Safety Relay

K7SR Series

Part Number Description

K7SR - ❶ - ❷

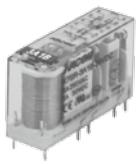
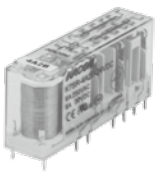
❶	**Contact Arrangement**	3A1B : 3NO + 1NC	2A2B : 2NO + 2NC	
		5A1B : 5NO + 1NC	4A2B : 4NO + 2NC	3A3B : 3NO + 3NC
❷	**Voltage**	24VDC		

General Specification

Contact Ratings	**Contact Form**		4P	6P
			2NO + 2NC, 3NO + 1NC	5NO + 1NC, 4NO + 2NC, 3NO + 3NC
	Forced Guide Type Contact (Based on IEC 61810-3)		Type A	
	Contact resistance		100mΩ max. (at 1A 6VDC)	
	Material		$AgSnO_2$	
	Rating		6A 250VAC / 30VDC (1circuit)	
	Max Switching voltage		400VAC / 30VDC	
	Max Switching current		6A	
	Max Switching power		1500VA / 180W	
	Mechanical life		10,000,000	
	Life [1]	**Mechanical**	10,000,000	
		Electrical	100,000 (1NO : 6A 30VDC, resistance load, 1sec ON 1sec OFF) 100,000 (1NO : 6A 250VAC, resistance load, 1sec ON 1sec OFF)	
Coil Ratings	**Coil Consumption**		Approx. 360mW	Approx. 500mW
	General voltage		24VDC	
	Min Operating voltage		18.0VDC	
	Maximum Drop-out Voltage		2.4VDC	
	Minimum Pick Up Voltage [2]		31.2VDC	26.4VDC
	Coil resistance (Ω)		1600 x (1±10%)	1152 x (1±10%)
General Ratings	**Insulation Resistance**		1000MΩ at 500VDC (It was measured at the same locations as the dielectric strength was measured.)	
	Grade of insulation		Class F	
	Withstand voltage [3]	**Between Coil & Contacts**	4000VAC 1 min	
		Between Open Contacts	1500VAC 1 min	
		Between Contact sets	2500VAC 1 min (34-33/44-43) 4000VAC 1 min (Other)	2500VAC 1 min (54-53/64-63) 4000VAC 1 min (Other)
	Surge voltage	**Between Coil & Contacts**	10kV (1.2 / 50μs)	
		Between Contact sets	5kV (1.2 / 50μs)	
	Operating time (at rated voltage)		20ms max. (This time the ambient temperature was 23 ° C. Contact bounce time is not included.)	
	Breaking time (at rated voltage)		20ms max. (This time the ambient temperature was 23 ° C. Contact bounce time is not included.)	
	Vibration resistance		NO/NC : 10Hz to 55Hz 1.5mm DA	NO : 55Hz to 200Hz, 98m/s² NC : 55Hz to 200Hz, 49m/s²
	Shock Resistant		Malfunction : 980m/s²	Destruction : 100m/s²
	Ambient temperature [4]		-40℃ to 85℃	
	Ambient Humidity		5% to 85% RH	
	Wiring		PCB board / Dedicated socket	
	Weight		Approx. 20g	Approx. 23g

☞ Caution: The above figures are the initial values.
☞ Specifications and materials are subject to change without prior notice for quality improvement.
Note 1) The Life is for an ambient temperature of 15 to 35°C and an ambient humidity of 25% to 75%.
Note 2) This is the maximum voltage of the relay coil that can be stably operated.
Note 3) When using Socket, the dielectric strength between coil contacts/different poles is 2,500VAC, for 1 min.
Note 4) When operating at a temperature between 50 and 70°C, reduce the rated carry current by 0.3A/°C.

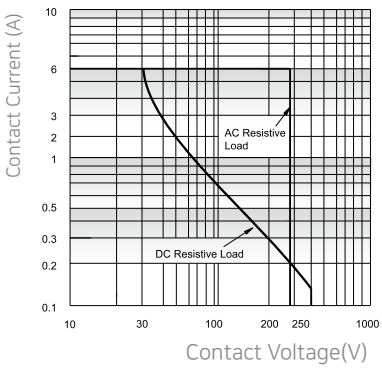
Product Selection

	Contact Form	Socket	Rated Voltage	Part Number
	3NO + 1NC	K7SC-10FL-24VDC	24VDC	K7SR-3A1B-24VDC
	2NO + 2NC	K7SC-10FL-24VDC	24VDC	K7SR-2A2B-24VDC
	5NO + 1NC	K7SC-14FL-24VDC	24VDC	K7SR-5A1B-24VDC
	4NO + 2NC	K7SC-14FL-24VDC	24VDC	K7SR-4A2B-24VDC
	3NO + 3NC	K7SC-14FL-24VDC	24VDC	K7SR-3A3B-24VDC

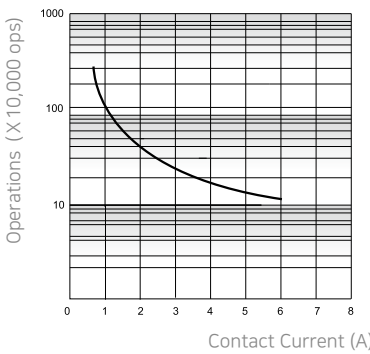
Reference Data

4P

Maximum Switching Power

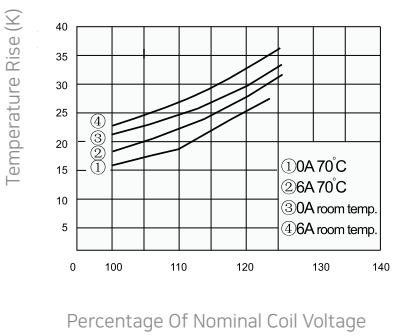


Endurance Curve



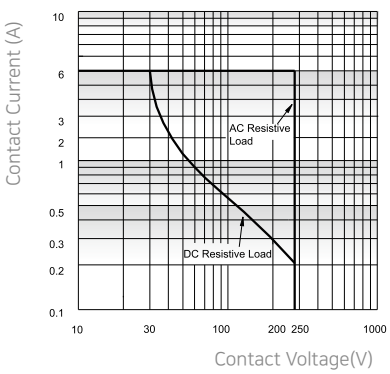
※ Test Conditions : 1NO, Resistive load, 250VAC, Room temp., 1s on 1s off

Coil Temperature

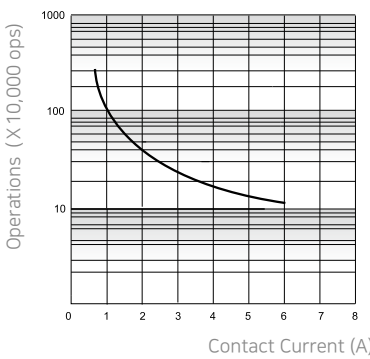


6P

Maximum Switching Power

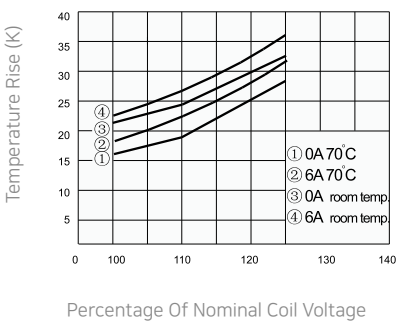


Endurance Curve



※ Test Conditions : 1NO, Resistive load, 250VAC, Room temp., 1s on 1s off

Coil Temperature

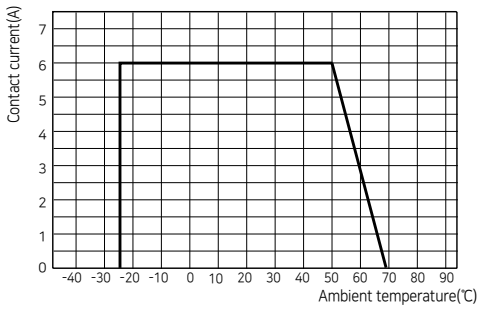


Safety Relay

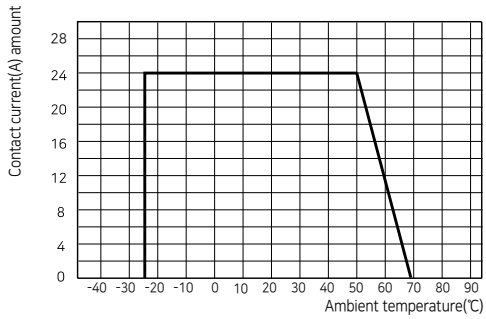
K7SR Series

Ambient temperature & contact current (With K7SC-□FL socket)

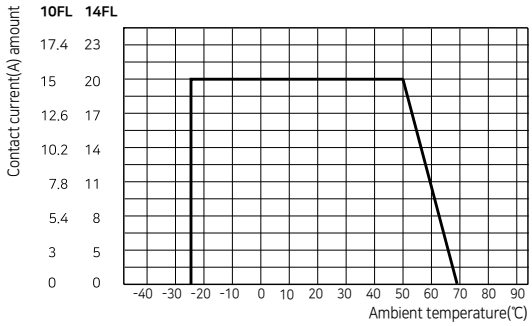
1 Circuit current characteristic [1)]



Current characteristic at 5A1B [2)]



Current characteristic at other models [3)] (TUV certification)



Note 1) The maximum current of one circuit in the temperature range of -25~50℃ is 6A.

Note 2) On apply K7SR-5A1B model, please attention to total current.
ex) Maximum 24A current at 50℃ (Current condition: 24A≥Total, 6A≥1circuit)
When 5 circuit A contacts are used, 24÷5= 4.8 maximum 4.8A per circuit.
When 4 circuit A contacts are used, 24÷4= 6 maximum 6A per circuit.

Note 3) On apply other models than K7SR-5A1B, please attention to total current.
ex 1) when use K7SR-3A1B model (10FL socket)
Maximum 15A current at 0℃ (Current condition: 15A≥Total, 6A≥1circuit)
When 3 circuit A contacts are used, 15÷3=5 maximum 5A per circuit.
When 2 circuit A contacts are used, 15÷2=7.5, 6×2=12 7.5A not applicable, 6A applicable.

ex2) When use K7SR-3A3B model (14FL socket)
Maximum 14A current at 56℃ (Current condition: 14A≥Total, 6A≥1circuit)
When 3 circuit A contacts are used, 14÷3=4.7 maximum 4.7A per circuit.
When 2 circuit A contacts are used, 14÷2=7 , 6×2=12 7A not applicable, 6A applicable.

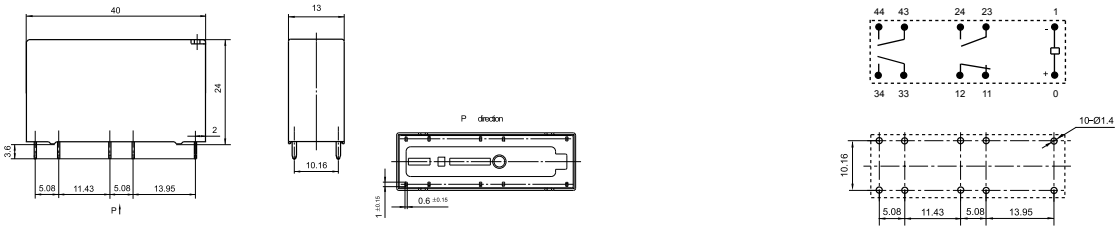
Maximum 11A current at 56℃ (Current condition: 11A≥Total, 6A≥1circuit)
When 3 circuit A contacts are used, 11÷3=3.6 maximum 3.6A per circuit.
When 2 circuit A contacts are used, 11÷2=5.5 maximum 5.5A per circuit.

※ The current condition values in the examples may differ slightly depending on the characteristic curve analysis.

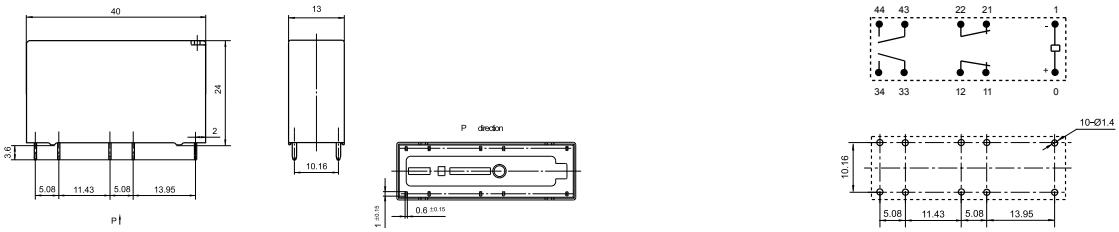
Dimensions and Wiring Diagram

(mm)

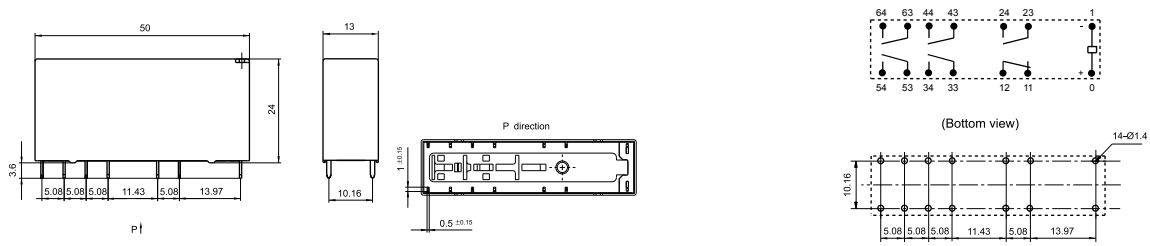
3A1B



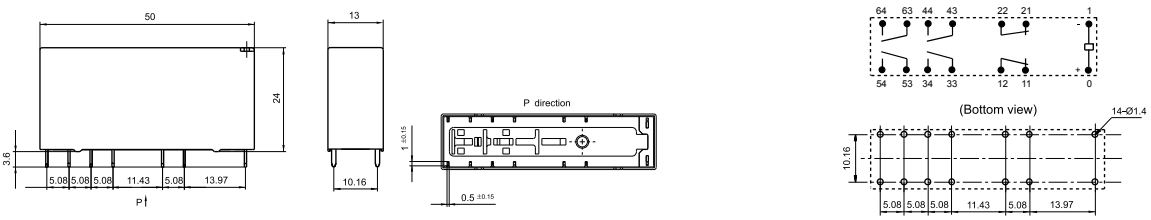
2A2B



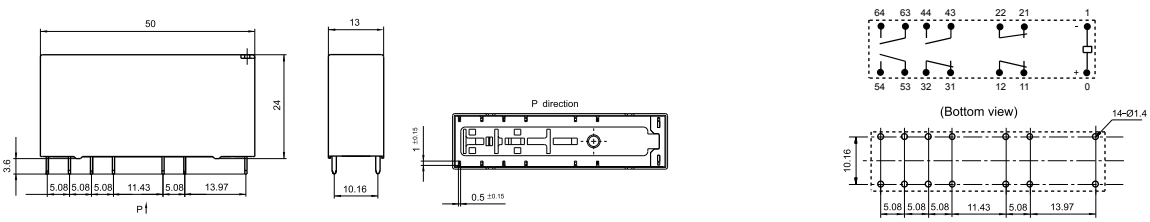
5A1B



4A2B



3A3B



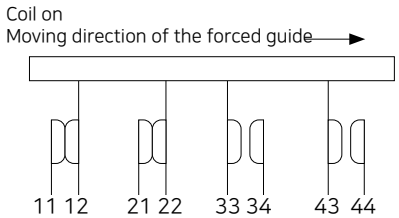
Note

1) The exterior dimensions shown above coincide with the following conditions: Tolerance ± 0.2 mm for 1 mm or above; Tolerance ± 0.3 mm for 1 mm ~ 5 mm; and Tolerance + 0.4 mm for 5 mm and above.
2) The tolerance on the PCB batch is ± 0.1 mm.

Safety Relay

K7SR Series

Definition of Operating Characteristics

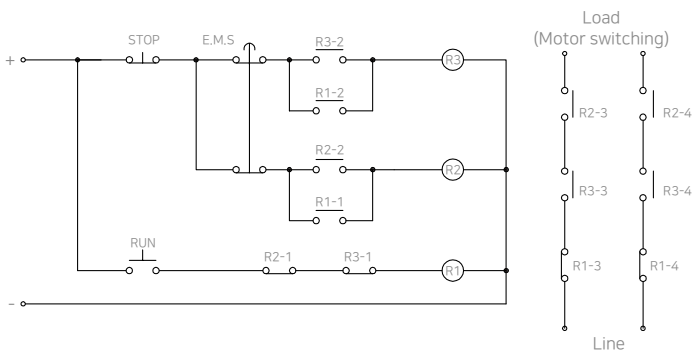


※ PIN number refers to the
1st digit - Pole's
2nd digit - Mechanical classification
1 : Stator of contact B
2 : Mover of contact B
3 : Mover of contact A
4 : Stator of contact A

In contrast to the general purpose relays, the NO and NC of each pole are composed independently, and the actuator of each contact is mechanically connected to the forced guide for operation.
This structure prevents the simultaneous closing operation of the NO contact and NC contact, thereby preventing the rest of the contacts from returning when the NO contact cannot be recovered (opened) due to fusion or failure (NC: Closed). In contrast, NO contact closure is also limited when the NC contact is fused.

Definition of Terms	Forced Guide: The operating part connected to the mover of each contact point is operated by the coil power.
	Mover: This refers to the movable contact which is moved by the forced guide during relay operation.
	Stator: This refers to a fixed contact with no movement regardless of relay operation.

An example of safety relay diagram



- Key Components
  Safety relay (R1, R2, R3), push button (RUN, STOP), EMS
- Operation Sequence
  1. Press RUN button: R1 on -> NO contact (R1-1, R1-2) of R1 closed: R2, R3 on
  2. Open R2, R3 NC contact (R2-1, R3-1) -> R1 off
  3. R1-3,4; R2-3,4; R3-3,4 contact closed -> Load operation

- Hazard Prevention Sequence in Case of Fusion Failure

Fused Spot	Whether the EMS operates normally	Whether to start over again
R3-3	Normal operation with R2-3 connected in a series on the same line. Load stop	Since R3-1 and R3-2 are not closed, the final load operation is unavailable because R1 does not operate even if the RUN button is pressed.
R1-4	Normal operation with R2-4 and R3-4 connected in a series. Load stop.	Since R1-1 and R1-2 are not closed, the final load operation is unavailable because R2 and R3 do not operate even if the RUN button is pressed.

※ Mechanical interlocking effect between contacts by forced guide.

Safety Relay Socket

K7SC Series

Part Number Description

K7SC - ❶ - ❷

❶	**Number of terminals**	10FL : 10 Terminal (4P Relay)	14FL : 14 Terminal (6P Relay)
❷	**Voltage**	24VDC	

General Specification

General Ratings	**Rated voltage**	250VAC
	Rated Current	6A
	Applicable relay coil voltage	6 ~ 24 VDC
	Ambient temperature	-25℃ to 55℃
	Specification Torque *	1.0N · m
	Wire thickness	1.5㎟ 16AWG
	Stripping Length	7mm
	Remarks	With LED

Note 1) When operating at a temperature between 50 and 70°C, reduce the rated carry current by 0.3A/°C.
Note 2) Torque at wire connection

Product Selection

	Part Number	Pole	Rated Voltage	Contact Form	Applied relay
	K7SC-10FL-24VDC	4P	24VDC	2A2B	K7SR-3A1B-24VDC
				3A1B	K7SR-2A2B-24VDC
	K7SC-14FL-24VDC	6P	24VDC	5A1B	K7SR-5A1B-24VDC
				4A2B	K7SR-4A2B-24VDC
				3A3B	K7SR-3A3B-24VDC

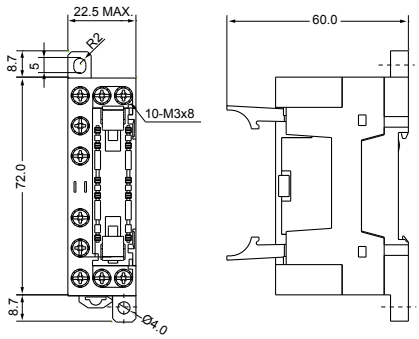
Safety Relay Socket

K7SC Series

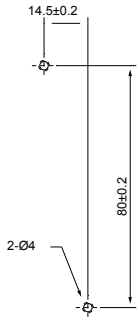
Dimensions

(mm)

4P

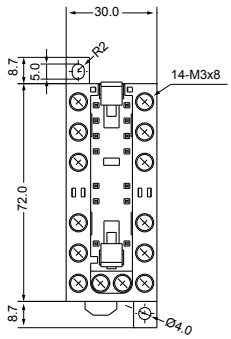


(Top View)

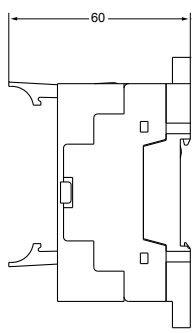


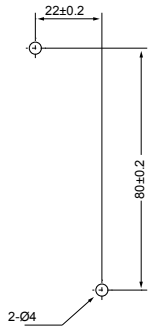
(Mounting Holes)

6P



(Top View)

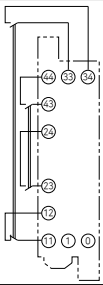
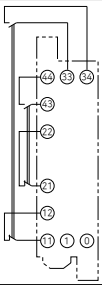
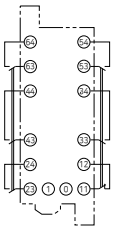
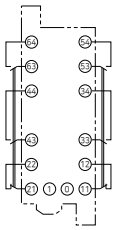
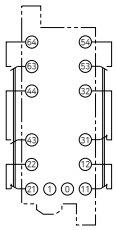
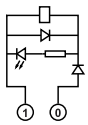




(Mounting Holes)

Note *) In exterior dimensions (L, W, H),
tolerance ± 1mm for 50mm or more / tolerance ± 0.5mm for 20mm ~ 50mm or less / tolerance ± 0.3mm for 20mm or lower.

Terminal layout & internal connection diagram

3A1B Layout	2A2B Layout	5A1B Layout	4A2B Layout	3A3B Layout	With LED
					

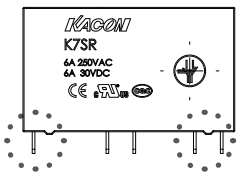
Precautions

Electrical Safety

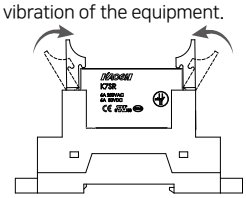
1. There is a risk of electric shock while the power is on.
   Do not let the body and tools touch the terminals.
2. If you need to check for maintenance, be sure to turn off the power before you start working.
3. Install the exclusive socket safety cover before supplying electricity.
4. Supply the rated voltage and current to the coil and contacts.
5. Press the two retainers until the relay locks into place when engaging the relay to the socket. If the relay is less locked, it may break off due to the vibration of the equipment.

Installation and Operation

1. In addition to the mechanical safety structure, use the control circuit that applies the product for the electric safety signal.
2. Use the correct terminal (Socket Terminal : M3 bolt, terminal width 6 mm or less) and tighten according to the specified torque (1.0 Nm or less).
3. The general purpose relay and the contact and power terminal arrangement are different. Check the arrangement of the contacts for each model. The unintentional application of the contact leads to equipment malfunction and accidents.
4. The pins of the relay may be deformed when excessive pressure is applied. Pay attention to the handling and socket coupling direction. Usage and Storage Environment.



5. When connecting the relays to the socket, press the two hooks until they are interlocked completely. If the relays are not locked tightly, they can break away due to the vibration of the equipment.

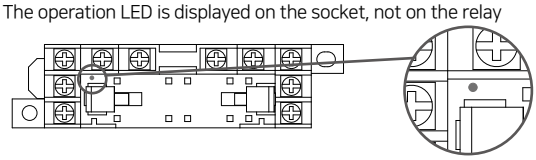


Use and Storage Condition

1. Do not use in environments with dust or corrosive gases and liquids
2. Please use in an environment with a specified temperature
   (Relay: -40° C to 85° C, Socket: -25° C to 55° C) and humidity (5% to 85% RH).
3. Do not install in environments with vibration or shock.
4. Do not use liquid or fluid cleaners for cleaning purposes. Use a dry cloth.

Other

1. The operation LED is displayed on the socket, not on the relay



2. Relays can be installed and used in sockets and circuit boards
3. In case of simultaneous installation of multiple articles, install a certain interval of more than 10 mm between relays for heat interference and maintenance convenience.