

RoHS compliant

FEATURES

- High density mounting with 5 mm .197 inch width**
Space saved with 5 mm .197 inch slim type with 28 mm 1.102 inch length. Allows high density mounting and use in compact devices.
- Satisfies reinforced insulation standard (EN/IEC 61810-1).**
- High switching capacity**
Supports 6A 250 V AC nominal switching capacity (resistive load) and AC15 and DC13 (inductive load).
- 1 Form A and 1 Form C contact arrangements with options for a variety of applications.**
- 4,000 V high breakdown voltage and 6,000 V high surge breakdown voltage.**
Controller protection against surges and noise with a breakdown voltage of 4,000 Vrms for 1 min. between contacts and coil, and 6,000 V surge breakdown voltage between contacts and coil.
- Resistance to heat and fire; EN60335-1, clause 30 (GWT) approved.**
- Sealed construction allows automatic washing.**
- Complies with all safety standards.**
UL/C-UL, VDE certified.

TYPICAL APPLICATIONS

- Interface relays for programmable controllers
- Output relays for measuring equipment, timers, counters and temperature controllers
- Industrial equipment, office equipment
- Household appliances for Europe

ORDERING INFORMATION

APF 0

Contact arrangement

- 1: 1 Form A
- 3: 1 Form C

Contact type

- 0: Single contact

Contact material

- 2: AgNi type
- 3: AgNi type/Au-plated

Nominal coil voltage (DC)

- 4H: 4.5 V 05: 5 V 06: 6 V 09: 9 V 12: 12 V 18: 18 V
- 24: 24 V 48: 48 V 60: 60 V

Note: Certified by UL/C-UL and VDE

PF (APF)

TYPES

| Contact arrangement | Nominal coil voltage | Part No. |
|-----------------------------------|----------------------|----------|
| 1 Form A (AgNi type) | 4.5V DC | APF1024H |
| | 5V DC | APF10205 |
| | 6V DC | APF10206 |
| | 9V DC | APF10209 |
| | 12V DC | APF10212 |
| | 18V DC | APF10218 |
| | 24V DC | APF10224 |
| | 48V DC | APF10248 |
| 1 Form A (AgNi type/Au-plated) | 60V DC | APF10260 |
| | 4.5V DC | APF1034H |
| | 5V DC | APF10305 |
| | 6V DC | APF10306 |
| | 9V DC | APF10309 |
| | 12V DC | APF10312 |
| | 18V DC | APF10318 |
| | 24V DC | APF10324 |
| 48V DC | APF10348 | |
| 60V DC | APF10360 | |

| Contact arrangement | Nominal coil voltage | Part No. |
|-----------------------------------|----------------------|----------|
| 1 Form C (AgNi type) | 4.5V DC | APF3024H |
| | 5V DC | APF30205 |
| | 6V DC | APF30206 |
| | 9V DC | APF30209 |
| | 12V DC | APF30212 |
| | 18V DC | APF30218 |
| | 24V DC | APF30224 |
| | 48V DC | APF30248 |
| 1 Form C (AgNi type/Au-plated) | 60V DC | APF30260 |
| | 4.5V DC | APF3034H |
| | 5V DC | APF30305 |
| | 6V DC | APF30306 |
| | 9V DC | APF30309 |
| | 12V DC | APF30312 |
| | 18V DC | APF30318 |
| | 24V DC | APF30324 |
| 48V DC | APF30348 | |
| 60V DC | APF30360 | |

Standard packing: Tube: 20 pcs.; Case: 1,000 pcs.

RATING

1. Coil data

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power | Max. applied voltage (at 20°C 68°F) |
|----------------------|---|--|--|--|-------------------------|--|
| 4.5V DC | Max. 70%V nominal voltage (Initial) | Min. 5%V nominal voltage (Initial) | 37.8mA | 119Ω | 170mW | 120%V of nominal voltage |
| 5V DC | | | 34.0mA | 147Ω | | |
| 6V DC | | | 28.3mA | 212Ω | | |
| 9V DC | | | 18.9mA | 476Ω | | |
| 12V DC | | | 14.2mA | 847Ω | | |
| 18V DC | | | 9.4mA | 1,906Ω | | |
| 24V DC | | | 7.1mA | 3,388Ω | | |
| 48V DC | | | 4.5mA | 10,618Ω | | |
| 60V DC | | | 2.9mA | 20,570Ω | 175mW | |

2. Specifications

| Characteristic | Item | Specifications | |
|----------------------------|--|--|---|
| | | 1 Form A | 1 Form C |
| Contact | Arrangement | | |
| | Contact resistance (Initial) | Max. 100 mΩ (By voltage drop 6 V DC 1A) | |
| | Contact material | AgNi type, AgNi type/Au-plated | |
| Rating | Nominal switching capacity (resistive load) | 6 A 250 V AC | |
| | Max. switching power (resistive load) | 1,500 VA | |
| | Max. switching voltage | 250V AC | |
| | Max. switching current | 6 A (AC) | |
| | Nominal operating power | 170 mW (5 to 24 V DC), 217 mW (48 V DC), 175 mW (60 V DC) | |
| | Min. switching capacity (Reference value)*1 | 100 mA 5 V DC (without Au-plated), 1 mA 1 V DC (with Au-plated) | |
| Electrical characteristics | Insulation resistance (Initial) | Min. 1,000MΩ (at 500V 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*2 (Between contact and coil) (Initial) | 6,000 V | |
| | Temperature rise (coil) (at 20°C 68°F) | Max. 45°C 113°F (By resistive method, nominal coil voltage applied to the coil; contact carrying current: 6A.) | |
| | Operate time (at 20°C 68°F) | Max. 8 ms (Nominal coil voltage applied to the coil, excluding contact bounce time.) | |
| | Release time (at 20°C 68°F) | Max. 4 ms (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode) | |
| Mechanical characteristics | Shock resistance | Functional | Min. 98 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs) |
| | | Destructive | Min. 980 m/s ² (Half-wave pulse of sine wave: 11 ms.) |
| | Vibration resistance | Functional | 10 to 55 Hz at double amplitude of 1 mm (Detection time: 10μs.) |
| | | Destructive | 10 to 55 Hz at double amplitude of 1.5 mm |
| Expected life | Mechanical | Min. 5×10 ⁶ (at 180 times/min.) | |
| | Electrical*4 | N.O.: Min. 5×10 ⁴ (at resistive load, 6 times/min. and nominal switching capacity) | N.O.: Min. 5×10 ⁴ , N.C.: Min. 3×10 ⁴ (at resistive load, 6 times/min. and nominal switching capacity) |
| Conditions | Conditions for operation, transport and storage*3 | Ambient temperature: -40°C to +85°C -40°F to +185°F; Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) | |
| Unit weight | | Approx. 5 g .18 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 ±1.2×50μs according to JEC-212-1981

*3. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to "Usage, transport and storage conditions" in NOTES.

*4. For cycle lifetime, refer to "Cautions for use 4)" in NOTES.

PF (APF)

REFERENCE DATA

1. Electrical life

Tested sample: APF30224

| Load type | | Voltage | Current | Ambient temperature | No. of ops. |
|----------------|-------|---------|---------|---------------------|-------------|
| Resistive load | | 250V AC | 6 A | 85°C 185°F | 30,000 |
| Inductive load | AC 15 | 250V AC | 3 A | 25°C 77°F | 20,000 |
| | DC 13 | 24V DC | 2 A | 25°C 77°F | 6,000 |

Notes: 1. Switch contacts are all on N.O. side.

2. AC 15 and DC 13 comply with IEC-60947-5-1 testing conditions.

2. Max. switching capacity (AC)

3. Coil temperature rise

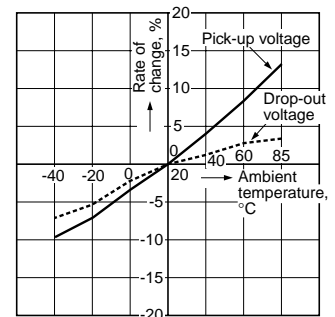
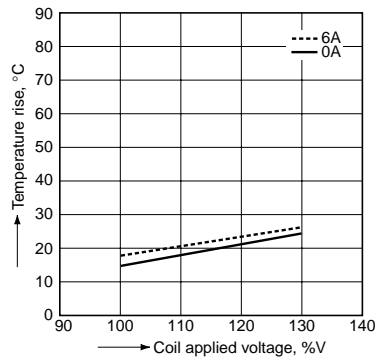
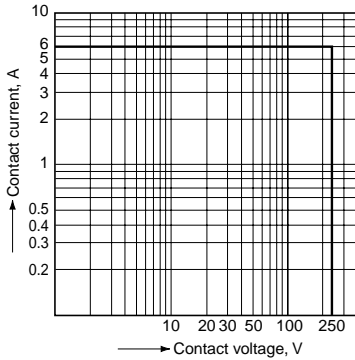
Tested sample: APF30224

Measured portion: Inside the coil

Ambient temperature: 28°C 82°F

4. Ambient temperature characteristics

Tested sample: APF30224, 6 pcs.

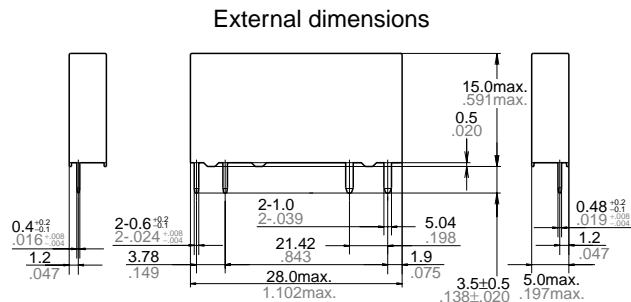


DIMENSIONS (mm inch)

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

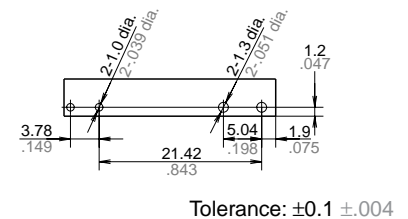
1.1 Form A type

CAD Data



General tolerance: $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)

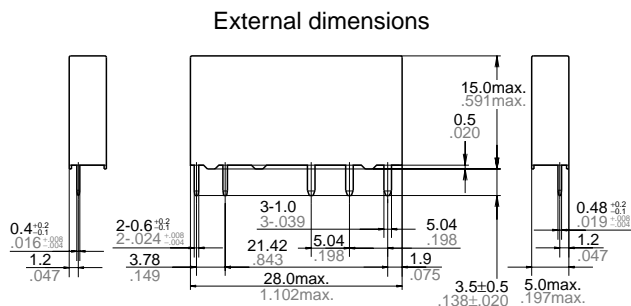


Schematic (Bottom view)



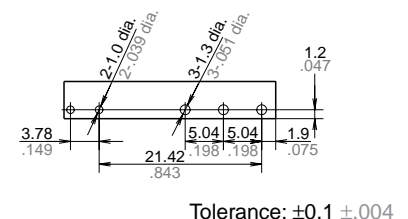
2.1 Form C type

CAD Data

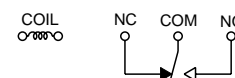


General tolerance: $\pm 0.3 \pm 0.12$

PC board pattern (Bottom view)



Schematic (Bottom view)



SAFETY STANDARDS

| Certification authority | File No. | Applicable standard | Rating | Remarks |
|-------------------------|----------|--|--|--|
| UL/C-UL | E120782 | UL508, CSA C22.2 No.14 UL1604 (class I, Division 2, Group A, B, C, D) | 277V AC 8A, General use, 24V DC 6A, General use, B300, R300 (Pilot Duty) | |
| VDE | 40027672 | EN/IEC 61810-1 | 250V AC 6A (cosφ = 1.0) 85°C 185°F N.O. side, N.C. side 250V AC 8A (cosφ = 1.0) 25°C 77°F N.O. side | Insulation: Reinforced insulation between contact and coil. Resistance to heat and fire; EN60335-1, clause 30 (GWT) approved. |

NOTES

■ Usage, transport and storage conditions

1) Temperature:

-40 to +85°C -40 to +185°F

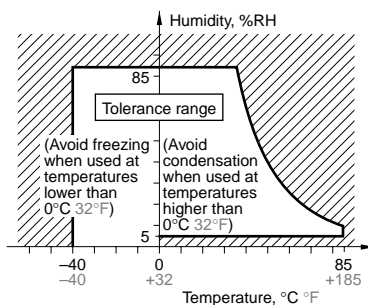
2) Humidity: 5 to 85% RH

(Avoid freezing and condensation.)

The humidity range varies with the temperature. Use within the range indicated in the graph below.

3) Atmospheric pressure: 86 to 106 kPa

Temperature and humidity range for usage, transport, and storage



4) Condensation

Condensation forms when there is a sudden change in temperature under

high temperature and high humidity conditions. Condensation will cause deterioration of the relay insulation.

5) Freezing

Condensation or other moisture may freeze on the relay when the temperatures is lower than 0°C 32°F. This causes problems such as sticking of movable parts or operational time lags.

6) Low temperature, low humidity environments

The plastic becomes brittle if the relay is exposed to a low temperature, low humidity environment for long periods of time.

For Cautions for Use.