Panasonic ideas for life

AUTOMOTIVE RELAY WITH ISO TERMINAL ARRANGEMENT

CB RELAYS



FEATURES

1. This relay has an ISO (International Organization for Standardization) terminal arrangement.

Terminals are all solder plated.
*35 A type: Terminal is the plug-in type
(no plating).

2. Relay is compact and high capacity (40 A).

Compact form factor realized with space saving 22×26 mm $.866 \times 1.024$ inch small base area thanks to integrated bobbin and base construction. Features high switching capacity of 40 A

3. Features high thermal resistance of 125°C 257°F (heat resistant type). Heat resistant type is available that can withstand use near engines. (40 A switching capacity)

4. Sealed type available for resisting adverse environments.

- 5. Surge absorbing built-in diode type that works when the relay coil is off and an internal resistor type are available. (Please inquire.)
- 6. Protective element type is also available.
- 7. For only plug-in types, types with nominal switching capacities of 35 A (12 V) and 15 A (24 V) are available.

TYPICAL APPLICATIONS

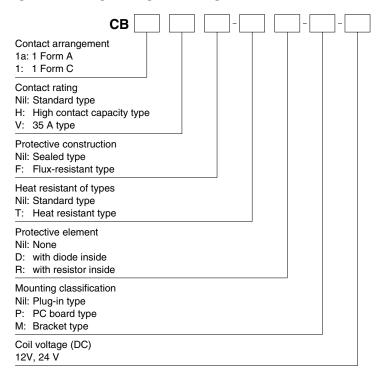
1. Automobiles

Headlights, Cell motors, Air conditioners, ABS, EPS, etc.

- 2. Construction equipment
- 3. Agricultural equipment, Conveyor,

RoHS Directive compatibility information http://www.mew.co.jp/ac/e/environment/

ORDERING INFORMATION



TYPES

1. Standard type

| C | Mounting plansification | Naminal sail valtage | Sealed type | Flux-resistant type |
|-------------------------------------|-------------------------|----------------------|-------------|---------------------|
| Contact arrangement | Mounting classification | Nominal coil voltage | Part No. | Part No. |
| | DC hoord type | 12V DC | CB1a-P-12V | CB1aF-P-12V |
| | PC board type | 24V DC | CB1a-P-24V | CB1aF-P-24V |
| 1 Form A | Dlug in type | 12V DC | CB1a-12V | CB1aF-12V |
| I FOIII A | Plug-in type | 24V DC | CB1a-24V | CB1aF-24V |
| | Due alset has a | 12V DC | CB1a-M-12V | CB1aF-M-12V |
| | Bracket type | 24V DC | CB1a-M-24V | CB1aF-M-24V |
| | PC board type | 12V DC | CB1-P-12V | CB1F-P-12V |
| | FC board type | 24V DC | CB1-P-24V | CB1F-P-24V |
| 1 Form C | Plug-in type | 12V DC | CB1-12V | CB1F-12V |
| I FOIII C | | 24V DC | CB1-24V | CB1F-24V |
| | Drocket type | 12V DC | CB1-M-12V | CB1F-M-12V |
| | Bracket type | 24V DC | CB1-M-24V | CB1F-M-24V |
| | DC haard turest | 12V DC | CB1aH-P-12V | CB1aHF-P-12V |
| | PC board type* | 24V DC | CB1aH-P-24V | CB1aHF-P-24V |
| High contact capacity (1 Form A) | Dlug in type | 12V DC | CB1aH-12V | CB1aHF-12V |
| | Plug-in type | 24V DC | CB1aH-24V | CB1aHF-24V |
| | Drocket type | 12V DC | CB1aH-M-12V | CB1aHF-M-12V |
| | Bracket type | 24V DC | CB1aH-M-24V | CB1aHF-M-24V |

Packing quantity; Carton: 50 pcs. Case: 200 pcs.

Notes: 1. Please use "CB***R**" to order built-in resistor type and "CB***D**" to order built-in diode type. (Asterisks "*" should be filled in from parts table.)

2. "Regarding solder, this product is not MIL (Military Standard) compliant. Please evaluate solder mounting by the actual equipment before using.

2. Heat resistant type

| C | Mounting classification | Naminal asil valtana | Sealed type | Flux-resistant type |
|----------------------------------|-------------------------|----------------------|---------------|---------------------|
| Contact arrangement | Mounting classification | Nominal coil voltage | Part No. | Part No. |
| | DC heard has | 12V DC | CB1a-T-P-12V | CB1aF-T-P-12V |
| | PC board type | 24V DC | CB1a-T-P-24V | CB1aF-T-P-24V |
| 1 Form A | Dlug in type | 12V DC | CB1a-T-12V | CB1aF-T-12V |
| I FOIIII A | Plug-in type | 24V DC | CB1a-T-24V | CB1aF-T-24V |
| | Drocket type | 12V DC | CB1a-T-M-12V | CB1aF-T-M-12V |
| | Bracket type | 24V DC | CB1a-T-M-24V | CB1aF-T-M-24V |
| | PC board type | 12V DC | CB1-T-P-12V | CB1F-T-P-12V |
| | | 24V DC | CB1-T-P-24V | CB1F-T-P-24V |
| 1 Form C | Plug-in type | 12V DC | CB1-T-12V | CB1F-T-12V |
| 1 Follii C | | 24V DC | CB1-T-24V | CB1F-T-24V |
| | Bracket type | 12V DC | CB1-T-M-12V | CB1F-T-M-12V |
| | | 24V DC | CB1-T-M-24V | CB1F-T-M-24V |
| | DC hoord type* | 12V DC | CB1aH-T-P-12V | CB1aHF-T-P-12V |
| High contact capacity (1 Form A) | PC board type* | 24V DC | CB1aH-T-P-24V | CB1aHF-T-P-24V |
| | Plug-in type | 12V DC | CB1aH-T-12V | CB1aHF-T-12V |
| | riug-iii type | 24V DC | CB1aH-T-24V | CB1aHF-T-24V |
| | Bracket type | 12V DC | CB1aH-T-M-12V | CB1aHF-T-M-12V |
| | bracket type | 24V DC | CB1aH-T-M-24V | CB1aHF-T-M-24V |

Packing quantity; Carton: 50 pcs. Case: 200 pcs.

Notes: 1. Please use "CB***R**" to order built-in resistor type and "CB***D**" to order built-in diode type. (Asterisks "*" should be filled in from parts table.)

2. *Regarding solder, this product is not MIL (Military Standard) compliant. Please evaluate solder mounting by the actual equipment before using.

3. 35 A type (*Terminals are all of the plug-in type.)

| Contact arrangement | Nominal coil voltage | Sealed type | Flux-resistant type |
|--------------------------------|----------------------|-------------|---------------------|
| Contact arrangement | Nominal con voltage | Part No. | Part No. |
| 1 Form A | 12V DC | CB1aV-12V | CB1aVF-12V |
| I FOIII A | 24V DC | CB1aV-24V | CB1aVF-24V |
| 1 Form C | 12V DC | CB1V-12V | CB1VF-12V |
| 1 Form C | 24V DC | CB1V-24V | CB1VF-24V |
| 1 Form A with resistor inside | 12V DC | CB1aV-R-12V | CB1aVF-R-12V |
| I FOITH A WITH TESISTON INSIDE | 24V DC | CB1aV-R-24V | CB1aVF-R-24V |
| 1 Form C with resistor inside | 12V DC | CB1V-R-12V | CB1VF-R-12V |
| i Form C with resistor inside | 24V DC | CB1V-R-24V | CB1VF-R-24V |
| 1 Form A with diode inside | 12V DC | CB1aV-D-12V | CB1aVF-D-12V |
| i Form A with diode inside | 24V DC | CB1aV-D-24V | CB1aVF-D-24V |
| 1 Form C with diode inside | 12V DC | CB1V-D-12V | CB1VF-D-12V |
| i Form C with aloae inside | 24V DC | CB1V-D-24V | CB1VF-D-24V |

Packing quantity; Carton: 50 pcs. Case: 200 pcs.

RATING

1. Coil data

1) 1. No protective element and with diode inside

| Contact arrangement | Nominal coil voltage | Pick-up voltage (Initial, at 20°C 68°F) | Drop-out voltage (Initial, at 20°C 68°F) | Nominal operating current (at 20°C 68°F) | Coil resistance (±10%) (at 20°C 68°F) | Nominal operating power (at 20°C 68°F) | Usable voltage range |
|---------------------------|----------------------|--|---|--|---|--|----------------------|
| 1 Form A, | 12V DC | 3 to 7V DC | 1.2 to 4.2V DC | 117mA | 103Ω | 1.4W | 10 to 16V DC |
| 1 Form C 24V DC | 6 to 14V DC | 2.4 to 8.4V DC | 75mA | 320Ω | 1.8W | 20 to 32V DC | |
| | 101/20 | 04-71/00 | 4.04-4.07.00 | 117mA | 103Ω | 1.4W (PC board type) | 10 to 16V DC |
| High contact 12V DC | 3 to 7V DC | 1.2 to 4.2V DC | 150mA | 80Ω | 1.8W | 10 10 16 16 16 | |
| capacity (1 Form A) 24 | 24V DC | 6 to 14V DC | 2.4 to 8.4V DC | 58mA | 411Ω | 1.4W (PC board type) | 20 to 32V DC |
| | 24V DC | | | 75mA | 320Ω | 1.8W | |

Note: Other pick-up voltage types are also available. Please contact us for details.

2) With resistor inside

| Contact arrangement | Nominal coil voltage | Pick-up voltage (Initial, at 20°C 68°F) | Drop-out voltage (Initial, at 20°C 68°F) | Nominal operating current (at 20°C 68°F) | Combined resistance (±10%) (at 20°C 68°F) | Nominal operating power (at 20°C 68°F) | Usable voltage range |
|---------------------|----------------------|--|---|--|---|--|----------------------|
| 1 Form A, | 12V DC | 3 to 7V DC | 1.2 to 4.2V DC | 134mA | 89.5Ω | 1.6W | 10 to 16V DC |
| 1 Form C | 24V DC | 6 to 14V DC | 2.4 to 8.4V DC | 84mA | 287.2Ω | 2.0W | 20 to 32V DC |

2. Specifications

1) Standard type (12 V coil voltage)

| Characteristics | | Item | | Specifications | · | |
|------------------------------------|---|--------------------------------------|---|--|---|--|
| | Arrangement | | 1 Form A | 1 Form C | High contact capacity (1 Form A) | |
| Contact | Contact resistance (Initial) | | - | Typ2m Ω (By voltage drop 6 V DC \cdot | 1 A) | |
| | Contact material | | | Ag alloy (Cadmium free) | | |
| Rating Ma | Nominal switching | capacity (Initial) | 40A 14V DC | N.O.: 40A 14V DC N.C.: 30A 14V DC | 70A 14V DC (at 20°C 68°F) 50A 14V DC (at 85°C 185°F) | |
| | Max. carrying curr (14V DC, at 85°C | rent (Initial) 185°F, continuous) | N.O.: 40A | N.O.: 40A, N.C.: 30A | N.O.: 40A | |
| | Nominal operating | power | 1.4W | 1.4W | 1.8W (1.4W: PC board type) | |
| | Min. switching cap | acity*1 | 1A | 12V DC (12V DC), 1A 24V DC (24 | IV DC) | |
| | Initial insulation resistance | | | Min. 20 MΩ (at 500 V DC) | | |
| Electrical voltage characteristics | Initial breakdown | Between open contacts | 500 Vrms for 1 min. (Detection current: 10mA) | | | |
| | voltage | Between contacts and coil | 500 Vrms for 1 min. (Detection current: 10mA) | | | |
| | Operate time (at nominal voltage) (at 20°C 68°F) | | Max. 15ms (at 20°C 68°F, excluding contact bounce time) (Initial) | | | |
| | Release time (at nominal voltage) (at 20°C 68°F) | | Max. 15ms (at 20°C 68°F, excluding contact bounce time, without diode) (Initial) | | | |
| | Charle variatemen | Functional | Min. 200 m/s ² {20G} | | | |
| Mechanical | Shock resistance | Destructive | | Min. 1,000 m/s ² {100G} | | |
| characteristics | Vibration | Functional | 1 | 10 Hz to 500 Hz, Min. 44.1m/s ² {4. | 5G} | |
| | resistance | Destructive | 10 Hz to 2,000 Hz, Min. 44.1m/s | ² {4.5G} Time of vibration for eac | h direction; X. Y. Z direction: 4 hours | |
| Francisco de life | Electrical (at nomi | nal switching capacity) | Flux-resistant type: Min. 105 | , Sealed type: Min. 5×104 (Operat | ing frequency: 2s ON, 2s OFF) | |
| Expected life | Mechanical | | Min. 10 ⁶ (at 120 cpm) | | | |
| | Conditions for operation, transport and | | Standard type; Ambient temp: -40 to +85°C -40 to +185°F, Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) | | | |
| Conditions | storage*2 | • | Heat resistant type; Ambient temp: -40 to +125°C -40 to +257°F, Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) | | | |
| | Max. operating sp | eed | 15 cpm (At nominal switching capacity) | | | |
| Unit weight | | | Approx. 33 g 1.16 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) Standard type (24 V coil voltage)

| Characteristics | Item | Specifications | | | | | |
|-----------------|---|-------------------------|--|----------------------------------|--|--|--|
| | Arrangement | 1 Form A | 1 Form C | High contact capacity (1 Form A) | | | |
| Contact | Contact resistance (Initial) | N | Max. 15mΩ (By voltage drop 6 V DC 1 A) | | | | |
| | Contact material | Ag alloy (Cadmium free) | | | | | |
| Rating | Nominal switching capacity (Initial) | 20A 28V DC | N.O.: 20A 28V DC N.C.: 10A 28V DC | 20A 28V DC | | | |
| | Max. carrying current (Initial) (28V DC, at 85°C 185°F, continuous) | 20A | N.O.: 20A, N.C.: 10A | 20A | | | |
| | Nominal operating power | 1.8W | 1.8W | 1.8W, 1.4W (PC board type) | | | |

Note: All other specifications are the same as those of standard type (12 V coil voltage)

^{*2.} The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT.

3) Heat resistant type (12 V and 24 V coil voltage)

| Characteristics | Item | Specifications | | | | | | |
|-----------------|--|---------------------------------------|--|---------------|---------------------------|----------------------------------|--------------------------------------|----------------------------------|
| Characteristics | item | 12V | | | 24V | | | |
| Contact | Arrangement | 1 Form A 1 Form C capacity (1 Form A) | | 1 Form A | 1 Form C | High contact capacity (1 Form A) | | |
| | Contact resistance (Initial) | | Max. 15mΩ (By voltage drop 6 V DC 1 A) | | | | | |
| | Contact material | | Ag alloy (Cadmium free) | | | | | |
| | Nominal switching capacity (Initial) | 40A 14V DC | N.O.: 40A 14V DC N.C.: 30A 14V DC | | | 20A 28V DC | N.O.: 20A 28V DC N.C.: 10A 28V DC | 20A 28V DC |
| Rating | Max. carrying current (Initial) (at 85°C 185°F, continuous)* | | | 45A 14V DC | 50A 14V DC | 25A 28V DC | N.O.: 25A 28V DC N.C.: 10A 28V DC | 25A 28V DC |
| | Nominal operating power | 1.4W | 1.4W | 1.8W | 1.4W (PCboard type) | 1.8W | 1.8W | 1.8W, 1.4W (PC board type) |

Notes: 1. All other specifications are the same as those of standard type (12 V coil voltage)
2. *Current value in which carry current is possible when the coil temperature is 180°C 356°F

4) 35 A type (12 V coil voltage)

| 4) 33 A type (| 12 V COII VOILA | je) | | | |
|----------------------------|---|-------------------------------------|--|--|--|
| Characteristics | | Item | S | Specifications | |
| | Arrangement | | 1 Form A | 1 Form C | |
| Contact | Contact resistance | e (Initial) | Typ2mΩ (By | voltage drop 6 V DC 1 A) | |
| | Contact material | | Ag allo | oy (Cadmium free) | |
| | Nominal switching capacity (Resistive load) | | 35A 14V DC | N.O.: 35A 14V DC, N.C.: 25A 14V DC | |
| Rating | Max. carrying curr (14V DC, at 85°C | ent (Initial) 185°F, continuous) | N.O.: 35A | N.O.: 35A, N.C.: 25A | |
| ū | Nominal operating | power | 1.4W, 1.6V | W (with resistor inside) | |
| | Min. switching capacity (Reference value)* | | 1A 12V DC (12\ | V DC), 1A 24V DC (24V DC) | |
| | Initial insulation resistance | | Min. 20 |) MΩ (at 500 V DC) | |
| | Initial breakdown | Between open contacts | 500 Vrms for 1 min. (Detection current: 10mA) | | |
| Electrical characteristics | voltage | Between contacts and coil | 500 Vrms for 1 min. (Detection current: 10mA) | | |
| Characteristics | Operate time (at n | ominal voltage) | Max. 15ms (excluding contact bounce time) (Initial) | | |
| | Release time (at r | ominal voltage) | Max. 15ms (excluding contact bounce time, without diode) (Initial) | | |
| | 011 | Functional | Min. 100 m/s ² {10G} (Half-wave pulse of sine wave: 11ms; detection: 10μs) | | |
| Mechanical | Shock resistance | Destructive | Min. 1,000 m/s ² {100G} | (Half-wave pulse of sine wave: 6ms) | |
| characteristics | Vibration | Functional | 10 Hz to 100 Hz, Min. 44 | 4.1m/s ² {4.5G} (Detection time: 10μs) | |
| | resistance | Destructive | 10 Hz to 2,000 Hz, Min. 44.1m/s ² {4.5G} Tim | ne of vibration for each direction; X.Y.Z direction: 4 hours | |
| Expected life | Electrical (at nominal switching capacity) | | Flux-resistant type: Min. 10 ⁵ , Sealed type: Min. 5×10 ⁴ (Operating frequency: 2s ON, 2s OFF) With diode inside: Min. 5×10 ⁴ (Operating frequency: 2s ON, 2s OFF) | | |
| | Mechanical | | Min. 10 ⁶ (at 120 cpm) | | |
| Conditions | Conditions for operation, transport and storage | | Ambient temp: -40°C to +85°C -40°F to +185°F Humidity: 5% R.H. to 85% R.H. (Not freezing and condensing at low temperature) | | |
| | Max. operating sp | eed | 15 cpm (At nominal switching capacity) | | |
| Unit weight | - | | Approx. 26 g .92 oz, Ap | prox. 28 g .99 oz (with diode inside) | |
| | | | | | |

Note: *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

5) 35 A type (24 V coil voltage)

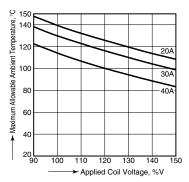
| <u>-,,</u> | | | | | | |
|-----------------|---|-----------------------------------|------------------------------------|--|--|--|
| Characteristics | Item | Specifications | | | | |
| Contact | Arrangement | 1 Form A 1 Form C | | | | |
| | Nominal switching capacity (Resistive load) | 15A 28V DC | N.O.: 15A 28V DC, N.C.: 25A 14V DC | | | |
| Haling | Max. carrying current (14V DC, at 85°C 185°F, continuous) | N.O.: 15A | N.O.: 15A, N.C.: 8A | | | |
| | Nominal operating power | 1.8W, 2.0W (with resistor inside) | | | | |

Note: All other specifications are the same as those of 35 A type (12 V coil voltage).

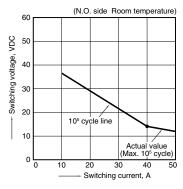
REFERENCE DATA

CB RELAYS (Standard type)

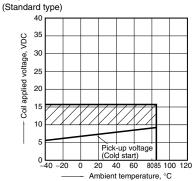
1. Allowable ambient temperature



2. Max. switching capability (Resistive load) (Standard type)

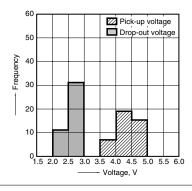


3. Ambient temperature and operating voltage range

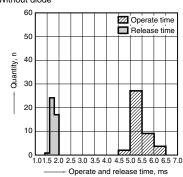


Asssumption:

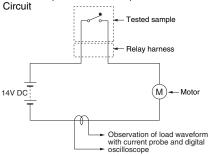
- Maximum mean coil temperature: 180°C
- Curves are based on 1.4W (Nominal power consumption of the unsupprressed coil at nominal voltage)
- 4. Distribution of pick-up and drop-out voltage Sample: CB1-P-12V, 42pcs.



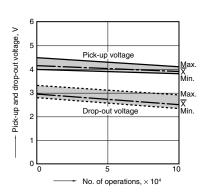
- 5. Distribution of operate and release time Sample: CB1-P-24V, 42pcs. * Without diode



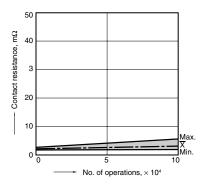
6-(1). Electrical life test (Motor free) Sample: CB1F-12V, 5pcs. Load: 25A 14V DC, motor free actual load Switching frequency: (ON:OFF = 1s:9s) Ambient temperature: Room temperature



Change of pick-up and drop-out voltage

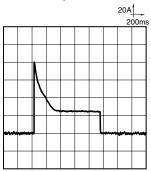


Change of contact resistance



Load current waveform

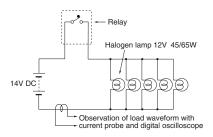
Inrush current: 80A, Steady current: 25A



6-(2). Electrical life test (Lamp load) Sample: CB1F-12V, 5pcs. Load: 45/65Wx5 parallel, 14V DC, halogen lamp

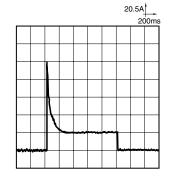
actual load

Switching frequency: (ON:OFF = 1s:8s) Ambient temperature: Room temperature Circuit

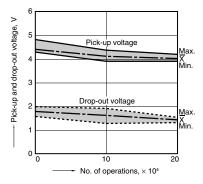


Load current waveform

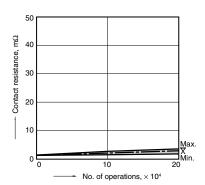
Inrush current: 100A, Steady current: 20A



Change of pick-up and drop-out voltage

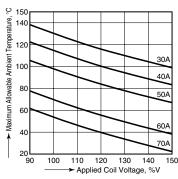


Change of contact resistance

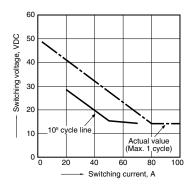


CB RELAYS (High contact capacity type)

1. Allowable ambient temperature

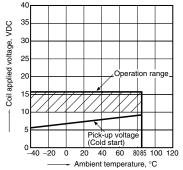


2. Max. switching capability (High contact capacity type)



3. Ambient temperature and operating voltage range

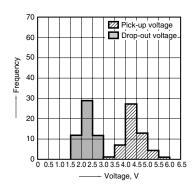
(Heat contact resistant type)



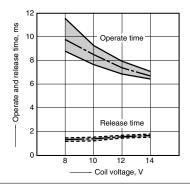
Asssumption:

- Maximum mean coil temperature: 180°C
 Curves are based on 1.4W (Nominal power consumption of the unsupprressed coil at nominal voltage)

4. Distribution of pick-up and drop-out voltage Sample: CB1aHF-12V, 53pcs.



5. Distribution of operate and release time Sample: CB1aHF-12V, 53pcs.



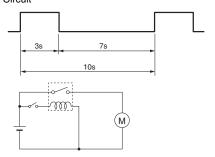
6. Contact resistance Sample: CB1aHF-12V, 53pcs. (By voltage drop 6V DC 1A)

> 60 50 Frequency 40 30 20 10 1.0 1.2 1.4 1.6 1.8 2.0 2.2 2.4 2.6 2.8

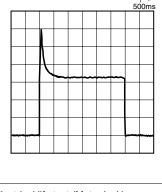
Resistance, $m\Omega$

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

Sample: CB1aH-12V, 3pcs.
Load: Inrush current: 64A/Steady current: 35A Fan motor actual load (motor free) 12V DC Switching frequency: (ON:OFF = 3s:7s) Ambient temperature: Room temperature Circuit

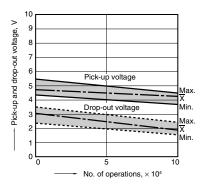


Load current waveform Inrush current: 64A, Steady current: 35A

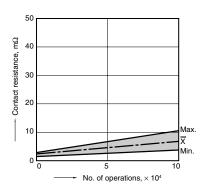


10A

Change of pick-up and drop-out voltage



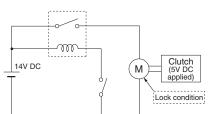
Change of contact resistance



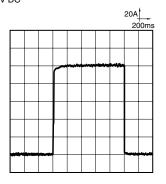
7-(2). Electrical life test (Motor lock) Sample: CB1aH-12V, 5pcs.

Load: 100A 14V DC

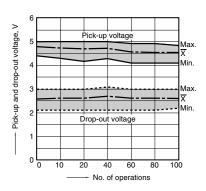
Magnet clutch actual load (lock condition) Switching frequency: (ON:OFF = 1s:9s) Ambient temperature: Room temperature Circuit



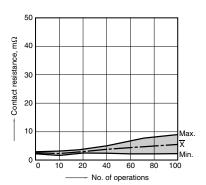
Load current waveform 100A 14V DC



Change of pick-up and drop-out voltage



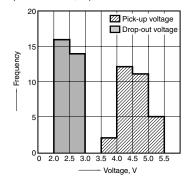
Change of contact resistance



CB RELAY (35 A type)

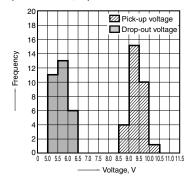
1-(1). Distribution of pick-up and drop-out voltage

Sample: CB1aV-12V, 30pcs.



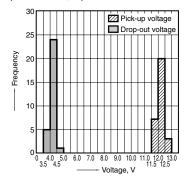
1-(2). Distribution of pick-up and drop-out voltage

Sample: CB1aV-24V, 30pcs.

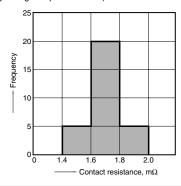


1-(3). Distribution of pick-up and drop-out voltage

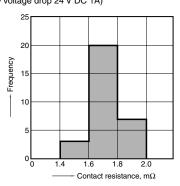
Sample: CB1V-24V, 30pcs.



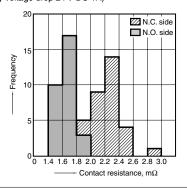
2.-(1) Contact resistance Sample: CB1aV-12V, 30pcs. (By voltage drop 12 V DC 1A)



2.-(2) Contact resistance Sample: CB1aV-24V, 30pcs. (By voltage drop 24 V DC 1A)

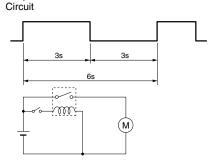


2.-(3) Contact resistance Sample: CB1V-24V, 30pcs. (By voltage drop 24 V DC 1A)

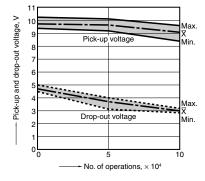


3. Electrical life test (Blower fan)

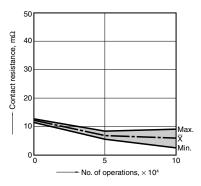
Sample: CB1aV-D-24V, 3pcs. Load: Blower fan load 28 V DC Inrush current: 30 A/Steady current: 10 A Switching frequency: (ON:OFF = 3s:3s) Switching cycle: 10⁵ Ambient temperature: 85°C Coil protective element: Diode



Change of pick-up and drop-out voltage

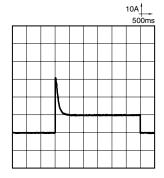


Change of contact resistance



Load current waveform

Inrush current: 30 A, Steady current: 10 A

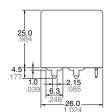


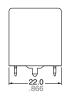
DIMENSIONS (Unit: mm inch)

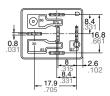
1. PC board type



External dimensions







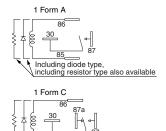
Dimension: General tolerance

 Max. 1mm .039 inch:
 ±0.1 ±.004

 1 to 3mm .039 to .118 inch: ±0.2 ±.008

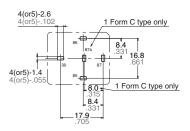
 Min. 3mm .118 inch:
 ±0.3 ±.012

Schematic (Bottom view)



PC board pattern (Bottom view)

Including diode type, including resistor type also available



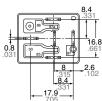
2. Plug-in type * The dimensions are the same as those of 35A type.



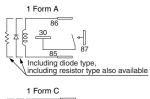
External dimensions

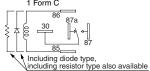






Schematic (Bottom view)



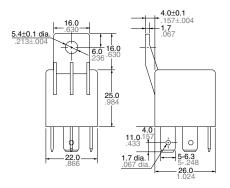


<u>Dimension:</u> <u>General tolerance</u>

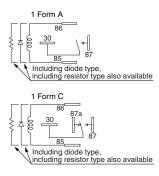
3. Bracket type

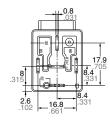


External dimensions



Schematic (Bottom view)





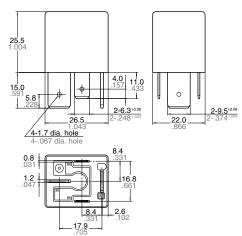
<u>Dimension:</u> <u>General tolerance</u> Max. 1mm .039 inch: $\pm 0.1 \pm .004$

1 to 3mm .039 to .118 inch: $\pm 0.2 \pm .008$ Min. 3mm .118 inch: $\pm 0.3 \pm .012$

4. High contact capacity (1 Form A) (Plug-in type)



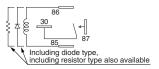
External dimensions



<u>Dimension:</u> <u>General tolerance</u>

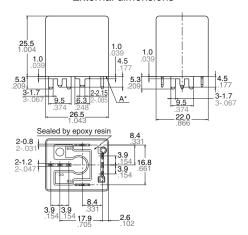
Max. 1mm .039 inch: ±0.1 ±.004 1 to 3mm .039 to .118 inch: ±0.2 ±.008 Min. 3mm .118 inch: ±0.3 ±.012

Schematic (Bottom view)



5. High contact capacity (1 Form A) (PC board type)

External dimensions



^{*} Intervals between terminals is measured at A surface level.

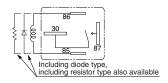
 Dimension:
 General tolerance

 Max. 1mm .039 inch:
 ±0.1 ±.004

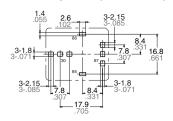
 1 to 3mm .039 to .118 inch: ±0.2 ±.008

 Min. 3mm .118 inch:
 ±0.3 ±.012

Schematic (Bottom view)



PC board pattern (Bottom view)



Cautions regarding the protection element

1. Part numbers without protection elements

1) 12 V models

When connecting a coil surge protection circuit to these relays, we recommend a zener diode with a zener voltage of 24 V or higher, or a resistor (680 Ω to 1,000 Ω). When a diode is connected to the coil in parallel, the release time will slow down and working life may shorten. Before use, please check the circuit and verify that the diode is not connected in parallel to the coil drive circuit.

2) 24 V models

When connecting a coil surge protection circuit to these relays, we recommend a zener diode with a zener voltage of 48 V or higher, or a resistor (2,800 Ω to 4,700 Ω).

When a diode is connected to the coil in parallel, the release time will slow down and working life may shorten. Before use, please check the circuit and verify that the diode is not connected in parallel to the coil drive circuit.

2. Part numbers with diodes

These relays use a diode in the coil surge protection element. Therefore, the release time is slower and the working life might be shorter compared to part numbers without protection elements and part numbers with resistors.

Be sure to use only after evaluating under actual load conditions.

3. Part numbers with resistors

This part number employs a resistor in the coil surge protection circuit; therefore, an external surge protection element is not required. In particular, when a diode is connected in parallel with a coil, the release time becomes slower which could adversely affect working life. Please check the circuit and make sure that a diode is not connected in parallel with the coil drive circuit.

For Cautions for Use, see Relay Technical Information.