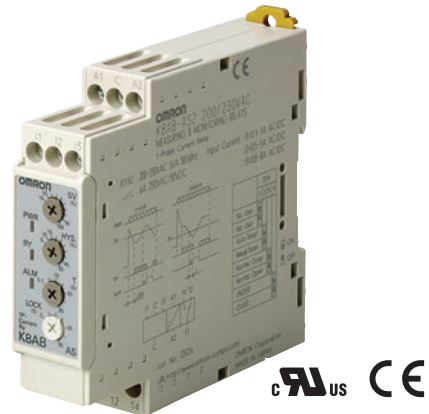



# Single-phase Current Relay K8AB-AS

CSM\_K8AB-AS\_DS\_E\_5\_1

## 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 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

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.)

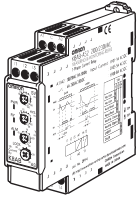
**Note:** The K8AB-AS3 is specially designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

#### 4. Supply Voltage

- 24 VAC/DC: 24 VAC/DC
- 100-115 VAC: 100 to 115 VAC
- 200-230 VAC: 200 to 230 VAC

## Ordering Information

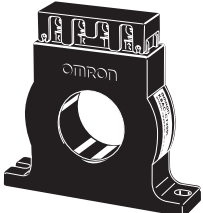
### List of Models

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

**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,<br>20 to 200 A AC | K8AB-AS3         | <b>K8AC-CT200L</b> |

#### Other CTs

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

## Ratings and Specifications

### Input Range

| Model           | Range*            | Connection terminal | Measuring current  | Input impedance                         | Overload capacity   |
|-----------------|-------------------|---------------------|--|---|---|
| <b>K8AB-AS1</b> | 0 to 20 mA AC/DC  | I1-COM              | 2 to 20 mA AC/DC,<br>10 to 100 mA AC/DC,<br>50 to 500 mA AC/DC | Approx. 5 $\Omega$                      | Continuous input:<br>120% of maximum input<br>1 s max.:<br>150% of maximum input  |
|                 | 0 to 100 mA AC/DC | I2-COM              |  | Approx. 1 $\Omega$                      |   |
|                 | 0 to 500 mA AC/DC | I3-COM              |  | Approx. 0.2 $\Omega$                    |   |
| <b>K8AB-AS2</b> | 0 to 1 A AC/DC    | I1-COM              | 0.1 to 1 A AC/DC,<br>0.5 to 5 A AC/DC,<br>0.8 to 8 A AC/DC     | Approx. 0.12 $\Omega$<br>(Load: 0.5 VA) |   |
|                 | 0 to 5 A AC/DC    | I2-COM              |  | Approx. 0.02 $\Omega$<br>(Load: 1.5 VA) |   |
|                 | 0 to 8 A AC/DC    | I3-COM              |  | Approx. 0.02 $\Omega$<br>(Load: 3 VA)   |   |
| <b>K8AB-AS3</b> | 0 to 100 A AC     | I2-COM              | 10 to 100 A AC,<br>20 to 200 A AC<br>(See note.)               | Using OMRON CT                          | Continuous input:<br>120% of maximum input<br>30 s max.:<br>200% of maximum input<br>1 s max.:<br>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.<br>24 VAC: 4 VA max.<br>100 to 115 VAC: 4 VA max.<br>200 to 230 VAC: 5 VA max.   |
| Operating value setting range (SV)   |                       | 10% to 100% of maximum measuring current<br>K8AB-AS1: 2 to 20 mA AC/DC<br>10 to 100 mA AC/DC<br>50 to 500 mA AC/DC<br>K8AB-AS2: 0.1 to 1 A AC/DC<br>0.5 to 5 A AC/DC<br>0.8 to 8 A AC/DC<br>K8AB-AS3: When used together with a K8AC-CT200L Current Transformer<br>10 to 100 A AC<br>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)<br><b>Note:</b> 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)<br><b>Note:</b> Enabled only for overcurrent operation. |                       | 0 to 30 s<br>(The startup lock timer starts when the input has reached approximately 30% or more of the set value.)<br><b>Note:</b> 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<br>Resistive load<br>6 A at 250 VAC ( $\cos\phi = 1$ )<br>6 A at 30 VDC ( $L/R = 0$ ms)<br>Inductive load<br>1 A at 250 VAC ( $\cos\phi = 0.4$ )<br>1 A at 30 VDC ( $L/R = 7$ ms)<br>Maximum contact voltage: 250 VAC<br>Maximum contact current: 6 A AC<br>Maximum switching capacity: 1,500 VA<br>Minimum load: 10 mA at 5 VDC<br>Mechanical life: 10,000,000 operations<br>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<br>Solid wire: 2.5 mm <sup>2</sup><br>Twisted wires: AWG16, AWG18<br><b>Note:</b> 1. Ferrules with insulating sleeves must be used with twisted wires.<br>2. Two wires can be twisted together.<br>Recommended ferrules<br>Al 1,5-8BK (for AWG16) manufactured by Phoenix Contact<br>Al 1-8RD (for AWG18) manufactured by Phoenix Contact<br>Al 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

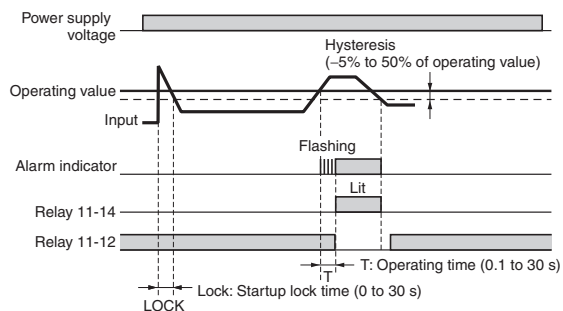
|   |                             |   |
|---|-----------------------------|---|
| <b>Allowable power supply voltage range</b>   |                             | 85% to 110% of power supply voltage   |
| <b>Allowable power supply frequency range</b> |                             | 50/60 Hz $\pm 5$ Hz 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

# Connections

## ■ Wiring Diagram

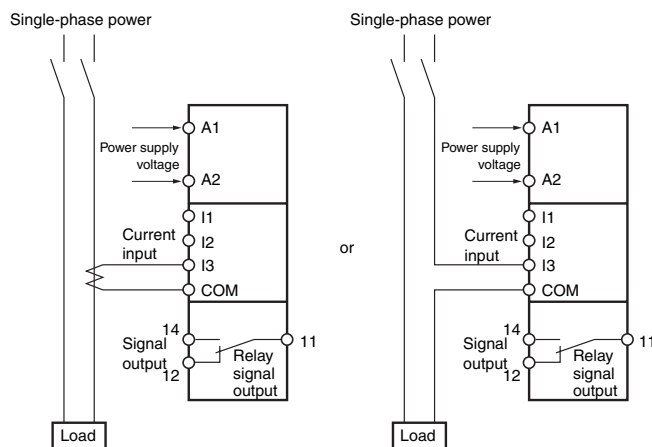
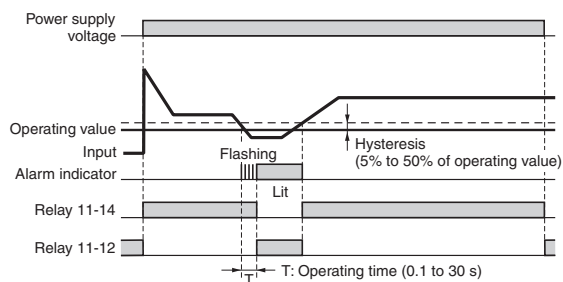
### Overcurrent Operation Diagram (Output Relay Drive Method: Normally Open)

DIP switch setting: SW3 OFF.



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

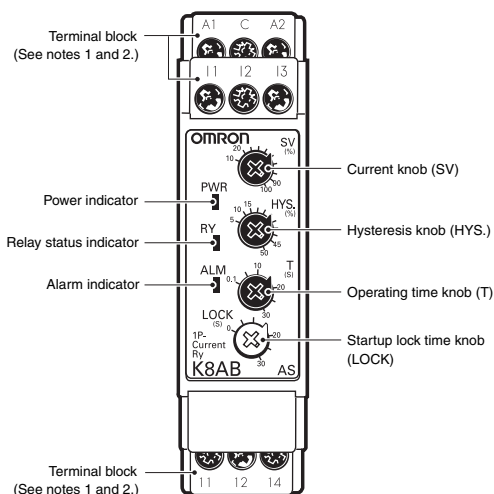
DIP switch setting: SW3 ON.



- Note:**
1. The K8AB-AS3 is designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT).
  2. There is no polarity when a DC current input is used.
  3. Refer to the "Setting Ranges and Wiring Connections" as the explanation of current input I1, I2, and I3 terminal.

# Nomenclature

## Front



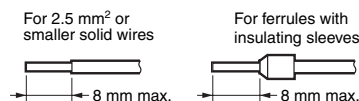
## Indicators

| 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.<br>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<sup>2</sup> 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-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.)

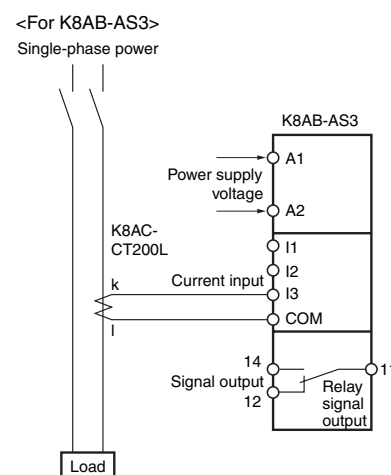
#### 2. Power Supply

Connect the power supply to terminals A1 and A2.

#### 3. Outputs

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

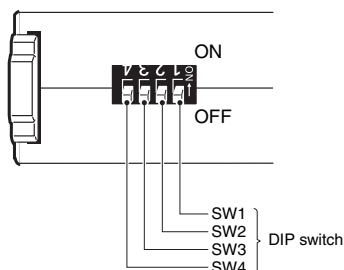
**Note:** Use the recommended ferrules if using twisted wires.



### 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 ● ↑<br>OFF ○ ↓ | ON  | 3   | 2   | 1      |
|--------------------|-------------------|-----|-----|-----|--------|
|                    |                   | 4   |     |     |        |
| 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).

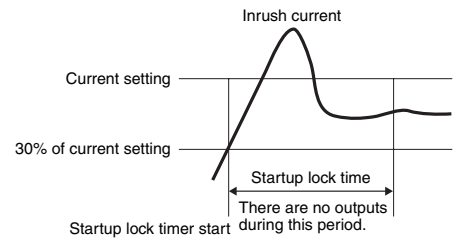
The startup lock time can be set to between 0 and 30 s.

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.

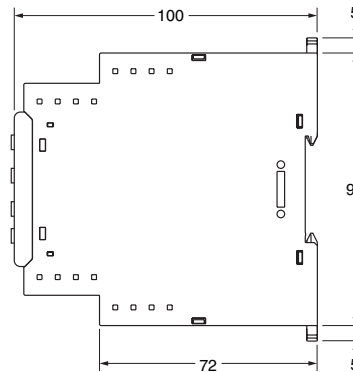
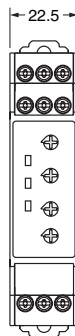
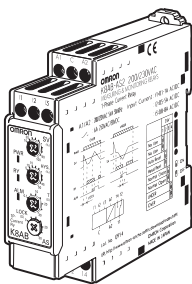


# Dimensions

(Unit: mm)

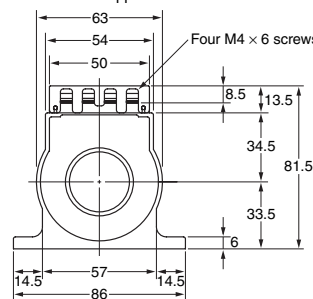
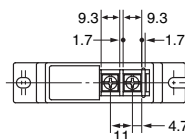
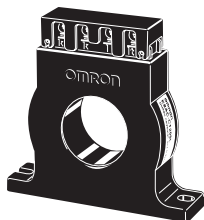
## Single-phase Current Relays

K8AB-AS1  
K8AB-AS2  
K8AB-AS3

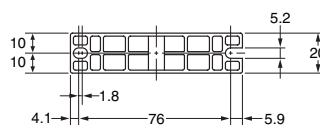
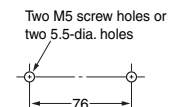


## OMRON CT

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.)



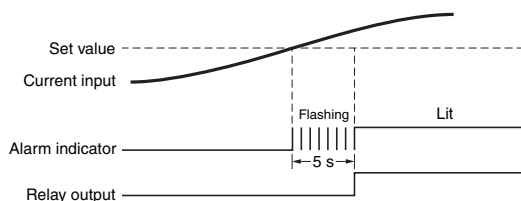
## Questions and Answers

### Q Checking Operation

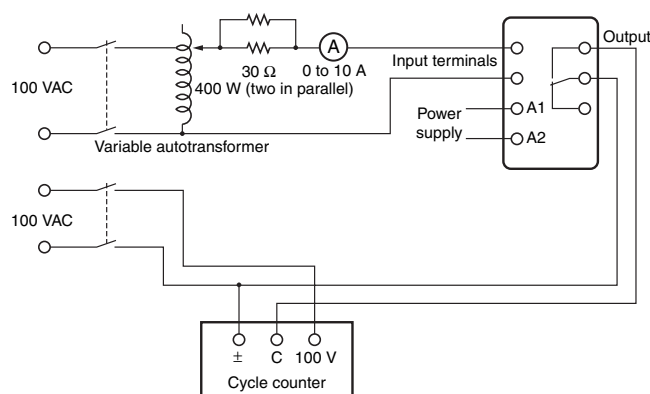
**A** Overcurrents  
Gradually increase the input from 80% of the setting. The input will equal the operating value when the input exceeds the setting and the alarm indicator starts flashing. Operation can be checked by the relay outputs that will start after the operating time has passed.

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

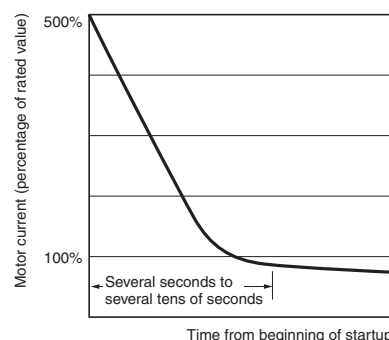
**A** Switch-mode Power Supplies cannot be monitored. In circuits with a capacitor input, including switch-mode power supplies, the input capacitor recharge current flows in pulse form as the load current. The K8AB-AS□ has a built-in filter as a countermeasure against high frequencies and cannot be used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

### Q Operating Adjustment Knobs

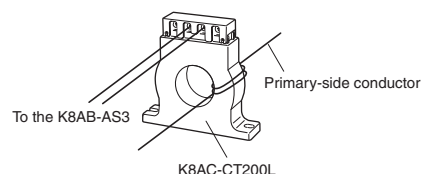
**A** Use a screwdriver to turn the knobs. There is a stopper to prevent the knob from turning any further once it has been turned completely to the left or right. Do not force the knob past these limits.

### 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.

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

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2009.12

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