

HarmonicDrive®

**Flat Hollow Shaft AC
Servo Motor
MMA Series**

Mitsubishi AC Servo
MITSUBISHI SERVO AMPLIFIERS & MOTORS
MELSERVO
+ J4

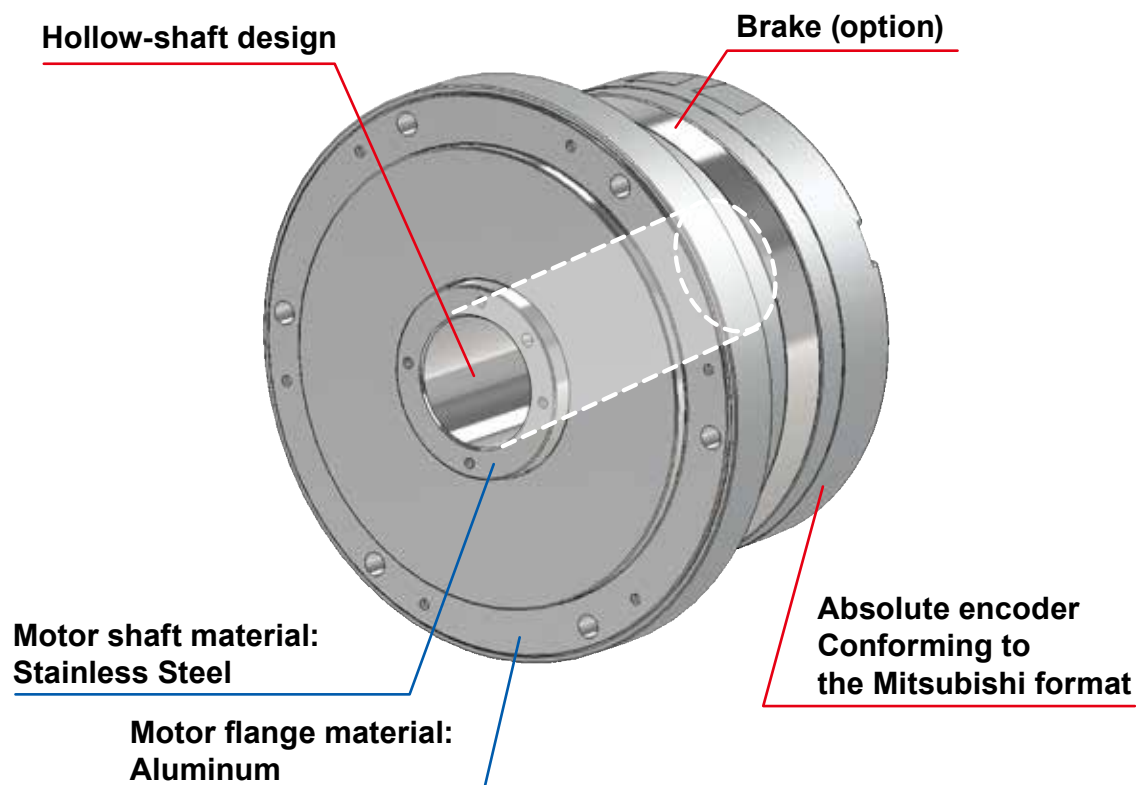


Harmonic Drive and Mitsubishi Collaboration

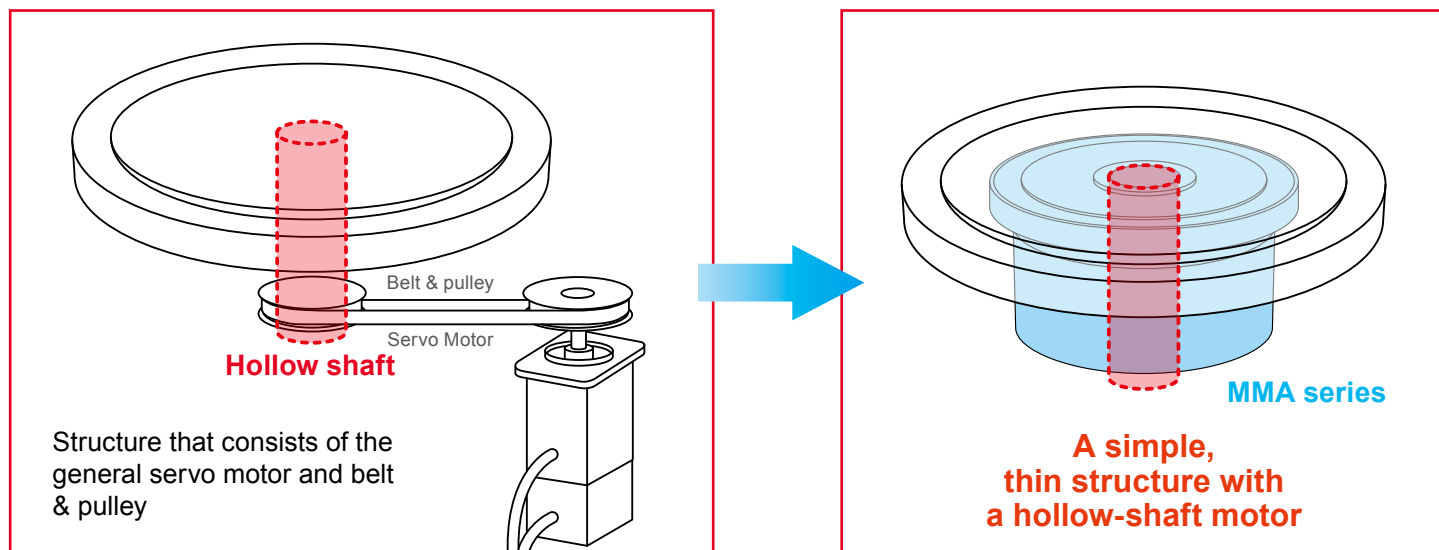
The flat hollow-shaft servo motor HMA series now connects directly with Mitsubishi MELSERVO-J4 (SSCNET III/H).

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 $\phi 22$ 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.

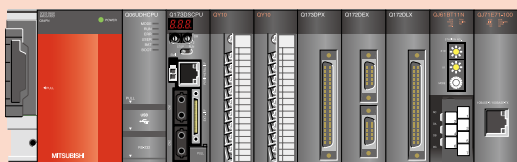
*** and "□" in the relay cable type means the cable length. Refer to the following description.

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

SSCNET III/H-Applicable

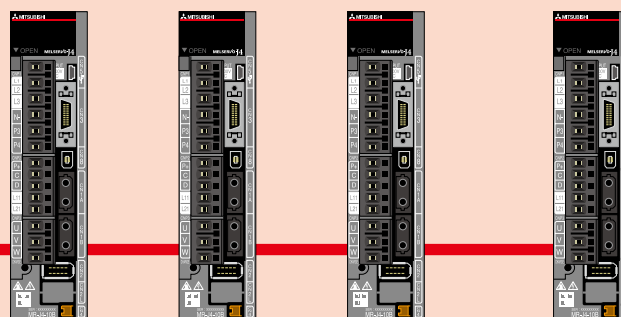


Easy connection through SSCNET III/H
communication!

AC Servo Amplifier

MR-J4-B

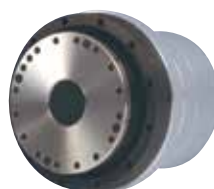
MR-J4-B-S033



HG series manufactured by
Mitsubishi Electric
HG Series



Harmonic Drive®



SHA Series

NEW!



MMA Series

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	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 A: Standard specification
(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

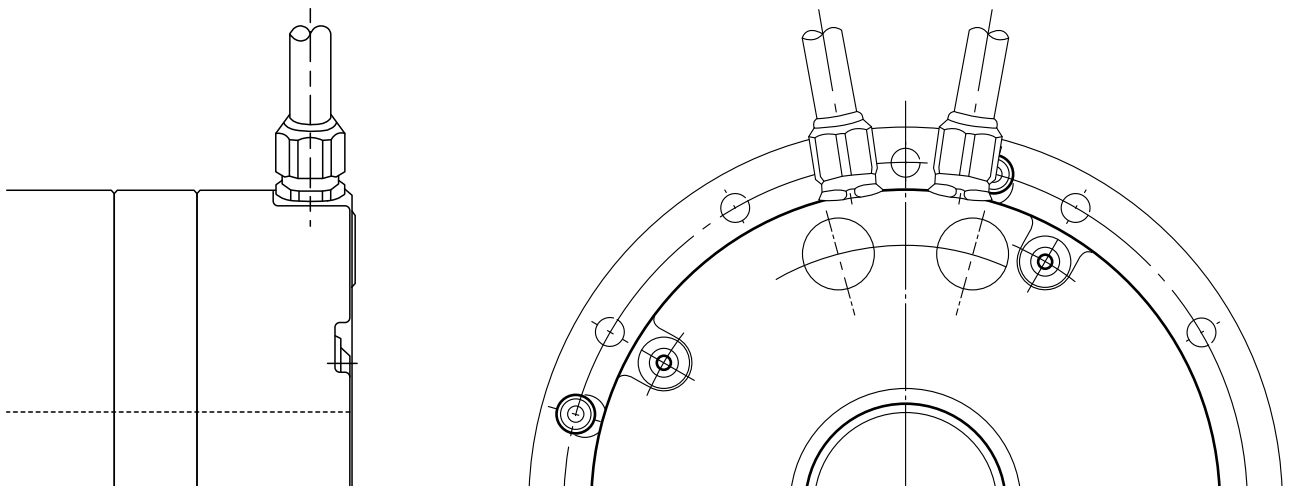
Option

■ 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 [†]		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.

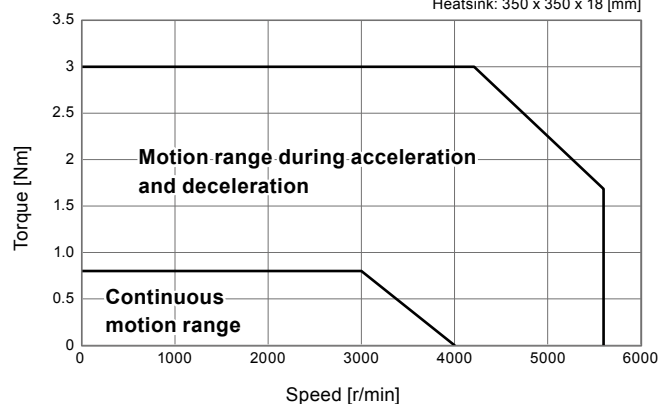
*4: The range of the multi revolution counter is from -32,768 to 32,767.

*5: This value is not ensured if vibrations or shocks are applied for hours or continuously.

Operating Range

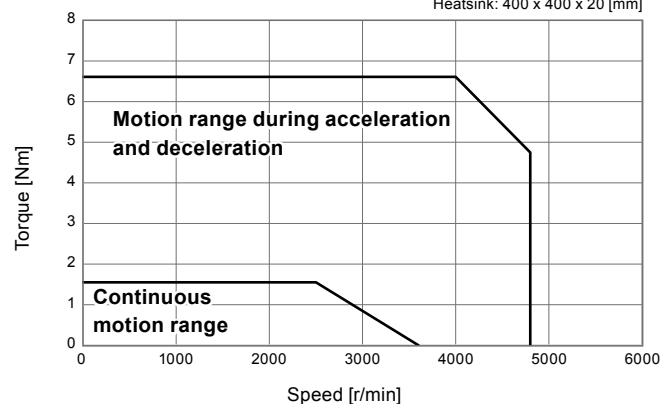
MMAB09/MR-J4-60B-S033

Heatsink: 350 x 350 x 18 [mm]



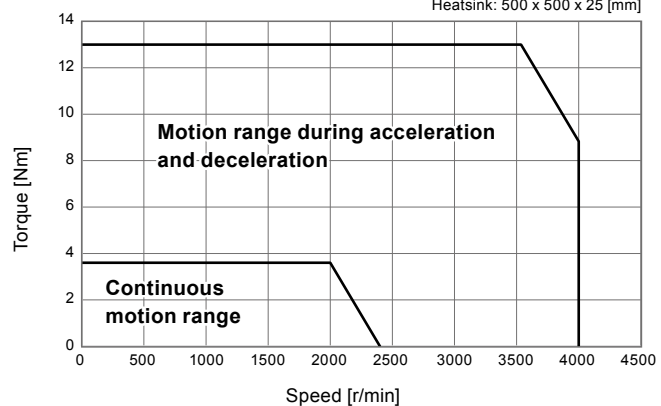
MMAB12/MR-J4-100B-S033

Heatsink: 400 x 400 x 20 [mm]



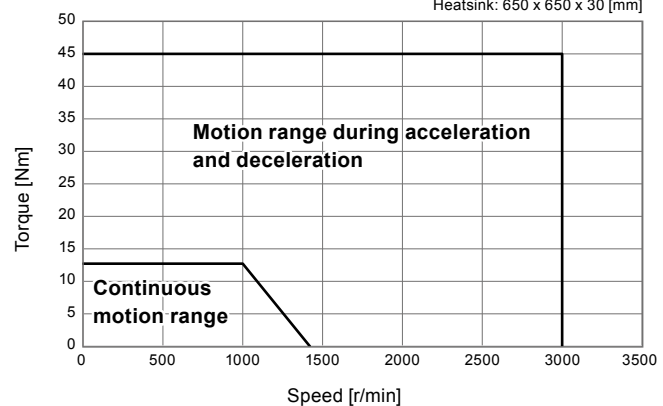
MMAB15/MR-J4-200B-S033

Heatsink: 500 x 500 x 25 [mm]

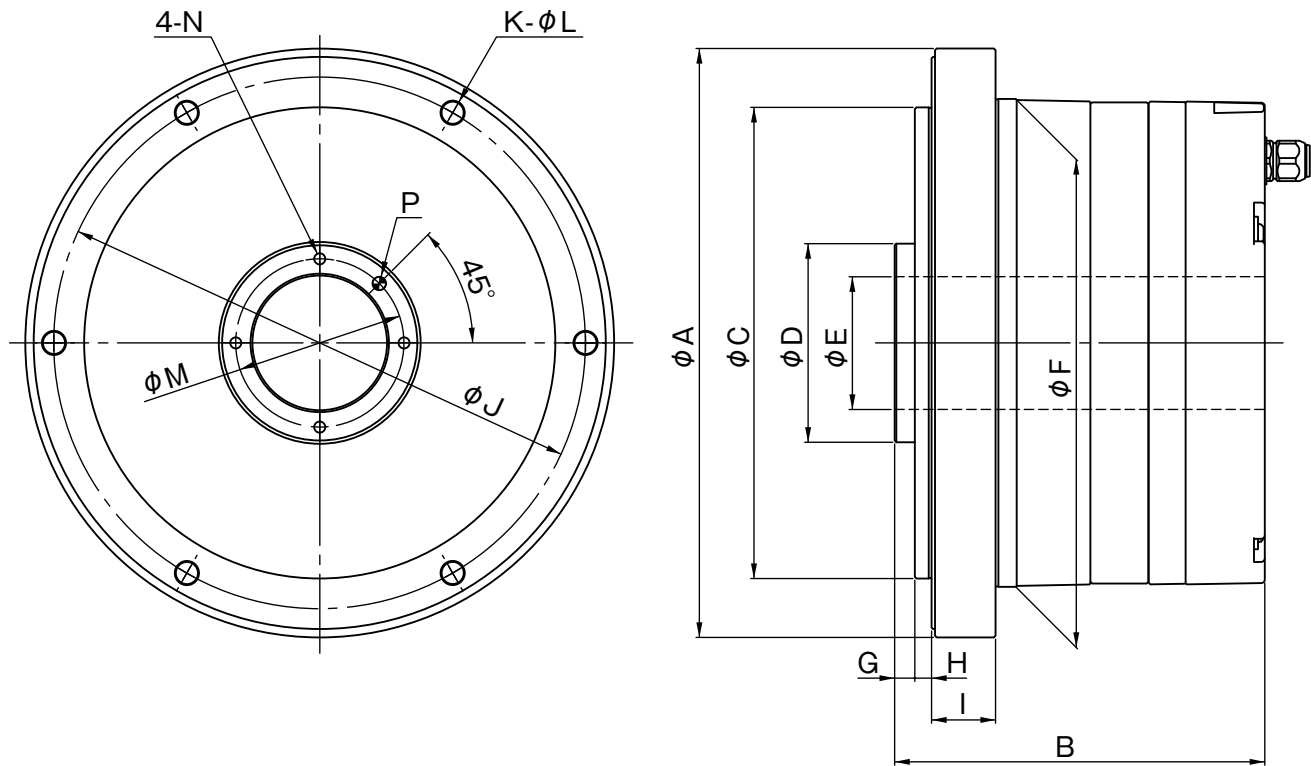


MMAA21A/MR-J4-500B-S033

Heatsink: 650 x 650 x 30 [mm]



External Dimensions



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

(Unit: mm)

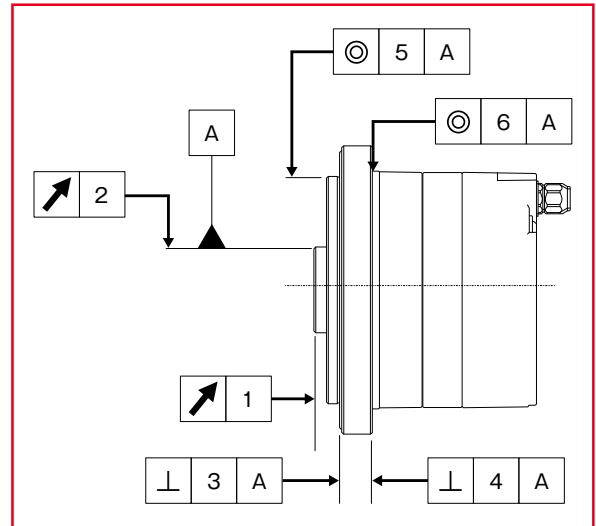
Dimension	MMAB09	MMAB12	MMAB15	MMAA21A
ϕA	114	146	175	247
B	88.5	95.5	110	157
ϕC	90 h7	114 h7	140 h7	200 h7
ϕD	34 h6	43 h6	59 h6	88 h6
ϕE (hollow diameter)	22	30	40	60
ϕF	94 h7	122 h7	145 h7	210 h7
G	5	5	6	8
H	5	5	5	8
I	13	15	19	39
ϕJ	102	132	158	226
K	6	6	6	8
ϕL	4.5	5.5	6.6	9.0
ϕM	28	36	50	74
N	M3X6	M3X6	M4X8	M5X10
P	$\phi 3$ H7X5	$\phi 3$ H7X5	$\phi 4$ H7X7	$\phi 5$ H7X8

Mechanical Accuracy

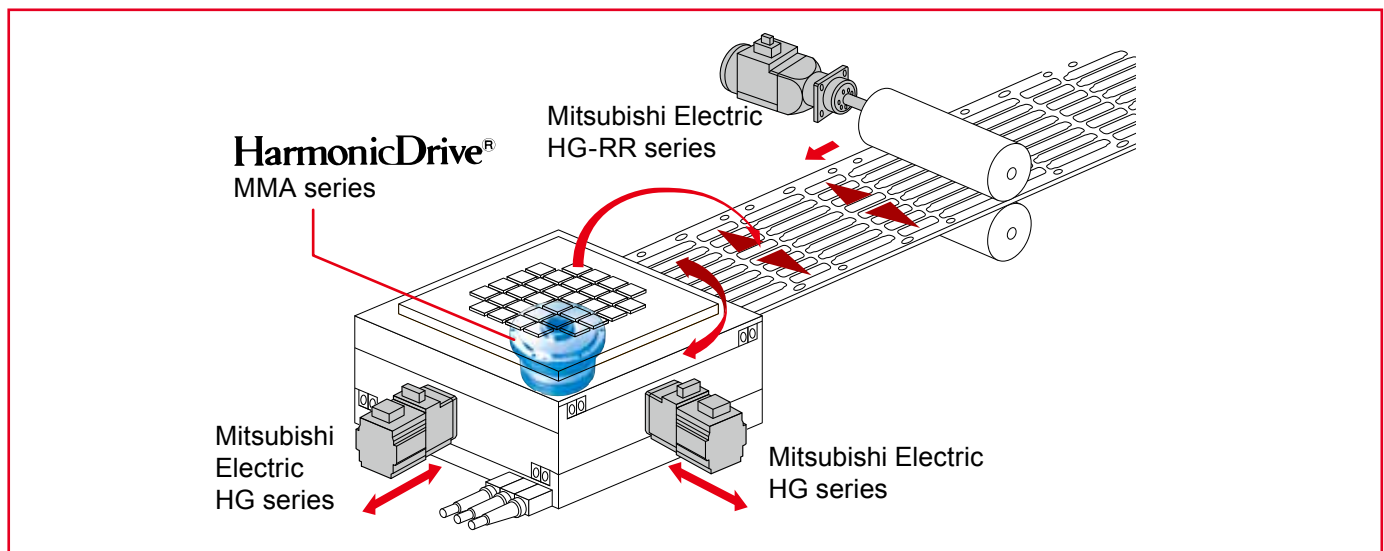
The mechanical accuracy of the MMA series motor output shaft and of the mounting flange are shown below:

(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



Harmonic Drive LLC

Boston US Headquarters

42 Dunham Ridge
Beverly, MA 01915
978.532.1800
www.HarmonicDrive.net

New York Sales Office

100 Motor Parkway, Suite 116
Hauppauge, NY 11788

California Sales Office

333 W. San Carlos Street, Suite 1070
San Jose, CA 95110

Chicago Sales Office

137 N. Oak Park Ave., Suite 410
Oak Park, IL 60301

Group Companies

Harmonic Drive Systems, Inc.
6-25-3 Minami-Ohi, Shinagawa-ku
Tokyo 141-0013, Japan

Harmonic Drive SE
Hoenbergstrasse, 14, D-65555
Limburg/Lahn Germany

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