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 insulation wire
- Low coil power (400mW)
- Cadmium free contacts
- Safety standards
  VDE approved
- Flux proof, RTII
- RoHS compliant (please see page 12 for more information)

■ PARTNUMBER INFORMATION

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

(a)	Relay type	FTR-K1	: FTR-K1-Series
(b)	Contact configuration	A C	: 1 form A (SPST-NO) : 1 form C (SPDT) (standard type "K" only)
(c)	Coil type / enclosure	K L	: Standard type (400mW) / flux proof : High sensitive (250mW) / flux proof (only for LA; LB versions)
(d)	Coil rated voltage	005	: 5.....110 VDC (5.....48VDC for LA; LB versions) Coil rating table at page 3
(e)	Contact material	W T E	: $AgSnO_2$ (applicable for 1 form C) : $AgSnO_2$ (applicable for 16A, 1 form A) (TV-5) : AgNi (90/10) (16A type only)
(f)	Contact rating / terminal pitch	Nil MA MB LA LB	: 16A, 5mm pitch : 12A and 3.5mm pitch : 12A and 5.0mm pitch : 10A and 3.5mm pitch : 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)		Max. 100mΩ at 1A, 6VDC	
	Contact rating (resistive)		14A, 250VAC / 24VDC	
	Max. carrying current *1		20A	
	Max. switching voltage		440VAC / 300VDC	
	Max. switching power		4,000VA / 384W	
	Min. switching load *2		100mA, 5VDC	
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
Coil Data	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)	
Timing Data	Operate (at nominal voltage)		Max. 15ms (without bounce, no diode)	
	Release (at nominal voltage)		Max. 5ms (without bounce, no diode)	
Insulation	Resistance (initial)		Min. 1,000MΩ 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	
	DIN EN61810-1, VDE0435	Voltage	250V	
		Pollution degree	3	
		Material group	III a	
		Category	C / 250V (Reference voltage) (VDE0110b)	
Other	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm	
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm	
	Shock	Misoperation	100m/s² (11 ± 1ms)	
		Endurance	1,000m/s² (6 ± 1ms)	
	Weight		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.

■ SPECIFICATION

12A type

Item			FTR-K1 AK ( ) W - (MA, MB) - RG	FTR-K1 CK ( ) W - (MA, MB) - RG
Contact Data	Configuration		1 form A	1 form C
	Construction		Single	
	Material		W: $AgSnO_2$	
	Resistance (initial)		Max. 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		100mA, 5VDC	
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	
Coil Data	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)	
Timing Data	Operate (at nominal voltage)		Max. 15ms (without bounce)	
	Release (at nominal voltage)		Max. 5ms (without bounce, no diode)	
Insulation	Resistance (initial)		Min. 1,000MΩ 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	
	DIN EN61810-1, VDE0435	Voltage	250V	
		Pollution degree	3	
		Material group	III a	
		Category	C / 250V (Reference voltage) (VDE0110b)	
Other	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm	
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm	
	Shock	Misoperation	100m/s² (11 ± 1ms)	
		Endurance	1,000m/s² (6 ± 1ms)	
	Weight		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.

■ SPECIFICATION

10A type

Item			FTR-K1 AL ( ) W - (LA, LB) - RG
Contact Data	Configuration		1 form A
	Construction		Single
	Material		W: $AgSnO_2$
	Resistance (initial)		Max. 100mΩ at 1A, 6VDC
	Contact rating (resistive)		10A, 250VAC / 24VDC
	Max. carrying current		14A
	Max. switching voltage		440VAC
	Max. switching power		2,500VA
	Min. switching load *		100mA, 5VDC
Life	Mechanical		Min. 20 x 10^6 operations
	Electrical	AC contact rating	Min. 100 x 10^3 operations
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)		Max. 15ms (without bounce, no diode)
	Release (at nominal voltage)		Max. 5ms (without bounce, no diode)
Insulation	Resistance (initial)		Min. 1,000MΩ 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
	DIN EN61810-1, VDE0435	Voltage	250V
		Pollution degree	3
		Material group	III a
		Category	C / 250V (Reference voltage) (VDE0110b)
Other	Vibration resistance	Misoperation	10 to 55 to 10Hz single amplitude 0.35mm
		Endurance	10 to 55 to 10Hz single amplitude 0.75mm
	Shock	Misoperation	100m/s² (11 ± 1ms)
		Endurance	1,000m/s² (6 ± 1ms)
	Weight		Approximately 13g
	Sealing		Flux proof, RTII

* 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.

■ PART NUMBERS

16A and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Thermal pitch	Special
FTR-K1AK(...)T-RG	A: 1 form A	K: 400mW	T: $AgSnO_2$	16A	Nil: 5.0mm	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	Thermal pitch	Special
FTR-K1AK(...)E-RG	A: 1 form A	K: 400mW	E: AgNi	16A	Nil: 5.0mm	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	Thermal pitch	Special
FTR-K1AK(...)W-MA-RG	A: 1 form A	K: 400mW	W: $AgSnO_2$	12A	MA: 3.5mm	RG: Transparent cover
FTR-K1CK(...)W-MA-RG	C: 1 form C					

12A, 5.0mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Thermal pitch	Special
FTR-K1AK(...)W-MB-RG	A: 1 form A	K: 400mW	W: $AgSnO_2$	12A	MB: 5.0mm	RG: Transparent cover
FTR-K1CK(...)W-MB-RG	C: 1 form C					

10A, 3.5mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Thermal pitch	Special
FTR-K1AL(...)W-LA-RG	A: 1 form A	L: 250mW	W: $AgSnO_2$	10A	LA: 3.5mm	RG: Transparent cover

10A, 5.0mm pitch and $AgSnO_2$ contacts

Ordering part number	Contact	Coil power	Contact material	Current	Thermal pitch	Special
FTR-K1AL(...)W-LB-RG	A: 1 form A	L: 250mW	W: $AgSnO_2$	10A	LB: 5.0mm	RG: Transparent cover

(...) = coil voltage

■ COIL RATING

400 mW coils (standard type)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release-Voltage (VDC) *	Rated 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	1210	15.4	2.2	
024	24	1440	16.8	2.4	
028	28	1960	19.6	2.8	
048	48	5360	33.6	4.8	430
060	60	8570	42.0	6.0	420
110	110	28800	77.0	11.0	

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

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

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/- 10% (Ohm)	Must Operate Voltage (VDC) *	Must Release-Voltage (VDC) *	Rated 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	1300	13.5	1.8	
024	24	2310	18	2.4	
048	48	9216	36	4.8	

Note: All values in the table are valid for 20°C and zero contact current.
* Specified operate 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, 250 VAC (cos φ=1) 3.5A, 250 VAC (cos φ=0.4) 16 A 24VDC (0ms) 5A/80A, 250 VAC (only T-type)	16A, 250 VAC (cos φ=1) 3.5A, 250 VAC (cos φ=0.4) 16A 24VDC (0ms)

12A type

Type	Compliance	Contact rating	
		FTR-K1AK ( ) (W) (MA, MB)	FTR-K1CK ( ) (W) (MA, MB)
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	FTR-K1 (A, C)K ( ) (W) (MA, MB) 12A, 250 VAC (cos φ=1) 16A, 250 VAC (cos φ=1) 12 A 24VDC (0ms) 16 A 24VDC (0ms) 3.5A, 250 VAC (cos φ=0.4)	

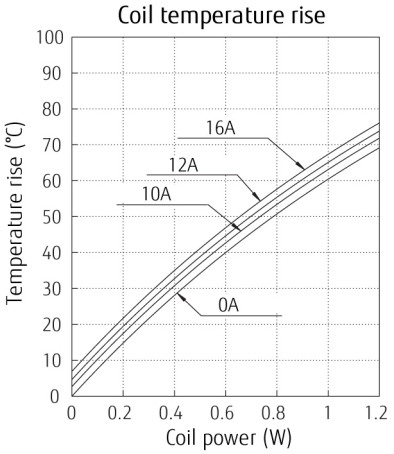
10A type

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	FTR-K1 AL( )W-(LA, LB) 10A, 250 VAC, 150,000 cycles 3A, 250 VAC (cos φ=0.4) 100,000 cycles FTR-K1CL ( )W-LA 10A, 250 VAC, 100,000 cycles

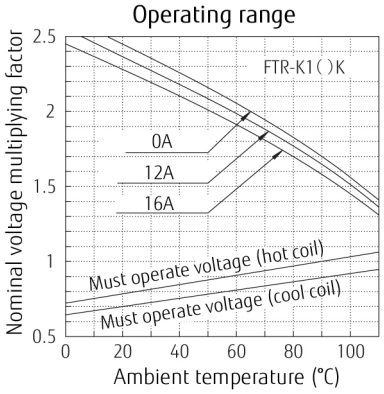
■ CHARACTERISTIC DATA

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

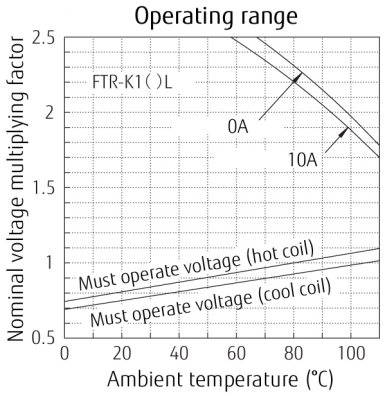
Coil temperature rise



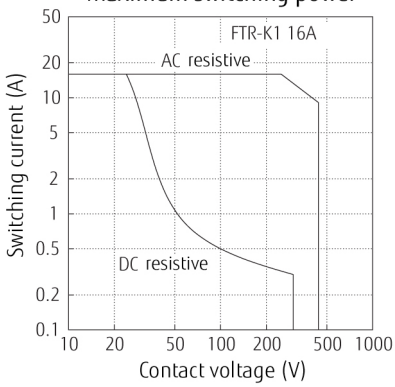
Operating range



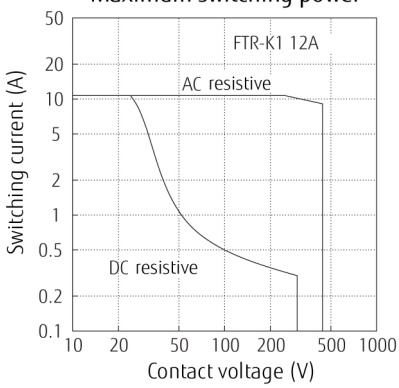
Operating range



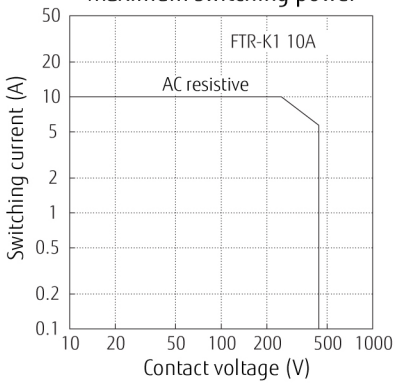
Maximum switching power



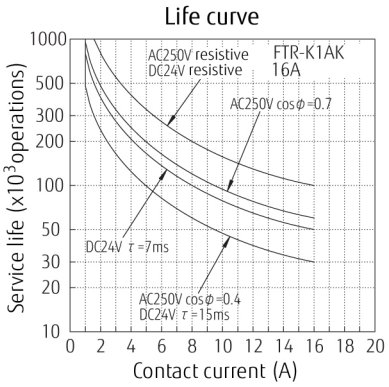
Maximum switching power



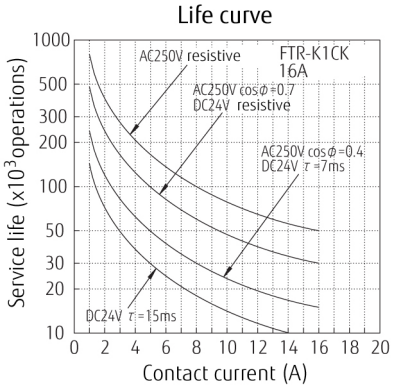
Maximum switching power



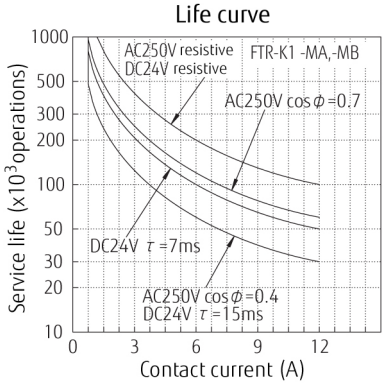
Life curve



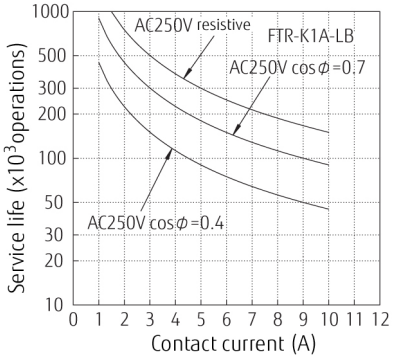
Life curve



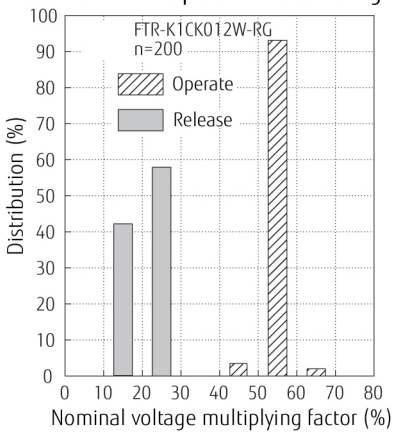
Life curve



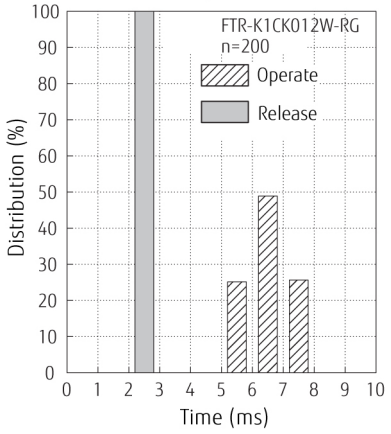
Life curve



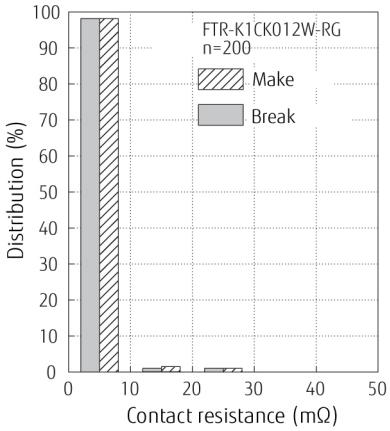
Distribution of operate/release voltage



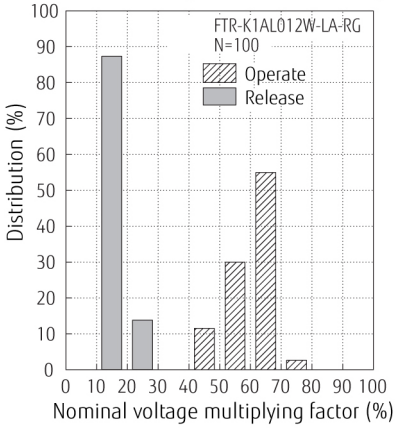
Distribution of operate/release time



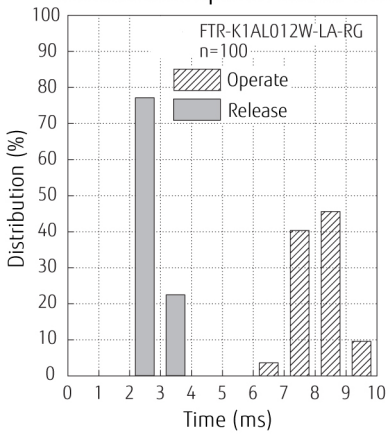
Distribution of contact resistance



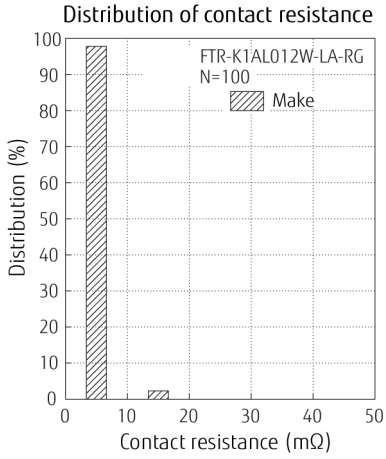
Distribution of operate/release voltage



Distribution of operate/release time



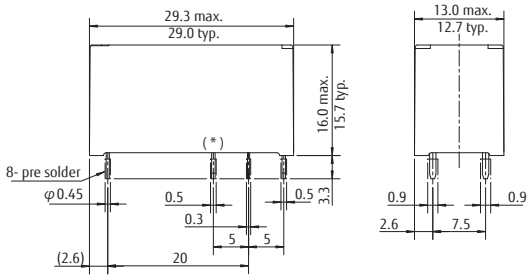
Distribution of contact resistance



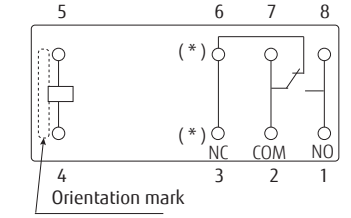
■ DIMENSIONS

FTR-K1/-LB

- **Dimensions**

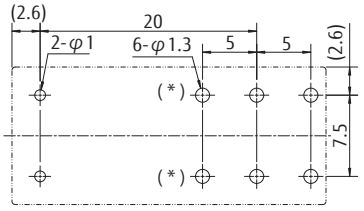


- **Schematics**



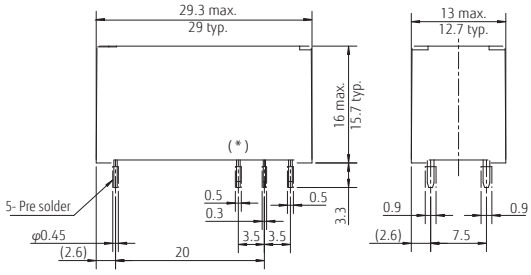
Connect terminal #1 and #8 on the PC board

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

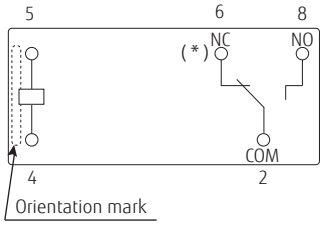


FTR-K1-MA/ -LA

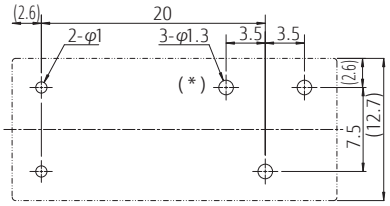
- **Dimensions**



- **Schematics**

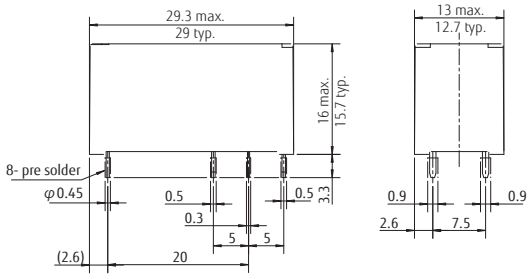


- **PC board mounting hole layout** (BOTTOM VIEW)

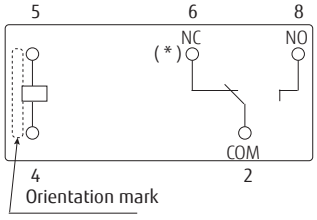


FTR-K1-MB

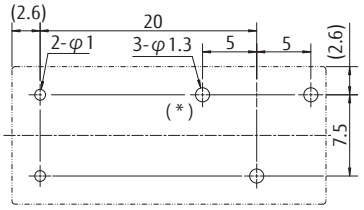
- **Dimensions**



- **Schematics**



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



Unit: mm

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

Cautions

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Please connect relay coils according to specified polarity.
- 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.

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	30-60W
Temperature:	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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