



Features

- Available in a variety of pin-out configurations
- Virtually infinite electrical circuit isolation
- Metal or plastic shaft options
- RoHS compliant*

Model 91, 92, 93, 94 & 95 - 5/8" Square Single-Turn Panel Control

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

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

*RoHS Directive 2002/95/EC Jan. 27, 2003 including annex and RoHS Recast 2011/65/EU June 8, 2011.
 Specifications are subject to change without notice.
 Customers should verify actual device performance in their specific applications.

Model 91, 92, 93, 94 & 95 - 5/8" Square Single-Turn Panel Control

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Mechanical Characteristics¹

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

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

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

Model 91, 92, 93, 94 & 95 - 5/8" Square Single-Turn Panel Control **BOURNS®**

Product Dimensions

Model 91 PC Pin Terminals, In-Line



Model 92 J-Hooked Terminals, In-Line



Model 94 J-Hooked Terminals, "L" Pattern



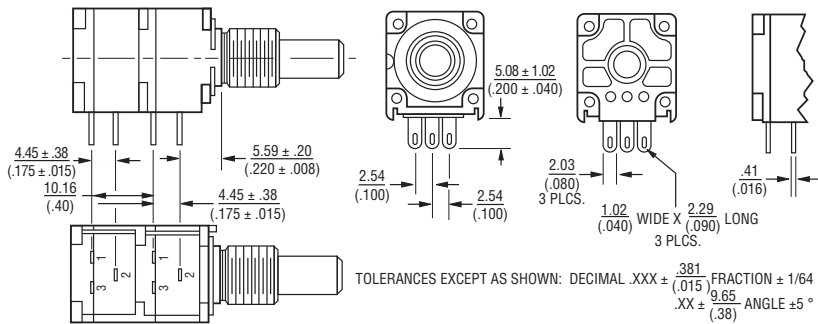
Model 93 PC Pin Terminals, "L" Pattern



Shaft Flat Orientation



Model 95 Solder Lug Terminals, "Triangular" Pattern



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Model 91, 92, 93, 94 & 95 - 5/8" Square Single-Turn Panel Control **BOURNS®**

Product Dimensions

Plastic Shaft Styles

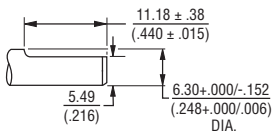
SHAFT TYPE "B" (USES BUSHING A)



STD. LENGTHS:

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

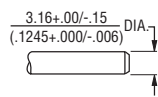
SHAFT TYPE "C" (USES BUSHING A)



STD. LENGTHS:

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

SHAFT TYPE "D" (USES BUSHING C)



STD. LENGTHS:

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

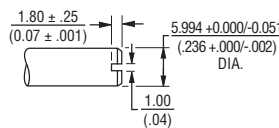
SHAFT TYPE "T" (USES BUSHING U)



STD. LENGTHS:

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

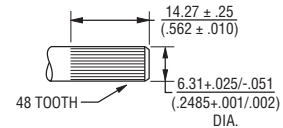
SHAFT TYPE "R" (USES BUSHING R)



STD. LENGTHS:

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

SHAFT TYPE "W" (USES BUSHING A)

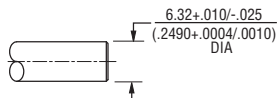


STD. LENGTHS:

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

Metal Shaft Styles

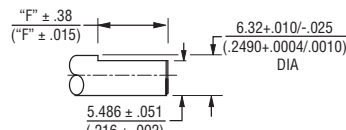
SHAFT TYPE "A" (USES BUSHING A)



STD. LENGTHS:

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

SHAFT TYPE "H" (USES BUSHING A)



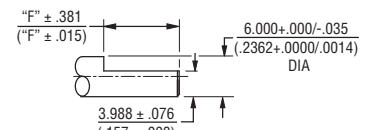
STD. LENGTHS:

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

FLAT LENGTH "F":

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

SHAFT TYPE "S" (USES BUSHING R)



STD. LENGTHS:

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

FLAT LENGTH "F":

| | |
|----------------|-----------------|
| 9.98 (.393) | 12.98 (.511) |
|----------------|-----------------|

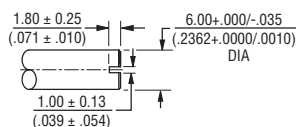
SHAFT TYPE "E" (USES BUSHING C)



STD. LENGTHS:

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

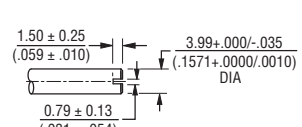
SHAFT TYPE "J" (USES BUSHING R)



STD. LENGTHS:

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

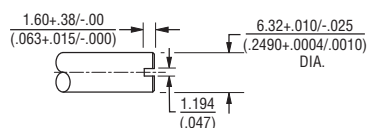
SHAFT TYPE "V" (USES BUSHING U)



STD. LENGTHS:

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

SHAFT TYPE "G" (USES BUSHING A)



STD. LENGTHS:

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

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

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

How to Order Model 91, 92, 93, 94 & 95 Panel Controls

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

91 A 2 A - A 28 - A 15 /

A15

L

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

| # SECTIONS | |
|------------|--------|
| 1 | Single |
| 2 | Dual |

| BUSHING | |
|----------|-------------------------------------------------|
| A | Metal Plain 3/8" (9.53 mm) D x 3/8" (9.53 mm) L |
| C | Metal Plain 1/4" (6.35 mm) D x 1/4" (6.35 mm) L |
| R | Metal Plain 10 mm D x 9 mm L |
| U | Metal Plain 7 mm D x 9 mm L |

| MODEL | |
|-----------|-------------------------------------------|
| 91 | Single-Turn, In-Line PC Pins |
| 92 | Single-Turn, In-Line J-Hooks |
| 93 | Single-Turn, L-Pattern PC Pins |
| 94 | Single-Turn, L-Pattern J-Hooks |
| 95 | Single-Turn, Triangle-Pattern Solder Lugs |

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

| RoHS IDENTIFIER | |
|-----------------|-----------|
| L | Compliant |

| ELEMENT TAPER TYPE/TOLERANCE | | RESISTANCE CODE VALUE IN OHMS | |
|-----------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|---------------------|
| (A) (H) | Linear Cermet ±10 % Linear Cermet ±5 % | (05) - 100 | (30) - 15 K |
| | | (28) - 150 | (16) - 20 K |
| | | (06) - 200 | (17) - 25 K |
| | | (07) - 250 | (18) - 50 K |
| | | (08) - 500 | (20) - 100 K |
| (B) (E) | Linear C-P ±20 % Linear C-P ±10 % | (10) - 1 K | (21) - 200 K |
| | | (11) - 2 K | (22) - 250 K |
| | | (12) - 2.5 K | (23) - 500 K |
| | | (13) - 5 K | (25) - 1 M |
| | | (15) - 10 K | |
| (C) (D) (F) (G) (S) (T) | CW Audio Cermet ±10 % CW Audio C-P ±20 % CCW Audio Cermet ±10 % CCW Audio C-P ±20 % CW Audio C-P ±10 % CCW Audio C-P ±10 % | (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 | |
|--------------------------------------------------|-------------------|-----------------|
| | LENGTHS (CODE) | BUSHINGS (CODE) |
| B Plastic Single Slotted 1/4" (6.35 mm) D | 16, 20, 24, 28 | A |
| C Plastic Single Flatted 1/4" (6.35 mm) D | 24, 28 | A |
| D Plastic Single Plain 1/8" (3.18 mm) D | 16, 20, 24 | C |
| R Plastic Single Slotted 6 mm D | Metric 16, 22 | R |
| T Plastic Single Slotted 4 mm D | Metric 16, 22 | U |
| W Plastic Single Knurled 1/4" (6.35 mm) D | 32 | A |
| A Metal Single Plain 1/4" (6.35 mm) D | 16, 20, 24 | A |
| E Metal Single Slotted 1/8" (3.18 mm) D | 16, 20, 24 | C |
| G Metal Single Slotted 1/4" (6.35 mm) D | 16, 20, 24, 28 | A |
| H Metal Single Flatted 1/4" (6.35 mm) D | 24, 28 | A |
| J Metal Single Slotted 6 mm D | Metric 16, 22 | R |
| S Metal Single Flatted 6 mm D | Metric 16, 22 | R |
| V Metal Single Slotted 4 mm D | Metric 16, 22 | U |

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



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