

LBB ULTRA-PRECISION GAGE HEADS

SPECIFICATIONS

- Spring and pneumatic extend versions
- Linear ball bearing front end
- Extremely long life cycle
- 0.000004 inch [0.1µm] repeatability
- ±0.02 to ±0.1 inch [±0.5 to ±2.5mm] ranges
- Replaceable tungsten carbide contact tip
- Double shielded LVDT
- Flexible cable, resistant to chemicals
- Fluoroelastomer boot *(Model dependent)*
- Selection of optional electrical connectors

The **Linear Ball Bearing (LBB) Ultra-Precision** gage heads are dimensional gaging probes engineered for highly precise and repeatable measurements in quality control and metrology applications. The linear ball bearing system within the gaging probe reduces radial play to a minute level and minimizes friction for ultra-precise measurement.

The bearing assembly utilizes two circumferential rows of miniature balls. The balls ride on a non-rotating plunger. The plunger is hardened to Rockwell 65, hard-chrome plated and precision ground for optimal repeatability and resistance to brinelling. The contact end of the plunger has a removable tungsten carbide ball tip. Plunger and bearings are enclosed in a cylindrical housing, hand-honed and fit to the ball bearing assembly. Precision fitting provides for exceptional repeatability. With the bearings and housing matched in hardness, the plungers can better tolerate side loads for a longer life cycle.

A Linear Variable Differential Transformer (LVDT) is contained in the opposite end of the tubular housing. With no physical contact between its core and coils, the LVDT produces a highly repeatable output voltage proportional to displacement.

LBB gage heads feature a unique two-piece construction and are repairable should either probe structure or cables become damaged. A bend relief spring (on selected models) protects the cable at its exit. Positive mechanical stops prevent damage to the LVDT from impacts at the end of the contact tip in cases of over-stroke.

Spring-extend LBB gage heads feature user adjustable pre-travel/over-travel settings. Air-extend, spring-retract units require dry, oil-free air at 5 to 15PSI [0.34 to 1bar]; by varying air pressure, users can control the gaging force to ensure that the probes do not damage finely finished surfaces or distort delicate parts.



Features

- 0.000004" (0.10µm) repeatability
- Housing diameter options: Smooth 0.315" [8mm] & 3/8" [9.5mm], or threaded 3/8"-40 UNS-2A
- Four electrical connector options (cable end)
- Optional contact tips (4-48 UNF-2A threads only)
- Adapter provided for radial cable exit (Selected models)
- Compatible with all our signal conditioners
- Calibration report supplied with each unit

Applications

- Online inspection of automotive parts
- Process feedback for numerically-controlled machine tools
- Dimensional inspection of precision parts
- Point-of-manufacture status of production process standards
- Automated data collection for factory SPC
- Robotics

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LBB ULTRA-PRECISION GAGE HEADS

PERFORMANCE SPECIFICATIONS

| ELECTRICAL SPECIFICATIONS | | | | |
|------------------------------------|---------------------------------|----------------|----------------|-----------------------|
| | LBBXXXXX-020 | LBBXXXXX-040 | LBBXXXXX-100 | LBBXXXXX-100A |
| Stroke range | ±0.020 [±0.51] | ±0.040 [±1.02] | ±0.100 [±2.54] | ±0.100 [±2.54] |
| Sensitivity, V/V/inch [mV/V/mm] | 6.5 [256] | 5.25 [207] | 5.25 [207] | 2.10±0.10 [82.7±4] |
| Output at stroke ends, mV/V (*) | 141 | 210 | 525 | 210 |
| Phase shift | 6.5° | 3° | 3° | 14° |
| Input impedance (Primary) | 405Ω | 960Ω | 775Ω | 360Ω |
| Output impedance (Secondary) | 1320Ω | 2150Ω | 2150Ω | 250Ω |
| Null voltage (maximum) | 5mV | 10mV | 15mV | 10mV |
| Test excitation frequency | 5kHz | 5kHz | 5kHz | 2.5kHz |
| Input (excitation) | 3VRMS sine wave @ 2.5 to 10kHz | | | |
| Repeatability | 0.000004 inch [0.1µm] | | | |
| Non linearity | ±0.2% of FR, maximum | | | |
| Temp. Coefficient of Sensitivity | ±0.005% per °F [±0.009% per °C] | | | |

| ENVIRONMENTAL SPECIFICATIONS & MATERIALS | |
|--|--|
| Operating temperature | +40°F to +140°F [+5°C to +60°C] |
| Housing material | High carbon, heat-treated tool steel |
| Electrical connection | Shielded cable with polyurethane jacket, 6.5 feet [2m] long, six conductors, 32 AWG stranded Copper, PTFE insulated. Shield is connected to case. |
| Cable exit | Axial standard; adaptor provided with most units to allow for radial exit |
| IEC 60529 rating | IP60 |

Notes:

All values are nominal unless otherwise noted

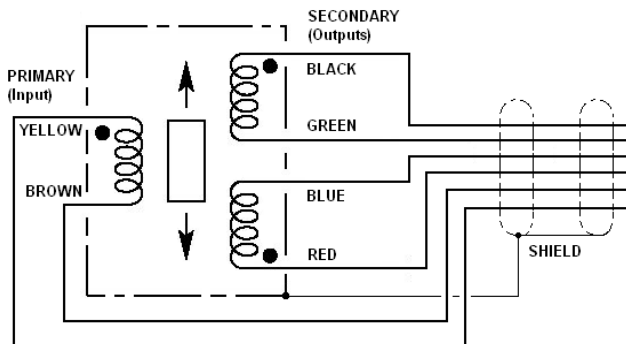
Electrical specifications are for the test frequency indicated in the table

Dimensions are in inch [mm] unless otherwise noted

FR: Full Range is 2X for ±X stroke

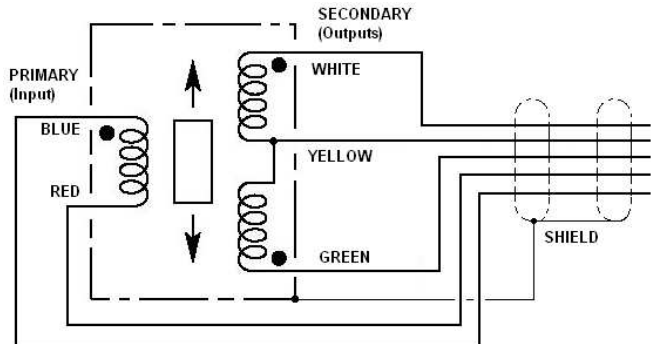
(*) Unit for output at stroke ends is millivolt per volt of excitation (input voltage)

WIRING SCHEMATIC



LBBXXXXX-020, -040, and -100

Connect Blue to Green for differential output



LBBXXXXX-200

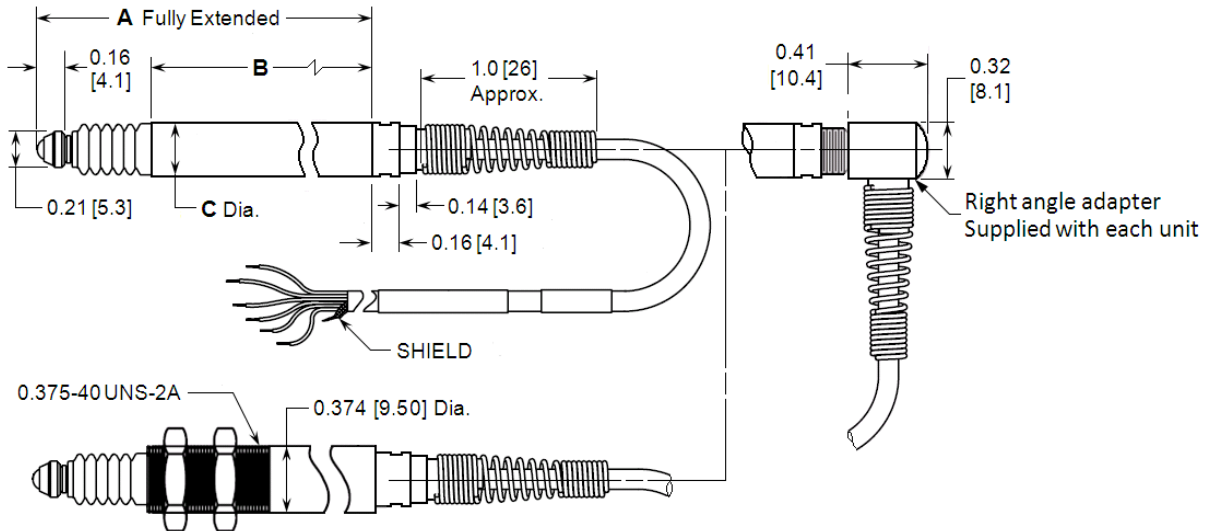
LBB ULTRA-PRECISION GAGE HEADS

MECHANICAL SPECIFICATIONS

| SPRING ACTUATED (SPRING EXTEND) | | | |
|---|---|----------------------------------|--|
| | LBBXXXXX-020 | LBBXXXXX-040 | LBBXXXXX-100 |
| Dimension A (Fully Extended) | 1.69 [42.9] | 2.62 [66.5] | 2.62 [66.5] |
| Dimension B (main housing length) | 1.37 [34.7] | 1.96 [49.8] | 1.96 [49.8] |
| Dimension C (housing diameter) | 0.315 [8.00], 0.374 [9.50], or threaded (see drawing) | | |
| Pre-travel | 0.002 to 0.005 [0.05 to 0.13] | 0.002 to 0.005 [0.05 to 0.13] | 0.002 to 0.005 [0.05 to 0.13] 2.5 [70] |
| Over-travel (minimum) | 0.005 [0.13] | 0.005 [0.13] | 0.005 [0.13] |
| Probe force at null position, oz [gram] | 2.5 [70] | 2.5 [70] | 2.5 [70] |
| Contact tip thread size | 2.5mm | 4-48 UNF-2A | 4-48 UNF-2A |

| AIR ACTUATED (AIR EXTEND, SPRING RETRACT) | | | |
|---|---------------|---------------|----------------------------------|
| | LBBXXXXX-020A | LBBXXXXX-040A | LBBXXXXX-100A |
| Dimension A (Fully Extended) | | | 4.25 [108.0] |
| Dimension B (main housing length) | | | 3.56 [90.4] |
| Dimension C (housing diameter) | | | 0.374 [9.50] or THD |
| Pre-travel | | | 0.003 to 0.005 [0.08 to 0.13] |
| Over-travel (minimum) | | | 0.11 [2.8] |
| Probe force at null position, oz [gram] | | | Variable |
| Contact tip thread size | | | 4-48 UNF-2B |

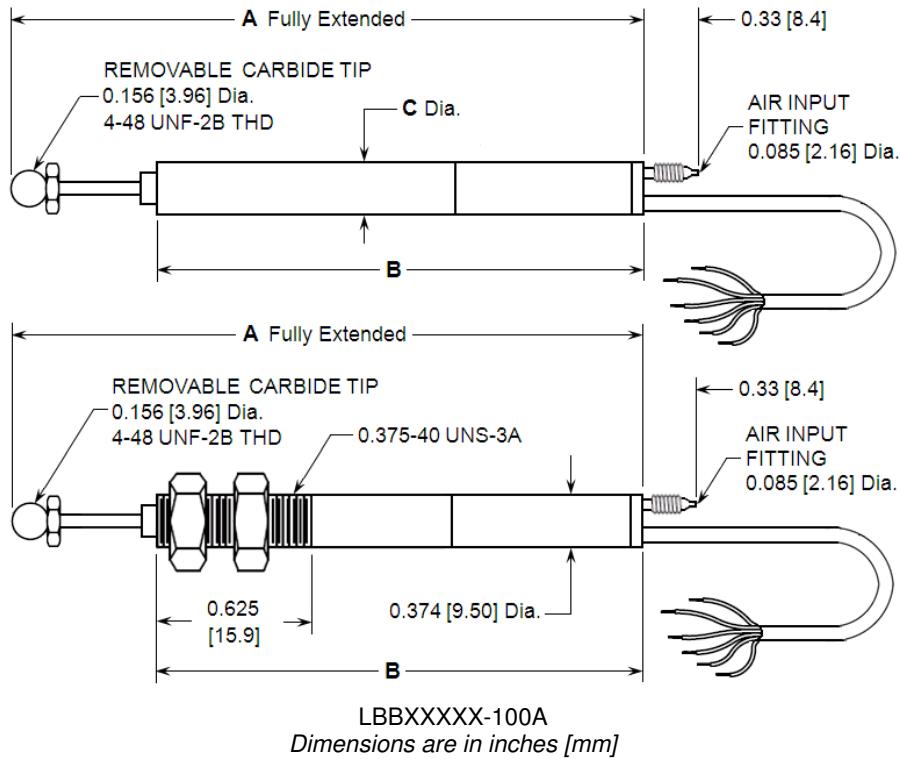
DIMENSIONS – SPRING ACTUATED



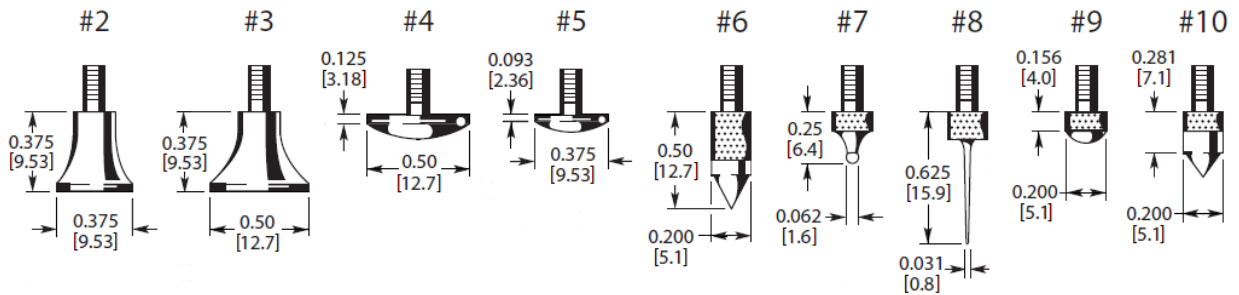
LBBXXXXX-020, -040, & -100
Dimensions are in inches [mm]

LBB ULTRA-PRECISION GAGE HEADS

DIMENSIONS – AIR ACTUATED



CONTACT TIP DIMENSIONS (see note below)



NOTE: Threads are 4-48 UNF-2A, and fit LBBXXXXX-040 and LBBXXXXX-100 models only!
Dimensions are in inches [mm]