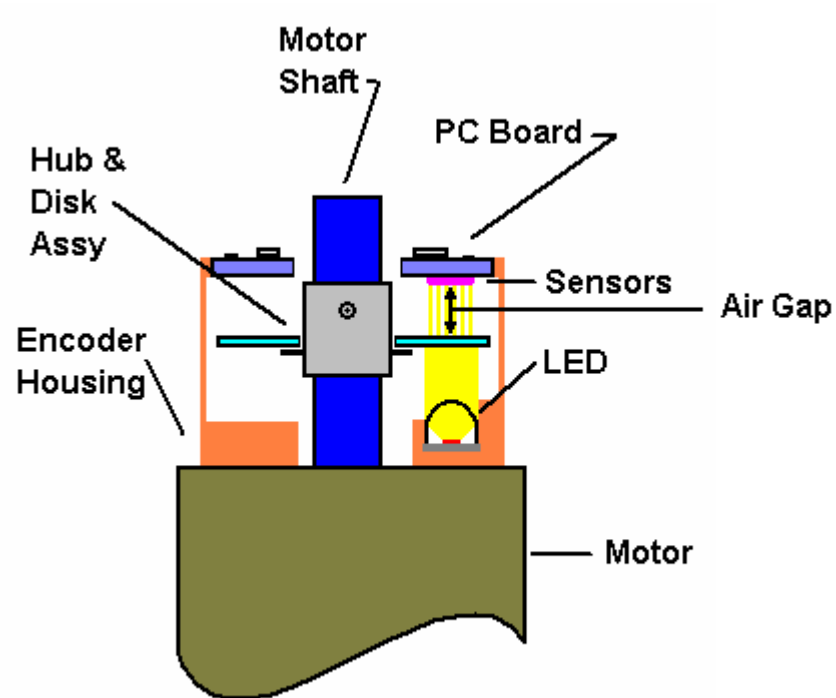




## Allowable Tolerances for Modular Encoder Misalignment

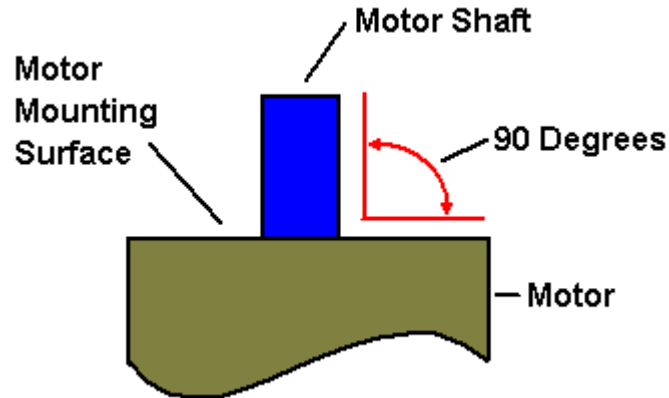


**Encoder installed on a Motor**

The five parameters that will affect the operation of the encoder are as follows:

- 1) Concentricity (of encoder housing with the centerline of the shaft)
- 2) Perpendicularity (motor shaft centerline to motor mounting surface)
- 3) Axial end play (of Motor shaft that supports the hub & disk assembly)
- 4) Tolerance between Encoder Hub & Disk Assembly and motor shaft
- 5) Runout - TIR (of hub & disk and Motor-shaft assembly)

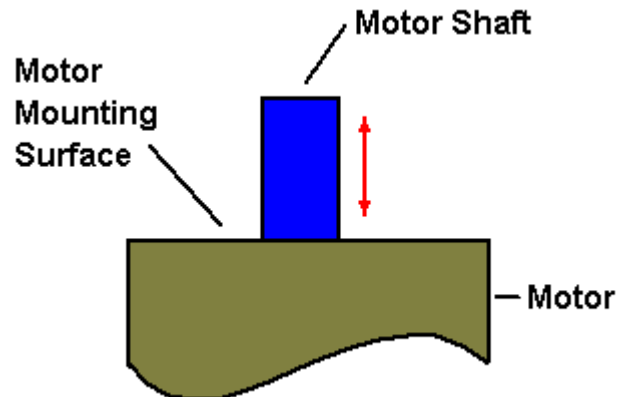
1) The RENCO modular encoder models have been designed with centering mechanisms which will accurately align the sensors to the center line of the motor shaft with motor tolerances as described below. This facilitates proper operation of the encoder throughout the full range of temperature and frequency specifications.



### Perpendicularity

2) The Perpendicularity of the encoder mounting surface will affect the air gap between the disk and the sensors on the pc board. Variation in the air gap will result in output signal jitter. Motor shaft Perpendicularity should be less than 0.0005" [0.013mm] TIR.

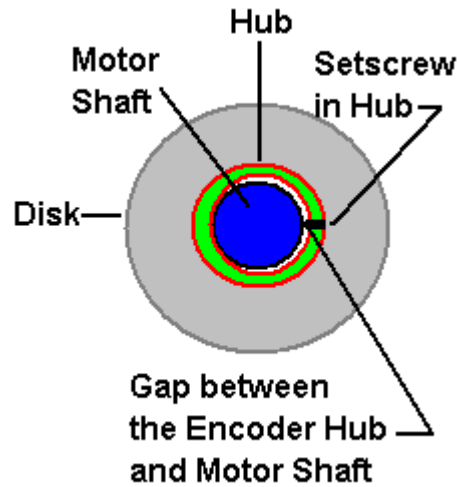
3) The axial end play of the shaft will cause the disk to move toward or away from the sensors on the pc board, which again results in changes to the air gap. The air gap specification is .012" to .014" [.300 to .350mm] for all RENCO Encoder products. In addition, all RENCO Encoders have a spacing of at least 0.012" [.300mm] below the disk.



### Axial Shaft Movement

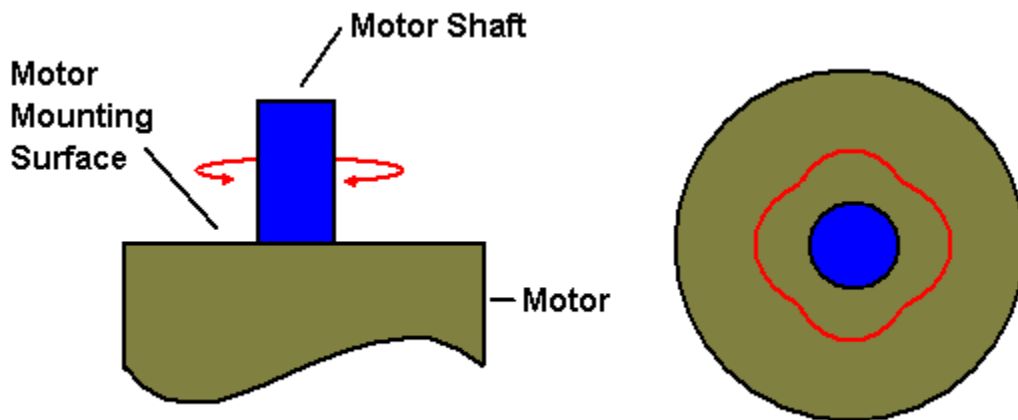
Maximum axial movement of the shaft must be constrained so that the total of the perpendicularity error and axial movement result in less than these allowed clearances. As a rule of thumb, if the shaft axial play is less than +/- 0.010" [0.25mm] this requirement will be met. Failure to constrain the motor endplay to values within this limit can result contact of the disk to the sensors. This condition should be avoided.

4) The RENCO hub ID is machined to be minimum .0001" [0.0025mm] larger than the maximum shaft size that the encoder will be installed. The hub size has a tolerance on the ID of + .0004", -.0000" [+0.010mm/-.000mm] from this value. The negative tolerance of the motor shaft is .0005" [.013mm] from the maximum OD of the motor shaft. The encoder has been designed to operate properly with the concentricity error between the hub and shaft at the worst case tolerance.



**Encoder Hub to Motor Shaft Tolerance**

5) Runout of the shaft will also cause the data tracks under the sensors to be non concentric. The TIR of all errors due to perpendicularity, hub/shaft clearances, and bearings should not be larger than  $\pm 0.002$ " [0.050mm]



**Shaft Runout**