



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

**HE RELAYS
PV Type**

FEATURES

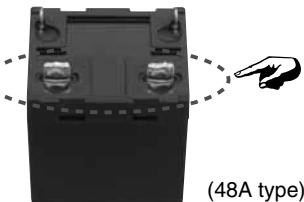
1. High capacity and compact size

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)



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

RoHS compliant

Protective construction: Flux-resistant 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

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, AgSnO₂ 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	1 Form A	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	1 Form A	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		

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)					
Rating	Contact material	AgSnO ₂ type	AgNi type						
	Nominal switching capacity	35A 277V AC (Resistive load)	48 A 277V AC (Resistive load)	80A 277V AC (Resistive load)					
	Contact carrying 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/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10 μs.)						
	Functional	980 m/s ² (Half-wave pulse of sine wave: 6 ms.)							
Expected life	Vibration resistance	Functional	10 to 55 Hz at double amplitude of 1.0 mm (Detection time: 10 μs.)						
	Functional	10 to 55 Hz at double amplitude of 1.5 mm							
Conditions	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)					
Unit weight	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)						
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 (35A type)

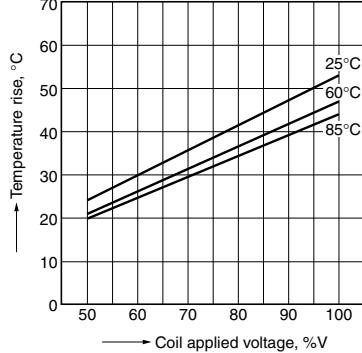
Sample: HE1aN-P-DC9V-H18, 6 pcs.

Point measured: coil inside

Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C

185°F

Contact carrying current: 35A



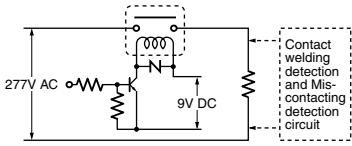
2.-(1) Electrical life test (35A type) (Resistive load 277V AC, 35A at 85°C 185°F)

Sample: HE1aN-P-DC9V-H18, 6 pcs.

Operation frequency: 6 times/min.

(ON/OFF = 1.0s : 9.0s)

Circuit:



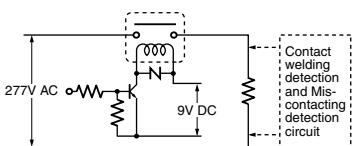
2.-(2) Electrical life test (48A type) (Resistive load 277V AC, 48A at 85°C 185°F)

Sample: HE1aN-P-DC9V-Y5, 6 pcs.

Operation frequency: 6 times/min.

(ON/OFF = 1.0s : 9.0s)

Circuit:



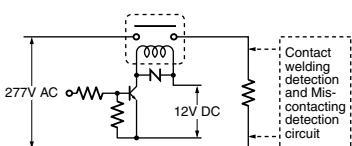
2.-(3) Electrical life test (90A type) (Resistive load 277V AC, 80A at 25°C 77°F)

Sample: HE1aN-W-DC12V-Y6, 6 pcs.

Operation frequency: 6 times/min.

(ON/OFF = 1.0s : 9.0s)

Circuit:



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

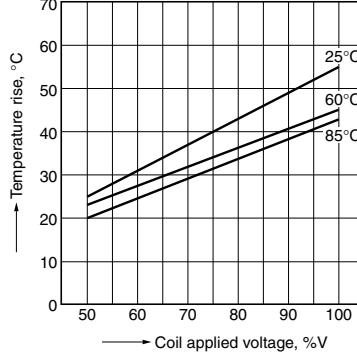
Sample: HE1aN-P-DC9V-Y5, 6 pcs.

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)

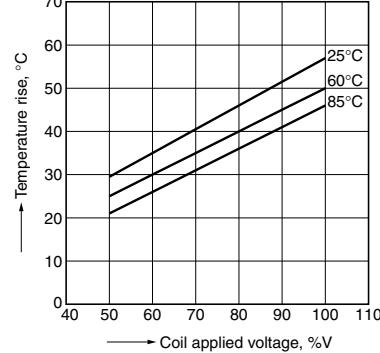
Sample: HE1aN-W-DC12V-Y6, 6 pcs.

Point measured: coil inside

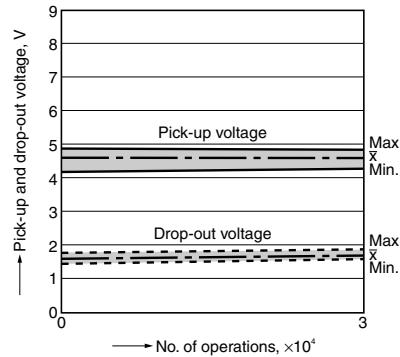
Ambient temperature: 25°C 77°F, 60°C 140°F, 85°C

185°F

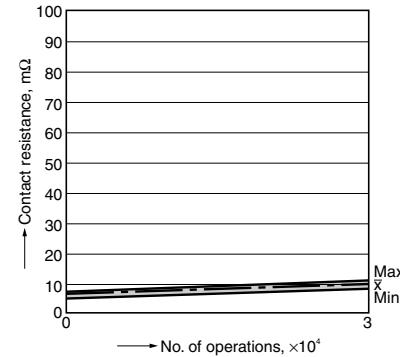
Contact carrying current: 90A



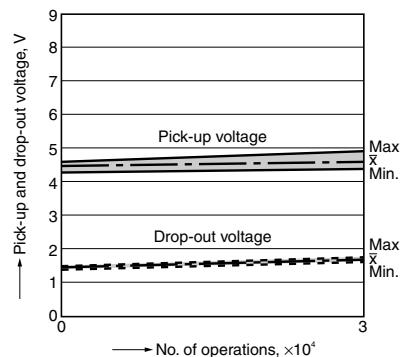
Change of pick-up and drop-out voltage



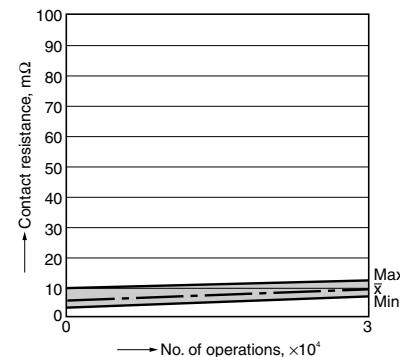
Change of contact resistance



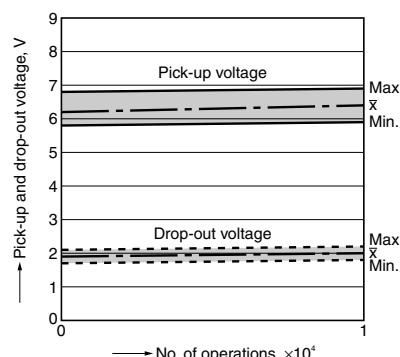
Change of pick-up and drop-out voltage



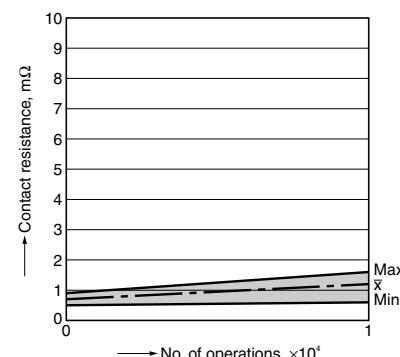
Change of contact resistance

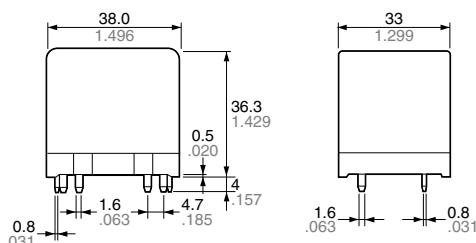


Change of pick-up and drop-out voltage

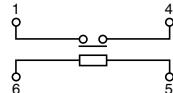
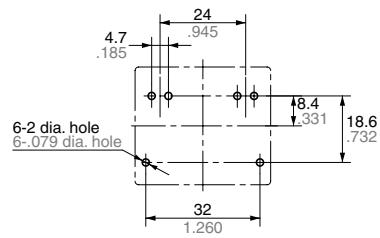


Change of contact resistance

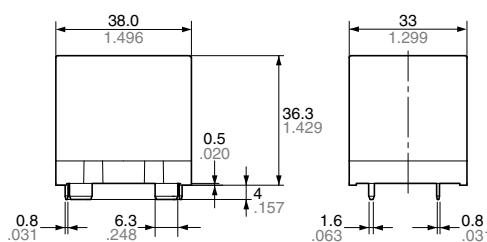


DIMENSIONS (mm inch)**1. 35A type****CAD Data****External dimensions**

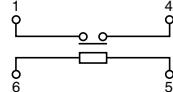
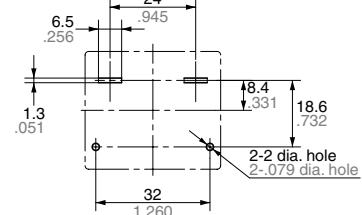
General tolerance: ±0.3 ±0.012

Schematic (Bottom view)
Single side stable type**PC board pattern (Bottom view)**

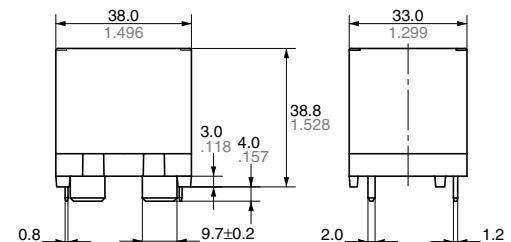
Tolerance: ±0.1 ±0.004

2. 48A type**CAD Data****External dimensions**

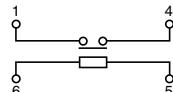
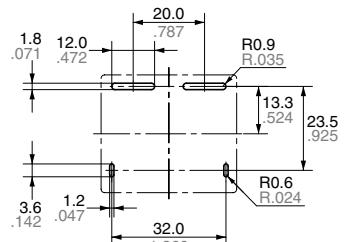
General tolerance: ±0.3 ±0.012

Schematic (Bottom view)
Single side stable type**PC board pattern (Bottom view)**

Tolerance: ±0.1 ±0.004

3. 90A type**CAD Data****External dimensions**

General tolerance: ±0.3 ±0.012

Schematic (Bottom view)
Single side stable type**PC board pattern (Bottom view)**

Tolerance: ±0.1 ±0.004

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 $\cos\phi = 1$ (at 25°C 77°F, 10k cycles)
			90A 250V AC $\cos\phi = 0.8$ (at 85°C 185°F, 1k cycles)
			80A 250V AC $\cos\phi = 0.8$ (at 85°C 185°F, 10k 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 $\cos\phi = 0.8$ (at 85°C 185°F, 30k cycles) 72A 250V AC ($\cos\phi = 0.8$ at 85°C 185°F, 50 cycles) 60A 250V AC ($\cos\phi = 0.8$ 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 $\cos\phi = 1$ (at 80°C 176°F, 50k cycles)

* CSA standard: Certified by C-UL

** Only 9V DC type is Certified by VDE

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)

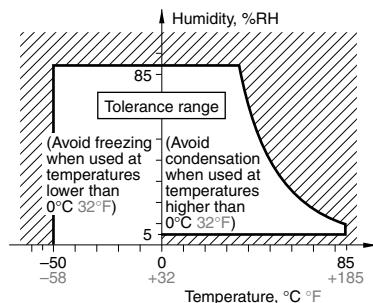
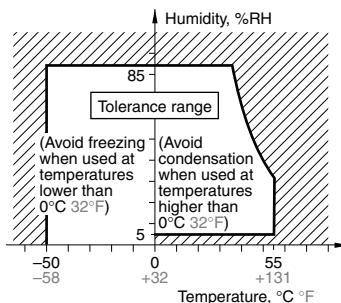
2) Humidity: 5 to 85% RH

(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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