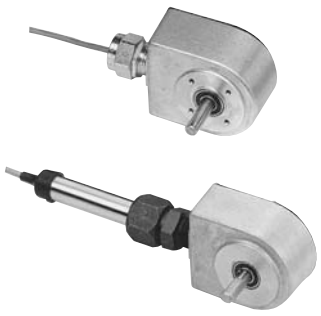
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Bulletin No. ZFG/ZCG-B
Drawing No. LP0737
Released 12/10

# MODEL ZCG - SINGLE CHANNEL OUTPUT ROTARY PULSE GENERATOR
# MODEL ZFG and ZGG - SINGLE CHANNEL OUTPUT LENGTH SENSORS
## (Replaces MODELS RPGC, LSCS and LSCD respectively)

- *VARIOUS PULSE PER REVOLUTION (PPR) RATES*
  Up to 200 PPR for fine, high-resolution counting or precision speed measurement from slow shaft speeds.
- *UP TO 10 KHz OUTPUT FREQUENCY*
- *CURRENT SINK OUTPUT*
- *LENGTH SENSORS AVAILABLE WITH:*
  Single or Dual Ended Shaft
- *SEALED PRECISION BALL BEARINGS*
- *VARIOUS CABLE LENGTHS AVAILABLE*



- *RUGGED CAST ALUMINUM HOUSING*
- *3/8" DIA. STAINLESS STEEL SHAFT*
- *WIDE INPUT SUPPLY VOLTAGE RANGE & LOW CURRENT OPERATION*
- *EASY INSTALLATION*
  Eliminates air-gap, sensing distance, and beam alignment procedures of other types of sensing.
- *IDEAL FOR DUSTY, DIRTY ENVIRONMENTS*
  Where "Non Contact" sensing means are impractical.

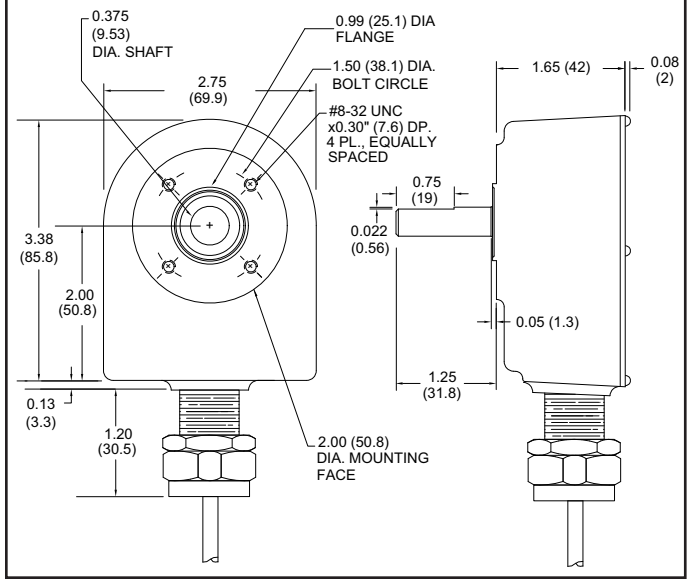
## DESCRIPTION

The units are rugged, incremental encoders that convert shaft rotation into a current sinking pulse train.

Internally, a single L.E.D. light source and a photologic sensor in conjunction with a shaft-mounted, durable, metal-etched encoder disc, provides signal accuracy and reliability to 10 KHz. The DC input power supply requirement is a versatile +8 to +35 VDC, and is reverse polarity protected. The NPN Open Collector Transistor Output is current limited to 40 mA and is compatible with most RLC counters, rate indicators, controllers and accessories.

All units are packaged in a rugged cast aluminum housing with a gasketed, rear aluminum cover. The 3/8" (9.53 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. They are designed to meet NEMA 13/IP54 environmental requirements. All units are supplied with 10 feet (3M) of PVC jacketed 3-wire, 22 AWG cable with stranded shield wire and 100% foil shield coverage. Operating Temperature range is -18°C to +60°C.

## ZCG DIMENSIONS In inches (mm)




## ROTARY PULSE GENERATOR

The ZCG 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 3-wire shielded cable exits through a cord connector.

## LENGTH SENSOR

The length sensors are available in both Single Ended Shaft *(ZFG)* and Double Ended Shaft *(ZGG)* versions, both of which include a Stainless Steel Handle Tube for mounting and 10 feet (3.05 M) of 3-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 which are hard, thin and strong provide good readings. Conversely, soft, thick and elastic materials can present problems in obtaining true readings. Count or Rate Indicators with *"input scaling"* can compensate for Measuring Wheel wear and material elasticity and compliance errors. In addition, English/Metric conversions may also be accomplished.

### Open Collector Output Wiring

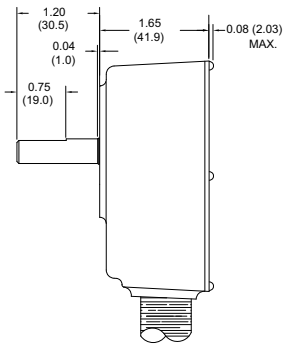
The ZCG, ZFG, and ZGG series of sensors have open collector outputs. An open collector output brings the uncommitted collector of the encoder switching device to the external world. Because the collector element is not associated with the sensor supply voltage, the sensor output collector may be "pulled up" to external voltages (40 VDC max.) different than the encoder supply voltage. NPN open collector outputs are current sinking devices. An output signal will not be generated unless a pull-up resistor is connected from the open-collector to the positive side of an external supply. The same supply can be used for powering the unit and for the pull-up resistor.

## LENGTH SENSOR MOUNTING CONSIDERATION

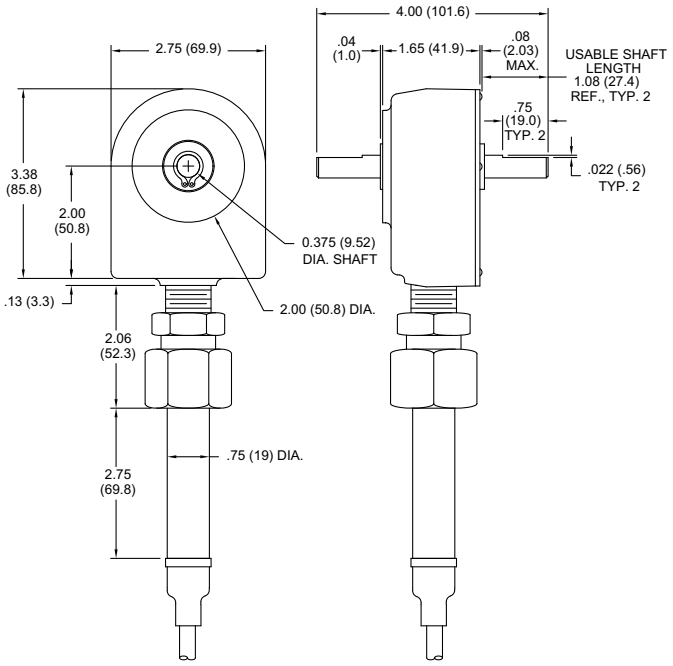
1. Length Sensors should be mounted so measuring wheel*(s)* contact ribbon, strip or web as it passes over a roller. As an alternative, wheel*(s)* can be driven by roller surface next to material being measured.
2. Note: The weight at the Length Sensor unit provides sufficient traction for accurate operation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

## ZFG DIMENSIONS In inches (mm)

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




## ZGG DIMENSIONS In inches (mm)




## ELECTRICAL SPECIFICATIONS

1. **SUPPLY VOLTAGE:** +8 to +35 VDC *(including power supply ripple)* @ 50 mA max. *(30 mA typ.)*; Reverse polarity protected.
2. **OUTPUTS:** NPN Open Collector Transistor;
   $V_{OH}$ = 30 VDC max., $V_{OL}$ = 1 V max. @ 40 mA
   Output current is limited to 40 mA.
3. **OUTPUT FREQUENCY:** Up to 10 KHz
4. **CABLE CONNECTIONS:**
   RED = +VDC; BLACK = Common; WHITE = NPN O.C. Output.

## MECHANICAL SPECIFICATIONS

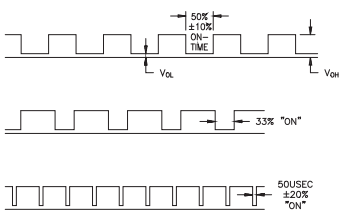
1. **MAXIMUM MECHANICAL SPEED:** 6000 RPM
2. **RADIAL SHAFT LOAD:** 15 lbs. max. (66.7N)
3. **AXIAL SHAFT LOAD:** 15 lbs. max. (66.7N)
4. **STARTING TORQUE:** 3 oz.-in. (21.2N-mm)
5. **MOMENT OF INERTIA:**
   Single Shaft = 2.82 x $10^{-4}$ oz. - in. - $sec.^2$ (1.99 x $10^{-3}$N - mm - $sec^2$)
   Dual Shaft = 3.09 x $10^{-4}$ oz. - in. - $sec.^2$ (2.19 x $10^{-3}$N - mm - $sec^2$)
6. **OPERATING TEMPERATURE:** -18°C to +60°C
7. **WEIGHT (LESS CABLE):**
   Rotary Pulse Generator = 15 oz (0.42 Kg)
   Length Sensors = 22 oz (0.62 Kg)

## WAVE OUTPUT DIAGRAM

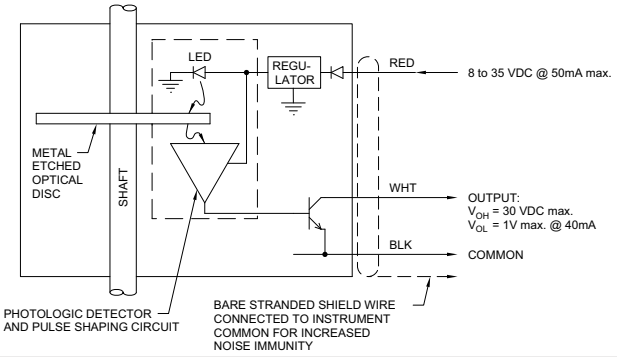
**Square wave output for models with PPR 1, 10, 12, 20, 60 and 100. Square wave, 50/50 duty cycle ±10%.**

**Models that use 1/3 yd. or 1/3 mtr wheels with internal ÷ 3 circuits. 66/33 duty cycle.**

**Models with 120 and 200 PPR utilize internal doubling. (50 µsec ±20% neg. going pulse.)**




## EQUIVALENT CIRCUIT & CONNECTIONS




## ORDERING INFORMATION

| MODEL NO. | DESCRIPTION | PPR | OUTPUT PULSE RATE CODE | PART NUMBER |
|---|---|---|---|---|
| ZCG | Rotary Pulse Generator (Replaces RPGC) | 1 | | ZCG0001C |
| | | 10 | | ZCG0010C |
| | | 12 | | ZCG0012C |
| | | 60 | | ZCG0060C |
| | | 100 | | ZCG0100C |
| | | *120 | | ZCG0120C |
| | | *200 | | ZCG0200C |
| **ZFG** | Length Sensor Single Shaft (Replaces LSCS) | 1 | 1/Foot | ZFG0001C |
| | | 10 | 10/Foot | ZFG0010C |
| | | 12 | 1/inch | ZFG0012C |
| | | 20 | 60/Mt or Yd | ZFG0020C |
| | | 60 | 60/Foot | ZFG0060C |
| | | 100 | 100/Foot | ZFG0100C |
| | | *120 | 10/Inch | ZFG0120C |
| | | *200 | 600/Mt or Yd | ZFG0200C |
| | | .333 | 1/Mt or Yd | ZFG00/3C |
| | | 3.333 | 10/Mt or Yd | ZFG03/3C |
| | | 33.333 | 100/Mt or Yd | ZFG33/3C |
| **ZGG** | Length Sensor Double Shaft (Replaces LSCD) | 1 | 1/Foot | ZGG0001C |
| | | 10 | 10/Foot | ZGG0010C |
| | | 12 | 1/inch | ZGG0012C |
| | | 20 | 60/Mt or Yd | ZGG0020C |
| | | 60 | 60/Foot | ZGG0060C |
| | | 100 | 100/Foot | ZGG0100C |
| | | *120 | 10/Inch | ZGG0120C |
| | | *200 | 600/Mt or Yd | ZGG0200C |
| | | .333 | 1/Mt or Yd | ZGG00/3C |
| | | 3.333 | 10/Mt or Yd | ZGG03/3C |
| | | 33.333 | 100/Mt or Yd | ZGG33/3C |
| RPGFC | Flexible Coupling (1" Length) 0.250" - 0.375" | | | RPGFC002 |
| | Flexible Coupling (1" Length) 0.375" - 0.375" | | | RPGFC003 |
| | Flexible Coupling (1" Length) 0.375" - 0.500" | | | RPGFC004 |
| | Flexible Coupling (1" Length) 0.375" - 6 mm | | | RPGFC006 |

* Rotary pulse generators and length sensors with 120 & 200 PPR outputs employ an internal doubling circuit and deliver a fixed 50 µsec ±20% output pulse at the leading and trailing edge of a passing slot. Additional doubling in external indicators or circuits may not be applicable. These outputs are derated to 7300 Hz due to internal x2 circuitry. *(See Wave Output Diagram)*

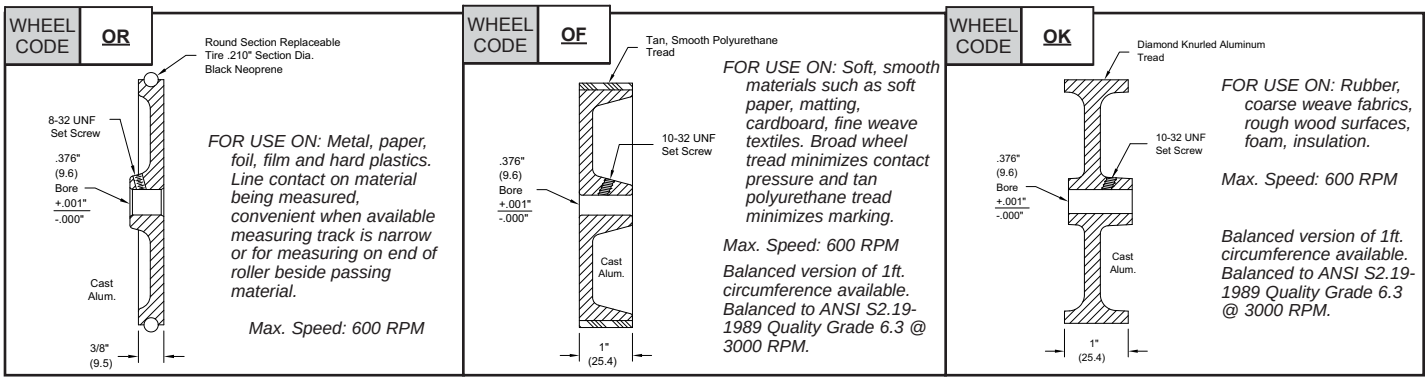
*Notes:*

*1. For 25 foot cable, replace the last character of the part number ("C") with "D". For 50 foot cable, replace the last character of the part number ("C") with "E".*

*2. Wheels and mounting brackets are sold separately, see Length Sensor Accessories.*

## *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 a length sensor and wheel combination is either in inches, feet, yards, or meters 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).*

## *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*

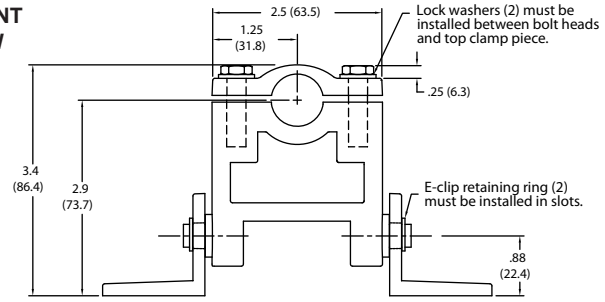
The Length Sensor Hinge Clamp Assembly provides an easy method for attachment and mounting of the Length Sensors and LSCB1 Conversion Bracket. The removable top on the solid zinc LSAHC mounting block allows quick installation of the Length Sensor handle tube and provides secure clamping retention. The 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.

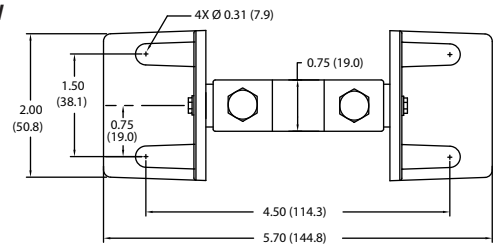
1. Tighten both bolts so that the top clamp half draws down evenly on the sensor tube.
2. Tighten the bolts until both lock washers are flat.
3. Then turn each bolt an additional ½ to ¾ turn.

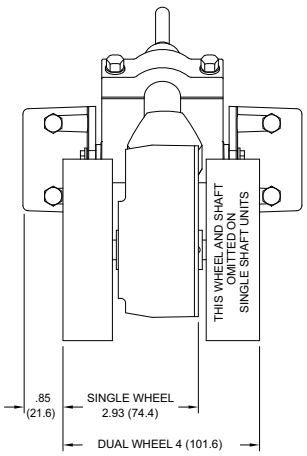
### *DIMENSIONS In inches (mm)*

**FRONT VIEW**




**TOP VIEW**

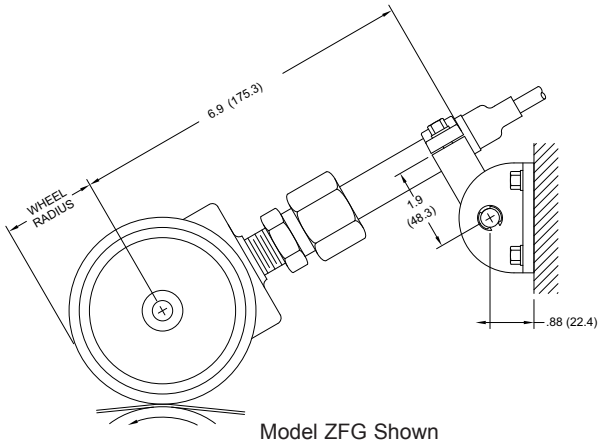



Model ZGG Shown

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.




Model ZFG Shown

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 | LSAHC001 |


### LIMITED WARRANTY

The Company warrants the products it manufactures against defects in materials and workmanship for a period limited to two years from the date of shipment, provided the products have been stored, handled, installed, and used under proper conditions. The Company's liability under this limited warranty shall extend only to the repair or replacement of a defective product, at The Company's option. The Company disclaims all liability for any affirmation, promise or representation with respect to the products.

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