

# Bourns® Models 3547, 3548 & 3549

## *Precision Potentiometers Product Brochure*



# Introduction

In line with our commitment to provide continuous improvement of our technologies and designs, Bourns® Sensors and Controls Division is pleased to announce the long-awaited release of the new Model 3547 3-Turn, 3548 5-Turn and 3549 10-Turn Precision Potentiometer family.

This new model family is built utilizing our classic wirewound and Hybritron® technologies with several product enhancements, process improvements and newly added options to provide a more reliable product with superior performance.

## Product Enhancements

This model family will provide a higher-grade alternative to our legacy Models 3540, 3541, 3543 and 3545. Product enhancements of the new model family over the legacy product are:

- The **cover** that houses the element and lid is heat-staked to provide a better dust seal.
- The **bushing** is molded into the front lid rather than assembled to the housing with a metal strap.
- The **bearing surface** between the rotor and the front cover has been improved to provide a longer wearing surface.
- The **bushing** has been upgraded to a brass and bronze bearing surface for better wear characteristics under side load.
- A tighter resistance tolerance on new **resistive wire** for better electrical performance.
- A new **bondable mandrel** holds the resistive wire in place to provide uniform spacing and better electrical performance.
- A newly designed **contact spring** provides increased rotational life.
- Higher-grade **plastics** have been selected for a more robust package and better performance of internal mechanical assemblies.
- The **solder terminal thickness** has been increased to provide a more robust terminal.
- Higher-grade **grease and lubricants** have been selected for smooth rotational shaft feel and for low temperature operation.

In addition to these enhancements, this new model family is **RoHS compliant** in accordance with Directive 2002/95/EC on the restriction of the use of certain hazardous substances (RoHS) in electrical and electronic equipment.

## Standard Options

- Panel mount bushing or servo lid
- Single or dual gang
- Wirewound or Hybritron® element
- $\pm 0.25$  to  $\pm 0.10$  % independent linearity
- Slotted or flatted shaft
- Various shaft lengths
- Various shaft diameters
- Anti-rotation pin
- Optional bronze bushing and stainless steel shaft (for applications where side load is encountered)

Outline dimensions and enhancements to performance are summarized in the adjoining specification sheets. For value-added product enhancements, please contact your local Bourns Sales Representative or one of our Field Application Engineers.

## 3547 Cross Reference List

Wirewound	
<i>Old</i>	<i>New</i>
3543S-1-102	3547S-1AA-102A
3543S-1-202	3547S-1AA-202A
3543S-1-502	3547S-1AA-502A
3543S-1-103	3547S-1AA-103A

## 3548 Cross Reference List

Wirewound	
<i>Old</i>	<i>New</i>
3545S-1-102	3548S-1AA-102A
3545S-1-202	3548S-1AA-202A
3545S-1-502	3548S-1AA-502A
3545S-1-103	3548S-1AA-103A

## 3549 Cross Reference List

Wirewound	
<i>Old</i>	<i>New</i>
3540S-1-201	3549S-1AA-201A
3540S-1-501	3549S-1AA-501A
3540S-1-102	3549S-1AA-102A
3540S-1-202	3549S-1AA-202A
3540S-1-502	3549S-1AA-502A
3540S-1-103	3549S-1AA-103A
3540S-1-203	3549S-1AA-203A
3540S-1-503	3549S-1AA-503A
3540S-1-104	3549S-1AA-104A

Hybritron®	
<i>Old</i>	<i>New</i>
3541H-1-102	3549H-1AA-102A
3541H-1-202	3549H-1AA-202A
3541H-1-502	3549H-1AA-502A
3541H-1-103	3549H-1AA-103A
3541H-1-203	3549H-1AA-203A
3541H-1-503	3549H-1AA-503A
3541H-1-104	3549H-1AA-104A

# Model 3547

Electrical Characteristics <sup>1</sup>	Wirewound Element	Hybritron® Element
Standard Resistance Range	1K to 50K ohms	1K to 10K ohms
Total Resistance Tolerance	±3 %	±10 %
Independent Linearity	±0.25 %	±0.25 %
Independent Linearity (Maximum Practical)	±0.20 %	±0.20 %
Effective Electrical Angle	1080 ° +10 °, -0 °	1080 ° +10 °, -0 °
Absolute Minimum Resistance/End Voltage	1 ohm or 0.1 % maximum (whichever is greater)	0.7 % maximum
Noise/Output Smoothness	100 ohms maximum	0.15 % maximum
Max. Wiper Current @ 5K ohms	20 mA	10 mA
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Resolution	See How to Order chart	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation)		
+70 °C	1 watts	1 watts
+125 °C	0 watt	0 watt

Environmental Characteristics <sup>1</sup>		
Operating Temperature Range		
Dynamic	-40 °C to +125 °C	-40 °C to +125 °C
Static	-55 °C to +125 °C	-55 °C to +125 °C
Temperature Coefficient (Over Static Temperature Range)	±50 ppm/°C	±100 ppm/°C
Temperature Cycling (5 Cycles Over Static Temperature Range)	±2 % TR shift max.	±4 % TR shift max.
Vibration (15 Gs, 10 Hz to 2 kHz)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Shock (100 Gs, 6 ms sawtooth)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Load Life (1,000 hours @ 70 °C)	±2 % TR shift max.	±5 % TR shift max.
Rotational Life		
No Load	750,000 shaft revolutions	1,500,000 shaft revolutions
Powered (MIL-PRF-12934)	600,000 shaft revolutions	1,200,000 shaft revolutions
Moisture Resistance (Mil-Std-202, Method 103)	±2 % TR shift max.	±5 % TR shift max.
IP Rating	IP 50	IP 50

Mechanical Characteristics <sup>1</sup>		
Mechanical Angle		1080 ° +10 °, -0 °
Backlash		1.0 ° max.
Stop Strength		53 N-cm (75 oz-in.) min.
Torque		
Starting		0.5 N-cm (0.7 oz.-in.) max.
Running		0.5 N-cm (0.7 oz.-in.) max.
Mounting		170-200 N-cm (15-18 in.-lb.) max.
Shaft Runout T.I.R.		0.08 mm (0.003 in.)
Lateral Runout T.I.R.		0.13 mm (0.005 in.)
Shaft End Play T.I.R.		0.15 mm (0.006 in.)
Shaft Radial Play T.I.R.		0.08 mm (0.003 in.)
Pilot Diameter Runout T.I.R.		0.08 mm (0.003 in.)
Weight		
Single		18 gm (0.63 oz.) typ.
Dual		34 gm (1.2 oz.) typ.
Shaft Side Load (Max. Allowable)		
Nickel Plated Brass Shaft w/Brass Bushing		50 gmf (1.7 ozf)
Stainless Steel Shaft w/Bronze Bushing		250 gmf (8.8 ozf)
Terminals		Gold-plated solder lugs
Solder Process - Manual		
Solder Type	96.5 Sn/3.0 Ag/0.5 Cu solid wire or no-clean rosin cored wire	
Temperature Profile	370 °C (700 °F) for 3 seconds maximum	
Wash Process	Not recommended	
Mounting Hardware	One lockwasher and one mounting nut is shipped with each potentiometer	
Recommended Panel Thickness (Bushing Mount)	2.46-3.81 mm (0.097-0.150 in.)	
Marking	Manufacturer's symbol, model number, product code and date code	
Standard Packaging	Plastic trays (5 pcs./tray)	

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

# How to Order Model 3547

3 5 4 7 S - 2 A A - 1 0 3 / 1 0 3 A

Model Designator	
Code	Description
3547	3-Turn

Element Type	
Code	Description
H	Hybritron®
S	Wirewound

No. of Sections	
Code	Description
1	Single
2	Dual

Anti-rotation Lug	
Code	Description
A	None
B	180°

Independent Linearity	
Code	Description
A	0.25 %
B	0.20 %

Resistance*		
Code	Element Type	Resolution
102 (1K Ω)	Hybritron®	—
502 (5K Ω)	Hybritron®	—
103 (10K Ω)	Hybritron®	—
201 (200 Ω)	Wirewound	0.069
501 (500 Ω)	Wirewound	0.054
102 (1K Ω)	Wirewound	0.043
202 (2K Ω)	Wirewound	0.04
502 (5K Ω)	Wirewound	0.038
103 (10K Ω)	Wirewound	0.029
203 (20K Ω)	Wirewound	0.023
503 (50K Ω)	Wirewound	0.017

\* For Single gang, use only first three digits.  
For Dual gang, use six digits separated by a "/".

Bushing Mount					
Code	Shaft FMS	Shaft Dia.	Shaft Material	Bushing Dia.	Bushing Material
A	13/16 "	1/4 "	Nickel Plated Brass	3/8 "	Brass
B	20.6 mm	6 mm	Nickel Plated Brass	9 mm	Brass
C	13/16 "	1/4 "	Stainless Steel	3/8 "	Bronze
D	20.6 mm	6 mm	Stainless Steel	9 mm	Bronze

Servo Mount			
Code	Shaft FMS	Shaft Dia.	Shaft Material
E	3/8 "	1/8 "	Stainless Steel



# Model 3548

Electrical Characteristics <sup>1</sup>	Wirewound Element	Hybritron® Element
Standard Resistance Range	500 to 50K ohms	1K to 10K ohms
Total Resistance Tolerance	±3 %	±10 %
Independent Linearity	±0.25 %	±0.25 %
Independent Linearity (Maximum Practical)	±0.15 %	±0.15 %
Effective Electrical Angle	1800 ° +10 °, -0 °	1800 ° +10 °, -0 °
Absolute Minimum Resistance/End Voltage	1 ohm or 0.1 % maximum (whichever is greater)	0.4 % maximum
Noise/Output Smoothness	100 ohms maximum	0.15 % maximum
Max. Wiper Current @ 5K ohms	20 mA	10 mA
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Resolution	See How to Order chart	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation)		
+70 °C	1.5 watts	1.5 watts
+125 °C	0 watt	0 watt

Environmental Characteristics <sup>1</sup>		
Operating Temperature Range		
Dynamic	-40 °C to +125 °C	-40 °C to +125 °C
Static	-55 °C to +125 °C	-55 °C to +125 °C
Temperature Coefficient (Over Static Temperature Range)	±50 ppm/°C	±100 ppm/°C
Temperature Cycling (5 Cycles Over Static Temperature Range)	±2 % TR shift max.	±4 % TR shift max.
Vibration (15 Gs, 10 Hz to 2 kHz)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Shock (100 Gs, 6 ms sawtooth)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Load Life (1,000 hours @ 70 °C)	±2 % TR shift max.	±5 % TR shift max.
Rotational Life		
No Load	1,000,000 shaft revolutions	2,500,000 shaft revolutions
Powered (MIL-PRF-12934)	1,000,000 shaft revolutions	2,500,000 shaft revolutions
Moisture Resistance (Mil-Std-202, Method 103)	±2 % TR shift max.	±5 % TR shift max.
IP Rating	IP 50	IP 50

Mechanical Characteristics <sup>1</sup>		
Mechanical Angle		1800 ° +10 °, -0 °
Backlash		1.0 ° max.
Stop Strength		53 N-cm (75 oz-in.) min.
Torque		
Starting		0.5 N-cm (0.7 oz.-in.) max.
Running		0.5 N-cm (0.7 oz.-in.) max.
Mounting		170-200 N-cm (15-18 in.-lb.) max.
Shaft Runout T.I.R.		0.08 mm (0.003 in.)
Lateral Runout T.I.R.		0.13 mm (0.005 in.)
Shaft End Play T.I.R.		0.15 mm (0.006 in.)
Shaft Radial Play T.I.R.		0.08 mm (0.003 in.)
Pilot Diameter Runout T.I.R.		0.08 mm (0.003 in.)
Weight		
Single		19 gm (0.67 oz.) typ.
Dual		35 gm (1.23 oz.) typ.
Shaft Side Load (Max. Allowable)		
Nickel Plated Brass Shaft w/Brass Bushing		50 gmf (1.7 ozf)
Stainless Steel Shaft w/Bronze Bushing		250 gmf (8.8 ozf)
Terminals		Gold-plated solder lugs
Solder Process - Manual		
Solder Type	96.5 Sn/3.0 Ag/0.5 Cu solid wire or no-clean rosin cored wire	
Temperature Profile	370 °C (700 °F) for 3 seconds maximum	
Wash Process	Not recommended	
Mounting Hardware	One lockwasher and one mounting nut is shipped with each potentiometer	
Recommended Panel Thickness (Bushing Mount)	2.46-3.81 mm (0.097-0.150 in.)	
Marking	Manufacturer's symbol, model number, product code and date code	
Standard Packaging	Plastic trays (5 pcs./tray)	

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

# How to Order Model 3548

3 5 4 8 S - 2 A A - 1 0 3 / 1 0 3 A

Model Designator	
Code	Description
3548	5-Turn

Element Type	
Code	Description
H	Hybritron®
S	Wirewound

No. of Sections	
Code	Description
1	Single
2	Dual

Anti-rotation Lug	
Code	Description
A	None
B	180°

Independent Linearity	
Code	Description
A	0.25 %
B	0.15 %

Resistance*		
Code	Element Type	Resolution
102 (1K Ω)	Hybritron®	—
502 (5K Ω)	Hybritron®	—
103 (10K Ω)	Hybritron®	—
201 (200 Ω)	Wirewound	0.069
501 (500 Ω)	Wirewound	0.054
102 (1K Ω)	Wirewound	0.043
202 (2K Ω)	Wirewound	0.04
502 (5K Ω)	Wirewound	0.038
103 (10K Ω)	Wirewound	0.029
203 (20K Ω)	Wirewound	0.023
503 (50K Ω)	Wirewound	0.017

\* For Single gang, use only first three digits.  
For Dual gang, use six digits separated by a "/".

Bushing Mount					
Code	Shaft FMS	Shaft Dia.	Shaft Material	Bushing Dia.	Bushing Material
A	13/16 "	1/4 "	Nickel Plated Brass	3/8 "	Brass
B	20.6 mm	6 mm	Nickel Plated Brass	9 mm	Brass
C	13/16 "	1/4 "	Stainless Steel	3/8 "	Bronze
D	20.6 mm	6 mm	Stainless Steel	9 mm	Bronze

Servo Mount			
Code	Shaft FMS	Shaft Dia.	Shaft Material
E	3/8 "	1/8 "	Stainless Steel



# Model 3549

Electrical Characteristics <sup>1</sup>	Wirewound Element	Hybritron® Element
Standard Resistance Range	100 to 100K ohms	1K to 100K ohms
Total Resistance Tolerance	±3 %	±10 %
Independent Linearity	±0.2 %	±0.2 %
Independent Linearity (Maximum Practical)	±0.1 %	±0.1 %
Effective Electrical Angle	3600 ° +10 °, -0 °	3600 ° +10 °, -0 °
Absolute Minimum Resistance/End Voltage	1 ohm or 0.1 % maximum (whichever is greater)	0.2 % maximum
Noise/Output Smoothness	100 ohms maximum	0.10 % maximum
Max. Wiper Current @ 5K ohms	20 mA	10 mA
Dielectric Withstanding Voltage (MIL-STD-202, Method 301)		
Sea Level	1,000 VAC minimum	1,000 VAC minimum
Insulation Resistance (500 VDC)	1,000 megohms minimum	1,000 megohms minimum
Resolution	See How to Order chart	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation)		
+70 °C	2 watts	2 watts
+125 °C	0 watt	0 watt

Environmental Characteristics <sup>1</sup>		
Operating Temperature Range		
Dynamic	-40 °C to +125 °C	-40 °C to +125 °C
Static	-55 °C to +125 °C	-55 °C to +125 °C
Temperature Coefficient (Over Static Temperature Range)	±50 ppm/°C	±100 ppm/°C
Temperature Cycling (5 Cycles Over Static Temperature Range)	±2 % TR shift max.	±4 % TR shift max.
Vibration (15 Gs, 10 Hz to 2 kHz)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Shock (100 Gs, 6 ms sawtooth)		
Wiper Bounce	0.1 ms max.	0.1 ms max.
Load Life (1,000 hours @ 70 °C)	±2 % TR shift	±5 % TR shift max.
Rotational Life		
No Load	2,000,000 shaft revolutions	5,000,000 shaft revolutions
Powered (MIL-PRF-12934)	2,000,000 shaft revolutions	5,000,000 shaft revolutions
Moisture Resistance (Mil-Std-202, Method 103)	±2 % TR shift max.	±5 % TR shift max.
IP Rating	IP 50	IP 50

Mechanical Characteristics <sup>1</sup>		
Mechanical Angle		3600 ° +4 °, -10 °
Backlash		1.0 ° max.
Stop Strength		53 N-cm (75 oz-in.) min.
Torque		
Starting		0.5 N-cm (0.7 oz-in.) max.
Running		0.5 N-cm (0.7 oz-in.) max.
Mounting		170-200 N-cm (15-18 in.-lb.) max.
Shaft Runout T.I.R.		0.08 mm (0.003 in.)
Lateral Runout T.I.R.		0.13 mm (0.005 in.)
Shaft End Play T.I.R.		0.15 mm (0.006 in.)
Shaft Radial Play T.I.R.		0.08 mm (0.003 in.)
Pilot Diameter Runout T.I.R.		0.08 mm (0.003 in.)
Weight		
Single		20 gm (0.7 oz.) typ.
Dual		36 gm (1.27 oz.) typ.
Shaft Side Load (Max. Allowable)		
Nickel Plated Brass Shaft w/Brass Bushing		50 gmf (1.7 ozf)
Stainless Steel Shaft w/Bronze Bushing		250 gmf (8.8 ozf)
Terminals		Gold-plated solder lugs
Solder Process - Manual		
Solder Type		96.5 Sn/3.0 Ag/0.5 Cu solid wire or no-clean rosin cored wire
Temperature Profile		370 °C (700 °F) for 3 seconds maximum
Wash Process		Not recommended
Mounting Hardware	One lockwasher and one mounting nut is shipped with each potentiometer	
Recommended Panel Thickness (Bushing Mount)		2.46-3.81 mm (0.097-0.150 in.)
Marking	Manufacturer's symbol, model number, product code and date code	
Standard Packaging		Plastic trays (5 pcs./tray)

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

# How to Order Model 3549

3 5 4 9 S - 2 A A - 1 0 3 / 1 0 3 A

Model Designator	
Code	Description
3549	10-Turn

Element Type	
Code	Description
H	Hybritron®
S	Wirewound

No. of Sections	
Code	Description
1	Single
2	Dual

Anti-rotation Lug	
Code	Description
A	None
B	180°

Independent Linearity	
Code	Description
A	0.20 %
B	0.10 %

Resistance*		
Code	Element Type	Resolution
102 (1K Ω)	Hybritron®	—
202 (2K Ω)	Hybritron®	—
502 (5K Ω)	Hybritron®	—
103 (10K Ω)	Hybritron®	—
203 (20K Ω)	Hybritron®	—
503 (50K Ω)	Hybritron®	—
104 (100K Ω)	Hybritron®	—
101 (100 Ω)	Wirewound	0.055
201 (200 Ω)	Wirewound	0.042
501 (500 Ω)	Wirewound	0.031
102 (1K Ω)	Wirewound	0.027
202 (2K Ω)	Wirewound	0.021
502 (5K Ω)	Wirewound	0.021
103 (10K Ω)	Wirewound	0.019
203 (20K Ω)	Wirewound	0.014
503 (50K Ω)	Wirewound	0.011
104 (100K Ω)	Wirewound	0.008

\* For Single gang, use only first three digits.  
For Dual gang, use six digits separated by a "/".

Bushing Mount					
Code	Shaft FMS	Shaft Dia.	Shaft Material	Bushing Dia.	Bushing Material
A	13/16 "	1/4 "	Nickel Plated Brass	3/8 "	Brass
B	20.6 mm	6 mm	Nickel Plated Brass	9 mm	Brass
C	13/16 "	1/4 "	Stainless Steel	3/8 "	Bronze
D	20.6 mm	6 mm	Stainless Steel	9 mm	Bronze

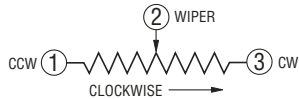
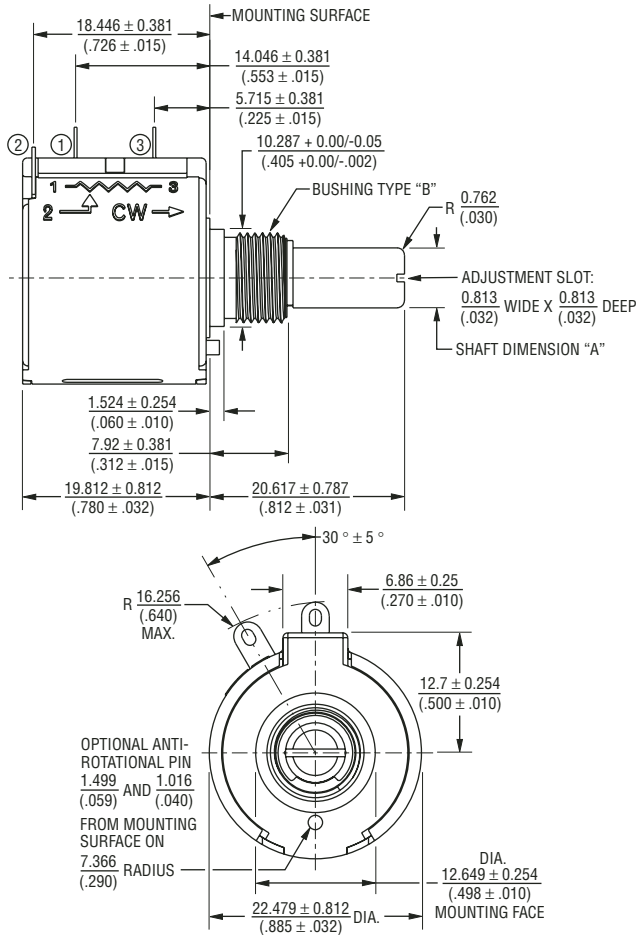
Servo Mount			
Code	Shaft FMS	Shaft Dia.	Shaft Material
E	3/8 "	1/8 "	Stainless Steel



# Models 3547, 3548 and 3549

## Product Dimensions

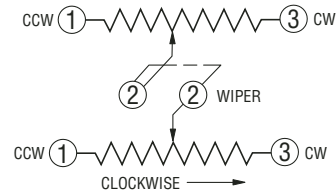
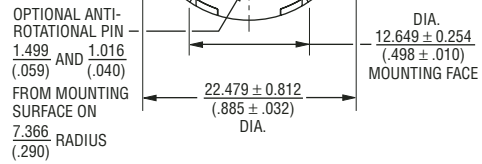
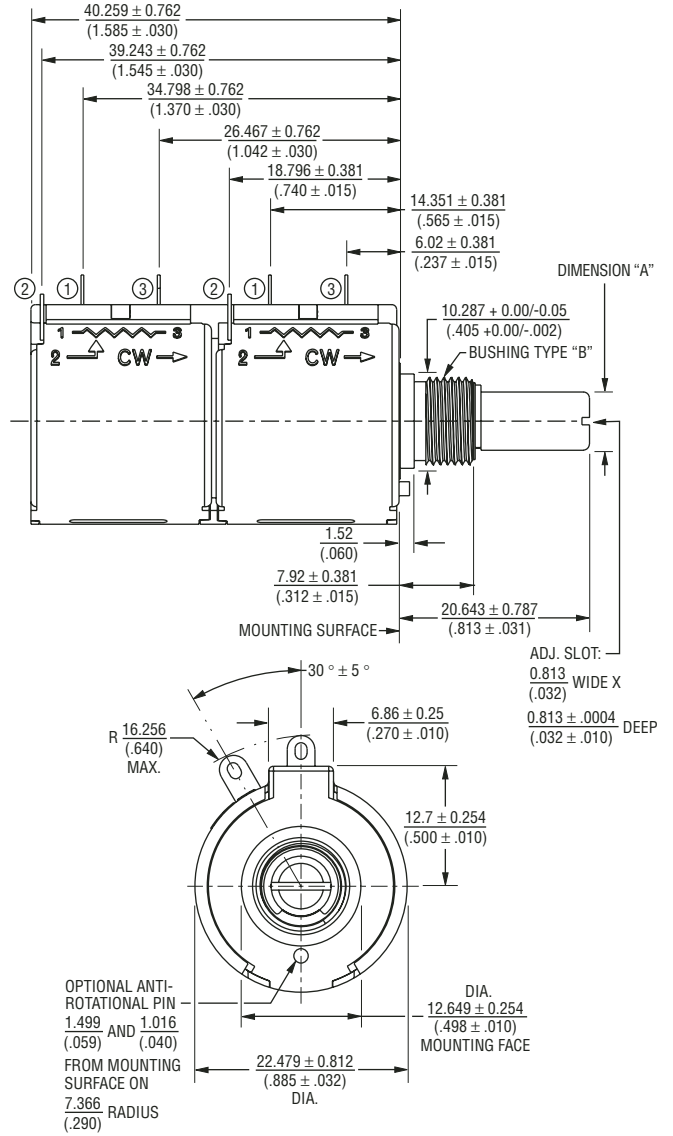
### Single Gang, Bushing Mount



TOLERANCES: EXCEPT WHERE NOTED  
 DECIMALS: XX ±  $\frac{.50}{(.02)}$  .XXX ±  $\frac{.127}{(.005)}$  .XXXX ±  $\frac{.0127}{(.0005)}$   
 DIMENSIONS:  $\frac{MM}{(IN)}$

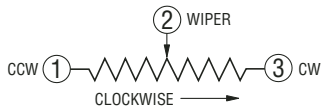
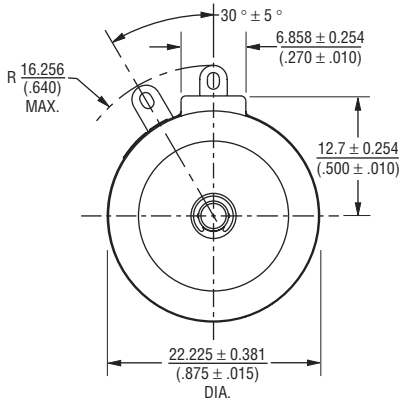
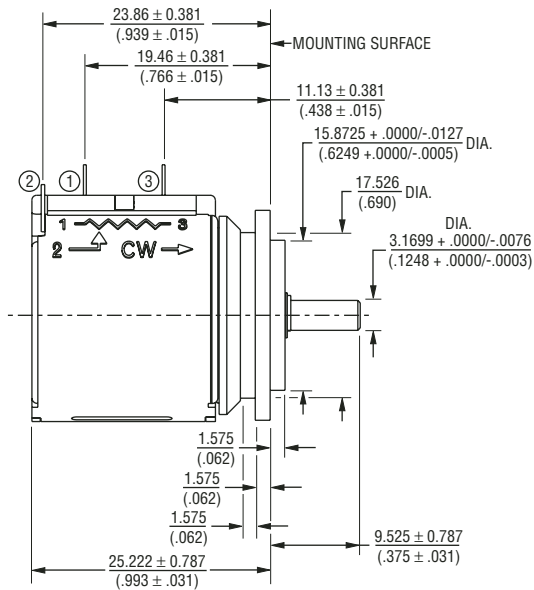
Bushing Selection Code	Shaft Dimension "A"	Shaft Material	Bushing Type "B"	Bushing Material
A	6.34 +0/-0.022 (0.249 +0/-0.0009)	Nickel Plated Brass	3/8" 32-UNEF- 2A THD.	Brass
B	6.00 +0/-0.022 (0.236 +0/-0.0009)	Nickel Plated Brass	M9 X 0.75-8g	Brass
C	6.34 +0/-0.007 (0.249 +0/-0.0003)	Stainless Steel	3/8" 32-UNEF- 2A THD.	Bronze
D	6.00 +0/-0.007 (0.236 +0/-0.0003)	Stainless Steel	M9 X 0.75-8g	Bronze

### Dual Gang, Bushing Mount



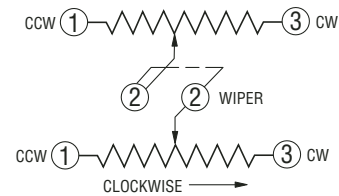
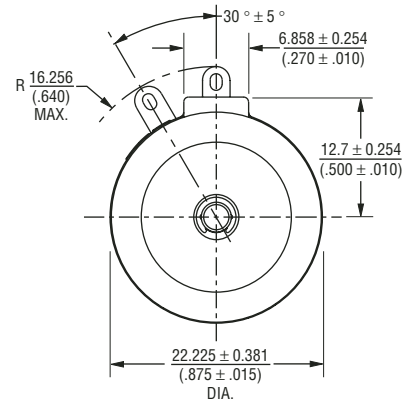
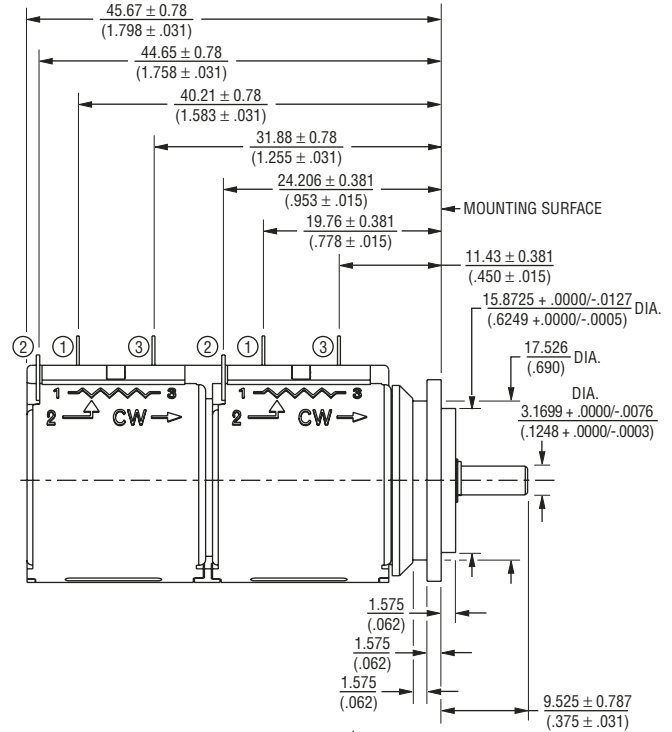
**Product Dimensions**

**Single Gang, Servo Mount**



TOLERANCES: EXCEPT WHERE NOTED  
 DECIMALS: .XX ±  $\frac{.50}{.02}$  .XXX ±  $\frac{.127}{.005}$  .XXXX ±  $\frac{.0127}{.0005}$   
 DIMENSIONS:  $\frac{MM}{(IN)}$

**Dual Gang, Servo Mount**





### Worldwide Sales Offices

Country	Phone	Fax
Benelux:	+41 (0)41 768 5555	+41 (0)41 768 5510
Brazil:	+55 11 5505 0601	+55 11 5505 4370
China:	+86 21 64821250	+86 21 64821249
France:	+33 (0)2 5473 5151	+33 (0)2 5473 5156
Germany:	+49 (0)69 800 78212	+49 (0)69 800 78299
Ireland/UK:	+44 (0)1276 691087	+44 (0)1276 691088
Italy:	+41 (0)41 768 5555	+41 (0)41 768 5510
Japan:	+81 49 269 3204	+81 49 269 3297
Malaysia (KL Office):	+60 3 71183138	+60 3 71183139
Malaysia (Penang Office):	+60 4 6581771	+60 4 6582771
Singapore:	+65 63461933	+65 63461911
Switzerland:	+41 (0)41 768 5555	+41 (0)41 768 5510
Taiwan:	+886 2 25624117	+886 2 25624116
UK/Ireland:	+44 (0)1276 691087	+44 (0)1276 691088
USA:	+1-951-781-5500	+1-951-781-5006

### Non-Listed European

<b>Countries:</b>	+41 (0)41 768 5555	+41 (0)41 768 5510
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### Technical Assistance

Region	Phone	Fax
Asia-Pacific:	+886 2 25624117	+886 2 25624116
Europe:	+41 (0)41 768 5555	+41 (0)41 768 5510
Americas:	+1-951-781-5500	+1-951-781-5700

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Bourns® products are available through an extensive network of manufacturer's representatives, agents and distributors. To obtain technical applications assistance, a quotation, or to place an order, contact a Bourns representative in your area.

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