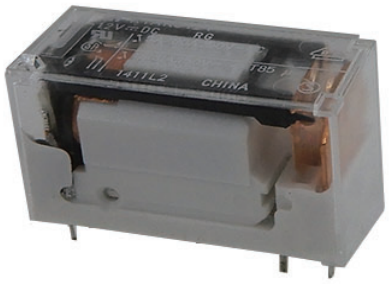
Discontinued - April 2025

POWER RELAY
1 POLE - 16A/12A/10A TRANSPARENT COVER

FTR-K1 Series

RoHS Compliant

■ FEATURES



- 16A, 12A, 10A versions
- Transparent cover
- Low profile (height: 15.7mm)
- High insulation
  Insulation distance (between coil and contacts): 10mm min.
  Dielectric strength: 5,000V, surge strength: 10,000V
- UL F class insulation wire
- Low coil power (400mW)
- Cadmium free contacts
- Safety standards: VDE approved
- Flux proof, RTII
- RoHS compliant

■ PART NUMBERS

[Example] FTR-K1 C K 012 W - MA - RG
(a) (b) (c) (d) (e) (f) (g)

(a)	Relay type	FTR-K1 series
(b)	Contact configuration	A : 1a (1 Form A, SPST-NO) C : 1c (1 Form C, SPDT) (standard type “K” only)
(c)	Coil type / enclosure	K : Standard type (400mW) / flux proof L : High sensitive (250mW) / flux proof (only for LA/LB versions)
(d)	Coil rated voltage	12 : 5....110VDC*1 (5...48VDC for LA/LB version) Please refer to coil rating table
(e)	Contact material	W : $AgSnO_2$ (applicable for 1c) T : $AgSnO_2$ (applicable for 16A 1a type) (TV-5) E : AgNi (16A type only)
(f)	Contact rating / terminal pitch	Nil : 16A, 5mm pitch MA : 12A and 3.5mm pitch MB : 12A and 5.0mm pitch LA : 10A and 3.5mm pitch LB : 10A and 5.0mm pitch
(g)	Special type	RG : Transparent cover

Actual marking does not carry the type name : “FTR” E.g.: Ordering code: FTR-K1CK005W Actual marking: K1CK005W (“RG” is marked on the relay)

*1: 110V coil is not for new design.

■ SPECIFICATIONS

16A type

Item			Specifications		Remarks/Conditions
			FTR-K1AK( )(T, W)-RG	FTR-K1CK( )(W, E)-RG	
Contact Data	Configuration		1a (1 Form A)	1c (1 Form C)	
	Construction		Signal		
	Material		T, W: $AgSnO_2$, E: AgNi		
	Resistance (initial)		Max. 100mΩ		At 1A, 6VDC
	Contact rating (initial)		14A, 250VAC/24VDC		Resistive
	Max. carrying current*1		20A		
	Max. switching voltage		440VAC/300VDC		
	Max. switching power		4,000VA/384W		
	Min. switching load *2		100mA, 5VDC		
Coil	Rated power (20°C)		400mw (430mW at 48V coil, 420mW at 60V/110V coil)		
	Operate power (20°C)		196mW (211mW at 48V coil, 206mW at 60V/110V coil)		
	Operating temperature range		-40 °C to +70 °C		No frost
Time	Operate (at nominal voltage)		Max. 15ms		Without bounce, no diode
	Release (at nominal voltage)		Max. 5ms		Without bounce, no diode
Life	Mechanical		Min. 20 x 10^6 operations		
	Electrical	AC contact rating	Min. 100 x 10^3 operations	Min. 50 x 10^3 operations	
		DC contact rating	Min. 100 x 10^3 operations	Min. 30 x 10^3 operations	
Insulation	Insulation resistance (initial)		Min. 1,000MΩ		At 500VDC
	Dielectric strength	Open contacs	1,000VAC (50/60Hz) 1 minute		
		Coil to contacts	5,000VAC (50/60Hz) 1 minute		
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave		
	Clearance		10mm		
	Creepage		10mm		
	EN61810-1, VDE0435	Voltage	250V		
		Pollution	3		
		Material group	IIIa		
		Category	C / 250V (Reference voltage) (VDE0110b)		
Others	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm		Coil ON/OFF, 3 axis, total 6 cycles
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm		Coil OFF, 3 axis, total 6 hours
	Shock resistance	Misoperation	100m/s^2 (11±1ms)		Coil ON/OFF, 3 axis, total 36 operations
		Endurance	1,000m/s^2 (6±1ms)		Coil OFF, 3 axis, total 18 operations
	Dimensions / Weight		12.7 x 29.0 x 15.7mm / Approximately 13g		
	Sealing		Flux proof RTII		

* 1: Need to consider the heat from PCB when max. current is more than 10A.

* 2: 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.

■ SPECIFICATIONS

12A type

Item			Specifications		Remarks/Conditions
			FTR-K1AK( )W-(MA, MB)-RG	FTR-K1CK( )W-(MA, MB)-RG	
Contact Data	Configuration		1a (1 Form A)	1c (1 Form C)	
	Construction		Single		
	Material		W: $AgSnO_2$		
	Resistance (initial)		Max. 100mΩ		At 1A, 6VDC
	Contact rating (initial)		12A, 250VAC/24VDC		Resistive
	Max. carrying current[*1]		14A		
	Max. switching voltage		440VAC/300VDC		
	Max. switching power		3,000VA/288W		
	Min. switching load [*2]		100mA, 5VDC		
Coil	Rated power (20°C)		400mW (430mW at 48V coil, 420mW at 60V/110V coil)		
	Operate power (20°C)		200mW (210mW at 48V coil, 206mW at 60V/110V coil)		
	Operating temperature range		-40 °C to +70 °C		No frost
Time	Operate (at nominal voltage)		Max. 15ms		Without bounce
	Release (at nominal voltage)		Max. 5ms		Without bounce, no diode
Life	Mechanical		Min. 20 x 10^6 operations		
	Electrical	AC contact rating	Min. 100 x 10^3 operations		
		DC contact rating	Min. 100 x 10^3 operations		
Insulation	Insulation resistance (initial)		Min. 1,000MΩ		At 500VDC
	Dielectric strength	Open contacs	1,000VAC (50/60Hz) 1 minute		
		Coil to contacts	5,000VAC (50/60Hz) 1 minute		
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave		
	Clearance		10mm		
	Creepage		10mm		
	EN61810-1, VDE0435	Voltage	250V		
		Pollution	3		
		Material group	IIIa		
		Category	C / 250V (Reference voltage) (VDE0110b)		
Others	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm		Coil ON/OFF, 3 axis, total 6 cycles
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm		Coil OFF, 3 axis, total 6 hours
	Shock resistance	Misoperation	100m/s^2 (11±1ms)		Coil ON/OFF, 3 axis, total 36 operations
		Endurance	1,000m/s^2 (6±1ms)		Coil OFF, 3 axis, total 18 operations
	Dimensions / Weight		12.7 x 29.0 x 15.7mm / Approximately 13g		
	Sealing		Flux proof, RTII		

* 1: Need to consider the heat from PCB when max. current is more than 10A.

* 2: 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.

■ SPECIFICATIONS

10A type

Item			Specifications	Remarks/Conditions
			FTR-K1AL( )W-(LA, LB)-RG	
Contact Data	Configuration		1a (1 Form A)	
	Construction		Single	
	Material		W: $AgSnO_2$	
	Resistance (initial)		Max. 100mΩ	At 1A, 6VDC
	Contact rating (initial)		10A, 250VAC/24VDC	Resistive
	Max. carrying current *1		14A	
	Max. switching voltage		440VAC	
	Max. switching power		2,500VA	
	Min. switching load *2		100mA, 5VDC	
Coil	Rated power (20°C)		250mW	
	Operate power (20°C)		141mW	
	Operating temperature range		-40 °C to +70 °C	No frost
Time	Operate (at nominal voltage)		Max. 15ms	Without bounce
	Release (at nominal voltage)		Max. 5ms	Without bounce, no diode
Life	Mechanical		Min. 20 x 10^6 operations	
	Electrical	AC contact rating	Min. 100 x 10^3 operations	
Insulation	Insulation resistance (initial)		Min. 1,000MΩ	At 500VDC
	Dielectric strength	Open contacs	1,000VAC (50/60Hz) 1 minute	
		Coil to contacts	5,000VAC (50/60Hz) 1 minute	
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave	
	Clearance		10mm	
	Creepage		10mm	
	EN61810-1, VDE0435	Voltage	250V	
		Pollution	3	
		Material group	IIIa	
		Category	C / 250V (Reference voltage) (VDE0110b)	
Others	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm	Coil ON/OFF, 3 axis, total 6 cycles
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm	Coil OFF, 3 axis, total 6 hours
	Shock resistance	Misoperation	100m/s^2 (11±1ms)	Coil ON/OFF, 3 axis, total 36 operations
		Endurance	1,000m/s^2 (6±1ms)	Coil OFF, 3 axis, total 18 operations
	Dimensions / Weight		12.7 x 29.0 x 15.7mm / Approximately 13g	
	Sealing		Flux proof, RTII	

* 1: Need to consider the heat from PCB when max. current is more than 10A.

* 2: 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

400mW coils (standard type)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)	Nominal Power (mW)
005	5	62	3.5	0.5	400
006	6	90	4.2	0.6	
009	9	202	6.3	0.9	
012	12	360	8.4	1.2	
018	18	810	12.6	1.8	
022	22	1,210	15.4	2.2	
024	24	1,440	16.8	2.4	
028	28	1,960	19.6	2.8	
048	48	5,360	33.6	4.8	430
060	60	8,570	42.0	6.0	420
110*2	110*2	28,800	77.0	11.0	

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.

*2: 110V coil is not for new design.

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

250mW coils (-LA, -LB types only)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)	Nominal Power (mW)
005	5	100	3.75	0.5	250
006	6	145	4.5	0.6	
009	9	325	6.75	0.9	
012	12	575	9	1.2	
018	18	1,300	13.5	1.8	
024	24	2,310	18	2.4	
048	48	9,216	36	4.8	

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.

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

■ SAFETY STANDARDS

16A type

Type	Compliance	Contact Rating	
		FTR-K1AK( )(T, E)-RG	FTR-K1CK( )(E, W)-RG
UL	Flammability: UL 94-V0 (plastics)		
VDE	IEC/EN 61810-1 EN60335-1 clause 15.3; 16.3; 29.1; 29.2; 29.3 EN60730-1 clause 12.2; 13.2; 20.1; 20.2; 20.3	16A, 250VAC (cosφ=1) 3.5A, 250VAC (cosφ=0.4) 16A, 24VDC (0ms) 5A/80A, 250VAC (only T-type)	16A, 250VAC (cosφ=1) 3.5A, 250VAC (cosφ=0.4) 16A, 24VDC (0ms)

12A type

Type	Compliance	Contact Rating	
		FTR-K1AK( )W-(MA, MB)-RG	FTR-K1CK( )W-(MA, MB)-RG
UL	Flammability: UL 94-VII (plastics)		
VDE	IEC/EN 61810-1 EN60335-1 clause 15.3; 16.3; 29.1; 29.2; 29.3 EN60730-1 clause 12.2; 13.2; 20.1; 20.2; 20.3	12A, 250VAC (cosφ=1) 16A, 250VAC (cos φ=1) 12A, 24VDC (0ms) 16A, 24VDC (0ms) 3.5A, 250 VAC (cos φ=0.4)	

10A type

Type	Compliance	Contact Rating
		FTR-K1AL( )(W, E)-(LA, LB)-RG
UL	Flammability: UL 94-VII (plastics)	
VDE	IEC/EN 61810-1 EN60335-1 clause 15.3; 16.3; 29.1; 29.2; 29.3 EN60730-1 clause 12.2; 13.2; 20.1; 20.2; 20.3	10A, 250VAC, 150,000 cycles 3A, 250VAC (cosφ=0.4) 100,000 cycles

The part numbers on the safety standards' certifications and the ordering part numbers may differe. Coil code is in ( ).

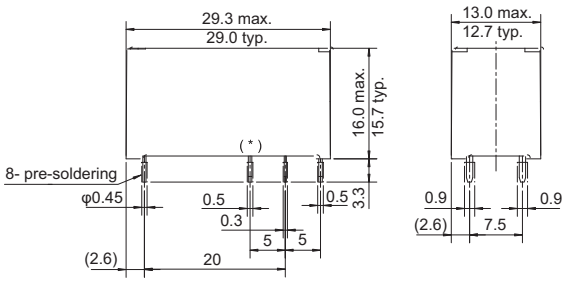
■ PART NUMBER LIST

Part Number	Current	Contact Configuration	Coil Power	Contact Material	Terminal pitch
FTR-K1AK( )T-RG	16A	1a	400mW	$AgSnO_2$	5.0mm
FTR-K1CK( )W-RG		1c			
FTR-K1AK( )E-RG		1a		AgNi	
FTR-K1CK( )E-RG		1c			
FTR-K1AK( )W-MA-RG	12A	1a	400mW	$AgSnO_2$	3.5mm
FTR-K1CK( )W-MA-RG		1c			
FTR-K1AK( )W-MB-RG		1a			5.0mm
FTR-K1CK( )W-MB-RG		1c			
FTR-K1AL( )W-LA-RG	10A	1a	250mW	$AgSnO_2$	3.5mm
FTR-K1AL( )W-LB-RG		1a			5.0mm

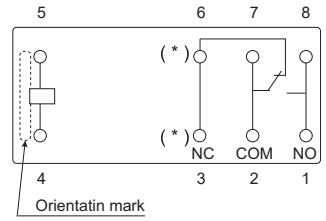
■ DIMENSIONS

FTR-K1/-LB

● Dimensions

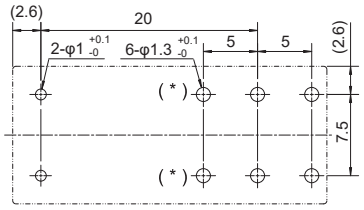


● Schematics
(BOTTOM VIEW)



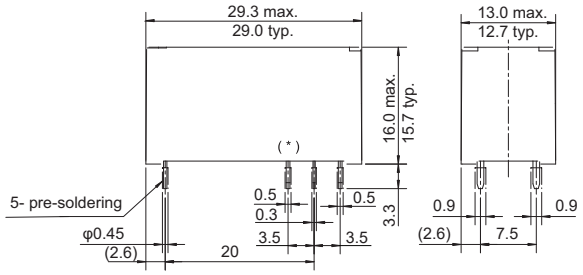
Connect terminal #1 and #8 on the PC board

● PC board mounting hole layout
(BOTTOM VIEW)

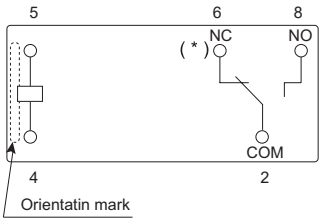


FTR-K1-MA/-LA

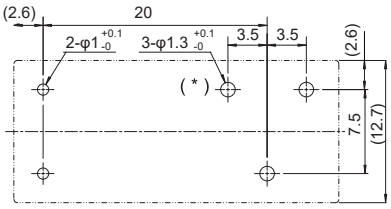
● Dimensions



● Schematics
(BOTTOM VIEW)

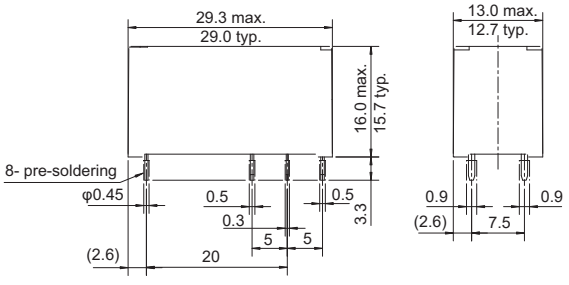


● PC board mounting hole layout
(BOTTOM VIEW)

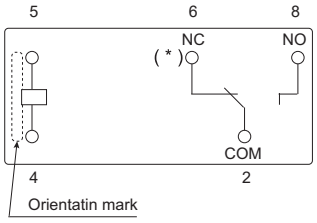


FTR-K1-MB

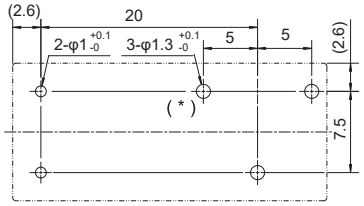
● Dimensions



● Schematics
(BOTTOM VIEW)



● PC board mounting hole layout
(BOTTOM VIEW)



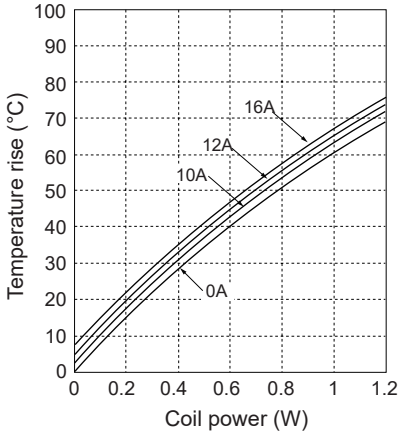
- Dimensions of the terminals do not include thickness of pre-soldering.
- Tolerance of PC board mounting hole layout is ±0.1 unless otherwise specified.
- (*): 1 Form A relays do not have terminal #3 and #6.

( ): Reference
Unit: mm

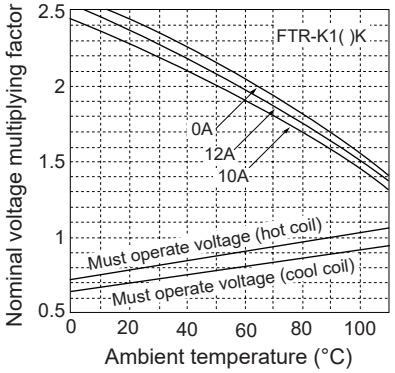
■ CHARACTERISTIC DATA

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

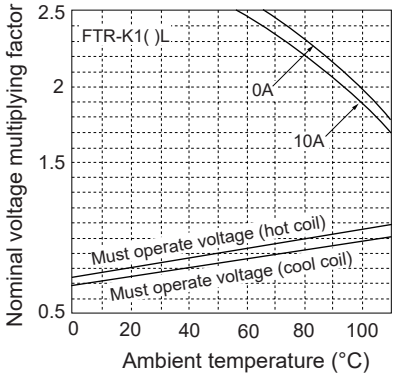
Coil temperature rise



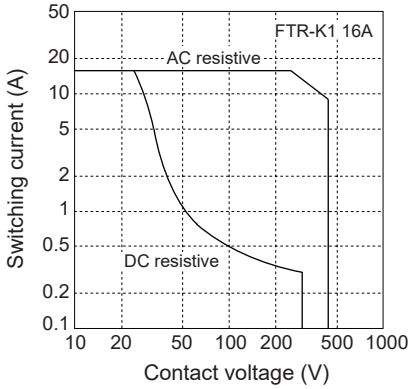
Operating range



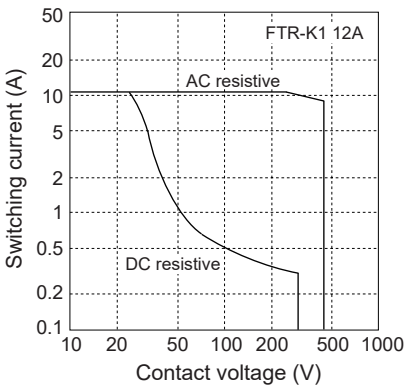
Operating range



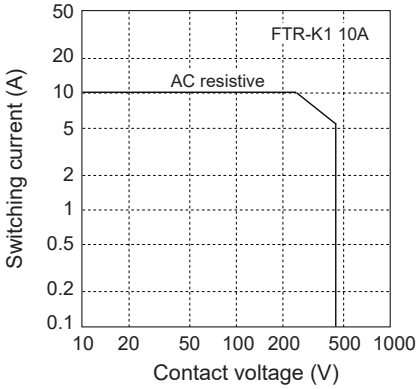
Maximum switching power



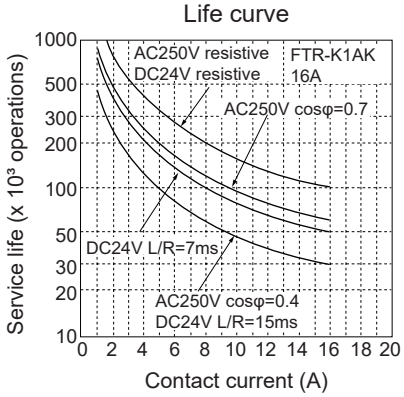
Maximum switching power



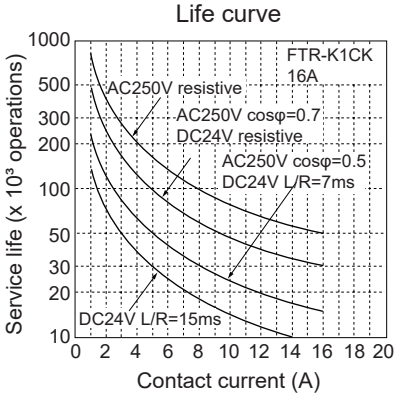
Maximum switching power



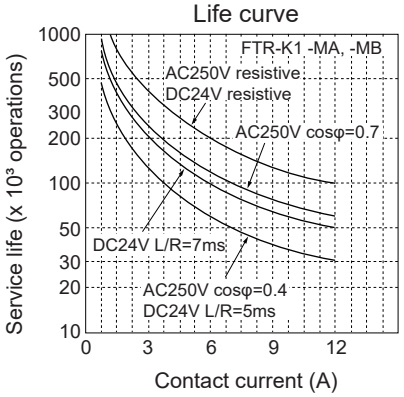
Life curve



Life curve



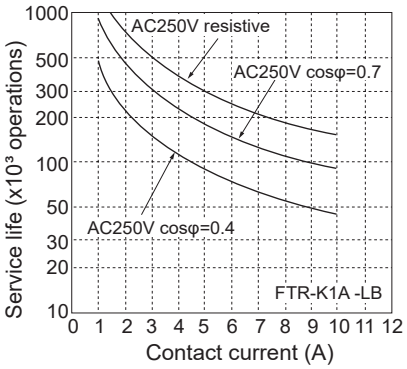
Life curve



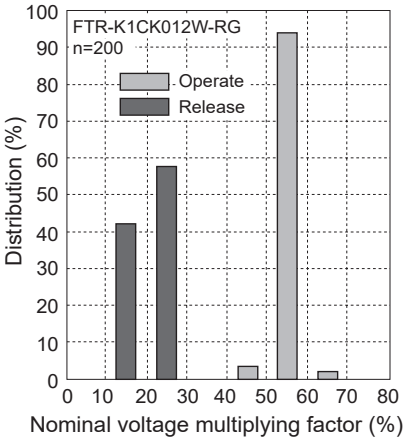
■ CHARACTERISTIC DATA

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

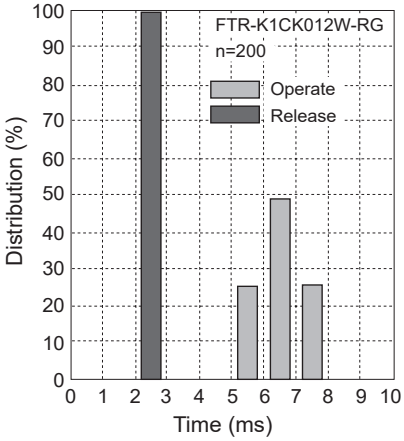
Life curve



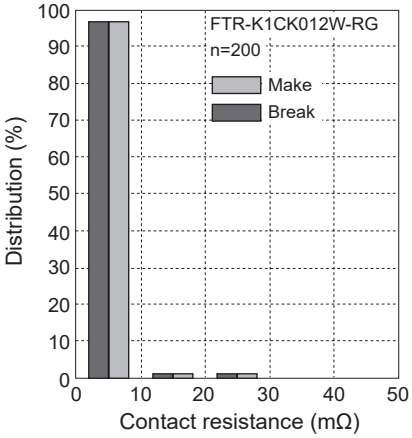
Distribution of operate/release voltage



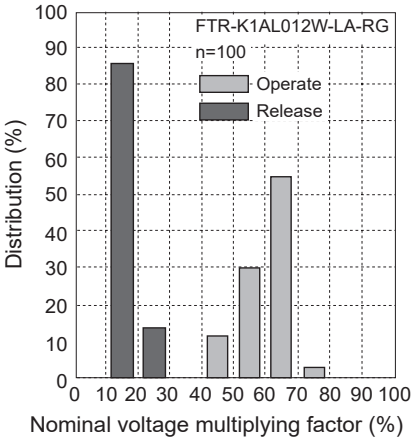
Distribution of operate/release time



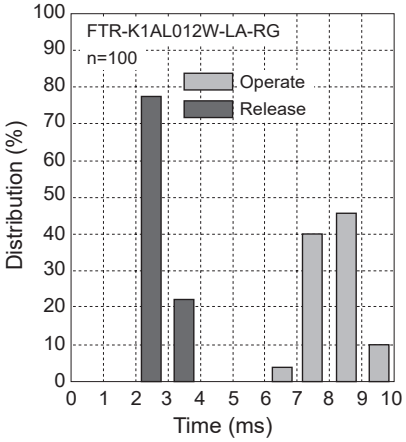
Distribution of contact resistance



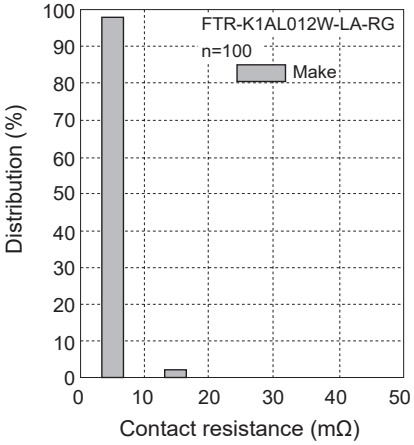
Distribution of operate/release voltage



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

Japan
FCL COMPONENTS LIMITED
Shinagawa Seaside Park Tower
12-4, Higashi-shinagawa 4-chome,
Tokyo 140 0002, Japan
Tel: +81-3-3450-1682
Email: fcl-contact@cs.fcl-components.com

North and South America
FCL COMPONENTS AMERICA, INC.
2055 Gateway Place Suite 480,
San Jose, CA 95110 USA
Tel: +1-408-745-4900
Email: contact@fcl-components.us

Europe
FCL COMPONENTS EUROPE B.V.
Diamantlaan 25
2132 WV Hoofddorp, Netherlands
Tel: +31-23-556-0910
Email: info@fcl-components.eu

Asia Pacific
FCL COMPONENTS ASIA PTE LTD.
No. 20 Harbour Drive, #07-01B
Singapore 117612
Tel: +65-6375-8560
Email: fcal@fcl-components.com

China
FCL COMPONENTS (SHANGHAI) CO.,LTD.
Unit 1105, Central Park - Jing An,
No.329 Heng Feng Road, Shanghai
200070, China
Tel: +86-21-3253 0998
Email: fcsh@fcl-components.com

Hong Kong
FCL COMPONENTS HONG KONG CO., LIMITED
Unit 2313, Seapower Tower, Concordia
Plaza, No.1 Science Museum Road,
TST, Kowloon, Hong Kong
Tel: +852-2881-8495
Email: fcal@fcl-components.com

Web: www.fcl-components.com/en/

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