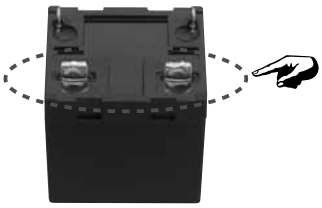
Ideal for solar inverter compact size, 1a 35A/48A power relays

HE RELAYS PV Type

RoHS compliant

FEATURES

• 35A/48A current at 250 V AC achieved in compact size (L: 33 × W: 38 × H: 36.3 mm L: 1.299 × W: 1.496 × H: 1.429 inch)
Due to improved conduction efficiency, wide terminal blades are used. (for high capacity type)



• Contact gap: 2.5 mm (VDE0126 compliant)
Compliant with European photovoltaic standard VDE0126
Compliant with EN61810-1 2.5 kV surge breakdown voltage (between contacts)

• Contributes to energy saving in devices thanks to reduced coil hold voltage
Coil hold voltage can be reduced down to 40% of the nominal coil voltage (ambient temperature 20°C 68°F). This equals to operating power of approximately 310 mW.
*Coil hold voltage is the coil voltage after 100 ms following application of the nominal coil voltage.

• High insulation and 10,000 V surge breakdown voltage (between contacts and coil) achieved.

• Conforms to various safety standards
UL/C-UL and VDE

TYPICAL APPLICATIONS

• Photovoltaic power generation systems (Solar inverter)

ORDERING INFORMATION

HE 1a N - P - DC ☐ - ☐

Contact arrangement
1a: 1 Form A (Single side stable type)

Pick-up voltage
N: 70% of nominal voltage

Terminals
P: PC board terminal type

Coil voltage (DC)
6, 9, 12, 24V

Type, contact material and switching capacity
Y5: PV type, AgNi type (1 Form A 48A high capacity)
H18: PV type, $AgSnO_2$ type (1 Form A 35A standard)

TYPES

Nominal coil voltage	Standard type*	High capacity type
	Part No.	Part No.
6V DC	HE1aN-P-DC6V-H18	HE1aN-P-DC6V-Y5
9V DC	HE1aN-P-DC9V-H18	HE1aN-P-DC9V-Y5
12V DC	HE1aN-P-DC12V-H18	HE1aN-P-DC12V-Y5
24V DC	HE1aN-P-DC24V-H18	HE1aN-P-DC24V-Y5

Standard packing: Carton: 20 pcs.; Case: 100 pcs.
*Standard 6V, 12V and 24V DC type: Certified by UL/C-UL (Standard 9V type: Certified by UL/C-UL and VDE)

RATING

1. Coil data

Nominal coil voltage	Pick-up voltage (at 20°C 68°F) (Initial)	Drop-out voltage (at 20°C 68°F) (Initial)	Nominal operating current [±10%] (at 20°C 68°F)	Coil resistance [±10%] (at 20°C 68°F)	Nominal operating power	Max. applied voltage (at 20°C 68°F)
6V DC	70%V or less of nominal voltage	10%V or more of nominal voltage	320mA	18.8Ω	1,920mW	110%V of nominal voltage
9V DC			213mA	42.2Ω		
12V DC			160mA	75.0Ω		
24V DC			80mA	300.0Ω		

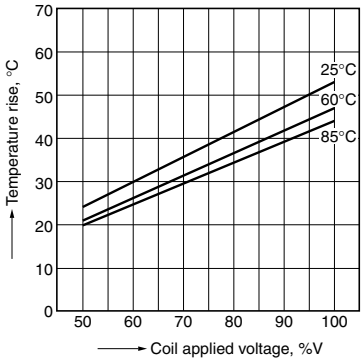
2. Specifications

Characteristics	Item		Specifications	
			Standard type	High capacity type
Contact	Arrangement		1 Form A	
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 6 V DC 1A)	
	Contact material		$AgSnO_2$ type	AgNi type
Rating	Nominal switching capacity		35 A 250 V AC (Resistive load)	48 A 250 V AC (Resistive load)
	Contact carring power		8,750 VA (Resistive load)	12,000 VA (Resistive load)
	Max. switching voltage		250 V AC	
	Max. switching current		35 A (AC)	48 A (AC)
	Nominal operating power		1,920 mW	
	Min. switching capacity (Reference value)*1		100 mA 5 V DC	
Electrical characteristics	Insulation resistance (Initial)		Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section.	
	Breakdown voltage (Initial)	Between open contacts	2,000 Vrms for 1 min. (Detection current: 10 mA)	
		Between contact and coil	5,000 Vrms for 1 min. (Detection current: 10 mA)	
	Surge breakdown voltage*2 (Between contact and coil) (Initial)		10,000 V	
	Temperature rise		Max. 60°C 140°F (By resistive method, contact carrying current: 35A, 100%V of nominal coil voltage at 55°C 131°F.)	Max. 60°C 140°F (By resistive method, contact carrying current: 48A, 100%V of nominal coil voltage at 55°C 131°F.)
			Max. 30°C 86°F (By resistive method, contact carrying current: 35A, 60%V of nominal coil voltage at 85°C 185°F.)	Max. 30°C 86°F (By resistive method, contact carrying current: 48A, 60%V of nominal coil voltage at 85°C 185°F.)
	Coil hold voltage*3		40 to 100%V (Contact carrying current: 35A, at 20°C 68°F), 50 to 100%V (Contact carrying current: 35A, at 55°C 131°F), 50 to 60%V (Contact carrying current: 35A, at 85°C 185°F)	40 to 100%V (Contact carrying current: 48A, at 20°C 68°F), 50 to 100%V (Contact carrying current: 48A, at 55°C 131°F), 50 to 60%V (Contact carrying current: 48A, at 85°C 185°F)
	Operate time (at 20°C 68°F)		Max. 30 ms (nominal coil voltage, excluding contact bounce time)	
	Release time (at 20°C 68°F)*5		Max. 10 ms (nominal coil voltage, excluding contact bounce time) (without diode)	
Mechanical characteristics	Shock resistance	Functional	Min. 98 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs.)	
		Destructive	Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms.)	
	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1.0 mm (Detection time: 10 μs.)	
		Destructive	10 to 55 Hz at double amplitude of 1.5 mm	
Expected life	Mechanical		Min. 10^6 (at 180 times/min.)	
	Electrical	Resistive load	Min. 3×10^4 (35 A 250 V AC) (ON : OFF = 1s : 9s)	Min. 3×10^4 (48 A 250 V AC) (ON : OFF = 1s : 9s)
		Inductive load	—	Endurance: 48 A 250 V AC ($\cos\phi$ = 0.8), Min. 3×10^4 (ON : OFF = 0.1s : 10s) Overload: 72 A 250 V AC ($\cos\phi$ = 0.8), Min. 50 (ON : OFF = 0.1s : 10s)
Conditions	Conditions for operation, transport and storage*4		Ambient temperature: –50 to +55°C –58 to +131°F (When nominal coil voltage applied) –50 to +85°C –58 to +185°F (When applied coil hold voltage is 50% to 60% of nominal coil voltage) Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature); Atmospheric pressure: 86 to 106 kPa	
	Max. operating speed		6 times/min. (at nominal switching capacity ON : OFF = 1s : 9s)	
Unit weight			Approx. 80 g 2.82 oz	

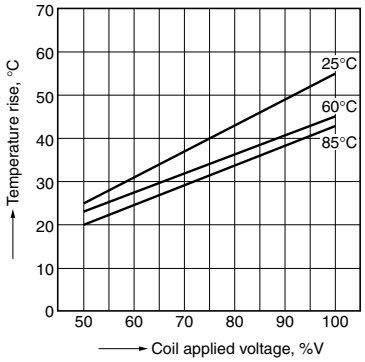
Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2. Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981
*3. Coil hold voltage is the coil voltage after 100 ms following application of the nominal coil voltage.
*4. The upper operation ambient temperature limit is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.
*5. Release time will lengthen if a diode, etc., is connected in parallel to the coil. Be sure to verify operation under actual conditions.

REFERENCE DATA

1.-(1) Coil temperature rise
(Standard type)
Sample: HE1aN-P-DC9V-H18, 6 pcs.
Point measured: coil inside
Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C 185°F
Contact carrying current: 35A

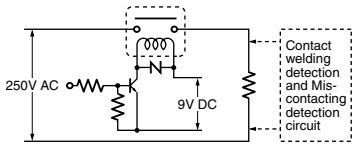


1.-(2) Coil temperature rise
(High capacity type)
Sample: HE1aN-P-DC9V-Y5, 6 pcs.
Point measured: coil inside
Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C 185°F
Contact carrying current: 48A

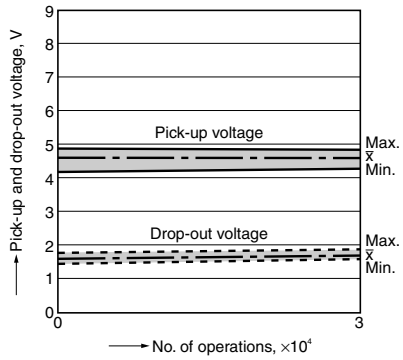


2.-(1) Electrical life test (Standard type, Resistive load 250V AC, 35A at 85°C 185°F)
Sample: HE1aN-P-DC9V-H18, 6 pcs.
Operation frequency: 6 times/min.
(ON/OFF = 1.0s : 9.0s)

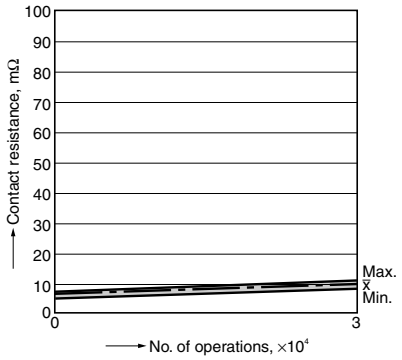
Circuit:



Change of pick-up and drop-out voltage

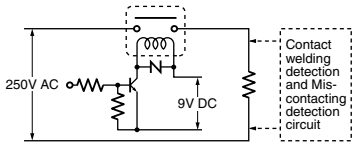


Change of contact resistance

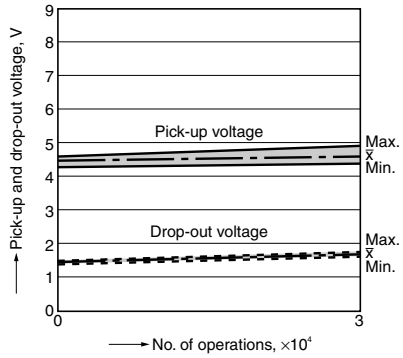


2.-(2) Electrical life test (High capacity type, Resistive load 250V AC, 48A at 85°C 185°F)
Sample: HE1aN-P-DC9V-Y5, 6 pcs.
Operation frequency: 6 times/min.
(ON/OFF = 1.0s : 9.0s)

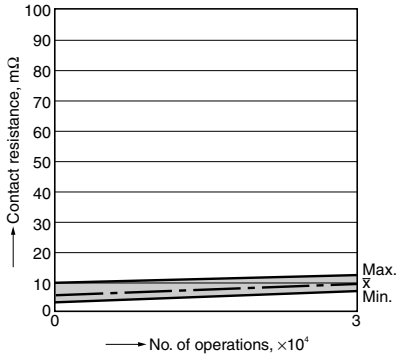
Circuit:



Change of pick-up and drop-out voltage



Change of contact resistance



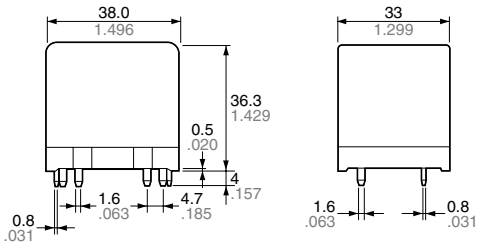
DIMENSIONS (mm inch)

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

CAD Data

Standard type

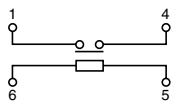
External dimensions



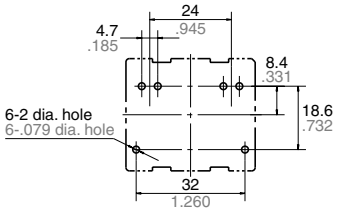
General tolerance: ±0.3 ±.012

Schematic (Bottom view)

Single side stable type



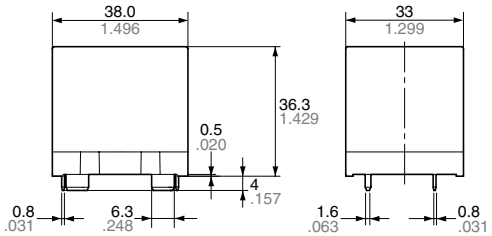
PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

High capacity type

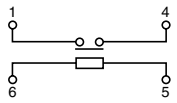
External dimensions



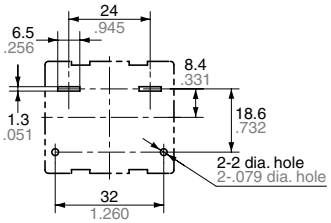
General tolerance: ±0.3 ±.012

Schematic (Bottom view)

Single side stable type



PC board pattern (Bottom view)



Tolerance: ±0.1 ±.004

SAFETY STANDARDS

Certification body		Contact rating
High capacity type	C-UL	48A 277V AC (at 85°C 185°F) *60A 277V AC (general use, at 60°C 140°F, 10k cycle), in use at 60% of rated coil voltage
	VDE (VDE0435)	48A 250V AC cosϕ = 0.8 (at 85°C 185°F) *72A 250V AC (cosϕ = 0.8 at 85°C 185°F, 50 cycle) *60A 250V AC (cosϕ = 0.8 at 85°C 185°F, 10k cycle) *50A 20V DC (0ms, at 85°C 185°F, 30k cycle)
Standard type	UL/CSA	35A 277V AC (at 25°C 77°F)
	VDE (VDE0435)**	35A 250V AC cosϕ = 1 (at 80°C 176°F)

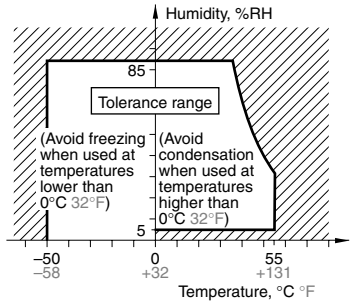
* Under development. Please contact us.
** Only 9V DC type is Certified by VDE

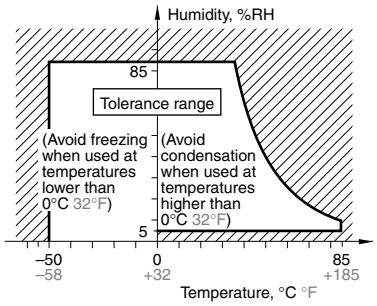
NOTES

■ Usage, transport and storage conditions

1) Temperature:
–50 to +55°C –58 to +131°F
–50 to +85°C –58 to +185°F (When applied coil hold voltage is 50% to 60% of nominal coil voltage)
2) Humidity: 5 to 85% RH
(Avoid freezing and condensation.)
The humidity range varies with the temperature. Use within the range indicated in the graph below.
3) Atmospheric pressure: 86 to 106 kPa

Temperature and humidity range for usage, transport, and storage





∗ –50 to +85°C –58 to +185°F (When applied coil hold voltage is 50% to 60% of nominal coil voltage)

■ Certification

This relay is UL/C-UL certified.
48 A 277 V AC (High capacity type)
35 A 277 V AC (Standard type)
This relay is certified by VDE
48 A 250 V AC cosϕ = 0.8
(High capacity type)
35 A 250 V AC cosϕ = 1
(Standard type)