

mm inch HCE Amber Relays

UL File No.: E43028; CSA File no.: LR26550

- 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 (100 μA to 10 A)
- Amber sealed types available
- Bifurcated contact types available as HC4D

SPECIFICATIONS

Contacts		1 Form C	2 Form C	3 Form C	4 Form C
Arrangement					
Initial current resistance, max. (By voltage drop 6 V DC 1 A)		30 mΩ			
Contact material		Gold-flashed silver alloy			Gold-clad silver nickel
Rating (resistive)	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
	Max. switching voltage	250 V AC			
	Max. switching current	10 A	7 A	7 A	5 A
Coil					
Nominal operating power	AC (50 Hz): 1.3 VA, AC (60 Hz): 1.2 VA DC: 0.9 to 1.1 W				

Remarks
 *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
 *5 Detection time: 10μs
 *6 Refer to 5. Conditions for operation, transport and storage mentioned in AMBIENT ENVIRONMENT (Page 49)

Characteristics

Max. operating speed	20 cpm (at max. rating)	
Initial insulation resistance	Min. 1,000 MW at 500 V DC	
Initial breakdown voltage*1	Between open contacts	700 Vrms for 1 min.
	Between contact sets	700 Vrms for 1 min.
	Between contact and coil	2,000 Vrms for 1 min.
Operate time*2 (at nominal voltage)	Approx. 20 ms	
Release time(without diode)*2 (at nominal voltage)	Approx. 20 ms	
Temperature rise, max. (at 70°C) (at nominal voltage)	80°C	
Shock resistance	Functional*3	Min. 196 m/s ² {20 G}
	Destructive*4	Min. 980 m/s ² {100 G}
Vibration resistance	Functional*5	Approx. 58.8 m/s ² (6 G), 10 to 55 Hz at double amplitude of 1 mm
	Destructive	Approx. 117.6 m/s ² {12 G}, 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 +40°C -58°F to +104°F
	Humidity	5 to 85% R.H.
Unit weight	Approx. 34g 1.2 oz	

Expected life (min. operations)

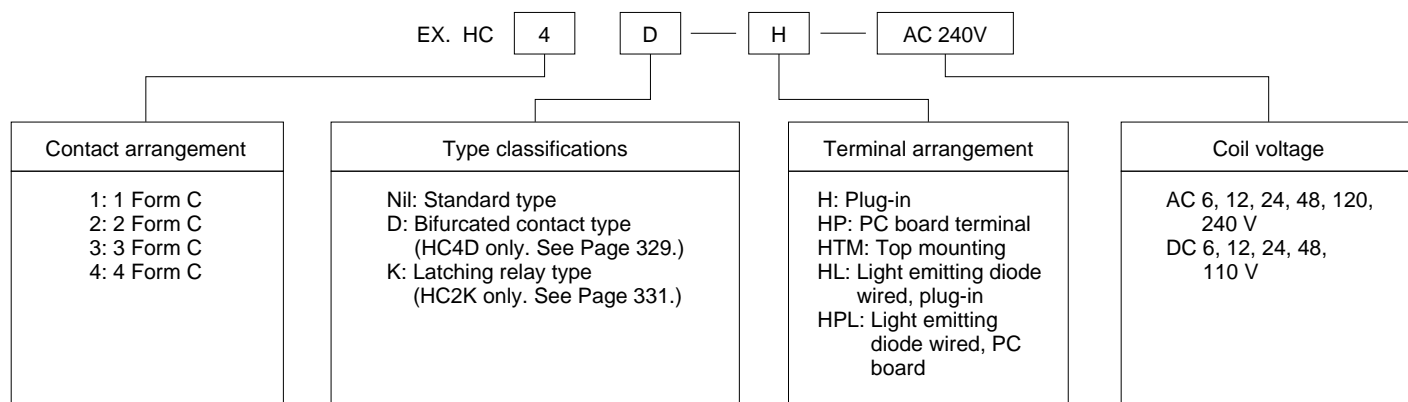
Voltage		125 V AC		250 V AC		30 V DC		Expected life
Load		Resistive (cosφ = 1)	Inductive (cosφ ≐ 0.4)	Resistive (cosφ = 1)	Inductive (cosφ ≐ 0.4)	Resistive	Inductive	
HC1 (1 Form C)	Current	10A	5A	10A	3A	—	—	2×10 ⁵
		7A	3A	7A	2.5A	3A	1A	5×10 ⁵
		5A	2A	5A	1.5A	—	—	1×10 ⁶
HC2 (2 Form C)	Current	7A	3.5A	7A	2A	—	—	2×10 ⁵
		5A	2.5A	5A	1.5A	3A	0.6A	5×10 ⁵
		3A	1.5A	3A	1A	—	—	1×10 ⁶
HC3 (3 Form C)	Current	7A	—	7A	—	—	—	1×10 ⁵
		—	3.5A	—	2A	—	—	2×10 ⁵
		5A	—	5A	—	3A	0.4A	5×10 ⁵
HC4 (4 Form C)	Current	5A	2A	5A	1A	—	—	2×10 ⁵
		3A	1A	3A	0.8A	3A	0.4A	5×10 ⁵
		2A	0.5A	2A	0.4A	—	—	1×10 ⁶

Mechanical life (at 180 cpm) DC type: 10⁸, AC type: 5×10⁷

UL/CSA rating	Form C	UL/CSA rating	VDE rating	UL/CSA rating		VDE rating	
				1 Form C	2 Form C	3 Form C	4 Form C
		10 A 250 V AC 1/3 HP 125, 250 V AC 3 A 30 V DC		1 Form C	10 A 250 V ~ (cos φ = 1.0) 3 A 250 V ~ (cos φ = 0.4) 3 A 30 V ∴ (0 ms)		
		7 A 250 V AC 1/6 HP 125, 250 V AC 3 A 30 V DC		2 Form C	7 A 250 V ~ (cos φ = 1.0) 2 A 250 V ~ (cos φ = 0.4) 3 A 30 V ∴ (0 ms)		
		7 A 250 V AC 1/6 HP 125, 250 V AC 3 A 30 V DC		4 Form C	5 A 65 V ~ (cos φ = 1.0) 3 A 65 V ~ (cos φ = 0.4) 3 A 30 V ∴ (0 ms)		
		5 A 250 V AC 1/10 HP 125, 250 V AC 3 A 30 V DC					

Note: HC3 (3 Form C) series are not approved by VDE.

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.

TYPICAL APPLICATIONS

Transportation, power station control equipment, refrigerators, building control equipment, office machines, coin operated machines, amusement devices, medical equipment, etc.

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

DC Type at 20°C 68°F

Coil voltage, V DC	Pick-up voltage, V DC (max.)	Drop-out voltage, V DC (min.)	Max. allowable voltage, V DC	Coil resistance, Ω (±10%)	Nominal coil current, mA (±10%)	Operating power, W	
						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, V AC	Pick-up voltage, V AC (max.)	Drop-out voltage, V AC (min.)	Max. allowable voltage, V AC	Nominal coil current, mA (±10%)	Operating power, VA	
					Nominal	Minimum
6	4.8	1.8	6.6	200	1.20	0.77
12	9.6	3.6	13.2	100		
24	19.2	7.2	26.4	50		
48	38.4	14.4	52.8	25		
120	96	36	132	11.9		
240	176.0	66.0	264.0	6.5		

NOTES:

1. The range of coil current is ±15% for AC (60 Hz), and ±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 ±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.

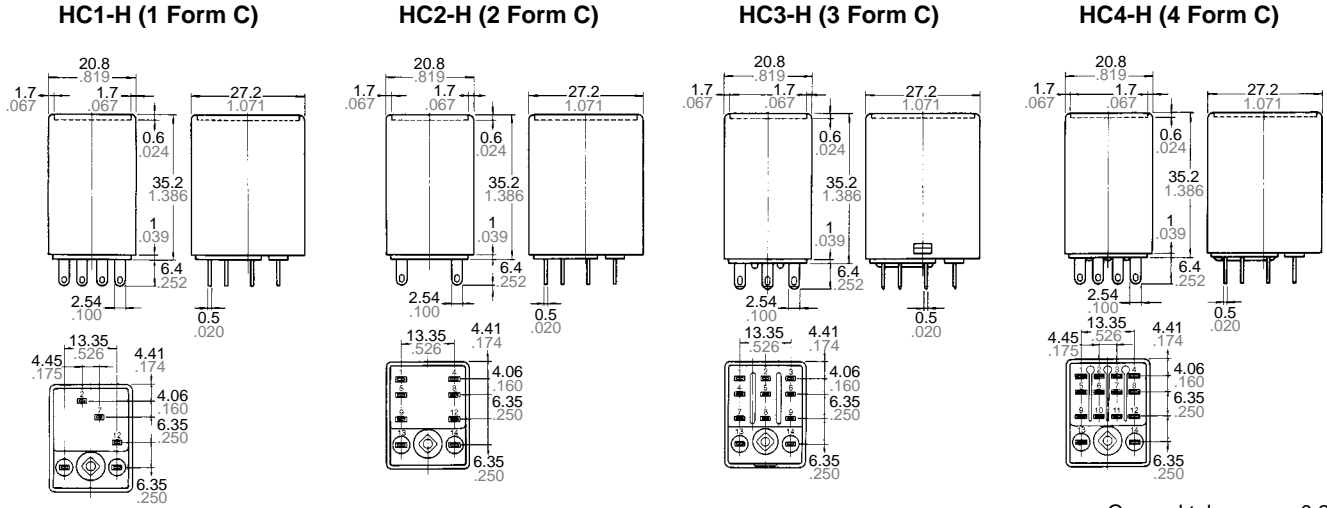
5. For use with 220 V or 240 V DC, connect a resistor as suggested in the chart below, in series with the 110 V DC relay.

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)

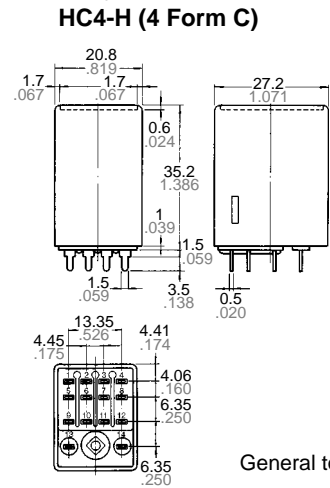
mm inch

Plug-in type



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

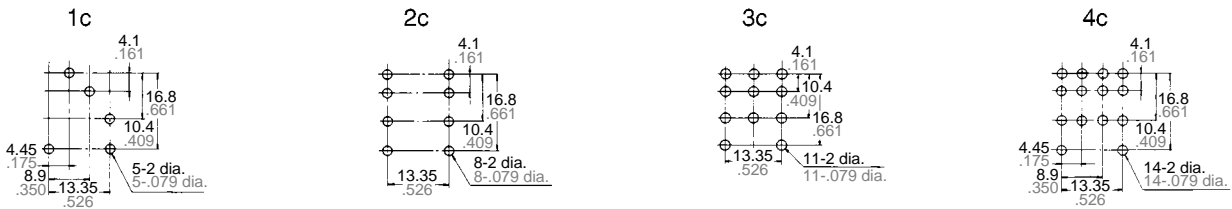
PC board type



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

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

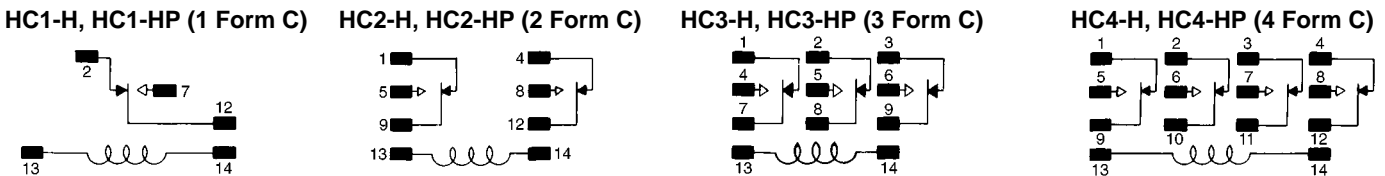
PC board pattern (Copper-side view)



Tolerance: $\pm 0.1 \pm .004$

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

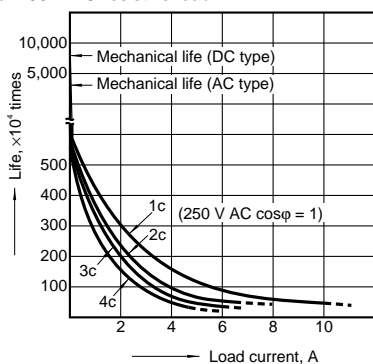
Schematic (bottom view)



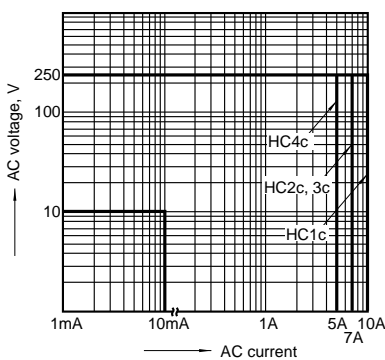
REFERENCE DATA

1. Life curve

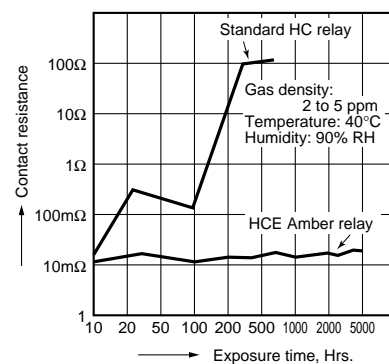
Load: 250 V AC resistive load



2. Switching capacity range



3. H₂S gas test



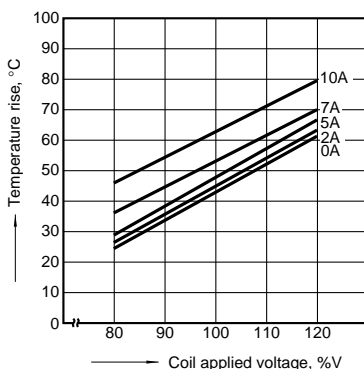
4. Coil temperature rise

Measured portion: Inside the coil

Note: When the nominal voltage is applied to AC 120 or 240 V coil types respectively, the figures of coil temperature rise increase by approx. 10 degrees to the ones shown on each graph.

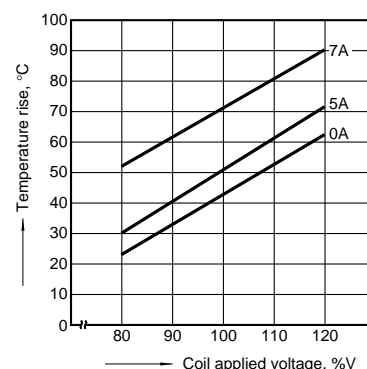
HC1 AC coil

Ambient temperature: 25°C 77°F



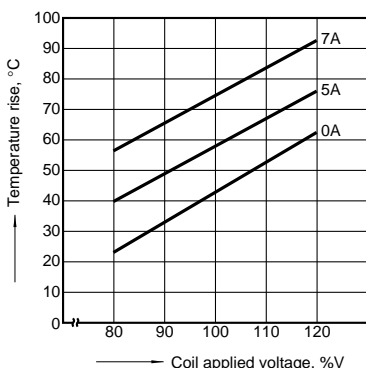
HC2 AC coil

Ambient temperature: 30°C 86°F



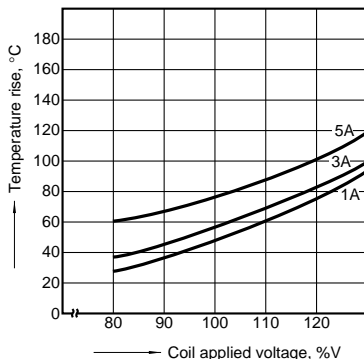
HC3 AC coil

Ambient temperature: 18°C 64°F



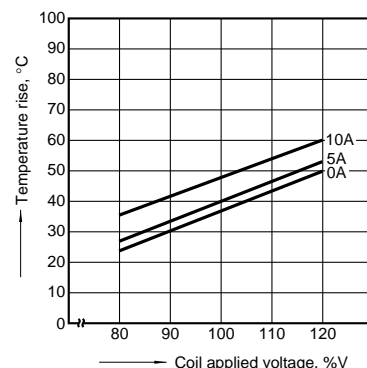
HC4 AC coil

Ambient temperature: 15 to 21°C 59 to 70°F



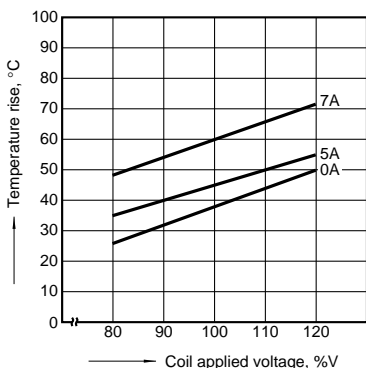
HC1 DC coil

Ambient temperature: 29°C 84°F



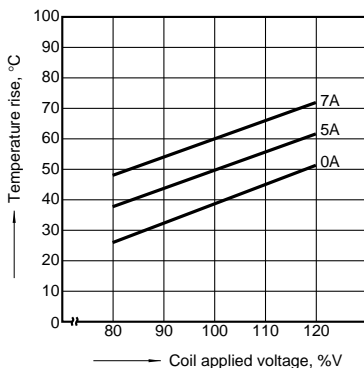
HC2 DC coil

Ambient temperature: 29°C 84°F



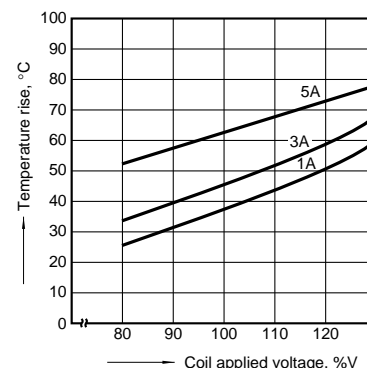
HC3 DC coil

Ambient temperature: 29°C 84°F



HC4 DC coil

Ambient temperature: 17 to 18°C 62 to 64°F



Amber Relays HCE

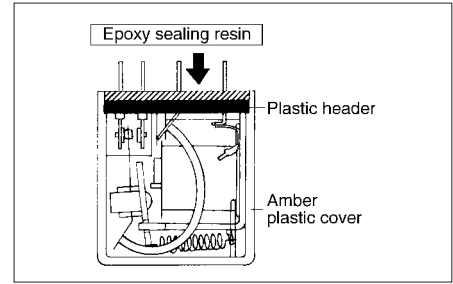
HC sealed relays are version of the HC relays and are recommended for use in switching medium loads under adverse ambient conditions. They show highly stable contact resistance even after long use, due to their sealed construction and reliable gold plated contacts. Amber relays also make the combined 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 cross-section of the plastic sealed relay. All the plastic parts are annealed and out-gassed to ensure fully the stability of both chemical and physical characteristics.

Sealed construction



SPECIFICATION

Contacts

Contact arrangement		1 Form C	2 Form C	4 Form C
Rating (resistive)	Nominal switching capacity	5 A 250 V AC	3 A 250 V AC	2 A 250 V AC
	Max. switching power	1,250 VA	700 VA	500 VA
	Max. switching voltage	250 V AC		
	Max. switching current	5 A	3 A	2 A
Conditions for operation, transport and storage (Not freezing and condensing at low temperature)		Ambient temp.	-40°C to +50°C -40°F to +122°F	
		Humidity	5 to 85% R.H.	
Ambient air pressure		760 mmHg +20% (1.013 mb +20%)		

Expected life (min. operations)

	Voltage		125 V AC	250 V AC	30 V DC		Expected life
	Load		Resistive (cosφ = 1)	Resistive (cosφ = 1)	Resistive	Inductive	
Electrical (at 20 cpm)	HC1E (1 Form C)	Current	5 A	5 A	3 A	1 A	2×10 ⁵
	HC2E (2 Form C)	Current	3 A	3 A	2 A	1.7 A	
	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 (Approx.) DC, AC: 13 ms
 Release time (Approx.) DC: 10 ms; AC 16 ms
 Note: All other specifications are the same as those of standard types. See Page 324.

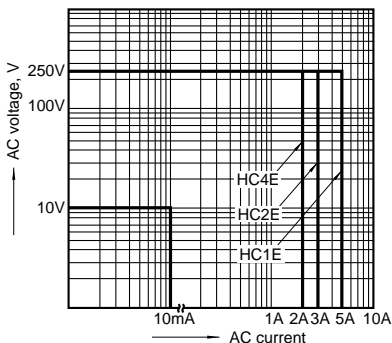
ORDERING INFORMATION

EX. HC 4 E D — HP — AC 240V

Contact arrangement 1: 1 Form C 2: 2 Form C 4: 4 Form C	Type classifications Nil: Standard type D: Bifurcated contact type (HC4D only. See Page 329.)	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
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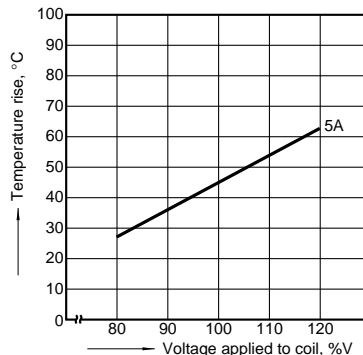
DATA (HC Amber Relays)

1. Switching capacity range



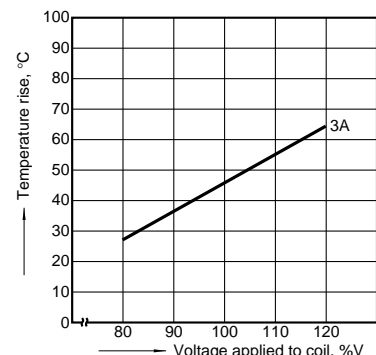
2.-(1) Coil temperature rise (1c AC type)

Measured portion: Inside the coil
 Ambient temperature 30°C 86°F



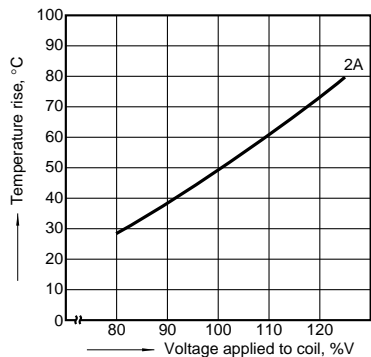
2.-(2) Coil temperature rise (2c AC type)

Measured portion: Inside the coil
 Ambient temperature: 30°C 86°F



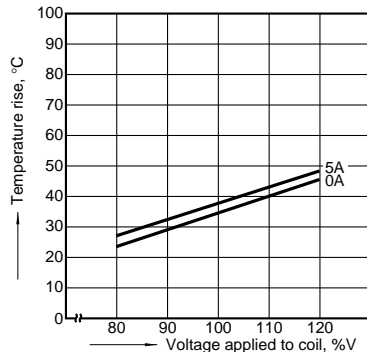
2.-(3) Coil temperature rise (4c AC type)

Measured portion: Inside the coil
Ambient temperature: 30°C 86°F



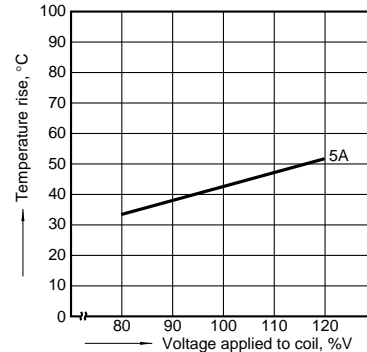
2.-(4) Coil temperature rise (1c DC type)

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°C 86°F

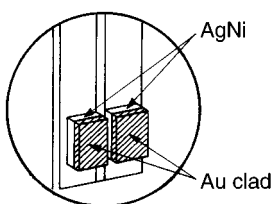


Bifurcated contact types HC4D

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
Rating (resistive)	Nominal switching capacity	3 A 250 V AC
	Max. switching power	750 VA
	Max. switching current	3 A

Characteristics

Operate time (Approx.)	DC, AC: 13 ms
Release time (Approx.)	DC: 10 ms AC: 16 ms

Expected life (min. operations)

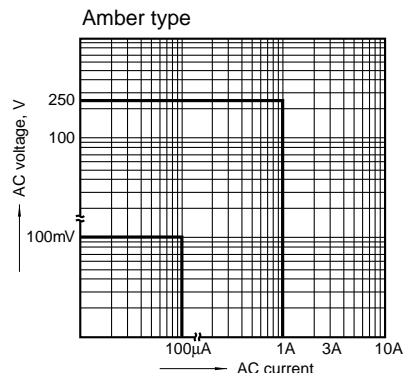
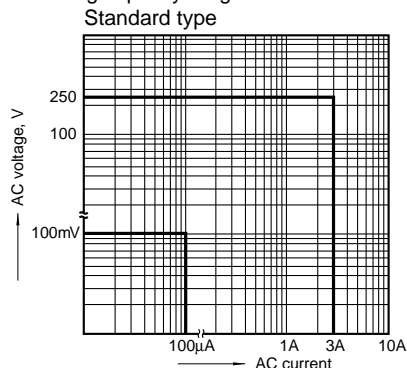
Electrical (at 20 cpm)

Voltage	125 V AC		250 V AC		30 V DC	Expected life
	Resistive (cos ϕ = 1)	Inductive (cos ϕ \approx 0.4)	Resistive (cos ϕ = 1)	Inductive (cos ϕ \approx 0.4)		
HC4D	3 A	1 A	3 A	0.8 A	3 A	2 \times 10 ⁵
HC4ED	1 A	—	1 A	—	—	

Note: All other specifications are the same as those of standard types. See Page 324.

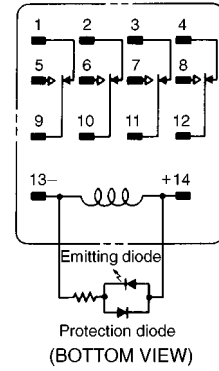
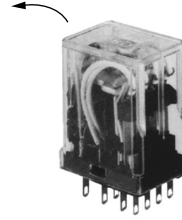
DATA

1. Switching capacity range



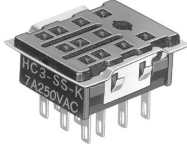
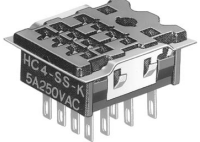



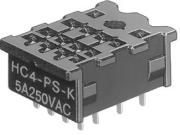




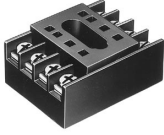
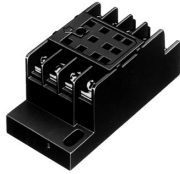

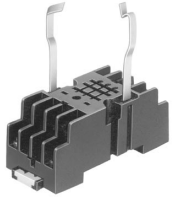
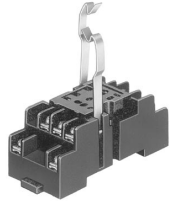
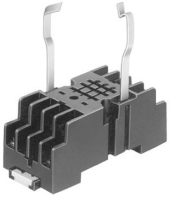


LED wired types: HC-L

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.



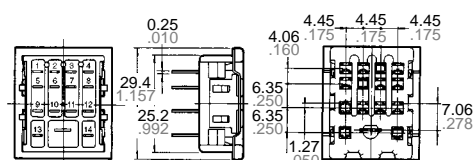
ACCESSORIES

Socket \ Relay	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)	 HC1-WS-K	 HC2-WS-K	 HC3-WS-K	 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-K Exclusively for HC2-H	 HC3-SFD-K For HC2-H, HC3-H	 HC4-SFD-K For HC1-H, HC2-H, HC4-H

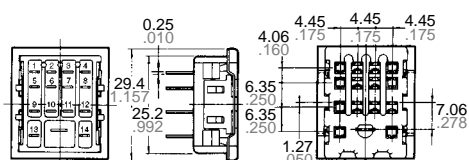
DIMENSIONS

Socket with solder tab (with hold-down clip)

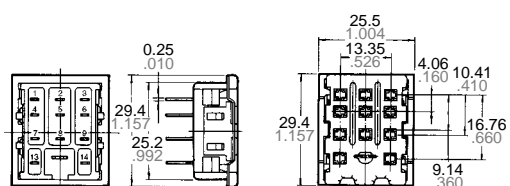
mm inch



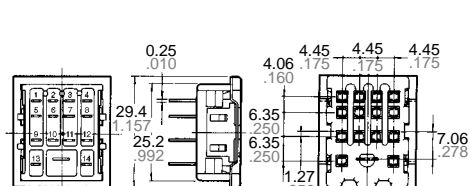
HC1-SS-K



HC2-SS-K

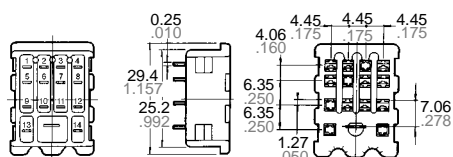


HC3-SS-K

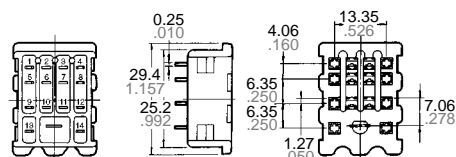


HC4-SS-K

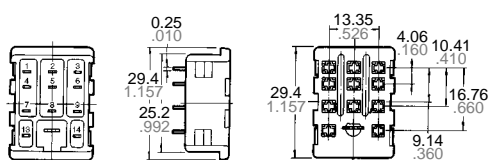
PC board socket (with hold-down clip)



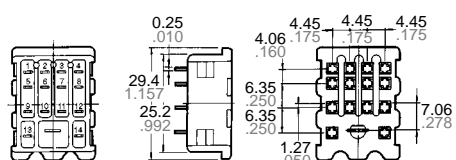
HC1-PS-K



HC2-PS-K



HC3-PS-K

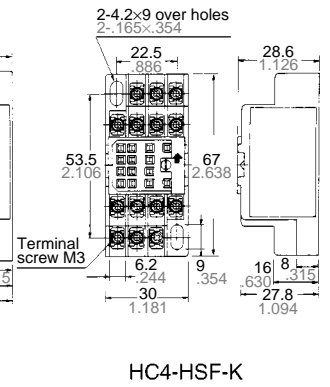
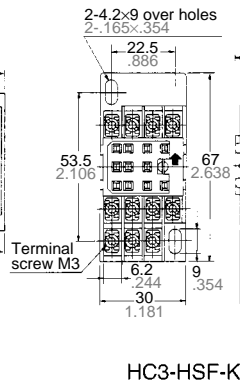
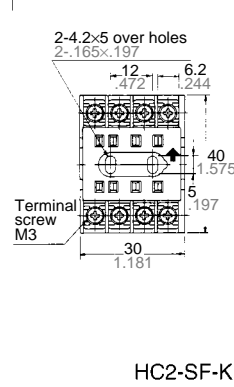
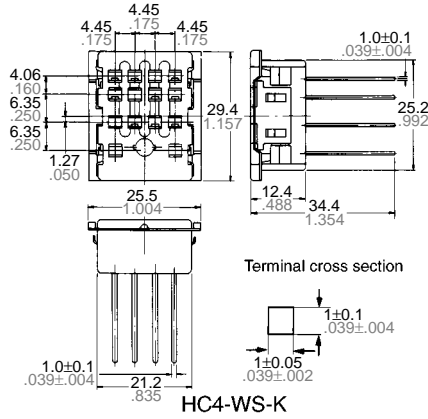


HC4-PS-K

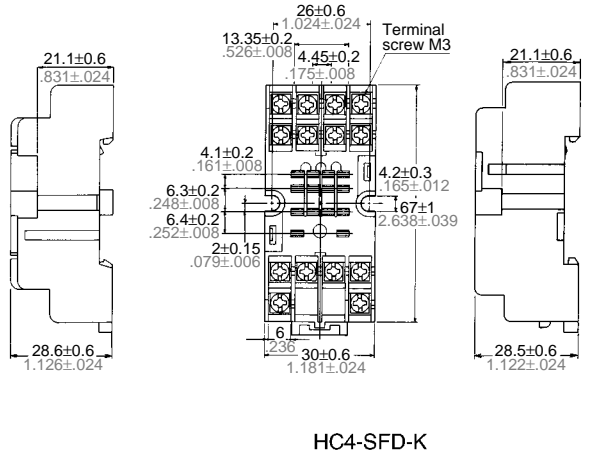
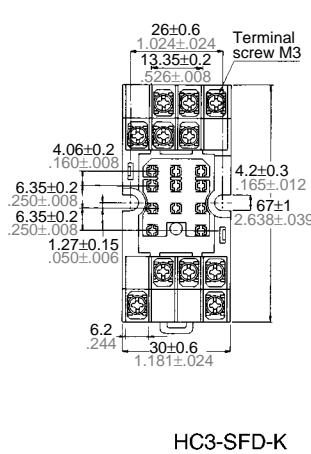
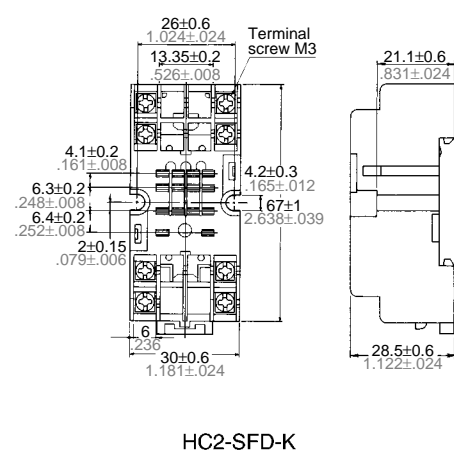
Socket for wrapping (with hold-down clip)

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

mm inch



Screw terminal socket for DIN rail assembly (with hold-down clip)



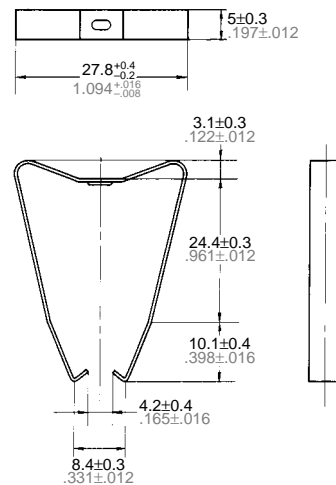
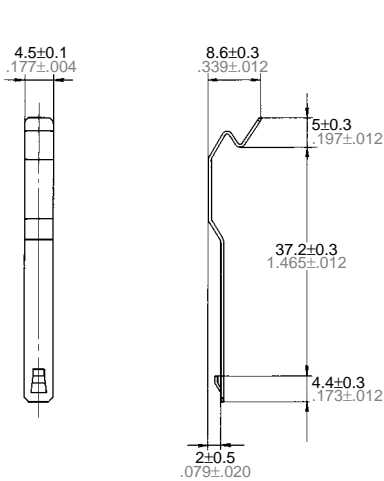
Hold-down clip

(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

(2) "M shape" leaf spring: Applied to HC1-WS-K, HC2-WS-K, HC3-WS-K, HC4-WS-K

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

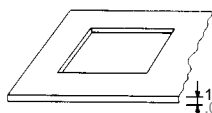
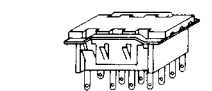
Part No.: HC/HL-LEAF-SPRING-MK



MOUNTING DIMENSIONS AND METHOD

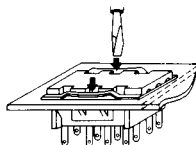
Solder and wrapping socket mount

mm inch



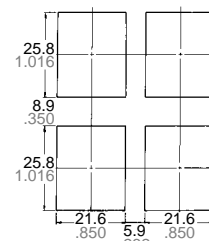
Chassis thickness

±1.0 to 2.0
±.039 to .079



Quick mounting

Chassis cutout



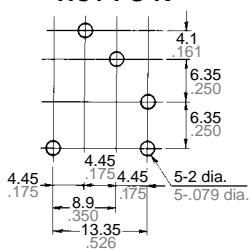
MINIMUM SEPARATION

Tolerance:
±0.1 ±.004

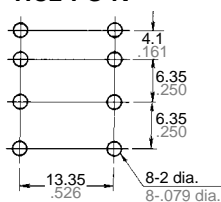
PC board pattern for PC board socket (Copper-side view)

For socket-mount

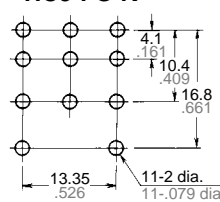
HC1-PS-K



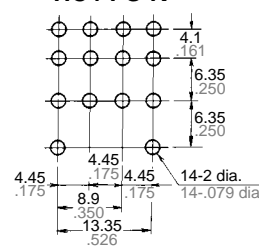
HC2-PS-K



HC3-PS-K



HC4-PS-K

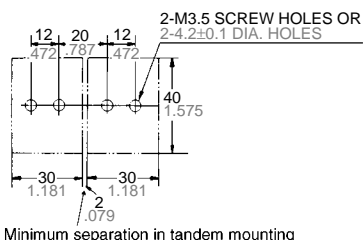


General tolerance: ±0.5 ±.020

Screw socket mounts (Top view)

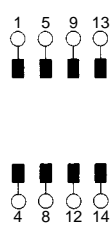
HC2-SF-K

Chassis cutout



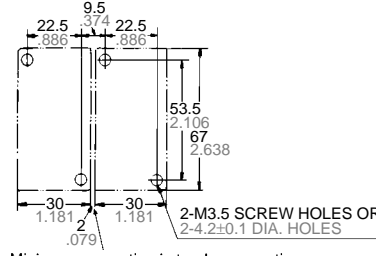
Minimum separation in tandem mounting

Schematic



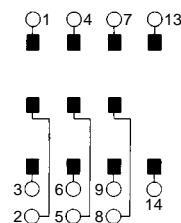
HC3-HSF-K

Chassis cutout



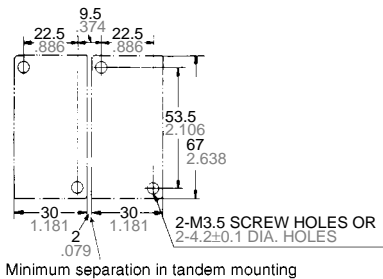
Minimum separation in tandem mounting

Schematic



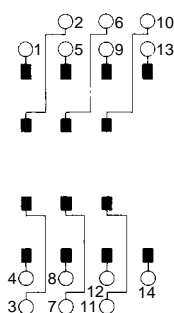
HC4-HSF-K

Chassis cutout



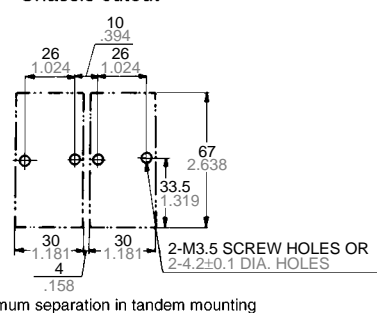
Minimum separation in tandem mounting

Schematic



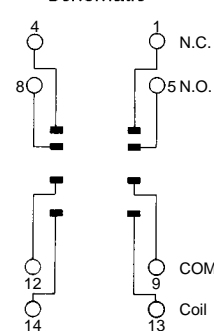
HC2-SFD-K

Chassis cutout



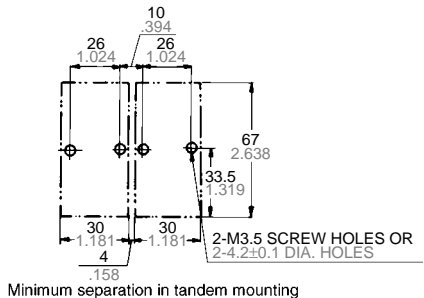
Minimum separation in tandem mounting

Schematic



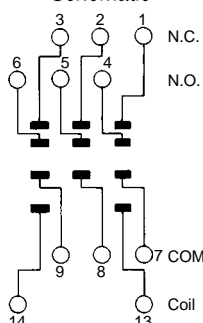
HC2-SFD-K

Chassis cutout



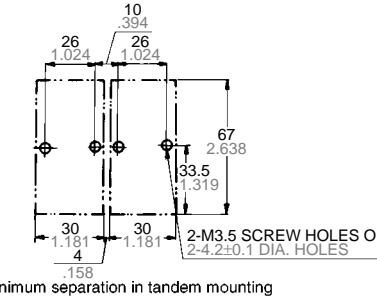
Minimum separation in tandem mounting

Schematic



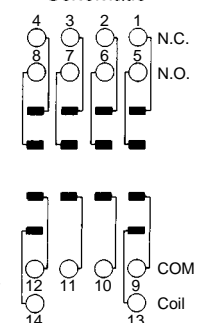
HC2-SFD-K

Chassis cutout



Minimum separation in tandem mounting

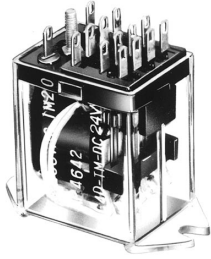
Schematic



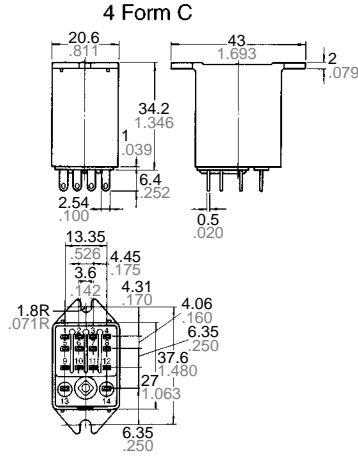
HC

Direct mount for HC-TM relay series

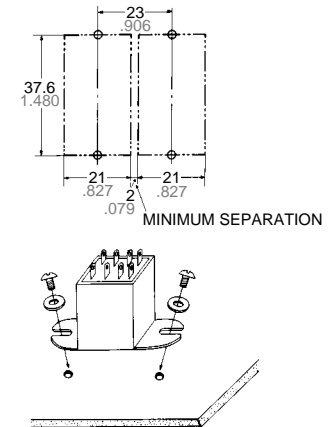
mm inch



HC-HTM



CHASSIS CUTOUT
IN TANDEM MOUNTING



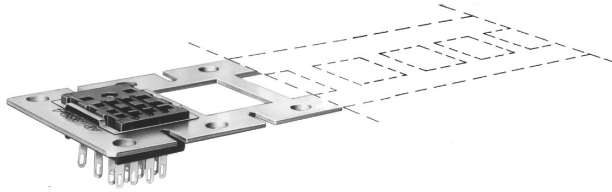
Tolerance: $\pm 0.1 \pm .004$

Notes:

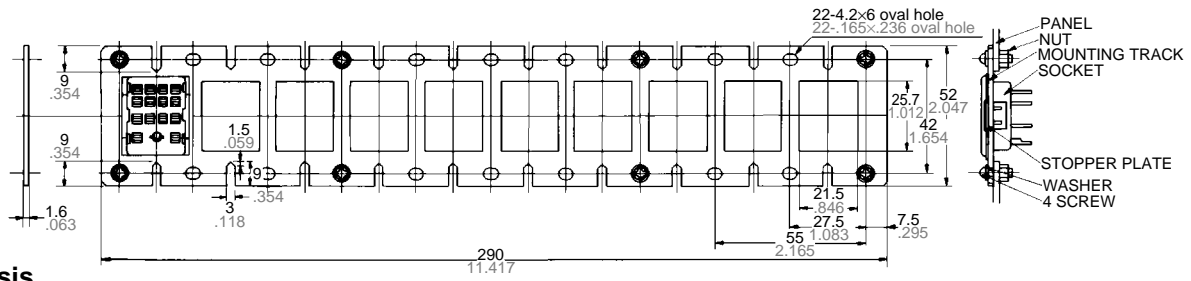
1. HC 1-HTM, HC2-HTM, HC3-HTM, HC4-HTM types all have dimensions in common except for the number of terminals.
2. For the specifications, please refer to Page 324.
3. In mounting, use M3 screw and M3 washer.

Mounting track for solder socket

Track-mounted solder log sockets
HC-MOUNTING TRACK

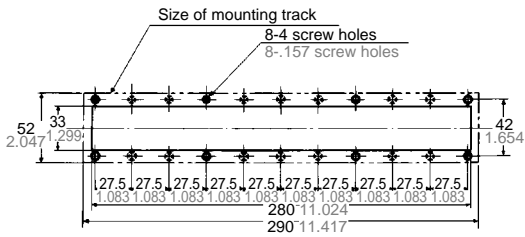


Up to 10 sockets per track.
Cut at notch for desired track length.

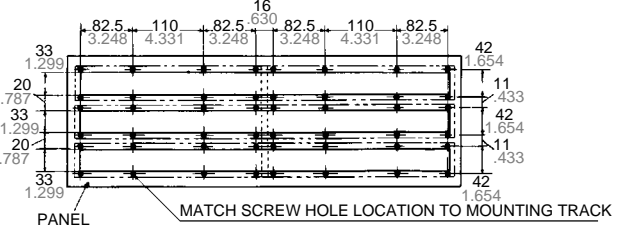


Chassis

For small quantity



For large quantity



Tolerance: $\pm 0.1 \pm .004$