anasonic



Relay for control panel of 1c 15A, and 2c 10A

HL RELAYS



FEATURES

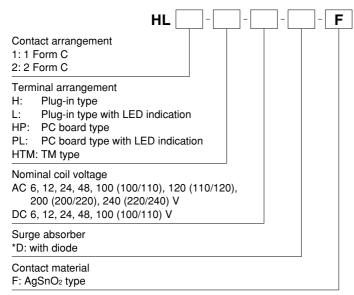
- 1. Compact high-capacity control relay In the same external dimensions as an HC relay, this compact power relay enables high-capacity control: 15 A for 1 Form C, 10 A for 2 Form C.
- 2. Designed for high reliability High operational reliability is achieved by solder-less construction, in which all connections between lead wires and the contact springs and terminal plate are welded.
- 3. Various types provided in rich lineup. LED indicator and diode type is 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

RoHS compliant

ORDERING INFORMATION



Notes: 1. Certified by C-UL, CSA and TÜV
Please inquire about TV approved products.

- *Diode type is available. (DC coil Plug-in type with LED indication only)
- 3. The LED indication color is green for the DC coil and red for the AC coil.

TYPES

1. Plug-in type

Nominal coil	1 Form C	2 Form C
voltage	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)

Nominal coil	1 Form C	2 Form C
voltage	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. Plug-in type (with LED indication and diode)

	Nominal coil	1 Form C	2 Form C		
voltage		Part No.	Part No.		
	6V DC	HL1-L-DC6V-D-F	HL2-L-DC6V-D-F		
	12V DC	HL1-L-DC12V-D-F	HL2-L-DC12V-D-F		
	24V DC	HL1-L-DC24V-D-F	HL2-L-DC24V-D-F		
	48V DC	HL1-L-DC48V-D-F	HL2-L-DC48V-D-F		
	100/110V DC	HL1-L-DC100V-D-F	HL2-L-DC100V-D-F		

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

4. PC board type

Nominal coil	1 Form C	2 Form C
voltage	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.

5. PC board type (with LED indication)

Nominal coil	1 Form C	2 Form C
voltage	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.

6. TM type

Nominal coil	1 Form C	2 Form C
voltage	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.

RATING

1. Coil data

1) AC coils

Nominal coil	Nominal coil current (mA)		Nominal operating power (VA)		Pick-up voltage	Drop-out voltage	Inductance (H)		Max. applied voltage						
voltage	50Hz	60Hz	50Hz	60Hz	(at 20°C 68°F)	(at 20°C 68°F)	When drop-out	When operating	(at 70°C 158°F)						
6V AC	224	200					0.078	0.074							
12V AC	111	100					0.312	0.295							
24V AC	56	50			30%V or more of	1.243	1.181	1100/1/ 1							
48V AC	28	25	1.3			1.2	1.2	1.2	1.2	1.2		nominal voltage	4.974	4.145	110%V of nominal voltage
100/110V AC	13.4/14.7	12/13.2							(Initial)	(Initial)	23.75	20.63	nominal voltago		
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 nominal voltage, 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 nominal voltage, humming will occur and a large current will flow leading possibly to coil burnout.

2. The maximum applied 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		40			
12V DC	75	0.9	160	80%V or less of	10%V or more of	
24V DC	37	0.9	650	nominal voltage	nominal voltage	110%V of nominal voltage
48V DC	18.5		2,600	(Initial)	(Initial)	Hominal voltage
100/110V DC	10	1.0	10,000			

Notes: 1. The nominal operating current is ±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 ±0.4% for every ±1°C change in temperature.
- 3. The relay operates in a range of 80% to 110% V of the nominal voltage, but ideally, in consideration of temporary voltage fluctuations, it should be operated at the nominal 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 applied 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

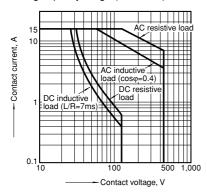
Characteristics	Item		Specifications
Contont	Contact resistance (Initial)		Max. 50 mΩ (By voltage drop 6 V DC 1A)
Contact	Contact material		AgSnO₂ type
Rating	Nominal switching ca	apacity*4	1 Form C: 15A 125V AC, 10A 250V AC (resistive load) 2 Form C: 10A 250V AC (resistive load)
· ·	Min. switching capac	ity (Reference value)*1	100mA 5V DC
	Insulation resistance	(Initial)	Min. 100M Ω (at 500V DC) Measurement at same location as "Breakdown voltage" section.
		Between open contacts	1,000 Vrms for 1min. (Detection current: 10mA)
	Breakdown voltage (Initial)	Between contact sets	1,500 Vrms for 1min. (Detection current: 10mA)
Electrical	(IIIIIai)	Between contact and coil	2,000 Vrms for 1min. (Detection current: 10mA)
characteristics	Temperature rise (co	il)	Max. 80°C 176°F (By resistive method, nominal voltage)
	Operate time (at 20°C 68°F)*2		DC type/AC type: Max. 25ms (Nominal coil voltage applied to the coil, excluding contact bounce time.)
	Release time (at 20°C 68°F)*2		DC type/AC type: Max. 25ms (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode)
	0	Functional	Min. 196 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)
Mechanical	Shock resistance	Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms.)
characteristics	V(1) - 12	Functional	10 to 55 Hz at double amplitude of 1 mm (Detection time: 10μs.)
	Vibration resistance	Destructive	10 to 55 Hz at double amplitude of 2 mm
	Mechanical	,	AC type: 5×10 ⁷ (at 180 times/min.), DC type: 10 ⁸ (at 180 times/min.)
Expected life	Floatrical	AC load	1 Form C: 15A 125V AC, 10A 250V AC resistive load (cosφ=1) Life switching cycle: Min. 5×10 ⁵ 2 Form C: 10A 250V AC resistive load (cosφ=1) Life switching cycle: Min. 3×10 ⁵
	Electrical	DC load	1 Form C: 3A 30V DC resistive load (cosφ=1) Life switching cycle: Min. 5×10 ⁵ 2 Form C: 3A 30V DC resistive load (cosφ=1) Life switching cycle: Min. 5×10 ⁵
Conditions	Conditions for operat	ion, 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 spee	d	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).

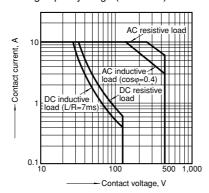
- *1. This value can change due to the switching frequency, environmental conditions and desired reliability level, therefore it is recommended to check this with the actual load.
- *2. For the AC coil types, the operate/release time will differ depending on the phase.
- *3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.
- *4. When using the socket, be sure to verify the max. continuous current.

REFERENCE DATA

Switching capacity range (1 Form C)

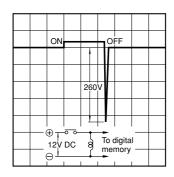


Switching capacity range (2 Form C)



With diode type (For DC)

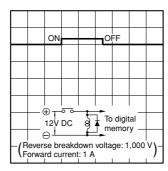
1. DC coil surge voltage waveform (without diode)



2. DC coil surge voltage waveform (with diode)

Diode characteristics;

Reverse breakdown voltage: 1,000V, Forward current: 1A



DIMENSIONS (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

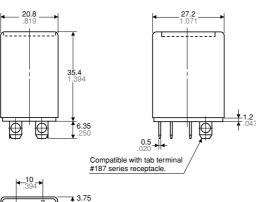
1. Plug-in type

1 Form C

CAD Data

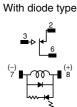


External dimensions



Schematic (Bottom view) Standard type









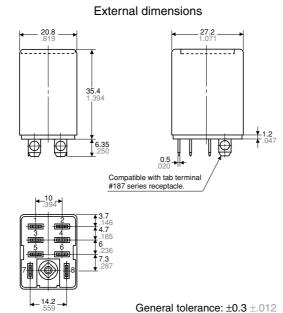
General tolerance: $\pm 0.3 \pm .012$

-4-

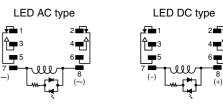
2 Form C

CAD Data





Schematic (Bottom view) Standard type With diode type



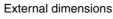
Schematic (Bottom view) Standard type

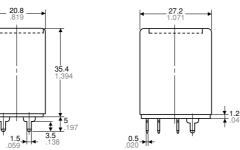
2. PC board type

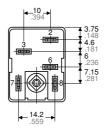
1 Form C

CAD Data

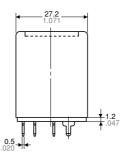


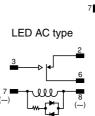


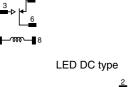


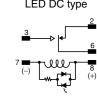


General tolerance: $\pm 0.3 \pm .012$

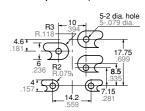








PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

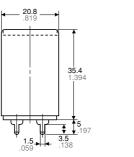
-5-

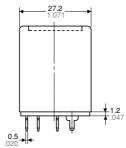
2 Form C

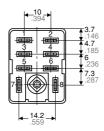
CAD Data



External dimensions

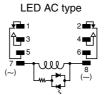


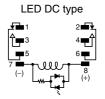




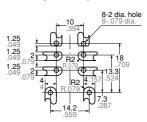
General tolerance: ±0.3 ±.012

Schematic (Bottom view) Standard type





PC board pattern (Bottom view)



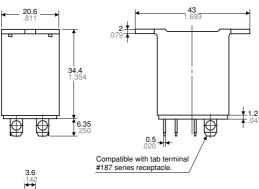
Tolerance: ±0.1 ±.004

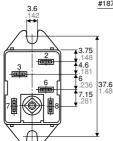
3. TM type 1 Form C

CAD Data



External dimensions





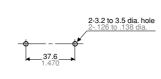
General tolerance: ±0.3 ±.012

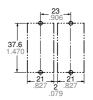
Schematic (Bottom view) Standard type



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.
 - 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.

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2 Form C

CAD Data



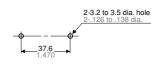
External dimensions Compatible with tab terminal #187 series receptacle.

Schematic (Bottom view) Standard type



Chassis (Panel) cutout

Chassis (Panel) cutout in tandem mounting





Tolerance: ±0.1 ±.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.

SAFETY STANDARDS

1. Standard type (Plug-in type except with diode, PC board type, TM type)

The control of the co								
Contact	UL/C-UL (Recognized)		CSA (Certified)		TV rating (UL/CSA)		TÜV rating	
arrangement	File No.	Contact rating	File No.	Contact rating	File No.	Rating	File No.	Rating
1 Form C	E43028*1	15A 250V AC 1/3HP 125, 250V AC 10A 30V DC	_	CSA standard certified by C-UL	UL: E43149 CSA: LR26550 etc.	NO→TV-5 NC→TV-2	B1305 13461 341	15A 125V AC (cosφ=1.0) 10A 250V AC (cosφ=1.0) 10A 30V DC (L/R=0ms)
2 Form C	E43028*1	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	_	CSA standard certified by C-UL	UL: E43149 CSA: LR26550 etc.	NO→TV-4 NC→TV-2	B1305 13461 341	10A 250V AC (cosφ=1.0) 10A 30V DC (L/R=0ms)

General tolerance: ±0.3 ±.012

2. Plug-in type (with diode)*2

Contact	UL/C-UL (Recognized)		CSA (Certified)		TV rating (UL/CSA)		TÜV rating	
arrangement	File No.	Contact rating	File No.	Contact rating	File No.	Rating	File No.	Rating
1 Form C	E43028*1	15A 250V AC 1/3HP 125, 250V AC 10A 30V DC	_	CSA standard certified by C-UL	_	_	B1305 13461 341	15A 125V AC (cosφ=1.0) 10A 250V AC (cosφ=1.0) 10A 30V DC (L/R=0ms)
2 Form C	E43028*1	10A 250V AC 1/3HP 125, 250V AC 10A 30V DC	_	CSA standard certified by C-UL	_	_	B1305 13461 341	10A 250V AC (cosφ=1.0) 10A 30V DC (L/R=0ms)

Note: "*1" indicates the UL/C-UL recognition file number. "*2" DC coil Plug-in type with LED indication only.

NOTES

1. For cautions for use, please read

"General Application Guidelines".

Panasonic



ACCESSORIES

(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

Туре	No. of poles	Item	Part No.
Division analyst	1-pole	HL1 socket	HL1-SS-K
Plug-in socket	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

Туре	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								
Туре		HL1 PC board socket	HL2 Plug-in socket	HL2 PC board socket	HK2-DIN rail terminal socket	HK2-DIN rail terminal socket (Finger protect type)			
ngement	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	15A	15A			
Between open contacts									
Between contact sets	2, 000 Vrms for 1 min. (Detection current: 10mA)								
Between contact and coil									
Initial insulation resistance		100 MΩ between each terminal (500V DC)							
	Type Ingement Dus current Injerature: -58 to +158°F) Between open contacts Between contact sets Between contact and coil	Type HL1 Plug-in socket Ingement Dus current perature: -58 to +158°F) Between open contacts Between contact sets Between contact and coil	Type HL1 Plug-in socket HL1 PC board socket ngement 1 Form C (1-pole) ous current ous current operature: -58 to +158°F) Between open contacts Between contact sets Between contact and coil	Type HL1 Plug-in socket PC board socket PL2 Plug-in socket ngement 1 Form C (1-pole) 2 Form C ous current ous current operature: -58 to +158°F) Between open contacts Between contact sets Between contact and coil	Type HL1 Plug-in socket PC board socket PC board socket PC board socket HL2 PC board socket HL2 PC board socket HL2 PC board socket HL2 PC board socket DUS current PD bous current PC board socket PL2 PC board socket PL2 PC board socket PL2 PC board socket PC board	Type			

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 (mm inch)

The CAD data of the products with a CAD Data mark can be downloaded from: http://industrial.panasonic.com/ac/e/

1. Plug-in type sockets

CAD Data

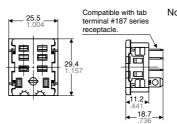


HL1 Socket (HL1-SS-K)



HL2 Socket (HL2-SS-K)

HL1 socket External dimensions



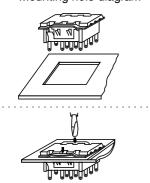
Note: The external and mounting dimensions of HL2 socket are the same for HL1 socket types. Only the number of terminals varies.



Hold-down clip

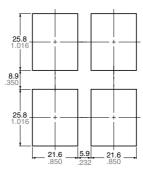
Hold-down clip is packaged with the socket. (Applied to HC sockets and ordinary HC terminal sockets)

Mounting hole diagram



Side-by-side installation

General tolerance: ±0.3 ±.012



Tolerance: $\pm 0.1 \pm .004$

Notes: 1. Applicable chassis board thickness is 1.0 to

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

CAD Data

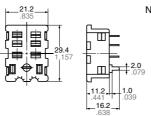


HL1 PC board type socket (HL1-PS-K)



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: $\pm 0.3 \pm .012$

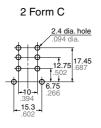
Hold-down clip



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

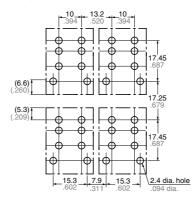
PC board pattern (Bottom view)



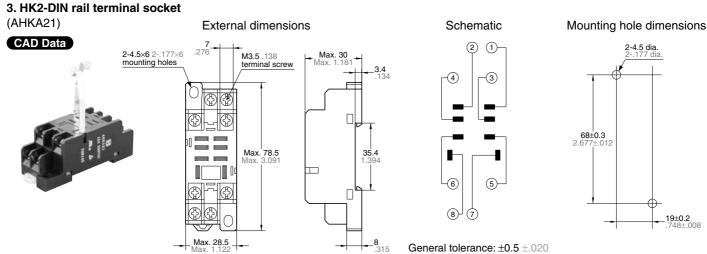


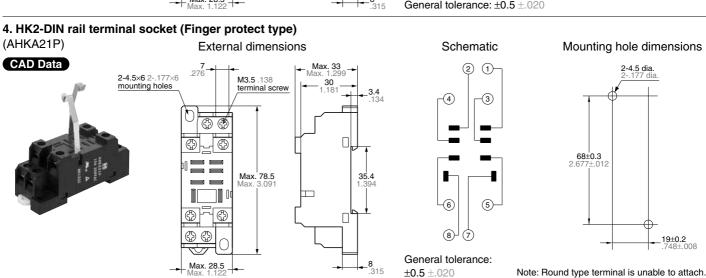
Tolerance: ±0.1 ±.004

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



Tolerance: $\pm 0.1 \pm .004$





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Panasonic:

HL2-HP-AC200V-F HL1-L-DC24V-F