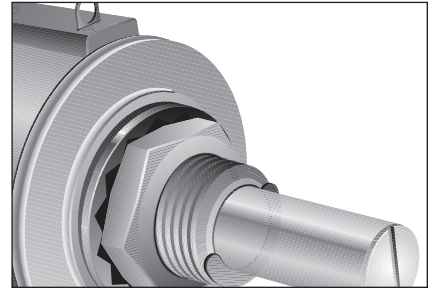


## Precision Potentiometers

**BOURNS®**

I. Product Selection Guide.....	258
II. Potentiometers	
Multiturn.....	260
Single-Turn.....	265
Knobpot® .....	270
Pushbutton (Digital Readout) .....	272
III. Definitions & Test Procedures.....	274



# Product Selection Guide

**BOURNS®**

## Multiturn Precision Potentiometers

Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Standard Linearity	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3400	10	Wirewound	±3%	100-500K	±0.15%	1-13/16" (30mm)	1-3/4" (46mm)	1/4" X 13/16" (6 X 21mm)	Bushing	260
3500	10	Wirewound	±3%	50-100K	±0.20%	7/8" (22mm)	1" (25mm)	1/4" X 13/16" (6 X 21mm)	Bushing	261
3540	10	Wirewound	±5%	100-100K	±0.25%	7/8" (22mm)	3/4" (19mm)	1/4" X 13/16" (6 X 21mm)	Bushing	262
3541	10	Hybritron®	±10%	1K-100K	±0.25%	7/8" (22mm)	3/4" (19mm)	1/4" X 13/16" (6 X 21mm)	Bushing	262
3543	3	Wirewound	±5%	20-50K	±0.25%	7/8" (22mm)	3/4" (19mm)	1/4" X 13/16" (6 X 21mm)	Bushing	263
3545	5	Wirewound	±5%	50-50K	±0.25%	7/8" (22mm)	3/4" (19mm)	1/4" X 13/16" (6 X 21mm)	Bushing	263
3590	10	Wirewound	±5%	200-100K	±0.25%	7/8" (22mm)	3/4" (19mm)	Various	Bushing	264

## Single-Turn Precision Potentiometers

Model No.	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Standard Linearity	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
6537	Conductive Plastic	±10%	1K-100K	±1%	7/8" (22mm)	1/2" (13mm)	1/8" X 1/2" (3 X 12.7mm)	Servo	265
6538	Conductive Plastic	±10%	1K-100K	±1%	7/8" (22mm)	19/32" (15mm)	1/8" X 1/2" (3 X 12.7mm)	Servo	265
6539	Conductive Plastic	±15%	1K-100K	±2%	7/8" (22mm)	19/32" (15mm)	1/8" X 1/2" (3 x 12.7mm)	Servo	268
6574	Conductive Plastic	±10%	1K-100K	±0.1%	2" (51mm)	19/32" (15mm)	1/4" X 7/8" (6 X 22mm)	Servo	266
6637	Conductive Plastic	±10%	1K-100K	±1%	7/8" (22mm)	9/16" (14mm)	1/8" X 7/8" (3 X 22mm)	Bushing	267
6639	Conductive Plastic	±15%	1K-100K	±2%	7/8" (22mm)	21/32" (17mm)	1/4" X 7/8" (6 x 22mm)	Bushing	268
6657	Conductive Plastic	±10%	1K-100K	±1%	1-5/16" (33mm)	25/32" (20mm)	1/4" X 7/8" (6 X 22mm)	Bushing	269

## Product Selection Guide

**BOURNS®**

### Knobpot® Precision Potentiometers

Model No.	Turns	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Accuracy	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3600	10	Wirewound	±5%	100-100K	See Data Sheet	3/4" (19mm)	See Data Sheet	N/A	Bushing	270
3610	10	Wirewound	±5%	100-100K	See Data Sheet	7/8" (22mm)	See Data Sheet	N/A	Snap-in	271

### Digital Pushbutton Potentiometers

Model No.	Digits	Element Type	Resistance Tolerance	Resistance Range (Ohms)	Accuracy	Pkg. Dia.	Pkg. Depth	Shaft Dia./Length	Mount	Page No.
3682	2	Cermet	±3%	50-1 Meg	See Data Sheet	See Data Sheet	See Data Sheet	N/A	Snap-in	272
3683	3	Cermet	±3%	50-1 Meg	See Data Sheet	See Data Sheet	See Data Sheet	N/A	Snap-in	272



## Features

- Bushing mount
- Optional  $\pm 0.05$  linearity option
- Excellent wiper stability
- High stop strength
- Sealable

## 3400 - Precision Potentiometer

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

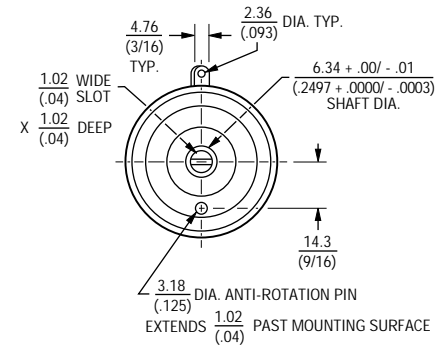
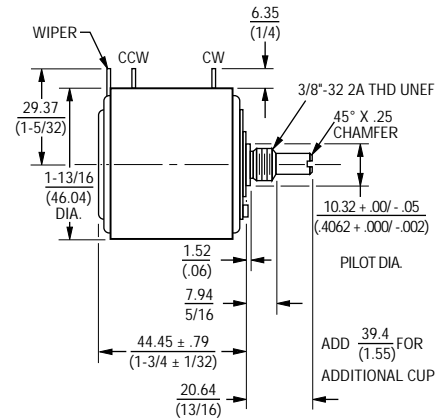
Standard Resistance Range .....	100 to 500K ohms
Resistance Tolerance .....	$\pm 3\%$
Independent Linearity .....	$\pm 0.15\%$
Resolution .....	See recommended part number
Effective Electrical Angle .....	$3600^\circ + 4^\circ, -0^\circ$
Absolute Minimum Resistance .....	1 ohm or 0.15% maximum (whichever is greater)
Noise .....	100 ohms ENR maximum
Power Rating (Voltage Limited By Power Dissipation, or 1,000 VAC, Whichever Is Less) .....	( $125^\circ\text{C}$ ) 0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	1,000 VAC minimum
80,000 Feet .....	300 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range .....	$-65^\circ\text{C}$ to $+125^\circ\text{C}$
Dynamic Temperature Range .....	$+1^\circ\text{C}$ to $+125^\circ\text{C}$
Temperature Coefficient <sup>2</sup> .....	$\pm 20\text{ppm}/^\circ\text{C}$ maximum/unit
Moisture Resistance .....	MIL-STD-202, Method 103, Condition B
Total Resistance Shift .....	$\pm 2\%$ maximum
Vibration .....	10G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	$\pm 2\%$ maximum
Voltage Ratio Shift .....	$\pm 0.1\%$ maximum
Shock .....	50G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	$\pm 2\%$ maximum
Voltage Ratio Shift .....	$\pm 0.1\%$ maximum
Load Life .....	1,000 hours, 5 watts
Total Resistance Shift .....	$\pm 2\%$ maximum
Rotational Life (No Load) .....	2,000,000 shaft revolutions <sup>2</sup>
Total Resistance Shift .....	$\pm 5\%$ maximum

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

Mechanical Angle .....	$3600^\circ + 4^\circ, -0^\circ$
Shaft Runout .....	0.002 in. (0.05mm) T.I.R.
Shaft End Play .....	0.005 in. (0.13mm) T.I.R.
Shaft Radial Play .....	0.0025 in. (0.06mm) T.I.R.
Pilot Diameter Runout .....	0.002 in. (0.05mm) T.I.R.
Lateral Runout .....	0.005 in. (0.13mm) T.I.R.
Stop Strength .....	.550 oz.-in. (388 Ncm) minimum
Torque (Starting & Running) .....	2.0 oz.-in. (1.4 Ncm) maximum
Backlash .....	$1.0^\circ$ maximum
Weight .....	Approximately 110G
Terminals .....	Gold-plated solder lugs
Markings .....	Manufacturer's name and part number, resistance value and tolerance, linearity tolerance, wiring diagram, date code
Ganging .....	2 cups maximum



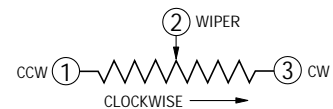
NOTE: LOCKWASHER AND HEX NUT TO BE SUPPLIED WITH EACH UNIT.

TOLERANCES: EXCEPT WHERE NOTED

DECIMALS:  $XX \pm \frac{.25}{(.010)}$ ,  $XXX \pm \frac{.13}{(.005)}$

FRACTIONS:  $\pm 1/64$

DIMENSIONS:  $\frac{MM}{(IN.)}$



### Recommended Part Numbers

Part Number	Resistance	Resolution
3400S-1-102	1,000	.020
3400S-1-502	5,000	.013
3400S-1-103	10,000	.010

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

<sup>1</sup>At room ambient:  $+25^\circ\text{C}$  nominal and 50% relative humidity nominal, except as noted.

<sup>2</sup>Consult manufacturer for complete specification details for resistances below 500 ohms and above 100K ohms.



## Features

- Bushing mount
- Sealable
- Non-standard features and specifications available
- Optional high torque feature
- Optional center tap feature

- Gangable

## 3500 - Precision Potentiometer

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

Standard Resistance Range .....50 to 200K ohms  
 Resistance Tolerance .....±3%  
 Independent Linearity .....±0.20% Resolution  
 .....See recommended part numbers  
 Effective Electrical Angle .....3600° +10°, -0°  
 Absolute Minimum Resistance/Minimum Voltage  
 .....1 ohm or 0.1% maximum (whichever is greater)  
 Noise .....100 ohms ENR maximum  
 Power Rating (Voltage Limited By Power Dissipation or 325 VAC, Whichever Is Less)  
 +70°C .....2 watts  
 +125°C .....0 watt  
 Dielectric Withstanding Voltage MIL-STD-202, Method 301  
 Sea Level.....1,500 VAC minimum  
 70,000 Feet .....400 VAC minimum  
 Insulation Resistance (500 VDC) ....1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature  
 Static Operation Temp Range .....-65°C to +125°C  
 Dynamic Temp Range .....+1°C to +125°C  
 Temperature Coefficient<sup>2</sup> .....±50ppm/°C maximum/unit  
 Vibration.....20G  
 Wiper Bounce .....0.1 millisecond maximum  
 Total Resistance Shift...±2% maximum  
 Voltage Ratio Shift.....±0.1% maximum  
 Shock.....100G  
 Wiper Bounce .....0.1 millisecond maximum  
 Total Resistance Shift...±2% maximum  
 Voltage Ratio Shift.....±0.1% maximum  
 Load Life .....1,000 hours, 2 watts  
 Total Resistance Shift...±2% maximum  
 Rotational Life (No Load) .....2,000,000 shaft revolutions<sup>2</sup>  
 Total Resistance Shift...±5% maximum  
 Moisture Resistance .....MIL-STD-202, Method 103, Condition B  
 Total Resistance Shift...±2% maximum

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

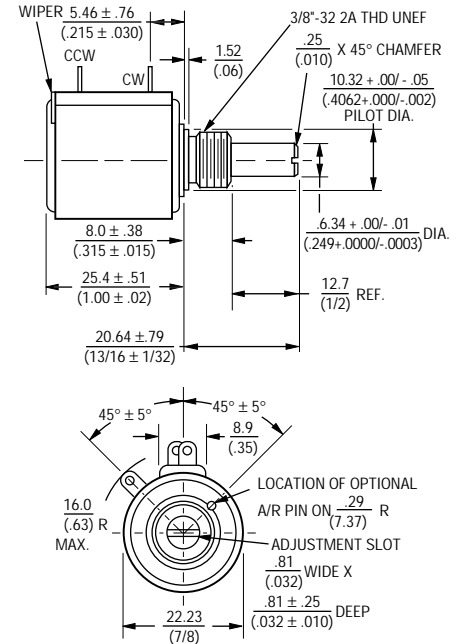
Mechanical Angle .....3600° +10°, -0°  
 Shaft Runout .....0.002 in. (0.05mm) T.I.R.  
 Lateral Runout .....0.005 in. (0.13mm) T.I.R.  
 Pilot Diameter Runout .....0.002 in. (0.05mm) T.I.R.  
 Shaft End Play .....0.005 in. (0.13mm) T.I.R.  
 Shaft Radial Play .....0.003 in. (0.08mm) T.I.R.  
 Stop Strength .....96 oz.-in. (67.8 Ncm) min.  
 Torque (Starting & Running) .....0.6 oz.-in. (0.42 Ncm) max.  
 Backlash.....1.0° maximum  
 Weight.....Approximately 28G  
 Terminals.....Gold-plated solder lugs  
 Ganging .....2 cups maximum

### Recommended Part Numbers

Part Number	Resistance	Resolution
<b>3500S-2-102</b>	<b>1,000</b>	<b>.030</b>
<b>3500S-2-502</b>	<b>5,000</b>	<b>.018</b>
<b>3500S-2-103</b>	<b>10,000</b>	<b>.019</b>

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.  
 FOR OTHER OPTIONS CONSULT FACTORY.

### 3500S-2/3501H-1



NOTE: LOCKWASHER AND HEX NUT TO BE SUPPLIED WITH EACH UNIT.

NOTE: SHAFT LENGTH VARIATIONS

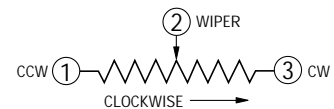
3500S-1-RC	11/16 (17.46)
3500S-2-RC	13/16 (20.64)
3501H-1-RC	13/16 (20.64)

TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: XX ± .25 (.010), .XXX ± .13 (.005)

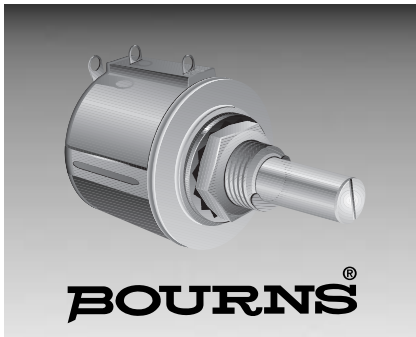
FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)



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

<sup>2</sup>Consult manufacturer for complete specification details for resistances below 500 ohms.



## Features

- Bushing mount
- Optional center tap and rear shaft extension
- Optional AR lug feature
- Gangable with common or concentric shafts
- High torque available
- Optional 0.1% linearity
- Non-standard features and specifications available

## 3540/3541 - Precision Potentiometer

3540 Wirewound Element 3541 Hybritron® Element

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

Standard Resistance Range	100 to 100K ohms	1K to 100K ohms
Resistance Tolerance	±5%	±10%
Independent Linearity	±0.25%	±0.25%
Resolution	See recommended part numbers	Essentially infinite
Effective Electrical Angle	3600° +10°, -0°	3600° +10°, -0°
Absolute Minimum Resistance	1 ohm or 0.1% maximum	Minimum voltage
Minimum Voltage	(whichever is greater)	0.2% maximum
Noise	100 ohms ENR maximum	Output smoothness 0.1% maximum

### Power Rating (Voltage Limited)

By Power Dissipation or  
447 VAC, Whichever Is Less)

+70°C	2 watts	2 watts
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	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

### Environmental Characteristics<sup>1</sup>

#### Operating Temperature

Static Operation Temp Range.....-55°C to +125°C .....-55°C to +125°C

Dynamic Temp Range.....+1°C to +125°C.....+1°C to +125°C

Temperature Coefficient<sup>2</sup> .....±50ppm/°C maximum/unit .....±100ppm/°C maximum/unit

Vibration.....15G .....15G

Wiper Bounce .....0.1 millisecond maximum .....0.1 millisecond maximum

Shock.....50G .....50G

Wiper Bounce .....0.1 millisecond maximum .....0.1 millisecond maximum

Load Life .....1,000 hours, 2 watts .....1,000 hours, 2 watts

Total Resistance Shift .....±2% .....±5%

Rotational Life (No Load) .....1,000,000 shaft revolutions<sup>2</sup> .....5,000,000 shaft revolutions<sup>2</sup>

Total Resistance Shift .....±5% maximum .....±5% maximum

Moisture Resistance .....MIL-STD-202, Method 103, Condition B .....MIL-STD-202, Method 103, Condition B

Total Resistance Shift .....±2% maximum .....±5% maximum

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

Mechanical Angle	3600° +10°, -0°	3600° +10°, -2°
Shaft Runout	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Lateral Runout	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Pilot Diameter Runout	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Shaft End Play	0.012 in. (0.30mm) T.I.R.	0.012 in. (0.30mm) T.I.R.
Shaft Radial Play	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Stop Strength	75 oz.-in. (53 Ncm) minimum	75 oz.-in. (53 Ncm) minimum
Torque (Starting & Running)	0.6 oz.-in. (0.35 Ncm) max.	0.6 oz.-in. (0.35 Ncm) max.
Backlash	1.0° maximum	1.0° maximum
Weight	Approximately 21G	Approximately 22.5G
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Ganging	2 cups maximum	2 cups maximum

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

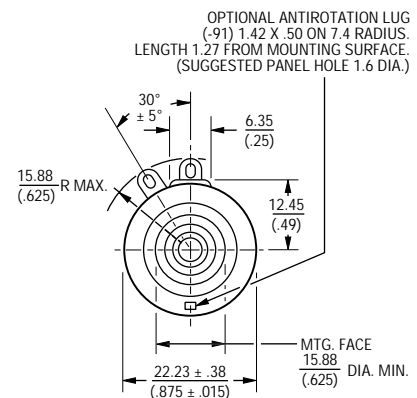
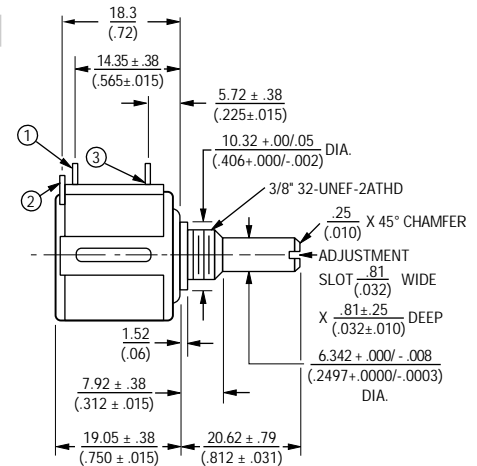
<sup>2</sup>Consult manufacturer for complete specification details.

### Recommended Part Numbers

Part Number	Resistance	Resolution
3540S-1-201	200	.042
3540S-1-501	500	.031
3540S-1-102	1,000	.027
3540S-1-202	2,000	.021
3540S-1-502	5,000	.021
3540S-1-103	10,000	.019
3540S-1-203	2,000	.014

Part Number	Resistance	Resolution
3540S-1-103	10,000	.019
3540S-1-203	20,000	.014
3540S-1-503	50,000	.011
3540S-1-104	100,000	.008
3541H-1-102	1,000	.027
3541H-1-502	5,000	.021
3541H-1-103	10,000	.019

### 3540S-1/3541H-1

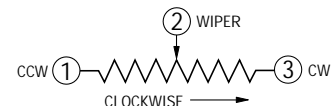


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: XX ± .25 (.010), .XXX ± .13 (.005)

FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)



BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

Specifications are subject to change without notice.



## Features

- Bushing mount
- Optional AR pin feature
- Non-standard features and specifications available
- Gangable

## 3543/3545 - Precision Potentiometer

**3543**  
3-Turn

**3545**  
5-Turn

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

Standard Resistance Range	20 to 50K ohms	50 to 50K ohms
Resistance Tolerance	±5%	±5%
Independent Linearity	±0.25%	±0.25%
Resolution	See recommended part numbers	See recommended part numbers
Effective Electrical Angle	1080° +10°, -0°	1800° +10°, -0°
Absolute Minimum Resistance/	1 ohm or 0.1% maximum	1 ohm or 0.1% maximum
Minimum Voltage	(whichever is greater)	(whichever is greater)
Noise	100 ohms ENR maximum	100 ohms ENR maximum
Power Rating (Voltage Limited)		
By Power Dissipation or		
224 VAC [3543] or 273 VAC		
[3545], Whichever Is Less		
+70°C	1 watt	1.5 watt
+125°C	0 watt	0 watt
Dielectric Withstanding Voltage	MIL-STD-202, Method 301	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

### Environmental Characteristics<sup>1</sup>

Operating Temperature		
Static Operation Temp Range	-55°C to +125°C	-55°C to +125°C
Dynamic Temp Range	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient <sup>2</sup>	±50ppm/°C maximum/unit	±50ppm/°C maximum/unit
Vibration	15G	15G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Shock	50G	50G
Wiper Bounce	0.1 millisecond maximum	0.1 millisecond maximum
Load Life	1,000 hours, 1 watt	1,000 hours, 1.5 watts
Total Resistance Shift	±2% maximum	±2% maximum
Rotational Life (No Load)	300,000 shaft revolutions	500,000 shaft revolutions
Total Resistance Shift	±5% maximum	±5% maximum
Moisture Resistance	MIL-STD-202, Method 103, Condition B	MIL-STD-202, Method 103, Condition B
Total Resistance Shift	±2% maximum	±2% maximum

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

Mechanical Angle	1080° +10°, -0°	1800° +10°, -0°
Shaft Runout	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Lateral Runout	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Pilot Diameter Runout	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Shaft End Play	0.010 in. (0.25mm) T.I.R.	0.010 in. (0.25mm) T.I.R.
Shaft Radial Play	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Stop Strength	75 oz.-in. (53 Ncm) min.	75 oz.-in. (53 Ncm) min.
Torque (Starting & Running)	0.5 oz.-in. (0.35 Ncm) max.	0.5 oz.-in. (0.35 Ncm) max.
Weight	Approximately 21G	Approximately 21G
Terminals	Gold-plated solder lugs	Gold-plated solder lugs
Backlash	1.0° maximum	1.0° maximum
Ganging	2 cups maximum	2 cups maximum

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

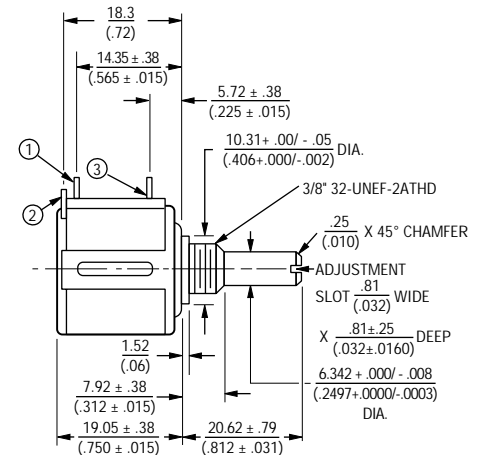
<sup>2</sup>Consult manufacturer for complete specification details.

### Recommended Part Numbers

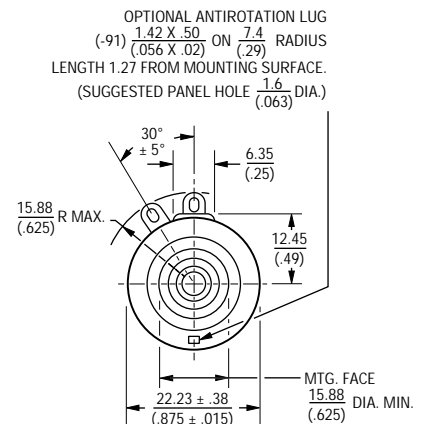
Part Number*	Resistance (Ω)	Resolution (%)
3543S-1-102	1,000	.063
3543S-1-202	2,000	.062
3543S-1-502	5,000	.047
3543S-1-103	10,000	.040

Part Number	Resistance (Ω)	Resolution (%)
3545S-1-102	1,000	.043
3545S-1-202	2,000	.036
3545S-1-502	5,000	.038
3545S-1-103	10,000	.027

### 3543S-1/3545S-1



NOTE: LOCKWASHER AND MOUNTING NUTS SUPPLIED.  
ADD .75 (19MM) FOR ADDITIONAL CUPS.

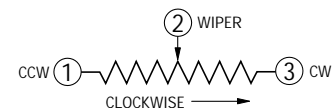


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .25 (.010), .XXX ± .13 (.005)

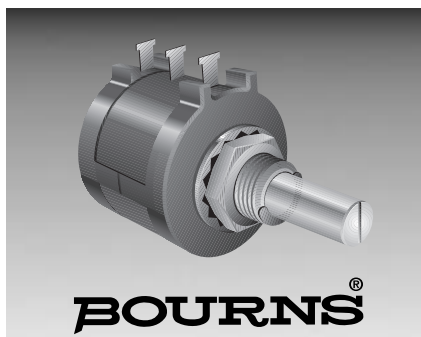
FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)



BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.



## Features

- Bushing mount
- Optional AR pin feature
- Plastic or metal shaft and bushings
- Wirewound
- Solder lugs or PC pins
- Sealable (Full body seal)

- Non-standard features and specifications available

## 3590 - Precision Potentiometer

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

Standard Resistance Range .....	200 to 100K ohms
Resistance Tolerance .....	±5%
Independent Linearity .....	±0.25%
Resolution .....	See recommended part numbers
Effective Electrical Angle .....	3600° +10°, -0°
Absolute Minimum Resistance .....	1 ohm or 0.1% maximum (whichever is greater)
Noise .....	100 ohms ENR maximum
Power Rating (Voltage Limited By Power Dissipation or 450 VAC, Whichever is Less)	
+40°C .....	2 watts
+125°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	2,000 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range .....	-55°C to +125°C
Dynamic Operation Temperature Range .....	+1°C to +125°C
Temperature Coefficient <sup>2</sup> .....	±50ppm/°C maximum/unit
Vibration .....	15G
Wiper Bounce .....	0.1 millisecond maximum
Shock .....	50G
Wiper Bounce .....	0.1 millisecond maximum
Load Life .....	1,000 hours, 2 watts
Total Resistance Shift .....	±2% maximum
Rotational Life (No Load) .....	1,000,000 shaft revolutions
Total Resistance Shift .....	±5% maximum
Moisture Resistance .....	MIL-STD-202, Method 103, Condition B
Total Resistance Shift .....	±2% maximum

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

Mechanical Angle .....	3600° +10°, -0°
Shaft Runout .....	0.005 in. (0.13mm) T.I.R.
Lateral Runout .....	0.008 in. (0.20mm) T.I.R.
Pilot Diameter Runout .....	0.003 in. (0.08mm) T.I.R.
Shaft End Play .....	0.010 in. (0.25mm) T.I.R.
Shaft Radial Play .....	0.005 in. (0.13mm) T.I.R.
Stop Strength .....	64 oz.-in. (45 Ncm) minimum
Torque (Starting & Running) .....	0.5 oz.-in. (0.40 Ncm) maximum (unsealed) 1.5 oz.-in. (1.1 Ncm) maximum (sealed)
Mounting Torque .....	5-7 in.-lbs. (0.55 - 0.80 Nm) (plastic) 15-18 in.-lbs. (1.7 - 2 Nm) (metal)
Backlash .....	1.0° maximum
Terminals .....	Solder lugs or PC pins
Weight .....	Approximately 19G

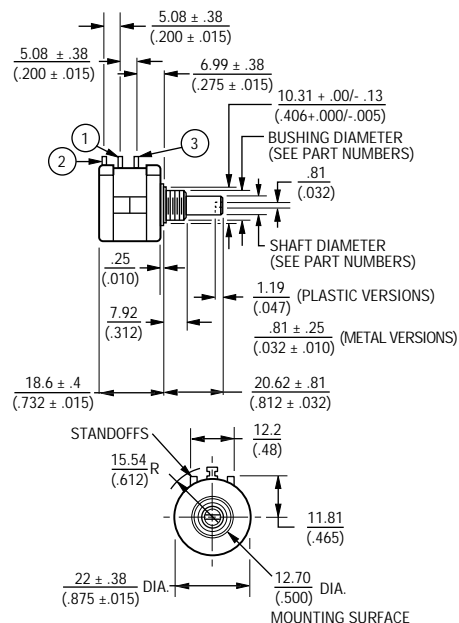
NOTE: For Anti-Rotation pin add 91 after configuration dash number. Example: -2 becomes -291 to add AR pin.

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

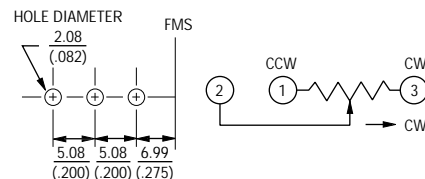
<sup>2</sup>Consult manufacturer for complete specification details for resistance below 1K ohms.

### Recommended Part Numbers

(Printed Circuit)	(Solder Lug)	Resistance (Ω)	Resolution (%)
3590P-1-102	3590S-2-102	1,000	.029
3590P-1-202	3590S-2-202	2,000	.023
3590P-1-502	3590S-2-502	5,000	.025
3590P-1-103	3590S-2-103	10,000	.020
3590P-1-203	3590S-2-203	20,000	.016
3590P-1-503	3590S-2-503	50,000	.013
3590P-1-104	3590S-2-104	100,000	.009



### RECOMMENDED PC BOARD MOUNTING HOLE LOCATIONS



### TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .01, .XXX ± .005

FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)

### SHAFT & BUSHING CONFIGURATIONS

- (Bushing - DxL, Shaft - D)
- (-1) Plastic Bushing (3/8" x 5/16") and Shaft (.2480 ± .001, - .002)
- (-2) Metal Bushing (3/8" x 5/16") and Shaft (.2497 ± .0000, - .0009)
- (-3) Sealed, Plastic Bushing (3/8" x 5/16") and Shaft (.2480 ± .001, - .002)
- (-4) Sealed, Metal Bushing (3/8" x 5/16") and Shaft (.2497 ± .0000, - .0009)
- (-5) Metric, Plastic Bushing (9mm x 7.94mm) and Shaft (6mm ± 0, - .076mm)
- (-6) Metric, Metal Bushing (9mm x 7.94mm) and Shaft (6mm ± 0, - .023mm)
- (-7) Metric, Sealed, Plastic Bushing (9mm x 7.94mm) and Shaft (6mm ± 0, - .076mm)
- (-8) Metric, Sealed, Metal Bushing (9mm x 7.94mm) and Shaft (6mm ± 0, - .023mm)

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

Specifications are subject to change without notice.





## Features

- Infinite resolution element
- Standard linearity: 1.0%
- Extended temperature range: -65°C to +125°C
- Extended life version (6538)
- Output smoothness: 0.1% standard

- Molded-in rear terminals
- Non-standard features and specifications available

## 6537/6538 - 22mm Precision Potentiometer

Electrical Characteristics <sup>1</sup>	6537	6538
Standard Resistance Range.....	1K to 100K ohms	1K to 100K ohms
Resistance Tolerance .....	±10%	±10%
Independent Linearity.....	±1%	±1%
Resolution .....	Essentially infinite	Essentially infinite
Effective Electrical Angle .....	340° ± 3°	340° ± 3°
End Voltage .....	0.5% max	0.5% max
Output Smoothness .....	0.1%	0.1%
Power Rating (Voltage Limited By Power Dissipation or 300 VAC, Whichever is Less)		
+70°C.....	1 watt	1 watt
+125°C.....	0 watt	0 watt
Dielectric Withstanding		
Voltage.....	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level .....	750 VAC min.	750 VAC min.
Insulation Resistance		
(500 VDC).....	500 megohms min.	1,000 megohms min.

## Environmental Characteristics<sup>1</sup>

Operating Temperature		
Static Operation Temp Range.....	-65°C to +125°C	-65°C to +125°C
Dynamic Temp Range.....	+1°C to +125°C	+1°C to +125°C
Temperature Coefficient .....	±500ppm/°C max.	±500ppm/°C max
Moisture Resistance .....	MIL-STD-202, Method 106	MIL-STD-202, Method 106
Total Resistance Shift.....	±10% max.	±10% max
Vibration.....	15G	15G
Wiper Bounce .....	0.1 millisecond max	0.1 millisecond max
Total Resistance Shift.....	±5% max.	±5% max
Voltage Ratio Shift.....	±0.5% max.	±0.5% max
Shock.....	50G	50G
Wiper Bounce .....	0.1 millisecond max	0.1 millisecond max
Total Resistance Shift.....	±5% max.	±5% max
Voltage Ratio Shift.....	±0.5% max.	±0.5% max
Load Life.....	1,000 hours, 1 watt	1,000 hours, 1 watt
Total Resistance Shift.....	±10% max.	±10% max
Rotational Life (No Load) .....	10,000,000 shaft rev's	20,000,000 shaft rev's
Total Resistance Shift.....	±10% max.	±10% max

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

Mechanical Angle .....	Continuous	Continuous
Backlash .....	0.1° max	0.1° max
Shaft Runout.....	0.005 in. (0.13mm) T.I.R.	0.001 in. (0.025mm) T.I.R.
Shaft End Play .....	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Shaft Radial Play .....	0.005 (0.13mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Pilot Diameter		
Runout .....	0.0025 in. (0.06mm) T.I.R.	0.0025 in. (0.06mm) T.I.R.
Lateral Runout.....	0.003 in. (0.08mm) T.I.R.	0.003 in. (0.08mm) T.I.R.
Torque (Starting & Running).....	0.5 oz.-in. (0.40 Ncm) max.	0.25 oz.-in. (0.18 Ncm) max.
Terminals.....	Molded-in rear	Molded-in rear

## Recommended Part Numbers

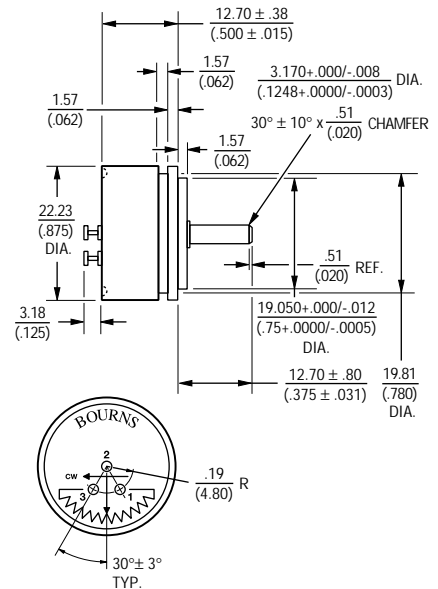
Part Number	Resistance (Ω)
6537S-1-103	10,000

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

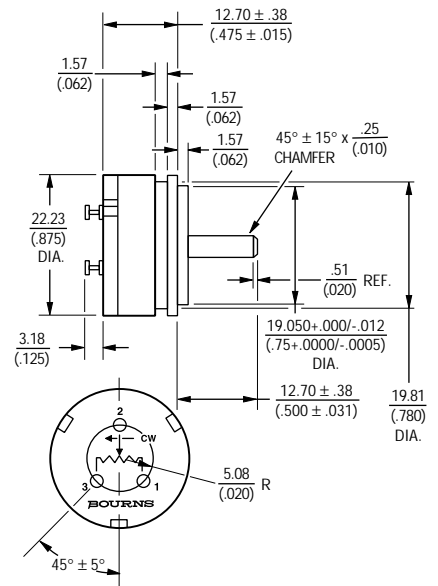
FOR OTHER OPTIONS CONSULT FACTORY.

Part Number	Resistance (Ω)
6538S-1-102	1,000
6538S-1-202	2,000
6538S-1-502	5,000
6538S-1-103	10,000

6537



6538 BALL BEARING

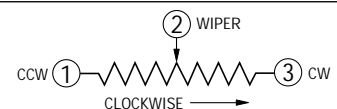


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: XX ± .25 (.010), .XXX ± .13 (.005)

FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)



<sup>1</sup>At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.  
Specifications are subject to change without notice.



## Features

- Servo mount style
- Shaft supported by front and rear precision ball bearings
- Non-standard features and specifications available
- Gangable up to 10 cups

## 6574 - Precision Potentiometer

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

Standard Resistance Range .....	1K to 100K ohms
Resistance Tolerance .....	±10%
Independent Linearity .....	±0.25%
Effective Electrical Angle .....	350° ±2°
Minimum Voltage .....	0.1% maximum (0.2% at 2K ohms, 0.4% at 1K ohms)
Resolution .....	Essentially infinite
Power Rating	
(Voltage Limited By Power Dissipation or 350 VAC, Whichever is Less)	
+70°C .....	2 watts
+125°C .....	0 watt
Output Smoothness .....	0.1%
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	1,000 VAC minimum
70,000 Feet .....	350 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range .....	-65°C to +125°C
Dynamic Operation Temperature Range .....	+1°C to +125°C
Temperature Coefficient <sup>2</sup> .....	±500ppm/°C maximum
Moisture Resistance .....	MIL-STD-202, Method 103, Condition B
Total Resistance Shift .....	±10% maximum
Vibration .....	15G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±2% maximum
Shock .....	60G
Wiper Bounce .....	0.1 millisecond maximum
Rotational Life (No Load) .....	25,000,000 shaft revolutions
Total Resistance Shift .....	±10% maximum
Load Life .....	1,000 hours, 1.5 watts
Total Resistance Shift .....	±10% maximum

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

Shaft Runout .....	0.001 in. (0.025mm) T.I.R.
Shaft End Play .....	0.003 in. (0.08mm) T.I.R.
Shaft Radial Play .....	0.003 in. (0.08mm) T.I.R.
Pilot Diameter Runout .....	0.001 in. (0.025mm) T.I.R.
Lateral Runout .....	0.003 in. (0.08mm) T.I.R.
Backlash .....	0.1° maximum
Mechanical Angle .....	Continuous
Torque (Starting & Running) .....	0.75 oz.-in. (0.53 Ncm) maximum

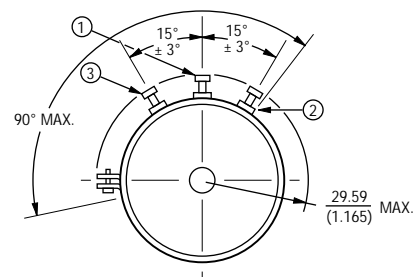
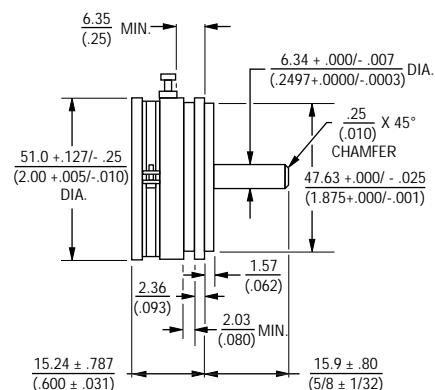
### Recommended Part Numbers

Part Number*	Resistance (W)
6574S-1-102	1,000
6574S-1-502	5,000
6574S-1-103	10,000

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

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

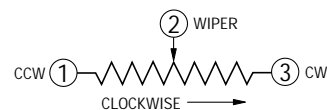


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .38 (.015), .XXX ± .13 (.005)

FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)





- Bushing mount
- Excellent resolution
- High rotational life
- Non-standard features and specifications available

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

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

Standard Resistance Range .....	1K to 100K ohms
Resistance Tolerance .....	±10%
Independent Linearity .....	±1%
Effective Electrical Angle .....	340° + 3°
End Voltage .....	0.5% maximum
Output Smoothness .....	0.1% maximum
Resolution .....	Essentially infinite
Power Rating (Voltage Limited By Power Dissipation or 300 VAC, Whichever is Less)	
+70°C .....	1 watt
+125°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	750 VAC minimum
Insulation Resistance (500 VDC) ....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temp Range	.....-65°C to +125°C
Dynamic Temp Range	.....+1°C to +125°C
Temperature Coefficient	.....±500ppm/°C maximum
Moisture Resistance	.....MIL-STD-202, Method 106
Total Resistance Shift	.....±10% maximum
Vibration	.....15G
Wiper Bounce	.....0.1 millisecond maximum
Total Resistance Shift	...±5% maximum
Voltage Ratio Shift	.....±0.5% maximum
Shock	.....50G
Wiper Bounce	.....0.1 millisecond maximum
Total Resistance Shift	...±5% maximum
Voltage Ratio Shift	.....±0.5% maximum
Rotational Life (No Load)	.....10,000,000 shaft revolutions
Total Resistance Shift	.....±10% maximum
Load Life	.....1,000 hours, 1 watt
Total Resistance Shift	...±10% maximum

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

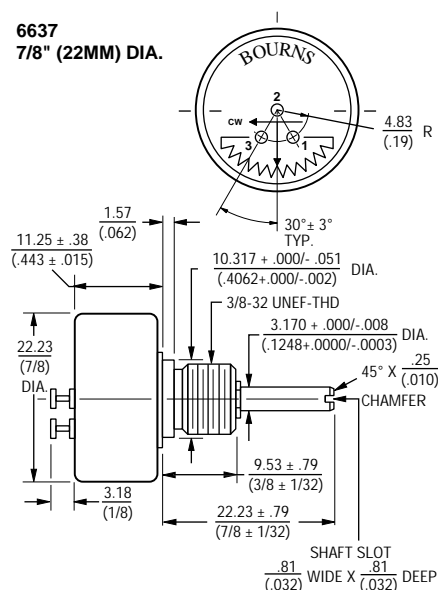
Mechanical Angle.....	Continuous
Backlash.....	0.1° maximum
Shaft Runout	
.....	0.001 in. (0.025mm) T.I.R.
Shaft End Play	
.....	0.005 in. (0.13mm) T.I.R.
Shaft Radial Play	
.....	0.005 in. (0.13mm) T.I.R.
Torque (Starting & Running)	
.....	0.5 oz.-in. (0.40 Ncm) max.

## Recommended Part Numbers

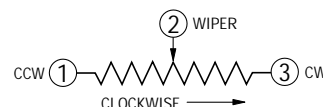
Part Numbers	Resistance (W)
6637S-1-102	1,000
6637S-1-502	5,000
6637S-1-103	10,000

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.



NOTE: SHAFT SUPPORTED BY FRONT SLEEVE BEARING.



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



## Features

- Essentially infinite resolution
- Excellent rotational life
- High quality, rugged construction
- General purpose applications
- Non-standard features available
- Cost and space saving

## 6539/6639 - Precision Potentiometer

### 6539 Servo Mount      6639 Bushing Mount

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

Standard Resistance Range.....	1K to 100K ohms	1K to 100K ohms
Resistance Tolerance		
Standard .....	±15%	±15%
Independent Linearity		
Standard .....	±2.0%	±2.0%
Resolution .....	Essentially infinite	Essentially infinite
Effective Electrical Angle .....	340° +3°	340° +3°
End Voltage .....	0.5% maximum	0.5% maximum
Output Smoothness .....	0.1%	0.1%
Power Rating (Voltage Limited)		
By Power Dissipation or		
300 VAC, Whichever is Less)		
+70°C.....	1.0 watt	1.0 watt
+125°C.....	0 watt	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301	MIL-STD-202, Method 301
Sea Level .....	750 VAC minimum	750 VAC minimum
Insulation Resistance		
(500 VDC).....	500 megohms minimum	500 megohms minimum

#### Environmental Characteristics<sup>1</sup>

Operating Temperature		
Static Operation Temp Range .....	-65°C to +125°C	-65°C to +125°C
Dynamic Temp Range .....	+1°C to +125°C	+1°C to +125°C
Vibration .....	15G	15G
Wiper Bounce .....	0.1 millisecond maximum	0.1 millisecond maximum
Shock .....	50G	50G
Wiper Bounce .....	0.1 millisecond maximum	0.1 millisecond maximum
Rotational Life (No Load) .....	10,000,000 shaft revolutions	10,000,000 shaft revolutions
Total Resistance Shift.....	±10% maximum	±10% maximum

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

Mechanical Angle.....	Continuous, Stops	Continuous, Stops
	(340° +8°, -0°) available	(340° +8° -0°) available
Backlash.....	0.1° maximum	0.1° maximum
Shaft Runout .....	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Shaft End Play .....	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Shaft Radial Play .....	0.005 in. (0.13mm) T.I.R.	0.005 in. (0.13mm) T.I.R.
Pilot Diameter		
Runout .....	0.0025 in. (0.06mm) T.I.R.	
Lateral Runout .....	0.003 in. (0.08mm) T.I.R.	
Torque (Starting & Running) .....	0.5 oz.-in. (0.40 Ncm) max.	0.5 oz.-in. (0.40 Ncm) max.
Terminals .....	Rear Turret Type	Rear Turret Type
Bearing Type.....	Brass Sleeve	Nickel Plated Brass
Markings.....	Manufacturer's name, part number, resistance value and tolerance, linearity tolerance, wiring diagram and date code.	Manufacturer's name, part number, resistance value and tolerance, linearity tolerance, wiring diagram and date code.

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

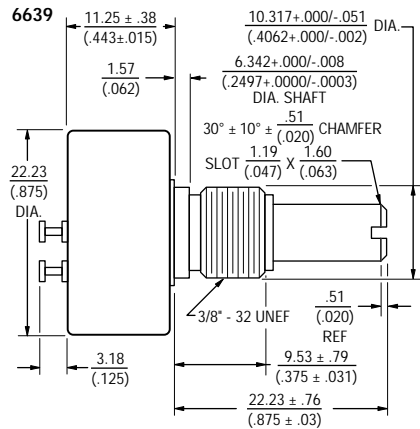
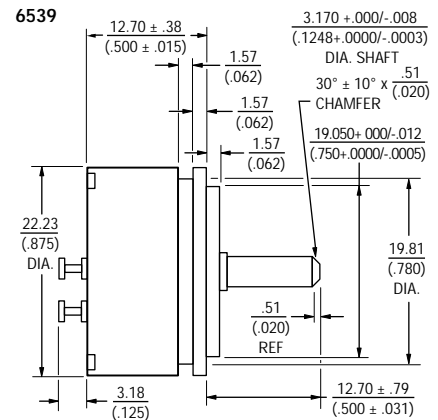
#### Recommended Part Numbers

Part Number	Resistance (Ω)
6539S-1-102	1,000
6539S-1-502	5,000
6539S-1-103	10,000

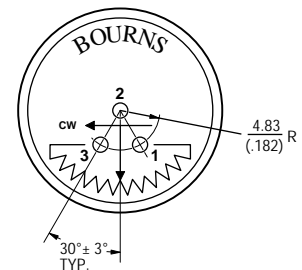
BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.

Part Numbers		Resistance (Ω)
Bushing Mount	Mechanical Stops	
6639S-1-102	6639S-301-102	1,000
6639S-1-202	6639S-301-202	2,000
6639S-1-502	6639S-301-502	5,000
6639S-1-103	6639S-301-103	10,000
6639S-1-203		20,000



#### 65/6639

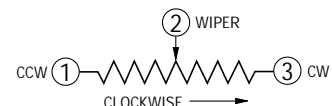


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .38  
(.015) XXX ± .13  
(.005)

FRACTIONS: ±1/64

DIMENSIONS: MM  
(IN.)





## Features

- Bushing mount
- Shaft supported by front sleeve bearing
- Non-standard features and specifications available

## 6657 - Precision Potentiometer

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

Standard Resistance Range .....	1K to 100K ohms
Resistance Tolerance .....	±10%
Independent Linearity .....	±1%
Resolution .....	Essentially infinite
Effective Electrical Angle .....	340° ±3°
End Voltage .....	0.5% maximum
Output Smoothness .....	0.1%
Power Rating (Voltage Limited By	
Power Dissipation or 300 VAC, Whichever is Less)	
+70°C .....	1.5 watts
+125°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	750 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range .....	-65°C to +125°C
Dynamic Operation Temperature Range .....	+1°C to +125°C
Temperature Coefficient .....	±500ppm/°C maximum
Vibration .....	15G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±5% maximum
Voltage Ratio Shift .....	±0.5% maximum
Shock .....	50G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±5% maximum
Voltage Ratio Shift .....	±0.5% maximum
Load Life .....	1,000 hours, 1.5 watts
Total Resistance Shift .....	±10% maximum
Rotational Life (No Load) .....	10,000,000 shaft revolutions
Total Resistance Shift .....	±10% maximum
Moisture Resistance .....	MIL-STD-202, Method 106
Total Resistance Shift .....	±15% maximum

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

Mechanical Angle .....	Continuous
Backlash .....	0.1° maximum
Shaft Runout .....	0.001 in. (0.025mm) T.I.R.
Shaft End Play .....	0.005 in. (0.13mm) T.I.R.
Shaft Radial Play .....	0.005 in. (0.13mm) T.I.R.
Torque (Starting & Running) .....	0.5 oz.-in. (0.40 Ncm) maximum

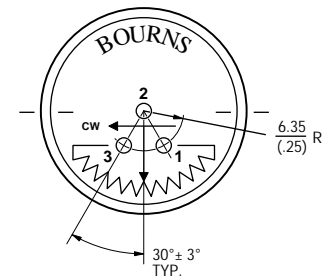
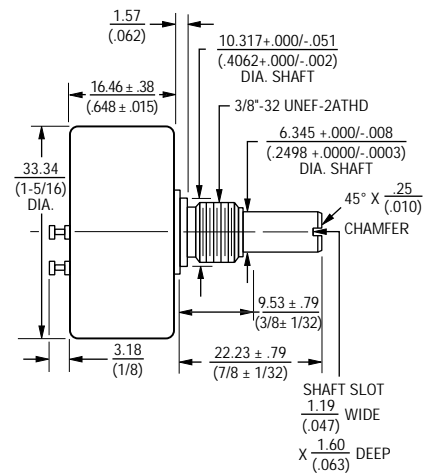
<sup>1</sup> At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

### Recommended Part Numbers

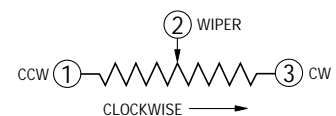
Part Number*	Resistance (Ω)
6657S-1-102	1,000
6657S-1-202	2,000
6657S-1-502	5,000
6657S-1-103	10,000

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.

FOR OTHER OPTIONS CONSULT FACTORY.



TOLERANCES: EXCEPT WHERE NOTED  
 DECIMALS: .XX ± .25  
 (.010), .XXX ± .13  
 (.005)  
 FRACTIONS: ±1/64  
 DIMENSIONS: MM  
 (IN.)





## Features

- Bushing mount
- Cost saving; pre-phased
- Highly readable clockface readout
- Easy mounting

## 3600 - Precision Potentiometer

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

Standard Resistance Range .....	100 to 100K ohms
Resistance Tolerance .....	±5%
Accuracy (Correlation of Dial Readout to Voltage Ratio Output) .....	±0.5% voltage ratio
Repeatability of Dial Readout .....	±0.1% voltage ratio
Resolution .....	See recommended part numbers
Effective Electrical Angle .....	3600° nominal
Absolute Minimum Resistance .....	1 ohm or 0.1% maximum (whichever is greater)
Noise .....	100 ohms ENR maximum

### Power Rating

(Voltage Limited By Power Dissipation or 385 VAC, Whichever is Less)

+25°C .....	1.5 watts
+85°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level .....	1,000 VAC minimum
70,000 Feet .....	400 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range .....	-65°C to +85°C
Dynamic Operation Temperature Range .....	+1°C to +85°C
Temperature Coefficient <sup>2</sup> .....	±50ppm/°C maximum/unit
Moisture Resistance .....	MIL-STD-202, Method 103, Condition B
Total Resistance Shift .....	±2% maximum
Vibration .....	10G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±2% maximum
Voltage Ratio Shift .....	±0.2% maximum
Shock .....	50G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±2% maximum
Voltage Ratio Shift .....	±0.2% maximum
Load Life .....	1,000 hours, 1.5 watts
Total Resistance Shift .....	±2% maximum
Rotational Life (No Load) <sup>2</sup> .....	200,000 shaft revolutions
Total Resistance Shift .....	±2% maximum

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

Mechanical Angle .....	3600° +20°, -0°
Stop Strength .....	20 oz.-in. (14 Ncm) minimum
Torque (Starting & Running) .....	4.0 oz.-in. (2.8 Ncm) maximum
Variation .....	1.0 oz.-in. (0.71 Ncm) maximum
Backlash .....	1.0° maximum
Weight .....	Approximately 17G
Terminals .....	Gold-plated J-Hooks
Markings .....	Manufacturer's name and part number, resistance value and date code

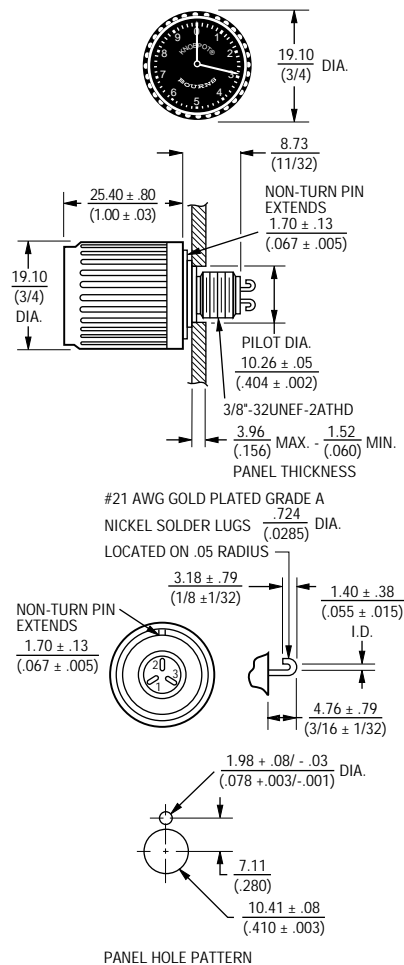
<sup>1</sup>At room ambient: +25°C nominal and 50% relative humidity nominal, except as noted.

<sup>2</sup>Consult manufacturer for complete specification details for resistances below 100 ohms.

### Recommended Part Numbers

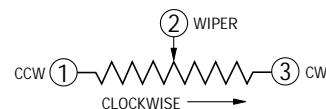
Part Number	Resistance (Ω)	Resolution (%)
3600S-1-102	1,000	.035
3600S-1-502	5,000	.027
3600S-1-103	10,000	.022

BOLD-FACE LISTINGS ARE IN STOCK AND READILY AVAILABLE THROUGH DISTRIBUTION.  
FOR OTHER OPTIONS CONSULT FACTORY.



LOCKWASHER AND MOUNTING NUT TO BE SUPPLIED WITH EACH UNIT

TOLERANCES: EXCEPT WHERE NOTED  
DECIMALS: .XX ± .25 (.010), .XXX ± .13 (.005)  
FRACTIONS: ±1/64  
DIMENSIONS: MM (IN.)





**BOURNS®**

## Features

- Snap-in mounting
- Space saving - extends only 5/8" behind most panels
- Easy one-hole, snap-in mounting
- Digital dial provides excellent readability

## 3610 - Precision Potentiometer

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

Standard Resistance Range .....	100 to 100K ohms
Resistance Tolerance.....	±5%
Accuracy (Correlation of Dial Readout to Voltage Ratio Output) .....	±0.5% voltage ratio
Repeatability of Dial Readout .....	±0.1% voltage ratio
Resolution .....	See recommended part numbers
Effective Electrical Angle .....	3600° nominal
Absolute Minimum Resistance .....	1 ohm or 0.1% maximum (whichever is greater)
Noise .....	100 ohms ENR maximum
Power Rating	
(Voltage Limited By Power Dissipation or 385 VAC, Whichever is Less)	
+25°C .....	1.5 watts
+85°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level.....	1,000 VAC minimum
70,000 Feet .....	400 VAC minimum
Insulation Resistance (500 VDC) .....	1,000 megohms minimum

### Environmental Characteristics<sup>1</sup>

Operating Temperature	
Static Operation Temperature Range.....	-25°C to +85°C
Dynamic Operation Temperature Range.....	+1°C to +85°C
Temperature Coefficient <sup>2</sup> .....	±50ppm/°C maximum/wire
Moisture Resistance.....	MIL-STD-202, Method 103, Condition B
Total Resistance Shift .....	±2% maximum
Vibration.....	10G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±2% maximum
Voltage Ratio Shift .....	±0.2% maximum
Shock.....	50G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±2% maximum
Voltage Ratio Shift .....	±0.2% maximum
Load Life .....	1,000 hours, 1.5 watts
Total Resistance Shift .....	±2% maximum
Rotational Life (No Load) .....	50,000 shaft revolutions
Total Resistance Shift .....	±2% maximum

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

Mechanical Angle .....	3600° +20°, -0°
Stop Strength .....	20 oz.-in. (14 Ncm) minimum
Torque (Starting & Running) .....	4.0 oz.-in. (2.8 Ncm) maximum
Variation .....	1.0 oz.-in. (0.71 Ncm) maximum
Backlash.....	1.0° maximum
Weight.....	Approximately 20G
Terminals.....	Gold-plated J-Hooks
Markings .....	Manufacturer's name and part number, resistance value and date code

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

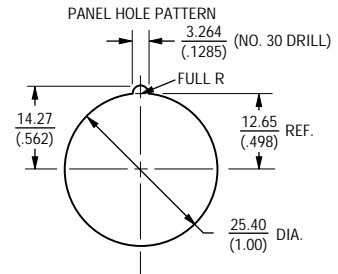
<sup>2</sup>Consult manufacturer for complete specification details for resistances below 500 ohms and above 100K ohms.

### Recommended Part Numbers

Part Number	Resistance (W)	Resolution (%)
3610S-1-102	1,000	.035
3610S-1-502	5,000	.027
3610S-1-103	10,000	.022

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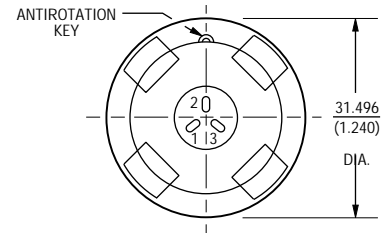
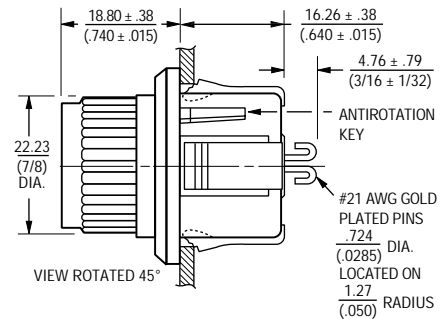
FOR OTHER OPTIONS CONSULT FACTORY.



NOTES:

1. SNAP-IN MOUNTING CUP ACCOMMODATES PANEL THICKNESS

$\frac{.64}{(.025)}$  THRU  $\frac{1.98}{(.078)}$  (NO. 22GA)  
THRU NO. 14GA) AND  $\frac{3.18}{(.125)}$

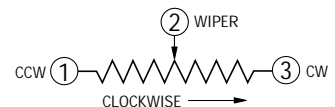


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: XX ±  $\frac{.25}{(.010)}$ , XXX ±  $\frac{.13}{(.005)}$

FRACTIONS: ±1/64

DIMENSIONS:  $\frac{MM}{(IN.)}$





## Features

- Repeatable settings
- Resolution to 0.001%
- Digital display provides excellent readability
- Snap-in panel mount

## 3680 - Precision Potentiometer

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

Standard Resistance Range .....	50 ohms to 1 megohm
Resistance Tolerance.....	±3%
Absolute Minimum Resistance .....	3 ohms or 0.2% maximum (whichever is greater)
Resolution	
3682.....	1%
3683.....	0.1%
Insulation Resistance (500 VDC) .....	1,000 megohms minimum
Power Rating	
(Voltage Limited By Power Dissipation or 500 VAC, Whichever is Less)	
+25°C .....	2 watts
+85°C .....	0 watt
Dielectric Withstanding Voltage .....	MIL-STD-202, Method 301
Sea Level.....	1,000 VAC minimum
Accuracy (Dial Reading to Output Ratio).....	±0.5% full scale

### Environmental Characteristics<sup>1</sup>

Operating Temperature Range .....	-25°C to +85°C
Temperature Coefficient .....	±100ppm/°C maximum
Vibration.....	10G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±1% maximum
Voltage Ratio Shift .....	±0.2% maximum
Shock.....	50G
Wiper Bounce .....	0.1 millisecond maximum
Total Resistance Shift .....	±1% maximum
Voltage Ratio Shift .....	±0.2% maximum
Load Life .....	1,000 hours, 2 watts
Total Resistance Shift .....	±2% maximum

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

Expected Life .....	75,000 button operations each decade
Total Resistance Shift .....	±2% maximum
Terminals.....	0.11 in. (2.79mm) wide x .016 in. (.41mm) thick, tinned solder lugs for 3 #20 AWG wires
Readout Marking .....	10 positions, 0-9
Markings .....	Manufacturer's name and part number, resistance value and date code

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

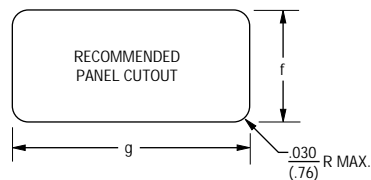
NOTE: Terminals 1 & 3 are reversed from illustration for models 3682 and 3684.

Model	Dimensions					Weight (Approx.)	
	a	b	c	d	e ±.015 (±.381)	oz.	gms.
3682	26.67 (1.050)	25.15 (.990)	10.67 (.420)	11.94 (.47)	8.38 (.330)	.576	16.5
3683	37.08 (1.460)	35.31 (1.390)	18.54 (.730)	11.94 (.47)	4.19 (.165)	.824	23.5

Model	Dimensions	
	f ±.010 (±.254)	g ±.010 (±.254)
3682	21.08 (.830)	25.91 (1.020)
3683	21.08 (.830)	36.07 (1.420)

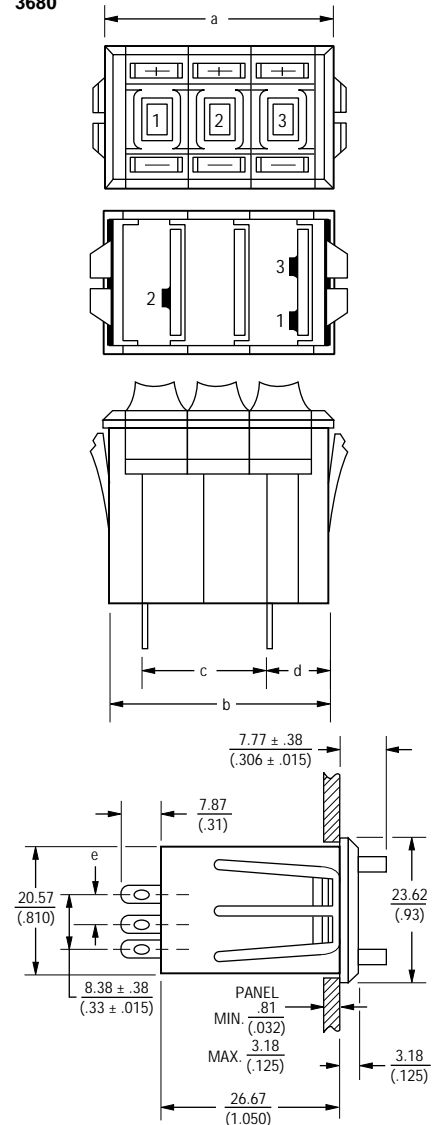
### Recommended Part Numbers

Resistance (Ω)	3682S-1 2 Decade	3683S-1 3 Decade
1,000	-102	-102
5,000	-502	-502
10K	-103	-103
50K		-503
100K		-104



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3680

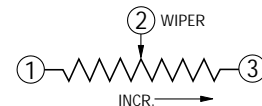


TOLERANCES: EXCEPT WHERE NOTED

DECIMALS: .XX ± .38 (.015) .XXX ± .13 (.005)

FRACTIONS: ±1/64

DIMENSIONS: MM (IN.)







### Features

- For use with Model 3680 digital pushbutton precision potentiometer

## H-385 - Panel Seal Assembly

### Physical Characteristics<sup>1</sup>

Material (Boot) .....	Clear silicone rubber
Material (Frame) .....	Rigid black plastic
Expected Life .....	100,000 actuations minimum
Weight	
H-385-2 .....	Approximately 8.50G
H-385-3 .....	Approximately 9.92G

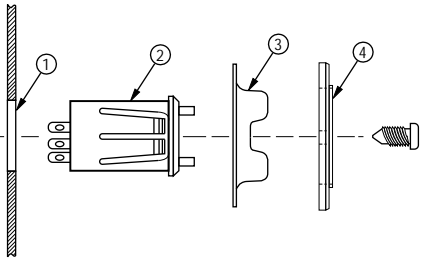
### Application Data

- Protects front of the pot from unwanted entry of rain, dust, grease or oils
- Transparent for easy viewing of numerals
- Tear resistant for long life
- Matte finish black plastic frame to complement most front panels

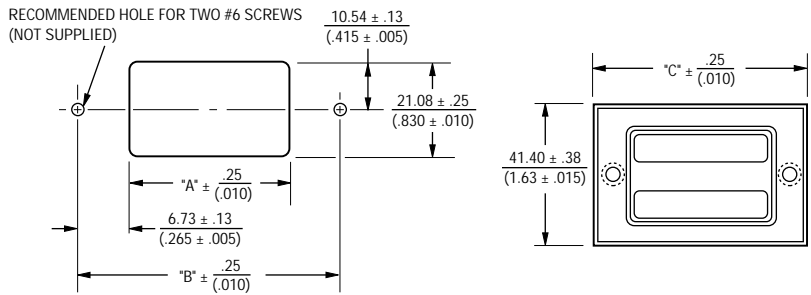
Bourns® Model H-385 Panel Seal Assembly minimizes accidental entry of liquids or foreign matter through the front of the Model 3680 Family Potentiometer.

### H-385 MOUNTING INSTRUCTIONS

1. Cut out and drill panel<sup>1</sup> per chart.
2. Install snap-in potentiometer<sup>2</sup>.
3. Locate silicone boot<sup>3</sup> and frame<sup>4</sup> over potentiometer and holes.
4. Attach panel seal assembly to panel with two #6 screws (not supplied).



### PANEL CUT-OUT/HOLE DIMENSIONS



For Use With	Part Number	Frame Dimensions "C"	Panel Cutout/ Hole Dimensions	
			"A"	"B"
3682	H-385-2	50.60 (1.992)	25.91 (1.020)	39.37 (1.550)
3683	H-385-3	60.76 (2.392)	36.07 (1.420)	49.53 (1.950)

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

### Cermet Elements

Cermet elements are available in a wide range of resistance values and tapers. They offer essentially infinite resolution and excellent stability in the most severe environmental conditions. Static and dynamic noise (CRV) performance is good but not as good as that of conductive plastic.

The temperature coefficient of cermet elements, though not as good as wirewound elements, is better than conductive plastic or carbon type elements. Linearity is quite good for a film type element and can be improved considerably for greater dial setting accuracy by laser tailoring.

Frequency response of cermet materials is very good and the practical application range extends well beyond 100 MHz.

### Conductive Plastic Elements

Conductive plastic is a thick film ink, similar to cermet, but has a smoother surface. This characteristic offers several operational advantages over cermet. Dynamic noise characteristics (CRV or output smoothness) and rotational life are measurably improved as a result of the surface smoothness. Resolution is essentially infinite.

Conductive plastic elements are generally available in a wide range of resistance values and tapers.

Moisture resistance, temperature coefficient, power dissipation and wiper current capacity for conductive plastic elements are not as good as cermet elements.

### Wirewound Elements

Wirewound elements offer good stability, excellent linearity, low noise, high power capabilities and good operational life.

Wirewound elements offer a wide selection of resistance values up to 500k ohms.

One primary limitation of wirewound elements is the finite resolution steps, which result from the wiper moving from turn to turn. (These steps are distinct, sudden, repeatable changes in output.) Resolution improves as resistance values increase due to the manufacturing processes whereby smaller wire and a higher number of turns are utilized.

In systems that might be sensitive to such discrete steps, care should be taken to select an element with resolution fine enough to avoid difficulty.

The many turns of resistance wire exhibit an inductive reactance that increases directly with frequency. This effect is most noticeable in low total resistance elements because the inductive reactance can be larger than the resistance, even at frequencies as low as 20KHZ.

The performance of wirewound elements is also affected by inherent capacitance. Capacitance exists from turn to turn and also between the winding and the mandrel. Capacitance effects are most significant in high total resistance elements.

### Hybritron® Elements

This element is a combination of a wirewound element with a conductive plastic coating. It exhibits the temperature coefficient and resistance stability approaching a pure wirewound element. It displays the long operational life, essentially infinite resolution and low noise characteristics of the pure conductive plastic elements. The combination of the two provides the major benefits of both types of elements. Not recommended in applications requiring high wiper currents.

**CAUTION: CONDUCTIVE PLASTIC AND HYBRITRON® ELEMENTS SHOULD BE APPLIED IN VOLTAGE DIVIDER CIRCUITS ONLY.**

### Absolute Minimum Resistance

#### DEFINITION

The resistance measured between the wiper terminal and either end terminal when the wiper is positioned to give a minimum value on the measuring device.

#### TEST PROCEDURE

The wiper shall be positioned at one end of the resistance element so that a minimum value of resistance shall be measured as specified between the wiper and the corresponding end terminal. The same procedure shall be followed for the opposite end of the resistance element.

### Contact Resistance Variation (CRV)

#### DEFINITION

The apparent resistance seen between the wiper and the resistance element when the wiper is energized with a specified current and moved over the adjustment travel in either direction at a constant speed. The output variations are

measured over a specified frequency bandwidth, exclusive of the effects due to roll-on or roll-off of the terminations and expressed in ohms or percent of total resistance test procedure

CRV shall be tested using the circuit as shown in Fig. 1 on page 253 of Potentiometer Handbook (or its equivalent). The operating shaft shall be rotated in both directions through 90% of the adjustment travel for a total of 6 cycles. Only the last 3 cycles shall count in determining whether or not a contact resistance variation is observed at least twice in the same area (within 5%), exclusive of the roll-on or roll-off points where the wiper moves from the termination, on or off, the resistance element. The rate of rotation of the operating shaft shall be such that the wiper completes 1 cycle in 5 seconds, minimum, to 2 minutes, maximum. The test current used shall be in accordance with the table below, unless otherwise specified.

Test Current (±20%)	Total Resistance Range
30 ma	50 Ohms
10 ma	= or >50 Ohms to <500 Ohms
1 ma	= or >500 Ohms to <100K Ohms
100 ua	= or >100K Ohms to <2 Megohms
50 ua	= or >2 Megohms

### Dielectric Withstanding Voltage

#### DEFINITION

The ability to withstand under prescribed conditions, a specified potential of a given characteristic between the terminals of each cup and exposed conducting surface of the potentiometer, or between the terminals of each cup and the terminals of every other cup in the assembly without exceeding a specified leakage current value.

#### TEST PROCEDURE

The magnitude of the test voltage shall be specified. Connect the equipment by applying the high voltage source between the potentiometer terminals (interconnected) and the shaft or case. Raise the test voltage from zero to the proper maximum value at a rate of 500 volts per second maximum. Maintain the test voltage at this level while operating the shaft through one full sweep of its mechanical travel in a time interval of not less than 5 seconds nor more than 60 seconds. Monitor the

## Definitions and Test Procedures

**BOURNS®**

leakage current indicating device throughout this test for evidence of damage, arcing, breakdown, or leakage current in excess of 1 milliamperes. Upon completion of the test, prior to disconnecting the leads, gradually reduce the test voltage to zero.

For ganged potentiometers, repeat the foregoing applying the high voltage between the terminals of each cup and the terminals of every other cup on the potentiometer under test.

### Equivalent Noise Resistance (ENR)

#### DEFINITION

Any spurious variation in the electrical output not present in the input, defined quantitatively in terms of an equivalent parasitic transient resistance in ohms, appearing between the contact and the resistance element when the shaft is rotated or translated. The equivalent noise resistance is defined independently of the resolution, the functional characteristics, and the total travel. The magnitude of the equivalent noise resistance is the maximum departure from a specified reference line. The wiper of the potentiometer is required to be excited by a specified current and moved at a specified speed.

#### TEST PROCEDURE

The potentiometer shaft is cycled not less than ten times over a minimum of 95% of the electrical continuity travel within the rated travel speed of the potentiometer just prior to making noise measurements. The potentiometer shaft is then connected mechanically to the constant speed drive and electrically connected to the test circuit. With the constant speed drive engaged, the potentiometer noise characteristic may then be noted on the oscilloscope as the wiper traverses one complete cycle over the full electrical continuity travel and the maximum values are compared to the specified limit.

If only random spikes of noise are noted, the potentiometer should be cycled again. If the random spikes are repetitive, the maximum values should be noted. Otherwise do not consider the initial measurements as noise.

### Independent Linearity

#### DEFINITION

The maximum deviation expressed as a percent of the total applied voltage, of the actual function characteristic from a straight line whose slope and position minimize the maximum deviations over the actual electrical travel, or any specified portion thereof.

#### TEST PROCEDURE

Consult factory.

### Insulation Resistance

#### DEFINITION

The resistance to a specified impressed DC voltage between the terminals of each cup and the exposed conducting surfaces of the potentiometer, or between the terminals of each cup and the terminals of every other cup in the gang, under prescribed conditions.

#### TEST PROCEDURE

Interconnect all electrically insulated terminals of each cup of the potentiometer. Connect the insulation resistance test set to the terminal of the first cup and to some exposed conducting surface (shaft, housing, etc.) and apply the specified test voltage. Unless otherwise specified the test voltage shall be 500 VDC. Maintain the test voltage at this level for 5 to 10 seconds before initiating movement of the shaft through one full sweep of the total mechanical travel in a time interval of not less than 5 seconds nor more than 60 seconds. Monitor the indicated insulation resistance during this voltage application, the insulation resistance is the minimum value observed during the movement of the shaft.

For ganged potentiometers, repeat the procedure for each cup applying the high voltage between the terminal of each cup and the exposed conducting surface of the potentiometer.

### Output Smoothness

#### DEFINITION

The spurious variations in the electrical output not present in the input. They are measured for specified travel increments over the theoretical electrical travel and expressed as a percentage of the total applied voltage.

#### TEST PROCEDURE

Mount the potentiometer in the constant-speed drive (4 RPM) and excite it with the power supply. Connect the wiper and the power common lead to the input of the filter and the output of the filter to the oscilloscope. When a load is specified for a conformity test, use that load for the output smoothness test. When no load is specified for the conformity test, apply a load equal to 100 times the nominal resistance value of the potentiometer under test between the wiper and the CCW end (unless otherwise specified).

The output smoothness is the largest excursion voltage occurring over one specified travel increment, divided by the total applied voltage. Unless otherwise specified, the travel increment is 1% of the theoretical electrical travel.

Excursions occurring at the point of abrupt changes in input slope (start, end, and reversal) are not considered output smoothness faults.

### Power Rating

#### DEFINITION

The maximum power, in watts, that a potentiometer can dissipate across the entire resistive element under specified conditions while meeting specified operating performance requirements.

### Resolution

#### DEFINITION

A measure of the sensitivity to which the output of a potentiometer may be set. (Applicable to wirewound potentiometers only.)

Theoretical resolution; the reciprocal of the number of turns of wire in the resistance winding in the actual electrical travel, expressed as a percentage.

Travel resolution; the maximum value of shaft travel (in degrees for rotary devices) in one direction per incremental voltage stop in any specified portion of the resistance element.

Voltage resolution; the maximum incremental change in output ratio with shaft travel in one direction in any specified portion of the resistance element.

#### TEST PROCEDURE

Consult factory.

### Temperature Coefficient of Resistance

#### DEFINITION

The unit change in resistance per degree Celsius change from a reference temperature, expressed in parts per million per degree Celsius using the following formula:

$$TC = [(R1-R2)/R1(T2-T1)] \times 10^6$$

WHERE: R1 = Resistance at reference temperature in ohms

R2 = Resistance at test temperature in ohms

T1 = Reference temperature in degrees Celsius

T2 = Test temperature in degrees Celsius

#### TEST PROCEDURE

Position the wiper of the potentiometer to be tested off of the actual electrical travel or at a point to minimize the total resistance if no over travel exists. Subject the potentiometer to the specified test temperature(s). The total resistance is measured after temperature chamber has been stabilized for the test temperature for a minimum of 30 minutes (avoid over aging). The reference temperature of 25 degree Celsius shall be used for all elevated and reduced temperatures. Calculate the (TC) by inserting the appropriate data into the above formula and comparing the result to the specification.

### Total Resistance

#### DEFINITION

The DC resistance between the end terminals of a potentiometer with the shaft positioned so as to give a maximum resistance value.

#### TEST PROCEDURE

With the VOM or DVM device (10ma maximum current) connected between the wiper and one end terminal, position the wiper onto the electrical overtravel. Reconnect the test leads of the measuring device to the end terminals of the potentiometer under test, the reading observed is the total resistance of the potentiometer.