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

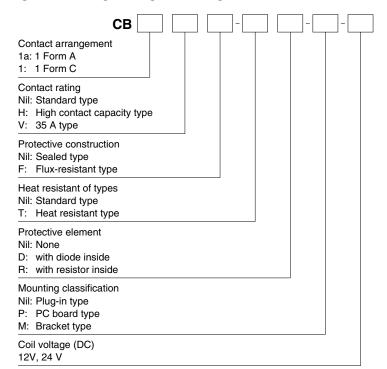
1. Automobiles

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

Contact arrangement	Mounting elegation	Naminal acil 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 tune	12V DC	CB1a-12V	CB1aF-12V
I FOIIII A	Plug-in type	24V DC	CB1a-24V	CB1aF-24V
	Drocket type	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
	PC board type	24V DC	CB1-P-24V	CB1F-P-24V
1 Form C	Plug-in type	12V DC	CB1-12V	CB1F-12V
I FOIIII C		24V DC	CB1-24V	CB1F-24V
	Bracket type	12V DC	CB1-M-12V	CB1F-M-12V
		24V DC	CB1-M-24V	CB1F-M-24V
	DC heard tonet	12V DC	CB1aH-P-12V	CB1aHF-P-12V
	PC board type*	24V DC	CB1aH-P-24V	CB1aHF-P-24V
High contact capacity	Dlug in tune	12V DC	CB1aH-12V	CB1aHF-12V
(1 Form A)	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

Contact arrangement	Mounting classification	Nominal coil voltage	Sealed type	Flux-resistant type
Contact arrangement	Wounting classification	Nominal coll 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	Plug-in type	12V DC	CB1a-T-12V	CB1aF-T-12V
I FOIIII A	Flug-III 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
I FOIII 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 haard husa*	12V DC	CB1aH-T-P-12V	CB1aHF-T-P-12V
	PC board type*	24V DC	CB1aH-T-P-24V	CB1aHF-T-P-24V
High contact capacity	Dlug in type	12V DC	CB1aH-T-12V	CB1aHF-T-12V
(1 Form A)	Plug-in type	24V DC	CB1aH-T-24V	CB1aHF-T-24V
	Due alset to see	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.)

Combook owner would	Naminal asil valtana	Sealed type	Flux-resistant type
Contact arrangement	Nominal coil voltage	Part No.	Part No.
1 Form A	12V DC	CB1aV-12V	CB1aVF-12V
I Form 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 Form A with resistor inside	24V DC	CB1aV-R-24V	CB1aVF-R-24V
1 Form C with resistor inside	12V DC	CB1V-R-12V	CB1VF-R-12V
1 Form C with resistor inside	24V DC	CB1V-R-24V	CB1VF-R-24V
4 Farms A soldle alle de localele	12V DC	CB1aV-D-12V	CB1aVF-D-12V
1 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 diode 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
	12V DC	3 to 7V DC	1.2 to 4.2V DC	117mA	103Ω	1.4W (PC board type)	10 to 16V DC
High contact	120 DC	3 10 7 V DC	1.2 (0 4.27 DC	150mA	80Ω	1.8W	10 10 16 16 16
capacity (1 Form A) 24V	24V DC	04-444-00	0.44- 0.47/ 0.0	58mA	411Ω	1.4W (PC board type)	20 to 32V DC
	24V DC	6 to 14V DC	2.4 to 8.4V 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)		
	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)	
Rating	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 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/s² {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. 10 ⁵ , Sealed type: Min. 5×10 ⁴ (Operating frequency: 2s ON, 2s OFF)			
Expected life	Mechanical		Min. 10 ⁶ (at 120 cpm)			
	Conditions for ope	eration, 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)	Max. 15mΩ (By voltage drop 6 V DC 1 A)				
	Contact material	Ag alloy (Cadmium free)				
	Nominal switching capacity (Initial)	20A 28V DC	N.O.: 20A 28V DC N.C.: 10A 28V DC	20A 28V DC		
Rating	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	nem		12V			24V		
Contact	Arrangement	1 Form A	1 Form C	capa	ontact acity rm A)	1 Form A	1 Form C	High contact capacity (1 Form A)
	Contact resistance (Initial)		Max. 15m Ω (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	40A 1	4V 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)*	50A 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)

+) 33 A type ((12 V COII VOILA	<i>je)</i>			
Characteristics		Item	Spec	cifications	
	Arrangement		1 Form A	1 Form C	
Contact	Contact resistance	e (Initial)	Typ2mΩ (By volta	age drop 6 V DC 1 A)	
	Contact material		Ag alloy (0	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	rent (Initial) 185°F, continuous)	N.O.: 35A	N.O.: 35A, N.C.: 25A	
_	Nominal operating	power	1.4W, 1.6W (v	vith resistor inside)	
	Min. switching cap	acity (Reference value)*	1A 12V DC (12V DC	C), 1A 24V DC (24V DC)	
	Initial insulation resistance		Min. 20 MΩ	2 (at 500 V DC)	
E	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	nominal voltage)	Max. 15ms (excluding contact bounce time, without diode) (Initial)		
	Shock resistance	Functional	Min. 100 m/s² {10G} (Half-wave pulse of sine wave: 11ms; detection: 10μs)		
Mechanical	Shock resistance	Destructive	Min. 1,000 m/s ² {100G} (Hal	If-wave pulse of sine wave: 6ms)	
characteristics	Vibration	Functional	10 Hz to 100 Hz, Min. 44.1m	n/s² {4.5G} (Detection time: 10µs)	
	resistance	Destructive	10 Hz to 2,000 Hz, Min. 44.1m/s² {4.5G} Time o	f vibration for each direction; X.Y.Z direction: 4 hours	
Expected life	Electrical (at nomi	nal 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 ope	eration, 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, Approx	k. 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)

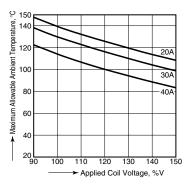
0,00,11,00	5) 55 7. type (= 1 t 55ts.mags)							
Characteristics	Item	Specifications						
Contact	Arrangement	1 Form A 1 Form C						
	Nominal switching capacity (Resistive load)	15A 28V DC	N.O.: 15A 28V DC, N.C.: 25A 14V DC					
Rating	Max. carrying current (14V DC, at 85°C 185°F, continuous)	N.O.: 15A	N.O.: 15A, N.C.: 8A					
	Nominal operating power	1.8W, 2.0W (with	n resistor inside)					

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

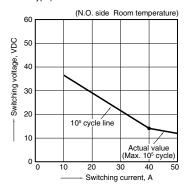
REFERENCE DATA

CB RELAYS (Standard type)

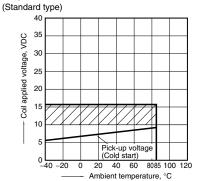
1. Allowable ambient temperature



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

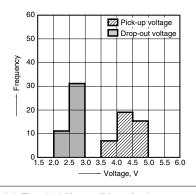


3. Ambient temperature and operating voltage range

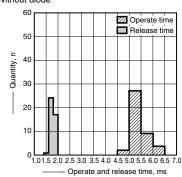


Asssumption:

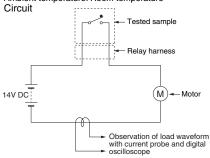
- Maximum mean coil temperature: 180°C
- Curves are based on 1.4W (Nominal power consumption of the unsupprressed coil at nominal voltage)
- 4. Distribution of pick-up and drop-out voltage Sample: CB1-P-12V, 42pcs.



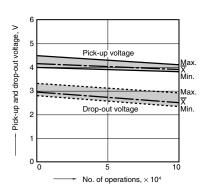
- 5. Distribution of operate and release time Sample: CB1-P-24V, 42pcs. * Without diode



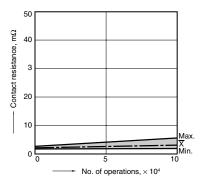
6-(1). Electrical life test (Motor free) Sample: CB1F-12V, 5pcs. Load: 25A 14V DC, motor free actual load Switching frequency: (ON:OFF = 1s:9s) Ambient temperature: Room temperature



Change of pick-up and drop-out voltage

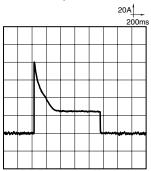


Change of contact resistance



Load current waveform

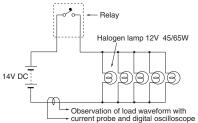
Inrush current: 80A, Steady current: 25A



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

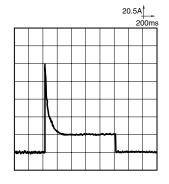
actual load Switching frequency: (ON:OFF = 1s:8s)

Ambient temperature: Room temperature Circuit

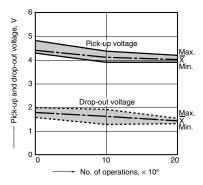


Load current waveform

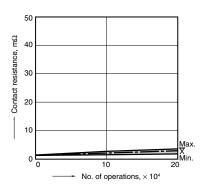
Inrush current: 100A, Steady current: 20A



Change of pick-up and drop-out voltage

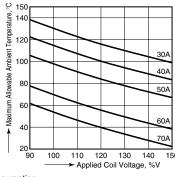


Change of contact resistance

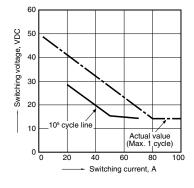


CB RELAYS (High contact capacity type)

1. Allowable ambient temperature

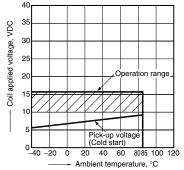


2. Max. switching capability (High contact capacity type)



3. Ambient temperature and operating voltage range

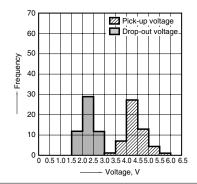
(Heat contact resistant type)



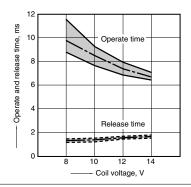
Asssumption:

- 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.



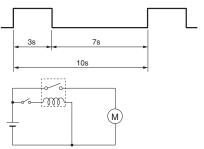
6. Contact resistance Sample: CB1aHF-12V, 53pcs. (By voltage drop 6V DC 1A)

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, $m\Omega$

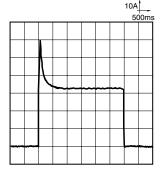
7-(1). Electrical life test (Motor free)

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

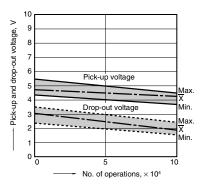
Circuit



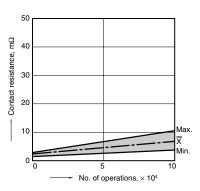
Load current waveform Inrush current: 64A, Steady current: 35A



Change of pick-up and drop-out voltage



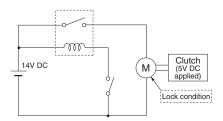
Change of contact resistance



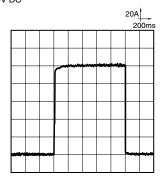
7-(2). Electrical life test (Motor lock) Sample: CB1aH-12V, 5pcs.

Load: 100A 14V DC

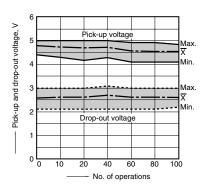
Magnet clutch actual load (lock condition) Switching frequency: (ON:OFF = 1s:9s) Ambient temperature: Room temperature Circuit



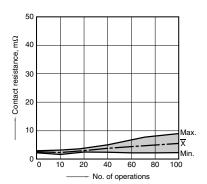
Load current waveform 100A 14V DC



Change of pick-up and drop-out voltage



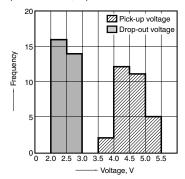
Change of contact resistance



CB RELAY (35 A type)

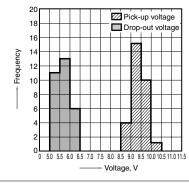
1-(1). Distribution of pick-up and drop-out voltage

Sample: CB1aV-12V, 30pcs.



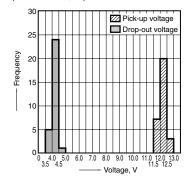
1-(2). Distribution of pick-up and drop-out voltage

Sample: CB1aV-24V, 30pcs.

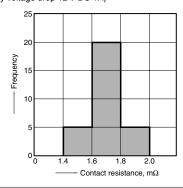


1-(3). Distribution of pick-up and drop-out voltage

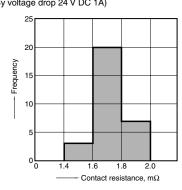
Sample: CB1V-24V, 30pcs.



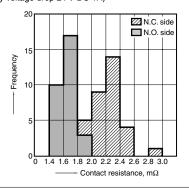
2.-(1) Contact resistance Sample: CB1aV-12V, 30pcs. (By voltage drop 12 V DC 1A)



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

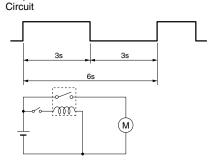


2.-(3) Contact resistance Sample: CB1V-24V, 30pcs. (By voltage drop 24 V DC 1A)

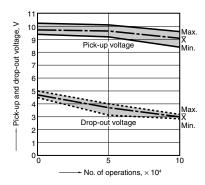


3. Electrical life test (Blower fan)

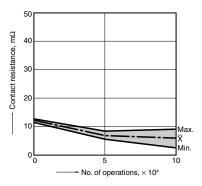
Sample: CB1aV-D-24V, 3pcs.
Load: Blower fan load 28 V DC
Inrush current: 30 A/Steady current: 10 A
Switching frequency: (ON:OFF = 3s:3s)
Switching cycle: 10⁵
Ambient temperature: 85°C
Coil protective element: Diode



Change of pick-up and drop-out voltage

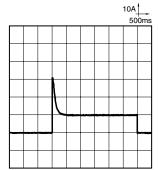


Change of contact resistance



Load current waveform

Inrush current: 30 A, Steady current: 10 A

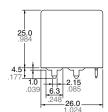


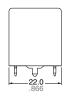
DIMENSIONS (Unit: mm inch)

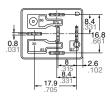
1. PC board type



External dimensions



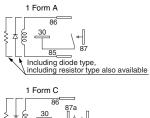


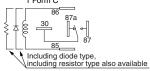


Dimension: General tolerance

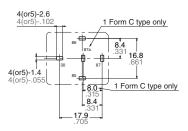
Max. 1mm .039 inch: ±0.1 ±.004 1 to 3mm .039 to .118 inch: ±0.2 ±.008 Min. 3mm .118 inch: ±0.3 ±.012

Schematic (Bottom view)





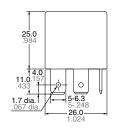
PC board pattern (Bottom view)

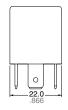


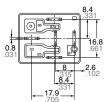
2. Plug-in type * The dimensions are the same as those of 35A type.



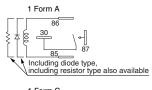
External dimensions

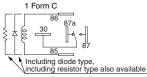






Schematic (Bottom view)





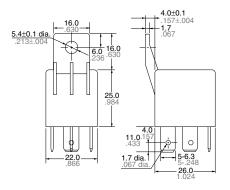
<u>Dimension:</u> <u>General tolerance</u>

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

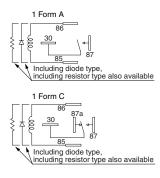
3. Bracket type

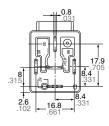


External dimensions



Schematic (Bottom view)



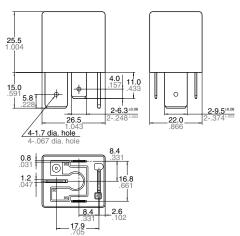


<u>Dimension:</u> <u>General tolerance</u>

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



External dimensions



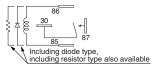
<u>Dimension:</u> <u>General tolerance</u>

 Max. 1mm .039 inch:
 ±0.1 ±.004

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

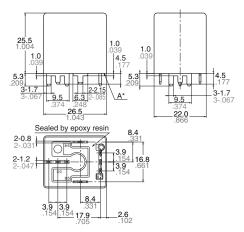
 Min. 3mm .118 inch:
 ±0.3 ±.012

Schematic (Bottom view)



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

External dimensions

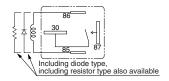


^{*} Intervals between terminals is measured at A surface level.

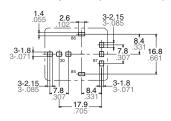
<u>Dimension:</u> <u>General tolerance</u> Max. 1mm .039 inch: $\pm 0.1 \pm .004$

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

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.