

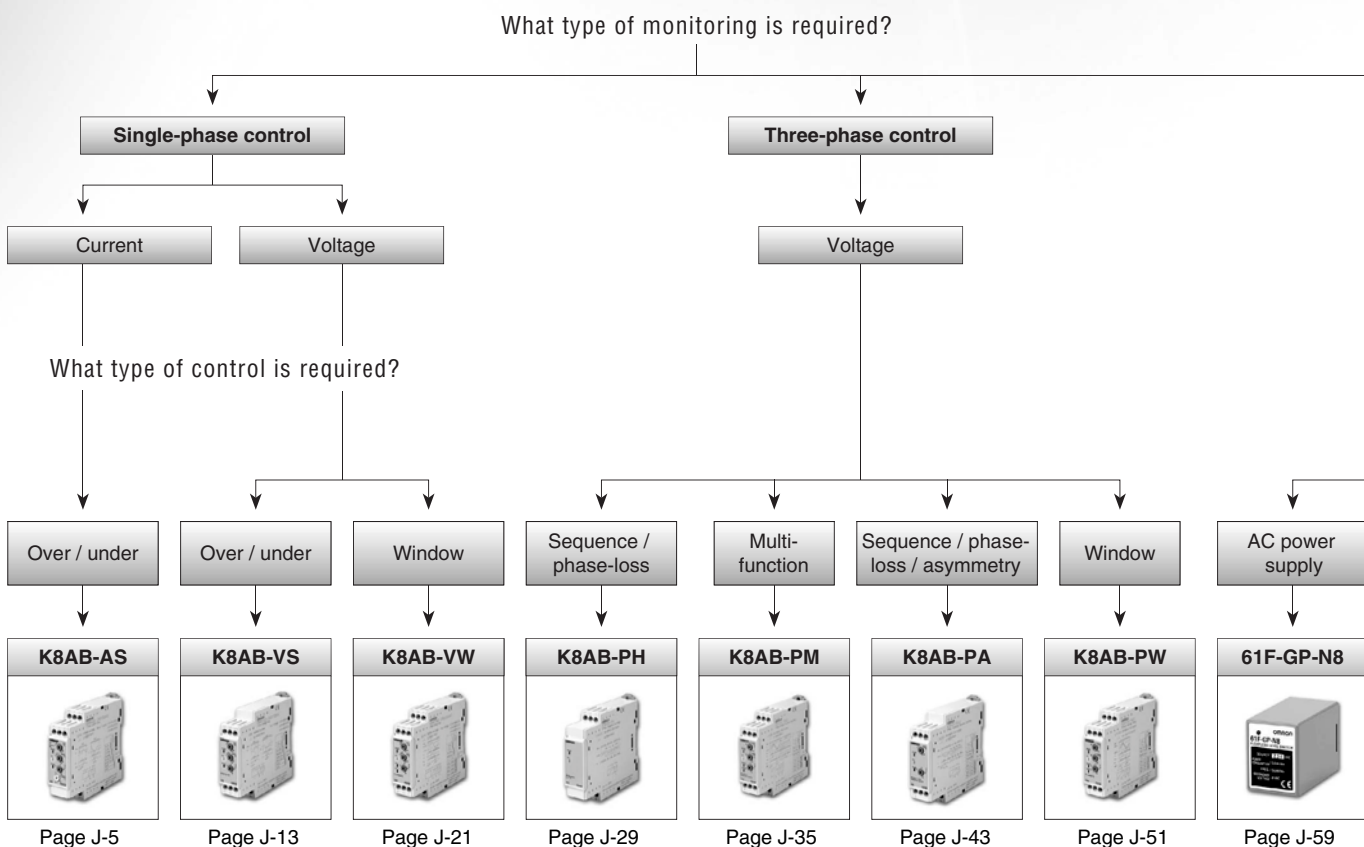
A complete new monitoring product range in 22.5 mm housing

The smart way to protect your system!

The K8 series offers a complete range of first-class quality monitoring products, all in compact 22.5 mm wide DIN-rail housing. The K8 series includes single-phase relays that monitor current or voltage variations, three-phase relays that monitor phase-sequence, phase asymmetry, phase-loss or voltage variations, and a conductive level controller.

With innovative features, these relays provide timely warnings of system errors. This series of just eight models offers you a flexible one-stop-shopping solution for your monitoring requirements.

Typical applications include monitoring generator voltages, providing chain breakage protection for conveyors, checking battery voltage, protecting pumps against idle running, monitoring phase sequence or phase loss on escalators, and monitoring liquid levels in tanks.



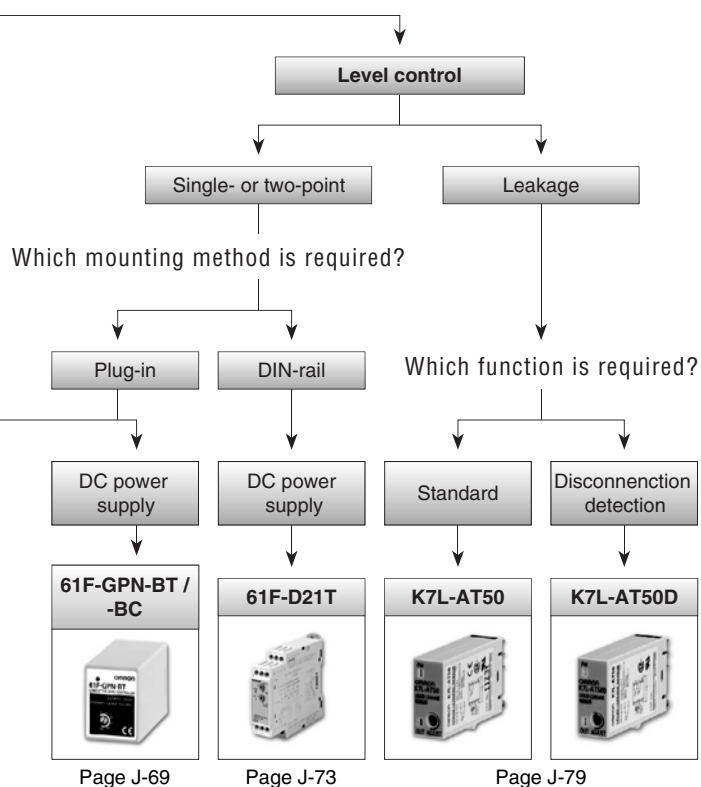















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Selection table

Category		1-phase control			3-phase control		
							
Selection criteria	Model	K8AB-AS	K8AB-VS	K8AB-VW	K8AB-PH	K8AB-PM	K8AB-PA
	Specialty	Ideal for current monitoring for industrial heaters and motors.	Ideal for voltage monitoring for industrial facilities and equipment.	Ideal for voltage monitoring for industrial facilities and equipment.	Ideal for phase-sequence and phase-loss monitoring for industrial facilities and equipment.	Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.	Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment.
	Sensing range (configurable)	20 mA to 10 A, current transformer: 100 / 200 A	60 mV to 600 V	60 mV to 600 V	Same as supply voltage	Same as supply voltage	Same as supply voltage
Supply voltage AC	24 VAC	■	■	■			
	100 VAC						
	110 VAC						
	115 VAC	■	■	■			
	120 VAC						
	200 VAC						
	220 VAC						
	230 VAC	■	■	■			
	240 VAC						
	200 - 500 VAC				■		
	200 - 240 VAC					■ (-PM1, 3-wire)	■ (-PA1, 3-wire)
	115 - 138 VAC					■ (-PM1, 4-wire)	■ (-PA1, 4-wire)
Supply voltage DC	24 VDC	■	■	■			
	12 .. 24 VDC						
	Transistor NPN						
	Transistor PNP						
Control output	Relay	■ (1 SPDT)	■ (1 SPDT)	■ (2 SPDT)	■ (1 SPDT)	■ (2 SPDT)	■ (1 SPDT)
	LED operation indicator	■	■	■	■	■	■
Features	Adjustable sensitivity						
	Electrode types						
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Category		3-phase control	Conductive level controllers				Leakage controllers	
								
Selection criteria	Model	K8AB-PW	61F-GP-N8	61F-GPN-BT	61F-GPN-BC	61F-D21T	K7L-AT50	K7L-AT50D
	Specialty	Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.	Single or two-point	AC sine wave between electrodes for stable detection with no electrolysis	AC sine wave between electrodes for stable detection with no electrolysis	Ideal for level control for industrial facilities and equipment	Sensor amplifier, AC sine wave between electrodes for stable detection with no electrolysis	Sensor amplifier with disconnection detection function
	Sensing range (configurable)	Same as supply voltage	4 to 50 kΩ	0 to 100 kΩ	1 to 100 kΩ	10 to 100 kΩ	0 to 50 MΩ	1 to 50 MΩ
Supply voltage AC	24 VAC		<input type="checkbox"/>			<input checked="" type="checkbox"/>		
	100 VAC		<input type="checkbox"/>					
	110 VAC		<input type="checkbox"/>					
	115 VAC					<input checked="" type="checkbox"/>		
	120 VAC		<input type="checkbox"/>					
	200 VAC		<input type="checkbox"/>					
	220 VAC		<input type="checkbox"/>					
	230 VAC		<input type="checkbox"/>			<input checked="" type="checkbox"/>		
	240 VAC		<input type="checkbox"/>					
	200 - 500 VAC							
	200 - 240 VAC	<input checked="" type="checkbox"/> (-PW1, 3-wire)						
	115 - 138 VAC	<input checked="" type="checkbox"/> (-PW1, 4-wire)						
	380 - 480 VAC	<input checked="" type="checkbox"/> (-PW2, 3-wire)						
	220 - 277 VAC	<input checked="" type="checkbox"/> (-PW2, 4-wire)						
Supply voltage DC	24 VDC			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>			
	12 .. 24 VDC						<input type="checkbox"/>	<input type="checkbox"/>
Control output	Transistor NPN				<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Transistor PNP						<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Relay	<input checked="" type="checkbox"/> (2 SPDT)	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		
Features	LED operation indicator	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Adjustable sensitivity			<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
	Electrode types		Electrode holder: PS-□S, PS-31, BF-1 and BS-1				Liquid leakage sensor band F03-	
Page		J-51	J-59	J-69	J-73	J-79		



Standard



Available



No / not available

LEADING IN SERVICE

Focussed, progressive, distinctive. Be assured, choose Omron

At Omron we set high standards for ourselves. Our products are known all over the world for their unrivalled quality. But we offer more than just excellent quality. In an environment that places ever greater demands with regard to service, quality and costeffectiveness, other things are important too. Providing a top-quality service is what we do every day, including extra service as standard. This helps to ensure that we can provide tailor-made solutions for applications more effectively and more quickly.

More and more companies are choosing Omron as they seek to work in a partnership that is based on reliability and certainty.

Omron – the reassuring choice.



International standards and approvals

Our products carry all relevant international standards and approvals, including CCC (Chinese Compulsory Certification), which makes exporting your system much easier.

- Reliability, also for your customers
- Maximum flexibility
- Confidence



5-day repair service

More and more people are choosing Omron, as a high degree of reliability is a key feature of its products. You can always rely on Omron. Even if a product unexpectedly malfunctions, our repair team is ready to swing into action.

- Product repaired and returned to you within 5 days, including collection and delivery
- You can track the status of your repair on-line
- Repairs within warranty are completely free-of-charge

For more information please visit the Service & Support section at <http://omron-industrial.com>



EPLAN for Omron products

The majority of standard Omron products are provided in digital EPLAN format, which means that a few clicks of your mouse are all that is needed to design the right product into your switching panel.

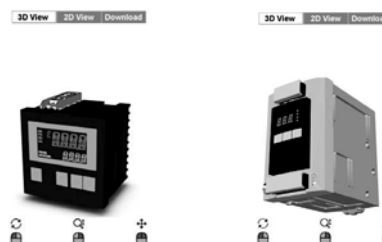
For more information please visit: <http://omron-industrial.com/en/eplan/>

- Very easy to use
- Always the right product
- Reduced engineering time

Downloadable 2-D and 3-D CAD drawings

Designers of switching panels and machines can download clear 2-D and 3-D CAD drawings for all current products from <http://omron-industrial.com/en/2D3D>, which can easily be incorporated into your design.

- Large number of formats supported for greater flexibility
- Readily available
- Convenience that saves you time

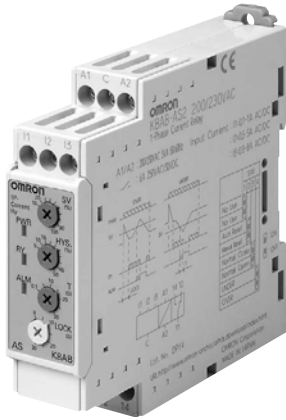


Single-phase Current Relay

K8AB-AS

Ideal for current monitoring for industrial heaters and motors.

- 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).
- Switch the output relay between normally ON and normally OFF operation.
- Process control signal (4 to 20 mA) and commercial CT input (0 to 1 A or 0 to 5 A) supported.
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification pending.



Model Number Structure

■ Model Number Legend

K8AB-

1	2	3	4
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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.)

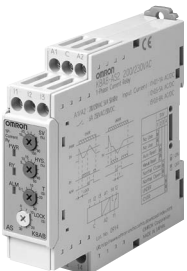
Note: The K8AB-AS3 is specially designed to be used in combination with the OMRON K8AC-CT200L Current Transformer (CT). (Direct input is not possible.)

4. Supply Voltage

- 24 VDC: 24 VDC
- 24 VAC: 24 VAC
- 100-115 VAC: 100 to 115 VAC
- 200-230 VAC: 200 to 230 VAC

Ordering Information

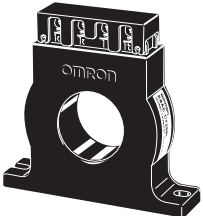
List of Models

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

Note: The K8AB-AS3 is designed to be used in combination with the 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, 20 to 200 A AC	K8AB-AS3	K8AC-CT200L

Other CTs

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

Ratings and Specifications

■ Ratings

Operating power	Non-isolated power supply	24 VDC (1 W)
	Isolated power supply	24 VAC (3 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operate (SV)	Operating value setting range	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	Hysteresis	5% to 50% of operating value
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Operating power ON lock (LOCK)		0 to 30 s (Value when input rapidly changes from 0% to 120%; lock timer starts when input reaches approximately 30% of set value.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency	K8AB-AS1/AS2	DC input, 45 to 65 Hz
	K8AB-AS3	45 to 65 Hz
Continuous input	K8AB-AS1/AS2	Continuous input: 115% of maximum input, 10 s max.: 125% of maximum input
	K8AB-AS3	Continuous input: 240 A, 30 s max.: 400 A, 1 s max.: 1,200 A
Input impedance		5 Ω max.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load)

■ Specifications

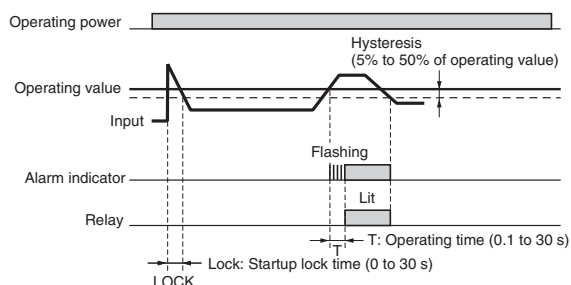
Ambient operating temperature		–20 to 60°C (with no condensation or icing)
Storage temperature		–40 to 70°C (with no condensation or icing)
Ambient operating humidity		25% to 85%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)

Degree of protection	Terminal section: IP20, Rear case: IP40
Case color	Munsell 5Y8/1 (ivory)
Case material	ABS resin (self-extinguishing resin) UL94-V0
Weight	200 g
Mounting	Mounted to DIN-rail or via M4 screws
Dimensions	22.5 (W) × 90 (H) × 100 (D) mm
Installation environment	Overvoltage Category III, Pollution Degree 2
Application standards	EN60255-5/-6
Safety standards	EN60664-1
EMC	EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

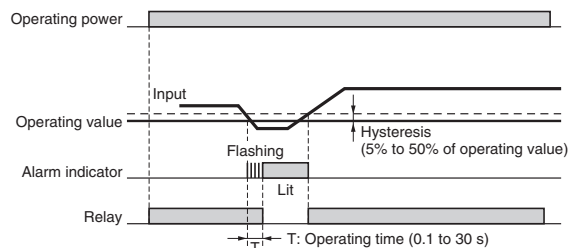
Connections

■ Wiring Diagram

Overcurrent Operation Diagram (Output: Normally Open)



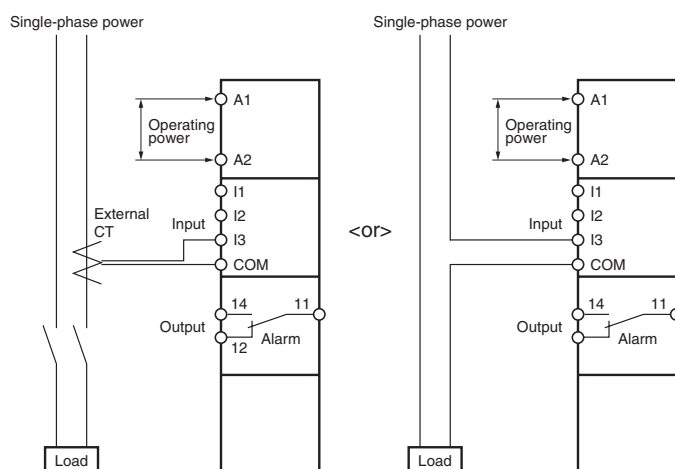
Undercurrent Operation Diagram (Output: Normally Closed)



Measuring Ranges and Connections

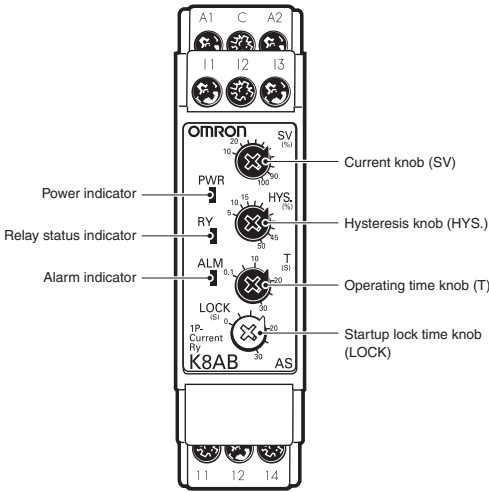
Model	Measuring range	Connection
K8AB-AS1	2 to 20 mA AC/DC	I1-COM
	10 to 100 mA AC/DC	I2-COM
	50 to 500 mA AC/DC	I3-COM
K8AB-AS2	0.1 to 1 A AC/DC	I1-COM
	0.5 to 5 A AC/DC	I2-COM
	0.8 to 8 A AC/DC	I3-COM
K8AB-AS3	10 to 100 A AC/DC (See note.)	I2-COM
	20 to 200 A AC/DC (See note.)	I3-COM

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



Nomenclature

■ Front



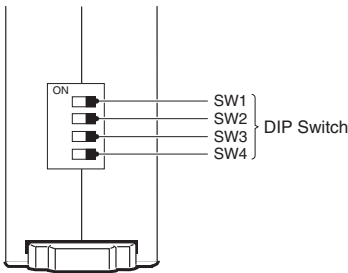
Indicators

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. 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 rated input 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.

■ Function Selection DIP Switch

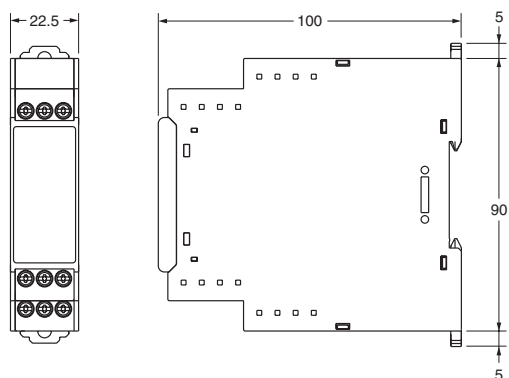
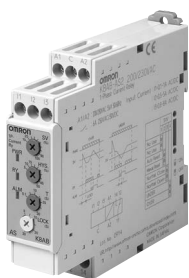


DIP Switch Functions

		Function		Default
SW1	Not used.	OFF	Not used.	OFF
		ON	Not used.	
SW2	Resetting method	OFF	Manual reset	OFF
		ON	Automatic reset	
SW3	Relay drive method	OFF	Normally open (normally OFF)	OFF
		ON	Normally closed (normally ON)	
SW4	Operating mode	OFF	Overcurrent monitoring	OFF
		ON	Undercurrent monitoring	

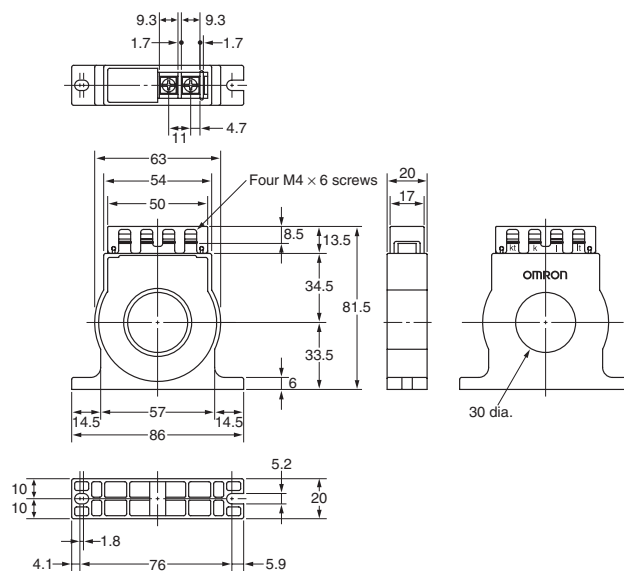
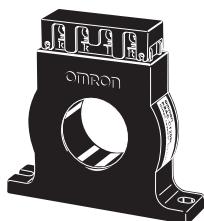
Dimensions

K8AB-AS

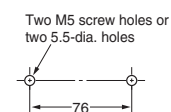


OMRON CT

K8AC-CT200L



Mounting Hole Dimensions



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 torque: 0.54 N·m
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 V_{r.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.

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.

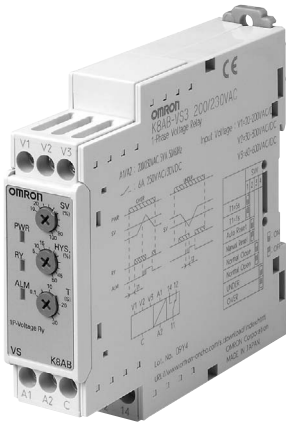
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

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).
- Switch the output relay between normally ON and normally OFF operation.
- Process control signal (0 to 10 V) and current splitter input supported.
- Relay warning status easily monitoring using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



Model Number Structure

■ Model Number Legend

K8AB-

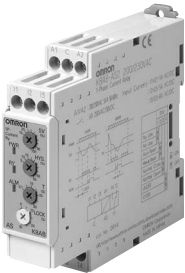
1 2 3 4

- 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
		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
		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
		24 VAC	K8AB-VS3 24 VAC
		100-115 VAC	K8AB-VS3 100-115 VAC
		200-230 VAC	K8AB-VS3 200-230 VAC

Note: The rated input depends on the connected terminals. Select the terminals suitable for the inputs, and connect the inputs to V1-COM, V2-COM, and V3-COM.

Ratings and Specifications

Ratings

Operating power	Non-isolated power supply	24 VDC (1 W)
	Isolated power supply	24 VAC (4 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operate (SV)	Operating value setting range	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	Hysteresis	5% to 50% of operating value
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s error ± 0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		$\pm 10\%$ of full scale
Time error		$\pm 10\%$ of set value (Minimum error: 50 ms)
Input frequency		40 to 500 Hz
Input impedance		K8AB-VS1: 9 k Ω min. K8AB-VS2: 100 k Ω min. K8AB-VS3: 1 M Ω min.
Indicators		LED Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm output (ALM): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load)

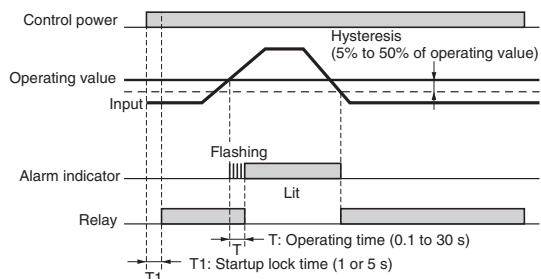
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	Resistive load	6 A at 250 VAC (cos φ = 1) 6 A at 30 VDC (L/R = 0 ms)
	Inductive load	1 A at 250 VAC (cos φ = 0.4) 1 A at 30 VDC (L/R = 7 ms)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm², two crimp terminals of 1.5 mm² with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with ground (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

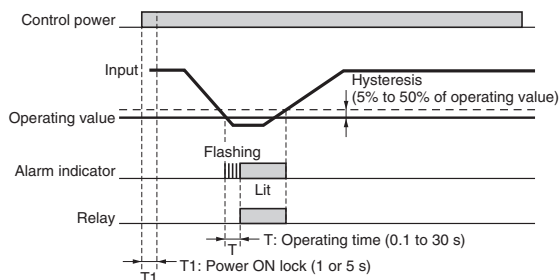
■ Wiring Diagram

Overcurrent Operation Diagram (Output: Normally Closed)

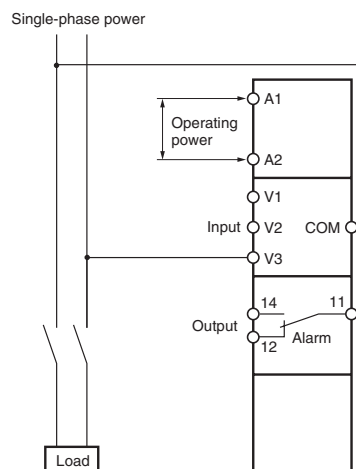


Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Undercurrent Operation Diagram (Output: Normally Open)



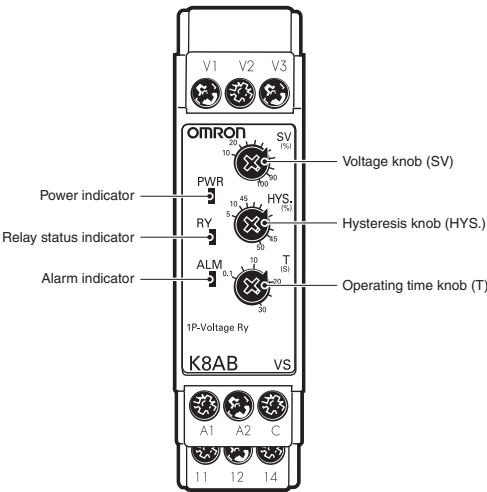
Note: The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Model	Measuring range	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

Nomenclature

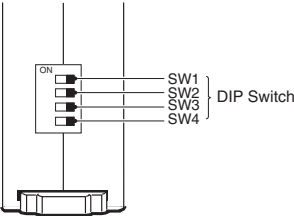
■ Front



Setting Knobs

Item	Usage
Current knob (SV)	Used to set the current to 10% to 100% of maximum rated input 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.

■ Function Selection DIP Switch



Indicators

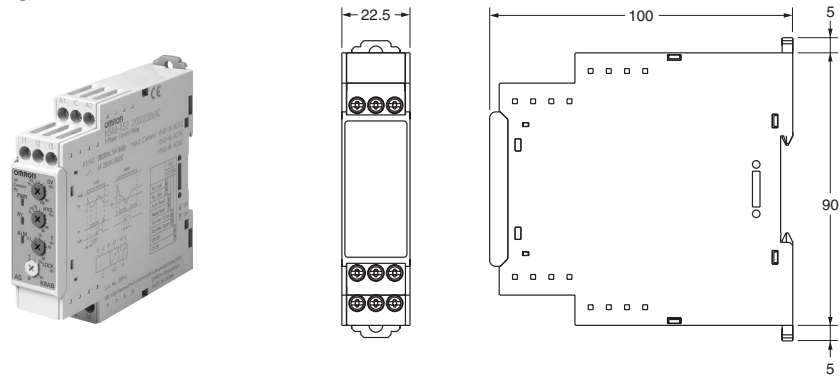
Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.
Alarm indicator (ALM: Red)	Lit when there is an overvoltage or undervoltage. The indicator flashes to indicate the error status after the input has exceeded the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

DIP Switch Functions

	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Resetting method	OFF	Manual reset	OFF
		ON	Automatic reset	
SW3	Relay drive method	OFF	Normally open (normally OFF)	OFF
		ON	Normally closed (normally ON)	
SW4	Operating mode	OFF	Overvoltage monitoring	OFF

Dimensions

K8AB-VS



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 torque: 0.54 N·m
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 V_{r.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.

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.

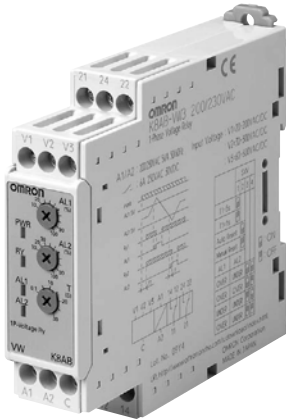
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Single-phase Voltage Relay K8AB-VW

Ideal for voltage monitoring for industrial facilities and equipment.

- Monitor for overvoltages and undervoltages simultaneously. Separate settings and outputs supported for overvoltages and undervoltages.
- Manual resetting and automatically resetting supported by one Relay.
- Pre-alarm Mode (H/HH and L/LL operating modes)
- Two SPDT output relays, 6 A at 250 VAC (resistive load).
- Process control signal (0 to 10 V) and current splitter input supported.
- Relay warning status easily monitoring using LED indicator.
- Input frequency of 40 to 500 Hz supported.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



CE

Model Number Structure

■ Model Number Legend


K8AB-

1 2 3 4

- 1. Basic Model**
K8AB: Measuring and Monitoring Relays
- 2. Functions**
VW: Single-phase Voltage Relay (Simultaneous upper and lower limit monitoring)
- 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-VW1 24 VDC
		24 VAC	K8AB-VW1 24 VAC
		100-115 VAC	K8AB-VW1 100-115 VAC
		200-230 VAC	K8AB-VW1 200-230 VAC
	1 to 10 V AC/DC, 3 to 30 V AC/DC, 15 to 150 V AC/DC	24 VDC	K8AB-VW2 24 VDC
		24 VAC	K8AB-VW2 24 VAC
		100-115 VAC	K8AB-VW2 100-115 VAC
		200-230 VAC	K8AB-VW2 200-230 VAC
	20 to 200 V AC/DC, 30 to 300 V AC/DC, 60 to 600 V AC/DC	24 VDC	K8AB-VW3 24 VDC
		24 VAC	K8AB-VW3 24 VAC
		100-115 VAC	K8AB-VW3 100-115 VAC
		200-230 VAC	K8AB-VW3 200-230 VAC

Note: The rated input depends on the connected terminals. Select the terminals suitable for the inputs, and connect the inputs to V1-COM, V2-COM, and V3-COM.

Ratings and Specifications

Ratings

Operating power	Non-isolated power supply	24 VDC (1 W)
	Isolated power supply	24 VAC (4 VA), 100 to 115 VAC (4 VA), 200 to 230 VAC (5 VA)
Operation (AL1 and AL2)	Operating value setting range	10% to 100% of maximum rated input value
	Operating value	100% operation at set value
Reset (HYS.)	Hysteresis	5% of operating value (fixed)
	Resetting method	Manual reset/automatic reset (switchable) Manual reset: Turn OFF operating power for 1 s or longer.
Operating time (T)		0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s error ± 0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		$\pm 10\%$ of full scale
Time error		$\pm 10\%$ of set value (Minimum error: 50 ms)
Input frequency		40 to 500 Hz
Input impedance		K8AB-VW1: 9 k Ω min. K8AB-VW2: 100 k Ω min. K8AB-VW3: 1 M Ω min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load), Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

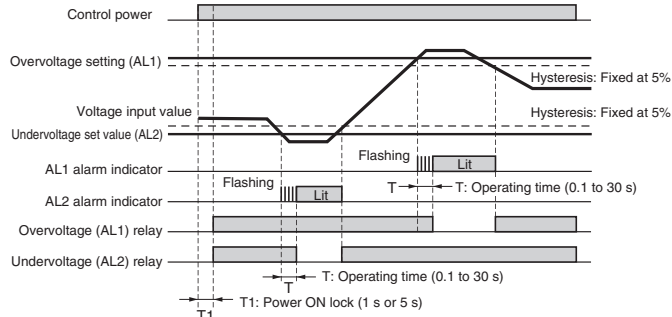
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Operating voltage range		85% to 110% of rated operating voltage
Rated power supply frequency		50/60 Hz ±5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 MΩ (at 500 V) between charged terminals and exposed uncharged parts 20 MΩ (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

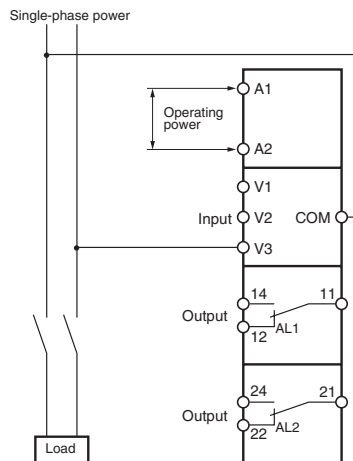
Connections

■ Wiring Diagram

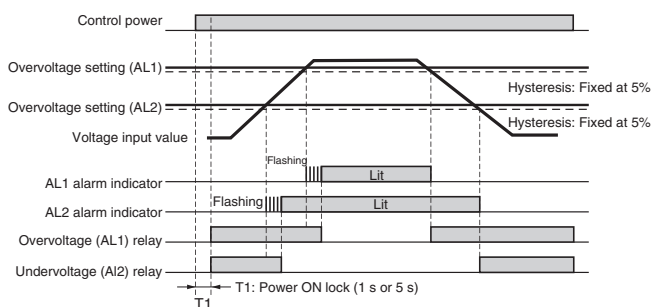
Overvoltage and Undervoltage Operation Diagram



- Note:**
1. The K8AB-VW output relay is normally operative.
 2. 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.

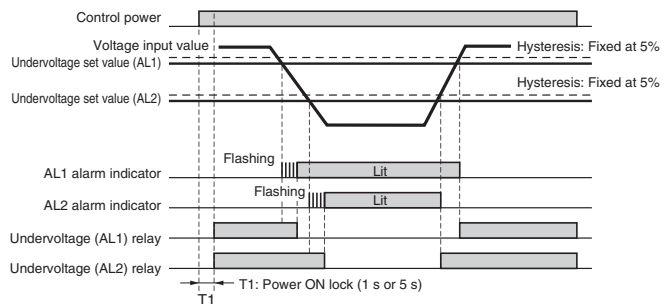


Overvoltage and Undervoltage Operation Diagram (Overvoltage Pre-alarm Mode)



- Note:**
1. The K8AB-VW output relay is normally operative.
 2. 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.

Overvoltage and Undervoltage Operation Diagram (Undervoltage Pre-alarm Mode)

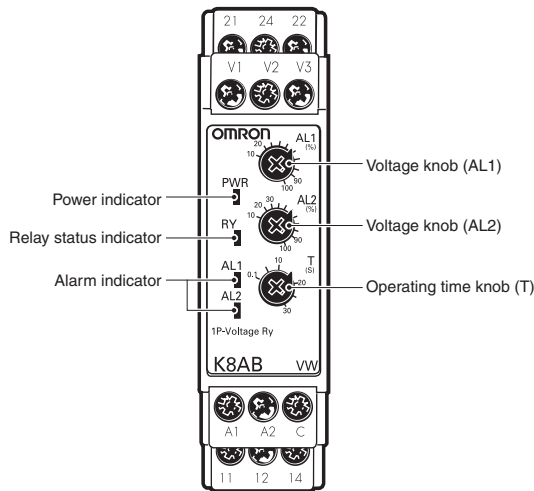


- Note:**
1. The K8AB-VW output relay is normally operative.
 2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.

Model	Measuring range	Connection
K8AB-VW1	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-VW2	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-VW3	20 to 200 V AC/DC	V1-COM
	30 to 300 V AC/DC	V2-COM
	60 to 600 V AC/DC	V3-COM

Nomenclature

Front



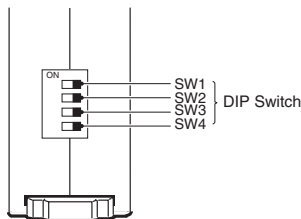
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay operates (Not light when both AL1 and AL2 are in error status) (Normally lit)
Alarm indicators (AL1 and AL2: 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 (AL1)	Used to set the voltage to 10% to 100% of maximum rated input voltage.
Voltage knob (AL2)	Used to set the voltage to 10% to 100% of maximum rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Function Selection DIP Switch

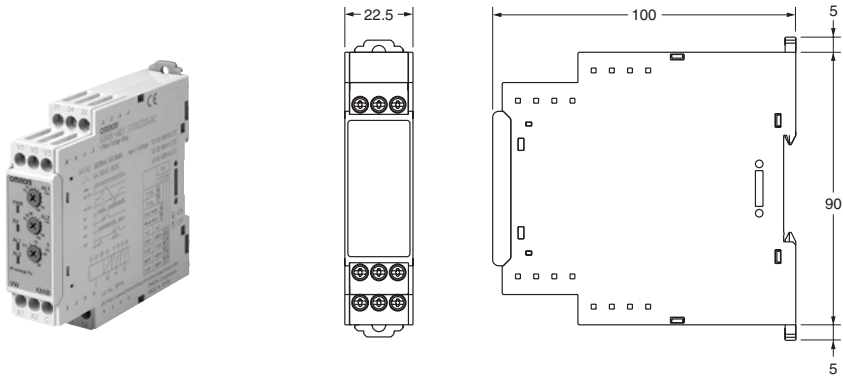


DIP Switch Functions

		Function			Default	
SW1	Operating power ON lock time		OFF	1 s	OFF	
			ON	5 s		
SW2	Resetting method		OFF	Manual reset	OFF	
			ON	Automatic reset		
SW3	SW4	Function			Default	
					SW3	SW4
OFF	OFF	Operating mode	AL1: Overvoltage, AL2: Undervoltage		OFF	OFF
ON	OFF		AL1: Overvoltage, AL2: Overvoltage			
OFF	ON		AL1: Undervoltage, AL2: Undervoltage			
ON	ON		AL1: Overvoltage, AL2: Undervoltage			

Dimensions

K8AB-VW



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 torque: 0.54 N·m
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 V_{r.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.

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.

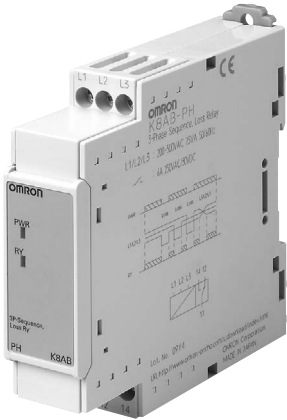
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Phase-sequence Phase-loss Relay

K8AB-PH

Ideal for phase sequence and phase loss monitoring for industrial facilities and equipment.

- Simultaneously monitor phase sequence and phase loss for three-phase 3-wire power supplies.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



CE

Model Number Structure

■ Model Number Legend

K8AB-□□

1 2 3

1. Basic Model

K8AB: Measuring and Monitoring Relays

2. Functions


PH: Phase-sequence Phase-loss Relay

3. Rated Input Voltage

1: 200 to 500 VAC

Ordering Information

List of Models

Phase-sequence Phase-loss Relay	Rated input voltage (See note.)	Model
	200 to 500 VAC	K8AB-PH1

Note: The power supply is shared with the rated input voltage.

Ratings and Specifications

Ratings

Rated input voltage	Non-isolated	200 to 500 VAC (15 VA)
Phase sequence, phase loss operating time	0.1 s max. (value when rated operating voltage changes quickly from 0% to 100%) (Relays are normally ON and turn OFF for phase sequence or loss phase errors.)	
Resetting method	Automatic reset	
Input frequency	45 to 65 Hz	
Input impedance	100 k Ω min.	
Indicators	Power (PWR): Green LED, Relay output (RY): Yellow LED	
Output relays	One SPDT relay (6 A at 250 VAC, resistive load)	

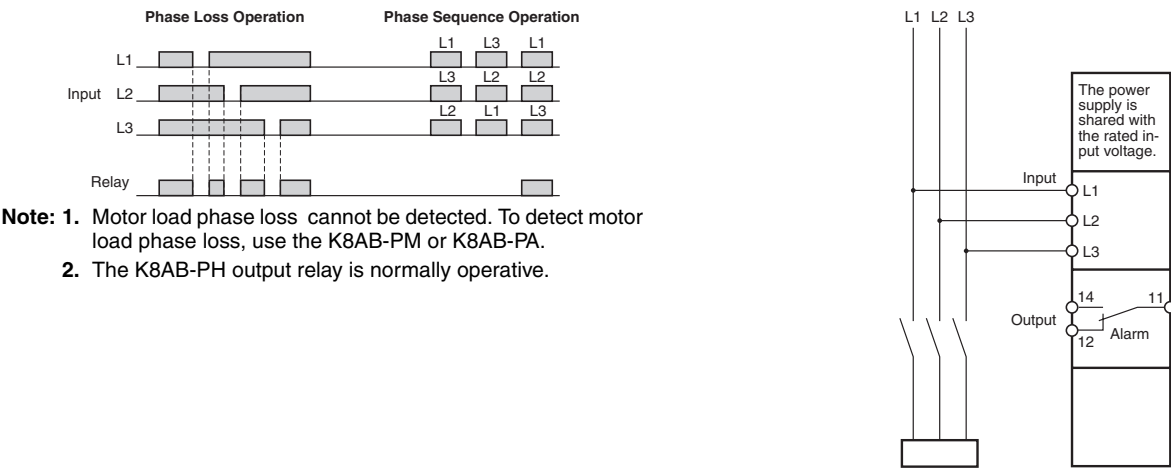
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz \pm 5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 M Ω (at 500 V) between charged terminals and exposed uncharged parts 20 M Ω (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

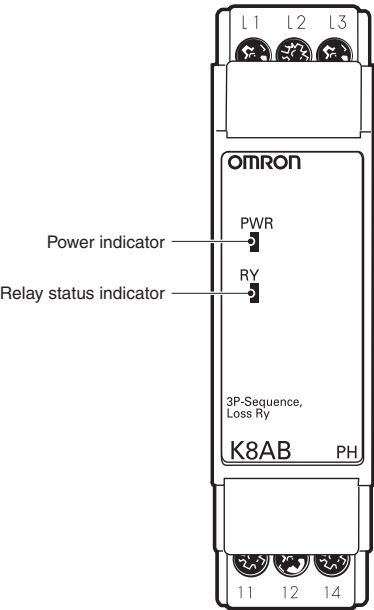
■ Wiring Diagram

Phase Sequence and Phase Loss Operation Diagram



Nomenclature

■ Front

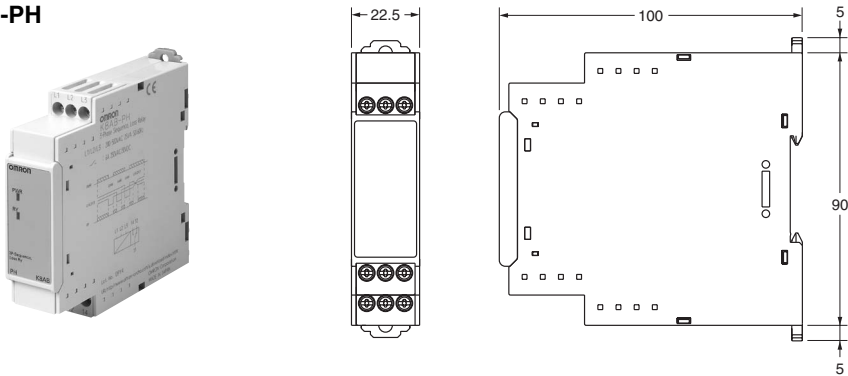


Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).

Dimensions

K8AB-PH



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 torque: 0.54 N·m
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.

■ 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.

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LIMITATIONS OF LIABILITY

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DIMENSIONS AND WEIGHTS

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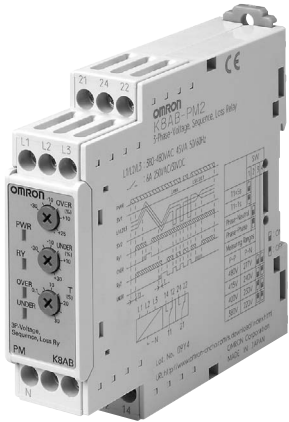
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Three-phase Phase-sequence Phase-loss Relay

K8AB-PM

Ideal for monitoring 3-phase power supplies for industrial facilities and equipment.

- Monitor overvoltages, undervoltages, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
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).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



Model Number Structure

■ Model Number Legend

K8AB-□□
1 2 3

1. Basic Model

K8AB: Measuring and Monitoring Relays

2. Functions

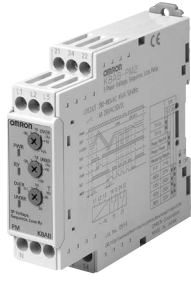
PM: Three-phase Phase-sequence Phase-loss Relay (Simultaneous upper and lower monitoring)

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 Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	200, 220, 230, 240 VAC	K8AB-PM1
	3-phase 4-wire mode	115, 127, 133, 138 VAC	
	3-phase 3-wire mode	380, 400, 415, 480 VAC	K8AB-PM2
	3-phase 4-wire mode	220, 230, 240, 277 VAC	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a switch.

2. The power supply is shared with the rated input voltage.

Ratings and Specifications

Ratings

Rated input voltage	K8AB-PM1	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PM2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Operation (overvoltage or undervoltage)	Operating value setting range	Overvoltage = -30% to 25% of maximum rated input voltage Undervoltage = -30% to 25% of maximum rated input voltage Note: The rated input voltage is switched with a switch.
	Operating value	100% operation at set value
Reset (HYS.)	Hysteresis	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	Overvoltage/undervoltage	0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
	Phase sequence, phase loss	0.1 max. (Value when input rapidly changes from 0% to 100%.)
Power ON lock (LOCK)		1 s or 5 s error ± 0.5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		$\pm 10\%$ of full scale
Time error		$\pm 10\%$ of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 k Ω min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load), Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

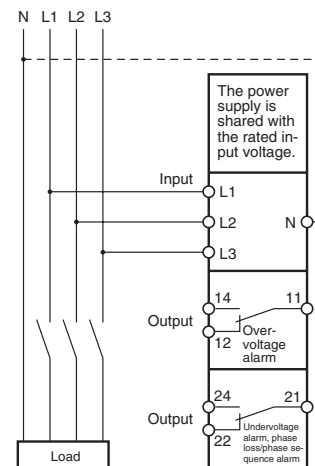
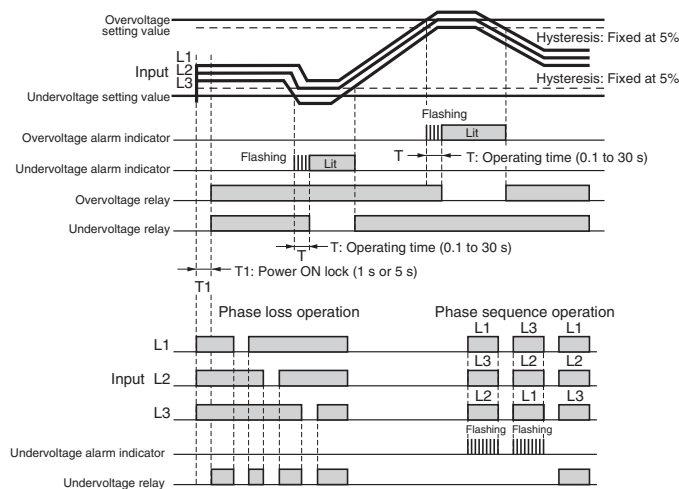
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz \pm 5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 M Ω (at 500 V) between charged terminals and exposed uncharged parts 20 M Ω (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

■ Wiring Diagram

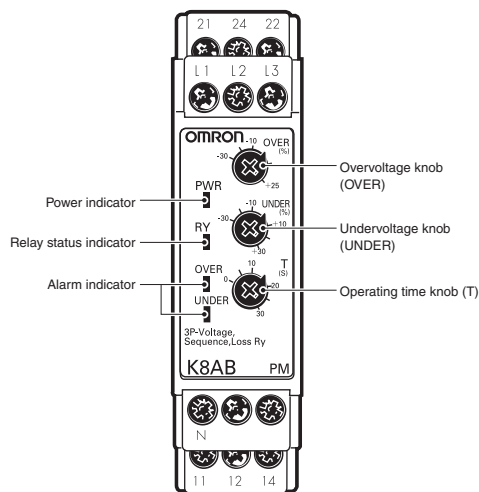
Overvoltage/Undervoltage and Phase Sequence/Phase Loss Operation Diagram



- Note:**
1. The K8AB-PM output relay is normally operative.
 2. 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



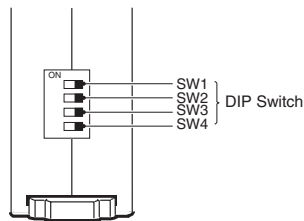
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	<p>Overvoltage: Lit for overvoltage. The indicator flashes to indicate the error status after the overvoltage has exceeded the threshold value while the operating time is being clocked.</p> <p>Undervoltage: Lit for 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. Lit for phase sequence error.</p>

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Used to set the voltage to -30% to 25% of the rated input voltage.
Undervoltage knob (UNDER)	Used to set the voltage to -30% to 25% of the rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

■ Function Selection DIP Switch

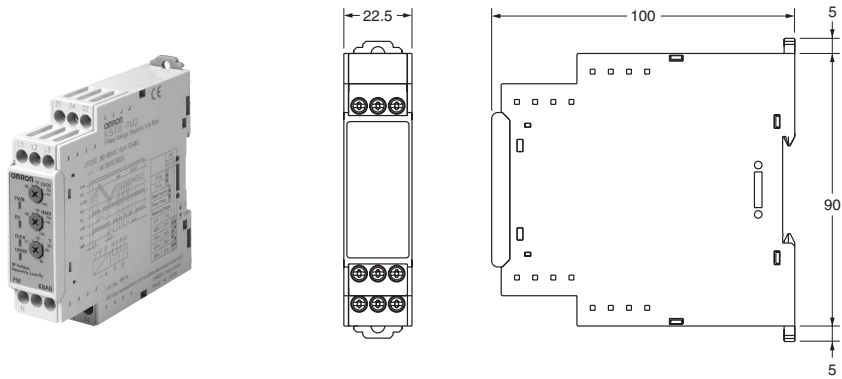


DIP Switch Functions

	Function			Default		
SW1	Power ON lock time	OFF	1 s	OFF		
		ON	5 s			
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF		
		ON	3-phase 4-wire power monitoring mode			
SW3	SW4	Function			Default	
			3-phase 3-wire mode	3-phase 4-wire mode	SW3	SW4
OFF	OFF	Rated input voltage switch (K8AB-PM1)	200 VAC	115 VAC	OFF	OFF
ON	OFF		220 VAC	127 VAC		
OFF	ON		230 VAC	133 VAC		
ON	ON		240 VAC	138 VAC		
OFF	OFF	Rated input voltage switch (K8AB-PM2)	380 VAC	220 VAC	OFF	OFF
ON	OFF		400 VAC	230 VAC		
OFF	ON		415 VAC	240 VAC		
ON	ON		480 VAC	277 VAC		

Dimensions

K8AB-PM



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 torque: 0.54 N·m
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.

■ 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.

Warranty and Application Considerations

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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.

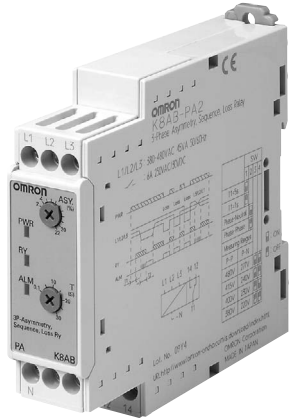
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Three-phase Asymmetry and Phase-sequence Phase-loss Relay

K8AB-PA

Ideal for 3-phase voltage asymmetry monitoring for industrial facilities and equipment.

- Monitor voltage asymmetry, phase sequence, and phase loss for three-phase 3-wire or 4-wire power supplies with just one Unit.
- Switch setting for 3-phase 3-wire or 3-phase 4-wire power supply.
- One SPDT output relay, 6 A at 250 VAC (resistive load).
- World-wide power specifications supported by one Unit (switchable).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



CE

Model Number Structure

■ Model Number Legend

K8AB-□□

1 2 3

1. Basic Model

K8AB: Measuring and Monitoring Relays

2. Functions

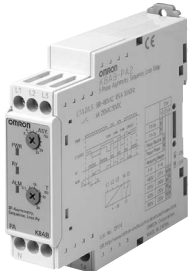
PA: Three-phase Asymmetry and Phase-sequence Phase-loss Relay.

3. Rated Input Voltage

- 1: AC 115, 127, 133, 138, 200, 220, 230, 240
- 2: AC 220, 230, 240, 277, 380, 400, 415, 480

Ordering Information

List of Models

Three-phase Asymmetry and Phase-sequence Phase-loss Relay	Rated input (See note 2.)		Model
	3-phase 3-wire mode	AC 200, 220, 230, 240	K8AB-PA1
	3-phase 4-wire mode	AC 115, 127, 133, 138	
	3-phase 3-wire mode	AC 380, 400, 415, 480	K8AB-PA2
	3-phase 4-wire mode	AC 220, 230, 240, 277	

Note: 1. Three-phase 3-wire or 4-wire and the input range are switched using a switch.
2. The power supply is shared with the rated input voltage.

Ratings and Specifications

Ratings

Rated input voltage	K8AB-PA1	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PA2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Asymmetry operation (ASY.)	Operating value setting range	Asymmetry rate: 2% to 22%
	Operating value	100% operation at set value Asymmetry operating value = Rated input voltage x Asymmetry set value [%] The asymmetry operation will function when the difference between the highest and lowest voltage phases equals or exceeds the asymmetry operating value.
Reset (HYS.)	Hysteresis	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	Asymmetry	0.1 s to 30 s (Value when input rapidly changes from 0% to 120%.)
	Phase sequence, phase loss	0.1 s max. (Value when input rapidly changes from 0% to 100%.)
Power ON lock (LOCK)		1 s or 5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		One SPDT relay (6 A at 250 VAC, resistive load) , normally closed operation (normally ON)

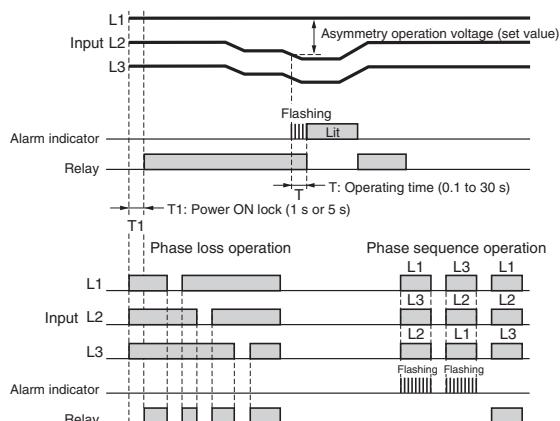
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz \pm 5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 M Ω (at 500 V) between charged terminals and exposed uncharged parts 20 M Ω (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

Connections

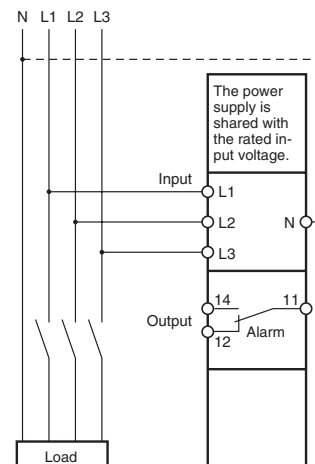
■ Wiring Diagram

Voltage Asymmetry and Phase Sequence/Phase Loss Operation Diagram



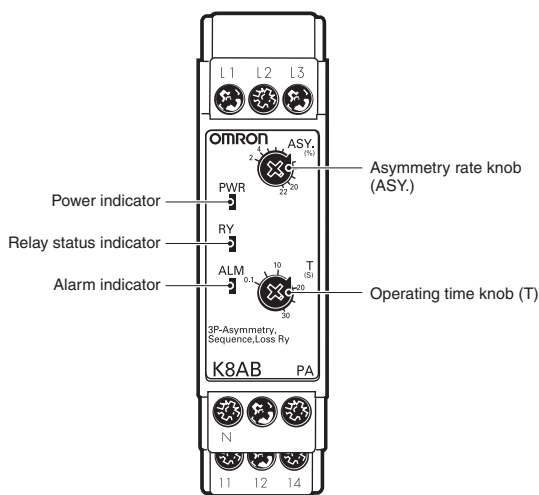
Note: 1. The K8AB-PA output relay is normally operative.
2. The power ON lock prevents unnecessary alarms from being generated during the unstable period when the power is first turned on. There is no relay output during timer operation.

Calculating the Asymmetry Operating Voltage
 Asymmetry operation condition = (Highest voltage – Lowest voltage) > Asymmetry operating voltage
 Asymmetry operating voltage = Rated input voltage (V) × Asymmetry set value (%)
Note: The rated input voltage is selected and set with the DIP switch.



Nomenclature

■ Front



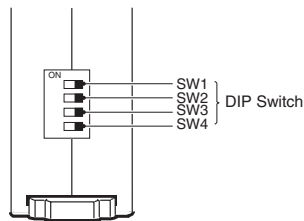
Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).
Alarm indicator (ALM: Red)	Asymmetry voltage error indicator 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
Asymmetry rate knob (SV)	Used to set the asymmetry rate to 2% to 22%.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Bottom



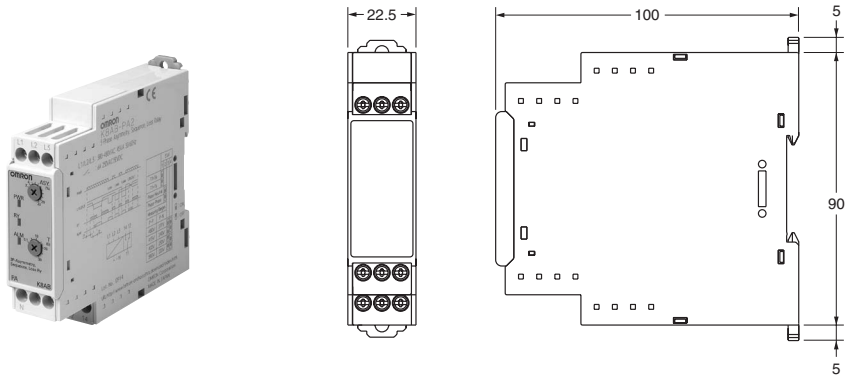
DIP Switch Functions

	Function			Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF
		ON	3-phase 4-wire power monitoring mode	

SW3	SW4	Function			Default	
			3-phase 3-wire mode	3-phase 4-wire mode	SW3	SW4
OFF	OFF	Rated input voltage switch (K8AB-PA1)	200 VAC	115 VAC	OFF	OFF
ON	OFF		220 VAC	127 VAC		
OFF	ON		230 VAC	133 VAC		
ON	ON		240 VAC	138 VAC		
OFF	OFF	Rated input voltage switch (K8AB-PA2)	380 VAC	220 VAC	OFF	OFF
ON	OFF		400 VAC	230 VAC		
OFF	ON		415 VAC	240 VAC		
ON	ON		480 VAC	277 VAC		

Dimensions

K8AB-PA



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 torque: 0.54 N·m
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.

■ 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.

Warranty and Application Considerations

Read and Understand this Catalog

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WARRANTY

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Disclaimers

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CHANGE IN SPECIFICATIONS

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DIMENSIONS AND WEIGHTS

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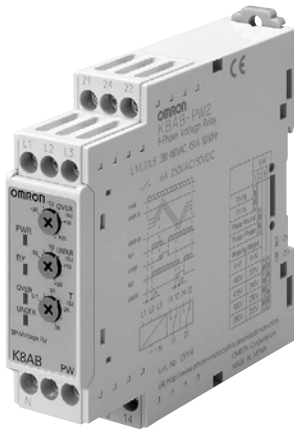
ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Three-phase Voltage Relay K8AB-PW

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.
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).
- Relay warning status easily monitoring using LED indicator.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification.



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)

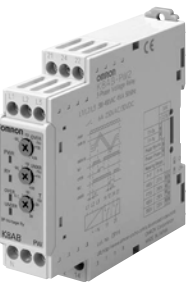
3. Rated Input Voltage

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 3-wire or 4-wire and the input range are switched using a switch.

2. The power supply is shared with the rated input voltage.

Ratings and Specifications

Ratings

Rated input voltage	K8AB-PW1	Three-phase, three-wire mode: 200, 220, 230, 240 VAC Three-phase, four-wire mode: 115, 127, 133, 138 VAC
	K8AB-PW2	Three-phase, three-wire mode: 380, 400, 415, 480 VAC Three-phase, four-wire mode: 220, 230, 240, 277 VAC
Operation (overvoltage and undervoltage)	Operating value setting range	Overvoltage = -30% to 25% of maximum rated input voltage Undervoltage = -30% to 25% of maximum rated input voltage Note: The rated input voltage is switched with a switch.
	Operating value	100% operation at set value
Reset (HYS.)	Hysteresis	5% of operating value (fixed)
	Resetting method	Automatic reset
Operating time (T)	Overvoltage/undervoltage	0.1 to 30 s (Value when input rapidly changes from 0% to 120%.)
Power ON lock (LOCK)		1 s or 5 s (Value when input rapidly changes from 0% to 100%. The operating time is the shortest at this point.)
Setting accuracy		±10% of full scale
Time error		±10% of set value (Minimum error: 50 ms)
Input frequency		45 to 65 Hz
Input impedance		100 kΩ min.
Indicators		Power (PWR): Green LED, Relay output (RY): Yellow LED, Alarm outputs (ALM1/2): Red LED
Output relays		Two SPDT relays (6 A at 250 VAC, resistive load) Normally closed operation (normally ON) (separate outputs possible for overvoltages and undervoltages)

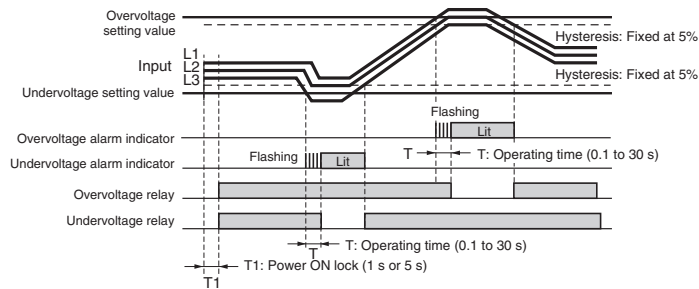
■ Specifications

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%
Storage humidity		25% to 85%
Altitude		2,000 m max.
Voltage fluctuation range		85% to 110% of rated input voltage
Input frequency		50/60 Hz \pm 5 Hz (AC power supply)
Output relays	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)
	Minimum load	10 mA at 5 VDC
	Maximum contact voltage	250 VAC
	Maximum contact current	6 A AC
	Maximum switching capacity	1,500 VA
	Mechanical life	10,000,000 operations
	Electrical life	Make: 50,000 times, Break: 30,000 times
Terminal screw tightening torque		1.2 N·m
Crimp terminals		Two solid wires of 2.5 mm ² , two crimp terminals of 1.5 mm ² with insulation sleeves, can be tightened together
Insulation resistance		20 M Ω (at 500 V) between charged terminals and exposed uncharged parts 20 M Ω (at 500 V) between any charged terminals (i.e., between input, output, and power supply terminals)
Degree of protection		Terminal section: IP20, Rear case: IP40
Case color		Munsell 5Y8/1 (ivory)
Case material		ABS resin (self-extinguishing resin) UL94-V0
Weight		200 g
Mounting		Mounted to DIN-rail or via M4 screws
Dimensions		22.5 (W) x 90 (H) x 100 (D) mm
Installation environment		Overvoltage Category III, Pollution Degree 2
Application standards		EN60255-5/-6
Safety standards		EN60664-1
EMC		EMI: EN61326 Industrial applications Electromagnetic interference wave CISPR11 Group 1, Class A: CISPR16-1/-2 Terminal interference wave voltage CISPR11 Group 1, Class A: CISPR16-1/-2 EMS: EN61326 Industrial applications Electrostatic discharge EN61000-4-2: 8 kV (in air) Radiating radio-frequency electromagnetic field EN61000-4-3: 10 V/m 1 kHz sine wave amplitude modulation (80 MHz to 1 GHz) Burst EN61000-4-4: 1 kV (I/O signal line), 2 kV (power line) Surge EN61000-4-5: 1 kV with line (power line), 2 kV with ground (power line) Conducted RF EN61000-4-6: 3 V (0.15 to 80 MHz) Power frequency magnetic field immunity EN61000-4-8: 30 A/m Voltage dip/short interruptions EN61000-4-11: 0.5 cycle, 0.180° each, polarity 100% (rated voltage)

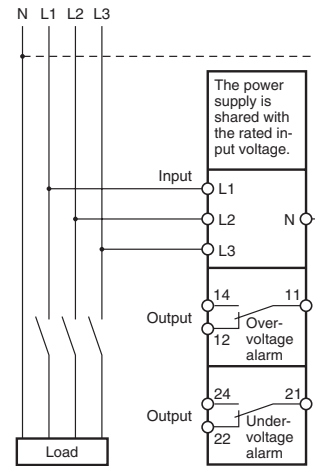
Connections

■ Wiring Diagram

Overvoltage and Undervoltage Operation Diagram

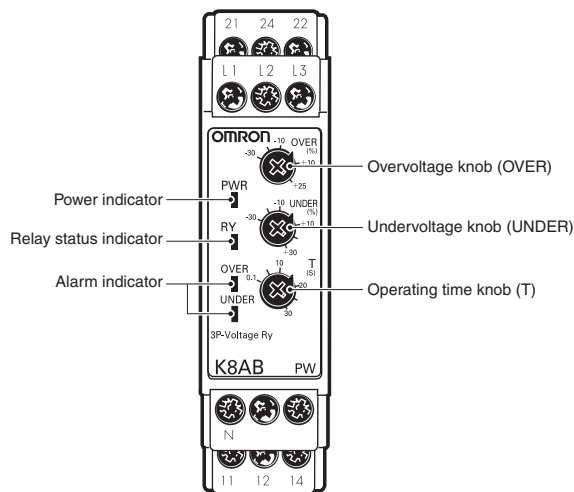


- Note:**
1. The K8AB-PW output relay is normally operative.
 2. The power ON lock prevents unnecessary alarms from being generated during the instable period when the power is first turned on. There is no relay output during timer operation.



Nomenclature

■ Front



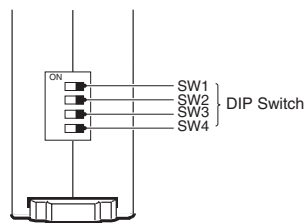
Indicators

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

Setting Knobs

Item	Usage
Overvoltage knob (OVER)	Used to set the voltage to -30% to 25% of the rated input voltage.
Undervoltage knob (UNDER)	Used to set the voltage to -30% to 25% of the rated input voltage.
Operating time knob (T)	Used to set the operating time to 0.1 to 30 s.

Bottom



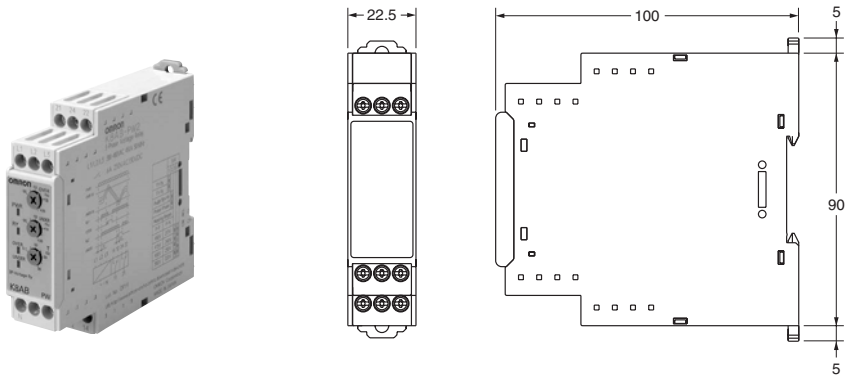
DIP Switch Functions

		Function		Default
SW1	Power ON lock time	OFF	1 s	OFF
		ON	5 s	
SW2	Monitoring mode selector	OFF	3-phase 3-wire power monitoring mode	OFF
		ON	3-phase 4-wire power monitoring mode	

SW3	SW4	Function		Default	
				SW3	SW4
OFF	OFF	Rated input voltage switch (K8AB-PW1)	3-phase 3-wire mode	200 VAC	115 VAC
	ON		3-phase 4-wire mode		
	OFF				
	ON				
ON	OFF	Rated input voltage switch (K8AB-PW2)	3-phase 3-wire mode	220 VAC	127 VAC
	ON		3-phase 4-wire mode		
	OFF				
	ON				

Dimensions

K8AB-PW



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 markings and polarity for correct wiring.
6. Tighten terminal screws firmly using the following torque.
Recommended torque: 0.54 N·m
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.

■ 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.

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
<p>WARRANTY</p> <p>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.</p> <p>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.</p>
<p>LIMITATIONS OF LIABILITY</p> <p>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.</p> <p>In no event shall the responsibility of OMRON for any act exceed the individual price of the product on which liability is asserted.</p> <p>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.</p>
Application Considerations
<p>SUITABILITY FOR USE</p> <p>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.</p> <p>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.</p> <p>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.</p>
Disclaimers
<p>PERFORMANCE DATA</p> <p>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 <i>Warranty and Limitations of Liability</i>.</p>
<p>CHANGE IN SPECIFICATIONS</p> <p>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.</p>
<p>DIMENSIONS AND WEIGHTS</p> <p>Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown.</p>

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

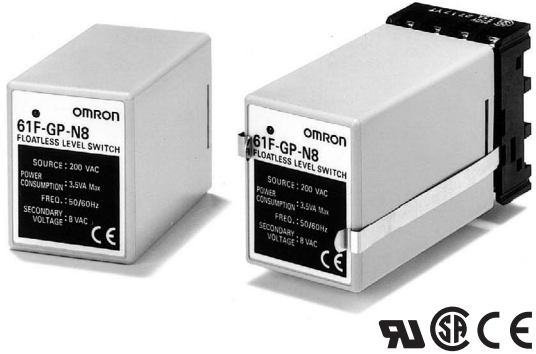
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Conductive Level Controller

61F-GP-N8

Compact Plug-in Level Controllers for Single or Two-point Level Control of Conductive Materials (Liquids and Solids)

- Wide range of models: long-distance, high and low-sensitivity, and two-wired types available.
- 24/100/110/120/200/220/230/240 VAC operation possible.
- Easy installation on DIN-rail.
- Low-voltage (AC) electrodes.
- Red LED operation indicator provided.
- Conforms to EMC and LVD Directives.
- UL/CSA approved.



Model Number Structure

Model Number Legend

61F-GP-N8□
1 2 3

1. Plug-in Type
2. Compact 8-pin Type

3. Applications
 - None: General-purpose type
 - L: Long-distance type
 - H: High-sensitivity type (reverse acting)
 - HY: High-sensitivity type (standard acting)
 - D: Low-sensitivity type
 - R: Two-wired type

Ordering Information

List of Models

Application		Model number
General-purpose type		61F-GP-N8
Long-distance type	2 km	61F-GP-N8L 2KM
	4 km	61F-GP-N8L 4KM
High-sensitivity type		61F-GP-N8H
Low-sensitivity type		61F-GP-N8D
Two-wired type		61F-GP-N8R

■ Accessories (Order Separately)

Selection Guide for Electrode Holders and Separators

Electrode Holders

Applications	For city water and other general-use electrodes. Easy-to-replace separate versions facilitate maintenance of electrodes.	When mounting space is limited. Special 3-pole holder of small size and light weight. Ideal for soft drink vendors, etc., where only limited space is available.	For low specific liquids. Used for sewage, sea water, etc., having a low specific resistance. In sewage use, electrode holders must be installed 10 to 20 cm apart from one another. For acids, alkalis and sea water, electrode holders may be as much as 1 meter apart to operate properly.	When resistance to high pressure is required. Ideal for use in tanks where temperature or pressure inside the tank is high, e.g. 250°C
Mounting style	Flange	Screw	Flange	Screw
Insulator material	Phenol resin	Phenol resin	Ceramics	PTFE
Max. temperature	70°C		150°C (without water drips or vapor on the surface of the electrode holder)	250°C (without water drips or vapor on the surface of the electrode holder)
No. of electrodes	1	---	---	BF-1
	3	PS-3S	PS-31	---
				BS-1

Electrode Separators

No. of electrodes	Model
1	F03-14 1P
3	F03-14 3P

Selection Guide for Electrodes, Connecting, and Lock Nuts

Applicable liquids	Material	Models for individual electrode assembly components					
		Electrode (1m long)		Connecting nut		Lock nut	
		Model	Indication mark	Model	Inscription	Model	Inscription
Purified city water, industrial water, sewage	Equivalent to SUS 304 (AISI-304)	F03-01 SUS201	1 line	F03-02 SUS201	---	F03-03 SUS201	---
Purified city water, industrial water, sewage, dilute alkaline solution	SUS316 (AISI-316)	F03-01 SUS316	2 lines	F03-02 SUS316	6	F03-03 SUS316	316

Specifications

■ Ratings and Characteristics

Model/Items	General-purpose Controller 61F-GP-N8	Long-distance Controllers 61F-GP-N8L 2KM (for 2 km) 61F-GP-N8L 4KM (for 4 km)	High-sensitivity Controllers 61F-GP-N8H 61F-GP-N8HY (see note 1)	Low-sensitivity Controller 61F-GP-N8D	Two-wired Controller 61F-GP-N8R
Controlling materials and operating conditions	For control of ordinary purified water or sew- age water	For control of ordinary purified water in cas- es where the distance between sewage pumps and water tanks or between re- ceiver tanks and sup- ply tanks is long or where remote control is required.	For control of liquids with high specific re- sistance such as dis- tilled water	For control of liquids with low specific re- sistance such as salt water, sewage water, acid chemicals, alkali chemicals	For control of ordinary purified water or sew- age water used in combination with two wired-type electrode holder (incorporating a resistor of 6.8 kΩ)
Supply voltage	24, 100, 110, 120, 200, 220, 230 or 240 VAC; 50/60 Hz				
Operating voltage range	85% to 110% of rated voltage				
Interelectrode voltage	8 VAC		24 VAC	8 VAC	
Interelectrode current	Approx. 1 mA AC max.		Approx. 0.4 mA AC max.	Approx. 1 mA AC max.	
Power consumption	Approx. 3.5 VA max.				
Interelectrode operate resistance	Approx. 0 to 4 kΩ	Approx. 0 to 1.3 kΩ (for 2 km) Approx. 0 to 0.5 kΩ (for 4 km)	Approx. 15 kΩ to 70 kΩ (see note 3)	Approx. 0 to 1.3 kΩ	Approx. 0 to 2 kΩ
Interelectrode release resistance	Approx. 15 k to ∞ Ω	Approx. 4 k to ∞ Ω (for 2 km) Approx. 2.5 k to ∞ Ω (for 4 km)	Approx. 300 k to ∞ Ω	Approx. 4 k to ∞ Ω	Approx. 15 k to ∞ Ω
Response time	Operate: 80 ms max. Release: 160 ms max.				
Cable length (see note 2)	1 km max.	2 km max. 4 km max.	50 m max.	1 km max.	800 m max.
Control output	1 A, 250 VAC (Inductive load: cosφ = 0.4) 3 A, 250 VAC (Resistive load)				
Ambient temperature	Operating: -10°C to 55°C				
Ambient humidity	Operating: 45% to 85% RH				
Insulation resistance (see note 3)	100 MΩ max. (at 500 VDC)				
Dielectric strength (see note 4)	2000 VAC, 50/60 Hz for 1 min.				
Life expectancy	Electrical: 100,000 operations min. Mechanical: 5,000,000 operations min.				

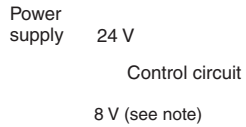
Note: 1. The relay in the 61F-GP-N8H de-energizes when there is water present across the electrodes, whereas the relay in the 61F-GP-N8HY energizes when there is water present across the electrodes.

- The length when using completely-insulated, 600-V, 3-conductor (0.75 mm²) cabtyre cables. Usable cable lengths will become shorter as the cable diameter or number of conductors becomes larger.
- The insulation resistance and dielectric strength indicate values between power terminals and electrode terminals, between power terminals and contact terminals, and between electrode terminals and contact terminals.
- Possible to use with 10 kΩ or less, however, this may cause reset failure.

Connections

Internal Circuit Diagrams

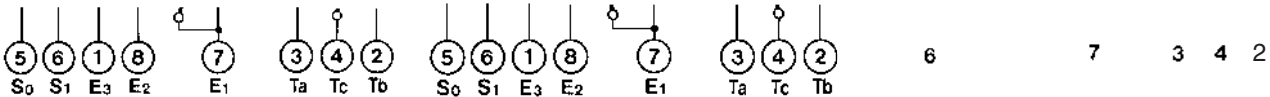
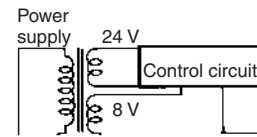
61F-GP-N8/-N8L/-N8D/-N8HY



61F-GP-N8H



61F-GP-N8R



Note: 24 V for the 61F-GP-N8HY.

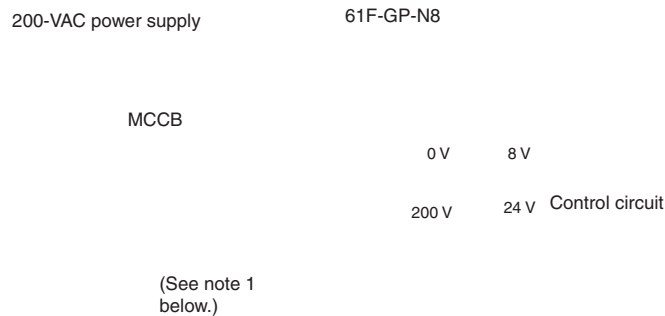
Automatic Water Supply and Drainage Control

1. Water Supply

- Connect electromagnetic switch coil terminal A to terminal 2.
- The pump stops when the water level reaches E1 and starts when the water level drops below E2.

2. Drainage

- Connect the electromagnetic switch coil terminal A to terminal 3.
- The pump starts when the water level reaches E1 and stops when the water level drops below E2.



- Note:** 1. The diagram shows the connections for water supply. When draining, change the connection from terminal 2 to terminal 3.
2. The earth terminal must be earthed.

Operation

The Conductive Level Controller consists of a plug-in controller connected to a set of stainless steel probes. These are cut to length and inserted vertically into the liquid. A low voltage is applied between these probes and the earth probe (or tank, if it is electrically conductive). The water provides a current between the earth probe and the high-level probe. The output relay in the Controller is energized when the water level reaches the high-level probe and de-energized when the water level falls below it.

For two-point control a low-level probe is used as well. In this case the relay does not de-energize until the water level falls below the low-level probe. Using the low-level probe allows a wide differential between switching a pump on and off, and can avoid excessive pump operation during tank emptying or filling. If this differential is not required, the low-level probe need not be connected.

Surge Suppressor Unit (61F-03B/04B)

A high-capacity protective device is available which protects 61F-series Floatless Level Controllers against faults arising from electrical surges (such as indirect strokes of lightning) when the Controllers are employed in elevated water tanks or in high-altitude locations.

Specifications

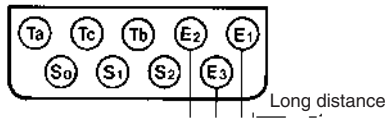
Discharge start voltage	90 V \pm 20 VDC
Impulse withstand voltage	200,000 V (1 x 40 μ s)
Impulse withstand current	6,000 A (1 x 40 μ s)

Internal Connections



Precautions

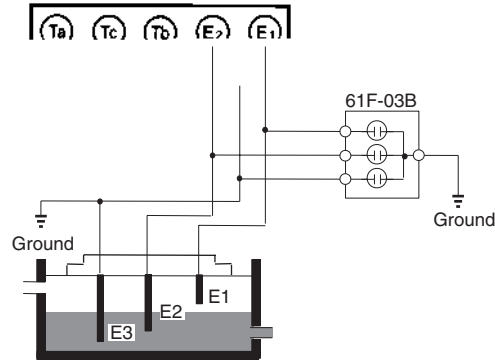
1. Mount the Surge Suppressor Unit as close to the Controller as possible.
2. When grounding the Surge Suppressor Unit in the vicinity of the Controller, connect the ground side of the Surge Suppressor Unit to electrode E3.



61F-03B

Ground

3. When connecting the Surge Suppressor Unit, wire as shown in the following example (with three electrodes).

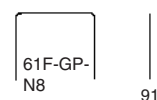


Connection Sockets

PF113A-E DIN-rail-mounted Socket
PL11 Back-connecting Socket

Dimensions

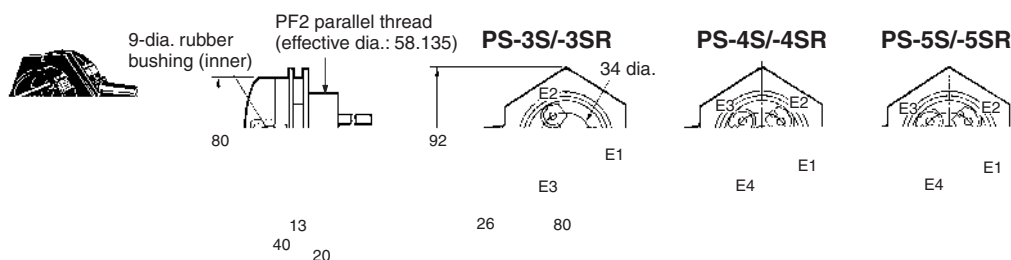
Note: All units are in millimeters unless otherwise indicated.



PF083A-E

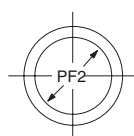
Electrode Holders

PS-□S

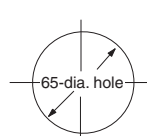


Mounting Holes

Screw Holes



Used with coupling

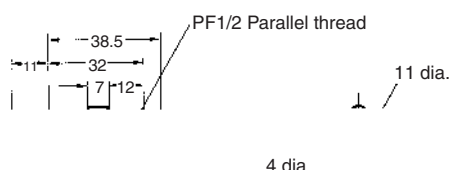


Used with mounting bracket

PS-31



Dust preventive rubber cap (optional)

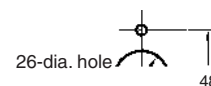
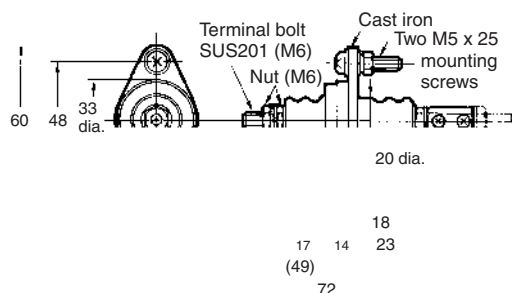


Mounting Holes



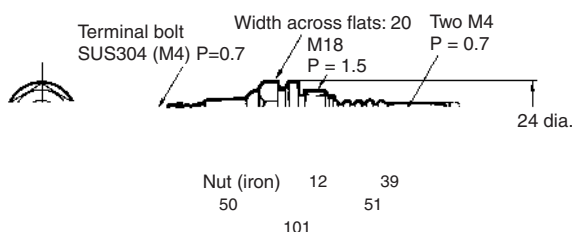
Note: Standard holder construction includes three integral 300-mm-long electrodes. However, a model having 1,000-mm-long electrodes is available on request.

BF-1



Two, 6-dia. holes

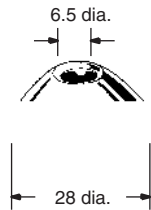
BS-1



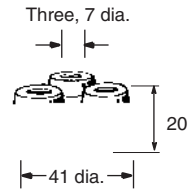
M18 P=1.5
(fine screw thread)

Electrode Separators

F03-14 1P (for Single Pole)



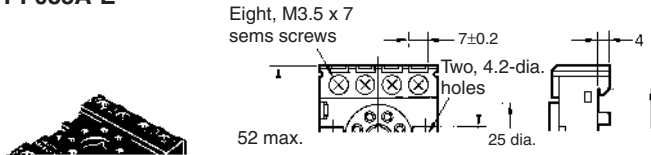
F03-14 3P (for Three Poles)



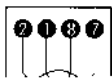
Connecting Sockets

DIN-rail Mounted Socket

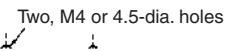
PF083A-E



Terminal Arrangement/
Internal Connections
(Top View)



Mounting Holes

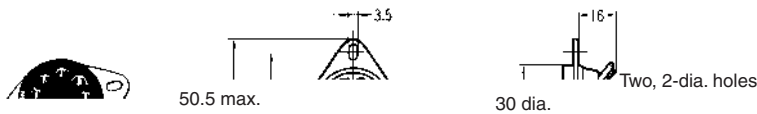


41 max.

21 max.

Back Connecting Socket

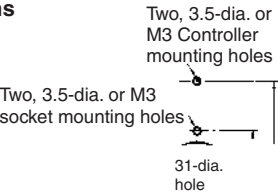
PL08



Terminal arrangement/
Internal Connections
(Bottom View)



Mounting Holes



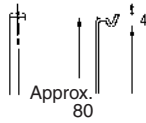
35 max.

Approx. 20.5

Holding Brackets

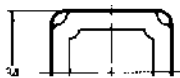
To mount the 61F-GP-N8 Conductive Level Controller on the PF083A DIN-rail Mounted Socket, use the PFC-N8 Mounting Brackets attached to the Socket as an accessory.

PFC-N8



Surge Suppressor Unit

61F-03B
61F-04B



PF113A-E

Application Examples

- Level control in tanks, reservoirs, sewage plants, underground wells, mixing plants etc.
- Level control for element protection in pipes, channels, and irrigation systems.
- Flow detection in pipes, channels, and irrigation systems.
- Ice bank control in cold drink dispensers, ice makers, water chillers, bulk milk tanks, etc.
- Dispensing of liquids by volume.
- Indication of liquid buildup due to filter blockages.
- Pollution/foul water detection for rivers, drains, etc.
- Alarm control warning of abnormal or dangerously high or low levels.

Application

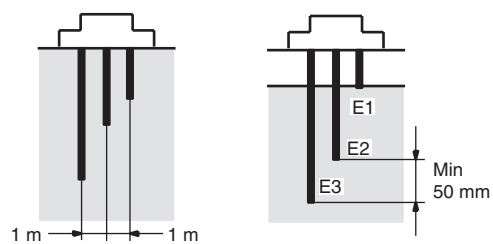
When using electrodes in sea water or sewage, provide a sufficient interval (normally 1 m) between the electrodes. If the sufficient interval cannot be provided, employ a low-sensitivity-type Floatless Level Controller.

When taping one of the electrodes to prevent it from contacting the other electrodes in water, do not tape the electrode entirely but leave at least 100 mm of its end uncovered.

When the required length of the electrode is more than 1 m, use a separator at each joint of two electrodes so as to prevent the electrodes from contacting one another.

Note: Avoid use of the separators in dust-containing liquids.

Usually, electrodes are used in a set of three: long, medium, and short. Connect the short electrode to E1, the medium electrode to E2, and the long electrode to E3. Make E3 at least 50 mm longer than E2.



Electrodes are in actual contact with the liquid. Standard electrodes are made of stainless steel and usable in purified water, sea water, sewage, acid (except acetic acid, sulfuric acid, etc.) and alkaline liquids, although they may corrode depending upon the temperature and working conditions.

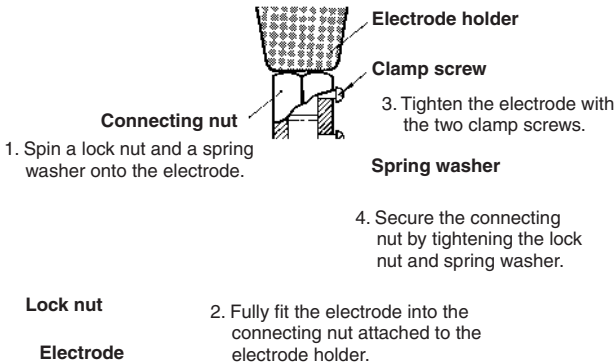
Note that the 61F-GP-N8 Conductive Level Controller is capable of controlling liquids with specific resistances of up to 30 kΩ-cm when the Controller employs a PS-3S electrode holder with the electrode(s) submerged to a depth of 30 mm max.

Kind of water	Specific resistance	Applicable type
City water	5 to 10 kΩ-cm	Standard type
Well water	2 to 5 kΩ-cm	Standard type
Industrial water	5 to 15 kΩ-cm	Standard type
Rainwater	15 to 25 kΩ-cm	Standard type
Sea water	0.03 kΩ-cm	Low-sensitivity type
Sewage	0.5 to 2 kΩ-cm	Low-sensitivity type
Distilled water	100 kΩ-cm or less	High-sensitivity type
	Over 100 kΩ-cm	Consult OMRON

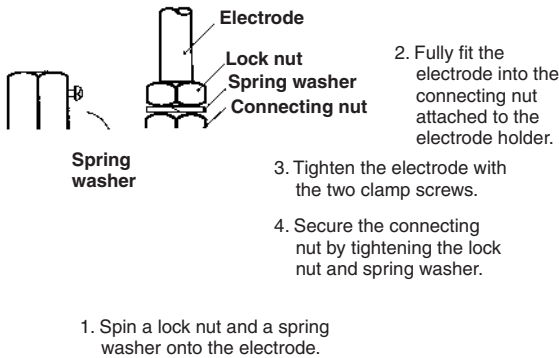
Precautions

How to Mount Electrodes

Connecting Electrodes to Electrode Holders



Connecting One Electrode to Another



ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

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

Conductive Level Controller 61F-GPN-BT/-BC

Battery (24 VDC) allows use in locations without AC power supply. AC sine-wave voltage between electrodes enables stable detection with no electric corrosion.

- Outputs can be set to self-hold at ON or OFF using special circuits.
- Adjustable sensitivity, with an operating resistance range of 0 to 100 kΩ, allows use for a wide variety of liquids.
- Relay contact chattering conventionally caused by waves eliminated using open collector output, reducing contact wear.
- Bears CE marking and is a UL recognized component.

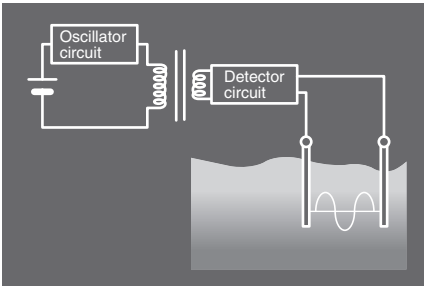


Features

The 61F can now run on DC power to allow energy savings, greater safety, and use in emergency situations.

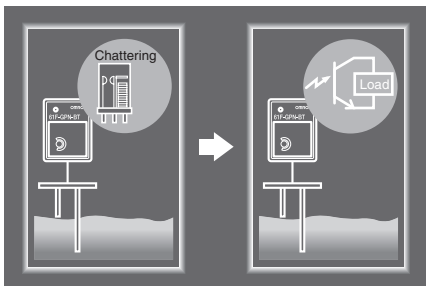
Combines DC Power Supply with AC Sensing Method

AC sine-wave signals are sent to electrodes using a built-in DC-AC converter, preventing electric corrosion and ensuring safety.



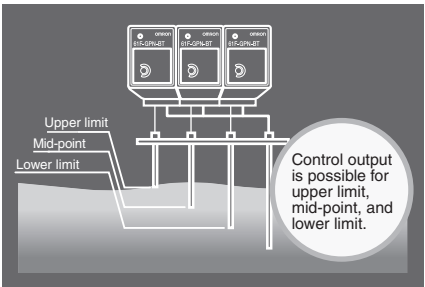
Open Collector Output

Signals can be used as direct input for a PLC. PNP output is also possible using the connection method.



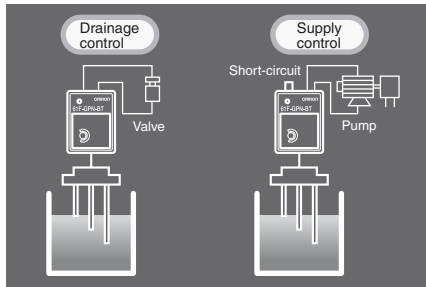
Supports Multi-channel Sensing

Power supply circuits and detection circuits are isolated, allowing more than one Controller to be used in the same tank.



Same Wiring for Supply and Drainage

Supply control and drainage control can be performed with the same wiring (short terminals 7 and 8 for supply control). This makes it easy to perform wiring and confirm connection.



Monitoring products

Ordering Information

Product name	Model number	
Conductive Level Controller	61F-GPN-BT	61F-GPN-BC
	Open collector (NPN)	Relay contact (SPST-NO)
Front Socket	PF113A-E	
Electrode Holder	(See note.)	

Note: A variety of Holders are available to suit different types of application. For details, refer to *61F Floatless Level Controller (F030-E1-8)*.

Specifications

■ Ratings

	61F-GPN-BT	61F-GPN-BC
Rated voltage	24 VDC	
Allowable voltage range	85% to 110% of the rated voltage	
Interelectrode voltage	5 VAC max.	
Operation resistance (See note 1.)	Variable (0 to 100 kΩ)	
Error	For scale of 0: +10 kΩ; For scale of 100: ±10 kΩ	
Release resistance	200% max. of the operation resistance	
Switching between supply and drainage	Terminals 7 and 8 open: Automatic drainage operation Terminals 7 and 8 shorted: Automatic supply operation	
Output specifications	Open collector (NPN) 30 VDC, 100 mA max.	SPST-NO 5 A, 240 VAC (Resistive load) 2 A, 240 VAC (Inductive load: $\cos\phi=0.4$)
Life expectancy	---	Electrical: 100,000 operations min. Mechanical: 20,000,000 operations min.
Wiring distance (See note 2.)	100 m max.	

Note: 1. The 61F may not operate at resistance settings close to zero. Adjust the sensitivity to match actual usage conditions.

2. The figure for wiring distance above is for when 600-V 3-core cabtyre cable with a cross-sectional area of 0.75 mm² is used.

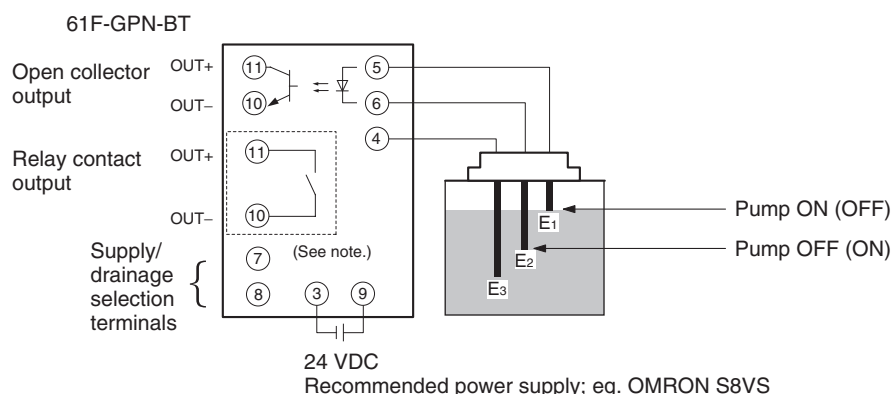
■ Characteristics

Ambient operating temperature	−10 to 55°C
Ambient operating humidity	25% to 85%
Insulation resistance	100 MΩ min. (at 500 VDC)
Dielectric strength (See note.)	2,000 VAC, 50/60 Hz for 1 minute
Power consumption	2 W max.
Response time	Operating: 1.5 s max. Releasing: 3.0 s max.

Note: The dielectric strength is measured between power terminals and electrode terminals, power terminals and output terminals, and between electrode terminals and output terminals.

Connections

■ Automatic Drainage Operation



Note: [] The part within the dotted-line box is for the 61F-GPN-BC (relay-output type) only.

■ Automatic Water Supply Operation

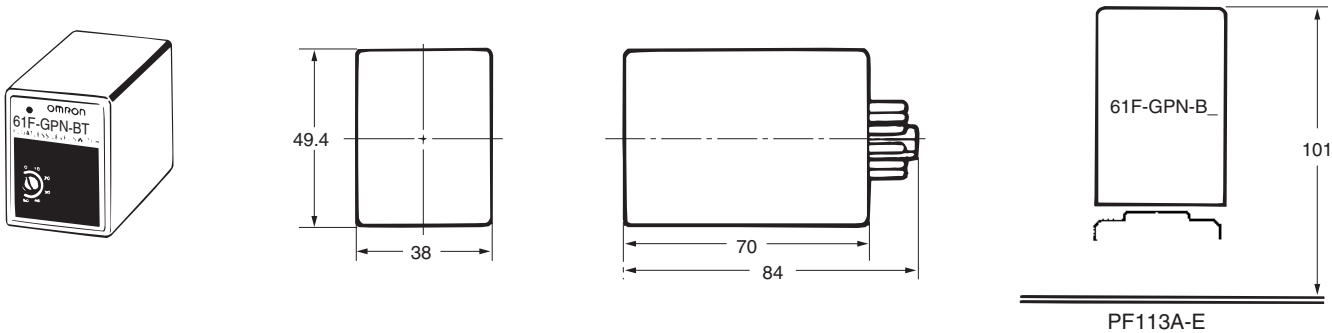
Short terminals 7 and 8 for automatic water supply operation. (Operation shown in parentheses in the diagram above.)

■ Reading Signals for the Liquid Level Only (No Control)

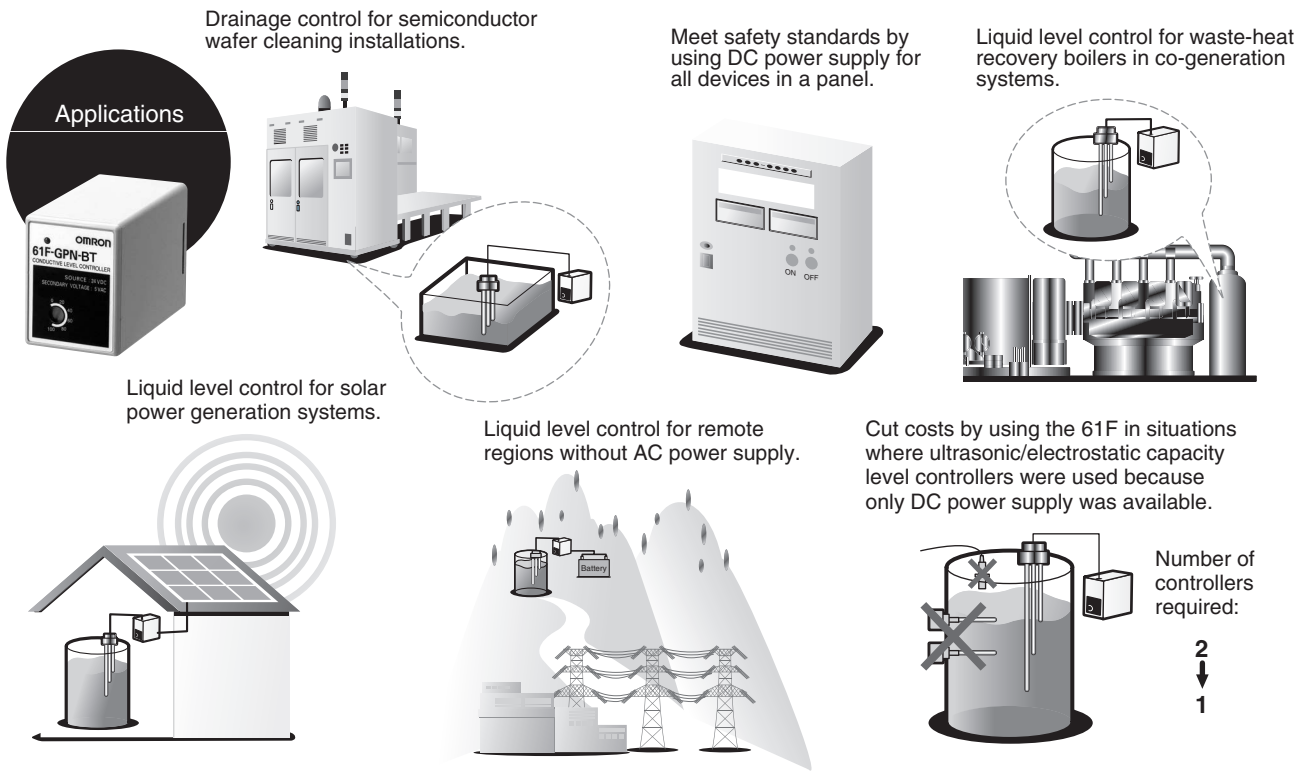
Only E1 and E3 are used. Output will turn ON when the liquid level reaches E1 if terminals 7 and 8 are open, and will turn OFF if terminals 7 and 8 are closed. Also, to take signals for liquid level at several points, use terminal 4 as a common for all of the Controllers and use terminal 5 of each Controller as an electrode.

Note: If terminals 7 and 8 are shorted, operation of the 61F relay is "de-energizing" (i.e., energized normally and de-energized when liquid is present across the electrodes). Therefore, if the power supply connected across terminals 3 and 9 is interrupted, the output from terminals 10 and 11 will turn OFF, enabling detection of power interruptions.

Dimensions



Application Examples



Precautions

General Precautions

Before using the Controller under conditions not described in the relevant documents or applying the Controller to nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, safety equipment and other systems, machines, and equipment that may have a serious influence on lives and property if used improperly, consult your OMRON representative.

Make sure that the ratings and performance characteristics of the Controller are sufficient for the systems, machines, and equipment and be sure to provide the systems, machines, and equipment with double safety-mechanisms.

Safety Precautions

In order to ensure safe operation, be sure to observe the following points.

- Use a power supply voltage within the specified range.
- Do not use the Controller in locations subject to flammable gases or objects.
- Insert the Socket until it securely clicks into place.
- Do not short the load connected to the output terminals.
- Do not connect the power supply in reverse.

Correct Use

Mounting

Mount to a panel of thickness 1 to 5 mm.

Do not mount the Controller in the following places.

- Locations subject to strong vibrations or shocks.
- Locations outside the specified temperature and humidity ranges, or locations prone to condensation. (The Controller detects high impedances. Do not use in locations subject to high humidity levels.)
- Locations subject to dust.
- Locations subject to corrosive gases (in particular, sulphurized gas or ammonia gas).
- Outdoors, or in locations subject to direct sunlight.
- Near devices that generate strong, high-frequency noise (e.g., high-frequency welders, machines).

ALL DIMENSIONS SHOWN ARE IN MILLIMETERS.

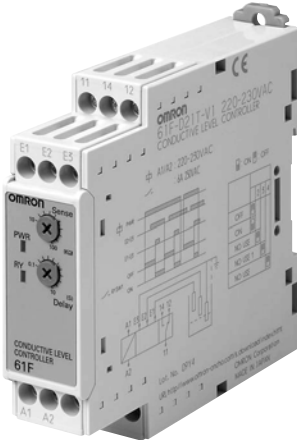
To convert millimeters into inches, multiply by 0.03937. To convert grams into ounces, multiply by 0.03527.

Conductive Level Controller

61F-D21T-V1

Ideal for level control for industrial facilities and equipment.

- Outputs can be set to self-hold at ON or OFF using self-holding circuits.
- Sensitivity adjustment of operating resistance from 10 to 100 kΩ for application to a wide range of liquids.
- Delay timer to prevent relay contact chattering caused by waves.
- CE marking, cUL application pending.
- Easy wiring with ferrules
2 × 2.5 mm² solid or 2 × 1.5 mm² standard ferrules.
- CE mark compliance certified by third party.
UL certification pending.



Model Number Structure

■ Model Number Legend

61F-□□

1 2 3

1. Basic Model

61F: Conductive Level Controller

2. Functions

D21T-V1: Automatic liquid supply operation/
Automatic liquid drainage operation

3. Supply Voltage

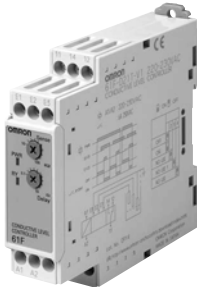
24 VAC: 24 VAC

115 VAC: 115 VAC

220-230 VAC: 220 to 230 VAC

Ordering Information

List of Models

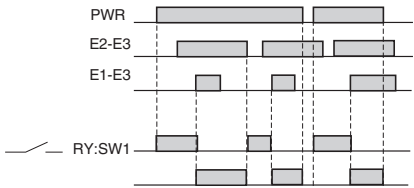
Conductive Level Controller	Supply voltage	Model
	24 VAC	61F-D21T-V1 24 VAC
	115 VAC	61F-D21T-V1 115 AC
	220 to 230 VAC	61F-D21T-V1 220 to 230 VAC

Specifications

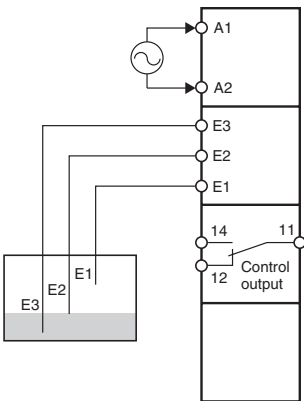
Rated voltage	24 VAC, 115 VAC, 220 to 230 VAC
Operating voltage range	85% to 110% of rated voltage
Voltage between electrodes	6 VAC p-p (approx. 20 Hz)
Power consumption	5 VA max.
Operating resistance	10 k Ω to 100 k Ω (variable)
Reset resistance	250 k Ω max.
Response time	Approx. 0.1 to 10 s (variable)
Cable length	100 m max. with completely insulated (600 V) cabtire cable with 3 conductors (0.75 mm ²)
Control output	6 A at 250 VAC for resistive load at 20°C, 1 A at 250 VAC for inductive load cos ϕ = 0.4 at 20°C
Indicators	Green LED: Power, Yellow LED: Control output
Ambient temperature	Operating: -20 to 60°C, Storage: -30 to 70°C (with no condensation or icing)
Ambient humidity	Operating: 25% to 85%, Storage: 25% to 85%
Elevation	2,000 m max.
Insulation resistance	100 M Ω min. (at 500 VDC) between power supply section, electrode section, and contact section
Dielectric strength	2,000 VAC 50/60 Hz for 1 min between power source section, electrode section, and contact section
Vibration resistance	Vibration of 10 to 55 Hz and acceleration of 50 m/s ² for 5 min. 10 times each in X, Y, and Z directions
Shock resistance	100 m/s ² 3 times each in 6 directions on 3 axes
Installation environment	Overvoltage Category II, Pollution Degree 2
Safety standards	EN61010-1
EMC	EN61326 Industrial applications

Connections

■ Operation Diagram

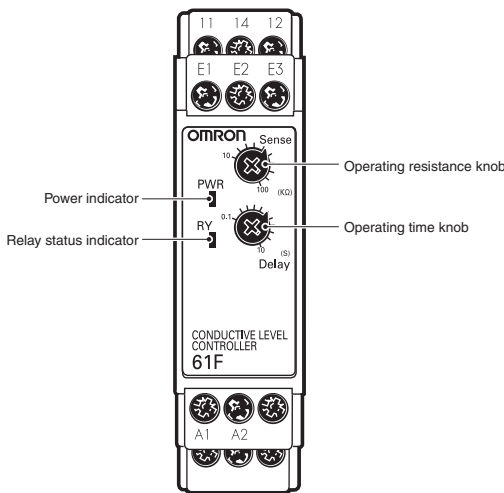


■ Wiring Diagram

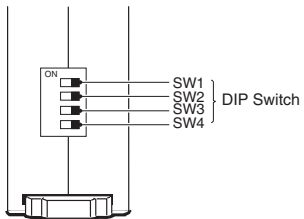


Nomenclature

■ Front



■ Bottoms



Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied.
Relay status indicator (RY: Yellow)	Lit when relay is operating.

Setting Knobs

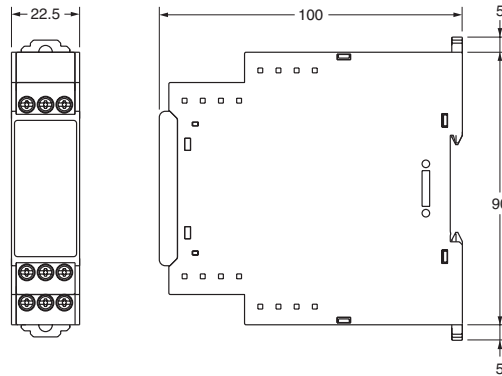
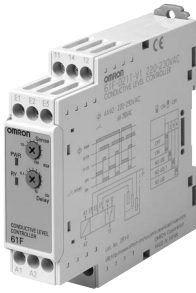
Item	Usage
Operating resistance knob	Used to set the operating resistance to 10 to 100 kΩ.
Operating time knob	Use to set the operating time to 0.1 to 10 s.

DIP Switch Functions

	Function			Default
SW1	Supply/ drainage selection	OFF	Automatic liquid supply operation	OFF
		ON	Automatic liquid drainage operation	
SW2	Not used.	OFF	Not used.	OFF
		ON	Not used.	
SW3	Not used.	OFF	Not used.	OFF
		ON	Not used.	
SW4	Not used.	OFF	Not used.	OFF
		ON	Not used.	

Dimensions

61F-D21T-V1



Safety Precautions

■ Precautions for Safe Use

- There is a remote risk of electrical shocks. Do not touch terminals while electricity is being supplied.
- There is a remote risk of electrical shocks, fire, or failure occurring. Do not disassemble, repair, or modify the product.
- When attaching the product to the DIN-rail, attach it firmly with screws. When the screws are not tightened firmly, the product or wiring may become disconnected due to vibrations or shocks.
- When attaching the product to the DIN-rail, ensure that the product has been attached firmly.
- If the thickness of a mounting panel is not adequate, or a mistake has been made during installation, the product may become disconnected.
- Ensure that terminal screws have been tightened firmly.
Recommended torque: 0.49 N·m
Proof torque: 0.59 N·m
- When using the product, ensure that the wiring is correct before turning ON the power. Incorrect wiring may result in electrical shocks, injuries, accidents, failure, or malfunctions.
- Use a power supply voltage that is within the range of the specifications.
- Use a control source and power supply or power lines that provide inputs with appropriate specifications.
Failure to do so may result in failures, burning, or electrical shocks.
- Do not install near heat-generating devices (coils, or devices that use coils).
- Be sure to confirm terminal numbers for correct wiring.
- Ensure that wiring is correct. Double-check materials such as connection charts and circuit diagrams.
- Properly ground the grounding terminal. Ensure that the common electrode terminal has been properly grounded.
Doing so can alleviate effects from noise to a certain extent.
- If electrodes make contact with liquid, purchase and use a separator to prevent such contact.
- Keep an appropriate distance from devices that generate high-frequency noise (e.g., high-frequency welders, electronic sewing machines).

Do not keep, install, or use this product in the following environments.

- Outdoors, or places subject to direct sunlight or severe weather conditions.
- Places where temperature and humidity exceed the allowable range of the product specifications.
- Places where there are extreme changes in temperature and humidity, or icing or condensation may occur.
- Places subject to static electricity or inductive noise.
- Places subject to electrical fields.
- Places where vibrations or physical shocks are strong.
- Places where flammable gases exist.
- Places where corrosive gases (in particular, sulfuric or ammonia gas) exist.
- Places with large amounts of dust or iron powder.
- Places where water or oil come in contact with the product.
- Places subject to salt-water splashes.

■ 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. Make sure to use power supply for operations, inputs, and transformer with the appropriate capacity and rated burden.
2. Maintenance and handling of this product may only be performed by qualified personnel.
3. Using this product for thyristor controls or inverters will result in errors.

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.

Liquid Leakage Sensor Amplifier

K7L-AT50

Ultra-miniature Sensor Amplifier Reliably Detects a Wide Variety of Liquids Ranging from Water to Liquid Chemicals with Low Conductivity.

- Detects liquids with impedance as high as 50 MΩ using inter-electrode resistance detection. Detection of IPA and pure water is possible.
- Four selectable sensing ranges ensure detection suited to the characteristics of the liquid.
- Incorporates a noise canceller circuit connected to a 3-conductor cable, ensuring a high level of noise immunity and reliable operation (patent pending).
- The power supply block and Sensing Band are isolated, allowing the installation of more than one device in the same place.



Ordering Information

Product name		Model	Characteristics
Liquid Leakage Sensor Amplifier		K7L-AT50	---
Sensors	Sensing Band	F03-16PE	Standard model
		F03-15	Greater durability and condensation resistance. (See note 1.)
		F03-16PT	Greater temperature and chemical resistance. (See note 1.)
		F03-16SF	Greater flexibility and superior workability. (See note 1.)
		F03-16SFC	Greater flexibility and enables visual confirmation when the inner color appears.
	Point Sensor	F03-16PS	Easier to wipe off than the band type.
		F03-16PS-F	Electrodes have fluororplastic coating to resist chemicals.
Mounting Brackets and Stickers	Sensing Band Stickers	F03-25	Used for F03-15 or F03-16SF(C).
		F03-26PES	Used for F03-16PE (adhesive tape).
		F03-26PEN	Used for F03-16PE (screws).
		F03-26PTN	Used for F03-16PT (screws).
	Point Sensor Mounting Brackets	F03-26PS	Used for F03-16PS.
Terminal Blocks		F03-20	---
DIN-rail-mounted Socket		P2RF-08-E	---
		P2RF-08	---

- Note:**
1. Compared with the standard model, F03-16PE.
 2. One F03-20 Terminal Block is included as an accessory with the K7L-AT50.
 3. The minimum order for the F03-25, F03-26PES, or F03-26PEN Sensing Band Stickers is one set (contains 30 Stickers).
 4. The minimum order for F03-20 Terminal Blocks, F03-26PTN Sensing Band Stickers, or F03-26PS Point Sensor Mounting Brackets is one set (contains 10 Terminal Blocks, Stickers, or Mounting Brackets).

Available Sensing Band Lengths

	1 m	2 m	5 m	10 m	15 m	20 m	25 m	30 m	40 m	50 m	60 m	70 m	75 m	80 m	90 m	100 m
F03-16PE	OK	OK	OK	OK	OK	OK	OK			OK						
F03-15	OK	OK	OK	OK	OK	OK	OK			OK			OK			OK
F03-16PT	OK	OK	OK	OK	OK	OK										
F03-16SF(C)			OK	OK	OK	OK		OK	OK	OK	OK	OK		OK	OK	OK

- Note:**
1. To place an order for 1 m of the F03-16PE for example, specify F03-16PE-1M.
 2. If you cannot find the length you need, please order the nearest larger length, then cut it to the required size.

Specifications

■ Ratings

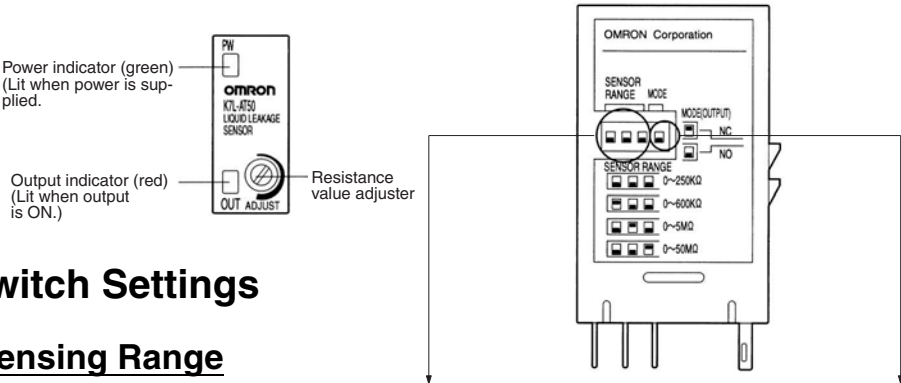
Rated power supply voltage	12 to 24 VDC (Allowable voltage fluctuation range: 10 to 30 VDC)
Operate resistance	<p>0 Ω to 50 MΩ, variable Range 0: 0 to 250 kΩ Range 1: 0 to 600 kΩ Range 2: 0 to 5 MΩ Range 3: 0 to 50 MΩ</p> <p>Note: The range is set using the DIP switch on the side of the Sensor Amplifier. (Refer to <i>DIP Switch Settings</i>.) Set the corresponding pin of the DIP switch in the up position. (For range 0, set all 3 pins in the down position.) The adjuster (ADJUST) on the top of the Sensor Amplifier sets the resistance value for detection within the set range. It is factory-set to the upper limit. (Normally, the K7L can be used with the adjuster at this setting.) With any range, resistance values can be set from 0 Ω.</p>
Release resistance	105% min. of operate resistance
Output configuration	<p>NPN open-collector transistor output with 100 mA at 30 VDC max.</p> <p>Note: If the rightmost pin of the DIP switch on the side of the Sensor Amplifier is set to the down position, the output turns ON when liquid is detected; if it is set to the up position, the output turns OFF when liquid is detected.</p>
Wiring distance	<p>Connecting cable: 50 m max. Sensing Band length: 10 m max.</p> <p>Note: These values are possible on condition that a completely insulated 3-conductor VCT cable with a thickness of 0.75 mm² and a dielectric strength of 600 V is used together with a Liquid Sensing Band specified by OMRON. (A 0.2-mm² cable can also be used.)</p>
Accessories	<p>F03-20 Terminal Block (for connecting the connecting cable and Sensing Band) Screwdriver for ADJUST setting. (Purchase the Sensing Band, Sensing Band Stickers, connecting cable, and Socket separately.)</p>

Note: UL File No. E138234
 CSA File No. LR95291-21
 CE EMA: ESD EN50082-2, EN61000-4-2
 REM Filled EN50082-2, ENV5140
 Conducted Immunity EN50082-2, ENV50141
 Fast Transient/Burst EN50082-2, EN61000-4-4
 EMI: Radiated/Conducted EN50081-2, EN55011

■ Characteristics

Ambient temperature	Operating: -10 to 55°C
Ambient humidity	Operating: 45% to 85%
Insulation resistance	10 M Ω at 100 VDC between case and current-carrying parts
Dielectric strength	1,000 VAC at 50/60 Hz for 1 min between case and current-carrying parts
Power consumption	1 W max.
Response time	<p>Operate: 800 ms max. Release: 800 ms max.</p>
Weight	Approx. 14 g

Nomenclature



DIP Switch Settings

Setting Sensing Range

DIP switch	Range number	Sensing range
	Range 0	0 to 250 kΩ
	Range 1	0 to 600 kΩ
	Range 2	0 to 5 MΩ
	Range 3	0 to 50 MΩ

DIP switch	Output mode
	Output OFF when liquid leakage detected.
	Output ON when liquid leakage detected.

- Set the sensing range according to the impedance of the liquid to be detected. (If the sensing range DIP switch pins are set in a way not shown above, the actual range used will be the largest one by default.) For the setting method, refer to the label on the side of the Sensor Amplifier.
- It is possible to set the resistance value within the set sensing range using the resistance value adjuster. At time of delivery, it is set to the largest possible value and this setting can be used for normal use.
- The resistance value adjuster is a precision component. Do not apply a torque to the resistance value adjuster in excess of the specified one. Doing so may cause the resistance value adjuster to be damaged.
Applicable torque:
 - Rotational torque: 9.81 m N·m max.
 - Detent strength: 29.4 m N·m min.

Operation

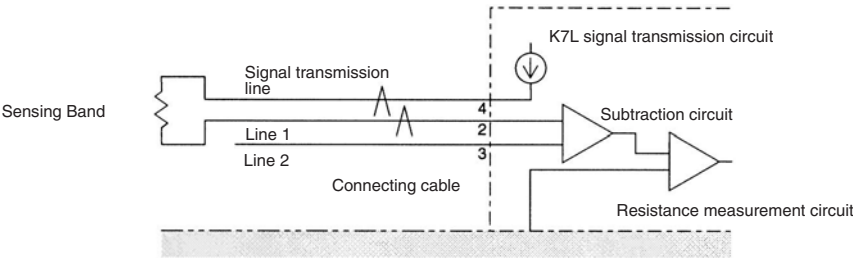
Countermeasures Against Noise

Noise Canceller Function for Highly Sensitive Impedance Detection

The K7L Liquid Leakage Sensor Amplifier detects liquids with impedance as high as 50 MΩ and connects to the Sensing Band through a cable that can be extended up to 50 meters. Countermeasures against external noise are especially important for the Sensing Band and connecting cable because they pick up external noise like an antenna. The K7L incorporates the noise canceller function described below.

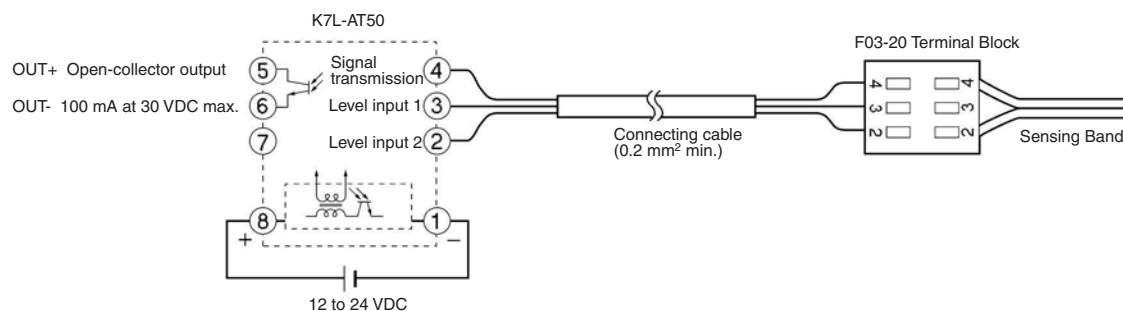
Connected with 3-conductor Cable that Offsets Inductive Noise (Patent Pending)

A VCT cable with three conductors (lines) is used. Line 1 is connected to the Sensing Band and line 2 is left open. Lines 1 and 2 are almost in the same position and thus will experience the same noise level. The K7L obtains the difference between these signals. This means that the noise signals in lines 1 and 2 are offset against each other and a reading for the signal, without inductive noise, can be made.



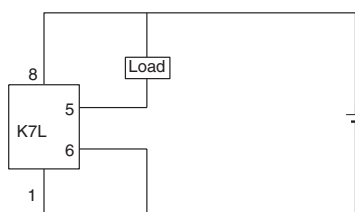
Monitoring products

■ Connections

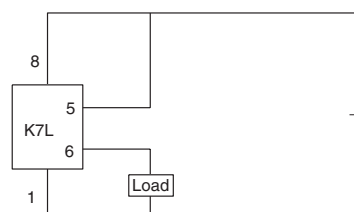


■ Connection Examples

NPN Output



PNP Output

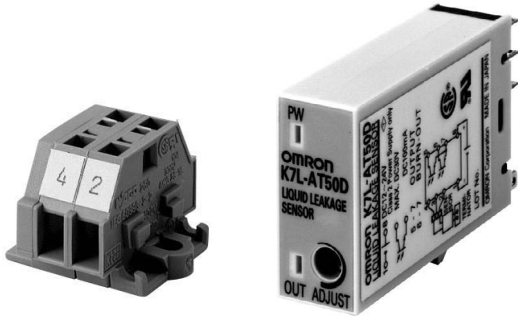


Liquid Leakage Sensor Amplifier with Disconnection Detection Function

K7L-AT50D/ -AT50D-S

Detect Disconnections between the Sensor Amplifier and a Terminator Connected to the End of the Sensing Band.

- Constantly monitors for disconnections between the Sensor Amplifier and the Sensing Band.
- Failure to detect liquid leakage due to disconnection in the Sensing Band prevented.
- Notification of disconnection detection made using LED indicator and transistor output.
- After a disconnection is detected, the operating status is held to avoid instability due to further contact of the disconnected part.
- This model retains all the characteristics of the K7L-AT50 (detection sensitivity, sensing ranges, and AC detection method).
- Meets UL/CSA standards. (See information on standards on page J-83.)



Ordering Information

Name	Model number
Liquid Leakage Sensor Amplifier with Disconnection Detection Function Set	K7L-AT50D
Liquid Leakage Sensor Amplifier with Disconnection Detection Function Sensor Amplifier Only	K7L-AT50D-S
Terminator (2P)	F03-20T

Note: The Sockets, Terminal Blocks, Stickers, and Sensing Bands are the same as for the K7L-AT50.

Specifications

■ Ratings

Rated power supply voltage	12 to 24 VDC (Allowable voltage fluctuation range: 10 to 30 VDC)
Operate resistance	<p>0 Ω to 50 MΩ, variable</p> <p>Range 0: 0 to 250 kΩ</p> <p>Range 1: 0 to 600 kΩ</p> <p>Range 2: 0 to 5 MΩ</p> <p>Range 3: 0 to 50 MΩ</p> <p>Note: The range is set using the DIP switch on the side of the Sensor Amplifier. (Refer to <i>DIP Switch Settings</i>.) Set the corresponding pin of the DIP switch in the up position. (For range 0, set all 3 pins in the down position.) The adjuster (ADJUST) on the top of the Sensor Amplifier sets the resistance value for detection within the set range. It is factory-set to the upper limit. (Normally, use with the adjuster set to the upper limit.) With any range, resistance values can be set from 0 Ω.</p>
Disconnection detection function	<p>Detection signal: 10 VDC max., 200 ms</p> <p>Detection time: 10 s max.</p> <p>Release: Released by resetting the power supply.</p>
Release resistance	105% min. of operate resistance
Output configuration	<p>NPN open-collector transistor output with 100 mA at 30 VDC max. for both liquid leakage detection and disconnection detection.</p> <p>Note: If the rightmost pin of the DIP switch on the side of the Sensor Amplifier is set to the down position, the output turns ON when liquid/disconnection is detected; if it is set to the up position, the output turns OFF when liquid/disconnection is detected.</p>
Wiring distance	<p>Connecting cable: 50 m max.</p> <p>Sensing Band length: 10 m max.</p> <p>Note: These values are possible on condition that a completely insulated 3-conductor VCT cable with a thickness of 0.75 mm² and a dielectric strength of 600 V is used together with a Liquid Sensing Band specified by OMRON. (A 0.2-mm² cable can also be used.)</p>
Accessories	<p>F03-20 Terminal Block (for connecting the connecting cable and Sensing Band)</p> <p>Screwdriver for ADJUST setting.</p> <p>F03-20T Terminator (provided with K7L-AT50D only)</p> <p>(Purchase the Sensing Band, Sensing Band Stickers, connecting cable, and Socket separately. The Terminal Block is 3P; the Terminator is 2P.)</p>

Note: UL File No. E138234
CSA File No. LR95291-21

■ Characteristics

The characteristics are the same as for the K7L-AT50. Refer to page J-80 for details.

Nomenclature

The nomenclature and DIP switch settings are the same as for the K7L-AT50. Refer to page J-81 for details.

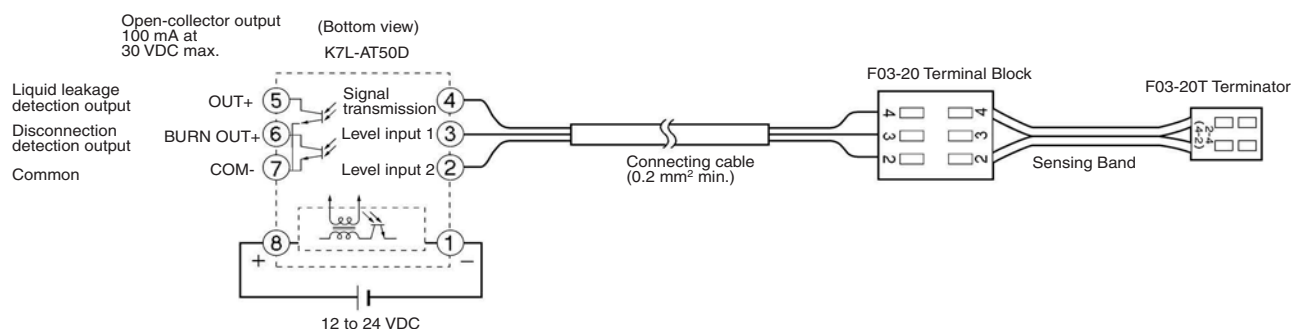
Operation While Monitoring for Liquid Leakage

-

A schematic diagram of a cable system. On the left, a vertical dashed line connects nine numbered circles (1-9). A label 'K7L' is placed next to this line. From circle 4, a cable extends to the right, passing through a series of components: a small rectangular box, a larger rectangular box with four internal slots, and a final rectangular box with a textured pattern. The cable continues to the right, ending in a large arrow pointing left, indicating a return path or signal flow.

Diagram illustrating a cable with a disconnection point. The cable is labeled "K7L" and shows a break in the signal path. The text "Signals are interrupted where the disconnection occurred." is shown above the break, with an arrow pointing to the location of the disconnection. The cable is shown with multiple conductors (1-8) and a shielded section.

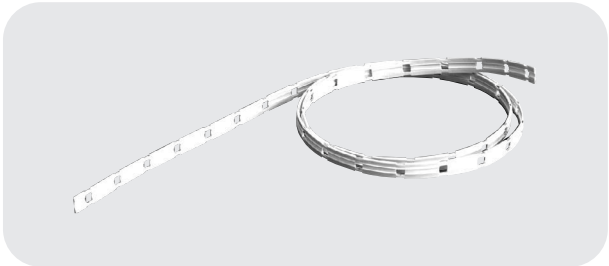
- ## ■ Block Diagram for External Connections



Sensing Band

F03-16PE

- SUS316 used for core and polyethylene used for sheath to ensure high resistance to both acidic and alkaline liquids.
- Sensing Band Stickers that use the same material as the Sensing Band's insulating resin are available in 2 types: adhesive-tape type and screw type.



Ordering Information

Name	Model number	Remarks
Liquid Leakage Sensing Band	F03-16PE	---
Sensing Band Stickers	F03-26PES	30 Stickers per set
	F03-26PEN	30 Stickers per set

Specifications

Sheath	Polyethylene
Core	SUS316 stainless steel
Ambient operating temperature	-15 to 55°C
Weight	Approx. 16 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	<div><p>Materials: Electrodes: SUS316 stainless steel, Sheath: Polyethylene</p></div>

■ Sensing Band Stickers

	F03-26PEN (screws)	F03-26PES (adhesive tape)
Appearance		
Structure	<div><p>Cut section</p><p>Material: Polyethylene</p></div>	<div><p>Adhesive tape (See note.)</p><p>Material: Polyethylene</p></div>

Note: The shape of the adhesive tape shown above is for securing the F03-16PE.

Sensing Band F03-16PT

- Compared to the F03-16PE (polyethylene), the F03-16PT has higher resistance to both high temperatures and chemicals.
- Small holes enable the detection of leakage even when installed upside down.



Ordering Information

Name	Model number	Remarks
Fluoroplastic Sensing Band	F03-16PT	---
Fluoroplastic Sensing Band Stickers	F03-26PTN	10 Stickers per set

Specifications

Sheath	PTFE fluoroplastic
Core	SUS316 stainless steel
Ambient operating temperature	-50 to 200°C
Weight	Approx. 16 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	<p>Materials: Electrodes: SUS316 stainless steel, Sheath: Fluoroplastic</p>

■ Sensing Band Stickers

F03-26PTN (screws)	
Appearance	
Structure	<p>Material: Fluoroplastic PTA</p>

Note: The shape of the adhesive tape shown above is for securing the F03-16PE.

Sensing Band
F03-15

- Ideal for harsh electrical room environments that are dusty and humid.
- For installation in locations requiring insulated materials.



Ordering Information

Name	Model number	Remarks
Liquid Leakage Sensing Band	F03-15	---
Sensing Band Stickers	F03-25	30 Stickers per bag

Specifications

Sheath	Flexible, transparent vinyl chloride
Core	SUS304 stainless steel
Ambient operating temperature	-15 to 50°C
Weight	Approx. 48 g (1 m)

Dimensions (Unit: mm)

■ Sensing Band

Appearance	
Structure	

■ Sensing Band Stickers

	F03-25
Appearance	
Structure	

Sensing Band F03-16SF

- Greater flexibility and superior workability compared with the F03-16PE.
- The sheath becomes transparent to reveal the red inner sheath if liquid leakage occurs, thereby enabling visual confirmation. After drying, the Sensing Band color will return to white (F03-16SFC only).



Ordering Information

Name	Model number	Remarks
Sensing Band	F03-16SF	Without color indication
	F03-16SFC	With color indication
Stickers	F03-25	30 Stickers per bag

Specifications

Sheath	Special plastic fiber braided cable with water-absorbent and water-repellent characteristics
Core	Tin-plated, copper stranded wire
Ambient operating temperature	-15 to 60°C
Fire retardancy	Not fire retardant
Weight	Approx. 20 g (1 m)

Length of cable

(1) Connection with K7L-AT50 (IV Cable + Sensing Band)

Sensing Band	10m	50m	100m	150m
IV Cable				
0m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
10m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
50m	○ Range 2	○ Range 2	○ Range 2	○ Range 1
100m	○ Range 2	○ Range 2	○ Range 2	○ Range 1
150m	○ Range 2	○ Range 2	○ Range 2	○ Range 1
150m	○ Range 2	○ Range 2	○ Range 2	○ Range 1

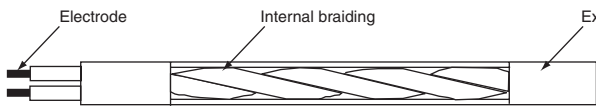
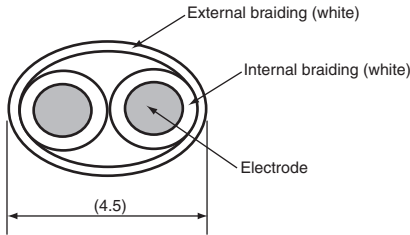
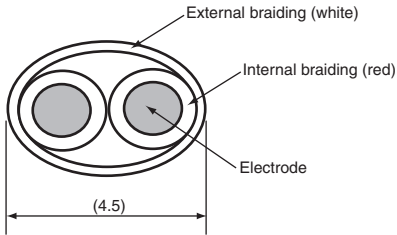
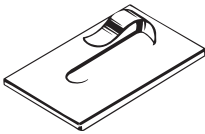
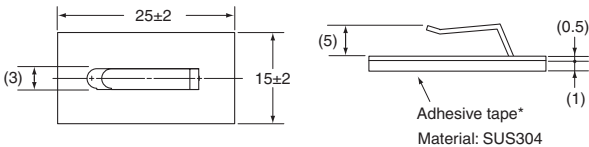
○...Set value that can be used.

(2) Connection with K7L-AT50D (IV Cable + Sensing Band)

Sensing Band	10m	50m	100m	150m
IV Cable				
0m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
10m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
50m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
100m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
150m	○ Range 3	○ Range 2	○ Range 2	○ Range 1
150m	○ Range 3	○ Range 2	○ Range 2	○ Range 1

○...Set value that can be used.

Dimensions (Unit: mm)

	F03-16SF	F03-16SFC
Appearance		
Structure		
	F03-25	
Appearance		
Structure		

Chemical Resistivity for F03-16PE/-16PT

Material	Sheath		Core	Material	Sheath		Core
	Polyethylene	Fluoroplastic	SUS316		Polyethylene	Fluoroplastic	SUS316
Water	A	A	A	Toluene	C	B	B
Acetone	C	A	A	Phenol	B	B	A
Ammonia	A	A	A	Butanol	B	A	---
Ethanol	B	A	A	Fluorine	A	A	C
Hydrochloric acid	A	A	C	Hexane	C	A	---
Hydrogen peroxide solution	A	A	A	Benzene	C	A	A
Xylene	B	A	A	Methanol	B	A	A
Cyclohexane	C	A	---	Sulfuric acid	C	A	B
Trichloroethylene	C	A	A	Phosphoric acid	A	B	B

Note: 1. A: Not affected at all or only very slightly affected.

B: Slightly affected but, depending on the conditions, sufficient for use.

C: Affected but may still be used. (Replace the Sensing Band immediately after detection.)

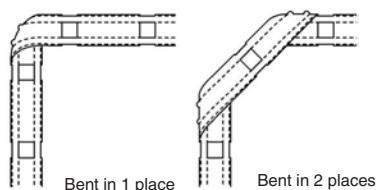
2. In order to prevent secondary fire damage, consider the effect of the atmosphere of the environment and the solution to be detected on the Sensing Band.

3. If the Sensing Band changes shape or color when a liquid is detected, replace the Sensing Band.

■ Connecting the Sensing Band

Bending the Sensing Band

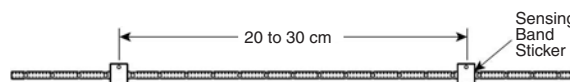
To change the direction of the Sensing Band, bend the Sensing Band in one or two places where the core is not exposed.



Note: Bend the Sensing Band approximately 4 cm (i.e., twice the distance between places where the core is exposed) away from places where a Sticker is attached. If the Sensing Band is bent at places further away than this, the Sensing Band may come away from the surface.

Interval Between Stickers

When securing the Sensing Band with Stickers, attach the Stickers at intervals of 20 to 30 cm in places where the core is not exposed.

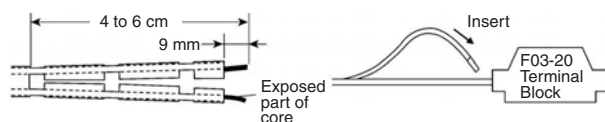


Note: 1. When using the F03-26PES (adhesive-tape model), be sure to wipe all moisture, oil, and dust from the surface to which the Sticker is to be attached. Failure to do so may result in insufficient adhesion, and the Sticker may peel away from the surface.

2. When using the F03-26PEN (screw model), before installing the Sensing Band, it is necessary to perform stud welding. For details on the pitch of the studs, refer to the information on the dimensions of Sensing Band Stickers.

Stripping and Connecting Terminals

1. Cut into the Sensing Band approximately 4 to 6 cm in from the end as shown in the diagram below.
2. Strip away approximately the last 9 mm of the sheath to expose the core (SUS line).
3. To connect to the Terminal Block, push down the top of the terminal with a screwdriver and insert the core from the side. (Refer to *Dimensions* on page J-85.) More Sensing Bands can be connected simply by wiring in an arch shape.



Note: Check that the wiring is secure before using the K7L in applications.

Liquid Leakage Sensing Band Precautions

Refer to the following installation methods and install the Sensing Band securely using the proper method for the location and environment.

1. **Post or Beam Mounting**
Use fasteners, such as concrete anchors, to secure the Sensing Band every 500 to 1,000 mm to ensure that it does not come loose. If the surface of the post or beam is very uneven, apply two-sided tape to the mounting surface first and then secure the Sensing Band to the tape with the fastener.
2. **Conduit Installation**
For vertical conduits, wrap the Sensing Band around the conduit at a pitch 2 to 3 times the diameter of the conduit. For horizontal conduits, secure the Sensing Band at appropriate intervals along the bottom of the conduit using an insulated adhesive strap, such as Insulock, to ensure that the Sensing Band does not come loose.
3. **Dike and Catch Basin installation**
Use the specified stickers (sold separately) to secure the Sensing Band at appropriate intervals to keep it flat in the dike or catch basin.
4. **Floor Installation**
Estimate the leakage detection area and use stickers to secure the Sensing Band at appropriate intervals on the floor and around equipment. Cover the Sensing Band with plastic or metal molding to protect it from contact with other objects and from being stepped on by workers. Leave a 50- to 100-mm gap in the molding at approximately 500-mm intervals where it touches the floor to allow liquids to pass through.
5. **Do not install the Sensing Band in locations where condensation is likely to occur.**
6. **Mount the Sensing Band as close as possible to the mounting surface.** Make sure that any gaps are no more than 2 mm in horizontal installations, such as the floor, and no more than 1 mm with vertical installations, such as posts and beams.
7. **Attach an insulated protector, such as plastic molding, securely to the Sensing Band to protect it from contact with power cables carrying over 300 V.**
8. **Normally leaking materials detected by the Sensing Band will evaporate and the Sensing Band will return to its original state.** The Sensing Band may not return to its original state and will have to be replaced, however, if the leaking material contained conductive impurities. Follow the appropriate replacement procedures.
9. **The Sensing Band is not designed to be used as electrical wiring and must not be used for any purpose other than leak detection.**
10. **Do not apply petroleum-based products, such as wax, to the Sensing Band.** Otherwise, liquids may be repelled and detection may fail.

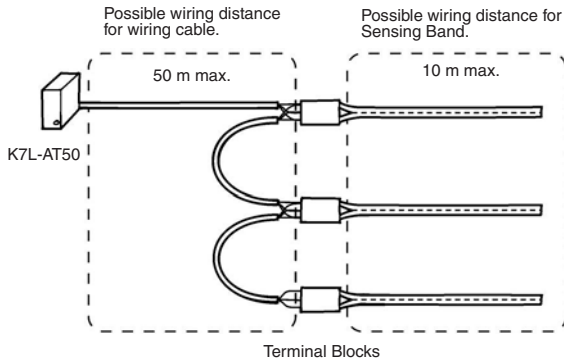
FAQs

Some questions that are frequently asked about the K7L are given below. Use this information when selecting a model.

Can one K7L Amplifier be used for detection in more than one place?

Yes.

By using Terminal Blocks to connect Sensing Bands in parallel, detection can be performed in more than place with only one K7L Amplifier.

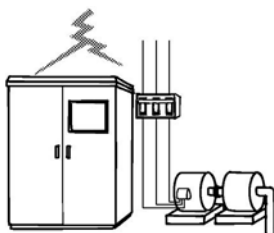


- Note:** 1. When wiring, be sure not to exceed the maximum possible wiring distances for both the connecting cable and the Sensing Band. Exceeding these distances may lead to faulty operation. Connect one Sensing Band to each Terminal Block.
2. Not applicable to K7L-AT50D.

Can the K7L Amplifier be used as a replacement for the 61F-GPN-V50 Water Leakage Detector?

Yes.

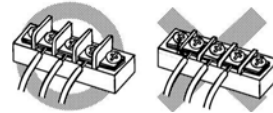
Because the surge withstand capability is different, however, do not use in locations where it will be exposed to impulses and surges, such as outdoor roofs or in pump panels. Also, items such as the power supply voltage and the connection sockets are different. Check these items before application.



Can a different terminal block (e.g. a commercially available terminal block or a terminal block constructed by the user) be used instead of the one provided?

Yes.

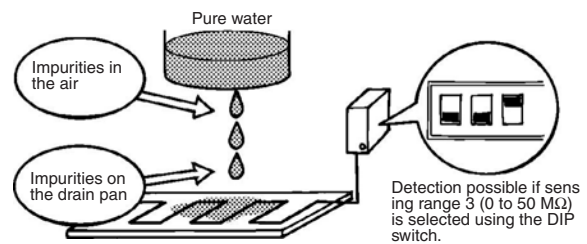
When using another terminal block, however, be sure to check that all the terminals are mutually isolated, and that there is no danger of ground faults in connecting cables or Sensing Bands.



Can the K7L Amplifier detect pure water?

Yes.

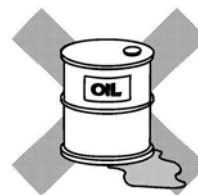
Even pure water, which has a resistance exceeding 10 MΩ·cm, can nearly always be detected if the K7L is used at its maximum sensitivity. This is because impurities are mixed with the water when it is leaked and the resistance drops.



Can the K7L Amplifier detect oil?

In most cases, no.

If, however, it contains impurities such as metal powder, as is the case with cutting oil and used engine oil, detection may be possible (actual instances of detection have been observed). The user should confirm whether the required kind of detection is possible before application.



Liquid Leakage Point Sensor F03-16PS

A New Liquid Leakage Point Sensor Has Been Added to the K7L Series. Fluoroplastic Coating on the Bottom Electrode Ensures Chemical Resistance.

- Can be used in conjunction with Sensing Bands.
- Stud screw mounting requires no tools for installation.
- No tools means the Sensor can be wiped clean quickly and easily.
- The optional Mounting Bracket enables faster installation than three-screw mounting.
- Connect multiple Sensors to one K7L-AT50 Amplifier for significant cost savings.



Ordering Information

Sensors

Product name	Main material	Cable material	Electrode material	Model
Liquid Leakage Point Sensor	Polyethylene	Outer sheath: PVC Inner sheath: Fluoroplastic	SUS304	F03-16PS
			SUS304 and fluoroplastic coating	F03-16PS-F
Mounting Brackets (See note 1.)		---	---	F03-26PS
Terminal Block (See note 2.)	Nylon 6.6	---	---	F03-20

Note: 1. Use a commercially available bonding agent for PVC. One bag contains 10 Brackets.
2. One bag contains 10 Blocks.

Amplifier

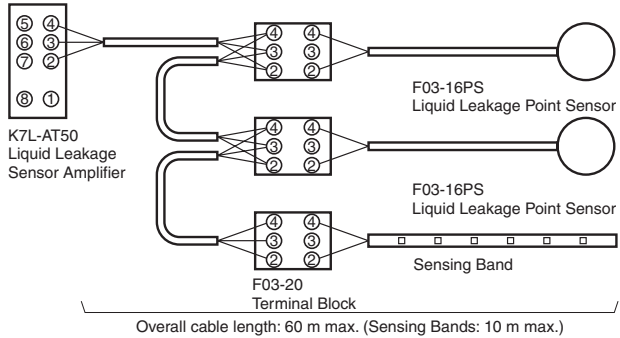
Product name	Model
Liquid Leakage Sensor Amplifier	K7L-AT50

Specifications

Ambient temperature	-10 to 60°C
Nut tightening torque	0.3 N·m max.
Weight	Approx. 30 g
Max. No. connected per Amplifier	Any number up to an overall cable length of 60 m.

Wiring Diagram

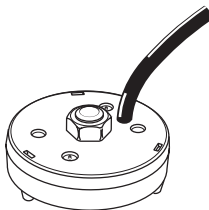
Any number of Sensors can be connected in parallel up to an overall cable length of 60 m. Leakage areas cannot be specified with the K7L-AT50.



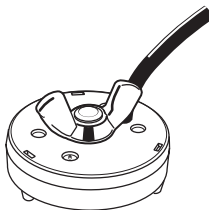
Mounting Methods

Stud Screw Mounting

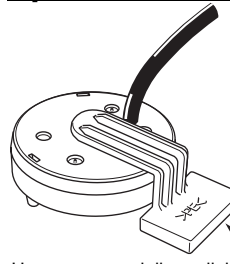
Securing the Sensor with a Nut



Securing the Sensor with a Wing Nut



Special Bracket Mounting



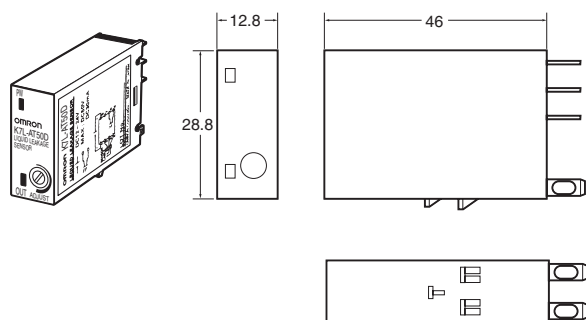
Note: Use a commercially available bonding agent for PVC. (See note.)

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

Dimensions (Unit: mm)

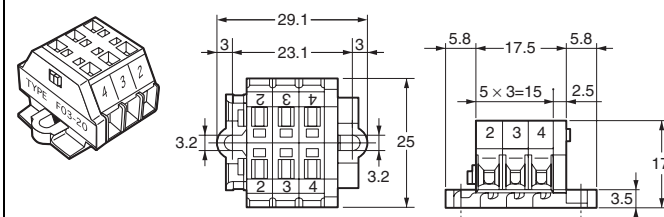
Liquid Leakage Sensor Amplifier

K7L-AT50/-AT50D



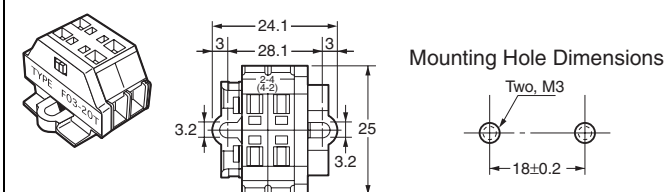
Terminal Block (See note 1.)

F03-20



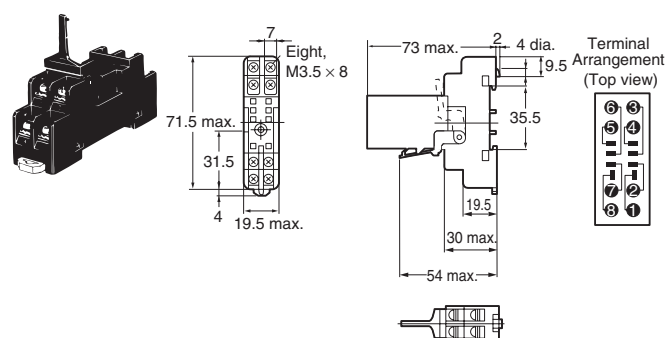
Terminator (See note 1.)

F03-20



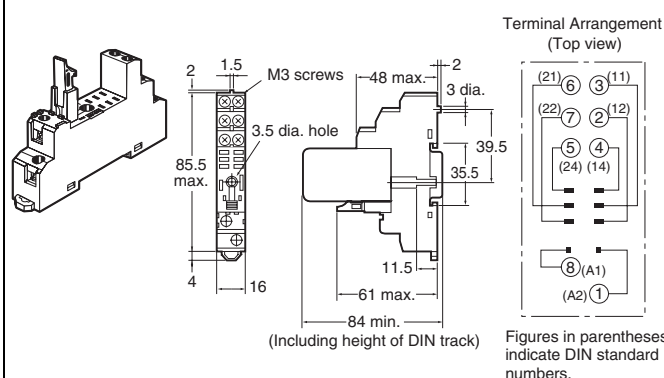
DIN-rail-mounted Sockets (See note 2.)

P2RF-08 (Round terminals can be used.)



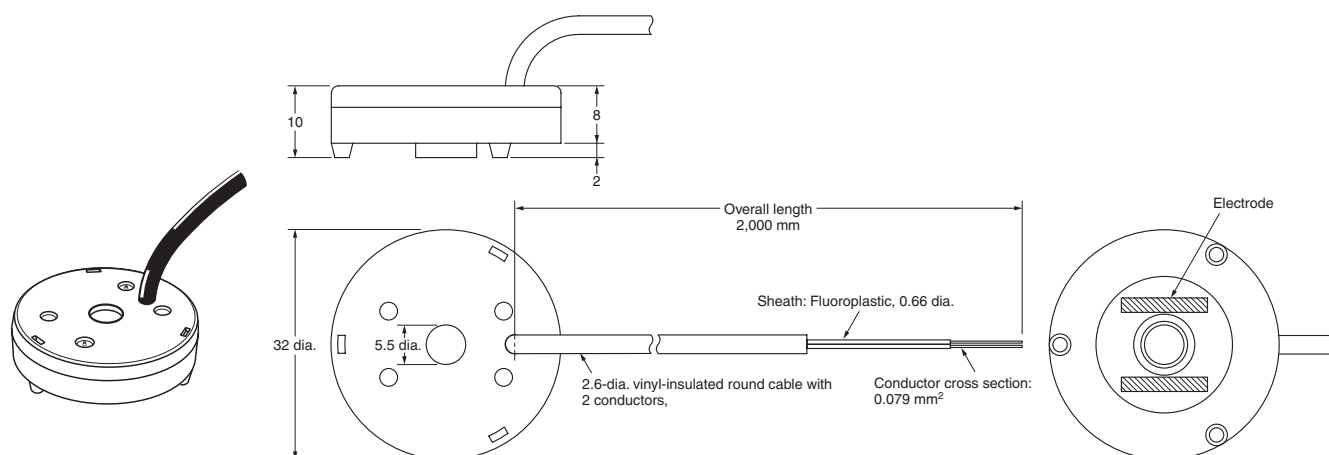
DIN-rail-mounted Sockets (See note 2.)

P2RF-08-E



Liquid Leakage Point Sensor

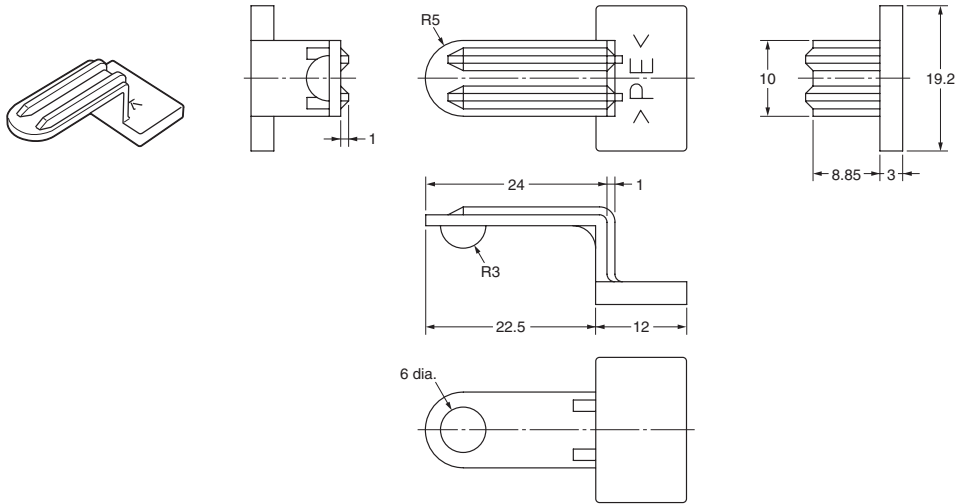
F03-16PS
F03-16PS-F



- Note:** 1. The Terminal Block is made of nylon 66. Mount the Terminal Block in locations not subject to liquid chemicals using M3 screws.
2. Secure the Sockets with M3 screws at a torque of 0.78 to 1.18 N·m.

Point Sensor Mounting Bracket

F03-26PS



Safety Precautions

■ Precautions for Safe Use

Observe the following points to ensure safe operation.

- Be sure to use a power supply voltage within the specified range. Not doing so may result in burning or malfunction.
- Do not use the product in locations subject to flammable gases or combustible objects. Doing so may result in fire.
- Insert the connection points into Sockets until the connection is locked securely. Not doing so may result in burning or malfunction.
- Do not short-circuit loads connected to output terminals. Doing so may result in burning.
- Be sure to connect the power supply with the correct polarity. Not doing so may result in malfunction.

■ Precautions for Correct Use

Installation

Attach to a panel of thickness 1 to 5 mm.

Do not install in the following locations.

- Locations subject to shock or vibration
- Locations where the temperature or humidity lies outside the specified range, or where condensation is likely to occur (To detect liquids with high impedances, do not use in locations with high humidity.)
- Locations subject to dust
- Locations subject to corrosive gases (particularly sulfide and ammonia gases)
- Outdoors or locations subject to direct sunlight
- Near devices that generate strong high-frequency noise (e.g., high-frequency welding devices etc.)

■ Application Precautions

You must allow sufficient leeway in ratings and performance, and provide proper fail-safe or other safety measures when using these products in any of the following applications. Be sure also to consult with your OMRON representative before actually attempting any of these applications.

- Applications under conditions or environments not specified in user documentation
- Applications for nuclear control systems, railroad systems, aviation systems, vehicles, combustion systems, medical equipment, amusement machines, or safety equipment
- Applications that may have a serious influence on lives and property and thus require particularly attention to safety

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