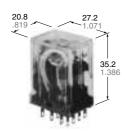
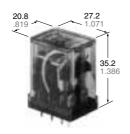


Panasonic ideas for life

MINIATURE RELAY FOR WIDER APPLICATIONS

HC RELAYS





HCE Amber Relays

FEATURES

- Extra long life Min. 108 mechanical operations (DC type)
- 4 contact arrangements
- 4 Form C (for 5 A 250 V AC),
- 3 Form C (for 7 A 250 V AC),
- 2 Form C (for 7 A 250 V AC),
- 1 Form C (for 10 A 250 V AC)
- Applicable to low to high level loads (100µA to 10A)
- Amber sealed types available
- Bifurcated contact types available as HC4D

SPECIFICATIONS

Contacts

mm inch

Arrangeme	ent	1 Form C	2 Form C	3 Form C	4 Form C		
	ent resistance, max. e drop 6 V DC 1 A)		30 mΩ				
Contact material		Gold-flashed silver alloy Gold-cla					
	Nominal switching capacity	10 A 250 V AC	7 A 250 V AC	7 A 250 V AC	5 A 250 V AC		
	Max. switching power	2,500 VA	1,750 VA	1,750 VA	1,250 VA		
Rating (resistive)	Max. switching voltage		250	V AC			
	Max. switching current	10 A	7 A	7 A	5 A		
	Min. switching capacity#1		1 mA,	1 V DC			

Coil

AC (50Hz): 1.3VA, AC (60Hz): 1.2 VA DC:0.9 to 1.1W

^{#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

Remarks

- * Specifications will vary with foreign standards certification ratings.
- *1 Detection current: 10 mA
- *2 Excluding contact bounce time
- *3 Half-wave pulse of sine wave: 11ms; detection time: 10μs
- *4 Half-wave pulse of sine wave: 6ms

Characteristics

Max. operation	ng speed	20 cpm (at max. rating)				
Initial insulat	ion resistance	•	Min. 1,000 MW at 500 V DC			
Initial	Between ope	en contacts	700 Vrms for 1 min.			
breakdown	Between cor	ntact sets	700 Vrms for 1 min.			
voltage*1	Between cor	ntact and coil	2,000 Vrms for 1 min.			
Operate time*2 (at nominal voltage) (at 20°C)			Max. 20 ms (DC, AC type)			
Release time (without diode)*2 (at nominal voltage) (at 20°C)			Max. 20 ms (DC, AC type)			
Temperature rise, max. (at 70°C) (at nominal voltage)			80°C			
Shock resista	2000	Functional*3	Min. 196 m/s ² {20 G}			
SHOCK TESISIATICE		Destructive*4	Min. 980 m/s ² {100 G}			
Vibration resistance		Functional*5	10 to 55 Hz at double amplitude of 1 mm			
		Destructive	10 to 55 Hz at double amplitude of 2 mm			
Conditions for operation, transport and storage*6 (Not freezing and condensing at low temperature)		Ambient temp.	-50°C to +70°C -58°F to +158°F			
		Humidity	5 to 85% R.H.			
Unit weight			Approx. 30g 1.06 oz			

^{*5} Detection time: 10μs

Expected life (min. operations)

Electrical (at 20 cpm)

Voltage		125 V AC		250	250 V AC		30 V DC	
Loa	d	Resistive (cos φ = 1)	Inductive $(\cos \phi = 0.4)$	Resistive (cos φ = 1)	Inductive $(\cos \phi = 0.4)$	Resistive	Inductive	Expected life
1104		10A	5A	10A	3A	_	_	2×10 ⁵
HC1 (1 Form C)	Current	7A	3A	7A	2.5A	3A	1A	5×10 ⁵
		5A	2A	5A	1.5A	_	_	1×10 ⁶
HC2 (2 Form C)		7A	3.5A	7A	2A	_	_	2×10 ⁵
	Current	5A	2.5A	5A	1.5A	3A	0.6A	5×10 ⁵
		ЗА	1.5A	3A	1A	_	_	1×10 ⁶
1100		7A	_	7A	_	_	_	1×10 ⁵
HC3 (3 Form C)	Current	_	3.5A	_	2A	_	_	2×10 ⁵
		5A	_	5A	_	3A	0.4A	5×10 ⁵
		5A	2A	5A	1A	_	_	2×10 ⁵
HC4 (4 Form C)	Current	ЗА	1A	3A	0.8A	3A	0.4A	5×10 ⁵
(4 FOITH C)		2A	0.5A	2A	0.4A	_	_	1×10 ⁶

Mechanical life (at 180 cpm)

DC type: 10^{8} , AC type: $5{\times}10^{7}$

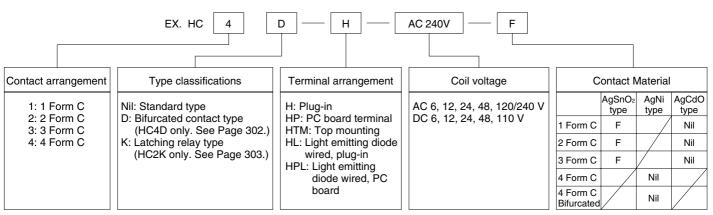
^{*6} Refer to 6. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT

TYPICAL APPLICATIONS

Transportation, power station control equipment, refrigerators, building control equipment, office machines, coin

operated machines, amusement devices, medical equipment, etc.

ORDERING INFORMATION



Notes:

- 1. When ordering VDE recognized types, add suffix VDE.
- 2. HC3 (3 Form C) series are not approved by VDE.
- 3. AC 48 V type is not available for LED wiring.
- 4. Standard packing Carton: 20 pcs.; Case: 200 pcs.
- 5. UL/CSA approved type is standard.

COIL DATA (Common for Standard, Amber sealed and Bifurcated contact types)

DC Type at 20°C 68°F

Coil voltage,	Pick-up voltage,	Drop-out voltage,	Max. allowable voltage,	Coil resistance,	Nominal coil current.	Operating	power, W
V DC	V DC (max.)	V DC (min.)	Voltage, V DC	Ω (±10%)	mA (±10%)	Nominal	Minimum
6	4.8	0.6	6.6	40	150	0.9	0.58
12	9.6	1.2	13.2	160	75	0.9	0.58
24	19.2	2.4	26.4	650	37	0.9	0.58
48	38.4	4.8	52.8	2,600	18.5	0.9	0.58
110	88.0	11.0	121.0	10,000	10	1.0	0.64

AC Types (50/60 Hz) at 60 Hz, 20°C 68°F

Coil voltage,	Pick-up voltage,	Drop-out voltage,	Max. allowable	Nominal coil	Operating	power, VA
V AC	V AC (max.)	V AC (min.)	voltage, V AC	current, mA (±20%)	Nominal	Minimum
6	4.8	1.8	6.6	200		
12	9.6	3.6	13.2	100		
24	19.2	7.2	26.4	50	1.20	0.77
48	38.4	14.4	52.8	25	1.20	0.77
110/120	96	36	132	10.9/11.9		
220/240	176.0	66.0	264.0	6.0/6.5		

NOTES:

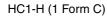
- 1. The range of coil current is $\pm 15\%$ for AC (60 Hz), and $\pm 10\%$ for DC, at 20°C. 2. The relay is applicable to the range of 80 % to 110% of the nominal coil voltage. However, it is recommended that the relay be used in the range of 85% to 110% to take temporary voltage variations into consideration.
- 3. The coil resistance of DC types is the measured value at a coil temperature of 20° C. Please compensate coil resistance by $\pm 0.4\%$ for each degree centigrade coil temperature change.
- 4. All AC 240 V types are rated for double coil voltages, both AC 220 V and AC 240 V.
- 5. For use with 220 V or 240 V DC, connect a resistor as suggested in the chart below, in series with the 110 V DC relay.

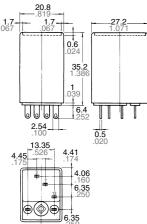
•	
Voltage	1 Form C, 2 Form C, 3 Form C, 4 Form C
220 V DC	11 kΩ (5 W)
240 V DC	13 kΩ (5 W)

DIMENSIONS (Common for standard, Amber sealed and Bifurcated contact (4C only) types)

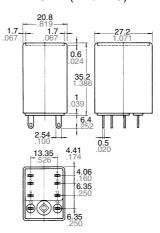
mm inch

Plug-in type

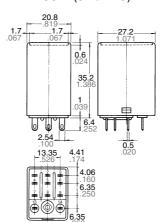




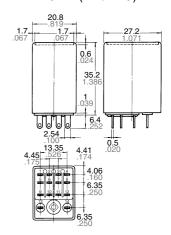
HC2-H (2 Form C)



HC3-H (3 Form C)



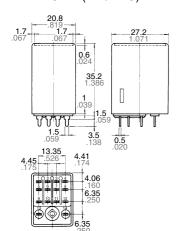
HC4-H (4 Form C)



General tolerance: $\pm 0.2 \pm .008$

PC board type

HC4-H (4 Form C)



Dimensions of HC1-HP, HC2-HP, HC3-HP are the same as those of plug-in type except shapes of terminals.

PC board pattern (Copper-side view)

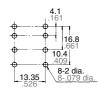
1c

4.1 16.8 661 10.4 409

Зс



2c



4.1 4.1 16.8 661 661 4.409 5 14.2 dia

Tolerance: $\pm 0.1 \pm .004$

Note: Special PC terminal with 0.9 mm (.035 inch) width available with suffix "-31".

General tolerance: ±0.2 ±.008

Schematic (bottom view)

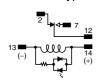
HC1-H, HC1-HP (1 Form C)



LED AC type



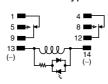
LED DC type



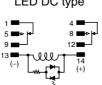
HC2-H, HC2-HP (2 Form C)



LED AC type



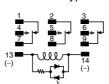
LED DC type



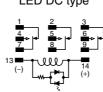
HC3-H, HC3-HP (3 Form C)



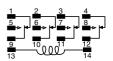
LED AC type



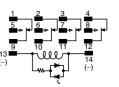
LED DC type



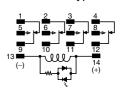
HC4-H, HC4-HP (4 Form C)



LED AC type



LED DC type





Amber Relays HCE

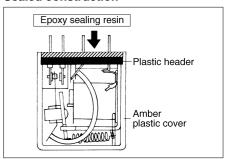
HC sealed relays are version of the HC relays and are recommended for use in switching medium loads under adverse ambient conditions. They show highly stable contact resistance even after long use, due to their sealed construction and reliable gold plated contacts. Amber relays also make the combined process of automatic wave soldering and cleaning process possible with their resultant savings in cost and labor. Contact

arrangements of 1 Form C, 2C, and 4C are available for plug-in, PC board and top-mount.

Construction

The diagram at right shows a crosssection of the plastic sealed relay. All the plastic parts are annealed and outgassed to ensure fully the stability of both chemical and physical characteristics.

Sealed construction



SPECIFICATIONS

Contacts

Contact arrangement			1 Form C	2 Form C	4 Form C
Nominal switching capacity		ching capacity	5 A 250 V AC	3 A 250 V AC	2 A 250 V AC
	Max. switchin	g power	1,250 VA	700 VA	500 VA
Rating (resistive)	Max. switchin	g voltage		250 V AC	
	Max. switchin	g current	5 A	3 A	2 A
	Min. switchin	g capacity#1	1 mA, 100 mV DC		
Conditions for operation, transport and storage (Not freezing and condensing at low temperature) Ambient tem Humidity		Ambient temp.	-40	0°C to +60°C -40°F to +14	10°F
		Humidity	5 to 85% R.H.		
Ambient air pressure			760	mmHg +20% (1.013 mb +	20%)

Expected life (min. operations)

Electrical
(at 20 cpm)

Volta	ge	125 V AC	250 V AC	30 V	/ DC	Expected
Load	d	Resistive $(\cos \varphi = 1)$	Resistive $(\cos \varphi = 1)$	Resistive	Inductive	life
HC1E (1 Form C)	Current	5 A	5 A	3 A	1 A	
HC2E (2 Form C)	Current	3 A	3 A	2 A	1.7 A	2×10 ⁵
HC4E (4 Form C)	Current	2 A	2 A	2 A	0.6 A	

Mechanical life (at 180 cpm)

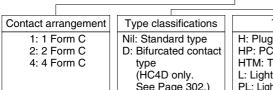
DC type: 10^8 , AC type: 5×10^7

Characteristics

Operate time	Max. 20 ms
Release time	Max. 20 ms

#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.

ORDERING INFORMATION



See Page 302.)

Terminal arrangement H: Plug-in HP: PC board terminal HTM: Top mounting L: Light emitting diode wired, plug-in PL: Light emitting diode wired, PC board

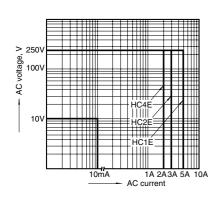
Coil voltage AC 6, 12, 24, 48, 120, 240 V DC 6, 12, 24, 48, 110 V

Contact Material								
	AgSnO ₂ type	AgNi type	AgCdO type					
1 Form C	F		Nil					
2 Form C	F		Nil					
4 Form C		Nil						
4 Form C		Nil						
Bifurcated		INII						

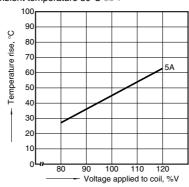
UL/CSA approved type is standard.

REFERENCE DATA (HC Amber Relays)

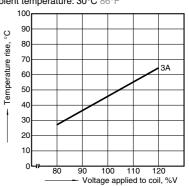
1. Switching capacity range



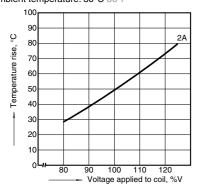
2.-(1) Coil temperature rise (1c AC type) Measured portion: Inside the coil Ambient temperature 30°C 86°F



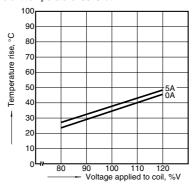
2.-(2) Coil temperature rise (2c AC type) Measured portion: Inside the coil Ambient temperature: 30°C 86°F



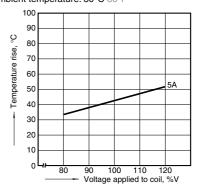
2.-(3) Coil temperature rise (4c AC type) Measured portion: Inside the coil Ambient temperature: 30°C 86°F



2.-(4) Coil temperature rise (1c DC type) Measured portion: Inside the coil Ambient temperature: 30°C 86°F



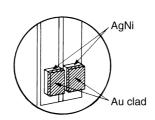
2.-(5) Coil temperature rise (2c DC type) Measured portion: Inside the coil Ambient temperature: $30^{\circ}C$ $86^{\circ}F$



Bifurcated contact types HC4D

Extremely high contact reliability has been made possible by adoption of gold-clad bifurcated contacts for both movable and stationary contacts.

HC4D type can be used from the dry circuit 100 μ A at 10 V DC to the power circuit 3 A at 250 V AC resistive load. Therefore, with HC4D type such a usage is possible that one contact switches 100 μ A and another contact switches 3 A load. Also Amber sealed types are available as HC4ED relays.



SPECIFICATIONS

Contacts

Contact arrangement		4 Form C only		
Contact material		Gold-clad silver nickel		
	Nominal switching capacity	3 A 250 V AC		
	Max. switching power	750 VA		
Rating (resistive)	Max. switching current	3A		
	Min. switching capacity#1	(HC4D) 100 μA, 1 V DC (HC4ED) 100 μA, 100 mV DC		
-	•	•		

Characteristics

Operate time (Approx.)	Max. 20 ms
Release time (Approx.)	Max. 20 ms

#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.

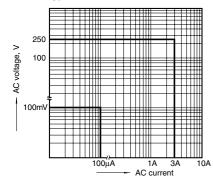
Expected life (min. operations)

Electrical (at 20 cpm)

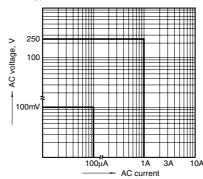
Voltage	125 V AC		250 V AC		30 V DC	
Load	Resistive (cos φ = 1)	Inductive ($\cos \phi = 0.4$)	Resistive (cos φ = 1)	Inductive ($\cos \phi = 0.4$)	Resistive	Expected life
HC4D	3 A	1 A	3 A	0.8 A	3 A	2×10 ⁵
HC4ED	1 A	_	1 A	_	_	ZX10 ³

REFERENCE DATA

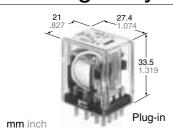
1. Switching capacity range Standard type



Amber type



atching relay types: HC2K



HC magnetic latching relays are particularly suitable for various vending machines, remote control devices, parking meters, conveyor, NC machinery, etc.

TYPES AND COIL DATA

DC coils at 20°C 68°F

UL, CSA recognized

Part No.		Nominal coil current (mA)		Nominal operating power (VA)		Coil voltage	
Plug-in	PC board terminal	set	reset	set	reset	Pick-up	Max. allowable
HC2K-DC6V (-F)	HC2K-P-DC6V (-F)	207	107	1.24	0.64	80% of	110% of
HC2K-DC12V (-F)	HC2K-P-DC12V (-F)	100	52.2	1.20	0.63		
HC2K-DC24V (-F)	HC2K-P-DC24V (-F)	51.1	25.5	1.23	0.61	Nominal	Nominal
HC2K-DC48V (-F)	HC2K-P-DC48V (-F)	25.3	13.7	1.21	0.66	voltage	voltage
HC2K-DC100V (-F)	HC2K-P-DC100V (-F)	15.6	5.8	1.56	0.58		



Plug-in

AC coils

Part No.		Nominal coil current (mA)		Nominal operating power (VA)		Coil voltage	
Plug-in	PC board terminal	set	reset	set	reset	Pick-up	Max. allowable
HC2K-AC6V (-F)	HC2K-P-AC6V (-F)	206	103	1.23	0.62	80% of Nominal voltage	110% of Nominal voltage
HC2K-AC12V (-F)	HC2K-P-AC12V (-F)	100	52	1.20	0.62		
HC2K-AC24V (-F)	HC2K-P-AC24V (-F)	51	21.4	1.22	0.51		
HC2K-AC48V (-F)	HC2K-P-AC48V (-F)	25.2	18.5	1.2	0.88		
HC2K-AC115V (-F)	HC2K-P-AC115V (-F)	10.4	5.4	1.20	0.621		



PC board terminal

HC2K AC types are not recognized by UL, CSA.

Notes: 1. The coil current range is $\pm 10\%$ of the nominal coil current.

- 2. The relay is suitable to the range of 80% 110% of the nominal coil voltage. However, it is recommended that the relay be used in the range of 85% — 110% of the nominal coil voltage, with the temporary voltage variation taken into consideration. 3. UL/CSA approved type is standard.

SPECIFICATIONS

Contacts

Arrangemen	t	2 Form C only		
	t resistance max. drop 6 V DC 1 A)	50 mΩ		
Rating (resistive)	Nominal switching capacity	3 A 250 V AC		
	Max. switching power	750 VA		
	Max. switching current	3A		
	Min. switching capacity#1	1 mA, 1 V DC		

Coil

Nominal operating power	Set coil	1.2 VA to 1.33 VA
Nominal operating power	Reset coil	0.51 VA to 0.88 VA

^{#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.

Characteristics

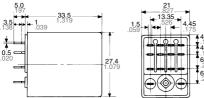
Initial breakdown voltage	Between contact and coil		1,500 Vrms for 1 min.		
Set time (at nominal	voltage)	(at 20°C)	AC, DC: Approx. 20 ms		
Reset time (at nominal voltage)			AC: Approx. 30 ms DC: Approx. 50 ms		
Temperature rise		Set coil	Max. 80°C		
(at nominal voltage)		Reset coil	Max. 50°C		
Shock/vibration resis	tance		Min. 98 m/s ² {10 G}		
Expected life	Mechanical (at 180 cpm)		107		
(min. operations)	Electrical (resistive) (at 20 cpm)		2×10 ⁵		
Ambient temperature			-40°C to +50°C -40°F to +122°F (Not freezing and condensing at low temperature)		

DIMENSIONS AND CIRCUIT DIAGRAM

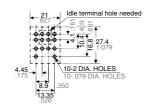
Dimensions

Circuit diagram

PC board pattern (Copper-side)







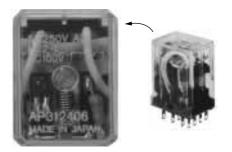
Tolerance: ±0.1 ±.004

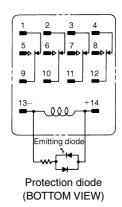
mm inch

- 1. Configuration and dimensions of HC2K types are the same as those of standard HC4 types. Standard sockets and screw terminal sockets of HC4 can be used: HC4-SS-K, HC4-PS-K, HC4-WS-K, and HC4-HSF-K.
- 2. Please note that circuit diagram of HC2K is different from HC4.
- 3. Avoid operation by capacitor since latching force varies according to input pulse voltage.

LED wired types: HC-L

The built-in indication LED (Light emitting diode) Series are suitable for instant indication of operate function in applications where numerous relays are to be used. The HC-L relays are supplied with LED wired in parallel with the coil for visual indication that the relay is functioning. A Red LED is used for AC type and green one for DC.



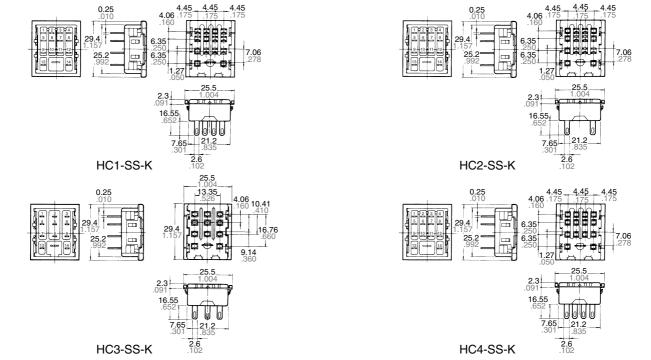


ACCESSORIES

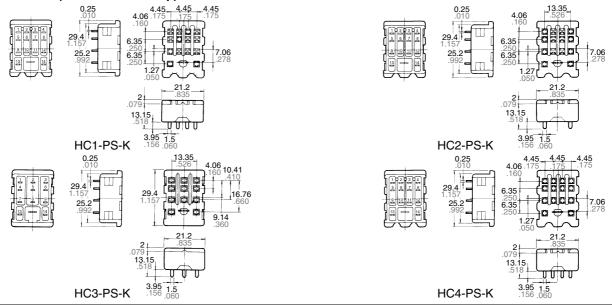
Relay Socket	HC1 (1 Form C)	HC2 (2 Form C)	HC3 (3 Form C)	HC4 (4 Form C)
Socket with solder tab (with hold-down clip)				
	HC1-SS-K	HC2-SS-K	HC3-SS-K	HC4-SS-K
PC board socket (with hold-down clip)				
	HC1-PS-K	HC2-PS-K	HC3-PS-K	HC4-PS-K
Socket for wrap wiring (with hold-down clip)	_	_	_	HC4-WS-K
Screw terminal socket for front wiring (with hold-down clip)	_	HC2-SF-K Exclusively for HC2-H	HC3-HSF-K For HC2-H, HC3-H	HC4-HSF-K For HC1-H, HC2-H, HC4-H
Screw terminal socket for DIN rail assembly (with hold-down clip)		HC2-SFD-S HC2-SFD-K Exclusively for HC2-H	HC3-SFD-K For HC2-H, HC3-H	HC4-SFD-K For HC1-H, HC2-H, HC4-H

DIMENSIONS mm inch

Socket with solder tab (with hold-down clip)

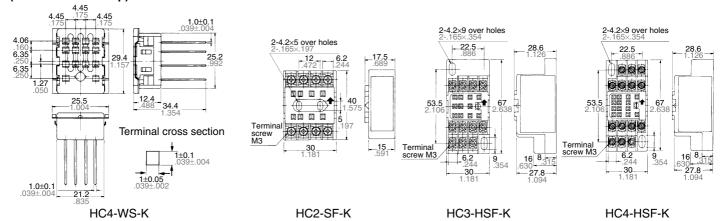


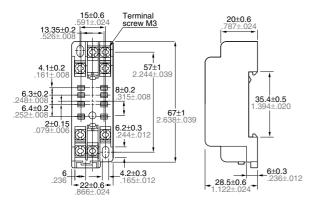
PC board socket (with hold-down clip)

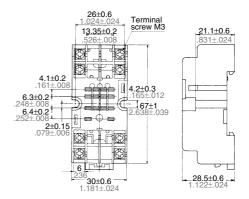


Socket for wrapping (with hold-down clip)

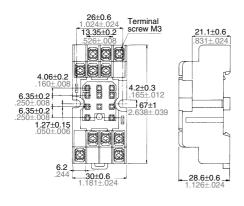
Screw terminal socket for front wiring (with hold-down clip)



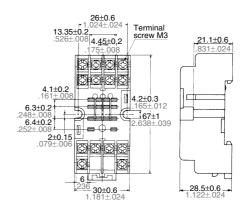




HC2-SFD-S HC2-SFD-K



HC3-SFD-K



HC4-SFD-K

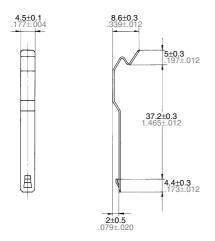
Hold-down clip

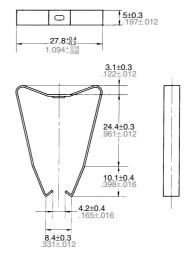
(1) Leaf spring: Applied to HC1-SS-K, HC2-SS-K, HC3-SS-K, HC4-SS-K, HC1-PS-K, HC2-PS-K, HC3-PS-K, HC4-PS-K, HC2-SF-K, HC3-HSF-K, HC4-HSF-K

Part No.: HC/HL-LEAF-SPRING-K

(2) "M shape" leaf spring: Applied to HC4-WS-K

Part No.: HC/HL-LEAF-SPRING-MK

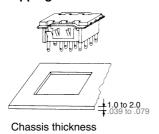




mm inch

MOUNTING DIMENSIONS AND METHOD

Solder and wrapping socket mount



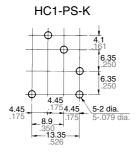


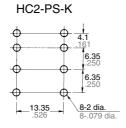
Chassis cutout MINIMUM SEPARATION

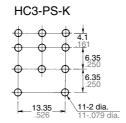
Tolerance: ±0.1 ±.004

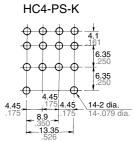
PC board pattern for PC board socket (Copper-side view)

For socket-mount





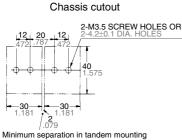




General tolerance: $\pm 0.5 \pm .020$

Screw socket mounts (Top view)

HC2-SF-K

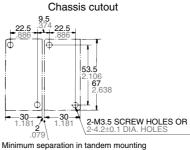


Schematic





HC3-HSF-K

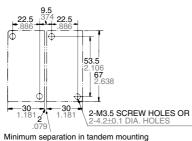


07 ○13 20-50-80

Schematic

HC4-HSF-K

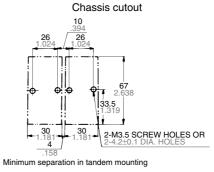
Chassis cutout







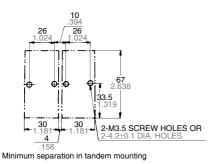
HC2-SFD-K



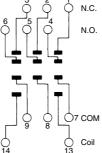
Schematic Ů п.с. Q5 N.O. СОМ Coil

HC3-SFD-K

Chassis cutout



Schematic



HC4-SFD-K

Chassis cutout 26 2-M3.5 SCREW HOLES OR Minimum separation in tandem mounting

Schematic N.O. J ()

Direct mount for HC-TM relay series



HC-HTM

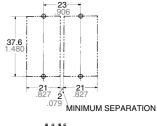
Notes:

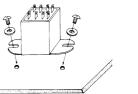
- HC 1-HTM, HC2-HTM, HC3-HTM, HC4-HTM types all have dimensions in common except for the number of terminals.
- 2. For the specifications, please refer to Page 297.
- 3. In mounting, use M3 screw and M3 washer.

34.2 1.346 1.3

4 Form C

CHASSIS CUTOUT IN TANDEM MOUNTING





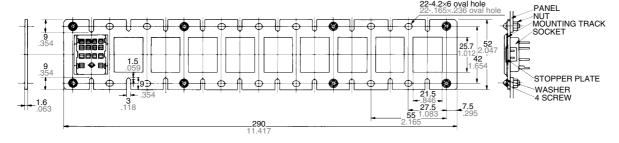
Tolerance: ±0.1 ±.004

Mounting track for solder socket



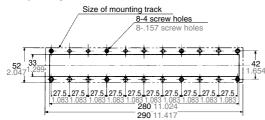
Up to 10 sockets per track. Cut at notch for desired track length.

Track-mounted solder log sockets HC-MOUNTING TRACK



Chassis

For small quantity



For large quantity

