



## Features

- RoHS compliant\*
- Conductive plastic or cermet
- Linear and audio tapers
- PC board and bushing mount
- Gangable
- Metal bushing and shaft
- Sealed for board washing



## 51/53 – Sealed 1/2" (12.5 mm) Square Control

| Electrical Characteristics <sup>1</sup>                                                                               | Conductive Plastic                                                                                                                                                                                                                                                                       | Cermet                |
|-----------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------|
| Standard Resistance Range                                                                                             |                                                                                                                                                                                                                                                                                          |                       |
| Linear                                                                                                                | 1 K ohms to 1 megohm                                                                                                                                                                                                                                                                     | 150 ohms to 1 megohm  |
| Audio                                                                                                                 | 1 K ohms to 1 megohm                                                                                                                                                                                                                                                                     | 1 K ohms to 1 megohm  |
| Total Resistance Tolerance                                                                                            |                                                                                                                                                                                                                                                                                          |                       |
| Linear Tapers                                                                                                         | ±10 % or ±20 %                                                                                                                                                                                                                                                                           | ±10 % or ±5 %         |
| Audio Tapers                                                                                                          | ±10 % or ±20 %                                                                                                                                                                                                                                                                           | ±10 %                 |
| Independent Linearity                                                                                                 | ±5 %                                                                                                                                                                                                                                                                                     | ±5 %                  |
| Absolute Minimum Resistance                                                                                           | 2 ohms maximum                                                                                                                                                                                                                                                                           | 2 ohms maximum        |
| Effective Electrical Angle                                                                                            | 270 ° ±5 °                                                                                                                                                                                                                                                                               | 270 ° ±5 °            |
| Contact Resistance Variation                                                                                          | 2 %                                                                                                                                                                                                                                                                                      | 2 %                   |
| Dielectric Withstanding Voltage (MIL-STD-202 – Method 301)                                                            |                                                                                                                                                                                                                                                                                          |                       |
| Sea Level                                                                                                             | 1,500 VAC minimum                                                                                                                                                                                                                                                                        | 1,500 VAC minimum     |
| 70,000                                                                                                                | 500 VAC minimum                                                                                                                                                                                                                                                                          | 500 VAC minimum       |
| Insulation Resistance                                                                                                 | 1,000 megohms minimum                                                                                                                                                                                                                                                                    | 1,000 megohms minimum |
| Power Rating At 70 °C (Derate To 0 At 125 °C)<br>(Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less) |                                                                                                                                                                                                                                                                                          |                       |
| Linear Tapers                                                                                                         | 0.5 watt                                                                                                                                                                                                                                                                                 | 1.0 watt              |
| Audio Tapers                                                                                                          | 0.25 watt                                                                                                                                                                                                                                                                                | 0.5 watt              |
| Theoretical Resolution                                                                                                | Essentially infinite                                                                                                                                                                                                                                                                     | Essentially infinite  |
| Environmental Characteristics <sup>1</sup>                                                                            |                                                                                                                                                                                                                                                                                          |                       |
| Operating Temperature Range                                                                                           | +1 °C to +125 °C                                                                                                                                                                                                                                                                         | +1 °C to +125 °C      |
| Storage Temperature Range                                                                                             | -55 °C to +125 °C                                                                                                                                                                                                                                                                        | -55 °C to +125 °C     |
| Temperature Coefficient Over Storage Temperature Range                                                                | ±1,000 ppm/°C                                                                                                                                                                                                                                                                            | ±150 ppm/°C           |
| Vibration (Single Section)                                                                                            | 15 G                                                                                                                                                                                                                                                                                     | 15 G                  |
| Total Resistance Shift                                                                                                | ±2 % maximum                                                                                                                                                                                                                                                                             | ±2 % maximum          |
| Voltage Ratio Shift                                                                                                   | ±5 % maximum                                                                                                                                                                                                                                                                             | ±5 % maximum          |
| Shock (Single Section)                                                                                                | 30 G                                                                                                                                                                                                                                                                                     | 30 G                  |
| Total Resistance Shift                                                                                                | ±2 % maximum                                                                                                                                                                                                                                                                             | ±2 % maximum          |
| Voltage Ratio Shift                                                                                                   | ±5 % maximum                                                                                                                                                                                                                                                                             | ±5 % maximum          |
| Load Life                                                                                                             | 1,000 hours                                                                                                                                                                                                                                                                              | 1,000 hours           |
| Total Resistance Shift                                                                                                | ±10 % TRS maximum                                                                                                                                                                                                                                                                        | ±5 % TRS maximum      |
| Rotational Life (No Load)                                                                                             | 50,000 cycles                                                                                                                                                                                                                                                                            | 25,000 cycles         |
| Total Resistance Shift                                                                                                | ±10 % TRS maximum                                                                                                                                                                                                                                                                        | ±10 % TRS maximum     |
| Contact Resistance Variation @ 25,000 Cycles                                                                          | ±2 %                                                                                                                                                                                                                                                                                     | ±4 %                  |
| Moisture Resistance (MIL-STD-202, Method 103, Condition B)                                                            |                                                                                                                                                                                                                                                                                          |                       |
| Total Resistance Shift                                                                                                | ±10 % TRS                                                                                                                                                                                                                                                                                | ±5 % TRS              |
| IP Rating                                                                                                             |                                                                                                                                                                                                                                                                                          |                       |
| Entire Unit                                                                                                           | IP64                                                                                                                                                                                                                                                                                     | IP64                  |
| Shaft/Bushing                                                                                                         | IP65                                                                                                                                                                                                                                                                                     | IP65                  |
| Mechanical Characteristics                                                                                            |                                                                                                                                                                                                                                                                                          |                       |
| Stop Strength                                                                                                         | 56 N-cm (5 lb.-in.)                                                                                                                                                                                                                                                                      |                       |
| Mechanical Angle                                                                                                      | 290 ° ±5 °                                                                                                                                                                                                                                                                               |                       |
| Torque                                                                                                                |                                                                                                                                                                                                                                                                                          |                       |
| Starting (Dual Sections)                                                                                              | +0.35 N-cm (+0.5 oz.-in.) maximum                                                                                                                                                                                                                                                        |                       |
| Running (Single Section)                                                                                              | 0.15 to 1.4 N-cm (0.2 to 2.0 oz.-in.)                                                                                                                                                                                                                                                    |                       |
| Running (Dual Section)                                                                                                | 0.35 to 1.8 N-cm (0.5 to 2.5 oz.-in.)                                                                                                                                                                                                                                                    |                       |
| Detent (Single Section)                                                                                               | 1.94 N-cm (2.75 oz.-in.) minimum                                                                                                                                                                                                                                                         |                       |
| Mounting (Torque on Bushing)                                                                                          | 1.7 to 2.0 N-m (15 to 18 lb.-in.) maximum                                                                                                                                                                                                                                                |                       |
| Weight (Single Section)                                                                                               | 5.5 grams                                                                                                                                                                                                                                                                                |                       |
| (Additional Section)                                                                                                  | 3.0 grams                                                                                                                                                                                                                                                                                |                       |
| Terminals                                                                                                             | PC pin or solder lug                                                                                                                                                                                                                                                                     |                       |
| Soldering Condition                                                                                                   | Recommended hand soldering using Sn95/Ag5 no clean solder, 0.025" wire diameter.<br>Maximum temperature 399 °C (750 °F) for 3 seconds. No wash process to be used with no clean flux.<br>Part can be wave soldered at 260 °C (500 °F) for 5 seconds, no wash process with no clean flux. |                       |
| Marking                                                                                                               | Manufacturer's trademark, part number and date code                                                                                                                                                                                                                                      |                       |
| Ganging (Multiple Section Potentiometer)                                                                              | 2 sections maximum**                                                                                                                                                                                                                                                                     |                       |
| Hardware                                                                                                              | One lockwasher and one mounting nut is shipped with each potentiometer (Bushing A: H-37-2 & H-38-2;<br>Bushing C: H-37-1 & H-38-1; Bushing R: H-37-4 & H-38-9; Bushing S: H-37-1 & H-38-14; Bushing U: H-37-3 & H-38-8)                                                                  |                       |

<sup>1</sup>Electrical specifications tested at 200 RPM, at room ambient: +25 °C nominal.

\*\* Additional sections available on special request with higher minimum order quantities.



**WARNING**  
Cancer and Reproductive Harm  
[www.P65Warnings.ca.gov](http://www.P65Warnings.ca.gov)

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

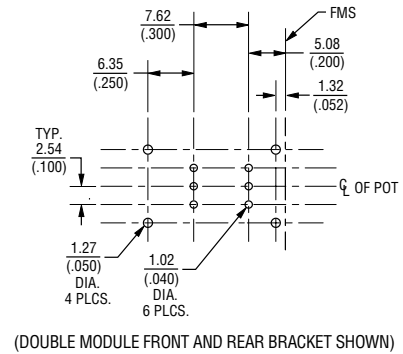
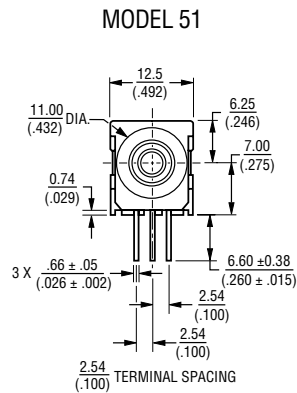
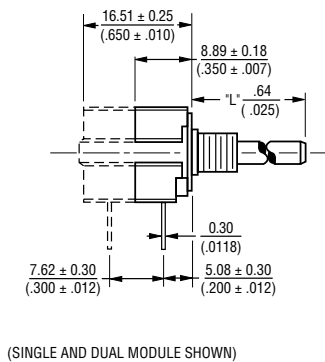
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# 51/53 – Sealed 1/2" (12.5 mm) Square Control

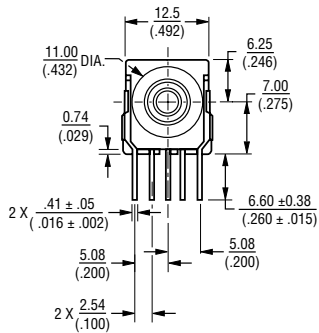
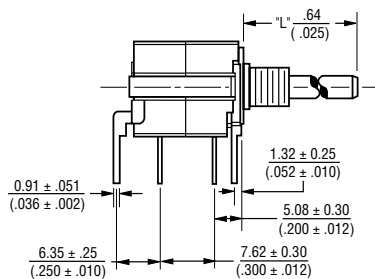
**BOURNS®**

## Product Dimensions

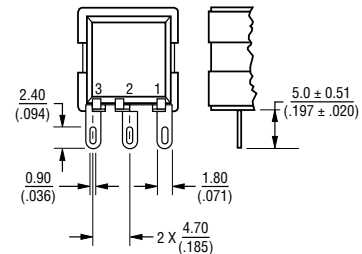
### PACKAGE DIMENSIONS



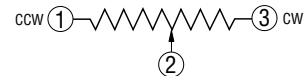
### PACKAGE DIMENSIONS PCB MOUNTING BRACKET



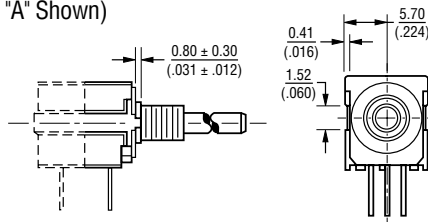
### SOLDER LUG TERMINALS MODEL 53



### ELECTRICAL SCHEMATIC

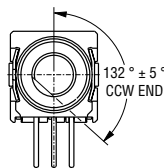


### ANTI-ROTATION LUG (Style "A" Shown)

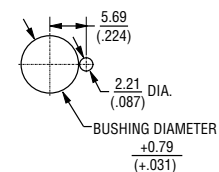


DIMENSIONS:  $\frac{\text{MM}}{\text{(INCHES)}}$

### SHAFT FLAT ORIENTATION



### SUGGESTED PANEL LAYOUT



FOR TOLERANCES SHOWN: .XX =  $\pm \frac{.25}{.010}$   
 .XXX =  $\pm \frac{.13}{.005}$   
 SHAFT DIMENSIONS =  $\pm \frac{.80}{(.1/32)}$

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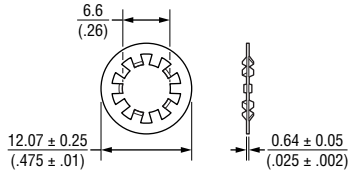
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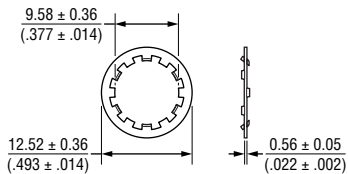
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## Hardware

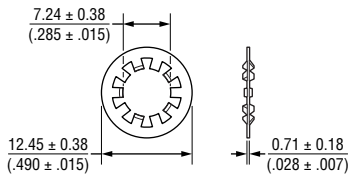
### LOCKWASHER H-37-1



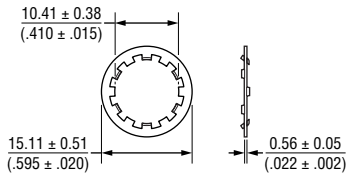
### LOCKWASHER H-37-2



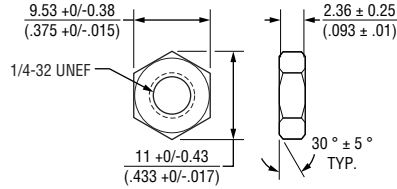
### LOCKWASHER H-37-3



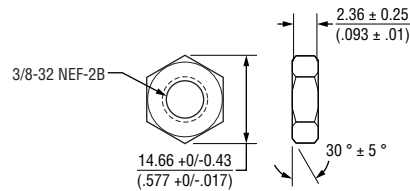
### LOCKWASHER H-37-4



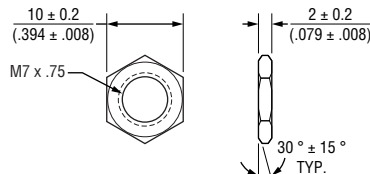
### NUT H-38-1



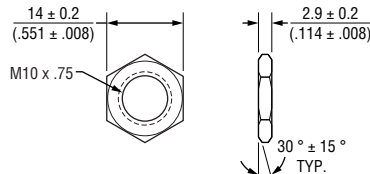
### NUT H-38-2



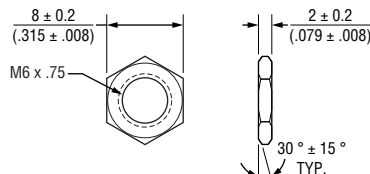
### NUT H-38-8



### NUT H-38-9



### NUT H-38-14



## Date Code Description

YY WW M

M = COUNTRY OF MANUFACTURE (MEXICO)  
 WW = WEEK NUMBER  
 YY = LAST TWO DIGITS OF YEAR MANUFACTURED

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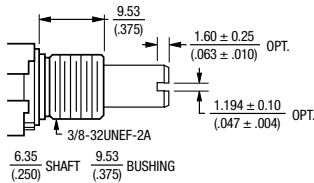
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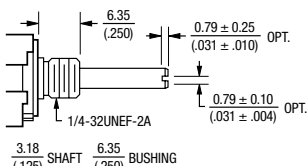
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## Shaft/Bushing Styles



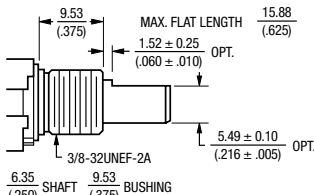
**A Style Bushing**

| STD. LENGTH 'L' |
|-----------------|
| .500 (12.7)     |
| .625 (15.88)    |
| .750 (19.05)    |
| .875 (22.23)    |
| 1.000 (25.4)    |



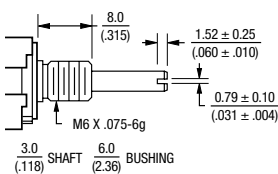
**C Style Bushing**

| STD. LENGTH 'L' |
|-----------------|
| .375 (9.53)     |
| .500 (12.7)     |
| .625 (15.88)    |
| .750 (19.05)    |
| .875 (22.23)    |
| 1.000 (25.4)    |



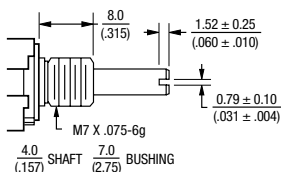
**A Style Bushing - Flatted Shaft**

| STD. LENGTH 'L' |
|-----------------|
| .625 (15.88)    |
| .750 (19.05)    |
| .875 (22.23)    |
| 1.000 (25.4)    |



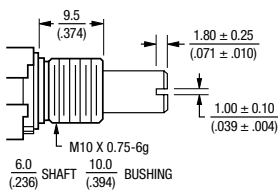
**S Style Bushing**

| STD. LENGTH 'L' |
|-----------------|
| .630 (16.0)     |
| .866 (22.0)     |
| .984 (25.0)     |



**U Style Bushing**

| STD. LENGTH 'L' |
|-----------------|
| .630 (16.0)     |
| .866 (22.0)     |
| .984 (25.0)     |



**R Style Bushing**

| STD. LENGTH 'L' |
|-----------------|
| .630 (16.0)     |
| .866 (22.0)     |
| .984 (25.0)     |

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

## How To Order

51 A A D - B 28 - A 15 / A15 L

Part number for multiple section potentiometers must have a taper and resistance value for each section.

RoHS IDENTIFIER  
L Compliant

### MOUNTING BRACKET/ ANTI-ROTATION LUG

| Code | Description            |
|------|------------------------|
| A    | AR Lug 90 °CW          |
| D    | No AR Lug or Bracket   |
| L    | Front Bracket          |
| M    | Rear Bracket           |
| N    | Front and Rear Bracket |

### # SECTIONS/DETENTS

| Code | Description            |
|------|------------------------|
| A    | Single No Detent       |
| B    | Double No Detent       |
| E    | Single w/Center Detent |
| F    | Double w/Center Detent |

### BUSHING CONFIGURATION

| Code | Description        |
|------|--------------------|
| A    | 3/8" D x 3/8" L    |
| C    | 1/4" D x 1/4" L    |
| R    | 10 mm D x 9.5 mm L |
| S    | 6 mm D x 8 mm L    |
| U    | 7 mm D x 8 mm L    |

### MODEL

| Code | Description             |
|------|-------------------------|
| 51   | PC Pins (.100" centers) |
| 53   | Solder Lugs             |

| ELEMENT TAPER TYPE/TOLERANCE |                               | RESISTANCE (CODE) |              |
|------------------------------|-------------------------------|-------------------|--------------|
| Code                         | Description                   | VALUE IN OHMS     |              |
| (A)                          | Linear Cermet ±10 %           | (28) – 150        | (14) – 7.5 K |
| (H)                          | Linear Cermet ±5 %            | (06) – 200        | (15) – 10 K  |
|                              |                               | (07) – 250        | (30) – 15 K  |
|                              |                               | (08) – 500        | (16) – 20 K  |
|                              |                               | (09) – 750        | (17) – 25 K  |
|                              |                               | (10) – 1 K        | (18) – 50 K  |
|                              |                               | (29) – 1.5 K      | (19) – 75 K  |
|                              |                               | (11) – 2 K        | (20) – 100 K |
|                              |                               | (12) – 2.5 K      | (23) – 500 K |
|                              |                               | (13) – 5 K        | (25) – 1 M   |
| (B)                          | Linear C-P ±20 %              | (10) – 1 K        | (18) – 50 K  |
| (E)                          | Linear C-P ±10 %              | (12) – 2.5 K      | (20) – 100 K |
|                              |                               | (13) – 5 K        | (22) – 250 K |
|                              |                               | (15) – 10 K       | (23) – 500 K |
|                              |                               | (16) – 20 K       | (25) – 1 M   |
|                              |                               | (17) – 25 K       |              |
| (C)                          | CW Audio Cermet ±10 %         | (10) – 1 K        | (18) – 50 K  |
| (F)                          | CCW Audio Cermet ±10 %        | (12) – 2.5 K      | (20) – 100 K |
|                              |                               | (13) – 5 K        | (23) – 500 K |
|                              |                               | (15) – 10 K       | (25) – 1 M   |
|                              |                               | (17) – 25 K       |              |
| (D)                          | CW Audio C-P ±20 %            | (10) – 1 K        | (18) – 50 K  |
| (S)                          | CW Audio C-P ±10 %            | (12) – 2.5 K      | (20) – 100 K |
|                              |                               | (13) – 5 K        | (22) – 250 K |
|                              |                               | (15) – 10 K       | (23) – 500 K |
|                              |                               | (17) – 25 K       | (25) – 1 M   |
| (G)                          | CCW Audio C-P ±20 %           | (10) – 1 K        | (18) – 50 K  |
| (T)                          | CCW Audio C-P ±10 %           | (12) – 2.5 K      | (20) – 100 K |
|                              |                               | (13) – 5 K        | (22) – 250 K |
|                              |                               | (15) – 10 K       | (23) – 500 K |
|                              |                               | (17) – 25 K       | (25) – 1 M   |
| (Y)                          | CW Dual Audio Taper C-P ±20 % | (10) – 1 K        | (18) – 50 K  |
|                              |                               | (12) – 2.5 K      | (20) – 100 K |
|                              |                               | (13) – 5 K        | (22) – 250 K |
|                              |                               | (15) – 10 K       | (23) – 500 K |
|                              |                               | (17) – 25 K       | (25) – 1 M   |

| SHAFT TYPE |                       | AVAILABLE ONLY IN BUSHINGS |                |
|------------|-----------------------|----------------------------|----------------|
| Code       | Description           | Code                       | Description    |
| B          | Single Slotted 1/4" D | A                          | 24,28          |
| C          | Single Flatted 1/4" D | A                          | 20,24,28,32    |
| E          | Single Slotted 1/8" D | C                          | 12,16,20,24,28 |
| R          | Single Slotted 6 mm D | R                          | 16,22,25       |
| T          | Single Slotted 4 mm D | U                          | 16,22,25       |
| U          | Single Slotted 3 mm D | S                          | 16,22,25       |

| SHAFT LENGTH (FMS) |             | AVAILABLE ONLY IN BUSHING |             |
|--------------------|-------------|---------------------------|-------------|
| Code               | Description | Code                      | Description |
| 12                 | 3/8"        | C                         |             |
| 16                 | 1/2"        | A, C                      |             |
| 20                 | 5/8"        | A, C                      |             |
| 24                 | 3/4"        | A, C                      |             |
| 28                 | 7/8"        | A, C                      |             |
| 32                 | 1"          | A, C                      |             |
| Metric             |             |                           |             |
| 16                 | 16 mm       | R, S, U                   |             |
| 22                 | 22 mm       | R, S, U                   |             |
| 25                 | 25 mm       | R, S, U                   |             |

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

REV. 10/20

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