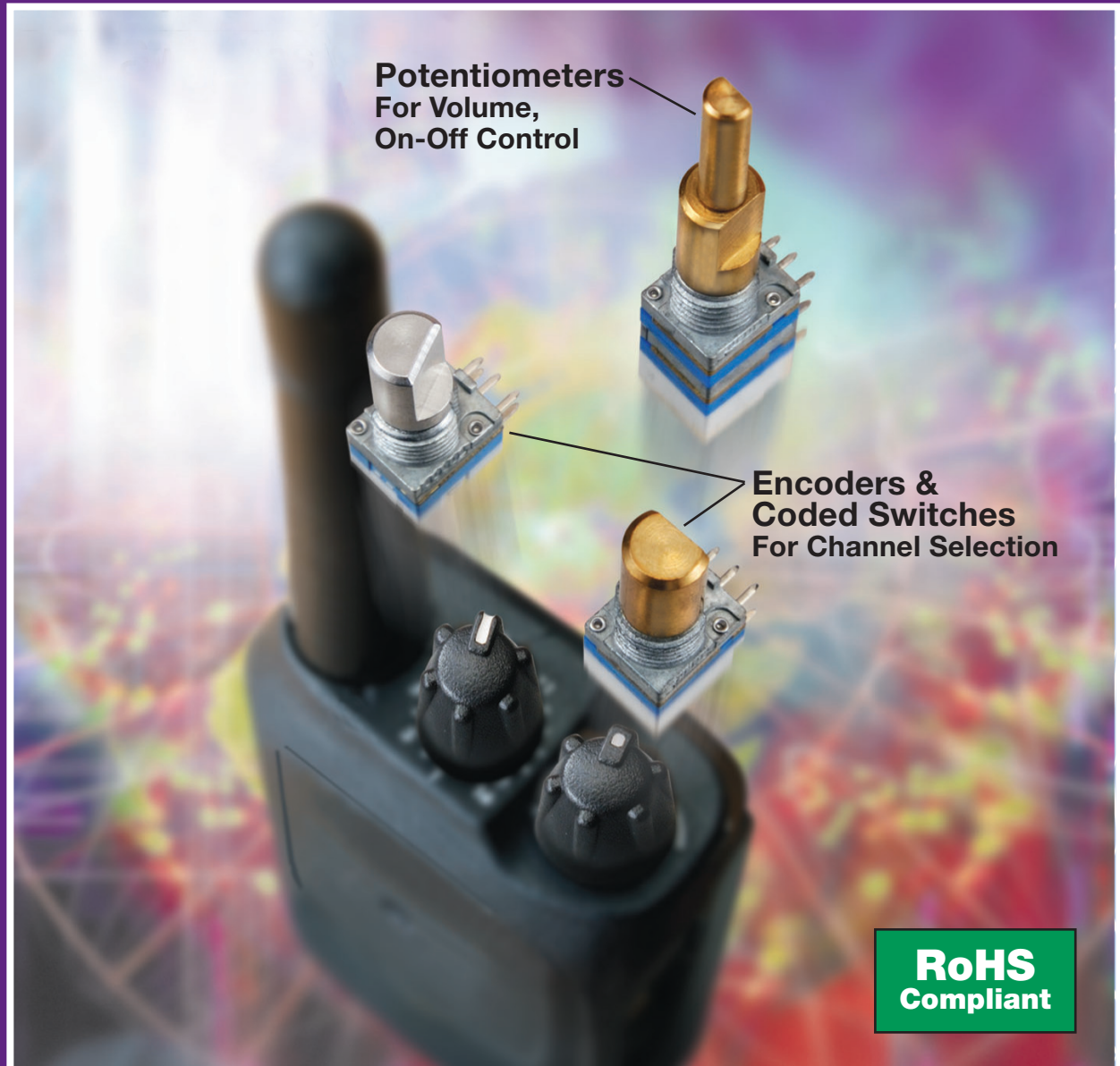


# TOCOS<sup>®</sup>

## TP7 and TP9 Series

POTENTIOMETERS  
ENCODERS & CODED SWITCHES



# SELECTION GUIDE

[www.tocos.com](http://www.tocos.com)

## TP7 and TP9 Series

# World's Smallest Potentiometers!



- Compact and lightweight design optimize customers' space saving requirements
- Industry-proven durability and performance
- Shaft and bushing flexibility for custom design requirements

### Features

#### ■ Compact 7mm Design

#### ■ Durability

Stainless shafts are available as an option. Stainless shafts are 1.5 times stronger than conventional brass and aluminum shafts. Stainless shafts are ideal for hand-held, 2-way radios which have a high drop risk.

#### ■ Variations of switches available

Rotary and momentary push types are available as options. On-Off switch function and Band Selector function can be combined into one multi-function unit.

#### ■ Waterproof option meets IP67

Rubber O-ring installed between the shaft and bushing to prevent water intrusion is available as an option.

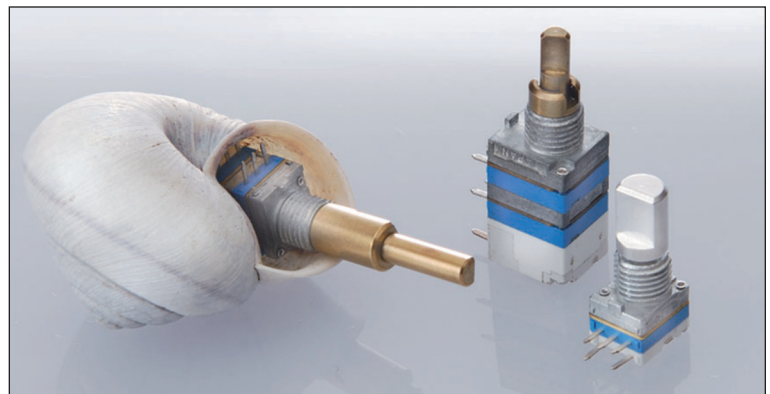
#### ■ High torque models

#### ■ Vertical and horizontal mounts

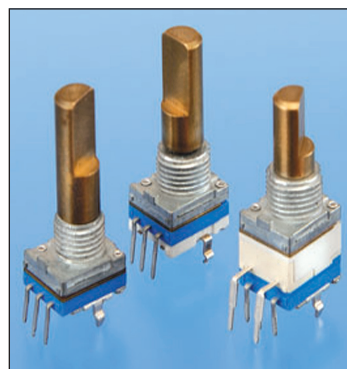
#### ■ Wide temperature range

Standard: -20 to +70°C

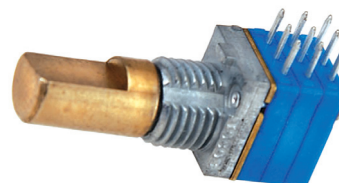
Optional: -30 to +70°C



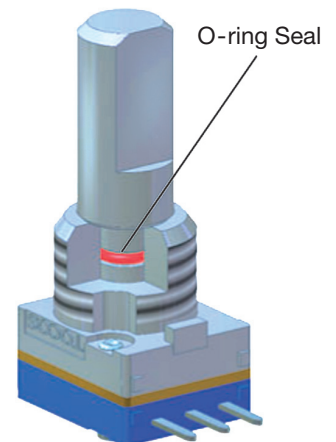
Compact 7mm and 9mm Models



Vertical Mount Models



Multi-function Switches



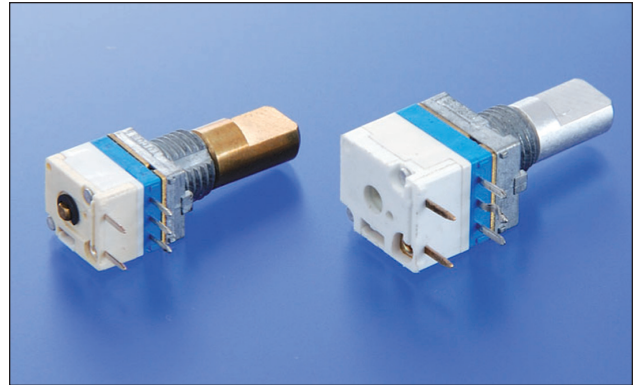
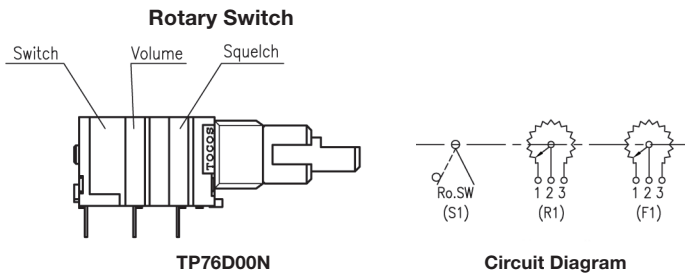
Waterproof Option



# Major Applications For Volume, Encoders and Switches

## POTENTIOMETERS

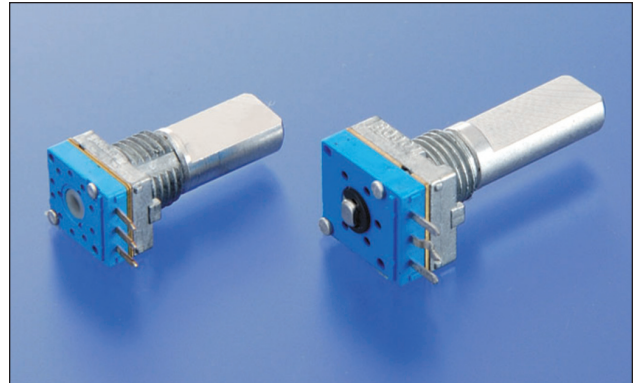
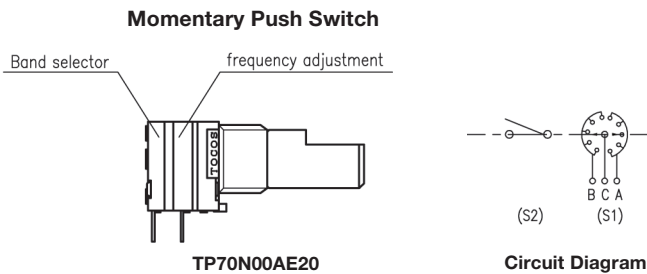
1. For Volume + Power On-Off Switches:  
TP76N00N, TP96N00N
2. For Volume + Squelch + Power On-Off Switches:  
TP76D00N, TP96D00N



See page 4 for drawing.

## ENCODERS

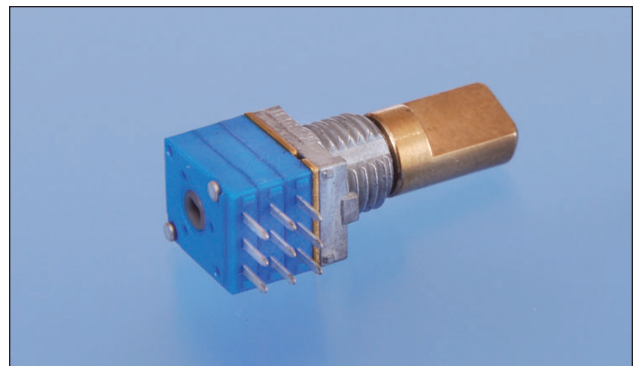
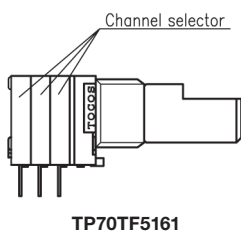
1. For Random Frequency Adjustment:  
TP70N00E20, TP90N00E20
2. For Random Frequency Adjustment + Frequency Band Selector:  
TP70N00AE20, TP90N00AE20



See page 5 for drawing.

## CODED SWITCHES

1. For Pro-use. Channel selector is preset to assigned frequencies:  
TP70TF5161 (Triple unit, Single shaft, 16 channels)



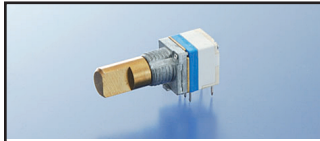
See page 6 for drawing.



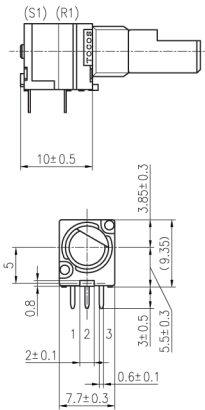
# Potentiometers

## TP7 Series - 7mm

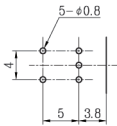
TP76N00N



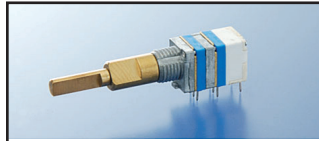
Outline Dimensions



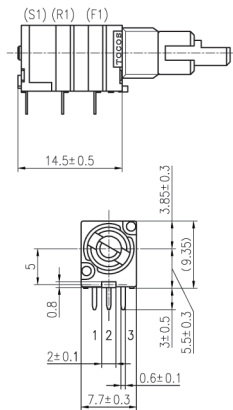
Mounting Hole Dimensions



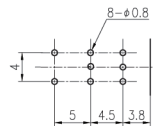
TP76D00N



Outline Dimensions

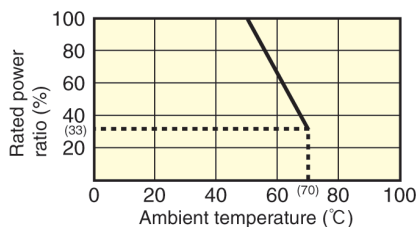


Mounting Hole Dimensions



### Electrical

- Nominal total resistance 1, 2, 5, 10, 20, 50, 100, 200, 500(kΩ)
- Resistance tolerance ±20%
- Resistance taper A • B • C
- End resistance 50Ω max.
- Power rating 0.05W
- Noise 100mV max.
- Insulation resistance 100MΩ min. at DC250V
- Dielectric strength 1 minute at AC300V
- Max. operating voltage DC10V, AC50V
- Derating curve



### Environment

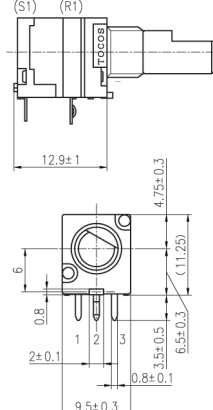
- Soldering heat resistance 350±5°C at 3 sec.
- Operating temperature range -20 to +70°C
- Rotational life 15,000 cycles without load
- Shaft Seal (Optional O-ring seal between the bushing and shaft) After securing to a panel, there shall be no leak between shaft and bushing at up to 9.8kPa (0.1kgf/cm<sup>2</sup>) 1 meter water by hydraulic pressure for 30 minutes (IP67).

## TP9 Series - 9mm

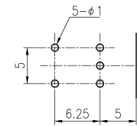
TP96N00N



Outline Dimensions



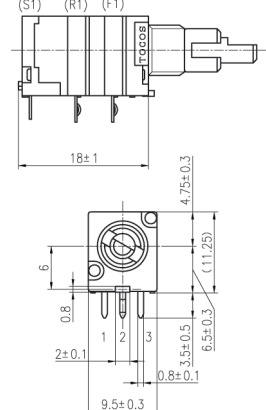
Mounting Hole Dimensions



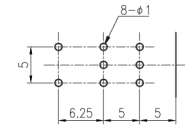
TP96D00N



Outline Dimensions



Mounting Hole Dimensions



### Mechanical

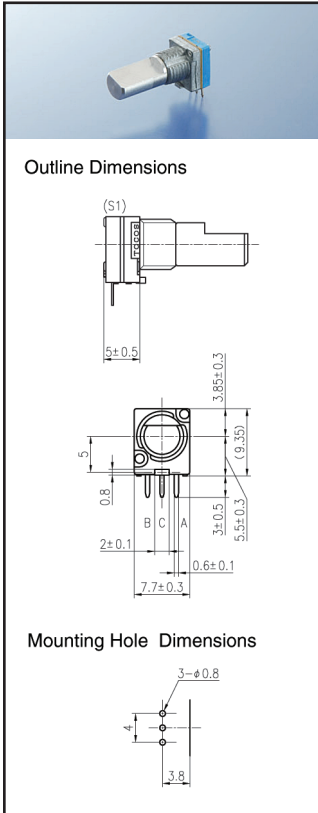
- Total rotational angle 300° (Mechanical)
- Rotational torque 2 to 24.5mN • m at +20°C (20 to 250gf • cm) 49.1mN • m at -20°C (500gf • cm max.)
- Shaft wobble and bend Radial direction 0.5 x Shaft length/30mm max. Thrust direction 0.5mm max.
- Detent position Center, 11, etc.
- Detent torque 2.9-29.4mN • m (30 to 300gf • cm)
- Shaft stopper strength TP7 inner shaft of dual shaft 0.3N • m (3kgf • cm) min. TP7 others 0.4N • m (4kgf • cm) min. TP9 0.5N • m (5kgf • cm) min.
- Shaft push-pull strength 98.1 N (10kgf) min.
- Nut tightening strength 0.98N • m (10kgf • cm) min.

### Switch Specifications

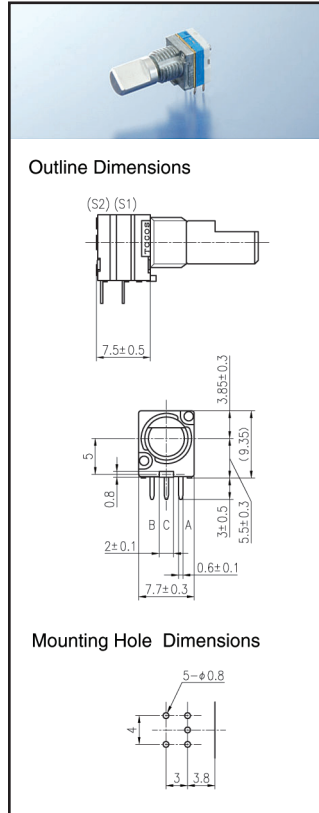
- Rotary switch, N S.P.S.T.: DC16V-3A; 50° max.
- Momentary push, A S.P.S.T.: DC12V-0.5A; 0.5mm Stroke
- Switch life 10,000 cycles without load
- Switch contact resistance Initial 50mΩ max. After 10,000 cycles-200mΩ max.

## TP7 Series - 7mm

### TP70N00E20

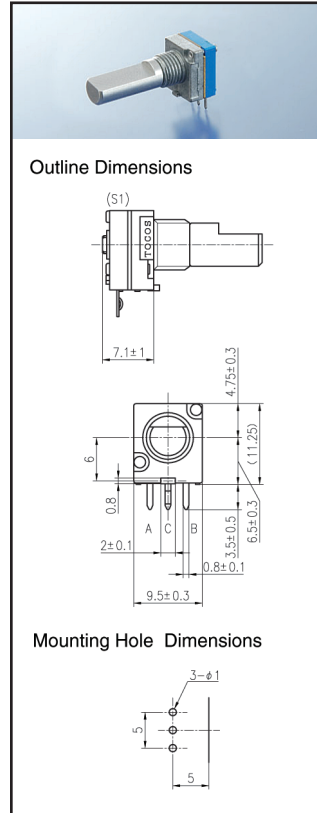


### TP70N00AE20

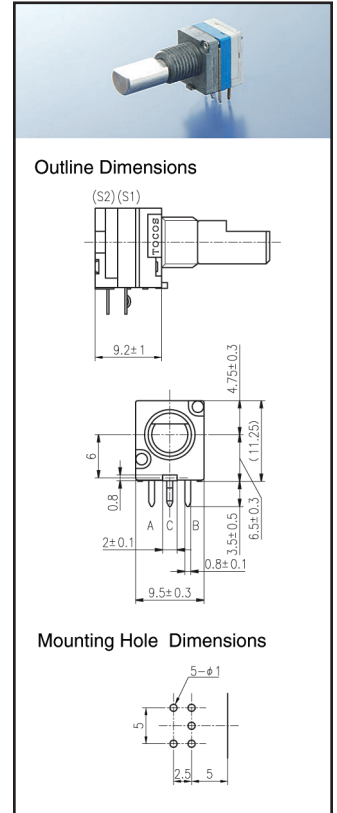


## TP9 Series - 9mm

### TP90N00E20



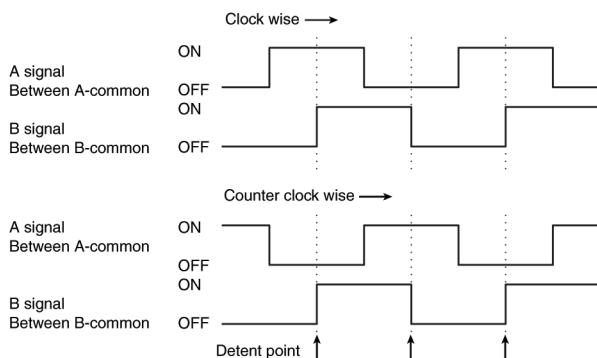
### TP90N00AE20



## Specifications

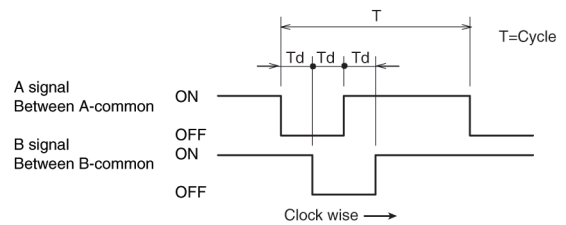
• Voltage rating	DC 5V
• Current rating	1mA
• Max. operating current	2.5mA
• Chattering	10ms max. (15 r.p.m)
• Contact resistance	TP7 10Ω max. TP9 200Ω max.

### • Output signal



### • Phase Difference

$$T_d = T/4 \pm T/6$$



• Duty ratio	50% ± 5% (18° ± 5.4°)
• Step angle	18° ± 3°
• Rotational Life	50,000 cycles
• Rotational torque	2 to 24.5mN • m (0 to +70°C) (20 to 250gf • cm) 49.1mN max. (0 to -20°C) (500gf • cm max.)

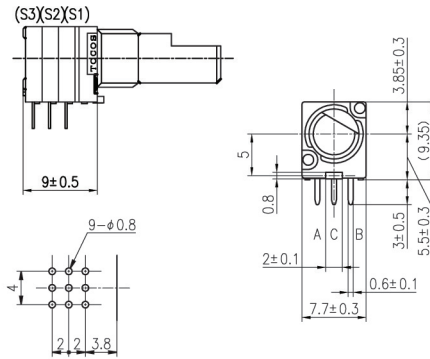
Please refer to Page 4 for other specifications.

• Resolution	10 pulses
• Detent point	20 detents A-common: ON or OFF B-common: Non provisions

# Coded Switches

## TP7 Series - 7mm

**TP70TF5161(S)** (S)=Sealed with O-ring between shaft and bushing



●—ON  
○—OFF

Detent position	S1		S2		S3	
	A-C	B-C	A-C	B-C	A-C	
FULL CCW	1	○	○	●	○	●
	2	○	●	●	○	●
	3	○	○	○	○	○
	4	○	○	○	○	○
	5	○	○	○	○	○
	6	○	○	○	○	○
	7	○	○	○	○	○
	8	○	○	○	○	○
	9	○	○	○	○	○
	10	○	○	○	○	○
	11	○	○	○	○	○
	12	○	○	○	○	○
	13	○	○	○	○	○
	14	○	○	○	○	○
	15	○	○	○	○	○
	16	○	○	○	○	○

### Electrical Characteristics

	Specification	Conditions
• Contact resistance	ON: 250Ω max. OFF: 1MΩ min.	Detent position
• Dielectric strength	No dielectric strength	AC300V at 1 minute Between terminal - Case Between terminal - Shaft
• Insulation resistance	100MΩ min.	DC250V at 1 minute Between terminal - Case Between terminal - Shaft

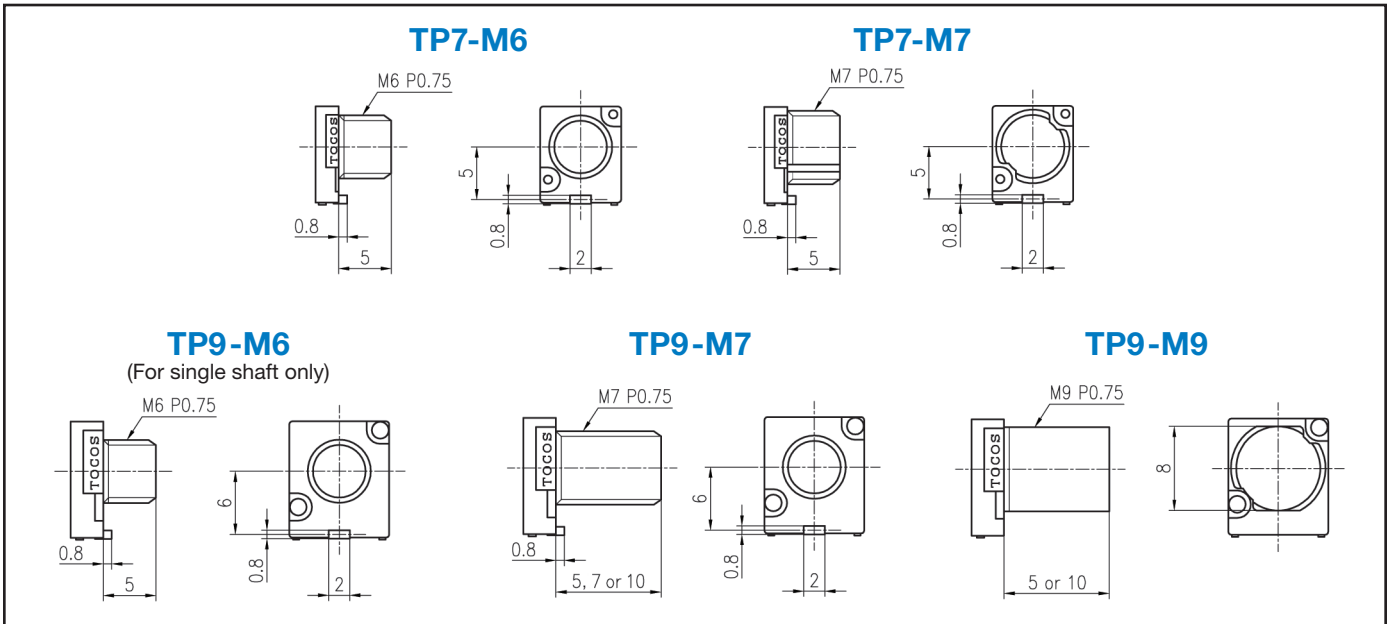
### Mechanical Characteristics

	Specification	Conditions
• Operating force	9.8-29.4mN • m(0 to +70°C) (100-300gf • cm) 98.1mN • m max.(0 to -20°C) (1000gf • cm) With detent pressure	
• Step angle	20 ± 3° Rotational angle: 300 ± 5°	
• Terminal strength	No damage to case and terminal fall-off. Bent terminals shall be acceptable No abnormality in electrical characteristics after testing to be seen	Static load of 4.9N (0.5kgf) shall be applied to the tip of the terminals for 15 secs. in vertical direction (1 time/terminal)
• Strength	Shaft pull: 98.1N min. (10kgf min.) Shaft push: 98.1N min. (10kgf min.) Nut tightening: 0.98N • m min. (10kgf • cm min.)	Static load
• Soldering, heat-resistance	There shall be no mechanical abnormality such as excessive play	Soldering iron: Max. 3 sec at 350 ± 5°
• Shaft stopper strength	0.39N • m min. (4kgf • cm min.)	
• Shaft wobble and bend	Radial: 0.5x shaft length/30mm max. Single shaft thrust: 0.5mm max. 2.5N (250gf) applied to tip of the shaft	

### Durability Characteristics

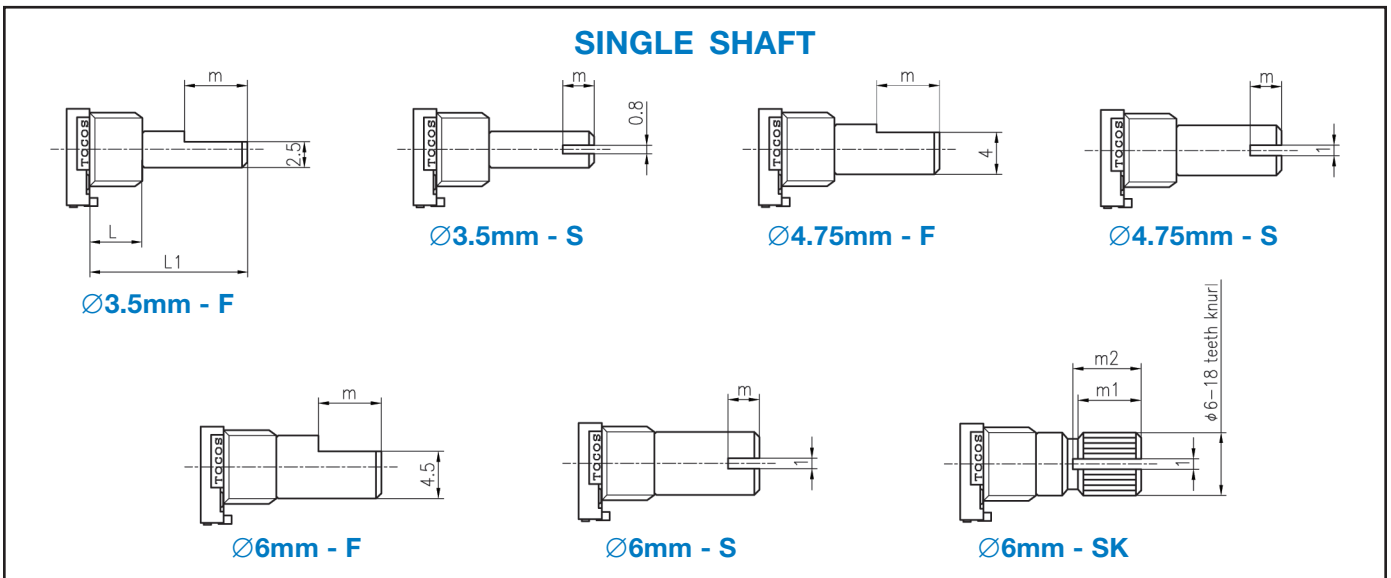
	Specification	Conditions
• Life (without load)	5,000 cycles (150,000 steps)	Contact resistance (ON): 1k Ω max. Contact resistance (OFF): 1MΩ min.
• Operating temperature range	-20°C to +70°C	
• Shaft Seal (Optional O-ring seal between the bushing and shaft)	After securing to a panel, there shall be no leak between shaft and bushing at up to 9.8kPa (0.1kgf/cm <sup>2</sup> ) 1 meter water by hydraulic pressure for 30 minutes (IP67).	

## BUSHING OPTIONS

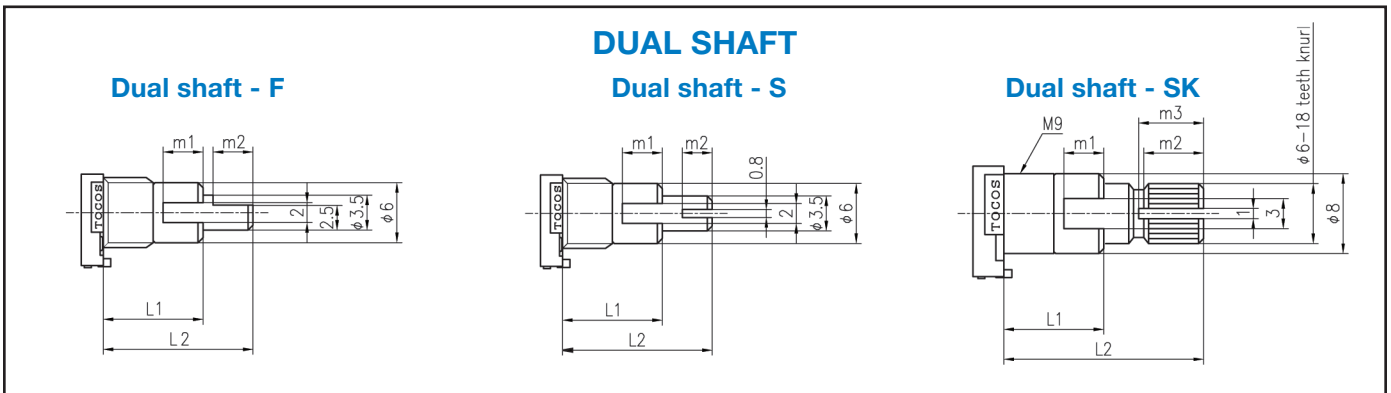


## SHAFT DIAMETERS AND STYLES

### SINGLE SHAFT

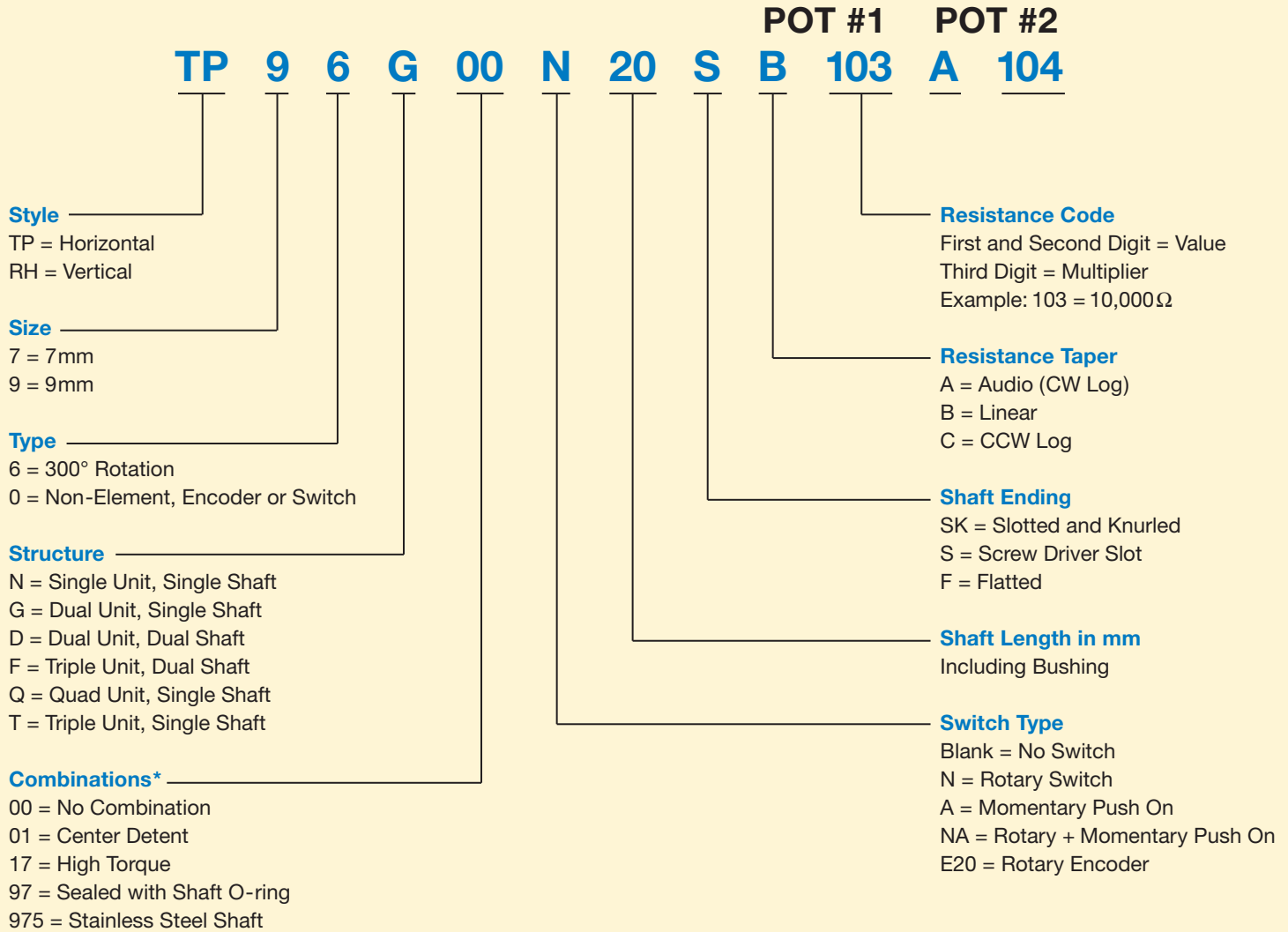


### DUAL SHAFT



# TP7 and TP9 Series Part Numbering System

Example: TP96G00N 20S B103 A104  
M7-5mm Shaft-6mm dia.



\*Hundreds of combinations are available.  
Contact Tocos for combination options.

1. Choose the potentiometers structure.
2. Select a combination, if none use 00.
3. Select switch type, if none leave blank.
4. Select shaft length, including the bushing. Standards are 15 and 20mm.
5. Select shaft ending.
6. Select taper and ohmic value.
7. Determine bushing and shaft sizes. (Other combinations are available)



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Affiliated With

