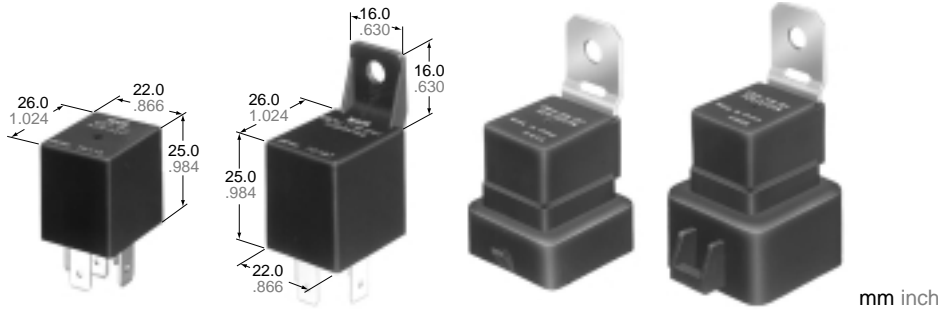


NAIS

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 switching capacity	N.O.: 40 A 14 V DC N.C.: 30 A 14 V DC
	Max. switching power	N.O.: 560 W N.C.: 420 W
	Max. switching voltage	16 V DC
	Max. switching current	See Contact Rating table
Expected life (min. ope.)	10 ⁶	
Mechanical (at 120 cpm)	10 ⁵	
Electrical (at rated load operating frequency 2 s ON, 2 s OFF)	(Sealed type: 5x10 ⁴)	

Coil

Nominal operating power	12 V	24 V
	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.	
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/s ² {20 G}
	Destructive	Min. 1,000 m/s ² {20 G}
Vibration resistance	Functional	44.1 m/s ² {4.5 G} 10 to 500 Hz/0.5 hr in X, Y, Z directions for 4 hrs
	Destructive	44.1 m/s ² {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: Shrouded type with bracket WM: Weatherproof type with bracket	12, 24 V

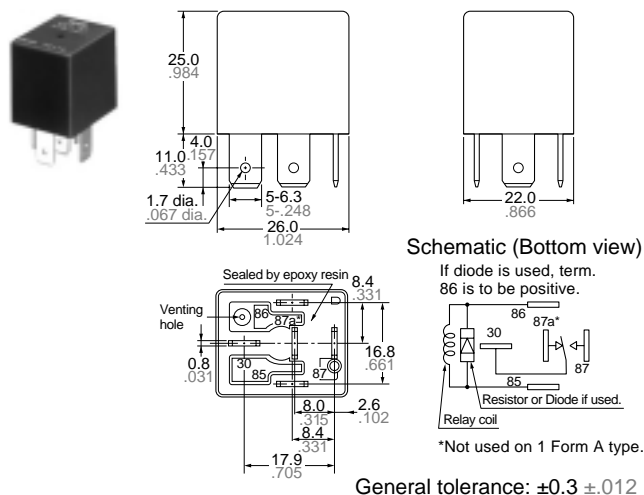
Note: Bulk package: 50 pcs.; 200 pcs.

COIL DATA

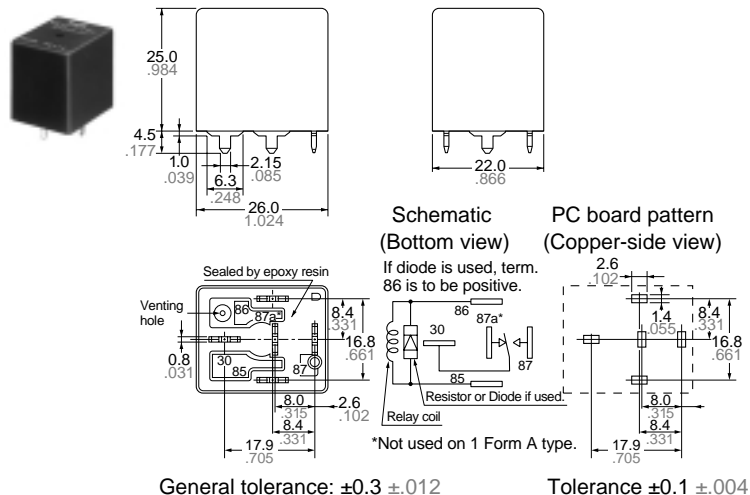
Nominal voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (mim.)	Nominal current, mA (±10%)	Coil resistance, Ω (±10%)	Nominal operating power, W	Maximum allowable voltage, V DC (at 85°C)
12	7	1.2 to 4.2	117	103	1.4	10 to 16
24	14	2.4 to 8.4	75	320	1.8	20 to 32

DIMENSIONS

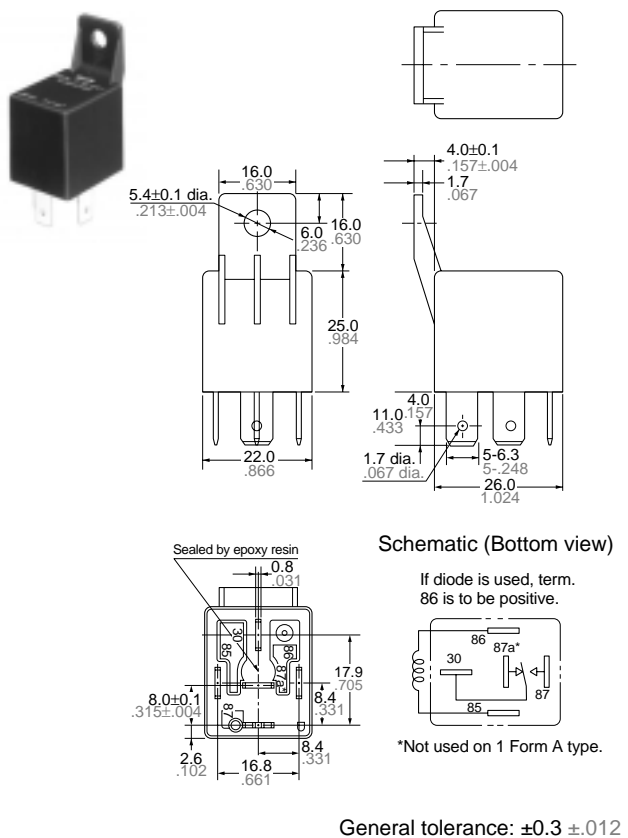
Quick connect type



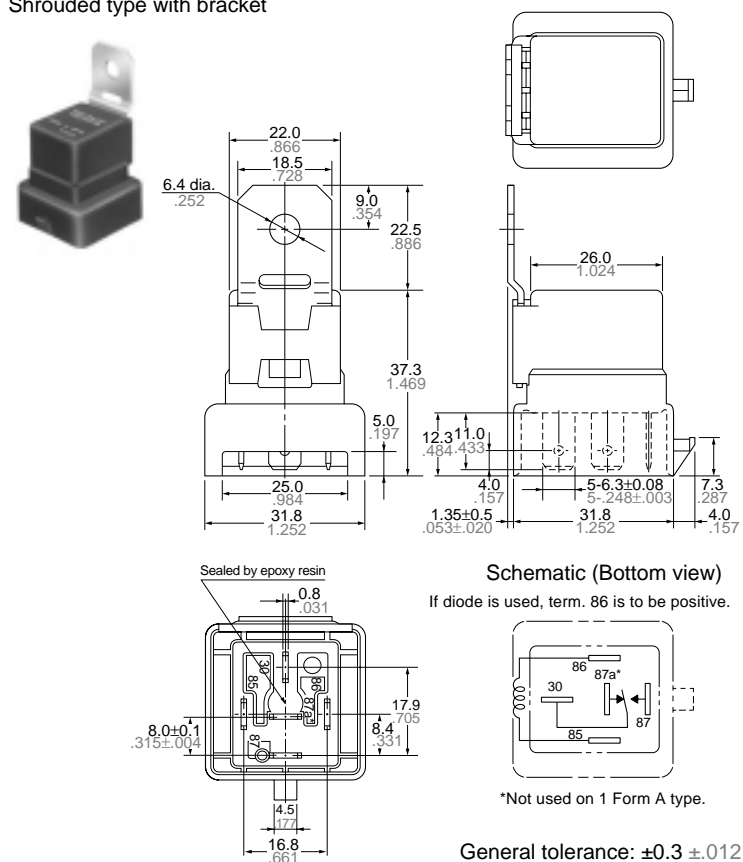
PC board type



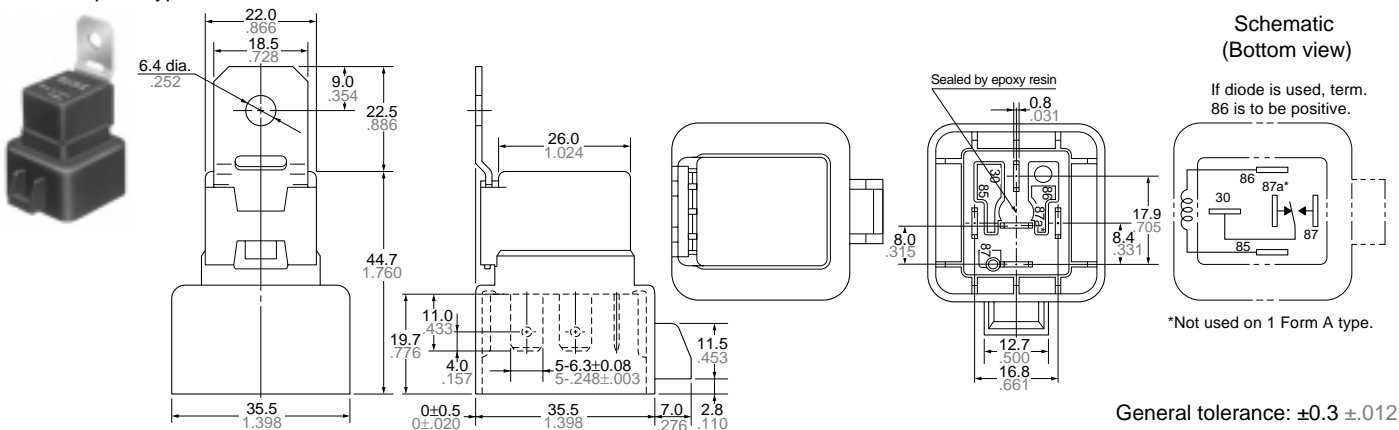
Bracket type



Shrouded type with bracket

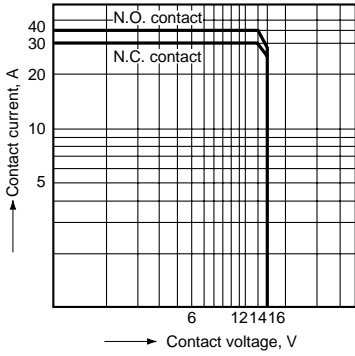


Weatherproof type with bracket

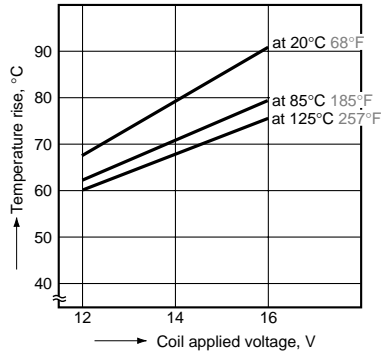


REFERENCE DATA

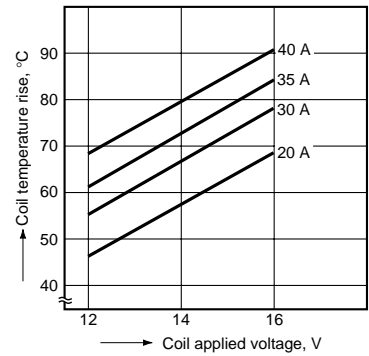
1. Maximum value for switching capacity
 Tested sample: CB1F-12V
 No. of operations: 10⁵



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



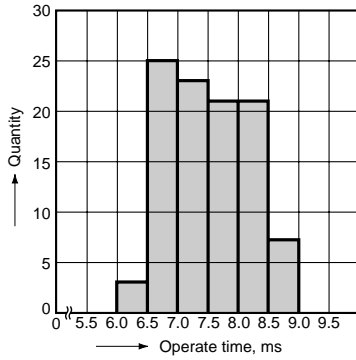
2-(2). Coil temperature rise (resistive)
 Tested sample: CB1F-12V, 6 pcs.
 Ambient temperature: 20°C, 68°F
 Contact carrying current: 20 A, 30 A, 35 A, 40 A
 Coil applied voltage: 12 V, 14 V, 16 V DC



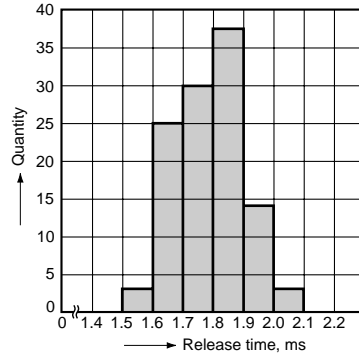
3. Distribution of operate/release time (at nominal voltage)

Tested sample: CB1F-12V, 100 pcs.
 Ambient temperature: 22°C, 72°F

Operate time



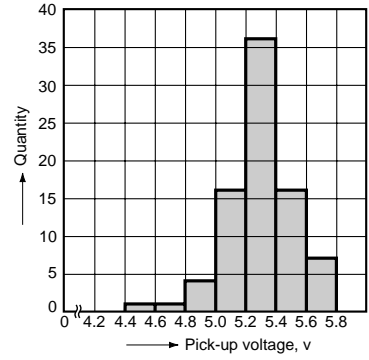
Release time



4. Distribution of pick-up/drop-out voltage

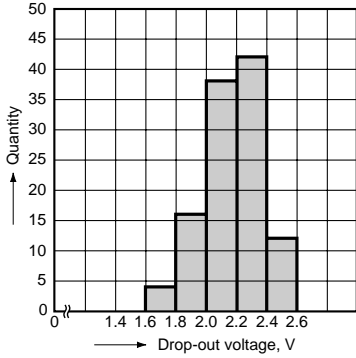
Tested sample: CB1F-12V, 100 pcs.

Pick-up voltage

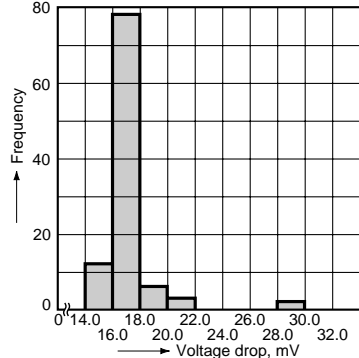


Distribution of pick-up/drop-out voltage
 Tested sample: CB1F-12V, 100 pcs.

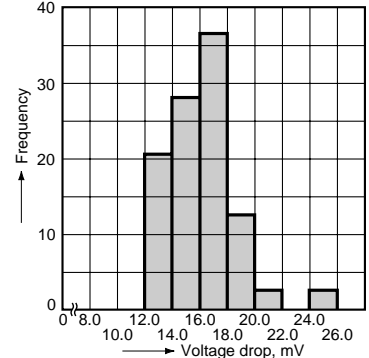
Drop-out voltage



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

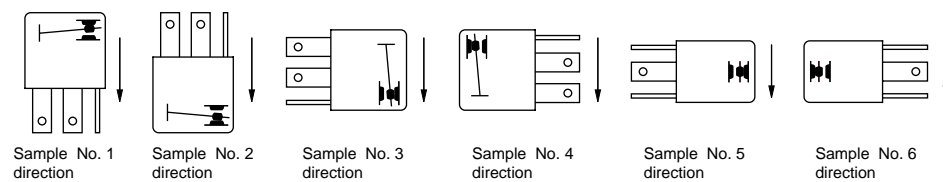
Test conditions:

Drop height: 2 meters to concrete surface

Drop direction: 6 directions, each 1 drop

Sample: CB1F-12V

Quantity: 6 pcs.



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.

