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# Rotary Position Transducers

E8R-RL210-G01MC  
E8R-RL210-G011S

## Instruction & Operation Manual

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# Rotary Position Transducers

## Single-Turn, Geared Single Turn and Dual (Multi-Turn) Resolvers

### INTRODUCTION

The resolver is a highly accurate and highly dependable device for absolute position shaft encoding. Resolvers have a reliable track record of applications in aerospace, military, and industry, where they have been used for decades for position sensing. Some of the common applications are radar antenna position sensing, missile guidance systems, NC machine position feedback, automotive stamping presses, 2 piece can-manufacturing presses and packaging machines.

The resolver is designed to operate reliably under extremely hostile environments, such as; continuous mechanical shock, vibration, extreme temperature and humidity changes, oil mist, coolants and solvents.

The resolver is a passive transducer. It is a brushless rotary transformer with one rotor and two stator windings. The stator windings are electrically 90 degrees out of phase with each other. As the shaft rotates, the relative position of the rotor and the stator windings change. Either the rotor or the two stator windings

together can be used as the primary of the rotary transformer and the secondary will then produce an analog voltage corresponding to the shaft position.

#### **Built-in Gear Train for Multi-turn Application**

Various resolver models from Autotech are available with a built-in precision gear train. The resolver makes 1 turn for a set number of turns (see *How to Order* for gear ratios available) of the input shaft.

#### **Explosion Proof, FM Approved**

Autotech's series E8R resolver has FM approved explosion proof housing and meets the requirements as per Class 1, Division 1, Groups B, C, and D.

#### **Dual resolvers with 1:1 Gear Ratio**

The dual resolver consists of two resolvers coupled to each other through a 1:1 gear train for redundancy. Each resolver provides independent signals for the absolute shaft position.

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## Specifications

### Mechanical

Resolver:	E8R-RL21 0-xxxxx
Housing Size:	Size 40, Explosion Proof (4" dia)
Max. Starting Torque @ 25° C (Oz-in):	8
Moment of Inertia (9gm/cm <sup>2</sup> ):	45
Max. Slew Speed (RPM):	5000
Shaft Size:	5/8"
Max. Shaft Loading	
Axial (lbs):	50
Radial (lbs):	100
Bearing life at Max. Mfr. Spec. (Rev.):	2x10 <sup>9</sup>
Approximate Weight (lbs):	8

### Environmental

Shock:	200g for 11mSec
Vibration:	20g to 2000 Hz
Operating Temperature:	-20° C to 85° C
Storage Temperature:	-40° C to 85° C
Enclosure:	NEMA 4X Class 1, Div. 1 Groups B.C. D

# Mounting

Autotech resolvers are designed to operate reliably under extremely hostile environments, such as; continuous mechanical shock, vibration, extreme temperature and humidity changes, oil mist, coolant and solvents. Still ordinary precautions to prevent damage to bearings of any rotation device should be followed to prolong their life.

- a. It is recommended that the Autotech encoder mounting bracket (MMB-EN359-010) be used, wherever possible, for size 40 resolvers.
- b. The servo-mount resolvers may be mounted either with traditional servo-clamps or through the four threaded mounting holes on the face of the resolver.
- c. The flange-mount resolvers are mounted using four mounting holes in the square flange.

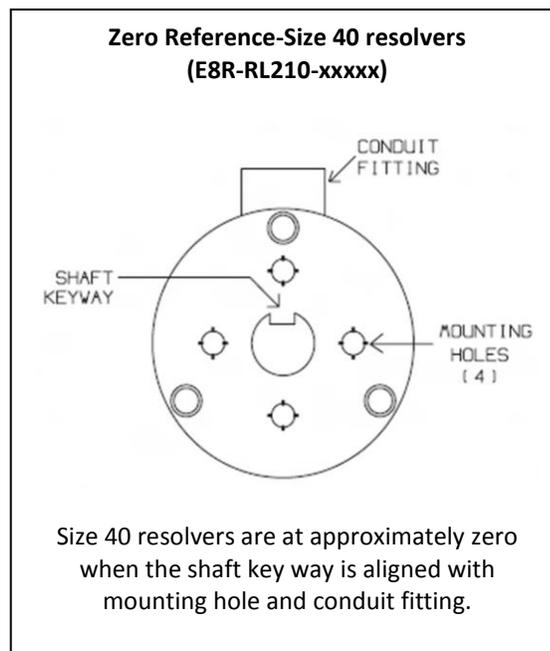
2. If the resolver is to be axially shaft driven, be sure that the shafts are aligned. Misaligned shafts can destroy resolver bearings.

3. If a pulley, coupling, or sprocket is mounted to the resolver shaft, DO NOT hammer or press on the shaft. DO NOT force fit anything on to or off of the resolver shaft.

4. If the resolver is belt-driven or chain-driven, DO NOT OVERTIGHTEN the drive belt or chain. Too much side loading (radial) can destroy the resolver bearings. Side loading is not allowed for E6R and RL101 (size 11) resolvers.

5. To maintain the NEMA 13 rating of the resolver, the following precautions must be taken: a) sealing compound must be used when fitting the conduit pipe; b) the bearing seal must be checked once every six months and replaced if necessary. Lubricating the bearing seal periodically prolongs its life.

6. Zero Reference: For most resolver types, the approximately zero reference may be located by aligning the shafts as shown in the figures below.



# How to Order

## Size 40, Explosion Proof

**E8R-RL210-G01MC** Explosion proof dual brushless resolver, conduit fitting, single-turn. Class 1, Division 1, Groups B, C, and D. FM approved. Terminal connections. 5/8" shaft diameter with built-in 1:1 gear.

**E8R-RL210-G011S** Same as above, with intrinsically safe resolvers.

## Accessories

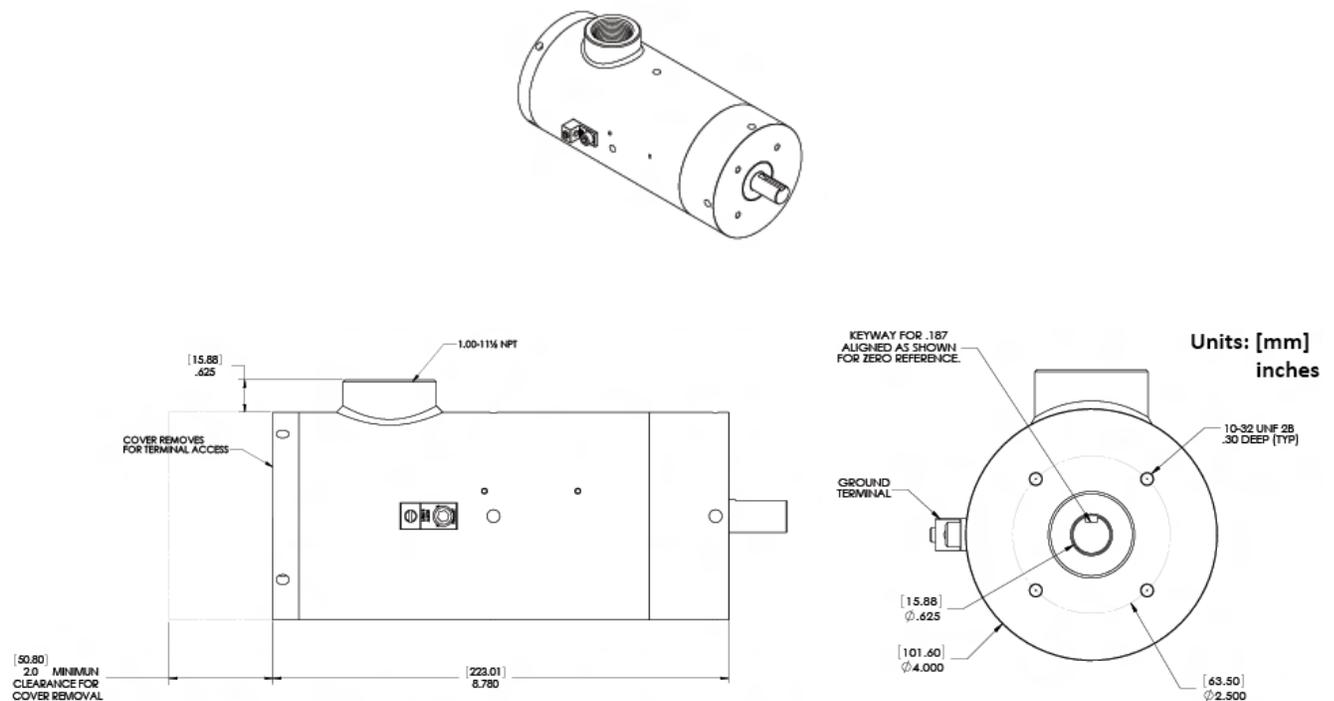
**CBL-10T22-xxx** 22AWG. 10 conductor (5 twisted pair) overall foil shielded cable  
xxx: Length in feet - standard lengths are 010, 020, 050 feet and increments of 50 feet (e.g. 100, 150, 200. etc.)

**CPL-005/8-5/8** 5/8" to 5/8" coupling

**MMB-EN359-010** Mounting bracket for size 25 and 40 resolvers

*Intrinsically safe barriers must be used with E8R-RL210-G011C, recommended barriers are:  
Stahl #9002/22-093/300/00 for R1 and R2 (1pc.), Stahl #9002/77-220-240-00 for S1, S2, S3 and S4 (4 PC.)*

# Outline Dimensions



# Wiring

Wiring			
CBL-10T22-xxxx Wire Color	Signal / Function	Resolver terminals	
		<i>Fine (1)</i>	<i>Coarse (2)</i>
Black/Green Green Twisted pair	Rotor R1 Rotor R2	1 2	7 8
Black/Yellow Yellow Twisted pair	S1 Stator S3 Stator	3 5	9 11
Black/Blue Blue Twisted pair	S2 Stator S4 Stator	4 6	10 12
Shield	Case Ground	GND (Green Screw)	GND (Green Screw)

Notes:

1. Black/Green indicates a black wire with green stripes.
2. An overall foil shielded cable with twisted pairs (such as Autotech's cable CBL-10T22-xxxx) must be used or wiring the unit. The pairs must be formed as follows: S1 and S3, S2 and S4, R1 and R2
3. Switch S1 and S3 to change direction.

## Grounding and Shielding

1. Resolver wiring must be done using twisted pairs in cable with an overall foil shield. The twisted pairs must be wired as per wiring instructions. See how to order section for suitable cable offered by Autotech.

2. It is recommended that the shielded resolver cable be routed in its own conduit or cable tray.

3. All shielded resolver cable must be kept at a minimum distance of 2 inches from all high voltage or inductive wiring.

4. All shielded resolver cable must be kept at a minimum distance of 12 inches from all motor wiring controlled by AC or DC drives.

5. All ground planes (chassis grounds) in the total system must be held to the same RF potential, by good metallic connections to building frames, conduit or wiring trays.

6. The shield drain wires may be terminated in one of two ways.

a) Connect to chassis ground at each end and not connected to signal reference at any point in the system.

b) Connect to signal reference at the decoder only. The shield drain should remain unconnected at the resolver end and the shield should not touch earth ground at any point in its run.

**NOTE:** Resolver with MS connectors have shield drain wire pre-terminated for method (a) above. Method a) is recommended for all Autotech products. In certain circumstances, in unusual EMI conditions, method b) may be necessary after consulting factory.

