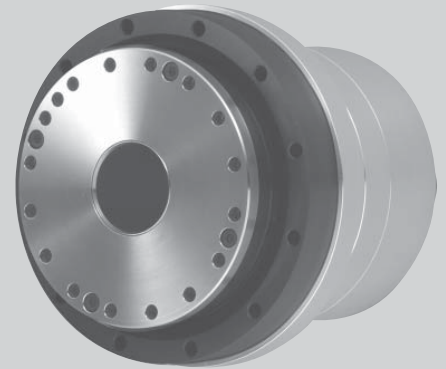


SHA Series

The SHA series comprises AC servo actuators that integrate a thin speed reducer HarmonicDrive® for precision control and a super flat AC servo motor. The SHA series features an unmatched compact hollow body. Entire machine and equipment structures can be simplified by passing wires, pipes and laser beams through a hole in the center of the actuator. Additionally, output shaft bearing, speed reducer, motor winding and others can be selected. The SHA series features wider variation that can meet various needs. Combination with the compact and multi-functional dedicated driver HA-800 controls the motions of the SHA series with high levels of accuracy and precision.



Features

- Hollow structure (maximum hollow opening diameter $\phi 65\text{mm}$), flat structure (maximum outside diameter $\phi 284\text{mm}$, total length 222mm)
* Both in SHA65
- Torque cubic volume ratio more than 5 times of direct drive motor is achieved. * According to the technical information of HarmonicDrive®.
- Torque from 26Nm to 3419Nm is set as series.
- Shaft bearing, speed reducer, and motor winding specifications can be selected to “meet various needs”
- 17bit magnetic type absolute encoder is mounted as standard (conforming to Nikon A format)
- By combining with hollow planetary reducer for precision control of “Harmonic Planetary” HPF series, high-speed revolution is available. (Model No. 25 and 32)
- By using dedicated drivers, control with MECHATROLINK-II or CC-Link becomes available.
- Motor itself can be sold as well.

Structure

Reducer model

Standard	High torque Harmonic Drive® SHG series High-speed Harmonic Planetary® HPF series (Model No. 25 and 32)
Variation	Changeable reducer model Flat Harmonic Drive® (SHD series) Planetary gear reducer (HPG series) Reduction ratio: selectable between 1/11 and 1/161

Cable lead-out

Standard	Rear lead-out (Connector used in models 58 and 65)
Variation	Side lead-out is available. (Models 25, 32, and 40)

Encoder

Standard	Magnetic type absolute encoder (17bit) Multi revolution backup (16bit) (conforming to Nikon A format)
Variation	Incremental encoder can be mounted.

Holding brake

Standard	Without brake
Variation	With brake (can be mounted without changing dimensions.)

AC Servo motor

Standard	Supported power voltage specification: AC 200V (SHA25 is AC100V spec and 200V spec.)
Variation	Supported power voltage specification: AC100V, DC48V to 90V (Inquire at Harmonic drive's sales office for the supported model.)

Output shaft bearing

Standard	HarmonicDrive® unit type Crossed roller bearing in common with SHG series
Variation	The size can be changed to the high load capacity and high load specification.

Option

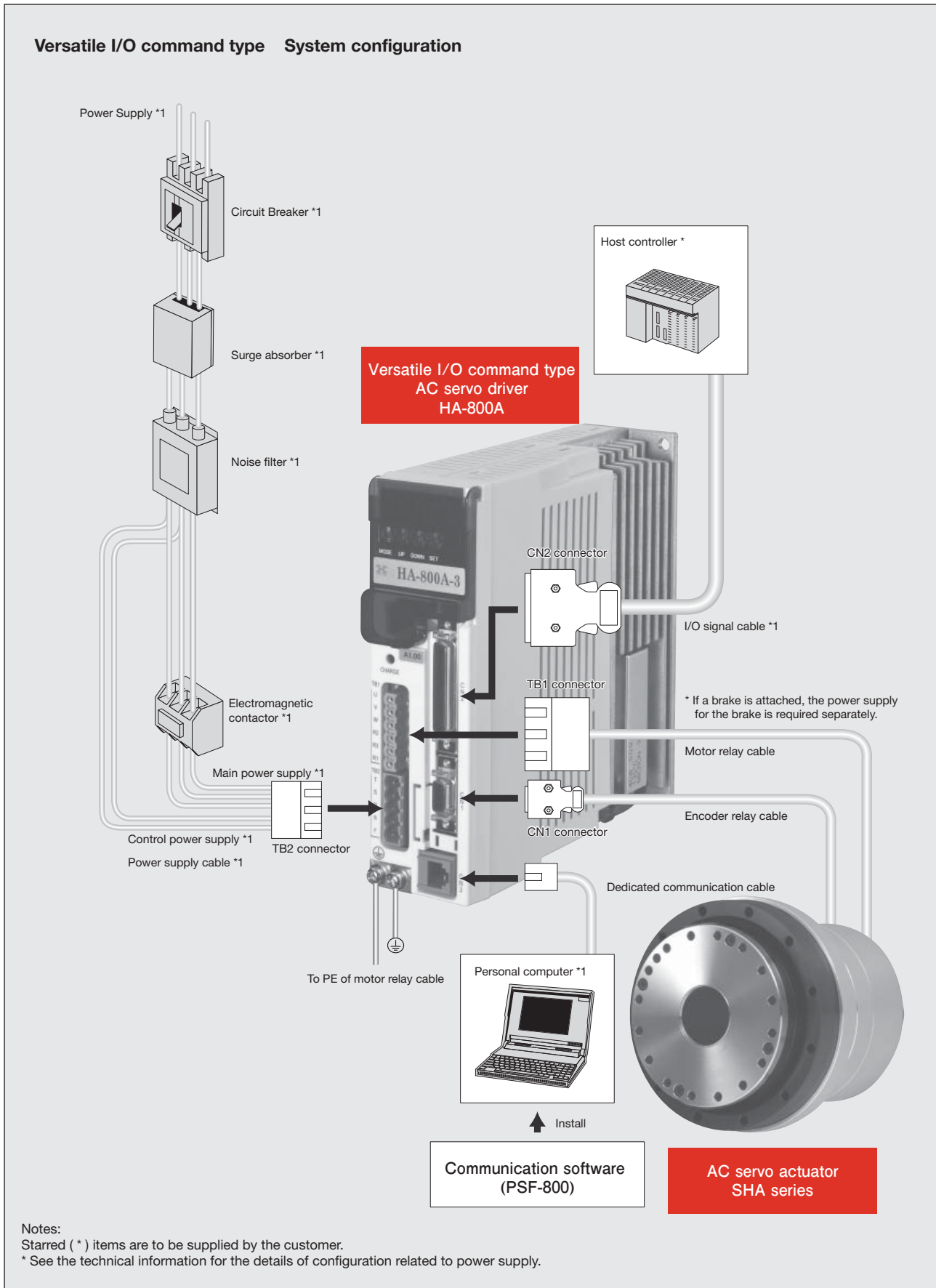
Standard	Near origin and end limit sensors
----------	-----------------------------------

Environment specification

Standard	Protection code: IP54 Operating temperature: 0°C to +40°C UL and CE markings Compliance with RoHS directive
Variation	Can be compatible with IP65 of protection code.

Example of System Configuration

Basic configuration of SHA actuator, HA-800 driver, and relay cable are illustrated.



SHA Series

Models and Symbols

AC servo actuator

Example of standard item model: (1) (2) (3) (4) (5) - (6) (7) (8) (9) - (10) (11) (12) - (13) (14) - (15)
 SHA 32 A 101 SG - B 12 A 200 - 10 S17b A - C

(1) Type: AC servo actuator
SHA series

(2) Model Nos.: 20, 25, 32, 40, 58, 65

(3) Version symbol

(4) Reduction ratio (represented as R of 1/R)

11	1/11
51	1/51
81	1/81
101	1/101
121	1/121
161	1/161

(5) Reducer type

SG	SHG series
HP	HPF series

(6) Motor version

A	Model Nos. 58, 65
B	Model Nos. 25, 32, 40
C	Model Nos. 20

* Reduction ratio 1/11 is set by combination with hollow planetary reducer HPF series.
The Applicable Model Nos. for the ratio are 25 and 32, and the ratio is available in case of AC200V only.

Specification

Item	Model		SHA20A					SHA25A						
			51	81	101	121	161	11	51	81	101	121		161
Maximum Torque *2	Nm		73	96	107	113	120	26	127	178	204	217	229	
	kgfm		7.4	9.8	10.9	11.5	12.2	2.7	13	18.2	20.8	22.1	23.4	
Max. Rotational Speed	r/min		117.6	74.1	59.4	49.6	37.3	509.1	1098(94.1)	69.1(59.3)	55.4(47.5)	46.3(39.7)	34.8(29.8)	
Torque Constant	Nm/A		16.5	27	33	40	53	4.2	19(11.1)	31(17.9)	39(22)	46(27)	62(36)	
	kgfm/A		1.7	2.7	3.4	4.1	5.4	0.43	2.0(1.1)	3.2(1.8)	4.0(2.3)	4.7(2.7)	6.3(3.6)	
Maximum Current *2	A		6.0	4.9	4.5	4.0	3.4	8.9	8.6(14.9)	7.5(13.0)	7.0(12.1)	6.3(10.9)	5.2(9.0)	
Moment of Inertia (without brake)	GD ² /4	kgm ²	0.23	0.58	0.91	1.3	2.3	0.029	0.56	1.42	2.2	3.2	5.6	
	J	kgfcm ²	2.4	6.0	9.3	13	24	0.296	5.7	14.4	22	32	57	
Moment of Inertia (with brake)	GD ² /4	kgm ²	0.26	0.65	1.0	1.4	2.6	0.034	0.66	1.66	2.6	3.7	6.6	
	J	kgfcm ²	2.6	6.6	10	15	26	0.347	6.7	17	26	38	67	
Permissible Moment Load	Nm		187					410					258	
	kgfm		19.1					41.8					26.3	
Moment Stiffness	Nm/rad		25.2×10 ⁶					37.9×10 ⁴					39.2×10 ⁴	
	kgfm/arc-min		7.5					11.3					11.6	
Encoder method	Magnetic type 17bit absolute encoder													
Encoder resolution per motor revolution	2 ¹⁷ (131,072)													
Multi revolution detection	2 ¹⁶ (65,536)													
Output shaft resolution	Pulse/revolution		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	
Input power voltage	V		AC200					AC200		AC100またはAC200				
Mass (without brake)	kg		2.0					5		2.95				
Mass (with brake)	kg		2.1					5.1		3.1				
Protection Structure	Totally enclosed self-cooled type (IP54 or equivalent: See the technical information for the details of protection code.)													
Environmental Conditions	Operating temperature 0 to 40°C, storage temperature -20 to 60°C, Operating humidity / storage humidity 20 to 80% RH (Do not expose to condensation), No dust, no metal powder, no corrosive gas, no inflammable gas and no oil mist, indoor use only. No exposure to direct sunshine. Altitude 1000m or less.													
Mounting Direction	All directions													
Safety Standard Compliance	CE Marking, Certifications for UL and TUV													
Combined Driver	HA-800□-3						HA-800□-3 HA-800□-6							

* 1: The aforementioned values are those at the output shaft.

* 2: Values in combination with an HA-800 servo driver.

* 3: The value in parentheses () of SHA25 is the value when the input power voltage is AC100V.

* 4: The value in parentheses () of SHA40 is the value when combined with HA-800□-24 (rated output current 24A).

* 5: Please check the actuator rotation direction in our technical data sheet.

(7) Motor size

08	Model Nos. 20
09	Model Nos. 25
12	Model Nos. 32
15	Model Nos. 40
21	Model Nos. 58, 65

(8) Brake

A	Without brake
B	With brake

(9) Power supply of motor

200	AC200V
100	AC100V

(100V is available only with our model No. 25.)

(10) Encoder format

10	A format, transmission speed: 2.5Mbps, one-to-one connection
----	--

(11) Encoder type, resolution

S17b	17bit absolute encoder, 131072 pulse/revolution
------	---

(12) Encoder phase angle

A	0°
---	----

(13) Attached connector

C	Connector attached as standard
N	Without connector
D	With special connector (special specification)

(14) Option symbol

L	Near origin and end limit sensors
Y	Side lead-out of cable

(15) Special specification

No description	Standard
	Special specification item

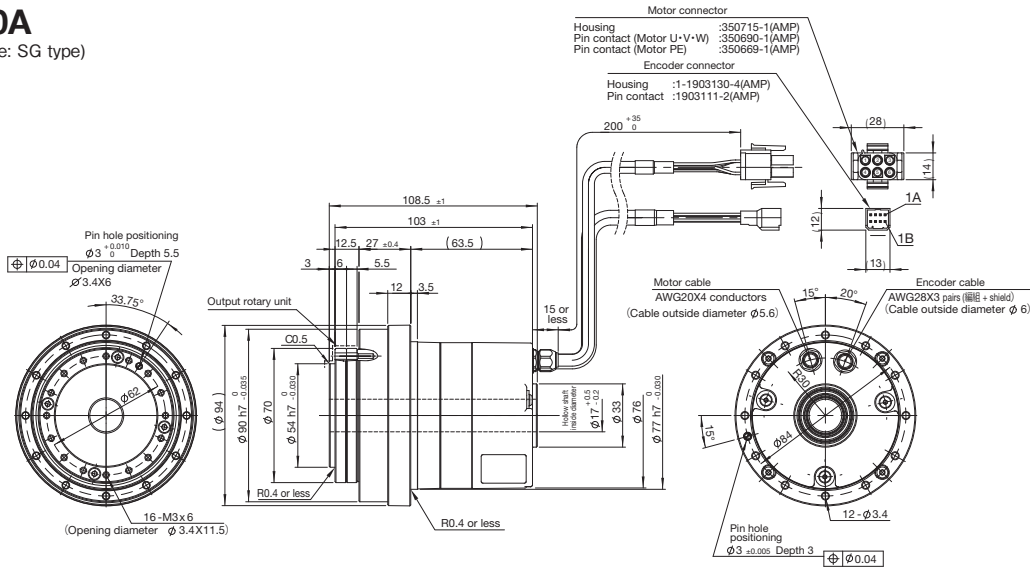
	SHA32A						SHA40A					SHA58A				SHA65A				
	11	51	81	101	121	161	51	81	101	121	161	81	101	121	161	81	101	121	161	
	62	281	395	433	459	484	340(523)	560(675)	686(738)	802	841	1924	2067	2236	2392	2400	2990	3263	3419	
	6.3	28.7	40.3	44.2	46.8	49.4	34.7(53.4)	57.1(68.9)	70(75.3)	81.8	85.8	196	211	228	244	245	305	333	349	
	436.4	94.1	59.3	47.5	39.7	29.8	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	
	4.5	21	33	42	50	66	25	41	51	61	81	54	68	81	108	54	68	81	108	
	0.46	2.1	3.4	4.2	5.1	6.8	2.6	4.1	5.2	6.2	8.2	5.5	6.9	8.3	11.0	5.5	6.9	8.3	11.0	
	19	17.3	15.2	13.5	12.2	9.9	18(26.7)	18(21.8)	18(19.4)	17.9	14.6	45	39	36	30	55	55	51	41	
	0.092	2.0	5.1	8.0	11	20	5.0	13	20	28	50	96	149	214	379	110	171	245	433	
	0.939	21	52	81	117	207	51	130	202	290	513	980	1520	2180	3870	1120	1740	2500	4420	
	0.107	2.3	5.9	9.2	13	23	6.1	15	24	34	61	106	165	237	420	120	187	268	475	
	1.087	24	60	94	135	238	62	157	244	350	619	1090	1690	2420	4290	1230	1910	2740	4850	
	932	580					849					2180				2740				
	95	59.1					86.6					222				280				
	86.1×10 ⁴	100×10 ⁴					179×10 ⁴					531×10 ⁴				741×10 ⁴				
	25.7	29.6					53.2					158				220				
Magnetic type 17bit absolute encoder																				
2 ¹⁷ (131,072)																				
2 ¹⁶ (65,536)																				
	1,441,792	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	
AC200																				
	9.4	5.9					9.9					29.5				37.5				
	9.7	6.2					10.7					32				40				
Totally enclosed self-cooled type (IP54 or equivalent: See the technical information for the details of protection code.) Operating temperature 0 to 40°C, storage temperature -20 to 60°C, Operating humidity / storage humidity 20 to 80% RH (Do not expose to condensation), No dust, no metal powder, no corrosive gas, no inflammable gas and no oil mist, Indoor use only. No exposure to direct sunshine. Altitude 1000m or less.																				
All directions																				
CE Marking, Certifications for UL and TUV																				
	HA-800□-6					HA-800□-6 HA-800□-24					HA-800□-24					HA-800□-24				



SHA Series

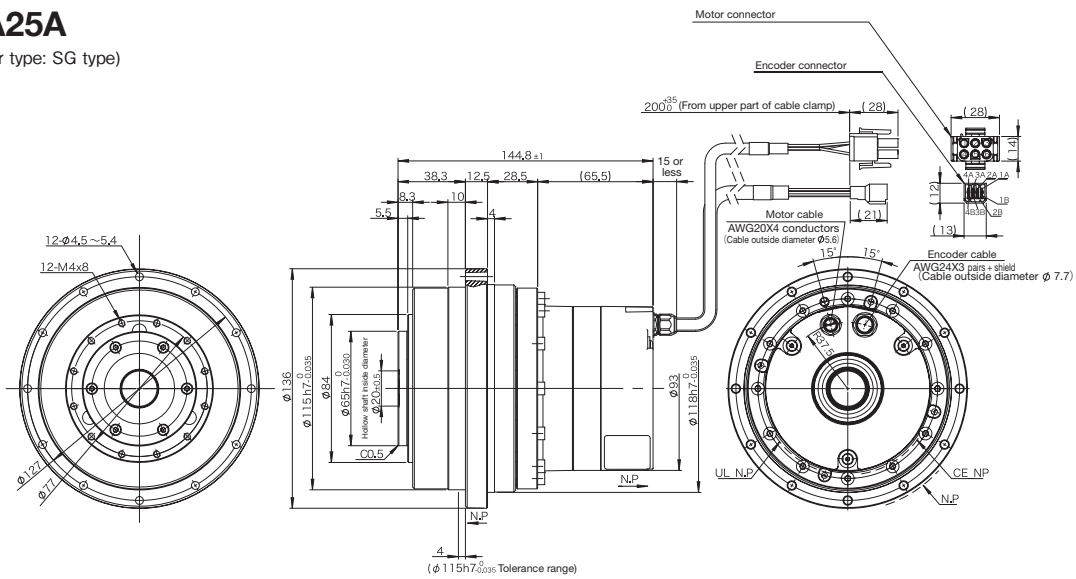
External Dimensions

SHA20A (Reducer type: SG type)



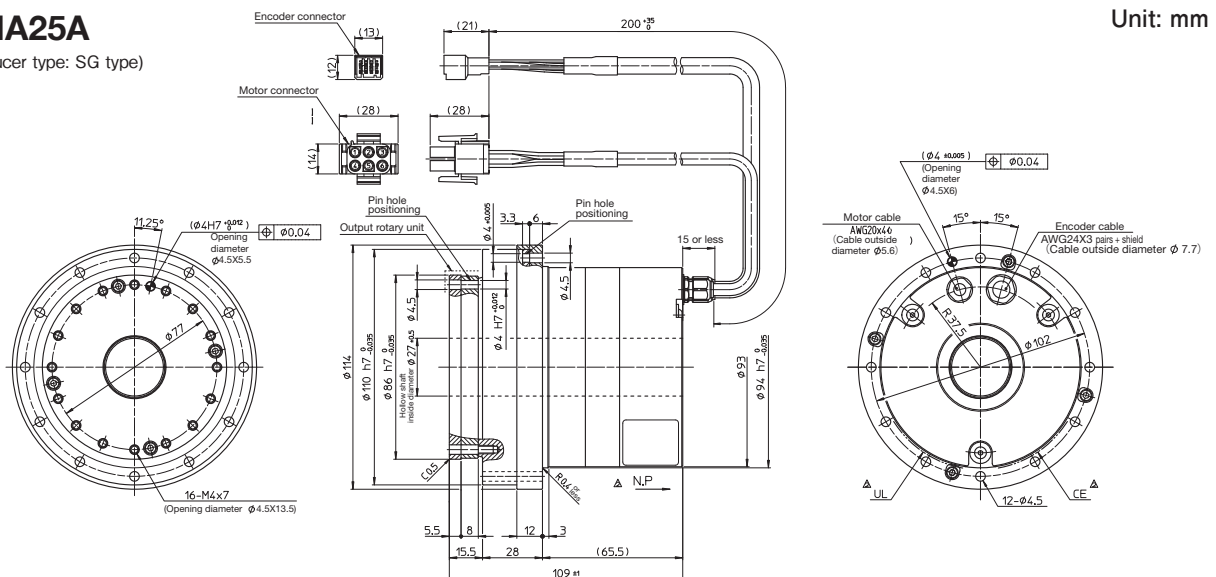
Unit: mm

SHA25A (Reducer type: SG type)



Unit: mm

SHA25A (Reducer type: SG type)



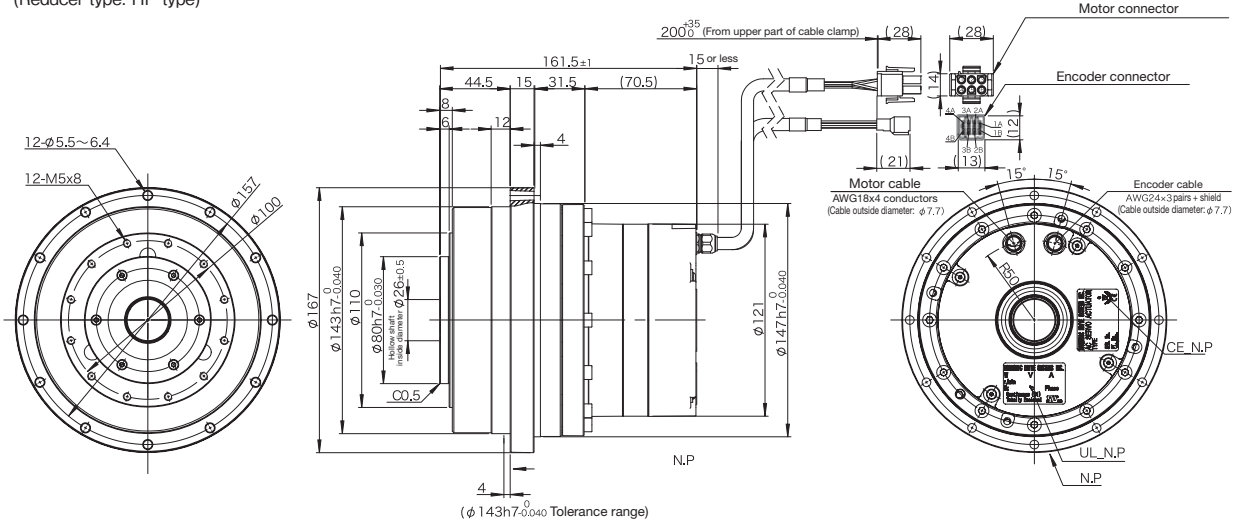
Unit: mm

* The differential range may differ depending on the method for manufacturing parts (molded articles, machining articles). Contact us for the differential range of the size that is not described.

SHA32A

(Reducer type: HP type)

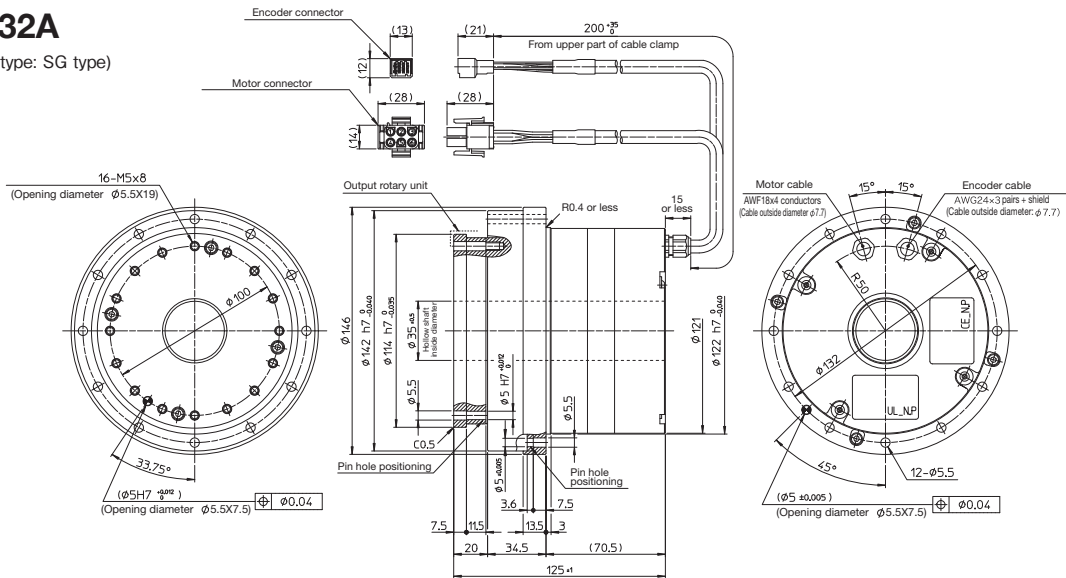
Unit: mm



SHA32A

(Reducer type: SG type)

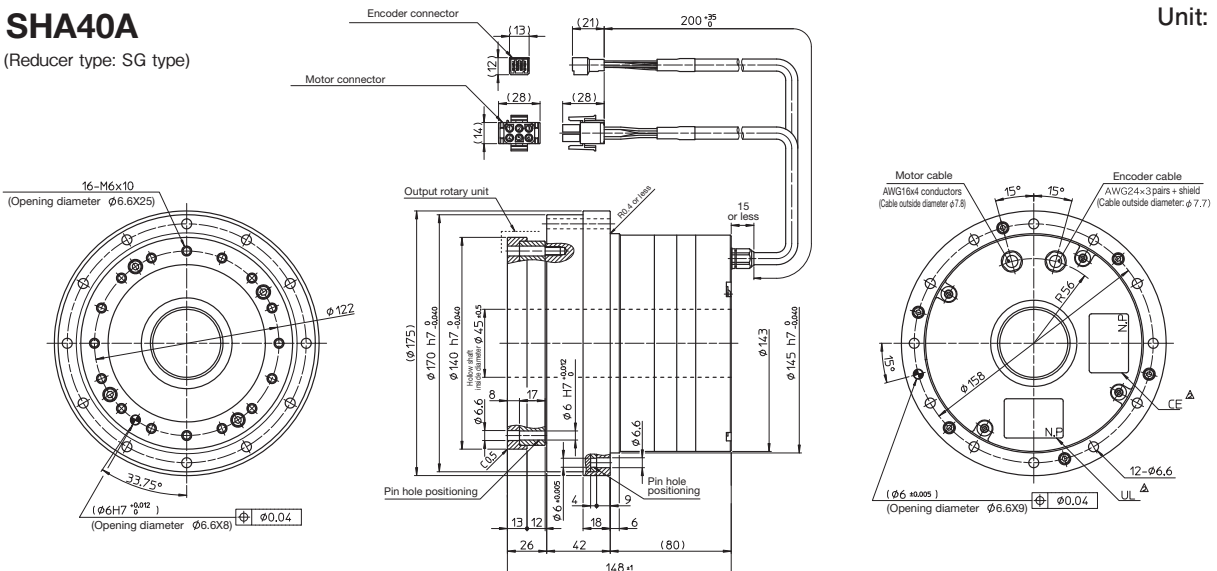
Unit: mm



SHA40A

(Reducer type: SG type)

Unit: mm



* The differential range may differ depending on the method for manufacturing parts (molded articles, machining articles). Contact us for the differential range of the size that is not described.

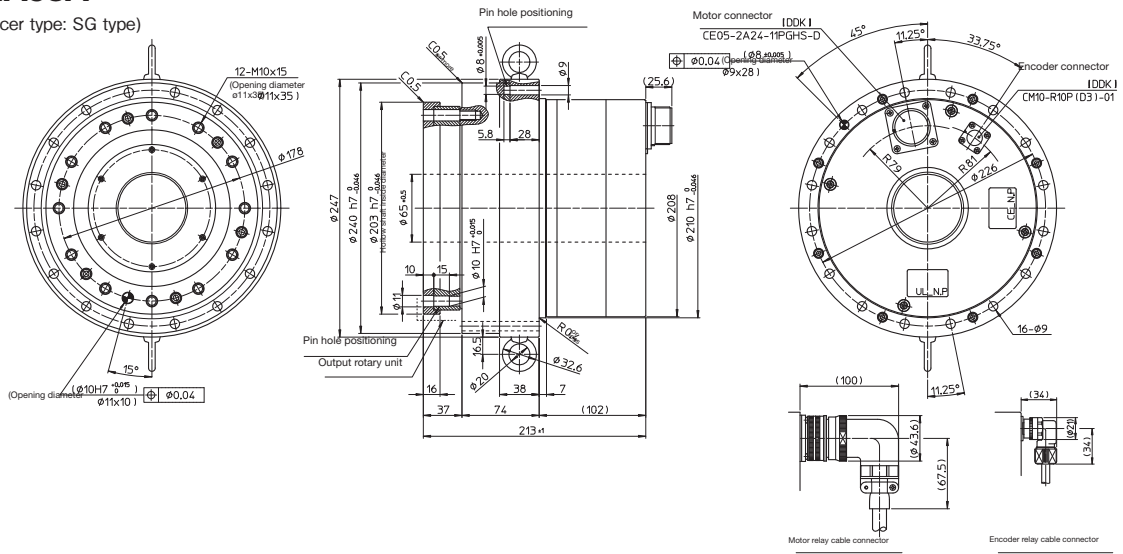
SHA Series

External Dimensions

Unit: mm

SHA58A

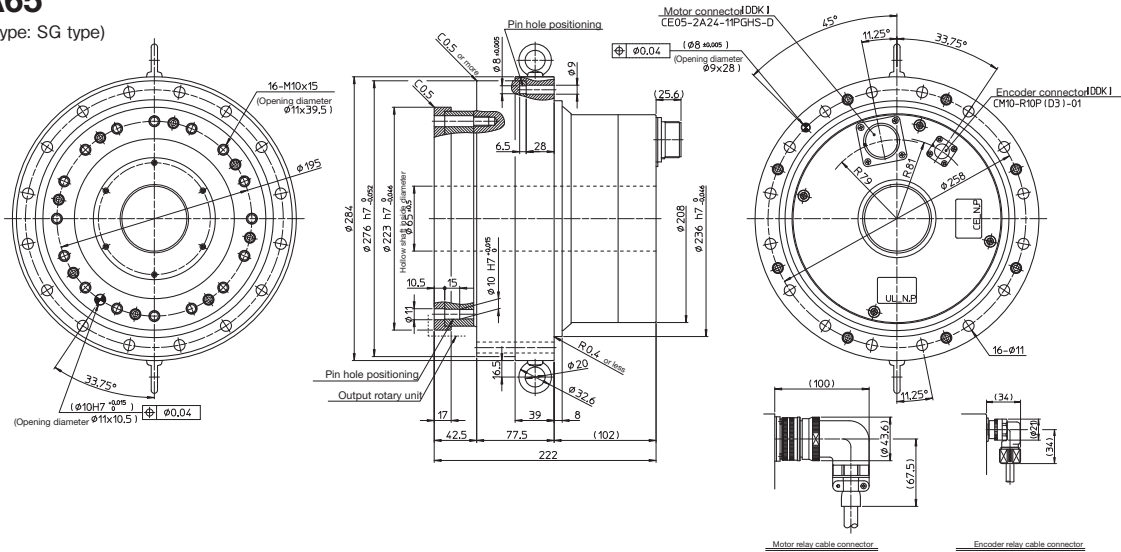
(Reducer type: SG type)



SHA65

(Reducer type: SG type)

Unit: mm

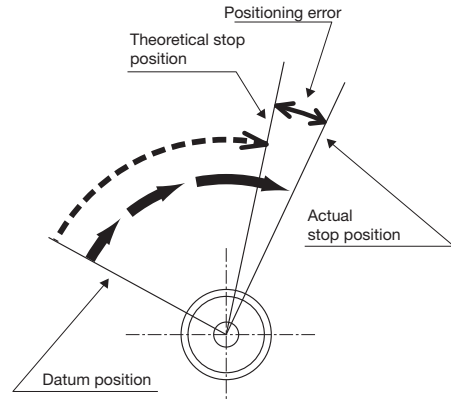


* The differential range may differ depending on the method for manufacturing parts (molded articles, machining articles). Contact us for the differential range of the size that is not described.

Uni-directional Positional accuracy

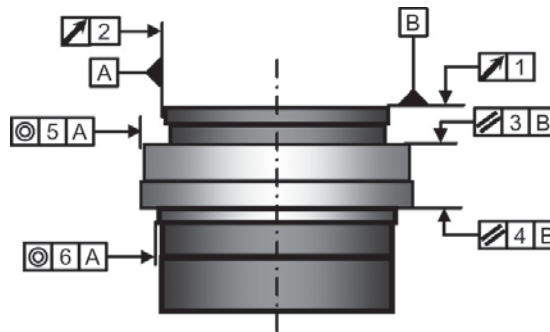
The “uni-directional positional accuracy” represents the maximum difference in one revolution among differences between an angle actually rotated from the datum position and an angle that is supposed to turn in each position by repeating positioning sequentially in a preset rotational direction. (Source: JIS [Japanese Industrial Standards] B 6201-1987). The SHA series contains a speed reducer HarmonicDrive® for precision control or a hollow planetary speed reducer for precision control HPF series. Therefore, positioning errors of the motor shaft are compressed according to reduction ratio. The “uni-directional positional accuracy” of the individual models are shown below.

Reduction ratio \ Model	SHA20A	SHA25A	SHA32A	SHA40A	SHA58A	SHA65A
1:11	—	120	120	—	—	—
1:51	60	50	50	50	—	—
1:81 or more	50	40	40	40	40	40



Mechanical Accuracy

The mechanical accuracies of the output shaft and mounting flange of the actuators in the SHA series are as follows.



(Unit: mm)

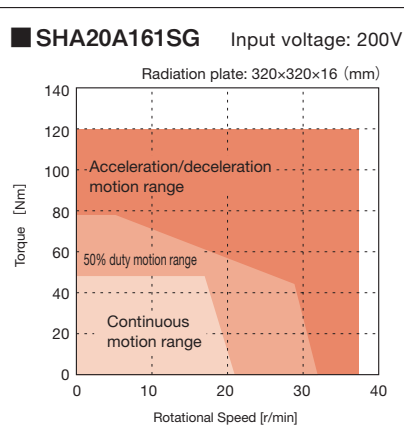
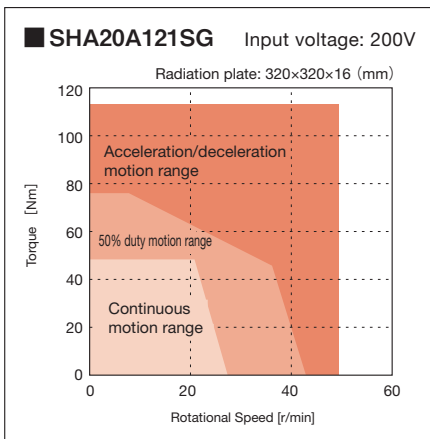
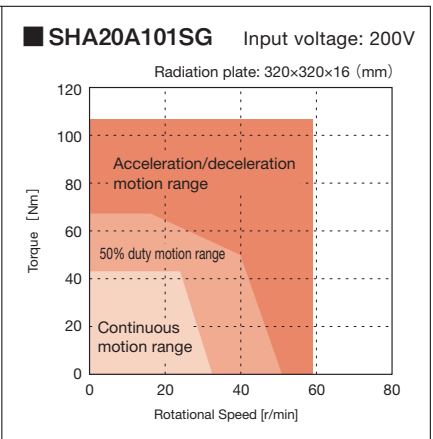
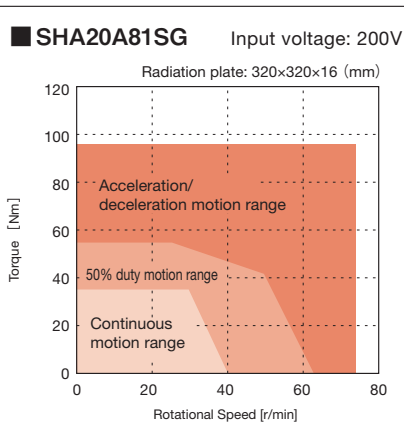
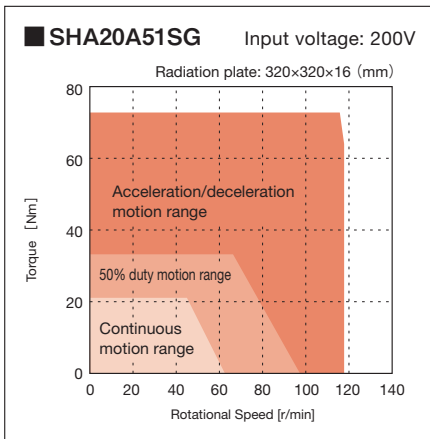
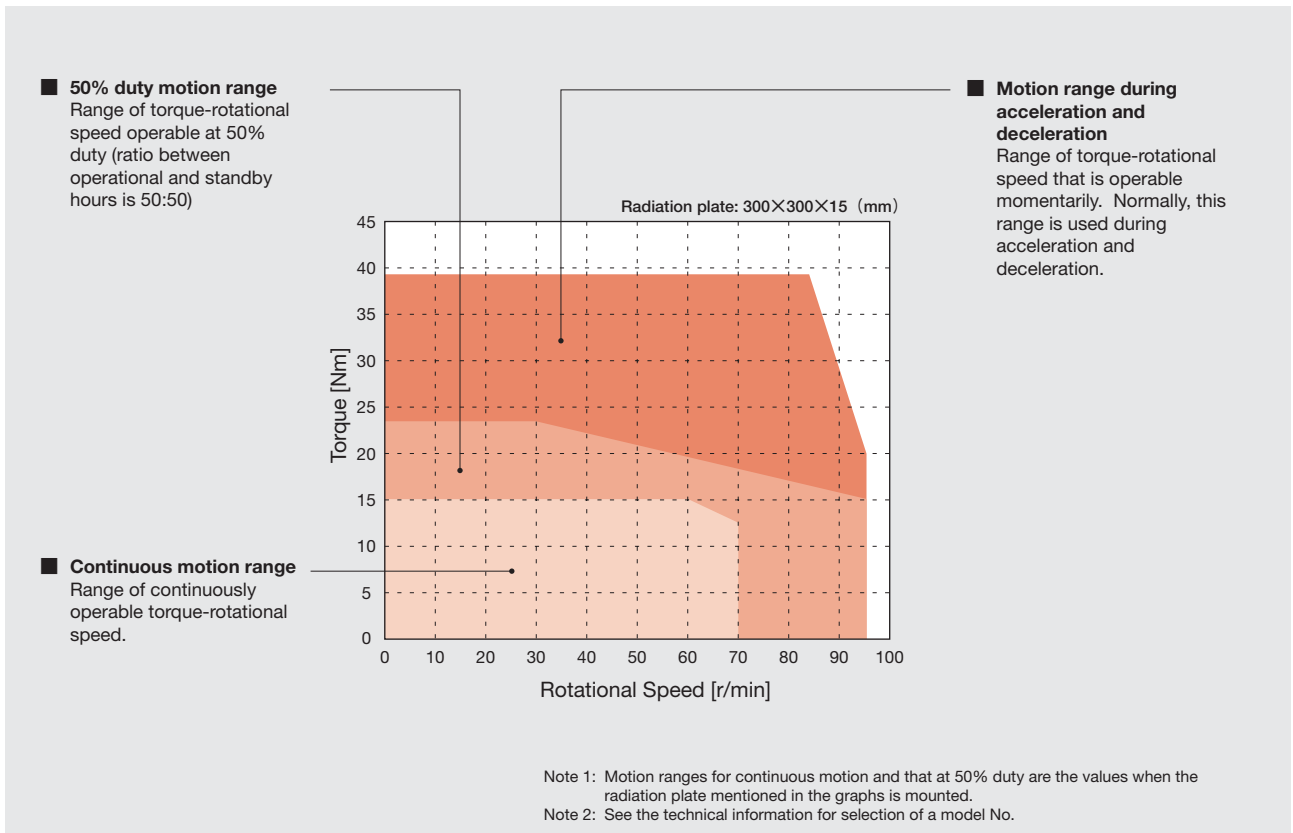
Item	SHA20A	SHA25A	SHA32A	SHA40A	SHA58A	SHA65A
1. Output shaft surface runout	0.030	0.035	0.040	0.045	0.050	0.050
2. Output shaft axial runout	0.030	0.035 (0.020)	0.040 (0.020)	0.045	0.050	0.050
3. Parallelism between the output shaft and mounted surface	0.030	0.035	0.040	0.045	0.050	0.050
4. Parallelism between the output shaft and mounted surface	0.055	0.050	0.055	0.060	0.070	0.070
5. Concentricity between the output shaft and fitting part	0.030	0.035	0.040	0.045	0.050	0.050
6. Concentricity between the output shaft and fitting part	0.045	0.060	0.065	0.070	0.080	0.080

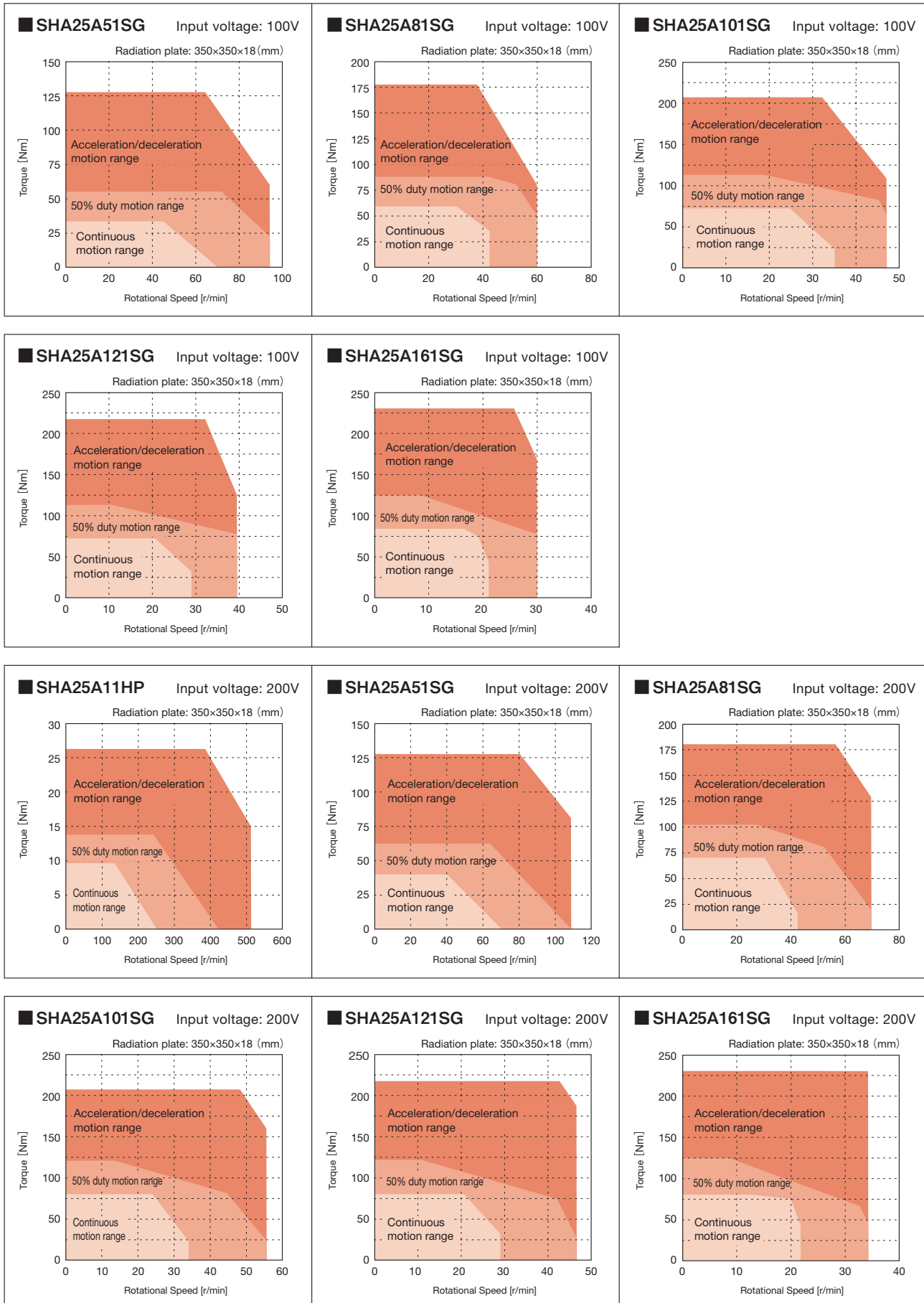
* See the technical information for the measuring method.
 * The aforementioned values are T.I.R (total indicator reading) values.
 * The values in parentheses () is the value when combining reducer type and HP type (hollow planetary reducer).

SHA Series

Operable Range

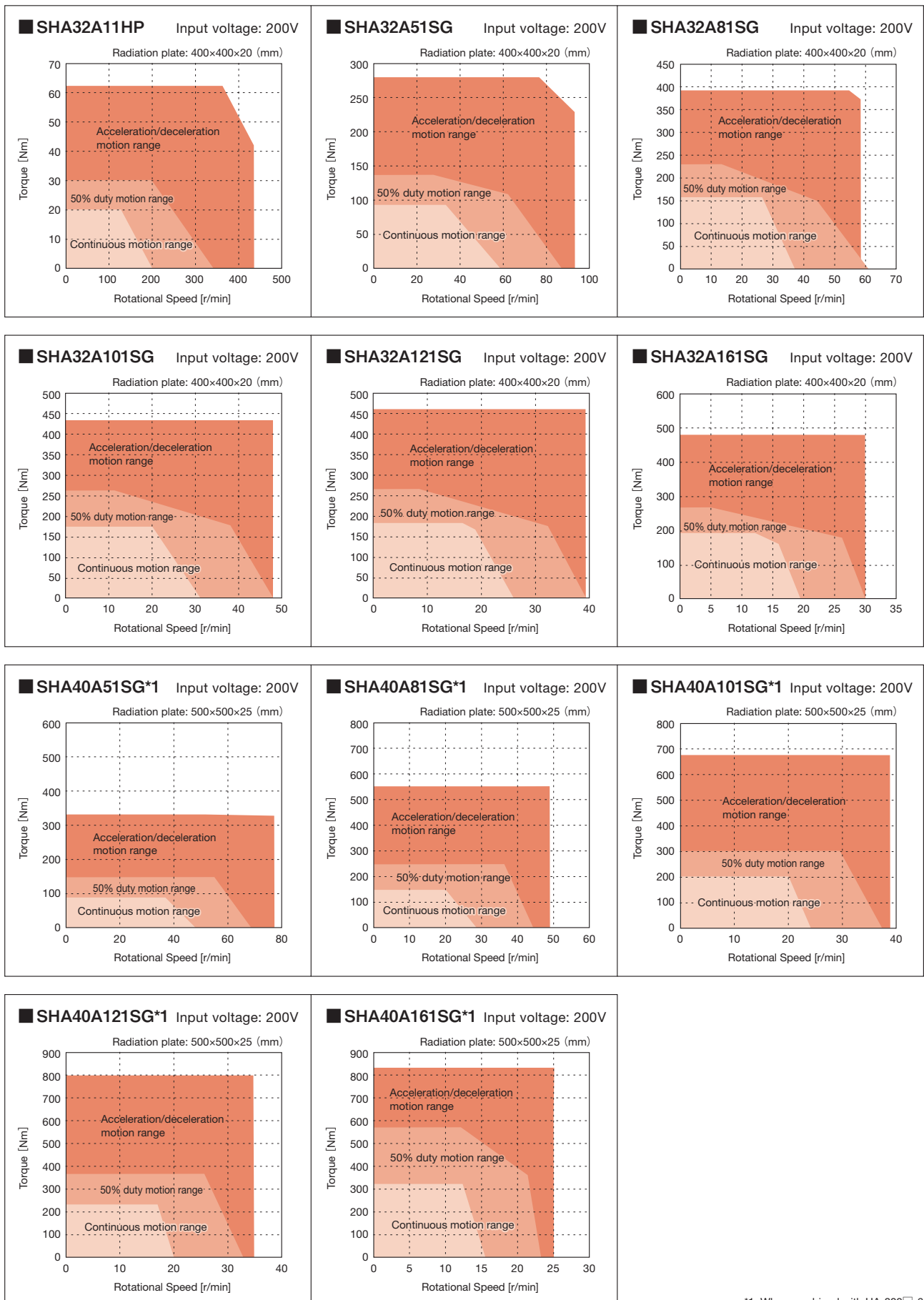
The following diagrams show the operable range of the SHA series (combined with driver HA-800 servo driver).





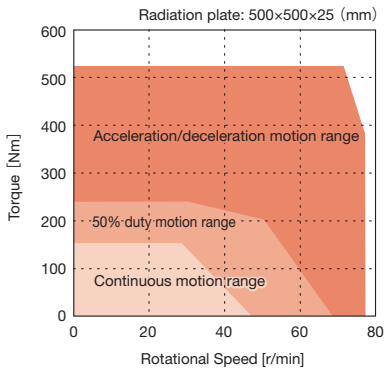
SHA Series

Operable Range

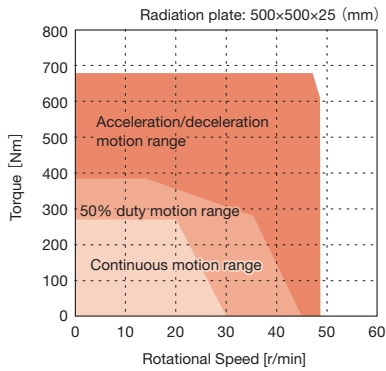


*1: When combined with HA-800□-6

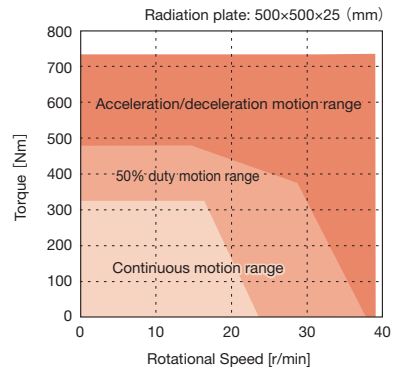
■ **SHA40A51SG*2** Input voltage: 200V
Radiation plate: 500×500×25 (mm)



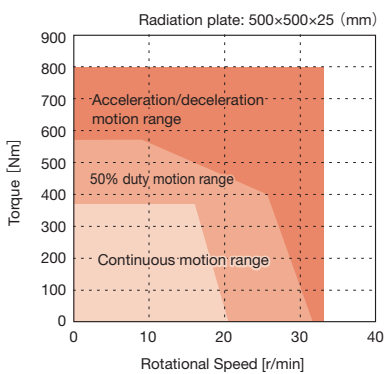
■ **SHA40A81SG*2** Input voltage: 200V
Radiation plate: 500×500×25 (mm)



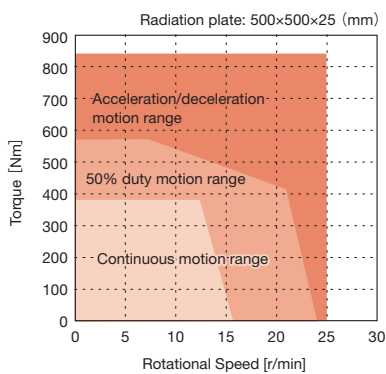
■ **SHA40A101SG*2** Input voltage: 200V
Radiation plate: 500×500×25 (mm)



■ **SHA40A121SG*2** Input voltage: 200V
Radiation plate: 500×500×25 (mm)

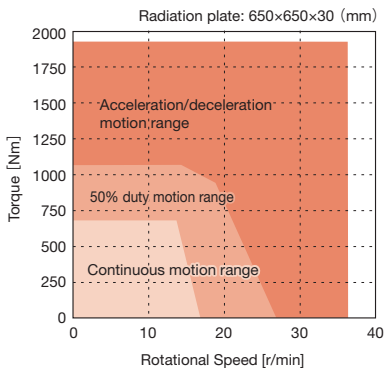


■ **SHA40A161SG*2** Input voltage: 200V
Radiation plate: 500×500×25 (mm)

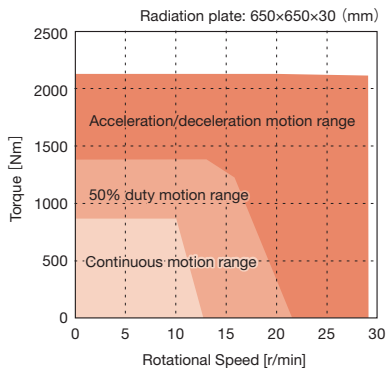


*2: When combined with HA-800□-24

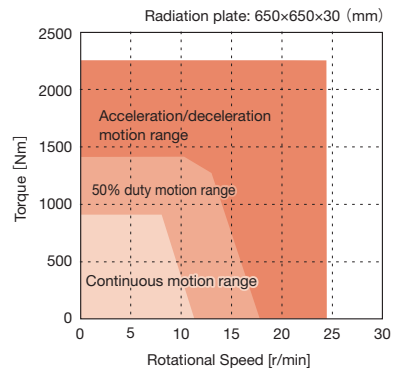
■ **SHA58A81SG** Input voltage: 200V
Radiation plate: 650×650×30 (mm)



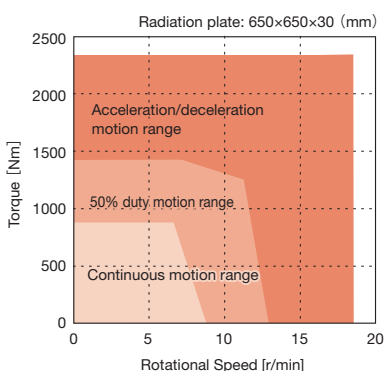
■ **SHA58A101SG** Input voltage: 200V
Radiation plate: 650×650×30 (mm)



■ **SHA58A121SG** Input voltage: 200V
Radiation plate: 650×650×30 (mm)

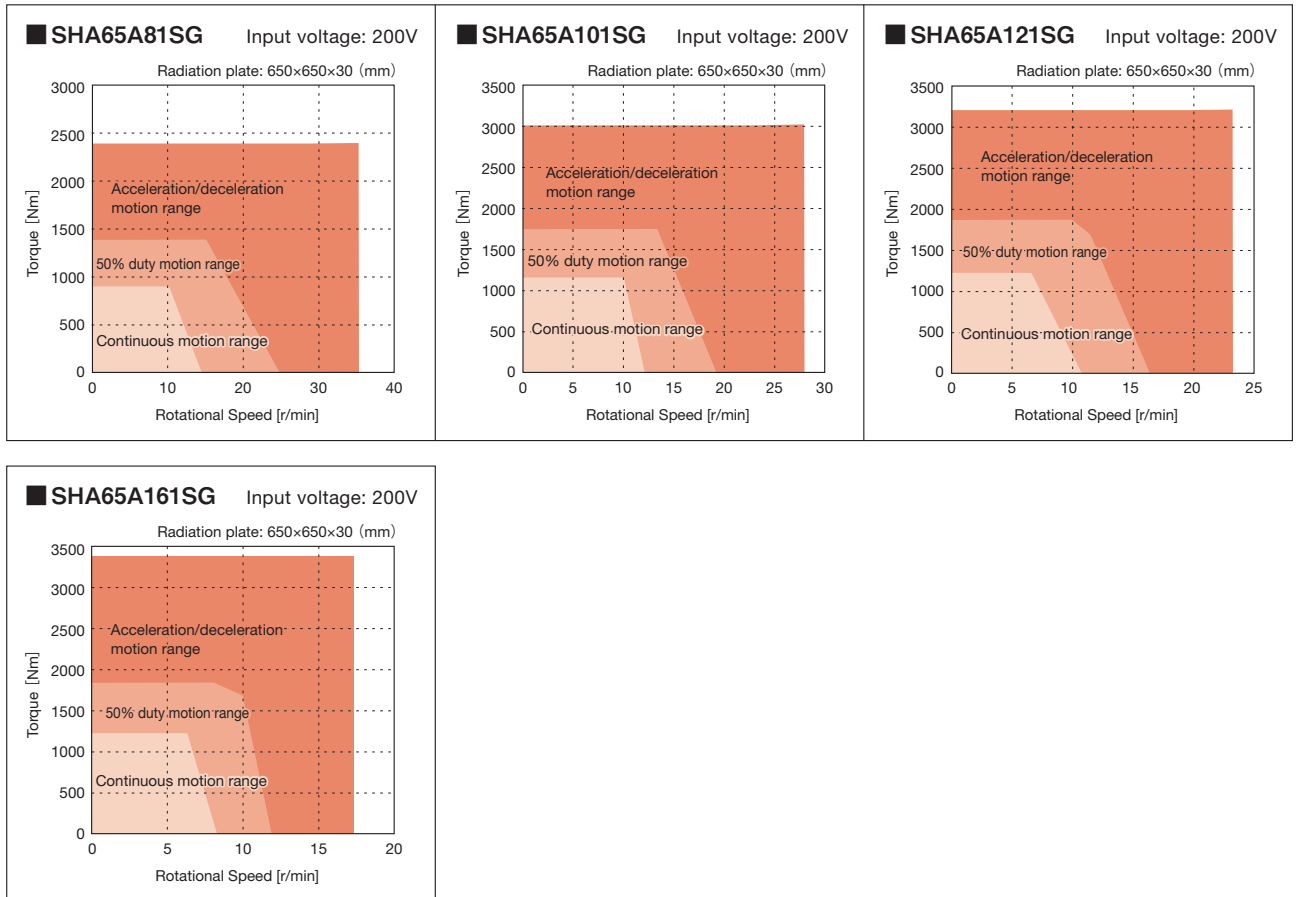


■ **SHA58A161SG** Input voltage: 200V
Radiation plate: 650×650×30 (mm)



SHA Series

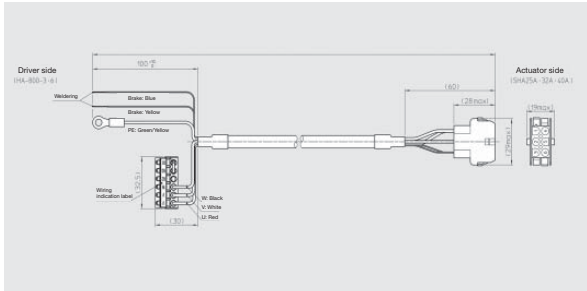
Operable Range



Options

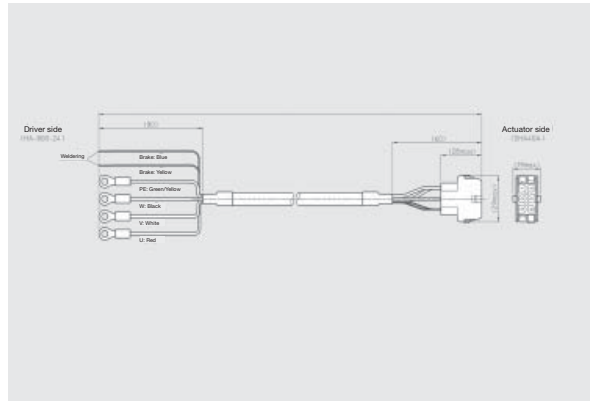
Relay Cable (for motors)

Actuator model Nos.: 20, 25, 32, 40 (Model No. 40 is applicable when combined with HA-800-6D.)
 Order Code Example: EWD-MB ** -A06-TN3
 The cable for connecting SHA series to HA-800 driver.
 There are two types of relay cable; for motor (including brake wire) and for absolute encoder. The relay cable is required for connecting SHA series to HA-800 driver.
 Standard cable lengths are 3, 5 and 10m.



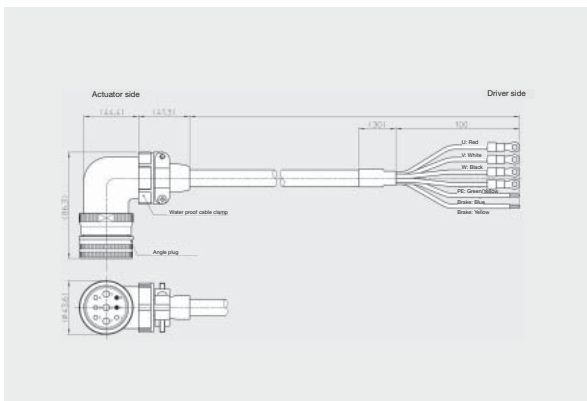
Relay Cable (for motors)

Actuator model No. 40 (when combined with HA-800-24D)
 Order Code Example: EWD-MB ** -A06-TMC
 Standard cable lengths are 3, 5 and 10m.



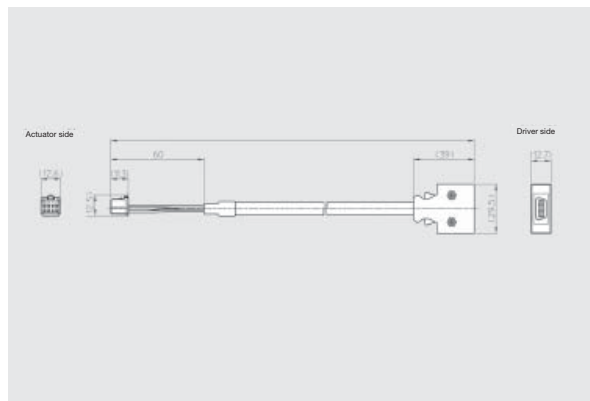
Relay Cable (for motors)

Actuator model No. 58, 65
 Order Code Example: EWD-MB ** -D09-TMC
 Standard cable lengths are 3, 5 and 10m.



Relay Cable (for absolute encoders)

Actuator model No. 20, 25, 32, 40
 Order Code Example: EWD-S ** -A08-3M14
 Standard cable lengths are 3, 5 and 10m.



Relay Cable (for absolute encoders)

Actuator model No. 58, 65
 Order Code Example: EWD-S ** -D10-3M14
 Standard cable lengths are 3, 5 and 10m.

