

# 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
- O Approx. 80% less relay space than MR301
- O Approx. 90% less relay height than MR301
- O Approx. 60% less relay weight than MR301

#### **APPLICATIONS**

- Motor control
- Heater control
- O 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.

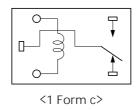
### READ CAUTIONS IN THE SELECTION GUIDE.

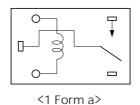
Read the cautions described in NEC's "Miniature Relays" (ER0046EJ\*) before dose designing your relay application.

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

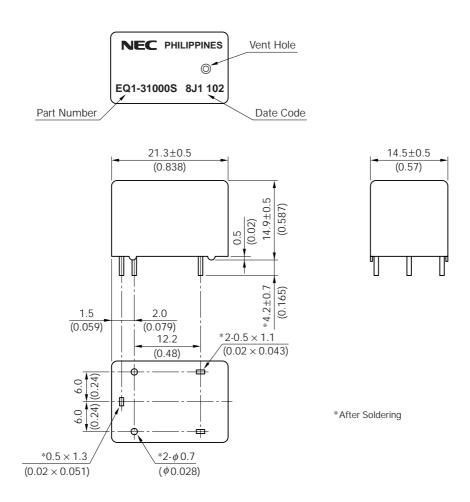


## SCHEMATIC (BOTTOM VIEW)

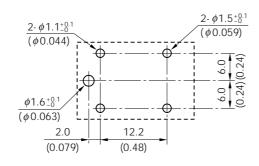




## DIMENSIONS mm (inch)



# PCB PAD LAYOUT mm (inch) (BOTTOM VIEW)





SPECIFICATION (at 20°C)

		For motor control For lamp and LCR circuit control				
	Items	EQ1-31000S	EQ1-11040S	EQ1-11111S	EQ1-22111S	
Contact Form	contact Form		1 Form c 1 Form a			
	Max. Switching Voltage	16 Vdc				
Contact Rating	Max. Switching Current	35 A (at 16 Vdc)				
	Contact Resistance	Typical 5 m $\Omega$ (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	1000 mW 80		
Insulation Resist	ance	100 MΩ (at 500 Vdc)				
Breakdown	Between Open Contact	500 Vac min. (for 1 minute)				
Voltage	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/s² (4.4 G)				
Resistance	Destructive Failure	10 to 500 Hz, 43 m/s <sup>2</sup> (4.4 G) 200 hour				
Ambient Temper	rature	-40 to +85°C (-40 to 185°F)				
Coil Temperature	e Rise	60°C/W (108°F/W)				
Life Expectancy	Mechanical	1 × 10 <sup>6</sup> operations				
	Motor : 25 A lock	100 × 10³ operations –		-		
	Lamp : 108 W Tungsten	- 100 × 10³ opera		perations		
	Lamp : 120 W Halogen	- 100 × 10³ operation		perations		
	LCR circuit : 70 A peak	- 100 × 10 <sup>3</sup> operatio		perations		
Weight		Approx. 9 g (0.32 oz)				

<sup>\*</sup> with diode

## **COIL RATING**

♦ SEALED TYPE (at 20°C)

Items		Nominal	Coil	Must	Must	
		Part Number	Voltage	Resistance	Operate	Release
					Voltage	Voltage
Applications			(Vdc)	(Ω ±10%)	(Vdc)	(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	12	180	7.2	0.9
		EQ1-11111S		144	6.5	0.6

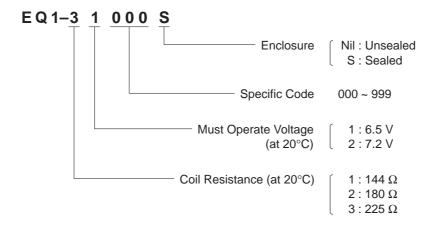
♦ UNSEALED TYPE (at 20°C)

(at 20 C						
Items Part N			Nominal	Coil	Must	Must
		Part Number	Voltage	Resistance	Operate	Release
					Voltage	Voltage
Applications			(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
Lamp and LCR circuit control		EQ1-22111	12	180	7.2	0.9
		EQ1-11111		144	6.5	0.6

3

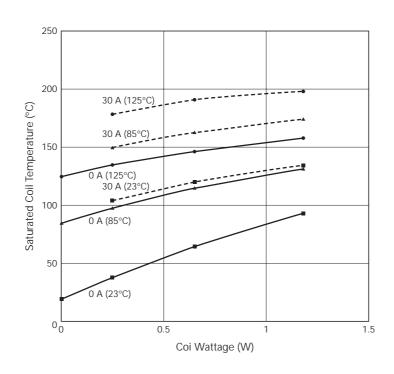


## **NUMBERING SYSTEM**



## TECHNICAL DATA

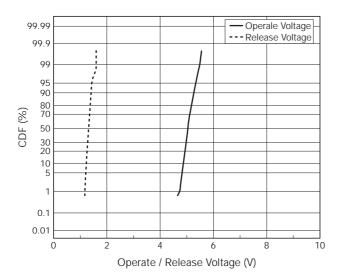
Coil Temperature Rise

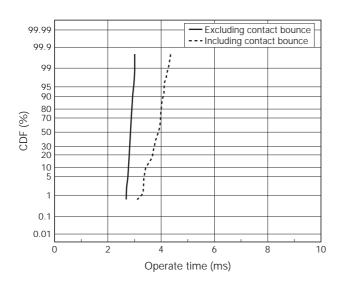


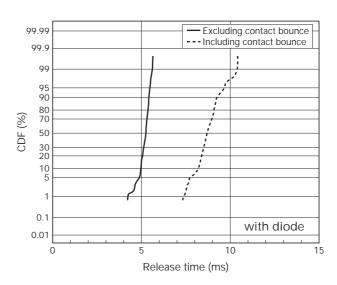


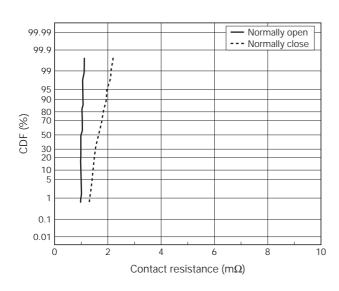
## RELAY CHARACTERISTICS DISTRIBUTION (INITIAL)

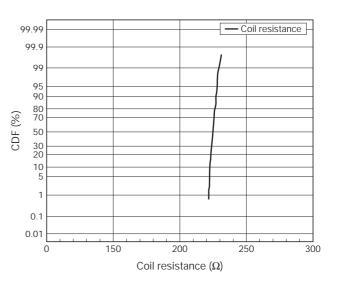
- EQ1-31000S
- 200 pieces





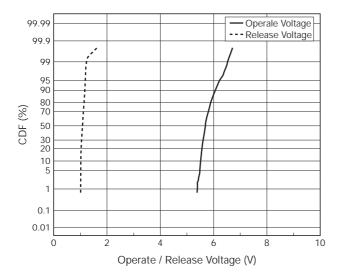


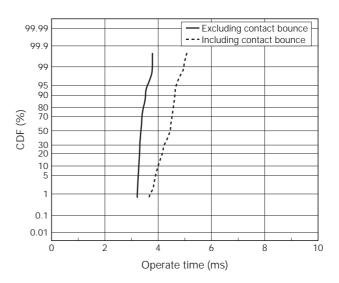


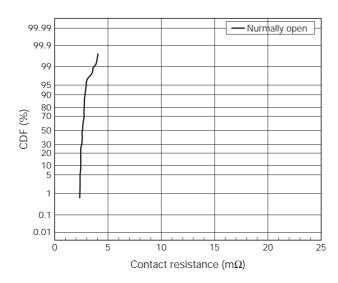


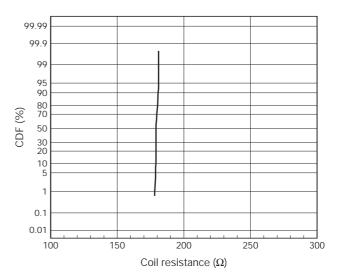


- EQ1-22111S
- 200 pieces











### **DURABILITY LIFE**

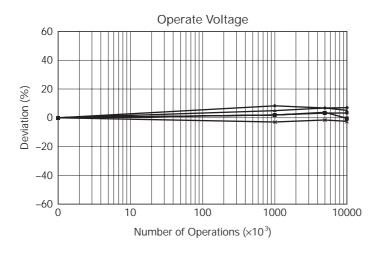
#### Mechanical Life Test

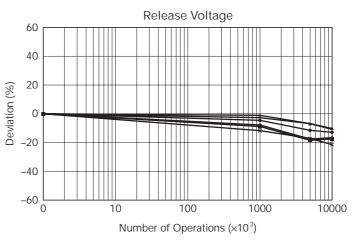
• Ambient Temperature : 23°C

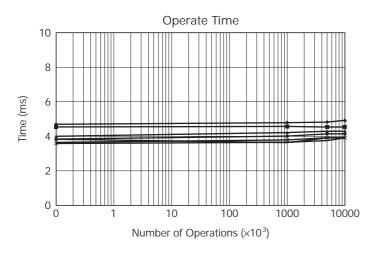
• Frequency : 12.5 Hz (50% duty)

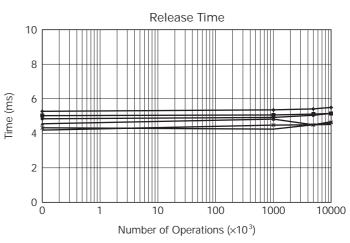
• Contact Load : No Load • Number of Operations :  $10 \times 10^6$ 

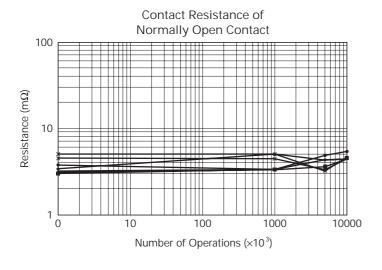
• Samples : EQ1-31000S 10 pieces

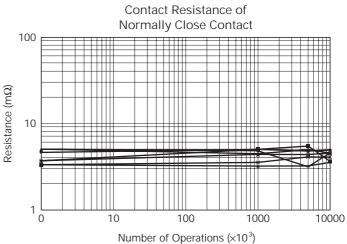












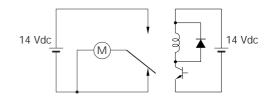


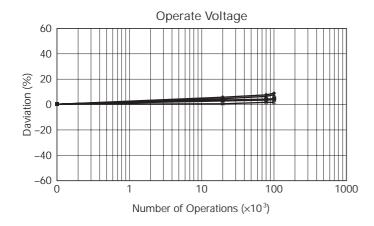
• Ambient Temperature : 23°C

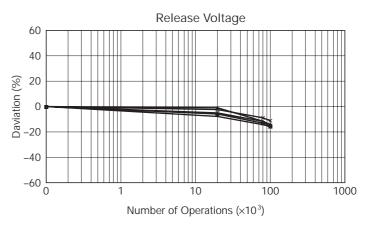
Frequency : 0.2s ON, 9.8s OFF, 0.1 HzContact Load : 14 Vdc, 25 A, Locked motor

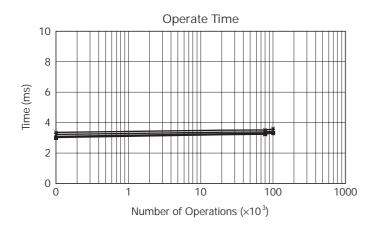
• Number of Operations :  $200 \times 10^3$ 

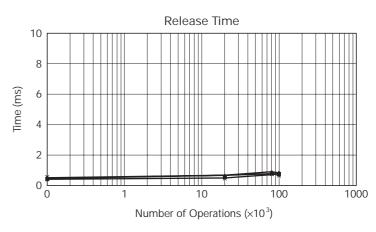
• Samples : EQ1-31000S 10 pieces

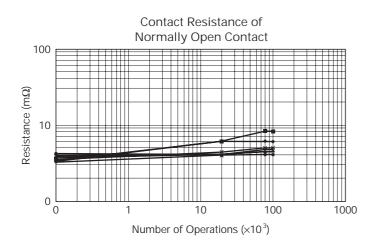


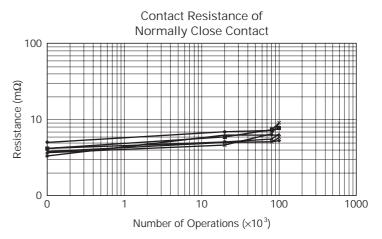














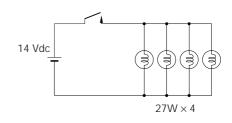
• Ambient Temperature : 23°C

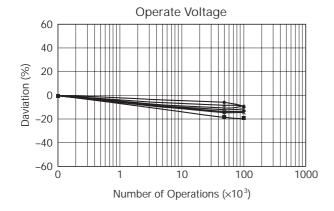
• Frequency : 1s ON, 29s OFF

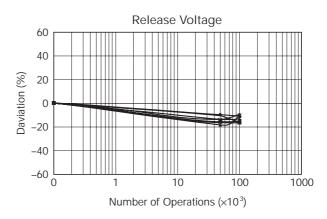
• Contact Load : 14 Vdc, 108 W, Tungsten Lamp

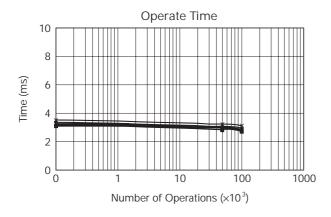
• Number of Operations :  $100 \times 10^3$ 

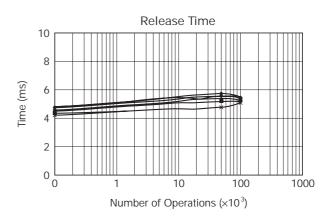
• Samples : EQ1-22111S 10 pieces

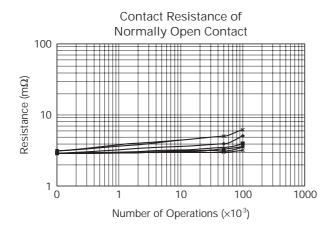


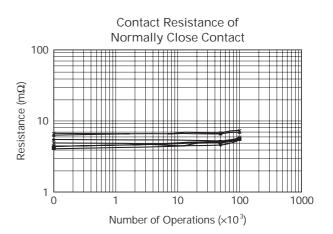














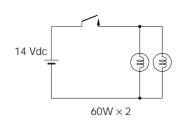
• Ambient temperature : 23°C

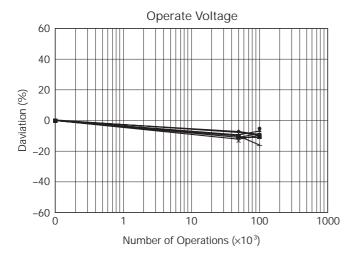
• Frequency : 1s ON, 29s OFF

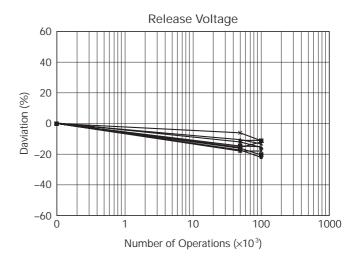
• Contact load : 14 Vdc, 120 W, Halogen Lamp

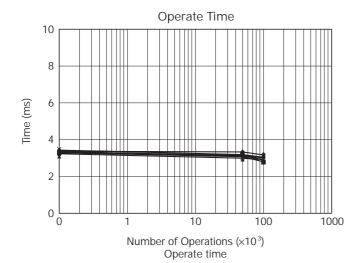
• Number of operations :  $100 \times 10^3$ 

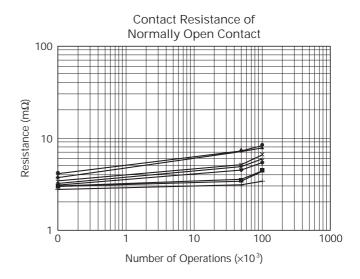
• Samples : EQ1-22111S, 10 pieces











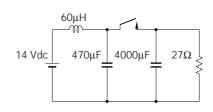


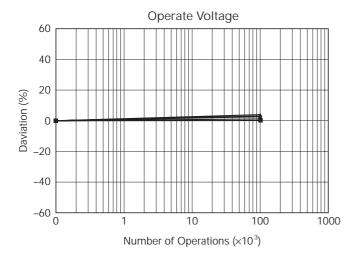
• Ambient temperature : 23°C

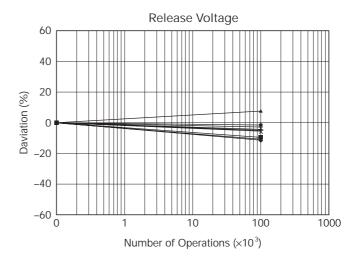
Frequency : 20ms ON, 3.98s OFFContact load : 14 Vdc, LCR circuit

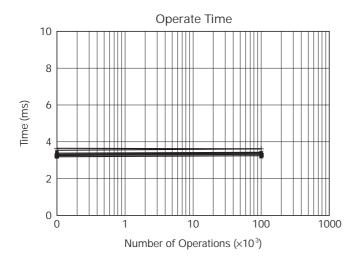
• Number of operations :  $100 \times 10^3$ 

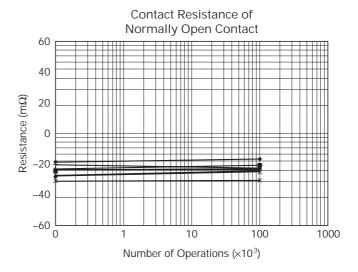
• Samples : EQ1-22111S, n=10











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