

# HarmonicDrive®

## AC servo Actuator SHA Series

Mitsubishi AC servo

MITSUBISHI SERVO AMPLIFIERS & MOTORS  
**MELSERVO**+ **J4**

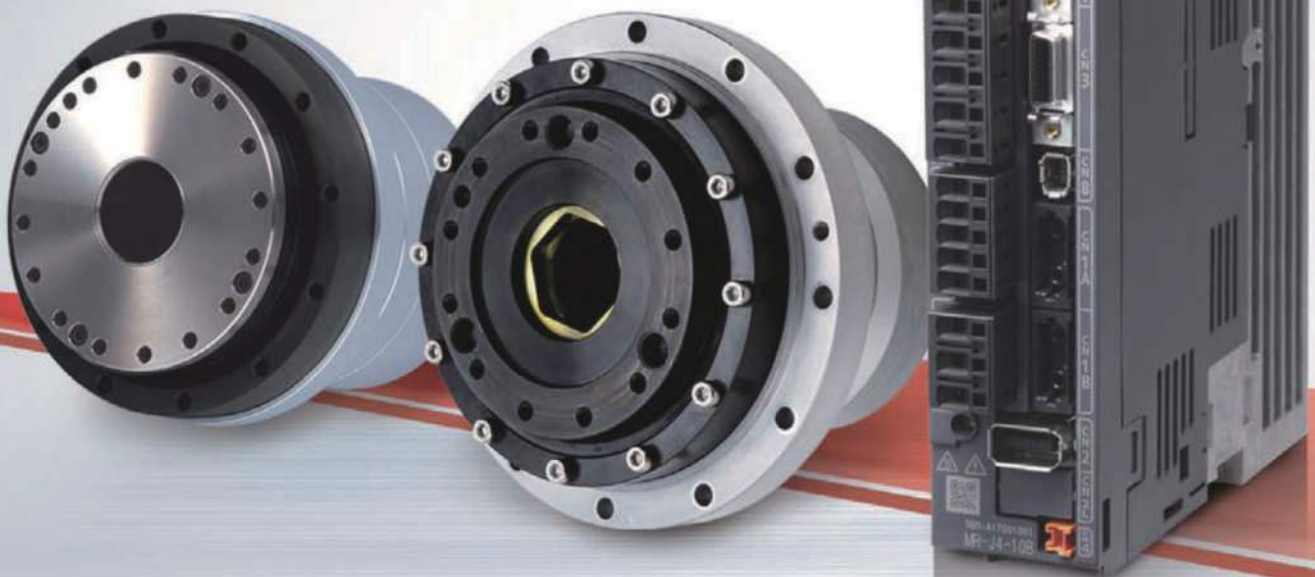
## Collaborative Success

HarmonicDrive® SHA Series AC Servo Actuator now connects directly with "Mitsubishi MELSERVO-J4" SSCNET III/H.

Further expanding the options for network connectivity.

Additional two options for the SHA-SG type featuring the compact shape and for the SHA-CG type with enhanced output flange surface runout accuracy are available.

HarmonicDrive®



**SSCNET III/H**  
SERVO SYSTEM CONTROLLER NETWORK

- The SHA Servo Actuator combines HarmonicDrive® gearing with a flat AC servo motor.
- The new products achieve almost identical accuracy and resolution as those of Direct Drive Motors and remarkably compact and lightweight!
- The hollow shaft actuator design allows piping and cabling to pass directly through the axis of rotation and achieve a simple machine design.
- Flat configuration enables compact machine designs.
- Precise one-way positioning accuracy: Gear Ratio 50:1=40 arc-sec (0.014 degrees)  
Gear Ratio 80:1 and higher =30 arc-sec (0.011 degrees) (for SHA-32M/40M-CG types)
- Torque to Volume ratio is more than 5 times greater than Direct Drive Motors.
- The SHA-M series actuators are easy to use with the machine configured with the "MELSERVO-J4" SSCNET III/H communication.

Contact:

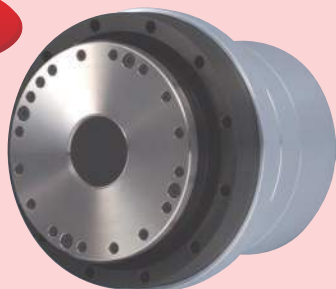
AC Servo Actuator SHA-M series (Harmonic Drive Systems Inc.)  
AC Servo Amplifier MELSERVO-J4 (Mitsubishi Electric Corp.)

# Wider Range of Model Lineups for Your Suitable Selection

## SHA-SG Type

SHA-SG type featuring compact-shape

Compact

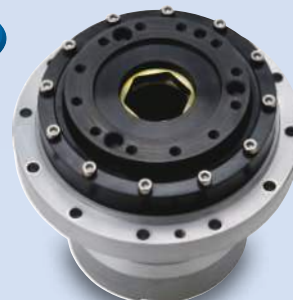


The SHA Servo Actuator combines precision Harmonic Drive® gearing with a flat AC servo motor. The unique compact shape and Hollow Shaft actuator design allow simple design of machine and device. Select from 5 types of sizes: 25, 32, 40, 58, and 65. For the sizes of 25 and 32, combinations with planetary gear reducer Harmonic Planetary® can also be selected.

## SHA-CG Type

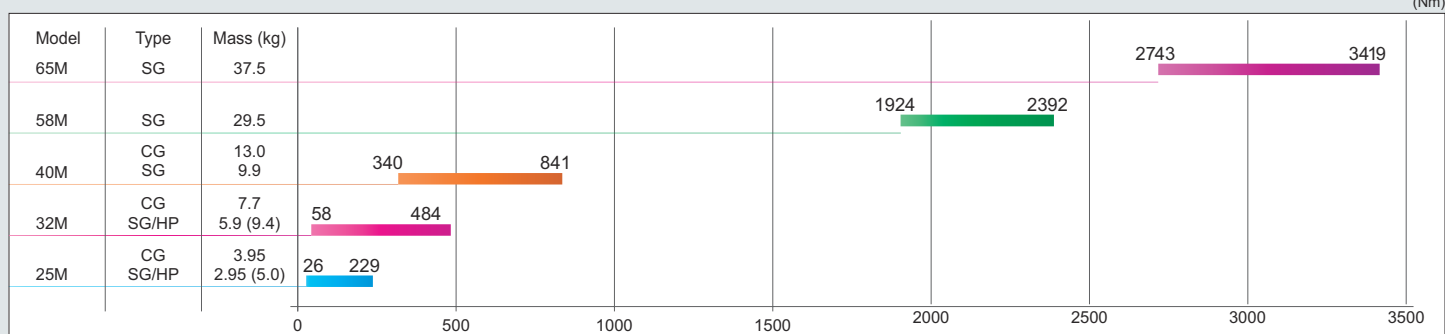
SHA-CG type with improved output flange surface runout

High Accuracy



Products with the output flange surface runout accuracy are considerably improved due to the change of Harmonic Drive® gearing inside an actuator. The SHA-CG type can be provided in an easy-to-use manner for the table swivel drive and alignment adjusting functions, which require mechanical accuracy. Size can be selected from three types of 25, 32, and 40.

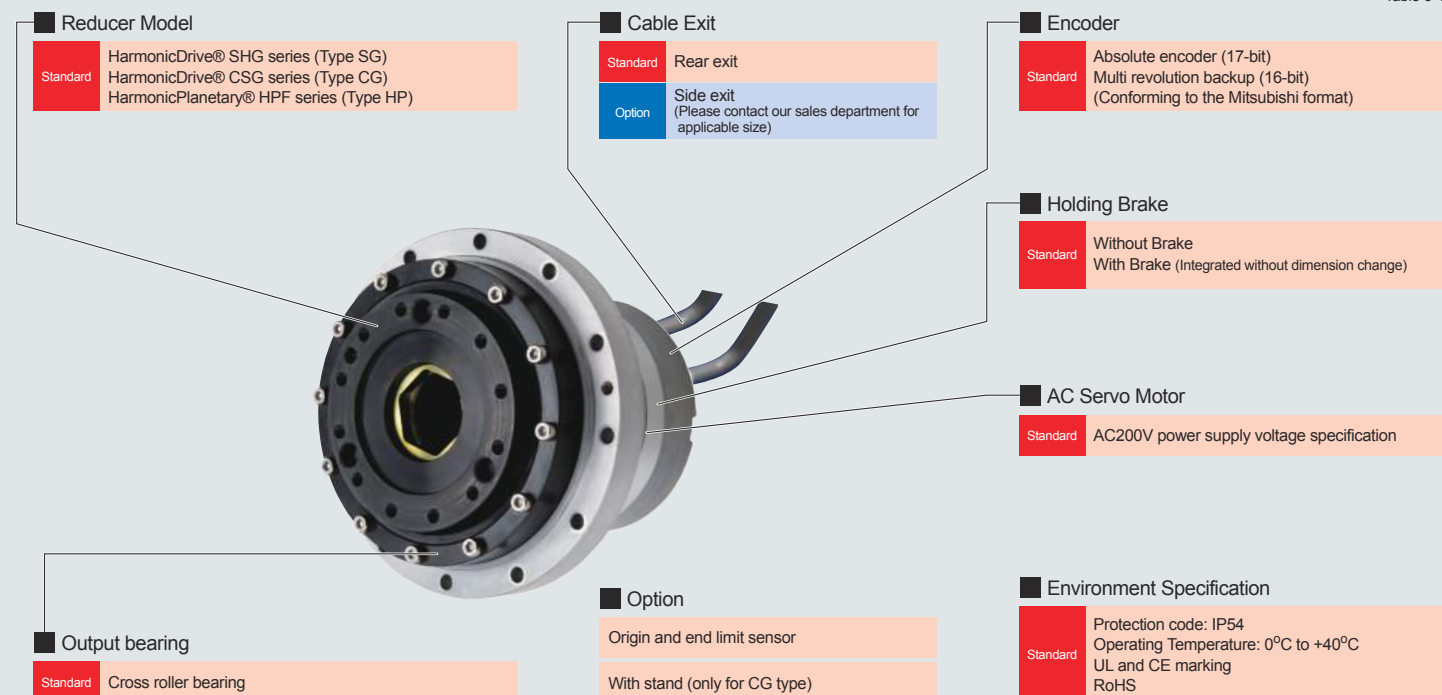
## Maximum Torque Rating Map



The mass value is for the without brake type and the value in brackets is the mass when using gear ratio 11:1 (HPF series).

## Configurations

Table 3-1



# Mitsubishi AC Servo MELSERVO-J4

## SSCNET III/H-compatible Servo Amplifier 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 SHA Actuator



### ■ Extension Cables Proper combination of Actuator, Servo Amplifier, and Extension Cables

SHA Series	Speed Reducer Type	Servo Amplifier	Extension Cable Model Number	
			Motor Cable	Encoder Cable
25M	SG/HP/CG	MR-J4-60B-S033	EWD-MB**A06-TMC-M	Note1: MR-EKBL**M-H H: High Flex Cable L: Standard Cable
32M	SG/HP/CG	MR-J4-100B-S033		
40M	SG/CG	MR-J4-100B-S033		
	SG/CG	MR-J4-200B-S033		
58M	SG	MR-J4-350B-S033	EWD-MB**D09-TMC-M1	
65M	SG	MR-J4-500B-S033	EWD-MB**D09-TMC-M2	

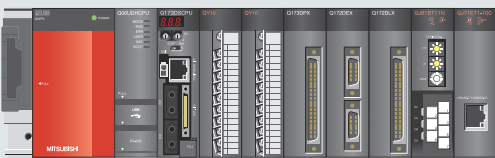
\*\* in the model code indicates the cable length in meters. Please select: (02=2m, 05=5m, 10=10m).

Note 1) The SHA-58M and 65M series actuators must be used in combination with the connector conversion cable provided with the actuator.

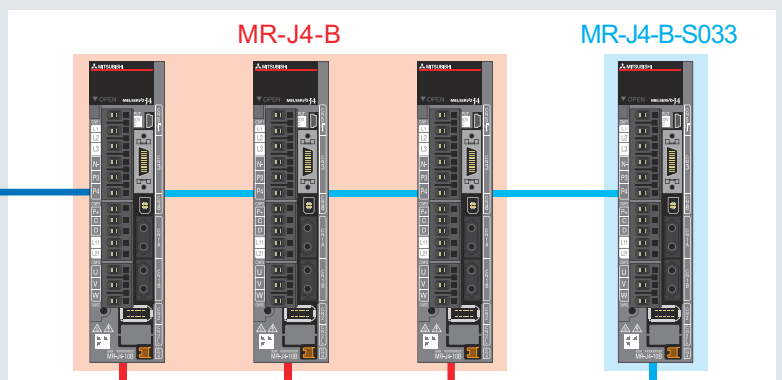
### ■ SSCNET III/H System Overview

### ■ AC Servo Amplifier

Controller compatible to SSCNET III/H



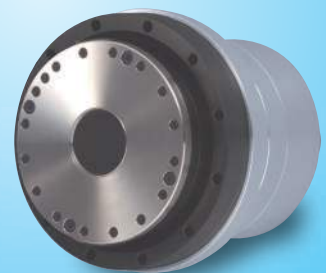
Simple Selection and Connection by SSCNET III/H Communication!



Mitsubishi Electric  
HG Series



HarmonicDrive®  
SHA-M Series



## Ordering Code

SHA	32	M	101	SG	-	B	12	A	200	-	16	S17b	A	-	C	□	-	SP
①	②	③	④	⑤		⑥	⑦	⑧	⑨		⑩	⑪	⑫		⑬	⑭		⑮

(1) Model: SHA series AC servo actuator

(2) Size

SG	25,32, 40,58, 65
HP	25,32
CG	25,32, 40

(3) Design Version:

M	Mitsubishi Compatible
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(4) Reduction Ratio: (1/R)

SG		CG	
51	1/51	50	1/50
81	1/81	80	1/80
101	1/101	100	1/100
121	1/121	120	1/120
161	1/161	160	1/160

HP	
11	1/11

(5) Gear Reducer

SG	SHG Series
HP	HPF Series
CG	CSG Series

(6) Motor Version

A	Size: 58, 65
B	Size: 25, 32, 40

(7) Motor Size

09	Size 25
12	Size 32
15	Size 40
21	Size: 58, 65

(8) Brake

A	Without Brake
B	With Brake

(9) Voltage Rating

200	200V
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(10) Encoder Format

16	Mitsubishi Format
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(11) Encoder Type / Resolution

S17b	17-bit Absolute Encoder 131072 counts/revolution
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(12) Encoder Offset Angle

Phase difference between the motor U phase and the encoder origin

A	0 Degrees
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(13) Connector Specification

C	With Standard Connector
N	Without Connector
D	With Special Connector

(14) Special Options

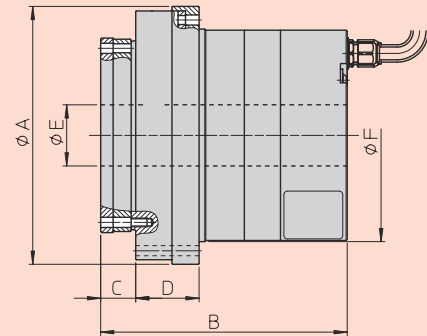
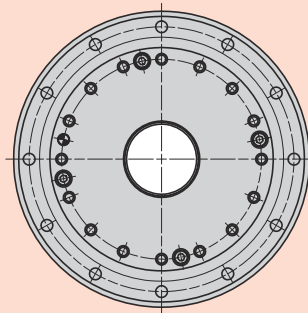
L	Origin and Limit Sensor
Y	Side Exiting Cable
V	With Stand (for the CG type only)

(15) SP designates Custom Specification, (Leave blank for standard product)

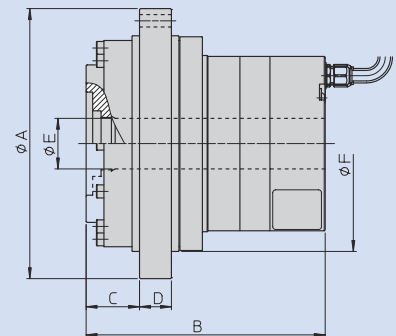
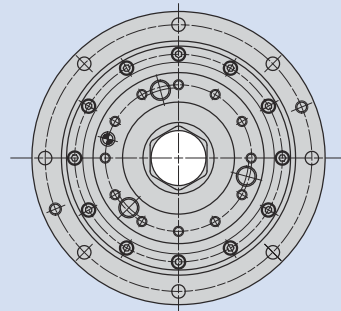
\* Reduction ratio 1:11 is used in combination with the hollow planetary gear HPF series.

## Dimension

### SHA-SG Type



### SHA-CG Type



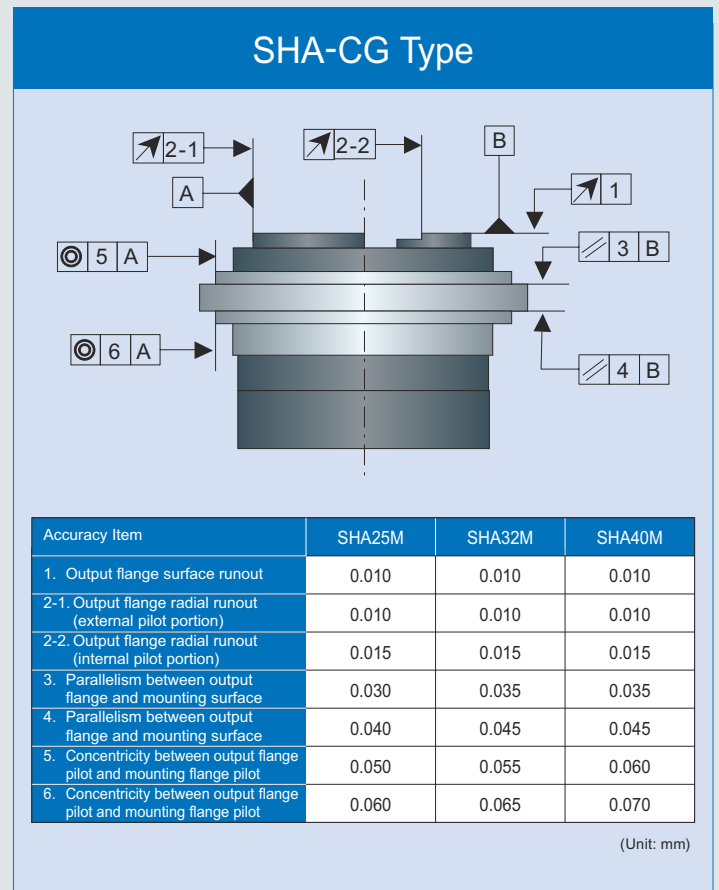
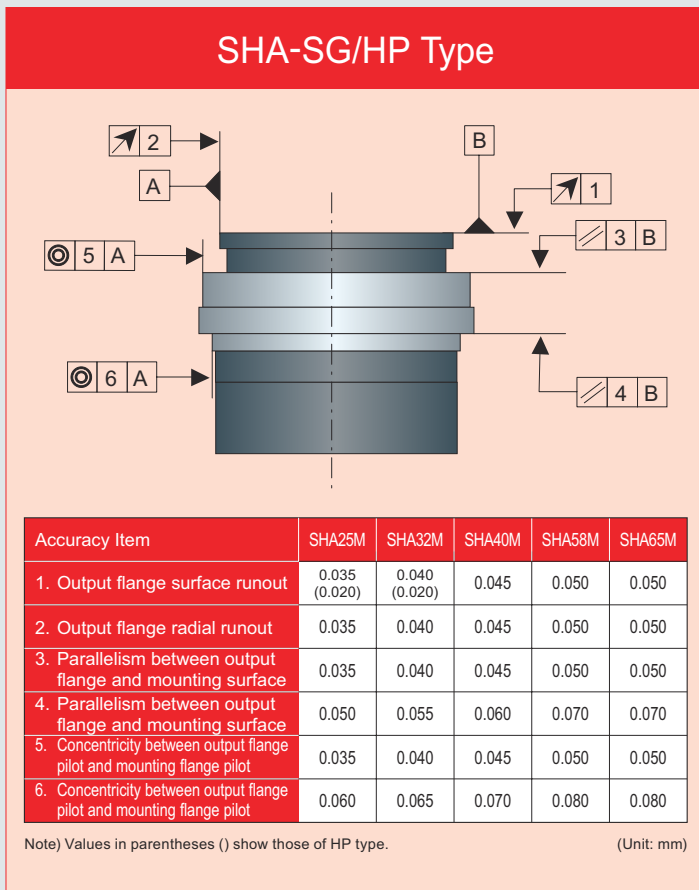
Dimension	SHA25			SHA32			SHA40		SHA58	SHA65
	Type HP	Type SG	Type CG	Type HP	Type SG	Type CG	Type SG	Type CG	Type SG	Type SG
φA	136	114	144	167	146	175	175	225	247	284
B	144.8	109	127.5	161.5	125	144	148	170	213	222
C	38.3	15.5	28.5	44.5	20	34	26	40	37	42.5
D	12.5	28	17	15	34.5	20	42	22	74	77.5
φE	20	27	27	26	35	35	45	45	65	65
φF	118	94	115	147	122	148	145	180	210	236

Note) For the detailed dimensions and tolerance, please check by confirmation drawing.

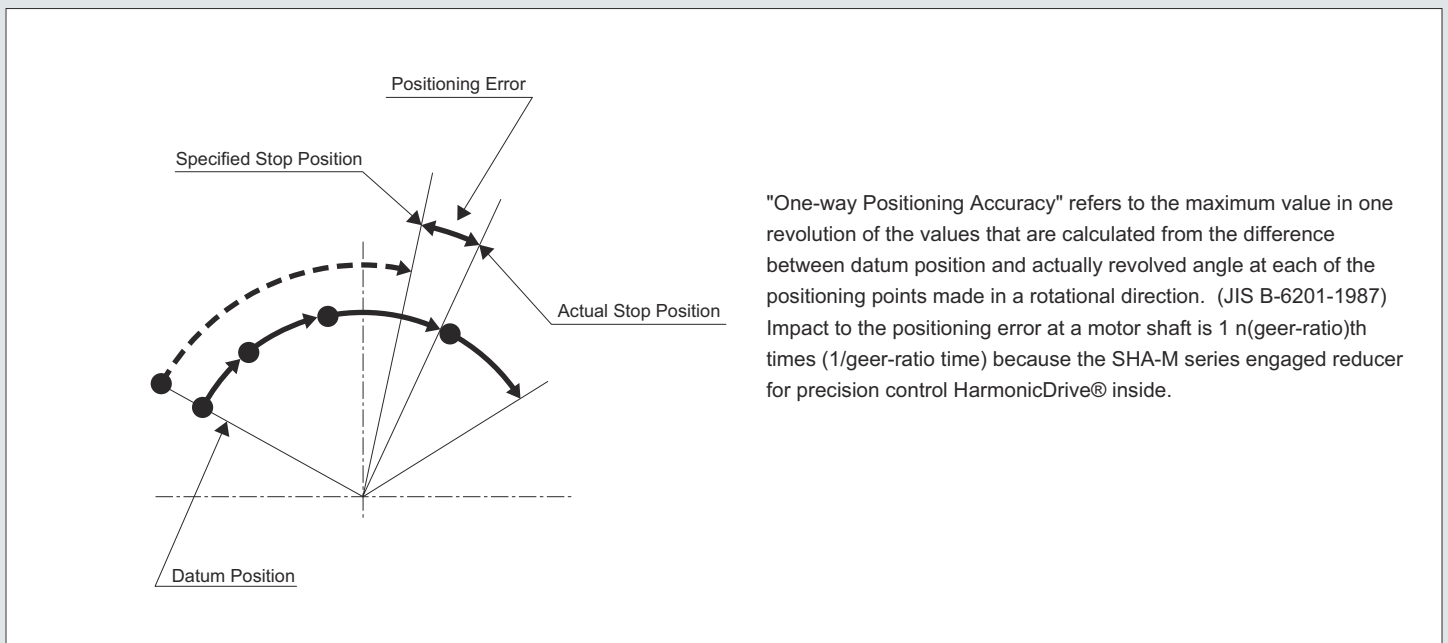
(Unit: mm)

## ■ Mechanical Accuracy

The SHA-M series actuator output shaft and mechanical accuracy of the mounting flange are shown below:



## ■ One-way Positioning Accuracy



### SHA-SG/HP Type

Reduction Ratio \ Type	SHA25M	SHA32M	SHA40M	SHA58M	SHA65M
1:11(HP)	120	120	-	-	-
1:51	50	50	50	-	-
1:81 or more	40	40	40	40	40

(Unit: second)

### SHA-CG Type

Reduction Ratio \ Type	SHA25M	SHA32M	SHA40M
1:50	50	40	40
1:80 or more	40	30	30

(Unit: second)

## ■ SHA -SG/HP Type Specification

Type		SHA25M						SHA32M						
		11	51	81	101	121	161	11	51	81	101	121	161	
Combined Servo Amplifier		MR-J4-60B-S033						MR-J4-100B-S033						
Maximum Torque*1	Nm	26	127	178	204	217	229	58	281	395	433	459	484	
Continuous Torque*1,2	Nm	9.0	41	67	81	81	81	20	92	153	178	178	178	
Maximum Speed*1	r/min	509.1	109.8	69.1	55.4	46.3	34.8	436.4	94.1	59.3	47.5	39.7	29.8	
Maximum Current*1	A	8.9	8.6	7.5	7.0	6.3	5.2	18	17.3	15.2	13.5	12.2	9.9	
Continuous Current*1,2	A	3.0	3.0	3.0	2.9	2.6	2.1	6.0	6.0	6.0	5.7	5.0	4.1	
Moment of Inertia (without Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	0.029	0.56	1.4	2.2	3.2	5.6	0.091	2.0	5.1	8.0	11	20
Moment of Inertia (with Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	0.034	0.66	1.7	2.6	3.7	6.6	0.11	2.3	5.9	9.2	13	23
Reduction Ratio		1:11	1:51	1:81	1:101	1:121	1:161	1:11	1:51	1:81	1:101	1:121	1:161	
Moment Load	Nm	410	258					932	580					
Moment Stiffness	Nm/rad	37.9×10 <sup>-4</sup>	39.2×10 <sup>-4</sup>					86.1×10 <sup>-4</sup>	100×10 <sup>-4</sup>					
One-way Positioning Accuracy	Second	120	50	40	40	40	40	120	50	40	40	40	40	
Encoder Type		Magnetic Type Absolute Encoder						Magnetic Type Absolute Encoder						
Output Resolution	counts / revolution	1,441,792	6,684,672	10,616,832	13,238,272	15,859,712	21,102,592	1,441,792	6,684,672	10,616,832	13,238,272	15,859,712	21,102,592	
Mass (without Brake)	kg	5.0	2.95					9.4	5.9					
Mass (with Brake)	kg	5.1	3.1					9.7	6.2					
Mounting Direction		Can be installed in any direction						Can be installed in any direction						

Type		SHA40M										SHA58M				SHA65M				
		51	81	101	121	161	51	81	101	121	161	81	101	121	161	81	101	121	161	
Combined Servo Amplifier		MR-J4-100B-S033* <sup>3</sup>					MR-J4-200B-S033					MR-J4-350B-S033				MR-J4-500B-S033				
Maximum Torque*1	Nm	340	560	686	802	841	523	675	738	802	841	1924	2067	2236	2392	2743	2990	3263	3419	
Continuous Torque*1,2	Nm	94	158	198	237	317	160	263	330	382	382	680	850	969	969	921	1149	1236	1236	
Maximum Speed*1	r/min	78.4	49.4	39.6	33.1	24.8	78.4	49.4	39.6	33.1	24.8	37.0	29.7	24.8	18.6	34.6	27.7	23.1	17.4	
Maximum Current*1	A	18	18	18	17.9	14.6	26.7	21.8	19.4	17.9	14.6	45	39	36	30	62	55	51	41	
Continuous Current*1,2	A	6.0	6.0	6.0	6.0	6.0	9.0	9.0	9.0	8.8	7.2	17.0	17.0	16.4	13.4	22.0	21.9	20.1	16.3	
Moment of Inertia (without Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	5.0	13	20	28	50	5.0	13	20	28	50	96	149	214	379	110	171	245	433
Moment of Inertia (with Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	6.1	15	24	34	61	6.1	15	24	34	61	106	165	237	420	120	187	268	475
Reduction Ratio		1:51	1:81	1:101	1:121	1:161	1:51	1:81	1:101	1:121	1:161	1:81	1:101	1:121	1:161	1:81	1:101	1:121	1:161	
Max. Moment Load	Nm	849										2180				2740				
Moment Stiffness	Nm/rad	179×10 <sup>-4</sup>										531×10 <sup>-4</sup>				741×10 <sup>-4</sup>				
One-way Positioning Accuracy	Second	50	40	40	40	40	50	40	40	40	40	40	40	40	40	40	40	40	40	
Encoder Type		Magnetic Type Absolute Encoder										Magnetic Type Absolute Encoder								
Output Resolution	counts / revolution	6,684,672	10,616,832	13,238,272	15,859,712	21,102,592	6,684,672	10,616,832	13,238,272	15,859,712	21,102,592	10,616,832	13,238,272	15,859,712	21,102,592	10,616,832	13,238,272	15,859,712	21,102,592	
Mass (without Brake)	kg	9.9										29.5				37.5				
Mass (with Brake)	kg	10.7										32				40				
Mounting Direction		Can be installed in any direction										Can be installed in any direction								

The values in the table above show typical values for the output shaft.

\*1: When used with the recommended sinusoidal amplifier.

\*2: Value for saturated temperature when installed on an aluminum heatsink, of the following size: (Size 25: 350 x 350 x 18mm, Size 32: 400 x 400 x 20mm, Size 58,65: 650 x 650 x 25mm)

\*3: Maximum torque and continuous torque are limited in case of combination of MR-J4-100B-S033 with SHA40M

## ■ SHA -SG/HP Type Specification

Type		SHA25M					SHA32M					
		50	80	100	120	160	50	80	100	120	160	
Combined Servo Amplifier		MR-J4-60B-S033					MR-J4-100B-S033					
Maximum Torque* <sup>1</sup>	Nm	127	178	204	217	229	281	395	433	459	484	
Continuous Torque* <sup>1,2</sup>	Nm	40	66	81	81	81	90	151	178	178	178	
Maximum Speed* <sup>1</sup>	r/min	112	70	56	46.7	35	96	60	48	40	30	
Maximum Current* <sup>1</sup>	A	8.7	7.6	7.0	6.3	5.2	17.7	15.4	13.7	12.2	10.0	
Continuous Current* <sup>1,2</sup>	A	3.0	3.0	3.0	2.6	2.1	6.0	6.0	5.7	5.0	4.1	
Moment of Inertia (without Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	0.50	1.3	2.0	2.9	5.1	1.7	4.3	6.7	9.7	17
Moment of Inertia (with Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	0.60	1.5	2.4	3.4	6.1	2.0	5.1	7.9	11	20
Reduction Ratio		1:50 AM	1:80	0:101	0:121	0:161	1:50 AM	1:80	0:101	0:121	0:161	
Max. Moment Load	Nm	258					580					
Moment Stiffness	Nm/rad	39.2×10 <sup>4</sup>					100×10 <sup>4</sup>					
One-way Positioning Accuracy	Second	50	40	40	40	40	40	30	30	30	30	
Repeatability	Second	±5					±4					
Bi-directional Positioning Accuracy	Second	60	25	25	25	25	60	25	25	25	25	
Encoder Type		Magnetic Type Absolute Encoder					Magnetic Type Absolute Encoder					
Output Resolution	counts / revolution	6,553,600	10,485,760	13,107,200	15,728,640	20,971,520	6,553,600	10,485,760	13,107,200	15,728,640	20,971,520	
Mass (without Brake)	kg	3.95					7.7					
Mass (with Brake)	kg	4.1					8.0					
Mounting Direction		Can be installed in any direction					Can be installed in any direction					

Type		SHA40M										
		50	80	100	120	160	50	80	100	120	160	
Combined Servo Amplifier		MR-J4-100B <sup>3</sup>					MR-J4-200B					
Maximum Torque* <sup>1</sup>	Nm	333	548	686	802	841	523	675	738	802	841	
Continuous Torque* <sup>1,2</sup>	Nm	92	156	196	235	315	157	260	327	382	382	
Maximum Speed* <sup>1</sup>	r/min	80	50	40	33.3	25	80	50	40	33.3	25	
Maximum Current* <sup>1</sup>	A	18.0	18.0	18.0	17.6	14.3	27.2	22.0	19.6	18.0	14.7	
Continuous Current* <sup>2,3</sup>	A	6.0	6.0	6.0	6.0	6.0	9.0	9.0	9.0	8.8	7.2	
Moment of Inertia (without Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	4.8	12	19	27	49	4.8	12	19	27	49
Moment of Inertia (with Brake)	GD <sup>2</sup> /4	kg·m <sup>2</sup>	5.8	15	23	33	59	5.8	15	23	33	59
Reduction Ratio		1:50	1:80	0:101	0:121	0:161	1:50	1:80	0:101	0:121	0:161	
Max. Moment Load	Nm	849										
Moment Stiffness	Nm/rad	179×10 <sup>4</sup>										
One-way Positioning Accuracy	Second	40	30	30	30	30	40	30	30	30	30	
Repeatability	Second	±4										
Bi-directional Positioning Accuracy	Second	50	20	20	20	20	50	20	20	20	20	
Encoder Type		Magnetic Type Absolute Encoder										
Output Resolution	counts / revolution	6,553,600	10,485,760	13,107,200	15,728,640	20,971,520	6,553,600	10,485,760	13,107,200	15,728,640	20,971,520	
Mass (without Brake)	kg	13.0										
Mass (with Brake)	kg	13.8										
Mounting Direction		Can be installed in any direction										

The values in the table above show typical values for the output shaft.

\*1: When used with the recommended sinusoidal amplifier.

\*2: Value for saturated temperature when installed on an aluminum heatsink of the following size: (Size 25: 350 x 350 x 18 mm, Size 32: 400 x 400 x 20 mm, Size 40: 500 x 500 x 25 mm)

\*3: Maximum torque and continuous torque are limited in the case of combination of MR-J4-100B-S033 with SHA40M

## ■ SHA Series Option

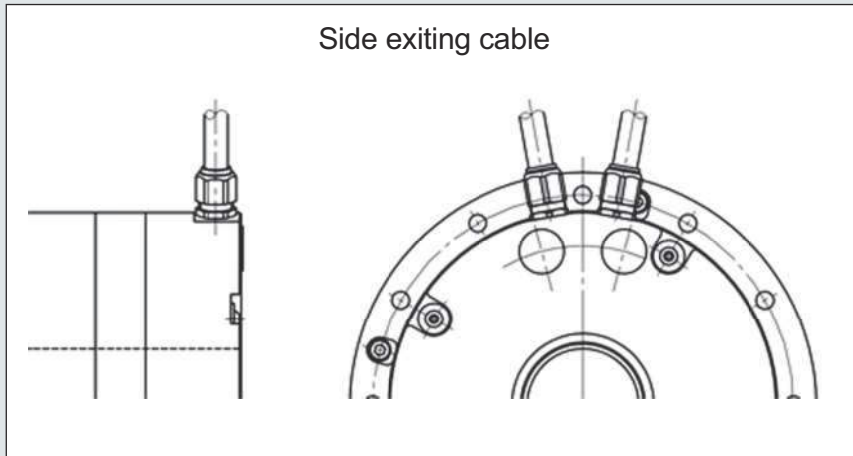
- With origin and end limit sensors (Symbol for option: L)

The revolution sensor is installed and directly connected to the output shaft on the opposite side of actuator output. Use this sensor when the origin of mechanical operation is required (when there is a problem in using the virtual origin of the absolute encoder) or when the operation range is preferably defined for the safety measure.

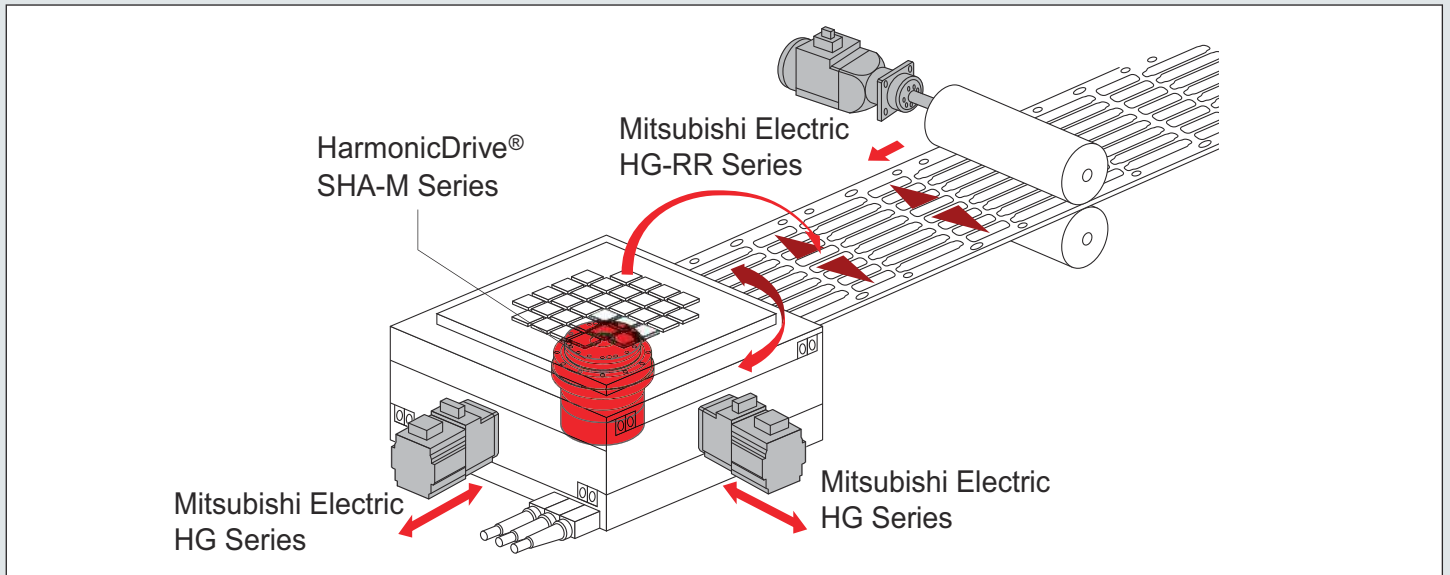
- Side exiting cable (Symbol for option: Y)

Cables (motor wire and encoder wire) are exited from the side of the actuator. Use this option when there is not enough space in the rear direction of housing when installing an actuator in the device. (This cannot be applied to the SHA-58M and SHA-65M series.)

- With stand (Symbol for option: VCG type only)



## ■ Simple system structure



\* Please contact our sales representative or distributor office for more information.



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The academic or generic term of our "HarmonicDrive" products is "strain wave gearing."  
Harmonic Drive® trademark is registered in Japan, Korea and Taiwan.



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No.1601-2R-SHA+J4/news21