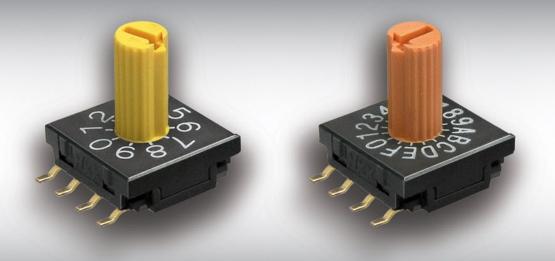
# DIP Rotaries FR02 10mm Ultra-Thin SMT

## New Shaft Actuator Option





### General Specifications

### **Electrical Capacity (Resistive Load)**

Switching Rating: 100mA @ 5V DC Nonswitching Rating: 100mA @ 50V DC

### **Other Ratings**

Contact Resistance:	100 milliohms maximum for circuit; 30 milliohms maximum for contact point		
Insulation Resistance:	1,000 megohms minimum @ 250V DC		
Dielectric Strength:	250V AC minimum for 1 minute minimum		
Mechanical Life:	10,000 detent operations minimum		
Electrical Life:	10,000 detent operations minimum		
	Notes: A detent operation is one actuator position operation or stepping. A cycle is one 360° rotation. 10,000 detent operations equal 625 cycles for hexadecimal devices or 1,000 cycles for decimal devices		
Nominal Operating Torque:	0.008Nm for decimal devices; 0.01Nm for hexadecimal devices		
Contact Timing:	Nonshorting		

Materials & Finishes

Actuators:	Screwdriver and Plastic Shaft - Glass fiber reinforced polyamide (UL94V-0)
Housing & Base:	Glass fiber reinforced polyamide (UL94V-0)
Leaf Spring:	Stainless steel
Movable Contacts:	Copper alloy with gold plating
Stationary Contacts:	Phosphor bronze with gold plating
Terminals:	Phosphor bronze with gold plating

### **Environmental Data**

Operating Temperature Range:	–25°C through +85°C (–13°F through +185°F)
Humidity:	90 ~ 95% humidity for 240 hours @ 40°C (104°F)
Vibration:	10 ~ 55Hz with peak-to-peak amplitude of 1.5mm traversing the frequency range & returning
	in 5 minutes; 3 right angled directions for 2 hours
Shock:	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

### Processing

Soldering:	See last page.
Cleaning:	See last page.

### **Standards & Certifications**

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Flammability Standards: UL94
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UL94V-0 rated actuator, housing, & base The FR02 Series rotaries have not been tested for UL recognition or CSA certification. These switches are designed for use in a low-voltage, low-current circuit. When used as intended, the results do not produce hazardous energy.



### **Distinctive Characteristics**

Slim .150" (3.8mm) body has the lowest profile in the industry and allows close stacking of PC boards.

Highly visible legends and choice of screwdriver or shaft actuators with arrow position indication provide trouble-free code setting.

Detent mechanism gives crisp, positive action for accurate switch setting.

Use of heat resistant resin allows infrared convection reflow soldering.

Gull-winged terminals ensure mechanical stability during soldering and simplify solder joint inspection.

Cam activated movable contact and gold contacts assure contact reliability and continuity.

Tape-reel packaging meets EIA-481-2 Standard.

1

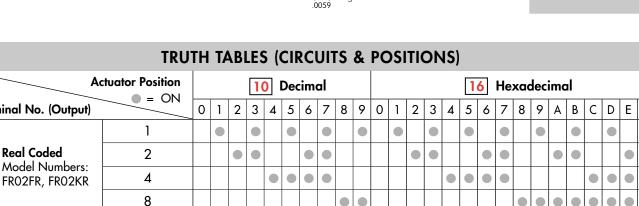
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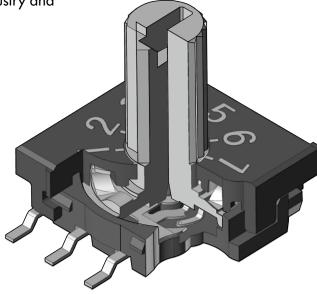
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8

Coplanarity: all considered surfaces must lie between two parallel planes that are a maximum distance apart of .0059" (0.15mm).

**TRUTH TABLES (CIRCUITS & POSITIONS) Actuator Position** 10 Decimal 16 Hexadecimal = ON 0 2 3 4 5 6 7 8 9 0 2 3 4 5 6 7 8 9 Terminal No. (Output) 1 1 А В 1 R **Real Coded** 2 Model Numbers:

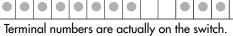




Actual Size

3

F





C Complement

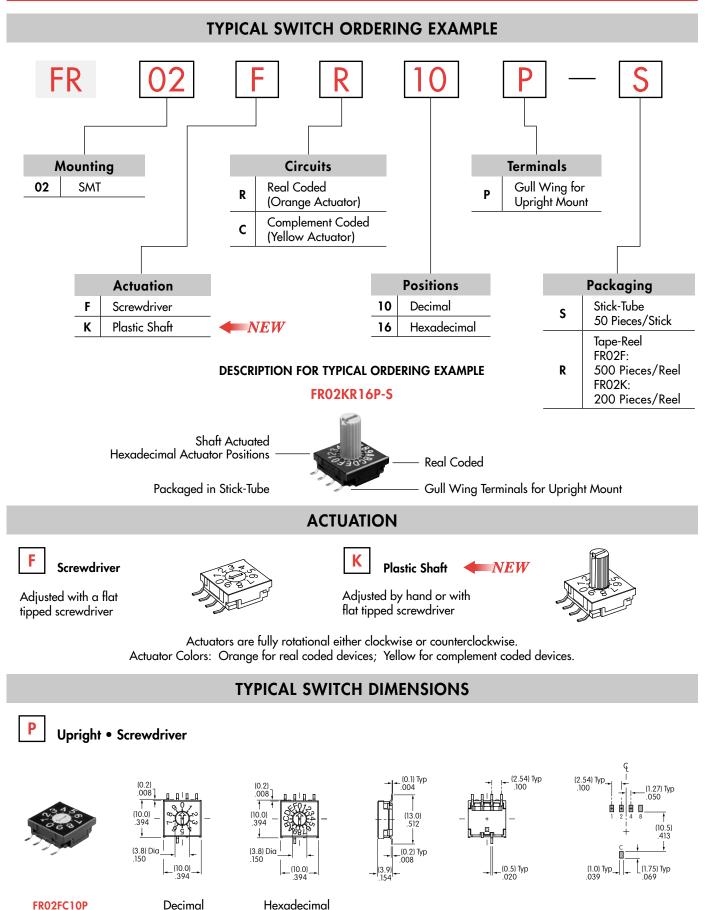
Model Numbers:

FR02FC, FR02KC

Coded

(0.15) Max J .0059

### Series FR02



SWITCHES

#### TYPICAL SWITCH DIMENSIONS Ρ Upright • Plastic Shaft (0.1) Typ .004 (2.54) Typ (2.54) Typ .100 (0.2) (0.2) .008 .100 \_(1.27) Typ .050 Ŧ Π (10.0) .394 (10.0) .394 (13.0) .512 (10.5) (3.8) .413 (3.8) Dic .150 (3.8) Dia .150 \_(0.2) Typ .008 (1.75) Typ (1.0) Typ\_ (10.0) (10.0) (0.5) Typ 3.9 - (7.0) - 276 154 020 394 Decimal Hexadecimal FR02KC16P PACKAGING S Stick-Tube FR02F & FR02K Each stick-tube contains 50 switches. Switches must be ordered in 50-piece increments. 900000 (16.6) .654 (540.0) 21.260 (16.2) .638 R Tape-Reel FR02F FR02K Switches must be ordered in 500-piece increments. Switches must be ordered in 200-piece increments. This packaging meets EIA-481-2 Standard. This packaging meets EIA-481-2 Standard. Each tape-reel of 550 pockets contains 500 switches. Each tape-reel of 250 pockets contains 200 switches. Minimum Leader Length: 15.748" (400mm) Minimum Leader Length: 15.748" (400mm) Minimum Trailer Length: 6.299" (160mm) Minimum Trailer Length: 6.299" (160mm) (1.75) .069 (4.0) (1.2) Typ .047 (1.5) Dia Typ Œ Ð Ð 3YMax (80.0) Dia 3.150 (11.5) FR02F (24.0) .945 (6.5) R .256 L (2.1) Typ (30.4) Max 1.197 (0.4) Direction of Feed (24.4) (10.5) Typ (2.0) Typ .079 (16.0) Typ .630 (10.3) Typ .406 (12.2) (1.5) Dia Typ 7.059 (2.0) Typ .079 (1.75) (4.0) Typ .069 ] .157 (1.2) Typ .047 Ð Œ ⊕ € (80.0) Dia 3.150 3 Max (11.5) .453 FR02K (24.0) Overall Dia (330.0) 13.0

SWITCHES

Direction of Feed

(1.5)

(24.0)\_

+ (0.5) .020

### PROCESSING

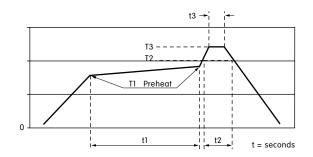
### FR02F & FR02K

### Soldering:

Manual Soldering: 390°C soldering iron tip temperature; 4 seconds time on terminal; 2 cycles

Reflow Soldering Recommended. See illustration and table.

Note: During Reflow Soldering process, set the switch to the following position: FR02FR10P, FR02FR16P, FR02KR10P, FR02KR16P: 0 position; FR02FC10P, FR02KC10P: 7 position; FR02FC16P, FR02KC16P: F position



Reflow Solder Profile	Symbol	Profile A High Temperature
Preheat Temperature	T1	180°C ~ 200°C
Preheat Time	t1	120 seconds
Heating Temperature	T2	230°C
Heating Time	t2	60 seconds
Peak Temperature (Surface)	Т3	250°C
Peak Time	t3	Not Specified
Thickness of PCB		1.6mm
Cycles		2
Comments		PCB with no Lead

Note: The Reflow Solder profile above describes the printed circuit board (PCB) surface temperature. Since PCB surface temperature and switch surface temperature will vary depending on the height of switch, PCB material, and PCB thickness, ensure switch surface temperature does not exceed 250°C. Contact factory if your conditions are more severe than above specifications.

### **Cleaning:**

These devices are not process sealed. Hand clean locally using alcohol based solution to remove flux on surface of PCB.

#### Handling:

When installing, avoid putting mechanical stress on terminal area.

