




























BRUSHLESS MOTOR CATALOG



Brushless motor lineup

Brushless DC Motors / Controllers

Flange Size	Motor	Geared Motors				Controllers		
		Reduction Ratio 10:1		Reduction Ratio 20:1				
60 mm <small>(with Hall sensors)</small>	 IS-74BZA	 MS-74BZA <small>Coming Soon</small>	 MS-74BZB <small>Coming Soon</small>	 MS-74BZD <small>Coming Soon</small>	 TBD*	 DS-34EC1-IS311		
85 mm <small>(with Hall sensors)</small>	 IS-94BZC	 MS-94BZA	 MS-94BZB	 MS-94BZC	 MS-94BZD	 MS-94BZE	 MS-94BZF	 DS-34EC1-IS221
100 mm <small>(with Hall sensors)</small>	 IS-B5BZA	 TBD*	 TBD*	 MS-B5BZD <small>Coming Soon</small>	 TBD*	 TBD*		
60 mm <small>(with Resolver sensors)</small>	 IR-74BZA <small>Coming Soon</small>	 TBD*	 TBD*	 TBD*	 TBD*	 DR-40FC1 <small>Coming Soon</small>		
85 mm <small>(with Resolver sensors)</small>	 IR-94BZA	 MR-94BZA	 MR-94BZB	 MR-94BZD <small>Coming Soon</small>	 MR-94BZE <small>Coming Soon</small>	 DR-40FC1-R111A DR-40FC3-R111A		

TBD*: Currently under development

Frameless Brushless DC Motors

Stator Diameter	Stator / Rotor
60 mm	IA-A3BZA IB-A3BZA 
75 mm	IA-B4BZA IB-B4BZA 
90 mm	IA-C5BZA IB-C5BZA 
120 mm	IA-D5BZA IB-D5BZA 

Compact design enabling Product miniaturization

IS MS IR
MR DS DR

Mabuchi brushless motors generate high output for their size. Engineered to be slim, their structure provides flexible product design. Combined with our compact motor controllers, Mabuchi motors contribute to space-saving design with more room for the battery and other components.

IPX4-rated protection

IS MS IR
MR DS DR

Mabuchi motors and controllers have an IPX4 rating. The water-resistant design is ideal for products operated in demanding conditions and outdoors (e.g. delivery robots, agricultural robots).



Motor efficiency up to 90%

IS IR

Mabuchi motors offer high efficiency (ratio of electrical energy input to mechanical energy output) due to their unique magnetic circuit design, thus improving power consumption and contributing to carbon neutrality and Sustainable Development Goal metrics.



Low-EMI design

DS DR

Mabuchi motor controllers have an EMI-suppressing design, compliant with CISPR32 Class B. This design ensures reduced risk of product malfunction caused by communication failures. As such, no external noise-suppressing is needed.

IS Series

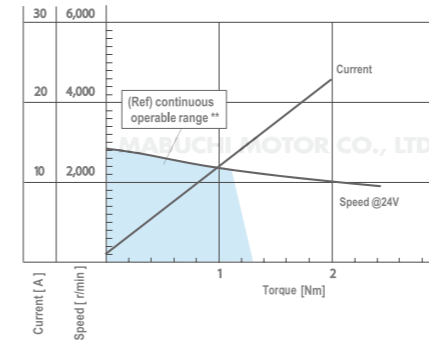
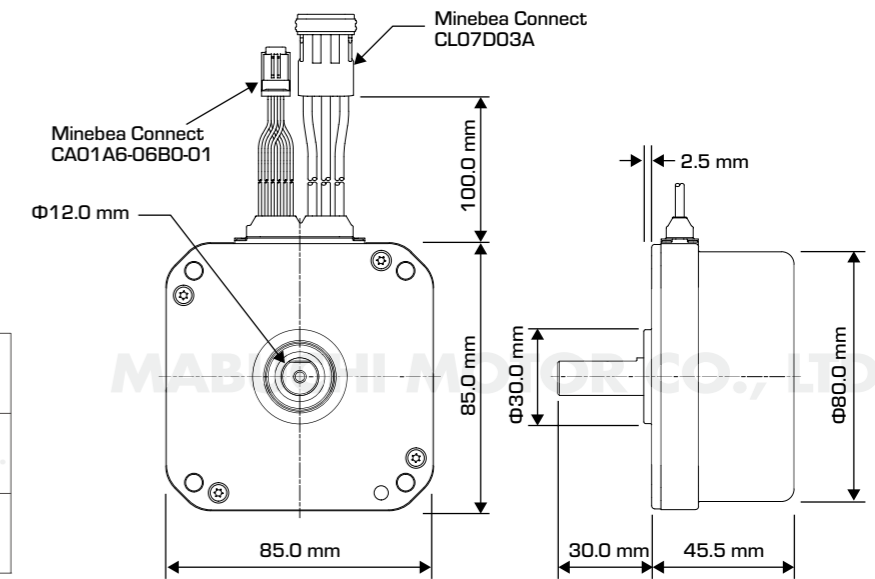
The IS Series brushless DC motors equipped with an uniquely-designed magnetic circuit are optimized for battery-powered commercial robots and various types of industrial equipment. Three different rated outputs and three different flange side dimensions are available.

Model	IS-74BZA	IS-94BZC	IS-B5BZA
Instant Maximum Output	280 W (10 sec max)	410 W (10 sec max)	1,000 W (10 sec max)
Instant Maximum Torque	0.9 Nm (10 sec max)	2.0 Nm (10 sec max)	4.0 Nm (10 sec max)
Rated Voltage	24V		48 V
Rated Output	200 W	250 W	640 W
Rated Torque	0.6 Nm	1.0 Nm	2.3 Nm
Rated Speed	3,200 r/min	2,400 r/min	2,660 r/min
Operating Voltage	15-55 V		
Size	60.0 mm x 60.0 mm x length: 44.5 mm	85.0 mm x 85.0 mm x length: 45.5 mm	100.0 mm x 100.0 mm x length: 54.0 mm
Weight	0.52 kg	0.83 kg	1.76 kg
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 MΩ (min.) (500 V DC)		
Degree of protection	IPX4 (Waterproof except at base of motor shaft. Must use dedicated waterproof mating connector.)		

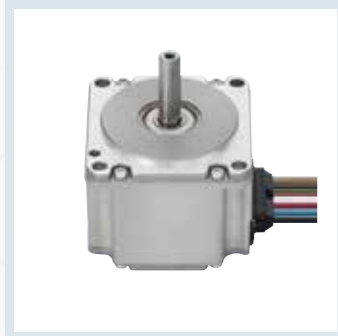
IS-94BZC



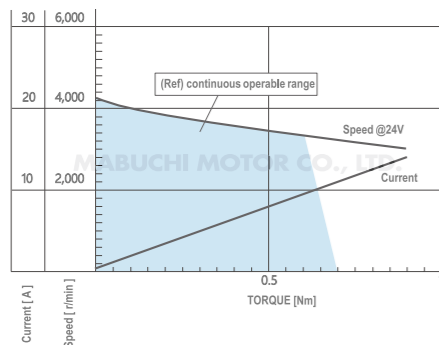
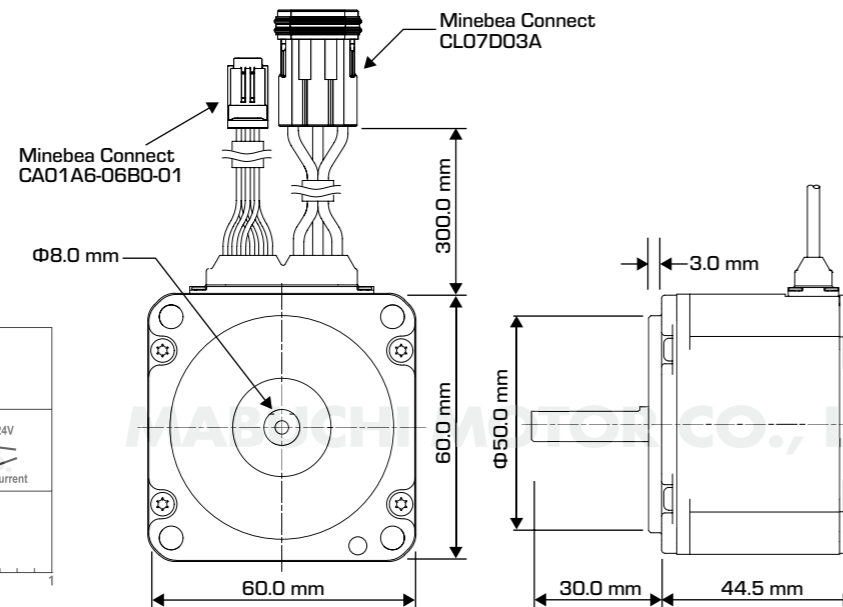
HALL SENSOR THERMISTOR DEGREE OF PROTECTION IPX4



IS-74BZA



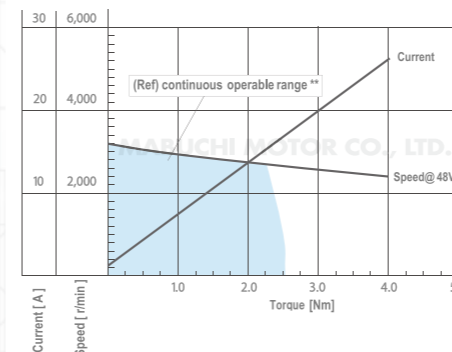
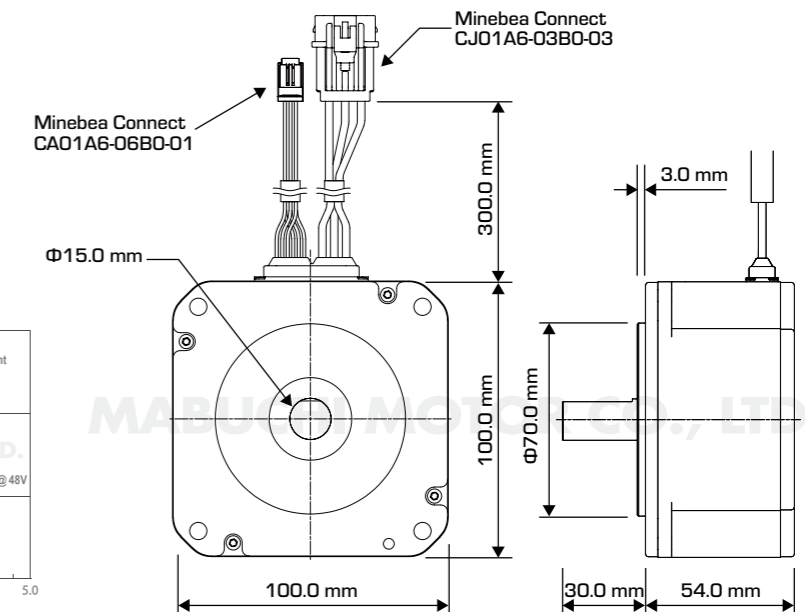
HALL SENSOR THERMISTOR DEGREE OF PROTECTION IPX4



IS-B5BZA



HALL SENSOR THERMISTOR DEGREE OF PROTECTION IPX4



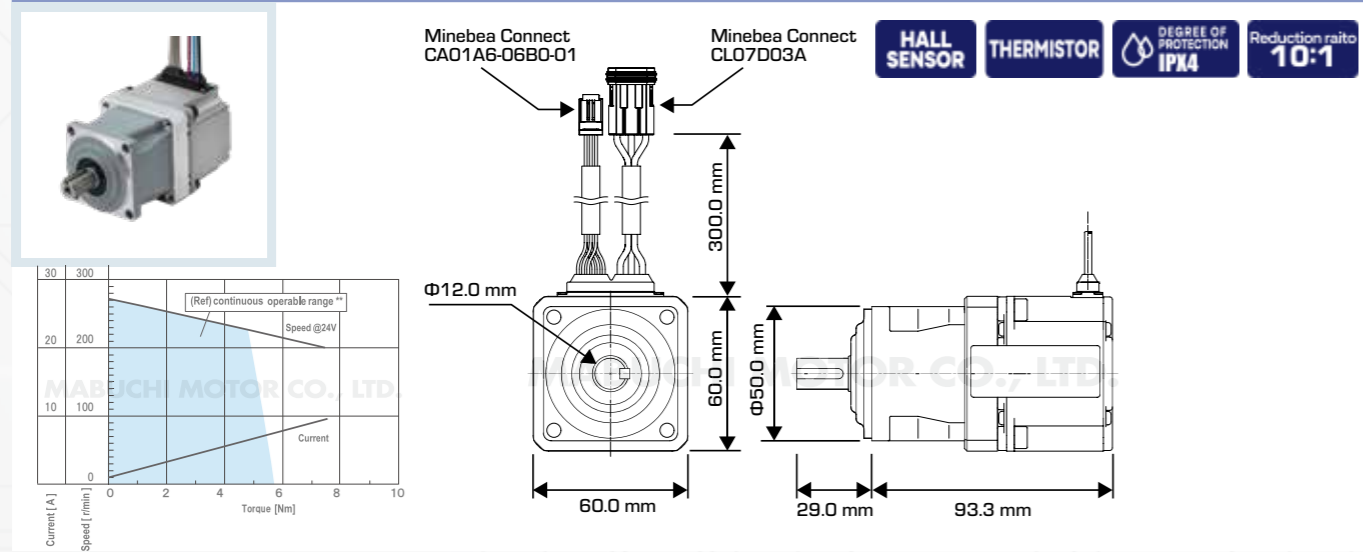
MS Series

The MS series brushless DC motor combines the IS series with additional accessories (gear reducer, static brake, foot-mount, wheel). The planetary gears offer reduction ratios of 10:1 and 20:1.

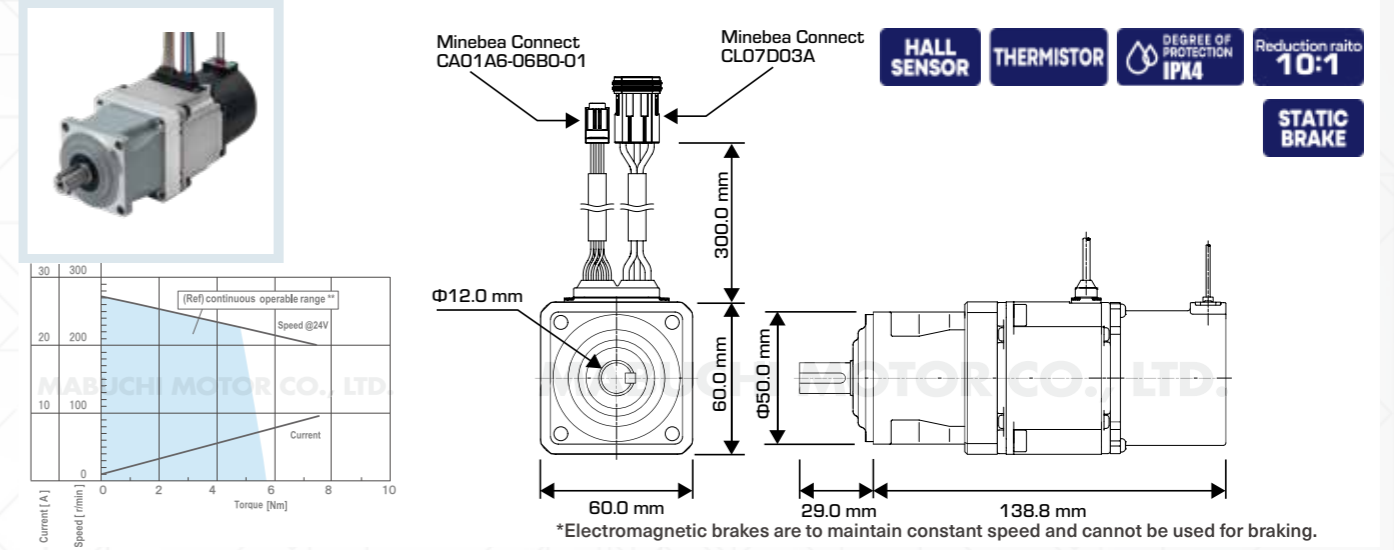
Model	MS-74BZA	MS-74BZB	MS-74BZD	MS-B5BZD
Instant Maximum Output	140 W (10 sec max)		115 W (10sec max)	760 W (10 sec max)
Instant Maximum Torque	7.5Nm (10 sec max)		13.8 Nm (10 sec max)	64 Nm (10 sec max)
Rated Voltage	24 V		24 V	48 V
Rated Output	100 W		90 W	495 W
Rated Torque	4.8 Nm		8.7 Nm	36.4 Nm
Rated Speed	200 r/min		100 r/min	130 r/min
Operating Voltage	15 - 55 V			
Size	60.0 mm x 60.0 mm x length : 93.3 mm	60.0mm x 60.0mm x length : 138.8 mm	60.0 mm x 60.0 mm x length : 110.7 mm	100.0 mm x 100.0 mm x length : 132.0 mm
Weight	1.06 kg	1.4 kg	1.4 kg	5.7 kg
Reduction Ratio	10 : 1		20 : 1	
Allowable Radial Load Bearing	650 N			2000 N
Allowable Load Inertia	0.26 kg/m2 max (Applicable Acceleration Rate: 200 r/min/s)			TBD*
Withstand Voltage	500 V AC 1 minute (between terminal and case)			
Insulation Resistance	10 MΩ (min.) (500 V DC)			
Static Brake Operation Voltage at 20°C (ambient)	—	Power off type (for holding & emergency stops), Release voltage 24V, Holding voltage 12V	—	—
Material	—	—	—	—
Degree of protection	IPX4 (Must use dedicated waterproof mating connector.)			

TBD*: Currently under development

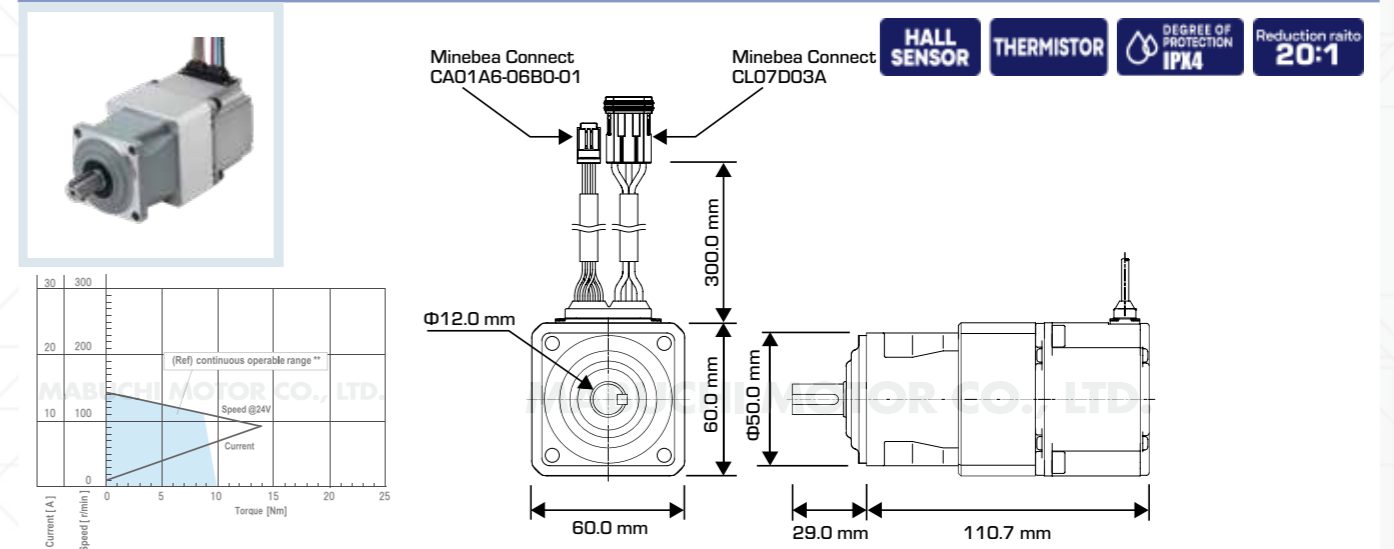
MS-74BZA (Coming soon)



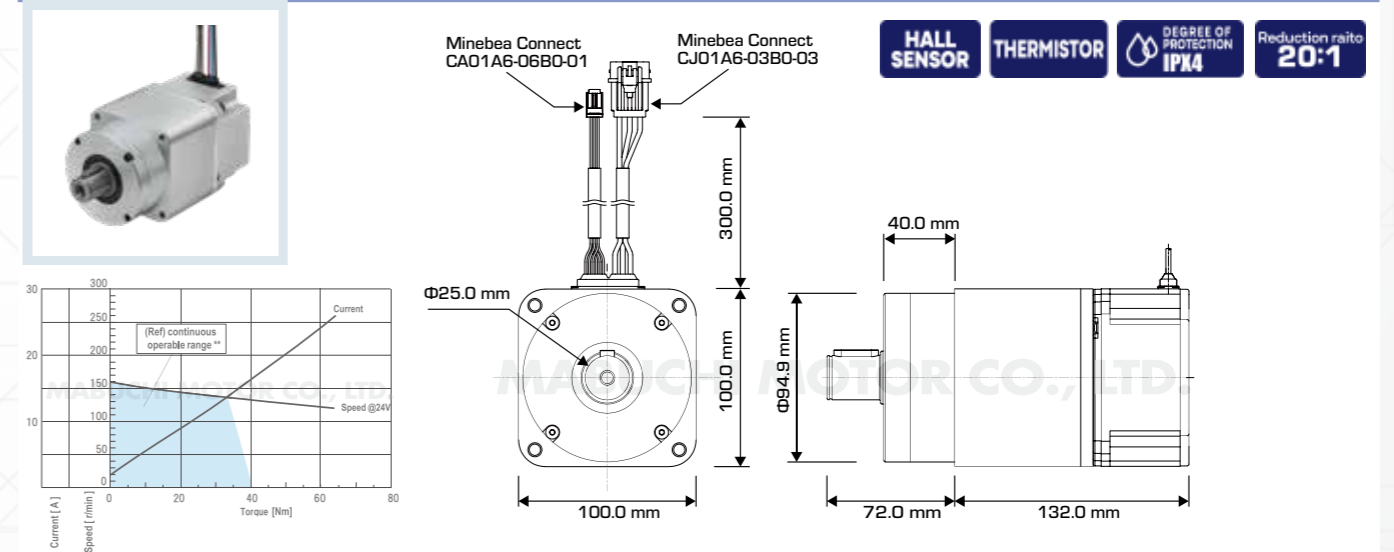
MS-74BZB (Coming soon)



MS-74BZD (Coming soon)



MS-B5BZD (Coming soon)



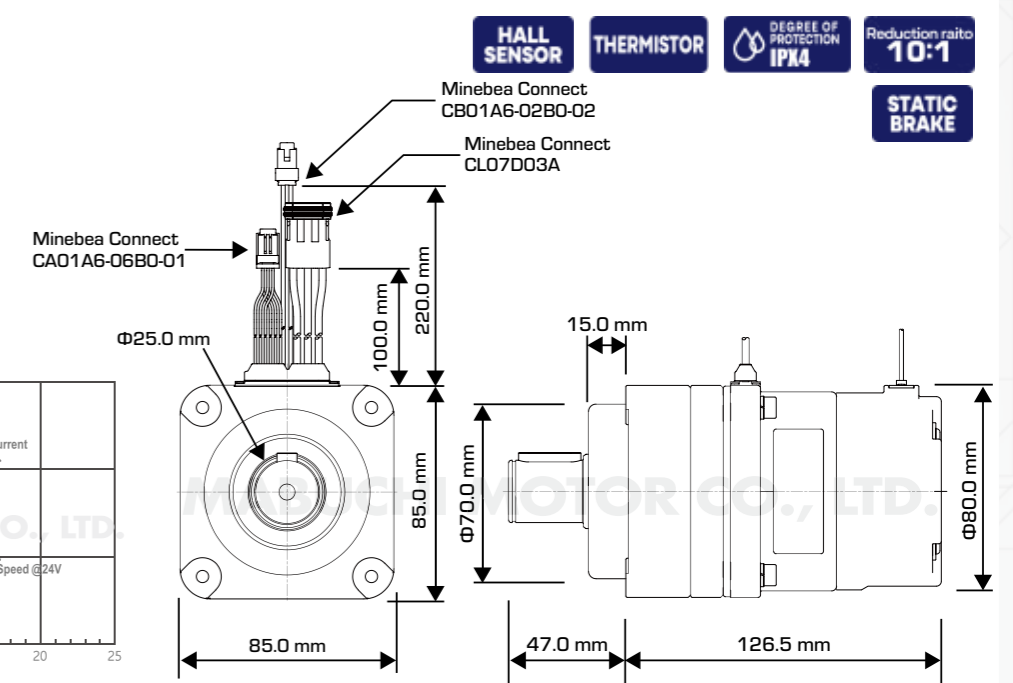
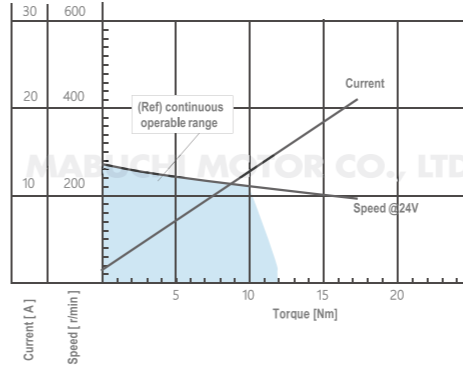
MS Series

The MS series brushless DC motor combines the IS series with additional accessories (gear reducer, static brake, foot-mount, wheel). The planetary gears offer reduction ratios of 10:1 and 20:1.

Model	MS-94BZA	MS-94BZB	MS-94BZC
Instant Maximum Output	342 W (10 sec max)		
Instant Maximum Torque	17.2 Nm (10 sec max)		
Rated Voltage	24 V		
Rated Output	202 W		
Rated Torque	8.6 Nm		
Rated Speed	225 r/min		
Operating Voltage	15 - 55 V		
Size	85.0 mm x 85.0 mm x length: 84.5 mm	85.0 mm x 85.0 mm x length: 126.5 mm	W:150.0 mm x D:187.5 mm x H:200.0 mm (Wheel Diameter: Φ 150.0 mm)
Weight	2.2 kg	2.8 kg	4.5 kg
Reduction Ratio	10.33 : 1		
Allowable Radial Load Bearing	700 N		
Allowable Load Inertia	0.6 kg/m ² max (Applicable Acceleration Rate: 200 r/min/s)		
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 M Ω (min.) (500 V DC)		
Static Brake Operation Voltage at 20°C (ambient)	—	Power off type (for holding & emergency stops), Release voltage 24V, Holding voltage 12V	
Material	—	—	Wheels, Brackets: ADC12 Wheels: Natural rubber
Degree of protection	IPX4 (Must use dedicated waterproof mating connector.)		

MS-94BZB

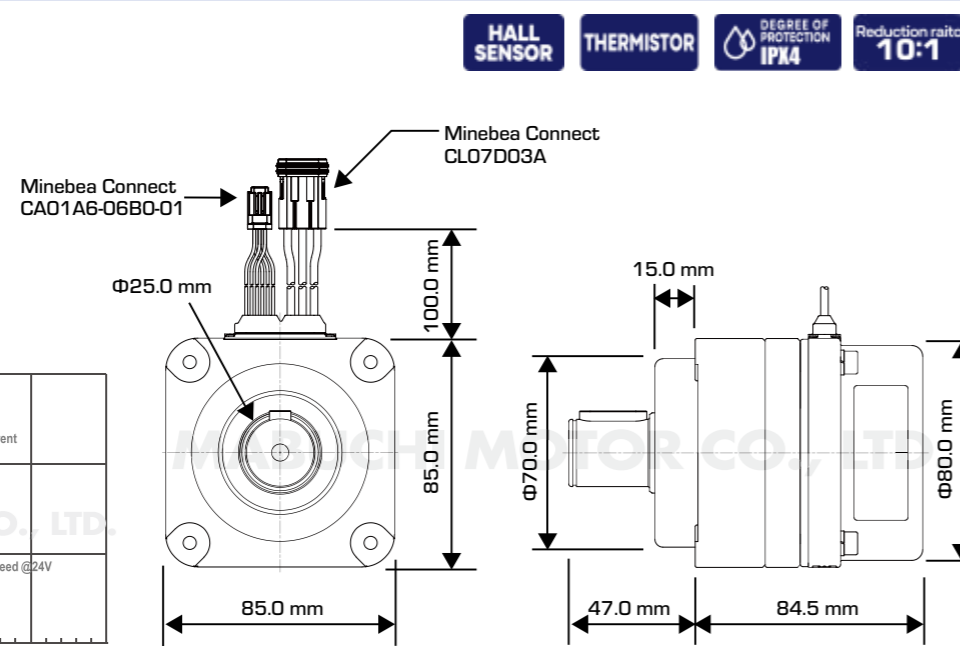
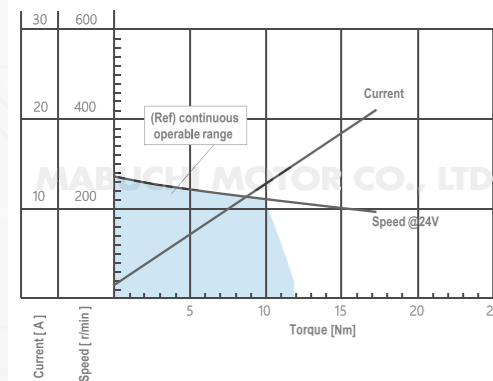
● High durability against radial load



*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

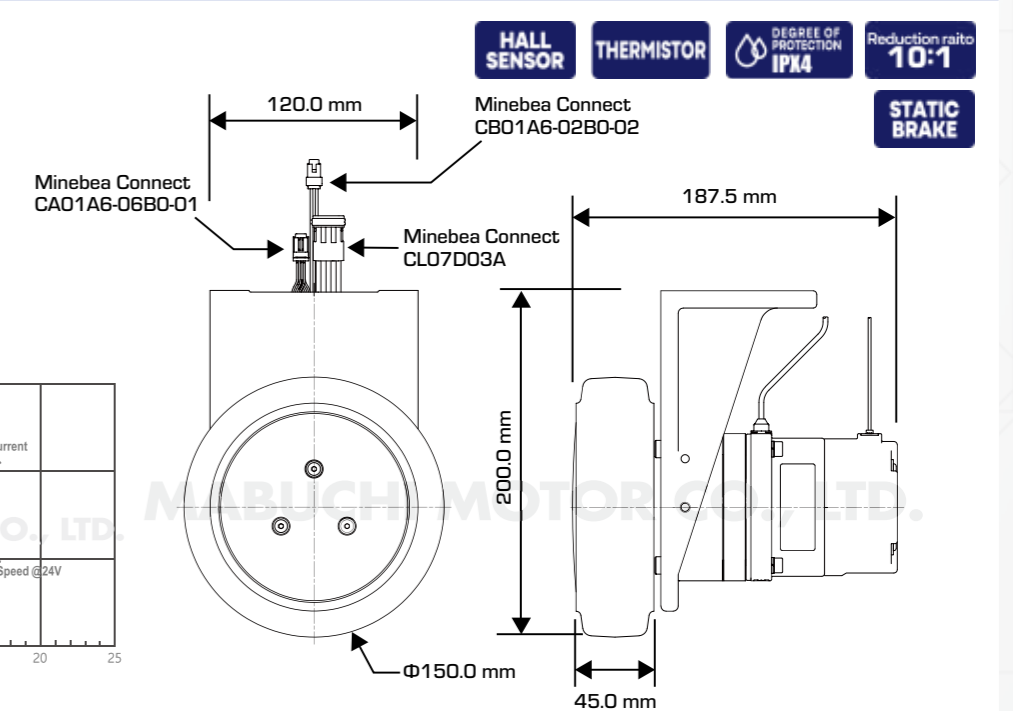
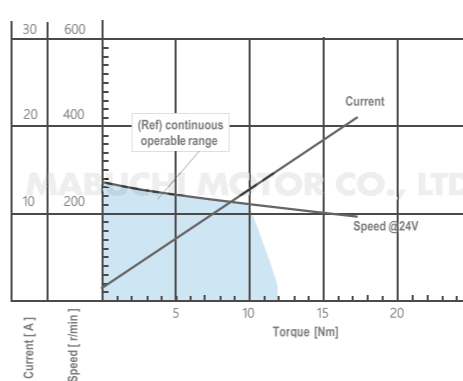
MS-94BZA

● High durability against radial load



MS-94BZC

● High durability against radial load



*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

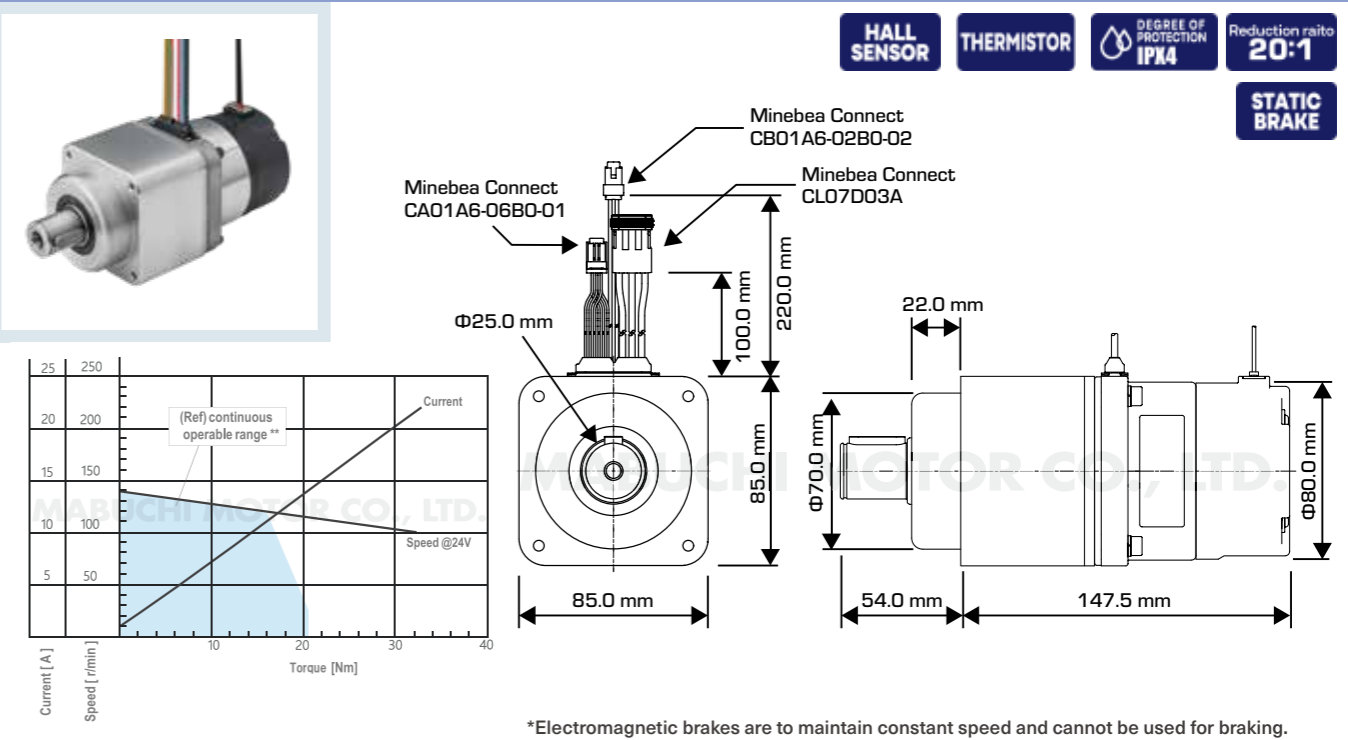
MS Series

The MS series brushless DC motor combines the IS series with additional accessories (gear reducer, static brake, foot-mount, wheel). The planetary gears offer reduction ratios of 10:1 and 20:1.

Model	MS-94BZD	MS-94BZE	MS-94BZF
Instant Maximum Output	327 W (10 sec max)		
Instant Maximum Torque	30.0 Nm (10 sec max)		
Rated Voltage	24 V		
Rated Output	203 W		
Rated Torque	16.0 Nm		
Rated Speed	121 r/min		
Operating Voltage	15-55 V		
Size	85.0 mm x 85.0 mm x length: 105.5 mm	85.0 mm x 85.0 mm x length: 147.5 mm	W:150.0 mm x D:215.5 mm x H:200.0 mm (Wheel Diameter: Φ 150.0 mm)
Weight	2.8 kg	3.4 kg	5.1 kg
Reduction Ratio	20 : 1		
Allowable Radial Load Bearing	700 N		
Allowable Load Inertia	0.6 kg/m ² max (Applicable Acceleration Rate: 200 r/min/s)		
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 M Ω (min.) (500 V DC)		
Static Brake Operation Voltage at 20°C (ambient)	—	Power off type (for holding & emergency stops), Release voltage 24V, Holding voltage 12V	
Material	—	—	Wheels, Brackets: ADC12
	—	—	Wheels: Natural rubber
Degree of protection	IPX4 (Must use dedicated waterproof mating connector.)		

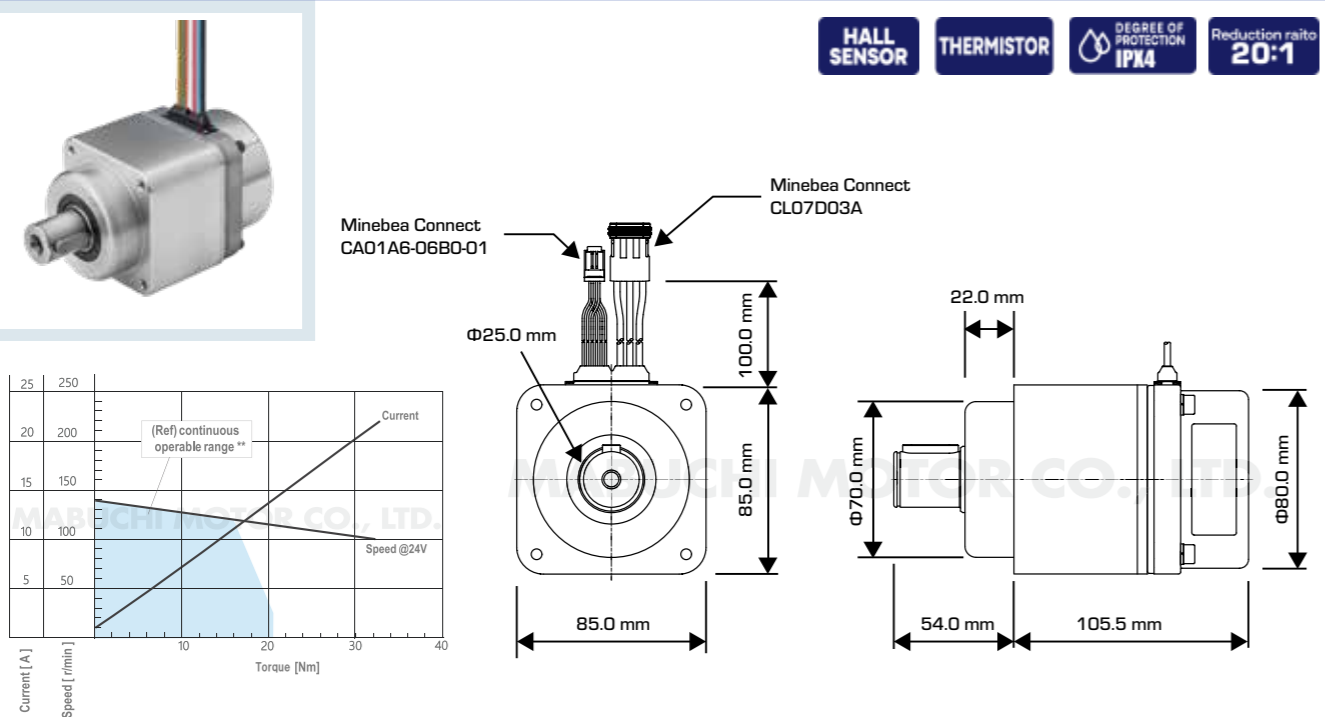
MS-94BZE

● High durability against radial load



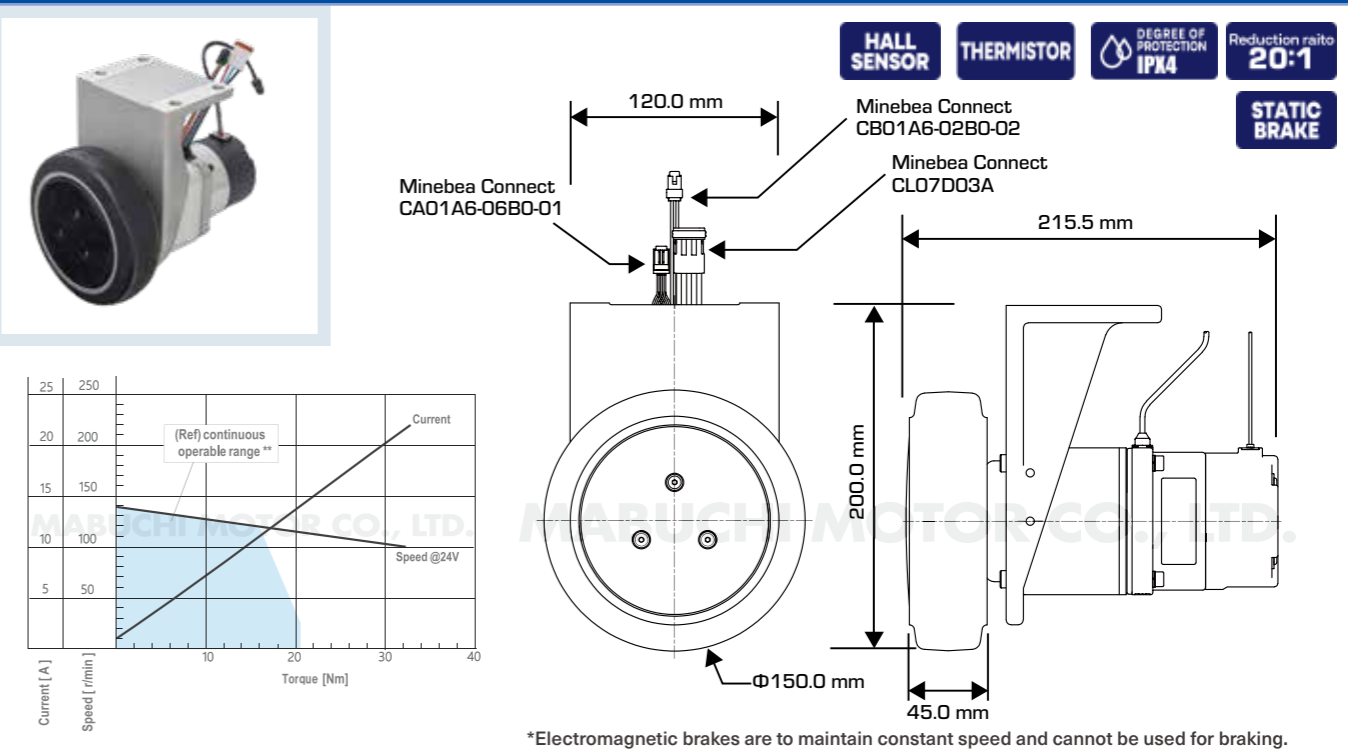
MS-94BZD

● High durability against radial load



MS-94BZF

● High durability against radial load



IR Series

The IR series brushless DC motor combines the IS series with a resolver equivalent to 15-bit resolution. These motors are suitable for AMR/AGV used in warehouses or factories, that require a stable performance at low speed and frequent stops.

Model	IR-74BZA	IR-94BZA
Instant Maximum Output	280 W (10 sec max)	710 W (10 sec max)
Instant Maximum Torque	0.9 Nm (10 sec max)	2.0 Nm (10 sec max)
Rated Voltage	24 V	48 V
Rated Output	200 W	355 W
Rated Torque	0.6 Nm	1.0 Nm
Rated Speed	3,200 r/min	3,400 r/min
Operating Voltage	17 - 60 V	
Size	60.0mm x 60.0mm x length: 66.5mm	85.0 mm x 85.0 mm x length: 65.5 mm
Weight	0.62 kg	1.1 kg
Allowable Radial Load Bearing	500 V AC 1 minute (between terminal and case)	
Insulation Resistance	10 MΩ (min.) (500 V DC)	
Degree of protection	IPX4 (Waterproof except at base of motor shaft. Must use dedicated waterproof mating connector.)	
Angle sensor	Current-detection type resolver sensor	

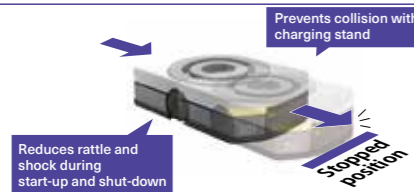
Features of the IR Series Motor Integrated Resolver

Precise Positioning

The motor with an integrated resolver, capable of 15-bit resolution, provides more precise positioning compared to hall sensors.

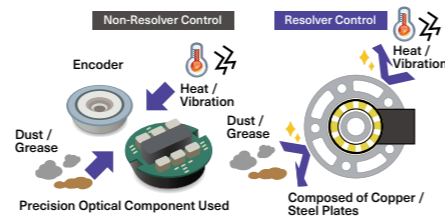
Resolution capability of conventional Hall sensor:
42 resolution capability/R ≈ 4-bit, 360 degrees/42=8.6 degrees

Resolution capability of Resolver:
56,000 resolution capability/R ≈ 15-bit, 360 degrees/56,000=0.006 degrees



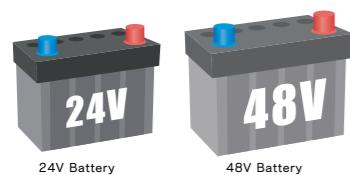
Robust Sensor Construction with Stable Sensing Capability

The uniquely engineered and in-house built resolver has a far higher resistance to heat, grease, dust and vibration compared to conventional encoders. The sensor, made of copper and steel plates, is robust and continues to perform reliably even in severe operating conditions.



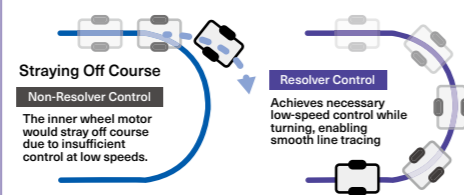
Can be operated at 24-48 V range

The motor and controller are optimized for 24-48 V DC battery-powered systems but have an overall operating range of 17-60 V.



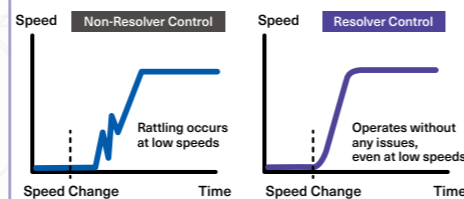
Elaborate Speed Controlling

The motor speed is controllable in the 0-4,000 r/min range, ensuring smooth and precise rotation.

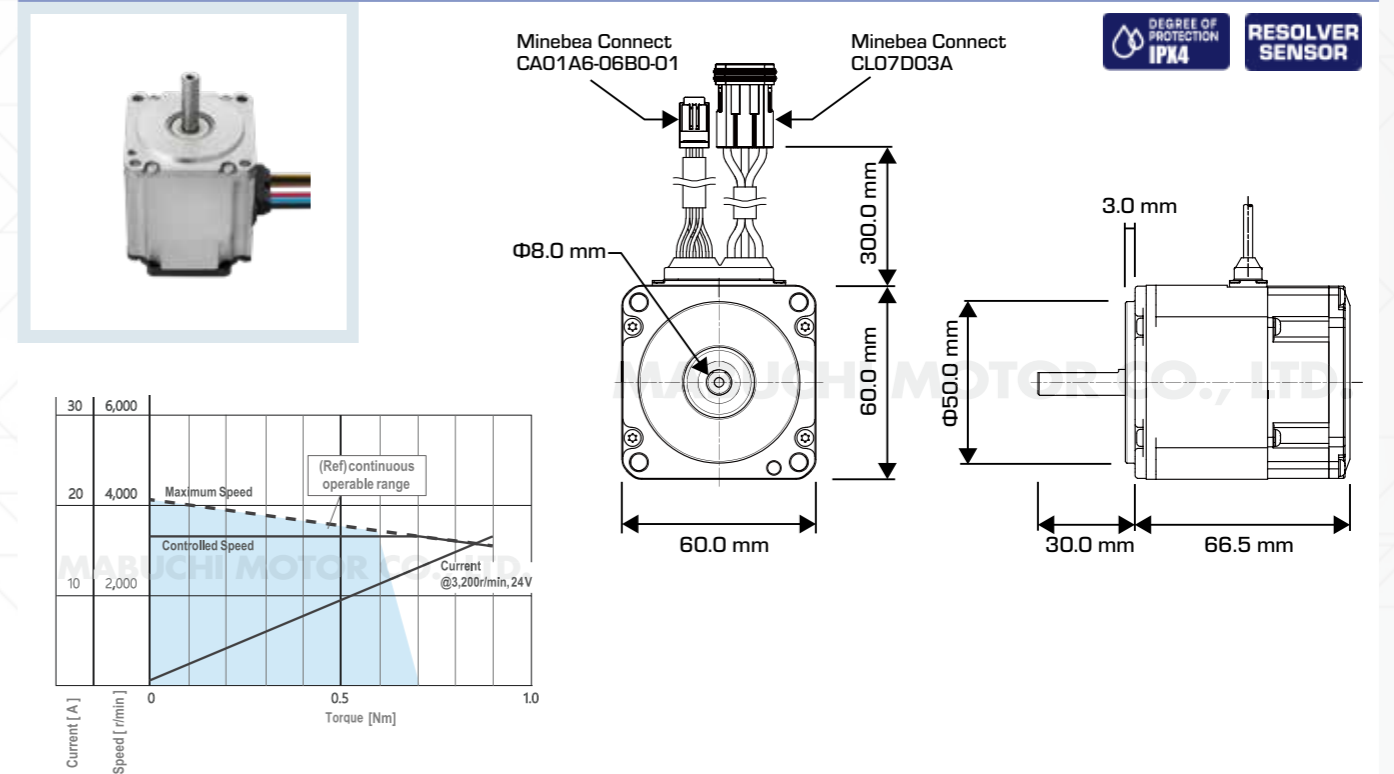


Smooth Acceleration and Motion

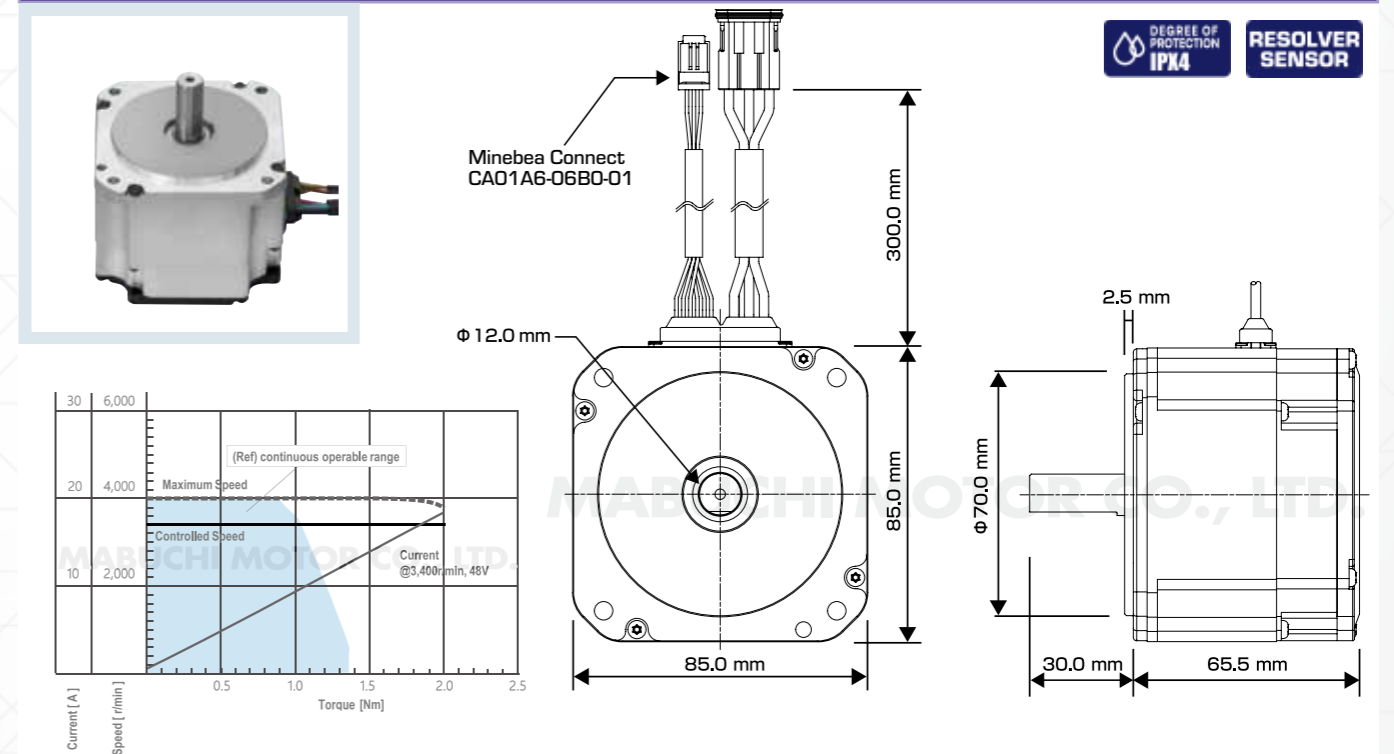
Due to the higher angular resolution of the resolver sensor, motor speed response is greatly improved; resulting in smooth, shock-free acceleration and motion.



IR-74BZA (Coming soon)



IR-94BZA



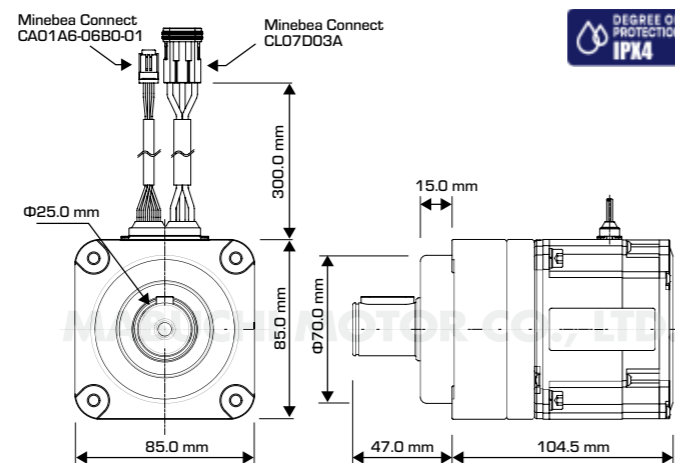
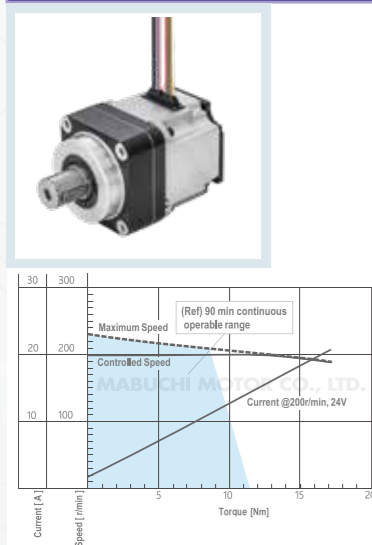
MR Series

The MR series motor is an IR series motor with a reduction gear, electromagnetic brake, etc., and is supplied as one fully integrated drop-in unit. The planetary gears offer reduction ratios of 10:1 and 20:1.

Model	MR-94BZA	MR-94BZB	MR-94BZD	MR-94BZE
Instant Maximum Output	320 W (10 sec max)		300 W (10 sec max)	
Instant Maximum Torque	17.2 Nm (10 sec max)		30.0 Nm (10 sec max)	
Rated Voltage	24V			
Rated Output	180 W		175 W	
Rated Torque	8.6 Nm		16.0 Nm	
Rated Speed	200 r/min		105 r/min	
Operating Voltage	17 - 60 V			
Size	85.0mm × 85.0mm × length: 104.5mm	85.0mm × 85.0mm × length: 143.0mm	85.0mm × 85.0mm × length: 125.5mm	85.0mm × 85.0mm × length: 164.0mm
Weight	2.5 kg	3.1 kg	3.1 kg	3.7 kg
Reduction Ratio	10.33 : 1		20 : 1	
Allowable Radial Load Bearing	700 N			
Allowable Load Inertia	0.6 kg/m ² max (Applicable Acceleration Rate: 200 r/min/s)			
Withstand Voltage	500 V AC 1 minute (between terminal and case)			
Insulation Resistance	10 MΩ (min.) (500 V DC)			
Static Brake Operation Voltage at 20°C (ambient)	—	Power off type (for holding & emergency stops), Release voltage 24V, Holding voltage 12V	—	Power off type (for holding & emergency stops), Release voltage 24V, Holding voltage 12V
Degree of protection	IPX4 (Must use dedicated waterproof mating connector.)			
Angle sensor	Current-detection type resolver sensor			

MR-94BZA

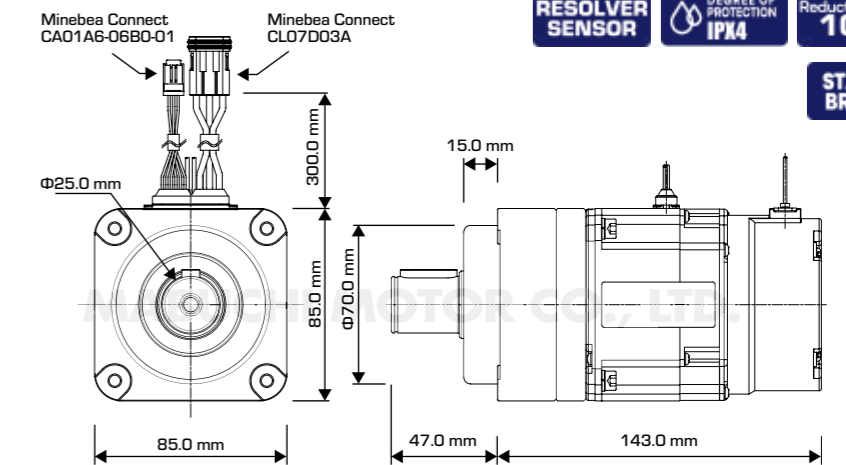
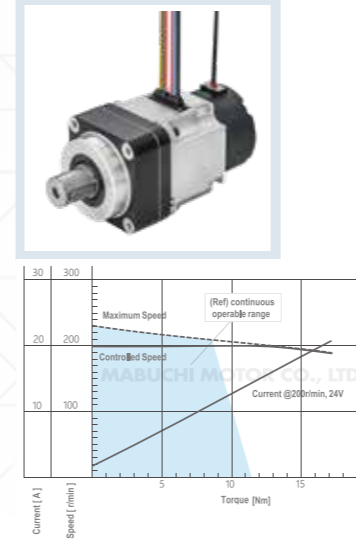
● High durability against radial load



DEGREE OF PROTECTION IPX4 RESOLVER SENSOR Reduction ratio 10:1

MR-94BZB

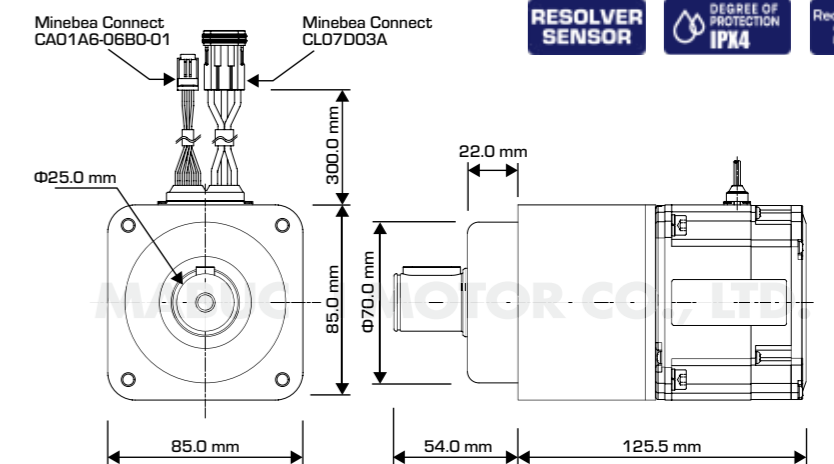
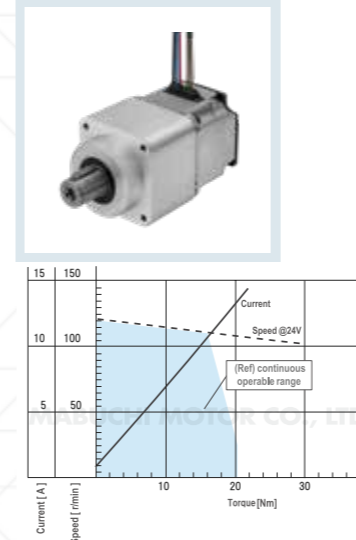
● High durability against radial load



RESOLVER SENSOR DEGREE OF PROTECTION IPX4 Reduction ratio 10:1 STATIC BRAKE

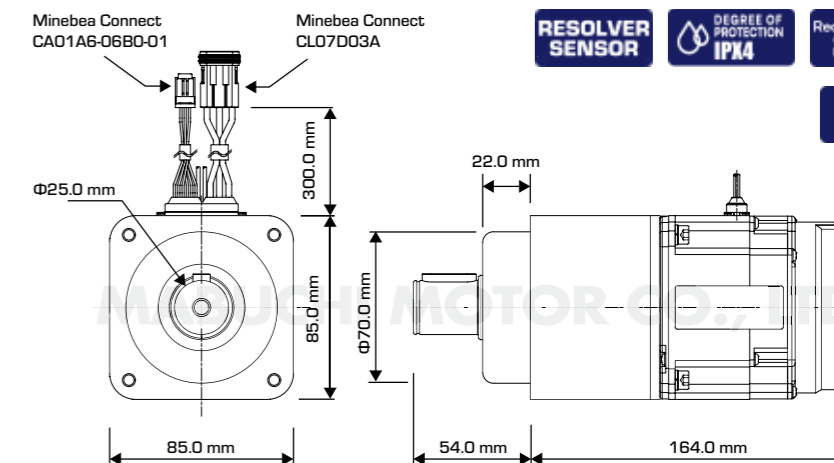
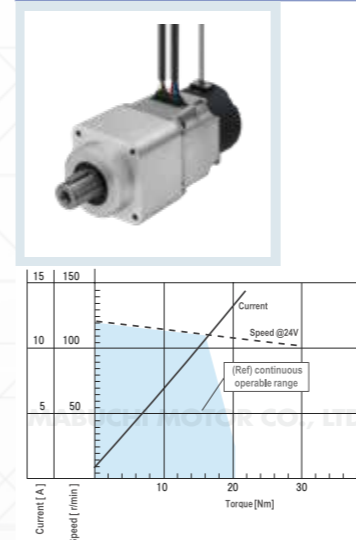
*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

MR-94BZD (Coming soon)



RESOLVER SENSOR DEGREE OF PROTECTION IPX4 Reduction ratio 20:1

MR-94BZE (Coming soon)



RESOLVER SENSOR DEGREE OF PROTECTION IPX4 Reduction ratio 20:1 STATIC BRAKE

*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

DS/DR Series (Controllers) Optional Cables

DS/DR Series

The DS/DR Series controllers are optimized to work with battery-powered systems using Mabuchi motors. The controllers offer easy integration with no interference due to their low-EMI design and capability.



DS-34EC1
DR-40FC1
DR-40FC3

Model	DS-34EC1-IS311	DS-34EC1-IS221	DR-40FC1-R111A	DR-40FC3-R111A	DR-40FC1 (Preliminary Data)
Compatible Models	For IS-74	For IS-94/MS-94	For IR-94/MR-94		For IR-74
Sensor System	Hall Sensor		Resolver		
Power-Supply Voltage Specifications	24-36 V DC (battery) Input Voltage Range: 17-45 V DC		24-48 V DC (battery) Input Voltage Range: 17-60 V DC		
Rated Output Current	9 Arms		11.5 Arms	9 Arms	
Peak Output Current	29 Apeak	50 Apeak	37 Apeak	29 Apeak	
Drive Method	Sine Wave Drive (Advanced Ignition Map)		Vector Control		
Control Function	Speed Control		Speed Control (Under Development: Torque Control, Positioning Control)		
Mandated Revolution Speed Range	100 - 4,000 r/min	60 - 3,000 r/min	0 - 4,000 r/min		
Interface	CAN Communication (Terminating Resistance: Enables Electrical Current Transition)		CAN Communication (Without Terminating Resistance)	CAN Communication (With Terminating Resistance)	CAN Communication (Without Terminating Resistance)
Size	W : 116 mm × D : 88 mm × H : 29 mm				
Weight	0.22 kg				
Degree of protection	IPX4 (Must use dedicated waterproof mating connector.)				
Low Radiation Noise	CISPR32 Class B Compliant, EN55011 Class B Compliant				
Withstand Voltage	500 V AC 1 minute (Between Power Input Terminal and Case)				
Insulation Resistance	10 MΩ (min.) (500 V DC)				

Extension / Connection Cables

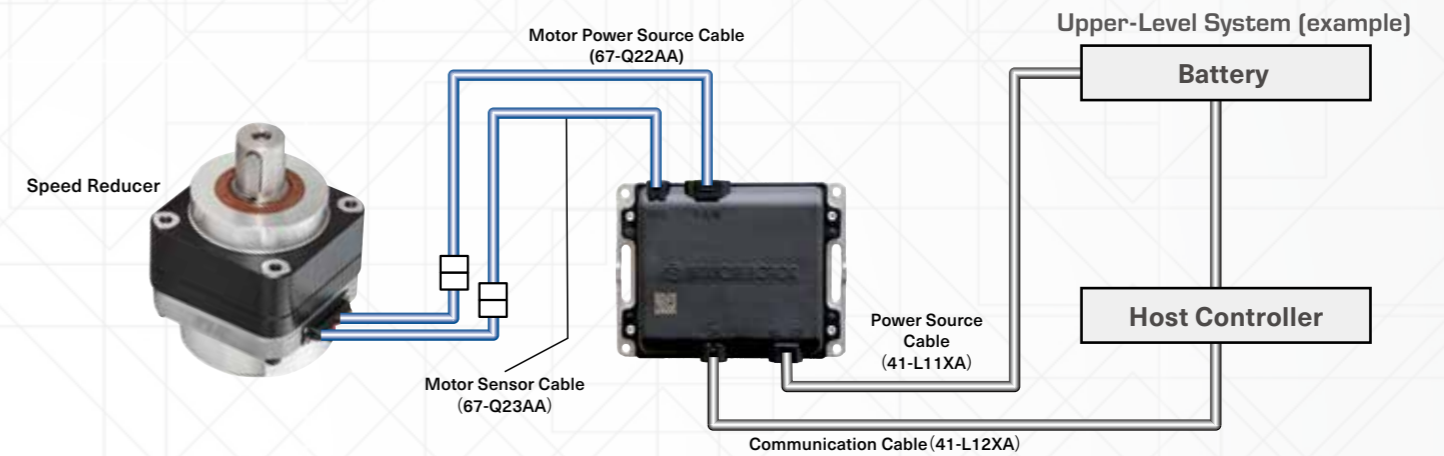
Extension and connection cables for further system integration available for purchase separately. Please contact us for information on various extension cables for IS-B5BZA and MS-B5BZD.



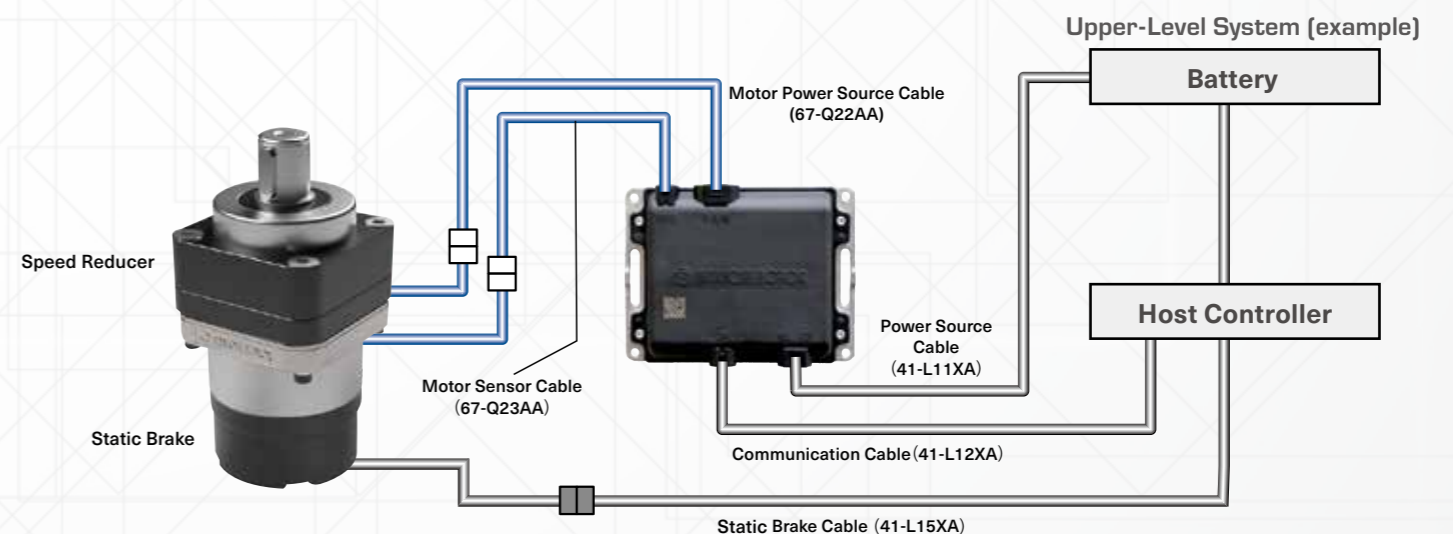
Classification	Motor Extension Cable			Controller Connection Cable	
	For Motor Power Source	For Motor Sensor	For Static Brake	For Power Source	For Communication
Product Name	67-Q22AA	67-Q23AA	41-L15XA	41-L11XA	41-L12XA
Part Number	67-Q22AA	67-Q23AA	41-L15XA	41-L11XA	41-L12XA
Length	1 m	1 m	1 m	1 m	1 m
Applicable Model	IS/IR/MS/MR Series	IS/IR/MS/MR Series	MS/MR Series (With Brake)	DS/DR Series	DS/DR Series

System Configurations

	Motor			Controller	
	Motor Only	Reduction Ratio 10:1	Reduction Ratio 20:1		
with Hall sensors	IS-74BZA	MS-94BZA	MS-94BZD	DS-34EC1-IS311	DS-34EC1-IS221
	IS-94BZC				
with Resolver sensors	IR-74BZA	MR-94BZA	MR-94BZD	DR-40FC1	DR-40FC1-R111A DR-40FC3-R111A
	IR-94BZA				



	Motor (with Static Brake)				Controller	
	Reduction Ratio 10:1		Reduction Ratio 20:1			
with Hall sensors	without Wheel	with Wheel	without Wheel	with Wheel	DS-34EC1-IS221	
	MS-94BZB	MS-94BZC	MS-94BZE	MS-94BZF		
with Resolver sensors	MR-94BZB		MR-94BZE		DR-40FC1-R111A	DR-40FC3-R111A



Extension or connection cables can be purchased separately. Refer to Page 16 for part number and description.

IA-IB Series

The IA-IB series frameless hollow-bore brushless DC motors are designed for robots or other non-automotive applications where built-in motors are required.

Suits a Wide Range of Applications

The motors, consisting of the rotor and stator, are available in four different outputs (200-950 W @48 V) and sizes (outer diameter of the stator, 60-120 mm).

Smaller, Lighter Products

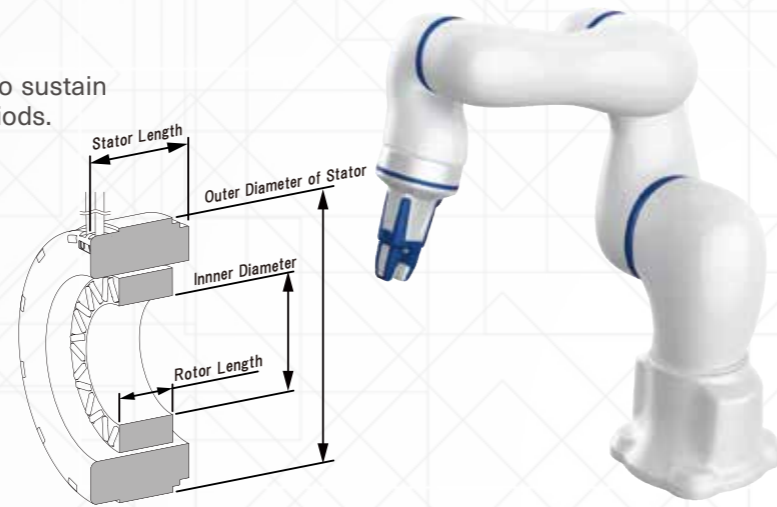
The motor simply consists of the rotor and stator for easy installation and product downsizing.

Energy Saving Design

Uniquely engineered magnetic circuit helps to sustain high energy efficiency over long operating periods.

Smooth Movement

Low cogging for smooth motion.



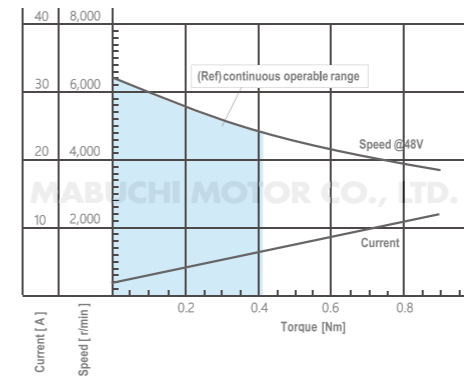
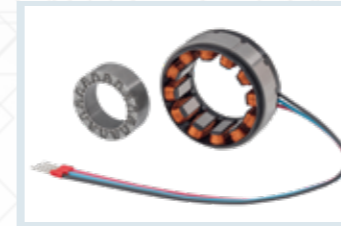
Model	IA-A3BZA/IB-A3BZA	IA-B4BZA/IB-B4BZA	IA-C5BZA/IB-C5BZA	IA-D5BZA/IB-D5BZA
Instant Maximum Torque	0.9 Nm (5 sec max)	2.1 Nm (5 sec max)	5.0 Nm (5 sec max)	11.0 Nm (5 sec max)
Rated Voltage	48 V			
Rated Output	200 W	500 W	650 W	950 W
Rated Torque	0.42 Nm	0.9 Nm	1.3 Nm	3.4 Nm
Rated Speed	4,600 r/min	5,300 r/min	4,800 r/min	2,700 r/min
Operating Voltage	15 - 55 V			
Outer Diameter of Stator	Φ 60.0 mm	Φ 75.0 mm	Φ 90.0 mm	Φ 120.0 mm
Inner Diameter	Φ 26.0 mm	Φ 35.0 mm	Φ 48.0 mm	Φ 55.0 mm
Stator Length	25.0 mm	32.0 mm	39.65 mm	45.1 mm
Rotor Length	14.2 mm	18.4 mm	22.9 mm	23.6 mm
Weight	0.19 kg	0.36 kg	0.6 kg	1.35 kg
Withstand Voltage	500 V AC 1 minute (Between the Lead Line and Laminated Core Part)			
Insulation Resistance	10 MΩ (min.) (500 V DC)			
International Standards (Conformity Directive)	CE (RoHS)			

CE declaration of conformity

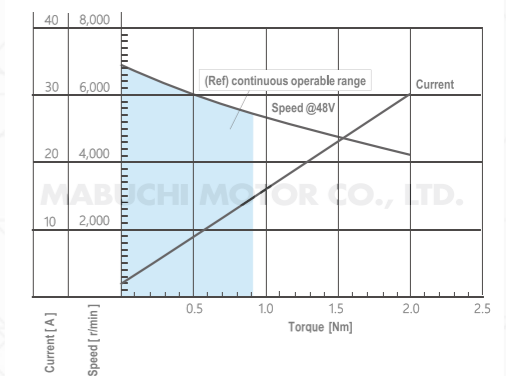
Rated output, torque, and speed differs depending on the heat dissipation of the customer's casing.



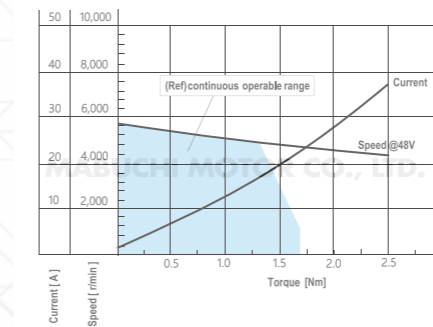
IA-A3BZA / IB-A3BZA



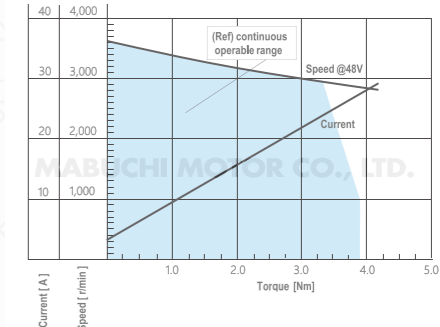
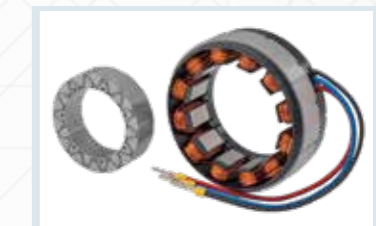
IA-B4BZA / IB-B4BZA



IA-C5BZA / IB-C5BZA

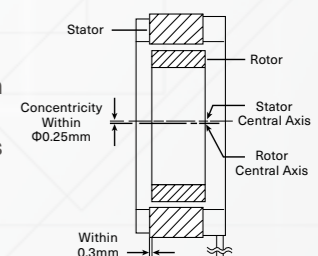


IA-D5BZA / IB-D5BZA



Installation Notes:

- Shafts, bearings and other parts needed for mounting the motor are not included.
- Take precautions when installing the rotor into the stator to prevent contact with surrounding parts due to magnet attraction or repulsion.
- Set the rotor/stator coaxially and ensure the gap between the rotor and stator (stack) is per the criteria as shown.
- For more details, instruction manuals can be downloaded from the Mabuchi website.





<https://www.mabuchi-motor.com>

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