

## Product Change Notice: Relay Safety Standard Certification Change

PCN.PG06.04.03.2024

04.03.2024

<p><b>About This Notice:</b></p>	<p>We would like to inform that the safety standard certification mark will change from TÜV to VDE on certain relay series.</p>
<p><b>Effective Date:</b></p>	<p>From November 2022 production.</p>
<p><b>Change Details:</b></p>	<p>Due to the change of safety standard certification authority for EN61810-1, the TÜV mark on certain relay series will be changed to VDE. There is no change in the acquired standard EN61810-1 itself. See example below.</p> <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Current product</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Sealed design ( Top surface )</div> </div> <div style="font-size: 2em; margin: 0 10px;">→</div> <div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>Modified product</p> <div style="border: 1px solid black; padding: 5px; margin-bottom: 5px;">Sealed design ( Top surface )</div> </div> </div>
<p><b>Affected Parts:</b></p>	<p>All LF, HE, DK, DY, DS-P, SP, JV-N, and PA-N series relays, including custom products. Excludes HE PV, HE-S, HE-V, and HE-N series. Excludes sockets and terminal sockets. See attached part number list.</p>
<p><b>Datasheet(s):</b></p>	<p>See attached.</p>
<p><b>Notes:</b></p>	<p>Part numbers, pricing, and specifications remain unchanged.</p>

**Panasonic PCN.PG06.04.03.2024 Relay Safety Standard Affected Parts**

Affected Series	Affected Part Numbers	Suggested Replacement Series	Suggested Replacement Part Numbers	Comments
LF Series Relays	ALF1P05			
LF Series Relays	ALF1P06			
LF Series Relays	ALF1P09			
LF Series Relays	ALF1P12			
LF Series Relays	ALF1P18			
LF Series Relays	ALF1P24			
LF Series Relays	ALF1PF12			
LF Series Relays	ALF1T05			
LF Series Relays	ALF1T06			
LF Series Relays	ALF1T09			
LF Series Relays	ALF1T12			
LF Series Relays	ALF1T18			
LF Series Relays	ALF1T24			
LF Series Relays	ALF1TF12			
LF Series Relays	ALF1TF24			
HE Series Relays	HE1AN-AC120V			
HE Series Relays	HE1AN-AC12V			
HE Series Relays	HE1AN-AC200V			
HE Series Relays	HE1AN-AC240V			
HE Series Relays	HE1AN-AC24V			
HE Series Relays	HE1AN-AC48V			
HE Series Relays	HE1AN-DC110V			
HE Series Relays	HE1AN-DC12V			
HE Series Relays	HE1AN-DC24V			
HE Series Relays	HE1AN-DC48V			
HE Series Relays	HE1AN-DC6V			
HE Series Relays	HE1AN-P-DC12V			
HE Series Relays	HE1AN-P-DC24V			
HE Series Relays	HE1AN-Q-AC120V			
HE Series Relays	HE1AN-Q-AC12V			
HE Series Relays	HE1AN-Q-AC240V			
HE Series Relays	HE1AN-Q-AC24V			
HE Series Relays	HE1AN-Q-DC100V			
HE Series Relays	HE1AN-Q-DC110V			
HE Series Relays	HE1AN-Q-DC12V			
HE Series Relays	HE1AN-Q-DC24V			
HE Series Relays	HE1AN-Q-DC48V			
HE Series Relays	HE1AN-S-AC120V			
HE Series Relays	HE1AN-S-AC12V			
HE Series Relays	HE1AN-S-AC240V			
HE Series Relays	HE1AN-S-DC12V			
HE Series Relays	HE1AN-S-DC24V			
HE Series Relays	HE2AN-AC120V			
HE Series Relays	HE2AN-AC240V			
HE Series Relays	HE2AN-AC24V			
HE	HE2AN-DC110V			
HE	HE2AN-DC12V			
HE	HE2AN-DC24V			
HE	HE2AN-DC48V			
HE	HE2AN-DC6V			
HE	HE2AN-P-DC24V			
HE	HE2AN-P-DC24V-H90			
HE	HE2AN-Q-AC120V			
HE	HE2AN-Q-AC12V			
HE	HE2AN-Q-AC200V			
HE	HE2AN-Q-AC240V			
HE	HE2AN-Q-AC24V			
HE	HE2AN-Q-DC12V			
HE	HE2AN-Q-DC24V			
HE	HE2AN-Q-DC48V			
HE	HE2AN-Q-DC6V			
HE	HE2AN-S-AC120V			
HE	HE2AN-S-AC12V			
HE	HE2AN-S-AC240V			
HE	HE2AN-S-AC48V			
HE	HE2AN-S-DC110V			
HE	HE2AN-S-DC12V			

HE	HE2AN-S-DC24V			
HE	HE2AN-S-DC48V			
HE	HE2AN-S-DC6V			
HE	HE2AN-SW-DC12V			
HE	HE2AN-SW-DC24V			
DY	ADY10003			
DY	ADY10005			
DY	ADY10006			
DY	ADY10009			
DY	ADY10012			
DY	ADY10024			
DY	ADY30003			
DY	ADY30005			
DY	ADY30006			
DY	ADY30009			
DY	ADY30012			
DY	ADY30024			
DY	ADY12003			
DY	ADY12005			
DY	ADY12006			
DY	ADY12009			
DY	ADY12012			
DY	ADY12024			
DY	ADY32003			
DY	ADY32005			
DY	ADY32006			
DY	ADY32009			
DY	ADY32012			
DY	ADY32024			
DK	DK1A-3V-F			
DK	DK1A-5V-F			
DK	DK1A-6V-F			
DK	DK1A-9V-F			
DK	DK1A-12V-F			
DK	DK1A-24V-F			
DK	DK1A-24V-F-Y4			
DK	DK1A1B-3V-F			
DK	DK1A1B-5V-F			
DK	DK1A1B-6V-F			
DK	DK1A1B-9V-F			
DK	DK1A1B-12V-F			
DK	DK1A1B-24V-F			
DK	DK2A-3V-F			
DK	DK2A-5V-F			
DK	DK2A-6V-F			
DK	DK2A-9V-F			
DK	DK2A-12V-F			
DK	DK2A-24V-F			
DK	DK1A-L-5V-F			
DK	DK1A-L2-3V-F			
DK	DK1A-L2-5V-F			
DK	DK1A-L2-6V-F			
DK	DK1A-L2-9V-F			
DK	DK1A-L2-12V-F			
DK	DK1A-L2-24V-F			
DK	DK1A1B-L2-3V-F			
DK	DK1A1B-L2-5V-F			
DK	DK1A1B-L2-6V-F			
DK	DK1A1B-L2-9V-F			
DK	DK1A1B-L2-12V-F			
DK	DK1A1B-L2-24V-F			
DK	DK2A-L2-3V-F			
DK	DK2A-L2-5V-F			
DK	DK2A-L2-6V-F			
DK	DK2A-L2-9V-F			
DK	DK2A-L2-12V-F			
DK	DK2A-L2-24V-F			
DS-P	DSP1-DC12V-F			
DS-P	DSP1-DC12V-R-F			
DS-P	DSP1-DC24V-F			
DS-P	DSP1-DC24V-R-F			
DS-P	DSP1-DC3V-F			
DS-P	DSP1-DC5V-F			
DS-P	DSP1-DC5V-R-F			

DS-P	DSP1-DC6V-F		
DS-P	DSP1-DC9V-F		
DS-P	DSP1-DC9V-R-F		
DS-P	DSP1-L2-DC12V-F		
DS-P	DSP1-L2-DC24V-F		
DS-P	DSP1-L2-DC3V-F		
DS-P	DSP1-L2-DC5V-F		
DS-P	DSP1-L2-DC6V-F		
DS-P	DSP1-L2-DC9V-F		
DS-P	DSP1A-DC12V		
DS-P	DSP1A-DC12V-R		
DS-P	DSP1A-DC24V		
DS-P	DSP1A-DC24V-R		
DS-P	DSP1A-DC3V		
DS-P	DSP1A-DC5V		
DS-P	DSP1A-DC5V-R		
DS-P	DSP1A-DC6V		
DS-P	DSP1A-DC6V-R		
DS-P	DSP1A-DC9V		
DS-P	DSP1A-L-DC12V		
DS-P	DSP1A-L-DC12V-R		
DS-P	DSP1A-L-DC3V		
DS-P	DSP1A-L-DC3V-R		
DS-P	DSP1A-L-DC5V		
DS-P	DSP1A-L2-DC12V		
DS-P	DSP1A-L2-DC24V		
DS-P	DSP1A-L2-DC24V-R		
DS-P	DSP1A-L2-DC3V		
DS-P	DSP1A-L2-DC5V		
DS-P	DSP1A-L2-DC5V-R		
DS-P	DSP1A-L2-DC6V		
DS-P	DSP1A-L2-DC9V		
DS-P	DSP2A-DC12V		
DS-P	DSP2A-DC12V-R		
DS-P	DSP2A-DC24V		
DS-P	DSP2A-DC24V-R		
DS-P	DSP2A-DC3V		
DS-P	DSP2A-DC5V		
DS-P	DSP2A-DC5V-R		
DS-P	DSP2A-DC6V		
DS-P	DSP2A-DC9V		
DS-P	DSP2A-L2-DC12V		
DS-P	DSP2A-L2-DC24V		
DS-P	DSP2A-L2-DC3V		
DS-P	DSP2A-L2-DC5V		
DS-P	DSP2A-L2-DC6V		
DS-P	DSP2A-L2-DC9V		
SP	SP2-DC110V		
SP	SP2-DC12V		
SP	SP2-DC24V		
SP	SP2-DC3V		
SP	SP2-DC48V		
SP	SP2-DC5V		
SP	SP2-L2-DC12V		
SP	SP2-L2-DC24V		
SP	SP2-L2-DC3V		
SP	SP2-L2-DC5V		
SP	SP2-L2-DC6V		
SP	SP2-P-DC12V		
SP	SP2-P-DC24V		
SP	SP2-P-DC48V		
SP	SP2-P-DC5V		
SP	SP2-PL-DC5V		
SP	SP2-PL2-DC12V		
SP	SP2-PL2-DC24V		
SP	SP2-PL2-DC3V		
SP	SP2-PL2-DC48V		
SP	SP2-PL2-DC5V		
SP	SP4-DC12V		
SP	SP4-DC24V		
SP	SP4-DC48V		
SP	SP4-DC5V		
SP	SP4-DC6V		
SP	SP4-L2-DC12V		

SP	SP4-L2-DC24V			
SP	SP4-L2-DC3V			
SP	SP4-L2-DC48V			
SP	SP4-L2-DC5V			
SP	SP4-L2-DC6V			
SP	SP4-P-DC12V			
SP	SP4-P-DC24V			
SP	SP4-P-DC48V			
SP	SP4-P-DC5V			
SP	SP4-P-DC6V			
SP	SP4-P-L2-DC12V			
SP	SP4-P-L2-DC24V			
SP	SP4-P-L2-DC5V			
SP	SP4-P-L2-DC6V			
SP	SP4-PL2-DC12V			
SP	SP4-PL2-DC24V			
SP	SP4-PL2-DC48V			
SP	SP4-PL2-DC5V			
JV-N	JVN1A-100V-F			
JV-N	JVN1A-12V-F			
JV-N	JVN1A-18V-F			
JV-N	JVN1A-24V-F			
JV-N	JVN1A-4.5V-F			
JV-N	JVN1A-48V-F			
JV-N	JVN1A-5V-F			
JV-N	JVN1A-6V-F			
JV-N	JVN1A-9V-F			
JV-N	JVN1AF-12V-F			
JV-N	JVN1AF-18V-F			
JV-N	JVN1AF-24V-F			
JV-N	JVN1AF-4.5V-F			
JV-N	JVN1AF-5V-F			
JV-N	JVN1AF-6V-F			
PA-N	APAN3103			
PA-N	APAN314H			
PA-N	APAN3105			
PA-N	APAN3106			
PA-N	APAN3109			
PA-N	APAN3112			
PA-N	APAN3118			
PA-N	APAN3124			

Power relays ( Over 2 A )

# DK RELAYS

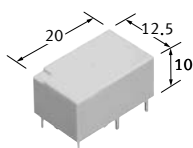
Product Catalog

**IN Your  
Future**

# DK RELAYS

## 1 Form A 10 A, 1 Form A 1 Form B/2 Form A 8 A, Small polarized power relays

Protective construction : Sealed type



(Unit : mm)

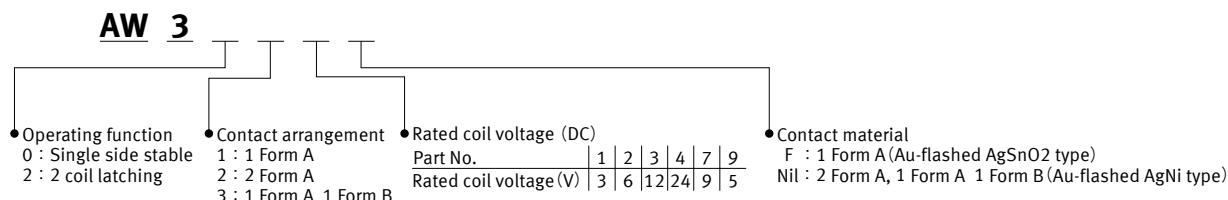
### FEATURES

- **Compact size**  
 1 Form A type: width (12.5 mm) × length (20 mm) × height (10 mm)  
 1 Form A 1 Form B, 2 Form A type: width (15 mm) × length (20 mm) × height (10 mm)
- **Surge withstand voltage: 10,000 V**
- **PC board sockets are available**
- **Variety of contact arrangements (1 Form A, 1 Form A 1 Form B, 2 Form A)**
- **Latching types available**

### TYPICAL APPLICATIONS

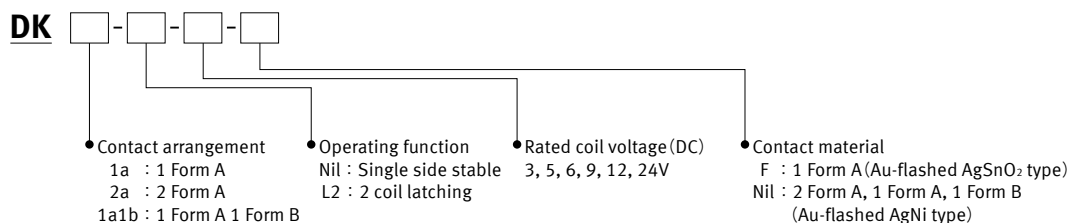
- **Power supply**
- **OA equipment**
- **Industrial machines**
- **Electric power equipment**

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



Note: VDE approved type is available.

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



Note : VDE approved type is available.

# Power relays (Over 2 A) DK 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	3 V DC	DK1a-3V-F	AW3011F	DK1a-L2-3V-F	AW3211F	50 pcs.	500 pcs.
	5 V DC	DK1a-5V-F	AW3019F	DK1a-L2-5V-F	AW3219F		
	6 V DC	DK1a-6V-F	AW3012F	DK1a-L2-6V-F	AW3212F		
	9 V DC	DK1a-9V-F	AW3017F	DK1a-L2-9V-F	AW3217F		
	12 V DC	DK1a-12V-F	AW3013F	DK1a-L2-12V-F	AW3213F		
	24 V DC	DK1a-24V-F	AW3014F	DK1a-L2-24V-F	AW3214F		
1 Form A 1 Form B	3 V DC	DK1a1b-3V	AW3031	DK1a1b-L2-3V	AW3231		
	5 V DC	DK1a1b-5V	AW3039	DK1a1b-L2-5V	AW3239		
	6 V DC	DK1a1b-6V	AW3032	DK1a1b-L2-6V	AW3232		
	9 V DC	DK1a1b-9V	AW3037	DK1a1b-L2-9V	AW3237		
	12 V DC	DK1a1b-12V	AW3033	DK1a1b-L2-12V	AW3233		
	24 V DC	DK1a1b-24V	AW3034	DK1a1b-L2-24V	AW3234		
2 Form A	3 V DC	DK2a-3V	AW3021	DK2a-L2-3V	AW3221		
	5 V DC	DK2a-5V	AW3029	DK2a-L2-5V	AW3229		
	6 V DC	DK2a-6V	AW3022	DK2a-L2-6V	AW3222		
	9 V DC	DK2a-9V	AW3027	DK2a-L2-9V	AW3227		
	12 V DC	DK2a-12V	AW3023	DK2a-L2-12V	AW3223		
	24 V DC	DK2a-24V	AW3024	DK2a-L2-24V	AW3224		

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

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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. 70% V of rated coil voltage (Initial)	Min. 10% V of rated coil voltage (Initial)	66.6 mA	45 $\Omega$	200 mW	130% V of rated coil voltage
5 V DC			40 mA	125 $\Omega$		
6 V DC			33.3 mA	180 $\Omega$		
9 V DC			22.2 mA	405 $\Omega$		
12 V DC			16.6 mA	720 $\Omega$		
24 V DC			8.3 mA	2,880 $\Omega$		

\*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. 70% V of rated coil voltage (Initial)	Max. 70% V of rated coil voltage (Initial)	66.6 mA	66.6 mA	45 $\Omega$	45 $\Omega$	200 mW	200 mW	130% V of rated coil voltage
5 V DC			40 mA	40 mA	125 $\Omega$	125 $\Omega$			
6 V DC			33.3 mA	33.3 mA	180 $\Omega$	180 $\Omega$			
9 V DC			22.2 mA	22.2 mA	405 $\Omega$	405 $\Omega$			
12 V DC			16.6 mA	16.6 mA	720 $\Omega$	720 $\Omega$			
24 V DC			8.3 mA	8.3 mA	2,880 $\Omega$	2,880 $\Omega$			

\*Square, pulse drive



■ Specifications

Item		Specifications		
Contact data	Contact arrangement	1 Form A	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 <sub>2</sub> type	Au-flashed AgNi type	
	Contact rating (resistive)	10 A 250 V AC, 10 A 30 V DC	8 A 250 V AC, 8 A 30 V DC	
	Max. switching power (resistive)	2,500 VA (AC), 300 W (DC)	2,000 VA (AC), 240 W (DC)	
	Max. switching voltage	250 V AC, 125 V DC (0.2 A)		
	Max. switching current	10 A (AC, DC)	8 A (AC, DC)	
	Min. switching load (reference value) *1	10 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	1,000 Vrms for 1 min (detection current: 10 mA)		
	Between contact sets	-	4,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact and coil	4,000 Vrms for 1 min (detection current: 10 mA)		
Surge withstand voltage (initial)*2	Between contact and coil	10,000 V		
Time characteristics (initial)	Operate (Set) time	Max. 10 ms (Max. 10ms) at rated coil voltage (at 20°C, without bounce)		
	Release (Reset) time	Max. 8 ms (Max. 10ms) at rated coil voltage (at 20°C, without bounce, without diode)		
Shock resistance	Functional	98 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 μs)		
	Destructive	980 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)		
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1.5 mm, detection time: 10 μs)		
	Destructive	10 to 55 Hz (at double amplitude of 3 mm)		
Expected life	Mechanical life	Min. 50 x 10 <sup>6</sup> (switching frequency: 300 times/min)		
Conditions	Conditions for usage, transport and storage*3	Ambient temperature: -40 to +65°C, Humidity: 5 to 85% RH (Avoid icing and condensation)		
Unit weight		Approx. 5 g	Approx. 6 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 ±1.2×50 μs according to JEC-212-1981

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

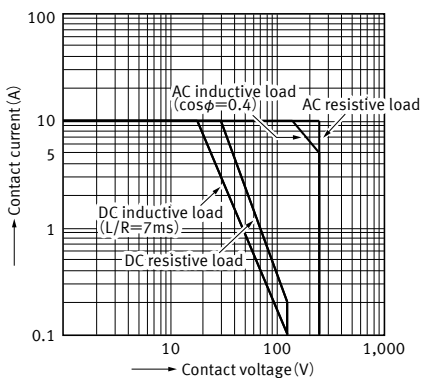
■ Expected electrical life

Conditions: Resistive load, switching frequency 20 times/min

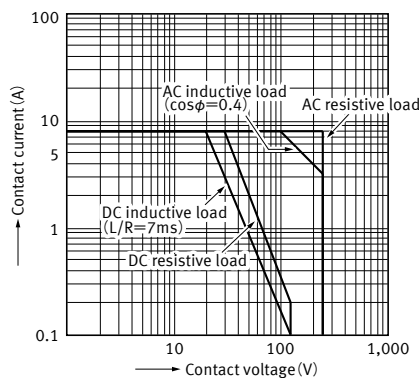
Type	Switching capacity	Number of operations
1 Form A	10 A 250 V AC	Min. 100 x 10 <sup>3</sup>
	10 A 30 V DC	Min. 100 x 10 <sup>3</sup>
1 Form A 1 Form B, 2 Form A	8 A 250 V AC	Min. 100 x 10 <sup>3</sup>
	8 A 30 V DC	Min. 100 x 10 <sup>3</sup>

REFERENCE DATA

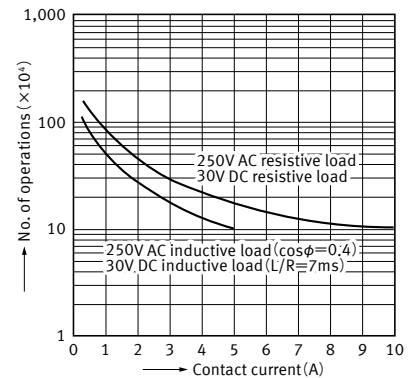
1-1.Max. switching capacity (1 Form A)



1-2.Max. switching capacity (1 Form A 1 Form B, 2 Form A)

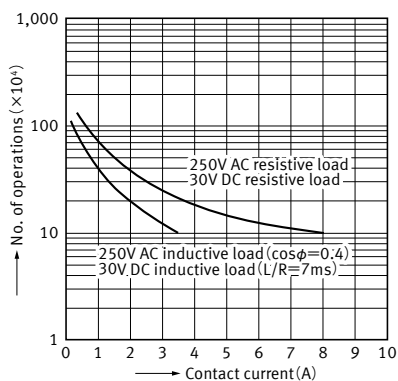


2-1.Switching life curve (1 Form A)



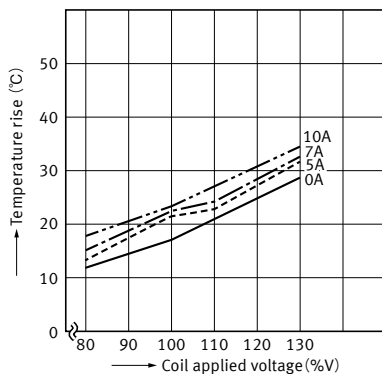
# Power relays (Over 2 A) DK RELAYS

## 2-2. Switching life curve (1 Form A 1 Form B, 2 Form A)



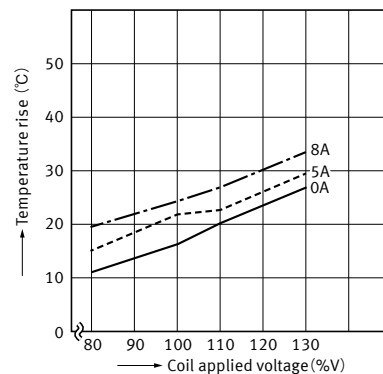
## 3-1. Coil temperature characteristics (1 Form A: Average)

Tested sample : DK1a-12V, 5 pcs.  
Ambient temperature : 30°C



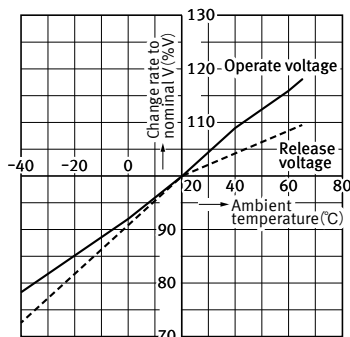
## 3-2. Coil temperature characteristics (1 Form A 1 Form B, 2 Form A: Average)

Tested sample : DK1a1b-12V, 5 pcs.  
Ambient temperature : 20°C

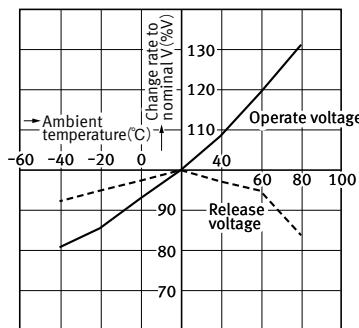


## 4-1. Ambient temperature characteristics (1 Form A: Average)

Tested sample : DK1a-24V, 6 pcs.  
Ambient temperature : -40 to +80°C

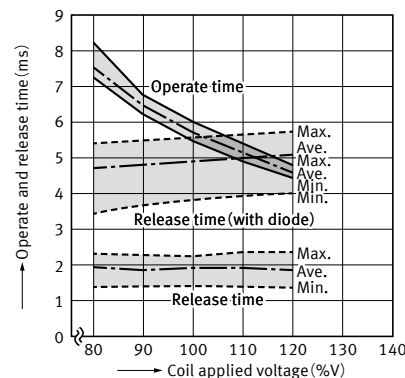


## 4-2. Ambient temperature characteristics (1 Form A 1 Form B, 2 Form A: Average)



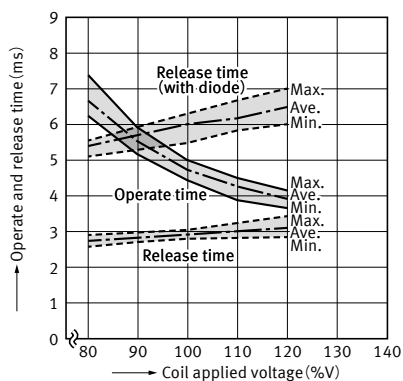
## 5-1. Operate and release time (1 Form A)

Tested sample : DK1a-24V, 5 pcs.



## 5-2. Operate and release time (1 Form A 1 Form B, 2 Form A)

Tested sample : DK1a1b-12V, 5 pcs.



**DIMENSIONS**

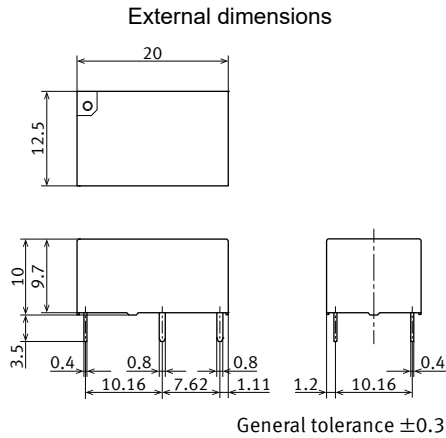
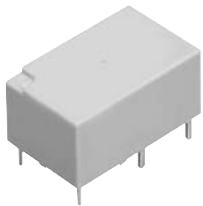
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

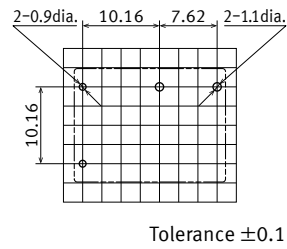
■ 1 Form A

● Single side stable

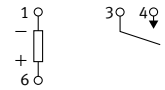
**CAD**



Recommended PC board pattern (BOTTOM VIEW)



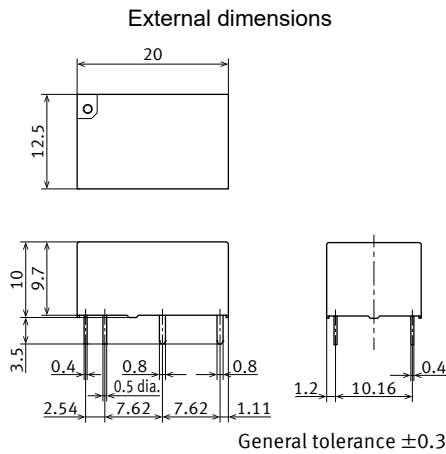
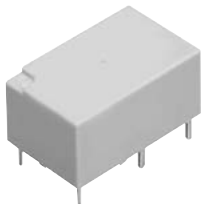
Schematic (BOTTOM VIEW) (De-energize)



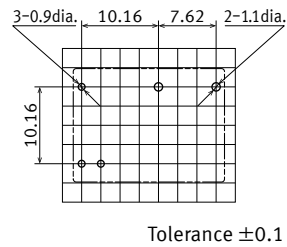
Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

● 2 coil latching

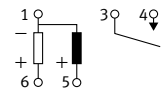
**CAD**



Recommended PC board pattern (BOTTOM VIEW)



Schematic (BOTTOM VIEW) (Reset)

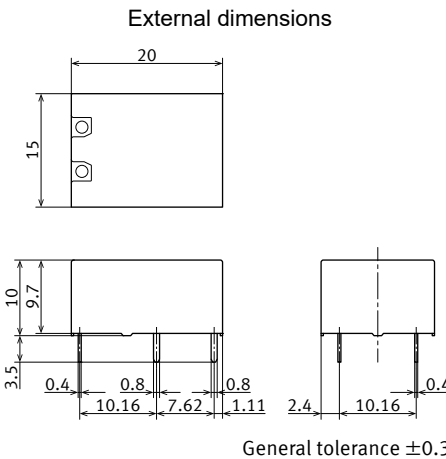


Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

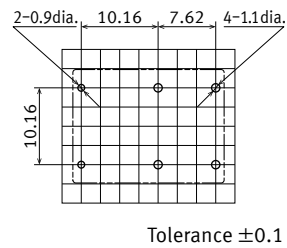
■ 1 Form A 1 Form B, 2 Form A

● Single side stable

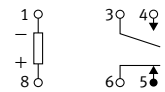
**CAD**



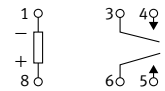
Recommended PC board pattern (BOTTOM VIEW)



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



2 Form (De-energize)

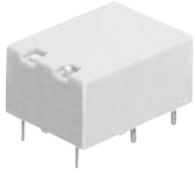


Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

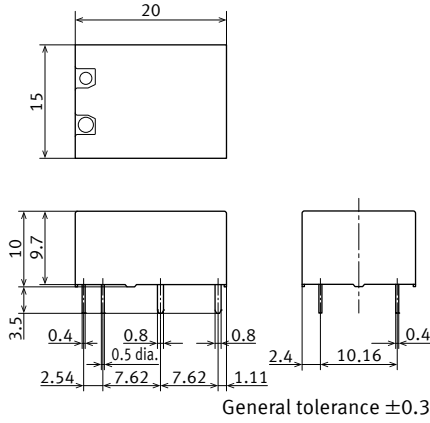
# Power relays (Over 2 A) DK RELAYS

● 2 coil latching

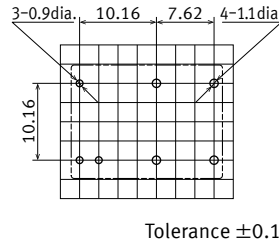
**CAD**



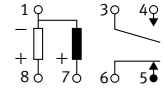
External dimensions



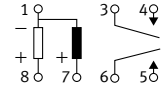
Recommended PC board pattern (BOTTOM VIEW)



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



2 Form A (De-energize)



Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic

## SAFETY STANDARDS

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

### UL (Recognized)

1 Form A

File No.	Contact rating
E43028	10 A 250 V AC
	10 A 30 V DC
	1/2 HP 125, 250 V AC

1 Form A 1 Form B, 2 Form A

File No.	Contact rating
E43028	8 A 250 V AC
	8 A 30 V DC
	1/2 HP 125, 250 V AC

### VDE (Certified)

Approved in products with different part number suffixes. Please contact us for more information.

### CSA (Certified)

1 Form A

File No.	Contact rating
LR26550	10 A 250 V AC
	10 A 30 V DC
	1/2 HP 125, 250 V AC

1 Form A 1 Form B, 2 Form A

File No.	Contact rating
LR26550	8 A 250 V AC
	8 A 30 V DC
	1/2 HP 125, 250 V AC

### TÜV (Certified)

1 Form A

File No.	Contact rating
B 12 06 13461 329	10 A 250 V AC ( $\cos\phi=1.0$ )
	10 A 30 V DC (0 ms)
	5 A 250 V AC ( $\cos\phi=0.4$ )

1 Form A 1 Form B, 2 Form A

File No.	Contact rating
B 12 06 13461 329	8 A 250 V AC ( $\cos\phi=1.0$ )
	8 A 30 V DC (0 ms)
	4 A 250 V AC ( $\cos\phi=0.4$ )

## INSULATION CHARACTERISTICS (IEC61810-1)

Item	Characteristics
Clearance/Creepage distance (IEC61810-1)	Min. 5.5/5.5 mm
Category of protection (IEC61810-1)	RT III
Tracking resistance (IEC60112)	PTI 175
Insulation material group	III a
Over voltage category	III
Rated voltage	250 V
Pollution degree	2
Type of insulation (Between contact and coil)	Reinforced insulation
Type of insulation (Between open contacts)	Micro disconnection

Notes: 1. EN/IEC VDE Certified  
2. VDE approved type only

**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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

**■ Cautions for usage of DK relays**

- The standard values of operate (set) and release (reset) voltages are values that apply when mounting with the terminals facing down.
- Please be careful when using this relay (1 Form A 1 Form B), because when it operates and releases, the N.O. and N.C. turn ON simultaneously, which can cause harm to the circuit.
- 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 sockets



## SELECTOR CHART

Relay type \ Socket		1 Form A		1 Form A 1 Form B, 2 Form A	
		Single side stable	2 coil latching	Single side stable	2 coil latching
1 Form A	Single side stable	●	●	-	-
	2 coil latching	-	●	-	-
1 Form A 1 Form B, 2 Form A	Single side stable	-	-	●	●
	2 coil latching	-	-	-	●

## TYPES

Product name	Single side stable		2 coil latching		Standard packing	
	Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	DK1a-PS	AW3810	DK1a-PSL2	AW3812	50 pcs.	500 pcs.
1 Form A 1 Form B, 2 Form A	DK2a-PS	AW3820	DK2a-PSL2	AW3822		

## RATING

Item	Specifications	
Contact arrangement	1 Form A	2 Form A, 1 Form A 1 Form B
Dielectric strength (initial)	Each between terminals: 4,000 Vrms for 1 min (detection current: 10 mA) (Except the portion between coil terminals)	
Insulation resistance (initial)	Each between terminals: Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)	
Max. continuous carrying current	10 A	8 A
Conditions for usage, transport and storage	Ambient temperature: -40 to +65°C Humidity: 5 to 85% RH (Avoid icing and condensation)	

**DIMENSIONS**

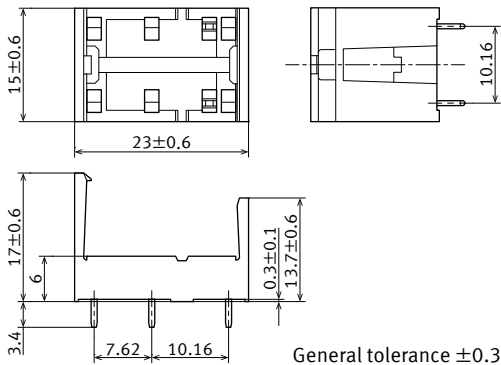
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

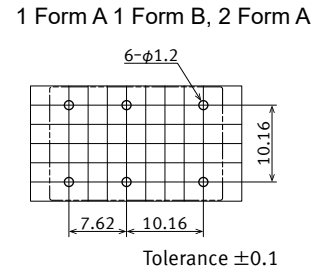
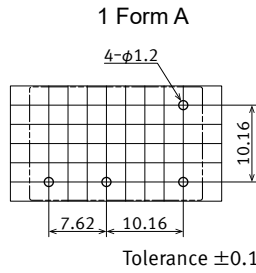
● Single side stable

**CAD**

External dimensions



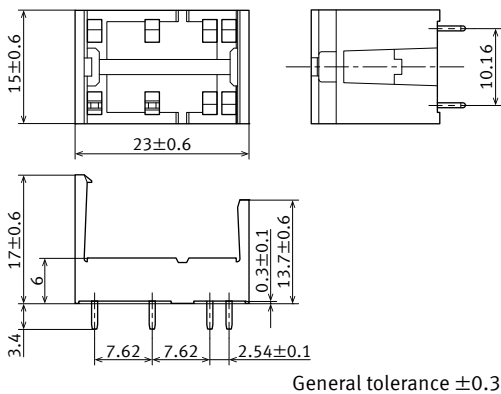
Recommended PC board pattern (BOTTOM VIEW)



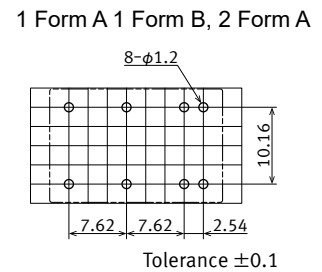
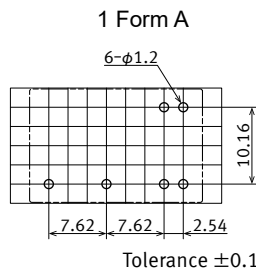
● 2 coil latching

**CAD**

External dimensions



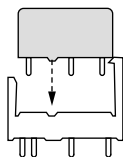
Recommended PC board pattern (BOTTOM VIEW)



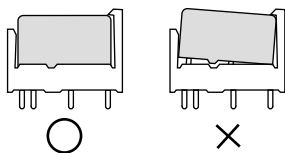
**HANDLING**

■ Mounting method of relay

1) Match the direction of relay and socket.

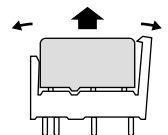


2) Both ends of the relay are to be secured firmly so that the socket hooks on the top surface of the relay.

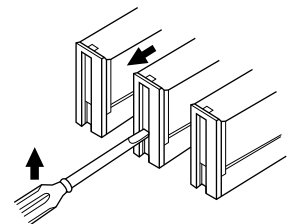


■ Removing method of relay

1) Remove the relay, applying force in the direction shown.



2) In case there is not enough space to grasp relay with fingers, 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.

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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.

## 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

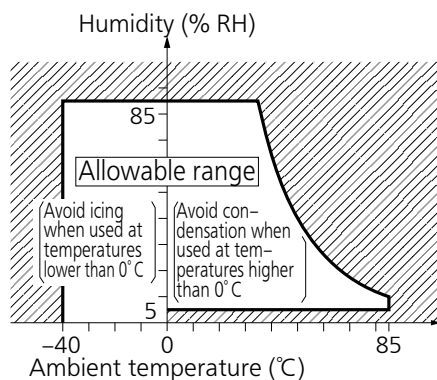
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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



### ■ 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.

### ● 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 switch 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.



# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

## ● 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2 A )

# DS POWER RELAYS

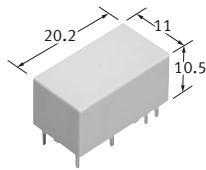
Product Catalog

**IN Your  
Future**

# DS POWER RELAYS

## 1 Form A 8 A (AC) 5 A (DC), 1 Form A 1 Form B/2 Form A 5 A (AC/DC), Small polarized power relays

Protective construction : Sealed type



(Unit : mm)

### FEATURES

- Compact size: width (11 mm) × length (20.2 mm) × height (10.5 mm)
- Variety of contact arrangements (1 Form A, 1 Form A 1 Form B, 2 Form A)
- Surge withstand voltage: 5,000 V
- Latching types available
- PC board sockets are available

### TYPICAL APPLICATIONS

- Electric power equipment
- Measuring instruments
- Industrial machines
- OA equipment

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

#### AGP 2

- Operating function  
0 : Standard type Single side stable  
1 : Standard type 1 coil latching  
2 : Standard type 2 coil latching
- Contact arrangement  
0 : 1 Form A  
1 : 1 Form A 1 Form B  
2 : 2 Form A
- Rated coil voltage (DC)  
Part number | 1 | 2 | 3 | 4 | 7 | 9  
Rated coil voltage(V) | 3 | 6 | 12 | 24 | 9 | 5
- Contact material  
● Au-flashed AgSnO<sub>2</sub> type  
F : 1 Form A 1 Form B  
Nil : 1 Form A, 2 Form A

Note : Reverse polarity types available

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

#### DSP

- Contact arrangement  
1a : 1 Form A  
1 : 1 Form A 1 Form B  
2a : 2 Form A
- Operating function  
Nil : Single side stable  
L : 1 coil latching  
L2 : 2 coil latching
- Rated coil voltage (DC)  
3, 5, 6, 9, 12, 24 V
- Polarity  
Nil : Standard polarity  
R : Reverse polarity
- Contact material  
● Au-flashed AgSnO<sub>2</sub> type  
F : 1 Form A 1 Form B  
Nil : 1 Form A, 2 Form A

Notes : 1. Reverse polarity types available (add suffix-R)  
2. Certified by UL, CSA and TÜV

# Power relays (Over 2 A) DS POWER 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		1 coil latching		2 coil latching		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	3 V DC	DSP1a-DC3V	AGP2001	DSP1a-L-DC3V	AGP2101	DSP1a-L2-DC3V	AGP2201	50 pcs.	500 pcs.
	5 V DC	DSP1a-DC5V	AGP2009	DSP1a-L-DC5V	AGP2109	DSP1a-L2-DC5V	AGP2209		
	6 V DC	DSP1a-DC6V	AGP2002	DSP1a-L-DC6V	AGP2102	DSP1a-L2-DC6V	AGP2202		
	9 V DC	DSP1a-DC9V	AGP2007	DSP1a-L-DC9V	AGP2107	DSP1a-L2-DC9V	AGP2207		
	12 V DC	DSP1a-DC12V	AGP2003	DSP1a-L-DC12V	AGP2103	DSP1a-L2-DC12V	AGP2203		
	24 V DC	DSP1a-DC24V	AGP2004	DSP1a-L-DC24V	AGP2104	DSP1a-L2-DC24V	AGP2204		
1 Form A 1 Form B	3 V DC	DSP1-DC3V-F	AGP2011F	DSP1-L-DC3V-F	AGP2111F	DSP1-L2-DC3V-F	AGP2211F		
	5 V DC	DSP1-DC5V-F	AGP2019F	DSP1-L-DC5V-F	AGP2119F	DSP1-L2-DC5V-F	AGP2219F		
	6 V DC	DSP1-DC6V-F	AGP2012F	DSP1-L-DC6V-F	AGP2112F	DSP1-L2-DC6V-F	AGP2212F		
	9 V DC	DSP1-DC9V-F	AGP2017F	DSP1-L-DC9V-F	AGP2117F	DSP1-L2-DC9V-F	AGP2217F		
	12 V DC	DSP1-DC12V-F	AGP2013F	DSP1-L-DC12V-F	AGP2113F	DSP1-L2-DC12V-F	AGP2213F		
	24 V DC	DSP1-DC24V-F	AGP2014F	DSP1-L-DC24V-F	AGP2114F	DSP1-L2-DC24V-F	AGP2214F		
2 Form A	3 V DC	DSP2a-DC3V	AGP2021	DSP2a-L-DC3V	AGP2121	DSP2a-L2-DC3V	AGP2221		
	5 V DC	DSP2a-DC5V	AGP2029	DSP2a-L-DC5V	AGP2129	DSP2a-L2-DC5V	AGP2229		
	6 V DC	DSP2a-DC6V	AGP2022	DSP2a-L-DC6V	AGP2122	DSP2a-L2-DC6V	AGP2222		
	9 V DC	DSP2a-DC9V	AGP2027	DSP2a-L-DC9V	AGP2127	DSP2a-L2-DC9V	AGP2227		
	12 V DC	DSP2a-DC12V	AGP2023	DSP2a-L-DC12V	AGP2123	DSP2a-L2-DC12V	AGP2223		
	24 V DC	DSP2a-DC24V	AGP2024	DSP2a-L-DC24V	AGP2124	DSP2a-L2-DC24V	AGP2224		

Note: Reverse polarity type (AGP9\*\*\*) are manufactured by lot upon receipt of order.

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

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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)	100 mA	30 $\Omega$	300 mW	130% V of rated coil voltage
5 V DC			60.2 mA	83 $\Omega$		
6 V DC			50 mA	120 $\Omega$		
9 V DC			33.3 mA	270 $\Omega$		
12 V DC			25 mA	480 $\Omega$		
24 V DC			12.5 mA	1,920 $\Omega$		

\*square, pulse drive

### 1 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)
3 V DC	Max. 80% V of rated coil voltage (Initial)	Max. 80% V of rated coil voltage (Initial)	50 mA	60 $\Omega$	150 mW	130% V of rated coil voltage
5 V DC			30.1 mA	166 $\Omega$		
6 V DC			25 mA	240 $\Omega$		
9 V DC			16.7 mA	540 $\Omega$		
12 V DC			12.5 mA	960 $\Omega$		
24 V DC			6.3 mA	3,840 $\Omega$		

\*square, pulse drive

# Power relays (Over 2 A) DS POWER RELAYS

## ● 2 coil latching

Rated coil voltage	Set voltage* (at 20 °C)	Reset voltage* (at 20 °C)	Rated operating current (±10%, at 20 °C)		Coil resistance (±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)	100 mA	100 mA	30 Ω	30 Ω	300 mW	300 mW	130% V of rated coil voltage
5 V DC			60.2 mA	60.2 mA	83 Ω	83 Ω			
6 V DC			50 mA	50 mA	120 Ω	120 Ω			
9 V DC			33.3 mA	33.3 mA	270 Ω	270 Ω			
12 V DC			25 mA	25 mA	480 Ω	480 Ω			
24 V DC			12.5 mA	12.5 mA	1,920 Ω	1,920 Ω			

\*square, pulse drive

## ■ Specifications

Item		Specifications		
Contact data	Contact arrangement	1 Form A	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 <sub>2</sub> type		
	Contact rating (resistive)	8 A 250 V AC, 5 A 30 V DC	5 A 250 V AC, 5 A 30 V DC	
	Max. switching power (resistive)	2,000 VA, 150 W	1,250 VA, 150 W	
	Max. switching voltage	250 V AC, 125 V DC (0.2A)		
	Max. switching current	8 A (AC), 5 A (DC)	5 A (AC, DC)	
	Min. switching load (reference value) *1	10 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	1,000 Vrms for 1 min (detection current: 10 mA)		
	Between contact sets	–	2,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact and coil	3,000 Vrms for 1 min (detection current: 10 mA)		
Surge withstand voltage (initial) *2	Between contact and coil	5,000 V		
Time characteristics (initial)	Operate (Set) time	Max. 10 ms (Max. 10 ms) at rated coil voltage (at 20 °C, without bounce)		
	Release (Reset) time	Max. 5 ms (Max. 10 ms) at rated coil voltage (at 20 °C, without bounce, without diode)		
Shock resistance	Functional	196 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 μs)		
	Destructive	980 m/s <sup>2</sup> (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 3.5 mm)		
Expected life	Mechanical life	Min. 50 x 10 <sup>6</sup> ope. (switching frequency: at 180 times/min)		
Conditions	Conditions for usage, transport and storage*3	Ambient temperature: -40 to +60 °C Humidity: 5 to 85% RH (Avoid icing and condensation)	Ambient temperature: -40 to +65 °C Humidity: 5 to 85% RH (Avoid icing and condensation)	Ambient temperature: -40 to +60 °C Humidity: 5 to 85% RH (Avoid icing and condensation)
Unit weight		Approx. 4.5 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 ±1.2×50 μs according to JEC-212-1981

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

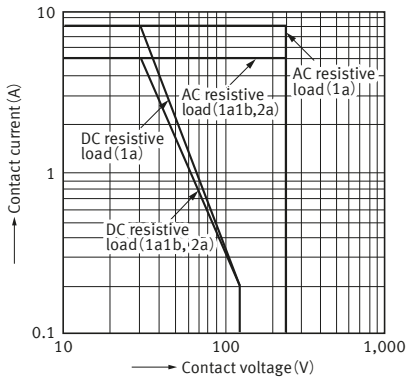
## ■ Expected electrical life

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

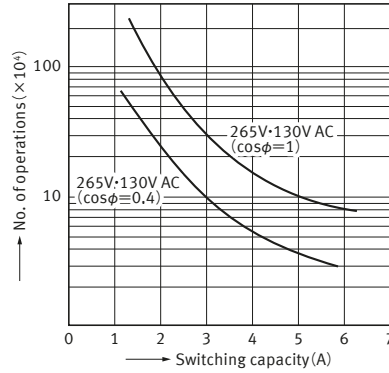
Type	Switching capacity	Number of operations
1 Form A	8 A 250 V AC	Min. 100 x 10 <sup>3</sup> ope.
	5 A 30 V DC	Min. 100 x 10 <sup>3</sup> ope.
1 Form A 1 Form B	5 A 250 V AC	Min. 100 x 10 <sup>3</sup> ope.
	5 A 30 V DC	Min. 100 x 10 <sup>3</sup> ope.
2 Form A	5 A 250 V AC	Min. 100 x 10 <sup>3</sup> ope.
	5 A 30 V DC	Min. 100 x 10 <sup>3</sup> ope.

## REFERENCE DATA

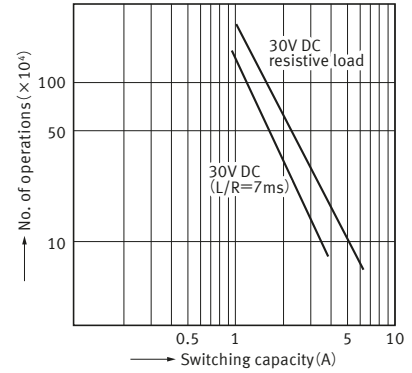
1. Max. switching capacity



2-1. Switching life curve (1 Form A 1 Form B)

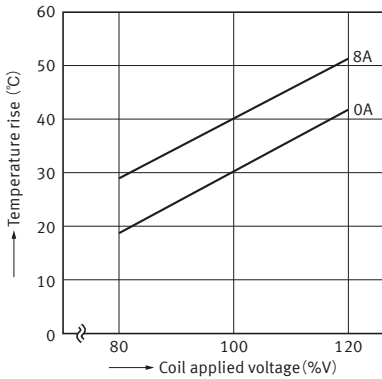


2-2. Switching life curve (1 Form A 1 Form B)



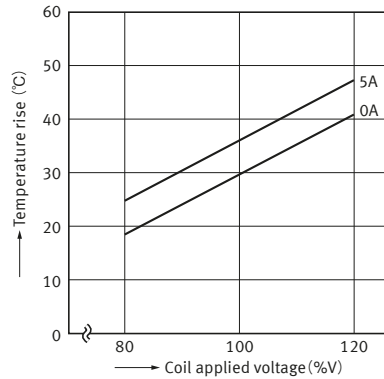
3-1. Coil temperature characteristics (1 Form A: Average)

Tested sample : DSP1a-12V DC, 5 pcs.



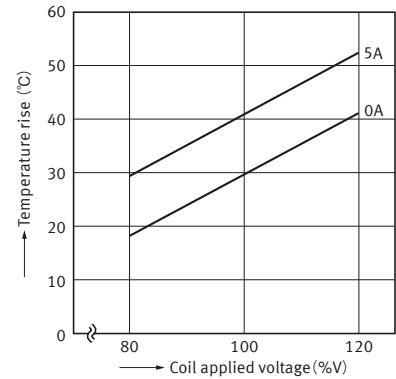
3-2. Coil temperature characteristics (1 Form A 1 Form B: Average)

Tested sample : DSP1-12V DC, 5 pcs.



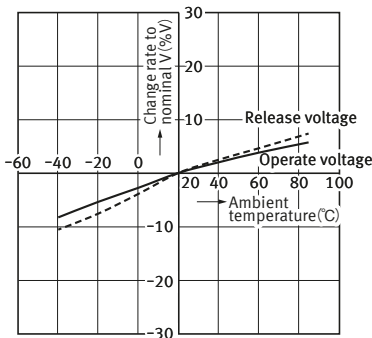
3-3. Coil temperature characteristics (2 Form A: Average)

Tested sample : DSP2a-12V DC, 5 pcs.



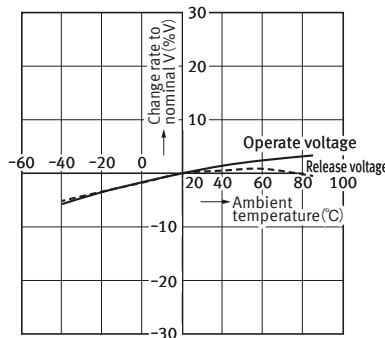
4-1. Ambient temperature characteristics (1 Form A: Average)

Tested sample : DSP1a-12V DC, 5 pcs.



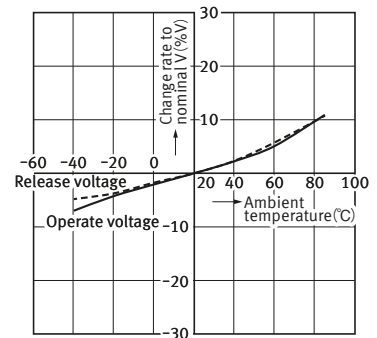
4-2. Ambient temperature characteristics (1 Form A 1 Form B: Average)

Tested sample : DSP1-12V DC, 5 pcs.



4-3. Ambient temperature characteristics (2 Form A: Average)

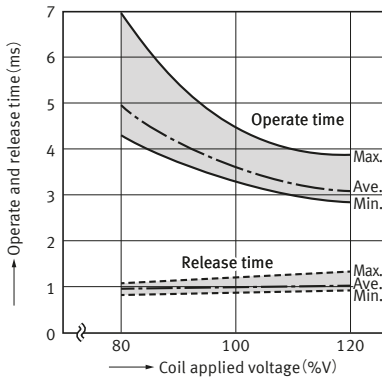
Tested sample : DSP2a-12V DC, 5 pcs.



# Power relays (Over 2 A) DS POWER RELAYS

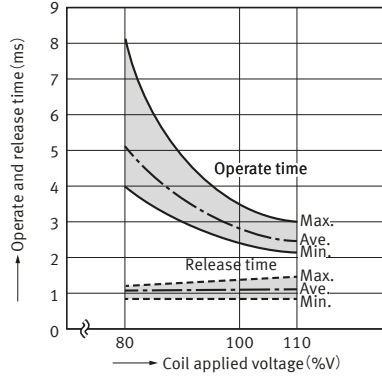
5-1. Operate and release time  
(without diode: 1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



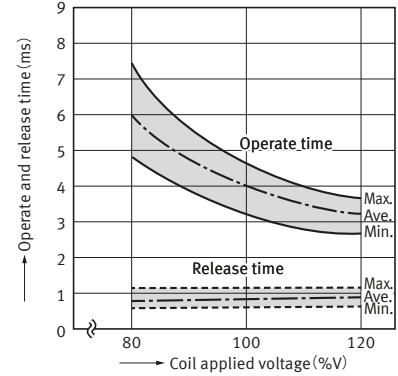
5-2. Operate and release time  
(without diode: 1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



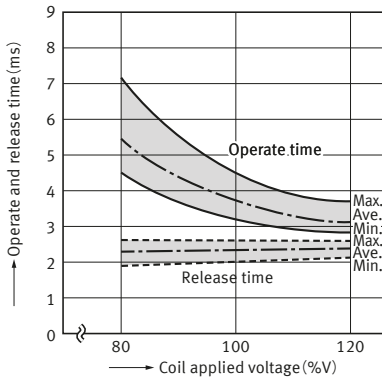
5-3. Operate and release time  
(without diode: 2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.



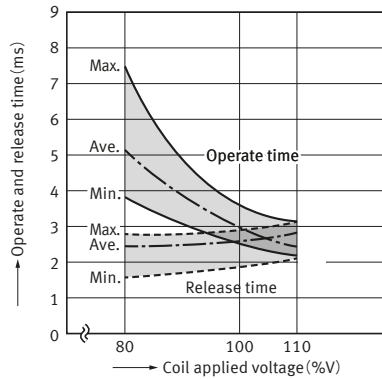
5-4. Operate and release time  
(with diode: 1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



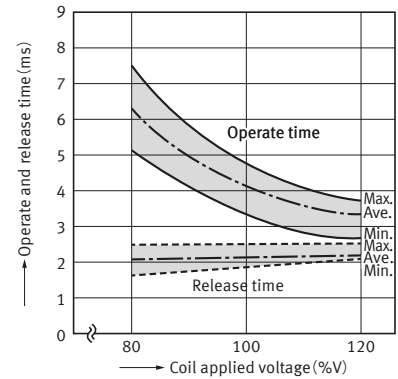
5-5. Operate and release time  
(with diode: 1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



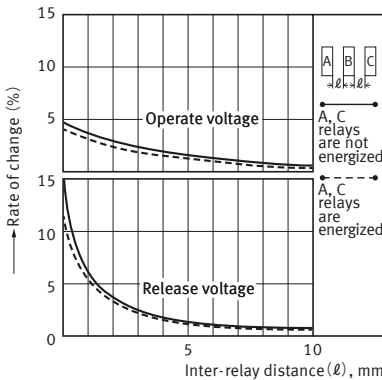
5-6. Operate and release time  
(with diode: 2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.



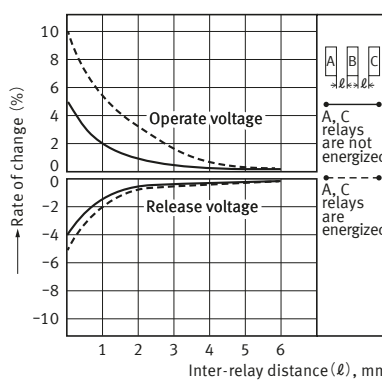
6-1. Influence of proximity mounting  
(1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



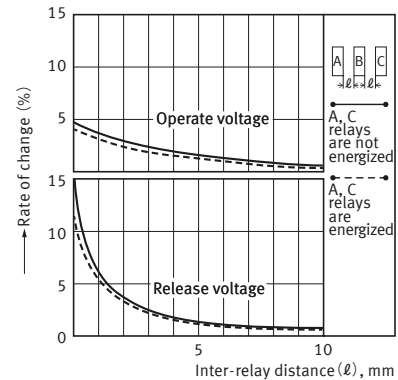
6-2. Influence of proximity mounting  
(1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



6-3. Influence of proximity mounting  
(2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.





# Power relays (Over 2 A) DS POWER RELAYS

## DIMENSIONS

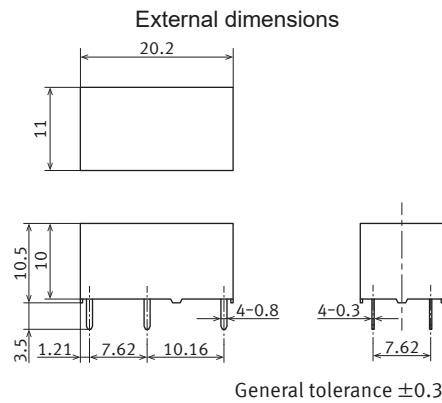
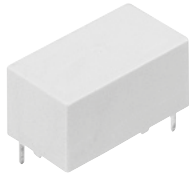
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

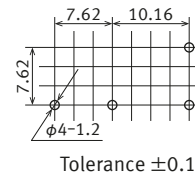
### ■ 1 Form A

● Single side stable

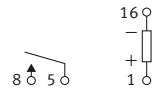
**CAD**



Recommended PC board pattern  
(BOTTOM VIEW)

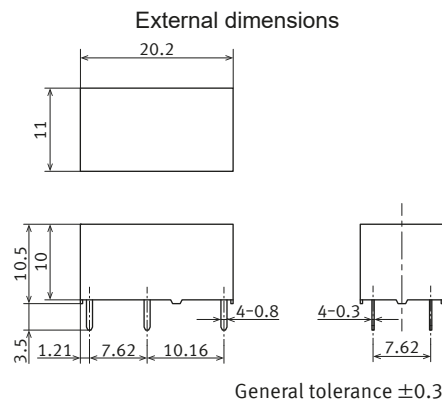
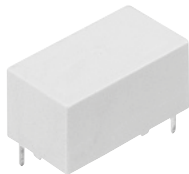


Schematic  
(BOTTOM VIEW)  
(De-energize)

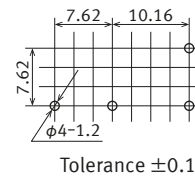


### ● 1 coil latching

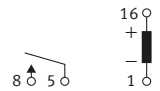
**CAD**



Recommended PC board pattern  
(BOTTOM VIEW)

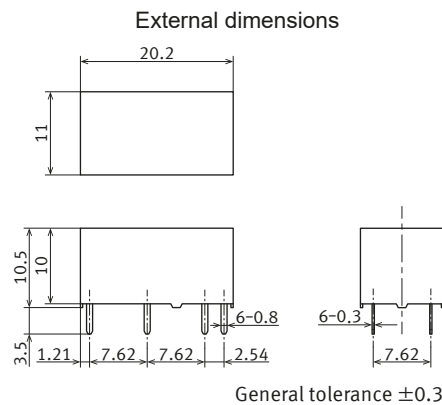


Schematic  
(BOTTOM VIEW)  
(Reset)

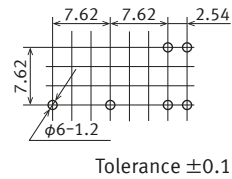


### ● 2 coil latching

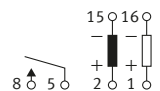
**CAD**



Recommended PC board pattern  
(BOTTOM VIEW)



Schematic  
(BOTTOM VIEW)  
(Reset)



# Power relays (Over 2 A) DS POWER RELAYS

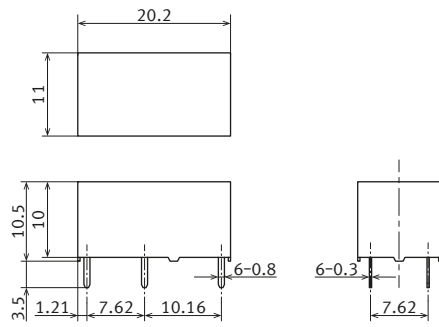
## ■ 1 Form A 1 Form B

● Single side stable

**CAD**

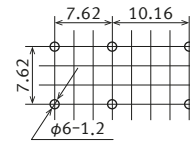


External dimensions



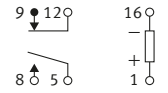
General tolerance  $\pm 0.3$

Recommended PC board pattern  
(BOTTOM VIEW)



Tolerance  $\pm 0.1$

Schematic  
(BOTTOM VIEW)  
(De-energize)

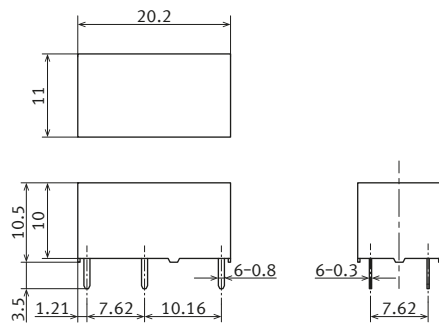


● 1 coil latching

**CAD**

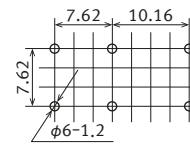


External dimensions



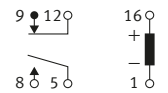
General tolerance  $\pm 0.3$

Recommended PC board pattern  
(BOTTOM VIEW)



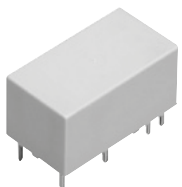
Tolerance  $\pm 0.1$

Schematic  
(BOTTOM VIEW)  
(Reset)

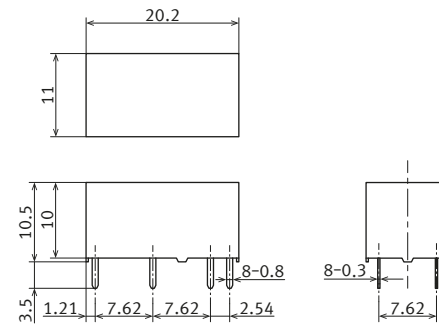


● 2 coil latching

**CAD**

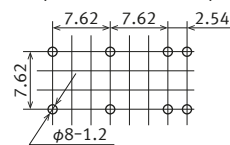


External dimensions



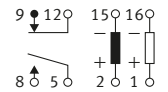
General tolerance  $\pm 0.3$

Recommended PC board pattern  
(BOTTOM VIEW)



Tolerance  $\pm 0.1$

Schematic  
(BOTTOM VIEW)  
(Reset)



# Power relays (Over 2 A) DS POWER RELAYS

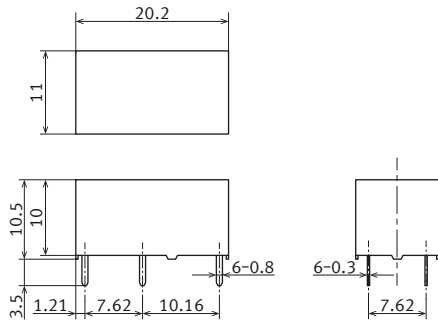
## ■ 2 Form A

● Single side stable

**CAD**

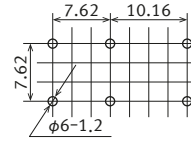


External dimensions



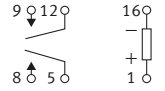
General tolerance  $\pm 0.3$

Recommended PC board pattern (BOTTOM VIEW)



Tolerance  $\pm 0.1$

Schematic (BOTTOM VIEW) (De-energize)

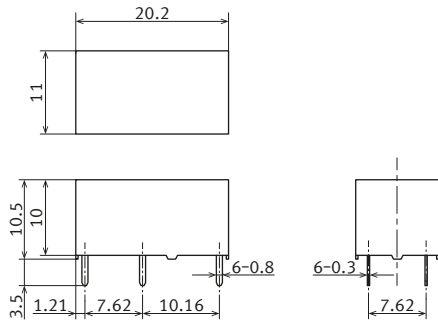


● 1 coil latching

**CAD**

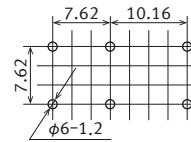


External dimensions



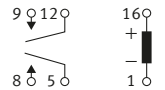
General tolerance  $\pm 0.3$

Recommended PC board pattern (BOTTOM VIEW)



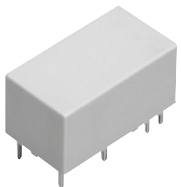
Tolerance  $\pm 0.1$

Schematic (BOTTOM VIEW) (Reset)

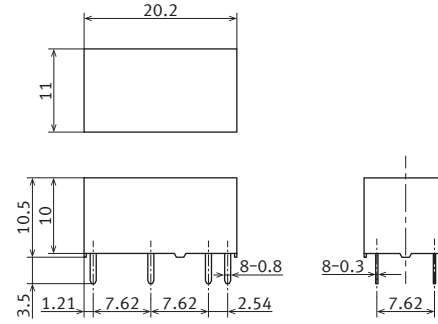


● 2 coil latching

**CAD**

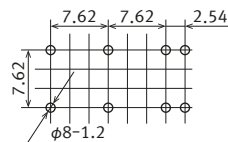


External dimensions



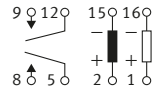
General tolerance  $\pm 0.3$

Recommended PC board pattern (BOTTOM VIEW)



Tolerance  $\pm 0.1$

Schematic (BOTTOM VIEW) (Reset)



# Power relays (Over 2 A) DS POWER RELAYS

## SAFETY STANDARDS

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

### ■ UL/C-UL ( Approved )

1 Form A

File No.	Contact rating
E43028	8 A 125, 250 V AC
	5 A 30 V DC R
	½ HP 125, 250 V AC
	B300

1 Form A 1 Form B

File No.	Contact rating
E43028	5 A 125, 250 V AC
	5 A 30 V DC R
	½ HP 125, 250 V AC
	30W Max.:1A 30V DC - 0.24 A 125 V DC

2 Form A

File No.	Contact rating
E43028	5 A 125, 250 V AC
	5 A 30 V DC R
	½ HP 125, 250 V AC

### ■ TÜV ( Approved )

1 Form A

File No.	Contact rating
B 18 03 13461 370	8 A 250 V AC (cosφ=1.0)
	5 A 250 V AC (cosφ=0.4)
	5 A 30 V DC (0 ms)

1 Form A 1 Form B

File No.	Contact rating
B 18 03 13461 370	5 A 250 V AC (cosφ=1.0)
	5 A 30 V DC (0 ms)
	3 A 250 V AC (cosφ=0.4)

2 Form A

File No.	Contact rating
B 18 03 13461 370	5 A 250 V AC (cosφ=1.0)
	5 A 30 V DC (0 ms)
	3 A 250 V AC (cosφ=0.4)

## 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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

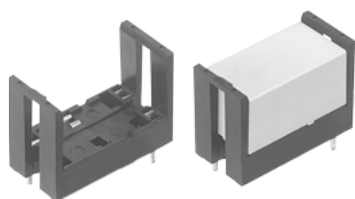
### ■ Cautions for usage of DS power relays

- Measurement of operate (set) and release (reset) voltages is done with terminals facing down.
- Please be careful when using this relay (1 Form A 1 Form B), because when it operates and releases, the N.O. and N.C. turn ON simultaneously, which can cause harm to the circuit.

### ● 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 25 ms or more at the rated coil voltage.

## PC board sockets



### SELECTOR CHART

Relay type		Socket	1 Form A		1 Form A, 1 Form A 1 Form B, 2 Form A	
			Single side stable, 1 coil latching	2 coil latching	Single side stable, 1 coil latching	2 coil latching
1 Form A	Single side stable		●	●	●	●
	1 coil latching		●	-	●	-
	2 coil latching		-	●	-	●
1 Form A 1 Form B	Single side stable		-	-	●	●
	1 coil latching		-	-	●	-
	2 coil latching		-	-	-	●
2 Form A	Single side stable		-	-	●	●
	1 coil latching		-	-	●	-
	2 coil latching		-	-	-	●

### TYPES

Product name	Single side stable, 1 coil latching		2 coil latching		Standard packing	
	Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	DSP1a-PS	AGP2800	DSP1a-PSL2	AGP2802	50 pcs.	500 pcs.
1 Form A, 1 Form A 1 Form B, 2 Form A	DSP2a-PS	AGP2820	DSP2a-PSL2	AGP2822		

### RATING

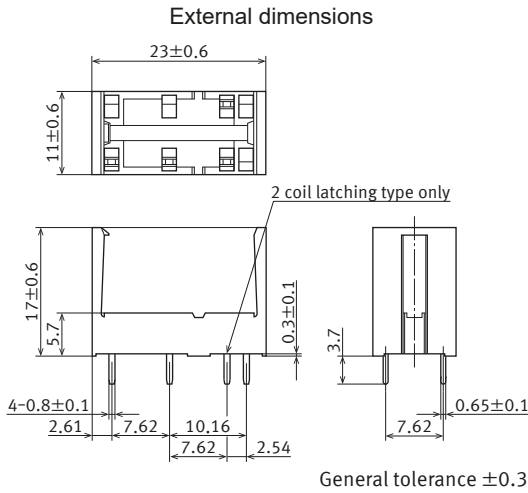
Item	Specifications
Dielectric strength (initial)	Each between terminal: 3,000 Vrms for 1 min (detection current:10 mA) (Except for the portion between coil terminals, AGP2802 and AGP2822 applicable)
Insulation resistance (initial)	Each between terminal: Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Maximum carrying current	8 A (AGP2800, AGP2802) 5 A (AGP2820, AGP2822)
Conditions for usage, transport and storage	Ambient temperature: -40 to +65°C Humidity:5 to 85% RH (Avoid icing and condensation)

## DIMENSIONS

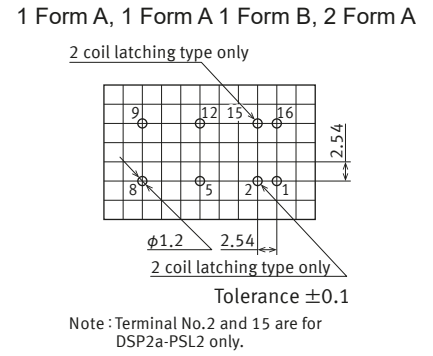
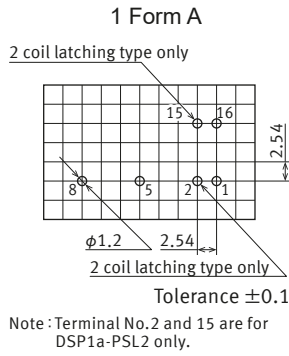
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

### CAD



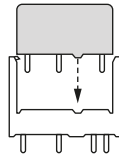
### Recommended PC board pattern (BOTTOM VIEW)



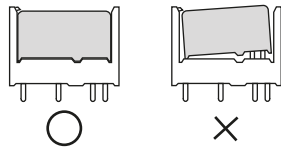
## HANDLING

### Mounting method of relay

1) Match the direction of relay and socket.

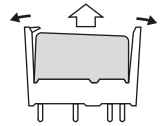


2) Both ends of relays are fixed so tightly that the socket hooks on the top surface of relays.

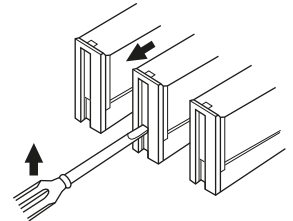


### Removing method of relay

1) Remove the relay, applying force in the direction as shown in the figure.



2) In case there is not enough space for finger to pick relay up, use screw drivers 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.

## GUIDELINES FOR USAGE

- Do not remove or insert relays when they are energized.
- Do not install other brands of relays into these sockets.

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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

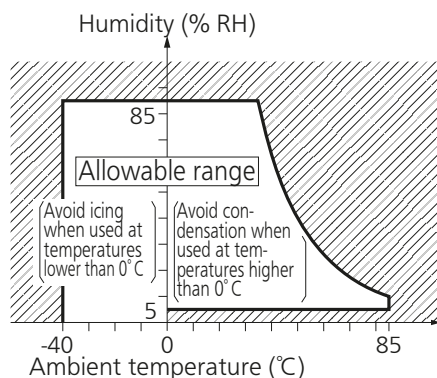
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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 switch 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 seal 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](https://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/](https://industrial.panasonic.com/ac/e/)

Power Relays ( Over 2 A )  
**DY RELAYS**

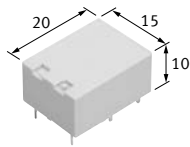
Product Catalog

**IN Your  
Future**

# DY RELAYS

## 1 Form A 10 A, 1 Form A 1 Form B 8 A, Small polarized power relays

Protective construction : Sealed type



(Unit : mm)

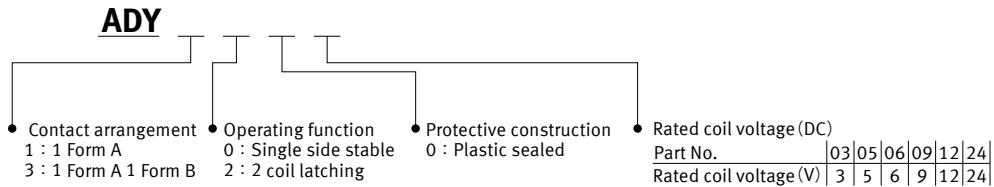
### FEATURES

- High capacity 1 Form A (10 A 250 V AC), 1 Form A 1 Form B (8 A 250 V AC)
- Compliance with the IEC standard EN61010-1 (Reinforced insulation with 6 mm distance between input and output)
- Variety of contact arrangements (1 Form A, 1 Form A 1 Form B)
- PC board sockets are available
- Latching types available

### TYPICAL APPLICATIONS

- Control for machine tools and robots
- Output for temperature controller, PLC, timers and sensors
- Measuring equipment
- Security equipment

### ORDERING INFORMATION (PART NO.)



### TYPES

Contact arrangement	Rated coil voltage	Part No.		Standard packing	
		Single side stable	2 coil latching	Inner carton	Outer carton
1 Form A	3 V DC	ADY10003	ADY12003	50 pcs.	500 pcs.
	5 V DC	ADY10005	ADY12005		
	6 V DC	ADY10006	ADY12006		
	9 V DC	ADY10009	ADY12009		
	12 V DC	ADY10012	ADY12012		
	24 V DC	ADY10024	ADY12024		
1 Form A 1 Form B	3 V DC	ADY30003	ADY32003		
	5 V DC	ADY30005	ADY32005		
	6 V DC	ADY30006	ADY32006		
	9 V DC	ADY30009	ADY32009		
	12 V DC	ADY30012	ADY32012		
	24 V DC	ADY30024	ADY32024		

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

# Power Relays (Over 2 A) DY RELAYS

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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. 70% V of rated coil voltage (Initial)	Min. 10% V of rated coil voltage (Initial)	66.6 mA	45 $\Omega$	200 mW	130% V of rated coil voltage
5 V DC			40 mA	125 $\Omega$		
6 V DC			33.3 mA	180 $\Omega$		
9 V DC			22.2 mA	405 $\Omega$		
12 V DC			16.6 mA	720 $\Omega$		
24 V DC			8.3 mA	2,880 $\Omega$		

\*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. 70% V of rated coil voltage (Initial)	Max. 70% V of rated coil voltage (Initial)	66.6 mA	66.6 mA	45 $\Omega$	45 $\Omega$	200 mW	200 mW	130% V of rated coil voltage
5 V DC			40 mA	40 mA	125 $\Omega$	125 $\Omega$			
6 V DC			33.3 mA	33.3 mA	180 $\Omega$	180 $\Omega$			
9 V DC			22.2 mA	22.2 mA	405 $\Omega$	405 $\Omega$			
12 V DC			16.6 mA	16.6 mA	720 $\Omega$	720 $\Omega$			
24 V DC			8.3 mA	8.3 mA	2,880 $\Omega$	2,880 $\Omega$			

\*square, pulse drive

### Specifications

Item		Specifications	
Contact data	Contact arrangement	1 Form A	1 Form A 1 Form B
	Contact resistance (initial)	Max. 30 m $\Omega$ (by voltage drop 6 V DC 1 A)	
	Contact material	Au-flashed AgSnO <sub>2</sub> type	
	Contact rating (resistive)	10 A 250 V AC, 10 A 30 V DC	8 A 250 V AC, 8 A 30 V DC
	Max. switching power (resistive)	2,500 VA, 300 W	2,000 VA, 240 W
	Max. switching voltage	250 V AC, 125 V DC (0.2 A)	
	Max. switching current	10 A	8 A
	Min. switching load (reference value) *1	10 mA 5 V DC	
Insulation resistance (initial)		Min. 1,000 M $\Omega$ (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	-	4,000 Vrms for 1 min
	Between contact and coil	4,000 Vrms for 1 min (detection current: 10 mA)	
Surge withstand voltage (initial) *2	Between contact and coil	10,000 V	
Time characteristics (initial)	Operate (Set) time	Max. 10 ms (Max. 10 ms) at rated coil voltage (at 20°C, without bounce)	
	Release (Reset) time	Max. 8 ms (Max. 10 ms) at rated coil voltage (at 20°C, without bounce, without diode)	
Shock resistance	Functional	98 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 $\mu$ s)	
	Destructive	980 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)	
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1.5 mm) (detection time: 10 $\mu$ s)	
	Destructive	10 to 55 Hz (at double amplitude of 3 mm)	
Expected switching life	Mechanical	Min. 50 x 10 <sup>6</sup> (switching frequency: 300 times/min)	
Use condition	Conditions for usage, transport and storage*3	Ambient temperature: -40 to +70°C Humidity: 5 to 85% RH (Avoid icing and condensation)	
Unit weight		Approx. 6 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**

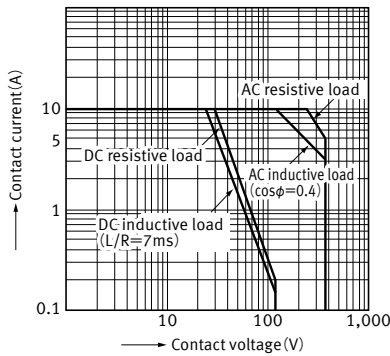
Conditions: Resistive load, Switching frequency 20 times/min

Type	Switching capacity	Number of operations
1 Form A	10 A 250 V AC	Min. 100 x 10 <sup>3</sup>
	10 A 30 V DC	Min. 100 x 10 <sup>3</sup>
1 Form A 1 Form B	8 A 250 V AC	Min. 100 x 10 <sup>3</sup>
	8 A 30 V DC	Min. 100 x 10 <sup>3</sup>

**REFERENCE DATA**

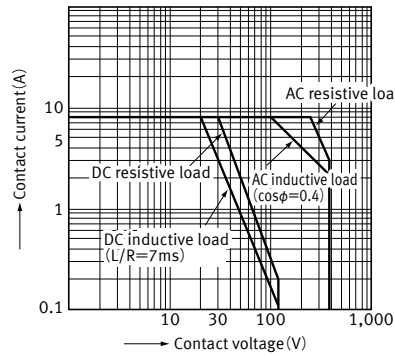
1-1.Max. switching capacity (1 Form A)

Tested sample : ADY10024



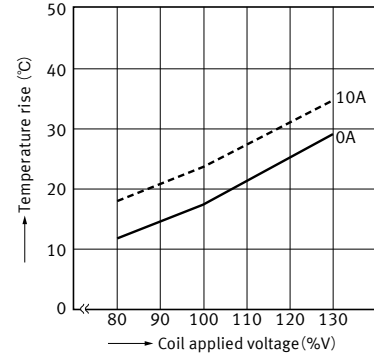
1-2.Max. switching capacity (1 Form A 1 Form B)

Tested sample : ADY30024



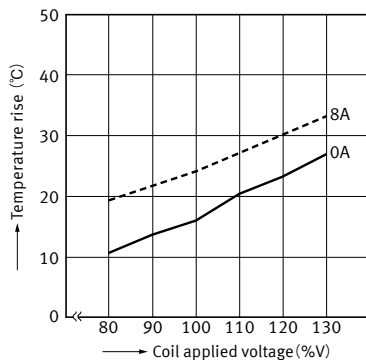
2-1.Coil temperature characteristics (1 Form A)

Tested sample : ADY10024, 6 pcs.  
Ambient temperature : 20°C



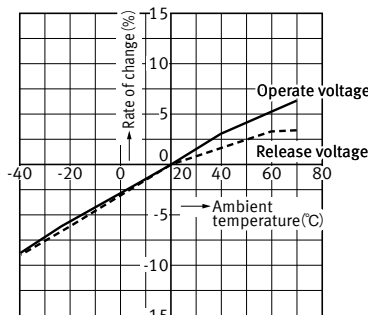
2-2.Coil temperature characteristics (1 Form A 1 Form B)

Tested sample : ADY30024, 6 pcs.  
Ambient temperature : 20°C



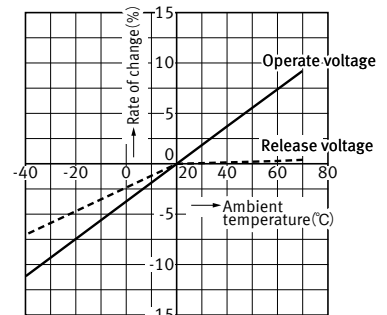
3-1.Ambient temperature characteristics (1 Form A)

Tested sample : ADY10024, 6 pcs.  
Ambient temperature : -40°C to +70°C



3-2.Ambient temperature characteristics (1 Form A 1 Form B)

Tested sample : ADY30024, 6 pcs.  
Ambient temperature : -40°C to +70°C



**DIMENSIONS**

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

Unit: mm

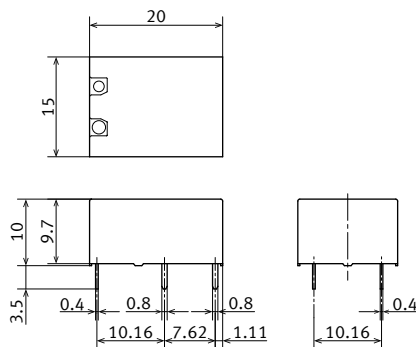
**1 Form A**

● Single side stable

**CAD**

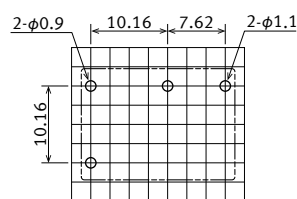


External dimensions



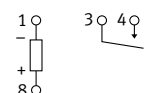
General tolerance ±0.3

Recommended PC board pattern (BOTTOM VIEW)



Tolerance ±0.1

Schematic (BOTTOM VIEW) (De-energize)

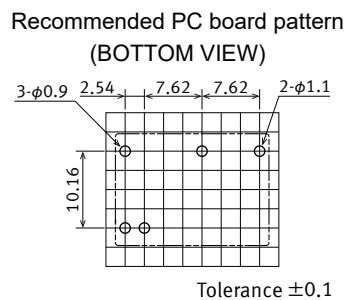
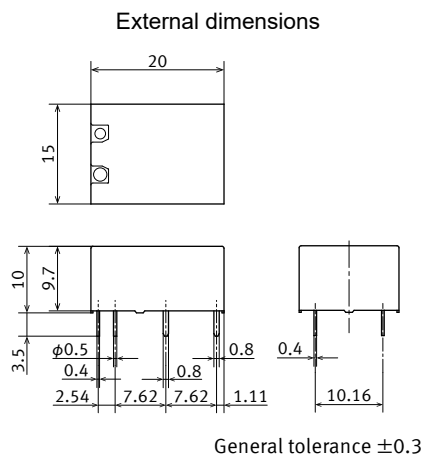


Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

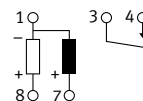
# Power Relays (Over 2 A) DY RELAYS

● 2 coil latching

**CAD**



Schematic  
(BOTTOM VIEW)  
(Reset)

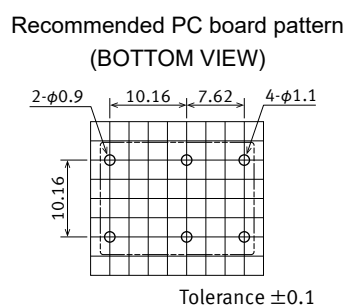
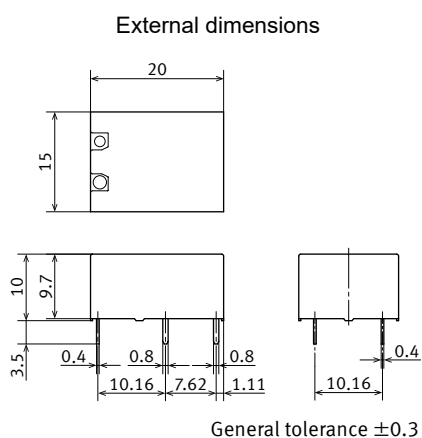


Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

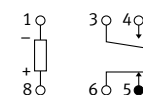
■ 1 Form A 1 Form B

● Single side stable

**CAD**



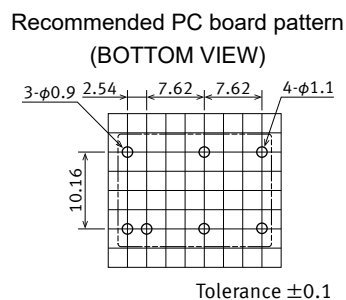
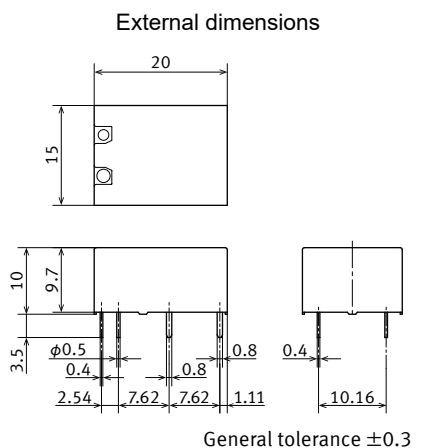
Schematic  
(BOTTOM VIEW)  
(De-energize)



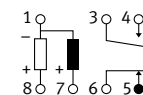
Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

● 2 coil latching

**CAD**



Schematic  
(BOTTOM VIEW)  
(Reset)



Note: Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

**SAFETY STANDARDS**

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

**UL (Approved)**

1 Form A

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

1 Form A 1 Form B

File No.	Contact rating
E43028	8A 250V AC
	1/4 HP 125, 250 V AC
	8 A 30 V DC

**CSA (Approved)**

1 Form A

File No.	Contact rating
LR26550	10 A 250 V AC
	1/3 HP 125, 250 V AC
	10 A 30 V DC

1 Form A 1 Form B

File No.	Contact rating
LR26550	8 A 250 V AC
	1/4 HP 125, 250 V AC
	8 A 30 V DC

**TÜV (Approved)**

1 Form A

File No.	Contact rating
B1803 13461 366	10 A 250 V AC (cosφ = 1.0)
	10 A 30 V DC (0 ms)

1 Form A 1 Form B

File No.	Contact rating
B1803 13461 366	8 A 250 V AC (cosφ = 1.0)
	8 A 30 V DC (0 ms)

**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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

**Cautions for usage of DY relays**

● External magnetic field

Since DY relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

● 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.

● When using, please be aware that the N.O. and N.C. sides of 1 Form A 1 Form B type may go on simultaneously at operate time and release time.

● Soldering conditions

Please obey the following conditions

1) Automatic soldering

(1) Preheating

Temperature	Within 120°C (terminal portion)
Time	Within 120 seconds

(2) Soldering iron

Soldering temperature	260±5°C
Soldering time	Within 6 seconds

2) Hand soldering

(1) Preheating

Soldering temperature	Within 350°C
Soldering time	Within 3 seconds

Note: The type of PC board will affect the relay; therefore, please confirm operation with the actual PC board to be used.

# PC board sockets



## SELECTOR CHART

Relay type		Socket	1 Form A		1 Form A 1 Form B	
			Single side stable	2 coil latching	Single side stable	2 coil latching
1 Form A	Single side stable		●	●	-	-
	2 coil latching		-	●	-	-
1 Form A 1 Form B	Single side stable		-	-	●	●
	2 coil latching		-	-	-	●

## TYPES

### ● Carton packing

Contact arrangement	Single side stable		2 coil latching		Standard packing	
	Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
1 Form A	DK1a-PS	AW3810	DK1a-PSL2	AW3810	50 pcs.	500 pcs.
1 Form A 1 Form B	DK2a-PS	AW3820	DK2a-PSL2	AW3820		

## RATING

Item	Specifications	
Contact arrangement	1 Form A	1 Form A 1 Form B
Dielectric strength (initial)	Each between terminals: 4,000 Vrms for 1 min (detection current:10 mA) (Except for the portion between coil terminals)	
Insulation resistance (initial)	Each 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	8 A
Conditions	Ambient temperature: -40 to +65°C Humidity:5 to 85% RH (Avoid icing and condensation)	

## DIMENSIONS

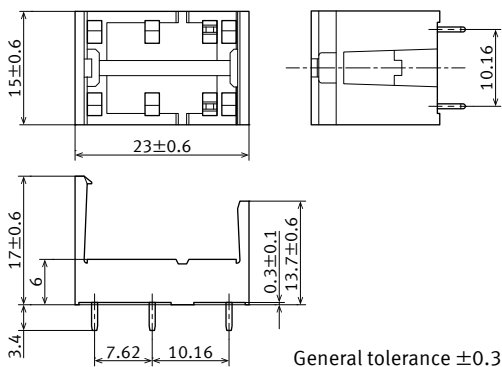
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

### ● Single side stable

#### CAD

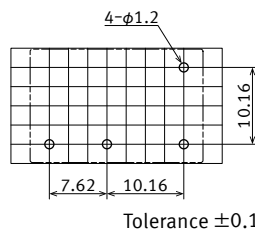
External dimensions



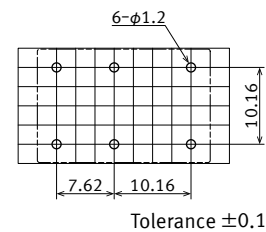
Recommended PC board pattern

(BOTTOM VIEW)

1 Form A



1 Form A 1 Form B

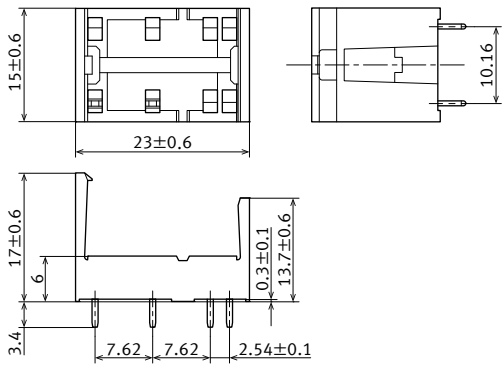




● 2 coil latching

**CAD**

External dimensions

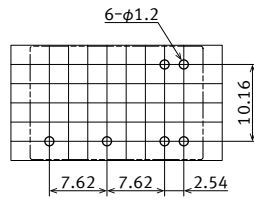


General tolerance ±0.3

Recommended PC board pattern

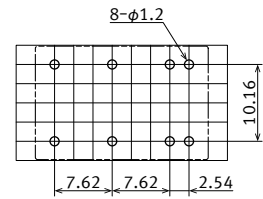
(BOTTOM VIEW)

1 Form A



Tolerance ±0.1

1 Form A 1 Form B

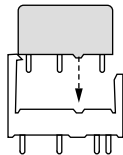


Tolerance ±0.1

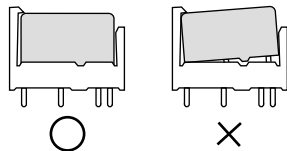
**HANDLING**

■ Mounting method of relay

1) Match the direction of relay and socket.

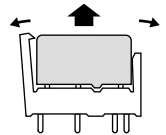


2) Both ends of relays are fixed so tightly that the socket hooks on the top surface of relays.

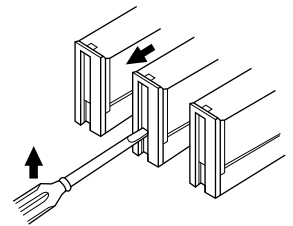


■ Removing method of relay

1) Remove the relay, applying force in the direction as shown in the figure.



2) In case there is not enough space for finger to pick relay up, use screw drivers 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.

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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

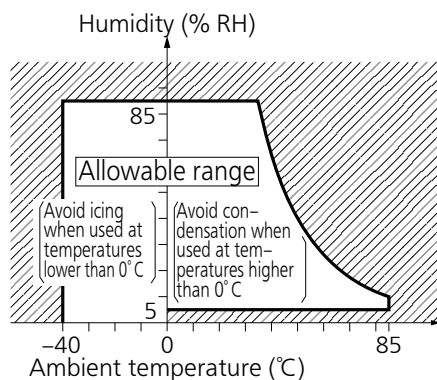
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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 switch 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2 A )

# HE RELAYS

Product Catalog

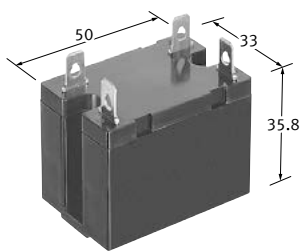
**IN Your  
Future**

# HE RELAYS

## TV-10/TV-15 rated, 1 Form A 30 A, 2 Form A 25 A, Power relays

**Protective construction**

- Dust cover type : Plug-in, TM and Screw terminal types
- Flux-resistant type : PC board type



1 Form A Plug-in type

(Unit : mm)

**FEATURES**

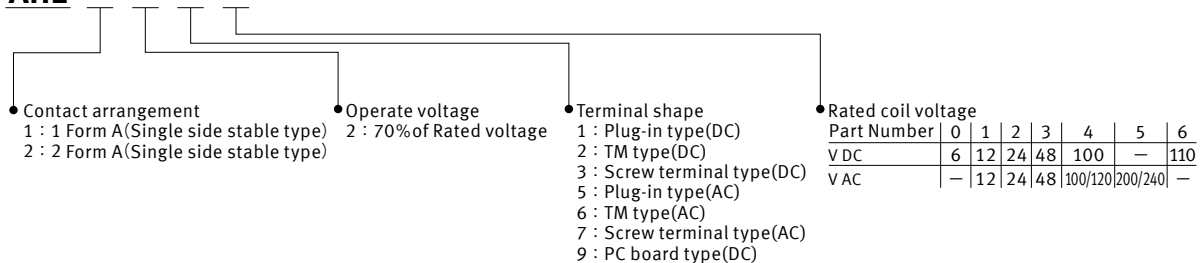
- **High capacity:** 30 A (1 Form A), 25 A (2 Form A)
- **TV standard approved:** TV-15 (1 Form A), TV-10 (2 Form A)
- **Surge withstand voltage:** 10,000 V (between contact and coil)
- **Terminal sockets are available**

**TYPICAL APPLICATIONS**

- Office equipment
- Industrial equipment
- Home appliances

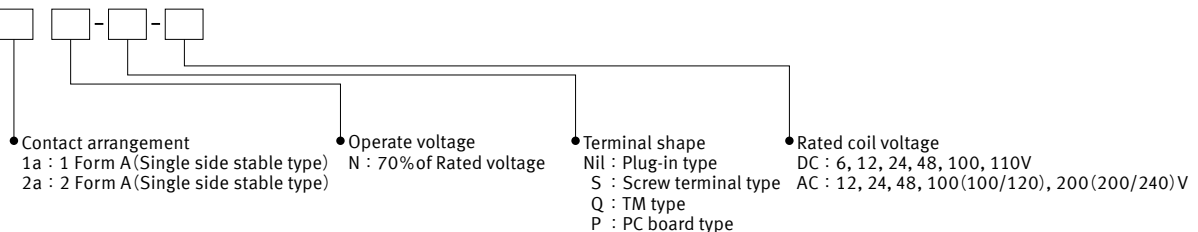
**ORDERING INFORMATION (PART NO. : Ordering part number for Japanese market)**

**AHE**



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

**HE**



**CLASSIFICATION**

Item	PC board terminal	Plug-in terminal	TM type	Screw terminal
Operational function	Single side stable			
Contact arrangement	1 Form A	1 Form A	2 Form A	1 Form A 2 Form A
Insulation gap	Min. 8 mm			
Distance between contacts (Reference value)	Min. 2.5 mm	Min. 3 mm		
Dielectric strength (initial)	Between open contacts	2,000 Vrms for 1 min		
	Between contact and coil	5,000 Vrms for 1 min		

# Power relays (Over 2 A) HE RELAYS

## TYPES

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

### ■ DC PC board terminal

Rated coil voltage	1 Form A		Standard packing	
	Type No.	Part No.	Inner carton	Outer carton
6 V DC	HE1aN-P-DC6V	AHE1290	25 pcs.	100 pcs.
12 V DC	HE1aN-P-DC12V	AHE1291		
24 V DC	HE1aN-P-DC24V	AHE1292		
48 V DC	HE1aN-P-DC48V	AHE1293		
100 V DC	HE1aN-P-DC100V	AHE1294		
110 V DC	HE1aN-P-DC110V	AHE1296		

### ■ Plug-in terminal

Type	Rated coil voltage	1 Form A		2 Form A		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
DC type	6 V DC	HE1aN-DC6V	AHE1210	HE2aN-DC6V	AHE2210	20 pcs.	100 pcs.
	12 V DC	HE1aN-DC12V	AHE1211	HE2aN-DC12V	AHE2211		
	24 V DC	HE1aN-DC24V	AHE1212	HE2aN-DC24V	AHE2212		
	48 V DC	HE1aN-DC48V	AHE1213	HE2aN-DC48V	AHE2213		
	100 V DC	HE1aN-DC100V	AHE1214	HE2aN-DC100V	AHE2214		
	110 V DC	HE1aN-DC110V	AHE1216	HE2aN-DC110V	AHE2216		
AC type	12 V AC	HE1aN-AC12V	AHE1251	HE2aN-AC12V	AHE2251		
	24 V AC	HE1aN-AC24V	AHE1252	HE2aN-AC24V	AHE2252		
	48 V AC	HE1aN-AC48V	AHE1253	HE2aN-AC48V	AHE2253		
	100/120 V AC	HE1aN-AC100V	AHE1254	HE2aN-AC100V	AHE2254		
	200/240 V AC	HE1aN-AC200V	AHE1255	HE2aN-AC200V	AHE2255		

### ■ TM type

Type	Rated coil voltage	1 Form A		2 Form A		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
DC type	6 V DC	HE1aN-Q-DC6V	AHE1220	HE2aN-Q-DC6V	AHE2220	20 pcs.	100 pcs.
	12 V DC	HE1aN-Q-DC12V	AHE1221	HE2aN-Q-DC12V	AHE2221		
	24 V DC	HE1aN-Q-DC24V	AHE1222	HE2aN-Q-DC24V	AHE2222		
	48 V DC	HE1aN-Q-DC48V	AHE1223	HE2aN-Q-DC48V	AHE2223		
	100 V DC	HE1aN-Q-DC100V	AHE1224	HE2aN-Q-DC100V	AHE2224		
	110 V DC	HE1aN-Q-DC110V	AHE1226	HE2aN-Q-DC110V	AHE2226		
AC type	12 V AC	HE1aN-Q-AC12V	AHE1261	HE2aN-Q-AC12V	AHE2261		
	24 V AC	HE1aN-Q-AC24V	AHE1262	HE2aN-Q-AC24V	AHE2262		
	48 V AC	HE1aN-Q-AC48V	AHE1263	HE2aN-Q-AC48V	AHE2263		
	100/120 V AC	HE1aN-Q-AC100V	AHE1264	HE2aN-Q-AC100V	AHE2264		
	200/240 V AC	HE1aN-Q-AC200V	AHE1265	HE2aN-Q-AC200V	AHE2265		

### ■ Screw terminal

Type	Rated coil voltage	1 Form A		2 Form A		Standard packing	
		Type No.	Part No.	Type No.	Part No.	Inner carton	Outer carton
DC type	6 V DC	HE1aN-S-DC6V	AHE1230	HE2aN-S-DC6V	AHE2230	10 pcs.	50 pcs.
	12 V DC	HE1aN-S-DC12V	AHE1231	HE2aN-S-DC12V	AHE2231		
	24 V DC	HE1aN-S-DC24V	AHE1232	HE2aN-S-DC24V	AHE2232		
	48 V DC	HE1aN-S-DC48V	AHE1233	HE2aN-S-DC48V	AHE2233		
	100 V DC	HE1aN-S-DC100V	AHE1234	HE2aN-S-DC100V	AHE2234		
	110 V DC	HE1aN-S-DC110V	AHE1236	HE2aN-S-DC110V	AHE2236		
AC type	12 V AC	HE1aN-S-AC12V	AHE1271	HE2aN-S-AC12V	AHE2271		
	24 V AC	HE1aN-S-AC24V	AHE1272	HE2aN-S-AC24V	AHE2272		
	48 V AC	HE1aN-S-AC48V	AHE1273	HE2aN-S-AC48V	AHE2273		
	100/120 V AC	HE1aN-S-AC100V	AHE1274	HE2aN-S-AC100V	AHE2274		
	200/240 V AC	HE1aN-S-AC200V	AHE1275	HE2aN-S-AC200V	AHE2275		

For the terminal sockets, please refer to the "HE RELAYS Terminal sockets".

## RATING

## ■ Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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.

## ● AC type

Rated coil voltage	Operate voltage* (at 20°C)	Release voltage* (at 20°C)	Rated operating current ( $\pm 10\%$ , at 20°C)	Rated operating power	Max. allowable voltage (at 20°C)
12 V AC	Max. 70% V of rated coil voltage (Initial)	Min. 15% V of rated coil voltage (Initial)	138 mA	1.7 VA	110% V of rated coil voltage
24 V AC			74 mA	1.8 VA	
48 V AC			39 mA	1.9 VA	
100/120 V AC	Max. 70 V AC (Initial)	Min. 18 V AC (Initial)	18.7 to 22.1 mA	1.9 to 2.7 VA	
200/240 V AC	Max. 140 V AC (Initial)	Min. 36 V AC (Initial)	9.1 to 10.8 mA	1.8 to 2.6 VA	

\*Square, pulse drive

## ● DC type

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 55°C)
6 V DC	Max. 70% V of rated coil voltage (Initial)	Min. 10% V of rated coil voltage (Initial)	320 mA	18.8 $\Omega$	1,920 mW	110% V of rated coil voltage
12 V DC			160 mA	75 $\Omega$		
24 V DC			80 mA	300 $\Omega$		
48 V DC			40 mA	1,200 $\Omega$		
100 V DC			19 mA	5,200 $\Omega$		
110 V DC			18 mA	6,300 $\Omega$		

\*Square, pulse drive



# Power relays (Over 2 A) HE RELAYS

## ■ Specifications

Item		Specifications	
Contact data	Contact arrangement	1 Form A	2 Form A
	Contact resistance (initial)	Max. 100 mΩ (by voltage drop 6 V DC 1 A)	
	Contact material	AgSnO <sub>2</sub> type	
	Contact rating (resistive)	30 A 277 V AC	25 A 277 V AC
	Max. switching power (resistive)	8,310 VA	6,925 VA
	Max. switching voltage	277 V AC, 30 V DC	
	Max. switching current	30 A (AC)	25 A (AC)
	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	2,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact sets	-	4,000 Vrms for 1 min (detection current: 10 mA)
	Between contact and coil	5,000 Vrms 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. 30 ms at rated coil voltage (at 20°C, without bounce)	
	Release time	DC: Max. 10 ms at rated coil voltage (at 20°C, without bounce, without diode) AC: Max. 30 ms at rated coil voltage (at 20°C, without bounce)	
Shock resistance	Functional	98 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 μs)	
	Destructive	980 m/s <sup>2</sup> (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 1.5 mm)	
Expected life	Mechanical life	DC: Min. 10 x 10 <sup>6</sup> (switching frequency: 180 times/min), AC: Min. 5 x 10 <sup>6</sup> (switching frequency: 180 times/min)	
Conditions	Conditions for usage, transport and storage*3	Temperature: -50 to +55°C, Humidity: 5 to 85% RH (Avoid icing and condensation)	
Unit weight		PC board terminal: Approx. 80 g, Plug-in terminal and TM type: Approx. 90 g, Screw terminal: Approx. 120 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 ±1.2×50 μs according to JEC-212-1981

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

## ■ Expected electrical life

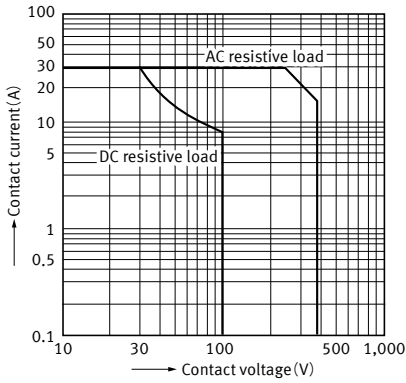
Conditions: Resistive load, switching frequency 20 times/min

Type	Switching capacity	Number of operations
1 Form A	30 A 250 V AC	Min. 200 x 10 <sup>3</sup>
2 Form A	20 A 250 V AC	Min. 200 x 10 <sup>3</sup>
	25 A 277 V AC	Min. 100 x 10 <sup>3</sup>

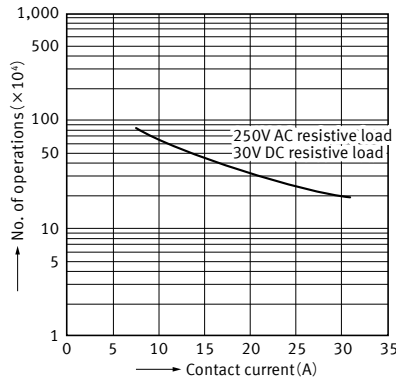
REFERENCE DATA

■ 1 Form A

1. Max. switching capacity

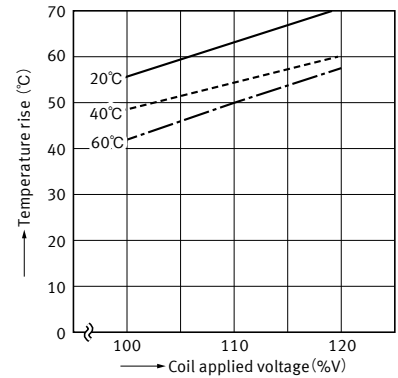


2. Switching life curve



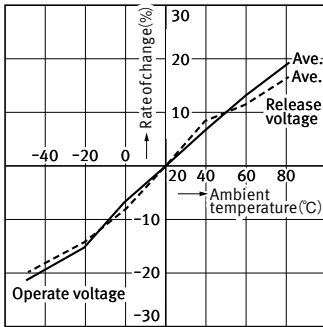
3. Coil temperature characteristics (DC type)

Measured portion : Coil inside  
Contact current : 30A



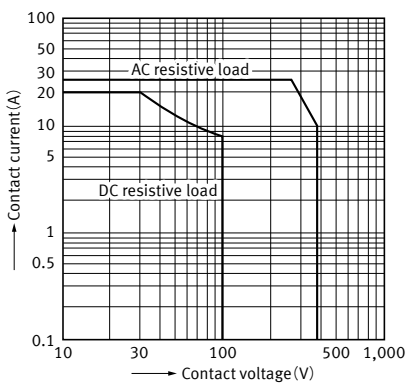
4. Ambient temperature characteristics (Average)

Tested sample : HE1aN-120V AC, 6pcs.

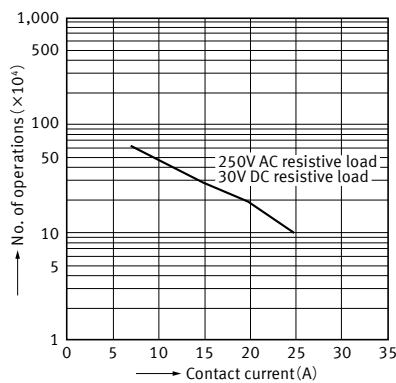


■ 2 Form A

1. Max. switching capacity

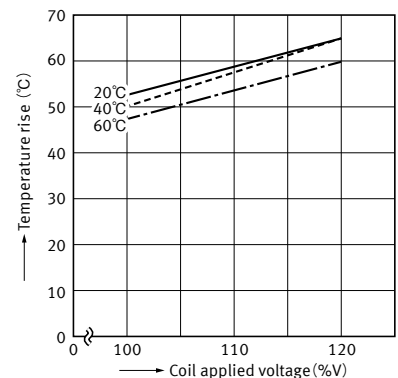


2. Switching life curve



3. Coil temperature characteristics (DC type)

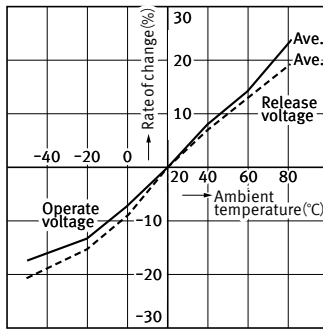
Measured portion : Coil inside  
Contact current : 25A



# Power relays (Over 2 A) HE RELAYS

## 4. Ambient temperature characteristics (Average)

Tested sample : HE2aN-120V AC, 6 pcs.



### DIMENSIONS

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

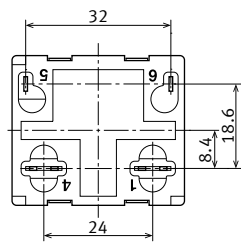
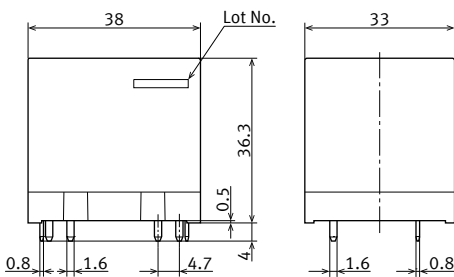
Unit: mm

### PC board terminal

● 1 Form A

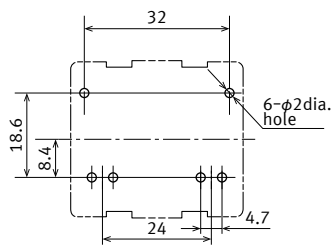
#### CAD

#### External dimensions



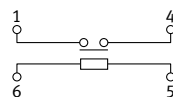
General tolerance  
 Less than 1mm :  $\pm 0.1$   
 Min. 1mm less than 3mm :  $\pm 0.2$   
 Min. 3mm :  $\pm 0.3$

#### Recommended PC board pattern (BOTTOM VIEW)



Tolerance  $\pm 0.1$

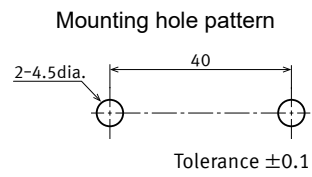
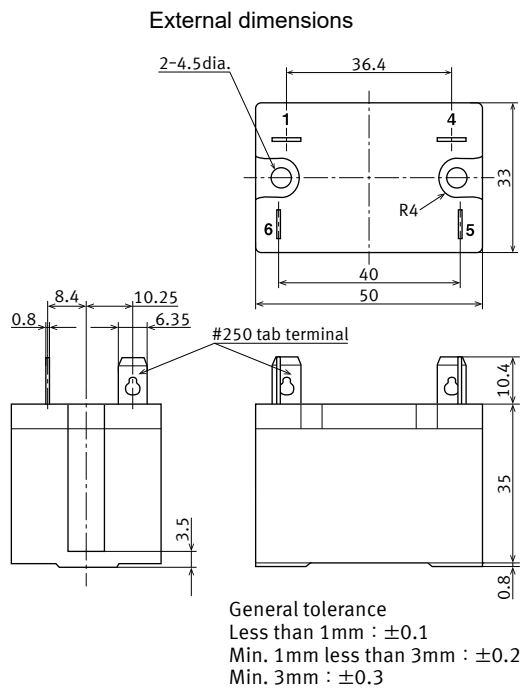
#### Schematic (BOTTOM VIEW)



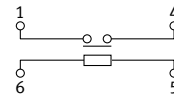
■ Plug-in terminal

● 1 Form A

CAD

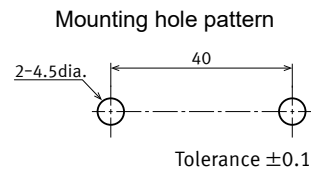
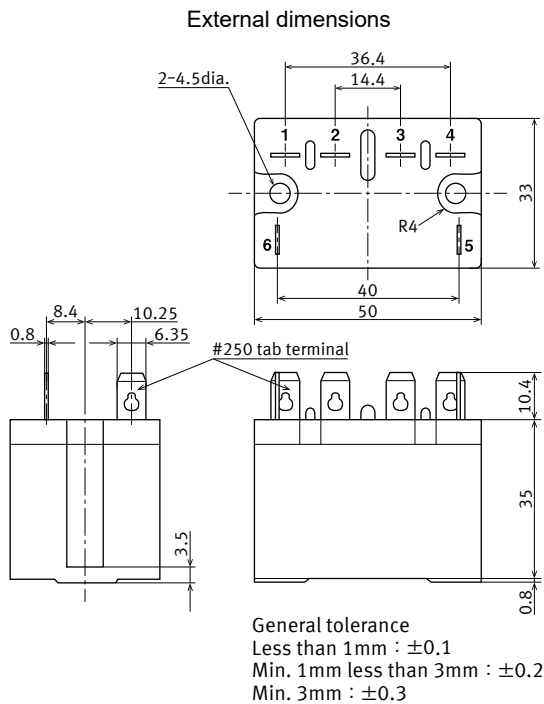


Schematic  
(BOTTOM VIEW)

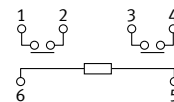


● 2 Form A

CAD



Schematic  
(BOTTOM VIEW)



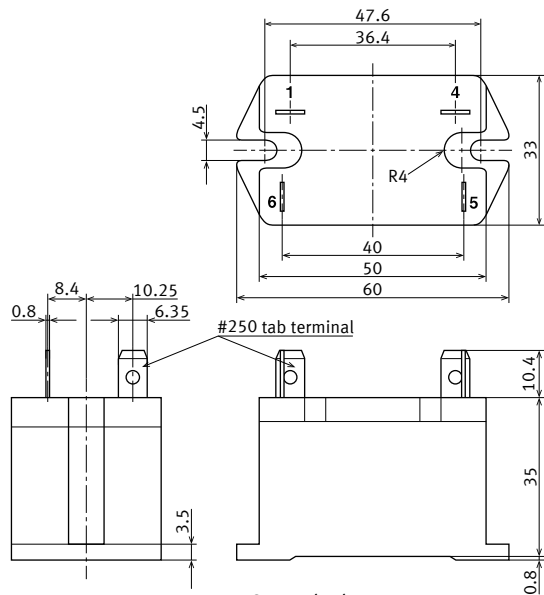
# Power relays (Over 2 A) HE RELAYS

■ TM type

● 1 Form A

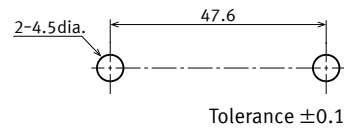
CAD

External dimensions

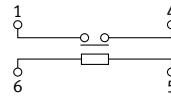


General tolerance  
 Less than 1mm :  $\pm 0.1$   
 Min. 1mm less than 3mm :  $\pm 0.2$   
 Min. 3mm :  $\pm 0.3$

Mounting hole pattern



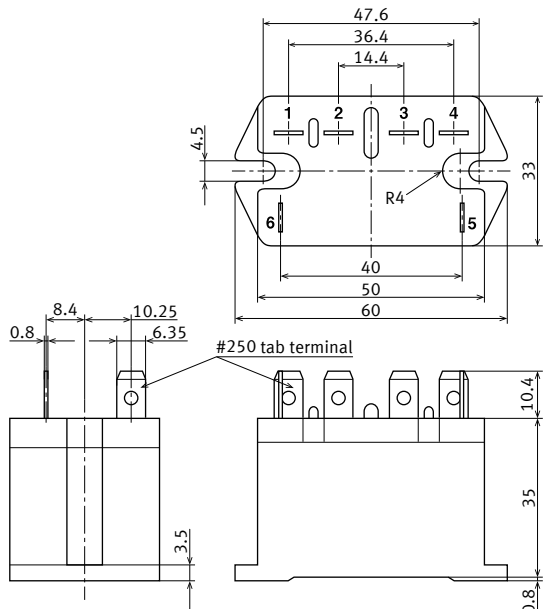
Schematic (BOTTOM VIEW)



● 2 Form A

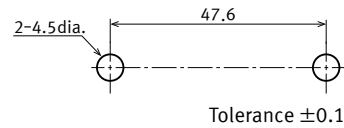
CAD

External dimensions

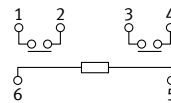


General tolerance  
 Less than 1mm :  $\pm 0.1$   
 Min. 1mm less than 3mm :  $\pm 0.2$   
 Min. 3mm :  $\pm 0.3$

Mounting hole pattern



Schematic (BOTTOM VIEW)

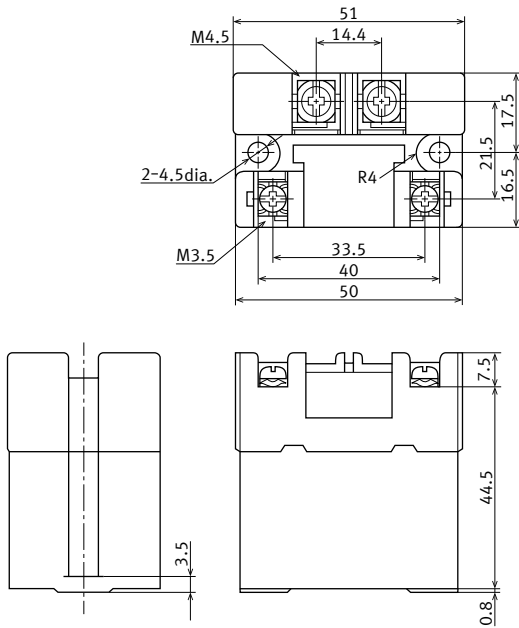


■ Screw terminal

● 1 Form A

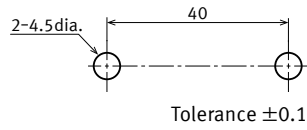
CAD

External dimensions

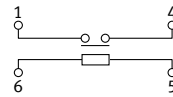


General tolerance  
 Less than 1mm :  $\pm 0.1$   
 Min. 1mm less than 3mm :  $\pm 0.2$   
 Min. 3mm :  $\pm 0.3$

Mounting hole pattern



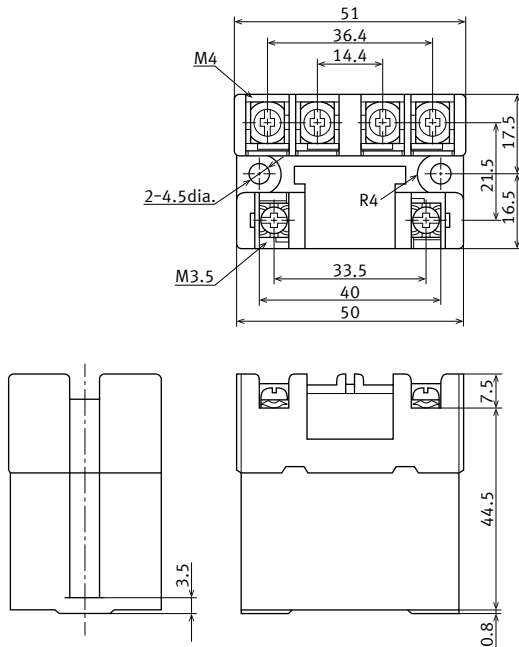
Schematic (BOTTOM VIEW)



● 2 Form A

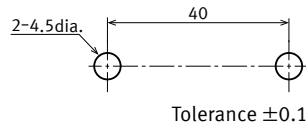
CAD

External dimensions

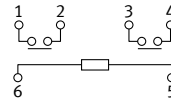


General tolerance  
 Less than 1mm :  $\pm 0.1$   
 Min. 1mm less than 3mm :  $\pm 0.2$   
 Min. 3mm :  $\pm 0.3$

Mounting hole pattern

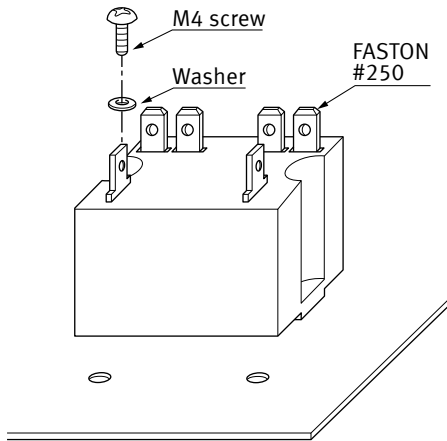


Schematic (BOTTOM VIEW)

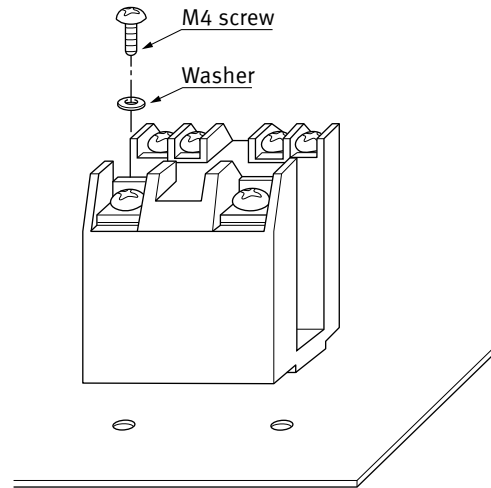


## MOUNTING METHOD

### ■ Plug-in terminal



### ■ Screw terminal



Due to the UP terminals, it is possible to either directly connect the wires or use crimped terminal.

## SAFETY STANDARDS

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

### ■ UL/C-UL (Recognized)

#### 1 Form A

File No.	Contact rating	Cycles
E43028	30 A 277 V AC	100×10 <sup>3</sup>
	30 A 30 V DC	100×10 <sup>3</sup>
	3 HP 250 V AC	100×10 <sup>3</sup>
	1.5 HP 125 V AC	100×10 <sup>3</sup>

#### 2 Form A

File No.	Contact rating	Cycles
E43028	25 A 277 V AC	100×10 <sup>3</sup>
	25 A 30 V DC	100×10 <sup>3</sup>
	3 HP 277 V AC	30×10 <sup>3</sup>
	2 HP 250 V AC	100×10 <sup>3</sup>
	1.5 HP 120 V AC	30×10 <sup>3</sup>
	1 HP 125 V AC	100×10 <sup>3</sup>

### ■ VDE (Certified)

VDE: Approved for products having a different last digit of Part No. Please contact us.

#### 1 Form A

File No.	Contact rating	Cycles	Temp.
40006681	30 A 250 V AC (cosΦ =1.0)	100×10 <sup>3</sup>	25°C
	30 A 250 V AC (cosΦ =0.4)	100×10 <sup>3</sup>	25°C
	5 A 110 V DC (0 ms)	100×10 <sup>3</sup>	25°C

#### 2 Form A

File No.	Contact rating	Cycles	Temp.
40006681	25 A 250 V AC (cosΦ =1.0)	100×10 <sup>3</sup>	25°C
	25 A 250 V AC (cosΦ =0.4)	100×10 <sup>3</sup>	25°C
	5 A 110 V DC (0 ms)	100×10 <sup>3</sup>	25°C

### ■ TV rating

#### 1 Form A

File No.	Contact rating
UL: E43028	TV-15

#### 2 Form A

File No.	Contact rating
UL: E43028	TV-10

### ■ CSA (Certified)

#### 1 Form A

File No.	Contact rating	Cycles
LR26550	30 A 277 V AC	100×10 <sup>3</sup>
	30 A 30 V DC	100×10 <sup>3</sup>
	3 HP 250 V AC	100×10 <sup>3</sup>
	1.5 HP 125 V AC	100×10 <sup>3</sup>

#### 2 Form A

File No.	Contact rating	Cycles
LR26550	25 A 277 V AC	100×10 <sup>3</sup>
	25 A 30 V DC	100×10 <sup>3</sup>
	2 HP 250 V AC	100×10 <sup>3</sup>
	1 HP 125 V AC	100×10 <sup>3</sup>

### ■ TÜV (Certified)

#### 1 Form A

File No.	Contact rating
B 18 03 13461 369	30 A 250 V AC (cosΦ=1.0)
	30 A 250 V AC (cosΦ=0.4)
	8 A 110 V DC (0 ms)

#### 2 Form A

File No.	Contact rating
B 18 03 13461 369	25 A 250 V AC (cosΦ=1.0)
	25 A 250 V AC (cosΦ=0.4)
	8 A 110 V DC (0 ms)

### ■ CQC (Certified)

#### 1 Form A

File No.	Contact rating	Cycles	Temp.
CQC13002100110	30 A 250 V AC	10×10 <sup>3</sup>	55°C

#### 2 Form A

File No.	Contact rating	Cycles	Temp.
CQC13002100110	20 A 250 V AC	10×10 <sup>3</sup>	55°C

**INSULATION CHARACTERISTICS (IEC61810-1)**

Item	Characteristics
Clearance/Creepage distance (IEC61810-1)	Min. 5.5/8.0 mm
Category of protection (IEC61810-1)	RT II
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 contact)	Full disconnection

\*Actual value

**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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

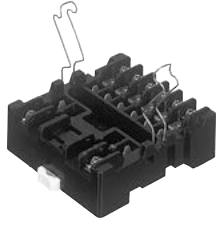
**■ Cautions for usage of HE relays**

- The dust cover should not be removed since doing so may alter the characteristics. (A cover doesn't remove by usual handling.)
- Avoid use under severe environmental conditions, such as high humidity, organic gas or in dust, oily locations and locations subjected to extremely frequent shock or vibrations.
- When mounting, use spring washers. Optimum fastening torque ranges from 49 to 68.6 N·m (5 to 7 kgf·cm).
- Firmly insert the receptacles so that there is no slack or looseness. To remove a receptacle, 19.6 to 39.2 N (2 to 4 kg) of pulling strength is required. Do not remove more than one receptacle at one time. Always remove one receptacle at a time and pull it straight outwards.
- When using the AC type, the operate time and release time due to the in-rush phase is 20 ms or more. Therefore, it is necessary for you to verify the characteristics for your actual circuit.
- When using the push-on blocks for the screw terminal type, use crimped terminals and tighten the screw-down terminals to the torque below.

M4.5 screw	147 to 166.6 N·cm (15 to 17 kgf·cm)
M4 screw	117.6 to 137 N·cm (12 to 14 kgf·cm)
M3.5 screw	78.4 to 98 N·cm (8 to 10 kgf·cm)



# HE RELAYS Terminal sockets



## TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Case
1 Form A	JH1-SF	AR58102	10 pcs.	50 pcs.
2 Form A	JH2-SF	AR58202		

## RATING

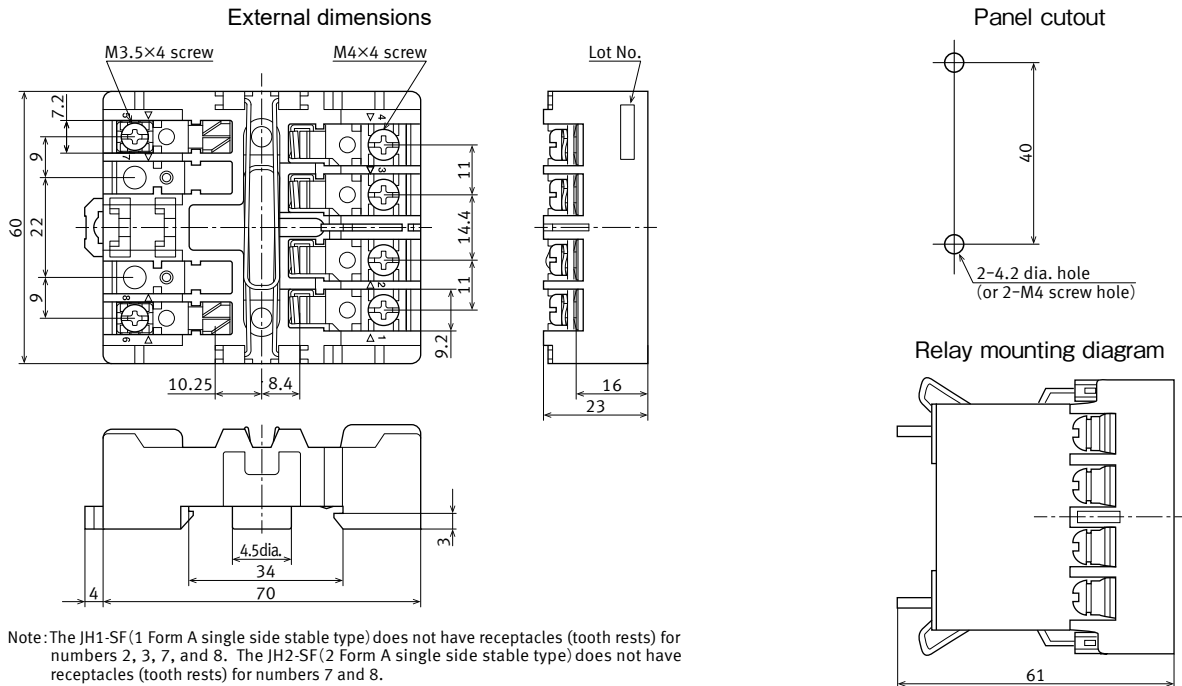
Item	Specifications	
Contact arrangement	1 Form A	2 Form A
Dielectric strength (initial)	Each between terminals: 2,000 Vrms for 1 min (detection current:10 mA) Between contacts – coil side: 5,000 Vrms for 1 min (detection current:10 mA)	
Insulation resistance (initial)	Each between terminals: Min. 100 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)	
Maximum carrying current	30 A 250 V AC	20 A 250 V AC
Conditions for usage, transport and storage	Ambient temperature: -50 to +55°C Humidity:5 to 85% RH (Avoid icing and condensation)	

## DIMENSIONS

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

Unit: mm

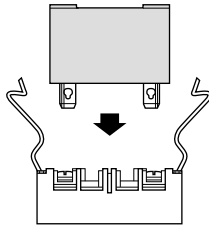
### CAD



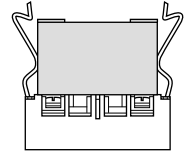
**HANDLING**

**■ Mounting method of relay**

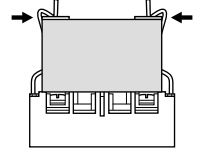
1) Match the direction of relay and terminal socket.



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

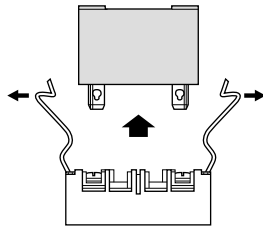


3) Press the hooks in the direction of the arrows to attach the relay securely.



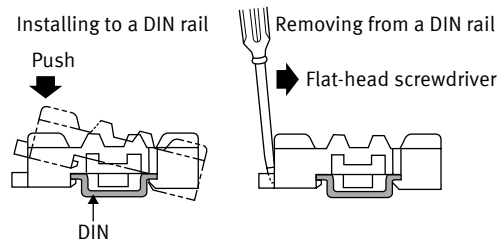
**■ Removing method of relay**

Pull out the relay after fully releasing both hooks



**■ Mounting to a DIN rail and Removing from a DIN rail**

- Please use a DIN Standard rail of the 35 mm width (DIN46277 and IEC60715).
- Mounting and removing methods will be as follows.



**GUIDELINES FOR USAGE**

- Be sure to tighten the screw-down terminals firmly. Loose terminals may lead to the generation of heat.
- When the 1 Form A is used in situations covered by the Japanese Electrical Appliance and Material Control Law, the use of 5.5 mm<sup>2</sup> cabling and 30 A current is not allowed. Consequently, the circuit should be less than 20 A.

- When fixing the terminal socket with screws, to avoid torque damage and distortion, apply torque within the ranges shown below.

M3.5 screw	0.784 to 0.98 N·m (8 to 10 kgf·cm)
M4 screw	1.176 to 1.37 N·m (12 to 14 kgf·cm)

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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.

## 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

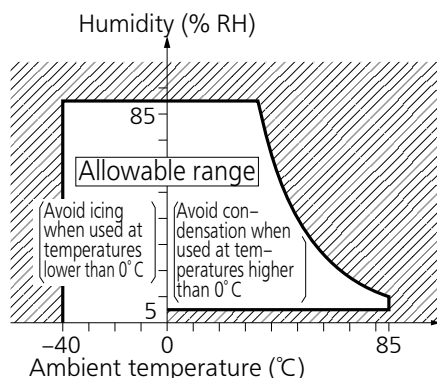
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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



### ■ 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.

### ● 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 switch 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2A )  
**JV-N RELAYS**

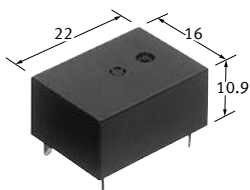
Product Catalog

**IN Your  
Future**

# JV-N RELAYS

## 1 Form A 16 A, low profile : 10.9 mm power relays for heater control

[Protective construction] Flux-resistant



(Unit : mm)

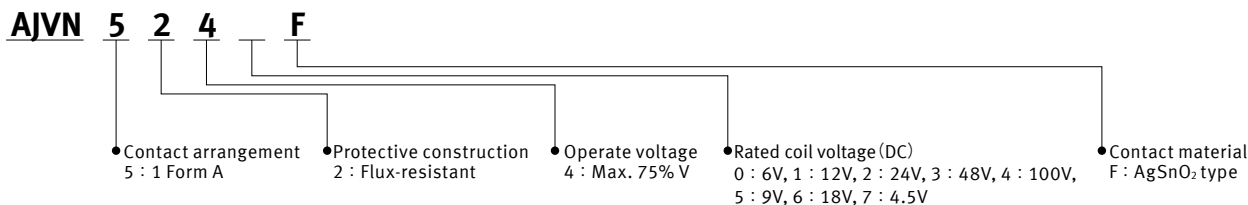
### FEATURES

- Low profile : 16 mm (W) x 22 mm (L) x 10.9 mm (H)
- Low operating power : 200 mW

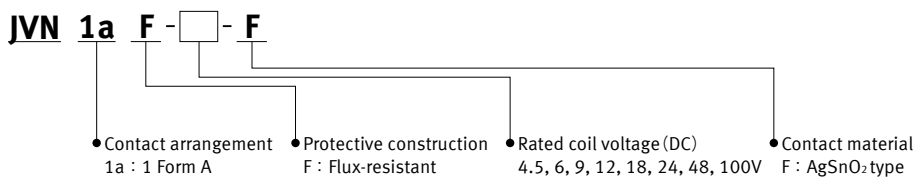
### TYPICAL APPLICATIONS

- Home appliances

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



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



# Power relays (Over 2A) JV-N RELAYS

## TYPES

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

### ■ PC board terminal

#### ● Carton

Rated coil voltage	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
4.5 V DC	JVN1aF-4.5V-F	AJVN5247F	100 pcs.	1,000 pcs.
6 V DC	JVN1aF-6V-F	AJVN5240F		
9 V DC	JVN1aF-9V-F	AJVN5245F		
12 V DC	JVN1aF-12V-F	AJVN5241F		
18 V DC	JVN1aF-18V-F	AJVN5246F		
24 V DC	JVN1aF-24V-F	AJVN5242F		
48 V DC	JVN1aF-48V-F	AJVN5243F		
100 V DC	JVN1aF-100V-F	AJVN5244F		

## RATING

### ■ Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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* (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)
4.5 V DC	Max. 75% V of rated coil voltage (initial)	Min. 5% V of rated coil voltage (initial)	44.4 mA	101 $\Omega$	200 mW	150% V of rated coil voltage
6 V DC			33.3 mA	180 $\Omega$		
9 V DC			22.2 mA	405 $\Omega$		
12 V DC			16.7 mA	720 $\Omega$		
18 V DC			11.1 mA	1,620 $\Omega$		
24 V DC			8.3 mA	2,880 $\Omega$		
48 V DC			4.2 mA	11,520 $\Omega$		
100 V DC	Max. 60 V DC	Min. 4 V DC	6 mA	16,600 $\Omega$	600 mW	110 V DC

\*square, pulse drive



## ■ Specifications

Item		Specifications
Contact data	Contact arrangement	1 Form A
	Contact resistance (initial)	Max. 100 mΩ (by voltage drop 6 V DC 1 A)
	Contact material	AgSnO <sub>2</sub> type
	Contact rating (resistive)	16 A 125 V AC, 10 A 277 V AC, 10 A 30 V DC
	Max. switching power (resistive)	2,770 VA, 300 W
	Max. switching voltage	277 V AC, 110 V DC (0.3 A)
	Max. switching current	16 A (AC), 10 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	1,000 Vrms for 1 min (detection current: 10 mA)
	Between contact and coil	2,500 Vrms for 1 min (detection current: 10 mA)
Surge withstand voltage (initial)*2	Between contact and coil	4,500 V
Time characteristics (initial)	Operate time	Max. 12 ms (4.5 to 48 V DC), Max. 8 ms (100 V DC) (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	200 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 μs)
	Destructive	1,000 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1.6 mm, detection time: 10 μs)
	Destructive	10 to 55 Hz (at double amplitude of 2 mm)
Expected life	Mechanical life	Min. 20 x 10 <sup>6</sup> (at 180 times/min)
Conditions	Conditions for usage, transport and storage*3	Ambient temperature: -40 to +70°C, -40 to +60°C (at 100 V DC) 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. Wave is standard shock voltage of  $\pm 1.2 \times 50 \mu\text{s}$  according to JEC-212-1981

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

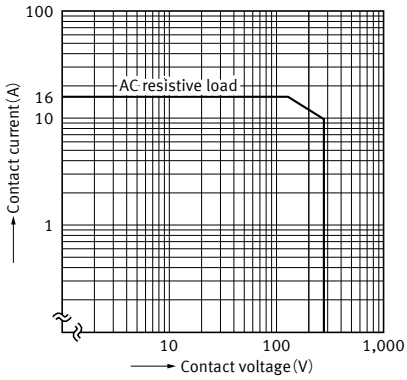
## ■ Expected electrical life

Conditions: Resistive load, at 20°C, at 20 times/min

Type	Switching capacity	Number of operations
1 Form A	10 A 125 V AC	Min. 100 x 10 <sup>3</sup>
	10 A 30 V DC	Min. 100 x 10 <sup>3</sup>
	10 A 277 V AC	Min. 50 x 10 <sup>3</sup>
	16 A 125 V AC	Min. 30 x 10 <sup>3</sup>

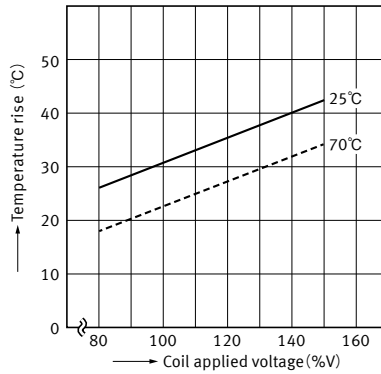
## REFERENCE DATA

### 1. Max. switching capacity



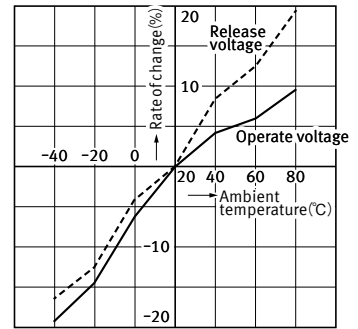
### 2. Coil temperature characteristics (Average)

Tested sample : JVN1aF-12 V-F, 6 pcs.  
Measured portion : Coil inside  
Contact current : 16A



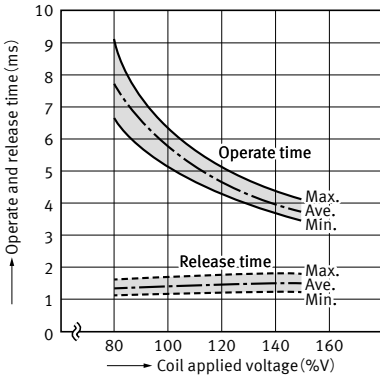
### 3. Ambient temperature characteristics (Average)

Tested sample : JVN1aF-12 V-F, 6 pcs.



### 4. Operate and release time characteristics

Tested sample : JVN1aF-12 V-F, 6 pcs.



## DIMENSIONS

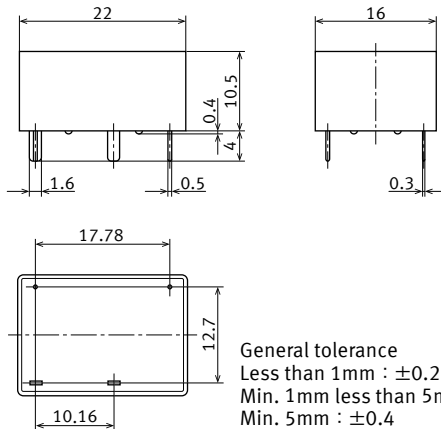
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

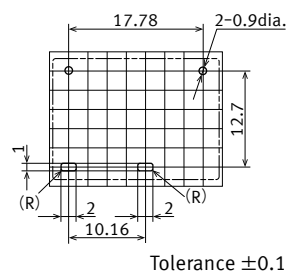
### CAD



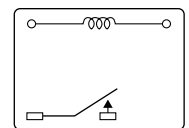
### External dimensions



### Recommended PC board pattern (BOTTOM VIEW)



### Schematic (BOTTOM VIEW)



General tolerance  
Less than 1mm :  $\pm 0.2$   
Min. 1mm less than 5mm :  $\pm 0.3$   
Min. 5mm :  $\pm 0.4$

**SAFETY STANDARDS**

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

**UL (Recognized)**

File No.	Contact rating
E43028	16 A 277 V AC
	16 A 125 V AC
	10 A 30 V DC
	0.3 A 110 V DC
	1/10 HP 277 V AC
	1/10 HP 125 V AC

**CSA (Certified)**

File No.	Contact rating
LR26550	16 A 277 V AC
	16 A 125 V AC
	10 A 30 V DC
	0.3 A 110 V DC
	1/10 HP 277 V AC
	1/10 HP 125 V AC

**TÜV (Certified)**

File No.	Contact rating	Operations
B 18 03 13461 373	16 A 250 V AC ( $\cos\phi = 1.0$ )	$10 \times 10^3$
	16 A 250 V AC ( $\cos\phi = 0.4$ )	$10 \times 10^3$
	10 A 30 V DC (0 ms)	$10 \times 10^3$

**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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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

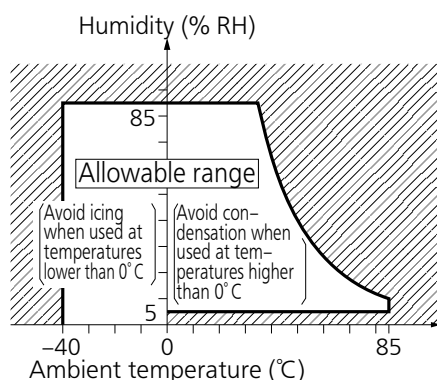
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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 switch 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2 A )

# LF RELAYS

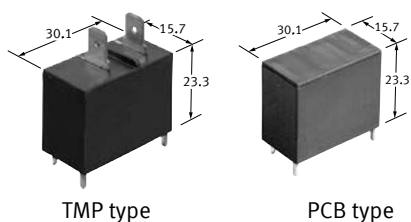
Product Catalog

**IN Your  
Future**

# LF RELAYS

## Ideal for compressor and inverter loads, 1 Form A 20 A, Power relays

Protective construction : Flux-resistant type



(Unit : mm)

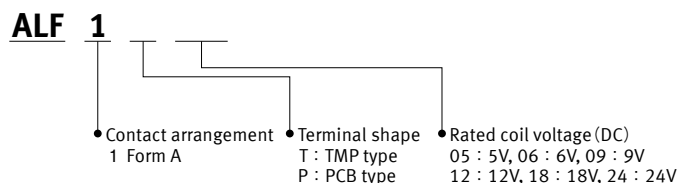
### FEATURES

- Ideal for compressor and inverter loads
- Insulation distance (between contact and coil):  
Clearance Min. 8 mm and Creepage Min. 9.5 mm
- Surge withstand voltage: 10,000 V
- TMP type/PCB type

### TYPICAL APPLICATIONS

- Air conditioner
- Refrigerators
- OA equipment

### ORDERING INFORMATION (PART NO.)



Note : Certified by UL/C-UL,VDE and TÜV

### TYPES

Contact arrangement	Rated coil voltage	Part No.		Standard packing	
		TMP type	PCB type	Inner carton	Outer carton
1 Form A	5 V DC	ALF1T05	ALF1P05	50 pcs.	200 pcs.
	6 V DC	ALF1T06	ALF1P06		
	9 V DC	ALF1T09	ALF1P09		
	12 V DC	ALF1T12	ALF1P12		
	18 V DC	ALF1T18	ALF1P18		
	24 V DC	ALF1T24	ALF1P24		



# Power relays (Over 2 A) LF RELAYS

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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* (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 60°C)
5 V DC	Max. 70% V of rated coil voltage (Initial)	Min. 10% V of rated coil voltage (Initial)	180 mA	27.8 $\Omega$	900 mW	110% V of rated coil voltage
6 V DC			150 mA	40 $\Omega$		
9 V DC			100 mA	90 $\Omega$		
12 V DC			75 mA	160 $\Omega$		
18 V DC			50 mA	360 $\Omega$		
24 V DC			37.5 mA	640 $\Omega$		

\*square, pulse drive

### Specifications

Item	Specifications	
Contact data	Contact arrangement	1 Form A
	Contact resistance (initial)	Max. 100 m $\Omega$ (by voltage drop 6 V DC 1 A)
	Contact material	AgSnO <sub>2</sub> type
	Contact rating (resistive)	20 A 250 V AC
	Max. switching power (resistive)	6,250 VA
	Max. switching voltage	250 V AC
	Max. switching current	25 A (AC)
	Min. switching load (reference value)* <sup>1</sup>	100 mA 5 V DC
Insulation resistance (initial)	Min. 1,000 M $\Omega$ (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 and coil	5,000 Vrms for 1 min (detection current: 10 mA)
Surge withstand voltage (initial)* <sup>2</sup>	Between contact and coil	10,000 V
Time characteristics (initial)	Operate time	Max. 20 ms at rated coil voltage (at 20°C, without bounce)
	Release time	Max. 15 ms at rated coil voltage (at 20°C, without bounce, with diode)
Shock resistance	Functional	100 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 $\mu$ s)
	Destructive	1,000 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 1.5 mm, detection time: 10 $\mu$ s)
	Destructive	10 to 55 Hz (at double amplitude of 1.5 mm)
Expected life	Mechanical life	Min. 2 x 10 <sup>6</sup> (switching frequency: 180 times/min)
Conditions	Conditions for usage, transport and storage* <sup>3</sup>	Ambient temperature: -40 to +60°C, Humidity: 5 to 85% RH (Avoid icing and condensation)
Unit weight		Approx. 23 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".

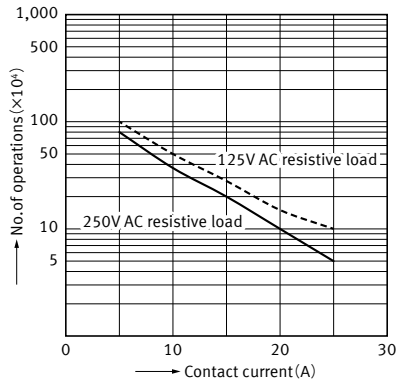
### Expected electrical life

Conditions: at 20°C

Type	Load	Switching capacity	Number of operations
1 Form A	Resistive load	20 A 250 V AC ( $\cos\phi = 1.0$ )	Min. 100 x 10 <sup>3</sup> (switching frequency 20 times/min)
		25 A 250 V AC ( $\cos\phi = 1.0$ )	Min. 10 x 10 <sup>3</sup> (switching frequency 20 times/min)
	Inverter load	Inrush 70 A ( $\cos\phi = 0.7$ ), Steady 20 A ( $\cos\phi = 0.9$ ) 250 V AC	Min. 100 x 10 <sup>3</sup> (switching frequency 20 times/min)
		Inrush 200 A, Steady 20 A 100 V AC	Min. 30 x 10 <sup>3</sup> (switching frequency 10 times/min)
Inverter load	Inrush 100 A, Steady 10 A 200 V AC	Min. 30 x 10 <sup>3</sup> (switching frequency 10 times/min)	

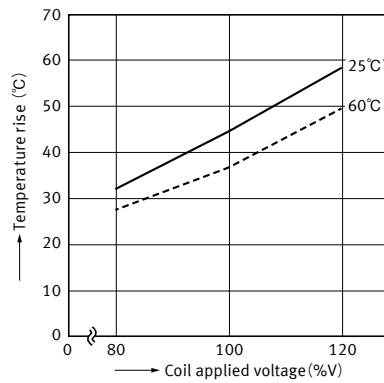
REFERENCE DATA

1. Switching life curve



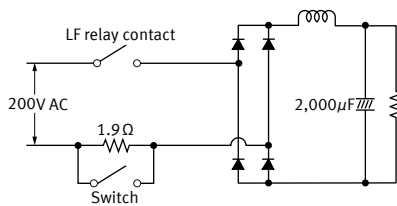
2. Coil temperature characteristics (Average)

Tested sample : ALF1T12, 6 pcs.  
 Measured portion : Coil inside  
 Contact current : 20A  
 Ambient temperature : 25°C, 60°C

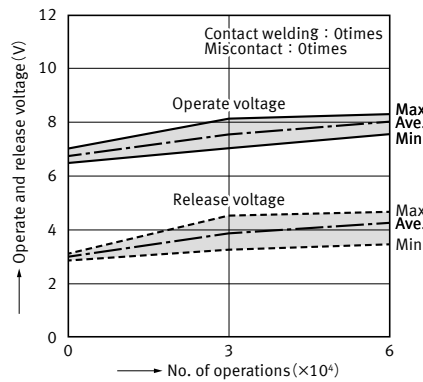


3-1. 200 V AC Electrical life test (200 V AC Inverter load)

Tested sample : ALF1T12, 6 pcs.  
 Load : Inrush 102A (wave peak value),  
 Steady 14.4A (wave peak value)  
 Inverter dummy 200V AC  
 Operation frequency : ON : OFF=1s : 5s  
 Circuit :

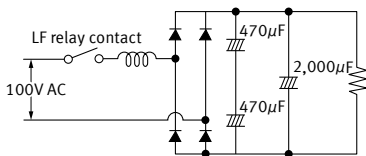


Change of operate and release voltage

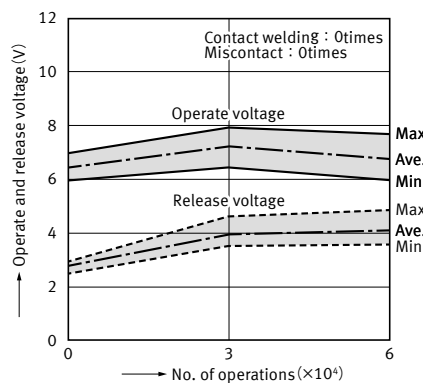


3-2. 100 V AC Electrical life test (100 V AC Inverter load)

Tested sample : ALF1T12, 6 pcs.  
 Load : Inrush 224A (wave peak value),  
 Steady 30.5A (wave peak value)  
 Inverter dummy 100V AC  
 Operation frequency : ON : OFF=1s : 5s  
 Circuit :



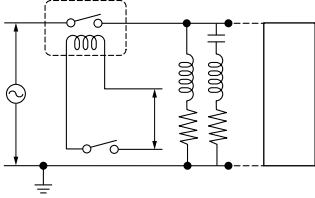
Change of operate and release voltage



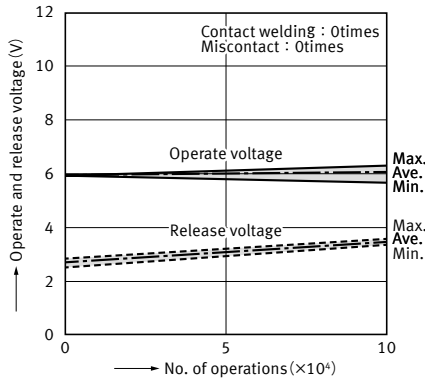
# Power relays (Over 2 A) LF RELAYS

## 3-3.250 V AC Electrical life test (250 V AC Compressor dummy load)

Tested sample : ALF1T12, 6 pcs.  
 Load : Inrush 70.7A,  $\cos\phi=0.7$   
 Steady 20A,  $\cos\phi=0.9$   
 compressor dummy 250V AC  
 Operation frequency : ON : OFF=1.5s : 1.5s  
 Circuit :



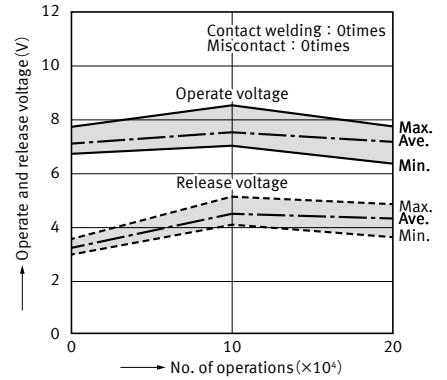
Change of operate and release voltage



## 3-4. Electrical life test

(20 A 250 V AC Resistive load)

Tested sample : ALF1T12, 6 pcs.  
 Operation frequency : ON : OFF=1.5s : 1.5s



### DIMENSIONS

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

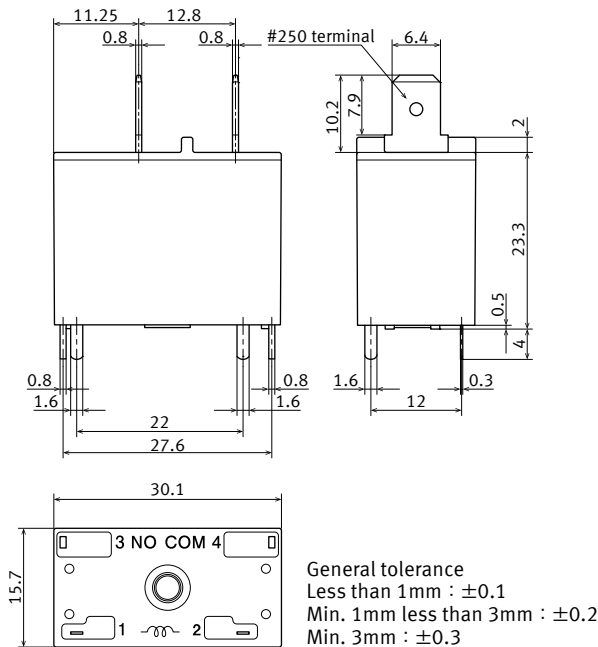
Unit: mm

#### ■ TMP type

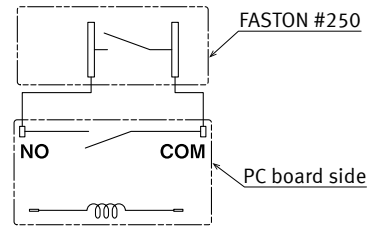
##### CAD



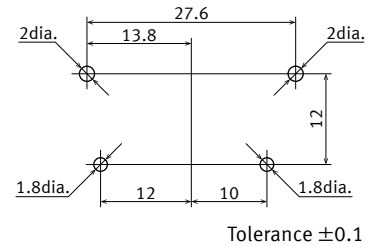
External dimensions



Schematic (BOTTOM VIEW)



Recommended PC board pattern (BOTTOM VIEW)

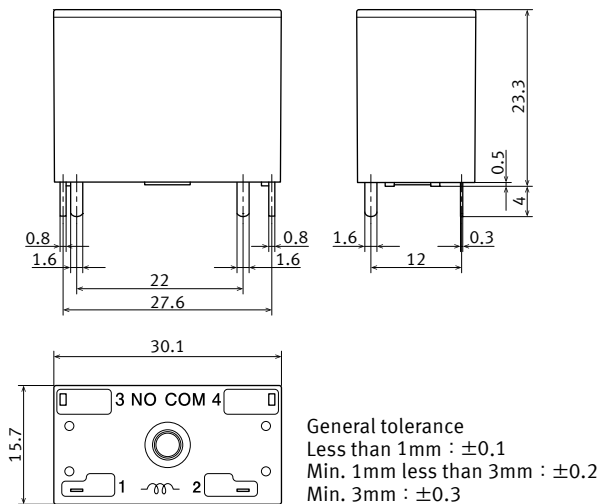


#### ■ PCB type

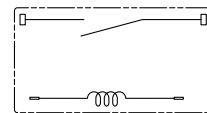
##### CAD



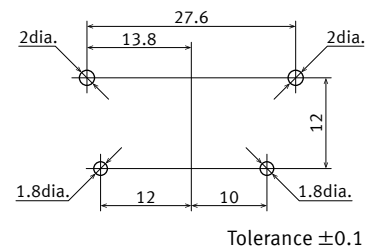
External dimensions



Schematic (BOTTOM VIEW)



Recommended PC board pattern (BOTTOM VIEW)



**SAFETY STANDARDS**

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

**UL/C-UL (Recognized)**

File No.	Contact rating	Operations	Ambient temperature
E43028	25 A 277 V AC Resistive	6 × 10 <sup>3</sup>	40°C
	20 A 277 V AC Resistive	100 × 10 <sup>3</sup>	40°C

**VDE (Certified)**

File No.	Contact rating	Operations	Ambient temperature
40009169	20 A 250 V AC (cosφ = 1.0)	10 × 10 <sup>3</sup>	60°C
	10 A 250 V AC (cosφ = 0.4)	100 × 10 <sup>3</sup>	70°C

**TV rating**

File No.	Contact rating
UL: E43028	TV-8

**CSA (Certified)**

CSA standard certified by C-UL

**TÜV (Certified)**

File No.	Contact rating	Operations	Ambient temperature
B 18 03 13461 374	20 A 250 V AC (cosφ = 1.0)	10 × 10 <sup>3</sup>	60°C

**INSULATION CHARACTERISTICS (IEC61810-1)**

Item	Characteristics
Clearance/Creepage distance (IEC61810-1)	Min. 5.5 /5.5 mm
Category of protection (IEC61810-1)	RT II
Tracking resistance (IEC60112)	PTI 175
Insulation material group	III a
Over voltage category	III
Rated voltage	250 V
Pollution degree	2
Type of insulation (Between contact and coil)	Reinforced insulation
Type of insulation (Between open contacts)	Micro disconnection

Note: Actual value

**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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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

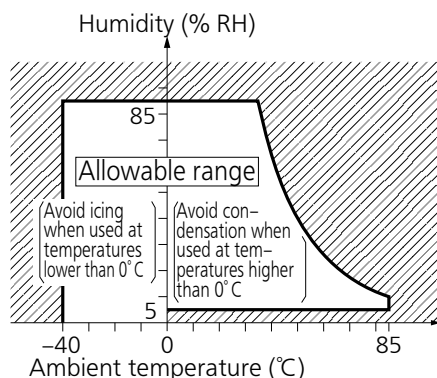
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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 switch 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2 A )

# PA-N RELAYS

Product Catalog

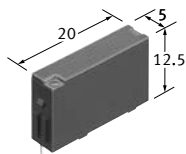
**IN Your  
Future**



# PA-N RELAYS

Complies with IEC61010 reinforced insulation, For PLC/Interface, 1 Form A 5 A, Slim power relay

Protective construction: Sealed type (RTIII)



(Unit: mm)

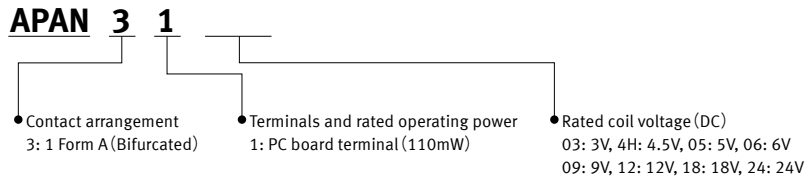
### FEATURES

- High density mounting:  
width (5 mm) x length (20 mm) x height (12.5 mm)
- Complies with IEC61010 reinforced insulation standards
- Insulation distance (Between contact and coil)  
Clearance: Min. 5.29 mm, Creepage: Min. 5.35 mm
- Dielectric strength: 3,000 Vrms  
Surge withstand voltage: 6,000 V
- Low operating power: 110 mW
- Complies with Standard for Hazardous Location (ANSI/ISA 12.12.01)

### TYPICAL APPLICATIONS

- Industrial equipment, office equipment
- Measuring devices and test equipment
- Output relays for programmable controllers and temperature controllers

### ORDERING INFORMATION (PART NO.)



### TYPES

Contact arrangement	Rated coil voltage	Part No.	Standard packing	
			Inner carton (1-tube)	Case
1 Form A	3 V DC	APAN3103	25 pcs.	1,000 pcs.
	4.5 V DC	APAN314H		
	5 V DC	APAN3105		
	6 V DC	APAN3106		
	9 V DC	APAN3109		
	12 V DC	APAN3112		
	18 V DC	APAN3118		
	24 V DC	APAN3124		

For the sockets, please refer to the "PA-N RELAYS PC board socket/Self-clinching terminal socket".

# Power relays (Over 2 A) PA-N RELAYS

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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* (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. 70% V of rated coil voltage (Initial)	Min. 5% V of rated coil voltage (Initial)	36.7 mA	82 $\Omega$	110 mW	120% V of rated coil voltage
4.5 V DC			24.4 mA	184 $\Omega$		
5 V DC			22 mA	227 $\Omega$		
6 V DC			18.3 mA	327 $\Omega$		
9 V DC			12.2 mA	736 $\Omega$		
12 V DC			9.2 mA	1,309 $\Omega$		
18 V DC			6.1 mA	2,945 $\Omega$		
24 V DC			4.6 mA	5,236 $\Omega$		

\*square, pulse drive

### Specifications

Item	Specifications	
Contact data	Contact arrangement	1 Form A (Bifurcated)
	Contact resistance (initial)	Max. 30 m $\Omega$ (by voltage drop 6 V DC 1 A)
	Contact material	AgNi type + Au
	Contact rating (resistive)	5 A 250 V AC, 5 A 30 V DC
	Max. switching power (resistive)	1,250 VA, 150 W
	Max. switching voltage	250 V AC, 110 V DC (0.4 A)
	Max. switching current	5 A (AC, DC)
	Min. switching load (reference value)*1	100 $\mu$ A 100 mV DC
Insulation resistance (initial)	Min. 1,000 M $\Omega$ (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 and coil	3,000 Vrms for 1 min (detection current: 10 mA)
Surge withstand voltage (initial)*2	Between contact and coil	6,000 V
Time characteristics (initial)	Operate time	Max. 10 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	147 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 $\mu$ s)
	Destructive	980 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 2.5 mm, detection time: 10 $\mu$ s)
	Destructive	10 to 55 Hz (at double amplitude of 3.5 mm)
Expected life	Mechanical life	Min. 20 x 10 <sup>6</sup> ope. (switching frequency: at 180 times/min)
Conditions	Conditions for usage, transport and storage*3	Ambient temperature: -40 to +90°C (-40 to +60°C at our standard packing condition) Humidity: 5 to 85% RH (Avoid icing and condensation)
Unit weight		Approx. 3 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.

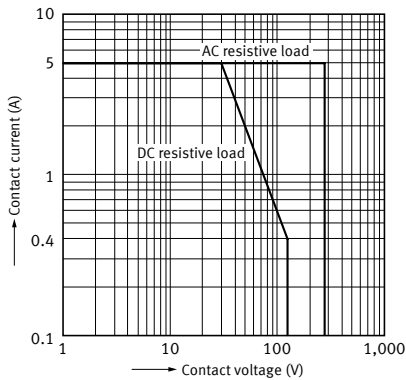
\*3. For ambient temperature, please read "GUIDELINES FOR RELAY USAGE".

### Expected electrical life

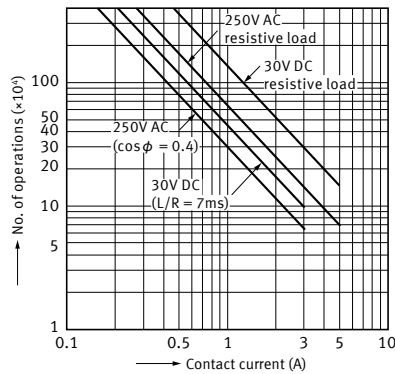
Type	Load	Switching capacity	Number of operations
1 Form A	Resistive load	3 A 250 V AC	Min. 100 x 10 <sup>3</sup> ope. (Switching frequency at 20 times/min)
		3 A 30 V DC	Min. 100 x 10 <sup>3</sup> ope. (Switching frequency at 20 times/min)
		5 A 250 V AC	Min. 50 x 10 <sup>3</sup> ope. (Switching frequency at 6 times/min, ON : OFF = 1 s : 9 s)
		5 A 30 V DC	Min. 50 x 10 <sup>3</sup> ope. (Switching frequency at 20 times/min)
	Inductive load	2 A 250 V AC (cos $\phi$ =0.4)	Min. 100 x 10 <sup>3</sup> ope. (Switching frequency at 6 times/min, ON : OFF = 1 s : 9 s)

**REFERENCE DATA**

1. Max. switching capacity

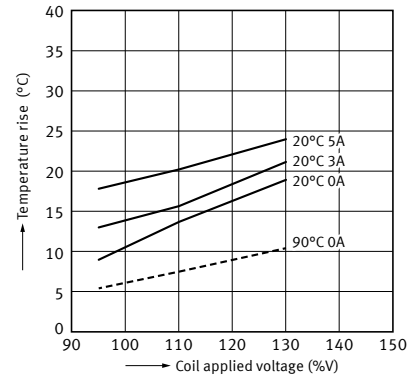


2. Switching life curve



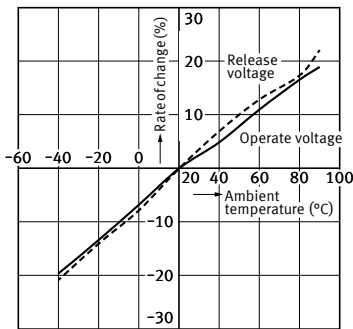
3. Coil temperature characteristics (Average)

Tested sample: APAN3124, 6 pcs.  
Measured portion: Inside the coil  
Ambient temperature: 20°C, 90°C (No contact current)



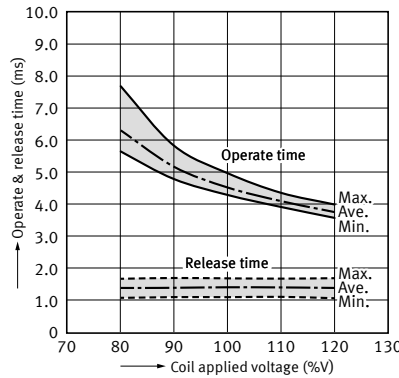
4. Ambient temperature characteristics (Average)

Tested sample: APAN3124, 6 pcs.



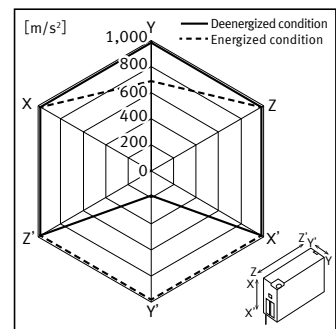
5. Operate and release time

Tested sample: APAN3124, 20 pcs.  
Measured direction: Upright



6. Shock resistance

Tested sample: APAN3124, 6 pcs.



**DIMENSIONS**

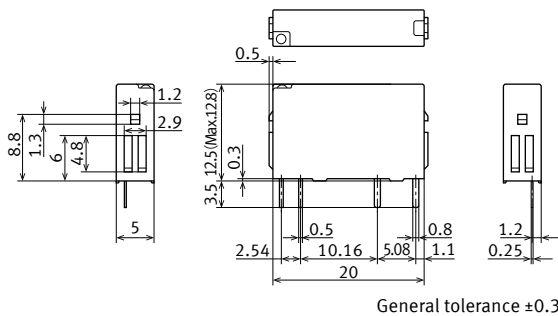
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

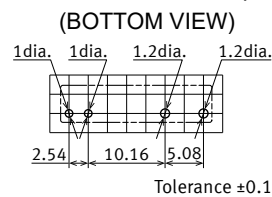
**CAD**



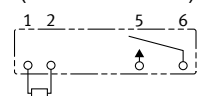
External dimensions



Recommended PC board pattern



Schematic (BOTTOM VIEW)



# Power relays (Over 2 A) PA-N RELAYS

## SAFETY STANDARDS

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

### Insulation distance (Between contact and coil)

Clearance: 5.29 mm, Creepage: 5.35 mm (UL/C-UL, TÜV)

### UL/C-UL (Approved)

File No.	Contact rating	Operations	Ambient temperature
E43149	5 A 250 V AC Resistive	50 x 10 <sup>3</sup>	40°C
	5 A 250 V AC Resistive	10 x 10 <sup>3</sup>	90°C
	5 A 30 V DC General use	50 x 10 <sup>3</sup>	40°C
	5 A 30 V DC General use	10 x 10 <sup>3</sup>	90°C
	3 A 250 V AC General use	10 x 10 <sup>3</sup>	90°C
	3 A 250 V AC Resistive	100 x 10 <sup>3</sup>	40°C
	3 A 30 V DC General use	100 x 10 <sup>3</sup>	40°C
	Pilot Duty B300, R300*	6 x 10 <sup>3</sup>	40°C
E479891	Class I Division2 Groups A, B, C, D Hazardous Location (ANSI/ISA 12.12.01-2015, CAN/CSA C22.2 No.213-15)		

\*Pilot Duty is in accordance with the conditions of UL508.

### CSA (Approved)

CSA standard certified by C-UL

### TÜV (Approved)

File No.	Contact rating	Operations	Ambient temperature
B 18 03 13461 368	5 A 250 V AC (cosφ=1.0)	50 x 10 <sup>3</sup>	40°C
	5 A 250 V AC (cosφ=1.0)	10 x 10 <sup>3</sup>	90°C
	5 A 30 V DC (0 ms)	50 x 10 <sup>3</sup>	40°C
	5 A 30 V DC (0 ms)	10 x 10 <sup>3</sup>	90°C
	3 A 250 V AC (cosφ=1.0)	100 x 10 <sup>3</sup>	40°C
	3 A 250 V AC (cosφ=1.0)	100 x 10 <sup>3</sup>	40°C
	3 A 30 V DC (0 ms)	100 x 10 <sup>3</sup>	40°C
	3 A 30 V DC (0 ms)	100 x 10 <sup>3</sup>	40°C

## GUIDELINES FOR USAGE

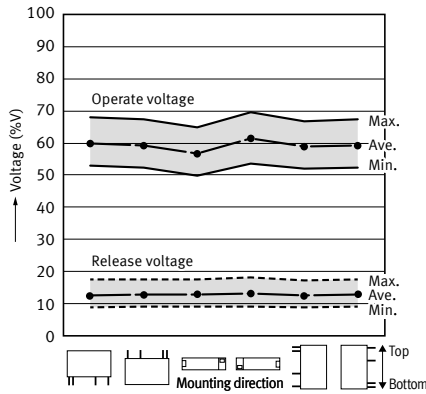
### For cautions for use, please read "GUIDELINES FOR RELAY USAGE".

[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)

### Cautions for usage of PA-N relay

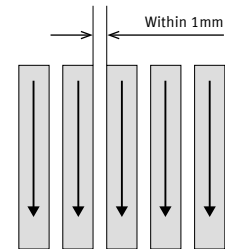
- Specification values for operate and release voltages are for the relay mounting with its terminals below. Please refer the figure regarding fluctuations in the operate and release voltages caused by the installation direction.

Tested sample: APAN3124, 6 pcs.  
Ambient temperature: 20°C  
Measured direction: 6 directions

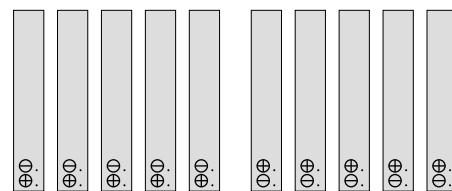


- When mounting the relays within 1 mm, please notice the condition below.

1) Mount the relays in the same direction.



2) Coil terminals (Terminal No. 1 & 2) polarity should be arranged in the same direction.



# PA-N RELAYS PC board socket/Self-clinching terminal socket

RoHS



Standard type terminal socket



Self-clinching type terminal socket

## TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
PC board socket	PA1a-PS	APA831	50 pcs.	500 pcs.
Self-clinching terminal socket	PA1a-PS-H	APA832		

## RATING

Item	Specifications
Dielectric strength (initial)	Between pin No. 2 and 5: 2,000 Vrms for 1 min (detection current: 10 mA) Between pin No. 5 and 6: 2,000 Vrms for 1 min (detection current: 10 mA)
Insulation resistance (initial)	Each between terminals: Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Max. carrying current	3 A
Conditions for usage, transport and storage	Ambient temperature: -40 to +70°C Humidity: 5 to 85% RH (Avoid icing and condensation)

## DIMENSIONS

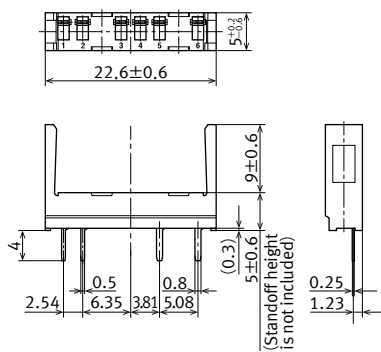
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

### PC board socket

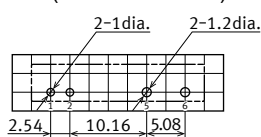
**CAD**

External dimensions



General tolerance  $\pm 0.3$

Recommended PC board pattern (BOTTOM VIEW)

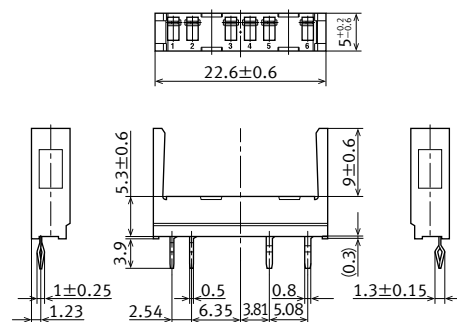


Tolerance  $\pm 0.1$

### Self-clinching terminal socket

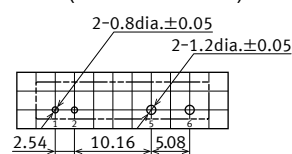
**CAD**

External dimensions



General tolerance  $\pm 0.3$

Recommended PC board pattern (BOTTOM VIEW)

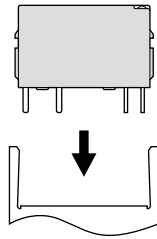


Tolerance  $\pm 0.1$

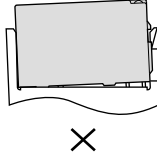
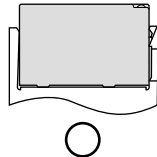
## HANDLING

### ■ Mounting method of relay

1) Match the direction of relay and socket.

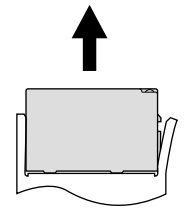


2) Insert both ends of the relay securely all the way in until both hooks clear the ribs on the relay case.

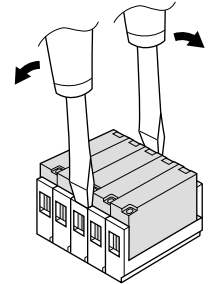


### ■ Removing method of relay

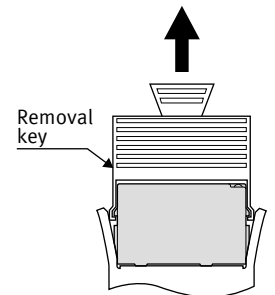
1) Remove the relay, applying force in the direction shown below.



2) In case there is not enough space for finger to pick relay up, use screwdrivers in the way shown.



3) When using the removal key (APA801), remove the relay as shown in the figure. You can purchase the removal key (APA801) as an accessories.



4) 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.

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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.

## 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

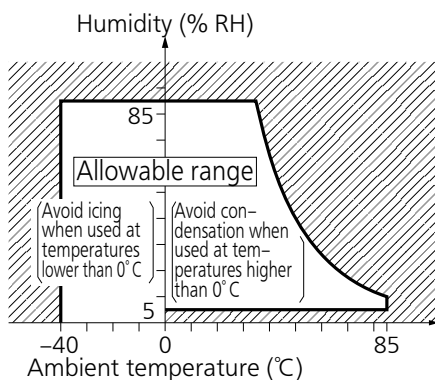
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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



### ■ 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.

### ● 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 switch 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 seal 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/>



---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)

Power relays ( Over 2 A )  
**SP RELAYS**

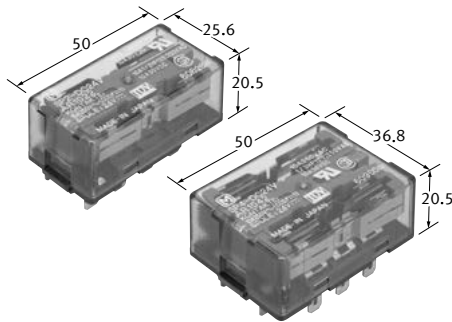
Product Catalog

**IN Your  
Future**

# SP RELAYS

## 2 Form C 15 A, 4 Form C 10 A, Polarized power relays

Protective construction : Dust cover type



(Unit : mm)

### FEATURES

- High sensitivity: Rated operating power 300 mW
- Plug-in terminal/PC board terminal
- Latching types also available
- Mounts directly on chassis and the mounting board is also available to enable DIN rail installation
- Terminal sockets are available

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

#### AR 1

- Terminal shape · Operating function
  - 0 : Plug-in type, Single side stable
  - 1 : Plug-in type, 1 coil latching\*
  - 2 : Plug-in type, 1 coil latching
  - 3 : PC board type, Single side stable\*
  - 4 : PC board type, 1 coil latching\*
  - 5 : PC board type, 2 coil latching\*
- Contact arrangement
  - 2 : 2 Form C
  - 4 : 4 Form C
- Rated coil voltage (DC)
 

Part No.	0	1	2	3	8	9
Rated coil voltage (V)	6	12	24	48	3	5

\*PC board type and 1 coil latching type are manufactured by lot upon receipt of order.

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

#### SP

- SP - [ ] - [ ] - [ ] - [ ]
- Contact arrangement
    - 2 : 2 Form C
    - 4 : 4 Form C
  - Terminal shape
    - Nil : Plug-in type
    - P : PC board type
  - Operating function
    - Nil : Single side stable
    - L : 1 coil latching
    - L2 : 2 coil latching
  - Rated coil voltage (DC)
    - 3, 5, 6, 12, 24, 48V

Notes : 1. PC board type and 1 coil latching type are manufactured by lot upon receipt of order.  
2. Certified by UL, CSA and TÜV

# Power relays (Over 2 A) SP 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
2 Form C	3 V DC	SP2-DC3V	AR1028	SP2-L2-DC3V	AR1228	20 pcs.	200 pcs.
	5 V DC	SP2-DC5V	AR1029	SP2-L2-DC5V	AR1229		
	6 V DC	SP2-DC6V	AR1020	SP2-L2-DC6V	AR1220		
	12 V DC	SP2-DC12V	AR1021	SP2-L2-DC12V	AR1221		
	24 V DC	SP2-DC24V	AR1022	SP2-L2-DC24V	AR1222		
	48 V DC	SP2-DC48V	AR1023	SP2-L2-DC48V	AR1223		
4 Form C	3 V DC	SP4-DC3V	AR1048	SP4-L2-DC3V	AR1248	10 pcs.	100 pcs.
	5 V DC	SP4-DC5V	AR1049	SP4-L2-DC5V	AR1249		
	6 V DC	SP4-DC6V	AR1040	SP4-L2-DC6V	AR1240		
	12 V DC	SP4-DC12V	AR1041	SP4-L2-DC12V	AR1241		
	24 V DC	SP4-DC24V	AR1042	SP4-L2-DC24V	AR1242		
	48 V DC	SP4-DC48V	AR1043	SP4-L2-DC48V	AR1243		

For the terminal sockets, please refer to the "SP RELAYS Terminal sockets". For the mounting board, please refer to the "SP RELAYS Mounting board".

## RATING

### Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, 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. 70% V of rated coil voltage (Initial)	Min. 10% V of rated coil voltage (Initial)	100 mA	30 $\Omega$	300 mW	150% V of rated coil voltage
5 V DC			60.2 mA	83 $\Omega$		
6 V DC			50 mA	120 $\Omega$		
12 V DC			25 mA	480 $\Omega$		
24 V DC			12.5 mA	1,920 $\Omega$		
48 V DC			6.2 mA	7,700 $\Omega$		

\*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. 70% V of rated coil voltage (Initial)	Max. 70% V of rated coil voltage (Initial)	100 mA	100 mA	30 $\Omega$	30 $\Omega$	300 mW	300 mW	150% V of rated coil voltage
5 V DC			60.2 mA	60.2 mA	83 $\Omega$	83 $\Omega$			
6 V DC			50 mA	50 mA	120 $\Omega$	120 $\Omega$			
12 V DC			25 mA	25 mA	480 $\Omega$	480 $\Omega$			
24 V DC			12.5 mA	12.5 mA	1,920 $\Omega$	1,920 $\Omega$			
48 V DC			6.2 mA	6.2 mA	7,680 $\Omega$	7,680 $\Omega$			

\*square, pulse drive

## Specifications

Item		Specifications	
Contact data	Contact arrangement	2 Form C	4 Form C
	Contact resistance (initial)	Max. 30 mΩ (by voltage drop 6 V DC 1 A)	
	Contact material	Stationary contact: Au flashed AgSnO <sub>2</sub> type, Movable contact: AgSnO <sub>2</sub> type	
	Contact rating (resistive)	15 A 250 V AC, 10 A 30 V DC	10 A 250 V AC, 10 A 30 V DC
	Max. switching power (resistive)	3,750 VA, 300 W	2,500 VA, 300 W
	Max. switching voltage	250 V AC, 30 V DC (48 V DC: Max. 2 A)	
	Max. switching current	15 A (AC), 10 A (DC)	10 A (AC), 10 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	1,500 Vrms for 1 min (detection current: 10 mA)	
	Between contact sets	3,000 Vrms for 1 min (detection current: 10 mA)	
	Between contact and coil	3,000 Vrms for 1 min (detection current: 10 mA)	
Time characteristics (initial)	Operate (Set) time	Max. 50 ms (Max. 50 ms) at rated coil voltage (at 20°C, without bounce)	
	Release (Reset) time	Max. 20 ms (Max. 50 ms) at rated coil voltage (at 20°C, without bounce, without diode)	
Shock resistance	Functional	392 m/s <sup>2</sup> (half-sine shock pulse: 11 ms, detection time: 10 μs)	
	Destructive	980 m/s <sup>2</sup> (half-sine shock pulse: 6 ms)	
Vibration resistance	Functional	10 to 55 Hz (at double amplitude of 3 mm, detection time: 10 μs)	
	Destructive	10 to 55 Hz (at double amplitude of 3 mm)	
Expected life	Mechanical life	Min. 50 × 10 <sup>6</sup> ope. (switching frequency: at 180 times/min)	
Conditions	Conditions for usage, transport and storage*2	Ambient temperature: -50 to +60°C, Humidity: 5 to 85% RH (Avoid icing and condensation)	
Unit weight		Approx. 50 g	Approx. 65 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

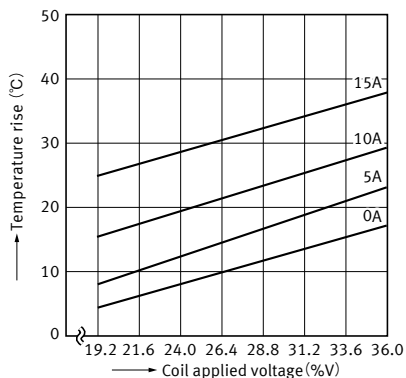
Type	Switching capacity	Number of operations
2 Form C	15 A 250 V AC	Min. 100 × 10 <sup>3</sup> ope.
	10 A 30 V DC	Min. 100 × 10 <sup>3</sup> ope.
4 Form C	10 A 250 V AC	Min. 100 × 10 <sup>3</sup> ope.
	10 A 30 V DC	Min. 100 × 10 <sup>3</sup> ope.

# Power relays (Over 2 A) SP RELAYS

## REFERENCE DATA

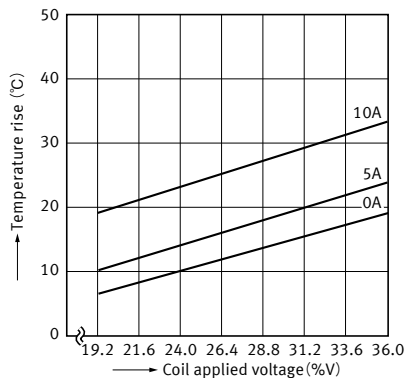
### 1-1.Coil temperature characteristics (2 Form C)

Tested sample : SP2-24V DC



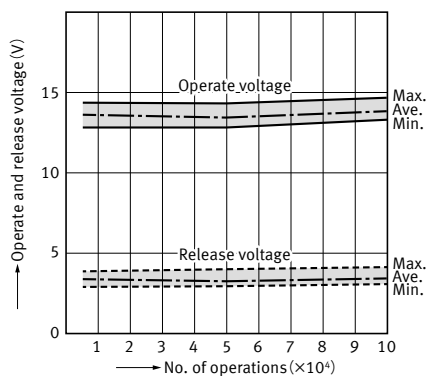
### 1-2.Coil temperature characteristics (4 Form C)

Tested sample : SP4-24V DC  
Ambient temperature : 27 to 29°C

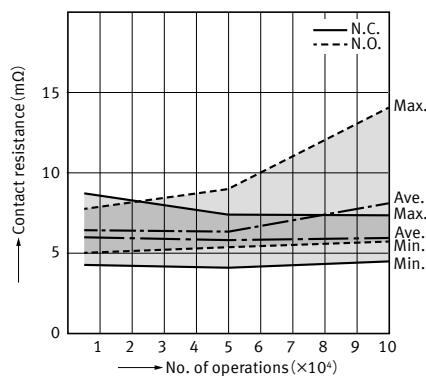


### 2-1.Electrical life test (2 Form C, 15 A 250 V AC Resistive load)

Change of operate and release voltage

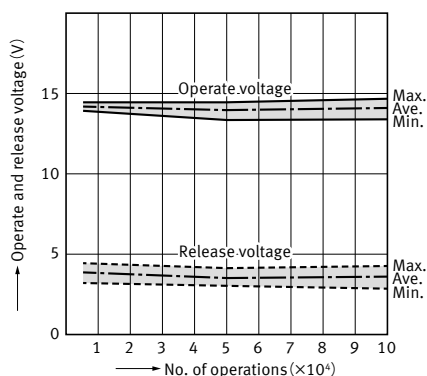


Change of contact resistance

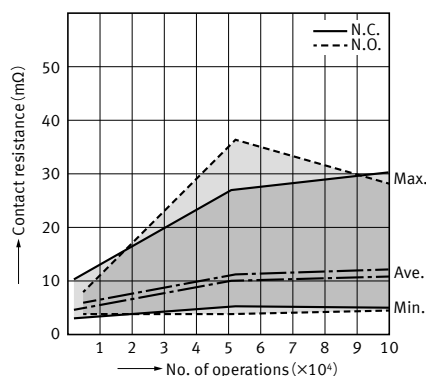


### 2-2.Electrical life test (4 Form C, 10 A 250 V AC Resistive load)

Change of operate and release voltage



Change of contact resistance



**DIMENSIONS**

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

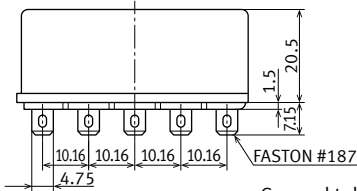
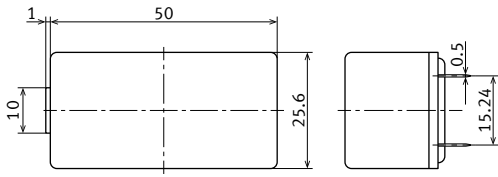
Unit: mm

**■ 2 Form C**

● Plug-in terminal

**CAD**

External dimensions



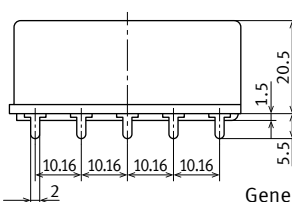
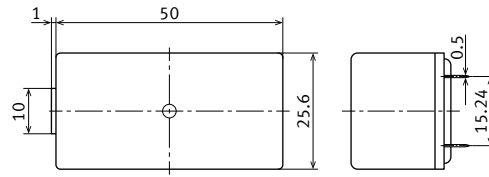
General tolerance  $\pm 0.3$

Note : Diagram shows the "reset" position when terminals 3 and 4 are energized. Energize terminals 1 and 2 to transfer contacts.

● PC board terminal

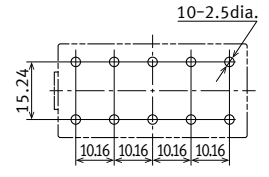
**CAD**

External dimensions



General tolerance  $\pm 0.3$

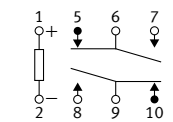
Recommended PC board pattern (BOTTOM VIEW)



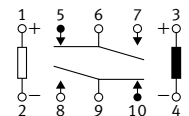
Tolerance  $\pm 0.1$

Schematic (BOTTOM VIEW)

Single side stable (De-energize)



2 coil latching (Reset)

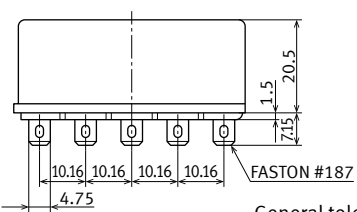
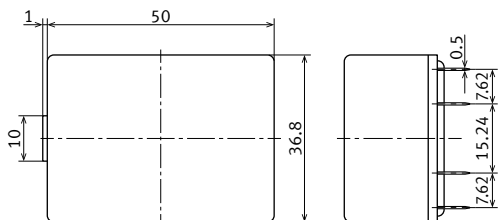


**■ 4 Form C**

● Plug-in terminal

**CAD**

External dimensions



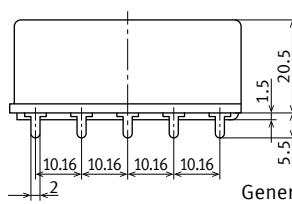
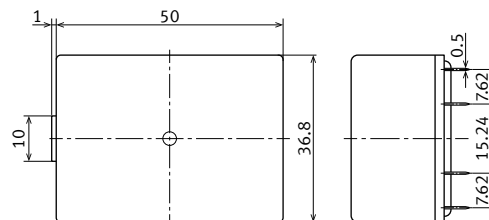
General tolerance  $\pm 0.3$

Note : Diagram shows the "reset" position when terminals 3 and 4 are energized. Energize terminals 1 and 2 to transfer contacts.

● PC board terminal

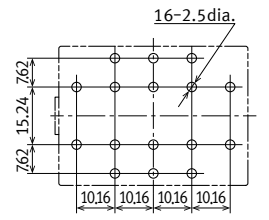
**CAD**

External dimensions



General tolerance  $\pm 0.3$

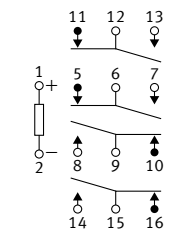
Recommended PC board pattern (BOTTOM VIEW)



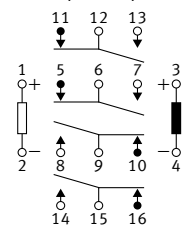
Tolerance  $\pm 0.1$

Schematic (BOTTOM VIEW)

Single side stable (De-energize)



2 coil latching (Reset)



# Power relays (Over 2 A) SP RELAYS

## SAFETY STANDARDS

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

### ■ UL (Approved)

2 Form C

File No.	Contact rating
E43028	15 A 250 V AC
	10 A 30 V DC
	1/2 HP 125, 250 V AC

4 Form C

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

### ■ TÜV (Approved)

2 Form C

File No.	Contact rating
B 18 03 13461 381	15 A 250 V AC ( $\cos\phi = 1.0$ )
	10 A 30 V DC

4 Form C

File No.	Contact rating
B 18 03 13461 381	10 A 250 V AC ( $\cos\phi = 1.0$ )
	10 A 30 V DC

### ■ CSA (Approved)

2 Form C

File No.	Contact rating
LR26550	15 A 250 V AC
	10 A 30 V DC
	1/2 HP 125, 250 V AC

4 Form C

File No.	Contact rating
LR26550	10 A 250 V AC
	10 A 30 V DC
	1/3 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](https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp)



# SP RELAYS Terminal sockets



## TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Case
SP2 Terminal socket	SP2-SF	AR1922	10 pcs.	50 pcs.
SP4 Terminal socket	SP4-SF	AR1942	5 pcs.	25 pcs.

## RATING

Item	Specifications
Dielectric strength (initial)	Each between terminals: 3,000 Vrms for 1 min (detection current: 10 mA)
Insulation resistance (initial)	Each between terminals: Min. 1,000 MΩ (at 500 V DC, Measured portion is the same as the case of dielectric strength.)
Maximum carrying current	15 A
Conditions for usage, transport and storage	Ambient temperature: -50 to +60°C Humidity: 5 to 85% RH (Avoid icing and condensation)

## DIMENSIONS

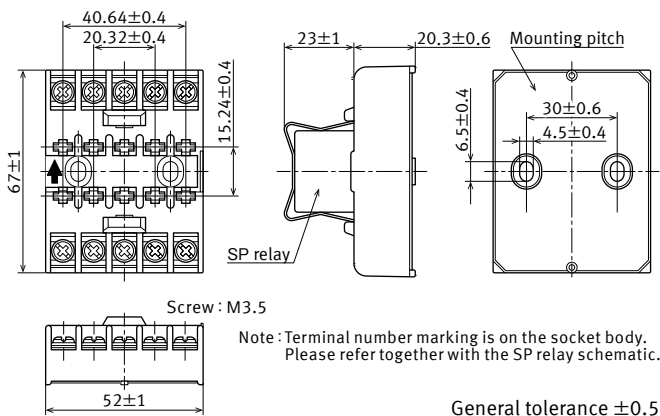
**CAD** The CAD data of the products with a "CAD" mark can be downloaded from our Website.

Unit: mm

### SP2 Terminal socket (AR1922)

**CAD**

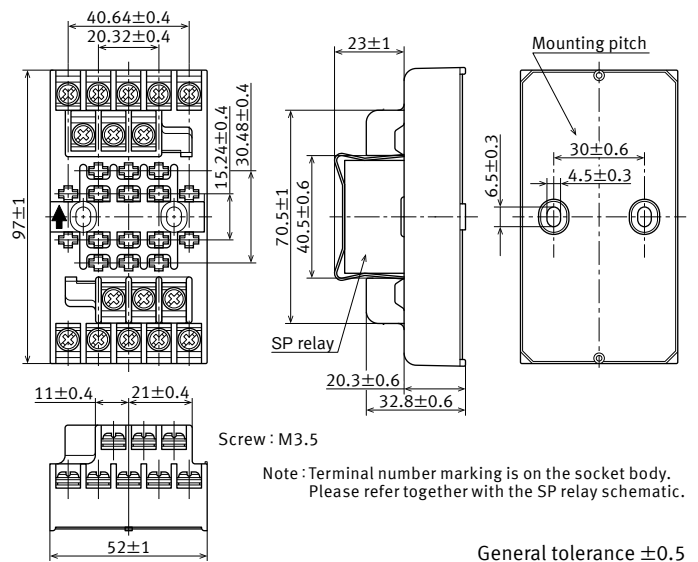
External dimensions



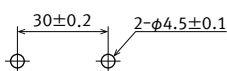
### SP4 Terminal socket (AR1942)

**CAD**

External dimensions



### Mounting hole pattern

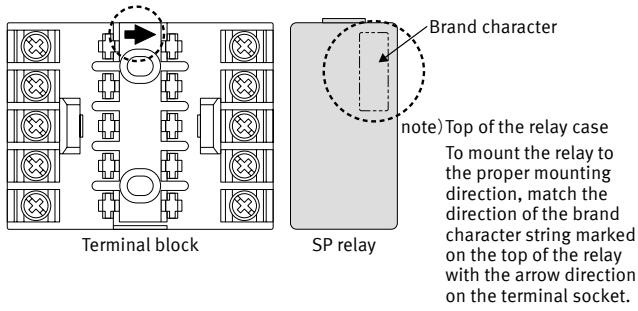


- Notes:
1. Mounting screws and the fastening bracket are included in the package.
  2. Mount the relay with the proper mounting direction — i.e. with the direction of the mark on top of the relay case matching the direction of the mark on the terminal block. (The direction of the terminal block is the upward direction of the relay.)

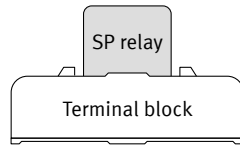
## HANDLING

### ■ Mounting method of relay

- 1) Match the direction of relay and terminal socket.



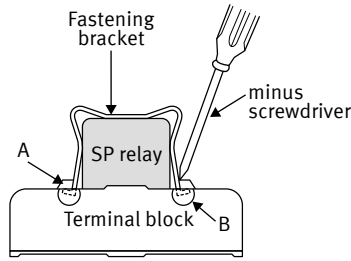
- 2) Both ends of the relay are to be secured firmly.



- 3) Use the included fastening bracket to firmly secure the relay.

### ● Mounting method of fastening bracket

- 1) Insert the A part into the mounting groove of the terminal socket.
- 2) Fit the B part into groove, while pressing with the tip of a minus screwdriver.

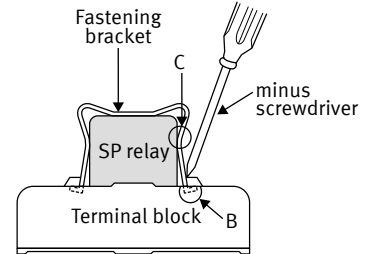


### ■ Removing method of relay

- 1) Pull out the relay after completely removing the fastening bracket.
- 2) 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.

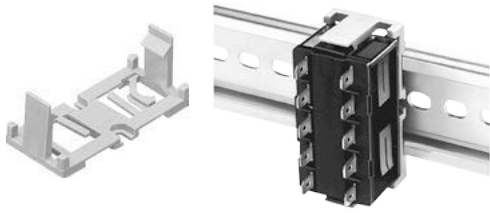
### ● Removing method of fastening bracket

- 1) Slide the B part from the groove in the terminal socket, while pressing with the tip of a minus screwdriver.
- 2) While the bracket is in this position, keep pressing the C part of the bracket to the relay side with your finger, and lift up and remove from the groove.



# SP RELAYS Mounting board

RoHS



Direct chassis mounting possible, and applicable to DIN rail.

## TYPES

Product name	Type No.	Part No.	Standard packing	
			Inner carton	Outer carton
Mounting board	SP-MA	AR1800	10 pcs.	100 pcs.

## RATING

Item	Specifications
Conditions for usage, transport and storage	Ambient temperature: -50 to +60°C Humidity: 5 to 85% RH (Avoid icing and condensation)
Shock resistance*	980 m/s <sup>2</sup>
Vibration resistance	10 to 55 Hz (at double amplitude of 3 mm)

\*\*When doing a DIN rail installation, refer to the mounting method 3) below: only direction A is 588 m/s<sup>2</sup>

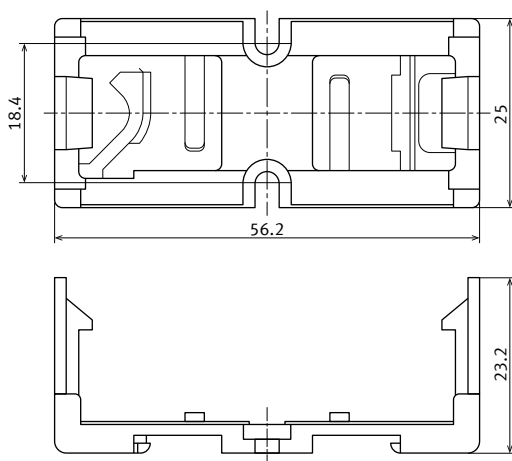
## DIMENSIONS

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

Unit: mm

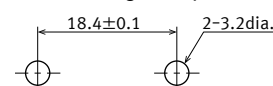
### CAD

External dimensions



General tolerance  $\pm 0.5$

Mounting hole pattern



## HANDLING

### ■ Mounting

- Both the SP relay 2 Form C and 4 Form C can be mounted to the mounting boards.
- Use the mounting boards either by attaching them directly to the chassis, or by mounting with a DIN rail.

#### 1) When attaching directly to chassis

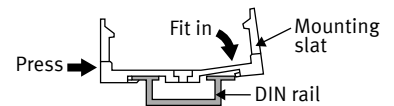
- Use two M3 screws.
- For the mounting pitch, refer to the dimensions.

#### 2) When mounting on a DIN rail

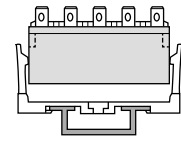
- Use a 35 mm wide DIN rail (DIN46277).

### ■ Method for mounting on DIN rail

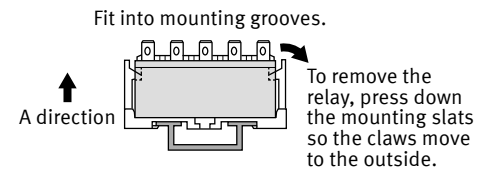
- 1) Fit the arc shaped claw of the mounting board into the DIN rail.



- 2) Press on the side as shown in the diagram.



- 3) Fit in the claw part on the opposite side.



## GUIDELINES FOR USAGE

- When mounting to a DIN rail, use a commercially available fastening bracket if there is a need to stop sliding of the mounting slat in the rail direction.

# GUIDELINES FOR POWER, HIGH-CAPACITY DC CUT OFF AND SAFETY RELAYS USAGE

■ For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.  
[https://industrial.panasonic.com/ac/e/control/relay/cautions\\_use/index.jsp](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

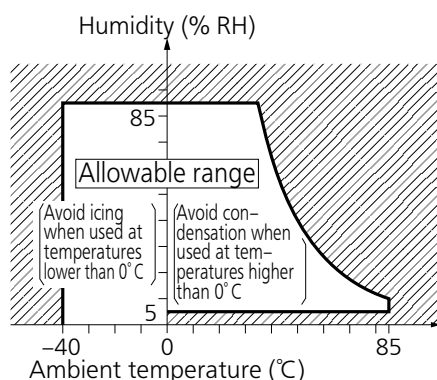
When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays 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 switch 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 seal 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/>

---

**Panasonic**  
INDUSTRY

**Panasonic Industry Co., Ltd.**

Electromechanical Control Business Division  
■1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan  
[industrial.panasonic.com/ac/e/](http://industrial.panasonic.com/ac/e/)