

# HIGH POWER RELAY

## 1 POLE—12, 30, 40 A

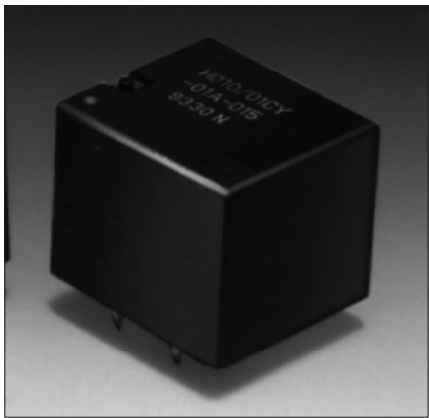
(FOR AUTOMOTIVE APPLICATIONS)

### FRL-274 SERIES

RoHS compliant

#### ■ FEATURES

- High current switching capacity by using new conductive materials.
- Suitable for automotive applications such as ABS, power assisted steering, etc.
- High heat resistance (40A type)  
Designed for use in high ambient temperature, such as engine compartment, and able to carry continuous current of 40 A in +125°C.
- New contact material  
New contact material formulation which is resistant to welding.
- Three types of contact gaps (0.4mm, 1.0mm, 1.4mm)
- RoHS compliant since date code: 0631  
Please see page 8 for more information



#### ■ ORDERING INFORMATION

##### 1. 40A Type

[Example]    FRL-274   N   D012 / 81   C   Y   -01A   -001  
                   (a)    (b)    (c)    (d)    (e)    (f)    (g)    (h)

(a)	Series Name	FRL-274: FRL-274 Series
(b)	Enclosure	N : Plastic sealed type
(c)	Nominal Voltage	D012 : 12 VDC
(d)	Carrying Current	81 : 40 A type
(e)	Contact Arrangement	A : 1 form A C : 1 form C
(f)	Contact Material	Y : Silver-tin oxide
(g)	Cover Terminal	01A : w/cover, wide terminal width
(h)	Custom Designation	To be assigned custom specification

# FRL-274 SERIES

## ■ ORDERING INFORMATION

### 2. Standard Type

[Example] FRL-274 N D 012 / 01 C S - 01A - \*\*\* (-S)  
 (a) (b) (c) (d) (e) (f) (g) (h) (i) (j)

(a)	Series Name	FRL-274: FRL-274 Series
(b)	Enclosure	N : Plastic sealed type
(c)	Coil Type	D : Standard (nominal power 1.7 to 2.1 W) H : Low power (nominal power 0.6 W)
(d)	Nominal Voltage	009 : 9 VDC 012 : 12 VDC 024 : 24 VDC
(e)	Contact Gap	01 : Standard gap (0.4 mm gap) 51 : 1.0 mm gap 61 : 1.4 mm gap
(f)	Contact Arrangement	A : 1 form A (SPST-NO) C : 1 form C (SPDT)
(g)	Contact Material	Y : Silver-tin oxide
(h)	Cover Terminal	: standard terminal width 1A : wide terminal width
(i)	Custom Designation	: To be assigned custom specification
(j)	Package	: Standard tray -S : Carrier tube

# FRL-274 SERIES

## ■ SPECIFICATIONS

Item		Specifications		
		12V Battery		24V Battery
		30A	40A	
Contact	Arrangement	1 form A (SPDT-NO), 1 form C (SPDT)		
	Material	Silver-tin oxide		
	Voltage Drop (resistance)	Max. 100mV initial (at 1 A, 12VDC)		
	Rating	14 VDC 30A (motor lock)	14 VDC 40A (motor lock)	28 VDC 12A (motor lock)
	Gap	01: 0.4mm gap	01: 0.4mm gap	51: 1.0mm gap 61: 1.4mm gap
	Max. Carrying Current	20° C: 30A continuous 40A 10 minutes	20° C 40A continuous 50A 1 hour 125° C: 20A continuous 40A 10 minutes	20° C: 30A continuous
	Max. Switching Frequency	Mechanical: 1,000 operations/hour Electrical: 1,000 operations/hour		
Min. Switching Load <sup>(*)</sup> (reference)	600mW minimum (50 mA minimum)			
Coil	Operating Temperature	-40° C to +85° C (no frost) (refer to Characteristic data)		
	Storage Temperature	-40° C to +100° C (no frost)		
Insulation	Resistance	Minimum 100MΩ (at 50VDC)		
	Dielectric Strength	500 VAC 1 minimum		
Time value	Operate (at nominal value)	0.4mm gap: max.10ms		1.0mm gap: max.10ms 1.4mm gap: max.15ms
	Release (at nominal value)	0.4mm gap: max.5ms		1.0mm gap: max. 8ms 1.4mm gap: max.10 ms
Life	Mechanical	10x10 <sup>6</sup> operations minimum		
	Electrical	100x10 <sup>6</sup> operations minimum		
Other	Vibration Resistance		10 to 55 Hz (double amplitude of 1.5mm)	
	Shock Resistance	Misoperation	100m/s <sup>2</sup> (11±1 ms)	
		Endurance	1000m/s <sup>2</sup> (11±1 ms)	
Weight		Approximately 20g		

\*1 Values when switching a resistive load at normal room temperature and humidity and in a clean environment. The minimum applicable load varies with the switching frequency and operating environment.

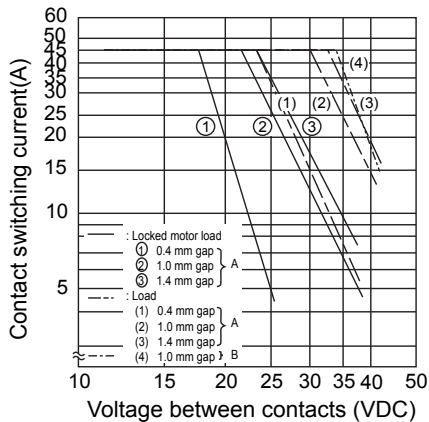
# FRL-274 SERIES

## COIL DATA CHART

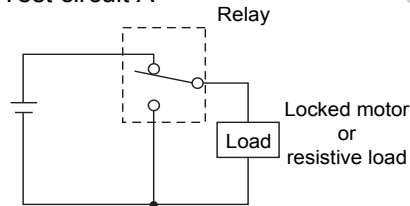
Type	Contact Gap	Nominal Power	Coil Voltage	Part Number	Coil Resistance (±10%) at 20° C	Must Operate Voltage		Coil Temperature Rise
						20° C	80° C	
12V Battery	0.4mm	lower power 0.6W	9 VDC	FRL-274NH009/01 □ Y - □□ A	135Ω	6.3 V	7.8 V	Approx. 35° C
			10 VDC	FRL-274NH010/01 □ Y - □□ A	165Ω	7.0 V	8.7 V	
			12 VDC	FRL-274NH012/01 □ Y - □□ A	240Ω	8.4 V	10.4 V	
	Standard	1.7W	12 VDC	FRL-274ND009/01 □ Y - □□ A	85Ω	6.5 V	8.0 V	Approx. 75° C
			4 A type 0.67W	12V DC	FRL-274ND009/81 □ Y - 01	165Ω	6.3 V	8.0 V
24V Battery	1.0mm	1.7W	24 VDC	FRL-274ND024/51 □ Y - □□ A	340Ω	16.8 V	21.0 V	Approx. 75° C
	1.4mm	2.1W	24 VDC	FRL-274ND024/61 □ Y - □□ A	275Ω	16.8 V	21.0 V	Approx. 85° C

## CHARACTERISTIC DATA

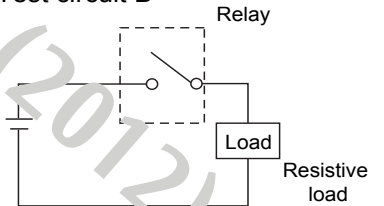
### 1. MAXIMUM BREAK CAPACITY



Test circuit A

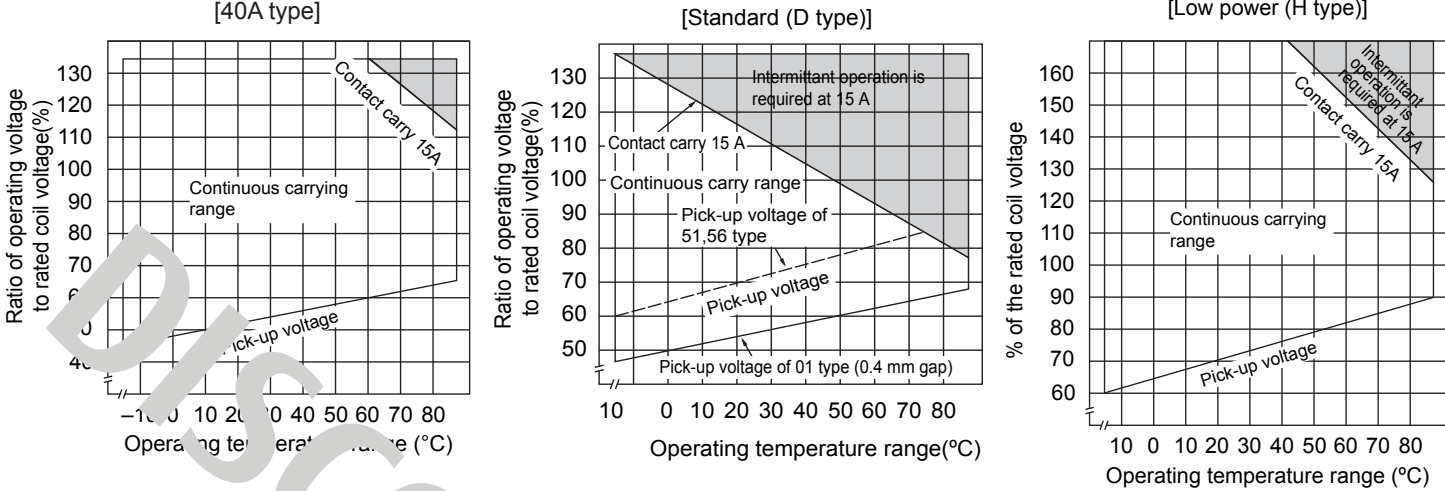


Test circuit B



# FRL-274 SERIES

## 2. OPERATING COIL VOLTAGE (EXAMPLE)

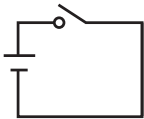


## 3. LIFE TEST (EXAMPLE)

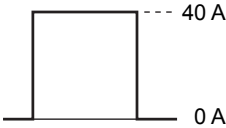
[40A type]

- Test item  
16 VDC, 40 A  
Motor lock  
 $2 \times 10^5$  operations

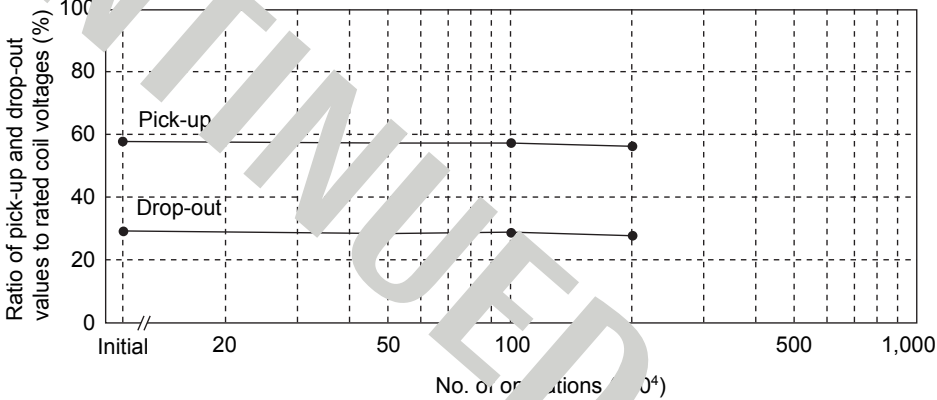
•Test circuit



•Circuit wave form

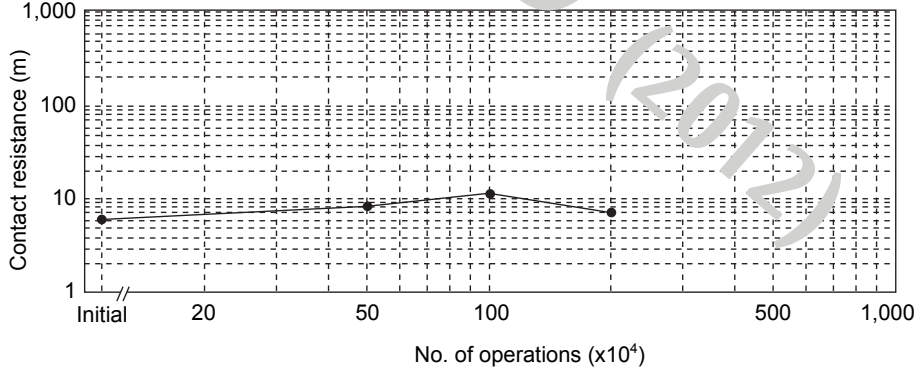


•Shift of pick-up and drop-out voltage



•Shift of contact resistance

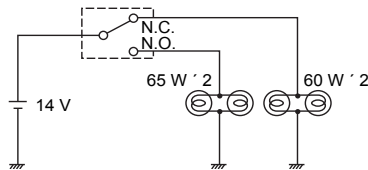
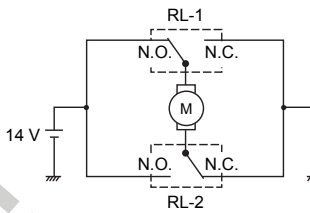
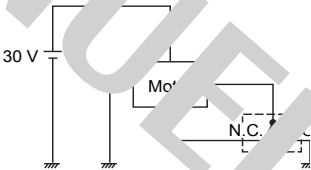
(measured at 6 V-1 A)



# FRL-274 SERIES

## LIFE TEST (EXAMPLE)

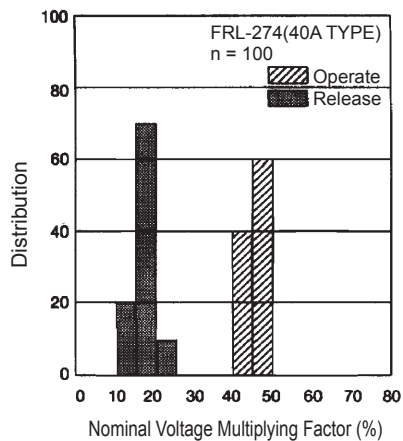
[Standard type]

Test Item	Test circuit
N.O. DC 14 V-65 W × 2 N.C. DC 14 V-60 W × 2 Halogen lamp load 500,000 operations minimum (contact material: special silver alloy)	
DC 14 V-30 A Motor lock 100,000 operations minimum (contact material: silver copper)	
DC 30 V-1.6 A Motor free 200,000 operations minimum (contact material: silver copper)	

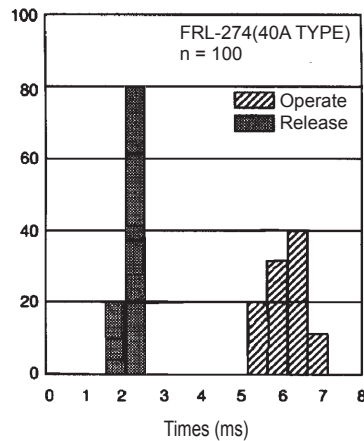
## REFERENCE DATA

[40A type]

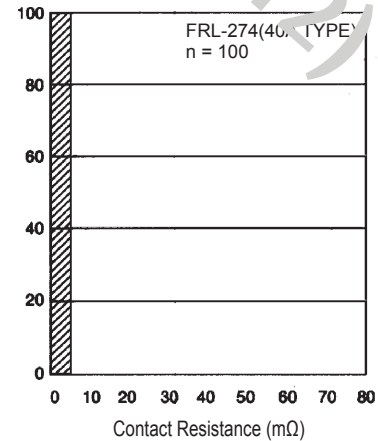
Distribution of Operate & Release Voltage



Distribution of Operate & Release Time



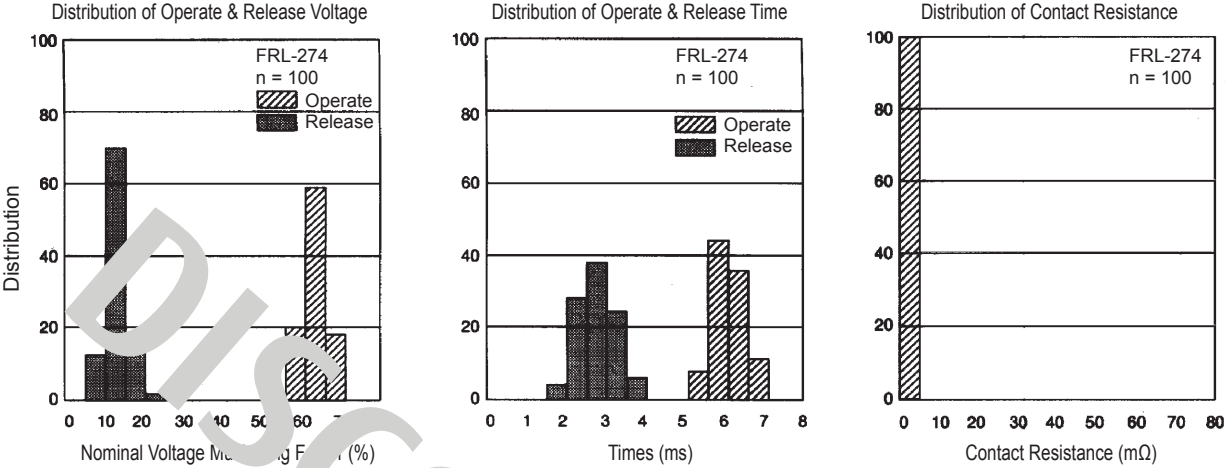
Distribution of Contact Resistance



# FRL-274 SERIES

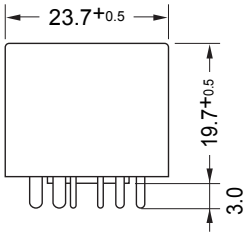
## REFERENCE DATA

[Standard type]

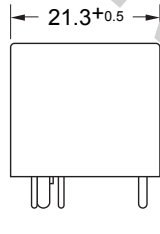


## DIMENSIONS

● Dimensions

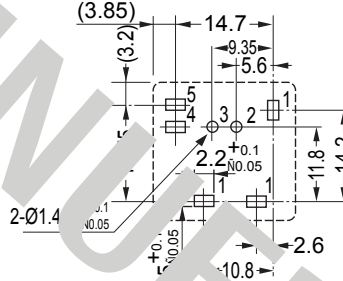


( ): N type



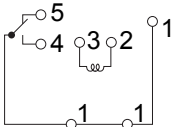
● PC board mounting hole layout (BOTTOM VIEW)

Standard terminal width

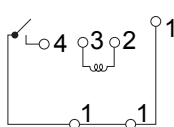


● Schematics (BOTTOM VIEW)

1 from C

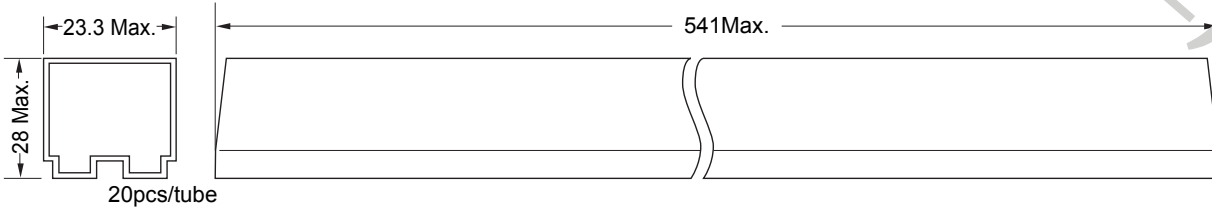


1 from A



Note : Tolerance ± 0.1 mm

● Tube carrier



Unit: mm

## RoHS Compliance and Lead Free Relay Information

### 1. General Information

- Relays produced after the specific date code that is indicated on each data sheet are lead-free now. Most of our signal and power relays are lead-free. Please refer to Lead-Free Status Info. (<http://www.fujitsu.com/us/downloads/MICRO/fcai/relays/lead-free-letter.pdf>)
- Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu.
- All signal and most power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 5 hazardous materials that are restricted by RoHS directive (lead, mercury, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in leaded assembly process will not cause any problems (compatibility).
- "LF" is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (for lead-free sample, etc.) please consult with area sales office.
- We will ship leaded relays as long as the leaded relay inventory exists.

Note: Cadmium was exempted from RoHS on October 21, 2005. (Amendment to Directive 2002/95/EC)

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu

#### Reflow Solder condition

**Flow Solder condition:**

Pre-heating: maximum 120°C  
Soldering: dip within 5 sec. at  
260°C solder bath

**Solder by Soldering Iron:**

Soldering Iron  
Temperature: maximum 360°C  
Duration: maximum 3 sec.

**We highly recommend that you confirm your actual solder conditions**

### 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical relays.

### 4. Tin Whisker

- Dipped SnAgCu solder is known as low risk tin whisker. No considerable length whisker was found by our in house test.



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