

Three-phase Voltage Relay K8AB-PW

CSM_K8AB-PW_DS_E_2_1

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 9 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

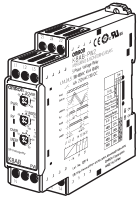
PW: Three-phase Voltage Relay (Simultaneous upper and lower monitoring)

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 ($\cos\phi = 1$) 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 Al 1,5-8BK (for AWG16) manufactured by Phoenix Contact Al 1-8RD (for AWG18) manufactured by Phoenix Contact Al 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

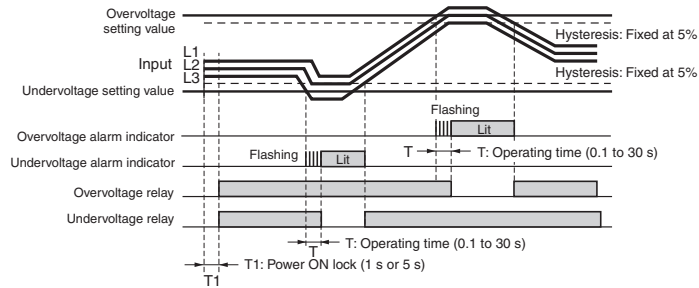
Input frequency range		45 to 65 Hz
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	Operating value	Set value $\pm 10\%$ of rated input voltage
	Operating time	
	Startup lock time	Set value ± 0.5 s
Repeat error	Operating value	Operating value $\pm 2\%$ Error calculation: Error = $((\text{Maximum operating value} - \text{Minimum operating value (over 10 operations)})/2)/$ Average value $\times 100\%$
	Reset value	Overvoltage: Operating value $\times 95\% \pm 2\%$ Undervoltage: Operating value $\times 105\% \pm 2\%$ Error calculation: Error = $((\text{Maximum reset value} - \text{Minimum reset value (over 10 resets)})/2)/$ Average value $\times 100\%$
	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: $\pm 1,000$ ppm/°C max. Standard temperature to 60°C: $\pm 1,000$ ppm/°C max. (Humidity: 25% to 80%) Operating time Fluctuation based on measured value at standard temperature: -20°C to standard temperature: $\pm 10\%$ max. Standard temperature to 60°C: $\pm 10\%$ max. (Humidity: 25% to 80%)
Humidity influence		Operating value Based on ambient humidity of 65% 25% to 80%: $\pm 5\%$ max. Operating time Based on ambient room humidity 25% to 80%: $\pm 10\%$ max.
Influence of input frequency		At 45 to 65 Hz Operating value $\pm 5\%$ Operating time $\pm 10\%$ 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 M Ω 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 $\mu\text{s}/100$ 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.

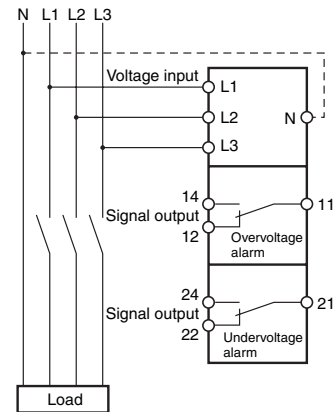
Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

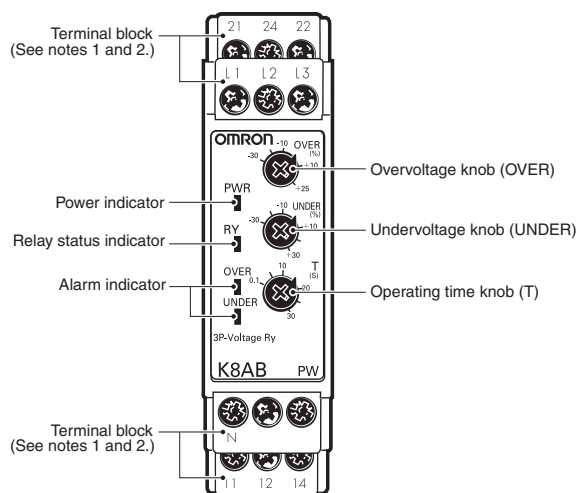


- Note:**
1. K8AB-PW output relay is normally operative.
 2. The power ON lock function prevents unnecessary alarms from being generated during the unstable period when the power is first turned ON. There is no relay output during timer operation.
 3. L1 and L2 use the same power supply and will not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



Nomenclature

Front



Indicators

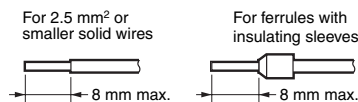
Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied (see note).
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Overvoltage: Lit when there is an overvoltage. The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.
	Undervoltage: 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 mm² 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

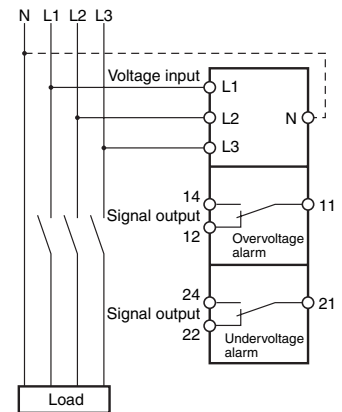
Connections

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.

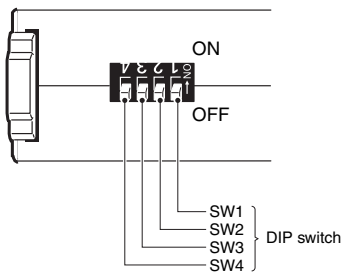
2. Outputs

Terminals 11, 12, and 14 are the output terminals for overvoltage (SPDT).
Terminals 21, 22, and 24 are the output terminals for undervoltage (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 ● ↑			
		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				
	240 V	●	●	---	---
	230 V	●	○	---	---
	220 V	○	●	---	---
	200 V	○	○	---	---

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

K8AB-PW2

SWITCH		ON ● ↑			
		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				
	480 V	●	●	---	---
	415 V	●	○	---	---
	400 V	○	●	---	---
	380 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 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-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 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 current.

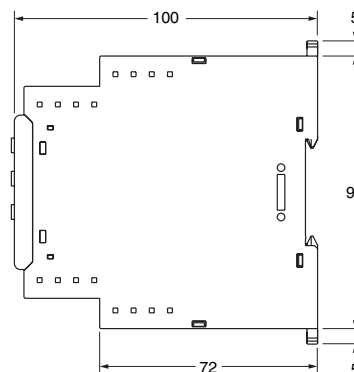
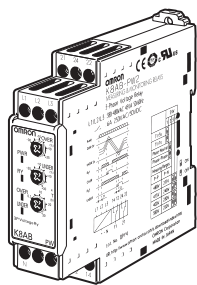
If the input exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

Dimensions

(Unit: mm)

Three-phase Voltage Relays

K8AB-PW1
K8AB-PW2



Questions and Answers

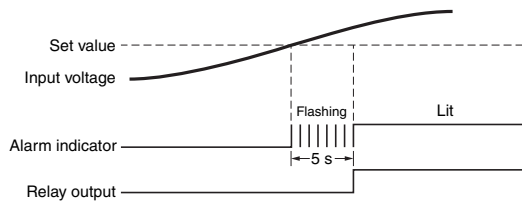
Q Checking Operation

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.

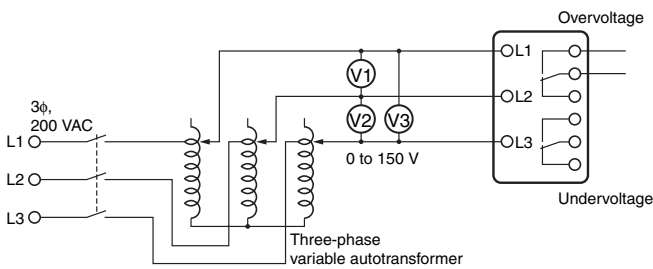
Undervoltage
 Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

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



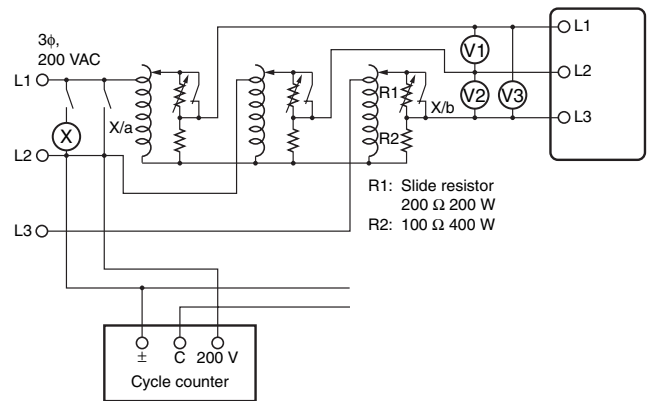
Q How to Measure the Operating Time

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.

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