



# Hollow Rotary Table

CROSS-ROLLER TYPE **SHA**

TAPER-ROLLER TYPE **SHB**



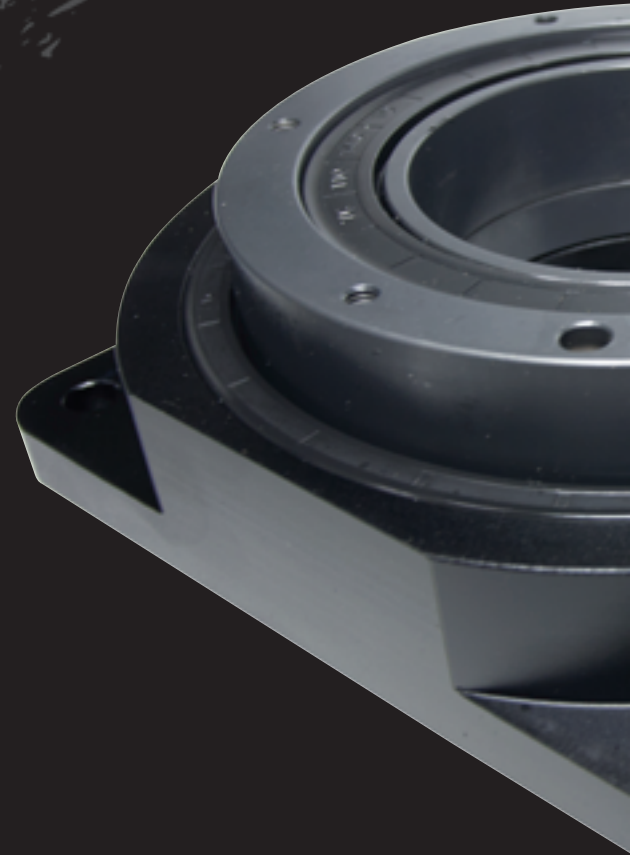
# Hollow Rotary Table SHA Series

SPG Hollow Rotary Table은 Stepping Motor와 Servo Motor용으로 개발되어 System 구성의 다양함을 제공합니다.

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

또한 대구경 중공출력축은 복잡한 배선, 배관을 간단하게 처리할 수 있어 장비설계의 유연성 및 편리성을 도모합니다.

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

▶ Frame Size : □60mm

▶ Dia. of Hollow Section : 28mm



SHA 085

▶ Frame Size : □85mm

▶ Dia. of Hollow Section : 33mm



SHA 130

▶ 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
- IP(Ingress Protection) 64



#### SHA 170

- ▶ Frame Size : □170mm
- ▶ Dia. of Hollow Section : 72mm



#### SHA 200

- ▶ Frame Size : □200mm
- ▶ Dia. of Hollow Section : 100mm

# Hollow Rotary Table -Feature Overview

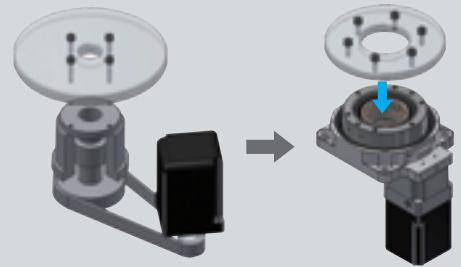
## ● Large-Diameter, Hollow Output Table Makes Simple Wiring and Piping Possible

The diameter of the driven gear has been increased with the use of a gear-reduction 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

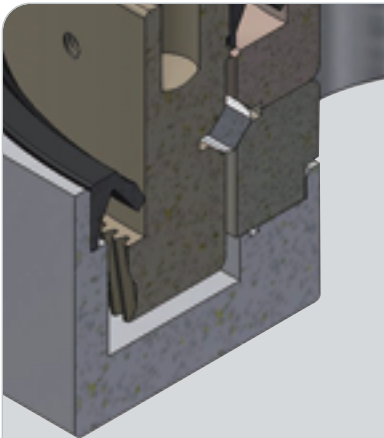
## ● Simple with Direct Coupling

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



## ● High Output, High Rigidity

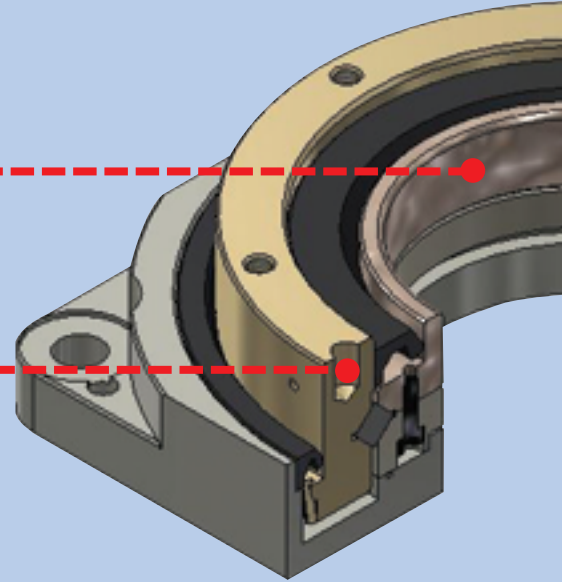
The output table uses a high rigidity cross-roller bearing for SHA 085, SHA 130, SHA 170, SHA 200 model, and deep-groove ball bearings (two pieces) for the SHA 060 model. This structure improves the permissible thrust load and moment load while maintaining high torque.



## ● Accurate Positioning

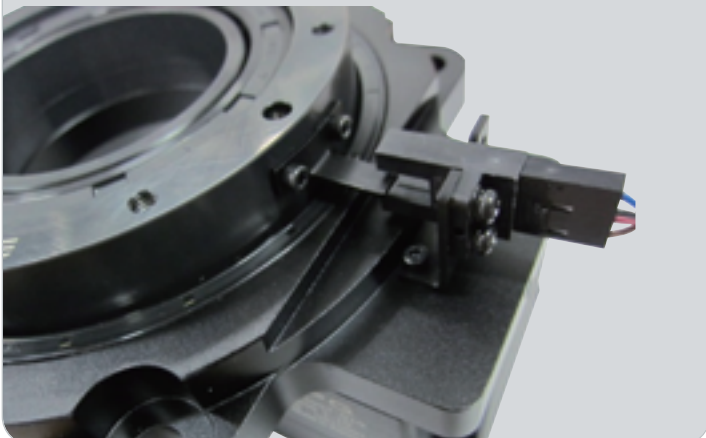
The gear-reduction mechanism employs precision gear along with a proprietary adjustment mechanism that eliminates backlash.

- Lost motion : 2 arcmin ( 0.033° )



## ● "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, fabrication 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.



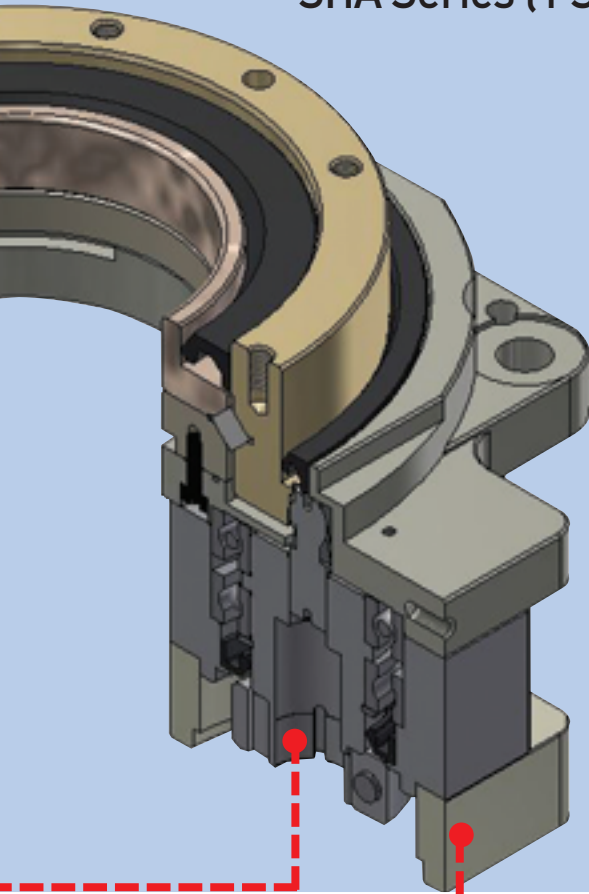


# SHA Series

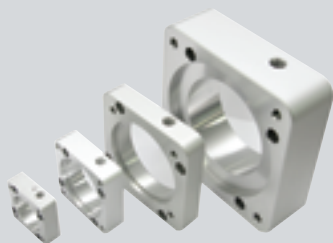
- Quiet operation Helical gears  
Contribute to reduce vibration and noise.



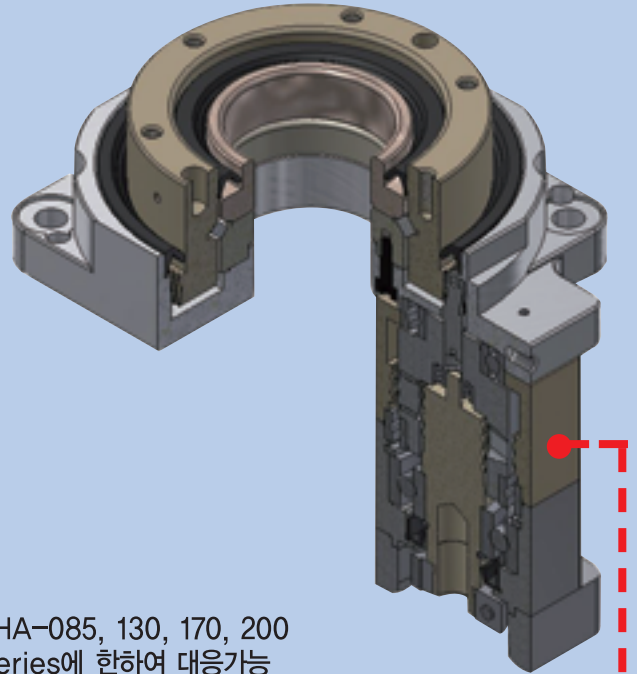
## SHA Series (1 Stage)



- Universal mounting motor flange  
Quicker deliveries and easier mounting to any stepping motor and servo motor.



## SHA Series (2 Stage)



※ SHA-085, 130, 170, 200 Series에 한하여 대응가능  
(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

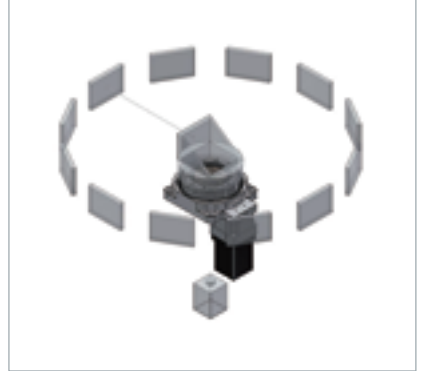
Applications subject to changing load inertia



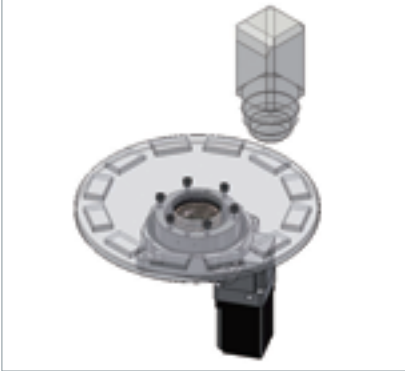
Applications where a moment load is applied



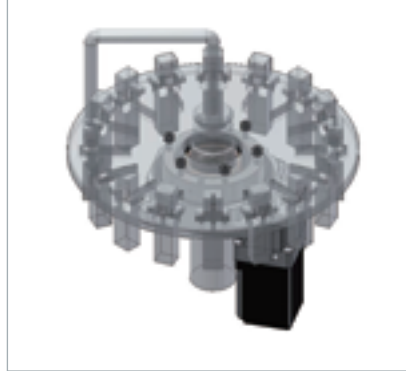
Optical applications using the hollow hole



High accuracy positioning applications



High accuracy positioning applications using the hollow hole



Air absorption applications using the hollow hole



## ■ Coding System

**SHA**

Series	
SHA	Hollow Rotary Table

**130**

Frame Size	
060	□60
085	□85
130	□130
170	□170
200	□200

주) 모터 Brand중의 일부 Model은 형합이 상이할 수 있으므로 주문시 재 확인 바랍니다.

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

**SV**

Available Motor	
ST	Stepping Motor
SV	Servo Motor

**010**

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

※단, SHA 060은 1 Stage만 대응가능 (But, for SHA 060, only 1 stage is possible)



## 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
- ▶ IP(Ingress Protection)64

# 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	[ i = 1/18, N · m ]	0,9	2,8	12	31	50
	[ i = 1/10 ~ 1/50, N · m ]	1,2	3,5	15	40	65
Inertial Moment	[ i = 1/18, J : kg · m <sup>2</sup> ]	3507x10 <sup>-7</sup>	12515x10 <sup>-7</sup>	81148x10 <sup>-7</sup>	240121x10 <sup>-7</sup>	359768x10 <sup>-7</sup>
	[ i = 1/10, J : kg · m <sup>2</sup> ]	1570x10 <sup>-7</sup>	6337x10 <sup>-7</sup>	40343x10 <sup>-7</sup>	151709x10 <sup>-7</sup>	264368x10 <sup>-7</sup>
	[ i = 1/30, J : kg · m <sup>2</sup> ]	-	44673x10 <sup>-7</sup>	254454x10 <sup>-7</sup>	934520x10 <sup>-7</sup>	1047101x10 <sup>-7</sup>
	[ i = 1/40, J : kg · m <sup>2</sup> ]	-	61102x10 <sup>-7</sup>	363806x10 <sup>-7</sup>	1086701x10 <sup>-7</sup>	1199362x10 <sup>-7</sup>
	[ i = 1/50, J : kg · m <sup>2</sup> ]	-	82784x10 <sup>-7</sup>	495908x10 <sup>-7</sup>	1337812x10 <sup>-7</sup>	1450472x10 <sup>-7</sup>
Gear Ratio	[ Stage1, i ]	10, 18				
	[ Stage2, i ]	30, 40, 50				
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 ]		0,030	0,015	0,015	0,015	0,015
Runout of Output Table Inner(Outer) Diameter [ mm ]		0,030	0,015	0,015	0,030	0,030
Parallelism of Output Table [ mm ]		0,050	0,030	0,030	0,050	0,050
Degree of Protection		IP64				
Operating Temp [ °C ]		-10 ~ +90				
Weight	[ Stage1, kg ]	0,5	1,0	2,3	6,6	8,8
	[ Stage2, kg ]	-	1,2	2,8	8,1	10,3

(1) SHA060은 1 Stage만 대응가능 (SHA 060, only 1 stage is possible)

\* 상기 사양표의 Data는 대표값을 나타내며, 제품의 성능개선을 위해 예고없이 사양을 변경할 수도 있습니다.

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

## 사양표 보는 방법 (How to read specification)

### ① Output Table Supporting Bearing

출력Table에 사용하는 Bearing의 종류입니다. (They are types of bearings used for the output table.)

### ② Permissible Torque

감속기구부의 기계적 강도 한계 값 입니다. 가속 Torque, 부하 변동 분도 포함해 이 허용 Torque이하에서 사용하여 주십시오.  
(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

Rotary Table과 감속기구부의 관성Moment를 Table 상에서 환산한 값의 합계입니다.  
(This is a limit for converted value of inertia moment from the rotary table and reducer's mechanical parts.)

### ④ Lost Motion

출력Table을 어느 위치에서 정전방향에서 위치결정했을 때와 역전방향에서 같은 위치로 위치결정했을 때의 정지각도의 차이를 말합니다.  
(This indicates difference at stopped angles when the output table is determined by normal direction and reversed direction at a certain position.)

### ⑤ Permissible Thrust Load

출력 Table의 축 방향에 가해지는 Thrust하중 허용 값을 나타냅니다. (This indicates allowable value for thrust load given to the direction of shaft at output table.)

### ⑥ Permissible Moment Load

출력 Table의 중심에서 편심 된 위치에 하중이 가해질 경우, 출력Table을 기울이는 힘이 작용합니다.  
그 때 중심으로 부터의 편심량 X 하중 으로 계산되는 Moment 하중의 허용 값을 말합니다.  
(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.)

### ⑦ Runout of Output Table Surface

무부하에서 출력 Table을 회전시켰을 때의 출력Table 설치면의 흔들림 최대값을 말합니다.  
(This indicates the maximum swaying value on installed surface for the output table when it is rotated without load.)

### ⑧ Runout of Output Table Inner(Outer) Diameter

무부하에서 출력 Table을 회전시켰을 때의 출력Table 내경 또는 외경의 흔들림 최대값을 말합니다.  
(This indicates the maximum swaying value on inner or outer diameter for the output table when it is rotated without load.)

### ⑨ Parallelism of Output Table

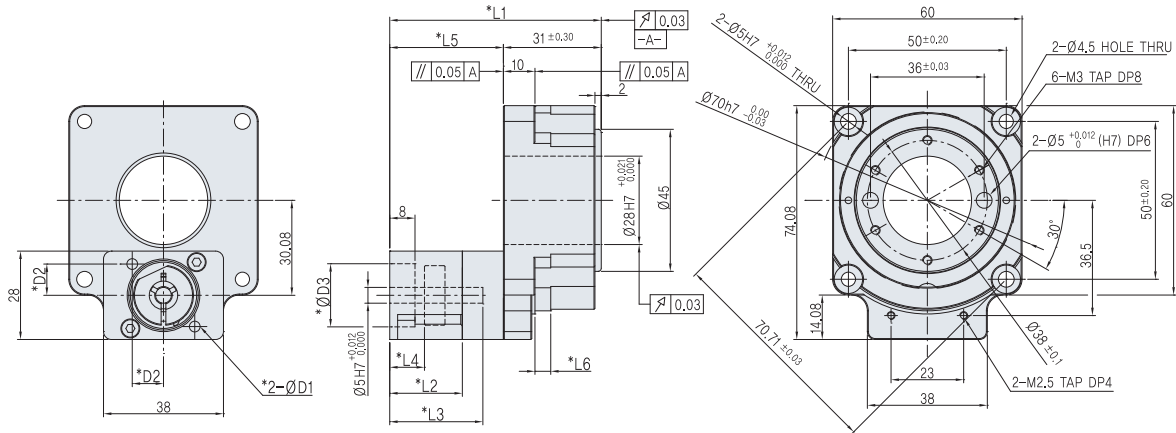
Hollow Rotary Table의 장비측 설치면에 대해 출력Table의 설치면이 어느 정도 기울어져 있는가를 나타냅니다.  
(This represents how much installation surface of output table is tilted against the machine on Hollow Rotary Table.)

### ⑩ Degree of Protection

IEC60529, EN60034-5 (= IEC60034-5)에 기초하여 기기의 보호구조에 대해 방진, 방수성을 등급으로 분류한 것입니다.  
(This is a classification for anti-dust and waterproof level from protective structure based on IEC60529, EN60034-5(= IEC60034-5))

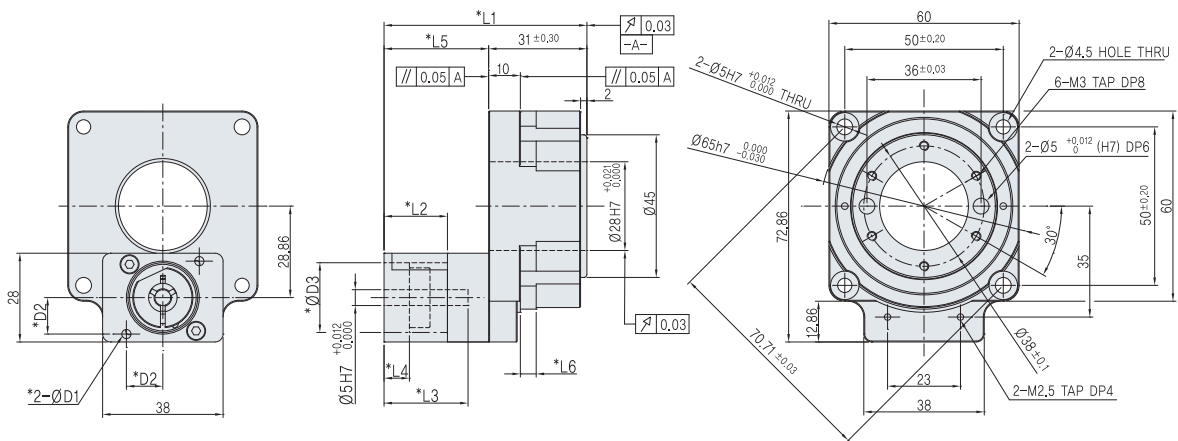


## ■ Dimensions –SHA 060 (1 Stage, Ratio(i)=1/10)



D3	$\varnothing 20H7$ $^{+0.021}_{0.000}$	$\varnothing 22H7$ $^{+0.021}_{0.000}$
D2	9.9	11.5
D1	$\varnothing 3.4$ HOLE THRU	$\varnothing 2.9$ HOLE THRU
L6	5	5
L5	36	33
L4	11	8
L3	29.5	26.5
L2	23	20
L1	67	64
치수 Classification	구분 Dimensions Classification	A TYPE      G TYPE

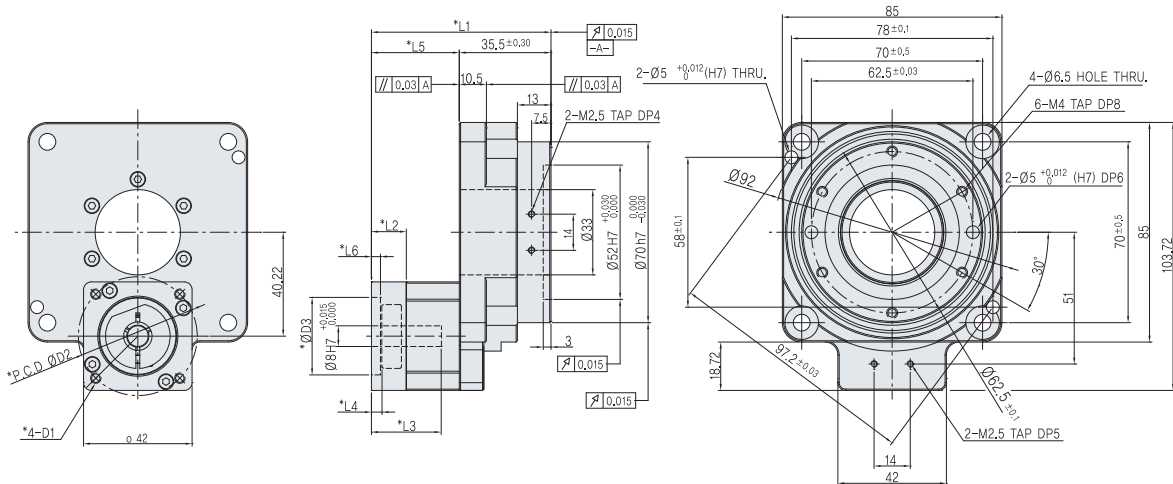
## ■ Dimensions –SHA 060 (1 Stage, Ratio(i)=1/18)



D3	$\varnothing 20H7$ $^{+0.021}_{0.000}$	$\varnothing 22H7$ $^{+0.021}_{0.000}$
D2	9.9	11.5
D1	$\varnothing 3.4$ HOLE THRU	$\varnothing 2.9$ HOLE THRU
L6	5	5
L5	36	33
L4	11	8
L3	29.5	26.5
L2	23	20
L1	67	64
치수 Classification	구분 Dimensions Classification	A TYPE      G TYPE

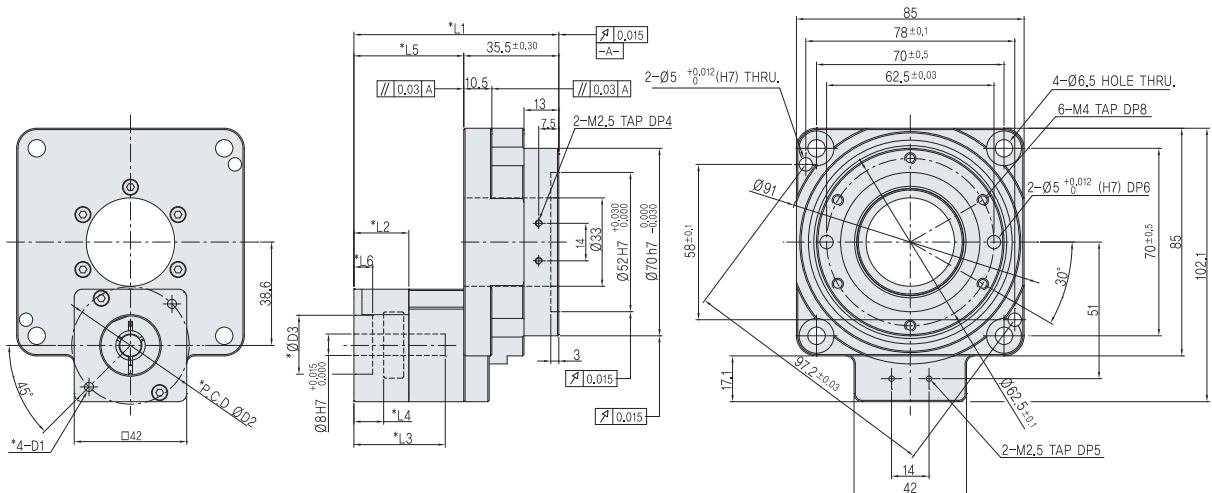
# Hollow Rotary Table

## ■ Dimensions –SHA 085 (1 Stage, Ratio(i)=1/10)



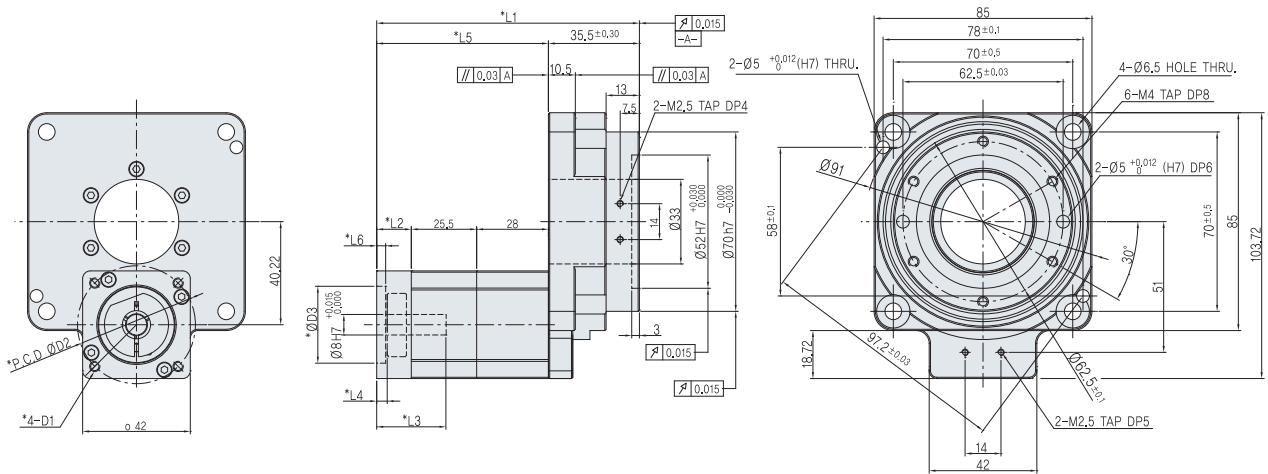
D3	$\text{Ø}30\text{H}7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$		$\text{Ø}22\text{H}7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$	
D2	$\text{Ø}46$	$\text{Ø}45$	$\text{Ø}46$	$\text{Ø}43.84$
D1	M4 TAP, DP8	M3 TAP, DP6	M4 TAP, DP8	$\text{Ø}3.1$ HOLE THRU
L6	3.5		7	
L5	34		37.5	
L4	4.1		7.6	
L3	27		30.5	
L2	13.5		17	
L1	69.5		73	
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

## ■ Dimensions –SHA 085 (1 Stage, Ratio(i)=1/18)



D3	$\text{Ø}30\text{H}7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$		$\text{Ø}22\text{H}7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$	
D2	$\text{Ø}46$	$\text{Ø}45$	$\text{Ø}46$	$\text{Ø}43.84$
D1	M4 TAP, DP8	M3 TAP, DP6	M4 TAP, DP8	$\text{Ø}3.1$ HOLE THRU
L6	3.5		7	
L5	34		37.5	
L4	4.1		7.6	
L3	27		30.5	
L2	13.5		17	
L1	69.5		73	
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

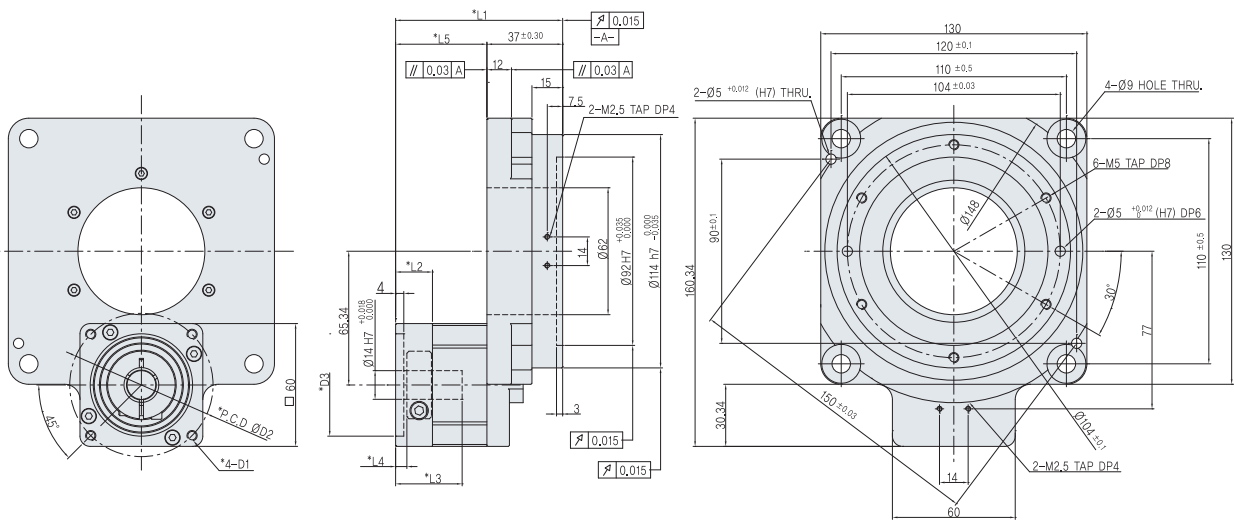
■ Dimensions –SHA 085 (2 Stage, Ratio(i)=1/30~1/50)



D3	Ø30H7 $\begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$		Ø22H7 $\begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$
D2	Ø46	Ø45	Ø46
D1	M4 TAP, DP8	M3 TAP, DP6	M4 TAP, DP8
L6	3.5		7
L5	67	70.5	74
L4	4.1	7.6	11.1
L3	27	30.5	34
L2	13.5	17	20.5
L1	102.5	106	109.5
지수 Classification	A TYPE	B TYPE	C TYPE
구분			D TYPE

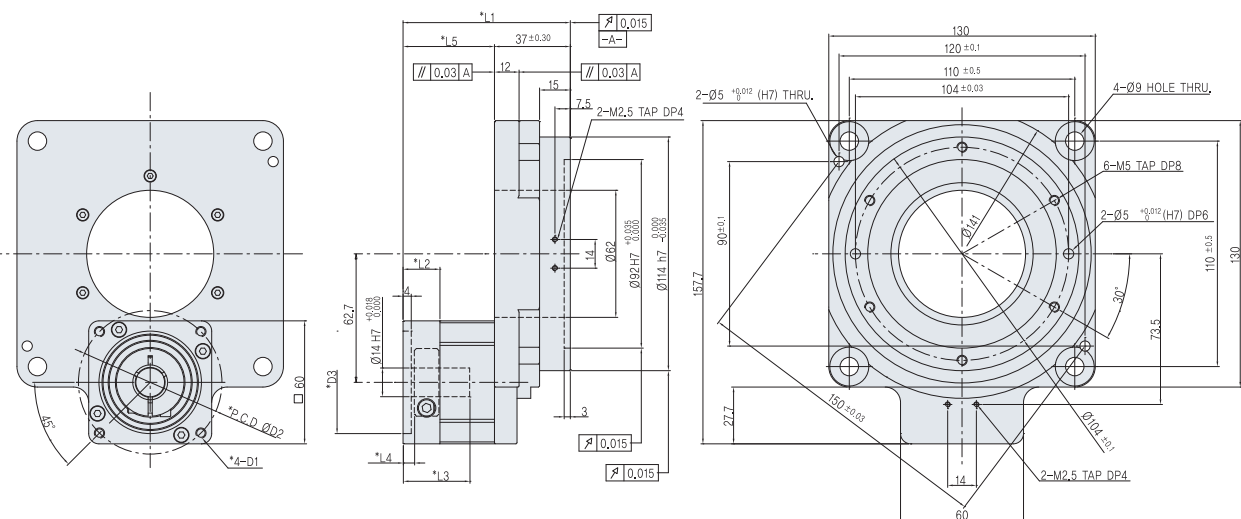
# Hollow Rotary Table

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



D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	
D2	Ø70		Ø70.71	Ø66.67	Ø70.71
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12	
L5	44.6		49.1	44.6	
L4	5.5		10	5.5	
L3	32.5		37	32.5	
L2	18		22.5	18	
L1	81.6		86.1	81.6	
Classification	A TYPE	B TYPE	C TYPE	D TYPE	G TYPE

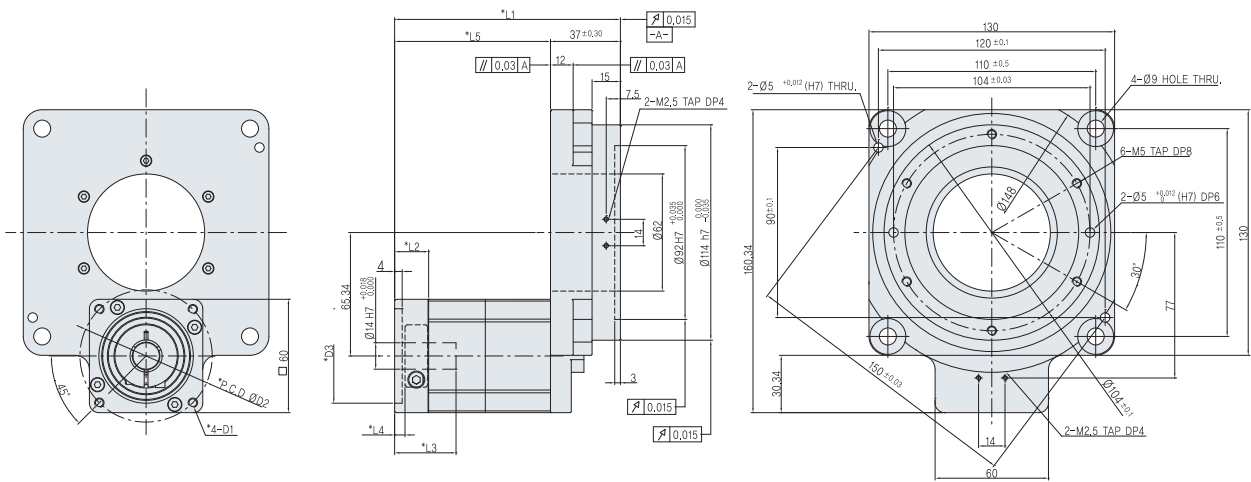
## ■ Dimensions –SHA 130 (1 Stage, Ratio(i)=1/18)



D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	
D2	Ø70		Ø70.71	Ø66.67	Ø70.71
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12	
L5	44.6		49.1	44.6	
L4	5.5		10	5.5	
L3	32.5		37	32.5	
L2	18		22.5	18	
L1	81.6		86.1	81.6	
Classification	A TYPE	B TYPE	C TYPE	D TYPE	G TYPE



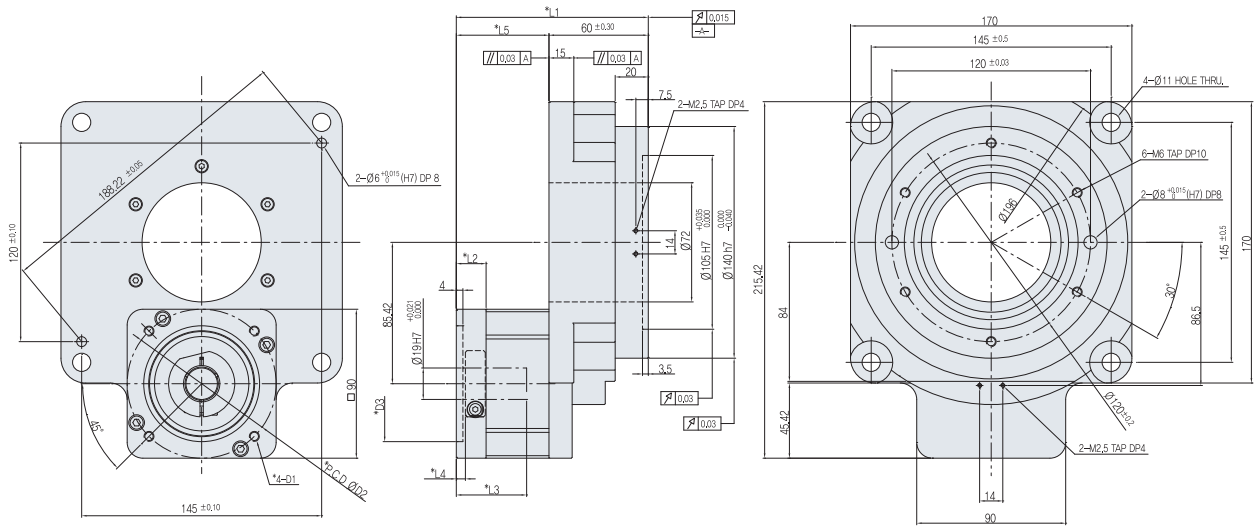
## ■ Dimensions –SHA 130 (2 Stage, Ratio(i)=1/30~1/50)



D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		
D2	Ø70		Ø70.71	Ø66.67	Ø70.71	
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12		
L5	82.5		87	82.5		
L4	5.5		10	5.5		
L3	32.5		37	32.5		
L2	18		22.5	18		
L1	119.5		124	119.5		
Classification	A TYPE	B TYPE	C TYPE	D TYPE	E TYPE	G TYPE

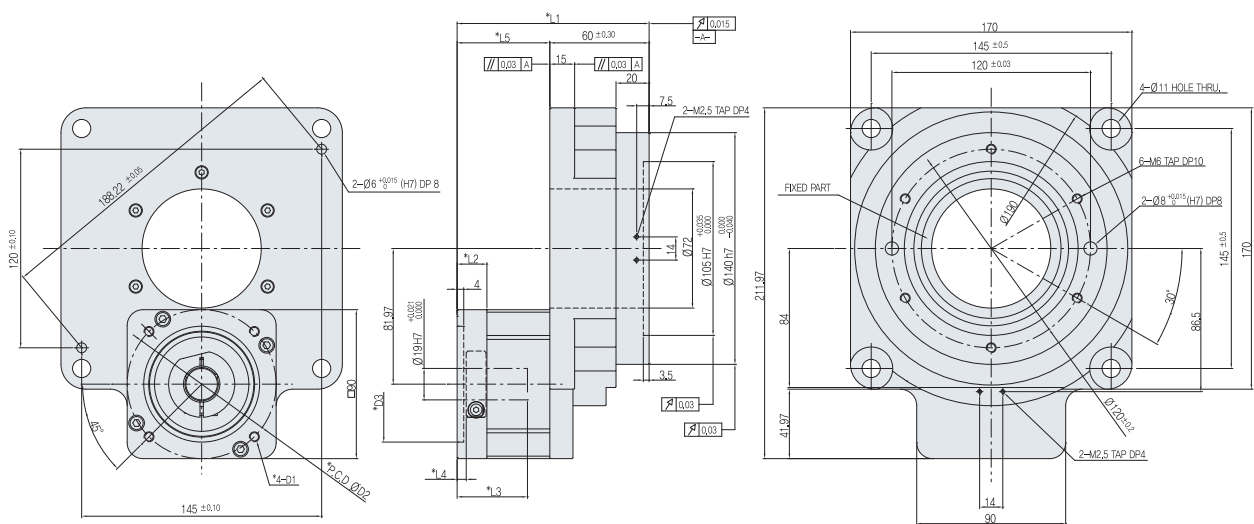
# Hollow Rotary Table

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



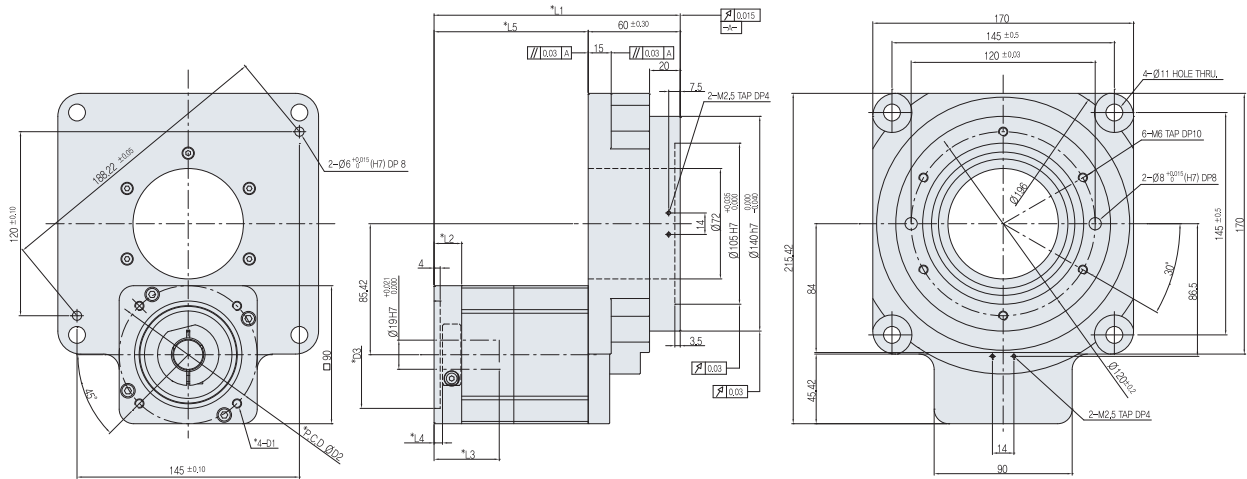
D3	Ø70 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$		Ø73 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$	
D2	Ø90		Ø98.43	
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	56		61	
L4	5.5		10.5	
L3	42.5		47.5	
L2	18		23	
L1	116		121	
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

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



D3	Ø70 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$		Ø73 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$	
D2	Ø90		Ø98.43	
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	56		61	
L4	5.5		10.5	
L3	42.5		47.5	
L2	18		23	
L1	116		121	
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

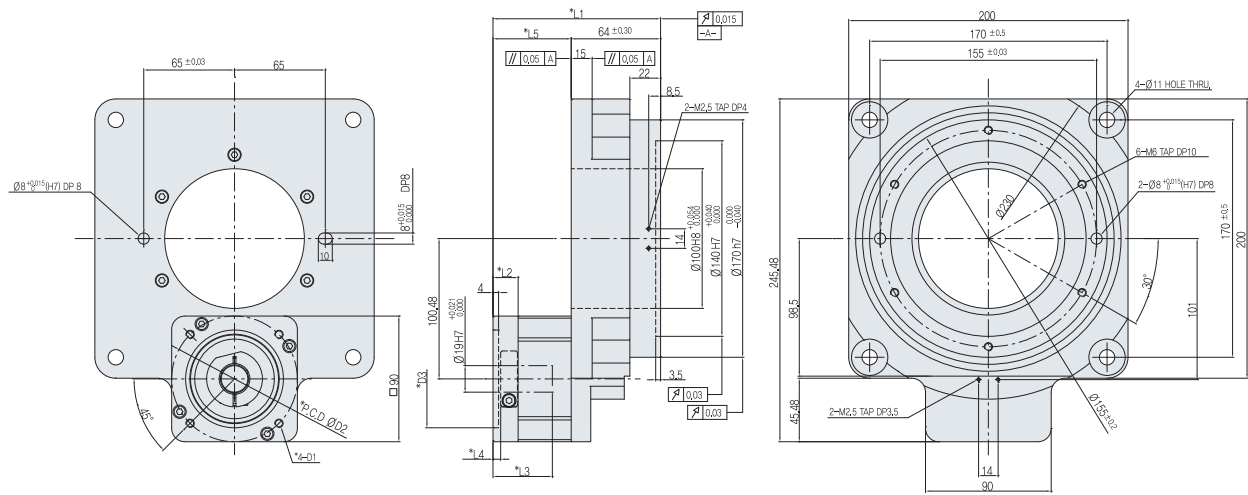
## ■ Dimensions –SHA 170 (2 Stage, Ratio(i)=1/30~1/50)



D3	$\varnothing 70$ H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$		$\varnothing 73$ H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$
D2	$\varnothing 90$		$\varnothing 98.43$
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12
L5	100.5	105.5	100.5
L4	5.5	10.5	5.5
L3	42.5	47.5	42.5
L2	18	23	18
L1	160.5	165.5	160.5
치수 Classification	A TYPE	B TYPE	D TYPE

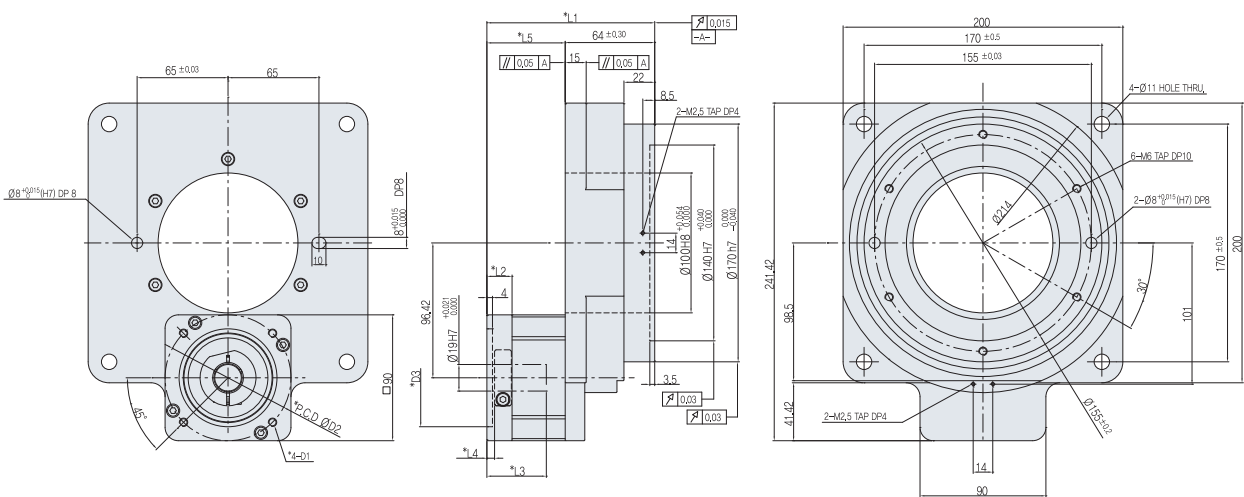
# Hollow Rotary Table

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



D3	Ø70 H7 $\frac{+0.030}{0.000}$		Ø73 H7 $\frac{+0.030}{0.000}$	
D2	Ø90			
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	56		61	56
L4	5,5		10,5	5,5
L3	42,5		47,5	42,5
L2	18		23	18
L1	120		125	120
차수 Classification	A TYPE	B TYPE	C TYPE	D TYPE

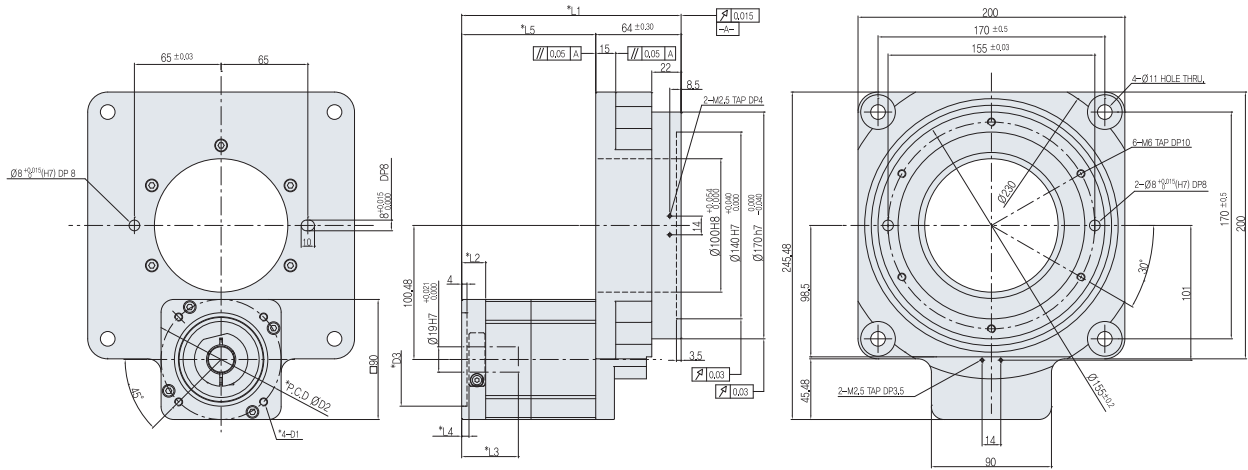
## ■ Dimensions – SHA 200 (1 Stage, Ratio(i)=1/18)



D3	Ø70 H7 $\frac{+0.030}{0.000}$		Ø73 H7 $\frac{+0.030}{0.000}$	
D2	Ø90			
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	56		61	56
L4	5,5		10,5	5,5
L3	42,5		47,5	42,5
L2	18		23	18
L1	120		125	120
차수 Classification	A TYPE	B TYPE	C TYPE	D TYPE



## ■ Dimensions –SHA 200 (2 Stage, Ratio(i)=1/30~1/50)



D3	$\varnothing 70 \text{ H7 } \begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$		$\varnothing 73 \text{ H7 } \begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$
D2	$\varnothing 90$		$\varnothing 98.43$
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12
L5	100.5	105.5	100.5
L4	5.5	10.5	5.5
L3	42.5	47.5	42.5
L2	18	23	18
L1	164.5	169.5	164.5
尺寸 寸法	A TYPE	B TYPE	C TYPE

# Hollow Rotary Table

## ■ 원점 Sensor Set (Origin Sensor Set)

원점복귀 운전을 간단히 실행하기 위해 Photo Micro Sensor, Connector 부착 Cable, Sensor Bracket, 차광판, 설치나사가 Set로 구성되어 있는 원점 Sensor Set를 옵션으로 준비했습니다.

원점복귀에 필요한 모든 부품이 갖춰져 있으므로 Sensor 설치에 필요한 설계, 제작, 부품 조달의 수고를 덜 수 있습니다.

SPG prepared an option with the origin sensor set, including photo micro sensor, cable with connector, sensor bracket, douser, installation screw in order to run home positioning operation simply. It includes all required parts for home positioning, so it can reduce efforts of design, production, and procurement of parts required for installation of the sensor.

### ■ 종류 (Type)

품명 (Product Name)	Sensor출력 (Sensor Output)	적용제품 (Applied Products)
SHAS-A	NPN	SHA060
SHAS-AY	PNP	
SHAS-B	NPN	SHA085, SHA130 SHA170, SHA200
SHAS-BY	PNP	

### ■ 원점 Sensor Set의 구성 (What's Included in the Origin Sensor Set)



### ■ 사양 (Specifications)

구분 (Division)	NPN Type	PNP Type
Sensor품명 (Product Name of the Sensor)	SHA060 : EE-SX672A (OMRON 제품 (Products)) SHA085, SHA130, SHA170, SHA200 : EE-SX673A (OMRON 제품 (Products))	SHA060 : EE-SX672R (OMRON 제품 (Products)) SHA085, SHA130, SHA170, SHA200 : EE-SX673R (OMRON 제품 (Products))
전원전압 (Power Supply Voltage)	DC5~24V ±10% , Ripple (P-P) 10% 이하 (Under 10%)	DC5~24V ±10% , Ripple (P-P) 10% 이하 (Under 10%)
소비전류 (Current Consumption)	35mA이하 (Under 35mA)	30mA이하 (Under 35mA)
제어출력 (Control Output)	NPN OpenCollector 출력 (Output) DC5~24V 100mA 이하 (Under 100mA) 잔류 전압 0.85V 이하 (Residual Voltage of Under 0.85V) (부하 전류 100mA 시 (for load current of 100 mA))	PNP OpenCollector 출력 (Output) DC5~24V 50mA 이하 (Under 50mA ) 잔류 전압 1.3V 이하 (Residual Voltage of Under 1.3V) (부하 전류 50mA 시 (for load current of 50 mA))
표시등 (Indicating Lamp)	검출 표시(적색) (Etection Display (Red))	검출 표시(적색) (Etection Display (Red))
Sensor논리 (Sensor Logic)	Normally Open / Normally Closed (접속에 따라서 전환 가능 (Convertible depending on connections))	Normally Open / Normally Closed (접속에 따라서 전환 가능 (Convertible depending on connections))

### ■ 원점 Sensor Set 설치시 주의사항 (Precautions for the Installation of Origin Sensor Set)

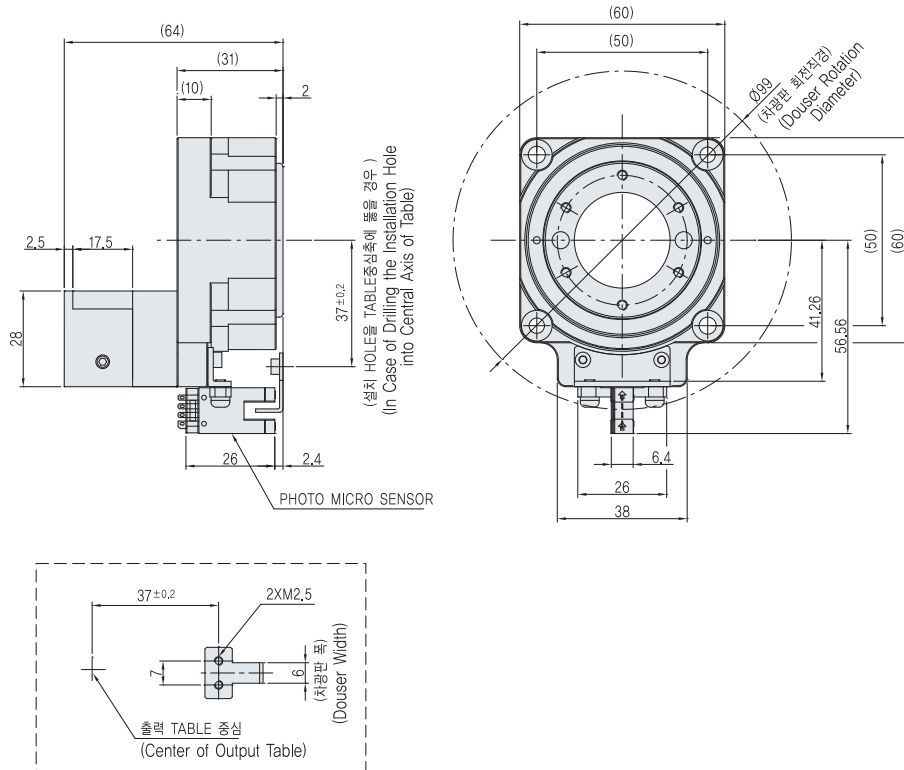
- 사용 주위온도 40℃ 이하, Actuator Motor 부 표면온도는 90℃ 이하가 되도록 운전조건 설정하여 주십시오.  
(Operating ambient temperature under 40℃, please set the operation condition with surface temperature on actuator motor side to be under 90℃.)
- 제공된 설치 부품이 아닌 것을 사용하였을 경우 제품 파손의 원인이 될 수 있습니다.  
(Using an installation part other than the provided one may lead to product damage.)

### ■ 원점 Sensor Cable을 연장할 경우 주의사항 (Precautions for Extending Origin Sensor Cable)

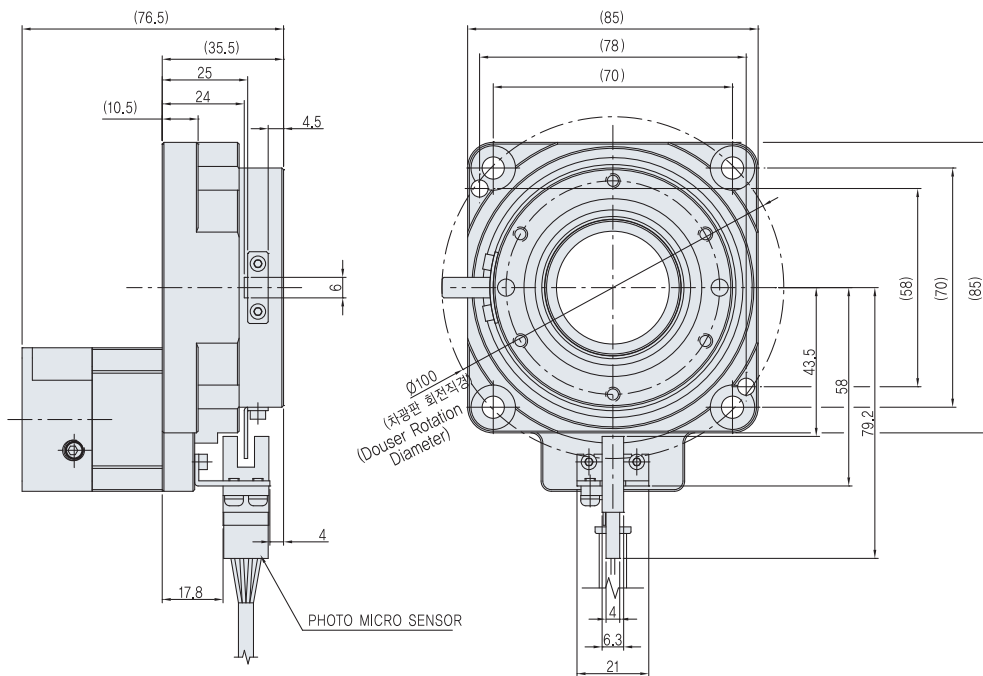
- Sensor Cable을 2m이상 연장할 경우에는 반드시 Shield Cable로 배선을 하고 접지 후 사용하여 주십시오.  
(Please wire with shield cable then ground it if extending the sensor cable for over 2m.)

## ■ 원점 Sensor Set 설치시 외형도 (Outside View in installing Origin Sensor Set)

### ■ SHA060



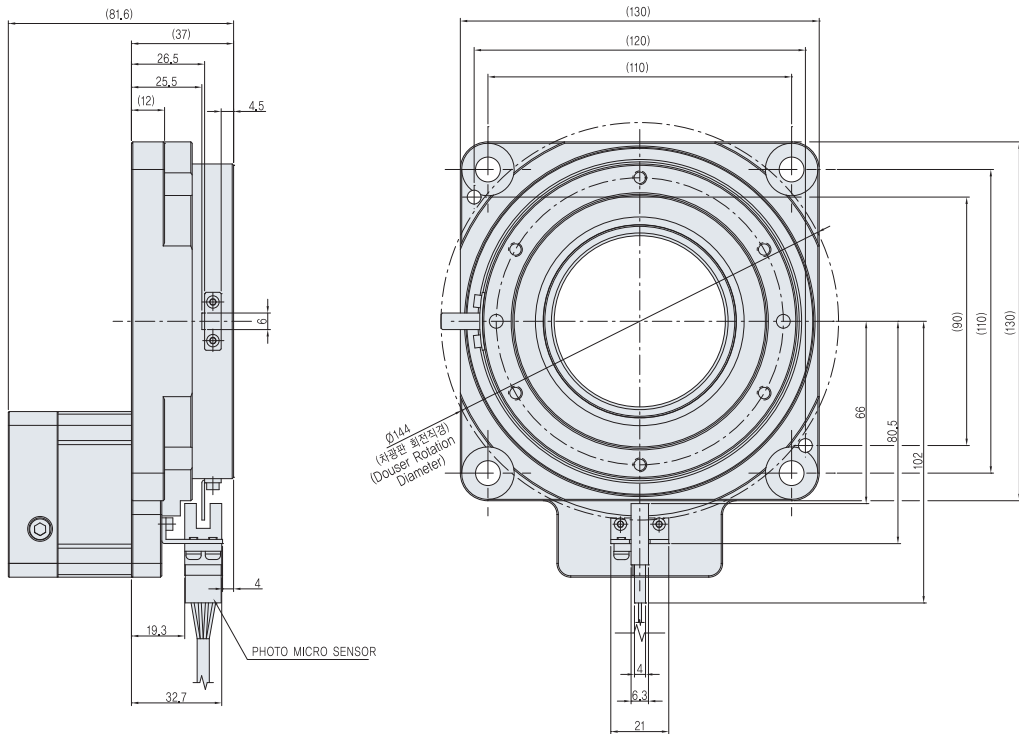
### ■ SHA085



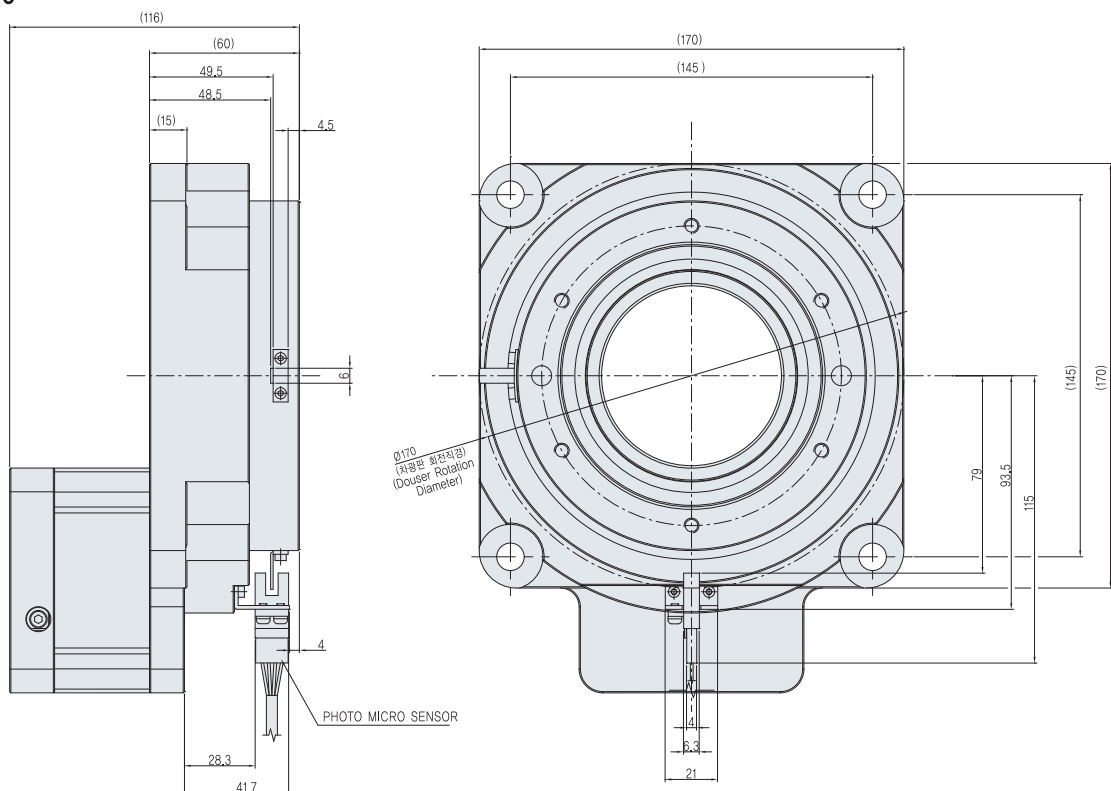
# Hollow Rotary Table

## ■ 원점 Sensor Set 설치시 외형도 (Outside View in installing Origin Sensor Set)

### ■ SHA130



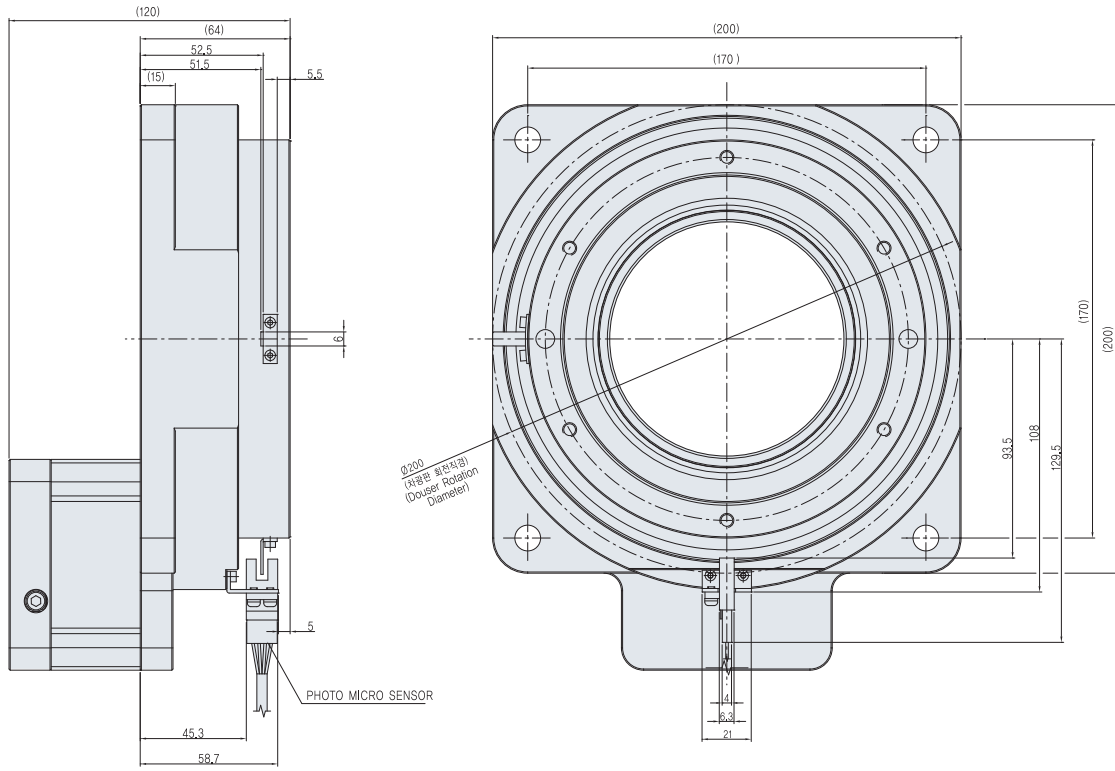
### ■ SHA170





■ 원점 Sensor Set 설치시 외형도 (Outside View in installing Origin Sensor Set)

■ SHA200



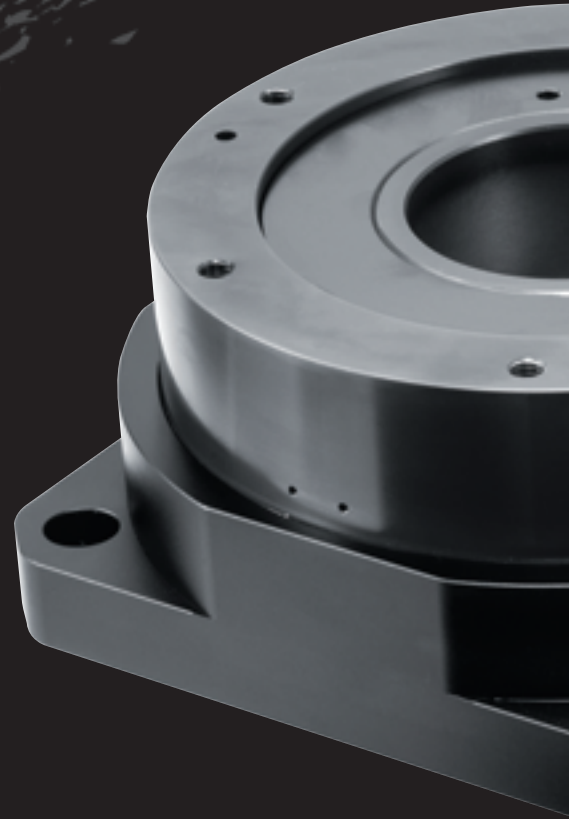
# Hollow Rotary Table SHB Series

SPG Hollow Rotary Table은 Stepping Motor와 Servo Motor용으로 개발되어 System 구성의 다양함을 제공합니다.

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

또한 대구경 중공출력축은 복잡한 배선, 배관을 간단하게 처리할 수 있어 장비설계의 유연성 및 편리성을 도모합니다.

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.



**SHB 060**

▶ Frame Size : □60mm

▶ Dia. of Hollow Section : 20mm



**SHB 100**

▶ Frame Size : □100mm

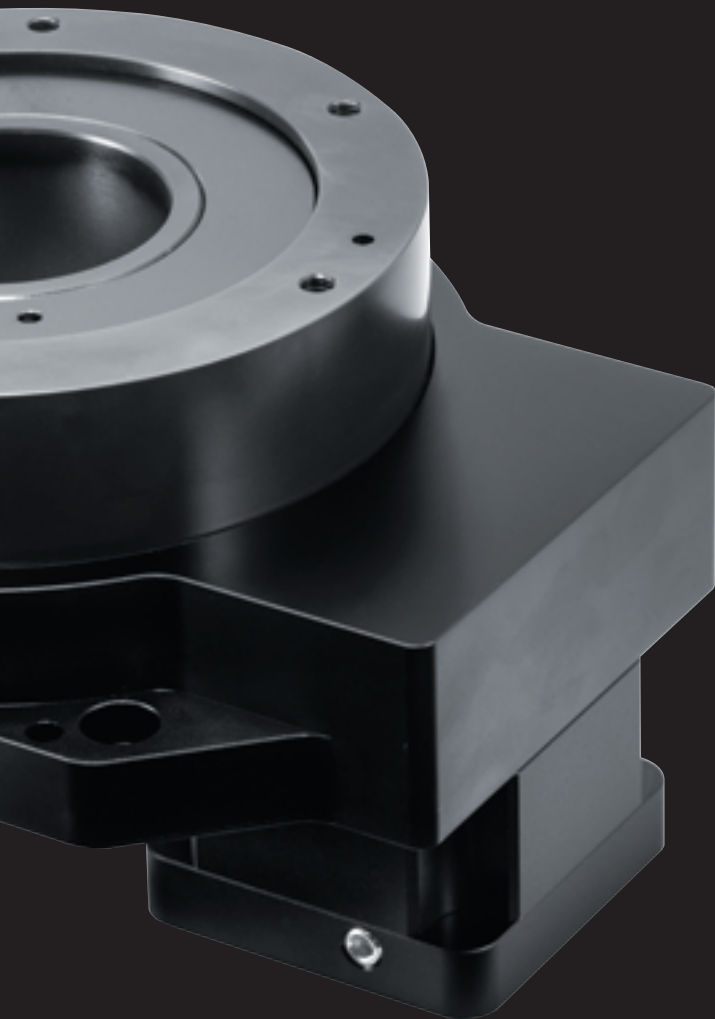
▶ Dia. of Hollow Section : 29mm



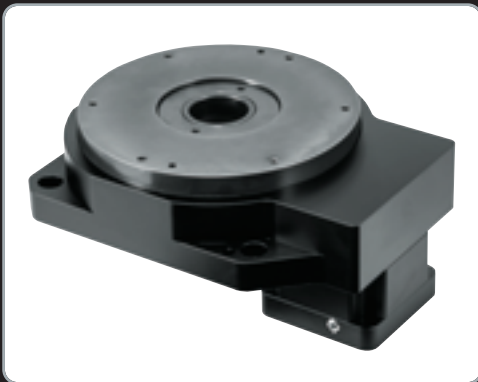
**SHB 130**

▶ Frame Size : □130 mm

▶ Dia. of Hollow Section : 40mm



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



**SHB 200**  
▶ Frame Size : □200mm  
▶ Dia. of Hollow Section : 40mm



**SHB 275**  
▶ Frame Size : □200mm  
▶ Dia. of Hollow Section : 75mm

# Hollow Rotary Table -Feature Overview

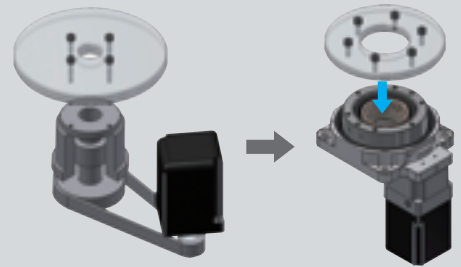
## ● Hollow Output Table Makes Simple Wiring and Piping Possible

The diameter of the driven gear has been increased with the use of a gear-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]
SHB 060	60	Ø20
SHB 100	100	Ø29
SHB 130	130	Ø40
SHB 200	200	Ø40
SHB 270	200	Ø75

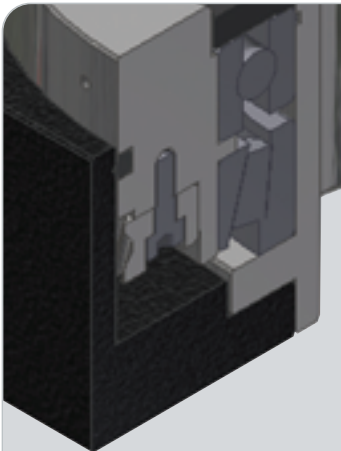
## ● Simple with Direct Coupling

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



## ● High Output

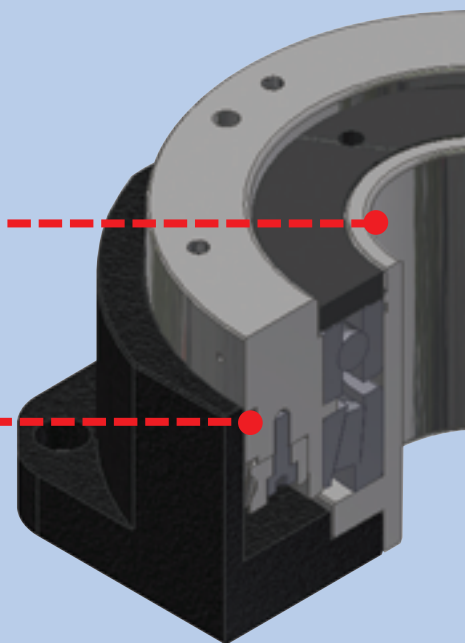
The output table uses a Taper Roller Bearing for SHB100, SHB130, SHB200 SHB275 model and deep-groove ball bearing for the SHB060 model.



## ● Accurate Positioning

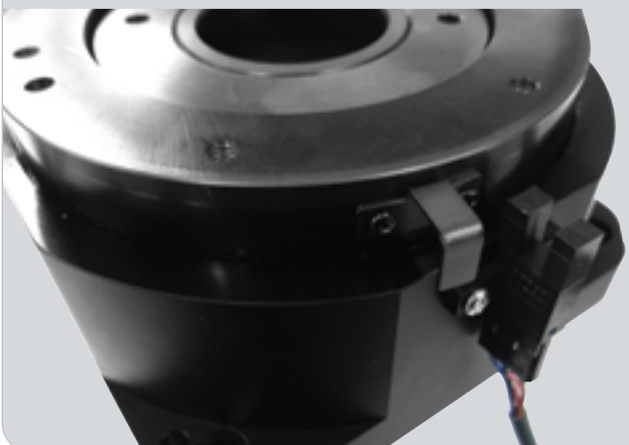
The gear-reduction mechanism employs precision gear along with a proprietary adjustment mechanism that eliminates backlash.

- Lost motion : 2 arcmin ( 0.033° )



## ● "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, fabrication 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.

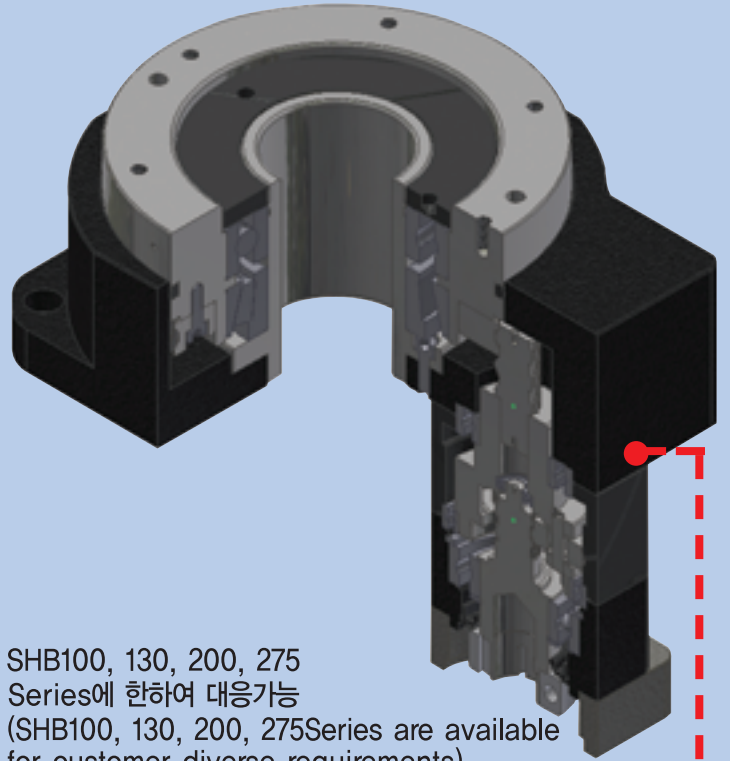


# SHB Series

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

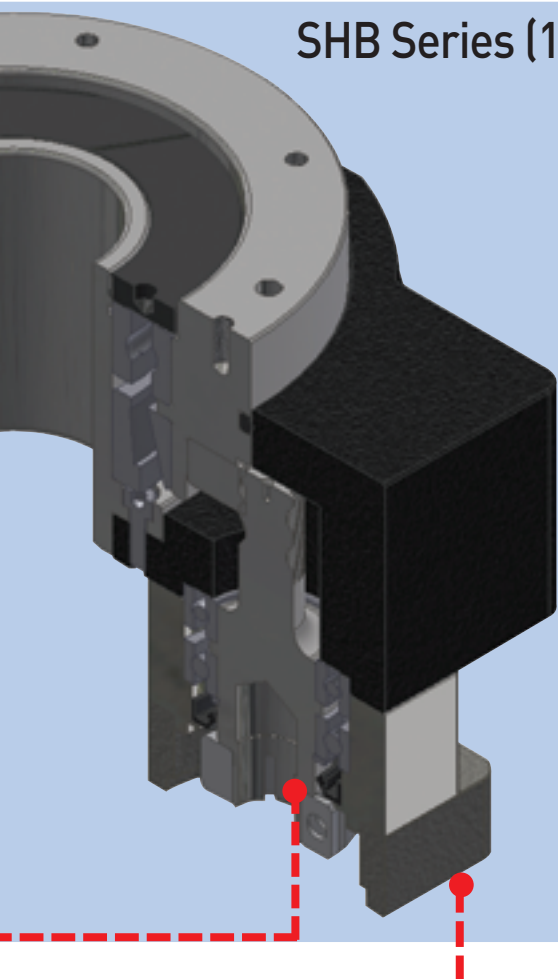


## SHB Series (2 Stage)

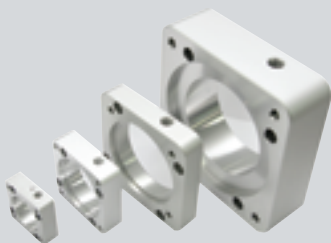


※ SHB100, 130, 200, 275 Series에 한하여 대응가능  
(SHB100, 130, 200, 275 Series are available for customer diverse requirements)

## SHB Series (1 Stage)



- Universal mounting motor flange  
Quicker deliveries and easier mounting to any stepping motor and servo motor.



- 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

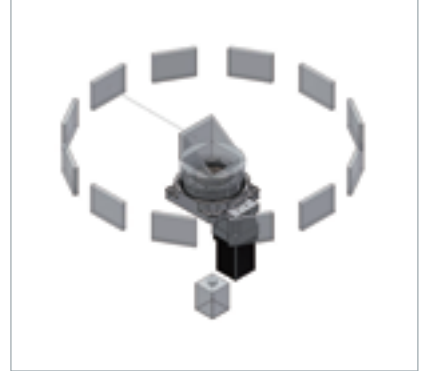
Applications subject to changing load inertia



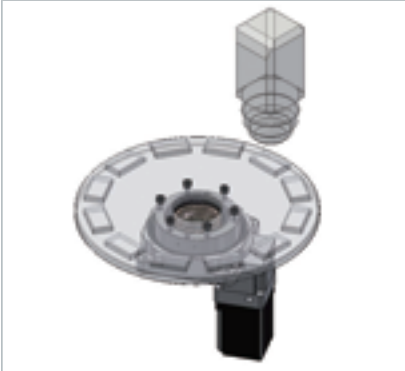
Applications where a moment load is applied



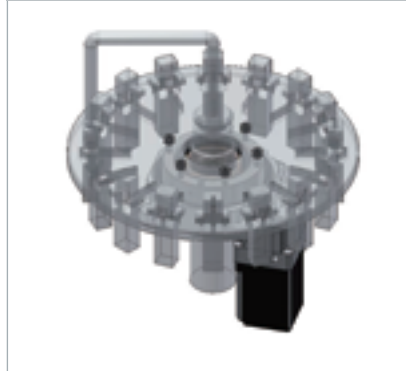
Optical applications using the hollow hole



High accuracy positioning applications



High accuracy positioning applications using the hollow hole



Air absorption applications using the hollow hole



## ■ Coding System

SHB		130		S		010		
Series		Frame Size		Available Motor		Gear Ratio [ i ] Stage		
SHB	Hollow Rotary Table	060	□60	S	Stepping Motor	005	005	1
		100	□100		Servo Motor	008	008	
		130	□130		010	010		
		200	□200			024	1/24	2
		275	□200			030	1/30	
						032	1/32	
						040	1/40	
						050	1/50	

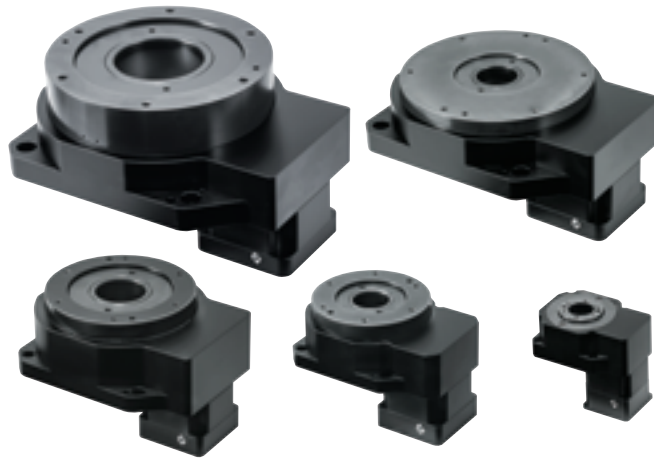
주) 모터 Brand중의 일부 Model은 형함이 상이할 수 있으므로 주문시 재 확인 바랍니다.

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

\*SHB200과 SHB275는 중공사이즈가 상이함. (40mm/75mm)  
(SHB200 and SHB275 have different hollow sizes. (40 mm/75 mm))

\*기준별 감속비는 상이함  
(Reduction ratio per model is different)  
단, SHB 060은 1 Stage만 대응가능  
(But, for SHA 060, only 1 stage is possible)





## Hollow Rotary Table SHB Series

- ▶ 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
- ▶ Reasonable Price



# Hollow Rotary Table

## Specifications

Description		SHB 060	SHB 100	SHB 130	SHB 200	SHB 275	
Motor Type		Stepping Motor & Servo Motor					
Output Table Supporting Bearing		Ball Bearing	Taper Roller Bearing				
Permissible Torque	[ Gear Ratio, Stage1 ]	i=1/5	i=1/8	i=1/10	i=1/10	i=1/10	
	[ N · m ]	3,5	15	15	65	65	
	[ Gear Ratio, Stage2 ]	-	i=1/24,32,40	i=1/30,40,50	i=1/30,40,50	i=1/30,40,50	
	[ N · m ]	-	15	15	65	65	
Inertial Moment	[ Gear Ratio, Stage1 ]	i=1/5	i=1/8	i=1/10	i=1/10	i=1/10	
	[ J : kg · m <sup>2</sup> ]	1235x10 <sup>-7</sup>	29626,7x10 <sup>-7</sup>	64735x10 <sup>-7</sup>	371100x10 <sup>-7</sup>	496730x10 <sup>-7</sup>	
	[ Gear Ratio, Stage2 ]	-	i=1/24,32,40	i=1/30,40,50	i=1/30,40,50	i=1/30,40,50	
	[ J : kg · m <sup>2</sup> ]	-	169548x10 <sup>-7</sup> 237005x10 <sup>-7</sup> 320658x10 <sup>-7</sup>	285911x10 <sup>-7</sup> 391300x10 <sup>-7</sup> 521995x10 <sup>-7</sup>	1151509x10 <sup>-7</sup> 1303762x10 <sup>-7</sup> 1554895x10 <sup>-7</sup>	2751875x10 <sup>-7</sup> 1981650x10 <sup>-7</sup> 1680525x10 <sup>-7</sup>	
Lost Motion	[ arcmin ]	2 ( 0,033° )					
Permissible Thrust Load		[ N ]	300	1,300	2,000	2,000	3,500
Permissible Moment Load		[ N · m ]	5	10	50	50	80
Runout of Output Table Surface		[ mm ]	0,030	0,015	0,015	0,015	0,015
Runout of Output Table Inner(Outer) Diameter		[ mm ]	0,030	0,015	0,015	0,030	0,030
Parallelism of Output Table		[ mm ]	0,050	0,030	0,030	0,050	0,050
Degree of Protection			IP40				
Operating Temp		[ °C ]	-10 ~ +90				
Weight	[ Stage1, kg ]	0,68	2,6	4,6	11,2	15,3	
	[ Stage2, kg ]	-	3,3	5,3	13	17,1	

(1) SHB060은 1 Stage 만 대응가능 (SHB 060, only 1 stage is possible)

\* 상기 사양표의 Data는 대표값을 나타내며, 제품의 성능개선을 위해 예고없이 사양을 변경할 수도 있습니다.

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

## ■ 사양표 보는 방법 (How to read specification)

### ① Output Table Supporting Bearing

출력 Table에 사용하는 Bearing의 종류입니다. (They are types of bearings used for the output table.)

### ② Permissible Torque

감속기구부의 기계적 강도 한계 값 입니다. 가속 Torque, 부하 변동 분도 포함해 이 허용 Torque이하에서 사용하여 주십시오.

(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

Rotary Table과 감속기구부의 관성Moment를 Table 상에서 환산한 값의 합계입니다.

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

### ④ Lost Motion

출력Table을 어느 위치에서 정전방향에서 위치결정했을 때와 역전방향에서 같은 위치로 위치결정했을 때의 정지각도의 차이를 말합니다.

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

### ⑤ Permissible Thrust Load

출력 Table의 축 방향에 가해지는 Thrust하중 허용 값을 나타냅니다. (This indicates allowable value for thrust load given to the direction of shaft at output table.)

### ⑥ Permissible Moment Load

출력 Table의 중심에서 편심 된 위치에 하중이 가해질 경우, 출력Table을 기울이는 힘이 작용합니다.

그 때 중심으로 부터의 편심량 X 하중 으로 계산되는 Moment 하중의 허용 값을 말합니다.

(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.)

### ⑦ Runout of Output Table Surface

무부하에서 출력 Table을 회전시켰을 때의 출력Table 설치면의 흔들림 최대값을 말합니다.

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

### ⑧ Runout of Output Table Inner(Outer) Diameter

무부하에서 출력 Table을 회전시켰을 때의 출력Table 내경 또는 외경의 흔들림 최대값을 말합니다.

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

### ⑨ Parallelism of Output Table

Hollow Rotary Table의 장비측 설치면에 대해 출력Table의 설치면이 어느 정도 기울어져 있는가를 나타냅니다.

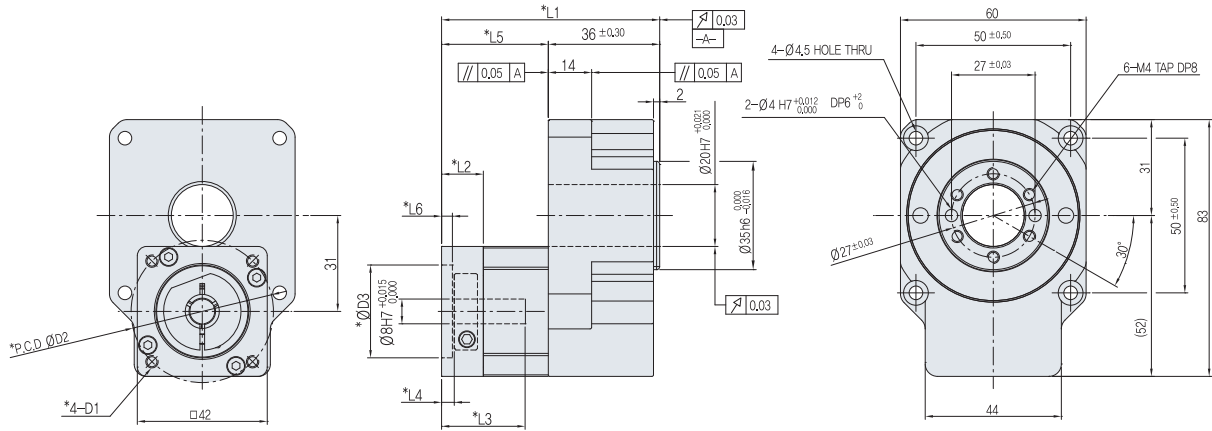
(This represents how much installation surface of output table is tilted against the machine on Hollow Rotary Table.)

### ⑩ Degree of Protection

IEC60529, EN60034-5 (= IEC60034-5) 에 기초하여 기기의 보호구조에 대해 방진, 방수성을 등급으로 분류한 것입니다.

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

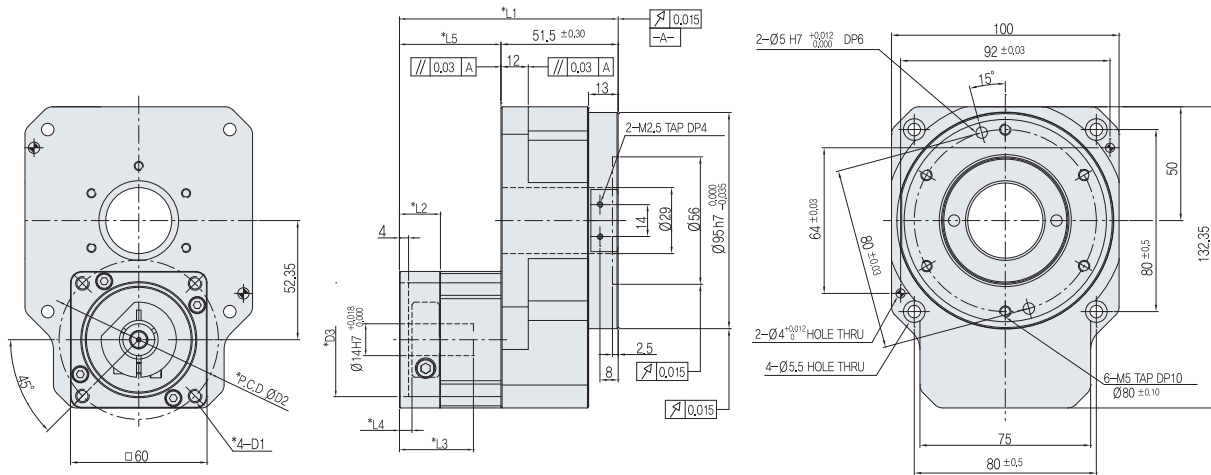
## ■ Dimensions –SHB 060 (1 Stage, Ratio(i)=1/5)



D3	$\varnothing 30H7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$		$\varnothing 22H7 \begin{smallmatrix} +0.021 \\ 0.000 \end{smallmatrix}$	
D2	$\varnothing 46$	$\varnothing 45$	$\varnothing 46$	$\varnothing 43.84$
D1	M4 TAP, DP8	M3 TAP, DP6	M4 TAP, DP8	$\varnothing 3.4$ HOLE THRU
L6	3.5		7	
L5	34	37.5	41	
L4	4.1	7.6	11.1	
L3	27	30.5	34	
L2	13.5	17	20.5	
L1	70.5	74	77.5	
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

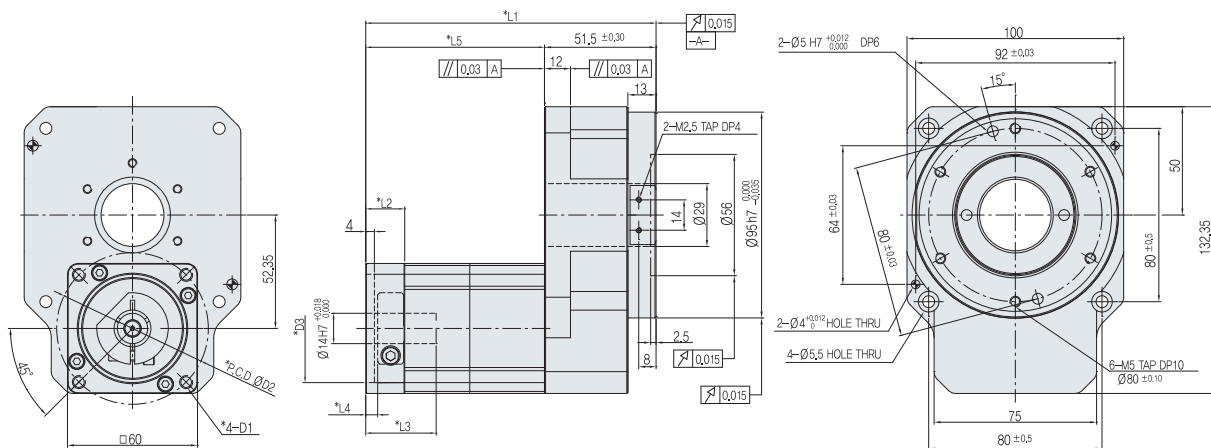
# Hollow Rotary Table

## ■ Dimensions –SHB100 (1 Stage, Ratio(i)=1/8)



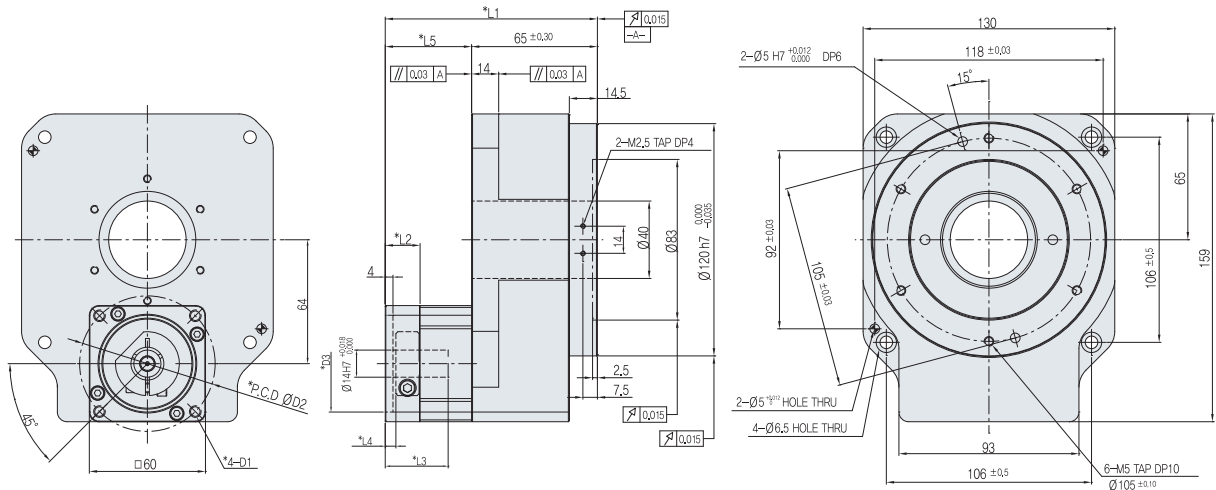
D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$			Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	
D2	Ø70			Ø70.71	Ø66.67	Ø70.71
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12		
L5	44.6		49.1	44.6		
L4	5.5		10	5.5		
L3	34		38.5	34		
L2	18		22.5	18		
L1	96.1		100.6	96.1		
지수/Dimensions Classification	A TYPE	B TYPE	C TYPE	D TYPE	E TYPE	G TYPE

## ■ Dimensions –SHB 100 (2 Stage, Ratio(i)=1/24~1/40)



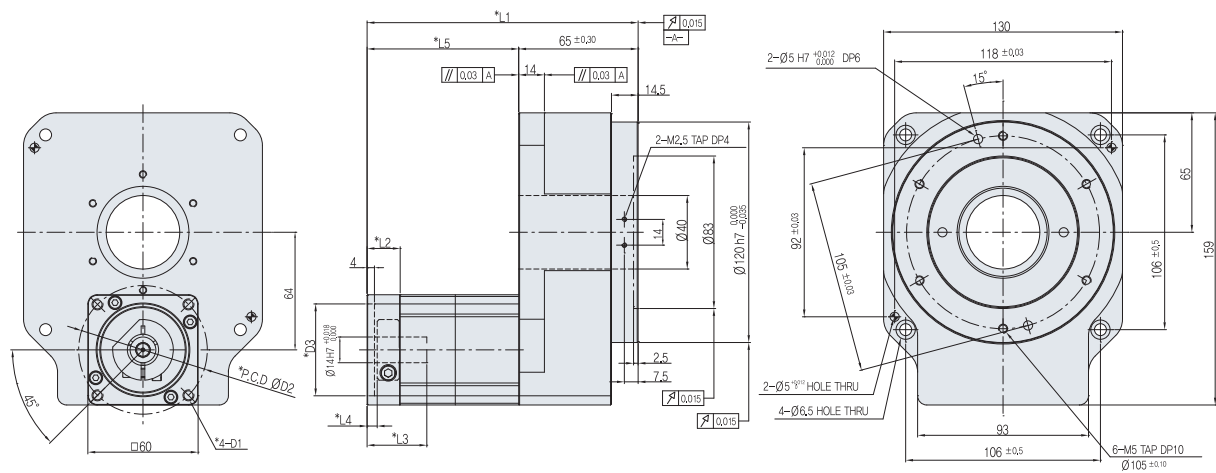
D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$			Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	
D2	Ø70			Ø70.71	Ø66.67	Ø70.71
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12		
L5	82.5		87	82.5		
L4	5.5		10	5.5		
L3	32.5		37	32.5		
L2	18		22.5	18		
L1	134		138.5	134		
지수/Dimensions Classification	A TYPE	B TYPE	C TYPE	D TYPE	E TYPE	G TYPE

## ■ Dimensions –SHB 130 (1 Stage, Ratio(i)=1/10)



D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		
D2	Ø70		Ø70.71	Ø66.67	Ø70.71	
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12		
L5	44,6		49,1	44,6		
L4	5,5		10	5,5		
L3	32,5		37	32,5		
L2	18		22,5	18		
L1	109,6		114,1	109,6		
Classification	A TYPE	B TYPE	C TYPE	D TYPE	E TYPE	G TYPE

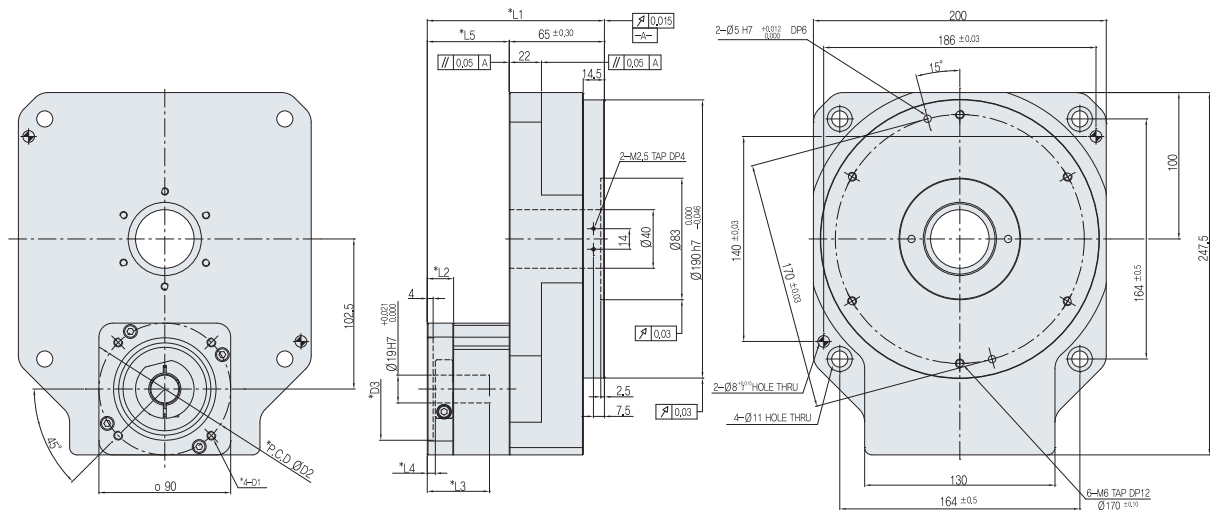
## ■ Dimensions –SHB 130 (2 Stage, Ratio(i)=1/30~1/50)



D3	Ø50 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		Ø36 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$	Ø38.1 H7 $\begin{smallmatrix} +0.025 \\ 0.000 \end{smallmatrix}$		
D2	Ø70		Ø70.71	Ø66.67	Ø70.71	
D1	M5 TAP, DP12	M4 TAP, DP12	M5 TAP, DP12	M4 TAP, DP12		
L5	82,5		87	82,5		
L4	5,5		10	5,5		
L3	32,5		37	32,5		
L2	18		22,5	18		
L1	147,5		152	147,5		
Classification	A TYPE	B TYPE	C TYPE	D TYPE	E TYPE	G TYPE

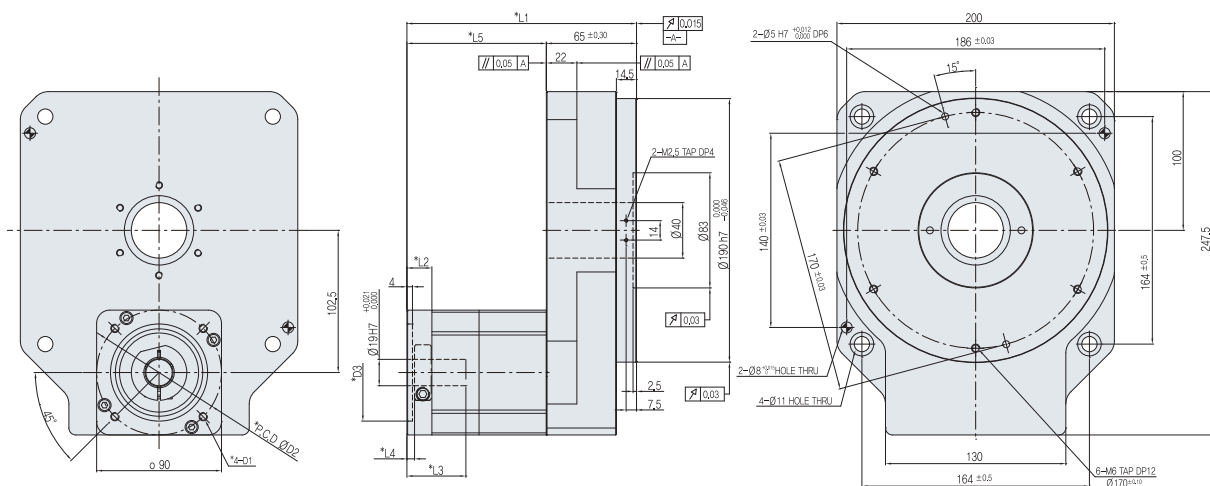
# Hollow Rotary Table

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



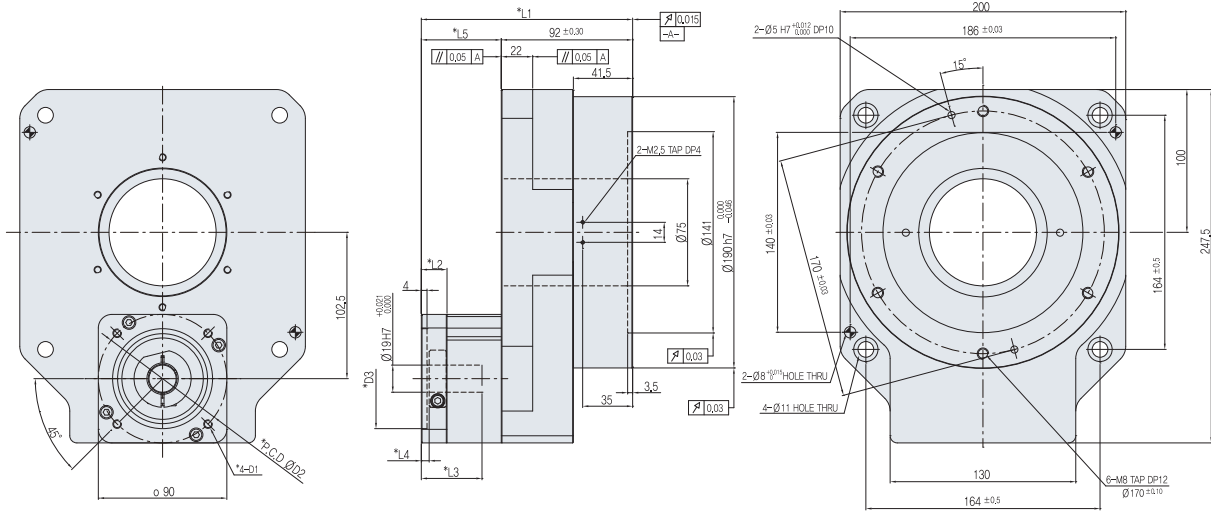
D3	Ø70 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$			Ø73 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$
D2	Ø90			Ø98.43
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	56	61	56	56
L4	5.5	10.5	5.5	5.5
L3	42.5	47.5	42.5	42.5
L2	18	23	18	18
L1	121	126	121	121
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

## ■ Dimensions –SHB 200 (2 Stage, Ratio(i)=1/30~1/50)



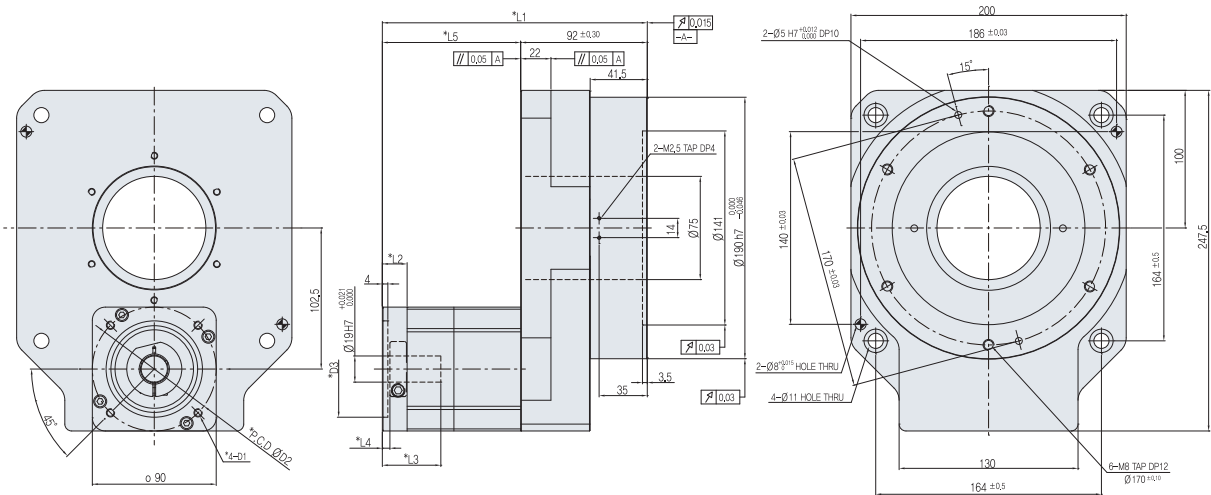
D3	Ø70 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$			Ø73 H7 $\begin{smallmatrix} +0.030 \\ 0.000 \end{smallmatrix}$
D2	Ø90			Ø98.43
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12	M6 TAP, DP12
L5	100.5	105.5	100.5	100.5
L4	5.5	10.5	5.5	5.5
L3	42.5	47.5	42.5	42.5
L2	18	23	18	18
L1	165.5	170.5	165.5	165.5
尺寸 Classification	A TYPE	B TYPE	C TYPE	D TYPE

## ■ Dimensions –SHB 275 (1 Stage, Ratio(i)=1/10)



D3	$\phi 70$ H7 $\frac{+0.030}{0.000}$		$\phi 73$ H7 $\frac{+0.030}{0.000}$
D2	$\phi 90$		
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12
L5	56	61	56
L4	5.5	10.5	5.5
L3	42.5	47.5	42.5
L2	18	23	18
L1	148	153	148
차수 Classification	A TYPE	B TYPE	C TYPE

## ■ Dimensions –SHB 275 (2 Stage, Ratio(i)=1/30~1/50)



D3	$\phi 70$ H7 $\frac{+0.030}{0.000}$		$\phi 73$ H7 $\frac{+0.030}{0.000}$
D2	$\phi 90$		
D1	M6 TAP, DP12	M5 TAP, DP12	M6 TAP, DP12
L5	100.5	105.5	100.5
L4	5.5	10.5	5.5
L3	42.5	47.5	42.5
L2	18	23	18
L1	192.5	197.5	192.5
차수 Classification	A TYPE	B TYPE	C TYPE

# Hollow Rotary Table

## ■ 원점 Sensor Set (Origin Sensor Set)

원점복귀 운전을 간단히 실행하기 위해 Photo Micro Sensor, Connector 부착 Cable, 차광판, 설치나사가 Set로 구성되어 있는 원점 Sensor Set를 옵션으로 준비했습니다.

원점복귀에 필요한 모든 부품이 갖춰져 있으므로 Sensor 설치에 필요한 설계, 제작, 부품 조달의 수고를 덜 수 있습니다.

SPG prepared an option with the origin sensor set, including photo micro sensor, cable with connector, douser, installation screw in order to run home positioning operation simply. It includes all required parts for home positioning, so it can reduce efforts of design, production, and procurement of parts required for installation of the sensor.

### ■ 종류 (Type)

품명 (Product Name)	Sensor출력 (Sensor Output)	적용제품 (Applied Products)
SHBS-B	NPN	SHB100, SHB130
SHBS-BY	PNP	SHB200, SHB275

### ■ 원점 Sensor Set의 구성

(What's Included in the Origin Sensor Set)



### ■ 사양 (Specifications)

구분 (Division)	NPN Type	PNP Type
Sensor품명 (Product Name of the Sensor)	SHB100, SHB130, SHB200, SHB275 : EE-SX672A (OMRON 제품 (Products))	SHB100, SHB130, SHB200, SHB275 : EE-SX672R (OMRON 제품 (Products))
전원전압 (Power Supply Voltage)	DC5~24V ±10% , Ripple (P-P) 10% 이하 (Under 10%)	DC5~24V ±10% , Ripple (P-P) 10% 이하 (Under 10%)
소비전류 (Current Consumption)	35mA이하 (Under 35mA)	30mA이하 (Under 35mA)
제어출력 (Control Output)	NPN OpenCollector 출력 (Output) DC5~24V 100mA 이하 (Under 100mA) 잔류 전압0.85V 이하 (Residual Voltage of Under 0.85V) (부하 전류100mA 시 (for load current of 100 mA))	PNP OpenCollector 출력 (Output) DC5~24V 50mA 이하 (Under 50mA ) 잔류 전압1.3V 이하 (Residual Voltage of Under 1.3V) (부하 전류50mA 시 (for load current of 50 mA))
표시등 (Indicating Lamp)	검출 표시(적색) (Etection Display (Red))	검출 표시(적색) (Etection Display (Red))
Sensor논리 (Sensor Logic)	Normally Open / Normally Closed (접속에 따라서 전환 가능 (Convertible depending on connections))	Normally Open / Normally Closed (접속에 따라서 전환 가능 (Convertible depending on connections))

### ■ 원점 Sensor Set 설치시 주의사항 (Precautions for the Installation of Origin Sensor Set)

- 사용 주위온도 40℃ 이하, Actuator Motor 부 표면온도는 90℃ 이하가 되도록 운전조건 설정하여 주십시오.  
(Operating ambient temperature under 40℃, please set the operation condition with surface temperature on actuator motor side to be under 90℃.)
- 제공된 설치 부품이 아닌 것을 사용하였을 경우 제품 파손의 원인이 될 수 있습니다.  
(Using an installation part other than the provided one may lead to product damage.)

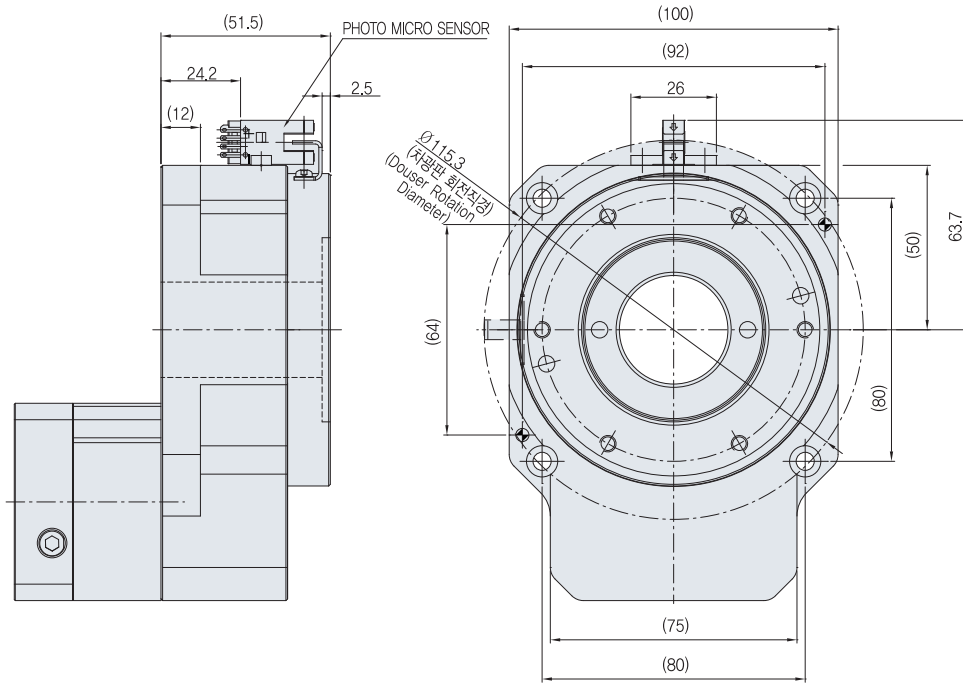
### ■ 원점 Sensor Cable을 연장할 경우 주의사항 (Precautions for Extending Origin Sensor Cable)

- Sensor Cable을 2m이상 연장할 경우에는 반드시 Shield Cable로 배선을 하고 접지 후 사용하여 주십시오.  
(Please wire with shield cable then ground it if extending the sensor cable for over 2m.)

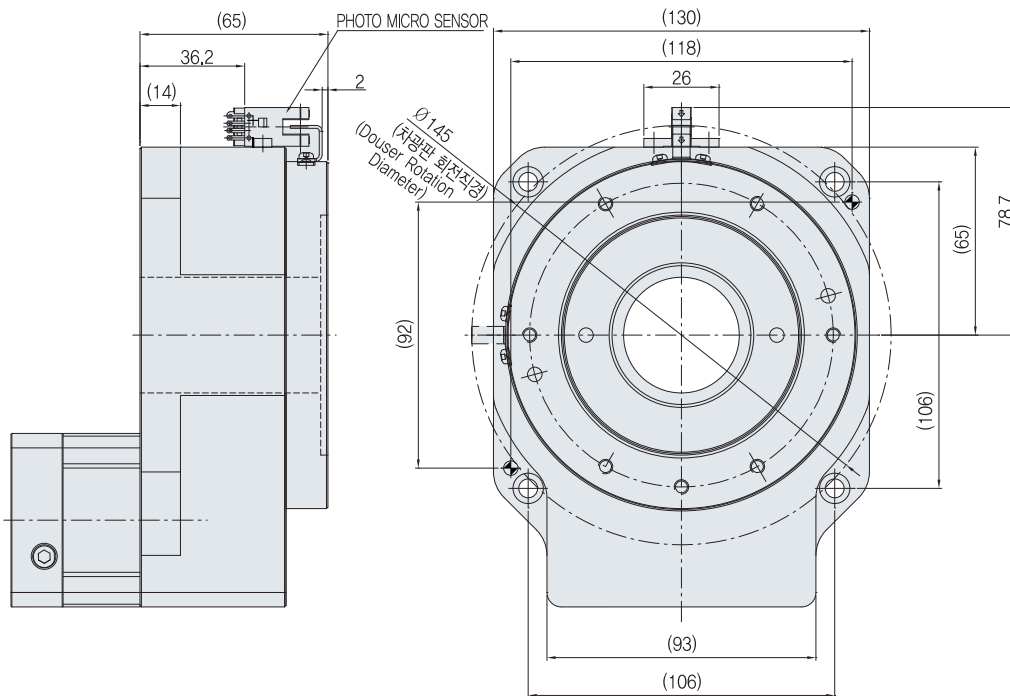


## ■ 원점 Sensor Set 설치시 외형도 (Outside View in installing Origin Sensor Set)

### ■ SHB100



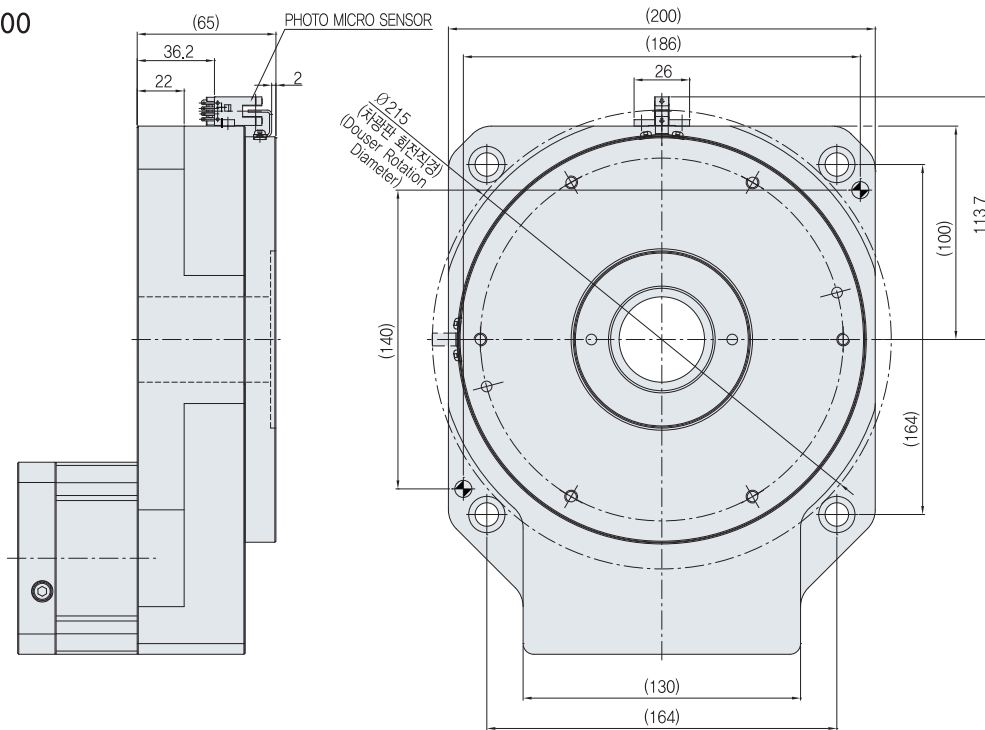
### ■ SHB130



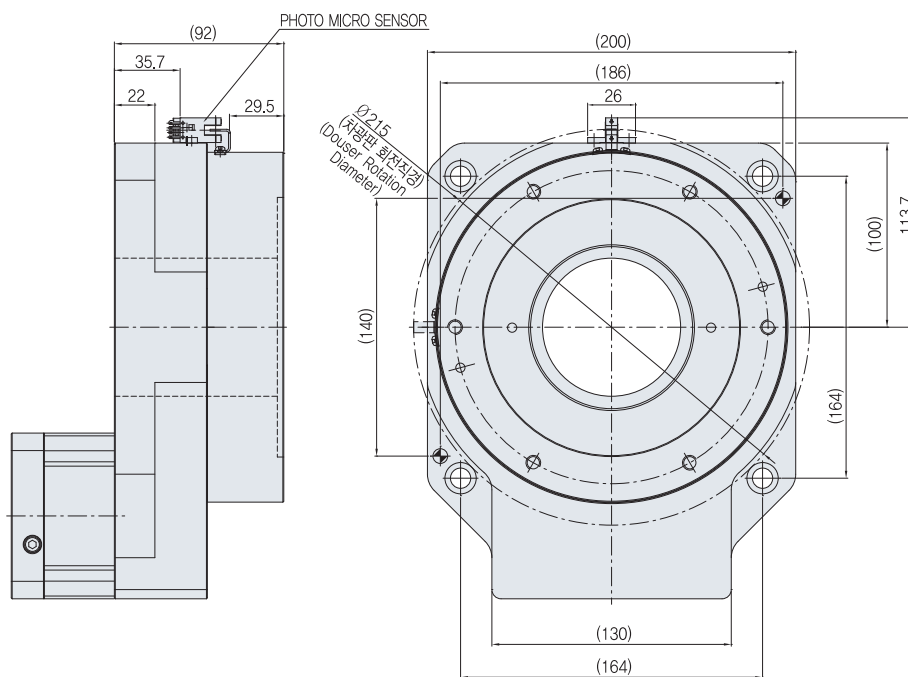
# Hollow Rotary Table

## ■ 원점 Sensor Set 설치시 외형도 (Outside View in installing Origin Sensor Set)

### ■ SHB200



### ■ SHB275



# Hollow Rotary Table Selection

## ■ Hollow Rotary Table 선정 Check Point. (Check Point to select Hollow Rotary Table)

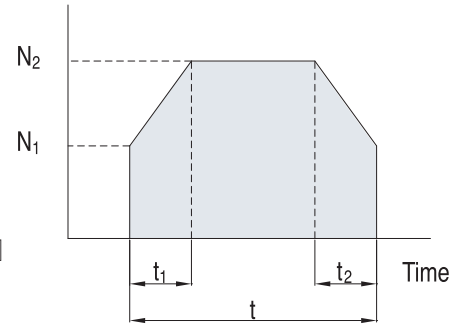
### ① Work 관성Moment(부하 관성Moment)를 계산합니다. (Calculating moments of inertia (load inertia Moment).)

Work관성 Moment는 적용Motor의 허용부하관성 Moment를 고려하여 주십시오  
(Make sure that the inertia moment for returned object is less than 30 times of the actuator's inertia moment.)

### ② 가속 Torque를 아래 식으로 계산합니다. (Use the following formula to calculate the acceleration torque.)

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

$J_M$  : 적용 Motor의 관성 Moment [kg·m<sup>2</sup>]      $J_M$  : inertia Moment [kgm<sup>2</sup>] for applied motor [kg·m<sup>2</sup>]  
 $J_A$  : Rotary Table관성 Moment [kg·m<sup>2</sup>]      $J_A$  : Actuator's inertia Moment [kg·m<sup>2</sup>]  
 $J_W$  : 부하관성 Moment [kg·m<sup>2</sup>]      $J_W$  : Load inertia Moment [kg·m<sup>2</sup>]  
 $N_2$  : 운전회전속도 [r/min]      $N_2$  : Operating rotation speed [r/min]  
 $N_1$  : 기동회전속도 [r/min]      $N_1$  : Starting rotation speed [r/min]  
 $t_1$  : 가속(감속) 시간 [s]      $t_1$  : Accelerating (Decelerating) Time [s]



### ③ 필요 Torque를 산출합니다. (Calculating the Required Torque.)

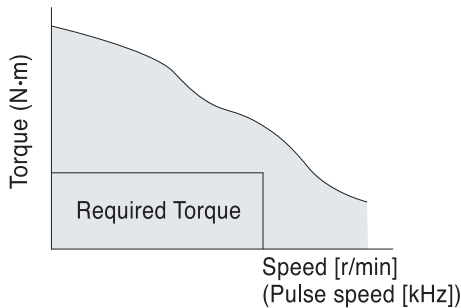
필요 Torque는 마찰저항으로 인한 부하 Torque와 관성 Moment로 인한 가속 Torque를 더한 것에 안전율을 곱한 것이 됩니다.  
(The required torque is calculated by multiplying the sum of load torque from the frictional resistance and the acceleration torque by safety coefficient.)

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

안전율S는 1.5이상 이 되도록 해 주십시오. (The safety coefficient, S is greater than 1.5.)

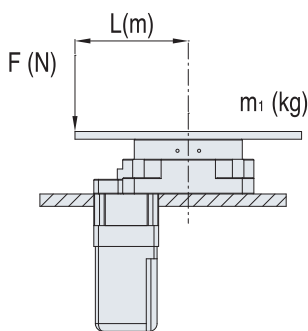
### ④ 필요 Torque T값이 적용 모터의 회전속도-Torque특성의 사양값 내에 있는지를 확인합니다.

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

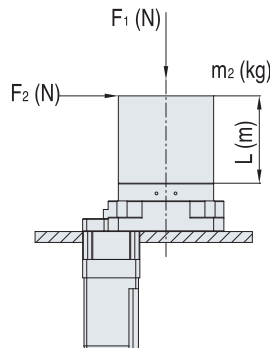


### ⑤ Thrust Load, Moment Load의 계산. (Calculating Thrust Load, Moment Load).

출력 Table에 아래 그림과 같이 Load가 가해지는 경우는 다음 식으로 Thrust Load, Moment Load를 계산하여 사양 값 내에 있는 것을 확인하여 주십시오. (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.)



Thrust Load [N] :  $F_t = F + m_1 \times g$   
 Moment Load [N·m] :  $M = F \times L$   
 $g$  : Gravitational Acceleration 9.807 [m/s<sup>2</sup>]

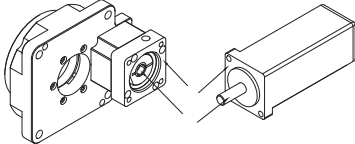
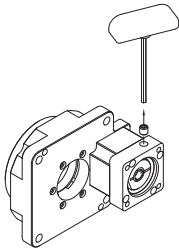
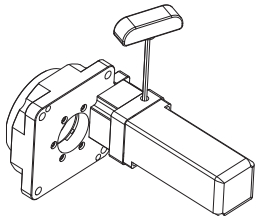
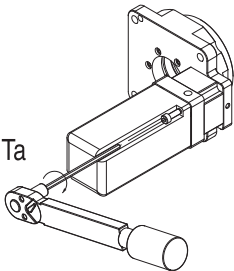
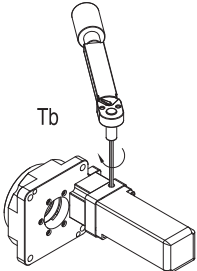
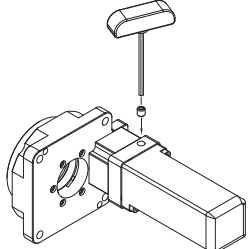


Thrust Load [N] :  $F_t = F_2 + m_2 \times g$   
 Moment Load [N·m] :  $M = F_2 \times (L + a)$   
 $g$  : Gravitational Acceleration 9.807 [m/s<sup>2</sup>]

Model	a
SHA060, SHB060	0.01
SHA085, SHB100	0.02
SHA130, SHB130	0.03
SHA170, SHA200, SHB200, SHB275	0.04

# Mounting Instructions

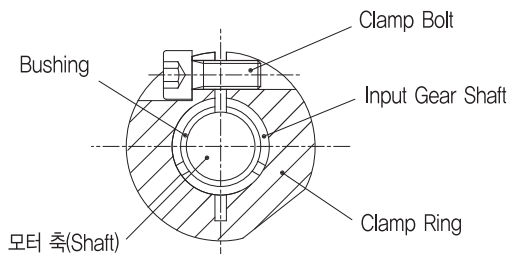
■ 모터 취부방법 – 모터와의 취부는 아래의 순서에 따라 하여 주십시오  
 Installation Instructions – For assembly with motor, please follow these steps below.

		
<p><b>1</b> 모터와 Rotary Table 사이즈를 확인 후 취부할 부위를 깨끗이 닦아 주십시오.          Brush away and clean out any foreign substances on the surface after verifying the size of the motor and the rotary table.</p>	<p><b>2</b> 어댑터 플랜지에서 스crew 플러그를 풀어낸 후 클램프 볼트가 보일 수 있도록 위치를 맞추십시오.          Remove the screw plug from the adapter flange and adjust the position so that the clamp bolt is noticeable. (See "Appendix 1.")</p>	<p><b>3</b> 모터에 취부할 때 Rotary Table의 어댑터 플랜지와 모터 취부면을 밀착 시킨 후 클램프 링이 헛돌지 않도록 클램핑 볼트를 살짝 조여 주십시오.          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><b>4</b> 토크렌치를 사용하여 규정된 체결토크로 대각선으로 체결하십시오.(체결토크는 「Appendix 2」를 참고하십시오)          Bolts diagonally tighten based on the standard Ta. (See "Appendix 2.")</p>	<p><b>5</b> 토크렌치를 사용하여 규정된 체결토크로 클램프 볼트를 체결하십시오.(체결토크는 「Appendix 2」를 참고하십시오)          Tighten the clamp ring based on the standard Tb. (See "Appendix 2.")</p>	<p><b>6</b> 스crew 플러그를 다시 체결하십시오.          Tighten the screw plug.</p>

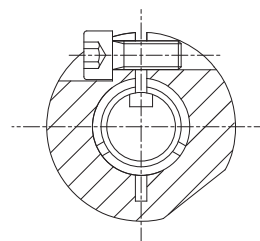
## ■ Appendix 1 올바른 모터 축 체결방법 (How to install motor)

모터축이 원형이 아닌 Key홈이 있는 경우, Key를 제거 후 모터축의 Key홈과 Rotary Table 입력축 Clamp Bolt가 「그림 B」와 같이 수직이 되도록 취부 하십시오. 또한 높은 체결력을 얻기 위해서는 조립시 Clamp Ring, Input Gear Shaft, Bushing 각각의 위치를 일렬로 정렬하십시오.

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.



(그림 A) 환축일 경우  
 (Figure A) Motor shaft without key



(그림 B) Key홈일 경우  
 (Figure B) Motor shaft with key

## 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 <sup>2</sup>	0,10197	10,197	0,7376	8,8509
1 N · cm	10 <sup>-2</sup>	1	1,0197×10 <sup>-3</sup>	0,10197	7,376×10 <sup>-3</sup>	8,8509×10 <sup>-2</sup>
1 kgf · m	9,8066	980,665	1	10 <sup>2</sup>	7,233	86,79
1 kgf · cm	9,8066×10 <sup>-2</sup>	9,8066	10 <sup>-2</sup>	1	7,233×10 <sup>-2</sup>	0,8680
1 lbf · ft	1,356	1,356×10 <sup>2</sup>	0,1383	13,83	1	12
1 lbf · in	0,113	11,3	1,152×10 <sup>-2</sup>	1,152	8,333×10 <sup>-2</sup>	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 기기 보호 등급 (IP) (Equipment Protection Grade (IP))

IP(Ingress Protection)은 IEC-529에서 규정하는 기기에 대한 방진, 방수 보호 등급 규정이며, 방진, 방수에 대한 등급 분류에 의한 표시방법은 다음과 같습니다. (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)

IP

방수 보호 등급 (두 번째 번호) (Protection against water (2nd digit))

방진 보호 등급 (첫 번째 번호) (Protection against foreign objects (1st digit))

### ① 방진(防塵)에 대한 등급분류 (첫 번째 번호)

Classification of Protection against foreign objects (1st digit)

IP 표시 (Indication)	보호정도 (Level of Protection)
IP 0□	없음 (None)
IP 1□	손의 접근으로부터의 보호 (Protected from access of a hands)
IP 2□	손가락의 접근으로부터의 보호 (Protected from access of a fingers)
IP 3□	공구의 선단 등으로부터의 보호 (Protected against solid objects, tool etc)
IP 4□	WIRE등으로부터의 보호 (Protected against wire)
IP 5□	분진으로부터의 보호 (Protected against dust)
IP 6□	완전한 방진 구조 (Completed dust-proof)

### ② 방수(防水)에 대한 등급분류 (두 번째 번호)

Classification of Protection against water (2nd digit)

IP 표시 (Indication)	보호정도 (Level of Protection)
IP □0	없음 (None)
IP □1	垂直으로 떨어지는 물방울로부터의 보호 (Protected against water spray from all directions)
IP □2	垂直의 15° 범위에서 떨어지는 물방울로부터의 보호 (Protected against water drops falling vertically over a 15° range)
IP □3	垂直의 60° 범위에서 떨어지는 물방울로부터의 보호 (Protected against water drops falling vertically over a 60° range)
IP □4	수방향으로飛散되는 물로부터의 보호 (Protected against water splattering from all directions)
IP □5	수방향으로 쏟아지는 물로부터의 보호 (Protected against water pouring from all directions)
IP □6	파도와 같이 강력하게 쏟아지는 물로부터의 보호 Protected against strong water pouring from all directions
IP □7	일정한 조건에서 물에 잠겨서도 사용가능 Possible to use after immersion in water under certain conditions
IP □8	물 밑에서 사용가능 (Possible to use under water)

## ■ 주의 / Caution

제품의 취급에 주의하여 주십시오.

- 제품에 망치로 충격을 가하지 마시고, 낙하에 의한 손상이 생기지 않도록 취급시 주의하여 주십시오.

제품을 부하측과 직접 연결할 경우 조립에 주의하여 주십시오.

- 제품이 구동되고 있을때 회전하는 축에 손이나 기타 이물을 넣지 마십시오, 부상의 원인이 됩니다.

허용토크를 초과하지 않도록 사용하여 주십시오.

- 순간허용 최대토크이상 토크가 가해지지 않도록 하여 주십시오, 체결부의 볼트 풀림, 흔들림 발생, 파손등에 의한 트러블의 원인이 됩니다.

제품을 분해하지 말아 주십시오.

- 임의로 제품을 분해, 재조립하지 말아 주십시오, 이 경우 당초의 성능이 보장되지 않습니다.

이상을 느끼면 시스템을 정지하여 주십시오.

- 이상음, 진동발생, 이상발열 등이 발생하면 즉시 시스템을 정지하여 주십시오, 시스템에 악영향을 미칠 수 있습니다.

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.

## ■ 보증 / Warranty

제품의 보증기간 및 보증범위는 다음과 같습니다.

### 1 보증 기간 / Warranty Period

당사가 규정한 운전, 조립, 유행 상태로 사용하는 조건하에 제품 납품후 12개월 또는 해당 제품의 운전기간이 2,000시간 중에서 빨리 도달한 경우로 적용합니다.

### 2 보증 범위 / Warranty Coverage

상기 보증기간에 당사 제조상의 결함에 의한 고장인 경우는 해당제품의 수리 또는 교환을 당사의 책임하에 행합니다. 단, 다음에 해당하는 경우는 보증 대상범위로 부터 제외합니다.

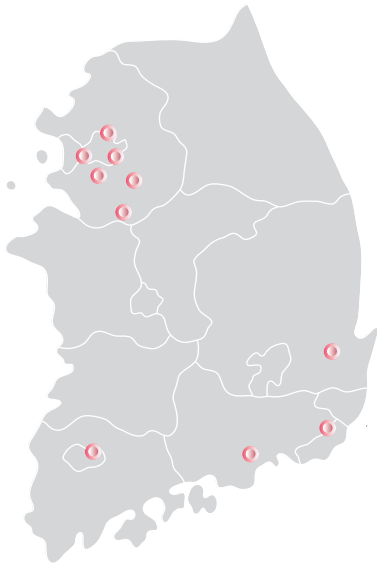
The SPG warranty plan covers the product in the event that it fails to operate properly due to defects in materials or workmanship. Coverage is effective on the date of the SPG product purchase and until the product either reaches 2000 hours worked on time, or 12 months from the date of purchase, whichever 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 고객의 부적합한 취급이나 사용에 의한 경우  
misuse, including unsuitable handling of the product
- ② 당사 이외에서 임의로 개조 또는 수리에 의한 경우  
repair done by anyone without the permission of SPG
- ③ 고장의 원인이 해당제품 이외의 사유에 의한 경우  
damages not resulting from quality of product itself
- ④ 기타 천재지변 등으로 당사의 책임이라 할수없는 경우  
accident, lighting, and other natural causes that does not come under SPG control

여기서 보증은 해당제품에 대한 보증을 의미합니다. 해당제품의 고장에 의해 유발되는 다른손실(기계의 유실에 의한 기획의 손실과 조립공수, 조립해체 및 취부에 대한 비용)등에 대해서는 당사의 부담범위 이외로 합니다.

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.

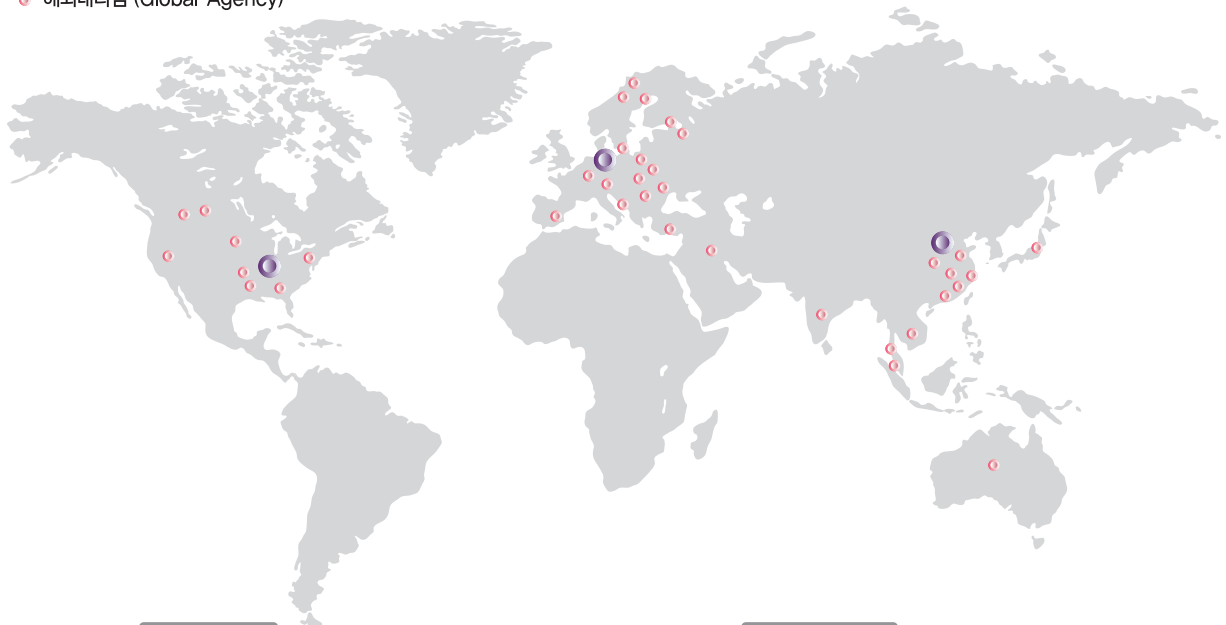
## ■ 국내대리점 / Domestic



- 국내 대리점 안내
  - 각 지역 별 대리점은 당사의 인터넷 홈페이지 ([www.spg.co.kr](http://www.spg.co.kr))에서 확인 하실 수 있습니다.
- Domestic Distributors
  - For regional distributors information, please visit our website at [www.spg.co.kr](http://www.spg.co.kr).

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