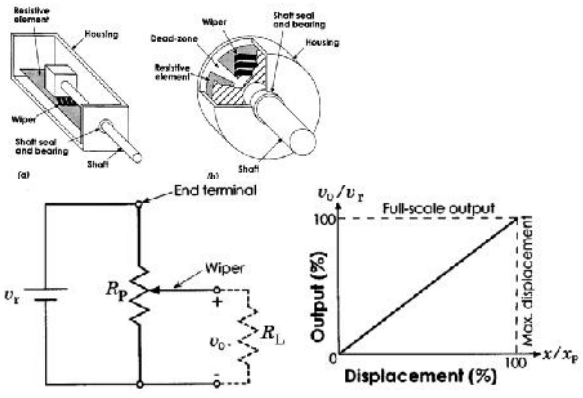
W05
Displacement Sensing

Resistive displacement Sensing

Potentiometers

A pot is an electromechanical device Containing an electrically conductive wiper that slides against a fixed according to the position or angle of an external shaft.



a pot is typically wired in a "voltage divider" configuration. The circuit's output, a function of the wiper's position is an analog voltage

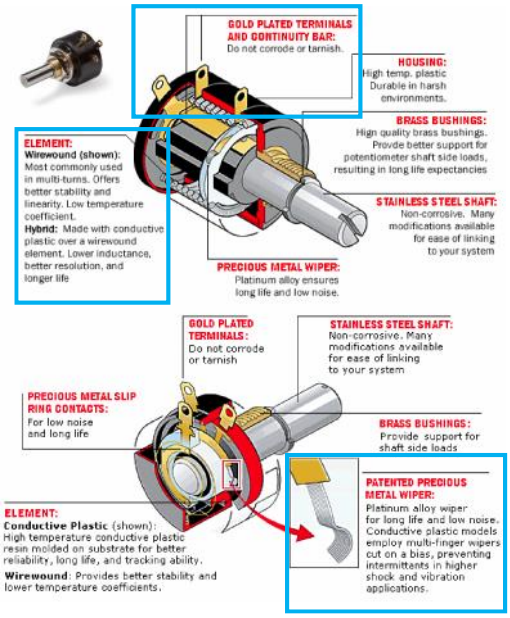
Precision Potentiometers

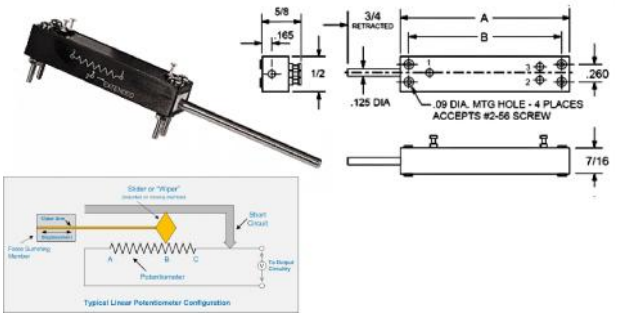
Position measurement requires a high-quality pot designed for extended operation

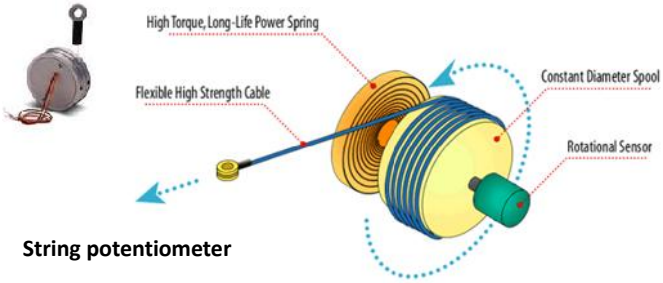
Rotary pots | Linear pots | String pots

Advantages	Disadvantages
Easy to use	Limited bandwidth
Low cost	Frictional loading
Nonelectronic	Inertial loading
High-amplitude output signal	Wear
Proven technology	

Resistive displacement Sensing







String potentiometer

Resistive displacement Sensing

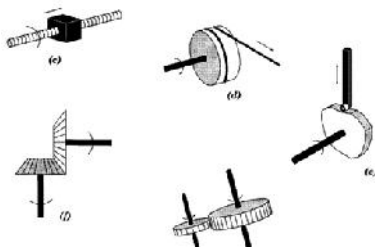
Precision Potentiometers

A pot's resistive element can be classified as either:
wirewound or nonwirewound

TABLE 6.2 Characteristics of Conductive Plastic, Wirewound, and Hybrid Resistive Elements

	Conductive plastic	Wirewound	Hybrid
Resolution	Infinitesimal	Quantized	Infinitesimal
Power rating	Low	High	Low
Temperature stability	Poor	Excellent	Very good
Noise	Very low	Low, but degrades with time	Low
Life	10^6–10^8 cycles	10^5–10^6 cycles	10^6–10^7 cycles

Direct Coupling
Mechanical advantage



A good design will:

- Give the pot mount the ability to accommodate minor misalignment
- Protect the shaft from thrust, side, and bending loads (i.e., not use the pot as a bearing)
- Provide hard limit stops within the pot's travel range (i.e., not use the pot's limit stops)
- Protect the pot from contaminants
- Strain-relieve the pot's electrical connections

Electrical issues

- Use a regulated voltage source whose output is stable with load variations
- Use high input-impedance signal conditioning or data acquisition circuitry
- Use only a portion of the pot's full travel
- Wirewound pots possess the lowest temperature coefficients. Temperature-compensating signal-conditioning circuitry can also be used.