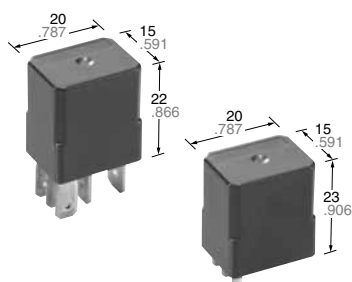


Micro-ISO Automotive Relay

CM RELAYS

<Protective construction>
Flux tight/Sealed



(Unit: mm inch)

RoHS compliant

FEATURES

- Micro-ISO type terminals and small size
- Wide line-up
- Compact and high-capacity switching

TYPICAL APPLICATIONS

- Fan motor, Heater, Head lamp, Air compressor, ABS, Blower fan, Defogger, etc.

ORDERING INFORMATION

CM - - - -

Contact arrangement

1a: 1 Form A

1: 1 Form C

Protective construction

Nil: Sealed

F: Flux tight

Protective element

Nil: None

R: With resistor inside

Mounting classification

Nil: Plug-in type

P: PC board type (24 V only)

Rated coil voltage (DC)

12 V, 24 V

TYPES

Standard type

| Contact arrangement | Rated coil voltage | Plug-in type | | PC board type | | Packing | |
|---------------------|--------------------|--------------------|------------------------|--------------------|------------------------|---------|----------|
| | | Sealed Type No. | Flux tight Type No. | Sealed Type No. | Flux tight Type No. | Carton | Case |
| 1 Form A | 12 V DC | CM1a-12V | CM1aF-12V | — | — | 50 pcs. | 200 pcs. |
| | 24 V DC | CM1a-24V | CM1aF-24V | CM1a-P-24V | CM1aF-P-24V | | |
| 1 Form C | 12 V DC | CM1-12V | CM1F-12V | — | — | | |
| | 24 V DC | CM1-24V | CM1F-24V | CM1-P-24V | CM1F-P-24V | | |

Note: Please use "CM**-R-**-*" built-in resistor type. (Asterisks "*" should be filled in from ORDERING INFORMATION.)

RATING

1. Coil data

| Rated coil voltage | Operate (Set) voltage (at 20°C 68°F) (Initial) | Release (Reset) voltage (at 20°C 68°F) (Initial) | Rated operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Rated operating power | Usable voltage range |
|--------------------|------------------------------------------------|--------------------------------------------------|-----------------------------------------------|---------------------------------------|-----------------------|----------------------|
| 12 V DC | 3 to 7 V DC | 1.2 to 4.2 V DC | 125 mA | 96Ω | 1.5 W | 10 to 16V DC |
| 24 V DC | 6 to 14 V DC | 2.4 to 8.4 V DC | 75 mA | 320Ω | 1.8 W | 20 to 32V DC |

2. Specifications

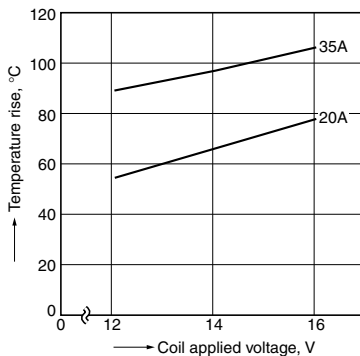
| Item | Specifications | | | | |
|--------------------------------|-----------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------|------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| | 12 V DC | | 24 V DC | | |
| Contact data | Contact arrangement | 1 Form A | 1 Form C | 1 Form A | 1 Form C |
| | Contact resistance (initial) | Max. 15mΩ (Typ. 2mΩ) (By voltage drop 1A 6V DC) | | | |
| | Contact material | Ag alloy | | | |
| | Rated switching capacity (resistive) | N.O. side: 35 A 14V DC | N.O. side: 35 A 14V DC N.C. side: 20 A 14V DC | N.O. side: 15 A 28V DC | N.O. side: 15 A 28V DC N.C. side: 8 A 28V DC |
| | Max. carrying current (at 85°C 185°F, continuous)*1 | N.O. side: 20 A 14V DC | N.O. side: 20 A 14V DC N.C. side: 10 A 14V DC | N.O. side: 15 A 28V DC | N.O. side: 15 A 28V DC N.C. side: 8 A 28V DC |
| | Min. switching load (resistive)*2 | 1 A 14V DC (at 20°C 68°F) | | 1 A 14V DC (at 20°C 68°F) | |
| | Contact voltage drop (after electrical life test) | N.O. side: Max. 0.5 V (By voltage drop 35 A 14 V DC) | N.O. side: Max. 0.5 V (By voltage drop 35 A 14 V DC) N.C. side: Max. 0.3 V (By voltage drop 20 A 14 V DC) | N.O. side: Max. 0.3 V (By voltage drop 15 A 28 V DC) | N.O. side: Max. 0.3 V (By voltage drop 15 A 28 V DC) N.C. side: Max. 0.2 V (By voltage drop 8 A 28 V DC) |
| Insulated resistance (initial) | Min. 20 MΩ (at 500V DC, Measurement at same location as "Dielectric strength" section.) | | | | |
| Dielectric strength (initial) | Between open contacts | 500 Vrms for 1 min. (Detection current: 10mA) | | | |
| | Between contacts and coil | 500 Vrms for 1 min. (Detection current: 10mA) | | | |
| Time characteristics (initial) | Operate (Set) time (at rated coil voltage) | Max. 10ms (at 20°C 68°F, without bounce time) | | | |
| | Release (Reset) time (at rated coil voltage) | Max. 10ms (at 20°C 68°F, without bounce time) (Without diode) | | | |
| Shock resistance | Functional | Min. 200 m/s ² {approx. 20G} (Half-wave pulse of sine wave: 11ms; detection time: 10μs) | | | |
| | Destructive | Min. 1,000 m/s ² {approx. 100G} (Half-wave pulse of sine wave: 6ms) | | | |
| Vibration resistance | Functional | 10 to 500 Hz, Min. 44.1 m/s ² {approx. 4.5G} | | | |
| | Destructive | 10 to 2,000 Hz, Min. 44.1 m/s ² {approx. 4.5G}, Time of vibration for each direction; X, Y, Z direction: 4 hours | | | |
| Expected life | Mechanical | Min. 10 ⁶ (at 120 cpm) | | | |
| | Electrical | Flux tight: Min. 10 ⁵ , Sealed: Min. 5 × 10 ⁴ (Operating frequency: 2s ON, 2s OFF) | | | |
| Conditions | Conditions for usage, transport and storage*3 | Ambient temperature: -40 to +85°C -40 to +185°F, Humidity: 5 to 85% R.H. (Please avoid icing or condensation) | | | |
| Weight | | Approx. 20 g .71 oz | | | |

Notes: *1. Depends on connection conditions. Also, this does not guarantee repeated switching. We recommend that you confirm operation under actual conditions.
 *2. 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.
 *3. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. For details, please refer to the "Automotive Relay Users Guide".
 Please inquire our sales representative if you will be using the relay in a high temperature atmosphere (110°C 230°F)

REFERENCE DATA

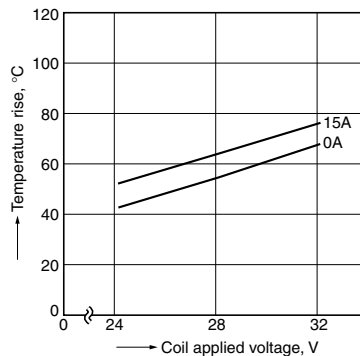
1.-(1) Coil temperature rise (12V type, 85°C 185°F)

Sample: CM1F-12V, 3 pcs.
 Measured portion: Inside the coil
 Contact carrying current: 20A, 35A
 Ambient temperature: 85°C 185°F

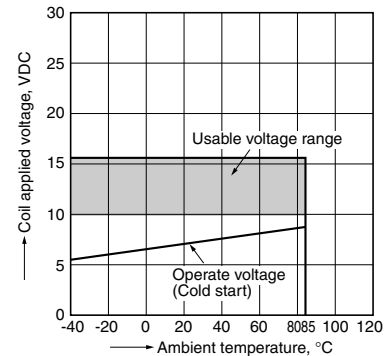


1.-(2) Coil temperature rise (24V type, 85°C 185°F)

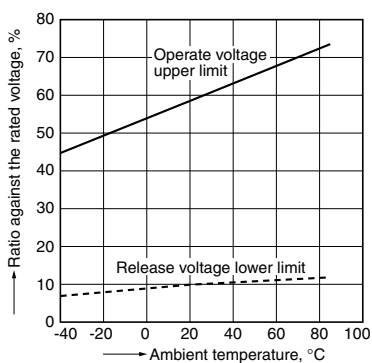
Sample: CM1F-24V, 4 pcs.
 Measured portion: Inside the coil
 Contact carrying current: 0A, 15A
 Ambient temperature: 85°C 185°F



2. Ambient temperature and usable voltage range (12V type)

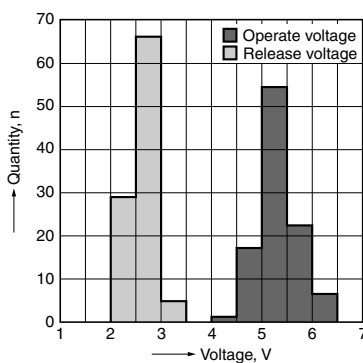


3. Ambient temperature characteristics
(Cold/initial)



4. Distribution of operate (set) and release (reset) voltage

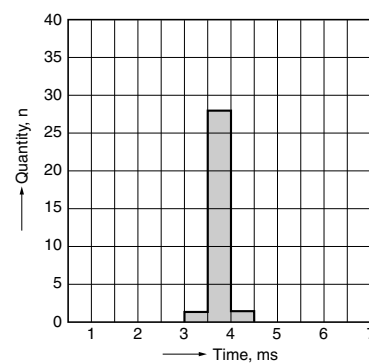
Sample: CM1F-12V, 100pcs.



5. Distribution of operate (set) time

Sample: CM1F-12V, 30pcs.

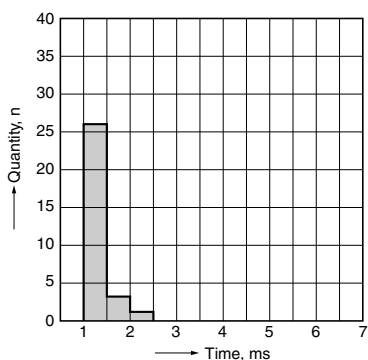
* Max. 10ms standard (excluding contact bounce)



6. Distribution of release (reset) time

Sample: CM1F-12V, 30pcs.

* Max. 10ms standard (excluding contact bounce)



7.-(1) Electrical life test (Motor free)

Sample: CM1aF-R-12V, 6pcs.

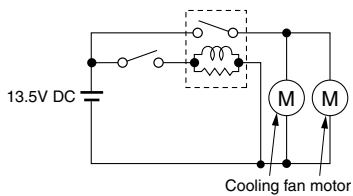
Load: 16 A 13.5 V DC

Cooling fan motor actual load
(free condition)

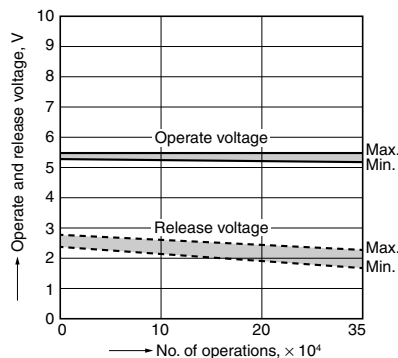
Operating frequency: ON 2s, OFF 6s

Ambient temperature: Room temperature

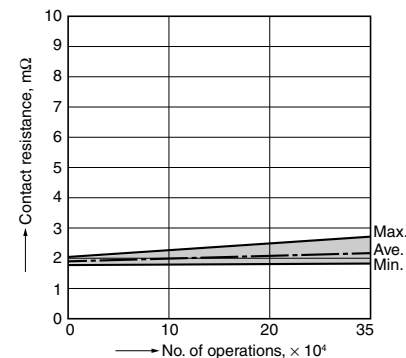
Circuit:



Change of operate (set) and release (reset) voltage

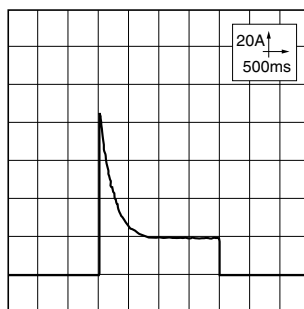


Change of contact resistance



Load current waveform

Load; Inrush current: 85A, Steady current: 18A



CM (ACM)

7.-(2) Electrical life test (Halogen lamp load)

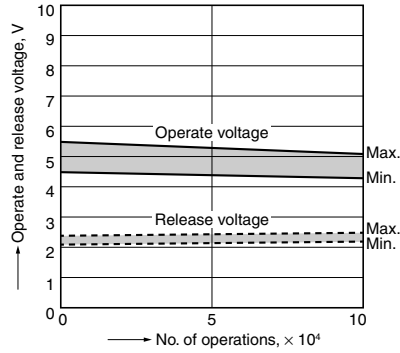
Sample: CM1aF-R-12V, 6pcs.

Load: 20A 13.5V DC

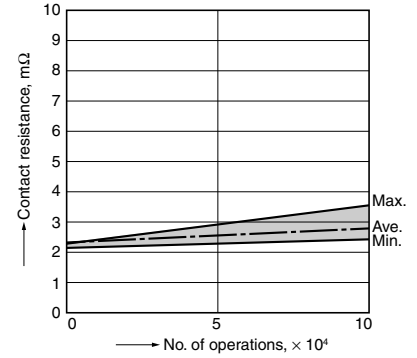
Operating frequency: ON 1s, OFF 14s

Ambient temperature: Room temperature

Change of operate (set) and release (reset) voltage



Change of contact resistance



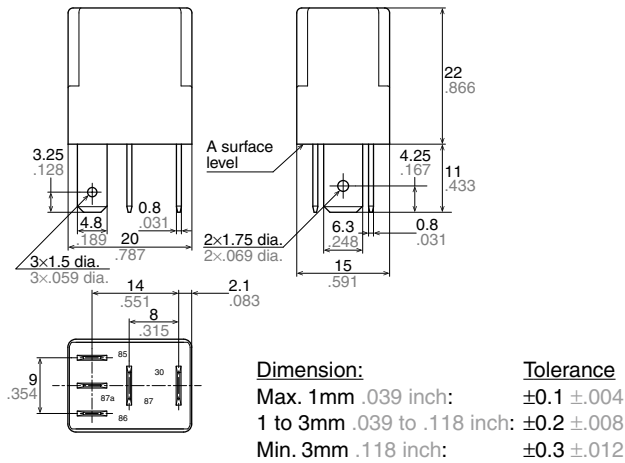
DIMENSIONS (mm inch)

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

1. Plug-in type (1 Form C)

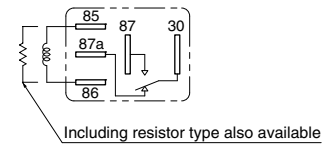
CAD

External dimensions



* Intervals between terminals is measured at A surface level.

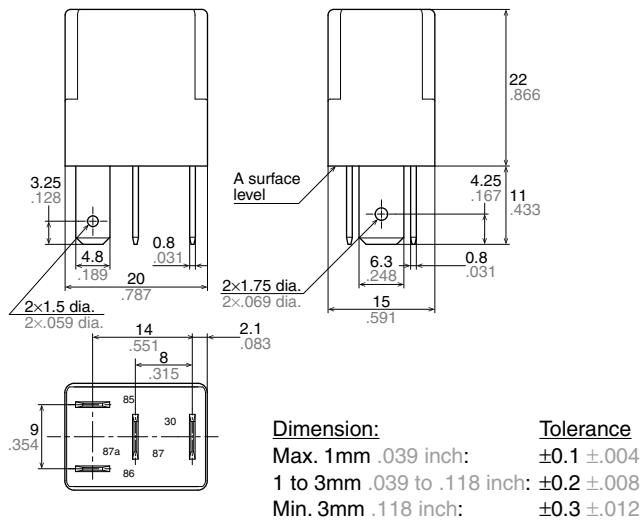
Schematic (Bottom view)



2. Plug-in type (1 Form A)

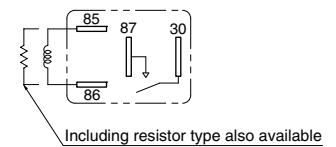
CAD

External dimensions



* Intervals between terminals is measured at A surface level.

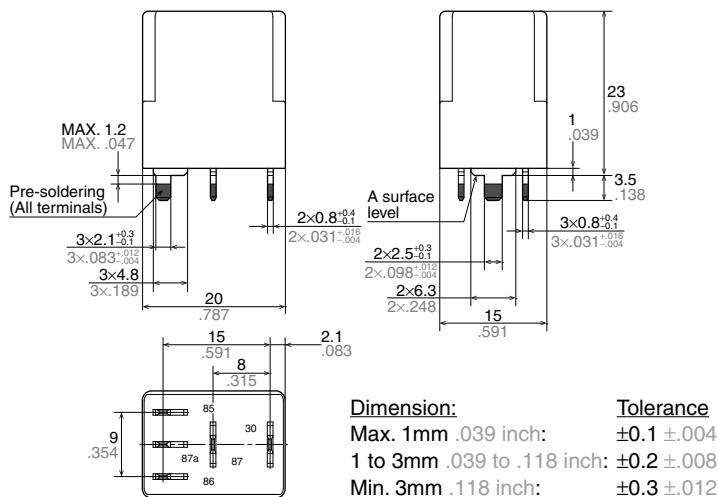
Schematic (Bottom view)



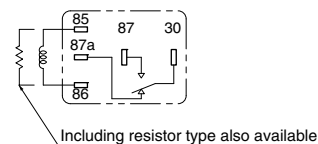
3. PC board type (1 Form C, 24V only)

CAD

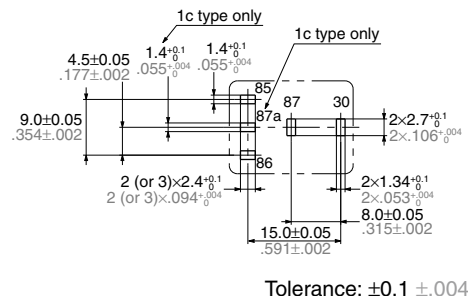
External dimensions



Schematic (Bottom view)



PC board pattern (Bottom view)

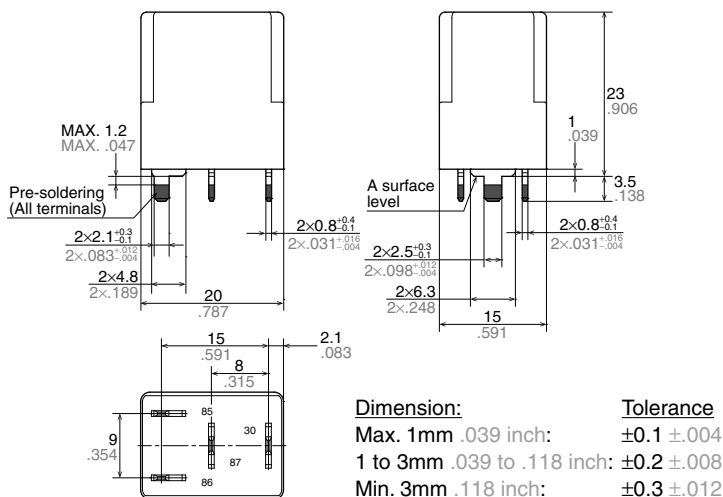


* Dimensions (thickness and width) of terminal is measured after pre-soldering. Intervals between terminals is measured at A surface level.

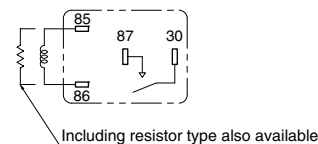
4. PC board type (1 Form A, 24V only)

CAD

External dimensions



Schematic (Bottom view)



* Dimensions (thickness and width) of terminal is measured after pre-soldering. Intervals between terminals is measured at A surface level.

NOTES

1. Soldering

Max. 350°C 662°F (solder temperature), within 3 seconds

(soldering time)

The effect on the relay depends on the actual PC board used.

Please verify the PC board to be used.

For general cautions for use, please refer to the “Automotive Relay Users Guide”.

Please contact

Panasonic Corporation

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

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