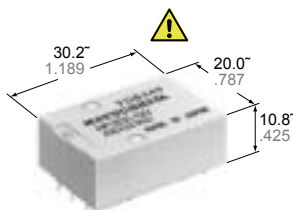


**Panasonic**  
ideas for life

## FLATPACK RELAY

# NF-RELAYS



⚠ Product is discontinued.

mm inch

## FEATURES

1. Flatpack
2. Long seller

## SPECIFICATIONS

### Contacts

|                                                            |                           |                  |                     |
|------------------------------------------------------------|---------------------------|------------------|---------------------|
| Arrangement                                                | 2 Form C, 4 Form C        |                  |                     |
| Initial contact resistance<br>(By voltage drop 6 V DC 1 A) | Max.                      | 50 mΩ            |                     |
|                                                            | Typical                   | 25 mΩ            |                     |
| 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 × 10 <sup>5</sup> |
|                                                            |                           | 1 A 30 V DC      | 10 <sup>6</sup>     |
|                                                            |                           | 0.5 A 30 V DC    | 10 <sup>7</sup>     |

### 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 in catalog.

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

|                                                                                                                         |                               |                           |                                                                                                                                                                                                              |
|-------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Max. operating speed                                                                                                    |                               |                           | 50 cps                                                                                                                                                                                                       |
| Initial insulation resistance* <sup>1</sup>                                                                             |                               |                           | 1,000 MΩ 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 | 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    | Min. 196 m/s <sup>2</sup> {20 G}                                                                                                                                                                             |
|                                                                                                                         | Destructive* <sup>5</sup>     |                           | Min. 980 m/s <sup>2</sup> {100 G}                                                                                                                                                                            |
| Vibration resistance                                                                                                    | Functional* <sup>6</sup>      | In de-energized condition | 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    | 117.6 m/s <sup>2</sup> {12 G} 10 to 55 Hz<br>at double amplitude of 2 mm                                                                                                                                     |
|                                                                                                                         | Destructive                   |                           | 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 —   — 48V — 1

| Contact arrangement         | Type classification | - | Coil voltage (DC)     | Contact material                                           |
|-----------------------------|---------------------|---|-----------------------|------------------------------------------------------------|
| 2: 2 Form C~<br>4: 4 Form C | EB: Standard        | - | 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)

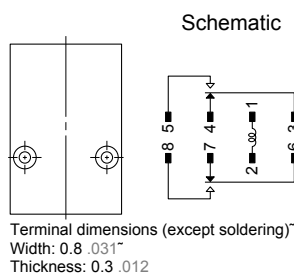
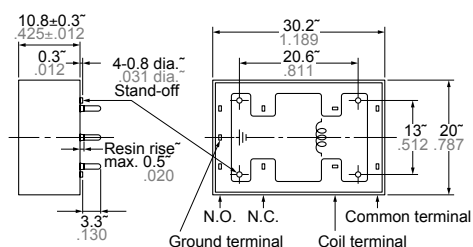
\*Less than 1,000 Ω: ±10%  
 \*More than 1,000 Ω: ±15%

| 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>Ω | Nominal<br>operating power,<br>mW | Inductance, H |       |
|-----------|--------------------------|---------------------------------|----------------------------------|----------------------------------------------|------------------------|-----------------------------------|---------------|-------|
|           |                          |                                 |                                  |                                              |                        |                                   | Armature      |       |
|           |                          |                                 |                                  |                                              |                        |                                   | 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  |

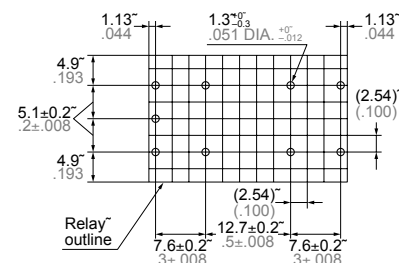
## DIMENSIONS

mm inch

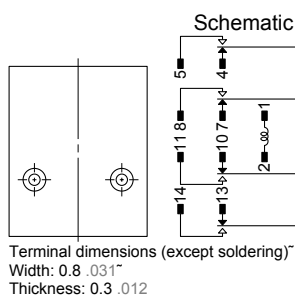
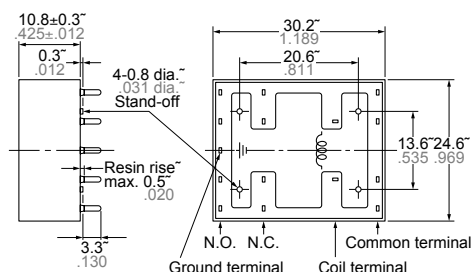
### 2 Form C



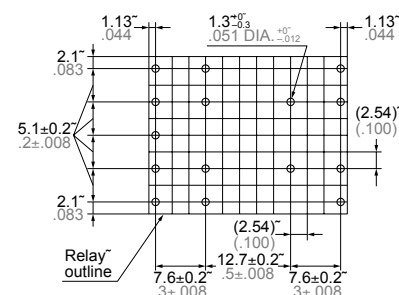
### PC board pattern (Copper-side view)



### 4 Form C



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

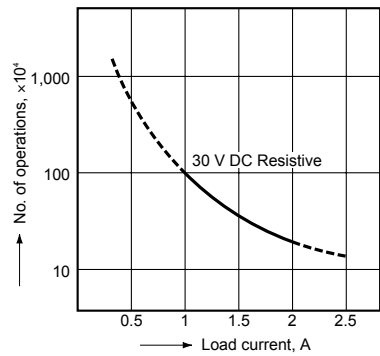


General tolerance: ±0.5 ± 0.020  
 (Except for the cover height)

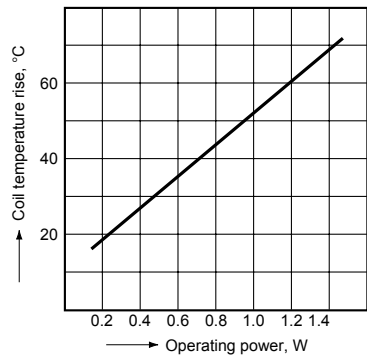
# NF

## REFERENCE DATA

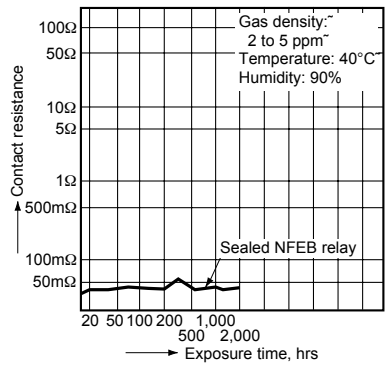
1. Life curve



2. Coil temperature rise (resistance method)



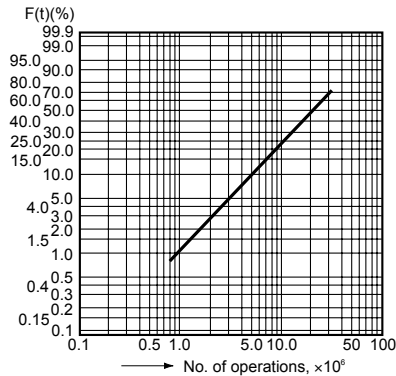
3.  $\text{H}_2\text{S}$  gas test



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  $\Omega$ )
- 4. Detection method: Observation of all changeover contacts



Test result:

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

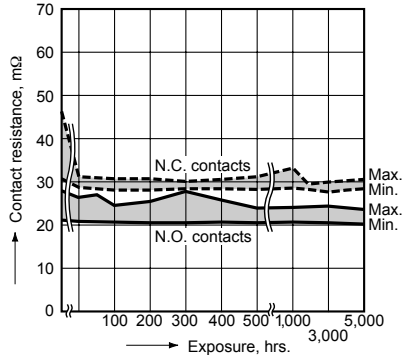
5. High temperature test

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.



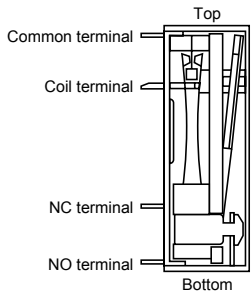
Test result:

Amber relays showed a stable spread of contact resistance within the initially specified 50 m $\Omega$  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.



For Cautions for Use, see Relay Technical Information in catalog.