DATA SHEET

AUTOMOTIVE AC RELAYS

AX1 SERIES

DESCRIPTION

The NEXEM AX1 series is AC relay for On Board Charger (OBC) applications of Electric Vehicle for automobiles which require high quality and high performance.

The AX1 series have higher carrying current performance for AC load.

FEATURE

- AC Load 16A/32A single relay
- High-voltage-resistant types between contacts are included in the product lineup
- Compact size , small mounting space
- High heat resistance
- Flux tight / Plastic seal type
- Pb free

APPLICATION

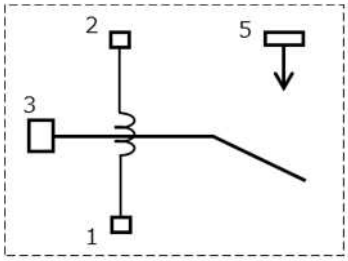
- On Board Charger (OBC) of Electric Vehicles (PHEV and BEV)



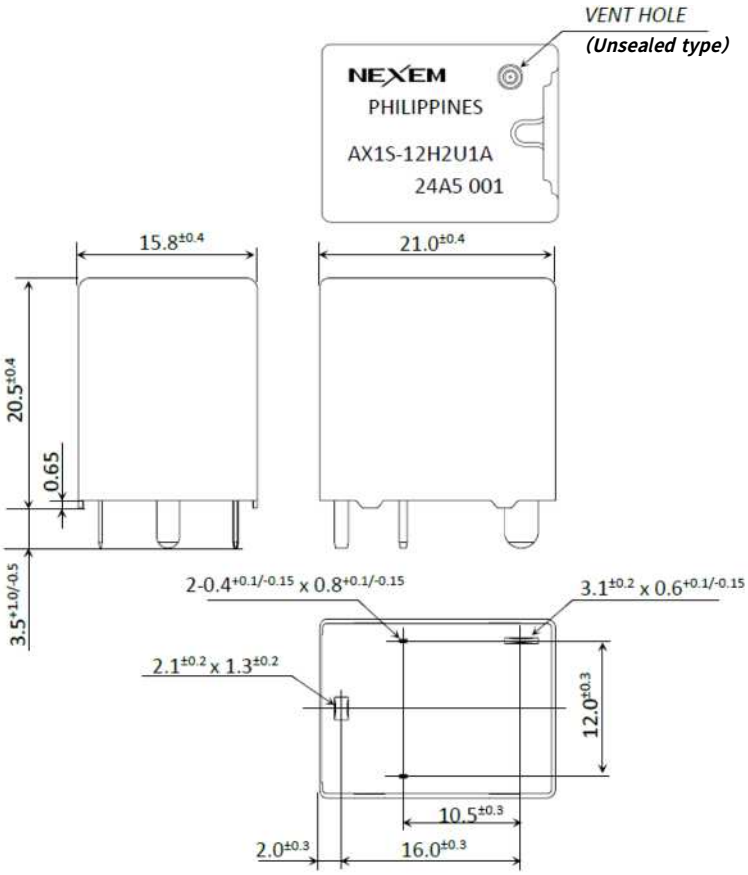
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<1a Type>

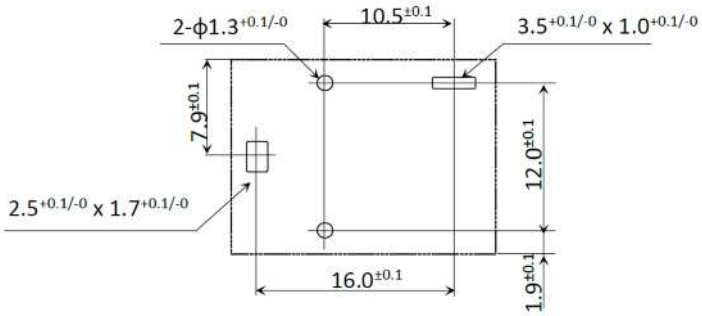
SCHEMATICS (BOTTOM VIEW)



DIMENSIONS (in mm)



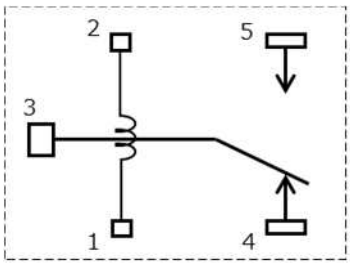
RECOMMENDED PCB PAD LAYOUT (BOTTOM VIEW) (in mm)



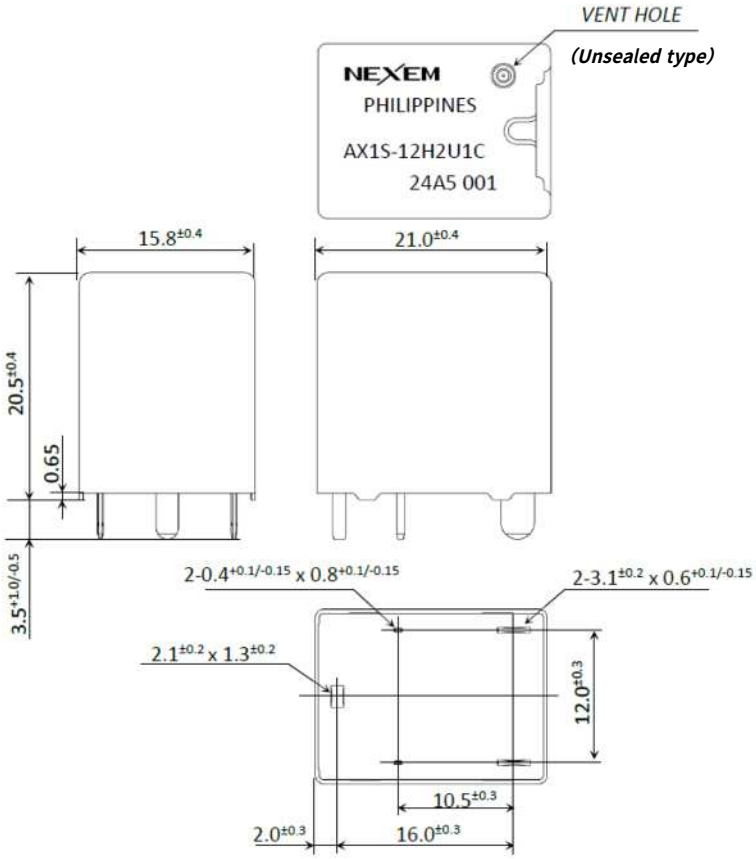
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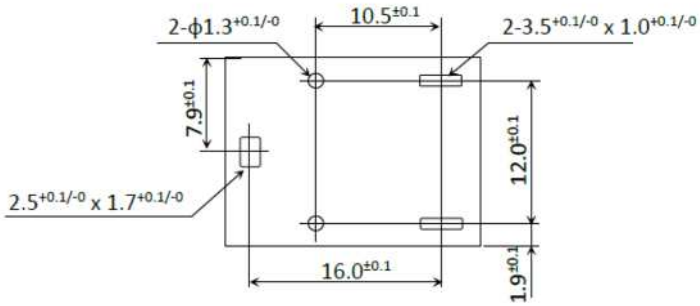
SCHEMATICS (BOTTOM VIEW)



DIMENSIONS (in mm)



RECOMMENDED PCB PAD LAYOUT (BOTTOM VIEW) (in mm)



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< Dielectric Strength (Between open contacts) 1000Vac Type>

[Rated current: 32A SPECIFICATIONS]

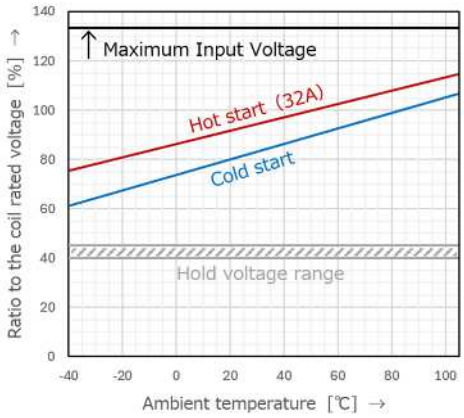
(Ambient temperature: 20°C)

Items			Specifications	
Contact form			1 form A	1 form C
Contact rating	Max. switching voltage		277Vac	
	Max. breaking current		32A	
	Max. continuous current		40A (at 105°C, initial)	
	Contact resistance		10mΩ max. (20A 6Vdc, initial)	
	Rated load		277Vac 32A, Resistive load	
Contact material			Ag alloy	
Operate time (1)			15ms max.	
Release time (1)			10ms max.	
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc	
	Dielectric strength	Between open contacts	1000Vac, 50/60Hz 1minute	
		Between coil and contact	4000Vac, 50/60Hz 1minute	
Shock resistance	Misoperation		98m/s^2	
	Destructive failure		980m/s^2	
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA	
	Destructive failure			
Ambient temperature (2)			-40 to +105°C (no freezing and condensation)	
Life expectancy	Mechanical		300,000 cycles	
	Electrical (N/O) (3)		Making 25A, Carrying 32A, Breaking 25A, 277Vac at 105°C 10,000cycles	
	Electrical (N/C) (3)		-	Making 5A, Carrying 32A, Breaking 5A, 277Vac at 105°C 10,000cycles
Weight			Approx. 15g	

(1) Excluding contact bounce without flywheel coil diode.

(2) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the “ambient temperature and operate voltage” as the energization voltage before applying the holding voltage.
Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(3) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



Ambient temperature and operate voltage

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< Dielectric Strength (Between open contacts) 1000Vac Type>

[Rated current: 16A SPECIFICATIONS]

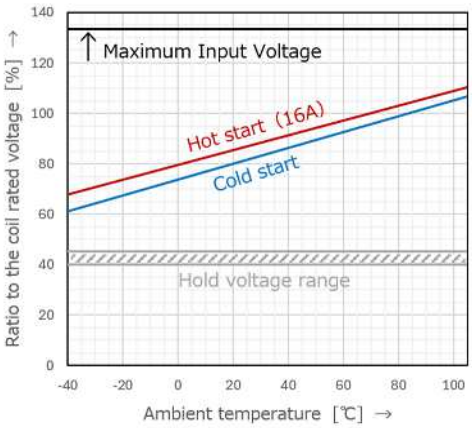
(Ambient temperature: 20°C)

Items			Specifications	
Contact form			1 form A	1 form C
Contact rating	Max. switching voltage		277Vac	
	Max. breaking current		16A	
	Max. continuous current		20A (at 105°C, initial)	
	Contact resistance		10mΩ max. (20A 6Vdc, initial)	
	Rated load		277Vac 16A, Resistive load	
Contact material			Ag alloy	
Operate time (4)			15ms max.	
Release time (4)			10ms max.	
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc	
	Dielectric strength	Between open contacts	1000Vac, 50/60Hz 1minute	
		Between coil and contact	4000Vac, 50/60Hz 1minute	
Shock resistance	Misoperation		98m/s^2	
	Destructive failure		980m/s^2	
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA	
	Destructive failure			
Ambient temperature (5)			-40 to +105°C (no freezing and condensation)	
Life expectancy	Mechanical		300,000 cycles	
	Electrical (N/O) (6)		16A- 277Vac at 105°C, 10,000cycles	
	Electrical (N/C) (6)		-	Making 5A, Carrying 16A, Breaking 5A, 277Vac at 105°C 10,000cycles
Weight			Approx. 15g	

(4) Excluding contact bounce without flywheel coil diode.

(5) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the "ambient temperature and operate voltage" as the energization voltage before applying the holding voltage.
Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(6) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



Ambient temperature and operate voltage

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< Dielectric Strength (Between open contacts) 1000Vac Type>

[COIL]

(Ambient temperature: 20°C)

Nominal Voltage (VDC)	Coil Resistance (Ω)±10%	Must Operate Voltage (7) (VDC)	Must Release Voltage (7) (VDC)	Holding voltage (8) (VDC)	Power consumption (W)
12	120	9.6	0.6	40~45% of rated voltage	0.22W(Holding voltage) 1.2W(12V)

(7) Test by pulse voltage

(8) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

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< Dielectric Strength (Between open contacts) 1500Vac Type>

[Rated current: 32A SPECIFICATIONS]

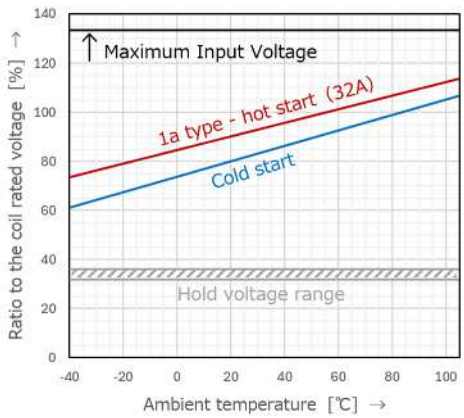
(Ambient temperature: 20°C)

Items			Specifications
Contact form			1 form A
Contact rating	Max. switching voltage		600Vac
	Max. breaking current		32A
	Max. continuous current		40A (at 105°C, initial)
	Contact resistance		10mΩ max. (20A 6Vdc, initial)
	Rated load		277Vac 32A, Resistive load
Contact material			Ag alloy
Operate time (9)			15ms max.
Release time (9)			10ms max.
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc
	Dielectric strength	Between open contacts	1500Vac, 50/60Hz 1minute
		Between coil and contact	4000Vac, 50/60Hz 1minute
Shock resistance	Misoperation		98m/s^2
	Destructive failure		980m/s^2
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA
	Destructive failure		
Ambient temperature(10)			-40 to +105°C (no freezing and condensation)
Life expectancy	Mechanical		100,000 cycles
	Electrical (11)		Making 16A, Carrying 32A, Breaking 16A, 277Vac at 105°C 10,000cycles
Weight			Approx. 15g

(9) Excluding contact bounce without flywheel coil diode.

(10) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the “ambient temperature and operate voltage” as the energization voltage before applying the holding voltage.
Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(11) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



Ambient temperature and operate voltage

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< Dielectric Strength (Between open contacts) 1500Vac Type>

[Rated current: 16A SPECIFICATIONS]

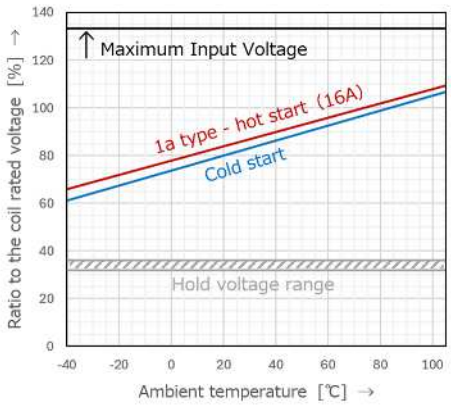
(Ambient temperature: 20°C)

Items			Specifications
Contact form			1 form A
Contact rating	Max. switching voltage		600Vac
	Max. breaking current		16A
	Max. continuous current (17)		20A (at 105°C, initial)
	Contact resistance		10mΩ max. (20A 6Vdc, initial)
	Rated load		277Vac 16A, Resistive load
Contact material			Ag alloy
Operate time (12)			15ms max.
Release time (12)			10ms max.
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc
	Dielectric strength	Between open contacts	1500Vac, 50/60Hz 1minute
		Between coil and contact	4000Vac, 50/60Hz 1minute
Shock resistance	Misoperation		98m/s^2
	Destructive failure		980m/s^2
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA
	Destructive failure		
Ambient temperature (13)			-40 to +105°C (no freezing and condensation)
Life expectancy	Mechanical		100,000 cycles
	Electrical (14)		16A- 277Vac at 105°C, 10,000cycles
Weight			Approx. 15g

(12) Excluding contact bounce without flywheel coil diode.

(13) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the “ambient temperature and operate voltage” as the energization voltage before applying the holding voltage. Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(14) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



Ambient temperature and operate voltage

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< Dielectric Strength (Between open contacts) 1500Vac Type>

[COIL]

(Ambient temperature: 20°C)

Nominal Voltage (VDC)	Coil Resistance (Ω)±10%	Must Operate Voltage (15) (VDC)	Must Release Voltage (15) (VDC)	Holding voltage (16) (VDC)	Power consumption (W)
5	15	4.0	0.25	32~36% of rated voltage	0.19W(Holding voltage) 1.67W(5V)
12	86	9.6	0.6	32~36% of rated voltage	0.19W(Holding voltage) 1.67W(12V)

(15) Test by pulse voltage

(16) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

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< Dielectric Strength (Between open contacts) 2000Vac Type>

[Rated current: 32A SPECIFICATIONS]

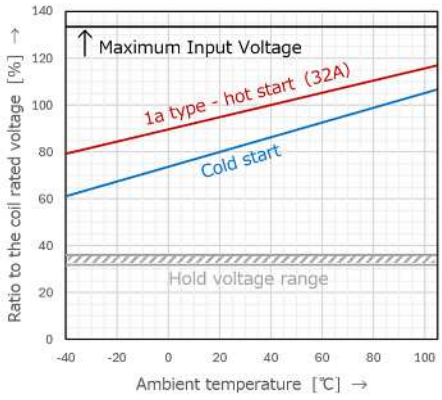
(Ambient temperature: 20°C)

Items			Specifications
Contact form			1 form A
Contact rating	Max. switching voltage		600Vac
	Max. breaking current		32A
	Max. continuous current (23)		40A (at 105°C, initial)
	Contact resistance		10mΩ max. (20A 6Vdc, initial)
	Rated load		277Vac 32A, Resistive load
Contact material			Ag alloy
Operate time (17)			15ms max.
Release time (17)			10ms max.
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc
	Dielectric strength	Between open contacts	2000Vac, 50/60Hz 1minute
		Between coil and contact	4000Vac, 50/60Hz 1minute
Shock resistance	Misoperation		98m/s^2
	Destructive failure		980m/s^2
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA
	Destructive failure		
Ambient temperature(18)			-40 to +105°C (no freezing and condensation)
Life expectancy	Mechanical		100,000 cycles
	Electrical (29)		Making 10A, Carrying 32A, Breaking 10A, 277Vac at 105°C 10,000cycles
Weight			Approx. 15g

(17) Excluding contact bounce without flywheel coil diode.

(18) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the “ambient temperature and operate voltage” as the energization voltage before applying the holding voltage. Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(19) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



Ambient temperature and operate voltage

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< Dielectric Strength (Between open contacts) 2000Vac Type>

[Rated current: 16A SPECIFICATIONS]

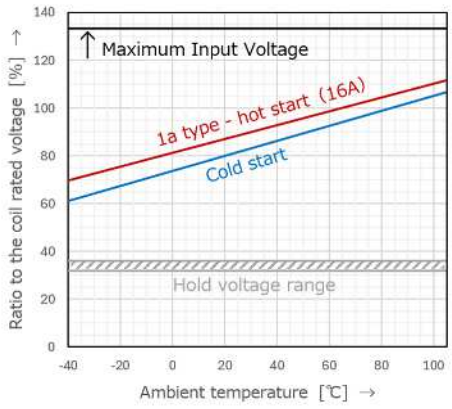
(Ambient temperature: 20°C)

Items			Specifications
Contact form			1 form A
Contact rating	Max. switching voltage		600Vac
	Max. breaking current		16A
	Max. continuous current (28)		20A (at 105°C, initial)
	Contact resistance		10mΩ max. (20A 6Vdc, initial)
	Rated load		277Vac 16A, Resistive load
Contact material			Ag alloy
Operate time (20)			15ms max.
Release time (20)			10ms max.
Insulation	Insulation resistance		1000MΩ min. at 1000Vdc
	Dielectric strength	Between open contacts	2000Vac, 50/60Hz 1minute
		Between coil and contact	4000Vac, 50/60Hz 1minute
Shock resistance	Misoperation		98m/s^2
	Destructive failure		980m/s^2
Vibration resistance	Misoperation		10 to 55Hz, 1.5mm DA
	Destructive failure		
Ambient temperature (21)			-40 to +105°C (no freezing and condensation)
Life expectancy	Mechanical		100,000 cycles
	Electrical (22)		Making 10A, Carrying 16A, Breaking 10A, 277Vac at 105°C 10,000cycles
Weight			Approx. 16g

(20) Excluding contact bounce without flywheel coil diode.

(21) When high-temperature operation or a hot start (transition to the ON state) is required, apply a voltage to the coil that exceeds the “ambient temperature and operate voltage” as the energization voltage before applying the holding voltage. Please contact EM Devices Corporation for information regarding hot-start characteristics during energization at the end of life (EOL).

(22) This performance is Flux tight type. Regarding performance of plastic sealed type, please contact EM Devices Corporation.



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< Dielectric Strength (Between open contacts) 2000Vac Type>

[COIL]

(Ambient temperature: 20°C)

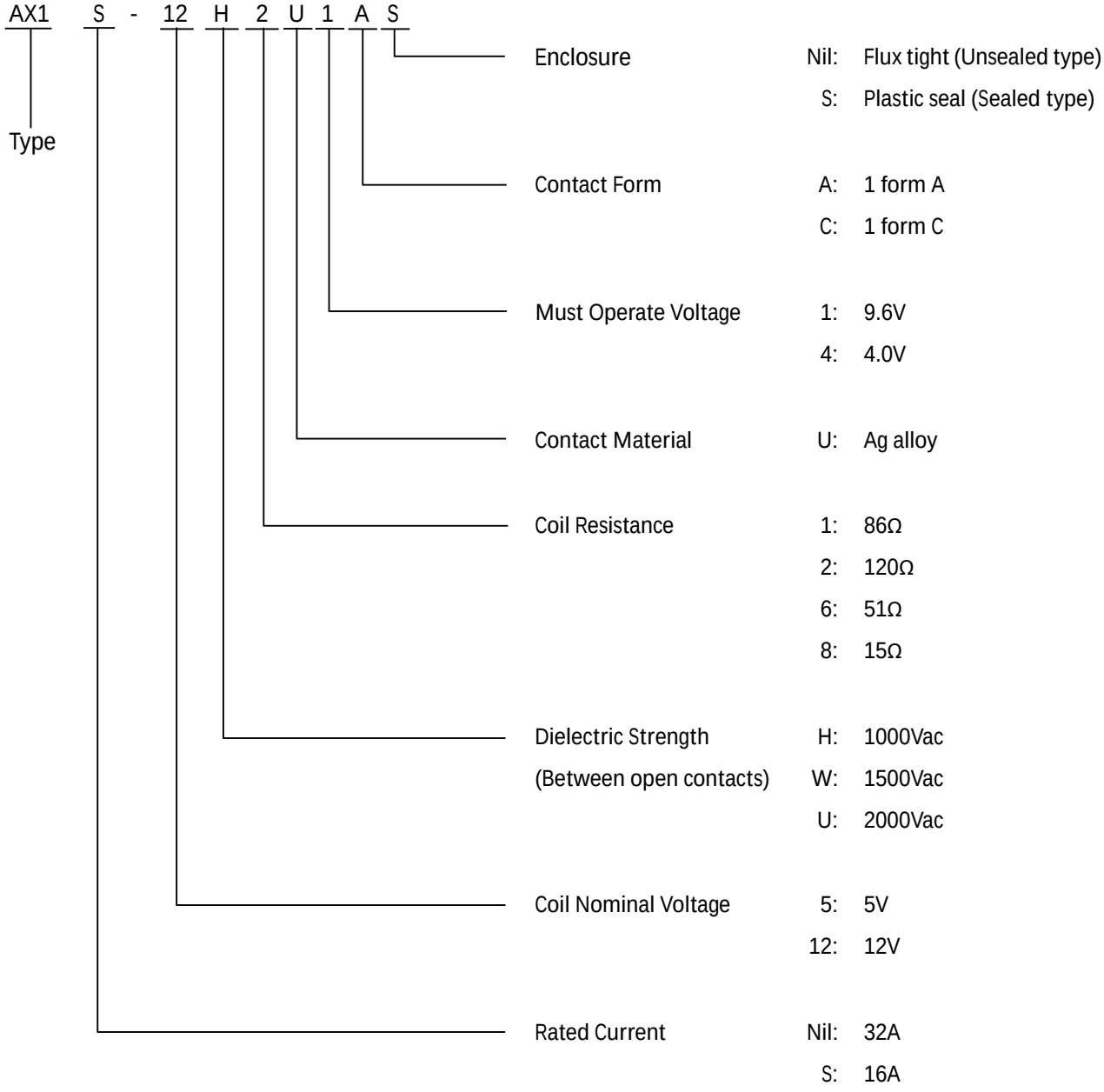
Nominal Voltage (VDC)	Coil Resistance (Ω)±10%	Must Operate Voltage (23) (VDC)	Must Release Voltage (23) (VDC)	Holding voltage (24) (VDC)	Power consumption (W)
12	51	9.6	0.6	32~36% of rated voltage	0.33W(Holding voltage) 2.8W(12V)

(23) Test by pulse voltage

(24) After the rated voltage is applied to the coil for 200ms, the coil excitation voltage is reduced to the holding voltage.

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PART NUMBER SYSTEM



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Rated Current	Contact Form	Coil Nominal Voltage	Coil Resistance	Dielectric Strength (Between open contacts)	Flux tight (Unsealed type)	Plastic seal (Sealed type)
16A	1a	12VDC	120Ω	1000Vac	AX1S-12H2U1A	AX1S-12H2U1AS
	1c	12VDC	120Ω	1000Vac	AX1S-12H2U1C	AX1S-12H2U1CS
	1a	5VDC	15Ω	1500Vac	AX1S-5W8U4A	AX1S-5W8U4AS
	1a	12VDC	86Ω	1500Vac	AX1S-12W1U1A	AX1S-12W1U1AS
	1a	12VDC	51Ω	2000Vac	AX1S-12U6U1A	AX1S-12U6U1AS
32A	1a	12VDC	120Ω	1000Vac	AX1-12H2U1A	AX1-12H2U1AS
	1c	12VDC	120Ω	1000Vac	AX1-12H2U1C	AX1-12H2U1CS
	1a	5VDC	15Ω	1500Vac	AX1-5W8U4A	AX1-5W8U4AS
	1a	12VDC	86Ω	1500Vac	AX1-12W1U1A	AX1-12W1U1AS
	1a	12VDC	51Ω	2000Vac	AX1-12U6U1A	AX1-12U6U1AS

[Notes]

- EM Devices recommends that the usage of the coating agent close to the relay is to be avoided.
- Please take care of the relay orientation installed in a car to avoid the malfunction by the vibration, impact and so on. If you have any questions, please contact EM Devices Corporation.

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