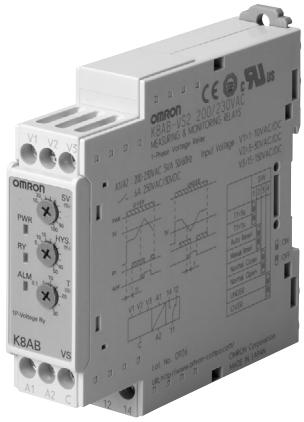
Single-phase Voltage Relay
K8AB-VS

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.



Model Number Structure

■ Model Number Legend

K8AB-□□□□

1 2 3 4

1. Basic Model
K8AB: Measuring and Monitoring Relays

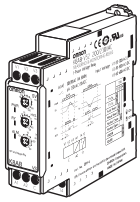
2. Functions
VS: Single-phase Voltage Relay (One-sided operation)

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 (See note.)	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 (See note.)**
		24 VAC	**K8AB-VS1 24 VAC**
		100-115 VAC	**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 (See note.)**
		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 (See note.)**
		24 VAC	**K8AB-VS3 24 VAC**
		100-115 VAC	**K8AB-VS3 100-115 VAC**
		200-230 VAC	**K8AB-VS3 200-230 VAC**

Note: Models with a 24-VDC power supply have a non-isolated power supply.
The inputs and power supply are connected internally so the K8AB-VS will not operate normally if an unwanted current path exists.
If an unwanted current path exists, use a K8AB AC Power Supply or isolate with an external power supply.

Ratings and Specifications

■ Ratings

Power supply voltage	**Non-isolated power supply**	24 VDC (See note.)
	Isolated power supply	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		K8AB-VS1: 9 kΩ min. K8AB-VS2: 100 kΩ min. K8AB-VS3: 1 MΩ min.
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		ABS resin (self-extinguishing resin) UL94-V0
Weight		DC models: Approx. 110 g AC models: Approx. 150 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

Note: Models with a 24-VDC power supply have a non-isolated power supply; the inputs and power supply are connected internally. If both the input and power supply are grounded, an unwanted current path will be created and the Unit will not operate normally. If an unwanted current path exists, use a K8AB model with an AC power supply or use an isolated DC power supply.

■ Specifications

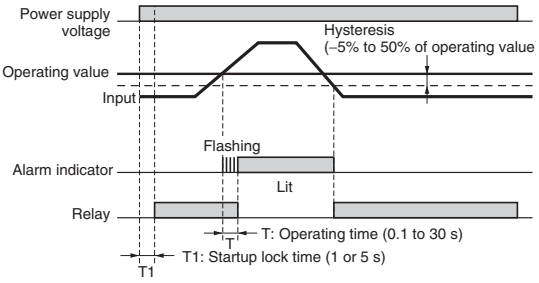
Allowable power supply voltage range		85% to 110% of power supply voltage
Allowable power supply frequency range		50/60 Hz ±5 Hz
Input frequency range		DC input or AC input (40 to 500 Hz)
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating 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 (See note.)	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

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

Connections

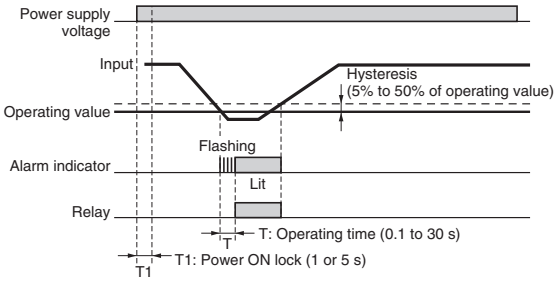
■ Wiring Diagram

Overvoltage Operation Diagram (Output: Normally Closed)

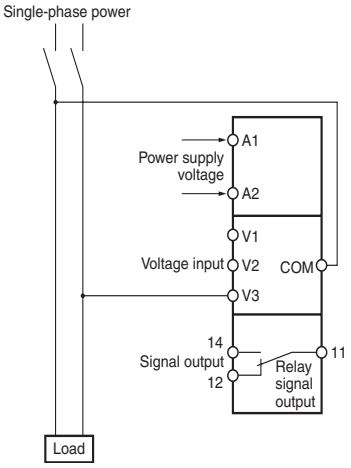


Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Undervoltage Operation Diagram (Output: Normally Open)

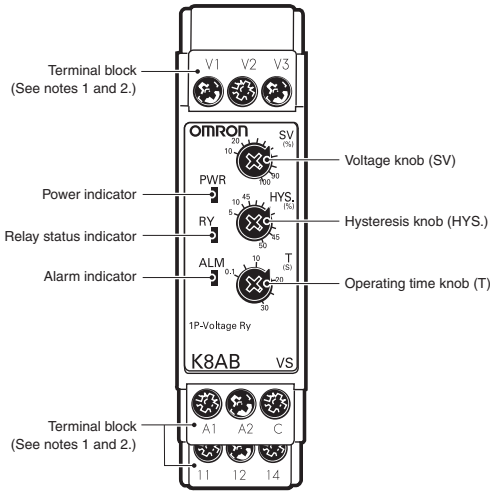


Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Nomenclature

■ Front



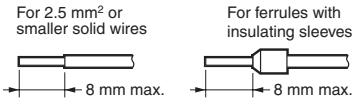
Indicators

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
- 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-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

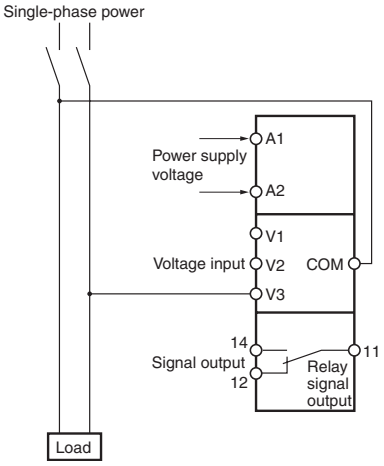
1. Input
Connect the input between terminals V1-COM, V2-COM, or V3-COM, depending on the input voltage.
Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly

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

Note: Models with DC power supply have a non-isolated power supply. The input and power supply terminals are connected internally so the K8AB-VS will not operate normally if an unwanted current path is created. If an unwanted current path exists, use a model with an AC power supply or isolate with an external power supply.

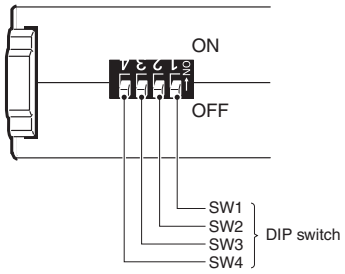
3. Outputs
SPDT relays are output to terminals 11, 12, and 14.

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%.

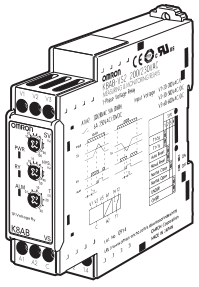
3. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this 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.

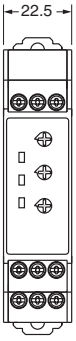
Dimensions

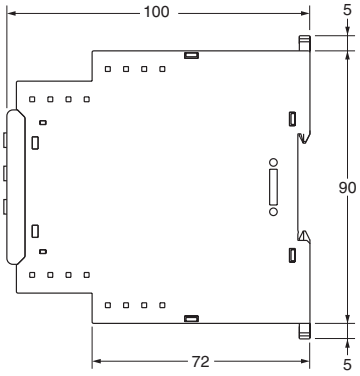
(Unit: mm)

Single-phase Voltage Relays

K8AB-VS1
K8AB-VS2
K8AB-VS3







Safety Precautions

■ 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.
11. For DC input, use a SELV power-supply capable of overcurrent protection. Specifically, a SELV power-supply has a double or reinforced insulation for input and output, and output voltage of 30 Vr.m.s with 42.4 V at peak or DC60V maximum.
    Recommended power-supply: Model S8VS-06024□. (Omron product)

■ 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. Using this product for thyristor controls or inverters will result in errors.
6. When setting the volume, adjust the control from the minimum side to the maximum side.

Questions and Answers

Q Checking Operation

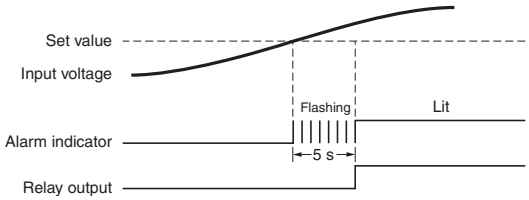
A

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.

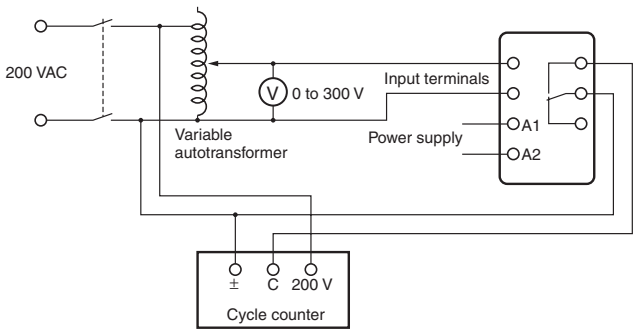
Undervoltage
Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

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 Grounding the Power Supply for K8AB Models with a DC Power Supply

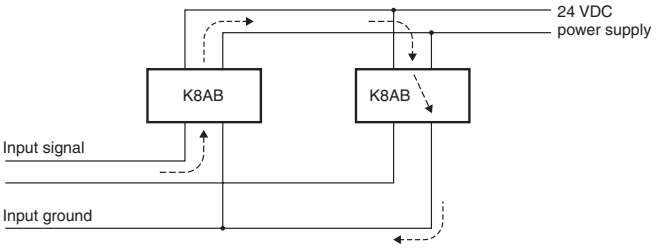
A

The input and power supply must be isolated.
Models with a DC power supply have a non-isolated power supply. The input and power supply are connected internally so the K8AB-VS□ will not operate normally if an unwanted current path exists. If an unwanted current path exists, use a K8AB model with an AC power supply or use an isolated DC power supply.

Q Using Multiple K8AB Relays with a DC Power Supply

A

The input and power supply must be isolated. The input and power supply are connected internally so an unwanted current path will be created if more than one K8AB is used with one DC power supply, as shown in the diagram, and the K8AB will not operate correctly. If an unwanted current path exists, use a K8AB model with an AC power supply or use a different isolated DC power supply for each K8AB.



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.

Warranty and Application Considerations

Read and Understand this Catalog

Please read and understand this catalog before purchasing the products. Please consult your OMRON representative if you have any questions or comments.

Warranty and Limitations of Liability

WARRANTY

OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON.

OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED.

LIMITATIONS OF LIABILITY

OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS, OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.

IN NO EVENT SHALL OMRON BE RESPONSIBLE FOR WARRANTY, REPAIR, OR OTHER CLAIMS REGARDING THE PRODUCTS UNLESS OMRON'S ANALYSIS CONFIRMS THAT THE PRODUCTS WERE PROPERLY HANDLED, STORED, INSTALLED, AND MAINTAINED AND NOT SUBJECT TO CONTAMINATION, ABUSE, MISUSE, OR INAPPROPRIATE MODIFICATION OR REPAIR.

Application Considerations

SUITABILITY FOR USE

OMRON shall not be responsible for conformity with any standards, codes, or regulations that apply to the combination of products in the customer's application or use of the products.

Take all necessary steps to determine the suitability of the product for the systems, machines, and equipment with which it will be used.

Know and observe all prohibitions of use applicable to this product.

NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM.

Disclaimers

PERFORMANCE DATA

Performance data given in this catalog is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements. Actual performance is subject to the OMRON *Warranty and Limitations of Liability.*

CHANGE IN SPECIFICATIONS

Product specifications and accessories may be changed at any time based on improvements and other reasons. Consult with your OMRON representative at any time to confirm actual specifications of purchased product.

DIMENSIONS AND WEIGHTS

Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.

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

Cat. No. N143-E1-02 **In the interest of product improvement, specifications are subject to change without notice.**

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