FUJITSU

POWER RELAY

1 POLE - 16A/12A/10A Transparent cover

FTR-K1 Series

■ FEATURES

- 16A, 12A, 10A versions
- Transparent cover
- Low profile (height: 15.7mm)
- High insulation
  Insulation distance (between coil and contacts): 10mm min.
  Dielectric strength: 5KV
  Surge strength: 10KV
- UL F class isolation wire
- Low coil power (400mW)
- Cadmium free contacts
- Safety standards
  UL, CSA, VDE, SEMKO approved
  UL, CSA TV-5 rating approved (1 form A type)
- RoHS compliant
  Please see page 13 for more information

■ PARTNUMBER INFORMATION

[Example] FTR-K1 (a) C (b) K (c) 005 (d) W (e) - MA (f) - RG (g)

(a)	Relay type	FTR-K1: FTR-K1 Series
(b)	Contact configuration	A : 1 form A (SPST-NO) C : 1 form C (SPDT) (standard type "K" only)
(c)	Coil type	K : Standard type (400mW) / flux free L : High sensitive (250mW) / flux free
(d)	Coil rated voltage	005 : 5.....48 VDC Coil rating table at page 7
(e)	Contact material	W : $AgSnO_2$ (applicable for 1 form C) T : $AgSnO_2$ (applicable for 16A, 1 form A) (TV-5) E : AgNi (90/10)
(f)	Contact rating/Terminal pitch	Nil : 16A, 5mm pitch MA : 12A and 3.5mm ptich 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)

■ SPECIFICATION

16A type

Item			FTR-K1 AK ( ) (T,W)-RG	FTR-K1 CK ( ) (W,E)-RG
Contact Data	Configuration		1 form A	1 form C
	Construction		Single	
	Material		T, W: $AgSnO_2$, E: AgNi	
	Resistance (initial)		Maximum 100mΩ at 1A, 6VDC	
	Contact rating (resistive)		16A, 250VAC / 24VDC	
	Max. carrying current *1		16A	
	Max. switching voltage		440VAC / 300VDC	
	Max. switching power		4,000VA / 384W	
	Min. switching load *2		10mA, 5VDC	
Life	Mechanical		20×10^6 operations minimum	
	Electrical	AC contact rating	100×10^3 operations minimum	50×10^3 operations minimum
		DC contact rating	100×10^3 operations minimum	30×10^3 operations minimum
Coil Data	Rated power (20 °C)		400mW (430mW at 48V coil)	
	Operate power (20 °C)		200mW (210mW at 48V coil)	
	Operating temperature range		-40 °C to +70 °C (no frost)	
Timing Data	Operate (at nominal voltage)		≤ 15ms (no bounce, no diode)	
	Release (at nominal voltage)		≤ 5ms (no bounce, no diode)	
Insulation	Resistance (initial)		≥ 1,000MOhm at 500VDC	
	Dielectric strength	Open contacts	1,000VAC (50/60Hz) 1min	
		Contacts to coil	5,000VAC (50/60Hz) 1min	
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave	
	Clearance		10mm	
	Creepage		10mm	
	EN61810-1, VDE0435	Voltage	250V	
		Pollution degree	3	
		Material group	III a	
		Category	C / 250V (Reference voltage) (VDE0110b)	
Other	Vibration resistance	Misoperation≥1us	10 to 55Hz double amplitude 0.7mm	
		Endurance	10 to 55Hz double amplitude 1.5mm	
	Shock	Misoperation≥1us	100m/s² (11 ± 1ms)	
		Endurance	1,000m/s² (6 ± 1ms)	
	Weight		Approximately 13g	

* 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 contions

■ SPECIFICATION

12A type

Item			FTR-K1 AK ( ) (W, E) - (MA, MB) - RG	FTR-K1 CK ( ) (W, E) - (MA, MB) - RG
Contact Data	Configuration		1 form A	1 form C
	Construction		Single	
	Material		W: $AgSnO_2$, E: AgNi	
	Resistance (initial)		Maximum 100mΩ at 1A, 6VDC	
	Contact rating (resistive)		12A, 250VAC / 24VDC	
	Max. carrying current *1		14A	
	Max. switching voltage		440VAC / 300VDC	
	Max. switching power		3,000VA / 288W	
	Min. switching load *2		10mA, 5VDC	
Life	Mechanical		20 x 10^6 operations minimum	
	Electrical	AC contact rating	100 x 10^3 operations minimum	
		DC contact rating	100 x 10^3 operations minimum	
Coil Data	Rated power (20 °C)		400mW (430mW at 48V coil)	
	Operate power (20 °C)		200mW (210mW at 48V coil)	
	Operating temperature range		-40 °C to +70 °C (no frost)	
Timing Data	Operate (at nominal voltage)		≤ 15ms (no bounce)	
	Release (at nominal voltage)		≤ 5ms (no bounce, no diode)	
Insulation	Resistance (initial)		≥ 1,000MOhm at 500VDC	
	Dielectric strength	Open contacts	1,000VAC (50/60Hz) 1min	
		Contacts to coil	5,000VAC (50/60Hz) 1min	
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave	
	Clearance		10mm	
	Creepage		10mm	
	EN61810-1, VDE0435	Voltage	250V	
		Pollution degree	3	
		Material group	III a	
		Category	C / 250V (Reference voltage) (VDE0110b)	
Other	Vibration resistance	Misoperation≥1us	10 to 55Hz double amplitude 0.7mm	
		Endurance	10 to 55Hz double amplitude 1.5mm	
	Shock	Misoperation≥1us	100m/s² (11 ± 1ms)	
		Endurance	1,000m/s² (6 ± 1ms)	
	Weight		Approximately 13g	

* 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 contions

■ SPECIFICATION

10A type

Item			FTR-K1 AL ( ) (W, E) - (LA, LB) - RG
Contact Data	Configuration		1 form A
	Construction		Single
	Material		W: $AgSnO_2$, E: AgNi
	Resistance (initial)		Maximum 100mΩ at 1A, 6VDC
	Contact rating (resistive)		10A, 250VAC / 24VDC
	Max. carrying current		10A
	Max. switching voltage		440VAC
	Max. switching power		2,500VA
	Min. switching load *		10mA, 5VDC
Life	Mechanical		20 x 10^6 operations minimum
	Electrical	AC contact rating	100 x 10^3 operations minimum
Coil Data	Rated power (20 °C)		250mW
	Operate power (20 °C)		141mW
	Operating temperature range		-40 °C to +70 °C (no frost)
Timing Data	Operate (at nominal voltage)		≤ 15ms (no bounce, no diode)
	Release (at nominal voltage)		≤ 5ms (no bounce, no diode)
Insulation	Resistance (initial)		≥ 1,000MOhm at 500VDC
	Dielectric strength	Open contacts	1,000VAC (50/60Hz) 1min
		Contacts to coil	5,000VAC (50/60Hz) 1min
	Surge strength	Coil to contacts	10,000V / 1.2 x 50μs standard wave
	Clearance		10mm
	Creepage		10mm
	EN61810-1, VDE0435	Voltage	250V
		Pollution degree	3
		Material group	III a
		Category	C / 250V (Reference voltage) (VDE0110b)
Other	Vibration resistance	Misoperation≥1us	10 to 55Hz double amplitude 0.7mm
		Endurance	10 to 55Hz double amplitude 1.5mm
	Shock	Misoperation≥1us	100m/s² (11 ± 1ms)
		Endurance	1,000m/s² (6 ± 1ms)
	Weight		Approximately 13g

* 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 contions and expected reliability levels.

■ PART NUMBERS

16A and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)T-RG	A: 1 form A	K: 400mW	T: $AgSnO_2$	Nil: 16A	RG: Transparent cover
FTR-K1CK(...)W-RG	C: 1 form C		W: $AgSnO_2$		

16A and AgNi contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)E-RG	A: 1 form A	K: 400mW	E: AgNi (90/10)	Nil: 16A	RG: Transparent cover
FTR-K1CK(...)E-RG	C: 1 form C				

12A, 3.5mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)W-MA-RG	A: 1 form A	K: 400mW	W: $AgSnO_2$	MA: 12A	RG: Transparent cover
FTR-K1CK(...)W-MA-RG	C: 1 form C				

12A, 3.5mm pitch and AgNi contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)E-MA-RG	A: 1 form A	K: 400mW	E: AgNi (90/10)	MA: 12A	RG: Transparent cover
FTR-K1CK(...)E-MA-RG	C: 1 form C				

12A, 5.0mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)W-MB-RG	A: 1 form A	K: 400mW	W: $AgSnO_2$	MB: 12A	RG: Transparent cover
FTR-K1CK(...)W-MB-RG	C: 1 form C				

(...) = coil voltage

■ PART NUMBERS

12A, 5.0mm pitch and AgNi contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AK(...)E-MB-RG	A: 1 form A	K: 400mW	E: AgNi (90/10)	MB: 12A	RG: Transparent cover
FTR-K1CK(...)E-MB-RG	C: 1 form C				

10A, 3.5mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AL(...)W-LA-RG	A: 1 form A	L: 250mW	W: $AgSnO_2$	LA: 10A	RG: Transparent cover

10A, 3.5mm pitch and AgNi contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AL(...)E-LA-RG	A: 1 form A	L: 250mW	E: AgNi (90/10)	LA: 10A	RG: Transparent cover

10A, 5.0mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AL(...)W-LB-RG	A: 1 form A	L: 250mW	W: $AgSnO_2$	LB: 10A	RG: Transparent cover

10A, 5.0mm pitch and AgNi contacts

Ordering part number	Contact	Coil power	Contact material	Current	Special
FTR-K1AL(...)E-LB-RG	A: 1 form A	L: 250mW	E: AgNi (90/10)	LB: 10A	RG: Transparent cover

(...) = coil voltage

■ COIL RATING

250 mW coils

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release-Voltage (VDC) *	Max. Coil Voltage (VDC)	Rated Power (mW)
005	5	100	3.75	0.5	15	250
006	6	145	4.5	0.6	18	
009	9	325	6.75	0.9	27	
012	12	575	9	1.2	36	
018	18	1300	13.5	1.8	54	
024	24	2310	18	2.4	72	
048	48	9216	36	4.8	144	

Note: All values in the table are valid for 20°C and zero contact current.
* Specified operate values are valid for pulse wave voltage.

400 mW coils

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release-Voltage (VDC) *	Max. Coil Voltage (VDC)	Rated Power (mW)
005	5	62	3.5	0.5	12.2	400
006	6	90	4.2	0.6	14.7	
009	9	202	6.3	0.9	22	
012	12	360	8.4	1.2	29.4	
018	18	810	12.6	1.8	44.1	
022	22	1210	15.4	2.2	53.9	
024	24	1440	16.8	2.4	58.8	
028	28	1960	19.6	2.8	68.6	
048	48	5360	33.6	4.8	117.6	430

Note: All values in the table are valid for 20°C and zero contact current.
* Specified operate values are valid for pulse wave voltage.

■ SAFETY STANDARDS

16A type

Type	Compliance	Contact rating	
		FTR-K1AK ( ) (T,E)-RG	FTR-K1CK ( ) W
UL	UL 508 E63614	Flammability: UL 94-VII (plastics)	
		16A, 24 VAC (resisitive) 16A, 277VAC (resisitive) 20A, 277VAC (resisitive) 1 HP, 277VAC 1/2 HP, 125VAC TV-5, 120VAC, 120VAC 25,000 cycles Pilot duty: A300	16A, 277 VAC/24VDC (resisitive) 20A, 277VAC (resistive) 1 HP, 277VAC 1/2 HP, 125VAC 1/8 HP, 125VAC TV-5, 250VAC 25,000 cycles Pilot duty: B300
CSA	C22.2 No. 14 LR 40304		16A, 277 VAC/24VDC (resisitive) 20A, 277VAC (resistive) 1 HP, 277VAC 1/2 HP, 125VAC 1/8 HP, 125VAC TV-5, 120VAC 25,000 cycles Pilot duty: B300
VDE	0435, 0631, 0700, 0860 40013848	16A, 250 VAC (cosØ=1) 3.5A, 250 VAC (cosØ=0.4) 16 A 24VDC (0ms) 5A/80A, 250 VAC (only T-type)	16A, 250 VAC (cosØ=1) 3.5A, 250 VAC (cosØ=0.4) 16A 24VDC (0ms)
SEMKO	EN 61058-1:1992 and A1 EN 61095:1993 and A1+A11	250VAC, 16 (3)A 40T70 5A/80A 250VAC (only T-type)	250VAC, 16(3)A40T70

Complies with NEMKO, DEMKO, FIMKO

■ SAFETY STANDARDS

12A type

Type	Compliance	Contact rating	
		FTR-K1AK ( ) (W)(MA, MB)	FTR-K1CK ( ) (W)(MA, MB)
UL	UL 508 E63614	Flammability: UL 94-VII (plastics)	
		16A, 24VAC (resisitive) 16A, 277 VAC (resisitive) 1 /2HP, 277VAC 1/3 HP, 125VAC Pilot duty: B300	12A, 24VAC (resisitive) 16A, 277 VAC (resisitive) 1 /2HP, 277VAC 1/3 HP, 125VAC 1/8 HP, 125VAC Pilot duty: B300
CSA	C22.2 No. 14 LR 40304	FTR-K1(A, C)K ( ) (W)(MA, MB) 12A, 277VAC/24VDC (resisitive) 16A, 277 VAC/24VDC (resisitive) 1 /2HP, 277VAC 1/3 HP, 125VAC Pilot duty: B300	
VDE	0435, 0631, 0700, 0860 40013848	FTR-K1(A, C)K ( ) (W)(MA, MB) 12A, 250 VAC (cosØ=1) 85˚C 16A, 250 VAC (cosØ=1) 85˚C 12 A 24VDC (0ms) 16 A 24VDC (0ms) 3.5A, 250 VAC (cosØ=0.4) 85˚C	
SEMKO	EN 61058-1:1992 and A1 EN 61095:1993 and A1+A11	250VAC, 12 (3)A 40T70	

Complies with NEMKO, DEMKO, FIMKO

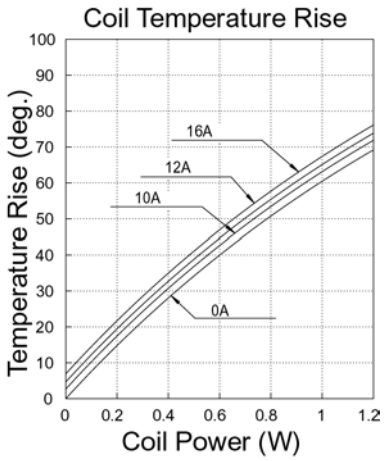
■ SAFETY STANDARDS

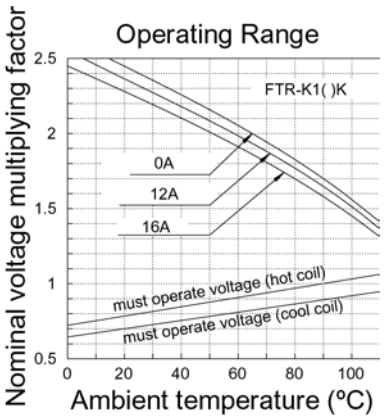
10A type

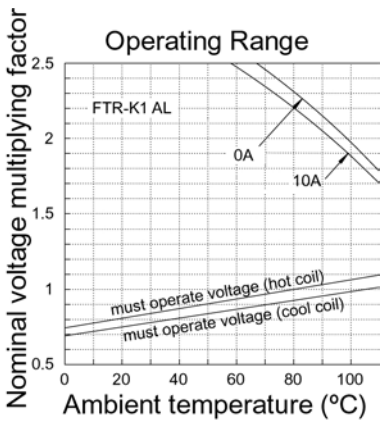
Type	Compliance	Contact rating
		FTR-K1AL( ) (W,E)(LA, LB)-RG
UL	UL 508 E63614	Flammability: UL 94-VII (plastics)
CSA	C22.2 No. 14 LR 40304	FTR-K1AL( ) (W)(LA, LB) 10A, 277 VAC (resistive) 1 /2HP, 125VAC 1/3 HP, 277VAC Pilot duty: B300 FTR-K1CL ( )W-LA 10A, 277VAC (resistive)
VDE	0435, 0631, 0700, 0860 40013848	FTR-K1 AL( )W-(LA, LB) 10A, 250 VAC, 150,000 cycles LA: 85ºC, LB:85ºC 3A, 250 VAC (cosØ=0.4) 100,000 cycles LA: 85ºC, LB:85ºC FTR-K1CL ( )W-LA 10A, 250 VAC, 100,000 cycles 85ºC
SEMKO	EN 61058-1:1992 and A1 EN 61095:1993 and A1+A11	250VAC, 10 (3)A 40T85 (-LA) 250VAC, 10 (3)A 40T85 (-LB)

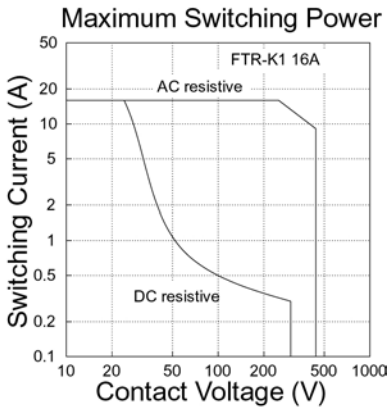
Complies with NEMKO, DEMKO, FIMKO

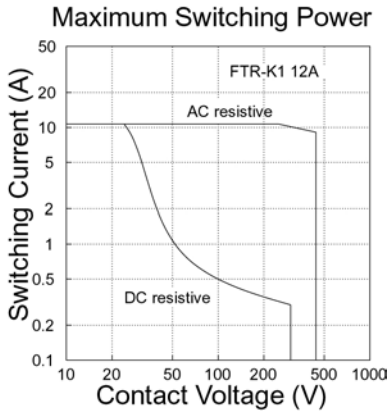
■ CHARACTERISTIC DATA

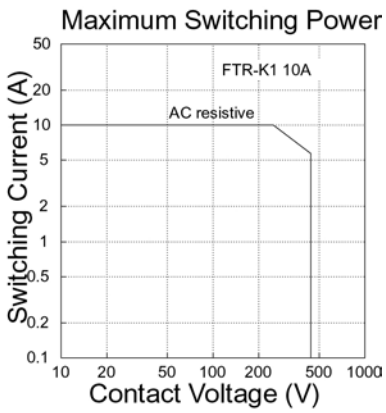


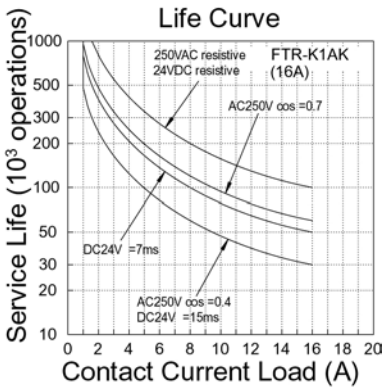


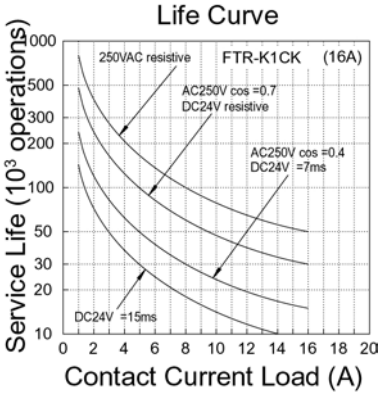


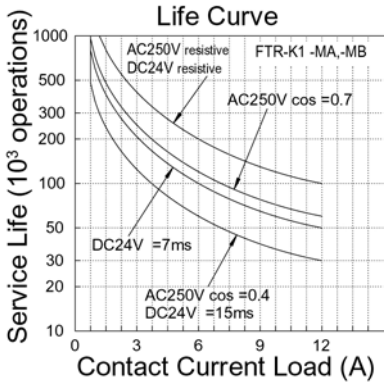


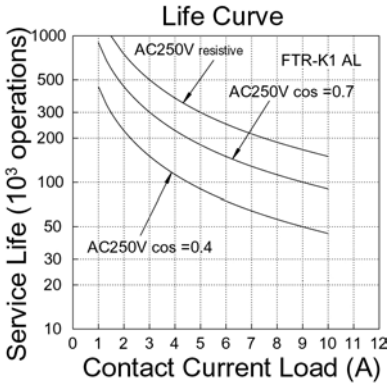


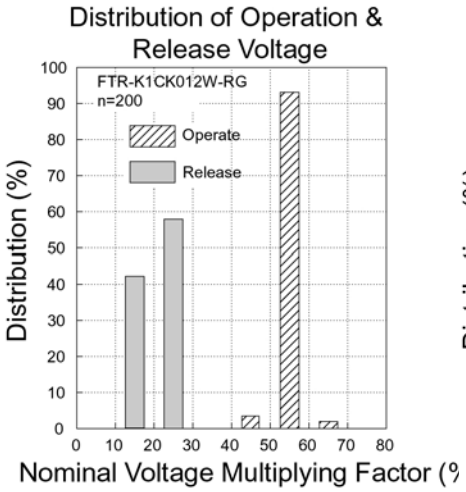


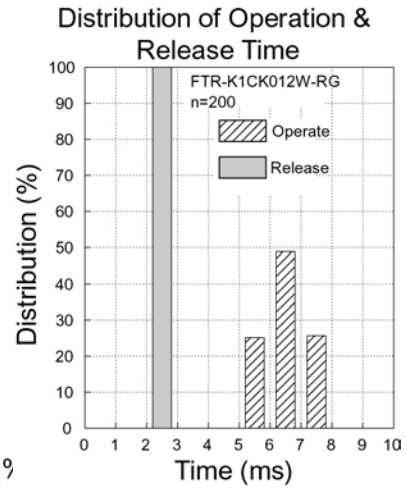


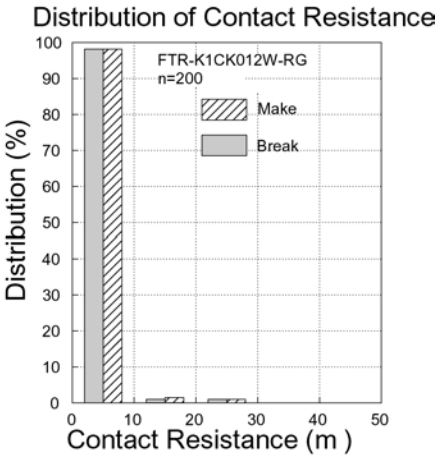


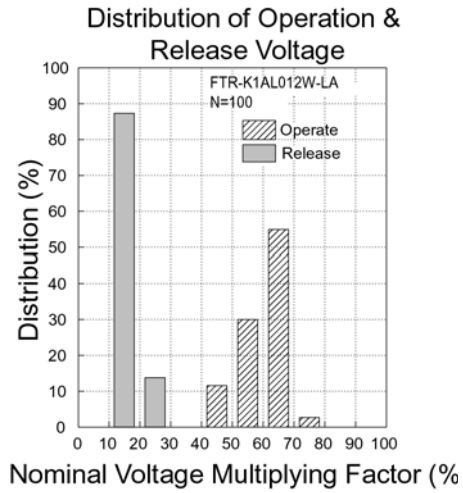


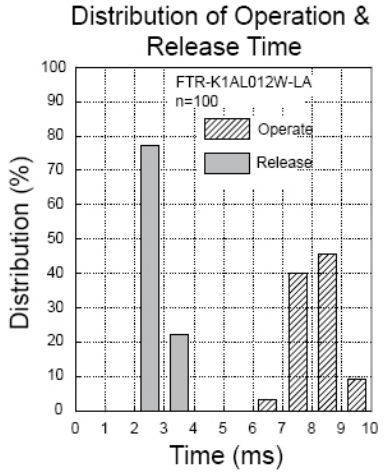

Life Curve
Service Life (10^3 operations)
1000
500
300
200
100
50
30
20
10
AC250V resistive
FTR-K1 AL
AC250V cos =0.7
AC250V cos =0.4
0 1 2 3 4 5 6 7 8 9 10 11 12
Contact Current Load (A)

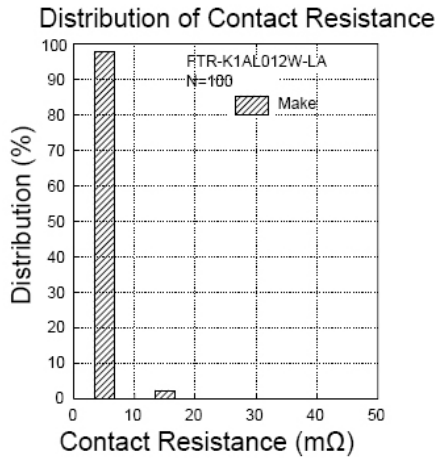

Distribution of Operation & Release Voltage
FTR-K1CK012W-RG
n=200
Operate
Release
Distribution (%)
0 10 20 30 40 50 60 70 80
Nominal Voltage Multiplying Factor (%


Distribution of Operation & Release Time
FTR-K1CK012W-RG
n=200
Operate
Release
Distribution (%)
0 1 2 3 4 5 6 7 8 9 10
Time (ms)


Distribution of Contact Resistance
FTR-K1CK012W-RG
n=200
Make
Break
Distribution (%)
0 10 20 30 40 50
Contact Resistance (m)


Distribution of Operation & Release Voltage
FTR-K1AL012W-LA
N=100
Operate
Release
Distribution (%)
0 10 20 30 40 50 60 70 80 90 100
Nominal Voltage Multiplying Factor (%

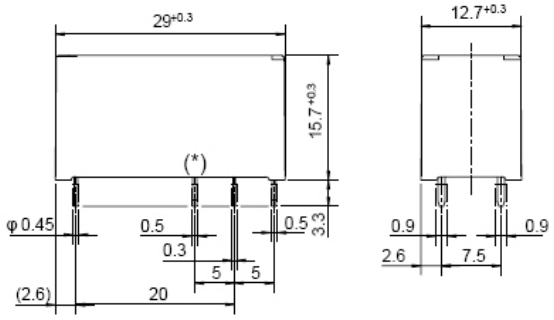

Distribution of Operation & Release Time
FTR-K1AL012W-LA
n=100
Operate
Release
Distribution (%)
0 1 2 3 4 5 6 7 8 9 10
Time (ms)


Distribution of Contact Resistance
FTR-K1AL012W-LA
N=100
Make
Distribution (%)
0 10 20 30 40 50
Contact Resistance (mΩ)

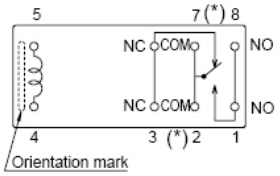
■ DIMENSIONS

- **Dimensions**

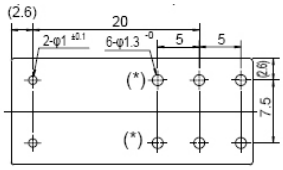
FTR-K1 ( ) / LB



- **Schematics**
(BOTTOM VIEW)

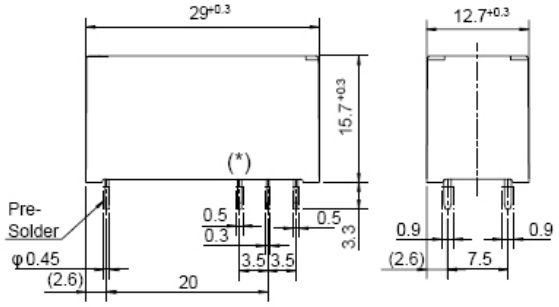


- **PC board mounting hole layout**
(BOTTOM VIEW)

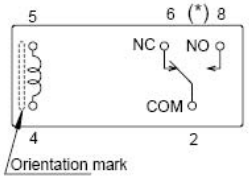


- **Dimensions**

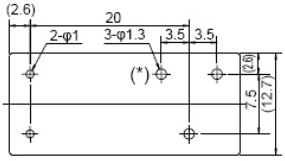
FTR-K1 ( ) MA / LA



- **Schematics**
(BOTTOM VIEW)

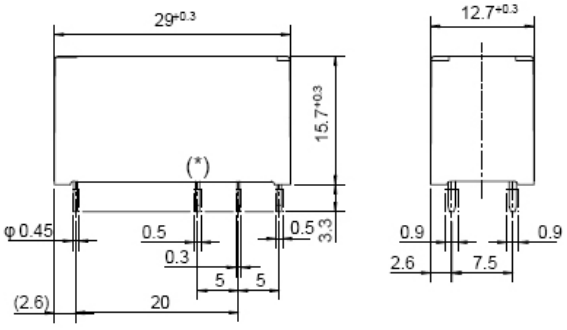


- **PC board mounting hole layout**
(BOTTOM VIEW)

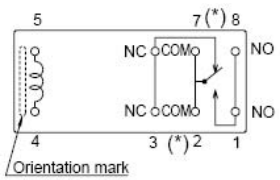


- **Dimensions**

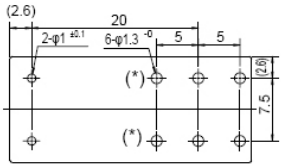
FTR-K1 ( ) / MB



- **Schematics**
(BOTTOM VIEW)



- **PC board mounting hole layout**
(BOTTOM VIEW)



* terminals ommited in case of 1 form A version

Unit: mm

RoHS Compliance and Lead Free Information

1. General Information

- All signal and power relays produced by Fujitsu Components are compliant with RoHS directive 2002/95EC including amendments.
- Cadmium as used in electrical contacts is exempted from the RoHS directives on October 21st, 2005. (Amendment to Directive 2002/95/EC)
- All of our signal and power relays are lead-free. Please refer to Lead-Free Status Info for older date codes at: http://www.fujitsu.com/us/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 Profile

- Recommended solder Sn-3.0Ag-0.5Cu.

Flow Solder condition:

Pre-heating:	maximum 120˚C
Soldering:	dip within 5 sec. at 260˚C solder bath

Solder by Soldering Iron:

Soldering Iron	
Temperature:	maximum 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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