



FEATURES

1. Compact high-capacity control relay

In the same external dimensions as an HC relay, this compact power relay enables high-capacity control: 15 A for 1 Form C, 10 A for 2 Form C.

2. Designed for high reliability

High operational reliability is achieved by solder-less construction, in which all connections between lead wires and the contact springs and terminal plate are welded.

3. Various types provided in rich lineup. LED indicator type also available.

4. The terminals are compatible with #187 series tab terminals.

5. Sockets and terminal sockets are available.

TYPICAL APPLICATIONS

1. Factory automation equipment and automotive devices

2. Control panels, power supply equipment, molding equipment, machine tools, welding equipment, agricultural equipment, etc.

3. Office equipment, automatic vending machines, telecommunications equipment,

disaster prevention equipment, copiers, measuring devices, medical equipment, amusement devices, etc.

4. All types of household appliance

ORDERING INFORMATION

HL - - - F

Contact arrangement

- 1: 1 Form C
- 2: 2 Form C

Terminal arrangement

- H: Plug-in type
- L: Plug-in with LED indication
- HP: PC board type
- PL: PC board with LED indication
- HTM: TM type

Nominal coil voltage

- AC 6, 12, 24, 48, 100 (100/110), 120 (110/120), 200 (200/220), 240 (220/240) V
- DC 6, 12, 24, 48, 100 (100/110) V

Contact material

- F: AgSnO₂ type

Notes: Certified by UL and CSA.

Please inquire about TV approved products.

Regarding with diode type please contact us.

TYPES

1. Plug-in type

Coil voltage	1 Form C	2 Form C
	Part No.	Part No.
6V AC	HL1-H-AC6V-F	HL2-H-AC6V-F
12V AC	HL1-H-AC12V-F	HL2-H-AC12V-F
24V AC	HL1-H-AC24V-F	HL2-H-AC24V-F
48V AC	HL1-H-AC48V-F	HL2-H-AC48V-F
100/110V AC	HL1-H-AC100V-F	HL2-H-AC100V-F
110/120V AC	HL1-H-AC120V-F	HL2-H-AC120V-F
200/220V AC	HL1-H-AC200V-F	HL2-H-AC200V-F
220/240V AC	HL1-H-AC240V-F	HL2-H-AC240V-F
6V DC	HL1-H-DC6V-F	HL2-H-DC6V-F
12V DC	HL1-H-DC12V-F	HL2-H-DC12V-F
24V DC	HL1-H-DC24V-F	HL2-H-DC24V-F
48V DC	HL1-H-DC48V-F	HL2-H-DC48V-F
100/110V DC	HL1-H-DC100V-F	HL2-H-DC100V-F

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

2. Plug-in type (with LED indication)

Coil voltage	1 Form C	2 Form C
	Part No.	Part No.
6V AC	HL1-L-AC6V-F	HL2-L-AC6V-F
12V AC	HL1-L-AC12V-F	HL2-L-AC12V-F
24V AC	HL1-L-AC24V-F	HL2-L-AC24V-F
48V AC	HL1-L-AC48V-F	HL2-L-AC48V-F
100/110V AC	HL1-L-AC100V-F	HL2-L-AC100V-F
110/120V AC	HL1-L-AC120V-F	HL2-L-AC120V-F
200/220V AC	HL1-L-AC200V-F	HL2-L-AC200V-F
220/240V AC	HL1-L-AC240V-F	HL2-L-AC240V-F
6V DC	HL1-L-DC6V-F	HL2-L-DC6V-F
12V DC	HL1-L-DC12V-F	HL2-L-DC12V-F
24V DC	HL1-L-DC24V-F	HL2-L-DC24V-F
48V DC	HL1-L-DC48V-F	HL2-L-DC48V-F
100/110V DC	HL1-L-DC100V-F	HL2-L-DC100V-F

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

3. PC board type

Coil voltage	1 Form C	2 Form C
	Part No.	Part No.
6V AC	HL1-HP-AC6V-F	HL2-HP-AC6V-F
12V AC	HL1-HP-AC12V-F	HL2-HP-AC12V-F
24V AC	HL1-HP-AC24V-F	HL2-HP-AC24V-F
48V AC	HL1-HP-AC48V-F	HL2-HP-AC48V-F
100/110V AC	HL1-HP-AC100V-F	HL2-HP-AC100V-F
110/120V AC	HL1-HP-AC120V-F	HL2-HP-AC120V-F
200/220V AC	HL1-HP-AC200V-F	HL2-HP-AC200V-F
220/240V AC	HL1-HP-AC240V-F	HL2-HP-AC240V-F
6V DC	HL1-HP-DC6V-F	HL2-HP-DC6V-F
12V DC	HL1-HP-DC12V-F	HL2-HP-DC12V-F
24V DC	HL1-HP-DC24V-F	HL2-HP-DC24V-F
48V DC	HL1-HP-DC48V-F	HL2-HP-DC48V-F
100/110V DC	HL1-HP-DC100V-F	HL2-HP-DC100V-F

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

4. PC board type (with LED indication)

Coil voltage	1 Form C	2 Form C
	Part No.	Part No.
6V AC	HL1-PL-AC6V-F	HL2-PL-AC6V-F
12V AC	HL1-PL-AC12V-F	HL2-PL-AC12V-F
24V AC	HL1-PL-AC24V-F	HL2-PL-AC24V-F
48V AC	HL1-PL-AC48V-F	HL2-PL-AC48V-F
100/110V AC	HL1-PL-AC100V-F	HL2-PL-AC100V-F
110/120V AC	HL1-PL-AC120V-F	HL2-PL-AC120V-F
200/220V AC	HL1-PL-AC200V-F	HL2-PL-AC200V-F
220/240V AC	HL1-PL-AC240V-F	HL2-PL-AC240V-F
6V DC	HL1-PL-DC6V-F	HL2-PL-DC6V-F
12V DC	HL1-PL-DC12V-F	HL2-PL-DC12V-F
24V DC	HL1-PL-DC24V-F	HL2-PL-DC24V-F
48V DC	HL1-PL-DC48V-F	HL2-PL-DC48V-F
100/110V DC	HL1-PL-DC100V-F	HL2-PL-DC100V-F

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

5. TM type

Coil voltage	1 Form C	2 Form C
	Part No.	Part No.
6V AC	HL1-HTM-AC6V-F	HL2-HTM-AC6V-F
12V AC	HL1-HTM-AC12V-F	HL2-HTM-AC12V-F
24V AC	HL1-HTM-AC24V-F	HL2-HTM-AC24V-F
48V AC	HL1-HTM-AC48V-F	HL2-HTM-AC48V-F
100/110V AC	HL1-HTM-AC100V-F	HL2-HTM-AC100V-F
110/120V AC	HL1-HTM-AC120V-F	HL2-HTM-AC120V-F
200/220V AC	HL1-HTM-AC200V-F	HL2-HTM-AC200V-F
220/240V AC	HL1-HTM-AC240V-F	HL2-HTM-AC240V-F
6V DC	HL1-HTM-DC6V-F	HL2-HTM-DC6V-F
12V DC	HL1-HTM-DC12V-F	HL2-HTM-DC12V-F
24V DC	HL1-HTM-DC24V-F	HL2-HTM-DC24V-F
48V DC	HL1-HTM-DC48V-F	HL2-HTM-DC48V-F
100/110V DC	HL1-HTM-DC100V-F	HL2-HTM-DC100V-F

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

For sockets and terminal sockets, see page page 7.

RATING

1. Coil data

1) AC coils

Nominal coil voltage	Nominal coil current (mA)		Nominal operating power (VA)		Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Inductance (H)		Max. applied voltage
	50Hz	60Hz	50Hz	60Hz			When drop-out	When operating	
6V AC	224	200	1.3	1.2	80%V or less of nominal voltage (Initial)	30%V or more of nominal voltage (Initial)	0.078	0.074	110%V of nominal voltage
12V AC	111	100					0.312	0.295	
24V AC	56	50					1.243	1.181	
48V AC	28	25					4.974	4.145	
100/110V AC	13.4/14.7	12/13.2					23.75	20.63	
110/120V AC	12.2/13.5	10.9/11.9					27.19	25.57	
200/220V AC	6.7/7.4	6/6.6					85.98	81.76	

Notes: 1. The relay operates in a range of 80% to 110% V of the voltage rating, but ideally, in consideration of temporary voltage fluctuations, it should be operated at the rated voltage.

In particular, for AC operation, if the applied voltage drops to 80% V or more below the rated voltage, humming will occur and a large current will flow leading possibly to coil burnout.

2. The maximum allowable voltage is the maximum voltage fluctuation value for the coil power supply. This value is not a permissible value for continuous operation. (This value differs depending on the ambient temperature. Please contact us for details.)

2) DC coils (at 20°C 68°F)

Nominal coil voltage	Nominal coil current (mA)	Nominal operating power (W)	Coil resistance (Ω)	Pick-up voltage (at 20°C 68°F)	Drop-out voltage (at 20°C 68°F)	Max. applied voltage (at 70°C 158°F)
6V DC	150	0.9	40	80%V or less of nominal voltage (Initial)	10%V or more of nominal voltage (Initial)	110%V of nominal voltage
12V DC	75	0.9	160			
24V DC	37	0.9	650			
48V DC	18.5	0.9	2,600			
100/110V DC	10	1.0	10,000			

Notes: 1. The rated excitation current is $\pm 10\%$ (20°C 68°F).

2. The coil resistance for DC operation is the value measured when the coil temperature is 20°C 68°F. Compensate $\pm 0.4\%$ for every $\pm 1^\circ\text{C}$ change in temperature.

3. The relay operates in a range of 80% to 110% V of the voltage rating, but ideally, in consideration of temporary voltage fluctuations, it should be operated at the rated voltage.

4. For use with 200 V DC, connect a 10 K Ω (5W) resistor, in series, to the 100 V DC relay.

5. The maximum allowable voltage is the maximum voltage fluctuation value for the coil power supply. This value is not a permissible value for continuous operation. (This value differs depending on the ambient temperature. Please contact us for details.)

2. Specifications

Characteristics	Item		Specifications
Contact	Initial contact resistance, max		Max. 50 m Ω (By voltage drop 6 V DC 1A)
	Contact material		AgSnO ₂ type
Rating	Nominal switching capacity		1 Form C: 15A 125V AC, 10A 250V AC (resistive load) 2 Form C: 10A 125V AC (resistive load)
	Min. switching capacity (Reference value)*1		100mA 5V DC
Electrical characteristics	Insulation resistance (Initial)		Min. 100M Ω (at 500V DC) Measurement at same location as "Initial breakdown voltage" section.
	Breakdown voltage (Initial)	Between open contacts	1,000 Vrms for 1min. (Detection current: 10mA.)
		Between contact sets	1,500 Vrms for 1min. (Detection current: 10mA.)
		Between contact and coil	2,000 Vrms for 1min. (Detection current: 10mA.)
	Temperature rise		Max. 80°C (By resistive method, nominal voltage)
	Operate time (at 20°C 68°F)*2		DC type/AC type: Max. 25ms (Nominal voltage applied to the coil, excluding contact bounce time.)
Mechanical characteristics	Release time (at 20°C 68°F)*2		DC type/AC type: Max. 25ms (Nominal voltage applied to the coil, excluding contact bounce time.) (without diode)
	Shock resistance	Functional	Min. 196 m/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μ s.)
		Destructive	Min. 980 m/s ² (Half-wave pulse of sine wave: 6 ms.)
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1 mm (Detection time: 10 μ s.)
		Destructive	10 to 55 Hz at double amplitude of 2 mm
Expected life	Mechanical		AC type: 5 $\times 10^7$ (at 180 times/min.), DC type: 10 ⁸ (at 180 times/min.)
	Electrical	AC load	1 Form C: 15A 125V AC, 10A 250V AC resistive load (cos ϕ =1) Life switching cycle: Min. 5 $\times 10^5$ 2 Form C: 10A 250V AC resistive load (cos ϕ =1) Life switching cycle: Min. 3 $\times 10^5$
		DC load	1 Form C: 3A 30V DC resistive load (cos ϕ =1) Life switching cycle: Min. 5 $\times 10^5$ 2 Form C: 3A 30V DC resistive load (cos ϕ =1) Life switching cycle: Min. 5 $\times 10^5$
Conditions	Conditions for operation, transport and storage*3		Ambient temperature: -50°C to +70°C -58°F to +158°F (Without LED indication); -50°C to +60°C -58°F to +140°F (With LED indication) Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature)
	Max. Operating speed		20 times/min. (at max. rating)
Unit weight			Approx. 35g 1.23 oz

Notes:

If integrating into electrical appliances that will be subject to compliance to the Electrical Appliance and Material Safety Law, please use in an ambient temperature between -50°C to +40°C -58°F to +104°F (AC type).

*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.

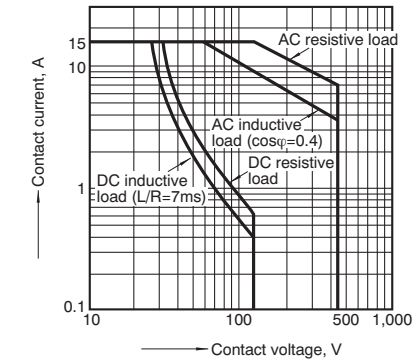
*2 For the AC coil types, the operate/release time will differ depending on the phase.

*3 The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to "6. Usage, Storage and Transport Conditions" in [AMBIENT ENVIRONMENT](#) section in [Relay Technical Information](#).

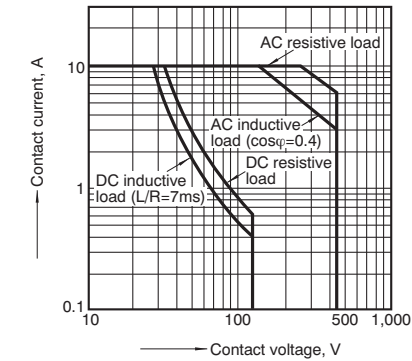
*4 When using the socket, be sure to verify the max. continuous current.

REFERENCE DATA

Switching capacity range (1 Form C)



Switching capacity range (2 Form C)



DIMENSIONS (mm inch)

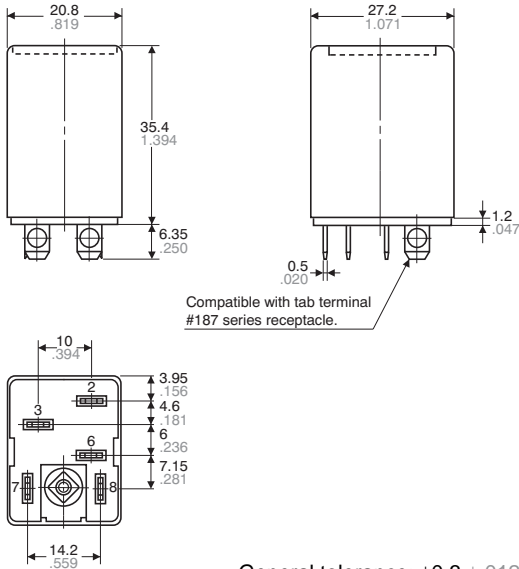
Download [CAD Data](#) from our Web site.

1. Plug-in type
1 Form C

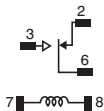
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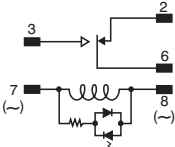
External dimensions



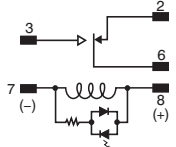
Schematic (Bottom view)
Standard type



LED AC type



LED DC type

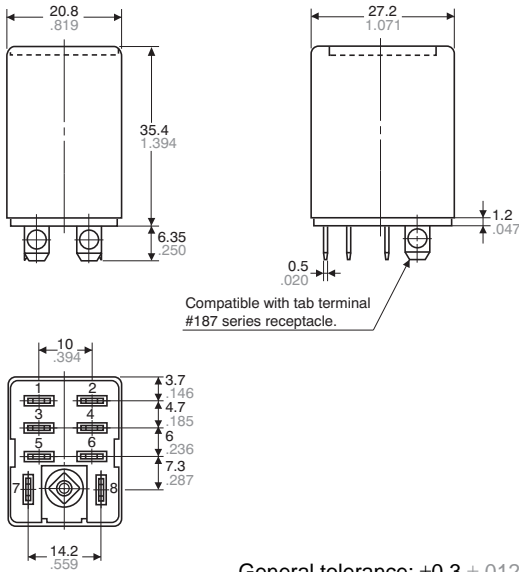


2 Form C

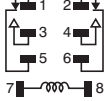
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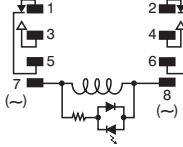
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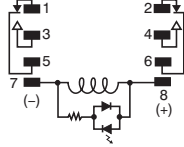
Schematic (Bottom view)
Standard type



LED AC type



LED DC type



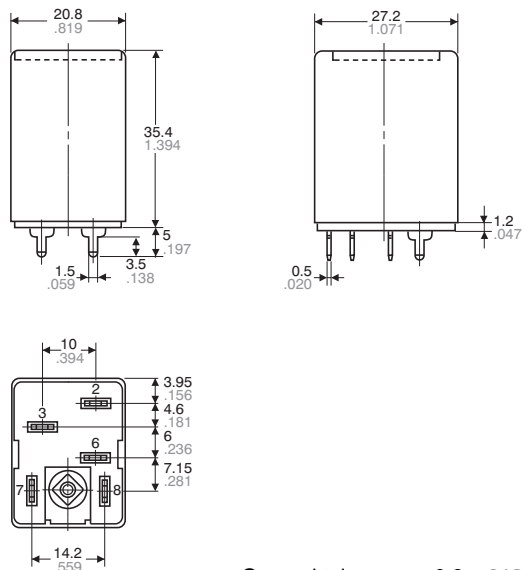
2. PC board type

1 Form C

CAD Data



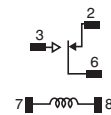
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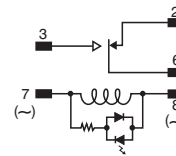
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Schematic (Bottom view)

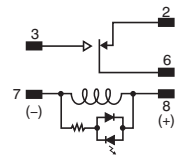
Standard type



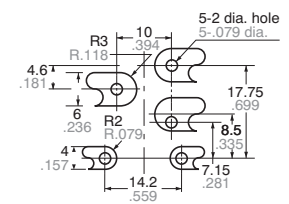
LED AC type



LED DC type



PC board pattern (Bottom view)



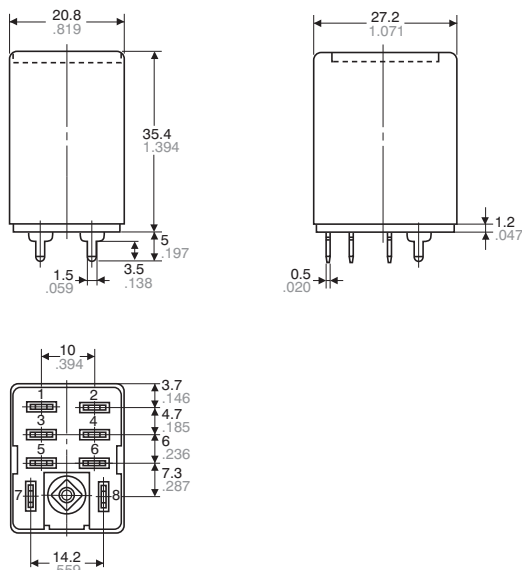
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2 Form C

CAD Data



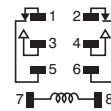
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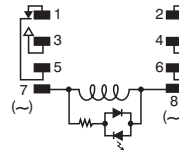
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Schematic (Bottom view)

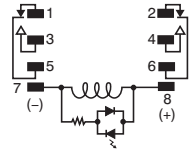
Standard type



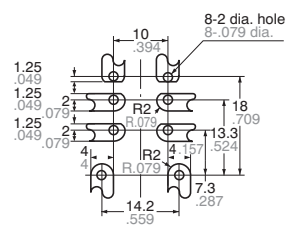
LED AC type



LED DC type



PC board pattern (Bottom view)



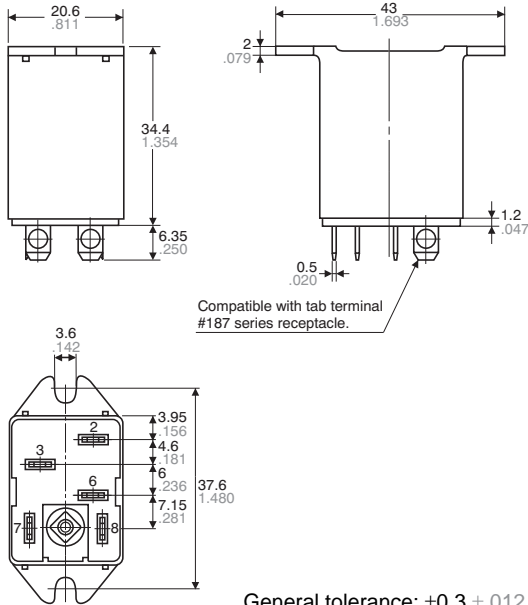
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3. TM type
1 Form C

CAD Data

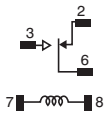


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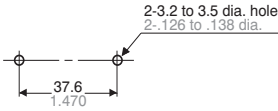


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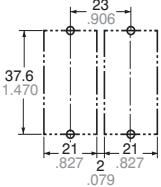
Schematic (Bottom view)
Standard type



Chassis (Panel) cutout



Chassis (Panel) cutout
in tandem mounting



Tolerance: $\pm 0.1 \pm .004$

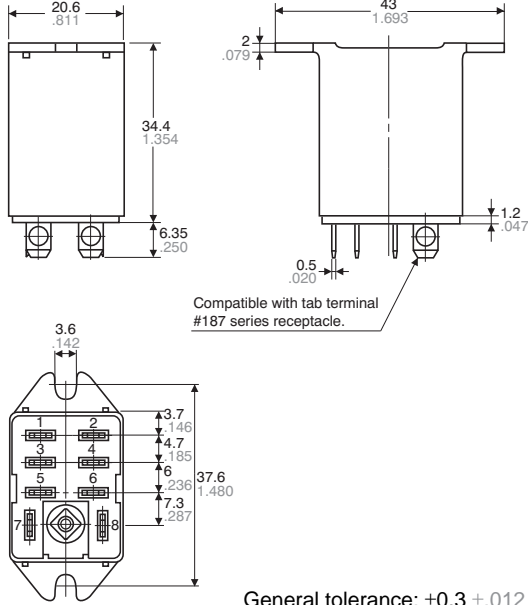
- Notes:
1. If connecting to #187 series tab terminals, use AMP Faston #187 series or #187 tab terminals conforming to UL or CSA inch-standard dimensions.
 2. In mounting, use M3 screws and M3 washers.
 3. When mounting TM types, use washers to prevent damage or distortion to the polycarbonate cover.
 4. When tightening fixing screws, the optimum torque range should be 0.294 to 0.49 N·m, (3 to 5 kgf·cm). Moreover, use washers to prevent loosening.

2 Form C

CAD Data

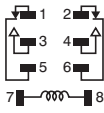


External dimensions

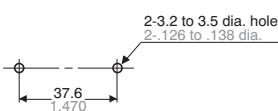


General tolerance: $\pm 0.3 \pm .012$

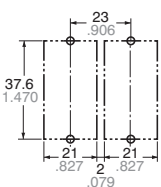
Schematic (Bottom view)
Standard type



Chassis (Panel) cutout



Chassis (Panel) cutout
in tandem mounting



Tolerance: $\pm 0.1 \pm .004$

- Notes:
1. If connecting to #187 series tab terminals, use AMP Faston #187 series or #187 tab terminals conforming to UL or CSA inch-standard dimensions.
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SAFETY STANDARDS

Contact arrangement	UL/C-UL (Recognized)		CSA (Certified)		TV rating (UL/CSA)	
	File No.	Contact rating	File No.	Contact rating	File No.	Rating
1 Form C	E43028	15A 250V AC 1/3HP 125, 250V AC 10A 30V DC	LR26550 etc.	10A 125, 250V AC 1/3HP 125, 250V AC 10A 30V DC	UL: E43149 CSA: LR26550 etc.	NO→TV-5 NC→TV-2
2 Form C	E43028	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	LR26550 etc.	10A 125, 250V AC 1/3HP 125, 250V AC 10A 30V DC	UL: E43149 CSA: LR26550 etc.	NO→TV-4 NC→TV-2

For Cautions for Use, see [Relay Technical Information](#).

ACCESSORIES

HL RELAYS

(Sockets and DIN rail terminal socket)

FEATURES

1. HL relay connection accessories include plug-in sockets, PC board sockets, and terminal socket for DIN rails.

2. Certified by UL and CSA

3. A hold-down clip is included in the package.



The fixing method is the same as for HL sockets, HC sockets and ordinary HC terminal sockets.

HC/HL-LEAF-SPRING-MK

TYPES

1. Sockets

Type	No. of poles	Item	Part No.
Plug-in socket	1-pole	HL1 socket	HL1-SS-K
	2-pole	HL2 socket	HL2-SS-K
PC board socket	1-pole	HL1 PC board socket	HL1-PS-K
	2-pole	HL2 PC board socket	HL2-PS-K

Standard packing: Carton: 20 pcs.; Case: 200 pcs.

2. Terminal sockets

Type	No. of poles	Item	Part No.
DIN rail terminal socket	1/2-pole (common)	HK2-DIN rail terminal socket	AHKA21
		HK2-DIN rail terminal socket (Finger protect type)	AHKA21P

Standard packing: Carton: 10 pcs.; Case: 100 pcs.

RATING

Specifications (Sockets and DIN rail terminal sockets)

Item		Performance				
Type		HL1 Plug-in socket	HL1 PC board socket	HL2 Plug-in socket	HL2 PC board socket	HK2-DIN rail terminal socket (Finger protect type)
Contact arrangement		1 Form C (1-pole)		2 Form C (2-pole)		2 Form C (1/2-pole common)
Max. continuous current (Ambient temperature: -50 to +70°C -58 to +158°F)		10A	10A	10A	10A	15A
Breakdown voltage (Initial)	Between open contacts	2, 000 Vrms for 1 min. (Detection current: 10mA)				
	Between contact sets					
	Between contact and coil					
Initial insulation resistance		100 MΩ between each terminal (500V DC)				

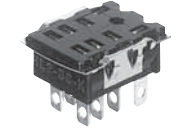
Note: When using a 1-pole HL relay on 1 Form C socket (HL1 Plug-in and HL1 PC board), please use within a range that does not exceed the max. continuous current (10A).

DIMENSIONS (Unit: mm inch)

1. Plug-in type sockets

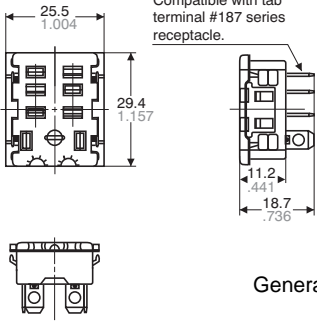


HL1 Socket (HL1-SS-K)



HL2 Socket (HL2-SS-K)

HL1 socket/External dimensions



Note: The external and mounting dimensions of HL2 socket are the same for HL1 socket types. Only the number of terminals varies.

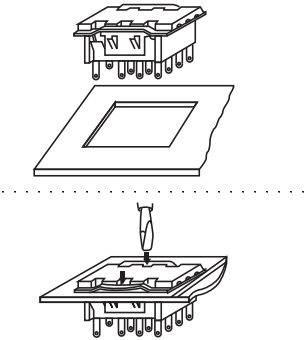
General tolerance: $\pm 0.3 \pm .012$

Hold-down clip

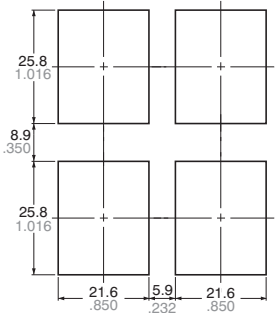


Hold-down clip is packaged with the socket.
(Applied to HC sockets and ordinary HC terminal sockets)

Mounting hole diagram



Side-by-side installation



Tolerance: $\pm 0.1 \pm .004$

- Notes: 1. Applicable chassis board thickness is 1.0 to 2.0 mm.
2. Installation is easy by inserting the socket from the top into the holes and by depressing the two down arrows on the retention fitting from the front.

2. PC board type sockets

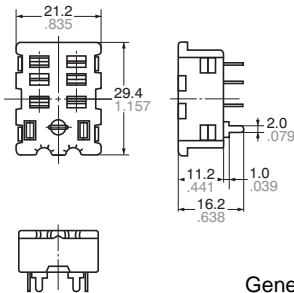


HL1 PC board type socket (HL1-PS-K)



HL2 PC board type socket (HL2-PS-K)

HL2 PC board type socket External dimensions



Note: The external and mounting dimensions of HL2 PC board type socket are the same for HL1 PC board type socket. Only the number of terminals varies.

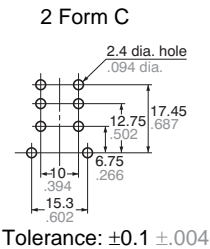
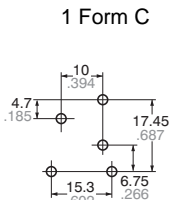
General tolerance: $\pm 0.3 \pm .012$

Hold-down clip

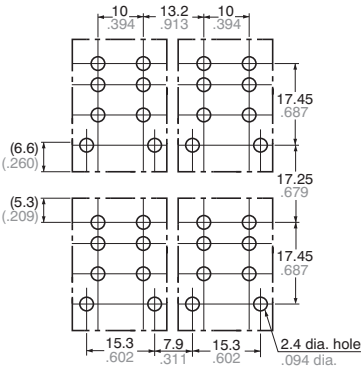


Hold-down clip is packaged with the socket.
(Applied to HC sockets and ordinary HC terminal sockets)

PC board pattern (Bottom view)

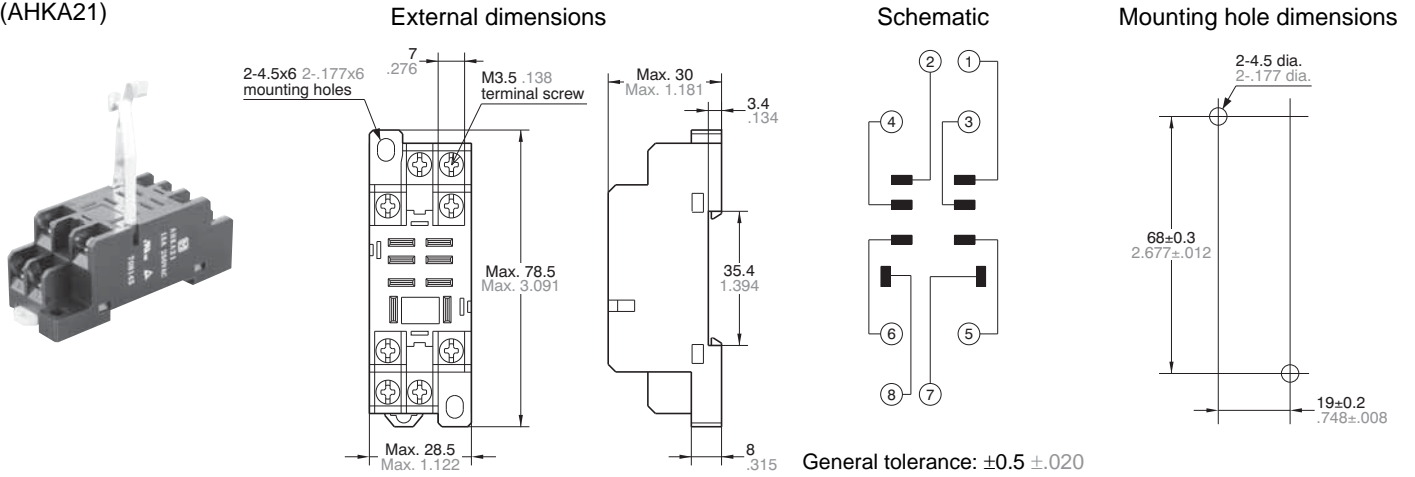


Side-by-side installation (For 2 Form C)

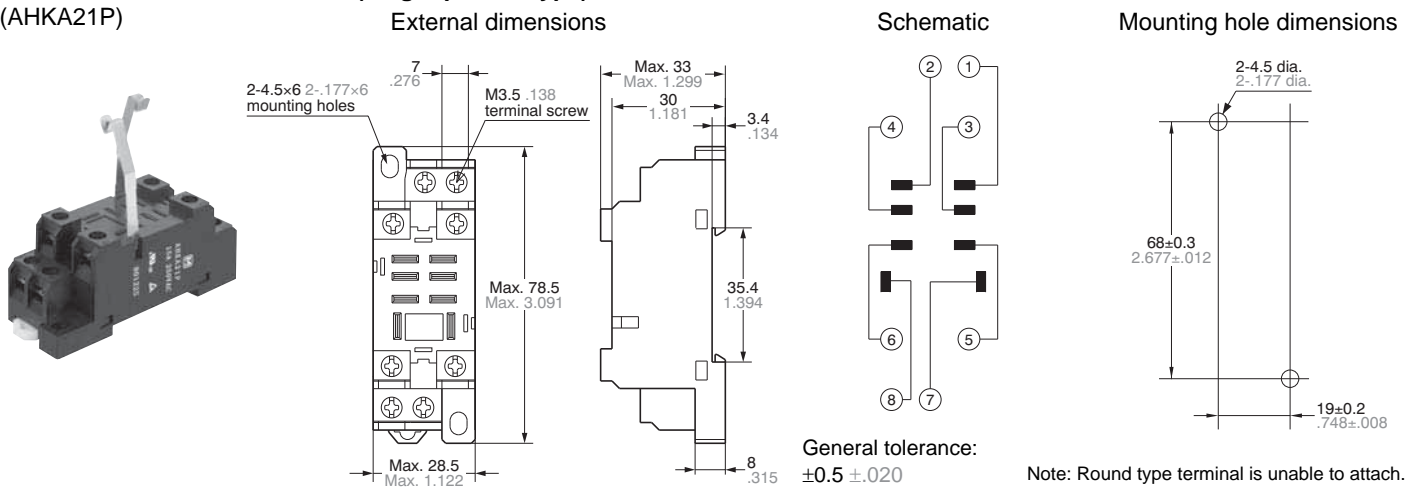


Tolerance: $\pm 0.1 \pm .004$

3. HK2-DIN rail terminal socket (AHKA21)



4. HK2-DIN rail terminal socket (Finger protect type) (AHKA21P)



For Cautions for Use, see [Relay Technical Information](#).