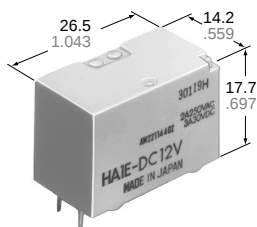
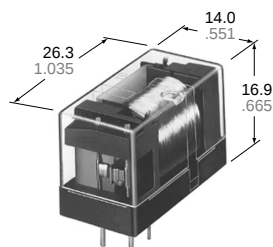


# NAIS

## COST SAVING SUBMINIATURE PC BOARD RELAYS

# HA-RELAYS



HAE Amber Relays

mm inch

## FEATURES

- Compact construction
- Sensitive - very low operating power
- Soldering flux inflow prevented by molded construction
- Contact capacity - 3 A 250 V AC, 30 V DC
- Simple mechanism for stable quality - only 9 pieceparts
- Amber sealed types available

## SPECIFICATIONS

### HA1 Standard type Contacts

|                                                                  |                        |                   |
|------------------------------------------------------------------|------------------------|-------------------|
| Arrangement                                                      |                        | 1 Form C          |
| Contact material                                                 |                        | Silver-nickel     |
| Initial contact resistance, max.<br>(By voltage drop 6 V DC 1 A) |                        | 50 mΩ             |
| Rating<br>(resistive<br>load)                                    | Max. switching power   | 750 VA, 90 W      |
|                                                                  | Max. switching voltage | 250 V AC, 30 V DC |
|                                                                  | Max. switching current | 3 A               |
| Expected<br>life (min.<br>operations)                            | Mechanical             | 10 <sup>7</sup>   |
|                                                                  | Electrical             | 3 A 250 V AC      |
|                                                                  | (resistive)            | 3 A 30 V DC       |

### Coil

|                         |                           |
|-------------------------|---------------------------|
| Minimum operating power | (AC) 0.58 VA, (DC) 230 mW |
| Nominal operating power | (AC) 0.9 VA, (DC) 360 mW  |

### Characteristics

|                                                                                                                    |                           |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------|
| Maximum operating speed                                                                                            |                           | 20 cpm                                                                                |
| Initial insulation resistance*1<br>(at 25°C, 50% R.H.)                                                             |                           | Min. 100 MΩ at 500 V DC                                                               |
| Initial<br>breakdown<br>voltage*2                                                                                  | Between open contacts     | 750 Vrms for 1 min.                                                                   |
|                                                                                                                    | Between contacts and coil | 1,500 Vrms for 1 min.                                                                 |
| Operate time*3 (at nominal voltage)<br>(at 20°C)                                                                   |                           | Approx. 6 ms (AC),<br>Approx. 5 ms (DC)                                               |
| Release time (without diode)*3<br>(at nominal voltage)(at 20°C)                                                    |                           | Approx. 6 ms (AC),<br>Approx. 3 ms (DC)                                               |
| Temperature rise (at 20°C)                                                                                         |                           | Max. (AC) 60°C, (DC) 40°C<br>with nominal coil voltage and<br>at 3A switching current |
| Shock resistance                                                                                                   | Functional                | 98 m/s <sup>2</sup> {10G}                                                             |
|                                                                                                                    | Destructive               | 980 m/s <sup>2</sup> {100G}                                                           |
| Vibration resistance                                                                                               | Functional                | 10 to 55Hz<br>at double amplitude of 1mm                                              |
|                                                                                                                    | Destructive               | 10 to 55Hz<br>at switching of 2mm                                                     |
| Conditions for operation,<br>transport and storage*4<br>(Not freezing and con-<br>densing at low tempera-<br>ture) | Ambient<br>temp.          | -40°C to +50°C<br>-40°F to +122°F                                                     |
|                                                                                                                    | Humidity                  | 5 to 85%R.H.                                                                          |
| Unit weight                                                                                                        |                           | Approx. 15 g .53 oz                                                                   |

### Remarks

\* Specifications will vary with foreign standards certification ratings.

\*1 Measurement at same location as "Initial breakdown voltage" section

\*2 Detection current: 10 mA

### HA1E Amber sealed type Contacts

|                                                                  |                        |                              |
|------------------------------------------------------------------|------------------------|------------------------------|
| Arrangement                                                      |                        | 1 Form C                     |
| Contact material                                                 |                        | Gold-clad over silver-nickel |
| Initial contact resistance, max.<br>(By voltage drop 6 V DC 1 A) |                        | 50 mΩ                        |
| Rating<br>(resistive<br>load)                                    | Max. switching power   | 500 VA, 90 W                 |
|                                                                  | Max. switching voltage | 250 V AC, 30 V DC            |
|                                                                  | Max. switching current | 2 A AC, 3A DC                |
| Expected<br>life (min.<br>operations)                            | Mechanical             | 10 <sup>7</sup>              |
|                                                                  | Electrical             | 2 A 250 V AC                 |
|                                                                  | (resistive)            | 3 A 30 V DC                  |

### Coil

|                         |                           |
|-------------------------|---------------------------|
| Minimum operating power | (AC) 0.58 VA, (DC) 230 mW |
| Nominal operating power | (AC) 0.9 VA, (DC) 360 mW  |

### Characteristics

|                                                                                                                    |                           |                                                                                       |
|--------------------------------------------------------------------------------------------------------------------|---------------------------|---------------------------------------------------------------------------------------|
| Maximum operating speed                                                                                            |                           | 20 cpm                                                                                |
| Initial insulation resistance*1<br>(at 25°C, 50% R.H.)                                                             |                           | Min. 100 MΩ at 500 V DC                                                               |
| Initial<br>breakdown<br>voltage*2                                                                                  | Between open contacts     | 750 Vrms for 1 min.                                                                   |
|                                                                                                                    | Between contacts and coil | 1,500 Vrms for 1 min.                                                                 |
| Operate time*3 (at nominal voltage)<br>(at 20°C)                                                                   |                           | Approx. 6 ms (AC),<br>Approx. 5 ms (DC)                                               |
| Release time (without diode)*3<br>(at nominal voltage)(at 20°C)                                                    |                           | Approx. 6 ms (AC),<br>Approx. 3 ms (DC)                                               |
| Temperature rise (at 50°C)                                                                                         |                           | Max. (AC) 60°C, (DC) 40°C<br>with nominal coil voltage and<br>at 3A switching current |
| Shock resistance                                                                                                   | Functional                | 98 m/s <sup>2</sup> {10G}                                                             |
|                                                                                                                    | Destructive               | 980 m/s <sup>2</sup> {100G}                                                           |
| Vibration resistance                                                                                               | Functional                | 10 to 55Hz<br>at double amplitude of 1mm                                              |
|                                                                                                                    | Destructive               | 10 to 55Hz<br>at double amplitude of 2mm                                              |
| Conditions for operation,<br>transport and storage*4<br>(Not freezing and con-<br>densing at low tempera-<br>ture) | Ambient<br>temp.          | -40°C to +50°C<br>-40°F to +122°F                                                     |
|                                                                                                                    | Humidity                  | 5 to 85%R.H.                                                                          |
| Unit weight                                                                                                        |                           | Approx. 15 g .53 oz                                                                   |

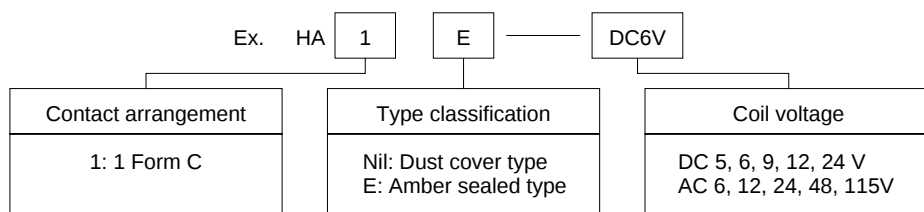
\*3 Excluding contact bounce time

\*4 Refer to 5. Conditions for operation, transport and storage mentioned in  
AMBIENT ENVIRONMENT (Page 61).

## TYPICAL APPLICATIONS

Office machines, electrical home appliances, load management equipment.

## ORDERING INFORMATION



Notes: 1. For UL/CSA recognized types, add suffix UL/CSA.  
2. Standard packing Carton: 100 pcs., Case: 500 pcs. or 2,000 pcs.

## TYPES AND COIL DATA (at 20°C 68°F)

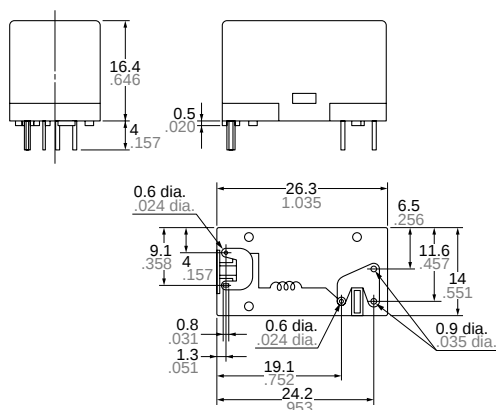
| Part No.                  | Nominal voltage | Pick-up voltage, (max.) | Drop-out voltage, (min.) | * Nominal operating current, mA | Nominal operating power | Coil resistance, $\Omega$ ( $\pm 10\%$ ) | Maximum allowable voltage |
|---------------------------|-----------------|-------------------------|--------------------------|---------------------------------|-------------------------|------------------------------------------|---------------------------|
| HA1-AC6V<br>HA1E-AC6V     | 6 V AC          | 4.8 V AC                | 1.2 V AC                 | 150                             | 0.9 VA                  | —                                        | 6.6 V AC                  |
| HA1-AC12V<br>HA1E-AC12V   | 12 V AC         | 9.6 V AC                | 2.4 V AC                 | 76                              | 0.9 VA                  | —                                        | 13.2 V AC                 |
| HA1-AC24V<br>HA1E-AC24V   | 24 V AC         | 19.2 V AC               | 4.8 V AC                 | 37                              | 0.9 VA                  | —                                        | 26.4 V AC                 |
| HA1-AC48V<br>HA1E-AC48V   | 48 V AC         | 38.4 V AC               | 9.6 V AC                 | 19                              | 0.9 VA                  | —                                        | 52.8 V AC                 |
| HA1-AC115V<br>HA1E-AC115V | 115 V AC        | 92.0 V AC               | 23.0 V AC                | 8                               | 0.9 VA                  | —                                        | 126.5 V AC                |
| HA1-DC5V<br>HA1E-DC5V     | 5 V DC          | 4.0 V DC                | 0.5 V DC                 | 72                              | 360 mW                  | 69                                       | 6.0 V DC                  |
| HA1-DC6V<br>HA1E-DC6V     | 6 V DC          | 4.8 V DC                | 0.6 V DC                 | 60                              | 360 mW                  | 100                                      | 7.2 V DC                  |
| HA1-DC9V<br>HA1E-DC9V     | 9 V DC          | 7.2 V DC                | 0.9 V DC                 | 40                              | 360 mW                  | 225                                      | 10.8 V DC                 |
| HA1-DC12V<br>HA1E-DC12V   | 12 V DC         | 9.6 V DC                | 1.2 V DC                 | 30                              | 360 mW                  | 400                                      | 14.4 V DC                 |
| HA1-DC24V<br>HA1E-DC24V   | 24 V DC         | 19.2 V DC               | 2.4 V DC                 | 15                              | 360 mW                  | 1,600                                    | 28.8 V DC                 |

Note: The range of coil current — AC type:  $\pm 15\%$  at 60 Hz, DC type:  $\pm 10\%$  at 20°C 68°F coil temperature.

## DIMENSIONS

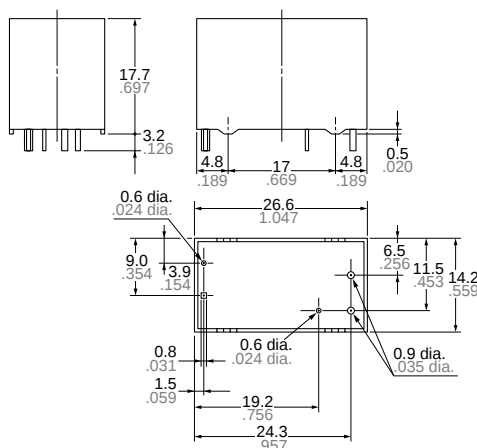
mm inch

HA1



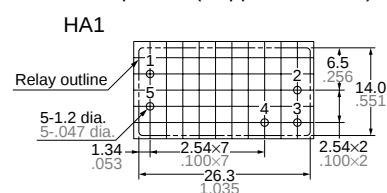
General tolerance:  $\pm 0.5 \pm .020$

HA1E

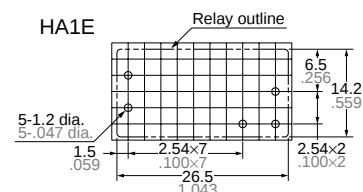


General tolerance:  $\pm 0.5 \pm .004$

PC board pattern (Copper-side view)

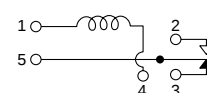


HA1E



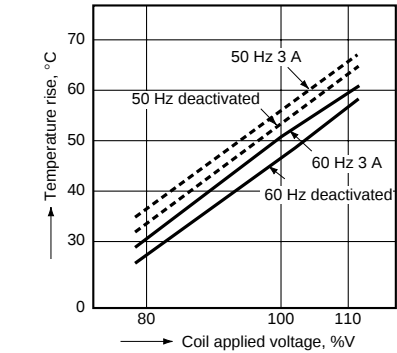
Tolerance:  $\pm 0.1 \pm .004$

Schematic (Bottom view)

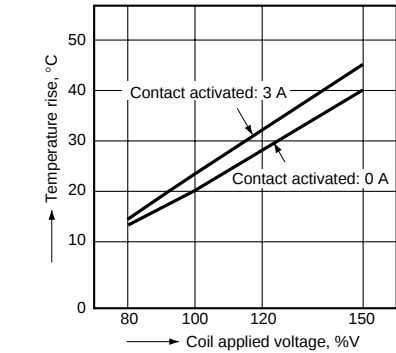


REFERENCE DATA

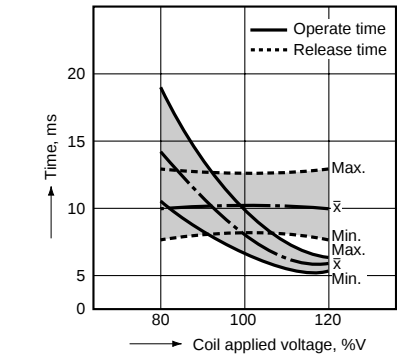
1.-(1) Coil temperature rise (AC PC board type)  
Point measured: Inside the coil



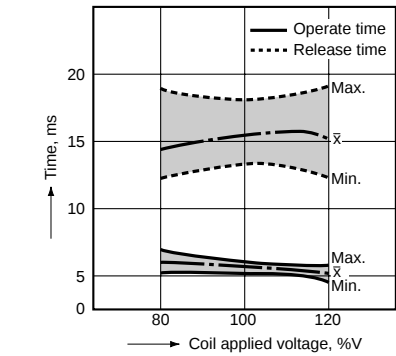
1.-(2) Coil temperature rise (DC PC board type)



Operate and release time  
Sample: HA1-DC12V



Sample: HA1-AC115V



For Cautions for Use, see Relay Technical Information (Page 48 to 76).