

HarmonicDrive® Flat Hollow Shaft AC Servo Motor YMA Series



YASKAWA Electric Corporation AC SERVOPACK Σ-7 Series

HarmonicDrive®



 MECHATROLINK

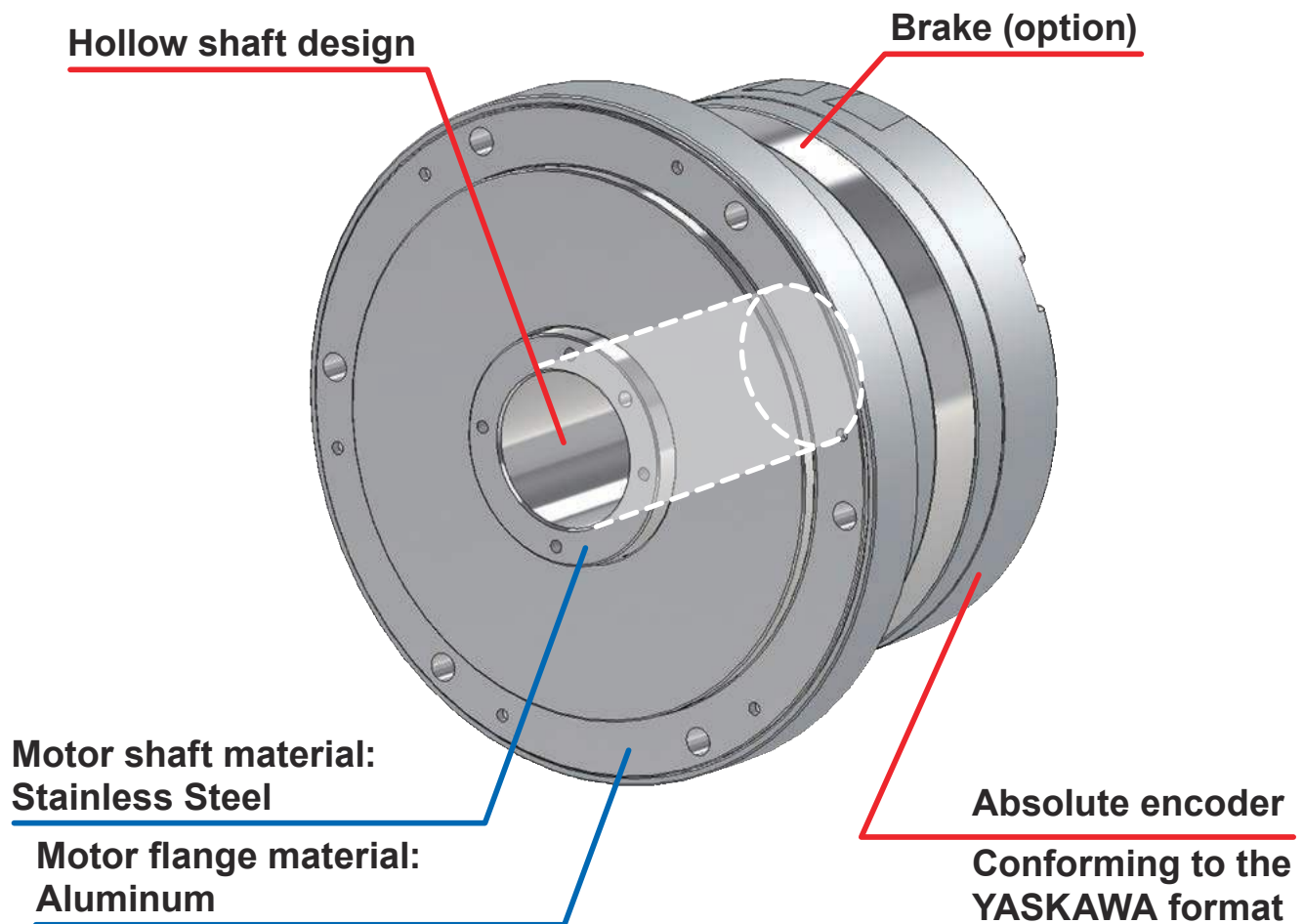
Models compatible with collaboration have been added.

The flat hollow-shaft AC servo motor HMA series is now compatible with the “Σ-7 series” manufactured by YASKAWA Electric Corporation to provide control through MECHATROLINK-III communication. Compatibility with the MECHATROLINK-III communication integrates the user interface, and the hollow shaft mechanism contributes to a reduction in size of the device configuration.

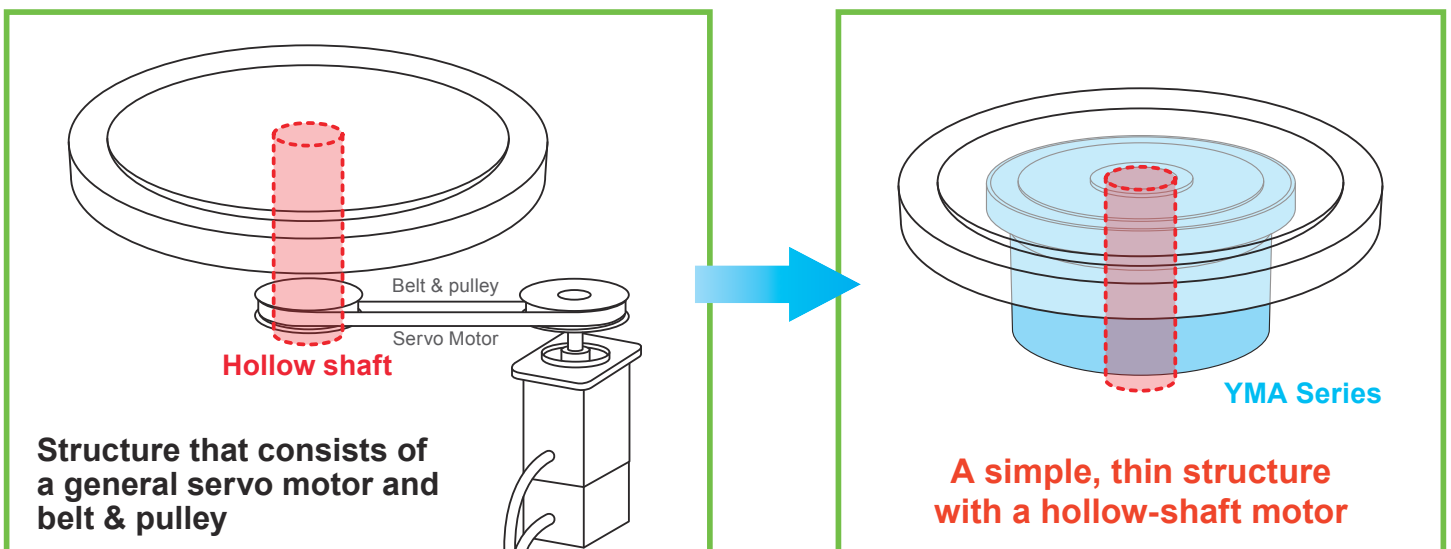
Contact: AC servo motor YMA series (Harmonic Drive Systems Inc.)
AC SERVOPACK Σ-7 series (YASKAWA Electric Corporation)

Features

- The hollow shaft design provides layout of the piping/wiring being layout on the center of rotation without offsetting the motor. (The hollow shaft is selectable from $\phi 22$ to 60 mm.)
- The flat structure reduces the size of the device configuration.
- A wide variety of four models with the rated output from 251 to 1320 W has been added to the lineup.
- 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 that achieves a velocity frequency response of 3.1kHz and MECHATROLINK-III 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). However, the single phase of YMAB12 (200V) is "008."



Combinations

The combinations of SERVOPACKs, motors, and relay cables are shown below.

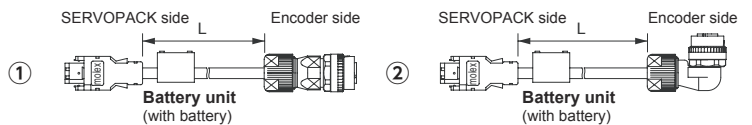
YMA model	SERVOPACK model ^{Note 1}	Power supply specification	Relay cable		
			Motor Cable	Encoder	
				Standard cable	Flex cable
YMAB09	SGD7S-3R8A20A■■■F81	Three-phase 200V	EWD-MB**-A06-TN-Y	JZSP-CSP19**-E	JZSP-CSP29**-E
	SGD7S-5R5A20A■■■F81	Single-phase 200V			
YMAB12	SGD7S-120A20A■■■F81	Three-phase 200V			
	SGD7S-120A20A008F81	Single-phase 200V			
YMAB15	SGD7S-180A20A■■■F81	Three-phase 200V			
YMAA21A	SGD7S-330A20A■■■F81	Three-phase 200V	EWD-MB**-D09-TMC (EWD-MB**-D09-TMC-Y) ^{Note 3}	①JZSP-CVP06**-E ②JZSP-CVP07**-E	①JZSP-CVP26**-E ②JZSP-CVP27**-E

Note 1: "■■■" in SERVOPACK models indicates whether or not a dynamic brake resistor is used (No: 000, Yes: 020). However, the single phase of YMAB12 (200V) is "008."

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 relay cables of YMAA21A, one of the two connector shapes can be selected.



MECHATROLINK-III System Image

MECHATROLINK-III-Compatible
Machine 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
Electric
 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 name	AC servo motor YMA series
(2)	Motor version Symbol	A: Size 21A B: Size 09, 12, 15
(3)	Size	09, 12, 15, 21A
(4)	Brake	A: Not equipped with a brake B: With brake
(5)	Applied servo amplifier Input voltage	200 VAC
(6)	Encoder format	Conforming to the YASKAWA format

(7)	Encoder type Resolution	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 Type 21A)
(11)	Special specifications	No symbol: Standard product SP: Special-specification product

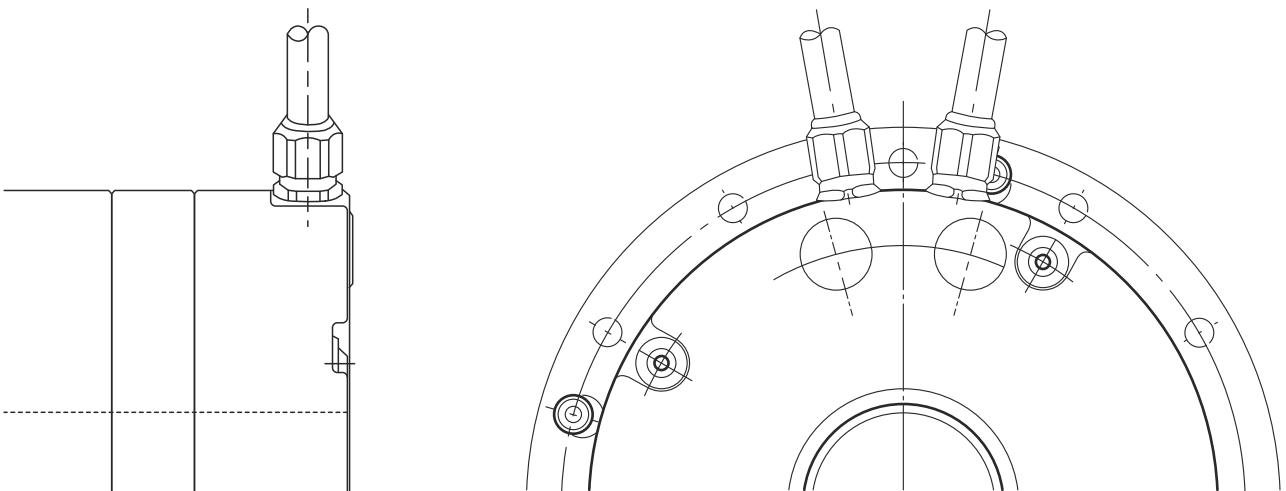
Option

■ 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 the housing when installing a motor in the device.

Side exiting cable



Motor Specifications

Item		Type	YMAB09	YMAB12	YMAB15	YMAA21A
Combination SERVOPACK (three-phase 200V) SGD7S-□□□A20A■■■F81 ^{*6}			3R8	120	180	330
Combination SERVOPACK (single-phase 200V) SGD7S-□□□A20A■■■F81 ^{*6}			5R5	120	-	-
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
	kgf·m		0.31	0.71	1.33	4.59
Rated torque ^{*1,2}	N·m		0.8	1.55	3.6	12.6
	kgf·m		0.082	0.158	0.367	1.29
Maximum Speed ^{*1}	r/min		5600	4800	4000	3000
Rated speed	r/min		3000	2500	2000	1000
Instantaneous maximum current ^{*1}	Arms		8.9	19	29	75
Rated current ^{*1,2}	Arms		2.5	4.2	7.8	20
Torque constant ^{*1}	N·m/Arms		0.41	0.44	0.54	0.72
	kgf·m/Arms		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	×10 ⁻⁴ kg·m ²	1.78 (2.16)	6.45 (6.83)	15.8 (19.8)	125 (141)
	J	×10 ⁻⁴ kgf·cm ² ·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 (131072)			
	Multi revolution counter ^{*4}		2 ¹⁶ (65536)			
Mass The values in parentheses are for the models 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: 25 m/s ²⁻¹⁵ (frequency: 10 to 400 Hz) / impact resistance: 300 m/s ²⁻¹⁵ 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 voltage: 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.

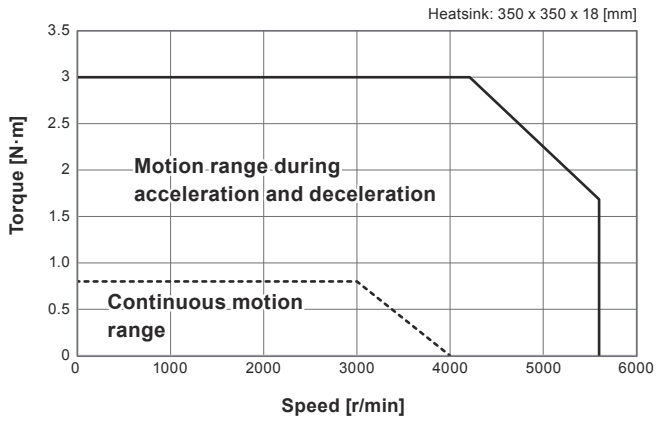
*4: The range of the multi revolution detector is from 0 to 65535.

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

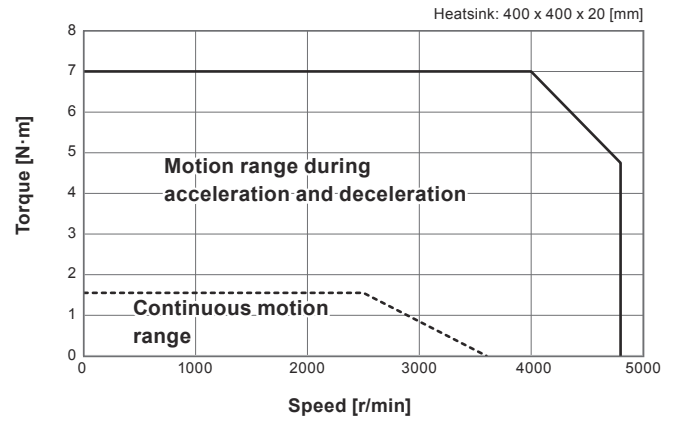
*6: "■■■" of the combination servo pack type indicates whether or not a dynamic brake resistor is used (No: 000, Yes: 020). However, the single phase of YMAB12 (200V) is "008."

Operable Range

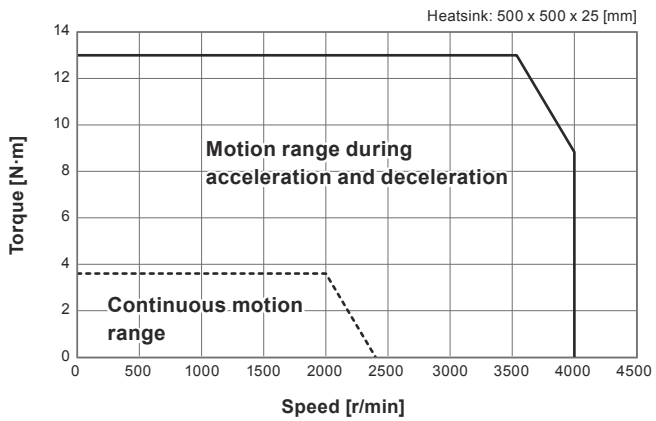
YMAB09/Three-phase: SGD7S-3R8A20A■■■F81
Single-phase: SGD7S-5R5A20A008F81



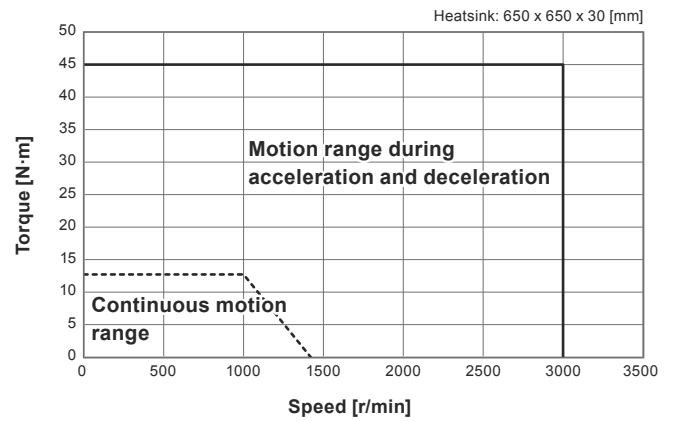
YMAB12/Three-phase: SGD7S-120A20A■■■F81
Single-phase: SGD7S-120A20A008F81



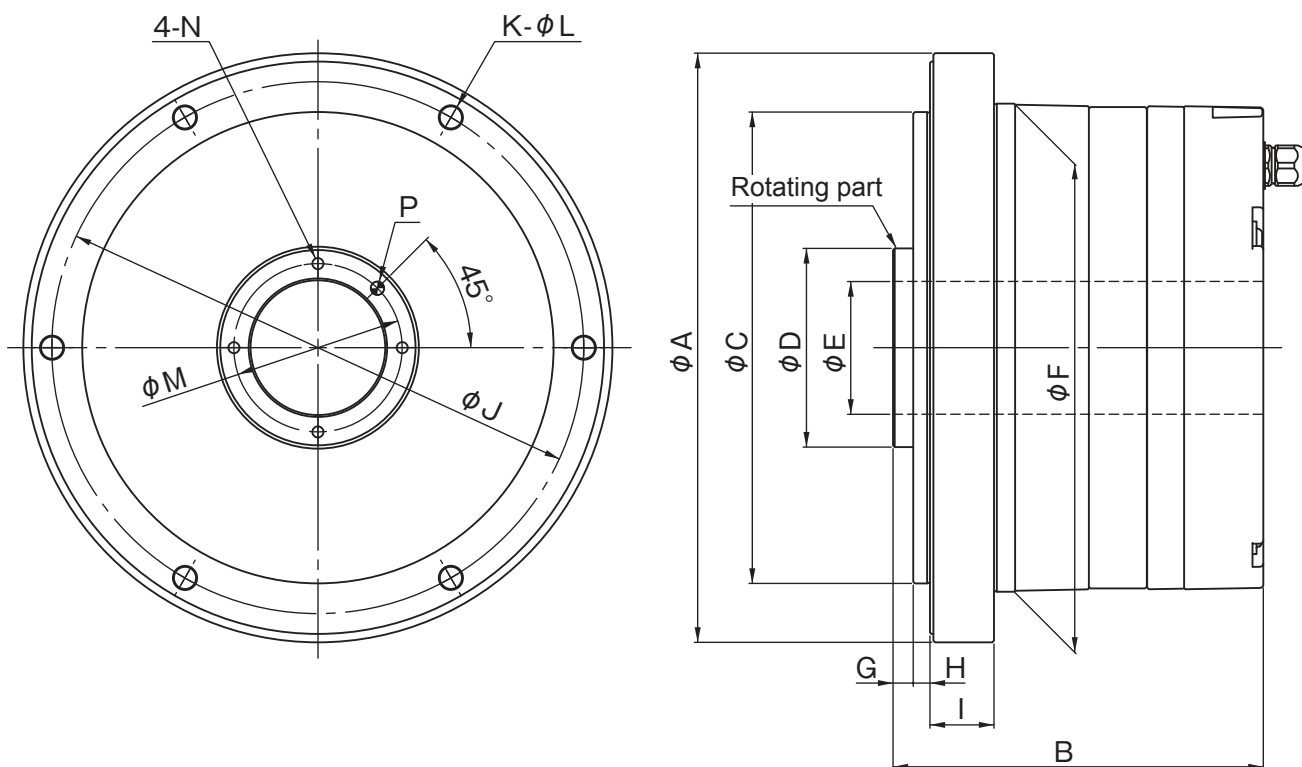
YMAB15/SGD7S-180A20A■■■F81



YMAA21A/SGD7S-330A20A■■■F81



External Dimensions



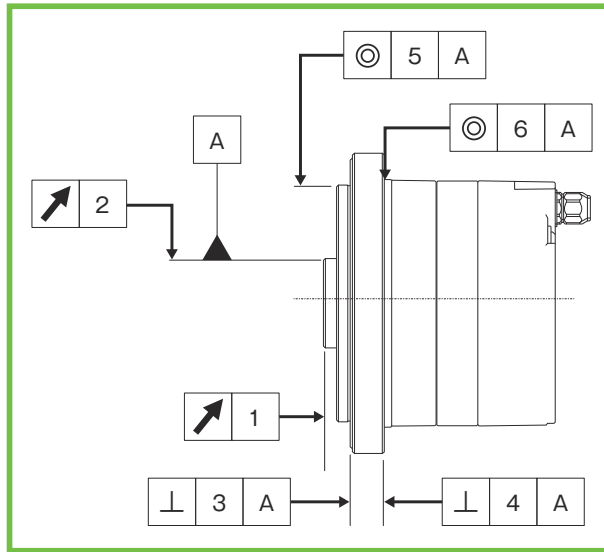
Note) For details of the external dimensions, refer to the delivery specification drawing issued by HDS.

[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

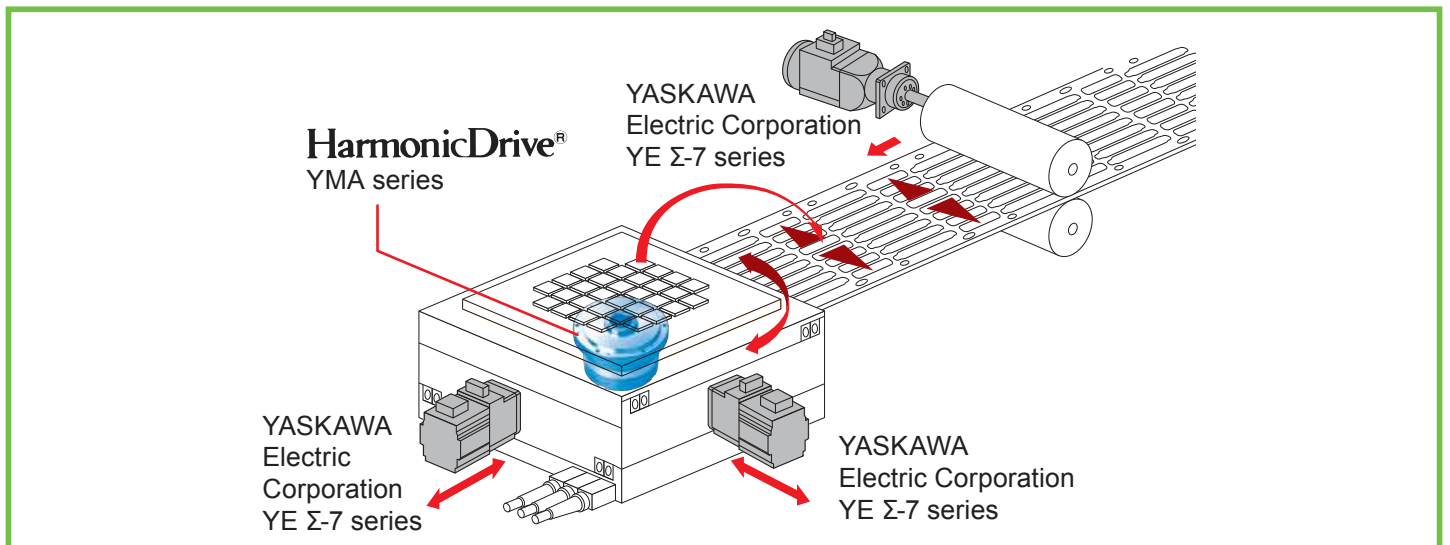
The mechanical accuracy of the YMA series motor output shaft and of the mounting flange are shown below:



(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 use case



■ Please contact our sales department with any questions.

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