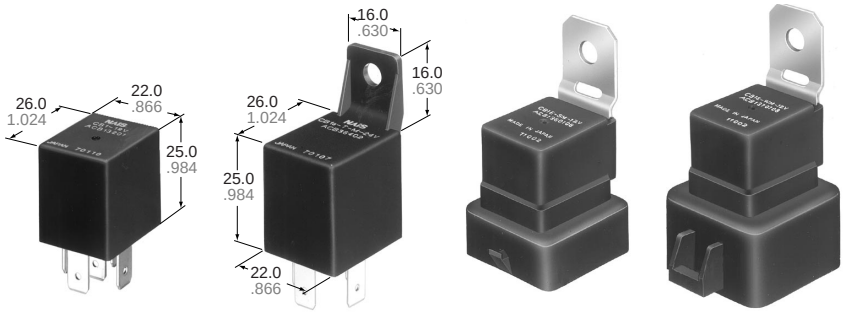
HIGH POWER AUTOMOTIVE RELAY

CB-RELAYS



- **40 A rating at 85°C 185°F**
- **ISO type terminals**
- **High shock resistance for drop test requirements (2 meters 6.6 feet)**
- **Low temperature rise — all current carrying material is copper.**
- **Quick connect and PC board type**
- **Various enclosure options**

SPECIFICATIONS

Contact

Type		12 V coil voltage	24 V coil voltage
Arrangement		1 Form A, 1 Form C	
Initial voltage drop		N.O.: Max. 0.5 V (at 40 A 12 V DC) N.C.: Max. 0.45 V (at 30 A 12 V DC)	N.O.: Max. 0.3 V (at 20 A 24 V DC) N.C.: Max. 0.15 V (at 10 A 24 V DC)
Contact material		Silver alloy	
Rating (resistive load)	Nominal switchig capacity	N.O.: 40 A 14 V DC N.C.: 30 A 14 V DC	N.O.: 20 A 28 V DC N.C.: 10 A 28 V DC
	Max. switching power	N.O.: 560 W N.C.: 420 W	N.O.: 560 W N.C.: 280 W
	Max. switching voltage	16 V DC	32 V DC
	Max. switching current	See Contact Rating table	
Expected life (min. ope.) Mechanical (at 120 cpm) Electrical (at rated load operating frequency 2 s ON, 2 s OFF)		10^6 10^5 (Sealed type: 5×10^4)	

Coil

Nominal operating power	1.4 W	1.8 W

Contact Rating

	12 V coil voltage			24 V coil voltage		
	Form A	Form C		Form A	Form C	
		N.O.	N.C.		N.O.	N.C.
Max. carry current	40 A	40 A	30 A	20 A	20 A	10 A
Max. make current	100 A	100 A	60 A	50 A	50 A	20 A
Max. break current	40 A	40 A	30 A	20 A	20 A	10 A

Characteristics

Type		12 V coil voltage / 24 V coil voltage
Max. operating speed (at rated load)		15 cpm
Initial insulation resistance		Min. 20 MΩ at 500 V DC
Initial break-down voltage*1	Between open contacts	AC 500 V for 1 min.
	Between contacts and coil	AC 500 V for 1 min.
Operate time*2 (at nominal voltage)		Max. 15 ms
Release time(without diode)*2 (at nominal voltage)		Max. 15 ms (Type with diode inside: Max. 25 ms)
Temperature rise (at nominal voltage)		Max. 75°C (at 20°C)
Shock resistance	Functional	Min. 200 m/s² {20 G}
	Destructive	Min. 1,000 m/s² {20 G}
Vibration resistance	Functional	44.1 m/s² {4.5 G} 10 to 500 Hz/0.5 hr in X, Y, Z directions for 4 hrs
	Destructive	44.1 m/s² {4.5 G} 10 to 2000 Hz/0.5 hr in X, Y, Z directions for 4 hrs
Conditions for operation, transport and storage*3 (Not freezing and condensing at low temperature)	Ambient temp.	–40°C to +85°C –40°F to +185°F
	Humidity	5 to 85% R.H.
Drop test		Capable of meeting specification after 6.6 feet (2 m) drop onto concrete
Unit weight		Quick connect/PC board type: Approx. 33 g 1.16 oz (Shrouded type: Approx. 43 g 1.52 oz) (Waterproof type: Approx. 47 g 1.66oz)

Remarks

*1 Detection current: 10 mA

*2 Excluding contact bounce time

*3 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 49)

ORDERING INFORMATION

CB | 1 | F | — | R | P | — | 12 V

Contact arrangement	Protective construction	Classification of types	Mounting classification	Coil voltage (DC)
1a: 1 Form A 1: 1 Form C	Nil: Sealed type F: Flux-resistant type	Nil: Standard type D: with diode inside R: with resistor inside	Nil: Quick connect type P: PC board type M:Bracket type SM: Shrounded type with bracket WM: Weatherproof type with bracket	12, 24 V

Note: Bulk pakage: 50 pcs.; 200 pcs.

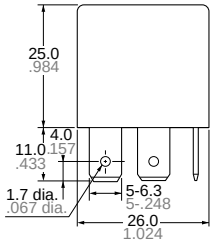
COIL DATA

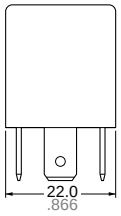
Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (mim.)	Nominal current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, W	Maximum allowable voltage, V DC (at 85°C)
12	7	1.2 to 4.2	117	103	1.4	10 to 16
24	14	2.4 to 8.4	75	320	1.8	20 to 32

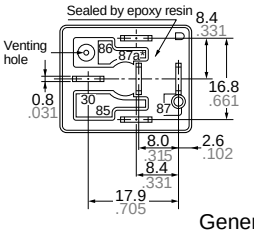
DIMENSIONS

mm inch

Quick connect type

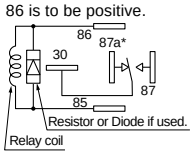






Schematic (Bottom view)

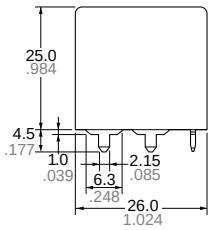
If diode is used, term. 86 is to be positive.

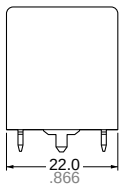


*Not used on 1 Form A type.

General tolerance: ±0.3 ±.012

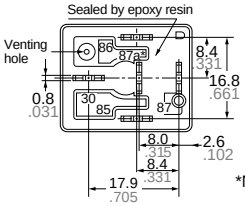
PC board type





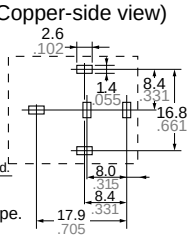
Schematic (Bottom view)

If diode is used, term. 86 is to be positive.



*Not used on 1 Form A type.

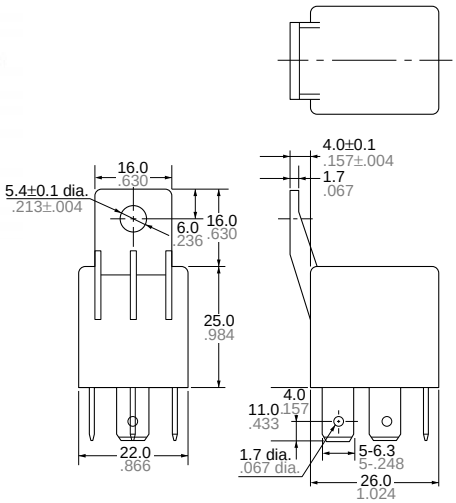
PC board pattern (Copper-side view)

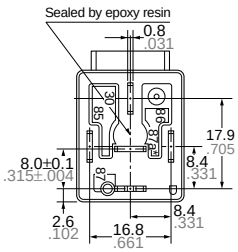


General tolerance: ±0.3 ±.012

Tolerance ±0.1 ±.004

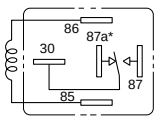
Bracket type





Schematic (Bottom view)

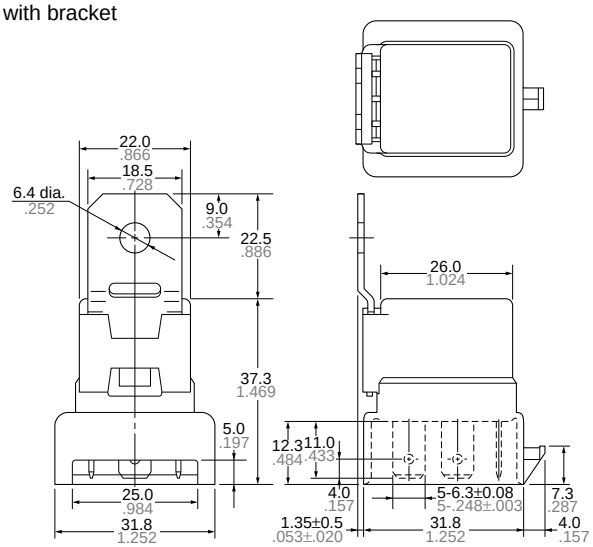
If diode is used, term. 86 is to be positive.

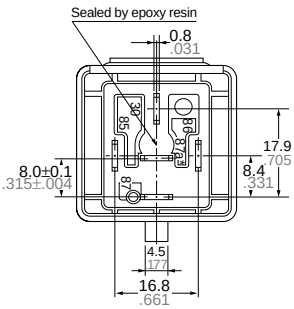


*Not used on 1 Form A type.

General tolerance: ±0.3 ±.012

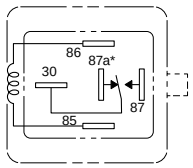
Shrouded type with bracket





Schematic (Bottom view)

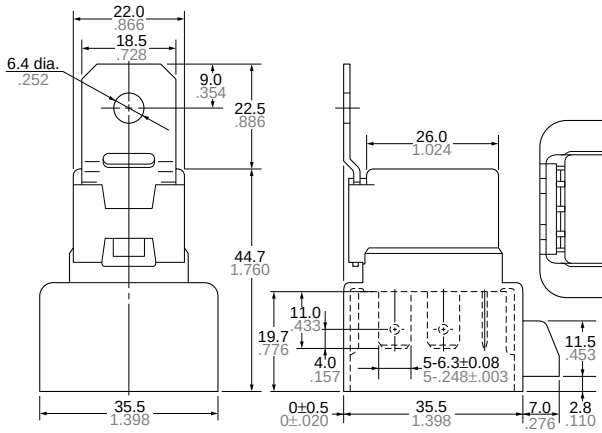
If diode is used, term. 86 is to be positive.

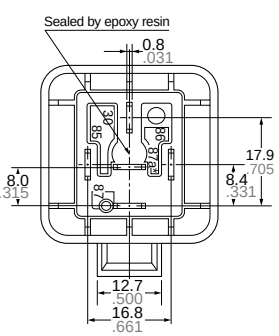


*Not used on 1 Form A type.

General tolerance: ±0.3 ±.012

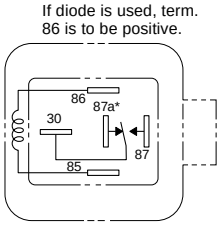
Weatherproof type with bracket





Schematic (Bottom view)

If diode is used, term. 86 is to be positive.

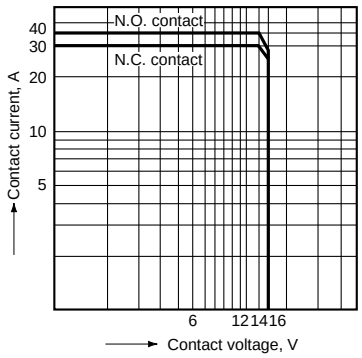


*Not used on 1 Form A type.

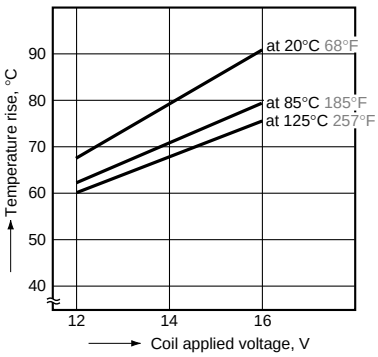
General tolerance: ±0.3 ±.012

REFERENCE DATA

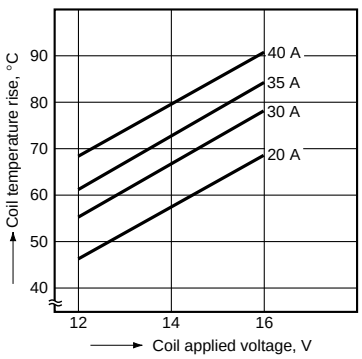
1. Maximum value for switching capacity
Tested sample: CB1F-12V
No. of operations: 10^5



2-(1). Coil temperature rise (resistive)
Tested sample: CB1F-12V, 6 pcs.
Ambient temperature: 20°C, 85°C, 125°C
68°F, 185°F, 257°F
Contact carrying current: 40 A
Coil applied voltage: 12 V, 14 V, 16 V DC

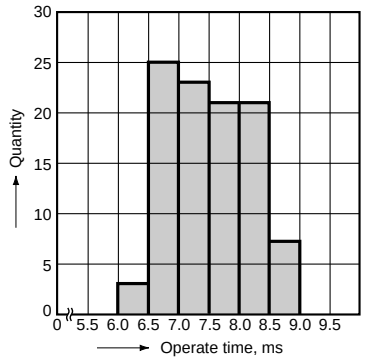


2-(2). Coil temperature rise (resistive)
Tested sample: CB1F-12V, 6 pcs.
Ambient temperature: 20°C, 68°F
Contact carrying current: 20 A, 30 A, 35 A, 40 A
Coil applied voltage: 12 V, 14 V, 16 V DC

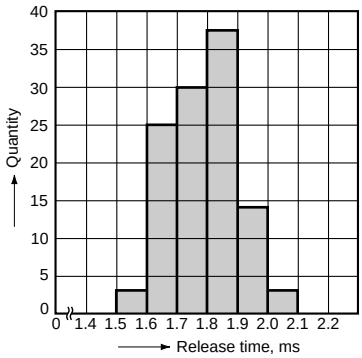


3. Distribution of operate/release time (at nominal voltage)
Tested sample: CB1F-12V, 100 pcs.
Ambient temperature: 22°C, 72°F

Operate time

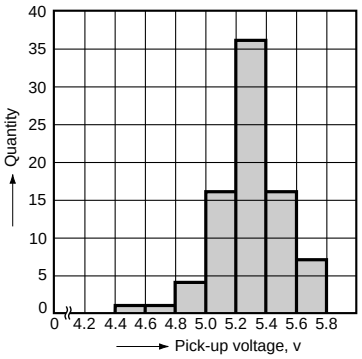


Release time



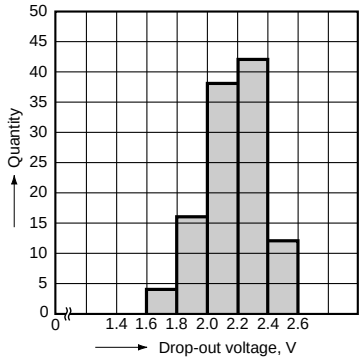
4. Distribution of pick-up/drop-out voltage
Tested sample: CB1F-12V, 100 pcs.

Pick-up voltage



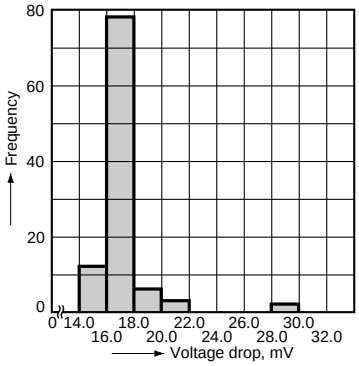
Distribution of pick-up/drop-out voltage
Tested sample: CB1F-12V, 100 pcs.

Drop-out voltage

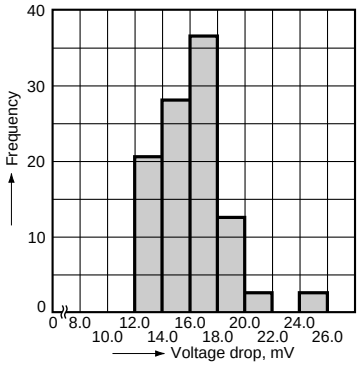


5. Distribution of voltage drop
Tested sample: CB1F-12V, 100 pcs.
Tested method: at 10 A voltage drop

N.C. contact



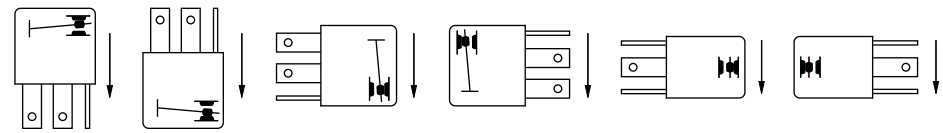
N.O. contact



6. Free-fall test

Test conditions:

Drop height: 2 meters to concrete surface
Drop direction: 6 directions, each 1 drop
Sample: CB1F-12V
Quantity: 6 pcs.



Sample No. 1 direction | Sample No. 2 direction | Sample No. 3 direction | Sample No. 4 direction | Sample No. 5 direction | Sample No. 6 direction

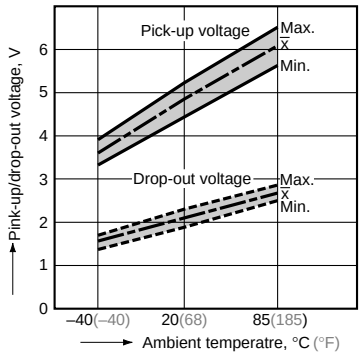
Test result: No abnormality was observed.

Sample No.	No. of operations	Pick-up voltage, V	Drop-out voltage, V	Contact resistance, mΩ		Insulation resistance	Breakdown voltage
				N.C.	N.O.		
1	Initial (at 28°C)	5.2	1.8	1.9	1.5	good	good
2		5.2	1.9	1.5	1.7	good	good
3		4.9	1.8	1.6	1.9	good	good
4		5.1	1.8	1.7	2.6	good	good
5		5.2	1.8	1.9	1.7	good	good
6		5.3	2.1	2.0	1.5	good	good
1	After (at 28°C)	4.7	1.6	1.7	1.4	good	good
2		4.9	1.8	2.2	1.7	good	good
3		4.4	1.5	2.5	1.6	good	good
4		4.7	1.6	2.2	2.3	good	good
5		4.8	1.6	2.5	1.6	good	good
6		4.7	1.7	1.7	1.6	good	good

Contact resistance: contact voltage drop (10 A)
Insulation resistance: 20 MΩ at 500 V DC
Breakdown voltage: Between open contacts: 500 Vrms
Between contacts and coil: 500 Vrms

7. Ambient temperature characteristics

Tested sample: CB1F-12V, 6 pcs.



For Cautions for Use, see Relay Technical Information.