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Edition 2.0

FUJITSU

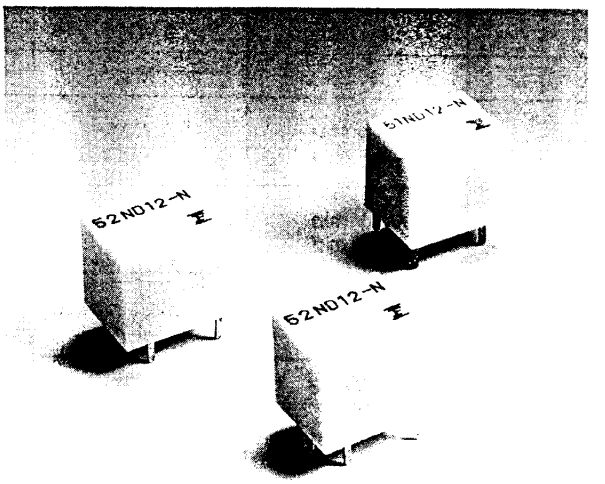
DATA SHEET

# FBR 51, 52 SERIES
# COMPACT POWER RELAY FOR AUTOMOTIVE APPLICATIONS

Fujitsu's new compact relays offer a tremendous weight and space savings, providing an increased current handling capacity.

## FEATURES

- Compact, Lightweight structure (42% the volume as compared with FBR160 relay)
- High current contact capacity (carrying current: 35A/2min, 25A/1Hr)
- High resistance to vibration and shock
- Improved Heat Resistance and Extended Operating Range
- Two types of contact gap (FBR51: 0.3 mm, FBR52: 0.6 mm)



## SPECIFICATIONS

| Item | Specification |
|---|---|
| Contact Arrangement | 1 form C |
| Contact Material | Silver–Tin oxide indium (–W type)<br>Silver copper nickel (–N type) |
| Contact Voltage Drop (Contact Resistance) | 100 mV Max. at 12 VDC–2 A |
| Vibration | No Contact Opening, No Damage:<br>10 G, 10 to 55Hz 1.5 mm double amplitude |
| Shock | No Contact Opening : 10 G Min.<br>No Damage : 100 G Min. |
| Operate Time | 10 ms Max. (excluding bounce time) |
| Release Time | 5 ms Max. (excluding bounce time) |
| Operating Temperature Range | –40°C to +85°C |
| Storage Temperature Range | –40°C to +100°C |
| Mechanical Life | 10 x $10^6$ Operations Minimum @ 5 Hz |
| Weight | 6.0 Grams (approx.) |

## CONTACT CAPACITIES

| Item | Specification |
|---|---|
| Contact Rating | 14 VDC–20 A (LOCKED MOTOR LOAD)<br>14 VDC–INRUSH 20 A, BREAK 4 A (MOTOR FREE LOAD) |
| Maximum Carrying Current | 35 A/2 min, 25A/1Hr (@ 25°C, 100% Rated Coil Voltage) |
| Maximum Inrush Current (Reference) | –W type : 60 A<br>–N type : 40 A |
| Maximum Break Current | 35 A at 16 VDC |
| Minimum Applicable Load (Reference) | –W type : 6 V, 1 A<br>–N type : 6 V, 2 A |

## COIL RATINGS

| Item | | Specification | | | |
|---|---|---|---|---|---|
| FBR51 | Rated Coil Voltage | 6 VDC | 9 VDC | 10 VDC | 12 VDC |
| | Coil Resistance (20 °C) | 60 Ω | 135 Ω | 180 Ω | 240 Ω |
| | Pick–Up Voltage<br>(20 °C)<br>(85 °C) | 3.6 V max<br>4.5 V max | 5.4 V max<br>6.8 V max | 6.3 V max<br>7.9 V max | 7.3 V max<br>9.2 V max |
| | Drop–Out Voltage<br>(20 °C)<br>(85 °C) | 0.5 V min<br>0.6 V min | 0.7 V min<br>0.8 V min | 0.8 V min<br>0.9 V min | 1.0 V min<br>1.2 V min |
| | Thermal Resistance | 86°C/W | | | |
| FBR52 | Rated Coil Voltage | 6 VDC | 9 VDC | 10 VDC | 12 VDC |
| | Coil Resistance (20 °C) | 45 Ω | 100 Ω | 135 Ω | 180 Ω |
| | Pick–Up Voltage<br>(20 °C)<br>(85 °C) | 3.6 V max<br>4.5 V max | 5.4 V max<br>6.8 V max | 6.3 V max<br>7.9 V max | 7.3 V max<br>9.2 V max |
| | Drop–Out Voltage<br>(20 °C)<br>(85 °C) | 0.5 V min<br>0.6 V min | 0.7 V min<br>0.8 V min | 0.8 V min<br>0.9 V min | 1.0 V min<br>1.2 V min |
| | Thermal Resistance | 78°C/W | | | |

## ORDERING INFORMATION

[Example] FBR51 (a) N (b) D12 (c) – W (d) □ (e)

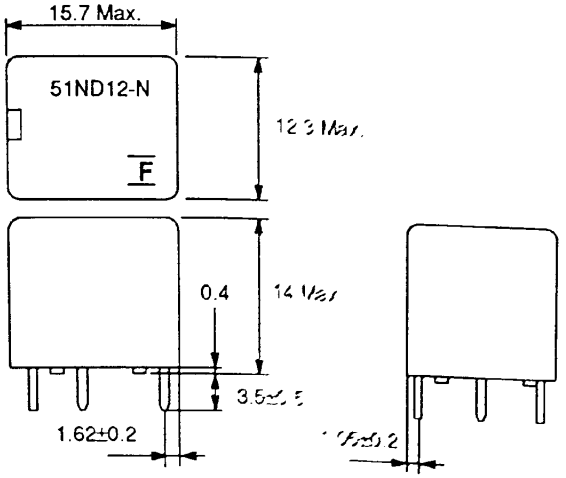
| | | |
|---|---|---|
| (a) | Series Name | FBR51 : Standard Type (Contact Gap 0.3 mm)<br>FBR52 : Wider Contact Gap Type (Contact Gap 0.6 mm) |
| (b) | Structure | N : For Automated Soldering + Immersion Cleaning (sealed case) |
| (c) | Rated Coil Voltage | ND06 : 6 VDC<br>ND09 : 9 VDC<br>ND10 : 10 VDC<br>ND12 : 12 VDC |
| (d) | Contact Material | –W : Silver–Tin oxide indium<br>–N : Silver copper nickel |
| (e) | Custom Designation | To be assigned custom specification |

## PART NUMBER LIST

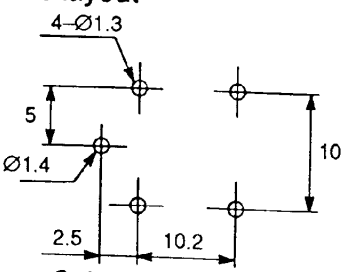
| Series Name | Rated Coil Voltage (VDC) | Contact Material | |
|---|---|---|---|
| | | W–Type | N–Type |
| FBR51 Series (Contact Gap 0.3 mm) | 6<br>9<br>10<br>12 | FBR51ND06–W<br>FBR51ND09–W<br>FBR51ND10–W<br>FBR51ND12–W | FBR51ND06–N<br>FBR51ND09–N<br>FBR51ND10–N<br>FBR51ND12–N |
| FBR52 Series (Contact Gap 0.6 mm) | 6<br>9<br>10<br>12 | FBR52ND06–W<br>FBR52ND09–W<br>FBR52ND10–W<br>FBR52ND12–W | FBR52ND06–N<br>FBR52ND09–N<br>FBR52ND10–N<br>FBR52ND12–N |

## DIMENSIONS

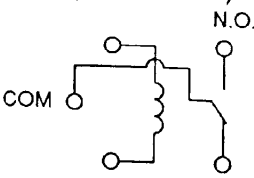
- **Dimensions**



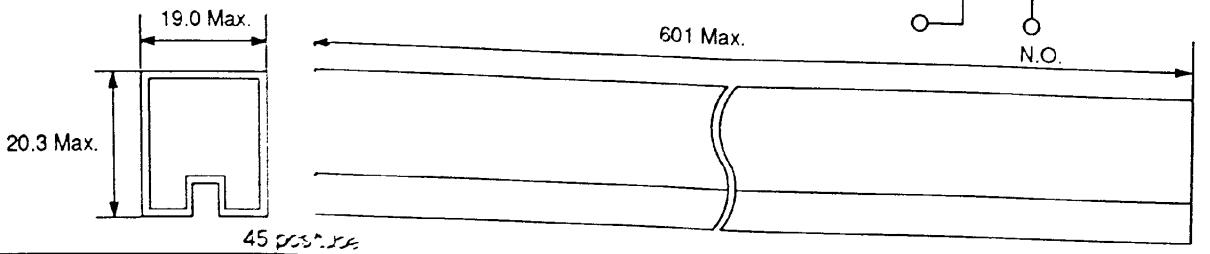

- **PC board mounting hole layout**




- **Schematics** (Bottom view)




- **Tube carrier**




Unit : mm

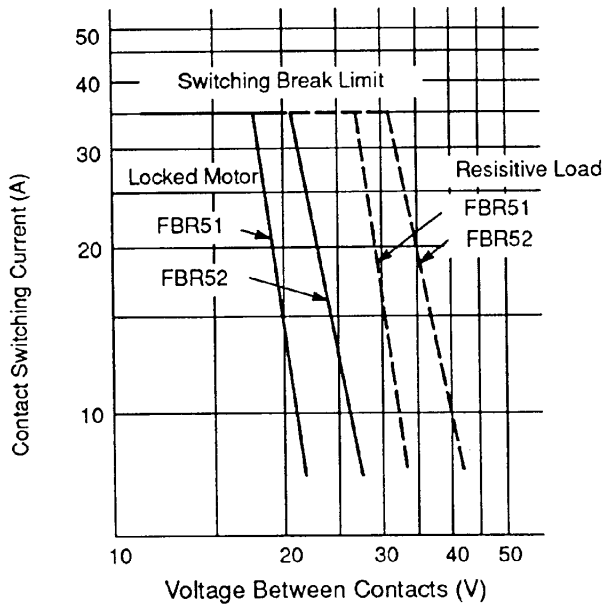
## PRINCIPAL APPLICATIONS

| Application | Normal Load Current (12VDC System) | Description | Recommendable P / N (Example) | |
|---|---|---|---|---|
| | | | For 15 V or less motor load voltage | For instantaneous 20 V or more load voltage |
| Power Windows | 20 to 25A (switching at motor locking) | Forward and Reverse Motor Control | FBR51N ☐ – W | FBR52N ☐ – W |
| Automatic Door Lock | 18 to 25A (switching at motor locking) | Forward and Reverse Motor Control | FBR51N ☐ – W | FBR52N ☐ – W |
| Intermittent Wipers | 15 to 30A Break 2 to 8A (motor-free) | Forward Only | FBR51N ☐ – N | FBR52N ☐ – N |
| Tilt-Lock Wheel | 20A Break 5A (some with motor locking) | Forward and Reverse Motor Control | FBR51N ☐ – W | FBR52N ☐ – W |
| Sunroof | 20 to 30A (switching at motor locking) | Forward and Reverse Motor Control | FBR51N ☐ – W | FBR52N ☐ – W |
| Adjustable Door Mirror | 3 to 5A (switching at motor locking) | Forward and Reverse Motor Control | FBR51N ☐ – W | |
| Automatic Antenna | 8 to 12A (INRUSH) Break 2A Max. (motor-free) | Forward and Reverse Motor Control | FBR51N ☐ – W | |
| Auto-Cruise | 2 to 3A | Power Shutoff and Solenoid | FBR51N ☐ – W | |
| Other | Car Audio System, etc. | | | |

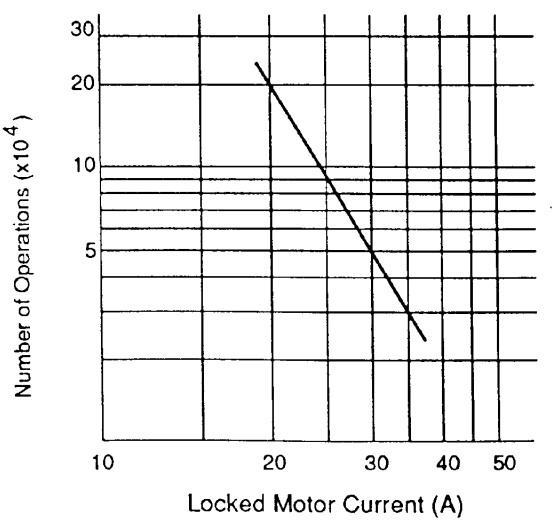
- For the load condition where higher voltage would be encountered during contact break, FBR52 series with wider contact gap is recommended.
- –N contact type is recommended for applications which require long durability and –W contact type is for high inrush current load applications.

## DATA

### (1) MAXIMUM BREAK CAPACITY




### (2) LIFE



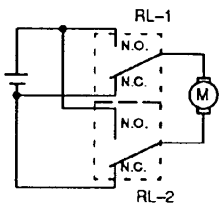
## (3) LIFE TEST (EXAMPLE)

- Test Item

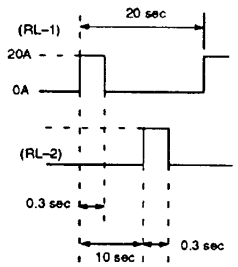
  14 VDC–20A
  Motor Lock
  200,000 ops, MIN.

  (FBR52□–W type)

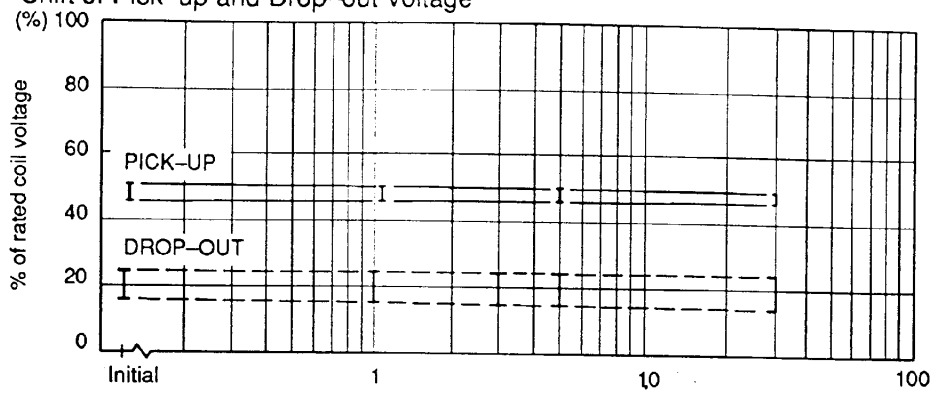
- Test Circuit




- Current Wave Form

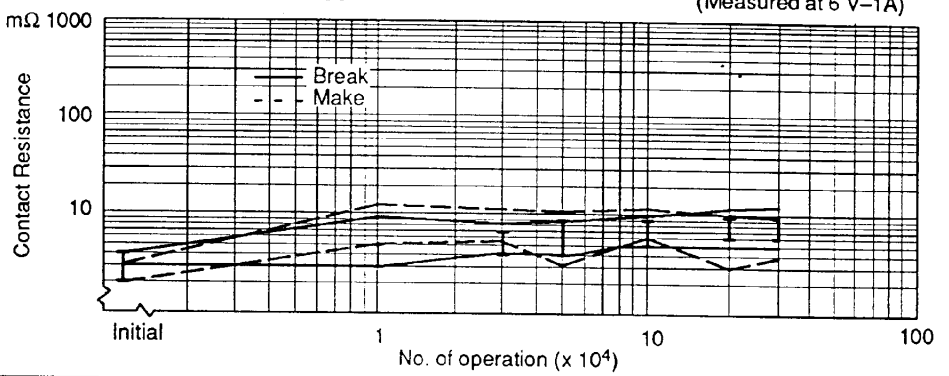



- Shift of Pick–up and Drop–out Voltage




- Shift of Contact Resistance

(Measured at 6 V–1A)

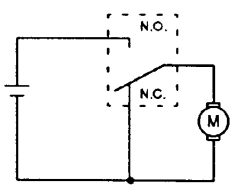



- Test Item

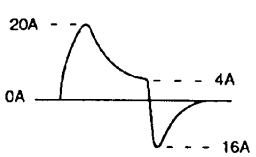
  14 VDC–20A INRUSH
  Motor Free
  400,000 ops, MIN.

  (FBR51□–N type)

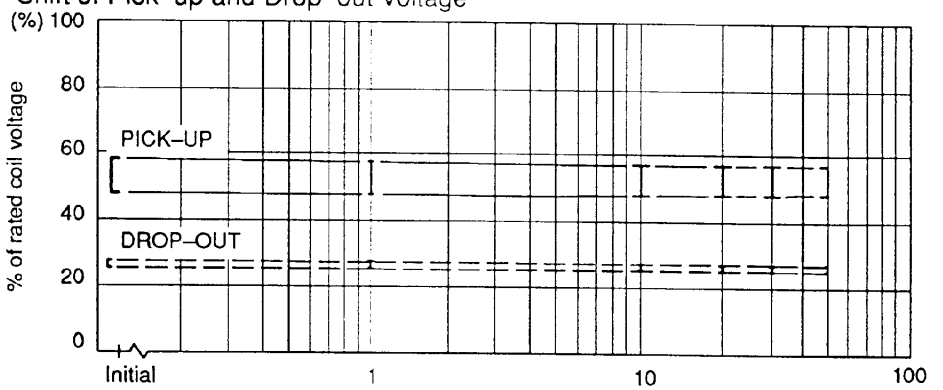
- Test Circuit




- Current Wave Form

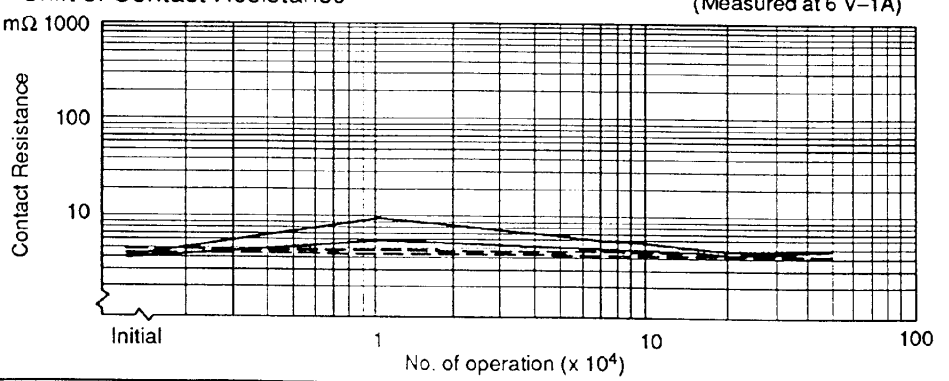



- Shift of Pick–up and Drop–out Voltage

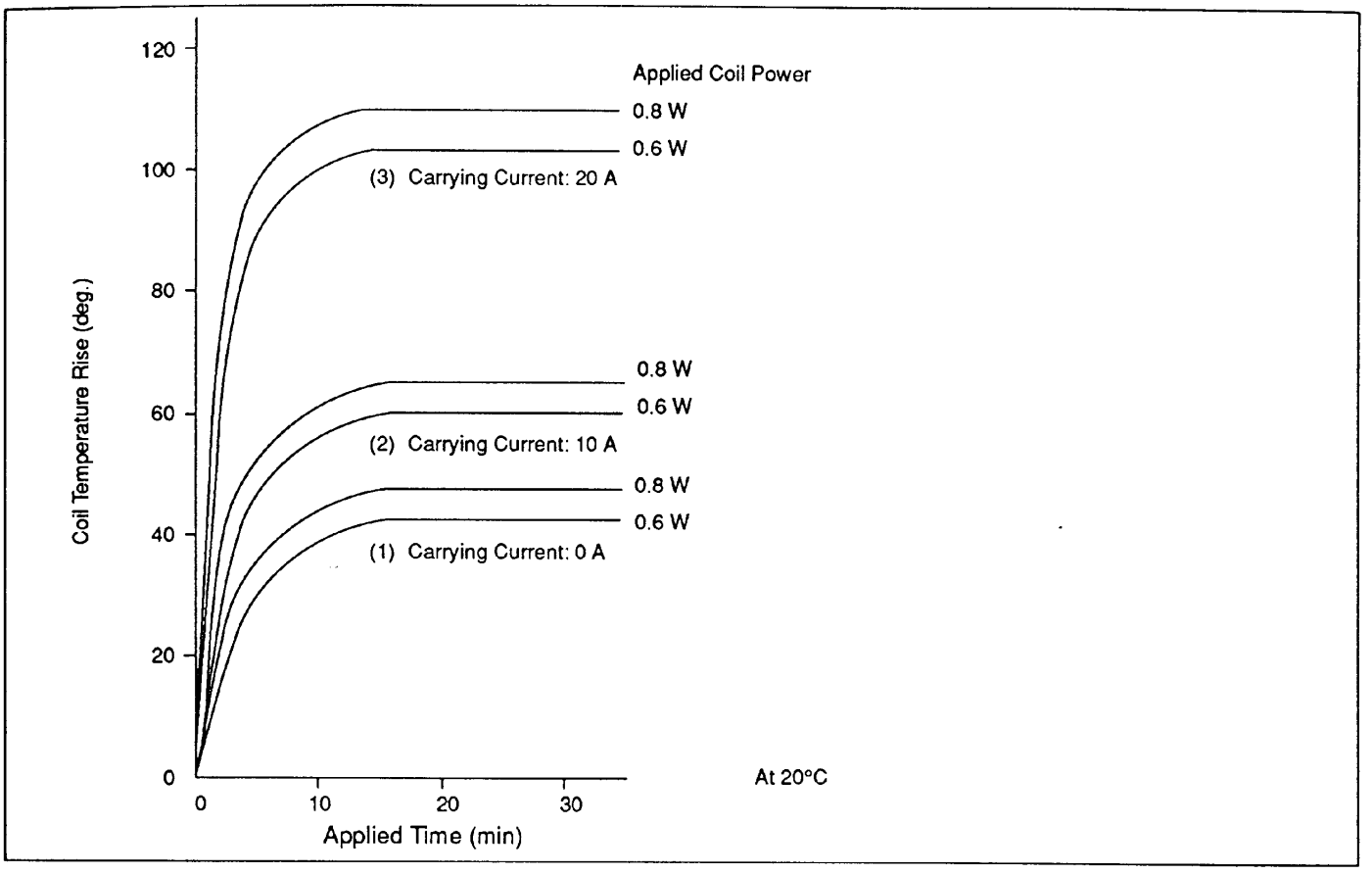



- Shift of Contact Resistance

(Measured at 6 V–1A)

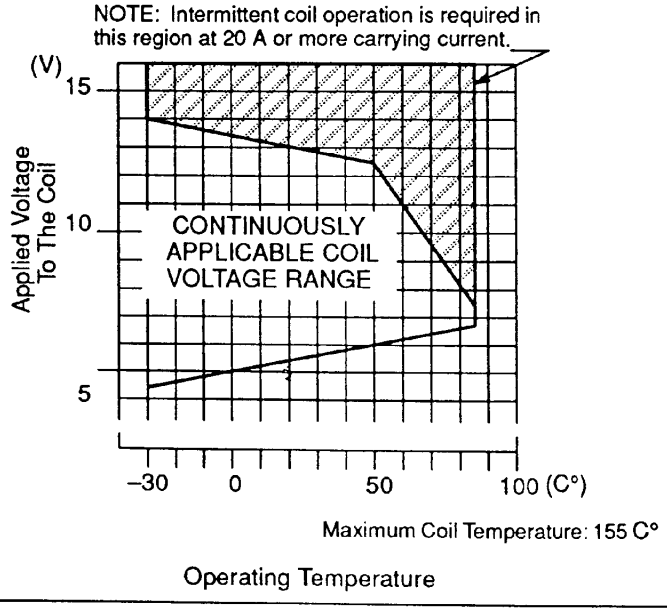


## (4) COIL TEMPERATURE RISE

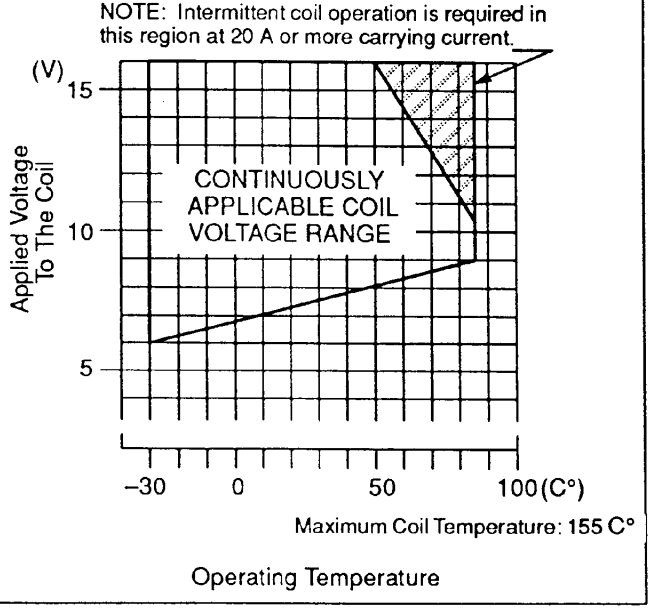



## (5) OPERATING COIL VOLTAGE RANGE (EXAMPLE)

**FBR51ND09–□**

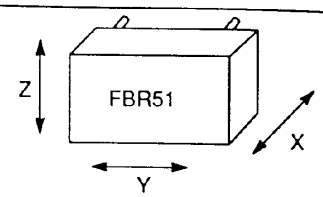


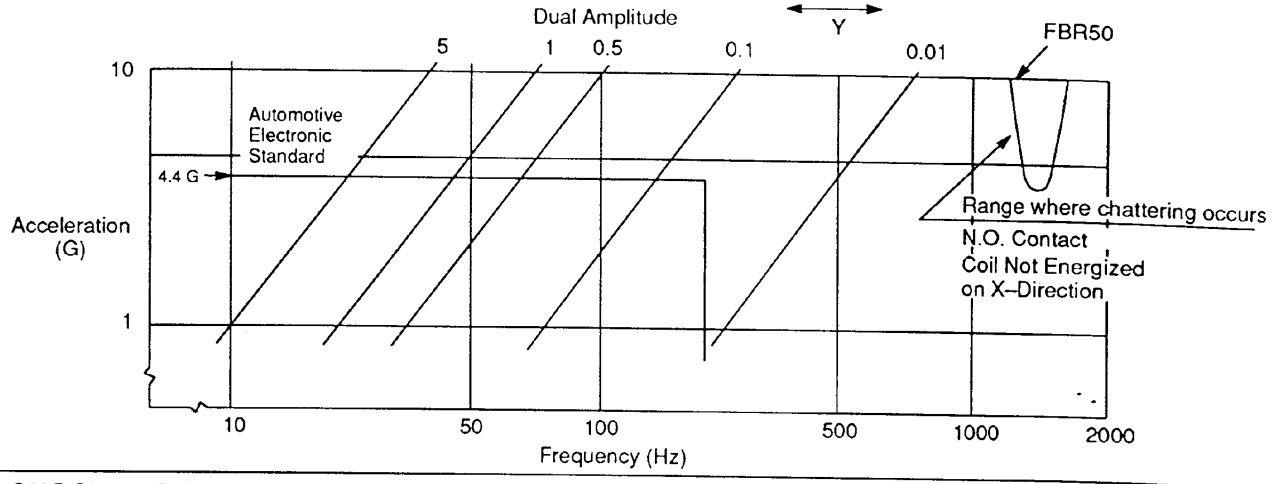

**FBR51ND12–□**



## (6) VIBRATION RESISTANCE CHARACTERISTICS

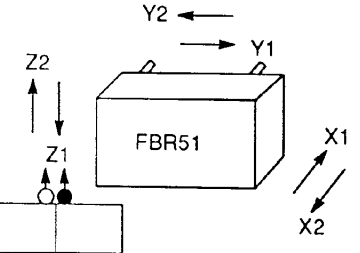
Frequency: 10 to 2000 Hz
Acceleration: 10 G Max.
Direction of Vibration: See diagram at right.
Detection Level: Chatter of 100 μs min.

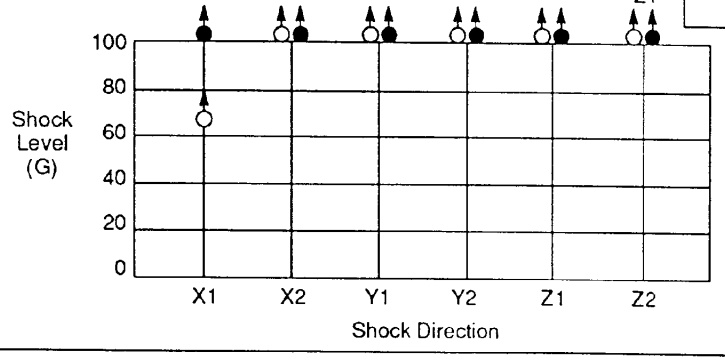



## (7) SHOCK RESISTANCE CHARACTERISTICS

Shock Application Time: 11 ms, Half–Sine Wave
Test Material: Coil, Energized and De–Energized
Shock Direction: See Diagram at Right
Detection Level: Chatter of 100 μs min.




○ : N.C. Contact ( coil de–energized)
● : N.O. Contact ( coil energized)