

High-Precision Linear Displacement Transducer for Motorsport Suspension Telemetry

1. PRODUCT OVERVIEW & APPLICATIONS

The GE-LP series represents a premium range of miniature articulated linear potentiometers engineered specifically for dynamic suspension travel monitoring in motorcycle racing and automotive chassis testing. Available in 75 mm (optimized for rear shock absorbers) and 150 mm (optimized for front forks) measurement strokes, the sensor features a heavy-duty conductive plastic resistive element providing infinite resolution and exceptional linearity of $\pm 0.05\%$ FS. Equipped with self-aligning M5 spherical rod ends (uniballs) and an IP67 environmental seal, it withstands extreme vibration, mud, and high-velocity suspension oscillations (up to 10 m/s), interfacing directly with the analog inputs of Gubellini Electronics GUBELOG and MICROLOG dataloggers.

2. KEY FEATURES

- Dual Stroke Variants (75 mm & 150 mm):** Dedicated models for motorcycle rear monoshock (75 mm) and front telescopic fork (150 mm) telemetry.
- Conductive Plastic Technology:** Smooth polymer resistance track delivers theoretical infinite resolution and extraordinary lifespan (> 25M cycles).
- High Independent Linearity ($\pm 0.05\%$ FS):** Ensures laboratory-grade displacement precision across the entire measuring range for accurate damping analysis.
- High Dynamic Speed (Up to 10 m/s):** Ultra-fast response capable of tracking high-frequency curb strikes, chattering, and violent suspension compressions.
- Dual Self-Aligning M5 Rod Ends:** Spherical uniball bearings with $\pm 13^\circ$ angular freedom prevent side-load binding caused by swingarm arc movement.
- IP67 Environmental Protection:** Double internal O-ring seal and front elastomer scraper protect against water spray, mud, brake dust, and oil.
- Standard 3-Wire Ratiometric Output:** Provides an analog 0–5 V DC voltage signal proportional to position, powered by data logger reference supply.

3. DIMENSIONAL & MECHANICAL SCHEMATIC

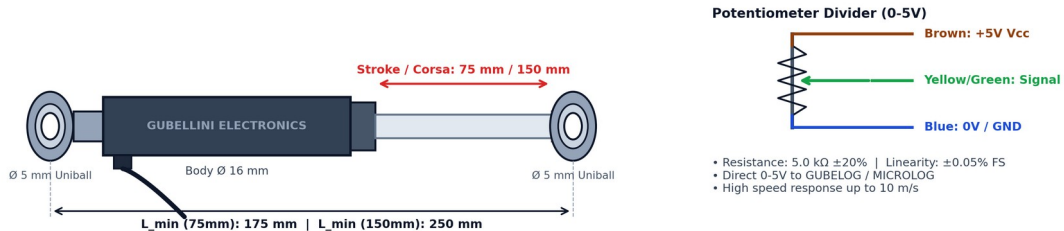


Figure 1: GE-LP Series Mechanical dimensions (retracted/extended lengths), dual M5 uniballs, and 3-wire analog divider pinout.

4. ORDERING INFORMATION & STROKE VARIANTS

Part Number	Electrical Stroke	Retracted / Extended Length	Typical Application
GE-LP-75	75 mm (Mech: 78 mm)	L_min: 175 mm L_max: 250 mm	Rear Monoshock / Linkage Telemetry
GE-LP-150	150 mm (Mech: 154 mm)	L_min: 250 mm L_max: 400 mm	Front Telescopic Fork Telemetry
GE-CLAMP-FORK	Billet Fork Clamp	Fits $\varnothing$ 43 mm to 54 mm fork tubes	Front suspension mounting bracket

5. TECHNICAL SPECIFICATIONS

Parameter	Specification
Operating Principle	Precision conductive plastic linear potentiometer (voltage divider)
Useful Electrical Stroke	75 mm (Model GE-LP-75) 150 mm (Model GE-LP-150)
Mechanical Stroke	78 mm (Model GE-LP-75) 154 mm (Model GE-LP-150)
Retracted Length (Eye-to-Eye, L_min)	175 mm (Model GE-LP-75) 250 mm (Model GE-LP-150)
Extended Length (Eye-to-Eye, L_max)	250 mm (Model GE-LP-75) 400 mm (Model GE-LP-150)
Nominal Track Resistance	5.0 kΩ ± 20% (Standard 5k potentiometer track)
Independent Linearity	± 0.05% FS (Optional ± 0.1% FS)
Repeatability Precision	0.01 mm (0.0004 in)
Resolution	Infinite (smooth continuous conductive plastic element)
Maximum Operating Voltage	Up to 42 V DC (Recommended: 5.0 V DC regulated reference supply)
Recommended Wiper Current	< 1 µA (Maximum continuous wiper current: 10 mA)
Maximum Displacement Speed	10 m/s (32.8 ft/s) continuous dynamic velocity
Maximum Acceleration	200 m/s² (20 g dynamic peak acceleration)
Rod End Bearings (Uniball)	Dual self-aligning spherical eyes, hole Ø 5.0 mm, angular freedom ±13°
Ingress Protection Rating	IP67 (Sealed against high-pressure water, mud, oil, and dust)
Operating Temperature Range	-30°C to +100°C (-22°F to +212°F) continuous
Body Housing Material	Anodized high-grade aluminum alloy, Ø 16 mm outer diameter
Shaft Rod Material	AISI 303 / 304 hardened ground stainless steel (Ø 5 mm)
Connecting Cable	1.5 m 3-core high-flex shielded PVC cable, vibration and oil resistant

6. SYSTEM INTEGRATION & WIRING (GUBELLINI DAQ)

The GE-LP-75 and GE-LP-150 connect directly to the 0–5 V analog inputs of the Gubellini Electronics GUBELOG and MICROLOG dataloggers. The datalogger provides a stable 5.0 V excitation voltage and digitizes the returning analog wiper voltage with 12-bit/16-bit resolution at sampling rates up to 200 Hz to calculate real-time suspension travel, velocity, and pitch/dive dynamics.

Conductor Color	Signal Function	Potentiometer Terminal	GUBELOG / MICROLOG Analog Input
Brown (BN)	Excitation Voltage (+5V Vcc)	Track High Terminal (Terminal 1)	Terminal +5V_REF (Regulated Sensor Vcc)
Blue (BU)	Ground Reference (0V / GND)	Track Low Terminal (Terminal 3)	Terminal AGND (Analog Sensor Ground)
Yellow/Green (YE/GN)	Wiper Signal Output (0–5V)	Moving Wiper Contact (Terminal 2)	Terminal AN_IN (Analog 0–5V Channel)
Shield Mesh (Drain)	Cable Noise Shield	Cable Outer Ground Shield	Terminal SHIELD / Chassis Earth Ground

7. INSTALLATION & MOTORSPORT SETUP GUIDELINES

- **Safety Stroke Margins:** Always reserve at least 3 to 5 mm of sensor stroke at full suspension compression (bottom-out) and full extension (top-out) to avoid internal mechanical damage.
- **Ball Joint Angular Alignment:** Mount the sensor so that spherical rod ends operate well within their ±13° misalignment envelope throughout the entire swingarm / fork sweep.
- **Protection Against Debris:** Position the sensor barrel with the cable exit oriented downward or shielded behind fork tubes to minimize stone-chip impact from front tyre spray.