

Introduction

Bourns has been a pioneer in both wirewound and non-wirewound resistive technology for over half a century and continues to lead the way in terms of product innovation and lean manufacturing. Bourns® Sensors & Controls division offers an assortment of precision potentiometers in sizes that range from 22 mm to 51 mm. Both single-turn and multiturn styles are available with bushing and servo mount styles. Some models are available with Ingress Protection (IP rating) up to IP 68. In addition, Bourns offers the Knobpot® model, which is a multiturn wirewound precision potentiometer

and a turns-counting dial all in one package. Sensors and Controls is dedicated to providing our customers with reliable precision potentiometer solutions.

In addition to precision potentiometers, Bourns® Sensors & Controls offers a variety of turns-counting dials. A turns-counting dial is generally used on the outside of the panel as a precision potentiometer's indicating and adjustment setting device. There are various models available with digital or analog (concentric scale) readouts.

General Use of Precision Potentiometers

Precision potentiometers are generally used in circuitry where adjustments to the voltage level or current flow:

- *Must be very accurate*
- *Require frequent adjustments, and/or*
- *Where a precise relationship must exist between the shaft rotation and the electrical output*

Performance Parameters and Technology

There are four performance parameters that are especially important when choosing a precision potentiometer for your application. They are:

- *Resolution*
- *Output smoothness*
- *Linearity*
- *Rotational life*

Based on your application, you can choose three different technology classifications of precision potentiometers: wirewound, Hybritron® (wire-wound element with conductive polymer coating), and conductive polymer.

Custom Solutions

A wide range of “value-added” enhancements are available to provide our customers with cost-effective solutions. Bourns’ capability to develop custom precision potentiometer solutions and modifications include those listed to the right.

For additional information on value-added enhancements, please contact your local Bourns Sales Representative or Field Application Engineer.

- *Cable harness/lead wires*
- *Detents*
- *Custom output*
- *Seal*
- *Torque*
- *Special packaging*
- *Terminal configurations*
- *Hardware*
- *Marking*
- *Mechanical stops*
- *Mounting brackets*
- *Special test requirements*
- *Customized shaft options*

Applications

Precision

Potentiometers

Medical Applications*

- Blood bank equipment
- Blood monitors
- Blood/chemical analyzers
- Communication equipment
- Computer-assisted tomography (CAT) equipment
- Dental chairs
- Dialysis equipment
- EKG, EEG heart monitors
- Electrosurgical equipment
- Hospital beds
- Incubators
- Insulin/infusion pumps
- Isokinetic equipment
- Lasers
- Magnetic resonance imaging (MRI) equipment
- Mobility equipment
- Radiographic equipment
- Respirators
- Respiratory monitors
- Scanners
- Speech/hearing amplifiers & transducers
- Stimulators
- Ventilators
- X-ray/diagnostic equipment

Industrial Automation & Equipment Applications

- Appliances
- Camera positioning
- Forklifts
- Irrigation controllers
- Position feedback
- Power generators
- Robotics
- Satellite positioning systems
- Servo motors
- Welding equipment

Test & Measurement Applications

- Appliance testers
- Battery testers
- Board in-circuit testers
- Calibration equipment
- Component testers
- Continuity testers
- Cycle testers
- Distortion testers
- Electric motor testers
- Electrostatic testers
- Environmental chambers & testers
- High voltage testers
- Laser, fiber optic testers
- Light testers
- Logic & spectrum analyzers
- Oscilloscopes
- Power supply testers
- Radiation & x-ray testers
- Signal level testers
- Telecom line testers
- Transmission testers
- TV/video generation testers
- Ultrasonic testers

Turns-Counting Dials

Telecommunications Applications

- CB & shortwave base stations
- Digital television cable boxes
- Video-conferencing equipment

Portable Electronics Applications

- Data communications equipment
- Data communications testers
- Smoke, CO₂, gas, heat & humidity detectors
- Household appliances
- Irrigation controllers
- Measuring equipment
- Portable test equipment
- Telecommunications equipment
- Verification equipment

Medical Applications*

- Blood & chemical analyzers
- EKG, EEG heart monitors
- Incubators
- Insulin & infusion pumps
- Isokinetic equipment
- Keratoscopes
- Kidney machines
- Lasers
- Magnetic resonance imaging (MRI) equipment
- Medical meters
- Radiographic equipment
- Respirators
- Respiratory & temperature monitors
- Stimulators
- Test equipment
- Transducer, speech, & hearing amplifiers
- Ventilators

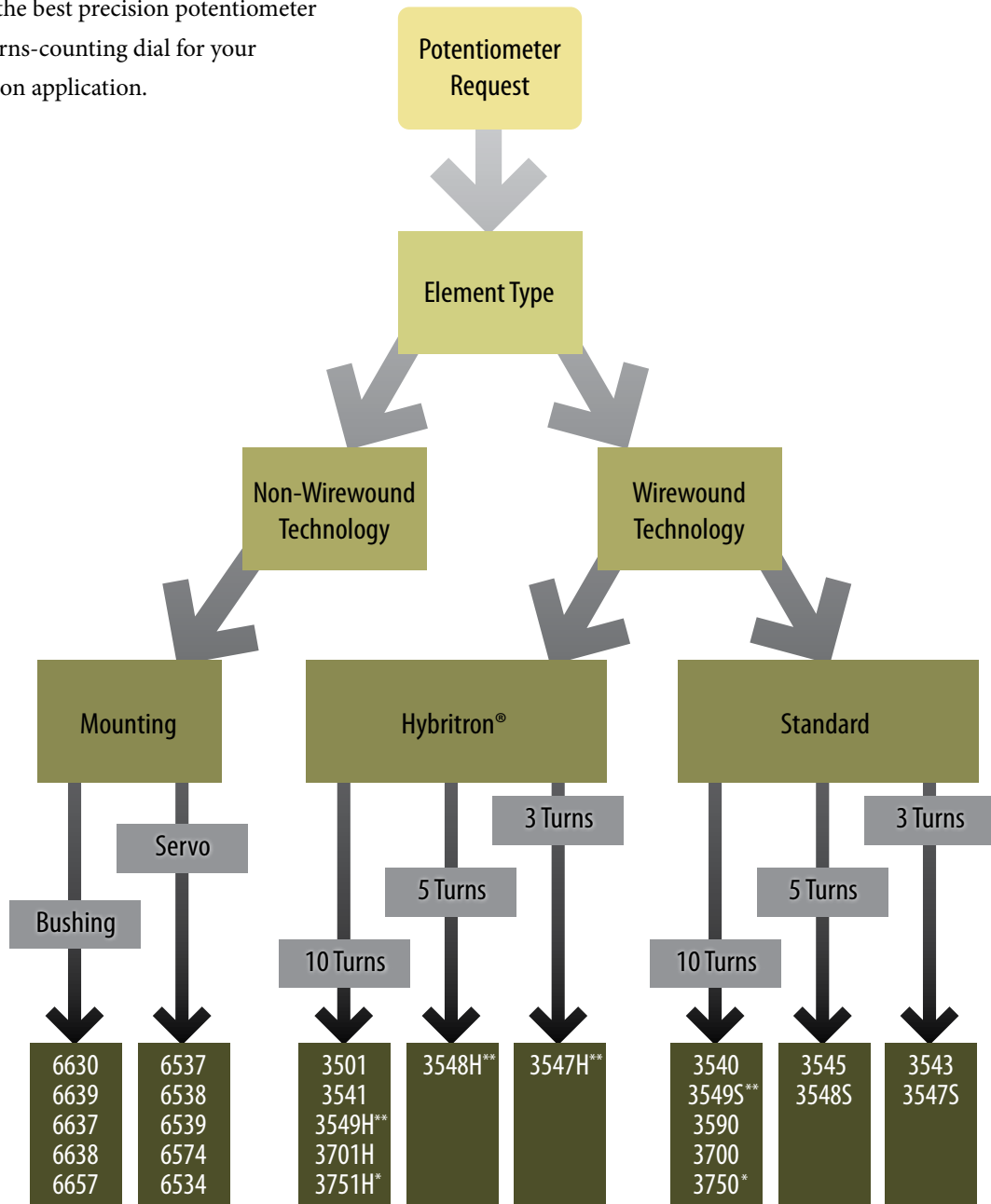
Test & Measurement Applications

- Cable testers
- Counters & timers
- Cycle testers
- Distortion testers
- Electrostatic testers
- Environmental chambers & testers
- High voltage testers
- Logic & spectrum analyzers
- Oscilloscopes
- Radiation & X-ray testers
- Signal level testers
- Ultrasonic testers

* Excluding critical life support applications

Precision Potentiometer Selection Guide

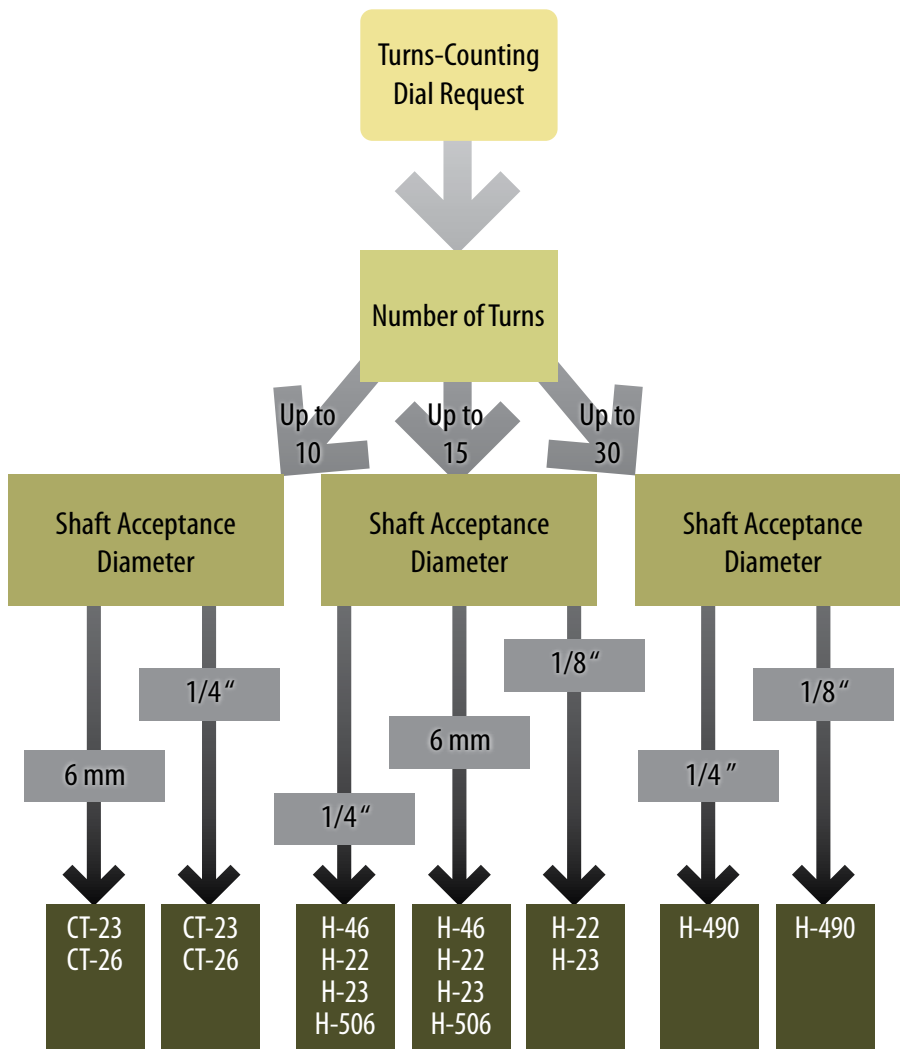
The following flowcharts will help you to select the best precision potentiometer and turns-counting dial for your precision application.



* Servo mount

** Standard servo mount option available

Turns-Counting Dial Selection Guide



Bourns® Precision Potentiometers



3400

Number of Turns	10
Rotational Life	2M Shaft Revolutions
Element	Wirewound
Noise/Output Smoothness	100 Ω max.
Operating Temp. Range	-40 to +125 °C
Power Rating	5 watts
Independent Linearity	±0.15 %
IP Rating	40

Features

- Bushing mount
- Optional -0.05 linearity option
- Excellent wiper stability
- High stop strength
- Sealable
- RoHS compliant versions available*



3500/3501

Number of Turns	10
Rotational Life	2M to 4M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	100 Ω max. / 0.1 % max.
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.20 % to ±0.25 %
IP Rating	65

Features

- Bushing mount
- Sealable
- Non-standard features and specifications available
- Optional high torque feature
- Optional center tap feature
- Gangable
- RoHS compliant versions available*



3540/3541

Number of Turns	10
Rotational Life	1M to 5M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	100 Ω max. / 0.1 % max.
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.25 %
IP Rating	40

Features

- Bushing mount
- Optional center tap and rear shaft extension
- Optional AR lug feature
- Gangable with common or concentric shafts
- High torque available
- Non-standard features and specifications available
- RoHS compliant versions available*



3543/3545

Number of Turns	3 to 5
Rotational Life	300K to 500K Shaft Revolutions
Element	Wirewound
Noise/Output Smoothness	100 Ω max.
Operating Temp. Range	-40 to +125 °C
Power Rating	1 to 1.5 watts
Independent Linearity	±0.25 %
IP Rating	40

Features

- Bushing mount
- Optional AR pin feature
- Non-standard features and specifications available
- Gangable
- RoHS compliant versions available*



3547

Number of Turns	3
Rotational Life	750K to 1.5M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	100 Ω max. / 0.15 % max.
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±0.20 % to ±0.25 %
IP Rating	50

Features

- Wirewound and Hybritron® elements
- High rotational life
- Optional 0.20 % linearity
- Optional AR lug
- Suitable for use under side load
- Designed for HMI and MMI applications
- Dual gang option
- Servo mount option
- RoHS compliant*

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.



3548

Number of Turns	5
Rotational Life	1M to 2.5M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	100 Ω max. / 0.15 % max.
Operating Temp. Range	-40 to +125 °C
Power Rating	1.5 watt
Independent Linearity	±0.15 % to ±0.25 %
IP Rating	50

Features

- Wirewound and Hybritron® elements
- High rotational life
- Optional 0.15 % linearity
- Optional AR lug
- Suitable for use under side load
- Designed for HMI and MMI applications
- Dual gang option
- Servo mount option
- RoHS compliant*



3549

Number of Turns	10
Rotational Life	2M to 5M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	100 Ω max. / 0.10 % max.
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.10 % to ±0.20 %
IP Rating	50

Features

- Wirewound and Hybritron® elements
- High rotational life
- Optional 0.1 % linearity
- Optional AR lug
- Suitable for use under side load
- Designed for HMI and MMI applications
- Dual gang option
- Servo mount option
- RoHS compliant*



3590

Number of Turns	10
Rotational Life	1M Shaft Revolutions
Element	Wirewound
Noise/Output Smoothness	100 Ω max.
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.25 %
IP Rating	40 or 65

Features

- Bushing mount
- Optional AR lug
- Plastic or metal shaft and bushings
- Wirewound
- Solder lugs or PC pins
- Sealable (Full body seal)
- Designed for use in HMI applications
- RoHS compliant versions available*



3700/3701

Number of Turns	10
Rotational Life	1M to 4M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	500 Ω max. / 0.10 % max.
Operating Temp. Range	+1 to +125 °C
Power Rating	1 watt
Independent Linearity	±0.25 %
IP Rating	40

Features

- Bushing mount
- Excellent resolution
- Non-standard features and specifications available
- Small diameter
- High rotational life
- RoHS compliant versions available*



3750/3751

Number of Turns	10
Rotational Life	1M to 10M Shaft Revolutions
Element	Wirewound or Hybritron®
Noise/Output Smoothness	500 Ω max. / 0.15 % max.
Operating Temp. Range	+1 to +105 °C
Power Rating	1 watt
Independent Linearity	±0.25 %
IP Rating	40

Features

- Servo mount
- Excellent resolution
- Non-standard features and specifications available
- Small diameter
- High rotational life
- RoHS compliant versions available*

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.

Bourns® Precision Potentiometers (Continued)



6534

Number of Turns	Continuous
Rotational Life	25M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±0.50 %
IP Rating	40

Features

- Servo mount
- Shaft support by front and rear precision ball bearings
- Non-standard features and specifications available
- Gangable up to 10 cups
- RoHS compliant*



6630

Number of Turns	Continuous (stops available)
Rotational Life	5M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±2.0 %
IP Rating	40

Features

- Lower profile than Model 6639
- Essentially infinite resolution
- Excellent rotational life
- High quality, rugged construction
- Recommended for HMI applications
- Cost and space saving
- Molded-in rear terminals
- Non-standard features & specifications available
- Anti-rotation lug option
- Mechanical stop option
- RoHS compliant*



6537/6538

Number of Turns	Continuous
Rotational Life	10M to 20M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±1.0 % to ±1.5 %
IP Rating	40

Features

- Infinite resolution element
- Standard linearity: 1.0 %
- Extended temperature range: -65 °C to +125 °C
- Extended life version (6538)
- Output smoothness: 0.1 % standard
- Molded-in rear terminals
- Non-standard features and specifications available
- RoHS compliant*



6539/6639

Number of Turns	Continuous
Rotational Life	10M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±2.0 %
IP Rating	40

Features

- Essentially infinite resolution
- Excellent rotational life
- High quality, rugged construction
- General purpose applications
- Non-standard features available
- Cost and space saving
- RoHS compliant*



6574

Number of Turns	Continuous
Rotational Life	25M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.25 %
IP Rating	40

Features

- Servo mount style
- Shaft supported by front and rear precision ball bearings
- Non-standard features and specifications available
- Gangable up to 10 cups
- RoHS compliant*

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.



6637

Number of Turns	Continuous
Rotational Life	10M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±1.0 %
IP Rating	40

Features

- Bushing mount
- Excellent resolution
- High rotational life
- Non-standard features and specifications available
- RoHS compliant*



6638

Number of Turns	Continuous
Rotational Life	20M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1 watt
Independent Linearity	±1.0 %
IP Rating	40

Features

- 7/8" (22 mm) diameter single turn conductive plastic
- Bushing mount
- Excellent resolution
- High rotational life – ball bearing shaft support
- Non-standard features and specifications available
- RoHS compliant*



6657

Number of Turns	Continuous
Rotational Life	10M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	1.5 watt
Independent Linearity	±1.0 %
IP Rating	40

Features

- Bushing mount
- Shaft supported by front sleeve bearing
- Non-standard features and specifications available
- RoHS compliant*



6674

Number of Turns	Continuous
Rotational Life	25M Shaft Revolutions
Element	Conductive Plastic
Output Smoothness	0.10 %
Operating Temp. Range	-40 to +125 °C
Power Rating	2 watts
Independent Linearity	±0.25 %
IP Rating	40

Features

- 51 mm (2") diameter, single-turn conductive plastic
- Excellent resolution
- High rotational life
- Bushing mount
- Gangable up to 10 cups
- Non-standard features and specifications available
- Ball bearings
- RoHS compliant*

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.

Bourns® Precision Potentiometers (Continued)



3610 (Knobpot®)

Number of Turns	10
Rotational Life	50K Shaft Revolutions
Element	Wirewound
Noise	100 Ω max.
Operating Temp. Range	+1 to +85 °C
Power Rating	1.5 watts
Accuracy (Dial Reading to Output Ratio)	±0.50 % Voltage Ratio
IP Rating	60

Features

- Snap-in mounting
- Space saving - extends only 5/8 " behind most panels
- Easy one-hole, snap-in mounting
- Digital dial provides excellent readability



3680

Number of Decades	2 to 5
Rotational Life	75K Button Operations Each Decade
Element	Cermet
Operating Temp. Range	-25 to +85 °C
Power Rating	2 watts
Accuracy (Dial Reading to Output Ratio)	±1 % Full Scale
IP Rating	40

Features

- Repeatable settings
- Resolution to 0.001 %
- Digital display provides excellent readability
- Snap-in panel mount
- RoHS compliant versions available*

Turns-Counting Dials



H-22

Number of Turns	0-15
Locking Brake	Yes
Division per Turn	50
Readout	Concentric Scale
Shaft Acceptance Diameter	6.35 mm (0.250"), 6.00 mm (0.236"), 3.175 mm (0.125")
Base Material	Metal
RoHS Compliant*	Yes

Features

- No backlash
- Compact - requires minimal panel space (22.2 mm diameter)
- For use with precision potentiometers or other rotary devices up to 15 turns
- Improved brake to provided higher torque
- Contoured grip knob



H-23

Number of Turns	0-15
Locking Brake	Yes
Division per Turn	50
Readout	Concentric Scale
Shaft Acceptance Diameter	6.35 mm (0.250"), 6.00 mm (0.236"), 3.175 mm (0.125")
Base Material	Metal
RoHS Compliant*	Yes

Features

- No backlash
- Compact - requires minimal panel space (22.2 mm diameter)
- For use with precision potentiometers or other rotary devices up to 15 turns
- Designed for metal shaft
- Improved brake to provided higher torque
- Contoured grip knob



H-506

Number of Turns	0-15
Locking Brake	Yes
Division per Turn	50
Readout	Concentric Scale
Shaft Acceptance Diameter	6.35 mm (0.250"), 6.00 mm (0.236")
Base Material	Plastic
RoHS Compliant*	Yes

Features

- Compact- requires only 22.7 mm diameter panel space
- No backlash
- For use with precision potentiometers or other rotary devices up to 15 turns
- Designed for plastic shaft



CT-23/CT-26

Number of Turns	0-10
Locking Brake	Yes
Division per Turn	50
Readout	Digital
Shaft Acceptance Diameter	6.35 mm (0.250"), 6.00 mm (0.236")
Base Material	Plastic
RoHS Compliant*	Yes

Features

- 27 & 28 mm diameter
- No backlash - mounted directly to potentiometer shaft
- High force, positive brake
- For use with precision potentiometers or other rotary devices up to 10 turns
- Compact- requires only 22.7 mm diameter panel space



H-490

Number of Turns	0-30
Locking Brake	Yes
Division per Turn	100
Readout	Concentric Scale
Shaft Acceptance Diameter	6.35 mm (0.250"), 3.175 mm (0.125")
Base Material	Plastic
RoHS Compliant*	Yes

Features

- No backlash - mounted directly to potentiometer shaft
- For use with precision potentiometers or other rotary devices up to 30 turns
- Compact- requires only 22.7 mm diameter panel space
- Available with or without brake

*RoHS Directive 2002/95/EC Jan 27 2003 including Annex.



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Bourns® products are available through an extensive network of manufacturer's representatives, agents and distributors. To obtain technical applications assistance, a quotation, or to place an order, contact a Bourns representative in your area.

Specifications subject to change without notice. Actual performance in specific customer applications may differ due to the influence of other variables. Customers should verify actual device performance in their specific applications.

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