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Panasonic
ideas for life

Eco-POWER METER makes energy management easy for all your facilities and machines!

KW4M
Eco-POWER METER (DIN□48)

Compliance with RoHS Directive

FEATURES

- **Electrical power measurement function**
  Instantaneous electrical power, integrated electrical energy, each phase voltage and each phase current
- **Hour meter function installed**
  Measuring the power distribution time of loads possible
- **Counter function installed**
  Supports pulse output devices including flow meters
- **Support for 400 V AC power measurement (use with external voltage transformer)**
- **Supports 4 types of dedicated current transformer (CT) to cover wide measuring range**
- **Supports Networking**
  - **An RS485 communications port comes standard**
  - **Comes with MODBUS (RTU) and easily connects to PLC**

DIN□48 IP66

PRODUCT TYPES

■ Main unit

Phase and wire system	Operating power supply	Measured voltage input	Terminal type	Communication protocol	Model number
Single-phase two-wire system Single-phase three-wire system Three-phase three-wire system	100 to 240 VAC	100/200 VAC	Screw terminal M3.5 "+/–" screw (crimp terminal)	MEWTOCOL	AKW5111
				MODBUS (RTU)	AKW5112
			11-pins	MEWTOCOL	AKW5211
				MODBUS (RTU)	AKW5212

■ Dedicated current transformer (CT)

Rated primary current	Model number
5A/50A (common)	AKW4801C
100A	AKW4802C
250A	AKW4803C
400A	AKW4804C

* When connectors are not necessary for trunk cables, cutting processing by users is necessary.
* Please order in accordance with the type of power distribution system you will be measuring.
  (Even if you will be using a secondary 5A CT, you will need an AKW4801C.)

■ Tool and Software

Product name	Descriptions	Remark
KW Monitor*1 (Data collection software for Eco-POWER METER)	For parameter settings, editing of measurement values, and monitoring, etc.	You can download from our website (free of charge)*2
KW Watcher (Electric power monitoring software)	Please use in situations where Web Datalogger Unit (DLU)/Data Logger Light (DLL) and Eco-POWER METER are used together. For easy "visualization" of data collected in DLU or DLL	

Notes: *1. KW Monitor only uses MEWTOCOL. You cannot use MODBUS (RTU) type (AKW5112, AKW5212) for communication.
*2. Customer registration is required to download data.

■ Other tool

Product name	Descriptions	Remark
KW4M Eco-POWER METER User's manual (PDF)	Detailed explanation of Eco-POWER METER usage	You can download from our website (free of charge)*2

■ Options

Product name	Descriptions	Model No.
Installation frame	Used for DIN48 size Main unit installation panel (For use when installation on the board is not possible)	AKW4822
Terminal protective cover	Used for screw terminal type Cover for shielding terminals of the main unit	AKW4823
Mounting frame	Supplied with a unit Used for mounting in a panel	ATA4811
Rubber gasket	Supplied with a unit Used for mounting in a panel	ATC18002
Protective cover	Used for protecting a front display (common to Timer/Counter)	AQM4803
DIN rail terminal socket	For 11-pin type (surface mounting)	ATC180041
Rear terminal socket	For 11-pin type (embedded mounting)	AT78051
11P cap	For 11-pin type (connectable directly with soldering)	ATA4861
Mounting rail	DIN rail terminal socket fixing rail	ATA48011

KW4M Eco-POWER METER (DIN□48) (AKW5)

■ Measurement items

Item			Unit	Data displayed range
Instantaneous electric power (Active)			kW	0.00 to 9999.99
Integrated electrical energy (Active)			kWh MWh	0.00 to 9999.99kWh to 10.00MWh to 9999.99MWh 9-digit display: 0.00 to 9999999.99 kWh
Current		L1(CT1)-phase current	A	0.0 to 6000.0
		L2(CT2)-phase current	A	0.0 to 6000.0
Voltage		Voltage between 1-2	V	0.0 to 9999.9
		Voltage between 2-3	V	0.0 to 9999.9
Corresponding value	Electricity charge*	Yen	JPY	0 to 999999
		Dollars	$	0.0 to 99999.9
		Euros	EUR	0.0 to 99999.9
		Yuan	CNY	0 to 999999
		No currency	CHG	0 to 999999
	Carbon dioxide (kg-CO_2)		CO_2	0.0 to 999999
Hour meter		ON-time	h (Hour)	0.0 to 99999.9
		OFF-time	h (Hour)	0.0 to 99999.9
Pulse input			Count	0 to 999999

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

SPECIFICATIONS

■ Main unit

Item	Specifications	
Rated operating voltage	100 to 120/200 to 240V AC	
Rated frequency	50/60Hz common	
Rated power consumption	8VA (240V AC at 25°C)	
Allowable operating voltage range	85 to 132/170 to 264V AC (85% to 110% of rated operating voltage)	
Allowable momentary power-off time	10ms	
Ambient temperature	–10 to +50°C (–25°C to +70°C at storage)	
Ambient humidity	30 to 85%RH (at 20°C non-condensing)	
Breakdown voltage (initial)	Between the isolated circuits: 2000V for 1min	[Use as a Power meter] • Insulated circuit (Between (1)-(2), (2)-(3), (1)-(3)) (1) Power terminal (1 (R), 2 (N, S), 3 (T)) CT input terminal (CT1 (+), CT2 (+), CT1, 2 (–)) (2) RS485 terminal (+, –) (3) Pulse output terminal (+, –) • Outer edge (case)-all terminals
Insulation resistance (initial)	Between the isolated circuits: 100MΩ or more (measured with 500V DC)	[Use as a Pulse counter] • Insulated circuit (Between (1)-(2), (2)-(3), (1)-(3)) (1) Power terminal (1 (R), 2 (N)) Pulse input terminal (CT1 (+), 0V) (2) RS485 terminal (+, –) (3) Pulse output terminal (+, –) • Outer edge (case)-all terminals
Vibration resistance	10 to 55Hz (1cycle/min) single amplitude: 0.75mm (1h on 3 axes)	
Shock resistance	Min. 294m/s² (5 times on 3 axes)	
Display method	LCD with backlight Upper section: Green, 4-digit, 16-segment, Letter height: 6.5 mm Lower section: Amber, 6-digit, 7-segment, Letter height: 7.5 mm	
Power failure memory method	EEP-ROM (more than 100,000 overwrite)	
Protection	IEC Standard IP66 (only front panel with rubber gasket) Note: Mounted in a row, waterproofing property will be lost.	
Weight	Approx. 140g (Screw terminal type), Approx. 130g (11-pin type)	

■ Power input specifications *Will not operate simultaneously with pulse measurement mode.

Item			Specifications
Phase and wire system			Single-phase two-wire system, Single-phase three-wire system, Three-phase three-wire system
Input voltage	Rating		Single-phase two-wire: 100 to 120/200 to 240V AC (common) Single-phase three-wire: 100 to 120V AC Three-phase three-wire: 200 to 240V AC
	Allowance		85% to 110% of rated input voltage
	Allowable measurement voltage		Single-phase two-wire: 85 to 132/170 to 264V AC (common) Single-phase three-wire: 85 to 132V AC Three-phase three-wire: 85 to 264V AC
	VT ratio		1.00 to 99.99 (Set with setting mode) *Voltage transformer (VT) is required when you measure a load with voltage over 200V system. *Secondary current rating of commercial VT is 110V.
Input current	Primary side rating		<In case using dedicated CT> • 5A/50A/100A/250A/400A (Select with setting mode) <In case using CT with secondary rating 5A> • 1 to 4000A (Set with setting mode) *Accuracy coverage: 10 to 100% of rated current of CT
	CT ratio		1 to 4000 (Set with setting mode) *In case measuring CT of secondary rated current 5A.
Special functions	Cut-off current		1.0 to 50.0%F.S.
	Hour meter threshold current		1.0 to 100.0%F.S.
Accuracy (without error in CT and VT)	Indication accuracy	Instantaneous electric power Integrated electric power Voltage Current Electricity charge Calculated CO_2 value	±2.5% F.S. ±1 digit (at 20°C, rated input, rated frequency, power factor 1) *Accuracy coverage: 10 to 100% of rated current of CT
		Hour meter	±0.01%+1 digit (at 20°C) (In case power on start or current energizing, ±0.01%+1s+1 digit)
	Temperature characteristics		±1.5% F.S./10°C+1 digit (Range of –10 to 50°C based on 20°C for rated input power factor 1)
	Frequency characteristics		±1.5% F.S.+1 digit (Frequency change ±5% based on rated frequency, for rated input power factor 1)

■ Pulse input specifications *Will not operate simultaneously with electrical power measurement mode.

Item		Specifications
Input mode		Addition (Fixed)
Max. counting speed		2kHz/30Hz (Select with setting mode)
Pulse input		Min. input signal width: 0.25ms (When selected 2kHz)/16.7ms (When selected 30Hz) ON : OFF ratio = 1 : 1
Input signal		Contact/No contact (open collector) • Impedance when shorted: Max. 1kΩ • Residual voltage when shorted: Max. 2V • Impedance when open: Min. 100kΩ
Output mode		HOLD (Over count)
Number of digit		6-digit (0 to 999999) (Selectable with setting mode)
Pre-scale setting	Decimal point	Setting possible up to 3 digits after decimal point (Auto-setting)
	Range	0.001 to 100.000 (Selectable with setting mode)
	Unit	CNT / l / kl / m^3 (Selectable with setting mode) (Count value does not change even if the unit setting is changed during counting.)

■ Pulse output (transistor output) specifications

Item		Specifications
Number of output point		1 point
Insulation method		Optical coupler
Output type		Open collector
Output capacity		100mA 30V DC
Pulse width		Approx. 100ms*
ON state voltage drop		1.5V or less
OFF state leakage current		100μA or less
Pulse output unit	Power measurement	0.001/0.01/0.1/1/10/100kWh/Alarm (Selectable with setting mode)
	Pulse input measurement	HOLD (Over count)

* We recommend the setting of minimum unit for pulse output for measurement shown as below. Output pulse: 4 pulse or less per 1sec.
How to calculate: (Unit for pulse output : PL-P) > (Max. measurement power [kW]) / (3600[s] × 4 [pulse/s])

Notes: 1. Count errors may occur if pulse output unit is set so that 4 or more pulses are output per 1 second.
2. The connected counter or PLC may cause count errors if the OFF time of the pulse output unit is short.

KW4M Eco-POWER METER (DIN□48) (AKW5)

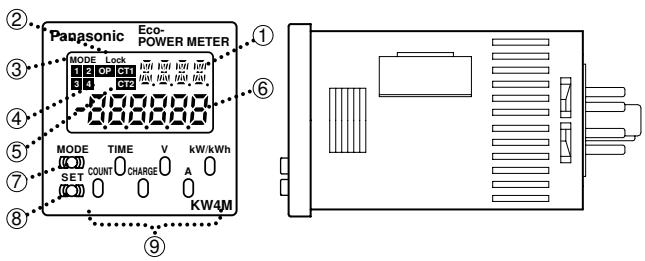
■ Communication specifications

Item		Specifications
Interface		Conforming to RS485
Protocol		MEWTOCOL/MODBUS (RTU) (different model)
Isolation status		Isolated with the internal circuit
Number of connected units		99 (max.)*2, *3
Transmission distance		1200m*1
Transmission speed		38400/19200/9600/4800/2400bps (selectable with setting mode)
Transmission format	Data length	8 bit/7 bit (selectable with setting mode) (MEWTOCOL type)
		8 bit (fixed) (MODBUS type)
	Parity	Not available/Odd number/Even number (selectable with setting mode)
	Stop bit	1 bit (fixed)
Communication method		Half-duplex
Synchronous system		Synchronous communication method
Ending resistance		Approx. 120Ω (built-in)*4

Notes: *1. Please check with the actual devices when some commercial devices with RS485 interface are connected.
The number of connected devices, transmission distance, transmission speed may be different according to using transmission line.
*2. For RS485 converter on the computer side, we recommend SI-35 (from LINE EYE Co., Ltd.).
*3. When using SI-35 or PLC from our company (which can be connected up to 99 units), up to 99 Eco-POWER METER can be connected. (However, 32 units (max.) using connection with C-NET adapter) In case using this system with the other devices, up to 31 Eco-POWER METER can be connected.
*4. Change the sliding switch of main unit as a terminal station. (Factory setting; General side)
* MODBUS Protocol is a communications protocol developed for PLCs by Modicon Inc.

*For RS485 communication and recommended cable, please refer to “PRECAUTIONS IN USING Eco-POWER METER”.

PARTS NAMES



① Mode indicator (16-segment LCD)
② Lock indicator ····· Illuminates when locked.
③ Mode indicator ····· Illuminates when setting a mode.
④ Output indicator ····· Illuminates during pulse output.
⑤ CT direction notification display ····· Illuminates when the CT direction is correct and a current flows that exceeds the set current value.
⑥ Value display (7-segment) ····· Displays the integrated electrical energy, instantaneous electrical power, current, voltage, electricity charge, hour meter time, count, and all settings.
⑦ MODE key ····· Used to move between different modes.
⑧ SET key ····· Used to make settings.
⑨ Select key ····· Changes the item displayed.
Used to move between modes.

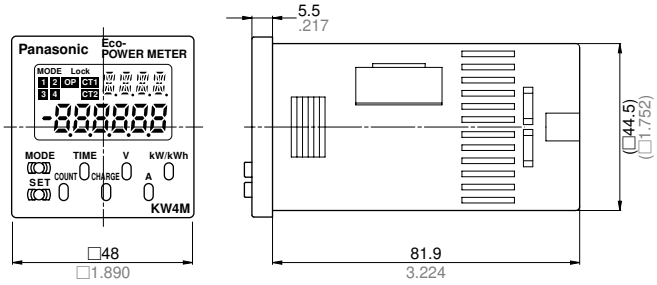
DIMENSIONS (mm inch)

The CAD data of the products with a **CAD Data** mark can be downloaded from: http://panasonic-electric-works.net/ac

CAD Data

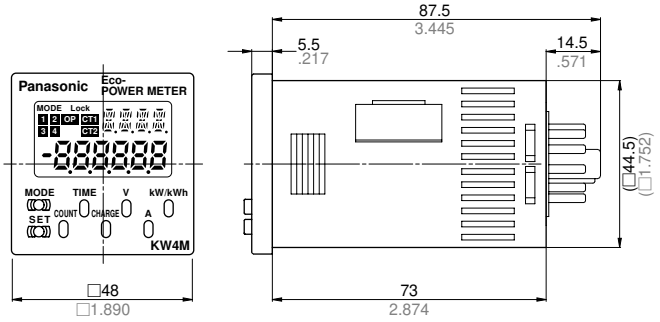
Tolerance: ±1.0 ±.039

Screw terminal type (AKW5111/AKW5112)

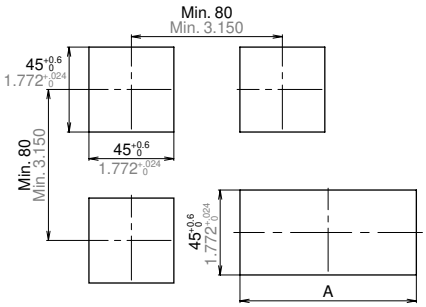


Screw terminal: M3.5 .138

Pin type (AKW5211/AKW5212)



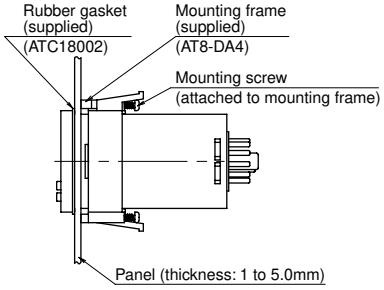
Panel cut-out dimensions



Dimension A when 'u' products are mounted in a row:
$A = (48 \times n - 2.5)^{+0.6}_{0}$

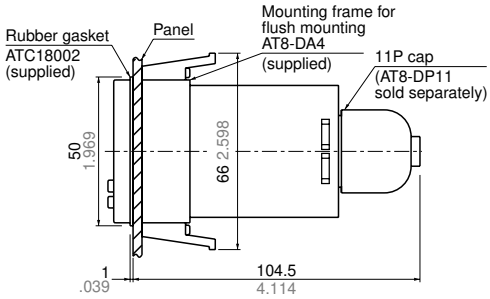
Note: If the products are mounted in a row, they lose their waterproofing properties.

Panel mount diagram

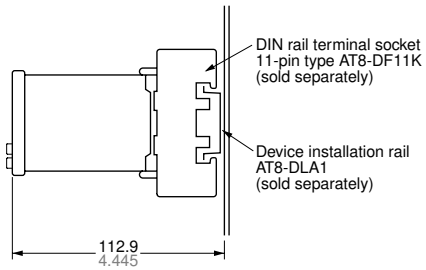


Dimensions for flush mounting (with adapter installed)

Pin type



Dimensions for front panel installations



TERMINAL ARRANGEMENT AND WIRING DIAGRAMS

■ Terminal arrangement

No.	Terminal type	
	Pin type	Screw terminal type
1	1, R, R	RS485 −
2	2, N, S	CT1 (k)/IN
3	3, T, T	CT1 (l), CT2 (l)
4	RS485 +	CT2 (k)
5	RS485 −	0V
6	Pulse output (+)	Pulse output (+)
7	Pulse output (–)	Pulse output (–)
8	CT1 (k)/IN	1, R, R
9	CT1 (l), CT2 (l)	2, N, S
10	CT2 (k)	3, T, T
11	0V	RS485 +

Notes: 1. Be sure to wire correctly according to the terminal arrangement and wiring diagrams.
2. A DIN rail terminal socket (AT8-DF11K) should be used for 11-pin type Eco-POWER METER.

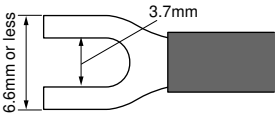
⚠ Be sure to wire correctly according to the wiring diagram. The input (applied) voltage to each pin (terminal) is as follows.

Phase and wire	Main unit type	Pin (Terminal)	Input (Applied) voltage
Single-phase two-wire	Pin type	(1)-(2)	100 to 120/200 to 240VAC (100 to 120/200 to 240V~)
	Screw terminal type	(8)-(9)	
Single-phase three-wire	Pin type	(1)-(2)-(3)	100 to 120VAC (100 to 120V~: 3W)
	Screw terminal type	(8)-(9)-(10)	
Three-phase three-wire	Pin type	(1)-(2)-(3)	200 to 240VAC (200 to 240V 3~)
	Screw terminal type	(8)-(9)-(10)	

Note: Please connect a breaker to the voltage input part for safety reasons and to protect the device.

■ Caution for Wiring

(1) Terminal fastening torque should be approx. 1.0 N·m. In case of using a crimping terminal, with insulating sleeve applicable to M3.5 screw. (Refer to the below.)



* Round terminals cannot be used in KW4M. Use Y shape terminals.

(2) To protect the device, it is necessary to install power switch and circuit breaker in operating power supply circuit. Therefore it is necessary to install them in the circuit near main unit.
(3) We recommend a wire with the cross section of 0.75 to 1.25 mm² for operating power supply line and measured voltage input line.
(4) Use fire resistant electrical wire (UL electrical wire, etc.)

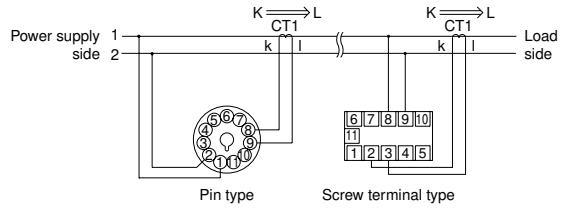
■ Power measurement

• Please connect a breaker to the voltage input part for safety reasons and to protect the device.
• After wiring, turn on the power once again (ON → OFF → ON).

1) When measuring load with 100 to 200VAC system

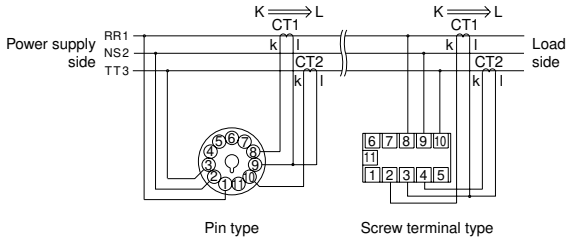
• Single-phase two-wire system

*One CT is required.



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

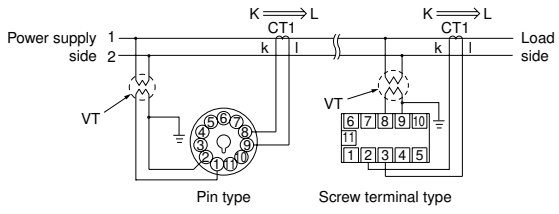
*Two CTs are required.



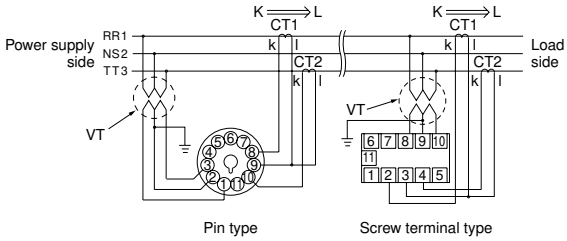
2) When measuring load with 400V or more system

* VT (Voltage transformer) is needed when you measure a load with voltage over 240VAC.
Use commercial VT, those secondary rating is 110V.

• Single-phase two-wire system



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



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