HarmonicDrive®
New Product News
Vol. 40

RTEX Realtime Express

EtherCAT®

HarmonicDrive®

Flat hollow-shaft AC servo actuator

SHA series

+

Panasonic Corporation

MINAS

A6N/A6B/A6S

HarmonicDrive®

Panasonic Corporation
MINAS A6N compatible with RTEX (RealtimeExpress)
MINAS A6B compatible with EtherCAT
MINAS A6S compatible with Pulse/Analog/Modbus

Compatible with the latest servo amplifier

Flat hollow-shaft AC servo actuator SHA series has become compatible with the latest servo amplifier MINAS A6 series manufactured by Panasonic.
Compatibility with RTEX, EtherCAT and general communication (serial, analog I/O, Modbus) contributes to integration of the user interface.
Two types for the SG type featuring the compact shape and for the CG type with high output shaft surface runout accuracy are available.

Contact: AC servo actuator SHA series (Harmonic Drive Systems Inc.)
AC servo amplifier MINAS A6 (Panasonic Corporation)

Wider range of model lineups for your suitable selection

SHA-SG type

SHA-SG type featuring compact-shape

Compact

The thin HarmonicDrive® and specially designed flat AC servo motor are integrated into this AC servo actuator.
The unique compact shape and hollow-shaft actuator design allow simple design of machine and device.
The size can be selected from seven types: 20, 25, 32, 40, 45, 58, and 65.

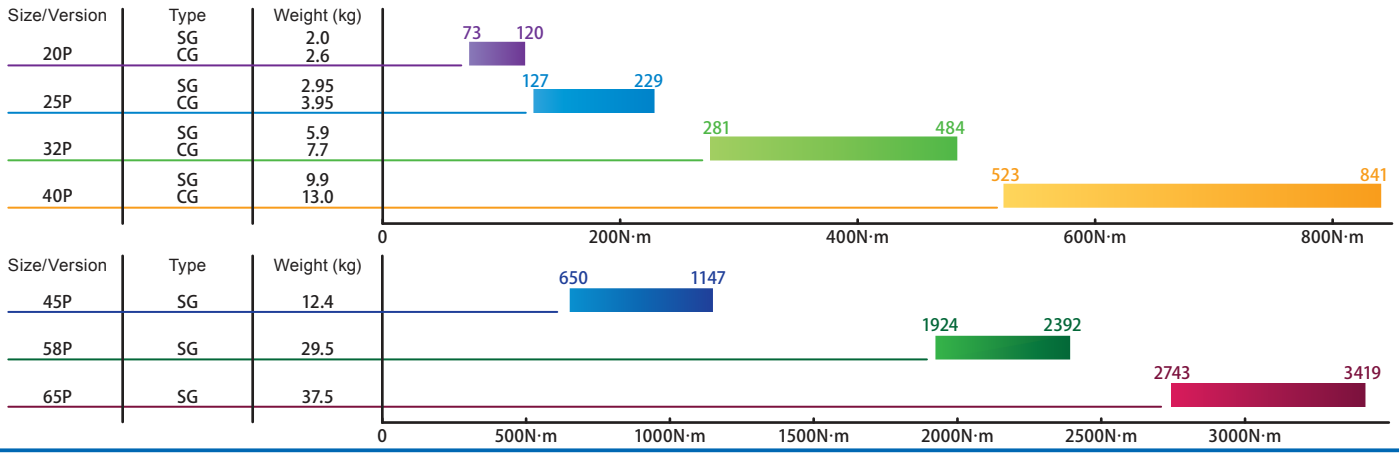
SHA-CG type

SHA-CG type with improved output shaft surface runout

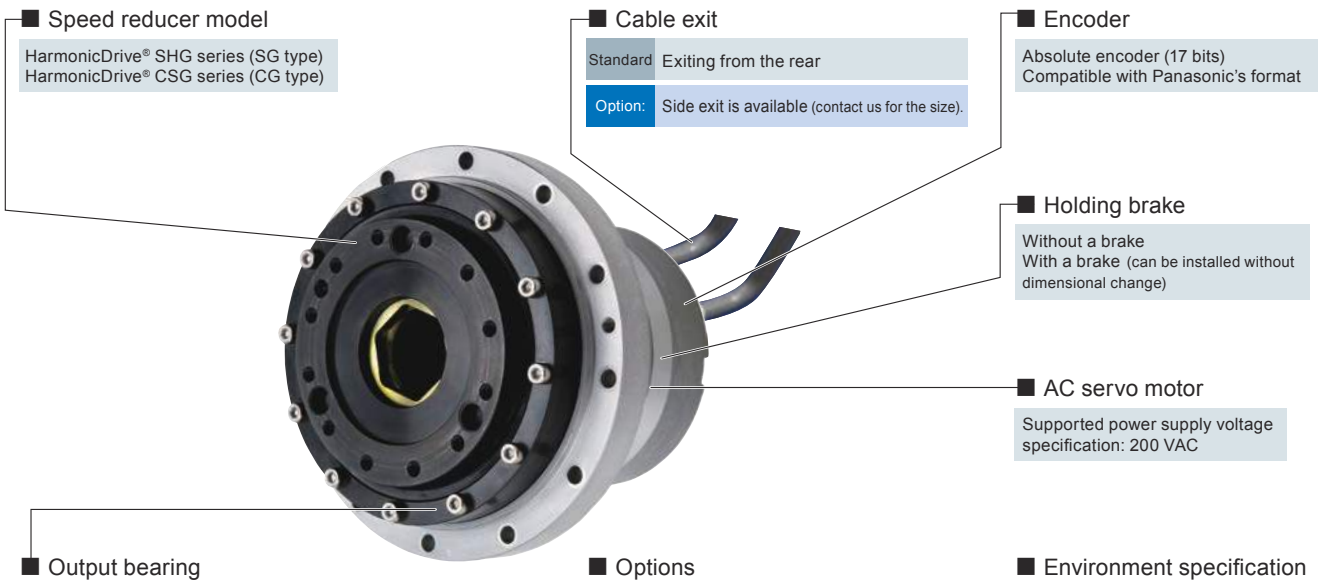
High accuracy

The HarmonicDrive® model to be combined has been changed to considerably improve the output shaft surface runout accuracy.
When it comes to the items that require mechanical accuracy such as the table swivel drive or alignment adjustment mechanism, this type can respond to a request for higher accuracy.
The size can be selected from four types: 20, 25, 32, and 40.

Maximum torque map



Composition



■ Speed reducer model

HarmonicDrive® SHG series (SG type)
HarmonicDrive® CSG series (CG type)

■ Cable exit

Standard: Exiting from the rear
Option: Side exit is available (contact us for the size).

■ Encoder

Absolute encoder (17 bits)
Compatible with Panasonic's format

■ Holding brake

Without a brake
With a brake (can be installed without dimensional change)

■ AC servo motor

Supported power supply voltage specification: 200 VAC

■ Output bearing

Cross roller bearing

■ Options

Near-origin detection and end-limit sensor are included.

With a stand (for the CG type only)

■ Environment specification

Protection code IP54
Operating temperature: 0°C to +40°C
UL and CE marks

Panasonic AC servo amplifier MINAS A6

The MINAS A6 series is the latest servo amplifier manufactured by Panasonic Corporation, and is compatible with the various types of open network including Realtime Express uniquely developed by Panasonic Corporation.

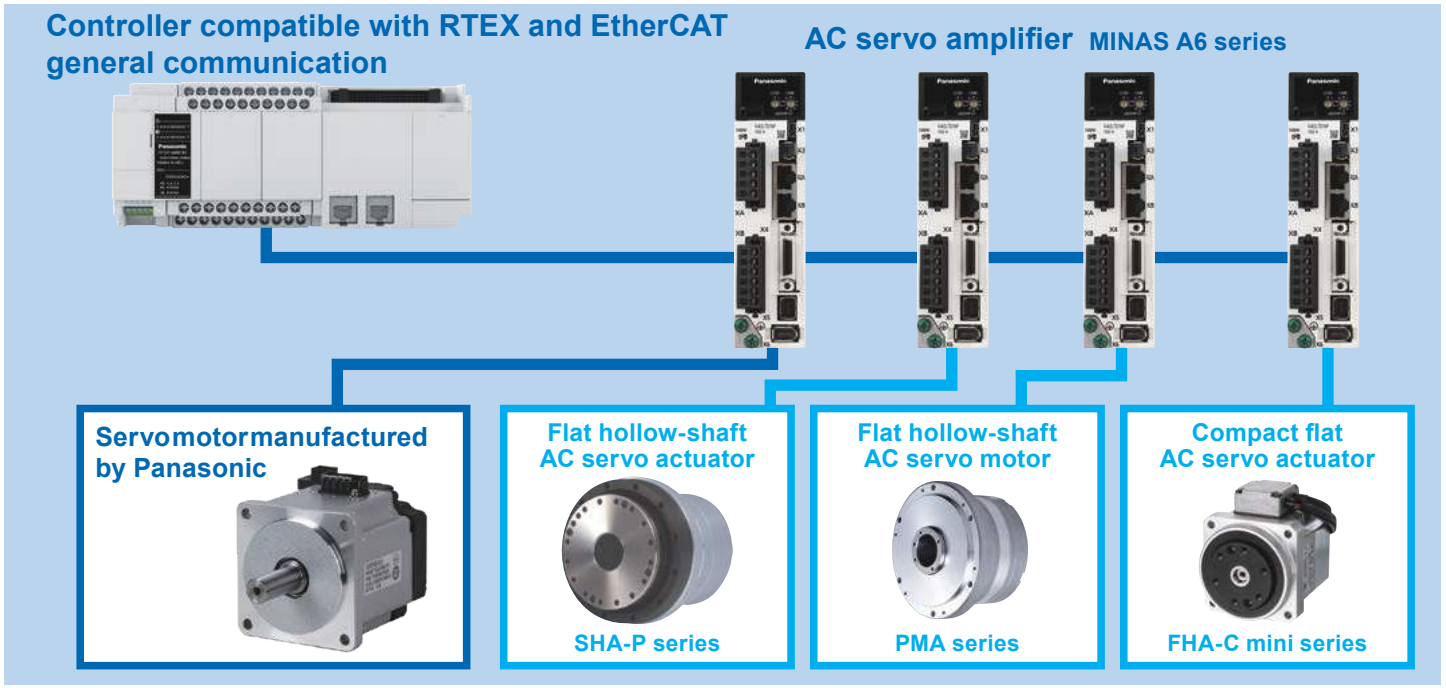
- **High-speed synchronous communication network (100 Mbps)**
  A6N series: RealtimeExpress (RTEX)
  A6B series: EtherCAT
- **General communication network (230 kbps)**
  A6S series: Pulse/Analog/Modbus

Combination of a servo amplifier with a relay cable

SHA model	Reduction ratio		Servo amplifier model*1*2			Relay cable model *3	
	SG	CG	A6N series	A6B series	A6S series	Motor	Encoder
SHA20P	51	50	MBDL■25N□	MBDL■25B□	MBDL■25S□	EWD-MB**-A06-TN-P	MFECA0**0EAE (Equipped with the battery box)
	81	80					
	101	100					
	121	120					
	161	160					
SHA25P	51	50	MCDL■35N□	MCDL■35B□	MCDL■35S□		
	81	80					
	101	100					
	121	120					
	161	160	MBDL■25N□	MBDL■25B□	MBDL■25S□		
SHA32P	51	50	MDDL■55N□	MDDL■55B□	MDDL■55S□		
	81	80					
	101	100					
	121	120	MDDL■45N□	MDDL■45B□	MDDL■45S□		
	161	160	MCDL■35N□	MCDL■35B□	MCDL■35S□		
SHA40P	51	50	MEDL■83N□	MEDL■83B□	MEDL■83S□		
	81	80	MDDL■55N□	MDDL■55B□	MDDL■55S□		
	101	100					
	121	120					
	161	160					
SHA45P	51		MEDL■83N□	MEDL■83B□	MEDL■83S□		
	81						
	101						
	121						
	161		MDDL■55N□	MDDL■55B□	MDDL■55S□		
SHA58P	81		MFDL■A3N□	MFDL■A3B□	MFDL■A3S□	EWD-MB**-D09-TMC-P	MFECA0**0ETE (Equipped with the battery box)
	101						
	121						
	161		MEDL■93N□	MEDL■93B□	MEDL■93S□		
SHA65P	81		MFDL■B3N□	MFDL■B3B□	MFDL■B3S□		
	101						
	121						
	161		MFDL■A3N□	MFDL■A3B□	MFDL■A3S□		

*1: ■ is replaced with the symbol that indicates whether to enable the safety function. T: Compatible with the safety function (Not available in the A6 SE, SG series) N: Without the safety function
*2: □ is replaced with the symbol that indicates the compatible communication. E: Position-control type (combination with the type not equipped with the safety function)
F: Multi-function type (combination with the type equipped with the safety function)
G: Modbus communication type (only for the A6S series) (combination with the type not equipped with the safety function)
*3: "**" in the model code indicates the cable length (03 = 3 m, 05 = 5 m, 10 = 10 m, 20 = 20 m).
*4: For the servo amplifier and encoder relay cable, contact Panasonic Corporation.

System image



Ordering code

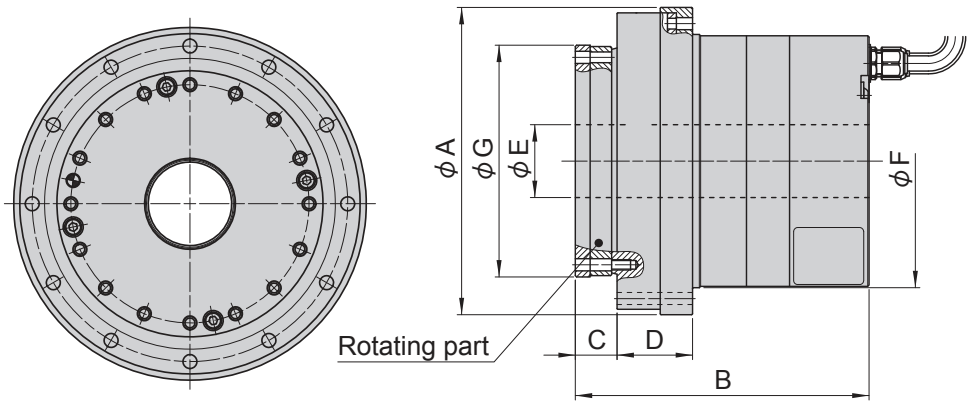
SHA	32	P	101	SG	-	B	12	A	200	-	14	S17b	B	-	C	□	-	A6	-	SP
(1)	(2)	(3)	(4)	(5)		(6)	(7)	(8)	(9)		(10)	(11)	(12)		(13)	(14)		(15)		(16)

(1)	Model name		AC servo actuator SHA series
(2)	Size	SG	20, 25, 32, 40, 45, 58, 65
		CG	20, 25, 32, 40
(3)	Version symbol		P: Compatible with Panasonic's format
(4)	Reduction ratio (expressed by R of 1/R)	SG	51: 1/51 81: 1/81 101: 1/101 121: 1/121 161: 1/161
		CG	50: 1/50 80: 1/80 100: 1/100 120: 1/120 160: 1/160
(5)	Speed reducer type	SG	SHG series
		CG	CSG series
(6)	Motor version symbol		A: Sizes 58, 65 B: Sizes 25, 32, 40 C: Size 20 D: Size 45

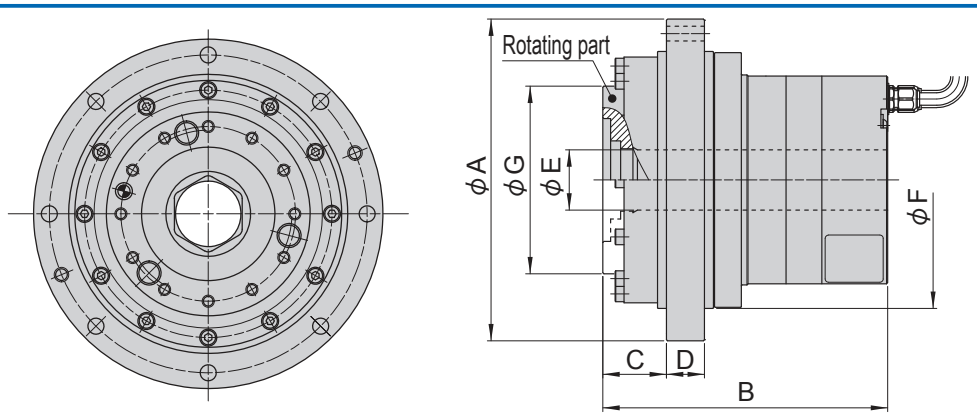
(7)	Motor size	09: Size 25 12: Size 32 15: Size 40 16: Sizes 4, 5 21: Sizes 58, 65
(8)	Brake	A: Without a brake B: With a brake
(9)	Motor power supply voltage	200: 200 V
(10)	Encoder format	14: Panasonic's format
(11)	Encoder type/Resolution	S17b: 17-bit absolute encoder 131072 pulse/revolution
(12)	Encoder phase angle	Phase difference between the motor U phase and the encoder origin A: 30 degrees
(13)	Connector specification	C: With standard connectors N: Without a connector
(14)	Option symbols	L: Near-origin detection and end-limit sensor Y: Side exiting cable V: With a stand (for the CG type only)
(15)	Symbol of the combined amplifier	A6: MINAS A6 series
(16)	Special specifications	No symbol: Standard product SP: Special-specification product

External dimensions

SHA-SG type



SHA-CG type



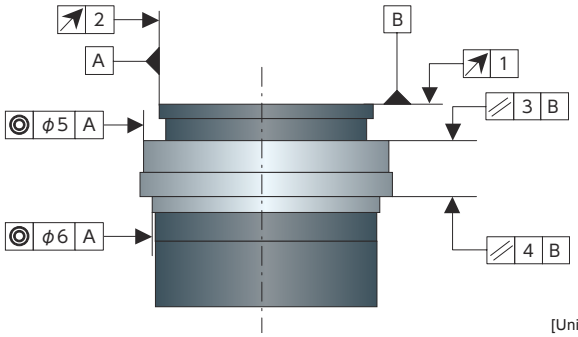
[Unit: mm]

Type / Symbol	SHA20P		SHA25P		SHA32P		SHA40P		SHA45P	SHA58P	SHA65P
	Type SG	Type CG	Type SG	Type CG	Type SG	Type CG	Type SG	Type CG	Type SG	Type SG	Type SG
ϕA	94	117	114	144	146	175	175	225	195	247	284
B	108.5	125.5	109	127.5	125	144	148	170	153.5	213	222
C	12.5	26	15.5	28.5	20	34	26	40	28	37	42.5
D	27	14	28	17	34.5	20	42	22	45.5	74	77.5
ϕE (hollow diameter)	17	17	27	27	35	35	45	45	45	65	65
ϕF	77 h7	95 h7	94 h7	115 h7	122 h7	148 h7	145 h7	180 h7	164 h7	210 h7	236 h7
ϕG	54 h7	69 h7	86 h7	84 h7	114 h7	110 h7	140 h7	132 h7	160 h7	203 h7	223 h7

Mechanical accuracy

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

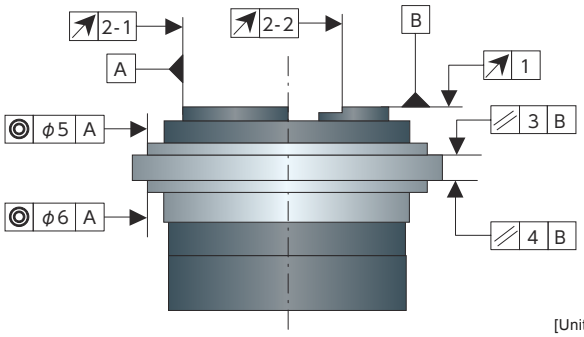
SHA-SG type



[Unit: mm]

Accuracy Item	SHA20P	SHA25P	SHA32P	SHA40P	SHA45P	SHA58P	SHA65P
1. Output shaft surface runout	0.030	0.035	0.040	0.045	0.045	0.050	0.050
2. Output shaft radial runout	0.030	0.035	0.040	0.045	0.045	0.050	0.050
3. Parallelism between output shaft and mounted surface	0.030	0.035	0.040	0.045	0.045	0.050	0.050
4. Parallelism between output shaft and mounted surface	0.055	0.050	0.055	0.060	0.060	0.070	0.070
5. Concentricity between output shaft and fitting part	0.030	0.035	0.040	0.045	0.045	0.050	0.050
6. Concentricity between output shaft and fitting part	0.045	0.060	0.065	0.070	0.070	0.080	0.080

SHA-CG type

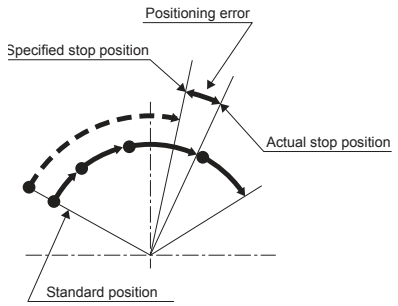


[Unit: mm]

Accuracy Item	SHA20P	SHA25P	SHA32P	SHA40P
1. Output shaft surface runout	0.010	0.010	0.010	0.010
2-1. Output shaft radial runout (external spigot)	0.010	0.010	0.010	0.010
2-2. Output shaft radial runout (internal spigot)	0.015	0.015	0.015	0.015
3. Parallelism between output shaft and mounted surface	0.030	0.030	0.035	0.035
4. Parallelism between output shaft and mounted surface	0.040	0.040	0.045	0.045
5. Concentricity between output shaft and fitting part	0.050	0.050	0.055	0.060
6. Concentricity between output shaft and fitting part	0.060	0.060	0.065	0.070

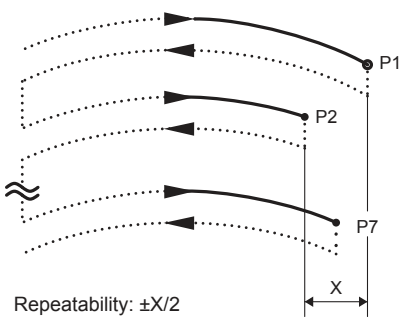
Positioning accuracy

Unidirectional positioning accuracy



"Unidirectional positioning accuracy" refers to the maximum value in one revolution of the values that are calculated from the difference between the actually revolved angle and the specified revolved angle from the standard position at each of the points positioned in the fixed rotational direction. (JIS B-6201-1987)
The SHA-P series incorporates the precision-control speed reducer HarmonicDrive® to reduce the impact on the motor shaft positioning error to 1/Reduction ratio.

Repeatability (CG type)

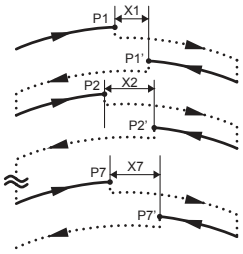


Repeatability: ±X/2

* P1 to P7: Stop position
X: Maximum difference

For "Repeatability", repeat positioning at the desired position in the same direction seven times, and measure the stop position of the output shaft. Measure the positions at four locations on the output shaft, and then obtain the maximum difference. Indicate the measured values value with the degree of angle, and add ± to a half of the maximum difference. (JIS B 6201-1987)

Reverse positioning accuracy (CG type)



Reverse positioning accuracy:
- X1 + X2 + ...+ X7 - /7

* P1 to P7: Stop position in the positive direction
P1' to P7': Stop position in the negative direction
X1 to X7: Difference between the stop positions in the positive and negative directions

For "Reverse positioning accuracy", set the position where running in the positive (or negative) direction stops as the reference position in advance, issue desired commands to run in the same direction and to stop, issue the same commands to start running in the negative (or positive) direction from the stop position and to stop, and then measure the difference between this stop position and the reference position. Repeat a series of these measurement works seven times, obtain the average value, and then indicate the maximum values of those measured at four locations on the output shaft. (JIS B 6201-1987)

SHA-SG Type

[Unit: Second]

Speed reducer \ Type	SHA 20P	SHA 25P	SHA 32P	SHA 40P	SHA 45P	SHA 58P	SHA 65P
1:51	60	50	50	50	50	—	—
1:81 or more	50	40	40	40	40	40	40

SHA-CG Type

[Unit: Second]

Speed reducer \ Type	SHA20P	SHA25P	SHA32P	SHA40P
1:50	60	50	40	40
1:80 or more	50	40	30	30

SHA-CG Type

[Unit: Second]

Speed reducer \ Type	SHA20P	SHA25P	SHA32P	SHA40P
All gear ratio	±5	±5	±4	±4

SHA-CG Type

[Unit: Second]

Speed reducer \ Type	SHA20P	SHA25P	SHA32P	SHA40P
1:50	75	60	60	50
1:80 or more	30	25	25	20

Specification

■ SHA-SG type

Item \ Type		SHA20P					SHA25P					SHA32P				
		51	81	101	121	161	51	81	101	121	161	51	81	101	121	161
Input power supply voltage	V	AC200					AC200					AC200				
Maximum torque*1	N·m	73	96	107	113	120	127	178	204	217	229	281	395	433	459	484
Limit for continuous torque*1*2	N·m	21	35	43	48	48	41	67	81	81	81	92	153	178	178	178
Maximum speed*1	r/min	117.6	74.1	59.4	49.6	37.3	109.8	69.1	55.4	46.3	34.8	94.1	59.3	47.5	39.7	29.8
Maximum current*1	A	6.0	4.9	4.5	4.0	3.4	8.6	7.5	7.0	6.3	5.2	17.3	15.2	13.5	12.2	9.9
Limit for moment load	N·m	187					258					580				
Unidirectional positioning accuracy	Second	60	50	50	50	50	50	40	40	40	40	50	40	40	40	40
Output shaft resolution	Pulse/ Revolution	6684672	10616832	13238272	15859712	21102592	6684672	10616832	13238272	15859712	21102592	6684672	10616832	13238272	15859712	21102592
Mass (without brake)	kg	2.0					2.95					5.9				
Mass (with brake)	kg	2.1					3.1					6.2				

Item \ Type		SHA40P					SHA45P				
		51	81	101	121	161	51	81	101	121	161
Input power supply voltage	V	AC200					AC200				
Maximum torque*1	N·m	523	675	738	802	841	650	918	982	1070	1147
Limit for continuous torque*1*2	N·m	160	263	330	382	382	174	290	363	437	523
Maximum speed*1	r/min	78.4	49.4	39.6	33.1	24.8	74.5	46.9	37.6	31.4	23.6
Maximum current*1	A	26.7	21.8	19.4	17.9	14.6	36.5	29.9	25.9	24.5	19.3
Limit for moment load	N·m	849					1127				
Unidirectional positioning accuracy	Second	50	40	40	40	40	50	40	40	40	40
Output shaft resolution	Pulse/ Revolution	6684672	10616832	13238272	15859712	21102592	6684672	10616832	13238272	15859712	21102592
Mass (without brake)	kg	9.9					12.4				
Mass (with brake)	kg	10.7					13.2				

Item \ Type		SHA58P				SHA65P			
		81	101	121	161	81	101	121	161
Input power supply voltage	V	AC200				AC200			
Maximum torque*1	N·m	1924	2067	2236	2392	2743	2990	3263	3419
Limit for continuous torque*1*2	N·m	714	905	969	969	921	1149	1236	1236
Maximum speed*1	r/min	37.0	29.7	24.8	18.6	34.6	27.7	23.1	17.4
Maximum current*1	A	45	39	36	30	62	55	51	41
Limit for moment load	N·m	2180				2740			
Unidirectional positioning accuracy	Second	40	40	40	40	40	40	40	40
Output shaft resolution	Pulse/Revolution	10616832	13238272	15859712	21102592	10616832	13238272	15859712	21102592
Mass (without brake)	kg	29.5				37.5			
Mass (with brake)	kg	32				40			

The values in the table above show typical values for the output shaft.
*1: They are typical characteristics in the case of combinations with the standard amplifier (driven with the ideal sine wave).
*2: They are the values produced at the saturation temperature when mounted on the aluminum heat sink.
SHA20P: 320 x 320 x 16 [mm] SHA25P: 350 x 350 x 18 [mm] SHA32P: 400 x 400 x 20 [mm]
SHA40P/45P: 500 x 500 x 25 [mm] SHA58P/65P: 650 x 650 x 30 [mm]

■ SHA-CG type

Item \ Type		SHA20P					SHA25P				
		50	80	100	120	160	50	80	100	120	160
Input power supply voltage	V	AC200					AC200				
Maximum torque*1	N·m	73	96	107	113	120	127	178	204	217	229
Limit for continuous torque*1*2	N·m	21	35	43	48	48	40	66	81	81	81
Maximum speed*1	r/min	120	75	60	50	37.5	112	70	56	46.7	35
Maximum current *1	A	6.1	5.0	4.6	4.1	3.4	8.7	7.6	7.0	6.3	5.2
Limit for moment load	N·m	187					258				
Unidirectional positioning accuracy	Second	60	50	50	50	50	50	40	40	40	40
Repeatability	Second	±5					±5				
Reverse positioning accuracy	Second	75	30	30	30	30	60	25	25	25	25
Output shaft resolution	Pulse/ Revolution	6553600	10485760	13107200	15728640	20971520	6553600	10485760	13107200	15728640	20971520
Mass (without brake)	kg	2.6					3.95				
Mass (with brake)	kg	2.7					4.1				

Item \ Type		SHA32P					SHA40P				
		50	80	100	120	160	50	80	100	120	160
Input power supply voltage	V	AC200					AC200				
Maximum torque*1	N·m	281	395	433	459	484	523	675	738	802	841
Limit for continuous torque*1*2	N·m	90	151	178	178	178	157	260	327	382	382
Maximum speed*1	r/min	96	60	48	40	30	80	50	40	33.3	25
Maximum current *1	A	17.7	15.4	13.7	12.2	10.0	27.2	22.0	19.6	18.0	14.7
Limit for moment load	N·m	580					849				
Unidirectional positioning accuracy	Second	40	30	30	30	30	40	30	30	30	30
Repeatability	Second	±4					±4				
Reverse positioning accuracy	Second	60	25	25	25	25	50	20	20	20	20
Output shaft resolution	Pulse/ Revolution	6553600	10485760	13107200	15728640	20971520	6553600	10485760	13107200	15728640	20971520
Mass (without brake)	kg	7.7					13.0				
Mass (with brake)	kg	8.0					13.8				

The values in the table above show typical values for the output shaft.
*1: They are typical characteristics in the case of combinations with the standard amplifier (driven with the ideal sine wave).
*2: They are the values produced at the saturation temperature when mounted on the aluminum radiation plate.
SHA20P: 320 x 320 x 16 [mm] SHA25P: 350 x 350 x 18 [mm] SHA32P: 400 x 400 x 20 [mm]
SHA40P: 500 x 500 x 25 [mm]

SHA series option

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

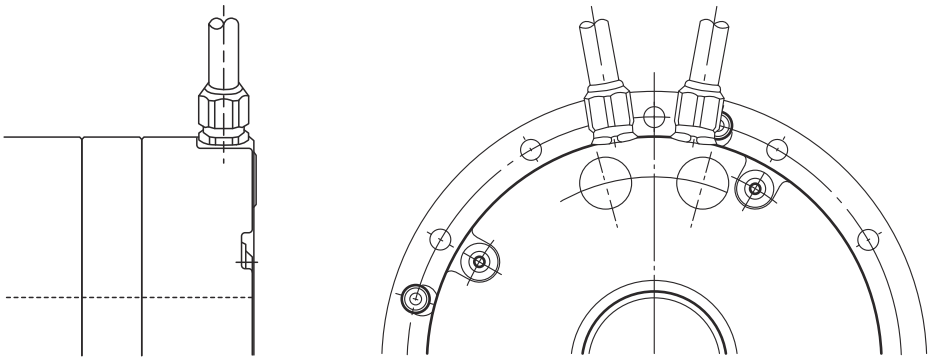
The revolution sensor is installed and directly connected to the output shaft on the opposite side of actuator output. Use this sensor when the origin of mechanical operation is required (when there is a problem in using the virtual origin of the absolute encoder) or when the operation range is preferably defined for the safety measure. (This cannot be applied to SHA20P.)

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 SHA20P-SG, SHA58P, and SHA65P.)

With a stand (Symbol for option: V) (only for CG type)

Side exiting cable



SHA-CG type equipped with the stand

■ **Please contact our sales department with any questions.**

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