Series 388/389 Custom Potentiometer Designer Guide
Now almost any special combination potentiometer you specify can be manufactured and shipped soon after your order is received.

Since Clarosystem and Mod Pot potentiometers are modular in construction, we can produce prototype quantities of 1/2 or 5/8 inch square, conductive plastic, cermet, or hot molded carbon pots for you in just a few hours . . . . and even production quantities in a matter of days with our VIP (Very Important Potentiometer) service!

Over one billion combinations of single, dual, triple, quad arrangements, push-pull or rotary switches and hundreds of shaft terminal variations can be produced.

If you need a potentiometer and you need it fast, call our product manager or fax us your requirements using the Custom Potentiometer Order Form included in this catalog.

WHY WAIT?
## Series 388 Potentiometer
Conductive Plastic - 1/2 inch square; .5 Watt

## Series 389 Potentiometer
Cermet - 1/2 inch square; 1 Watt

### Description
The 388 and 389 series are 1/2 in. square, modular, stackable potentiometers. The basic construction suits the series for countless design options. The 388 and 389 series can be found in a wide range of sophisticated systems in a broad scope of industries.

### Operational Specifications

<table>
<thead>
<tr>
<th>Feature</th>
<th>Series 388</th>
<th>Series 389</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resistance Range</strong></td>
<td>Linear: 100 ohm to 5 Megohm</td>
<td>Linear: 50 ohm to 5 Megohm</td>
</tr>
<tr>
<td></td>
<td>Tapered: 500 ohm to 1 Megohm</td>
<td>Tapered: 100 ohm to 1 Megohm</td>
</tr>
<tr>
<td></td>
<td>See chart, page 7</td>
<td>See chart, page 7</td>
</tr>
<tr>
<td><strong>Resistance Tolerance</strong></td>
<td>Linear: thru 500K ohm, ±10%;</td>
<td>Linear: ±10%; ±20% special</td>
</tr>
<tr>
<td></td>
<td>above 500K ohm, ±20%</td>
<td>Tapered: ±10%</td>
</tr>
<tr>
<td></td>
<td>Tapered: thru 100K ohm, ±10%;</td>
<td>Under 20 ohm ±20%</td>
</tr>
<tr>
<td></td>
<td>above 100K ohm, ±20%</td>
<td></td>
</tr>
<tr>
<td><strong>Taper</strong></td>
<td>See Taper Curve charts on page 6 for</td>
<td>See Taper Curve charts on page 6 for</td>
</tr>
<tr>
<td></td>
<td>standard and special tapers available</td>
<td>standard and special tapers available</td>
</tr>
<tr>
<td><strong>Taper Tolerance</strong></td>
<td>±20% of nominal resistance at 50%</td>
<td>±20% of nominal resistance at 50%</td>
</tr>
<tr>
<td></td>
<td>±3% mechanical rotation</td>
<td>mechanical rotation</td>
</tr>
<tr>
<td><strong>Independent Linearity</strong></td>
<td>±5% standard with specials available</td>
<td>±5% standard with specials available</td>
</tr>
<tr>
<td><strong>End Resistance</strong></td>
<td>4 ohms max. each end linear and low side of taper. 1% of total R high side of taper.</td>
<td>2 ohms max. each end (5 ohms - 2.5K ohms) 4 ohms max. each end (above 2.5K)</td>
</tr>
<tr>
<td><strong>Dynamic Noise (C.R.V.)</strong></td>
<td>1.5% of total R, standard linear; 1.0% of total R, special linear; 2.2% of total R, tapered.</td>
<td>3.0% of total R, standard linear; 1.5% of total R, special linear (500 ohms and above); 6.0% of total R, tapered.</td>
</tr>
<tr>
<td><strong>Static Noise</strong></td>
<td>Up to 30K ohms - 20db; 100K ohms - 12 db; 1 Megohms +3db</td>
<td>Up to 100 ohms - 25db; 10K ohms - 15 db; 100K ohms - 10db.</td>
</tr>
</tbody>
</table>

**Features**
- **Small size** - 1/2 in. square
- **Stackable** - up to 8 modules
- **Switches** - rotary, push-pull, push-momentary, and schadow.
- **Versatility** - various shaft, bushings, terminal styles, resistance values, tapers and tolerances. Available in Conductive Plastic or Thick Film Cermet
- **RoHS Compliant**

**Special Features**
- **Detents** - Center detent and 11 position detents available
- **Seals** - mounting and shaft seals
- **Medium torque** - 1 to 6 oz. in.
### Operational Specifications

#### Series 388

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Rating</strong></td>
<td>0.5 Watt @ 70°C bushing mounting&lt;br&gt;0.25 Watt @ 70°C PC mounting.&lt;br&gt;Derate to 0 watts at 120°C.&lt;br&gt;Derate 50% for non-linear tapers and derate multiple sections 1/2 wattage of panel unit.</td>
</tr>
<tr>
<td><strong>Working Voltage</strong></td>
<td>350 Vdc across end terminals, but power not to exceed rating.</td>
</tr>
<tr>
<td><strong>Dielectric Withstanding Voltage</strong></td>
<td>750 VAC @ ATM pressure -760mm Mercury, equivalent to sea level.&lt;br&gt;350 VAC @ 3.4 in. - 86.36mm Mercury, equivalent to 50,000 feet.</td>
</tr>
<tr>
<td><strong>Insulation Resistance</strong></td>
<td>1000 Megohms minimum for dry, clean conditions @ 25°C</td>
</tr>
<tr>
<td><strong>Temperature Coefficient</strong></td>
<td>See Temperature Resistance Change table on page 7</td>
</tr>
<tr>
<td><strong>Tracking</strong></td>
<td>10% voltage ratio tracking between sections standard. Specials available.</td>
</tr>
<tr>
<td><strong>Electrical Rotation</strong></td>
<td>295° ±5°</td>
</tr>
<tr>
<td><strong>Effective Rotation</strong></td>
<td>265° ±5° without switch;&lt;br&gt;240° ±5° with switch.</td>
</tr>
<tr>
<td><strong>Load Life</strong></td>
<td>10% maximum change in resistance and within end resistance limits with rated power across element, at 70°C ambient temperature. Power applied 1.5 hours “on” 0.5 hours “off” for 1000 hours.</td>
</tr>
<tr>
<td><strong>Rotational Life</strong></td>
<td>Potentiometer: 10% maximum resistance change up to 25,000 cycles under load.&lt;br&gt;Rotary Switch: 15,000 cycles of operation&lt;br&gt;Trimmer: 5,000 cycles</td>
</tr>
<tr>
<td><strong>Low Temperature Operation</strong></td>
<td>Less than 3% change in total R.&lt;br&gt;Operating torque at -40°C is 30 oz. in.</td>
</tr>
</tbody>
</table>

#### Series 389

<table>
<thead>
<tr>
<th>Specification</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Power Rating</strong></td>
<td>1.0 Watt @ 85°C bushing mounting&lt;br&gt;0.5 Watt @ 85°C PC mounting.&lt;br&gt;Derate to 0 watts at 150°C.&lt;br&gt;Derate 50% for non-linear tapers and derate multiple sections 1/2 wattage of panel unit.</td>
</tr>
<tr>
<td><strong>Working Voltage</strong></td>
<td>350 Vdc across end terminals, but power not to exceed rating.</td>
</tr>
<tr>
<td><strong>Dielectric Withstanding Voltage</strong></td>
<td>750 VAC @ ATM pressure - 760mm Mercury, equivalent to sea level.&lt;br&gt;350 VAC @ 3.4 in. 86.36mm Mercury, equivalent to 50,000 feet.</td>
</tr>
<tr>
<td><strong>Insulation Resistance</strong></td>
<td>1000 Megohms minimum for dry, clean conditions @ 25°C</td>
</tr>
<tr>
<td><strong>Temperature Coefficient</strong></td>
<td>15 ohms to 100 ohms 250 ppm/°C.&lt;br&gt;100 ohms to 5 Megohms 150 ppm/°C&lt;br&gt;Temperature range -55°C to 150°C.</td>
</tr>
<tr>
<td><strong>Tracking</strong></td>
<td>10% voltage ratio tracking between sections standard. Specials available.</td>
</tr>
<tr>
<td><strong>Electrical Rotation</strong></td>
<td>295° ±5°</td>
</tr>
<tr>
<td><strong>Effective Rotation</strong></td>
<td>250° +10° -5° without switch;&lt;br&gt;225° +10° -5° with switch.</td>
</tr>
<tr>
<td><strong>Load Life</strong></td>
<td>5% maximum change in resistance and within end resistance limits with rated power across element, at 85°C ambient temperature. Power applied 1.5 hours “on” 0.5 hours “off” for 1000 hours.</td>
</tr>
<tr>
<td><strong>Rotational Life</strong></td>
<td>Potentiometer: 10% maximum resistance change up to 25,000 cycles under load.&lt;br&gt;Rotary Switch: 15,000 cycles of operation&lt;br&gt;Trimmer: 5,000 cycles</td>
</tr>
<tr>
<td><strong>Low Temperature Operation</strong></td>
<td>Less than 2% change in total R.&lt;br&gt;Operating torque at -40°C is 30 oz. in.</td>
</tr>
</tbody>
</table>
### Mechanical Specifications - Series 388 & Series 389

<table>
<thead>
<tr>
<th>Environment</th>
<th>Series 388</th>
<th>Series 389</th>
</tr>
</thead>
<tbody>
<tr>
<td>MIL-R-94 Standard</td>
<td>Series 388 is designed to meet MIL-R-94 performance characteristics where applicable</td>
<td>Series 389 is designed to meet MIL-R-94 and MIL-R-22097 performance characteristics where applicable</td>
</tr>
<tr>
<td>Low Temperature Storage</td>
<td>Less than 2% change in total resistance</td>
<td>Less than 2% change in total resistance</td>
</tr>
<tr>
<td>Thermal Cycling</td>
<td>Less than 4% total R change as a result of 5 cycles @ -55°C to +120°C</td>
<td>Less than 3% total R change as a result of 5 cycles @ -55°C to +150°C</td>
</tr>
<tr>
<td>Moisture Resistance</td>
<td>10% maximum total R change when tested per method 103 of MIL-STD-202</td>
<td>5% maximum total R change when tested per method 103 of MIL-STD-202</td>
</tr>
<tr>
<td>Solderability</td>
<td>Meet the requirements of MIL-STD—202, Method 210, Condition A except immersed within .125 inch of element for 5 seconds.</td>
<td>Meet the requirements of MIL-STD—202, Method 210, Condition A except immersed within .125 inch of element for 5 seconds.</td>
</tr>
<tr>
<td>Shock</td>
<td>The total resistance setting change is 2% maximum between left and right terminals and 5% maximum between CCW terminal and center terminal when tested per method 213 condition I of MIL-STD-202. Applicable to single shaft potentiometers only.</td>
<td>The total resistance setting change is 2% maximum between left and right terminals and 5% maximum between CCW terminal and center terminal when tested per method 213 condition I of MIL-STD-202. Applicable to single shaft potentiometers only.</td>
</tr>
<tr>
<td>Vibration, High Frequency</td>
<td>No intermittent contacts or open circuits when tested per method 204 Condition C of MIL-STD-202. Resistance setting change is 5% maximum between left (CCW) terminal and center terminal. The total resistance change is 2% maximum between left and right terminals. Applicable to single shaft potentiometers only.</td>
<td>No intermittent contacts or open circuits when tested per method 204 Condition C of MIL-STD-202. Resistance setting change is 5% maximum between left (CCW) terminal and center terminal. The total resistance change is 2% maximum between left and right terminals. Applicable to single shaft potentiometers only.</td>
</tr>
<tr>
<td>Washability</td>
<td>Units may be adversely affected if subjected to conventional after-solder board-wash</td>
<td>Units may be adversely affected if subjected to conventional after-solder board-wash</td>
</tr>
</tbody>
</table>

### Environmental and Mechanical Specifications

<table>
<thead>
<tr>
<th>Environment</th>
<th>Series 388</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body Size</td>
<td>Single module: .5 in. square ±.047 in. (except at standoffs)</td>
</tr>
<tr>
<td>Terminals</td>
<td>Printed circuit style on 0.100 in. grid in line, 0.250 in. long. Maximum PC terminal length: .875 in. Terminal spacing in multiple section controls: 0.300 in. Solder lugs formed from PC pins to accept 3 - #22 AWG wires.</td>
</tr>
<tr>
<td>Housing</td>
<td>Molded thermoplastic</td>
</tr>
<tr>
<td>Anti-turn Device</td>
<td>Location 1 supplied unless otherwise specified. See Chart D. Anti-turn Device radius: 6.35mm.</td>
</tr>
<tr>
<td>Seals</td>
<td>Mounting seal and shaft seal for single shafts only. Caution: These seals are not designed to meet board washing requirements.</td>
</tr>
<tr>
<td>Bushing Diameter</td>
<td>1/4 in. x 32NEF-2A standard 3/8 in. x 32NEF-2A optional</td>
</tr>
<tr>
<td>When using 3/8 in. diameter bushing, distance from mounting surface to PC terminals is .170 in. See page 8.</td>
<td></td>
</tr>
<tr>
<td>Bushing Length</td>
<td>Plain: 1/4 in., 3/8 in., or 1/2 in Split-locking style: 3/8 in.</td>
</tr>
<tr>
<td>Rotational Torque</td>
<td>Single and dual concentric controls: 0.2 to 3.0 oz. in. Two Modules: 0.3 to 3.5 oz. in. Three Modules: 0.5 to 4.5 oz. in. Four Modules: 0.5 to 5.5 oz. in. Medium Torque Option for single shaft only: 1 to 6 oz. in. Torque Variation within a rotation: 1 oz. in. max.</td>
</tr>
<tr>
<td>Stop Torque</td>
<td>Single shaft: 3 lb. in. (standard) High Stop Torque: 5 lb. in. 1/8” shaft with O-ring 8 lb. in. ¼” or 1/8” shaft without O-Ring</td>
</tr>
</tbody>
</table>

Mechanical Specifications continued on next page
**Mechanical Specifications, continued**

**Mechanical Rotation**
With or without switch: 295°±5°.

**Maximum Shaft Pull Force**
- .125 in. diameter shaft: 18 lbs (20 lbs Option)
- .250 in. diameter shaft: 10 lbs (20 lbs Option)
Concentric Front & Rear Shaft: 7.5 lbs.
AJ rotary and BJ Push-Pull Switches: 10 lbs (20 lbs Option)
BJ Push-Pull or BJM Momentary Switches: 20 lbs.

**Shaft Radial Play (single shaft potentiometer)**
- .028 in. maximum 1 in. from mounting surface with .250 in diameter bushing

**Shaft End Play**
- .020 in. maximum

**Mounting Torque**
Torque applied to the mounting nuts should not exceed 15 to 18 inch-pounds (1.7 to 2.0 N-m) for the .375 inch (9.52 mm) diameter bushing.

**Standard Taper Curves**

<table>
<thead>
<tr>
<th>% Electrical Rotation (Clockwise)</th>
<th>% RESISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Between Terminals 1 and 2</td>
<td>% RESISTANCE</td>
</tr>
</tbody>
</table>

- **S** = Linear
- **Z** = Audio/Log

**Special Taper Curves**

<table>
<thead>
<tr>
<th>% Electrical Rotation (Clockwise)</th>
<th>% RESISTANCE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Measured Between Terminals 1 and 2</td>
<td>% RESISTANCE</td>
</tr>
</tbody>
</table>

- **T** = REVERSE T
- **W** = Special Taper Curves
- **M** = Special Taper Curves

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 value at 50% of counter-clockwise rotation (right hand).

For conformity and special output curves, consult State Electronics.

**Tap Terminal Strength**
18 lbs. maximum pull

**Hardware**
Mounting Hardware available as the following:
- A. Hex mounting nut 1/4 in. x 32 thread, 5/16 in. across flats, 1/16 in. thick.
- B. Internal tooth lockwasher 13/32 in. OD x .025 in. thick.
- C. Jam hex nut 5/16 in. across flats, 5/32 in. thick - supplied with locking type bushings.

**Marking**
Consisting of State Electronics part number. Customer part number optional.
### Standard Resistance Values

<table>
<thead>
<tr>
<th></th>
<th>388 Linear</th>
<th>388 Audio</th>
<th>388 Reverse</th>
<th>389 Linear</th>
<th>389 Audio</th>
</tr>
</thead>
<tbody>
<tr>
<td>50</td>
<td>●</td>
<td>•</td>
<td>●</td>
<td>●</td>
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<td>100</td>
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<td>1K</td>
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<tr>
<td>2.5K</td>
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<td>•</td>
<td>●</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>5K</td>
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<td>●</td>
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<tr>
<td>1M</td>
<td>●</td>
<td>•</td>
<td>●</td>
<td>●</td>
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<tr>
<td>2.5M</td>
<td>●</td>
<td>•</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>5M</td>
<td>●</td>
<td>•</td>
<td></td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>

### Temperature Resistance Change

<table>
<thead>
<tr>
<th>Nominal Resistance</th>
<th>Maximum Percent Temporary Resistance Change From 25°C</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Ohms</td>
<td>±5.0 ±4.0 ±1.5 0 ±1.5 ±2.0 ±3.5</td>
</tr>
<tr>
<td>10K Ohms</td>
<td>+7.0 +5.5 +2.0 0 ±1.5 ±2.5 ±5.5</td>
</tr>
<tr>
<td>100K Ohms</td>
<td>+8.0 +6.0 +2.5 0 ±2.0 ±3.5 ±6.0</td>
</tr>
<tr>
<td>1 Megohm</td>
<td>+10.0 +8.0 +3.0 0 ±2.5 ±4.0 ±7.5</td>
</tr>
</tbody>
</table>

Note: For non-linear tapers, multiply chart values by 1.25

### Locating Tab Options

#### P.C. Board & Panel Mounting Dimensions
- Using Slots for Locating Tab(s)
- Using Holes for Locating Tab(s)

#### Series 388 Locating Lug Style:
- Tab width: .091”
- Tab Height: .041 ± .005” FMS
- Spacing: .250”

#### Option Number
- 1 = one tab - at 9 o’clock (standard)
- 2 = one tab - at 3 o’clock
- 3 = one tab - at 12 o’clock
- 4 = one tab - at 6 o’clock
- 5 = two tabs - at 3 and 9 o’clock
- 6 = two tabs - at 6 and 12 o’clock
- 7 = No Locating Lug

**NOTE:** Slots are recommended for the locating tab(s) when using 3/8” diameter bushings because of clearance issues,
**Series 388/389 Bushings**

**Figure 6**
.250 (6.35mm) Diameter Bushing, Plain Shaft

- "A" Bushing Lengths for .250" Dia. Bushing:
  - .250 [6.35mm] STD
  - .375 [9.53mm]
  - .500 [12.70mm]

**Figure 7**
.375 (9.53mm) Diameter Bushing, Plain Shaft

- "A" Bushing Lengths for .375" Dia. Bushing:
  - .250 [6.35mm] STD
  - .375 [9.53mm]
  - .500 [12.70mm]

**Figure 8**
.250 (6.35mm) Diameter, Locking Bushing

**Figure 9**
.375 (9.53mm) Diameter, Locking Bushing

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**Switch Modules**

**Figure 4**
Series AJ Switch: Rotary Style

**Figure 8**
Series AJ - SPDT Rotary
125MA 28VDC
**Series 388/389 Shafts**

**Figure 10**
0.125 (3.18mm) Diameter - Slotted Shaft

- Mounting Surface: 0.31 [0.80]
- Diameter: 0.125 ±0.001 [3.18 ±0.03]

**Figure 11**
0.250 (6.35mm) Diameter - Slotted Shaft

- Mounting Surface: 0.125 ±0.001 [3.18 ±0.03]
- Diameter: 0.250 ±0.000 [6.35 ±0.05]

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**Figure 12**
0.250 (6.35mm) Diameter, Flatted Shaft

- Diameter: 0.250 ±0.000 [6.35 ±0.05]
- Flatted Surface: 0.216 ±0.002 [5.50 ±0.05]
- ØCC = 122.5

Flat can extend to within 0.031 (0.79) of mounting bushing where shaft length will not permit standard flat.

**Figure 13**
0.125 (3.18mm) Diameter - Concentric Shafts

- Diameter: 0.125 ±0.001 [3.18 ±0.03]
- Mounting Surface: 0.078 ±0.001 [1.96 ±0.03]

Note: Only Plain Ends are Available for Concentric Shafts

**Figure 14**
0.125 (3.18mm) Diameter, Flatted Shaft

- Diameter: 0.125 ±0.001 [3.18 ±0.03]
- Flatted Surface: 0.094 ±0.002 [2.38 ±0.05]
- ØCC = 122.5

Flat will extend to within 0.031 (0.79) of mounting bushing where shaft length will not permit standard flat.

**Figure 15**
Trimmer

- Dimension A: 0.025 (0.64) Standard
- Other lengths available to 0.50 (12.70) Maximum
Common Combinations

Series 388 & 389 controls are assembled from 1/2” square, stackable potentiometer and switch modules. Combine up to 8 modules, with single or concentric metal shafts. Series 388 potentiometer modules have conductive plastic resistive elements, and Series 389 potentiometer modules have cermet resistive elements.

The most common configurations are listed below. Contact your State Electronics sales representative for your custom requirements.

**Series 388/389 - Horizontal Mounting Styles**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-22</td>
<td>1, 2, 3, or 4 Potentiometer or Rotary Switch Modules, PC Pin Terminals</td>
<td>11</td>
</tr>
<tr>
<td>B-22</td>
<td>2 or 3 Potentiometer or Rotary Switch Modules, PC Pin Terminals, Concentric Shafts</td>
<td>11C</td>
</tr>
<tr>
<td>B-24</td>
<td>1, 2, 3, or 4 Potentiometer or Rotary Switch Modules, PC Pin Terminals, Support Plates</td>
<td>12</td>
</tr>
<tr>
<td>B-22</td>
<td>2 or 3 Potentiometer or Rotary Switch Modules, PC Pin Terminals, Concentric Shafts, Support Plates</td>
<td>12C</td>
</tr>
<tr>
<td>B-22</td>
<td>1, 2, 3, or 4 Potentiometer or Rotary Switch Modules, Solder Hook Terminals</td>
<td>13</td>
</tr>
<tr>
<td>B-22</td>
<td>2 or 3 Potentiometer or Rotary Switch Modules, Solder Hook Terminals, Concentric Shafts</td>
<td>13C</td>
</tr>
<tr>
<td>B-22</td>
<td>Single Potentiometer or Rotary Switch, plus Push-Pull/Momentary Switch, PC Pin Terminals</td>
<td>14</td>
</tr>
<tr>
<td>B-22</td>
<td>Single, Dual Pot or Rotary Switch, plus Push-Pull/Momentary Switch, Solder Hook Terminals</td>
<td>14C</td>
</tr>
<tr>
<td>B-22</td>
<td>Dual Potentiometer/Rotary switch with (BJ) Push-Pull/(BJM) Momentary Switch; PC Pin Terminals</td>
<td>15</td>
</tr>
</tbody>
</table>

**Detent**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-22</td>
<td>Single, Dual Potentiometer with Detent, Valley Style, PC Pin Terminals, Solder Hook Terminals</td>
<td>16</td>
</tr>
<tr>
<td>B-24</td>
<td>Single, Dual Potentiometer with Detent, Valley Style, PC Pin Terminals, Support Plates</td>
<td>17</td>
</tr>
</tbody>
</table>

**Schadow Switch**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Single</td>
<td>Dual Potentiometer with DPDT Schadow Switch, PC Pin Terminals</td>
<td>18</td>
</tr>
</tbody>
</table>

**Series 388/389 - Vertical Mounting Styles**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-8</td>
<td>Single Potentiometer or Rotary Switch, PC Pin Terminals</td>
<td>19</td>
</tr>
<tr>
<td>A-18</td>
<td>Single Potentiometer or Rotary Switch, PC Pin Terminals</td>
<td>19</td>
</tr>
<tr>
<td>C-15</td>
<td>BBJ Single Push-Pull / BBJM Momentary Switch, PC Pin Terminals</td>
<td>20</td>
</tr>
<tr>
<td>A-19, A-20</td>
<td>Dual Potentiometer or Rotary Switch, PC Pin Terminals</td>
<td>20</td>
</tr>
<tr>
<td>C-14, A-21, C-9, C-10</td>
<td>Dual Potentiometer or Rotary Switch, PC Pin Terminals</td>
<td>21</td>
</tr>
<tr>
<td>A-22, C-15</td>
<td>BBJ Momentary/ BBJM Push-Pull Switch, PC Pin Terminals</td>
<td>21</td>
</tr>
<tr>
<td>C-11</td>
<td>Single Potentiometer and BBJ/BBJM Switch, PC Pin Terminals</td>
<td>22</td>
</tr>
</tbody>
</table>

**Concentric Shafts**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-9, C-10</td>
<td>Dual Potentiometer, Concentric Shaft, PC Pin Terminals</td>
<td>22</td>
</tr>
</tbody>
</table>

**Detent**

<table>
<thead>
<tr>
<th>Style</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>C-8, A-18, C10, A20</td>
<td>Single, Dual Potentiometer with Detent, Valley Style, PC Pin Terminals</td>
<td>23</td>
</tr>
</tbody>
</table>
Dwg 11-1: B-22 Single Potentiometer or Rotary Switch, PC Pin Terminals

Dwg 11-2: B-22 Dual Potentiometer or Rotary Switch, PC Pin Terminals

Dwg 11-3: B-22 Triple Potentiometer or Rotary Switch, PC Pin Terminals

Dwg 11-4: B-22 Quad Potentiometer or Rotary Switch, PC Pin Terminals

Notes:
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±.016 [.40], except as specified.
2. B-22 PC pin length standard is 0.250". Maximum 0.875"
3. Drawings are not to scale.
**Series 388/389 - Horizontal Mounting Styles (continued)**

**Drawing 11C-1:** B-22 Dual Potentiometer or Rotary Switch, Concentric Shaft, PC Pin Terminals

**Drawing 11C-2:** B-22 Triple Potentiometer or Rotary Switch, Concentric Shaft, PC Pin Terminals

**Notes:**
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ± 0.016 [0.40], except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875".
3. Drawings are not to scale.

---

**Notes:**
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ± 0.016 [0.40], except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875".
3. Drawings are not to scale.
Series 388/389 - Horizontal Mounting Styles (continued)

**Dwg 12-1: B-24 Single Potentiometer or Rotary Switch, Support Plates**

![Diagram](image1)

**Dwg 12-2: B-24 Dual Potentiometer or Rotary Switch, Support Plates**

![Diagram](image2)

**Dwg 12-3: B-24 Triple Potentiometer or Rotary Switch, Support Plates**

![Diagram](image3)

**Dwg 12-4: B-24 Quad Potentiometer or Rotary Switch, Support Plates**

![Diagram](image4)

**Notes:**
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters.
2. Tolerance is ±0.016 [0.40], except as specified.
3. PC pins length is 0.250". Maximum 0.875".
4. Drawings are not to scale.

**Support Plate Dimensions:**

<table>
<thead>
<tr>
<th>Type</th>
<th>&quot;A&quot; Support Plate</th>
<th>&quot;C&quot; Terminal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>B–24–1</td>
<td>0.375 [9.53]</td>
<td>0.250 [6.35] STANDARD</td>
</tr>
<tr>
<td>B–24–2</td>
<td>0.500 [12.70]</td>
<td>0.375 [9.53]</td>
</tr>
<tr>
<td>B–24–3</td>
<td>0.625 [15.88]</td>
<td>0.500 [12.70]</td>
</tr>
<tr>
<td>B–24–4</td>
<td>0.750 [19.05]</td>
<td>0.625 [15.88]</td>
</tr>
<tr>
<td>B–24–5</td>
<td>0.875 [21.78]</td>
<td>0.750 [19.05]</td>
</tr>
</tbody>
</table>
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 12C-1: B-24 Dual Potentiometer or Rotary Switch, Concentric Shaft, PC Pin Terminals, Support Plates

Dwg 12C-2: B-24 Triple Potentiometer or Rotary Switch, Concentric Shaft, PC Pin Terminals, Support Plates

Support Plate Dimensions:

<table>
<thead>
<tr>
<th>Type</th>
<th>&quot;A&quot; Support Plate</th>
<th>&quot;C&quot; Terminal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-24-1</td>
<td>0.375 [9.53]</td>
<td>0.250 [6.35] STANDARD</td>
</tr>
<tr>
<td>B-24-2</td>
<td>0.500 [12.70]</td>
<td>0.375 [9.53]</td>
</tr>
<tr>
<td>B-24-3</td>
<td>0.625 [15.88]</td>
<td>0.500 [12.70]</td>
</tr>
<tr>
<td>B-24-4</td>
<td>0.750 [19.05]</td>
<td>0.625 [15.88]</td>
</tr>
<tr>
<td>B-24-5</td>
<td>0.275 [6.98]</td>
<td>0.125 [3.18]</td>
</tr>
</tbody>
</table>

Notes:
1. Basic dimensions are in inches.
   Dimensions in brackets are in millimeters.
   Dimensional Tolerance ±0.016 [0.40], except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875".
3. Drawings are not to scale.
Dwg 13-1: B-22 Single Potentiometer or Rotary Switch, Solder Hook Terminals

Dwg 13-2: B-22 Dual Potentiometer or Rotary Switch, Solder Hook Terminals

Dwg 13-3: B-22 Triple Potentiometer or Rotary Switch, Solder Hook Terminals

Dwg 13-4: B-22 Quad Potentiometer or Rotary Switch, Solder Hook Terminals

NOTE: Solder Hook Terminal receives (3) NO. 22 AWG .025 (0.64mm) solid wires
**Series 388/389 - Horizontal Mounting Styles (continued)**

**Dwg 13C-1: B-22 Dual Potentiometer or Rotary Switch, Concentric Shaft, Solder Hook Terminals**

![Dwg 13C-1 Diagram](image)

**Dwg 13C-2: B-22 Triple Potentiometer or Rotary Switch, Concentric Shaft, Solder Hook Terminals**

![Dwg 13C-2 Diagram](image)

**Notes:**
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±0.016 [0.40], except as specified.
2. B-22 PC pins length standard is 0.250”. Maximum 0.875”
3. Drawings are not to scale.
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 14-1A: B-22 Single Module, plus Push-Pull/Momentary Switch, PC Pin Terminals

Dwg 14-1B: B-22 Single Module, plus Push-Pull/Momentary Switch, PC Pin Terminals, Support Plate

Dwg 14-1C: B-22 Single Pot or Rotary Switch, plus Push-Pull/Momentary Switch, Solder Hook Terminals

Notes:
1. Basic dimensions are in inches.
   Dimensions in brackets are in millimeters.
   Dimensional Tolerance ±.016 [.41], except as specified.
2. B-22 PC pins length standard is 0.250”. Maximum 0.875”
3. Drawings are not to scale.
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 14-2A: B-22 Dual Potentiometer or Rotary Switch, plus Push-Pull/Momentary Switch, PC Pin Terminals

Dwg 14-2B: B-22 Dual Potentiometer or Rotary Switch, plus Push-Pull/Momentary Switch, PC Pin Terminals with Support Plates

Dwg 14-2C: B-22 Dual Pot or Rotary Switch, plus Push-Pull/Momentary Switch, Solder Hook Terminals

Notes:
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±0.016 (0.40), except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875"
3. Drawings are not to scale.
Series 388/39 - Horizontal Mounting Styles (continued)

Dwg 14-3: B-24 Dual Pot or Rotary Switch, Concentric Shaft, PC Pin Terminals, Support Plates

Dwg 14-3A: B-24 Triple Pot or Rotary Switch, Concentric Shaft, PC Pin Terminals, Support Plates

Support Plate Dimensions:

<table>
<thead>
<tr>
<th>Type</th>
<th>&quot;A&quot; Support Plate</th>
<th>&quot;C&quot; Terminal Length</th>
</tr>
</thead>
<tbody>
<tr>
<td>B-24-3</td>
<td>.625 [15.88]</td>
<td>.500 [12.70]</td>
</tr>
<tr>
<td>B-24-4</td>
<td>.750 [19.05]</td>
<td>.625 [15.88]</td>
</tr>
<tr>
<td>B-24-5</td>
<td>.275 [6.98]</td>
<td>.125 [3.18]</td>
</tr>
</tbody>
</table>
Dwg 15-1: Dual Potentiometer/Rotary switch with (BJ) Push-Pull/(BJM) Momentary Switch; PC Pin Terminals (Support Plates optional)

Locating Lug (no Support Brackets)

Support Brackets (no Locating Lug)

Dwg 15-2: Dual Potentiometer/Rotary switch with (BJ) Push-Pull/(BJM) Momentary Switch; Solder Hook Terminals.

1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±.016 [.40], except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875".
3. Drawings are not to scale.
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 15-3: Triple Potentiometer/Rotary switch with (BJ) Push-Pull/(BJM) Momentary Switch; PC Pin Terminals (Support Plates optional)

Locating Lug and no Support Brackets

Support Brackets and no Locating Lug

Dwg 15-4: Triple Potentiometer/Rotary switch with (BJ) Push-Pull/(BJM) Momentary Switch; Solder Hook Terminals.

1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±.016 (.40) except as specified.
2. B-22 PC pins length standard is 0.250". Maximum 0.875"
3. Drawings are not to scale.
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 16-1: B-22 Single Potentiometer with detent, Valley Style, PC Pin Terminals

Dwg 16-2: B-22 Dual Potentiometer with detent, Valley Style, PC Pin Terminals

Dwg 16-3: B-22 Single Potentiometer with detent, Valley Style, Solder Hook Terminals

Dwg 16-4: B-22 Dual Potentiometer with detent, Valley Style, Solder Hook Terminals
**Dwg 17-1: B-24 Single Potentiometer with detent, Valley Style, PC Pin Terminals, Support Plates**

![Single Potentiometer Diagram](image1)

**Dwg 17-2: B-24 Dual Potentiometer with detent, Valley Style, PC Pin Terminals, Support Plates**

![Dual Potentiometer Diagram](image2)
Series 388/389 - Horizontal Mounting Styles (continued)

Dwg 18-1: Single Potentiometer with DPDT Schadow Switch:
Momentary Push or Push On / Push Off.

Dwg 18-2: Dual Potentiometer with DPDT Schadow Switch:
Momentary Push or Push On / Push Off.
**Series 388/389 - Vertical Mounting Styles**

**Dwg 19-1: C-8 Single Potentiometer or Rotary Switch, PC Pin Terminals**

- PC board surface: A ± .031 (0.80)
- Tab Length: 1/4" Dia. Bushing: 0.039 ± 0.005 (0.999)
- 3/8" Dia. Bushing: 0.07 ± 0.005 (1.78)

**Dwg 19-2: A-18 Single Potentiometer or Rotary Switch, PC Pin Terminals**

- PC board surface: A ± .031 (0.80)
- FMS Tab Length: 1/4" Dia. Bushing: 0.039 ± 0.005 (0.999)
- 3/8" Dia. Bushing: 0.07 ± 0.005 (1.78)

---

**PC Board Layout (top view)**

**Type C-8**

- 300 [7.62]
- 250 [6.35]
- 250 [6.35]
- 100 [2.54]
- 100 [2.54]
- 100 [2.54]
- 100 [2.54]
- 109 [2.78] Diameter (2 places)

**Type A-18**

- 265 [6.74] Diameter
- 250 [6.35]
- 250 [6.35]
- 109 [2.78] Diameter
Notes:
1. Basic dimensions are in inches. Dimensions in brackets are in millimeters. Dimensional Tolerance ±0.016 (0.40), except as specified.
2. Drawings are not to scale.
**SERIES 388, 389 - Vertical Mounting Styles (continued)**

### Dwg 21-1: A-21 Dual Potentiometer or Rotary Switch, PC Pin Terminals

```
A ± .031 (0.80)
3.15 [8.00] DIAMETER
265 [6.73] DIAMETER
109 [2.76] DIAMETER
300 [7.62] DIAMETER

PC BOARD LAYOUT (top view)
Type A-21
```

### Dwg 21-2: A-20 Dual Potentiometer or Rotary Switch, PC Pin Terminals

```
A ± .031 (0.80)
3.15 [8.00] DIAMETER
265 [6.73] DIAMETER
109 [2.76] DIAMETER
300 [7.62] DIAMETER

PC BOARD LAYOUT (top view)
Type A-20
```

### Dwg 21-3: C-9 Dual Potentiometer or Rotary Switch, PC Pin Terminals

```
A ± .031 (0.80)
3.15 [8.00] DIAMETER
265 [6.73] DIAMETER
109 [2.76] DIAMETER
300 [7.62] DIAMETER

PC BOARD LAYOUT (top view)
Type C-9
```

### Dwg 21-4: C-10 Dual Potentiometer or Rotary Switch, PC Pin Terminals

```
A ± .031 (0.80)
3.15 [8.00] DIAMETER
265 [6.73] DIAMETER
109 [2.76] DIAMETER
300 [7.62] DIAMETER

PC BOARD LAYOUT (top view)
Type C-10
```
Series 388/389 - Vertical Mounting Styles (continued)

**Dwg 22-1: C-9 Dual Potentiometer, Concentric Shaft, PC Pin Terminals**

**Dwg 22-2: C-10 Dual Potentiometer, Concentric Shaft, PC Pin Terminals**

**Dwg 22-3: C-11 Single Potentiometer and BBJ Momentary/BBJM Push-Pull Switch, PC Pin Terminals**

**DIMENSION NOTES**

A = Shaft Length (Out Position)

B = Bushing Length

.250 (6.35mm) STD

.375 (9.53mm)

.500 (12.70mm)

**Table Length:**

1/4" Dia. Bushing: 0.039 ± 0.005 (0.999)

3/8" Dia. Bushing: 0.07 ± 0.005 (0.178)

**Note:** Connecting terminals 2 and 4 together will create a SPDT switch.

Shaft shown in the extended position.
**SERIES 388, 389**

**Series 388/389 - Vertical Mounting Styles (continued)**

---

**Dwg 23-1: C-8 Single Potentiometer with Detent, PC Pin Terminals**

![Dwg 23-1: C-8 Single Potentiometer with Detent, PC Pin Terminals]

**Dwg 23-2: A-18 Single Potentiometer with Detent, PC Pin Terminals**

![Dwg 23-2: A-18 Single Potentiometer with Detent, PC Pin Terminals]

---

**Dwg 23-3: C-10 Dual Potentiometer with Detent, PC Pin Terminals**

![Dwg 23-3: C-10 Dual Potentiometer with Detent, PC Pin Terminals]

**Dwg 23-4: A-20 Dual Potentiometer with Detent, PC Pin Terminals**

![Dwg 23-4: A-20 Dual Potentiometer with Detent, PC Pin Terminals]

---

**DIMENSION NOTES**

B = Bushing Length

- 250 (6.35mm) STD
- 375 (9.53mm)
- 500 (12.70mm)

**PC BOARD LAYOUT (top view)**

- Type C-8
- Type C-10
- Type A-18
- Type A-20

---

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Cage Code: 7A378  http://www.potentiometers.com
### CLAROSYSTEM

**Series 388/389**  
Request For Quotation  
Single Page Form

#### 1/2" Square Modular Potentiometer
- **Conductive Plastic** – 1/2 Watt  
- **Cermet** - 1 Watt

---

### Request Quotation Online at Potentiometer.com

**Customer Name:**  
**Address:**

**City, State, Zip, Country:**  
**Customer Part Number/When Specified:**

---

**SEE DATA SHEETS FOR ASSEMBLED DIMENSIONS & DETAILED DESCRIPTION OF THE FOLLOWING OPTIONS:**

**FOLLOW STEPS TO DESCRIBE CONTROL**

<table>
<thead>
<tr>
<th>STEP</th>
<th>RESISTANCE ELEMENT (Select One)</th>
<th>TERMINALS (Select One)</th>
<th>TAPER (Insert Taper Designation Letter for Each Resistance Module)</th>
<th>RESISTANCE VALUE (Insert for Each Resistance Module)</th>
<th>SWITCH MODULES (Insert for Each Switch Module)</th>
<th>BUSHING (Select Length and Diameter)</th>
<th>SHAFT (Select Diameter and Length)</th>
<th>LOCATING LUG OPTIONS (Select One)</th>
<th>MOUNTING HARDWARE (Select One)</th>
<th>MARKING (Select One)</th>
<th>KNOB</th>
<th>QUANTITY</th>
</tr>
</thead>
</table>
| 1    | Conductive Plastic, Series 388 | 822 PC, Pin Style Terminals (See Other Options At Right) | Cermet, S, Z  
Conductive Plastic, S, Z, RZ (See Graph Below) | Nominal Resistance Values in Ohms  
100 1K 10K 100K 1.0 Meg  
250 2.5K 25K 250K 2.5 Meg  
500 5K 50K 500K 5 Meg  
Other Values Available on Special Order | A1 Rotary SPDT CW or CCW detent  
B1 Push-Pull SPDT (last section only)  
B24 Momentary SPDT (last section only)  
Schadow DPDT Momentary Switch (last section only)  
Schadow DPDT Push-Push (last section only) | Length (Dim “A”)  
1/4” 3/8”  Locking 3/8” | 1/2” Diameter  
1/4” 3/8”  Other | | STANDARD | STANDARD | Indicate Manufacturer and Part Number |
| 2    | Cermet, Series 389 | | | | | | | 1 = tab at 9 o'clock (std)  
2 = tab at 3 o'clock  
3 = tab at 12 o'clock  
4 = tab at 6 o'clock  
5 = tabs at 3 and 9 o'clock  
6 = tabs at 3 and 9 o'clock  
7 = No Locating Lug | | |
| 3    | | | | | | | | | | | |
| 4    | | | | | | | | | | | |
| 5    | | | | | | | | | | | |
| 6    | | | | | | | | | | | |
| 7    | | | | | | | | | | | |
| 8    | | | | | | | | | | | |
| 9    | | | | | | | | | | | |
| 10   | | | | | | | | | | | |
| 11   | | | | | | | | | | | |
| 12   | | | | | | | | | | | | **Purchase Order No.**

---

**NOTE:** SELECT THE DIMENSIONS WHICH ARE REQUIRED AND FILL IN ALL APPROPRIATE BOXES

**REMARKS AND/OR SPECIAL FEATURES:**

**Date:**  
**Issued By:**  
**Title:**  
**Phone:**

**DISCLAIMER:** Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications

Fax completed form to: **STATE ELECTRONICS**, 36 Route 10, East Hanover, NJ 07936 • FAX 973-887-1940  
For Assistance Contact Clarosystem Product Manager **Toll Free – 800-631-8083**

---
Series 388/389 Custom Ordering Information – Follow Steps to Describe Control

1 Resistance Element (choose one) □ Series 388 Conductive Plastic □ Series 389 Cermet

2 Terminals OR Support Plates (choose one)

☐ Terminals (choose style)

☐ Solder Hook

☐ PC Pin Style B22 (specify length) □ .250 in. (6.35mm) □ .350 in. (8.89mm) □ .750 in. (19.05mm) □ .500 in. (12.7mm) □ .625 in. (15.875mm) □ .875 in. (22.225mm) Standard

☐ PC Pin Style special configuration (specify)

☐ C8 ☐ C9 ☐ C10 ☐ A18 ☐ A19 ☐ A20

☐ Optional Support Plates (choose one type)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>B-24-1</td>
<td>.375 (9.53)</td>
<td>.250 (6.35)</td>
</tr>
<tr>
<td>B-24-2</td>
<td>.500 (12.53)</td>
<td>.375 (9.35)</td>
</tr>
<tr>
<td>B-24-3</td>
<td>.625 (15.88)</td>
<td>.500 (12.70)</td>
</tr>
<tr>
<td>B-24-4</td>
<td>.750 (19.05)</td>
<td>.625 (15.88)</td>
</tr>
<tr>
<td>B-24-5</td>
<td>.275 (6.98)</td>
<td>.125 (3.18)</td>
</tr>
<tr>
<td>* B-24-6</td>
<td>.2969 (7.54)</td>
<td>.175 (4.45)</td>
</tr>
<tr>
<td>* B-24-7</td>
<td>.4375 (11.11)</td>
<td>.315 (8.00)</td>
</tr>
<tr>
<td>* B-24-8</td>
<td>.5625 (14.28)</td>
<td>.425 (10.8)</td>
</tr>
</tbody>
</table>

* (Discontinued - For Reference Only)
Taper (Insert taper designation letter below module or modules)
Cermet or Conductive Plastic  Taper Design
Linear  S
Clockwise Modified Log  Z
Counter Clockwise Modified Log  RZ
Modified Linear  M*
Counter Clockwise Modified Log  V*
Modified Log  W*
Counter Clockwise Modified Log  T*
Modified Log  RT* *(special order)

Tolerance (Insert tolerance for each resistance module)
Cermet: 10% standard; 5% special
Conductive Plastic: 10% standard; 5% special

Resistance Value (Insert for each resistance module)
Nominal Resistance Values in Ohms
<p>| | | | | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>100</td>
<td>1K</td>
<td>10K</td>
<td>100K</td>
<td>1.0 Meg</td>
</tr>
<tr>
<td>250</td>
<td>2.5K</td>
<td>25K</td>
<td>250K</td>
<td>2.5 Meg</td>
</tr>
<tr>
<td>500</td>
<td>5K</td>
<td>50K</td>
<td>500K</td>
<td></td>
</tr>
</tbody>
</table>

Other Values Available on Special Order

Switch Modules (Insert designation in proper module box)
☐ AJ SPDT Rotary – CCW detent
☐ AJ SPDT Rotary – CW detent
☐ BJ SPDT Push-Pull (last section only)
☐ BJM SPDT Push Momentary (last section only)
☐ Schadow DPDT Push-Push (single shaft, last section only)
☐ Schadow DPDT Momentary (single shaft, last section only)
### Special Options (Specify if required)
- 8 lb. Stop Torque

### Bushing (Choose length and diameter)

<table>
<thead>
<tr>
<th>Length (Dim &quot;A&quot;)</th>
<th>Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plain .250 in. (6.35mm)</td>
<td>Plain .250 in. (6.35mm)</td>
</tr>
<tr>
<td>Plain .375 in. (9.53mm)</td>
<td>Plain .375 in. (9.53mm)</td>
</tr>
<tr>
<td>Plain .500 in (12.70mm)</td>
<td></td>
</tr>
<tr>
<td>Locking .375 in (9.53mm)</td>
<td></td>
</tr>
</tbody>
</table>

### Shaft

- Diameter (Choose one)
  - .125 in. (3.18mm) (with .250 in. (6.35mm) Dia. bushing)
  - .250 in. (6.35mm) (with .375 in. (9.53mm) Dia. bushing)

- Length (Dim "B") from mounting surface (FMS) (specify)

- Concentric Shafts (available for Up to 3 modules. Module closest to Panel is controlled by outer shaft.)
  - .125 in. (3.18mm) Outer Diameter; .078 in. (1.98mm) Inner Diameter

<table>
<thead>
<tr>
<th>Length FMS (specify)</th>
<th>Outer</th>
<th>Inner</th>
</tr>
</thead>
</table>

### Shaft Ending (Select one)
- Plain
- Slotted
- Flatted (specify length & thickness)
- Special (specify)

### Locating Lug Options (Select one)
- 1 = one tab - at 9 o'clock (standard)
- 2 = one tab - at 3 o'clock
- 3 = one tab - at 12 o'clock
- 4 = one tab - at 6 o'clock
- 5 = two tabs - at 3 and 9 o'clock
- 6 = two tabs - at 6 and 12 o'clock
- 7 = No Locating Lug

### Mounting Hardware (Specify)
- Standard
- IP66 Hardware
- None

### Marking (Specify)
- Standard
- Other

**DISCLAIMER:** Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Offered Options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max Wattage Rating</td>
<td>1-Watt, 2-Watt, 1/2-Watt</td>
</tr>
<tr>
<td>Operating Temperature (°C)</td>
<td>-55 ° to 120 °, -55 ° to 150 °, -55 ° to 120 °, -55 ° to 150 °, -55 ° to 125 °</td>
</tr>
<tr>
<td>Temperature Coefficient (TC)</td>
<td>+/-5% (Typical), +/-5% (Typical), +/-5% (Typical), +/-5% (Typical)</td>
</tr>
<tr>
<td>Rotational Life</td>
<td>100,000, 50,000, 25,000, 1,000,000</td>
</tr>
<tr>
<td>Sections</td>
<td>6, 84</td>
</tr>
<tr>
<td>Center Detent</td>
<td>Center or 11 Detents</td>
</tr>
<tr>
<td>Detents</td>
<td>Not Available, 21 Detents Available</td>
</tr>
<tr>
<td>Rotary Switch - Counter Clockwise</td>
<td>2A @125VAC, 1A @125VAC</td>
</tr>
<tr>
<td>Detent</td>
<td>1 SPST, N.O., 1 SPST, N.C.</td>
</tr>
<tr>
<td>Rotary Switch - Clockwise</td>
<td>No CW Detent, 1 SPST, N.O.</td>
</tr>
<tr>
<td>Push-Pull Switch (1/8” or 1/4” Dia. Shaft)</td>
<td>Optional, 250 MA @ 30 VDC</td>
</tr>
<tr>
<td>Push-Momentary - 1/8” Dia. Shaft</td>
<td>2A @125VAC</td>
</tr>
<tr>
<td>Detent</td>
<td>1 SPST, N.O., 1 SPST, N.C.</td>
</tr>
<tr>
<td>Push-Momentary - 1/4” Dia. Shaft</td>
<td>2 SPST N.O., 2 SPST N.C.</td>
</tr>
<tr>
<td>Push-On / Push-Off - 1/8” Dia. Shaft</td>
<td>Not Available, Optional, 500 MA @ 30VDC</td>
</tr>
<tr>
<td>Max Shaft Single Length - 1/8 Dia.</td>
<td>Plastic Shaft - 3/4”</td>
</tr>
<tr>
<td>Max Shaft Single Length - 1/4 Dia.</td>
<td>Plastic Shaft - 7/8”</td>
</tr>
<tr>
<td>Concentric Shafts - .078 / .125</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
</tr>
<tr>
<td>Concentric Shafts - .125 / .250</td>
<td>.125 / .250 Combination Not Available</td>
</tr>
<tr>
<td>Vernier Drive</td>
<td>Optional, No, No</td>
</tr>
<tr>
<td>Internal Shaft Seal</td>
<td>Optional, Optional, Standard</td>
</tr>
<tr>
<td>IP 66 Rated</td>
<td>No, No, Standard</td>
</tr>
<tr>
<td>Stop Torque</td>
<td>4 in / lb, 3 in / lb, 2.5 in / lb</td>
</tr>
<tr>
<td>High Stop Torque</td>
<td>Not Available, 8 in / lb Not Available</td>
</tr>
<tr>
<td>Rotational Torque Standard (Min / Max)</td>
<td>0.3  /  3.0  (In-Oz), 0.2  /  3.0  (In-Oz), 1.5 Max   (In-Oz)</td>
</tr>
<tr>
<td>Rotational Torque, Medium Torque Option</td>
<td>Not Available, 1 - 6 (In-Oz)</td>
</tr>
<tr>
<td>Rotary Switch Actuating Torque</td>
<td>20 (In-Oz), 3.3 - 10.5 (In-Oz), 2 (In-Oz)</td>
</tr>
</tbody>
</table>

Note: Most parameters (wattage rating, rotational torque, etc.) are affected by the total number of sections. Download full specifications for further details.
GLOSSARY OF TERMS

Input and Output Terms

Output Voltage
(e) The voltage between the wiper terminal and the designated reference point. Unless otherwise specified, the designated reference point is the CCW terminal (See 3.1).

Output Ratio
(e/E) The ratio of the output voltage to the designated input reference voltage. Unless otherwise specified, the reference voltage is the total applied voltage.

Rotation and Translation

Total Mechanical Travel
The total travel of the shaft between integral stops, under the specified stop load. In potentiometers without stops, the mechanical travel is continuous.

Mechanical Overtravel - Wirewound
The shaft travel between each End Point (or Theoretical End Point for Absolute Conformity or Linearity units) and its adjacent corresponding limit of Total Mechanical Travel.

Mechanical Overtravel
The shaft travel between each Theoretical End Point and its adjacent corresponding limit of Total Mechanical Travel.

Backlash
The maximum difference in shaft position that occurs when the shaft is moved to the same actual Output Ratio point from opposite directions.

Theoretical Electrical Travel
The specified shaft travel over which the theoretical function characteristic extends between defined Output Ratio limits, as determined from the Index Point.

Electrical Overtravel - Nonwirewound
The shaft travel over which there is continuity between the wiper terminal and the resistance element beyond each end of the Theoretical Electrical Travel.

Electrical Continuity Travel
The total travel of the shaft over which electrical continuity is maintained between the wiper and the resistance element.

Tap Location
The position of a tap relative to some reference. This is commonly expressed in terms of an Output Ratio and/or a shaft position. When a shaft position is specified, the Tap Location is the center of the Effective Tap Width.

Resistance

End Resistance
The resistance measured between the wiper terminal and an end terminal with the shaft positioned at the corresponding End Point.

Temperature Coefficient Of Resistance
The unit change in resistance per degree celsius change from a reference temperature, expressed in parts per million per degree celsius as follows:

\[
T.C. = \frac{R_2 - R_1}{R_1(T_2 - T_1)} \times 10^6
\]

Where:
R1 = Resistance at reference temperature in ohms.
R2 = Resistance at test temperature in ohms
T1 = Reference temperature in degrees celsius.
T2 = Test temperature in degrees celsius.

Conformity and Linearity

Linearity
A specific type of conformity where the theoretical function characteristic is a straight line. Mathematically:

\[
\frac{e}{E} = f(W) = A(W) + B + C
\]

Where:
A is the given slope; B is given intercept at W=0.
W = Angle or slope

Absolute Linearity
The maximum deviation of the actual function characteristic from a fully defined straight reference line. It is expressed as a percentage of the Total Applied Voltage and measured over the Theoretical Electrical Travel. An Index Point on the actual output is required.
The straight reference line may be fully defined by specifying the low and high theoretical end Output Rations separated by the Theoretical Electrical Travel. Unless otherwise specified, these end Output Rations are 0.0 and 1.0 respectively.

Mathematically:

\[ \frac{e}{E} = A\left(\frac{W}{W_T}\right) + B \pm C \]

Where:
A is the given slope; B is given intercept at \( W=0 \).
Unless otherwise specified: \( A=1; B=0 \)

**Figure 2**

---

**Independent Linearity**

The maximum deviation, expressed as a percent of the Total Applied Voltage, of the actual function characteristic from a straight reference line with its slope and position chosen to minimize deviations over the Actual Electrical Travel, or any specified portion thereof.

Note: End Voltage requirements, when specified, will limit the slope and position of the reference line.

Mathematically:

\[ \frac{e}{E} = P\left(\frac{W}{W_A}\right) + Q \pm C \]

Where:
P is unspecified slope; Q is unspecified intercept at \( W=0 \). And both are chosen to minimize C but are limited by the End Voltage requirements.

**Figure 3**

---

**INDEX POINT**

**THEORETICAL FUNCTION CHARACTERISTIC**

**INDEX POINT**

**ABSOLUTE LINEARITY LIMITS**

**ACTUAL FUNCTION CHARACTERISTIC**

**TRAVEL \( \phi \)**

**TOTAL THEORETICAL ELECTRICAL TRAVEL (\( \phi_T \))**

**ELECTRICAL CONTINUITY TRAVEL**

\[ \frac{\phi}{E} = \frac{180}{\text{MAXIMUM + AND } - \text{ DEVIATIONS ARE MINIMIZED}} \]

\[ \frac{e}{E} = \frac{180}{\text{MAXIMUM}} \]

**INDEX POINT**

**C MAXIMUM**

**MAXIMUM + AND - DEVIATIONS ARE MINIMIZED**

**TRAVEL \( \phi \)**

**TOTAL THEORETICAL ELECTRICAL TRAVEL (\( \phi_T \))**

**ELECTRICAL CONTINUITY TRAVEL**

---
**Electrical Characteristics**

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

**Output Smoothness (Non-wirewound Potentiometers Only)**
Output Smoothness is a measurement of any spurious variation in the electrical output not present in the input. It is expressed as a percentage of the Total Applied Voltage and measured for specified travel increments over the Theoretical Electrical Travel. Output Smoothness includes effects of contact resistance variations, resolution, and other micrononlinearities in the output.

**Resolution**
A measure of the sensitivity to which the Output Ratio of the potentiometer may be set.

**Dielectric Strength**
Ability to withstand under prescribed conditions, a specified potential of a given characteristic between the terminals of each cup and the exposed conducting surfaces of the potentiometer, or between the terminals of each cup and the terminals of every other cup in the gang without exceeding a specified leakage current value.

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

**Power Rating**
The maximum power that a potentiometer can dissipate under specified conditions while meeting specified performance requirements.

**Power Derating**
The modification of the nominal power rating for various considerations such as Load Resistance, Output Slopes, Ganging, nonstandard environmental conditions and other factors.

**Life**
The number of shaft revolutions or translations obtainable under specific operating conditions and within specified allowable degradations of specific characteristics.

**Mechanical Characteristics**

**Shaft Runout**
The eccentricity of the shaft diameter with respect to the rotational axis of the shaft, measured at a specified distance from the end of the shaft. The body of the potentiometer is held fixed and the shaft is rotated with a specified load applied radially to the shaft. The eccentricity is expressed in inches, TIR.

**Lateral Runout**
The perpendicularity of the mounting surface with respect to the rotational axis of the shaft, measured on the mounting surface at a specified distance from the outside edge of the mounting surface. The shaft is held fixed and the body of the potentiometer is rotated with specified loads applied radially and axially to the body of the pot. The Lateral Runout is expressed in inches.

**Shaft Radial Play (single shaft potentiometer)**
The total radial excursion of the shaft, measured at a specified distance from the front surface of the unit. A specified radial load is applied alternately in opposite directions at a specified point. Shaft Radial Play is expressed in inches.

**Shaft End Play**
The total axial excursion of the shaft, measured at the end of the shaft with a specified axial load supplied alternately in opposite directions. Shaft End Play is expressed in inches.

**Starting Torque**
The maximum moment in the clockwise and counterclockwise directions required to initiate shaft rotation anywhere in the Total Mechanical Travel.

**Running Torque**
The maximum moment in the clockwise and counterclockwise directions required to sustain uniform shaft rotation at a specified speed throughout the Total Mechanical Travel.

**Moment of Inertia**
The mass moment of inertia of the rotating elements of the potentiometer about their rotational axis.

**Stop Strength**

**Static Stop Strength**
The maximum static load that can be applied to the shaft at each mechanical stop for a specified period of time without permanent change of the stop positions greater than specified.

**Dynamic Stop Strength**
The inertia load, at a specified shaft velocity and a specified number of impacts, that can be applied to the shaft at each stop without a permanent change of the stop position greater than specified.
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All agreements are more contingent upon strikes, accidents or causes of delay beyond our control.

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Claims and Rejected Material

Claims for defective material must be made within 30-days of the customer's receipt of shipment. No products may be returned without a return authorization (RMA).

Country of Origin

The 388 / 389 and 70 series Mod-Pot products are assembled in the United States at our facility located in East Hanover, New Jersey, USA, using components parts manufactured by the Sensing and Control Division of Honeywell International headquartered in Morris Township, New Jersey, USA.

Export Information

HARMONIZED TARIFF SCHEDULE (HTS #) - 8533.31.0000

EXPORT CONTROL CLASSIFICATION # (ECCN #) - EAR99
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