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HCFA

Initiative Integrity Innovation

Zhejiang Hechuan Technology Co.,Ltd.

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HCFA ATC

All information in this document is subject to change without notice.
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Due to the delay in updating the paper version, please refer to the official website for the latest product information.

HCFA

Hu-MDB Series

Frameless Torque Motor Product Catalog

High quality

High performance

High efficiency

Be dedicated to creating values in automation industry

Zhejiang Hechuan Technology Co., Ltd., established in 2011, is a company that focuses on the research and development, manufacturing, sales and application integration of industrial automation products, and committed to providing core components and system integration solutions for smart factories.

The main products include controllers, servo systems, vision systems, encoders, VFDs, HMIs, electric rollers, precision transmission components, etc., covering the entire field of industrial automation.

We have newly established a 200-mu high-efficiency precision industrial transmission industrialization base. By introducing industry professionals, it has orderly promoted the industrialization application of precision guide rails, lead screws and other transmission components.

In November 2023, HCFA Technology and Bosch Rexroth signed a strategic cooperation agreement. Bosch Rexroth strategically invested in HCFA Technology and planned to cooperate to establish a subsidiary. Based on common innovation concepts and innovative thinking, the two parties will integrate their respective advantages, form resource complementarity, and carry out in-depth cooperation, striving to become ecological partners in the entire value chain of industrial automation and promote the further development of China's industrial automation industry.

Never stop to build up core competitiveness

R&D Centers
6
Set up nationally

R&D investment
10%+
Proportion of revenue

R&D personnel
300+
Elite gathering

- **Established six R&D centers in Longyou, Hangzhou, Shenzhen, Dalian, Suzhou and Germany**
- **Self-designed ASIC and SOC chips, realize localization replacement**
- **First-class AMR magnetic technology/high-precision encoder in the industry**

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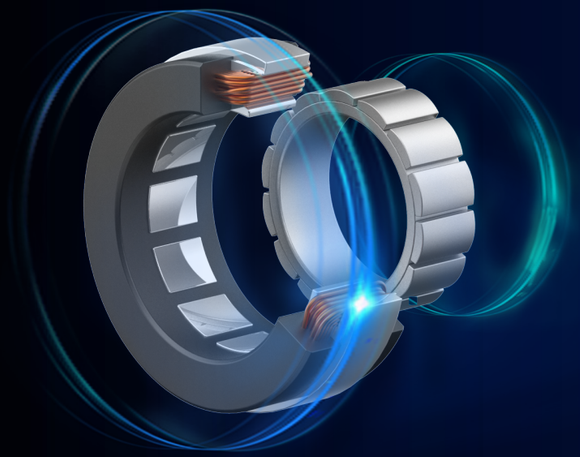
HCFA

Product Features



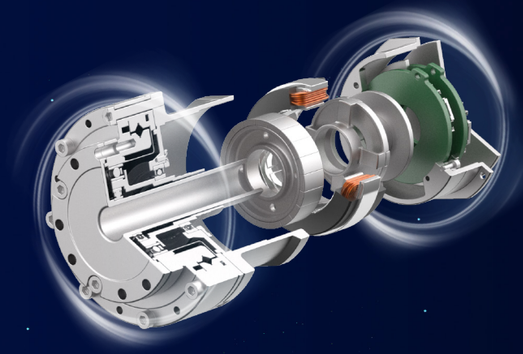
Excellent performance

The Hu-MDB series is designed for applications that require small size, light weight, low inertia, but high power motors. The entire series offers a variety of frame sizes from ϕ14mm to ϕ160mm, and the rated torque values of the entire series cover 0.012Nm to 12N.m.

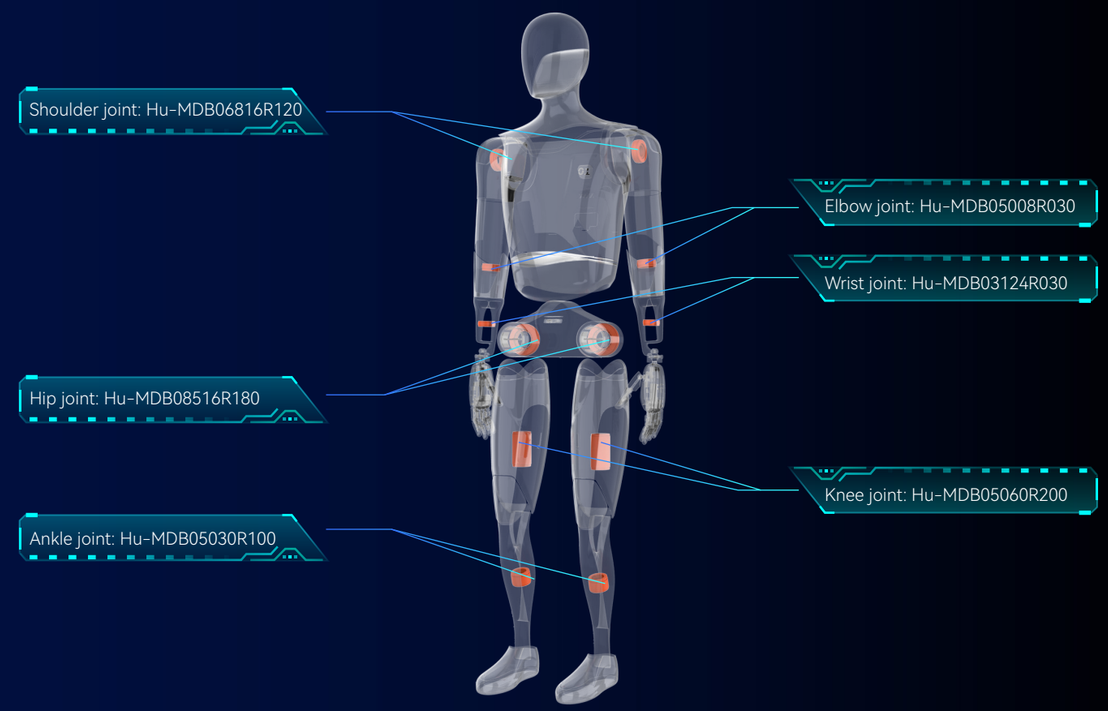
- Covering multiple frame sizes from ϕ 14mm to ϕ160mm
- Motor with high-torque and high acceleration performance
- Meeting wide speed and high overload torque capabilities
- High-efficiency motor output at full performance
- A variety of standard thermal sensors available
- Lightweight and compact motor design
- Perfectly meet the joint space requirements of humanoid robots
- High-precision manufacturing batch production capabilities

Product Applications

Application fields of humanoid robots



- Lightweight
- High precision
- High integration

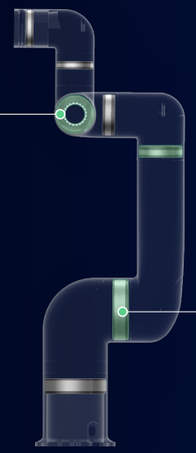


Application fields of human-machine collaborative robots

Match within

20 kg

For collaborative robots



Large motor crack ratio

Supports large hollow design inside the module

The application of frameless motors can provide a highly integrated robot power actuator design solution, which can be matched with power modules for humanoid robot joints, collaborative robot joints, quadruped robots, surgical robots, AGV logistics robots, and mechanical exoskeletons. Compared with traditional motor solutions, frameless motors integrated into power modules are conducive to improving overall machine performance and reducing system costs, and have significant competitive advantages in robot industry applications.

Naming Rule

Hu-MDB 060 08 R 006 - SPN1

Product series	
Hu-MDB	Motor series

Frame size (ϕ)	
014	14.5mm
023	23.5mm
031	31mm
.....	

Stack height	
08	8mm
16	16mm
24	24mm
.....	

Motor Type	
A	Axial Flux Motor
R	Internal flux motor
K	External flux motor

Rated torque	
006	0.06N.m
070	0.7N.m
160	1.6N.m
200	2.0N.m
.....	

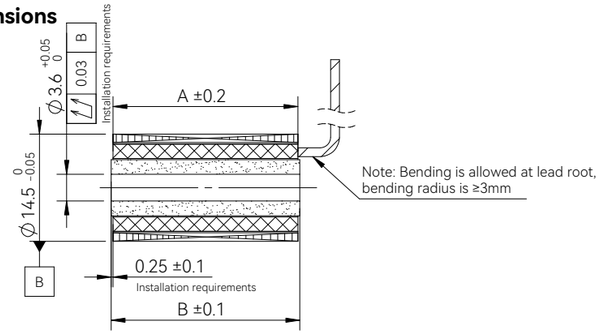
Customized Code	
	Standard models
S/N	Performance customization/ Non-performance customization
P/N	Temperature sensor/ No temperature sensor
H/N	Built-in Hall / No built-in Hall
1	Customized version No.

Motor Parameters

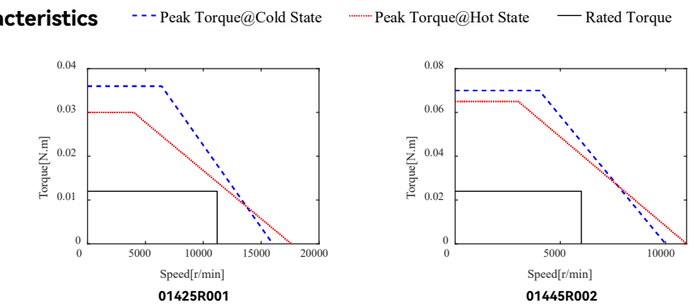
Hu-MDB014

Models			01425R001	01445R002
Size	A (core height)	mm	25	45
	B (rotor height)	mm	25.5	45.5
Motor parameters	Rated voltage	V	24	48
	Rated power	W	14	15
	Rated speed	r/min	11200	6000
	Rated torque	Nm	0.012	0.024
	Rated current	Arms	1	0.5
	Max. speed	r/min	17600	11000
	Peak torque	Nm	0.036	0.07
	Peak current	Arms	3.1	1.55
	Torque constant	N·m/Arms±10%	0.012	0.049
	Line back EMF constant	mV/(r/min)±10%	0.81	3
	Pole pairs	/	2	2
	Line resistance	Ω±10%	3.3	11.2
	Line inductance	mH±30%	0.25	1.3
	Insulation Class	/	F	F
	Weight	kg	0.032	0.055

· **External dimensions**



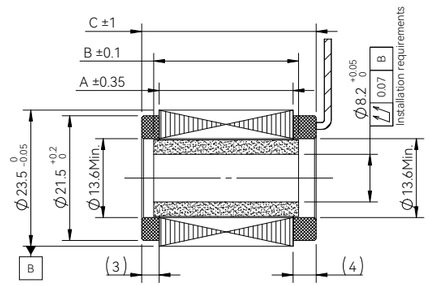
· **Torque characteristics**



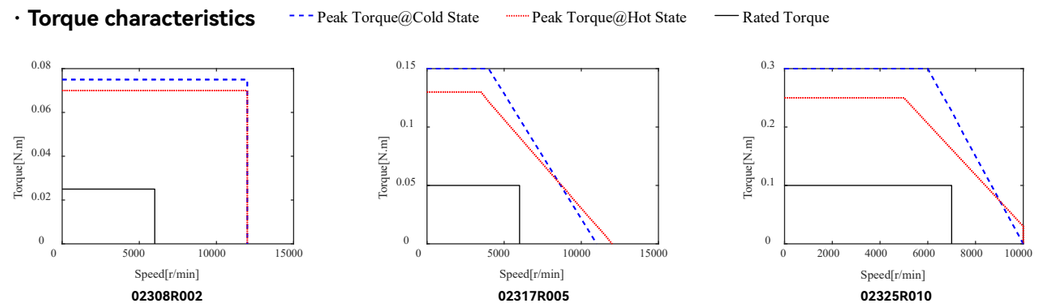
Hu-MDB023

Models			02308R002	02317R005	02323R010
Size	A(core height)	mm	8.5	17	23.1
	B(rotor height)	mm	8.5	17	25
	C(overall height)	mm	15.5	24	30.1
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	15.7	31	73
	Rated speed	r/min	6000	6000	7000
	Rated torque	Nm	0.025	0.05	0.1
	Rated current	Arms	1.6	1.6	2.7
	Max. speed	r/min	12000	12000	10000
	Peak torque	Nm	0.075	0.15	0.3
	Peak current	Arms	4.9	4.9	8.5
	Torque constant	N·m/Arms±10%	0.018	0.041	0.038
	Line back EMF constant	mV/(r/min)±10%	1.1	2.5	2.3
	Pole pairs	/	4		
	Line resistance	Ω±10%	2	3.4	2
	Line inductance	mH±30%	0.74	1.02	0.3
	Insulation Class	/	F		
	Weight	kg	0.025	0.053	0.085

· **External dimensions**



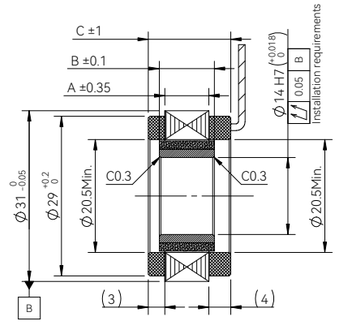
· **Torque characteristics**



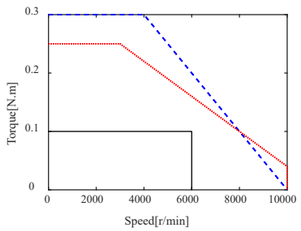
Hu-MDB031

Models			03108R010	03116R020	03124R030
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	63	105	125
	Rated speed	r/min	6000	5000	4000
	Rated torque	Nm	0.1	0.2	0.3
	Rated current	Arms	2	3.5	3.8
	Max. speed	r/min	10000	8000	6000
	Peak torque	Nm	0.3	0.6	0.9
	Peak current	Arms	6.2	12.3	12.2
	Torque constant	N·m/Arms±10%	0.05	0.063	0.083
	Line back EMF constant	mV/(r/min)±10%	3	3.8	5
	Pole pairs	/	5		
	Line resistance	Ω±10%	3	1.8	1
	Line inductance	mH±30%	0.55	0.4	0.28
	Insulation Class	/	F		
	Weight	kg	0.04	0.075	0.1

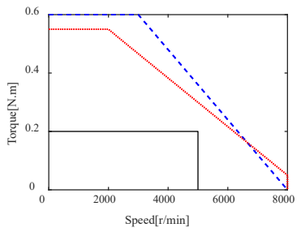
· **External dimensions**



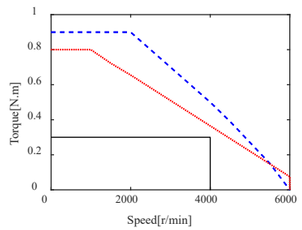
· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



03108R010



03116R020

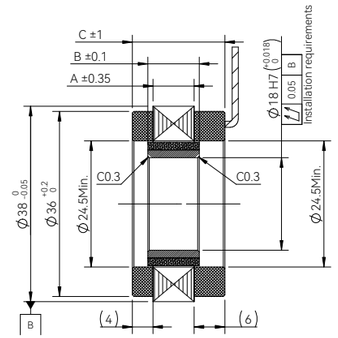


03124R030

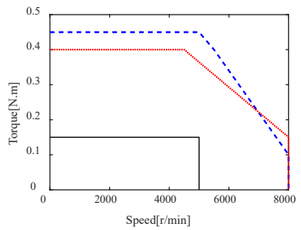
Hu-MDB038

Models			03808R015	03816R030	03824R045
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	78.5	157	188
	Rated speed	r/min	5000	5000	4000
	Rated torque	Nm	0.15	0.3	0.45
	Rated current	Arms	2.8	4.5	6
	Max. speed	r/min	8000	7000	6000
	Peak torque	Nm	0.45	0.9	1.35
	Peak current	Arms	8.9	15	18.5
	Torque constant	N·m/Arms±10%	0.055	0.069	0.081
	Line back EMF constant	mV/(r/min)±10%	3.3	4.2	4.9
	Pole pairs	/	7		
	Line resistance	Ω±10%	1.45	0.82	0.68
	Line inductance	mH±30%	0.59	0.44	0.38
	Insulation Class	/	F		
	Weight	kg	0.065	0.135	0.135

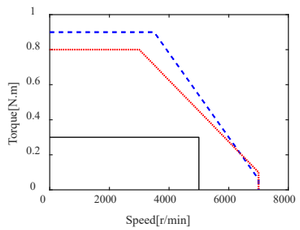
· **External dimensions**



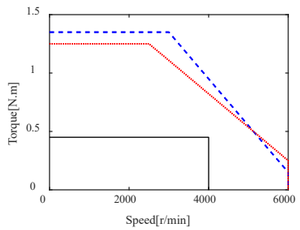
· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



03808R015



03816R030

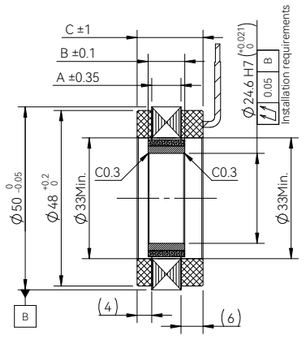


03824R045

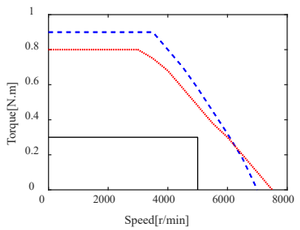
Hu-MDB050

Models			05008R030	05016R060	05024R090
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	157	157	235
	Rated speed	r/min	5000	2500	2500
	Rated torque	Nm	0.3	0.6	0.9
	Rated current	Arms	4.5	5.2	7
	Max. speed	r/min	7500	4250	4000
	Peak torque	Nm	0.9	1.8	2.7
	Peak current	Arms	14.3	16.5	22
	Torque constant	N·m/Arms±10%	0.069	0.124	0.137
	Line back EMF constant	mV/(r/min)±10%	4.2	7.5	8.3
	Pole pairs	/	7		
	Line resistance	Ω±10%	0.78	0.84	0.6
	Line inductance	mH±30%	0.52	0.78	0.62
	Insulation Class	/	F		
	Weight	kg	0.113	0.175	0.255

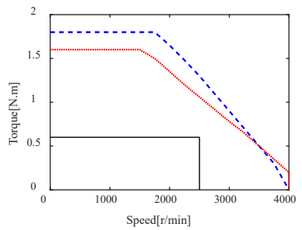
· **External dimensions**



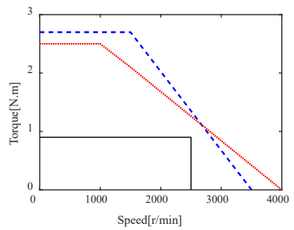
· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



05008R030



05016R060

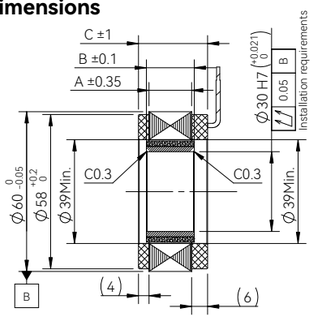


05024R090

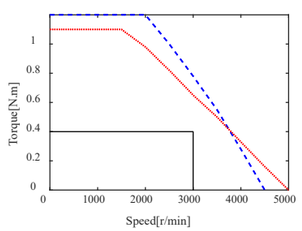
Hu-MDB060

Models			06008R040	06016R080	06024R120
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	125	167	226
	Rated speed	r/min	3000	2000	1800
	Rated torque	Nm	0.4	0.8	1.2
	Rated current	Arms	4	5	6.5
	Max. speed	r/min	4500	3000	2500
	Peak torque	Nm	1.2	2.4	3.6
	Peak current	Arms	12	15	21
	Torque constant	N·m/Arms±10%	0.109	0.173	0.198
	Line back EMF constant	mV/(r/min)±10%	6.6	10.5	12
	Pole pairs	/	10		
	Line resistance	Ω±10%	1	1	0.65
	Line inductance	mH±30%	0.65	0.82	0.72
	Insulation Class	/	F		
	Weight	kg	0.162	0.254	0.355

· **External dimensions**



· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



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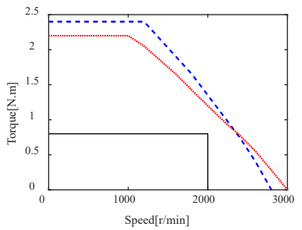

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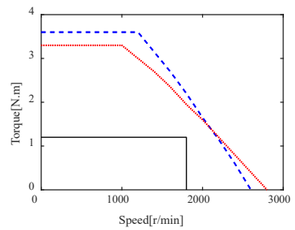
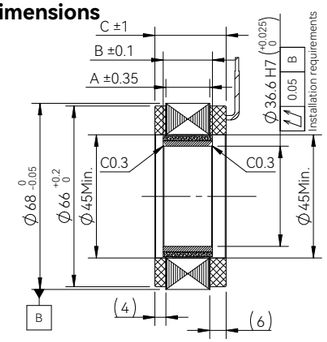


06024R120

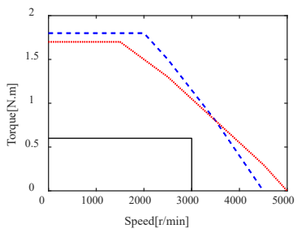
Hu-MDB068

Models			06808R060	06816R120	06824R180
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	188	226	339
	Rated speed	r/min	3000	1800	1800
	Rated torque	Nm	0.6	1.2	1.8
	Rated current	Arms	6	6.5	10
	Max. speed	r/min	5000	2800	2800
	Peak torque	Nm	1.8	3.6	5.4
	Peak current	Arms	19.5	20.5	31
	Torque constant	N·m/Arms±10%	0.109	0.188	0.19
	Line back EMF constant	mV/(r/min)±10%	6.6	11.4	11.5
	Pole pairs	/	10		
	Line resistance	Ω±10%	0.56	0.65	0.37
	Line inductance	mH±30%	0.6	0.95	0.6
	Insulation Class	/	F		
	Weight	kg	0.235	0.35	0.483

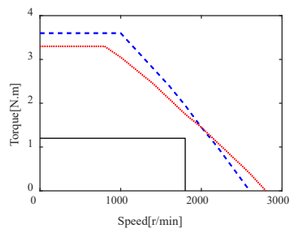
· **External dimensions**



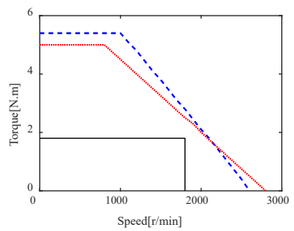
· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



06808R060



06816R120

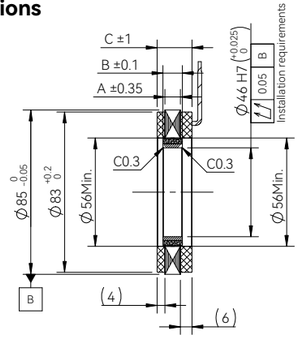


06824R180

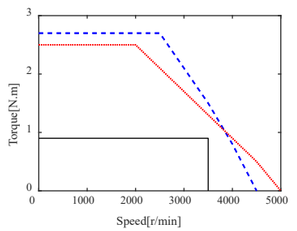
Hu-MDB085

Models			08508R090	08516R180	08524R270
Size	A(core height)	mm	8	16	24
	B(rotor height)	mm	10	18	26
	C(overall height)	mm	18	26	34
Motor parameters	Rated voltage	V	48	48	48
	Rated power	W	250	377	452
	Rated speed	r/min	3500	2000	1600
	Rated torque	Nm	0.9	1.8	2.7
	Rated current	Arms	8.5	9.5	11.5
	Max. speed	r/min	5000	2700	2200
	Peak torque	Nm	2.85	5.4	8.1
	Peak current	Arms	27	30.5	37.9
	Torque constant	N·m/Arms±10%	0.108	0.196	0.246
	Line back EMF constant	mV/(r/min)±10%	6.5	11.9	14.9
	Pole pairs	/	10		
	Line resistance	Ω±10%	0.24	0.24	0.23
	Line inductance	mH±30%	0.33	0.5	0.5
	Insulation Class	/	F		
	Weight	kg	0.295	0.485	0.655

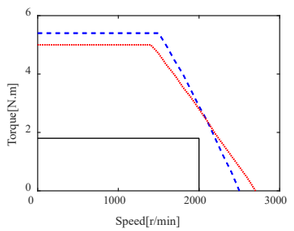
· **External dimensions**



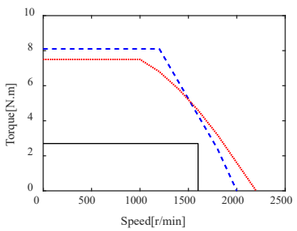
· **Torque characteristics** Peak Torque@Cold State Peak Torque@Hot State Rated Torque



08508R090



08516R180

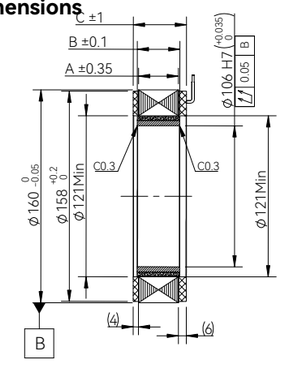


08524R270

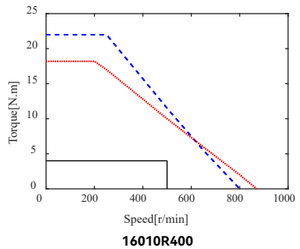
Hu-MDB160

Models			16010R400	16030R1200
Size	A(core height)	mm	10	30
	B(rotor height)	mm	12	32
	C(overall height)	mm	20	40
Motor parameters	Rated voltage	V	48	48
	Rated power	W	210	628
	Rated speed	r/min	500	500
	Rated torque	Nm	4	12
	Rated current	Arms	6.5	19.5
	Max. speed	r/min	700	700
	Peak torque	Nm	22	69
	Peak current	Arms	38	117
	Torque constant	N·m/Arms±10%	0.615	0.615
	Line back EMF constant	mV/(r/min)±10%	37.7	37.7
	Pole pairs	/	15	
	Line resistance	Ω±10%	0.55	0.1
	Line inductance	mH±30%	0.96	0.3
	Insulation Class	/	F	
	Weight	kg	0.9	2.3

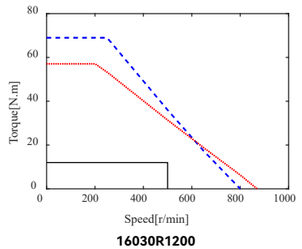
· External dimensions



· Torque characteristics Peak Torque@Cold State Peak Torque@Hot State Rated Torque



16010R400



16030R1200

Precautions

Selection of installation materials

For stator installation, it is not recommended to use plastic or other materials with poor thermal conductivity, nor is it recommended to use carbon steel, 400 series stainless steel alloys, and other magnetic ferrous metal materials. Considering the rigid installation of the stator, the thermal conductivity requirements of the motor, the lightweight design equirements, and the material cost, it is recommended to use aluminum alloy as the stator shell material. The rotor consists of a magnetized rotor steel sleeve and a rotor shaft. The rotor steel sleeve can be assembled on a metal shaft made of carbon steel or stainless steel. The rotor shaft does not carry magnetic flux, and the magnetic conductivity of the material is not considered in the material selection. The material selection and matching tolerance of the rotor shaft are mainly based on the motor torque range and the internal temperature rise of the motor. For specific material selection, please consult HCFA engineers for help.

Grounding protection

During stator installation applications, the stator core and the cabinet where the servo drive is located need to be grounded at the same potential, otherwise electromagnetic noise or electric shock may be generated during motor operation.

Pay attention to strong magnetism

The magnetized rotor steel sleeve uses high-performance rare earth permanent magnet materials. During transportation and assembly, it is necessary to avoid strong magnetic forces that may cause personal injury and product damage. At the same time, strong magnetic fields can damage electronic products and equipment, so special attention needs to be paid during transportation and assembly.

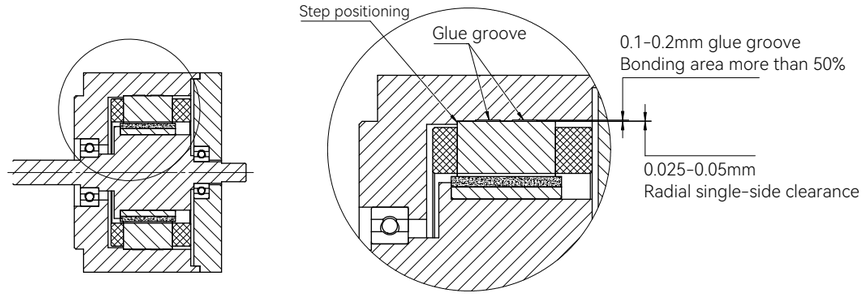
Installation Instructions

Stator assembly

It is recommended to consider the motor torque, vibration and thermal characteristics, as well as the cost, assembly ease and applicability required by the user, and choose bonding or axial fastening to install the motor stator.

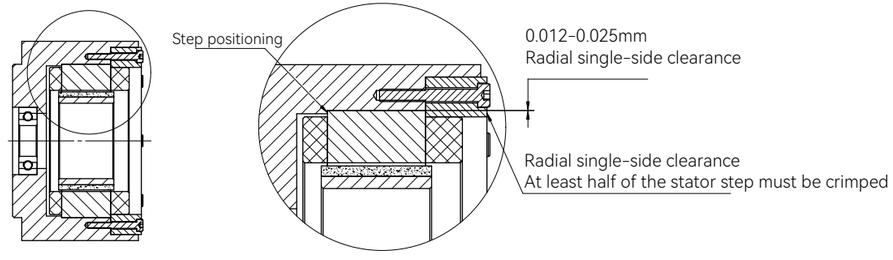
· Stator bonding

Bonding is the preferred stator installation solution. It is usually recommended to use structural epoxy resin adhesives, such as Loctite 326, 648, etc. To ensure the reliability of bonding, be sure to clean the oil and impurities on the bonding surface before bonding. As shown in the figure below, the housing is designed with a cylindrical cavity. The stator axial positioning step is designed deep in the cavity. The recommended radial depth of the step is 0.5~0.8mm. The positioning surface is usually selected from the non-outlet end of the stator. The matching method between the cavity and the stator core is clearance matching. The design of the tolerance zone needs to consider the characteristics of the selected glue. In addition, if a thermosetting glue is selected, the curing temperature threshold shall not exceed 155℃. For motors with higher output torque, a glue storage groove can be designed on the mating surface of the casing to increase bonding reliability. The recommended depth of the glue storage groove is 0.1~0.2mm, and the area of the glue storage groove should not be less than 50% of the mating surface area.



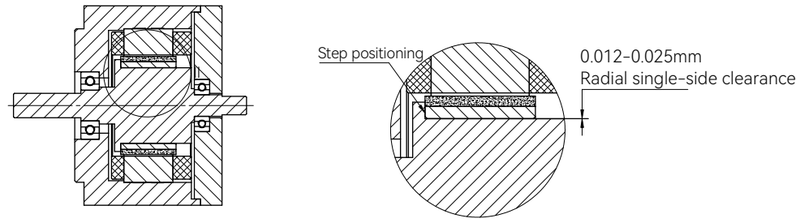
· Axial compression

For applications with low motor torque and the need to repeatedly disassemble and assemble the stator, it is recommended to install the stator by axial compression, but this solution is not recommended under high impact and vibration loads or extreme application environment conditions . The specific installation diagram is shown in the figure below. The non-outlet end is positioned and installed through the positioning step deep in the casing. The pressure plate is used to press one side of the stator outlet end. The mating surface of the casing and the stator is a clearance fit, and the recommended fit tolerance range is between 0.025mm and 0.050mm.



Rotor assembly

The recommended installation method between the magnetic steel sleeve and the rotor is to use glue bonding. The bonding surface must be cleaned before bonding. The recommended glue is anaerobic glue such as Loctite 640 or 648. The bonding surface between the rotor steel sleeve and the rotor shaft needs to be designed as a clearance fit. The recommended fit tolerance range is between 0.025mm and 0.050mm. When using thermosetting glue, the heating temperature should not exceed 120℃ to avoid permanent demagnetization of the magnet. In addition, to increase the reliability of bonding, it is possible to consider designing a glue storage tank on the rotor shaft bonding surface.



Stator and rotor assembly

Considering the strong magnetism of the rotor magnet, in order to avoid personal injury or damage to the magnet caused by the strong magnetic force on the rotor surface during installation, it is recommended to use guide tooling during assembly to avoid direct contact between the stator and rotor.

To ensure the stability of the system, the coaxiality of the stator and rotor must be ensured during installation, and the axial length of the magnetic steel part must completely cover the axial length of the stator core.

Stator lead space

To ensure the stability and reliable conductivity of the motor phase line, it is necessary to ensure that the lead wires are not squeezed or bent beyond the minimum lead bending radius during installation, which may cause lead damage, copper leakage and other conductivity and safety problems . The axial distance installation space on the motor output side is required to be ≥5mm.