

OMRON KM1/KE1 [Measurement Master]

Smart Power Monitor/Smart Monitoring Device

KM1-PMU1A-FLK Power Measurement Unit
 KM1-PMU2A-FLK Power Two-System Measurement Unit
 KE1-PGR1C-FLK Power/Earth Leakage Monitoring Unit
 KE1-PVS1C-FLK Power/Voltage-Sag Monitoring Unit

EN INSTRUCTION SHEET

Thank you for purchasing this product. This manual describes the functions, performance, and application methods needed for optimum use of the product. Please observe the following items when using the product.

- This product is designed for use by qualified personnel with a knowledge of electrical systems.
- Before using the product, thoroughly read and understand this manual to ensure correct use.
- Keep this manual in a safe location so that it is available for reference whenever required.

OMRON Corporation

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PRECAUTIONS ON SAFETY

● Meanings of Signal Words

CAUTION Indicates a potentially hazardous situation which, if not avoided, will result in minor or moderate injury, or there may be property damage.

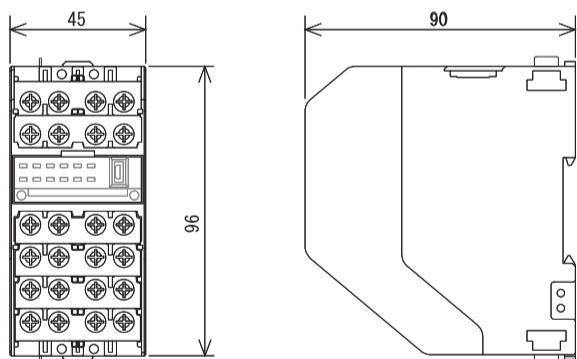
● Signal Words

CAUTION	!
Property damage may occur due to fire. Tighten the terminal screws to the specified torques. Recommended terminal screw tightening torque: 0.69 to 0.88 N·m After tightening the screw, check that the screw is not tilted.	!
Minor or moderate injury or property damage may occur due to explosion. Do not use the product in locations where explosive or flammable gasses may be present.	!
Breakdown or explosion may occasionally occur. Use the power-supply voltage and loads of the specified range.	!
Breakdown or explosion may occasionally occur. Isolation isn't obtained between the voltage input circuit and the CT secondary circuit. When grounding the dedicated CT, Zero-phase CT(ZCT) wrong wiring may cause short circuit between the voltage input circuit and the CT secondary circuit. To avoid failure, be sure not to ground CT. Since this product uses the dedicated CT, even if CT isn't grounded, the normal measurement is available.	!
Electric shock may occasionally occur. Always make sure that the power is turned OFF before connecting the Current Transformer (CT).	!
Electric shock may occasionally occur. Do not touch the terminals while energized.	!
Electric shock may occasionally occur. Use the covered electric wire with basic insulation or more when clamping the special CT. When the special CT is clamped the bus-bar, use insulation tape to cover the bus-bar or to keep the distance (basic insulation or more) between bus-bar and special CT.	!
Doing so may occasionally result in electric shock, minor injury, fire, or malfunction of products. Do not try to disassemble, repair, or modify the product.	!

■ Ratings

Item	Model	KM1-PMU1A -FLK (Power Measurement Unit)	KM1-PMU2A -FLK (Power Two-System Measurement Unit)	KE1-PGR1C-FLK (Power/Earth Leakage Monitoring Unit)	KE1-PVS1C-FLK (Power/ Voltage-Sag Monitoring Unit)
Applicable circuit		1-phase 2-wire, 1-phase 3-wire, 3-phase 3-wire, 3-phase 4-wire	1-phase 2-wire, 1-phase 3-wire, 3-phase 3-wire	1-phase 2-wire, 1-phase 3-wire, 3-phase 3-wire, 3-phase 4-wire	
Power supply	Rated power supply voltage	100 to 240 VAC, 50/60 Hz			
	Allowable power supply voltage range	85% to 110% of rated supply voltage			
	Power supply frequency variation range	45 to 65 Hz			
	Power consumption	10VA or less independently, 14VA or less when being expanded at a maximum			
	Voltage sag monitoring prevention	Only the electrical voltage measurement function backed up at least 1.2 second by the capacitor			
Input	Rated input voltage	100 to 480 VAC [1-phase 2-wire]: Line voltage 100/200 VAC [1-phase 3-wire]: Phase voltage/Line voltage 100 to 480 VAC [3-phase 3-wire]: Line voltage 58 to 277VAC [3-phase 4-wire]: Phase voltage	100 to 480 VAC [1-phase 2-wire]: Line voltage 100/200 VAC [1-phase 3-wire]: Phase voltage/Line voltage 100 to 480 VAC [3-phase 3-wire]: Line voltage	100 to 480 VAC [1-phase 2-wire]: Line voltage 100/200 VAC [1-phase 3-wire]: Phase voltage/Line voltage 100 to 480 VAC [3-phase 3-wire]: Line voltage 58 to 277VAC [3-phase 4-wire]: Phase voltage	
	Rated input current (CT)	5, 50, 100, 200, 400, or 600 A			
	Rated input current (ZCT)				50, 100, 150, 200, 400, 600, or 1000A
	Rated input power	4 kW at 5 ACT, 40 kW at 50 ACT, 80 kW at 100 ACT, 160 kW at 200 ACT, 320 kW at 400 ACT, 480 kW at 600 ACT			
	Rated frequency	50/60 Hz			
	Input frequency variation range	45 to 65 Hz			
	Input earth leakage current				1000mA
	Allowable input voltage	110% of rated input voltage (Continuous)			
	Allowable input current	120% of rated input current (Continuous)			
	Rated input load	Voltage input: 0.5 VA max. (except power supply) Current input: 0.5 VA max. (each input)			
Date/Time	Clock setting	2012 to 2099 with leap year adjustment			
	Clock accuracy	±1.5 minutes/month (at 23°C)			
	Backup retention period	7 days by the electrical double layer capacitor (during power OFF) at 23°C			
	Ambient operating temperature	-10 to 55°C (with no icing or condensation)			
Conservation temperature	-25 to 65°C (with no icing or condensation)				
Ambient operating humidity	Relative humidity 25% to 85%				
Conservation humidity	Relative humidity 25% to 85%				
Altitude	2,000 m max.				
Installation environment	Overvoltage category: II, Degree of contamination: 2, Measurement category: II				
Applicable standards	IEC61010-2-030, EN61326-1				

■ Dimensions (unit: mm)



■ Setting switch

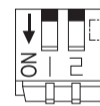
The communication protocol can be set by the DIP switch. Instead of Switch 1, use Switch 2 to change the communication protocol ON and OFF.

Switch 2: OFF CompoWay/F
ON Modbus

* Make sure to set the switch only when the power is OFF.

The settings will be enabled only when the power is turned on and any change made during current application will not be reflected.

To change the settings, turn off the power first and make necessary changes. Then, turn on the power again.



■ USB port

The setting and measurement values can be read by connecting KM1/KE1 with a USB cable. Although the Power is off, the settings can be changed via USB connection. Be sure to turn on the power when using multiple units.

To make measurement values read, make sure to turn on KM1/KE1 first and connect the USB cable. When the power is ON with multiple units connected, the settings of the combined units can be read and written by connecting the USB cable with the Measurement Master.

* Use a mini-USB B cable

* Download the setting tools and ".inf" files necessary for communication from the website: <http://www.ia.omron.com/>

■ Display screen

KM1-PMU1A-FLK	Green	Red	Yellow	Yellow	Yellow	
	PWR	ALM	CT1	CT2	CT3	
	Yellow	Yellow	Yellow	Yellow	Yellow	
	CONN	COMM	OUT1	OUT2	OUT3	
KM1-PMU2A-FLK	Green	Red	Yellow	Yellow	Yellow	Yellow
	PWR	ALM	CT1	CT2	CT3	CT4
	Yellow	Yellow	Yellow	Yellow	Yellow	
	CONN	COMM	OUT1	OUT2	OUT3	
KE1-PGR1C-FLK	Green	Red	Yellow	Yellow	Yellow	Yellow
	PWR	ALM	CT1	CT2	CT3	ZCT
	Yellow	Yellow	Yellow	Yellow		
	CONN	COMM	OUT1	OUT2		
KE1-PVS1C-FLK	Green	Red	Yellow	Yellow	Yellow	
	PWR	ALM	CT1	CT2	CT3	
	Yellow	Yellow	Yellow	Yellow		
	CONN	COMM	OUT1	OUT2		

PWR : Lighting when the power is ON. Blinking at the time of errors.

ALM : Lighting when the alarm is going off.

CT : Corresponding LED lighting when the CT is ON.

OUT : Corresponding LED lighting when the Output is ON.

CONN : Lighting when the multiple units are connected.

COMM : Lighting when the RS-485,USB is in communication mode.

ZCT : LED lighting when the ZCT is ON.

PRECAUTIONS FOR SAFE USE

In order to prevent malfunction, false operation or adverse effect on performance/functions, observe the following matters.

- Do not store, install or use the product in the following environment.
 - Locations subject to vibration or strong shocks.
 - Locations where the Unit is unstable.
 - Locations subject to temperature or humidity beyond the specifications.
 - Locations subject to extreme change in temperature and humidity, resulting in icing or condensation. Locations subject to vibration or strong shocks.
 - Locations subject to direct sunlight.
 - Outdoors or locations exposed to the elements.
 - Locations subject to static electricity or noise.
 - Locations splashed with water and oil, and locations subject to exposure to salt water
 - Locations subject to corrosive gases (in particular, sulfide gas and ammonia gas).
 - Locations subject to dust (including iron dust).
 - Locations subject to an electric field or a magnetic field.
- Install DIN rails using screws without looseness. Furthermore, install the DIN rails and body assuredly. Looseness may cause the DIN rails, product body and wiring to unfasten due to vibration, impact and so on.
- Use 35mm width DIN rails (Omron, Form PFP-50N/100N).
- Wire the product using crimp terminals for M3.5 screws.
- Make sure of proper specification and wiring prior to connection.
- Before operating or performing maintenance of the product, read this Instruction Manual thoroughly to acquire sufficient knowledge of the product. Otherwise electric shock, injury, accident, or malfunction may occur.
- Install and clearly mark a switch or circuit breaker conforming to requirement in IEC60947-1 and IEC60947-3, to enable immediate power OFF by the operator.
- Understand instructions of a manual before setting up equipment.
- When installing the product, allow as much space as possible from the equipments that generate powerful high frequency noises, such as high-frequency welders, high-frequency sewing machines or motors, or devices that generate surges.
- Be sure to touch grounded metal as a measure against electrostatic prior to touching of the product.
- Separate the product wiring from high-voltage or high-current power lines to prevent inductive noise, and do not place the product wiring parallel to or in the same ducts or conduits as power lines. Use separate ducts, separate conduits, or shielded cables.
- Do not install the product close to heat-producing devices, a coil for instance.
- Do not make metals, conductors or chips during installation and machining penetrate into products.
- Do not use thinner or similar merical alcohol.
- Use the specified power supply and wires for the supply of control power or inputs. Product failure, burns, or electric shock may occur.
- Install wall surface using screws without looseness. Looseness may cause the product body and wiring to unfasten due to vibration, impact, and so on.
- When using multiple units, slide the horizontally combining hook unit a clicking sound is heard.
- When mounting the unit on the DIN rail, slide the DIN hook unit a clicking sound is heard.
- Use our dedicated CTs and dedicated CT cable.

Dedicated CT: Split type	KM20-CTF-5A	KM20-CTF-50A
	KM20-CTF-100A	KM20-CTF-200A
	KM20-CTF-400A	KM20-CTF-600A
	Through type KM20-CTB-5A/50A	
Dedicated to grounding wire	K6ER-CN22	OTG-CN77
Dedicated ZCT: Split type	OTG-CN52	OTG-CN36W
	OTG-CN112	OTG-L30
	Through type	
	OTG-L21	OTG-L30
	OTG-L42	OTG-L68
	OTG-L82	OTG-L156
	OTG-LA30W	
- Dedicated CT cable : KM20-CTF-CB3 (3m)
- This Product cannot be used to measure the inverter's secondary side.
- Allow for proper ventilation. Do not block the area around the product, or the ventilation holes on the product.
- Make sure to wire properly after confirming the terminal number. Do not connect anything with terminals that are not used.
- This is a class A product. In residential areas it may cause radio interference, in which case the user may be required to take adequate measures to reduce interference.
- Use dedicated CT/zero-phase CT under 600V voltage circuit.

Precautions for Correct Use

- Set the parameters of the product so that they are suitable for the system being measured.
- Do not pull the unit with a cable.
- As this product is not certified as a specified measuring instrument by measurement law, it cannot be used for proof of electric energy levels.
- Dispose of this product in accordance with local and national disposal regulations.
- Always use varistors to between the line of power supply and the line of voltage input when this product installed under over-voltage category III.

Suitability for Use

The warranty period for an OMRON Product is one year from either the date of purchase or the date on which the OMRON Product is delivered to the specified location. OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of the products in the customer's application or use of the product. Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product. NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCT IS PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. See also product catalog for Warranty and Limitation of Liability.

Contact Information

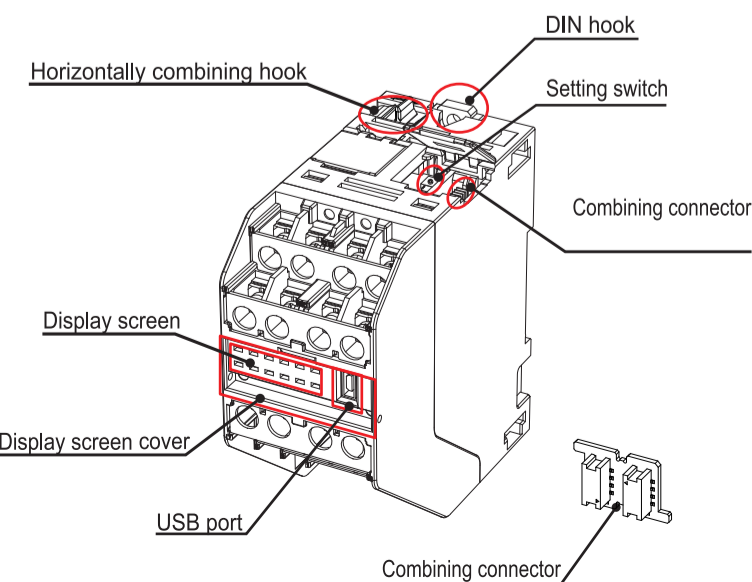
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■ Nomenclature



Basic operating procedure

Default setting

Use the setting switch to set the communication protocol.

- * Standardize the communication protocol of the units.
- * Make sure that there is no duplicated slave ID of the units.

Initialize by the USB communication. (Unit No.:XX)

Set defaults by the unit's USB communication or RS-485 communication.

Settings

- Set the unit number
- Set the combined units
- Set the options (alarm output, log saving settings, etc.)

* Apply supply voltage for RS-485 communication.

* Set the unit number not to duplicate in the system to be connected.

Mounting

Mounting

- * Cut the power when the power supply voltage is on.

Mounting method

- Set the unit on the DIN rail
- Set the unit on the wall surface

* When using multiple units, combine them first and then mount the units on the DIN rail.

* Multiple units cannot be used on the wall surface.

Wiring

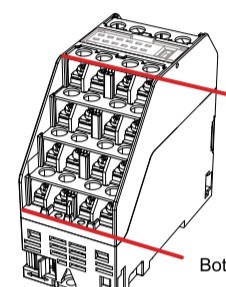
Wiring

- * For wiring, start from the bottom of the unit.

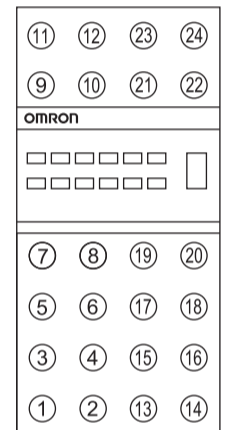
Turn ON the power supply

Turn ON the power supply.

- * Apply power supply voltage between terminals ① and ② of each unit.

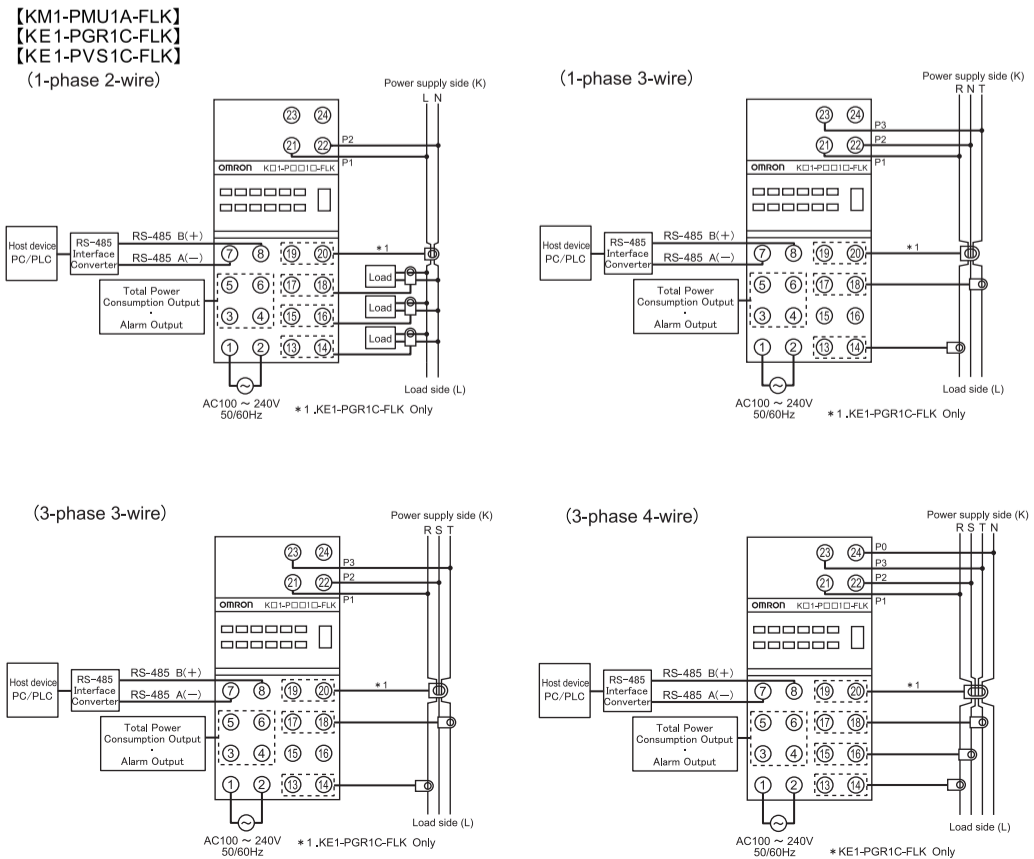


Terminal diagram



Terminal number	KM1-PMU1A-FLK Power Measurement Unit	KM1-PMU2A-FLK Power Two-System Measurement Unit	KE1-PGR1C-FLK Power/Earth Leakage Monitoring Unit	KE1-PVS1C-FLK Power/Voltage-Sag Monitoring Unit
①	Power supply voltage	Power supply voltage	Power supply voltage	Power supply voltage
②	Power supply voltage	Power supply voltage	Power supply voltage	Power supply voltage
③	Transistor output COM	Transistor output COM	Relay output	Semiconductor relay output
④	Transistor output 1	Transistor output 1	Relay output	Semiconductor relay output
⑤	Transistor output 2	Transistor output 2	Transistor output	Transistor output
⑥	Transistor output 3	Transistor output 3	Transistor output COM	Transistor output COM
⑦	RS-485 A(-)	RS-485 A(-)	RS-485 A(-)	RS-485 A(-)
⑧	RS-485 B(+)	RS-485 B(+)	RS-485 B(+)	RS-485 B(+)
⑨	NC	2-P1	NC	NC
⑩	NC	2-P2	NC	NC
⑪	NC	2-P3	NC	NC
⑫	NC	DO NOT USE	NC	NC
⑬	CT-1S	CT-1S	CT-1S	CT-1S
⑭	CT-1L	CT-1L	CT-1L	CT-1L
⑮	CT-2S	CT-2S	CT-2S	CT-2S
⑯	CT-2L	CT-2L	CT-2L	CT-2L
⑰	CT-3S	CT-3S	CT-3S	CT-3S
⑱	CT-3L	CT-3L	CT-3L	CT-3L
⑲	NC	CT-4S	ZCT-K	NC
⑳	NC	CT-4L	ZCT-L	NC
㉑	P1	1-P1	P1	P1
㉒	P2	1-P2	P2	P2
㉓	P3	1-P3	P3	P3
㉔	P0	DO NOT USE	P0	P0

Wiring diagram



Connect

When using multiple units, fix the adjacent units using a horizontally combining hook and connect them using the attached Combining connector.

Slide the horizontally combining hook until a clicking sound is heard.

To separate the units, follow the combining procedure backwards.

- * To remove the Combining connector, use a flathead screwdriver.
- * Measurement master can not be connected together.

Mounting of the unit on the DIN rail

To install the DIN rail, place at least three screws vertically against the ground (within the control panel) After the installation, set the end plates on both sides of the product so that the DIN rail is firmly fixed.

- Recommended DIN rail

Model	Dimension
PFP-100N	1,000mm
PFP-50N	500mm

- End plates (PFP-M)

Vertical : ○ Horizontal : ×

Width : ○ Length : ×

- Mounting of the product

Pull down the DIN hook of bottom side and put the top nail on the DIN rail. Push the unit until the DIN hook can be locked and then lock the DIN hook.

- ① Pull down the DIN hook
- ② Put the top nail on the DIN rail
- ③ Push the unit
- ④ Lock

To remove the product, use a flathead screwdriver by pulling down the DIN hook.

Mounting on the wall surface

- Mounting size
- Mounting on the product

Pull out the two DIN hooks on the back of the product until a clicking sound is heard.

Mount the unit on the wall surface by placing M4 screws in the holes of the DIN hooks.

- * Multiple units cannot be used on the wall surface.

【KM1-PMU2A-FLK】

(1-phase 2-wire)

(1-phase 3-wire)

(3-phase 3-wire)

AC100 ~ 240V 50/60Hz

- Protocol can be chosen between CompoWay/F and Modbus. Number of KM1/KE1 connectable (excluding the host equipment) is 31 in CompoWay/F or 99 in Modbus.
- The maximum transmission distance is 500 m.
- Use shielded twist pair cable of AWG 24 to AWG 14.
- Mount a terminating resistor to the devices including a host device connected to both ends of the transmission line.
- For the Product connected to a terminating resistor, connect a terminating resistor of 120 Ω (1/2 W) between terminal number 7 and 8.
- When connecting multiple wires to the same terminal, screws may not be fully tightened. Therefore, we recommend crimping all wires together to one crimp-type terminal.