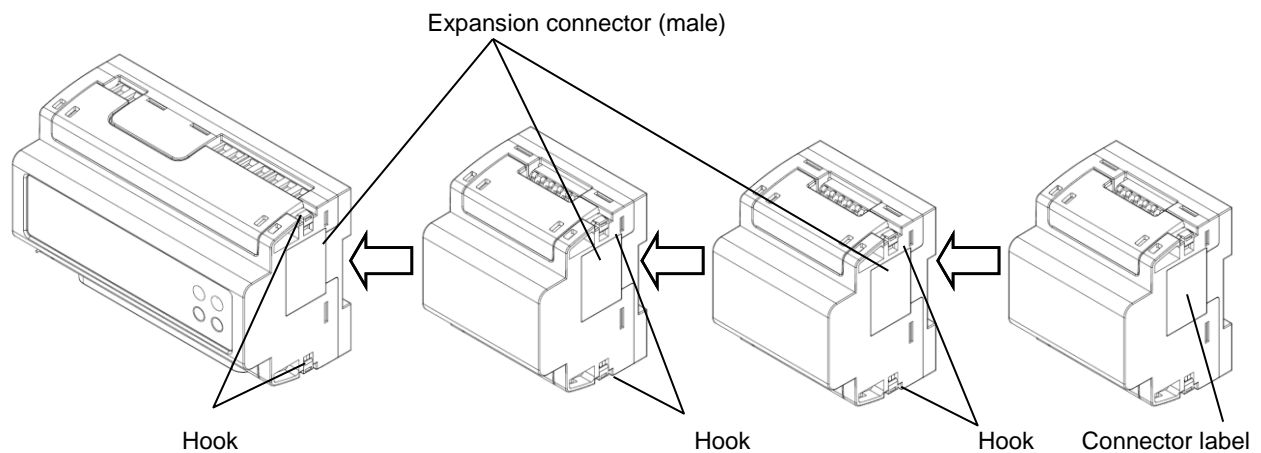
•In order to measure several systems, it is necessary to use one main unit for each system.

4.3 Connection expansion units to the main unit

•Turn off the power of the main unit when connecting expansion units.

- Peel off the connector label on the side before connecting.
(Do not peel off the connector labels when no expansion units are to be connected.)
- Connect each male connector to a female connector. The female connector is on the other side of the male connector.
- After connecting, push the hooks into the unit to fix the expansion unit.
- Up to 3 expansion units can be connected to 1 main unit.

Note: The communication will be stopped or the measurement data will be lost when the units are removed or connected while the power is turned on.



4.4 Wiring Diagrams

Please connect a breaker or a fuse to the power supply and voltage input part for safety reasons and to protect the device.

- Recommended breaker: 3 to 15A (IEC approved or UL Listed)
- Recommended fuse: Time-lag fuse rated current 2A (IEC approved or UL Listed)

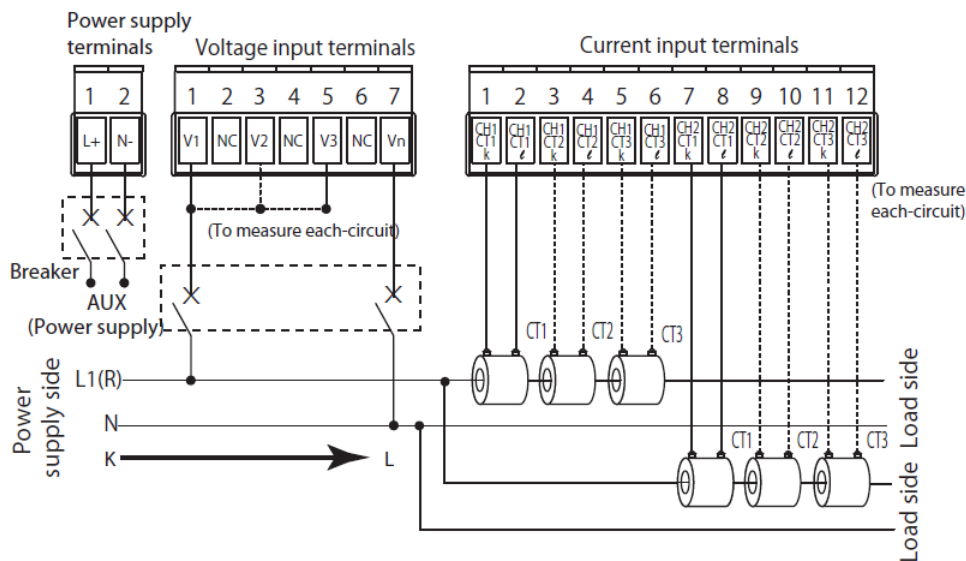
Grounding the secondary side of VT (voltage transformer) and CT (current transformer) is not necessary with a low-voltage circuit.

*When using several CTs, set each CT approximately 1m apart. If the two CTs are set too close each other, the device may not measure accurately due to magnetic field interferences.

◆When measuring a load with rated input voltage

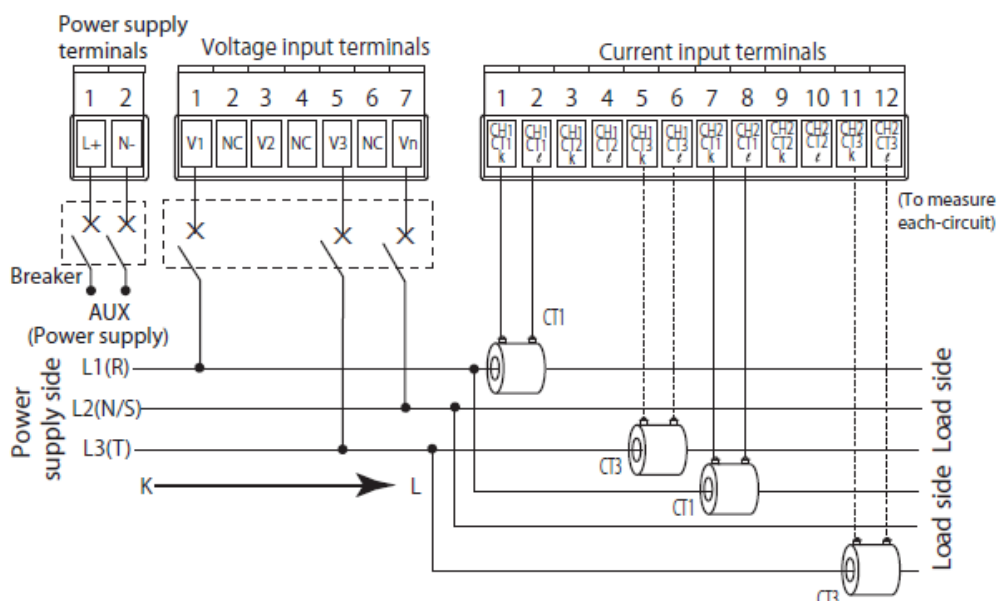
Single-phase two-wire system

- *One CT is needed to measure a single-phase two-wire system.
- *2 CTs are needed to measure 2-circuit and 3 CTs are needed to measure 3-circuit.
- *To measure 2-circuit, wire 1 and 3. To measure 3-circuit, wire 1 and 3 and 5.



Single-phase three-wire/Three-phase three-wire

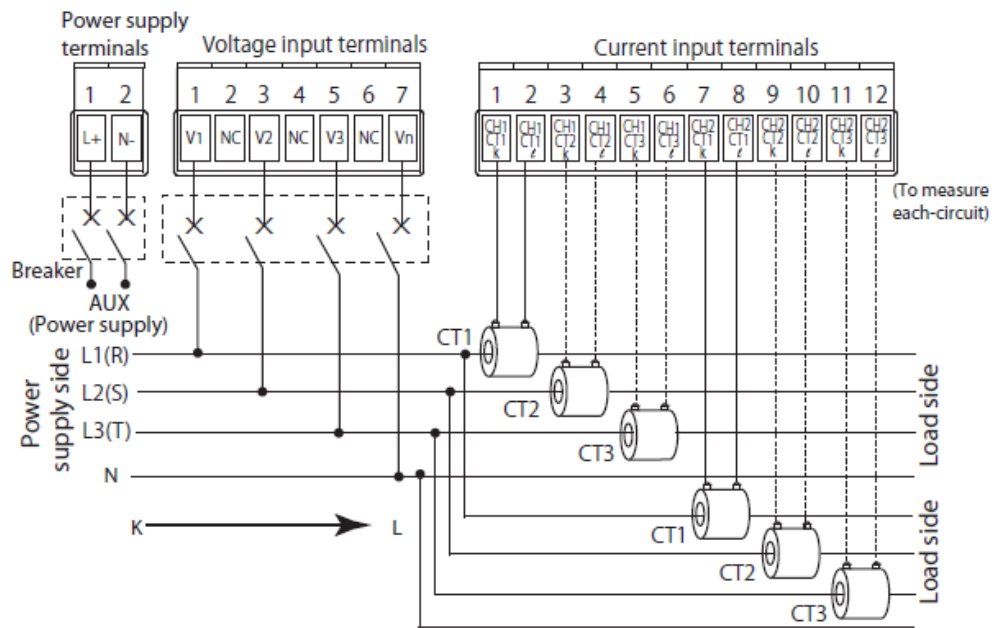
- *2 CTs are needed to measure single-phase three-wire system, three-phase three-wire system.
- *4 CTs are needed to measure 2-circuit.



Three-phase four-wire system

*3 CTs are needed to measure three-phase four-wire system.

*6 CTs are needed to measure 2-circuit.



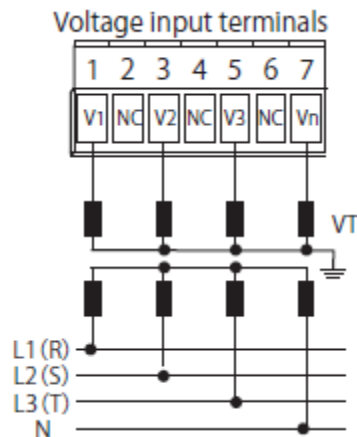
Vn terminal should be connected to grounded N-phase.

◆ Measuring a load with exceeded input voltage

A voltage transformer (VT) is needed when you measure a load with over input voltage.

Use a VT with a secondary voltage rating of 110V.

Grounding the secondary side of VT and CT is not necessary with a low-voltage circuit.



4.5 How to attach the Current Transformer (CT)



DANGER

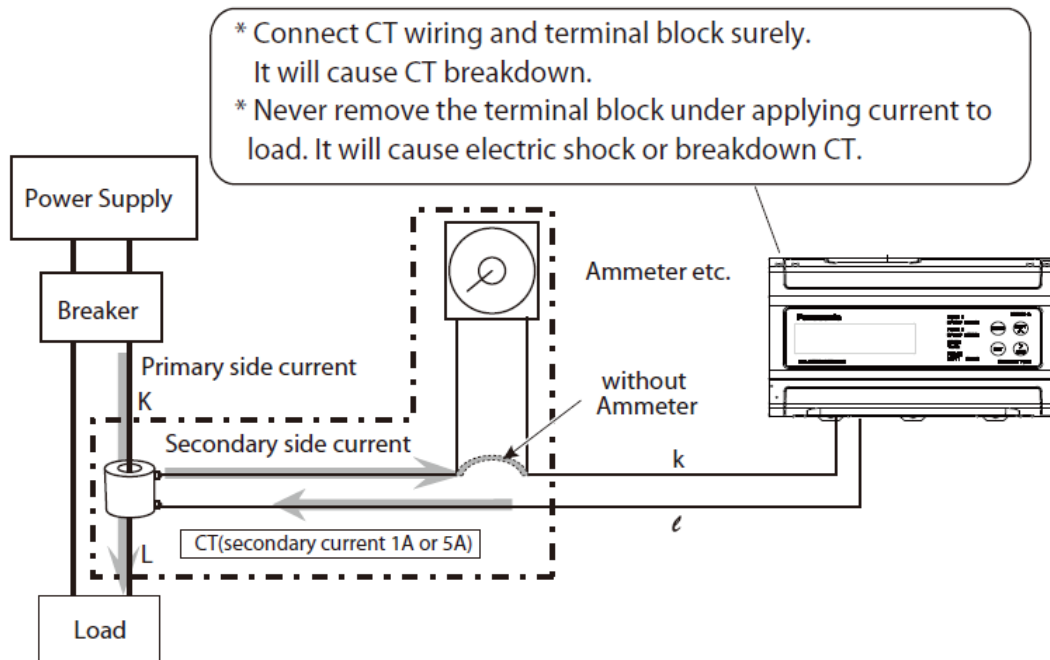
- Never open the secondary circuit of CT under applying current to load.

- Use a CT with a secondary side current of 5A or 1A.
- One CT is needed when measuring 1-circuit of 1P2W. Two CTs are needed when measuring 1P3W/3P3W (4 CTs for 2-circuit). Three CTs are needed when measuring 3P4W (6 CTs for 2-circuit). If you use all CTs for one unit, they should be all measuring the same type of system.
- Use the correct wire or it might cause a breakdown, burnout or electric shock.
- When connecting a CT, connect the secondary side to the terminal of the main unit first and after that wire the primary side to a load electric wire. **Incorrect order might cause an electric shock or break the CT.**
- The CT has polarity. Wire correctly according to the K and L marks. **When the polarity is wrong, the device cannot measure correctly.**
- If there is some distortion by harmonic or waveform, the device may not measure correctly. Please perform some tests with the actual system before going live.
- Separate the wiring (strong electric part) of the measured voltage input terminal (operating power supply terminal) from the CT cable. Otherwise, noise may have an adverse effect on the accuracy.

◆How to connect a CT

- (1) Turn off the power of the measured devices.
- (2) Install the applicable CT.
- (3) Connect the CT to the terminal block.
- (4) Check that the wiring is correct, then turn on the power of the load and the KW2M-A.

Connection example:



◆How to set the parameters for CT

- (1) Select CT type (option "CT-T") according to the CT used.
(Select '5A' if the secondary side current of the CT used is 5A. Select '1A' if the secondary side current of the CT used is 1A.)
- (2) Set the primary current of measured CT at primary side current of CT setting mode (option "CT-1").
For example, if the measured CT is 400A/1A or 400A/5A, set to "400".
- (3) Connect the CT according to the CT direction, power side (K) to load side (L).

4.6 For Input Connection

- Pulse input

- Contact input

Use highly reliable metal plated contacts. Since the contact's bounce time leads directly to error in the count value, use contacts with as short a bounce time as possible. In general, select 30Hz for max.counting speed.

- Non-contact input (Transistor input)

Connect with an open collector. Use the transistor with the following specifications.

$V_{CE0}=20V$ min. $I_C=20mA$ min. $I_{CBO}=6\mu A$ max.

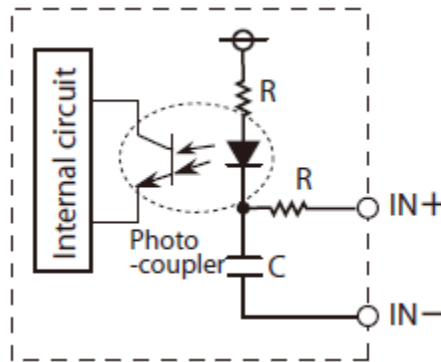
Use transistors with a residual voltage of max. 3V when the transistor is ON.

* Short-circuit impedance should be $1k\Omega$ max.

Open-circuit impedance should be $100k\Omega$ min. When the impedance is 0Ω , the drain current is approx. 10mA.

- Input wiring

Please wire as short as possible by using a shielded wire or a metallic electric wire tube individually.

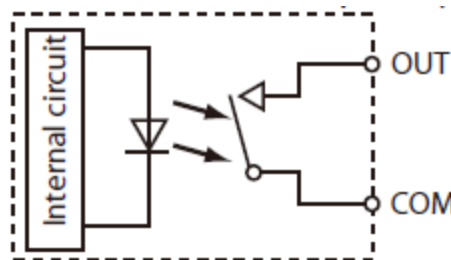


4.7 For Output Connection

- PhotoMOS relay output

- With a PhotoMOS relay output, there is no polarity.

Output: Rated capacity 30V AC/DC, 0.1A

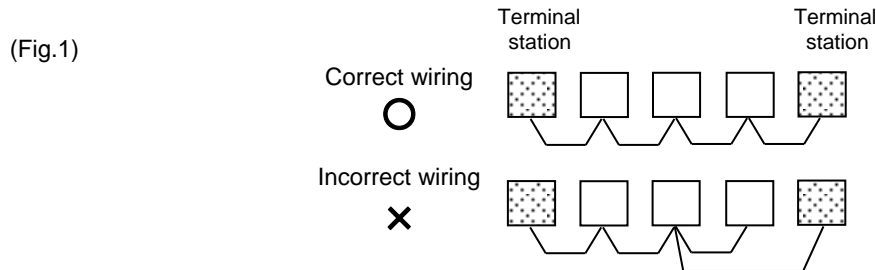


- Do not connect devices with a voltage or load that exceeds the rated capacity (30V AC/DC, 0.1A)

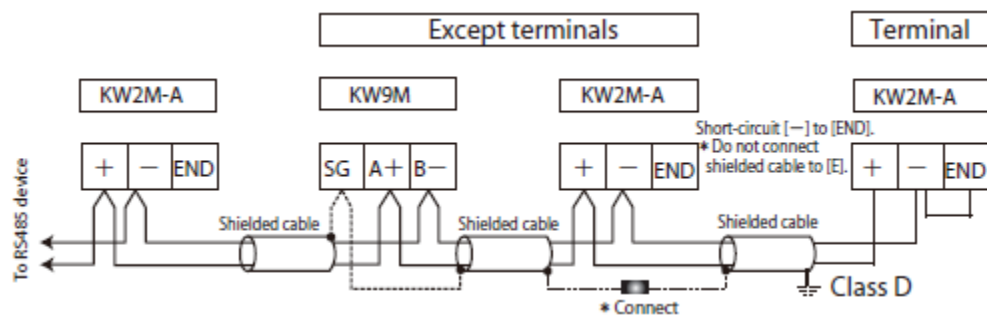
- Please do not exceed the maximum wire length of 100m for the outputs. If the wire is longer, it may not work correctly due to a floating capacitance.

4.8 RS485 Communication

- When using a shielded cable for the RS485 transmission line, ground one end. Use a class D dedicated earth for grounding. Do not share a ground with other earth lines. (Fig. 1)
- Make sure to establish a daisy-chain connection with the RS485 transmission line between each unit. Do not use a splitter. (Fig. 1)
- To avoid noise, separate the transmission lines from high-voltage lines (power supply, voltage line).



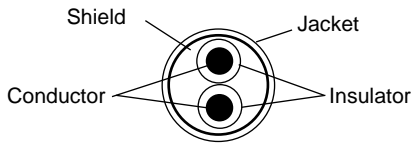
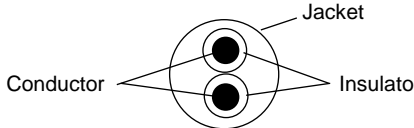
◆ How to connect a KW2M-A (2-wire) and a KW9M (3-wire)



Recommended cable

Use the transmission cables shown below for the Eco-POWER METER RS485 communication system.

Cable	Conductor		Insulator		Cable diameter	Applicable cable
	Size	Resistance (at 20°C)	Material	Thickness		
Twisted pair cable with shield	Min. 1.25mm ² (AWG16)	Max. 16.8Ω/km	Polyethylene	Max. 0.5mm	Approx. 8.5mm	HITACHI KPEV-S 1.25mm ² ×1P Belden Inc. 9860
	Min. 0.5mm ² (AWG20)	Max. 33.4Ω/km	Polyethylene	Max. 0.5mm	Approx. 7.8mm	HITACHI KPEV-S 0.5mm ² ×1P Belden Inc. 9207
VCTF	Min. 0.75mm ² (AWG18)	Max. 25.1Ω/km	PVC	Max. 0.6mm	Approx. 6.6mm	VCTF 0.75mm ² ×2C (JIS)

Cable	Section
Twisted pair cable with shield	
VCTF	

Notes

- 1) Use shielded type twisted pair cables.
- 2) Use only one type of transmission cable.
- 3) Do not mix different types of cables.
- 4) Use twisted pair cables under a bad noise environment.

4.9 Low Voltage Directive

In order to use the device under the measurement category III, install varistors or SPD between the lines of power supply and the measured voltage input. Use the varistors or SPD compliant with European standards and specifications to meet power supply and current.

When the device is to be used in applications conforming to EN61010-1/IEC61010-1, make sure to satisfy the following conditions.

- 1) RS485 communication part and pulse input part ensure only basic insulation. In order to ensure reinforced (double) insulation demanded by EN 61010-1/ IEC61010-1, use a basic insulation or better with load side and reinforced (double) insulation with the RS485 communication system side.
- 2) Provide the voltage input part with an EN60947-1 or EN60947-3 compliant circuit breaker.
- 3) Use a wire with basic insulation or better for a wire cramped (or connected) CT.
- 4) The Vn terminal should be connected to a grounded N-phase.






【Environmental conditions】

- Overvoltage category III, Pollution degree 2
- Indoor use
- An ambient temperature of -10 to +50°C
- An ambient non-condensing humidity of 30 to 85%RH (at 20°C)
- Usable altitude: max. 2000m above sea level

【Mount the product in a place with】

- A minimum of dust, and an absence of corrosive gases
- No flammable, explosive gasses
- Few mechanical vibrations or shocks
- No exposure to direct sunlight
- No large capacity electromagnetic switches or cables through which large current is flowing

4.10 Symbol List

Symbol	Explanation
	AC Voltage
	DC Voltage
	CE Mark Confirmation of conformity of the product with the applicable EU directives and compliance with the essential requirements contained in these directives
	Protective insulation, device with protection class II
	Products with this mark comply with both the Canadian and the American requirements

Chapter 5 Settings

You can set basic parameters for measuring using the keys on the device. For setting other function parameters, use a Web browser.

(URL: <http://xxx.xxx.xxx.xxx/setup/index.htm>. Set the IP address to 'xxx.xxx.xxx.xxx')

After wiring the device and the CT, turn the power on and set the parameters for power measurement. The device can measure the electric power. In order to use the other functions, set other parameters according to your needs.

◆Key functions in setting mode

<MODE>	Use this key to switch to setting mode.
<SET>	Use this key to set the items and values.
<SHIFT/Λ>, <ITEM/>>	Use these keys to select items and change values.

◆Parameters for power measurement

○: Available —: Not available

Item		Range	Initial value	Setting		
				Keys	Web	
Phase/Wire system		1P2W, 1P3W, 3P3W 3P4W	1P2W	○	○	
CT type		1, 5 [A]	5A			
Primary side current of CT		1 to 65535 [A]	5A			
VT secondary side voltage		100 to 690 [V]	230V			
VT primary side voltage		100 to 500000 [V]	230V			
Over voltage (ON threshold)		0.0 to 120.0 [%]	0.0%	—		
Over voltage (OFF threshold)						
Under voltage (ON threshold)						
Under voltage (OFF threshold)						
Over current (ON threshold)						
Over current (OFF threshold)						
Under current (ON threshold)						
Under current (OFF threshold)						
Conversion rate (P) total		0.00 to 99.99/1kWh	10.00	○		
Conversion rate (-P) total						
Hour meter threshold		01 to 100.0 [%]	10.0%	—		
Target phase for hour meter		Phase1, Phase2, Phase3, All	All			
Cut-off current		0.1 to 50.0%	0.1%			
Simple measurement	Setup	OFF, Fixed voltage/PF, Measure one CT	OFF			
	Voltage	0.0 to 500000.0 [V]	230V			
	PF	0.000 to 1.000	1.000			

◆Parameters for demand measurement

○: Available —: Not available

Item		Range	Initial value	Setting	
				Keys	Web
Power demand type		Sliding block, Fixed block	Sliding block	—	○
Power demand interval 1		1 to 60 [min.]	15		
Power demand interval 2		1 to 60 [min.]	1		
Power input		CT (CT input), Pulse (Pulse input)	CT		
Pulse unit		kWh (electric power), PLS (pulse constant)	kWh		
Pulse rate (convert to electric power)		0.001 to 100.000 [kWh]	1.000		
Pulse constant number		1000 to 99000 [pulse/kWh]	50000		
Current demand interval		1 to 60 [min.]	15		

◆Parameters for pulse input

○: Available —: Not available

Item		Range	Initial value	Setting	
				Keys	Web
Pulse input		30, 2000	30	—	○
Pre-scale		0.001 to 100.000	1.000		
Unit for pulse output (OUT1,OUT2)	kWh	0.001, 0.01, 0.1, 1, 10, 100 (kWh/1pulse)	0.001		
	Alarm	Stand-by power, Active power, Reactive power, Apparent power, Over current, Under current, Power interruption, Power factor, Over voltage, Under voltage, Over frequency, Under frequency, Current THD, Voltage THD, Current harmonics, Voltage harmonics, Current unbalancing, Voltage unbalancing, Power demand, Current demand			
	General-purpose	Digital output			
Target phase for pulse output (OUT1,OUT2)		Total, Phase1, Phase2, Phase3	total		
Target phase for alarm output (OUT1,OUT2)	Electric power	Total, All, Phase1, Phase2, Phase3	total		
	Current	All, Phase1, Phase2, Phase3, Phase N	All		
	Power interruption Over voltage Under voltage	All, Phase1, Phase2, Phase3, Line 1-2, Line 2-3, Line 3-1	All		
Integral direction (OUT1,OUT2)		P, -P	P		
Output pulse width		1 to 100 [ms]	1		
Stand-by alarm (threshold) (OUT1,OUT2)		0.1 to 100.0 [%]	100.0		
Stand-by alarm (start time) (OUT1,OUT2)		0 to 9999 [sec.]	0		
Stand-by alarm (phase) (OUT1,OUT2)		Phase1, Phase2, Phase3, All	All		
Power alarm (active/reactive/apparent) threshold (ON/OFF) (OUT1,OUT2)		0.00 to 999999999.999 [kW/kvar/kVA]	999999999.999		
PF alarm threshold (ON/OFF) (OUT1,OUT2)		0.000 to 1.000	0.000		
Over frequency alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 100.00 [Hz]	100.00		
Under frequency alarm threshold (ON/OFF) (OUT1,OUT2)			0.00		

○: Available —: Not available

Item	Range	Initial value	Setting	
			Keys	Web
Voltage harmonics alarm threshold (ON/OFF) (OUT1,OUT2)	0.00 to 400.0 [%]	400.00	—	○
Current harmonics alarm threshold (ON/OFF) (OUT1,OUT2)				
Current THD alarm threshold (ON/OFF) (OUT1,OUT2)				
Voltage THD alarm threshold (ON/OFF) (OUT1,OUT2)				
Voltage unbalancing alarm threshold (ON/OFF) (OUT1,OUT2)	0.00 to 300.00 [%]	300.00		
Current unbalancing alarm threshold (ON/OFF) (OUT1,OUT2)				
Power demand alarm power type (ON/OFF) (OUT1,OUT2)	Active, Reactive, Apparent, Active (Export), Reactive (Export)	Active		
Power demand alarm threshold(ON/OFF)(OUT1,OUT2)	0.000 to 99999.999 [kW/kvar/kVA]	0		
Current demand alarm threshold (OUT1,OUT2)	0.0 to 120.0 [%]	0		
Preset value (OUT1,OUT2)	0 to 999999	0		

◆Parameters for communication (RS485)

○: Available —: Not available

Item	Range		Initial value	Setting	
				Keys	Web
Protocol	MEWTOCOL, MODBUS(RTU),		MEWTOCOL	○	○
Device number	MEWTOCOL	1 to 99	1		
	MODBUS(RTU)	1 to 247			
Transmission speed	38400, 19200, 9600,4800, 2400, 57600, 115200 [bps]		19200		
Transmission format	8b-o (8 bit odd), 8b-n (8 bit none), 8 bit-E (8 bit even)		8b-o		
Stop bit	1,2		1		
Response time	1 to 99 [ms]		5		

◆Parameters for communication (Ethernet)

○: Available —: Not available

Item		Range	Initial value	Setting	
				Keys	Web
MEWTOCOL	Use	Available, Not available	Available	—	○
	Protocol	TCP,UDP	TCP		
	Port number	1024 to 65535	9094		
MODBUS(TCP)	Use	Available, Not available	Available	—	
	Protocol	TCP,UDP	TCP		
	Port number	502,1024 to 65535	502		
IP address	DHCP	Yes (available), No (not available)	No	○	
	Fixed IP address	0.0.0.0 to 255.255.255.255	192.168.1.5		
	Subnet mask		255.255.255.0		
	Default gateway		192.168.1.1		
DNS server	Acquisition method	Auto-setting, Manual-setting	Auto-setting	—	
	DNS server	0.0.0.0 to 255.255.255.255	0.0.0.0		
Web server	Web server settings	Yes (available), No (not available)	Yes	—	
	User name (administrator)	half-width alphanumeric (64 letters)	admin		
	Password (administrator)	half-width alphanumeric (64 letters)	admin		

◆Parameters for optional functions

○: Available —: Not available

Item	Range	Initial value	Setting	
			Keys	Web
Auto-off	0 to 99 [min.]	1	○	○
Display update cycle	0.5, 1.0, 2.0, 3.0 [sec.]	1.0 sec		
Reset all integral value	Yes, No	No		
Reset integral value 1	Yes, No	No		
Reset integral value 2	Yes, No	No		
Reset integral value 3	Yes, No	No		
Reset hour meter	Yes, No	No		
Reset count value	Yes, No	No		
Reset logging data	Yes, No	No		
Version				

◆Password

○: Available —: Not available

Item	Range	Initial value	Setting	
			Keys	Web
Password change	0000 to 9999	0000	○	○

5.1 Setting Flow

The different arrows stand for the different keys.

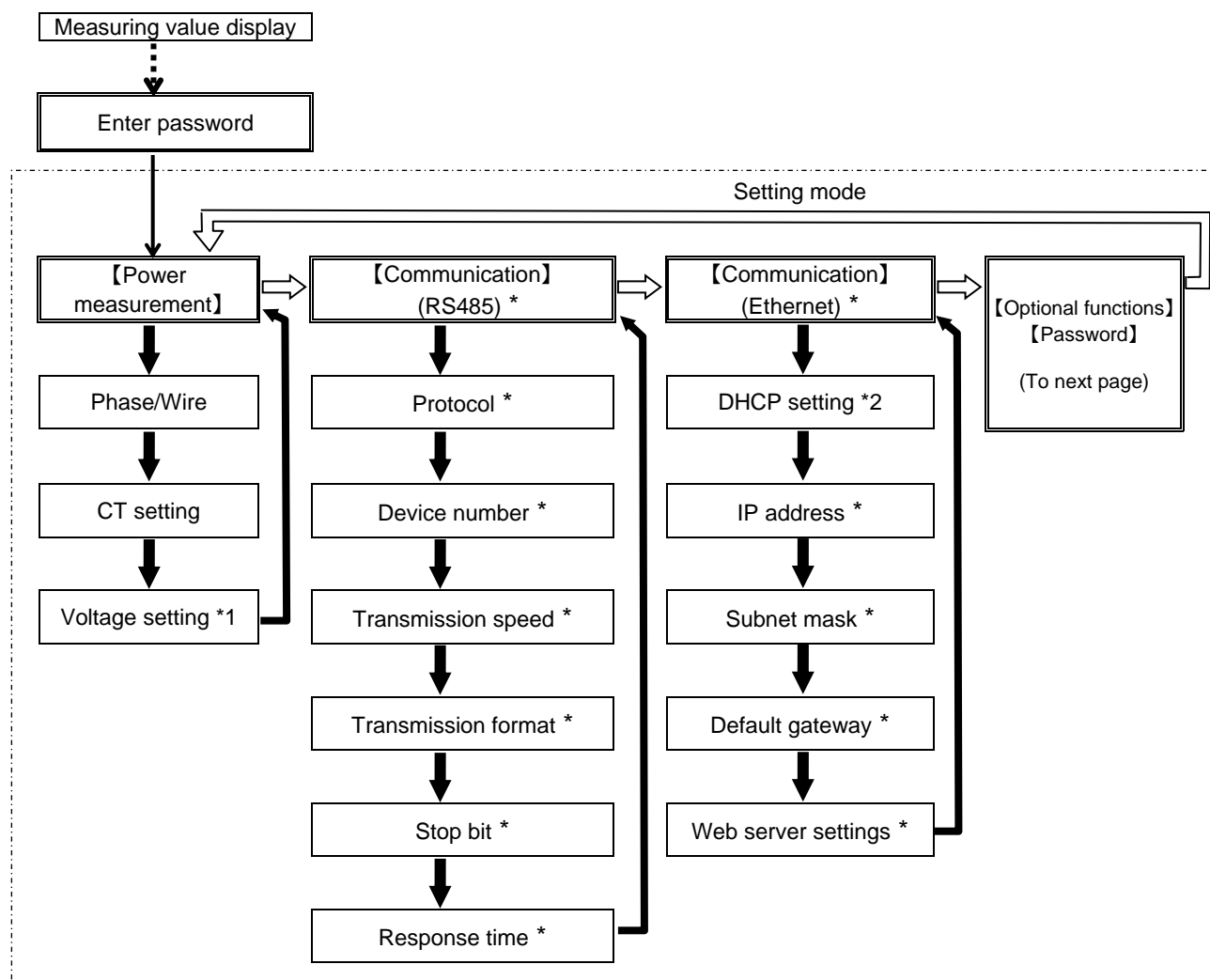
.....> <MODE>

→ <SET>

⇒ <ITEM/>>

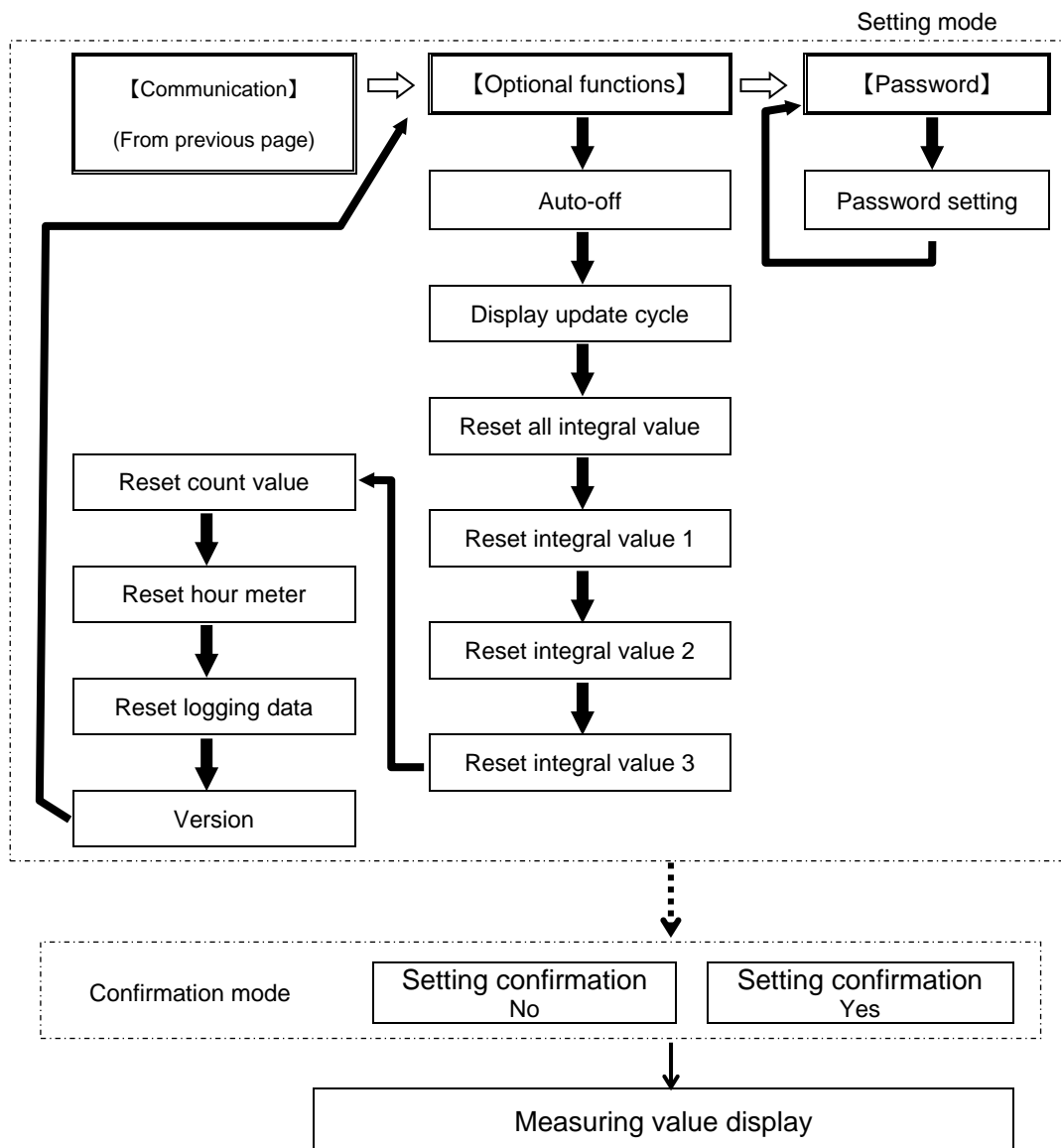
➡ <SHIFT/Λ>

Items with * are only for Main unit CH1.



*1 'Voltage setting' is valid for main unit CH1, CH2, expansion unit CH1, CH2.

*2 'IP address' and 'Subnet mask' are skipped when 'DHCP setting' is set to "Yes" (available).



Press <SET> while an item is displayed to change the current setting value.
 Press <MODE> to display the confirmation window. Select [Yes] and press <SET> to save the setting value. However, if no value has been changed, the confirmation window is skipped and the display returns to the measuring value display.

5.2 Password entry

It is necessary to enter a password to switch to setting mode.

Enter [0000] and switch to password setting mode when you set a password for the first time.

*When you are setting a password, make sure to write it down.

Measuring value display

↓ <MODE>

M - 1	P a s s w o r d
0 - - -	

↓ <SET>

M - 1	P o w e r

Press <MODE> and it switches to password entry window.

Enter password the from left to right using the keys <ITEM/>>, <SHIFT/Λ>.

<SHIFT/Λ> Increases the value

<ITEM/>> Shifts the entered digit to the right

Press <SET> after entering the password.

If the password is correct, the device switches to the setting mode for power measurement.

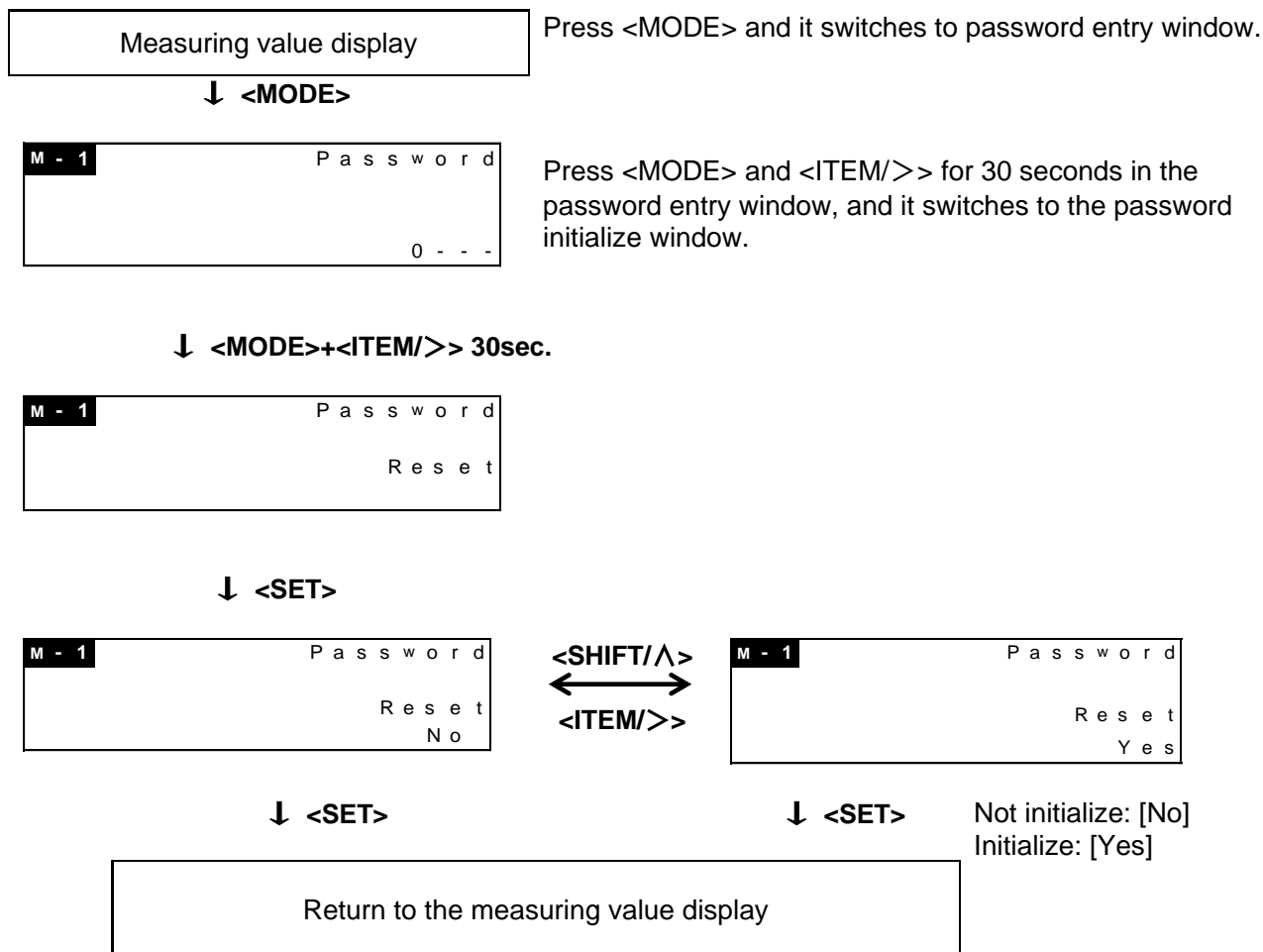
If the password is wrong, [FAIL] is displayed and the device returns to the password entry window.

*If you enter the wrong password 5 times, you have to wait 1 hour before you can try again.

M - 1	P a s s w o r d
F a i l	

5.3 Password initialize

When you forget the password, initialize it by following the procedure below. The Initial password is 0000. It is impossible to decode a set password, so make sure to write it down if you set your own password.



5.4 How to make settings using the keys

■ Set before measuring.

Select an setting item with <ITEM/>> and press <SET> and the value will be blinking. Set a new value with the keys <ITEM/>> and <SHIFT/Λ>.

When you select [Yes] in the confirmation window and press <SET>, the setting values are saved.

Setting items with (※) can be set for each CH and each unit individually.

5.4.1 Settings for power measurement

Phase/Wire system (※)

Select phase/wire system to measure.

M - 1	Power System
	1 P 2 W

Press <ITEM/>>, <SHIFT/Λ>.

[Set list]

1P2W, 1P3W, 3P3W, 3P4W (initial: 1P2W)

* When the setting does not match the measured system, the device will not measure correctly.

CT setting (※)

Select the CT type used.

M - 1	Power CT
Primary	5 A
Secondary	5 A

Press <SET> to select primary or secondary.

Press <ITEM/>>, <SHIFT/Λ> to select the range.

[Set range]

Primary side: 1 to 65535 (initial: 5)

Secondary side: 5 (5A), 1 (1A) (initial: 5)



Increase



Decrease

For CT with secondary side current 5A: [5]

For CT with secondary side current 1A: [1]

Voltage setting

Set the rated voltage to measure.

M - 1	Power VT
Primary	230 V
Secondary	230 V

Press <SET> to select primary or secondary.

Press <ITEM/>>, <SHIFT/Λ> to set the voltage.

[Set range]

Primary side: 100 to 500000 (initial: 230)

Secondary side: 100 to 690 (initial: 230)

*Set the rated voltage when no VT is used.



Increase



Decrease

5.4.2 Settings for communication (RS485)

Protocol

Select serial communication protocol for main unit (RS485).

*When you change the protocol setting, the settings for device number, transmission speed (baud rate), transmission format, stop bit and response time will be initialized.

M - 1	COM RS485
	Protocol
	MEWTOCOL

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list]

MEWTOCOL, MODBUS(RTU) (initial: MEWTOCOL)

Device number

Set an individual device number for each unit when two or more units are connected to communicate via serial communication (RS485).

M - 1	COM RS485
	No
	99

Press <ITEM/>>, <SHIFT/Λ> to set a value.

The setting range differs according to the protocol.

[Set range] MEWTOCOL: 1 to 99
MODBUS(RTU): 1 to 247



Increase



Decrease

Transmission speed (Baud rate)

Select the transmission speed for RS485 communication.

Both the KW2MA and the communication partner (PLC etc.) must use the same setting.

M - 1	COM RS485
	Speed
	38400 bps

Press <ITEM/>>, <SHIFT/Λ> to select a transmission speed.

[Set list]

2400, 4800, 9600, 19200, 38400, 57600, 115200 [bps]
(initial: 19200)

Transmission format

Select the transmission format (data length, parity) for RS485 communication.
Both the KW2MA and the communication partner (PLC etc.) must use the same setting.

M - 1	COM RS 4 8 5
	Format
	8 b i t - o

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list]

8b-o (8 bit odd), 8b-n (8 bit none), 8b-E (8 bit even)
(initial: 8b-o)

Stop bit

Select the stop bit for RS485 communication.

M - 1	COM RS 4 8 5
	Stop bit
	1 b i t

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list] 1, 2 (initial: 1)

Response time

Set the response time of the main unit for RS485 communication.
When a command is received, the response is sent after the set response time has passed.

M - 1	COM RS 4 8 5
	Response Time
	5 m s

Press <ITEM/>>, <SHIFT/Λ> to set.

[Set range] 1 to 99ms (initial: 5)



Increase



Decrease

* If a Data Logger Unit (DLU) or Data Logger Light (DLL) is used as a master, set the response time to at least 5ms because DLU or DLL send the response after max. 1.1ms after receiving a command when the transmission speed is set to 19200bps.

5.4.3 Settings for communication (Ethernet)

DHCP setting**Select DHCP for Ethernet communication.**

M - 1	COM	E t h e r n e t
		D H C P
		N o

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list] Yes (available), No (not available) (initial: No)

IP address

This item is skipped when DHCP is set to [Yes].

Set the IP address for Ethernet communication.

M - 1	COM	E t h e r n e t
		I P A d r e s s
		1 9 2 . 1 6 8 . 0 0 1 . 0 0 5

Press <ITEM/>>, <SHIFT/Λ> to set.

[Set range] 0. 0. 0. 0 to 255. 255. 255. 255
(initial: 192.168.1.5)

Increase



Decrease

Subnet mask

This item is skipped when DHCP is set to [Yes].

Set the subnet mask for Ethernet communication.

M - 1	COM	E t h e r n e t
		S u b n e t m a s k
		2 5 5 . 2 5 5 . 2 5 5 . 0 0 0

Press <ITEM/>>, <SHIFT/Λ> to set.

[Set range] 128. 000. 000. 000 to 255. 255. 255. 255
(initial: 255.255.255.0)

Increase



Decrease

Default Gateway



This item is skipped when DHCP is set to [Yes].

Set the default gateway for Ethernet communication.

M - 1	COM	E t h e r n e t
	D e f u a l t	G a t e w a y
	1 9 2 . 1 6 8 . 0 0 1 . 0 0 1	

Press <ITEM/>>, <SHIFT/Λ> to set.

[Set range] 0. 0. 0. 0 to 255. 255. 255.255
(initial: 192.168.1.1)

-  Increase
-  Decrease

Web server setting

Select the Web server setting for Ethernet communication.

M - 1	COM	E t h e r n e t
	w e b	S e r v e r
		Y e s

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list]
Yes (available), No (not available) (initial: Yes)

5.4.4 Settings for optional functions

Auto-off

Activate this function when you want the display backlight to turn off automatically when no key is pressed for a long time. Once the time set in this option has passed, the backlight will turn off.

M - 1	Option
	Auto OFF
	5 min

Press <ITEM/>>, <SHIFT/Λ> to set a value.

[Set range] 0 to 99 min. (initial: 5)



Increase



Decrease

Always leave backlight on: [0]

Turn backlight off after set time: [1 to 99]

After the backlight has been turned off, pressing any of the key turns it on again.

Update cycle

Select update cycle for the measured-value display.

It updates the display of measured values after the time set here has passed.

M - 1	Option
	Display update
	0.5 s

Press <ITEM/>>, <SHIFT/Λ> to select a value.

[Set list] 0.5, 1.0, 2.0, 3.0 [s] (initial: 1.0)

Reset all integral value

All integral power values (active, reactive, apparent) can be reset simultaneously.

M - 1	Option
	All Reset
	Yes

Press <ITEM/>>, <SHIFT/Λ> to select a setting.

[Set list] Yes, No (initial: No)

Reset all: [Yes]

Do No reset: [No]

Reset integral value 1

This item is skipped when "Reset all integral value" is set to [Yes].

Reset the integral power of 1CH/1-phase (active, reactive, apparent) and integral export power of 1CH/1-phase (active, reactive).

M - 1	Option
	Reset 1
	Yes

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list] Yes, No (initial: No)

Reset: [Yes]

No reset: [No]

Reset integral value 2

This item is skipped when “Reset all integral value” is set to [Yes].

Reset the integral power of 2CH/2-phase (active, reactive, apparent) and integral export power of 2CH/2-phase (active, reactive).

M - 1	O p t i o n
	R e s e t 2
	Y e s

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list] Yes, No (initial: No)

Reset: [Yes]
No reset: [No]

Reset integral value 3

This item is skipped when “Reset all integral value” is set to [Yes].

Reset the integral power of 3CH/3-phase (active, reactive, apparent) and integral export power of 3CH/3-phase (active, reactive).

M - 1	O p t i o n
	R e s e t 3
	Y e s

Press <ITEM/>>, <SHIFT/Λ> to select.

[Set list] Yes, No (initial: No)

Reset: [Yes]
No reset: [No]

Reset count value

This item is skipped when “Reset all integral value” is set to [Yes].

Reset the count value.

Press <ITEM/>>, <SHIFT/Λ> to select.

M - 1	O p t i o n
	R e s e t C o u n t
	Y e s

[Set list] Yes, No (initial: No)

Reset: [Yes]
No reset: [No]

Reset hour meter

This item is skipped when “Reset all integral value” is set to [Yes].

Reset the values measured by the hour meter: ON-time, OFF-time, Stand-by-time, and Maintenance-time.

Press <ITEM/>>, <SHIFT/Λ> to select.

M - 1	O p t i o n
	R e s e t H o u r M e t e r
	Y e s

[Set list] Yes, No (initial: No)

Reset: [Yes]
No reset: [No]

Reset log data

This item is skipped when “Reset all integral value” is set to [Yes].

Reset all log data.

Press <ITEM/>>, <SHIFT/Λ> to select.

M - 1	O p t i o n
	R e s e t L o g
	Y e s

[Set list] Yes, No (initial: No)

Reset: [Yes]
No reset: [No]

Version

Display the software version.

This item displays the software version.

M - 1	V e r s i o n
B a s e	
0 . 1 7	

5.4.5 Password setting

Password setting

You can set a password to prevent unauthorized users from changing the settings.
The password has to be entered before the device switches to the setting mode.

M - 2

P a s s w o r d

0 0 0 0

Press <SET> and [0] on the left is blinking.
Set a password using <ITEM/>>, <SHIFT/Λ>.



Increase



Shift entered digit to the right

Set from left to right. Make the digit to set blink.

[Set range] 0000 to 9999 (initial: 0000)

M - 2

P a s s w o r d

2 3 4 5

Set 4-digit password and press <SET>
Then the confirmation window is displayed.

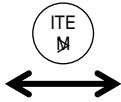
↓ <SET>

M - 2

P a s s w o r d

No

2 3 4 5



M - 2

P a s s w o r d

Y e s

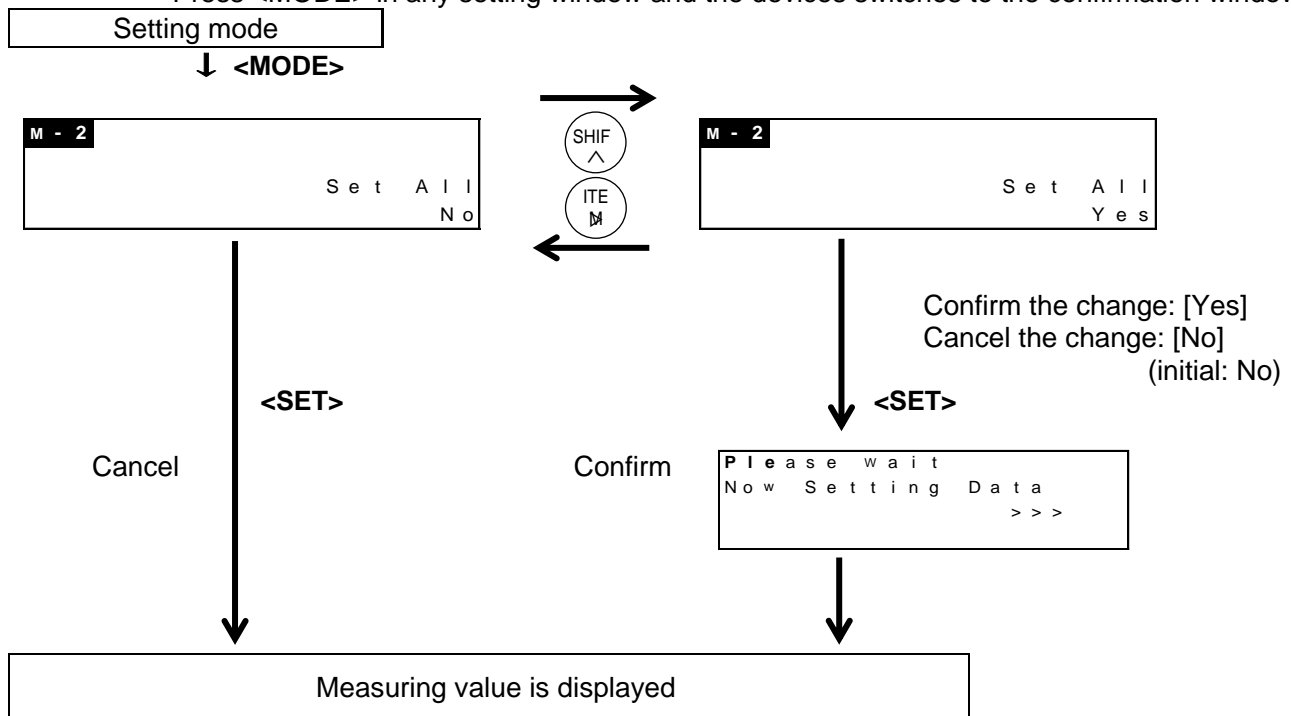
2 3 4 5

Confirm: [Yes]
Cancel: [No]

[Set list] Yes, No (initial: N0)

5.4.6 Confirmation window

Press <MODE> in any setting window and the device switches to the confirmation window.



5.5 How to set up the device by web browser

You can set up the device by using a Web browser.

Access to 'http: //xxx.xxx.xxx.xxx/setup/index.htm'. Put the setting IP address to 'xxx.xxx.xxx.xxx'.

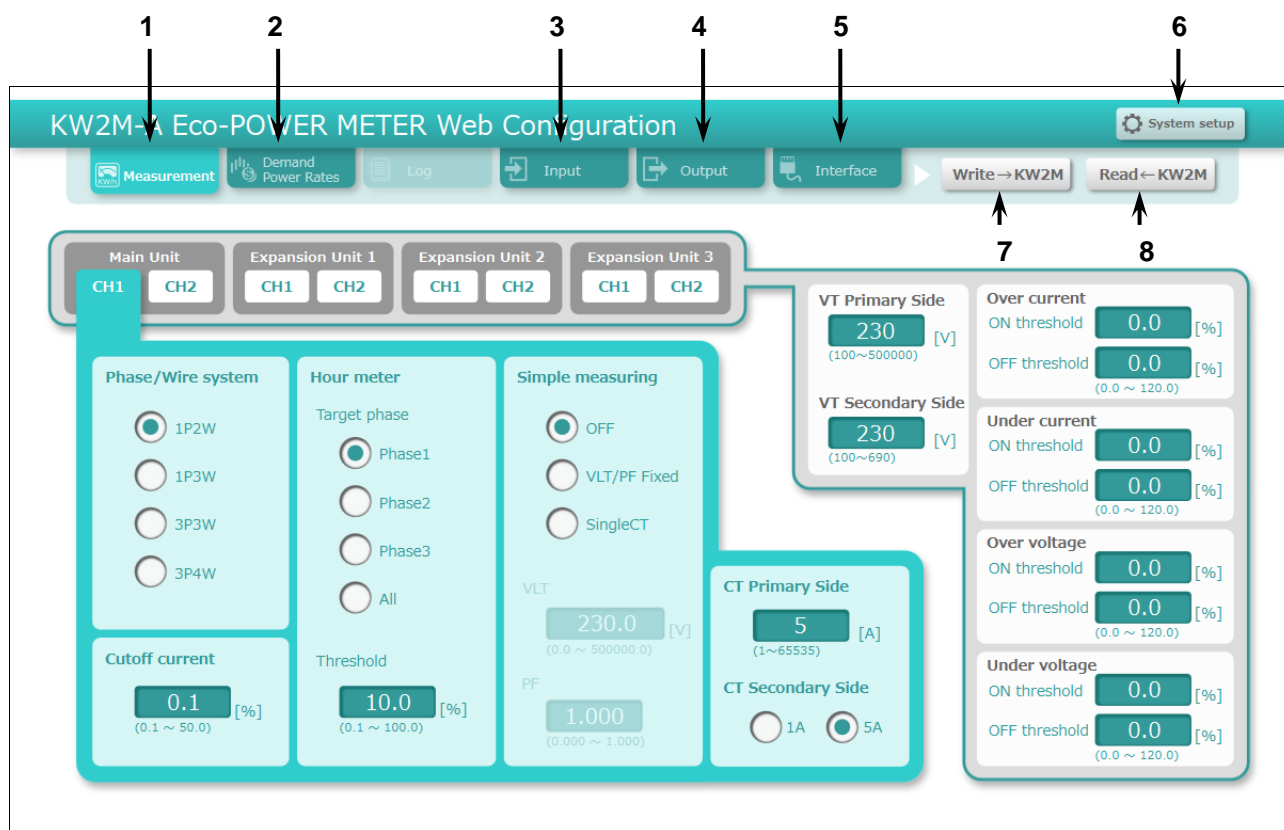
You must enter your user name and password to access the website.

(Initial user name: admin, initial password: admin)

It may take time to load the website depending on the communication environment.

5.5.1 Overview of tabs with setting items

The setting items are distributed over several tabs.



Tab	Description
1 Measurement	Set parameters related to power measurement
2 Demand / Power Rates	Set parameters related to demand, conversion rate
3 Input	Set parameters related to pulse input
4 Output	Set parameters related to pulse output
5 Interface	Set parameters related to Ethernet and RS485 communication
6 System setup	Set parameters related to system
7 Write→KW2M	Write parameters to Eco-POWER METER
8 Read←KW2M	Read out parameters from Eco-POWER METER

5.5.2 Settings for Power Measurement

The screenshot shows the 'Measurement' tab in the 'KW2M-A Eco-POWER METER Web Configuration' interface. The interface includes a top navigation bar with tabs for Measurement, Demand Power Rates, Log, Input, Output, and Interface. Below the tabs are buttons for 'Write→KW2M' and 'Read←KW2M'. The main content area is divided into several sections, each with a numbered callout:

- 1**: Unit Selection (Main Unit, Expansion Unit 1, Expansion Unit 2, Expansion Unit 3)
- 2**: Phase/Wire system (1P2W, 1P3W, 3P3W, 3P4W)
- 3**: Cutoff current (0.1%)
- 4**: Hour meter (Phase1, Phase2, Phase3, All)
- 5**: Simple measuring (OFF, VLT/PF Fixed, SingleCT)
- 6**: CT Primary Side (5A)
- 7**: VT Primary Side (230V)
- 8**: Over current (0.0%)
- 9**: Under current (0.0%)
- 10**: Over voltage (0.0%)
- 11**: Under voltage (0.0%)

Item	Description
1 Select unit and CH	Select unit and CH to set.
2 Phase/Wire system	Select phase and wire system for power measurement. <List> 1P2W, 1P3W, 3P3W, 3P4W (initial: 1P2W)
3 Cutoff current	Set a ratio of current for rated current used for cutoff that is not measured. <Range> 0.1 to 50.0% (initial: 0.1)
4 Hour meter	Select phase and current that is measured as ON-time by percentage. <List> Target phase: Phase1, Phase2, Phase3, ALL (initial: Phase1) Threshold: 0.1 to 100.0% (initial: 10.0)
5 Simple measuring	Select mode and set parameters for simple measuring. <List & Range> Type: OFF (inactive) VLT/PF Fixed (use actual current with fixed voltage and PF) SingleCT (use phase 1 current and all voltage) (initial: OFF) VLT*: 0.0 to 500000.0V (initial: 230V) PF*: 0.000 to 1.000 (initial: 1.000) * VLT and PF can be set when 'VLT/PF Fixed' is selected.

Item	Description
6 CT	Set parameters of CT. <Range> Primary side: 1 to 65535 (initial: 5) Secondary side: 5 (5A), 1 (1A) (initial: 5)
7 VT*	Set parameters of VT when VT is used. When VT is not used, set parameters of rated voltage to measure. <Range> Primary side: 100 to 500000 (initial: 230) Secondary side: 100 to 690 (initial: 230)
8 Over current*	Set a ratio of current for rated current used as a threshold for judging over current.
9 Under current*	
10 Over Voltage*	Set a ratio of voltage for rated voltage used as a threshold for judging over voltage.
11 Under Voltage*	

* Common to unit and CH.

5.5.3 Settings for Demand and Power Rates

Click '◀ ▶' to shift window of 'Demand Setup' and 'Conversion rate Setup'.

[Demand Setup]

Item	Description
1 Power demand type	Select type of power demand measurement. <List> Sliding block, Fixed block (initial: Sliding block)
2 Power demand interval	Set interval time to use for power demand measurement. <Range> Power demand interval 1: 1 to 60min (initial: 15) Power demand interval 2: 1 to 60min (initial: 1)
3 Power input source *1	Select input type to use for demand measurement, current measurement or pulse input. <List> CT, Pulse (initial: CT)
4 Pulse-Power Conversion Method *2	Select and set electric power value per 1-pulse or pulse constant value input by an outer pulse detector. <Range> Pulse rate: 0.001 to 100.000 kWh/pulse (initial: 0.001) Pulse constant: 1000 to 99000 pulse/kWh (initial: 50000)
5 Current demand interval	Set interval to use for current demand calculation. < Range > 1 to 60min (initial: 15)

*1 Power input source is setting for main unit CH1.

*2 Pulse-power conversion method is available when [Pulse] is selected for 'Power input source'.

[Conversion rate Setup]

KW2M-A Eco-POWER METER Web Configuration

System setup

Measurement Demand Power Rates Log Input Output Interface Write→KW2M Read←KW2M

Main Unit Expansion Unit 1 Expansion Unit 2 Expansion Unit 3

CH1 CH2 CH1 CH2 CH1 CH2 CH1 CH2

1 Conversion rate Setup

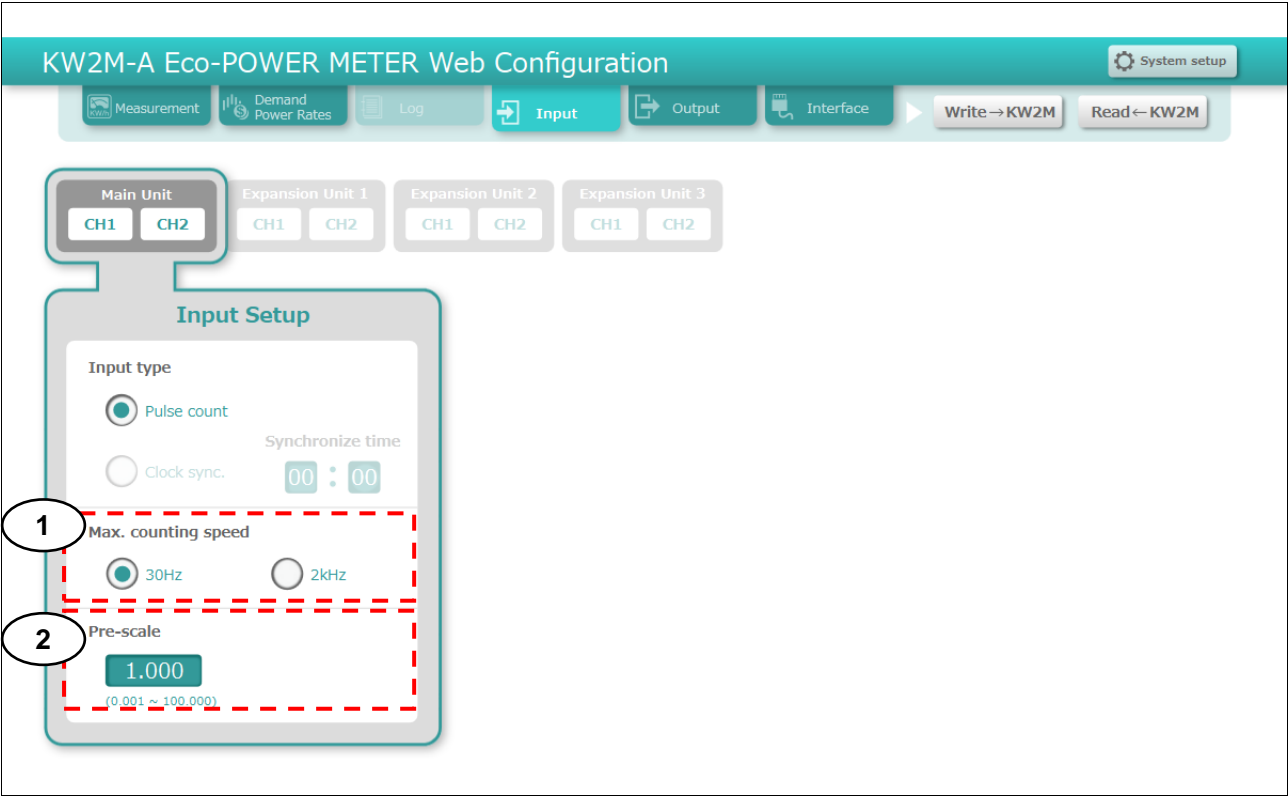
[Rate]	T1	T2	T3	T4	T
[P/kWh]	10.00	10.00	10.00	10.00	10.00 (0.01~99.99)
[-P/kWh]	10.00	10.00	10.00	10.00	10.00 (0.01~99.99)

Time Program Setup

Rate	T	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF	OFF
Start-time	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM	HH:MM
Time zone classification	00:00 06:00 12:00 18:00 00:00									

Item	Description
1 Conversion rate Setup	Set the conversion rate per integral active power (import and export) 1 kWh. < Range > P/kWh: 0.01 to 99.99 (initial: 10.00) -P/kWh: 0.01 to 99.99 (initial: 10.00)

5.5.4 Settings for Pulse Input



Item		Description
1	Max counting speed	Select the max. counting speed for pulse input. < List > 30Hz, 2kHz (initial: 30Hz)
2	Pre-scale	Set a pre-scale value used to convert the count value of the pulse input. < Range > 0.001 to 100.00 (initial: 1.000)

5.5.5 Settings for Pulse Output

The measurement value of main unit CH1 is used for pulse output CH1 and the measurement value of main unit CH2 is used for pulse output CH2.

[Integral power pulse]

Item	Description
1 Select CH *	Select channel to set.
2 Output type	Select pulse output type. < List > Integral power pulse, Alarm, General output (initial: Integral power pulse)
3 Unit for output	Set unit used for pulse output. < List > 0.001, 0.01, 0.1, 1, 10, 100kWh (initial: 0.001)
4 Direction	Select direction of power (import or export) to be used as a threshold for pulse output. < List > P, -P (initial: P)
5 Target phase	Select a phase to monitor in order to judge the output. Select 'Total' for measuring 3P3W. < List > Phase1, Phase2, Phase3, Total (initial: Total)
6 Pulse width	Set pulse width. < Range > 1 to 100ms (initial: 1)

[Alarm]

The alarm is output when the condition next to a checked (activated) box is true.

Item	Description
1 Select CH *	Select channel to set.
2 Output type	Select pulse output type. < List > Integral power pulse, Alarm, General output (initial: Integral power pulse)
3 Stand-by power	Select phase to monitor and set the threshold to use for output. <List & Range> Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL) Threshold: 0.1 to 100.0% (initial: 0.1%) Elapsed: 0 to 9999min (initial: 0)
4 Active power	Select phase to monitor and set the threshold to use for output. *Select 'Total' when measuring 3P3W. <List & Range> Target phase: Phase1, Phase2, Phase3, ALL, Total (initial: Total) OFF threshold: 0.00 to 9999999999.99 (initial: 9999999999.99) ON threshold: 0.00 to 9999999999.99 (initial: 9999999999.99)
5 Reactive power	
6 Apparent power	
7 Over current	Select phase to monitor. *The threshold is the ratio that is set at 'Setting for Power Measurement'.
8 Under current	
9 Power interruption	
	< List > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL)

Item	Description
10 Power factor	Select phase to monitor and set threshold to use for output. *Select 'All' when measuring 3P3W. < List & Range > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL) OFF threshold: 0.00 to 9999999999.99 (initial: 9999999999.99) ON threshold: 0.00 to 9999999999.99 (initial: 9999999999.99)
11 Count value	Set a count value to use for alarm output. <Range> 0 to 999999 (initial: 0)
12 Over Voltage	Select phase to monitor. *The threshold is the ratio that is set at 'Setting for Power Measurement'.
13 Under Voltage	< List > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL)
14 Over frequency	Select phase to monitor and set threshold to use for output. < List & Range > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL)
15 Under frequency	OFF threshold: 0.00 to 100.00Hz (initial: 100.00) ON threshold: 0.00 to 100.00Hz (initial: 100.00)
16 Current THD	Select phase to monitor and set threshold to use for output.
17 Voltage THD	< List & Range > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL)
18 Current harmonics	OFF threshold: 0.00 to 400.00% (initial: 400.00)
19 Voltage harmonics	ON threshold: 0.00 to 400.00% (initial: 400.00)
20 Current unbalancing	Select phase to monitor and set threshold to use for output.
21 Voltage unbalancing	< Range > OFF threshold: 0.00 to 300.00% (initial: 300.00) ON threshold: 0.00 to 300.00% (initial: 300.00)
22 Power demand	Select demand type to monitor and set threshold to use for output. < List & Range > Power Type: Active, Reactive, Apparent, Active(Export), Reactive(Export) (initial: Active) OFF threshold: 0.000 to 999999999.999 (initial: 999999999.999) ON threshold: 0.000 to 999999999.999 (initial: 999999999.999)
23 Current demand	Select phase to monitor and set threshold to use for output. < List & Range > Target phase: Phase1, Phase2, Phase3, ALL (initial: ALL) OFF threshold: 0.00 to 120.00% (initial: 0.00) ON threshold: 0.00 to 120.00% (initial: 0.00)

5.5.6 Settings for Ethernet and RS485 communication

Click '◀ ▶' to shift window of 'Ethernet Setup' and 'RS485 Setup'.

[Ethernet Setup]

The screenshot shows the 'KW2M-A Eco-POWER METER Web Configuration' interface. At the top, there are tabs for Measurement, Demand Power Rates, Log, Input, Output, and Interface. The 'Interface' tab is selected. Below the tabs, there are sections for Main Unit (CH1, CH2) and Expansion Units 1, 2, and 3. The 'Ethernet Setup' section is highlighted with a red dashed box and labeled with a circled '2'. It contains two sub-sections: one for IP address configuration (labeled with a circled '1') and one for protocol and port settings (labeled with a circled '3'). The IP address configuration section has radio buttons for 'Obtain an IP address automatically' and 'Use the following IP address'. The 'Use the following IP address' option is selected, with fields for IP address (192.168.1.5), Subnet mask (255.255.255.0), and Default gateway (192.168.1.1). The protocol and port settings section has checkboxes for 'Use MEWTOCOL-COM' and 'Use MODBUS-TCP', both of which are checked. It also has radio buttons for 'Protocol' (TCP/UDP) and a 'Port number' field (9094 for MEWTOCOL-COM and 502 for MODBUS-TCP). There is also a 'Use FTP server' option with a 'Port number' field (21) and a 'Change password' button.

Item	Description
1 IP address	<p>Select the setting method for the IP address. When you select “Use the following IP address”, set the IP address, subnet mask and default gateway manually.</p> <p>< Range > Setting IP address: Obtain an IP address automatically or Use the following IP address IP address: 001. 000. 000. 000 to 255. 255. 255. 255 (initial: 192.168.1.5) Subnet mask: 128. 000. 000. 000 to 255. 255. 255. 255 (initial: 255.255.255.0) Default gateway: 001. 000. 000. 000 to 255. 255. 255.255 (initial: 192.168.1.1)</p>
2 MEWTOCOL-COM	<p>Set protocol and port number.</p> <p>< List & Range > Protocol: TCP, UDP (initial: TCP) Port number: 1024 to 65535 (initial: 9094)</p>
3 MODBUS-TCP	<p>Set protocol and port number.</p> <p>< List & Range > Protocol: TCP, UDP (initial: TCP) Port number: 502, 1024 to 65535 (initial: 502)</p>

[RS485 Setup]

KW2M-A Eco-POWER METER Web Configuration

System setup

Measurement Demand Power Rates Log Input Output Interface Write→KW2M Read←KW2M

Main Unit CH1 CH2 Expansion Unit 1 CH1 CH2 Expansion Unit 2 CH1 CH2 Expansion Unit 3 CH1 CH2

RS485 Setup

1 Protocol ☒ MEWTOCOL ☐ MODBUS RTU

2 Device number 1

3 Transmission speed 19200bps

4 Transmission format

Data length (8bit fixed)

Parity odd

Stop bit 1bit

5 Response time 5 [ms] (1~99)

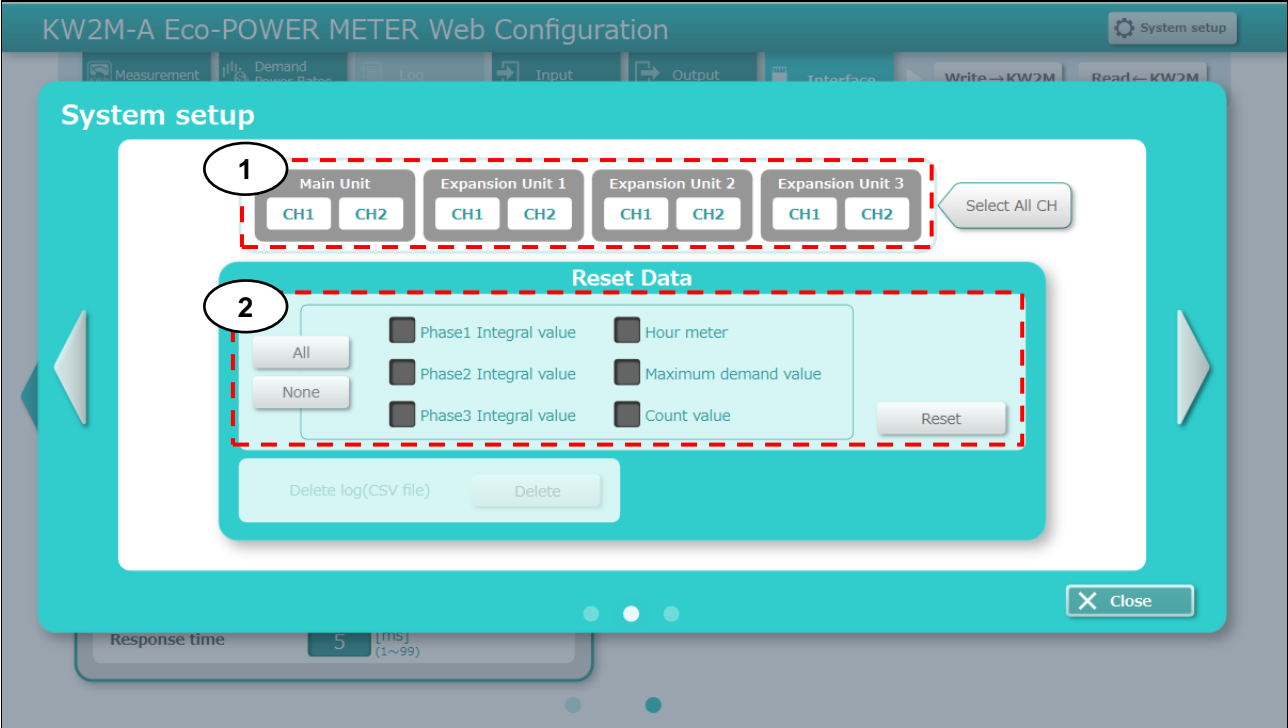
Item	Description
1 Protocol	Select communication protocol < List > MEWTOCOL, MODBUS RTU (initial: MEWTOCOL)
2 Device number	Set device number. < Range > MEWTOCOL: 1 to 99 MODBUS RTU: 1 to 247
3 Transmission speed	Select transmission speed. < List > 2400, 4800, 9600, 19200, 38400, 57600, 115200bps (initial: 19200)
4 Transmission format	Select transmission format. < List > Parity: none, odd, even (initial: odd) Stop bit: 1bit, 2bit (initial: 1bit)
5 Response time	Set response time. < Range > 1 to 99ms (initial: 5)

5.5.7 System setup

[System setup]

Item	Description
1 Setting File	Transfer settings from the Eco-POWER METER to your PC or vice versa. <Item> Export: Save settings from the Eco-POWER METER to a file on your PC. Import: Transfer file with saved settings from a PC to the Eco-POWER METER. Browse: Select setup file which are saved in PC.
2 System Web Password	Set password to access Web page.
3 Backlight auto-off	Display backlight turns off automatically when no key is pressed for a long time. Once the time set in this option has passed, the backlight will turn off. < Range > 0 to 99min (initial: 5)
4 Screen refresh interval	Select refresh interval for measuring window. The display is updated every time the time set in this option has passed. < List > 0.5, 1.0, 2.0, 3.0s (initial: 1.0)

[Reset Data]



Item		Description
1	Select unit and CH	Select unit and CH to reset.
2	Select item	Select data item to reset. After selecting item, click 'Reset' to reset.

Chapter 6 Miscellaneous functions

6.1 Power quality measurement and logging function

The KW2M-A Eco-POWER METER can measure harmonics and THD for power quality measurement, which is helpful to improve the power quality.

[Max. demand]

The device measures and logs the following maximum demand values: active, reactive, apparent, active (export), reactive (export), current.

6.2 Pulse output function

You can use 2-type pulse output, OUT1 and OUT2.

Refer to 5.5.5 Settings for Pulse Output for details.

[OUT1][OUT2] are blinking during pulse output.

6.2.1 Output depends on integral electric power

Set the unit for pulse output of integral power value and pulse output turns on every time when the integral electric power reaches the unit (pulse width: about 100ms).

It is synchronized with the sampling cycle.

6.2.2 Stand-by alarm

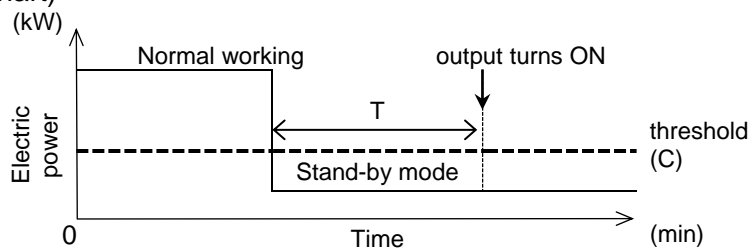
When it detects stand-by power (current) of the measured load, the pulse output turns on.

Set threshold (current) (C) and stand-by time (T) to judge whether the load is on stand-by.

When the measured load satisfies the conditions you have set, the pulse output turns on.

When it exceeds the threshold you have set, it turns off and resets.

(Working flow chart)



6.2.3 Under voltage alarm

When the measured value falls below the voltage you have set, the pulse output turns on.

When the measured value exceeds the voltage you have set, the output turns off.

6.2.4 Over voltage alarm

When the measured value exceeds the voltage you have set, the pulse output turns on.

When the measured value falls below the voltage you have set, the output turns off.

6.2.5 Power interruption alarm

When the device detects that the voltage is under 5% of rated voltage for at least 5ms, the pulse output turns on.

6.2.6 Under current alarm

When the measured value falls below the current you have set, pulse output turns on in order to notice.

When the measured value exceeds, the output turns off.

6.2.7 Current alarm

When the measured value exceeds the setting current, pulse output turns on in order to notice.

When the measured value falls below, the output turns off.

6.2.8 Power alarm

When the measured value exceeds the setting for instantaneous electric power (active, reactive, apparent, active (export), reactive (export)), pulse output turns on in order to notice.

When the measured value falls below, the output turns off.

6.2.9 Other alarms

Output turns on or off according to each alarm setting.

PF alarm, over frequency alarm, under frequency alarm, voltage harmonics alarm, current harmonics alarm, voltage THD alarm, current THD alarm, voltage unbalancing alarm, current unbalancing alarm, power demand alarm, current demand alarm

6.2.10 Output depends on count value

Set a preset value and the pulse output turns on when the count value has reached the preset value. Refer to 6.3 Counter function for details.

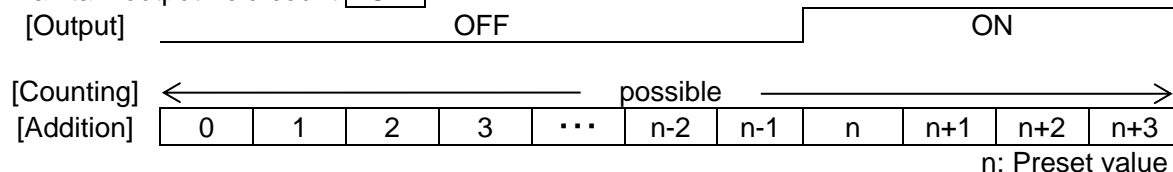
6.2.11 Level output

It turns on or off the output by writing 0 (OFF) or 1 (ON) to the data register allocated to each output (OUT1: DT50294, OUT2: DT50295) for communication with an external device.

6.3 Counter function

● Operation mode

Maintain output hold count **HOLD**



- (1) Output turns on when preset value “n” is reached. The output is held until it is reset. The device keeps on counting even after “n” has been reached.
- (2) The counter reverts to “0” after it has counted to the end of the valid range, but output control is still maintained. However, the output turns OFF if the count value or the preset value are changed.

● Change the Preset Value

It is possible to change the preset value even during counting. However, please note the following points.

◇ When the pre-scale value is “1.000” (PSCL=1.000).

- (1) If the preset value is changed to a value lower than the count value, counting will continue until it reaches the end of the valid range, returns to “0” and then reaches the new preset value.
- (2) If the preset value is changed to “0”, the counter will not begin counting at “0” right away. Instead, counting will continue until it reaches the end of the valid range and then it will start counting from “0”.
- (3) When the count value is fixed, output is changed according to the changing of preset value as below.
 - If the preset value is changed to a value lower than or equal to the count value, the output is ON. (Count value ≥ Preset value)
 - If the preset value is changed to a value higher than the count value, the output is OFF. (Count value < Preset value)

◇ When the pre-scale is not “1.000”. (PSCL≠1.000)

Even if the preset value is changed after counting to the end of the valid range, the output is not changed.

6.4 Demand function

You can select one of the demand calculation methods from the list below.

- According to IEC61557-12
 1. Sliding block interval demand
 2. Fixed block interval demand
 3. Current demand

The simple demand function calculates an estimate. The value is not guaranteed.

Caution

Definition of Demand: Demand is the max. power drawn from the power grid within a certain interval (usually 15 or 30 minutes).

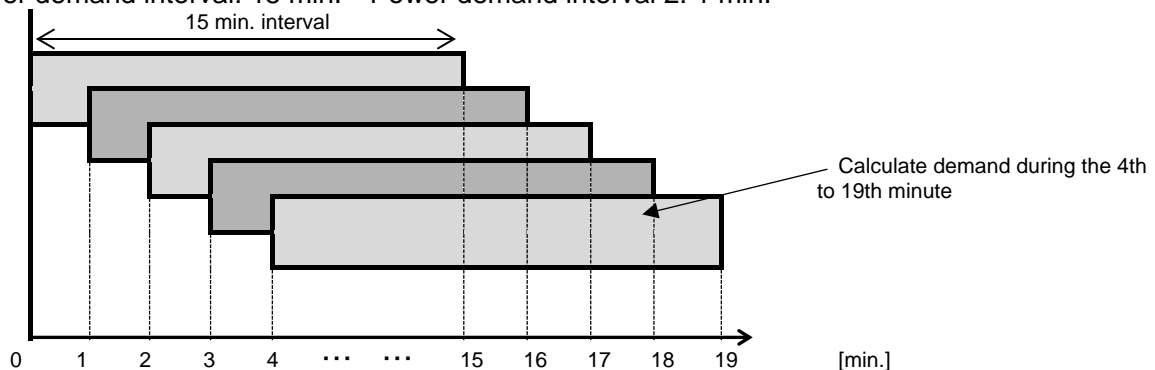
6.4.1 Block interval demand

The device calculates the demand for the interval you have set and displays it. The interval can be a sliding block or a fixed block. The device outputs a demand alarm when the conditions you have set are TRUE.

Sliding block

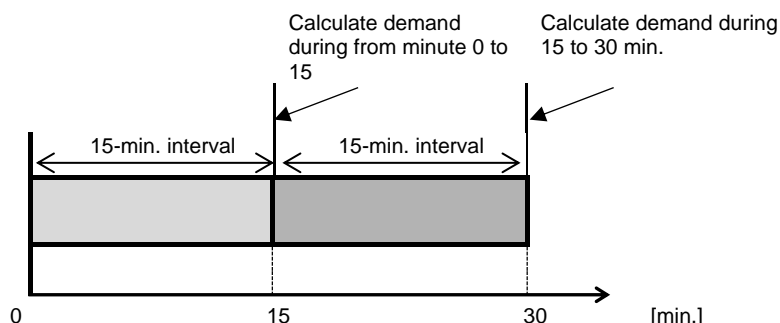
The interval can be set from 1 to 60 (min.) in 1-minute increments (the increment is defined in "power demand interval 2"). The device calculates the demand during the latest finished interval and displays the value.

Ex.) Power demand interval: 15 min. Power demand interval 2: 1 min.



Fixed block

The interval can be set from 1 to 60 (min.) The device calculates the demand during the latest finished interval and displays the value. After one interval finishes, the next interval starts.



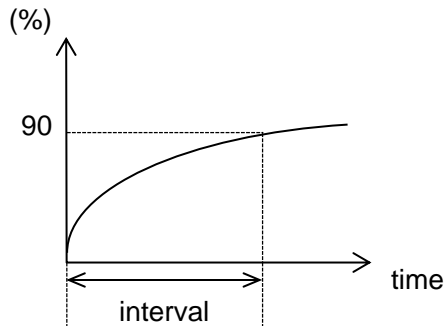
6.4.2 Current Demand

Current demand calculates the demand based on a thermal demand meter.

Current demand =

$(\text{Average of current} - \text{last current demand value}) \times 90\% (\text{fixed}) + \text{Last current demand value}$

If a stable current flows for the interval time, 90% of current value is displayed.



6.4.3 Max. demand value

The device measures and logs the following maximum demand values: active, reactive, apparent, active (export), reactive (export), current.

6.4.4 Demand alarm output

- Output with the pulse output terminal (open collector).
- Output only when the output type is set to [alarm].
- No alarm is output if the power demand alarm threshold is set to '0.000'kW.

6.4.5 Behavior during power failure and recovery

<When a power failure occurs>

- The device stops the demand measurement.
- The device logs the values for max. demand and monthly max. demand in the internal memory.

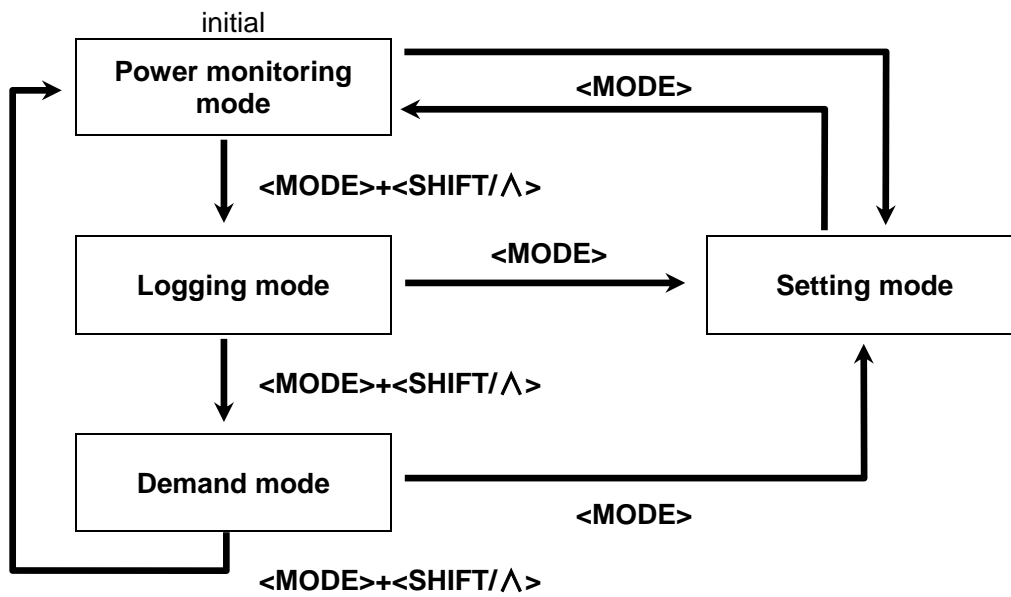
<When the device recovers from a power failure>

- The device stops the demand measuring until the next interval. As soon as the next interval has started, the device starts measuring the demand.

Chapter 7 Display of values

7.1 Changing the monitor display

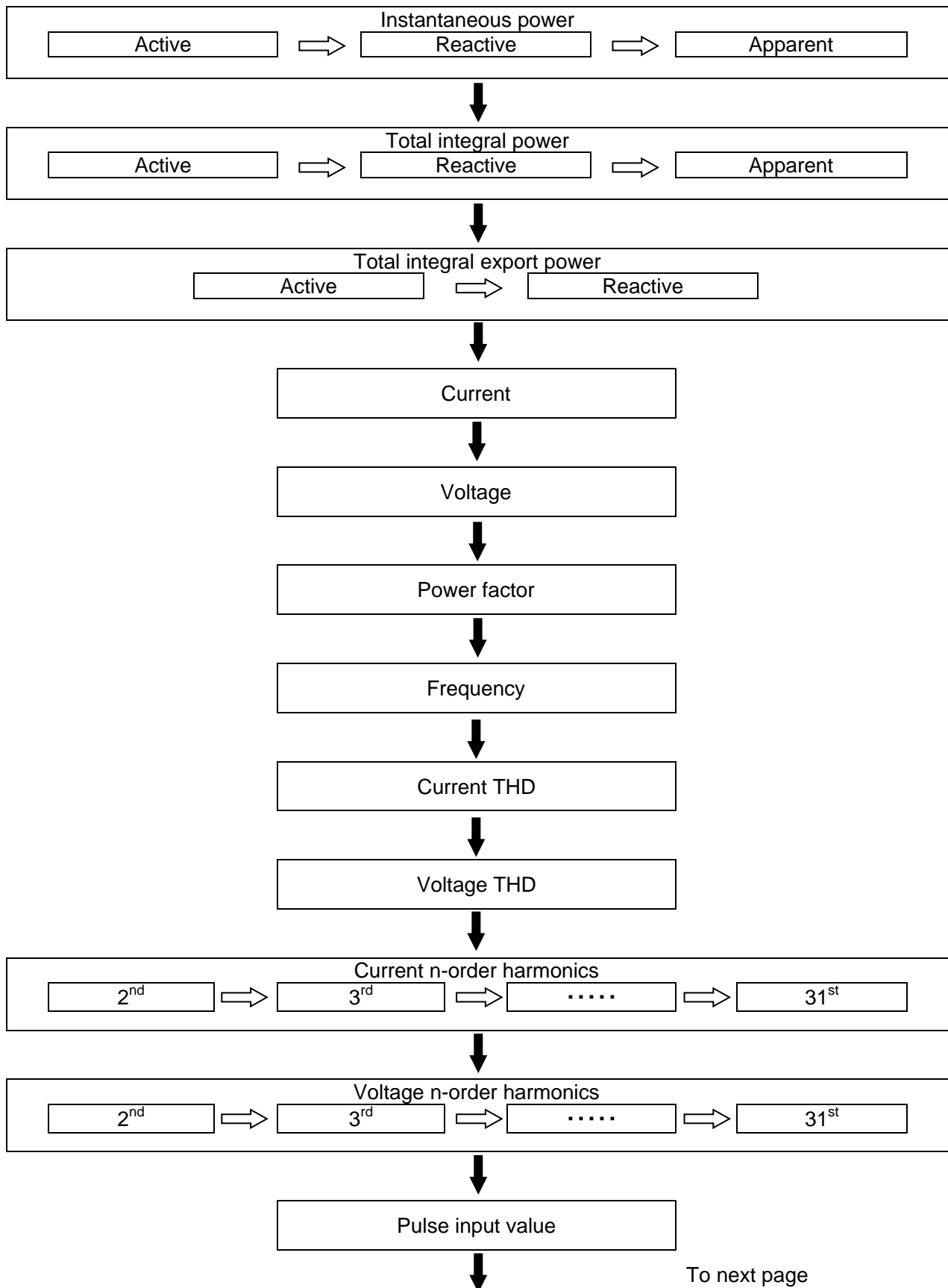
Press <SHIFT/Λ> while pressing <MODE> to change between the power monitoring mode, logging mode and demand mode. Press <MODE> to change to setting mode.



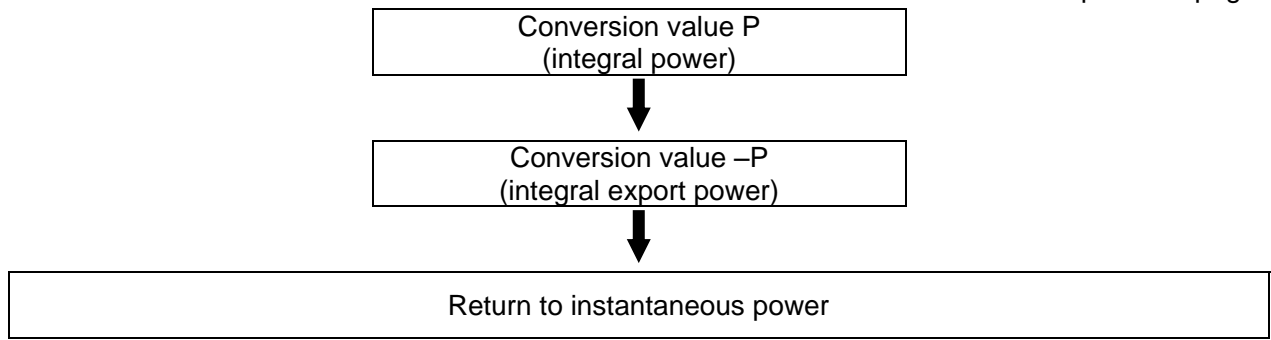
7.2 Changing the monitor display

7.2.1 Single-phase two-wire system

The different arrows stand for the different keys. **➡** <ITEM/>> **⇨** SHIFT/▽>

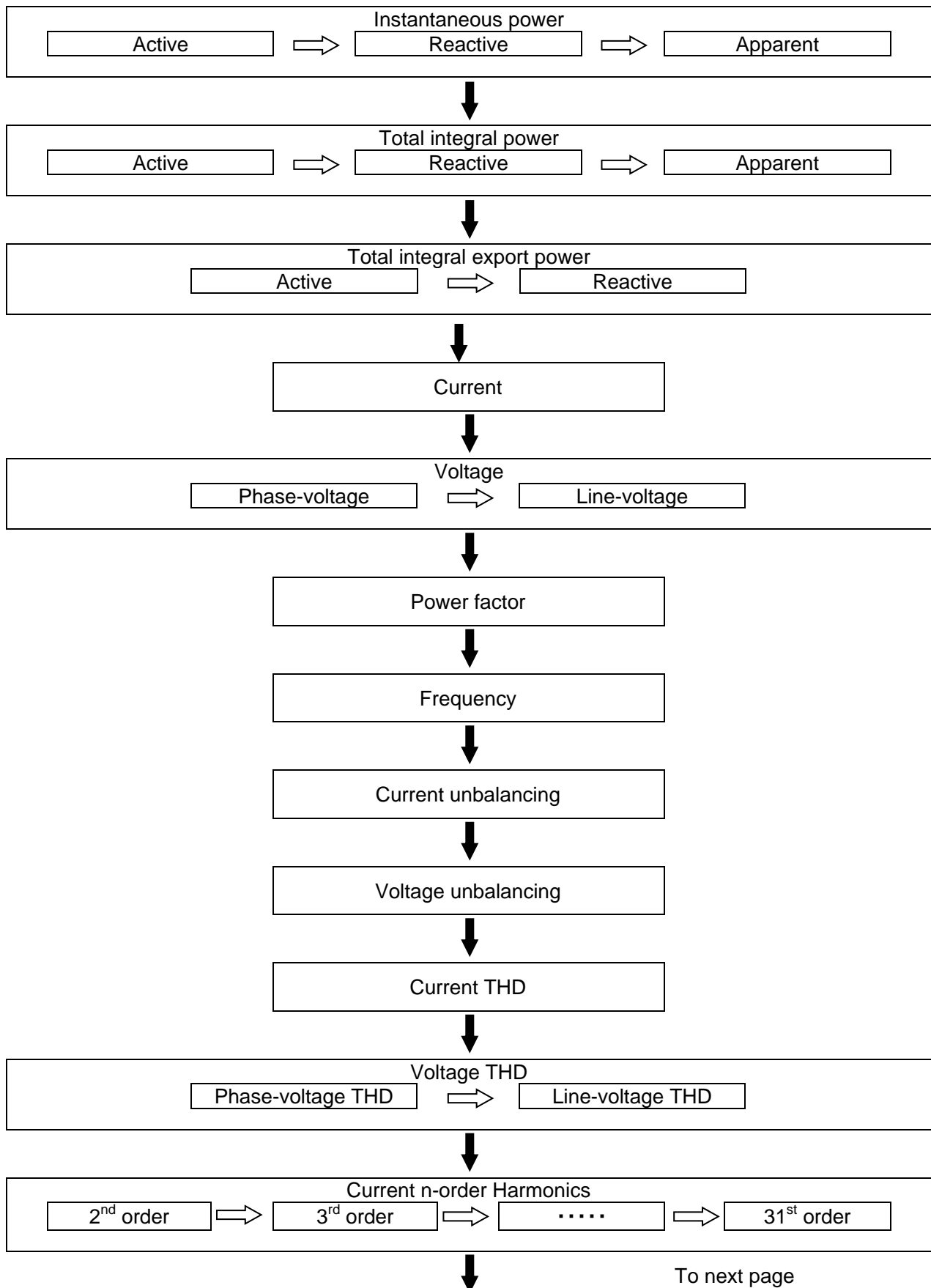


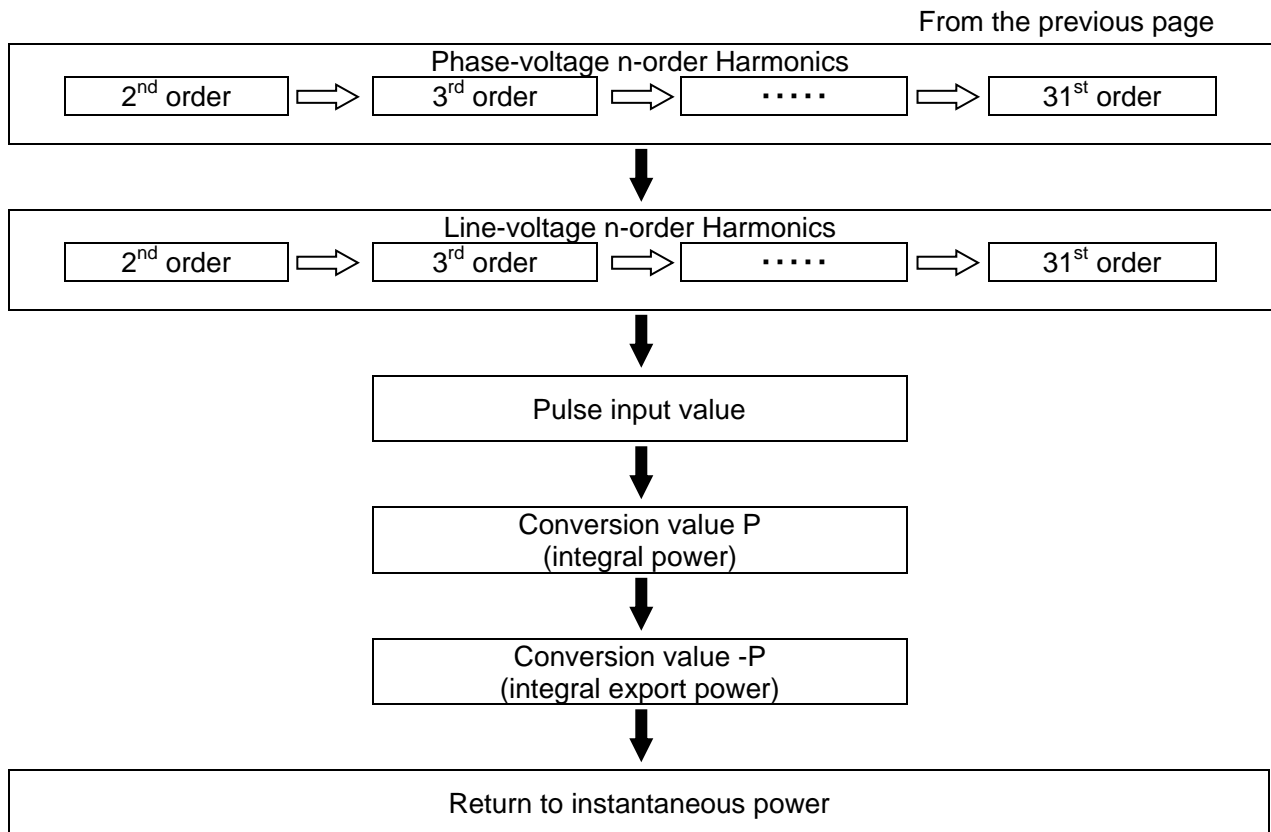
From the previous page



7.2.2 Single-phase three-wire system

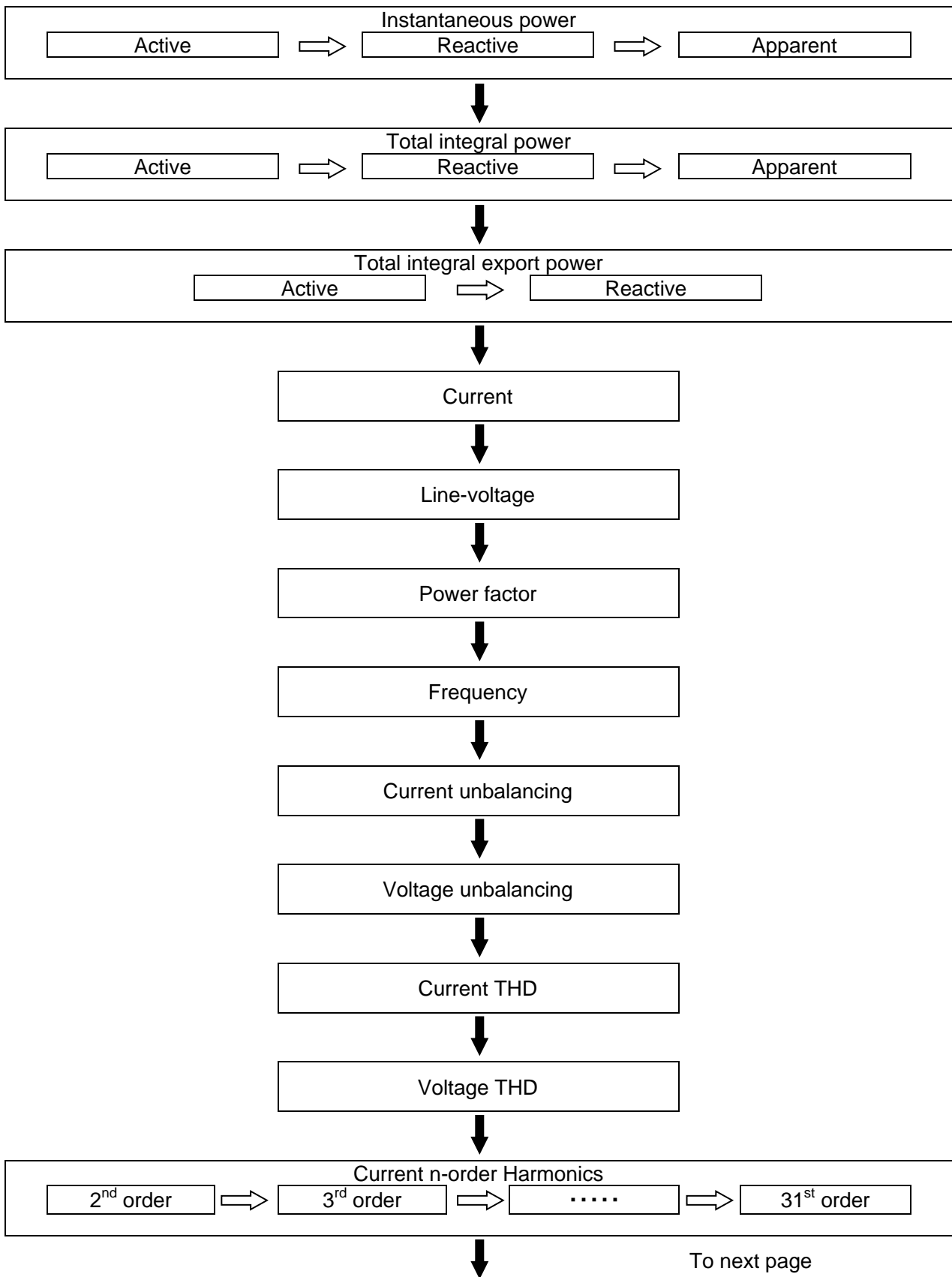
The different arrows stand for the different keys. ➡ <ITEM/>> ⇨ <SHIFT/Λ>

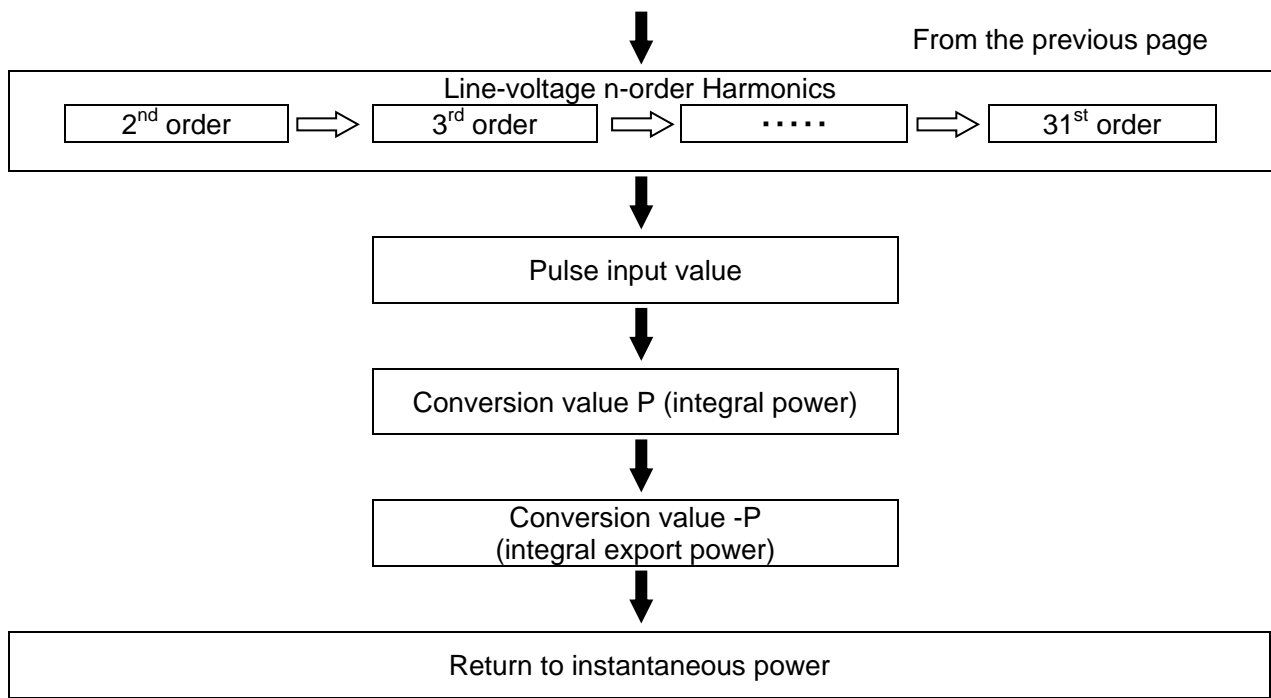




7.2.3 Three-phase three-wire system

The different arrows stand for the different keys. **➡** <ITEM/>> **⇨** <SHIFT/Λ>

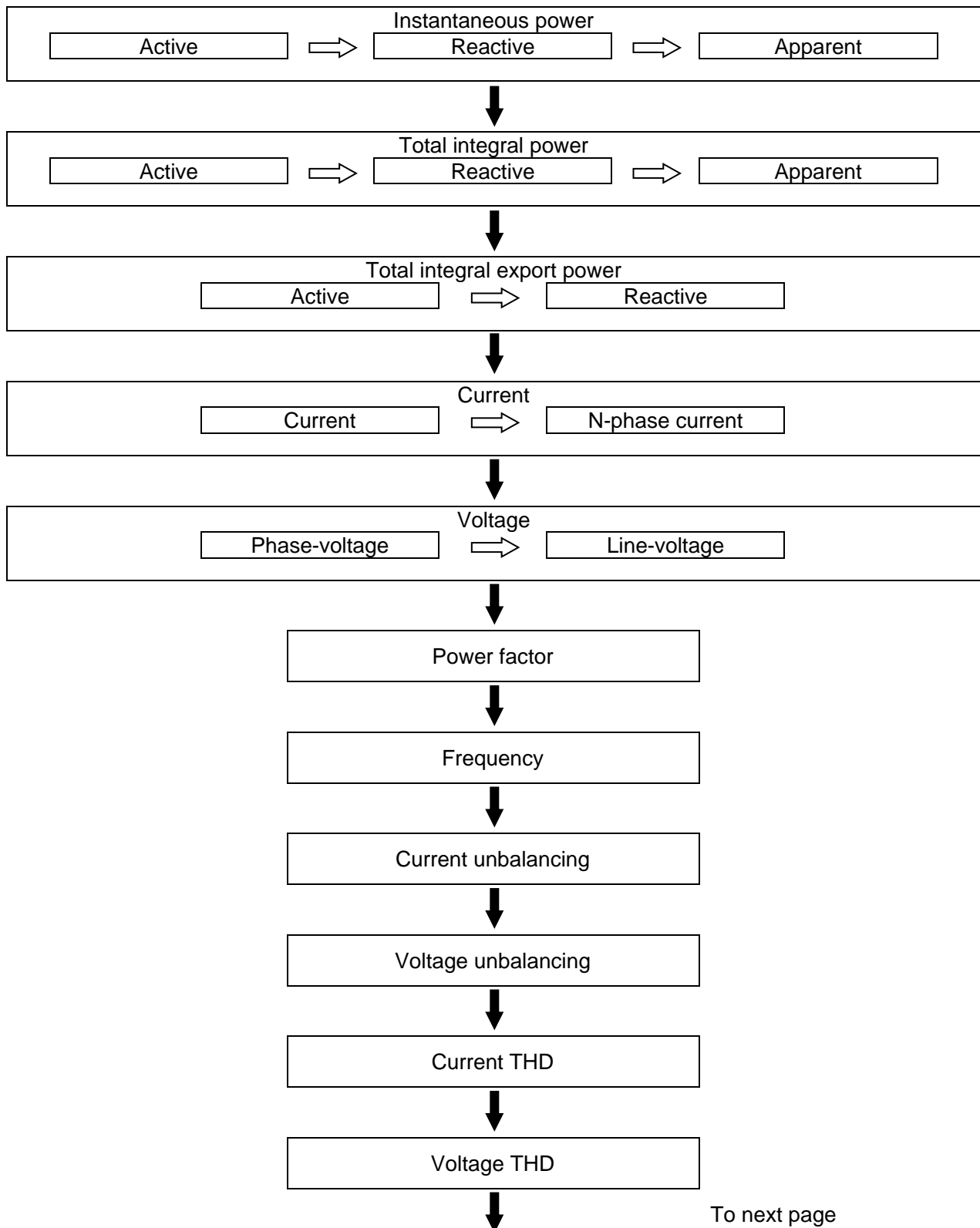


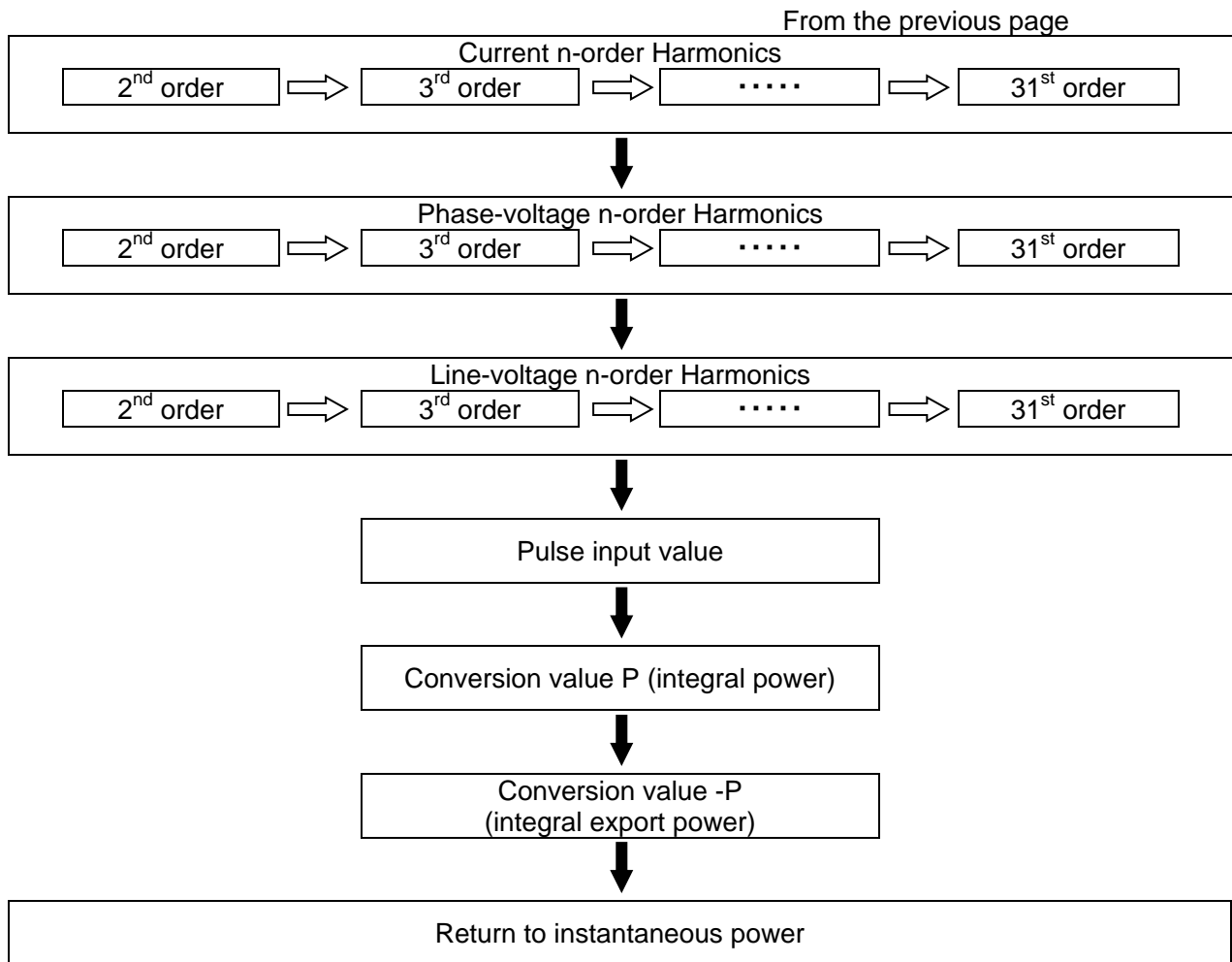


7.2.4 Three-phase four-wire system

The different arrows stand for the different keys.

➡ <ITEM/>> ⇨ <SHIFT/Λ>





7.2.5 Instantaneous power

- The currently measured instantaneous power of all phases or all circuits is displayed.
- Press <SHIFT/Λ> to switch between active, reactive, and apparent.

<1P2W/1P3W/3P4W>

Active

M - 1	1	1	2	3	.	4	5	k	w
P	2							k	w
	3							k	w
	Σ							k	w

SHIF
^

Reactive

1 - 2	1	k v a r
Q	2	k v a r
	3	k v a r
	Σ	k v a r

Apparent

2 - 2	1	k V A
S	2	k V A
	3	k V A
	Σ	k V A

- The device displays the power as shown below.

Display	1P2W	1P3W	3P4W
1	1 st circuit	R-phase	R-phase
2	2 nd circuit	---	S-phase
3	3 rd circuit	T-phase	T-phase
Σ	Total (1+2+3)	Total (R+T)	Total (R+S+T)

<3P3W>

Active

M - 1

P

x . x x x k w

SHIF
^

Reactive

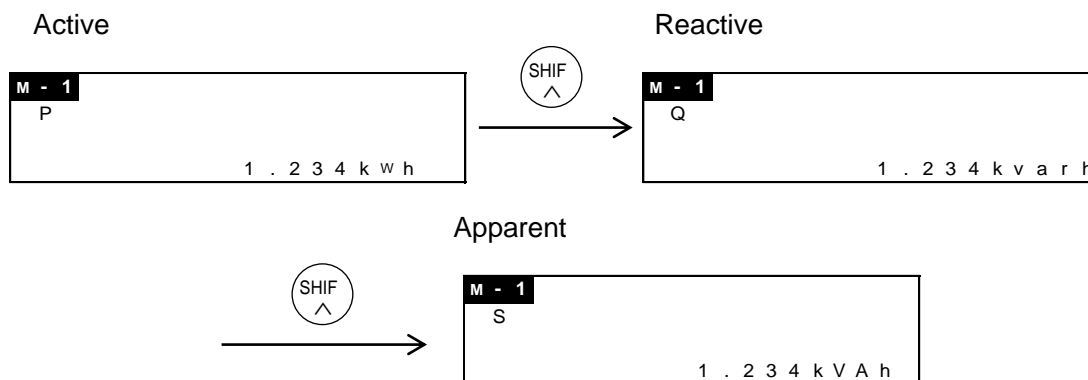
M - 1
Q
x . x x x k v a r

Apparent

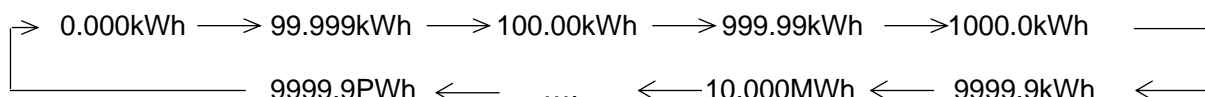
M - 1
S
x . x x x k V A

7.2.6 Total integral power

- The present total integral power is displayed.
- Press <SHIFT/Λ> to switch between active, reactive, and apparent.



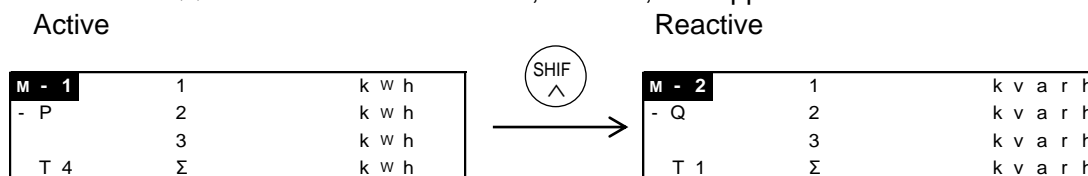
- The total integral power is measured and displayed from 0.000 (kWh/kvarh/kVAh) to 9999.9 (PWh/Pvar/PVA).
- The decimal point is changed automatically.



When the end of the range (9999.9PWh) is reached, the value reverts to 0.000, but the device continues to measure.

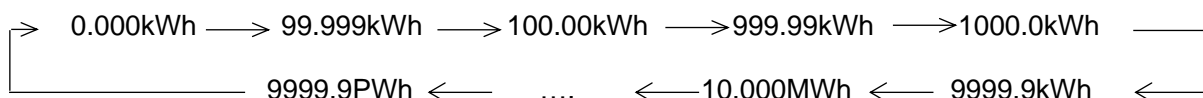
7.2.7 Total integral export power

- The present total export power is displayed.
- Press <SHIFT/Λ> to switch between active, reactive, and apparent.



*It does not light [Σ] with 3P3W system.

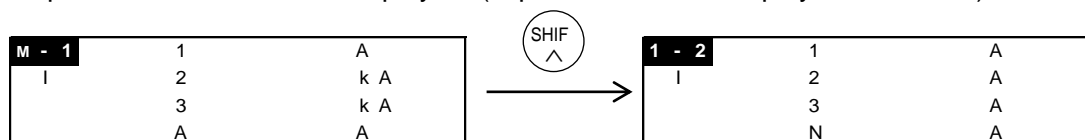
- The total integral power is measured and displayed from 0.000 (kWh/kvarh/kVAh) to 9999.9 (PWh/Pvar/PVA).
- The decimal point is changed automatically.



When the end of the range (29999999) is reached, the value reverts to 0.000, but the device continues to measure.

7.2.8 Current

- The present current value is displayed. (N-phase current is displayed for 3P4W.)



- It measures from 0.1% of CT secondary current.
- When input current exceeds 200% or the display range, it displays “- - - -”.
- Check the measurement environment.
- Current measuring points: The device measures the current as shown below.

Display	1P2W	1P3W	3P3W 3P4W
1	1 st circuit R-current	R-current	R-current
2	2 nd circuit R-current	N-current	S-current
3	3 rd circuit R-current	T-current	T-current
A	Average	Average of R and T	Average
N	—	—	N-current *only 3P4W

7.2.9 Voltage

- The present voltage is displayed.
- Press <SHIFT/△> to switch between phase voltage and line voltage.
- (Line voltage is not displayed for 1P2W system. Phase voltage is not displayed for 3P3W system.)

Phase voltage

M - 1	1	V
U	2	V
	3	V
	A	V

Line voltage

M - 1	1 2	V
U	2 3	V
	3 1	V
	A	V

- When input voltage is under 3V (when VT ratio is 1.), the device displays “0.00” and does not measure.
- When input voltage exceeds 828V or the display range, the device displays “- - - -”.
- Check the measurement environment.
- Voltage measuring points: The device measures the voltage as shown below.

Display	1P2W	1P3W	3P3W	3P4W
1	R-voltage (L1-N) or 1 st circuit R-voltage	R-voltage (L1-N)	No display	R-voltage (L1-N)
2	None or 2 nd circuit R-voltage	None		S-voltage (L2-N)
3	None or 3 rd circuit R-voltage	T-voltage (L3-N)		T-voltage (L3-N)
A	Average	Average of R and T		Average
1 2	No display	R-voltage (L1-N)	RS-voltage (L1-L2)	RS-voltage (L1-L2)
2 3		T-voltage (L3-N)	ST-voltage (L2-L3)	ST-voltage (L2-L3)
3 1		TR-voltage (L3-L1)	TR-voltage (L3-L1)	TR-voltage (L3-L1)
A		Average of R and T	Average	Average

7.2.10 Power factor

•The present power factor of the load is displayed.

<1P2W/1P3W/3P4W>

M - 1	1
P F	2
	3
	A

<3P3W>

M - 1	
P F	
	1 2 3

*The power factor operation is a method that assumes a balanced load. Measuring an unbalanced load may lead to big errors.

7.2.11 Frequency

•The present frequency is displayed.

<1P2W/1P3W/3P4W>

M - 1	1	H z
F	2	H z
	3	H z
	A	H z

<3P3W>

M - 1	
F	
	H z

7.2.12 Current unbalancing

•The present current unbalancing is displayed (no display for 1P2W).

M - 1	
I	
	1 0 0 . 0 0 %

7.2.13 Voltage unbalancing

•The present voltage unbalancing is displayed (no display for 1P2W).

M - 1	
U	
	1 0 0 . 0 0 %

7.2.14 Current THD

- The present THD for current is displayed.

M - 1	1	%
T H D i	2	%
	3	%
	A	%

7.2.15 Voltage THD

- The present THD for voltage displayed.

M - 1	1	%
T H D u	2	%
	3	%
	A	%

M - 1	1 2	%
T H D u	2 3	%
	3 1	%
	A	%

7.2.16 Current n-order Harmonics

- The present current n-order harmonics is displayed.
- Press <SHIFT/Λ> to change the display.
2nd order, 3rd order, 4th order up to 31st order

M - 1	1	%
H - I 2	2	%
	3	%
	A	%

7.2.17 Voltage n-order Harmonics

- The present voltage n-order harmonics is displayed.
- Press <SHIFT/Λ> to change the display.
2nd order, 3rd order, 4th order up to 31st order

M - 1	1	%
H - U 2	2	%
	3	%
	A	%

7.2.18 Pulse input value

- The present pulse input value is displayed.
- The pulse input status (ON or OFF) is controlled via communication. (MEWTOCOL and MODBUS)

Pulse input

M - 1												
C N T												
	1	2	3	4	5	6	7	8	9	0	1	

*When the unit is turned ON while IN1 is shorted, the first pulse is not counted. After that, when a pulse is input, the device counts the pulse.

7.2.19 Conversion value for integral active power

- The conversion value for the present integral active power (P) is displayed (only the total conversion value is displayed for 3P3W).
- Press <SHIFT/Λ> to switch between total, phase 1 (1st circuit), phase 2 (2nd circuit) and phase 3 (3rd circuit).

<1P2W/1P3W/3P4W>

Total

M - 1	1												
C H G	2												
	3												
	Σ	1	2	3	4	5	6	7	8	9	0	1	

<3P3W>

Total

M - 1	1												
C H G	2												
	3												
	Σ	1	2	3	4	5	6	7	8	9	0	1	

*When the conversion value exceeds “99999999”,
“-----” is displayed.

Check the measurement environment.

7.2.20 Conversion value for integral export power

- The conversion value for the present integral export active power (-P) is displayed (only the total conversion value is displayed for 3P3W).
- Press <SHIFT/Λ> to switch between total, phase 1 (1st circuit), phase 2 (2nd circuit) and phase 3 (3rd circuit).

<1P2W/1P3W/3P4W>

Total

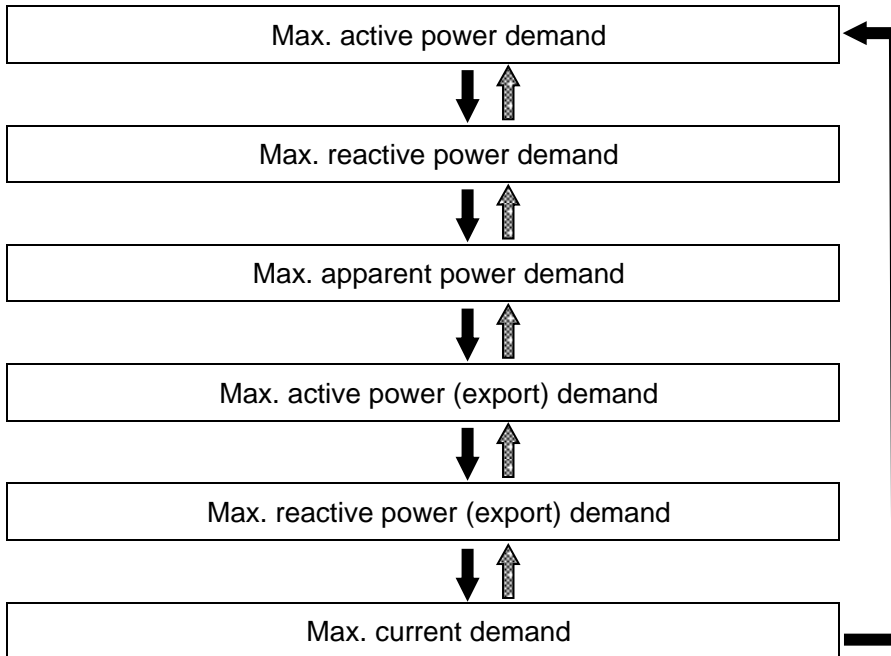
M - 1	1
C H G -	2
	3
	Σ

7.3 Logging Mode

Each measured value is displayed as shown below. It differs according to the selected phase/wire system.

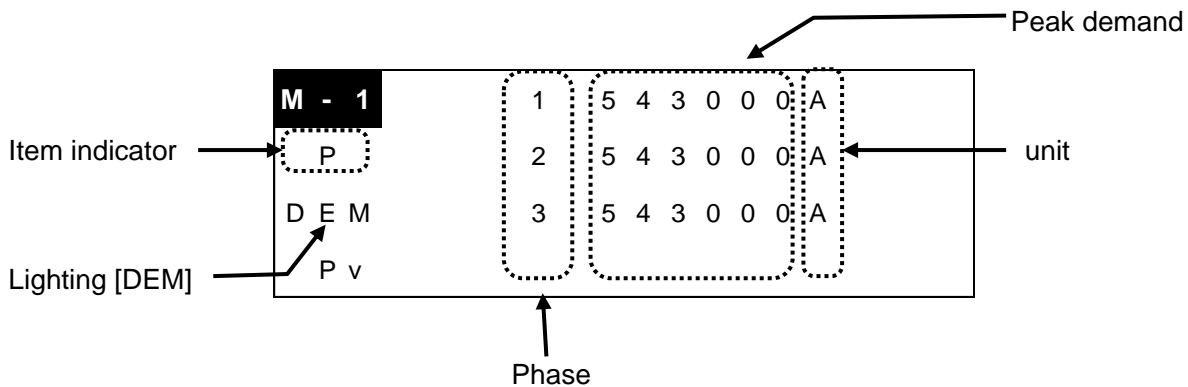
The different arrows stand for the different keys.

 <ITEM/>>
  <SHIFT/Λ>
  <SET>
  <SET>+<ITEM/>>



7.3.1 Max. demand value

• Log data of peak demand is displayed.



• Press <ITEM/>> to change to a different item to display.

Item	Display	
	Indicator	unit
Active power Peak demand	P	kW
Reactive power Peak demand	Q	kvar
Apparent power Peak demand	S	kVA
Active power (export) Peak demand	-P	kW
Reactive power (export) Peak demand	-Q	kvar
Current Peak demand	I	A

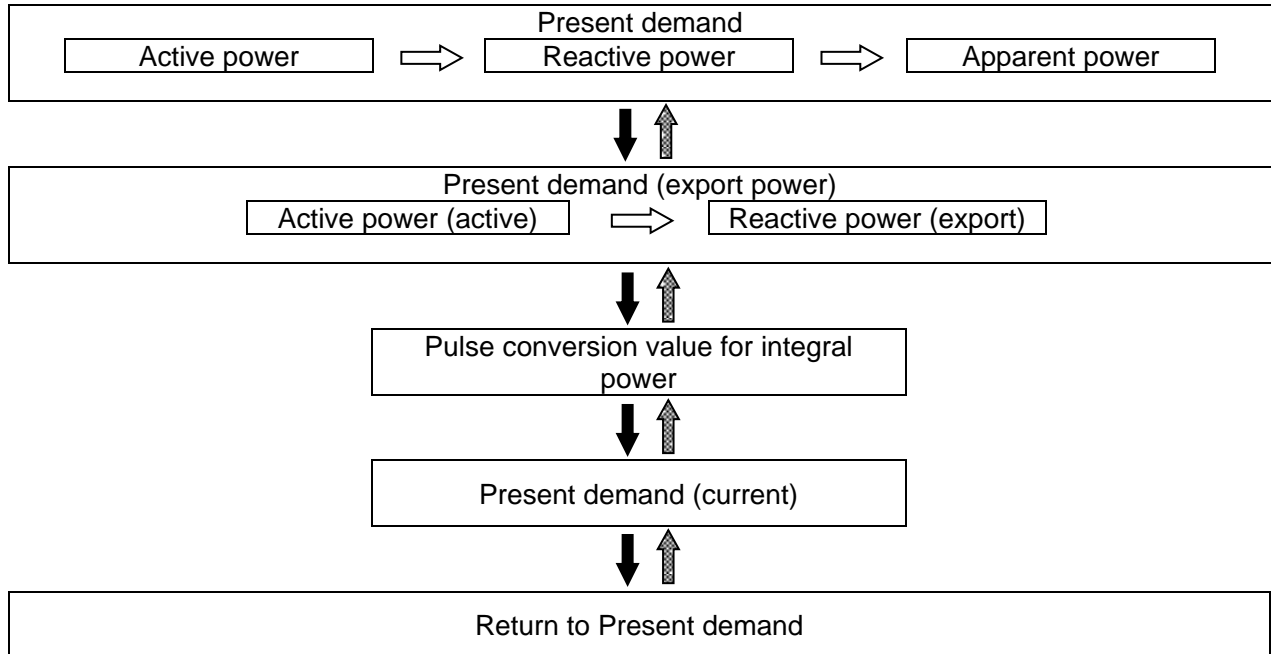
7.4 Demand Mode

Each measured value is displayed as shown below. It differs according to the selected demand type.

7.4.1 Block Interval Demand (sliding block, fixed block)

The different arrows stand for the different keys.

 <ITEM/>>
  <SHIFT/Λ>
  <SET>
  <SET>+<ITEM/>>

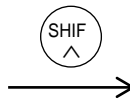


Present power demand

- Each demand value is displayed.
- Press <SHIFT/Λ> to switch between active power, reactive power, apparent power.

Active power present demand

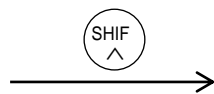
M - 1
P
D E M
P v 1 2 3 . 4 5 k w



Reactive power present demand

M - 2
Q
D E M
P v 1 2 3 . 4 5 k v a r

Apparent power present demand



1 - 1
S
D E M
P v 1 2 3 . 4 5 k V A

* [— — — — —] is displayed in the following cases:

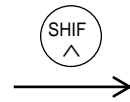
- Until the time set to start monitoring demand has passed
- The demand value exceeds the display range
- The clock is changed between demand time intervals
- Until the next interval starts after a power failure

Present export power demand

- Each demand value is displayed.
- Press <SHIFT/Λ> to switch between active power (export), reactive power (export).

Active power (export)
present demand

M - 1
- P
D E M
P v 1 2 3 . 4 5 k w



Reactive power (export)
present demand

M - 2
- Q
D E M
P v 1 2 3 . 4 5 k v a r

* [— — — — —] is displayed in the following cases:

- Until 1 minute has passed after starting to monitor demand
- The demand value exceeds the display range

Pulse conversion value for integral power

• Present value of pulse conversion value for integral power is displayed.

M - 1	
P L S	
	1 2 3 . 4 5 k w h

Present current demand

• Present value of current demand is displayed.

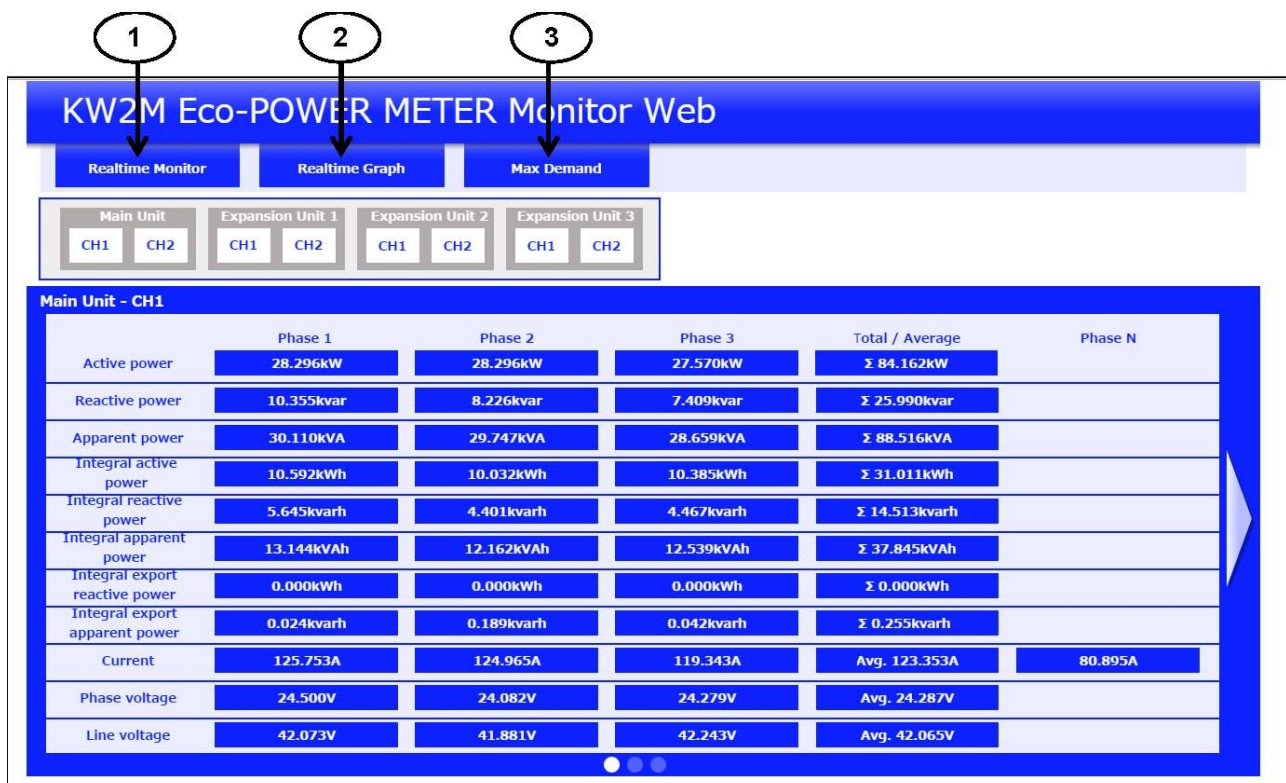
M - 1	1	1 2 . 3 4 5 A
I	2	A
D E M	3	A
P v		

Chapter 8 Monitoring measured values via Web browser (Monitor Web)

This function is available only for the KW2M-X. It allows you to monitor the values measured by the device with a Web browser.

Access to <http://xxx.xxx.xxx.xxx/cu/index.htm> by web browser. It may take time to load the website depending on the communication environment.

Use the IP address you have set in “5.5.6 Settings for Ethernet and RS485 communication” (p. 48). If you have activated the password function for Monitor Web and Customer Web, you need to log in with a password (initial user name: user, initial password: user).



Item	Description
1 Realtime monitor	Display measured instantaneous values
2 Realtime graph	Display graph of measured instantaneous values
3 Max demand	Display max demand

Chapter 9 Creating web contents (Customer Web)

This function is available only for the KW2M-X. It allows you to upload your designed screen (contents) created with Control Web Creator to the device and to monitor the information of the web server in the device via a web browser.

Access to <http://xxx.xxx.xxx.xxx/monitor/index.htm> by web browser. It may take time to load the website depending on the communication environment.

Use the IP address you have set in 5.4.2 Settings for communication (RS485) or 5.4.3 Settings for communication (Ethernet) depending on the communication type you are using.

If you have activated the password function for Monitor Web and Customer Web, you need to log in with a password (initial user name: user, initial password: user).

For more information, refer to the section on [Control Web Creator] in the FP7 Web Server Function Manual.

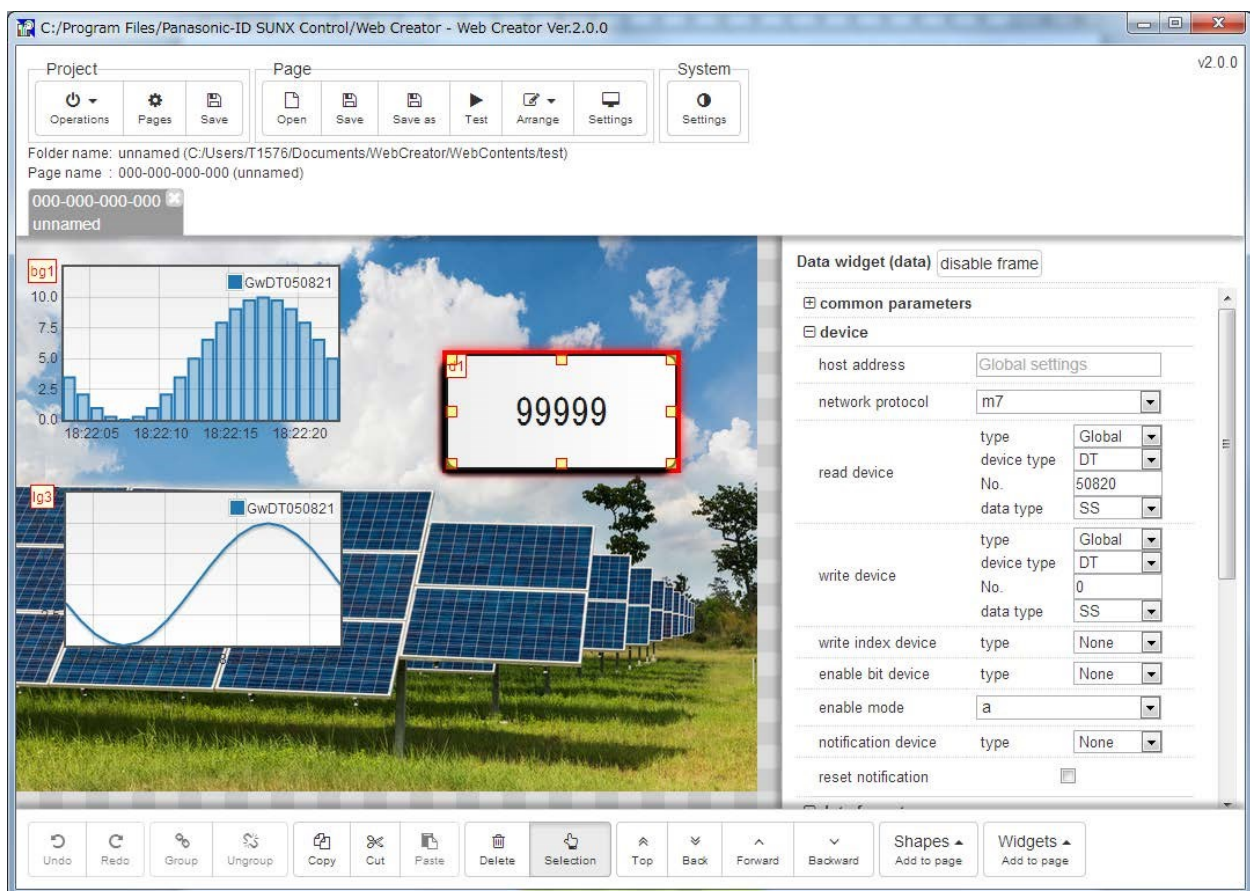
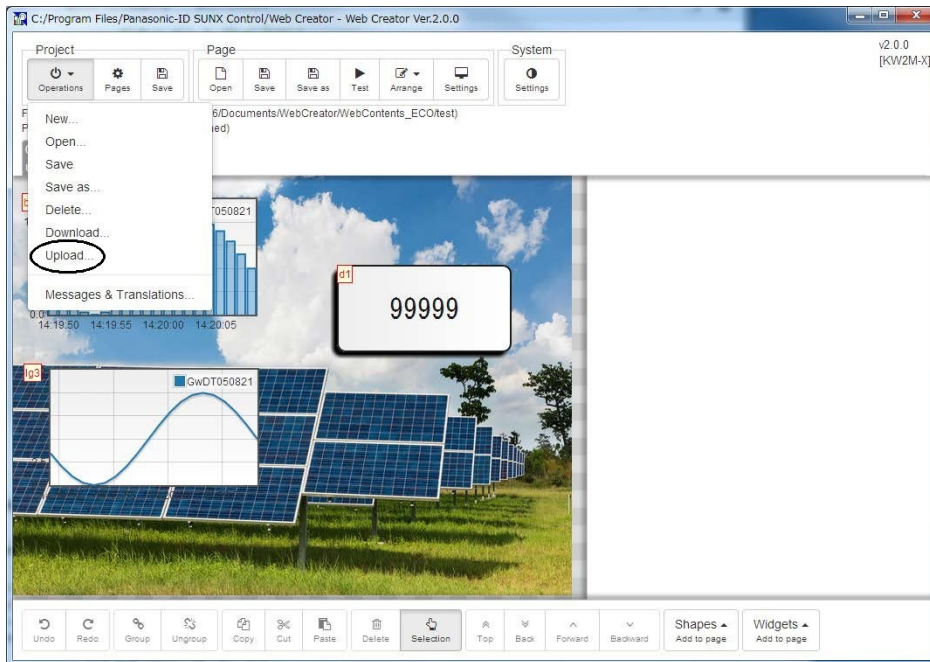


Image of the Control Web Creator

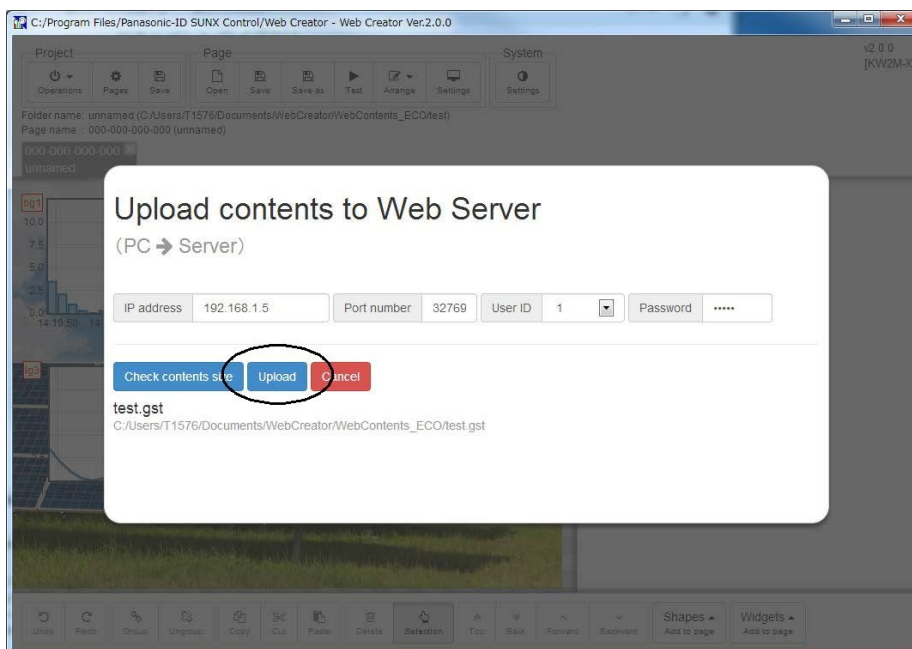
9.1 How to upload web contents to the device

This is how you upload the web contents created with Control Web Creator to the device.

- 1) Start Control Web Creator.
- 2) Select [Operations] – [Upload].

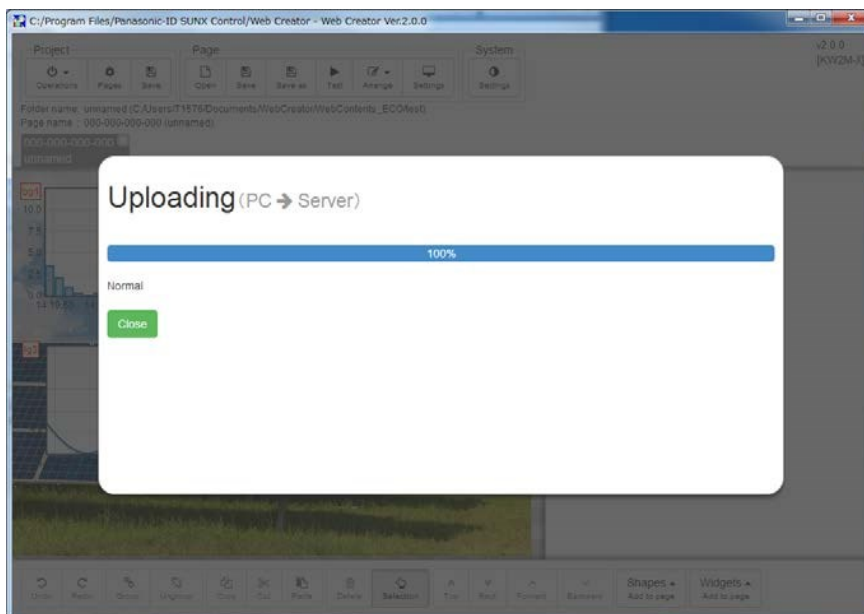


- 3) Set the IP address, the port number, user ID and password
- 4) Select [Upload].
The upload window appears.



Item	Content
IP address	IP address of the device (initial: 192.168.1.5)
Port number	32769 (fixed)
User ID	1 (fixed)
Password	Password of SystemWeb (initial: admin)

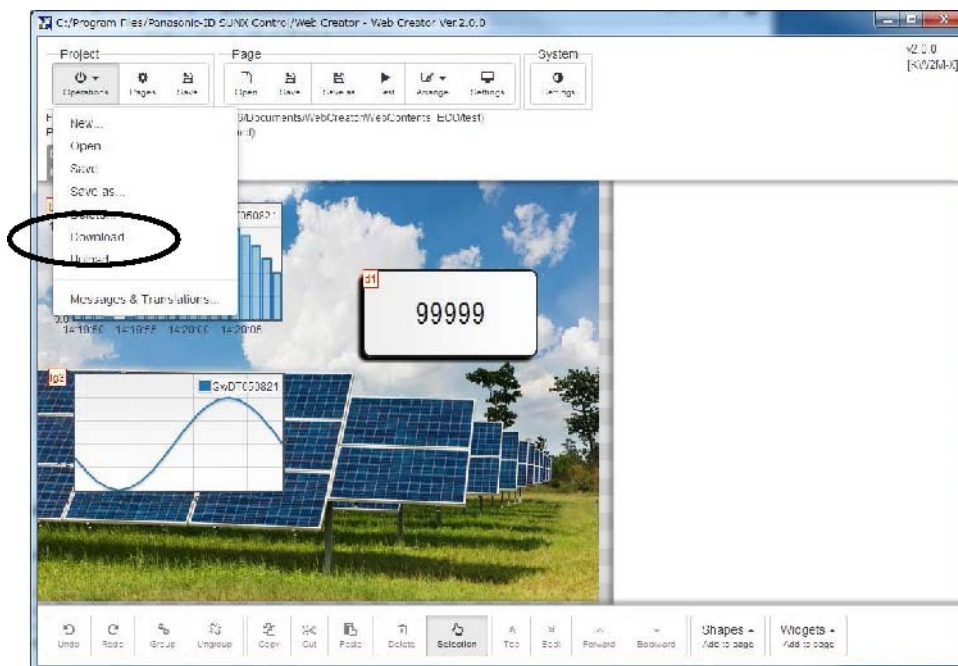
- 5) When the upload is finished, the following window appears.



9.2 How to download web contents from the device

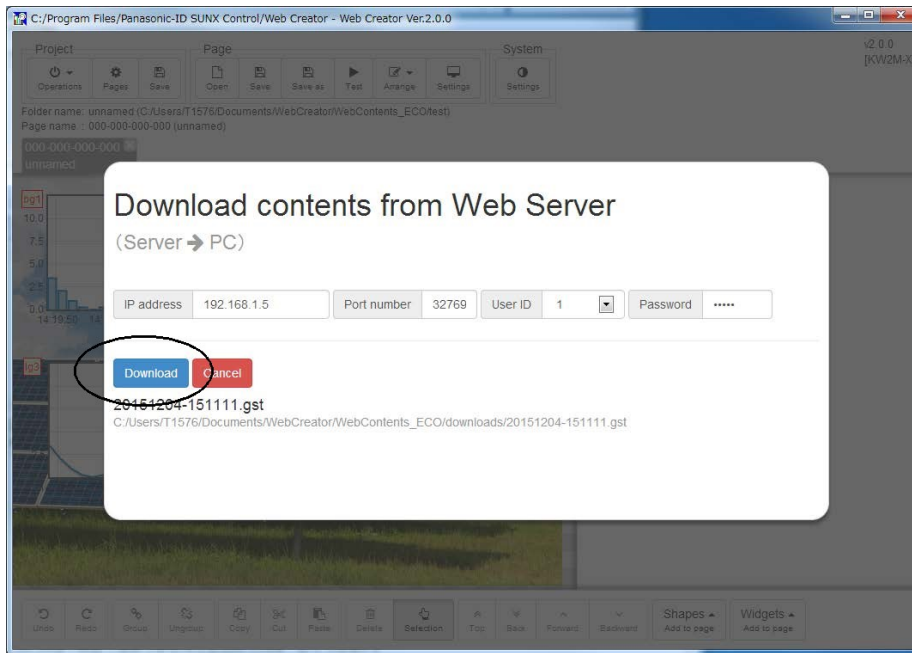
This is how you download the web contents from the device to your computer.

- 1) Start Control Web Creator.
- 2) Select [Operations] – [Download].



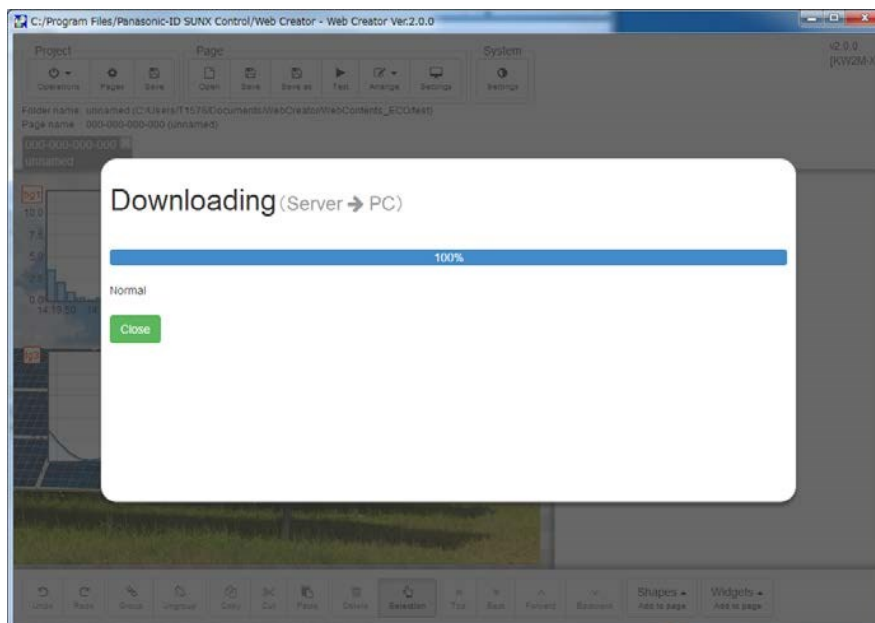
- 3) Set the IP address, the port number, user ID and password

- 6) Select [Download].
The download window appears.



Item	Content
IP address	IP address of the device (initial: 192.168.1.5)
Port number	32769 (fixed)
User ID	1 (fixed)
Password	Password of SystemWeb (initial: admin)

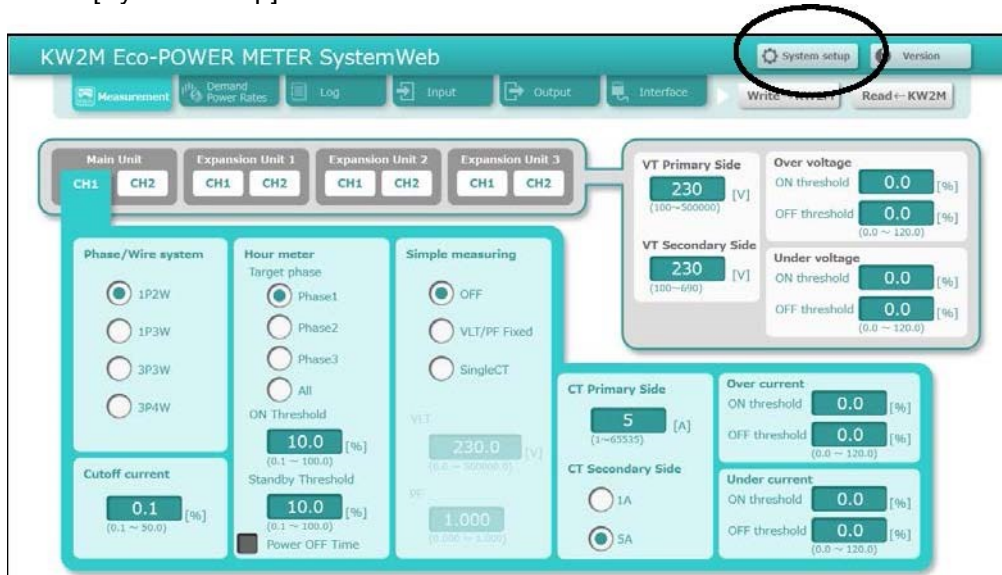
- 4) When the download is finished, the following window appears.



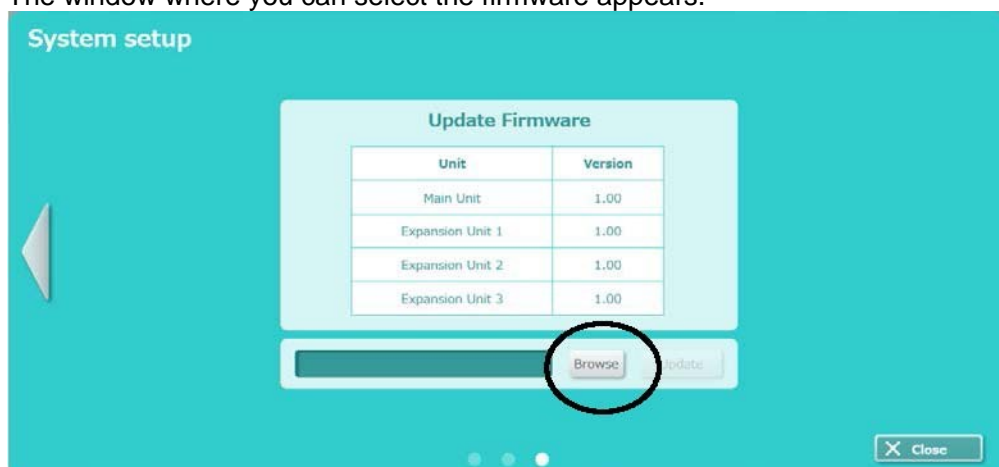
Chapter 10 How to update the firmware

You can update the firmware by System Web. Expansion units connected to the main unit are updated at the same time.

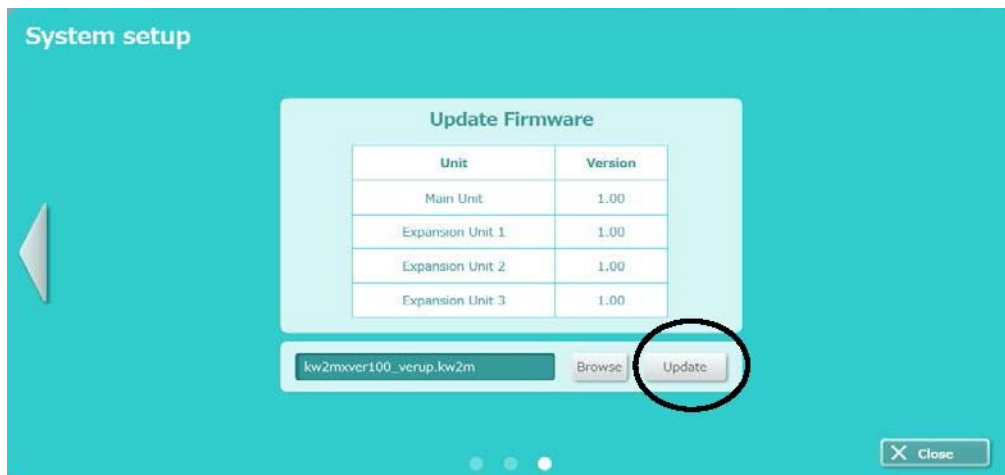
- 1) Download the latest firmware from the web site.
- 2) Open <http://xxx.xxx.xxx.xxx/setup/index.htm> in the web browser.
- 3) Select [System setup]



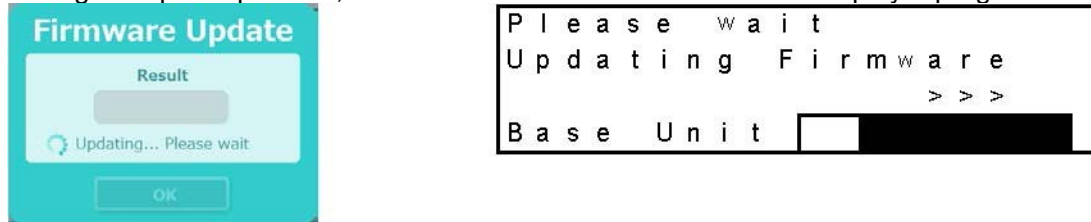
- 4) Select [Browse]
- The window where you can select the firmware appears.



- 5) Select the update file "kw2maverxxx_verup.kw2m" or "kw2mxverxxx_verup.kw2m" according to your device
- 6) Select [Open]
- 7) When the selected file name is displayed, click [Update]



During the update process, both the web browser and the device display a progress bar.



- 8) When the firmware update is finished, the following window appears.



When the update has failed, an error window will appear. Check the communication settings and try again.



- 9) Select [OK] to exit System Web. The device is now ready for use.

Chapter 11 Specifications

11.1 General specifications (main unit and expansion unit)

Supply voltage range	100 to 240V AC
Rated frequency	50/60Hz
Nominal power consumption	Approx. 15V A (240V AC at 25°C)
Inrush current	Max. 30A (240V AC/DC at 25°C)
Allowable momentary power-off time	10ms
Ambient temperature	Operation -10 to + 50°C
	Storage -25 to + 70°C
Ambient humidity	30 to 85%RH (at 20°C) non-condensing
Breakdown voltage (initial)	Between the isolated circuits: 2,000V/1min
	a) enclosure ⇔ all terminals b) primary insulated circuits ⇔ secondary insulated circuits (Double insulation) • power supply terminals ⇔ other terminals • voltage input terminals ⇔ other terminals
Insulation resistance (initial)	Between the isolated circuits: min. 100MΩ
Vibration resistance	10 to 150Hz (7.5 minutes/cycle) Single amplitude: 0.075mm (1h on 3 axes)
	10 to 55Hz (1 minute/cycle) Single amplitude: 0.375mm (1h on 3 axes)
Shock resistance	Min. 294m/s ² (5 times on 3 axes)
Display method	LCD with backlight
Display updated cycle	500, 1000, 2000, 3000ms (set in setting mode)
Power failure memory method (when power is off)	Internal memory
Usable altitude	Max. 2,000m above sea level
Overvoltage category	III
Pollution degree	2
Dimensions W/H/D	Main unit 85 x 140 x 65mm
	Expansion unit 85 x 70 x 65mm
Weight	Main unit Approx. 450g
	Expansion unit Approx. 200g

11.2 Measurement Specifications

Power measurement (for main unit and expansion unit)

Measured circuit number		Main unit		2-circuit of 1-system (6-circuit of 1-system for 1P2W)	
		Expansion unit		2-circuit of 1-system (6-circuit of 1-system for 1P2W)	
Max. measured circuit number		8-circuit of 1-system (24-circuit of 1-system for 1P2W) (3 Expansion units are connected to main unit.)			
Measured data		AC sine			
Phase/wire system		Single-phase two-wire (1P2W, max.3-circuit) Single-phase three-wire (1P3W) Three-phase three wire (3P3W) Three-phase four-wire (3P4W) (common)			
Applicable power system		100V system, 200V system, 400V system			
Measured frequency		50/60Hz			
Sampling rate		Sampling		1.024MHz (approx.1.0μs)	
		Data update		100ms 22.5s for Harmonics (2 nd to 31 st except THD)	
Voltage	Direct input voltage	1P2W	L-L	0-690V AC *0-300V AC for UL standard	
		1P3W	L-L	0-690V AC *0-300V AC for UL standard	
			L-N	0-350V AC *0-152V AC for UL standard	
		3P3W	L-L	0-690V AC *0-300V AC for UL standard	
		3P4W	L-N	0-690V AC *0-300V AC for UL standard	
			L-L	0-398V AC *0-173V AC for UL standard	
	Impedance	Min. 2MΩ (L-N; V1/V2/V3/Vn)			
	Resolution	0.01V			
	Power consumption	Approx. 0.2VA (L-N; V1/V2/V3 - Vn)			
	Accuracy	±0.2% *±0.5% for 2-phase of 1P3W, 3-1 voltage of 3P3W and line voltage of 3P4W			
Input voltage with VT	Primary voltage *3 100 to 500000V Secondary voltage *3 100 to 690V				
Current	Input current (with CT)	Primary current		Max. 65,535A	
		Secondary current		1A or 5A (set in setting mode)	
	Max. current	10A (200% of the rating)			
	Overload capacity	1000% of the rating for 3s			
	Resolution	0.001A			
	Power consumption	Approx. 0.2VA (between K and L of CT)			
	Accuracy *1	±0.2% *2 *±0.5% for 2(N)-phase of 1P3W and 2(S)-phase of 3P3W.			
Power	Accuracy *1	±0.5%			
		Active power	Class 0.5S (IEC 62053-22)		
		Reactive power	Class 2 (IEC 62053-23)		

*1 Without error of current transformers (CT) and voltage transformers (VT)

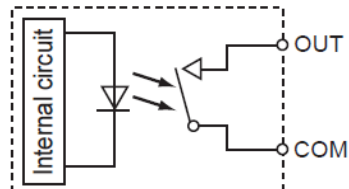
*2 When the device measures a current that is more than 5% below the rating, the accuracy may vary by 0.5%.

*3 When no VT is used, set the primary and the secondary voltage to the same value.

11.3 Output Specifications (main unit only)

Number of outputs		2 (insulate between output terminals)
Insulation method		MOSFET relay
Output type		1a
Output capacity		100mA, 30V AC/DC
Output mode (OUT1/OUT2)		<ul style="list-style-type: none"> • Pulse by integral power • Output by alarm or events (set in setting mode)
Pulse by integral power	Pulse width	1 to 100ms (set in setting mode)
	Pulse output unit	0.001kWh/ 0.01kWh/ 0.1kWh/ 1kWh/ 10kWh/ 100kWh
Alarm Event	Type	Stand-by alarm/ Under voltage alarm/ Over voltage alarm/Power interruption alarm/ Under current alarm/Over current alarm/ Active power alarm/ Reactive power alarm/Apparent power alarm/ PF alarm/ Over frequency alarm/ Under frequency alarm/ Voltage harmonics alarm/ Current harmonics alarm/ Voltage THD alarm/ Current THD alarm/ Unbalanced voltage alarm/ Unbalanced current alarm/ Power demand alarm/ Current demand alarm/ counter output/ level output (external control)
	Alarm reset	Self-reset (according to the setting) / Manual-reset
Protection element		Varistor
Alarm output	Indicator	Lighting alarm mark and blinking backlight
	Output signal	2 (can be set separately) Normal: OFF, Alarm: ON
	Output capacity	100mA, 30V AC/DC

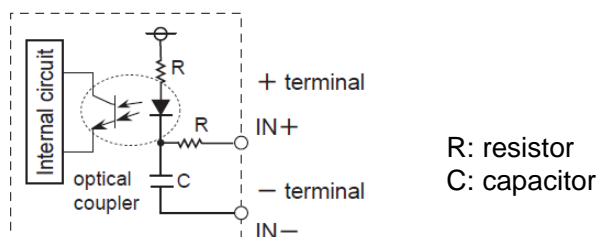
<Internal output circuit>



11.4 Input Specifications (main unit only)

Number of inputs		1
Insulation method		Designated insulation for input (insulate to the other functions)
Input method		Contact / non-voltage contact or open-collector
Input signal		Non-voltage <ul style="list-style-type: none"> • Impedance: Max. 1kΩ (when short-circuit current: max. 10mA) • Residual voltage when shorted: max. 3V • Impedance when open: min. 100kΩ
Input mode		Pulse input or synchronized with input from external device
Max. counting speed		2000Hz / 30Hz
Min. input signal width		0.25ms (when 2000Hz is set) / 16.7ms (when 30Hz is set) ON:OFF ratio=1:1
Pre-scale	Decimal point	Under 3 digits
	Range	0.001 to 100.000 (set in setting mode)
Output mode when pulse output is selected		HOLD
Protective elements		Zener diode
Pulse input	Input signal	1,000 to 99,000 pulse/kWh (set in setting mode) (External pulse converter is necessary.)
	Pulse rate	0.001 to 100.000 kWh/pulse
	Input condition	2000Hz
		Pulse width
		Pulse interval
		Min. 0.25ms Min. 0.5ms (OFF time min. 0.25ms)
		30Hz
		Pulse width
		Pulse interval
		Min. 16.7ms Min 33.4ms (OFF time min. 16.7ms)
	Operation voltage/current	5V DC 10mA

<Internal input circuit>



11.5 Demand monitor and control specifications

Demand type	IEC61557-12 requirement 1. Sliding block interval 2. Fixed block interval 3. Current demand
Power input type	Current transformer input Pulse input (set in setting mode) *1
Demand span	1 to 60 min. (set in setting mode)
Measurement item	Present demand
Data update cycle	1 min.
Display	Present demand (active/ reactive/ apparent/ Active (export)/ reactive (export)/ current)
Saved data	Max.demand

*1 Only CH1 of main unit is available. Only current transformer input is available for CH2 of main unit and expansion unit.

11.6 Communication Specifications

<RS485>

Interface		Conforming to RS485
Communication method		Half-duplex
Synchronous system		Synchronous communication method
Isolation status		Isolated with the internal circuits
Protocol		MEWTOCOL, MODBUS(RTU) (select in setting mode)
Number of connected unit		99 (max.) *1
Transmission distance		1200m *2
Transmission speed		115200, 57600, 38400, 19200, 9600, 4800, 2400bps (select in setting mode)
Transmission format	Data length	8 bit (fixed)
	Parity	Not available / odd number / even number (select in setting mode)
	Stop bit	1bit, 2bit (select in setting mode)

*1 For RS485 converter on the computer side, we recommend SI-35 and SI-35USB (from LINE EYE Co.,Ltd.). When using SI-35,SI-35USB or PLC from our company (which can be connected up to 99 units), up to 99 can be connected. In case using this system with the other devices, up to 31 can be connected.

*2 Please check with the actual devices when some commercial devices with RS485 interface are connected. The number of connected devices, transmission distance, and transmission speed may be different according to using transmission line.

< Ethernet >

Port number		2 port
Interface		IEEE802.3u,100BASE-T/10BASE-TX
Connector shape		RJ45
Transmission	Transmission speed	100Mbps / 10Mbps
	Transmission method	Base band
	Max. segment length	100m
Transmission cable		UTP (Category 5)
Protocol (DNS, DHCP)		TCP/IP, UDP / IP
Web server		Setting
Functions		Auto-negotiation *1 MDI / MDI-X Auto-crossover

*1 With the auto-negotiation function, the transmission speed is changed automatically.

11.7 Self-diagnostics and troubleshooting

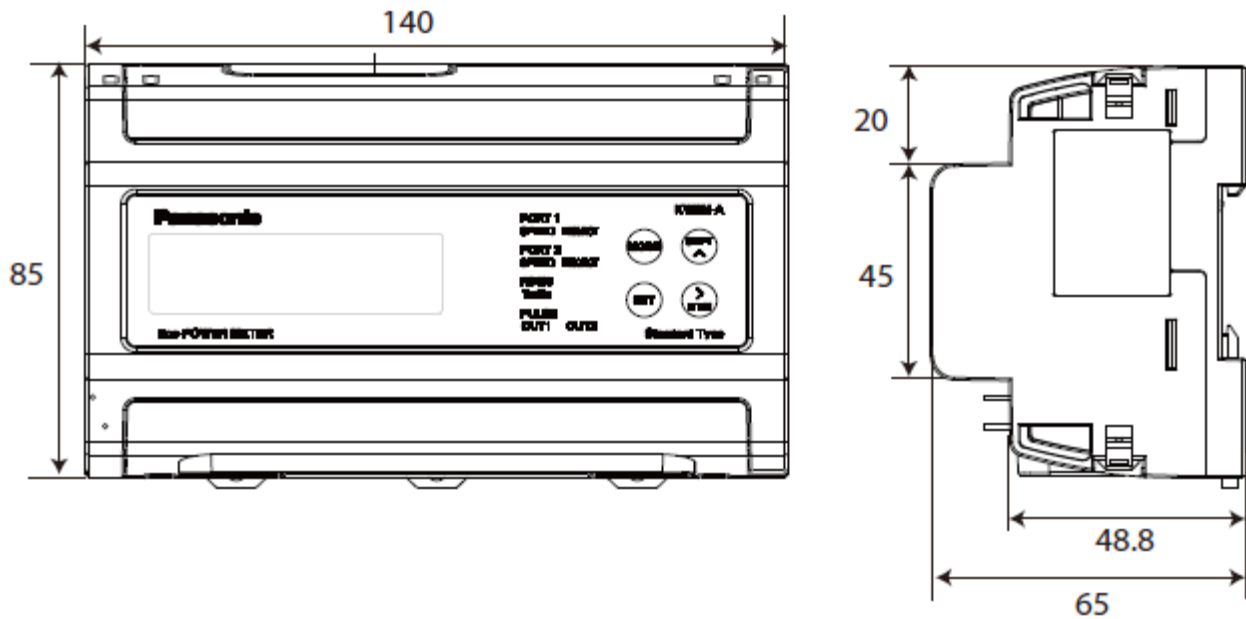
When an error occurs, an error code will be displayed. Refer to the list of error codes in the table to find out what to do.

Error code	Error description	Action to take
W0001	DHCP server access error	Connect to the DHCP server.
W0002	Illegal IP address has been obtained by the DHCP server	Check the DHCP server.
W0003	IP address duplication	Change the IP address.
W0013	Web server is in lock out due to an authentication failure	Wait 10 minutes and try again.
E0042	No expansion units found	Turn off power and connect the expansion units
E0049	Hardware error	Turn the power off and on again. When the device does not recover, change the main unit as it may have reached the end of its service life.
E0091	Internal memory error 1	Turn the power off and on again. When the device does not recover, change the main unit as it may have reached the end of its service life.
E0092	Internal memory error 2	Turn the power off and on again. When the device does not recover, change the main unit as it may have reached the end of its service life.

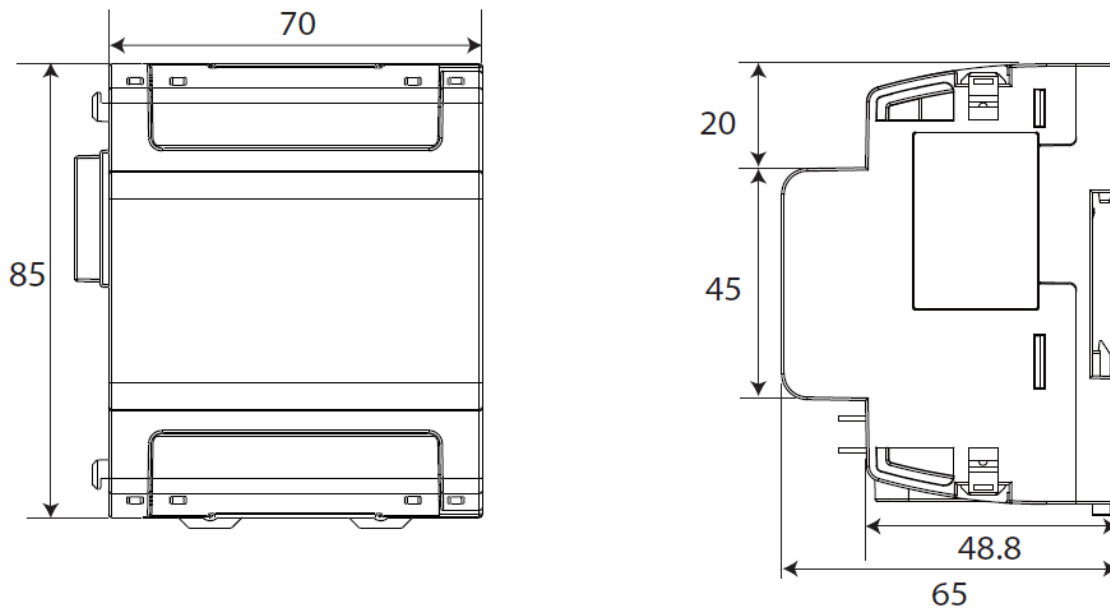
Chapter 12 Dimensions

12.1 Main unit

Unit: mm
Tolerance: ± 1.0



12.2 Expansion unit



Revision History

Issue Date	Manual No.	Content of revision
April 2016	WUME-KW2MAX-01	First edition
July 2016	WUME-KW2MAX-02	Second edition <ul style="list-style-type: none">• Correction of surge wave form diagram in chapter 1.



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