NEC

AUTOMOTIVE RELAYS
EQ1 SERIES

DESCRIPTION

The new NEC EQI Series automotive relays are designed for motor and lamp control applications that require a high level of quality and performance. The EQ1 has a unique two-piece design for the magnetic circuit, which result in small size, light weight, and high productivity.

FEATURES

- PC board mounting
- Same pin-layout as MR301
- Approx. 70% less relay volume than MR301
- Approx. 80% less relay space than MR301
- Approx. 90% less relay height than MR301
- Approx. 60% less relay weight than MR301

APPLICATIONS

- Motor control
- Heater control
- Solenoid control
- Lamp control

EQ1 SERIES

For Proper Use of Miniature Relays

DO NOT EXCEED MAXIMUM RATING

Do not use relay under excessive conditions such as over ambient temperature, over voltage and over current. Incorrect use could result in abnormal heating and damage to the relay or other parts.

READ CAUTIONS IN THE SELECTION GUIDE.

Read the cautions described in NEC's "Miniature Relays" (ER0046EJ*) before dose designing your relay application.

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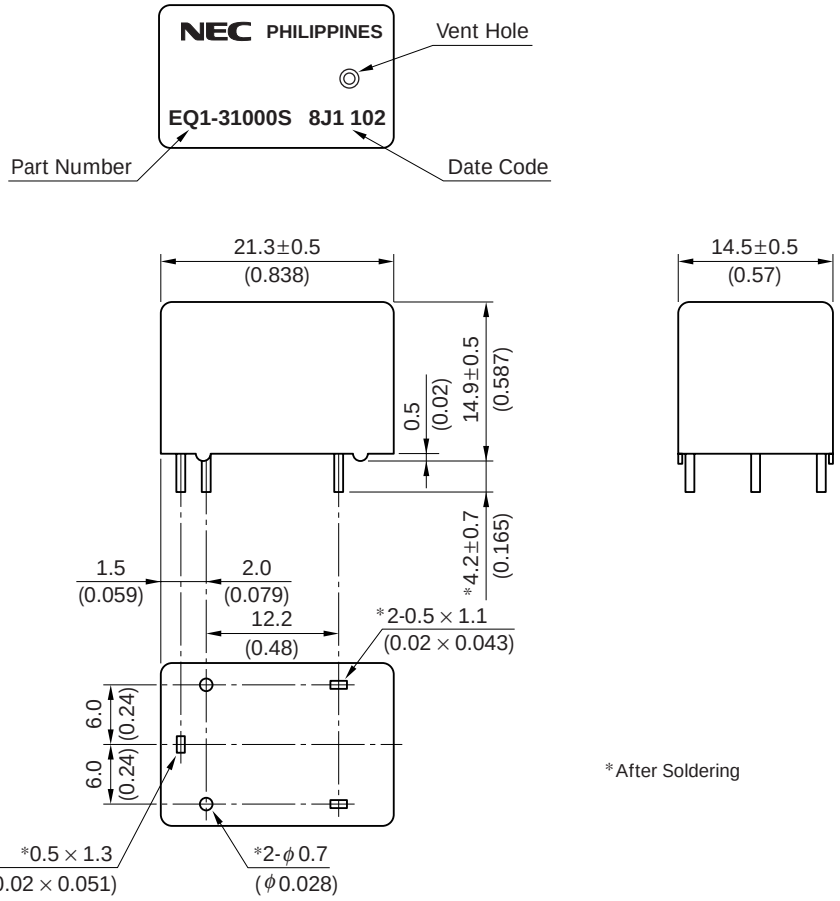
Printed in Japan

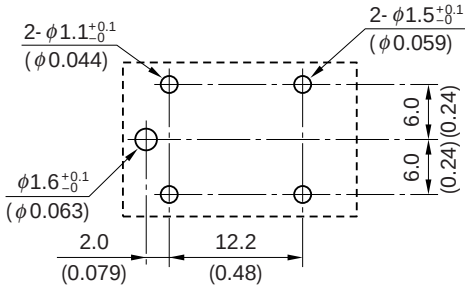
SCHEMATIC (BOTTOM VIEW)

<1 Form c> <1 Form a>

DIMENSIONS mm (inch)



PCB PAD LAYOUT mm (inch) (BOTTOM VIEW)



SPECIFICATION

(at 20°C)

Items		For motor control		For lamp and LCR circuit control	
		EQ1-31000S	EQ1-11040S	EQ1-11111S	EQ1-22111S
Contact Form		1 Form c		1 Form a	
Contact Rating	Max. Switching Voltage	16 Vdc			
	Max. Switching Current	35 A (at 16 Vdc)			
	Contact Resistance	Typical 5 mΩ (measured at 1 A) Initial			
Contact Material		Silver oxide complex alloy			
Operate Time (Excluding Bounce)		Typical 3 ms (at Nominal Voltage)			
Release Time (Excluding Bounce) *		Typical 4 ms (at Nominal Voltage)			
Nominal Operate Power		640 mW	1000 mW		800 mW
Insulation Resistance		100 MΩ (at 500 Vdc)			
Breakdown Voltage	Between Open Contact	500 Vac min. (for 1 minute)			
	Between Coil and Contact	500 Vac min. (for 1 minute)			
Shock Resistance	Misoperation	98 m/s^2 (10 G)			
	Destructive Failure	980 m/s^2 (100 G)			
Vibration Resistance	Misoperation	10 to 300 Hz, 43 m/s^2 (4.4 G)			
	Destructive Failure	10 to 500 Hz, 43 m/s^2 (4.4 G) 200 hour			
Ambient Temperature		–40 to +85°C (–40 to 185°F)			
Coil Temperature Rise		60°C/W (108°F/W)			
Life Expectancy	Mechanical	1×10^6 operations			
	Motor : 25 A lock	100×10^3 operations		–	
	Lamp : 108 W Tungsten	–		100×10^3 operations	
	Lamp : 120 W Halogen	–		100×10^3 operations	
	LCR circuit : 70 A peak	–		100×10^3 operations	
Weight		Approx. 9 g (0.32 oz)			

* with diode

COIL RATING

◆ SEALED TYPE

(at 20°C)

Items / Applications		Part Number	Nominal Voltage (Vdc)	Coil Resistance (Ω ±10%)	Must Operate Voltage (Vdc)	Must Release Voltage (Vdc)
Motor Control	General-Purpose	EQ1-31000S	12	225	6.5	0.9
	For Jump Start	EQ1-11040S		144	6.5	0.6
Lamp and LCR circuit control		EQ1-22111S		180	7.2	0.9
		EQ1-11111S		144	6.5	0.6

◆ UNSEALED TYPE

(at 20°C)

Items / Applications		Part Number	Nominal Voltage (Vdc)	Coil Resistance (Ω ±10%)	Must Operate Voltage (Vdc)	Must Release Voltage (Vdc)
Motor Control	General-Purpose	EQ1-31000	12	225	6.5	0.9
	For Jump Start	EQ1-11040		144	6.5	0.6
Lamp and LCR circuit control		EQ1-22111		180	7.2	0.9
		EQ1-11111		144	6.5	0.6

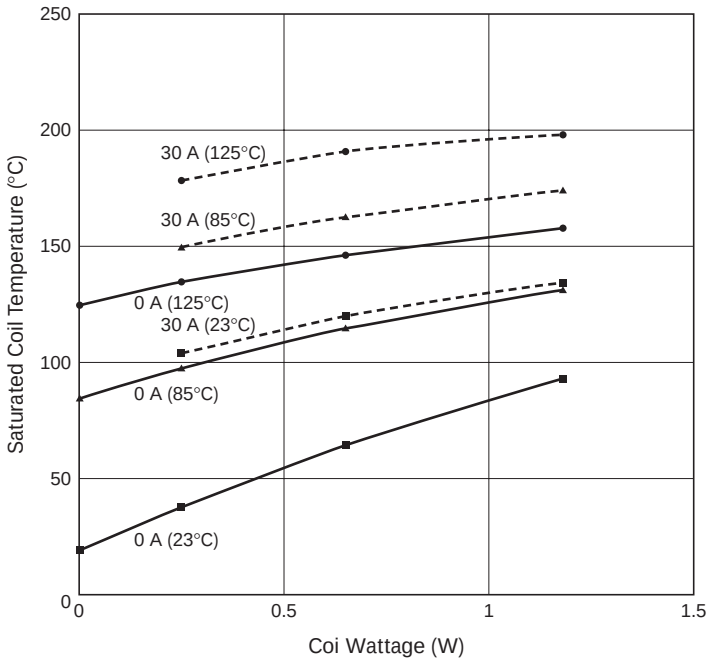
NUMBERING SYSTEM

EQ1–3 1 000 S

- Enclosure: Nil : Unsealed / S : Sealed
- Specific Code: 000 ~ 999
- Must Operate Voltage (at 20°C): 1 : 6.5 V / 2 : 7.2 V
- Coil Resistance (at 20°C): 1 : 144 Ω / 2 : 180 Ω / 3 : 225 Ω

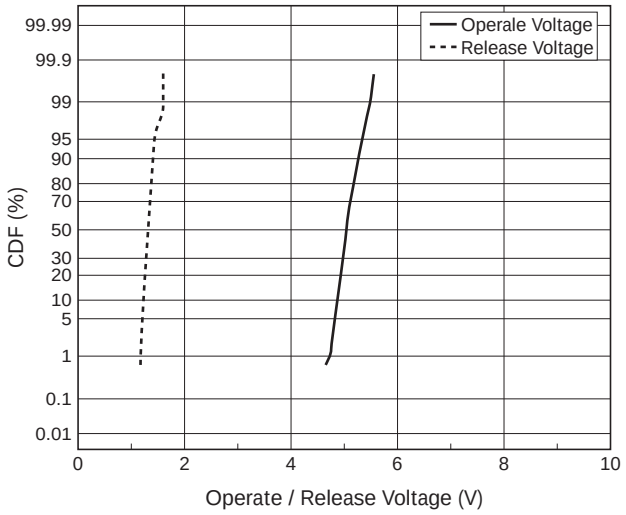
TECHNICAL DATA

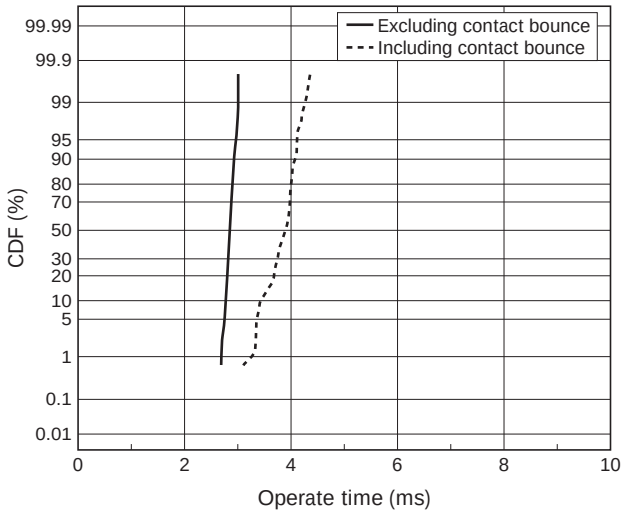
Coil Temperature Rise

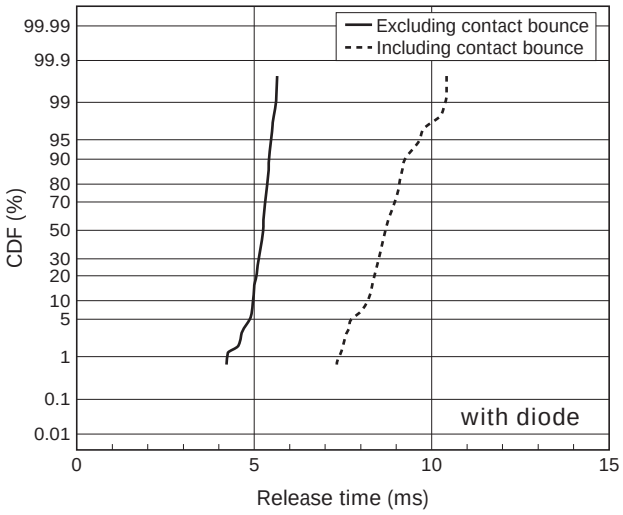


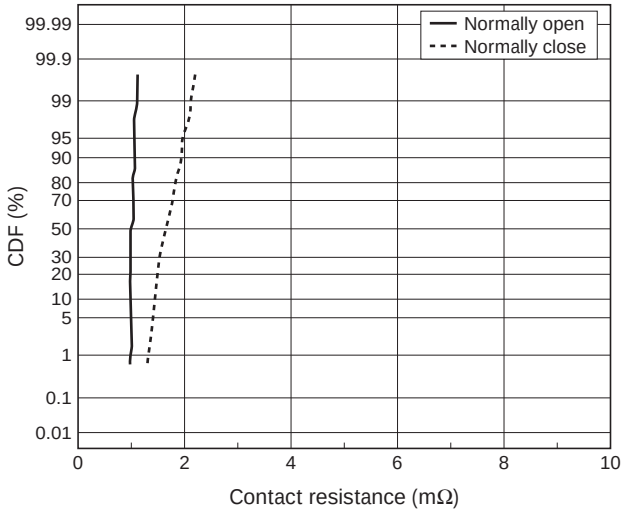
RELAY CHARACTERISTICS DISTRIBUTION (INITIAL)

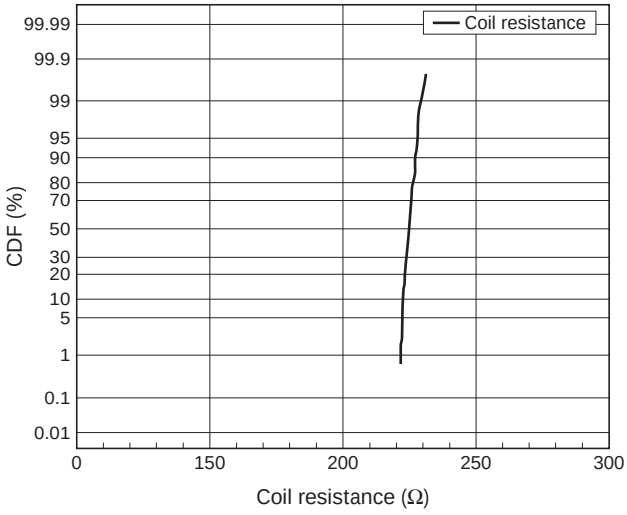
- EQ1-31000S
- 200 pieces



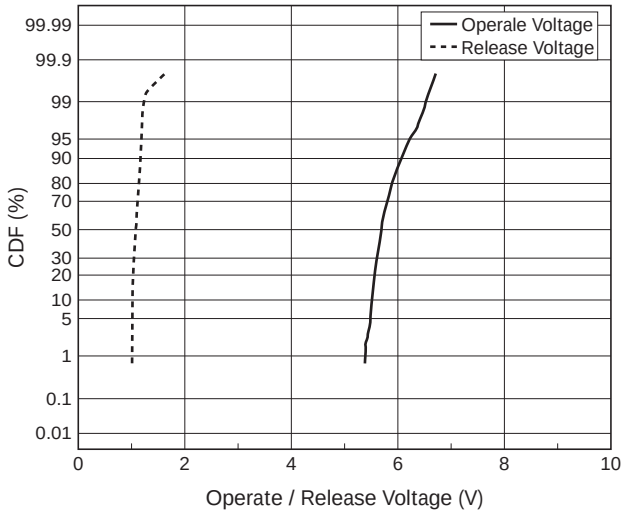


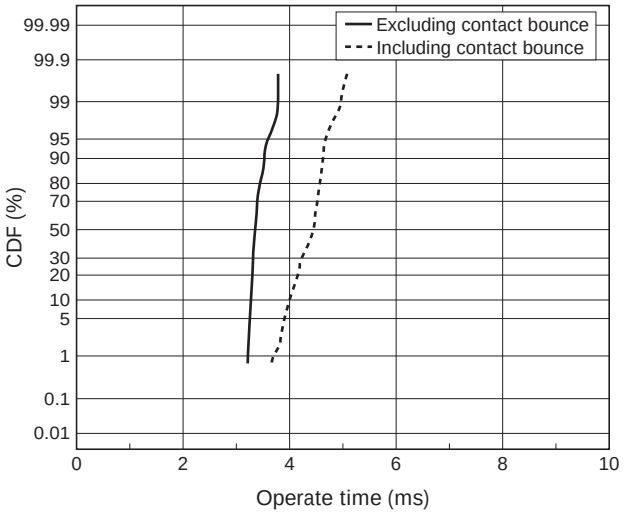


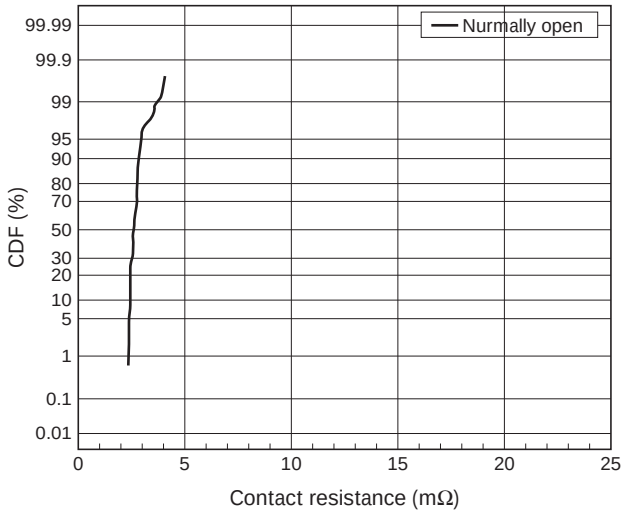


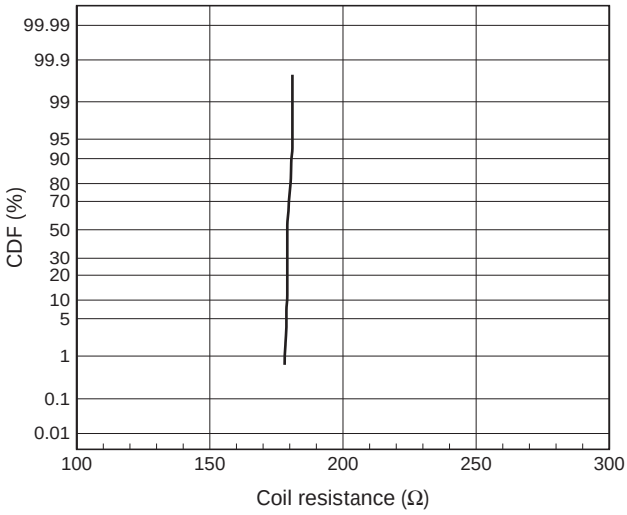


• EQ1-22111S
• 200 pieces







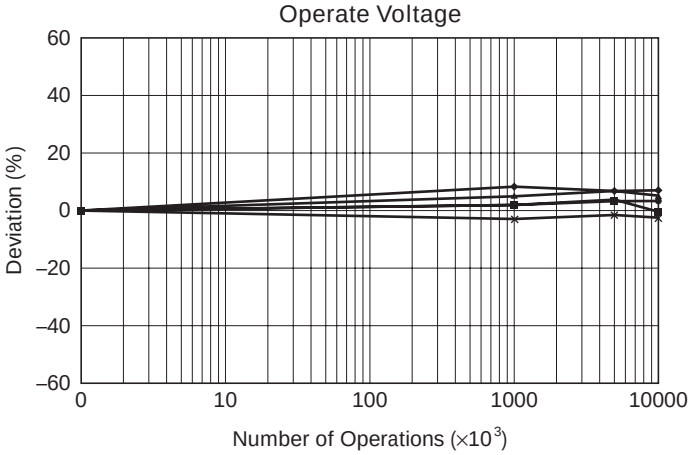


DURABILITY LIFE

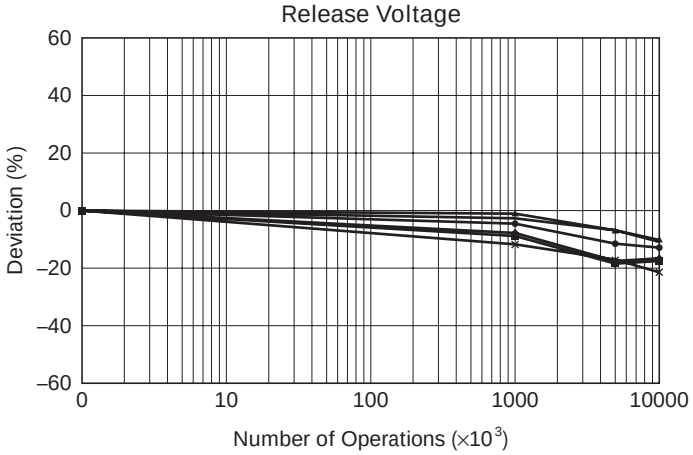
Mechanical Life Test

- Ambient Temperature : 23°C
- Frequency : 12.5 Hz (50% duty)
- Contact Load : No Load
- Number of Operations : 10×10^6
- Samples : EQ1-31000S 10 pieces

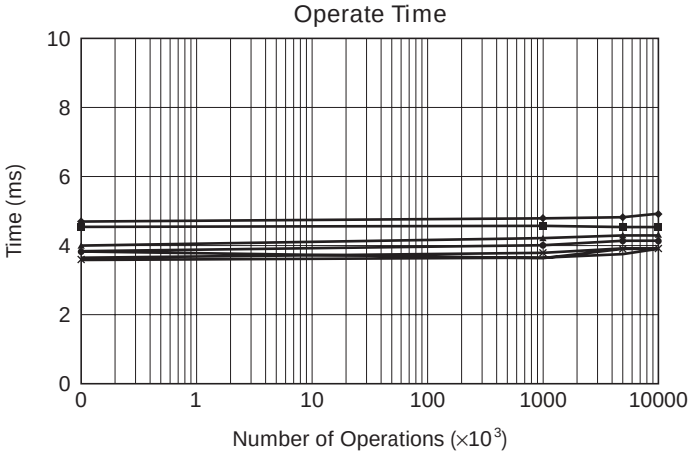
Operate Voltage



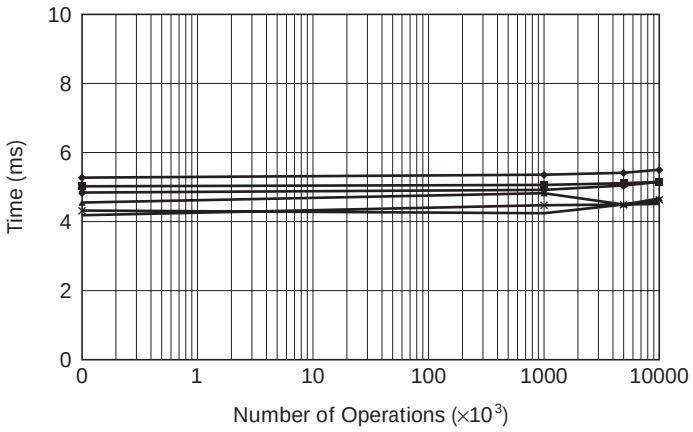
Release Voltage



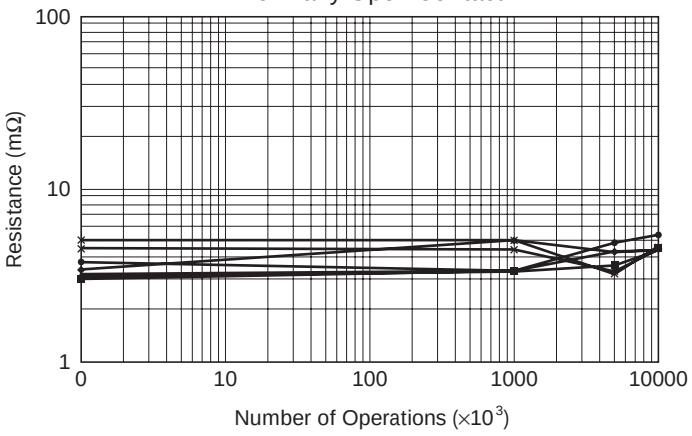
Operate Time



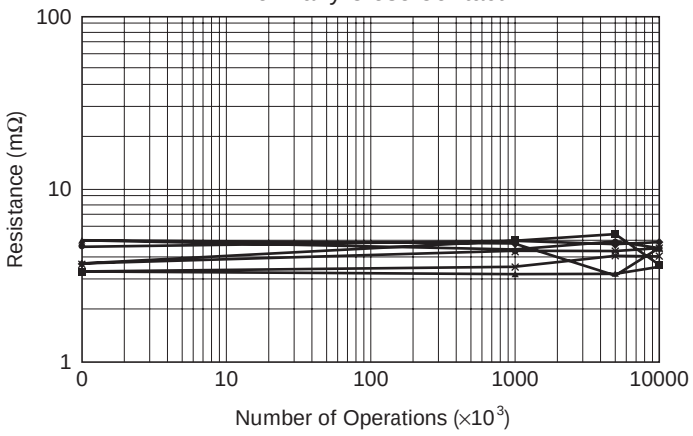
Release Time



Contact Resistance of Normally Open Contact

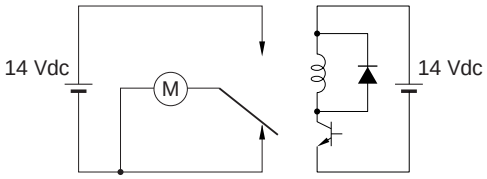


Contact Resistance of Normally Close Contact

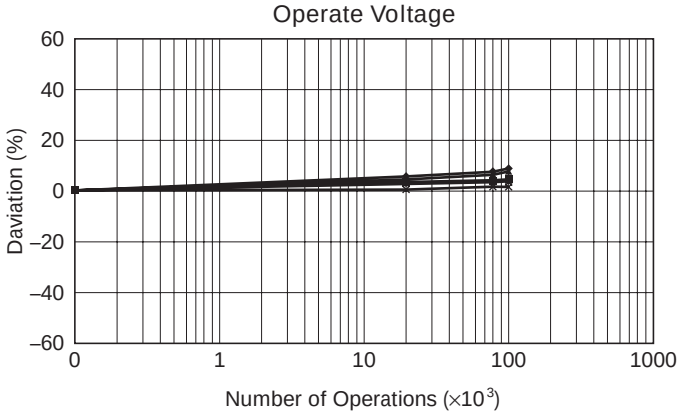


Electrical Life Test 1

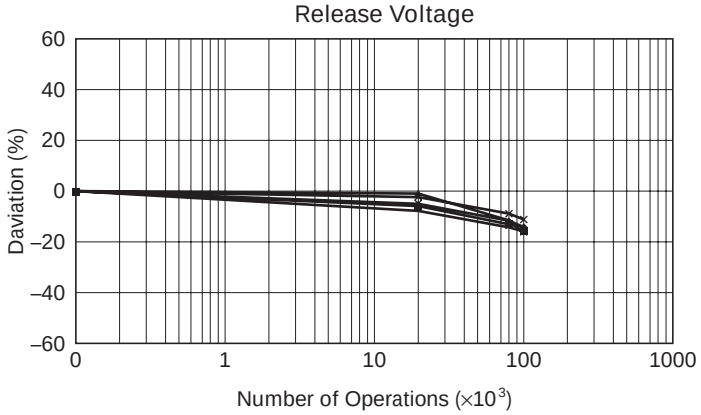
- Ambient Temperature : 23°C
- Frequency : 0.2s ON, 9.8s OFF, 0.1 Hz
- Contact Load : 14 Vdc, 25 A, Locked motor
- Number of Operations : 200×10^3
- Samples : EQ1-31000S 10 pieces



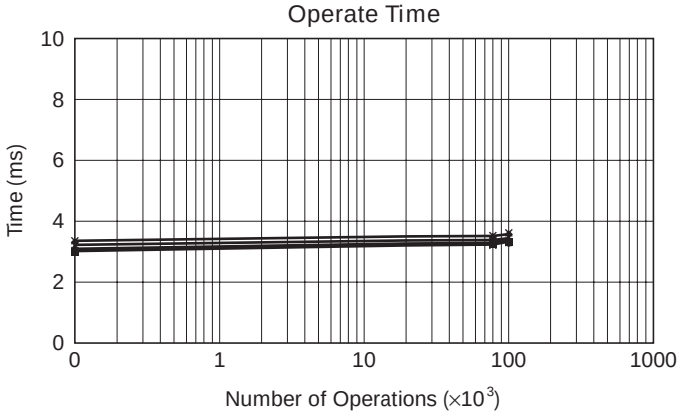
Operate Voltage



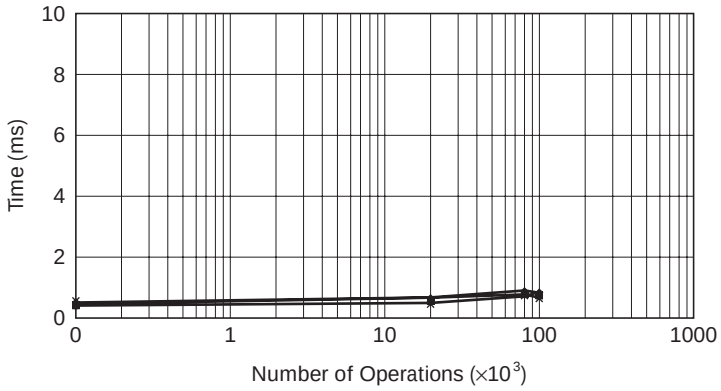
Release Voltage



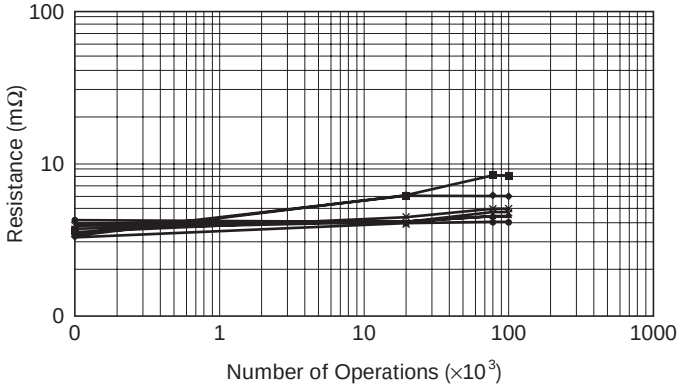
Operate Time



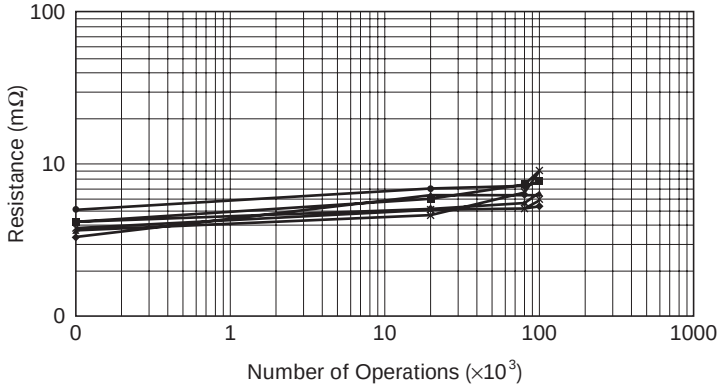
Release Time



Contact Resistance of Normally Open Contact

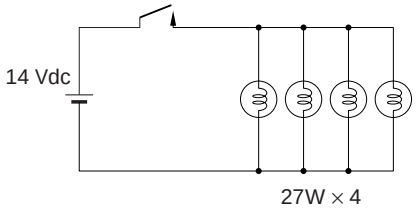


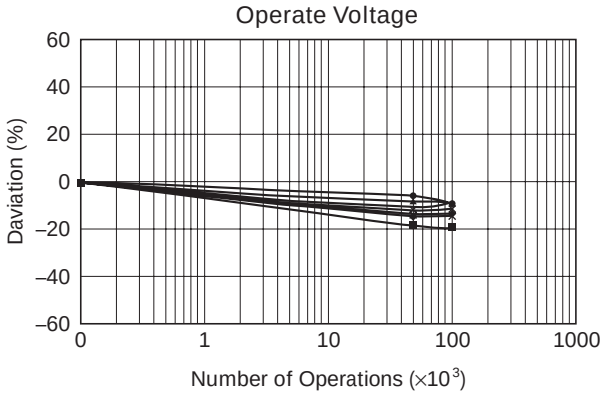
Contact Resistance of Normally Close Contact

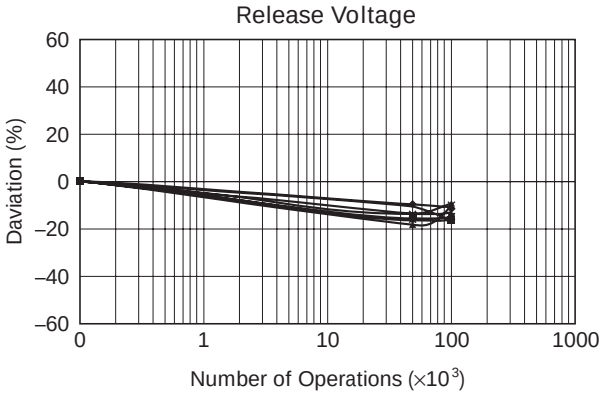


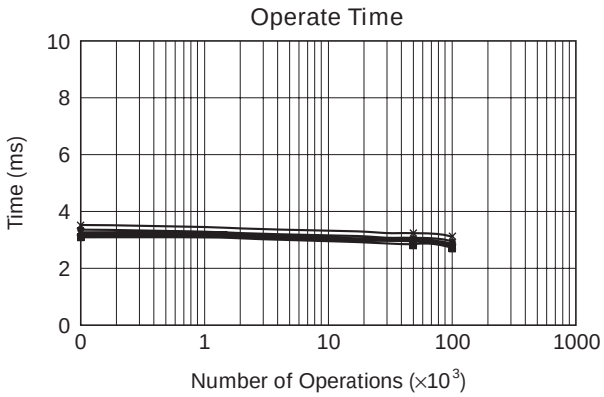
Electrical Life Test 2

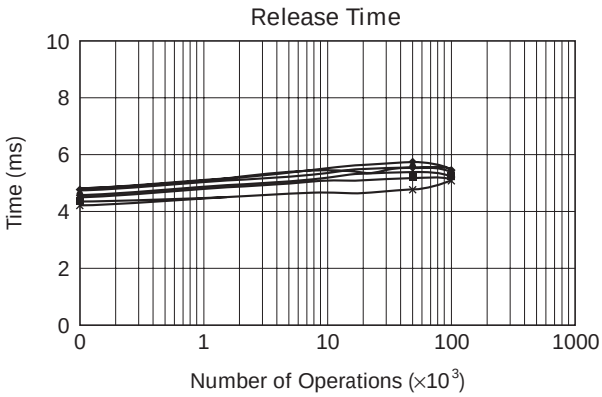
- Ambient Temperature : 23°C
- Frequency : 1s ON, 29s OFF
- Contact Load : 14 Vdc, 108 W, Tungsten Lamp
- Number of Operations : 100×10^3
- Samples : EQ1-22111S 10 pieces

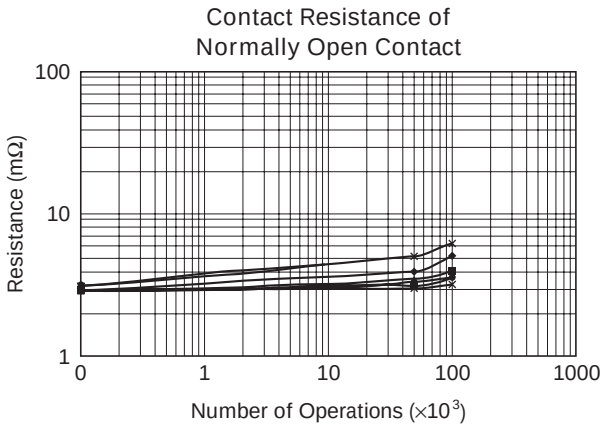


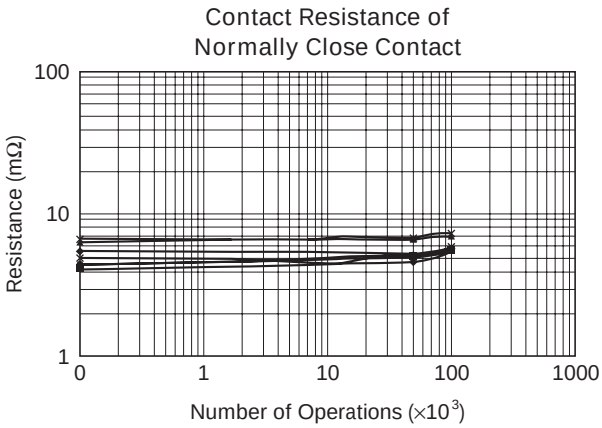






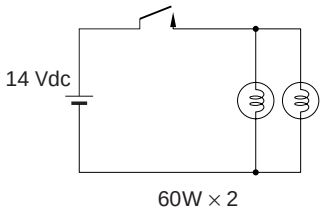


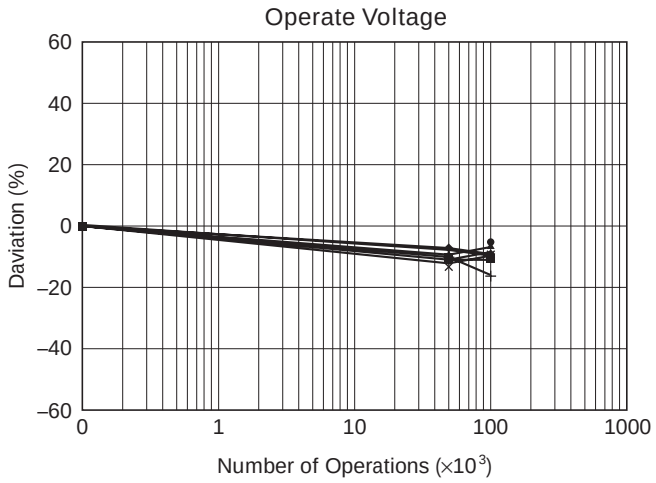


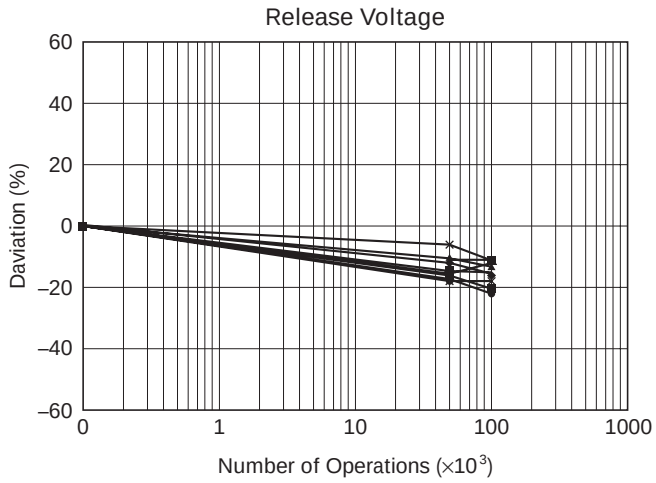


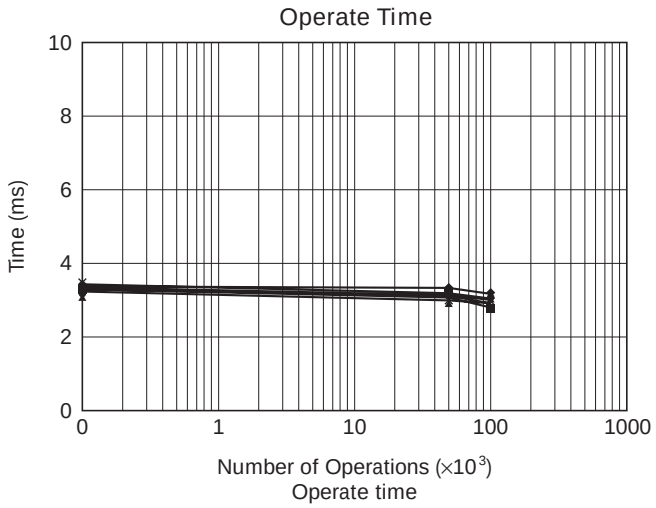
Electrical Life Test 3

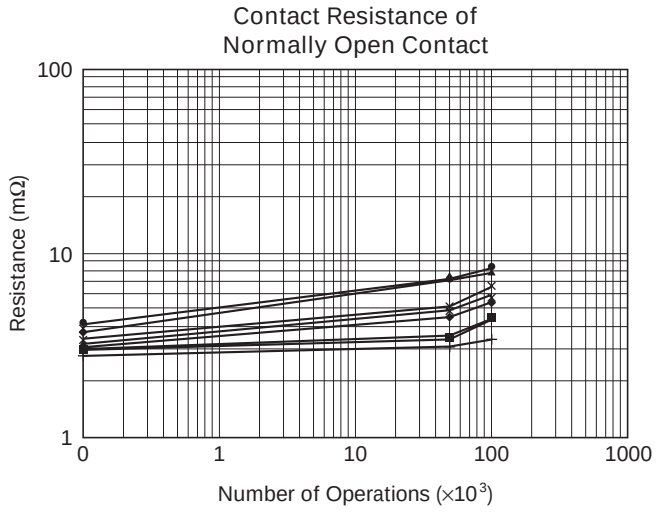
- Ambient temperature : 23°C
- Frequency : 1s ON, 29s OFF
- Contact load : 14 Vdc, 120 W, Halogen Lamp
- Number of operations : 100×10^3
- Samples : EQ1-22111S, 10 pieces











Electrical Life Test 4

- Ambient temperature : 23°C
- Frequency : 20ms ON, 3.98s OFF
- Contact load : 14 Vdc, LCR circuit
- Number of operations : 100×10^3
- Samples : EQ1-22111S, n=10