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Precision Motion Specialist

FRAMELESS MOTOR INSTALLATION MANUAL

Jiangsu DINGS' Intelligent Control Technology Co., Ltd.

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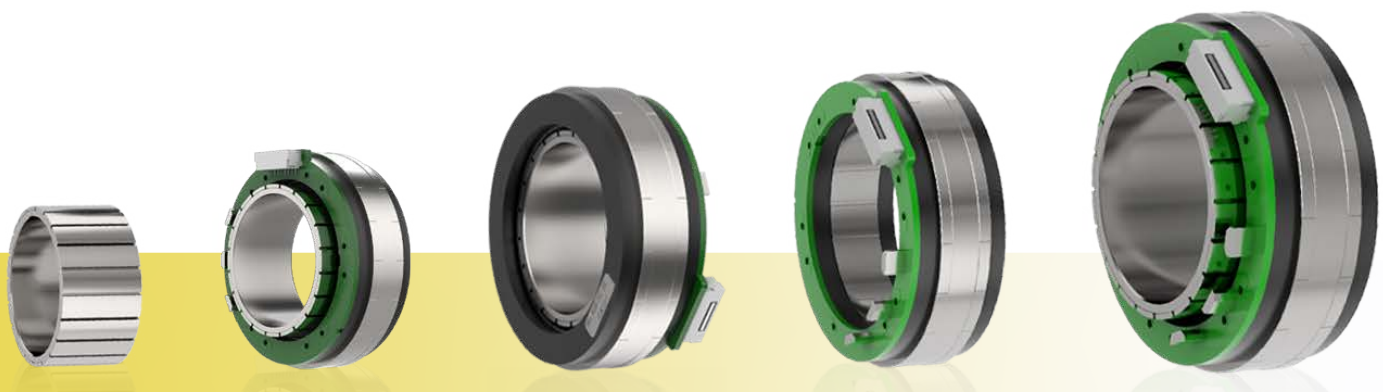
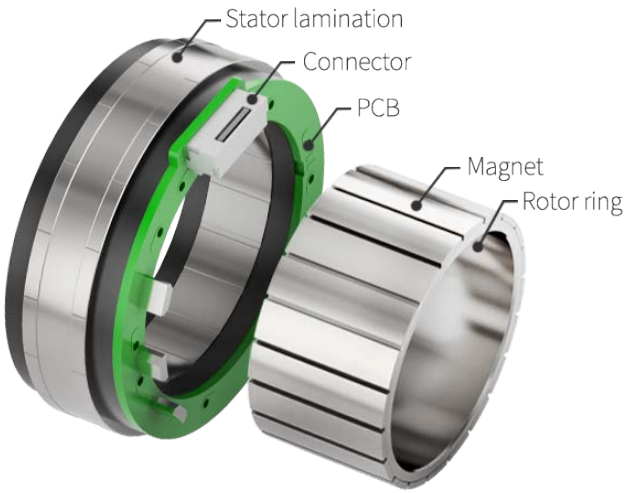


FRAMELESS MOTOR

Frameless Motor Manual

1. Introduction to Frameless Motor Structure

A frameless motor typically consists of two main components: the stator assembly and the rotor assembly. The stator assembly includes the stator core, copper windings embedded in the stator core, and a PCB board. The PCB board is used to guide the winding wires and secure the hall sensors, which detect the rotor's position and provide signals to the control system. The hall sensor's signal ports can be connected via plug terminals. For improved reliability and longevity, the stator assembly is vacuum encapsulated with potting material. The rotor assembly typically comprises the rotor cylinder and magnets, which are fixed to a magnetic conducting ring using appropriate methods based on operational conditions.



2. Recommendations for Frameless Motor Assembly

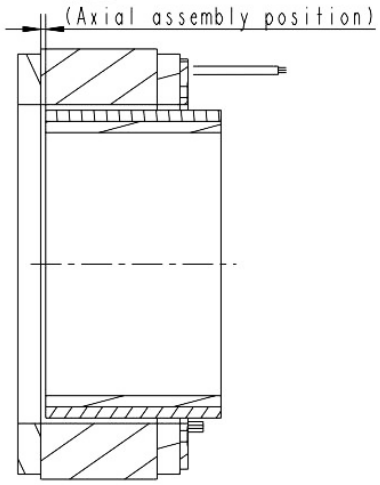
Proper assembly methods must be confirmed during the initial stages of motor customization to ensure the safe and reliable integration of the frameless motor into its equipment, guaranteeing stable motor operation.

2.1 Stator and Rotor Positioning

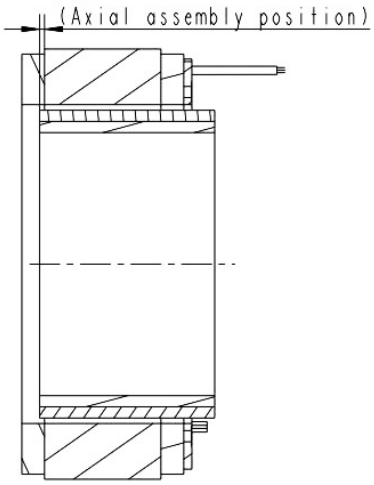
Correct axial and radial positioning of the stator and rotor is crucial for the smooth operation of the frameless motor.

2.1.1 Axial Positioning

The rotor should completely encase the stator to prevent axial pulling forces, ensuring no loss of output torque. The stator and rotor must be fully coupled axially.



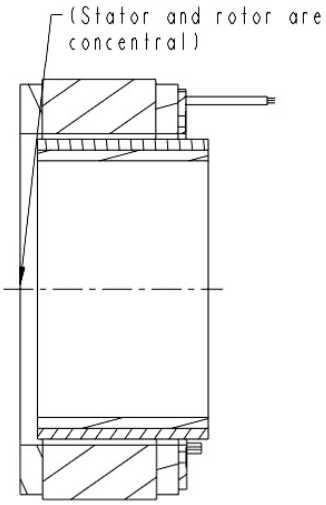
Right Axial Positioning



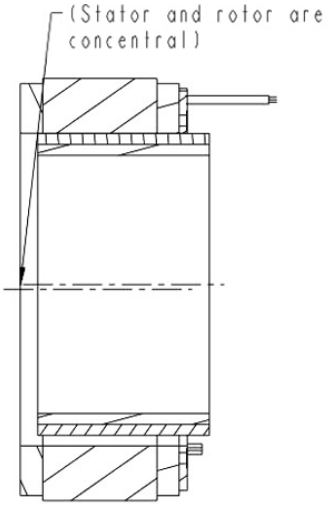
Wrong Axial Positioning

2.1.2 Radial Positioning

The stator and rotor must maintain concentric alignment, avoiding radial eccentricity. The total accumulated tolerance should not exceed half of the air gap on either side.



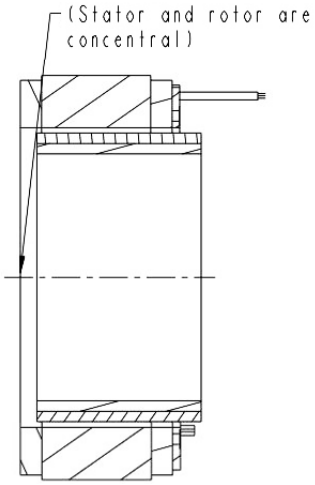
Right Radial Positioning



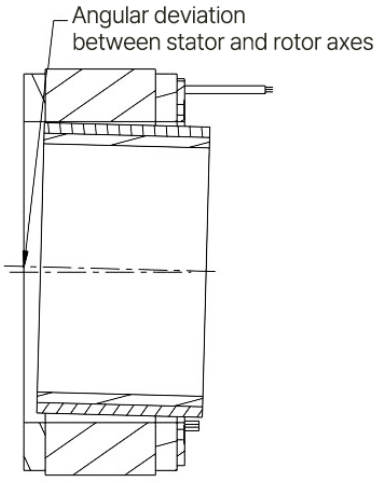
Wrong Radial Positioning

2.1.3 Angular Positioning

Misalignment of the stator and rotor's axes can lead to uneven air gaps, causing instability and, in severe cases, internal friction between components.



Right Angular Positioning



Wrong Angular Positioning

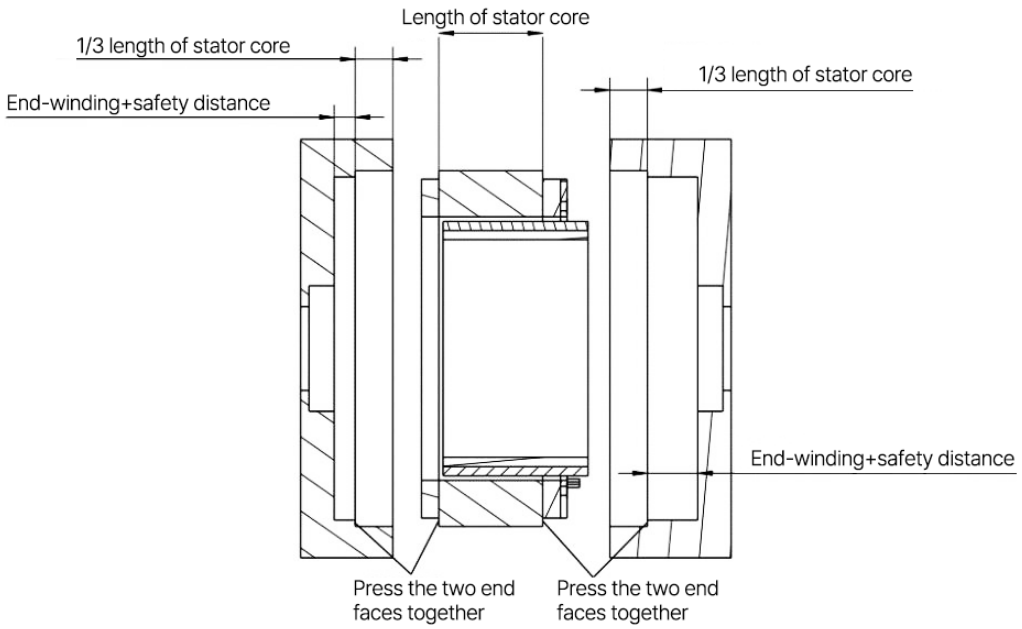
2.2 Stator Assembly

The stator must be securely fixed in the equipment to prevent tangential slipping during motor operation. There are three primary methods for Housing the stator:

1. Using end caps to secure the stator.
2. Housing the stator through interference fits or thermal shrinkage.
3. Bonding the stator with adhesive.

2.2.1 Housing the Stator with End Caps

In this method, the front and rear end caps are tightly pressed against the stator core, utilizing friction between the end surfaces to prevent the stator from moving during operation. Bolts are used to tightly secure the end caps to the stator. The end caps also serve as support structures for components like bearings. Holes are drilled in the end caps for the lead wires based on the exit location. For optimal concentricity, the outer diameter of the stator core is machined to fit the inner diameter of the end caps. A transition fit is recommended, with a limit tolerance of H8/js8.

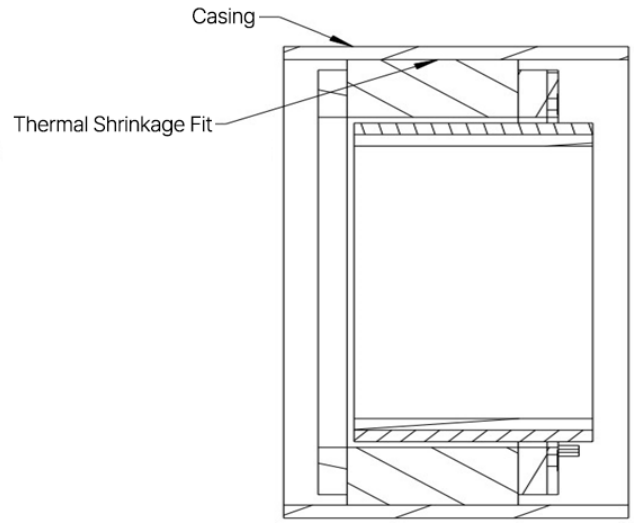


Housing the Stator with End Caps

2.2.2 Thermal Shrinkage Fit

It is difficult to provide specific instructions on the method and size matching of Thermal Shrinkage Fit In various applications, but we have the following suggestions:

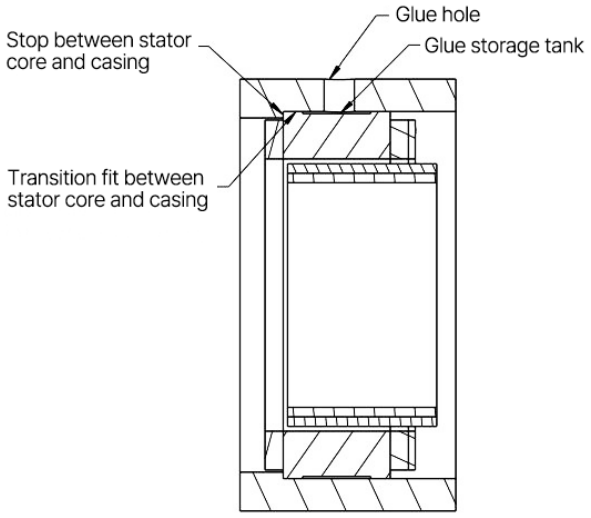
1. Thermal shrinkage methods vary depending on the materials involved. For aluminum housings, a suggested limit tolerance is N8/h8. At the same time, the extreme temperature conditions for storage or operation should be considered.
2. The case must withstand the torque transmitted by the stator, and the thickness of the case should be determined based on the motor torque. The thicker the case, the greater the torque transmitted.
3. Surface roughness must be considered to ensure proper fitting.



Motor and casing Thermal shrinkage Fit or tight fit

2.2.3 Adhesive Bonding

Adhesive bonding is a convenient method. A transition fit is recommended between the stator core and the housing, with a limit tolerance of H8/js8 to ensure concentricity. The bonding strength must be sufficient to withstand tangential forces during motor operation.



Adhesive Bonding

2.3 Rotor Installation

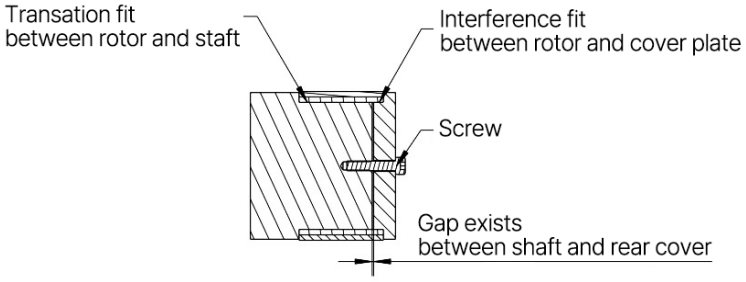
The rotor can be secured to the shaft using one of the following methods:

1. Screw fastening.
2. Adhesive bonding.
3. Interference fit.

Each method must maintain concentricity and ensure uniform air gaps between the rotor and stator

2.3.1 Screw fixation

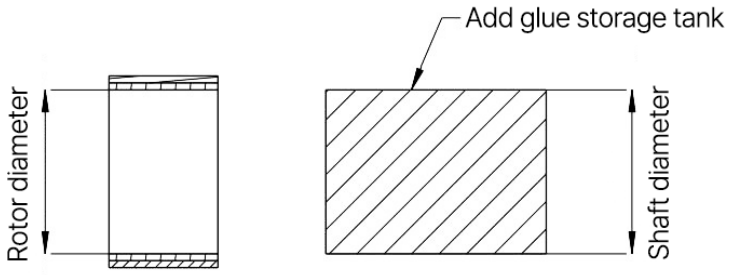
Fix the rotor on the shaft in a transitional fit, with a recommended maximum fit tolerance of H8/K7, and use machined parts to ensure good concentricity. At the bottom, a rear cover plate is used to press down on the other end of the rotor, and there is a gap between the shaft and the rear cover plate in the axial direction. The rear cover plate and the shaft are fixed together with fastening screws to achieve the fixation of the rotor on the shaft. The number and size of screws can be determined based on the motor torque situation.



2.3.2 Rotor Adhesive

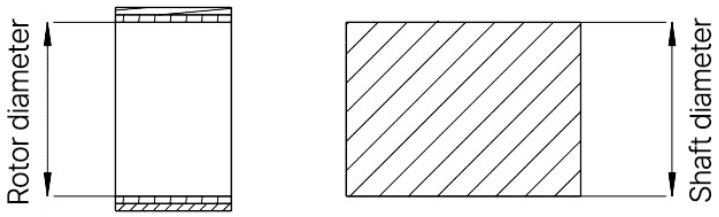
It is difficult to provide specific tolerance fit for rotor adhesive, and the specific situation depends on the adhesive model, rotor shaft size

Determination of parameters such as torque magnitude. It is necessary to add a glue storage groove on the surface of the shaft, and the form of the glue storage groove should be determined by oneself, such as threaded or other forms of glue storage grooves.



2.3.3 Interference fit

Interference fit is an assembly method achieved by setting a reasonable interference fit between the inner diameter of the rotor and the outer diameter of the shaft. The recommended assembly limit tolerance is H8/p7, but parameters such as motor speed and output torque should also be considered. The surface of the shaft needs to be set with a reasonable roughness.



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