Panasonic

CE
Conforming to Low Voltage
and EMC Directives

One Meter Works for Both

Energy Saving and Power Quality Surveillance

Panasonic

Eco-POWER METER

LEAD

KW9M-A

High accuracy: 0.2 %*

Harmonic measurement*

Simple demand management*

Unbalanced measurement*

*Advanced type

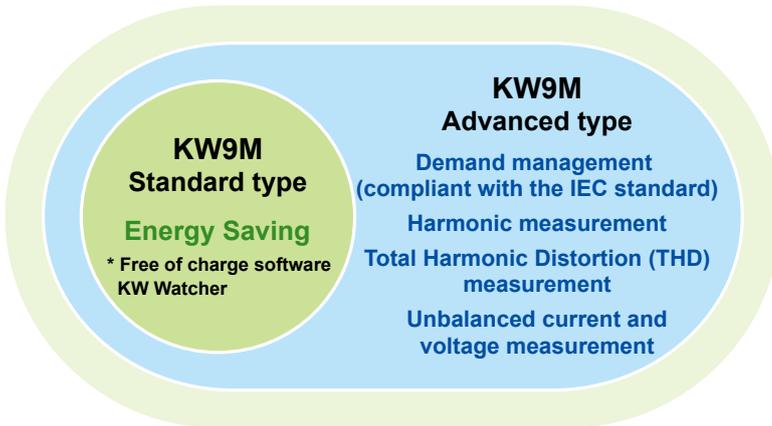3 Year Warranty

0.2 % accuracy, Advanced type debuted!

Multi-function power meter featuring a simple demand management and power quality surveillance function in addition to the energy saving

KW9M series

KW9M Standard type

Energy Saving

* Free of charge software KW Watcher

KW9M Advanced type

Demand management (compliant with the IEC standard)

Harmonic measurement

Total Harmonic Distortion (THD) measurement

Unbalanced current and voltage measurement

* Current and voltage measurement accuracy of the advanced type.
  Active power: Class 0.5S (IEC62053-22)

Panasonic
Eco-POWER METER

P

LEAD

1 0.000 kW
2 0.000
3 0.000
Σ 0.001

MODE   SET   SHIFT   ITEM

KW9M-A

Energy Saving
(Standard type)

Demand Management and Power Quality Surveillance
(Advanced type)

Fields	• Factory • Store • Office	• Infrastructure (Freeway, railway station · facility, etc) • Theme park

Applications	• Visualizing power consumption by department or equipment • Monitoring for any waste of standby power • Improving the unit consumption • • •
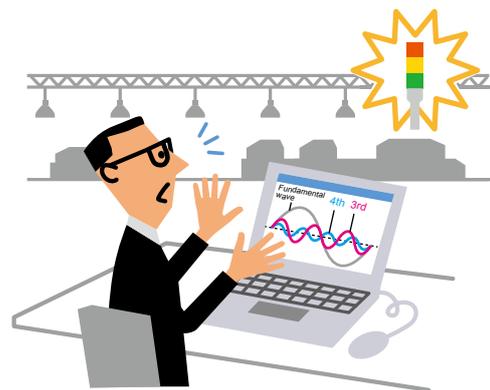
Fields	• Factory • Store • Office	• Power station • Infrastructure (Freeway, railway station · facility, etc) • Public facilities

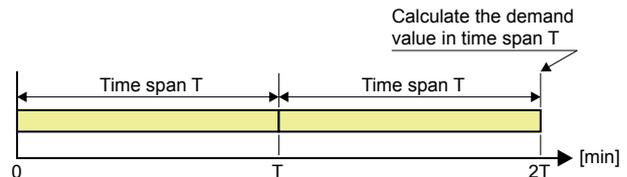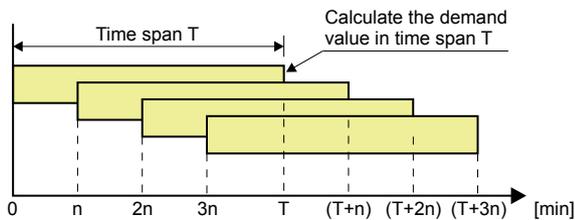| **Applications**	• Energy-saving through demand management (compliant with the IEC standard) • Surveillance and improving power quality • Preventive maintenance of power equipment • • •

Fundamental Wave   4th 3rd

Useful Functions

Multi-Function Power Meter
Eco-POWER METER® KW9M SERIES

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Function 1

Demand measuring function compliant with IEC61557-12 effective for energy saving

* 30-min demand method is also selectable for use in Japan.

IEC demand (Sliding block interval and Fixed block interval)

Users set the time span for demand calculation to an arbitrary value between 1 to 60 minutes (in increments of one minute). The average power demand within the set span is calculated at the end of the span. [The demand values of active, reactive, apparent, active (export), and reactive (export) power are calculated.]
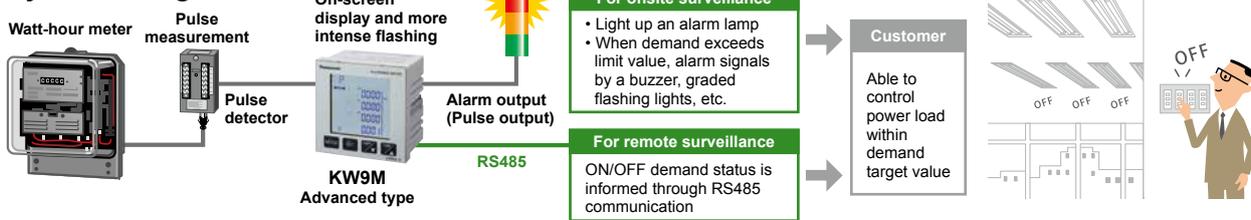
Time span T
Calculate the demand value in time span T

0　n　2n　3n　T　(T+n)　(T+2n)　(T+3n)　[min]

Calculate the demand value in time span T

0　　Time span T　　T　　Time span T　　2T　[min]

• Sliding block interval method
The next time span starts "n" minutes later. (Value "n" is arbitrarily set by users.)

• Fixed block interval method
The next time span starts after completion of the current span.

System configuration

Watt-hour meter

Pulse measurement

Pulse detector

On-screen display and more intense flashing

KW9M Advanced type

Alarm output (Pulse output)

RS485

For onsite surveillance
• Light up an alarm lamp
• When demand exceeds limit value, alarm signals by a buzzer, graded flashing lights, etc.

For remote surveillance
ON/OFF demand status is informed through RS485 communication

Customer

Able to control power load within demand target value
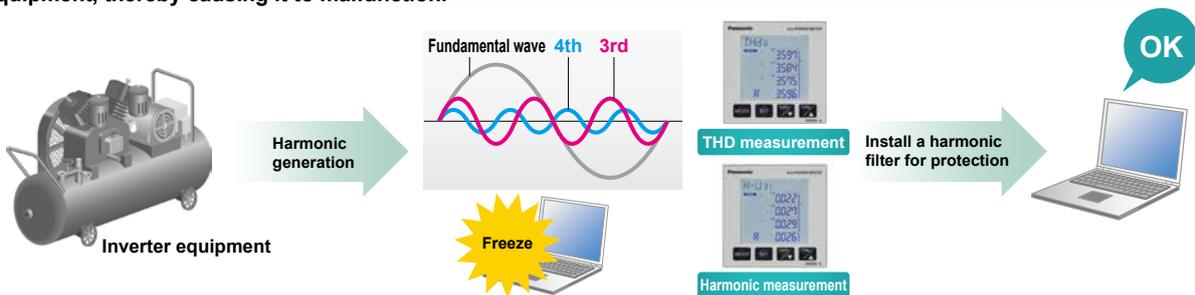
OFF　OFF　OFF　OFF

* Also ready for CT inputs (electric power measurement)

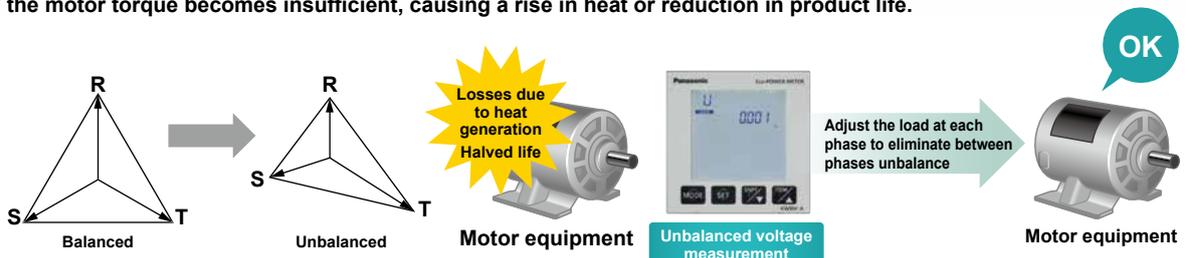## Function 2

Harmonic measurement (Advanced type)

Inverter equipment and fluorescent lighting fixtures are harmonic sources and can have adverse effects on precision equipment, thereby causing it to malfunction.

Inverter equipment

Harmonic generation

Fundamental wave　**4th**　**3rd**

Freeze

THD measurement

Harmonic measurement

OK

Install a harmonic filter for protection

Function 3

Improvement of between phases unbalance (Advanced type)

If there is an unbalanced load due to a V-connected transformer or a heater, a voltage imbalance occurs between phases, and the motor torque becomes insufficient, causing a rise in heat or reduction in product life.

R
S　　T
Balanced

R
S　　T
Unbalanced

Losses due to heat generation Halved life

Motor equipment

Unbalanced voltage measurement

OK

Adjust the load at each phase to eliminate between phases unbalance

Motor equipment

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Feature 1

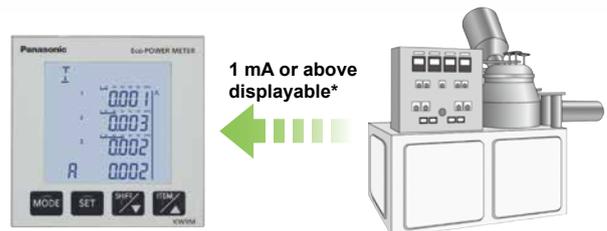**Large-screen LCD with backlight clearly displays the electric power of each phases and their total on one screen.**

96 mm
3.780 in

96 mm
3.780 in
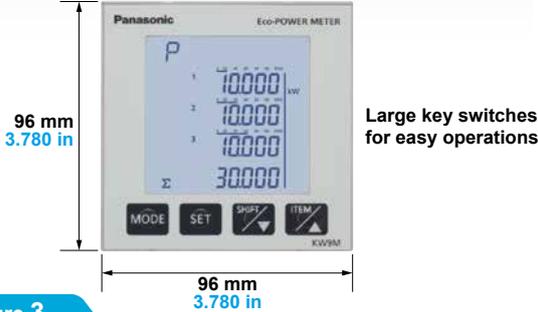
Large key switches for easy operations

Feature 2

Capable of displaying small currents of 1 mA or above This allows for the monitoring of standby power consumption, which helps energy saving.
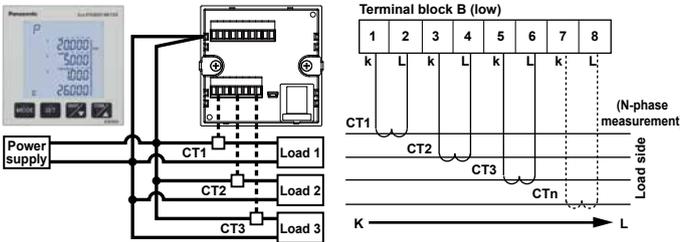
1 mA or above displayable*

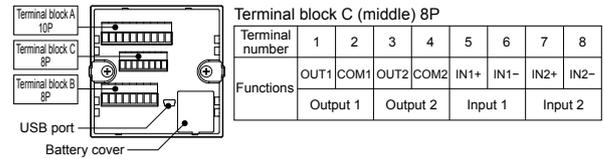* Capable of measuring 0.1 % or higher the rating of the secondary side of CT.

Feature 3

Capable of simultaneously measuring up to three circuits in a single phase two-wire system of same power supply The advanced type is also capable of N-phase measurement and electric leakage detection using the fourth CT.

Power supply

CT1 — Load 1
CT2 — Load 2
CT3 — Load 3

Terminal block B (low)

1	2	3	4	5	6	7	8
k	L	k	L	k	L	k	L

CT1
CT2
CT3
CTn

(N-phase measurement)

Load side

K ———→ L

Feature 4

Equipped with input and output terminals (Advanced type)

Two pulse input points — Simultaneously measures data including that other than electric energy (production amount, flow rate, etc.). Capable of time synchronization by inputting a clock setting trigger

Two pulse output points — The PhotoMOS output allows for connection of NPN input and PNP input devices. Ready for alarm outputs, which are frequently used.

Terminal block A 10P
Terminal block C 8P
Terminal block B 8P
USB port
Battery cover

Terminal block C (middle) 8P

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	

Feature 5

Various log functions available (Advanced type)

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 happening 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

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

Feature 6

Data can be made visualization by connecting the meter to DLL* and logging the data. Alarms can be e-mailed to mobile phones or other equipment.
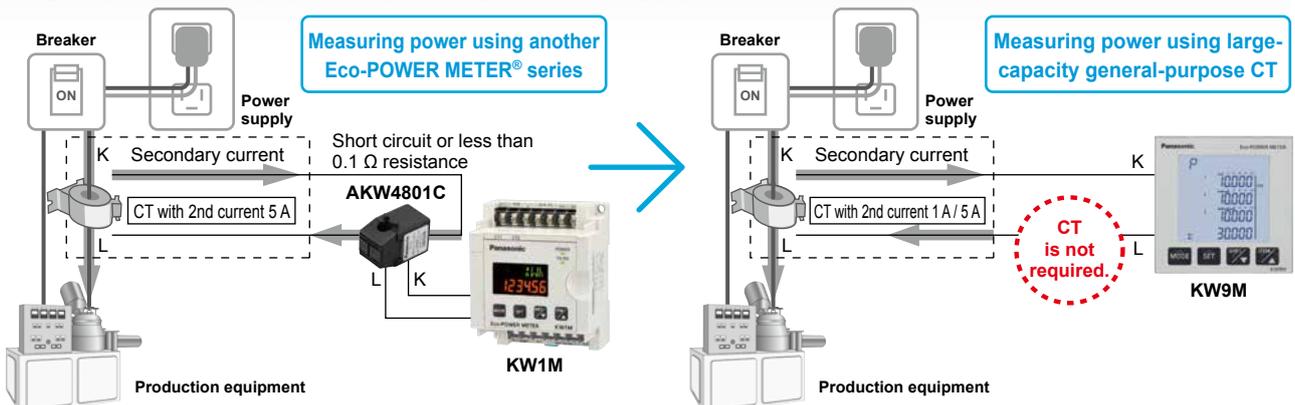
***DLL** is the abbreviation for **Data Logger Light**.

DLL

Isolation RS485

Modbus RTU, MEWTOCOL
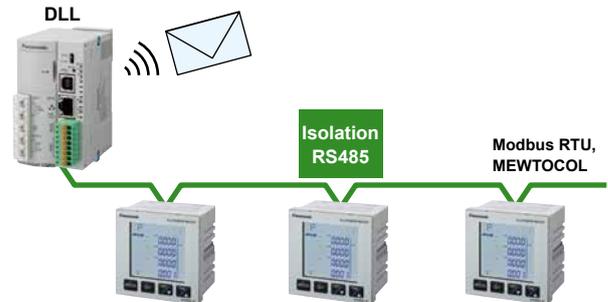
Feature 7

You can measure power with a direct connection to an already-installed large-capacity general-purpose CT (secondary side 1 A / 5 A type).

* The dedicated CT for Eco-POWER METER® cannot be used. Use a CT with a secondary side current of 1 A / 5 A.

Breaker
ON
Power supply

Measuring power using another Eco-POWER METER® series

K Secondary current
CT with 2nd current 5 A
L

Short circuit or less than 0.1 Ω resistance
AKW4801C

L K

KW1M

Production equipment

Breaker
ON
Power supply

Measuring power using large-capacity general-purpose CT

K Secondary current
CT with 2nd current 1 A / 5 A
L

K
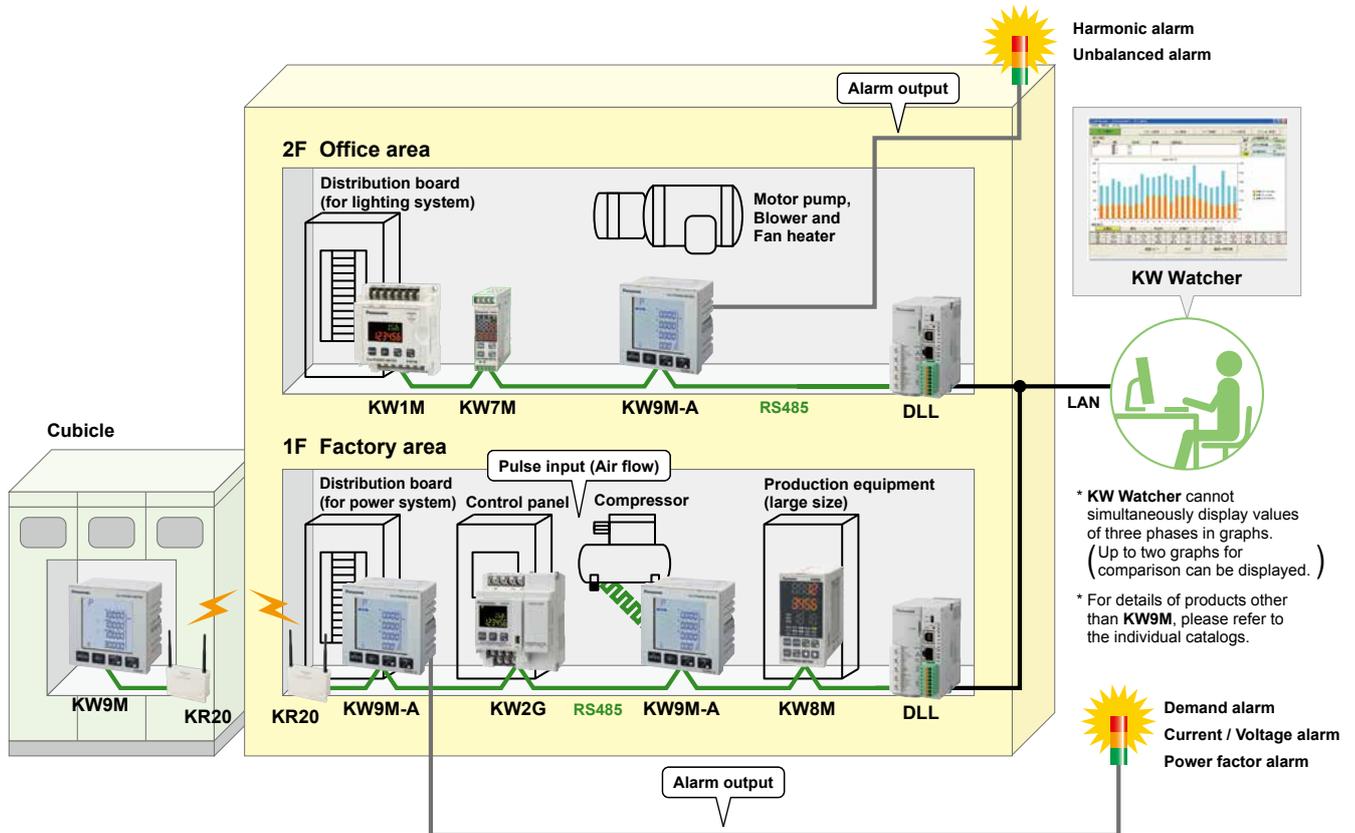**CT is not required.**
L

KW9M

Production equipment

The measuring accuracy of the Eco-POWER METER® does not take the CT error into account. Other Eco-POWER METER® series (except **AKW8115**) need to use two CTs for measurement. **KW9M** is ready for direct input from only one CT, allowing higher accuracy measurements than with other Eco-POWER METER® series.
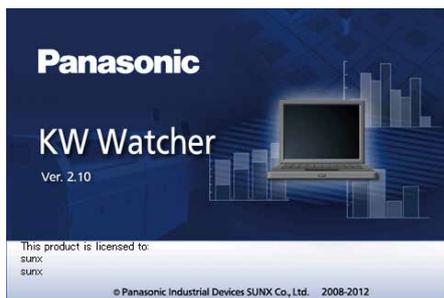
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Example of a comprehensive solution for the entire factory

Harmonic alarm
Unbalanced alarm

Alarm output

2F Office area

Distribution board (for lighting system)

Motor pump, Blower and Fan heater

KW1M   KW7M   KW9M-A   RS485   DLL

KW Watcher

LAN

Cubicle

1F Factory area

Pulse input (Air flow)

Distribution board (for power system)   Control panel   Compressor   Production equipment (large size)

KW9M   KR20   KR20   KW9M-A   KW2G   RS485   KW9M-A   KW8M   DLL

Alarm output

* **KW Watcher** cannot simultaneously display values of three phases in graphs. (Up to two graphs for comparison can be displayed.)

* For details of products other than **KW9M**, please refer to the individual catalogs.

Demand alarm
Current / Voltage alarm
Power factor alarm

Free visualization software for supporting energy management

Power consumption analysis enhances equipment operation efficiency.

Panasonic KW Watcher Ver. 2.10

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KW Watcher can be downloaded, free of charge, from our website.
*You can also check the required operating environments.

Free software to create graphs from data collected by DLL for energy management

- **Cumulative bar charts by equipment and pie charts**
- **Comparison graphs by time and equipment**
- **Numeric display function**
- **Auto graph updating function**

* **KW Watcher** cannot simultaneously display values of three phases in graphs. (Up to two graphs for comparison can be displayed.)
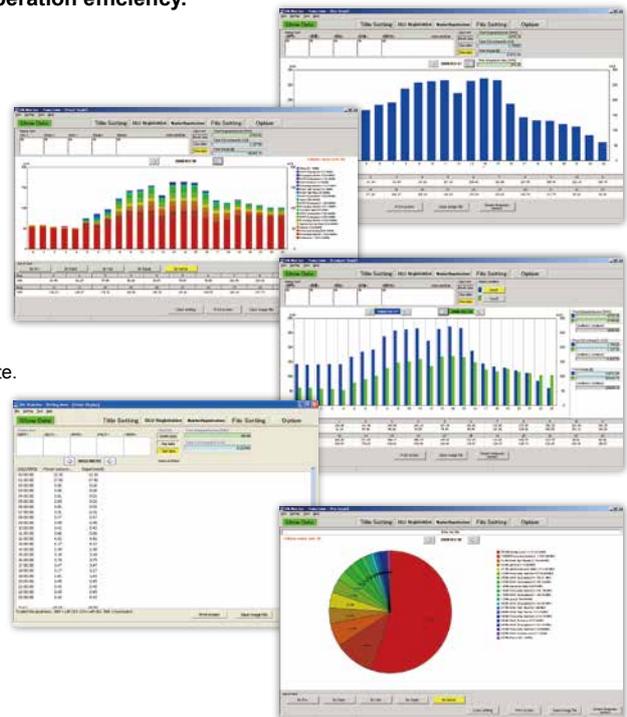
Specifications

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■ORDER GUIDE

Product name	Phase/Wire system	Input measurement voltage	Input measurement current	Applicable current transformer*	Model No.
KW9M Eco-POWER METER® Standard type	Single-phase two-wire (1P2W) Single-phase three-wire (1P3W) Three-phase three-wire (3P3W) Three-phase four-wire (3P4W) (common)	0 to 500 V AC	1 to 4,000 A	Secondary side current 1 A or 5 A	**AKW91110**
KW9M Eco-POWER METER® Advanced type			1 to 65,535 A		**AKW92112**

*The dedicated current transformer (CT) can not be used. Please use a CT with a secondary side 1 A / 5 A.

■OVERVIEW OF FUNCTIONS

	Type	Standard	Advanced
Measurement items	Active power	Each phase and Total (Import, Export)	
	Reactive power	Each phase and Total (Import, Export)	
	Apparent power	Each phase and Total	
	Power demand	—	IEC61557-12 demand 30-min demand Peak demand
	Active electric energy	Each phase and Total (Import, Export)	
	Reactive electric energy	Each phase and Total (Import, Export)	
	Apparent electric energy	Each phase and Total	
	Current	Each phase and Average current	Each phase, N-phase (when 3P4W) and Average current
	Unbalanced current	—	Total (except N-phase)
	Current THD	—	Each phase
	Current harmonics	—	Each phase (2nd to 31st harmonics)
	Current demand	—	Each phase current demand
	Voltage	Line voltage (Each line and average), Phase voltage (Each phase and average)	
	Unbalanced voltage	—	Total
	Voltage THD	—	Line and Phase voltage
	Voltage harmonics	—	Line and Phase voltage (2nd to 31st harmonics)
	Power factor	Each phase and Average	
	Frequency	Each phase and Average	
	Pulse count (Integral pulse)	—	2 points
	Temperature	Ambient temperature	
	Calendar	—	Internal clock
Input		—	2 points
Output		—	2 points

* IEC 61557-12 is an international standard on performance measuring and monitoring devices (PMD).

■MEASUREMENT ITEMS

By Type

Item		Unit	Display data range	Standard Present value (Instantaneous value)	Advanced Present value (Instantaneous value)	Advanced Maximum	Advanced Minimum
Instantaneous power	Active	kW	−99999 to 0.000 to 99999	●	●	●	●
	Reactive	kvar					
	Apparent	kVA					
Integral power (import)	Active	kWh	0.00 to 9999999.9	●	●	—	—
	Reactive	kvarh					
	Apparent	kVAh					
Integral power for each time zone (4-zone) (import)	Active	kWh	0.00 to 9999999.9	—	●	—	—
	Reactive	kvarh					
	Apparent	kVAh					
Integral power (export)	Active	kWh	0.000 to 9999999.9	●	●	—	—
	Reactive	kvarh					
Integral power for each time zone (4-zone) (export)	Active	kWh	0.000 to 9999999.9	—	●	—	—
	Reactive	kvarh					
Current		A	Standard: 0.000 to 8000.0	●	●	●	●
	N-phase when 3P4W	A	Advanced: 0.000 to 99999	—	●	●	●
Voltage (Phase and Line voltage)		V	0.00 to 99999	●	●	●	●
Power factor			−1.000 to 0.000 to 1.000	●	●	●	●
Frequency		Hz	0.00 to 99.99	●	●	●	●
Pulse count value			0.000 to 99999999	—	●	—	—
Power conversion value	Total		0.000 to 99999999	●	●	—	—
	For each time zone			—	●	—	—
Temperature		degree C	−100.0 to 100.0	●	●	—	—
Calendar			January 1, 2000 00:00:00 to Dec. 31, 2099 23:59:59	—	●	—	—

Note: "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.

■MEASUREMENT ITEMS

Power quality (Only advanced type)

Item		Unit	Display data range	Present value (Instantaneous value)	Maximum	Minimum
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 (2nd to 31st)	Each phase	%	0.000 to 400.00	●	—	—
Voltage harmonics (2nd to 31st)	Phase	%	0.000 to 400.00	●	—	—
	Line	%	0.000 to 400.00	●	—	—

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

Demand measurement (Only advanced type)

Item		Unit	Display data range	Present value (Instantaneous value)	Maximum	Minimum
Present demand	Active	kW	0.000 to 99999	●	●	—
	Reactive	kvar				
	Apparent	kVA				
	Active (export)	kW				
	Reactive (export)	kvar				
	Current	A				
Estimated demand (Note 1)		kW	0.000 to 99999	●	—	—
Ratio of estimated demand (Note 1)		%	0.000 to 99999	●	—	—
Integral power converted by pulse (Note 1)		kWh	0.000 to 999999.99	●	—	—

* Please use this demand function as your standard. The demand value calculated with this function is not guaranteed.
Note:
1) Only when 30-min demand is set.

■MAIN UNIT SPECIFICATIONS

Type		Standard	Advanced
Supply voltage range		85 to 264 V AC	
		100 to 300 V DC	
Rated frequency		50/60 Hz	
Nominal power consumption		5 VA approx. (240 V AC at 25 °C 77 °F) 3 W approx. (240 V DC at 25 °C 77 °F)	6 VA approx. (240 V AC at 25 °C 77 °F) 3 W approx. (240 V DC at 25 °C 77 °F)
Inrush current		30 A or less (240 V AC/DC at 25 °C 77 °F)	
Allowable momentary power-off time		10 ms	
Ambient temperature		Accuracy guarantee: −10 to +55 °C 14 to 131 °F	
		Operation: −25 to +55 °C −14 to 131 °F	
		Storage: −25 to +70 °C −14 to 158 °F	
Ambient humidity		30 to 85 % RH (at 20 °C 68 °F) non-condensing	
Breakdown voltage (initial)		Between the isolated circuits: 2,000 V/1 min a) enclosure - all terminals b) between insulated circuits • power supply terminals – other terminals • RS485 terminals – other terminals • measured current input terminals – other terminals	Between the isolated circuits: 1,500 V/1 min 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
Insulation resistance (initial)		Between the isolated circuits: 100 MΩ or more	
Vibration resistance		10 to 150 Hz (7.5 minutes/cycle) single amplitude: 0.075 mm 0.0030 in (1 h on 3 axes)	
		10 to 55 Hz (1 minute/cycle) single amplitude: 0.375 mm 0.015 in (1 h on 3 axes)	
Shock resistance		Min. 294 m/s² (5 times on 3 axes)	
Display method		LCD with backlight	
Display updating time		100 ms	100 to 1000 ms (set with setting mode)
Power failure memory method (when power OFF)		Internal memory (overwrite 10¹⁰ or more)	
Calendar	Range		From January 1, 2000 00:00:00 to December 31, 2099 23:59:59
	Accuracy		±15 seconds/month (at 25 °C 77 °F)
	Backup		About 1-month (backup with secondary battery) (after passing 48-hour, at 23 °C 73.4 °F)
Degree of protection		Front: IP51, Back: IP20	
Sea level altitude		Under 2,000 m 6,562 ft	
Overvoltage category		2	
Pollution degree		II	
Dimensions W/H/D		96 × 96 × 56 mm 3.78 × 3.78 × 2.20 in (without terminal block) 96 × 96 × 68 mm 3.78 × 3.78 × 2.68 in (with terminal block)	
Weight		450 g approx.	480 g approx. (with secondary battery)

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■MEASUREMENT SPECIFICATIONS

Type			Standard	Advanced
Measured data			AC sine	
Phase/Wire system			Single-phase two-wire (1P2W) (max. 3-circuit), Single-phase three-wire (1P3W), Three-phase three-wire (3P3W) and Three-phase four-wire (3P4W) (Common)	
Applicable power system			100 V system, 200 V system and 400 V system	
Measured frequency			50/60 Hz	
Sampling rate	Sampling		1.024 MHz (1.0 µs approx.)	1.024 MHz (1.0 µs approx.)
	Date update	Instantaneous value	100 ms	100 ms
		Harmonics	—	22.5s (2nd to 31st)
Voltage	Input voltage	1P2W L-L	0 to 500 V AC	
		1P3W L-L	0 to 500 V AC	
		L-N	0 to 250 V AC	
		3P3W L-L	0 to 500 V AC	
		3P4W L-L	0 to 500 V AC	
		L-N	0 to 289 V AC	
	Impedance		2 MΩ or more (L-N: V1/V2/V3-Vn)	
	Resolution		0.01 V	
	Power consumption		0.2 VA approx. (L-N: V1/V2/V3-Vn)	
	Accuracy (Note 1)		0.5 % *1.0 % for 2-phase voltage of 1P3W, 3-1 voltage of 3P3W and line voltage of 3P4W.	0.2 % *0.5 % for 2-phase voltage of 1P3W, 3-1 voltage of 3P3W and line voltage of 3P4W.
	VT ratio		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 110 V.) *When it input direct, VT ratio is set to 1.00.	
Current	Input current (with CT)	Primary current	4,000 A or less	65,535 A or less
		Secondary current	1 A or 5 A (set with setting mode)	
	Max. current		10 A (200 % of the rating)	
	Overload capacity		1,000 % of the rating for 3s	
	Resolution		0.001 A	
	Power consumption		0.2 VA approx.	
	Accuracy (Note 1)		0.5 % *1.0 % for 2 (N) - phase of 1P3W and 2 (S) - phase of 3P3W.	0.2 % (Note 2) *0.5 % for 2 (N) - phase current of 1P3W and 2 (S) - phase current of 3P3W.
Power	Accuracy (Note 1)		1.0 % Active power Class 1 (IEC 62053-21) Reactive power Class 2 (IEC 62053-23)	0.5 % Active power Class 0.5S (IEC 62053-22) Reactive power Class 2 (IEC 62053-23)
Temperature	Accuracy		±5.0 °C ±41 °F (after ambient temperature correction with setting mode) Passing 2 hours or more after energized	

Notes: 1) Without error of current transformers (CT) and voltage transformers (VT)
2) As to the current under 5 % of rating, it may not satisfy the accuracy according to CT setting (max. error; 0.5 %).
* It measures from 0.1 % of CT secondary current.
* IEC62053 is the international standard for Electricity metering equipment.

■OUTPUT SPECIFICATIONS Only Advanced type

Number of output point		2 points *Insulate between output terminals
Insulation method		PhotoMOS relay
Output type		1a
Output capacity		100 mA, 30 V AC/DC
Output mode (OUT1/OUT2)		• Pulse by integral power • Output by alarm or events (set with setting mode)
Pulse output by integral power	Pulse width	100 ms approx.
	Pulse output unit	0.0001 kWh / 0.001 kWh / 0.01 kWh / 0.1 kWh /1 kWh / 10 kWh / 100 kWh
Alarm output Event output	Type	Stand-by power 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 / Power factor 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 (Note)

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

How to calculate

(1) Calculate the appropriate power to be measured from the unit of the integral power pulse output.
Unit for pulse output > (Max. measurement power [kW]) / (3,600 sec × 1 pulse/sec)

When the pulse output unit is 0.001, the maximum power that can be properly measured by pulse output is 3.6 kW (3,600 sec × 1 pulse/sec × 0.001).
If the load is higher than this value, the output pulses cannot keep up with it, and the number of pulses becomes small.
In such cases, set the pulse output unit to the value immediately above.

(2) Calculate the appropriate pulse output unit from the instantaneous power to be measured.
(Max. measurement power [kW]/3,600 sec × 1 pulse/sec) < Unit for pulse output

When the maximum power to be measured is 10 kW, the pulse output unit required for the correct pulse output is 0.01 kWh/pulse, which is the value immediately above this one:
10 W/3,600 sec x 1 pulse/sec = 0.0027

Notes:
1) If the pulse output unit is set to output one pulse or more per second, the Eco-POWER METER® cannot correctly output pulses.
2) If the pulse output OFF time is set too short, count errors by connected counters, PLCs (Programmable Logic Controllers) may occur.

■INPUT SPECIFICATIONS (Only Advanced type)

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 (Powered by an internal power supply)
Input signal		Non-voltage input	• Impedance; Max. 1 kΩ (when short-circuit current: Max. 10 mA) • Residual voltage when shorted: Max. 3 V • Impedance when open: Min. 100 kΩ
Input mode	IN1	Pulse input or synchronized with output from outer device
	IN2	Pulse input
Max. counting speed	IN1	30 Hz (when pulse input)
	IN2	2000 Hz / 30 Hz
Min. input signal width	IN1	16.7 ms ON:OFF ratio = 1:1
	IN2	0.25 ms (when 2000 Hz is set) / 16.7 ms (when 30 Hz 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

■DEMAND MONITOR AND CONTROL SPECIFICATIONS (Only Advanced type)

Demand type			• Peak demand • IEC61557-12 demand 1. Sliding block interval demand 2. Fixed block interval demand 3. Current demand • 30-min demand (set with setting mode)
Demand monitor input type			Current transformer (CT) input (IEC demand /30-min demand) Integral pulse input (only 30-min demand) (set with setting mode)
Demand time span	IEC61557-12 demand		1 to 60 min. (set with setting mode)
	30-min demand		30 min. (fixed)
Demand measurement item			Present demand, Estimated demand (only 30-min demand)
Demand calculate method (Note)			Additional method / Average method (set with setting mode)
Demand data update cycle			1 min.
Demand stand-by time (mask time) (Note)			1 to 30 min. (set with setting mode)
Display	IEC61557-12 demand		Present demand [active/ reactive/ apparent/active(export)/ reactive(export)/ current]
	30-min demand		Power demand (active power), Estimated demand, Demand target value, Ratio of estimated demand, Current present 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 (Powered by an internal power supply)
	Pulse input condition	Pulse width	50 ms or more
	Operating voltage/ current		5 V DC 10 mA
	Signal common		Common (IN2; common to pulse input)
Pulse input <IN2>	Input terminal		IN2
	Input method		Non-voltage a contact or open-collector (Powered by an internal power supply)
	Pulse input signal		50,000 pulse/kWh <An external pulse detector required> 2,000 pulse/kWh <An external pulse convertor required>
	Pulse rate		0.001 to 100.000 kWh/pulse
	Pulse input condition	2000 Hz	Pulse width: 0.25 ms or more Pulse interval: 0.5 ms or more (OFF: 0.25 ms or more)
		30 Hz	Pulse width: 16.7 ms or more Pulse interval: 33.4 ms or more (OFF: 16.7 ms or more)
	Operating voltage/ current		5 V DC 10 mA
	Signal common		Common (IN1; common to clock synchronized input)

Note: The time span can be arbitrarily set only for sliding block interval demand and fixed block interval demand.

■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 (Note 1) (select with setting mode)
Number of connected unit		99 (max.) (Note 2)
Transmission distance		1,200 m 3,937 ft (Note 3)
Transmission speed		38,400, 19,200, 9,600, 4,800, 2,400, 1,200 bps (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)

Notes: 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.
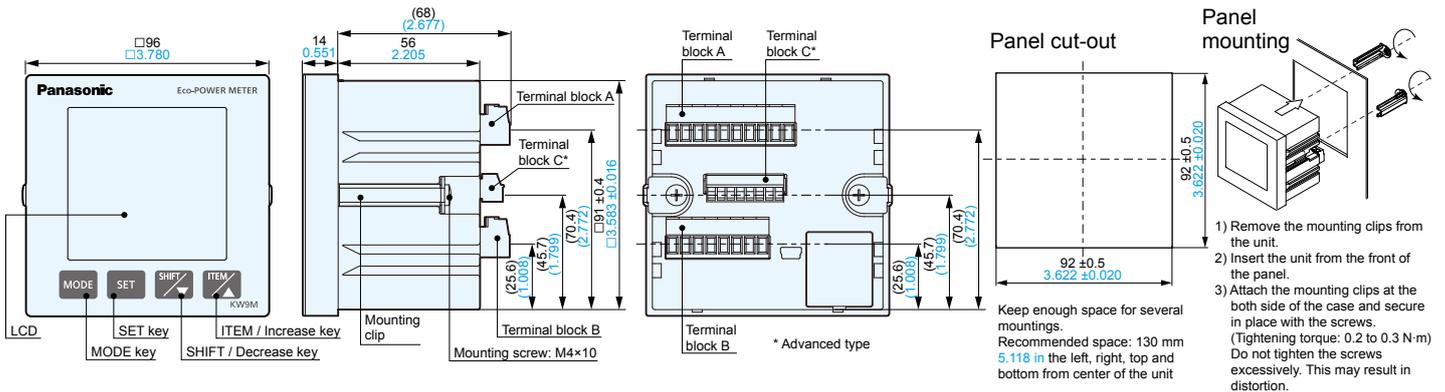
Dimensions

■EXTERNAL DIMENSIONS

(Unit: mm in)　Eco-POWER METER® is a registered trademark of Panasonic Corporation. (Registered Trademark No. 5501901)

LCD · MODE key · SET key · SHIFT / Decrease key · ITEM / Increase key

Terminal block A · Terminal block C* · Terminal block B · Mounting clip · Mounting screw: M4×10

Panel cut-out — 92 ±0.5 3.622 ±0.020 · 92 ±0.5 3.622 ±0.020
Keep enough space for several mountings.
Recommended space: 130 mm 5.118 in 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: 0.2 to 0.3 N·m) Do not tighten the screws excessively. This may result in distortion.
• Applicable panel thickness: 1 to 5 mm 0.039 to 0.197 in

* Advanced type

■TERMINAL ARRANGEMENT AND WIRING DIAGRAMS

Terminal 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, to protect the device and ease of maintenance.
  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.
• Do not open the secondary side of CT while the primary side current is energized. Do not remove the terminal block while the primary side current of CT is energized. These actions may result in electric shock or CT breakdown.

Rear view

Terminal block A 10P
Terminal block C* 8P
Terminal block B 8P
USB port
Battery label*
* Advanced type

After use, remove the label, take out the battery, and dispose of it according to the applicable regional (municipal) rules.
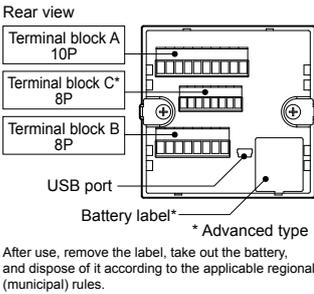
Specifications of terminal block A/B
Screw size: M2.5
Tightening torque: 0.4 to 0.5 N·m
Applicable wire: (Crimp-type terminal is recommended.)
• Single wire 0.13 to 4 mm² (AWG26 to 12)
• Stranded wire 0.2 to 4 mm² (AWG24 to 12)

• for 2 pcs.
Single wire / Stranded wire 2 pcs.
0.5 to 2.1 mm² (AWG20 to 14)

Specifications of terminal block C
Screw size: M2.0
Tightening torque: 0.2 to 0.25 N·m
Applicable wire: (Crimp-type terminal is recommended.)
• Single wire 0.08 to 1.5 mm² (AWG28 to 16)
• Stranded wire 0.2 to 1.5 mm² (AWG24 to 16)

Stripping length: 7 to 8 mm 0.276 to 0.315 in

Terminal arrangement

Terminal block A (upper) 10P

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

Terminal block C (middle) 8P (Only Advanced type)

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	

Terminal block B (lower) 8P

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

* The N-phase measurement is available for the advanced type only.

Wiring diagrams

Single-phase two-wire system

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

Three-phase four-wire system
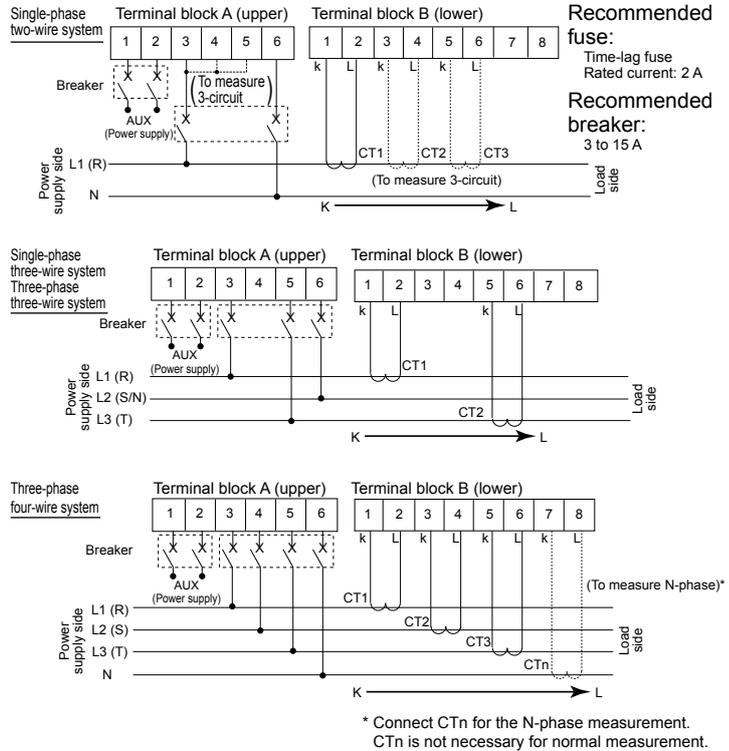
* Connect CTn for the N-phase measurement. CTn is not necessary for normal measurement.

Recommended fuse:
Time-lag fuse
Rated current: 2 A

Recommended breaker:
3 to 15 A

Please contact ....

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