

## Features

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

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

### Potentiometer Specifications

Initial Electrical Characteristics <sup>1</sup>	Conductive Plastic Element	Cermet Element
<b>Standard Resistance Range</b>		
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)
<b>Dielectric Withstanding Voltage (MIL-STD-202, Method 301)</b>		
Sea Level.....	1,500 VAC minimum.....	1,500 VAC minimum
70,000 Feet.....	500 VAC minimum.....	500 VAC minimum
<b>Insulation Resistance (500 VDC) .....</b>		
	1,000 megohms minimum .....	1,000 megohms minimum
<b>Power Rating (Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less)</b>		
+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<sup>1</sup>

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

\*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011. Specifications are subject to change without notice.

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

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

**BOURNS®**

### Potentiometer Specifications

#### Mechanical Characteristics<sup>1</sup>

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, except where noted in the part number.

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

<sup>1</sup>At room ambient: +25 °C nominal and 50 % relative humidity nominal, except as noted.

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

# BOURNS®

## Rotary Switch Specifications

### Initial Electrical Characteristics<sup>1</sup>

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<sup>1</sup>

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<sup>1</sup>

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.

<sup>1</sup>At room ambient: +25 °C nominal and 50 % relative humidity nominal, except as noted.

Specifications are subject to change without notice.

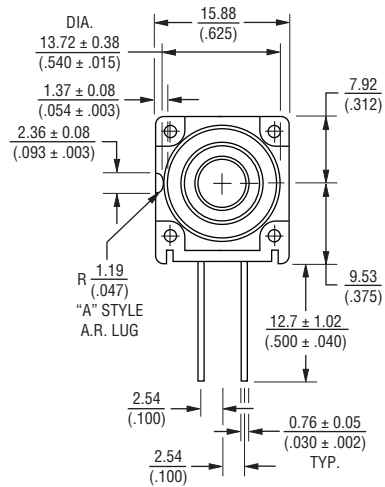
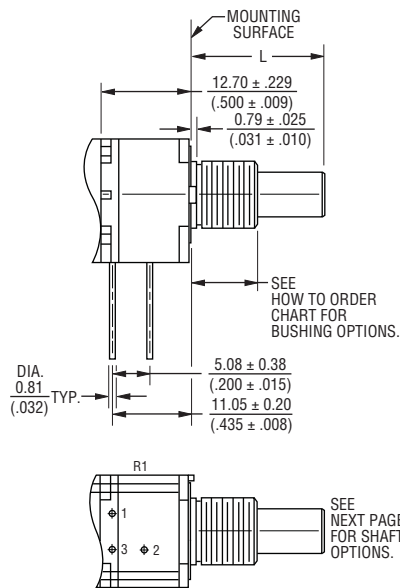
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

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

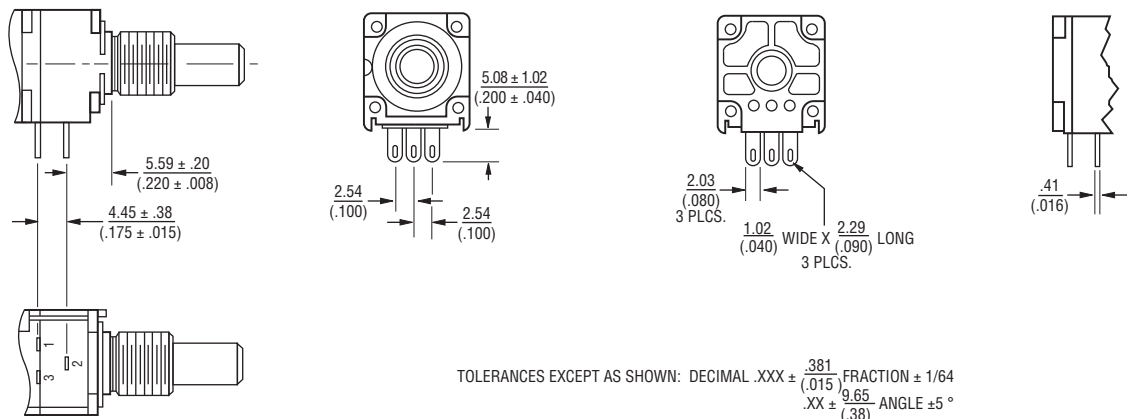
**BOURNS®**

## Product Dimensions

### Model 97 PC Pin Terminals, "L" Pattern



### Model 99 Solder Lug Terminals, "Triangular" Pattern



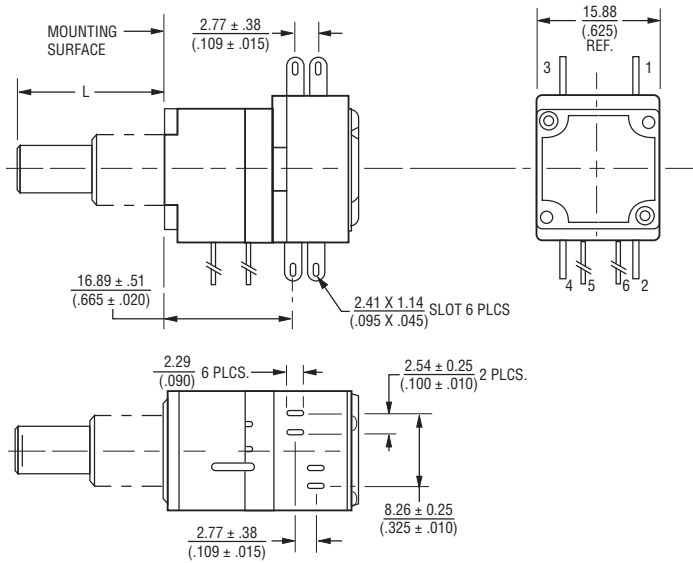
Specifications are subject to change without notice. The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

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

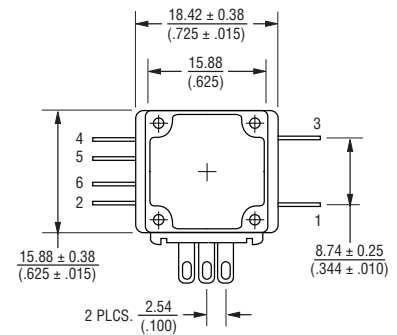


## Product Dimensions

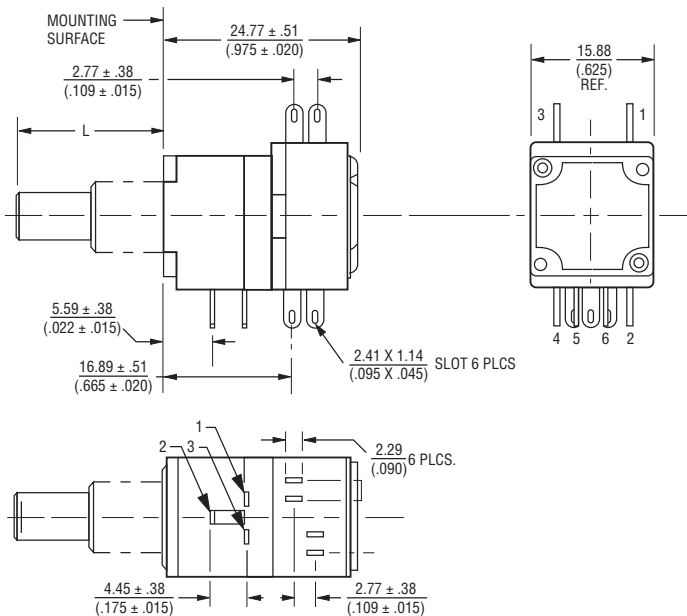
### Model 97 (2nd Cup - Switch)



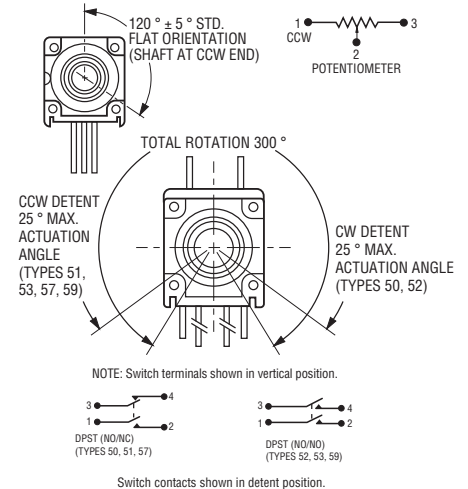
### Horizontal Term. (Switch Types R57, R59)



### Model 99 (2nd Cup - Switch)



### Switch Module Variations Shaft Flat Orientation



TOLERANCES EXCEPT AS SHOWN: DECIMAL .XXX ±  $\frac{.381}{.015}$  FRACTION ± 1/64  
 .XX ±  $\frac{9.65}{.38}$  ANGLE ± 5°

DIMENSIONS:  $\frac{MM}{(INCHES)}$

Specifications are subject to change without notice.  
 The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.  
 Users should verify actual device performance in their specific applications.

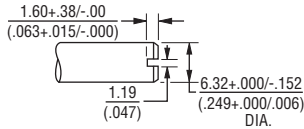
# Model 97 & 99 - 5/8" Square Single-Turn Panel Control with Rotary Switch

# BOURNS®

## Product Dimensions

### Plastic Shaft Styles

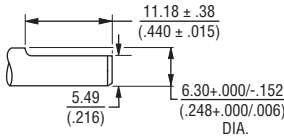
**SHAFT TYPE "B"** (USES BUSHING A)



STD. LENGTHS:

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

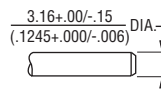
**SHAFT TYPE "C"** (USES BUSHING A)



STD. LENGTHS:

19.05 (.750)	22.23 (.875)
-----------------	-----------------

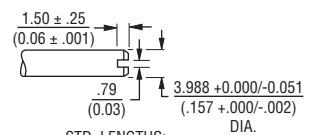
**SHAFT TYPE "D"** (USES BUSHING C)



STD. LENGTHS:

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

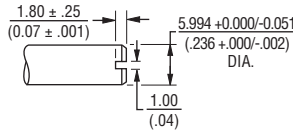
**SHAFT TYPE "T"** (USES BUSHING U)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)
----------------	----------------

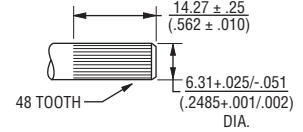
**SHAFT TYPE "R"** (USES BUSHING R)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)
----------------	----------------

**SHAFT TYPE "W"** (USES BUSHING A)

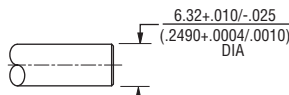


STD. LENGTHS:

25.40 (1.00)
-----------------

### Metal Shaft Styles

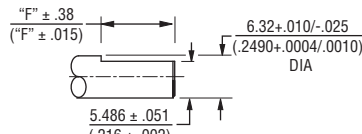
**SHAFT TYPE "A"** (USES BUSHING A)



STD. LENGTHS:

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

**SHAFT TYPE "H"** (USES BUSHING A)



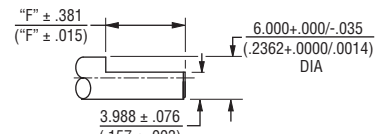
STD. LENGTHS:

19.05 (.750)	22.23 (.875)
-----------------	-----------------

FLAT LENGTH "F":

7.95 (.313)	11.13 (.438)
----------------	-----------------

**SHAFT TYPE "S"** (USES BUSHING R)



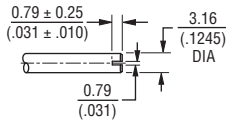
STD. LENGTHS:

16.0 (.630)	22.0 (.866)
----------------	----------------

FLAT LENGTH "F":

6.99 (.275)	12.98 (.511)
----------------	-----------------

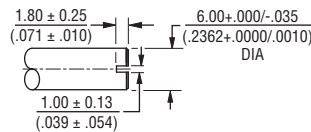
**SHAFT TYPE "E"** (USES BUSHING C)



STD. LENGTHS:

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

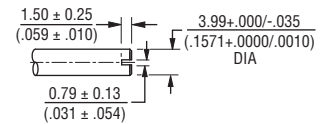
**SHAFT TYPE "J"** (USES BUSHING R)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)
----------------	----------------

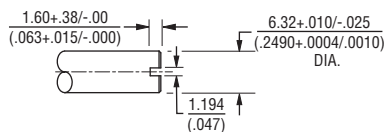
**SHAFT TYPE "V"** (USES BUSHING U)



STD. LENGTHS:

16.0 (.630)	22.0 (.866)
----------------	----------------

**SHAFT TYPE "G"** (USES BUSHING A)



STD. LENGTHS:

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

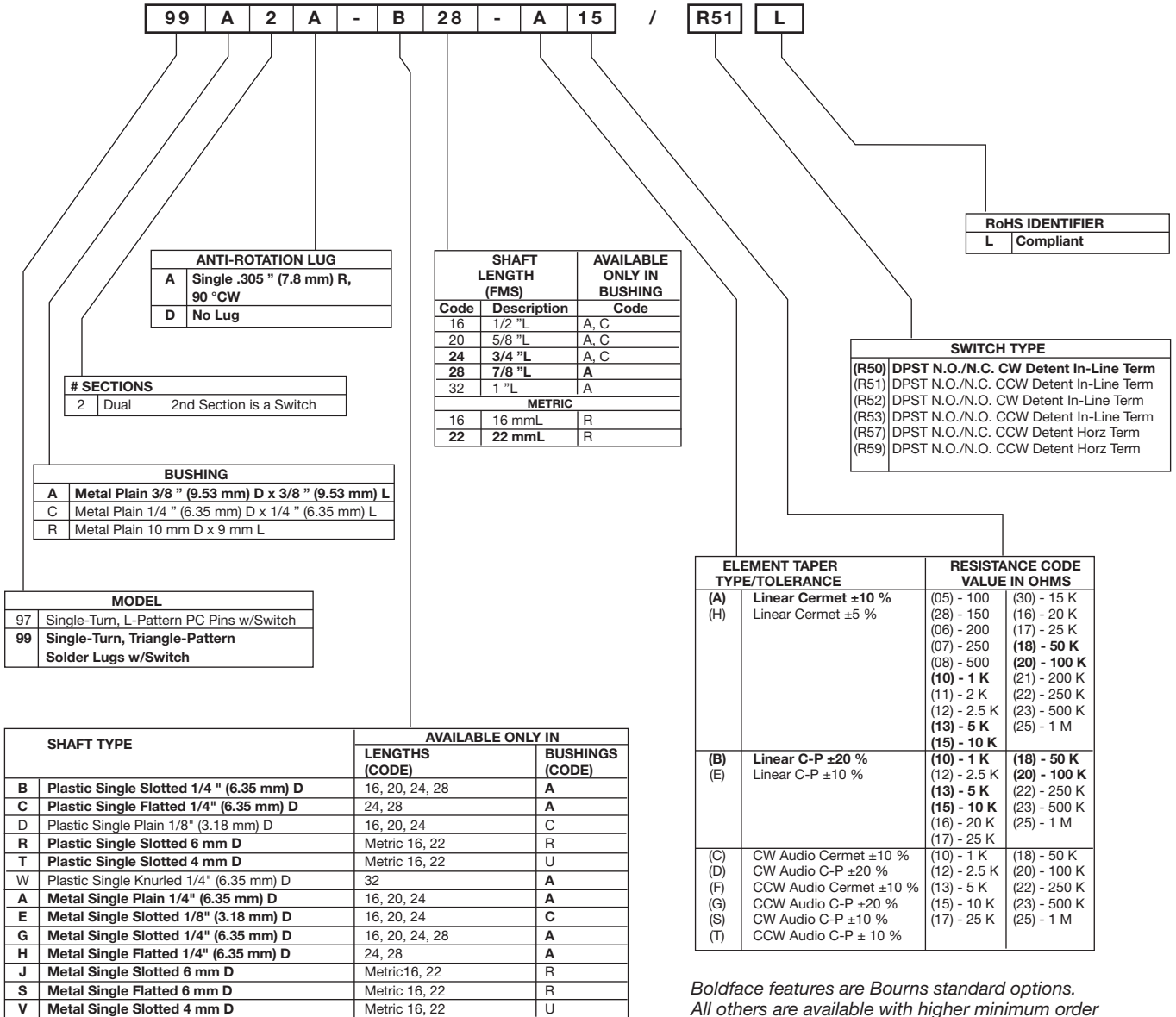
TOLERANCES EXCEPT AS SHOWN: .XX ± .02  
(.050)  
.XXX ± .005  
(.127)  
.XXX ± .0005  
(.0127)

DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

# How to Order Model 97 & 99 Panel Controls

**BOURNS®**



REV. 05/13

Specifications are subject to change without notice. The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time. Users should verify actual device performance in their specific applications.

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