

AUTOMOTIVE RELAYS

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
- $\,\circ\,$ 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.

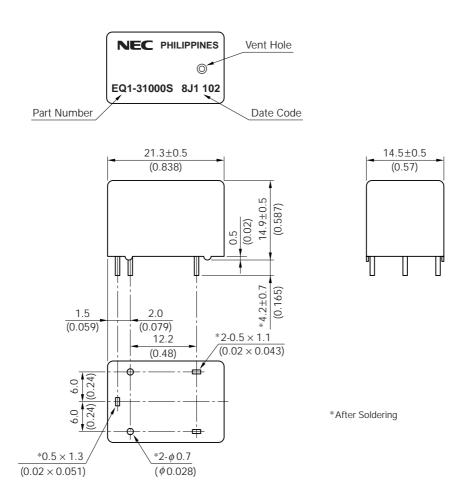
Read the cautions described in NEC's "Miniature Relays" (ER0046EJ*) before dose designing your relay application.

The information in this document is subject to change without notice.

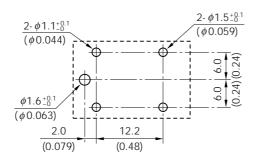
SCHEMATIC (BOTTOM VIEW)



DIMENSIONS mm (inch)



PCB PAD LAYOUT mm (inch) (BOTTOM VIEW)



SPECIFICATION

(at 20°C)	(at	20°C)
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		For motor control		For lamp and LCR circuit control		
Items		EQ1-31000S	EQ1-11040S	EQ1-11111S	EQ1-22111S	
Contact Form		1 Fo	rm c	1 Fo	1 Form a	
	Max. Switching Voltage	16 Vdc				
Contact Rating	Max. Switching Current	35 A (at 16 Vdc)				
	Contact Resistance	Typical 5 m Ω (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 i		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	Misoperation	98 m/s² (10 G)				
Resistance	Destructive Failure	980 m/s² (100 G)				
Vibration	Misoperation	10 to 300 Hz, 43 m/s ² (4.4 G)				
Resistance	Destructive Failure	10 to 500 Hz, 43 m/s ² (4.4 G) 200 hour				
Ambient Tempe	erature	-40 to +85°C (-40 to 185°F)				
Coil Temperature Rise		60°C/W (108°F/W)				
	Mechanical	1 × 10 ⁶ operations				
Life Expectancy	Motor : 25 A lock	100 × 10 ³ operations –		-		
	Lamp : 108 W Tungsten	– 100 × 10 ³ operation		operations		
	Lamp : 120 W Halogen	- 100 × 10 ³ operations		operations		
	LCR circuit : 70 A peak	- 100 × 10 ³ operations		operations		
Weight		Approx. 9 g (0.32 oz)				

* with diode

COIL RATING

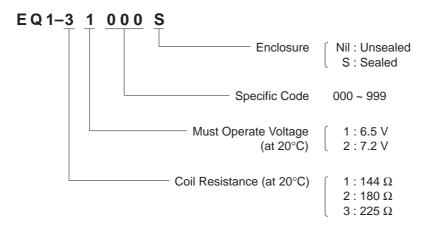
♦ SEALED TYPE

◆ SEALED TYPE (at 20°C)						
\sim	Items		Nominal	Coil	Must	Must
		Part Number	Voltage	Resistance	Operate	Release
					Voltage	Voltage
Applicatio	ons		(Vdc)	(Ω±10%)	(Vdc)	(Vdc)
Motor	General-Purpose	EQ1-31000S		225	6.5	0.9
Control	For Jump Start	EQ1-11040S	12	144	6.5	0.6
Lamp and	nd LCR circuit control	EQ1-22111S	12	180	7.2	0.9
		EQ1-11111S		144	6.5	0.6

♦ UNSEALED TYPE

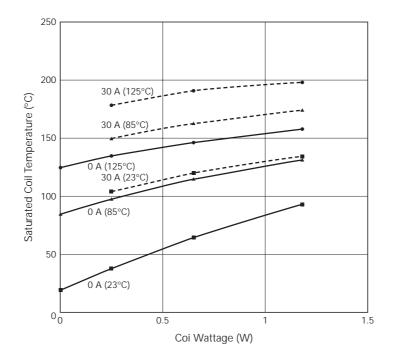
◆ UNSEALED TYPE (at 20°C)						
	Items		Nominal	Coil	Must	Must
		Part Number	Voltage	Resistance	Operate	Release
					Voltage	Voltage
Applicatio	ons		(Vdc)	(Ω±10%)	(Vdc)	(Vdc)
Motor Control	General-Purpose	EQ1-31000	12	225	6.5	0.9
	For Jump Start	EQ1-11040		144	6.5	0.6
	d LCR circuit control	EQ1-22111	12	180	7.2	0.9
		EQ1-11111		144	6.5	0.6

NUMBERING SYSTEM



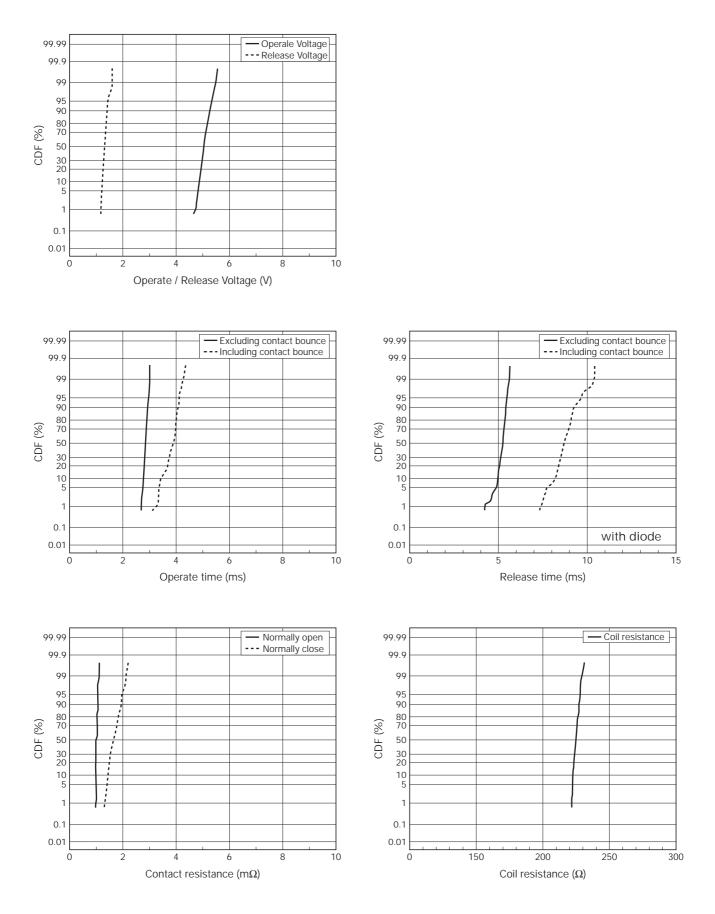
TECHNICAL DATA

Coil Temperature Rise



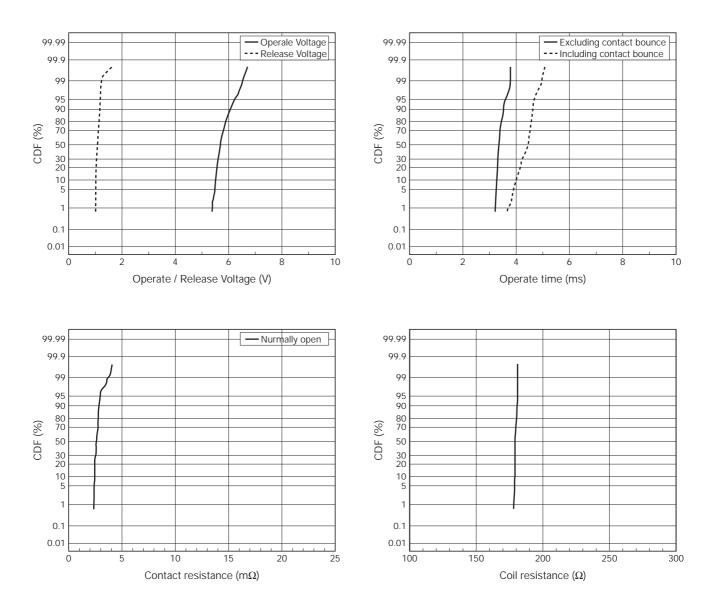
RELAY CHARACTERISTICS DISTRIBUTION (INITIAL)

- EQ1-31000S
- 200 pieces



• EQ1-22111S

• 200 pieces

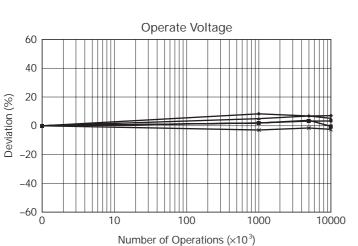


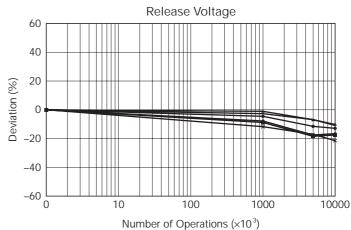
NEC

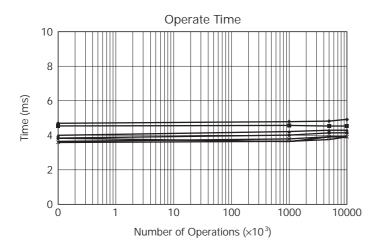
DURABILITY LIFE

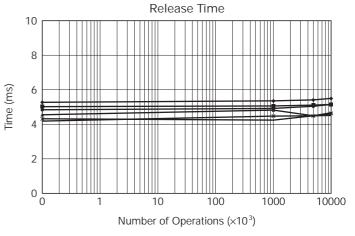
Mechanical	l ife	Test
IVIECHALIICAL	LIIE	1621

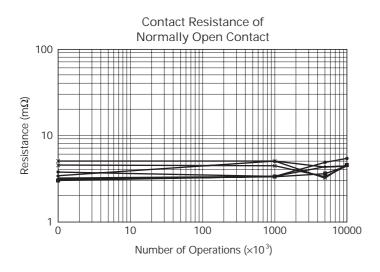
- Ambient Temperature : 23°C
- Frequency : 12.5 Hz (50% duty)
- Contact Load : No Load
- Number of Operations $: 10 \times 10^6$
- Samples
- : 10 × 10° : EQ1-31000S 10 pieces



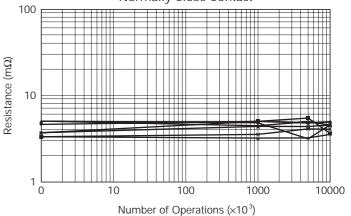














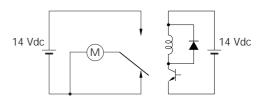
Electrical Life Test 1

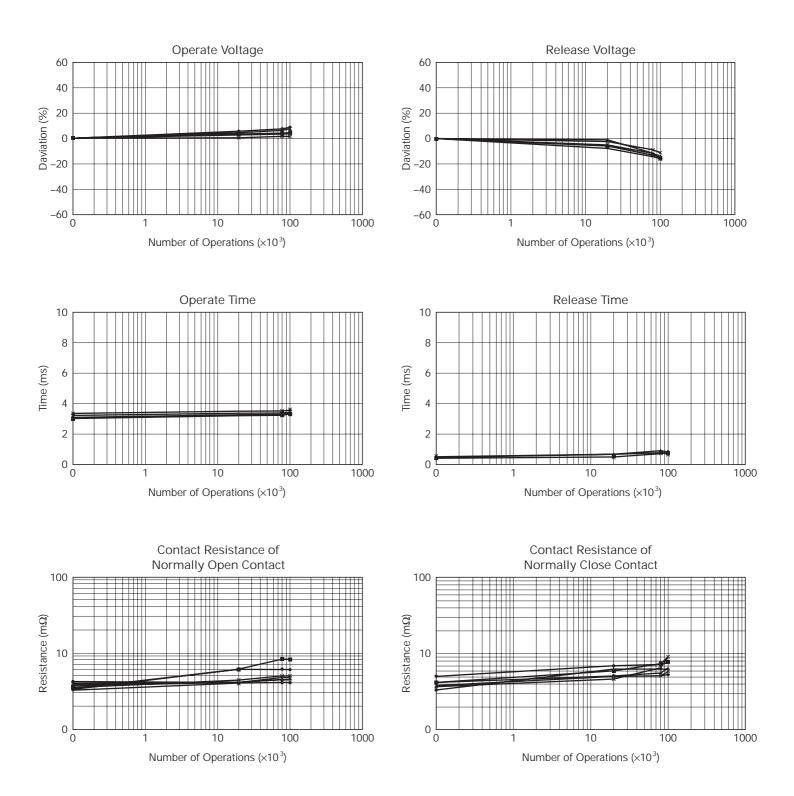
- Ambient Temperature
- Frequency
- Contact Load
- Number of Operations
- Samples
- : 14 Vdc, 25 A, Locked motor : 200×10^3

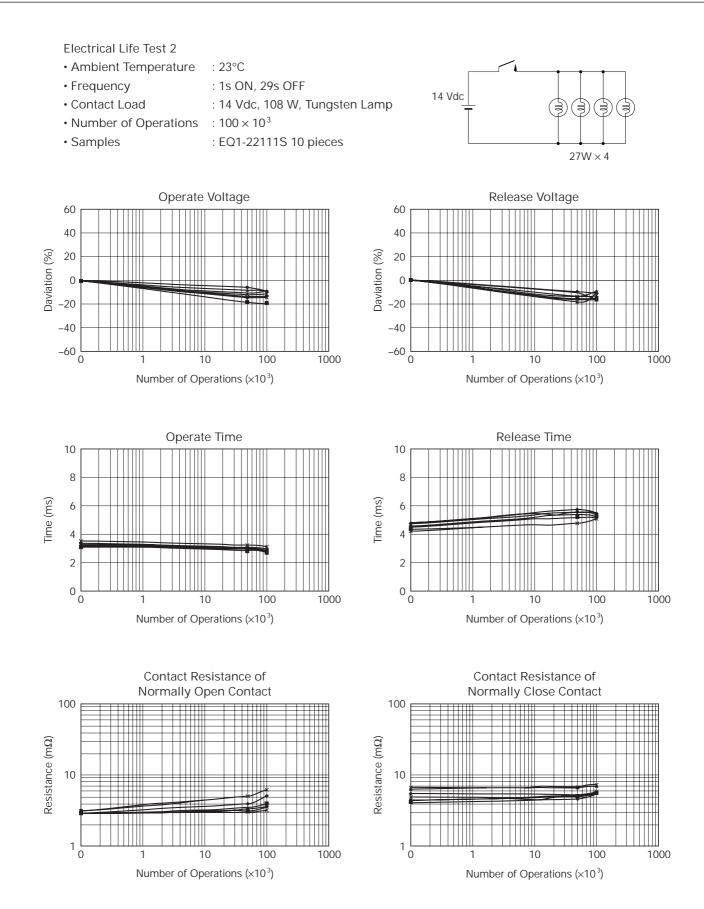
: 0.2s ON, 9.8s OFF, 0.1 Hz

: EQ1-31000S 10 pieces

: 23°C







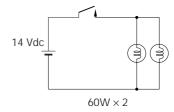
NEC

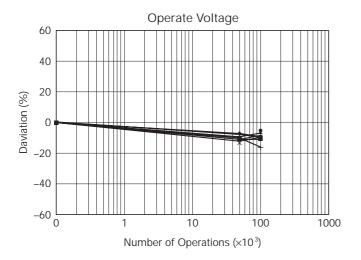


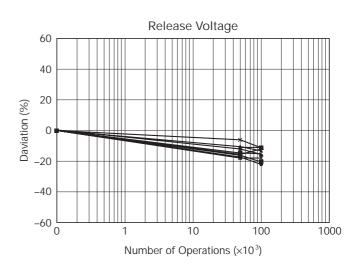
EQ1 SERIES

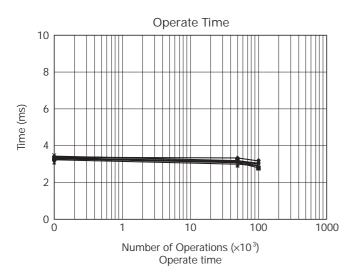
Electrical Life Test 3

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

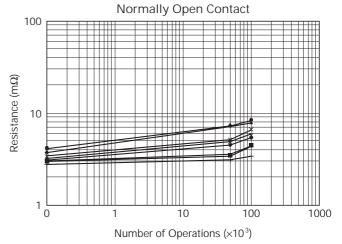








Contact Resistance of





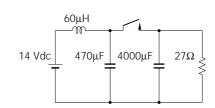
EQ1 SERIES

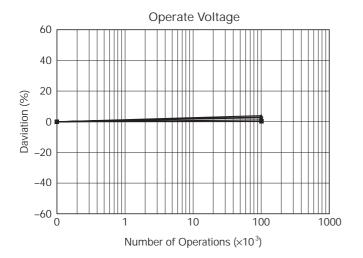
Electrical Life Test 4

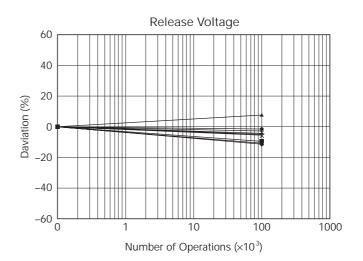
- Ambient temperature
- Frequency
- Contact load
- Number of operations
- Samples
- : 20ms ON, 3.98s OFF : 14 Vdc, LCR circuit

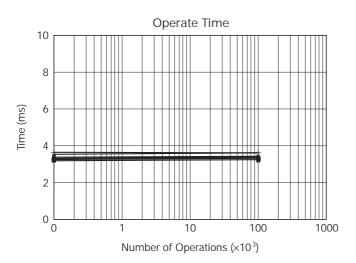
: 23°C

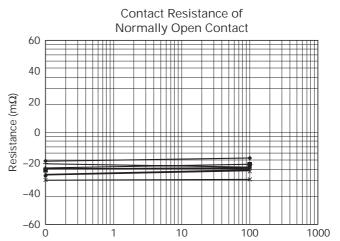
- : 100 × 10³
- : EQ1-22111S, n=10











Number of Operations (×10³)



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- Special: Transportation equipment (automobiles, trains, ships, etc.), traffic control systems, anti-disaster systems, anti-crime systems, safety equipment and medical equipment (not specifically designed for life support)
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Anti-radioactive design is not implemented in this product.