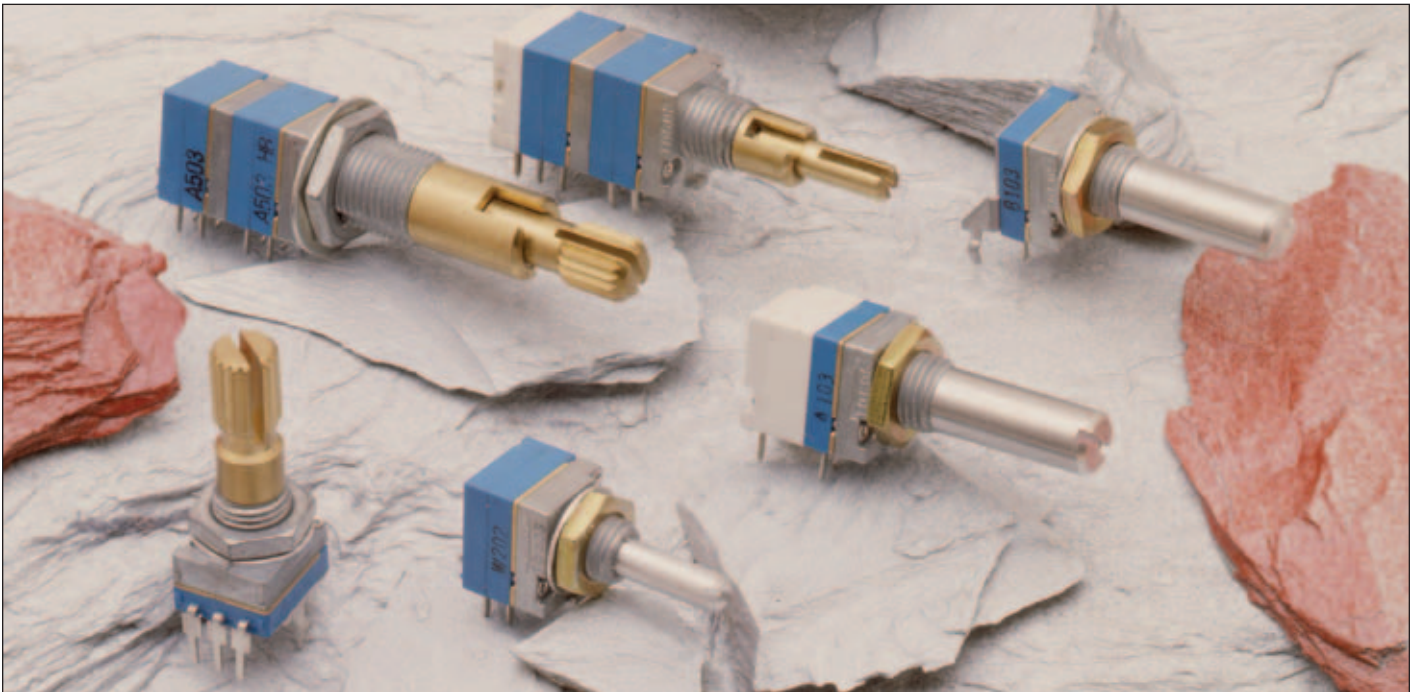


TP9/RH9 Series

WORLD'S MOST CUSTOMIZABLE POTENTIOMETER



Features

■ **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**

■ **Long-Life models**

■ **Vertical and horizontal mounts**

■ **Wide temperature range**

Standard: -20 to +70°C
Optional: -30 to +70°C

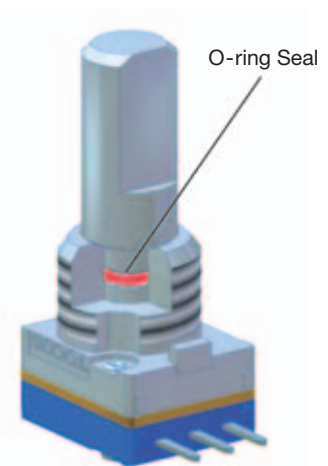


Multi-function Switches



TP96N93
Long-Life Option
300,000 Cycles

Ideal for hand held communication devices, hand held measuring instruments, audio mixing and electronic preamp and amp systems.



Waterproof Option



**HUNDREDS OF CUSTOM-BUILT COMBINATIONS!
BUILD YOUR OWN CUSTOM PART NUMBER...**

Part Numbering System

Example: TP96N00N 20 F B202

Bushing: M7-5mm length Shaft: 6mm diameter

TP 9 6 N 00 N 20 F B 202

Style

TP = PC Pin, Horizontal Mount
RH = PC Pin, Vertical Mount

Size

9 = 9mm

Type

6 = 300° Rotation
7 = 120° Rotation
8 = 180° Rotation
0 = Non-Element, Encoder or Switch

Structure

N = Single Shaft, Single Unit
G = Single Shaft, Dual Unit
T = Single Shaft, Triple Unit
Q = Single Shaft, Quad Unit
S = Single Shaft, Five Gang Unit
P = Single Shaft, Six Gang Unit
E = Single Shaft, Eight Gang Unit
D = Dual Shaft, Dual Unit
F = Dual Shaft, Triple Unit
H = Dual Shaft, Quad Unit
C = Dual Shaft, Five Gang Unit
R = Dual Shaft, Six Gang Unit
J = Dual Shaft with Pull Clutch
V = Single Shaft, Triple Unit with Pull Clutch
W = Single Shaft, Quad Unit with Pull Clutch

Combinations

00 = No Combination
01 = Center Detent (Outer Shaft)
03 = Layer Tap (3rd Terminal Side)
07 = 27-Detent
08 = 31-Detent
10 = Center Detent (Inner Shaft)
17 = High Torque
82 = 11-Detent
93 = Long-Life Element (300,000 Cycles)
97 = Sealed with Shaft O-ring

**Call TOCOS for more
Options/ Combinations.**

Resistance Code

First and Second Digit = Value
Third Digit = Multiplier
Example: 202 = 2,000 Ω

Resistance Taper

A = Audio (CW Log)
B = Linear
C = CCW Log

Shaft End Style

R = Round
F = Flatted
S = Screw Driver Slot
H = Deep Slot
SK = Slotted and Knurled

Standard Shaft Length

Includes Bushing Length
15 = 15mm (from mounting surface)
20 = 20mm (from mounting surface)

Switch Type

Blank = No Switch
N = Rotary Switch
A = Momentary Push-On
NA = Rotary + Momentary Push-On
X = Push-Push

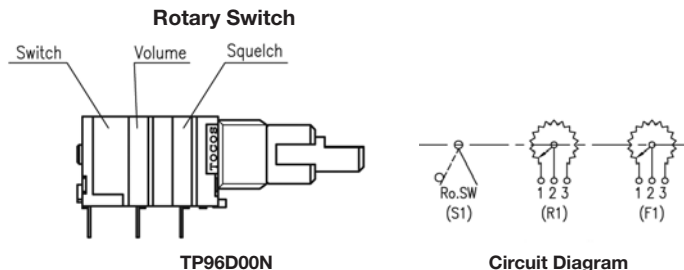
How to Build a Part Number

1. Choose the potentiometer 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 end style.
6. Select taper and ohmic value.
7. Determine bushing and shaft sizes.

See Page 35 for Bushing and Shaft Styles.

TP9/RH9 SERIES

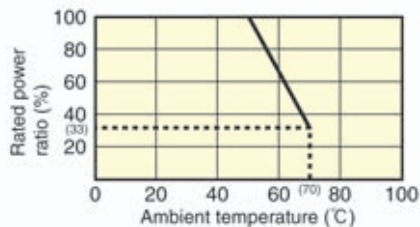
1. For Volume + Power On-Off Switches:
TP96N00N
2. For Volume + Squelch + Power On-Off Switches:
TP96D00N



9mm Electrical

- Nominal total resistance 1, 2, 5, 10, 20, 50, 100, 200, 500 (kΩ)
- Resistance tolerance ±20%
- Resistance taper A, B, C, D, W
- End resistance 5Ω max.
- Power rating 0.05W
- Noise 100mV max.
- Insulation resistance 100MΩ min. at 250VDC
- Dielectric strength 1 minute at 300VAC
- Max. operating voltage 10VDC, 50VAC
- Tracking error
Volume cont.: 3dB max. at 0 to -40dB
Tone cont.: 2dB max. at 50% of rotational angle

• Derating curve



Environment

- Soldering heat resistance 350 ± 5°C at 3 sec.
- Operating temperature range -20°C to +70°C
- Rotational life Permissible resistance change after 15,000 ± 200 cycles on 600rph without load: ± 15% max.
- Shaft Seal (Optional O-ring seal between the bushing and shaft) After mounting to a panel, there shall be no leak between shaft and bushing at 0.1kgf/cm by hydraulic pressure for 30 minutes

9mm Mechanical

- Total rotational angle 300° (Mechanical)
- Tolerance for total rotational angle ± 5°C, +10/-5°C: Push-pull drive shaft
- Rotational torque 2~24.5mN • m (20 to 250gf • cm) at +20°C
49.1mN • m (500gf • cm max.) at -20°C
- Shaft wobble and bend
Radial direction 0.5mm P-P
tip of the shaft, applied 2.45N (250gf)
Thrust direction 0.5mm max.
- Detent position Center
- Detent torque +2.9~29.4mN • m (30 to 300gf • cm)
- Shaft stopper strength
Inner shaft of dual shaft 0.3N • m (3kgf • cm min.)
Others 0.4N • m (4kgf • cm min.)
- Shaft push-pull strength 98.1 N (10kgf min.)
- Nut tightening strength 0.98N • m (10kgf • cm min.)

Switch Specifications

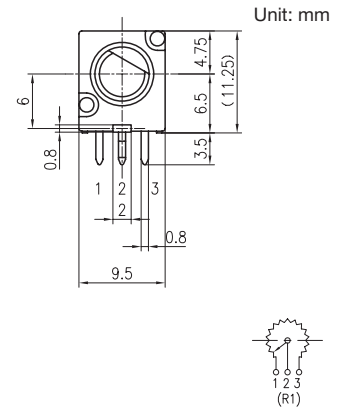
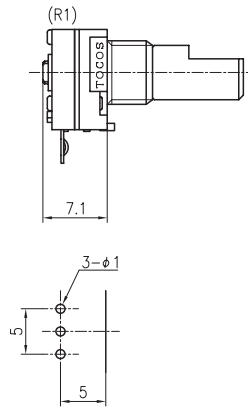
- Rotary switch, N SPST: 16VDC-3A; 50° max. angle
- Momentary push, A SPST: 12VDC-0.5A; 0.5 ± 0.3mm stroke
- Push-push switch, X SPDT: 16VDC-3A; 1.5 ± 0.5mm stroke
- Switch life 10,000 cycles without load
- Switch contact resistance Initial 50mΩ max.
After 10,000 cycles-200mΩ max.

◆ All products in this catalog are not for use in life support equipment.

TP/RH Series are NOT board washable.

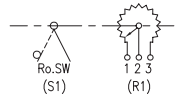
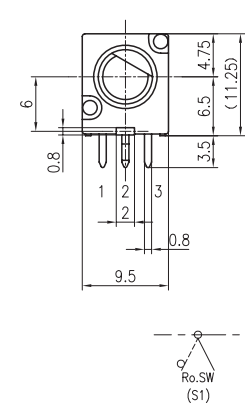
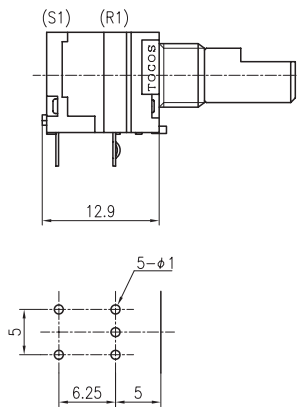
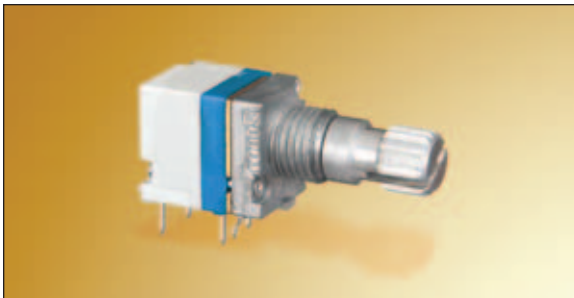
TP96N00

Single Shaft, Single Unit



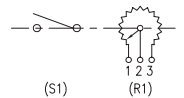
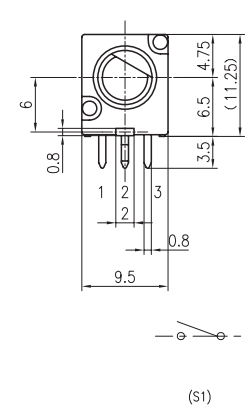
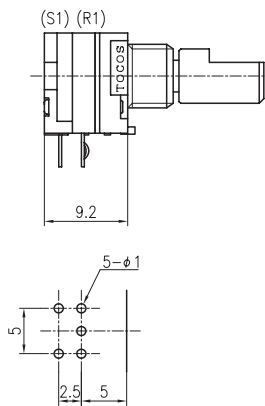
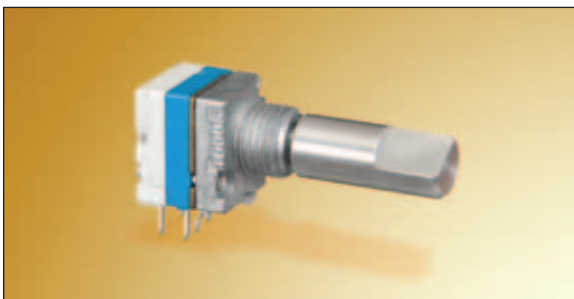
TP96N00N

Single Shaft, Single Unit, Rotary Switch



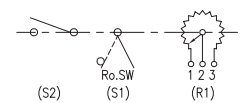
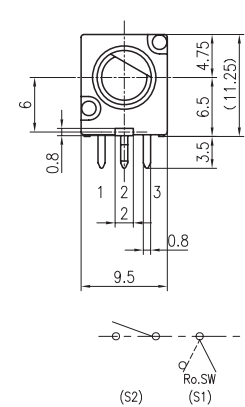
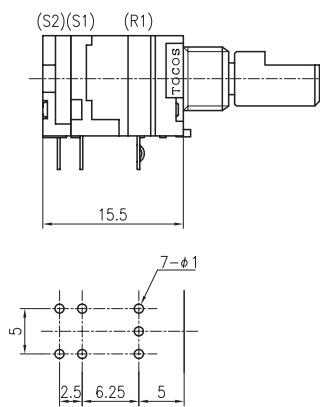
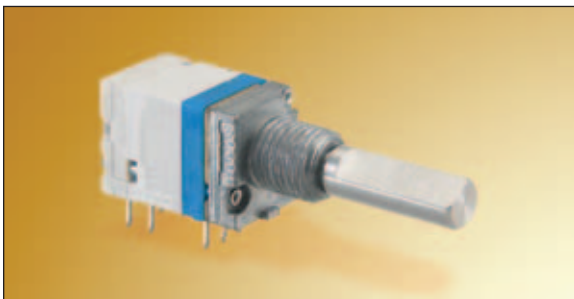
TP96N00A

Single Shaft, Single Unit, Momentary Push-on Switch



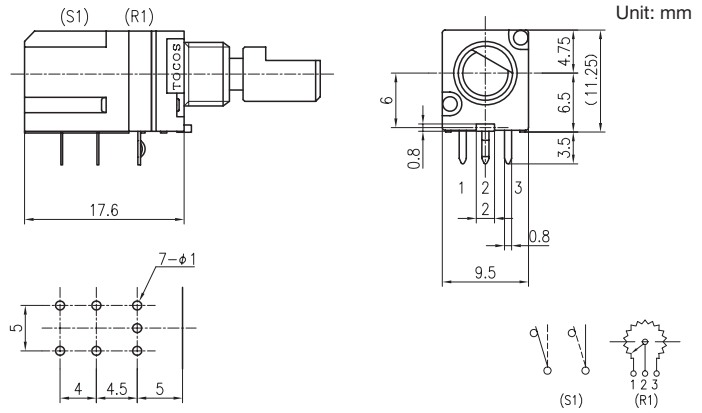
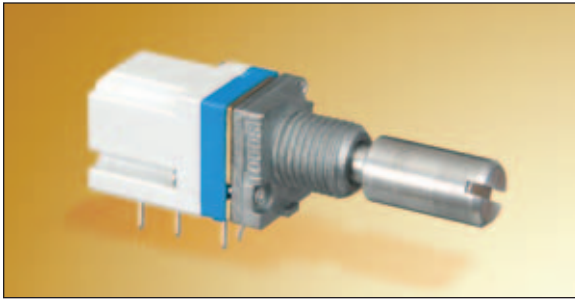
TP96N00NA

Single Shaft, Single Unit, Rotary + Momentary Push-on Switches



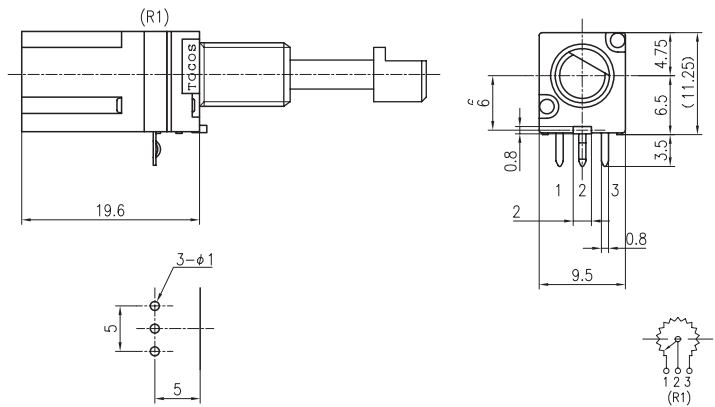
TP96N00X

Single Shaft, Single Unit, Push-Push Switch



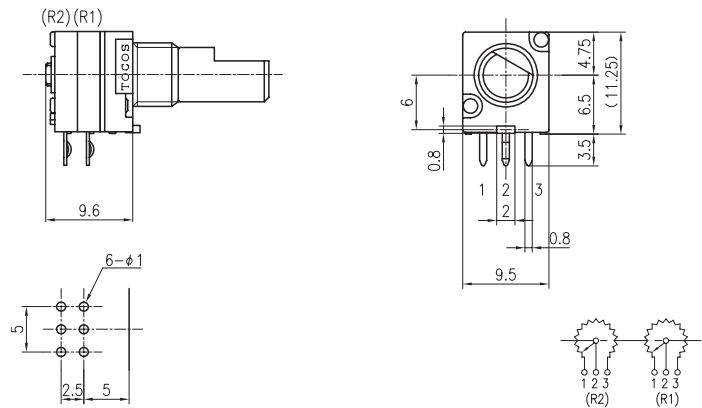
TP96N00Z

Single Shaft, Single Unit, Push-Lock Mechanism



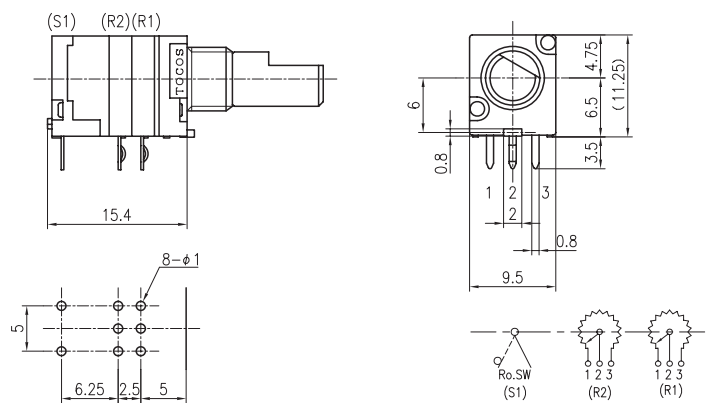
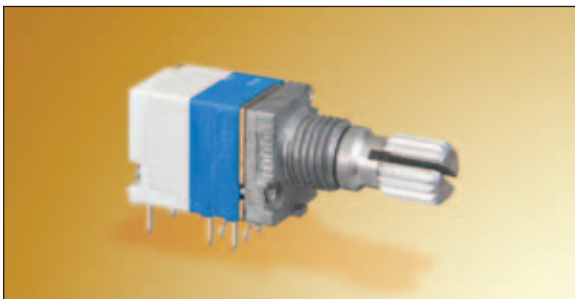
TP96G00

Single Shaft, Dual Unit



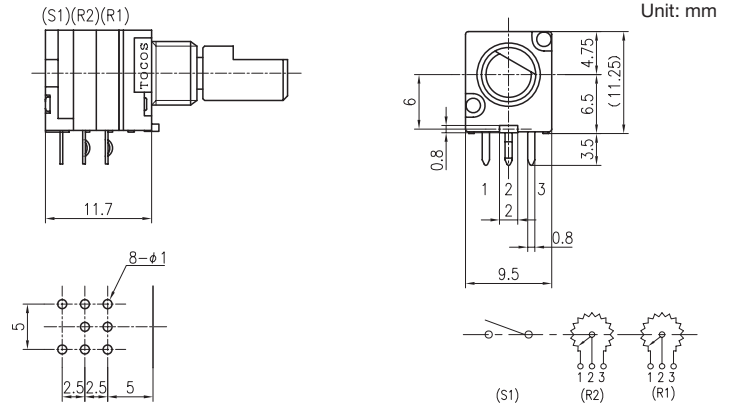
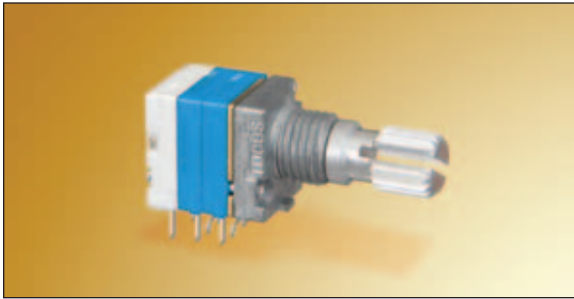
TP96G00N

Single Shaft, Dual Unit, Rotary Switch



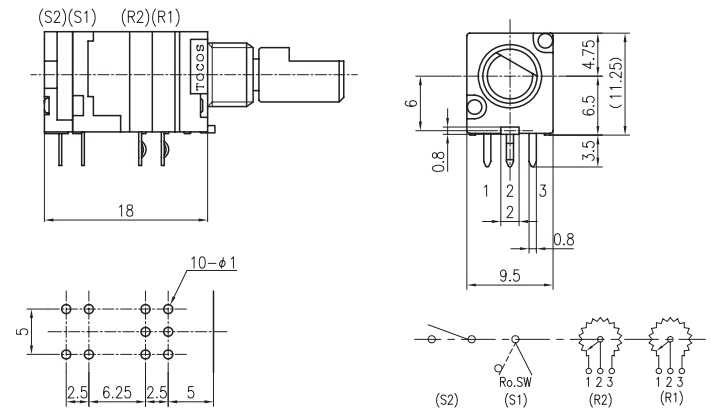
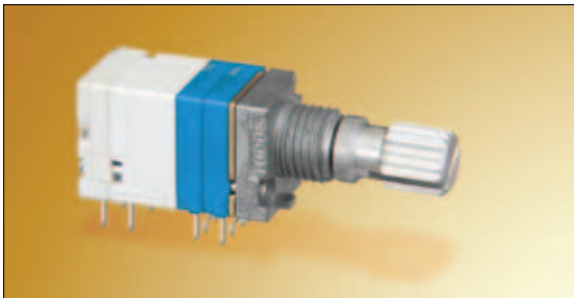
TP96G00A

Single Shaft, Dual Unit, Momentary Push-on Switch



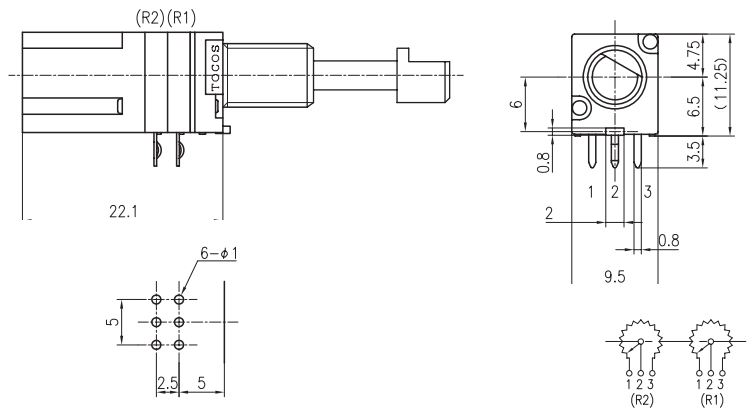
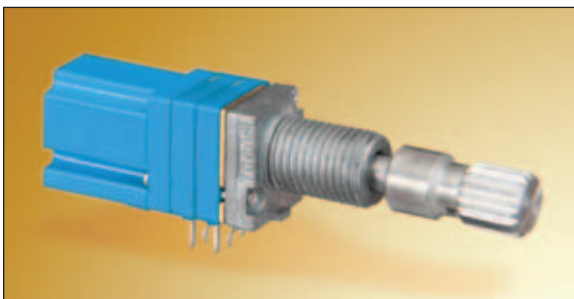
TP96G00NA

Single Shaft, Dual Unit, Rotary + Momentary Push-on Switches



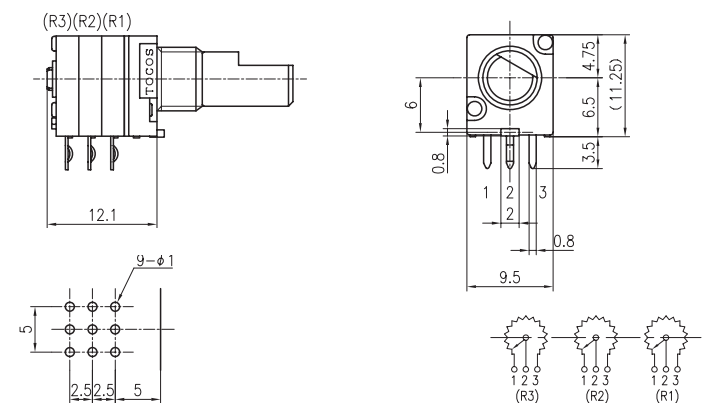
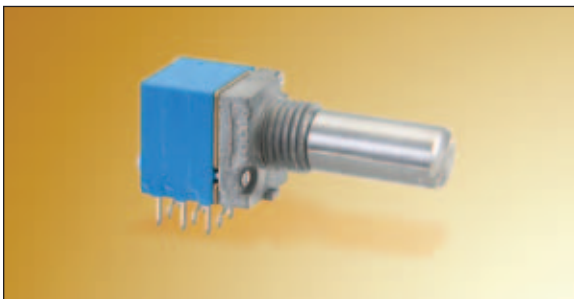
TP96G00Z

Single Shaft, Dual Unit, Push-Lock Mechanism



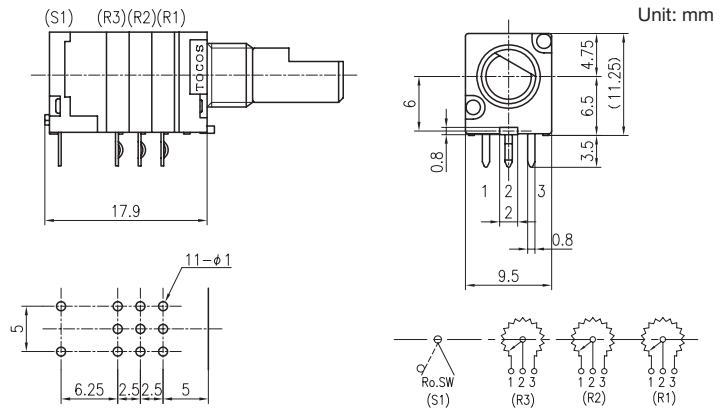
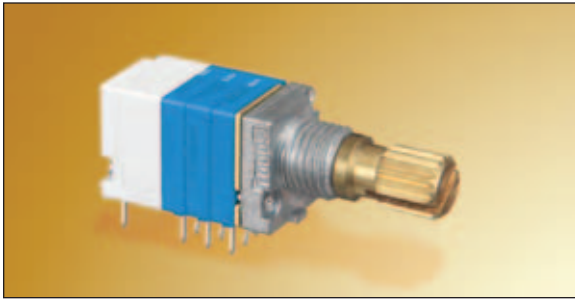
TP96T00

Single Shaft, Triple Unit



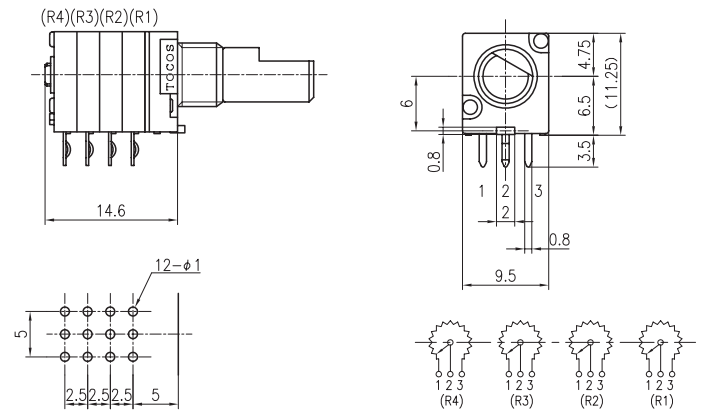
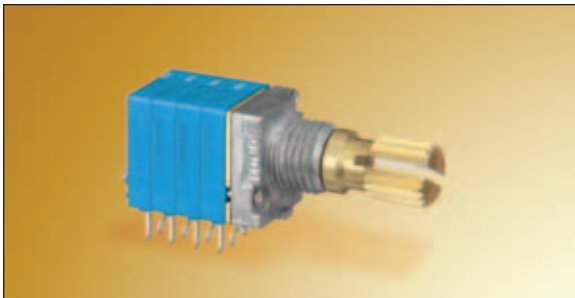
TP96T00N

Single Shaft, Triple Unit, Rotary Switch



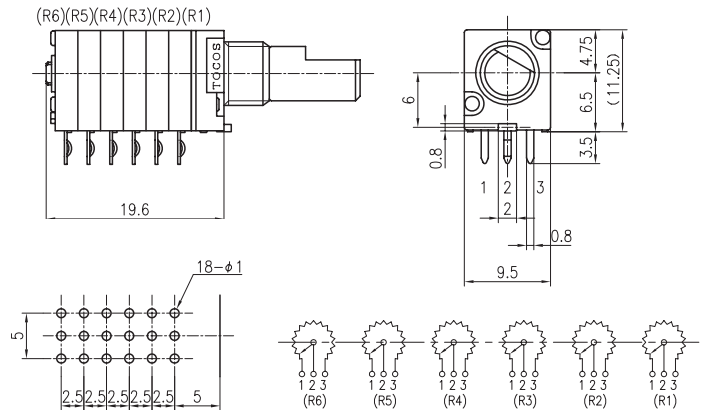
TP96Q00

Single Shaft, Quad Unit



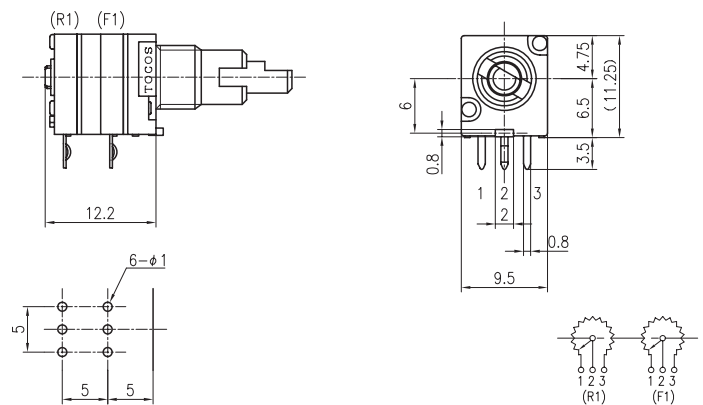
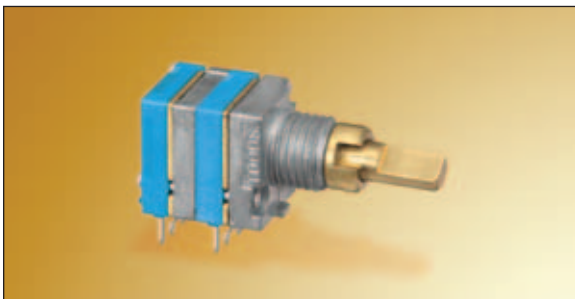
TP96P00

Single Shaft, Six-Gang Unit



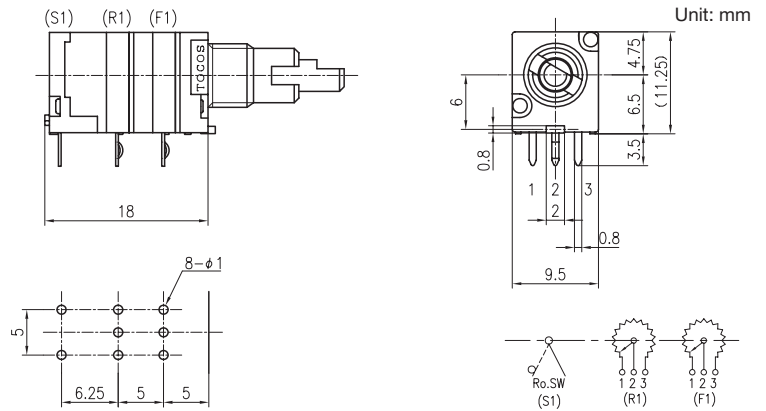
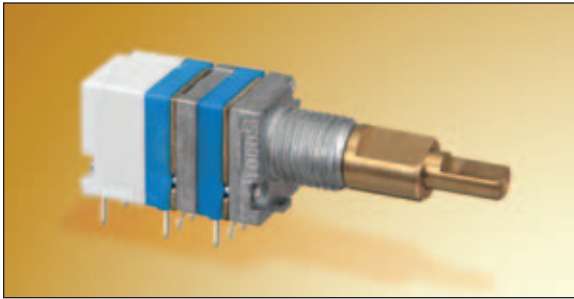
TP96D00

Dual Shaft, Dual Unit



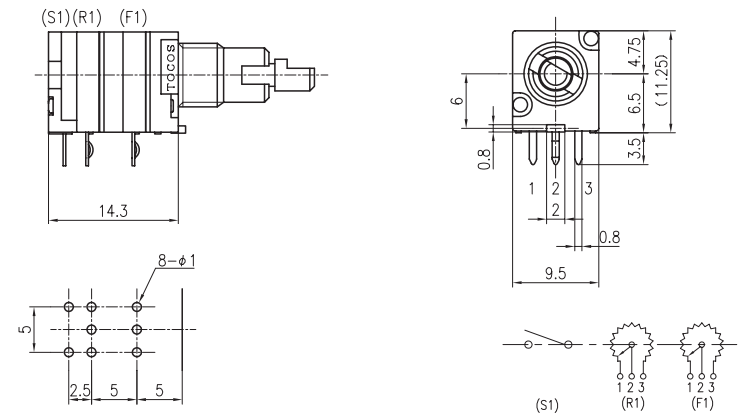
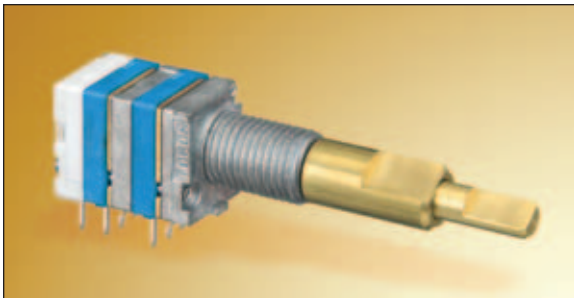
TP96D00N

Dual Shaft, Dual Unit, Rotary Switch



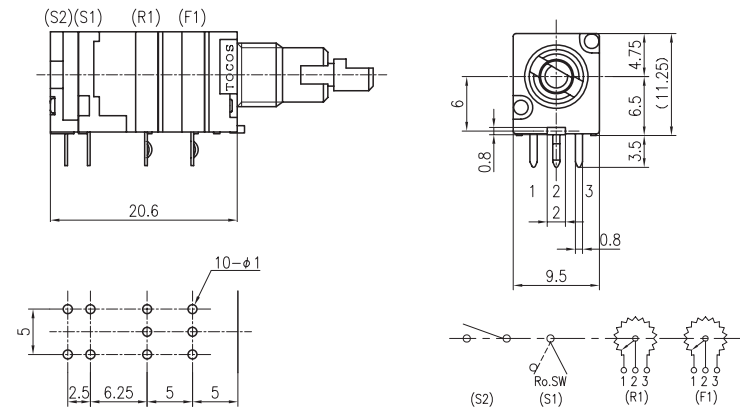
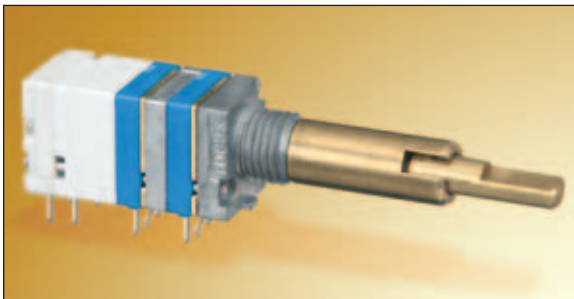
TP96D00A

Dual Shaft, Dual Unit, Momentary Push-on Switch



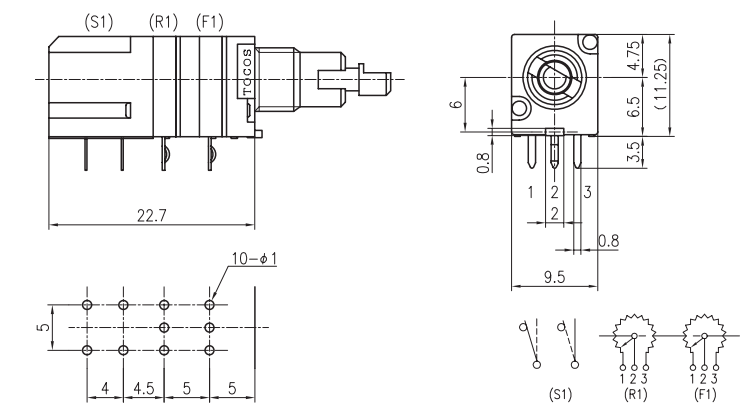
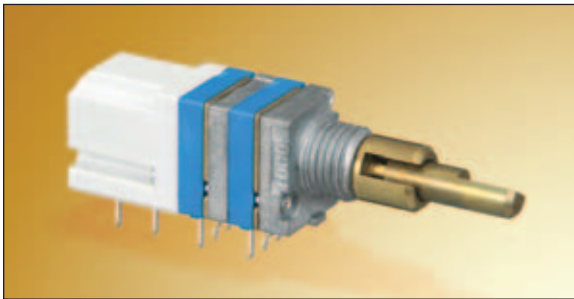
TP96D00NA

Dual Shaft, Dual Unit, Rotary + Momentary Push-on Switches



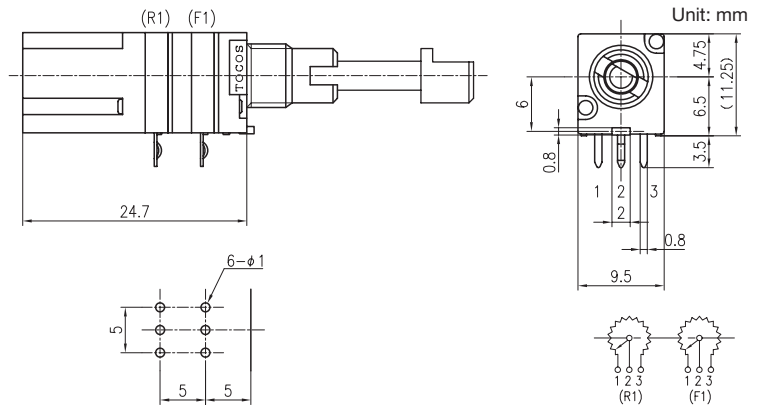
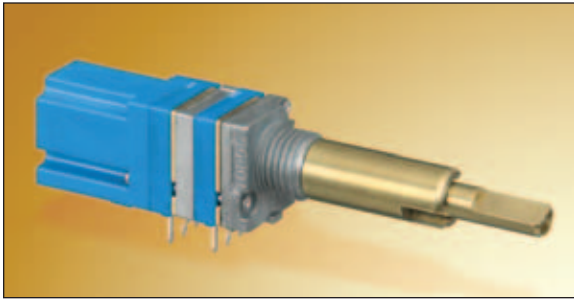
TP96D00X

Dual Shaft, Dual Unit, Push-Push Switch



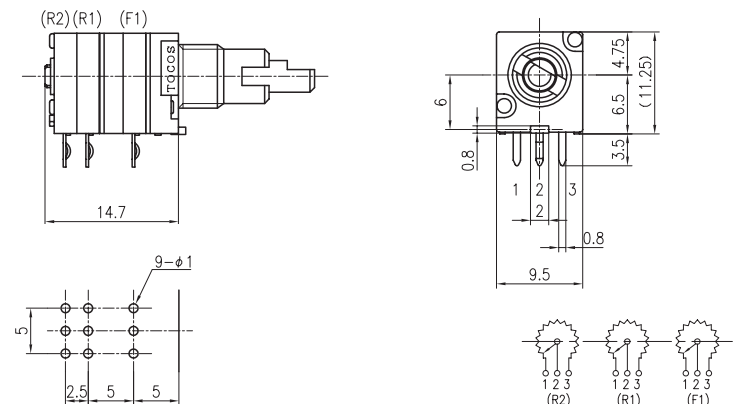
TP96D00Z

Dual Shaft, Push-Lock Mechanism



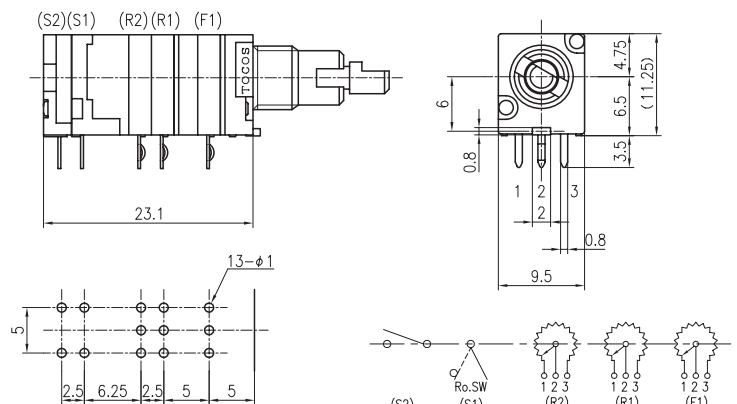
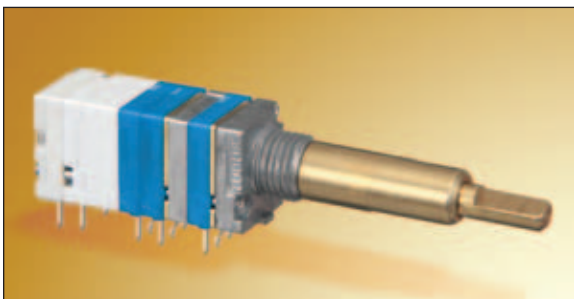
TP96F00

Dual Shaft, Triple Unit



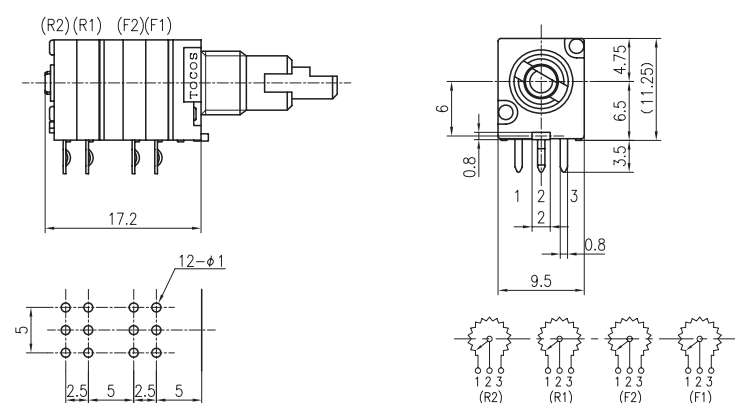
TP96F00NA

Dual Shaft, Triple Unit, Momentary Push-on Switch



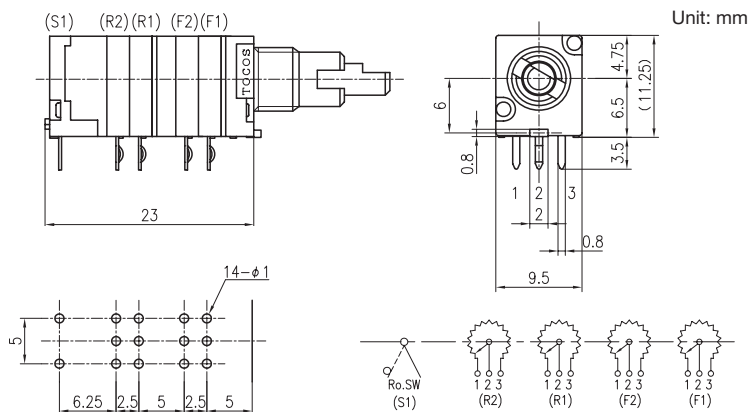
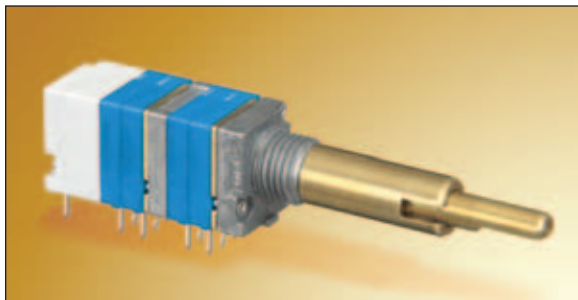
TP96H00

Dual Shaft, Quad Unit



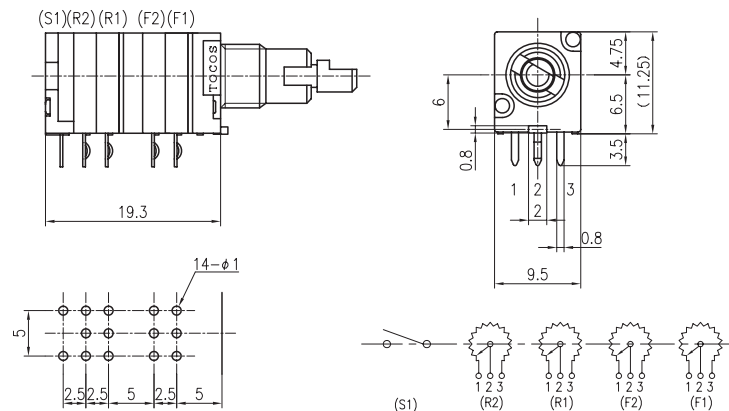
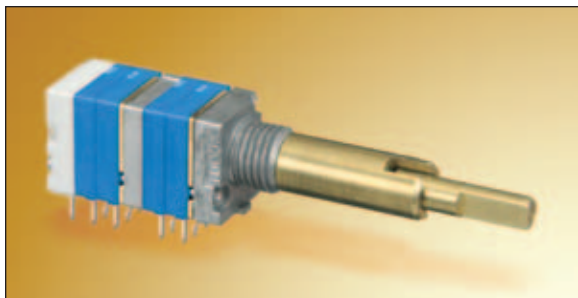
TP96H00N

Dual Shaft, Quad Unit, Rotary Switch



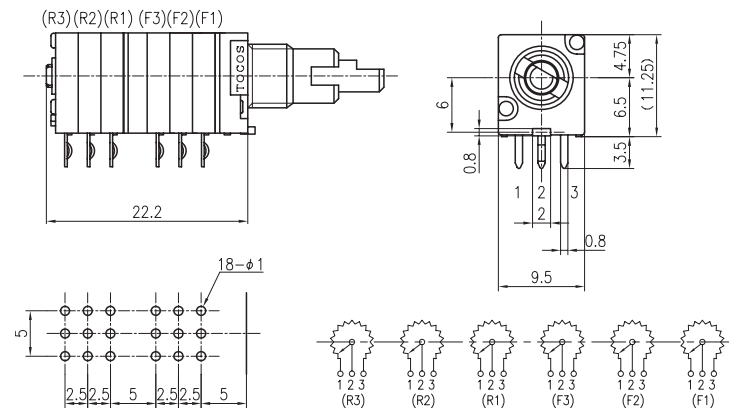
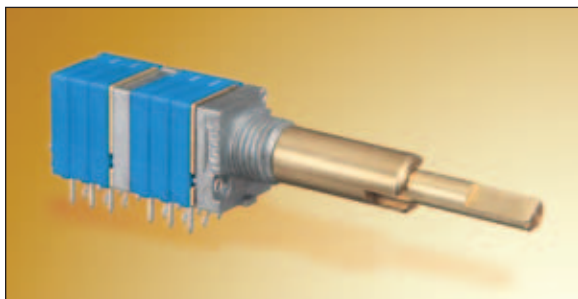
TP96H00A

Dual Shaft, Quad Unit, Momentary Push-on Switch



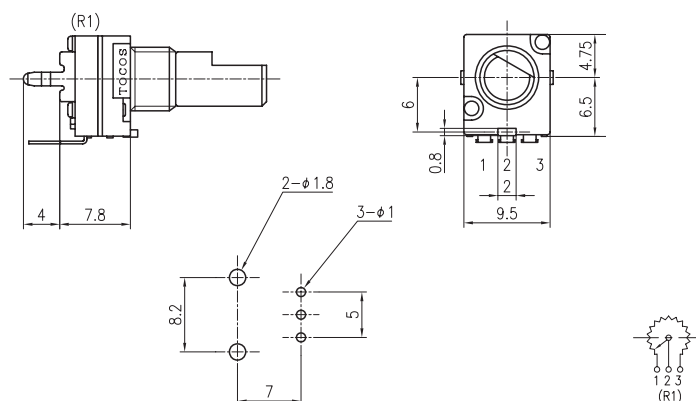
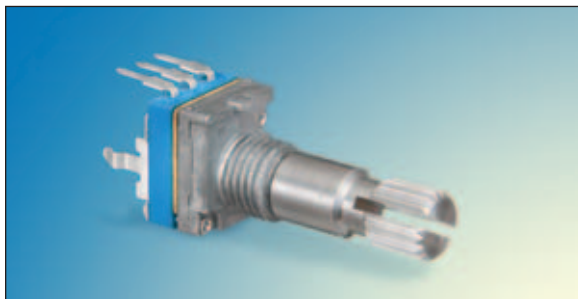
TP96R00

Dual Shaft, Six-Gang Unit



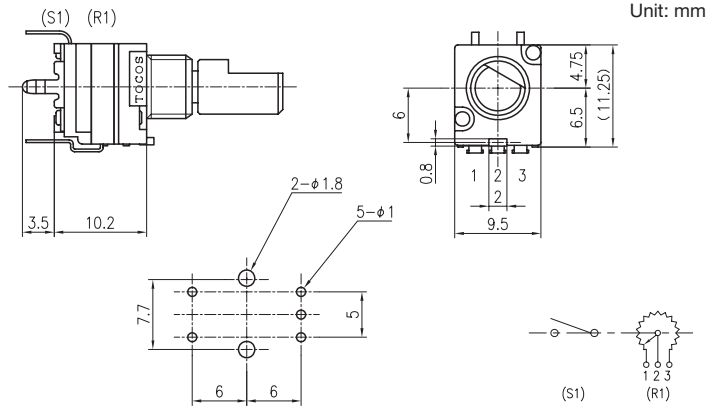
RH96N74

Vertical Mount, Single Shaft, Single Unit, Bracket with Snap-in Mounting Pins



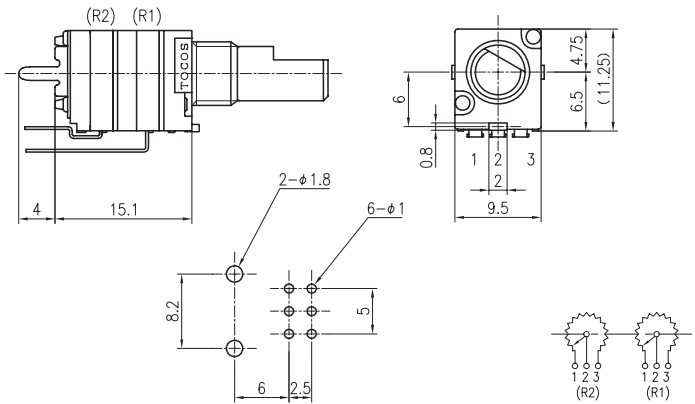
RH96N74A

Vertical Mount, Single Shaft, Single Unit, Momentary Push-on Switch, Bracket with Snap-in Mounting Pins



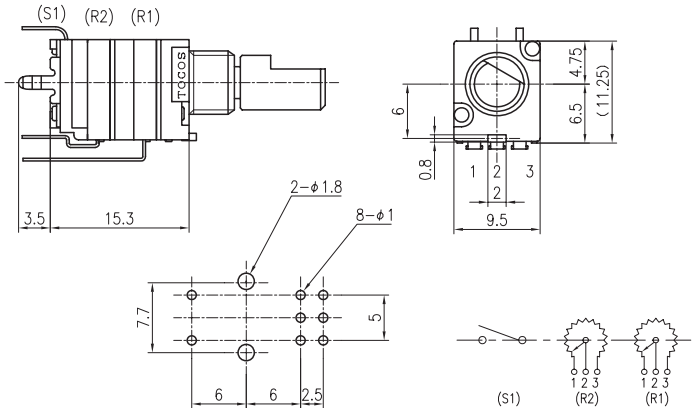
RH96G932

Vertical Mount, Single Shaft, Dual Unit, Momentary Push-on Switch, Bracket with Snap-in Mounting Pins, Holding Case, Intermediate Case



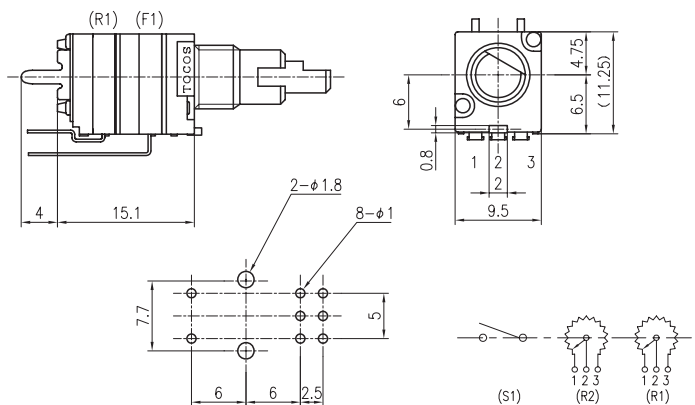
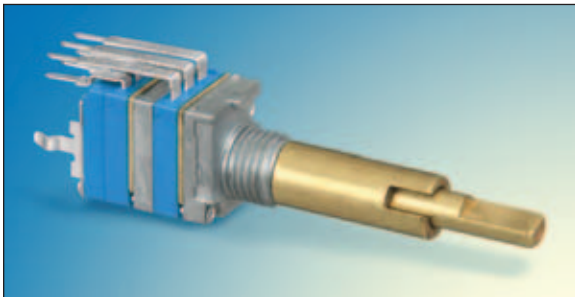
RH96G947A

Vertical Mount, Single Shaft, Dual Unit, Momentary Push-on Switch, Bracket with Snap-in Mounting Pins, Intermediate Case



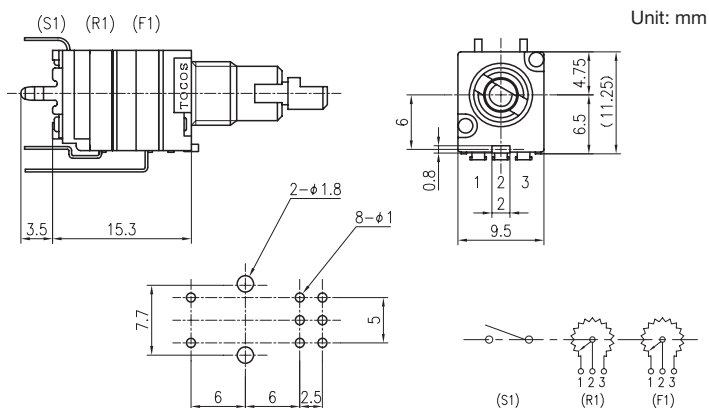
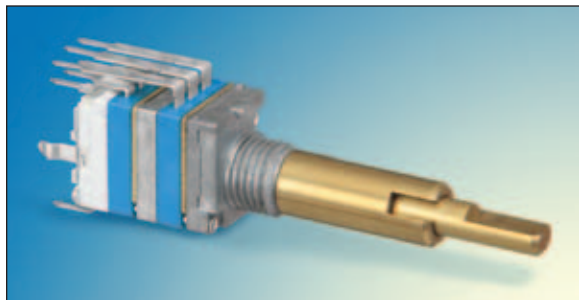
RH96D190

Vertical Mount, Dual Shaft, Dual Unit, Bracket with Snap-in Mounting Pins, Holding Case



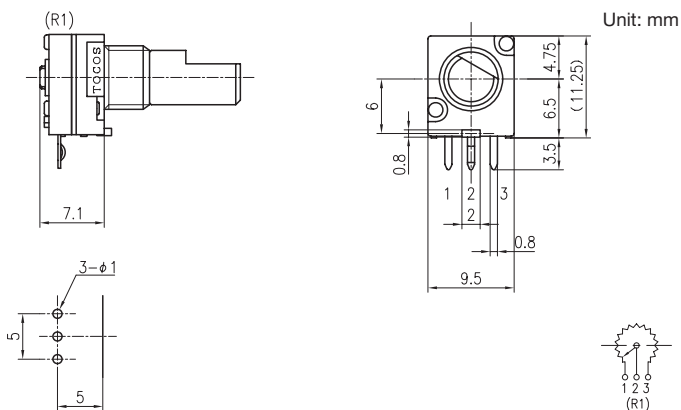
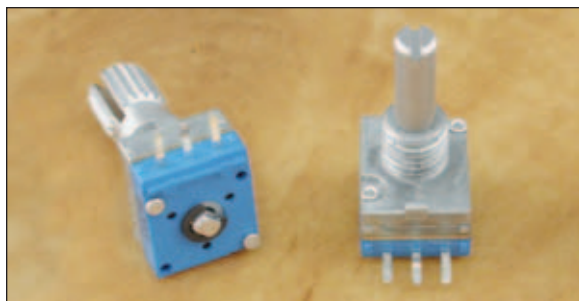
RH96D74A

Vertical Mount, Dual Shaft, Dual Unit, Momentary Push-on Switch, Bracket with Snap-in Mounting Pins



TP96N93 - Long-Life Series

Single Shaft, Single Unit, Long-Life up to 300,000 cycle rotational life



- Carbon film element, metal shaft and bushing
- Internal resin molded coating to prevent flux intrusion
- Linear (B) taper
- Standard 15mm or 20mm shaft length
- 6mm diameter shafts in round, flat, slot or knurl end styles
- Vertical mount pin terminals also available

Environmental

- Temperature Range** -20°C to +70°C
- Temperature Characteristics** +70°C, 240 hours
ΔT/R ≤ +5%, -30%
- Temperature Cycle** -20°C, +70°C,
30 minutes each, 5 cycles
ΔT/R ≤ +10%, -30%
- Load Life** +50°C, 0.05 watt, 1,000 hours
ΔT/R ≤ ±30%
- Moisture and Load Life** +40°C, 90-95% RH,
0.05 watt, 350 hours
ΔT/R ≤ ±20%
- Vibration** 10-55Hz, 1.5mm amplitude, 3 directions
ΔT/R ≤ ±2.5%
- Soldering Heat Resistance** 350°C ±5°C, 5 seconds
ΔT/R ≤ ±5%
- Rotational Life** 300,000 cycles with 3.5V load
ΔT/R ≤ ±15%

ΔT/R = Total Resistance Change

Electrical

- Standard Resistance Range** 1kΩ to 100kΩ
- Resistance Tolerance** ±20% standard
- End Resistance** 100Ω max.
- Resistance Taper** B = linear
- Peak Noise (C.R.V.)** 100mV max.
- Power Rating** 0.05 watt at +50°C, 0 watt at +70°C
- Maximum Input Voltage** 70VDC or power rating,
whichever is smaller
- Insulation Resistance** 100MΩ minimum at 250VDC
- Dielectric Strength** 300VAC, 1 minute
- Adjustment Travel** 266° nominal

Mechanical

- Mechanical Travel** 300° ± 5°
- Shaft Torque** 20 gf·cm (0.277 oz·in) max.
- Stop Strength** 5 kgf·cm (69.31 oz·in) min.
- Shaft Strength (push)** 98.1 N (10 kgf) min.
- Shaft Strength (tensile)** 98.1 N (10 kgf) min.
- Shaft End Play** ±0.5 × (shaft length/30) mm max.
- Mounting Nut Torque** 10 kgf·cm (138.63 oz·in) min.
- Flammability of Plastic Materials** Meets UL 94HB
- Marking** Model type, taper, resistance code,
terminal identification, date code