


# Phase-sequence Phase-loss Relay K8DS-PH

## Three-phase Phase-sequence Phase-loss Relay Using Voltage Detection Method



- Lineup includes a 17.5-mm slim, compact model. *NEW*
- Greater resistance to inverter noise. *NEW*
- Distinguishes between positive phases, reversed phases, and phase loss when power is turned ON.
- Supports phase loss detection when the motor is operating.
- Output status can be monitored using LED indicator.
- Ideal to prevent reverse operation of motors.

 Refer to *Safety Precautions for the K8AK Series* on page 86.  
Refer to page 44 for commonly asked questions.



For the most recent information on models that have been certified for safety standards, refer to your OMRON website.

## Ordering Information

### List of Models

Function	Rated input voltage*	Relay output	Model
Phase sequence and phase loss monitoring	3-phase, 3-wire 200 to 480 VAC	SPDT × 1	K8DS-PH1

\* The power supply is shared with the rated input voltage.

# K8DS-PH

## Ratings and Specifications

### Ratings

Rated input voltage	3-phase, 200 to 480 VAC (3-wire)
Input load	Approx. 2.7 VA
Reversed phase and phase loss operating time	0.1 s max.
Reset method	Automatic reset
Indicators	Power (PWR): Green, Relay output (RY): Yellow
Output relays	One SPDT relay (NC operation)
Output relay ratings	<p>Rated load</p> <ul style="list-style-type: none"> <li>Resistive load</li> <li>5 A at 250 VAC</li> <li>5 A at 30 VDC</li> </ul> <p>Max. switching voltage</p> <ul style="list-style-type: none"> <li>250 VAC or 30 VDC</li> </ul> <p>Max. switching current: 5 A</p> <p>Maximum switching capacity: 1,250 VA, 150 W</p> <p>Mechanical life: 10 million operations min.</p> <p>Electrical life: 5 A at 250 VAC or 30 VDC:50,000 operations 3 A at 250 VAC/30 VDC:100,000 operations</p>
Ambient operating temperature	-20 to 60°C (with no condensation or icing)
Storage temperature	-25 to 65°C (with no condensation or icing)
Ambient operating humidity	25% to 85% (with no condensation)
Storage humidity	25% to 85% (with no condensation)
Altitude	2,000 m max.
Terminal screw tightening torque	0.49 N·m
Terminal wiring method	<p>Recommended wire</p> <ul style="list-style-type: none"> <li>Solid wire: 2.5 mm<sup>2</sup></li> <li>Twisted wires: AWG16, AWG18</li> </ul> <p><b>Note:</b> 1. Ferrules with insulating sleeves must be used with twisted wires. 2. Two wires can be twisted together.</p> <p>Recommended ferrules</p> <ul style="list-style-type: none"> <li>Al 1,5-8BK (for AWG16) manufactured by Phoenix Contact</li> <li>Al 1-8RD (for AWG18) manufactured by Phoenix Contact</li> <li>Al 0,75-8GY (for AWG18) manufactured by Phoenix Contact</li> </ul>
Case color	N1.5
Case material	PC and ABS
Weight	Approx. 60 g
Mounting	Mounts to DIN Track.
Dimensions	17.5 × 80 × 73 mm (W×D×H)

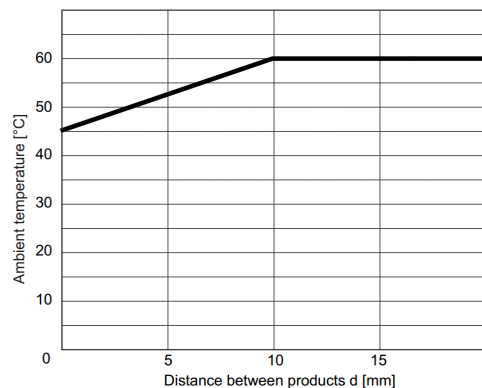
## Specifications

<b>Input voltage range</b>		200 to 480 VAC
<b>Input frequency</b>		50/60 Hz (no presumed range)
<b>Overload capacity</b>		Continuous 500 V
<b>Applicable standards</b>	<b>Conforming standards</b>	EN60947-5-1 Installation environment (pollution level 2, installation category III)
	<b>EMC</b>	EN60947-5-1
	<b>Safety standards</b>	UL 508 (Recognition), Korean Radio Waves Act (Act 10564), CSA: CAN/CSA C22.2 No.14, CCC: GB14048.5
<b>Insulation resistance</b>		20 M $\Omega$ min. Between external terminals and case Between input terminals and output terminals
<b>Dielectric strength</b>		2,000 VAC for one minute Between external terminals and case Between input terminals and output terminals
<b>Noise immunity</b>		1,500 V power supply terminal common/normal mode Square-wave noise of $\pm 1 \mu\text{s}/100 \text{ ns}$ pulse width with 1-ns rise time
<b>Vibration resistance</b>		Frequency: 10 to 55 Hz, acceleration 50 m/s <sup>2</sup> 10 sweeps of 5 min each in X, Y, and Z directions
<b>Shock resistance</b>		150 m/s <sup>2</sup> , 3 times each in 6 directions along 3 axes However, 100 m/s <sup>2</sup> for relay contacts.
<b>Degree of protection</b>		Terminals: IP20

### ●Relationship of Mounting Distance between K8DS-PH Relays and Ambient Temperature (Reference Values)

The following diagram shows the relationship between the mounting distances and the ambient temperature.

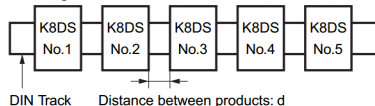
If the relay is used with an ambient temperature that exceeds these values, the temperature of the K8DS may rise and shorten the life of the internal components.



#### Test method

Sample: K8DS-PH

Mounting distances: 0, 5, and 10 mm min.

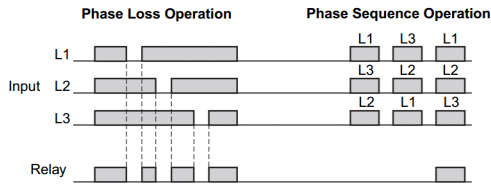


# K8DS-PH

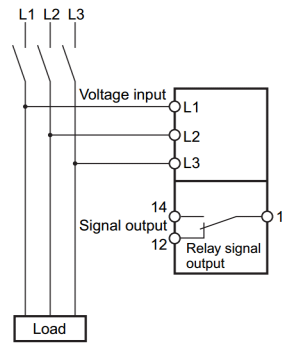
## Connections

### Wiring Diagram

#### ●Phase Sequence and Phase Loss Operation Diagram

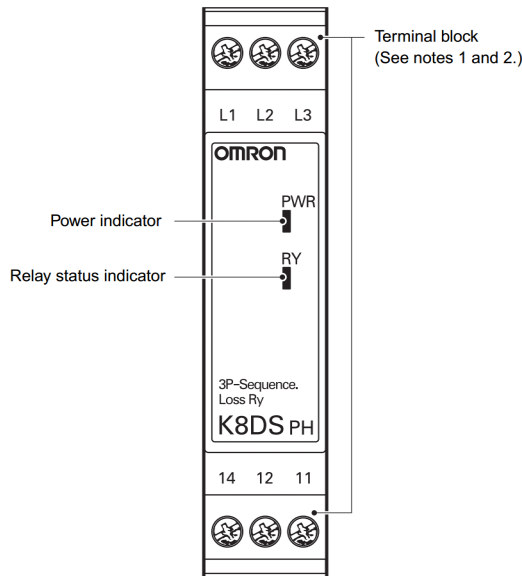


- Note:**
1. The K8DS-PH1 output contacts are normally operative.
  2. The Relay will not operate if the input voltage drops below 70% of the minimum input value because L1 and L2 are also used to provide power.
  3. Phase loss cannot be detected on the load side because this detection is based on the voltage.



## Nomenclature

### Front

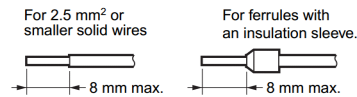


### ●Indicators

Item	Meaning
Power indicator (PWR: Green)	Lit when power is being supplied *3.
Relay status indicator (RY: Yellow)	Lit when relay is operating (normally lit).

\* The input across L1 and L2 is used for the internal power supply. Therefore, the power indicator will not be lit if there is no input across L1 and L2.

**Note:** 1. Use either a solid wire of 2.5 mm<sup>2</sup> maximum or a ferrule with insulating sleeve for the terminal connection. The length of the exposed current-carrying part inserted into the terminal must be 8 mm or less to maintain dielectric strength after connection.



Recommended ferrules  
Phoenix Contact

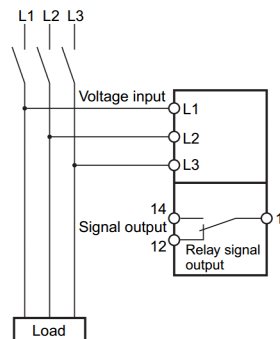
- Al 1,5-8BK (for AWG16)
- Al 1-8RD (for AWG18)
- Al 0,75-8GY (for AWG18)

2. Tightening torque: 0.49 N·m

## Operation and Setting Methods

### ●Connections

1. Input  
Connect using L1, L2, and L3.  
Make sure the phase sequence is wired correctly. The Unit will not operate normally if the phase sequence is incorrect.
  2. Outputs  
Terminals 11, 12, and 14 are the output terminals SPDT.
- \* Use the recommended ferrules if you use twisted wires.

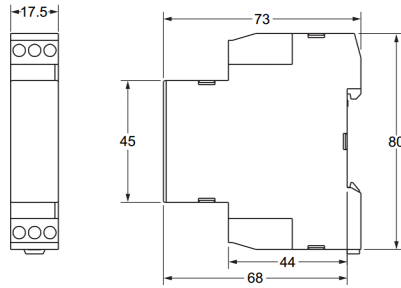


Dimensions

(Unit: mm)

●Phase-sequence Phase-loss Relay

K8DS-PH1

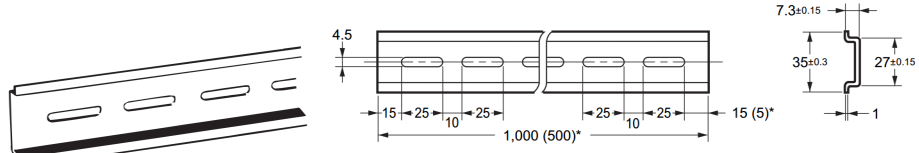


Optional Parts for DIN Track Mounting

●DIN Tracks

PFP-100N

PFP-50N



\*Dimensions in parentheses are for the PFP-50N.

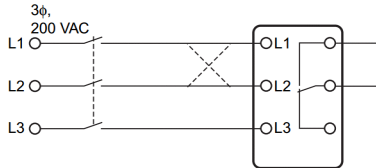
## Questions and Answers

**Q** Checking Operation

**A** Phase Sequence  
Switch the wiring, as shown by the dotted lines in the connection diagram, to reverse the phase sequence and check that the K8DS operates.

Phase Loss  
Create a phase loss for any input phase and check that the K8AK operates.

**Connection Diagram**



**Q** Can phase loss be detected on the load side?

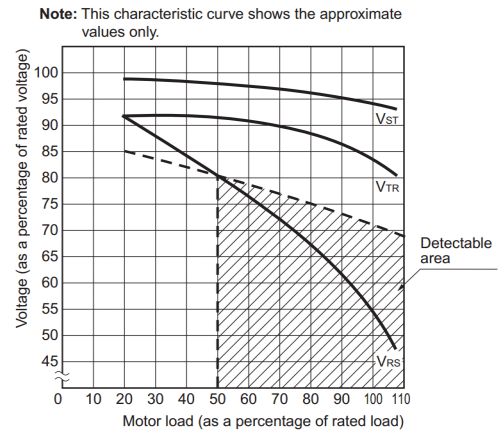
**A** In principle, phase loss cannot be detected on the load side because the K8DS-PH measures three-phase voltage to determine phase loss.

**Q** Is it possible to detect phase losses for motor loads while the motor is operating?

**A** Phase loss can be detected while the motor is operating. However, the detection conditions depend on the load conditions that are shown in the following figure. Understand these characteristics when using this feature.

Normally, three-phase motors will continue to rotate even if one phase is open. The three-phase voltage will be induced at the motor terminals. The diagram shows voltage induction at the motor terminals when phase R has been lost with a load applied to a three-phase motor. The horizontal axis shows the motor load as a percentage of the rated load, and the vertical axis shows voltage as a percentage of the rated voltage. The solid line in the this graph shows the voltage that is induced at the motor terminals when a phase loss occurs while the motor is operating under various loads. The figure below shows how a phase loss that occurs while the motor is operating causes an imbalance in the voltage across each motor terminal. The K8DS-PH1 detects phase loss when the motor is operating when the voltage is unbalanced. (Detection occurs when the imbalance is 80% of the maximum phase). The K8DS-PH1 cannot detect phase loss with light motor loads because the voltage imbalance is too small. The detectable range is shown by the diagonal lines.

**Characteristic Curve Diagram**



**Note:** For phase loss of phase R. V<sub>ST</sub>, V<sub>TR</sub>, and V<sub>RS</sub> indicate the motor terminal voltage at phase loss.