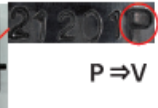
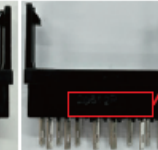
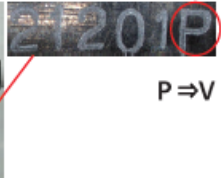
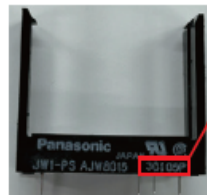
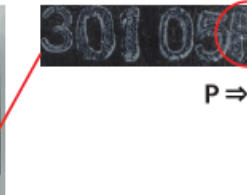
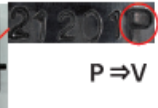
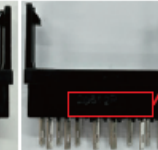
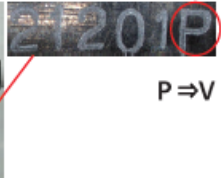
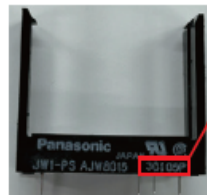
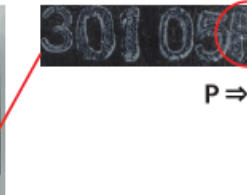
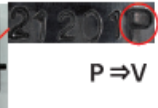
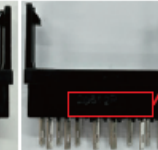
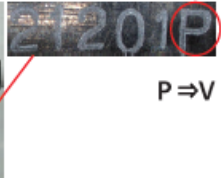
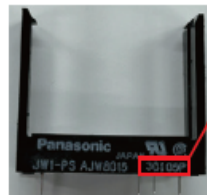
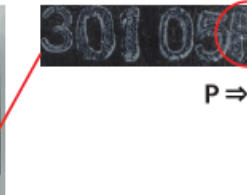


Product Change Notice: S, NC, ST, & JW relay sockets Production Location Change
PCN.PG03.PG04.PG06.03.07.2024

03.07.2024

About This Notice:	We would like to inform that the S, NC, ST, and JW type sockets are all subject to change due to change manufacturing site location to consolidate manufacturing bases and improve production efficiency.																																				
Effective Date:	January 1, 2024.																																				
Change Details:	The 6th digit of the production lot was changed from “P” to “V” as shown below. Also, the labels of inner and outer cartons will be marked with a circled “K” for three months. <table><tr><th colspan="3">S relay sockets</th><th colspan="3">NC relay sockets 8 type numbers</th></tr><tr><td>(Surface)</td><td>(Back side)</td><td>Production lot</td><td>(Surface)</td><td>(Back side)</td><td>Production lot</td></tr><tr><td></td><td></td><td> P ⇒ V</td><td></td><td></td><td> P ⇒ V</td></tr><tr><th colspan="3">ST relay sockets 2 type numbers</th><th colspan="3">JW relay sockets 2 type numbers</th></tr><tr><td>(Surface)</td><td></td><td>Production lot</td><td>(Surface)</td><td></td><td>Production lot</td></tr><tr><td></td><td></td><td> P ⇒ V</td><td></td><td></td><td> P ⇒ V</td></tr></table>	S relay sockets			NC relay sockets 8 type numbers			(Surface)	(Back side)	Production lot	(Surface)	(Back side)	Production lot			 P ⇒ V			 P ⇒ V	ST relay sockets 2 type numbers			JW relay sockets 2 type numbers			(Surface)		Production lot	(Surface)		Production lot			 P ⇒ V			 P ⇒ V
S relay sockets			NC relay sockets 8 type numbers																																		
(Surface)	(Back side)	Production lot	(Surface)	(Back side)	Production lot																																
		 P ⇒ V			 P ⇒ V																																
ST relay sockets 2 type numbers			JW relay sockets 2 type numbers																																		
(Surface)		Production lot	(Surface)		Production lot																																
		 P ⇒ V			 P ⇒ V																																
Affected Parts:	S-PS NC2-JPS NC4-JPS NC2-SS NC2-PS																																				

	NC2-WS NC4-SS NC4-PS NC4-WS ST-PS ST-SS JW1-PS JW2-PS	
Datasheet(s):	See attached.	
Notes:	The part number, specification, and price will remain unchanged.	

Panasonic PCN.PG03.PG04.PG06.03.07.2024 S, NC, ST, and JW relay sockets Affected Parts List				
Panasonic PCN.PG03.03.07.2024 S, NC, ST, and JW relay sockets Affected Parts				
Panasonic PCN.PG04.03.07.2024 S, NC, ST, and JW relay sockets Affected Parts				
Panasonic PCN.PG03.03.07.2024 S, NC, ST, and JW relay sockets Affected Parts				

Affected Series	Affeceted Part Numbers	Suggested Replacement Series	Suggested Replacement Part Numbers	Comments
S Relay Socket	S-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC2-JPS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC4-JPS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC2-SS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC2-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC2-WS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC4-SS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC4-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
NC Relay Socket	NC4-WS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
ST Relay Socket	ST-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
ST Relay Socket	ST-SS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
JW Relay Socket	JW1-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"
JW Relay Socket	JW2-PS	N/A	N/A	The 6th digit in the production lot code is changed from "P" to "V"

Power Relays (Over 2 A)
JW RELAYS

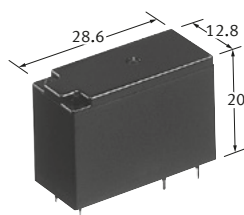
Product Catalog

**IN Your
Future**

JW RELAYS

1 Form A/1 Form C/2 Form A/2 Form C, 5 A/10 A, Power relays

Protective construction : Flux-resistant/Sealed



(Unit : mm)

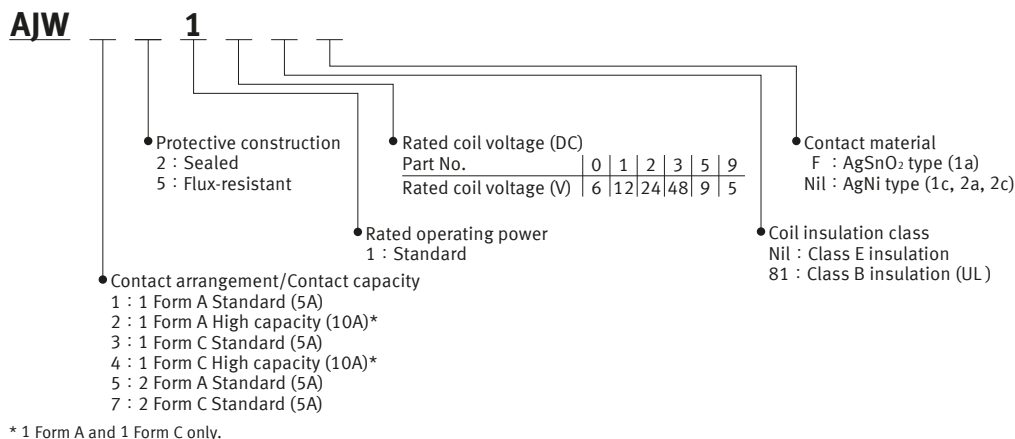
FEATURES

- Miniature/slim:
12.8 mm (W) × 28.6 mm (L) × 20 mm (H)
- Standard type (5 A) and high capacity type (10 A) are available
- PC board sockets are available

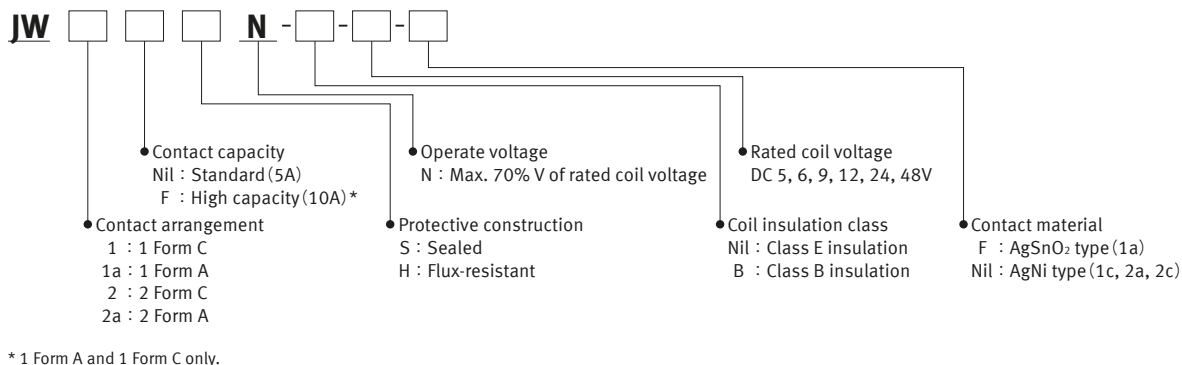
TYPICAL APPLICATIONS

- Home appliance
- Office machine
- Industrial equipment

ORDERING INFORMATION (PART NO. : Ordering part number for Japanese market)



ORDERING INFORMATION (TYPE NO. : Ordering part number for non Japanese market)



Power Relays (Over 2 A) JW RELAYS

TYPES

" Type No. " is ordering part number for non Japanese market. " Part No. " is ordering part number for Japanese market.

● Standard type (5 A)

Contact arrangement	Rated coil voltage	Sealed		Flux-resistant		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	5 V DC	JW1aSN-DC5V-F	AJW1219F	JW1aHN-DC5V-F	AJW1519F	100 pcs.	500 pcs.
	6 V DC	JW1aSN-DC6V-F	AJW1210F	JW1aHN-DC6V-F	AJW1510F		
	9 V DC	JW1aSN-DC9V-F	AJW1215F	JW1aHN-DC9V-F	AJW1515F		
	12 V DC	JW1aSN-DC12V-F	AJW1211F	JW1aHN-DC12V-F	AJW1511F		
	24 V DC	JW1aSN-DC24V-F	AJW1212F	JW1aHN-DC24V-F	AJW1512F		
	48 V DC	JW1aSN-DC48V-F	AJW1213F	JW1aHN-DC48V-F	AJW1513F		
1 Form C	5 V DC	JW1SN-DC5V	AJW3219	JW1HN-DC5V	AJW3519		
	6 V DC	JW1SN-DC6V	AJW3210	JW1HN-DC6V	AJW3510		
	9 V DC	JW1SN-DC9V	AJW3215	JW1HN-DC9V	AJW3515		
	12 V DC	JW1SN-DC12V	AJW3211	JW1HN-DC12V	AJW3511		
	24 V DC	JW1SN-DC24V	AJW3212	JW1HN-DC24V	AJW3512		
	48 V DC	JW1SN-DC48V	AJW3213	JW1HN-DC48V	AJW3513		
2 Form A	5 V DC	JW2aSN-DC5V	AJW5219	JW2aHN-DC5V	AJW5519		
	6 V DC	JW2aSN-DC6V	AJW5210	JW2aHN-DC6V	AJW5510		
	9 V DC	JW2aSN-DC9V	AJW5215	JW2aHN-DC9V	AJW5515		
	12 V DC	JW2aSN-DC12V	AJW5211	JW2aHN-DC12V	AJW5511		
	24 V DC	JW2aSN-DC24V	AJW5212	JW2aHN-DC24V	AJW5512		
	48 V DC	JW2aSN-DC48V	AJW5213	JW2aHN-DC48V	AJW5513		
2 Form C	5 V DC	JW2SN-DC5V	AJW7219	JW2HN-DC5V	AJW7519		
	6 V DC	JW2SN-DC6V	AJW7210	JW2HN-DC6V	AJW7510		
	9 V DC	JW2SN-DC9V	AJW7215	JW2HN-DC9V	AJW7515		
	12 V DC	JW2SN-DC12V	AJW7211	JW2HN-DC12V	AJW7511		
	24 V DC	JW2SN-DC24V	AJW7212	JW2HN-DC24V	AJW7512		
	48 V DC	JW2SN-DC48V	AJW7213	JW2HN-DC48V	AJW7513		

Note) Class B coil insulation type is available. Ex) AJW121181F

● High capacity type (10 A)

Contact arrangement	Rated coil voltage	Sealed		Flux-resistant		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	5 V DC	JW1aFSN-DC5V-F	AJW2219F	JW1aFHN-DC5V-F	AJW2519F	100 pcs.	500 pcs.
	6 V DC	JW1aFSN-DC6V-F	AJW2210F	JW1aFHN-DC6V-F	AJW2510F		
	9 V DC	JW1aFSN-DC9V-F	AJW2215F	JW1aFHN-DC9V-F	AJW2515F		
	12 V DC	JW1aFSN-DC12V-F	AJW2211F	JW1aFHN-DC12V-F	AJW2511F		
	24 V DC	JW1aFSN-DC24V-F	AJW2212F	JW1aFHN-DC24V-F	AJW2512F		
	48 V DC	JW1aFSN-DC48V-F	AJW2213F	JW1aFHN-DC48V-F	AJW2513F		
1 Form C	5 V DC	JW1FSN-DC5V	AJW4219	JW1FHN-DC5V	AJW4519		
	6 V DC	JW1FSN-DC6V	AJW4210	JW1FHN-DC6V	AJW4510		
	9 V DC	JW1FSN-DC9V	AJW4215	JW1FHN-DC9V	AJW4515		
	12 V DC	JW1FSN-DC12V	AJW4211	JW1FHN-DC12V	AJW4511		
	24 V DC	JW1FSN-DC24V	AJW4212	JW1FHN-DC24V	AJW4512		
	48 V DC	JW1FSN-DC48V	AJW4213	JW1FHN-DC48V	AJW4513		

Note) Class B coil insulation type is available. Ex) AJW221181F

For the sockets, please refer to the " JW RELAYS PC board sockets ".

Power Relays (Over 2 A) JW RELAYS

RATING

Coil data

- Operating characteristics such as " Operate voltage " and " Release voltage " are influenced by mounting conditions or ambient temperature, etc.
Therefore, please use the relay within $\pm 5\%$ of rated coil voltage.
- " Initial " means the condition of products at the time of delivery.

Rated coil voltage	Operate voltage* ¹ (at 20 °C)	Release voltage* ¹ (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)	Coil resistance ($\pm 10\%$, at 20 °C)	Rated operating power	Max. allowable voltage
5 V DC	Max. 70 % V of rated coil voltage (Initial)	Min. 10 % V of rated coil voltage (Initial)	106 mA	47 Ω	530 mW	130 % V of rated coil voltage (at 60 °C: class E) 120 % V of rated coil voltage (at 85 °C: class B) * ²
6 V DC			88 mA	68 Ω		
9 V DC			58 mA	155 Ω		
12 V DC			44 mA	270 Ω		
24 V DC			22 mA	1,100 Ω		
48 V DC			11 mA	4,400 Ω		

*1: square, pulse drive

*2: The operate and release voltages rise approximately 0.4 % for every 1 °C given a standard ambient temperature of 20 °C.

Therefore, when using relays where the ambient temperature is high, please take into consideration the rise in operate voltage and keep the coil applied voltage within the maximum allowable applied voltage.

Specifications

Item		Specifications	
		Standard type	High capacity type
Contact data	Contact arrangement	1 Form A, 1 Form C, 2 Form A, 2 Form C	1 Form A, 1 Form C
	Contact resistance (initial)	Max. 100 m Ω (by voltage drop 6 V DC 1 A)	
	Contact material	1 Form A: AgSnO ₂ type 1 Form C, 2 Form A, 2 Form C: AgNi type	
	Contact rating (resistive)	5 A 250 V AC, 5 A 30 V DC	10 A 250 V AC, 10 A 30 V DC
	Max. switching power (resistive)	1,250 VA, 150 W	2,500 VA, 300 W
	Max. switching voltage	250 V AC, 30 V DC	
	Max. switching current	5 A	10 A
	Min. switching load (reference value) * ¹	100 mA 5 V DC	
Insulation resistance (initial)		Min. 1,000 M Ω (at 500 V DC, Measured portion is the same as the case of dielectric strength.)	
Dielectric strength (initial)	Between open contacts	1,000 V rms for 1 min (detection current: 10 mA)	
	Between contact sets	2 Form A, 2 Form C: 3,000 V rms for 1 min (detection current: 10 mA)	—
	Between contact and coil	5,000 V rms for 1 min (detection current: 10 mA)	
Surge withstand voltage (initial) * ²	Between contact and coil	10,000 V	
Time characteristics (initial)	Operate time	Max. 15 ms (at rated coil voltage, at 20 °C, without bounce)	
	Release time	Max. 5 ms (at rated coil voltage, at 20 °C, without bounce, without diode)	
Shock resistance	Functional	98 m/s ² (half-sine shock pulse: 11 ms, detection time: 10 μ s)	
	Destructive	980 m/s ² (half-sine shock pulse: 6 ms)	
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1.6 mm, detection time: 10 μ s)	
	Destructive	10 to 55 Hz (at double amplitude of 2 mm)	
Expected life	Mechanical life	Min. 5 $\times$ 10 ⁶ ope. (switching frequency: at 180 times/min)	
Conditions	Conditions for usage, transport and storage* ³	Ambient temperature: -40 to +60 °C (class E) , -40 to +85 °C (class B) * ⁴ Humidity: 5 to 85 % RH (Avoid icing and condensation)	
Unit weight		Approx. 13 g	

*1: This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2: Wave is standard shock voltage of $\pm 1.2 \times 50 \mu$ s according to JEC-212-1981

*3: For ambient temperature, please read " GUIDELINES FOR RELAY USAGE ".

*4: The operate and release voltages rise approximately 0.4 % for every 1 °C given a standard ambient temperature of 20 °C.

Therefore, when using relays where the ambient temperature is high, please take into consideration the rise in operate voltage and keep the coil applied voltage within the maximum allowable applied voltage.

Power Relays (Over 2 A) JW RELAYS

Expected electrical life

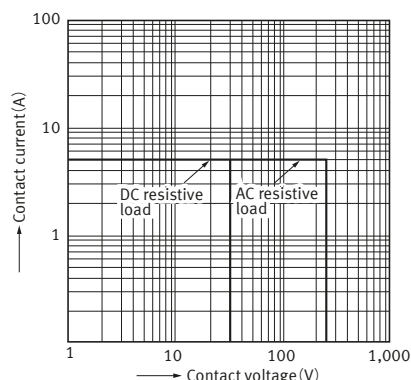
Conditions: Resistive load, at 20 °C, Flux-resistant: at 20 times/min • Sealed: at 6 times/min

Type	Switching capacity	Number of operations
1 Form A, 1 Form C, 2 Form A, 2 Form C (Standard)	5 A 250 V AC	Min. 100×10^3 ope.
	5 A 30 V DC	Min. 100×10^3 ope.
1 Form A, 1 Form C (High capacity)	10 A 250 V AC	Min. 100×10^3 ope.
	10 A 30 V DC	Min. 100×10^3 ope.

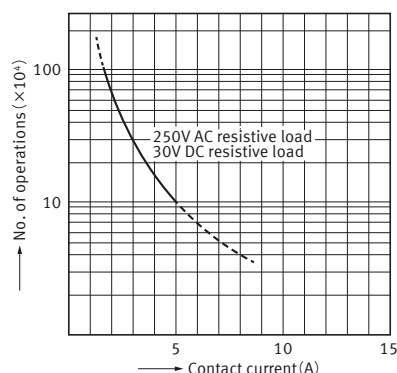
REFERENCE DATA

1 Form A Standard type

1. Max. switching capacity

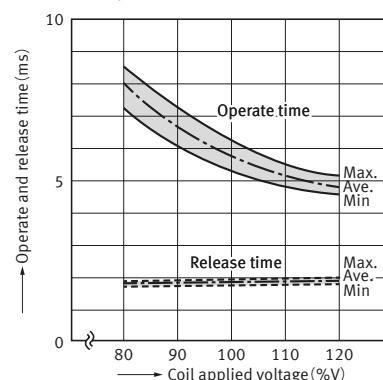


2. Switching life curve



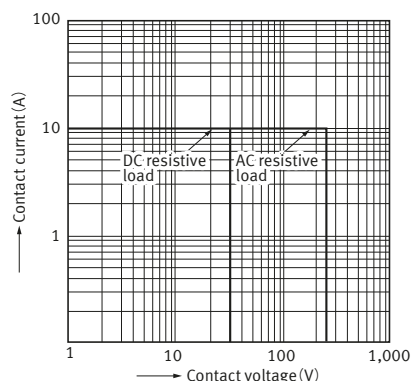
3. Operate and release time characteristics

Tested sample : JW1aSN-DC 12V-F, 10 pcs.
Ambient temperature : 20°C

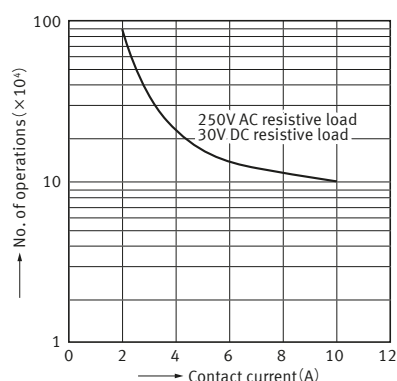


1 Form A High capacity type

1. Max. switching capacity

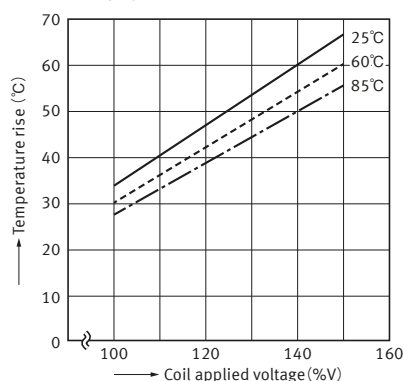


2. Switching life curve



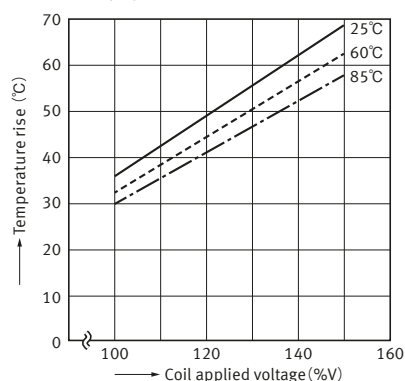
3-1. Coil temperature characteristics (Average)

Tested sample : JW1aFSN-DC 12V-F
Measured portion : Coil inside
Contact carrying current : 5A



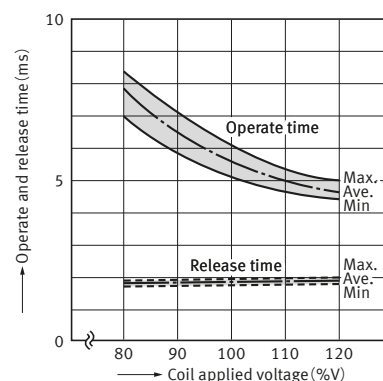
3-2. Coil temperature characteristics (Average)

Tested sample : JW1aFSN-DC 12V-F
Measured portion : Coil inside
Contact carrying current : 10A



4. Operate and release time characteristics

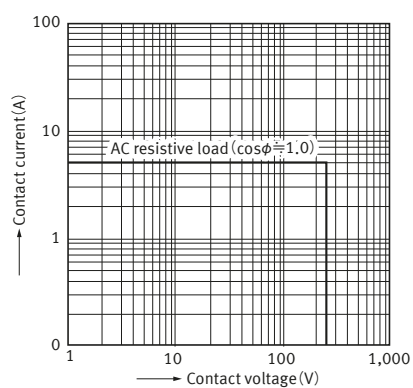
Tested sample : JW1aFSN-DC 12V-F, 10 pcs.
Ambient temperature : 20°C



Power Relays (Over 2 A) JW RELAYS

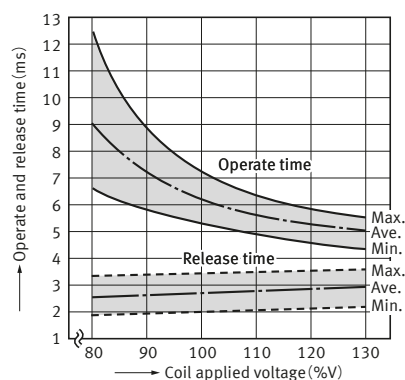
■ 1 Form C Standard type

1. Max. switching capacity



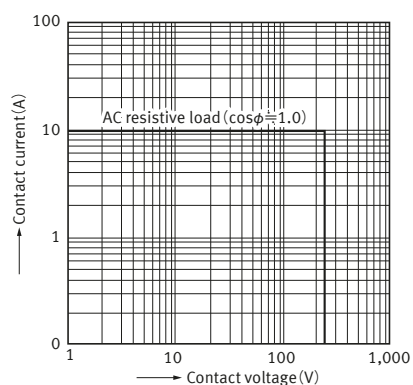
2. Operate and release time characteristics

Tested sample : JW1SN-DC 12V, 6 pcs.
Ambient temperature : 20°C



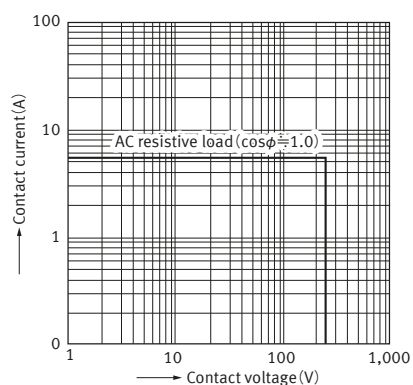
■ 1 Form C High capacity type

1. Max. switching capacity



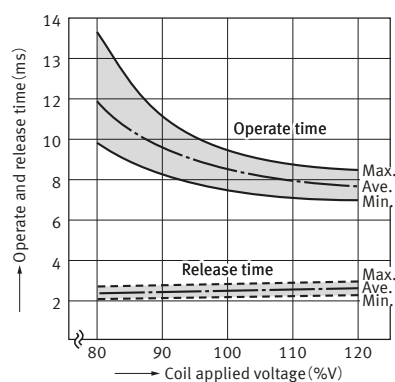
■ 2 Form A Standard type

1. Max. switching capacity



2. Operate and release time characteristics

Tested sample : JW2aSN-DC 24V, 6 pcs.
Ambient temperature : 20°C



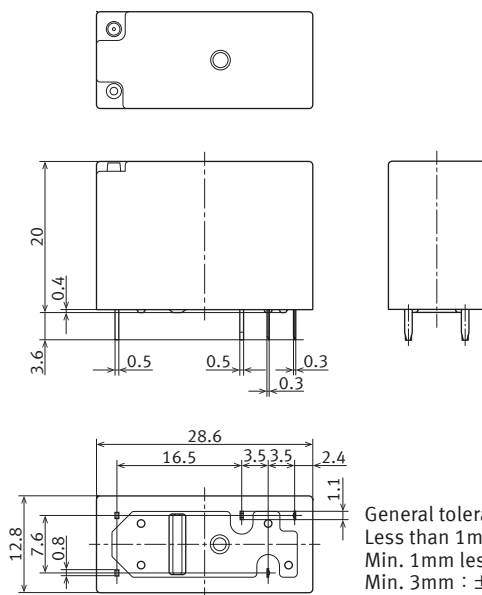
Power Relays (Over 2 A) JW RELAYS

■ 1 Form C

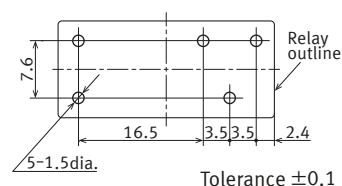
CAD



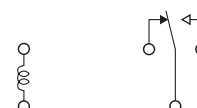
External dimensions



Recommended PC board pattern
 (BOTTOM VIEW)



Schematic
 (BOTTOM VIEW)

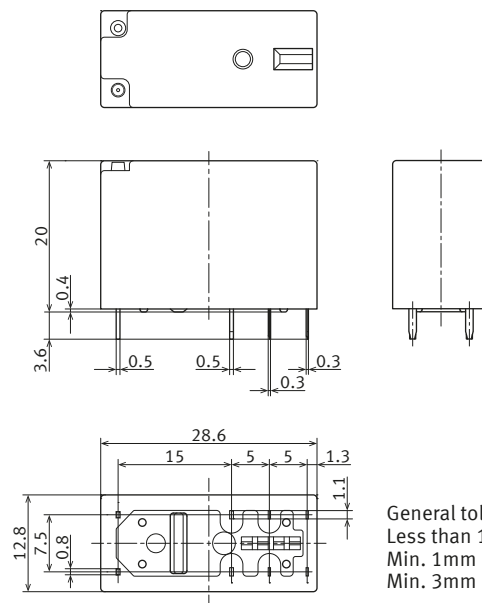


■ 2 Form A, 2 Form C

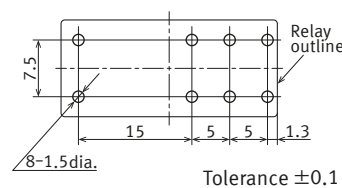
CAD



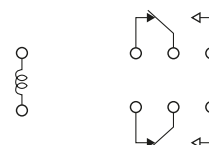
External dimensions



Recommended PC board pattern
 (BOTTOM VIEW)



Schematic
 (BOTTOM VIEW)



Note : JW 2 Form A is as shown in the diagram above except the N.C. terminals are not present.

Power Relays (Over 2 A) JW RELAYS

SAFETY STANDARDS

Each standard may be updated at any time, so please check our Website for the latest information.

■ UL (Approved)

● Standard type

1 Form A

File No.	Contact rating
E43028	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

1 Form C

File No.	Contact rating
E43028	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

● High capacity type

1 Form A

File No.	Contact rating
E43028	10 A 277 V AC
	10 A 30 V DC
	1/3 HP 250 V AC
	1/3 HP 125 V AC

■ CSA (Approved)

● Standard type

1 Form A

File No.	Contact rating
1024714	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

1 Form C

File No.	Contact rating
1024714	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

● High capacity type

1 Form A

File No.	Contact rating
1024714	10 A 277 V AC
	10 A 30 V DC
	1/3 HP 250 V AC
	1/3 HP 125 V AC

2 Form A

File No.	Contact rating
E43028	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

2 Form C

File No.	Contact rating
E43028	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

1 Form C

File No.	Contact rating
E43028	10 A 277 V AC
	10 A 30 V DC
	1/3 HP 250 V AC
	1/3 HP 125 V AC

2 Form A

File No.	Contact rating
1024714	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

2 Form C

File No.	Contact rating
1024714	5 A 277 V AC
	5 A 30 V DC
	1/8 HP 250 V AC
	1/8 HP 125 V AC

1 Form C

File No.	Contact rating
1024714	10 A 277 V AC
	10 A 30 V DC
	1/3 HP 250 V AC
	1/3 HP 125 V AC

Power Relays (Over 2 A) JW RELAYS

■ VDE (Approved)

● Standard type

1 Form A

File No.	Contact rating
40013854	5 A 250 V AC ($\cos\phi = 1.0$)
	3 A 250 V AC ($\cos\phi = 0.4$)

2 Form A

File No.	Contact rating
40013854	5 A 250 V AC ($\cos\phi = 1.0$)
	5 A 30 V DC (0 ms)
	3 A 250 V AC ($\cos\phi = 0.4$)

1 Form C

File No.	Contact rating
40013854	5 A 250 V AC ($\cos\phi = 1.0$)
	5 A 30 V DC (0 ms)
	3 A 250 V AC ($\cos\phi = 0.4$)

2 Form C

File No.	Contact rating
40013854	5 A 250 V AC ($\cos\phi = 1.0$)
	5 A 30 V DC (0 ms)
	3 A 250 V AC ($\cos\phi = 0.4$)

● High capacity type

1 Form A

File No.	Contact rating
40013854	10 A 250 V AC ($\cos\phi = 1.0$)
	7 A 250 V AC ($\cos\phi = 0.4$)

1 Form C

File No.	Contact rating
40013854	10 A 250 V AC ($\cos\phi = 1.0$)
	10 A 30 V DC (0 ms)
	7 A 250 V AC ($\cos\phi = 0.4$)

■ CQC (Approved)

2 Form C (JW2SN-DC12V only)

File No.	Contact rating
CQC10002041727	5 A 250 V AC

INSULATION CHARACTERISTICS (IEC61810-1)

Item	Characteristics
Clearance/Creepage distance (IEC61810-1)	Min.5.5/8.0 mm
Category of protection (IEC61810-1)	RT II, III
Tracking resistance (IEC60112)	PTI 175
Insulation material group	III a
Over voltage category	III
Rated voltage	250 V
Pollution degree	3
Type of insulation (Between contact and coil)	Reinforced insulation
Type of insulation (Between open contacts)	Micro disconnection

Note) EN/IEC VDE Approved.

GUIDELINES FOR USAGE

- For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

JW RELAYS PC board sockets



SELECTOR CHART

Relay type \ Socket	JW1 PC board socket	JW2 PC board socket
1 Form A	●	—
1 Form C	●	—
2 Form A	—	●
2 Form C	—	●

TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
JW1 PC board socket	JW1-PS	AJW8015	10 pcs.	100 pcs.
JW2 PC board socket	JW2-PS	AJW8025		

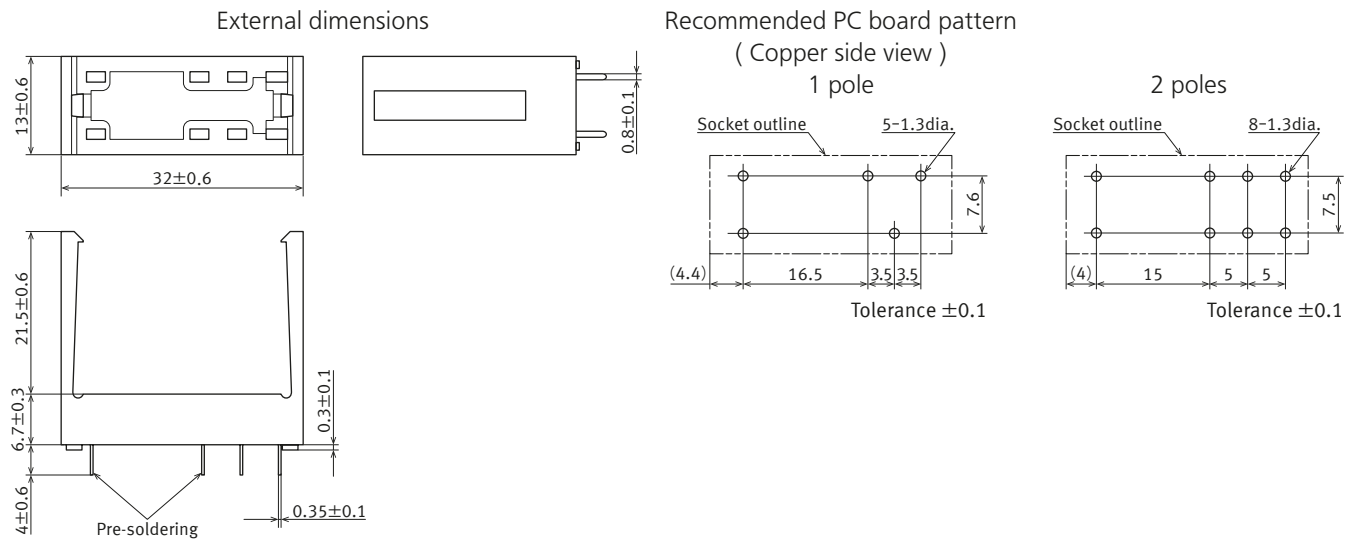
RATING

Item	Specifications	
Contact arrangement	1 pole	2 poles
Dielectric strength (initial)	Between charging portion: 1,500 V rms for 1 min (detection current: 10 mA)	
Insulation resistance (initial)	Between charging portion: Min. 100 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)	
Maximum carrying current	10 A	5 A
Conditions for usage, transport and storage	Ambient temperature: −50 to +50 °C Humidity: 5 to 85 % RH (Avoid icing and condensation)	

DIMENSIONS (Unit: mm)

CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

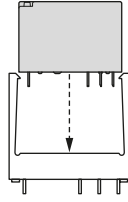
CAD



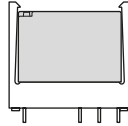
Power Relays (Over 2 A) JW RELAYS

■ Mounting method of relay

- 1) Match the direction of relay and socket.

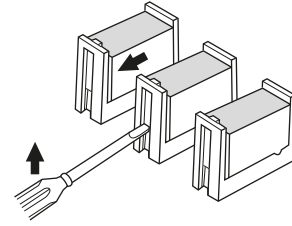


- 2) Both ends of the relay are to be secured firmly so that the socket both hooks on the top surface of the relay.



■ Removing method of relay

- 1) Remove the relay, applying force in the direction as shown in the figure.
- 2) In case there is not enough space to grasp relay with fingers, use screwdrivers in the way as shown in the figure.



- 3) Exercise care when removing relays. If greater than necessary force is applied at the socket hooks, deformation may alter the dimensions so that the hook will no longer catch, and other damage may also occur.

■ For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

Precautions for Coil Input

■ Long term current carrying

A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts) Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself. For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection.

■ DC Coil operating power

Steady state DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5 %. However, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

■ Coil connection

When connecting coils of polarized relays, please check coil polarity (+, -) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

■ Maximum allowable voltage and temperature rise

Proper usage requires that the rated coil voltage be impressed on the coil. Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise. Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

● Operate voltage change due to coil temperature rise

In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the operate voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere. The resistance/temperature relationship for copper wire is about 0.4 % for 1 °C, and with this ratio the coil resistance increases. That is, in order to operate of the relay, it is necessary that the voltage be higher than the operate voltage and the operate voltage rises in accordance with the increase in the resistance value. However, for some polarized relays, this rate of change is considerably smaller.

Ambient Environment

■ Usage, Transport, and Storage Conditions

During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

● Temperature/Humidity/Pressure

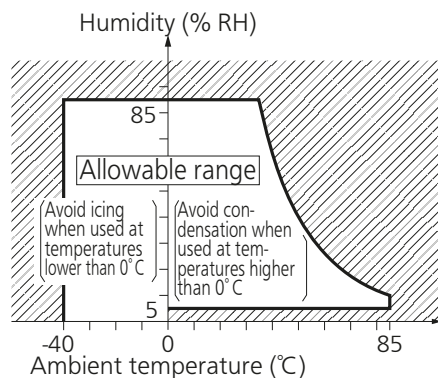
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications.

Also allowable humidity level is influenced by temperature, please check charts shown below and use relays within mentioned conditions. (Allowable temperature values differ for each relays, please refer to the relay's individual specifications.)

1) Temperature:

The tolerance temperature range differs for each relays, please refer to the relay's individual specifications

2) Humidity: 5 to 85 % RH



3) Pressure: 86 to 106 kPa

● Dew condensation

Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity.

Condensation causes the failures like insulation deterioration, wire disconnection and rust etc.

Panasonic Industry Co., Ltd. does not guarantee the failures caused by condensation.

The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur.

Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

● Icing

Condensation or other moisture may freeze on relays when the temperature become lower than 0 °C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Industry Co., Ltd. does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur.

Please conduct product evaluations in the worst condition of the actual usage.

● Low temperature and low humidity

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

● High temperature and high humidity

Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

● Package

In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

● Silicon

When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.

This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic sealed types).

● NOx Generation

When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid.

This corrodes the internal metal parts and adversely affects operation.

Avoid use at an ambient humidity of 85 % RH or higher (at 20 °C). If use at high humidity is unavoidable, please contact our sales representative.

Others

■ Cleaning

- Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
- Cleaning with the boiling method is recommended (The temperature of cleaning liquid should be 40 °C or lower). Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

Please refer to "**the latest product specifications**" when designing your product.

- Requests to customers:

<https://industrial.panasonic.com/ac/e/salespolicies/>

■ Global Sales Network Information: industrial.panasonic.com/ac/e/salesnetwork

Panasonic
INDUSTRY

Panasonic Industry Co., Ltd.

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

Power Relays (Over 2 A)
NC RELAYS

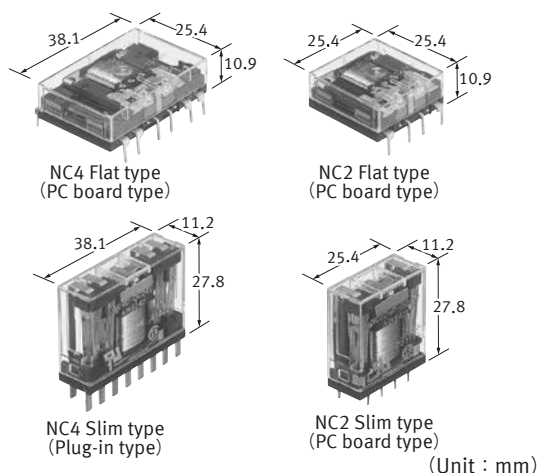
Product Catalog

**IN Your
Future**

NC RELAYS

Transistor drive, 2 Form C/4 Form C, 5 A Slim power relays

Protective construction : Dust cover type/Sealed type



FEATURES

- Flat type: profile 10.9 mm
Slim type: width 11.2 mm
- Twin (bifurcated) contact
- Plug-in terminal/PC board terminal
- Sockets and terminal sockets are available

TYPICAL APPLICATIONS

- Electric power equipment
- Industrial equipment
- Measuring devices

ORDERING INFORMATION (PART NO. : Ordering part number for Japanese market)

AW 8

- Terminal shape
2 : Slim type, Plug-in terminal
4 : Slim type, PC board terminal
8 : Flat type, PC board terminal
- Contact arrangement
1 : 2 Form C Single side stable
4 : 4 Form C Single side stable
- Rated coil voltage (DC)
Part No. 0 | 1 | 2 | 3 | 4 | 8 | 9
Rated coil voltage (V) 6 | 12 | 24 | 48 | 100 | 3 | 5
- Protective construction
Nil : Dust cover type
60 : Sealed type

ORDERING INFORMATION (TYPE NO. : Ordering part number for non Japanese market)

- NC** **D** - -
- Protective construction
Nil : Dust cover type
EB : Sealed type
 - Relay shape
Nil : Slim type
J : Flat type
 - Operating function
Nil : Single side stable
 - Rated coil voltage (DC)
3, 5, 6, 12, 24, 48, 100V
 - Contact arrangement
2 : 2 Form C
4 : 4 Form C
 - Contact characteristics
D : Twin (bifurcated) contact
 - Terminal shape
Nil : Plug-in type
P : PC board type

Power Relays (Over 2 A) NC RELAYS

TYPES

" Type No. " is ordering part number for non Japanese market. " Part No. " is ordering part number for Japanese market.

■ Dust cover type

● Flat type

Contact arrangement	Rated coil voltage	PC board terminal		Standard packing	
		Type No.	Part No.	Inner carton	Outer carton
2 Form C	3 V DC	NC2D-JP-DC3V	AW8818	20 pcs.	200 pcs.
	5 V DC	NC2D-JP-DC5V	AW8819		
	6 V DC	NC2D-JP-DC6V	AW8810		
	12 V DC	NC2D-JP-DC12V	AW8811		
	24 V DC	NC2D-JP-DC24V	AW8812		
	48 V DC	NC2D-JP-DC48V	AW8813		
	100 V DC	NC2D-JP-DC100V	AW8814		
4 Form C	3 V DC	NC4D-JP-DC3V	AW8848		
	5 V DC	NC4D-JP-DC5V	AW8849		
	6 V DC	NC4D-JP-DC6V	AW8840		
	12 V DC	NC4D-JP-DC12V	AW8841		
	24 V DC	NC4D-JP-DC24V	AW8842		
	48 V DC	NC4D-JP-DC48V	AW8843		
	100 V DC	NC4D-JP-DC100V	AW8844		

● Slim type

Contact arrangement	Rated coil voltage	Plug-in terminal		PC board terminal		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
2 Form C	3 V DC	NC2D-DC3V	AW8218	NC2D-P-DC3V	AW8418	20 pcs.	200 pcs.
	5 V DC	NC2D-DC5V	AW8219	NC2D-P-DC5V	AW8419		
	6 V DC	NC2D-DC6V	AW8210	NC2D-P-DC6V	AW8410		
	12 V DC	NC2D-DC12V	AW8211	NC2D-P-DC12V	AW8411		
	24 V DC	NC2D-DC24V	AW8212	NC2D-P-DC24V	AW8412		
	48 V DC	NC2D-DC48V	AW8213	NC2D-P-DC48V	AW8413		
	100 V DC	NC2D-DC100V	AW8214	NC2D-P-DC100V	AW8414		
4 Form C	3 V DC	NC4D-DC3V	AW8248	NC4D-P-DC3V	AW8448		
	5 V DC	NC4D-DC5V	AW8249	NC4D-P-DC5V	AW8449		
	6 V DC	NC4D-DC6V	AW8240	NC4D-P-DC6V	AW8440		
	12 V DC	NC4D-DC12V	AW8241	NC4D-P-DC12V	AW8441		
	24 V DC	NC4D-DC24V	AW8242	NC4D-P-DC24V	AW8442		
	48 V DC	NC4D-DC48V	AW8243	NC4D-P-DC48V	AW8443		
	100 V DC	NC4D-DC100V	AW8244	NC4D-P-DC100V	AW8444		

■ Sealed type

● Flat type

Contact arrangement	Rated coil voltage	PC board terminal		Standard packing	
		Type No.	Part No.	Inner carton	Outer carton
2 Form C	3 V DC	NC2EBD-JP-DC3V	AW881860	20 pcs.	200 pcs.
	5 V DC	NC2EBD-JP-DC5V	AW881960		
	6 V DC	NC2EBD-JP-DC6V	AW881060		
	12 V DC	NC2EBD-JP-DC12V	AW881160		
	24 V DC	NC2EBD-JP-DC24V	AW881260		
	48 V DC	NC2EBD-JP-DC48V	AW881360		
	100 V DC	NC2EBD-JP-DC100V	AW881460		
4 Form C	3 V DC	NC4EBD-JP-DC3V	AW884860		
	5 V DC	NC4EBD-JP-DC5V	AW884960		
	6 V DC	NC4EBD-JP-DC6V	AW884060		
	12 V DC	NC4EBD-JP-DC12V	AW884160		
	24 V DC	NC4EBD-JP-DC24V	AW884260		
	48 V DC	NC4EBD-JP-DC48V	AW884360		
	100 V DC	NC4EBD-JP-DC100V	AW884460		

Power Relays (Over 2 A) NC RELAYS

● Slim type

Contact arrangement	Rated coil voltage	Plug-in terminal		PC board terminal		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
2 Form C	3 V DC	NC2EBD-DC3V	AW821860	NC2EBD-P-DC3V	AW841860	20 pcs.	200 pcs.
	5 V DC	NC2EBD-DC5V	AW821960	NC2EBD-P-DC5V	AW841960		
	6 V DC	NC2EBD-DC6V	AW821060	NC2EBD-P-DC6V	AW841060		
	12 V DC	NC2EBD-DC12V	AW821160	NC2EBD-P-DC12V	AW841160		
	24 V DC	NC2EBD-DC24V	AW821260	NC2EBD-P-DC24V	AW841260		
	48 V DC	NC2EBD-DC48V	AW821360	NC2EBD-P-DC48V	AW841360		
	100 V DC	NC2EBD-DC100V	AW821460	NC2EBD-P-DC100V	AW841460		
4 Form C	3 V DC	NC4EBD-DC3V	AW824860	NC4EBD-P-DC3V	AW844860		
	5 V DC	NC4EBD-DC5V	AW824960	NC4EBD-P-DC5V	AW844960		
	6 V DC	NC4EBD-DC6V	AW824060	NC4EBD-P-DC6V	AW844060		
	12 V DC	NC4EBD-DC12V	AW824160	NC4EBD-P-DC12V	AW844160		
	24 V DC	NC4EBD-DC24V	AW824260	NC4EBD-P-DC24V	AW844260		
	48 V DC	NC4EBD-DC48V	AW824360	NC4EBD-P-DC48V	AW844360		
	100 V DC	NC4EBD-DC100V	AW824460	NC4EBD-P-DC100V	AW844460		

For the sockets, please refer to the "Sockets/DIN terminal sockets".

RATING

■ Coil data

- Operating characteristics such as "Operate voltage" and "Release voltage" are influenced by mounting conditions or ambient temperature, etc.
Therefore, please use the relay within $\pm 5\%$ of rated coil voltage.
- "Initial" means the condition of products at the time of delivery.

Contact arrangement	Rated coil voltage	Operate voltage* ¹ (at 20 °C)	Release voltage* ¹ (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)	Coil resistance ($\pm 10\%$, at 20 °C)	Rated operating power	Max. allowable voltage (at 50 °C) * ²
2 Form C	3 V DC	Max. 80 % V of rated coil voltage (Initial)	Min. 10 % V of rated coil voltage (Initial)	120 mA	25 Ω	360 mW	135 % V of rated coil voltage
	5 V DC			72 mA	69.4 Ω		
	6 V DC			60 mA	100 Ω		
	12 V DC			30 mA	400 Ω		
	24 V DC			15 mA	1,600 Ω		
	48 V DC			7.5 mA	6,400 Ω		
	100 V DC			7.4 mA	13,500 Ω	740 mW	110 %V of rated coil voltage
4 Form C	3 V DC	Max. 80 % V of rated coil voltage (Initial)	Min. 10 % V of rated coil voltage (Initial)	240 mA	12.5 Ω	720 mW	110 % V of rated coil voltage
	5 V DC			144 mA	34.7 Ω		
	6 V DC			120 mA	50 Ω		
	12 V DC			60 mA	200 Ω		
	24 V DC			30 mA	800 Ω		
	48 V DC			15 mA	3,200 Ω		
	100 V DC			7.4 mA	13,500 Ω	740 mW	

*1: Square, pulse drive

*2: At 20°C (Sealed type)

Power Relays (Over 2 A) NC RELAYS

Specifications

Item		Specifications	
Contact data	Contact arrangement	2 Form C	4 Form C
	Contact resistance (initial)	Max. 50 mΩ (by voltage drop 6 V DC 1 A)	
	Contact material	Au-clad, AgNi type	
	Contact rating (resistive)	Dust cover: 5 A 250 V AC, 5 A 30 V DC Sealed : 3 A 250 V AC, 5 A 30 V DC	Dust cover: 4 A 250 V AC, 5 A 30 V DC Sealed : 2 A 250 V AC, 5 A 30 V DC
	Max. switching power (resistive)	Dust cover: 1,250 VA, 150 W Sealed : 750 VA, 150 W	Dust cover: 1,000 VA, 150 W Sealed : 500 VA, 150 W
	Max. switching voltage	250 V AC, 220 V DC	
	Max. switching current	Dust cover: 5 A (AC, DC) Sealed : 3 A (AC), 5 A (DC)	Dust cover: 4 A (AC), 5 A (DC) Sealed : 2 A (AC), 5 A (DC)
	Min. switching load (reference value) ^{*1}	100 μA 1 V DC	
Insulation resistance (initial)		Min. 100 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)	
Dielectric strength (initial)	Between open contacts	1,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact sets	1,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact and coil	2,000 Vrms for 1 min (detection current: 10 mA)	
Time characteristics (initial)	Operate time	Max. 20 ms at rated coil voltage (at 20 °C, without bounce)	
	Release time	Max. 10 ms at rated coil voltage (at 20 °C, without bounce, without diode)	
Shock resistance	Functional	98 m/s ² (half-sine shock pulse: 11 ms, detection time: 10 μs)	
	Destructive	980 m/s ² (half-sine shock pulse: 6 ms)	
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1 mm, detection time: 10 μs)	
	Destructive	10 to 55 Hz (at double amplitude of 2 mm)	
Expected life	Mechanical life	Min. 50 × 10 ⁶ ope. (switching frequency: at 180 times/min)	
Conditions	Conditions for usage, transport and storage ^{*2}	Ambient temperature: -40 to +70 °C (Max. 48 V DC), -40 to +55 °C (Min. 100 V DC) Humidity: 5 to 85 % RH (Avoid icing and condensation)	Ambient temperature: -40 to +55 °C Humidity: 5 to 85 % RH (Avoid icing and condensation)
Unit weight		Approx. 16 g	Slim type: Approx. 19 g Flat type : Approx. 18 g

*1: This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2: For ambient temperature, please read " GUIDELINES FOR RELAY USAGE ".

Expected electrical life

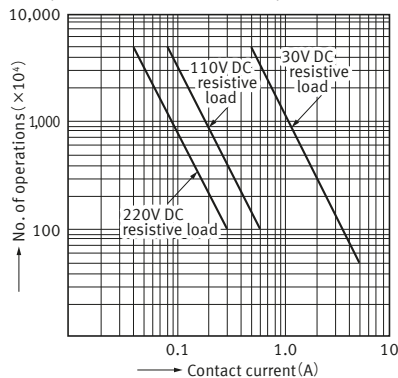
Conditions: Resistive load, switching frequency at 20 times/min

Type		Switching capacity	Number of operations
2 Form C	Dust cover	5 A 30 V DC	Min. 500 × 10 ³ ope.
		5 A 250 V AC	Min. 100 × 10 ³ ope.
	Sealed	5 A 30 V DC	Min. 500 × 10 ³ ope.
		3 A 250 V AC	Min. 100 × 10 ³ ope.
4 Form C	Dust cover	5 A 30 V DC	Min. 500 × 10 ³ ope.
		4 A 250 V AC	Min. 100 × 10 ³ ope.
	Sealed	5 A 30 V DC	Min. 500 × 10 ³ ope.
		2 A 250 V AC	Min. 100 × 10 ³ ope.

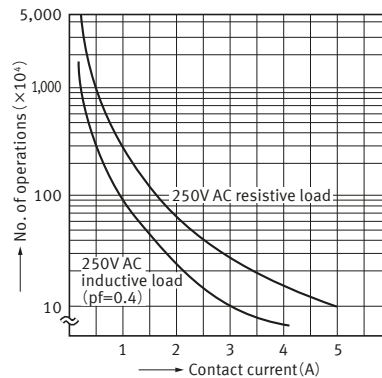
Power Relays (Over 2 A) NC RELAYS

REFERENCE DATA

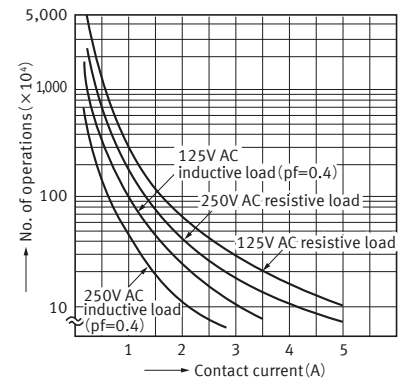
1-1. Switching life curve
(2 Form C, 4 Form C)



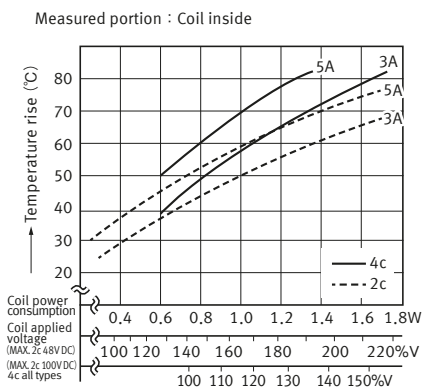
1-2. Switching life curve (2 Form C)



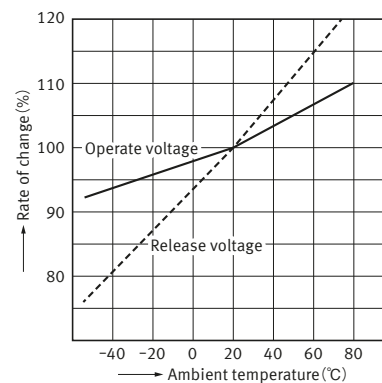
1-3. Switching life curve (4 Form C)



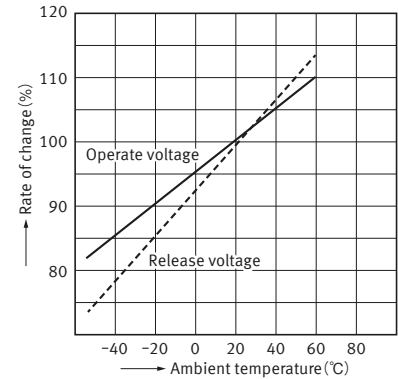
2. Coil temperature characteristics



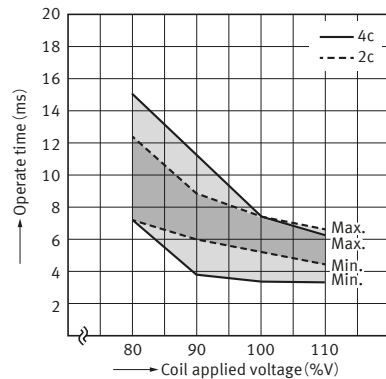
3-1. Ambient temperature characteristics
(2 Form C)



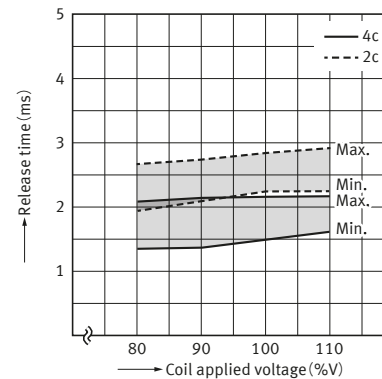
3-2. Ambient temperature characteristics
(4 Form C)



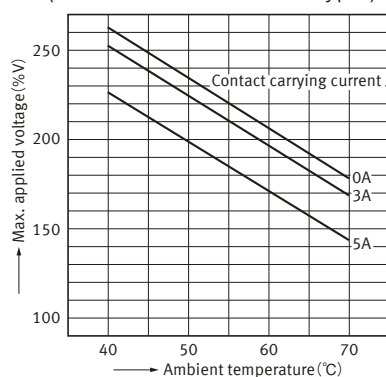
4. Operate time



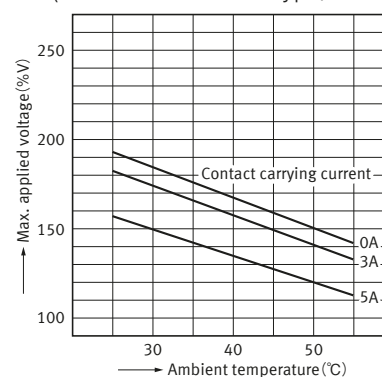
5. Release time



6-1. Ambient temperature vs Max.
applied voltage
(2 Form C: 3 to 48 V DC type)



6-2. Ambient temperature vs Max.
applied voltage
(2 Form C: 100 V DC type, 4 Form C)



Power Relays (Over 2 A) NC RELAYS

DIMENSIONS (Unit: mm)

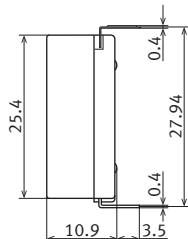
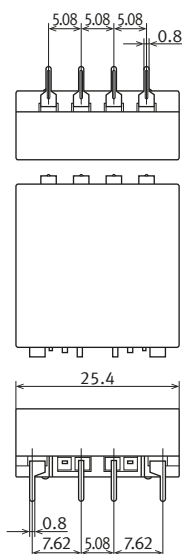
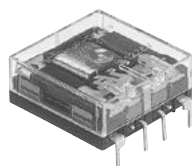
CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

■ Dust cover: Flat type

● PC board terminal: 2 Form C

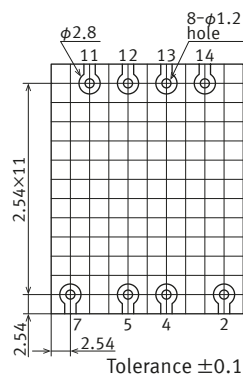
CAD

External dimensions

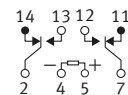


General tolerance
Less than 1mm : ± 0.2
Min. 1mm less than 3mm : ± 0.3
Min. 3mm : ± 0.5

Recommended
PC board pattern
(BOTTOM VIEW)



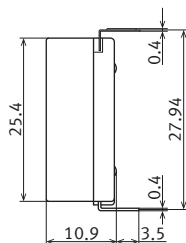
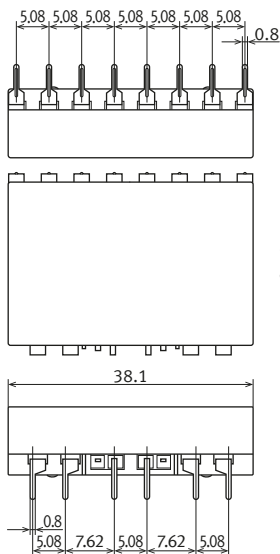
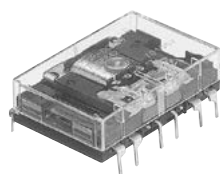
Schematic
(TOP VIEW)
(De-energize)



● PC board terminal: 4 Form C

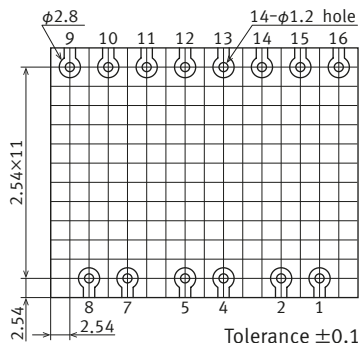
CAD

External dimensions

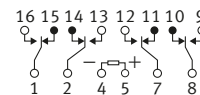


General tolerance
Less than 1mm : ± 0.2
Min. 1mm less than 3mm : ± 0.3
Min. 3mm : ± 0.5

Recommended
PC board pattern
(BOTTOM VIEW)



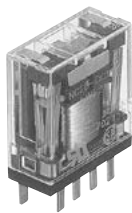
Schematic
(TOP VIEW)
(De-energize)



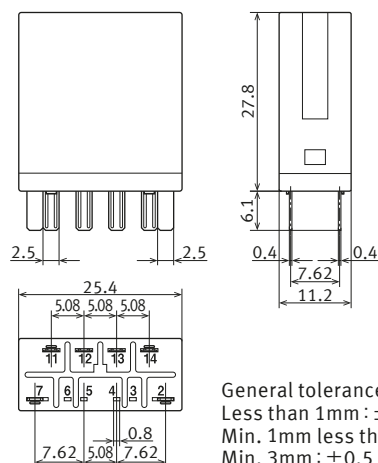
Power Relays (Over 2 A) NC RELAYS

- Dust cover: Slim type
- Plug-in terminal: 2 Form C

CAD

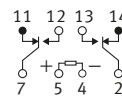


External dimensions



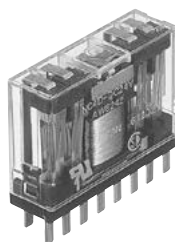
General tolerance
 Less than 1mm : ± 0.2
 Min. 1mm less than 3mm : ± 0.3
 Min. 3mm : ± 0.5

Schematic (BOTTOM VIEW) (De-energize)

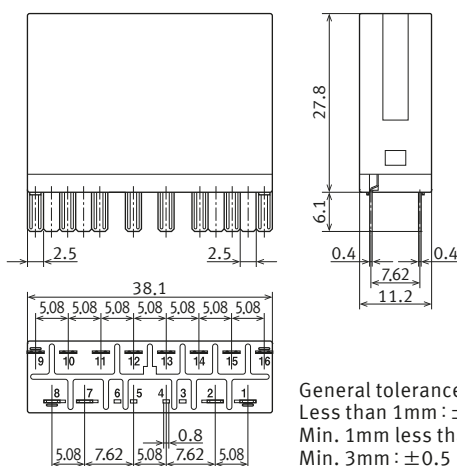


- Plug-in terminal: 4 Form C

CAD

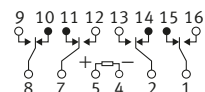


External dimensions



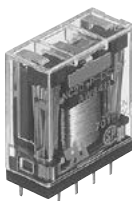
General tolerance
 Less than 1mm : ± 0.2
 Min. 1mm less than 3mm : ± 0.3
 Min. 3mm : ± 0.5

Schematic (BOTTOM VIEW) (De-energize)

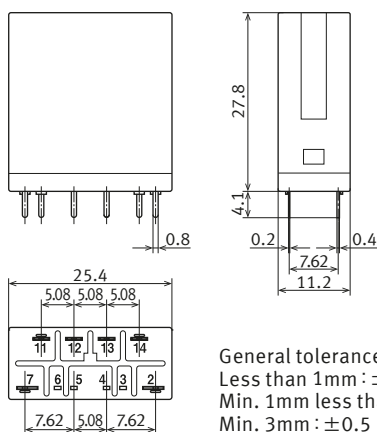


- PC board terminal: 2 Form C

CAD

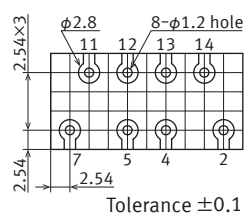


External dimensions

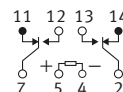


General tolerance
 Less than 1mm : ± 0.2
 Min. 1mm less than 3mm : ± 0.3
 Min. 3mm : ± 0.5

Recommended PC board pattern (BOTTOM VIEW)



Schematic (BOTTOM VIEW) (De-energize)



Power Relays (Over 2 A) NC RELAYS

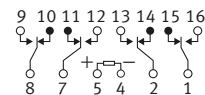
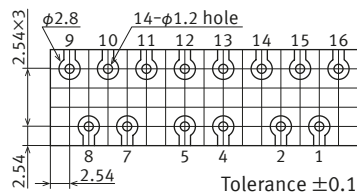
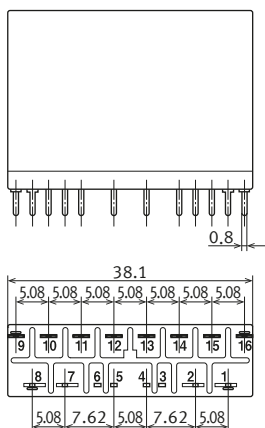
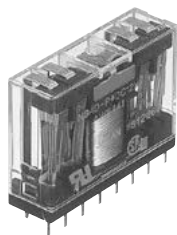
- PC board terminal: 4 Form C

CAD

External dimensions

Recommended
PC board pattern
(BOTTOM VIEW)

Schematic
(BOTTOM VIEW)
(De-energize)



General tolerance
Less than 1mm : ± 0.2
Min. 1mm less than 3mm : ± 0.3
Min. 3mm : ± 0.5

Sealed: Flat type

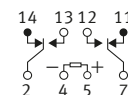
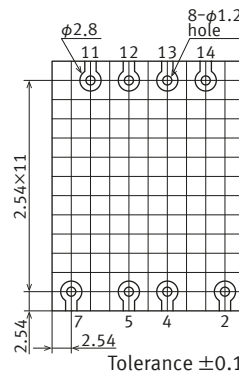
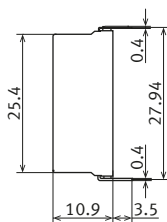
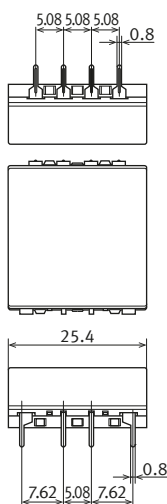
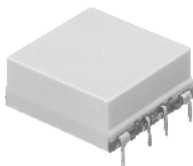
- PC board terminal: 2 Form C

CAD

External dimensions

Recommended
PC board pattern
(BOTTOM VIEW)

Schematic
(TOP VIEW)
(De-energize)



General tolerance
Less than 1mm : ± 0.2
Min. 1mm less than 3mm : ± 0.3
Min. 3mm : ± 0.5

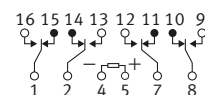
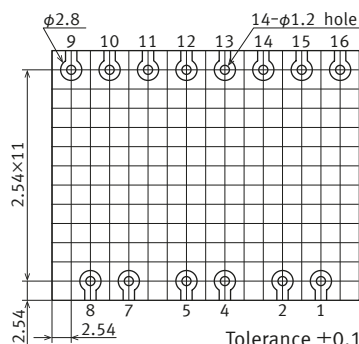
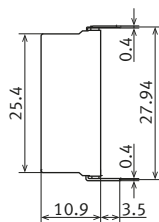
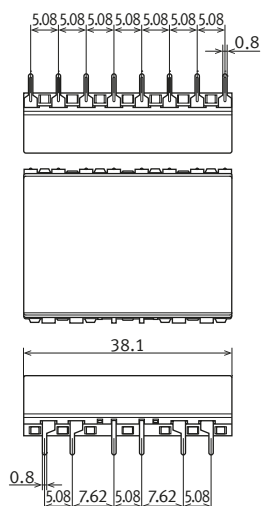
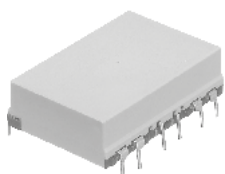
- PC board terminal: 4 Form C

CAD

External dimensions

Recommended
PC board pattern
(BOTTOM VIEW)

Schematic
(TOP VIEW)
(De-energize)

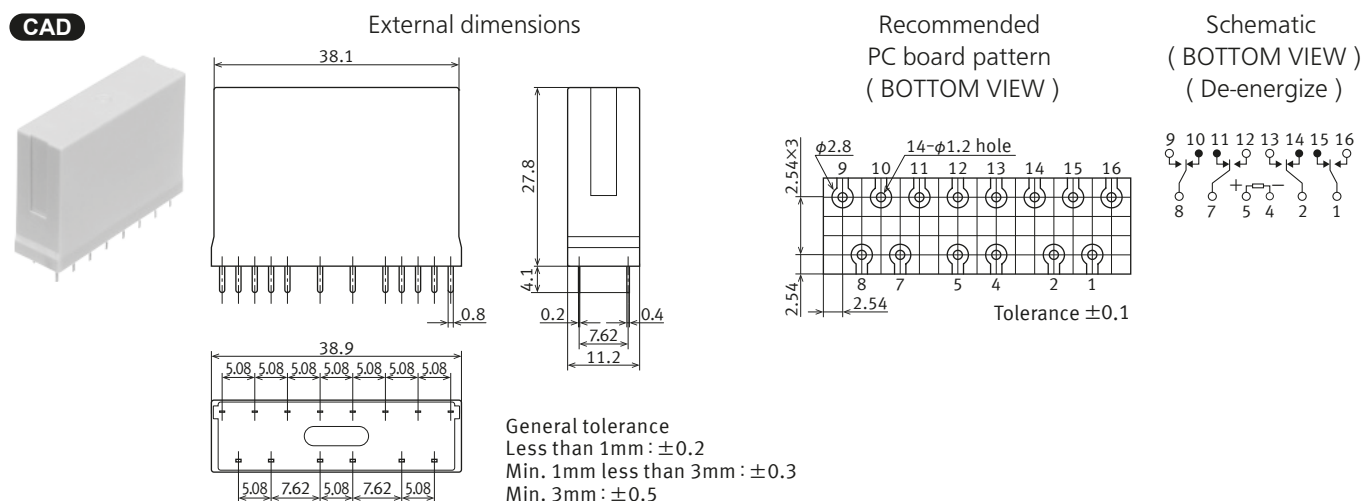


General tolerance
Less than 1mm : ± 0.2
Min. 1mm less than 3mm : ± 0.3
Min. 3mm : ± 0.5

Power Relays (Over 2 A) NC RELAYS

● PC board terminal: 4 Form C

CAD



SAFETY STANDARDS

Each standard may be updated at any time, so please check our Website for the latest information.

■ UL (Approved)

● Dust cover

2 Form C

File No.	Contact rating	Operations
E43028	5 A 250 V AC	100×10^3
	5 A 30 V DC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

4 Form C

File No.	Contact rating	Operations
E43028	5 A 30 V DC	100×10^3
	4 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

■ CSA (Approved)

● Dust cover

2 Form C

File No.	Contact rating	Operations
1440474	5 A 250 V AC	100×10^3
	5 A 30 V DC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

4 Form C

File No.	Contact rating	Operations
1440474	5 A 30 V DC	100×10^3
	4 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

● Sealed

2 Form C

File No.	Contact rating	Operations
E43028	5 A 30 V DC	100×10^3
	3 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

4 Form C

File No.	Contact rating	Operations
E43028	5 A 30 V DC	100×10^3
	2 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

● Sealed

2 Form C

File No.	Contact rating	Operations
1440474	5 A 30 V DC	100×10^3
	3 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

4 Form C

File No.	Contact rating	Operations
1440474	5 A 30 V DC	100×10^3
	2 A 250 V AC	100×10^3
	$\frac{1}{10}$ HP 125, 250 V AC	—

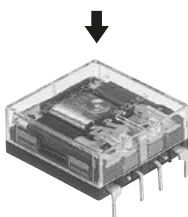
GUIDELINES FOR USAGE

- For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

■ Cautions for usage of NC relay

- Because the NC relay is polarized, the positive (+) and negative (—) connections to the coil should be done as indicated on the wiring diagram. If connected incorrectly, it may malfunction or fail to operate.
- When designing top and bottom view schematic diagrams, note that:
 - 1) " Top view " wiring diagram is indicated for the flat type because terminals can be seen from above.
 - 2) " Bottom view " schematic diagram is indicated for the slim type because terminals cannot be seen from above.
- Cautions for close proximity mounting
When using slim series in close proximity, mount all relays facing the same direction. Different mounting directions may cause change in the relay characteristics because NC relays are polarized.

TOP VIEW



Flat type

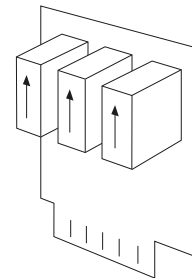
- 2) " Bottom view " schematic diagram is indicated for the slim type because terminals cannot be seen from above.

Slim type



BOTTOM VIEW

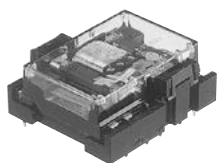
Same direction



Sockets/DIN terminal sockets



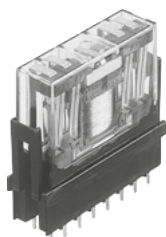
NC2 Flat type socket



NC4 Flat type socket



NC2 Slim type socket



NC4 Slim type socket

NC2
DIN terminal socket

TYPES

Type	Product name	Terminal connection method	Type No.	Part No.	Main Part No. to be installed	Standard packing	
						Inner carton	Outer carton
Flat type socket	NC2-flat type PC board socket	PC board	NC2-JPS	AW4920	AW881 series	20 pcs.	200 pcs.
	NC4-flat type PC board socket	PC board	NC4-JPS	AW4940	AW884 series		
Slim type DIN terminal socket	NC2-DIN terminal socket	DIN rail	NC2-SFD	AW4928	AW821 series	20 pcs.	100 pcs.
Slim type socket	NC2-slim type soldering socket	Solder terminal	NC2-SS	AW4922	AW821 series	20 pcs.	200 pcs.
	NC2-slim type PC board socket	PC board	NC2-PS	AW4924			
	NC2-slim type wrapping socket	Lead wire	NC2-WS	AW4926			
	NC4-slim type soldering socket	Solder terminal	NC4-SS	AW4942	AW824 series		
	NC4-slim type PC board socket	PC board	NC4-PS	AW4944			
	NC4-slim type wrapping socket	Lead wire	NC4-WS	AW4946			

RATING

Item	Specifications
Dielectric strength (initial)	Each between terminals: 2,000 Vrms for 1 min (detection current: 10 mA)
Insulation resistance (initial)	Each between terminals: Min. 100 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Max. continuous carrying current	Slim type: 5 A 250 V AC Flat type : 5 A 250 V AC
Conditions for usage, transport and storage	Ambient temperature: -50 to +50 °C (AW4924, AW4926, AW4928, AW4944, AW4946) -40 to +70 °C (AW4920, AW4922, AW4940, AW4942) Humidity: 5 to 85 % RH (Avoid icing and condensation)

Power Relays (Over 2 A) NC RELAYS

DIMENSIONS (Unit: mm)

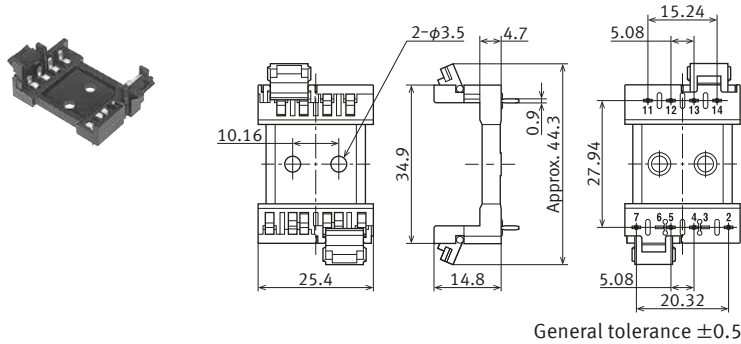
CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

■ Flat type PC board socket

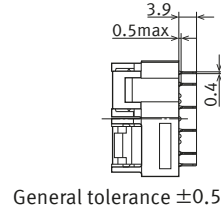
● NC2 (AW4920)

CAD

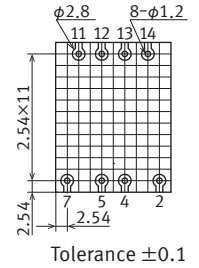
External dimensions



Terminal portion dimensions



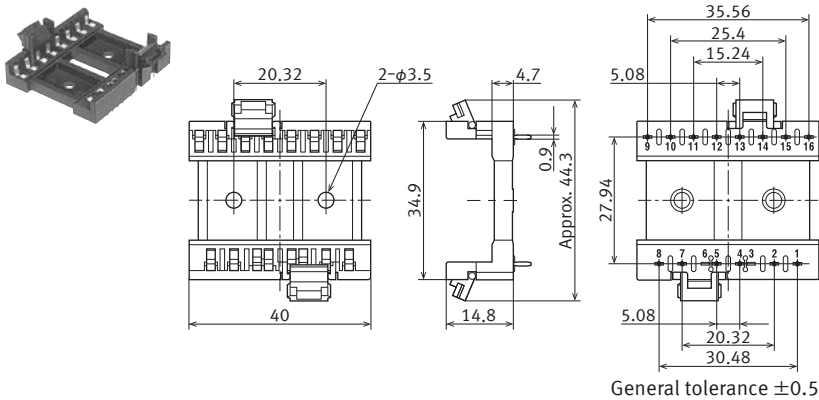
Recommended PC board pattern



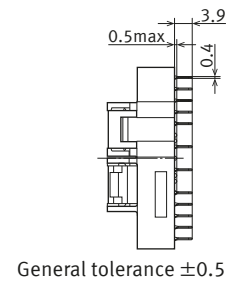
● NC4 (AW4940)

CAD

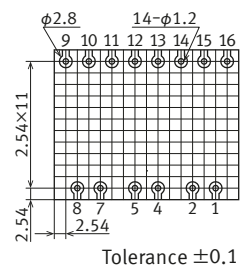
External dimensions



Terminal portion dimensions



Recommended PC board pattern

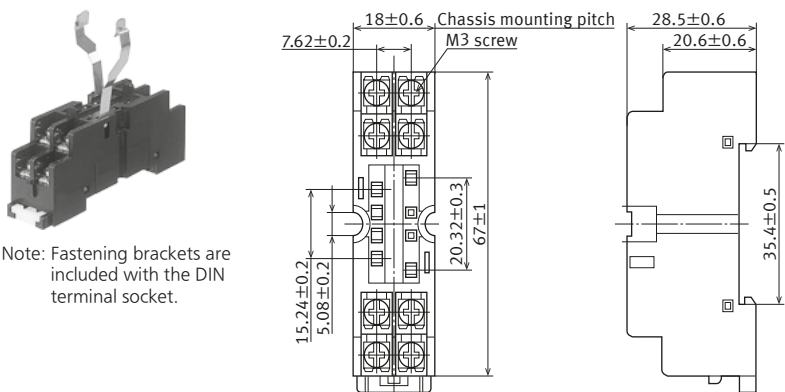


■ Slim type DIN terminal socket

● NC2 (AW4928)

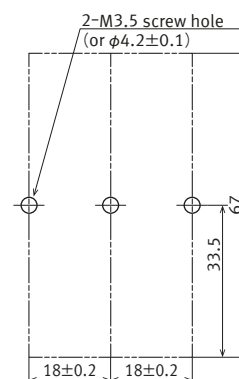
CAD

External dimensions

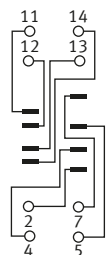


Note: Fastening brackets are included with the DIN terminal socket.

Mounting hole pattern



Schematic

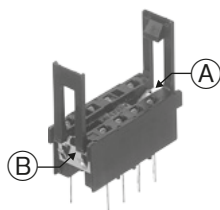


Power Relays (Over 2 A) NC RELAYS

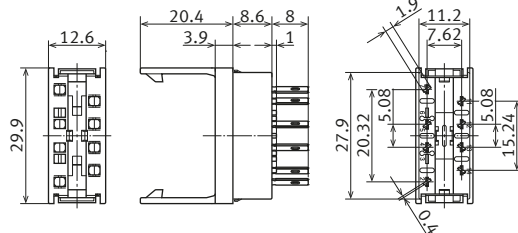
■ Slim type soldering socket

● NC2 (AW4922)

CAD

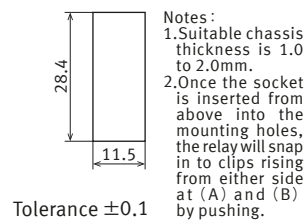


External dimensions



General tolerance ± 0.5

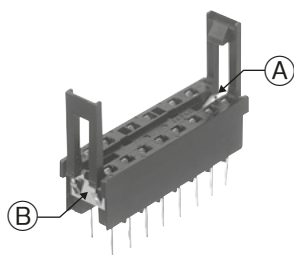
Chassis cutout



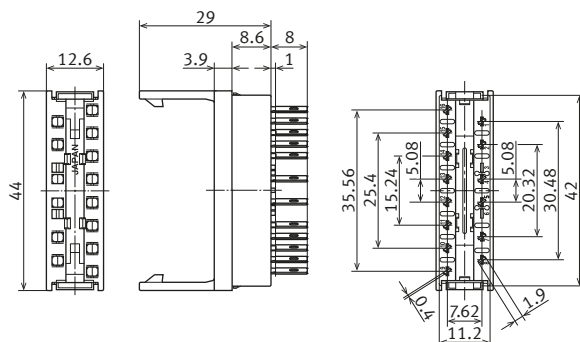
Tolerance ± 0.1

● NC4 (AW4942)

CAD

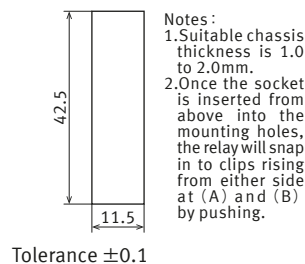


External dimensions



General tolerance ± 0.5

Chassis cutout



Tolerance ± 0.1

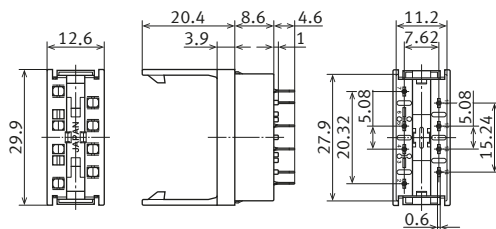
■ Slim type PC board socket

● NC2 (AW4924)

CAD

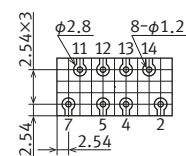


External dimensions



General tolerance ± 0.5

Recommended PC board pattern



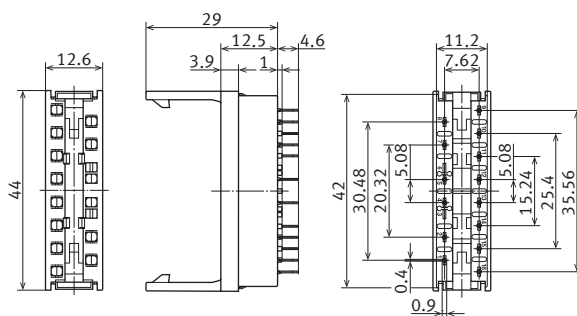
Tolerance ± 0.1

● NC4 (AW4944)

CAD

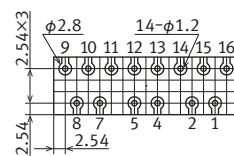


External dimensions



General tolerance ± 0.5

Recommended PC board pattern



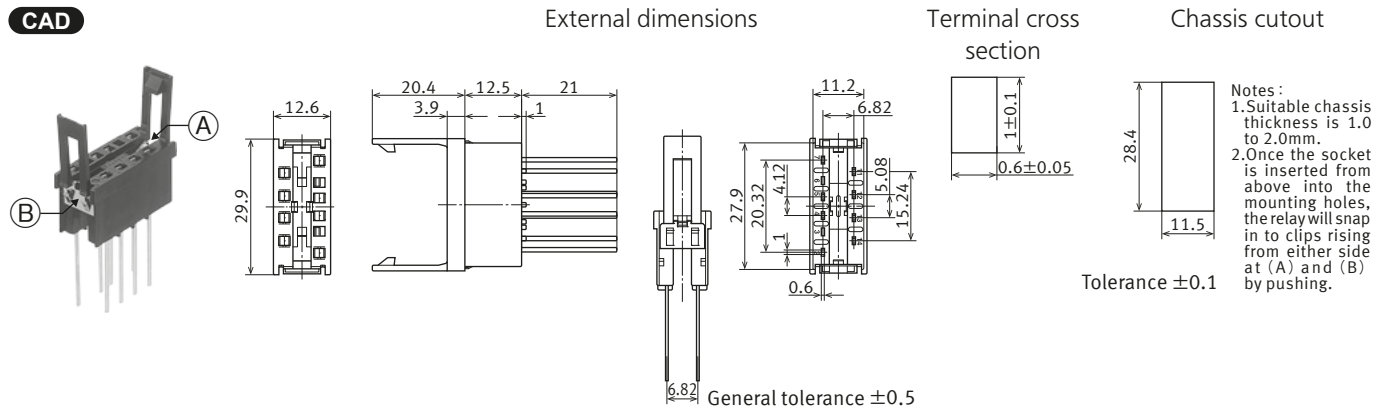
Tolerance ± 0.1

Power Relays (Over 2 A) NC RELAYS

■ Slim type wrapping socket

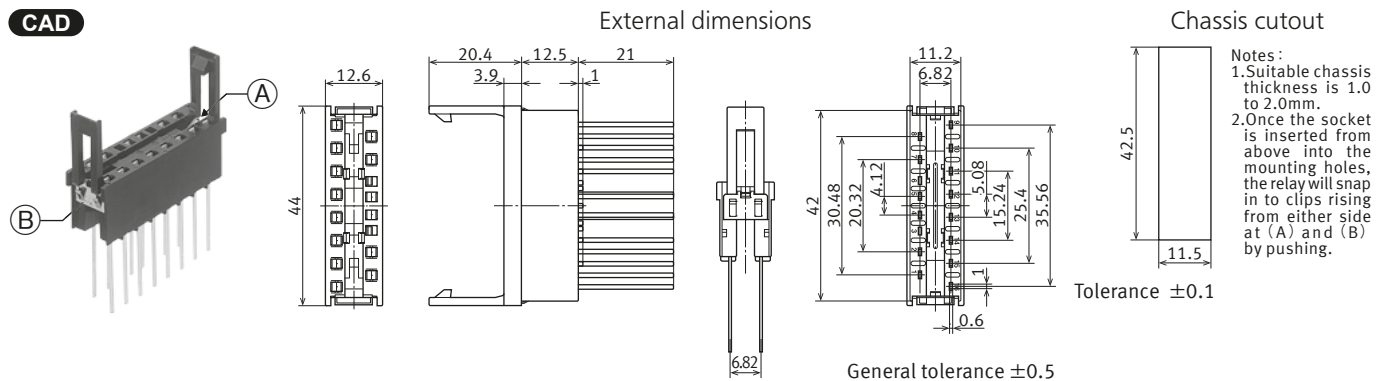
● NC2 (AW4926)

CAD



● NC4 (AW4946)

CAD

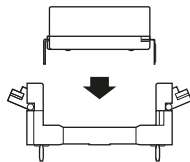


HANDLING

■ Flat type socket

● Mounting method of relay

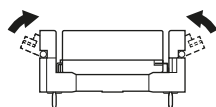
- 1) Match the direction of relay and socket.



- 2) Insert both ends of the relay firmly, all the way in.

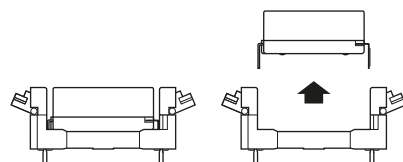


- 3) Press the hooks in the direction of the arrows to attach the relay securely.



● Removing method of relay

- 1) Pull out the relay after fully releasing both hooks.



- 2) Take care not to push or spread the hooks more than necessary when installing or removing the relay, because doing so may cause deformation which will prevent the hooks from engaging with the relay, or the hooks may break.

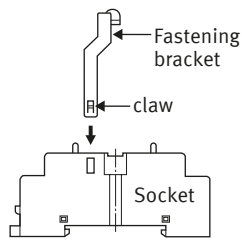
Power Relays (Over 2 A) NC RELAYS

■ Slim type DIN terminal socket

Install the fastening bracket before mounting the relay.

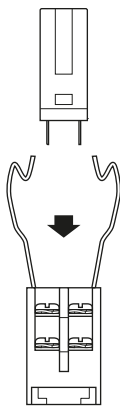
● Mounting method of fastening bracket

- Press the fastening bracket into the terminal socket until it stops and check that the claw has engaged with the terminal socket.

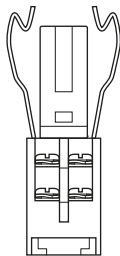


● Mounting method of relay

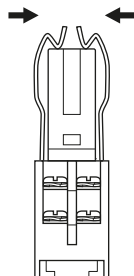
- Match the direction of relay and terminal socket.



- Insert both ends of the relay firmly, all the way in.

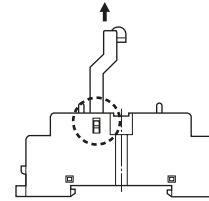


- With the included fastening bracket, securely attach the relay.



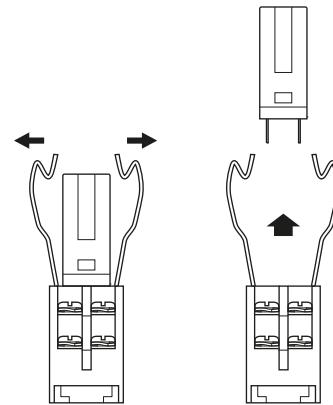
● Removing method of fastening bracket

- Pull out the fastening bracket while pressing the tab with a screwdriver or similar.



● Removing method of relay

- Pull out the relay after fully releasing fastening bracket.



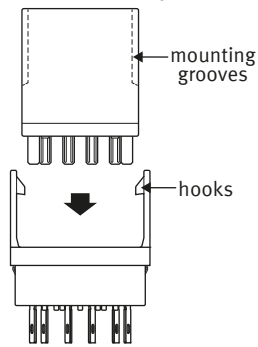
- Take care not to push or spread the hooks more than necessary when installing or removing the relay, because doing so may cause deformation which will prevent the hooks from engaging with the relay, or the hooks may break.

Power Relays (Over 2 A) NC RELAYS

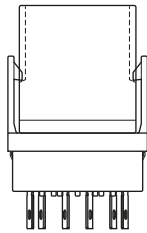
■ Slim type socket

● Mounting method of relay

- 1) Match the direction of relay and socket.

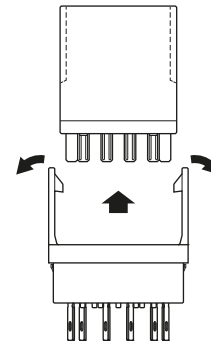


- 2) Insert both ends of the relay securely and all the way until both hooks engage with the mounting grooves.



● Removing method of relay

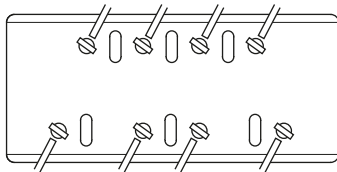
- 1) Pull out the relay while pressing and spreading the hooks.



- 2) Take care not to push or spread the hooks more than necessary when installing or removing the relay, because doing so may cause deformation which will prevent the hooks from engaging with the relay, or the hooks may break.

GUIDELINES FOR USAGE

- For solder terminal types, connect terminals as shown in the diagram to maintain insulation distance.



■ For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

Precautions for Coil Input

■ Long term current carrying

A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts) Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself. For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection.

■ DC Coil operating power

Steady state DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5 %. However, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

■ Coil connection

When connecting coils of polarized relays, please check coil polarity (+, -) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

■ Maximum allowable voltage and temperature rise

Proper usage requires that the rated coil voltage be impressed on the coil. Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise. Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

● Operate voltage change due to coil temperature rise

In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the operate voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere. The resistance/temperature relationship for copper wire is about 0.4 % for 1 °C, and with this ratio the coil resistance increases. That is, in order to operate of the relay, it is necessary that the voltage be higher than the operate voltage and the operate voltage rises in accordance with the increase in the resistance value. However, for some polarized relays, this rate of change is considerably smaller.

Ambient Environment

■ Usage, Transport, and Storage Conditions

During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

●Temperature/Humidity/Pressure

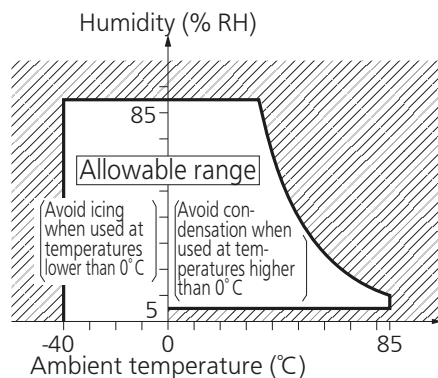
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications.

Also allowable humidity level is influenced by temperature, please check charts shown below and use relays within mentioned conditions. (Allowable temperature values differ for each relays, please refer to the relay's individual specifications.)

1) Temperature:

The tolerance temperature range differs for each relays, please refer to the relay's individual specifications

2) Humidity: 5 to 85 % RH



3) Pressure: 86 to 106 kPa

●Dew condensation

Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc.

Panasonic Industry Co., Ltd. does not guarantee the failures caused by condensation.

The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur.

Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

●Icing

Condensation or other moisture may freeze on relays when the temperature become lower than 0 °C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Industry Co., Ltd. does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur.

Please conduct product evaluations in the worst condition of the actual usage.

●Low temperature and low humidity

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

●High temperature and high humidity

Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

●Package

In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

●Silicon

When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.

This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic sealed types).

●NOx Generation

When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid.

This corrodes the internal metal parts and adversely affects operation.

Avoid use at an ambient humidity of 85 % RH or higher (at 20 °C). If use at high humidity is unavoidable, please contact our sales representative.

Others

■ Cleaning

- Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
- Cleaning with the boiling method is recommended (The temperature of cleaning liquid should be 40 °C or lower). Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

Please refer to "**the latest product specifications**" when designing your product.

- Requests to customers:

<https://industrial.panasonic.com/ac/e/salespolicies/>

■ Global Sales Network Information: industrial.panasonic.com/ac/e/salesnetwork

Panasonic
INDUSTRY

Panasonic Industry Co., Ltd.

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

Power Relays (Over 2 A)
S RELAYS

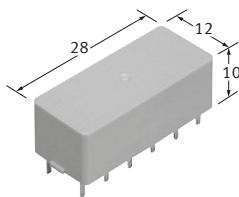
Product Catalog

**IN Your
Future**

S RELAYS

2 Form A 2 Form B/3 Form A 1 Form B/4 Form A /4 A Polarized power relays

Protective construction : Sealed type



(Unit : mm)

FEATURES

- Four-pole, multi-contact arrangement (2 Form A 2 Form B, 3 Form A 1 Form B, 4 Form A)
- Low thermal electromotive force: Approx. 3 μ V
- Twin (bifurcated) contacts
- Latching types available
- PC board sockets are available

TYPICAL APPLICATIONS

- Measuring equipment

4-GAP BALANCED ARMATURE MECHANISM

■ Balanced armature mechanism has excellent resistance to vibration and shock

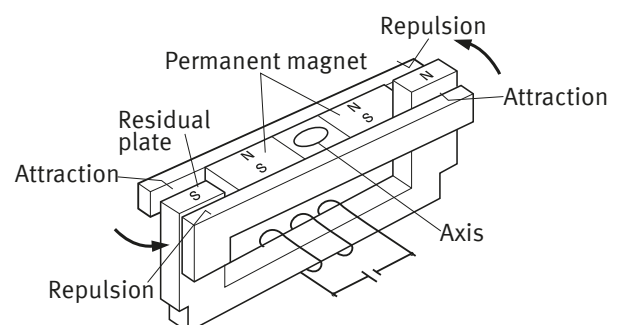
The armature structure enables free rotation around the armature center of gravity. Because the mass is maintained in balance at the fulcrum of the axis of rotation, large rotational forces do not occur even if acceleration is applied along any vector. The mechanism has proven to have excellent resistance to vibration and shock. All our S relays are based on this balanced armature mechanism, which is able to further provide many other characteristics.

■ High sensitivity and reliability provided by 4-gap balanced armature mechanism

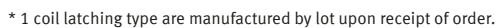
As a (polarized) balanced armature, the S relay armature itself has two permanent magnets. Presenting four interfaces, the armature has a 4-gap structure. As a result, the rotational axis at either end of the armature is symmetrical and, in an energized into a polarized state, the twin magnetic armature interfaces are subject to repulsion on one side and attraction on the other. Our original mechanism provides a highly efficient polarized magnetic circuit structure that is both highly sensitive and has a small form factor. Moreover, suitability for provision with many types of contact array and other advantages promise to make it possible to provide many of the various characteristics that are coming to be demanded of relays.

HOW IT WORKS (single side stable type)

- 1) When current is passed through the coil, the yoke becomes magnetic and polarized.
- 2) At either pole of the armature, repulsion on one side and attraction on the other side is caused by the interaction of the poles and the permanent magnets of the armature.
- 3) At this time, opening and closing operates owing to the action of the simultaneously molded balanced armature mechanism, so that when the force of the contact breaker spring closes the contact on one side, on the other side, the balanced armature opens the contact (2 Form A 2 Form B) .



ORDERING INFORMATION (PART NO. : Ordering part number for Japanese market)



ORDERING INFORMATION (TYPE NO. : Ordering part number for non Japanese market)



TYPES

"Type No. " is ordering part number for non Japanese market. "Part No. " is ordering part number for Japanese market.

Contact arrangement	Rated coil voltage	Single side stable		2 coil latching		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
2 Form A 2 Form B	3 V DC	S2EB-3V	AG302160	S2EB-L2-3V	AG322160	50 pcs.	500 pcs.
	5 V DC	S2EB-5V	AG302960	S2EB-L2-5V	AG322960		
	6 V DC	S2EB-6V	AG302260	S2EB-L2-6V	AG322260		
	12 V DC	S2EB-12V	AG302360	S2EB-L2-12V	AG322360		
	24 V DC	S2EB-24V	AG302460	S2EB-L2-24V	AG322460		
	48 V DC	S2EB-48V	AG302760	S2EB-L2-48V	AG322760		
3 Form A 1 Form B	3 V DC	S3EB-3V	AG303160	S3EB-L2-3V	AG323160		
	5 V DC	S3EB-5V	AG303960	S3EB-L2-5V	AG323960		
	6 V DC	S3EB-6V	AG303260	S3EB-L2-6V	AG323260		
	12 V DC	S3EB-12V	AG303360	S3EB-L2-12V	AG323360		
	24 V DC	S3EB-24V	AG303460	S3EB-L2-24V	AG323460		
	48 V DC	S3EB-48V	AG303760	S3EB-L2-48V	AG323760		
4 Form A	3 V DC	S4EB-3V	AG304160	S4EB-L2-3V	AG324160		
	5 V DC	S4EB-5V	AG304960	S4EB-L2-5V	AG324960		
	6 V DC	S4EB-6V	AG304260	S4EB-L2-6V	AG324260		
	12 V DC	S4EB-12V	AG304360	S4EB-L2-12V	AG324360		
	24 V DC	S4EB-24V	AG304460	S4EB-L2-24V	AG324460		
	48 V DC	S4EB-48V	AG304760	S4EB-L2-48V	AG324760		

For the sockets, please refer to the "PC board sockets".

Power Relays (Over 2 A) S RELAYS

RATING

Coil data

- Operating characteristics such as " Operate voltage " and " Release voltage " are influenced by mounting conditions or ambient temperature, etc.
Therefore, please use the relay within $\pm 5\%$ of rated coil voltage.
- " Initial " means the condition of products at the time of delivery.

Single side stable

Rated coil voltage	Operate voltage* (at 20 °C)	Release voltage* (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)	Coil resistance ($\pm 10\%$, at 20 °C)	Rated operating power	Max. allowable voltage (at 40 °C)
3 V DC	Max. 70 % V of rated coil voltage (Initial)	Min. 10 % V of rated coil voltage (Initial)	66.7 mA	45 Ω	200 mW	180 % V of rated coil voltage
5 V DC			38.5 mA	130 Ω	192 mW	
6 V DC			33.3 mA	180 Ω	200 mW	
12 V DC			16.7 mA	720 Ω	200 mW	
24 V DC			8.4 mA	2,850 Ω	202 mW	
48 V DC			5.6 mA	8,500 Ω	271 mW	156 % V of rated coil voltage

* Square, pulse drive

2 coil latching

Rated coil voltage	Set voltage* (at 20 °C)	Reset voltage* (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)		Coil resistance ($\pm 10\%$, at 20 °C)		Rated operating power		Max. allowable voltage (at 40 °C)
			Set coil	Reset coil	Set coil	Reset coil	Set coil	Reset coil	
3 V DC	Max. 70 % V of rated coil voltage (Initial)	Max. 70 % V of rated coil voltage (Initial)	66.7 mA	66.7 mA	45 Ω	45 Ω	200 mW	200 mW	180 % V of rated coil voltage
5 V DC			38.5 mA	38.5 mA	130 Ω	130 Ω	192 mW	192 mW	
6 V DC			33.3 mA	33.3 mA	180 Ω	180 Ω	200 mW	200 mW	
12 V DC			16.7 mA	16.7 mA	720 Ω	720 Ω	200 mW	200 mW	
24 V DC			8.4 mA	8.4 mA	2,850 Ω	2,850 Ω	202 mW	202 mW	
48 V DC			7.4 mA	7.4 mA	6,500 Ω	6,500 Ω	355 mW	355 mW	135 % V of rated coil voltage

* Square, pulse drive

Specifications

Item		Specifications
Contact data	Contact arrangement	2 Form A 2 Form B, 3 Form A 1 Form B, 4 Form A
	Contact resistance (initial)	Max. 50 m Ω (by voltage drop 6 V DC 1 A)
	Contact material	AgNi-AgSnO ₂ type, Au clad on double-layer contact
	Contact rating (resistive)	4 A 250 V AC, 3 A 30 V DC
	Max. switching power (resistive)	1,000 VA, 90 W
	Max. switching voltage	250 V AC, 48 V DC
	Max. switching current	4 A (AC) , 3 A (DC) (30 to 48 V DC at less than 0.5 A)
	Min. switching load (reference value) * ¹	100 μ A 100 mV DC
Insulation resistance (initial)		10,000 M Ω (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Dielectric strength (initial)	Between open contacts	750 V rms for 1 min (detection current: 10 mA)
	Between contact sets	1,000 V rms for 1 min (detection current: 10 mA)
	Between contact and coil	1,500 V rms for 1 min (detection current: 10 mA)
Time characteristics (initial)	Operate (Set) time	Max. 15 ms (Max. 15 ms) at rated coil voltage (at 20 °C, without bounce)
	Release (Reset) time	Max. 10 ms (Max. 15 ms) at rated coil voltage (at 20 °C, without bounce, without diode)
Shock resistance	Functional	490 m/s ² (half-sine shock pulse: 11 ms, detection time: 10 μ s)
	Destructive	980 m/s ² (half-sine shock pulse: 6 ms)
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 3 mm, detection time: 10 μ s)
	Destructive	10 to 55 Hz (at double amplitude of 4 mm)
Expected life	Mechanical life	Min. 100 $\times$ 10 ⁶ ope. (switching frequency: at 50 times/min)
Conditions	Conditions for usage, transport and storage* ²	Ambient temperature: -55 to +65 °C, Humidity: 5 to 85 % RH (Avoid icing and condensation)
Unit weight		Approx. 8 g

*1: This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2: For ambient temperature, please read " GUIDELINES FOR RELAY USAGE ".

Power Relays (Over 2 A) S RELAYS

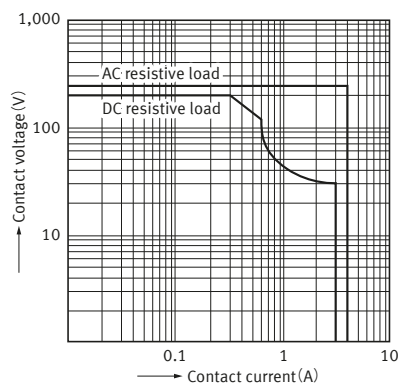
Expected electrical life

Conditions: Resistive load, switching frequency at 20 times/min

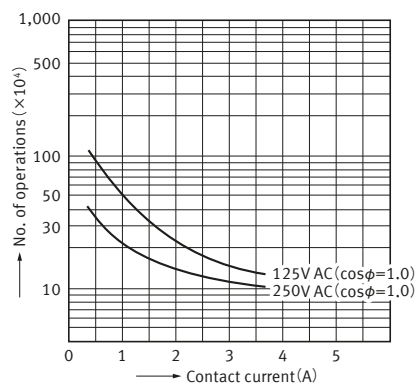
Type	Switching capacity	Number of operations
2 Form A 2 Form B, 3 Form A 1 Form B, 4 Form A	3 A 30 V DC	Min. 200×10^3 ope.
	4 A 250 V AC	Min. 100×10^3 ope.

REFERENCE DATA

1. Max. switching capacity

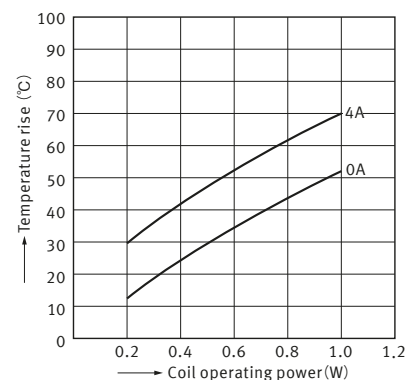


2. Switching life curve



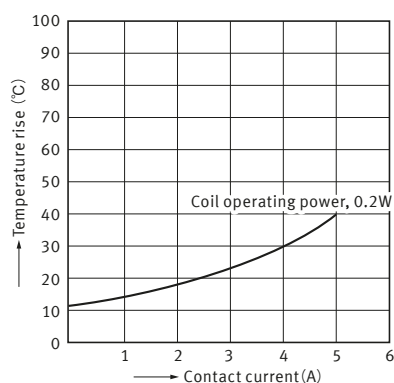
3-1. Coil temperature characteristics

Tested sample : S4EB-24V, 4 Form A



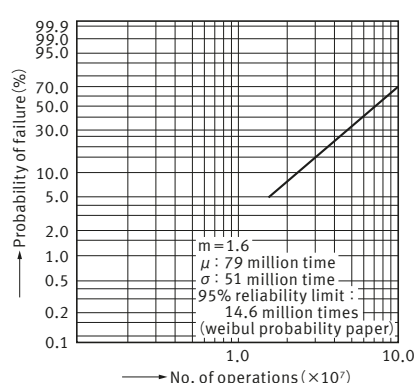
3-2. Coil temperature characteristics

Tested sample : S4EB-24V, 4 Form A



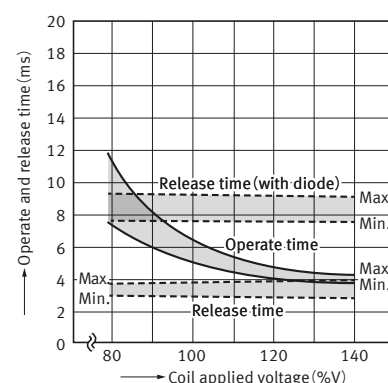
4. Contact reliability test

Tested sample : S4EB-24V, 10pcs.
Condition : 1V DC, 1mA
Detection level : 10Ω

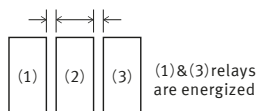


5. Operate and release time (Single side stable)

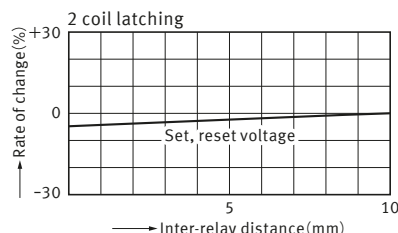
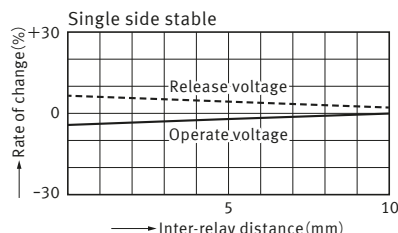
Tested sample : S4EB-24V, 10pcs.



6. Influence of proximity mounting

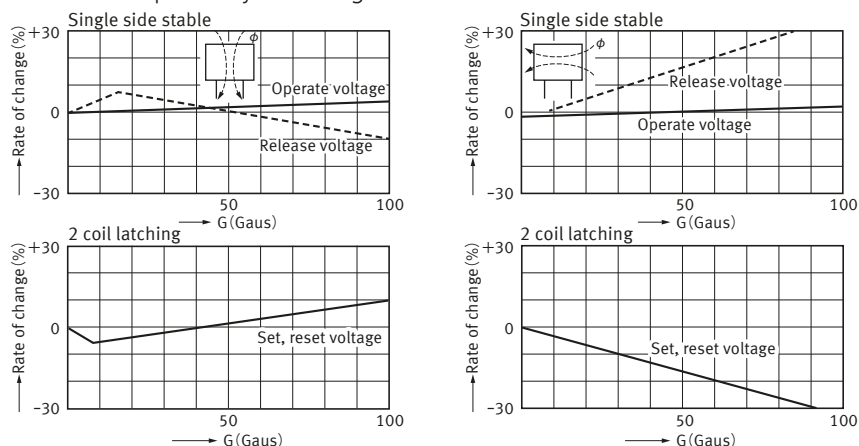


Note: When installing an S-relay near another, and there is no effect from an external magnetic field, be sure to leave at least 10mm between relays in order to achieve the performance listed in the catalog.



Power Relays (Over 2 A) S RELAYS

7. Influence of proximity mounting

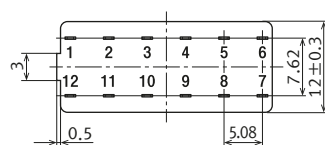
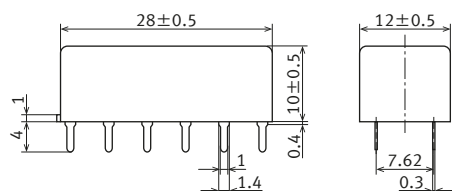
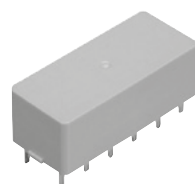


DIMENSIONS (Unit: mm)

CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

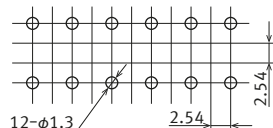
CAD

External dimensions



General tolerance ± 0.3

Recommended PC board pattern

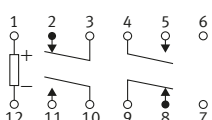


Tolerance ± 0.1

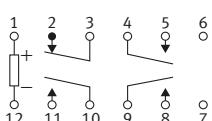
Schematic (BOTTOM VIEW)

Single side stable (De-energize)

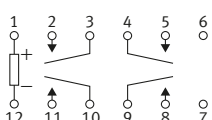
2 Form A 2 Form B



3 Form A 1 Form B

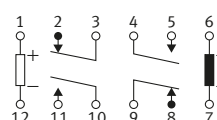


4 Form A

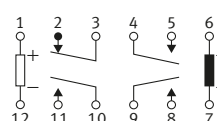


2 coil latching (Reset)

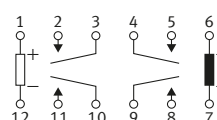
2 Form A 2 Form B



3 Form A 1 Form B



4 Form A



SAFETY STANDARDS

Each standard may be updated at any time, so please check our Website for the latest information.

UL (Approved)

File No.	Contact rating
E43028	4 A 250 V AC
	3 A 30 V DC
	$\frac{1}{20}$ HP 125 V AC (FLA 1.5 A)
	$\frac{1}{20}$ HP 250 V AC (FLA 0.75 A)

CSA (Approved)

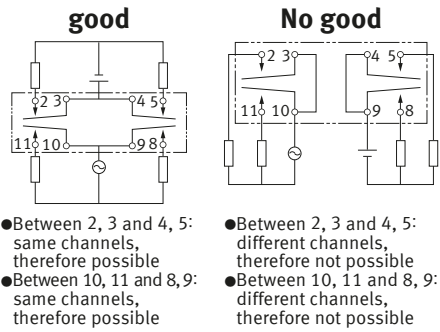
File No.	Contact rating
2367221	4 A 250 V AC
	3 A 30 V DC
	$\frac{1}{20}$ HP 125 V AC
	$\frac{1}{20}$ HP 250 V AC

GUIDELINES FOR USAGE

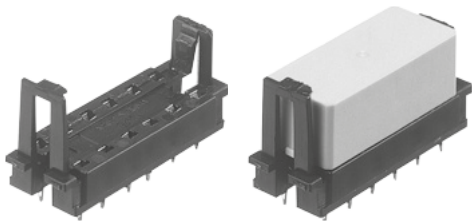
■ For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

■ Cautions for usage of S relays

- Based on regulations regarding insulation distance, there is a restriction on same-channel load connections between terminals No. 2, 3 and 4, 5, as well as between No. 8, 9 and 10, 11.
- Please note that when this relay (2 Form A 2 Form B type, 3 Form A 1 Form B type) operates and releases, N.O. and N.C. may go ON at the same time
- If using under conditions in which the relay will be continually powered, we recommend the latching type.



PC board socket



TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
PC board socket	S - PS	AG3801	50 pcs.	500 pcs.

RATING

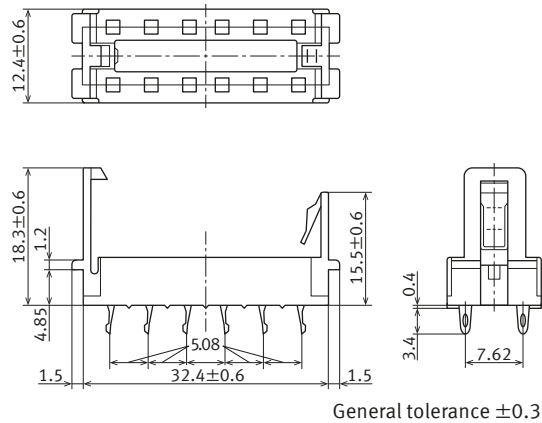
Item	Specifications
Dielectric strength (initial)	Each between terminals: 1,500 V rms for 1 min (detection current: 10 mA)
Insulation resistance (initial)	Each between terminals: Min. 100 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Maximum carrying current	4 A
Conditions for usage, transport and storage	Ambient temperature: -40 to +65 °C Humidity: 5 to 85 % RH (Avoid icing and condensation)

DIMENSIONS (Unit: mm)

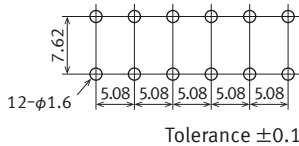
CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

CAD

External dimensions



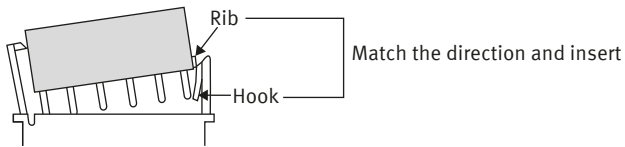
Recommended PC board pattern



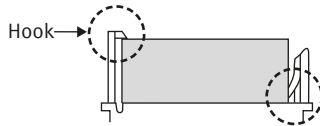
HANDLING

■ Mounting method of relay

- 1) Match the direction of relay and socket.

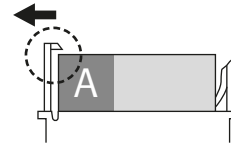


- 2) Insert both ends of the relay securely all the way until both hooks engage.

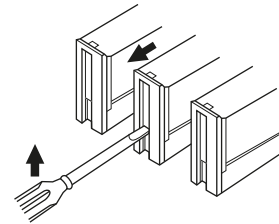


■ Removing method of relay

- 1) Remove the relay, applying force in the direction.
(Use your fingers to grab section A and remove the relay.)



- 2) In case there is not enough space to grasp relay with fingers, use screwdrivers in the way as shown in the figure.



- 3) Exercise care when removing relays. If greater than necessary force is applied at the socket hooks, deformation may alter the dimensions so that the hook will no longer catch, and other damage may also occur.

■ For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

Precautions for Coil Input

■ Long term current carrying

A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts) Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself. For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection.

■ DC Coil operating power

Steady state DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5 %. However, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

■ Coil connection

When connecting coils of polarized relays, please check coil polarity (+ , -) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

■ Maximum allowable voltage and temperature rise

Proper usage requires that the rated coil voltage be impressed on the coil. Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise. Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

● Operate voltage change due to coil temperature rise

In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the operate voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere. The resistance/temperature relationship for copper wire is about 0.4 % for 1 °C, and with this ratio the coil resistance increases. That is, in order to operate of the relay, it is necessary that the voltage be higher than the operate voltage and the operate voltage rises in accordance with the increase in the resistance value. However, for some polarized relays, this rate of change is considerably smaller.

Ambient Environment

■ Usage, Transport, and Storage Conditions

During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

●Temperature/Humidity/Pressure

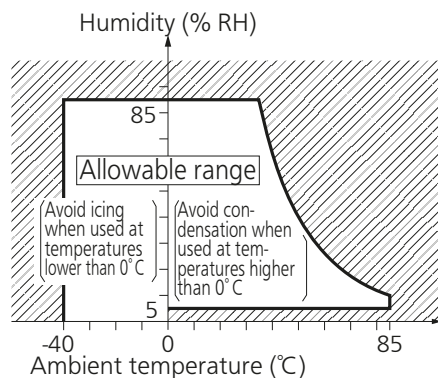
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications.

Also allowable humidity level is influenced by temperature, please check charts shown below and use relays within mentioned conditions. (Allowable temperature values differ for each relays, please refer to the relay's individual specifications.)

1) Temperature:

The tolerance temperature range differs for each relays, please refer to the relay's individual specifications

2) Humidity: 5 to 85 % RH



3) Pressure: 86 to 106 kPa

●Dew condensation

Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity.

Condensation causes the failures like insulation deterioration, wire disconnection and rust etc.

Panasonic Industry Co., Ltd. does not guarantee the failures caused by condensation.

The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur.

Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

●Icing

Condensation or other moisture may freeze on relays when the temperature become lower than 0 °C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Industry Co., Ltd. does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur.

Please conduct product evaluations in the worst condition of the actual usage.

●Low temperature and low humidity

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

●High temperature and high humidity

Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

●Package

In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

●Silicon

When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.

This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic sealed types).

●NOx Generation

When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid.

This corrodes the internal metal parts and adversely affects operation.

Avoid use at an ambient humidity of 85 % RH or higher (at 20 °C). If use at high humidity is unavoidable, please contact our sales representative.

Others

■ Cleaning

- Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
- Cleaning with the boiling method is recommended (The temperature of cleaning liquid should be 40 °C or lower). Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

Please refer to "**the latest product specifications**" when designing your product.

- Requests to customers:

<https://industrial.panasonic.com/ac/e/salespolicies/>

■ Global Sales Network Information: industrial.panasonic.com/ac/e/salesnetwork

Panasonic
INDUSTRY

Panasonic Industry Co., Ltd.

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

Power Relays (Over 2 A)
ST RELAYS

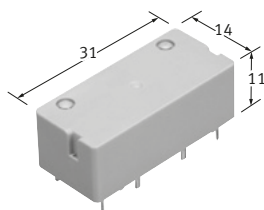
Product Catalog

**IN Your
Future**

ST RELAYS

1 Form A 1 Form B/2 Form A, 8 A, Polarized power relays

Protective construction : Sealed type



(Unit : mm)

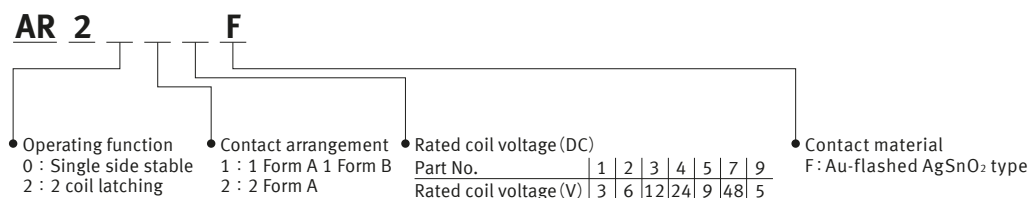
FEATURES

- 8 A, Multi-channel, 1 Form A 1 Form B/ 2 Form A contact relay
- Dielectric strength: 3,750 V rms
Surge withstand voltage: 6,000 V
- Sockets for PC board and soldering are available
- Latching types available

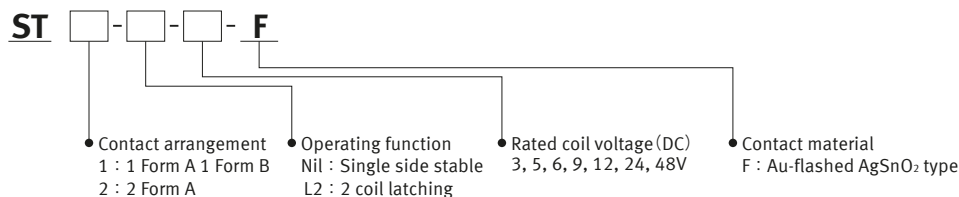
TYPICAL APPLICATIONS

- Electric power equipment
- Industrial machines

ORDERING INFORMATION (PART NO. : Ordering part number for Japanese market)



ORDERING INFORMATION (TYPE NO. : Ordering part number for non Japanese market)



Power Relays (Over 2 A) ST RELAYS

TYPES

" Type No. " is ordering part number for non Japanese market. " Part No. " is ordering part number for Japanese market.

Contact arrangement	Rated coil voltage	Single side stable		2 coil latching		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A 1 Form B	3 V DC	ST1-DC3V-F	AR2011F	ST1-L2-DC3V-F	AR2211F	50 pcs.	500 pcs.
	5 V DC	ST1-DC5V-F	AR2019F	ST1-L2-DC5V-F	AR2219F		
	6 V DC	ST1-DC6V-F	AR2012F	ST1-L2-DC6V-F	AR2212F		
	9 V DC	ST1-DC9V-F	AR2015F	ST1-L2-DC9V-F	AR2215F		
	12 V DC	ST1-DC12V-F	AR2013F	ST1-L2-DC12V-F	AR2213F		
	24 V DC	ST1-DC24V-F	AR2014F	ST1-L2-DC24V-F	AR2214F		
	48 V DC	ST1-DC48V-F	AR2017F	ST1-L2-DC48V-F	AR2217F		
2 Form A	3 V DC	ST2-DC3V-F	AR2021F	ST2-L2-DC3V-F	AR2221F		
	5 V DC	ST2-DC5V-F	AR2029F	ST2-L2-DC5V-F	AR2229F		
	6 V DC	ST2-DC6V-F	AR2022F	ST2-L2-DC6V-F	AR2222F		
	9 V DC	ST2-DC9V-F	AR2025F	ST2-L2-DC9V-F	AR2225F		
	12 V DC	ST2-DC12V-F	AR2023F	ST2-L2-DC12V-F	AR2223F		
	24 V DC	ST2-DC24V-F	AR2024F	ST2-L2-DC24V-F	AR2224F		
	48 V DC	ST2-DC48V-F	AR2027F	ST2-L2-DC48V-F	AR2227F		

For the sockets, please refer to the " PC board socket/Soldering socket ".

RATING

Coil data

- Operating characteristics such as " Operate voltage " and " Release voltage " are influenced by mounting conditions or ambient temperature, etc.
Therefore, please use the relay within $\pm 5\%$ of rated coil voltage.
- " Initial " means the condition of products at the time of delivery.

Single side stable

Rated coil voltage	Operate voltage* (at 20 °C)	Release voltage* (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)	Coil resistance ($\pm 10\%$, at 20 °C)	Rated operating power	Max. allowable voltage (at 20 °C)
3 V DC	Max. 80 % V of rated coil voltage (Initial)	Min. 10 % V of rated coil voltage (Initial)	78.9 mA	38 Ω	Approx. 240 mW	150 % V of rated coil voltage
5 V DC			47.6 mA	105 Ω		
6 V DC			40 mA	150 Ω		
9 V DC			25 mA	360 Ω		
12 V DC			20 mA	600 Ω		
24 V DC			10 mA	2,400 Ω		
48 V DC			5.3 mA	9,000 Ω		

* Square, pulse drive

2 coil latching

Rated coil voltage	Set voltage* (at 20 °C)	Reset voltage* (at 20 °C)	Rated operating current ($\pm 10\%$, at 20 °C)		Coil resistance ($\pm 10\%$, at 20 °C)		Rated operating power		Max. allowable voltage (at 20 °C)
			Set coil	Reset coil	Set coil	Reset coil	Set coil	Reset coil	
3 V DC	Max. 80 % V of rated coil voltage (Initial)	Max. 80 % V of rated coil voltage (Initial)	75 mA	75 mA	40 Ω	40 Ω	Approx. 240 mW	Approx. 240 mW	150 % V of rated coil voltage
5 V DC			45 mA	45 mA	110 Ω	110 Ω			
6 V DC			37.5 mA	37.5 mA	155 Ω	155 Ω			
9 V DC			25 mA	25 mA	360 Ω	360 Ω			
12 V DC			18.8 mA	18.8 mA	640 Ω	640 Ω			
24 V DC			10 mA	10 mA	2,400 Ω	2,400 Ω			
48 V DC			4.7 mA	4.7 mA	10,200 Ω	10,200 Ω			

* Square, pulse drive

Power Relays (Over 2 A) ST RELAYS

Specifications

Item		Specifications
Contact data	Contact arrangement	1 Form A 1 Form B, 2 Form A
	Contact resistance (initial)	Max. 30 mΩ (by voltage drop 6 V DC 1 A)
	Contact material	Au-flashed AgSnO ₂ type
	Contact rating (resistive)	8 A 250 V AC, 5 A 30 V DC
	Max. switching power (resistive)	2,000 VA, 150 W
	Max. switching voltage	250 V AC, 30 V DC
	Max. switching current	8 A (AC) , 5 A (DC)
	Min. switching load (reference value) *1	100 mA 5 V DC
Insulation resistance (initial)		Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Dielectric strength (initial)	Between open contacts	1,200 V rms for 1 min (detection current: 10 mA)
	Between contact sets	2,000 V rms for 1 min (detection current: 10 mA)
	Between contact and coil	3,750 V rms for 1 min (detection current: 10 mA)
Surge withstand voltage (initial) *2	Between contact and coil	6,000 V
Time characteristics (initial)	Operate (Set) time	Max. 15 ms (Max. 15 ms) at rated coil voltage (at 20 °C, without bounce)
	Release (Reset) time	Max. 10 ms (Max. 15 ms) at rated coil voltage (at 20 °C, without bounce, without diode)
Shock resistance	Functional	196 m/s ² (half-sine shock pulse: 11 ms, detection time: 10 μs)
	Destructive	980 m/s ² (half-sine shock pulse: 6 ms)
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 2 mm, detection time: 10 μs)
	Destructive	10 to 55 Hz (at double amplitude of 3 mm)
Expected life	Mechanical life	Min. 10 × 10 ⁶ ope. (switching frequency: at 180 times/min)
Conditions	Conditions for usage, transport and storage*2	Ambient temperature: -40 to +60 °C, Humidity: 5 to 85 % RH (Avoid icing and condensation)
Unit weight		Approx. 10 g

*1: This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2: Wave is standard shock voltage of $\pm 1.2 \times 50 \mu s$ according to JEC-212-1981

*3: For ambient temperature, please read " GUIDELINES FOR RELAY USAGE ".

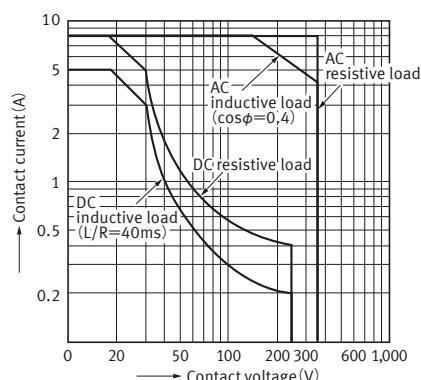
Expected electrical life

Conditions: Resistive load, switching frequency ON : OFF = 1 s : 5 s

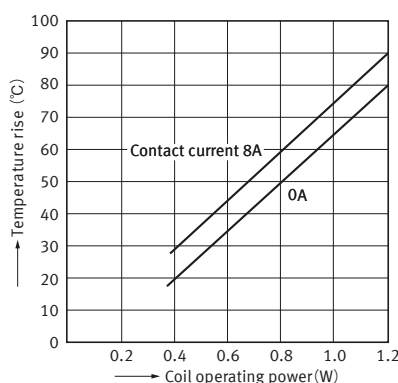
Type	Switching capacity	Number of operations
1 Form A 1 Form B, 2 Form A	8 A 250 V AC	Min. 100 × 10 ³ ope.

REFERENCE DATA

1. Max. switching capacity



2. Coil temperature characteristics

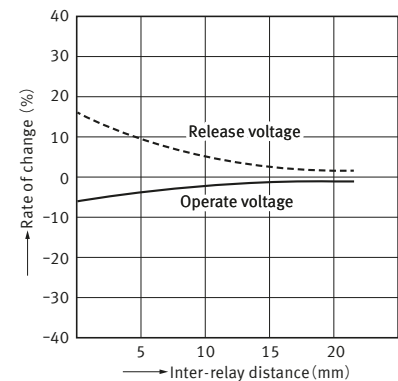
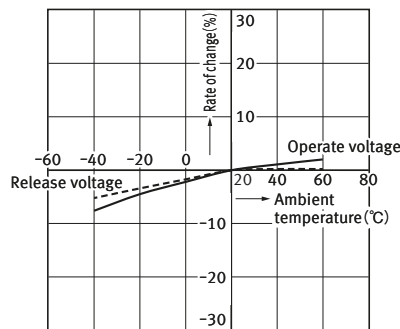
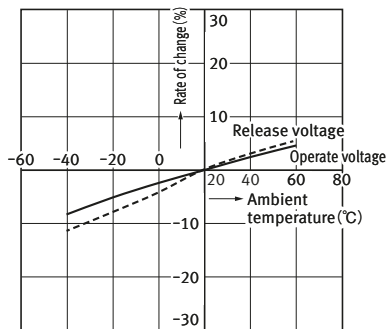


Power Relays (Over 2 A) ST RELAYS

3-1. Ambient temperature characteristics (1 Form A 1 Form B: Average) 3-2. Ambient temperature characteristics (2 Form A: Average) 4. Influence of proximity mounting

Tested sample : AR2013F, 4 pcs.

Tested sample : AR2024F, 4 pcs.

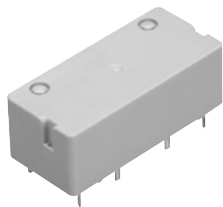


DIMENSIONS (Unit: mm)

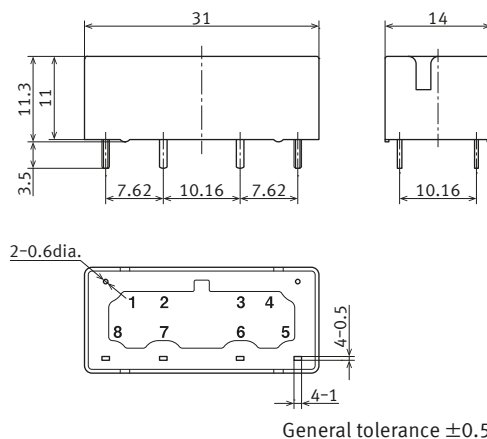
CAD The CAD data of the products with a " CAD " mark can be downloaded from our Website.

Single side stable

CAD

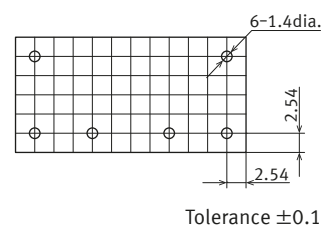


External dimensions



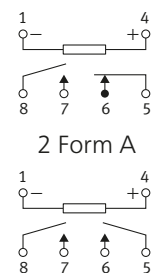
General tolerance ± 0.5

Recommended
PC board pattern
(BOTTOM VIEW)
1 Form A



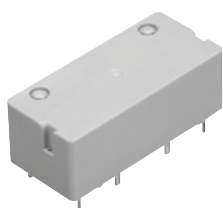
Tolerance ± 0.1

Schematic
(BOTTOM VIEW)
(De-energize)
1 Form A 1 Form B

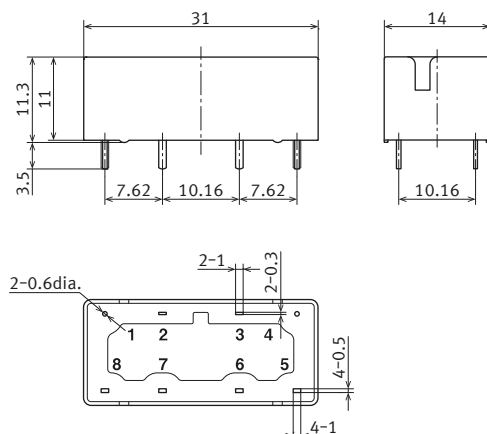


2 coil latching

CAD

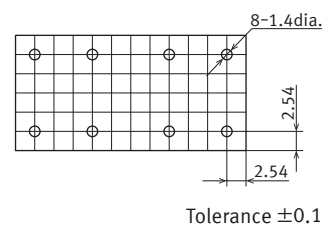


External dimensions



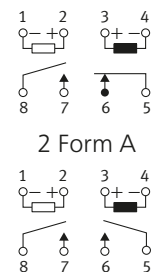
General tolerance ± 0.5

Recommended
PC board pattern
(BOTTOM VIEW)
1 Form A



Tolerance ± 0.1

Schematic
(BOTTOM VIEW)
(Reset)
1 Form A 1 Form B



Power Relays (Over 2 A) ST RELAYS

SAFETY STANDARDS

Each standard may be updated at any time, so please check our Website for the latest information.

■ UL (Approved)

File No.	Contact rating
E43028	8 A 250 V AC
	5 A 30 V DC
	¼ HP 125, 250 V AC

■ CSA (Approved)

File No.	Contact rating
2369519	8 A 250 V AC
	5 A 30 V DC
	¼ HP 125, 250 V AC

■ VDE (Approved)

File No.	Contact rating
40017740	8 A 250 V AC ($\cos\phi = 1.0$)
	5 A 30 V DC (0 ms)
	4 A 250 V AC ($\cos\phi = 0.4$)

■ TV rating

File No.	Contact rating
UL: E43028	TV-3
CSA: 2369519	TV-3

INSULATION CHARACTERISTICS (IEC61810-1)

Item	Characteristics
Clearance/Creepage distance (IEC61810-1)	Min. 1.5/2.5 mm
Category of protection (IEC61810-1)	RT III
Tracking resistance (IEC60112)	PTI 100
Insulation material group	III a
Over voltage category	II
Rated voltage	250 V
Pollution degree	2
Type of insulation (Between contact and coil)	Basic insulation
Type of insulation (Between open contacts)	Micro disconnection

Note) EN/IEC VDE Certified.

GUIDELINES FOR USAGE

- For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

■ Cautions for usage of ST relays

- The standard values of operate (set) and release (reset) voltage are for when the relay is installed with the terminals oriented downward.
- When using, please be aware that the N.C. and N.O. sides of 1 Form A 1 Form B type may go on simultaneously at operate time and release time.
- **Set and reset pulse time**
Regarding the set and reset pulse time of the latching type, for the purpose of reliable operation under ambient temperature fluctuations and different operating conditions, we recommend setting the coil applied set and reset pulse time to 50 ms or more at the rated coil voltage.

PC board socket/Soldering socket



Terminal socket
for PC board



Terminal socket
for soldering

TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
PC board socket	ST-PS	AR2800	50 pcs.	500 pcs.
Soldering socket	ST-SS	AR2806		

RATING

Item	Specifications
Dielectric strength (initial)	Between contact and coil: 4,000 V rms for 1 min (detection current: 10 mA) Between contact and terminal: 2,000 V rms for 1 min (detection current: 10 mA)
Insulation resistance (initial)	Between terminals: Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Maximum carrying current	10 A
Conditions for usage, transport and storage	Ambient temperature: −40 to +60 °C Humidity: 5 to 85 % RH (Avoid icing and condensation)

Power Relays (Over 2 A) ST RELAYS

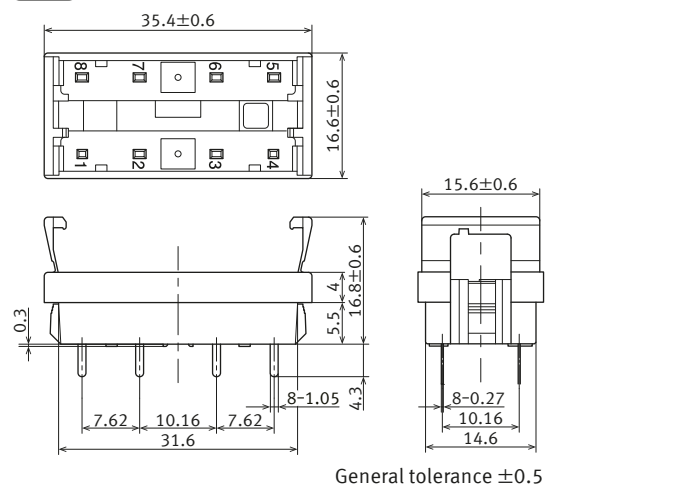
DIMENSIONS (Unit: mm)

CAD The CAD data of the products with a "CAD" mark can be downloaded from our Website.

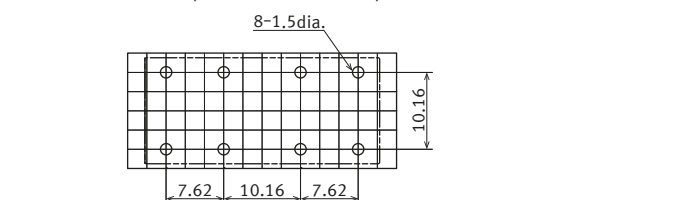
■ PC board Socket

CAD External dimensions

CAD External dimensions



Recommended PC board pattern
(BOTTOM VIEW)

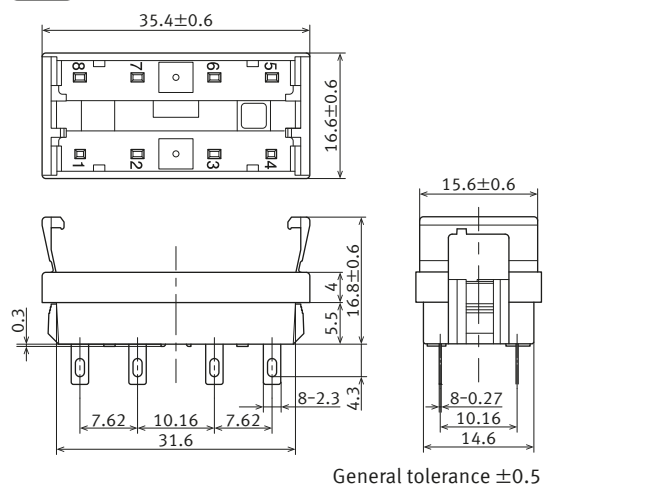


Tolerance ± 0.1

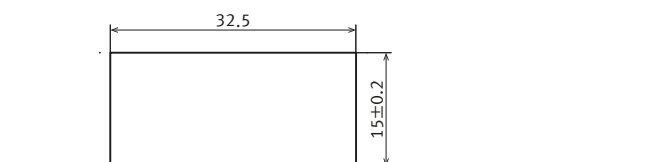
■ Soldering socket

CAD External dimensions

CAD External dimensions

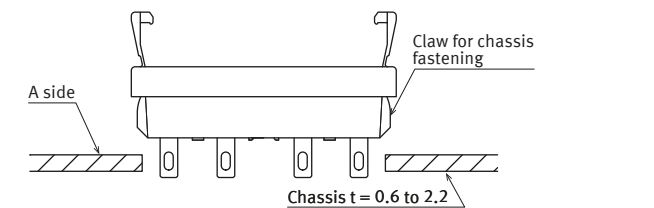


Panel cut-off



Tolerance ± 0.1

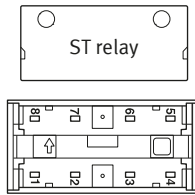
- The range for chassis thickness is 0.6 to 2.2 mm.
- If the chassis hole is punched with a press, set so the release R on the front side(A side).



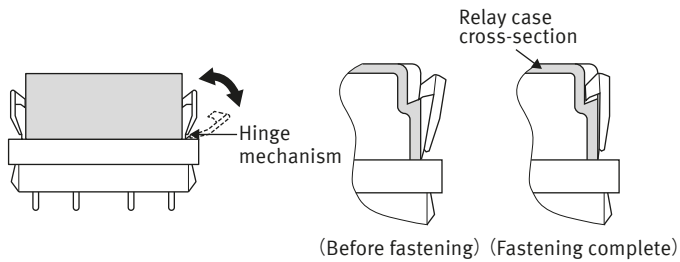
HANDLING

■ Mounting method of relay

- 1) Align the direction of relay and socket.

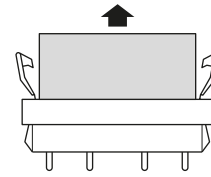


- 2) Insert the relay all the way in, so it is securely in place.
- 3) Press the hook section in the direction of the arrow and firmly secure the relay with the hook.

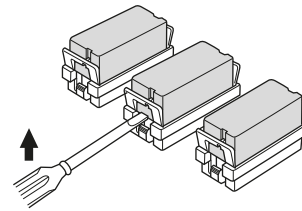


■ Removing method of relay

- 1) When removing the relay, completely release the hooks on both sides and pull the relay out.



- 2) In case there is not enough space to grasp relay with fingers, after completely removing both hooks, use screwdrivers in the way shown.



- 3) Exercise care when removing relays. If greater than necessary force is applied at the socket hooks, deformation may alter the dimensions so that the hook will no longer catch, and other damage may also occur.

■ For cautions for use, please read " GUIDELINES FOR RELAY USAGE ".
https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

Precautions for Coil Input

■ Long term current carrying

A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts) Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself. For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection.

■ DC Coil operating power

Steady state DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5 %. However, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

■ Coil connection

When connecting coils of polarized relays, please check coil polarity (+ , -) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

■ Maximum allowable voltage and temperature rise

Proper usage requires that the rated coil voltage be impressed on the coil. Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise. Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

● Operate voltage change due to coil temperature rise

In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the operate voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere. The resistance/temperature relationship for copper wire is about 0.4 % for 1 °C, and with this ratio the coil resistance increases. That is, in order to operate of the relay, it is necessary that the voltage be higher than the operate voltage and the operate voltage rises in accordance with the increase in the resistance value. However, for some polarized relays, this rate of change is considerably smaller.

Ambient Environment

■ Usage, Transport, and Storage Conditions

During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

●Temperature/Humidity/Pressure

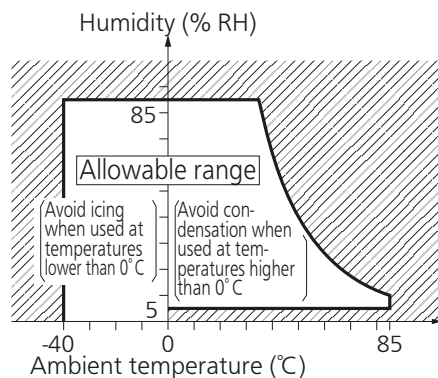
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications.

Also allowable humidity level is influenced by temperature, please check charts shown below and use relays within mentioned conditions. (Allowable temperature values differ for each relays, please refer to the relay's individual specifications.)

1) Temperature:

The tolerance temperature range differs for each relays, please refer to the relay's individual specifications

2) Humidity: 5 to 85 % RH



3) Pressure: 86 to 106 kPa

●Dew condensation

Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc.

Panasonic Industry Co., Ltd. does not guarantee the failures caused by condensation.

The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur.

Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

●Icing

Condensation or other moisture may freeze on relays when the temperature become lower than 0 °C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Industry Co., Ltd. does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur.

Please conduct product evaluations in the worst condition of the actual usage.

●Low temperature and low humidity

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

●High temperature and high humidity

Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

●Package

In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

●Silicon

When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.

This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic sealed types).

●NOx Generation

When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid.

This corrodes the internal metal parts and adversely affects operation.

Avoid use at an ambient humidity of 85 % RH or higher (at 20 °C). If use at high humidity is unavoidable, please contact our sales representative.

Others

■ Cleaning

- Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
- Cleaning with the boiling method is recommended (The temperature of cleaning liquid should be 40 °C or lower). Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

Please refer to "**the latest product specifications**" when designing your product.

- Requests to customers:

<https://industrial.panasonic.com/ac/e/salespolicies/>

■ Global Sales Network Information: industrial.panasonic.com/ac/e/salesnetwork

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