

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

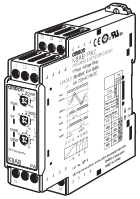
PW: Three-phase Voltage Relay (Simultaneous upper and lower monitoring)

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

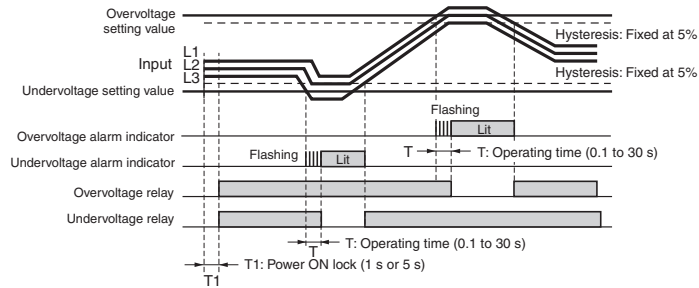
| | | |
|-------------------------------------|-----------------------------|---|
| Input frequency range | | 45 to 65 Hz |
| Overload capacity | | Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input |
| Setting error | Operating value | Set value $\pm 10\%$ of rated input voltage |
| | 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 μ 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.

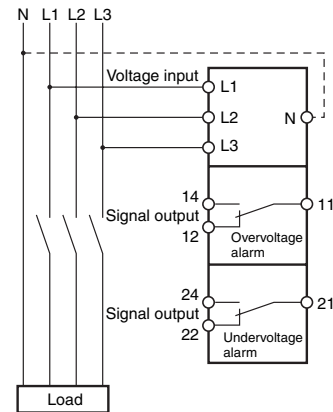
Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

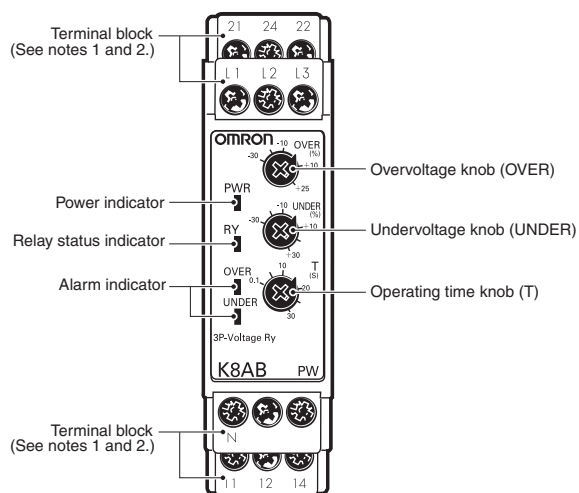


- Note:**
1. K8AB-PW output relay is normally operative.
 2. The power ON lock function prevents unnecessary alarms from being generated during the unstable period when the power is first turned ON. There is no relay output during timer operation.
 3. L1 and L2 use the same power supply and will not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



Nomenclature

Front



Indicators

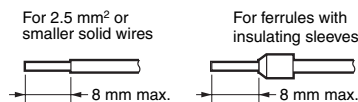
| Item | Meaning |
|-------------------------------------|--|
| Power indicator (PWR: Green) | Lit when power is being supplied (see note). |
| Relay status indicator (RY: Yellow) | Lit when relay is operating (normally lit). |
| Alarm indicator (ALM: Red) | Overvoltage: Lit when there is an overvoltage. 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.

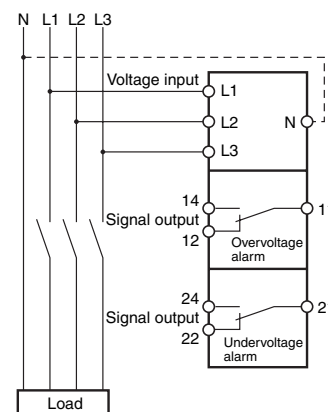
The Unit will not operate correctly if the DIP switch setting and the wiring do not agree.

Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.

2. Outputs

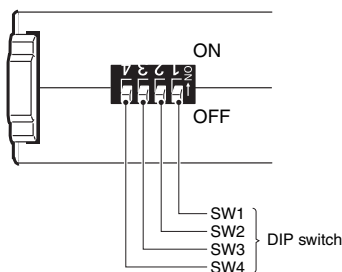
Terminals 11, 12, and 14 are the output terminals for overvoltage (SPDT).

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.

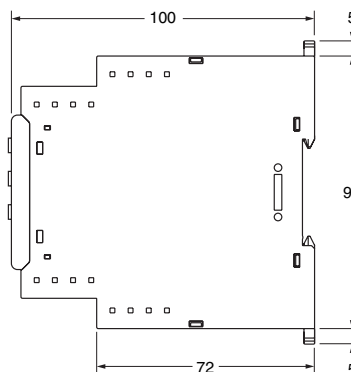
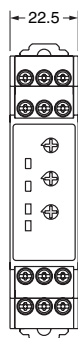
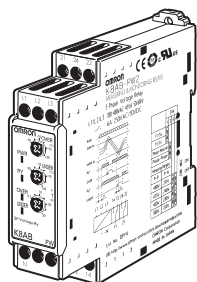
If the input exceeds (or drops lower than) the voltage setting, the alarm indicator will start flashing for the set period and then stay lit.

Dimensions

(Unit: mm)

Three-phase Voltage Relays

K8AB-PW1
K8AB-PW2



Questions and Answers

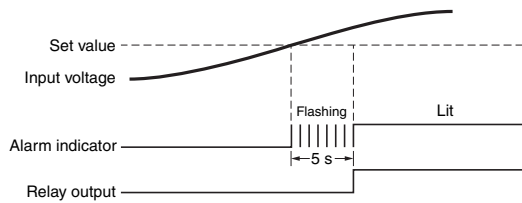
Q Checking Operation

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.

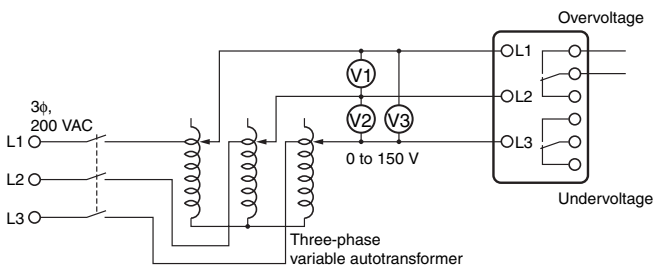
Undervoltage
 Gradually decrease the input from 120% of the setting and check the operation using the same method as for overvoltage.

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



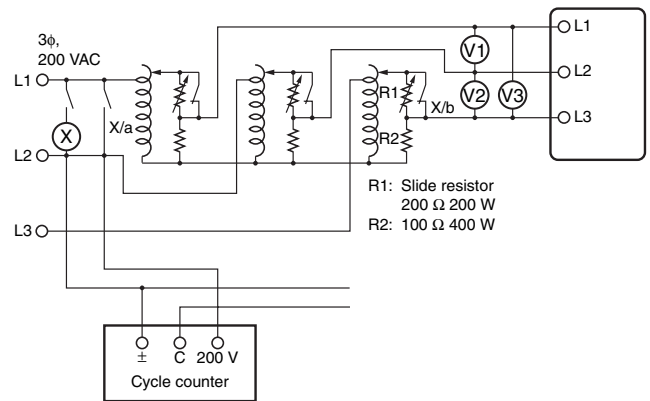
Q How to Measure the Operating Time

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.

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.

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.

At the customer's request, OMRON will provide applicable third party certification documents identifying ratings and limitations of use that apply to the products. This information by itself is not sufficient for a complete determination of the suitability of the products in combination with the end product, machine, system, or other application or use.

The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products:

- 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.

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.

PROGRAMMABLE PRODUCTS

OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof.

Disclaimers

CHANGE IN SPECIFICATIONS

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.

2009.11

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

OMRON Corporation
Industrial Automation Company

<http://www.ia.omron.com/>

(c)Copyright OMRON Corporation 2009 All Right Reserved.