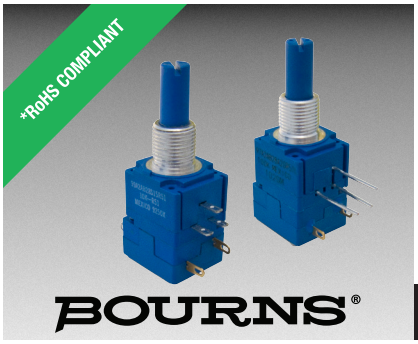


Features

- Virtually infinite electrical circuit isolation
- Metal or plastic shaft options
- DPST and DPDT switch options
- RoHS compliant*

Additional Information

Click these links for more information:

PRODUCT | TECHNICAL LIBRARY | INVENTORY | SAMPLES | CONTACT

Model 97 & 99 – 5/8˝ Square Single-Turn Panel Control with Rotary Switch

Potentiometer Specifications

Initial Electrical Characteristics[1]	Conductive Plastic Element	Cermet Element
Standard Resistance Range		
Linear Tapers (A, B, E, & H)	(B & E) 1 K ohms to 1 megohm	(A & H) 100 ohms to 1 megohm
Audio Tapers (C, D, F, G, S, & T)	(D,G,S, & T) 1 K ohms to 1 megohm	(C & F) 1 K ohms to 1 megohm
Total Resistance Tolerance	10 % or 20 %	5% or 10%
Independent Linearity	±5 %	±5 %
Absolute Minimum Resistance	2 ohms maximum	2 ohms maximum
Effective Electrical Angle	(Linear tapers) 240 ° ± 5 °	(Linear tapers) 240 ° ± 6 °
	(Audio tapers) 225 ° ± 5 °	(Audio tapers) 225 ° ± 6 °
Contact Resistance Variation	±1 %	±1 % or 3 ohms (whichever is greater)
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level	1,500 VAC minimum	1,500 VAC minimum
70,000 Feet	500 VAC minimum	500 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less)		
+70 °C Single Section Assembly	(Linear tapers) 1 watt	(Linear tapers) 2 watts
	(Audio tapers) 0.5 watt	(Audio tapers) 1 watt
+70 °C Multiple Section Assembly	(Linear tapers) 0.5 watt/section	(Linear tapers) 1 watt/section
	(Audio tapers) 0.25 watt/section	(Audio tapers) 0.5 watt/section
+125 °C	0 watt	0 watt
Theoretical Resolution	Essentially infinite	Essentially infinite

Environmental Characteristics[1]

Operating Temperature Range	-40 °C to +125 °C	-40 °C to +125 °C
Storage Temperature Range	-55 °C to +125 °C	-55 °C to +125 °C
Temperature Coefficient Over Storage Temperature Range	±1,000 ppm/°C	±150 ppm/°C
Vibration (Single Section)	15 G	15 G
Total Resistance Shift	±2 % maximum	±2 % maximum
Voltage Ratio Shift	±5 % maximum	±5 % maximum
Shock (Single Section)	30 G	30 G
Total Resistance Shift	±2 % maximum	±2 % maximum
Voltage Ratio Shift	±5 % maximum	±5 % maximum
Load Life	1,000 hours	1,000 hours
Total Resistance Shift	±10 % maximum	±5 % maximum
Rotational Life (No Load)	100,000 cycles	100,000 cycles
Total Resistance Shift	(Linear tapers) 10 ohms or ±15 % TRS max. (whichever is greater)	(All tapers) ±5 % TRS max.
	(Audio tapers) ±20 % maximum	
Contact Resistance Variation @ 50,000 cycles	(Linear tapers) ±2 %	±2 %
	(Audio tapers) ±3 %	±3 %
Moisture Resistance (MIL-STD-202, Method 103, Condition B)		
Total Resistance Shift	(Linear tapers) ±10 % TRS maximum	(All tapers) ±5 % TRS maximum
	(Audio tapers) ±20 % TRS maximum	
Insulation Resistance (500 VDC)	100 megohms minimum	100 megohms minimum
IP Rating	IP 40	IP 40

[1] Electrical specifications tested at 200 RPM, at room ambient: +25 °C nominal.

WARNING
Cancer and Reproductive Harm
www.P65Warnings.ca.gov

*RoHS Directive 2015/863, Mar 31, 2015 and Annex.

Potentiometer Specifications

Mechanical Characteristics[1]

Stop Strength (1/4 ″ D shaft) ..... 45.19 N-cm (4 lb.-in.)
(1/8 ″ D shaft) ..... 33.89 N-cm (3 lb.-in.)
Mechanical Angle ..... 300 ° ±5 °
Torque
Starting ..... 0.3 max. above average running torque
Running Torque
Single or Dual Section (A & R Bushings) ..... 0.21 to 1.06 N-cm (0.3 to 1.5 oz.-in.)
Single or Dual Section (C & U Bushings) ..... 0.14 to 1.06 N-cm (0.2 to 1.5 oz.-in.)
Mounting ..... 1.7-2.0 N-m (15-18 lb.-in.) maximum
Variation ..... 0.35 N-cm (0.5 oz.-in.) maximum in 45 ° shaft travel
Weight (Single Section, Metal Bushing) ..... 12.7 grams nominal
(Each Additional Section) ..... 4 grams nominal
Terminals ..... Printed circuit terminals, J-Hooks or solder lugs
Soldering Condition ..... Recommended hand soldering using Sn95/Ag5 no clean solder, 0.025 ″ wire diameter. Maximum temperature 399 °C (750 °F) for 3 seconds. No wash process to be used with no clean flux.
Marking ..... Manufacturer's trademark, date code, resistance, manufacturer's part number
Ganging (Multiple Section Potentiometers) ..... 2 cups maximum
Hardware ..... One lockwasher and one mounting nut is shipped with each potentiometer (Bushing A: H-37-2 & H-38-2; Bushing C: H-37-1 & H-38-1; Bushing R: H-37-4 & H-38-9)

NOTE: Performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

[1] Electrical specifications tested at 200 RPM, at room ambient: +25 °C nominal.

Rotary Switch Specifications

Initial Electrical Characteristics[1]

Contacts:
- DPST ..... N.O/N.O., N.C./N.C. or N.O./N.C.
- DPDT ..... 2 N.O./N.C. (break before make)

Power Rating (Resistive Load):
- DPST ..... 2 A @ 125 volts RMS-60 Hz or 2 A @ 28 VDC, 1 A @ 250 volts RMS-60 Hz
- DPDT ..... 1 A @ 125 volts RMS-60 Hz or 1 A @ 28 VDC

Contact Resistance (0.1 VDC-10 mA) ..... 10 milliohms nominal
Contact Bounce ..... 5 milliseconds maximum
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)
- Sea Level ..... 1500 VAC minimum

Insulation Resistance ..... 1000 megohms minimum

Environmental Characteristics[1]

Operating Temperature Range ..... 0 °C to +70 °C
Exposure Temperature Range ..... -65 °C to +125 °C
Vibration (Dual Section) ..... 8 G
- Contact Resistance ..... 10 milliohms maximum
- Contact Bounce ..... 0.1 millisecond maximum

Shock (Dual Section) ..... 20 G
- Contact Resistance ..... 10 milliohms maximum
- Contact Bounce ..... 0.1 millisecond maximum

Rotational Life ..... 25,000 cycles
- Switch Actuating Torque (50% Duty cycle @ Rated Power Load) ..... 1.41 to 4.94 N-cm (2 to 7 oz.-in.)
- Contact Resistance ..... 100 milliohms maximum

Moisture Resistance (MIL-STD-202, Method 106, Condition B)
- Contact Resistance (0.1 VDC-10 mA) ..... 10 milliohms maximum
- Insulation Resistance (After 24 Hours @ Room Temperature) (500 VDC) ..... 100 megohms minimum

Housing Material ..... High temperature, flame retardant, thermosetting plastic

Mechanical Characteristics[1]

Actuating Torque (Each Section, Switch Module Only) ..... 3.53 to 10.59 N-cm (5 to 15 oz.-in.)
Running Torque (Out of Detent, 2-4 Module Assembly) ..... 0.21 to 1.41 N-cm (0.3 to 2 oz.-in.)
Detent ..... CW or CCW standard
Actuation Angle ..... 20 ° ±5 °
Contact Materials ..... Fine silver with gold overlay
Terminal Styles ..... Solder lug only
- Standard Orientation ..... In-line with control terminals
- Optional ..... Rotated 90 ° CCW from standard

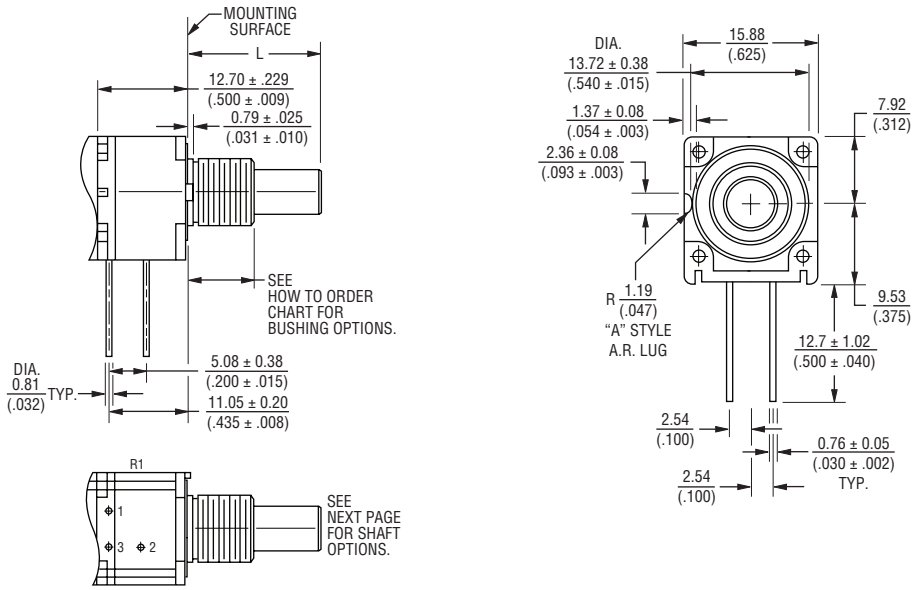
Terminal Strength (Before and After Soldering Heat Exposure) ..... 0.9 kg (2 lbs.) minimum

NOTE: Performance specifications do not apply to units subjected to printed circuit board cleaning procedures.

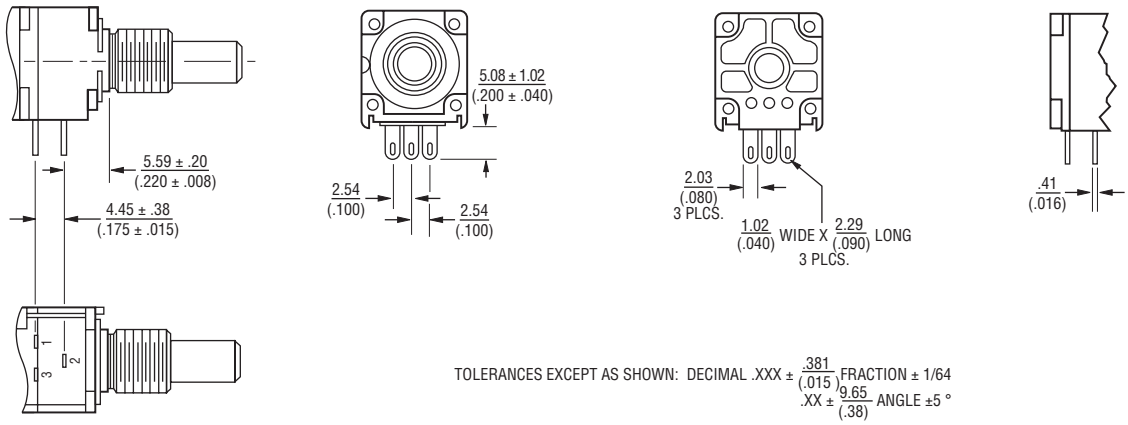
[1] Electrical specifications tested at 200 RPM, at room ambient: +25 °C nominal.

Product Dimensions

Model 97 PC Pin Terminals, “L” Pattern



Model 99 Solder Lug Terminals, "Triangular" Pattern

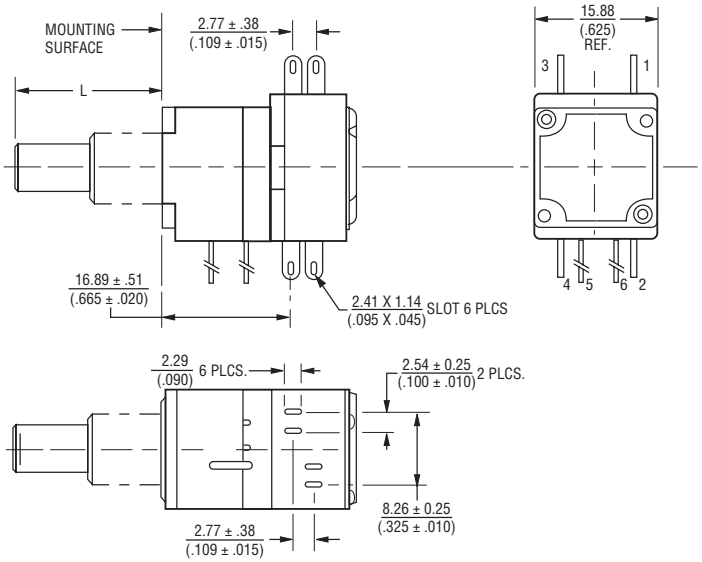


TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ± .381 (.015) FRACTION ± 1/64
.XX ± 9.65 (.38) ANGLE ±5 °

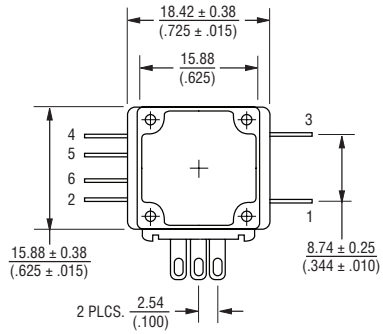
DIMENSIONS: MM / (INCHES)

Product Dimensions

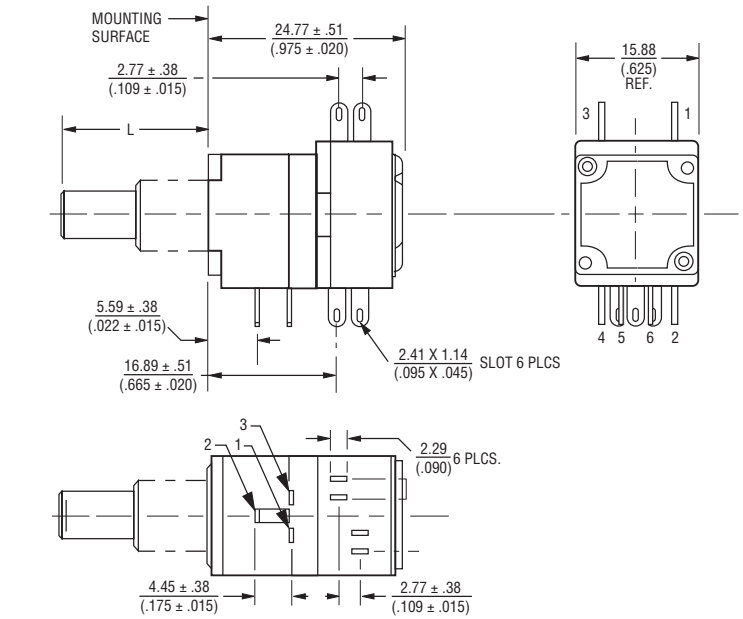
Model 97
(2nd Cup - Switch)



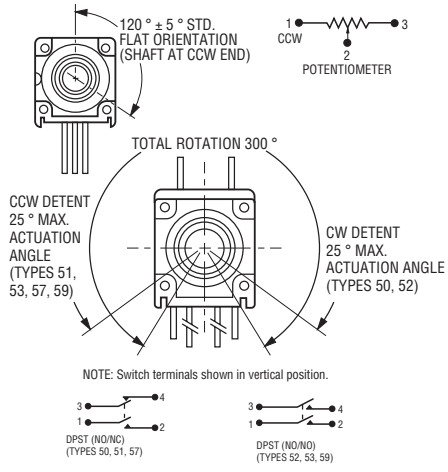
Horizontal Term.
(Switch Types R57, R59)



Model 99
(2nd Cup - Switch)



Switch Module Variations
Shaft Flat Orientation



TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ± .381 (.015) FRACTION ± 1/64
.XX ± 9.65 (.38) ANGLE ±5 °

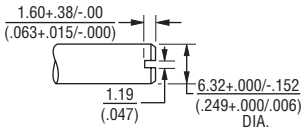
DIMENSIONS: MM / (INCHES)

Specifications are subject to change without notice.
Users should verify actual device performance in their specific applications.
The products described herein and this document are subject to specific legal disclaimers as set forth on the last page of this document, and at www.bourns.com/docs/legal/disclaimer.pdf.

Product Dimensions

Plastic Shaft Styles

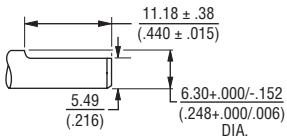
SHAFT TYPE "B" (USES BUSHING A)



STD. LENGTHS:

12.70 (.500)	15.88 (.625)	19.05 (.750)	22.23 (.875)

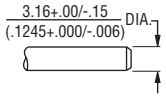
SHAFT TYPE "C" (USES BUSHING A)



STD. LENGTHS:

19.05 (.750)	22.23 (.875)

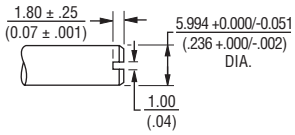
SHAFT TYPE "D" (USES BUSHING C)



STD. LENGTHS:

12.70 (.500)	15.88 (.625)	19.05 (.750)

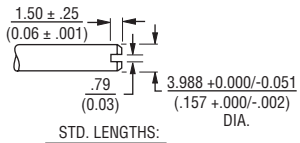
SHAFT TYPE "R" (USES BUSHING R)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)

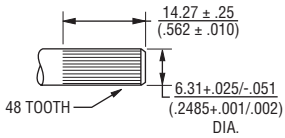
SHAFT TYPE "T" (USES BUSHING U)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)

SHAFT TYPE "W" (USES BUSHING A)

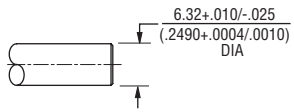


STD. LENGTHS:

25.40 (1.00)

Metal Shaft Styles

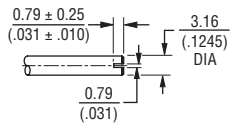
SHAFT TYPE "A" (USES BUSHING A)



STD. LENGTHS:

12.70 (.500)	15.88 (.625)	19.05 (.750)	22.23 (.875)	25.4 (1.000)

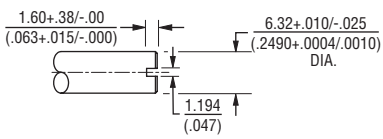
SHAFT TYPE "E" (USES BUSHING C)



STD. LENGTHS:

12.0 (.500)	16.0 (.625)	19.0 (.750)

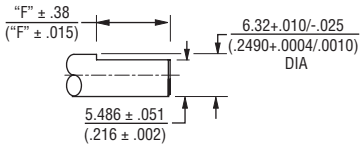
SHAFT TYPE "G" (USES BUSHING A)



STD. LENGTHS:

12.70 (.500)	15.88 (.625)	19.05 (.750)	22.23 (.875)

SHAFT TYPE "H" (USES BUSHING A)



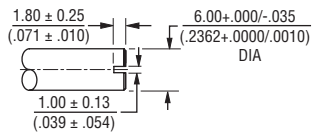
STD. LENGTHS:

19.05 (.750)	22.23 (.875)

FLAT LENGTH "F":

7.95 (.313)	11.13 (.438)

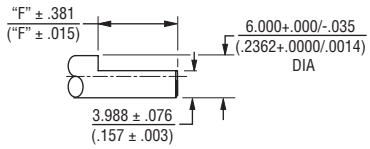
SHAFT TYPE "J" (USES BUSHING R)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)

SHAFT TYPE "S" (USES BUSHING R)



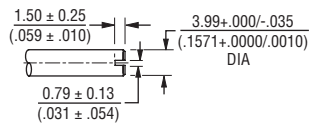
STD. LENGTHS:

16.0 (.630)	22.0 (.866)

FLAT LENGTH "F":

6.99 (.275)	12.98 (.511)

SHAFT TYPE "V" (USES BUSHING U)



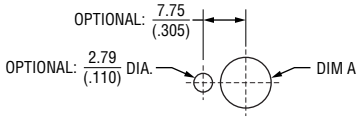
STD. LENGTHS:

16.0 (.630)	22.0 (.866)

TOLERANCES EXCEPT AS SHOWN: .XX = ± .02 (.050)
.XXX = ± .005 (.127)
.XXXX = ± .0005 (.0127)

DIMENSIONS: MM (INCHES)

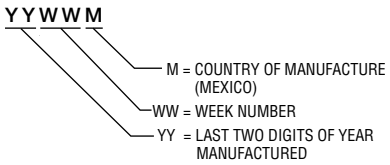
Suggested Panel Layout



BUSHING	DIM A
A	9.91 (.39)
C	6.73 (.265)
R	10.5 (.413)

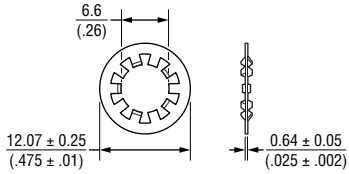
DIMENSIONS: MM (INCHES)

Date Code Description

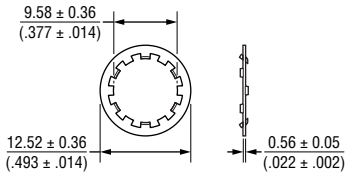


Hardware

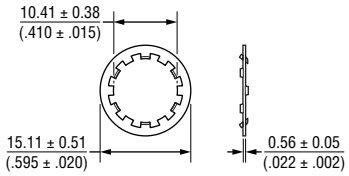
LOCKWASHER H-37-1



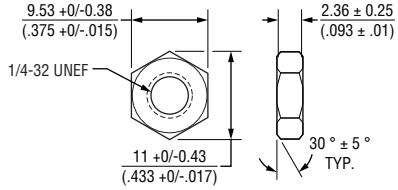
LOCKWASHER H-37-2



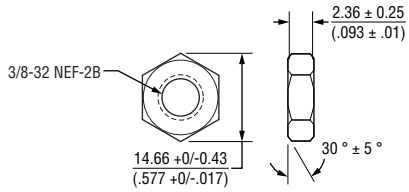
LOCKWASHER H-37-4



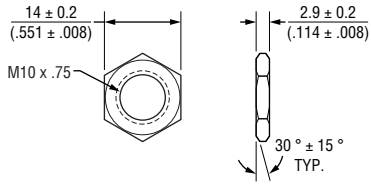
NUT H-38-1



NUT H-38-2



NUT H-38-9



DIMENSIONS: MM (INCHES)

How to Order Model 97 & 99 Panel Controls

BOURNS®

99	A	2	A	-	B	28	-	A	15	/	R51	L

RoHS IDENTIFIER	
L	**Compliant**

SWITCH TYPE	
(R50)	**DPST N.O./N.C. CW Detent In-Line Term**
(R51)	DPST N.O./N.C. CCW Detent In-Line Term
(R52)	DPST N.O./N.O. CW Detent In-Line Term
(R53)	DPST N.O./N.O. CCW Detent In-Line Term
(R57)	DPST N.O./N.C. CCW Detent Horz Term
(R59)	DPST N.O./N.O. CCW Detent Horz Term

ANTI-ROTATION LUG	
A	**Single .305 ” (7.8 mm) R, 90 °CW**
D	**No Lug**

SHAFT LENGTH (FMS)		AVAILABLE ONLY IN BUSHING
Code	**Description**	**Code**
16	1/2 ”L	A, C
20	5/8 ”L	A, C
24	**3/4 ”L**	A, C
28	**7/8 ”L**	**A**
32	1 ”L	A
METRIC		
16	16 mmL	R
22	**22 mmL**	R

# SECTIONS		
2	Dual	2nd Section is a Switch

BUSHING	
A	**Metal Plain 3/8 ” (9.53 mm) D x 3/8 ” (9.53 mm) L**
C	Metal Plain 1/4 ” (6.35 mm) D x 1/4 ” (6.35 mm) L
R	Metal Plain 10 mm D x 9 mm L

MODEL	
97	Single-Turn, L-Pattern PC Pins w/Switch
99	**Single-Turn, Triangle-Pattern Solder Lugs w/Switch**

ELEMENT TAPER TYPE/TOLERANCE		RESISTANCE CODE VALUE IN OHMS	
(A)	**Linear Cermet ±10 %**	(05) - 100	(30) - 15 K
(H)	Linear Cermet ±5 %	(28) - 150	(16) - 20 K
		(06) - 200	(17) - 25 K
		(07) - 250	**(18) - 50 K**
		(08) - 500	**(20) - 100 K**
		(10) - 1 K	(21) - 200 K
		(11) - 2 K	(22) - 250 K
		(12) - 2.5 K	(23) - 500 K
		(13) - 5 K	(25) - 1 M
		(15) - 10 K	
(B)	**Linear C-P ±20 %**	**(10) - 1 K**	**(18) - 50 K**
(E)	Linear C-P ±10 %	(12) - 2.5 K	**(20) - 100 K**
		(13) - 5 K	(22) - 250 K
		(15) - 10 K	(23) - 500 K
		(16) - 20 K	(25) - 1 M
		(17) - 25 K	
(C)	CW Audio Cermet ±10 %	(10) - 1 K	(18) - 50 K
(D)	CW Audio C-P ±20 %	(12) - 2.5 K	(20) - 100 K
(F)	CCW Audio Cermet ±10 %	(13) - 5 K	(22) - 250 K
(G)	CCW Audio C-P ±20 %	(15) - 10 K	(23) - 500 K
(S)	CW Audio C-P ±10 %	(17) - 25 K	(25) - 1 M
(T)	CCW Audio C-P ± 10 %		

SHAFT TYPE		AVAILABLE ONLY IN LENGTHS (CODE)	AVAILABLE ONLY IN BUSHINGS (CODE)
B	**Plastic Single Slotted 1/4 " (6.35 mm) D**	16, 20, 24, 28	**A**
C	**Plastic Single Flatted 1/4" (6.35 mm) D**	24, 28	**A**
D	Plastic Single Plain 1/8" (3.18 mm) D	16, 20, 24	C
R	**Plastic Single Slotted 6 mm D**	Metric 16, 22	R
T	**Plastic Single Slotted 4 mm D**	Metric 16, 22	U
W	Plastic Single Knurled 1/4" (6.35 mm) D	32	**A**
A	**Metal Single Plain 1/4" (6.35 mm) D**	16, 20, 24	**A**
E	**Metal Single Slotted 1/8" (3.18 mm) D**	16, 20, 24	**C**
G	**Metal Single Slotted 1/4" (6.35 mm) D**	16, 20, 24, 28	**A**
H	**Metal Single Flatted 1/4" (6.35 mm) D**	24, 28	**A**
J	**Metal Single Slotted 6 mm D**	Metric16, 22	R
S	**Metal Single Flatted 6 mm D**	Metric 16, 22	R
V	**Metal Single Slotted 4 mm D**	Metric 16, 22	U

Boldface features are Bourns standard options. All others are available with higher minimum order quantities.

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