HarmonicDrive®

Flat Hollow Shaft AC Servo Motor

MMA Series

Mitsubishi AC Servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS

MELSERVO J4

SSCNET III/H

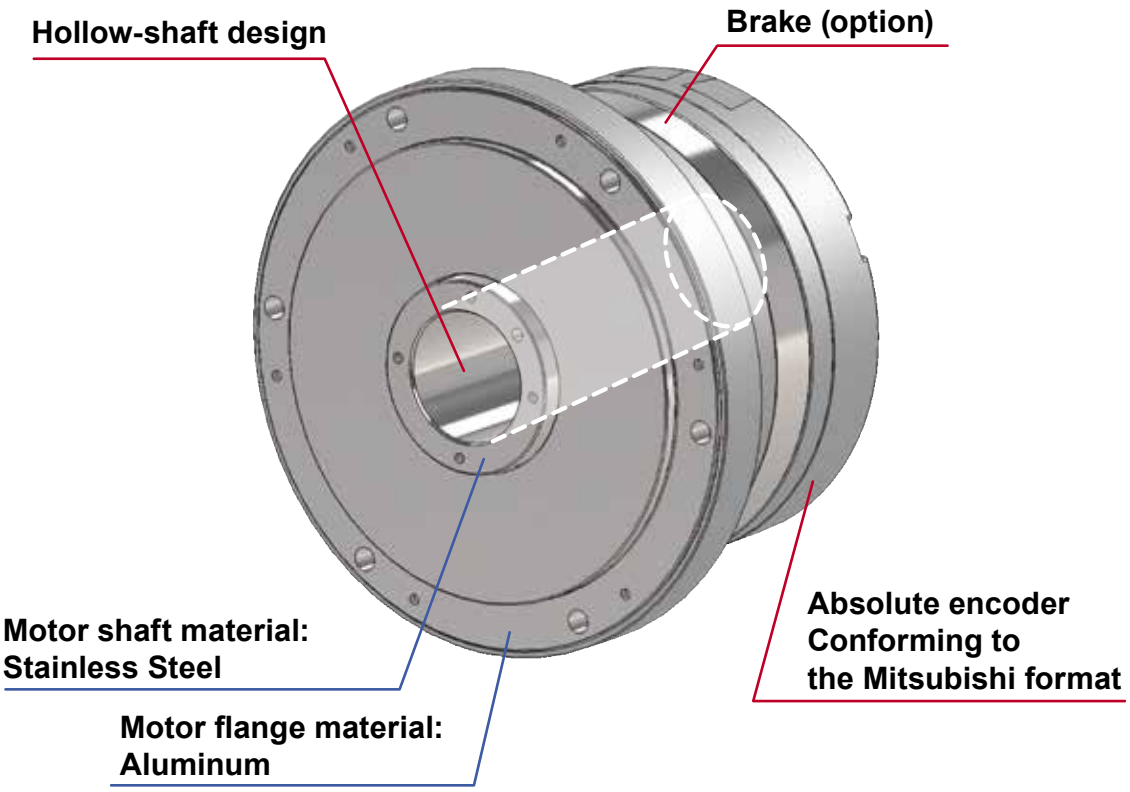
SERVO SYSTEM CONTROLLER NETWORK

Harmonic Drive and Mitsubishi Collaboration

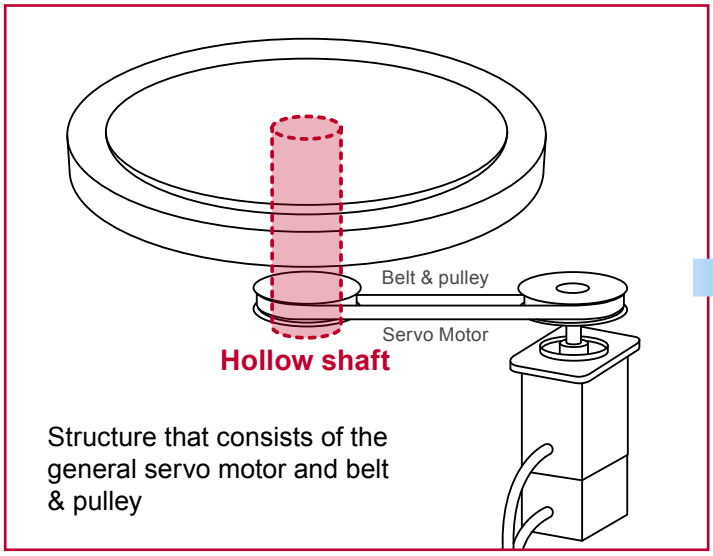
The flat hollow-shaft servo motor HMA series now connects directly with Mitsubishi MELSERVO-J4 (SSCNET III/H).

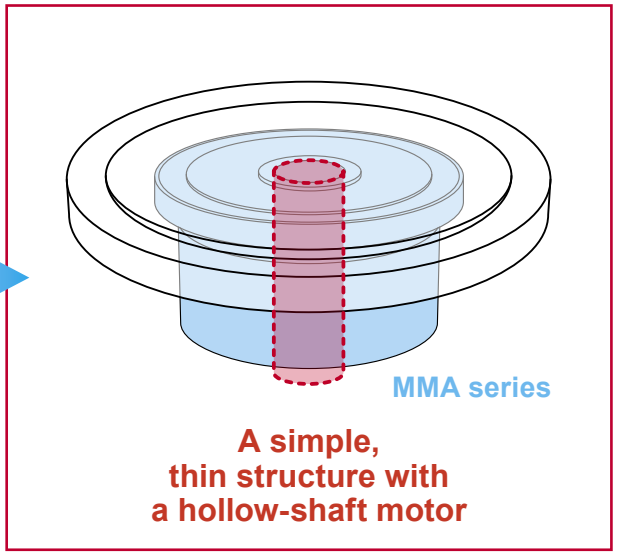
Features

- Large through-hole can be used to pass cables, pipes or shafts concentric to the axis of rotation. (The hollow shaft is available from φ22 to 60 mm.)
- Flat configuration.
- Four types with rated output from 251 to 1320W.
- Integrated brake option is available without dimension change.
- Provides easy connection to a system configured with the “MELSERVO-J4” SSCNET III/H communication.



Simple System Configuration





Mitsubishi AC Servo MELSERVO-J4

Servo Amplifier compatible with SSCNET III/H
MR-J4-B-S033

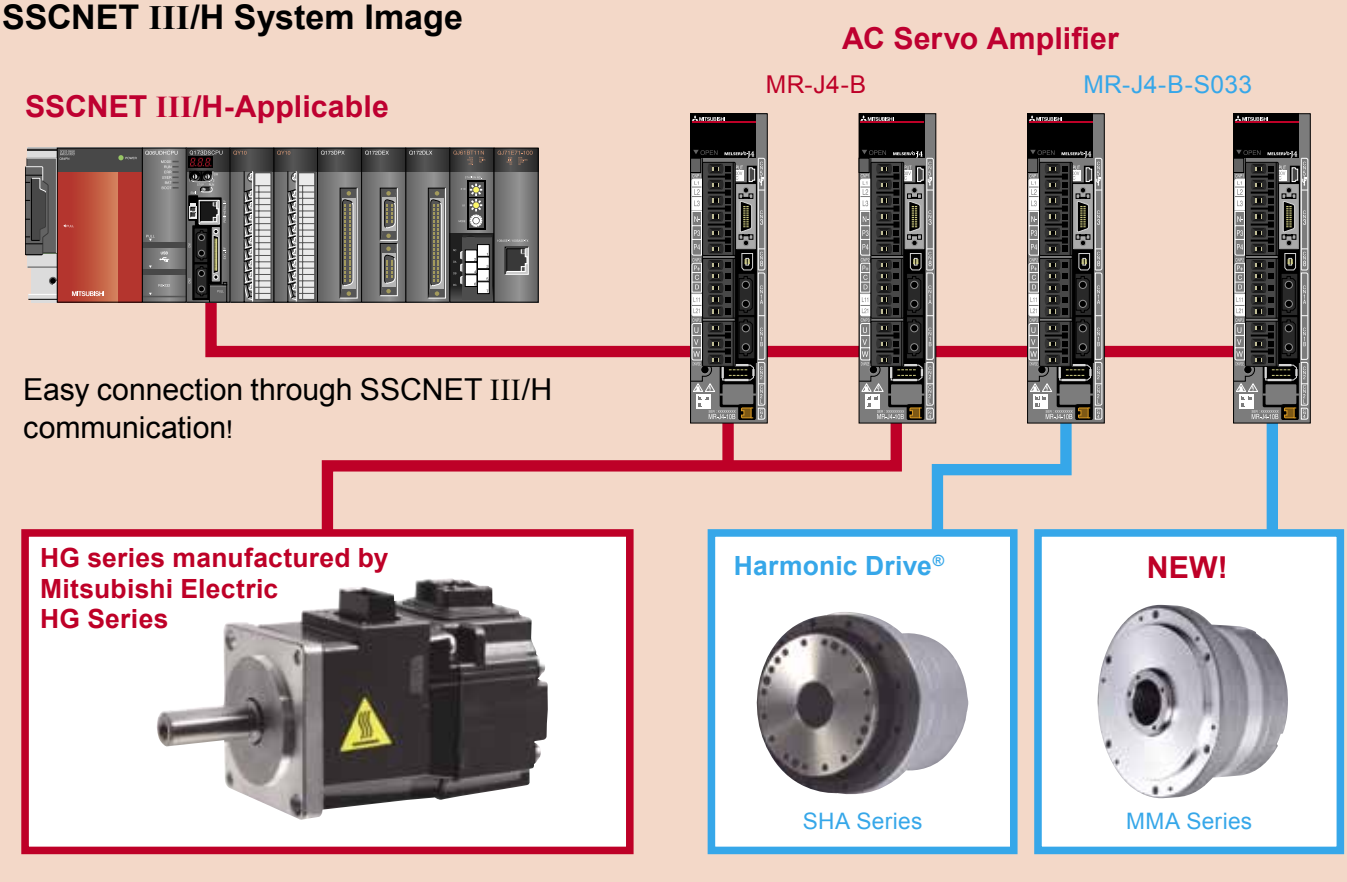
Servo Amplifier for SSCNET III/H Advanced High-Speed Motion Network 2.5kHz Velocity Frequency Response Delivers full performance from the MMA Actuator

Combination of Servo Amplifier with a Relay Cable

Motor model	Servo amplifier model Compatibility with SSCNET III/H	Relay cable type (separately sold)	
		Motor cable	Encoder cable Note
MMAB09	MR-J4-60B-S033	EWD-MB**-A06-TMC-M	MR-EKCBL□M-H (Enhanced flex life product) or MR-EKCBL□M-L (Standard product)
MMAB12	MR-J4-100 B-S033		
MMAB15	MR-J4-200 B-S033		
MMAA21A	MR-J4-500 B-S033	EWD-MB**D09-TMC-M2	

For the servo amplifier and encoder relay cable, contact Mitsubishi Electric Corporation.
"**" and "□" in the relay cable type means the cable length. Refer to the following description.
Motor wire: 02 = 2 m, 05 = 5 m, 10 = 10 m Encoder wire: 2 = 2 m, 5 = 5 m, 10 = 10 m
Note: MMAA21A must be used in combination with the encoder connector conversion cable provided with the motor.

■ SSCNET III/H System Image



Ordering Code

MMA	B	09	A	200	–	16	S17b	A	–	C	Y	–	SP
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)		(9)	(10)		(11)

(1)	Model Name	AC servo motor MMA series
(2)	Motor Version Symbol	A: Size 21A B: Size 09, 12, 15
(3)	Size	09, 12, 15, 21A
(4)	Brake	A: Without brake B: With brake
(5)	Applied Servo Amplifier Input voltage	200VAC

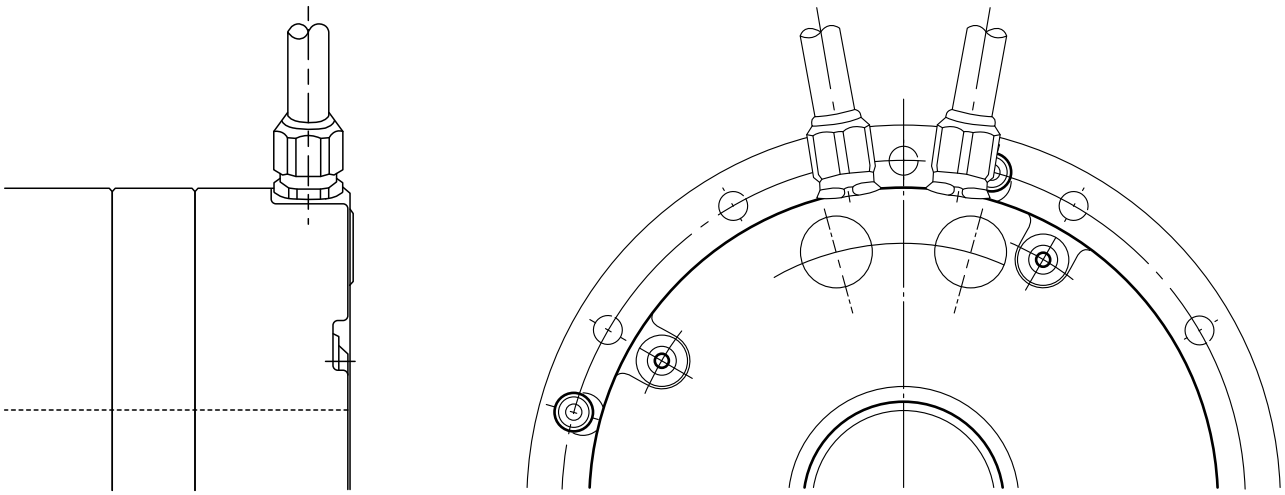
(6)	Encoder Format	Conforming to the Mitsubishi format
(7)	Encoder Resolution	17-bit multi-revolution absolute encoder 131,072 pulses/revolution
(8)	Encoder Phase Angle	Phase difference between the motor U phase and the encoder origin
(9)	Connector Specification	C: With standard connectors N: Without connectors
(10)	Option Symbols	No symbol: Standard product Y:Side exiting cable (Not supported in Size 21A)
(11)	Special Specifications	No symbol: Standard product SP: Special-specification product

Option

■ **Side Exiting Cable** (Symbol for option: Y)

Cables (motor cable and encoder cable) are exited from the side of the motor.
Use this option when there is not enough space in the rear direction of housing when installing a motor in the device.

Side Exiting Cable



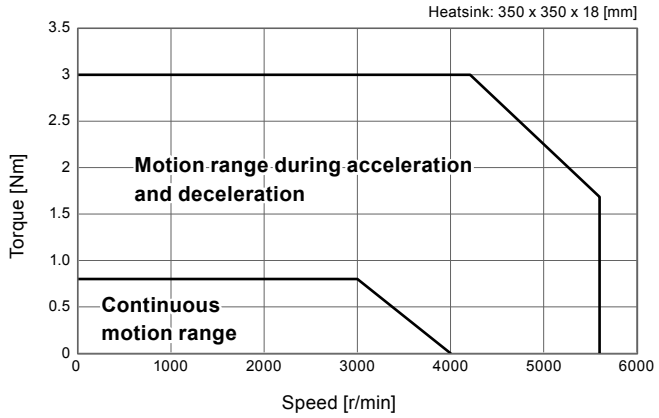
Motor Specifications

Item \ Type			MMAB09	MMAB12	MMAB15	MMAA21A
Combined servo amplifier			MR-J4-60 B-S033	MR-J4-100 B-S033	MR-J4-200 B-S033	MR-J4-500 B-S033
Input power supply voltage		V	200	200	200	200
Rated output		W	251	406	754	1320
Instantaneous maximum torque*1		Nm	3.0	6.6	13	45
		kgf·m	0.31	0.67	1.33	4.59
Rated torque*1, *2		Nm	0.80	1.55	3.60	12.6
		kgf·m	0.082	0.158	0.367	1.29
Maximum speed*1		rpm	5,600	4,800	4,000	3,000
Rated speed		rpm	3,000	2,500	2,000	1,000
Instantaneous maximum current*1		A_{rms}	8.9	18	29	75
Rated current*1, *2		A_{rms}	2.5	4.2	7.8	20.0
Torque constant*1		Nm/A_{rms}	0.41	0.44	0.54	0.72
		$kgf·m/A_{rms}$	0.042	0.045	0.055	0.073
Inductive voltage constant*3		V/(r/min)	0.043	0.046	0.057	0.075
Phase resistance (20°C)		Ω	1.2	0.33	0.19	0.028
Phase inductance		mH	3.0	1.4	1.2	0.29
Moment of Inertia ( ) indicates the model equipped with a brake.	$GD^2/4$	$x\ 10^{-4}\ kg·m^2$	1.78 (2.16)	6.45 (6.83)	15.8 (19.8)	125 (141)
	J	$x\ 10^{-4} kgf·cm·s^2$	18.2 (22.1)	65.8 (69.7)	161 (202)	1280 (1444)
Allowable radial load (static)		N	800	1200	2400	4500
		kgf	81.6	122	245	459
Allowable axial load (static)		N	2400	3600	5000	14000
		kgf	245	367	510	1429
Rated radial load (At the rated speed)		N	185	233	530	1040
		kgf	18.9	23.8	54.1	106.1
Rated axial load (At the rated speed)		N	105	130	180	880
		kgf	10.7	13.3	18.4	89.8
Encoder type			Absolute encoder			
Encoder resolution	Single turn motor revolution		2^{17}(131,072)			
	Multi-revolution counter*4		2^{16}(65,536)			
Mass ( ) indicates the model equipped with a brake.		kg	2.0 (2.1)	3.4 (3.8)	5.5 (6.2)	17.5 (19.7)
Ambient environment specification			Operating temperature: 0 to 40°C/Storage temperature: -20 to 60°C Operating/storage humidity: 20 to 80% RH (non-condensing) Vibration resistance: $25m/s^2$ (frequency: 10 to 400 Hz) / impact resistance: $300\ m/s^2$ *5 No dust, metal powder, corrosive gas, flammable gas, oil mist, or other similar material. Place indoors without being exposed to direct sunlight. Altitude: 1,000 m or less			
Motor insulation			Insulation resistance: 100 MΩ (500 VDC) or higher Dielectric strength voltage: 1500 VAC/min Insulation class: A			
Mounting direction			Can be installed in any direction.			
Protective structure			Totally enclosed self-cooled type (IP54)			

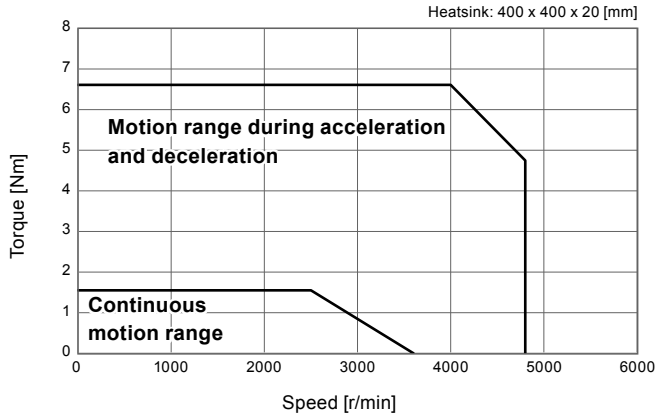
The values in the table above show typical values.
*1: They are typical characteristics in the case of combinations with our driver (driven with the ideal sine wave).
*2: This is the value for saturated temperature when installed on the next aluminum heatsink of the following size:
MMAB09: 350 x 350 x 18 [mm], MMAB12: 400 x 400 x 20 [mm], MMAB15: 500 x 500 x 25 [mm], MMAA21A: 650 x 650 x 30 [mm]
*3: This is the value of the phase EMF constant multiplied by 3.
*4: The range of the multi revolution counter is from -32,768 to 32,767.
*5: This value is not ensured if vibrations or shocks are applied for hours or continuously.

Operating Range

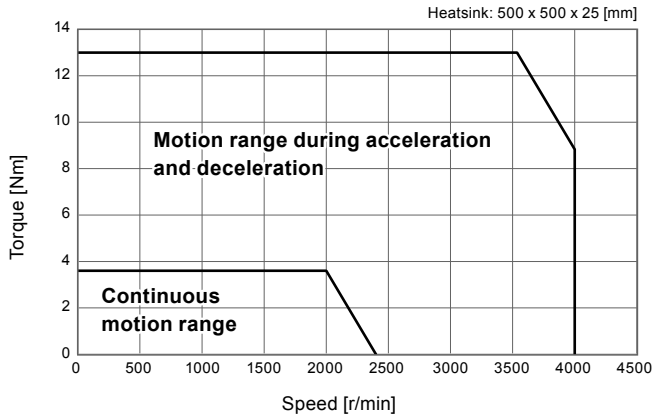
MMAB09/MR-J4-60B-S033



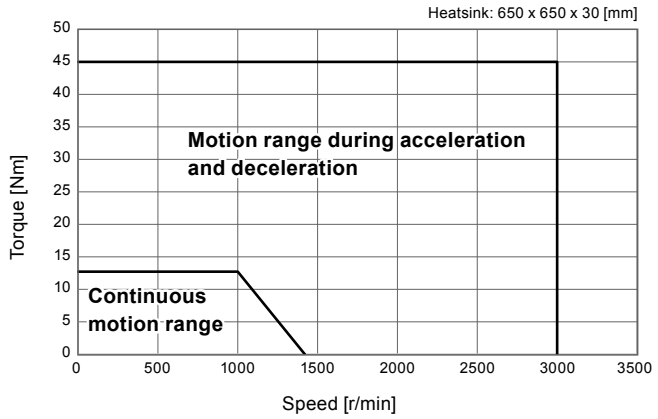
MMAB12/MR-J4-100B-S033



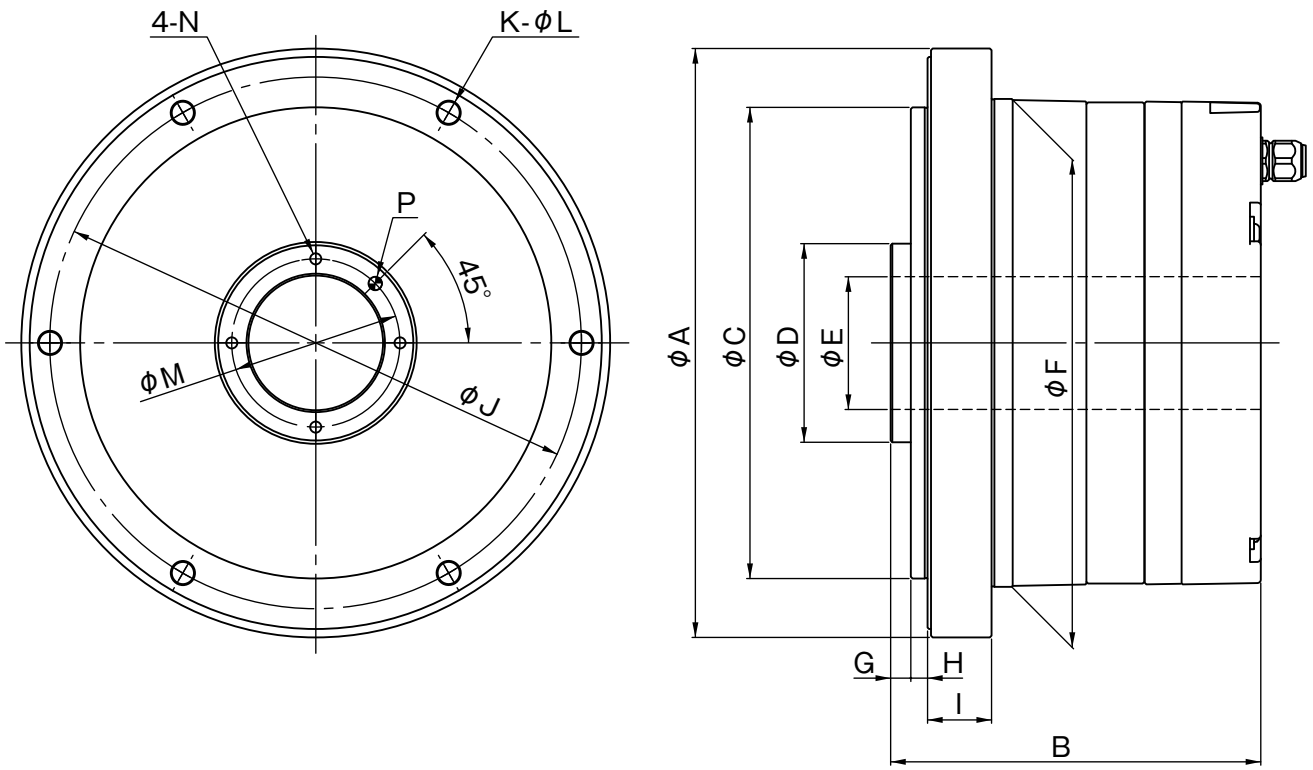
MMAB15/MR-J4-200B-S033



MMAA21A/MR-J4-500B-S033



External Dimensions



Note) For details of the external dimensions, refer to the delivery specification drawing issued by HDS.

(Unit: mm)

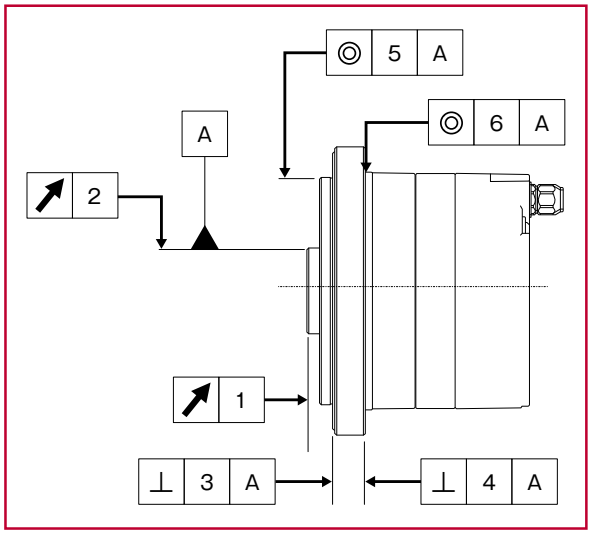
Dimension	MMAB09	MMAB12	MMAB15	MMAA21A
φA	114	146	175	247
B	88.5	95.5	110	157
φC	90 h7	114 h7	140 h7	200 h7
φD	34 h6	43 h6	59 h6	88 h6
φE (hollow diameter)	22	30	40	60
φF	94 h7	122 h7	145 h7	210 h7
G	5	5	6	8
H	5	5	5	8
I	13	15	19	39
φJ	102	132	158	226
K	6	6	6	8
φL	4.5	5.5	6.6	9.0
φM	28	36	50	74
N	M3X6	M3X6	M4X8	M5X10
P	Φ3 H7X5	Φ3 H7X5	Φ4 H7X7	Φ5 H7X8

Mechanical Accuracy

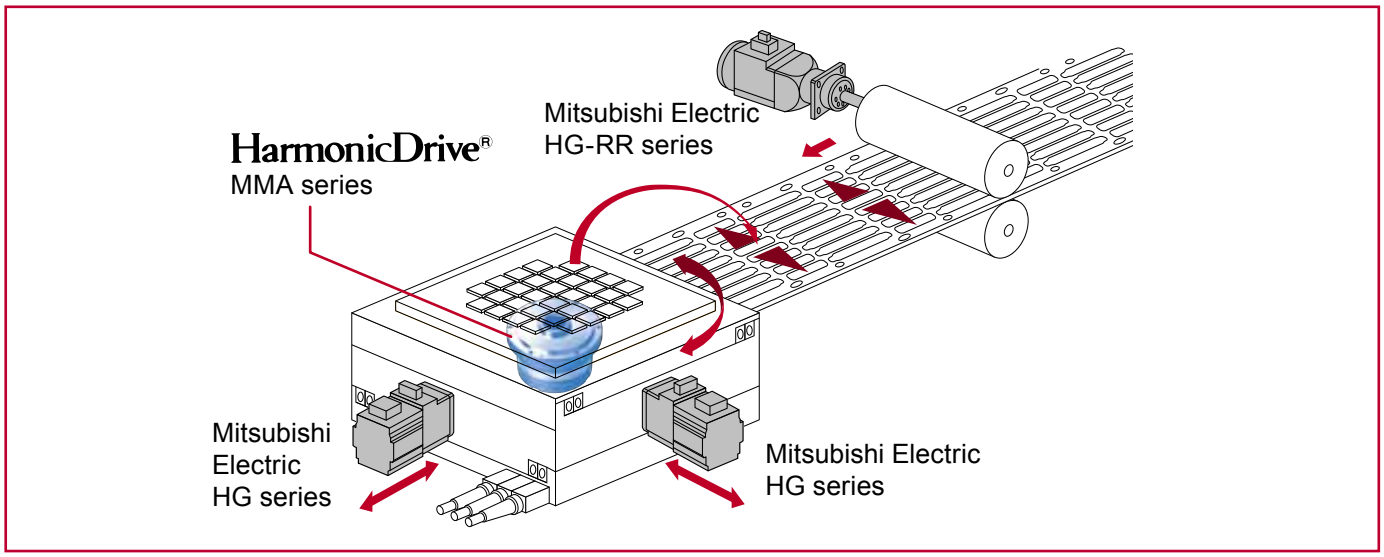
The mechanical accuracy of the MMA series motor output shaft and of the mounting flange are shown below:

(Unit: mm)

Accuracy Item	MMAB09	MMAB12	MMAB15	MMAA21A
1. Output shaft surface runout	0.020	0.020	0.040	0.040
2. Output shaft radial runout	0.020	0.020	0.040	0.040
3. Mounting surface squareness to the output shaft	0.080	0.080	0.090	0.100
4. Mounting surface squareness to the output shaft	0.065	0.065	0.085	0.090
5. Concentricity between the output shaft and actuator mounting diameter	0.050	0.050	0.050	0.060
6. Concentricity between the output shaft and actuator mounting diameter	0.045	0.045	0.055	0.065



Application Example



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