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Tel: +86-755-8981 8866 Fax: +86-755-8427 6832

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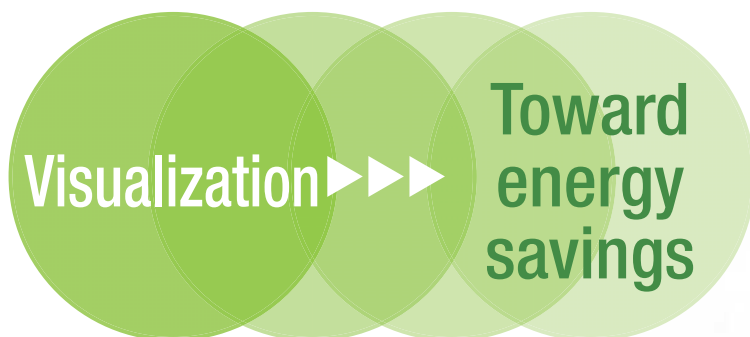
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



KW8M

Eco-POWER METER

1A/5A CT Input type



Makes us more ecological!

Direct input of secondary side 1A/5A CT

Direct input from "secondary side 1A/5A" type domestic and overseas CTs. Dedicated CTs are no longer needed, which lowers the cost of implementation.

High current circuit measurement

Even for high currents that exceed 400 A on the primary side, a wide range of currents up to 4,000 A can be measured using a CT with secondary side current 1A/5A.

400 V and Three-phase four-wire system

With 400 VAC Transformer-less input possible, it is compatible with three-phase, four-wire systems. Direct connection is possible to the dynamic power systems of large-scale factories and buildings.

Pulse measurement and Networking

Carried on from the standard KW8M specifications, features such as simultaneous pulse measurement, networking and the notification function are provided.



KW8M Eco- POWER METER
(1A/5A CT Input type)
AKW8115
Available from: May 2010



KW8M Eco-POWER METER

1A/5A CT Input type

Main unit

Phase and wire system	Operating power supply	Measured voltage input	Measured current input	Terminal type	Model No.
Single-phase two-wire system	100 to 240 V AC, 50/60 Hz	• 400 V AC • 100/200 V AC	Max. 4,000 A (Secondary side of CT: 1A or 5A)	Screw terminal (M3 "+" screw)	AKW8115
Single-phase three-wire system					
Three-phase three-wire system					
Three-phase four-wire system					

Options

Product name	Model No.
Terminal cover	AKT8801
Mounting frame	AKW8822

Measurement items

Item	Unit	Data range (Display range)
Integrated electric power	Active power	kWh 0.00 to 9999999.9
	Reactive power	kvarh 0.00 to 9999999.9
	Apparent power	kVAh 0.00 to 9999999.9
Instantaneous electric power	Active power	kW 0.00 to 999999.99
	Reactive power	kvar -99999.99 to 0.00 to 999999.99
	Apparent power	kVA 0.00 to 999999.99
Current	A	0.0 to 6000
Voltage	V	0.0 to 9999
Electricity charge*1		0.00 to 99999999
Power factor		0.00 to 1.00 (Distinguishes if leading-phase (LEAD) or lagging-phase (LAG).) (Within range of phase angle $\theta = -90$ to 0 to $+90^\circ$)
Frequency	Hz	47.5 to 63.0
Hour meter	ON time	h 0.0 to 99999.9
	OFF time	
Pulse counter		0 to 999999999 (at prescale setting: 1.000)*2

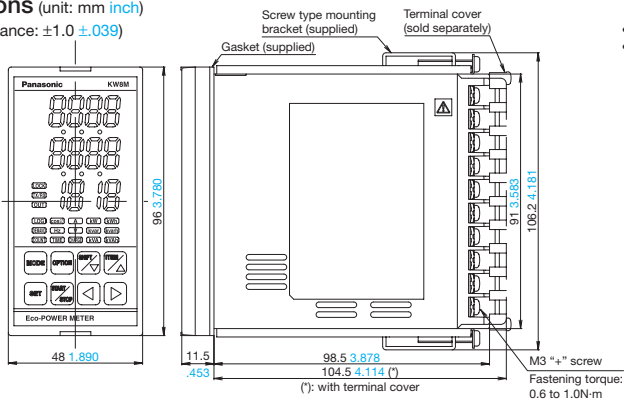
*1 Eco-POWER METER is designed chiefly for managing energy saving. It is not intended to be used for billing. Also, this instrument has not been certified by an institution designated under the measurement law; therefore, it cannot be used to provide proof of electric power usage.
*2 The number of display digits of the pulse counter changes in accordance with the pre-scale value that was set (max. 13 digits).

Accuracy (without error in CT and VT)

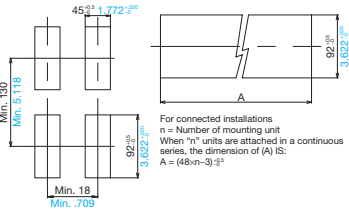
Item	
Electric power (active/apparent)	
Integrated electric power (active/apparent)	Max. $\pm (1.5\% \text{ F.S.} + 1 \text{ digit})$
Voltage	(at 20°C 68°F , rated input, rated frequency, power-factor: 1)
Current	*Accuracy coverage: 10 to 100% of rated current
Electricity charge	
Electric power (Reactive)	Max. $\pm (3.0\% \text{ F.S.} + 1 \text{ digit})$
Integrated electric power (Reactive)	(at 20°C 68°F , rated input, rated frequency, power-factor: 1)

Dimensions (unit: mm inch)

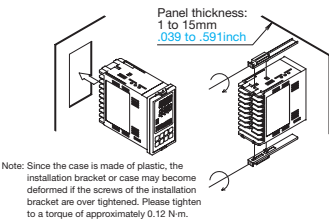
(General tolerance: $\pm 1.0 \pm 0.039$)



Panel cut-out dimensions



Dimensions for panel installations



Wiring diagrams

Be sure to wire according to the terminal arrangement or wiring diagrams.

Terminal arrangement

Function	Terminal No.	Function	Back view
N.C.	①	P1	①
Operating power supply	L ②	P0	②
	N ③	P2	③
	+	P3	④
Pulse input	- ⑤	CT1 (+)	⑤
	+	CT1 (-)	⑥
Pulse output	- ⑦	CT2 (+)	⑦
	+	CT2 (-)	⑧
RS485	- ⑨	CT3 (+)	⑨
	E ⑩	CT3 (-)	⑩

The input voltage to each terminal is as follows.

Terminal	Phase and wire system	Terminal	Input voltage
Operating power supply input	Single-phase two-wire	②—③	100 to 240VAC (100 to 240V-) (Line voltage)
Measured voltage input	Single-phase two-wire	①—②	0 to 440VAC (0 to 440V-) (Line voltage)
	Single-phase three-wire	①—②—③	0 to 220VAC (0 to 220V-: 3W) (Phase voltage)
	Three-phase three-wire	①—②—③	0 to 440VAC (0 to 440V 3-) (Line voltage)
	Three-phase four-wire	①—②—③—④	0 to 254VAC (0 to 254V 3N-) (Phase voltage)

Recommended Current Transformer (CT)

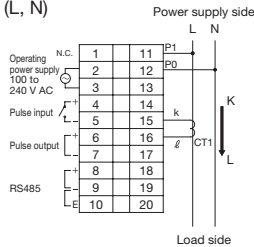
U.R.D. co., ltd. Clamp-on type CTL Series

*Please check the maker's specifications before using.

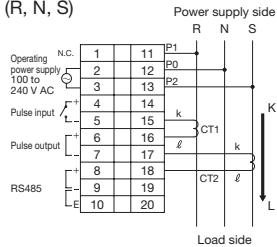
Terminal arrangement and Wiring diagrams

- In order to promote safety and protect the device, please connect a breaker at the voltage input.
- In low-voltage circuits, grounding on the secondary side is not required for the VT (voltage transformer) and CT (current transformer).

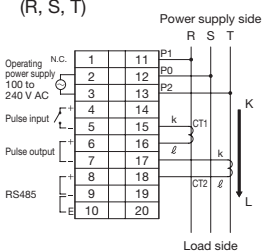
• Single-phase two-wire system (L, N)



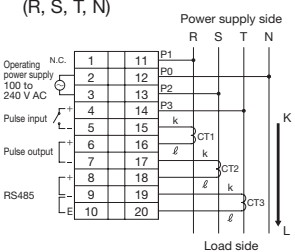
• Single-phase three-wire system (R, N, S)



• Three-phase three-wire system (R, S, T)



• Three-phase four-wire system (R, S, T, N)



Panasonic Electric Works Co., Ltd.

Automation Controls Business Unit

■ Head Office: 1048, Kadoma, Kadoma-shi, Osaka 571-8686, Japan

■ Telephone: +81-6-6908-1050 ■ Facsimile: +81-6-6908-5781

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Panasonic

ideas for life

Lineup with new
energy saving and
environmentally
friendly features!

KW8M

Eco-POWER METER (DIN48×96)



AKW8111/
AKW8111H
(High performance type)

AKW8115
(1A/5A CT input type)

FEATURES

- Direct measurement of 400 V power loads
- Three-phase four-wire system available
- Simultaneous power and pulse measurement
- Supports Networking (RS485 communications port comes standard)

- Only AKW8111H
- Log data can be saved to memory of main unit.
 - Built-in battery (for memory backup)

- Only AKW8115
- CT with secondary side output 1A/5A can be connected directly.
 - High current circuit measurement

Compliance with RoHS Directive

PRODUCT TYPES

Main unit

Phase and wire system	Operating power supply	Measured voltage input	Measured current input	Log function	Model number	Terminal type
Single-phase two-wire system Single-phase three-wire system Three-phase three-wire system Three-phase four-wire system	100 to 240 V AC, 50/60 Hz	100/200/400 V AC (selectable)	Dedicated CT type 5A/50A, 100A, 250A, 400A	Not available	AKW8111	Screw terminal (M3 screw)
				Available	AKW8111H	
			Secondary current of CT Max. 4000A (Secondary current: 1A or 5A)	Not available	AKW8115	

Dedicated current transformer (CT) (Dedicated CT cannot be used with the AKW8115.)

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

For AKW8111 and AKW8111H, 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.)

Options

Product name	Available model			Model number
	AKW8111	AKW8111H	AKW8115	
Terminal cover	Available	Available	Available	AKT8801
Spare battery*1	Not available	Available	Not available	AFC8801
Mounting frame*2	Available	Available	Available	AKW8822

Notes: *1. The spare battery is attached to AKW8111H when shipped.

*2. The mounting bracket is attached to the main unit in KW8M. Use when installation on the board is not possible.

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	

Other tool

Product name	Descriptions	Remark
KW8M Eco-POWER METER User's manual (pdf)	Detailed explanation of Eco-POWER METER usage	You can download from our website (free of charge)*2

Notes: *1. KW Monitor only uses MEWTOCOL. You cannot use Modbus (RTU) type.

*2. Customer registration is required to download data.

KW8M Eco-POWER METER (DIN48×96) (AKW8)

MEASUREMENT ITEMS

Item		Unit	Data range
Integrated electric power	Active power	kWh	0.00 to 9999999.9
	Reactive power	kvarh	0.00 to 9999999.9
	Apparent power	kVAh	0.00 to 9999999.9
Instantaneous electric power	Active power	kW	0.00 to 999999.99
	Reactive power	kvar	−99999.99 to 0.00 to 999999.99
	Apparent power	kVA	0.00 to 999999.99
Current	CT1 phase current	A	0.0 to 6000
	CT2 phase current	A	0.0 to 6000
	CT3 phase current	A	0.0 to 6000
Voltage	Voltage between P1 and P0	V	0.0 to 9999
	Voltage between P2 and P0	V	0.0 to 9999
	Voltage between P3 and P0	V	0.0 to 9999
Electricity charge Note)		—	0.00 to 99999999
Power factor		Display	0.00 to 1.00 (Distiguishes if ahead (LEAD) or behind (LAG).)
		Communication	−1.00 to 0.00 to 1.00 (Within range of phase angle $\theta = -90$ to 0 to $+90^\circ$)
Frequency		Hz	47.5 to 63.0
Hour meter	ON time	Time	0.0 to 99999.9
	OFF time		
Pulse counter		—	0 to 99999999 (at pre-scale: 1.000*)

Note: Eco-POWER METER is designed chiefly for managing energy saving. It is not intended to be used for billing.
*1. Applies to AKW8115 only. The number of pulse counter digits displayed changes according to the set pre-scale value. (13 digits max.)

SPECIFICATIONS

■ Main unit

Item	Specifications	
Rated operating voltage	100 to 240V AC	
Rated frequency	50/60Hz common	
Rated power consumption	8VA (240V AC at 25°C)	
Allowable operating voltage range	85 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	● Outer edge (case) ⇔ All terminals ● Insulated circuit
Insulation resistance (initial)	Between the isolated circuits:100MΩ or more (measured at 500V DC)	• Operating power supply terminals ⇔ Analog input terminals*1 • Operating power supply terminals ⇔ Pulse input terminal • RS485 ⇔ All other terminals • Pulse output terminals ⇔ All other terminals
Vibration resistance	10 to 55Hz (1cycle/min) single amplitude: 0.375mm (1h on 3 axes)	
Shock resistance	Min. 294m/s² (5 times on 3 axes)	
Display method	8-digit, 7-segment LED	
Power failure memory method	EEP-ROM (more than 100,000 overwrite)	
Size	48 × 96 × 98.5 mm	
Weight*2	AKW8111: approx. 235g, AKW8111H: approx. 250g, AKW8115: approx. 265g	

*1. Analog input terminals: No.11 to 20 / Pulse input terminal: No.4 and 5
*2. Without mounting bracket

KW8M Eco-POWER METER (DIN48×96) (AKW8)

Electrical power input specifications

Item		Specifications
Phase and wire system		Single-phase two-wire system, Single-phase three-wire system, Three-phase three-wire system, Three-phase four-wire system (common)
Measured input voltage	Rating	Single-phase two-wire: 0 to 440V AC (Line voltage) Single-phase three-wire: 0 to 220V AC (Phase voltage) Three-phase three-wire: 0 to 440V AC (Line voltage) Three-phase four-wire: 0 to 254V AC (Phase voltage)
	Allowable measurement voltage	Up to 120% of rated input voltage Single-phase two-wire: 0 to 528V AC (Line voltage) Single-phase three-wire: 0 to 264V AC (Phase voltage) Three-phase three-wire: 0 to 528V AC (Line voltage) Three-phase four-wire: 0 to 300V AC (Phase voltage)
	VT ratio	1.00 to 99.99 (Set with setting mode) *Voltage transformer (VT) is required when you measure a load with voltage over 440V AC system. (Secondary side: 110V)
Measured input current	Primary side rating	<div> <div> <In case using dedicated CT> (AKW8111 and AKW8111H) • 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 </div> <div> (AKW8115) • Current set value of primary side CT: 1 to 4000A • 1A/5A (Select with setting mode) *Use a commercial CT with secondary side current 1A or 5A *Accuracy coverage: 10 to 100% of rated current of CT (Without error in input current of commercial CT) </div> </div>
Special functions	Cut-off current	1.0 to 50.0%F.S. (Select with setting mode)
	Current threshold for hour meter	1.0 to 100.0%F.S.
Accuracy (without error in CT and VT)	AKW8111 and AKW8111H (Electric power and Integrated electric power: active/reactive/apparent): ±2.5% F.S. +1digit (at 20°C, rated input, rated frequency, power factor 1) *Accuracy coverage: 10 to 100% of rated current of CT	
	AKW8115 (Electric power and Integrated electric power: active/apparent): Within ±1.5% F.S. +1digit (at 20°C, rated input, rated frequency, power factor 1) *Accuracy coverage: 10 to 100% of rated current	
	AKW8115 (Electric power and Integrated electric power: reactive): Within ±3.0% F.S. +1digit (at 20°C, rated input, rated frequency, power factor 1)	
	Voltage Current Electricity charge	Excluding the above: ±2.5% F.S. +1digit (at 20°C, rated input, rated frequency, power factor 1) *Accuracy coverage: 10 to 100% of rated current of CT
	Hour meter	±0.01%±1digit (at 20°C) (In case power on start or current energizing: ±0.01%+1s±1 digit)
	Temperature characteristics	AKW8111 AKW8111H Within ±1.5% F.S. /10°C +1digit (Range of -10 to 50°C for rated input, power factor 1) AKW8115 Within ±1.0% F.S. /10°C +1digit (Range of -10 to 50°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

Item		Specifications
Input mode		Addition (Fixed)
Max. counting speed		2kHz/30Hz (Select with setting mode)
Pulse input		Min. input signal width: 0.25ms (When 2kHz selected)/16.7ms (When 30Hz selected) 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		8-digit (0 to 99999999)
Pre-scale setting (AKW8115 only)	Decimal point	Setting possible up to 3 digits after decimal point
	Range	0.001 to 100.000 (Select with setting mode)

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	AKW8111 and AKW8111H	0.001/0.01/0.1/1/10/100 kWh/Power alarm (AL-P)/Current (Cnt) (Select with setting mode)
	AKW8115	0.001/0.01/0.1/1/10/100 kWh/Power alarm (AL-P)/Current alarm (AL-C)/Standby power alarm (AL-S)/Counter (Cnt) (Select with setting mode)

* 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.

KW8M Eco-POWER METER (DIN48×96) (AKW8)

Communication specifications

Item		Specifications
Interface		Conforming to RS485
Protocol		MEWTOCOL/MODBUS(RTU) (selectable with setting mode)
Isolation status		Isolated with the internal circuit
Number of connected units		99 (max.)*2 *3
Transmission distance		1200m (max.)*1
Transmission speed (selectable with setting mode)		AKW8111 and AKW8111H: 19200/9600/4800/2400bps AKW8115: 38400/19200/9600/4800/2400bps
Transmission format	Data length	8bit/7bit (selectable with setting mode)*4
	Parity	Not available / Odd number / Even number (selectable with setting mode)
	Stop bit	1bit (fixed)
Communication method		Half-duplex
Synchronous system		Synchronous communication method
Ending resistance		Approx. 120Ω (built-in)

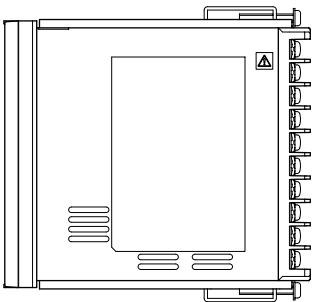
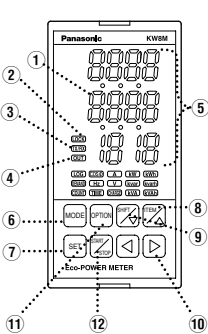
Notes: *1. Please check with the actual devices when some commercial devices with RS485 interface are connected. The number of connected devices, transmission distance, transmission speed may be different according to connected devices or using transmission line.
*2. For RS485 converter on the computer side, we recommend SI-35 and SI-35USB (from LINE EYE Co., Ltd.).
*3. When using SI-35, SI-35USB or our PLC (which can be connected up to 99 units), up to 99 Eco-POWER METER can be connected. (Max. 32 when C-NET adapter from our company is connected.) In case using this system with the other devices, up to 31 Eco-POWER METER can be connected.
*4. With MODBUS(RTU) protocol, it works only with data length 8bit.
* MODBUS Protocol is a communications protocol developed for PLCs by Modicon Inc.

Optional specifications (AKW8111H high performance type only)

Item			Specifications
Log function Memory of main unit	Automatic logging	Save cycle	60 min.
		Save data	Integrated active power, Integrated reactive power, Integrated apparent power
		Save data amount	Max. 2232 records (3 months)
		Display	Integrated electric power by month, Integrated electric power by day, Integrated electric power by hour
	Selected logging* ¹	Save cycle	1, 5, 10, 15, 30, 60 min.
		Save data	Integrated active power, Integrated reactive power, Integrated apparent power, Instantaneous voltage, Instantaneous current, Pulse count value
		Save data amount	Max. 2160 records *1.5 days (when save cycle is 1 min.)
Calendar timer function			Time accuracy monthly accuracy: 240 sec. (at −10°C) monthly accuracy: 70 sec. (at 25°C) monthly accuracy: 240 sec. (at 50°C)
Arbitrary integrated active power			Integrated active power in arbitrary time Display range: 0.00 to 9999999.9 kWh
Content of battery backup			Time measurement and log data retained
Battery life* ² * ³			About 5 years (at ambient temperature 25°C)

Notes: *1. Another software is required to check selectable log data saved in the built-in memory. The recommended software, KW Monitor, is available for download from our website.
*2. When battery power is reduced, "E" is blinking. Please change the battery according to the battery replacement procedure.
*3. Battery life will shorten if this product is used in high temperature environments.

PARTS NAMES



- ① Display indicator Lighting or blinking according to the display
- ② LOCK indicator Lighting while in lock mode
- ③ TX/RX indicator Blinking while communication
- ④ OUT indicator Lighting when pulse output
- ⑤ Display each value Display each measured value, Display each setting value
- ⑥ MODE key
- ⑦ SET key
- ⑧ ITEM / Δ key
- ⑨ SHIFT / ▽ key
- ⑩ Left / Right (◀/▶) keys
- ⑪ OPTION key
- ⑫ START/STOP key

KW8M Eco-POWER METER (DIN48×96) (AKW8)

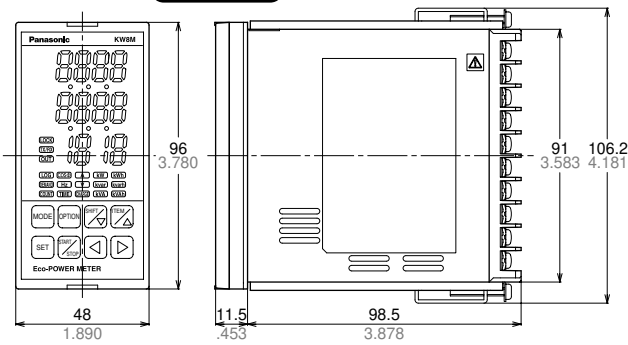
DIMENSIONS (mm inch)

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

Main unit

CAD Data

Tolerance: $\pm 1.0 \pm 0.039$



TERMINAL ARRANGEMENT

No.	Functions	No.	Functions
1	GND	11	P1
2	Operating power supply	12	P0
3		13	P2
4	Pulse input	14	P3
5		15	CT1 (+)
6	Pulse output	16	CT1 (-)
7		17	CT2 (+)
8	RS485	18	CT2 (-)
9		19	CT3 (+)
10		20	CT3 (-)

Back view

①	⑪
②	⑫
③	⑬
④	⑭
⑤	⑮
⑥	⑯
⑦	⑰
⑧	⑱
⑨	⑲
⑩	⑳

⚠ The input voltage to each terminal is as follows.

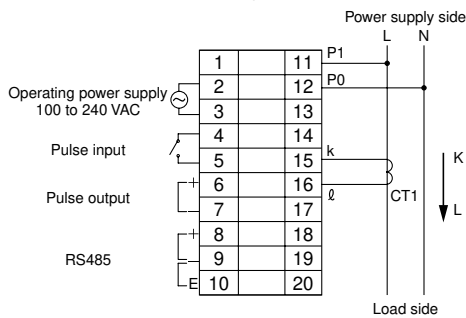
Terminal	Phase and wire system	Terminal	Input voltage
Operating power supply	Single-phase two-wire	②-③	100 to 240VAC (100 to 240V~) (Line voltage)
Measured voltage input	Single-phase two-wire	⑪-⑫	0 to 440VAC (0 to 440V~) (Line voltage)
	Single-phase three-wire	⑪-⑫-⑬	0 to 220VAC (0 to 220V~: 3W) (Phase voltage)
	Three-phase three-wire	⑪-⑫-⑬	0 to 440VAC (0 to 440V 3~) (Line voltage)
	Three-phase four-wire	⑪-⑫-⑬-⑭	0 to 254VAC (0 to 254V 3N~) (Phase voltage)

Wiring diagrams (wiring for electrical power measurement)

When measuring a load of 100 to 200 VAC and 400 VAC system

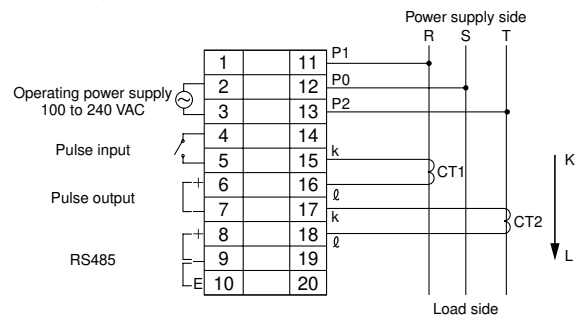
• Single-phase two-wire system

*One current transformer (CT) is required.



• Three-phase three-wire system

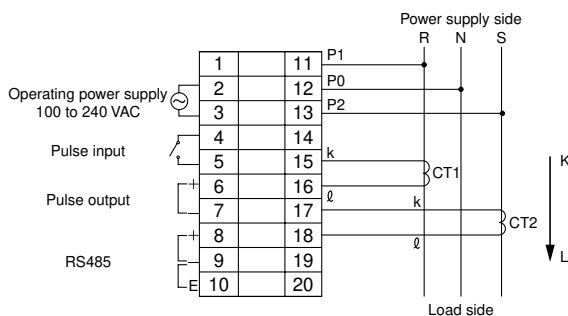
*Two CTs are required.



• Single-phase three-wire system

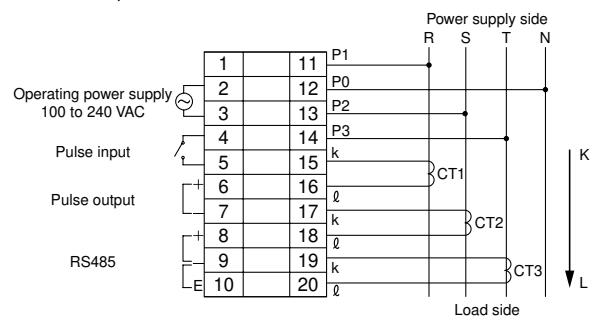
*Two CTs are required.

Wire by diagram of single-phase two-wire system when measure load using R-S with single-phase three-wire system.



• Three-phase four-wire system

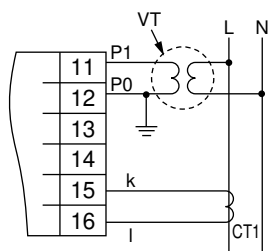
*Three CTs are required.



KW8M Eco-POWER METER (DIN48×96) (AKW8)

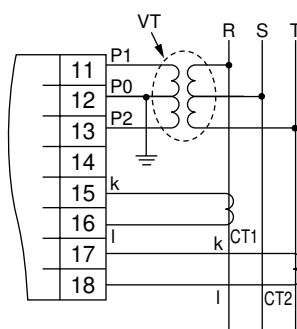
■ VT (Voltage transformer) is needed when you measure a load with voltage over 440V system.
(Use commercial VT, those secondary rating is 110V.)

• Single-phase two-wire system



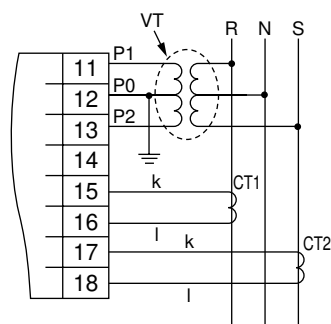
No.13, 14, 17 to 20 are not wired.

• Three-phase three-wire system



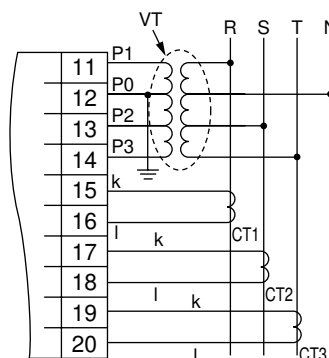
No.14, 19, 20 are not wired.

• Single-phase three-wire system



No.14, 19, 20 are not wired.

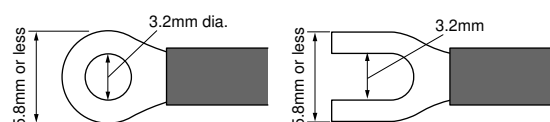
• Three-phase four-wire system



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

■ Caution for Wiring

(1) Terminal fastening torque should be 0.6 to 1.0N·m. In case of using a crimping terminal, use it with insulating sleeve applicable to M3 screw. (Refer to the below.)



(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) The terminal block of KW8M is designed to be wired from left. Insert wires to the terminal from the left and fasten with terminal screws.

(4) 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.

(5) Use fire resistant electrical wire (UL electrical wire, etc.)

KW8M Eco-POWER METER (DIN48×96) (AKW8)

BATTERY FOR MEMORY BACKUP (only for AKW8111H)

Battery is set to the main unit, when shipping. Be sure to set the battery switch ON before starting the unit.
Also, use an insulated tool to set switch.

It can backup the logging data and time measurement.

*When passing long time with battery OFF, initialize the memory by memory initialize mode (MODE 4).

■ Battery life

Battery life is about 5 years (at 25°C).

Battery life will shorten if this product is used in high temperature environments.

When battery power is reduced, "E" is blinking in the bottom line. Please replace the battery in accordance with the remove and mounting procedure on the KW8M User's Manual.

