

HarmonicDrive®

HarmonicDrive®
Flat Hollow Shaft
AC Servo Motor
YMA Series



YASKAWA
AC SERVOPACK
Σ-7 Series



HarmonicDrive®



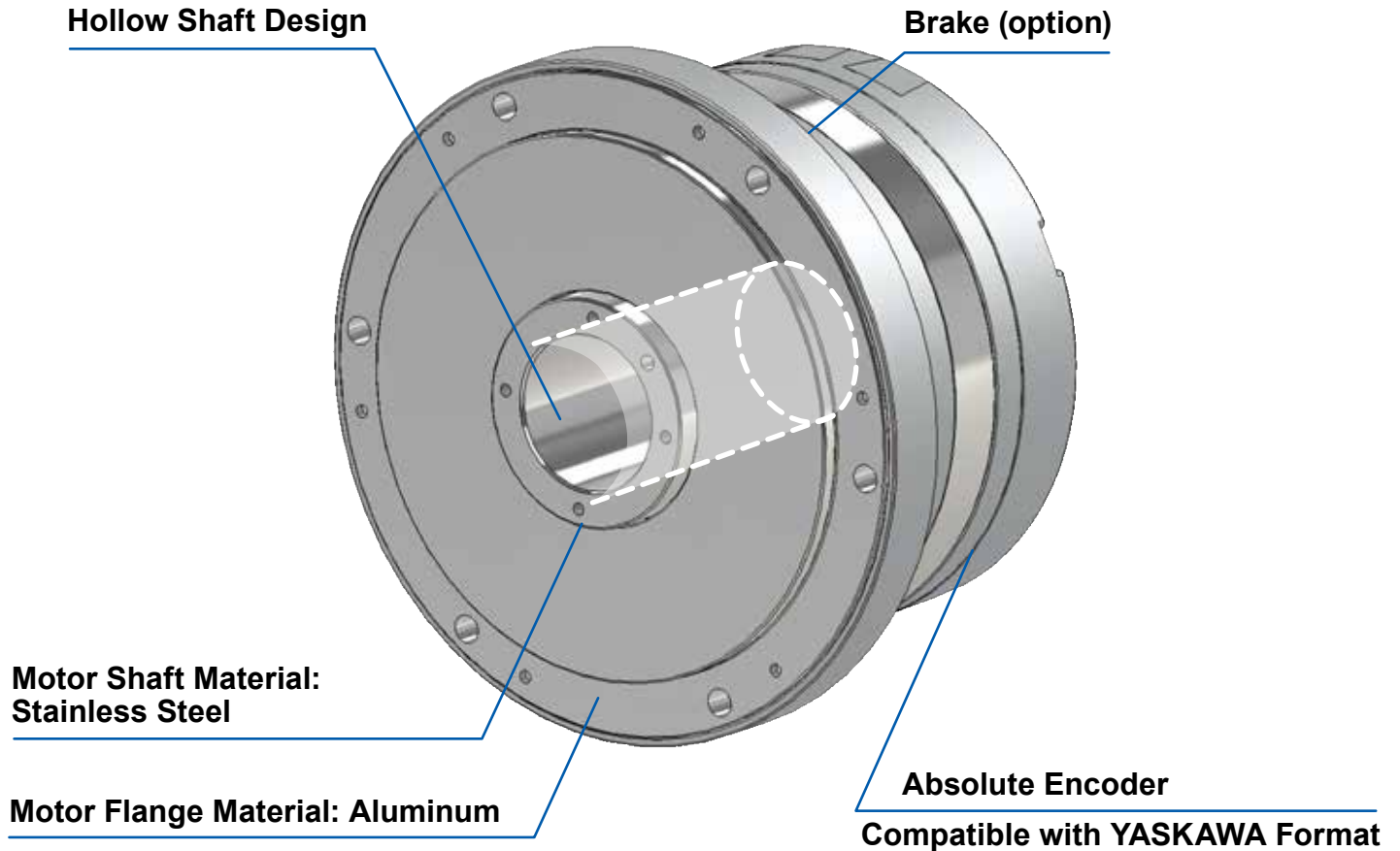
 **MECHATROLINK**

Harmonic Drive and Yaskawa Collaboration

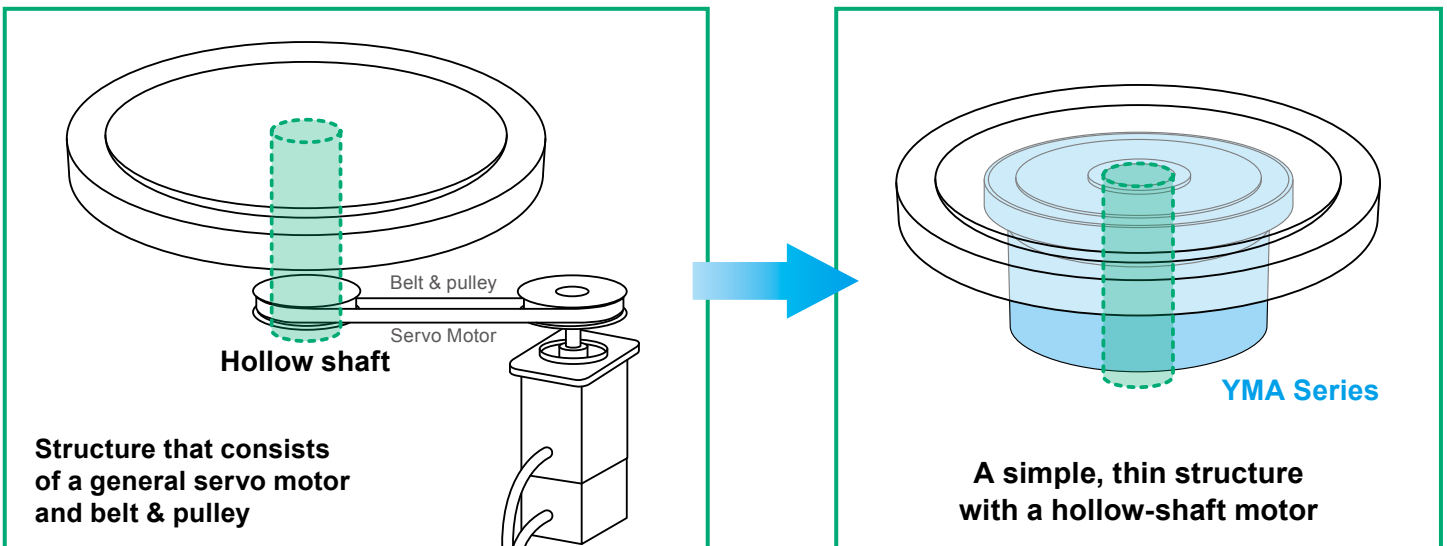
The HMA series Flat Hollow Shaft AC servo motor from Harmonic Drive is now compatible with the latest Σ-7 series servo amplifier with MECHATROLINK-III communication from Yaskawa.

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 structure
- Four models rated output from 251 to 1320 W
- Integrated brake option is available without dimension change.
- Provides easy connection to a system configured with MECHATROLINK-III communication.



Simple System Configuration



YE AC SERVOPACK Σ -7 Series

■ MECHATROLINK-III-compatible AC SERVOPACK SGD7S-□□□A20A■■■F81

The combination of the SERVOPACK achieves a velocity frequency response of 3.1kHz and MECHATROLINK-□ with the shortest transmission cycle of 125 μ s delivers full performance of the YMA series.

* "■■■" indicates whether or not a dynamic brake resistor is used (No: 000, Yes: 020).



■ Combinations The combinations of SERVOPACKs, motors, and extension cables are shown below.

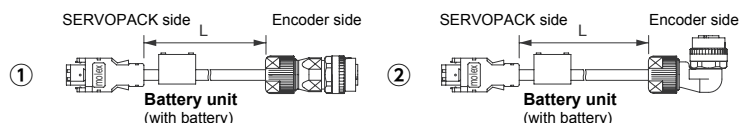
YMA	SERVOPACK Note 1	Power Supply	Extension cable		
			Motor Cable	Encoder	
				Standard Cable	Flex Cable
YMAB09	SGD7S-3R8A20A■■■F81	Three-phase 200V	EWD-MB**-A06-TN-Y	JZSP-CSP19**-E	JZSP-CSP29**-E
	SGD7S-5R5A20A008F81	Single-phase 200V			
YMAB12	SGD7S-120A20A■■■F81	Three-phase 200V			
	SGD7S-120A20A008F81	Single-phase 200V			
YMAB15	SGD7S-180A20A■■■F81	Three-phase 200V	EWD-MB**-A06-TMC-Y		
YMAA21A	SGD7S-330A20A■■■F81	Three-phase 200V	EWD-MB**-D09-TMC (EWD-MB**-D09-TMC-Y) Note 3	① JZSP-CVP06**-E ② JZSP-CVP07**-E	① JZSP-CVP26**-E ② JZSP-CVP27**-E

Note 1: "■■■" in SERVOPACK models indicates with/without dynamic brake resistor is (No: 000, Yes: 020).

Note 2: "****" in relay cable model codes indicates the cable length (03 = 3 m, 05 = 5 m, 10 = 10 m, and 15 = 15 m).

Note 3: The item in parentheses is for 15m.

Note 4: For encoder extension cables of YMAA21A, one of the two connector shapes can be selected.



■ MECHATROLINK-III System Image

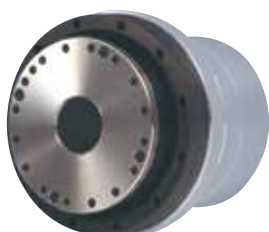
MECHATROLINK-III-Controller
MP-3300 Series

SGD7S-□□□A20A■■■F81
SHA-Y, YMA-Compatible
SERVOPACK
 Σ -7-F81 Series

SGD7S-□□□A20A
 Σ -7 Series Standard
SERVOPACK



HarmonicDrive®
SHA-Y Series



HarmonicDrive®
YMA Series



YASKAWA
 Σ -7 Series
Servo Motor
(Standard)



Easy connection through
MECHATROLINK-III communication!
Selections available!

Ordering Code

YMA	B	09	A	200	–	17	S17b	A	–	C	Y	–	SP
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)		(9)	(10)		(11)

(1)	Model	YMA AC servo motor 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)	Power Supply Voltage	200 VAC
(6)	Encoder Format	17: YASKAWA

(7)	Encoder Resolution	S17b: 17-bit multi-revolution absolute encoder 131072 pulse/revolution
(8)	Encoder Phase Angle	Phase difference between the induced voltage of the motor U phase and the absolute 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 code

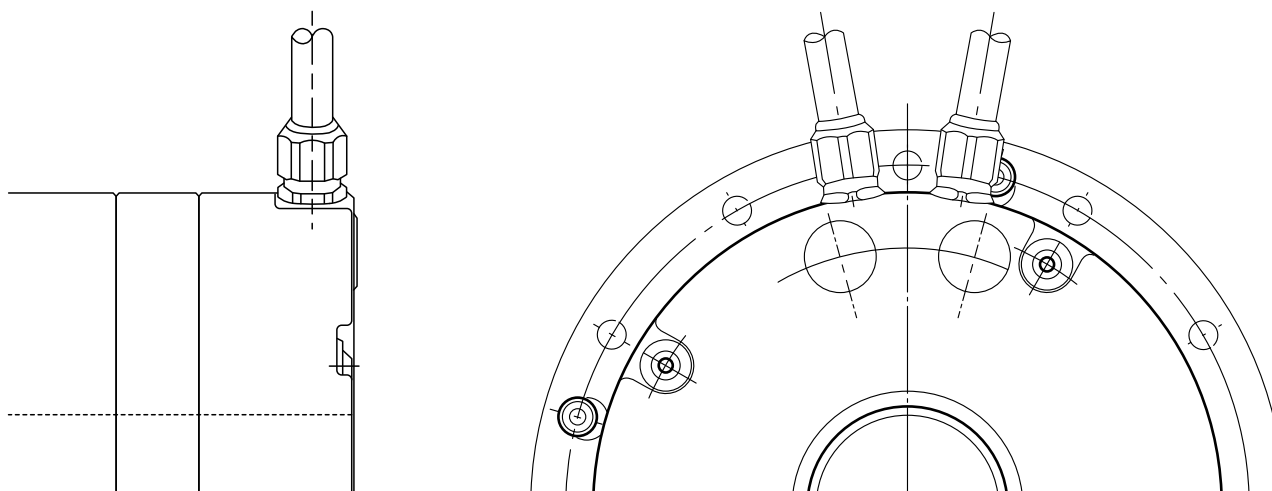
Option

■ Side Exit 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 the housing when installing the motor.

Side Exit Cable



Motor Specifications

Item			Type	YMAB09	YMAB12	YMAB15	YMAA21A
Combination SERVOPACK (three-phase 200V) SGD7S-□□□A20A-■□■F81				3R8A	120A	180A	330A
Combination SERVOPACK (single-phase 200V) SGD7S-□□□A20A-008F81				5R5A	120A	-	-
Input power supply voltage		V		200	200	200	200
Rated Output ^{*1,2}		W		251	406	754	1320
Instantaneous maximum torque ^{*1}		N·m		3.0	7.0	13	45
Rated Torque ^{*1,2}		N·m		0.8	1.55	3.6	12.6
Maximum Speed ^{*1}		rpm		5600	4800	4000	3000
Rated Speed		rpm		3000	2500	2000	1000
Instantaneous Maximum Current ^{*1}		A _{rms}		8.9	19	29	75
Rated Current ^{*1,2}		A _{rms}		2.5	4.2	7.8	20
Torque Constant ^{*1}		N·m/A _{rms}		0.41	0.44	0.54	0.72
Inductive Voltage Constant ^{*3}		V/(rpm)		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 with brake.	GD ² /4	×10 ⁻⁴ kg·m ²		1.78 (2.16)	6.45 (6.83)	15.8 (19.8)	125 (141)
	J	×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
Allowable Axial Load (static)		N		2400	3600	5000	14000
Rated Radial Load (at the rated speed)		N		185	233	530	1040
Rated Axial Load (at the rated speed)		N		105	130	180	880
Encoder Type				Absolute encoder			
Encoder Resolution		Single turn motor revolution		2 ¹⁷ (131072)			
		Multi revolution counter ^{*4}		2 ¹⁶ (65536)			
Mass () indicates with 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: 25 m/s ² ^{*5} (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: 1000 m or less			
Motor Insulation				Insulation resistance: 100 MΩ (500 VDC) or higher Dielectric strength: 500 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: Typical characteristics when used with the recommended sinusoidal SERVOPACK

*2: This is the value for saturated temperature when installed on the aluminum heatsink of the following size:

YMAB09 :350x350x18[mm] YMAB12: 400x400x20[mm] YMAB15 :500x500x25[mm] YMAA21A: 650x650x30[mm]

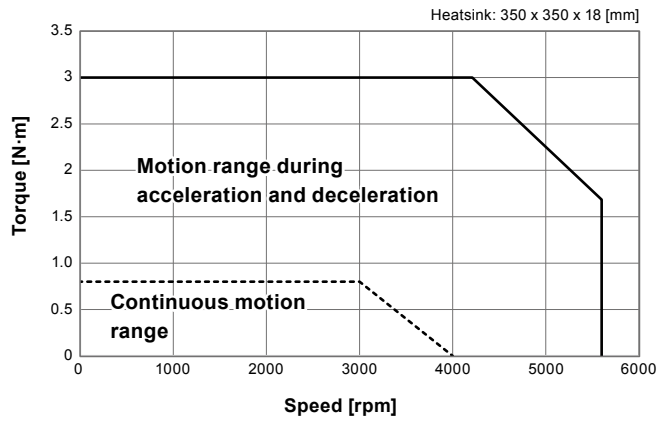
*3: This is the value of the phase EMF constant multiplied by 3.

*4: The range of the multi revolution detector is from 0 to 65535.

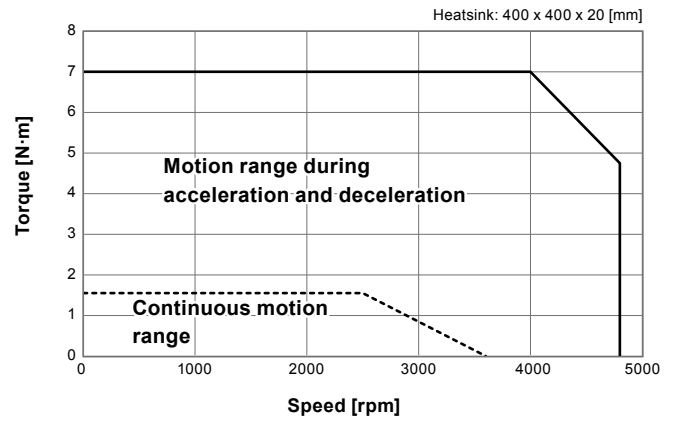
*5: This value is not ensured if vibrations or shocks are applied for hours or continuously.

Operable Range

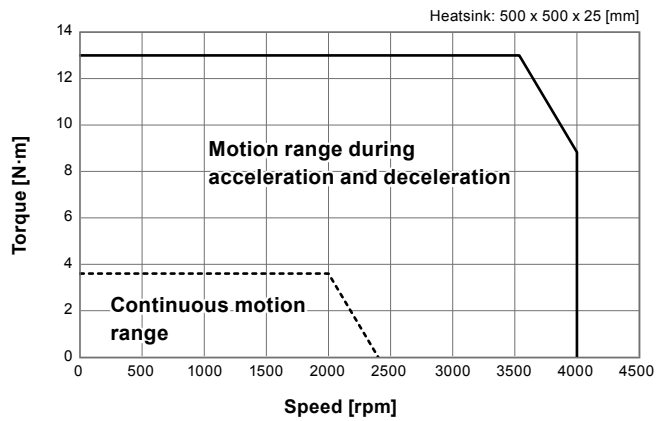
YMAB09/Three-phase: SGD7S-3R8A20A□□□F81
Single-phase: SGD7S-5R5A-20A008F81



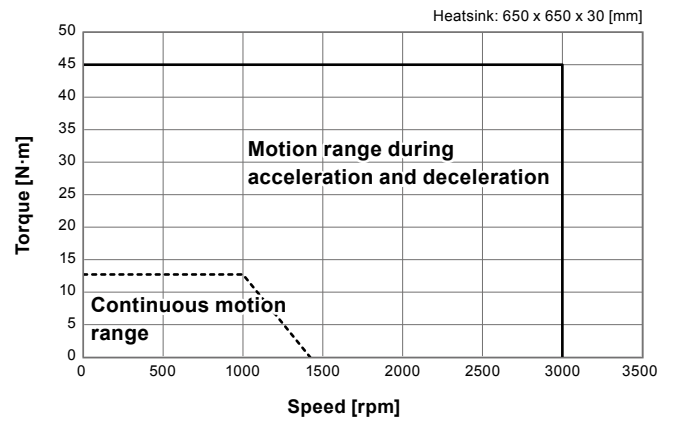
YMAB12/Three-phase: SGD7S-120A20A□□□F81
Single-phase: SGD7S-120A20A008F81



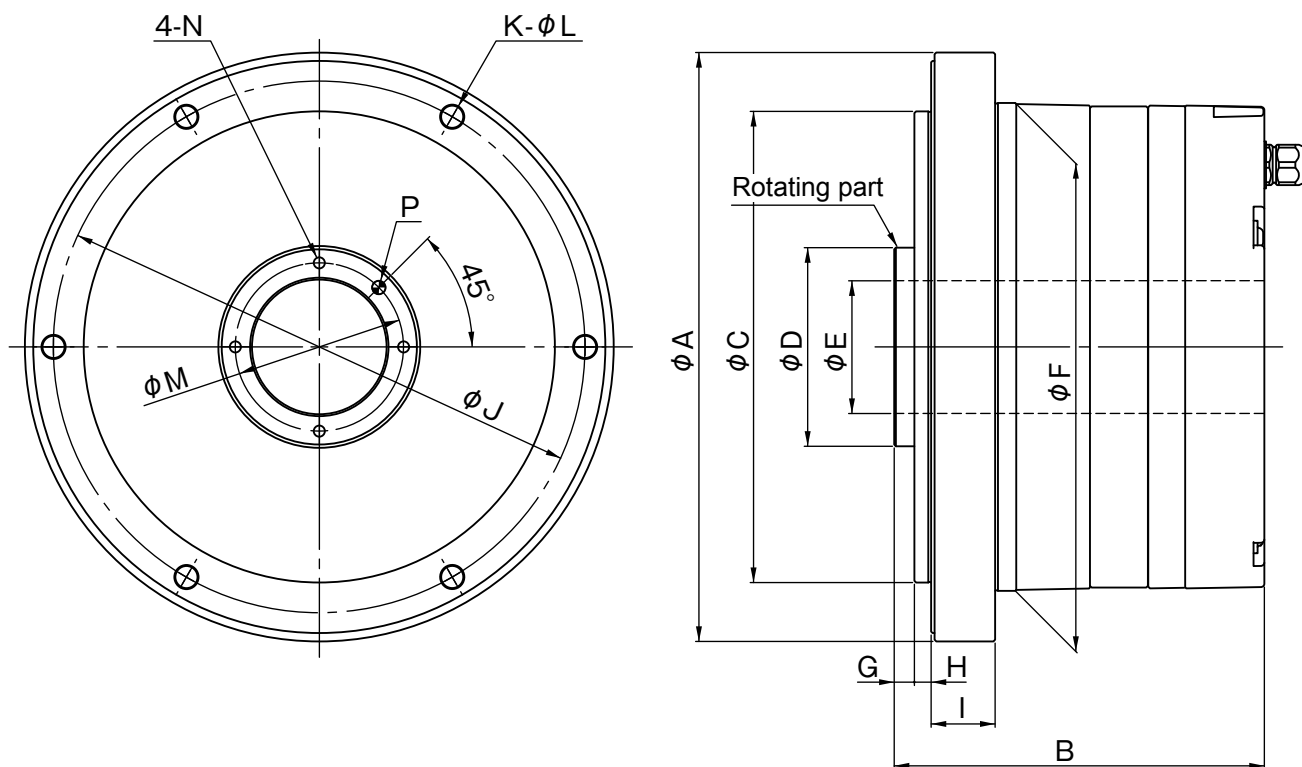
YMAB15□SGD7S-180A20A□□□F81



YMAA21A□SGD7S-330A20A□□□F81



Outline Dimensions



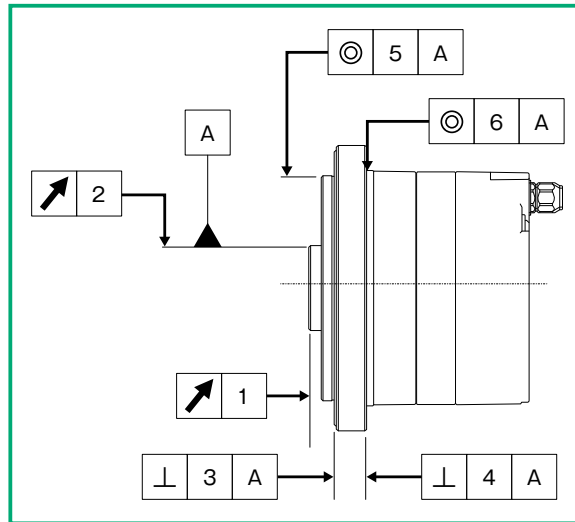
Note) For detailed dimensions, please refer to the confirmation drawing provided by Harmonic Drive.

[Unit: mm]

Dimension	YMAB09	YMAB12	YMAB15	YMAA21A
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 YMA series motor output shaft and of the mounting flange are shown below:



(Unit: mm)

Accuracy Item	YMAB09	YMAB12	YMAB15	YMAA21A
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

System Example

HarmonicDrive®
YMA series

YASKAWA
YE Σ-7 series

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