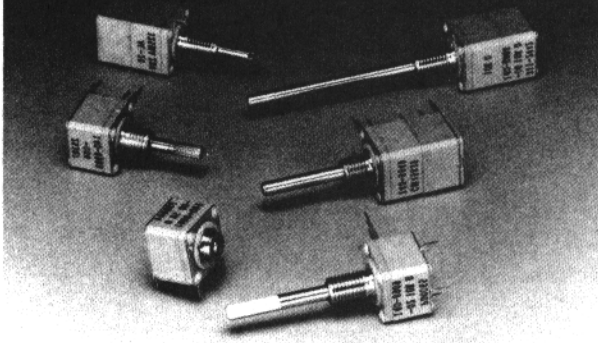


Series 408 Sealed Potentiometer  
1/2 in. sq. 0.5 Watt

Series 409 Sealed Potentiometer  
1/2 in. sq. 1.0 Watt



**408: Modular Style, Conductive Plastic**

**409: Modular Style, Thick-Film Cermet**

## Description

The series 408 and 409 are high-performance potentiometers, designed to meet wave soldering applications for mounting to PC boards.

They are also available with S.P.S.T. or S.P.D.T. rotary switch modules, S.P.D.T. push-pull or momentary switch modules and/or potentiometer modules in multiple sections up to three sections.

## Features

- **Compact** - 1/2 in. (12.7mm) miniature, totally sealed, modular size.
- **Precision Made** - screen-printed conductive plastic and thick-film cermet elements.
- **Cost-effective** - Elimination of hand soldering.
- **Rugged** - Horizontal or vertical mountings with support plates. Nickel-plated brass shaft and bushings in various diameters and lengths. Insert molded gold plated terminals for strength.
- **Stability** - Series 408 - 40°C to +120°C; Series 409 - 40°C to 150°C operating temperature.

### Series 408 Electrical Specifications

### Series 409 Electrical Specifications

<i>Resistance Tolerance</i>	100Ω to 5 Megohms, linear; 500Ω to 2 Megohms, non-linear	Linear: 5Ω to 5 Megohms Taper: 100Ω to 2 Megohms
<i>Resistance Range</i>	Linear, thru 500KΩ, ±10%; above 500K to 5 Megohms, ±20%. Non-linear thru 100KΩ, ±10%; above 100Ω ±20%.	±10% standard; ±5% special. Trimmers ±20%.
<i>End Resistance</i>	Linear, 4Ω maximum each end. Taper low side. 4Ω maximum. High side 1% of total R.	2Ω maximum, 5Ω to 2500Ω. 4Ω maximum, 5KΩ and above.
<i>Power Rating</i>	.5 watt @ 70°C. Derated linearly to zero watts at 120°C. See Chart B, page 37. For non linear tapered units or PC mounting, derate by 50%. Trimmer style, derate by 50%.	1 watt @ 85°C. Derate linearly to zero watts at 150°C. For tapered units, trimmers or PC mounting, derate 50%.
<i>Effective Rotation</i>	265° ±5° without rotary switch; 240° ±5° with rotary switch.	250° +10° -5° without rotary switch; 225° +10° -5° with rotary switch.
<i>Dynamic Noise</i>	Standard: Linear single controls maximum initial noise level of 1.5% of total resistance. Measurement made using constant current source and oscilloscope detection technique. Special: 1%.	Standard: Linear single controls maximum initial noise level of 3% of total resistance. Measurement made using constant current source and oscilloscope detection technique. Special: 1.5%

*Electrical Specifications continued, next page*

*Electrical Specifications continued*

<i>Electrical Rotation</i>	295° ±5°	295° ±5°
<i>Working Voltage</i>	350 Vdc across end terminals, but power not to exceed rating.	350 Vdc across end terminals, but power not to exceed rating.
<i>Resistance Temperature Characteristics</i>	See Chart C, page 38.	See Chart C, page 38.
<i>Linearity</i>	±5% independent	±5% independent
<i>Non-linear Tapers</i>	Right or left-hand available. See Chart A, page 37.	Right or left-hand available. See Chart A, page 37.
<i>Taper Tolerance</i>	±20% of nominal resistance @ 50% ±3% of mechanical rotation.	±20% of nominal resistance @ 50% ±3% of mechanical rotation.
<i>Voltage Coefficient</i>	.008%/Volt maximum	.008%/Volt maximum
<i>Dielectric Withstanding Voltage</i>	750 Vac for 60 seconds @ ATM pressure. 350 Vac for 6 seconds @ 3.4 in. Hg.	900 Vac for 60 seconds @ ATM pressure. 350 Vac for 60 seconds @ 3.4 in. Hg.

**Series 408/409 Mechanical Specifications**

*Mechanical Rotation*

295° ±5°

*Stop Torque*

3 lb. in. minimum (metal shaft)

*Torque Range*

.20 to 3.0 oz. in. (Single); .3 to 3.5 oz. in. (Dual); .4 to 4.5 oz. in. (Triple).

Other torque options available. Please consult Factory.

*Torque Variation*

Within control .5 oz. in. maximum

*Bushing Lengths*

.25 in. (6.35mm), .375 in. (9.53mm), .5 in. (12.7mm)

*Shafts, Standard*

.125 in. (3.18mm) diameter; brass, nickel-plated

*Shaft Lengths*

Lengths from mounting surface to 3 in. (76.2mm) in 1/64 in. (.397mm) increments

*Push-Pull and Momentary Switch*

S.P.D.T., 250ma, 30Vdc, push-pull (type BL).  
Momentary (type BLM).

*Rotary Switch*

S.P.S.T. or S.P.D.T., CCW or CW, 125ma, 28Vdc.  
(Type AL).

*Mechanical Specifications continued*

*Seal*

O-ring shaft seal standard all styles, and the complete unit is sealed for wave solder and wash processing. The shaft seal withstands 3 PSI pressure. Mounting seals are available. See Chart D, page 38.

*Housing*

Thermoplastic polyester, blue. (U.L. SE-O rating).

*Hardware*

Nut: brass, nickel-plated

Lockwasher: phosphorous bronze, nickel-plated

*Solvent Resistance*

Housing resistant to trichlorethylene, \*Chlorethene NU, Freon TMS, \*\*Freon TMC, toluene, MEK, ethyl acetate and gasoline. For solvents not listed, please consult Factory.

*Terminals*

Gold-coated PC terminals or solder hook style. PC pins fit .100 grid spacing. Terminal mounting options available.

*Weight (approx.)*

Metal shaft & bushing: (Single) .19 oz., (Dual) .27 oz., (Triple) .35 oz.

\*T.M. Dow Chemical Co.

\*\*T.M. DuPont

*Mechanical Specifications continued, next column*

## Series 408/409 Operational Specifications

### Operating Temperature Range

Series 408: -40°C to +120°C

Series 409: -40°C to +150°C

### Storage Temperature Range

Series 408: -55° to +120°C

Series 409: -55°C to +150°C

### Rotational Life

Series 408: linear control, 50,000 cycles under load, (plain bushing).

Change not to exceed 10% R.

Trimmer life under load is 5,000 cycles.

Series 409: linear control, 25,000 cycles under load, (plain bushing).

Change not to exceed 5% R.

Trimmer life under load is 5,000 cycles.

## AL Switch Specifications

### Rating

125ma 28Vdc (dry circuit)

### Rotational Life

25,000 cycles under rated load

## BL and BLM Switch Specifications

### Rating

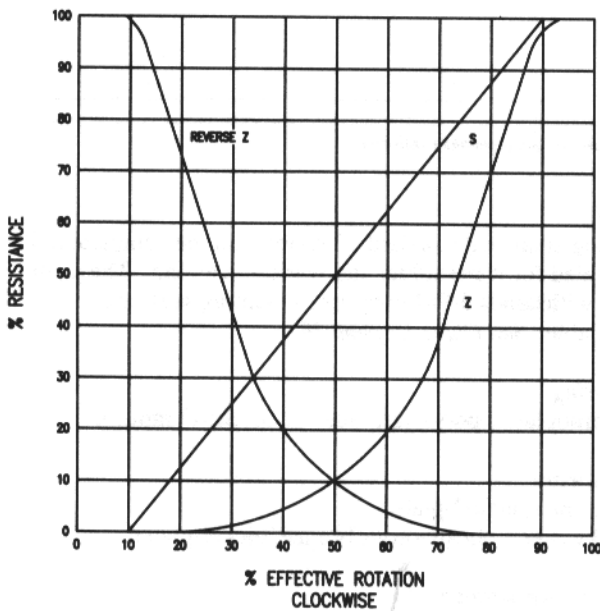
250ma 30Vdc (dry circuit)

### Rotational Life

15,000 cycles under rated load

Figure 1

Chart A



### Curves Standard

The "S" taper is linear, the change in resistance value being directly proportional to the degree of rotation. It can be used either as right-hand or left-hand taper.

The "Z" taper attains 10% resistance value at 50% of clockwise rotation (left-hand).

The reverse "Z" taper attains 10% resistance values at 50% of counter-clockwise rotation (right-hand).

For conformity and special output curves, consult Factory

Figure 2

Chart B

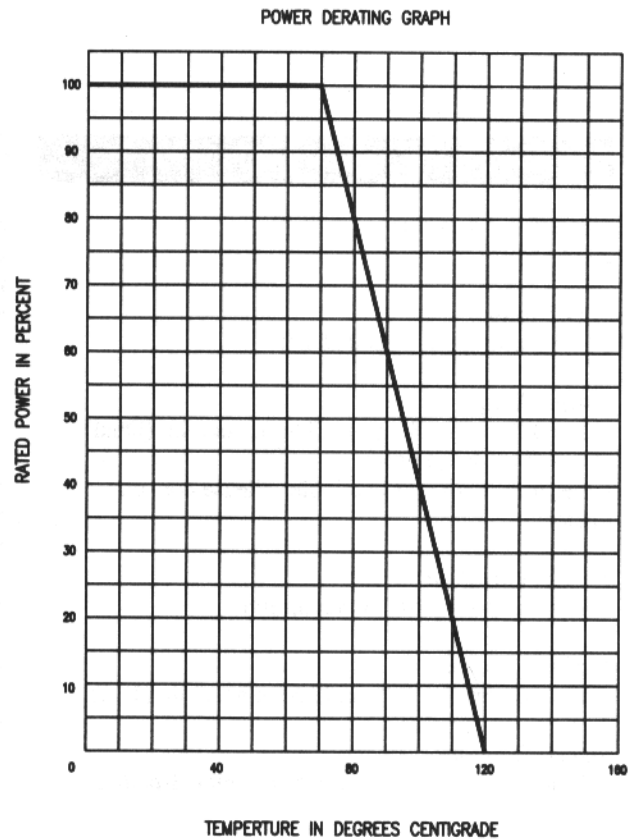
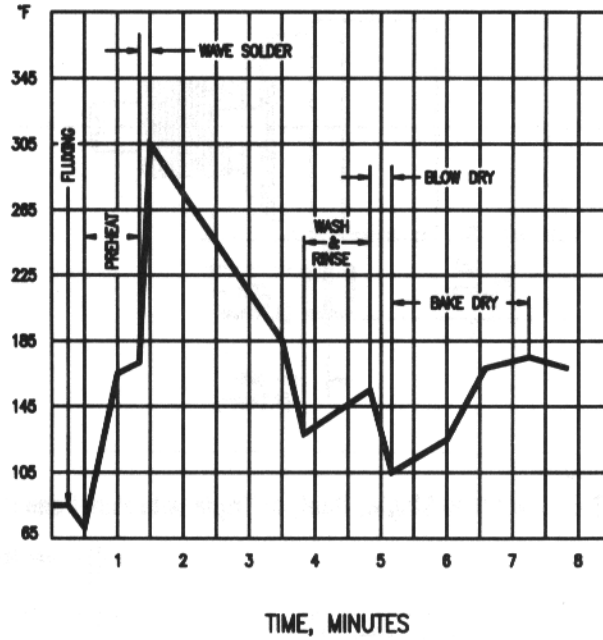


Figure 3  
Chart C

Nominal Resistance	Maximum Percent Temporary Resistance Change From 25°						
	-55°C	-40°C	0°C	+25°C	+55°C	+85°C	+120°C
100 Ohms	±5.0	±4.0	±1.5	0	±1.5	±2.0	±3.5
10k Ohms	+7.0	+5.5	+2.0	0	±1.5	±2.5	±5.5
100k Ohms	+8.0	+6.0	+2.5	0	±2.0	±3.5	±6.0
1 Megohm	+10.0	+8.0	+3.0	0	±2.5	±4.0	±7.5

For non-linear tapers, multiply chart values by 1.25.

Figure 4  
Chart D



Wave Solder and Board Wash Parameters Recommended Profile, Temperature on PC Board

Process Limits	Temp.	Time
Preheat Maximum	195°F	1 Min.
Solder Temperature Maximum	550°F	
Maximum Differential Temperature After Solder Into Wash (3/4T)	72°F	
Wash Temperature	150-160°F	1-1/2Min.
Dry Temperature	160-220°F	2 Min.

Tolerance specifications apply to all layout drawings unless otherwise specified:  
 fractions  $\pm 1/64$  in. (.379mm);  
 $\pm 1/32$  in. (.794mm) over 1 in. (25.4mm);  
 decimals  $\pm .005$  in. (.127mm);  
 PC board layout  $\pm .010$  in. (.254mm).

Figure 5  
Series 408/409

Single, Dual or Triple  
 (Second or Third Section May Be AL Series Rotary Switch)  
 Printed Circuit - Type B-22  
 "C" Terminal Length: .875" (22.3mm) Maximum  
 Standard PC Terminal Length: .250" (6.36mm)

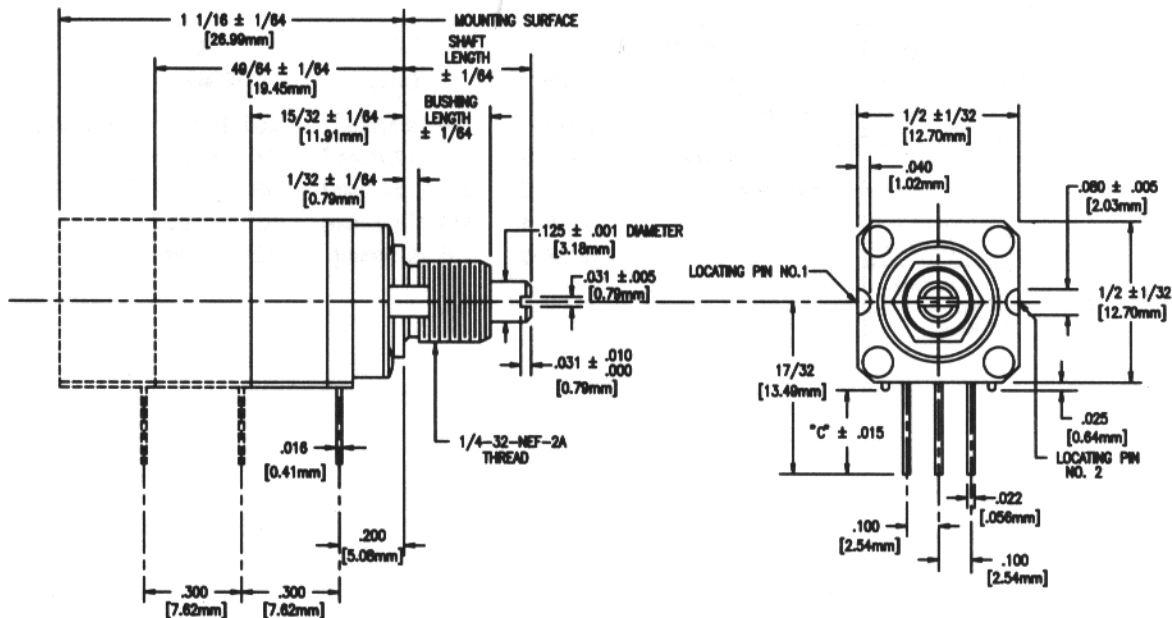


Figure 6

Series 408/409 Solder Lug Terminals

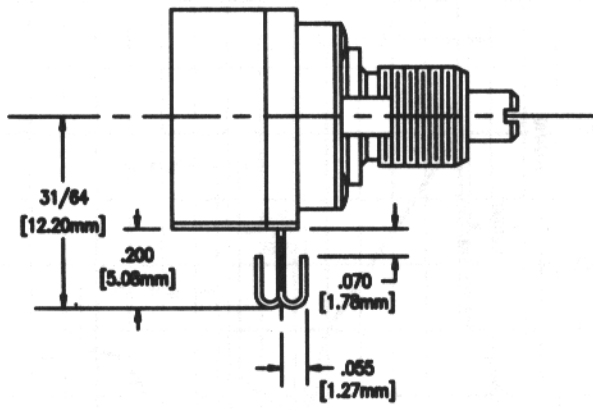


Figure 7

Series 408/409 Bushingless Trimmer

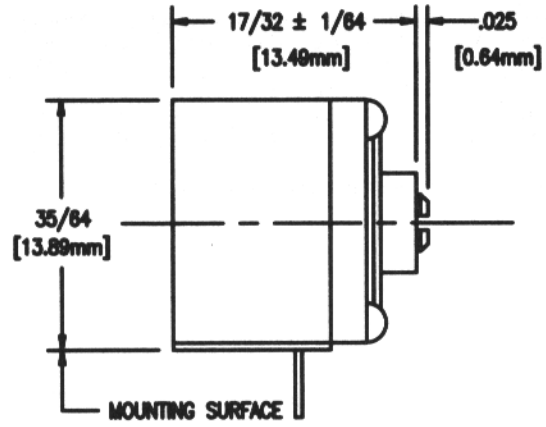
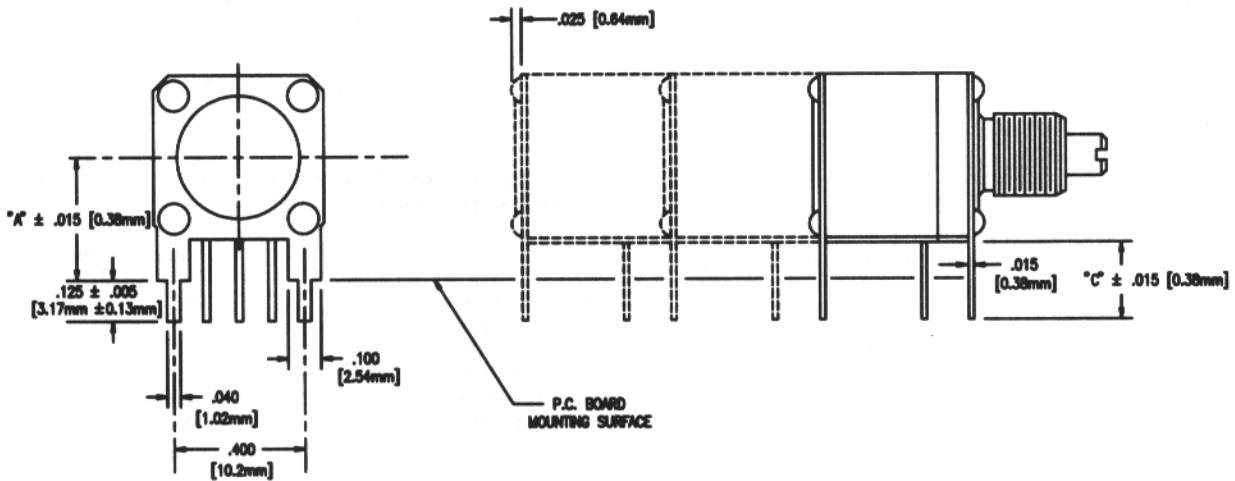
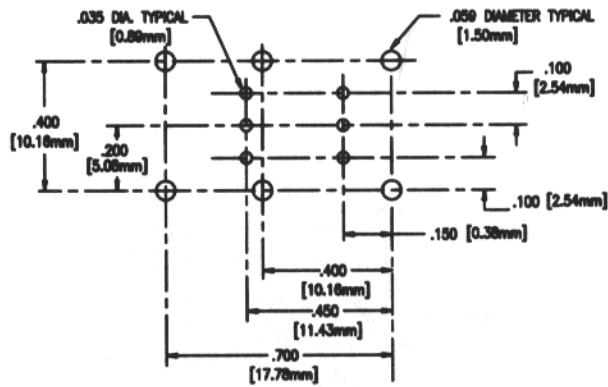


Figure 8

Series 408/409 Single, Dual, or Triple with Panel and Rear Support Plates, Horizontal Mounting

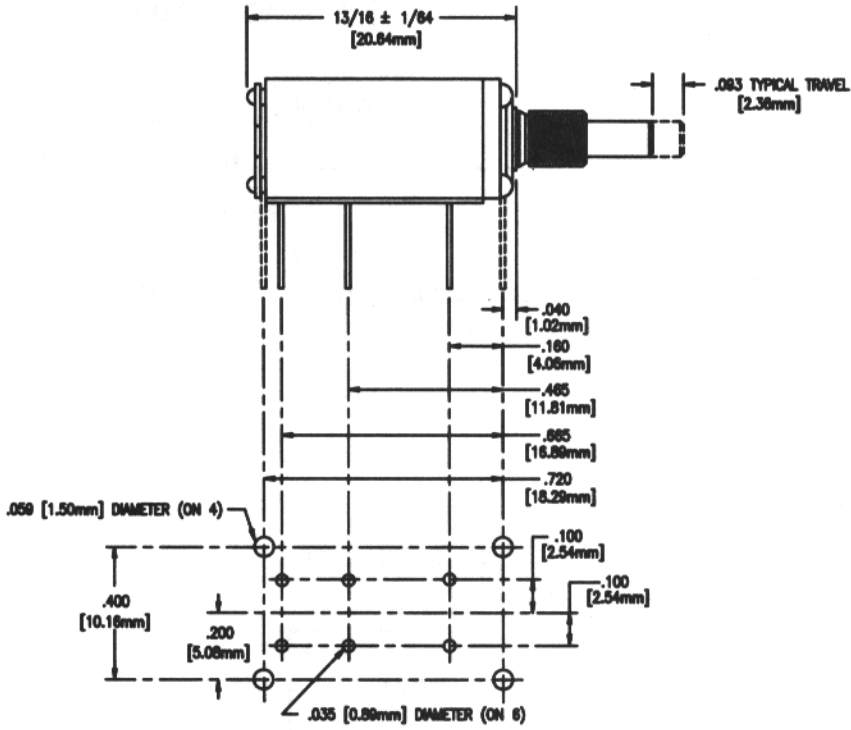


PC Board Layout

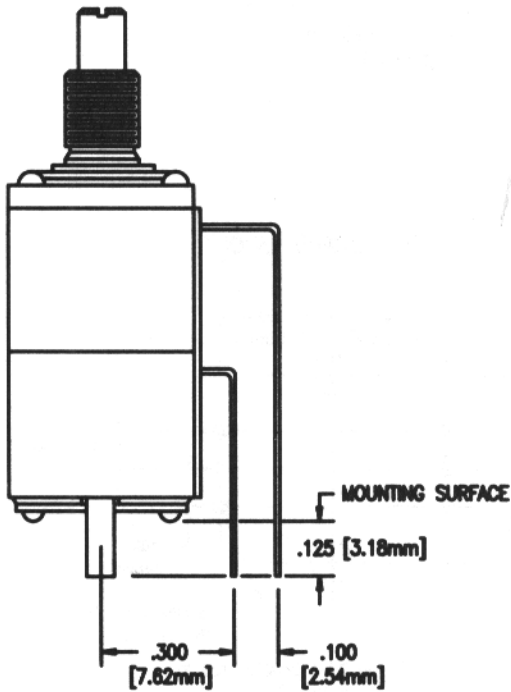


TYPE	"A" (PLATE)	"C" (TERMINAL)	STANDARD
B-24-1	3/8 [9.52mm]	.250 [6.35mm]	STANDARD
B-24-2	1/2 [12.70mm]	.375 [9.40mm]	
B-24-3	5/8 [15.88mm]	.500 [12.70mm]	
B-24-4	3/4 [19.05mm]	.625 [15.88mm]	
B-24-5	.255 [6.48mm]	.125 [3.18mm]	

**Figure 9**  
**Series 408/409 Pot and BL Series Push-Pull or BLM Momentary**  
**Switch Printed Circuit Board Layout (Available with B-24 Support**  
**Plates)**



**Figure 10**  
**Series 408/409 Type C-10 Printed Circuit Terminals**



**P.C. BOARD LAYOUT**

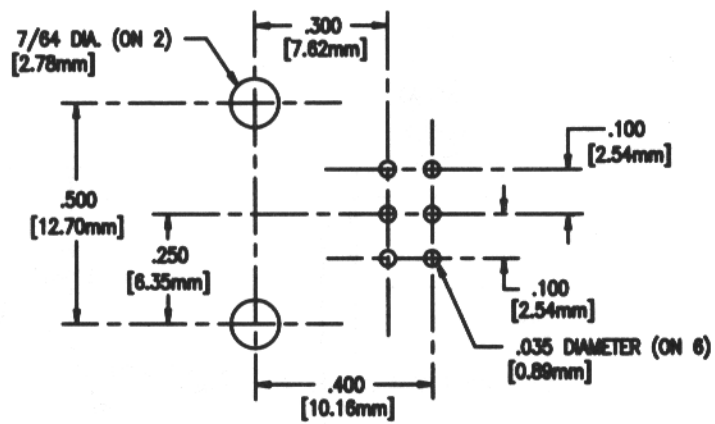


Figure 11

Series 408/409 Type A-18 Printed Circuit Terminals

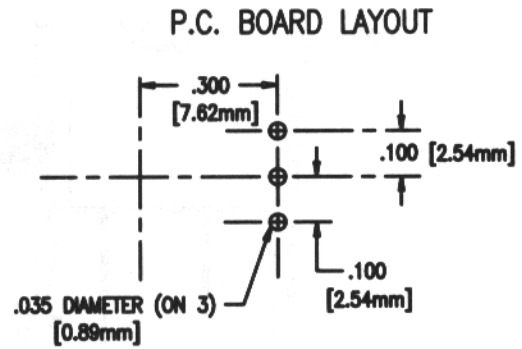
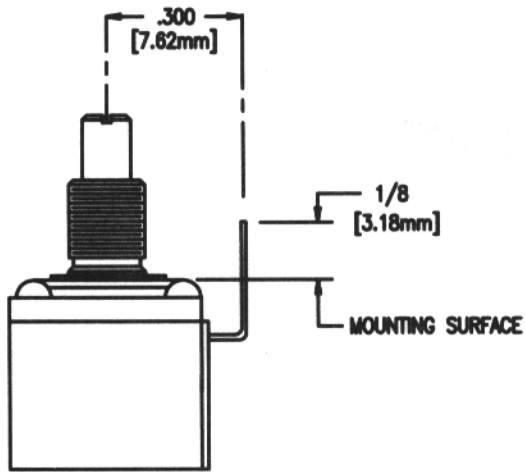
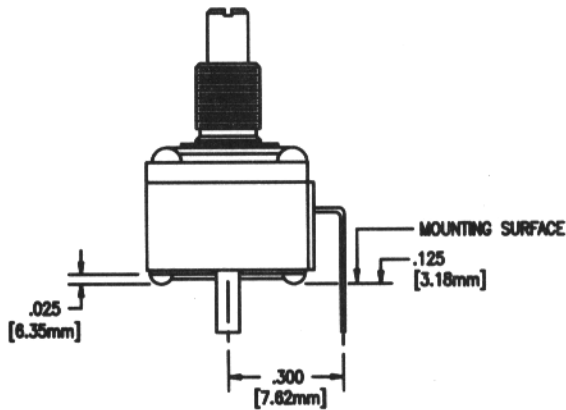


Figure 12

Series 408/409 Type C-8 Printed Circuit Terminals



PC BOARD LAYOUT

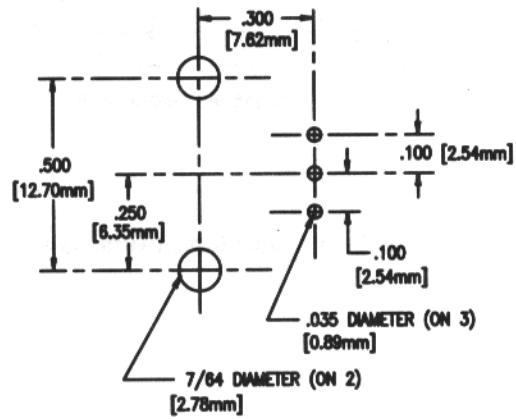
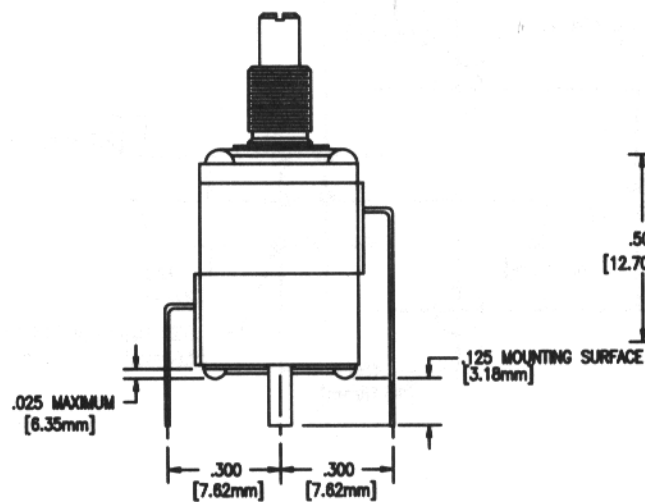


Figure 13

Series 408/409 Type C-9 Printed Circuit Terminals



P.C. BOARD LAYOUT

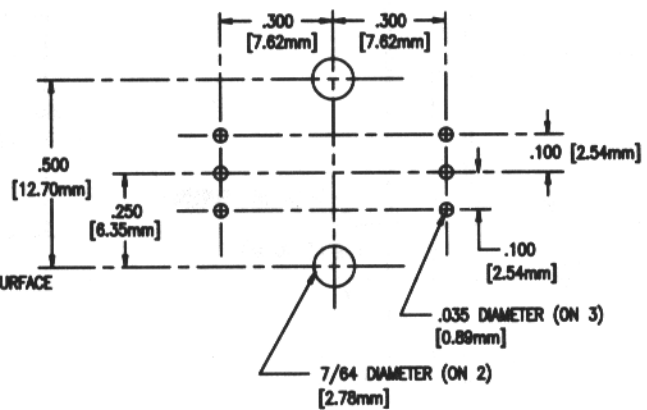
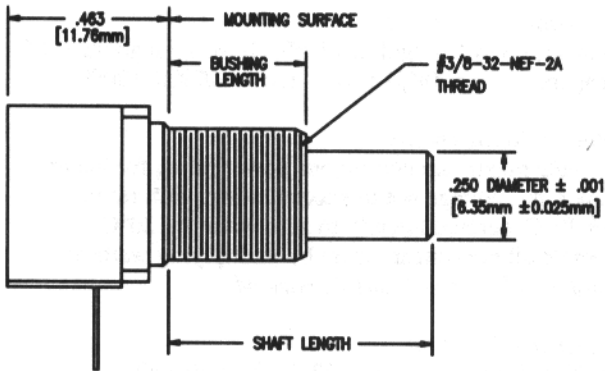


Figure 14

**Series 408/409** ( See Figure 4 for other dimensions)

1/4 in. (6.35 mm) Diameter Shaft  
 3/8 in. (9.53 mm) Diameter Bushing



**Standard Resistance Values continued**

**D408N(RZ)** (Same resistance & taper in both sections)

500	10K	50K
1K	25K	100K

**D408N (Z/RZ)** (Same resistance both sections. Panel Z taper, rear RZ taper.)

1K	10K	50K
5K	25K	

**409N**

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

**409N(Z)**

1K	5K	50K
2.5K	10K	

**SUPPORT MOUNTING (Optional)\***

Catalog Number	"A" (Plate)	"C" (Terminal)
B-24A-1	.375	.250
B-24A-2	.500	.375
B-24A-3	.625	.500
B-24A-4	.750	.625
B-24A-5	.255	.125

\*Rear plate only.

**Series 408/409 Standard Resistance Values**

**Stock Values (Ohms)**

408N			
100	2.5K	50K	1Meg
250	5K	100K	2.5Meg
500	10K	250K	5Meg
1K	25K	500K	

408N(Z)			
1K	10K	50K	
5K	25K	100K	

408N(RZ)			
500	10K	50K	
1K	25K	100K	

408NS			
100	1K	10K	100K
500	5K	50K	

408NS(Z)			
1K	10K	50K	
5K	25K	100K	

408NPPS			
100	1K	10K	50K
500	5K	25K	100K

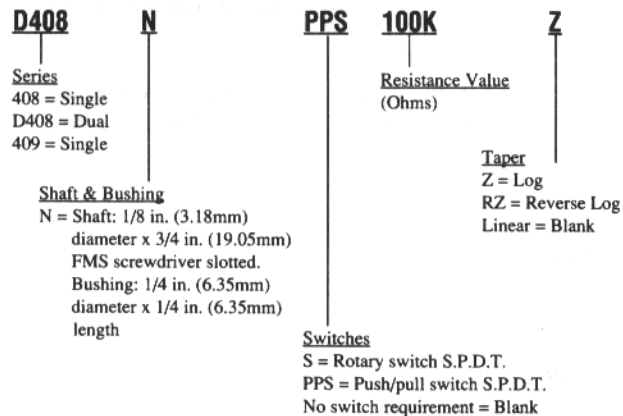
408NPPS(Z)			
500	5K	25K	100K
1K	10K	50K	

D408N (Same resistance in both sections)			
100	2.5K	50K	1Meg
250	5K	100K	2.5Meg
500	10K	250K	5Meg
1K	25K	500K	

D408N(Z) (Same resistance & taper in both sections)			
500	5K	25K	100K
1K	10K	50K	

**Series 408/409 How To Order**

Example: **D408-N-PPS-100K-Z**



Standard Resistance Values continued, next column