Measuring and Monitoring Relays

K8AB Series

Industry First!
Two SPDT Outputs Available in New Models DIN Sized at 22.5 mm

Eight slim models featuring a variety of innovative new functions.

- Single-phase power monitoring:
  - Current relay
  - Voltage relay
  - Upper-/lower-limit voltage relays
- Three-phase power monitoring:
  - Phase-sequence phase-loss relay (Detected at startup.)
  - Voltage phase-sequence phase-loss relay *
  - Asymmetry phase-sequence phase-loss relay *
  - Voltage relay
- Temperature monitoring:
  - Temperature alarm device

* Refer to the Q&A section for information on phase loss during operation.

Features

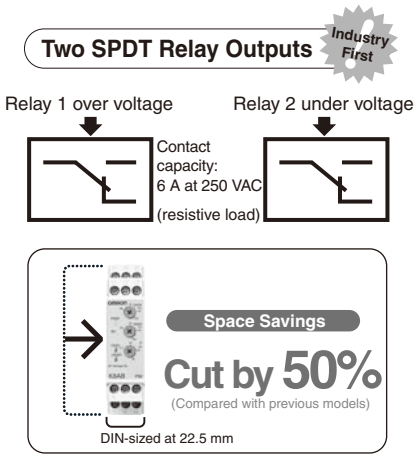
Slim 22.5-mm Design Features Two SPDT Relay Outputs (K8AB-VW, K8AB-PM, and K8AB-PW)

Provides individual over voltage and under voltage settings and outputs.

1-/3-phase Power Supply

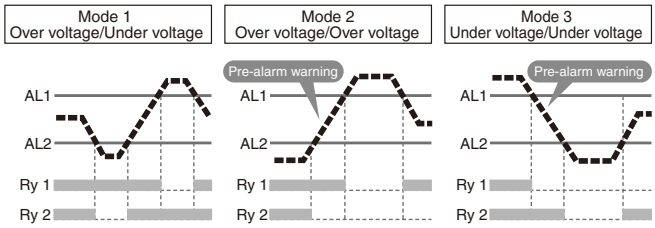
Many customers require the individual upper and lower limit outputs that are normally available only in larger 45-mm relays. For the first time from any manufacturer, OMRON has achieved this and more in a slim-body design measuring just 22.5 mm. These relays not only offer advantages such as 3-phase power supply compatibility and a resistive load contact capacity of 6 A at 250 VAC, but they also reduce panel production cost because they use 50% less space than previous models.

Note: The relay output capacity for the K8AB-TH is 3 A at 250 VAC (resistive load).



Pre-alarm Monitoring Mode Provides Advanced Warning (K8AB-VW Only)

In plants and other sites that operate 365 days a year, unexpected shutdowns must be kept to an absolute minimum. OMRON addresses this problem with the K8AB-VW featuring a pre-alarm monitoring mode that can be set to two levels for two outputs. K8AB-VW makes scheduled maintenance possible because the pre-alarm monitoring mode provides advance warning of impending trip alarms.

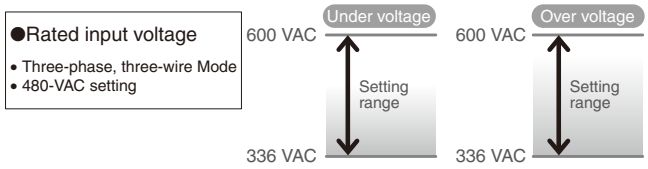


Expanded Setting Range Ensures Over Voltage and Under Voltage Monitoring Flexibility

Over voltage and under voltage can be set for the full span of the allowable input range, so over voltage and under voltage can now be monitored with flexibility.

Note: The setting range for operation time can be set within –30% to +25% of the range selected using the DIP switch on the Unit.

Example: K8AB-PW 3-phase Voltage Relay



Usable as a Simple Sensor Controller

Accepts inputs of 4 to 20 mA or 0 to 10 V.

Compatible with Commercial CTs

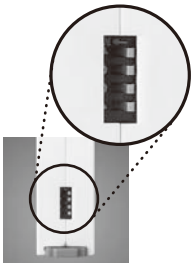
The K8AB-AS 1-Phase Current Relay can be used with commercial CTs for current measurement.

	CT current on secondary side	Applicable model
Commercial CTs	0 to 1 A AC	K8AB-AS2
	0 to 5 A AC	

Note: OMRON-compatible CT: K8AC-CT200L Only the K8AB-AS3 can be used for AC operation at both 100 and 200 A.

DIP Switch Function Selection

Various relay functions can be selected using a DIP switch. This means that the number of models required can be reduced to 1/8 what it had been simply by installing a relay like the K8AB-AS. An added advantage is that it reduces the inventory of maintenance parts.



Example: K8AB-AS 1-Phase Current Relay

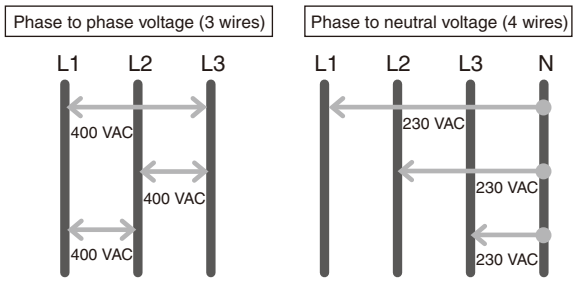
	DIP switch		Function
Resetting method	SW2	ON	Manual reset
		OFF	Automatic reset
Relay drive method	SW3	ON	Normally open
		OFF	Normally closed
Operating mode	SW4	ON	Over current
		OFF	Under current

Note: 1. The operating time can be set to 0.1 to 30 s.

2. SW1 of K8AB-AS is not used.

Single K8AB Monitors 3-phase Power Supply with 3 or 4 Wires (K8AB-PM, K8AB-PA, and K8AB-PW)

OMRON Low-voltage Monitoring Relays can be used to monitor 3-phase power supplies with 3 or 4 wires simply by changing DIP switch settings.



A Single K8AB Can Monitor a 3-phase Power Supply Anywhere in the World

Reduces Maintenance Parts Inventory

	SW3			ON	ON	OFF	OFF
	SW4			ON	OFF	ON	OFF
K8AB-P□1	SW2	ON	P-P	200 V	220 V	230 V	240 V
		OFF	P-N	115 V	127 V	133 V	138 V
K8AB-P□2	SW2	ON	P-P	380 V	400 V	415 V	480 V
		OFF	P-N	220 V	230 V	240 V	277 V

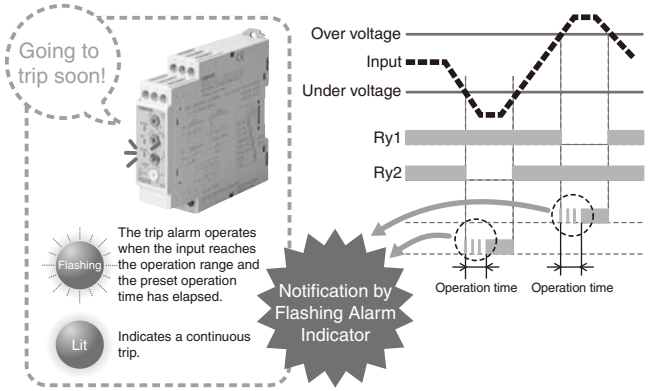
DIN Track Mounting

Gang-mounting is also possible.

Operation Level Indication by Flashing Alarm Indicator

Checking the operating status has never been convenient because of the time it takes to reach the preset operation time. The K8AB eliminates this problem by featuring a flashing alarm indicator that clearly indicates the operating status. This has greatly simplified the task of checking on-site status particularly when operation settings are changed or an error occurs.

Note: Excluding the K8AB-PH and K8AB-TH.



Ideal for Monitoring Current or Voltage

Current Monitoring Applications (Single Phase)

Application	Measured current	Applicable models	Operating value setting range
Simple Sensor Controller	4 to 20 mA DC	K8AB-AS1	2 to 20 mA AC/DC
			10 to 100 mA AC/DC
			50 to 500 mA AC/DC
Process control signal monitoring (using a commercial CT)	0 to 1 A AC 0 to 5 A AC	K8AB-AS2	0.1 to 1 A AC/DC
			0.5 to 5 A AC/DC
			0.8 to 8 A AC/DC
Current monitoring for motors and heaters (using a special CT)	0 to 200 A AC	K8AB-AS3 (See note.)	---
			10 to 100 A AC
			20 to 200 A AC

Note: Special CT model: OMRON K8AC-CT200L

Voltage Monitoring Applications (Single Phase)

Application	Measured voltage	Applicable models	Operating value setting range
Direct current monitoring (monitoring the output voltage of a shunt)	0 to 60 mV DC 0 to 100 mV DC 0 to 150 mV DC	K8AB-VS1 K8AB-VW1	6 to 60 mV AC/DC
			10 to 100 mV AC/DC
			30 to 300 mV AC/DC
Power supply line monitoring	12 VDC 24 VDC 100 VAC 115 VAC	K8AB-VS2 K8AB-VW2	1 to 10 V AC/DC
			3 to 30 V AC/DC
			15 to 150 V AC/DC
	200 VAC 230 VAC 400 VAC 480 VAC	K8AB-VS3 K8AB-VW3	20 to 200 V AC/DC
			30 to 300 V AC/DC
			60 to 600 V AC/DC

Wire Connection

2×2.5 mm^2 solid or 2×1.5 mm^2 standard ferrules.

Compliance with International Standards

A third party has certified CE mark compliance. This device is in compliance with UL certification requirements.

Selection Guide

Product name	Model	Nominal input	Supply voltage	Output relays	Housing
1-Phase Current Relay	K8AB-AS1	I1-COM: 2 to 20 mA AC/DC I2-COM: 10 to 100 mA AC/DC I3-COM: 50 to 500 mA AC/DC	24 VDC	One SPDT relay	DIN 22.5 mm
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-AS2	I1-COM: 0.1 to 1 A AC/DC I2-COM: 0.5 to 5 A AC/DC I3-COM: 0.8 to 8 A AC/DC	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-AS3	I2-COM: 10 to 100 A AC I3-COM: 20 to 200 A AC *	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
1-Phase Voltage Relay	K8AB-VS1	V1-COM: 6 to 60 mV AC/DC V2-COM: 10 to 100 mV AC/DC V3-COM: 30 to 300 mV AC/DC	24 VDC	One SPDT relay	
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-VS2	V1-COM: 1 to 10 V AC/DC V2-COM: 3 to 30 V AC/DC V3-COM: 15 to 150 V AC/DC	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-VS3	V1-COM: 20 to 200 V AC/DC V1-COM: 30 to 300 V AC/DC V1-COM: 60 to 600 V AC/DC	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
1-Phase Voltage Relay	K8AB-VW1	V1-COM: 6 to 60 mV AC/DC V2-COM: 10 to 100 mV AC/DC V3-COM: 30 to 300 mV AC/DC	24 VDC	Two SPDT relays	
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-VW2	V1-COM: 1 to 10 V AC/DC V2-COM: 3 to 30 V AC/DC V3-COM: 15 to 150 V AC/DC	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
	K8AB-VW3	V1-COM: 20 to 200 V AC/DC V1-COM: 30 to 300 V AC/DC V1-COM: 60 to 600 V AC/DC	24 VDC		
			24 VAC		
			100 to 115 VAC		
			200 to 230 VAC		
Phase-sequence, Phase-loss Relay	K8AB-PH1	200 to 500 VAC	Same as the input voltage.	One SPDT relay	
3-Phase Voltage, Phase-sequence, Phase-loss Relay	K8AB-PM1	200, 220, 230, or 240 VAC		Two SPDT relays	
	K8AB-PM2	380, 400, 415, or 480 VAC			
3-Phase Asymmetry, Phase-sequence, Phase-loss Relay	K8AB-PA1	200, 220, 230, or 240 VAC		One SPDT relay	
	K8AB-PA2	380, 400, 415, or 480 VAC			
3-Phase Voltage Relay	K8AB-PW1	200, 220, 230, or 240 VAC		Two SPDT relays	
	K8AB-PW2	380, 400, 415, or 480 VAC			
Temperature Monitoring Relay	K8AB-TH11S	Thermocouple/Pt100 (0 to 399°C/°F)	100 to 240 VAC	One SPDT relay	
	K8AB-TH12S	Thermocouple (setting unit of 10°C/°F)	100 to 240 VAC		
NEW	K8AB-TH11S	Thermocouple/Pt100 (0 to 399°C/°F)	24 V AC/DC		
	K8AB-TH12S	Thermocouple (setting unit of 10°C/°F)	24 V AC/DC		

* The K8AC-CT200L CT is required to use the K8AB-AS3. Use the K8AB-AS to use a commercially available CT.

Model Number Structure

K8AB-□□
1 2 3

1. Basic Model

Notation	Meaning
K8AB	Measuring and Monitoring Relays

2. Functions

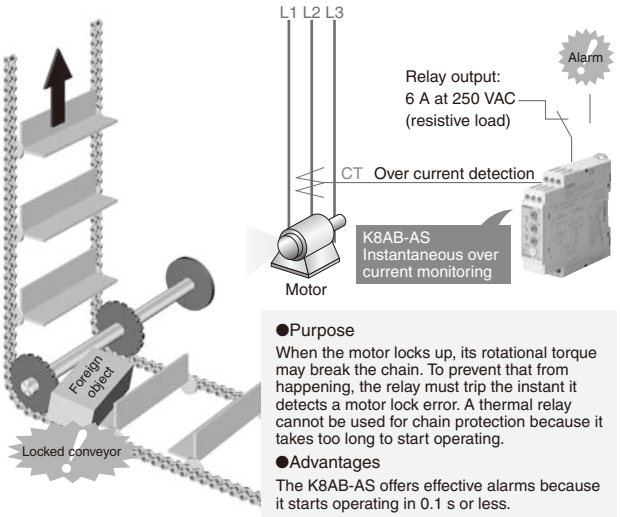
Notation	Meaning	Operation	Datasheet available
AS	Single-phase Current Relay	One-sided operation	Yes
VS	Single-phase Voltage Relay	One-sided operation	Yes
VW	Single-phase Upper-/lower-limit Voltage Relay	Simultaneous upper and lower limit monitoring	Yes
PH	Phase-sequence Phase-loss Relay	---	Yes
PM	Three-phase Voltage Phase-sequence Phase-loss Relay	Simultaneous upper and lower limit monitoring	Yes
PA	Three-phase Asymmetry Phase-sequence Phase-loss Relay	---	Yes
PW	Three-phase Voltage Relay	Simultaneous upper and lower limit monitoring	Yes
TH	Temperature Alarm Device	One-sided operation	Yes

3. Rated Operating Power

Note: For details, refer to *the relevant detasheet*.

Application Examples

Chain Breakage Protection for Conveyors K8AB-AS



●Purpose

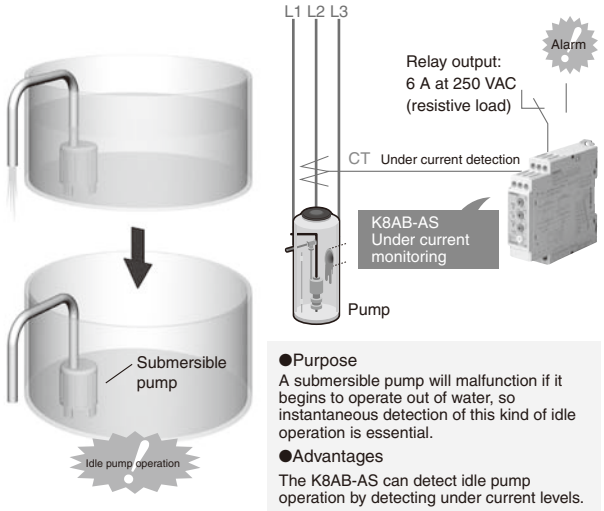
When the motor locks up, its rotational torque may break the chain. To prevent that from happening, the relay must trip the instant it detects a motor lock error. A thermal relay cannot be used for chain protection because it takes too long to start operating.

●Advantages

The K8AB-AS offers effective alarms because it starts operating in 0.1 s or less.

(If a motor is used as the load, be careful that the inrush current does not exceed the allowable input range.)

Protection against Idle Running of a Submersible Pump K8AB-AS



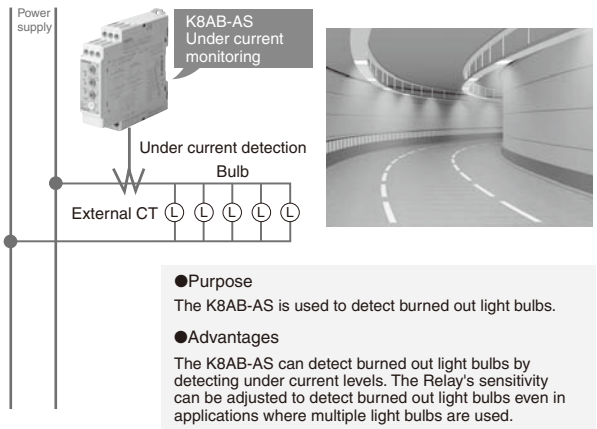
●Purpose

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 K8AB-AS can detect idle pump operation by detecting under current levels.

Bulb Burnout Detection K8AB-AS



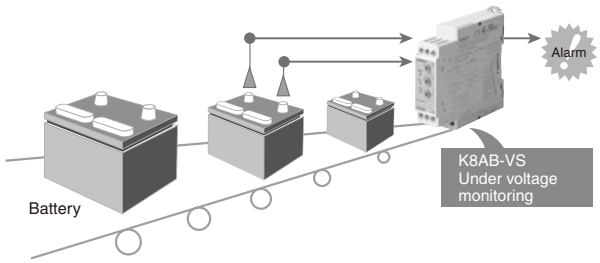
●Purpose

The K8AB-AS is used to detect burned out light bulbs.

●Advantages

The K8AB-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.

Battery Voltage Checking K8AB-VS



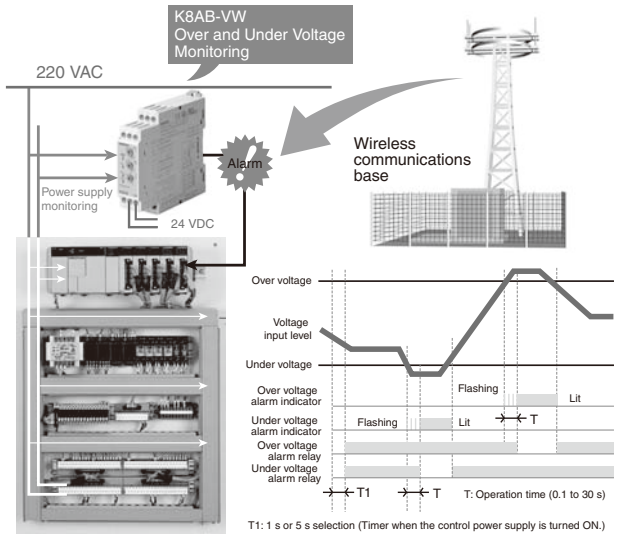
●Purpose

The K8AB-VS is used to check battery charge levels.

●Advantages

The K8AB-VS can detect when the battery charge is low.

Monitoring the Control Power Supply at Communication Bases K8AB-VW



T1: 1 s or 5 s selection (Timer when the control power supply is turned ON.)

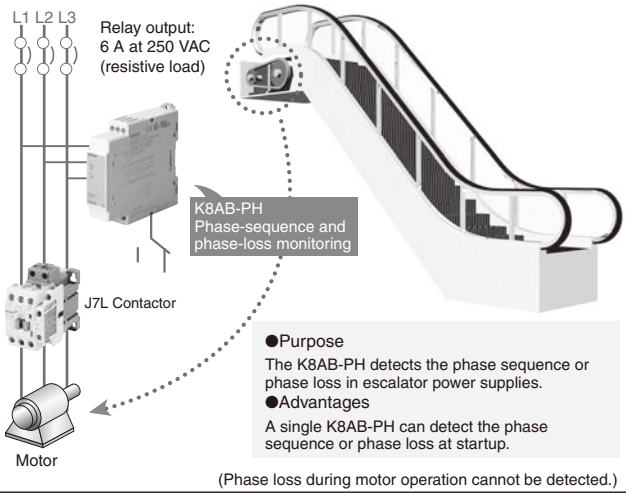
●Purpose

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 K8AB-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.

Monitoring Phase Sequence/ Phase Loss for Escalators — K8AB-PH



●Purpose

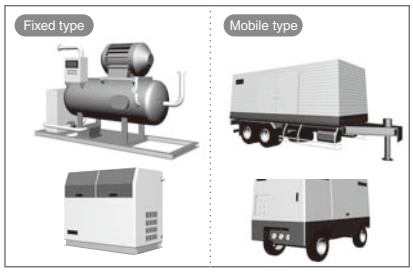
The K8AB-PH detects the phase sequence or phase loss in escalator power supplies.

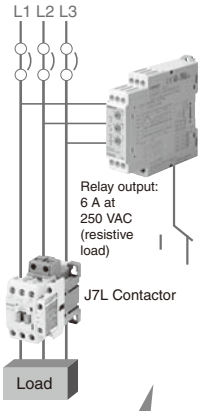
●Advantages

A single K8AB-PH can detect the phase sequence or phase loss at startup.

(Phase loss during motor operation cannot be detected.)

Monitoring Compressor Power Supplies — K8AB-PM





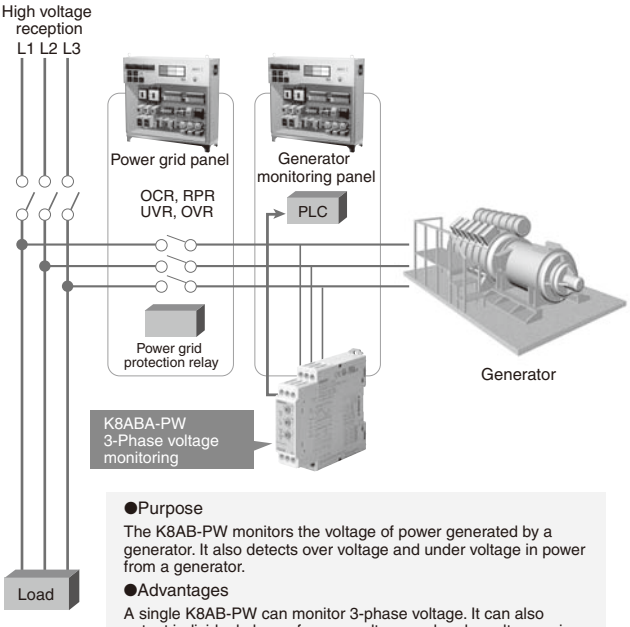
●Purpose

Compressors cannot operate correctly under conditions such as under voltage, asymmetry voltage, phase loss, or phase sequence. The K8AB-PM can be used to monitor 3-phase voltage, the phase sequence, and phase loss.

●Advantages

A single K8AB-PM can monitor over voltage, under voltage, the phase sequence and phase loss in 3-phase voltage. It can also output individual alarms for over voltage or under voltage using an SPDT relay. The K8AB-PM is able to recognize which alarm has occurred.

Monitoring Generated Voltage — K8AB-PW



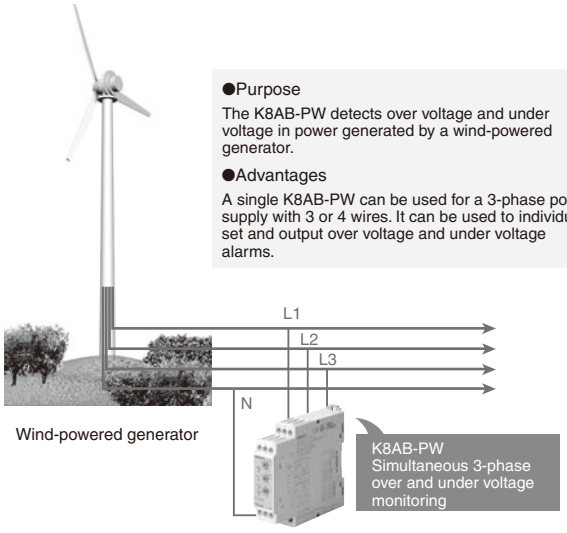
●Purpose

The K8AB-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 K8AB-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 480 VAC and the K8AB-PW can be switched to monitor phase voltage or line voltage.

Monitoring Voltage Generated by Wind-powered Generators — K8AB-PW



●Purpose

The K8AB-PW detects over voltage and under voltage in power generated by a wind-powered generator.

●Advantages

A single K8AB-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.

- The application examples provided in this catalog are for reference only. Check functions and safety of the equipment before use.
- Never use the products for any application requiring special safety requirements, such as nuclear energy control systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, or other 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 products are properly rated and installed for the intended use within the overall equipment or system.

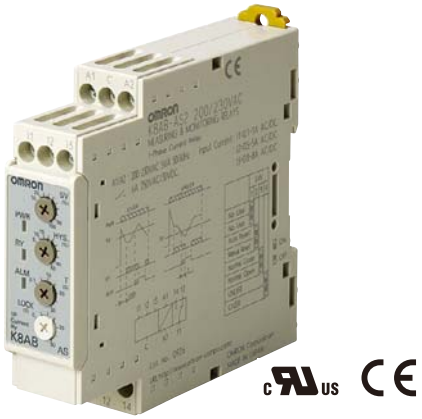
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Single-phase Current Relay
K8AB-AS

Ideal for current monitoring for industrial facilities and equipment.

- Monitor for overcurrents or undercurrents.
- Manual resetting and automatically resetting supported by one Relay.
- Startup lock and operating time can be set separately.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Output relay can be switched between normally open and normally closed.
- Process control signal (4 to 20 mA) and commercial CT input (0 to 1 A or 0 to 5 A) supported.
- Output status can be monitored using LED indicator.
- Inputs are isolated from the power supply.



⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 15 for the Q&A section.

Model Number Structure

■ Model Number Legend

K8AB-□□□□
1 2 3 4

1. Basic Model
K8AB: Measuring and Monitoring Relays

2. Functions
AS: Single-phase Current Relay (One-sided operation)

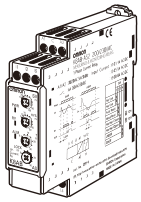
3. Measuring Current
1: 2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC
2: 0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC
3: 10 to 100 A AC, 20 to 200 A AC (See note.)

Note: The K8AB-AS3 is specially designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

4. Supply Voltage
24 VDC: 24 VDC
24 VAC: 24 VAC
100-115 VAC: 100 to 115 VAC
200-230 VAC: 200 to 230 VAC

Ordering Information

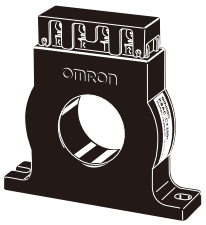
■ List of Models

Single-phase Current Relay	Measuring current	Supply voltage	Model
	2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC	24 VDC	**K8AB-AS1 24 VDC**
		24 VAC	**K8AB-AS1 24 VAC**
		100-115 VAC	**K8AB-AS1 100-115 VAC**
		200-230 VAC	**K8AB-AS1 200-230 VAC**
	0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC	24 VDC	**K8AB-AS2 24 VDC**
		24 VAC	**K8AB-AS2 24 VAC**
		100-115 VAC	**K8AB-AS2 100-115 VAC**
		200-230 VAC	**K8AB-AS2 200-230 VAC**
	10 to 100 A AC, 20 to 200 A AC (See note.)	24 VDC	**K8AB-AS3 24 VDC**
		24 VAC	**K8AB-AS3 24 VAC**
		100-115 VAC	**K8AB-AS3 100-115 VAC**
		200-230 VAC	**K8AB-AS3 200-230 VAC**

Note: The K8AB-AS3 is designed to be used in combination with an OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

■ Accessory (Order Separately)

OMRON CT

Current Transformer	Input range	Applicable Relay	Model
	10 to 100 A AC, 20 to 200 A AC	K8AB-AS3	**K8AC-CT200L**

Other CTs

CT current on secondary side	Applicable Relay
0 to 1 A AC, 0 to 5 A AC	K8AB-AS2

Ratings and Specifications

■ Input Range

Model	Range*	Connection terminal	Measuring current	Input impedance	Overload capacity
K8AB-AS1	0 to 20 mA AC/DC	I1-COM	2 to 20 mA AC/DC, 10 to 100 mA AC/DC, 50 to 500 mA AC/DC	Approx. 5 Ω	Continuous input : 120% of maximum input 1 s max. : 150% of maximum input
	0 to 100 mA AC/DC	I2-COM		Approx. 1 Ω	
	0 to 500 mA AC/DC	I3-COM		Approx. 0.2 Ω	
K8AB-AS2	0 to 1 A AC/DC	I1-COM	0.1 to 1 A AC/DC, 0.5 to 5 A AC/DC, 0.8 to 8 A AC/DC	Approx. 0.12 Ω (Load : 0.5 VA)	
	0 to 5 A AC/DC	I2-COM		Approx. 0.02 Ω (Load : 1.5 VA)	
	0 to 8 A AC/DC	I3-COM		Approx. 0.02 Ω (Load : 3 VA)	
K8AB-AS3	0 to 100 A AC	I2-COM	10 to 100 A AC, 20 to 200 A AC (See note.)	Using OMRON CT	Continuous input : 120% of maximum input 30 s max. : 200% of maximum input 1 s max. : 600% of maximum input
	0 to 200 A AC	I3-COM		Using OMRON CT	

Note: The K8AB-AS3 is designed to be used in combination with an OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

* The range is selected using connected terminals.

■ Ratings

Power supply voltage **Isolated power supply**	24 VDC, 24 VAC, 100 to 115 VAC, 200 to 230 VAC
Power consumption	24 VDC: 1 W max. 24 VAC: 4 VA max. 100 to 115 VAC: 4 VA max. 200 to 230 VAC: 5 VA max.
Operating value setting range (SV)	10% to 100% of maximum measuring current K8AB-AS1: 2 to 20 mA AC/DC 10 to 100 mA AC/DC 50 to 500 mA AC/DC K8AB-AS2: 0.1 to 1 A AC/DC 0.5 to 5 A AC/DC 0.8 to 8 A AC/DC K8AB-AS3: When used together with a K8AC-CT200L Current Transformer 10 to 100 A AC 20 to 200 A AC
Operating value	100% operation at set value
Reset value setting range (HYS.)	5% to 50% of operating value
Reset method	Manual reset/automatic reset (switchable) **Note:** Manual reset: Turn OFF power supply for 1 s or longer.
Operating time setting range (T)	0.1 to 30 s
Startup lock time setting range (LOCK) **Note:** Enabled only for overcurrent operation.	0 to 30 s (The startup lock timer starts when the input has reached approximately 30% or more of the set value.) **Note:** Enabled only for overcurrent operation.
Indicators	Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red
Input impedance	Refer to "Input Range" on previous page.
Output relays	One SPDT relay (NO/NC switched using DIP switch.)
Output relay ratings	Rated load Resistive load 6 A at 250 VAC (cosϕ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC (cosϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature	−20 to 60°C (with no condensation or icing)
Storage temperature	−40 to 70°C (with no condensation or icing)
Ambient operating humidity	25% to 85% (with no condensation)
Storage humidity	25% to 85% (with no condensation)
Altitude	2,000 m max.
Terminal screw tightening torque	0.49 N·m
Terminal wiring method	Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color	Munsell 5Y8/1
Case material	PBT/ABS resin (self-extinguishing resin) UL94-V0
Weight	Approx. 130 g
Mounting	Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions	22.5 (W) × 90 (H) × 100 (D) mm

■ Specifications

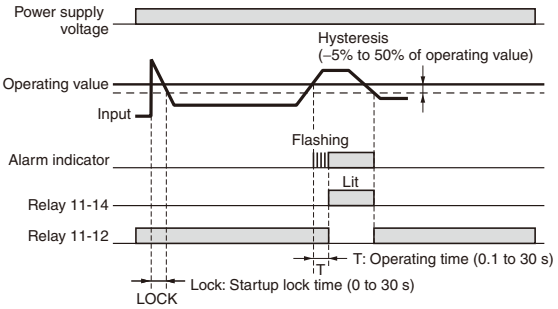
Allowable power supply voltage range		85% to 110% of power supply voltage
Allowable power supply frequency range		50/60 Hz ±5 Hz
Input frequency range		K8AB-AS1 and K8AB-AS2: DC input or AC input (45 to 65 Hz) K8AB-AS3: AC input (45 to 65 Hz)
Overload capacity		K8AB-AS1 and K8AB-AS2: Continuous input: 120% of maximum input, 1 s max.: 150% of maximum input. K8AB-AS3: Continuous input: 120% of maximum input, 30 s max.: 200% of maximum input, 1 s max.: 600% of maximum input **Note:** Overload capacity of primary side of CT.
Setting error	**Operating value**	Set value ±10% full scale
	Reset value	
	Operating time	
	Startup lock time	
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/Average value × 100%
	Reset value	Reset value ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Overcurrent: Measured when input suddenly changes from 0% to 120% of setting. Undercurrent: Measured when input suddenly changes from 120% to 0% of setting.
	Startup lock time	Startup lock time repeat error: ±50 ms (measured at sudden change from 0% to 120% of setting)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of power supply voltage		Operating value: ±5% max. Operating time: ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Influence of power supply frequency		Operating value: ±5% max. (at 45 to 65 Hz) Operating time: ±10% max. (at 45 to 65 Hz) **Note:** The error in the operating value and operating time under standard conditions.
Influence of input frequency		Operating value (45 to 65 Hz) K8AB-AS1 and K8AB-AS2: ±5% max. K8AB-AS3: ±10% max. Operating time (45 to 65 Hz) ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
Insulation resistance		20 MΩ min. Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output terminals Between input terminals and output terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output terminals Between input terminals and output terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Connections

■ Wiring Diagram

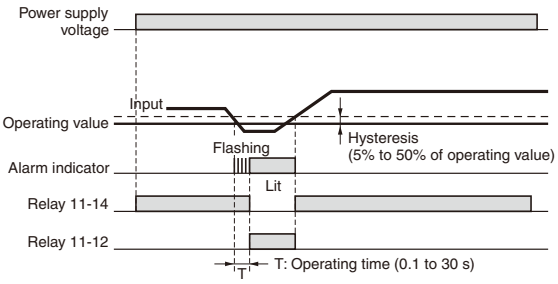
Overcurrent Operation Diagram (Output Relay Drive Method: Normally Open)

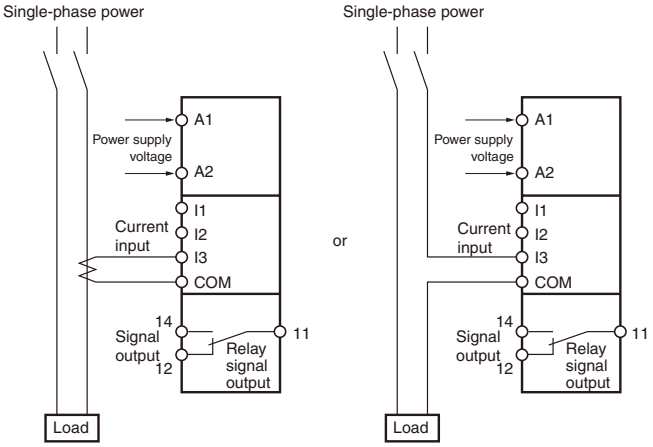
DIP switch setting: SW3 OFF.



Undercurrent Operation Diagram (Output Relay Drive Method: Normally Closed)

DIP switch setting: SW3 ON.

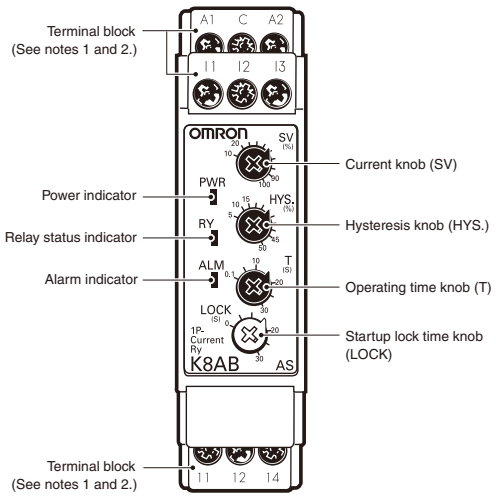




Note: The K8AB-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT).

Nomenclature

■ Front



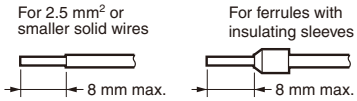
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.
Alarm indicator (ALM: Red)	Lit when there is an overcurrent or undercurrent. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Current knob (SV)	Used to set the current to 10% to 100% of maximum measuring current.
Hysteresis knob (HYS.)	Used to set the rest value to 5% to 50% of the operating value.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.
Startup lock time knob (LOCK)	Used to set the startup lock time to 0 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- Al 1,5-8BK (for AWG16)
- Al 1-8RD (for AWG18)
- Al 0,75-8GY (for AWG18)

2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

Setting Ranges and Wiring Connections

Model	Measuring current	Wiring connection
K8AB-AS1	2 to 20 mA AC/DC	I1-COM
	10 to 100 mA AC/DC	I2-COM
	50 to 500 mA AC/DC	I3-COM
K8AB-AS2	0.1 to 1 A AC/DC	I1-COM
	0.5 to 5 A AC/DC	I2-COM
	0.8 to 8 A AC/DC	I3-COM
K8AB-AS3	10 to 100 A AC (See note 2.)	I2-COM
	20 to 200 A AC (See note 2.)	I3-COM

Note: 1. The DC input terminals have no polarity.
2. The K8AB-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

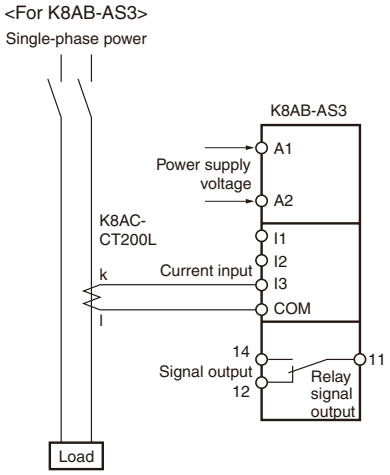
Connections

1. Input
Connect the input between the I1-COM, I2-COM, or I3-COM terminals, according to the input current. Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly.
Terminal I1 is not used by the K8AB-AS3.
If using the OMRON K8AC-CT200L CT, connect to terminals k and l on the K8AC-CT200L. (Terminals kt and lt are not used.)

2. Power Supply
Connect the power supply to terminals A1 and A2.

3. Outputs
SPDT relays are output to terminals 11, 12, and 14.

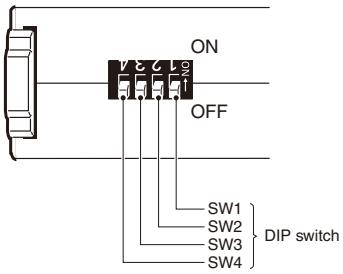
Note: Use the recommended ferrules if using twisted wires.



DIP Switch Settings

The resetting method, relay drive method, and operating mode are set using the DIP switch located on the bottom of the Unit.

K8AB-AS□ does not use SW1.



DIP Switch Functions

SWITCH	ON ● ↑ / OFF ❍ ↓	4 (ON / OFF)	3	2	1
Resetting method	Automatic reset	---	---	●	NO USE
	Manual reset	---	---	❍	
Relay drive method	Normally closed	---	●	---	
	Normally open	---	❍	---	
Operating mode	Undercurrent	●	---	---	
	Overcurrent	❍	---	---	

Note: All pins are set to OFF at the factory.

Setting Method

1. Setting Current
The current knob (SV) is used to set the current.
The current can be set to 10% to 100% of the maximum measuring current.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the current.
The maximum measuring current will differ depending on the model and the input terminal.
Example: K8AB-AS3 Using Input Terminals I3-COM
The maximum measuring current will be 200 A AC and the setting range will be 20 to 200 A.

2. Hysteresis

Hysteresis is set using the hysteresis knob (HYS.)
The setting range is 5 to 50% of the operating value.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the hysteresis.

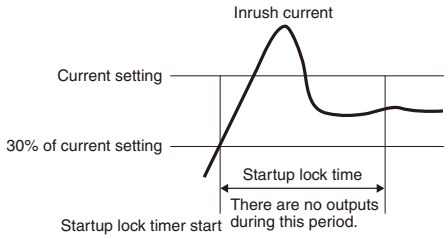
Example: Maximum of 200 A AC, Current Setting (SV) of 50%, and Overcurrent Operation
Operation will be at 100 A and resetting at 90 A when the hysteresis (HYS.) is set to 10%.

3. Operating Time

The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input current exceeds (drops lower than) the current setting, the alarm indicator will start flashing for the set period and then stay lit.

4. Startup Lock Time

The startup lock time is set using the startup lock time knob (LOCK).
The startup lock time can be set to between 0 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the startup lock time.
The startup lock time will start when the input current reaches 30% or more of the current setting.
Use startup lock time to prevent unwanted operation, e.g., as a result of inrush current.

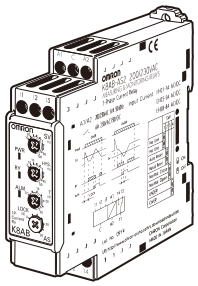


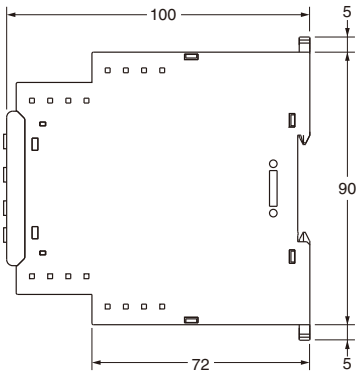
Dimensions

(Unit: mm)

Single-phase Current Relays

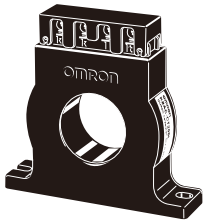
K8AB-AS1
K8AB-AS2
K8AB-AS3

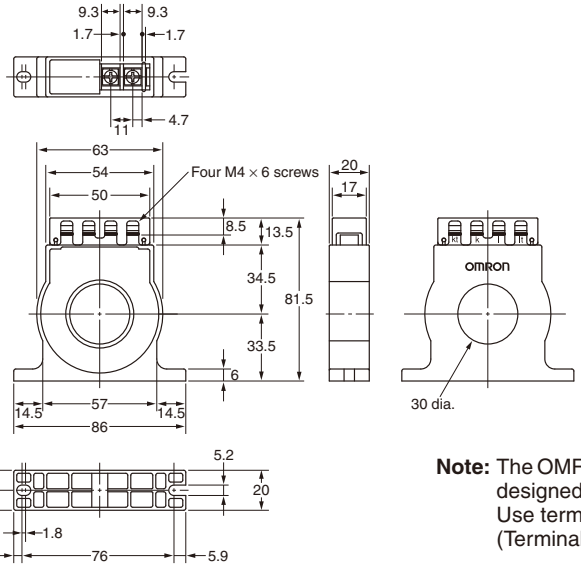




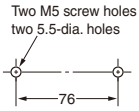
OMRON CT

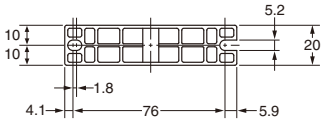
K8AC-CT200L





Mounting Hole Dimensions





Note: The OMRON Current Transformer (CT) is designed to be used with the K8AB-AS3. Use terminals k and l for connections. (Terminals kt and lt are not used.)

Questions and Answers

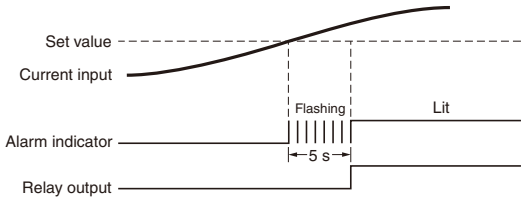
Q **Checking Operation**

A

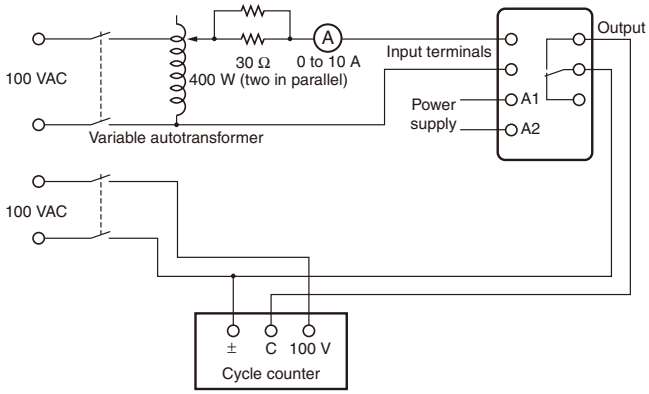
Overcurrents
Gradually increase the input from 80% of the setting. The input will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.

Undercurrent
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overcurrent.

Example: Overcurrent Operating Mode, Normally Open Relay Drive, and an Operating Time of 5 s



Connection Diagram



Q **How to Measure the Operating Time**

A

Overcurrent
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.

Undercurrent
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

Q **Monitoring Switch-mode Power Supplies**

A

Switch-mode Power Supplies cannot be monitored. In circuits with a capacitor input, including switch-mode power supplies, the input capacitor recharge current flows in pulse form as the load current. The K8AB-AS□ has a built-in filter as a countermeasure against high frequencies and cannot be used to remove pulse current.

Q **Operating Adjustment Knobs**

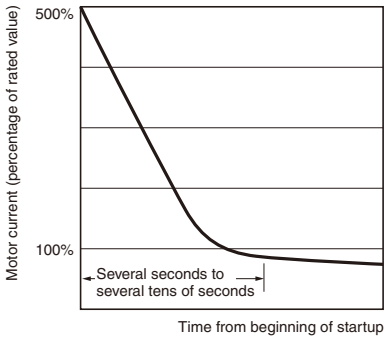
A

Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

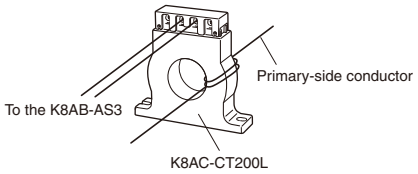
Q **Can a motor with a rated current of 5 A be monitored using the K8AB?**
Are there any application precautions?

A

The K8AB-AS1 and K8AB-AS2 cannot be used with motor loads. Use the K8AB-AS3 in combination with the K8AC-CT200L Current Transformer (CT). With motor loads, the startup current and stall current will cause a current of many times the rated current to flow. Refer to the following figure for information on the motor startup current.



For a motor with a rating of 5 A, the startup current will be approximately 30 A. The startup current will exceed the overload capacity (rating: 150% for 1 s) of the K8AB-AS1 and K8AB-AS2 and result in failure of the Relay.
To monitor the motor load, use the K8AB-AS3. (Overload capacity: 120% of rating for continuous load, 200% of rating for 30 s, and 600% of rating for 1 s).
The K8AB-AS3 has a large input range. Pass the conductors multiple times through the special CT.



Concept behind Passing Conductor through the CT When Using the K8AB-AS3

Example: Monitoring Overload of a Motor with a Rated Current of 5 A

K8AB settings:
Overcurrent detection, operating value setting: 25%, operating time: 0.1 s
Startup lock timer: 0.1 to 30 s (Set the timer according to the duration of the startup current.)

The setting range for the K8AB-AS3 is 10% to 100% of the rated current (i.e., 10 to 100 A). Pass the conductors through the CT five times so that at least 10 A of current flows. The input current to the K8AB will be 25 A (i.e., 5 A x 5 loops).
If a startup current of six times the rated current is generated, it will be 150 A (i.e., 25 A x 6). The overload capacity for the K8AB-AS3 is 200% of the rating for 30 s. The Relay will not fail even if the startup current continues for 30 s, and it is possible to perform overload detection.

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ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Single-phase Voltage Relay

K8AB-VS

Ideal for voltage monitoring for industrial facilities and equipment.

- Monitor for overvoltages or undervoltages.
- Manual resetting and automatically resetting supported by one Relay.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Output relay can be switched between normally open and normally closed.
- Process control signal (0 to 10 V) and current splitter input supported.
- Output status can be monitored using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Inputs are isolated from the power supply.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 24 for the Q&A section.

Model Number Structure

■ Model Number Legend

K8AB-□□□□

1 2 3 4

1. Basic Model

K8AB: Measuring and Monitoring Relays

2. Functions

VS: Single-phase Voltage Relay (One-sided operation)

3. Measuring Current

1: 6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC

2: 1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC

3: 20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC

4. Supply Voltage

24 VDC: 24 VDC

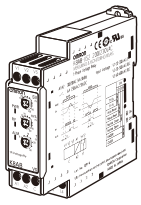
24 VAC: 24 VAC

100-115 VAC: 100 to 115 VAC

200-230 VAC: 200 to 230 VAC

Ordering Information

■ List of Models

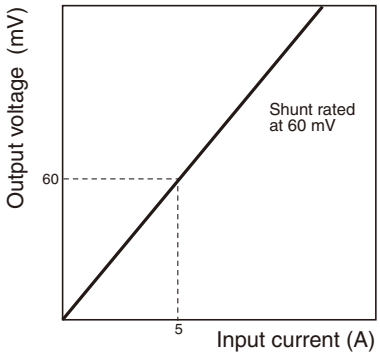
Single-phase Voltage Relay	Measuring voltage	Supply voltage	Model
	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	24 VDC	**K8AB-VS1 24 VDC**
		24 VAC	**K8AB-VS1 24 VAC**
		100-115	**K8AB-VS1 100-115 VAC**
		200-230 VAC	**K8AB-VS1 200-230 VAC**
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VDC	**K8AB-VS2 24 VDC**
		24 VAC	**K8AB-VS2 24 VAC**
		100-115 VAC	**K8AB-VS2 100-115 VAC**
		200-230 VAC	**K8AB-VS2 200-230 VAC**
	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	24 VDC	**K8AB-VS3 24 VDC**
		24 VAC	**K8AB-VS3 24 VAC**
		100-115 VAC	**K8AB-VS3 100-115 VAC**
		200-230 VAC	**K8AB-VS3 200-230 VAC**

■ Shunts (Order Separately)

A shunt is a resistor to convert a DC current into a DC voltage.
Use the shunt in combination with K8AB-VS to detect undercurrent and overcurrent in DC circuits.

Model	Rated current	Output voltage
SDV-SH5	5 A	60 mV
SDV-SH7.5	7.5 A	
	7.5 A (for 100 mV)	100 mV
SDV-SH10	10 A	60 mV
SDV-SH15	15 A	
SDV-SH20	20 A	
SDV-SH30	30 A	
SDV-SH50	50 A	
SDV-SH75	75 A	
SDV-SH100	100 A	
SDV-SH150	150 A	
SDV-SH200	200 A	
SDV-SH300	300 A	
SDV-SH500	500 A	
SDV-SH750	750 A	
SDV-SH1000	1,000 A	

Characteristics
SDV-SH5A (Rated Current: 5 A)



Note: 1. All the above listed shunts have an accuracy in the 1.0 class.

2. Select a shunt whose rated current is more than 120% of the current normally flowing in a circuit. The characteristics of the shunt may change or fusing of a resistor element may occur if an overload that is 1,000% of the rated current is applied. Therefore, determine the rated current of the shunt to be used, by taking the circuit conditions into account.

Ratings and Specifications

■ Input Range

Model	Range*	Connection terminal	Measuring voltage	Input impedance	Overload capacity
K8AB-VS1	0 to 60 mV AC/DC	V1-COM	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	Approx. 220 kΩ	Continuous input : 115% of maximum input 10 s max. : 125% of maximum input
	0 to 100 mV AC/DC	V2-COM		Approx. 230 kΩ	
	0 to 300 mV AC/DC	V3-COM		Approx. 260 kΩ	
K8AB-VS2	0 to 10 V AC/DC	V1-COM	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	Approx. 120 kΩ	
	0 to 30 V AC/DC	V2-COM		Approx. 320 kΩ	
	0 to 150 V AC/DC	V3-COM		Approx. 1.6 MΩ	
K8AB-VS3	0 to 200 V AC/DC	V1-COM	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	Approx. 1.2 MΩ	
	0 to 300 V AC/DC	V2-COM		Approx. 1.7 MΩ	
	0 to 600 V AC/DC	V3-COM		Approx. 3.1 MΩ	

* The range is selected using connected terminals.

■ Ratings

Power supply voltage	**Isolated power supply**	24 VDC, 24 VAC, 100 to 115 VAC, 200 to 230 VAC
Power consumption		24 VDC: 1 W max. 24 VAC: 4 VA max. 100 to 115 VAC: 4 VA max. 200 to 230 VAC: 5 VA max.
Operating value setting range (SV)		10% to 100% of maximum measuring voltage K8AB-VS1: 6 to 60 mV AC/DC 10 to 100 mV AC/DC 30 to 300 mV AC/DC K8AB-VS2: 1 to 10 V AC/DC 3 to 30 V AC/DC 15 to 150 V AC/DC K8AB-VS3: 20 to 200 V AC/DC 30 to 300 V AC/DC 60 to 600 V AC/DC
Operating value		100% operation at set value
Reset value setting range (HYS.)		5% to 50% of operating value
Reset method		Manual reset/automatic reset (switchable) **Note:** Manual reset: Turn OFF power supply for 1 s or longer.
Operating time setting range (T)		0.1 to 30 s
Power ON lock time (LOCK)		1 s or 5 s (Switched using DIP switch.)
Indicators		Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red
Input impedance		Refer to "Input Range" on previous page.
Output relays		One SPDT relay (NO/NC switched using DIP switch.)
Output relay ratings		Rated load Resistive load 6 A at 250 VAC ($\cos\phi$ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC ($\cos\phi$ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85% (with no condensation)
Storage humidity		25% to 85% (with no condensation)
Altitude		2,000 m max.
Terminal screw tightening torque		0.49 N·m
Terminal wiring method		Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color		Munsell 5Y8/1
Case material		PBT/ABS resin (self-extinguishing resin) UL94-V0
Weight		Approx. 130 g
Mounting		Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions		22.5 (W) × 90 (H) × 100 (D) mm

■ Specifications

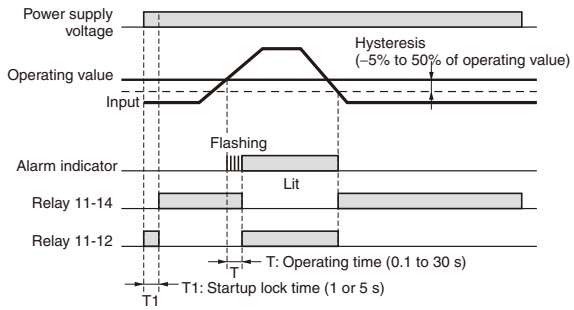
Allowable power supply voltage range		85% to 110% of power supply voltage
Allowable power supply frequency range		50/60 Hz ±5 Hz
Input frequency range		DC input or AC input (40 to 500 Hz)
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating value**	Set value ±10% full scale
	Reset value	
	Operating time	
	Power ON lock time	Set value ± 0.5 s
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/Average value × 100%
	Reset value	Reset value ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Overvoltage: Measured when input suddenly changes from 0% to 120% of setting. Undervoltage: Measured when input suddenly changes from 120% to 0% of setting.
	Power ON lock time	Power ON lock time repeat error: ±0.5 s (The operating time when the operating time is set to the minimum value and the power supply suddenly changes from 0% to 100%.)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of power supply voltage		Operating value: ±5% max. Operating time: ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Influence of power supply frequency		Operating value: ±5% max. (at 45 to 65 Hz) Operating time: ±10% max. (at 45 to 65 Hz) **Note:** The error in the operating value and operating time under standard conditions.
Influence of input frequency		At 40 to 500 Hz Operating value ±5% max. Operating time ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output terminals Between input terminals and output terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output terminals Between input terminals and output terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Connections

■ Wiring Diagram

Overvoltage Operation Diagram (Output Relay Drive Method : Normally Closed)

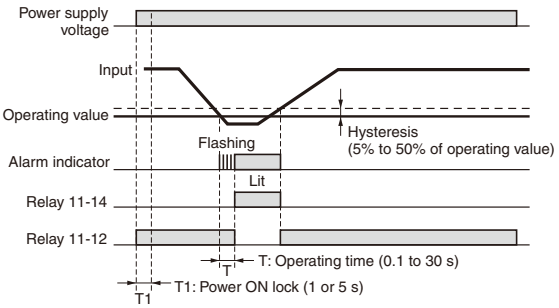
DIP switch setting: SW3 ON.



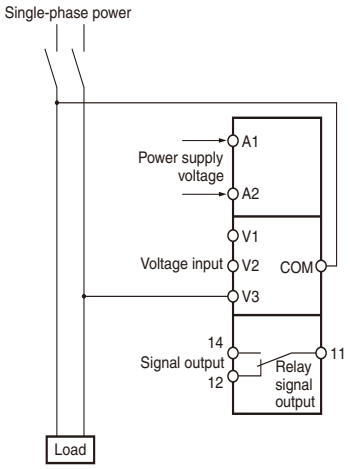
Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Undervoltage Operation Diagram (Output Relay Drive Method: Normally Open)

DIP switch setting: SW3 OFF.

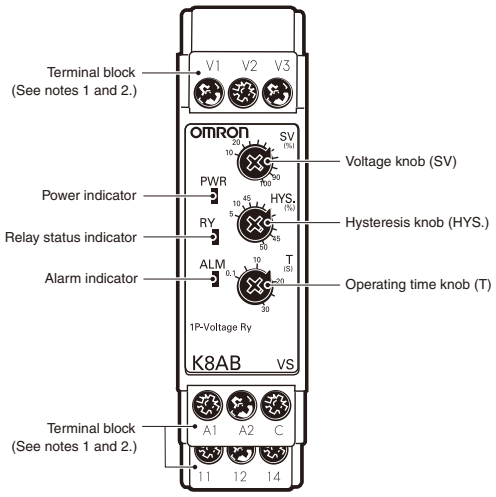


Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Nomenclature

■ Front



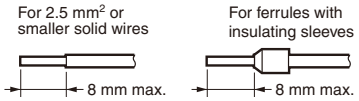
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating
Alarm indicator (ALM: Red)	Lit when there is an overvoltage or undervoltage. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Voltage knob (SV)	Used to set the voltage to 10% to 100% of maximum measuring voltage.
Hysteresis knob (HYS.)	Used to set the rest value to 5% to 50% of the operating value.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- Al 1,5-8BK (for AWG16)
- Al 1-8RD (for AWG18)
- Al 0,75-8GY (for AWG18)

2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

Setting Ranges and Wiring Connections

Model	Measuring current	Wiring connection
K8AB-VS1	6 to 60 mV AC/DC	V1-COM
	10 to 100 mV AC/DC	V2-COM
	30 to 300 mV AC/DC	V3-COM
K8AB-VS2	1 to 10 V AC/DC	V1-COM
	3 to 30 V AC/DC	V2-COM
	15 to 150 V AC/DC	V3-COM
K8AB-VS3	20 to 200 V AC/DC	V1-COM
	30 to 300 V AC/DC	V2-COM
	60 to 600 V AC/DC	V3-COM

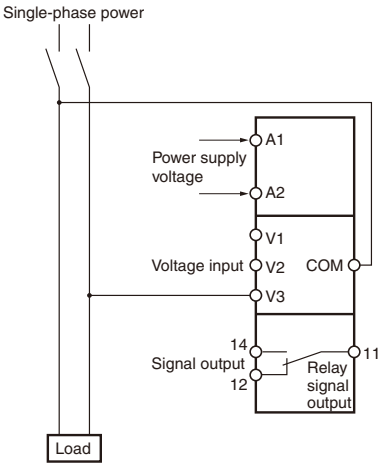
Connections

1. Input
Connect the input between terminals V1-COM, V2-COM, or V3-COM, depending on the input voltage.
Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly

2. Power Supply
Connect the power supply to terminals A1 and A2.

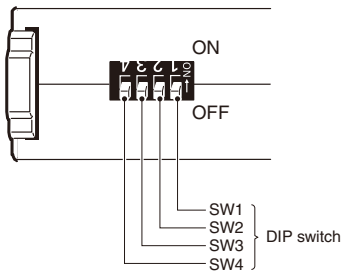
3. Outputs
SPDT relays are output to terminals 11, 12, and 14.

Note: Use the recommended ferrules if using twisted wires.



DIP Switch Settings

The power ON lock time, resetting method, relay drive method, and operating mode are set using the DIP switch located on the bottom of the Unit.



DIP Switch Functions

SWITCH	ON ● ↑ / OFF ❍ ↓	4 (ON / OFF)	3	2	1
Power ON lock time	5 s	---	---	---	●
	1 s	---	---	---	❍
Resetting method	Automatic reset	---	---	●	---
	Manual reset	---	---	❍	---
Relay drive method	Normally closed	---	●	---	---
	Normally open	---	❍	---	---
Operating mode	Undervoltage	●	---	---	---
	Overvoltage	❍	---	---	---

Note: All pins are set to OFF at the factory.

Setting Method

1. Setting Voltage
The voltage knob (SV) is used to set the voltage.
The voltage can be set to 10% to 100% of the maximum measuring voltage.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The maximum measuring voltage will differ depending on the model and the input terminal.
Example: K8AB-VS3 Using Input Terminal V3-COM
The maximum measuring voltage will be 600 VAC/VDC and the setting range will be 60 to 600 V.

2. Hysteresis
Hysteresis is set using the hysteresis knob (HYS.)
The setting range is 5 to 50% of the operating value.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the setting and the input have reached the same level.)
Use this as a guide to set the hysteresis.
Example: Maximum Setting of 600 VAC/VDC, Voltage Setting (SV) of 50%, and Overvoltage Operation
Operation will be at 300 V and resetting at 270 V when the hysteresis (HYS.) is set to 10%.

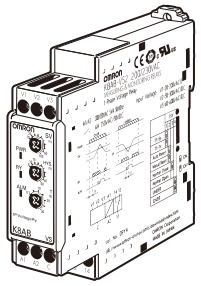
3. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input voltage exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

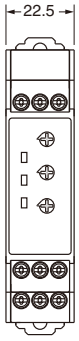
Dimensions

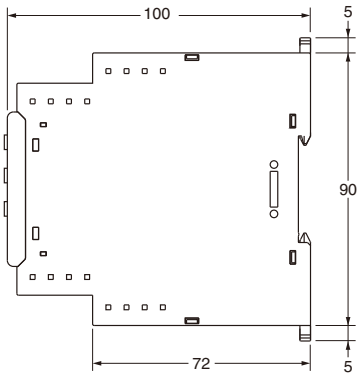
(Unit: mm)

■ Single-phase Voltage Relays

K8AB-VS1
K8AB-VS2
K8AB-VS3

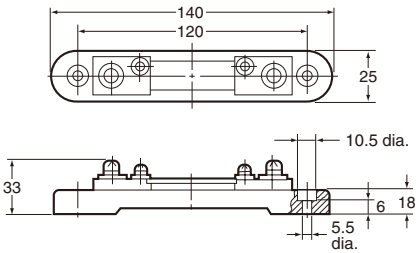






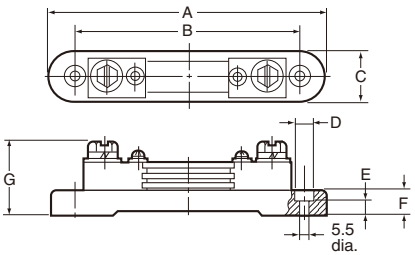
■ Shunts

SDV-SH5 to SDV-SH50 (60-mV Rating)



Current terminal: M6 screw
Voltage terminal: M4 screw

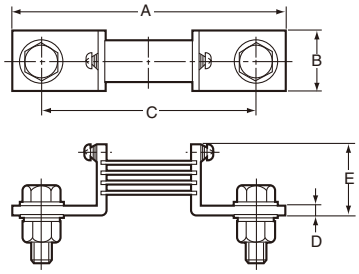
SDV-SH75 to SDV-SH200 (60-mV Rating)



Current terminal: M8 screw
Voltage terminal: M4 screw

Model	A	B	C	D	E	F	G
SDV-SH75	140	120	25	10.5	6	18	36
SDV-SH100	140	120	25	10.5	6	18	36
SDV-SH150	140	120	25	10.5	6	18	43
SDV-SH200	140	120	25	10.5	6	18	43

SDV-SH300/-SH500 (60-mV Rating)

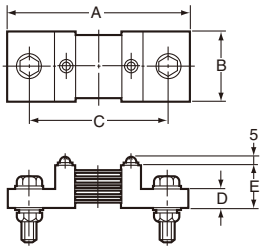


Current terminal: M10 screw (SDV-SH300), M12 screw (SDV-SH500)
Voltage terminal: M4 screw

Model	A	B	C	D	E	Resistor
SDV-SH300	130	30	110	4	36	4
SDV-SH500	160	40	120	6	41	5

Note: Inquire about models with a rated current of 1,500 A or larger.

SDV-SH750/-SH1000 (60-mV Rating)



Current terminal: M12 screw
Voltage terminal: M5 screw

Model	A	B	C	D	E
SDV-SH750	175	45	130	15	30
SDV-SH1000	175	60	135	18	30

Questions and Answers

Q **Checking Operation**

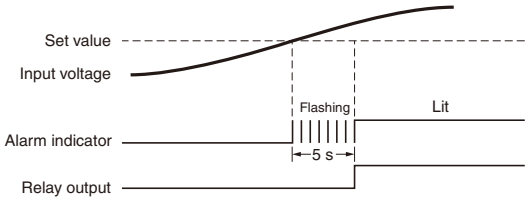
A

Overvoltages
Gradually increase the input from 80% of the setting. The input will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.

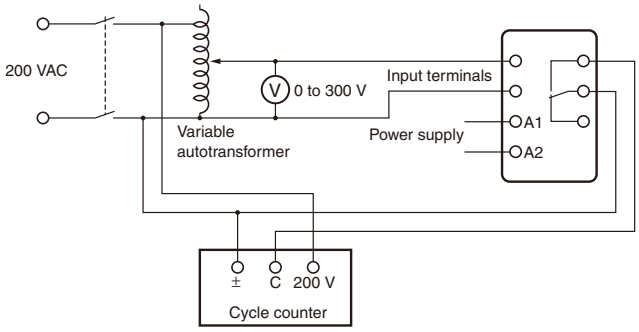
Undervoltage
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

Example: Overvoltage Operating Mode and an Operating Time of 5 s

Note: K8AB-VS□ output relays are normally operative.



Connection Diagram



Q **How to Measure the Operating Time**

A

Overvoltage
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.

Undervoltage
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

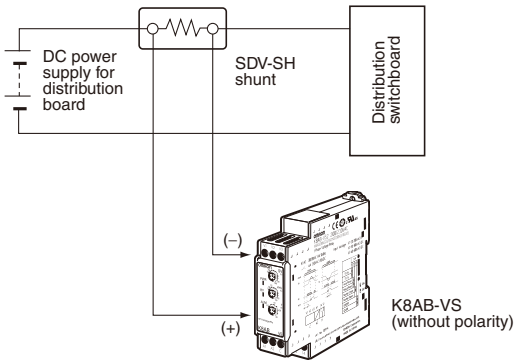
Q **Operating Adjustment Knobs**

A Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

Q **Detecting Current with a Current Splitter**

A An example of detecting an overload is shown below.

Example: Overload detection in a distribution switch board installed in a power substation.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Single-phase Voltage Relay
K8AB-VW

Ideal for voltage monitoring for industrial facilities and equipment.

- Monitor for overvoltages and undervoltages simultaneously. Separate settings and outputs supported for overvoltages and undervoltages.
- Manual resetting and automatically resetting supported by one Relay.
- Pre-alarm Monitoring Mode.
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
- Process control signal (0 to 10 V) and current splitter input supported.
- Output status can be monitored using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Inputs are isolated from the power supply.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 33 for the Q&A section.

Model Number Structure

■ Model Number Legend

K8AB-□□□□□
1 2 3 4

1. Basic Model
K8AB: Measuring and Monitoring Relays

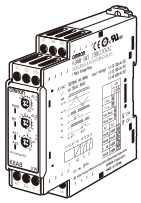
2. Functions
VW: Single-phase Voltage Relay (Simultaneous upper and lower limit monitoring)

3. Measuring Current
1: 6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC
2: 1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC
3: 20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC

4. Supply Voltage
24 VDC: 24 VDC
24 VAC: 24 VAC
100-115 VAC: 100 to 115 VAC
200-230 VAC: 200 to 230 VAC

Ordering Information

■ List of Models

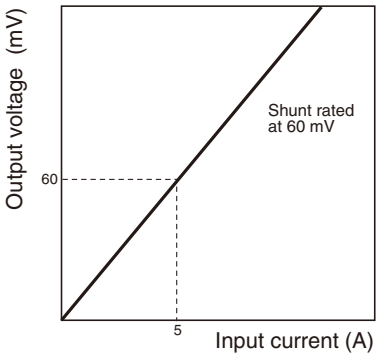
Single-phase Voltage Relay	Measuring voltage	Supply voltage	Model
	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	24 VDC	**K8AB-VW1 24 VDC**
		24 VAC	**K8AB-VW1 24 VAC**
		100-115 VAC	**K8AB-VW1 100-115 VAC**
		200-230 VAC	**K8AB-VW1 200-230 VAC**
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VDC	**K8AB-VW2 24 VDC**
		24 VAC	**K8AB-VW2 24 VAC**
		100-115 VAC	**K8AB-VW2 100-115 VAC**
		200-230 VAC	**K8AB-VW2 200-230 VAC**
	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	24 VDC	**K8AB-VW3 24 VDC**
		24 VAC	**K8AB-VW3 24 VAC**
		100-115 VAC	**K8AB-VW3 100-115 VAC**
		200-230 VAC	**K8AB-VW3 200-230 VAC**

■ Shunts (Order Separately)

A shunt is a resistor to convert a DC current into a DC voltage.
Use the shunt in combination with K8AB-VW to detect undercurrent and overcurrent in DC circuits.

Model	Rated current	Output voltage
SDV-SH5	5 A	60 mV
SDV-SH7.5	7.5 A	
	7.5 A (for 100 mV)	100 mV
SDV-SH10	10 A	60 mV
SDV-SH15	15 A	
SDV-SH20	20 A	
SDV-SH30	30 A	
SDV-SH50	50 A	
SDV-SH75	75 A	
SDV-SH100	100 A	
SDV-SH150	150 A	
SDV-SH200	200 A	
SDV-SH300	300 A	
SDV-SH500	500 A	
SDV-SH750	750 A	
SDV-SH1000	1,000 A	

Characteristics
SDV-SH5A (Rated Current: 5 A)



Note: 1. All the above listed shunts have an accuracy in the 1.0 class.

2. Select a shunt whose rated current is more than 120% of the current normally flowing in a circuit. The characteristics of the shunt may change or fusing of a resistor element may occur if an overload that is 1,000% of the rated current is applied. Therefore, determine the rated current of the shunt to be used, by taking the circuit conditions into account.

Ratings and Specifications

■ Input Range

Model	Range*	Connection terminal	Measuring voltage	Input impedance	Overload capacity
K8AB-VW1	0 to 60 mV AC/DC	V1-COM	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	Approx. 220 kΩ	Continuous input : 115% of maximum input 10 s max. : 125% of maximum input
	0 to 100 mV AC/DC	V2-COM		Approx. 230 kΩ	
	0 to 300 mV AC/DC	V3-COM		Approx. 260 kΩ	
K8AB-VW2	0 to 10 V AC/DC	V1-COM	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	Approx. 120 kΩ	
	0 to 30 V AC/DC	V2-COM		Approx. 320 kΩ	
	0 to 150 V AC/DC	V3-COM		Approx. 1.6 MΩ	
K8AB-VW3	0 to 200 V AC/DC	V1-COM	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	Approx. 1.2 MΩ	
	0 to 300 V AC/DC	V2-COM		Approx. 1.7 MΩ	
	0 to 600 V AC/DC	V3-COM		Approx. 3.1 MΩ	

* The range is selected using connected terminals.

■ Ratings

Power supply voltage	**Isolated power supply**	24 VDC, 24 VAC, 100 to 115 VAC, 200 to 230 VAC
Power consumption		24 VDC: 1 W max. 24 VAC: 4 VA max. 100 to 115 VAC: 4 VA max. 200 to 230 VAC: 5 VA max.
Operating value setting range (AL1 and AL2)		10% to 100% of maximum measuring voltage K8AB-VW1: 6 to 60 mV AC/DC 10 to 100 mV AC/DC 30 to 300 mV AC/DC K8AB-VW2: 1 to 10 V AC/DC 3 to 30 V AC/DC 15 to 150 V AC/DC K8AB-VW3: 20 to 200 V AC 30 to 300 V AC 60 to 600 V AC
Operating value		100% operation at set value
Reset value		5% of operating value (fixed)
Reset method		Manual reset/automatic reset (switchable) **Note:** Manual reset: Turn OFF power supply for 1 s or longer.
Operating time setting range (T)		0.1 to 30 s
Power ON lock time (LOCK)		1 s or 5 s (Switched using DIP switch.)
Indicators		Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red
Input impedance		Refer to "Input Range" on previous page.
Output relays		Two SPDT relays (NC operation)
Output relay ratings		Rated load Resistive load 6 A at 250 VAC ($\cos\phi$ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC ($\cos\phi$ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85% (with no condensation)
Storage humidity		25% to 85% (with no condensation)
Altitude		2,000 m max.
Terminal screw tightening torque		0.49 N·m
Terminal wiring method		Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color		Munsell 5Y8/1
Case material		PBT/ABS resin (self-extinguishing resin) UL94-V0
Weight		Approx. 140 g
Mounting		Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions		22.5 (W) × 90 (H) × 100 (D) mm

■ Specifications

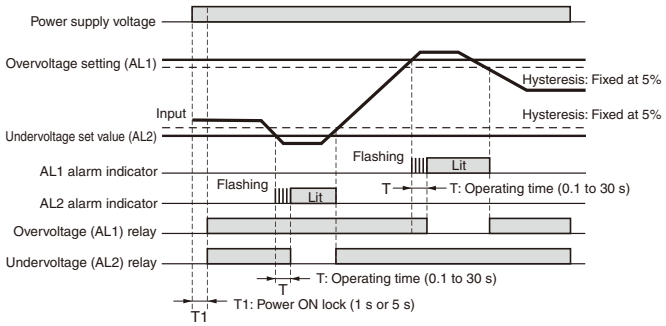
Allowable power supply voltage range		85% to 110% of power supply voltage
Allowable power supply frequency range		50/60 Hz ±5 Hz
Input frequency range		40 to 500 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating value**	Set value ±10% full scale
	Operating time	
	Power ON lock time	Set value ±0.5 s
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/Average value × 100%
	Reset value	Overvoltage Operating value × 95% ±2% Undervoltage Operating value × 105% ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Overvoltage: Measured when input suddenly changes from 0% to 120% of setting. Undervoltage: Measured when input suddenly changes from 120% to 0% of setting.
	Power ON lock time	Power ON lock time repeat error: ±0.5 s (The operating time when the operating time is set to the minimum value and the power supply suddenly changes from 0% to 100%.)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of power supply voltage		Operating value: ±5% max. Operating time: ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Influence of power supply frequency		Operating value: ±5% max. (at 45 to 65 Hz) Operating time: ±10% max. (at 45 to 65 Hz) **Note:** The error in the operating value and operating time under standard conditions.
Influence of input frequency		At 40 to 500 Hz Operating value ±5% max. Operating time ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output 1 terminals Between power supply terminals and output 2 terminals Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between power supply terminals and input terminals (excluding models with DC power supply) Between power supply terminals and output 1 terminals Between power supply terminals and output 2 terminals Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

DIP switch settings: SW3 and SW4 both ON or both OFF.

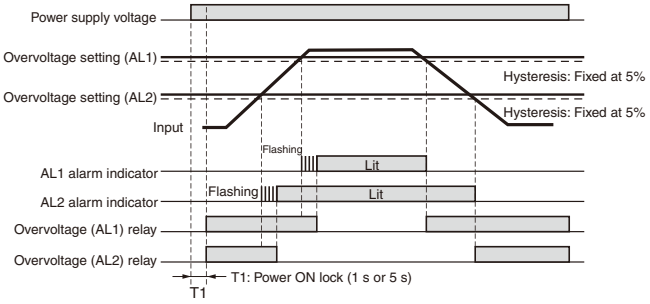


Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Overvoltage and Overvoltage Operation Diagram (Overvoltage Pre-alarm Mode)

DIP switch settings: SW3 ON and SW4 OFF.

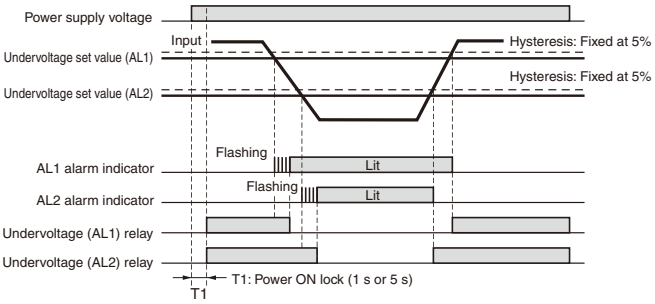


Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

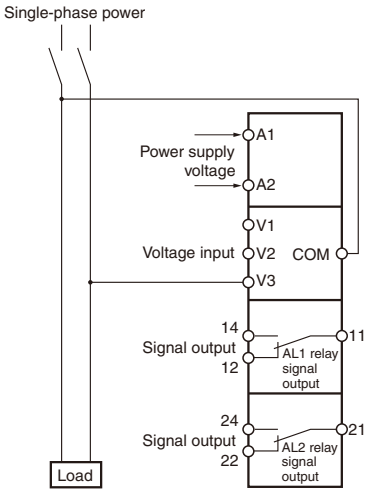
Undervoltage and Undervoltage Operation Diagram (Undervoltage Pre-alarm Mode)

DIP switch settings: SW3 OFF and SW4 ON.



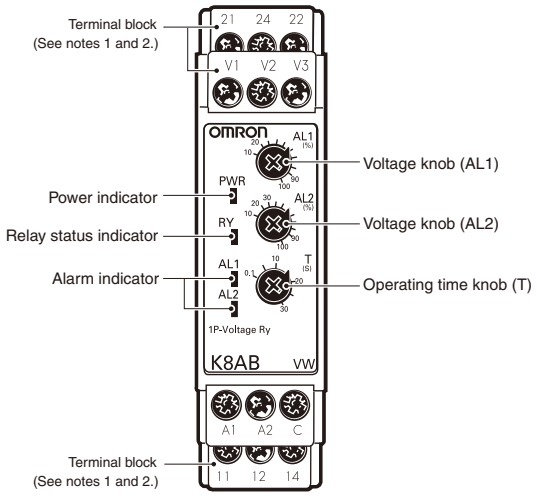
Note: 1. The K8AB-VW output relay is normally operative.

2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Nomenclature

■ Front



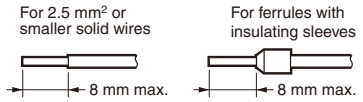
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay operates (Not light when both AL1 and AL2 are in error status) (Normally lit)
Alarm indicators (AL1 and AL2: Red)	Lit when there is an overvoltage or undervoltage. The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Setting Knobs

Item	Usage
Voltage knob (AL1)	Used to set the voltage to 10% to 100% of maximum measuring voltage.
Voltage knob (AL2)	Used to set the voltage to 10% to 100% of maximum measuring voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- AI 1,5-8BK (for AWG16)
- AI 1-8RD (for AWG18)
- AI 0,75-8GY (for AWG18)

2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

Setting Ranges and Wiring Connections

Model	Measuring current	Wiring connection
K8AB-VW1	6 to 60 mV AC/DC	V1-COM
	10 to 100 mV AC/DC	V2-COM
	30 to 300 mV AC/DC	V3-COM
K8AB-VW2	1 to 10 V AC/DC	V1-COM
	3 to 30 V AC/DC	V2-COM
	15 to 150 V AC/DC	V3-COM
K8AB-VW3	20 to 200 V AC/DC	V1-COM
	30 to 300 V AC/DC	V2-COM
	60 to 600 V AC/DC	V3-COM

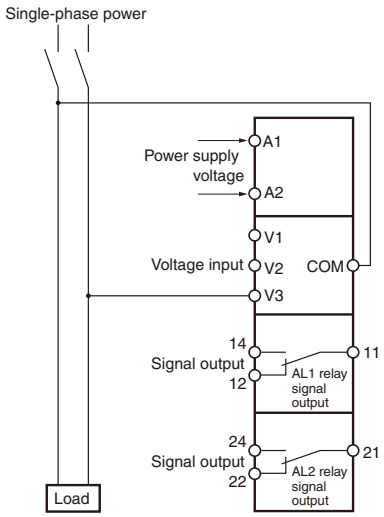
Connections

1. Input
Connect the input between terminals V1-COM, V2-COM, or V3-COM, depending on the input voltage.
Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly.

2. Power Supply
Connect the power supply to terminals A1 and A2.

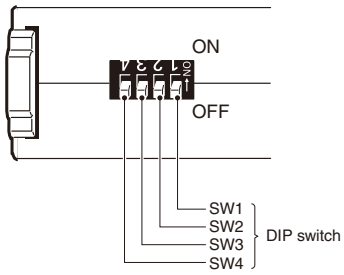
3. Outputs
AL1 (SPDT relay) is output to terminals 11, 12, and 14.
AL2 (SPDT relay) is output to terminals 21, 22, and 24.

Note: Use the recommended ferrules if using twisted wires.



DIP Switch Settings

The power ON lock time, resetting method and operating mode are set using the DIP switch located on the bottom of the Unit.



DIP Switch Functions

SWITCH	ON ● ↑ / OFF ❍ ↓		4 (ON / OFF)	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Resetting method	Automatic reset		---	---	●	---
	Manual reset		---	---	❍	---
Operating mode	AL1	AL2				
	Overvoltage	Undervoltage	●	●	---	---
	Undervoltage	Undervoltage	●	❍	---	---
	Overvoltage	Overvoltage	❍	●	---	---
	Overvoltage	Undervoltage	❍	❍	---	---

Note: All pins are set to OFF at the factory.

Setting Method

1. Setting Voltage
The voltage knob (AL1 and AL2) is used to set the voltage.
The voltage can be set to 10% to 100% of the maximum measuring voltage.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The maximum measuring voltage will differ depending on the model and the input terminal.
Example: K8AB-VW3 Using Input Terminal V3-COM
The maximum measuring voltage will be 600 VAC/VDC and the setting range will be 60 to 600 V.

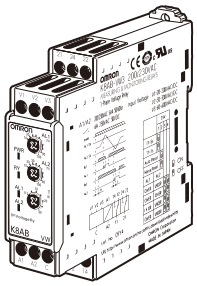
2. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

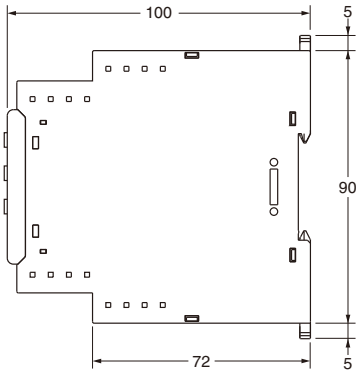
Dimensions

(Unit: mm)

■ Single-phase Voltage Relays

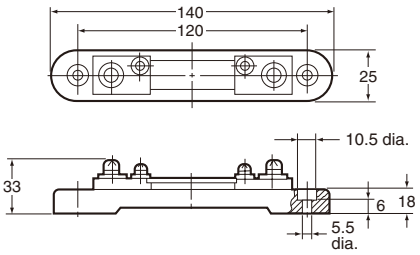
K8AB-VW1
K8AB-VW2
K8AB-VW3





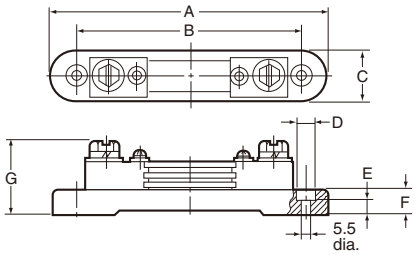
■ Shunts

SDV-SH5 to SDV-SH50 (60-mV Rating)



Current terminal: M6 screw
Voltage terminal: M4 screw

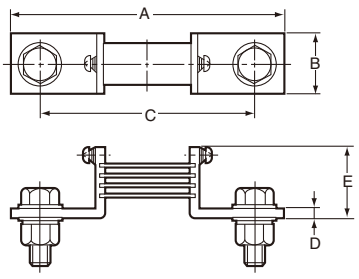
SDV-SH75 to SDV-SH200 (60-mV Rating)



Current terminal: M8 screw
Voltage terminal: M4 screw

Model	A	B	C	D	E	F	G
SDV-SH75	140	120	25	10.5	6	18	36
SDV-SH100	140	120	25	10.5	6	18	36
SDV-SH150	140	120	25	10.5	6	18	43
SDV-SH200	140	120	25	10.5	6	18	43

SDV-SH300/-SH500 (60-mV Rating)

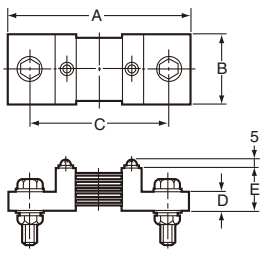


Current terminal: M10 screw (SDV-SH300),
M12 screw (SDV-SH500)
Voltage terminal: M4 screw

Model	A	B	C	D	E	Resistor
SDV-SH300	130	30	110	4	36	4
SDV-SH500	160	40	120	6	41	5

Note: Inquire about models with a rated current of 1,500 A or larger.

SDV-SH750/-SH1000 (60-mV Rating)



Current terminal: M12 screw
Voltage terminal: M5 screw

Model	A	B	C	D	E
SDV-SH750	175	45	130	15	30
SDV-SH1000	175	60	135	18	30

Questions and Answers

Q **Checking Operation**

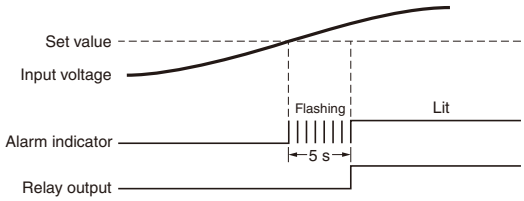
A

Overvoltages
Gradually increase the input from 80% of the setting. The input will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.

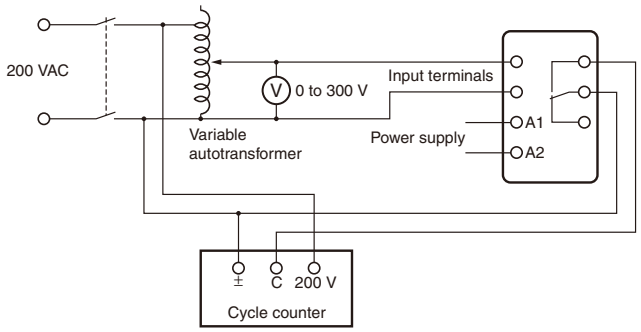
Undervoltage
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

Example: Overvoltage Operating Mode, Undervoltage Operating Mode and an Operating Time of 5 s

Note: K8AB-VW□ output relays are normally operative.



Connection Diagram



Q **How to Measure the Operating Time**

A

Overvoltage
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.

Undervoltage
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

Q **Operating Adjustment Knobs**

A

Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

Q **Setting the Pre-alarm Monitoring Mode**

A

Use the DIP switch to set the operating mode pins both to overvoltage (SW3 ON and SW4 OFF) or both to undervoltage (SW3 OFF and SW4 ON).

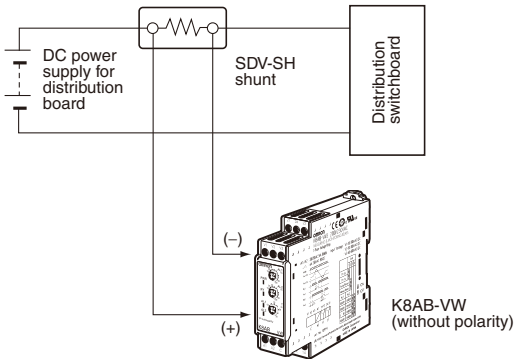
Example: Both Pins Set to Overvoltage
AL1 can be used as the pre-alarm for AL2 by setting a smaller voltage set value for AL1 than for AL2.

Q **Detecting Current with a Current Splitter**

A

An example of detecting an overload is shown below.

Example: Overload detection in a distribution switch board installed in a power substation.



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Phase-sequence Phase-loss Relay

K8AB-PH

Three-phase Phase-sequence Phase-loss Relay Using Voltage Detection Method

- Prevents reverse motor rotation due to incorrect wiring.
- Distinguishes between positive phases, reversed phases, and phase loss when power is turned ON.
- Voltage detection method enables application for any load current.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Output status can be monitored using LED indicator.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 38 for the Q&A section.

Model Number Structure

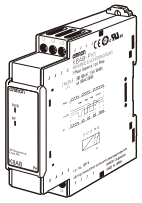
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PH: Phase-sequence Phase-loss Relay
3. **Rated Input Voltage**
   1: 200 to 500 VAC

Ordering Information

■ List of Models

Phase-sequence Phase-loss Relay	Functions	Rated input voltage (See note.)	Model
	Phase sequence and phase loss monitoring	200 to 500 VAC	**K8AB-PH1**

Note: The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	Three-phase, three-wire mode, 200 to 500 VAC
Input load	15 VA max.
Reversed phase and phase loss operating time	0.1 s max.
Reset method	Automatic reset
Indicators	Power (PWR): Green, Relay output (RY): Yellow
Output relays	One SPDT relay (NC operation)
Output relay ratings	Rated load Resistive load 6 A at 250 VAC (cosϕ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC (cosϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature	−20 to 60°C (with no condensation or icing)
Storage temperature	−40 to 70°C (with no condensation or icing)
Ambient operating humidity	25% to 85% (with no condensation)
Storage humidity	25% to 85% (with no condensation)
Altitude	2,000 m max.
Terminal screw tightening torque	0.49 N·m
Terminal wiring method	Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color	Munsell 5Y8/1
Case material	ABS resin (self-extinguishing resin) UL94-V0
Weight	Approx. 110 g
Mounting	Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions	22.5 (W) × 90 (H) × 100 (D) mm

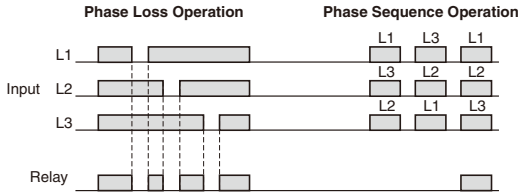
■ Specifications

Input voltage range		200 to 500 VAC
Input frequency range		45 to 65 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Temperature influence		Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of power supply voltage		Operating time: ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Influence of power supply frequency		Operating time: ±10% max. (at 45 to 65 Hz) **Note:** The error in the operating value and operating time under standard conditions.
Influence of input frequency		At 45 to 65 Hz Operating time ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between input terminals and output terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between input terminals and output terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

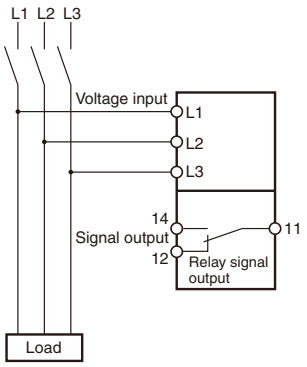
Connections

■ Wiring Diagram

Phase Sequence and Phase Loss Operation Diagram

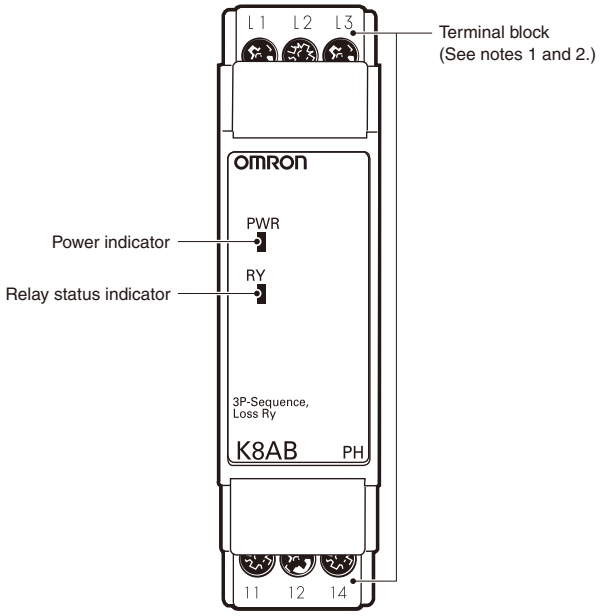


Note: **1.** Motor load phase loss cannot be detected. To detect motor load phase loss, use the K8AB-PM or K8AB-PA.
2. The K8AB-PH output relay is normally operative.
3. L1 and L3 function both as the power supply terminals and as input terminals. If the voltage drops below the minimum input voltage (60%), then the Relay will not operate due to an undervoltage.
4. Phase loss is detected based on the phase sequence, so phase loss cannot be detected for loads that generate inductive power, e.g., due to monitoring during operation.
5. Phase loss is detected based on voltage, so phase loss cannot be detected on the load side.



Nomenclature

■ Front

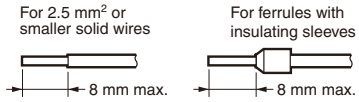


Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied (see note).
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).

Note: 1. The input across L1 and L3 is used for the internal power supply. Therefore, the power indicator will not be lit if there is no input across L1 and L3.

2. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- AI 1,5-8BK (for AWG16)
- AI 1-8RD (for AWG18)
- AI 0,75-8GY (for AWG18)

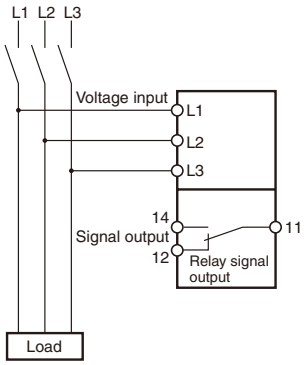
3. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

Connections

1. Input
Connect using L1, L2, and L3.
Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.

2. Outputs
Terminals 11, 12, and 14 are output terminals for SPDT.

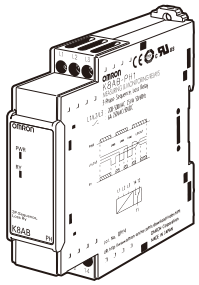


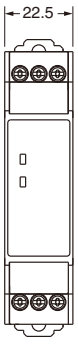
Dimensions

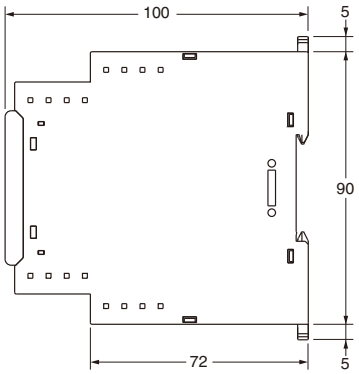
(Unit: mm)

Phase-sequence, Phase-loss Relays

K8AB-PH1







Questions and Answers

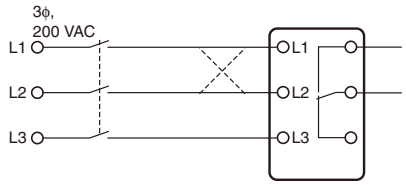
Q **Checking Operation**

A

Phase Sequence
Switch the wiring, as shown by the dotted lines in the connection diagram, to reverse the phase sequence and check that the K8AB operates.

Phase Loss
Create a phase loss for any input phase and check that the K8AB operates.

Connection Diagram



Q **Can phase loss be detected on the load side?**

A In principle, phase loss cannot be detected on the load side because the K8AB-PH1 measures three-phase voltage to determine phase loss.

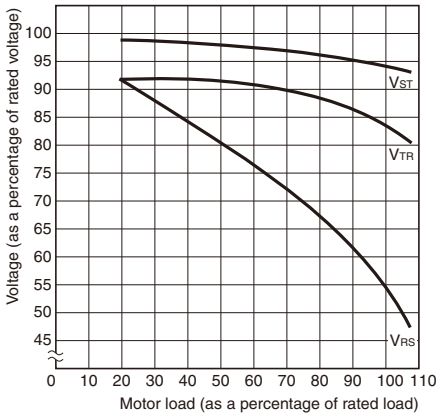
Q **Motor Load Phase Loss during Operation**

A Motor load phase loss cannot be detected during operation. It can be used to detect phase loss at startup.

Normally, three-phase motors will continue to rotate even if one phase is open. The three-phase voltage will be induced at the motor terminals. The diagram shows voltage induction at the motor terminals when phase R has been lost with a load applied to a three-phase motor. The horizontal axis shows the motor load as a percentage of the rated load, and the vertical axis shows voltage as a percentage of the rated voltage. The lines in the graph show the voltage induced at the motor terminals for each load when phase loss occurs during operation. As the graph shows, voltage is induced at the motor terminals even if there is phase loss for a motor load, so the K8AB-PH1 cannot detect phase loss for motor loads during operation. Use the K8AB-PH1 to detect phase loss at startup.

Characteristic Curve Diagram

Note: This characteristic curve shows the approximate values only.



Note: For phase loss of phase R. V_{ST}, V_{TR}, and V_{RS} indicate the motor terminal voltage at phase loss.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Phase-sequence Phase-loss Relay
K8AB-PM

Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.

- Monitor overvoltages, undervoltages, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
  Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
  Output overvoltages and undervoltages using separate relays.
- World-wide power specifications supported by one Unit (switchable).
- Output status can be monitored using LED indicator.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 46 for the Q&A section.

Model Number Structure

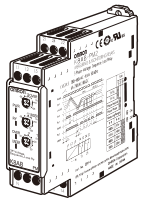
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PM: Three-phase Phase-sequence Phase-loss Relay (Simultaneous upper and lower monitoring)
3. **Rated Input Voltage**
   1: 115, 127, 133, 138, 200, 220, 230, 240 VAC
   2: 220, 230, 240, 277, 380, 400, 415, 480 VAC

Ordering Information

■ List of Models

Three-phase Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	200, 220, 230, 240 VAC	**K8AB-PM1**
	3-phase 4-wire mode	115, 127, 133, 138 VAC	
	3-phase 3-wire mode	380, 400, 415, 480 VAC	**K8AB-PM2**
	3-phase 4-wire mode	220, 230, 240, 277 VAC	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a DIP switch.
2. The power supply is shared with the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PM1**	Three-phase, three-wire Mode: 200, 220, 230 and 240 VAC Three-phase, four-wire Mode: 115, 127, 133 and 138 VAC
	K8AB-PM2	Three-phase, three-wire Mode: 380, 400, 415 and 480 VAC Three-phase, four-wire Mode: 220, 230, 240 and 277 VAC
Input load		K8AB-PM1: 25 VA max. K8AB-PM2: 45 VA max.
Operating value setting range (OVER, UNDER)		Overvoltage –30% to 25% of rated input voltage Undervoltage –30% to 25% of rated input voltage **Note:** The rated input voltage can be switched using the DIP switch.
Operating value		100% operation at set value
Reset value		5% of operating value (fixed)
Reset method		Automatic reset
Operating time setting range (T)	**Overvoltage/undervoltage**	0.1 to 30 s
	Reversed phase/phase loss	0.1 s max.
Startup lock time (LOCK)		1 s or 5 s (Switched using DIP switch.)
Indicators		Power (PWR): Green, Relay output (RY): Yellow, OVER/UNDER: Red
Output relays		Two SPDT relays (NC operation)
Output relay ratings		Rated load Resistive load 6 A at 250 VAC (cosϕ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC (cosϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85% (with no condensation)
Storage humidity		25% to 85% (with no condensation)
Altitude		2,000 m max.
Terminal screw tightening torque		0.49 N·m
Terminal wiring method		Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color		Munsell 5Y8/1
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		Approx. 130 g
Mounting		Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions		22.5 (W) × 90 (H) × 100 (D) mm

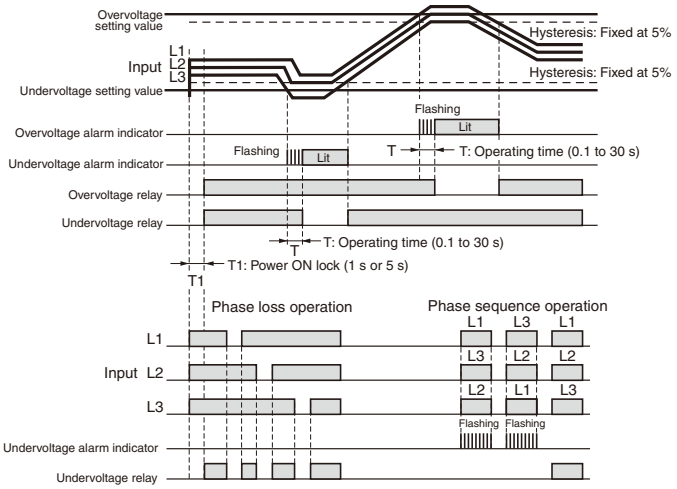
■ Specifications

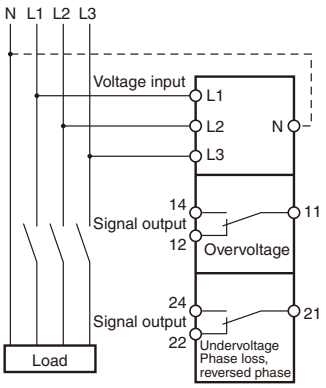
Input frequency range		45 to 65 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating value**	Set value ±10% of full scale
	Operating time	
	Startup lock time	Set value ±0.5 s
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/Average value × 100%
	Reset value	Overvoltage: Operating value x 95% ±2% Undervoltage: Operating value x 105% ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Overvoltage: Measured when input suddenly changes from 70% to 120% of setting. Undervoltage: Measured when input suddenly changes from 120% to 70% of setting. The input voltage, however, must be between 70% and 125% of rating.
	Startup lock time	Startup lock time repeat error: ±0.5 s (The operating time when the operating time is set to the minimum value and the power supply suddenly changes from 0% to 100%.)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of input frequency		At 45 to 65 Hz Operating value ±5% max. Operating time ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Connections

■ Wiring Diagram

Overvoltage/Undervoltage and Phase Sequence/Phase Loss Operation Diagram

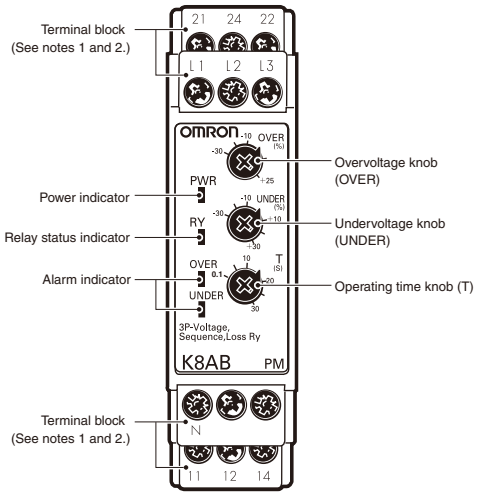




Note: 1. The K8AB-PM output relay is normally operative.
2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.
3. Phase loss is detected by L1, L2, and L3 voltage drops.
A phase loss will exist if any of the phases drops below 60% of the rated input.
4. L1 and L2 function both as the power supply terminals and as input terminals. If the voltage drops dramatically, then the Relay will not operate due to an undervoltage.
5. Motor load phase loss cannot be detected during operation.
6. Phase loss is detected based on voltage, so phase loss cannot be detected on the load side.

Nomenclature

■ Front



Indicators

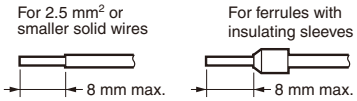
Item		Meaning
Power indicator (PWR: Green)		Lit when power is being supplied (see note).
Relay status indicator (RY: Yellow)		Lit when relay is operating (normally lit).
Alarm indicator	Overvoltage: Red	Lit when there is an overvoltage. The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.
	Undervoltage: Red	• Lit when there is an undervoltage or phase loss. The indicator flashes to indicate the error status after the undervoltage has exceeded the threshold value while the operating time is being clocked. • Lit when there is a phase sequence error.

Note: The input across L1 and L2 is used for the internal power supply. Therefore, the power indicator will not be lit if there is no input across L1 and L2.

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Can be set between –30% and 25% of the rated input.
Undervoltage knob (UNDER)	Can be set between –30% and 25% of the rated input.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules
Phoenix Contact
- Al 1,5-8BK (for AWG16)
- Al 1-8RD (for AWG18)
- Al 0,75-8GY (for AWG18)

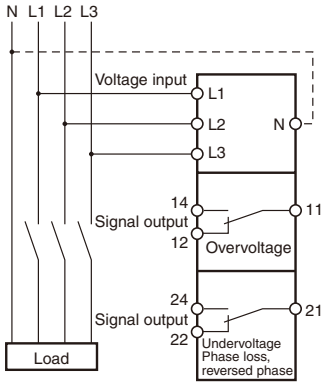
2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

Connections

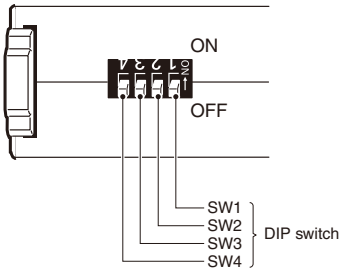
1. Input
Connect to L1, L2, and L3 (for three-phase three-wire mode) or L1, L2, L3, and N (for three-phase four-wire mode), depending on the mode selected using pin 2 on the DIP switch.
The Unit will not operate correctly if the DIP switch setting and the wiring do not agree.
Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.

2. Outputs
Terminals 11, 12, and 14 are the output terminals for overvoltage (SPDT).
Terminals 21, 22, and 24 are the output terminals for undervoltage, phase loss, and reversed phase (SPDT).



DIP Switch Settings

The power ON lock time, number of wires, and rated voltage are set using the DIP switch located on the bottom of the Unit.



DIP Switch Functions

K8AB-PM1

SWITCH	ON ● ↑ / OFF ❍ ↓		4	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	240 V	138 V	●	●	---	---
	230 V	133 V	●	❍	---	---
	220 V	127 V	❍	●	---	---
	200 V	115 V	❍	❍	---	---

Note: All pins are set to OFF at the factory.

K8AB-PM2

SWITCH	ON ● ↑ / OFF ❍ ↓		4	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	480 V	277 V	●	●	---	---
	415 V	240 V	●	❍	---	---
	400 V	230 V	❍	●	---	---
	380 V	220 V	❍	❍	---	---

Note: All pins are set to OFF at the factory.

Setting Method

1. Overvoltage
The overvoltage knob (OVER) is used to set the overvoltage threshold.
The overvoltage can be set to between −30% and 25% of the rated input voltage.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The rated input depends on the model and DIP switch setting.
Example: K8AB-PM1 with Pin 2 Turned OFF (Three-phase, Three-wire Mode) and Pins 3 and 4 Turned OFF (Rated Voltage of 200 V)
The rated input voltage is 200 VAC and the setting range is 140 to 250 V.

2. Undervoltage
Undervoltage is set using the undervoltage knob (UNDER).
The undervoltage can be set to between −30% and 25% of the rated input.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The rated input depends on the model and DIP switch setting.
Example: K8AB-PM1 with Pin 2 Turned OFF (Three-phase, Three-wire Mode) and Pins 3 and 4 Turned OFF (Rated Voltage of 200 V)
The rated input voltage is 200 VAC and the setting range is 140 to 250 V.

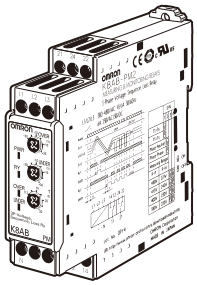
3. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

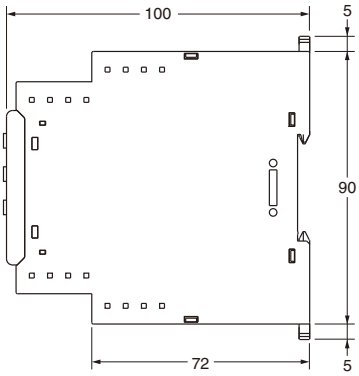
Dimensions

(Unit: mm)

Three-phase Voltage with Phase-sequence, Phase-loss Relays

K8AB-PM1
K8AB-PM2





Questions and Answers

Q Checking Operation

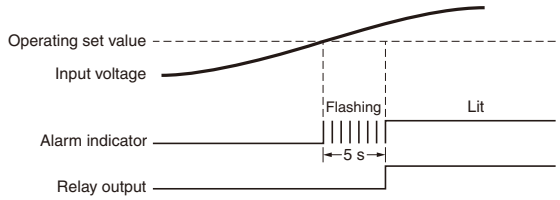
A

Overvoltages
Gradually increase the input from 80% of the setting. The input value will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay output that will start after the operating time has passed.

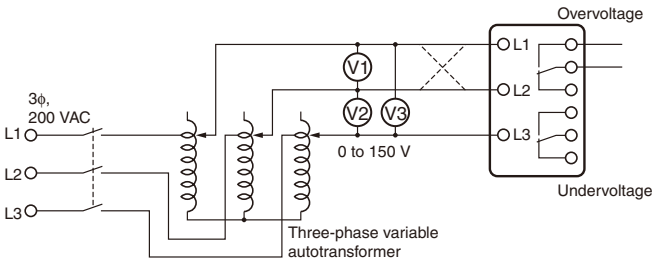
Undervoltage
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

Example: For monitoring mode set to three-phase three-wire monitoring, a rated voltage of 200 V, and an operating time of 5 s.

Note: K8AB-PM□ output relays are normally operative.



Connection Diagram 1



Q How to Measure the Operating Time

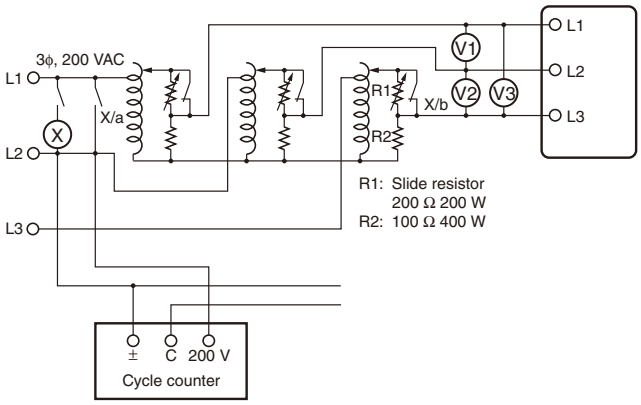
A

Overvoltage
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.

Undervoltage
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

Operating Time
Adjust the slide resistor so that the voltage applied to the K8AB terminals is 120% of the set value (for overvoltage detection) and 80% of the set value (for undervoltage detection) when the auxiliary relay operates, as shown in connection diagram 2. Close the switch and use the cycle counter to measure the operating time.

Connection Diagram 2



Q Checking the Phase Sequence and Phase Loss Operation

A

Phase Sequence
Switch the wiring, as shown by the dotted lines in connection diagram 1, to reverse the phase sequence and check that the K8AB operates.

Phase loss
Create a phase loss for any input phase and check that the K8AB operates.

Q Operating Adjustment Knobs

A

Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

Questions and Answers

Q **Load-side Phase Loss**

A In principle, phase loss cannot be detected on the load side because the K8AB-PM□ measures three-phase voltage to determine phase loss.

Q **Motor Load Phase Loss during Operation**

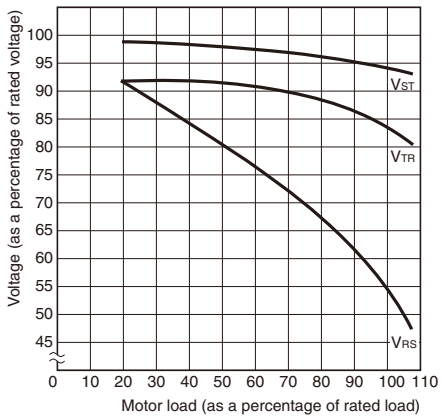
A Motor load phase loss cannot be detected during operation. It can be used to detect phase loss at startup.

Normally, three-phase motors will continue to rotate even if one phase is open. The three-phase voltage will be induced at the motor terminals. The diagram shows voltage induction at the motor terminals when phase R has been lost with a load applied to a three-phase motor. The horizontal axis shows the motor load as a percentage of the rated load, and the vertical axis shows voltage as a percentage of the rated voltage. The lines in the graph show the voltage induced at the motor terminals for each load phase loss occurs during operation. As the graph shows, phase loss cannot be detected because the motor terminal voltage does not drop very much even if a phase is lost when the load on the motor is light. To detect motor load phase loss during operation, use the undervoltage detection function to detect the motor terminal voltages at phase loss.

Set the operating time carefully because it will affect the time from when the phase loss occurs until tripping when this function is used.

Characteristic Curve Diagram

Note: This characteristic curve shows the approximate values only.



Note: For phase loss of phase R. V_{ST}, V_{TR}, and V_{RS} indicate the motor terminal voltage at phase loss.

Q **Overvoltage Detection When Only One Phase Exceeds the Overvoltage Threshold**

A The K8AB monitors each of the three-phase voltages. This means an overvoltage is detected if even only one phase exceeds the threshold value. The same applies to undervoltages.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Asymmetry and Phase-sequence Phase-loss Relay
K8AB-PA

Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment.

- Monitor voltage asymmetry, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
  Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- World-wide power specifications supported by one Unit (switchable).
- Relay status can be monitored using LED indicator.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 56 for the Q&A section.

Model Number Structure

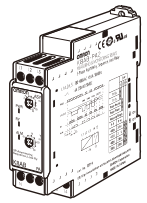
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PA: Three-phase Asymmetry and Phase-sequence Phase-loss Relay.
3. **Rated Input Voltage**
   1: AC 115, 127, 133, 138, 200, 220, 230, 240
   2: AC 220, 230, 240, 277, 380, 400, 415, 480

Ordering Information

■ List of Models

Three-phase Asymmetry and Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	AC 200, 220, 230, 240	**K8AB-PA1**
	3-phase 4-wire mode	AC 115, 127, 133, 138	
	3-phase 3-wire mode	AC 380, 400, 415, 480	**K8AB-PA2**
	3-phase 4-wire mode	AC 220, 230, 240, 277	

Note: 1. Three-phase, three-wire or four-wire and the input range are switched using a DIP switch.

2. The power supply voltage is the same as the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PA1**	Three-phase, three-wire Mode: 200, 220, 230 and 240 VAC Three-phase, four-wire Mode: 115, 127, 133 and 138 VAC
	K8AB-PA2	Three-phase, three-wire Mode: 380, 400, 415 and 480 VAC Three-phase, four-wire Mode: 220, 230, 240 and 277 VAC
Input load		K8AB-PA1: 25 VA max. K8AB-PA2: 45 VA max.
Operating value setting range (ASY.)		Asymmetry rate: 2% to 22%
Operating value		Asymmetry operating value = Rated input voltage × Asymmetry set value (%) The asymmetry operation will function when the potential difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value.
Reset value setting range (HYS.)		5% to 50% of operating value
Reset method		Automatic reset
Operating time setting range (T)	**Asymmetry**	0.1 to 30 s
	Reversed phase/phase loss	0.1 s max.
Startup lock time (LOCK)		1 s or 5 s (Switched using DIP switch.)
Indicators		Power (PWR): Green, Relay output (RY): Yellow, Alarm outputs (ALM): Red
Output relays		One SPDT relay (NC operation)
Output relay ratings		Rated load Resistive load 6 A at 250 VAC (cosϕ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC (cosϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature		−20 to 60°C (with no condensation or icing)
Storage temperature		−40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85% (with no condensation)
Storage humidity		25% to 85% (with no condensation)
Altitude		2,000 m max.
Terminal screw tightening torque		0.49 N·m
Terminal wiring method		Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color		Munsell 5Y8/1
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		Approx. 120 g
Mounting		Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions		22.5 (W) × 90 (H) × 100 (D) mm

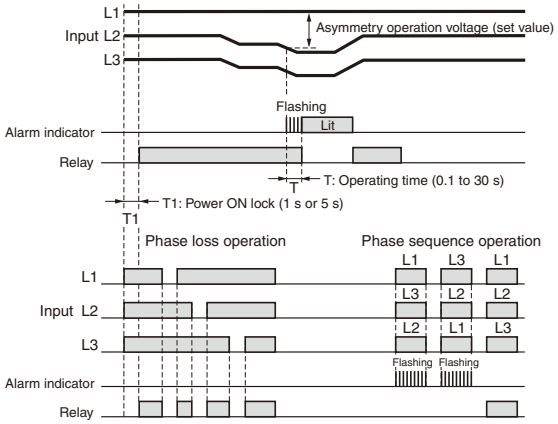
■ Specifications

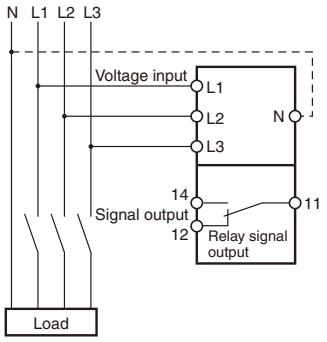
Input frequency range		45 to 65 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating value**	Set value ±10% full scale
	Operating time	
	Startup lock time	Set value ±0.5 s
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/Average value × 100%
	Reset value	Operating value × 95% ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Asymmetry: Measured when the input suddenly changes from the three-phase asymmetry status to a difference between the maximum and minimum phases of 120% of the asymmetry operating value.
	Startup lock time	Startup lock time repeat error: ±0.5 s (The operating time when the operating time is set to the minimum value and the power supply suddenly changes from 0% to 100%.)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of input frequency		At 45 to 65 Hz Operating value ±5% max. Operating time ±10% max. **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between input terminals and output terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between input terminals and output terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Connections

■ Wiring Diagram

Voltage Asymmetry and Phase Sequence/Phase Loss Operation Diagram





Note: 1. K8AB-PA output relay is normally operative.
2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.
3. Phase loss is detected by L1, L2, and L3 voltage drops.
A phase loss will exist if any of the phases drops below 60% of the rated input.
4. L1 and L2 function both as the power supply terminals and as input terminals. If the voltage drops dramatically, then the Relay will not operate due to an undervoltage.
5. Motor load phase loss cannot be detected during operation.
6. Phase loss is detected based on voltage, so phase loss cannot be detected on the load side.

Calculating the Asymmetry Operating Voltage

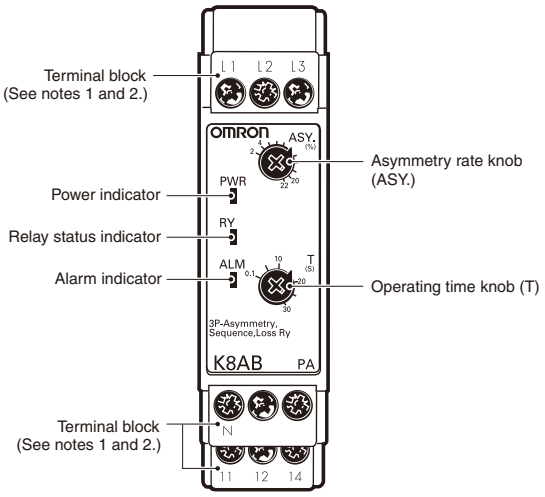
Asymmetry operation condition = (Highest voltage − Lowest voltage) > Asymmetry operating voltage

Asymmetry operating voltage = Rated input voltage (V) × Asymmetry set value (%)

Note: The rated input voltage is selected and set with the DIP switch.

Nomenclature

■ Front



Indicators

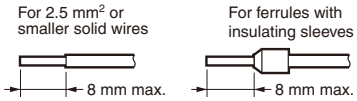
Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied (see note).
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Asymmetry voltage error indicator The indicator flashes to indicate the error status after the input has exceeded the threshold value while the operating time is being clocked.

Note: The input across L1 and L2 is used for the internal power supply. Therefore, the power indicator will not be lit if there is no input across L1 and L2.

Setting Knobs

Item	Usage
Asymmetry rate knob (ASY.)	Used to set the asymmetry rate to 2% to 22%.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



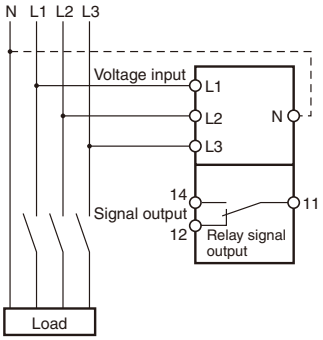
Recommended ferrules
Phoenix Contact
- Al 1,5-8BK (for AWG16)
- Al 1-8RD (for AWG18)
- Al 0,75-8GY (for AWG18)

2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

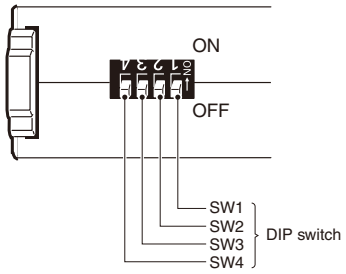
Connections

1. Input
   Connect to L1, L2, and L3 (for three-phase three-wire mode) or L1, L2, L3, and N (for three-phase four-wire mode), depending on the mode selected using pin 2 on the DIP switch.
   The Unit will not operate correctly if the DIP switch setting and the wiring do not agree.
   Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.
2. Outputs
   Terminals 11, 12, and 14 are output terminals for SPDT.



DIP Switch Settings

The power ON lock time, number of wires, and rated voltage are set using the DIP switch located on the bottom of the Unit.



DIP Switch Functions

K8AB-PA1

SWITCH	ON ● ↑ / OFF ❍ ↓		4	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	240 V	138 V	●	●	---	---
	230 V	133 V	●	❍	---	---
	220 V	127 V	❍	●	---	---
	200 V	115 V	❍	---	---	---

Note: All pins are set to OFF at the factory.

K8AB-PA2

SWITCH	ON ● ↑ / OFF ❍ ↓		4	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	480 V	277 V	●	●	---	---
	415 V	240 V	●	❍	---	---
	400 V	230 V	❍	●	---	---
	380 V	220 V	❍	❍	---	---

Note: All pins are set to OFF at the factory.

Setting Method

1. Asymmetry
Asymmetry is set using the asymmetry operation knob (ASY.)
The setting can be between 2% and 22% of the rated input.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the asymmetry.
The rated input depends on the model and DIP switch setting.

Example: K8AB-PA1 with Pin 2 Turned OFF (Three-phase, Three-wire Mode) and Pins 3 and 4 Turned OFF (Rated Voltage of 200 V)
The rated input voltage is 200 VAC and the setting range is 4 to 44 V.
If the setting (ASY. knob) is at 10%, the asymmetry operation voltage is 20 V and an alarm will be output if the difference between the minimum and maximum phases for two of the three phases exceeds 20 V.

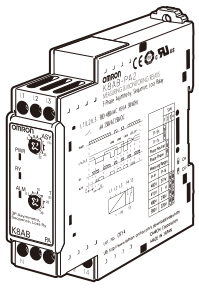
2. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the operating time.
If the input exceeds the asymmetry set value, the alarm indicator will start flashing for the set period and then stay lit.

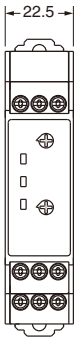
Dimensions

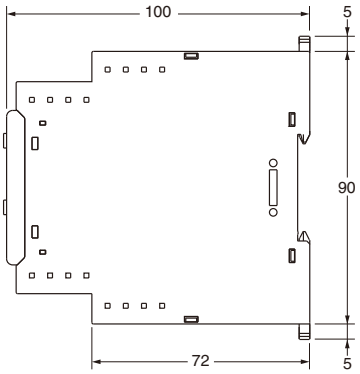
(Unit: mm)

Three-phase Asymmetry and Phase-sequence Phase-loss Relay

K8AB-PA1
K8AB-PA2







Questions and Answers

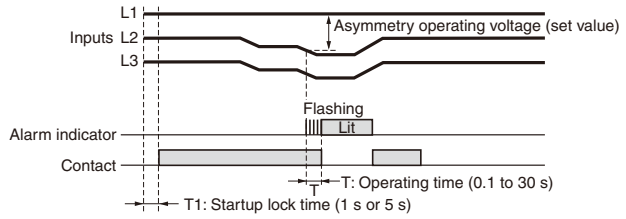
Q **Checking Operation**

A With the rated input voltage applied, gradually change the voltage to any one phase. The Unit will operate when the difference between the maximum and minimum voltage phases reaches or exceeds the asymmetry operating value.

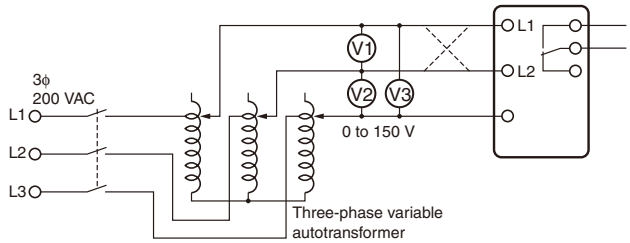
Asymmetry operating value = Rated input voltage × Asymmetry set value (%)

Example: For monitoring mode set to three-phase three-wire monitoring, a rated voltage of 200 V, and an operating time of 5 s.

Note: K8AB-PA□ output relays are normally operative.



Connection Diagram 1



Q **How to Measure the Operating Time**

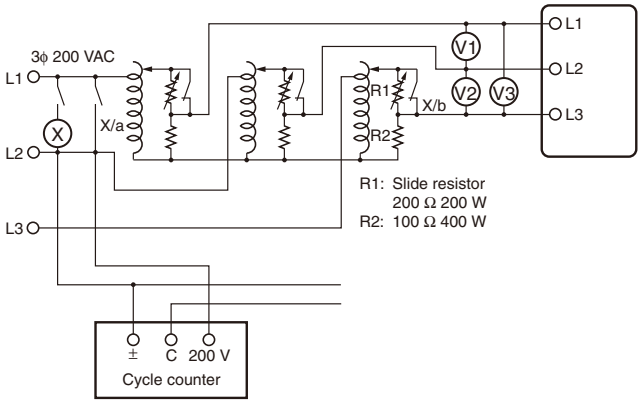
A Asymmetry

Change the input rapidly from a symmetric state to an asymmetric state and measure the time until the relay operates.

Operating Time

Adjust the slide resistor so that the voltage difference applied to the K8AB terminals is equal to or greater than the asymmetry operating value when the auxiliary relay operates, as shown in connection diagram 2. Close the switch and use the cycle counter to measure the operating time.

Connection Diagram 2



Q **Checking the Phase Sequence and Phase Loss Operation**

A Phase Sequence Operation

Switch the wiring, as shown by the dotted lines in connection diagram 1, to reverse the phase sequence and check that the K8AB operates.

Phase Loss Operation

Create a phase loss for any input phase and check that the K8AB operates.

Q **Operating Adjustment Knobs**

A Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

Q **Load-side Phase Loss**

A In principle, phase loss cannot be detected on the load side because the K8AB-PA□ measures three-phase voltage to determine phase loss.

Q **Motor Load Phase Loss during Operation**

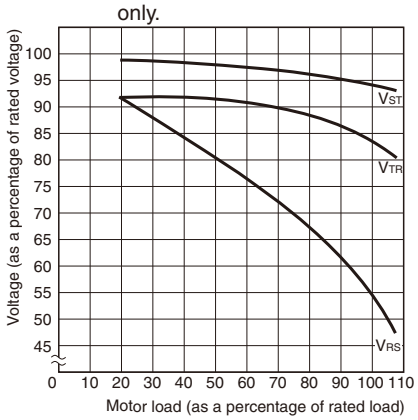
A Phase loss cannot be detected for motor loads during operation. Use the asymmetry detection function.

Normally, three-phase motors will continue to rotate even if one phase is open. The three-phase voltage will be induced at the motor terminals. The diagram shows voltage induction at the motor terminals when phase R is lost with a load applied to a three-phase motor. The horizontal axis shows the motor load as a percentage of the rated load, and the vertical axis shows voltage as a percentage of the rated voltage. The lines in the graph show the voltage induced at the motor terminals for each load when phase loss occurs during operation. As the graph shows, phase loss cannot be detected because the motor terminal voltage does not drop very much even if a phase is lost when the load on the motor is light. Use the asymmetry detection function to detect asymmetry in the motor terminal voltages.

Set the operating time carefully because it will affect the time from when the phase loss occurs until tripping when this function is used.

Characteristic Curve Diagram

Note: This characteristic curve shows the approximate values only.



Note: For phase loss of phase R. V_{ST}, V_{TR}, and V_{RS} indicate the motor terminal voltage at phase loss.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Three-phase Voltage Relay
K8AB-PW

Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.

- Monitor overvoltages and undervoltages for three-phase 3-wire or 4-wire power supplies.
  DIP switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
  Separate outputs possible for overvoltages and undervoltages.
- World-wide power specifications supported by one Unit (switchable using DIP switch).
- Relay status can be monitored using LED indicator.

⚠ Refer to *Safety Precautions for the K8AB Series*. Refer to page 66 for the Q&A section.

Model Number Structure

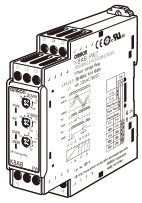
■ Model Number Legend

K8AB-□□
1 2 3

1. **Basic Model**
   K8AB: Measuring and Monitoring Relays
2. **Functions**
   PW: Three-phase Voltage Relay (Simultaneous upper and lower monitoring)
3. **Rated Input Voltage**
   1: 115, 127, 133, 138, 200, 220, 230, 240 VAC
   2: 220, 230, 240, 277, 380, 400, 415, 480 VAC

Ordering Information

■ List of Models

Three-phase Voltage Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	200, 220, 230, 240 VAC	**K8AB-PW1**
	3-phase 4-wire mode	115, 127, 133, 138 VAC	
	3-phase 3-wire mode	380, 400, 415, 480 VAC	**K8AB-PW2**
	3-phase 4-wire mode	220, 230, 240, 277 VAC	

Note: 1. Three-phase, three-wire or four-wire and the input range are switched using a DIP switch.

2. The power supply voltage is the same as the rated input voltage.

Ratings and Specifications

■ Ratings

Rated input voltage	**K8AB-PW1**	Three-phase, three-wire Mode: 200, 220, 230 and 240 VAC Three-phase, four-wire Mode: 115, 127, 133 and 138 VAC
	K8AB-PW2	Three-phase, three-wire Mode: 380, 400, 415 and 480 VAC Three-phase, four-wire Mode: 220, 230, 240 and 277 VAC
Input load		K8AB-PW1: 25 VA max. K8AB-PW2: 45 VA max.
Operating value setting range (OVER, UNDER)		Overvoltage −30% to 25% of rated input voltage Undervoltage −30% to 25% of rated input voltage **Note:** The rated input voltage can be switched using the DIP switch.
Operating value		100% operation at set value
Reset value		5% of operating value (fixed)
Reset method		Automatic reset
Operating time setting range (T)		Overvoltage and undervoltage: 0.1 to 30 s
Startup lock time (LOCK)		1 s or 5 s (Switched using DIP switch.)
Indicators		Power (PWR): Green, Relay output (RY): Yellow, OVER/UNDER: Red
Output relays		Two SPDT relays (NC operation)
Output relay ratings		Rated load Resistive load 6 A at 250 VAC (cosϕ = 1) 6 A at 30 VDC (L/R = 0 ms) Inductive load 1 A at 250 VAC (cosϕ = 0.4) 1 A at 30 VDC (L/R = 7 ms) Maximum contact voltage: 250 VAC Maximum contact current: 6 A AC Maximum switching capacity: 1,500 VA Minimum load: 10 mA at 5 VDC Mechanical life: 10,000,000 operations Electrical life: Make: 50,000 times, Break: 30,000 times
Ambient operating temperature		−20 to 60°C (with no condensation or icing)
Storage temperature		−40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85% (with no condensation)
Storage humidity		25% to 85% (with no condensation)
Altitude		2,000 m max.
Terminal screw tightening torque		0.49 N·m
Terminal wiring method		Recommended wire Solid wire: 2.5 mm^2 Twisted wires: AWG16, AWG18 **Note: 1.** Ferrules with insulating sleeves must be used with twisted wires. **2.** Two wires can be twisted together. Recommended ferrules AI 1,5-8BK (for AWG16) manufactured by Phoenix Contact AI 1-8RD (for AWG18) manufactured by Phoenix Contact AI 0,75-8GY (for AWG18) manufactured by Phoenix Contact
Case color		Munsell 5Y8/1
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		Approx. 130 g
Mounting		Mounted to DIN Track or via M4 screws (tightening torque: 1.2 N·m)
Dimensions		22.5 (W) × 90 (H) × 100 (D) mm

■ Specifications

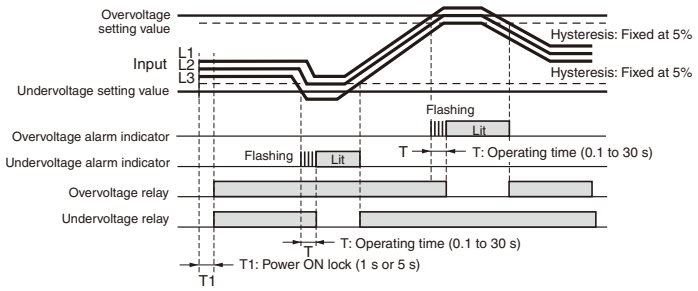
Input frequency range		45 to 65 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating value**	Set value ±10% of rated input voltage
	Operating time	
	Startup lock time	Set value ±0.5 s
Repeat error	**Operating value**	Operating value ±2% Error calculation: Error = ((Maximum operating value − Minimum operating value (over 10 operations))/2)/ Average value × 100%
	Reset value	Overvoltage: Operating value x 95% ±2% Undervoltage: Operating value x 105% ±2% Error calculation: Error = ((Maximum reset value − Minimum reset value (over 10 resets))/2)/ Average value × 100%
	Operating time	Operating time repeat error: ±50 ms Overvoltage: Measured when input suddenly changes from 70% to 120% of setting. Undervoltage: Measured when input suddenly changes from 120% to 70% of setting. The input voltage, however, must be between 70% and 125% of rating.
	Startup lock time	Startup lock time repeat error: ±0.5 s (The operating time when the operating time is set to the minimum value and the power supply suddenly changes from 0% to 100%.)
Temperature influence		Operating value Drift based on measured value at standard temperature: −20°C to standard temperature: ±1,000 ppm/°C max. Standard temperature to 60°C : ±1,000 ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: −20°C to standard temperature: ±10% max. Standard temperature to 60°C : ±10% max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: ±5% max. Operating time Based on ambient room humidity 25% to 80%: ±10% max.
Influence of input frequency		At 45 to 65 Hz Operating value ±5% Operating time ±10% **Note:** The error in the operating value and operating time under standard conditions.
Applicable standards	**Conforming standards**	EN60255-5 and EN60255-6 Installation environment (Pollution Degree 2, Overvoltage Category III)
	EMC	EN61326
	Safety standards	UL508
Insulation resistance		20 MΩ min. Between external terminals and case Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Dielectric strength		2,000 VAC for one minute Between external terminals and case Between input terminals and output 1 terminals Between input terminals and output 2 terminals Between output 1 terminals and output 2 terminals
Noise immunity		1,500 V power supply terminal common/normal mode Square-wave noise of ±1 μs/100 ns pulse width with 1-ns rise time
Vibration resistance		Frequency 10 to 55 Hz, 0.35-mm single amplitude, acceleration 50 m/s^2 10 sweeps of 5 min each in X, Y, and Z directions
Shock resistance		100 m/s^2, 3 times each in 6 directions along three axes (up/down, left/right, forward/backward)
Degree of protection		Terminal section: Finger protection

Note: The reset value is valid only for automatic resets.

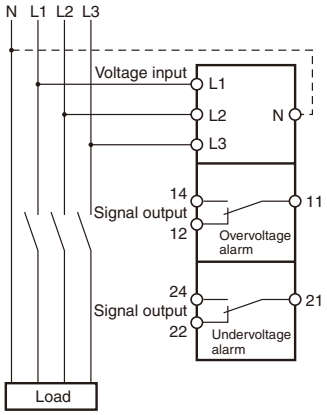
Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

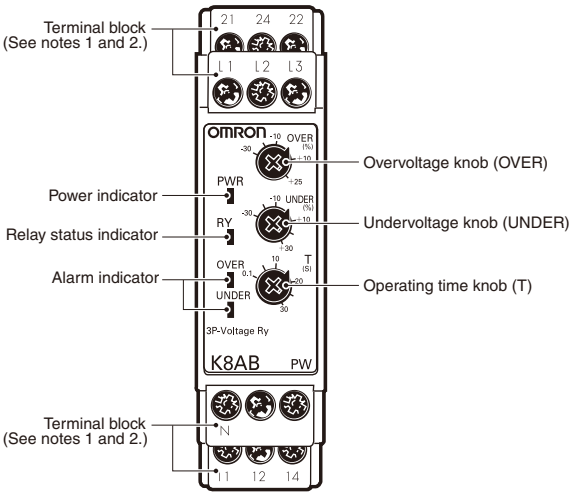


Note: **1.** K8AB-PW output relay is normally operative.
2. The power ON lock function prevents unnecessary alarms from being generated during the unstable period when the power is first turned ON. There is no relay output during timer operation.
3. L1 and L2 use the same power supply and will not operate due to an undervoltage if they drop below the rated input of 60%.



Nomenclature

■ Front



Indicators

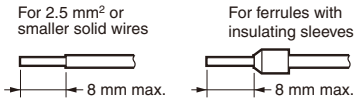
Item		Meaning
Power indicator (PWR: Green)		Lit when power is being supplied (see note).
Relay status indicator (RY: Yellow)		Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Overvoltage: Red	Lit when there is an overvoltage. The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.
	Undervoltage: Red	Lit when there is an undervoltage or phase loss. The indicator flashes to indicate the error status after the undervoltage has exceeded the threshold value while the operating time is being clocked.

Note: The input across L1 and L2 is used for the internal power supply. Therefore, the power indicator will not be lit if there is no input across L1 and L2.

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Can be set between −30% and 25% of the rated input.
Undervoltage knob (UNDER)	Can be set between −30% and 25% of the rated input.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Note: 1. Use either a solid wire of 2.5 mm^2 maximum or a ferrule with insulating sleeve for the terminal connection.
The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



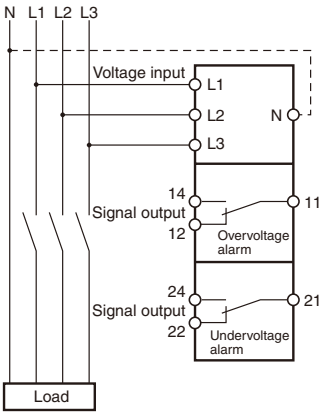
Recommended ferrules
Phoenix Contact
- AI 1,5-8BK (for AWG16)
- AI 1-8RD (for AWG18)
- AI 0,75-8GY (for AWG18)

2. Tightening torque
Recommended: 0.49 N·m
Maximum: 0.54 N·m

■ Operation and Setting Methods

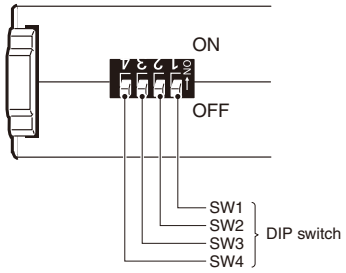
Connections

1. Input
   Connect to L1, L2, and L3 (for three-phase three-wire mode) or L1, L2, L3, and N (for three-phase four-wire mode), depending on the mode selected using pin 2 on the DIP switch.
   The Unit will not operate correctly if the DIP switch setting and the wiring do not agree.
   Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.
2. Outputs
   Terminals 11, 12, and 14 are the output terminals for overvoltage (SPDT).
   Terminals 21, 22, and 24 are the output terminals for undervoltage (SPDT).



DIP Switch Settings

The Startup lock time, number of wires, and rated voltage are set using the DIP switch located on the bottom of the Unit.



DIP Switch Functions

K8AB-PW1

SWITCH	ON ● ↑ / OFF ❍ ↓		4 (ON / OFF)	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	240 V	138 V	●	●	---	---
	230 V	133 V	●	❍	---	---
	220 V	127 V	❍	●	---	---
	200 V	115 V	❍	❍	---	---

Note: All pins are set to OFF at the factory.

K8AB-PW2

SWITCH	ON ● ↑ / OFF ❍ ↓		4 (ON / OFF)	3	2	1
Power ON lock time	5 s		---	---	---	●
	1 s		---	---	---	❍
Number of wires	Three-phase, four-wire		---	---	●	---
	Three-phase, three-wire		---	---	❍	---
Rated voltage	Three-phase, three-wire	Three-phase, four-wire				
	480 V	277 V	●	●	---	---
	415 V	240 V	●	❍	---	---
	400 V	230 V	❍	●	---	---
	380 V	220 V	❍	❍	---	---

Note: All pins are set to OFF at the factory.

Setting Method

1. Overvoltage
The overvoltage knob (OVER) is used to set the overvoltage.
The overvoltage can be set to between −30% and 25% of the rated input voltage.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The rated input depends on the model and DIP switch setting.
Example: K8AB-PW1 with Pin 2 Turned OFF (Three-phase, Three-wire Mode) and Pins 3 and 4 Turned OFF (Rated Voltage of 200 V)
The rated input voltage is 200 VAC and the setting range is 160 to 250 V.

2. Undervoltage
Undervoltage is set using the undervoltage knob (UNDER).
The undervoltage can be set to between −30% and 25% of the rated input.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the voltage.
The rated input depends on the model and DIP switch setting.
Example: K8AB-PW1 with Pin 2 Turned OFF (Three-phase, Three-wire Mode) and Pins 3 and 4 Turned OFF (Rated Voltage of 200 V)
The rated input voltage is 200 VAC and the setting range is 160 to 250 V.

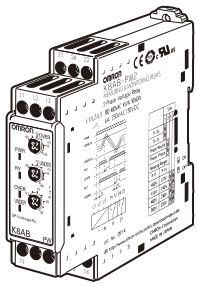
3. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this as a guide to set the current.
If the input exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

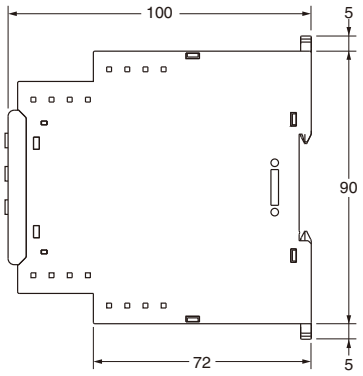
Dimensions

(Unit: mm)

Three-phase Voltage Relays

K8AB-PW1
K8AB-PW2





Questions and Answers

Q **Checking Operation**

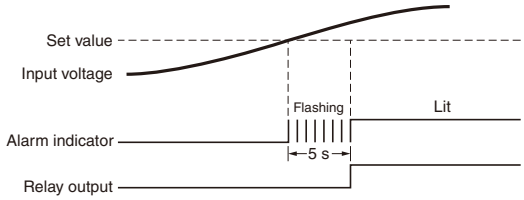
A

Overvoltage
Gradually increase the input from 80% of the setting. The input value will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay output that will start after the operating time has passed.

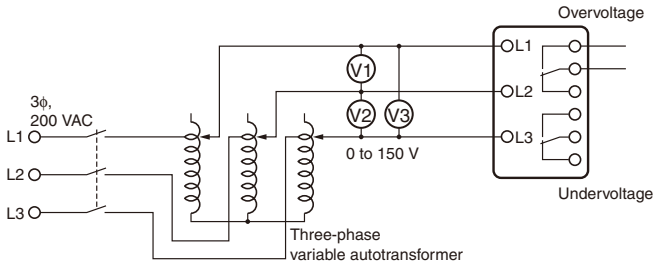
Undervoltage
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

Example: For monitoring mode set to three-phase three-wire monitoring, a rated voltage of 200 V, and an operating time of 5 s.

Note: K8AB-PW□ output relays are normally operative.



Connection Diagram



Q **How to Measure the Operating Time**

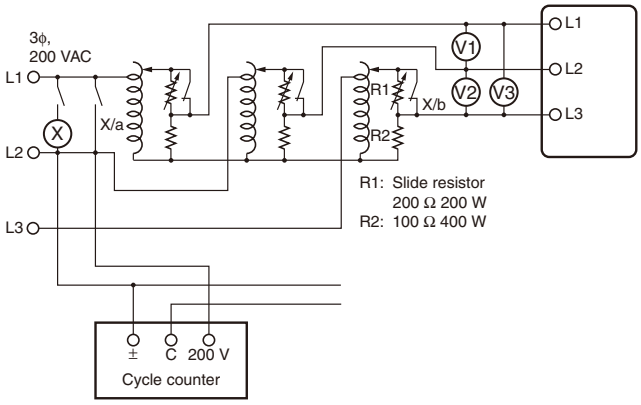
A

Overvoltage
Change the input suddenly from 0% to 120% of the set value and measure the time until the Unit operates.

Undervoltage
Change the input suddenly from 120% to 0% of the set value and measure the time until the Unit operates.

Operating Time
Adjust the slide resistor so that the voltage applied to the K8AB terminals is 120% of the overvoltage set value or 80% of the undervoltage set value when the auxiliary relay operates in a test circuit. Close the switch and use the cycle counter to measure the operating time.

Connection Diagram



Q **Operating Adjustment Knobs**

A Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

Q **Overvoltage Detection When Only One Phase Exceeds the Overvoltage Threshold**

A The K8AB monitors each of the three-phase voltages. This means an overvoltage is detected if even only one phase exceeds the threshold value. The same applies to undervoltages.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

In the interest of product improvement, specifications are subject to change without notice.

Safety Precautions for the K8AB Series

■ Precautions for Safe Use

Make sure to follow the instructions below to ensure safety.

1. Do not use or keep this product in the following environments.
   - Outdoors, or places subject to direct sunlight or wearing weather.
   - Places where dust, iron powder, or corrosive gases (in particular, sulfuric or ammonia gas) exist.
   - Places subject to static electricity or inductive noise.
   - Places where water or oil come in contact with the product.
2. Make sure to install this product in the correct direction.
3. There is a remote risk of electric shock. Do not touch terminals while electricity is being supplied.
4. Make sure to thoroughly understand all instructions in the Instructions Manual before handling this product.
5. Make sure to confirm terminal makings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque.
   Recommended tightening torque: 0.49 N·m
   Maximum tightening torque: 0.54 N·m max.
7. Operating ambient temperature and humidity for this product must be within the indicated rating when using this product.
8. There is a remote risk of explosion. Do not use this product where flammable or explosive gas exists.
9. Make sure that no weight rests on the product after installation.
10. To enable an operator to turn off this product easily, install switches or circuit breakers that conform to relevant requirements of IEC60947-1 and IEC60947-3, and label them appropriately.

■ Precautions for Correct Use

For Proper Use

1. Do not use the product in the following locations.
   - Places subject to radiant heat from heat generating devices.
   - Places subject to vibrations or physical shocks.
2. Make sure to use setting values appropriate for the controlled object. Failure to do so can cause unintended operation, and may result in accident or corruption of the product.
3. Do not use thinner or similar solvent for cleaning. Use commercial alcohol.
4. When discarding, properly dispose of the product as industrial waste.
5. Only use this product within a board whose structure allows no possibility for fire to escape.

About Installation

1. When wiring, use only recommended crimp terminals.
2. Do not block areas around the product for proper dissipation of heat. (If you do not secure space for heat dissipation, life cycle of the product will be compromised.)
3. To avoid electrical shocks, make sure that power is not supplied to the product while wiring.
4. To avoid electrical shocks, make sure that power is not supplied to the product when performing DIP switch settings.

Noise Countermeasures

1. Do not install the product near devices generating strong high frequency waves or surges.
2. When using a noise filter, check the voltage and current and install it as close to the product as possible.
3. In order to prevent inductive noise, wire the lines connected to the product separately from power lines carrying high voltages or currents. Do not wire in parallel with or on the same cable as power lines.
   Other measures for reducing noise include running lines along separate ducts and using shield lines.

To avoid faulty operations, malfunctions, or failure, observe the following operating instructions.

1. When turning on the power, make sure to realize rated voltage within 1 second from the time of first supply of electricity.
2. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
3. Maintenance and handling of this product may only be performed by qualified personnel.
4. Distortion ratio of input wave forms must be 30% or less. Use of this product with circuits that have large distortion in wave forms may result in unwanted operations.
5. Error will be large if the K8AB-AS, K8AB-VS or K8AB-VW is used for thyristor or inverter control.
   The K8AB-PH, K8AB-PM, K8AB-PA, and K8AB-PW cannot be used for thyristor or inverter control.
6. When setting the adjustment knobs, adjust them from the minimum value to the maximum value.
7. The K8AB-PM and K8AB-PA detect phase loss when the motor power supply is turned ON. Phase loss cannot be detected during motor operation.
8. Phase loss can be detected only from the input contact to the power supply side by the K8AB-PH, K8AB-PM, and K8AB-PA. Phase loss cannot be detected from the input contact to the load side.

In the interest of product improvement, specifications are subject to change without notice.

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