

# NEW PRODUCTS

Contact No.119

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## SERIES FRO1 DIP ROTARIES

*New Options!*  
Metal Shaft and Dial Actuators



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Available  
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## General Specifications

### Electrical Capacity (Resistive Load)

<b>Switching Rating:</b>	100mA @ 5V DC
<b>Nonswitching Rating:</b>	100mA @ 50V DC

### Other Ratings

<b>Contact Resistance:</b>	100 milliohms maximum for circuit; 30 milliohms maximum for contact point
<b>Insulation Resistance:</b>	1,000 megohms minimum @ 250V DC
<b>Dielectric Strength:</b>	250V AC minimum for 1 minute minimum
<b>Mechanical Life:</b>	10,000 detent operations minimum
<b>Electrical Life:</b>	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.

<b>Nominal Operating Torque:</b>	S Type: 0.008Nm for decimal devices; 0.01Nm for hexadecimal devices A Type: 0.009Nm for decimal devices; 0.011Nm for hexadecimal devices
<b>Contact Timing:</b>	Nonshorting (break-before-make)

### Materials & Finishes

<b>Shaft &amp; Bushing (FR01A only):</b>	Brass with nickel plating
<b>Mounter (FR01A only):</b>	Glass fiber reinforced PBT (UL94 HB)
<b>Actuator:</b>	Glass fiber reinforced polyamide (UL94V-0)
<b>Housing &amp; Base:</b>	Glass fiber reinforced polyamide (UL94V-0)
<b>Leaf Spring:</b>	Stainless steel
<b>Movable Contacts:</b>	Copper alloy with gold plating
<b>Stationary Contacts:</b>	Phosphor bronze with gold plating
<b>Terminals:</b>	Phosphor bronze with gold plating
<b>Terminal Cover:</b>	Polyamide (Right angle model only)
<b>Bracket:</b>	Phosphor bronze with tin plating
<b>Knob (S type only):</b>	POM (UL94 HB)

### Environmental Data

<b>Operating Temperature Range:</b>	-25°C through +85°C (-13°F through +185°F)
<b>Humidity:</b>	90 ~ 95% humidity for 240 hours @ 40°C (104°F)
<b>Vibration:</b>	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
<b>Shock:</b>	50G (490m/s <sup>2</sup> ) acceleration (tested in 6 right angled directions, with 5 shocks in each direction)

### PCB Processing

<b>Soldering:</b>	Wave Soldering recommended. See Profile A in Supplement section. Manual Soldering: 4 seconds maximum @ 390°C maximum
<b>Cleaning:</b>	These devices are not process sealed. Hand clean locally using alcohol based solution. See Cleaning Specifications in the Supplement section.

### Standards & Certifications

<b>Flammability Standards:</b>	UL94V-0 rated actuator, housing, base; mounter UL94 HB, knob UL94 HB
<b>UL Recognition or CSA Certification:</b>	The FR01 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

New metal shaft or dial actuators with highly visible legends on side provide trouble-free code setting, in addition to screwdriver and plastic shaft options. Knobs are available for metal shaft in a variety of styles and colors.

Compact dimensions and low profile allow high density mounting and close stacking of PC boards.

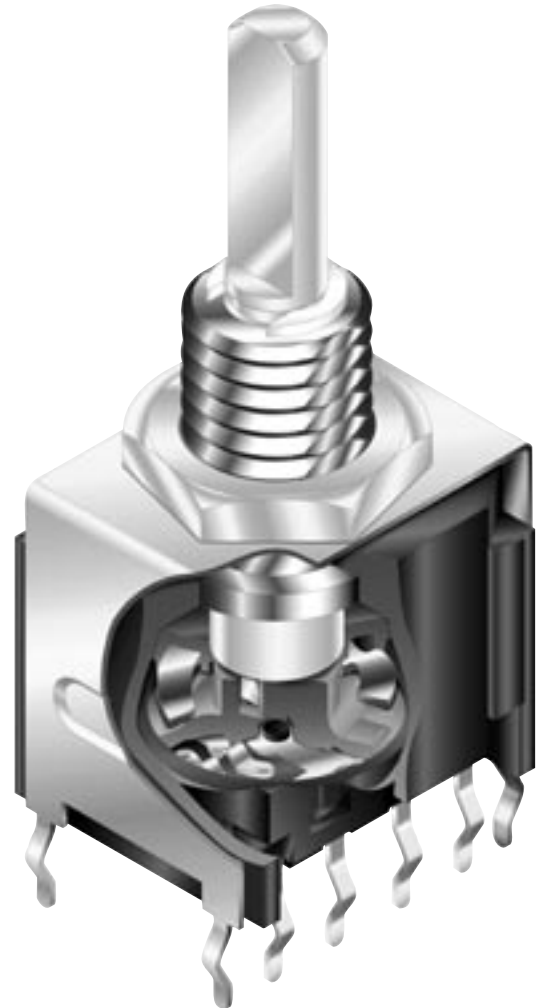
Dial actuation features real or complement code setting identified by color-keyed actuator.

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

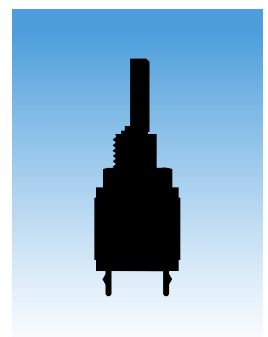
Crimped terminals ensure secure PC mounting and prevent dislodging during soldering.

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

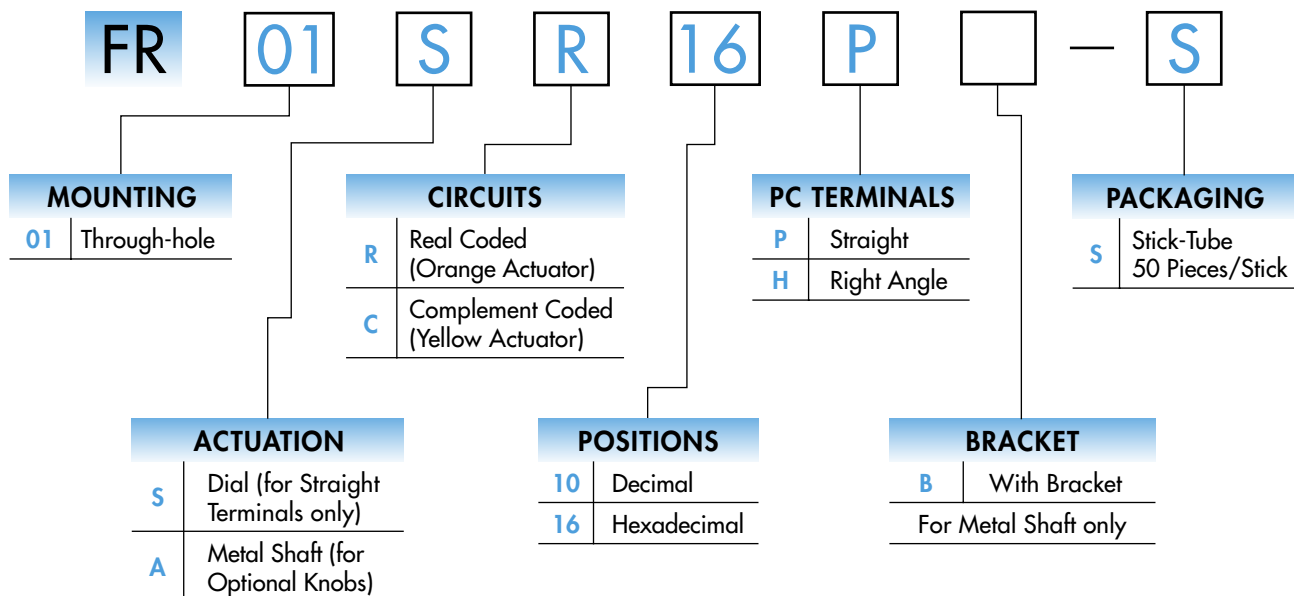
Surface mount models also available with screwdriver actuation. See Series FR02.



Actual Size

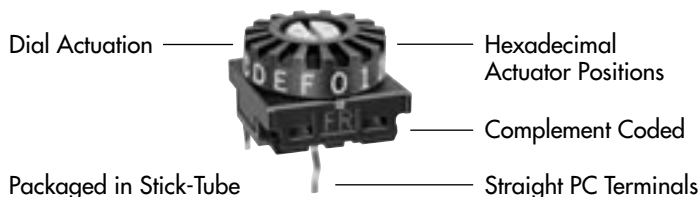


## TYPICAL SWITCH ORDERING EXAMPLE



### DESCRIPTION FOR TYPICAL ORDERING EXAMPLE

**FR01SC16P-S**



## MOUNTING

**01** Through-hole

## ACTUATION

**S** Dial

Adjusted by hand or with flat tipped screwdriver

Actuator Colors:  
Orange for real coded devices;  
Yellow for complement coded devices



**A** Metal Shaft

Knob options and color choices illustrated on the following page



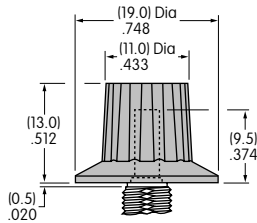
Actuators are fully rotational and operate either clockwise or counterclockwise.

## OPTIONAL KNOBS FOR METAL SHAFT

### AT433 Plain Black

Material:  
Polyacetal

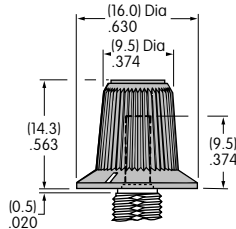
Color:  
Black



### AT4103 Small Color Tipped

Polyester Base:  
Black

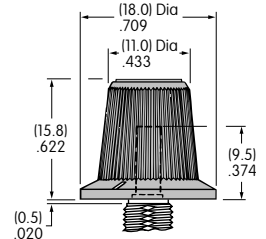
Polyamide Tip  
Colors:  
A, B, C, E, F, G, H



### AT4104 Large Color Tipped

Polyester Base:  
Black

Polyamide Tip  
Colors:  
A, B, C, E, F, G, H



**Color Codes:**    **A** Black    **B** White    **C** Red    **E** Yellow    **F** Green    **G** Blue    **H** Gray

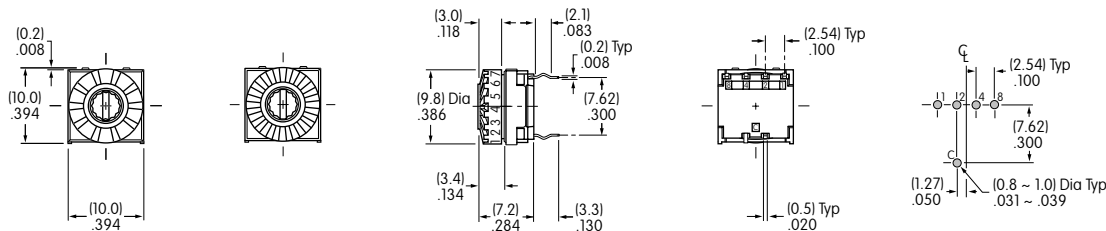
## TRUTH TABLES (CIRCUITS & POSITIONS)

Terminal No. (Output)	Actuator Position ● = ON	10 Decimal									16 Hexadecimal																
		0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
<b>R</b> Real Coded Model Numbers: FR01SR, FR01AR	1		●		●		●		●		●		●		●		●		●		●		●		●		●
	2			●	●			●	●				●	●			●	●				●	●			●	●
	4					●	●	●	●						●	●	●	●					●	●	●	●	
	8									●	●									●	●	●	●	●	●	●	●
<b>C</b> Complement Coded Model Numbers: FR01SC, FR01AC	1	●		●		●		●		●		●		●		●		●		●		●		●		●	
	2	●	●			●	●			●	●			●	●			●	●			●	●			●	●
	4	●	●	●	●					●	●	●	●							●	●	●	●				
	8	●	●	●	●	●	●	●						●	●	●	●	●									

Terminal numbers are actually on the switch.

## TYPICAL SWITCH DIMENSIONS

Straight PC • Dial **P**



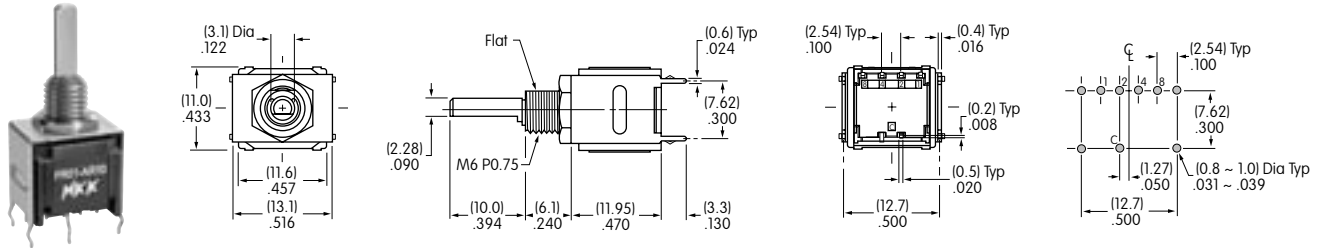
Decimal

Hexadecimal

FR01SC10P

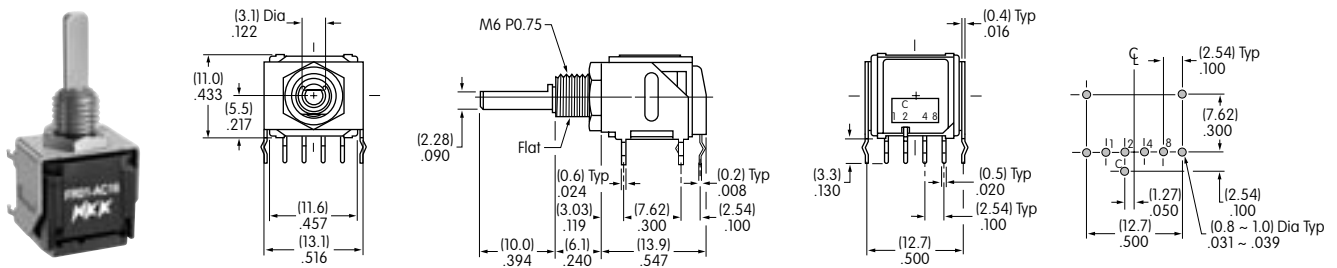
## TYPICAL SWITCH DIMENSIONS

### P Straight PC • Metal Shaft



FR01AR10PB Shown in Position 0 with shaft flat rotated 180° from bushing flat

### H Right Angle PC • Metal Shaft



FR01AC16HB Shown in Position 0 with shaft flat rotated 180° from bushing flat

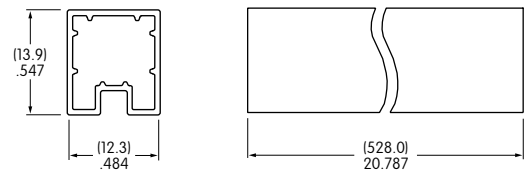
## PACKAGING

### S Stick-Tube

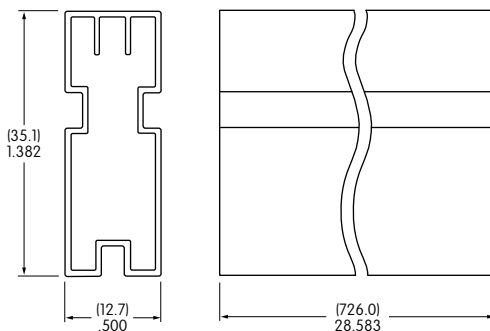
Each stick-tube contains 50 switches.

Switches are not available in bulk and must be ordered in 50-piece increments.

#### FR01S with Dial Actuation & Straight PC



#### FR01A with Metal Shaft & Straight PC



#### FR01A with Metal Shaft & Right Angle PC

