

# COMPACT POWER RELAY

## 1 POLE - 25/30A (For automotive applications)

### FBR51, 52 Series

#### ■ FEATURES

- Compact and light weight structure
- High current contact capacity  
(carrying current: 35 A/10 minutes, 30 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



#### ■ Part Numbers

[Example]    FBR51    N    D12    -    W1  
                   (a)        (b)        (c)        (d)

(a)	Relay type	FBR51 : FBR51-Series - Standard type (contact gap 0.3mm) FBR52 : FBR52-Series - Wide contact gap type (contact gap 0.6mm)
(b)	Enclosure	N : Plastic sealed type
(c)	Coil rated voltage	D12 : 6...12VDC Coil rating table at page 3
(d)	Contact material	W1 : Silver-tin oxide indium (high power type, 1 form C) WL : Silver-tin oxide indium (lamp loads, 1 form A, FBR51 only) WF : Silver-tin oxide indium (flasher loads, 1 form A, FBR51 only)

Actual markings does not carry the type name: "FBR"

E.g.: Ordering code: FBR51ND12-W1 Actual marking: 51ND12-W1

# FBR51, 52 Series

## ■ Specifications (for motor load)

Item			Characteristics	Remarks / conditions
			W1 contact	
Contact data	Configuration		1 form C (SPDT)	
	Material		AgSnO <sub>2</sub> In (high capacity type)	
	Voltage drop		Max. 100 mV	At 1A/12VDC
	Contact rating		25A, 14VDC	At locked motor load
	Max. carrying current		35A / 10 minutes, 30A / 1hr	
	Max. inrush current		60A	Reference
	Max. switching voltage		16VDC	Reference
	Max. switching current		35A	Reference
	Min. switching load		1A 6VDC	Reference *
Coil	Storage temperature range		-40 °C to +100 °C	No frost
	Operating temperature range		-40 °C to +85 °C (At long continuous carry current conditions, refer to "operating coil voltage range" on page 7)	No frost
Timing data	Operate		Max. 10ms	At nominal voltage No diode, excluding bounce
	Release		Max. 5ms	At nominal voltage No diode, excluding bounce
Life	Mechanical		Min. 10 x 10 <sup>6</sup> operations	
	Electrical		Min. 100 x 10 <sup>3</sup> operations	At contact rating, locked motor load
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration	Direction X, Y, Z, contact ON/OFF total 6 cycles
		Endurance	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration	Direction X, Y, Z, contact OFF total 6 hours
	Shock resistance	Misoperation	100m/s <sup>2</sup> (11±1ms)	Direction X, Y, Z, contact ON/OFF total 36 times
		Endurance	1,000m/s <sup>2</sup> (6±1ms)	Direction X, Y, Z, contact OFF total 18 times
	Dimensions / weight		12.1 x 15.5 x 13.7 mm / approx. 6g	

\*: Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels. Care shall be taken on the heat generated on PC board when maximum carrying current exceeds 10A. Please perform the confirmation test with actual conditions.

# FBR51, 52 Series

## ■ Specifications (for lamp load)

Item			Characteristics		Remarks / conditions
			WF contact	WL Contact	
Contact data	Configuration		1 form A (SPDT)		
	Material		AgSnO <sub>2</sub> In (for flasher)	AgSnO <sub>2</sub> In (for lamp)	
	Voltage drop		Max. 100 mV		At 2A/12VDC
	Contact rating		14VDC, 80W	14VDC, 120W	At lamp load
	Max. carrying current		35A / 10 minutes, 30A / 1hr		At 25 °C with nominal coil voltage
	Max. inrush current		80A		At lamp load, reference
	Max. switching voltage		16VDC		Reference
	Max. switching current		35A		Reference
	Min. switching load		1A 6VDC		Reference *
Coil	Storage temperature range		-40 °C to +100 °C		No frost
	Operating temperature range		-40 °C to +85 °C (At long continuous carry current conditions, refer to "operating coil voltage range" on page 8)		No frost
Timing data	Operate		Max. 10ms		At nominal voltage No diode, excluding bounce
	Release		Max. 5ms		At nominal voltage No diode, excluding bounce
Life	Mechanical		Min. 10 x 10 <sup>6</sup> operations		
	Electrical		Min. 2.5 x 10 <sup>6</sup> operations at inrush 11A 14VDC (0.35 sec - ON/0.35 sec - OFF)	Min. 100 x 10 <sup>3</sup> operations	At contact rating, lamp load
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration		Direction X, Y, Z, contact ON/OFF total 6 cycles
		Endurance	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration		Direction X, Y, Z, contact OFF total 6 hours
	Shock resistance	Misoperation	100m/s <sup>2</sup> (11±1ms)		Direction X, Y, Z, contact ON/OFF total 36 times
		Endurance	1,000m/s <sup>2</sup> (6±1ms)		Direction X, Y, Z, contact OFF total 18 times
	Dimensions / weight		12.1 x 15.5 x 13.7 mm / approx. 6g		

\*: Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels. Care shall be taken on the heat generated on PC board when maximum carrying current exceeds 10A. Please perform the confirmation test with actual conditions.

# FBR51, 52 Series

## ■ Coil Data (FBR51 series)

Coil code	Rated Coil Voltage (VDC)	Coil Resistance +/-10% ( $\Omega$ )	Must Operate Voltage* (VDC)	Must Release Voltage* (VDC)
D06	6	60	3.6 4.5 (at 85°C)	0.5 0.7 (at 85°C)
D09	9	135	5.4 6.8 (at 85°C)	0.7 0.9 (at 85°C)
D10	10	180	6.3 7.9 (at 85°C)	0.8 1.0 (at 85°C)
D12	12	240	7.3 9.2 (at 85°C)	1.0 1.3 (at 85°C)

## ■ Coil Data (FBR52 series)

Coil code	Rated Coil Voltage (VDC)	Coil Resistance +/-10% ( $\Omega$ )	Must Operate Voltage* (VDC)	Must Release Voltage* (VDC)
D06	6	45	3.6 4.5 (at 85°C)	0.5 0.7 (at 85°C)
D09	9	100	5.4 6.8 (at 85°C)	0.7 0.9 (at 85°C)
D10	10	135	6.3 7.9 (at 85°C)	0.8 1.0 (at 85°C)
D12	12	180	7.3 9.2 (at 85°C)	1.0 1.3 (at 85°C)

Note: All values in the table are valid at 20°C and zero contact current, unless otherwise specified.

\*: Specified operated values are valid for pulse wave voltage.

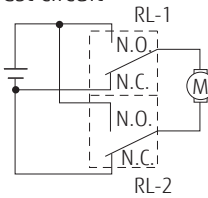
Please use at rated coil voltage. Please refer to characteristic data and set up adequate voltage in case of use at over voltage.

# FBR51, 52 Series

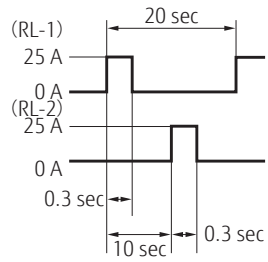
## ■ Characteristic Data (Reference)

- Test item  
25A 14VDC  
motor lock 200,000  
operations minimum  
(FBR52N( )-W1 type)

- Test circuit

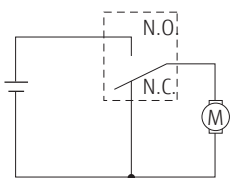


- Current wave form

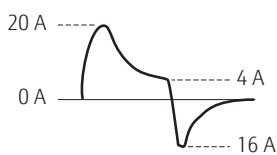


- Test item  
20A 14VDC  
motor free 400,000  
operations minimum  
(FBR51N( )-W1 type)

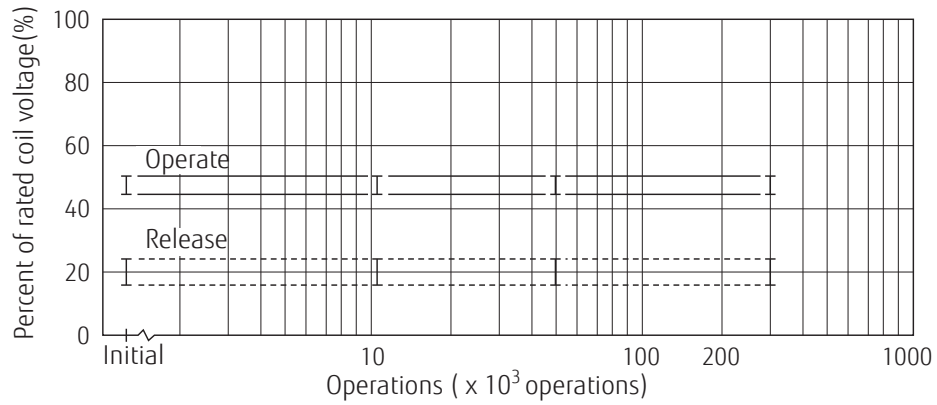
- Test circuit



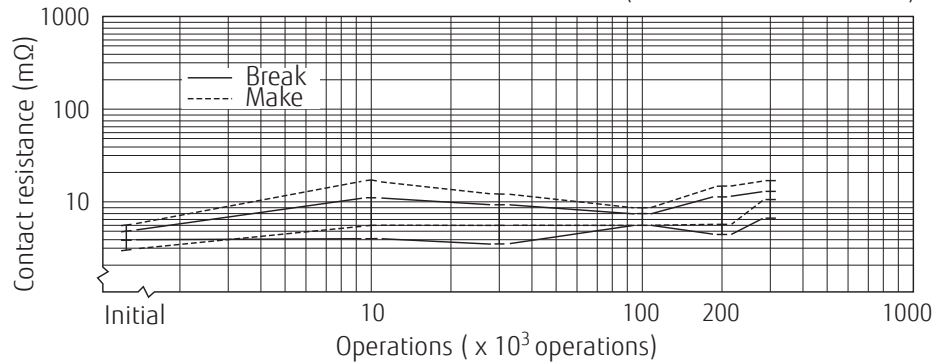
- Current wave form



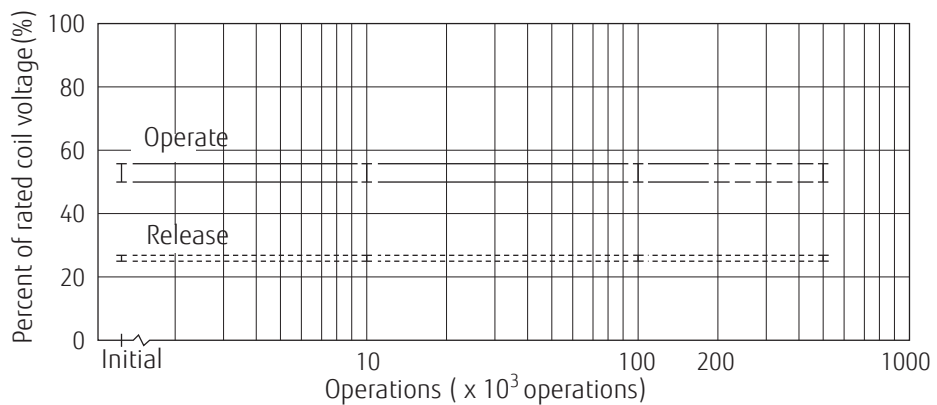
Operate/release voltage



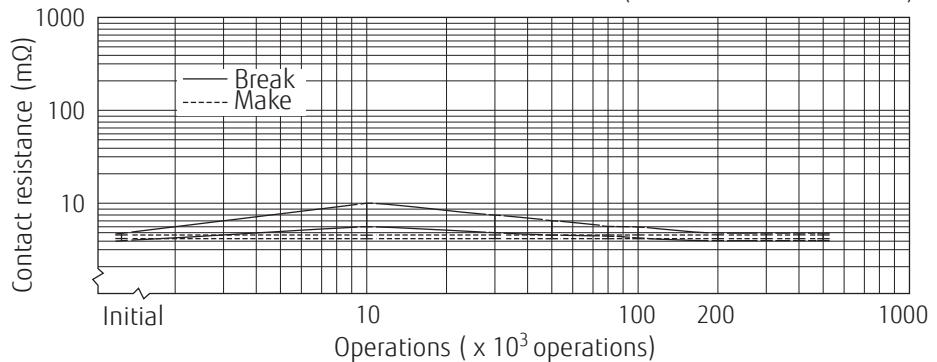
Contact resistance



Operate/release voltage



Contact resistance

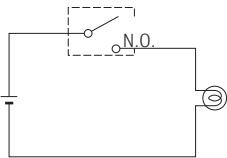


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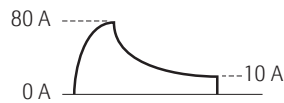
- Life test (example)

- Test item  
Inrush 80A 14VDC  
lamp load (120W)  
100,000 ops. minimum  
(FBR51N( )-WL type)

- Test circuit

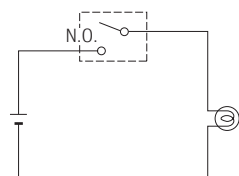


- Current wave form

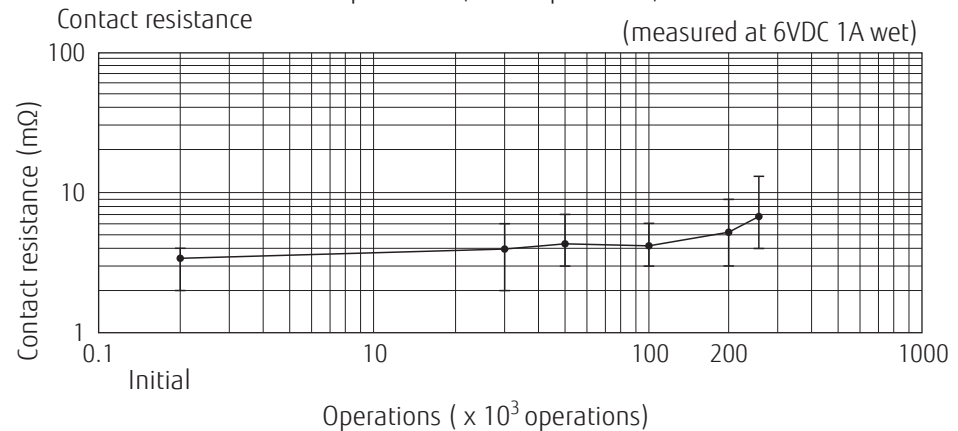
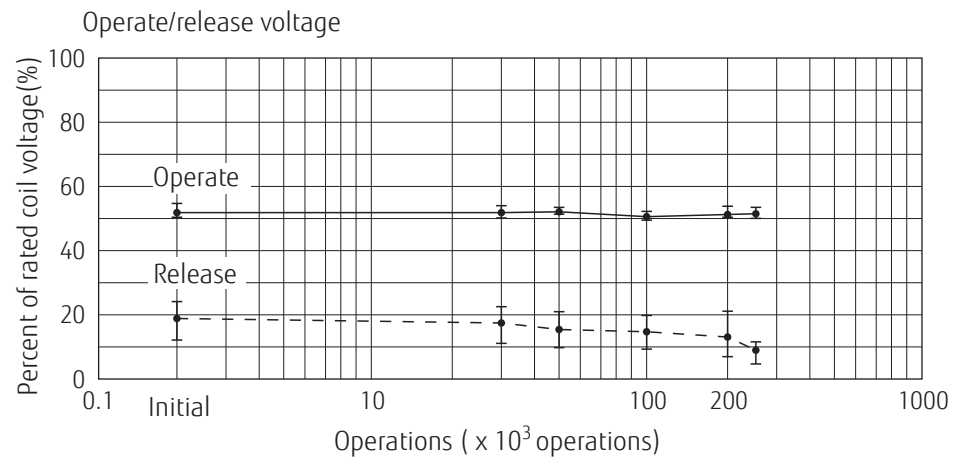
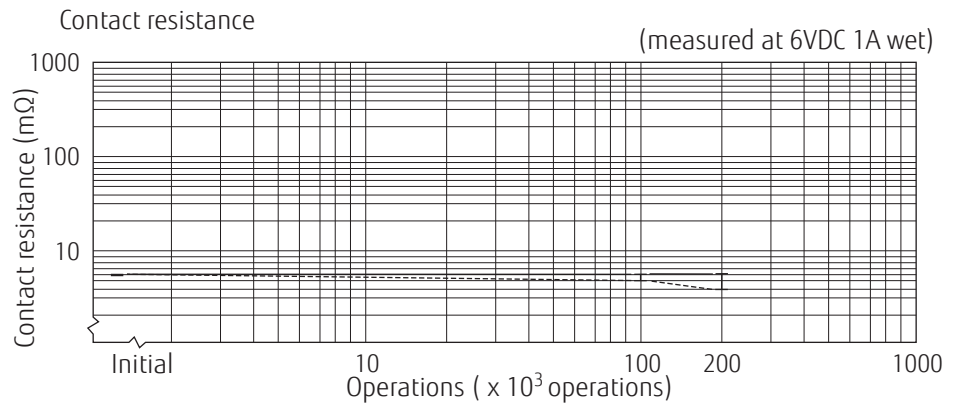
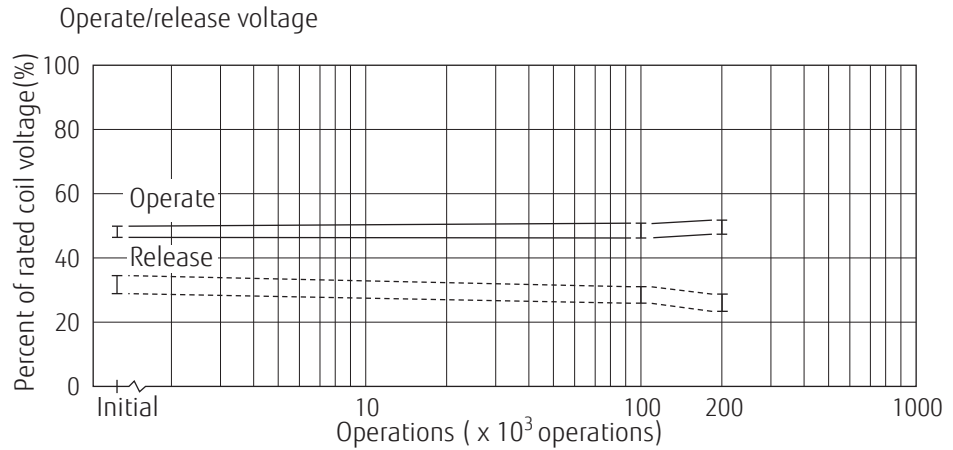


- Test item  
Inrush 11A 14VDC  
flasher, hazard lamp  
(80W)load 2,500,000  
operations minimum  
(FBR51N( )-WF type)

- Test circuit

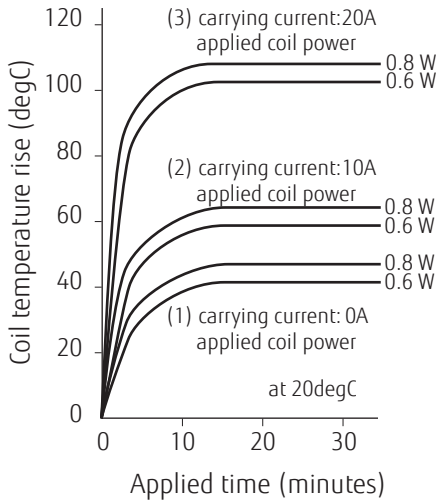


- Current wave form

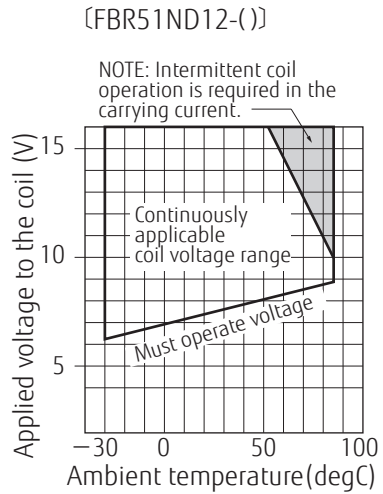
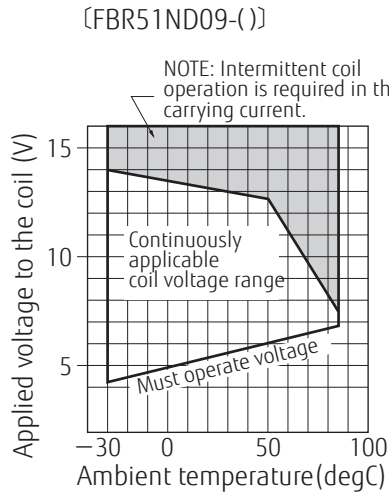


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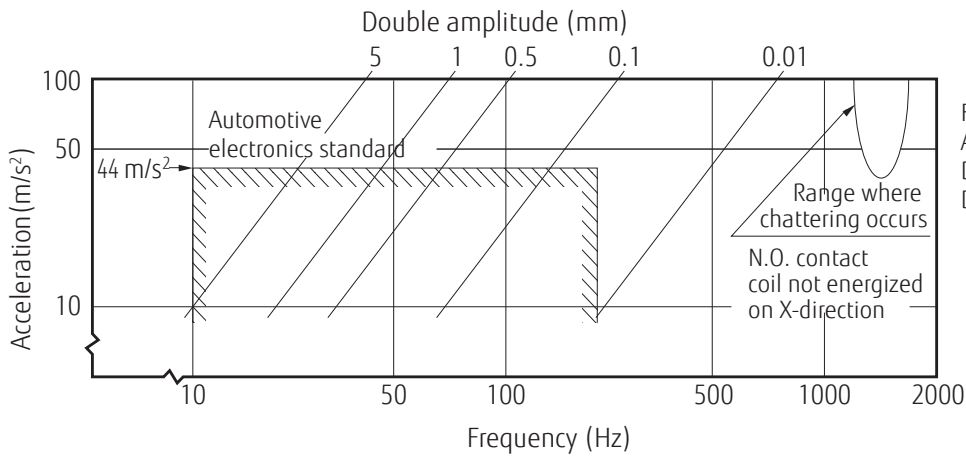
## Coil Temperature Rise



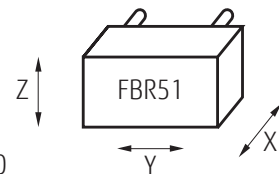
## Operating Coil Voltage Range



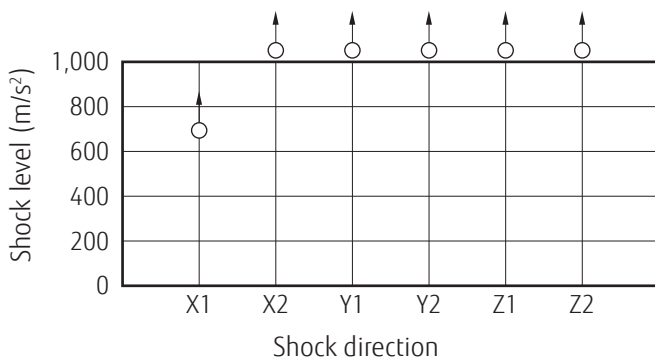
## Coil Temperature Rise



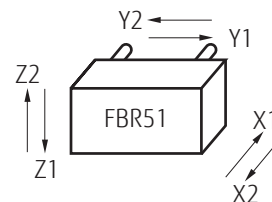
Frequency: 10 to 2000 Hz  
Acceleration: 100m/s<sup>2</sup> max.  
Direction of vibration: see under diagram  
Detection level: chatter >1ms.



## Shock Resistance Characteristics



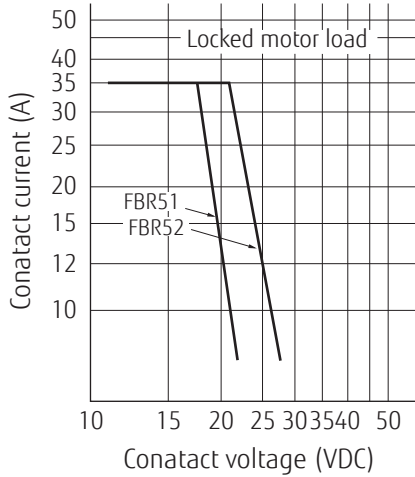
Shock application time: 6<sup>+/-1</sup>ms, half-sine wave  
Test material: coil, energized and de-energized  
Shock direction: set under diagram  
Detection level: chatter > 1ms.



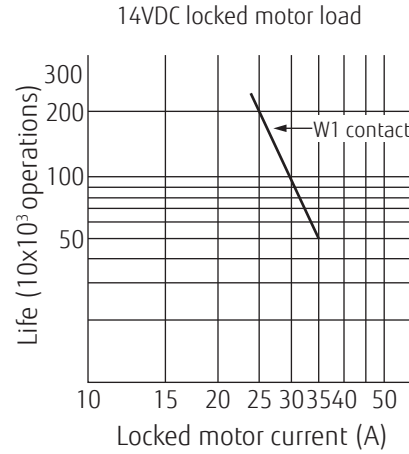
○: N.C.contact (coil de-energized)  
N.O.contact: min. 1,000m/s<sup>2</sup> in all directions

# FBR51, 52 Series

Maximum Switching Power

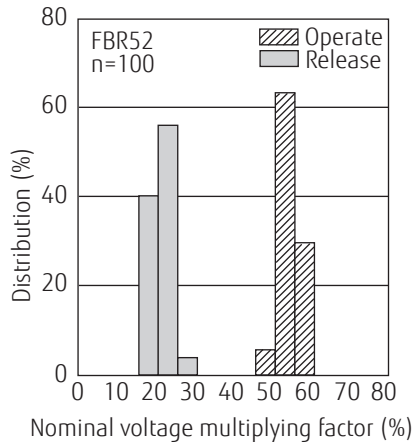


Live Curve

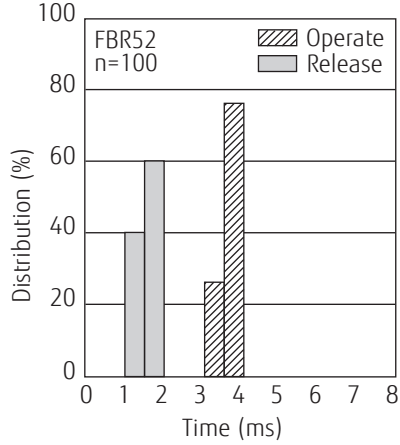


Initial Distributions data

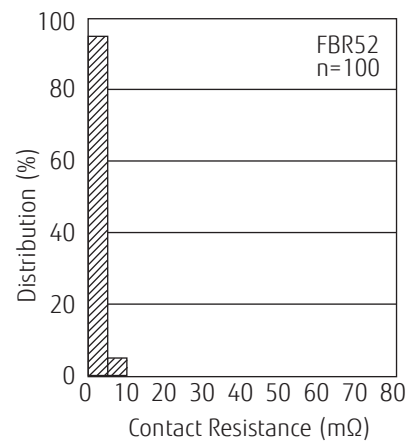
Distribution of operate and release voltage



Distribution of operate and release time



Distribution of contact resistance

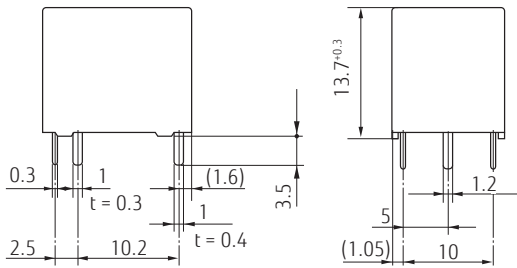
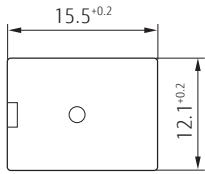




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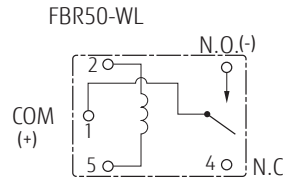
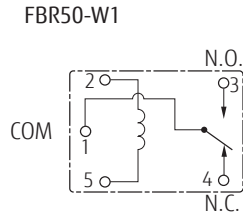
## ■ Dimensions

### Dimensions

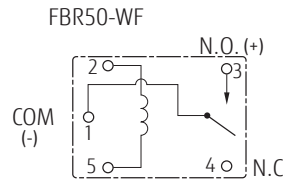


Note: Dimensions of the terminals does not includes thickness of pre-solder.

### Schematics (BOTTOM VIEW)

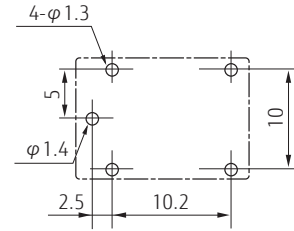


Refer to the test circuit at CHARACTERISTIC DATA for connection, and polarity.



Refer to the test circuit at CHARACTERISTIC DATA for connection, and polarity.

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



Tolerance: +/-0.1

Unit: mm

# FBR51, 52 Series

## GENERAL INFORMATION

### 1. ROHS Compliance

- All relays produced by Fujitsu Components are compliant with RoHS directive 2011/65/EU including amendments.
- Use of Cadmium in electrical contacts is exempted as per Annex III of the RoHS directive 2001/65/EU. Please consider expiry date of exemption. Relays with Cadmium containing contacts are not to be used for new designs.
- All relays are lead-free. Please refer to Lead-Free Status Info for older date codes at: <http://www.fujitsu.com/downloads/MICRO/fcai/relays/lead-free-letter.pdf>

### 2. Recommended lead free solder condition

- Lead free solder plating on relay terminals is Sn-3.0Ag-0.5Cu, unless otherwise specified. This material has been verified to be compatible with PbSn assembly process.
- Recommended solder for assembly: Sn-3.0Ag-0.5Cu.

#### Flow Solder Condition:

Pre-heating: maximum 120°C  
within 90 sec.  
Soldering: dip within 5 sec. at  
255°C ± 5°C solder bath  
Relay must be cooled by air immediately  
after soldering

#### Solder by Soldering Iron:

Soldering Iron 30-60W  
Temperature: maximum 350-360°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, unless otherwise indicated. -RW THR relay will be shipped in moisture barrier bag.

### 4. Tin Whiskers

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

# FBR51, 52 Series

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[FBR51ND10-W1](#) [FBR51ND12-WL](#) [FBR51ND09-N](#) [FBR51ND09-W](#) [FBR51ND06-WL](#) [FBR51ND10-WL](#) [FBR51ND12-](#)  
[N](#) [FBR51ND09-WL](#) [FBR51ND09-W1](#) [FBR51ND12-W1](#)