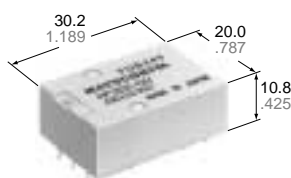


**NAIS****FLATPACK RELAY****NF-RELAYS**

mm inch

**FEATURES**

1. Flatpack
2. Long seller

**SPECIFICATIONS****Contacts**

|  |                           |                    |                     |
|--|---------------------------|--------------------|---------------------|
| Arrangement <sup>1)</sup>                                  |                           | 2 Form C, 4 Form C |                     |
| Initial contact resistance<br>(By voltage drop 6 V DC 1 A) | Max.                      | 50 mOhm            |                     |
|  | Typical                   | 25 mOhm            |                     |
| Contact material   | Movable contact           | Gold-clad silver   |                     |
|  | Stationary contact        | Gold-clad silver   |                     |
| Rating,<br>(resistive load)                                | Max. switching power      | 60 W 100 VA        |                     |
|  | Max. switching voltage    | 220 V AC, DC       |                     |
|  | Max. switching current    | 2 A                |                     |
| Expected life<br>(min. operations)                         | Mechanical                |                    | 10 <sup>8</sup>     |
|  | Electrical<br>(Resistive) | 2 A 30 V DC        | 2 x 10 <sup>5</sup> |
|  |                           | 1 A 30 V DC        | 10 <sup>6</sup>     |
|  |                           | 0.5 A 30 V DC      | 10 <sup>7</sup>     |

<sup>1)</sup> MBB types available: 2MBB & 4MBB  
(See next page for contact positions.)

**Coil**

|  |    |                              |
|--|----|------------------------------|
| Nominal operating power, at 25°C         | 2C | Approx. 300 mW               |
|  | 4C | Approx. 480 mW               |
| Max. operating power for continuous duty |    | Approx. 1 W<br>at 40°C 104°F |

**Remarks**

- \* Specifications will vary with foreign standards certification ratings.
- \*<sup>1)</sup> Measurement at same location as "Initial breakdown voltage" section
- \*<sup>2)</sup> Detection current: 10 mA
- \*<sup>3)</sup> Excluding contact bounce time
- \*<sup>4)</sup> Half-wave pulse of sine wave: 11ms; detection time: 10μs
- \*<sup>5)</sup> Half-wave pulse of sine wave: 6ms
- \*<sup>6)</sup> Detection time: 10μs
- \*<sup>7)</sup> Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 61).

**Characteristics (at 25°C 77°F, 50% R.H. seal level)**

|  |  |   |
|--|--|---|
| Max. operating speed   |  | 50 cps  |
| Initial insulation resistance* <sup>1)</sup>   |  | 1,000 MOhm at 500 V DC  |
| Electrostatic capacitance  | Contact/Contact  | Approx. 4 pF  |
|  | Contact/Coil   | Approx. 7 pF  |
|  | Contact/Ground   | Approx. 6 pF  |
| Initial breakdown voltage* <sup>2)</sup>   | Between open contacts  | 750 Vrms  |
|  | Between contact sets   | 1,000 Vrms  |
|  | Between live parts and ground  | 1,000 Vrms  |
|  | Between contacts and coil  | 1,000 Vrms  |
| Operate time* <sup>3)</sup> (at nominal voltage)   |  | Max. 15 ms (Approx. 10 ms)  |
| Release time (without diode)* <sup>3)</sup><br>(at nominal voltage)  |  | Max. 10 ms (Approx. 3 ms)   |
| Contact bounce   |  | Approx. 1.5 ms  |
| Shock resistance   | Functional* <sup>4)</sup>  | In de-energized condition<br>Min. 29.4 m/s <sup>2</sup> {3 G}<br>(In contact direction)<br>Min. 98 m/s <sup>2</sup> {10 G}<br>(perpendicular to contact)  |
|  |  | In energized condition<br>Min. 196 m/s <sup>2</sup> {20 G}  |
|  | Destructive* <sup>5)</sup><br>Min. 980 m/s <sup>2</sup> {100 G}                          |   |
| Vibration resistance   | Functional* <sup>6)</sup>  | In de-energized condition<br>29.4 m/s <sup>2</sup> {3 G}, 10 to 55 Hz<br>at double amplitude of 0.5 mm<br>(in contact direction)<br>98 m/s <sup>2</sup> {10 G} 10 to 55 Hz<br>at double amplitude of 1.6 mm<br>(perpendicular to contact) |
|  |  | In energized condition<br>117.6 m/s <sup>2</sup> {12 G} 10 to 55 Hz<br>at double amplitude of 2 mm  |
|  | Destructive<br>196 m/s <sup>2</sup> {20 G}, 10 to 55 Hz<br>at double amplitude of 3.3 mm |   |
| Conditions for operation,<br>transport and storage* <sup>7)</sup><br>(Not freezing and condensing<br>at low temperature) | Ambient temp.  | -40°C to +65°C<br>-40°F to +149°F   |
|  | Humidity   | 5 to 85%R.H.  |
| Unit weight  | 2C   | Approx. 14 g .49 oz   |
|  | 4C   | Approx. 15.5 g .55 oz   |

**TYPICAL APPLICATIONS**

NF relays are widely acceptable in applications where small size and high sensitivity are required.

Such applications include: Electronic equipment, Household applications,

Alarm systems, Office machines, Communication equipment, Measuring equipment, Remote control systems, General control circuits, Machine tools, Industrial machinery, etc.

## ORDERING INFORMATION

Ex. NF 4 EB — 4M — 48V — 1

| Contact arrangement        | Type classification | MBB function   | Coil voltage (DC)     | Contact material   |
|----------------------------|---------------------|--|-----------------------|--|
| 2: 2 Form C<br>4: 4 Form C | EB: Standard        | Nil: Form C type<br>2M: 2MBB (2 Form D)<br>4M: 4MBB (4 Form D) | 5, 6, 12,<br>24, 48 V | Nil: Gold-clad silver<br>1: Gold-cap over silver palladium |

- (Notes) 1. For VDE recognized types, add suffix VDE.  
 2. For UL/CSA recognized type, add suffix-A, as NF2EB-12V-A whose ground terminal is cut off.  
 3. Standard packing Carton: 20 pcs.; Case: 200 pcs.

## TYPES AND COIL DATA (at 25°C 77°F)

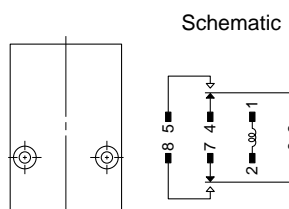
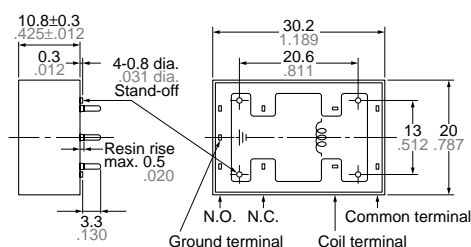
\*Less than 1,000 W:  $\pm 10\%$   
 \*More than 1,000 W:  $\pm 15\%$

| Part No.  | Nominal voltage,<br>V DC | Pick-up voltage,<br>V DC (max.) | Drop-out voltage,<br>V DC (min.) | Max. allowable<br>voltage,<br>V DC (at 40°C) | Coil resistance,*<br>Ohm | Nominal<br>operating power,<br>mW | Inductance, H |       |
|-----------|--------------------------|---------------------------------|----------------------------------|--|--------------------------|-----------------------------------|---------------|-------|
|           |                          |                                 |                                  |  |                          |                                   | Armarure      |       |
|           |                          |                                 |                                  |  |                          |                                   | Open          | Close |
| NF2EB-5V  | 5                        | 4.0                             | 0.5                              | 8.7  | 90                       | 278                               | 0.071         | 0.071 |
| NF2EB-6V  | 6                        | 4.8                             | 0.6                              | 10.5   | 137                      | 260                               | 0.093         | 0.094 |
| NF2EB-12V | 12                       | 9.6                             | 1.2                              | 21   | 500                      | 290                               | 0.338         | 0.344 |
| NF2EB-24V | 24                       | 19.2                            | 2.4                              | 42   | 2,000                    | 290                               | 1.29          | 1.31  |
| NF2EB-48V | 48                       | 38.4                            | 4.8                              | 84   | 7,000                    | 330                               | 4.12          | 4.18  |
| NF4EB-5V  | 5                        | 4.0                             | 0.5                              | 7  | 53                       | 472                               | 0.029         | 0.029 |
| NF4EB-6V  | 6                        | 4.8                             | 0.6                              | 8.5  | 90                       | 400                               | 0.070         | 0.071 |
| NF4EB-12V | 12                       | 9.6                             | 1.2                              | 17.0   | 330                      | 440                               | 0.22          | 0.23  |
| NF4EB-24V | 24                       | 19.2                            | 2.4                              | 34   | 1,200                    | 480                               | 0.77          | 0.79  |
| NF4EB-48V | 48                       | 38.4                            | 4.8                              | 68   | 4,200                    | 550                               | 2.22          | 2.25  |

## DIMENSIONS

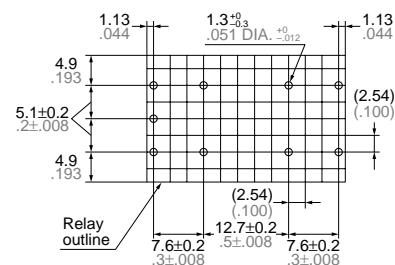
mm inch

### 2 Form C

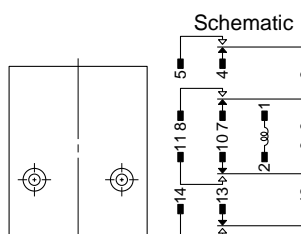
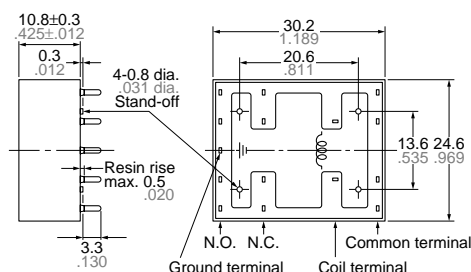


Terminal dimensions (except soldering)  
 Width: 0.8 (0.031)  
 Thickness: 0.3 (0.012)  
 MBB contact position  
 NF2-2M: terminal 6-7-8, 3-4-5

### PC board pattern (Copper-side view)

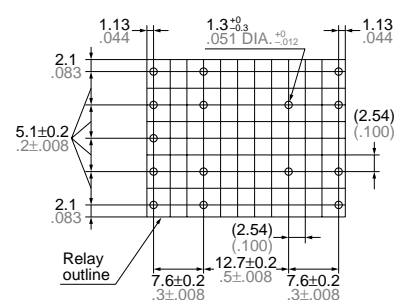


### 4 Form C



Terminal dimensions (except soldering)  
 Width: 0.8 (0.031)  
 Thickness: 0.3 (0.012)  
 MBB contact position  
 NF4-2M: terminals 6-7-8, 9-10-11  
 NF4-2M: terminals 6-7-8, 3-4-5, 12-13-14, 9-10-11

### PC board pattern (Copper-side view)

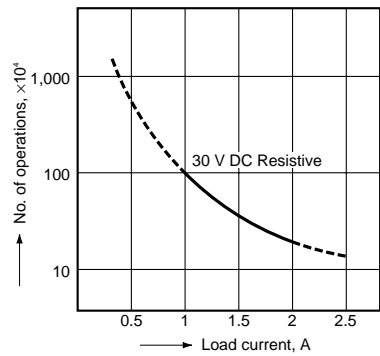


General tolerance:  $\pm 0.5 \pm 0.020$   
 (Except for the cover height)

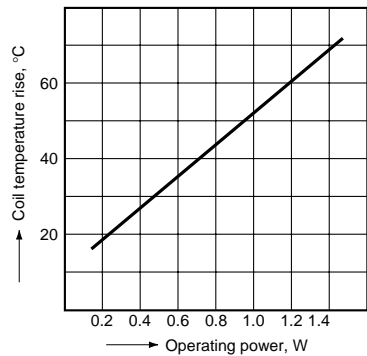
# NF

## REFERENCE DATA

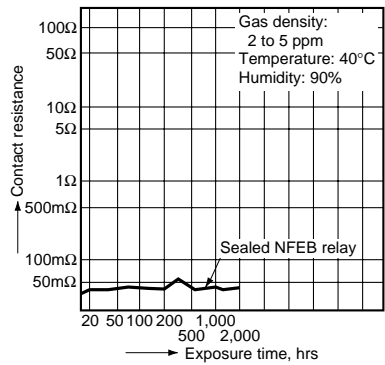
1. Life curve



2. Coil temperature rise (resistance method)



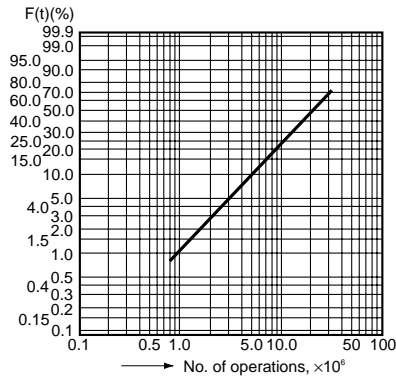
3. H<sub>2</sub>S gas test



4. Contact reliability

Test conditions:

1. Contact current/voltage: 10  $\mu\text{A}$  100 mV 1 kHz
2. Cycle rate 20 cps.
3. Miscontact detection level: 1 mW (= 100 Ohm)
4. Detection method: Observation of all changeover contacts



Test result:

- $m = 1.5$   
 $m = 21.2 \times 10^6$   
95% confidence level =  $3.1 \times 10^6$   
17 contacts out of 20 achieved 10 million no miscontact operations.

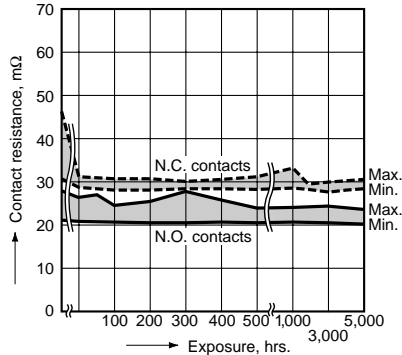
5. High temperature test

Test conditions:

Ambient temperature: 80 $^{\circ}\text{C} \pm 2^{\circ}\text{C}$

Test method:

1. All contacts were switched for 100 operations on 2 A 30 V DC resistive load.
2. Samples then were exposed to 80 $^{\circ}\text{C}$  temperature for 5,000 hours, continuous
3. Contact resistance was measured with Hewlett-Packard testing equipment.



Test result:

Amber relays showed a stable spread of contact resistance within the initially specified 50 mW after 5,000 hours exposure.

## NOTES

### 1. Prevention of vibration and shock

To reduce the likelihood of vibration and shock, we recommend that you install so that the contact action is not in the direction of gravity.

