Panasonic

KW9M
Eco-POWER METER
Advanced Type

User's Manual

WUME-KW9MA-04

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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.

Copyright and trademark

Introduction

Thank you very much indeed for purchasing “KW9M Eco-POWER METER Advanced type”.
In this manual, we explain the usage of “KW9M Eco-POWER METER” in detail.
Please use it correctly after understanding the content enough.

Table of Contents

Cautions before using

■ About this product

Eco-POWER METER is designed chiefly to manage saving energy.
It is neither nor can it 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 -25 to 55 °C.
- ・Where the ambient humidity is outside the range of 30 to 85 % RH (at 20℃), 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 serge

◇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.
- ・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.

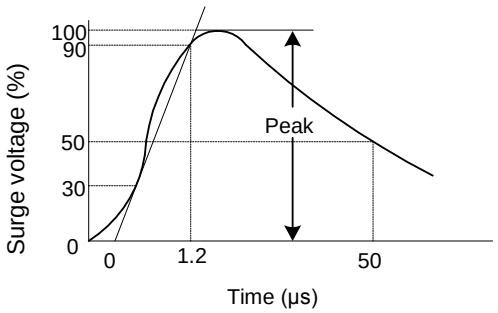
■ Installation

- ・Eco-POWER METER is designed to be used in a control panel.
- ・The power supply terminal and voltage input terminal of the main unit is common. Therefore if 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.
- ・Never remove the terminal block under applying current to load.
  It might cause electric shock or CT breakdown.
- ・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 ± (1.2/50) μs of single-polarity full-wave voltage.

Surge wave form
[± (1.2/50) μs 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: 1 μs, 50 ns
Polarity: Cycle: 10 ms

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.

■ As to measurement

・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.

■ 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.

Chapter 1 Unit's Outline

With KW9M 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.
This has built-in thermistor to measure the temperature of installation place such as inside the panel board for your reference.

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

Model number	AKW92112
Model name	KW9M Eco-POWER METER Advanced type

1.1 Measurement outline

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	1-circuit (when measuring 1P2W: max. 3-circuit)
Input measurement voltage	0 to 500VAC
Input measurement current	1 to 65,535A
Applicable current sensor	Secondary side current: 1A or 5A

1.2 Measurement items

Item		Unit	Display data range	
Instantaneous power	Active	kW	-99999 to 0.000 to 99999	Present value Max. value Min. value
	Reactive	kvar		
	Apparent	kVA		
Integral power (import)	Active	kWh	0.000 to 9999999.9 * Total integral power (import) 0.000 to 29999999	Present value
	Reactive	kvarh		
	Apparent	kVAh		
Integral power for each time zone (4-zone) (import)	Active	kWh	0.000 to 9999999.9	Present value
	Reactive	kvarh		
	Apparent	kVAh		
Integral power (export)	Active	kWh	0.000 to 9999999.9 * Total integral power (export) 0.000 to 29999999	Present value
	Reactive	kvarh		
Integral power for each time zone (4-zone) (export)	Active	kWh	0.000 to 9999999.9	Present value
	Reactive	kvarh		
Current		A	0.000 to 99999 *1	Present value Max. value Min. value
Voltage		V	0.00 to 99999 *1	Present value Max. value Min. value
Power factor			-1.000 to 1.000	Present value Max. value Min. value
Frequency		Hz	0.00 to 99.99 *1	Present value Max. value Min. value
Pulse count value			0.000 to 99999999	Present value
Power conversion value			0.000 to 99999999	Present value
Temperature		degree C	-100.0 to 100.0 *1	Present value
Calendar			January 1, 2000 00:00:00 – December 31, 2099 23:59:59	Present value

*1 'Display data range' is the range to be able to indicate with the main unit display, it is not a range that can be measured.

・Power Quality

Item		Unit	Display data range
Unbalanced current	Each phase	%	0.000 to 999.99
Unbalanced voltage	Each phase	%	0.000 to 999.99
Current THD (total harmonic distortion)	Each phase	%	0.000 to 400.00
Voltage THD (total harmonic distortion)	Each phase	%	0.000 to 400.00
Current harmonics (2^{nd} to 31^{st})	Each phase	%	0.000 to 400.00
Voltage harmonics (2^{nd} to 31^{st})	Phase	%	0.000 to 400.00
	Line	%	0.000 to 400.00

・Demand

Item		Unit	Display data range
Present demand *1	Active	kW	0.000 to 99999
	Reactive	kvar	
	Apparent	kVA	
	Active (export)	kW	
	Reactive (export)	kvar	
	Current	A	
Estimated demand *2		kW	0.000 to 99999
Ratio of estimated demand *2		%	0.000 to 99999
Integral power converted by pulse *2		kWh	0.000 to 999999.99

* Please use this demand function as your standard.
The demand value calculated with this function is not guaranteed.
*1 When peak demand is set, only current demand is available.
When 30-min.demand is set, active power demand and current demand are available.
*2 Only when 30-min demand is set.

1.3 Logging items

Item		Record
Measurement max. value for each month Measurement min. value for each month (with time stamp*)	Power	12 records (for 12-month)
	Current	12 records (for 12-month)
	Voltage	12 records (for 12-month)
	Power factor	12 records (for 12-month)
	Frequency	12 records (for 12-month)
	Unbalanced current	12 records (for 12-month)
	Unbalanced voltage	12 records (for 12-month)
Max. demand value (active power, reactive power, apparent power, export active power, export reactive power, current) (with time stamp*)		12 records (for 12-month), Max. value
Power quality * (with time stamp for occurrence date and period)	Voltage interruption	Up to 10 records
	Over voltage	Up to 10 records
	Under voltage	Up to 10 records
	Over current	Up to 10 records
	Under current	Up to 10 records
Pulse output occurrence date (time stamp)	OUT1	Up to 10 records
	OUT2	Up to 10 records

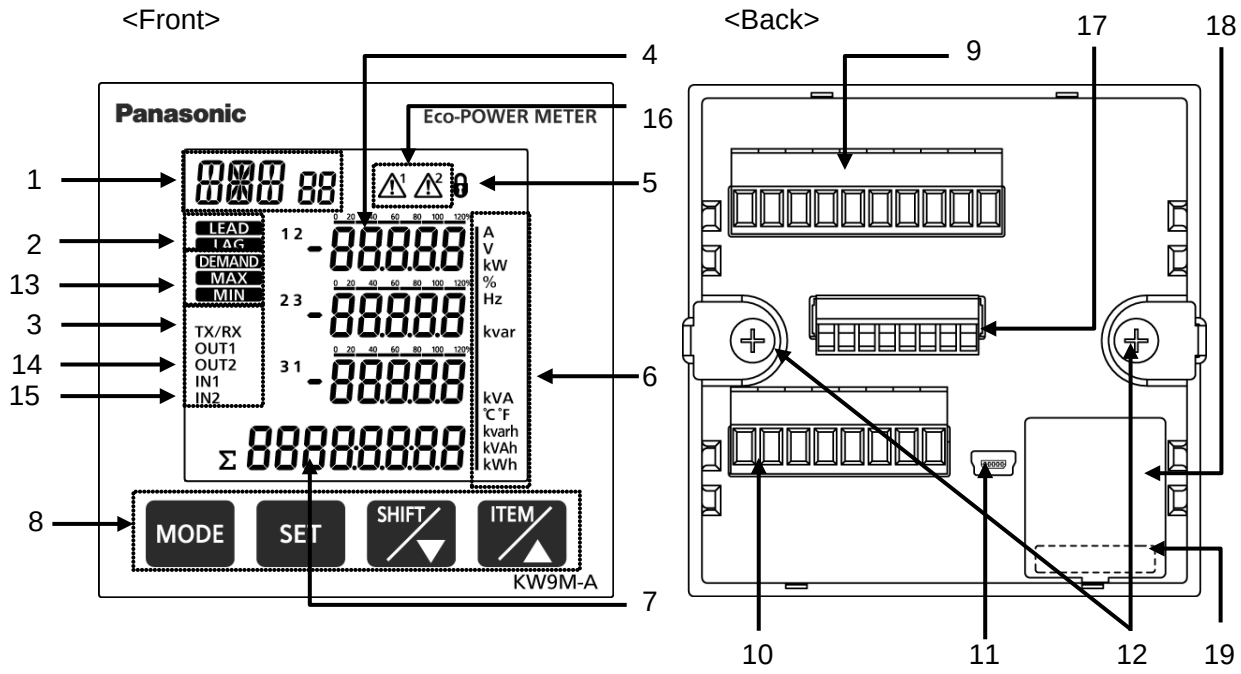
* Time stamps and power quality data can be confirmed via communication. They are not displayed.

<Glossary>
Eco-POWER METER defines as below.

THD (total harmonic distortion)	Ratio of harmonic distortion (voltage or current) for the fundamental frequency. Lower the value shows that the distortion is less.
Harmonics	Sinusoidal wave other than fundamental frequency. It has frequency that is 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 different between each phase-voltage due to the load unbalancing. It is calculated as below. $\frac{\lvert\text{Max. (Min.) voltage of all phase} - \text{average voltage}\rvert}{\text{Average voltage}} \times 100\ (\%)$
Current unbalancing	The difference between each-phase current due to the load unbalancing. It is calculated as below. $\frac{\lvert\text{Max. (Min.) current of all phase} - \text{average current}\rvert}{\text{Average current}} \times 100\ (\%)$
Power interruption	Voltage under 5% of rating is kept 100ms or more,
Under voltage	Set the ratio for the rated voltage and it is used for threshold. Voltage under the set ratio is kept 100ms or more, it will judge 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 100ms or more, it will judge 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 100ms or more, it will judge as over current.
Demand by IEC61557-12	Based on IEC61557-12 Performance measuring and monitoring devices (PMD)
Sliding block interval demand	It calculates by measured power via CT with setting interval. Set power interval by 1 to 60(min.) (every 1-min.). It calculates demand during latest finished interval and displays. One interval is started every setting time.
fixed block interval demand	It calculates by measured power via CT with setting interval. Set power interval by 1 to 60 (min.) (every 1-min.) It calculates demand during latest finished interval and displays. After one interval finishes, the next interval starts.
Current demand	It calculates based on a thermal demand meter. It measures an average current (current demand) within setting interval and the max. value is considered as max. current demand.
30-min demand	This works for electric power input by CR or pulse. It measures using power during 30-min. and calculates average (kW). Max. value of 1-month is recorded and displayed.
Peak demand	Max. value of instantaneous power during 1-month is considered as a peak demand. Peak demand of 12-month is recorded for 4 time-zones.

Chapter 2 Parts Name and Working

2.1 Parts Names



1) Item indicator	Measuring mode	Indicate the measuring item
	Setting mode	Indicate the setting item
2) Auxiliary mark	Measuring mode	Indicate the power condition
3) TX/RX mark	Measuring mode	Blinking while communication
4) Load ratio indicator	Measuring mode	Indicate the ratio of load (current) for the rating
5) Lock mark	Measuring mode	Lighting while in lock mode
6) Unit mark	Measuring mode	Indicate the measuring unit
7) Measurement value	Measuring mode	Indicate the measuring value
	Setting mode	Indicate the setting value
8) Key	Use to operate the unit	
9) Terminal A		
10) Terminal B		
11) USB port	USB communication port	
12) Mounting clip	Use to panel mounting (screws :M4 × 10mm)	
13) Log indication	Logging mode	Indicate log type
14) Pulse output Indicator	Measuring mode Logging mode Demand mode	Lighting when pulse is output
15) Pulse input Indicator	Measuring mode Logging mode Demand mode	Lighting when pulse is input
16) Alarm indicator	Measuring mode Logging mode Demand mode	Lighting when alarm is output
17) Terminal C		
18) Battery label		
19) Backup battery	Backup clock and logging data	

*1 Auxiliary mark [LEAD] [LAG] indicates the phase difference between voltage and current.
When current phase delays to voltage phase, [LAG] is indicated.
When current phase leads to voltage phase, [LEAD] is indicated.
When power factor is ‘1’, ‘0’ and ‘-1’, it doesn’t display [LEAD] nor [LAG].

2.2 Key’s functions

Key	Functions	
<MODE>	Measuring mode	Shift to setting mode
	Setting mode	Shift to setting confirmation mode and measuring mode
	Logging mode Demand mode	Shift to setting mode
<SET>	Setting mode	Set setting items and setting values
	Measuring mode	Shift to measuring item
	Logging mode	Select logging item to display
<SET> (continuous 3-sec)	Measuring mode Logging mode Demand mode	All keys locked
	Lock mode	Release the lock mode
<SHIFT/▽> <ITEM/△>	Measuring mode	Select measuring item to display
	Setting mode	Select a setting value
	Logging mode	Select logging item to display
	Demand mode	Select demand item to display
<SET>+<SHIFT/▽>	Measuring mode	Select measuring item to display
	Logging mode	Select logging item to display
	Demand mode	Select demand item to display
<MODE>+<SHIFT/▽>	Measuring mode	Shift to logging mode
	Logging mode	Shift to demand mode
	Demand mode	Shift to measuring mode
<SET>+<ITEM/△>	Measuring mode	Select measuring item to display
	Logging mode	Select logging item to display
	Demand mode	Select demand item to display

●Lock mode
It is the mode makes all keys unable. In this mode, you can not input by any keys.
When you press <SET> continuously for about 3sec., lock mark is displayed.
Press <SET> continuously for about 3sec. again to release Lock mode.
When it set to use auto-display functions, the display items are changed automatically.
Refer to 4.4.3 setting for optional functions for auto-display functions.

2.3 Indication on KW9M Eco-POWER METER

The alphabet is shown as below.

	A	B	C	D	E	F	G	H	I	J	K
Value display											
Item indicator Top left											

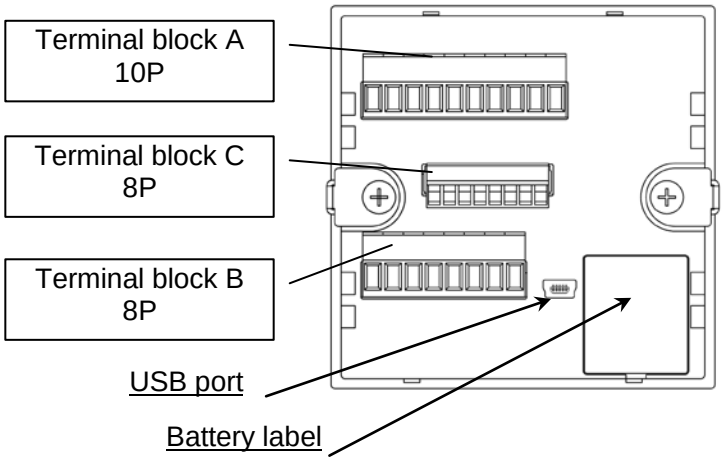
	L	M	N	O	P	Q	R	S	T	U	V
Value display											
Item indicator Top left											

	W	X	Y	Z
Value display				
Item indicator Top left				

Chapter 3 Wiring

Be sure to wire correctly according to the terminal arrangement and wiring diagrams.
Please connect a fuse or a breaker to power supply part for safety reasons and to protect the device.
This 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.

3.1 Main unit terminal arrangement



Terminal block A

Terminal number	1	2	3	4	5	6	7	8	9	10
Functions	L +	N−	V1	V2	V3	Vn	NC	SG	A +	B−
	Power supply		Measured voltage input				vacant	RS485		

*Do not use NC (vacant) terminals in any purpose.

Terminal block C

Terminal number	1	2	3	4	5	6	7	8
Functions	OUT1	COM1	OUT2	COM2	IN1+	IN1-	IN2+	IN2-
	Output 1		Output 2		Input 1		Input 2	

*It is insulated between OUT1 and OUT2.
*Minus terminals of input terminal are connected internal.

Terminal block B

Terminal number	1	2	3	4	5	6	7	8
Functions	K	L	K	L	K	L	K	L
	CT1		CT2		CT3		CTn	
	Measured current input							

⚠ **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−)	85-264V AC [85-264V ∿] 100-300V DC [100-300V ⎓]	
Measured voltage input	Single-phase two-wire	3 - 6 (V1-Vn)	0-500VAC [0-500V ∿]	(L-L)
	Single-phase three-wire	3 - 5 - 6 (V1-V3-Vn)	0-500VAC [0-500V ∿ :3W] 0-250VAC [0-250V ∿ :3W]	(L-L) (L-N)
	Three-phase three-wire	3 - 5 - 6 (V1-V3-Vn)	0-500VAC [0-500V 3 ∿]	(L-L)
	Three-phase four-wire	3 - 4 - 5 - 6 (V1-V2-V3-Vn)	0-500VAC [0-500V 3∿] 0-289VAC [0-289V 3N∿]	(L-L) (L-N)

◆Applicable wire (Crimp-type terminal is recommended.) ・Stripping length: 7 to 8mm

・Power supply/Measured voltage/RS485 communication
Terminal block: A
Screw size: M2.5
Tightening torque: 0.4 to 0.5N・m
Sectional area
single /stranded wire 0.5 to 4mm^2(AWG20 to12)
・for 2pcs.
single/stranded wire 2pcs.×0.5 to 2mm^2 (AWG20 to 14)
*Use shielded wire for RS485 communication.

・Output/Input
Terminal block: C
Screw size: M2
Tightening torque: 0.2 to 0.25N・m
Sectional area:
single /stranded wire 0.5 to 1.5mm^2(AWG20 to16)

・CT Input (Measured current)
Terminal block: B
Screw size: M2.5
Tightening torque: 0.4 to 0.5N・m
Sectional area:
single /stranded wire 0.5 to 4mm^2(AWG20 to12)

*Use applicable wire according to the measured current.

3.2 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 low-voltage circuit.

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

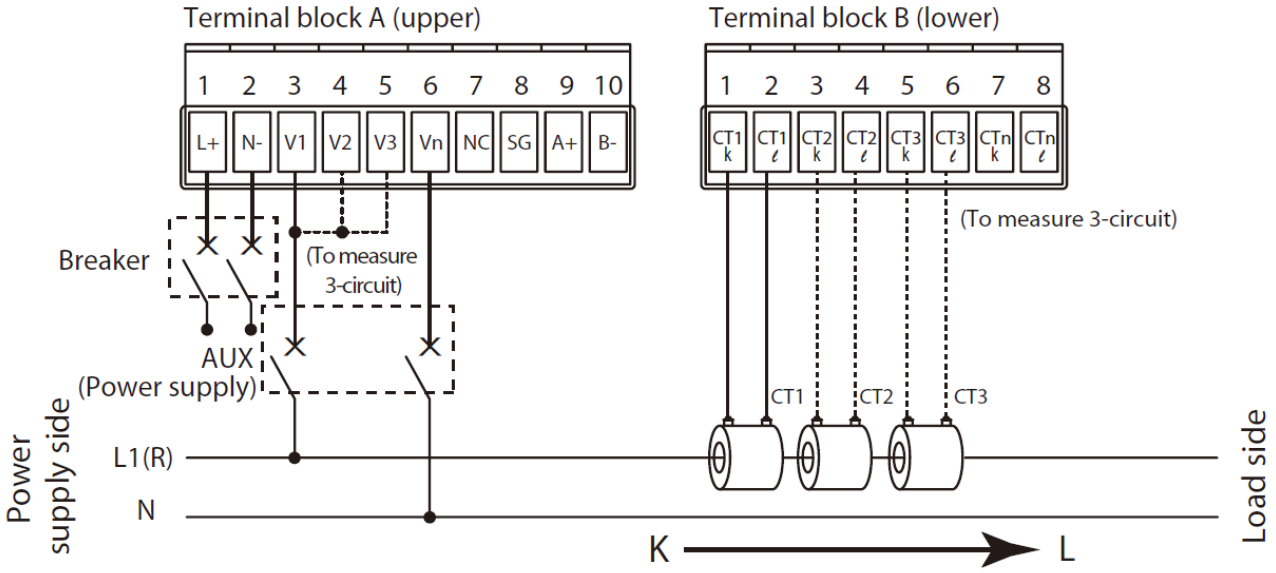
◆When measuring a load with rated input voltage

Single-phase two-wire system

*One CT is needed to measure single-phase two-wire system.

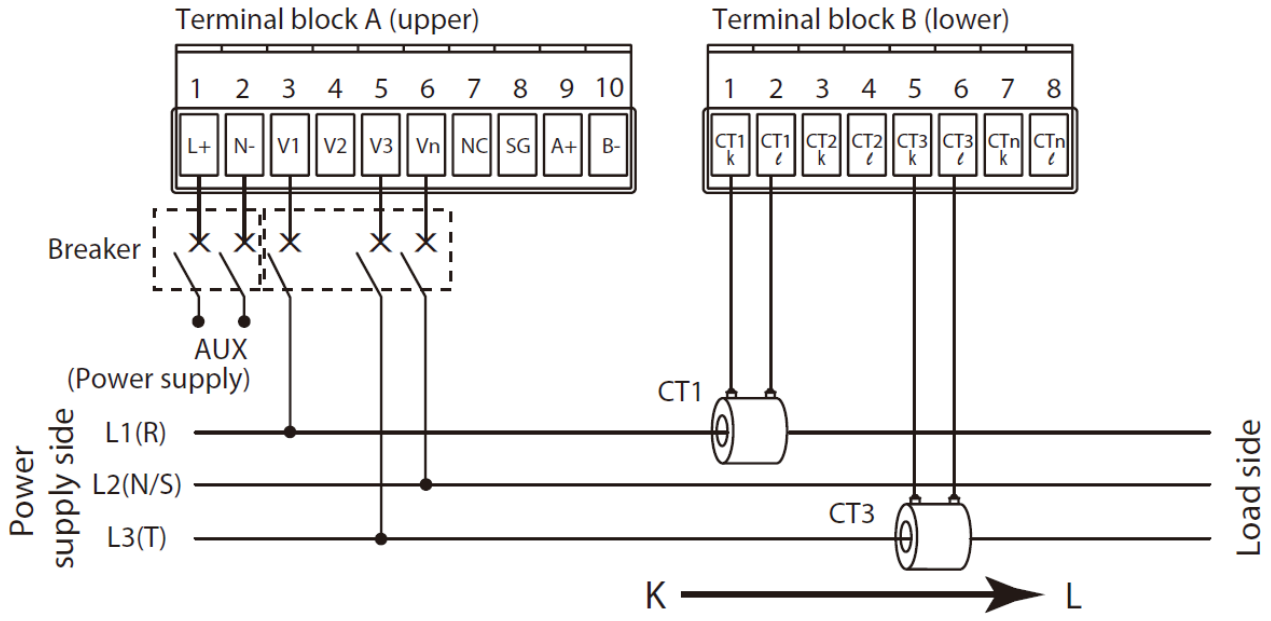
*2 CTs are needed to measure 2-circuit and 3 CTs are needed to measure 3-circuit.

*To measure 2-circuit, wire 3 and 4. To measure 3-circuit, wire 3 and 4 and 5.



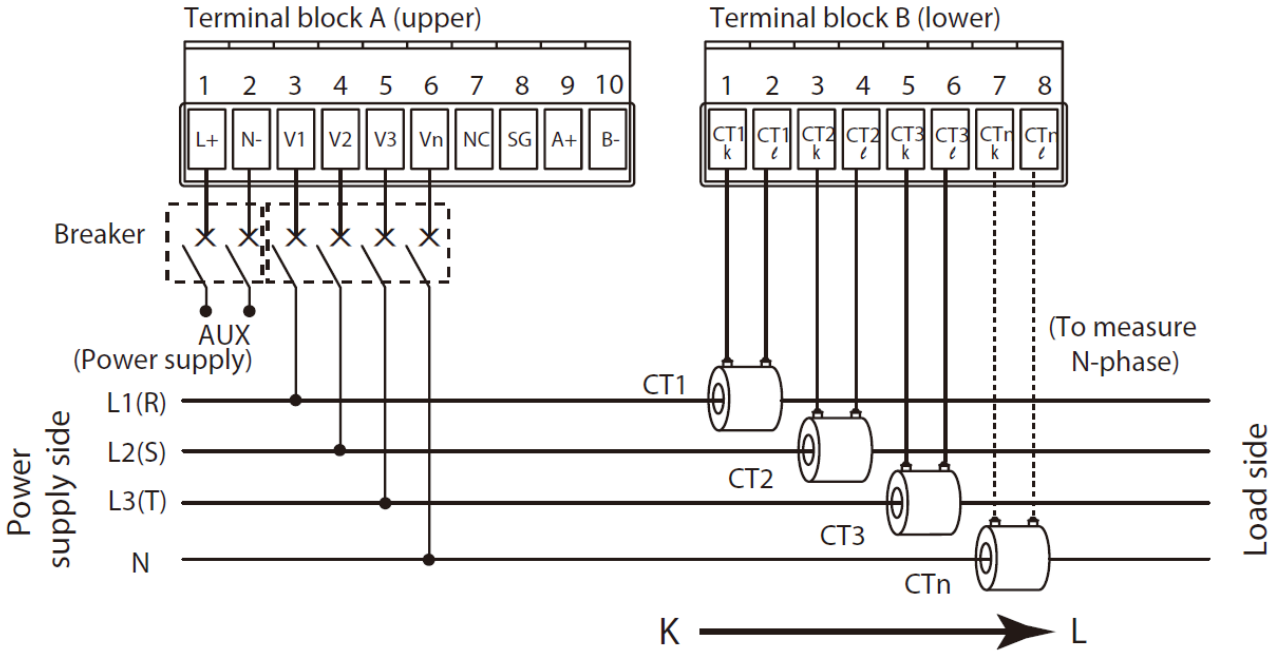
Single-phase three-wire/Three-phase three-wire

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



Three-phase four-wire system

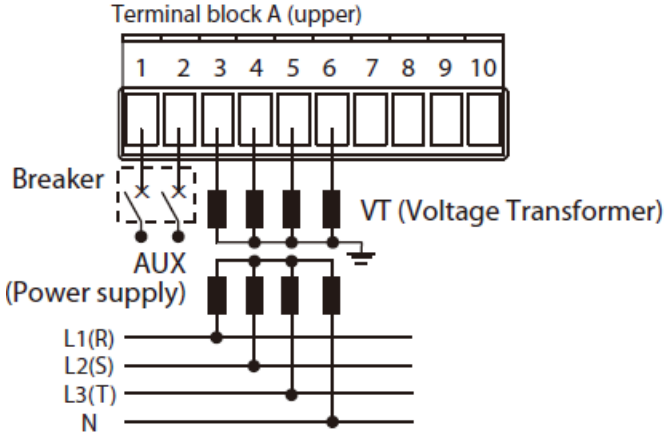
*3 CTs are needed to measure three-phase four-wire system.



⚠ Vn terminal should be connected to N-phase which is grounded.

◆When measuring a load with exceed input voltage

Voltage transformer (VT) is needed when you measure a load with over input voltage.
Use a VT, those secondary voltage rating is 110V.
Grounding the secondary side of VT and CT is not necessary with low-voltage circuit.



3.3 How to attach the Current Transformer (CT)

DANGER

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

●Never remove the terminal block under applying current to load.

Will cause electric shock or breakdown CT

・Use CT that the secondary side current is 5A or 1A, the rated burden 0.5VA or more.

・One CT is needed for 1 unit when measuring 1P2W (2 CTs for 2-circuit, 3CTs for 3-circuit). Two CTs are needed when measuring 1P3W/3P3W. Three CTs are needed when measuring 3P4W.
Using all CTs for one unit should be the same.

・Use the applicable wire, or it might cause a breakdown, burnout or electric shock.

・When connecting 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 CT.

・The CT has polarity. Wire correctly according to the K and L marks. **Wrong direction can't measure correctly.**

・If there is some distortion by harmonic or waveform, it may not measure correctly.
Please check with the actual system before adopts it.

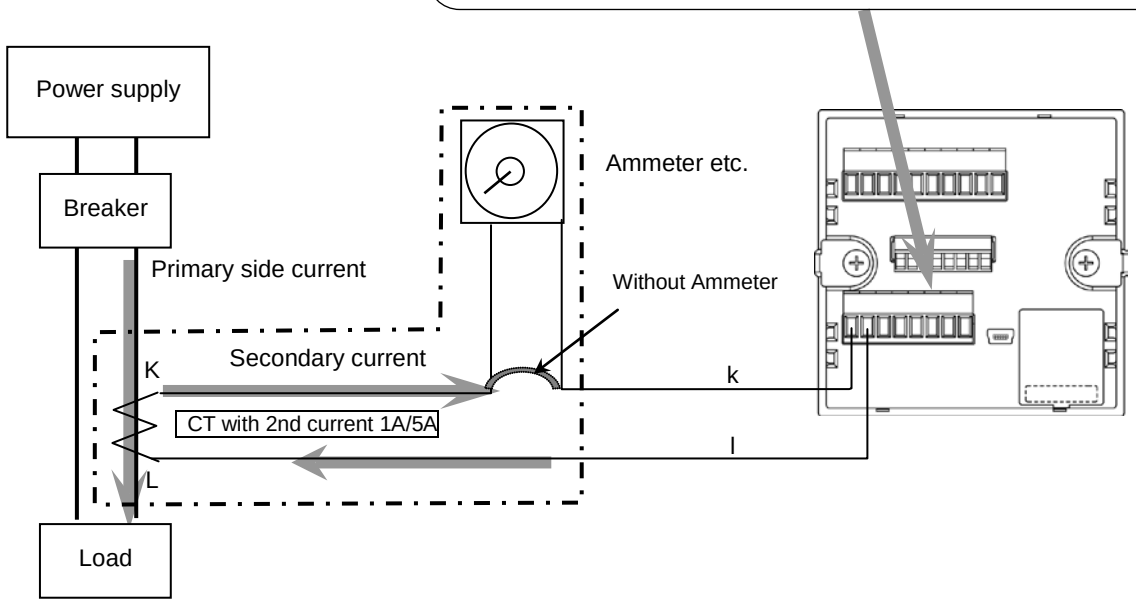
・Separate the wiring (strong electric part) of the measured voltage input terminal (operating power supply terminal) from the CT cable. It may not satisfy the accuracy due to noise.

◆How to connect CT

(1) Power off the measured devices.
(2) Install applicable CT.
(3) Remove terminal block of KW9M.
(4) Connect CT to the terminal block.
(5) Insert terminal stand surely.
(6) After confirm all wiring correct, turn on the power of the load and KW9M.

(Connection example)

* Connect CT wiring and terminal block surely.
  It will cause CT breakdown.
* Never remove the terminal block under applying current to load. It will cause electric shock or breakdown CT.



◆How to set the parameters for CT

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

3.4 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_{CEO}=20V min. I_C=20mA min. I_{CBO}=6μA max

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

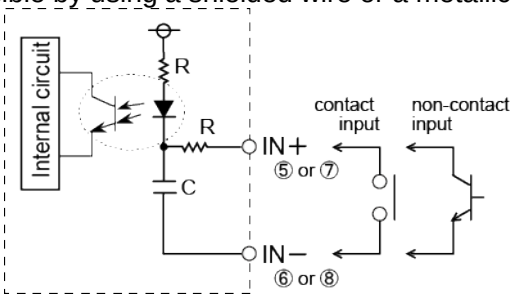
*`Short-circuit impedance should be less than 1kΩ.

Open-circuit impedance should be more than 100kΩ.

(When the impedance is 0Ω, 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.

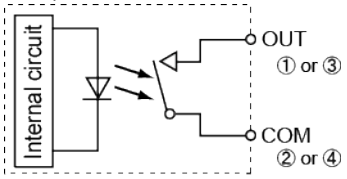


3.5 For Output Connection

●PhotoMOS relay output

・It adopts PhotoMOS relay output, there is no polarity.

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



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

・Please wire less than 100m fir output.

If it is long, it may not work correctly due to floating capacitance.

3.6 RS485 Communication

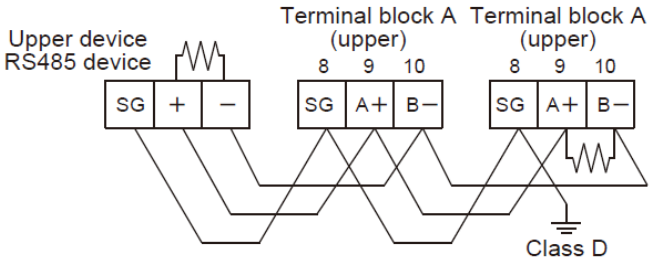
・When using shielded cable for the RS485 transmission line, ground one end.
Use a class D dedicated earth for grounding. Do not share a ground with other earth lines. (Fig. 1)

・For terminal stations of both side including the upper device, termination resistors should be connected. KW9M Eco-POWER METER doesn't have any built-in termination resistors.
Connect 120Ω, 1/2W or more termination resistor between [A+] and [B-] of Eco-POWER METER that is connected the end of RS485 transmission line. The RS485 transmission line shielded cable should be grounded at the end KW9M Eco-POWER METER. (Fig. 1)

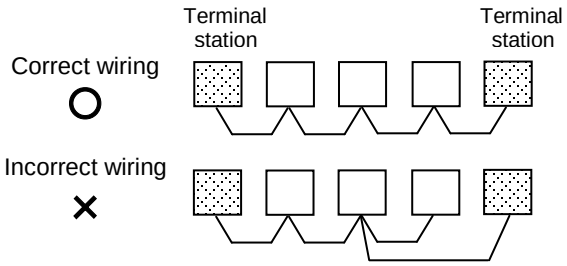
・Be sure to connect with daisy chain the RS485 transmission line between each unit.
Do not use a splitter. (Fig. 2)

・To avoid noise, separate the transmission line from high-voltage line (power supply, voltage line).

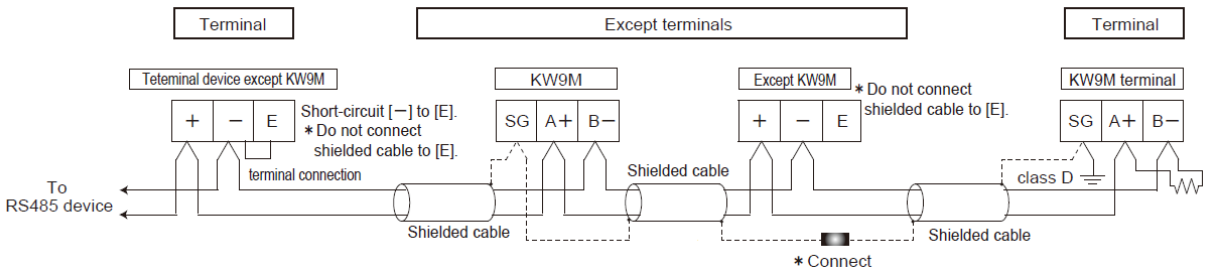
(Fig.1)



(Fig.2)



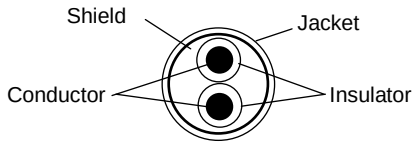
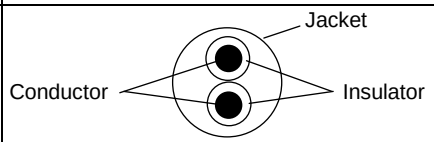
◆How to connect KW9M and the other devices with 2-wire system



Recommended Cable

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

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

Cable	Section
Twisted-pair with shield	
VCTF	

Notes

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

3.7 Backup Battery for Clock

It is possible to backup the clock with backup battery for 1-month. In order to charge full, it is necessary to turn on the power for 2 days. If it turns off within 2 days from first installation, it may not backup the clock for 1-month.

3.8 Low Voltage Directive

For using 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 which is complied with European standard and specifications to meet power supply and added current.

When using in the application conforming to EN61010-1/IEC61010-1, make sure to satisfy the following conditions.

1) RS485 communication part and pulse input part secure only basic insulation. In order to secure reinforced (double) insulation demanded by EN 61010-1/ IEC61010-1, secure basic insulation or more with load side and reinforced (double) insulation with 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 more for a wire cramped (or connected) CT
4) Vn terminal should be connected to N-phase which is grounded.

【Environmental conditions】

- ·Overvoltage category Ⅱ, Pollution degree 2
- ·Indoor use
- ·An ambient temperature of -25 to +55℃
- ·An ambient non-condensing humidity of 30 to 85%RH (at 20℃)
- ·Altitude of 2000m or less

【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

3.9 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 wit both the Canadian and the American requirements

Chapter 4 Settings

You can set parameters for measuring and the other functions using the keys on Eco-POWER METER. After wiring Eco-POWER METER and CT, power on and set the parameter for power measurement, Eco-POWER Meter can measure the electric power. In order to use the other functions, set other parameters according to your use.

◆Keys' functions at setting mode

<MODE>	Shift to setting mode
<SET>	Set the items and values
<SHIFT/▽>, <ITEM/△>	Select items and change values

◆Parameters for power measurement

Item	Range	Initial value
Phase/Wire system	1P2W, 1P3W, 3P3W 3P4W	1P2W
CT type	1, 5 [A]	5A
Primary side current of CT	1 to 65535 [A]	5A
Rated voltage	100 to 500 [V]	100V
VT ratio	1.00 to 600.00	1.00
Over voltage (ON threshold)	100.0 to 120.0 [%]	105.0%
Over voltage (OFF threshold)	100.0 to 120.0 [%]	105.0%
Under voltage (ON threshold)	5.0 to 100.0 [%]	95.0%
Under voltage (OFF threshold)	5.0 to 100.0 [%]	95.0%
Over current (ON threshold)	0.1 to 120.0 [%]	100.0%
Over current (OFF threshold)	0.1 to 120.0 [%]	100.0%
Under current (ON threshold)	0.0 to 100.0 [%]	0.0%
Under current (OFF threshold)	0.0 to 100.0 [%]	0.0%
Conversion rate (P) total	0.00 to 99.99/1kWh	10.00
Conversion rate (P) time-zone1		
Conversion rate (P) time-zone2		
Conversion rate (P) time-zone3		
Conversion rate (P) time-zone4		
Conversion rate (-P) total		
Conversion rate (-P) time-zone1		
Conversion rate (-P) time-zone2		
Conversion rate (-P) time-zone3		
Conversion rate (-P) time-zone4		

◆Parameters for demand measurement

Item	Range	Initial value
Power demand type	Peak (Peak demand), Slide (Sliding block), Fixed (Fixed block), 30min (30-min demand)	Peak
Power demand interval 1	1 to 60 [min.]	15
Power demand interval 2	1 to 60 [min.]	1
30-min demand calculation method	Add (addition), Avg (average)	Add
Power input	CT (CT input), PM (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	50000[pulse/kWh], 2000[pulse/kWh]	50000
Current interval	1 to 60 [min.]	15

◆Parameters for pulse input

Item		Range	Initial value
Pulse input (IN1)		30, Clock (clock correction)	30
Clock correction time		00:00 to 23:59	00:00
Pulse input (IN2)		30, 2000	30
Pre-scale (IN1,IN2)		0.001 to 100.000	1.000
Unit for pulse output (OUT1,OUT2)		0.0001, 0.001, 0.01, 0.1, 1, 10, 100 (kWh/1pulse) AL-S, AL-oV, AL-uV, AL-C, AL-uC, AL-MS, AL-P, AL-Q, AL-S, AL-PF, AL-oF, AL-uF, AL-VH, AL-CH, AL-VT, AL-CT, AL-VU, AL-CU, AL-PD, AL-CD Cnt1, Cnt2, PL-L	0.001
Target phase for pulse output (OUT1,OUT2)		Total, Phase1, Phase2, Phase3	total
Target phase for alarm output (OUT1,OUT2)	electric power	Total, All(ALL) , Phase1, Phase2, Phase3	total
	current	All(ALL) , Phase1, Phase2, Phase3, N 相	All
	Power interruption Over voltage Under voltage	All(ALL) , Phase1, Phase2, Phase3, Line 1-2, line 2-3, line 3-1	All
Integral direction (OUT1,OUT2)		P, -P	P
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)		0.0 to 2999999.9 [kW/kvar/kVA]	2999999.9
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 to 100.00 [Hz]	0.00
Voltage harmonics alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 400.0 [%]	400.00
Current harmonics alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 400.0 [%]	400.00
Current THD alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 400.0 [%]	400.00
Voltage THD alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 400.0 [%]	400.00
Voltage unbalancing alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 999.99 [%]	999.99
Current unbalancing alarm threshold (ON/OFF) (OUT1,OUT2)		0.00 to 999.99 [%]	999.99

Item	Range	Initial value
Power demand alarm power type (ON/OFF) (OUT1,OUT2)	P, Q, S, -P, -Q	P
Power demand alarm threshold(ON/OFF)(OUT1,OUT2)	0.000 to 99999.999 [kW/kvar/kVA]	0
Power demand alarm hysteresis (OUT1,OUT2)	0 to 100% [%]	0
Power demand alarm start time (OUT1,OUT2)	1 to 30 [min.]	10
Current demand alarm threshold (OUT1,OUT2)	0.0 to 120.0 [%]	0
Preset value (OUT1,OUT2)	0 to 999999	0

◆Parameters for communication

Item	Range		Initial value
Protocol	MEWTOCOL, MODBUS(RTU), DL/T645-2007		MEWTOCOL
Device number	MEWTOCOL	1 to 99	1
	MODBUS(RTU)	1 to 247	
	DL/T645-2007	0 to 9999	
Transmission speed	38400, 19200, 9600,4800, 2400, 1200 [bps]		19200
Transmission format	8b-o(8bit odd), 8b-n(8bit none), 8bit-E(8bit even)		8b-o
Stop bit	1,2		1
Response time	1 to 99 [ms]		5

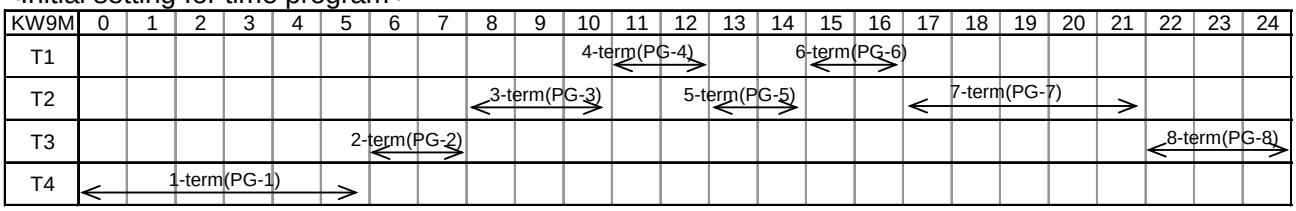
◆Parameters for optional functions

Item	Range	Initial value
Auto-off	0 to 99 [min.]	1
Luminance	1, 2, 3, 4, 5 (1: dark to 5:light)	3
Alarm blinking	ON, OFF	OFF
Update cycle	100 to 1000 [ms]	100
Auto-display	0 to 99 [min.]	10
Display cycle	1 to 99 [sec.]	5
Temperature correction	-100.0 to 100.0	0.0
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 count value 1	YES, NO	NO
Reset count value 2	YES, NO	NO
Reset logging data	YES, NO	NO
Version		

◆Parameters for time program

Item	Range		Initial value
Program 1	time-zone	T1, T2, T3, T4, OFF	T4
	start-time	00:00 to 23:59	00:00
Program 2	time-zone	T1, T2, T3, T4, OFF	T3
	start-time	00:00 to 23:59	6:00
Program 3	time-zone	T1, T2, T3, T4, OFF	T2
	start-time	00:00 to 23:59	8:00
Program 4	time-zone	T1, T2, T3, T4, OFF	T1
	start-time	00:00 to 23:59	10:00
Program 5	time-zone	T1, T2, T3, T4, OFF	T2
	start-time	00:00 to 23:59	12:00
Program 6	time-zone	T1, T2, T3, T4, OFF	T1
	start-time	00:00 to 23:59	14:00
Program 7	time-zone	T1, T2, T3, T4, OFF	T2
	start-time	00:00 to 23:59	16:00
Program 8	time-zone	T1, T2, T3, T4, OFF	T3
	start-time	00:00 to 23:59	22:00
Program 9	time-zone	T1, T2, T3, T4, OFF	OFF
	start-time	00:00 to 23:59	—
Program 10	time-zone	T1, T2, T3, T4, OFF	OFF
	start-time	00:00 to 23:59	—

<Initial setting for time program >



◆Calendar timer

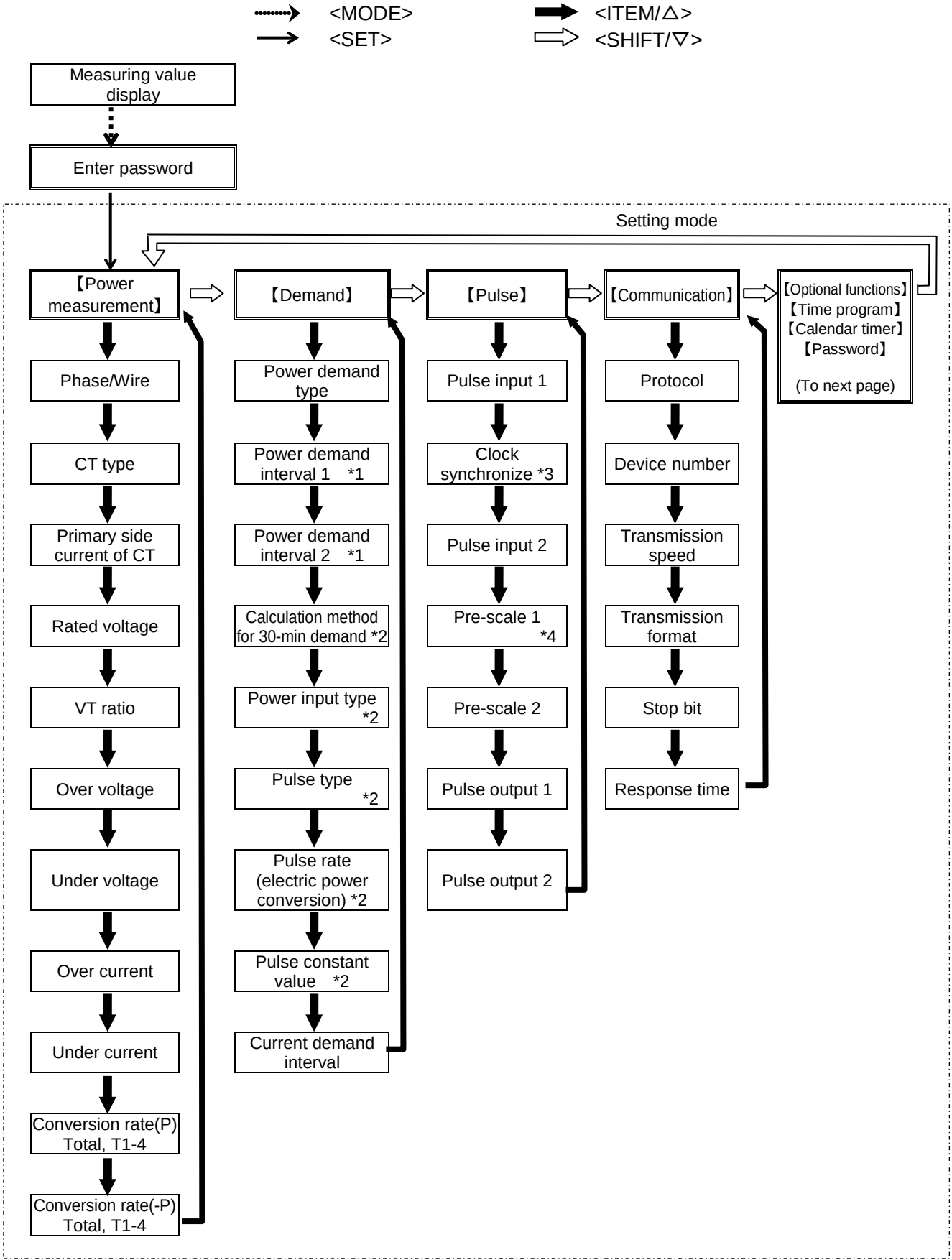
Item	Range	Initial value
Calendar timer	January 1st, 2000 00:00:00 to December 31st ,2099 23:59:59	

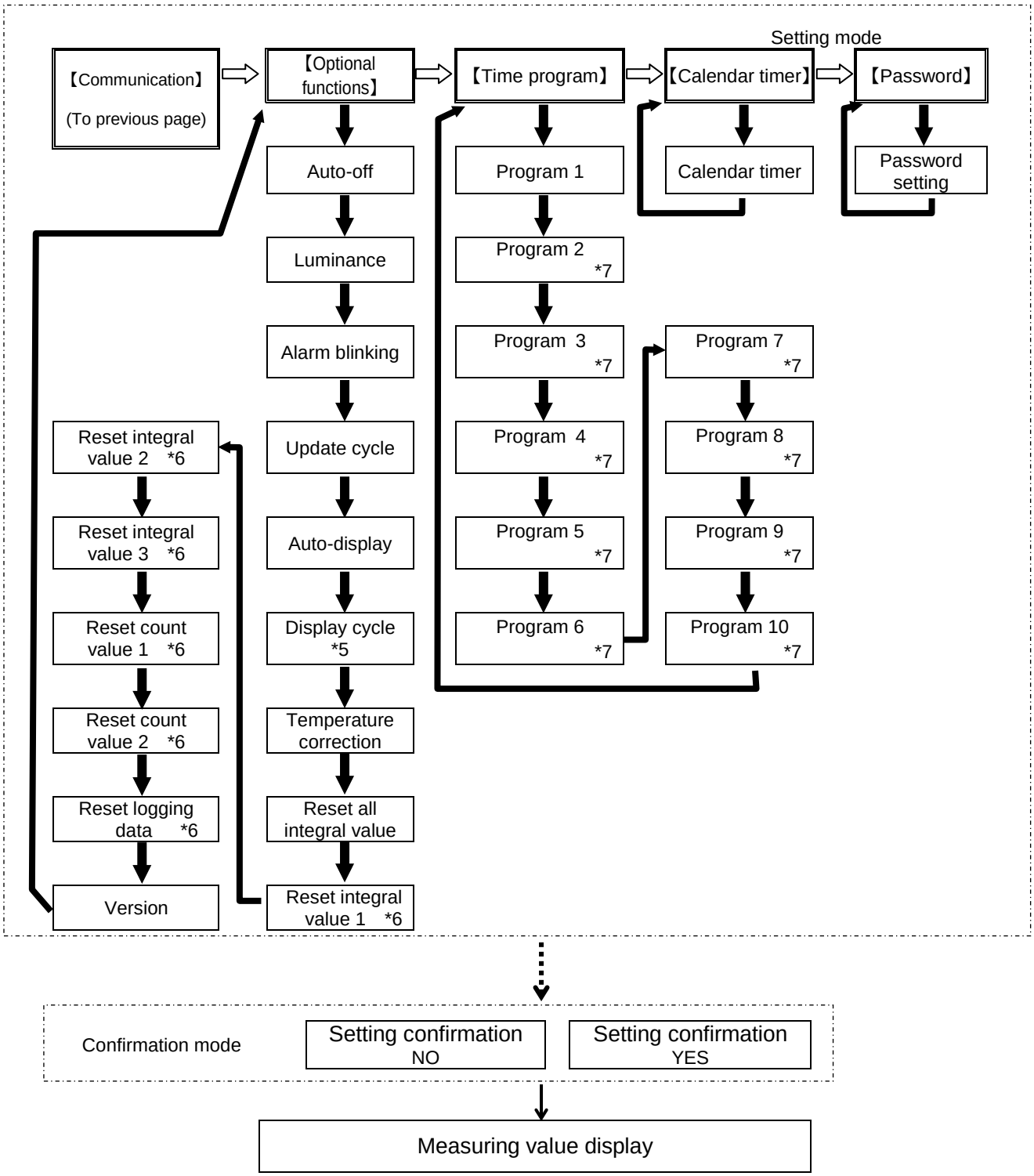
◆Password

Item	Range	Initial value
Password change	0000 to 9999	0000

4.1 Setting Flow

Arrow mark means press each key





Press <SET> during each item is displayed to change the setting value.
Press <MODE> to display the confirmation window. Select [YES] and press <SET> to decide the setting value. However no value is changed, the confirmation window is skipped and it displays the measuring value display.

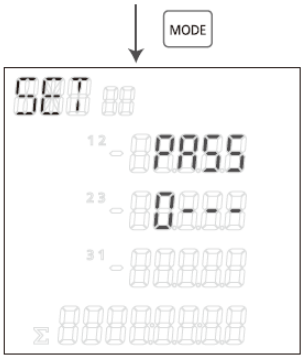
*1 It skips when [Peak] or [30min] is set at power demand type.
*2 It skips when except [30min] is set at power demand type.
*3 It skips when [30] is set at pulse input 1.
*4 It skips when [Clock] is selected at pulse input 1.
*5 It skips when [0] is set at auto-display setting.
*6 It skips when [YES] is selected at reset all integral value.
*7 It skips when [OFF] is selected at the previous program.

4.2 Password entry

It is necessary to enter password to shift to setting mode.
Enter [0000] and shift to password setting mode when you set password at the first time.
*When setting password, be careful for handling and note it.

Measuring value display

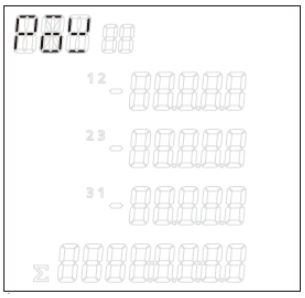
Press <MODE> and it shifts to password entry window.



Enter password from left to right using <ITEM/△>, <SHIFT/▽>.

Increase

Shift entered digit to the right



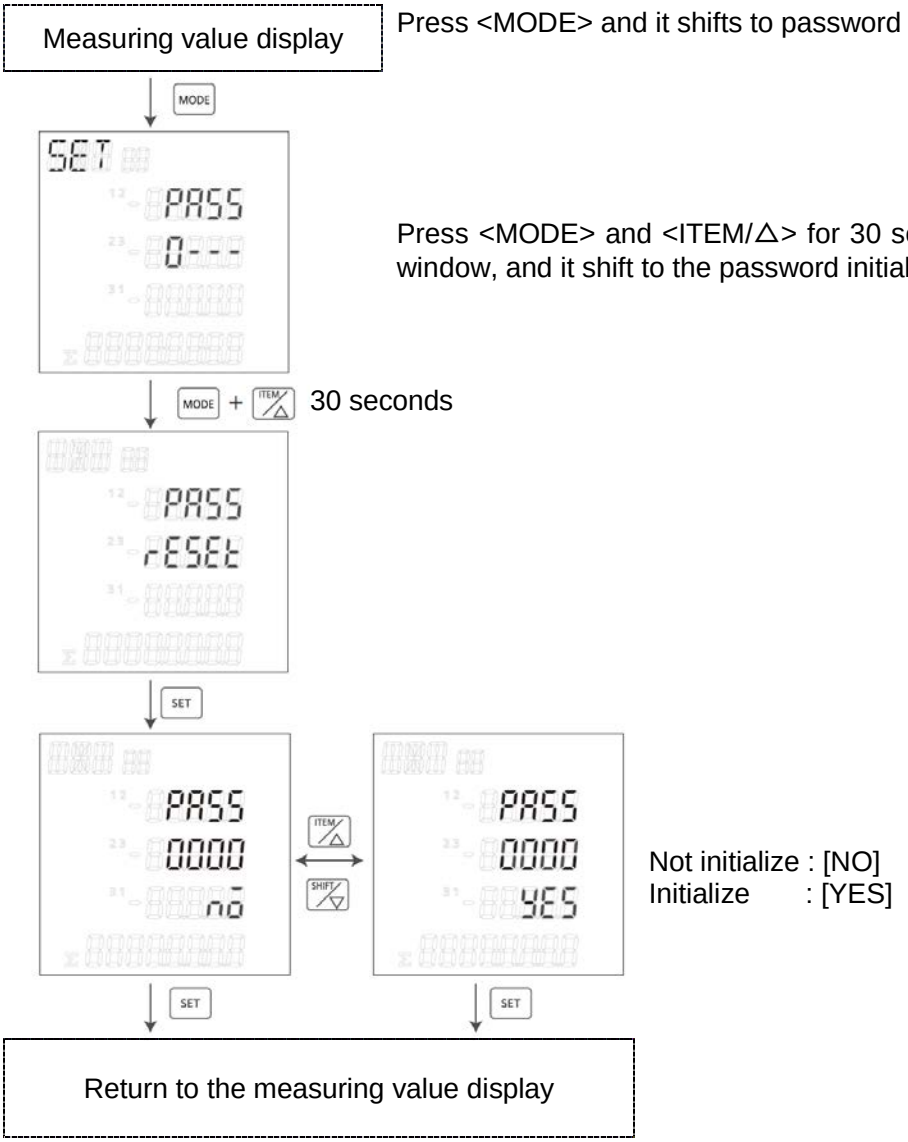
Press <SET> after enter the password.

If the password is correct, it shift to setting mode of power measurement.

If the password is wrong, [FAIL] is displayed and it returns to the password entry window.
*If you make wrong password 5 times, you can't set 1-hour after.

4.3 Password initialize

When you forget the password, initialize it in the following procedures. (Initial: [0000])
It is impossible to decode the set password.



4.4 How to Set

■Set before measuring.

Select setting item with <ITEM/△> and press <SET>, and the value will be blinking.

Set with <ITEM/△> and <SHIFT/▽>.

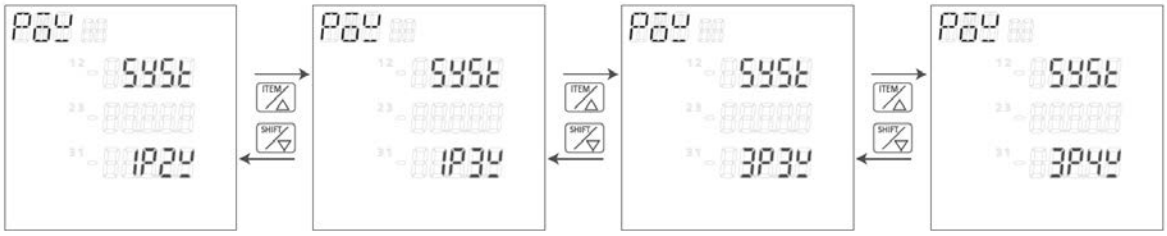
When you select [YES] with the confirmation window and press <SET>, the setting values are settled.

4.4.1 Settings for power measurement

Phase/Wire system

Select phase/wire system to measure.

Press <ITEM/△>, <SHIFT/▽> to select phase/wire system.

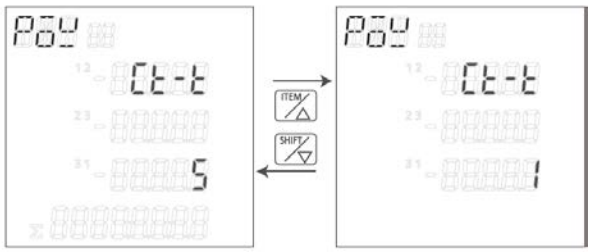


[Set list] 1P2W, 1P3W, 3P3W, 3P4W (initial: 1P2W)

* When the system is not matched with the measure system, it doesn't measure correctly.

CT type

Select using CT type (secondary side current).



Press <ITEM/△>, <SHIFT/▽> to select CT type.

[Set list] 5 (5A), 1 (1A) (initial: 5)

To use CT with secondary side current 5A; [5]

To use CT with secondary side current 1A: [1]

Primary side current of CT

Set the primary side current of using CT.

Enter the primary side current of CT that is set at CT type setting.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1 to 65535 (initial:5)

Increase

decrease

Primary side current of using CT is 400A: [400]

Rated voltage

Set the rated voltage to measure.

Press <ITEM/△>, <SHIFT/▽> to set the rated voltage.

[Set range] 100 to 500 (initial:100)

Increase

decrease

VT ratio

Select the voltage input method, input voltage directly or uses a voltage transformer (VT: secondary side rating 110V) and set VT ratio.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1.00 to 600.00 (initial:1.00)

increase

decrease

Input directly without VT: [1.00]
Use VT : [1.01 to 600.00]

*When input voltage is under 3V (VT ratio = 1), [0.0] is displayed and it doesn't measure.

Over voltage /Over voltage 2

Set a ratio of voltage for rated voltage used for threshold to judge over voltage and to clear the over voltage.

At [over volt] window set a ratio of voltage to judge over voltage.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 100.0 to 120.0% (initial:105.0)

Increase

decrease

Press <SET>, and [over volt 2] is displayed. At this window, set a ratio of voltage to clear overt voltage.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 100.0 to 120.0% (initial:105.0)

Increase

decrease

ex.) Settings; [over volt] 120.0%, [over volt 2] 105.0%
When measured voltage is over 120.0%, it judges over voltage and output alarm.
During output the alarm, if the measured voltage becomes fewer than 105.0%, it will clear the alarm.

Under voltage / Under voltage 2

Set a ratio of voltage for rated voltage used for threshold to judge under voltage and to clear the under voltage.

At [under volt] window set a ratio of voltage to judge under voltage.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 5.0 to 100.0% (initial:95.0)

Increase

decrease

Press <SET>, and [under volt 2] is displayed. At this window, set a ratio of voltage to clear under voltage.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 5.0 to 100.0% (initial:95.0)

Increase

decrease

ex.) Settings; [under volt] 95.0%, [under volt 2]
When measured voltage is under 95.0%, it judges under voltage and output alarm.
During output the alarm, if the measured voltage becomes over 100.0%, it will clear the alarm.

Over current / Over current 2

Set a ratio of current for rated current used for threshold to judge over current and to clear the over current.

At [over curr] window set a ratio of current to judge over current.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 0.1 to 120.0% (initial:100.0)

Increase

decrease

Press <SET>, and [over curr 2] is displayed. At this window, set a ratio of current to clear over current.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 0.1 to 120.0% (initial:100.0)

Increase

decrease

ex.) Settings; [over curr] 120.0%, [over curr 2] 105.0%
When measured current is over 120.0%, it judges over current and output alarm.
During output the alarm, if the measured current becomes fewer than 105.0%, it will clear the alarm.

Under current / Under current 2

Set a ratio of current for rated current used for threshold to judge under current and to clear the under current.

At [under curr] window set a ratio of current to judge under current.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 0.0 to 100.0% (initial: 0.0)

ITEM/△ Increase

SHIFT/▽ decrease

Press <SET>, and [under curr 2] is displayed. At this window, set a ratio of current to clear under current.

Press <ITEM/△>, <SHIFT/▽> to set the ratio.

[Set range] 0.0 to 100.0% (initial: 0.0)

ITEM/△ Increase

SHIFT/▽ decrease

ex.) Settings; [under curr] 95.0%, [under curr 2] 100.0%
When measured current is under 95.0%, it judges under current and output alarm.
During output the alarm, if the measured current becomes 100.0%, it will clear the alarm.

Conversion rate (P)

Set the conversion rate per integral active power 1 kWh.

Press <ITEM/△>, <SHIFT/▽> to set.

[set range] 0.00 to 99.99/1kWh (initial:10.00)

ITEM/△ increase

SHIFT/▽ decrease

Conversion rate (-P)

Set the conversion rate per integral export power (-P) 1kWh.

Press <ITEM/△>, <SHIFT/▽> to set.

[set range] 0.00 to 99.99/1kWh (initial:10.00)

ITEM/△ increase

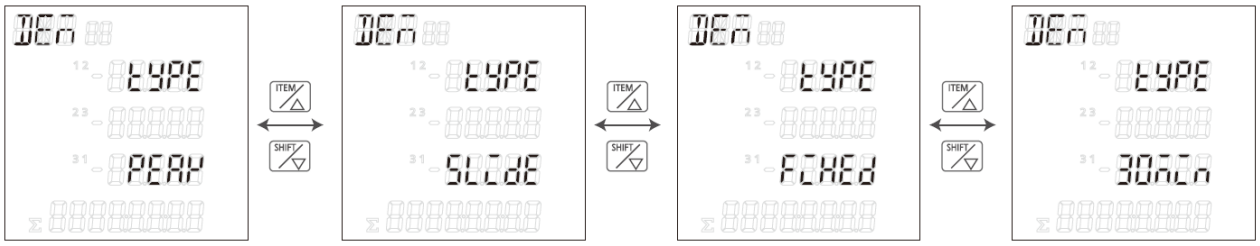
SHIFT/▽ decrease

4.4.2 Settings for demand measurement

Power demand type

Select type of power demand measurement.

Press <ITEM/△>, <SHIFT/▽> to select power demand type.



[Set list]

Peak (peak demand), Slide (sliding block), Fixed (fixed block), 30min (30-min demand) (initial: Peak)

Power demand interval 1

* It skips this when [Peak] or [30min] is set for power demand type.

Set interval time to use for sliding block and fixed block for power demand measurement.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1 to 60 min. (initial: 15)

Increase

Decrease

Power demand interval 2

* It is only when [Slide] is selected for power demand type.

Set slide time to use for sliding block for power demand measurement.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1 to 60 min. (initial: 1)

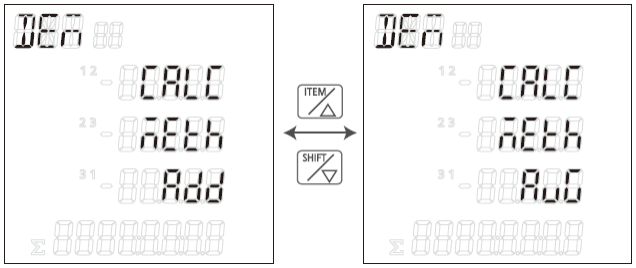
Increase

decrease

Calculation method for 30-min demand

* It is only when [30min] is selected for power demand type.

Select calculation method for 30-min demand.



Press <ITEM/△>, <SHIFT/▽> to select.

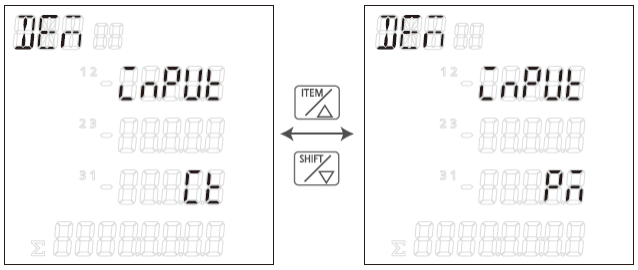
[Set list] Add(addition), Avg(average)
(initial: Add)

Power input type

*It is only when [30min] is selected for power demand type.

Select input type to use for demand measurement, current measurement or pulse input.

'CT'; Use current measurement via CT for demand measurement.
'PM'; Use pulse input for demand measurement.
Count value by pulse input2 is used for power input.



Press <ITEM/△>, <SHIFT/▽> to select.

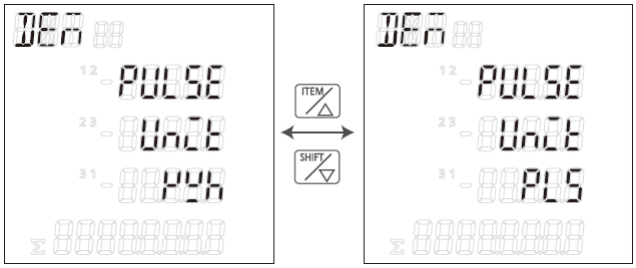
[Set list] CT(current measurement),
PM(Pulse input) (initial: CT)

Pulse type

*It is only when [PM] is selected for power input type.

Select pulse type to input.

'kWh'; Set electric power value per 1-pulse directly.
'PULSE'; Use pulse constant value of pulse output device to use.



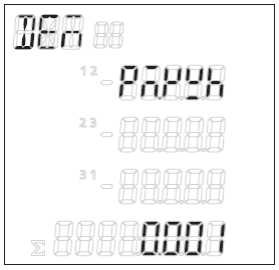
Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] kWh, PULSE (initial: kWh)

Pulse rate (electric power conversion)

* It is only when [kWh] is selected for pulse type.

Set electric power value per 1-pulse.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.001 to 100.000 [kWh]

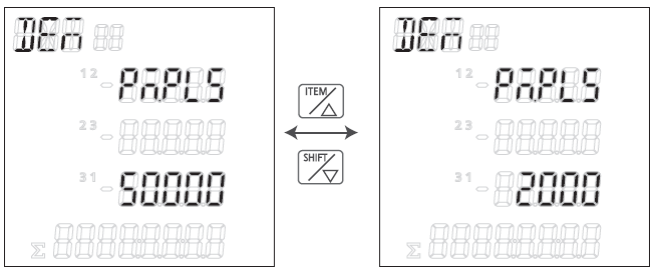
ITEM/△ Increase

SHIFT/▽ Decrease

Pulse constant value

* It is only when [PULSE] is selected for pulse type.

Select pulse constant value input by an outer pulse detector.
Check and select the pulse constant value of using pulse detector.



Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] 50000(pulse/kWh), 2000(pulse/kWh)
(initial: 50000)

Current demand interval

Set interval to use for current demand calculation.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1 to 60 min. (initial: 15)

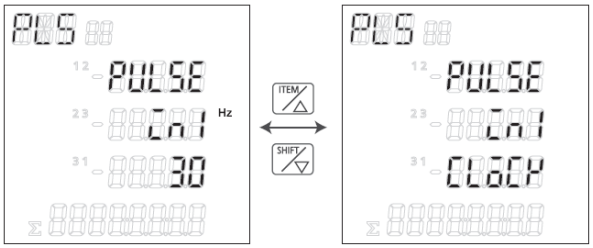
Increase

Decrease

4.4.3 Settings for pulse measurement

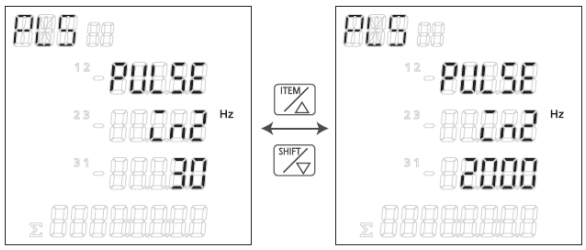
Pulse input IN1 IN2

Select pulse input max. counting speed or select to use pulse input for clock correction.



Press <ITEM/△>, <SHIFT/▽> to select.

[Pulse input IN1: Set list]
30(Hz), Clock (clock correction) (initial: 30)



[Pulse input IN2: Set list]
30(Hz), 2000(Hz) (initial: 30)

Clock synchronize

* It skips when [30] is selected for Pulse input IN1.

Set time to correct the clock by using pulse input IN1.

*If KW9M clock is different 1-hour or more from the setting time when pulse is input to IN1, it doesn't correct the clock.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 00:00 to 23:59 (initial: 00:00)

Increase

decrease

Pre-scale N1 IN2

* It skips when [Clock] is selected for Pulse input IN1.

Set pre-scale value used to convert count value of pulse input.

Press <ITEM/△>, <SHIFT/▽> to set .

[Set range] 0.001 to 100.00 (initial: 1.000)

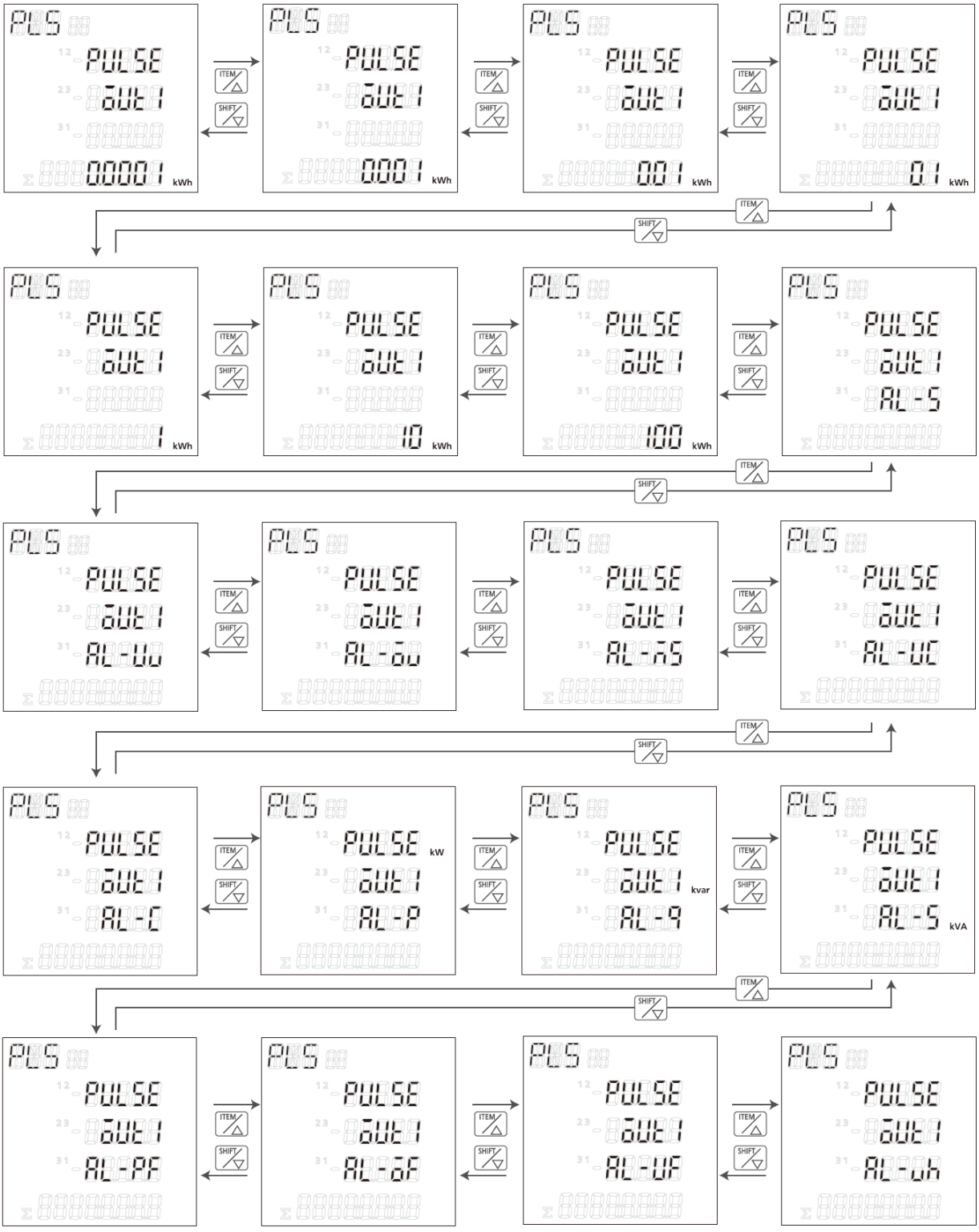
Increase

decrease

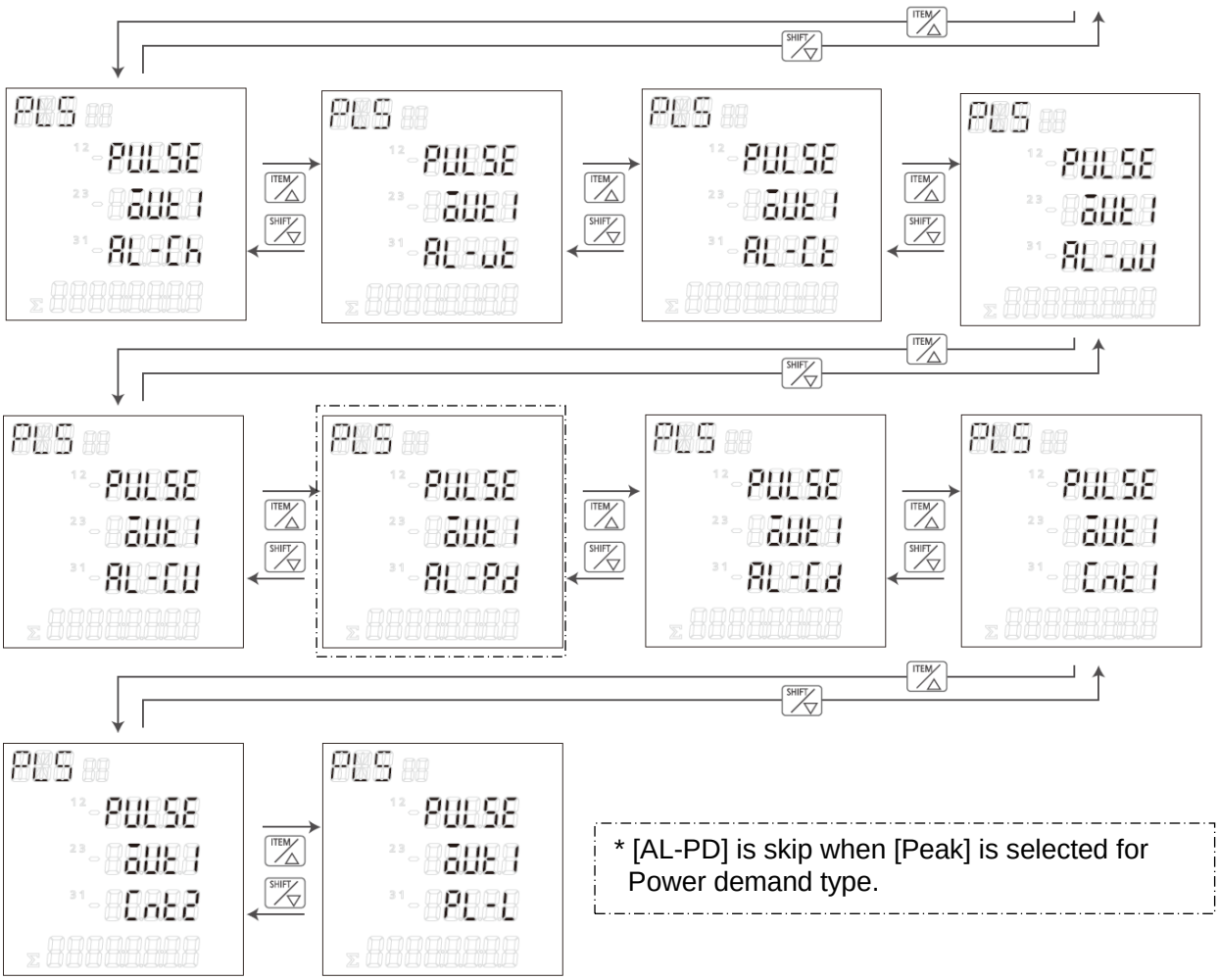
Unit for pulse output OUT1 OUT2

Set unit used for pulse output.

Press <ITEM/△>, <SHIFT/▽> to select unit for pulse output.



To the next page



[Set list] integral value (kWh/1pulse): 0.0001, 0.001, 0.01, 0.1, 1, 10, 100,
AL-S (stand-by alarm), AL-uV (under voltage alarm), AL-oV (over voltage alarm),
AL-MS (power interruption alarm), AL-uC (under current alarm), AL-C (current alarm),
AL-P (active power alarm), AL-Q (reactive power alarm), AL-S (apparent power alarm),
AL-PF (power factor alarm), AL-oF (over frequency alarm), AL-uF (under frequency alarm),
AL-VH (voltage harmonics alarm), AL-CH (current harmonics alarm),
AL-VT (voltage THD alarm), AL-CT (current THD alarm), AL-VU (voltage unbalancing alarm),
AL-CU (current unbalancing alarm), AL-PD (Power demand alarm),
AL-CD (current demand alarm), Cnt1 (count output), Cnt2 (count output), PL-L (level output)
(initial: 0.001)

・When one of AL-uV(under voltage alarm), AL-oV(over voltage alarm), AL-uC (under current alarm), AL-C(current alarm) is set, alarm is output according to the settings of under voltage, over voltage, under current, over current.
・When AL-MS(power interruption alarm) is set, alarm is output when it detects voltage under 5% of rated voltage.
・When PL-L(level output) is set, when the designated data register is 1, it output.
It is necessary to control by outer device. Write 1 (output ON) or 0 (output OFF) to the designated data register (OUT1:DT00005, OUT2:DT00006).

* Notes for selecting integral value
Select unit for pulse output so that pulse is less than 1-pulse for 1 second.

Target phase for pulse output/ alarm (OUT1 OUT2)

*It skips when [AL-VU, AL-CU, AL-PD, Cnt1, Cnt2, PL-L] is selected for unit for pulse output.

Select phase to monitor in order to judge the output.

It differs according to the setting unit and phase/wire systems.

Press <ITEM/△>, <SHIFT/▽> to select.

Set unit	Set list
Integral value	total, Phase1, Phase2, Phase3 (initial: total) ・For 3P3W, it fixes total. Setting window is skipped.
AL-P, AL-Q, AL-S (Power alarm)	total, All, Phase1, Phase2, Phase3 (initial: total) ・For 3P3W, it fixes total. Setting window is skipped.
AL-S (Stand-by alarm) AL-UC, AL-uC, AL-CH, AL-CT,AL-CD	All, Phase1, Phase2, Phase3 (initial: All)
AL-PF, AL-oF, AL-uF,	All, Phase1, Phase2, Phase3 (initial: All) ・For 3P3W, it can't be selected. Setting window is skipped.
AL-C	All, Phase1, Phase2, Phase3 (initial: All) ・For 3P4W: All*, Phase1, Phase2, Phase3, Phase-n (initial: All) *Except Phase-n
AL-uV, AL-oV, AL-MS, AL-VH, AL-VT	All, Phase1, Phase2, Phase3 (initial: All) ・For 3P3W: All, Line1-2, Line2-3, Line3-1 (initial: All)

*Selecting [All], it output when one of voltage of phase1, phase2 or phase3 exceeds (or falls below) the threshold.
Selecting [total], it output when total voltage of phase1, phase2 and 3 exceeds (or falls below) the threshold.

[Setting window display] example of OUT1

total

Phase1

Phase2

Phase3

All

Line 1-2

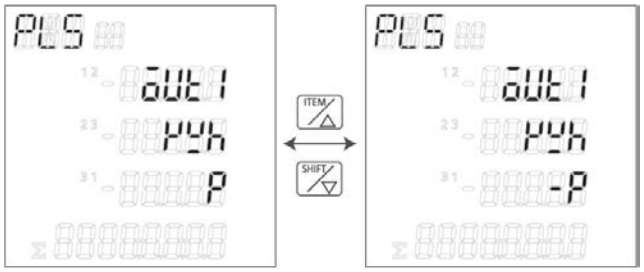
Line 2-3

Line 3-1

Phase-n

Direction of integral power for pulse output (OUT1 OUT2)

Select the direction of power (import or export) for using as a threshold for pulse output when unit for pulse output set to 'integral value'.



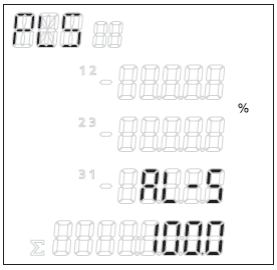
Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] P(import), -P(export) (initial: P)

Stand-by power alarm (threshold) (OUT1 OUT2)

* It is only when [AL-S] is selected for unit for pulse output.

Set a ratio of current for rated current used for threshold to judge stand-by power.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.1 to 100.0% (initial:100.0)

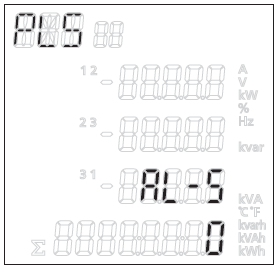
Increase

decrease

Stand-by power alarm (pass time) (OUT1 OUT2)

* It is only when [AL-S] is selected for unit for pulse output.

Set pass time used for threshold to judge stand-by power.
After passing the setting time, it will judge as a stand-by power.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0 to 9999 min. (initial: 0)

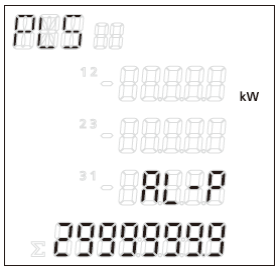
Increase

decrease

Active power alarm threshold (OUT1 OUT2)

* It is only when [AL-P] is selected for unit for pulse output.

Set a value of instantaneous active power to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

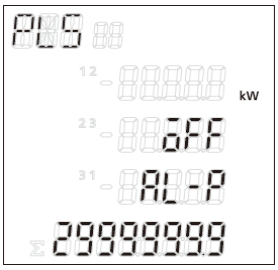
Increase

Decrease

Active power alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-P] is selected for unit for pulse output.

Set a value of instantaneous active power to use for clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

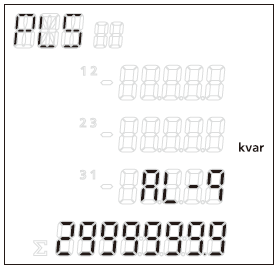
Increase

Decrease

Reactive power alarm threshold (OUT1 OUT2)

* It is only when [AL-Q] is selected for unit for pulse output.

Set a value of instantaneous reactive power to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

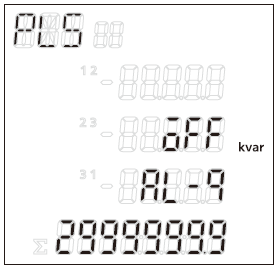
Increase

decrease

Reactive power alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-Q] is selected for unit for pulse output.

Set a value of instantaneous reactive power to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

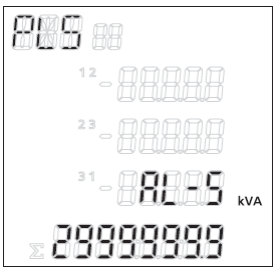
Increase

decrease

Apparent power alarm threshold (OUT1 OUT2)

* It is only when [AL-S] is selected for unit for pulse output.

Set a value of instantaneous apparent power to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

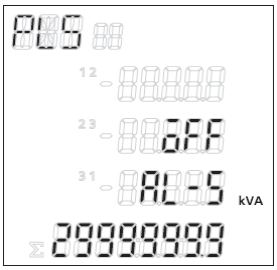
Increase

decrease

Apparent power alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-S] is selected for unit for pulse output.

Set a value of instantaneous apparent power to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 2999999.9 (initial: 2999999.9)

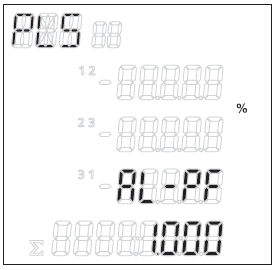
Increase

decrease

PF alarm threshold (OUT1 OUT2)

* It is only when [AL-PF] is selected for unit for pulse output.

Set a value of power factor to use for alarm output.
It judge by using absolute value of measured power factor.
*When measured PF is '0.000', it doesn't output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.000 to 1.000 (initial: 0.000)

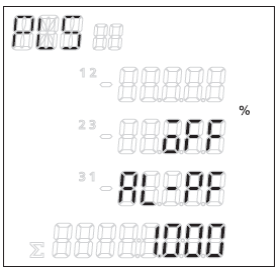
Increase

decrease

PF alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-PF] is selected for unit for pulse output.

Set a value of power factor to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.000 to 1.000 (initial: 0.000)

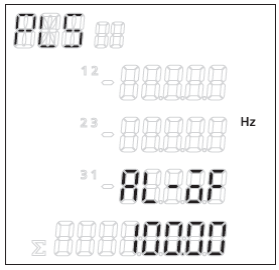
Increase

decrease

Over frequency alarm threshold (OUT1 OUT2)

* It is only when [AL-oF] is selected for unit for pulse output.

Set a value of frequency to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 100.00 [Hz] (initial:100.00)

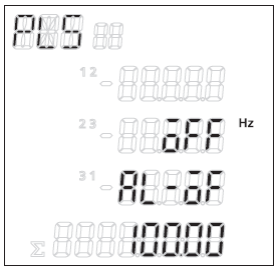
Increase

decrease

Over frequency alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-oF] is selected for unit for pulse output.

Set a value of frequency to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 100.00 [Hz] (initial:100.00)

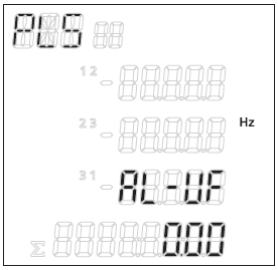
Increase

decrease

Under frequency alarm threshold (OUT1 OUT2)

* It is only when [AL-UF] is selected for unit for pulse output.

Set a value of frequency to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 100.00 [Hz] (initial0.00)

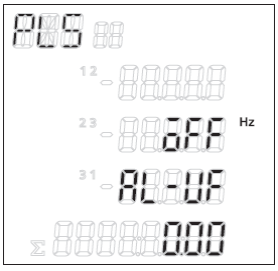
Increase

decrease

Under frequency alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-UF] is selected for unit for pulse output.

Set a value of frequency to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 100.00 [Hz] (initial0.00)

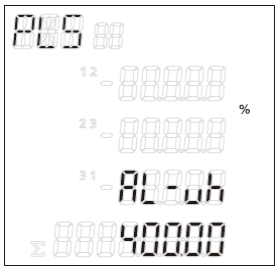
Increase

decrease

Voltage harmonics alarm threshold (OUT1 OUT2)

* It is only when [AL-VH] is selected for unit for pulse output.

Set a value of voltage harmonics to use for alarm output.
When one of 2 to 31-order harmonics exceeds the setting threshold, it output alarm.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

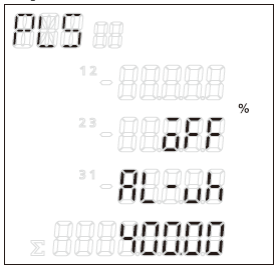
Increase

decrease

Voltage harmonics alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-VH] is selected for unit for pulse output.

Set a value of voltage harmonics to clear the alarm output.
When all values of 2 to 31-order harmonics falls below the setting threshold, it clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

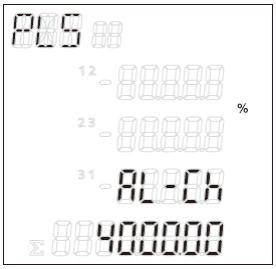
Increase

decrease

Current harmonics alarm threshold (OUT1 OUT2)

* It is only when [AL-CH] is selected for unit for pulse output.

Set a value of current harmonics to use for alarm output.
When one of 2 to 31-order harmonics exceeds the setting threshold, it output alarm.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

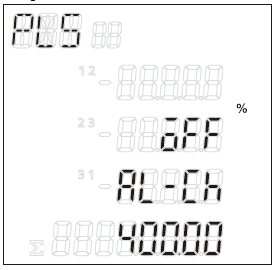
Increase

decrease

Current harmonics alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-CH] is selected for unit for pulse output.

Set a value of current harmonics to clear the alarm output.
When all values of 2 to 31-order harmonics falls below the setting threshold, it clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

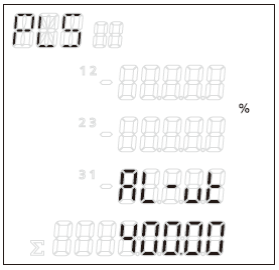
Increase

decrease

Voltage THD alarm threshold (OUT1 OUT2)

* It is only when [AL-VT] is selected for unit for pulse output.

Set a value of voltage THD to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

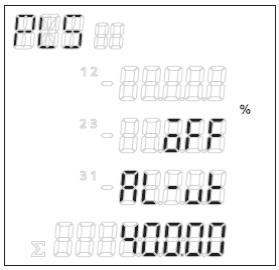
Increase

decrease

Voltage THD alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-VT] is selected for unit for pulse output.

Set a value of voltage THD to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

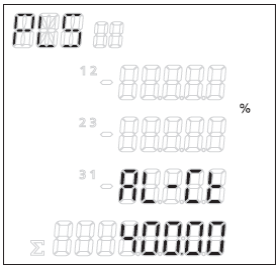
Increase

decrease

Current THD alarm threshold (OUT1 OUT2)

* It is only when [AL-CT] is selected for unit for pulse output.

Set a value of current THD to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

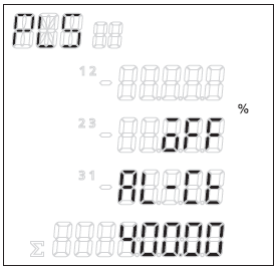
Increase

decrease

Current THD alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-CT] is selected for unit for pulse output.

Set a value of current THD to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 400.00 [%] (initial: 400.00)

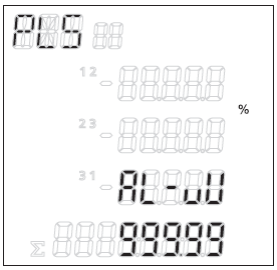
Increase

decrease

Voltage unbalancing alarm threshold (OUT1 OUT2)

* It is only when [AL-VU] is selected for unit for pulse output.

Set an unbalancing to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 999.99 [%] (initial: 999.99)

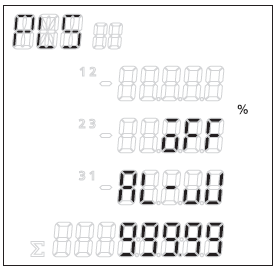
Increase

decrease

Voltage unbalancing alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-VU] is selected for unit for pulse output.

Set a value of unbalancing to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 999.99 [%] (initial: 999.99)

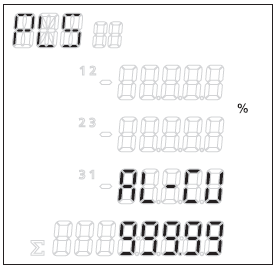
Increase

decrease

Current unbalancing alarm threshold (OUT1 OUT2)

* It is only when [AL-CU] is selected for unit for pulse output.

Set a value of unbalancing to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 999.99 [%] (initial: 999.99)

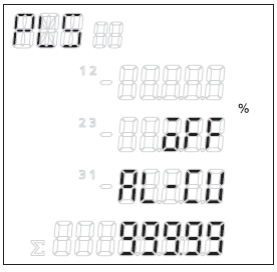
Increase

decrease

Current unbalancing alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-CU] is selected for unit for pulse output.

Set a value of unbalancing to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.00 to 999.99 [%] (initial: 999.99)

Increase

decrease

Power type for power demand alarm

* It is only when [Slide] or [Fixed] is selected for power demand type, and when [AL-PD] is selected for unit for pulse output.

Select power type to use for power demand alarm.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set list] P (active power), Q (reactive power), S (apparent power),
-P (active power (export)), -Q (reactive power (export)) (initial: P (active power))

Power demand alarm threshold (OUT1 OUT2)

* It is only when [Peak] isn't selected for power demand type, and when [AL-PD] is selected for unit for pulse output.

Set a value of instantaneous power to use for alarm output.

It differs the unit according to the selected power type.

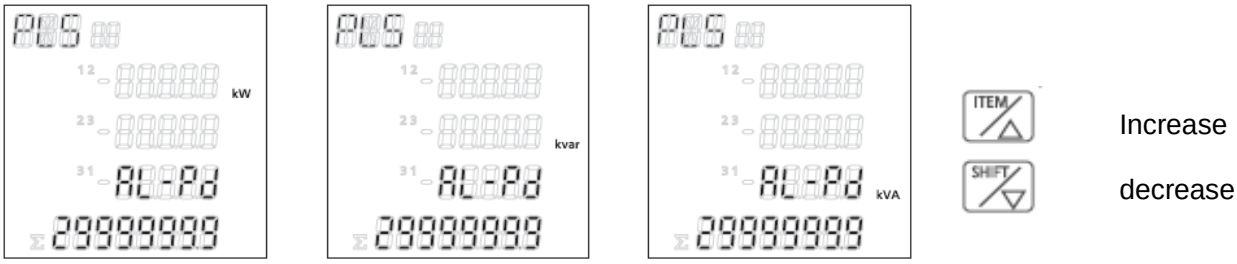
Press <ITEM/△>, <SHIFT/▽> to set the threshold.

[Set range] 0.000 to 99999.999 [kWh/kvar/kVA] (initial: 0.0)

P(active power)
-P(active power (import))

Q(reactive power)
-Q(reactive power (import))

S(apparent power)



Power demand alarm OFF threshold (OUT1 OUT2)

* It is only when [Slide] or [Fixed] is selected for power demand type, and when [AL-PD] is selected for unit for pulse output.

Set a value of instantaneous power to clear the alarm output.

It differs the unit according to the selected power type.

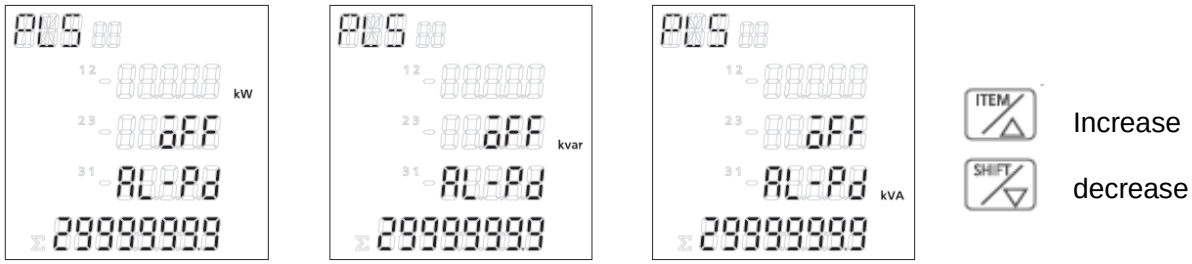
Press <ITEM/△>, <SHIFT/▽> to select the threshold.

Set range] 0.000 to 99999.999 [kWh/kvar/kVA] (initial: 99999.999)

P(active power)
-P(active power (import))

Q(reactive power)
-Q(reactive power (import))

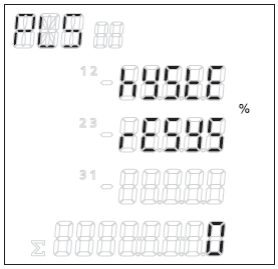
S(apparent power)



Power demand alarm hysteresis (OUT1 OUT2)

* It is only when [30min] is selected for power demand type, and when [AL-PD] is selected for unit for pulse output.

Set hysteresis to clear timing of power demand alarm.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0 to 100% [%] (initial: 0)

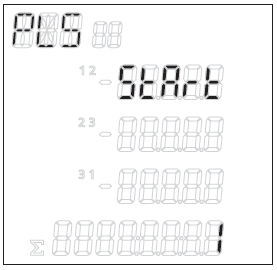
ITEM Increase

SHIFT Decrease

Power demand alarm start time (OUT1 OUT2)

* It is only when [30min] is selected for power demand type, and when [AL-PD] is selected for unit for pulse output.

Set time by minute to start monitoring power demand.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 1 to 30 [min.] (initial: 10)

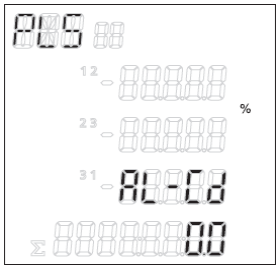
ITEM Increase

SHIFT decrease

Current demand alarm threshold (OUT1 OUT2)

* It is only when [AL-CD] is selected for unit for pulse output.

Set ratio of current demand to use for alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 120.0 [%] (initial:0.0)

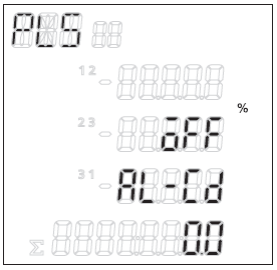
ITEM Increase

SHIFT decrease

Current demand alarm OFF threshold (OUT1 OUT2)

* It is only when [AL-CD] is selected for unit for pulse output.

Set ratio of current demand to clear the alarm output.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0.0 to 120.0 [%] (initial:0.0)

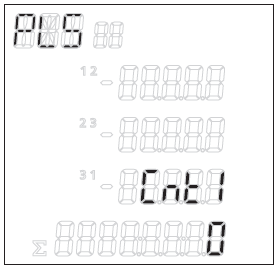
ITEM Increase

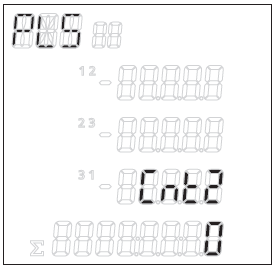
SHIFT decrease

Preset value (OUT1 OUT2)

* It is only when [Cnt1] or [Cnt2] is selected for unit for pulse output.

Set count value to output pulse.





Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0(0.000) to 999999(999.999) (initial: 0)

Increase

decrease

4.4.4 Settings for communication

Protocol

Select protocol for of main unit via serial communication (RS485).

*When protocol is changed, device number, transmission speed (baud rate), transmission format, stop bit and response time will be initialized.

Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] MEWT(MEWTOCOL), MODr (MODBUS(RTU)), 645(DL/T645-2007)
(initial: MEWT)

Device number

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

Press <ITEM/△>, <SHIFT/▽> to set.
The setting range differs according to the protocol.

[Set range] MEWTOCOL: 1 to 99
MODBUS(RTU): 1 to 247
DL/T645-2007: 0 to 9999 (initial:1)

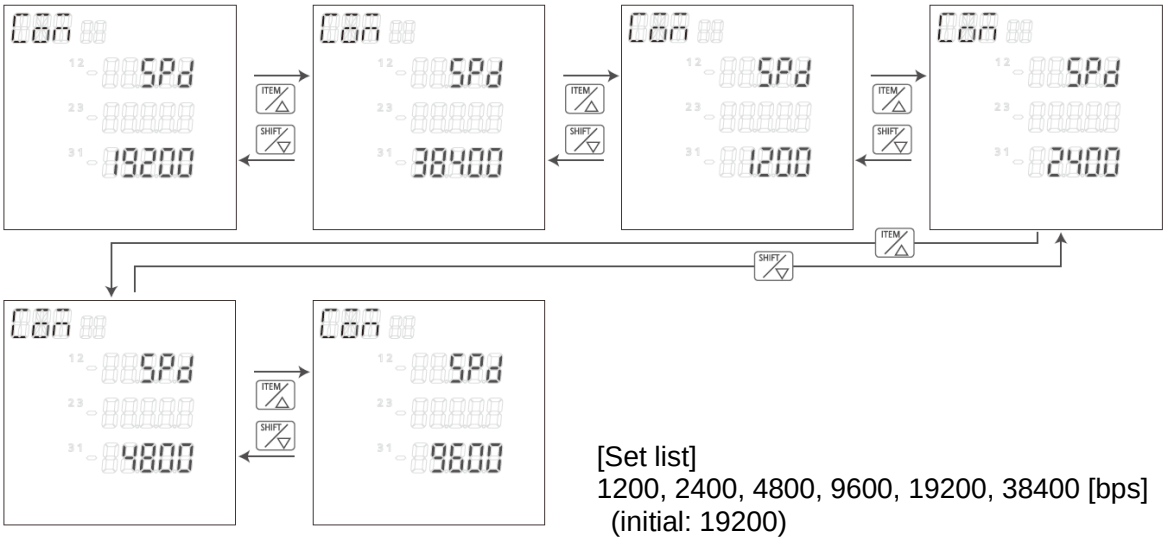
increase

decrease

Transmission speed (Baud rate)

Select the serial communication (RS485) transmission speed.
Define the transmission speed according to the master's (PLC etc.).

Press <ITEM/△>, <SHIFT/▽> to select.



[Set list]
1200, 2400, 4800, 9600, 19200, 38400 [bps]
(initial: 19200)

Transmission format

*Select [8b-E] when [645] is set for the protocol.

Select serial communication (RS485) transmission format (Data length, Parity).
Define the transmission format according to the master's (PLC etc.).

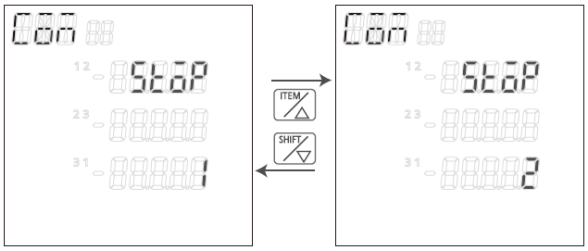
Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] 8b-o (8bit odd), 8b-n (8bit none), 8b-E (8bit even) (initial: 8b-o)

Stop bit

*Select [1] when [645] is set for the protocol.

Select serial communication (RS485) stop bit.



Press <ITEM/△>, <SHIFT/▽> to select.

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

Response time

*Select 50 or more when [645] is set for the protocol.

Set serial communication (RS485) response time of main unit.
When command is received, it sends response after setting response time passes.

Press <ITEM/△>, <SHIFT/▽> to set.

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

increase

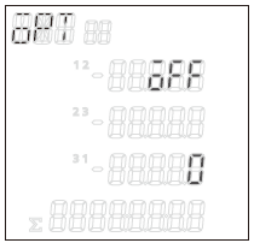
decrease

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

4.4.5 Settings for optional functions

Auto-off

Display LCD turns off automatically when there is no key operation for a long time.
After it passes the setting time, backlight will turn off.



Set <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0 to 99 min. (initial:1)

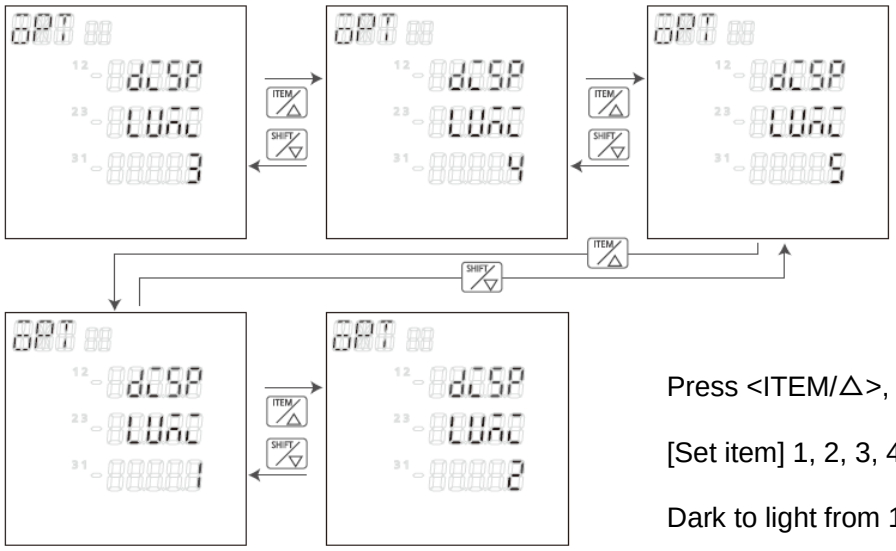
increase

decrease

Always turn on : [0]
Turn off after setting time: [1 to 99]
After turns off the LCD, any key operation makes it turns on.

Luminance

Adjust the display luminance.



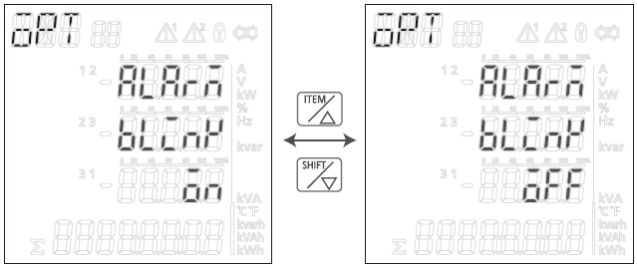
Press <ITEM/△>, <SHIFT/▽> to select.

[Set item] 1, 2, 3, 4, 5 (initial: 3)

Dark to light from 1 to 5

Alarm blinking

Select if the display is blinking during alarm output, or not.



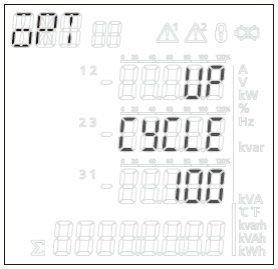
Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] ON, OFF (initial: OFF)

Press any key during blinking the display to stop blinking.

Update cycle

Set update cycle for measuring window.
It updates the display of measured values every setting time.



Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 100 to 1000ms (initial:100)

Increase

decrease

Auto-display

It shifts items of each integral value automatically.
When it passes the setting time after key operation, the integral value is shifted automatically.

Press <ITEM/△>, <SHIFT/▽> to set.

[Set range] 0 to 99 min. (initial:10)

increase

decrease

Not change automatically : [0]
Chang automatically after the setting time: [1 to 99]
*Any key operation during auto-display makes the display shift to instantaneous active power.

Display cycle

*It skips this item when [0] is set for auto-display.

Set each display cycle during auto-display.

Press <ITEM/△>, <SHIFT/▽> to set.

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

increase

decrease

Shift every 1second: [1]
*Any key operation during auto-display makes the display shift to instantaneous active power.

Temperature correction

The measured temperature can be corrected to display.

Press <ITEM/△>, <SHIFT/▽> to set.

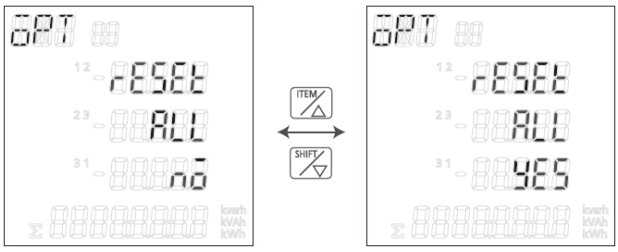
[Set range] -100.0 to 100.0 (initial: 0.0)

increase

decrease

Reset all integral value

Integral power (active, reactive, apparent) can be reset at one time.



Press <ITEM/△>, <SHIFT/▽> to select.

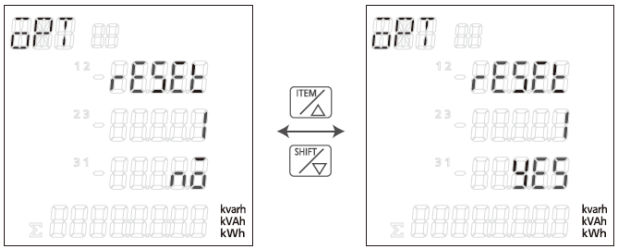
[Set list] YES, NO (initial: NO)

Reset all : [YES]
Not reset : [NO]

Reset integral value 1

*It skips this item when [YES] is selected for reset all integral value.

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



Press <ITEM/△>, <SHIFT/▽> to select.

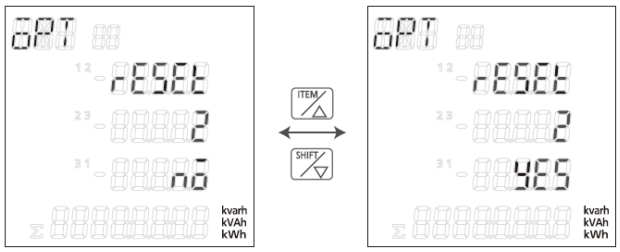
[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]

Reset integral value 2

*It skips this item when [YES] is selected for reset all integral value.

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



Press <ITEM/△>, <SHIFT/▽> to select.

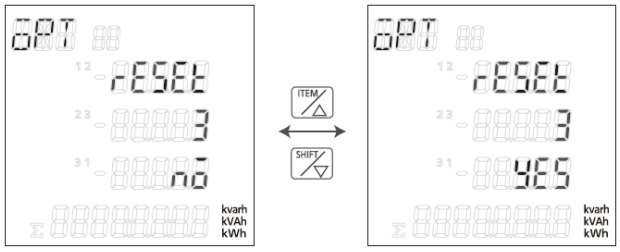
[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]

Reset integral value 3

*It skips this item when [YES] is selected for reset all integral value.

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



Press <ITEM/△>, <SHIFT/▽> to select.

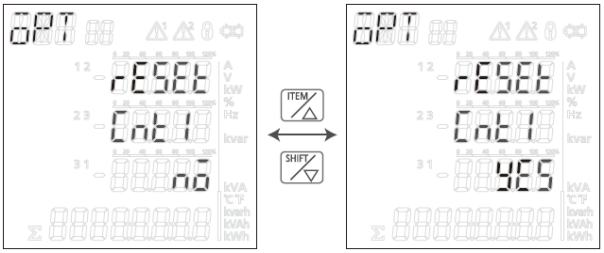
[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]

Reset count value 1

*It skips this item when [YES] is selected for reset all integral value.

Reset the count value 1.



Press <ITEM/△>, <SHIFT/▽> to select.

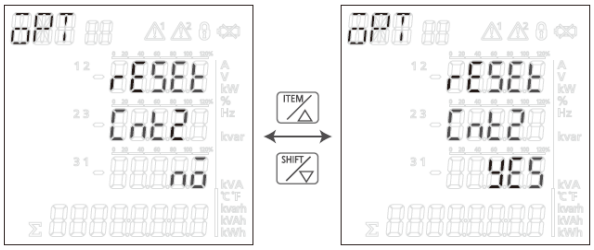
[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]

Reset count value 2

*It skips this item when [YES] is selected for reset all integral value.

Reset the count value 2.



Press <ITEM/△>, <SHIFT/▽> to select.

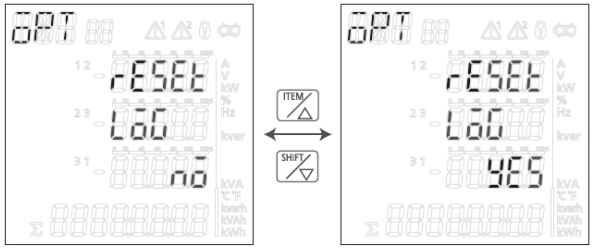
[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]
* In case of that [PM] is selected for power input type, it reset the electric power converted by pulse.

Reset log data

*It skips this item when [YES] is selected for reset all integral value.

Reset all log data (monthly max. /min. value of measured value, max. demand, power quality event).



Press <ITEM/△>, <SHIFT/▽> to select.

[Set list] YES, NO (initial: NO)

Reset : [YES]
Not reset : [NO]

Version

You can check the software version.

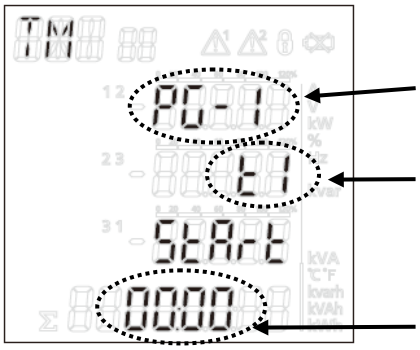
It displays the software version.

4.4.6 Settings for time program

Time program 1 to 10

You can set 10-type time program.
Set start time and end time for each time-zone and use it with setting conversion rate.
Refer to 5.2 Time-zone setting function in detail.
*End time
Start time of PG-2 is set as the end time of PG-1.
It means that the end time of PG-n is the same as the start time of PG-(n+1).

[Display explanation]



Program number; PG-1 to PG-10

time-zone; T1, T2, T3, T4, OFF

Program start time

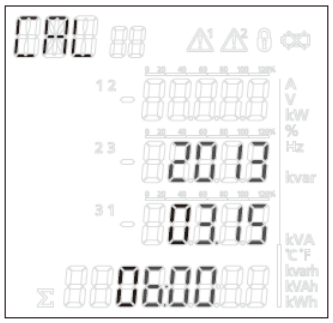
Press <SET> and ‘time-zone’ is blinking. Press <ITEM/△>, <SHIFT/▽> to select the time-zone.
After that press <SET>, and ‘program start-time’ is blinking. Set hour and minute.
Same time period can’t be set to the different programs.
Press <ITEM/△> to change program number.

4.4.7 Settings for calendar timer

Calendar timer

Set the year, month, day and time.

・Setting range is from January 1,2013 00:00 to December 31, 2099 23:59.
Set the date and time to use logging function.



Press <SET> and year, month, date, time are blinking in turn.
With blinking the setting item and press <ITEM/△> and <SHIFT/▽>.

Caution;

The timing when the calendar timer is settled to the unit is the timing when you select [YES] with the confirmation window and press <SET>.
It doesn't set the calendar timer to the unit when you press <SET> with calendar timer setting window.
Give your attention when you set time by second.

4.4.8 Password setting

Password setting

You can set password for changing the settings.
It is necessary to enter the password before moving the setting mode.
We recommend you to set password to avoid unexpected change.

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

Increase

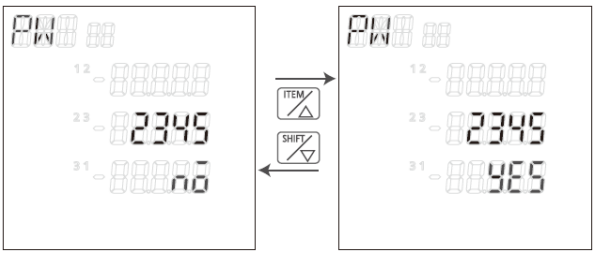
Shift entered digit to the right

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

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

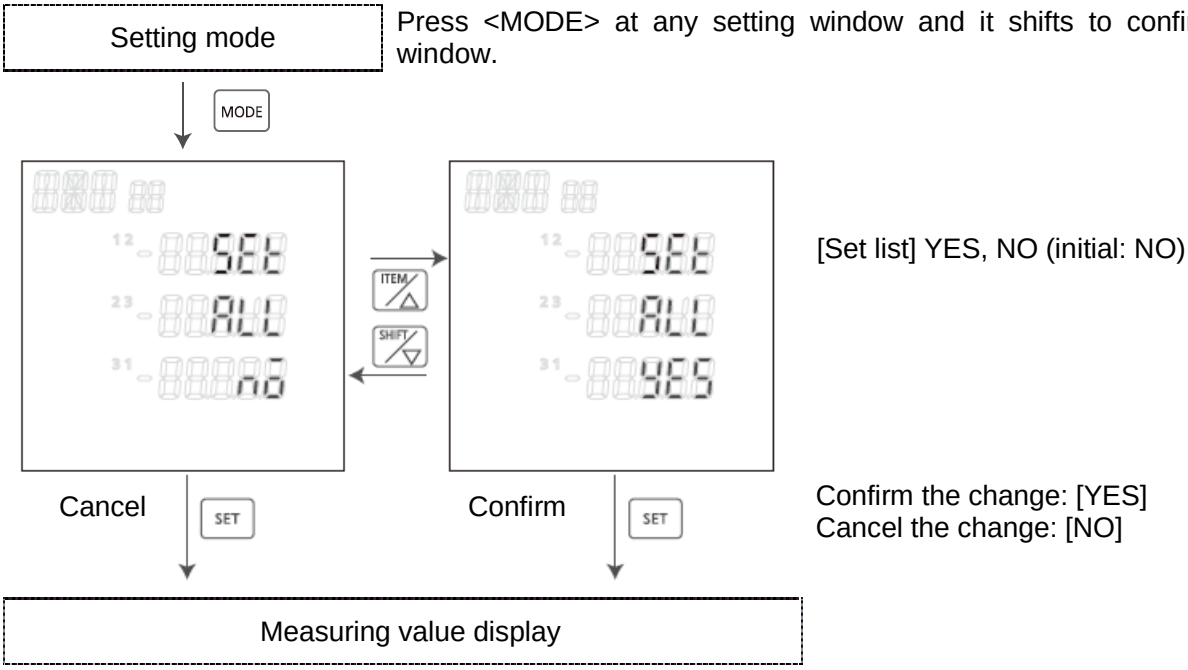
Set 4-digit password and press <SET>
After that the confirm window is displayed.

[Set range] YES, NO (initial: NO)



Confirm: [YES]
Not confirm: [NO]

4.4.9 Confirmation window



Chapter 5 Various Functions

5.1 Pulse output function

You can use 2-type pulse output, OUT1 and OUT2.
Refer to 4.4.3 Settings for pulse measurement for setting.

[OUT1][OUT2] are blinking when pulse output.
Time and date when pulse is output are recorded up to 10-record for each OUT1 and OUT2.

5.1.1 Output depends on integral electric power

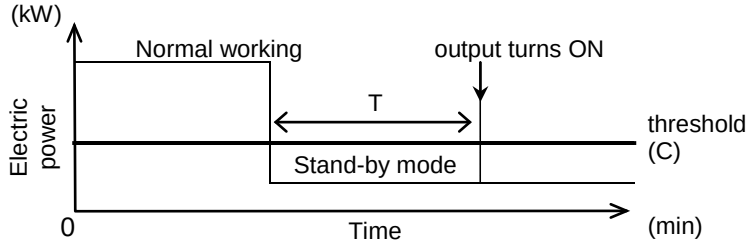
Set the unit for pulse output of integral power value and pulse output turns on every time when integral electric power reaches the unit. (Pulse width: about 100ms)
It judges at the same time of sampling cycle.

5.1.2 Stand-by alarm

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

Set threshold (current) (C) and stand-by time (T) to judge stand-by power.
When the measured load is satisfied the setting conditions, pulse putout turns on in order to notice.
When it exceeds the setting threshold, it turns off and reset it.

(Working flow chart)



5.1.3 Under voltage alarm

When it falls below the setting voltage, pulse output turns on in order to notice.
When it exceeds, the output turns off.

5.1.4 Over voltage alarm

When it exceeds the setting voltage, pulse output turns on in order to notice.
When it falls below, the output turns off.

5.1.5 Power interruption alarm

When it detects the voltage under 5% of rated voltage for 100ms or more, pulse output turns on in order to notice.

5.1.6 Under current alarm

When it falls below the setting current, pulse output turns on in order to notice.
When it exceeds, the output turns off.

5.1.7 Current alarm

When it exceeds the setting current, pulse output turns on in order to notice.
When it falls below, the output turns off.

5.1.8 Power alarm

When it exceeds the setting instantaneous electric power (active, reactive, apparent, active(export), reactive(export)), pulse output turns on in order to notice.
When it falls below, the output turns off.

5.1.9 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

5.1.10 Output depends on count value

Set the preset value and pulse output turns on the time when count value reaches the preset value. Refer to the next in detail.

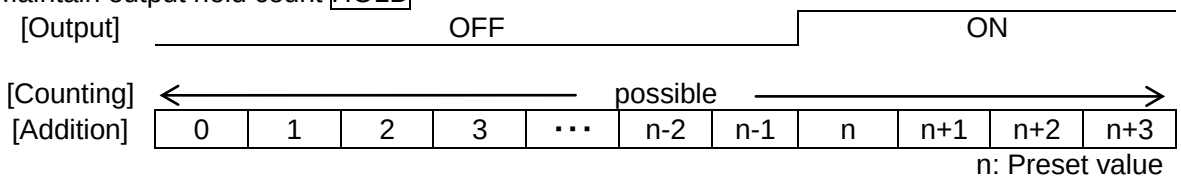
5.1.11 Level output

It runs on or off the output by writing 0 (OFF) or 1 (ON) to the designated data register (OUT1: DT00005, OUT2: DT00006) via communication by external control.

5.2 Counter function

●Operation mode

Maintain output hold count HOLD



(1) Output control is maintained after count-up completion and until reset. However counting is possible despite of count-up completion.

(2) It reverts“0” after counting up full scale, but output control is maintained. However output is OFF if count value or preset value is changed.

●Change the Preset Value

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

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

(1) If the preset value is changed to the value less than the count value, counting will continue until it reaches full scale, returns to “0” and then reaches the new preset value.

(2) If the preset value is changed to “0”, it will not count up at start with “0”. It counts up when the counting value comes to “0” again (after reach to full scale). However output is OFF if count value or preset value is changed.

(3) When the count value is fixed, output is changed according to the changing of preset value as below.

①If the preset value is changed to the value less than the count value or same as count value, output is ON.

（Count value ≧ Preset value）

②If the preset value is changed to the value more than the count value, 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 full scale, output is not changed.

5.3 Clock Correction Function

The clock in KW9M Eco-POWER METER can be set by pulse input when you set pulse input IN1 to [Clock]. However, the clock is different 1-hour or more from the setting time, it doesn't correct.

5.4 Demand function

You can select demand calculation methods for KW9M Eco-POWER METER from the belows.

・Peak demand
・According to IEC61557-12
  1. Sliding block interval demand
  2. Fixed block interval demand
  3. Current demand
・30-min demand

Please use this simple demand function as your standard. The value is not guaranteed.

Caution
(1)Definition of Demand
It is demand measurement in order to use by yourself as your standard.

(2) The time used by this function is the time set up with Eco-POWER METER.
Therefore, it is different from the demand meter controlled by an electric power company.

5.4.1 Peak demand

The maximum values of instantaneous power (active, reactive, apparent, active (export), reactive (export)) in one month are recorded as peak demand for 12-month.

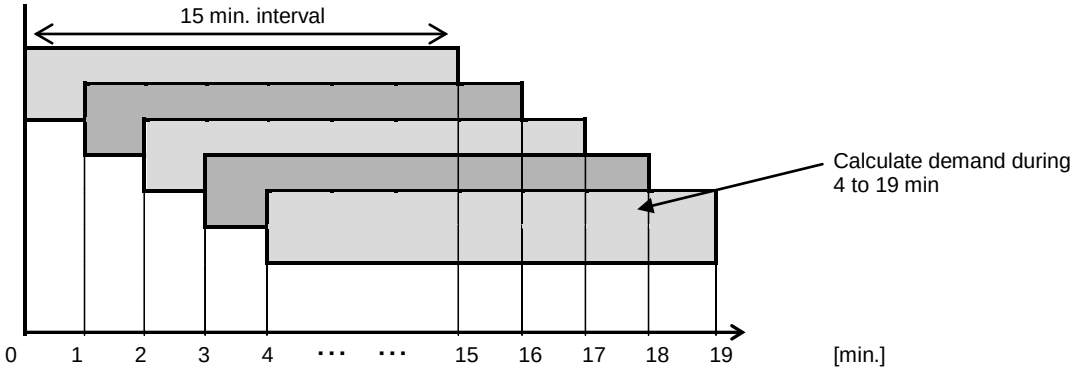
5.4.2 Block interval demand

It calculates demand by setting interval and displays.
You can select sliding block or fixed block for interval.
It output demand alarm according to the setting conditions.

Sliding block

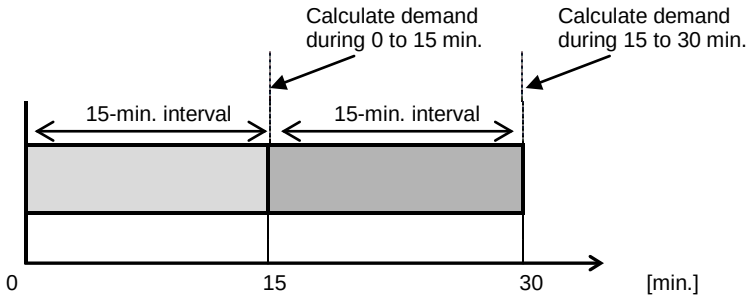
Set power interval by 1 to 60(min.) (every 1-min.). It calculates demand during latest finished interval and displays.
One interval is started every time that set for 'power demand interval 2'.

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



Fixed block

Set power interval by 1 to 60 (min.) (every 1-min.) It calculates demand during latest finished interval and displays. After one interval finishes, the next interval starts.



5.4.3 30-min demand

It estimated an average using electric power and judges it for the setting demand every 1 min.
This works demand monitoring for electric power input by CT or pulse.
You can select demand calculation method, additional or average.
In order to use demand monitoring by pulse input, input pulse that meet the specifications of 8.5.
It output demand alarm according to the setting conditions.

◆Output demand alarm

When present demand or estimated demand exceeds the setting threshold for power demand alarm, it output alarm.

[present demand or estimated demand ≧ threshold for power demand alarm]

It keeps alarm output for 1 minute, after that,

[present demand or estimated demand ≧ threshold for power demand alarm] -> Keep alarm

[present demand or estimated demand ＜ threshold for power demand alarm] -> Clear alarm

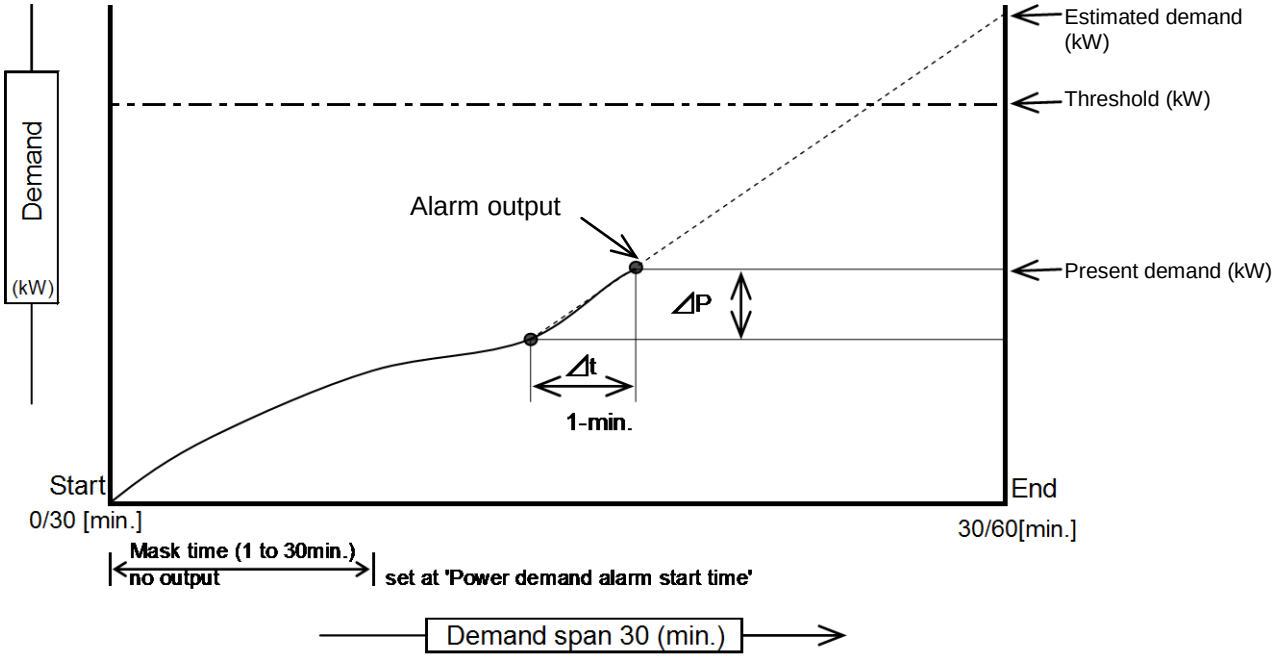
When you set hysteresis for power demand alarm, the timing of clear alarm is as below.

Ex.) Threshold for power demand alarm: 100kW Hysteresis: 10%

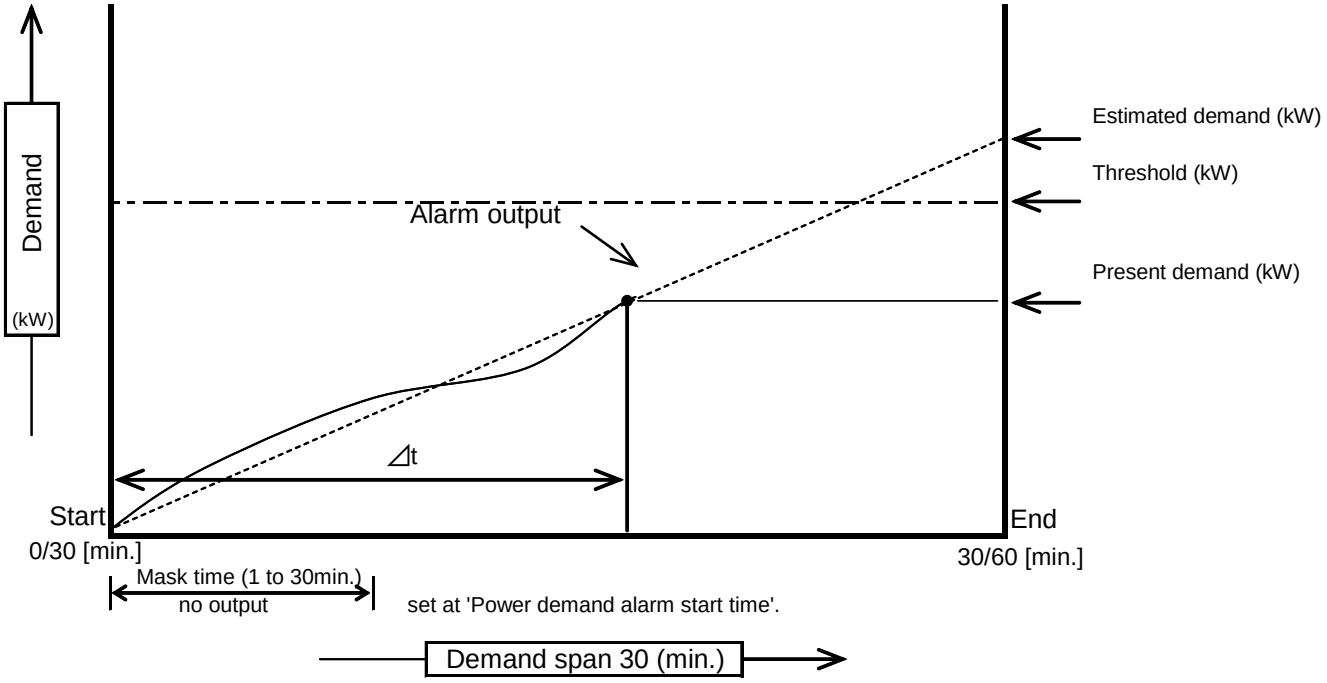
When present demand or estimated demand exceeds 100kW, it output alarm and keep 1 minute. After that if the present demand or estimated demand exceeds 90kW, it keep alarm. If it is below 90kW, it clears alarm.

When you set hysteresis, it can avoid frequent alarm output ON/OFF near threshold for power demand alarm.

◆Working outline for additional



◆Working outline for average



<Present demand (PV)>
It shows demand value from the time when demand span starts to present time.

[Calculation]

CT input (calculated by Eco-POWER METER)

$$\text{Present demand (kW)} = \text{Integral electric power until present from the start} \times \frac{60\ (\text{min.})}{30\ (\text{min.})\ \text{Demand span}}$$

$$= \text{Integral electric power until present from the start} \times 2$$

Pulse input (integral pulse input from a power meter)

$$\text{Present demand (kW)} = (\text{Integral electric power until present from the start} \times \text{pulse rate}) \times \frac{60\ (\text{min.})}{30\ (\text{min.})\ \text{Demand span}}$$

$$= (\text{Integral electric power until present from the start} \times \text{pulse rate}) \times 2$$

<Estimated demand (EV)>
It shows the estimated demand value at the end of demand span according to the using power from the time when demand span starts to present time.

[Calculation] (addition)

$$\text{Estimated demand(kW)} = \text{Present demand} + \frac{\text{Power change amount for } \Delta t \text{ minutes } (\Delta P)}{\text{Sampling cycle } \Delta t \text{ (minute)}} \times \text{Remaining time (minute)}$$

[Calculation] (average)

$$\text{Estimated demand(kW)} = \frac{\text{Present demand}}{\text{Pass time}} \times \text{Remaining time (minute)}$$

<Power demand threshold (SV)> It shows the threshold for demand alarm output.

<Ratio of estimated demand (SET.R)> Ratio of estimated demand to power demand alarm threshold.

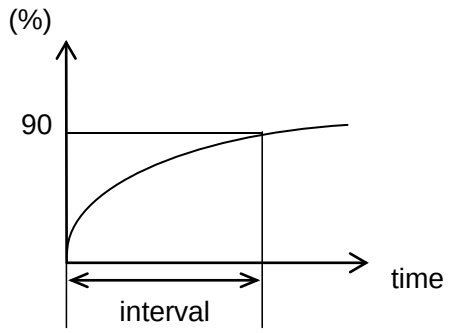
<Alarm output>
When present demand or estimated demand is satisfied the setting conditions, it output alarm and it indicates alarm.

5.4.4 Current Demand

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

Current demand =
(Average of current – last current demand value) × 90%(fixed) + Last current demand value

In case of that a stable current flows for interval time, 90% of current value is displayed.



5.4.5 Max. demand value

Maximum value of measured demand value (active, reactive, apparent, active (export), reactive (export), current)) during 1-month are considered to the max. demand value.
It records the max. demand value of each time-zone and all time for 12-month.

5.4.6 Demand alarm output

- It output with pulse output terminal. (open collector)
- It output only when [AL-PD] is set for unit for pulse output.
- It doesn't output alarm if power demand alarm threshold is set to '0.000'kW.

5.4.7 Working at power failure and at recovery

<At power failure>

- It stops the demand measurement.
- It records monthly max. demand log, max. demand value in the internal memory.

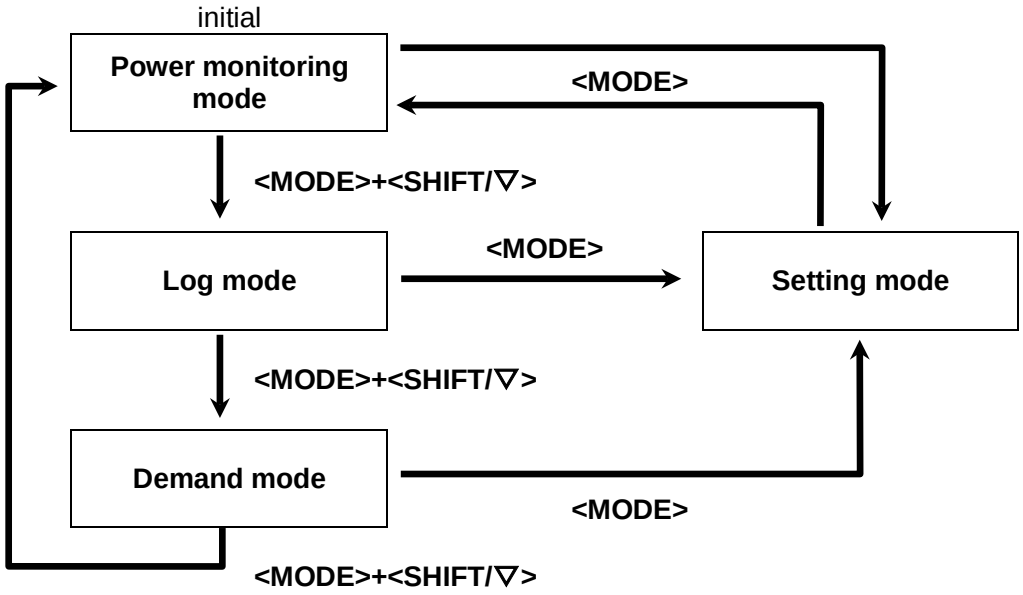
<At recovery>

- It stops the demand measuring until next span starts. When the next span starts, it will start demand measuring.

Chapter 6 Display of each Value

6.1 Working of Monitor display

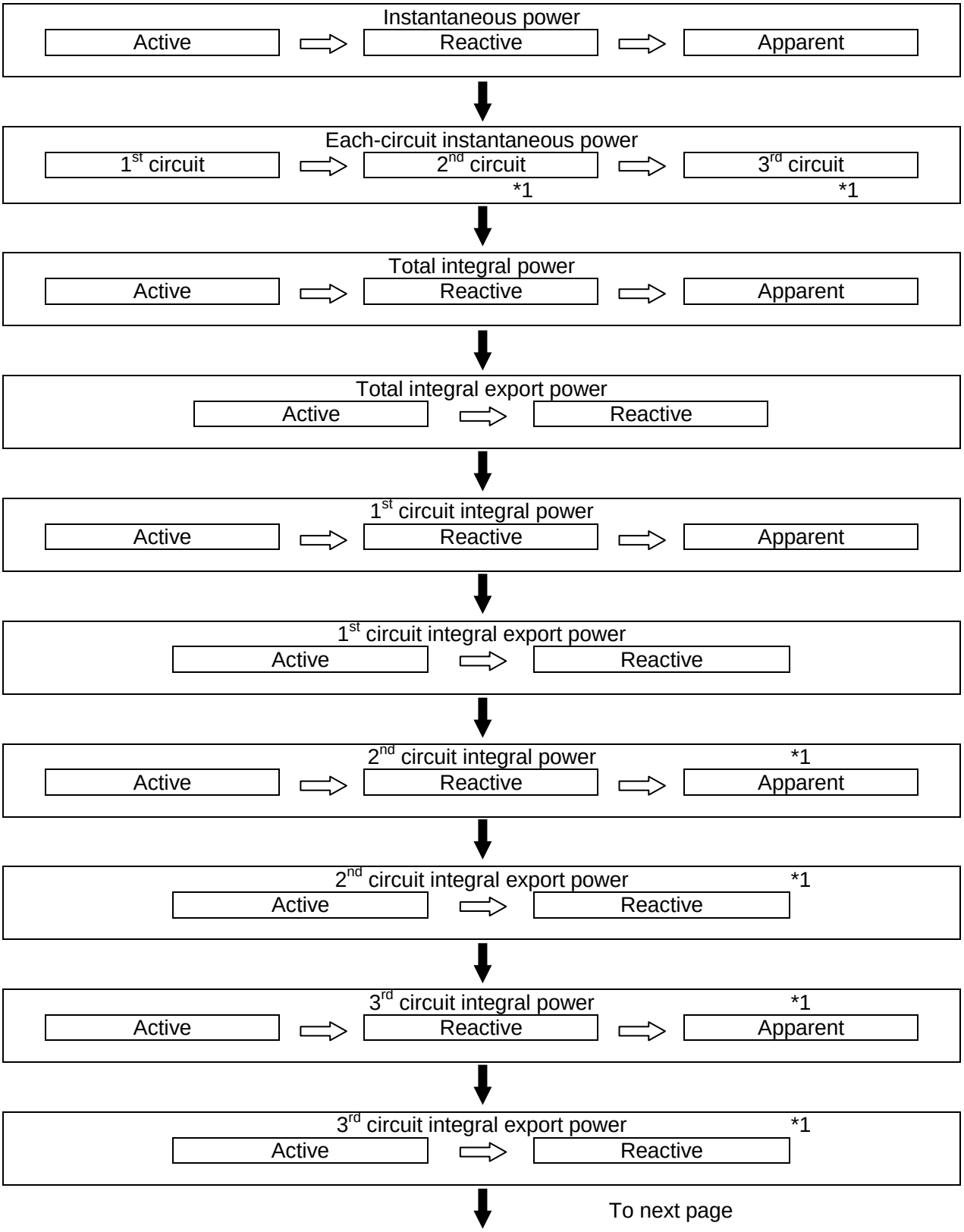
【Shift the display mode】
Press <SHIFT/▽> during pressing <MODE>, it shifts measuring mode, logging mode and demand mode.
Press <MODE> to shift the setting mode.



6.2 Working of Monitor Display

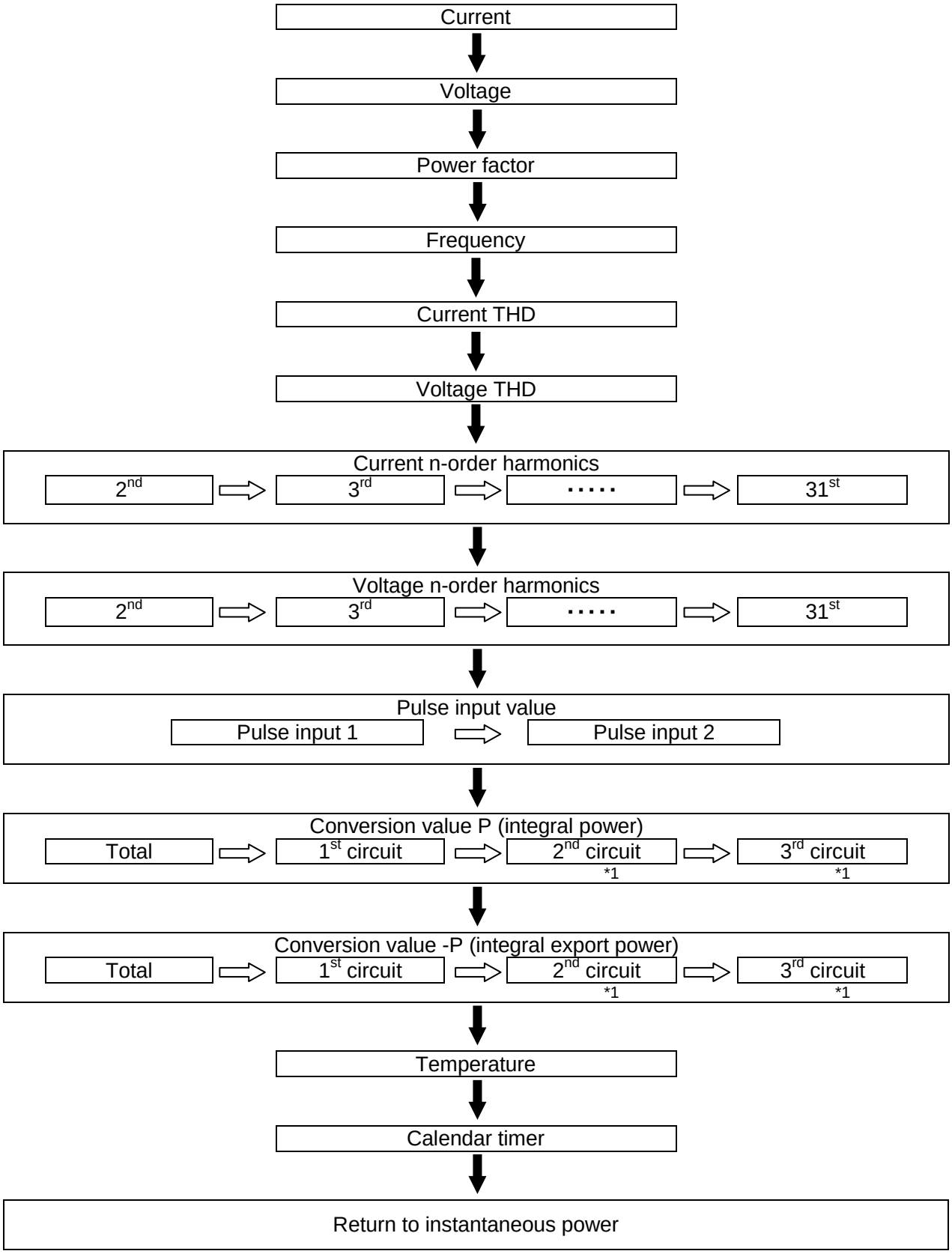
6.2.1 Single-phase two-wire system

Arrow mark shows to press each key. ➡ <ITEM/△> ⇨ SHIFT/▽>



To next page

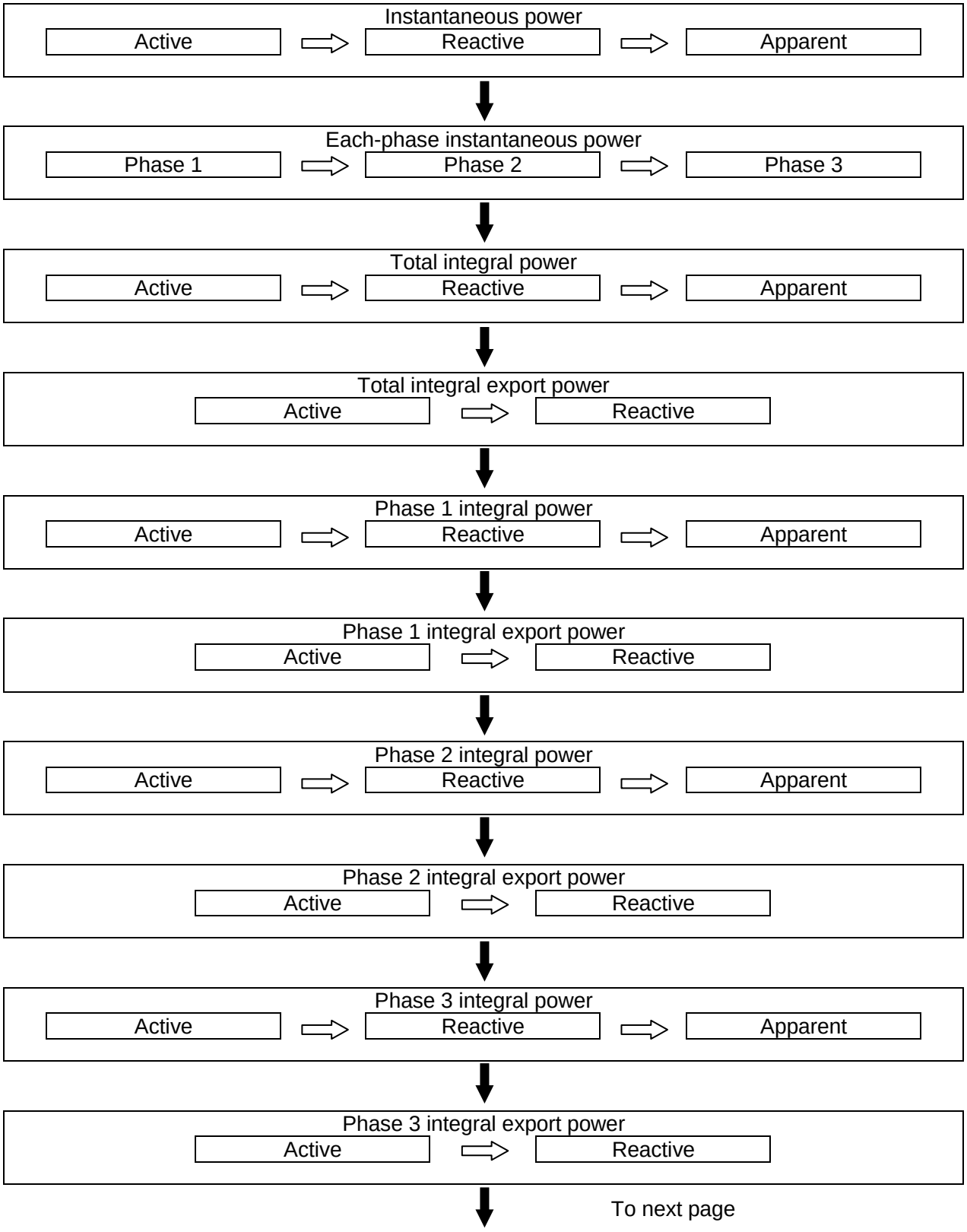
From the previous page



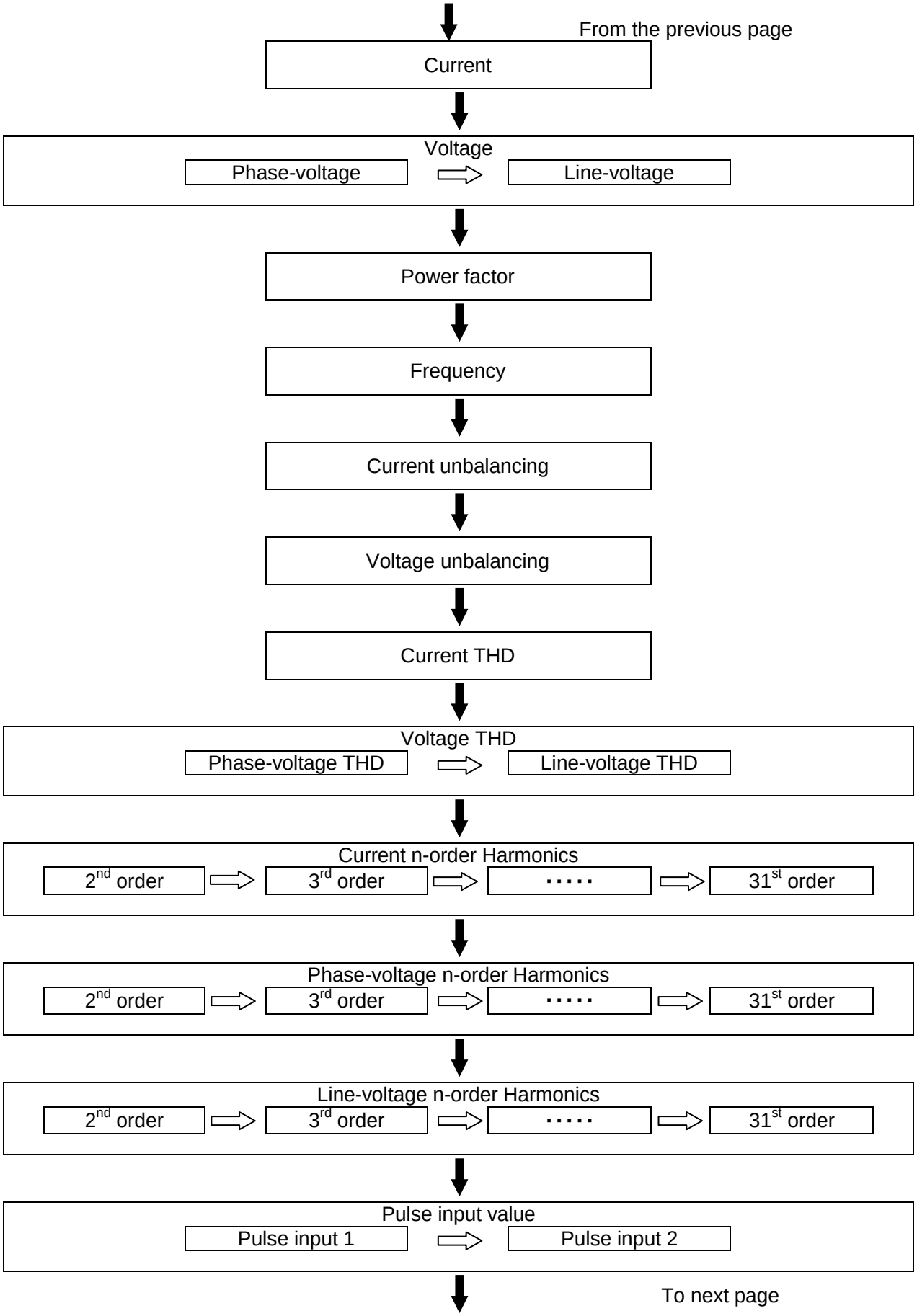
*1) When 2nd circuit and 3rd circuit are not measured, [0] are displayed.

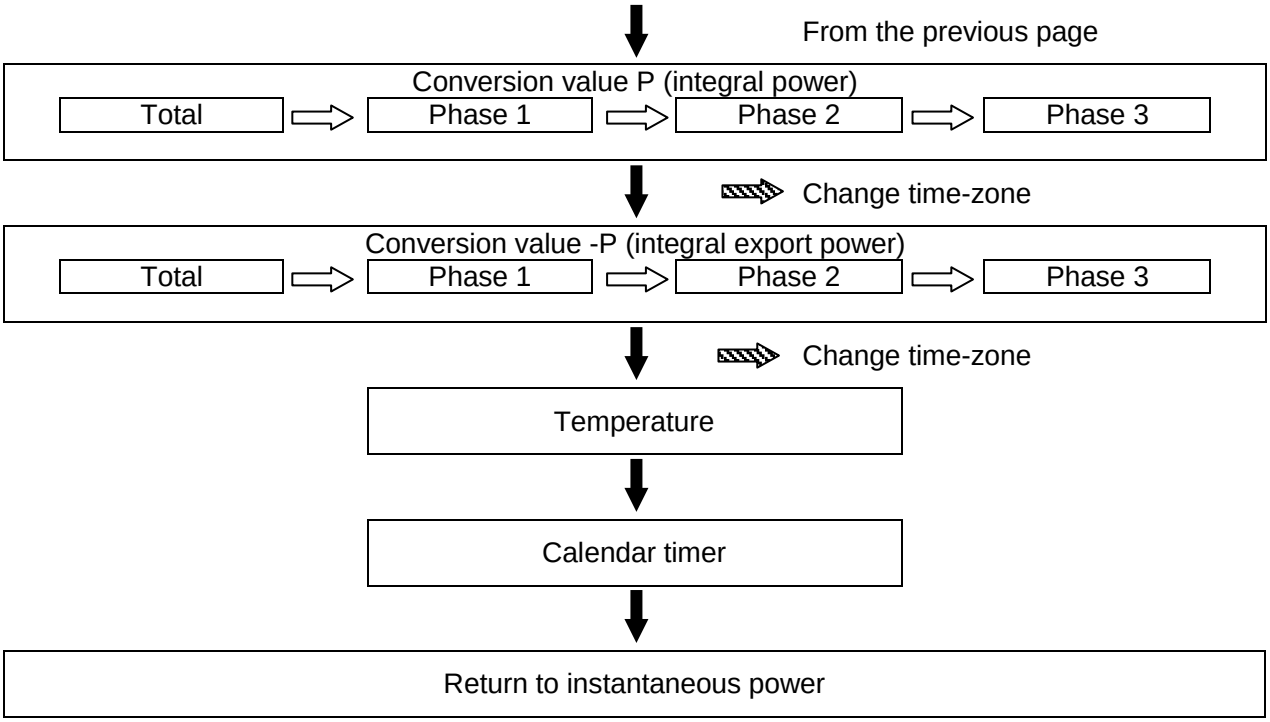
6.2.2 Single-phase three-wire system

Arrow mark shows to press each key. ➡ <ITEM/△> ⇨ <SHIFT/▽>



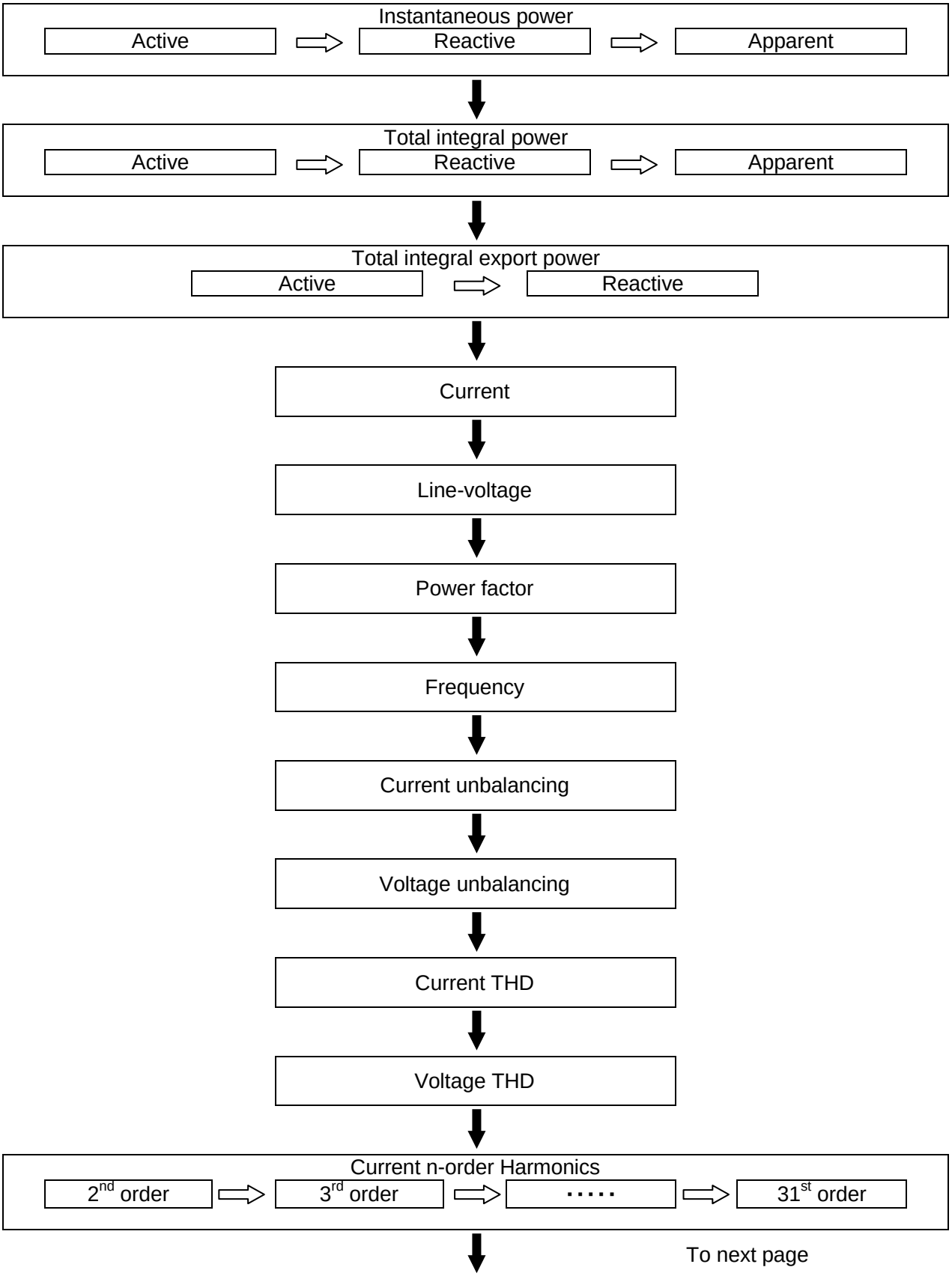
To next page


From the previous page
Current
Voltage
Phase-voltage
Line-voltage
Power factor
Frequency
Current unbalancing
Voltage unbalancing
Current THD
Voltage THD
Phase-voltage THD
Line-voltage THD
Current n-order Harmonics
2nd order
3rd order
·····
31st order
Phase-voltage n-order Harmonics
2nd order
3rd order
·····
31st order
Line-voltage n-order Harmonics
2nd order
3rd order
·····
31st order
Pulse input value
Pulse input 1
Pulse input 2
To next page

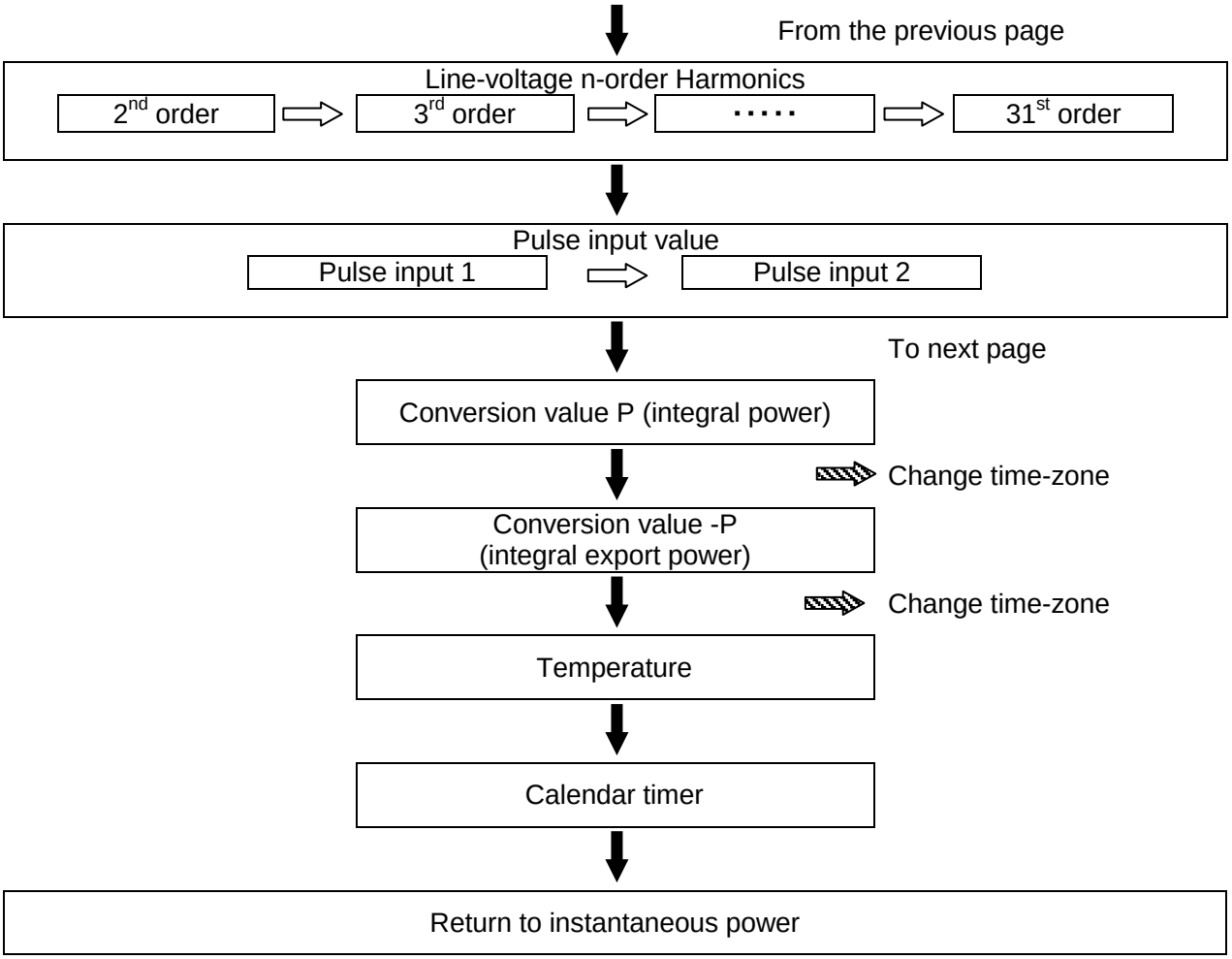

From the previous page
Conversion value P (integral power)
Total
Phase 1
Phase 2
Phase 3
Change time-zone
Conversion value -P (integral export power)
Total
Phase 1
Phase 2
Phase 3
Change time-zone
Temperature
Calendar timer
Return to instantaneous power

6.2.3 Three-phase three-wire system

Arrow mark shows to press each key. ➡ <ITEM/△> ⇨ <SHIFT/▽>

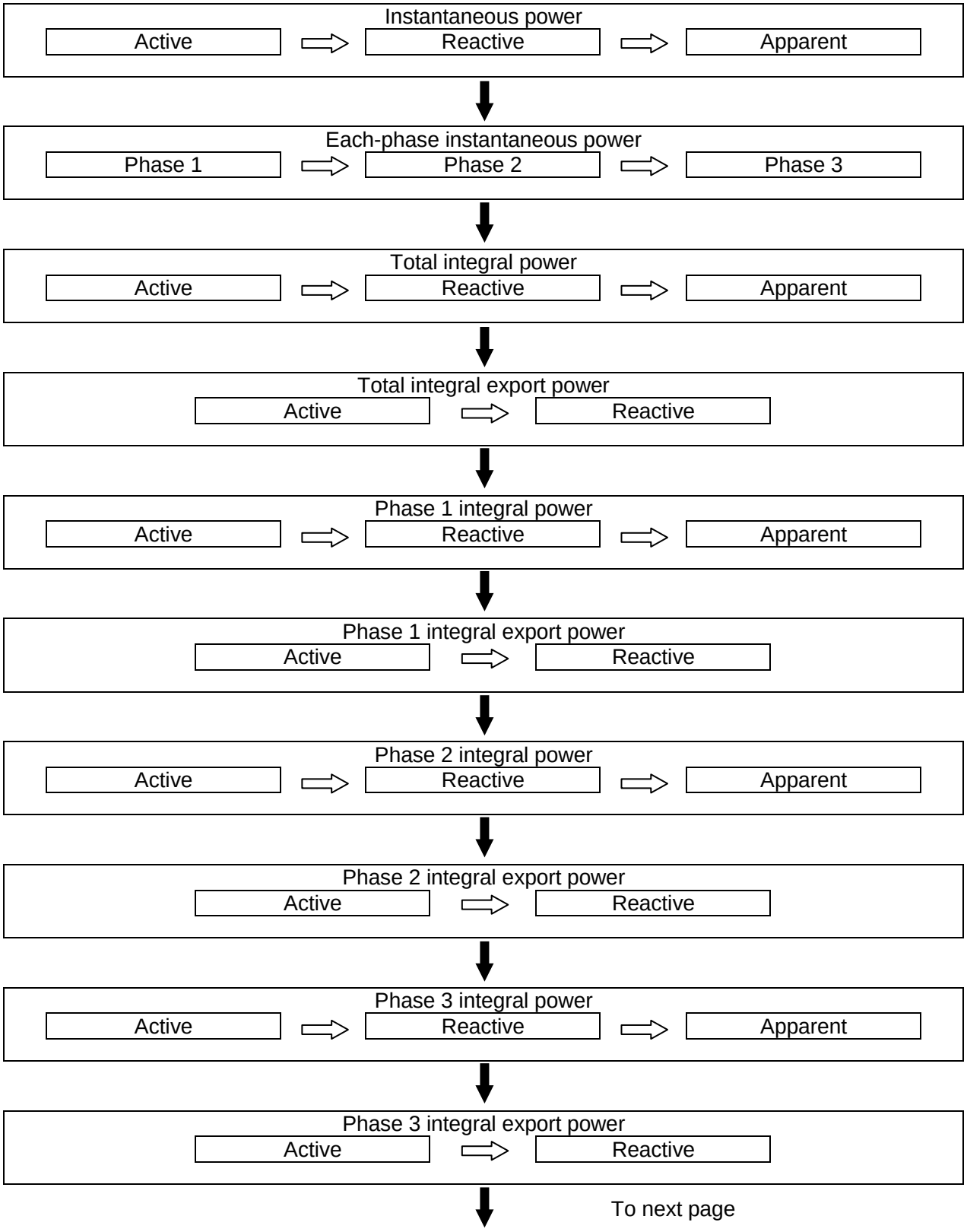


To next page

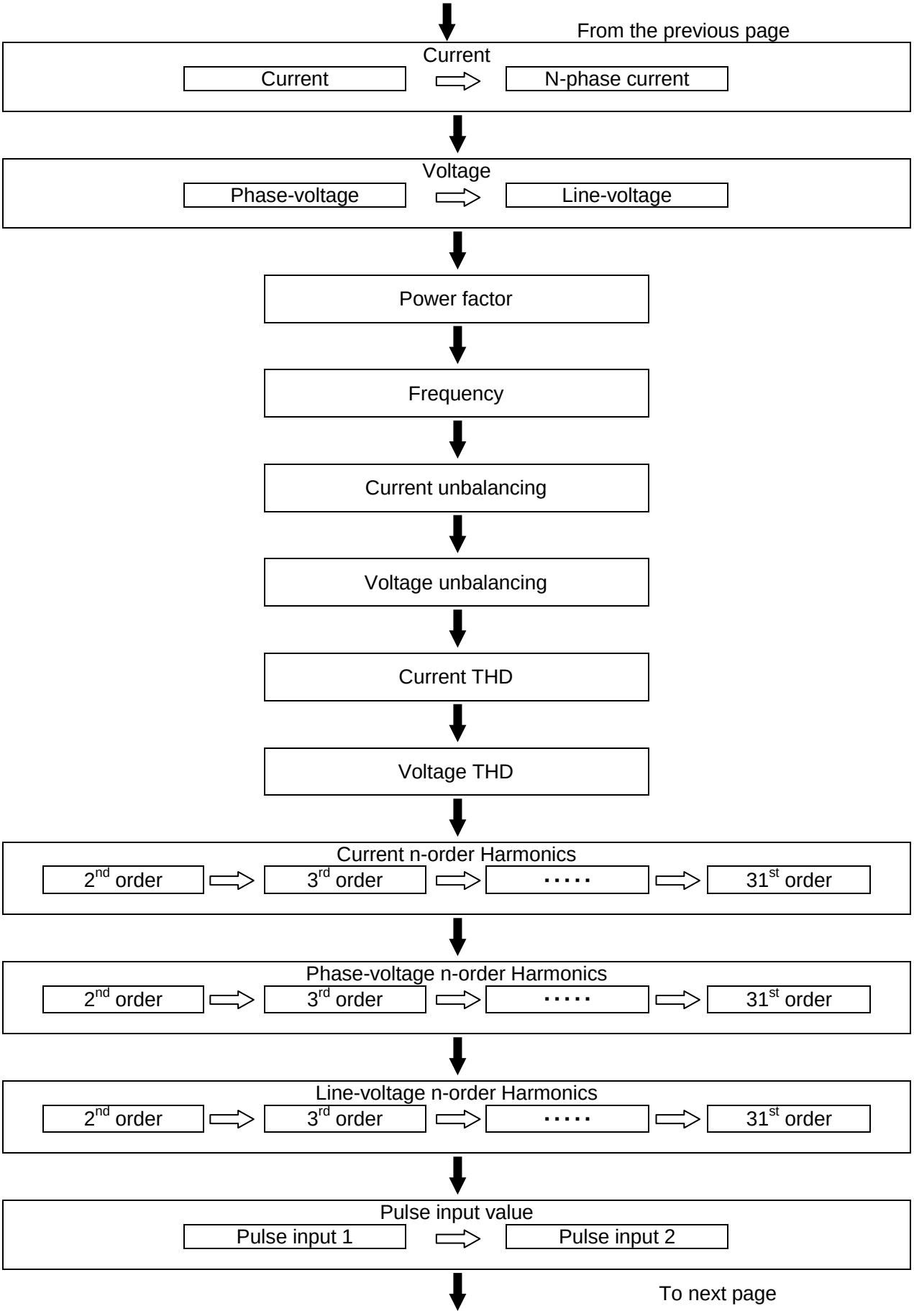

From the previous page
Line-voltage n-order Harmonics
2nd order
3rd order
·····
31st order
Pulse input value
Pulse input 1
Pulse input 2
To next page
Conversion value P (integral power)
Change time-zone
Conversion value -P
(integral export power)
Change time-zone
Temperature
Calendar timer
Return to instantaneous power

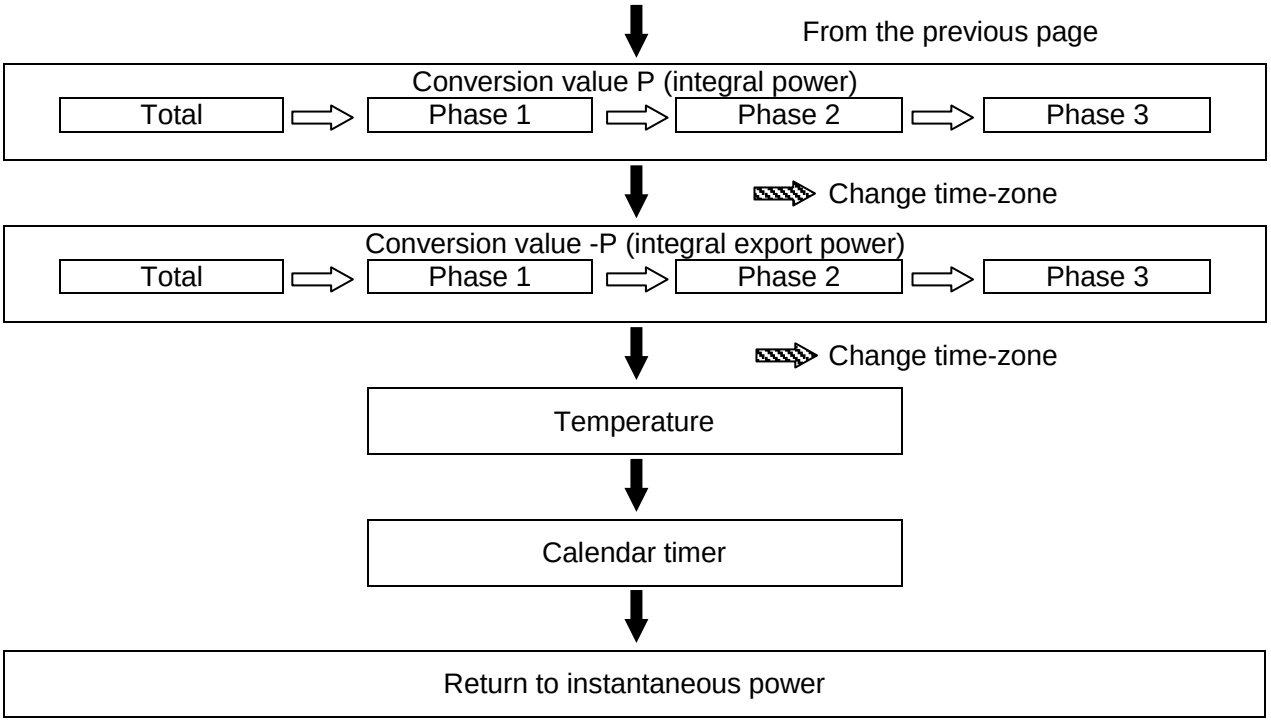
6.2.4 Three-phase four-wire system

Arrow mark shows to press each key. ➡ <ITEM/△> ⇨ <SHIFT/▽>



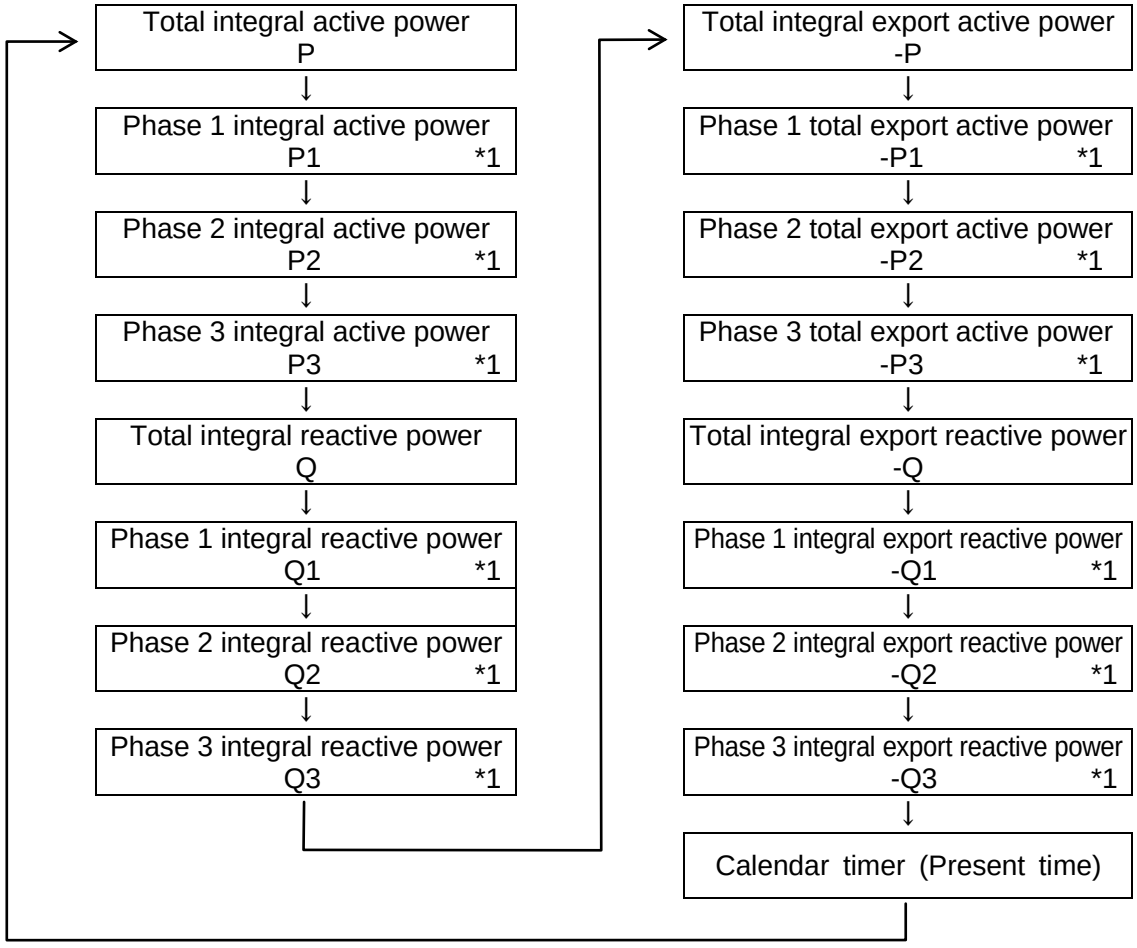
To next page


From the previous page
Current
Current
N-phase current
Voltage
Phase-voltage
Line-voltage
Power factor
Frequency
Current unbalancing
Voltage unbalancing
Current THD
Voltage THD
Current n-order Harmonics
2nd order
3rd order
·····
31st order
Phase-voltage n-order Harmonics
2nd order
3rd order
·····
31st order
Line-voltage n-order Harmonics
2nd order
3rd order
·····
31st order
Pulse input value
Pulse input 1
Pulse input 2
To next page


From the previous page
Conversion value P (integral power)
Total
Phase 1
Phase 2
Phase 3
Change time-zone
Conversion value -P (integral export power)
Total
Phase 1
Phase 2
Phase 3
Change time-zone
Temperature
Calendar timer
Return to instantaneous power

●Items that are displayed during the auto-display mode

When some value is set at auto-display setting, each integral value display is shifted automatically. If you press any key during auto-display mode, it returns the instantaneous power display. Items, which are not displayed according to the phase/wire system, are skipped



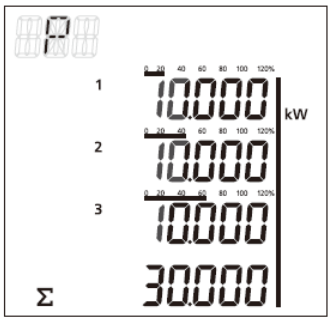
*1 Those are skipped when it set to three-phase three-wire system.

6.2.5 Instantaneous power

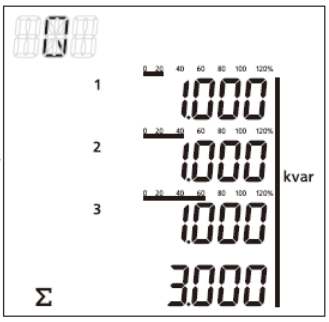
・The present instantaneous power of all phases or all circuits is displayed.
・Press <SHIFT/▽> to change active, reactive and apparent.

<1P2W/1P3W/3P4W>

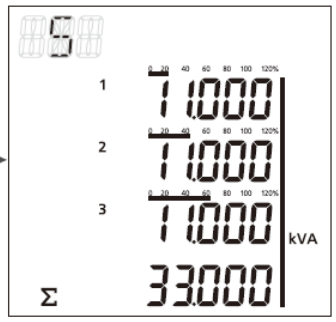
Active



Reactive



Apparent

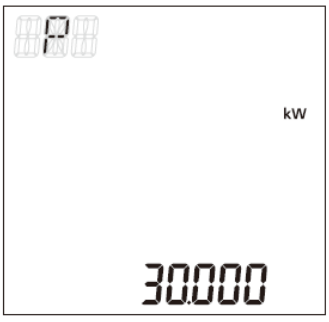


・Eco-POWER METER displays the power as below.

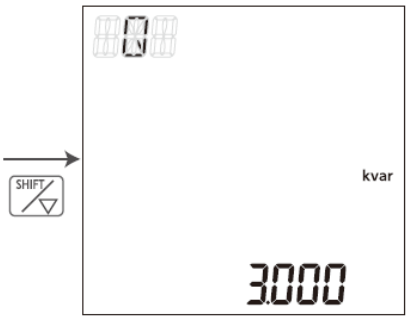
Display	1P2W	1P3W	3P4W
1	1st circuit	R-phase	R-phase
2	2nd circuit	---	S-phase
3	3rd circuit	T-phase	T-phase
Σ	Total (1+2+3)	Total (R+T)	Total (R+S+T)

<3P3W>

Active



Reactive



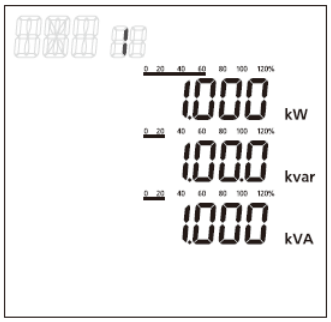
Apparent

6.2.6 Instantaneous power of each phase / each circuit

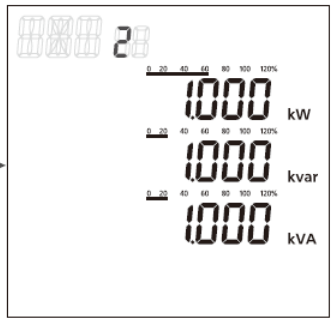
・The present instantaneous power of each phase or each circuit is displayed.
(It doesn't display for 3P3W system.)
・Press <SHIFT/▽> to change phase 1 (1st circuit), phase 2 (2nd circuit) and phase 3 (3rd circuit).

<1P2W/1P3W/3P4W>

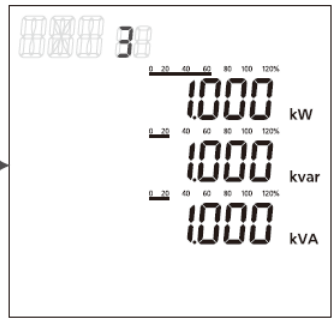
Phase 1/ 1st circuit



Phase 2/ 2nd circuit



Phase 3/ 3rd circuit



6.2.7 Total integral power

・The present total integral power is displayed.
・Press <SHIFT/▽> to change active, reactive and apparent.
・Press <SET> to change the display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone

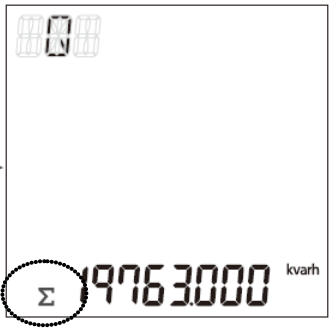
*Time-zone without setting for any time program is not displayed.

All time-zone

total integral active power

SHIFT/▽

total integral reactive power



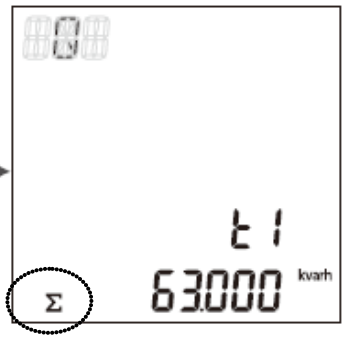
SHIFT/▽

total integral apparent power

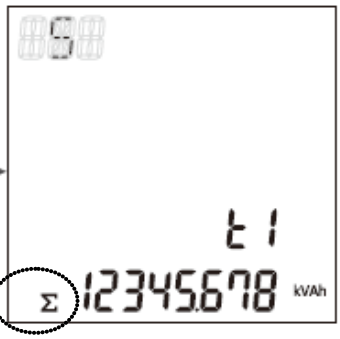
SET

time-zone1

SHIFT/▽



SHIFT/▽



SET

time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

*It doesn't light [Σ] with 3P3W system.

・Total integral power is measured and displayed from 0.000 to 29999999 (kWh/kvarh/kVAh).
・The decimal point is changed automatically.

0.000 → 99999.999 → 100000.00 → 999999.99 → 1000000.0 → 29999999

(After reach the full scale, 29999999, the value reverts to 0.000 but continues to measure.)

*At this window, present total integral power is displayed even if integral powers of each phase/ each circuit return to '0' after measuring to full-scale or reset. Therefore the total value of displayed integral power of each phase/each circuit is different from the value at this window.

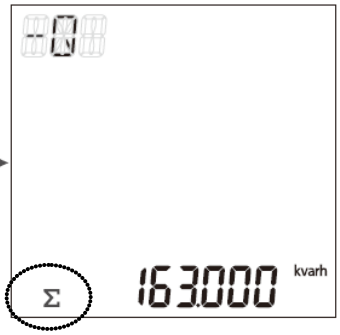
6.2.8 Total integral export power

・The present total export power is displayed.
・Press <SHIFT/▽> to change active, reactive and apparent.
・Press <SET＞ to change display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone
*Time-zone without setting for any time program is not displayed.

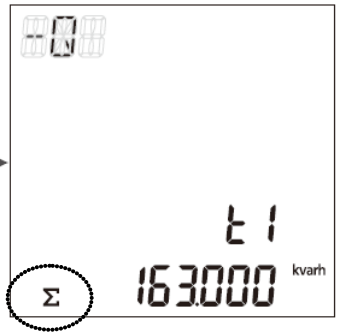
All time-zone

total integral active power (export)

total integral reactive power (export)



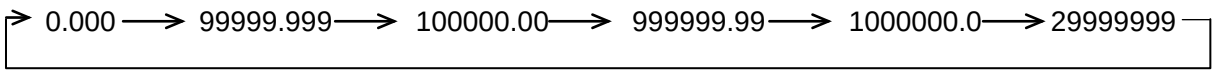
time-zone1



time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

*It doesn't light [Σ] with 3P3W system.

・Total integral power is measured and displayed from 0.000 to 29999999 (kWh/kvarh/kVAh).
・the decimal point is changed automatically.

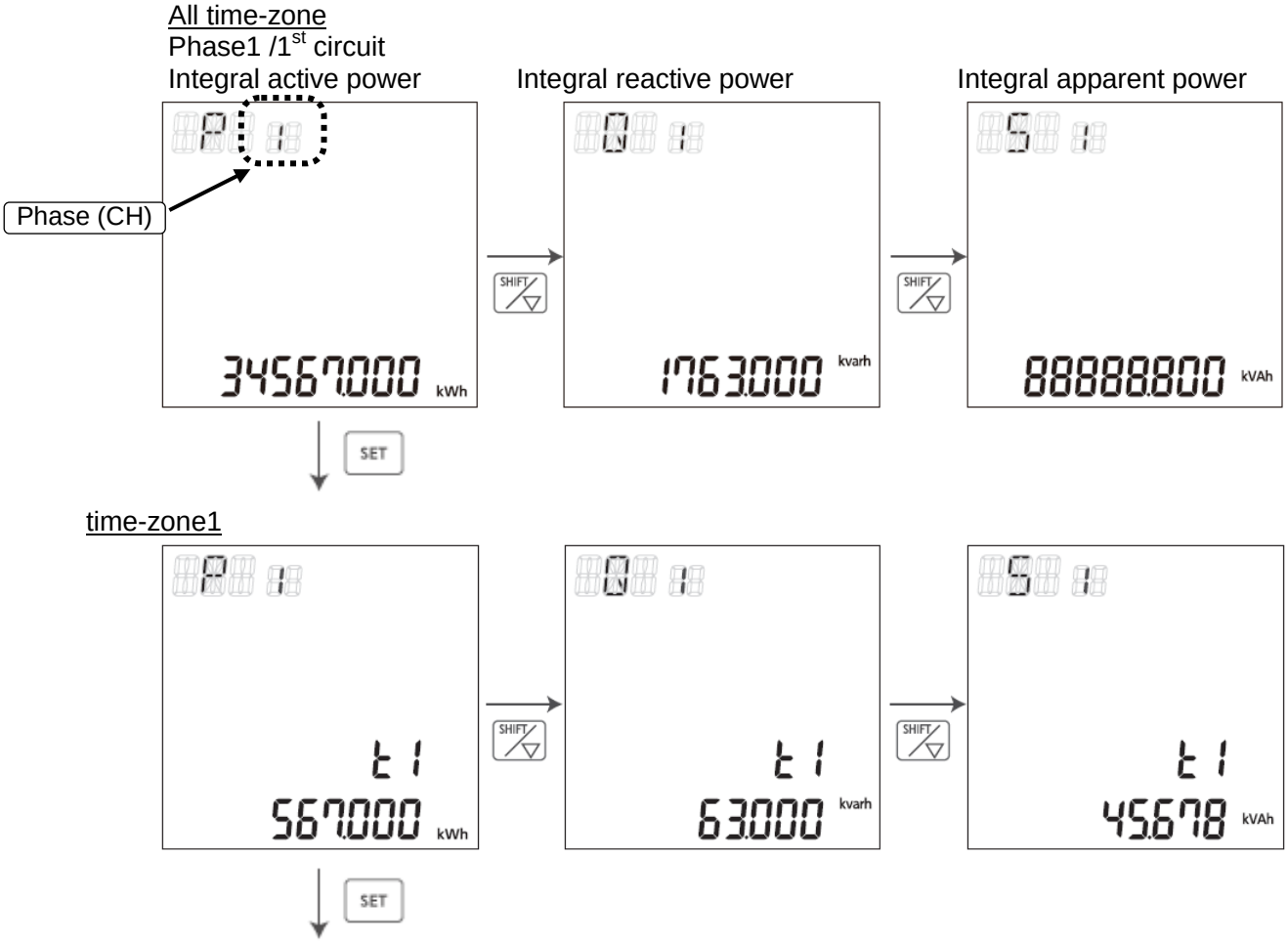


(After reach the full scale, 29999999, the value reverts to 0.000 but continues to measure.)

*At this window, present total export power is displayed even if integral powers of each phase/ each circuit return to '0' after measuring to full-scale or reset. Therefore the total value of displayed integral power of each phase/each circuit is different from the value at this window.

6.2.9 Integral power of each phase / each circuit

・The present integral power of each phase or each circuit is displayed.
(It doesn't display for 3P3W system.)
・Press <SHIFT/▽> to change active, reactive and apparent.
・Press <SET> to change the display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone
*Time-zone without setting for any time program is not displayed.



time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

・Integral power is measured and displayed from 0.000 to 9999999.9 (kWh/kvarh/kVAh).
・The decimal points is changed automatically.

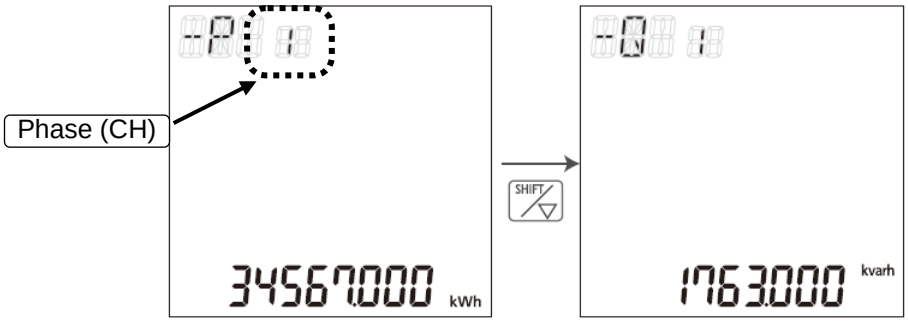
0.000 → 99999.999 → 100000.00 → 999999.99 → 9999999.9 →

(After reach the full scale, 9999999.9, the value reverts to 0.000 but continues to measure.)

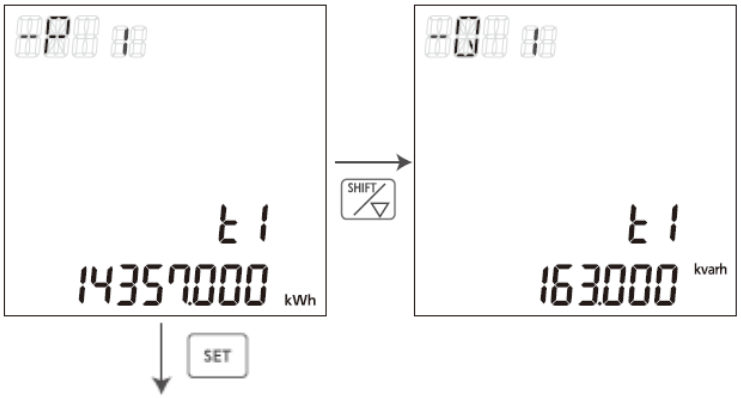
6.2.10 Integral export power of each phase / each circuit

・The present integral export power of each phase or each circuit is displayed.
(It doesn't display for 3P3W system.)
・Press <SHIFT/▽> to change active, reactive and apparent.
・Press <SET> to change the display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone
*Time-zone without setting for any time program is not displayed.

All time-zone
Phase1 / 1st-circuit
Integral active power (export) Integral reactive power (export)



time-zone1



time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

・Integral power is measured and displayed from 0.000 to 9999999.9 (kWh/kvarh).
・The decimal points is changed automatically.

0.000 → 99999.999 → 100000.00 → 999999.99 → 9999999.9 →

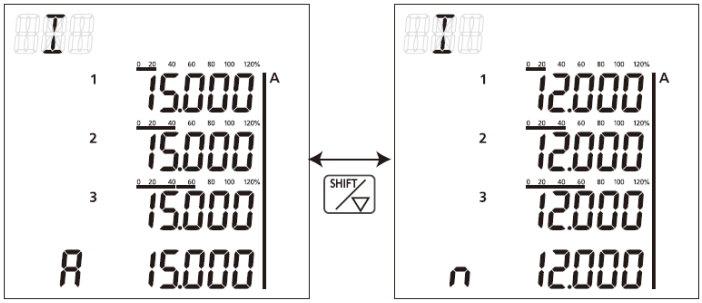
(After reach the full scale, 9999999.9, the value reverts to 0.000 but continues to measure.)

How to reset integral power (active/reactive/apparent) and integral export power (active/reactive)

・You can reset the value at the optional functions settings.
Refer to 4.4.3 setting for optional functions in detail.

6.2.11 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 and confirm the measurement environment.

・Current measuring points Eco-POWER METER measures the current as below.

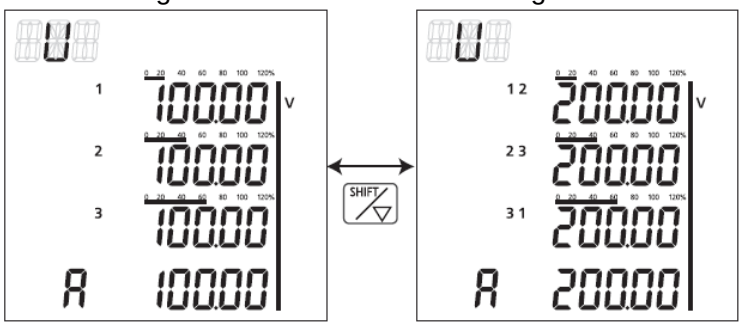
Display	1P2W	1P3W	3P3W 3P4W
1	1st circuit R-current	R-current	R-current
2	2nd circuit R-current	N-current	S-current
3	3rd circuit R-current	T-current	T-current
A	Average	Average of R and T	Average
N	—	—	N-current *only 3P4W

6.2.12 Voltage

・The present voltage is displayed.

・Press <SHIFT/▽> to change phase voltage and line voltage.
(Line voltage is not displayed for 1P2W system. Phase voltage is not displayed for 3P3W system.

Phase voltage Line voltage



・When input voltage is under 3V (when VT ratio is 1.), it displays "0.0" and doesn't measure.

・When input voltage exceeds 600V or the display range, it displays "- - - - -".
Check and confirm the measurement environment.

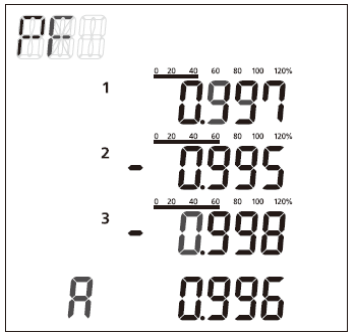
・Voltage measuring points Eco-POWER METER measures the voltage as below.

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

6.2.13 Power factor

・The present power factor of the load is displayed.

<1P2W/1P3W/3P4W>



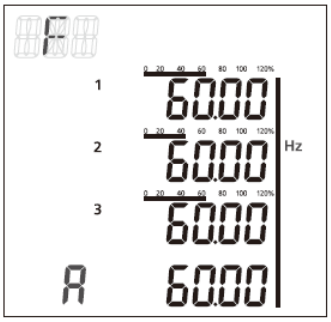
<3P3W>

*Power factor operation is a method assuming balanced load. The error might be big when it measures unbalanced load.

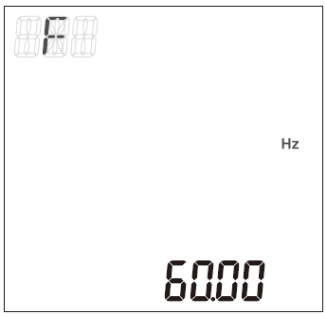
6.2.14 Frequency

・The present frequency is displayed.

<1P2W/1P3W/3P4W>



<3P3W>



6.2.15 Current unbalance

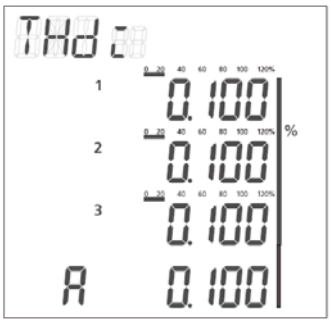
・The present current unbalance is displayed. (No display for 1P2W.)

6.2.16 Voltage unbalancing

・The present voltage unbalancing is displayed. (No display for 1P2W.)

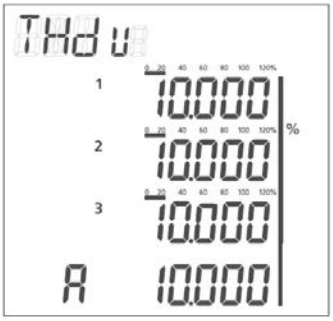
6.2.17 Current THD

・The present THD for current is displayed.



6.2.18 Voltage THD

・The present THD for voltage displayed.

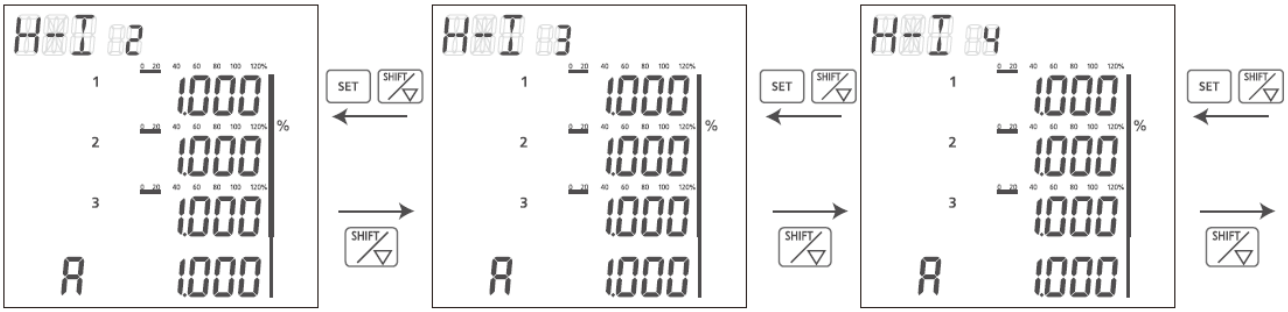


6.2.19 Current n-order Harmonics

・The present current n-order harmonics is displayed.

・Press <SHIFT/▽> to change display.

2^{nd} order, 3^{rd} order, 4^{th} order ・・・・・ up to 31^{st} order

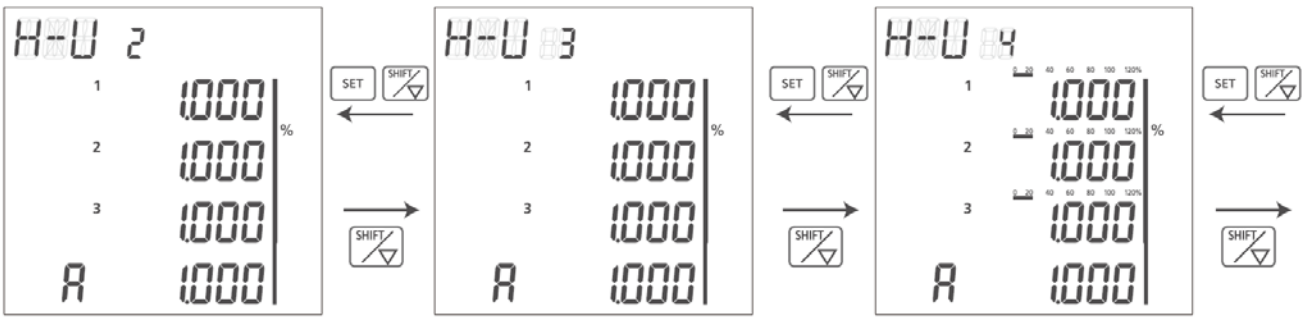


6.2.20 Voltage n-order Harmonics

・The present voltage n-order harmonics is displayed.

・Press <SHIFT/▽> to change display.

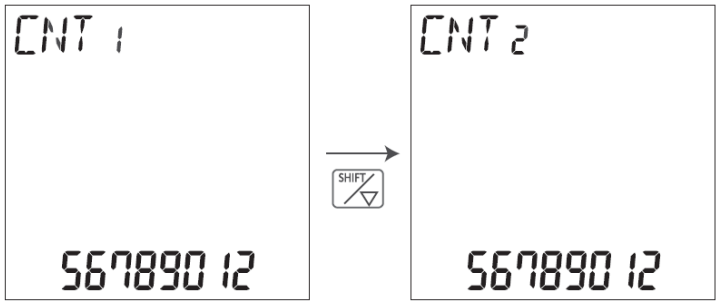
2^{nd} order, 3^{rd} order, 4^{th} order ・・・・・ up to 31^{st} order



6.2.21 Pulse Input Value

・The present pulse input value is displayed.
・Press <SHIFT/▽> to change CNT1, CNT2.
CNT1 is not displayed when CNT1 is set to [Clock] (clock correction).
・Pulse input status (ON or OFF) is confirmed via communication. (MEWTOCOL and MODBUS)

Pulse input 1 Pulse input 2



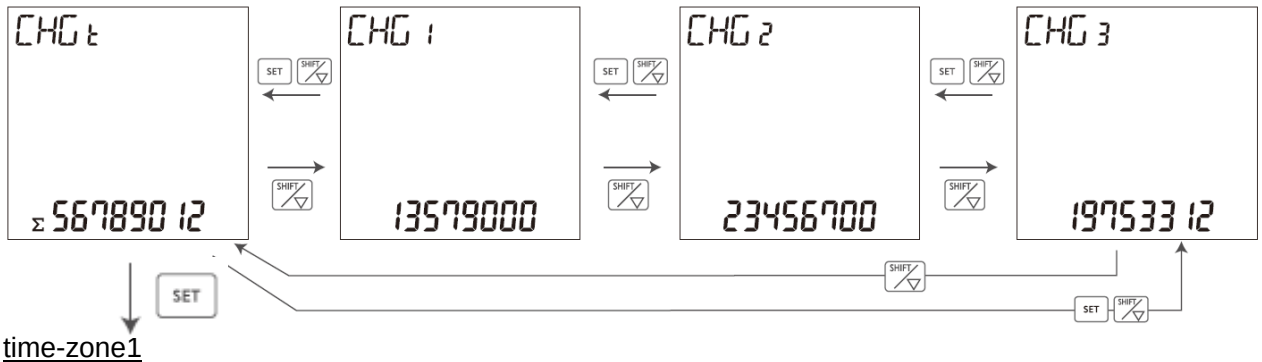
*Turn on the unit during IN1 or IN2 is shorted, first 1-pulse is not counted and it doesn't light on [IN1] [IN2]. After that, when pulse is input pulse it count the pulse.

6.2.22 Conversion value for integral active power

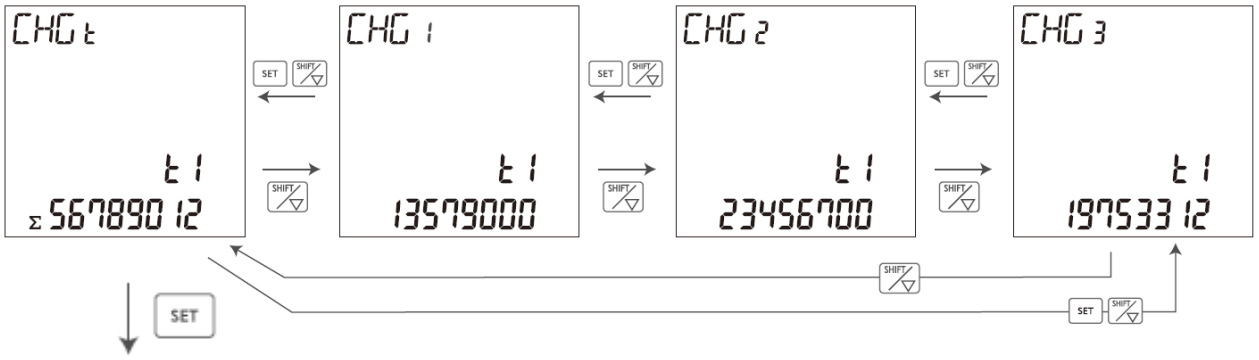
・The conversion value for the present integral active power (P) is displayed.
(Only total conversion value is displayed for 3P3W system.)
・Press <SHIFT/▽> to change total, phase 1 (1st circuit), phase 2 (2nd circuit) and phase 3 (3rd circuit).
・Press <SET> to change the display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone
*Time-zone without setting for any time program is not displayed.

<1P2W/1P3W/3P4W>
All time-zone

Total Phase 1 (1st circuit) Phase 2 (2nd circuit) Phase 3 (3rd circuit)



time-zone1



time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

<3P3W>

Total

*The conversion value exceeds “99999999”,
“－－－－－－－－” is displayed.
Check and confirm the measurement environment.

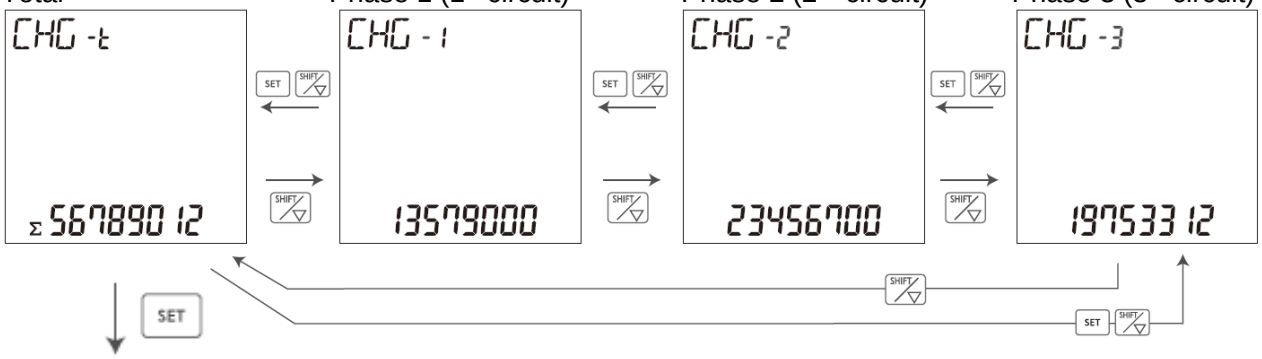
6.2.23 Conversion value for integral export power

・The conversion value for the present integral export active power (-P) is displayed.
(Only total conversion value is displayed for 3P3W.)
・Press <SHIFT/▽> to change total, phase 1 (1st circuit), phase 2 (2nd circuit) and phase 3 (3rd circuit).
・Press <SET> to change the display with each time-zone.
After changing, press <SET> to change displayed time-zone.
time-zone1(T1) →time-zone2(T2) →time-zone3(T3) →time-zone4(T4) →All time-zone
*Time-zone without setting for any time program is not displayed.

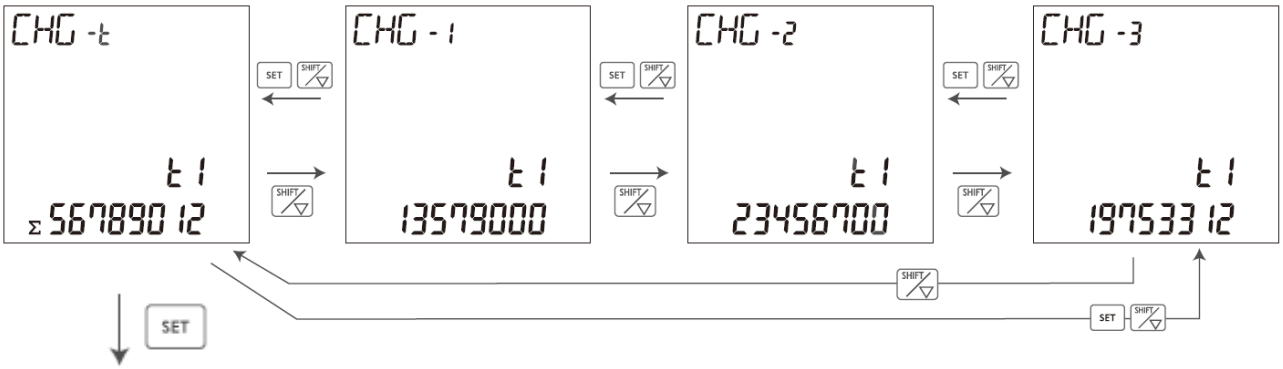
<1P2W/1P3W/3P4W>

All time-zone

Total Phase 1 (1st circuit) Phase 2 (2nd circuit) Phase 3 (3rd circuit)



time-zone1



time-zone2, time-zone3, time-zone4 and all time-zone are changed in turn.

<3P3W>

Total

*The conversion value exceeds “99999999”,
“－－－－－－－－” is displayed.
Check and confirm the measurement environment.

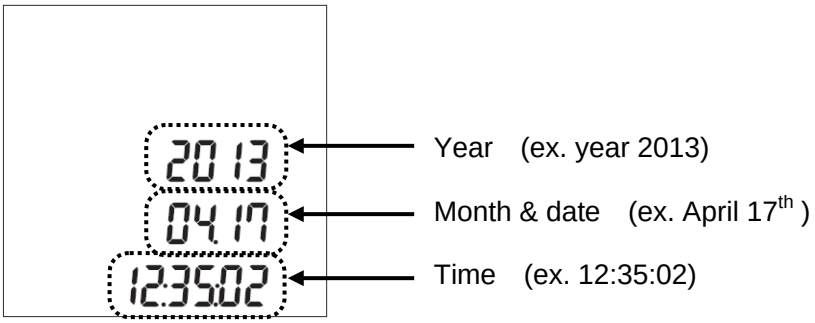
6.2.24 Temperature

・The present temperature is displayed.

・Temperature measuring function is the simple function Use this only to check temperature trend and do not use for control.
・It measures by built-in thermistor, therefore it differs the measuring value according to the internal circuit conditions (communication, input current). Use it for your reference.
・When the temperature of the front is much different from the temperature of installed panel, when it cools inside the panel, it is impossible to measure correctly. Use the temperature correction function in order to adjust the temperature and use only to check temperature trend.

6.2.25 Calendar timer

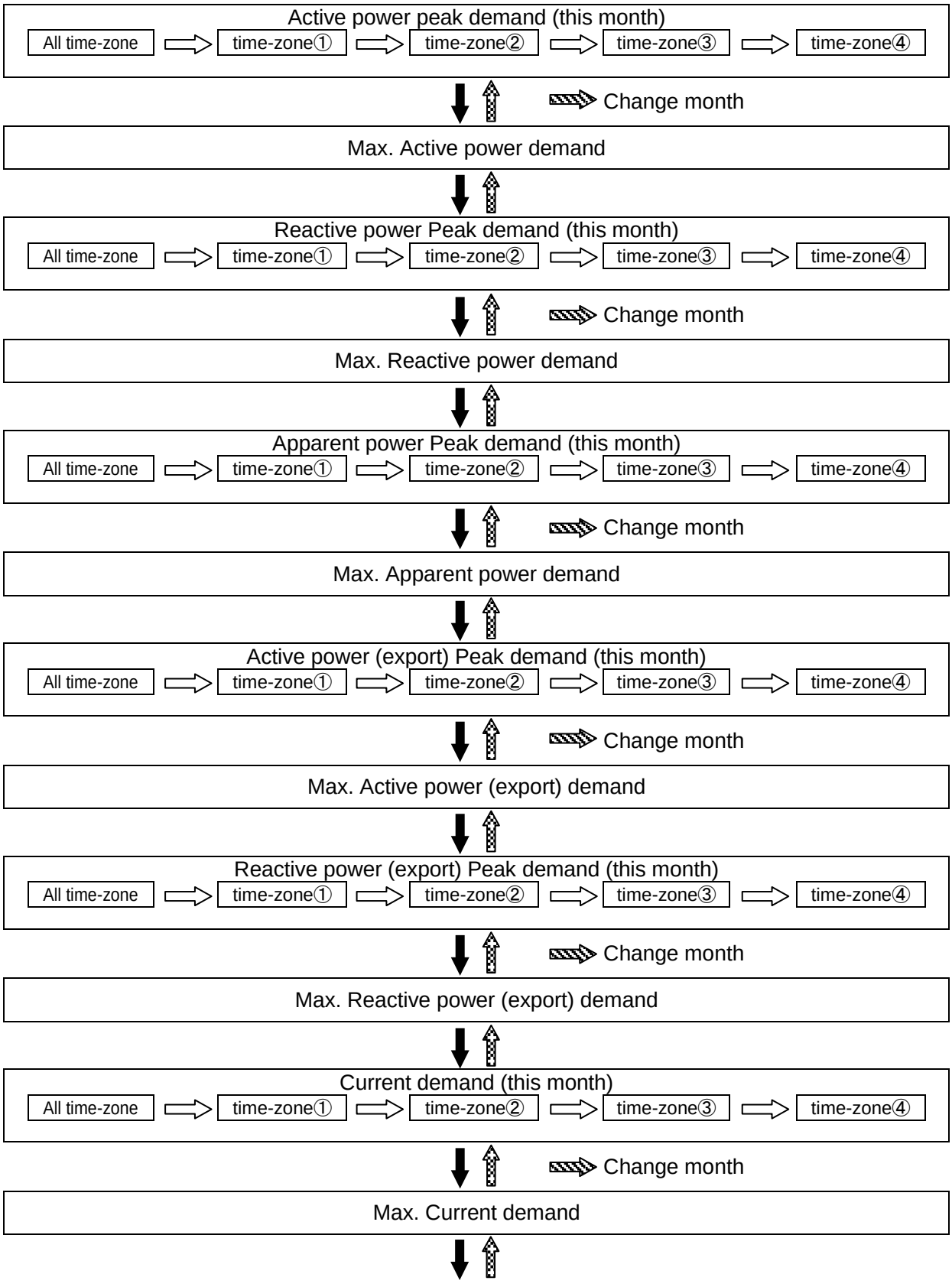
・The present date and time is displayed.

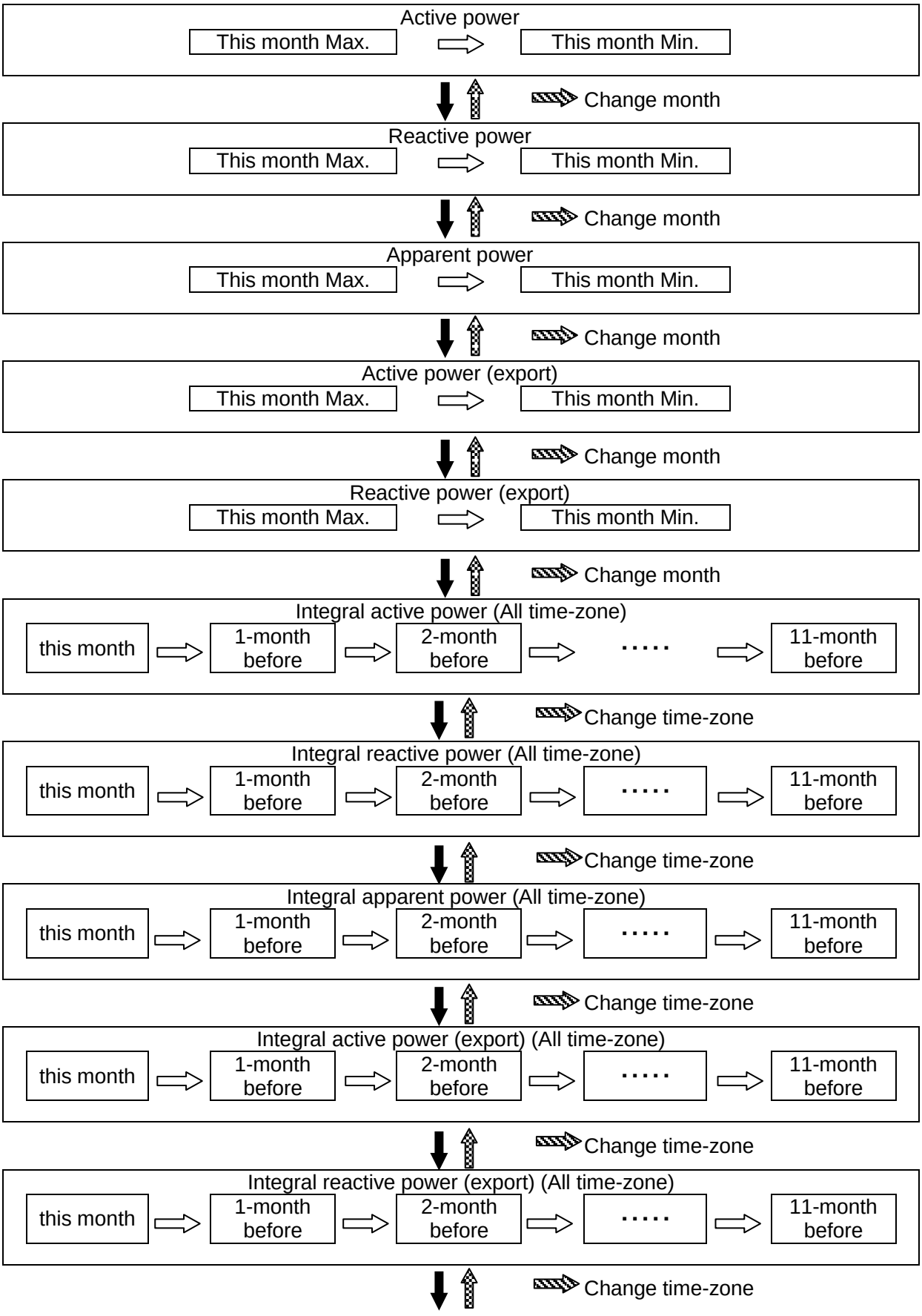


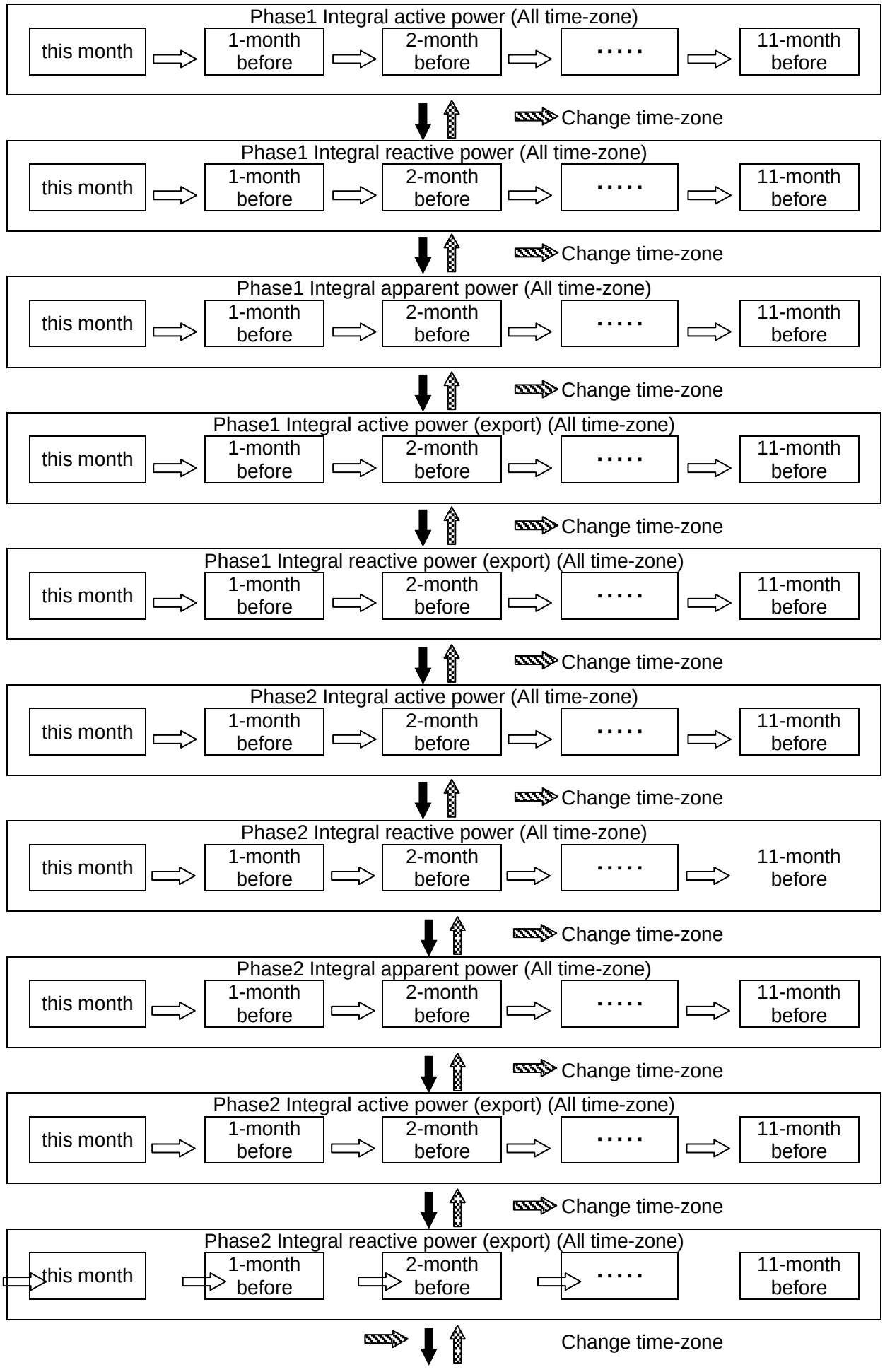
6.3 Working of Logging Mode

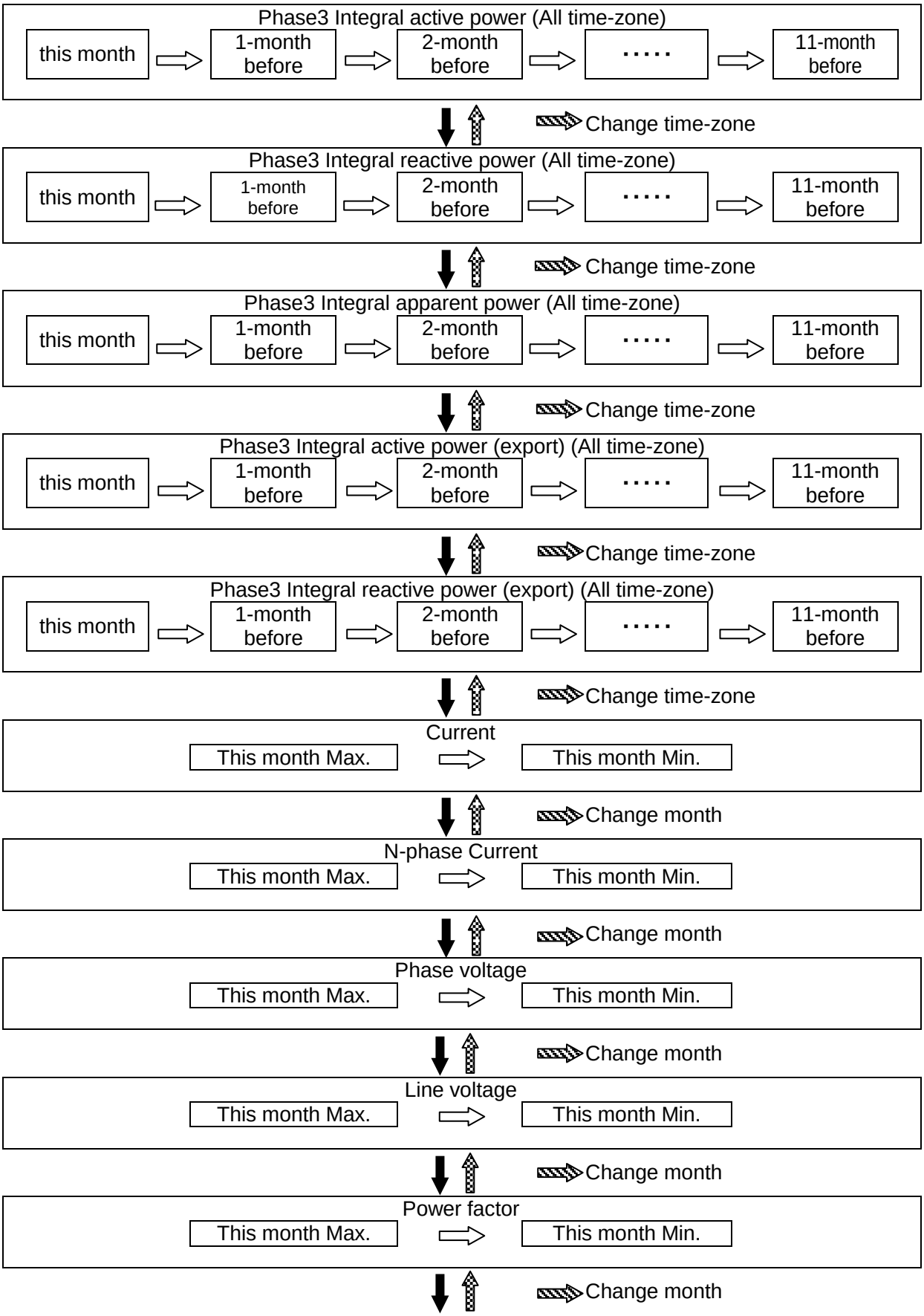
Each measured value is displayed as below. It differs according to the selected phase/wire system.
Arrow mark shows to press each key.

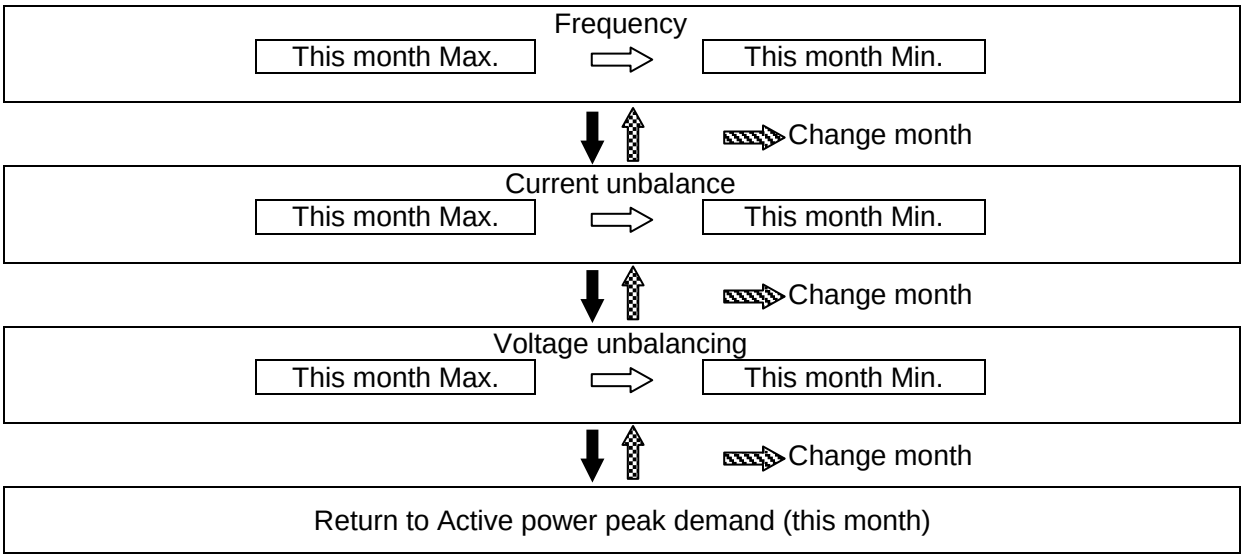
<ITEM/△> <SHIFT/▽> <SET> <SET>+<ITEM/△>




Active power
This month Max.
This month Min.
Change month
Reactive power
This month Max.
This month Min.
Change month
Apparent power
This month Max.
This month Min.
Change month
Active power (export)
This month Max.
This month Min.
Change month
Reactive power (export)
This month Max.
This month Min.
Change month
Integral active power (All time-zone)
this month
1-month before
2-month before
.....
11-month before
Change time-zone
Integral reactive power (All time-zone)
this month
1-month before
2-month before
.....
11-month before
Change time-zone
Integral apparent power (All time-zone)
this month
1-month before
2-month before
.....
11-month before
Change time-zone
Integral active power (export) (All time-zone)
this month
1-month before
2-month before
.....
11-month before
Change time-zone
Integral reactive power (export) (All time-zone)
this month
1-month before
2-month before
.....
11-month before
Change time-zone


Phase1 Integral active power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase1 Integral reactive power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase1 Integral apparent power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase1 Integral active power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase1 Integral reactive power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase2 Integral active power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase2 Integral reactive power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase2 Integral apparent power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase2 Integral active power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase2 Integral reactive power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone


Phase3 Integral active power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase3 Integral reactive power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase3 Integral apparent power (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase3 Integral active power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Phase3 Integral reactive power (export) (All time-zone)
this month
1-month before
2-month before
·····
11-month before
Change time-zone
Current
This month Max.
This month Min.
Change month
N-phase Current
This month Max.
This month Min.
Change month
Phase voltage
This month Max.
This month Min.
Change month
Line voltage
This month Max.
This month Min.
Change month
Power factor
This month Max.
This month Min.
Change month



It differs the displayed items according to the phase and wire system. Some items are not displayed.

6.3.1 Max. demand value

・Log data of peak demand is displayed.

・Press <SHIFT/▽> to change displayed time-zone.

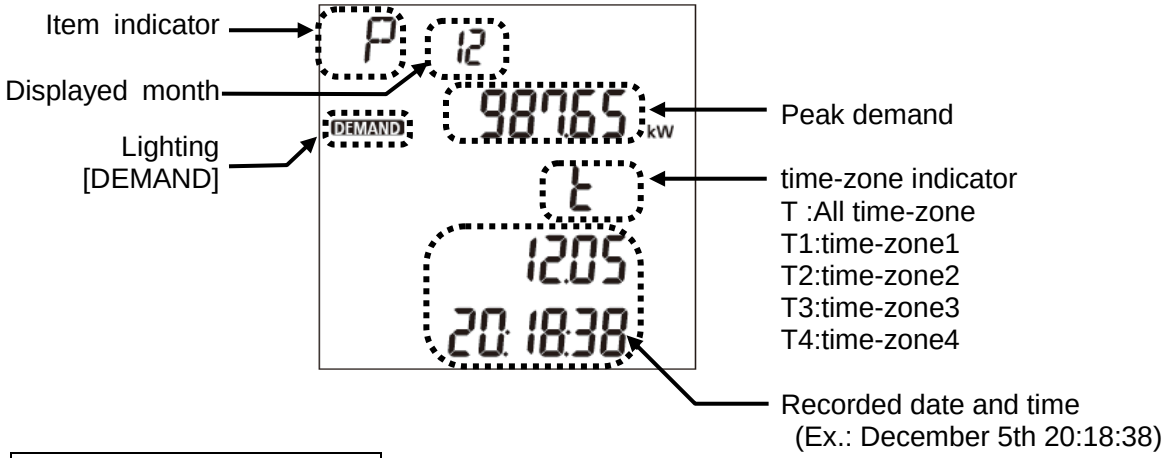
All time-zone → time-zone1(T1) → time-zone2(T2) → time-zone3(T3) → time-zone4(T4)

・Press <SET> to change the display with each month.

1-month before →2-month before →3-month before →・・・・・(12-month before)

*Time-zone without setting for any time program is not displayed.

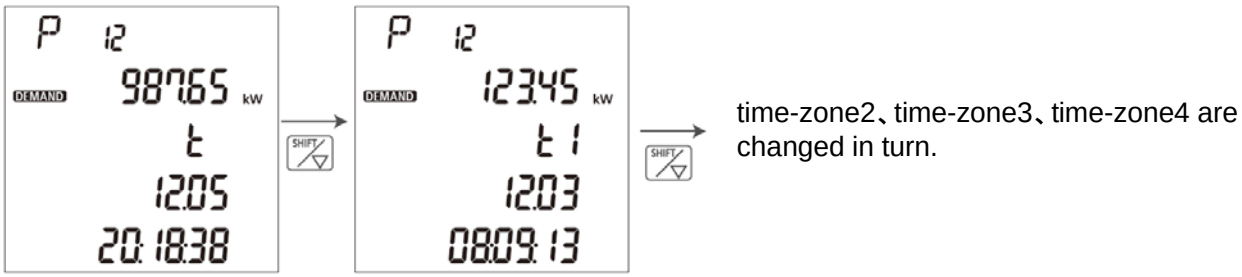
s



Active power display example

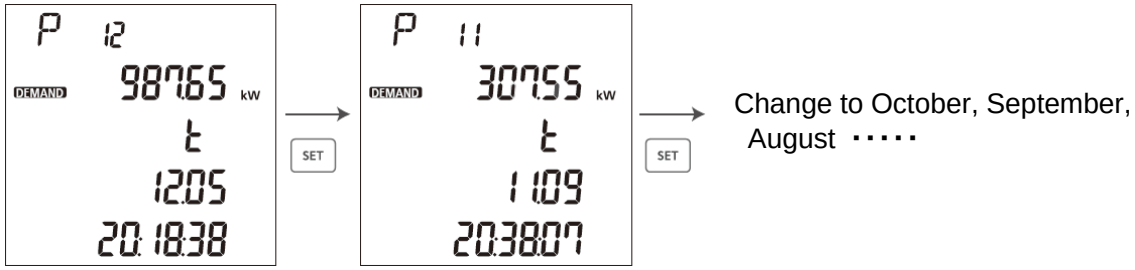
・Each time-zone

[December All time-zone] [time-zone1]



・Each month

[December] [November]



・Press <ITEM/△> to change items 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

6.3.2 Max. / Min. value of electric power

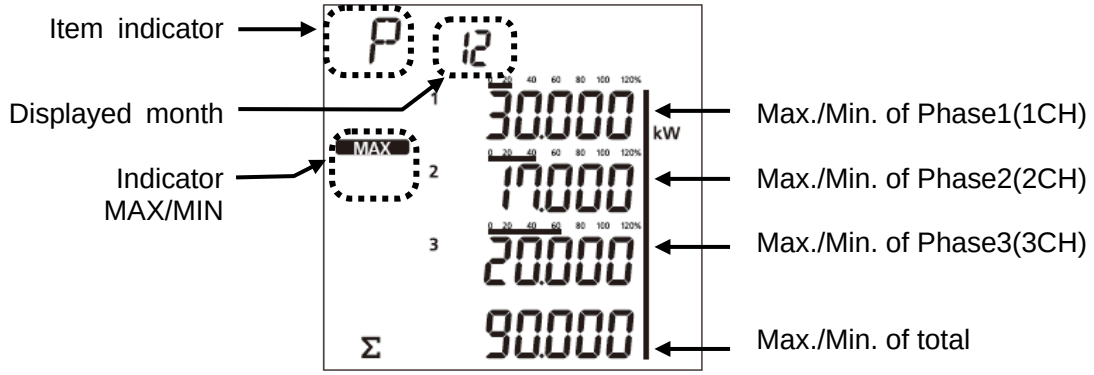
・Log data of max. and min. value for electric power is displayed.

・Press <SHIFT/▽> to change max. and min.

・Press <SET> to change displayed month.

1-month before →2-month before →3-month before →・・・・・(12-month before)

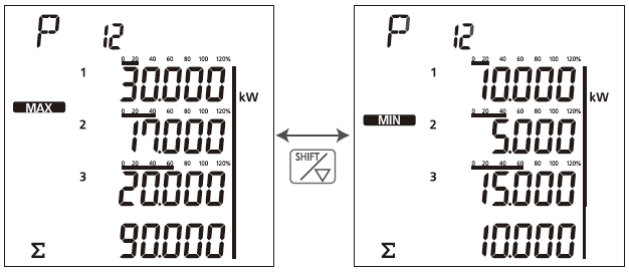
*If the setting of phase and wire system is changed, log data of max. and min. will be reset.



Active power display example

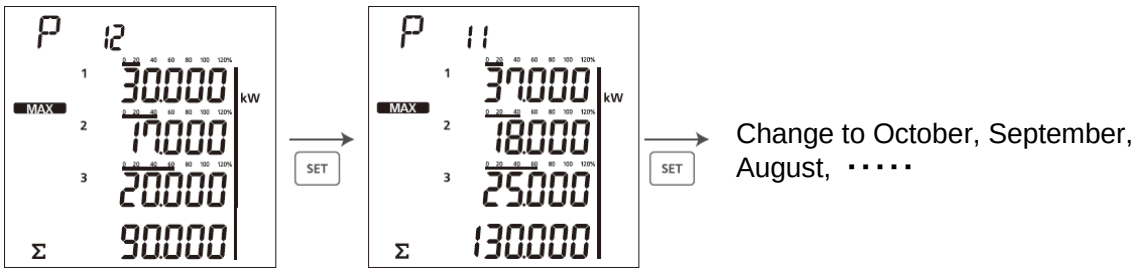
・Max. and Min.

[Max. value in December] [Min. value in December]



・Each month

[Max. in December] [Max. in November]



・Press <ITEM/△> to change items to display.

Item	Display	
	Indicator	unit
Active power	P	kW
Reactive power	Q	kvar
Apparent power	S	kVA
Active power (export)	-P	kW
Reactive power (export)	-Q	kvar

6.3.3 Integral power

・Log data of integral power is displayed.

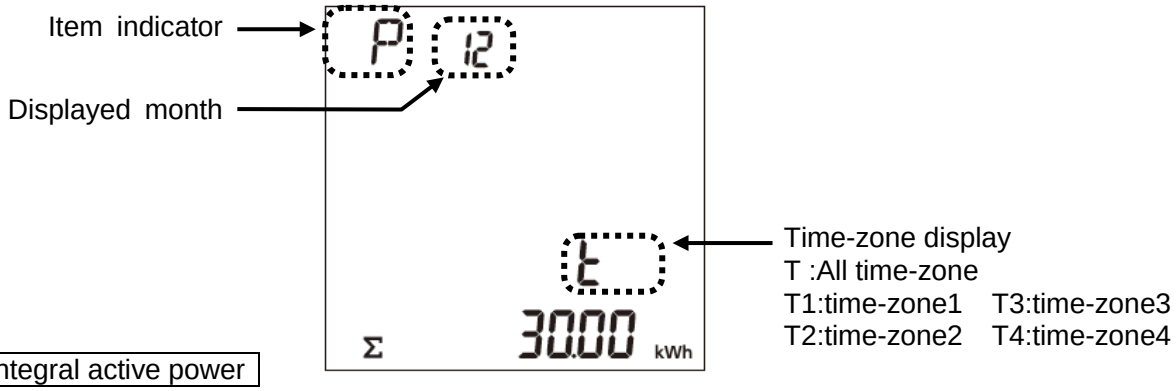
・Press <SHIFT/▽> to change displayed month.

1-month before →2-month before →3-month before →・・・・・(12-month before)

・Press <SET> to change displayed time-zone.

All time-zone → time-zone1(T1) → time-zone2(T2) → time-zone3(T3) → time-zone4(T4)

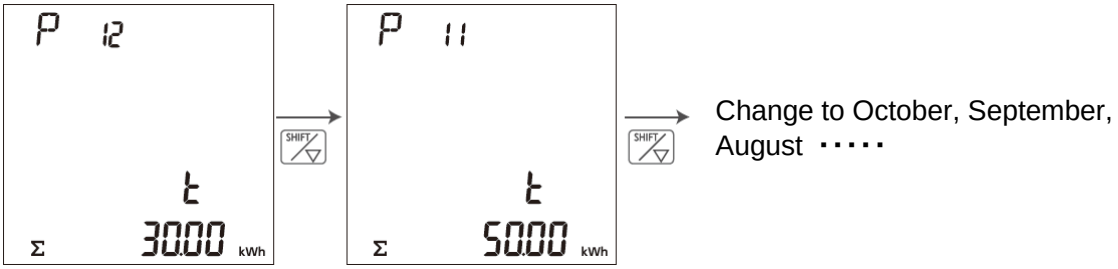
*If the setting of phase and wire system is changed, log data of max. and min. will be reset.



Integral active power

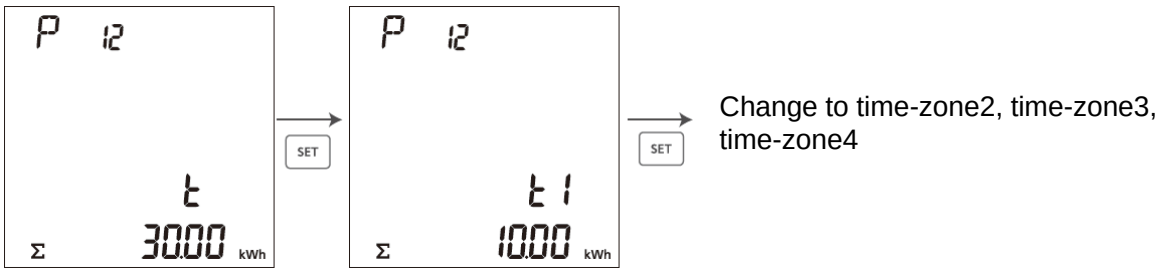
・Each month

[December] [November]



・Each time-zone

[All time-zone] [time-zone1]



・Press <ITEM/△> to change items to display.

Item	Display		Item	Display	
	Indicator	unit		Indicator	unit
Integral active power	P	kWh	Phase2 Integral active power	P2	kWh
Integral reactive power	Q	kvarh	Phase2 Integral reactive power	Q2	kvarh
Integral apparent power	S	kVAh	Phase2 Integral apparent power	S2	kVAh
Integral active power(export)	-P	kWh	Phase2 Integral active power(export)	-P2	kWh
Integral reactive power(export)	-Q	kvarh	Phase2 Integral reactive power(export)	-Q2	kvarh
Phase1 Integral active power	P1	kWh	Phase3 Integral active power	P3	kWh
Phase1 Integral reactive power	Q1	kvarh	Phase3 Integral reactive power	Q3	kvarh
Phase1 Integral apparent power	S1	kVAh	Phase3 Integral apparent power	S3	kVAh
Phase1 Integral active power(export)	-P1	kWh	Phase3 Integral active power(export)	-P3	kWh
Phase1 Integral reactive power(export)	-Q1	kvarh	Phase3 Integral reactive power(export)	-Q3	kvarh

6.3.4 Max. /Min. value of each measured value

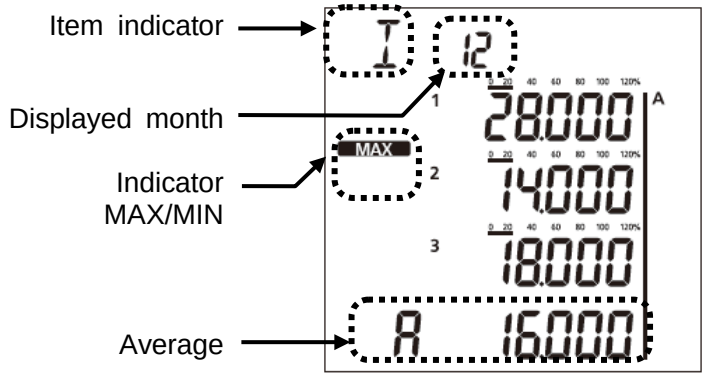
・Log data of max. and min. value for current, voltage, power factor frequency, current unbalancing, voltage unbalancing is displayed.

・Press <SHIFT/▽> to change max. and min.

・Press <SET> to change displayed month.

1-month before →2-month before →3-month before →・・・・・(12-month before)

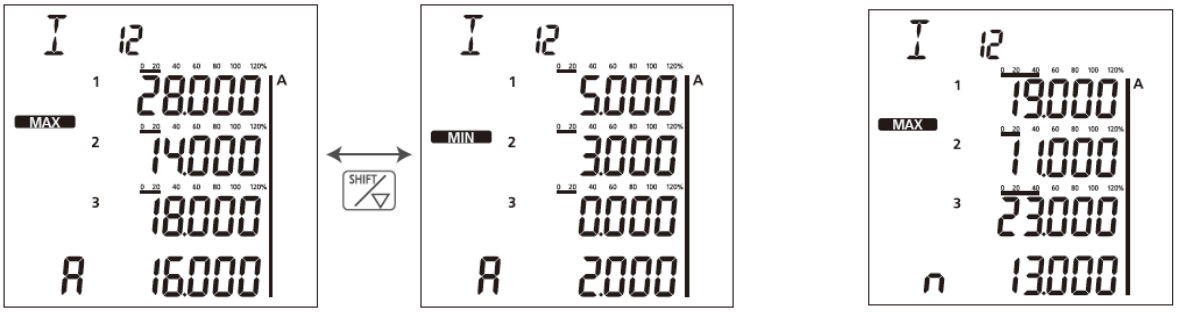
*If the setting of phase and wire system is changed, log data of max. and min. will be reset.



Current display example

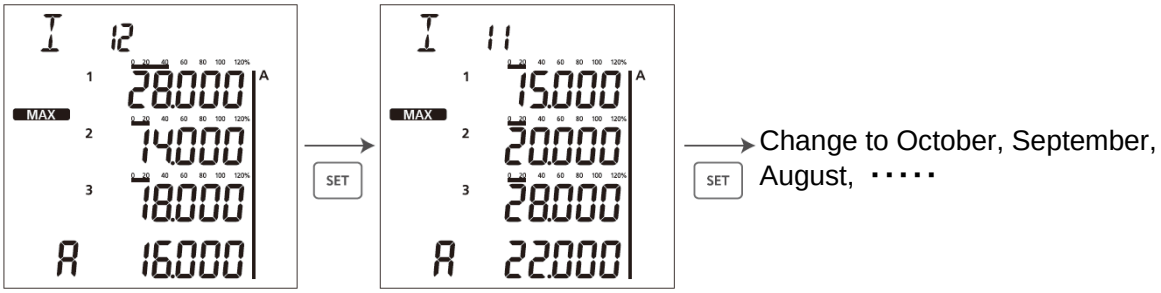
・Max. and Min.

[Max. in December] [Min. in December] [N-phase]



・Each month

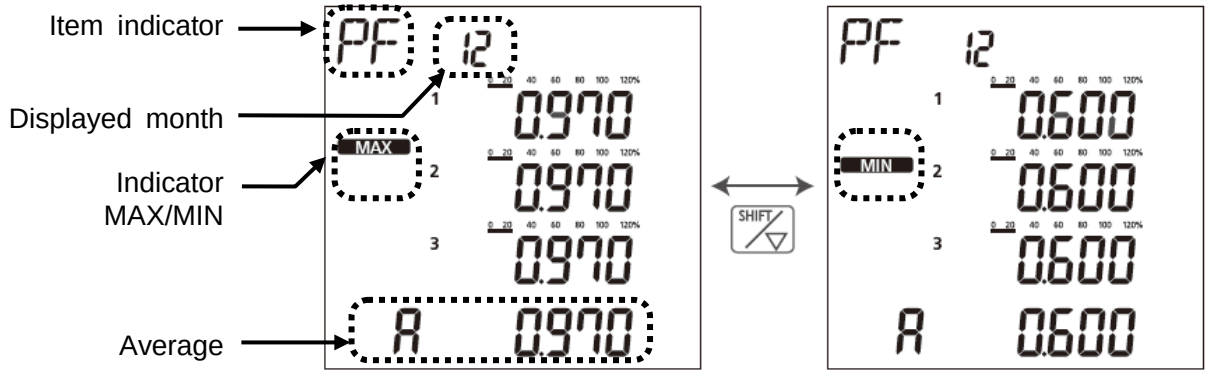
[December] [November]



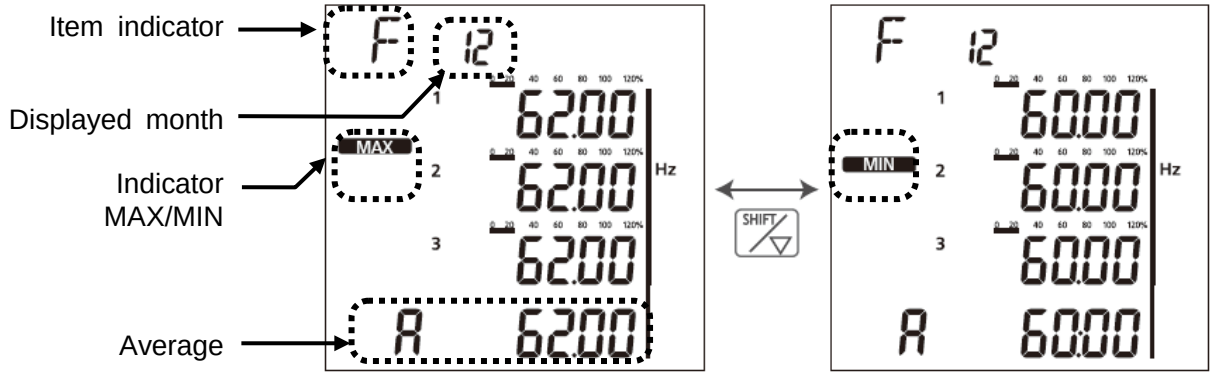
・Press <ITEM/△> to change items to display.

Item	Display	
	Indicator	unit
current	I	A
N-phase current	I	A
Phase-voltage	U	V
Line-voltage	U	V

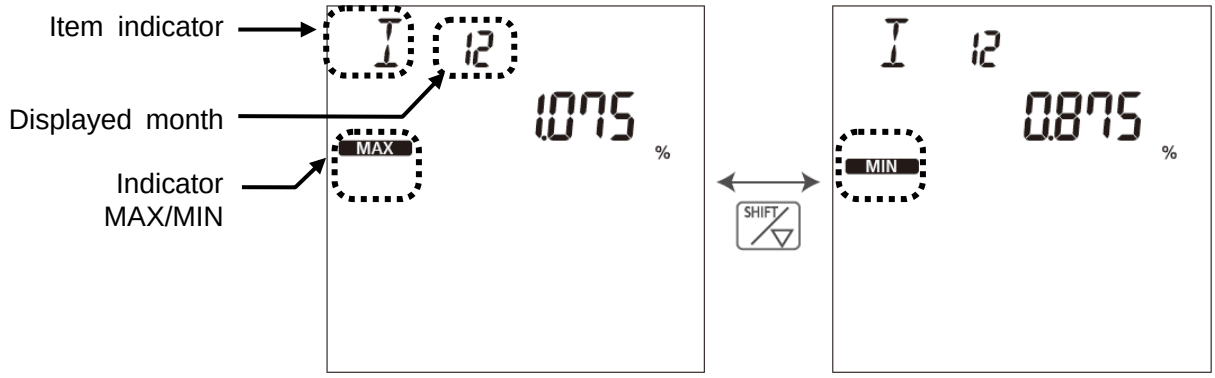
Power factor display



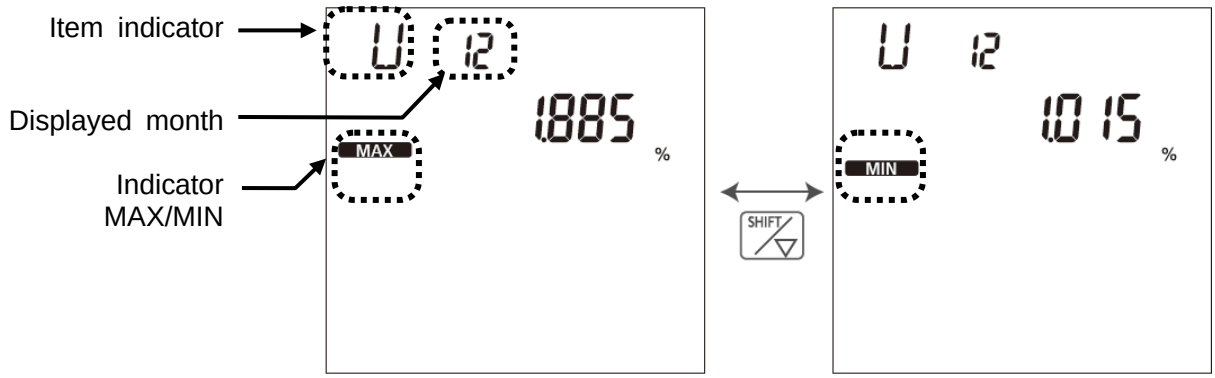
Frequency display



Current unbalancing display



Voltage unbalancing display

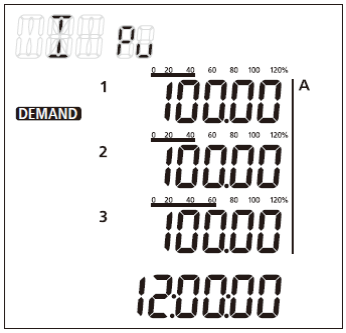


6.4 Working of Demand Mode

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

6.4.1 Peak Demand

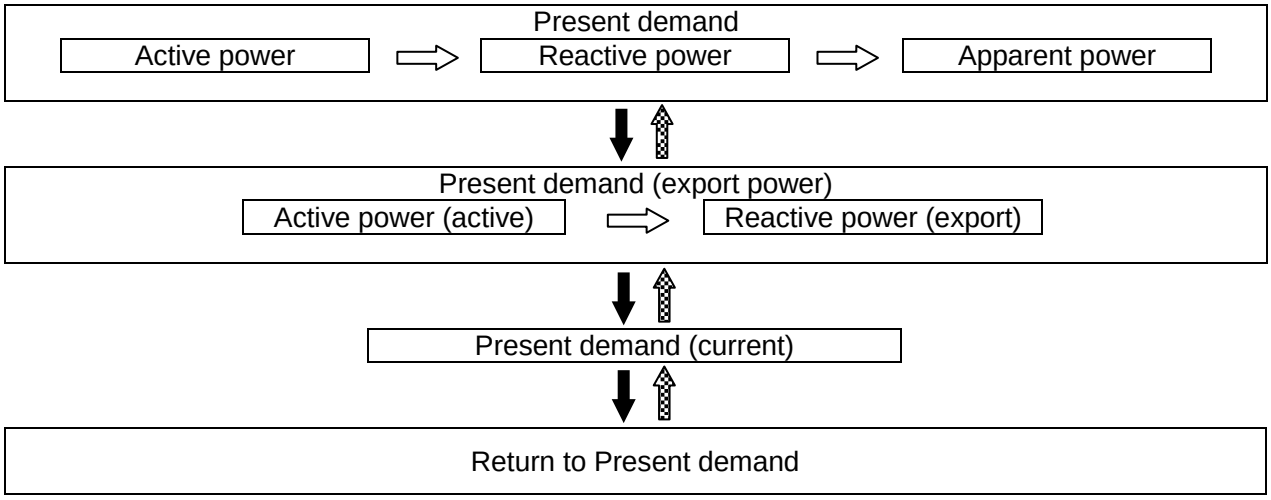
・When peak demand is selected, present current demand is displayed.
Other demand value is not displayed.



6.4.2 Block Interval Demand (Sliding block、fixed block)

Arrow mark shows to press each key.

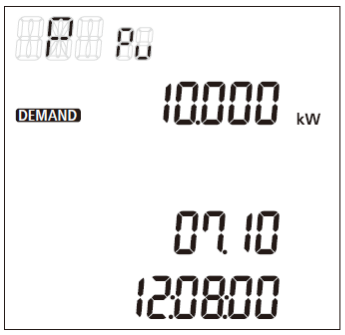
<ITEM/△> <SHIFT/▽> <SET> <SET>+<ITEM/△>



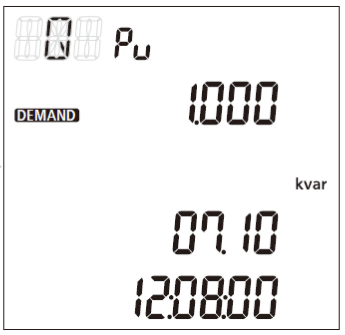
Present power demand

・Each demand value is displayed.
・Press <SHIFT/▽> to change active power, reactive power, apparent power.
・Date and time when present demand is measured is displayed in lower 2 lines.

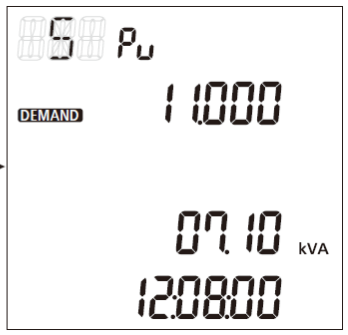
Active power present demand



Reactive power present demand



Apparent power present demand



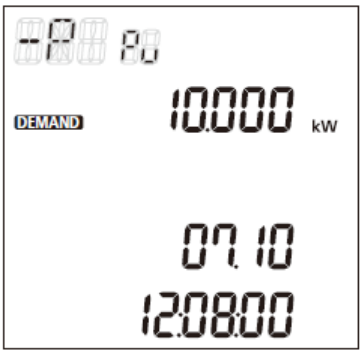
SHIFT/▽

* [－－－－－－－－] is displayed during the following cases.
・Until passing the setting time to start monitoring demand
・Demand value exceeds the display range
・Clock is changed between demand time span
・Until starting next time span at power failure

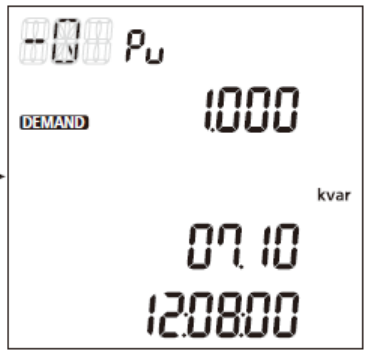
Present export power demand

・Each demand value is displayed.
・Press <SHIFT/▽> to change active power (export), reactive power (export).
・Date and time when present demand is measured is displayed in lower 2 lines.

Active power (export) present demand



Reactive power (export) present demand

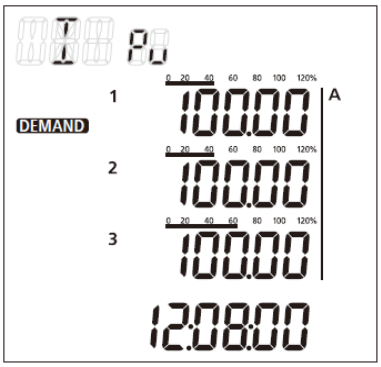


SHIFT/▽

* [－－－－－－－－] is displayed during the following cases.
・Until passing the setting time to start monitoring demand
・Demand value exceeds the display range
・Clock is changed between demand time span
・Until starting next time span at power failure

Present current demand

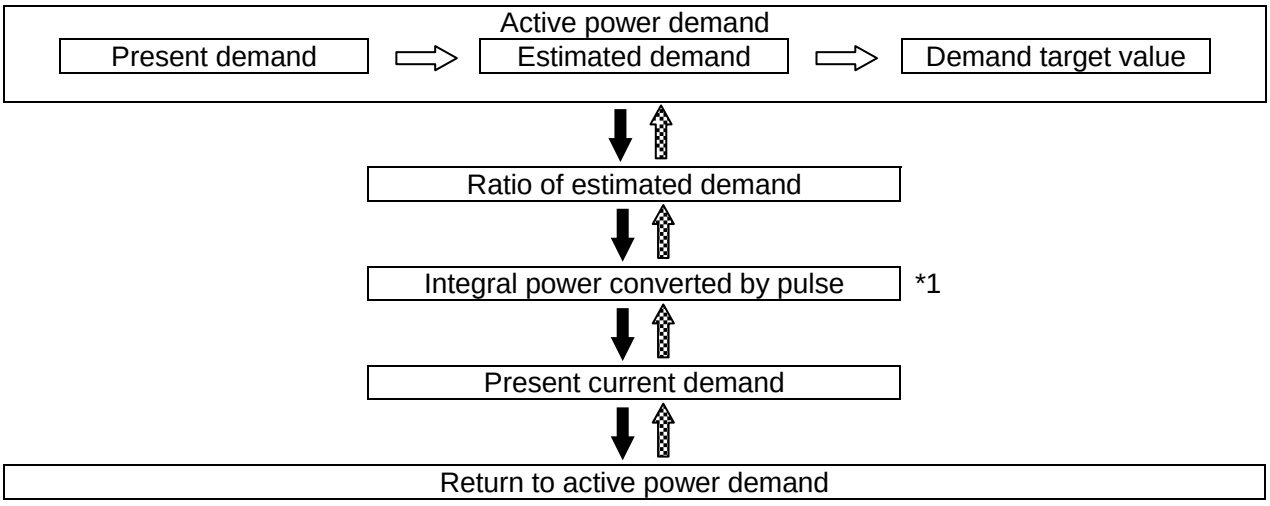
・Present value of current demand is displayed.



6.4.3 30-min. Demand

Arrow mark shows to press each key.

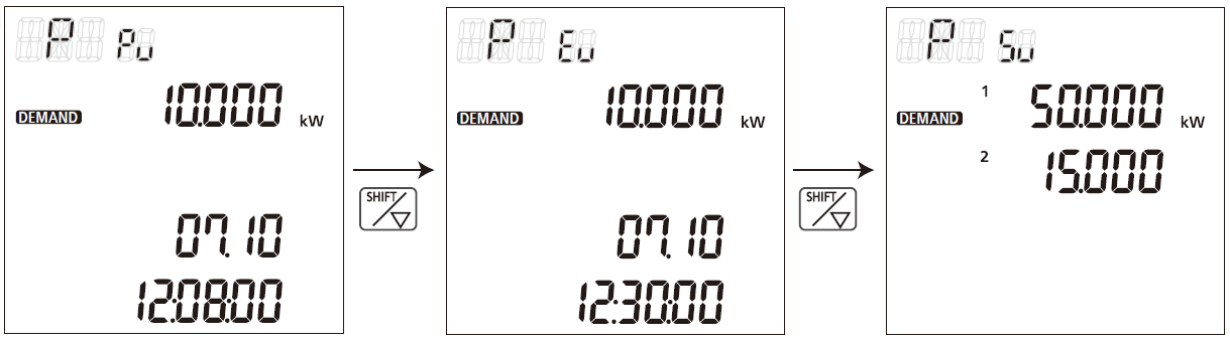
<ITEM/△> <SHIFT/▽> <SET> <SET>+<ITEM/△>



*1 only when [PULSE] is selected for power input type.

Active power demand

・Each demand value is displayed.
・Press <SHIFT/▽> to change present demand, estimated demand, demand target value.
・Demand target value is set at ‘ Power demand alarm threshold (OUT1 OUT2)’.



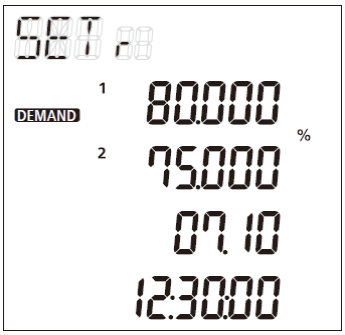
Present date and time

Estimated time

1; OUT1threshold
2; OUT2threshold

Ratio of estimated demand
・Ratio of estimated demand is displayed.

Ex.) Estimated demand: 2.5kW, Power demand alarm threshold: 5.0kW
-> Ratio of estimated demand is 50.0%.



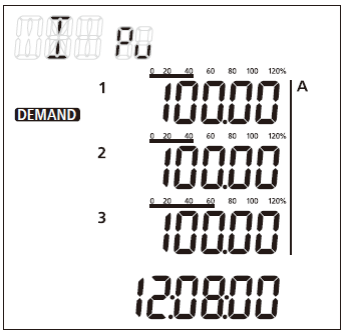
* [－－－－－－－－] is displayed during the following cases.
・Until passing the setting time to start monitoring demand
・Demand value exceeds the display range
・Clock is changed between demand time span
・Until starting next time span at power failure
・[AL-PD] is not selected for unit for pulse output.

Integral power converted by pulse

・Conversion value that pulse from outer pulse detector is converted to electric power is displayed.

Present value of current demand

・Present value of current demand is displayed.



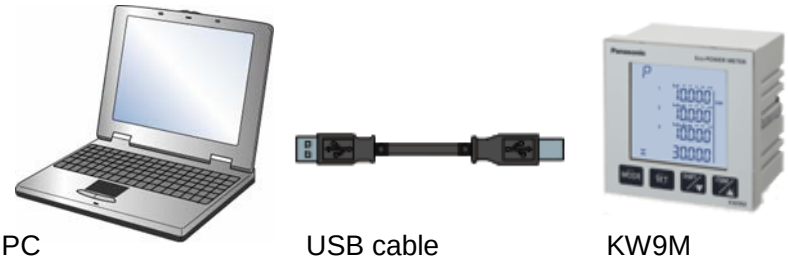
Chapter 7 How to update the firmware

The firmware of Eco-POWER METER can be upgraded via USB communication.
KW Upgrade Tool and USB cable is necessary to upgrade the firmware.
Use the latest KW Version Upgrade Tool.

7.1 How to install USB driver

It is necessary to install USB driver (kw9musb_vxxx.inf) for connecting KW9M Eco-POWER METER via USB communication.
* Once installing USB driver, it is not necessary to install from the second time.
* When you change the using port, install the driver again.

Turn on KW9M and connect KW9M and PC via USB cable.
After that, install USB driver according to your OS.



PC USB cable KW9M

7.2 How to update the firmware

7.2.1 Connect PC and Eco-POWER METER

Connect a PC via USB with Eco-POWERE METER.

7.2.2 Prepare Eco-POWER METER to update

Shift the device to update mode according to the below procedures.

1) Press 2 keys of <MODE> and <ITEM/▲> for 10 seconds.
2) Password entry window will be displayed. Enter the password.

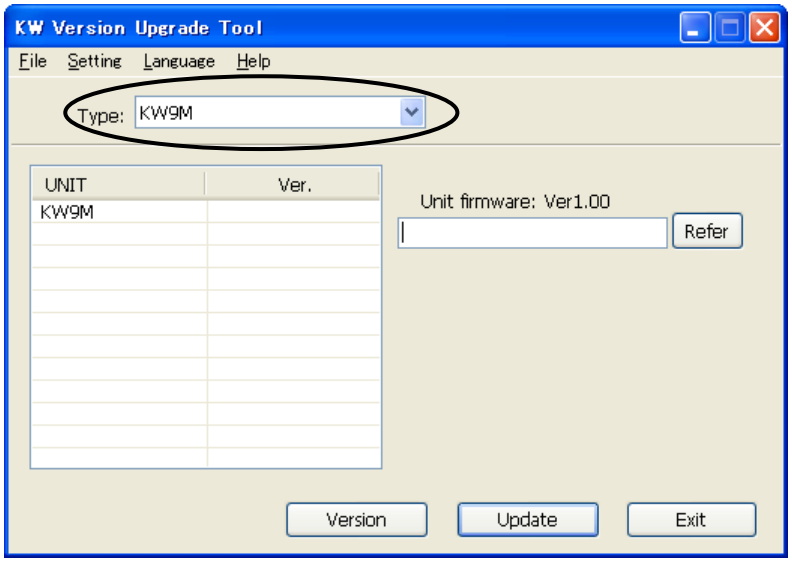
[PROG] on the upper line and the current version [x.xx] on the middle line are displayed.
This is ready to update the firmware of Eco-POWER METER.

7.2.3 Update the firmware using KW Version Upgrade Tool

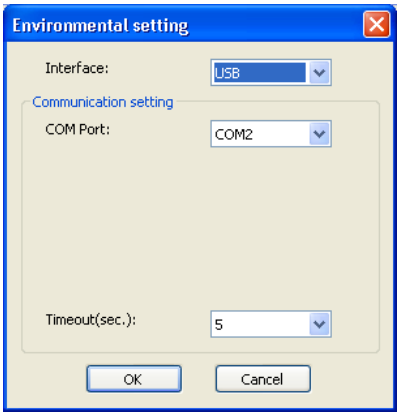
Connect Eco-POWER METER to PC via USB cable.

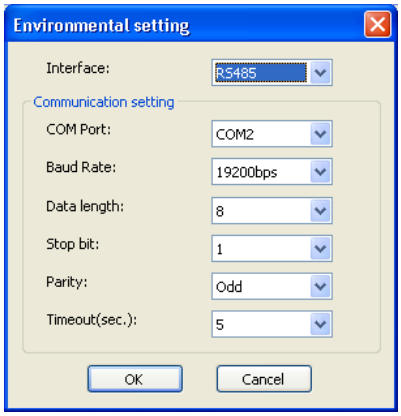
1) Start “KW Version Upgrade Tool”.

2) Select “KW9M” at Type, it changes the window for KW9M.



3) Set connected interface with [Environmental setting] and window appears for setting.
Port is displayed automatically. If it is different, set it.

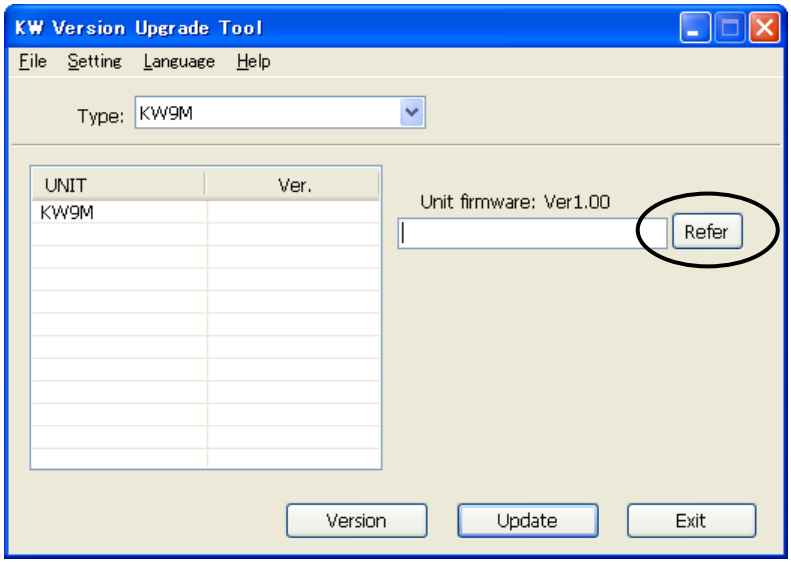




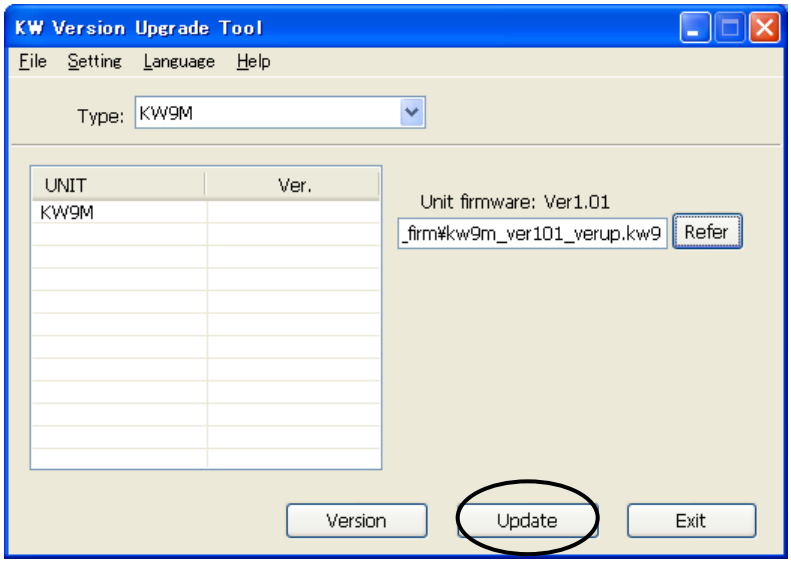
[RS485]
Set as below.

Baud Rate: 19200bps
Data length: 8bit
Stop bit: 1
Parity: Odd

4) Click [Refer] and it opens the window to select firmware.
Select file to update “kw9m_verxxx_verup.kw9” and click [Open].
*You can download from our website the latest firmware.

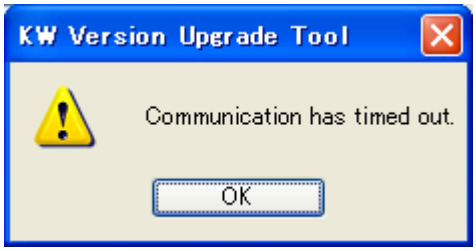


5) When selected file name is displayed, click [Update].

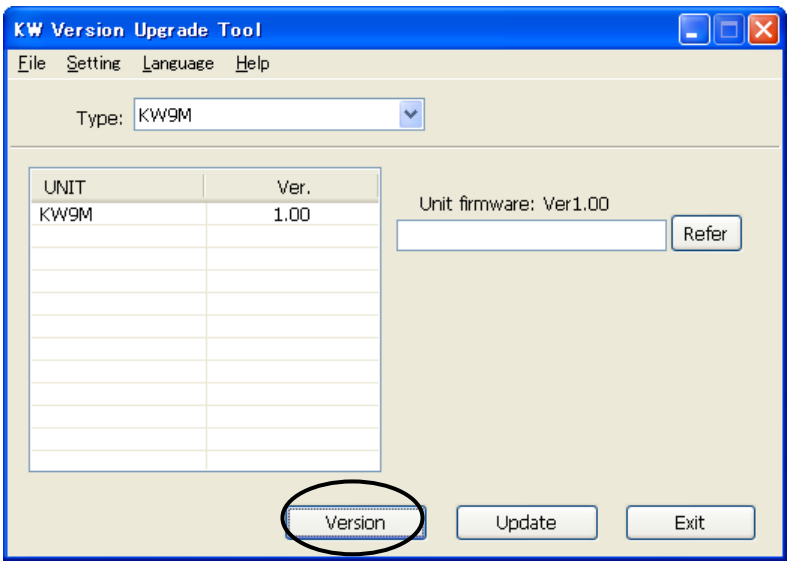


When timed out error is occurred, check the below.

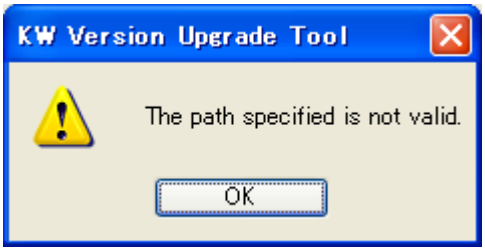
- Is Eco-POWER METER ready to update?
- Is USB cable connected correctly?
- Are communication port and timeout value conformed?



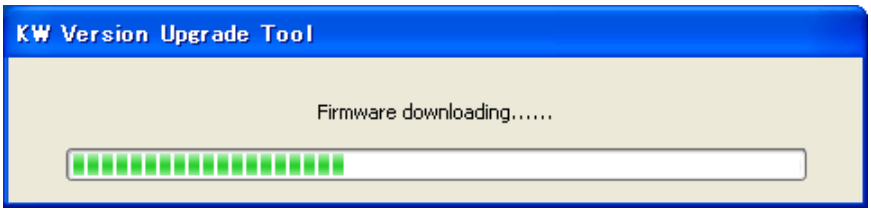
Click [Version] and it displays the current version. After it shows the version, you need to update the firmware if it is not necessary. If not, Eco-POWER METER can't be used.



When you have used KW Version Upgrade Tool before, it displays the last updated firmware. If the firmware was moved, the error window will be appeared.
Select firmware again and update it.

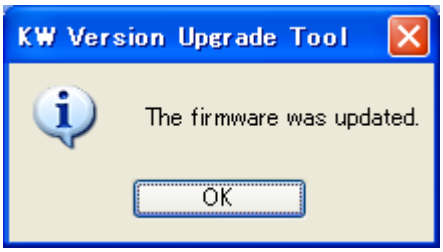


6) When it starts updating, the indicator is appeared and it updates to the selected firmware.

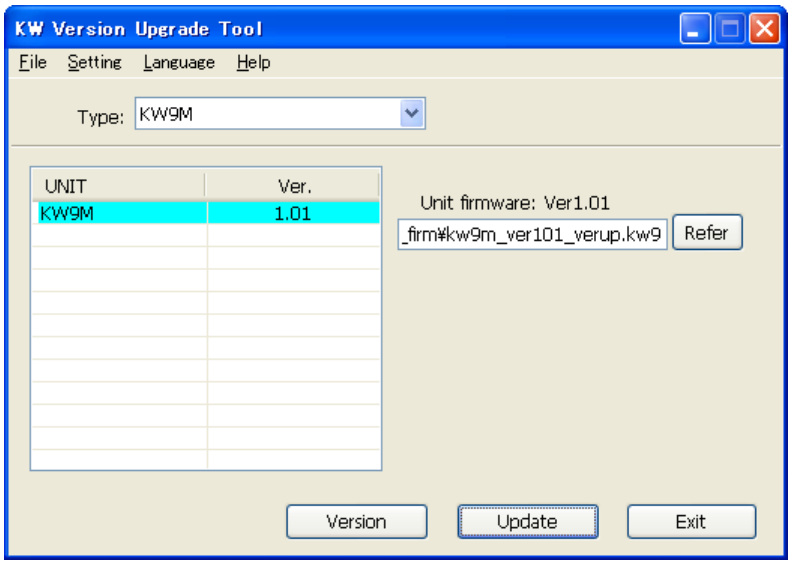


Do not turn off Eco-POWER METER.

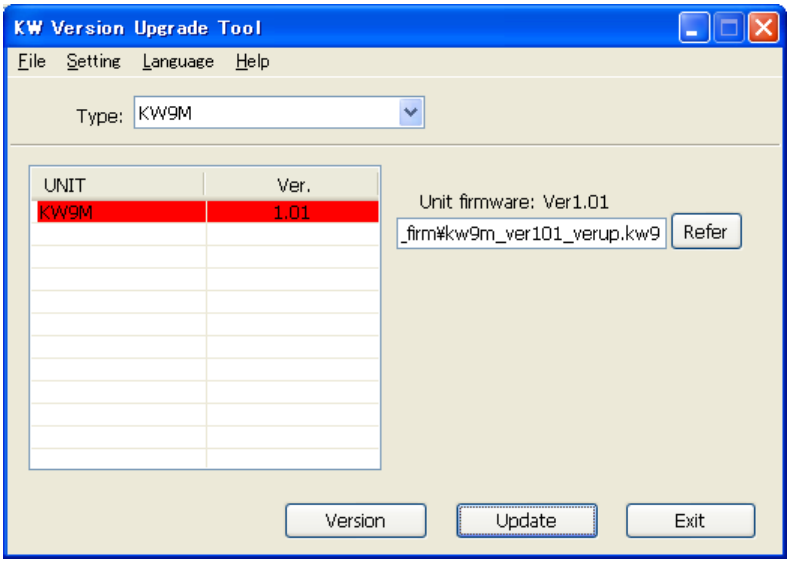
7) When it completes updating the firmware, the complete window will be appeared.
Click [OK].



8) Cell of unit that its firmware is updated correctly is blue.
You can confirm with the display of Eco-POWER METER and the display will return to measuring.



[When it doesn't update correctly]
After completing download, cell of unit that updating is failure is red.
On the display of Eco-POWER METER, [PROG] is displayed on the upper line and [- - - -] is displayed on the middle line.
Check and confirm the wiring of Eco-POWER METER and so on and update again.



9) Click [Exit] to close KW Version Upgrade Tool.
You can use Eco-POWER METER as it is.

Chapter 8 Specifications

8.1 Main unit

<table>
<tr><td>Supply voltage range</td><td colspan="3">85 to 264V AC
100 to 300V DC</td></tr>
<tr><td>Rated frequency</td><td colspan="3">50/60Hz</td></tr>
<tr><td>Nominal power consumption</td><td colspan="3">Approx. 6VA (240V AC at 25℃)
Approx. 3W (240V DC at 25℃)</td></tr>
<tr><td>Inrush current</td><td colspan="3">30A or less (240V AC/DC at 25℃)</td></tr>
<tr><td>Allowable momentary power-off time</td><td colspan="3">10ms</td></tr>
<tr><td rowspan="3">Ambient temperature</td><td colspan="3">Accuracy guarantee -10 to + 55℃</td></tr>
<tr><td colspan="3">Operation -25 to + 55℃</td></tr>
<tr><td colspan="3">Storage -25 to + 70℃</td></tr>
<tr><td>Ambient humidity</td><td colspan="3">30 to 85%RH (at 20℃) non-condensing</td></tr>
<tr><td>Breakdown voltage (initial)</td><td>Between the isolated circuits: 1,500V/1min</td><td rowspan="2" colspan="2">a) enclosure ⇔ all terminals
b) between insulated circuits
・power supply terminals ⇔other terminals
・RS485 terminals ⇔other terminals
・measured current input terminals ⇔ other terminals
・pulse input terminals ⇔other terminals
・pulse output terminals ⇔other terminals</td></tr>
<tr><td>Insulation resistance (initial)</td><td>Between the isolated circuits: 100 MΩ or more</td></tr>
<tr><td rowspan="2">Vibration resistance</td><td colspan="3">10 to 150Hz (7.5 minutes/cycle)
single amplitude:0.075mm (1h on 3 axes)</td></tr>
<tr><td colspan="3">10 to 55Hz (1 minute/cycle)
single amplitude:0.375mm (1h on 3 axes)</td></tr>
<tr><td>Shock resistance</td><td colspan="3">Min. 294m/s^2 (5 times on 3 axes)</td></tr>
<tr><td>Display method</td><td colspan="3">LCD with backlight</td></tr>
<tr><td>Display updated cycle</td><td colspan="3">100 to 1000ms (set with setting mode)</td></tr>
<tr><td>Power failure memory method</td><td colspan="3">Internal memory (overwrite 10^{10} or more)</td></tr>
<tr><td rowspan="3">Calendar</td><td>Range</td><td colspan="2">From January 1, 2000 00:00:00
to December 31, 2099 23:59:59</td></tr>
<tr><td>Accuracy</td><td colspan="2">±15 seconds/month (at 25℃)</td></tr>
<tr><td>Backup</td><td colspan="2">About 1-month (backup with secondary battery)
(after passing 48-hour, at 23℃)</td></tr>
<tr><td>Degree of protection</td><td colspan="3">Front: IP51 Back: IP20</td></tr>
<tr><td>Sea level altitude</td><td colspan="3">Under 2,000m</td></tr>
<tr><td>Overvoltage category</td><td colspan="3">II</td></tr>
<tr><td>Measurement category</td><td colspan="3">II</td></tr>
<tr><td>Pollution degree</td><td colspan="3">2</td></tr>
<tr><td>Dimensions W/H/D</td><td colspan="3">96 x 96 x 56 mm (without terminal block)
96 x 96 x 68 mm (with terminal block)</td></tr>
<tr><td>Weight</td><td colspan="3">Approx. 480g (with battery)</td></tr>
</table>

8.2 Input Specifications

<table>
<tr><td colspan="2">Measured data</td><td colspan="3">AC sine</td></tr>
<tr><td colspan="2">Phase/wire system</td><td colspan="3">Single-phase two-wire (1P2W) (max.3-circuit)
Single-phase three-wire (1P3W) (common)
Three-phase three wire (3P3W)
Three-phase four-wire (3P4W)</td></tr>
<tr><td colspan="2">Applicable power system</td><td colspan="3">100V system, 200V system, 400V system</td></tr>
<tr><td colspan="2">Measured frequency</td><td colspan="3">50/60Hz</td></tr>
<tr><td colspan="2" rowspan="2">Sampling rate</td><td>Sampling</td><td colspan="2">1.024MHz (approx.1.0 μs)</td></tr>
<tr><td>Data update</td><td colspan="2">100ms
22.5s for Harmonics (2nd to 31st)</td></tr>
<tr><td rowspan="9">Voltage</td><td rowspan="6">Input voltage</td><td>1P2W</td><td>L-L</td><td>0-500V AC</td></tr>
<tr><td rowspan="2">1P3W</td><td>L-L</td><td>0-500V AC</td></tr>
<tr><td>L-N</td><td>0-250V AC</td></tr>
<tr><td>3P3W</td><td>L-L</td><td>0-500V AC</td></tr>
<tr><td rowspan="2">3P4W</td><td>L-N</td><td>0-500V AC</td></tr>
<tr><td>L-L</td><td>0-289V AC</td></tr>
<tr><td>Impedance</td><td colspan="3">2 MΩ or more (L-N; V1/V2/V3 - Vn)</td></tr>
<tr><td>Resolution</td><td colspan="3">0.01V</td></tr>
<tr><td>Power consumption</td><td colspan="3">Approx. 0.2VA (L-N; V1/V2/V3 - Vn)</td></tr>
<tr><td>Accuracy *1</td><td colspan="3">0.2%
*0.5% for 2-phase of 1P3W, 3-1 voltage of 3P3W and line voltage of 3P4W.</td></tr>
<tr><td>VT ratio</td><td colspan="3">1.00 to 600.00 (set with setting mode)
*Voltage transformer (VT) is required when you measure a load with voltage over rated voltage. (Rated secondary voltage of VT is 110V.)
*When it input direct, VT ratio is set to 1.00.</td></tr>
<tr><td rowspan="7">Current</td><td rowspan="2">Input current (with CT)</td><td colspan="2">Primary current</td><td>65,535A or less</td></tr>
<tr><td colspan="2">Secondary current</td><td>1A or 5A (set with setting mode)</td></tr>
<tr><td>Max. current</td><td colspan="3">10A (200% of the rating)</td></tr>
<tr><td>Overload capacity</td><td colspan="3">1000% of the rating for 3s</td></tr>
<tr><td>Resolution</td><td colspan="3">0.001A</td></tr>
<tr><td>Power consumption</td><td colspan="3">Approx. 0.2VA</td></tr>
<tr><td>Accuracy *1 *2</td><td colspan="3">0.2%
*0.5% for 2(N)-phase of 1P3W and 2(S)-phase of 3P3W.</td></tr>
<tr><td>Power</td><td>Accuracy *1</td><td colspan="3">0.5%
Active power Class 0.5S (IEC 62053-22)
Reactive power Class 2 (IEC 62053-23)</td></tr>
<tr><td>Tempera-ture</td><td>Accuracy</td><td colspan="3">±5.0℃ (after ambient temperature correction with setting mode)
Passing 2 hours or more after energized</td></tr>
</table>

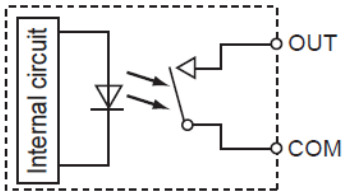
*1 Without error of current transformers (CT) and voltage transformers (VT)
・It measures from 0.1% of CT secondary current.

8.3 Output Specifications

Number of output point		2 points *Insulate between output terminals
Insulation method		PhotoMOS relay
Output type		1a
Output capacity		100mA, 30V AC/DC
Output mode (OUT1/OUT2)		・Pulse by integral power ・Output by alarm or events (set with setting mode)
Pulse by integral power	Pulse width	Approx. 100ms
	Pulse output unit	0.0001kWh/ 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 *1

*1 Varistor is mounted internal as a protection element.
Install a protective device in case of using at the place where it effects by surge.

<Internal output circuit>



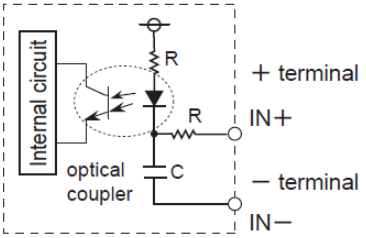
How to calculate
Unit for pulse output＞(Max. measurement power [kW])／(3600[s]×1 [pulse/s])

Note
(1) Improper unit setting may cause miss counting.
(2) If the OFF time is too short, there is a possibility of counting errors.

8.4 Input Specifications

Number of input point		2 points *Not insulate between input terminals (COM is common.)
Insulation method		Designated insulation for input (insulate to the other functions)
Input method		Contact/ non-voltage a contact or open-collector
Input signal		Non-voltage ・Impedance; Max. 1kΩ (when short-circuit current: Max. 10mA) ・Residual voltage when shorted; Max. 3V ・Impedance when open: Min. 100kΩ
Input mode	IN1	Pulse input or synchronized with input from outer device
	IN2	Pulse input
Max. counting speed	IN1	30Hz (when pulse input)
	IN2	2000Hz / 30Hz
Min. input signal width	IN1	16.7m ON:OFF ratio＝1:1
	IN2	0.25ms (when 2000Hz is set) / 16.7ms(when 30Hz is set) ON:OFF ratio＝1:1
Pre-scale	Decimal point	Under 3-digit
	Range	0.001 to 100.000 (set with setting mode)
Output mode (when pulse output is selected)		HOLD
Protective elements		Zener diode

<Internal input circuit>



R: resister
C: capacitor

8.5 Demand monitor and control specifications (common to 9, 10)

Demand type			・Peak demand ・IEC61557-12 demand 1. Sliding block interval 2. Fixed block interval 3. Current demand ・30-min demand (set with setting mode)	
Power input type			Current transformer input (IEC demand /30-min demand)) Integral pulse input (only 30-min demand) (set with setting mode)	
Demand span	IEC demand		1 to 60 min. (set with setting mode)	
	30-min demand		30 min. (fixed)	
Measurement item			Present demand, Estimated demand (only 30-min demand)	
Demand calculate method *1			Additional method / Average method (set with setting mode)	
Data update cycle			1 min.	
Demand stand-by time (mask time) *1			1 to 30 min. (set with setting mode)	
Display	IEC demand		Present demand (active/ reactive/ apparent/ active(export)/ reactive(export)/ current)	
	30-min demand		Power demand (active), Estimated demand, Demand target value, Ratio of estimated demand, Current demand, Monthly max. demand, Max. demand	
Saved data			Monthly max. demand 12 records (12-month), Max.demand	
Time span synchronized method			Clock synchronized (Pulse input to IN1) (set with setting mode)	
Synchronized signal input <IN1>	Input terminal		IN1	
	Input method		Non-voltage a contact or open-collector	
	Pulse width		50ms or more	
	Operating voltage/ current		5VDC 10mA	
	Signal common		Common (IN2; common to pulse input)	
Pulse input <IN2>	Input terminal		IN2	
	Input method		Non-voltage a contact or open-collector	
	Input signal		50,000 / 2,000 [pulse/kWh]	
	Pulse rate		0.001 to 100.000 kWh/pulse	
	Input pulse	2000Hz	width	0.25ms or more
			interval	0.5ms or more (OFF: 0.25ms or more)
		30Hz	Width	16.7ms or more
			interval	33.4ms or more (OFF: 16.7ms or more)
	Operating voltage/ current		5VDC 10mA	
	Signal common		Common (IN1; common to clock synchronized input)	

Alarm output <OUT1> <OUT2> *2	Display		Lighting alarm mark / Blinking backlight
	Output signal		2 points; set each ・normal; OFF ・alarm; ON
	Output capacity		100mA, 30V AC/DC
	Communication	OUT1	DT00298 (MEWTOCOL), 12Ahex (MODBUS) normal; 0, alarm; 1
		OUT2	DT00299 (MEWTOCOL), 12Bhex (MODBUS) normal; 0, alarm; 1

*1 Available when 30-min demand is selected.
*2 Alarm output can't be set when peak demand is selected.

8.6 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), DL/T645-2007 *1 (select with setting mode)
Number of connected unit		99 (max.) *2
Transmission distance		1200m *3
Transmission speed		38400, 19200, 9600, 4800, 2400, 1200bps (select with setting mode)
Transmission format	Data length	8bit (fixed)
	Parity	Not available / odd number / even number (select with setting mode)
	Stop bit	1bit, 2bit (select with setting mode)

*1 MEWTOCOL is the protocol for PLC from Panasonic.
DL/T645 is the China power-meter standard. Only DL/T645-2007 is supported.
*2 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.
*3 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.

< USB >

Electric specification	Conform to USB2.0 standard
Connector shape	USB series MiniB
Insulation method	Insulated to internal circuit
Transmission speed	12Mbps(Full-Speed)
Transmission function	Computer link (MEWTOCOL)

*Install the dedicated USB driver before using USB port.
*Do not ground the signal wire of USB communication.

8.7 Self-diagnostic function

If an error occurs, the following indication will be given.
When several errors occur, [1] are indicated for the designated digits.

Indicator	Meaning	To recover	After recovery
00000001	Hardware breakdown	Change main unit due to the end of hardware	
00000100	Firmware update failure	Update again	Start with updating firmware.
00100000	Internal program error	Power on again	Before the abnormal
10000000	Memory breakdown or crash *	Change main unit due to the end of internal memory	

*Includes the possibility that the internal memory life has expired.

8.8 Power Failure Memory

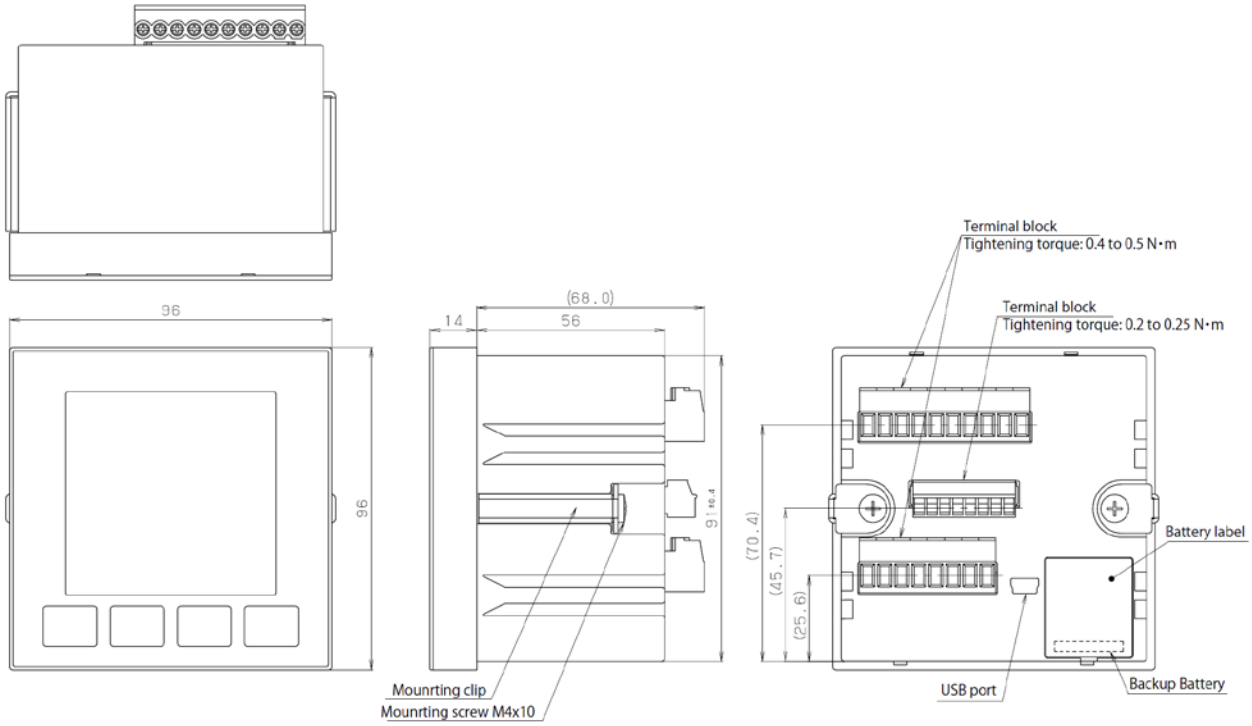
Eco-POWER METER memories integral electric power and working status to internal memory until when power supply is off. (Power failure guarantee)
And every time to change each setting, each setting value is memorized to internal memory at the same time. Rewritable times are limited. Especially be careful if you set by communication.

Chapter 9 Mounting

9.1 Dimensions

9.1.1 Main unit

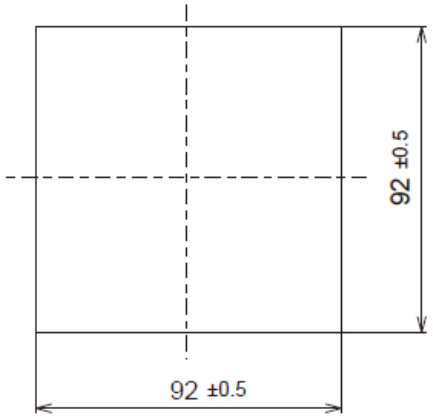
(Unit: mm)
(Clearance: ±1.0)



9.2 Panel mounting

(Unit: mm)

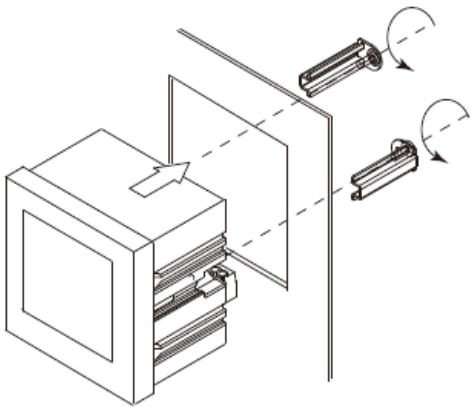
◆Panel cut-out



Keep enough space for several mountings.
recommended space:
130mm the left, right, top and bottom
from center of the unit

◆Panel mounting

1) Remove the mounting clips from the unit.
2) Insert the unit from the front of the panel.
3) Attach the mounting clips at the both side of the case and secure in place with the screws.
(Tightening torque: approx. 0.2 to 0.3N·m)
·Applicable panel thickness: 1 to 5mm



Revision History

Issue Date	Manual No.	Content of revision
August, 2013	WUME-KW9MA-01	First edition
September, 2013	WUME-KW9MA-02	2nd edition -Add note for theree-phase four-wire system wiring -Add condition for Low voltage directive
July, 2014	WUME-KW9MA-03	3rd edition <Add functions> - Add the reset function with communication
April, 2015	WUME-KW9MA-04	4th edition -Add comments for recommended breaker and fuse -Add 'Symbol List'

Please contact .....

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WUME-KW9MA-04