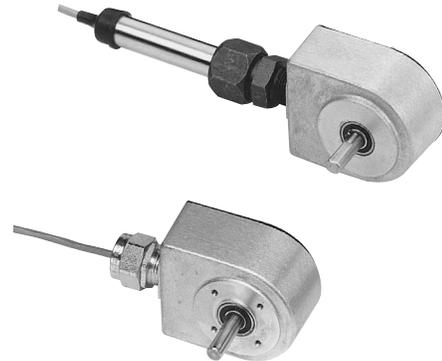


MODEL RPGQ - QUADRATURE OUTPUT ROTARY PULSE GENERATOR AND MODEL LSQ - QUADRATURE OUTPUT LENGTH SENSOR

- 100, 200 & 500 PULSES PER REVOLUTION
- QUADRATURE CURRENT SINKING OUTPUTS TO 50 KHz
 For position measurement, bi-directional counting
 and systems with mechanical backlash
- SEALED PRECISION BALL BEARINGS
- RUGGED CAST ALUMINUM HOUSING
- 3/8" DIA. STAINLESS STEEL SHAFT
- WIDE INPUT SUPPLY VOLTAGE RANGE & LOW CURRENT OPERATION
- EXCEPTIONAL PRICE/PERFORMANCE



DESCRIPTION

The RPGQ and LSQ are rugged, incremental encoders that convert shaft rotation into two output signals that are in quadrature relationship to one another (see Fig.1). This output arrangement allows the direction of shaft movement to be determined in applications requiring positioning, bi-directional counting or anti-backlash counting.

Internally, a single L.E.D. light source and a monolithic sensor array in conjunction with a shaft-mounted, durable, metal-etched, encoder disc, provides signal accuracy and reliability to 50 KHz. The DC input power supply requirement is a versatile +8 to +28 VDC, and is reverse polarity protected. The two NPN Open Collector Transistor Outputs are each current limited to 40 mA and are compatible with all RLC quadrature input counters, controllers and accessories.

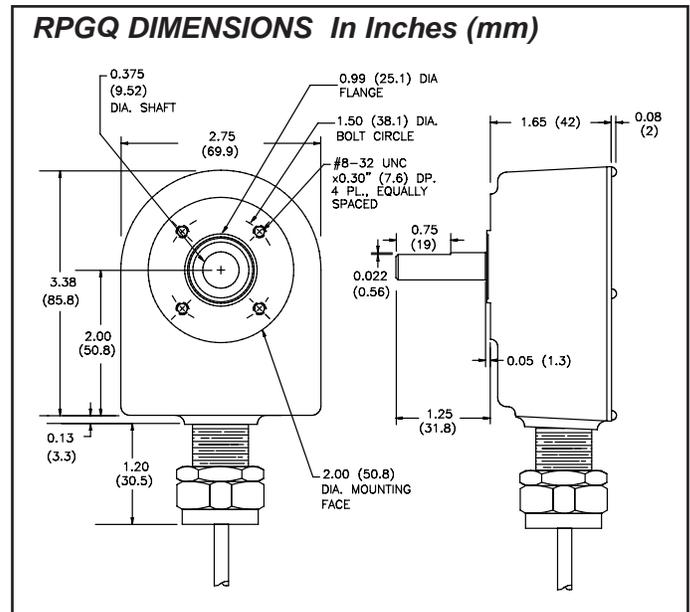
All units are packaged in a rugged cast aluminum housing with a gasketed, rear aluminum cover. The 3/8" (9.5 mm) diameter heavy duty stainless steel shaft and sealed, lifetime-lubricated precision ball bearings are preloaded for minimum end play and rated for continuous use up to 6000 RPM. RPGQ and LSQS meet NEMA 13/IP54 environmental requirements. All units are supplied with 10 feet (3.05 M) of PVC jacketed 4-wire, 22 AWG cable with stranded shield wire and 100% foil shield coverage. Operating Temperature range is 0°C to +70°C.

MODEL RPGQ

The RPGQ can be direct-coupled to a machine shaft by means of a flexible bellows, spring or rubber sleeve type coupler, etc., that allows for axial and radial misalignment. They can also be coupled with instrument timing belts and pulleys or gears. The housing may be rigidly face-mounted with the 4, #8-32 threaded holes. The RPGQ's 4-wire shielded cable exits through a cord connector.

MODEL LSQ

The LSQ is available in both Single Ended Shaft (LSQS) and Double Ended Shaft (LSQD) versions, both of which include a Stainless Steel Handle Tube for mounting and 10 feet (3.05 M) of 4-wire shielded cable. When mounted to a Length Sensor Hinge Clamp Assembly (See Model LSAHC001) and coupled with one or two Measuring Wheels (See Measuring Wheels), a low cost, versatile and highly accurate length measurement system can be configured.

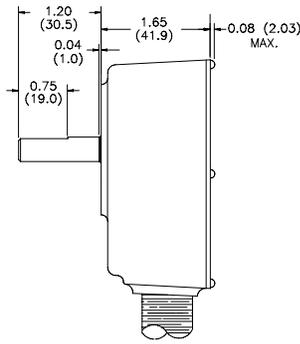


LENGTH SENSOR MEASUREMENT ACCURACY

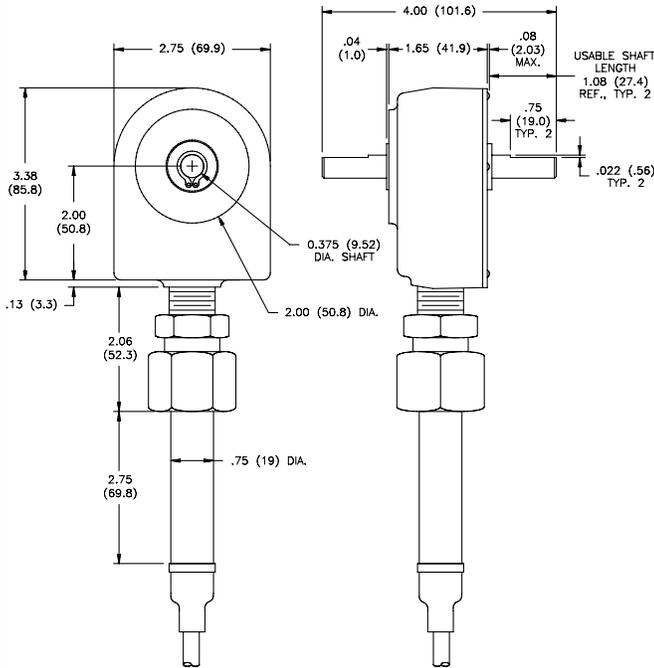
Factors which affect measurement accuracy include Measuring Wheel accuracy and wear, and material conditions. Ideally, materials that are hard, thin and strong provide good readings, conversely, soft, thick and elastic materials can present problems in obtaining true readings. The great majority of these situations, where this effect is consistent, can be compensated for by applying a multiplier to the quadrature output pulse train so as to obtain a corrected measurement. Counter or Rate Indicators with "input scaling" can compensate for Measuring Wheel wear and material elastic and compliance errors. In addition, English/Metric conversions may also be accomplished (See RLC catalog for more information).

LSQS DIMENSIONS In Inches (mm)

This is the side view of the Model LSQS. All other dimensions (including the handle tube) are the same as the Model LSQD. See below.



LSQD DIMENSIONS In Inches (mm)



RPGQ/LSQ MECHANICAL SPECIFICATIONS

- MAXIMUM MECHANICAL SPEED:** 6000 RPM
- RADIAL SHAFT LOAD:** 15 lbs. max. (6.8 kg)
- AXIAL SHAFT LOAD:** 15 lbs. max. (6.8 kg)
- STARTING TORQUE:** 3 oz.-in. (21 Nmm)
- MOMENT OF INERTIA:**
 - RPGQ = 1.03×10^{-4} oz. - in. - sec.² (7.30×10^{-4} N - mm - sec.²)
 - LSQS = 1.03×10^{-4} oz. - in. - sec.² (7.30×10^{-4} N - mm - sec.²)
 - LSQD = 1.30×10^{-4} oz. - in. - sec.² (9.21×10^{-4} N - mm - sec.²)
- OPERATING TEMPERATURE:** 0°C to +70°C (+32°F to +158°F)
- WEIGHT (LESS CABLE):**
 - RPGQ = 14.3 oz. (406 g)
 - LSQS = 22.0 oz. (623 g)
 - LSQD = 22.7 oz. (643 g)

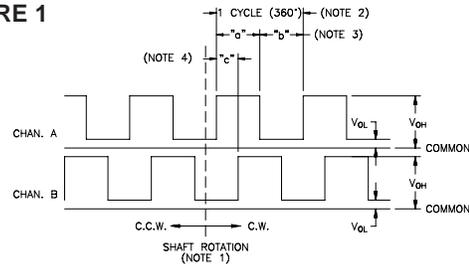
LENGTH SENSOR MOUNTING CONSIDERATION

- Length Sensors should be mounted so measuring wheel(s) contact ribbon, strip or web as it passes over a roller. As an alternative, wheel(s) can be driven by roller surface next to material being measured.
- Note: The weight at the Length Sensor unit provides sufficient traction for accurate operation when mounted, with arm angle from horizontal not exceeding $\pm 30^\circ$.
- Tension on signal cable can cause wheel(s) to lift. Make sure cable is clamped to machine frame near LSQ and allow slack.

RPGQ/LSQ ELECTRICAL SPECIFICATIONS

- SUPPLY VOLTAGE:** +8 to +28 VDC (including power supply ripple) @ 50 mA max. (30 mA typ.); Reverse polarity protected.
- OUTPUTS:** Channels A & B: NPN Open Collector Transistor, $V_{OH} = 30$ VDC max., $V_{OL} = 1$ V max @ 40 mA output current is limited to 40 mA
- OUTPUT FREQUENCY:** Up to 50 KHz
- OUTPUT DUTY CYCLE:** Channel A & B: 50/50 nominal. (See Fig.1, Note 3.)
- QUADRATURE OUTPUT PHASE:** $90^\circ \pm 15^\circ$ (Fig.1, Note 4).
- CABLE CONNECTIONS:** RED = +VDC; BLACK = Common; WHITE = Chan. A Output; GREEN = Chan.B Output.

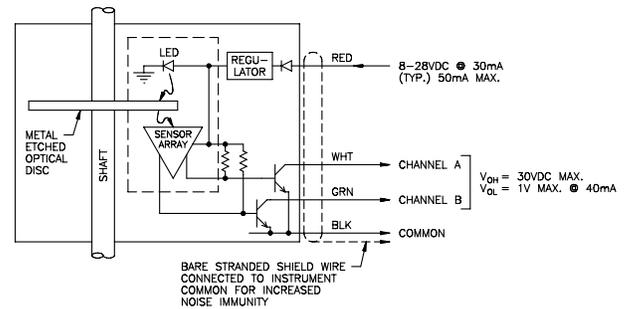
FIGURE 1



NOTES:

- Channel A leads Channel B for clockwise shaft rotation when viewed from housing front. Conversely, Channel B leads Channel A for Counterclockwise shaft rotation.
- The number of lines on the optical disc determines the Pulses Per Revolution (PPR).
- Duty Cycle is the relationship of output "High" time, "a", to output "Low" time, "b", and is expressed as a High/Low percentage ratio, ie....% High time = $a/(a+b) \times 100$; % Low time = $b/(a+b) \times 100$.
- Quadrature Phase "c" is specified as the lead or lag between Channel A & B in electrical degrees. Nominally 90° (1/4 cycle).

RPGQ/LSQ EQUIVALENT CIRCUIT & CONNECTIONS



LENGTH SENSOR ACCESSORIES

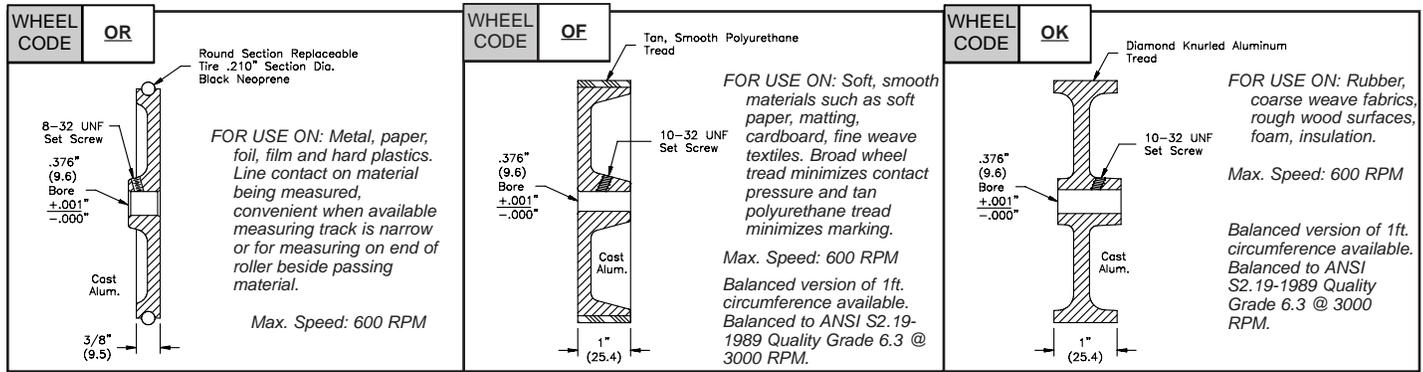
Model LSAHC - Length Sensor Hinge Clamp Assembly. The Length Sensor Hinge Clamp Assembly provides an easy method for attachment & mounting of Model LSC and LSQ Length Sensors and LSCB1 Conversion Bracket. The removable top on the solid aluminum LSAHC mounting block allows quick installation of the Length Sensor handle tube and provides secure clamping retention. The mounting block steel shaft pivots freely in oil impregnated sintered bronze bushings, and aluminum right angle brackets allow mounting the assembly via clearance holes for 1/4" (6.35 mm) dia. bolts (See LSAHC Dimensions & Mounting).

ORDERING INFORMATION

| MODEL NO. | DESCRIPTION | PPR | PART NUMBER |
|-----------|---|-----|-------------|
| RPGQ | Quadrature Rotary Pulse Generator | 100 | RPGQ0100 |
| | | 200 | RPGQ0200 |
| | | 500 | RPGQ0500 |
| LSQS | Single Shaft Quadrature Length Sensor | 100 | LSQS0100 |
| | | 200 | LSQS0200 |
| | | 500 | LSQS0500 |
| LSQD | Dual Shaft Quadrature Length Sensor | 100 | LSQD0100 |
| | | 200 | LSQD0200 |
| | | 500 | LSQD0500 |
| RPGFC | Flexible Coupling (1" Length) 0.250" - 0.375" | - | RPGFC002 |
| | Flexible Coupling (1" Length) 0.375" - 0.375" | - | RPGFC003 |

LENGTH SENSOR ACCESSORIES

SEPARATE LENGTH MEASURING WHEELS - DIMENSIONS In Inches (mm)



SELECTING APPROPRIATE WHEEL SIZE & PPR (Pulses Per Rev.) OF ROTARY PULSE GENERATOR

When the desired output of an RPG and wheel combination is either in feet or inch units, selection of the proper combination is relatively straight forward. For example, with a 1-foot wheel circumference, a 1 PPR Rotary Pulse Generator will deliver 1 pulse/ft, 12 PPR would deliver 12 pulses/ft (1 pulse/inch); 100 PPR would yield 100 pulses/ft; and 120 PPR would permit measuring to 1/10th of an inch (1/120th of a foot).

Measuring in yards or meters, however, is a bit more involved since a 1-yard or 1-meter circumference wheel would be prohibitively large. Instead, 4/10 yard and 4/10 meter wheels can be used in conjunction with RPGB.

WHEELS & REPLACEMENT TIRES FOR CODE OR WHEELS

ORDERING INFORMATION

| WHEEL CODE | CIRCUMFERENCE | TOLERANCE | PART NUMBER |
|----------------------|-----------------|-----------|-------------|
| OR | 1 foot (1/3 yd) | ±0.40% | WF1000OR |
| | 1/3 meter | ±0.40% | WM0333OR |
| | 4/10ths yard | ±0.40% | WY0400OR |
| | 4/10ths meter | ±0.40% | WM0400OR |
| OF | 1 foot (1/3 yd) | ±0.35% | WF1000OF |
| | 1/3 meter | ±0.30% | WM0333OF |
| | 4/10ths yard | ±0.30% | WY0400OF |
| | 4/10ths meter | ±0.30% | WM0400OF |
| BF (Balanced) | 1 foot (1/3 yd) | ±0.40% | WF1000BF |

| WHEEL CODE | CIRCUMFERENCE | TOLERANCE | PART NUMBER |
|--|-----------------|-----------|-------------|
| OK | 1 foot (1/3 yd) | ±0.35% | WF1000OK |
| | 1/3 meter | ±0.30% | WM0333OK |
| | 4/10ths yard | ±0.30% | WY0400OK |
| | 4/10ths meter | ±0.30% | WM0400OK |
| BK (Balanced) | 1 foot (1/3 yd) | ±0.35% | WF1000BK |
| Replacement Tires for OR Wheels | 1 foot (1/3 yd) | | TORF1000 |
| | 1/3 meter | | TORM0333 |
| | 4/10ths yard | | TORY0400 |
| | 4/10ths meter | | TORM0400 |

Note: After installation of measuring wheels, ensure guards, shields or other devices are in place to protect personnel from rotating equipment.

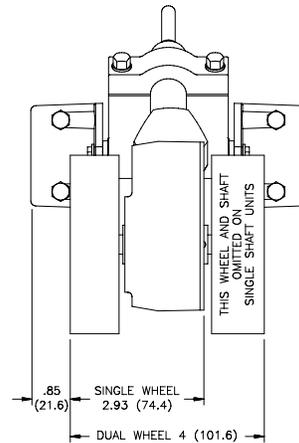
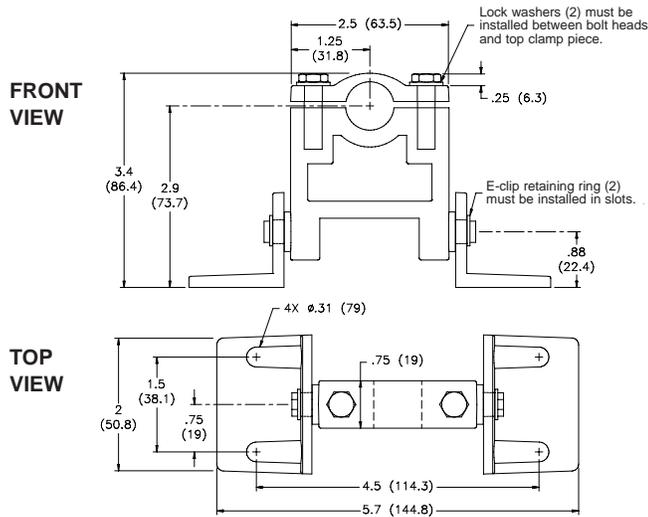
MODEL LSAHC - LENGTH SENSOR HINGE CLAMP ASSEMBLY

The Length Sensor Hinge Clamp Assembly provides an easy method for attachment and mounting of Model LSC and LSQ Length Sensors and LSCB1 Conversion Bracket. The removable top on the solid zinc LSAHC mounting block allows quick installation of the Length Sensor handle tube and provides secure clamping retention. The mounting block pivots freely in zinc right angle brackets to allow mounting the assembly via clearance holes for 1/4" dia. bolts.

The lock washers must be used as indicated (between the bolt head and the top clamp piece). Assemble the top clamp piece as follows.

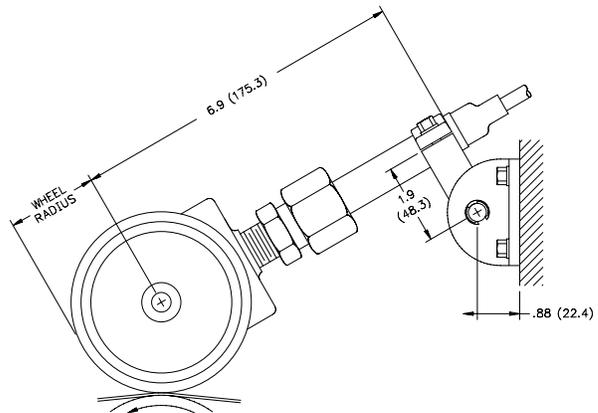
1. Tighten both bolts so that the top clamp half draws down evenly on the sensor tube.
2. Tighten the bolts until both lock washers are flat.
3. Then turn each bolt an additional 1/2 to 3/4 turn.

DIMENSIONS In inches (mm)



CAUTION: Downward tension on signal cable can cause wheel(s) to lift. Make sure cable is clamped to machine frame near encoder and allow slack.

NOTE: The weight at the Length Sensor unit provides sufficient traction for accurate operation when mounted as shown, with arm angle from horizontal not exceeding ±30°, and with hinge clamp toward the far extreme of the extension arm.



Length Sensors should be mounted so measuring wheel(s) contact ribbon, strip or web as it passes over a roller. As an alternative, wheel(s) can be driven by roller surface next to material being measured.

ORDERING INFORMATION

| MODEL NO. | DESCRIPTION | PART NUMBER |
|-----------|--|-------------|
| LSAHC | Length Sensor Hinge Clamp Assembly for Model LSC, LSQ, and LSCB1 | LSAHC001 |