

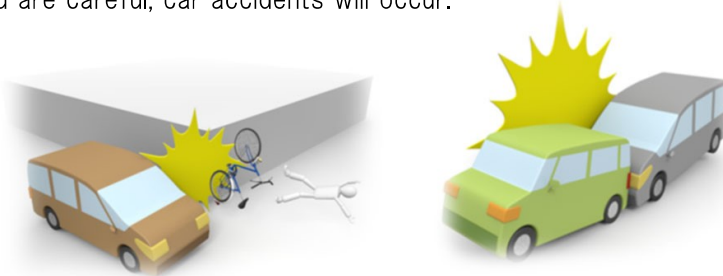
Measuring and Monitoring Relays Application Guide



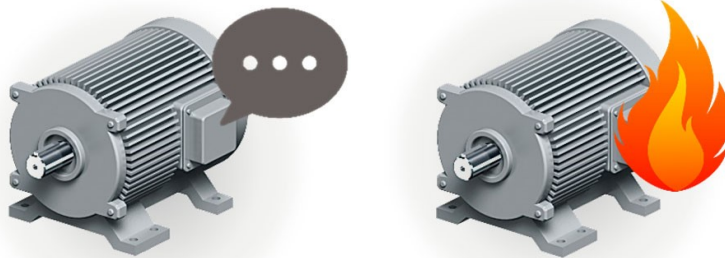
Measuring and Monitoring Relays Functions

Measuring and Monitoring Relays is like a [Automobile Assurance...](#)

► Even if you are careful, car accidents will occur.



Even if the motor malfunctions are also being careful it will occur.



► There are many kinds of car insurance in preparation for a car accident

- For person
- For object
- For your car etc.

There are many kinds of Measuring and Monitoring Relays in preparation for the motor malfunctions

- Over load
- Upper & Lower current / Upper & Lower voltage
- Phase Sequence / Phase Loss
- Current leakage etc.

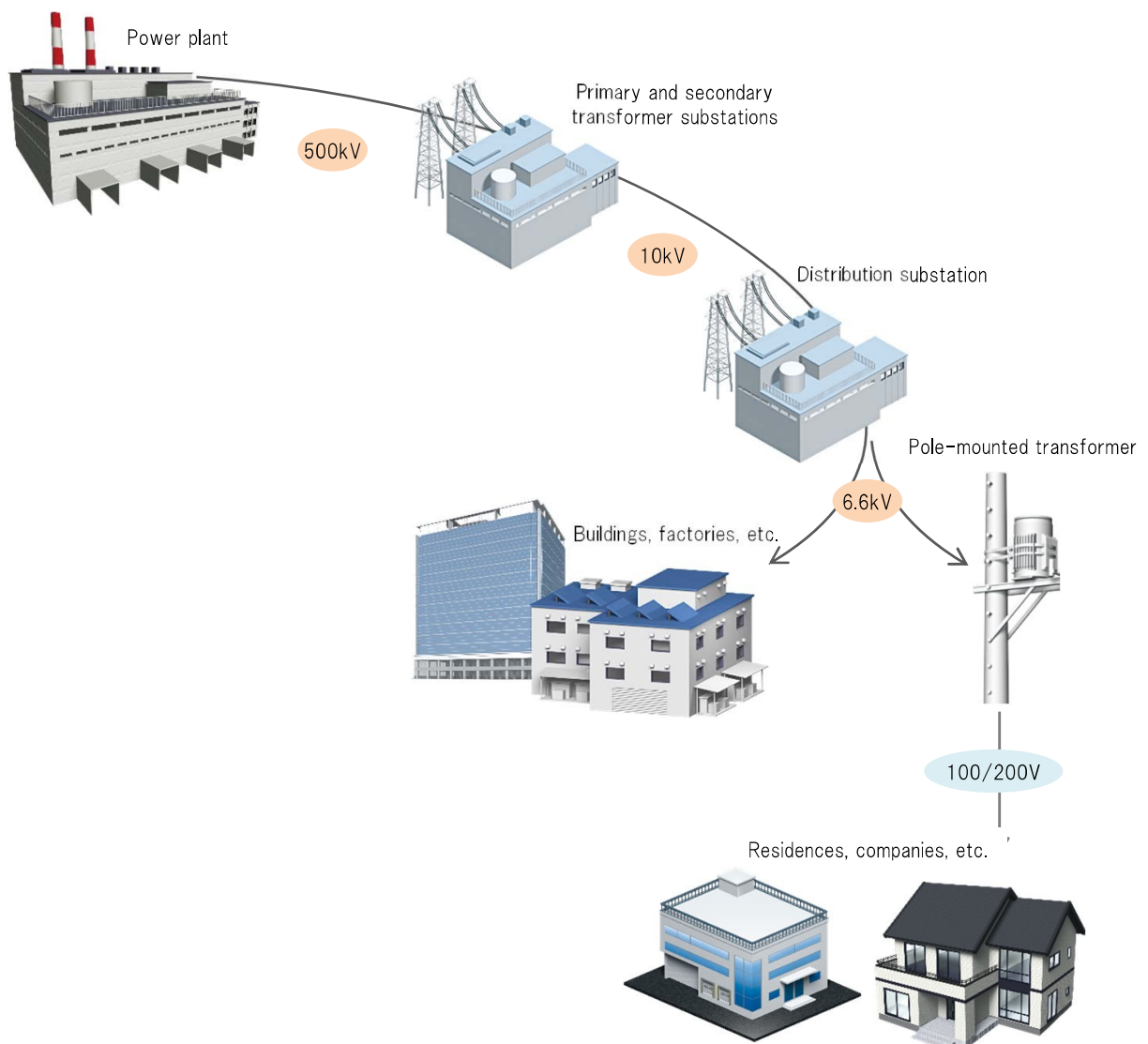
**Customer is inherently happy that Automobile Assurance & Measuring and Monitoring Relays never moves.
However preparation is necessary for an accident.**

Locations for Introducing Measuring and Monitoring Relays and Their Functions

Various machines operate at production sites. Such industrial machines are used as the power source for motors and heaters on production lines, so when there is some kind of trouble with the machines, defects occur in products and sometimes production equipment is damaged. Monitoring the status of the main power circuits for industrial machines and production equipment and protecting devices from low-voltage, over-currents, over-voltages, and other faults for power up to 600 VAC* in this way is called device protection. OMRON calls the products for this type of device protection Measuring and Monitoring Relays.

* The voltage that is specified in Japan.

■ Example from Japan

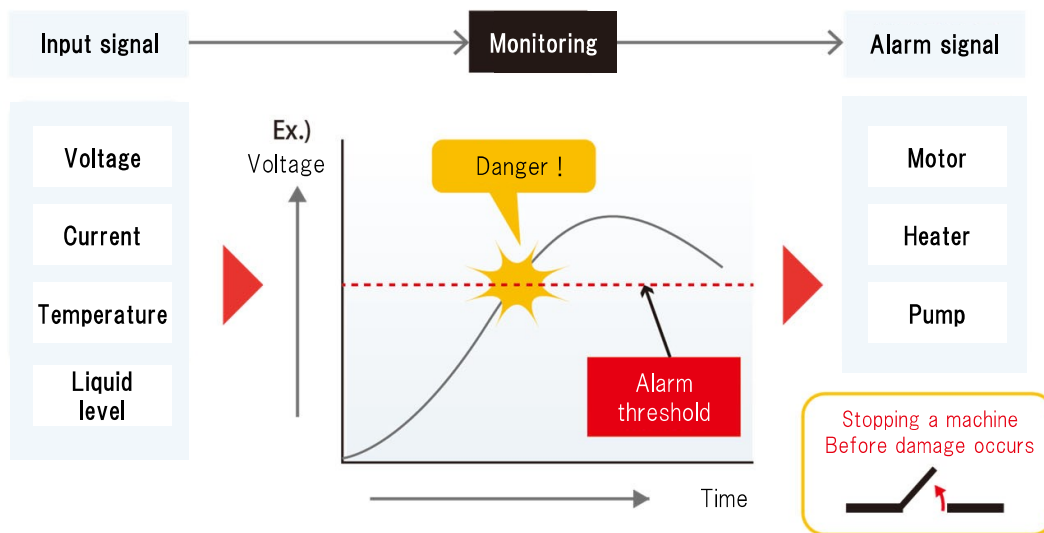


What Is a Measuring and Monitoring Relay?

There are various types of Measuring and Monitoring Relays depending on what they monitor and output alarm signals for. The basic functions are to receive input signals, monitor and determine them, and output an alarm signal if a set value (threshold) is reached. Measuring and Monitoring Relays (alarm relays) protect your important devices and products against unlikely problems (e.g., overvoltage and overcurrent faults).

They monitor AC power supplies (voltage and current), temperatures, and other analog signals and detect abnormalities in machines and equipment by determining values against alarm thresholds. Also, an alarm signal can be output from relay contacts if an input signal goes into an abnormal status to stop the machine or equipment before it is damaged.

■ Operation Example



Input Signal voltage, current, temperature (from a thermocouple or platinum resistance thermometer), or liquid level (from an electrode) can be input.*1

Alarm Output You can select a relay output or transistor output.*2

*1. There are different models for different types of inputs.

*2. A transistor output can be selected only from the K8DT Series.

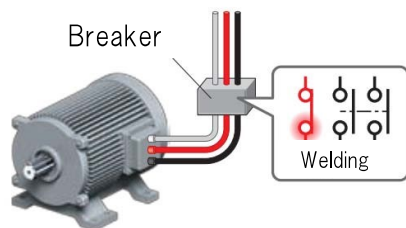
Motor Failure Examples (Phenomena)

There are various failure types that lead to motor failure. By detecting abnormal signals and using them to stop the motor, motor failure and damage to the motor's load can be avoided. Major examples of motor failures and products that can be used to detect motor abnormalities are introduced.

① Phase-loss Errors

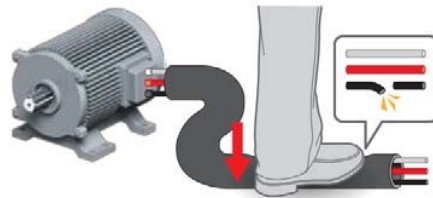
Causes

- ▶ Welded contacts inside a breaker

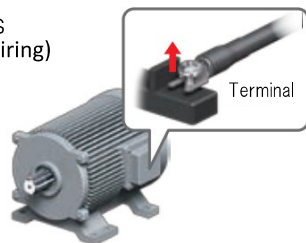


- ▶ Disconnection

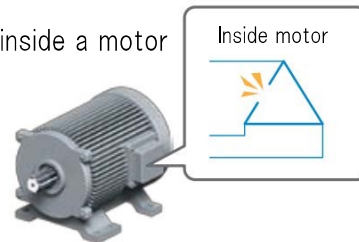
- Wheels rolling over or people stepping on lines
- Cables bent too far, etc.



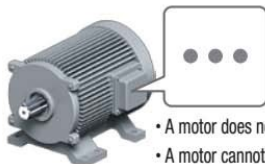
- ▶ Loose screws (contact failure in wiring)



- ▶ Phase loss inside a motor



Failure to start



- A motor does not start.
- A motor cannot operate a load.

Burning due to phase-loss operation



- Forced startup causes a motor to burnout.

Unstable operation



- Stopping of operation when the load is heavy.
- Intermittent starting and stopping, etc.

Phase loss when starting

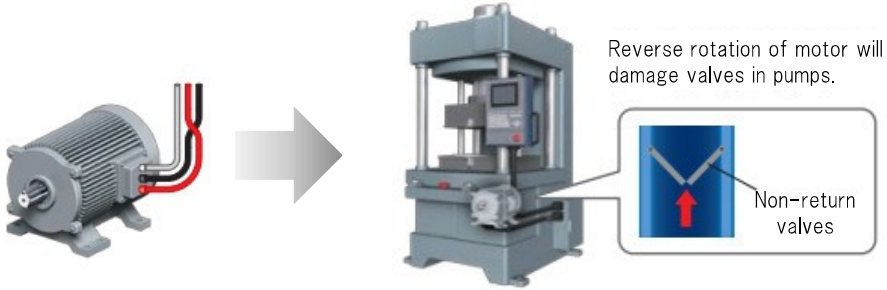
Phase loss during operation

Motor Failure Examples (Phenomena)

② Reversed-phase (Phase-sequence) Errors

Causes

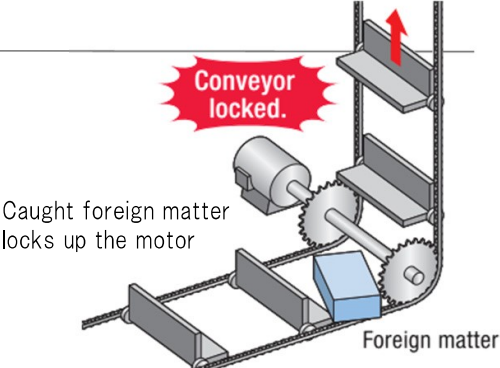
- ▶ Incorrect wiring
- Movable equipment
- Incorrect phase on power line side



③ Overloads

Causes

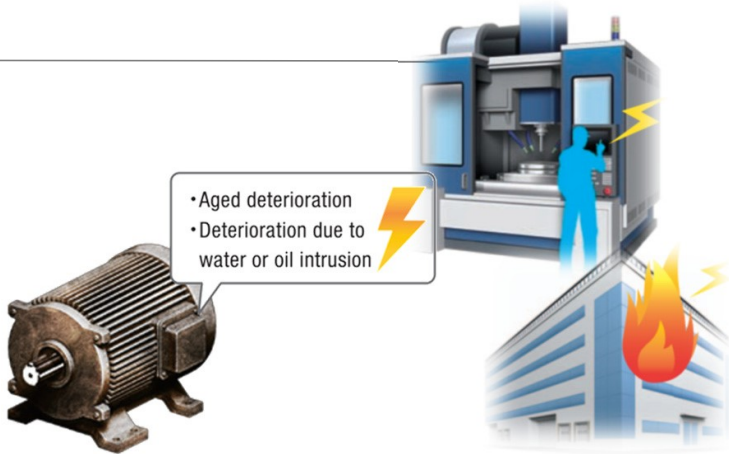
- ▶ Caught foreign matter



④ Current Leakage

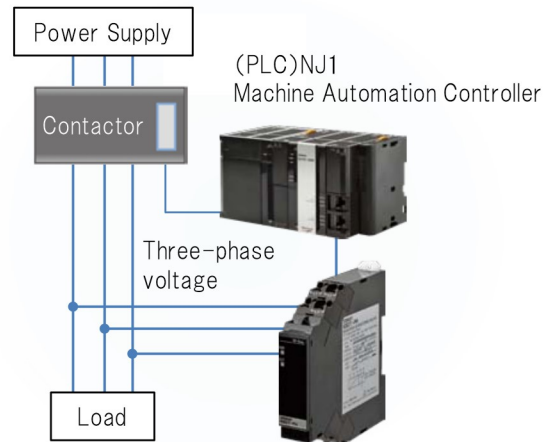
Causes

- ▶ Insulation deterioration

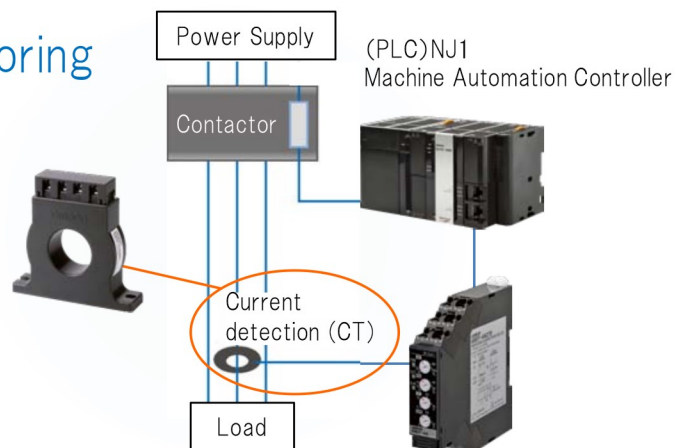


Various types of Measuring and Monitoring Relays

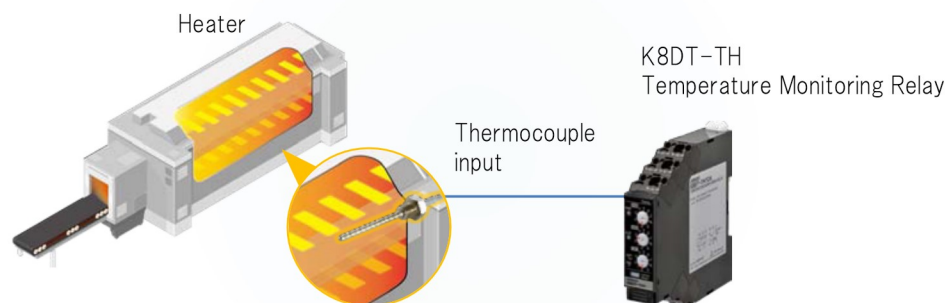
Voltage Monitoring



Current Monitoring

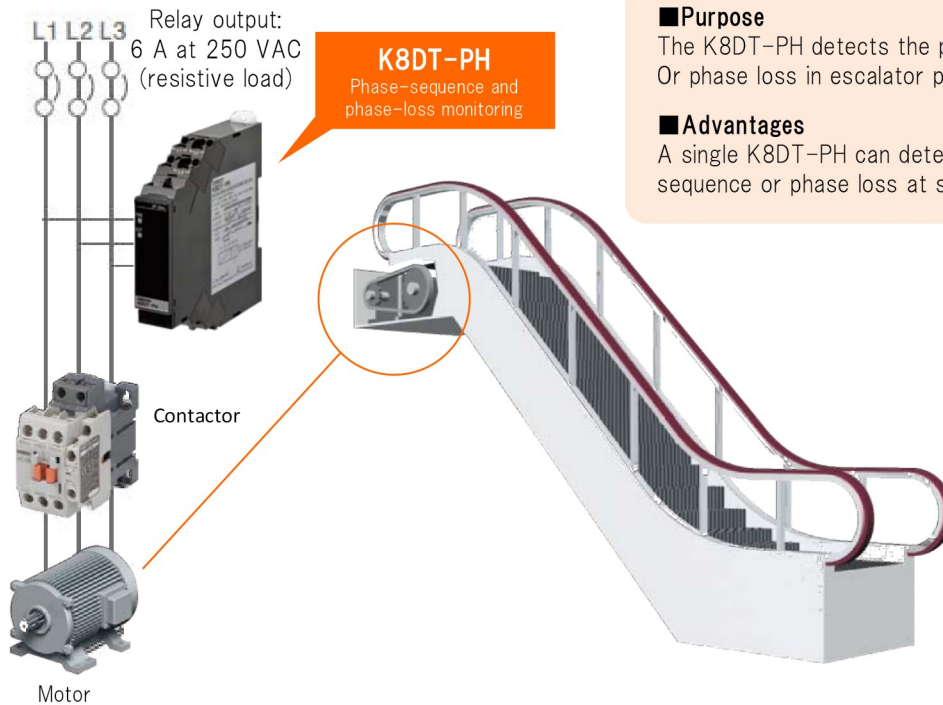


Temperature Monitoring



Application Examples

1. Monitoring Phase Sequence/Phase Loss for Escalators



■ Purpose

The K8DT-PH detects the phase sequence Or phase loss in escalator power supplies.

■ Advantages

A single K8DT-PH can detect the phase sequence or phase loss at startup.



	Models	Function	Sensor
Measuring & Monitoring relays	K8DT-PH(Push-In Plus)	Three-phase Phase Sequence/ Phase Loss	Unnecessity
	K8AK-PH(Screw terminal)		
	K8DS-PH(Screw terminal)		
Motor Relay	SE		SET-3A SET-3B
	K2CM		Integrated CT

K8DT-PH



K8AK-PH



K8DS-PH



SE



SET

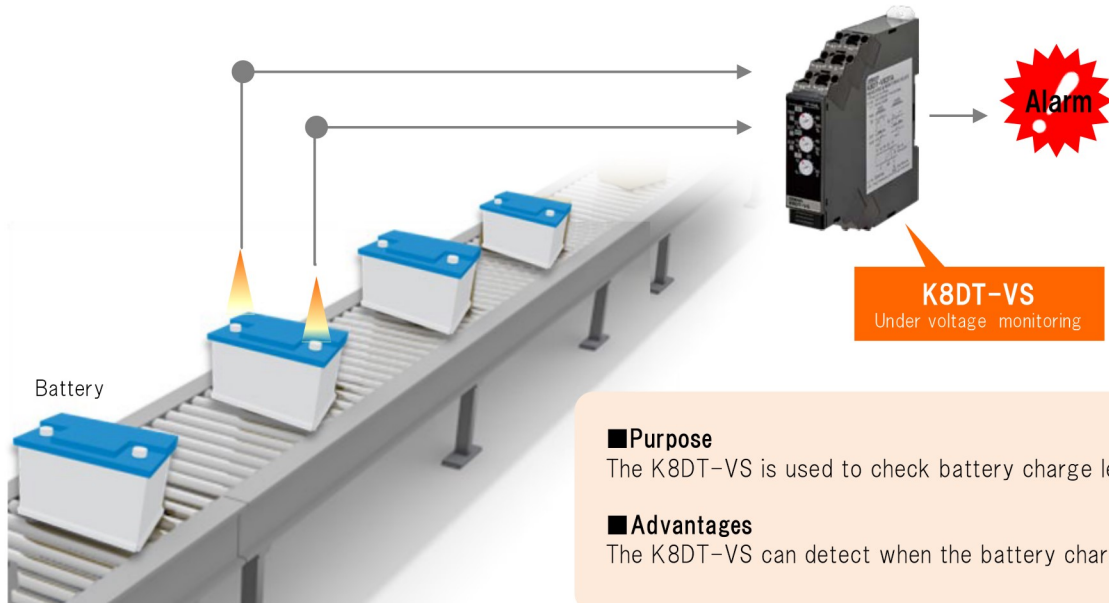


K2CM



Application Examples

2. Battery Voltage Checking



■ Purpose

The K8DT-VS is used to check battery charge levels.

■ Advantages

The K8DT-VS can detect when the battery charge is low.



	Models		Function	Sensor
Measuring & Monitoring relays	K8DT-VS(Push-In Plus)	Value Design for Panel	Single-phase Upper or Lower Voltage	Unnecessity
	K8AK-VS(Screw terminal)			
	K8DT-VW(Push-In Plus)	Value Design for Panel	Single-phase Upper and Lower Voltage	Unnecessity
	K8AK-VW(Screw terminal)			
Voltage detection	SDV-F		Upper or Lower Voltage	Unnecessity
	SDV-D		Upper and Lower Voltage	Unnecessity
	LG2-AB(AC) LG2-DB(DC)		Upper Voltage (Lower voltage is possible)	Unnecessity

K8DT-VS

K8AK-VS

K8DT-VW

K8AK-VW



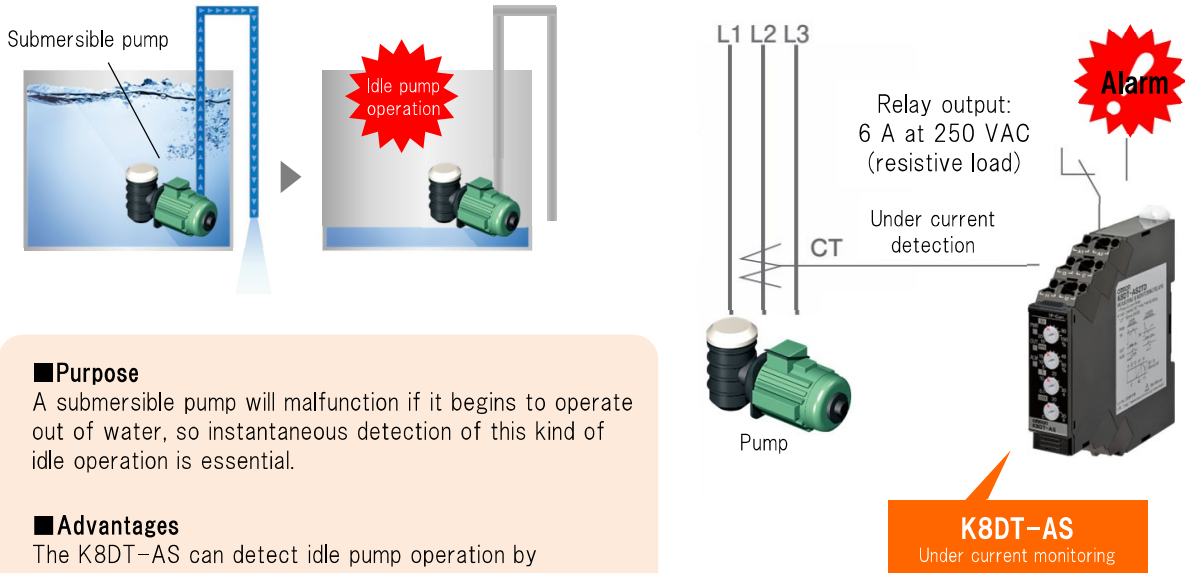
SDV

LG2



Application Examples

3. Protection against Idle Running of a Submersible Pump



■ Purpose

A submersible pump will malfunction if it begins to operate out of water, so instantaneous detection of this kind of idle operation is essential.

■ Advantages

The K8DT-AS can detect idle pump operation by detecting under current levels.



First Choice !

	Models		Function	Sensor
Measuring & Monitoring relays	K8DT-AS(Push-In Plus)	Value Design for Panel	Single-phase Upper or Lower Current	<ul style="list-style-type: none"> ·K8AC-CT200L ·Commercial CT
	K8AK-AS(Screw terminal)			
	K8DT-AW(Push-In Plus)	Value Design for Panel		
	K8AK-AW(Screw terminal)			
Current sensor	SAO(For three phase)		Upper Current	<ul style="list-style-type: none"> SET-3A SET-3B

K8DT-AS



K8AK-AS



K8DT-AW



K8AK-AW



K8AC-CT200L



SAO

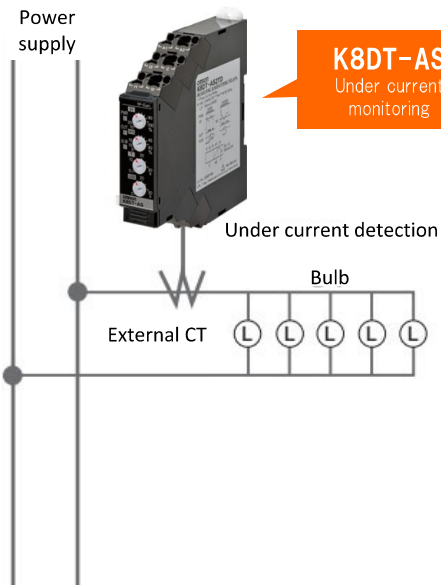


SET



Application Examples

4. Bulb Burnout Detection



■ Purpose

The K8DT-AS is used to detect burned out light bulbs.

■ Advantages

The K8DT-AS can detect burned out light bulbs by detecting under current levels.

The Relay's sensitivity can be adjusted to detect burned out light bulbs even in applications where multiple light bulbs are used.



First Choice!

	Models		Function	Sensor
Measuring & Monitoring relays	K8DT-AS(Push-In Plus)	Value Design for Panel	Single-phase Upper or Lower Current	<ul style="list-style-type: none"> •K8AC-CT200L •Commercial CT
	K8AK-AS(Screw terminal)			
	K8DT-AW(Push-In Plus)	Value Design for Panel	Single-phase Upper or Lower Current	
	K8AK-AW(Screw terminal)			

K8DT-AS



K8AK-AS



K8DT-AW



K8AK-AW

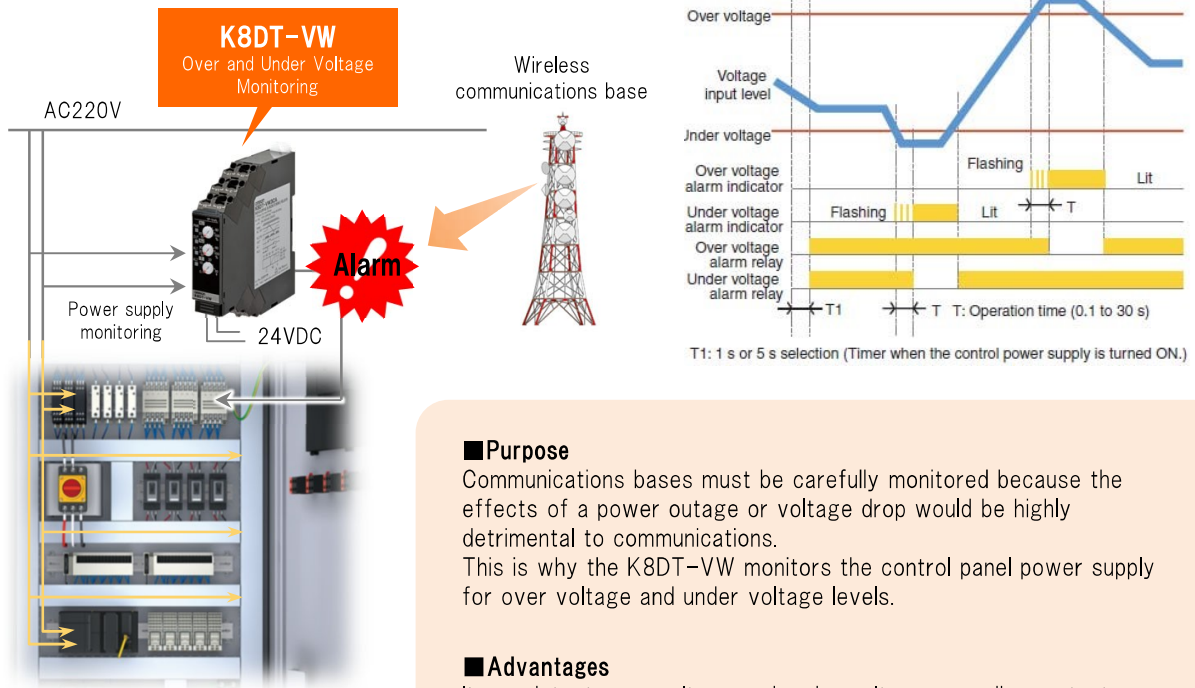


K8AC-CT200L



Application Examples

5. Monitoring the Control Power Supply at Communication Bases



■ Purpose

Communications bases must be carefully monitored because the effects of a power outage or voltage drop would be highly detrimental to communications. This is why the K8DT-VW monitors the control panel power supply for over voltage and under voltage levels.

■ Advantages

It can detect over voltage and under voltage as well as output individual over voltage and under voltage alarms using SPDT relays.



First Choice!

	Models		Function	Sensor
Measuring & Monitoring relays	K8DT-VS(Push-In Plus)	Value Design for Panel	Single-phase Upper or Lower Voltage	Unnecessity
	K8AK-VS(Screw terminal)			
	K8DT-VW(Push-In Plus)	Value Design for Panel	Single-phase Upper and Lower Voltage	Unnecessity
	K8AK-VW(Screw terminal)			

K8DT-VS



K8AK-VS



K8DT-VW



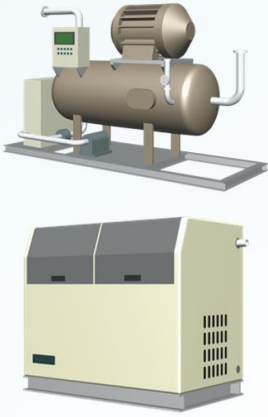
K8AK-VW




Application Examples

6. Monitoring Compressor Power Supplies

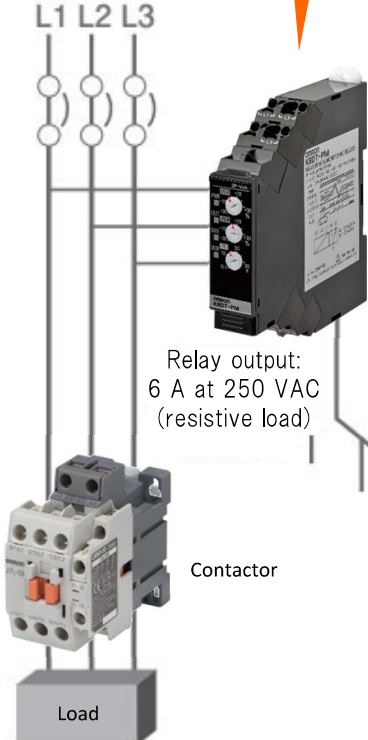
【Fixed type】



【Mobile type】



K8DT-PM
3-Phase voltage, phase-sequence, and phase-loss monitoring



Relay output:
6 A at 250 VAC
(resistive load)

Contactor


Load

■ **Purpose**
Compressors cannot operate correctly under conditions such as under voltage, asymmetry voltage, phase loss, or phase sequence. The K8DT-PM can be used to monitor 3-phase voltage, The phase sequence, and phase loss.

■ **Advantages**
It can detect over voltage and under voltage as well as output individual over voltage and under voltage alarms using SPDT relays.



First Choice!

	Models	Function	Sensor
Measuring & Monitoring relays	K8DT-PM(Push-In Plus)  K8AK-PM(Screw terminal) K8DS-PM(Screw terminal)	Three-phase Phase Sequence/ Phase Loss/Upper and Lower Voltage	Unnecessity

K8DT-PM



K8AK-PM

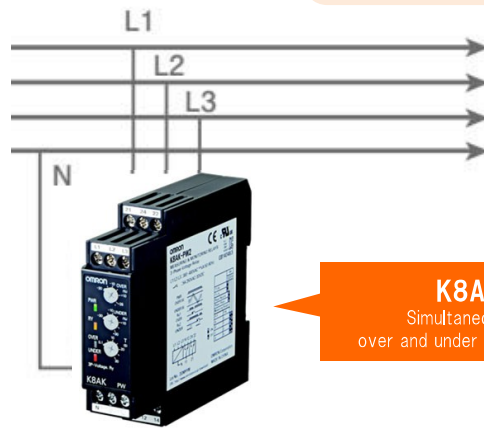


K8DS-PM



Application Examples

7. Monitoring Voltage Generated by Wind-powered Generators



■ Purpose

The K8AK-PW detects over voltage and under voltage in power generated by a wind-powered generator.

■ Advantages

A single K8AK-PW can be used for a 3-phase power supply with 3 or 4 wires. It can be used to individually set and output over voltage and under voltage alarms.

K8AK-PW

Simultaneous 3-phase over and under voltage monitoring



First Choice !

	Models	Function	Sensor
Measuring & Monitoring relays	K8AK-PW(Screw terminal)	Three-phase Upper and Lower Voltage	Unnecessity
Voltage sensor	SDV-D	Upper and Lower Voltage	Unnecessity

K8AK-PW

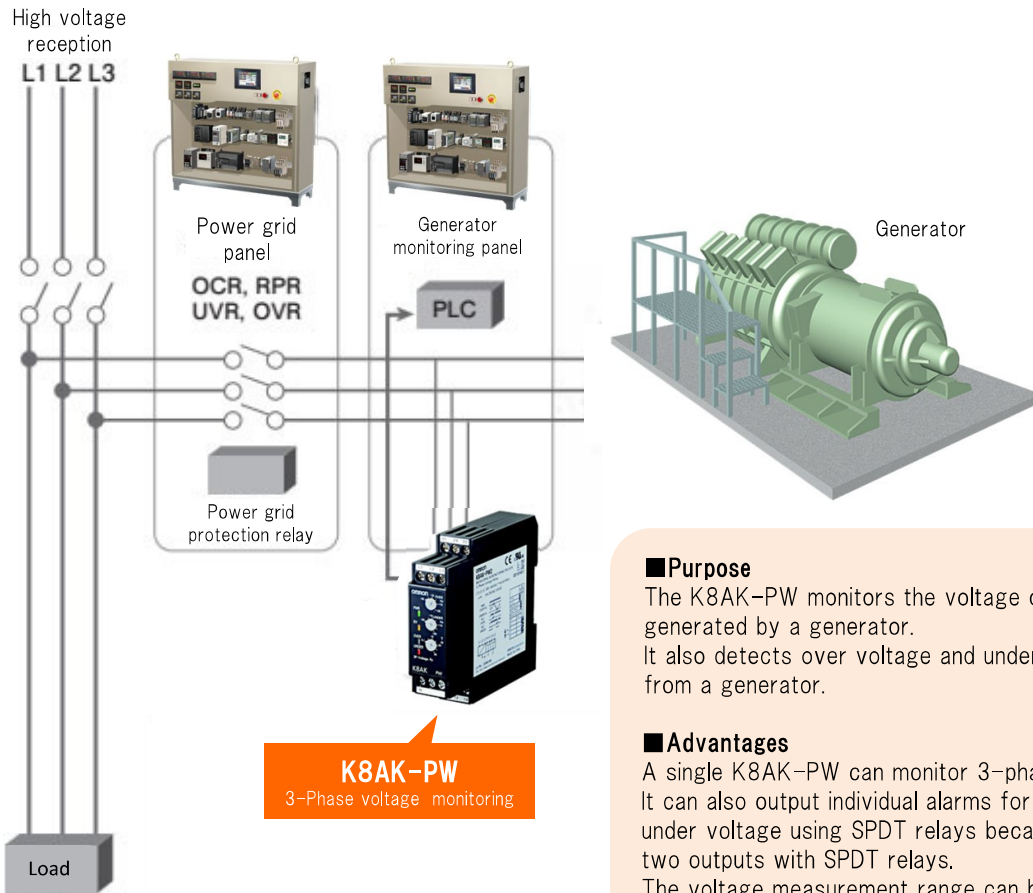


SDV-D



Application Examples

8. Monitoring Generated Voltage



■ Purpose

The K8AK-PW monitors the voltage of power generated by a generator. It also detects over voltage and under voltage in power from a generator.

■ Advantages

A single K8AK-PW can monitor 3-phase voltage. It can also output individual alarms for over voltage and under voltage using SPDT relays because it features two outputs with SPDT relays. The voltage measurement range can be switched from 200 to 480VAC and the K8AB-PW can be switched to monitor phase voltage or line voltage.



First Choice !

	Models	Function	Sensor
Measuring & Monitoring relays	K8AK-PW(Screw terminal)	Three-phase Upper and Lower Voltage	Unnecessity
Voltage sensor	SDV-D	Upper and Lower Voltage	Unnecessity

K8AK-PW



SDV-D

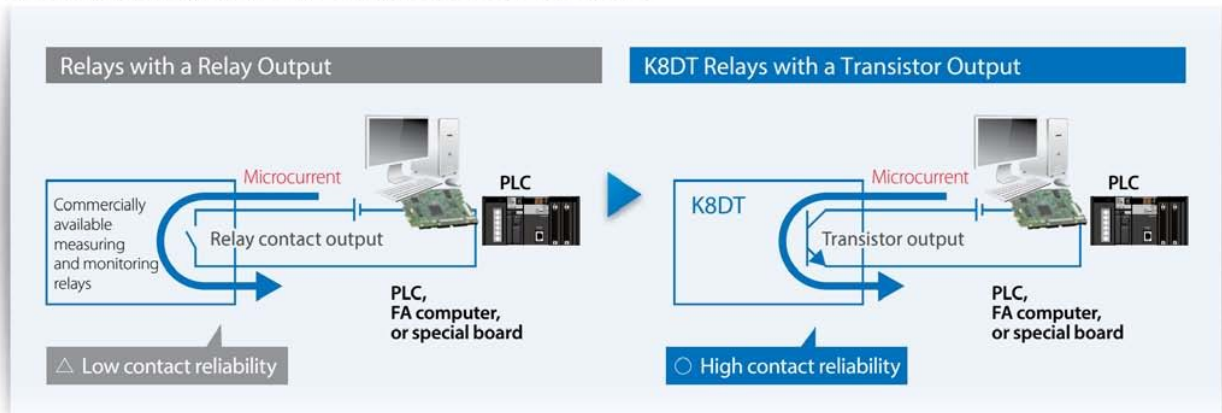




Feature of K8DT

Use transistor outputs to take advantage of the long-term contact reliability.

The operating frequency of Measuring and Monitoring Relays is low, which means the surfaces of relay contacts can deteriorate and reduces reliability. Particularly for microcomputer board and PLC inputs, a microcurrent of 5 mA or less for switching reliability is required, making transistor outputs superior.



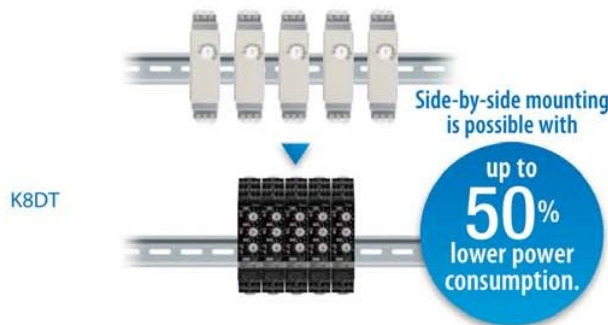
Point Visualization of Fault Status
 Visualization of fault status can be achieved by inputting it to a PLC or other host devices. In turn, visualization of fault status contributes to rapid recovery from equipment faults. The use of transistor outputs enables stable input of fault signals to a PLC or other host devices, helping to create IoT equipment.

Low Power Consumption Design Enables Side-by-side Mounting

The power consumption has been greatly reduced in comparison with commercially available measuring and monitoring relays.

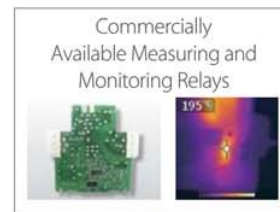
A lower power consumption means that internal heat generation is suppressed, which enables side-by-side mounting.

Commercially Available Measuring and Monitoring Relays



Reliability Even in Poor Noise Environments

There is no heat generated by high-frequency noise, which enhances reliability.



Commercially available measuring and monitoring relays use a capacitor voltage divider, which generates heat due to high-frequency inverter noise and leads to a shorter product life.



The K8DT-series Relays, however, use a switch mode power supply. There is no heat resulting from inverter noise, for safe, reliable application.

<p>Greater Reliability</p> <p>The product lineup includes new models with transistor outputs for greater reliability when inputting signals to PLCs.</p>	<p>Long Service Life</p> <p>Low power consumption and low heat generation design achieve a long service life.</p>	<p>Applicable Standards</p> <p>Certified for main safety standards. Applicable with the voltage specifications of various countries.</p>	<p>Handles Power Supply Voltages Worldwide</p> <table border="1"> <thead> <tr> <th>Area</th> <th>Power supply voltage</th> </tr> </thead> <tbody> <tr> <td>China</td> <td>Three-phase, 380 V</td> </tr> <tr> <td>India</td> <td>Three-phase, 400 or 415 V</td> </tr> <tr> <td>Thailand</td> <td>Three-phase, 380 V</td> </tr> <tr> <td>USA</td> <td>Three-phase, 460 or 480 V</td> </tr> <tr> <td>Europe</td> <td>Three-phase, 380, 400, or 415 V</td> </tr> </tbody> </table>	Area	Power supply voltage	China	Three-phase, 380 V	India	Three-phase, 400 or 415 V	Thailand	Three-phase, 380 V	USA	Three-phase, 460 or 480 V	Europe	Three-phase, 380, 400, or 415 V
Area	Power supply voltage														
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Feature of K8DT

Control Panel Downsizing and Reduced Wiring; Flexible Layout with a 17.5-mm Width

This Is the Shape That Resulted from Efforts to Downsize Panels and Reduce Wiring.

- The slim body is only 17.5 mm wide to enable control panel downsizing.
- To simplify wiring, Push-In Plus terminal blocks are positioned at the front.
- To simplify changing settings, the setting switches were placed on the front.



Setting Switches on the Front Panel



A Slim 17.5 mm

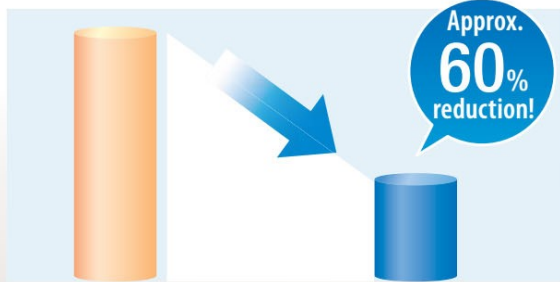
Push-In Plus Technology for Easy Wiring



Just Insert Wires: No Tools Required

Now you can use Push-In Plus technology to reduce the time and work involved in wiring.

Greatly Reduce Wiring Work with Push-In Plus Technology



Conventional screw terminal blocks OMRON Push-In Plus terminal block

*Information for Push-In Plus and screw terminal blocks is based on OMRON's actual measurement value data.

Wiring Possible with Stranded Wires

You can insert wires with pin terminals or ferrules, or you can also insert solid wires or stranded wires.



Selection Guide (K8 series)

	Input	Alarm operation	Function	Width	Terminal block	Output	Model	
Single-phase	Current	Upper or lower limit (switched)		22.5 mm	Screws	One SPDT relay output	K8AK-AS	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-AS	
		Upper and lower limits (redundant operation)		22.5 mm	Screws	Two SPDT relay outputs	K8AK-AW	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-AW	
	Voltage	Upper or lower limit (switched)		22.5 mm	Screws	One SPDT relay output	K8AK-VS	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-VS	
		Upper and lower limits (redundant operation)		22.5 mm	Screws	Two SPDT relay outputs	K8AK-VW	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-VW	
	Three-phase	Voltage	Fixed		22.5 mm	Screws	One DPDT relay output	K8AK-PH
					17.5 mm	Screws	One SPDT relay output	K8DS-PH
			Fixed		17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-PH
					22.5 mm	Screws	Two SPDT relay outputs	K8AK-PM
Upper and lower limits				17.5 mm	Screws	One SPDT relay output	K8DS-PM	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-PM	
Upper limit				22.5 mm	Screws	One SPDT relay output	K8AK-PA	
				17.5 mm	Screws	One SPDT relay output	K8DS-PA	
Upper and lower limits				22.5 mm	Screws	Two SPDT relay outputs	K8AK-PW	
				17.5 mm	Screws	One SPDT relay output	K8DS-PU	
Upper and lower limits				17.5 mm	Screws	One SPDT relay output	K8DS-PZ	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-PZ	
Fixed				22.5 mm	Screws	One SPDT relay output	K8AK-PT	
				22.5 mm	Screws	One SPDT relay output	K8AK-TS	
Temperature monitoring	Thermocouple or platinum resistance thermometer	Upper or lower limit (switched)		22.5 mm	Screws	One SPDT relay output	K8AK-TH	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-TH	
Water level control	Electrode	Water supply or discharge (switched)		22.5 mm	Screws	One SPDT relay output	K8AK-LS	
				17.5 mm	Push-In Plus	One SPDT relay output or one transistor output	K8DT-LS	

Note: Do not use this document to operate the Unit.

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