Compact size, 1 Form A 35A/48A/90A power relays for solar inverter

HE RELAYS PV Type

35A type

48A type 90A type

RoHS compliant

Protective construction: Flux-resistant type

FEATURES

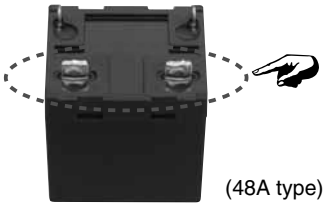
1. High capacity and compact size

High capacity control possible (35A/48A/90A type)

35A/48A type: L: 33 × W: 38 × H: 36.3mm L: 1.299 × W: 1.496 × H: 1.429inch

90A type: L: 33 × W: 38 × H: 38.8mm L: 1.299 × W: 1.496 × H: 1.528inch

Due to improved conduction efficiency, wide terminal blades are used (for 48A and 90A type)



(48A type)

2. Contact GAP

Compliant with European photovoltaic standard VDE0126

Compliant with EN61810-1 2.5kW surge breakdown voltage (between contacts)

35A/48A type: 2.5mm .098inch

90A type: 3.0mm .118inch

3. Contributes to energy saving in devices thanks to reduced coil hold voltage

Coil hold voltage can be reduced down 40% of the nominal coil voltage (ambient temperature 20°C 68°F)

This is equal to operating power of approximately 310mW.

*Coil hold voltage is the coil voltage after 100ms following application of the nominal coil voltage.

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

TYPICAL APPLICATIONS

- **Inverter (Solar and industrial)**
- **UPS**
- **Stationary charging stand**

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ORDERING INFORMATION

HE [1a] [N] - [ ] - 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 / Blade terminal type
W: Wide blade terminal type

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

Type, contact material and switching capacity
Y5: PV type, AgNi type (1 Form A 48A)
Y6: PV type, AgNi type (1 Form A 90A)
H18: PV type, $AgSnO_2$ type (1 Form A 35A)

TYPES

Type	Nominal coil voltage	Contact arrangement	Part No.
35A*	6V DC	1 Form A	HE1aN-P-DC6V-H18
	9V DC		HE1aN-P-DC9V-H18
	12V DC		HE1aN-P-DC12V-H18
	24V DC		HE1aN-P-DC24V-H18
48A	6V DC		HE1aN-P-DC6V-Y5
	9V DC		HE1aN-P-DC9V-Y5
	12V DC		HE1aN-P-DC12V-Y5
	24V DC		HE1aN-P-DC24V-Y5
90A	6V DC		HE1aN-W-DC6V-Y6
	9V DC		HE1aN-W-DC9V-Y6
	12V DC		HE1aN-W-DC12V-Y6
	24V DC		HE1aN-W-DC24V-Y6

Standard packing: Carton: 25 pcs.; Case: 100 pcs.
*35A 6V,12V and 24V DC type: Certified by UL/C-UL (35A 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		

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2. Specifications

Characteristics	Item		Specifications		
			35A type	48A type	90A type
Contact	Arrangement		1 Form A		
	Contact resistance (Initial)		Max. 100 mΩ (By voltage drop 6V DC 1A)		Max. 10 mΩ (By voltage drop 5V DC 20A)
	Contact material		$AgSnO_2$ type	AgNi type	
Rating	Nominal switching capacity		35A 277V AC (Resistive load)	48 A 277V AC (Resistive load)	80A 277V AC (Resistive load)
	Contact carring power		9,695VA (Resistive load)	13,296VA (Resistive load)	24,930VA (Resistive load)
	Max. switching voltage		277V AC		
	Max. switching current		35A (AC)	48A (AC)	90A (AC)
	Nominal operating power		1,920mW		
	Min. switching capacity (Reference value)*1		100mA 5V 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: 10mA)		
		Between contact and coil	5,000 Vrms for 1 min. (Detection current: 10mA)		
	Surge breakdown voltage*2 (Between contact and coil)		10,000 V (Initial)		
	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. 60°C 140°F (By resistive method, contact carrying current: 90A, 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.)	Max. 30°C 86°F (By resistive method, contact carrying current: 90A, 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)	40 to 100%V (Contact carrying current: 90A, at 20°C 68°F), 50 to 60%V (Contact carrying current: 90A, 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	98 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs.)		
		Destructive	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. 10^7 (at 180 times/min.)		Min. 1×10^6 (at 180 times/min.)
	Electrical	Resistive load	Min. 3×10^4 (35A 277V AC) (ON : OFF = 1s : 9s, at 85°C 185°F)	Min. 3×10^4 (48A 277V AC) (ON : OFF = 1s : 9s, at 85°C 185°F)	Min. 1×10^4 (80A 277V AC) (ON : OFF = 1s : 9s, at 20°C 68°F) Min. 1×10^3 (90A 250V AC) (ON : OFF = 1s : 9s, at 85°C 185°F)
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); Air 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		Approx. 85 g 3.00 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.

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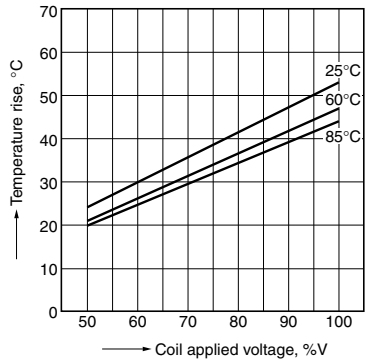
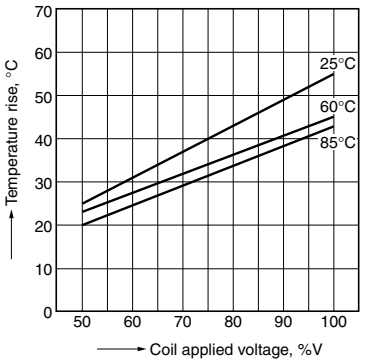
REFERENCE DATA

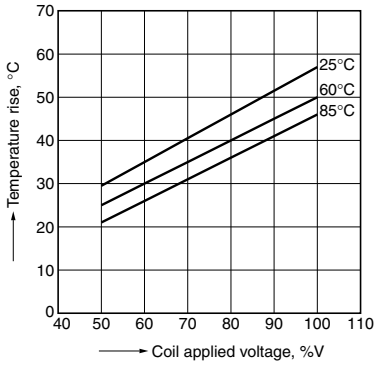
1.-(1) Coil temperature rise (35A type)
Sample: HE1aN-P-DC9V-H18, 6 pcs.
Point measured: coil inside
Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C 185°F
Contact carrying current: 35A



1.-(2) Coil temperature rise (48A 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

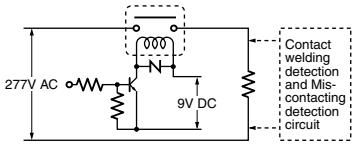


1.-(3) Coil temperature rise (90A type)
Sample: HE1aN-W-DC12V-Y6, 6 pcs.
Point measured: coil inside
Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C 185°F
Contact carrying current: 90A

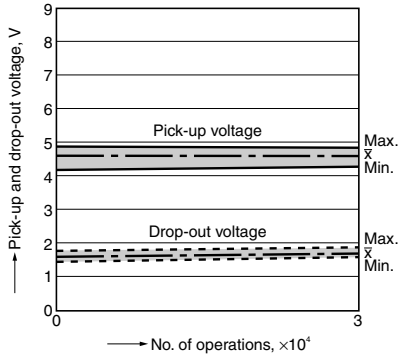


2.-(1) Electrical life test (35A type) (Resistive load 277V AC, 35A at 85°C 185°F)
Sample: HE1aN-P-DC9V-H18, 6 pcs.
Operation frequency: 6 times/min.
(ON/OFF = 1.0s : 9.0s)

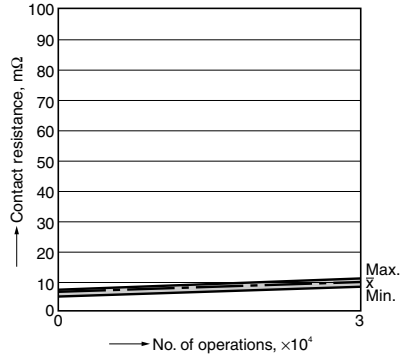
Circuit:



Change of pick-up and drop-out voltage

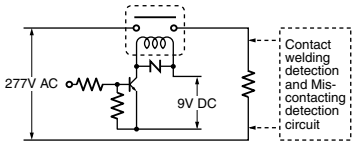


Change of contact resistance

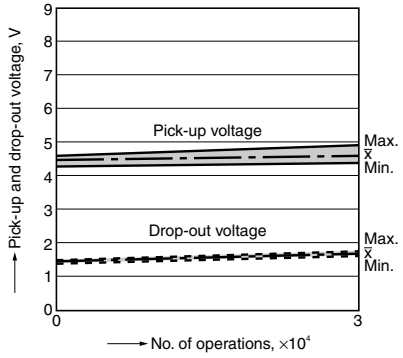


2.-(2) Electrical life test (48A type) (Resistive load 277V AC, 48A at 85°C 185°F)
Sample: HE1aN-P-DC9V-Y5, 6 pcs.
Operation frequency: 6 times/min.
(ON/OFF = 1.0s : 9.0s)

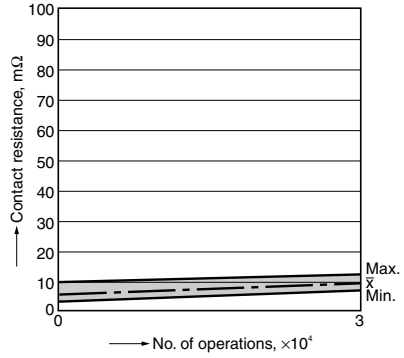
Circuit:



Change of pick-up and drop-out voltage

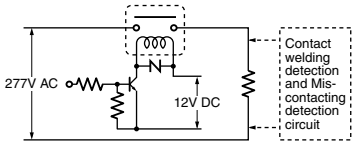


Change of contact resistance

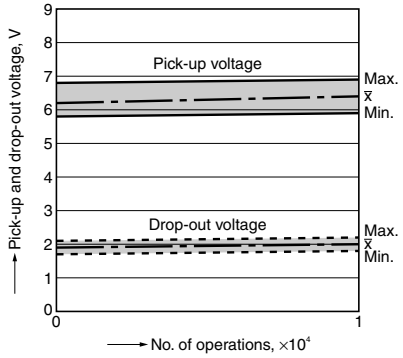


2.-(3) Electrical life test (90A type) (Resistive load 277V AC, 80A at 25°C 77°F)
Sample: HE1aN-W-DC12V-Y6, 6 pcs.
Operation frequency: 6 times/min.
(ON/OFF = 1.0s : 9.0s)

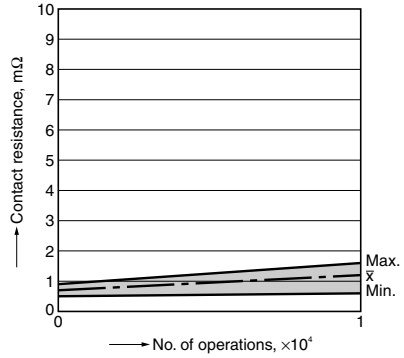
Circuit:



Change of pick-up and drop-out voltage



Change of contact resistance



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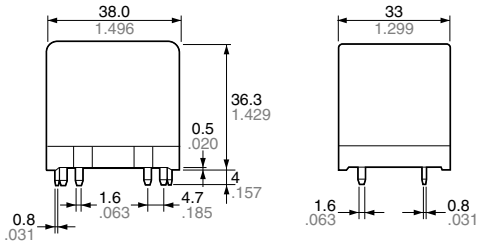
DIMENSIONS (mm inch)

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

1. 35A type

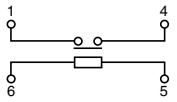
CAD Data

External dimensions

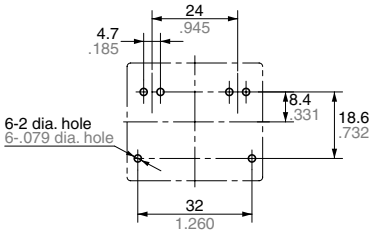


Schematic (Bottom view)

Single side stable type



PC board pattern (Bottom view)



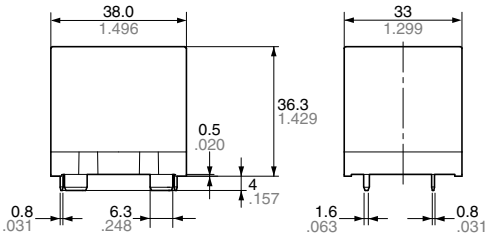
General tolerance: ±0.3 ±.012

Tolerance: ±0.1 ±.004

2. 48A type

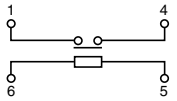
CAD Data

External dimensions

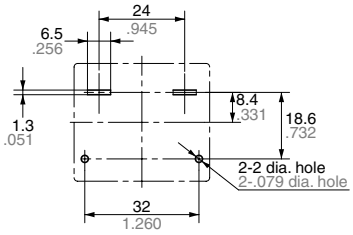


Schematic (Bottom view)

Single side stable type



PC board pattern (Bottom view)



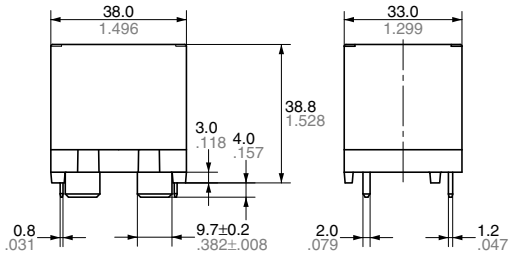
General tolerance: ±0.3 ±.012

Tolerance: ±0.1 ±.004

3. 90A type

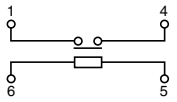
CAD Data

External dimensions

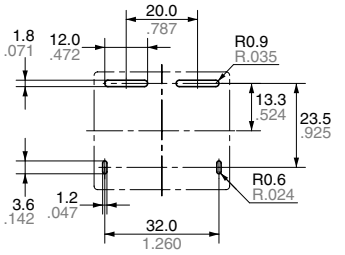


Schematic (Bottom view)

Single side stable type



PC board pattern (Bottom view)



General tolerance: ±0.3 ±.012

Tolerance: ±0.1 ±.004

SAFETY STANDARDS

Type	Certification authority	File No.	Contact rating
90A	UL/C-UL*	E43028	80A 300V AC (general use 10k cycles) 80A 300V AC (general use at 85°C 185°F, 6k cycles) in use at 60% of rated coil voltage
	VDE (VDE0435)	40006681	80A 250V AC cosϕ = 1 (at 25°C 77°F, 10k cycles)
			90A 250V AC cosϕ = 0.8 (at 85°C 185°F, 1k cycles)
			80A 250V AC cosϕ = 0.8 (at 85°C 185°F, 10k cycles)
			90A 300V AC cosϕ = 1 (at 85°C 185°F, 1k cycles)
48A	UL/C-UL	E43028	48A 277V AC (general use, at 85°C 185°F, 30k cycles) in use at 60% of rated coil voltage 60A 277V AC (general use, at 60°C 140°F, 10k cycles), in use at 60% of rated coil voltage
	VDE (VDE0435)	40006681	48A 250V AC cosϕ = 0.8 (at 85°C 185°F, 30k cycles) 72A 250V AC (cosϕ = 0.8 at 85°C 185°F, 50 cycles) 60A 250V AC (cosϕ = 0.8 at 85°C 185°F, 10k cycles) 50A 20V DC (0ms, at 85°C 185°F, 30k cycles)
35A	UL/CSA	E43028	35A 277V AC (10k cycles), 30A 277V AC (100k cycles), 30A 30V DC (100k cycles), 1.5HP 125V AC (100k cycles), 3HP 250V AC (100k cycles), TV-15
	VDE (VDE0435)**	40006681	35A 250V AC cosϕ = 1 (at 80°C 176°F, 50k cycles)

* CSA standard: Certified by C-UL

** Only 9V DC type is Certified by VDE

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NOTES

1. For cautions for use, please read "GENERAL APPLICATION GUIDELINES".

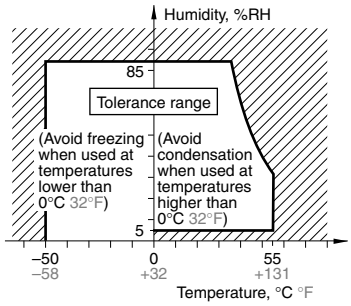
2. Usage, transport and storage conditions

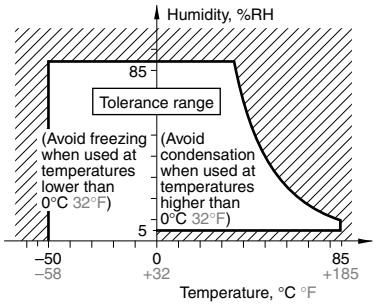
1) Temperature:
–50 to +55°C –58 to +131°F
–50 to +85°C –58 to +185°F (When applied coil hold voltage is 50% to 60% of nominal coil voltage)

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)

Please contact .....

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