

# COMPACT POWER RELAY

## 1 POLE—25 A (FOR AUTOMOTIVE APPLICATIONS)

### FBR51, 52 SERIES

#### ■ FEATURES

- Compact and lightweight structure  
(42% of the volume of the FBR160 relay)
- High current contact capacity  
(carrying current: 35 A/10 minutes, 25 A/1 hour)
- High resistance to vibration and shock
- Improved heat resistance and extended operation range
- Two contact gap options  
(FBR51: 0.3 mm, FBR52: 0.6 mm)
- Three types of contact material



#### ■ ORDERING INFORMATION

[Example]     FBR51   N   D12   -   W   \*\*  
                  (a)    (b)   (c)    (d)   (e)

(a)	Series Name	FBR51 : Standard type (contact gap 0.3 mm) FBR52 : Wider contact gap type (contact gap 0.6 mm)
(b)	Enclosure	N     : Plastic sealed type
(c)	Nominal Voltage	D06   : 6 VDC D09   : 9 VDC D10   : 10 VDC D12   : 12 VDC
(d)	Contact Material	W     : Silver-tin oxide indium W1    : Silver-tin oxide indium (high power type) WL    : Silver-tin oxide indium (1 lamp loads, see applications table) N     : Silver copper nickel
(e)	Custom Designation	To be assigned custom specification

**■ SPECIFICATIONS**

Item		Specifications			
		W contact	W1 contact	N contact	WL contact
Contact	Arrangement	1 form C (SPDT)			1 form A (SPST)
	Material	Silver-tin oxide indium	Silver-tin oxide indium (high power type)	Silver copper nickel	Silver-tin oxide indium
	Voltage Drop (Resistance)	Maximum 100mV (at 2A 12 VDC)			
	Rating	14 VDC 20 A (motor free load)	14 VDC 25 A (motor free load)	14 VDC inrush 20 A, break 4 A (motor free load)	115 Watt lamp at 14 VDC
	Maximum Carrying Current	35 A/10 minutes, 25 A/ 1 hour (25° C, 100% rated coil voltage)			
	Maximum Inrush Current (Reference)	60 A			40 A
	Max. Switching Current (Reference)	35 A 16 VDC			
	Min. Switching Load*1 (Reference)	6 VDC 1 A			
Coil	Operating Temperature Range	-40° C to +85° C (no frost)			
	Storage Temperature Range	-40° C to +100° C (no frost)			
Time Value	Operate (at nominal voltage)	Maximum 10 ms			
	Release (at nominal voltage)	Maximum 5ms			
Life	Mechanical	10 x 10 <sup>6</sup> operations minimum			
	Electrical	2 x10 <sup>5</sup> ops. min. 14 VDC 20 A Locked motor load	2 x10 <sup>5</sup> ops. min. 14 VDC 25 A Locked motor load	4 x10 <sup>5</sup> ops. min. 14 VDC inrush 20 A break 4A motor free load	2.5 x10 <sup>5</sup> ops. min. 115 Watts lamp, 14 VDC
Other	Vibrations Resistance		10 to 55 Hz (double amplitude of 1.5mm)		
	Shock Resistance	Misoperation	100 m/s <sup>2</sup>		
		Endurance	1,000 m/s <sup>2</sup>		
Weight		Approximately 6g			

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

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## ■ COIL DATA CHART

### 1. FBR51 Series

MODEL			Nominal voltage	Coil resistance (±10%) (at 20°C)	Must operate voltage	Thermal resistance
W contact	W1 contact	N contact				
FBR51ND06-W	FBR51ND06-W1	FBR51ND06-N	6 VDC	60 Ω	3.6 VDC (at 20°C) 4.5 VDC (at 85°C)	73°C/W
FBR51ND09-W	FBR51ND09-W1	FBR51ND09-N	9 VDC	135 Ω	5.4 VDC (at 20°C) 6.8 VDC (at 85°C)	
FBR51ND10-W	FBR51ND10-W1	FBR51ND10-N	10 VDC	180 Ω	6.3 VDC (at 20°C) 7.9 VDC (at 85°C)	
FBR51ND12-W	FBR51ND12-W1	FBR51ND12-N	12 VDC	240 Ω	7.3 VDC (at 20°C) 9.2 VDC (at 85°C)	

### 2. FBR52 Series

MODEL			Nominal voltage	Coil resistance (±10%) (at 20°C)	Must operate voltage	Thermal resistance
W contact	W1 contact	N contact				
FBR52ND06-W	FBR52ND06-W1	FBR52ND06-N	6 VDC	45 Ω	3.6 VDC (at 20°C) 4.5 VDC (at 85°C)	65°C/W
FBR52ND09-W	FBR52ND09-W1	FBR52ND09-N	9 VDC	100 Ω	5.4 VDC (at 20°C) 6.8 VDC (at 85°C)	
FBR52ND10-W	FBR52ND10-W1	FBR52ND10-N	10 VDC	135 Ω	6.3 VDC (at 20°C) 7.9 VDC (at 85°C)	
FBR52ND12-W	FBR52ND12-W1	FBR52ND12-N	12 VDC	180 Ω	7.3 VDC (at 20°C) 9.2 VDC (at 85°C)	

# FBR51, 52 SERIES

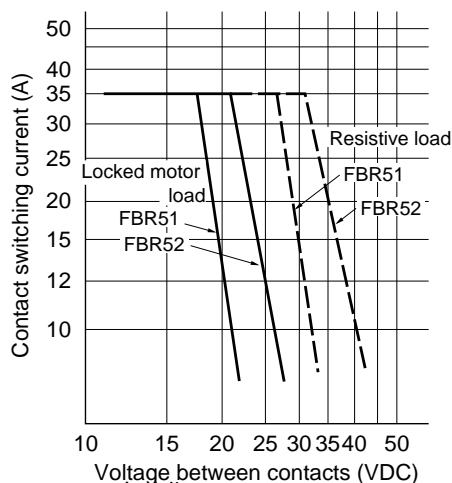
## ■ SUITABLE APPLICATIONS

Application	Normal load current (12 VDC system)	Description	Recommended model (example)	
			For 16 V or less motor load voltage	For instantaneous 20 V or more load voltage
Power Windows	20 to 25 A (switching at motor locking)	forward and reverse motor control	FBR51N□ -W FBR51N□ -W1	FBR52N□ -W FBR52N□ -W1
Automatic Door Lock	18 to 25 A (switching at motor locking)	forward and reverse motor control	FBR51N□ -W FBR51N□ -W1	FBR52N□ -W FBR52N□ -W1
Intermittent Wipers	15 to 30 A break 2 to 8 A (motor-free)	forward only	FBR51N□ -N	FBR52N□ -N
Tilt-Lock Wheel	20 A (switching at motor locking)	forward and reverse motor control	FBR51N□ -W	FBR52N□ -W
Sunroof	20 to 30 A (switching at motor locking)	forward and reverse motor control	FBR51N□ -W	FBR52N□ -W
Adjustable Door Mirror	3 to 5 A (switching at motor locking)	forward and reverse motor control	FBR51N□ -W	
Automatic Antenna	8 to 12 A (INRUSH) break 2 A maximum (motor-free)	forward and reverse motor control	FBR51N□ -W	
Auto-Cruise	2 to 3 A	power shutoff and solenoid	FBR51N□ -W	
Lamp loads	115 Watts	for up to 250K operations	FBR51N□ -WL	
Others	Car Audio System, etc.		FBR51N□ -W	

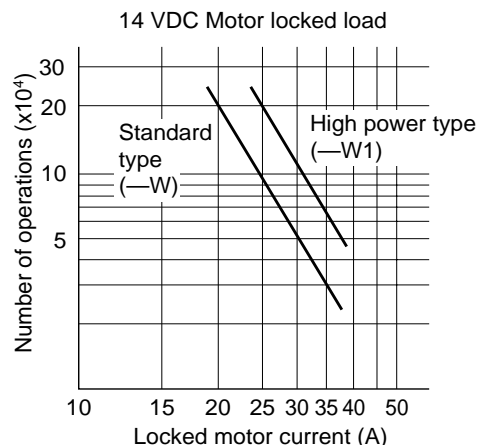
- For the load condition where higher voltage would be encountered during contact break, FBR52 series with wider contact gap is recommended.
- -N contact type is recommended for applications which require long durability, -W and -W1 contact type is for high inrush current load applications.

## ■ CHARACTERISTIC DATA

### 1. MAXIMUM BREAK CAPACITY



### 2. LIFE

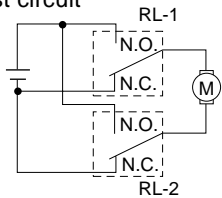


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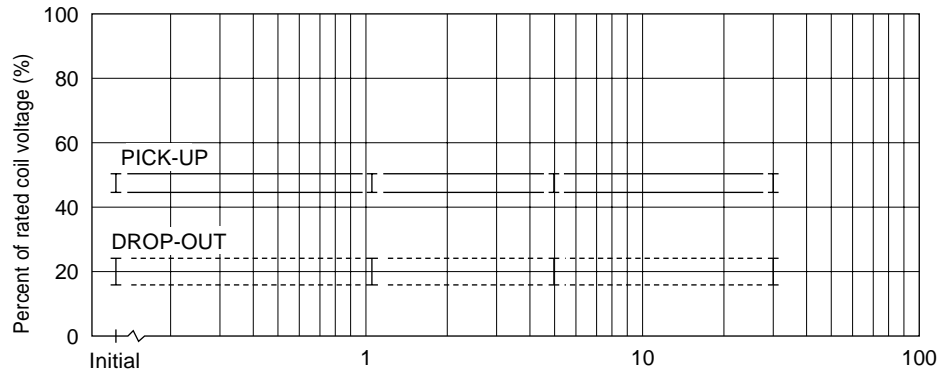
## 3. LIFE TEST (EXAMPLE)

- Test item  
14 V DC-20 A  
motor lock 200,000  
operations minimum  
(FBR52□-W type)

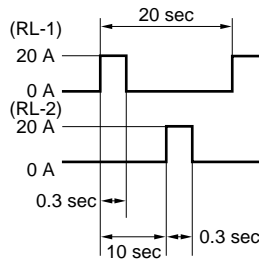
- Test circuit



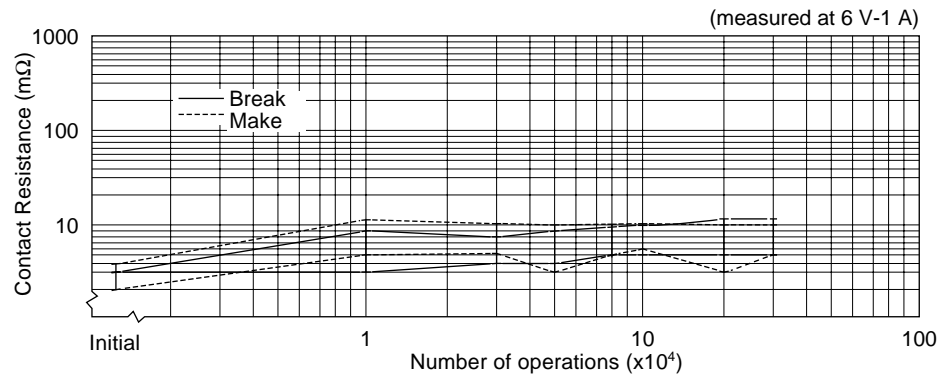
- Shift of pick-up drop-out voltage



- Current wave form

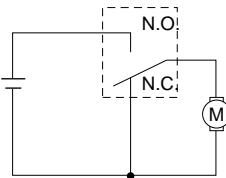


- Shift of contact resistance

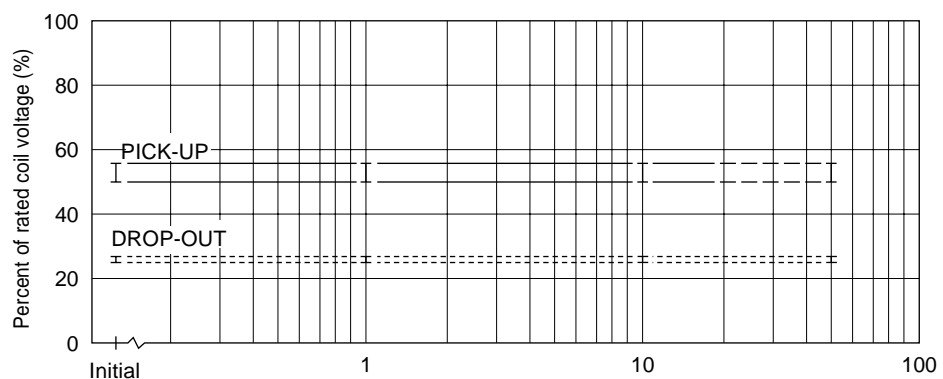


- Test item  
14 V DC-20 A  
motor free 400,000  
operations minimum  
(FBR51□-N type)

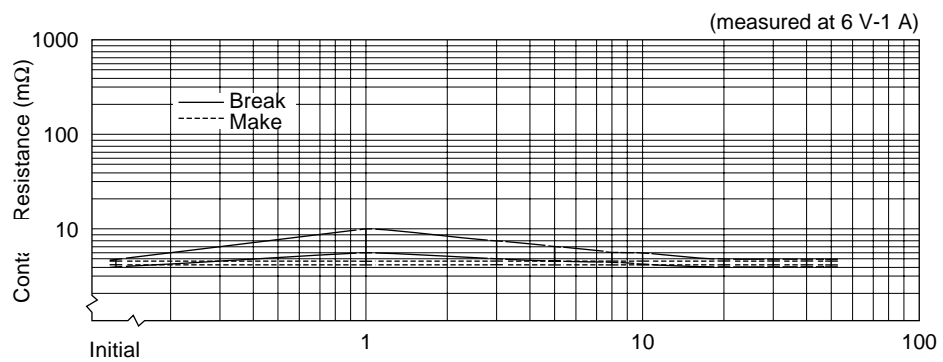
- Test circuit



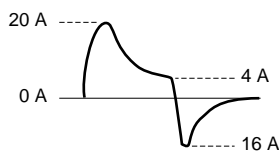
- Shift of pick-up drop-out voltage



- Shift of contact resistance



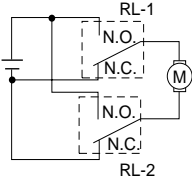
- Current wave form



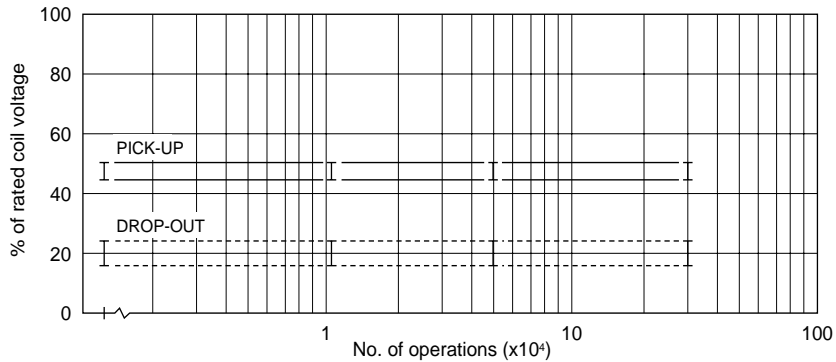
# FBR51, 52 SERIES

- Test item  
14 V DC-25 A  
Motor lock  
200,000 operations minimum  
(FBR51 □-W1 type)

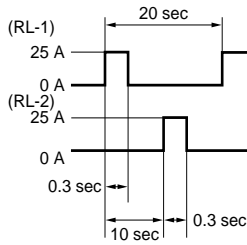
- Test circuit



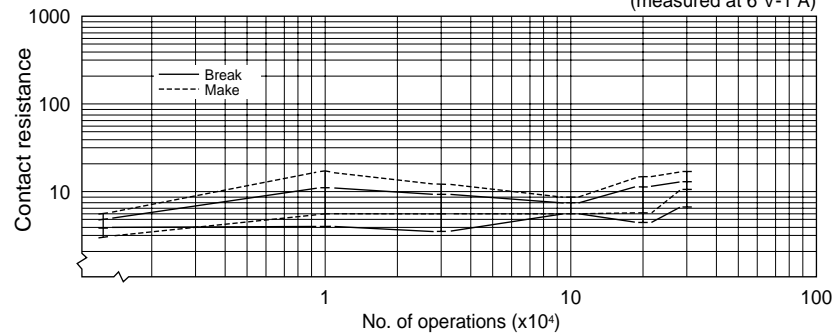
- Shift of pick-up and drop-out voltage



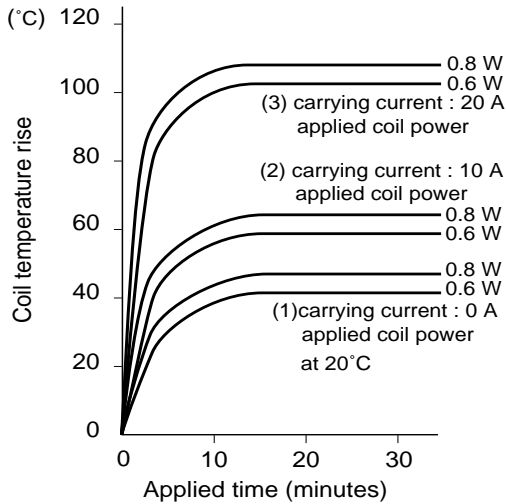
- Current wave form



- Shift of contact resistance



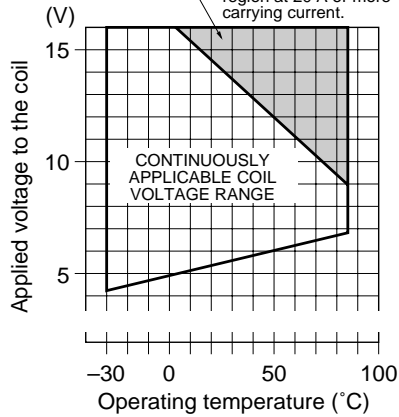
## 4. COIL TEMPERATURE RISE



## 5. OPERATING COIL VOLTAGE RANGE (EXAMPLE)

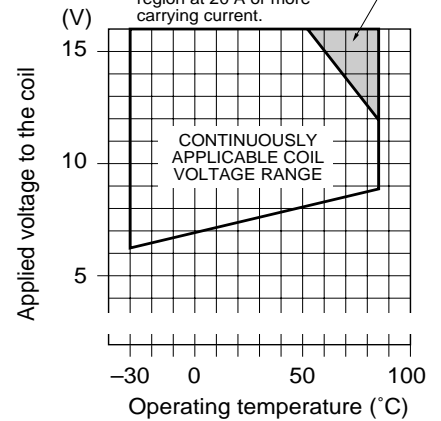
[ FBR51ND09-□ ]

NOTE : Intermittent coil operation is required in this region at 20 A or more carrying current.



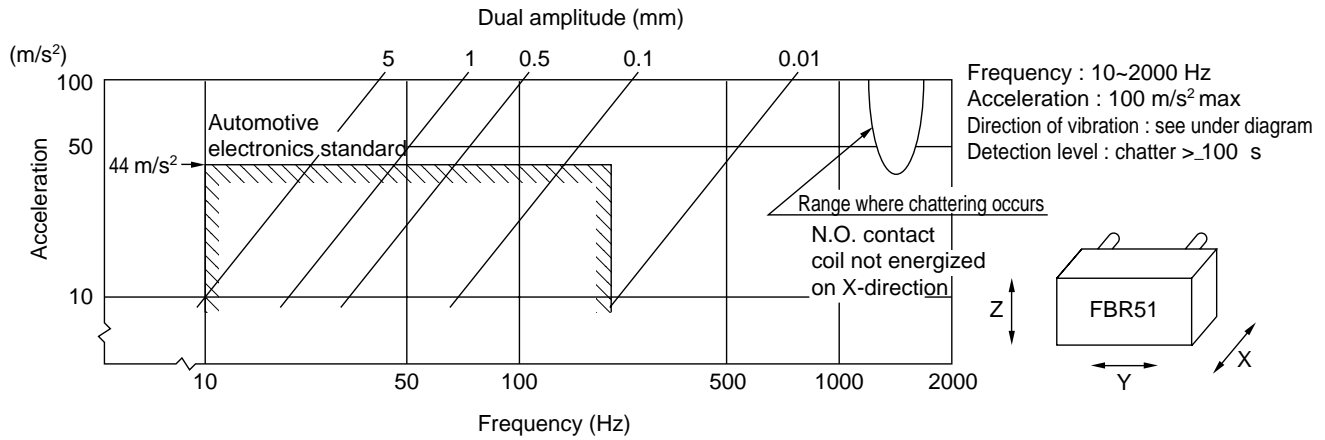
[ FBR51ND12-□ ]

NOTE : Intermittent coil operation is required in this region at 20 A or more carrying current.

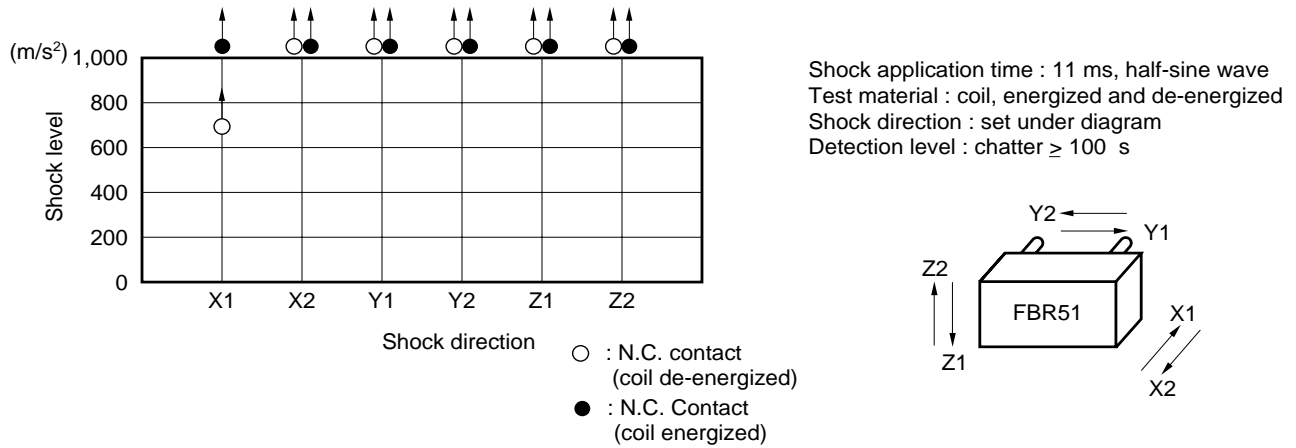


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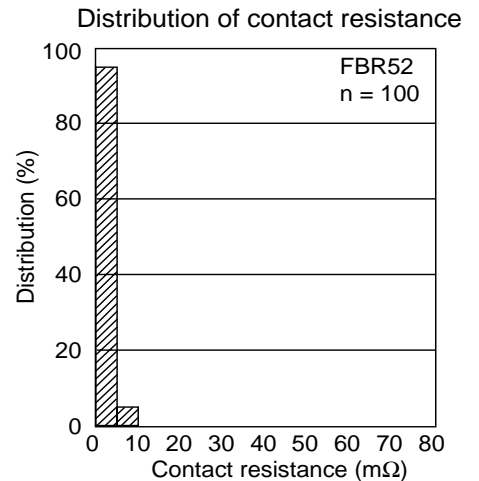
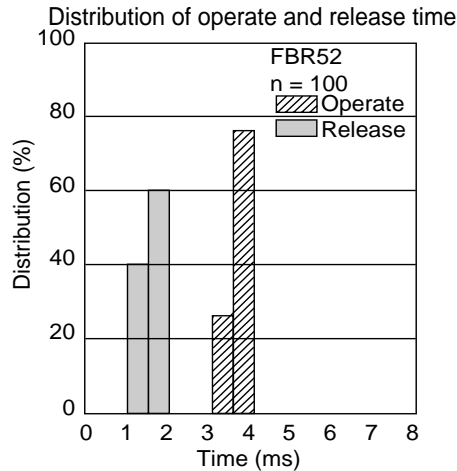
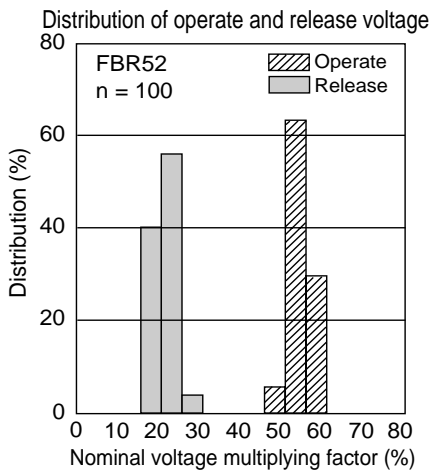
## 6. VIBRATION RESISTANCE CHARACTERISTICS



## 7. SHOCK RESISTANCE CHARACTERISTICS



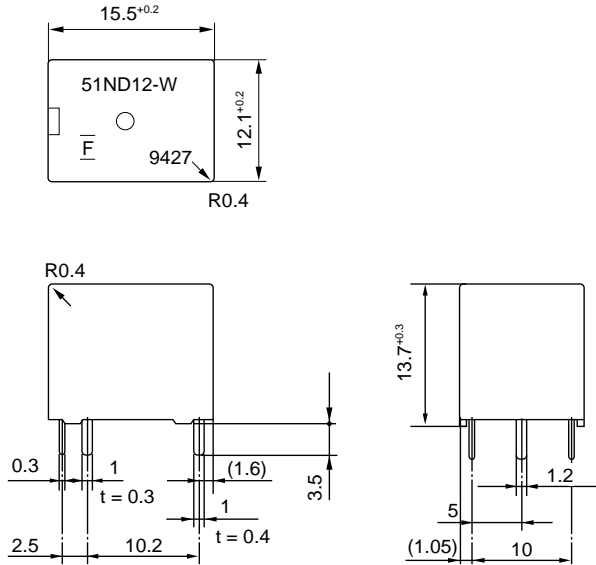
## REFERENCE DATA



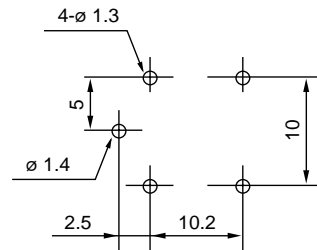
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## ■ DIMENSIONS

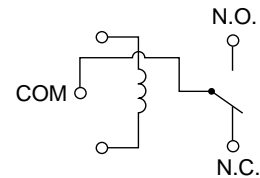
### ● Dimensions



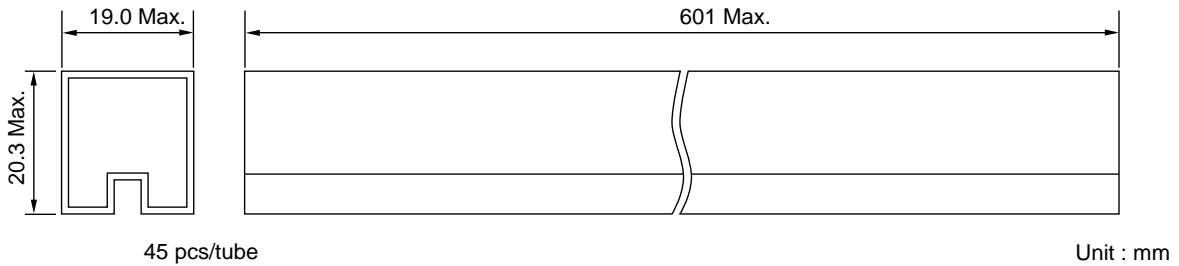
### ● PC board mounting hole layout (BOTTOM VIEW)



### ● Schemati (BOTTOM VIEW)



### ● Tube carrier



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