

PROVEN PERFORMANCE

Customers in over 50 countries and in diverse markets and sectors.



Kinco

Motion control
servo system

➔ Kinco frameless torque motor

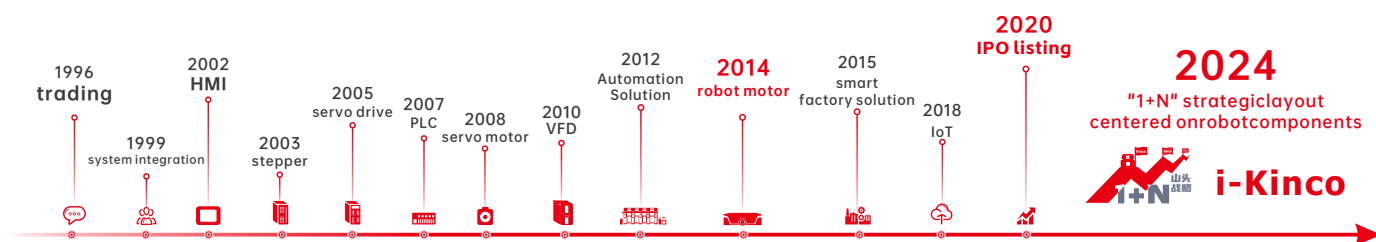
- FMC Series
- FMK Series



Kinco® Automation
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Kinco was founded in 1996, and successfully listed on the Shanghai Stock Exchange in 2020 (abbreviated name: Kinco share, stock code 688160), which is a high-tech, specialized and sophisticated enterprise that attaches great importance to independent research and development and innovation, mainly engaged in the research and development, production, sales and related technical services of industrial automation and robot core components and digital factory hardware and software. It is a leading supplier of automation control, robot power and digital factory solutions in China.

After years of continuous research and development and innovation, Kinco has established a complete product line with independent intellectual property rights, covering a series of products from machine iot to human-machine interaction, control, drive and execution, which are widely used in robots, medical equipment, logistics equipment, packaging equipment, food equipment, clothing equipment, environmental protection equipment, etc. New energy equipment, rail transit equipment and other automation equipment industry.

Based on the comprehensive industrial automation and digital technology platform, the company has in-depth application scenarios in the robot industry, providing display, control, drive and other multi-dimensional solutions for industrial mobile robots, collaborative robots, industrial robots, pan-service robots, and bionic robots. Through the insight of the industry pain points, deep links with robot customers, combined with the advantages of product research and development, the company continues to innovate, and launches industry-leading low-voltage servo products for mobile robots, integrated servo wheel, frameless torque motor for collaborative robots, robot human-machine interfaces, robot controllers and other products. The company has formed a relatively complete robot core parts capability, and after nearly 10 years of hard work in the robot industry, it has become a leading enterprise in the field of mobile robot low-voltage servo, and has a high brand influence in the industry.

Kinco has four research and development centers in Shanghai, Shenzhen, Changzhou and Chengdu, and two manufacturing bases in Shenzhen and Changzhou, a total of 10+ domestic marketing centers, 100+ domestic service providers, 40+ global partners, and products are exported to 70+ countries overseas. In terms of after-sales service, Kinco has established after-sales service centers in Shanghai, Shenzhen and Changzhou.

Four R&D centers and two manufacturing bases



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FMC&FMK frameless torque motor

Frameless torque motors, unlike traditional servo motors, consist only of stator and rotor components. Compared to framed motors, frameless motors offer flexible configuration and easy installation. Considering the increasing trend of highly integrated drive systems, frameless motors better meet the expectations of engineers. Engineers no longer need to consider motor interfaces in system design, allowing for maximum reduction of space occupied by the power output unit in the drive system, leading to higher system integration.

In response to customers' increasing demands for core joint components, Kinco has launched the fourth-generation FMK series frameless torque motor .

FMK series frameless torque motor has optimized the stator welding process, enhanced the roundness of the stator, and ensured superior performance while minimizing the motor length to meet the usage requirements of customer. In addition, the motor has been upgraded with a larger split ratio and a larger hollow design, and its rotor manufacturing process has been optimized, making it more suitable for embodied intelligent product and effectively reducing customers' overall TCO . Meanwhile, the FMK series frameless torque motor has further expanded its size coverage, basically covering the size specifications of mainstream joint modules on the market, thus making the size options of Kinco's frameless products more comprehensive.

Collaborative Robots



Advantages and Features of FMC Frameless Torque Motors

Independent research and development, with better performance compared to second-generation products

- Slimmer body thanks to new lightweight design, providing faster and smoother motion as well as smaller size and lower temperature rise under same torque performance.
- Higher torque density achieved through optimization of electromagnetic solutions, with smaller cogging torque thanks to increased pole pairs.
- Easy replacement of mainstream foreign products thanks to compatible product dimensions, also wide compatibility to common harmonic reducers in the market.
- Various frame sizes, larger hollow inner diameter to meet diverse threading requirements, covering loads of 3-25Kg.
- Customizable options: optional Hall sensors, temperature sensors, etc., with noticeable cost advantages.
- Digital factory for continuous and stable production, with multiple global / local distribution and offices providing support and services.

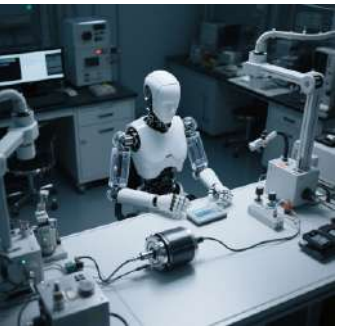
Anthropomorphic robot



Collaboration & Dual Arm Robot
J1-J6 joints



Four-legged robots
Walkable joints



Anthropomorphic robot
Flexible joints

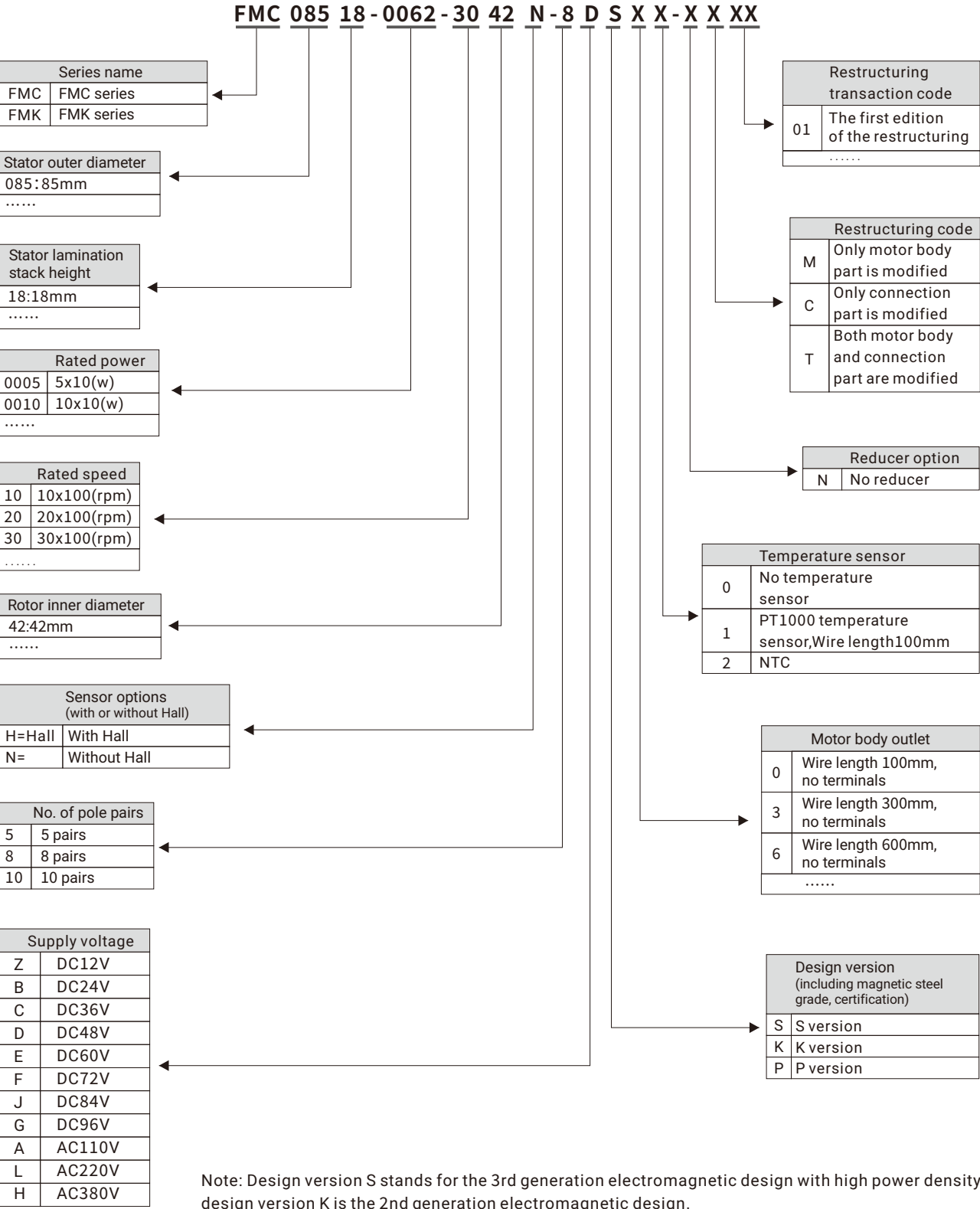
Advantages and features of FMK frameless torque motor

The fourth-generation frameless torque motor

- The size coverage has been upgraded again! The outer diameters of the fourth-generation FMK series products include 25/38/43/50/60/70/85/115/140/160mm;
- The large split ratio and large hollow design, along with the larger inner diameter of the rotor, are more suitable for the wire passing and board layout requirements during the mechanical design of humanoid robots
- The process update reduces the weight of the motor and increases the power density, and contribute to the lightweight development of customer's embodied intelligence product overall weight control.
- The temperature rise performance is excellent. The potting process and electromagnetic optimization bring excellent temperature rise control.
- The noise and vibration performance is excellent, bringing a good experience to the movement coordination of embodied intelligence products.

Model Description

Frameless torque motor naming rules



Model (parameter) list

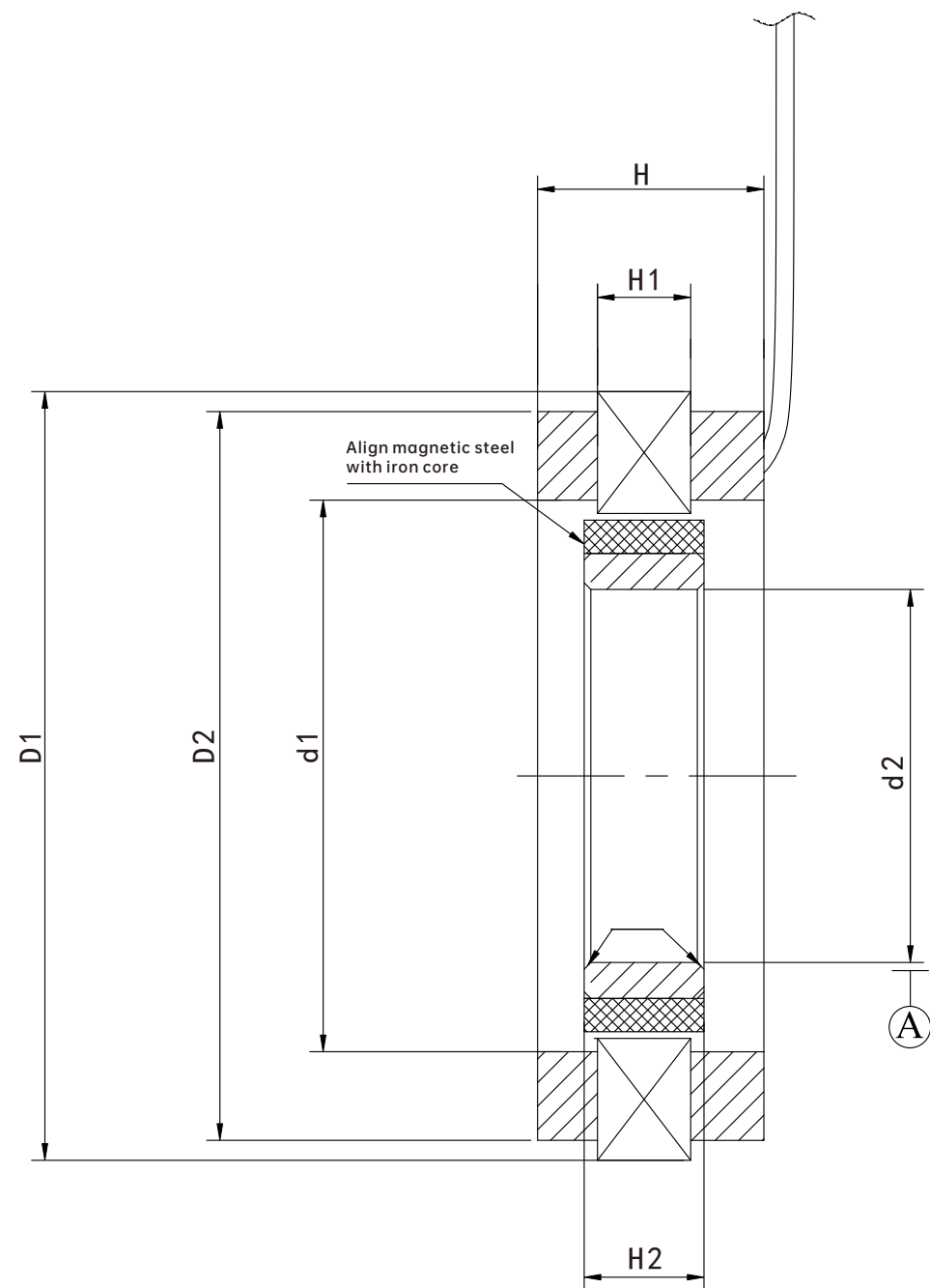
FMC frameless torque motor parameters

Model	Rated power Pn(W)	Rated speed Nn(rpm)	Mechanical time constant τm(ms)	Torque constant Kt(Nm/A)	Rated torque Tn(N.m)
FMC05705-0007-3028N-8DS00	75	3000	2.75	0.12	0.24
FMC05707-0011-3528N-8DS00	117	3500	1.93	0.107	0.32
FMC05714-0020-3027N-8DS00	200	3000	1.47	0.132	0.64
FMC06012-0014-3128N-8DK00	146	3100	1.06	0.124	0.45
FMC06805-0010-3034N-8DS00	101	3000	0.99	0.127	0.32
FMC06808-0015-3034N-8DS00	157	3000	0.77	0.127	0.5
FMC06813-0025-3034N-8DS00	251	3000	0.52	0.129	0.8
FMC07605-0012-3038N-8DS00	126	3000	1.7	0.126	0.4
FMC07712-0031-3033N-8DS00	314	3000	1.45	0.1	1
FMC07730-0075-3035N-8DS00	750	3000	1.21	0.131	2.39
FMC08505-0015-3042N-8DS00	157	3000	1.51	0.126	0.5
FMC08508-0031-3042N-8DS00	314	3000	1.25	0.123	1
FMC08513-0047-3042N-8DS00	471	3000	0.81	0.125	1.5
FMC08518-0062-3042N-8DS00	628	3000	0.76	0.105	2
FMC09114-0063-3046N-8DS01	630	3000	1.39	0.130	2
FMC10414-0072-3055N-8DS01	723	3000	1.01	0.134	2.3
FMC10422-0100-3047N-8DS00	1000	3000	1.44	0.13	3.18
FMC10429-0100-2543N-8DS00	1050	2500	1.09	0.196	4
FMC12330-0100-2060N-5DK00	1000	2000	0.045	0.22	4.78
FMC12718-0090-2465N-8DS00	904	2400	1.46	0.161	3.6
FMC12730-0160-2457N-8DS00	1600	2400	1.14	0.2	6.37
FMC13224-0118-3243N-8DK00	1180	3220	0.801	0.132	3.5

FMK frameless torque motor parameters

Model	Rated power Pn(W)	Rated speed Nn(rpm)	Mechanical time constant τm(ms)	Torque constant Kt(Nm/A)	Rated torque Tn(N.m)
FMK02509-0004-5511-7DP02	36	5500	0.576	0.041	0.063
FMK03807-0005-3518N-7DP02	50	3500	0.95	0.089	0.135
FMK04311-0008-3725N-7DP02	77	3700	0.068	0.099	0.2
FMK05008-0016-5030N-10DP02	157	5000	0.61	0.089	0.3
FMK06018-0020-2028N-10DP02	209	2000	0.51	0.172	1
FMK06018-0026-3628N-10DP02	264	3600	1.91	0.103	0.7
FMK07011-0025-3642N-10DP02	252	3650	0.48	0.116	0.66
FMK08513-0037-2952N-10DP02	370	2950	1.1	0.14	1.2
FMK08523-0073-3542N-10DP02	732	3500	1.02	0.134	2
FMK11525-0117-3260N-10DP02	1173	3200	1.15	0.127	3.5

Drawings (parameters) (unit:mm)



FMC frameless torque motor

Frame (mm)	Stator		Coil		Rotor		Total height H
	Outside diameter D1	Iron core height H1	Outside diameter D2	Inside diameter d1	Inside diameter d2	Iron core height H2	
FMC05705-0007-3028N-8DS00	57.8	5	56	39.4	28	5.55	14.5
FMC05707-0011-3528N-8DS00	57.8	7	56	39.4	28	7.55	16.5
FMC05714-0020-3027N-8DS00	57.8	14	56.5	39.4	27	16	25
FMC06012-0014-3128N-8DK00	60	13.5	58.5	40.5	28.7	13.55	22.7
FMC06805-0010-3034N-8DS00	68	5	64	46	34	6	17
FMC06808-0015-3034N-8DS00	68	8	64	46	34	10	20.5
FMC06813-0025-3034N-8DS00	68	13	64	46	34	14	26
FMC07605-0012-3038N-8DS00	76	5	72.5	52	38	6	15
FMC07712-0031-3033N-8DS00	77	12	75	53	33	14	26
FMC07730-0075-3035N-8DS00	77	30	75	53	35	31	44
FMC08505-0015-3042N-8DS00	85	5	80	57	42.5	6	17.5
FMC08508-0031-3042N-8DS00	85	8	80	57	42.5	9	19
FMC08513-0047-3042N-8DS00	85	13	80	57	42.5	14	27
FMC08518-0062-3042N-8DS00	85	18	80	57	42.5	20	33
FMC09114-0063-3046N-8DS01	91.5	14	89	61.7	46.7	16	28.5
FMC10414-0072-3055N-8DS01	104	14	100.5	72	55	16	28
FMC10422-0100-3047N-8DS00	104	22	100.5	71	47	24	38.8
FMC10429-0100-2543N-8DS00	104	29	100.5	72	43	30	44.1
FMC12330-0100-2060N-5DK00	122.5	30	119	80	60	32	51
FMC12718-0090-2465N-8DS00	127	18	123	87	65	20	36
FMC12730-0160-2457N-8DS00	127	30	123	87	57	32	48
FMC13224-0118-3243N-8DK00	132	24.5	129	82	57	29	41.1

FMK frameless torque motor

Frame (mm)	Stator		Coil		Rotor		Total height H
	Outside diameter D1	Iron core height H1	Outside diameter D2	Inside diameter d1	Inside diameter d2	Iron core height H2	
FMK02509-0004-5511-7DP02	25	9.2	24.5	15.8	11.6	10.3	16.35
FMK03807-0005-3518N-7DP02	38	7	36.6	24	18	8.1	13.8
FMK04311-0008-3725N-7DP02	43	11	42.3	31.3	25.5	12.1	20
FMK05008-0016-5030N-10DP02	50	8.6	49	36.5	30	11.5	16
FMK06018-0020-2028N-10DP02	60	18	58.5	46.2	39.2	22	29.2
FMK06018-0026-3628N-10DP02	60	18	58.5	46.2	39.2	22	29.2
FMK07011-0025-3642N-10DP02	69	11	66	49.6	42	15	19.6
FMK08513-0037-2952N-10DP02	85	13	83	61.6	52	15	23.35
FMK08523-0073-3542N-10DP02	85	23.5	83	61.6	42	25	33.8
FMK11525-0117-3260N-10DP02	115	26	112	87	60	26	45

Mounting and installation guide

Kinco suggests the following options for installation of the frameless motors to realize the high performance, small space consumption, high efficiency and serviceability desired by the user.

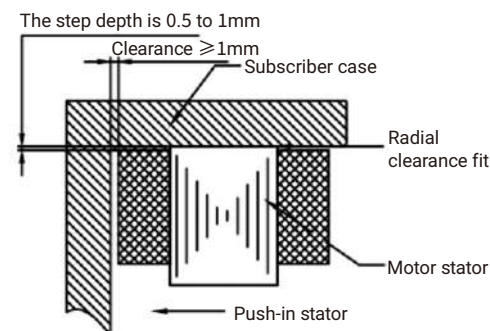
Stator Mounting Practices

Stator bonding

In most cases, motors may have the stator bonded in place using anaerobic, such as Loctite 638/648 or other similar adhesives. Adhesive bonding is a preferred and convenient installation technique for all stators, the user should consult the adhesive manufacturer for proper curing instructions (depends on the adhesive applied).

Following options for stator housing design and installaiton of the motor stator should be repected:

1. The stator enclosure housing should be designed as a cylindrial cup.
2. A small shoulder with radial depth of 0.5mm-1mm for axial positioning at one end of the stator housing should be designed.
3. The shoulder serves as a axial stop point for the stator bo bank against when inserted from the open end of the stator housing and should not use the stator winding lead-out end.
4. The clearance fit is adopted between stator outer diameter and the housing inner diameter. The user should consult the adhesive manufacturer's guidelines for proper housing inner diameter clearance design recommendations.
5. It is recommended to place additional adhesive grroves in the inner diameter of the housing to provide torsional strength for more reliable bonding.
6. Stator and housing surfaces should be cleaned thoroughly prior to bonding to ensure good adhesion.
7. Adhesive cure temperatures should not exceed 155°C to avoid damaging the motor stator.



Stator shink Fit

In case adhesive is not preferred, a thermal shink fit technique for motor stator installation is recommended. Cold pressing should be avoid during installation. Extreme pressures will result in damage to the structure of stator laminations stack.

If desired, following options for stator housing design and installaiton of the motor stator should be repected:

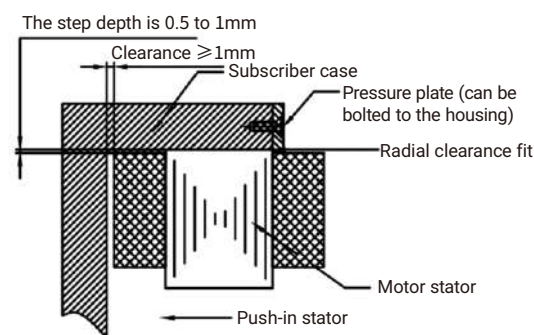
1. The stator enclosure housing should be designed as a cylindrial cup.
2. The clearance fit is adopted between stator outer diameter and the housing inner diameter. The user should consider required pulling-out force with respect to appliations for proper housing inner diameter clearance design. Dissimilar thermal expansion coefficients (e.g. steel laminations vs. aluminum housing) should also be considered to ensure reliable holding strength across a board temperature range.

Stator clamping

For applications where the torque range is small or the stator may need to be repeatedly installed and removed from the system, axial clamping may also be an acceptable option. Kinco does not recommend this technique in mass production where shock or vibration from motor operation is high and the clamping methods may fail.

If desired, following options for stator housing design and installaiton of the motor stator should be repected:

1. The stator enclosure housing should be designed as a cylindrial cup.
2. A small shoulder with radial depth of 0.5mm-1mm for axial positioning at one end of the stator housing should be designed.
3. The shoulder serves as a axial stop point for the stator bo bank against when inserted from the open end of the stator housing and should not use the stator winding lead-out end.
4. A clamping ring is needed is needed at the opposite end of the stator and bolted to the housing. The clamping ring should contact the stator with pressures designed according to the clamping forces needed in the applications.
5. The sliding fit between stator outer diameter and the housing inner diameter.



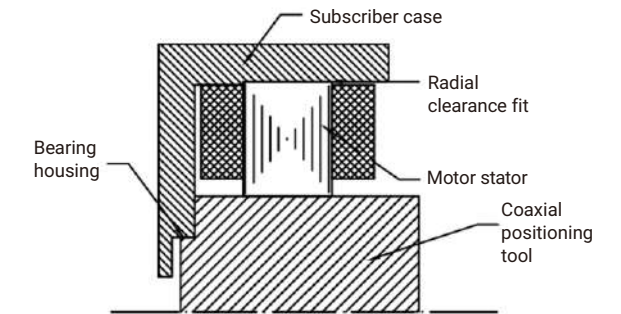
Mounting and installation guide

Important

All these three installation options are clearance fit between stator outer diameter and housing inner diameter during stator insertion and the radial running out tolerance in between will be presented as a result and therefore further create the running out tolerance between motor stator and rotor.

The axial alignment between stator inner diameter and rotor outer diameter must be maintained to ensure proper motor performance. It is recommended to have a common and stable axial basis when mounting the stator and rotor:

1. Set the stator housing case stop point or bearing chamber as the positioning basis.
2. Insert the rotor into the stator by using a custom installation fixture.

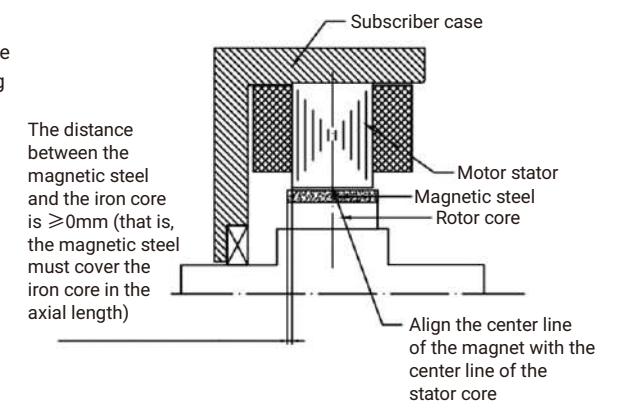


Rotor Mounting Practices

The rotor of a frameless motor generally consists of a ring shaped metal yoke with magnets equally placed around its outer surface with adhesive bonding technique. The user can install the rotor to a shaft by the inner bore of the metal ring for most applications. Generally the rotors can be installed by means of adhesive bonding or cold pressing techniques. Consider proper fit tolerance with repect to different installation option taken or applicaiton requirements.

To ensure proper motor performance, following specified mounting dimension principles must be respected:

1. Axial alignment must be maintained between rotor magnets and stator.
2. Or the dimension tolerance design should at least guarantee that the axial length of the rotor magnets can envelop the axial length of the stator lamination stack.



Important

Kinco FMC freamelessless motors utilize high-performance rare earth magnets, the attractive forces between magnetized rotors and nearby stator steel lamination can be extremely powerful. Improper handling can result in unexpected impacts and can potentially damage the rotor fiber band layer. Following assembly process can be followed:

1. Insert the rotor into the position inside the stator by using a custom installation fixture to avoid rotor from sticking to the inner bore of the stator.
2. In case no custom fixture is available, user can install a thin layer of shim material (such as insulation film) in the inner bore of the stator, prior to inserting the rotor into the stator. Remove the shim material from the airgap between the rotor and stator after the installation.

