FUJITSU

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

■ PARTNUMBER INFORMATION

	FBR51	N	D12	-	W1
[Example]	(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.....12 VDC 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, see application table, 1 form A) WF : Silver-tin oxide indium (flasher loads, 1 form A)

Actual marking does not carry the type name: "FBR"
E.g.: Ordering code: FBR51ND12-W1 Actual marking: 51ND12-W1

■ SPECIFICATION

Item			Characteristics W1 contact	Remarks
Contact Data	Configuration		1 form C (SPDT)	
	Material		$AgSnO_2In$ (high capacity type)	
	Voltage drop (initial)		Max. 100mV	At 1A/12VDC
	Contact rating		25A, 14VDC	At locked motor load
	Max. carrying current		35A / 10 minutes, 30A / 1hr	At 25 °C with nominal coil voltage
	Max. inrush current (reference)		60A	
	Max. switching voltage (reference)		16VDC	
	Max. switching current (reference)		35A	
	Min. switching load (reference) *		1A, 6 VDC	
Life	Mechanical		Min. 10×10^6 operations	
	Electrical		Min. 200×10^3 operations	At contact rating, locked motor load
Coil Data	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 (or freezing)
	Storage temperature range		-40 °C to +100 °C	
Timing Data	Operate		Max. 10 ms (no diode, excluding bounce)	At nominal coil voltage
	Release		Max. 5 ms (no diode, excluding bounce)	At nominal coil voltage
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 43m/s² (4.4G), constant acceleration	For 3 directions, totally 6 cycles, with/without coil energizing
		Endurance	10 to 200Hz, acceleration 43m/s² (4.4G), constant acceleration	For 3 directions, totally 6 hours, without coil energizing
	Shock resistance	Misoperation	100m/s² (11±1ms)	For 3 directions, totally 36 times, with/ without coil energizing
		Endurance	1,000m/s² (6±1ms)	For 3 directions, totally 18 times, without coil energizing
	Weight		Approximately 6 g	

* 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.

■ SPECIFICATION

Item			Characteristics		Remarks
			WF contact	WL contact	
Contact Data	Configuration		1 form A (SPST)		
	Material		$AgSnO_2In$ (For flasher)	$AgSnO_2In$ (For lamp)	
	Voltage drop (initial)		Max. 100mV		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 (reference)		80A		At lamp load
	Max. switching voltage (reference)		16VDC		
	Max. switching current (reference)		35A		
	Min. switching load (reference) *		1A , 6 VDC		
Life	Mechanical		Min. 10×10^6 operations		
	Electrical		Min. 2.5×10^6 operations (0.35 sec - ON/0.35 sec - OFF)	Min. 100×10^3 operations	At contact rating, lamp load
Coil data	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 (or freezing)
	Storage temperature range		-40 °C to +100 °C		
Timing Data	Operate		Max. 10 ms (no diode, excluding bounce)		At nominal coil voltage
	Release		Max. 5 ms (no diode, excluding bounce)		At nominal coil voltage
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 43m/s² (4.4G), constant acceleration		For 3 directions, totally 6 cycles, with/without coil energizing
		Endurance	10 to 200Hz, acceleration 43m/s² (4.4G), constant acceleration		For 3 directions, totally 6 hours, without coil energizing
	Shock resistance	Misoperation	100m/s² (11±1ms)		For 3 directions, totally 36 times, with/without coil energizing
		Endurance	1,000m/s² (6±1ms)		For 3 directions, totally 18 times, without coil energizing
	Weight		Approximately 6 g		

* 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.

■ COIL RATING

FBR51 Series

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release Voltage (VDC) *
D06	6	60	3.6 (at 20 ℃)	0.5 (at 20 ℃)
			4.5 (at 85 ℃)	0.7 (at 85 ℃)
D09	9	135	5.4 (at 20 ℃)	0.7 (at 20 ℃)
			6.8 (at 85 ℃)	0.9 (at 85 ℃)
D10	10	180	6.3 (at 20 ℃)	0.8 (at 20 ℃)
			7.9 (at 85 ℃)	1.0 (at 85℃)
D12	12	240	7.3 (at 20 ℃)	1.0 (at 20 ℃)
			9.2 (at 85 ℃)	1.3 (at 85 ℃)

FBR52 Series

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release Voltage (VDC) *
D06	6	45	3.6 (at 20 ℃)	0.5 (at 20 ℃)
			4.5 (at 85 ℃)	0.7 (at 85 ℃)
D09	9	100	5.4 (at 20 ℃)	0.7 (at 20 ℃)
			6.8 (at 85 ℃)	0.9 (at 85 ℃)
D10	10	135	6.3 (at 20 ℃)	0.8 (at 20 ℃)
			7.9 (at 85 ℃)	1.0 (at 85℃)
D12	12	180	7.3 (at 20 ℃)	1.0 (at 20 ℃)
			9.2 (at 85 ℃)	1.3 (at 85 ℃)

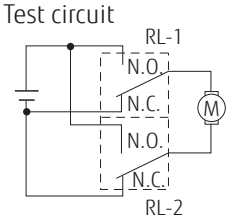
Note: Coil resistance values in the tables are valid for 20℃.
* Specified operate values are valid for pulse wave voltage.

■ CHARACTERISTIC DATA (Reference)

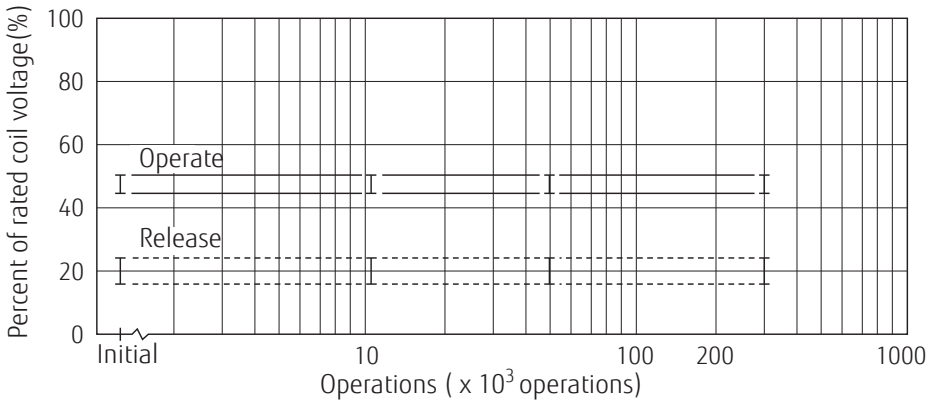
Life test (example)

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

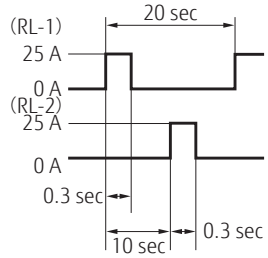
- Test circuit



Operate/release voltage

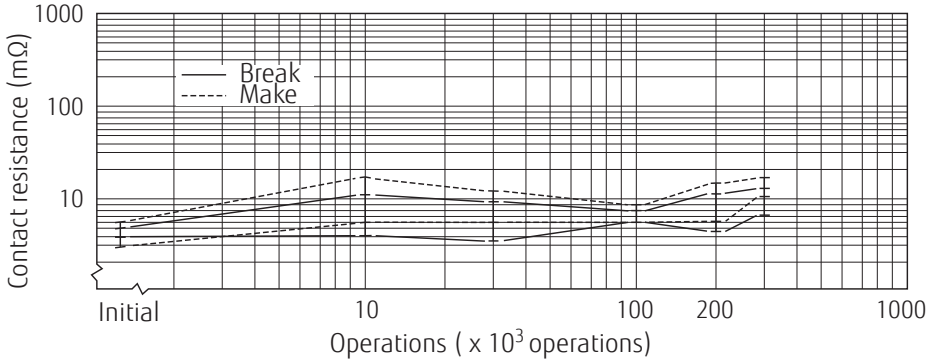


- Current wave form



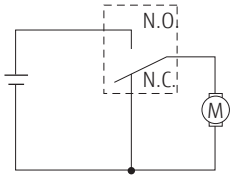
Contact resistance

(measured at 6VDC 1A wet)

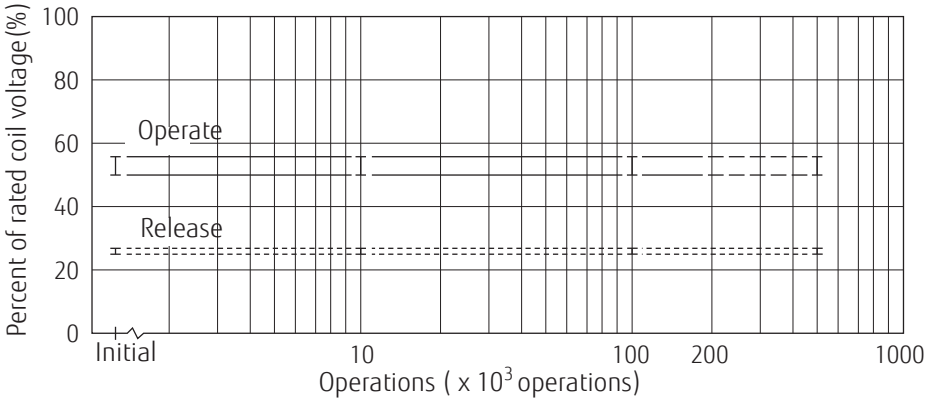


- Test item
  20A 14VDC
  motor free 400,000
  operations minimum
  (FBR51N( )-W1 type)

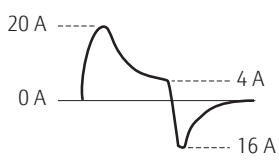
- Test circuit



Operate/release voltage

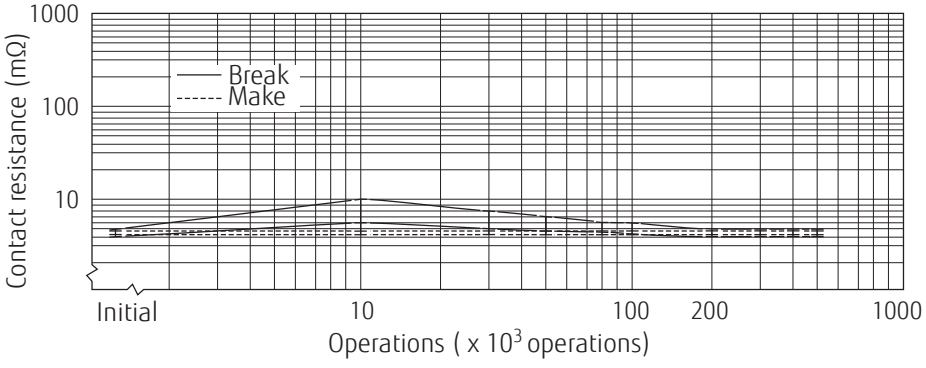


- Current wave form



Contact resistance

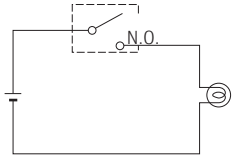
(measured at 6VDC 1A wet)



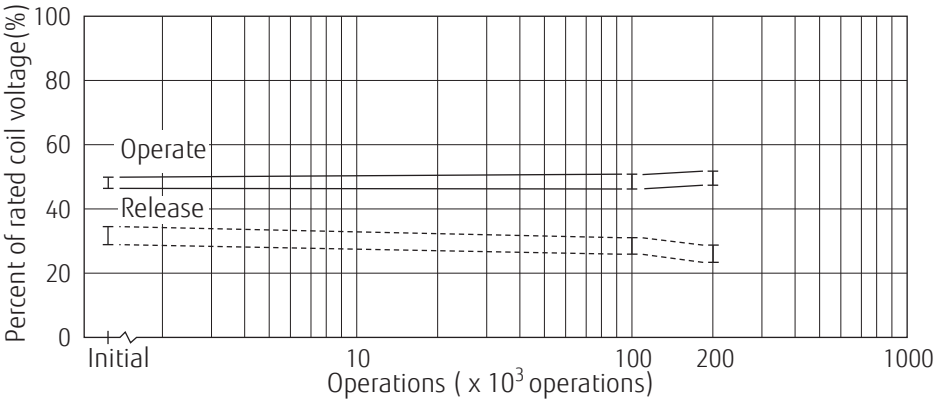
Life test (example)

- Test item
  Inrush 80A 14VDC
  lamp load 100,000
  operations minimum
  (FBR51N( )-WL type)

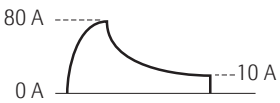
- Test circuit



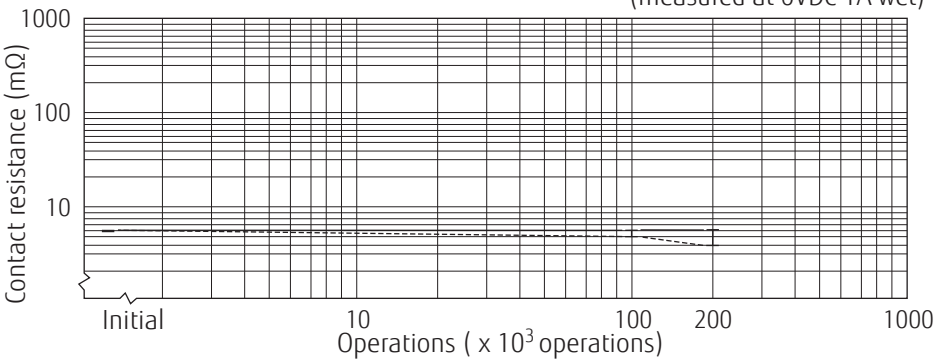
Operate/release voltage



- Current wave form

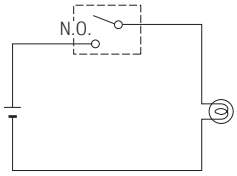


Contact resistance
(measured at 6VDC 1A wet)

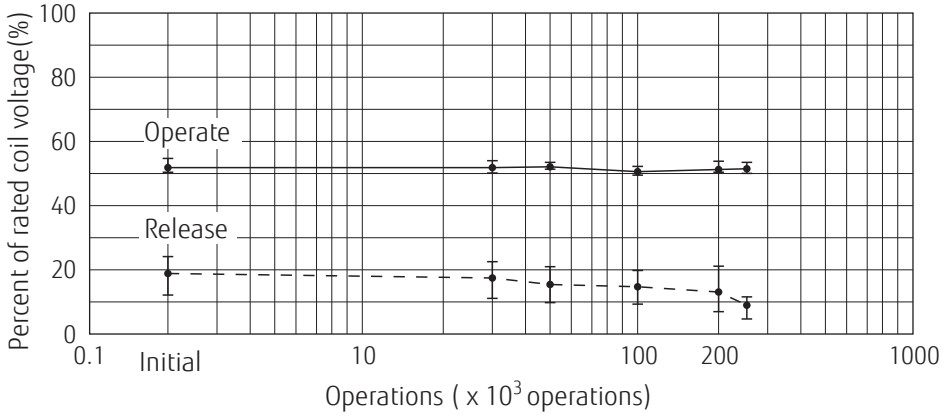


- Test item
  Inrush 11A 14VDC
  flasher, hazard lamp
  (80W)load 2,500,000
  operations minimum
  (FBR51N( )-WF type)

- Test circuit

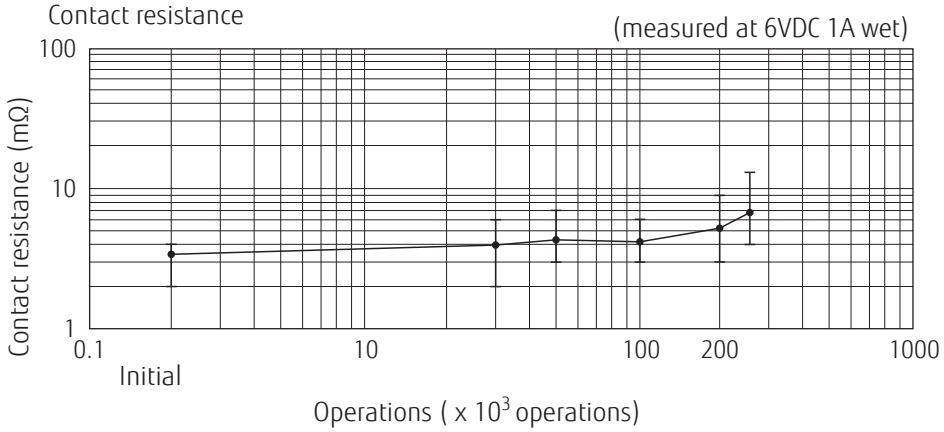


Operate/release voltage

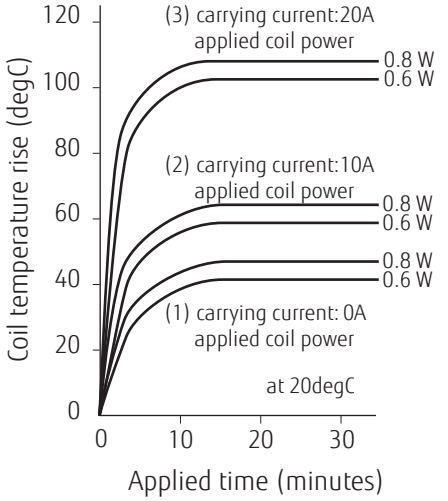


- Current wave form

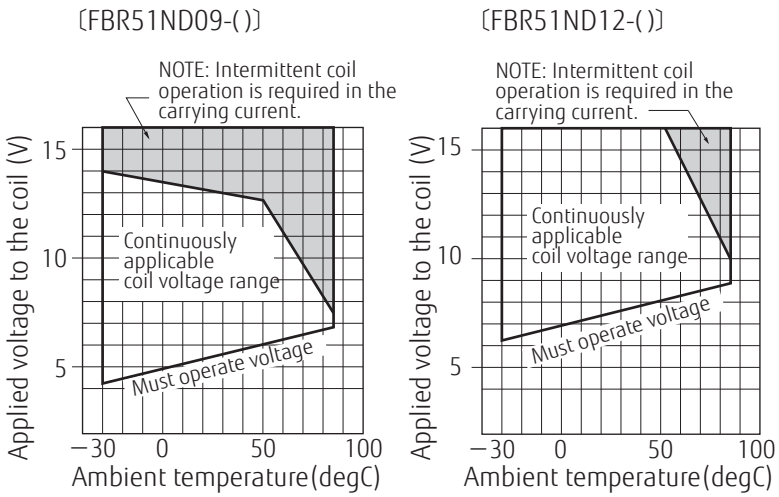
Contact resistance
(measured at 6VDC 1A wet)



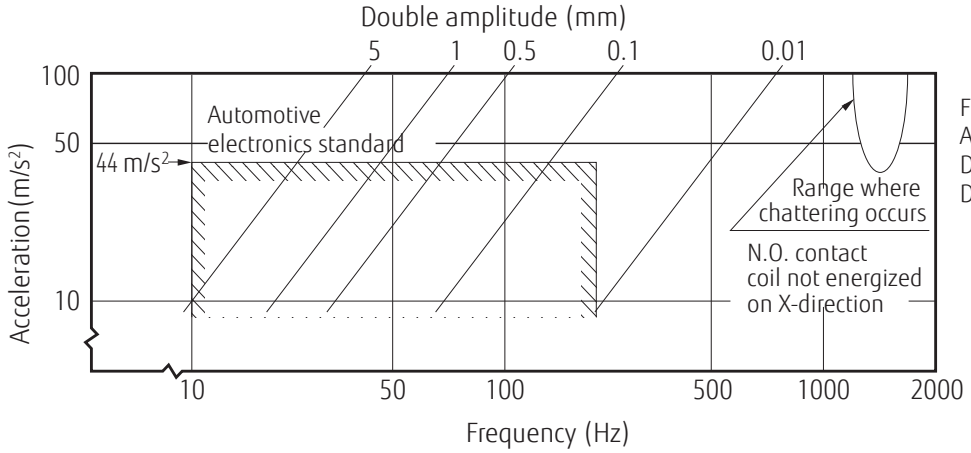
Coil Temperature Rise



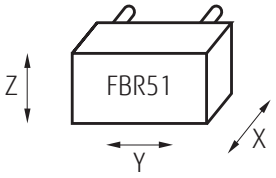
Operating Coil Voltage Range



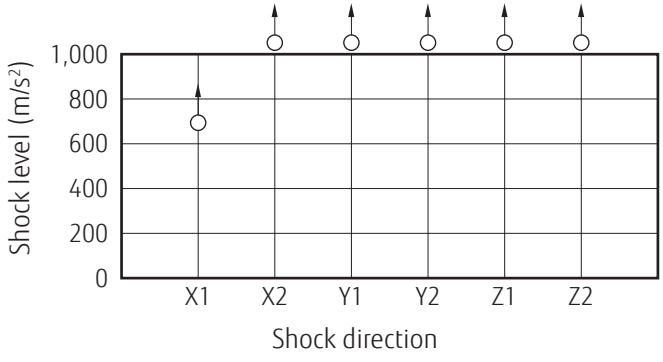
Coil Temperature Rise



Frequency: 10 to 2000 Hz
Acceleration: 100m/s² max.
Direction of vibration: see under diagram
Detection level: chatter >10micro-sec.

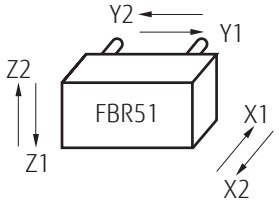


Shock Resistance Characteristics

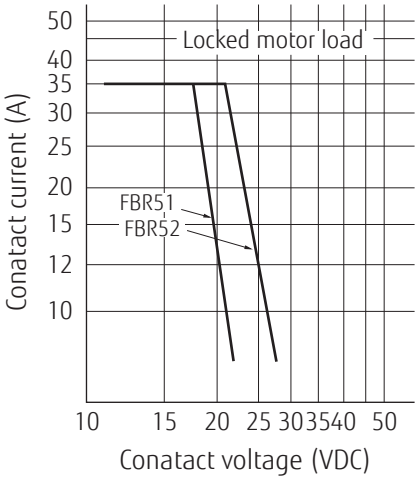


○: N.C.contact (coil de-energized)
N.O.contact: min. 1,000m/s² in all directions

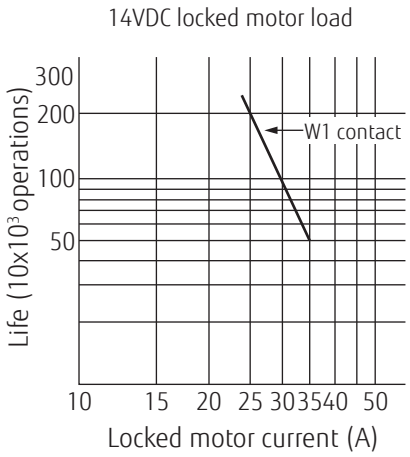
Shock application time: $11^{+/-1}$ms, half-sine wave
Test material: coil, energized and de-energized
Shock direction: set under diagram
Detection level: chatter > 100micro-sec.



Maximum Switching Power

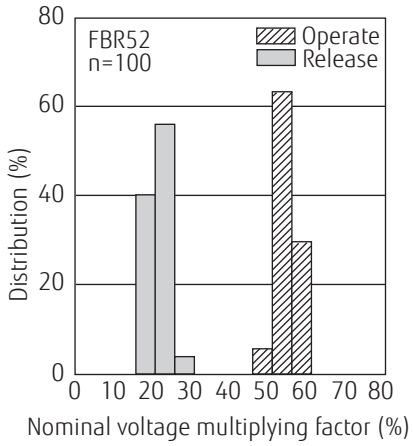


Live Curve

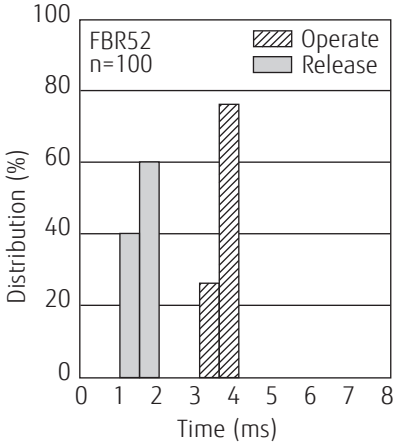


Initial Distributions data

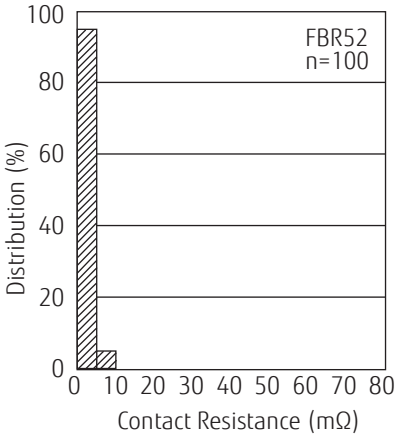
Distribution of operate and release voltage



Distribution of operate and release time

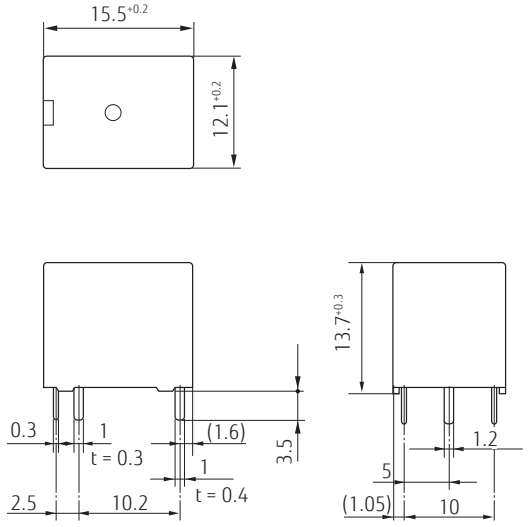


Distribution of contact resistance



■ DIMENSIONS

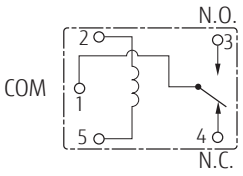
Dimensions



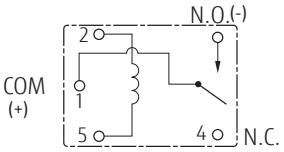
Note: Dimensions of the terminals does not includes thickness of pre-solder.

Schematics
(BOTTOM VIEW)

FBR50-W1

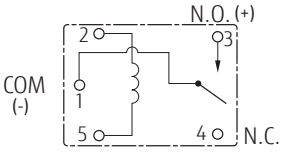


FBR50-WL



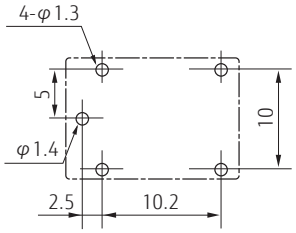
Refer to the test circuit at CHARACTERISTIC DATA for connection, and polarity.

FBR50-WF



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

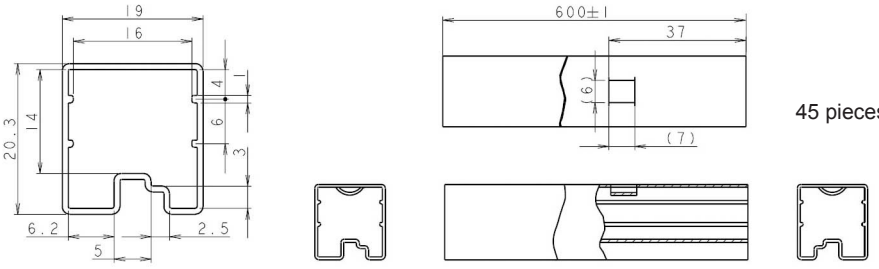
PC board mounting hole layout
(BOTTOM VIEW)



Tolerance: +/-0.1

Unit: mm

- **Tube carrier**
  (pokayoke)



45 pieces/tube

RoHS Compliance and Lead Free Information

1. General Information

- All relays produced by Fujitsu Components are compliant with RoHS directive 2011/65/EU including amendments.
- Cadmium as used in electrical contacts is exempted from the RoHS directives.
  As per Annex III of directive 2011/65/EU.
- 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
- 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.

2. Recommended Lead Free Solder Condition

- Recommended solder Sn-3.0Ag-0.5Cu.

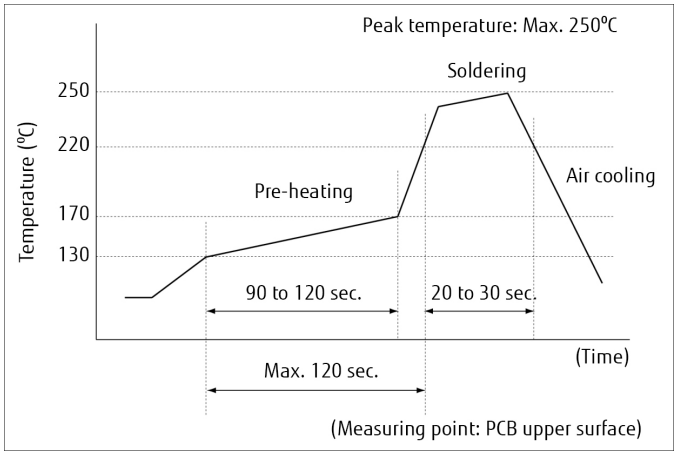
Flow Solder Condition:

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 Temperature:	30-60W 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.

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.

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