

# KE1 [CT Expansion Slave]

Smart Monitoring Device

KE1-CTD8E CT Expansion Unit  
KE1-ZCT8E Zero-phase CT Expansion 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.

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## PRECAUTIONS ON SAFETY

### ● Meanings of Signal Words



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

### ● Signal Words



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.	

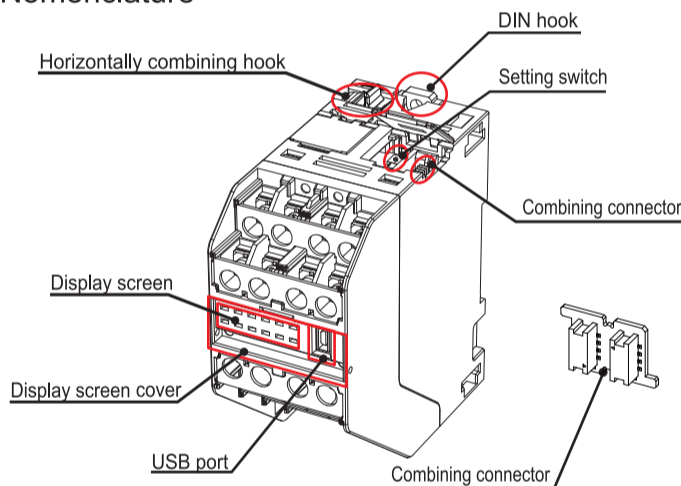
## ■ Ratings

Item	Model	KE1-CTD8E (CT Expansion Unit)	KE1-ZCT8E (Zero-phase CT Expansion Unit)	
Applicable circuit		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		
	Power consumption	10 VA max		
Input	Rated input current (CT)	5, 50, 100, 200, 400, or 600 A		
	Rated input current (ZCT)	50, 100, 200, 400, or 600 A		
	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	
	Input earth leakage current	1000mA		
Allowable input current	120% of rated input current (Continuous)			
Rated input load	Current input: 0.5 VA max, (each input)			
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	EC61010-2-030, EN61326-1			

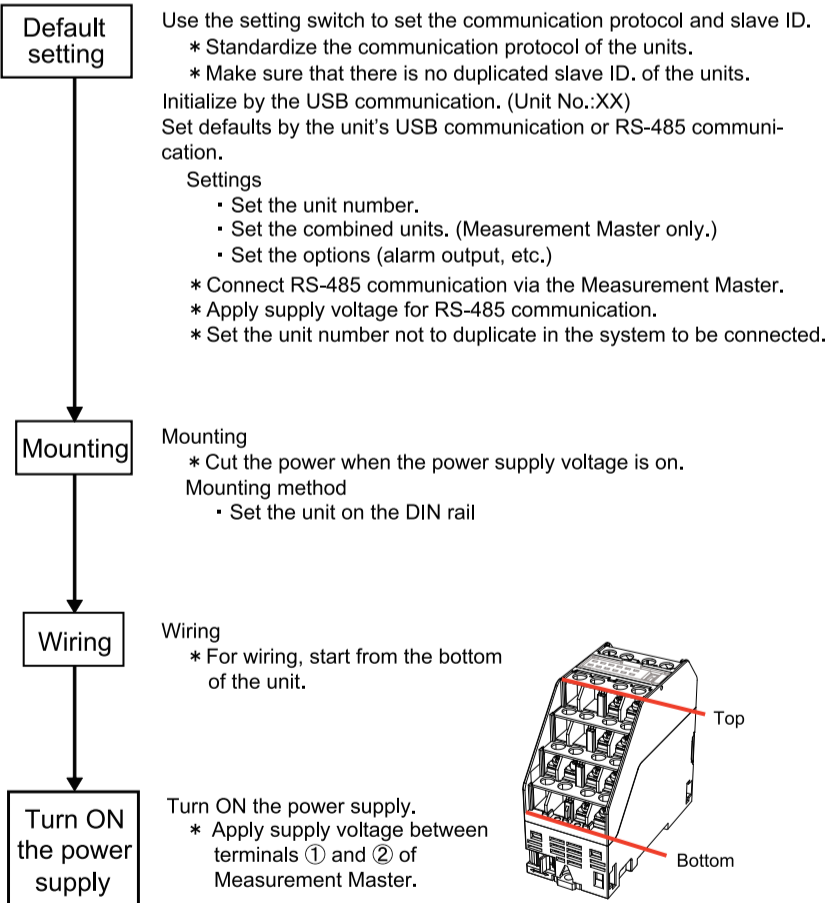
## ■ Features

- [CT Expansion Unit]
  - Incapable of operating independently. Connect with a Measurement Master of KM1/KE1.
  - It is possible to perform multipoint measurement by connecting with the measurement master.
  - A maximum of four units can be connected to the measurement master in conjunction with the Function slave.
  - The CT expansion slave does not have a logging function.
- [KE1-CTE8E]
  - Capable of connecting with the KM1/KE1 Measurement Master.
  - When connecting a single KE1-CTD8E with the KM1/KE1 Measurement Master, it is possible to measure 8 points for 1-phase 2-wire type, 4 points for 1-phase 3-wire type / 3-phase 3-wire type, and 2 points for 3-phase 4-wire type.
  - Current and Active power can be measured.
- [KE1-ZCT8E]
  - Capable of connecting with the KE1-PGR1C-FLK Measurement Master.
  - When connecting a single KE1-CTD8E with the KE1 Measurement Master, it is possible to measure 8 points irrespective of the settings of applicable circuits.
  - Earth leakage can be measured.

## ■ Nomenclature



## ■ Basic operating procedure

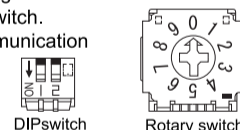


## ■ Setting switch

There are two setting switches: a rotary switch and a DIP switch. Slave ID can be set by a rotary switch. The slave ID is used to identify each unit when multiple units are connected. The slave ID should be set without overlapping among 1 to 4. The communication protocol can be set by the DIP switch. Instead of Switch 1, use Switch 2 to change the communication protocol.

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 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 KE1 first and connect it with 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

KE1-CTD8E	Green	Red	Yellow	Yellow	Yellow	Yellow
PWR	ALM	CT1	CT2	CT3	CT4	
CONN	COMM	CT5	CT6	CT7	CT8	
KE1-ZCT8E	Green	Red	Yellow	Yellow	Yellow	Yellow
PWR	ALM	ZCT1	ZCT2	ZCT3	ZCT4	
CONN	COMM	ZCT5	ZCT6	ZCT7	ZCT8	

PWR : Lighting when the power is ON. Blinking at the time of errors.  
ALM : Lighting when the alarm is going off.  
CONN : Lighting when the multiple units are connected.  
COMM : Lighting when the RS-485, USB is in communication mode.  
CT : Corresponding LED lighting when the CT is ON.  
ZCT : Corresponding 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 a 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 conduction.
  - 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.
  - 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
	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

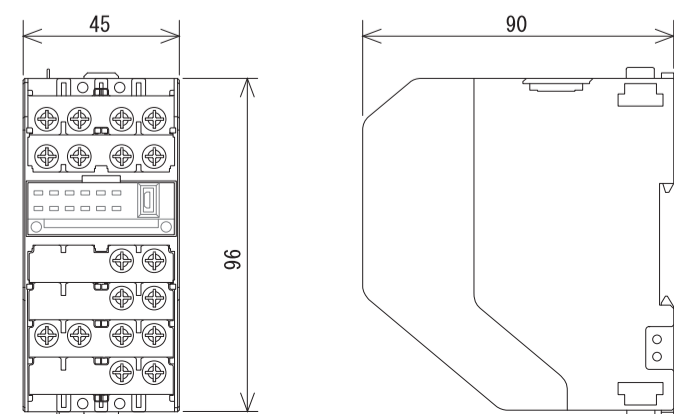
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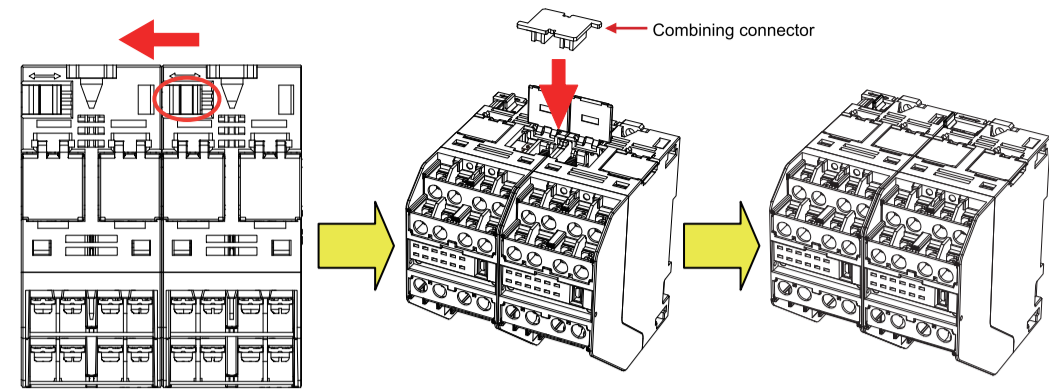
**OMRON CORPORATION**  
3-4-10 Toranomon Minato-ku, Tokyo, 105-0001 Japan  
Phone: 81-3-3436-7260 Fax: 81-3-3436-7261

## ■ Dimensions (unit: mm)



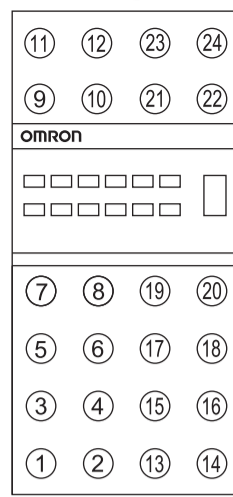
## Connect

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.  
 \* The CT Exslave can be only connected to the measurement master.

## Terminal diagram



Terminal number	KE1-CTD8E CT Expansion Unit	KE1-ZCT8E Zero-phase CT Expansion Unit
1	NC	NC
2	NC	NC
3	Relay Output	Relay Output
4	Relay Output	Relay Output
5	NC	NC
6	NC	NC
7	NC	NC
8	NC	NC
9	CT-7S	ZCT-7K
10	CT-7L	ZCT-7L
11	CT-8S	ZCT-8K
12	CT-8L	ZCT-8L
13	CT-1S	ZCT-1K
14	CT-1L	ZCT-1L
15	CT-2S	ZCT-2K
16	CT-2L	ZCT-2L
17	CT-3S	ZCT-3K
18	CT-3L	ZCT-3L
19	CT-4S	ZCT-4K
20	CT-4L	ZCT-4L
21	CT-5S	ZCT-5K
22	CT-5L	ZCT-5L
23	CT-6S	ZCT-6K
24	CT-6L	ZCT-6L

## Mounting of the unit on the DIN rail

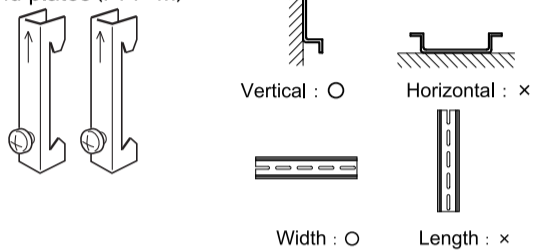
To install the DIN rail, place at least three screws vertically against the ground (within the control panel)

After the installation, set the end plates on both sides of the product so that the DIN rail is firmly fixed.

### Recommended DIN rail

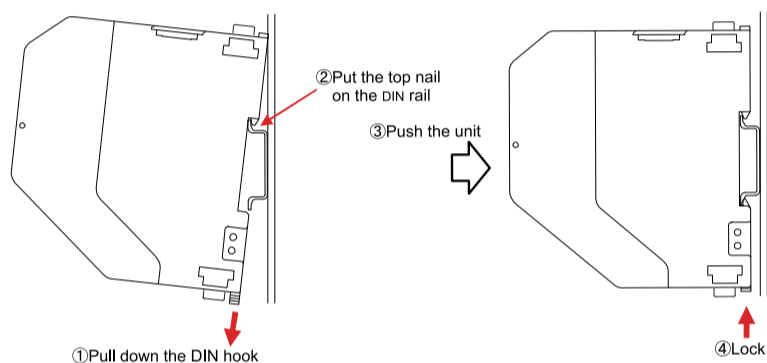
Model	Dimension
PFP-100N	1,000mm
PFP-50N	500mm

### End plates (PFP-M)



### 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.

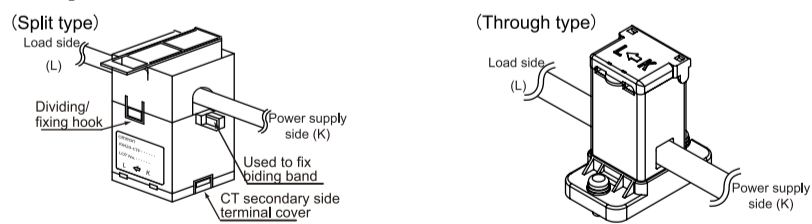


To remove the product, use a flathead screwdriver by pulling down the DIN hook.

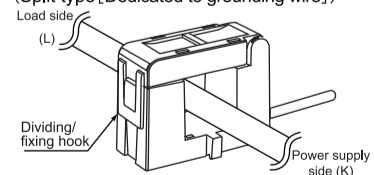
## Dedicated CT / ZCT connection

- One dedicated Current Transformer (CT) is required for 1-phase 2-wire measurement, two dedicated CTs are required for 1-phase 3-wire or 3-phase 3-wire measurement, three dedicated CTs are required for 3-phase 4-wire measurement.
- One dedicated Current Transformer (ZCT) is required for 1-phase 2-wire, 1-phase 3-wire, 3-phase 3-wire or 3-phase 4-wire or measurement.
- Must use the same rating for all dedicated CTs used for one system.
- Ratings of dedicated CT and the dedicated CT setting of KE1 should be the same.
- Dedicated CT is polarized. Be sure to make a correct connection between k of dedicated CT and 1S or 3S of KM1/KE1, and between l of dedicated CT and 1L or 3L of KM1/KE1.
- For position of terminals, refer to the terminal diagram.
- Be sure to check the directions of power supply side (K) and load side (L) before connecting the dedicated CT.
- The wrong connecting direction will result in incorrect measurement.
- Close the dedicated CT secondary side terminal cover.
- Do not ground the dedicated CT.
- Otherwise, a trouble may occur.
- 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.
- Do not clamp directly to lines of 600VAC or more.
- Open dividing/fixing hook and clamp to each phase.
- After clamping, make sure a clicking sound is heard to ensure engagement.
- Fix the dedicated CT and ZCT firmly to a board and so on.

### 【Dedicated CT】

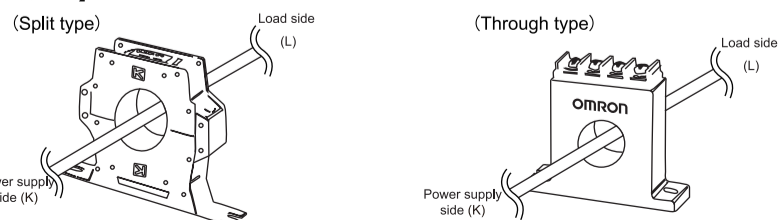


### 【Dedicated ZCT】



\* Be sure to connect CT (Dedicated to grounding wire) with ZCT terminal.

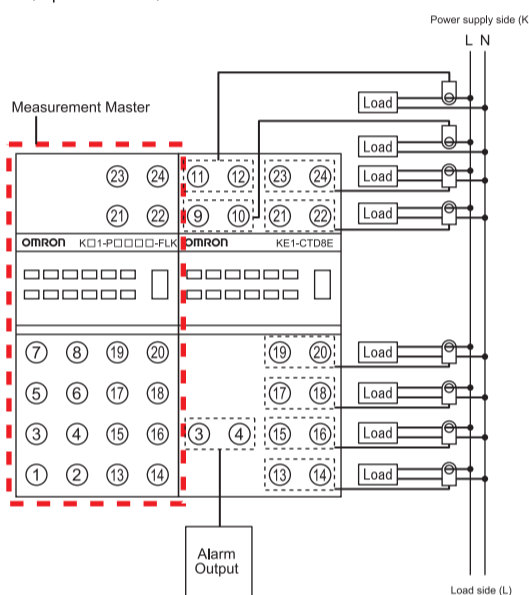
### 【Dedicated ZCT】



## Wiring diagram

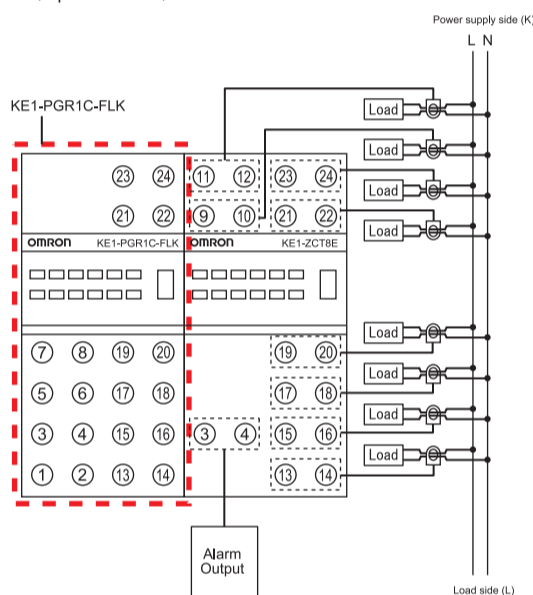
### 【KE1-CTD8E】

(1-phase 2-wire)

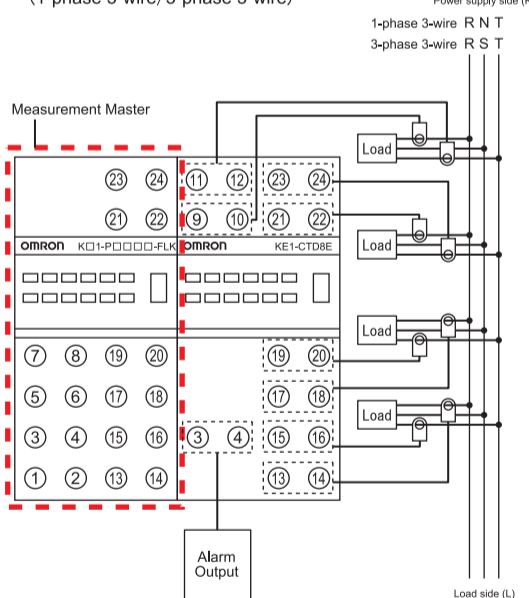


### 【KE1-ZCT8E】

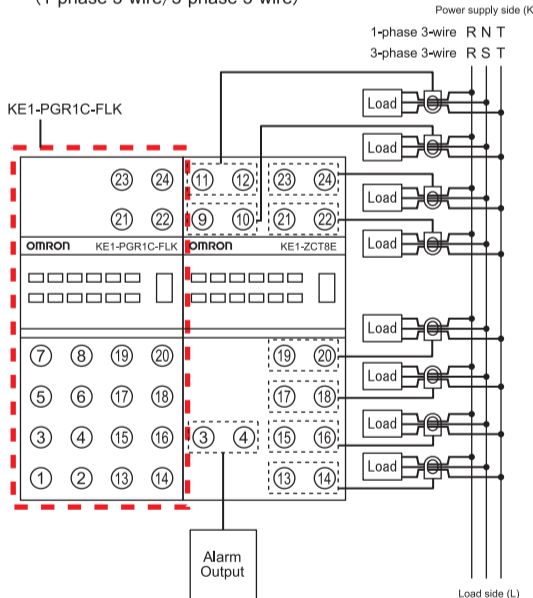
(1-phase 2-wire)



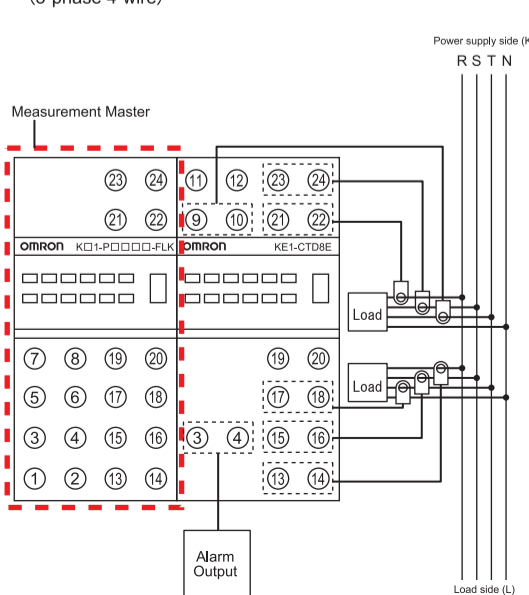
(1-phase 3-wire/3-phase 3-wire)



(1-phase 3-wire/3-phase 3-wire)



(3-phase 4-wire)



(3-phase 4-wire)

