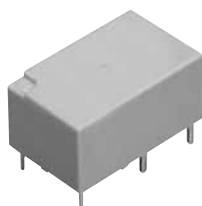




### 1a 10A, 1a1b/2a 8A small polarized power relays

## DK RELAYS



RoHS compliant

Protective construction: Sealed type

### FEATURES

- 1. Compact with high capacity**  
High capacity switching in a small package: 1 Form A, 10 A 250 V AC; 1 Form A 1 Form B and 2 Form A, 8 A 250 V AC.
- 2. High sensitivity: 200 mW nominal operating power**
- 3. High breakdown voltage**  
Independent coil and the contact structure improves breakdown voltage.

| Between contact and coil                                     | Between open contacts                                       |
|--------------------------------------------------------------|-------------------------------------------------------------|
| 4,000 Vrms for 1 min.<br>10,000 V surge<br>breakdown voltage | 1,000 Vrms for 1 min.<br>1,500 V surge<br>breakdown voltage |

Conforms with FCC Part 68

- 4. Latching types available**
- 5. Sealed construction allows automatic washing**
- 6. Sockets are available**
- 7. Complies with safety standards**  
Complies with Japan Electrical Appliance and Material Safety Law requirements for operating 200 V power supply circuits, and complies with UL, CSA, and TÜV safety standards.

### TYPICAL APPLICATIONS

- 1. Switching power supply**
- 2. Power switching for various OA equipment**
- 3. Control or driving relays for industrial machines (robotics, numerical control machines, etc.)**
- 4. Output relays for programmable logic controllers, temperature controllers, timers and so on**
- 5. Home appliances**

### ORDERING INFORMATION

DK  -  -  -

Contact arrangement

1a: 1 Form A

2a: 2 Form A

1a1b: 1 Form A 1 Form B

Operating function

Nil: Single side stable

L2: 2 coil latching

Nominal coil voltage (DC)

3, 5, 6, 9, 12, 24V

Contact material

F: 1 Form A (Au-flashed AgSnO<sub>2</sub> type)

Nil: 2 Form A, 1 Form A 1 Form B (Au-flashed AgNi type)

Note: VDE approved type is available.

TYPES

| Contact arrangement  | Nominal coil voltage | Single side stable | 2 coil latching |
|----------------------|----------------------|--------------------|-----------------|
|                      |                      | Part No.           | Part No.        |
| 1 Form A             | 3V DC                | DK1a-3V-F          | DK1a-L2-3V-F    |
|                      | 5V DC                | DK1a-5V-F          | DK1a-L2-5V-F    |
|                      | 6V DC                | DK1a-6V-F          | DK1a-L2-6V-F    |
|                      | 9V DC                | DK1a-9V-F          | DK1a-L2-9V-F    |
|                      | 12V DC               | DK1a-12V-F         | DK1a-L2-12V-F   |
|                      | 24V DC               | DK1a-24V-F         | DK1a-L2-24V-F   |
| 1 Form A<br>1 Form B | 3V DC                | DK1a1b-3V          | DK1a1b-L2-3V    |
|                      | 5V DC                | DK1a1b-5V          | DK1a1b-L2-5V    |
|                      | 6V DC                | DK1a1b-6V          | DK1a1b-L2-6V    |
|                      | 9V DC                | DK1a1b-9V          | DK1a1b-L2-9V    |
|                      | 12V DC               | DK1a1b-12V         | DK1a1b-L2-12V   |
|                      | 24V DC               | DK1a1b-24V         | DK1a1b-L2-24V   |
| 2 Form A             | 3V DC                | DK2a-3V            | DK2a-L2-3V      |
|                      | 5V DC                | DK2a-5V            | DK2a-L2-5V      |
|                      | 6V DC                | DK2a-6V            | DK2a-L2-6V      |
|                      | 9V DC                | DK2a-9V            | DK2a-L2-9V      |
|                      | 12V DC               | DK2a-12V           | DK2a-L2-12V     |
|                      | 24V DC               | DK2a-24V           | DK2a-L2-24V     |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.  
\* Sockets available.

RATING

1. Coil data

1) Single side stable

| Nominal coil voltage | Pick-up voltage<br>(at 20°C 68°F)            | Drop-out voltage<br>(at 20°C 68°F)           | Nominal operating current<br>[±10%] (at 20°C 68°F) |  | Coil resistance<br>[±10%] (at 20°C 68°F) | Nominal operating power | Max. applied voltage<br>(at 20°C 68°F) |
|----------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------------|--|------------------------------------------|-------------------------|----------------------------------------|
| 3V DC                | 70%V or less of nominal voltage<br>(Initial) | 10%V or more of nominal voltage<br>(Initial) | 66.6mA                                             |  | 45Ω                                      | 200mW                   | 130%V of nominal voltage               |
| 5V DC                |                                              |                                              | 40mA                                               |  | 125Ω                                     |                         |                                        |
| 6V DC                |                                              |                                              | 33.3mA                                             |  | 180Ω                                     |                         |                                        |
| 9V DC                |                                              |                                              | 22.2mA                                             |  | 405Ω                                     |                         |                                        |
| 12V DC               |                                              |                                              | 16.6mA                                             |  | 720Ω                                     |                         |                                        |
| 24V DC               |                                              |                                              | 8.3mA                                              |  | 2,880Ω                                   |                         |                                        |

2) 2 coil latching

| Nominal coil voltage | Set voltage<br>(at 20°C 68°F)                | Reset voltage<br>(at 20°C 68°F)              | Nominal operating current<br>[±10%] (at 20°C 68°F) |            | Coil resistance<br>[±10%] (at 20°C 68°F) |            | Nominal operating power |            | Max. applied voltage<br>(at 20°C 68°F) |
|----------------------|----------------------------------------------|----------------------------------------------|----------------------------------------------------|------------|------------------------------------------|------------|-------------------------|------------|----------------------------------------|
|                      |                                              |                                              | Set coil                                           | Reset coil | Set coil                                 | Reset coil | Set coil                | Reset coil |                                        |
| 3V DC                | 70%V or less of nominal voltage<br>(Initial) | 70%V or less of nominal voltage<br>(Initial) | 66.6mA                                             | 66.6mA     | 45Ω                                      | 45Ω        | 200mW                   | 200mW      | 130%V of nominal voltage               |
| 5V DC                |                                              |                                              | 40mA                                               | 40mA       | 125Ω                                     | 125Ω       |                         |            |                                        |
| 6V DC                |                                              |                                              | 33.3mA                                             | 33.3mA     | 180Ω                                     | 180Ω       |                         |            |                                        |
| 9V DC                |                                              |                                              | 22.2mA                                             | 22.2mA     | 405Ω                                     | 405Ω       |                         |            |                                        |
| 12V DC               |                                              |                                              | 16.6mA                                             | 16.6mA     | 720Ω                                     | 720Ω       |                         |            |                                        |
| 24V DC               |                                              |                                              | 8.3mA                                              | 8.3mA      | 2,880Ω                                   | 2,880Ω     |                         |            |                                        |

## 2. Specifications

| Characteristics            | Item                                                          |                           | Specifications                                                                                                                   |                           |                           |
|----------------------------|---------------------------------------------------------------|---------------------------|----------------------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------|
| 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 1A)                                                                                           |                           |                           |
|                            | Contact material                                              |                           | Au-flashed AgSnO <sub>2</sub> type                                                                                               | Au-flashed AgNi type      |                           |
| Rating                     | Nominal switching capacity (resistive load)                   |                           | 10 A 250 V AC, 10 A 30 V DC                                                                                                      | 8 A 250 V AC, 8 A 30 V DC | 8 A 250 V AC, 8 A 30 V DC |
|                            | Max. switching power (resistive load)                         |                           | 2,500 VA, 300 W                                                                                                                  | 2,000 VA, 240 W           | 2,000 VA, 240 W           |
|                            | Max. switching voltage                                        |                           | 250 V AC, 125 V DC (0.2A)                                                                                                        | 250 V AC, 125 V DC (0.2A) | 250 V AC, 125 V DC (0.2A) |
|                            | Max. switching current                                        |                           | 10 A                                                                                                                             | 8 A                       | 8 A                       |
|                            | Min. switching capacity (Reference value)* <sup>1</sup>       |                           | 10 m A 5 V DC                                                                                                                    |                           |                           |
| Electrical characteristics | Insulation resistance (Initial)                               |                           | Min. 1,000 MΩ (at 500 V DC) Measurement at same location as "Breakdown voltage" section.                                         |                           |                           |
|                            | Breakdown voltage (Initial)                                   | Between open contacts     | 1,000 Vrms for 1 min. (Detection current: 10 mA.)                                                                                |                           |                           |
|                            |                                                               | Between contact and coil  | 4,000 Vrms for 1 min. (Detection current: 10 mA.)                                                                                |                           |                           |
|                            | Surge breakdown voltage* <sup>2</sup> (Initial)               | between contacts and coil | 10,000 V                                                                                                                         |                           |                           |
|                            | Operate time [Set time] (at 20°C 68°F)                        |                           | Max. 10 ms (Approx. 5 ms) [10 ms (Approx. 5 ms)]<br>(Nominal coil voltage applied to the coil, excluding contact bounce time.)   |                           |                           |
| Mechanical characteristics | Shock resistance                                              | Functional                | Min. 98 m/s <sup>2</sup> (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs.)                                           |                           |                           |
|                            |                                                               | Destructive               | Min. 980 m/s <sup>2</sup> (Half-wave pulse of sine wave: 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                                                    |                           | Min. 5×10 <sup>7</sup> (at 300 times/min.)                                                                                       |                           |                           |
| Conditions                 | Conditions for operation, transport and storage* <sup>3</sup> |                           | Ambient temperature: -40°C to +65°C -40°F to +149°F,<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) |                           |                           |
| Unit weight                |                                                               |                           | Approx. 5 g .18 oz                                                                                                               | Approx. 6 g .21 oz        | Approx. 6 g .21 oz        |

Notes: \*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. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

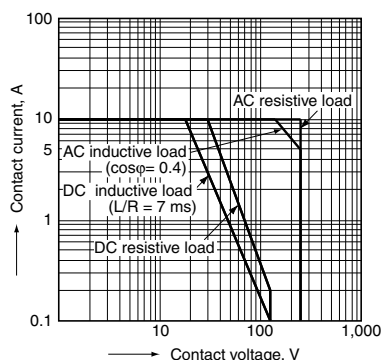
## 3. Electrical life

Condition: Resistive load, at 20 times/min.

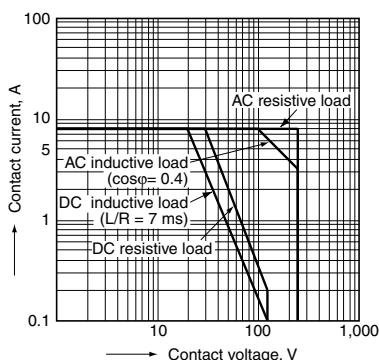
| Type                        | Switching capacity        | Number of operations   |
|-----------------------------|---------------------------|------------------------|
| 1 Form A                    | 10A 250V AC<br>10A 30V DC | Min. 1×10 <sup>5</sup> |
| 1 Form A 1 Form B, 2 Form A | 8A 250V AC<br>8A 30V DC   | Min. 1×10 <sup>5</sup> |

## REFERENCE DATA

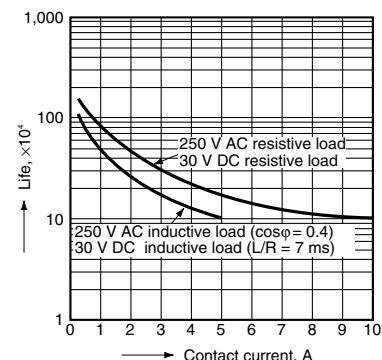
1-(1). Maximum operating power (1 Form A)



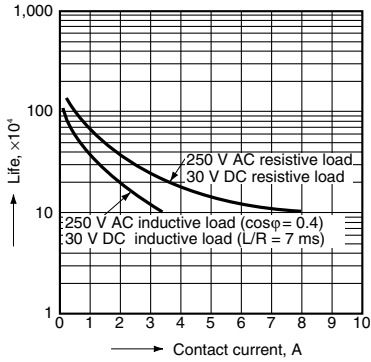
1-(2). Maximum operating power (1 Form A 1 Form B, 2 Form A)



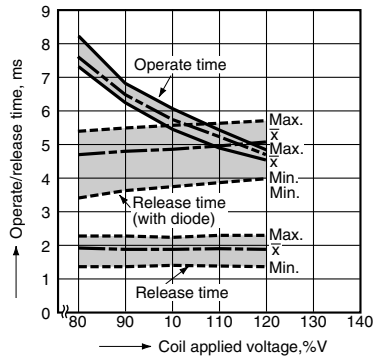
2-(1). Life curve (1 Form A)



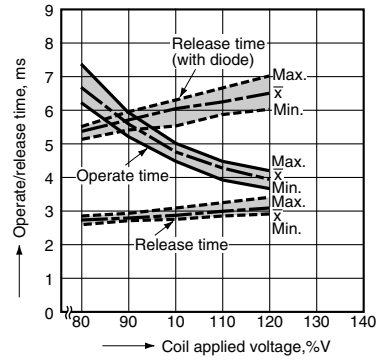
2-(2). Life curve  
(1 Form A 1 Form B, 2 Form A)



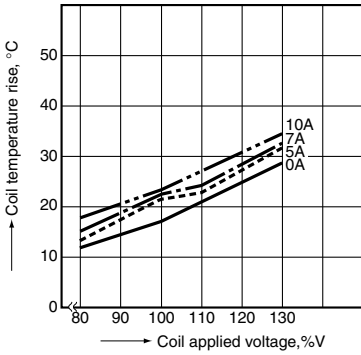
3-(1). Operate/Release time (1 Form A)  
Tested sample: DK1a-24V, 5 pcs.



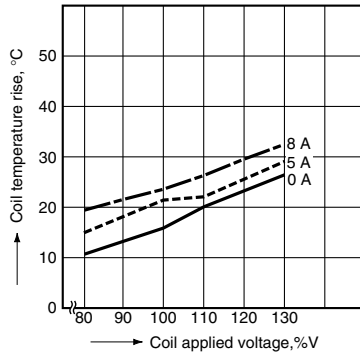
3-(2). Operate/Release time  
(1 Form A 1 Form B, 2 Form A)  
Tested sample: DK1a1b-12V, 5 pcs.



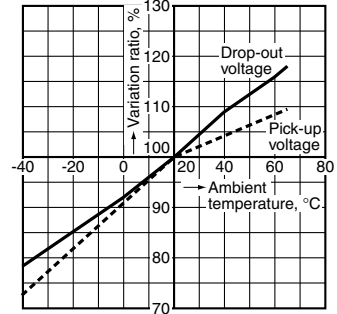
4-(1). Coil temperature rise (1 Form A)  
Tested sample: DK1a-12V, 5 pcs.  
Ambient temperature: 30°C 86°F



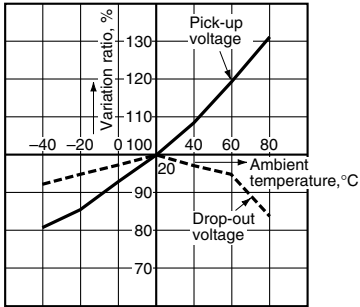
4-(2). Coil temperature rise  
(1 Form A 1 Form B, 2 Form A)  
Tested sample: DK1a1b-12V, 5 pcs.  
Ambient temperature: 20°C 68°F



5-(1). Ambient temperature characteristics  
(1 Form A)  
Tested sample: DK1a-24V, 6 pcs  
Ambient temperature: -40°C to +80°C  
-40°F to +176°F



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

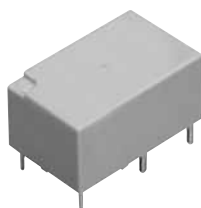


# DIMENSIONS (mm inch)

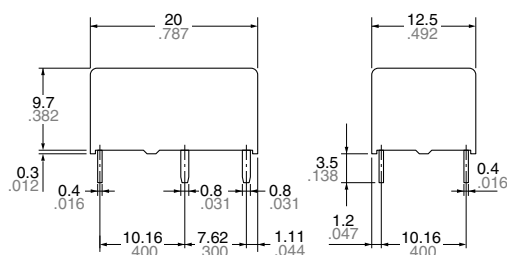
The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

## 1. 1 Form A type

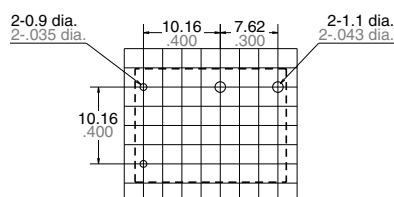
### CAD Data



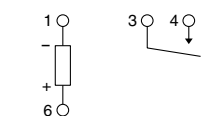
External dimensions  
Single side stable type



PC board pattern (Bottom view)  
Single side stable type

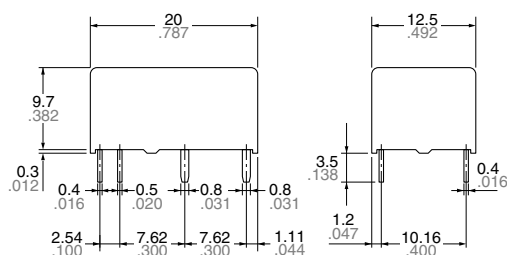


Schematic  
(Bottom view)  
Single side stable type

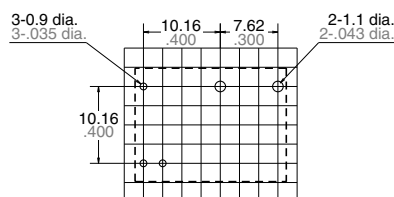


(Deenergized condition)

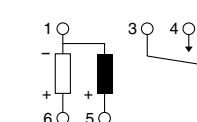
2 coil latching type



2 coil latching type



2 coil latching type



(Reset condition)

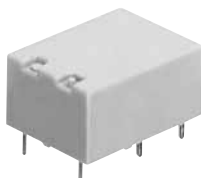
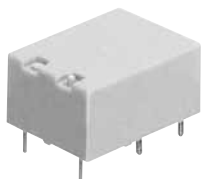
General tolerance:  $\pm 0.3 \pm .012$

Tolerance:  $\pm 0.1 \pm .004$

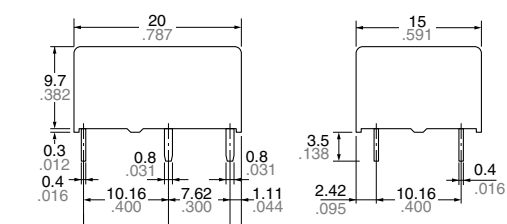
Since this is a polarized relay, the connection to the coil should be done according to the above schematic.

## 2. 1 Form A 1 Form B type, 2 Form A type

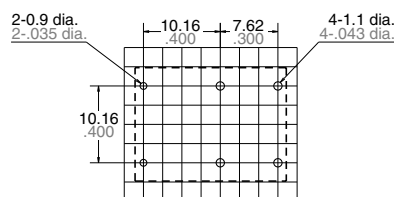
### CAD Data



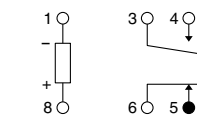
External dimensions  
Single side stable type



PC board pattern (Bottom view)  
Single side stable type

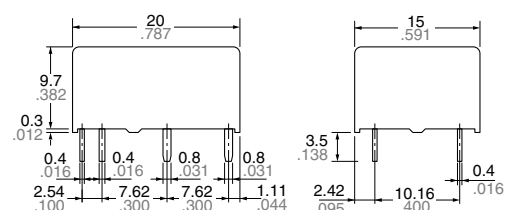


Schematic  
(Bottom view)  
<1 Form A 1 Form B type>  
Single side stable type

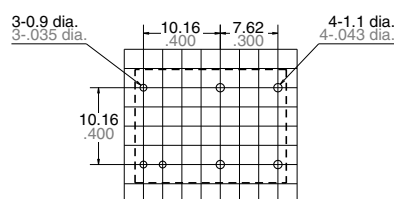


(Deenergized condition)

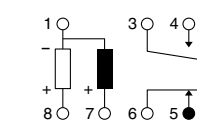
2 coil latching type



2 coil latching type



2 coil latching type

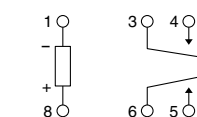


(Reset condition)

General tolerance:  $\pm 0.3 \pm .012$

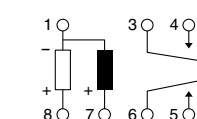
Tolerance:  $\pm 0.1 \pm .004$

<2 Form A>  
Single side stable type



(Deenergized condition)

2 coil latching type



(Reset condition)

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

## SAFETY STANDARDS

| Type                           | UL/C-UL (Recognized) |                    | CSA (Certified) |                    | TÜV (Certified)      |                                |
|--------------------------------|----------------------|--------------------|-----------------|--------------------|----------------------|--------------------------------|
|                                | File No.             | Rating             | File No.        | Rating             | File No.             | Rating                         |
| 1 Form A                       | E43028               | 10A 250V AC        | LR26550         | 10A 250V AC        | B 12 06<br>13461 329 | 10A 250V AC ( $\cos\phi=1.0$ ) |
|                                |                      | 10A 30V DC         |                 | 10A 30V DC         |                      | 10A 30V DC (0ms)               |
|                                |                      | 1/3HP 125, 250V AC |                 | 1/3HP 125, 250V AC |                      | 5A 250V AC ( $\cos\phi=0.4$ )  |
| 1 Form A 1 Form B,<br>2 Form A | E43028               | 8A 250V AC         | LR26550         | 8A 250V AC         | B 12 06<br>13461 329 | 8A 250V AC ( $\cos\phi=1.0$ )  |
|                                |                      | 8A 30V DC          |                 | 8A 30V DC          |                      | 8A 30V DC (0ms)                |
|                                |                      | 1/4HP 125, 250V AC |                 | 1/4HP 125, 250V AC |                      | 4A 250V AC ( $\cos\phi=0.4$ )  |

Notes: VDE approved type is available. Please contact our company.

## INSULATION CHARACTERISTICS (IEC61810-1)

| Item                                          | Characteristics       |
|-----------------------------------------------|-----------------------|
| Clearance/Creepage distance (IEC61810-1)      | Min. 5.5/5.5mm        |
| Category of protection (IEC61810-1)           | RT III                |
| Tracking resistance (IEC60112)                | PTI 175               |
| Insulation material group                     | III a                 |
| Over voltage category                         | III                   |
| Rated voltage                                 | 250V                  |
| 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.

## NOTES

**1. For cautions for use, please read “GENERAL APPLICATION GUIDELINES”.**

**2. Soldering should be done under the following conditions:**

- 1) Preheating: Within 120°C 248°F and within 120 seconds
- 2) Soldering iron: 260°C±5°C 500°F±41°F and within 6 seconds

**3. External magnetic field**

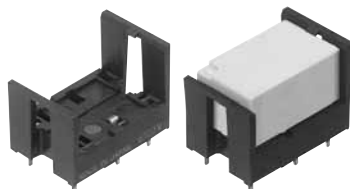
Since DK relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

**4. When using, please be aware that the a contact and b contact sides of 1 Form A 1 Form B type may go on simultaneously at operate time and release time.**



### ACCESSORIES

### DK RELAY PC BOARD SOCKETS



RoHS compliant

### TYPES

| Type                           |                    | Part No.  |
|--------------------------------|--------------------|-----------|
| 1 Form A                       | Single side stable | DK1a-PS   |
|                                | 2 coil latching    | DK1a-PSL2 |
| 1 Form A 1 Form B,<br>2 Form A | Single side stable | DK2a-PS   |
|                                | 2 coil latching    | DK2a-PSL2 |

Standard packing: Carton: 50 pcs.; Case: 500 pcs

### RELAY COMPATIBILITY

| Relay                          | Socket                  | 1 Form A                |                      | 1 Form A 1 Form B, 2 Form A |                      |
|--------------------------------|-------------------------|-------------------------|----------------------|-----------------------------|----------------------|
|                                |                         | Single side stable type | 2 coil latching type | Single side stable type     | 2 coil latching type |
| 1 Form A                       | Single side stable type | ●                       | ●                    | —                           | —                    |
|                                | 2 coil latching type    | —                       | ●                    | —                           | —                    |
| 1 Form A 1 Form B,<br>2 Form A | Single side stable type | —                       | —                    | ●                           | ●                    |
|                                | 2 coil latching type    | —                       | —                    | —                           | ●                    |

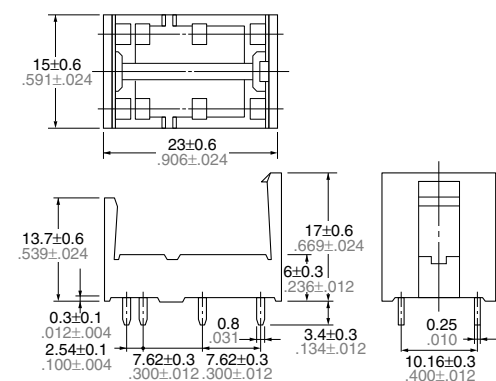
### SPECIFICATIONS

| Item                            | Specifications                                                                          |
|---------------------------------|-----------------------------------------------------------------------------------------|
| Breakdown voltage (Initial)     | 4,000 Vrms<br>(Detection current: 10 mA)<br>(Except the portion between coil terminals) |
| Insulation resistance (Initial) | Min. 1,000 mΩ (at 500 V DC)                                                             |
| Heat resistance                 | 150°C (for 1 hour)                                                                      |
| Max. continuous current         | 10 A (DK1a-PS, DK1a-PSL2),<br>8 A (DK2a-PS, DK2a-PSL2)                                  |

### DIMENSIONS (mm inch)

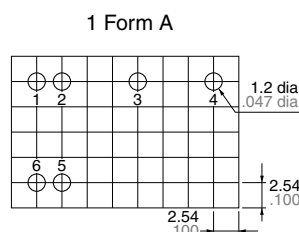
The CAD data of the products with a **CAD Data** mark can be downloaded from: <http://industrial.panasonic.com/ac/e/>

#### CAD Data External dimensions

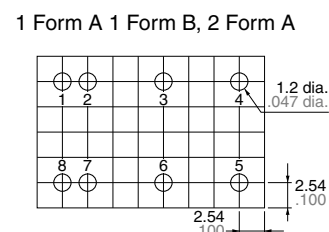


General tolerance:  $\pm 0.3 \pm 0.12$

#### PC board pattern (Bottom view)



Note: The above shows 2 coil latching type.  
No.2 and 5 terminal are eliminated on single side stable type.

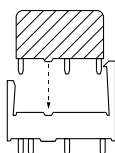


Tolerance:  $\pm 0.1 \pm 0.004$

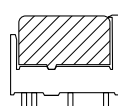
Note: The above shows 2 coil latching type.  
No.2 and 7 terminal are eliminated on single side stable type.

### FIXING AND REMOVAL METHOD

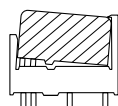
1. Match the direction of relay and socket.



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

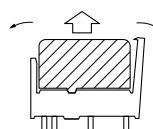


GOOD

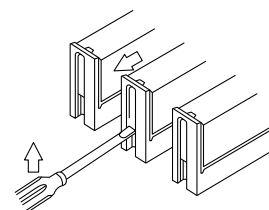


NO GOOD

3. Remove the relay, applying force in the direction shown below.



4. In case there is not enough space to grasp relay with fingers, use screwdrivers in the way shown below.



Notes: 1. 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.  
2. It is hazardous to use IC chip sockets.

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Please contact .....

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