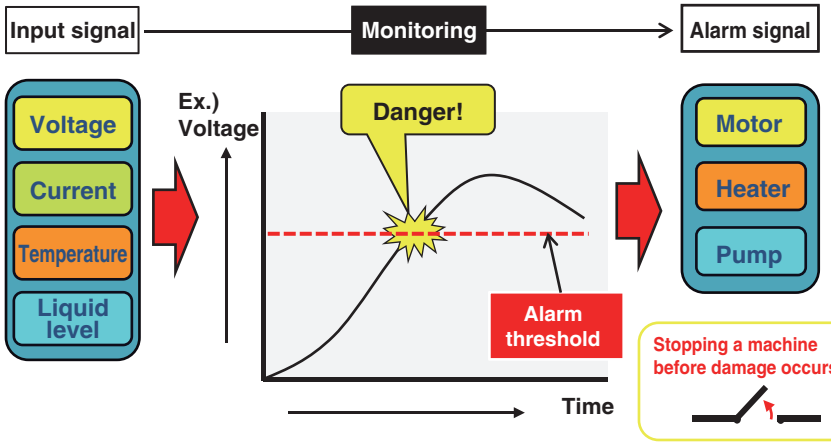
Introduction

What Is a Measuring and Monitoring Relay?

A Measuring and Monitoring Relay is a protective control device. 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: A 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.

Measuring and Monitoring Relays

K8DT Series Slim and Extended Models

K8AK Series Extended Models

K8DS Series Compact and Simple Models

These are the problems that OMRON's K8-series Measuring and Monitoring Relays can solve for you:

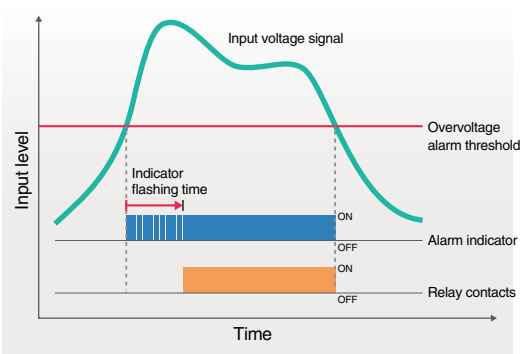
(1) Alarms do not occur before equipment is damaged.
(2) Protecting equipment from poor-quality power supply systems is necessary.
(3) Preventing excessive temperature increases in heaters is necessary.
(4) Control panels for electrode-based water level control must be downsized.
(5) Measuring and Monitoring Relays that conform to international safety standards are necessary.*

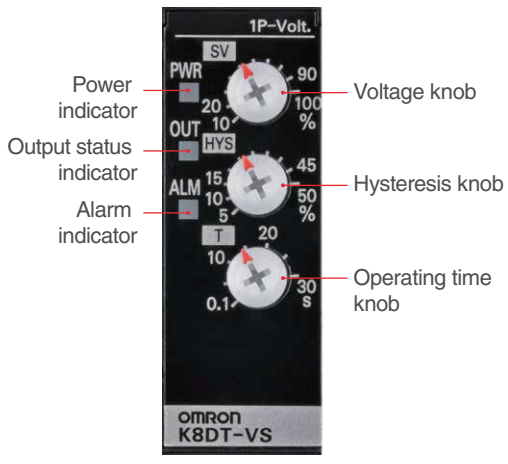
* For information on applicable standards,refer to specific product datasheets.

Description of Operation

Example of a K8DT-VS Relay for Voltage Monitoring

Operation Timing Chart



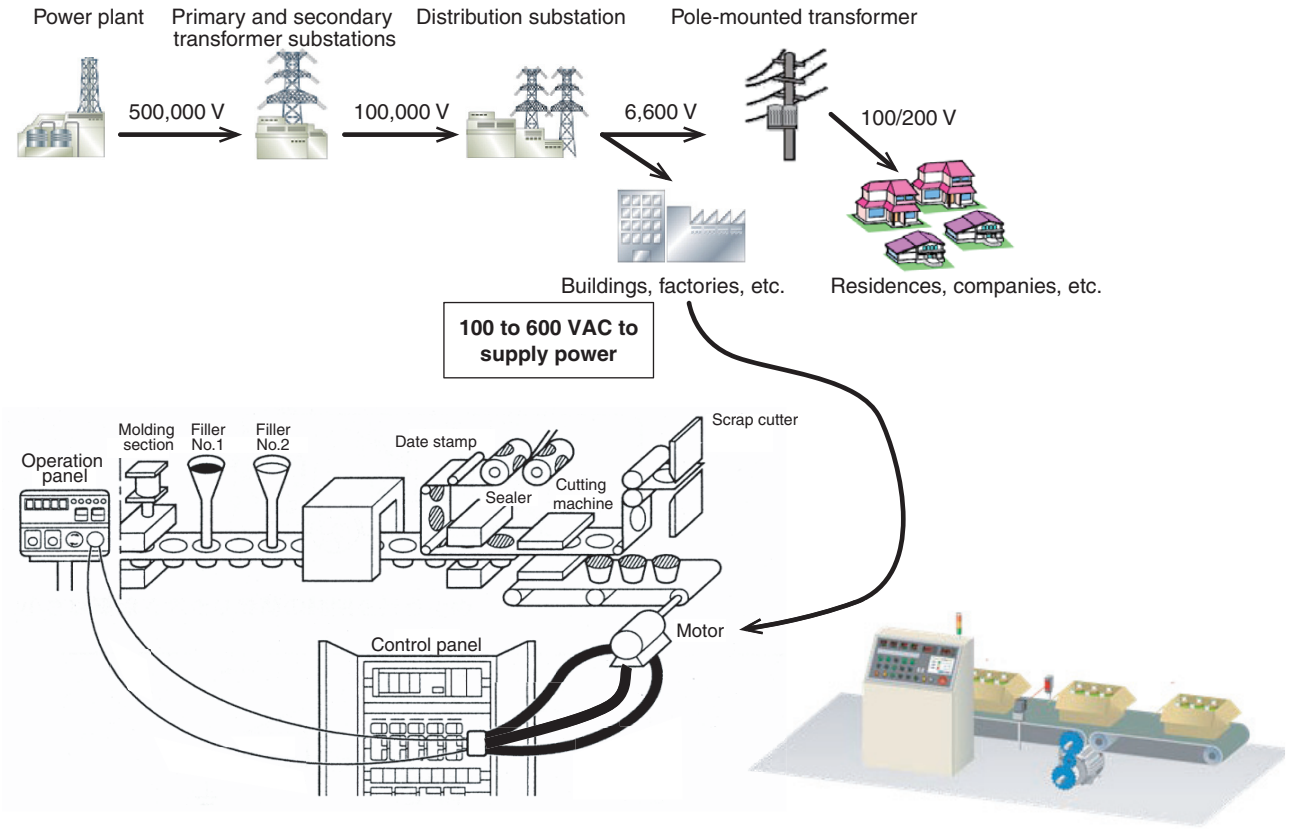


Locations for Introducing Measuring and Monitoring Relays and Their Functions

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 overcurrents, overvoltages, 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.

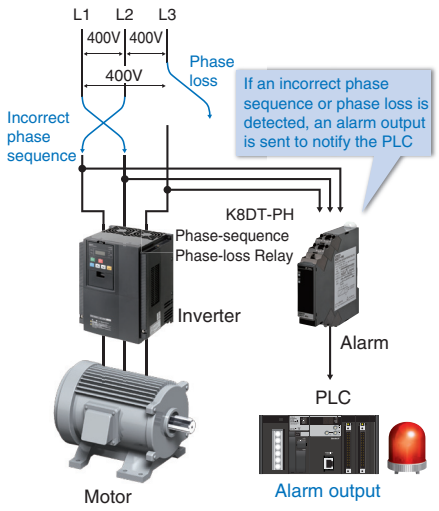
Example from Japan



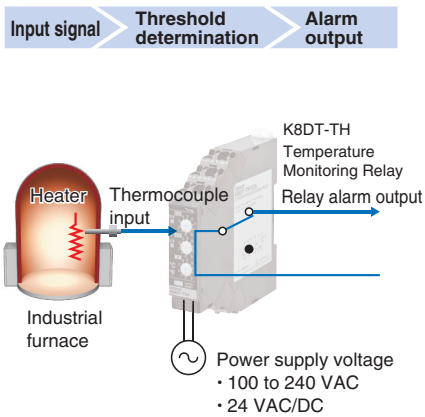
Types of Measuring and Monitoring Relays

There are the following types of Measuring and Monitoring Relays.

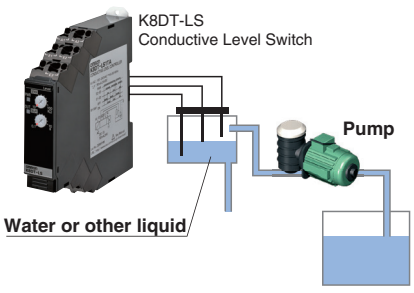
Motor Protection Relays



Temperature Monitoring Relays



Water Level Control Relays



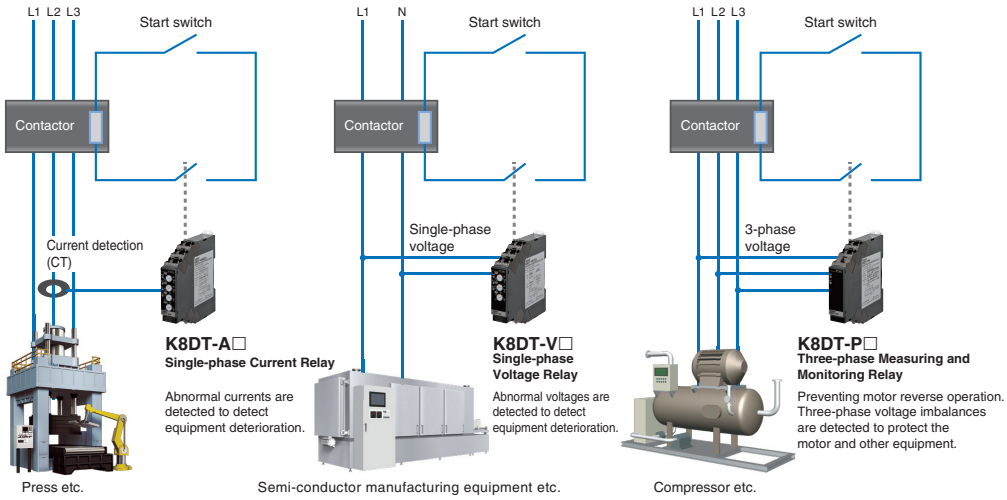
Application Examples

Motor Protection

K8DT-A□/-V□/-P□

Application Ideal for monitoring for error trends in motors and other equipment (e.g., equipment with three-phase motors, expensive equipment, and equipment with compressors).

Handle a Wide Range of Applications

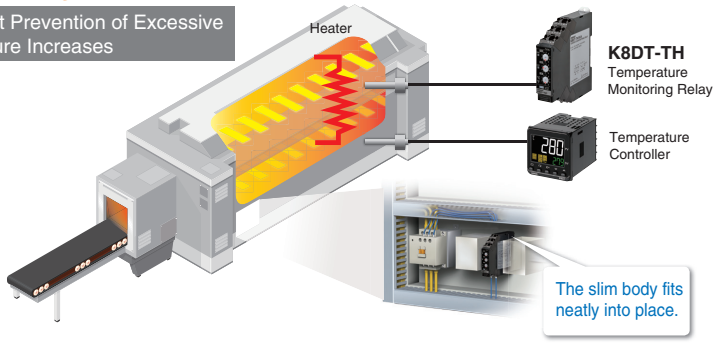


Temperature Monitoring Relay

K8DT-TH

Application Ideal for redundant prevention of excessive temperature increases in heaters (e.g., electronic components, semiconductors, and industrial furnaces).

Redundant Prevention of Excessive Temperature Increases



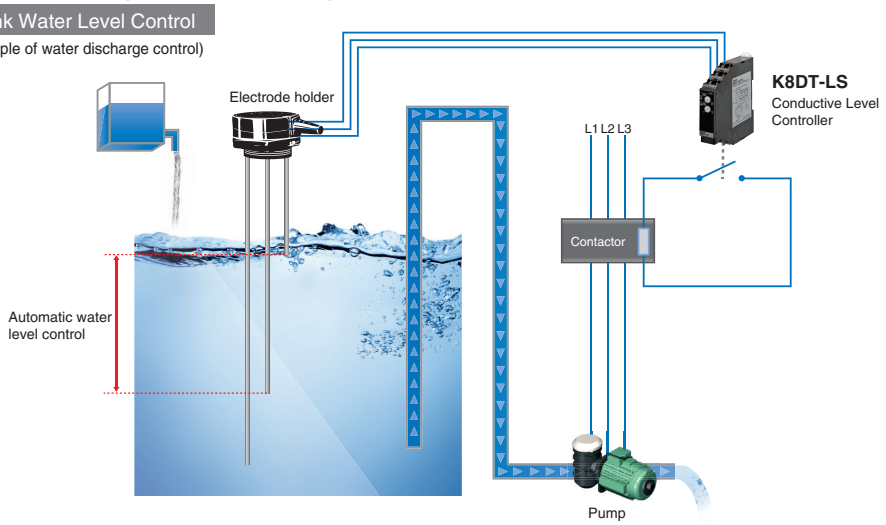
Water Level Control

K8DT-LS

Application Ideal for water level detection and control in tanks (e.g., water processing and circulation equipment).

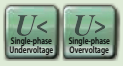
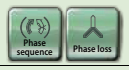
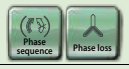
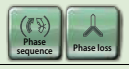
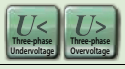
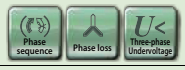
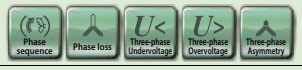
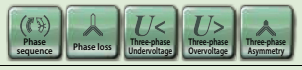
Tank Water Level Control

(Example of water discharge control)



Classifications of Measuring and Monitoring Relays

The OMRON K8-series Monitoring and Measuring Relays are classified as follows:

		Input	Alarm operation	Function	Width	Terminal block	Output	Model
Motor protection	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
			Fixed		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
			Upper and lower limits		22.5 mm	Screws	Two SPDT relay outputs	K8AK-PM
			Upper and lower limits		17.5 mm	Screws	One SPDT relay output	K8DS-PM
			Upper and lower limits		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
			Upper limit		17.5 mm	Screws	One SPDT relay output	K8DS-PA
			Upper and lower limits		22.5 mm	Screws	Two SPDT relay outputs	K8AK-PW
			Lower limit alarm		17.5 mm	Screws	One SPDT relay output	K8DS-PU
			Upper and lower limits		17.5 mm	Screws	One SPDT relay output	K8DS-PZ
			Upper and lower limits		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
			Fixed		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

Explanation of Terms

Incorrect Phase Sequence Protection
Preventing motor reverse operation due to incorrect wiring of a three-phase power supply (three wires).

Phase Loss Protection
Monitoring a three-phase power supply (three wires) to prevent a motor from burning out due to a disconnected wire.

Overcurrent
When a current above the rated value flows through a device (motor).

Undercurrent
The operating status of a device (motor) under an abnormally low load (such as idle running of a submersible pump).

Overvoltage
Applying a voltage that is above the rated value to a device.

Undervoltage
When the rated voltage is not being applied to the device.

Voltage Asymmetry
A voltage imbalance in a three-phase power supply (three wires).

Liquid Level Control
Controlling the level of a liquid with electrodes (e.g., the function of the 61F).

✻ A relay that performs this type of control is called a Conductive Level Controller or Floatless Level Controller.

Temperature Monitoring Relay
A relay that produces an alarm for an abnormal temperature (it does not support PID control).

Single-phase Power Supply
A power supply that uses two wires.

Example: The power supply used for a household fan. The fan motor runs with two wires on single-phase residential power.

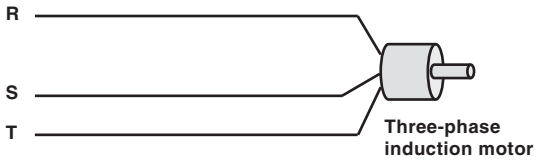
A single-phase power supply uses two wires.

Three-phase Power Supply
A power supply that uses three wires.

Examples: Almost all belt conveyors, cranes, and other industrial motors use three-phase power supplies.

The majority of power equipment (motors and heaters) used in factories runs on three-phase AC power (400 V or 200 V).

✻ In addition to motors, there are single-phase and three-phase heaters too.



Incorrect Phase Sequence
If the power wires to a three-phase motor are connected in the wrong sequence, the motor operates in reverse.

Phase Loss
If a wire to a three-phase motor is disconnected or was not connected, the motor cannot achieve its specified output.

Further Information

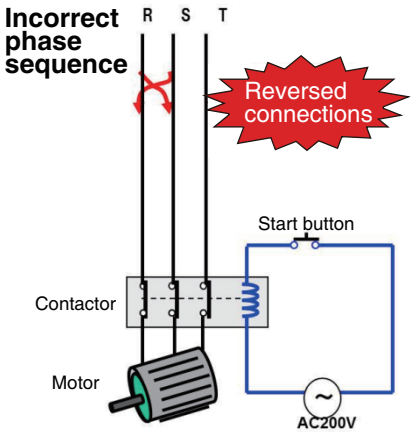
Three-phase AC Power Faults

The types of faults that can occur in machines and equipment that use three-phase AC power supplies include incorrect phase sequence, phase loss, three-phase asymmetry, overvoltage, and undervoltage.
Concretely, in order to prevent malfunctions, motor burnout, and other troubles that can be caused by power supply faults, incorrect phase sequence, phase loss, voltage asymmetry, overvoltage, undervoltage, and other faults are detected to protect devices and equipment and to shorten recovery work time.

Incorrect Phase Sequence

Incorrect phase sequence indicates that part of the phase sequence of a power supply is in the opposite order, e.g., due to incorrect wiring. This causes the motor to operate in the reverse direction from its normal one.
The sequence should be R, S, T, R, S, and then T, but if it becomes S, R, T, S, R, and then T, the rotation direction is reversed.

The motor operating in reverse moves a conveyor in reverse or moves an elevator or escalator in the opposite direction from normal, creating a major hazard and possibly damaging the machine too.

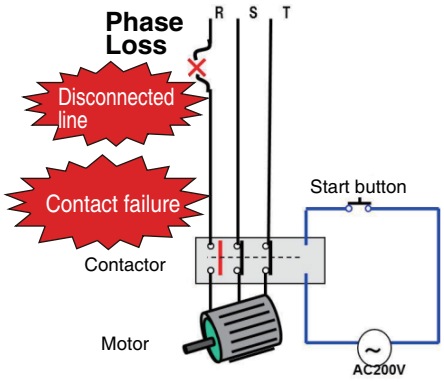


The motor operates in **reverse**.
The load device is damaged.

Phase Loss

Phase loss indicates the status in which the motor is operated on a single phase because of a disconnected motor power wire, loose connection, switching contact defect, or disconnected wire inside the motor.

When a phase is lost, the motor does not start or even if it operates, it does not do so smoothly and as a result, the motor does not provide its specified output and the motor itself may overheat and burn out.



There is **no motor output**.
The load device stops operating normally.

Three-phase Asymmetry

If there is fluctuation in the load capacity or circuit current between the wires for a three-phase load, voltage asymmetry occurs. If this happens, the three-phase device (e.g., motor) may heat up, break down, become louder, etc.

Overvoltage and Undervoltage

A power voltage fluctuation leads to device and machine malfunctions and damage.