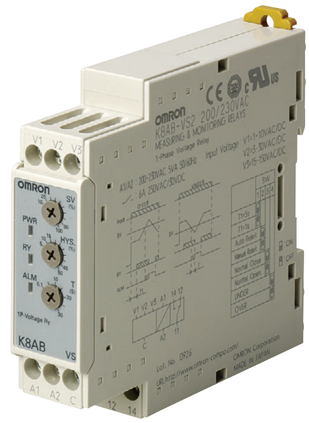
Single-phase Voltage Relay

K8AB-VS

CSM_K8AB-VS_DS_E_3_1

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 9 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

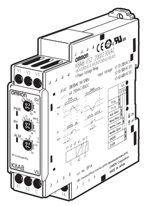
24 VAC/DC: 24 VAC/DC

100-115 VAC: 100 to 115 VAC

200-230 VAC: 200 to 230 VAC

Ordering Information

■ List of Models

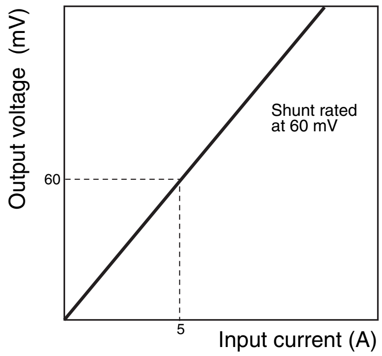
Single-phase Voltage Relay	Measuring voltage	Supply voltage	Model
	6 to 60 mV AC/DC, 10 to 100 mV AC/DC, 30 to 300 mV AC/DC	24 VAC/DC	**K8AB-VS1 24 VAC/DC**
		100-115 VAC	**K8AB-VS1 100-115 VAC**
		200-230 VAC	**K8AB-VS1 200-230 VAC**
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VAC/DC	**K8AB-VS2 24 VAC/DC**
		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 VAC/DC	**K8AB-VS3 24 VAC/DC**
		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-SH5 (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 (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

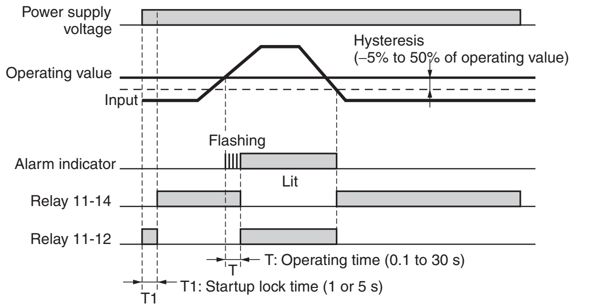
Allowable power supply voltage range		85% to 110% of power supply voltage
Allowable power supply frequency range		50/60 Hz ±5 Hz
Input frequency range		DC input or AC input (40 to 500 Hz)
Overload capacity		Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
Setting error	**Operating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

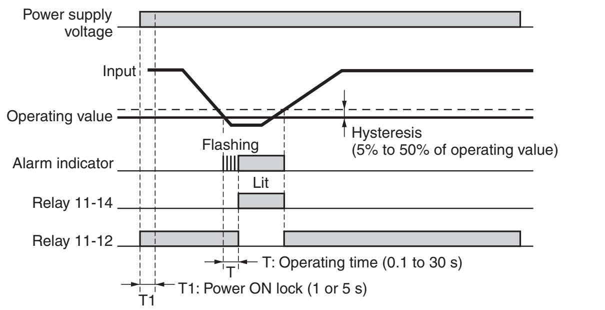
DIP switch setting: SW3 ON.



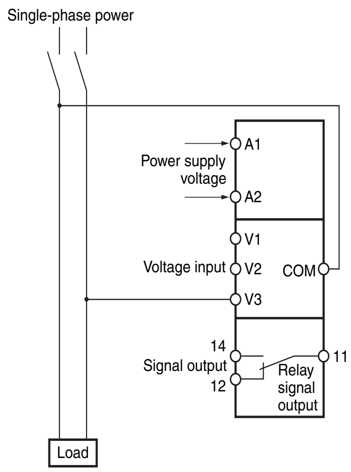
Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

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

DIP switch setting: SW3 OFF.



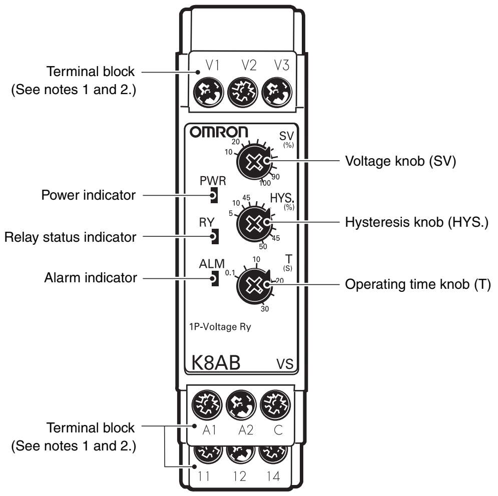
Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Note: There is no polarity when a DC current input is used.

Nomenclature

■ Front



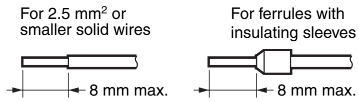
Indicators

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

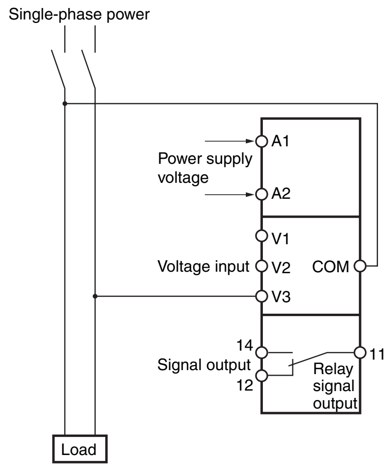
Setting Ranges and Wiring Connections

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

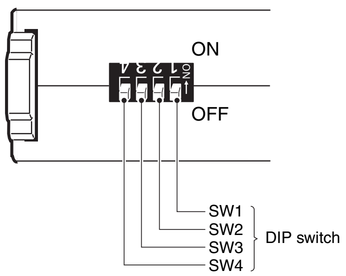
1. Input
   Connect the input between terminals V1-COM, V2-COM, or V3-COM, depending on the input voltage.
   Malfunctions may occur if the input is connected to unused terminals and the Unit will not operate correctly
2. Power Supply
   Connect the power supply to terminals A1 and A2.
3. Outputs
   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%.

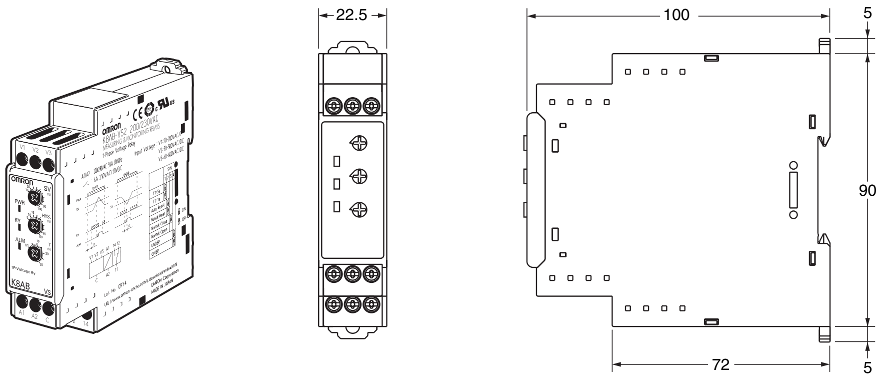
3. Operating Time
The operating time is set using the operating time knob (T).
The operating time can be set to between 0.1 and 30 s.
Turn the knob while there is an input to the input terminals until the alarm indicator flashes (when the set value and the input have reached the same level.)
Use this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

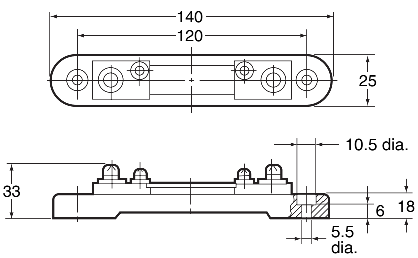
■ Single-phase Voltage Relays

K8AB-VS1
K8AB-VS2
K8AB-VS3



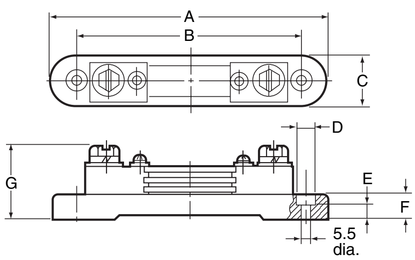
■ Shunts

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



Current terminal: M6 screw
Voltage terminal: M4 screw

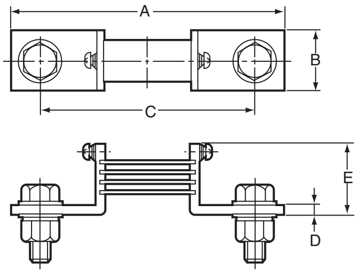
SDV-SH75 to SDV-SH200 (60-mV Rating)



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)

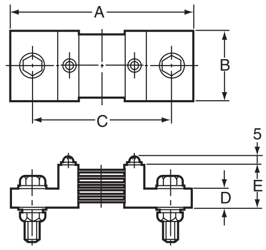


Current terminal: M10 screw (SDV-SH300), M12 screw (SDV-SH500)
Voltage terminal: M4 screw

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

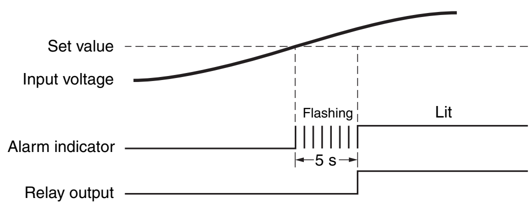
Questions and Answers

Q Checking Operation

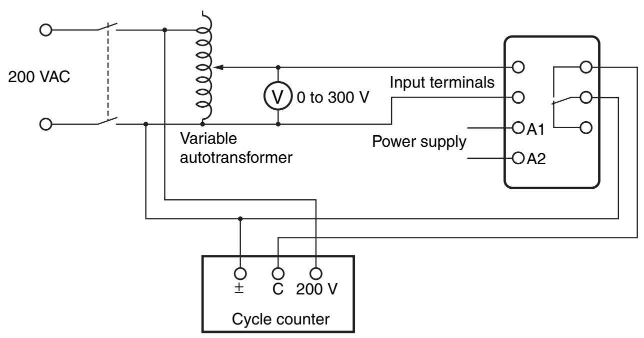
A Overvoltages
Gradually increase the input from 80% of the setting. The input will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.
Undervoltage
Gradually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

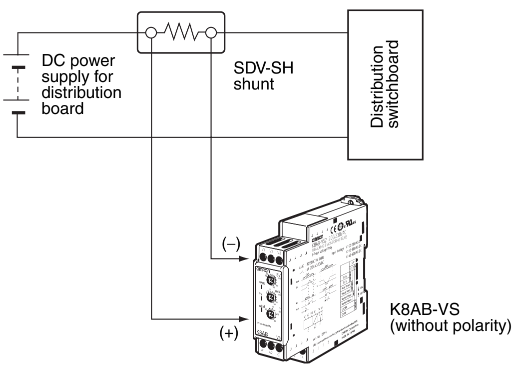
Q Operating Adjustment Knobs

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.

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- Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this catalog.
- Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations.
- Systems, machines, and equipment that could present a risk to life or property.

Please know and observe all prohibitions of use applicable to the products.

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Disclaimers

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Product specifications and accessories may be changed at any time based on improvements and other reasons.

It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products.

DIMENSIONS AND WEIGHTS

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

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.

ERRORS AND OMISSIONS

The information in this document has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions.

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

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