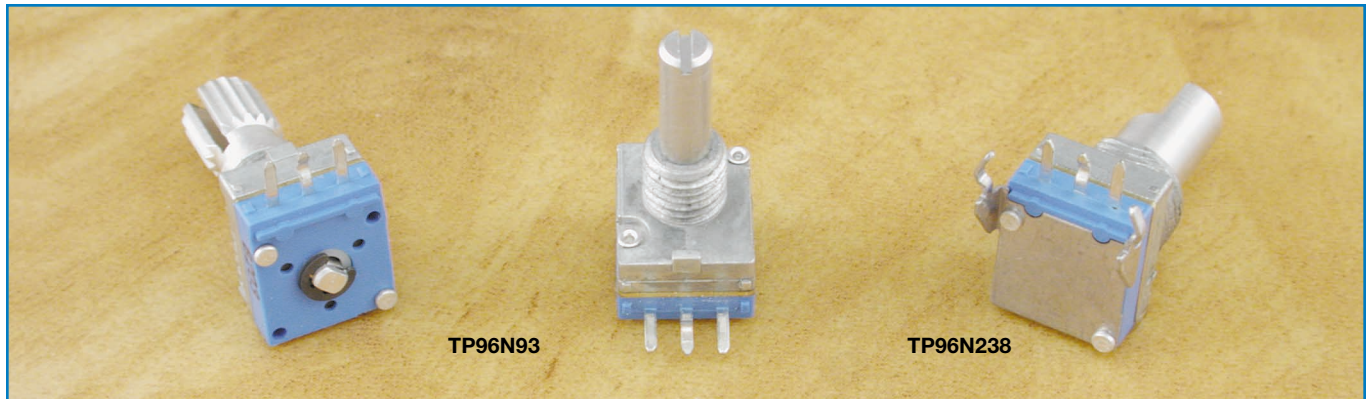


## Long Life 9mm Square, Single-Turn, Carbon Panel Controls



### Features

- Long life 9mm square, single-turn industrial panel controls
- Carbon film element
- Up to 300,000 cycle rotational life
- Single unit, single shaft
- Internal resin molded coating to prevent flux intrusion
- Metal shaft and bushing
- Linear taper
- Standard 15mm or 20mm shaft length
- 6mm diameter shafts in slot, flat or round end styles
- Standard PCB right angle inline pin terminals
- Vertical mount pin terminals available as special order

### Specifications

#### Electrical

<b>Standard Resistance Range</b> .....	1k $\Omega$ to 100k $\Omega$
<b>Resistance Tolerance</b> .....	$\pm 20\%$ standard
<b>End Resistance</b> .....	100 $\Omega$ max.
<b>Resistance Taper</b> .....	B = linear
<b>Peak Noise (C.R.V.)</b> .....	100mV max.
<b>Power Rating</b> .....	0.05 watt at +50°C, 0 watt at +70°C
<b>Maximum Input Voltage</b> .....	70VDC or power rating, whichever is smaller
<b>Insulation Resistance</b> .....	100M $\Omega$ minimum at 250VDC
<b>Dielectric Strength</b> .....	300VAC, 1 minute
<b>Adjustment Travel</b> .....	266° nominal

#### Mechanical

<b>Mechanical Travel</b> .....	300° $\pm 5^\circ$
<b>Shaft Torque</b> .....	20 gf•cm (0.277 oz•in) max.
<b>Stop Strength</b> .....	5 kgf•cm (69.31 oz•in) min.
<b>Shaft Strength (push)</b> .....	98.1 N (10 kgf) min.
<b>Shaft Strength (tensile)</b> .....	98.1 N (10 kgf) min.
<b>Shaft End Play</b> .....	$\pm 0.5 \times$ (shaft length/30) mm max.
<b>Mounting Nut Torque</b> .....	10 kgf•cm (138.63 oz•in) min.
<b>Marking</b> .....	Model type, taper, resistance code, terminal identification, date code

#### Environmental

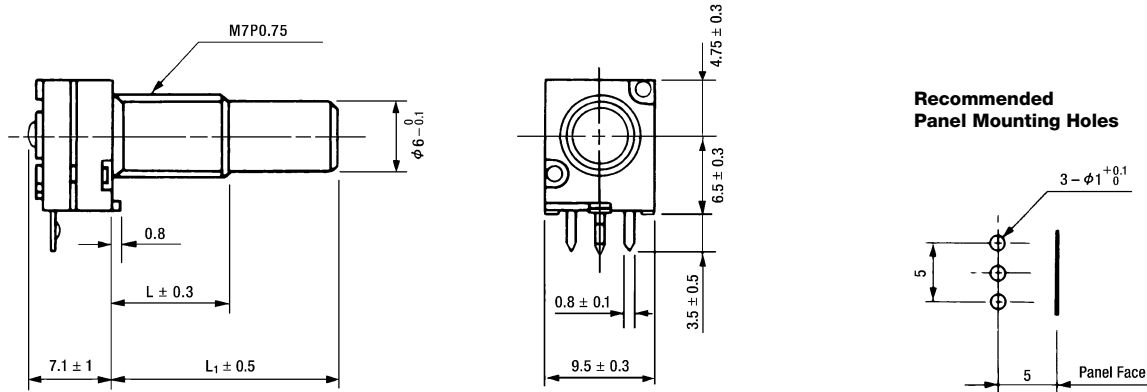
<b>Temperature Range</b> .....	-20°C to +70°C
<b>Temperature Characteristics</b> .....	+70°C, 240 hours $\Delta T/R \leq +5\%, -30\%$
<b>Temperature Cycle</b> .....	-20°C, +70°C, 30 minutes each, 5 cycles $\Delta T/R \leq +10\%, -30\%$
<b>Load Life</b> .....	+50°C, 0.05 watt, 1,000 hours $\Delta T/R \leq \pm 30\%$
<b>Moisture and Load Life</b> .....	+40°C, 90-95% RH, 0.05 watt, 350 hours $\Delta T/R \leq \pm 20\%$
<b>Vibration</b> .....	10-55Hz, 1.5mm amplitude, 3 directions $\Delta T/R \leq \pm 2.5\%$
<b>Soldering Heat Resistance</b> .....	350°C $\pm 5^\circ$ C, 5 seconds $\Delta T/R \leq \pm 5\%$
<b>Rotational Life</b> .....	300,000 cycles with 3.5V load $\Delta T/R \leq \pm 15\%$

$\Delta T/R$  = Total Resistance Change

Note: A long life panel control should only be used in a circuit as a potentiometer (3-terminal voltage divider).

Unit: mm

**TP96N93**  
**PCB Mount, Single Unit, Single Shaft**  
**Right Angle Mount Pin Terminals, 3-Pin Inline Pattern**



Part Numbering System

**TP 9 6 N 93 15 S B 104 M**

NOTE: FMS = From Mounting Surface

- **Resistance Tolerance: M** =  $\pm 20\%$  (standard).
- **Resistance Code:** Expressed in ohms. A three digit code where the first two digits are significant figures, and the third digit indicates the number of zeros that follow these figures (i.e., 100 = 10 $\Omega$ ; 101 = 100 $\Omega$ ; 102 = 1,000 $\Omega$ ; 103 = 10,000 $\Omega$ ; 104 = 100,000 $\Omega$ ). See table for standard resistance values.
- **Resistance Taper: B** = Linear.
- **Shaft End Style: S** = Slotted.  
**F** = Flatted.  
**R** = Round.
- **Standard Shaft Length: 15** = 15mm FMS.  
**20** = 20mm FMS.  
 Up to 50mm shaft length available (special order).
- **Rotational Life: 93** = Long Life, 300,000 cycles.  
**Q** = Long Life, 100,000 cycles (special order).
- **Style: N** = PCB Mount, Single Unit, Single Shaft, Pin Terminals, 3-Pin Inline Pattern.
- **Mechanical Travel: 6** = 300° Mechanical Travel.
- **Size: 9** = 9mm.
- **TOCOS Series Name: TP** = PCB Pin Terminals, Right Angle Mount.  
**RH** = PCB Pin Terminals, Vertical Mount (available as special order).

Standard Resistance Values and Part Numbering Codes

Standard Nominal Total Resistance Values and Part Numbering Codes

Resistance ( $\Omega$ )	Code	Resistance ( $\Omega$ )	Code	Resistance ( $\Omega$ )	Code
1,000	102	10,000	103	100,000	104
2,000	202	20,000	203		
5,000	502	50,000	503		

Refer to Shaft End Styles Specifications and Hardware Specifications for details and availability.  
 For additional information, refer to Guidelines and Precautions for Using Panel Controls.