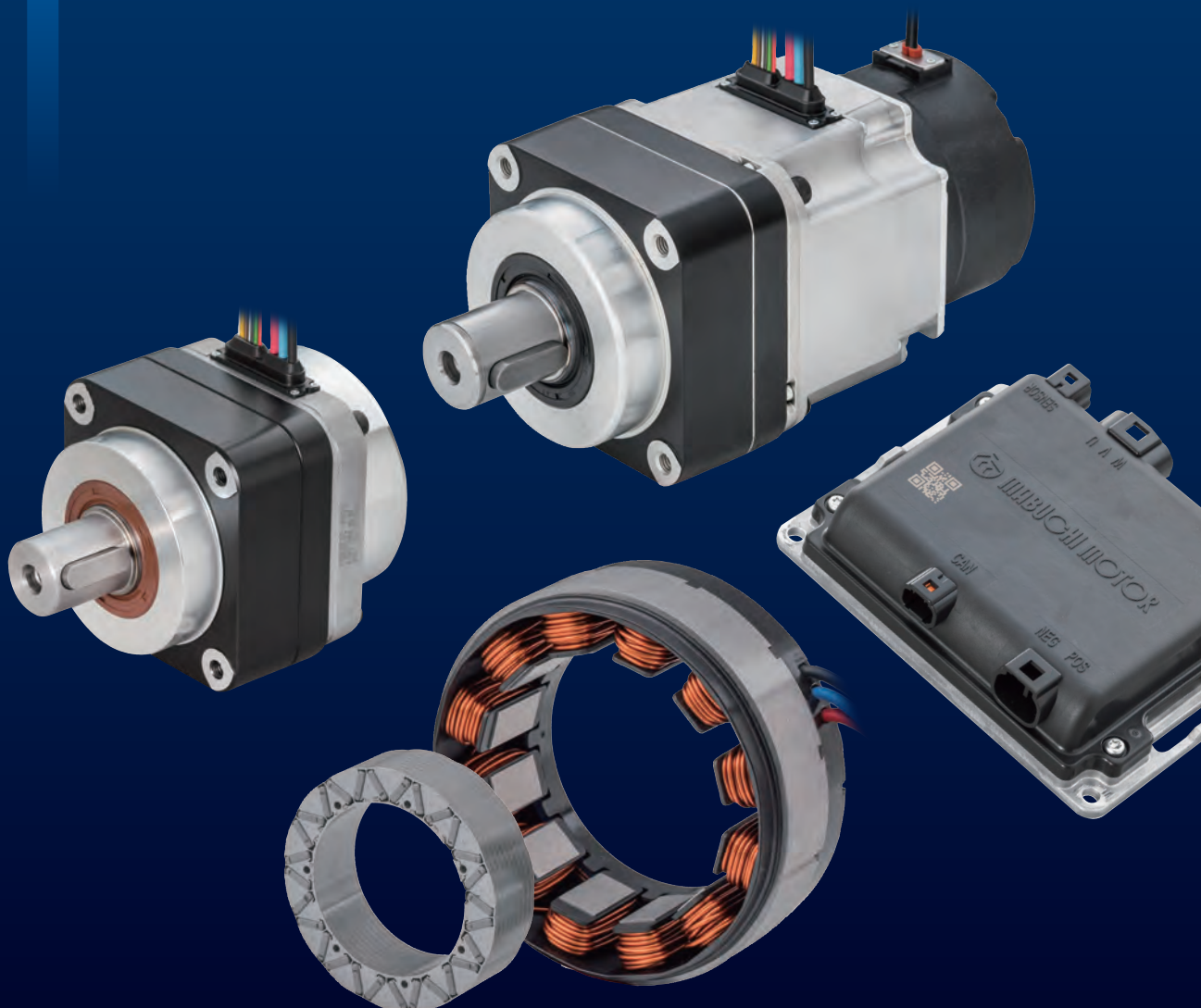
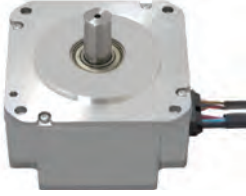






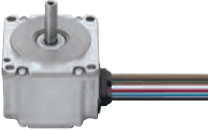

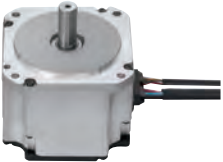





# BRUSHLESS MOTOR CATALOG



# Brushless motor lineup

## Brushless DC Motors / Controllers

Flange Dimension	Motor	Geared Motors			
		Reduction Ratio 10:1			
100mm	 <p><b>IS-B5BZA</b> (with Hall sensors)</p>	 <p><b>Coming Soon</b></p>			
85mm	 <p><b>IS-94BZC</b> (with Hall sensors)</p>	 <p><b>MS-94BZA</b></p>	 <p><b>MS-94BZB</b></p>	 <p><b>MS-94BZC</b></p>	 <p><b>MS-94BZD</b></p>
60mm	 <p><b>IS-74BZA</b> (with Hall sensors)</p>	 <p><b>Coming Soon</b></p>			
85mm	 <p><b>IR-94BZA</b> (with resolver)</p>	 <p><b>MR-94BZA</b></p>	 <p><b>MR-94BZB</b></p>		

### Compact design enabling efficient packaging

IS MS IR  
MR DS DR

Mabuchi brushless motors generate high output for the size. Engineered to be thin, their architecture provides freedom in product design. Combined with the compact motor controllers, Mabuchi motors enable efficient packaging by securing more space for the battery and other components.














### IPX4-rated waterproof design

IS MS IR  
MR DS DR

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



## Frameless Brushless DC Motors

Reduction Ratio 20:1	Controllers	Stator Diameter	Motor
 <b>Coming Soon</b>	 <b>Coming Soon</b>	<b>120mm</b>	<b>IA-D5BZA</b> <b>IB-D5BZA</b> 
 <b>MS-94BZE</b>  <b>MS-94BZF</b>	 <b>DS-34EC1-IS221</b>	<b>90mm</b>	<b>IA-C5BZA</b> <b>IB-C5BZA</b> 
 <b>Coming Soon</b>	 <b>DS-34EC1-IS311</b>	<b>75mm</b>	<b>IA-B4BZA</b> <b>IB-B4BZA</b> 
 <b>Coming Soon</b>	 <b>DR-40FC1</b> <b>DR-40FC3</b>	<b>60mm</b>	<b>IA-A3BZA</b> <b>IB-A3BZA</b> 

### 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**

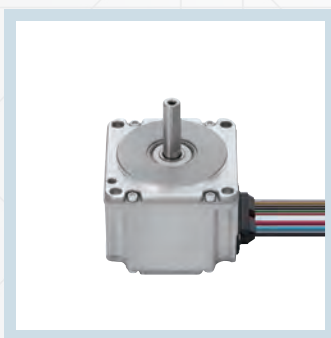
Mabuchi motor controllers have an EMI-suppressing design, compliant with CISPR32 Class B, which minimizes the risk of product malfunction caused by communication failures due to interference. As such, no external noise-suppressing is needed.

# IS Series

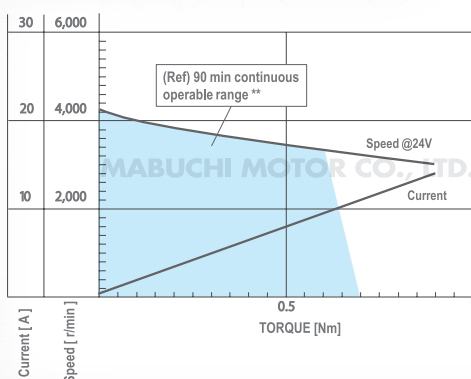
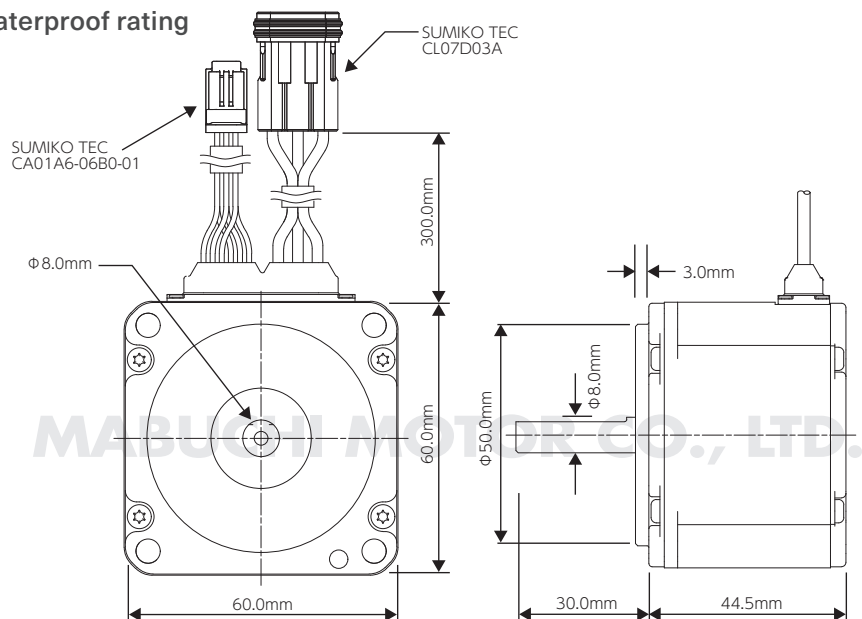
The IS Series brushless DC motors equipped with uniquely-designed magnetic circuit are optimized for battery-powered commercial robots and various types of industrial equipment. Available in three different rated outputs and three different flange side dimensions.

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	24 V		48 V
Rated Output	200 W	250 W	600 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	520 g	830 g	1,760 g
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 MΩ (min.) (500 V DC)		

## IS-74BZA



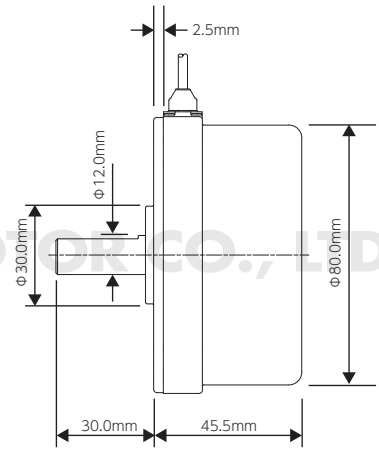
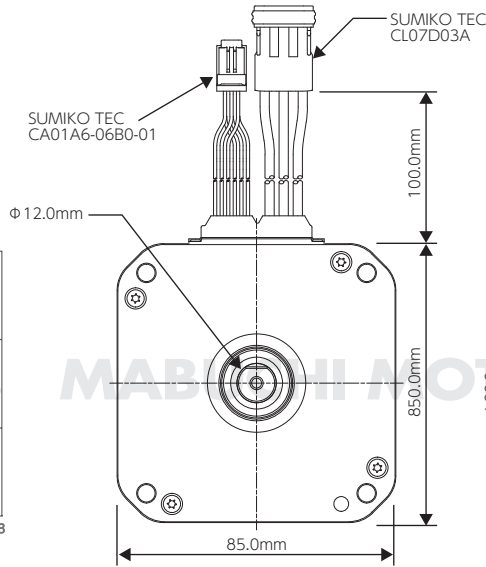
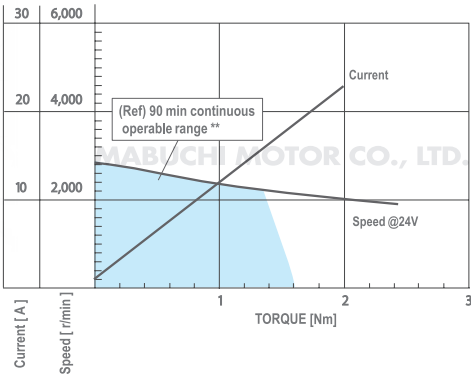
- Brushless DC motor
- Equipped with hall sensors and thermistor
- IPX4 waterproof rating



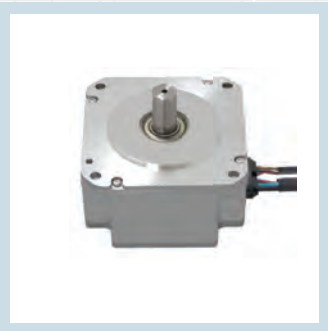
## IS-94BZC



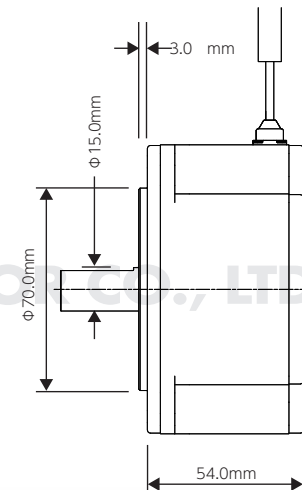
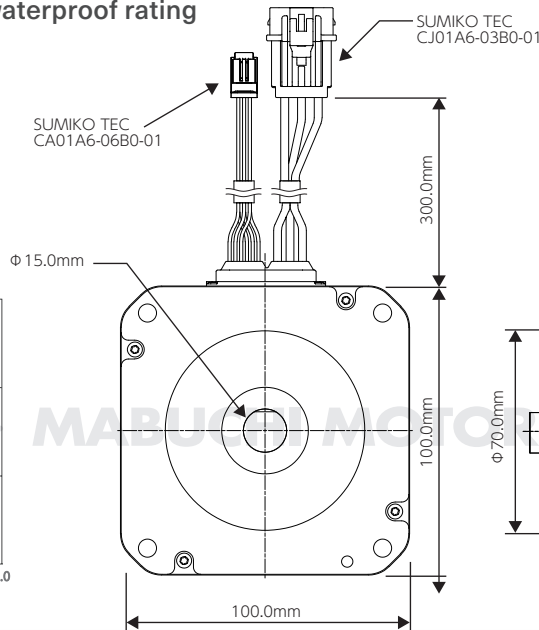
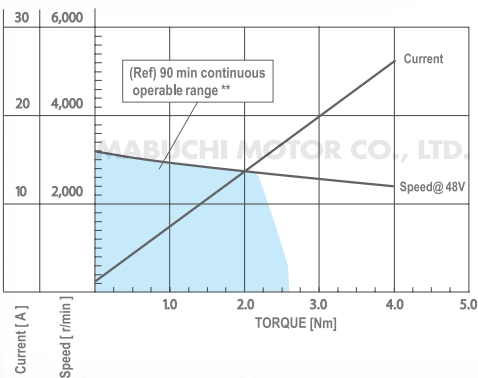
- Brushless DC motor
- Equipped with hall sensors and thermistor
- IPX4 waterproof rating



## IS-B5BZA



- Brushless DC motor
- Equipped with hall sensors and thermistor
- IPX4 waterproof rating



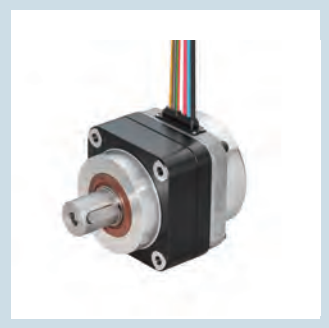
# MS Series

The MS Series motors are a combination of the IS series motors with specifically designed optional accessories (gear reducer, static brake, foot-mount, wheel) for high torque and drive applications.

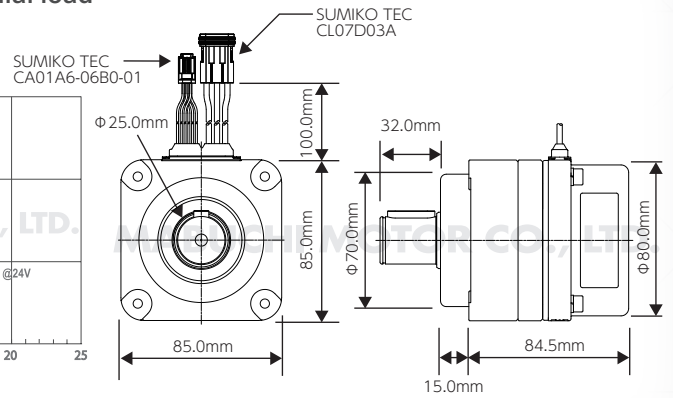
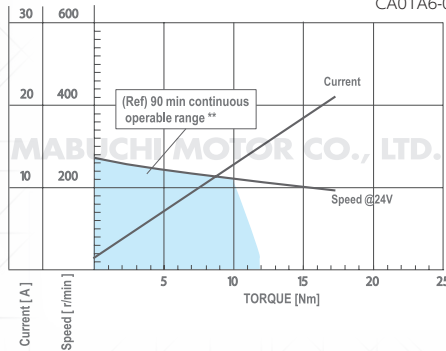
Model	MS-94BZA	MS-94BZB	MS-94BZC
Instant Maximum Output	342 W (10 sec max)		
Instant Maximum Torque	17.2 Nm (10 sec max)		
Rated Voltage	24 V		
Rated Output	202 W		
Rated Torque	8.6 Nm		
Rated Speed	225 r/min		
Operating Voltage	15-55 V		
Size	85.0 mm x 85.0 mm x length: 84.5 mm	85.0 mm x 85.0 mm x length: 126.5 mm	W:150.0 mm x D:187.5 mm x H:200.0 mm (Wheel Diameter: $\Phi$ 150.0 mm)
Weight	2.2 kg	2.8 kg	4.5 kg
Reduction Ratio	10.33		
Allowable Radial Load Bearing	700 N		
Allowable Load Inertia	0.6 kg/m <sup>2</sup> max (Applicable Acceleration Rate: 200 r/min/s)		
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 M $\Omega$ (min.) (500 V DC)		
Electromagnetic Brake	_____	Power-off type, Release voltage 24 V, at 20°C (ambient)	
Material	_____	_____	Wheels, Brackets: ADC12
	_____	_____	Wheels: Natural rubber

Model	MS-94BZD	MS-94BZE	MS-94BZF
Instant Maximum Output	327W (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: $\Phi$ 150.0 mm)
Weight	2.8 kg	3.4 kg	5.1 kg
Reduction Ratio	20		
Allowable Radial Load Bearing	700 N		
Allowable Load Inertia	0.6 kg/m <sup>2</sup> max (Applicable Acceleration Rate: 200 r/min/s)		
Withstand Voltage	500 V AC 1 minute (between terminal and case)		
Insulation Resistance	10 M $\Omega$ (min.) (500 V DC)		
Electromagnetic Brake	_____	Power-off type, Release voltage 24 V, at 20°C (ambient)	
Material	_____	_____	Wheels, Brackets: ADC12
	_____	_____	Wheels: Natural rubber

## MS-94BZA



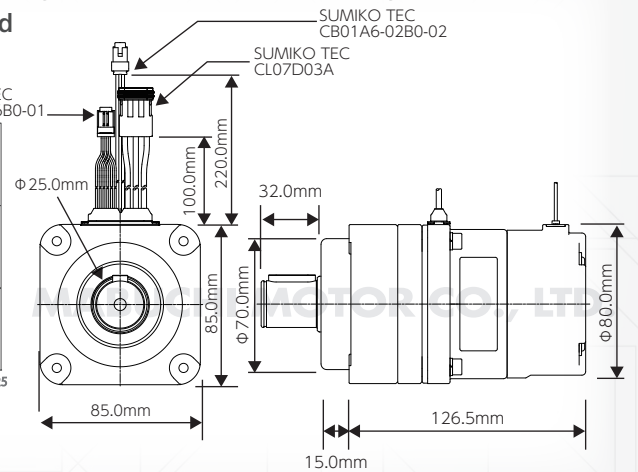
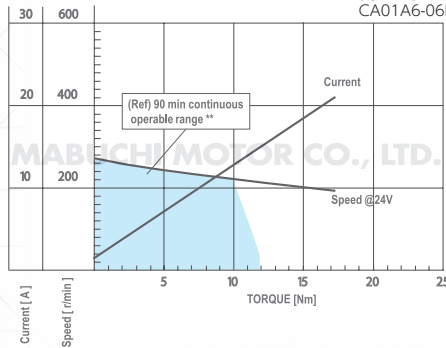
- Brushless DC motor equipped with gear reducer
- High durability against radial load
- IPX4 waterproof rating



## MS-94BZB



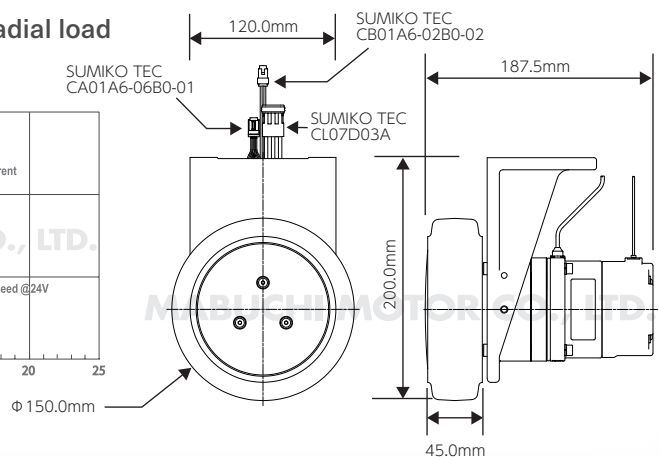
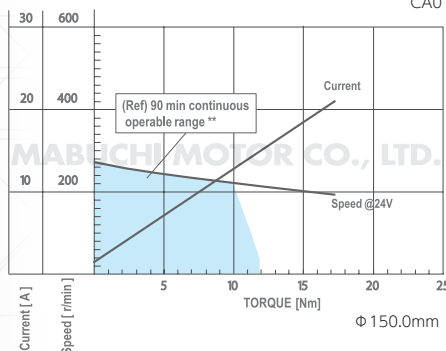
- Brushless DC motor equipped with gear reducer and electromagnetic brake\*
- High durability against radial load
- IPX4 waterproof rating



## MS-94BZC



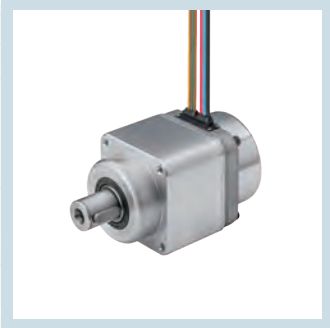
- Brushless DC motor equipped with gear reducer, electromagnetic brake\*, foot-mount, and rubber wheel
- High durability against radial load
- IPX4 waterproof rating



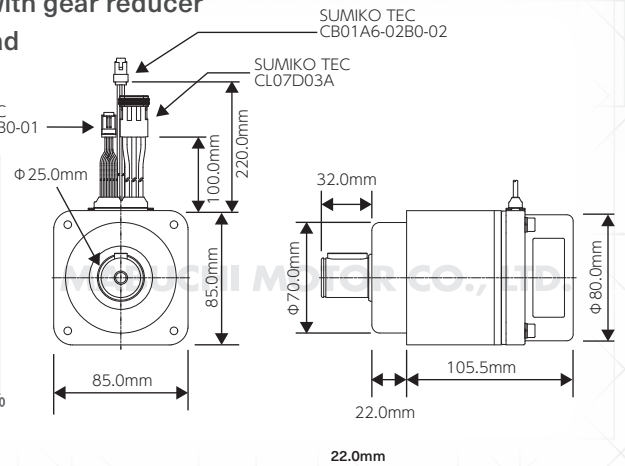
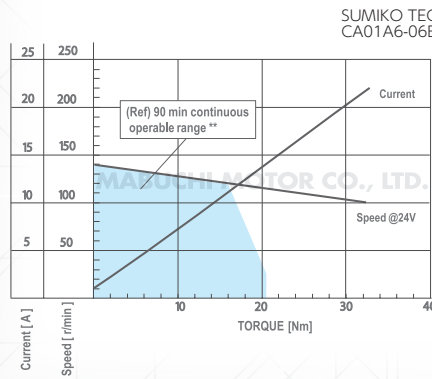
\*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

# MS Series

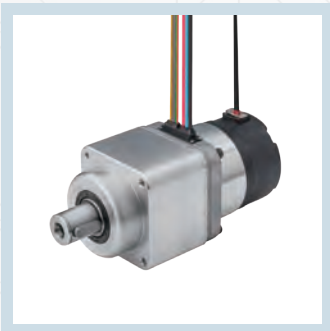
## MS-94BZD



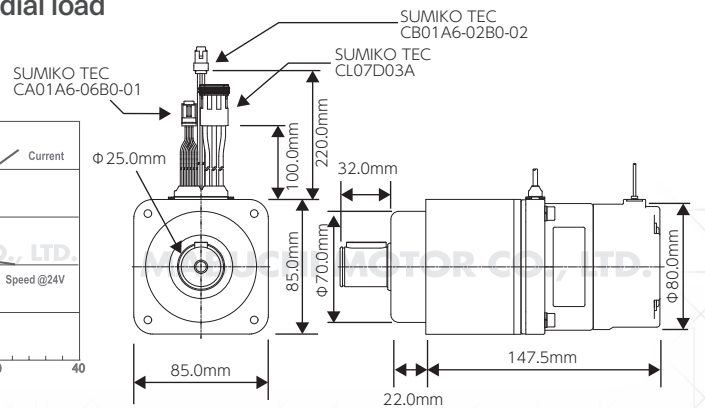
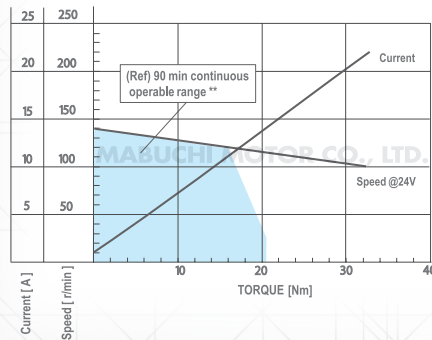
- Brushless DC motor equipped with gear reducer
- High durability against radial load
- IPX4 waterproof rating



## MS-94BZE



- Brushless DC motor equipped with gear reducer and electromagnetic brake\*
- High durability against radial load
- IPX4 waterproof rating

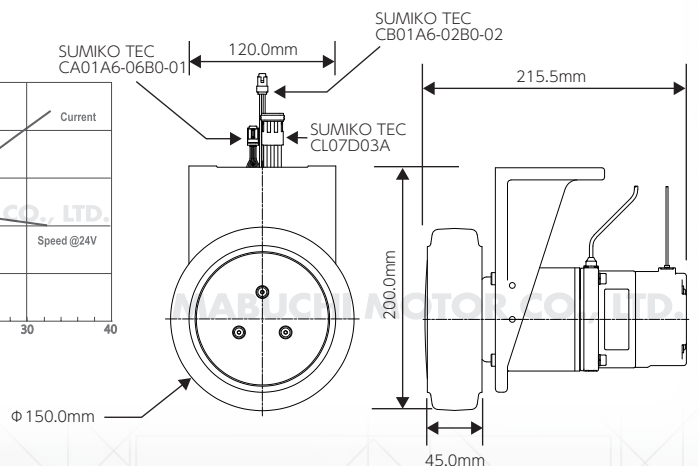
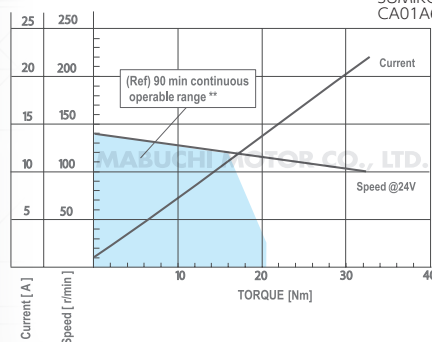


\*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.

## MS-94BZF



- Brushless DC motor equipped with gear reducer, electromagnetic brake\*, foot-mount, and rubber wheel
- High durability against radial load
- IPX4 waterproof rating



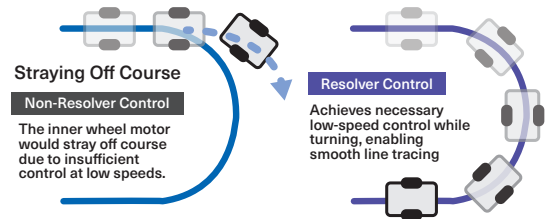
\*Electromagnetic brakes are to maintain constant speed and cannot be used for braking.



# Features of IR/MR Series Motor Integrated with Resolver

## Elaborate Speed Controlling

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

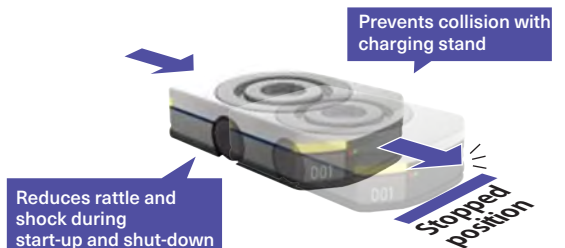


## Precise Positioning

The motor is equipped with a resolver sensor capable of 15-bit resolution, which provides more precise positioning compared to hall sensors.

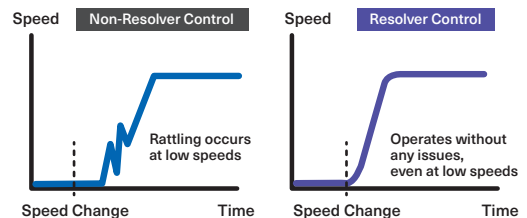
Resolution capability of conventional Hall sensor  
42 resolution capability /  $R \approx 4\text{-bit}$ , 360 degrees / 42 = 8.6 degrees

Resolution capability of Resolver  
56,000 resolution capability /  $R \approx 15\text{-bit}$ , 360 degrees / 56,000 = 0.006 degrees



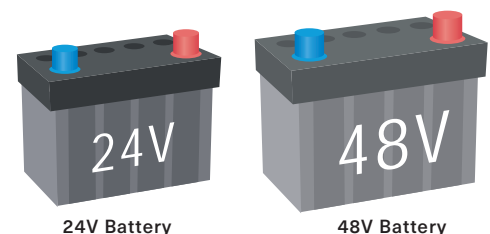
## Smooth Acceleration and Motion

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



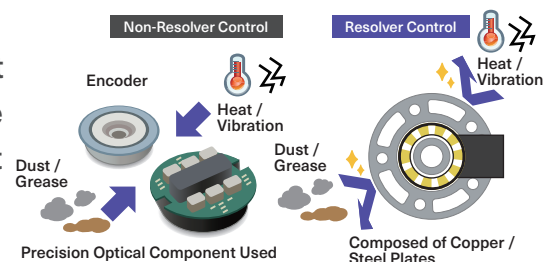
## Can be operated at 24-48 V range

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



## Robust Sensor Construction with Stable Sensing Capability

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

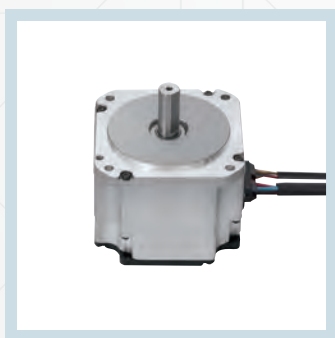


# IR/MR Series

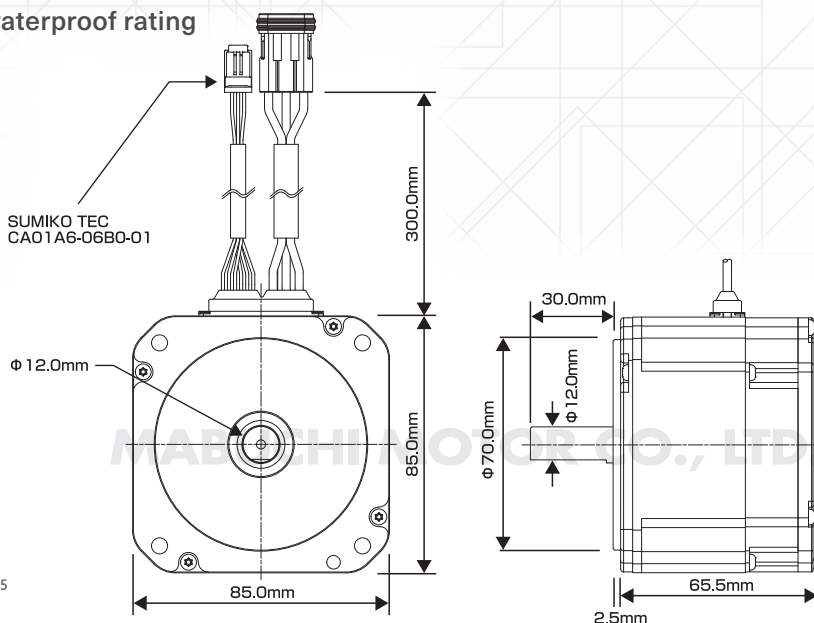
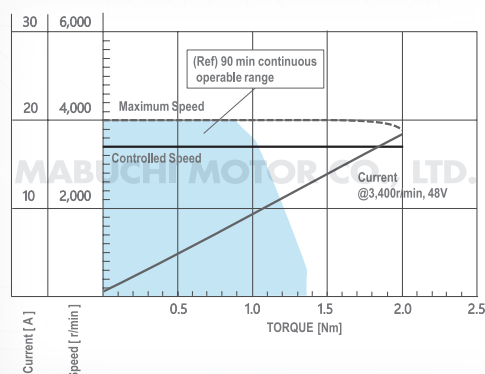
The IR/MR Series motors come equipped with a resolver sensor equivalent to a 15-bit encoder for precise motion sensing and feedback. The IR/MR Series motors are ideal for applications where precise stationary or low-speed motion control is required (e.g. autonomous mobile robots (AMRs), automated guided vehicles (AGVs), etc.).

Model	IR-94BZA	MR-94BZA	MR-94BZB
Instant Maximum Output	710 W (10 sec max)	320 W (10 sec max)	
Instant Maximum Torque	2.0 Nm (10 sec max)	17.2 Nm (10 sec max)	
Rated Voltage	48 V	24 V	
Rated Output	355 W	180 W	
Rated Torque	1.0 Nm	8.6 Nm	
Rated Speed	3,400 r/min	200 r/min	
Operating Voltage	17-60 V		
Size	85.0 mm x 85.0 mm x length: 65.5 mm	85.0 mm x 85.0 mm x length: 104.5 mm	85.0 mm x 85.0 mm x length: 143.0 mm
Weight	1.1 kg	2.5 kg	3.1 kg
Reduction Ratio	—	10.33	
Allowable Radial Load Bearing	—	700 N	
Allowable Load Inertia	—	0.6 kg/m <sup>2</sup> max (Applicable Acceleration Rate: 200 r/min/s)	
Withstand Voltage	500 V AC 1 minute (between terminal and case)	500 V AC 1 minute (between terminal and case)	
Insulation Resistance	10 MΩ (min.) (500 V DC)	10 MΩ (min.) (500 V DC)	
Electromagnetic Brake	—	—	Power off type, Release voltage 24V, at 20°C (ambient)

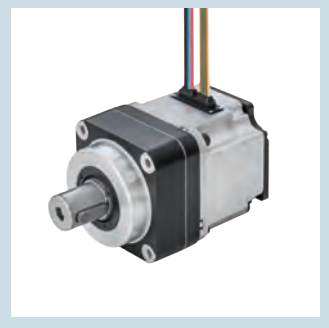
## IR-94BZA



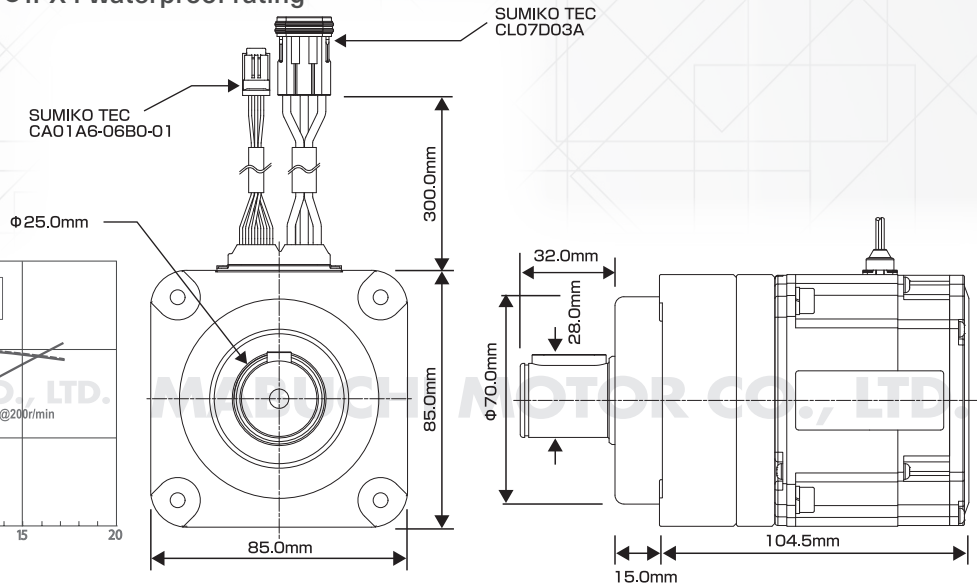
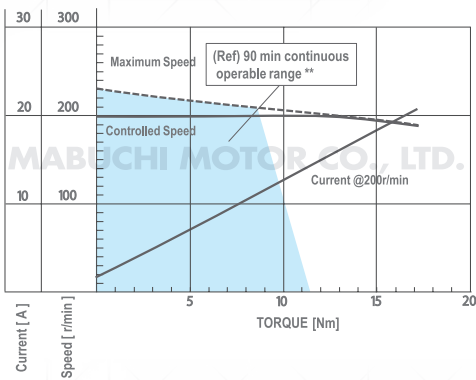
- Brushless DC motor
- Built-in resolver sensor
- IPX4 waterproof rating



## MR-94BZA



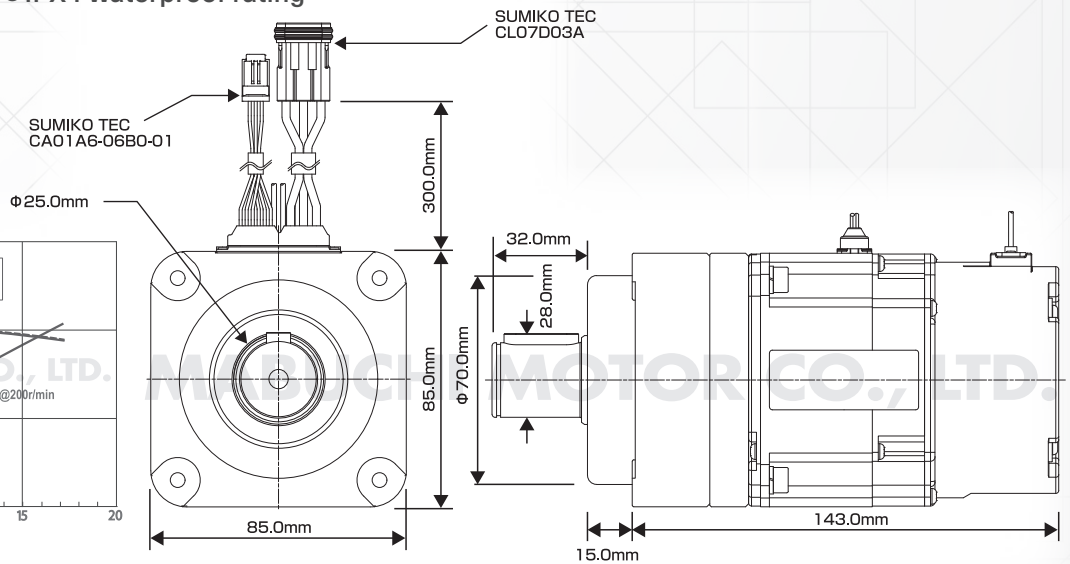
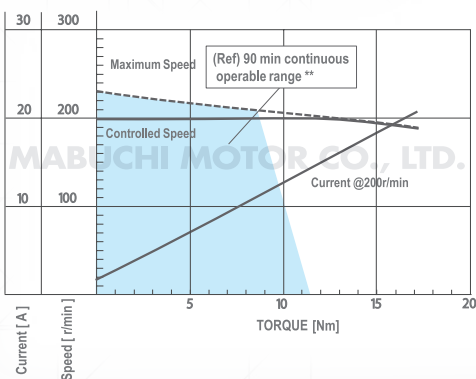
- Brushless DC motor equipped with gear reducer
- Built-in resolver sensor
- High durability against radial load
- IPX4 waterproof rating



## MR-94BZB



- Brushless DC motor equipped with gear reducer and electromagnetic brake\*
- Built-in resolver sensor
- High durability against radial load
- IPX4 waterproof rating



\*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	DR-40FC3
Compatible Models	For IS-74	For IS-94/MS-94	For IR-94/MR-94	
Sensor System	Hall Sensor		Resolver Sensor	
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	
Peak Output Current	29 Apeak	50 Apeak	37 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)
Size	W:116 mm × D:88 mm × H:29 mm			
Weight	220 g			
Waterproofing	IPX4			
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)			

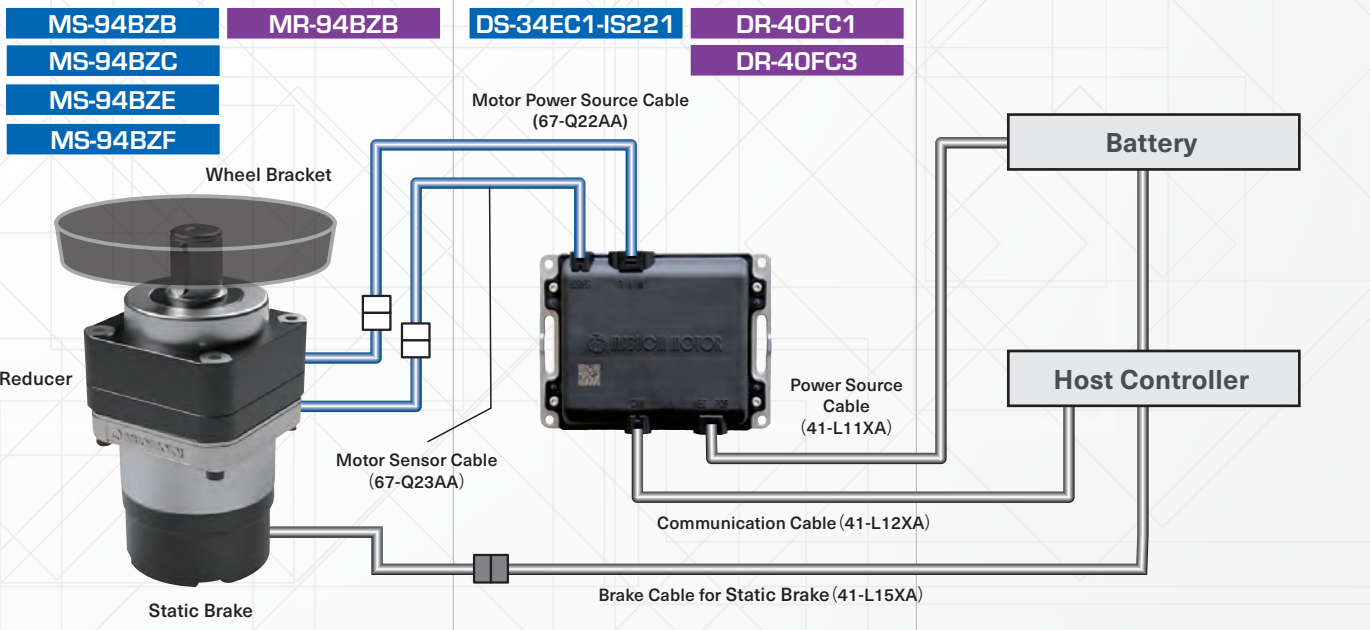
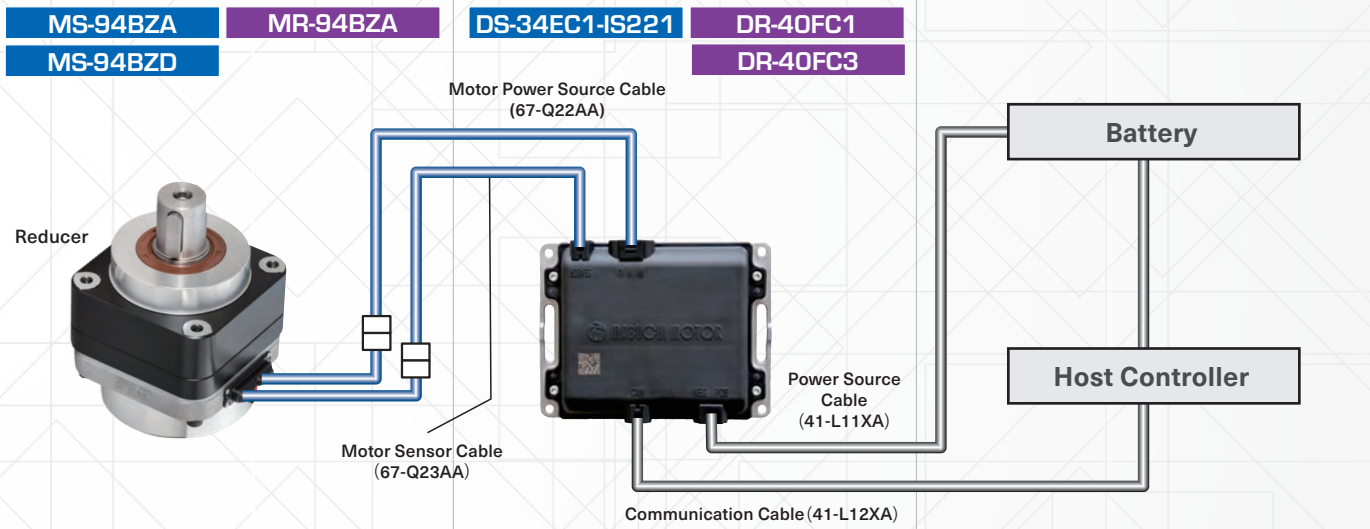
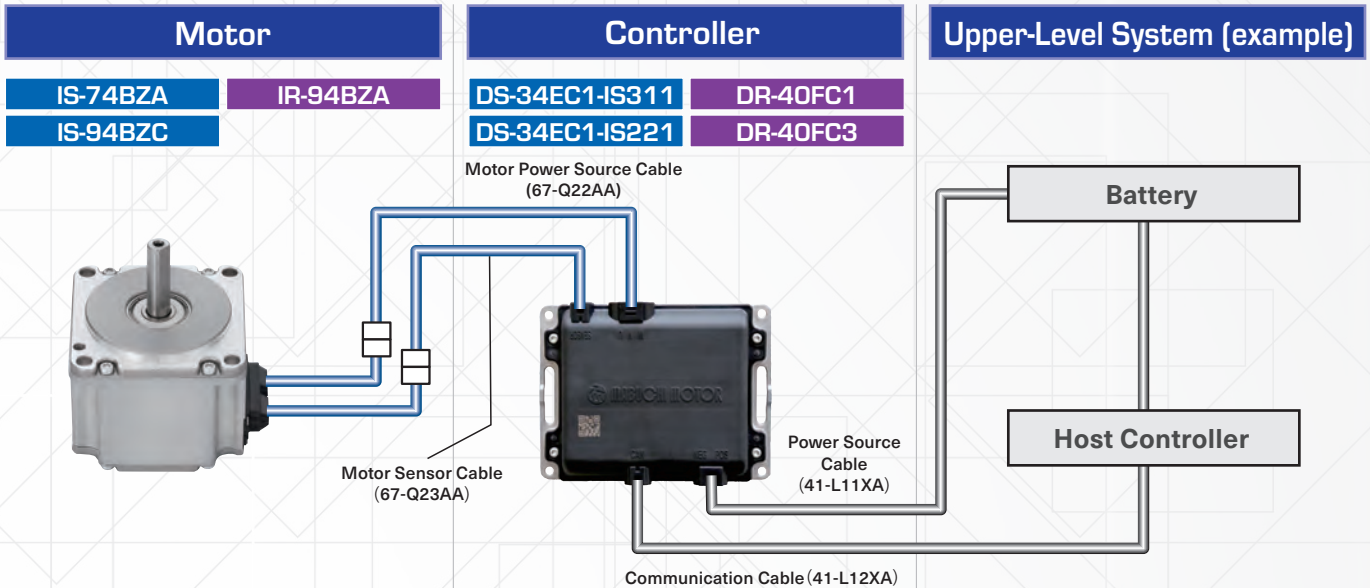
## Extension / Connection Cables

Extension and connection cables are available for purchase separately to further expand system integration.



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



Extension or connection cables can be purchased separately. Refer to Page 12 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 (200-960 W @48 V) and sizes (outer diameter of the stator, 60-120 mm).

## Energy Saving Design

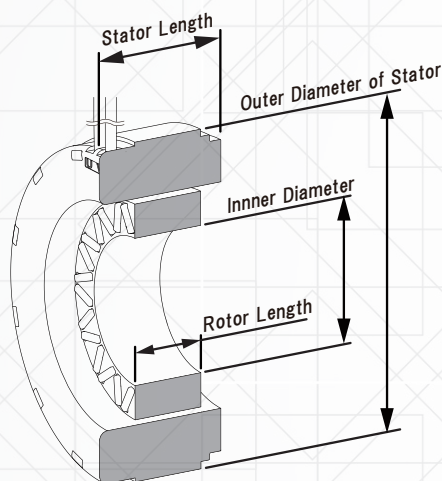
Uniquely engineered magnetic circuit helps to sustain high energy efficiency over long operating periods.

## Smooth Movement

Low cogging for smooth motion.

## Smaller, Lighter Products

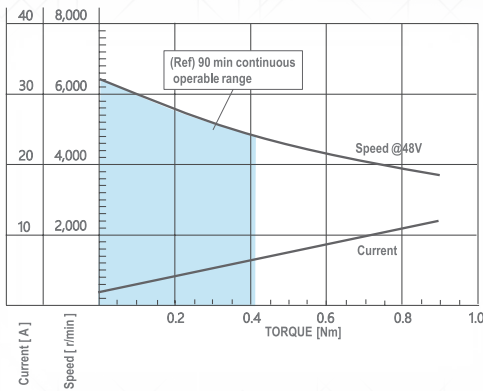
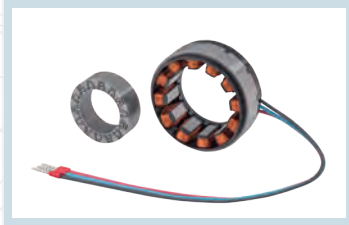
The motor simply consists of the rotor and stator for easy installation and product downsizing.



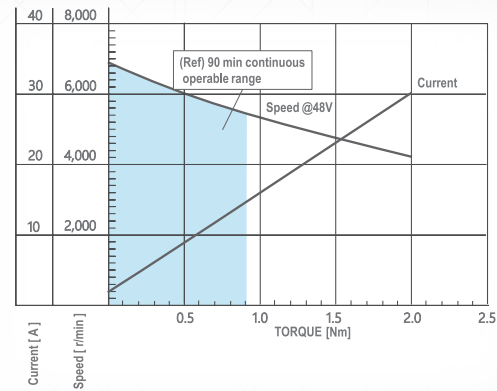
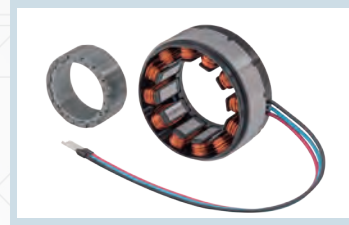
Model	IA-A3BZA/IB-A3BZA	IA-B4BZA/IB-B4BZA	IA-C5BZA/IB-C5BZA	IA-D5BZA/IB-D5BZA
Instant Maximum Torque	0.9 Nm (5 sec max)	2.1 Nm (5 sec max)	5.0 Nm (5 sec max)	11.0 Nm (5 sec max)
Rated Voltage	48 V			
Rated Output	200 W	500 W	650 W	950 W
Rated Torque	0.42 Nm	0.9 Nm	1.3 Nm	3.4 Nm
Rated Speed	4,600 r/min	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	190 g	360 g	600 g	1,350 g
Withstand Voltage	500 V AC 1 minute (Between the Lead Line and Laminated Core Part)			
Insulation Resistance	10 MΩ (min.) (500 V DC)			

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

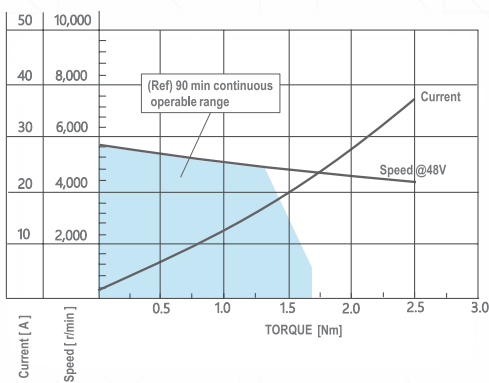
## IA-A3BZA / IB-A3BZA



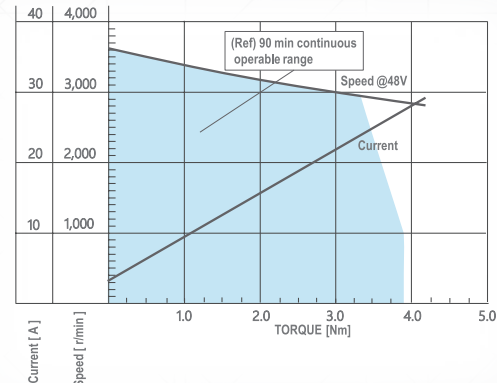
## IA-B4BZA / IB-B4BZA



## IA-C5BZA / IB-C5BZA

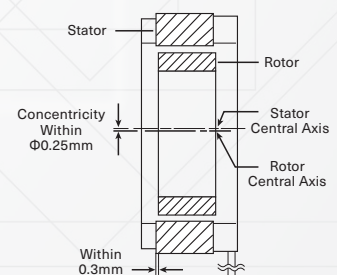


## IA-D5BZA / IB-D5BZA



### 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 Mabuchi website.





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

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