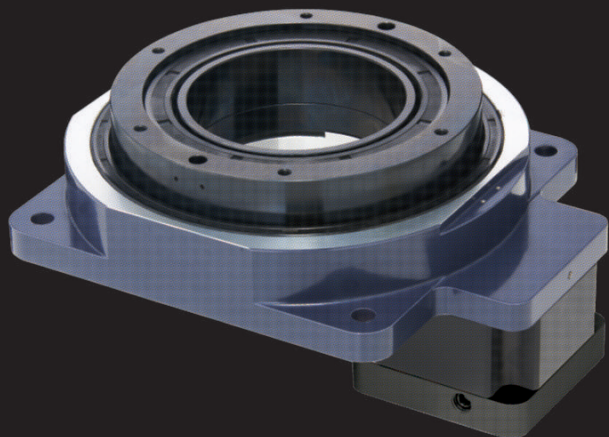




Hollow Rotary Table

SHA Series

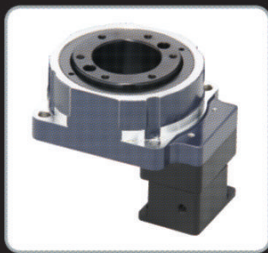
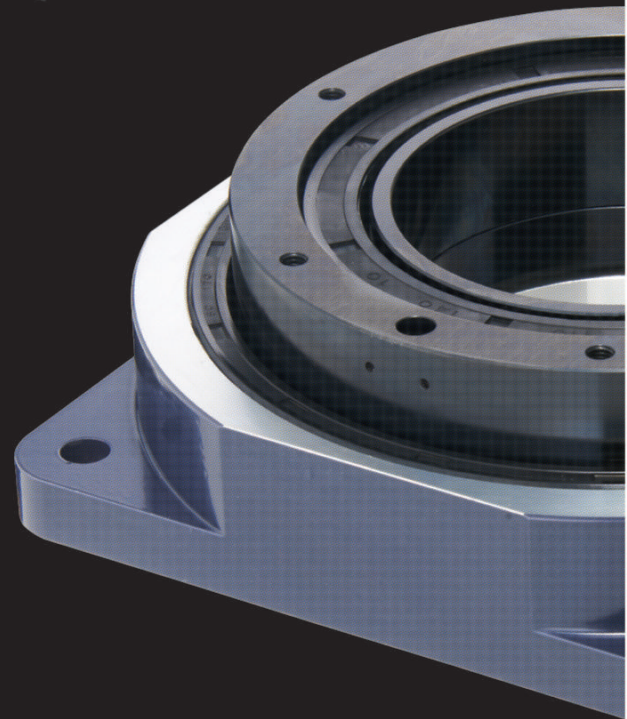


Hollow Rotary Table

SHA Series

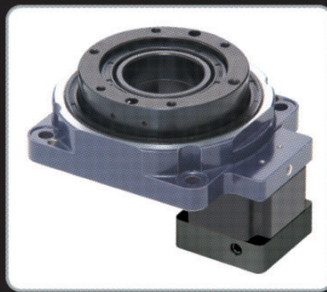
SPG Hollow Rotary Table is developed for Stepping Motor and Servo Motor to provide various system configurations.

In addition, it seeks flexibility and convenience of machine design because the large diameter of hollow shafts is able to process complicated wiring and piping simply.



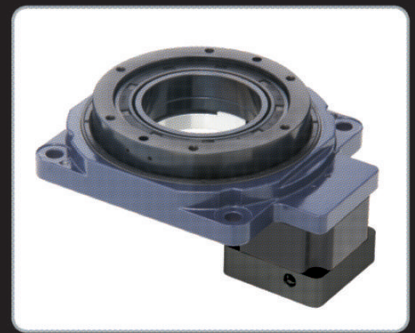
SHA 060

- ▶ Permissible Torque : 0.9N·m
- ▶ Frame Size : □60mm
- ▶ Dia. of Hollow Section : 28mm



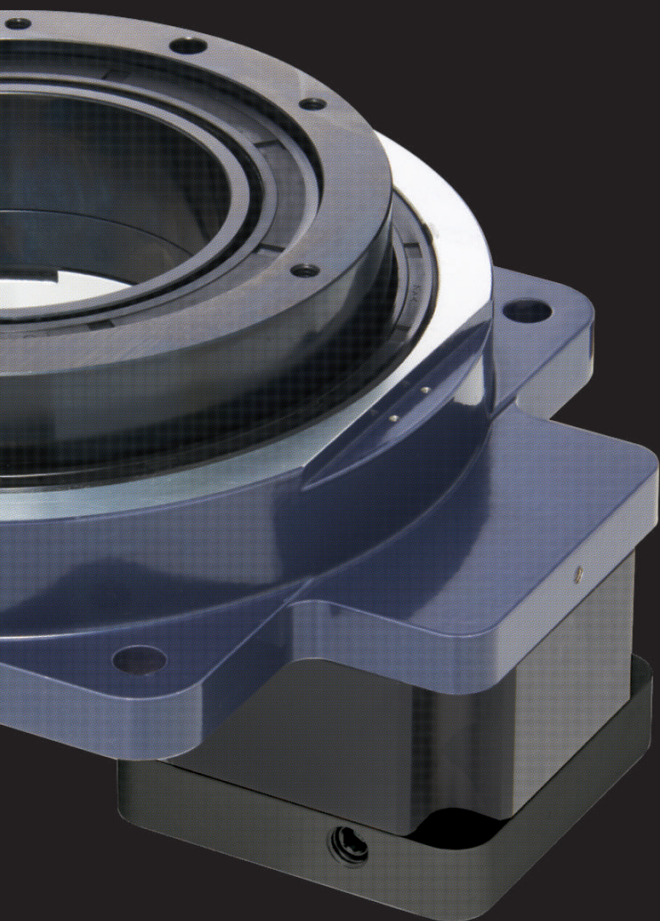
SHA 085

- ▶ Permissible Torque : 2.8N·m
- ▶ Frame Size : □85mm
- ▶ Dia. of Hollow Section : 33mm



SHA 130

- ▶ Permissible Torque : 12N·m
- ▶ Frame Size : □130 mm
- ▶ Dia. of Hollow Section : 62mm

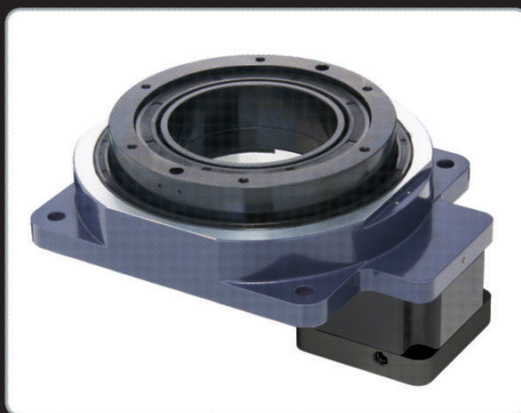


- Hollow Rotary Index Table
- Accurate Helical Gear Driven
- High Precision
- High Rigidity
- High Torque
- High Reduction Ratio
- Easy to Use



SHA 170

- ▶ Permissible Torque : 30N·m
- ▶ Frame Size : □170mm
- ▶ Dia. of Hollow Section : 72mm



SHA 200

- ▶ Permissible Torque : 50N·m
- ▶ Frame Size : □200mm
- ▶ Dia. of Hollow Section : 100mm

Structure & Feature Overview

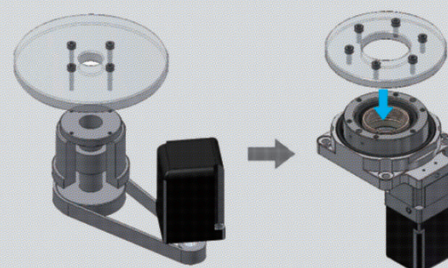
● Large-Diameter, Hollow Output Table Makes Simple Wiring and Piping Possible

The diameter of the driven gear has been increased with the use of a single-stage reduction gear mechanism, resulting in a hollow hole of sufficiently large diameter with respect to frame size. This helps reduce the complexity of wiring and piping, thus simplifying your equipment design.

Model	Frame Size [mm]	Diameter Hollow Section [mm]
SHA 060	60	Ø28
SHA 085	85	Ø33
SHA 130	130	Ø62
SHA 170	170	Ø72
SHA 200	200	Ø100

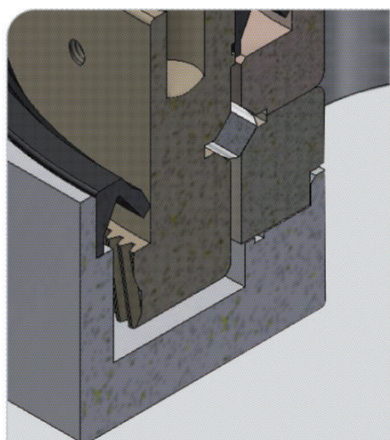
● Simple with Direct Coupling

Equipment tables and arms can be installed directly on the output table.



● High Output, High Rigidity

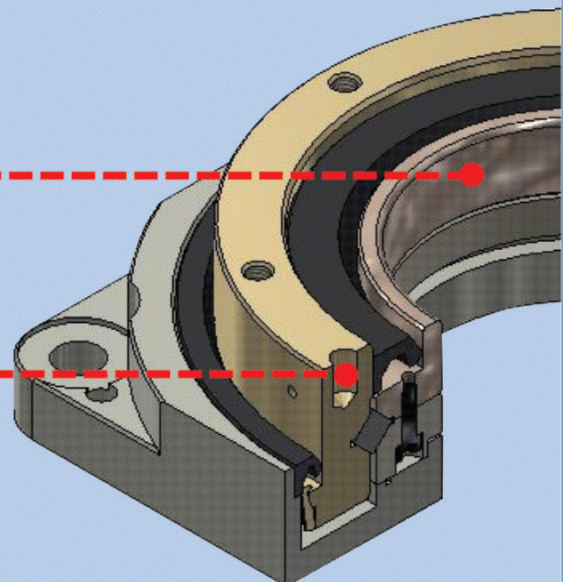
The output table uses a high rigidity cross-roller bearing for SHA 085, SHA 130, SHA 170, SHA 200 model, and deep-groove ball bearings (two pieces) for the SHA 060 model. This structure improves the permissible thrust load and moment load while maintaining high torque.



● Accurate Positioning

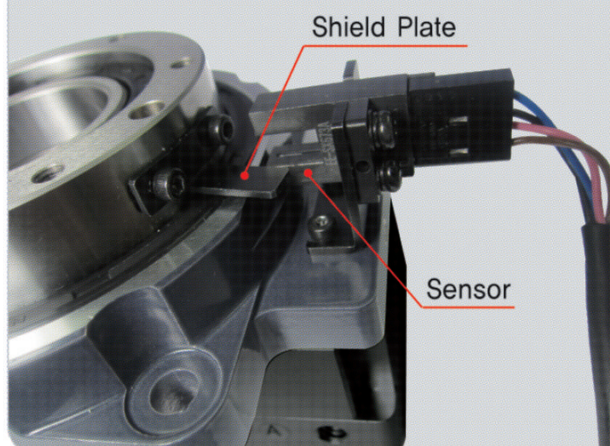
The gear-reduction mechanism employs precision gear along with a proprietary adjustment mechanism that eliminates backlash.

- Repetitive Positioning Accuracy : $\pm 15 \text{ sec. (} \pm 0.004^\circ \text{)}$
- Lost motion : $2 \text{ arcmin (} 0.033^\circ \text{)}$



● "Home Sensor Set" is Available as an Accessory

Since the sensor set comes with all the parts required for the return-to-home operation, less time is spent designing, fabricating and procuring parts related to sensor installation.

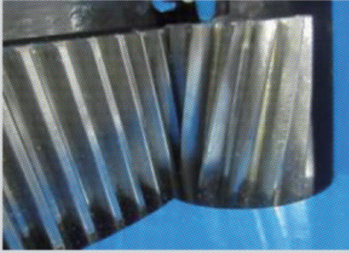


● Dynamic balanced clamp ring mechanism

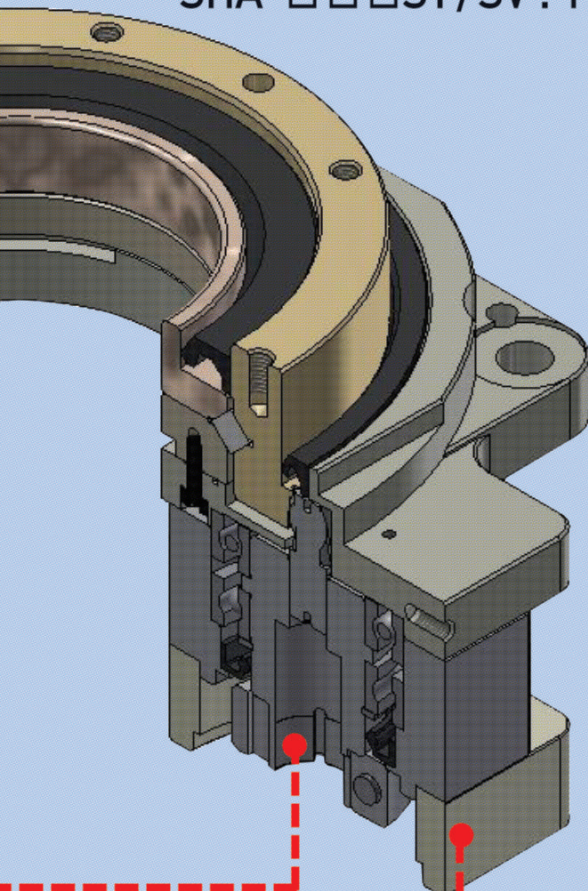
Error-free installation and balanced clamping system allows higher input speeds and no backlash for power transmission.



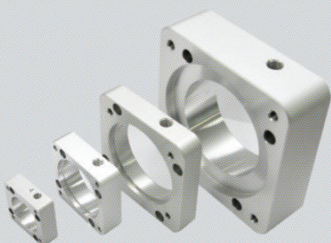
- **Quiet operation Helical gears**
Contribute to reduce vibration and noise.



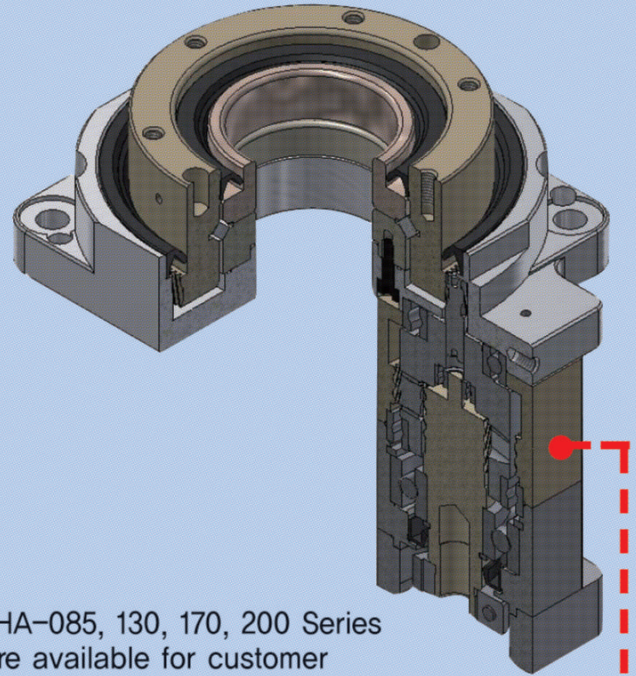
SHA □□□ST/SV : 1Stage



- **Universal mounting motor flange**
Allows quicker delivery and easier mounting to any stepping motor and servo motor.

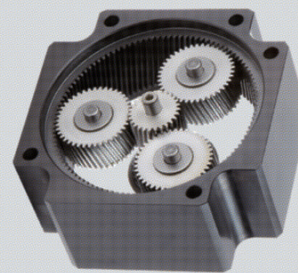


SHA □□□SV : 2Stage

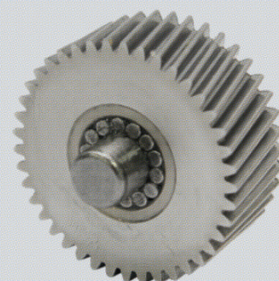


※ SHA-085, 130, 170, 200 Series
are available for customer
diverse requirements

- **High torque and low backlash**
Helical gear type planetary gearing.
Improvement by gear heat treatment



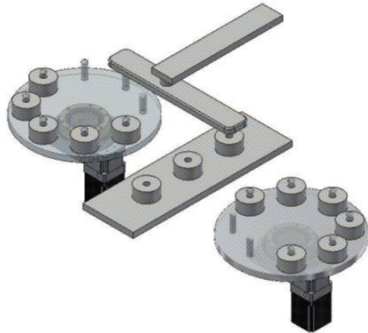
- **Increased Service Life**
Full complement needle planet bearings.
(Solid uncaged needle roller bearings)



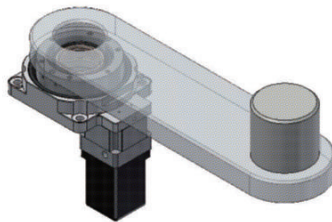
Applications & Coding System

■ Applications

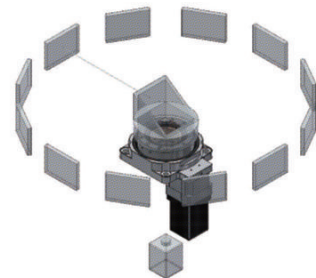
Applications subject to changing load inertia



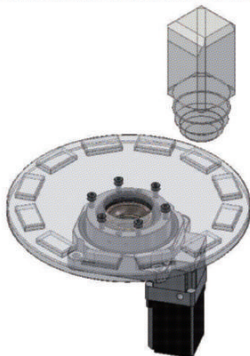
Applications where a moment load is applied



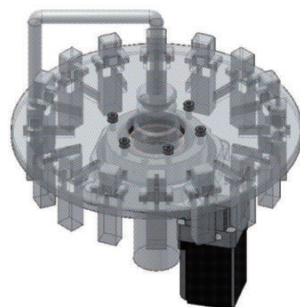
Optical applications using the hollow hole



High accuracy positioning applications



High accuracy positioning applications using the hollow hole



Air absorption applications using the hollow hole



■ Coding System

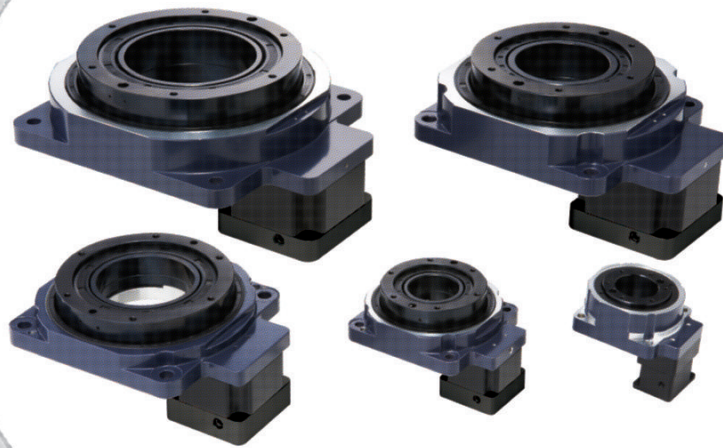
SHA	130	SV	10	A
Series	Frame Size	Available Motor		Input Adapter Flange (Servo Motor Brand)
SHA Hollow Rotary Table	060 □60 085 □85 130 □130 170 □170 200 □200	ST Stepping Motor SV Servo Motor		A Mitsubishi, Yaskawa, Tamagawa, Higen, LS series B Panasonic series C Rockwell series

Note) Some of these models may have different configurations, depending on motor brands. Therefore, make sure to check its specification again when you order them

Gear Ratio [i]	Stage
010 1/10	1
018 1/18	1
030 (1/30)	2
040 (1/40)	2
050 (1/50)	2

*Reduction gear ratio in () is available only by special order
But, for SHA 060, only 1 stage is possible

*Limited to Servo Motor



Hollow Rotary Table SHA Series

- ▶ Large-Diameter, Hollow Output Table
- ▶ Accurate Helical Gear Driven
- ▶ High Output Torque, High Rigidity
- ▶ High Reduction Ratio
- ▶ Simple with Direct Coupling on the Output Table
- ▶ Diverse Stepping Motors and Servo Motors are Available

Hollow Rotary Table

■ Specifications

Description		SHA 060	SHA 085	SHA 130	SHA 170	SHA 200
Motor Type		Stepping Motor & Servo Motor				
Output Table Supporting Bearing		Ball Bearing	Cross Roller Bearing			
Permissible Torque [N • m]		0.9	2.8	12	31	50
Inertial Moment [J : kg • m ²]		3507x10 ⁻⁷	12593x10 ⁻⁷	81556x10 ⁻⁷	250202x10 ⁻⁷	361220x10 ⁻⁷
Stepping Motor	Gear Ratio [i]	18				
	Permissible Output Speed Of Table [rpm]	200	200	200	110	110
Servo Motor ⁽¹⁾	Gear Ratio [i]	10 (30, 40, 50)				
	Permissible Output Speed Of Table [rpm]	200	300	300	160	160
	Normal Input Speed [rpm]	3,000			2,000	
	Max. Input Speed [rpm]	4,000			2,500	
Repetitive Positioning Accuracy [sec]		± 15 (± 0.004°)				
Lost Motion [arcmin]		2 (0.033°)				
Permissible Thrust Load [N]		100	500	2,000	3,000	4,000
Permissible Moment Load [N • m]		2	10	50	75	100
Runout of Output Table Surface [mm]		0.03	0.015	0.015	0.015	0.015
Runout of Output Table Inner(Outer) Diameter [mm]		0.03	0.015	0.015	0.030	0.030
Parallelism of Output Table [mm]		0.05	0.030	0.030	0.030	0.050
Degree of Protection		IP64				
Operating Temp. ⁽²⁾ [°C]		-10 ~ +90				
Weight [kg]		0.5	1.0	2.3	6.6	8.8

(1) Reduction gear ratio in () is available only by special order.

(2) Temperature on surface of case and surrounding temperature range (-10°C ~ +40°C)

Cautions: Direction of rotation in the output table is opposite to that of the input motor's shaft .

※ Data in above specification table indicates representative values and its specification may be changed for improvement of performance without prior notification.

■ How to read specification

① Output Table Supporting Bearing

They are types of bearings used for the output table.

② Permissible Torque

It is a limit for mechanical strength in reducer's mechanical parts. Make sure to use this within the allowable torque as the load changes.

③ Inertial Moment

This is a limit for converted value of inertia moment from the rotary table and reducer's mechanical parts.

④ Permissible Output Speed of Table

This is the allowable rotation speed for output table depending on mechanical strength for reducer's mechanical parts.

⑤ Repetitive Positioning Accuracy

These are values indicating how much tolerance occurs when the position is repeatedly determined from the same location and the same direction.

⑥ Lost Motion

This indicates difference at stopped angles when the output table is determined by normal direction and reversed direction at a certain position.

⑦ Permissible Thrust Load

This indicates allowable value for thrust load given to the direction of shaft at output table.

⑧ Permissible Moment Load

If a load is given to eccentric position from the center of output table, a force to tilt the output table is exerted. In this case, this means the allowable value for moment is calculated by an eccentric amount from the center, X load.

⑨ Runout of Output Table Surface

This indicates the maximum swaying value on installed surface for the output table when it is rotated without load.

⑩ Runout of Output Table Inner(Outer) Diameter

This indicates the maximum swaying value on inner or outer diameter for the output table when it is rotated without load.

⑪ Parallelism of Output Table

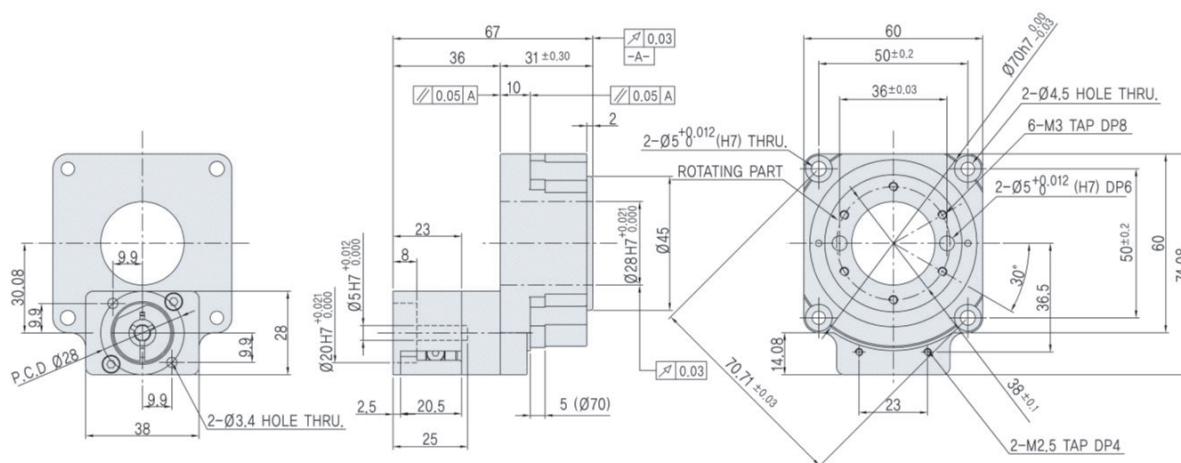
This represents how much installation surface of output table is tilted against the machine on Hollow Rotary Table.

⑫ Degree of Protection

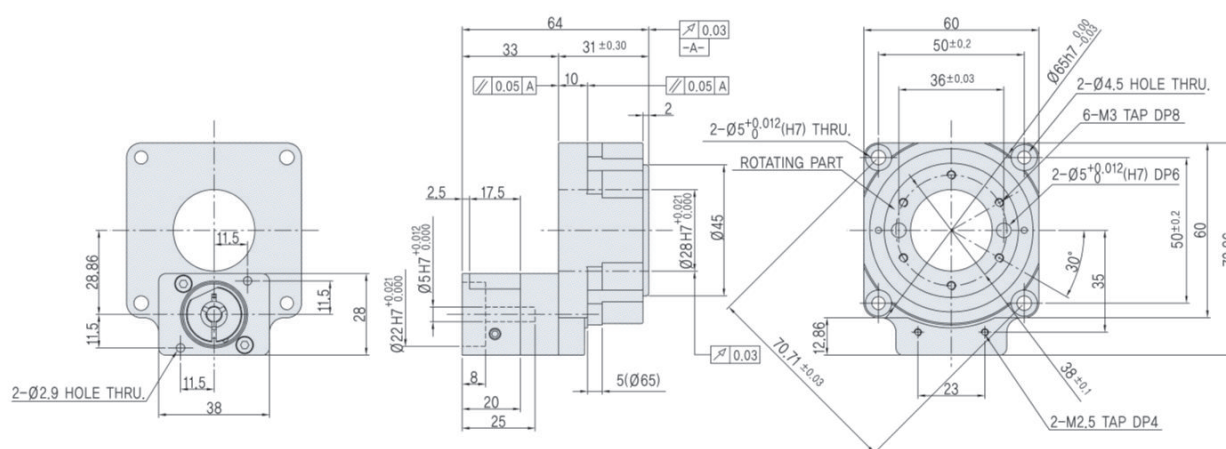
This is a classification for anti-dust and waterproof level from protective structure based on IEC60529, EN60034-5(= IEC60034-5)

SHA Series

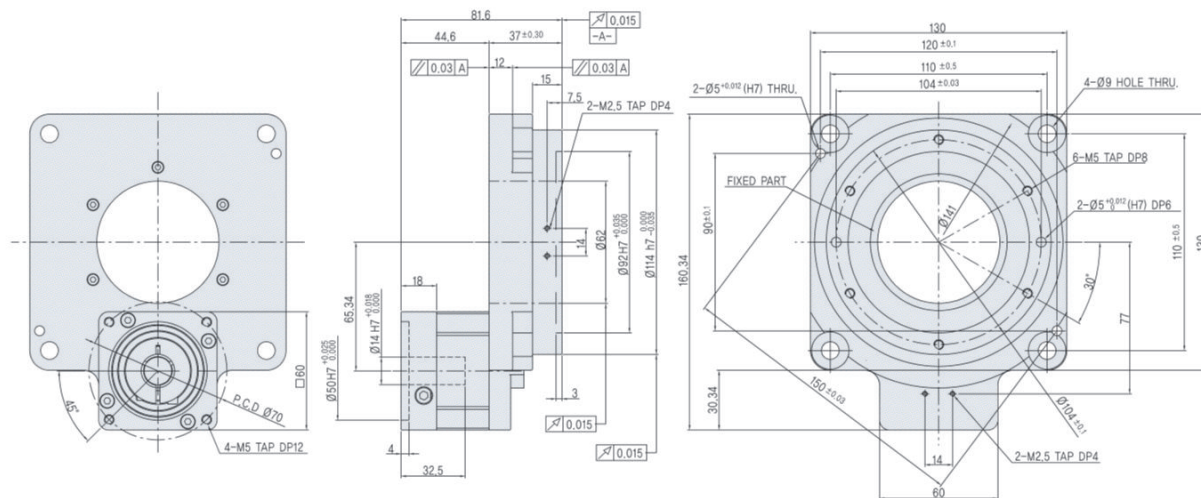
- Dimensions – SHA 060 (1 Stage, Ratio(i) = 1/10)



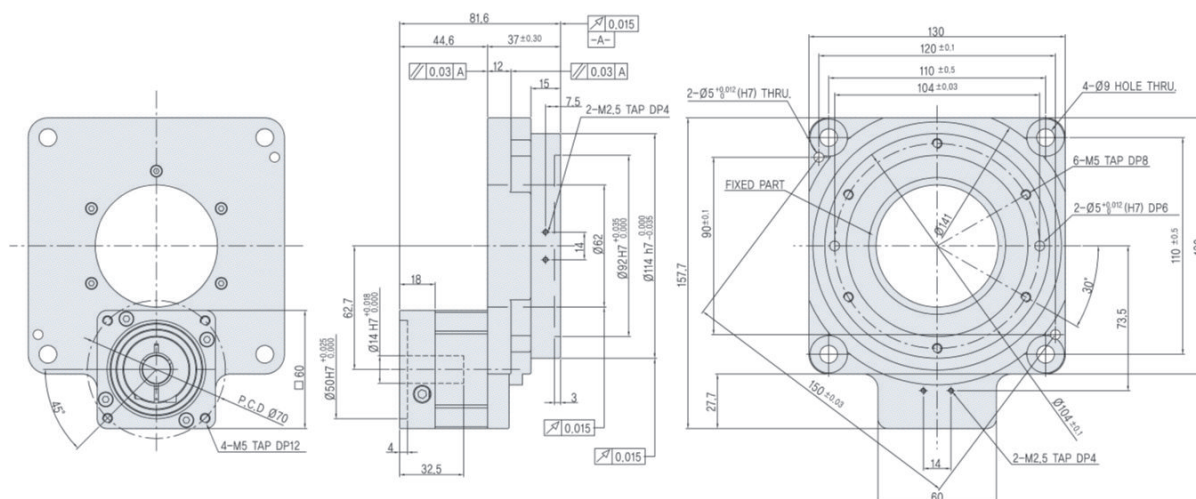
- Dimensions – SHA 060 (1 Stage, Ratio(i) = 1/18)



- Dimensions – SHA 130 (1 Stage, Ratio(i) = 1/10)

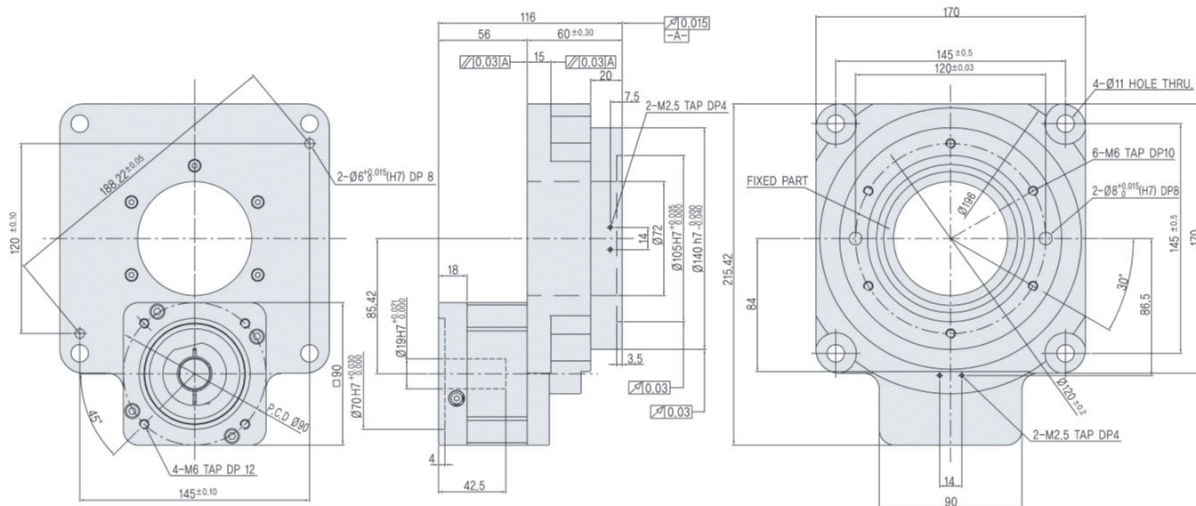


- Dimensions – SHA 130 (1 Stage, Ratio(i) = 1/18)

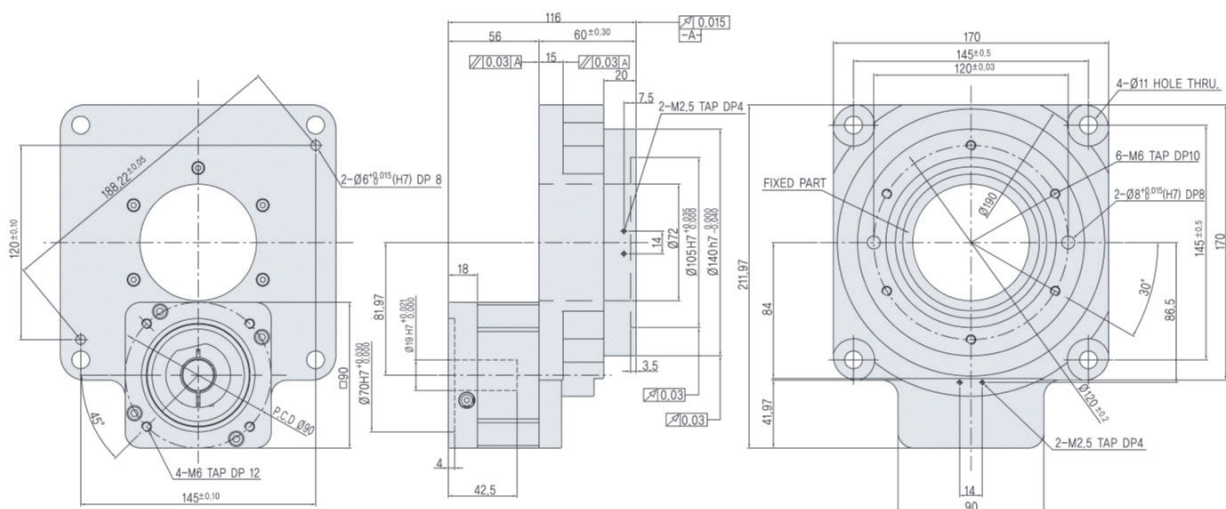


Hollow Rotary Table

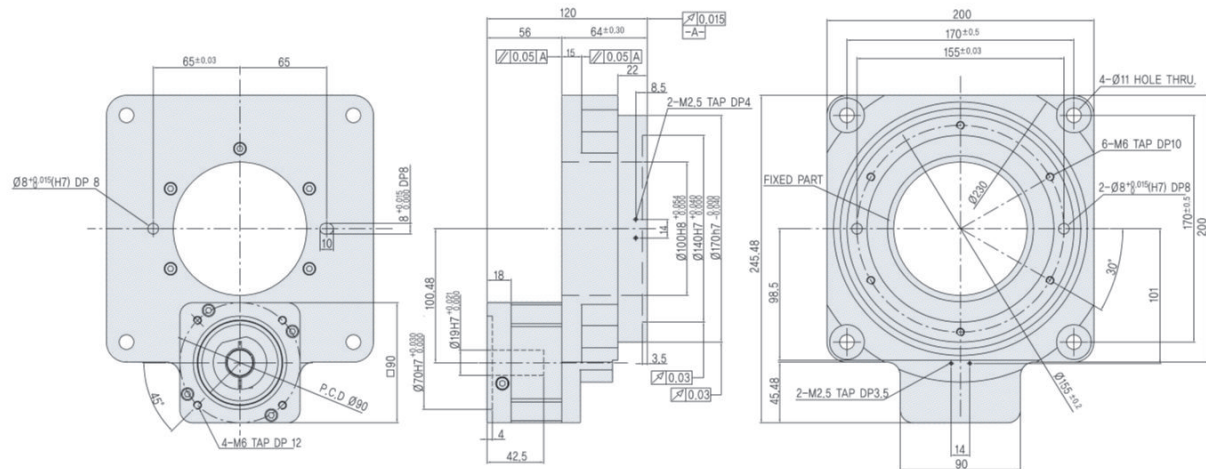
■ Dimensions – SHA 170 (1 Stage, Ratio(i) = 1/10)



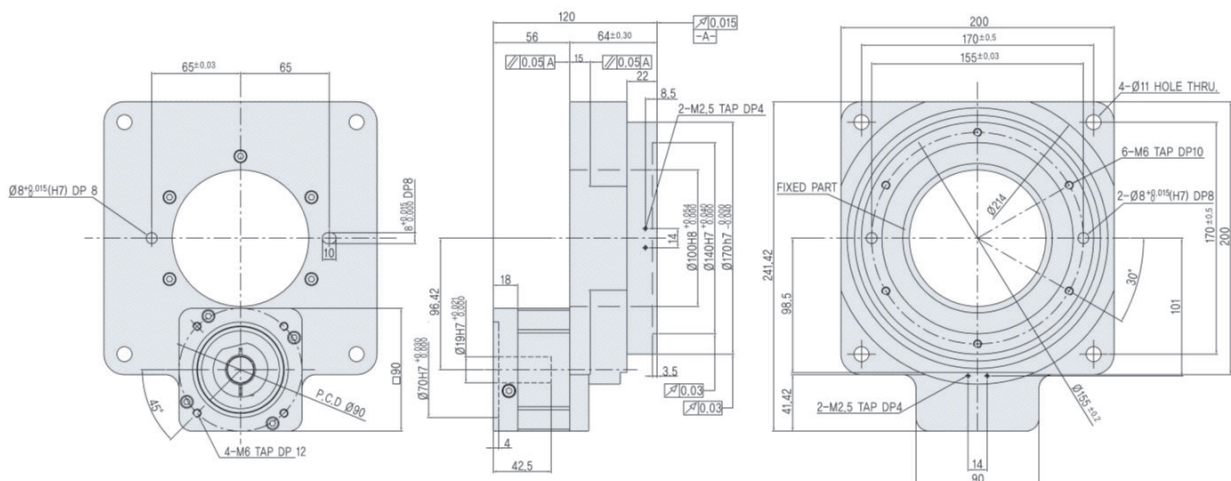
■ Dimensions – SHA 170 (1 Stage, Ratio(i) = 1/18)



■ Dimensions – SHA 200 (1 Stage, Ratio(i) = 1/10)



■ Dimensions – SHA 200 (1 Stage, Ratio(i) = 1/18)



Hollow Rotary Table Selection

■ Check Point to select Hollow Rotary Table

① Calculating moments of inertia (load inertia Moment).

Make sure that the inertia moment for returned object is less than 30 times of the actuator's inertia moment.

② Use the following formula to calculate the acceleration torque.

$$\text{Acceleration Torque } T_a [\text{N} \cdot \text{m}] = (J_M + J_A + J_W) * \frac{\pi}{30} * \frac{(N_2 - N_1)}{t_1} N_2$$

J_M : inertia Moment [kgm²] for applied motor [kg·m²]

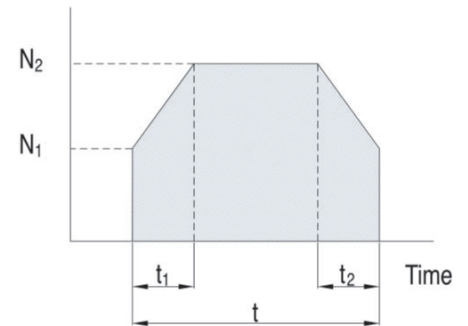
J_A : Actuator's inertia Moment [kg·m²]

J_W : Load inertia Moment [kg·m²]

N_2 : Operating rotation speed [r/min]

N_1 : Starting rotation speed [r/min]

t_1 : Accelerating (Decelerating) Time [s]



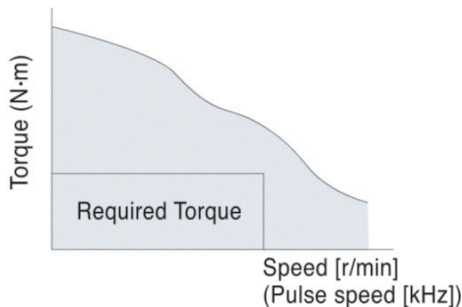
③ Calculating the Required Torque.

The required torque is calculated by multiplying the sum of load torque from the frictional resistance and the acceleration torque by safety coefficient.

$$\begin{aligned} \text{Required Torque } T &= (\text{Load Torque} [\text{N} \cdot \text{m}] + \text{Accelerating Torque} [\text{N} \cdot \text{m}]) \times \text{safety coefficient} \\ &= (T_L + T_a) \times S \end{aligned}$$

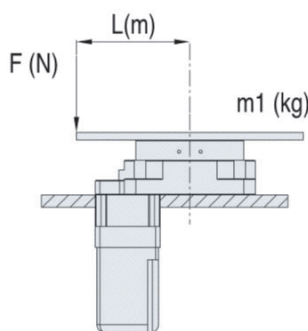
The safety coefficient, S is greater than 1.5.

④ The required torque of the selected motor, T must fall within the the specification of the speed-torque.

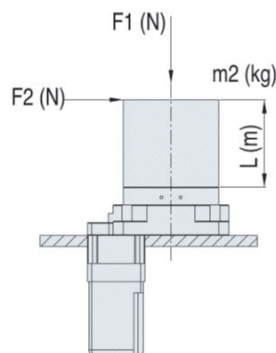


⑤ Calculating Thrust Load, Moment Load

When the load is given to the output table as shown below, be sure the calculated thrust load and moment load using the formulas below are within the specified limit.



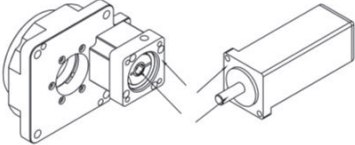
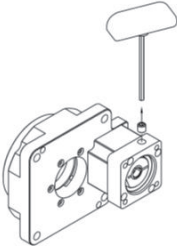
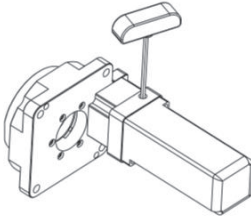
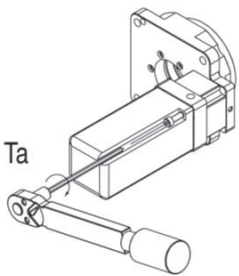
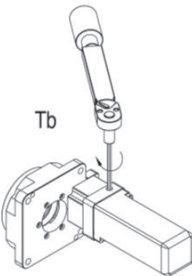
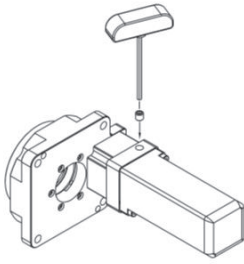
$$\begin{aligned} \text{Thrust Load } [N] : F_t &= F + m_1 \times g \\ \text{Moment Load } [N \cdot m] : M &= F \times L \\ g : \text{Gravitational Acceleration } &9.807 [\text{m/s}^2] \end{aligned}$$



$$\begin{aligned} \text{Thrust Load } [N] : F_t &= F_1 + m_2 \times g \\ \text{Moment Load } [N \cdot m] : M &= F_2 \times (L + A) \\ g : \text{Gravitational Acceleration } &9.807 [\text{m/s}^2] \end{aligned}$$

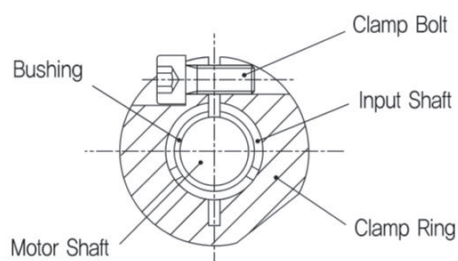
Model	A
SHA 060	0.010
SHA 085	0.015
SHA 130	0.017
SHA 170	0.033
SHA 200	0.033

1. Installation Instructions

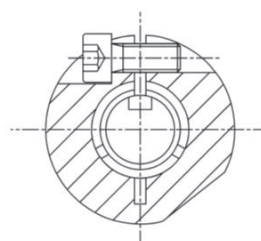
		
<p>1 Brush away and clean out any foreign substances on the surface after verifying the size of the motor and the rotary table.</p>	<p>2 Remove the screw plug from the adapter flange and adjust the position so that the clamp bolt is noticeable. (See 'Appendix 1'.)</p>	<p>3 When mounting onto the motor, closely adhere the adapter flange of the rotary table and the motor mounting side and slightly tighten the clamping bolt so that the clamp ring not idle.</p>
		
<p>4 Bolts diagonally tighten based on the standard Ta. (See 'Appendix 2'.)</p>	<p>5 Tighten the clamp ring based on the standard Tb. (See 'Appendix 2'.)</p>	<p>6 Tighten the screw plug.</p>

Appendix 1 How to install motor

Remove the key and make sure that the key way of the If the motor shaft has a key-way, input shaft is positioned in line with the slots of the bushing and clamp ring as shown in Fig. B. Arranging the slots of the clamp ring and bushing with shaft key-way allows for maximum tightening of the clamp ring cap screw.



(Figure A) Motor shaft without key

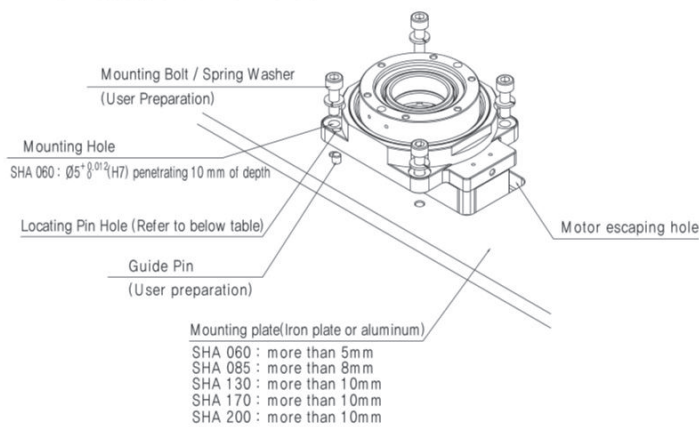


(Figure B) Motor shaft with key

Installation Instructions

■ 2. How to mount Actuator

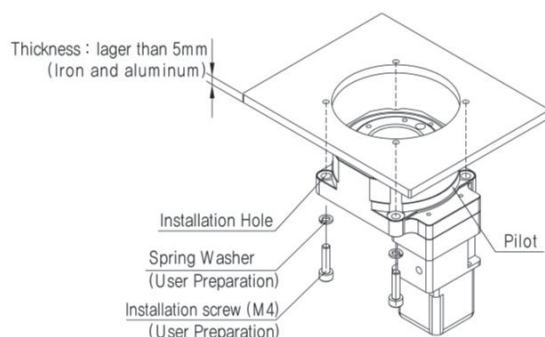
Using 2 holes (for SHA 060, the mounting hole and the locating pin hole are common), install the actuator onto the mounting plate of the machine as the figure shown below. These holes are to be used for accurate positioning of the actuator on the machine. Be sure to firmly secure the locating pin in the mounting plate. Allow holes through the mounting plate to provide an escape of the motor.



※ Locating Pin Hole

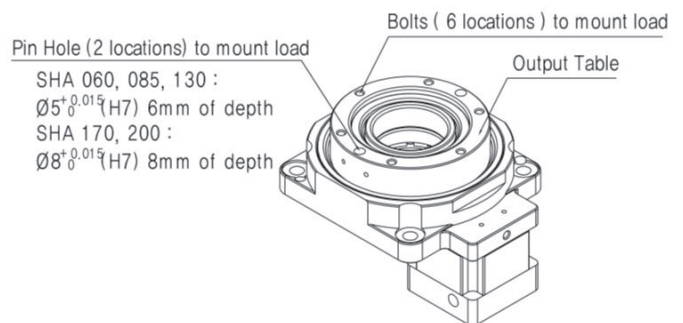
Product	Pin Hole Diameter(mm)	Pin Hole Depth(mm)	Number of Pin Holes
SHA 085	$\varnothing 5^{+0.012}_{-0}$ (H7)	10.5 (Penetrating)	2
SHA 130		12 (Penetrating)	
SHA 170	$\varnothing 6^{+0.015}_{-0}$ (H7)	6 (Closed)	2
SHA 200	$\varnothing 8^{+0.015}_{-0}$ (H7)	8 (Closed)	2 (one spot among them is a long hole with 8 to 10)

HA 060(i=1/18) can be installed using a mounting pilot part as shown in the figure below. However, if the optional origin of sensor is used, installation from this direction is not available.



■ 3. How to mount load on output table

Install the load using the mounting screw holes in 6 locations in the output table. There are 2 pin holes to install the load in the output table and use them to determine the locations of the load. Be sure affix the pins firmly on the load.



■ Installation Precaution

The following installation precaution should be read thoroughly before installation.

This product is designed and manufactured for the purpose of assembling equipment

- Indoors (Area not exposed to direct sun)
- Area free of heat radiation
- Operating ambient temperature: 0~+50°C
Under the origin sensor: 0~+40°C
- Operating ambient humidity: under 85%
- No explosive, inflammable and acid gas present
- Area it can be protected from dust, oil, and splashing water
- Area not exposed to direct vibration and excessive impact

■ Appendix 2 Wrench Bolt tightening torque

Wrench Bolt Size	Motor mounting(8.8T) Ta		Clamp ring(12.9T) Tb	
	N · m	kgf · cm	N · m	kgf · cm
M3	1,28	13	2,15	22
M4	2,9	30	4,95	50
M5	5,75	59	9,7	99
M6	9,9	101	16,5	168
M8	24	245	40	408
M10	48	489	81	826
M12	83	846	140	1,428
M14	132	1,346	220	2,243
M16	200	2,039	340	3,467

■ Appendix 3 Conversion Table (Torque)

Units to be Converted	1 N · m	1 N · cm	1 kgf · m	1 kgf · cm	1 lbf · ft	1 lbf · in
1 N · m	1	10 ²	0,10197	10,197	0,7376	8,8509
1 N · cm	10 ⁻²	1	1,0197×10 ⁻³	0,10197	7,376×10 ⁻³	8,8509×10 ⁻²
1 kgf · m	9,8066	980,665	1	10 ²	7,233	86,79
1 kgf · cm	9,8066×10 ⁻²	9,8066	10 ⁻²	1	7,233×10 ⁻²	0,8680
1 lbf · ft	1,356	1,356×10 ²	0,1383	13,83	1	12
1 lbf · in	0,113	11,3	1,152×10 ⁻²	1,152	8,333×10 ⁻²	1

■ Appendix 4 Angular Unit Indication method

Angular Unit	Value	Symbol	약어
degree	1/360 circle	°	Deg
arcminute	1/60 degree	' (prime)	arcmin, amin, MOA
arcsecond	1/60 arcminute	" (double prime)	arcsec
milliarcsecond	1/1,000 arcsecond		mas

■ Appendix 5 Equipment Protection Grade (IP)

The IP(Ingress Protection) code is published by IEC529 and it specifies the class of protection provided against foreign objects and water in electrical enclosures. An IP code consists of the letters 'IP' as detailed below:



① Classification of Protection against foreign objects (1st digit)

IP Indication	Level of Protection
IP0□	None
IP1□	Protected from access of a hands
IP2□	Protected from access of a fingers
IP3□	Protected against solid objects, tool etc
IP4□	Protected against wire
IP5□	Protected against dust
IP6□	Completed dust-proof

② Classification of Protection against water (2nd digit)

IP Indication	Level of Protection
IP □0	None
IP □1	Protected against water drops falling vertically over a 15° range
IP □2	Protected against water drops falling vertically over a 60° range
IP □3	Protected against water spray from all directions
IP □4	Protected against water splattering from all directions
IP □5	Protected against water pouring from all directions
IP □6	Protected against strong water pouring from all directions
IP □7	Possible to use after immersion in water under certain conditions
IP □8	Possible to use under water

Cautions for Use

■ Caution

Please ensure to carefully read the precautions indicated below to prevent damage or injury to the user. Failure to read and understand these precautions may result in serious or possible fatal injury or damage to the product, or to related equipment and systems.

- Avoid hitting the product with a hammer and causing damage from a fall.
- Be cautious when connecting the product to the load side
- Handle the edge and key side of the product carefully
- Keep hands and other foreign substance away from the rotating shaft while the product in use
- Avoid excessive impact to the product when assembling a pulley, a coupling, a key etc.
- Do not exceed permissible torque , it may cause loosened bolts, shaking, damage, etc.
- Do not disassemble and reassemble the product. Doing so, the original performance may not be guaranteed.
- When sensing an abnormality, stop the operation immediately. It may adversely influence the system.

■ Warranty

The SPG warranty plan covers the product in the event that it fails to operate properly due to defects in materials or workmanship.

Coverage is effective on the date of the SPG product purchase and until the product either reaches 2000 hours worked on time, or 12 months from the date of purchase, whichever comes first.

The products and parts thereof have been used under normal operating conditions or under such conditions specified by the Company, SPG.

If any defects exist during the warranty period, SPG shall repair or exchange the product under this warranty. However, this warranty does not cover:

① misuse, including unsuitable handling of the product

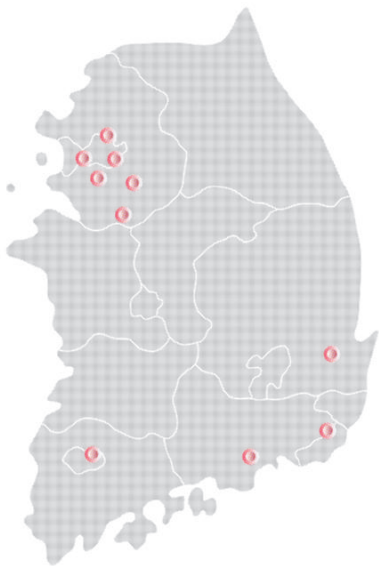
② repair done by anyone without the permission of SPG

③ damages not resulting from quality of product itself

④ accident, lightning, and other natural causes that does not come under SPG control

SPG warranty herein means the warranty of the product. SPG shall not be liable for consequential or incidental damage arising out of the failure of any product to operate properly.

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- Domestic Distributors
 - For regional distributors information, please visit our website at www.spg.co.kr.

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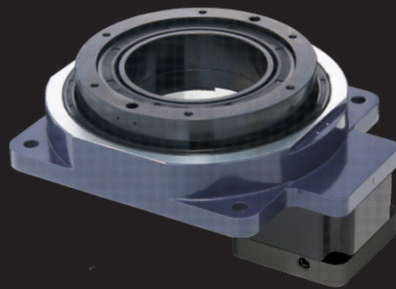
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Passion for only one, SPG Hollow Rotary Table



 **SPG Co., Ltd.**
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