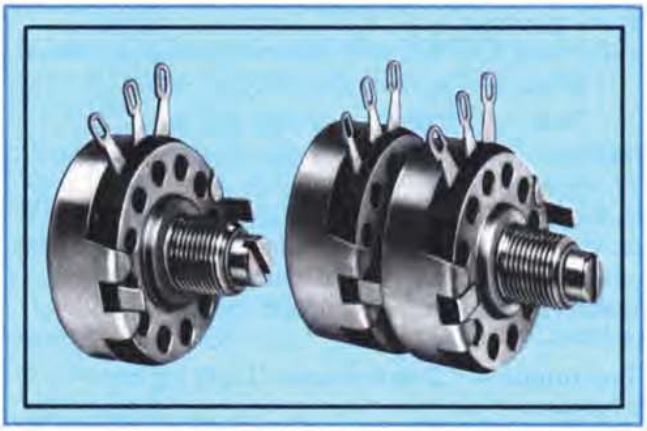
Type J
Hot-Molded Panel Potentiometers

1-5/32 (1.156) Inch
(29,36 mm) Diameter
2.25 Watts (70° C)
50 Ohms to 5.0 Megohms



FEATURES

- ±20% or ±10% Tolerance
- Linear and Non-Linear Tapers
- Hot-Molded Composition
- Single, Dual and Triple Sections
- Switches UL Approved
- Style RV4 and 2RV7

SPECIFICATIONS

General

Temperature range – −55° C to +120° C.

Total resistance values – Preferred nominal values listed below. Other values available.

OHMS				
50	750	7.5K	75K	750K
100	1K	10K	100K	1 Meg.
200	2K	20K	200K	2 Meg.
250	2.5K	25K	250K	2.5 Meg.
500	5K	50K	500K	5 Meg.

Total resistance tolerances – ±20% or ±10%.

Tapers – Available in the following resistance ranges:

TAPER	TOTAL RESISTANCE RANGE
U	50 Ohms to 5.0 Megohms
A, B, S & DB	250 Ohms to 5.0 Megohms

See chart on Page 93 for explanation of tapers. Special tapers, where practical, can be supplied.

End resistance – See chart on Page 93.

Switches – Single pole, Single throw snap switch that "turns on at start of clockwise rotation". Underwriter rating 2 amperes 125 volts RMS 60 Hertz. Underwriter Laboratories approval file number E-10392. Also rated 10 amperes 10 volts direct current noninductive. Meets 3 ampere 117 volts MIL-R-94 specification. Switches can be operated 5000 cycles at full rating.

Attenuators – See Allen-Bradley Publication EC5910-2.1 for L, Bridged-T, Straight-T and Bridged-H pads.

Applicable military specification – Many of the single variable resistors listed herein may be ordered as Style RV4 of MIL-R-94; and many of the duals may be ordered as Style 2RV7 of MIL-R-94.

Electrical

Power – 2.25 watts maximum at +70° C (single resistors only) provided voltage rating is not exceeded.

Power derating – Derate power linearly from +70° C to zero at +120° C. Derate 50 percent for non-metallic mounting and for resistors with "A", "B", "S", and "DB" tapers. For rheostat applications see Page 94.

For derating of Dual and Triple resistors refer to Page 94.

Voltage – 500 volts maximum working voltage (RMS or DC), or as determined by $E_{max.} = \sqrt{PR}$, whichever is less (at sea level).

Dielectric withstanding voltage – Maximum continuous voltage 500 volts RMS at sea level, 300 volts RMS at 3.4 inches (86,36 mm) mercury. Will withstand a one second test of 1000 volts RMS at sea level or 500 volts RMS at 3.4 inches (86,36 mm) mercury. (Electrical specifications continued on Page 92.)

Electrical

Taps – Single electrical taps are available at 35 percent, 50 percent or 65 percent of rotation. Resistance tolerance ±20 percent. Unless otherwise specified low series tap resistance is provided. See dimensions on Page 97 for tap terminal locations. Consult factory for other available taps.

Capacitance – See Page 94 for explanation.

Operational

Load life – 10 percent maximum change in total resistance as a result of a 1000 hour test at rated power across entire element in still air at +70° C (1.5 hour "ON", 0.5 hour "OFF").

Rotational life – 10 percent maximum change in total resistance as a result of a 100,000 cycle life test without load (single section resistors only).

Mechanical

Shafts – Diameter of shafts .250 inch (6,35 mm). Minimum length .250 inch (6,35 mm). Maximum length 6.000 inches (152,40 mm). Preferred shaft lengths and endings are shown in the table below.

PREFERRED SHAFT LENGTHS
Plain Round

Inches	.500	.625	.750	.875	2.000
mm	12,70	15,88	19,05	22,23	50,80

Screwdriver Slotted

Inches	.500	.625	.750	.875
mm	12,70	15,88	19,05	22,23

Other lengths available in 1/64 inch (0,40 mm) increments. All shaft lengths are measured from the mounting face of the resistor to the free end of the shaft. Special shaft endings can be supplied.

Bushings – All bushings have a 32-NEF-2A thread and are .375 inch (9,52 mm) in diameter. Bushing lengths and types are shown in the table below.

Plain		Standard Locking		Special Locking		Shaft Watertight		Panel and Shaft Watertight	
Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
.125	3,18	.500	12,70	.375	9,52	.250	6,35	.281	7,14
.250	6,35			.500	12,70	.375	9,52	.406	10,32
.375	9,52					.500	12,70		
.500	12,70								

All bushing lengths are measured from the mounting face of the resistor and include the bushing washer.

Standard locking bushings will prevent shaft rotation with torques up to 40 inch-ounces (2,88 kgf-cm) after lock nuts have been tightened with a torque of 10 inch-pounds (11,52 kgf-cm).

Hardware – Resistors are normally supplied with one mounting nut, M-2786, and one internal tooth lock washer, M-2898. Resistors with standard locking bushings are normally supplied with one lock nut, B-13750, in addition to the above. Standard locking bushings with MAXIMUM shaft extension of .125 inch (3,18 mm) beyond the bushing can be supplied with acorn lock nut, M-3236, instead of lock nut, B-13750. Unless otherwise specified, all hardware shipped in bulk. For hardware dimensions see Page 97.

Locating lugs – Two locating lugs are provided so resistors may be indexed with respect to the surface on which they are mounted. Lug option 1 standard. See dimensions on Page 97.

Turning torque – At +25° C minimum torque 1 inch-ounce (0,07 kgf-cm). Maximum torque as follows:

Single – 6 inch-ounces (0,43 kgf-cm)
Dual – 12 inch-ounces (0,86 kgf-cm)

Dual concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on each shaft. Triple concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on the outer shaft and 12 inch-ounces (0,86 kgf-cm) on the inner shaft. Immersion sealed types require an additional torque of 6 inch-ounces (0,43 kgf-cm).

Stop torque – 12 inch-pounds (13,82 kgf-cm) minimum.

Rotation – Mechanical rotation without switch is 312° ±3°, with switch 333° ±3°. Electrical rotation is 292° nominal.

Backlash – Maximum backlash: single resistors ±1-1/2°, dual resistors ±3°, triple resistors ±6°.

Construction – Materials are corrosion resistant and essentially non-magnetic; terminals are treated for easy soldering.

Immersion sealed types, commonly referred to as "watertight", are optional. These immersion sealed types incorporate an internal "O" ring between the shaft and bushing. External surfaces are given special treatment so that the entire resistor is immersion sealed. This feature is not available when concentric shafts or switches are required.

A panel-shaft "watertight" bushing is also optional. This option is provided with an external "O" ring plus the features of the immersion sealed type. This feature is not available when concentric shafts are required. When furnished with a switch the assembly is not immersion sealed.

Immersion (Immersion sealed types only) – No continuous stream of bubbles (4 or more) emanating from the resistor as a result of the immersion test (1 minute in water at +85° C).

Marking – Allen-Bradley part number and nominal total resistance marked in two lines. Other marking possible, limited to maximum of 13 characters in each of two lines. A-B monogram plus "Type J" always included.

Environmental

Vibration – 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 204, condition "C" of MIL-STD-202. Triple resistors tested per method 204, condition "A" of MIL-STD-202.)

Shock – 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 213, condition "I" of MIL-STD-202. Triple resistors tested per method 213, condition "G" of MIL-STD-202.)

Moisture resistance – 10 percent maximum total resistance change. (Tested per method 106 of MIL-STD-202. Resistors with solid shafts only.)

Corrosion resistance – Materials show no corrosion after a 200 hour salt spray test. (Method 101 of MIL-STD-202.)

Effect of soldering – 2 percent maximum change in total resistance as a result of immersing the terminals in 350° C solder to within 0.125 inch (3,18 mm) of the resistor body for 5 seconds.

Temperature cycling – 3 percent maximum change in total resistance as a result of the temperature cycling test (five cycles −55° C to +120° C).

Low temperature operation – 3 percent maximum change in total resistance as a result of the low temperature operation test (−55° C for two hours without load and 45 minutes with rated load).

Low temperature storage – 2 percent maximum change in total resistance as a result of the storage test (24 hours at −63° C).

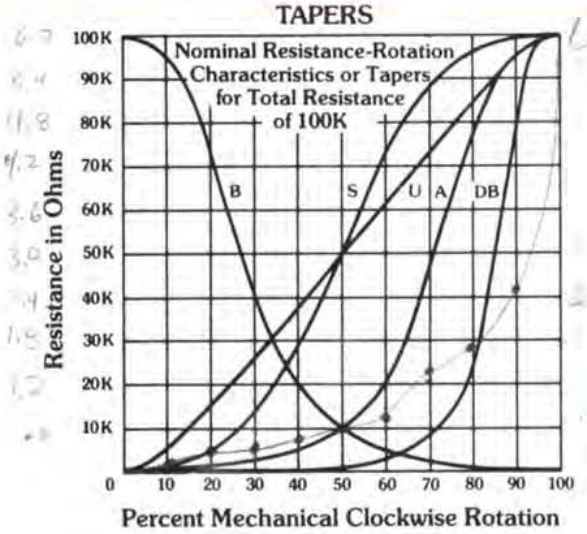
Temperature characteristics – Maximum percent temporary total resistance change from the +25° C value. See table below.

Nominal Resistance	Degrees Celsius – "U" Linear Taper						
	−55°	−25°	0°	+25°	+55°	+85°	+120°
100 Ohms	+ 4.5	+2.5	+1.5	0	±1.0	±1.5	+3.5
1,000 Ohms	+ 5.5	+3.0	+1.5	0	±1.0	±2.0	+4.5
10,000 Ohms	+ 7.0	+3.5	+2.0	0	±1.0	±2.5	+5.5
100,000 Ohms	+ 8.0	+4.0	+2.0	0	±1.5	±3.0	+6.0
1 Megohm	+10.0	+5.0	+2.5	0	±1.5	±3.5	+7.5

For "S", "A", "B" and "DB" tapers multiply percentage figures shown above by 1.25.

Taper data

TAPERS



END RESISTANCE

TAPER	MINIMUM RESISTANCE BETWEEN TERMINALS 1 and 2	MINIMUM RESISTANCE BETWEEN TERMINALS 2 and 3
U & S	1	1
A	1	2
B	2	1
DB	3	2

1 "Less than .004% of total resistance," or "less than 4 ohms" whichever is greater.

2 "Less than 1% of total resistance," or "less than 4 ohms" whichever is greater.

3 Less than 4 ohms.

Ordering information

1. Type (Single, dual or triple).
2. Taper (each element on multi-section controls).
3. Total resistance value (each element on multi-section controls) in ohms.
4. Tolerance (each element on multi-section controls) percent.
5. Bushing type (plain, locking, shaft watertight, or panel and shaft watertight).
6. Bushing length in inches.
7. Shaft ending (plain, slotted or flatted).
8. Shaft length from mounting surface in inches.
9. Switch required?
10. Locating lug option (1, 2, 3 or 4).
11. Mounting hardware (A-B Standard or Other).
12. Part number you have assigned, if any.
13. Marking required on the part.
14. Special features.

Additional ratings

Multiple resistor power derating – The permissible power dissipation in one resistor element is a function of the power dissipation in the other elements. Maximum continuous power rating in watts with entire resistor elements in the circuit are as follows:

$$\left(\frac{W1}{2.25}\right)^2 + \left(\frac{W2}{1.8}\right)^2 + \left(\frac{W3}{1.8}\right)^2 = 1 \text{ (Maximum)}$$

Where W_1 = Watts in entire first or panel resistor element.
W_2 = Watts in entire second or middle resistor element.
W_3 = Watts in entire third or rear resistor element.

Derating with respect to rotation – rheostat application

Percent Rotation	Multiply Wattage Rating By	Percent Rotation	Multiply Wattage Rating By
100	1.00	40	0.81
90	0.99	30	0.68
80	0.98	20	0.49
70	0.96	10	0.23
60	0.93	0	0.11
50	0.89		

Capacitance – The capacitance between terminals #1 and #3 with terminal #2 "floating" is approximately 2 to 3 pF at 1 KHz.

The capacitance between terminal #1 (grounded to bushing) and terminal #3 (shaft in extreme clockwise position) is approximately 10 to 12 pF at 1 KHz.

The capacitance between all terminals shorted together and the bushing is approximately 15 to 20 pF at 1 KHz.

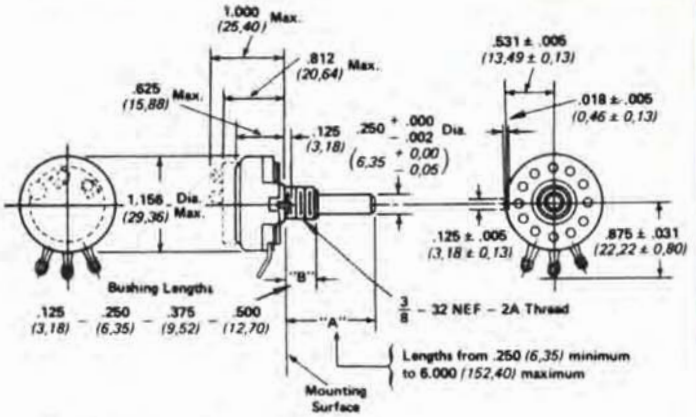
In all cases capacitance indicated is for resistor only and does not include capacitance of measuring lead wires on test fixtures.

	First or Panel Resistor Element W_1	Second or Middle Resistor Element W_2	Third or Rear Resistor Element W_3
DUAL SECTION	2.25 Watts	0 Watt	–
	2.00 Watts	0.83 Watt	–
	1.75 Watts	1.13 Watts	–
	1.50 Watts	1.34 Watts	–
	1.25 Watts	1.49 Watts	–
	1.00 Watts	1.61 Watts	–
	0.75 Watts	1.70 Watts	–
	0.50 Watts	1.76 Watts	–
	0.25 Watts	1.79 Watts	–
	0 Watt	1.80 Watts	–
TRIPLE SECTION	2.0 Watts	0.5 Watt	0.65 Watt
	1.5 Watts	1.0 Watt	0.89 Watt
	1.5 Watts	0.5 Watt	1.24 Watts
	1.0 Watt	1.5 Watts	0.59 Watt
	1.0 Watt	1.0 Watt	1.27 Watts
	1.0 Watt	0.5 Watt	1.53 Watts
	0.5 Watt	1.5 Watts	0.90 Watt
	0.5 Watt	1.0 Watt	1.44 Watts
	0.5 Watt	0.5 Watt	1.68 Watts

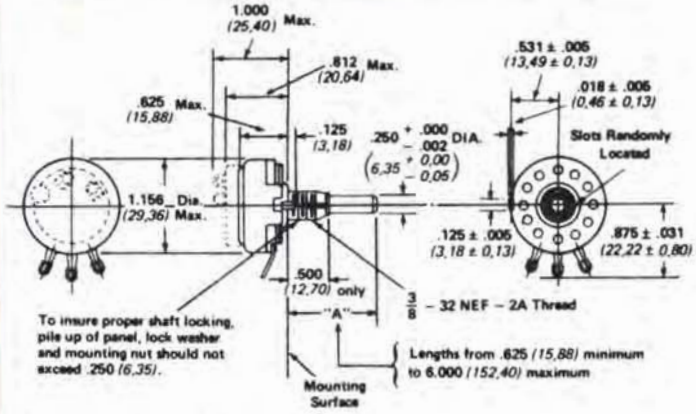
DIMENSIONS

Single section resistors

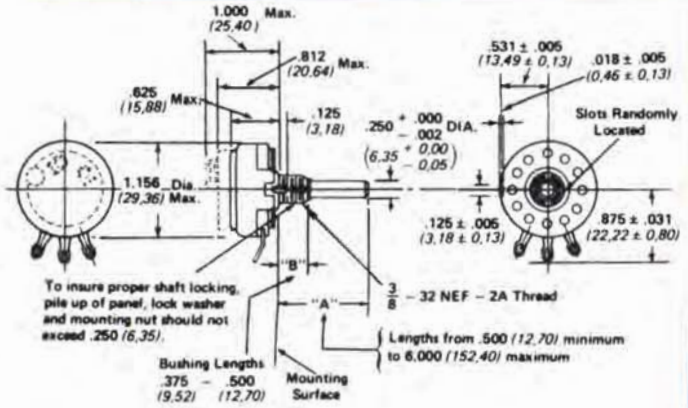
See Page 96 for additional dimensions common to all units.



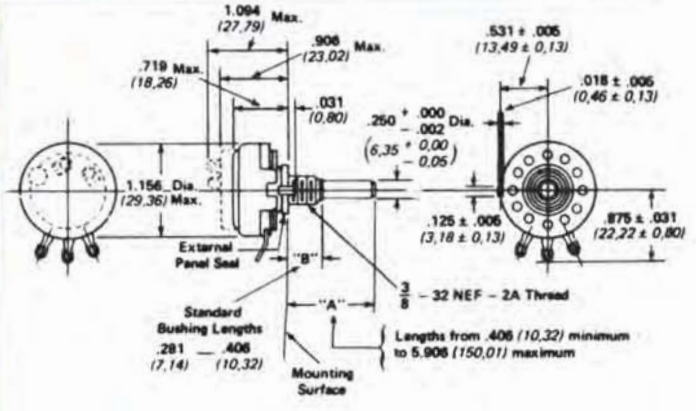
With or Without Switch Plain Shaft Ending
With Plain Bushing or Shaft Watertight Bushing



With or Without Switch Plain Shaft Ending
With Standard, Locking Bushing



With or Without Switch Plain Shaft Ending
With Special Locking Bushing (For Use With Jam Nut M-3638)



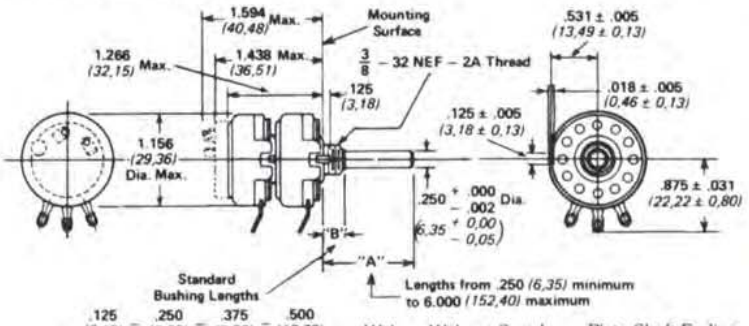
With or Without Switch Plain Shaft Ending
With Panel Shaft Watertight Bushing

DIMENSIONS

Dual section resistors

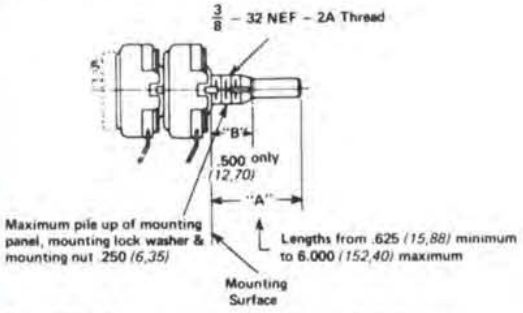
See Page 96 for additional dimensions common to all units.

Plain or Shaft Watertight Bushing



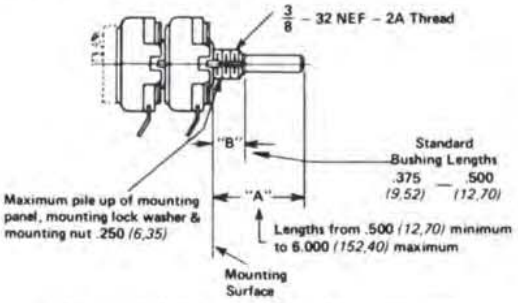
With or Without Switch Plain Shaft Ending

Standard Locking Bushing

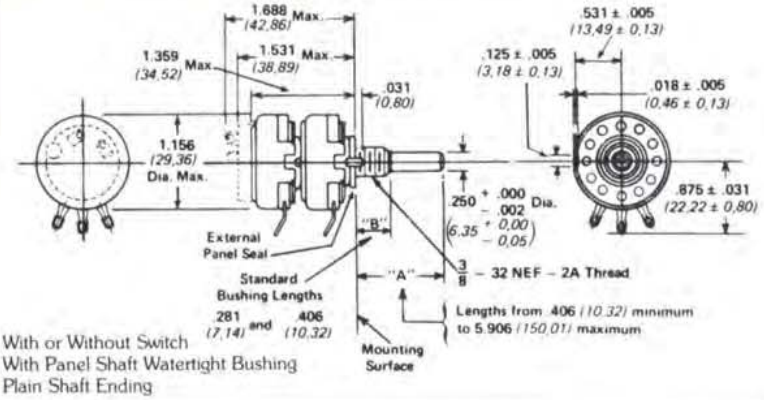


Four randomly located slots on all locking bushings.

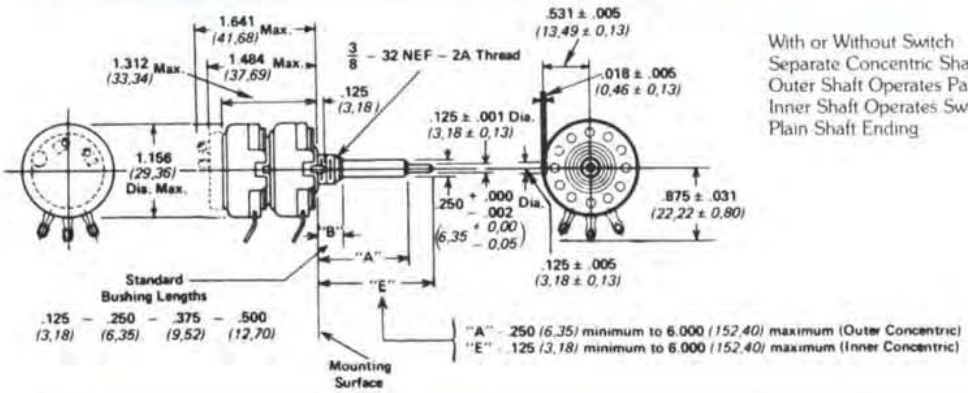
Special Locking Bushing
(For Use With Jam Nut M-3638)



Four randomly located slots on all locking bushings.



With or Without Switch
With Panel Shaft Watertight Bushing
Plain Shaft Ending

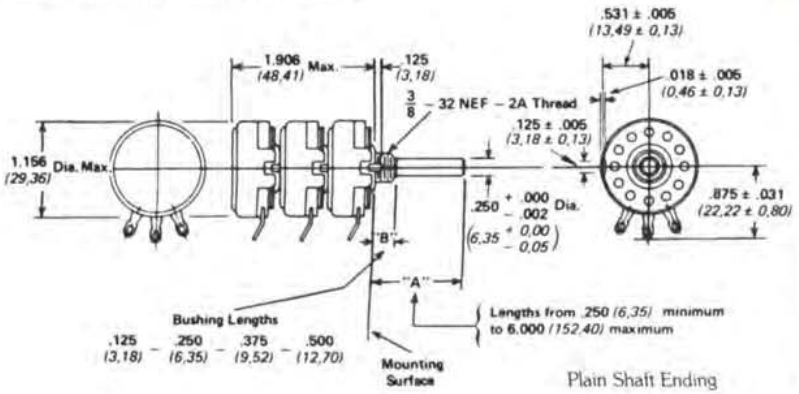


With or Without Switch
Separate Concentric Shafts for Independent Operation of Each Resistor
Outer Shaft Operates Panel Section
Inner Shaft Operates Switch and Rear Section
Plain Shaft Ending

Triple section resistors

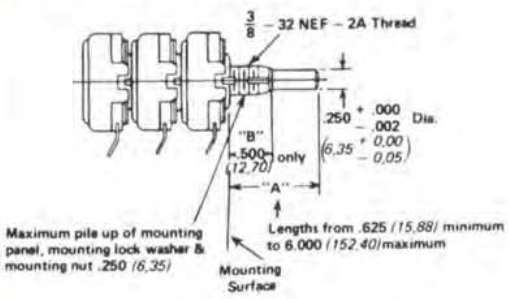
See Page 96 for additional dimensions common to all units.

Plain or Shaft Watertight Bushing



Plain Shaft Ending

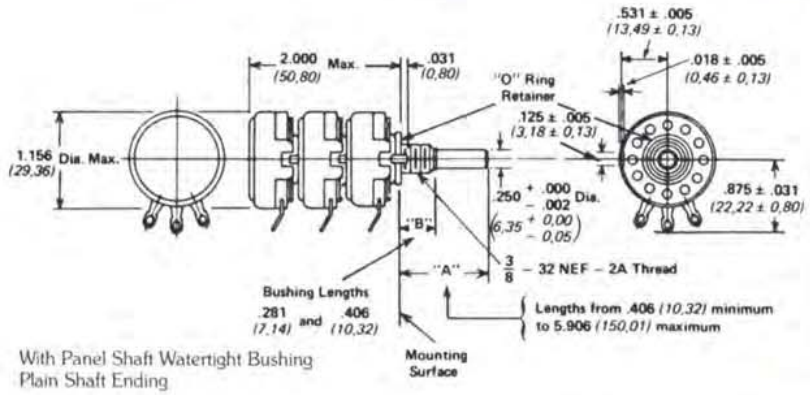
Standard Locking Bushing



Four randomly located slots on all locking bushings.

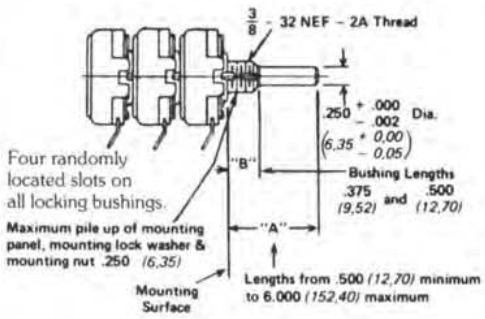
DIMENSIONS

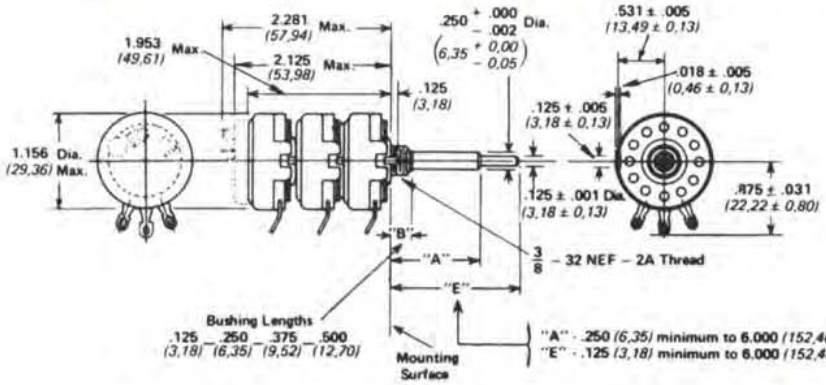
Triple section resistors



With Panel Shaft Watertight Bushing
Plain Shaft Ending

Special Locking Bushing
(For Use With Jam Nut M-3638)





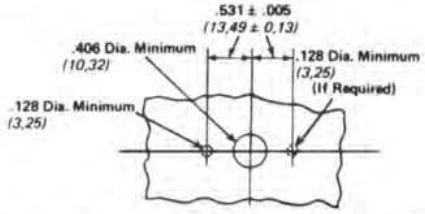
With or Without Switch
With Concentric Shafts
Outer Shaft Operates Panel Section
Inner Shaft Operates Switch,
Middle and Rear Sections
Plain Shaft Ending

DIMENSIONS COMMON TO ALL UNITS

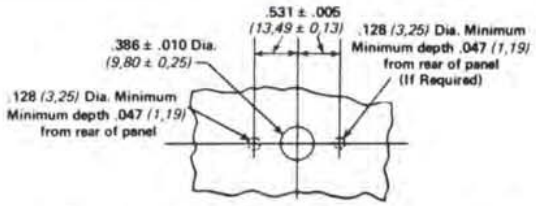
Basic dimensions in inches. Dimensions shown in PARENTHESES are in millimeters.

TOLERANCE
Dimensional Tolerance ±.016 (0,40).
Except as Specified.
NOT TO SCALE

Mounting holes

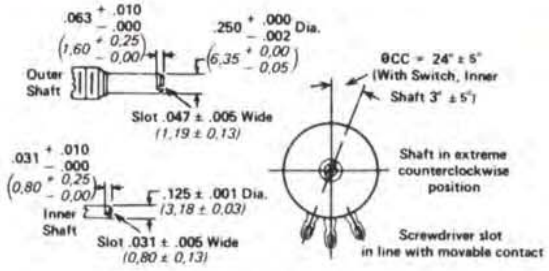


Mounting dimension for resistors with plain bushings, shaft watertight bushings, and locking bushings.

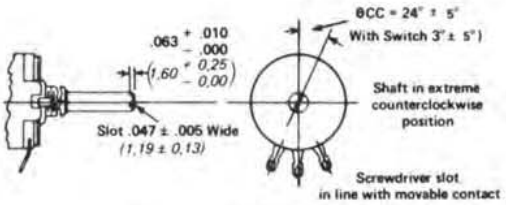


Mounting dimension for resistor with panel shaft watertight bushings.

Standard slotted shaft ending



Dimensions for resistors with concentric shafts.

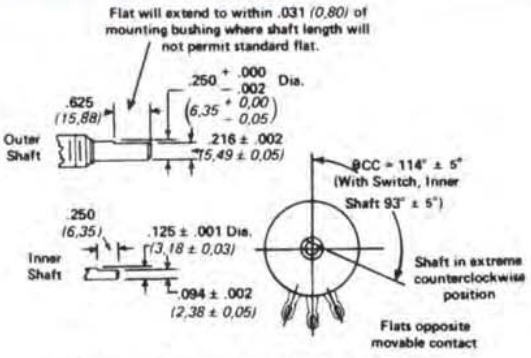


Dimensions for resistors with solid shafts.

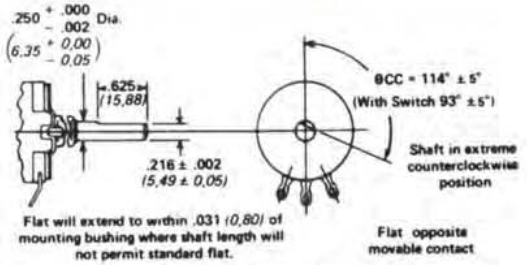
All .250 (6,35) diameter shafts supplied with maximum chamfer .031 (0,80) x 45° at the shaft end.
All .125 (3,18) diameter shafts supplied with maximum chamfer .016 (0,40) x 45° at the shaft end.

DIMENSIONS COMMON TO ALL UNITS

Standard flatted shaft ending



Dimensions for resistors with concentric shafts.

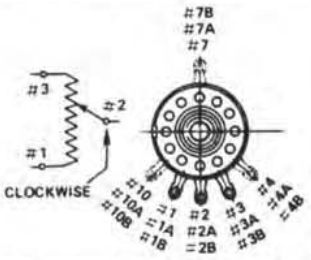


Dimensions for resistors with solid shafts.

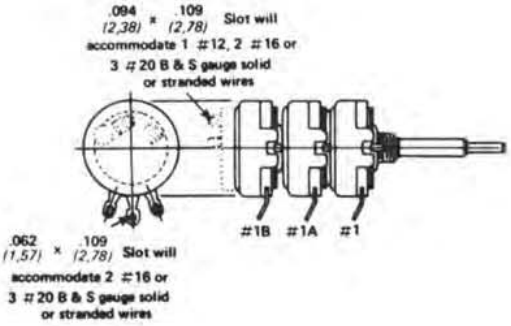
All .250 (6,35) diameter shafts supplied with maximum chamfer .031 (0,80) x 45° at the shaft end.

All .125 (3,18) diameter shafts supplied with maximum chamfer .016 (0,40) x 45° at the shaft end.

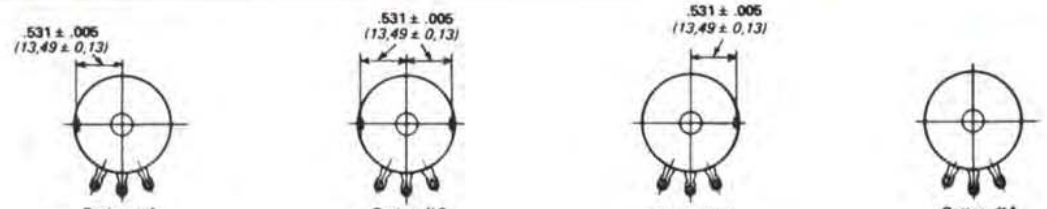
Terminal connections to resistance element



#1 Extreme Countarclockwise End
#2 Movable Contact Brush
#3 Extreme Clockwise End
#4 Tap 65% Effective or Special Between 60% and 100%
#7 Tap 50% Effective Clockwise
#10 Tap 35% Effective Clockwise or Special Between 0 and 50%
Tap Location Tolerances ± 3%

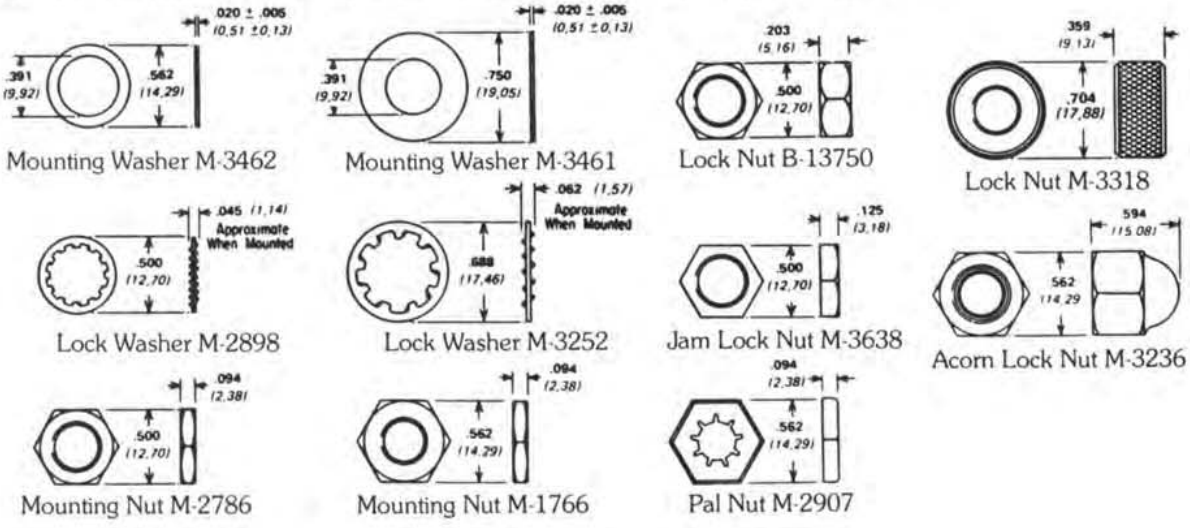


Locating lug options



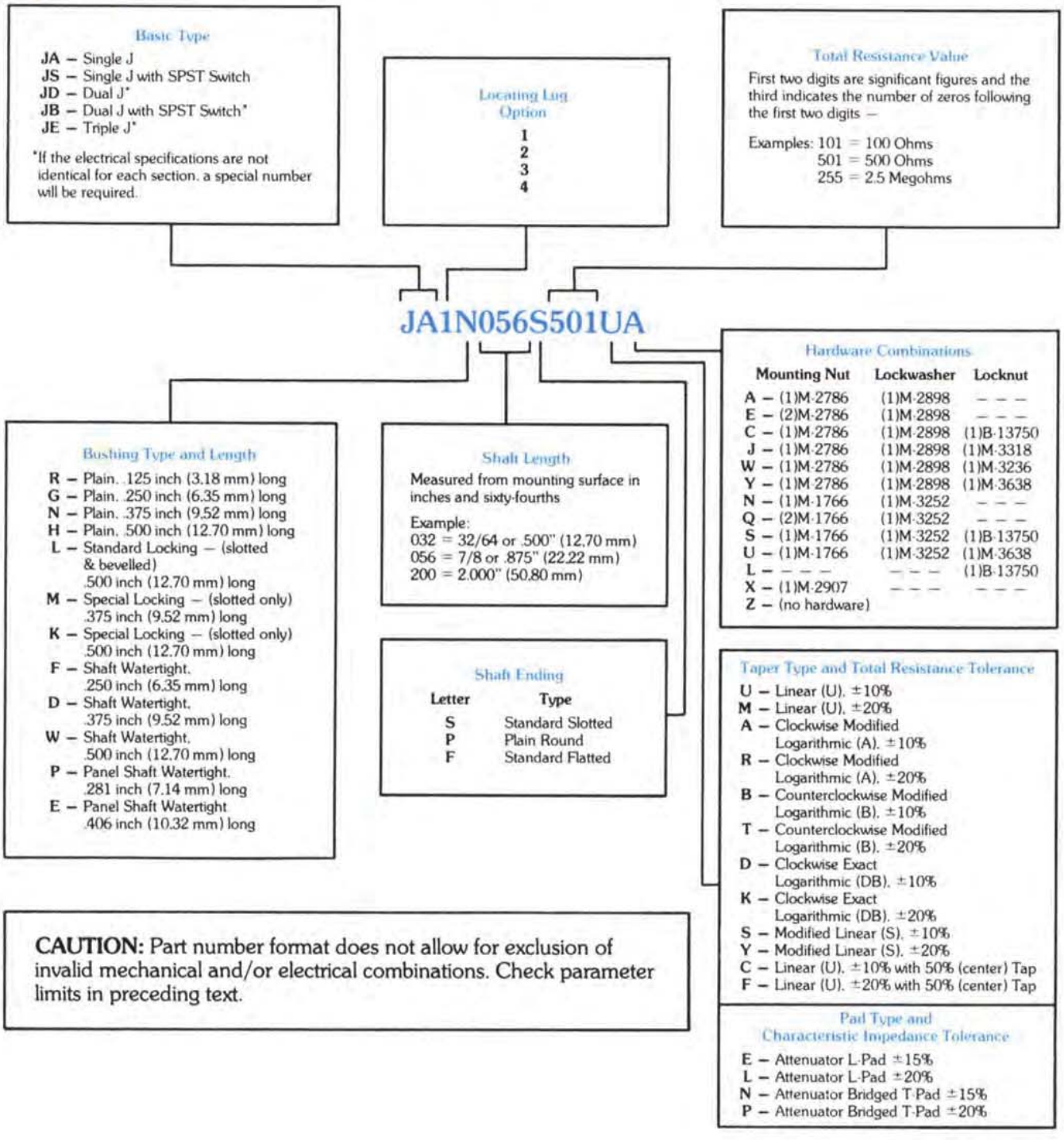
Mounting hardware

When Specified, Any of the Hardware Illustrated can be supplied (See Page 92)



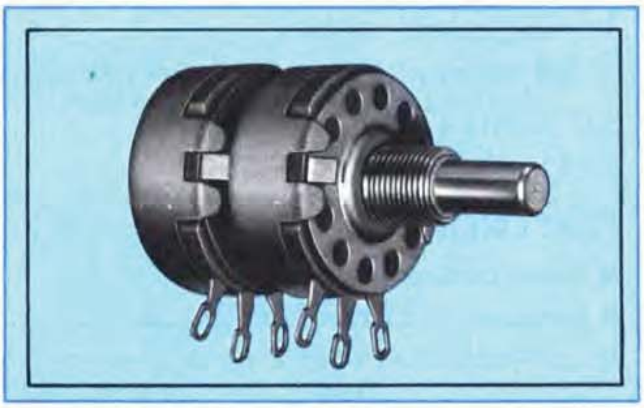
Hot-Molded Panel Potentiometers

EXPLANATION OF PART NUMBERS



CAUTION: Part number format does not allow for exclusion of invalid mechanical and/or electrical combinations. Check parameter limits in preceding text.

Type J
Hot-Molded Panel Potentiometers



Vernier Adjustment
1-5/32 (1.156) Inch
(29,36 mm) Diameter
2.25 Watts (70°C)
50 Ohms to 5 Megohms

FEATURES

- ±20% or ±10% Tolerance
- Hot-Molded Composition
- Single-Knob, Single-Turn

SPECIFICATIONS

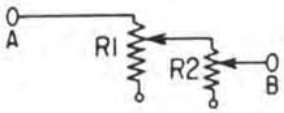
General

Both coarse and fine rheostat or potentiometer adjustments are now possible in a single-knob single-turn control due to the special coupling between front and rear sections of this Type J variable resistor. It's lower in price than concentric construction and needs the panel space of only one control.

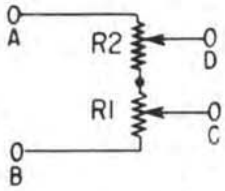
R2 (rear section) is usually the higher value, generally by a factor of about 10 times R1 (greater than 20:1 ratio is not recommended). Built-in backlash will permit R2 to "idle" while a "backing off" adjustment is made in R1. Mechanical independence of R1 covers about 40°.

Typical circuitry

As a rheostat

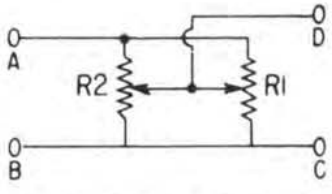


As a potentiometer



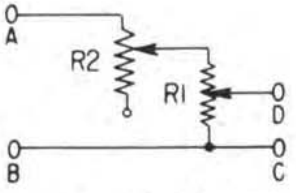
Four-Terminal Circuit

This lifts Terminal C above Terminal B by an amount equal to the voltage in the lower portion of the R1 section.



Three-Terminal Parallel Circuit

In this case, the R2 section is the lower resistance, the R1 is higher. A ratio of 5:1 is probably a good one here due to the loading effect of R2 on R1 adjustments.



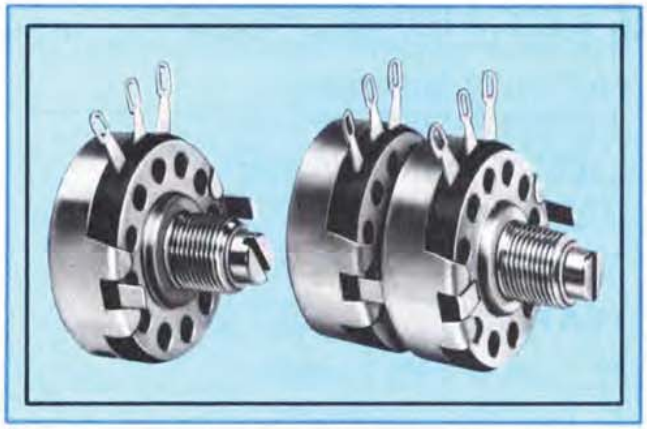
Three-Terminal Modified Circuit

This maintains continuity between B and C but results in a changeable overall resistance between Terminal A and B.

For additional specifications, please refer to Technical Publication EC5607-2.1.

NOT AVAILABLE FROM STOCK AT ELECTRONIC DISTRIBUTORS.

Type K Hot-Molded Panel Potentiometers



1-5/32 (1.156) Inch
(29,36 mm) Diameter
3.0 Watts (70° C)
50 Ohms to 5.0 Megohms

FEATURES

- Single, Dual and Triple Sections
- Linear and Non-Linear Tapers
- ±20% or ±10% Tolerance

SPECIFICATIONS

General

Temperature range — – 55° C to +150° C.

Total resistance values — Preferred nominal values listed below. Other values available.

OHMS				
50	1K	10K	100K	1 Meg.
100	2.5K	25K	250K	2.5 Meg.
250	5K	50K	500K	5 Meg.
500				

Total resistance tolerances – ±20% or ±10%.

Tapers — Available in the following resistance ranges:

TAPER	TOTAL RESISTANCE RANGE
U	50 Ohms to 5.0 Megohms
A, B, S & DB	250 Ohms to 5.0 Megohms

See chart on following pages for explanation of tapers. Special tapers, where practical, can be supplied.

End resistance — See chart on following pages.

Electrical

Power — 3 watts maximum at + 70° C for "U" linear taper only, (single resistors only) provided voltage rating is not exceeded.

Power derating — Derate power linearly from + 70° C to zero at + 150° C. Derate 50 percent for non-metallic mounting and for resistors with "A", "B", "S", and "DB" tapers. For rheostat applications derate directly with shaft or actuator position.

For derating of Dual and Triple resistors refer to following pages.

Voltage — 500 volts maximum working voltage (RMS or DC), or as determined by $E_{max.} = \sqrt{PR}$, whichever is less (at sea level).

Dielectric withstanding voltage — Maximum continuous voltage 500 volts RMS at sea level. Will withstand a one second test of 1000 volts (RMS or DC) at sea level or 500 volts RMS at 3.4 inches (86,36 mm) mercury.

Capacitance — The capacitance between terminals #1 and #3 with terminal #2 "floating" is approximately 2 to 3 pF at 1 KHz.

The capacitance between terminal #1 (grounded to bushing) and terminal #3 (shaft in extreme clockwise position) is approximately 10 to 12 pF at 1 KHz.

The capacitance between all terminals shorted together and the bushing is approximately 15 to 20 pF at 1 KHz.

In all cases capacitance indicated is for resistor only and does not include capacitance of measuring lead wires on test fixtures.

NOT AVAILABLE FROM STOCK AT ELECTRONIC DISTRIBUTORS.

Operational

Load life — 10 percent maximum change in total resistance as a result of a 1000 hour test at rated power across entire element in still air at +70° C (1.5 hour "ON", 0.5 hour "OFF").

Rotational life — 10 percent maximum change in total resistance as a result of a 100,000 cycle life test without load (single section resistors only).

Mechanical

Shafts — Diameter of shafts .250 inch (6,35 mm). Minimum length .250 inch (6,35 mm). Maximum length 6.000 inches (152,40 mm). Preferred shaft lengths and endings are shown in the table below.

PREFERRED SHAFT LENGTHS

Plain Round

Inches	.500	.625	.750	.875	2.000
mm	12.70	15.88	19.05	22.23	50.80

Screwdriver Slotted

Inches	.500	.625	.750	.875
mm	12.70	15.88	19.05	22.23

Other lengths available in 1/64 inch (0,40 mm) increments. All shaft lengths are measured from the mounting face of the resistor to the free end of the shaft. Concentric shafts available, see DIMENSIONS.

Bushings — All bushings have a 32-NEF-2A thread and are .375 inch (9,52 mm) in diameter. Bushing lengths and types are shown in the table below.

Plain		Standard Locking		Special Locking		Shaft Watertight		Panel and Shaft Watertight	
Inch	mm	Inch	mm	Inch	mm	Inch	mm	Inch	mm
.125	3.18	.500	12.70	.375	9.52	.250	6.35	.281	7.14
.250	6.35			.500	12.70	.375	9.52	.406	10.32
.375	9.52					.500	12.70		
.500	12.70								

All bushing lengths are measured from the mounting face of the resistor and include the bushing washer.

Standard locking bushings will prevent shaft rotation with torques up to 40 inch-ounces (2,88 kgf-cm) after lock nuts have been tightened with a torque of 10 inch-pounds (11,52 kgf-cm).

Hardware — Resistors are normally supplied with one mounting nut, M-2786, and one internal tooth lock washer, M-2898. Resistors with standard locking bushings are normally supplied with one lock nut, B-13750, in addition to the above. Standard locking bushings with MAXIMUM shaft extension of .125 inch (3,18 mm) beyond the bushing can be supplied with acorn lock nut, M-3236, instead of lock nut, B-13750. Unless otherwise specified, all hardware shipped in bulk. For hardware dimensions see Page 106.

Locating lugs — Two locating lugs are provided so resistors may be indexed with respect to the surface on which they are mounted. Four lug options available. Lug option 1 standard. See DIMENSIONS.

Turning torque — At + 25° C minimum torque 1 inch-ounce (0,07 kgf-cm). Maximum torque as follows:

Single — 6 inch-ounces (0,43 kgf-cm)
Dual — 9 inch-ounces (0,65 kgf-cm)
Triple — 12 inch-ounces (0,86 kgf-cm)

Dual concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on each shaft. Triple concentric types have a maximum torque of 6 inch-ounces (0,43 kgf-cm) on the outer shaft and 9 inch-ounces (0,65 kgf-cm) on the inner shaft. Immersion sealed types require an additional torque of 6 inch-ounces (0,43 kgf-cm).

Stop torque — 12 inch-pounds (13,82 kgf-cm) minimum.

Rotation — Mechanical rotation is 312° ± 3°. Electrical rotation is 292° nominal.

Backlash — Maximum backlash; single resistors ± 1-1/2°, dual resistors ± 3°, triple resistors ± 6°.

Construction — Materials are corrosion resistant and essentially non-magnetic; enclosure is dust and splash resistant; terminals are treated for easy soldering.

Immersion sealed types, commonly referred to as "watertight", are optional. These immersion sealed types incorporate an internal "O" ring between the shaft and bushing. External surfaces are given special treatment so that the entire resistor is immersion sealed. This feature is not available when concentric shafts are required.

A panel-shaft "watertight" bushing is also optional. This option is provided with an external "O" ring plus the features of the immersion sealed type. This feature is not available when concentric shafts are required.

Immersion (Immersion sealed types only) — No continuous stream of bubbles (4 or more) emanating from the resistor as a result of the immersion test (1 minute in water at +85° C).

Marking — Allen-Bradley part number and nominal total resistance marked in two lines. Other marking possible, limited to maximum of 13 characters in each of two lines. A-B monogram plus "Type K" always included.

Environmental

Vibration — 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 204, condition "C" of MIL-STD-202. Triple resistors tested per method 204, condition "A" of MIL-STD-202.)

Shock — 2 percent maximum total resistance change and 5 percent maximum resistance setting change. (Single and dual resistors tested per method 213, condition "I" of MIL-STD-202. Triple resistors tested per method 213, condition "G" of MIL-STD-202.)

Moisture resistance — 10 percent maximum total resistance change. (Tested per method 106 of MIL-STD-202. Resistors with solid shafts only.)

Corrosion resistance — Materials show no corrosion after a 200 hour salt spray test. (Method 101 of MIL-STD-202.)

Effect of soldering — 2 percent maximum change in total resistance as a result of immersing the terminals in + 350° C solder to within 0.125 inch (3,18 mm) of the resistor body for 5 seconds.

Temperature cycling — 3 percent maximum change in total resistance as a result of the temperature cycling test (five cycles − 55° C to + 150° C).

Low temperature operation — 3 percent maximum change in total resistance as a result of the low temperature operation test (−55° C for two hours without load and 45 minutes with rated load).

Low temperature storage — 2 percent maximum change in total resistance as a result of the storage test (24 hours at −63° C).

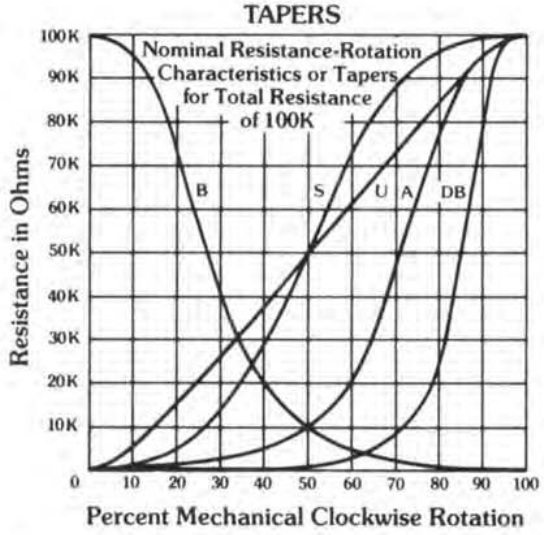
Temperature characteristics — Maximum percent temporary total resistance change from the +25° C value. See table below.

Nominal Resistance	Degrees Celsius — "U" Linear Taper							
	−55°	−25°	0°	+25°	+55°	+85°	+120°	+150°
100 Ohms	+ 4.5	+ 2.5	+ 1.5	0	± 1.0	± 1.5	+ 3.5	+ 5.5
1,000 Ohms	+ 5.5	+ 3.0	+ 1.5	0	± 1.0	± 2.0	+ 4.5	+ 6.5
10,000 Ohms	+ 7.0	+ 3.5	+ 2.0	0	± 1.0	± 2.5	+ 5.5	+ 8.5
100,000 Ohms	+ 8.0	+ 4.0	+ 2.0	0	± 1.5	± 3.0	+ 6.0	+10.5
1 Megohm	+10.0	+ 5.0	+ 2.5	0	± 1.5	± 3.5	+ 7.5	+12.5

For "S", "A", "B" and "DB" tapers multiply percentage figures shown above by 1.25.

Taper data

TAPERS



TAPER	END RESISTANCE	
	MINIMUM RESISTANCE BETWEEN TERMINALS 1 and 2	MINIMUM RESISTANCE BETWEEN TERMINALS 2 and 3
U & S	1	1
A	1	2
B	2	1
DB	3	2

1 "Less than .004% of total resistance," or "less than 4 ohms" whichever is greater.

2 "Less than 1% of total resistance," or "less than 4 ohms" whichever is greater.

3 Less than 4 ohms.

Ordering information

1. Type (single, dual or triple).
2. Total resistance value (each element on multi-section controls) in ohms.
3. Tolerance (each element on multi-section controls) percent.
4. Taper (each element on multi-section controls).
5. Bushing type (plain, locking, shaft watertight, or panel and shaft watertight).
6. Bushing length in inches or millimeters.
7. Shaft ending (plain, slotted or flatted).
8. Shaft length from mounting surface in inches or millimeters.
9. Locating lug option (1, 2, 3 or 4).
10. Mounting hardware (A-B standard or other).
11. Part number you have assigned, if any.
12. Marking required on the part.
13. Special features.
14. Remarks.

Additional ratings

Multiple resistor power derating — The permissible power dissipation in one resistor element is a function of the power dissipation in the other elements. Maximum continuous power rating in watts with entire resistor elements in the circuit are as follows:

$$\left(\frac{W1}{3}\right)^2 + \left(\frac{W2}{2.4}\right)^2 + \left(\frac{W3}{2.4}\right)^2 = 1 \text{ (Maximum)}$$

Where W_1 = Watts in entire first or panel resistor element.
W_2 = Watts in entire second or middle resistor element.
W_3 = Watts in entire third or rear resistor element.

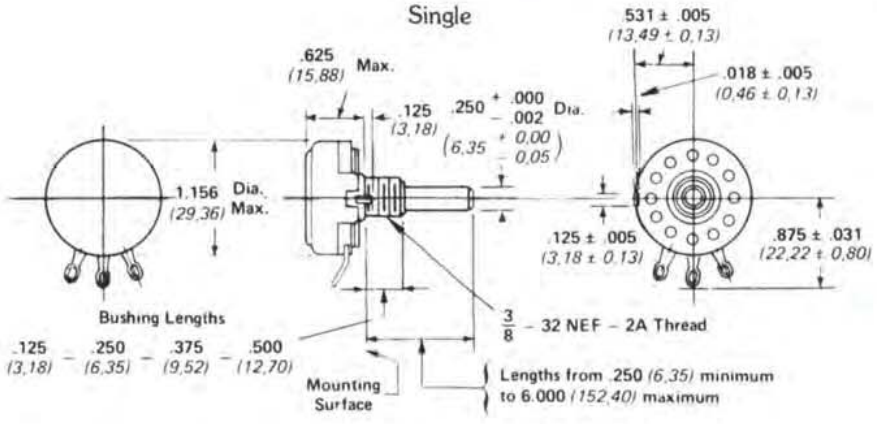
Derating with respect to rotation — rheostat application

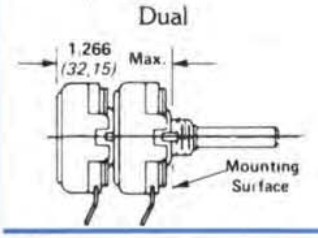
Percent Rotation	Multiply Wattage Rating By	Percent Rotation	Multiply Wattage Rating By
100	1.00	40	0.81
90	0.99	30	0.68
80	0.98	20	0.49
70	0.96	10	0.23
60	0.93	0	0.11
50	0.89		

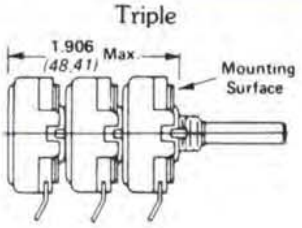
	First or Panel Resistor Element W_1	Second or Middle Resistor Element W_2	Third or Rear Resistor Element W_3
DUAL	3.0	0	
	2.75	0.96	
	2.50	1.33	
	2.25	1.59	
	2.00	1.79	
	1.75	1.95	
	1.50	2.08	
	1.25	2.18	
	1.00	2.27	
	0.75	2.32	
	0.50	2.37	
	0.25	2.39	
	0	2.40	
	R_1	**R_2**	**R_3**
TRIPLE	2.5 Watts	1.0 Watt	0.87 Watt
	2.5 Watts	0.5 Watt	1.23 Watts
	2.0 Watts	1.5 Watts	0.97 Watt
	2.0 Watts	1.0 Watt	1.48 Watts
	2.0 Watts	0.5 Watt	1.72 Watts
	1.5 Watts	2.0 Watts	0.56 Watt
	1.5 Watts	1.5 Watts	1.44 Watts
	1.5 Watts	1.0 Watt	1.82 Watts
	1.5 Watts	0.5 Watt	2.02 Watts
	1.0 Watt	2.0 Watts	1.06 Watts
	1.0 Watt	1.5 Watts	1.70 Watts
	1.0 Watt	1.0 Watt	2.03 Watts
	1.0 Watt	0.5 Watt	2.20 Watts
	0.5 Watt	2.0 Watts	1.26 Watts
	0.5 Watt	1.5 Watts	1.83 Watts
	0.5 Watt	1.0 Watt	2.14 Watts
	0.5 Watt	0.5 Watt	2.31 Watts

DIMENSIONS

Plain or shaft watertight bushing

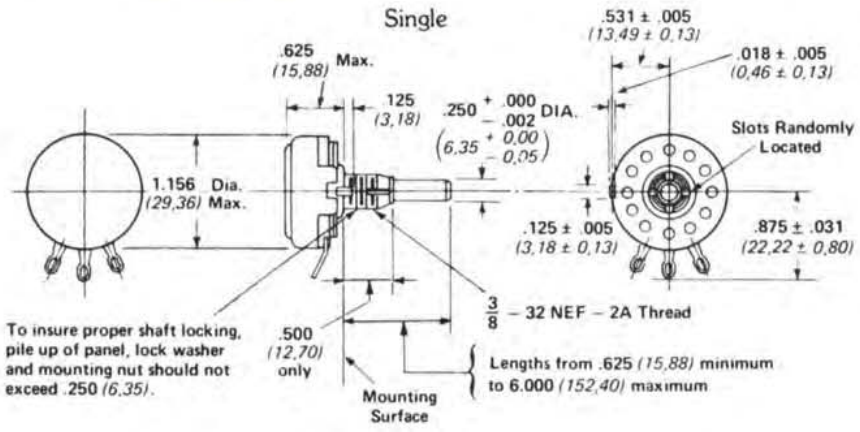


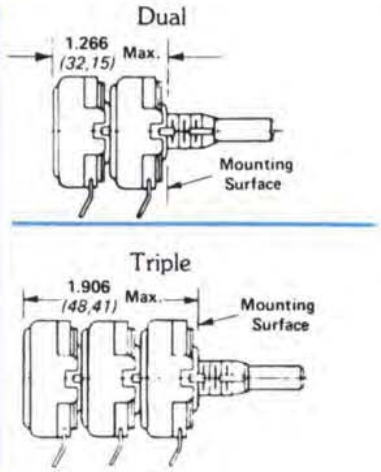




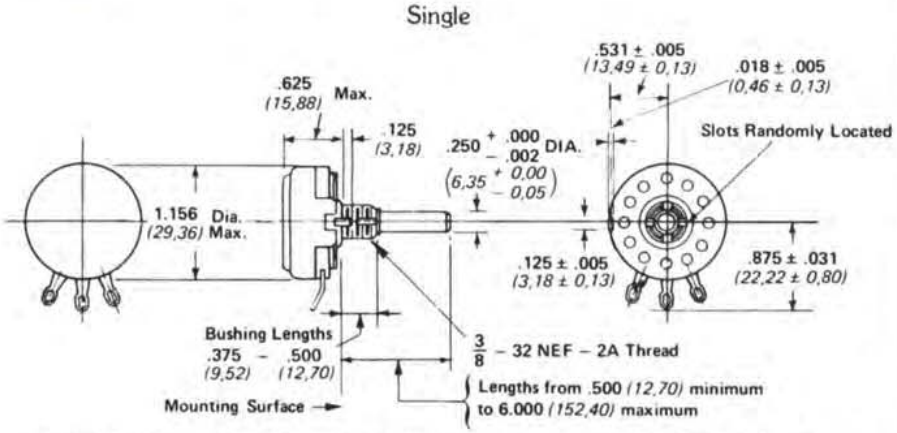
DIMENSIONS

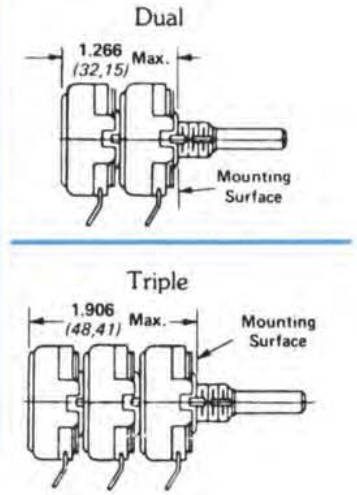
Standard locking bushing



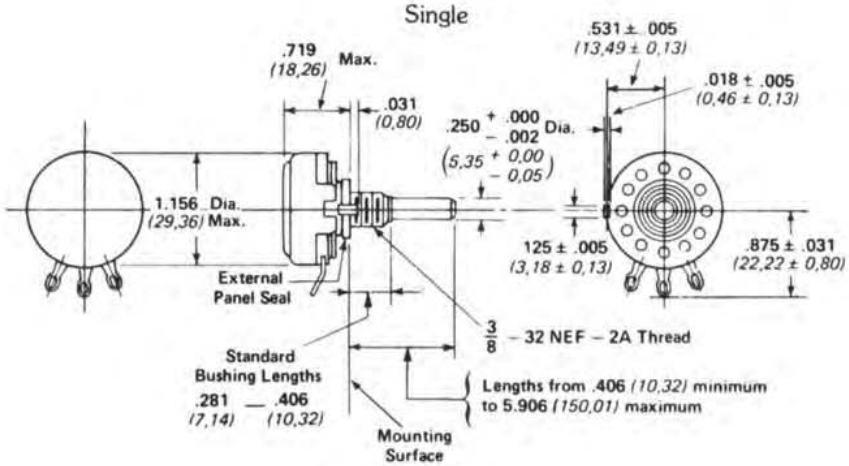


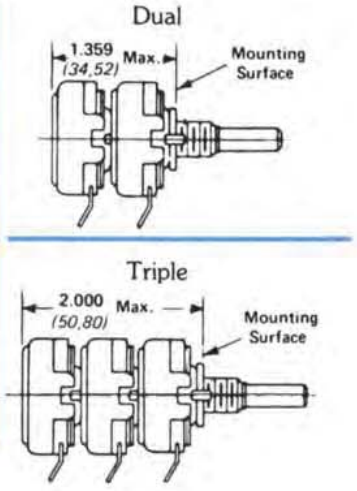
Special locking bushing





Panel-shaft watertight bushing

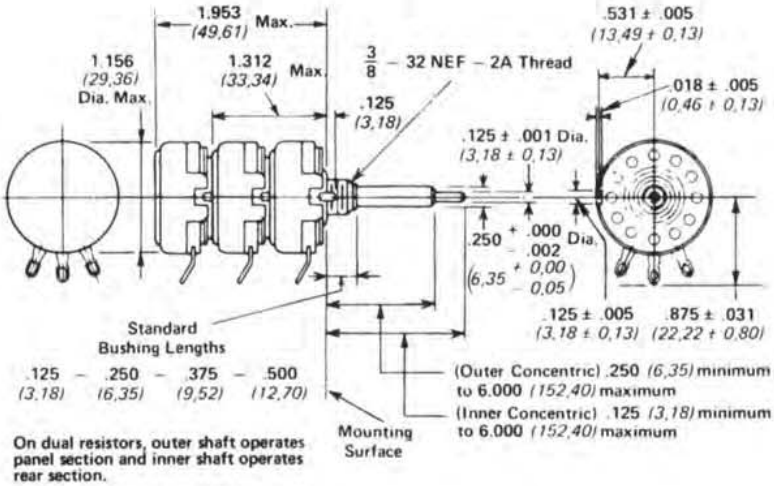




DIMENSIONS

Concentric shaft

Dual - Triple



On dual resistors, outer shaft operates panel section and inner shaft operates rear section.

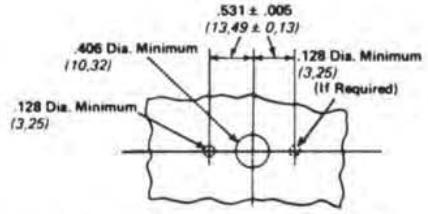
On triple resistors, outer shaft operates panel section and inner shaft operates middle and rear section.

DIMENSIONS COMMON TO ALL UNITS

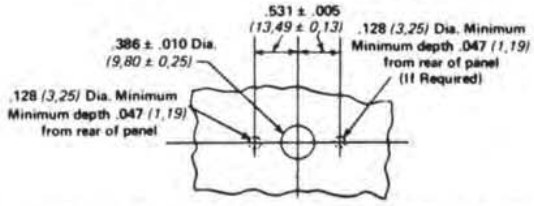
Basic dimensions in inches. Dimensions shown in PARENTHESES are in millimeters.

TOLERANCE
Dimensional Tolerance ±.016 (0.40).
Except as Specified.
NOT TO SCALE

Mounting holes

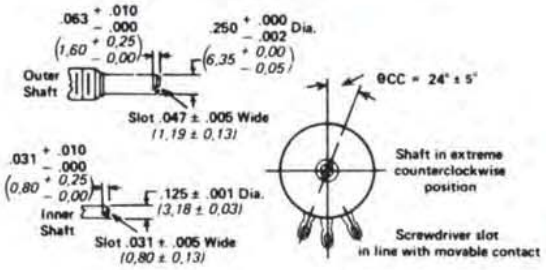


Mounting dimension for resistors with plain bushings, shaft watertight bushings, and locking bushings.

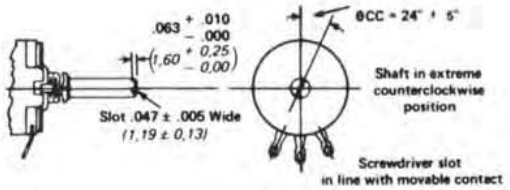


Mounting dimension for resistor with panel and shaft watertight bushings.

Standard slotted shaft ending



Dimensions for resistors with concentric shafts.



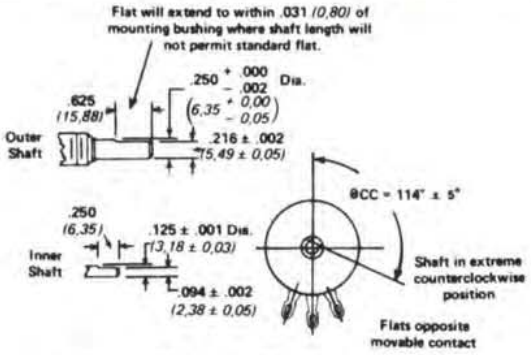
Dimensions for resistors with solid shafts.

All .250 (6.35) diameter shafts supplied with maximum chamfer .031 (0.80) x 45° at the shaft end.

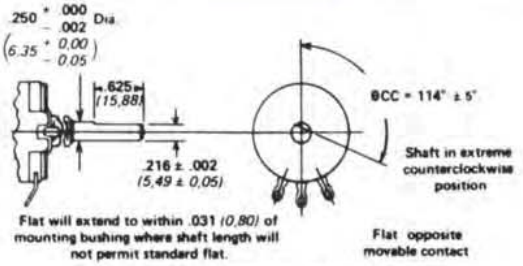
All .125 (3.18) diameter shafts supplied with maximum chamfer .016 (0.40) x 45° at the shaft end.

DIMENSIONS COMMON TO ALL UNITS

Standard flatted shaft ending



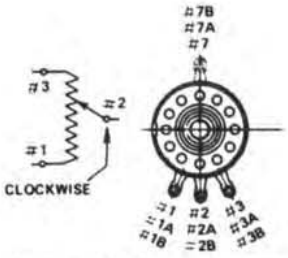
Dimensions for resistors with concentric shafts



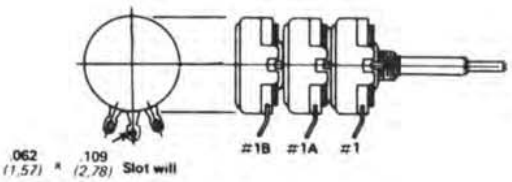
Dimensions for resistors with solid shafts

All .250 (6.35) diameter shafts supplied with maximum chamfer .031 (0,80) x 45° at the shaft end.
All .125 (3.18) diameter shafts supplied with maximum chamfer .016 (0,40) x 45° at the shaft end.

Terminal connections to resistance element

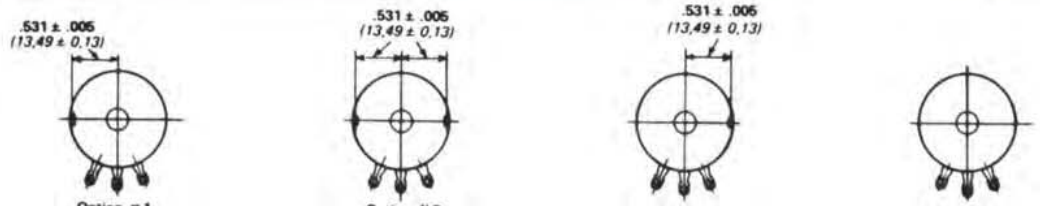


#1 Extreme Counterclockwise End
#2 Movable Contact Brush
#3 Extreme Clockwise End
#7 Tap 50% Effective Clockwise



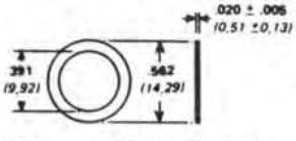
.062 (1,57) × .109 (2,78) Slot will accommodate 2 #16 or 3 #20 B & S gauge solid or stranded wires

Locating lug options

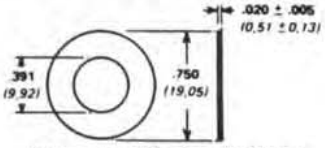


Mounting hardware

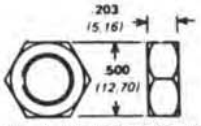
When Specified, Any of the Hardware Illustrated can be supplied (See Page 101)



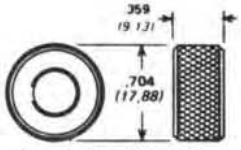
Mounting Washer M-3462



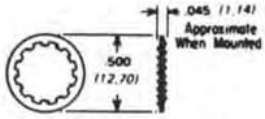
Mounting Washer M-3461



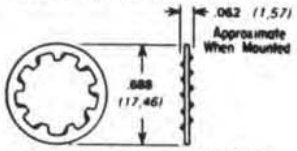
Lock Nut B-13750



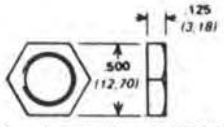
Lock Nut M-3318



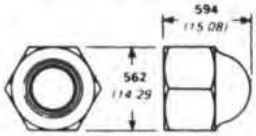
Lock Washer M-2898



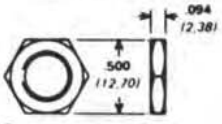
Lock Washer M-3252



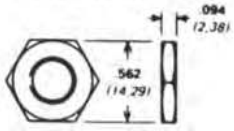
Jam Lock Nut M-3638



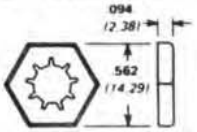
Acorn Lock Nut M-3236



Mounting Nut M-2786



Mounting Nut M-1766



Pal Nut M-2907

EXPLANATION OF PART NUMBERS

Basic Type
KA - Single K
KD - Dual K*
KE - Triple K*

*If the electrical specifications are not identical for each section, a special number will be required.

Locating Lug Option
1
2
3
4

Total Resistance Value
First two digits are significant figures and the third indicates the number of zeros following the first two digits —

Examples: 101 = 100 Ohms
501 = 500 Ohms
255 = 2.5 Megohms

KA1N056S501UA

Bushing Type and Length
R - Plain, .125 inch (3,18 mm) long
G - Plain, .250 inch (6,35 mm) long
N - Plain, .375 inch (9,52 mm) long
H - Plain, .500 inch (12,70 mm) long
L - Standard Locking — (slotted and bevelled) .500 inch (12,70 mm) long
M - Special Locking — (slotted only) .375 inch (9,52 mm) long
K - Special Locking — (slotted only) .500 inch (12,70 mm) long
F - Shaft Watertight, .250 inch (6,35 mm) long
D - Shaft Watertight, .375 inch (9,52 mm) long
W - Shaft Watertight, .500 inch (12,70 mm) long
P - Panel Shaft Watertight, .281 inch (7,14 mm) long
E - Panel Shaft Watertight .406 inch (10,32 mm) long

Hardware Combinations

	Mounting Nut	Lockwasher	Locknut
A	(1)M-2786	(1)M-2898	- - -
E	(2)M-2786	(1)M-2898	- - -
C	(1)M-2786	(1)M-2898	(1)B-13750
J	(1)M-2786	(1)M-2898	(1)M-3318
W	(1)M-2786	(1)M-2898	(1)M-3236
Y	(1)M-2786	(1)M-2898	(1)M-3638
N	(1)M-1766	(1)M-3252	- - -
Q	(2)M-1766	(1)M-3252	- - -
S	(1)M-1766	(1)M-3252	(1)B-13750
U	(1)M-1766	(1)M-3252	(1)M-3638
L	- - -	- - -	(1)B-13750
X	(1)M-2907	- - -	- - -
Z	(no hardware)		

Shaft Length
Measured from mounting surface in inches and sixty-fourths

Example:
032 = 32/64 or .500 in. (12,70 mm)
056 = 7/8 or .875 in. (22,22 mm)
200 = 2.000 in. (50,80 mm)

Preferred Shaft Lengths and Endings

Plain Round

Inches	.500	.625	.750	.875	2.000
mm	12,70	15,88	19,05	22,23	50,80

Screwdriver Slotted

Inches	.500	.625	.750	.875
mm	12,70	15,88	19,05	22,23

Taper Type and Total Resistance Tolerance
U - Linear (U), ± 10%
M - Linear (U), ± 20%
A - Clockwise Modified Logarithmic (A), ± 10%
R - Clockwise Modified Logarithmic (A), ± 20%
B - Counterclockwise Modified Logarithmic (B), ± 10%
T - Counterclockwise Modified Logarithmic (B), ± 20%
D - Clockwise Exact Logarithmic (DB), ± 10%
K - Clockwise Exact Logarithmic (DB), ± 20%
S - Modified Linear (S), ± 10%
Y - Modified Linear (S), ± 20%
C - Linear (U), ± 10% with 50% (center) Tap
F - Linear (U), ± 20% with 50% (center) Tap

CAUTION: Part number format does not allow for exclusion of invalid mechanical and/or electrical combinations. Check parameter limits in preceding text.

Shaft Ending

Letter	Type
S	Standard Slotted
P	Plain Round
F	Standard Flatted