

# SILENT TWIN RELAY FOR AUTOMOTIVE APPLICATIONS

## 1 POLE x 2 – 25A (FOR 12V CAR BATTERY)

### FTR-P2 Series

RoHS Compliant

#### ■ FEATURES

- Low operating sound  
An original silent mechanism decreases the propagation of operating sound when mounted on a PCB (Average sound pressure: 50dB at 5cm)
- Compact, high density package  
350mm<sup>2</sup> mounting area
- High sensitivity, low power consumption  
(nominal power consumption: 450mW)
- Simple PCB layout due to internal H-bridge connections typically used in motor applications  
All terminals are on the perimeter
- High breaking capability.
- RoHS compliant



#### ■ APPLICATIONS

- Power window, door lock, power seat, wiper (for H-bridge circuit) etc.

#### ■ PART NUMBERS

[Example] FTR-P2 C N 012 W1  
 (a) (b) (c) (d) (e)

(a)	Relay type	FTR-P2 series
(b)	Contact configuration	C : 1c (1 Form C) x 2, H-bridge
(c)	Contact gap	N : 0.3mm gap
(d)	Coil rated voltage	012 : 9....12VDC Please refer to coil rating table
(e)	Contact material	W1 : Silver tin oxide indium

Actual marking does not carry the type name: "FTR"

E.g.: Ordering code: FTR-P2CN012W1 Actual marking: P2CN012W1

## ■ SPECIFICATIONS

Item		Specifications	Remarks/Conditions
Contact Data	Configuration	1c (1 Form C) x 2, H-bridge	
	Material	Silver tin oxide indium	
	Voltage drop	Max. 100mV	At 1A, 12VDC
	Contact rating	14VDC, 25A	Motor locked load
	Max. carrying current	25A/1 hour (25°C, nominal voltage applied to coil)	
	Max. switching voltage	16VDC	Reference
	Max. switching current	35A	Reference
	Min. switching load <sup>1</sup>	1A, 6VDC	Reference
Coil	Operating temperature range	-40°C to +85°C	No frost
	Storage temperature range	40°C to +100°C	No frost
Time	Operate	Max. 10ms	At nominal voltage
	Release	Max. 5ms (without diode), Max. 15ms (with diode)	At nominal voltage
Life	Mechanical	Min. 10 x 10 <sup>6</sup> operations	
	Electrical	Min. 100 x 10 <sup>3</sup> operations	At contact rating
Others	Vibration resistance	Misoperation	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G), constant acceleration
		Endurance	10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G), constant acceleration
	Shock resistance	Misoperation	100 m/s <sup>2</sup> (11±1ms)
		Endurance	1,000 m/s <sup>2</sup> (6±1ms)
	Dimensions / Weight	16.5 x 21.0 x 18.0mm / Approximately 13g	
Average sound pressure		Approximately 50dB at 5cm	

<sup>1</sup>: 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.

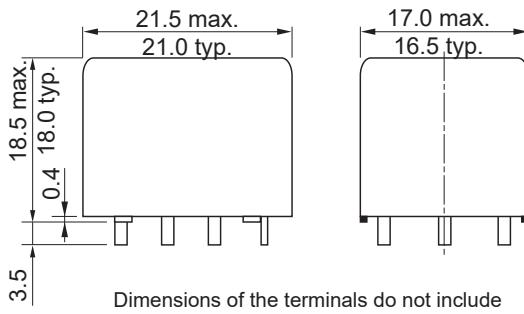
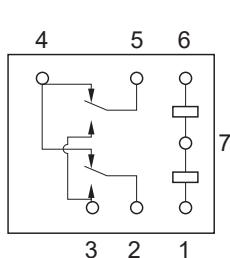
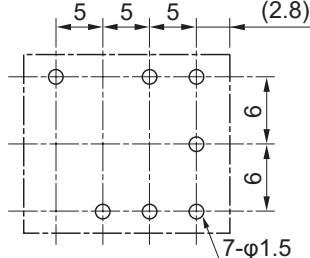
## ■ COIL DATA

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage <sup>*1</sup> (VDC)	Must Release Voltage <sup>*1</sup> (VDC)
009	9	180	5.5 (at 20°C) 6.9 (at 85°C)	0.7 (at 20°C) 0.9 (at 85°C)
010	10	220	6.3 (at 20°C) 7.9 (at 85°C)	0.8 (at 20°C) 1.0 (at 85°C)
012	12	320	7.3 (at 20°C) 9.2 (at 85°C)	1.0 (at 20°C) 1.3 (at 85°C)

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

\*1: Specified operated values are valid for pulse wave voltage.

## ■ DIMENSIONS

Dimensions	Schematics (BOTTOM VIEW)	PC board mounting hole layout (BOTTOM VIEW)
 <p>Dimensions of the terminals do not include thickness of pre-soldering.</p>		 <p>Tolerance of PC board mounting hole layout : ±0.1 unless otherwise specified.</p> <p>( ): Reference Unit: mm</p>

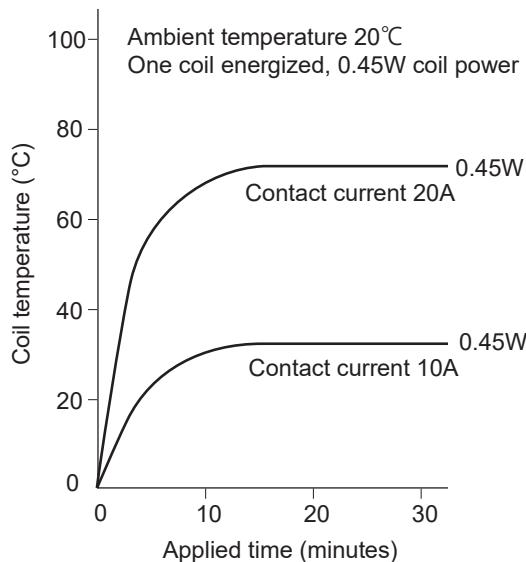
## ■ PART NUMBER LIST

Part Number	Contact Configuration	Enclosure	Contact Material
FTR-P2CN( )W1	1c (1 Form C) x 2	Plastic sealed	Silver tin oxide indium

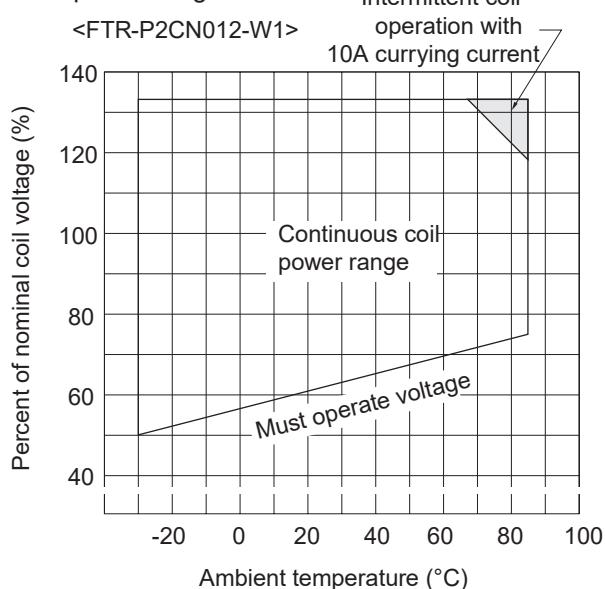
## ■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

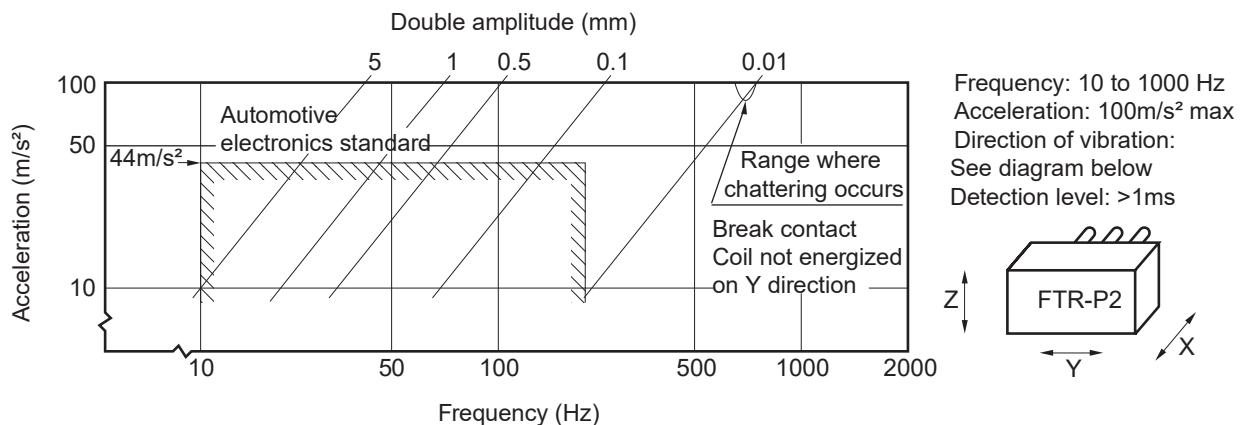
## 2. Coil temperature rise



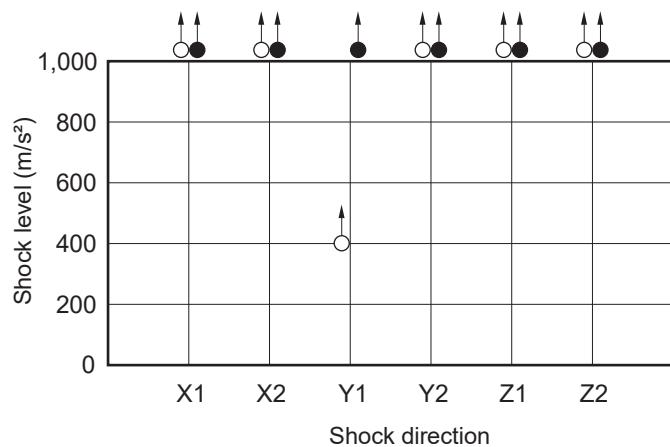
### 3. Operate range



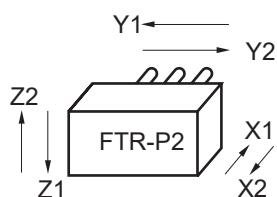
#### 4. Vibration resistance characteristics



## 5. Shock resistance characteristics



Shock application time:  $6 \pm 1$ ms, half-sine wave  
Test conditions: Coil energized and de-energized  
Shock direction: See diagram below  
Detection level:  $> 1$ ms



- : Break contact (coil de-energized)
- : Make contact (coil energized)

## ■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

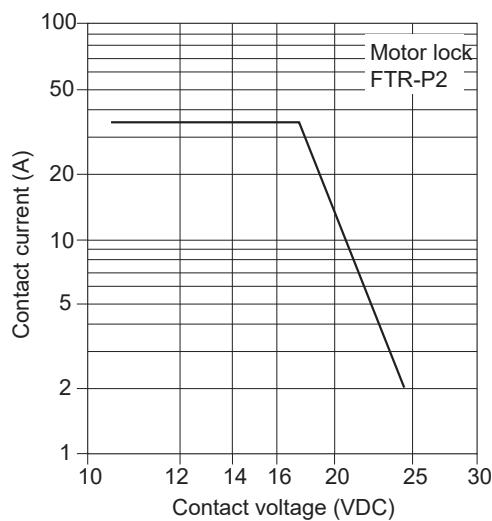
### Life test (example)

<p><b>Test Conditions</b> 25A 14VDC Motor lock 100,000 operations min. 0.25 sec. ON, 9.75 sec. OFF</p>	<p><b>Operate/release voltage</b></p>
<p><b>Test Circuit</b></p>	<p><b>Current wave form</b></p>
<p><b>Test Conditions</b> 17A 14VDC Motor free 300,000 operations min. 0.25 sec. ON, 9.75 sec. OFF</p>	<p><b>Operate/release voltage</b></p>
<p><b>Test Circuit</b></p>	<p><b>Current wave form</b></p>
	<p><b>Contact resistance</b></p> <p>(Measured at 6VDC 1A wet)</p>

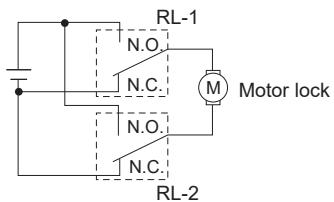
## ■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

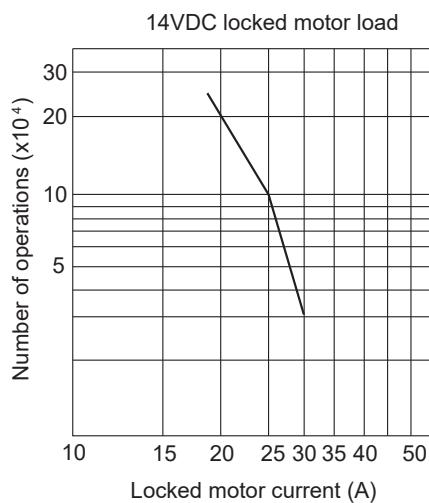
Maximum break capacity



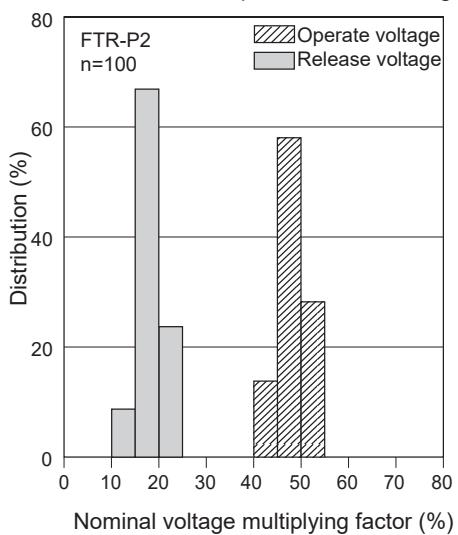
Test circuit



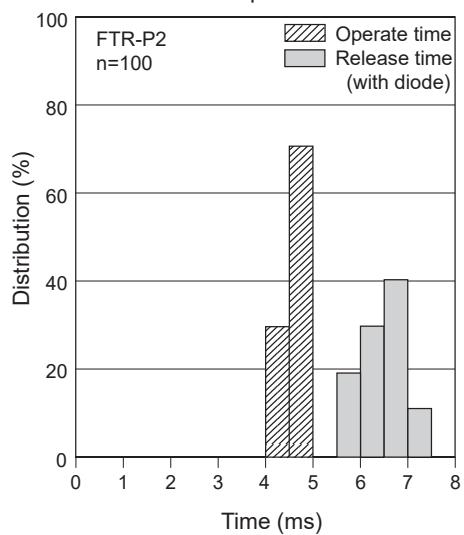
Life curve



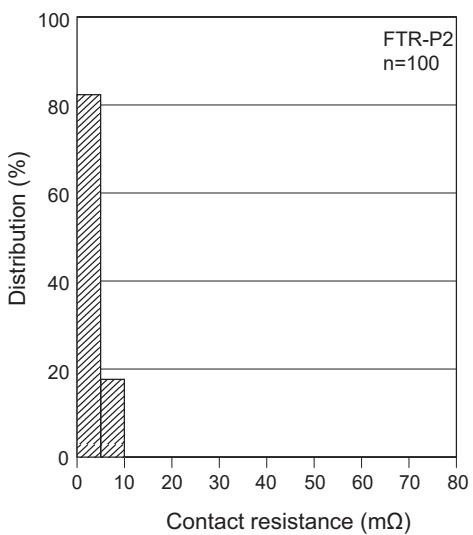
Distribution of operate/release voltage



Distribution of operate/release time



Distribution of contact resistance



## CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is prohibited.
- Do not use relays in the atmosphere with sulfide gas, chloride gas or nitric oxide. Contact resistance may increase.
- Do not use silicon or silicon-containing product or materials near relays. It may cause contact failure.

## GENERAL INFORMATION

### 1. ROHS Compliance

- All relays produced by FCL Components are compliant with RoHS directive 2011/65/EU, including commission delegated directive 2015/863.

### 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 340-360°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.

## Contact

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