Series S159 Potentiometer
5/8" (15.88mm) Square

Description:
The Series S159 modules are 5/8" square (15.88mm), with metal shaft and bushing.
Combine up to 4 modules, including a rotary switch option.
For more information about this product, visit our website at: www.potentiometers.com

Features:
- **Stackable** - up to 4 modules
- **Conductive Plastic or Cermet Resistance Element**
- **Linear, CW or CCW audio Taper**
- **Metal Shaft and Bushing**
- **PCB or Solder Lug Terminals**
- **Rotary Switch module** - DPST, 2A @ 58Vdc
- **IP40 Rating**
- **RoHS Compliant**

Electrical Specifications

- **Resistance Range - Conductive Plastic**
  - Audio & Linear Taper: 1 K ohms to 1 meghom
- **Resistance Range - Cermet**
  - Linear Taper: 100 ohms to 1 meghom
  - Audio Taper: 1 K ohms to 1 meghom
- **Total Resistance Tolerance**
  - ±10% Standard (±5% or ±20% Optional)
  - Independent Linearity: ±5 %
- **Absolute Minimum Resistance**: 2 ohms maximum
- **Effective Electrical Angle - Conductive Plastic**
  - Linear Taper: 240° ±5°; Audio Taper: 225° ±5°
- **Effective Electrical Angle - Cermet**
  - Linear Taper: 240° ±6°; Audio Taper: 225° ±6°
- **Contact Resistance Variation**
  - Conductive Plastic: ±1%
  - Cermet: ±1% or 3 ohms (whichever is greater)
- **Dielectric Withstanding Voltage (MIL-STD-202 - Method 301)**
  - Sea Level: 1,500 VAC minimum
  - 70,000 feet: 500 VAC minimum
- **Insulation Resistance**: 1,000 megohms minimum
- **Power Rating At 70 °C** (Derate to 0 At 125 °C)
  - (Voltage Limited By Power Dissipation or 350 VAC, Whichever Is Less)
  - **Single Section**:
    - Conductive Plastic Linear Taper: 1 watt
    - Conductive Plastic Audio Taper: 0.5 watt
    - Cermet Linear Taper: 2 watts
    - Cermet Audio Taper: 1 watt
  - **Multiple Section**:
    - Conductive Plastic Linear Taper: 0.5 watt/section
    - Conductive Plastic Audio Taper: 0.25 watt/section
    - Cermet Linear Taper: 1.0 watt/section
    - Cermet Audio Taper: 0.5 watt/section
- **Theoretical Resolution**: Essentially Infinite

Mechanical Specifications

- **Mechanical Angle**: 300° ±5°
- **Stop Strength**:
  - 1/4” and 1/8” diameter shafts: 45.19 N-cm (4 lb.-in.)
- **Starting and Running Torque (Non-Locking Bushing)**:
  - Single Section: 0.14 to 1.06 N-cm (0.2 to 1.5 oz.-in.)
  - Dual Section: 0.14 to 1.06 N-cm (0.2 to 1.5 oz.-in.)
  - Triple Section: 0.35 to 1.41 N-cm (0.5 to 2.0 oz.-in.)
  - Quad Section: 0.35 to 1.41 N-cm (0.5 to 2.0 oz.-in.)
- **Starting and Running Torque (Locking Bushings)**:
  - 0.14 to 2.82 N-cm (0.2 to 4.0 oz.-in.)
- **Shaft Locking Torque with Locknut @ 10 in-lb.**
  - (B & E Bushings): 14 N-cm (20 oz-in.)
- **Mounting**: 1.7-2.0 N-m (15-18 lb.-in.) maximum
- **Running Torque, Maximum**:
  - Single Section: 0.15 to 1.4 N-cm (0.2 to 2.0 oz.-in.)
  - Dual Section: +0.35 N-cm (+0.5 oz.-in.)
- **Weight**:
  - Single Section: 21 grams maximum
  - Additional Sections: 6 grams maximum
- **Multiple Sections**:
  - 4 gangs maximum
- **Soldering Condition**:
  - Recommended hand soldering using Sn95/Ag5 no clean solder, 0.025” wire diameter. Maximum temperature 399 °C (750 °F) for 3 seconds.
  - No wash process to be used with no clean flux.
Series S159 Potentiometer
5/8" (15.88mm) Square

Environmental Specifications

Operating Temperature Range: -40° C to +125° C
Storage Temperature Range: -55 °C to +125 °C
Temperature Coefficient over Storage Range:
  Conductive Plastic: ±1,000 ppm/°C;
  Cermet: ±150 ppm/°C
Vibration (Single Section): 15 G
  Total Resistance Shift: ±2% maximum
  Voltage Ratio Shift: ±5% maximum
Shock (Single Section): 30 G
  Total Resistance Shift: ±2% maximum
  Voltage Ratio Shift: ±5% maximum

Load Life: 1,000 hours
  Conductive Plastic Total Resistance Shift: ±10% max.
  Cermet Total Resistance Shift: ±5% max.
Rotational Life (No Load): 100,000 cycles
  Conductive Plastic Total Resistance Shift:
    Linear taper: 10 ohms or ±10% TRS max.
    (whichever is greater)
    Audio taper: ±20% TRS maximum
  Cermet Total Resistance Shift:
    All tapers: ±20% TRS maximum
  Contact Resistance Variation @ 50,000 Cycles:
    Audio taper: ±3%
    Linear taper: ±2%

Moisture Resistance (MIL-STD-202, Method 103, Condition B)
  Conductive Plastic Total Resistance Shift:
    (B & E tapers): ±10% TRS max.
    (D, G, S & T tapers): ±20% TRS max.
  Cermet Total Resistance Shift:
    (all tapers): ±5% TRS max.
Insulation Resistance (500 VDC): 100 megohms minimum
IP Rating: IP40

Rotary Switch Environmental Specifications

Operating Temperature Range: -40 °C to +70 °C
Storage Temperature Range: -65 °C to +125 °C
Vibration (Dual Section): 8 G
  (Triple Section): 5 G
  (Quadruple Section): 3 G
Shock (Dual Section): 20 G
  (Triple Section): 15 G
  (Quadruple Section): 10 G
Contact Resistance: 10 milliohms maximum
Contact Bounce: 0.1 millisecond maximum

Rotational Life: 25,000 cycles
Switch Actuating Torque
  (50% Duty cycle @ Rated Power Load):
    1.41 to 4.94 N-cm (2 to 7 oz.-in.)
  Contact Resistance: 100 milliohms maximum
Moisture Resistance (MIL-STD-202, Method 106, Condition B)
  Contact Resistance (0.1 VDC-10 mA):
    10 milliohms maximum
  Insulation Resistance
    (After 24 Hours @ Room Temperature) (500 VDC)
    100 megohms minimum
Switch Housing Material:
  High temperature, flame retardant, thermosetting plastic

Rotary Switch Mechanical Specifications

Actuating Torque (Each Section, Switch Module Only):
  3.53 to 10.6 N-cm (5 to 15 oz.-in.)
Running Torque (Out of Detent, 2-4 Module Assembly):
  0.21 to 1.41 N-cm (0.3 to 2 oz.-in.)
Detent: CW or CCW standard
Actuation Angle: 25 °
Contact Materials: Fine silver with gold overlay
Terminal Styles: Solder lug only
Standard Orientation: In-line with control terminals
Optional: Rotated 90 ° CCW from standard
Terminal Strength (Before and After Soldering Heat Exposure): 0.9 Kg (2 lbs.) minimum

Disclaimer
Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications.
Series S159 Potentiometer
5/8" (15.88mm) Square

S159PC / S159SH Dimensions - Single Turn Potentiometer

Dual Unit - PC Pins & J-Hook

Model S159PC / S159SH
Single Unit - PC Pins & J-Hook

S159 Resistance Tapers

On chart:
1. Linear Taper (A, H, or E options)
2. Clockwise Audio Taper (C or D options)
3. Counter-Clockwise Audio Taper (F or T options)
4. Modified Linear Taper (Special Order)

Element & Taper:
A = Linear Cermet 10%
H = Linear Cermet 5%
E = Linear Conductive Plastic 10%
C = CW Audio Cermet 10%
D = CW Audio Conductive Plastic 10%
F = CCW Audio Cermet 10%
T = CCW Audio Conductive Plastic 10%

Ref: Ordering Information on page 6
Series S159 Potentiometer
5/8" (15.88mm) Square

S159PCR / S159SHR Dimensions - Single Turn Potentiometer with Rotary Switch

Primary Potentiometer Module
Model S159PCR / S159SHR

Secondary Potentiometer Module
Model S159PCR / S159SHR

Shaft Flat Orientation*  
120° ± 5° CCW END  
FLATTED SHAFT  
SLOTTED SHAFT

Switch Module Terminal Orientation

Vertical (In-Line) Orientation  
(Types R50, R51, R52 & R53)  
Horizontal Orientation  
(Types R56, R57, R58 & R59)

DPST (NO/NC)  
(TYPES 50, 51, 56, 57)

DPST (NO/NO)  
(TYPES 52, 53, 58, 59)

Switch contacts shown in detent position.

Locating Lug Options  S159 Series - All Models

Disclaimer: Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications.
**Series S159 Potentiometer - 5/8" (15.88mm) Square**

### Dimensions - S159 Series Bushings

**"A" Bushing**
- 3/8" (9.53 mm) Dia. Plain - Single Shaft
- 9.53 ± 0.13 (375 ± 0.050) PILOT DIA.
- 12.70 ± 0.13 (500 ± 0.050) STANDARD
- 1.60 + 0.00 (0.064 + 0.007) DIA.
- 45° ± 0° (0.010) CHAMFER

**"B" Bushing**
- 3/8" (9.53 mm) Dia. Plain - Single Shaft
- 15.88 ± 0.79 (0/8 + 1/16) STANDARD
- 1.60 + 0.00 (0.064 + 0.007) DIA.
- 45° ± 0° (0.010) CHAMFER

**"C" Bushing**
- 1/4" (6.35 mm) Dia. Plain - Single Shaft
- 9.53 ± 0.13 (375 ± 0.050) PILOT DIA.
- 3/8-32 UNEF
- 45° ± 0° (0.010) CHAMFER

**"E" Bushing**
- 1/4" (6.35 mm) Dia. Locking - Single Shaft
- 12.7 ± 0.13 (500 ± 0.050) STANDARD
- 1.25 ± 0.00 (0.049 ± 0.000) DIA.
- 45° ± 0° (0.010) CHAMFER

**"S" Bushing**
- 10 mm Dia. Locking - Single Shaft
- 10.92 ± 0.43 (0.430 ± 0.017) MIN.
- 9.53 ± 0.13 (375 ± 0.050) PILOT DIA.
- 1.98 ± 0.10 (0.078 ± 0.004) DIA.

**Specifications**

Specifications are subject to change without notice.
The device characteristics and parameters in this data sheet can and do vary in different applications and actual device performance may vary over time.
Users should verify actual device performance in their specific applications. Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications.
### Ordering Information - Single Turn Potentiometer with Switch Option

**Example Part Number:** S159PC-A3A-B24-A103-A103-SW50CW (Two 10K Potentiometer Modules, plus Rotary Switch Module)

<table>
<thead>
<tr>
<th>S159</th>
<th>PCR</th>
<th>A</th>
<th>3</th>
<th>A</th>
<th>B</th>
<th>24</th>
<th>A</th>
<th>103</th>
<th>A</th>
<th>103</th>
<th>SW50CW</th>
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<tbody>
<tr>
<td><strong>Model</strong></td>
<td><strong>S159</strong></td>
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<tr>
<td>Anti-Rotation Lug:</td>
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<tr>
<td>A = Single .305&quot; R, 90° CW</td>
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<tr>
<td>B = Double .305&quot; R, 90° &amp; 270° CW</td>
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<tr>
<td>C = Single .305&quot; R, 270° CW</td>
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<tr>
<td>D = No Lug</td>
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<tr>
<td>E = Single .531&quot; R, 90° CW</td>
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<tr>
<td>F = Single .305&quot; R, 180° CW</td>
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<tr>
<td>J = Single .375&quot; R, 90° CW</td>
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<tr>
<td>K = Double .375&quot; R, 90° &amp; 270° CW</td>
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</tr>
</tbody>
</table>

**Module Options:**
- **1 = Single**
- **2 = Double**
- **3 = Triple**
- **4 = Quad**

**Bushing:**
- **A** = Plain 3/8" Dia. x 3/8" Length
- **B** = Locking 3/8" Dia. x 1/2" Length
- **C** = Plain 1/4" Dia. x 1/4" Length
- **E** = Locking 1/4" Dia. x 1/2" Length
- **J** = Plain 3/8" Dia. x 1/4" Length
- **N** = Plain 1/4" Dia. x 3/8" Length
- **R** = Plain 10mm Dia. x 9mm Length
- **S** = Locking 10mm Dia. x 12.5mm Length
- **U** = Plain 7mm Dia. x 6mm Length

**Shaft Options:**
- **PC = Pot Module(s) PC Board Pin**
- **PCR = Pot Module(s) with Rotary Switch, PC Board Pins**
- **SH = Pot Module(s) Solder Lugs**
- **SHR = Pot Module(s) with Rotary Switch, Solder Lugs**

**Element & Taper:**
- **A = Linear Cermet 10%**
- **H = Linear Cermet 10%**
- **E = Linear Conductive Plastic 10%**
- **C = CW Audio Cermet 10%**
- **F = CCW Audio Cermet 10%**
- **D = CW Audio Conductive Plastic 10%**
- **T = CCW Audio Conductive Plastic 10%**

**Available with Bushing Code:**
- **C, J, N**

**Switch Horizontal Terminals: SW50CW = DPST N.O./N.C. CW**
- **SW51CW = DPST N.O./N.C. CCW (standard)**
- **SW52CW = DPST N.O./N.O. CW**
- **SW53CW = DPST N.O./N.O. CCW**
- **SW56HCW = DPST N.O./N.C. CW**
- **SW57HCW = DPST N.O./N.C. CCW**
- **SW58HCW = DPST N.O./N.O. CW**
- **SW59HCW = DPST N.O./N.O. CCW**

**Resistance:**
- **101 = 100 ohms**
- **151 = 150 ohms**
- **201 = 200 ohms**
- **251 = 250 ohms**
- **501 = 500 ohms**
- **102 = 1.0K ohms**
- **152 = 1.5K ohms**
- **202 = 2.0K ohms**
- **252 = 2.5K ohms**
- **502 = 5.0K ohms**
- **750 = 750 ohms**
- **103 = 10K ohms**
- **153 = 15K ohms**
- **203 = 20K ohms**
- **503 = 50K ohms**
- **104 = 100K ohms**
- **154 = 150K ohms**
- **204 = 200K ohms**
- **254 = 250K ohms**
- **504 = 500K ohms**
- **752 = 7.5K ohms**
- **501 = 500 ohms**
- **102 = 1.0K ohms**
- **152 = 1.5K ohms**
- **202 = 2.0K ohms**
- **252 = 2.5K ohms**
- **502 = 5.0K ohms**
- **105 = 1 M ohms**
- **505 = 5 M ohms**

Due to the unlimited design combinations, certain designs may not perform in accordance with all of the specifications. For Pricing and Delivery information, create an RFQ on our website or contact your State Electronics Sales Representative at 973-887-2550.

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http://www.potentiometers.com

Page 6

THE POTENTIOMETER SPECIALISTS®
Updated Oct. 7, 2019
## Mod-Pot™ SERIES OPTIONS

<table>
<thead>
<tr>
<th>5/8&quot; Square / Modular Design</th>
<th>1/2&quot; Square / Modular Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>388389S127</td>
<td>Non-Magnetic Construction</td>
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### Technology

<table>
<thead>
<tr>
<th>Technology</th>
<th>Conductive Plastic</th>
<th>Cermet</th>
<th>Conductive Plastic</th>
<th>Cermet</th>
<th>Conductive Plastic</th>
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<td>Max Wattage Rating</td>
<td>1-Watt</td>
<td>2-Watt</td>
<td>1/2-Watt</td>
<td>1-Watt</td>
<td>1-Watt</td>
<td>2-Watt</td>
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<tr>
<td>Operating Temperature (°C)</td>
<td>-55 ° to 120 °</td>
<td>-55 ° to 150 °</td>
<td>-55 ° to 120 °</td>
<td>-55 ° to 150 °</td>
<td>-40 ° to 125 °</td>
<td>-40 ° to 125 °</td>
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<td>Temperature Coefficient (TC)</td>
<td>+/-%5 (Typical)</td>
<td>150 PPM °C</td>
<td>+/-%5 (Typical)</td>
<td>150 PPM °C</td>
<td>+/-%10</td>
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<td>Rotational Life</td>
<td>100,000</td>
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<td>25,000</td>
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<td>Sections</td>
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<tr>
<td>Center Detent</td>
<td>Center or 11 - Detents</td>
<td>Center or 11 - Detents</td>
<td>Only 21 Detents</td>
<td>21 Detents Not Available</td>
<td>21 Detents</td>
<td>21 Detents Not Available</td>
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<tr>
<td>Rotary Switch - Counter Clockwise Detent</td>
<td>2A @125VAC</td>
<td>2A @125VAC, 2A @28VDC, 1A @ 250VAC</td>
<td>1A @ 250VAC</td>
<td>0.5A @ 30VDC</td>
<td>2A @125VAC</td>
<td>2A @125VAC, 2A @28VDC, 1A @ 250VAC</td>
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<tr>
<td>Rotary Switch - Clockwise Detent</td>
<td>2A @125VAC</td>
<td>2A @125VAC, 2A @28VDC, 1A @ 250VAC</td>
<td>No CW Detent</td>
<td>No CW Detent</td>
<td>2A @125VAC</td>
<td>2A @125VAC, 2A @28VDC, 1A @ 250VAC</td>
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<tr>
<td>Push-Pull Switch (1/8&quot; or 1/4&quot; Dia. Shaft)</td>
<td>Optional</td>
<td>250 MA @ 30 VDC</td>
<td>2A @125VAC</td>
<td>Not Available</td>
<td>2A @125VAC</td>
<td>2A @125VAC, 2A @28VDC, 1A @ 250VAC</td>
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<tr>
<td>Push-Momentary - 1/8&quot; Dia. Shaft</td>
<td>2A @125VAC</td>
<td>2SPST N.O. + 2 SPST N.C.</td>
<td>1 SPST, N.O. + 1 SPST N.O.</td>
<td>Not Available</td>
<td>1 SPST, N.O. + 1 SPST N.O.</td>
<td>1 SPST, N.O. + 2 SPST N.C.</td>
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<tr>
<td>Push-On  / Push-Off - 1/8&quot; Dia. Shaft</td>
<td>Not Available</td>
<td>500 MA @ 30VDC</td>
<td>1 SPST, N.O. + 1 SPST N.O.</td>
<td>2SPST N.O. + 2SPST N.O.</td>
<td>500 MA @ 30VDC</td>
<td>2SPST N.O. + 2SPST N.O.</td>
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<tr>
<td>Max Shaft Single Length - 1/8 Dia.</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Plastic Shaft - 3/4&quot;</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Plastic Shaft - 3/4&quot;</td>
<td>Plastic Shaft - 3/4&quot;</td>
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<tr>
<td>Max Shaft Single Length - 1/4 Dia.</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Plastic Shaft - 7/8&quot;</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Metal Shaft 2.5&quot;</td>
<td>Plastic Shaft - 7/8&quot;</td>
<td>Plastic Shaft - 7/8&quot;</td>
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<tr>
<td>Concentric Shafts</td>
<td>.078 / .125</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
<td>.078 / .125</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
<td>.078 / .125</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
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<tr>
<td>Concentric Shafts</td>
<td>.125 / .250</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
<td>.125 / .250</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
<td>.125 / .250</td>
<td>Any Metal Shaft Combination for Inner &amp; Outer Shaft</td>
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<td>Vernier Drive</td>
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<td>Internal Shaft Seal</td>
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<td>Standard</td>
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<td>IP Rated</td>
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<td>IP40</td>
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<td>Stop Torque</td>
<td>4 lb.-in.</td>
<td>4 lb.-in.</td>
<td>3 lb.-in.</td>
<td>2.5 lb.-in.</td>
<td>4 lb.-in.</td>
<td>4 lb.-in.</td>
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<td>High Stop Torque</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>Not Available</td>
<td>8 in / pd</td>
<td>Not Available</td>
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<tr>
<td>Rotational Torque Standard (Min / Max)</td>
<td>Single section</td>
<td>0.3 / 3.0 oz.-in.</td>
<td>0.2 to 1.5 oz.-in.</td>
<td>0.2 / 3.0 oz.-in.</td>
<td>1.5 Max oz.-in.</td>
<td>1.5 Max oz.-in.</td>
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<tr>
<td>Rotational Torque, Medium Torque Option (Min / Max)</td>
<td>Available - Varies with each configuration</td>
<td>0.4 to 2.0 oz.-in.</td>
<td>0.2 to 1.0 oz.-in.</td>
<td>0.4 to 2.0 oz.-in.</td>
<td>1.0 Max oz.-in.</td>
<td>1.0 Max oz.-in.</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.
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