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## STRAIN WAVE GEAR

Committed to building a world-class electromechanical brand



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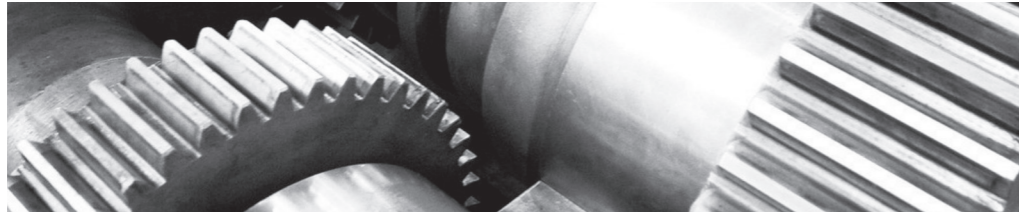
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## Company Profile



WANSHSIN was founded in 2009 in Dongguan, Guangdong, and moved its headquarters to Changsha, Hunan in 2014.

WANSHSIN is a leading professional gearbox and gearmotor manufacturer and intelligent automation complete solution provider, integrating R&D, production, sales and service, products include gear reducer, gear motor and controller (servo driver, inverter, etc), which are widely used in lithium battery industry, automated production lines, robots, automobile manufacturing, engineering machinery, warehousing and logistics, metallurgy chemicals, ceramics, animal husbandry and other industries. WANSHSIN has gradually become a reliable long-term partner of those leading enterprises of relevant industries.

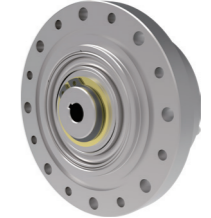


## Product Pictures

WCSG-I Series Reducer



WCSG-II Series Reducer



WSHG-I Series Reducer



WSHG-II Series Reducer



WSHG-III Series Reducer



WSHG-IV Series Reducer



WSHD- I Series Reducer



WCSD- I Series Reducer





## Transmission Principle

### Transmission Principle

The harmonic gear drive was invented by an American inventor, C. W. Musser in 1955. It is a new type of transmission, which uses the elastic deformation of flexible components for motion or power transmission. It breaks through the mode of using rigid components to realize mechanical drive, thus obtaining a series of special functions that other transmission cannot reach. Its name comes from the deformation process of the intermediate flexible component, which is a symmetrical harmonic.

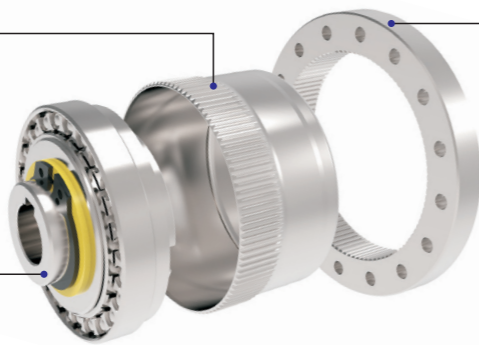
### Composition

#### Flex Spline

The Flex Spline is a thin-cup-shaped metallic elastic component, with external teeth around. The circumference of its mouth opening, when the wave generator is inserted into the flex spline's mouth opening, the flex spline becomes deformed into an elliptical shape. It is attached to the output shaft.

#### Wave Generator

Small ball bearings are built in the outer circumference of its elliptical cam, and the bearings' inner faces are fixed to the cam. The outer faces are subjected to elastic deformation as the bearings move. Normally, it is mounted to the input shaft.

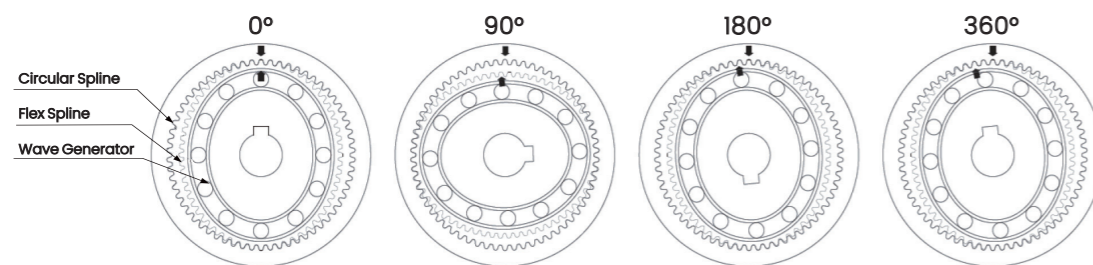


#### Circular Spline

The circular spline is a rigid ring-shaped component with teeth along its inner circumference. The number of teeth is usually two more than the accompanying flex spline has. It is usually secured to the machine's casing.

### Deceleration principle

As a reducer, harmonious waves are generally driven by wave generator with fixed rigid spline and output by flexible spline. When wave generator is installed inside the inner ring of flexible spline, flexible spline is forced to go through elastic transformation and becomes an elliptical shape; the flexible spline teeth of long shaft insert into the gear groove of rigid spline to realize complete engagement; the gear teeth of the two splines of the short shaft are not contacted at all but disengaged. Between engagement to disengagement, gear teeth are in engaging-out or engaging-in status. When the wave generator rotates continuously, the flexible spline is forced to deform constantly, and the gear teeth of the two gears change their working status repeatedly in the engaging-in, engagement, engaging-out and disengagement, generating the so-called staggered teeth motion and realizing the motion transmission between active wave generator and flexible spline.



1. The flex spline is forced into an elliptical shape by the wave generator causing the flex spline teeth to engage with the tooth profile of the circular spline along the major axis of the ellipse, with the teeth completely disengaged across the minor axis of the ellipse.

As the wave generator rotates clockwise with the circular spline fixed, the flex spline is subjected to elastic deformation and its tooth engagement position moves turning relative to the circular spline.

As the wave generator rotates 180 degrees clockwise, the flex spline moves counterclockwise by one tooth relative to the circular spline.

For every one full rotation clockwise (360 degrees) of the wave generator, the flex spline moves counterclockwise by two teeth relative to the circular spline because the flex spline has two fewer teeth than there are on the circular spline. In general, this movement is treated as output performing.

## Named Rules

①      ②      ③      ④      ⑤

WCSG - 14 - 50 I Standard & Customized

Model	Size	Ratio				Type	Standard & Customized
WCSG	14	50	80	100	-	I . Standard type II . Cross slider coupling type	Standard: Blank SP: Customized
	17	50	80	100	-		
	20	50	80	100	-		
	25	50	80	100	120		
	32	50	80	100	120		

Model	Size	Ratio				Type	Standard & Customized
WSHG	14	50	80	100	-	I . Standard type II . Cross slider coupling type III . Hollow shaft type IV . Shaft input type	Standard: Blank SP: Customized
	17	50	80	100	-		
	20	50	80	100	-		
	25	50	80	100	120		
	32	50	80	100	120		

Model	Size	Ratio		Type	Standard & Customized
WCSD	14	50	100	I . Standard type	Standard: Blank SP: Customized
	17	50	100		
	20	50	100		
	25	50	100		

Model	Size	Ratio		Type	Standard & Customized
WSHD	14	50	100	I . Standard type	Standard: Blank SP: Customized
	17	50	100		
	25	50	100		
	32	50	100		



**① Note**

The product code is determined by the flexspline's shape, length, and high torque; status

**② Code**

Size Code	14	17	20	25	32
Flexspline Pitch Circle Diameter	35.6	43.2	50.8	63.5	81.3

**③ Ratio****④ Connection Type**

Type I : Standard type, the input shaft is matched with the inner bore of the elliptical cam by a flat key.

Type II : Cross slider coupling type, the input shaft and cam are connected by cross slider coupling.

Type III : Hollow shaft type, the input part and the hollow elliptical cam are connected by screws.

Type IV : Shaft input type, The high-speed end of the reducer comes with its own input shaft.

**⑤ Special specifications**

Blank = Standard, SP = Customized.

**Starting Torque (N.cm)**

Model	14			17			20				25				32			
	50	80	100	50	80	100	50	80	100	120	50	80	100	120	50	80	100	120
WCSG- I/II	4.1	2.8	2.5	6.1	4	3.4	7.8	4.9	4.3	3.8	15	9.2	8	7.3	31	19	18	15
WSHG- I/II	4.1	2.8	2.5	6.1	4	3.4	7.8	4.9	4.3	3.8	15	9.2	8	7.3	31	19	18	15
WSHG-III	8.8	7.5	6.9	27	25	24	36	33	32	31	56	50	49	48	85	74	72	68
WSHG-IV	5.7	4.4	3.7	9.7	7.2	6.5	14	11	9.9	9.3	22	15	14	13	41	29	27	24
WCSD	4		2.5	6		3.4	8		4.6		14.5		8.2		29		18	
WSHD	5.6		4.3	17.1		15.3	22.5		19.8		35		31		54		45	

**Technical Service****Rated Technical Table**

Rated technical table terms:

(1) Rated Torque: Allowable continuous load torque when the input speed is 2000r / min

(2) Allowable peak torque at start and stop condition: When starting, there will be a load larger than the normal torque applied to the reducer according to the moment inertia of load, and current rating table value is the allowable value of peak torque.

(3) Maximum allowable load torque:

3.1 Load torque, when the input speed changes, the average value of the load torque needs to be calculated.

3.2 The value in the rating table indicates the allowable value of the average load torque.

3.3 When the average load torque exceeds the rated value, it may cause early deterioration of lubricant due to heat generation, and gear may be abnormal.

(4) Instant allowable maximum torque: In addition to the normal load torque and the load torque at the start and stop, there are also unpredictable shock torques from the outside. The values in the rating table indicate the current allowable values.

(5) Moment of inertia: Means the moment of inertia on the shaft of each model of wave generator.

(6) Direction of rotation and ratio:

In general use, the wave generator is worked as the active part, the situation described here is on the condition that the wave generator is the active part.

When circular spline is fixed: The actual reduction ratio is equal to the reduction ratio in the rated technical table. The rotating direction of the flex spline is opposite to the wave generator.

When flex spline is fixed: The actual reduction ratio is equal to the reduction ratio in the rated technical table plus one. The rotating direction of the Circular spline is the same as the wave generator.

E.g.: WSHG25-120

Model is 25, the ratio is 120 in the rated technical table.

The real ratio =120 when the Circular spline is fixed.

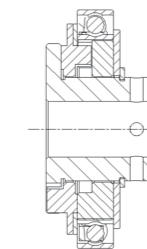
And the real ratio =120+1=121 when flex spline is fixed.

(7) Wanshin harmonic reducer wave generator has two structures: one is an automatic centering type with a centering structure, and the other one is an integrated type without a centering structure.

As show below:



Integrated Wave Generator



Integrated Wave Generator

The structure of the integrated wave generator is a cam equipped with a flexible bearing, which is simple and low weight. The structure of the Automatic Centering Wave Generator is a European-style coupling with a cam and a flexible bearing, automatically aligning when rotating, reducing the influence of small-scale non-concentricity. Starting Torque is generated instantaneously the reducer output starts to rotate by the transmission force of reducer input.

Model	Starting Torque(N.M)
11	≤0.8
14	≤1.25
17	≤2
20	≤3
25	≤5
32	≤8

**Efficiency**

For models 14-32, speeds ranging from 500-3000 rpm, reduction ratios between 50-120, the efficiency is 65%-85%.

**Noise**

The noise is less than 60dB under rated speed and load.

**Life Span**

Under normal operation of rated speed and load, when the life span of the flexible bearing is 8000h, the life span of the harmonic reducer is 10000h. During life span test, the temperature rise does not exceed 45 °C.

**High Accuracy**

Adopting the most advanced design technology, ANSYS software simulation technology, the design error is reduced to less than 1 micron. WANSHSIN developed its independent intellectual property rights of flexible bearings, cross bearings, flex spline, circular spline. The machine tool used is also the most precise in the industry.

**High Transmission Ratio**

Designed according to international standards, the transmission ratio of the one-stage harmonic reducer can reach  $i = 50 \sim 160$ . And the structure is simple, with three coaxial basic components to achieve a high reduction ratio.

**Large Load Capacity**

The surface contact and large number of the arc-shaped flex spline tooth and circular spline tooth make the harmonic reducer load capacity higher than other transmission forms. Furthermore, application of cross bearings makes the load capacity greatly improved.

**Compact design and Low Weight**

Adopting integrated design and high-performance materials, harmonic reducer size and weight can be greatly reduced, compared with ordinary gear devices.

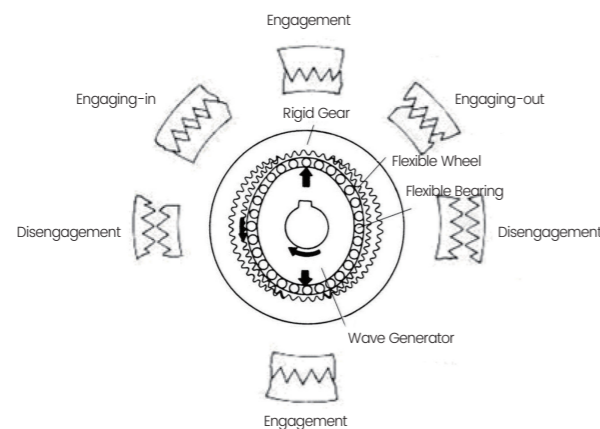
**High Efficiency, Long Serving Life**

Due to the use of high-strength, high-performance material, as well as the use of advanced surface heat treatment technology and surface coating technology, the surface wear resistance of key components has increased by more than three times, resulting in a greatly increased life span.

**Stable Transmission, Shock-Free, Low-Noise**

The key parts have high precision, small deformation, stable and smooth transmission, and high-performance due to the use of advanced 3D simulation design technology and high-precision processing technology. High-performance lubricants are also used, making it free of impact and low noise.

**Operating principle of harmonic reducer**

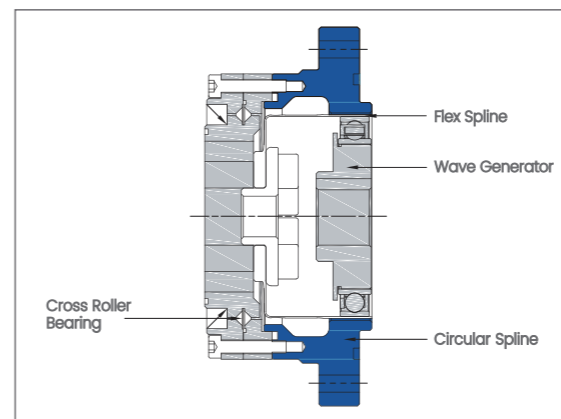


**WCSG-I Series Reducer**



**WCSG-I series reducer**

WCSG-I series flex Spline is a cup-shaped standard structure. The input shaft is connected with the inner hole of the wave generator through the cross-slider coupling. Generally, the circular spline end is fixed and the flex spline is the output end.



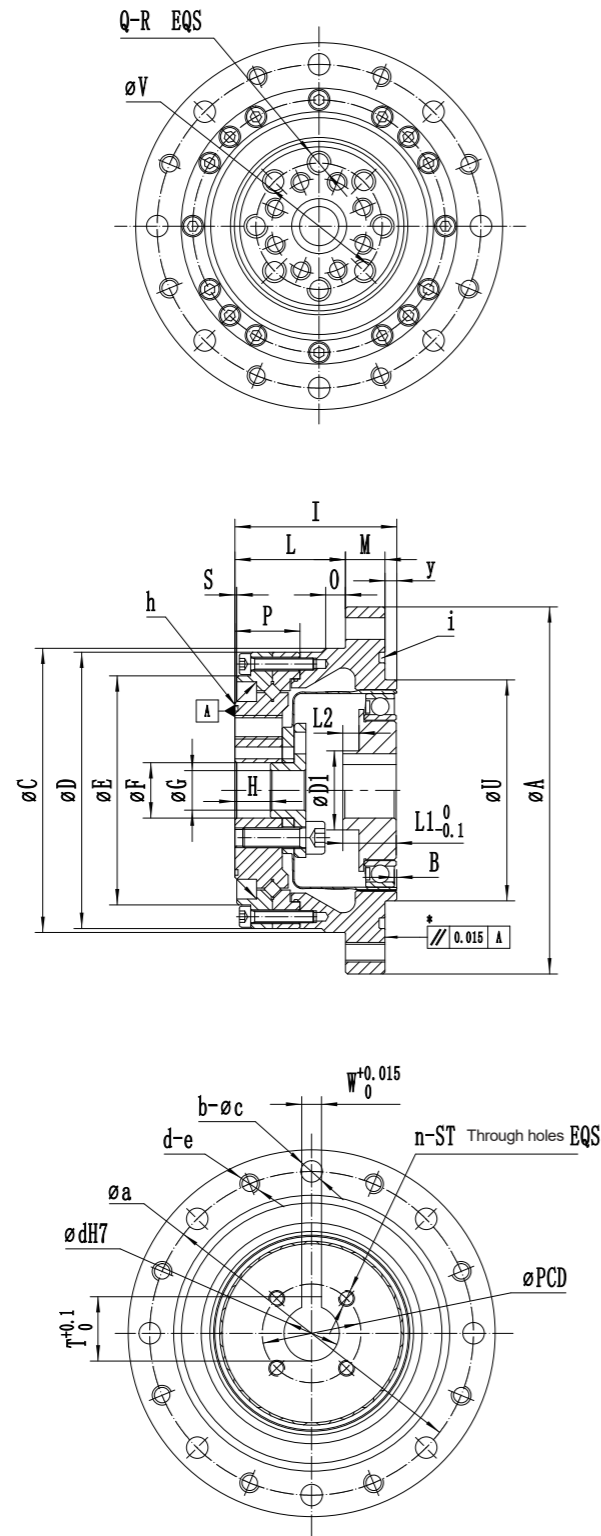
**WCSG-I Series Features**

1. WCSG series: high torque
2. Cup-shaped standard structure
3. Compact and simple design
4. No backlash, input- output coaxial
5. High positioning and rotation accuracy

**WCSG-I Series Performance Parameter**

Model	Ratio	Rated torque at input speed 2000r/min N·m	Allowable maximum starting & stopping Torque N·m	Allowable maximum torque at average load N·m	Instantaneous allowable maximum torque N·m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000

### WCSG-I Series Dimensional Drawing

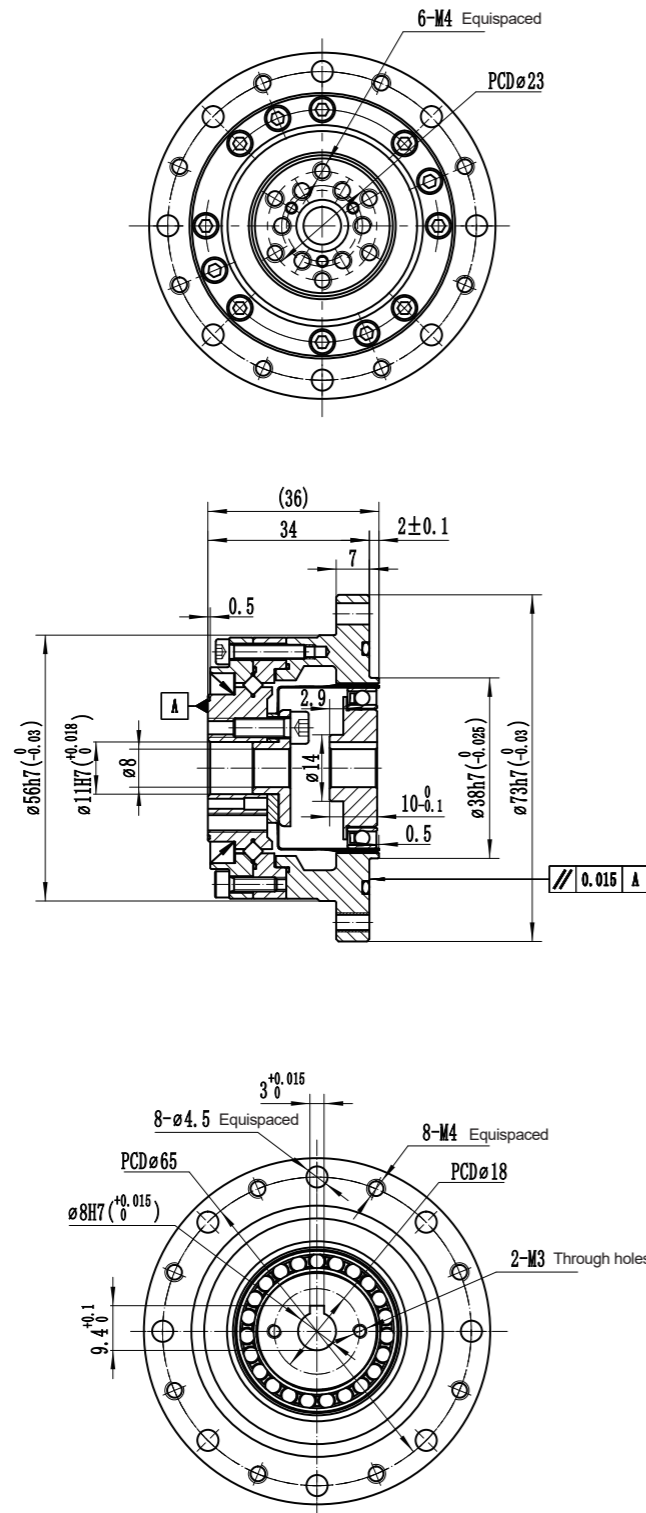


### WCSG-I Series Dimension

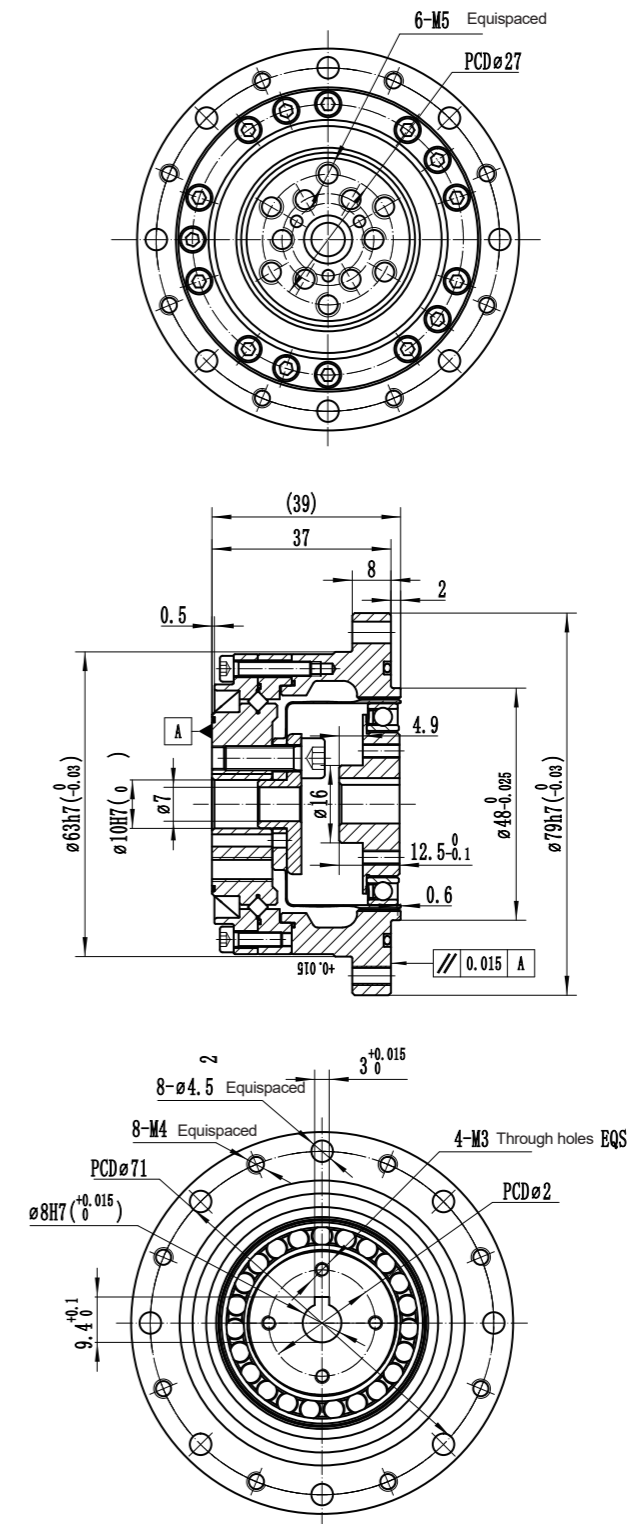
Model	14	17	20	25	32
$\Phi A h6$	73	79	93	107	138
L1	10	12.5	13.5	14.5	16
$\phi C h7$	56	63	72	86	113
$\Phi D$	55	62	70	85	112
$\Phi E$	31	38	45	58	78
$\Phi F H7$	11	10	14	20	26
$\Phi G$	8	7	10	15	20
H	9.4	9.5	9	12	15.2
I	36	39	41	49	60
B	0.5±0.2	0.6±0.2	0.6±0.2	0.7±0.2	0.9±0.2
$\Phi D1$	14	16	20	22	30
L	27	29	28	36	45
M	7	8	10	10	12
Y	2	2	3	3	3
O	3.5	3.5	4.5	4.5	4.5
P	16.5	16.5	16.5	18.5	22.5
S	0.5	0.5	0.5	0.5	1
$\Phi dh7$	8	8	14	14	19
$\phi U H7$	38	48	56	67	90
$\Phi v$	23	27	32	42	55
Q	6	6	8	8	8
R	M4×8	M5×10	M6×9	M8×12	M10×15
T	9.4	9.4	16.3	16.3	21.8
W(+0.015,0)	3	3	5	5	6
$\phi a$	65	71	82	96	125
b	8	8	8	10	12
c	4.5	4.5	5.5	5.5	6.6
d	8	8	8	10	12
e	M4	M4	M5	M5	M6
h	27.5x0.53	33x0.8	40x1	52x1	68x2
i	47x2	53x2	64x2	77x2	100x1.8
L2	2.9	4.9	4.1	5.4	4.1
n	2	4	4	4	4
ST	M3	M3	M4	M4	M5
PCD	18	22	25	32	36
Weight(Kg)	0.51	0.66	0.95	1.48	3.18



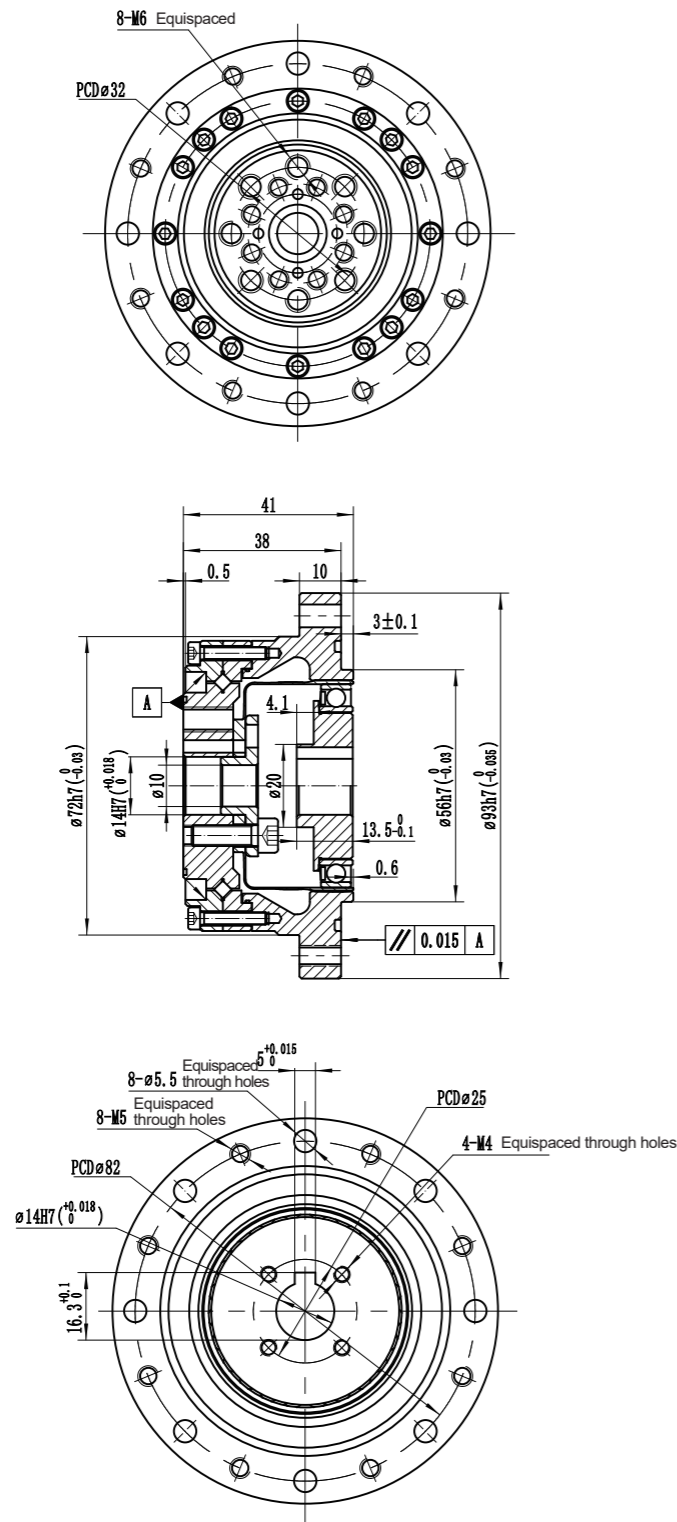
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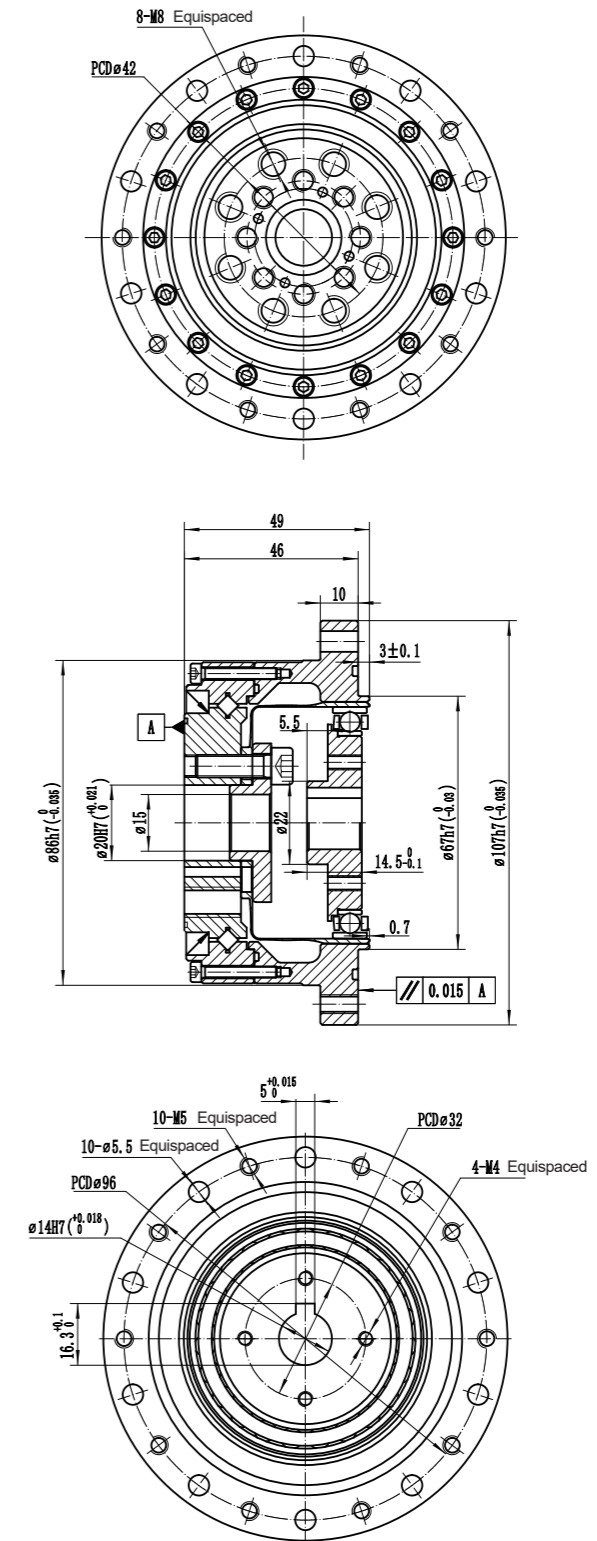
WCSG-17-XXX-I



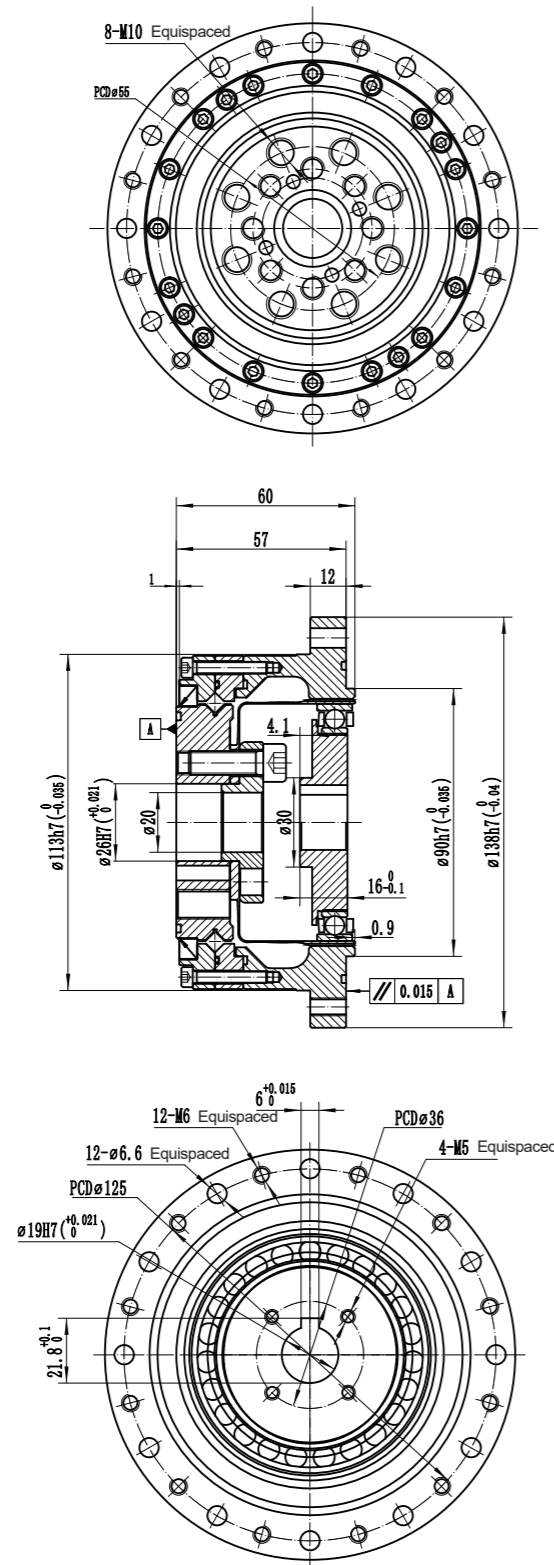
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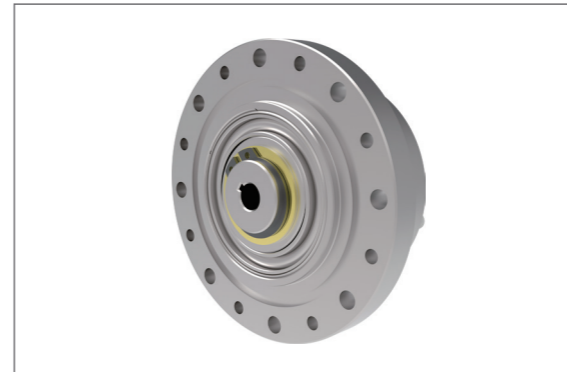
WCSG-25-XXX-I



WCSG-32-XXX-I

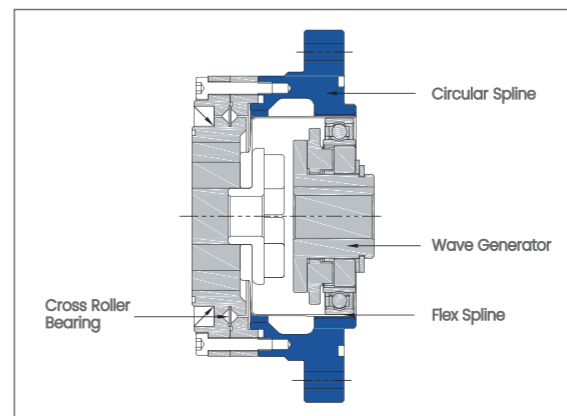


WCSG-II Series Reducer



WCSG-II series reducer

WCSG-II series flex Spline is a cup-shaped standard structure. The input shaft is connected with the inner hole of the wave generator through the cross-slider coupling. Generally, the circular spline end is fixed and the flex Spline is the output end.



WCSG-II Series Features

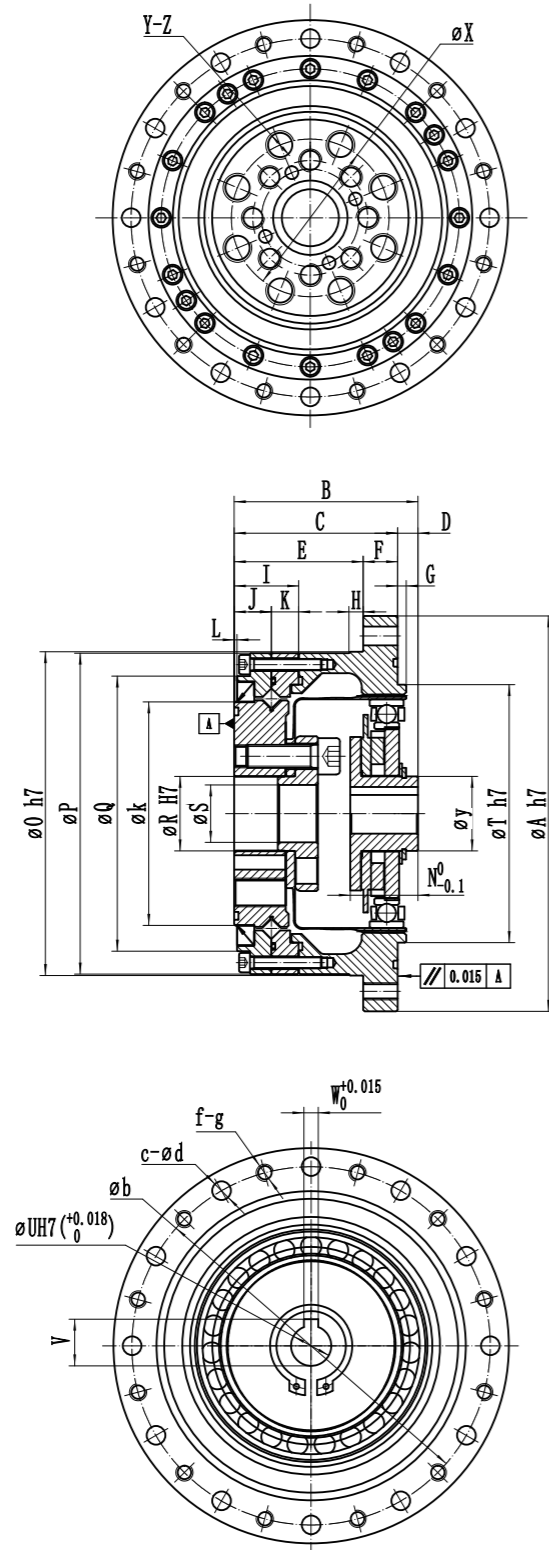
1. WCSG series: high torque
2. Cup-shaped standard structure
3. Compact and simple design
4. No backlash, input- output coaxial
5. High positioning and rotation accuracy

WCSG-II Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000



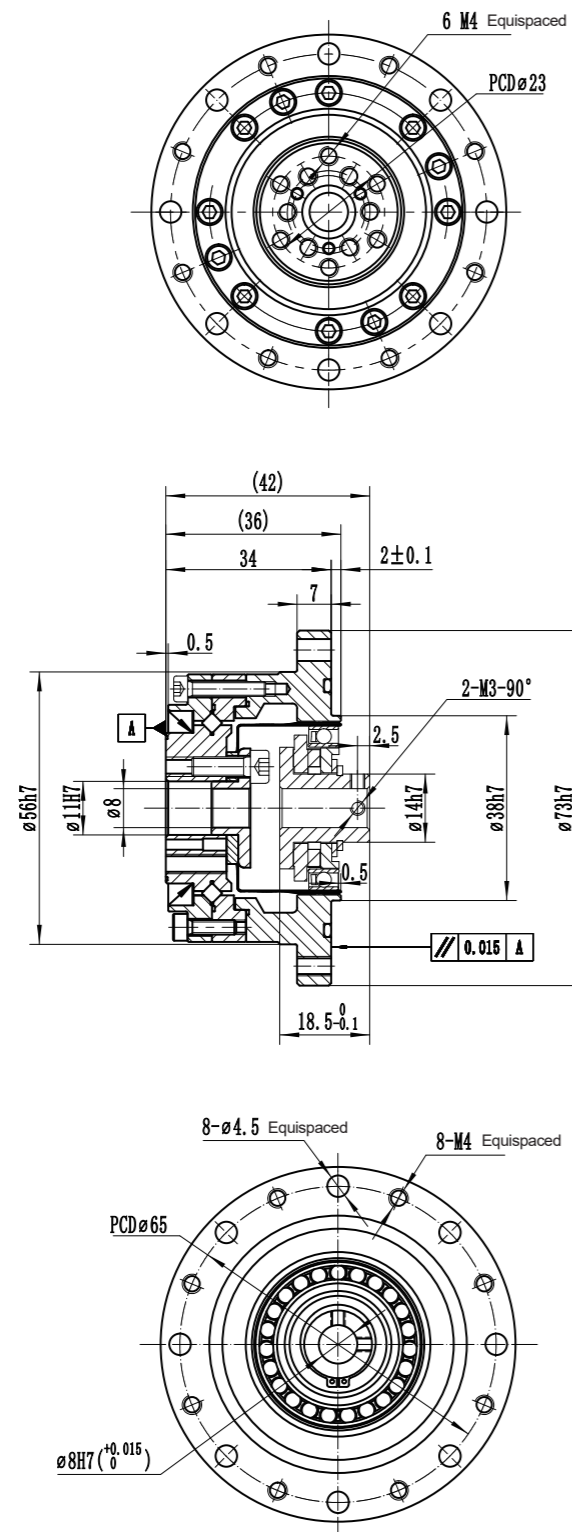
### WCSG-II Series Dimensional Drawing



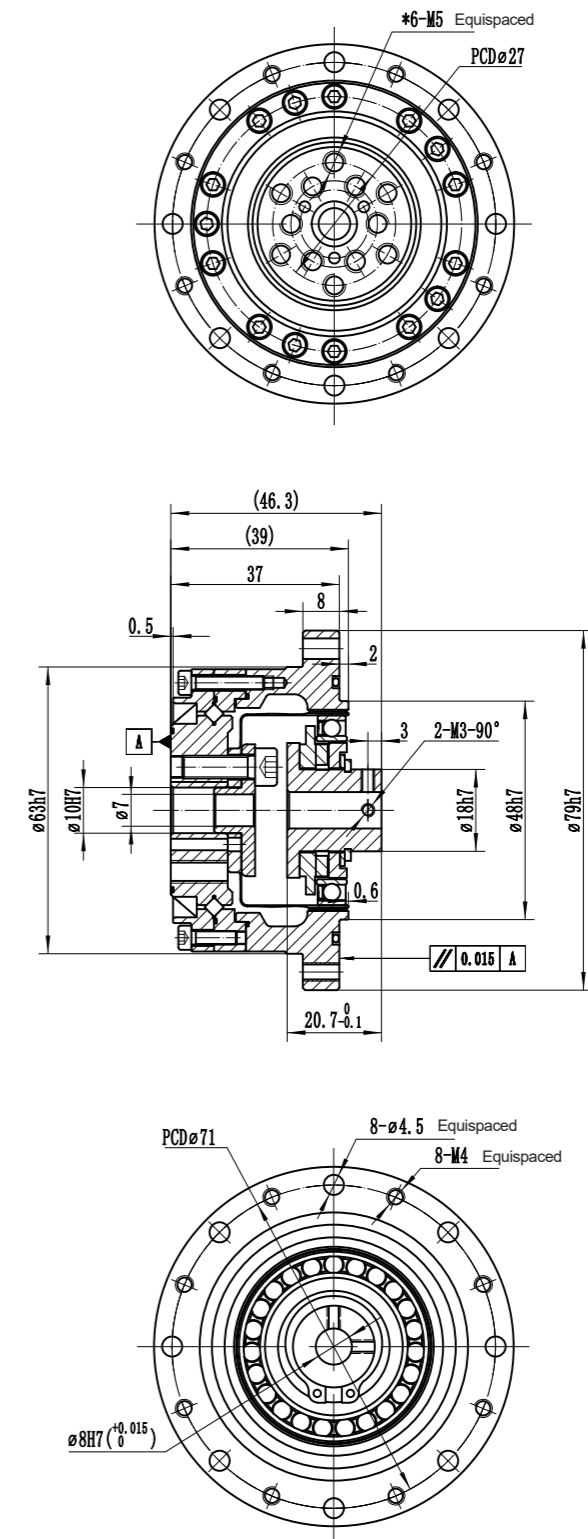
### WCSG-II Series Dimension

Symbol	Model	14	17	20	25	32
φA		73	79	93	107	138
B		42	46.3	46.8	53.5	64.1
C		34	37	38	46	57
D		8	9.3	8.8	7.5	7.1
E		27	29	28	36	45
F		7	8	10	10	12
G		2	2	3	3	3
H		3.5	3.5	5	4.5	4.5
I		16.5	16.5	16.5	18.5	22.5
J		4.5	4.5	4	4.5	5.5
K		12	12	12.5	14	17
L		0.5	0.5	0.5	0.5	1
M		9.4	9.5	9	12	15.2
N		18.5	20.7	21.5	21.6	23.6
φO h7		56	63	72	86	113
φP		55	62	70	85	112
φQ		42.5	49.5	58	73	96
ΦR H7		11	10	14	20	26
φS		8	7	10	15	20
φT h7		38	48	56	67	90
ΦU H7		8	8	14	14	14
V		-	-	16.3 <sup>+0.1</sup>	16.3 <sup>+0.1</sup>	16.3 <sup>+0.1</sup>
W (0.015,0)		-	-	5	5	5
X		23	27	32	42	55
Y		6	6	8	8	8
Z		M4*8	M5*10	M6*9	M8*12	M10*15
φb		65	71	82	96	125
c		8	8	8	10	12
φd		4.5	4.5	5.5	5.5	6.6
g		M4	M4	M5	M5	M6
f		8	8	8	10	12
i		47x2	53x2	64x2	77x2	100x1.8
φk		31	38	45	58	78
φy		14	18	21	26	26
Weight (Kg)		0.52	0.68	0.98	1.5	3.2

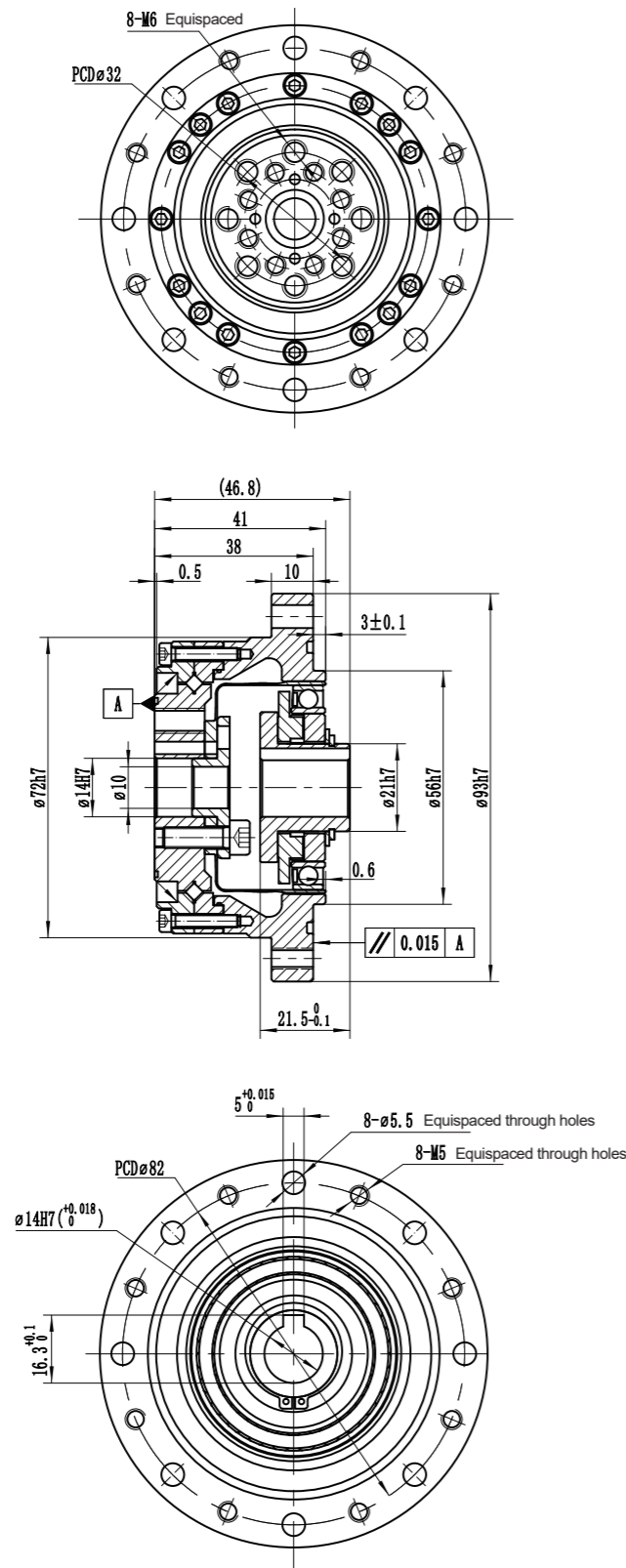
WCSG-14-XXX-II



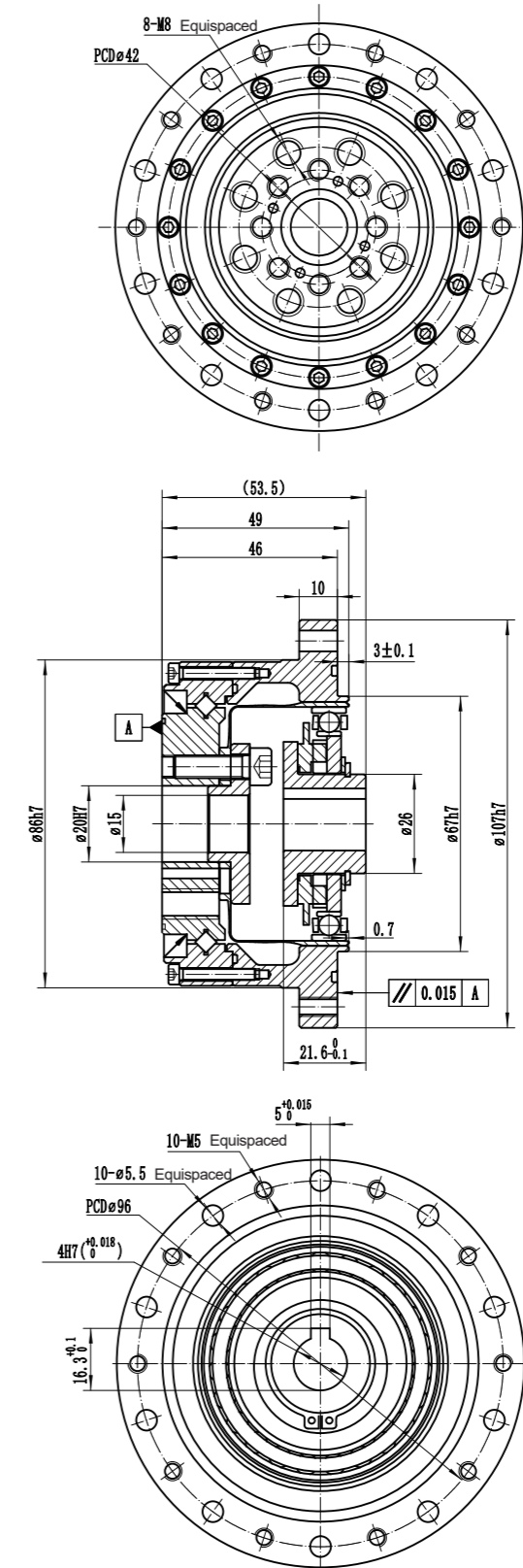
WCSG-17-XXX-II



WCSG-20-XXX-II

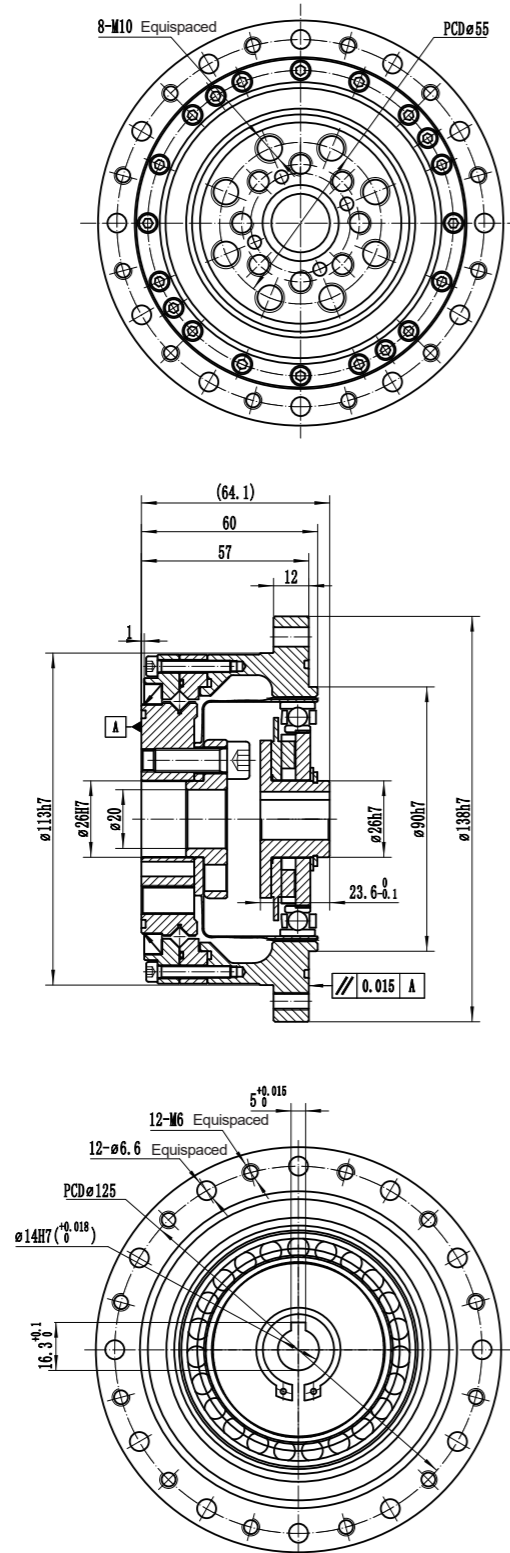


WCSG-25-XXX-II

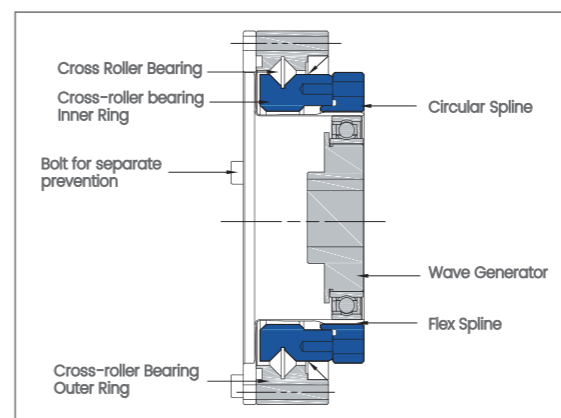




WCSG-32-XXX-II



WSHG-I Series Reducer



WSHG-I series reducer

WSHG-I series flex Spline has a hollow top hat type standard structure., whole reducer compact design. The input shaft is connected with the inner hole of the wave generator through the cross-slider coupling coil. It can be used by both connect way, one is fix the flex spline and circular spline output, another one is fix flex spline and circular spline output.

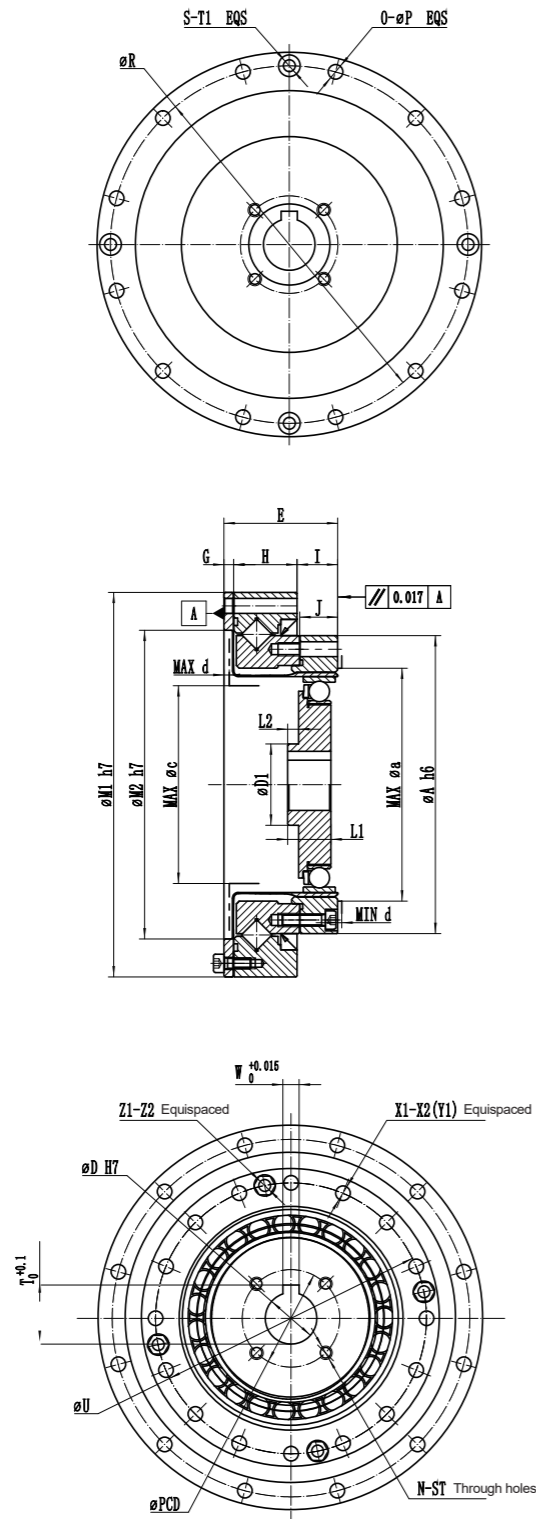
WSHG-I Series Features

- 1.Flat Shape, one-piece CAM structure
- 2.Compact, simple design
- 3.No backlash
- 4.Input-output coaxial
- 5.Excellent positioning and rotation accuracy

WSHG-I Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000

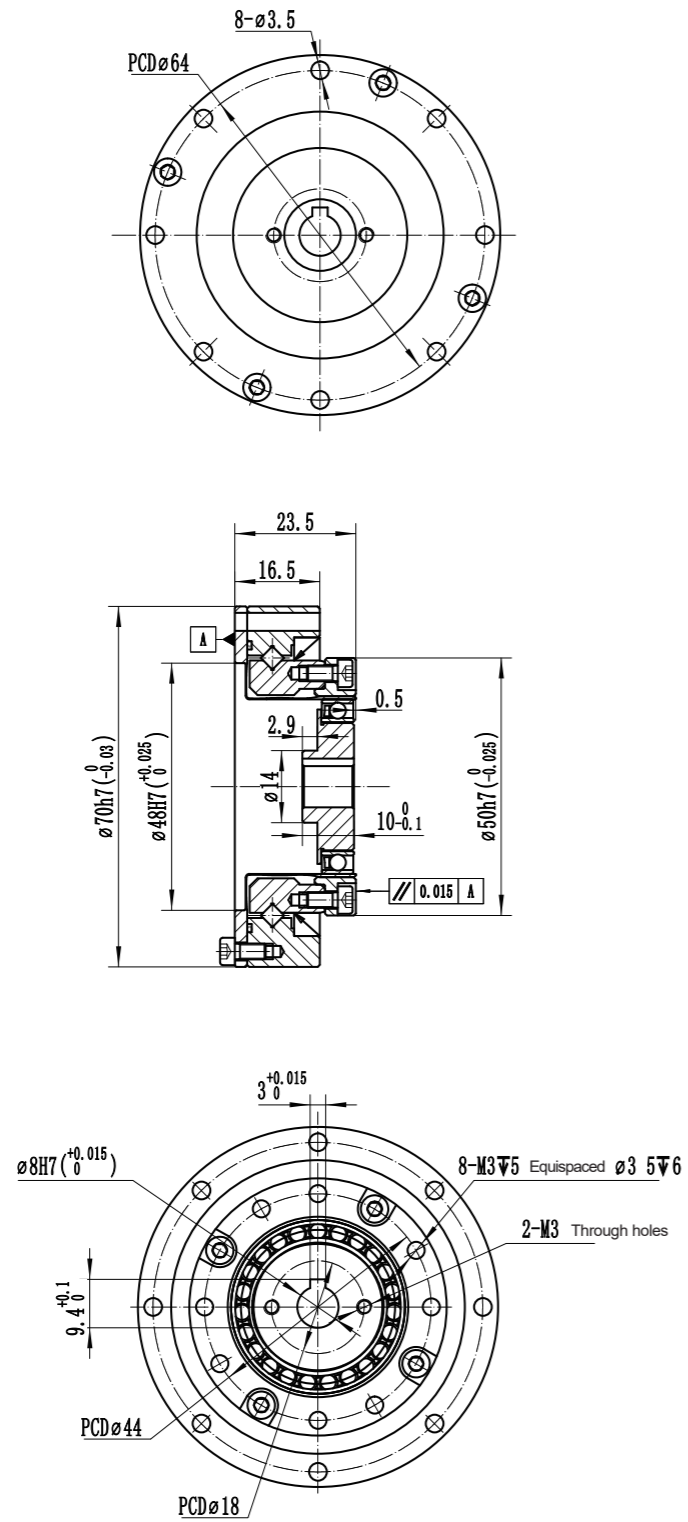
### WSHG-I Series Dimensional Drawing



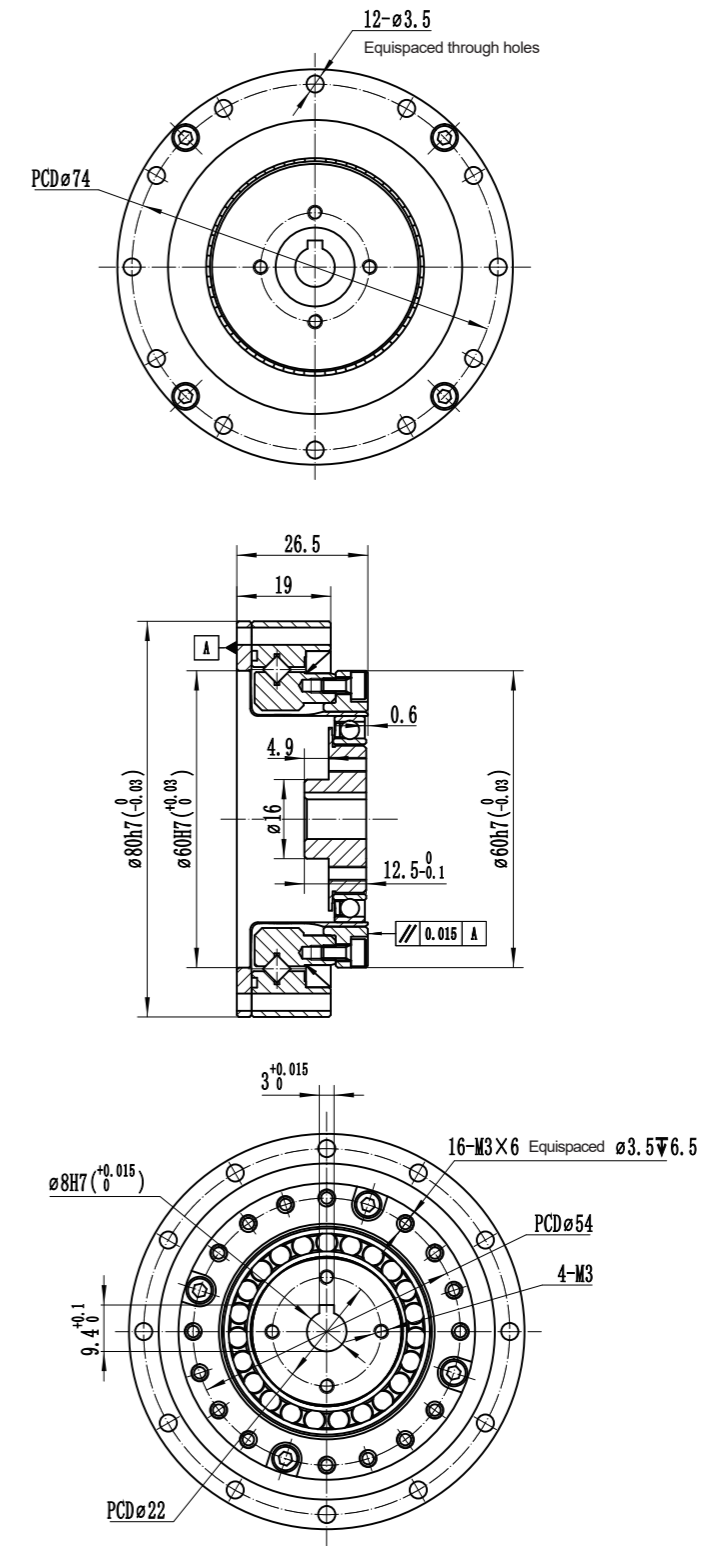
### WSHG-I Series Dimension

Model Symbol	14	17	20	25	32
ΦA h6	50	60	70	85	110
ΦD	8	8	14	14	19
L1	10	12.5	13.5	14.5	16
L2	2.9	4.9	4.1	5.5	4.1
D1	14	16	20	22	30
T	9.4	9.4	16.3	16.3	21.8
W	3	3	5	5	6
PCD	18	22	25	32	36
N	2	4	4	4	4
ST	M3	M3	M4	M4	M5
E	23.5	26.5	29	34	42
G	2.4	3	3	3.3	3.6
H	14.1	16	17.5	18.7	23.4
I	7	7.5	8.5	12	15
J	6	6.5	7.5	10	14
K	0.5±0.2	0.6±0.2	0.6±0.2	0.7±0.2	0.9±0.2
φM1 h7	70	80	90	110	142
φM2 h7	48	60	70	88	114
O	8	12	12	12	12
φP	3.5	3.5	3.5	4.5	5.5
φR	64	74	84	102	132
S	2	4	4	4	4
T1	M3x6 Screw	M3x6 Screw	M3x10 Screw	M3x6 Screw	M3x10 Screw
T2	22.5°	15°	15°	15°	15°
φU	44	54	62	77	100
X1	8	16	16	16	16
X2	M3x5	M3x6	M3x6	M4x7	M5x8
Y1	Φ 3.5x6	Φ 3.5x6.5	Φ 3.5x7.5	Φ 4.5x10	Φ 5.5x14
Z1	4	4	4	4	4
Z2	M3x6 Screw	M3x8 Screw	M3x8 Screw	M3x10 Screw	M3x16 Screw
φa	38	45	53	66	86
b	1	1	1.5	1.5	1.5
φc	31	38	45	56	73
d	1.7	2.1	2	2	2
Weight (Kg)	0.4	0.57	0.78	1.29	2.92

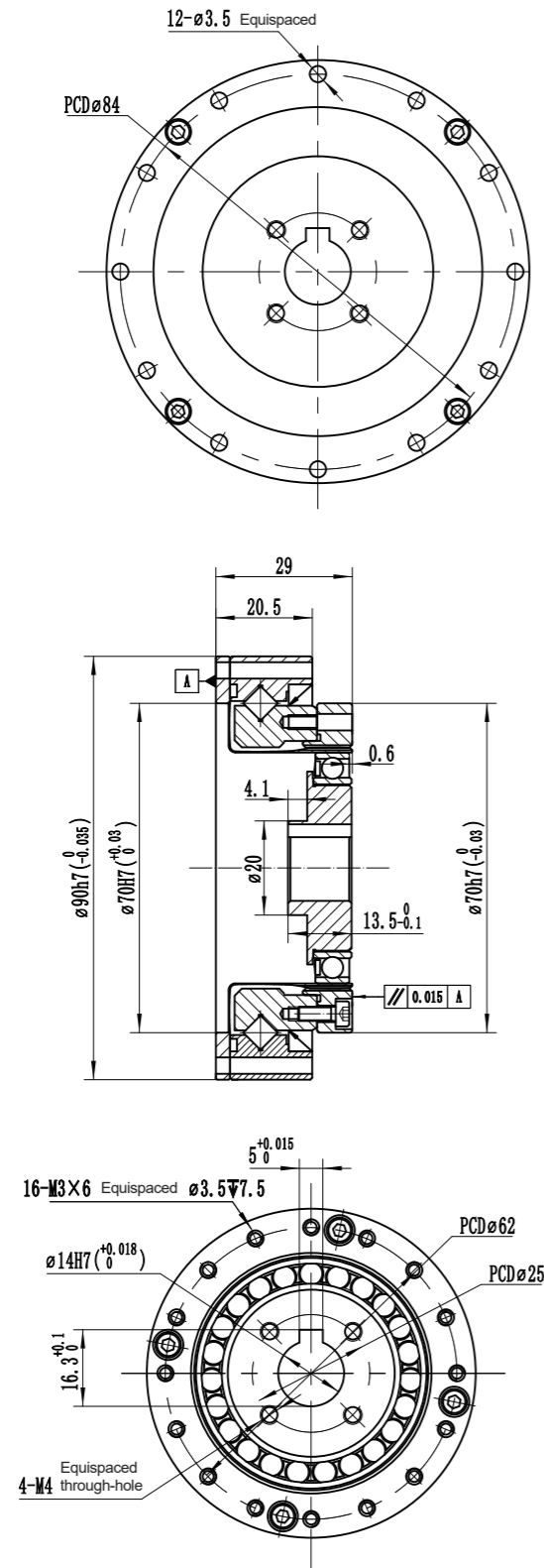
WSHG-14-XXX-I



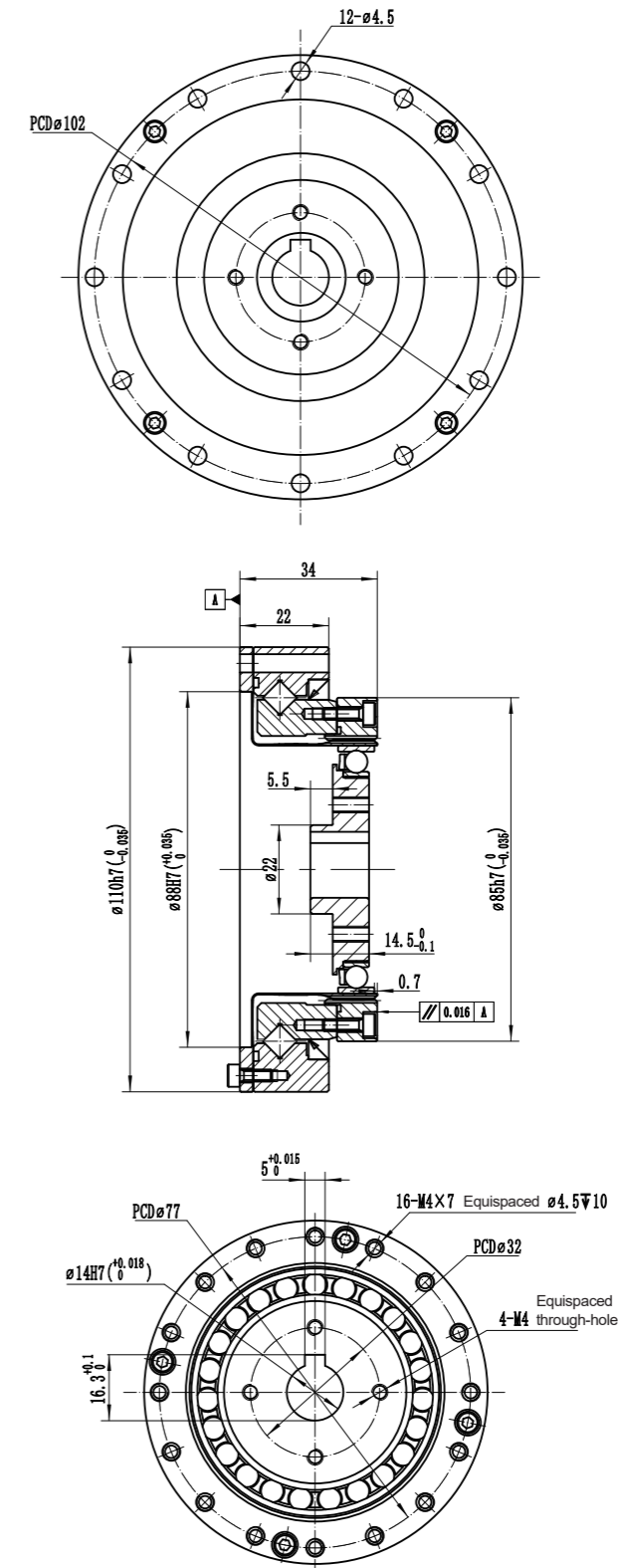
WSHG-17-XXX-I



WSHG-20-XXX-I

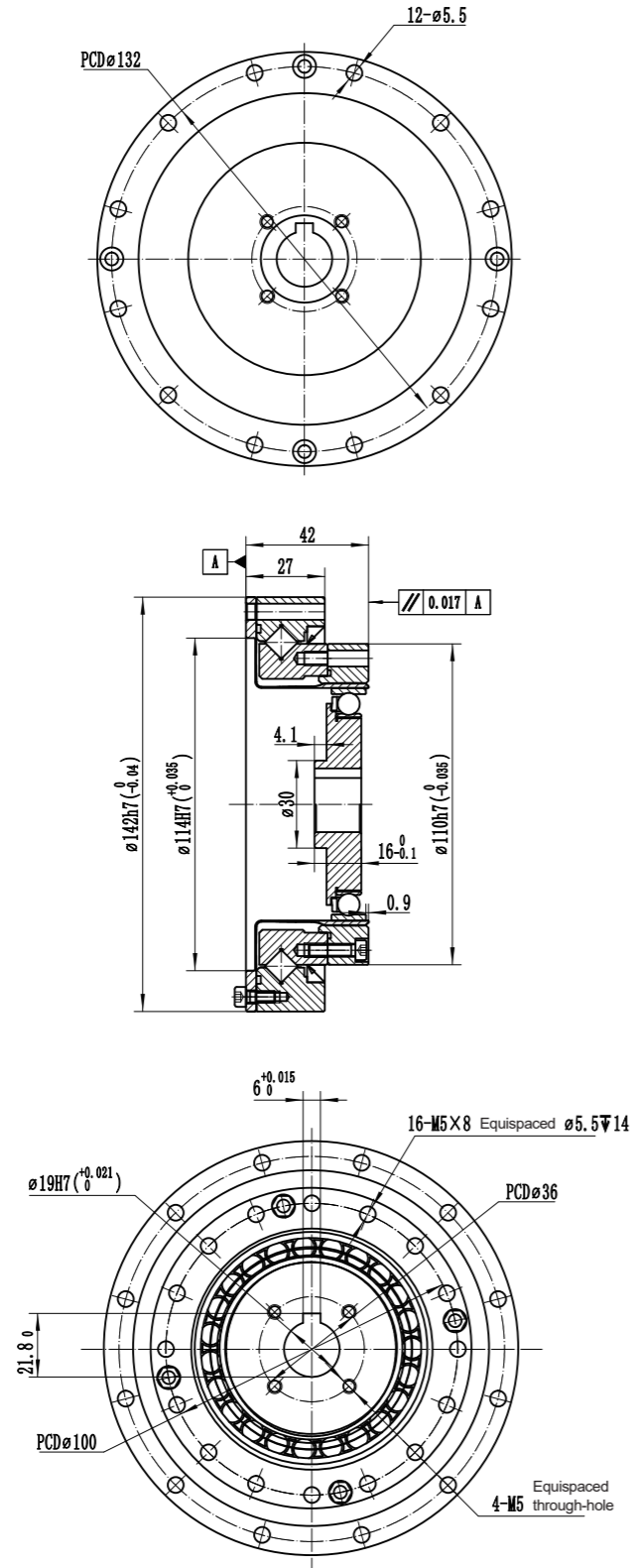


WSHG-25-XXX-I





WSHG-32-XXX-I

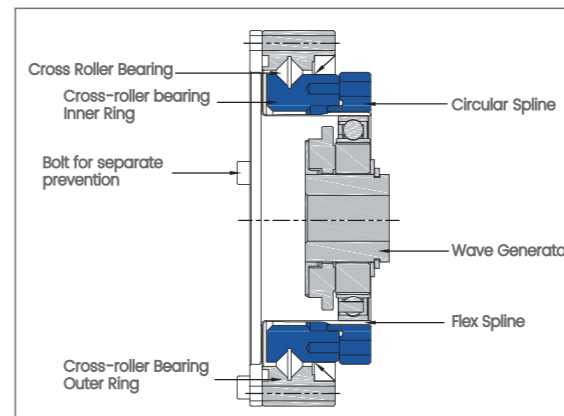


WSHG-II Series Reducer



WSHG-II series reducer

WSHG -II Series flex spline is hollow hat type structure, compact structure, input shaft is connected through the cross-sliding coupling and wave generator inner hole, can use by the connection way of fix the circular spline, flex spline output, or fix flex spline end, and circular spline output connection to use.



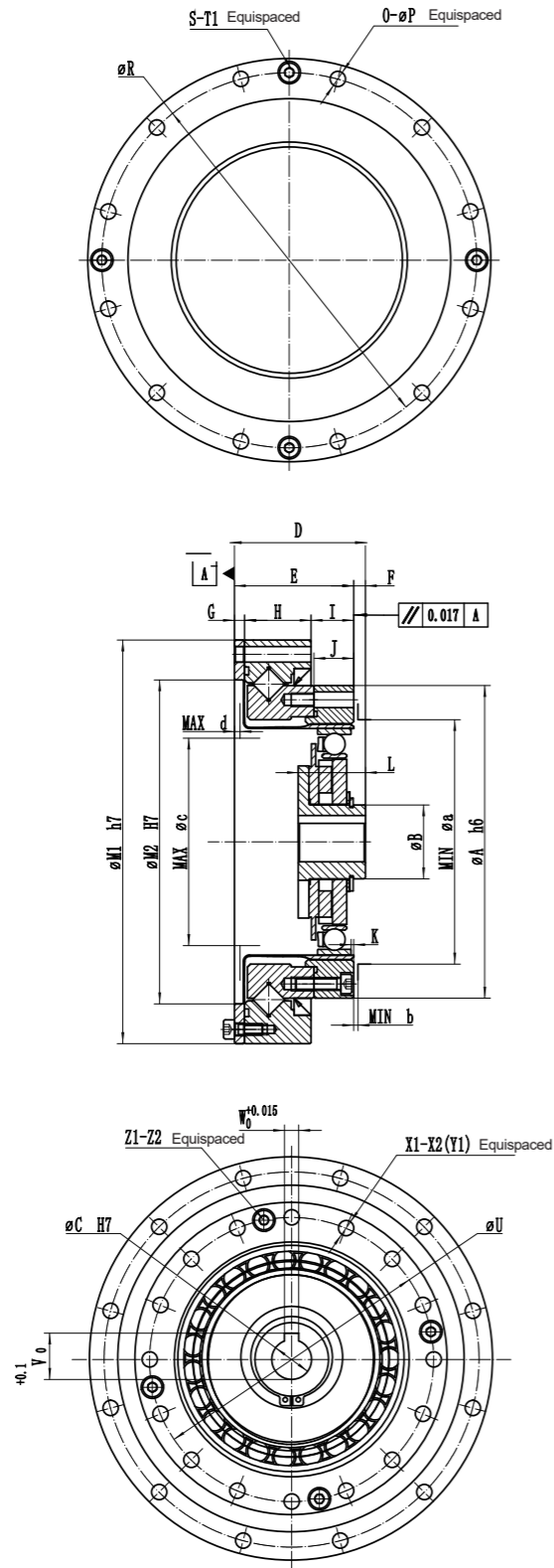
WSHG-II Series Features

- 1.Flat Shape, one-piece CAM structure
- 2.Compact, simple design
- 3.No backlash
- 4.Input-output coaxial
- 5.Excellent positioning and rotation accuracy

WSHG-II Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000

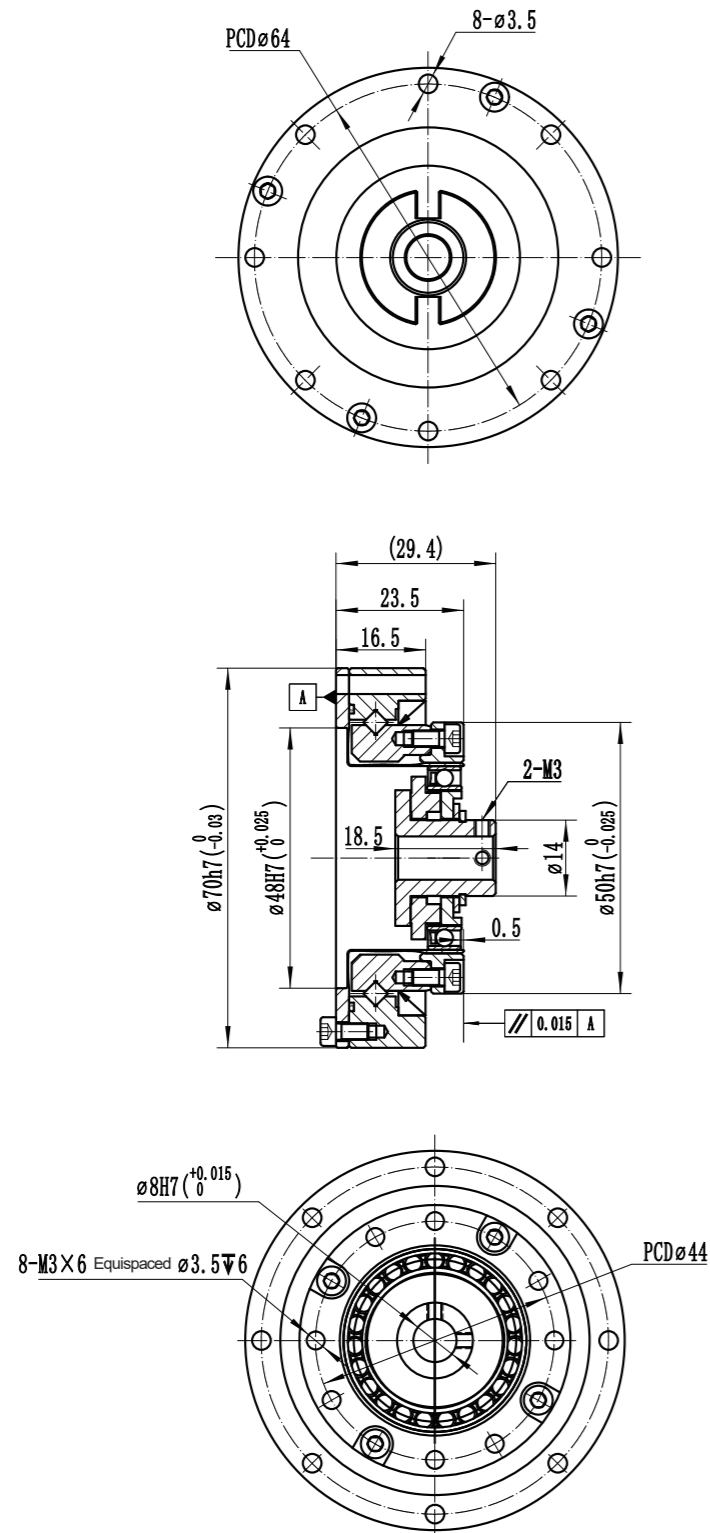
### WSHG-II Series Dimensional Drawing



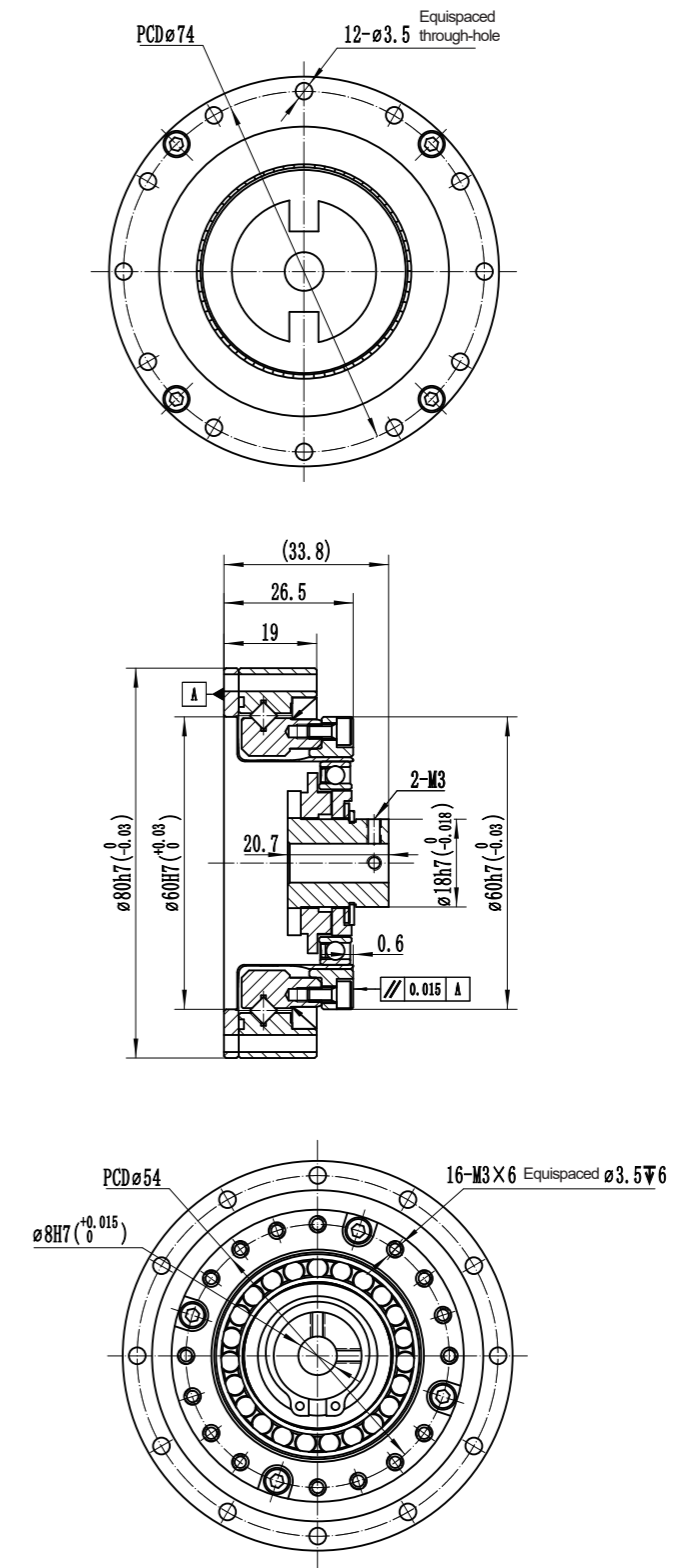
### WSHG-II Series Dimension

Model Symbol	14	17	20	25	32
ΦA h6	50	60	70	85	110
ΦB	14	18	21	26	26
ΦC H7	8	8	14	14	14
D	29.4	33.8	34.8	38.7	46.1
E	23.5	26.5	29	34	42
F	5.9	7.3	5.8	4.7	4.1
G	2.4	3	3	3.3	3.6
H	14.1	16	17.5	18.7	23.4
I	7	7.5	8.5	12	15
J	6	6.5	7.5	10	14
K	0.5	0.6	0.6	0.7	0.9
L	18.5 <sup>-0.1</sup>	20.7 <sup>-0.1</sup>	21.5 <sup>-0.1</sup>	21.6 <sup>-0.1</sup>	23.6 <sup>-0.1</sup>
ΦM1 h7	70	80	90	110	142
ΦM2 H7	48	60	70	88	114
O	8	12	12	12	12
φP	3.5	3.5	3.5	4.5	5.5
φR	64	74	84	102	132
S	4	4	4	4	4
T1	M3×6 Screw	M3×8 Screw	M3×10 Screw	M3×10 Screw	M3×10 Screw
T2	22.5°	15°	15°	15°	15°
φU	44	54	62	77	100
V	-	-	16.3	16.3	16.3
W JS9	-	-	5	5	5
X1	EQUISPACED 8 OF 12	EQUISPACED 16 OF 20	16	16	16
X2	M3×5	M3×6	M3×6	M4×7	M5×8
Y1	Φ3.5×6	Φ3.5×6.5	Φ3.5×7.5	Φ4.5×10	Φ5.5×14
Z1	4	4	4	4	4
Z2	M3×6 Screw	M3×6 Screw	M3×8 Screw	M3×10 Screw	M4×16 Screw
a	38	45	53	66	86
b	1	1	1.5	1.5	1.5
φc	31	38	45	56	73
d	1.7	2.1	2	2	2
Weight(Kg)	0.41	0.57	0.81	1.31	2.94

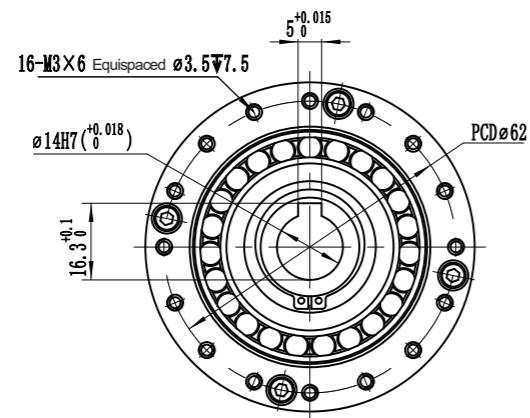
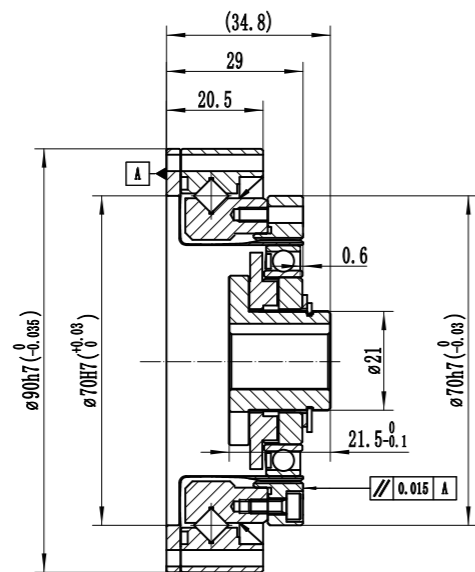
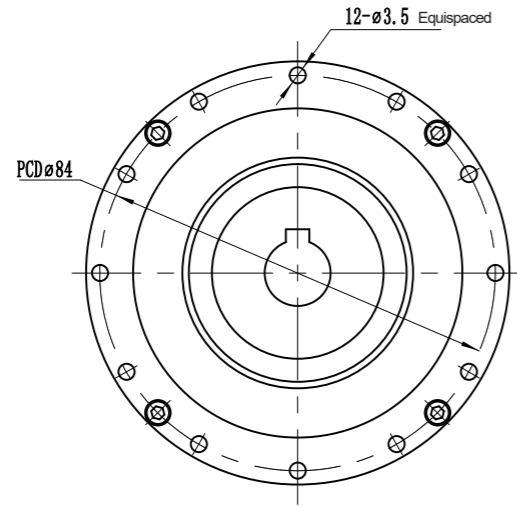
WSHG-14-XXX-II



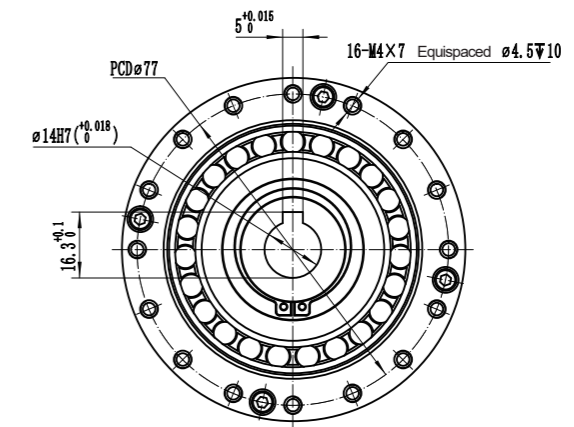
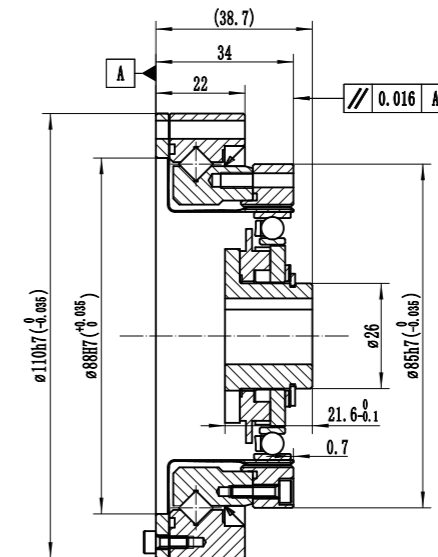
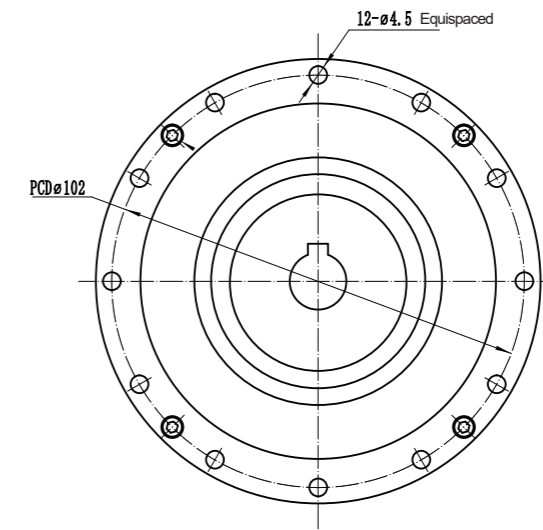
WSHG-17-XXX-II



WSHG-20-XXX-II

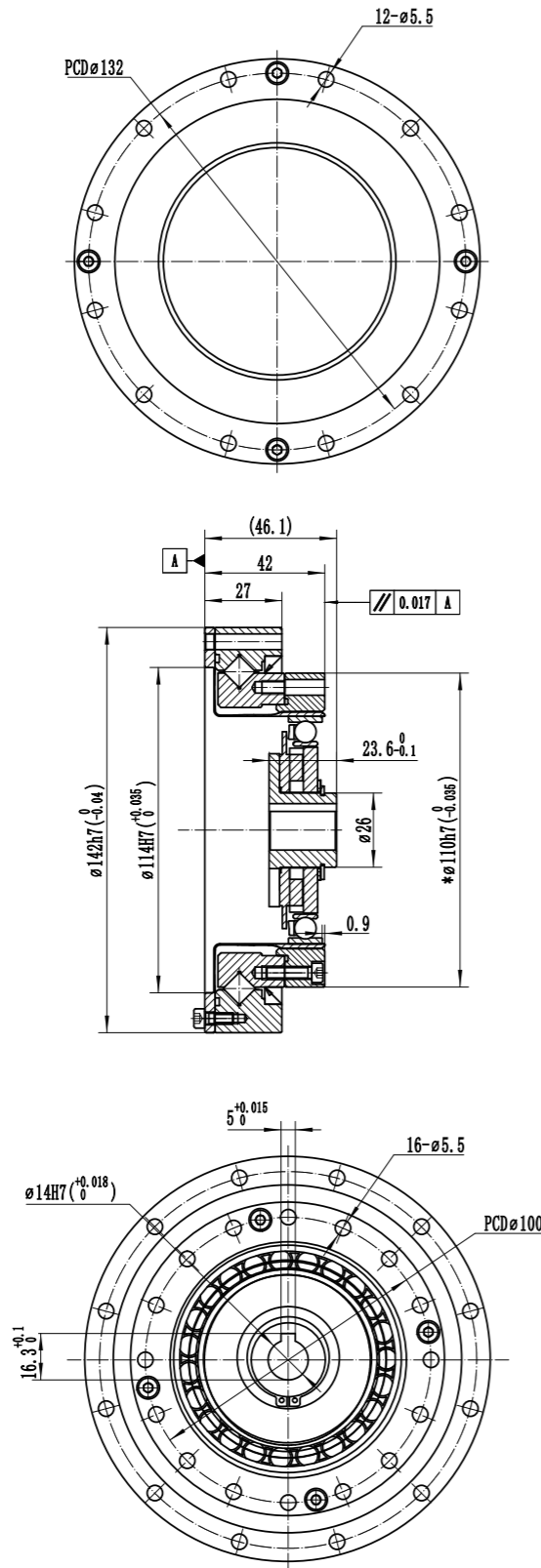


WSHG-25-XXX-II





WSHG-32-XXX-II

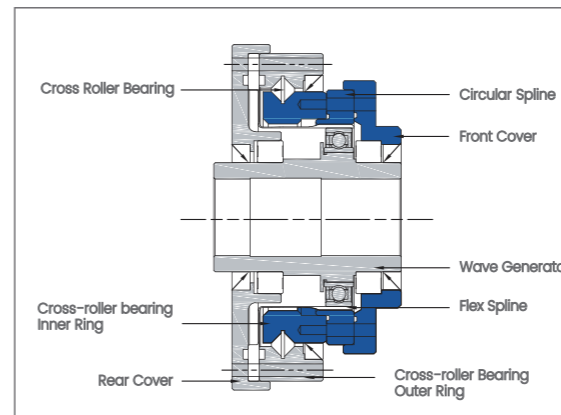


WSHG-III Series Reducer



WSHG-III series reducer

WSHG-III Series flex spline is a hollow hat-shaped standard structure. The wave generator is a hollow elliptical shaft with a large diameter. The reducer is designed with a roller cross bearing inside, fully sealed, easy to install, and suitable for applications of threading through the reducer center.



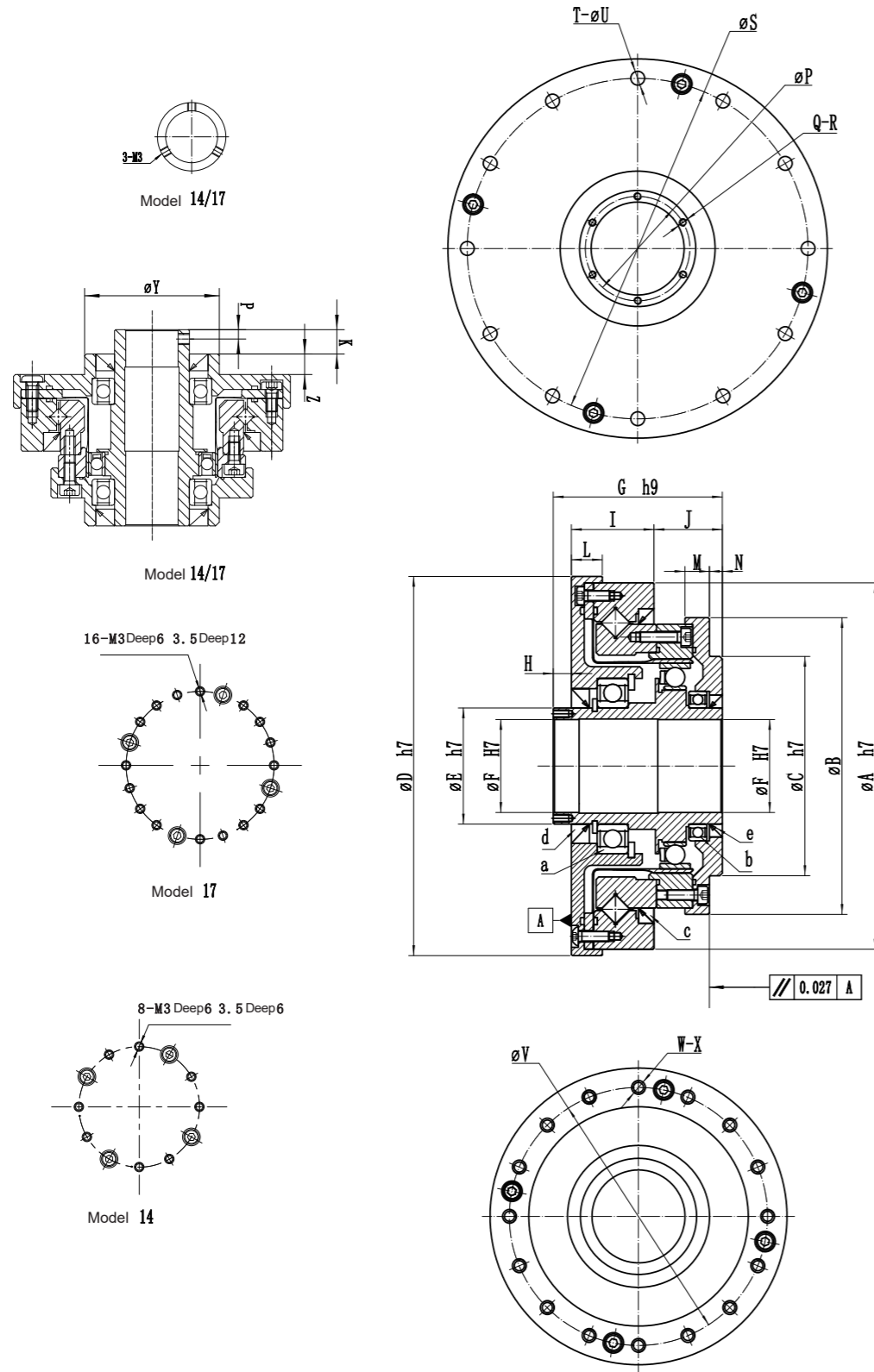
WSHG-III Series Features

1. Large diameter, hollow hole
2. Compact, simple design
3. No backlash
4. Input-output coaxial
5. Excellent positioning and rotation accuracy

WSHG-III Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000

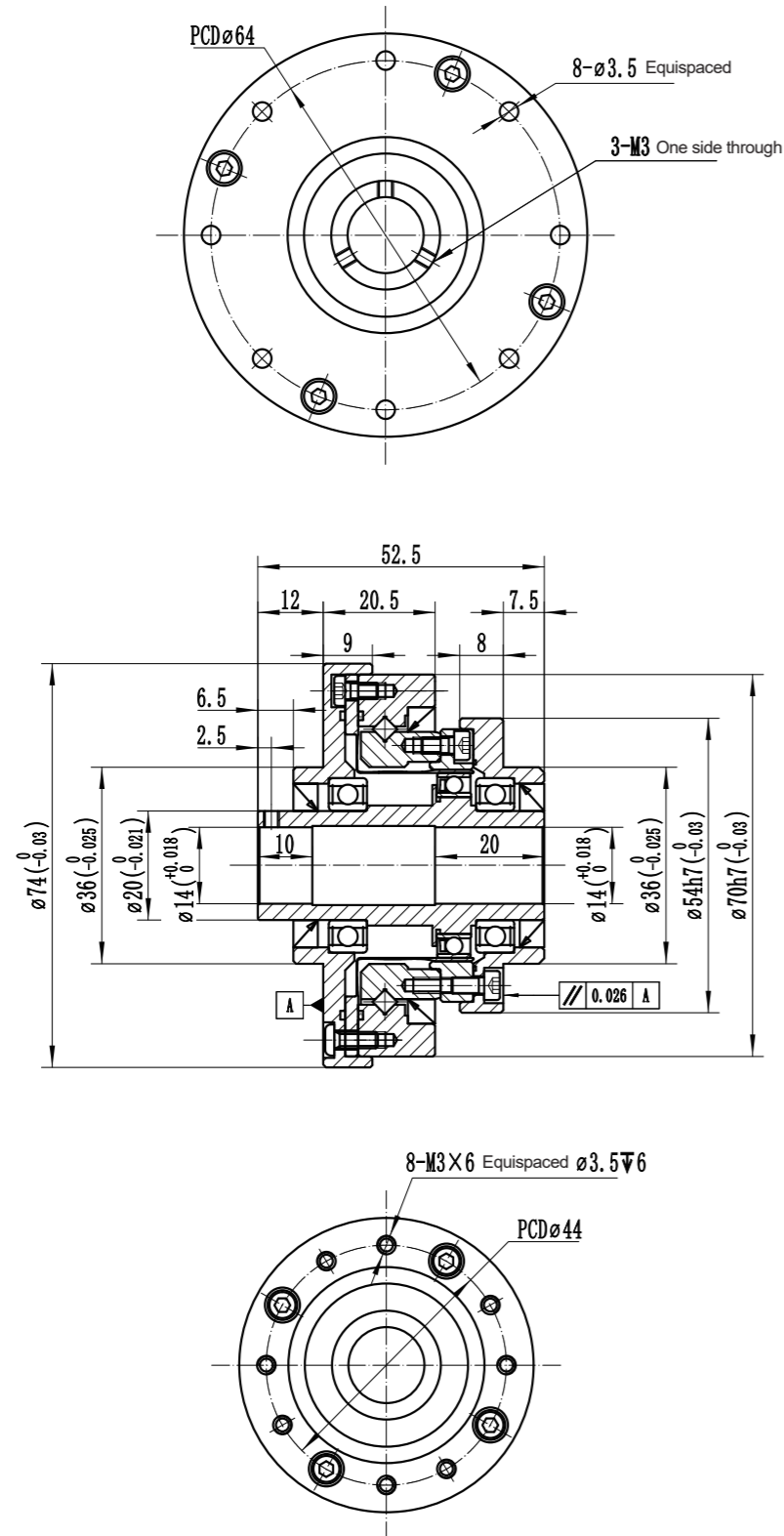
WSHG-III Series Dimensional Drawing



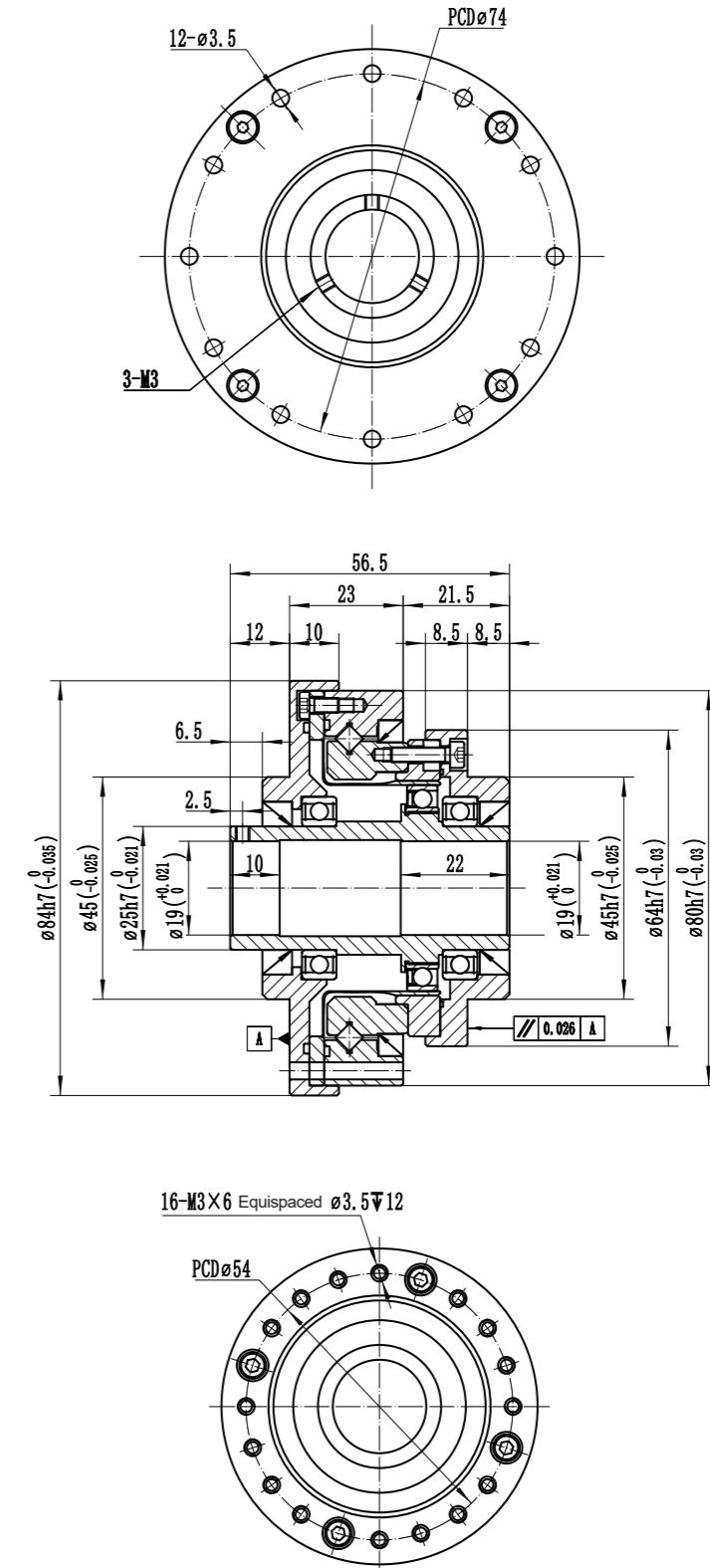
WSHG-III Series Dimension

Model Symbol	14	17	20	25	32
$\Phi A h7$	70	80	90	110	142
$\Phi B$	54	64	75	90	115
$\Phi C h7$	36	45	50	60	85
$\Phi D h7$	74	84	95	115	147
$\Phi E h7$	20	25	30	38	45
$\Phi F H7$	14	19	21	29	36
G	52.5	56.5	51.5	55.5	65.5
H	12	12	5	6	7
I	20.5	23	25	26	32
J	20	21.5	21.5	23.5	26.5
K	6.5	6.5	-	-	-
L	9	10	10.5	10.5	12
M	8	8.5	9	8.5	9.5
N	7.5	8.5	7	6	5
$\phi P (P)$	(2.50)	(2.50)	25.5	33.5	40.5
Q	-	-	6	6	6
R	-	-	M3×6 Screw	M3×6 Screw	M3×6 Screw
$\phi S$	64	74	84	102	132
T	8	12	12	12	12
$\Phi U$	3.5	3.5	3.5	4.5	5.5
$\Phi V$	44	54	62	77	100
W	8	16	16	16	16
X	M3×6 $\Phi 3.5 \times 6$	M3×6 $\Phi 3.5 \times 12$	M3×6 $\Phi 3.5 \times 13.5$	M4×7 $\Phi 4.5 \times 15.5$	M5×8 $\Phi 5.5 \times 20.5$
$\Phi Y$	36	45	-	-	-
Z	5.5	5.5	-	-	-
a	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6909ZZ
b	6804ZZ	6805ZZ	6806ZZ	6808ZZ	6809ZZ
c	D49585	D59685	D69785	D84945	D1101226
d	S20304.5	S25356	S30405	S38475	S45607
e	S20304.5	S25356	S30405	S38475	S45555
Weight(Kg)	0.71	1	1.38	2.1	4.5

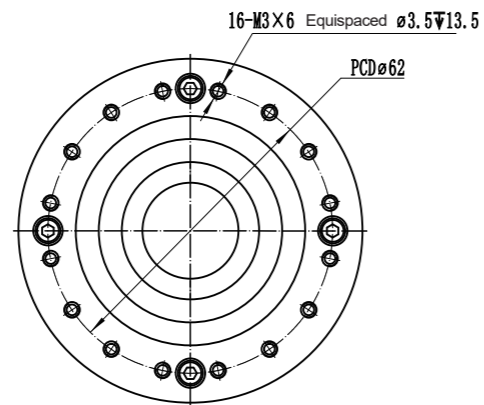
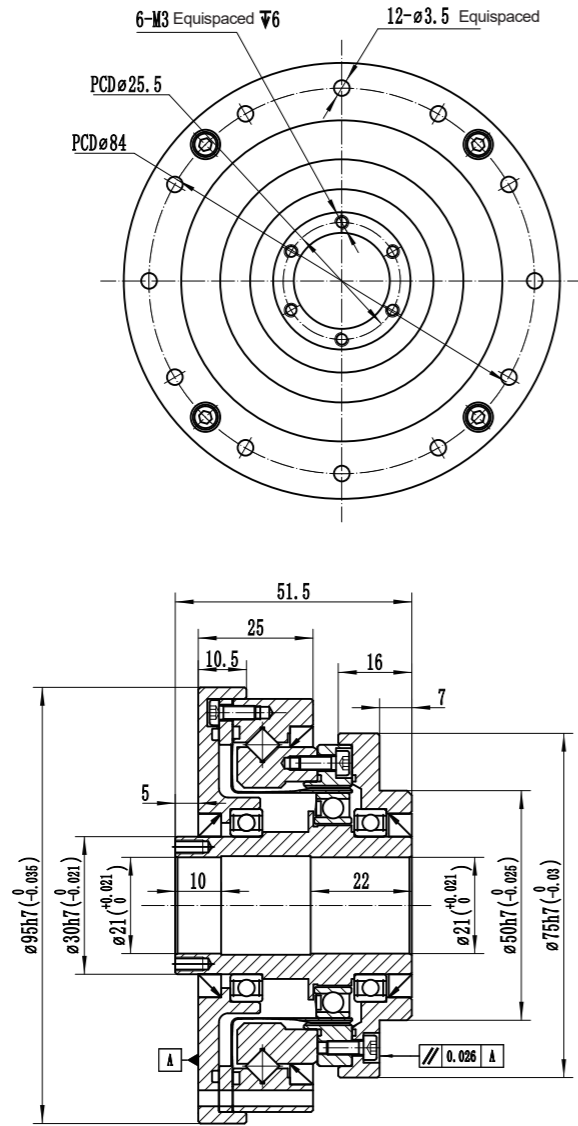
WSHG-14-XXX-III



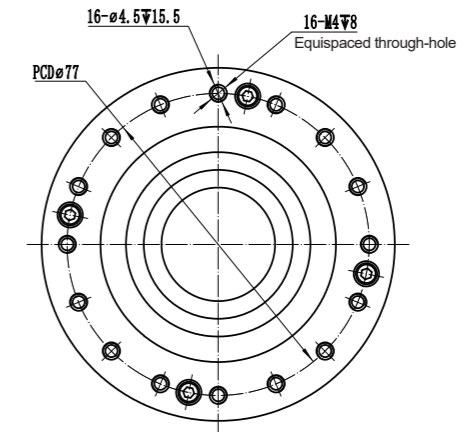
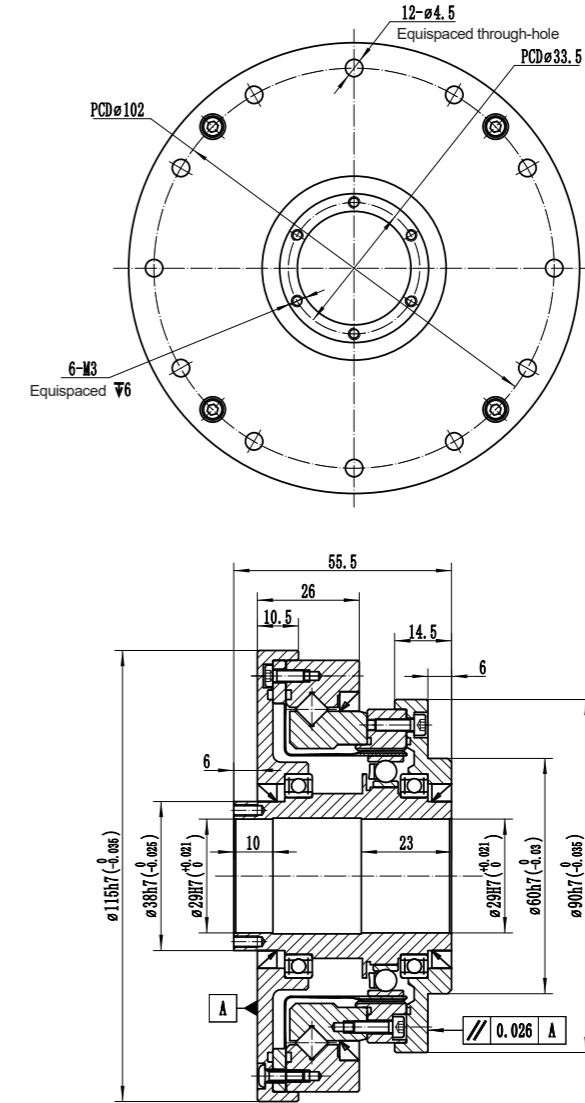
WSHG-17-XXX-III



WSHG-20-XXX-III

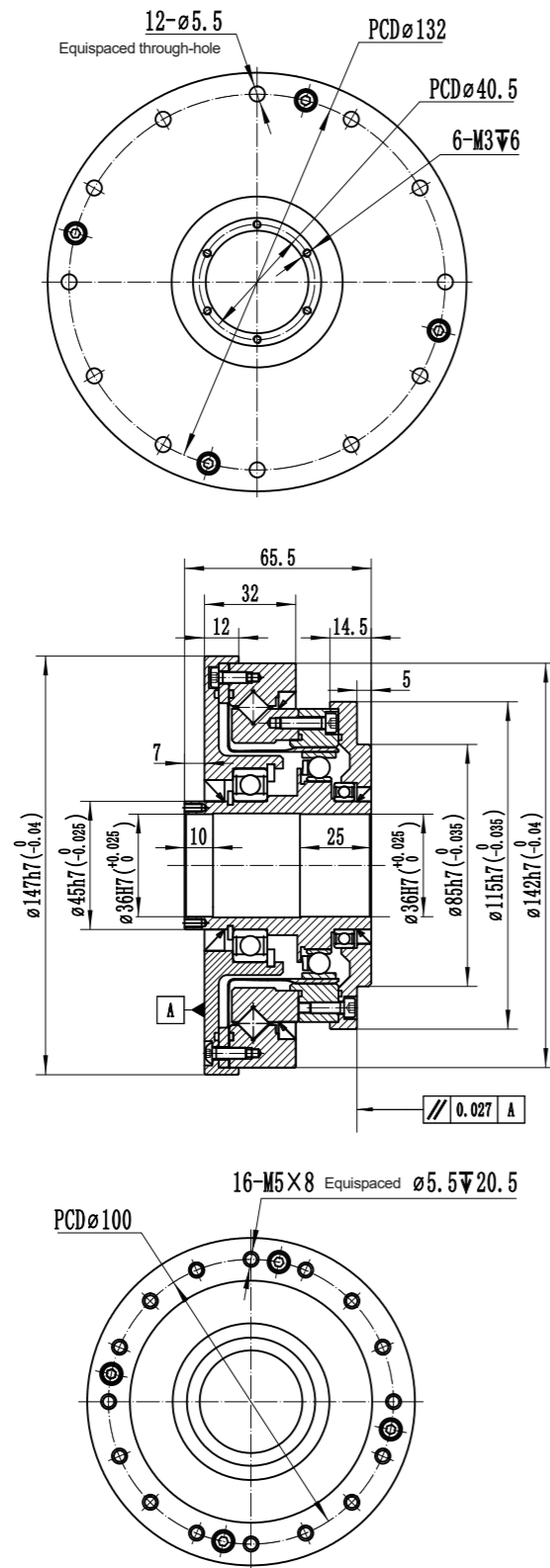


WSHG-25-XXX-III





WSHG-32-XXX-III

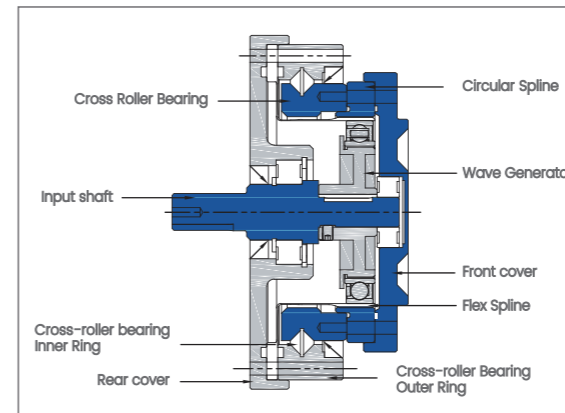


WSHG-IV Series Reducer



WSHG-IV series reducer

Hollow combined type (shaft input)  
 With a hollow top-hat standard structure flexspline.  
 The wave generator has its own input shaft.  
 There are roller cross bearings inside the reducer, with fully enclosed structure and easy to install, suitable for applications that require bevel gear or synchronous belt transmission at the input.



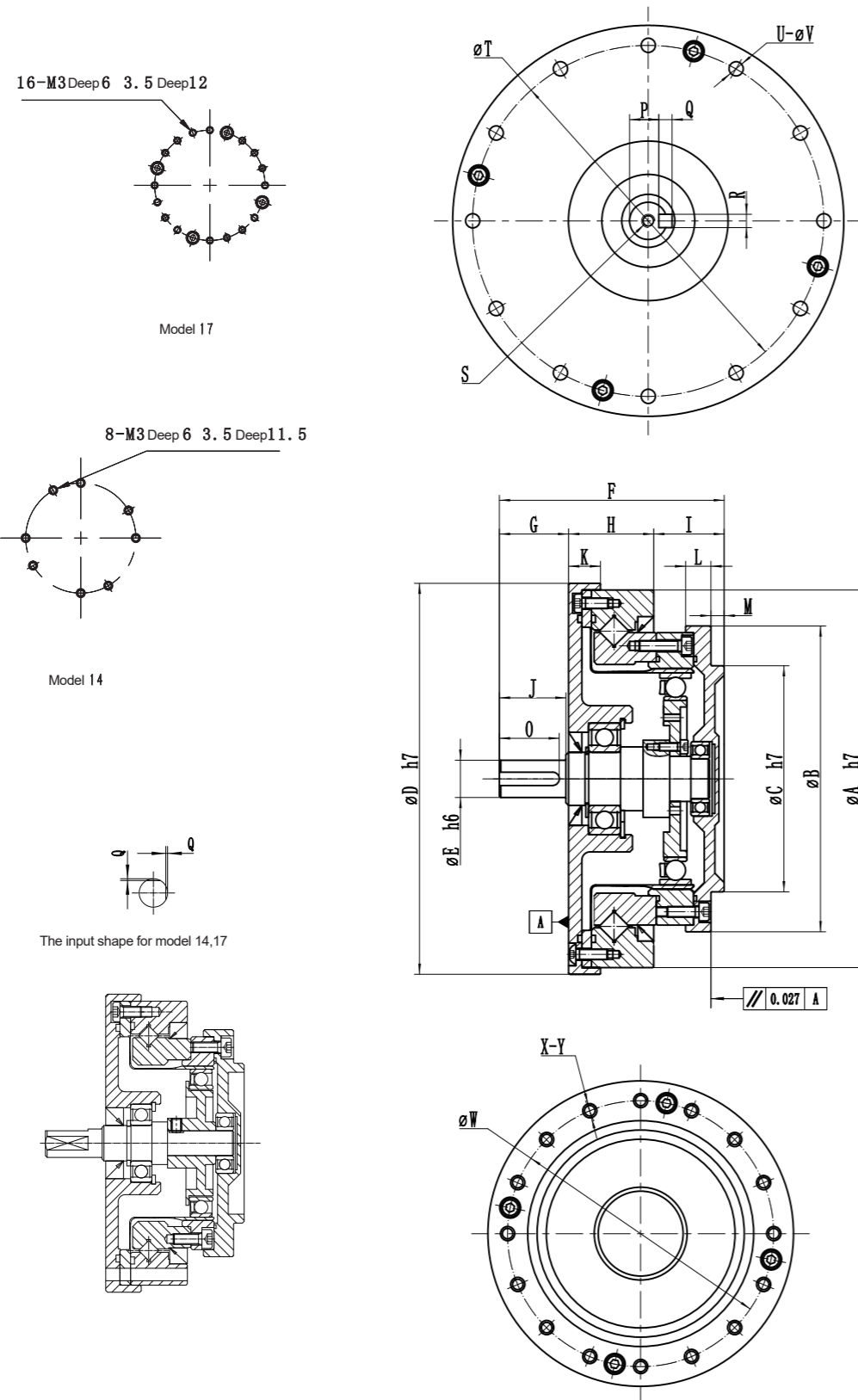
WSHG-IV Series Features

1. Applicable for multiple input
2. Compact, simple design
3. No backlash
4. Input-output coaxial
5. Excellent positioning and rotation accuracy

WSHG-IV Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	6.3	21	8	42	8000	3500	15	10000
	80	9	27	13	55			15	15000
	100	9	33	13	63			15	15000
17	50	19	40	31	82	7000	3500	15	10000
	80	26	50	32	102			15	15000
	100	28	63	46	129			15	15000
20	50	30	66	40	115	6000	3500	15	10000
	80	40	87	55	149			15	15000
	100	47	97	58	172			15	15000
	120	47	102	58	172			15	15000
25	50	46	114	65	218	5500	3500	15	10000
	80	74	160	102	299			15	15000
	100	78	184	126	332			15	15000
	120	78	196	126	356			15	15000
32	50	89	253	126	448	4500	3500	15	10000
	80	138	356	196	665			15	15000
	100	160	370	253	757			15	15000
	120	160	413	253	803			15	15000

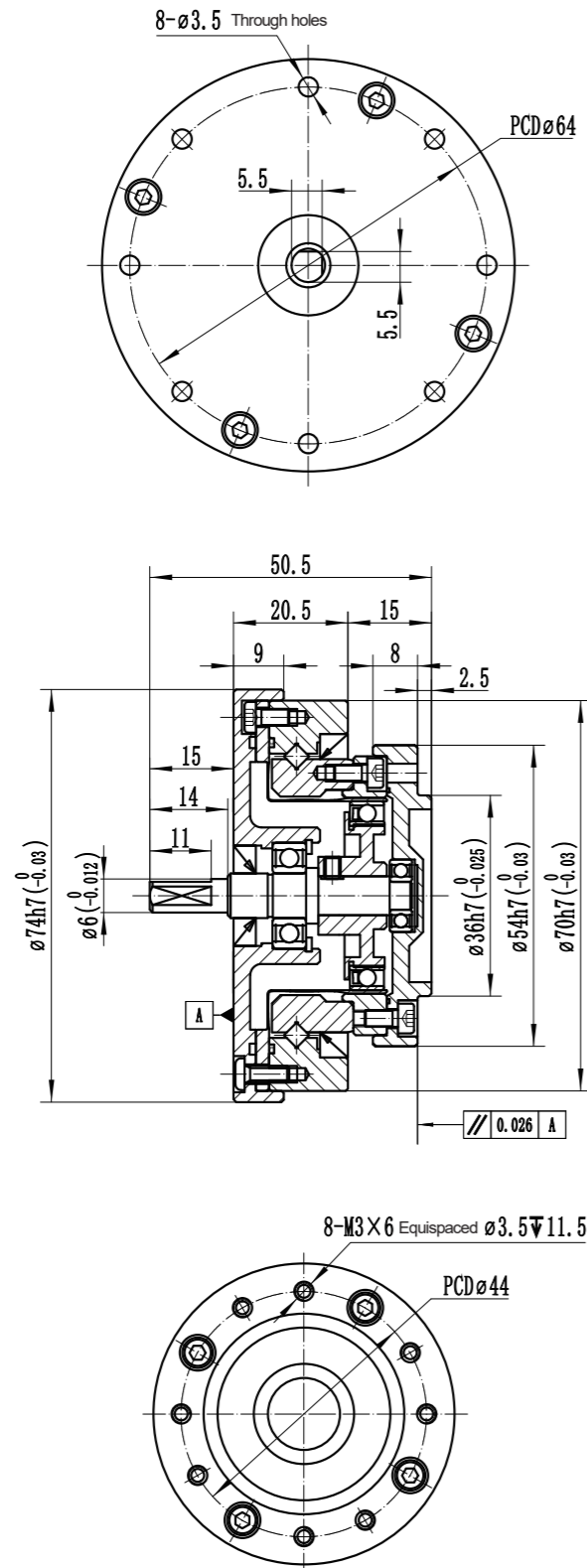
### WSHG-IV Series Dimensional Drawing



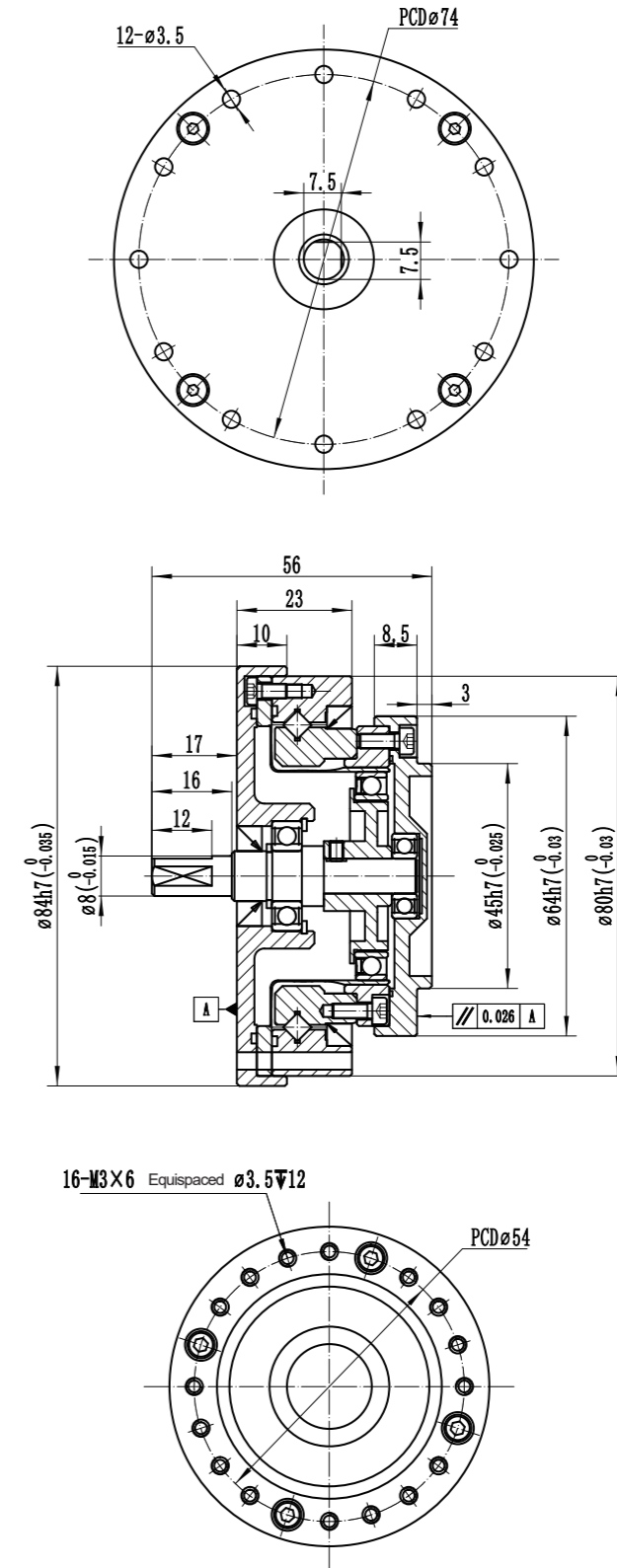
### WSHG-IV Series Dimension

Model Symbol	14	17	20	25	32
ΦA h7	70	80	90	110	142
ΦB	54	64	75	90	115
ΦC h7	36	45	50	60	85
ΦD h7	74	84	95	115	147
ΦE h6	6	8	10	14	14
F	50.5	56	63.5	72.5	84.5
G	15	17	21	26	26
H	20.5	23	25	26	32
I	15	16	17.5	20.5	26.5
J	14	16	20	25	25
K	9	10	10.5	10.5	12
L	8	8.5	9	8.5	9.5
M	2.5	3	3	3	5
O	11	12	16.5	22.5	22.5
P	-	-	8.2	11	11
Q	0.5	0.5	3 <sup>-0.025</sup>	5 <sup>-0.030</sup>	5 <sup>-0.030</sup>
R	-	-	3 <sup>-0.025</sup>	5 <sup>-0.030</sup>	5 <sup>-0.030</sup>
S	-	-	M3×6	M5×10	M5×10
φT	64	74	84	102	132
U	8	12	12	12	12
ΦV	3.5	3.5	3.5	4.5	5.5
ΦW	44	54	62	77	100
X	8	16	16	16	16
Y	M3×6 Φ3.5×11.5	M3×6 Φ3.5×12	M3×6 Φ3.5×13.5	M4×7 Φ4.5×15.5	M5×8 Φ5.5×20.5
Weight(Kg)	0.66	0.94	1.38	2.1	4.4

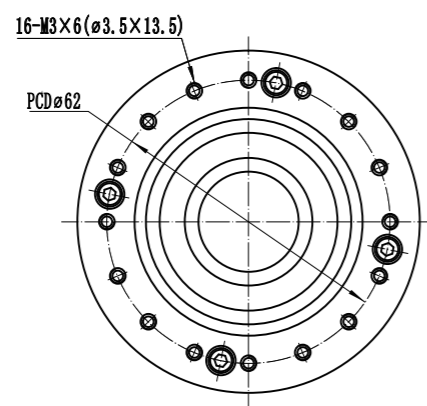
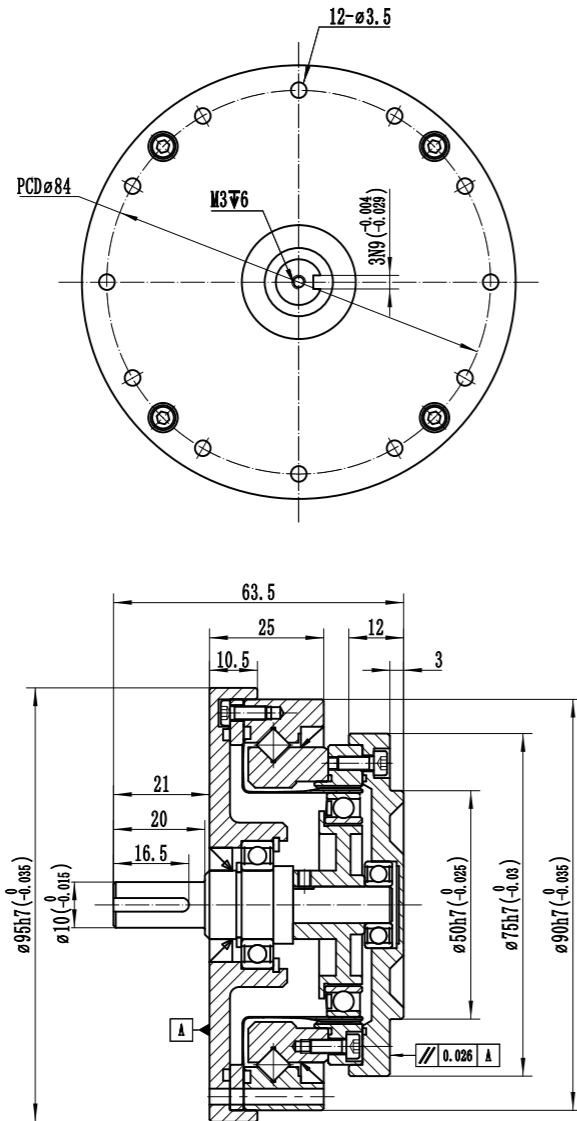
WSHG-14-XXX-IV



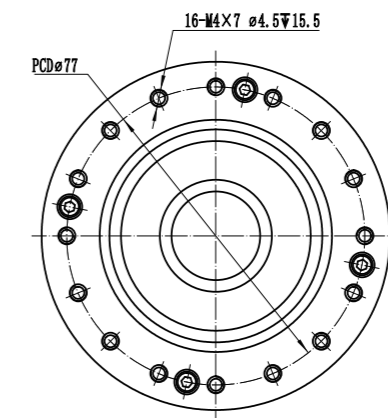
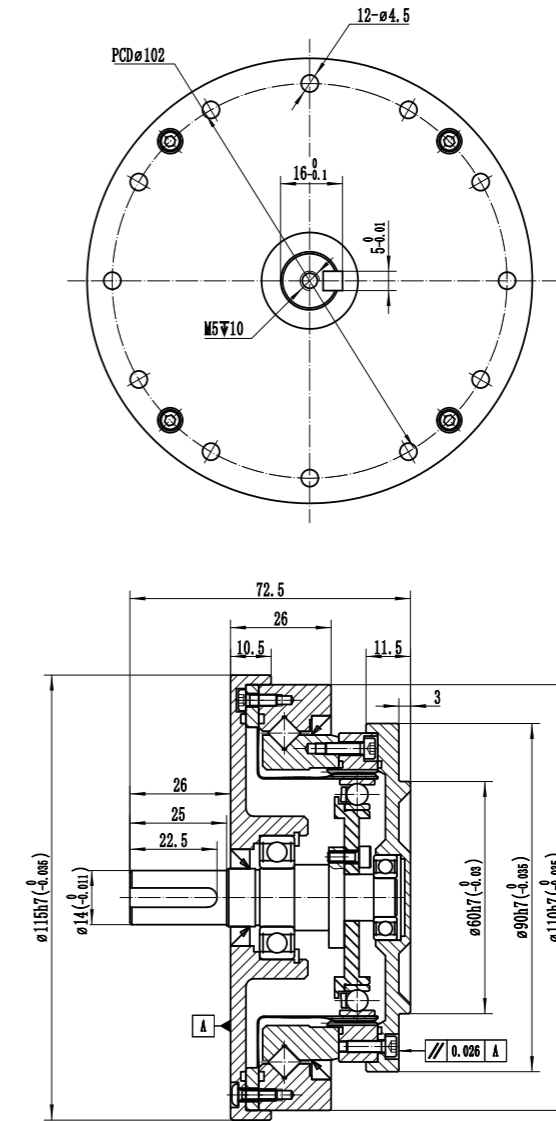
WSHG-17-XXX-IV



WSHG-20-XXX-IV

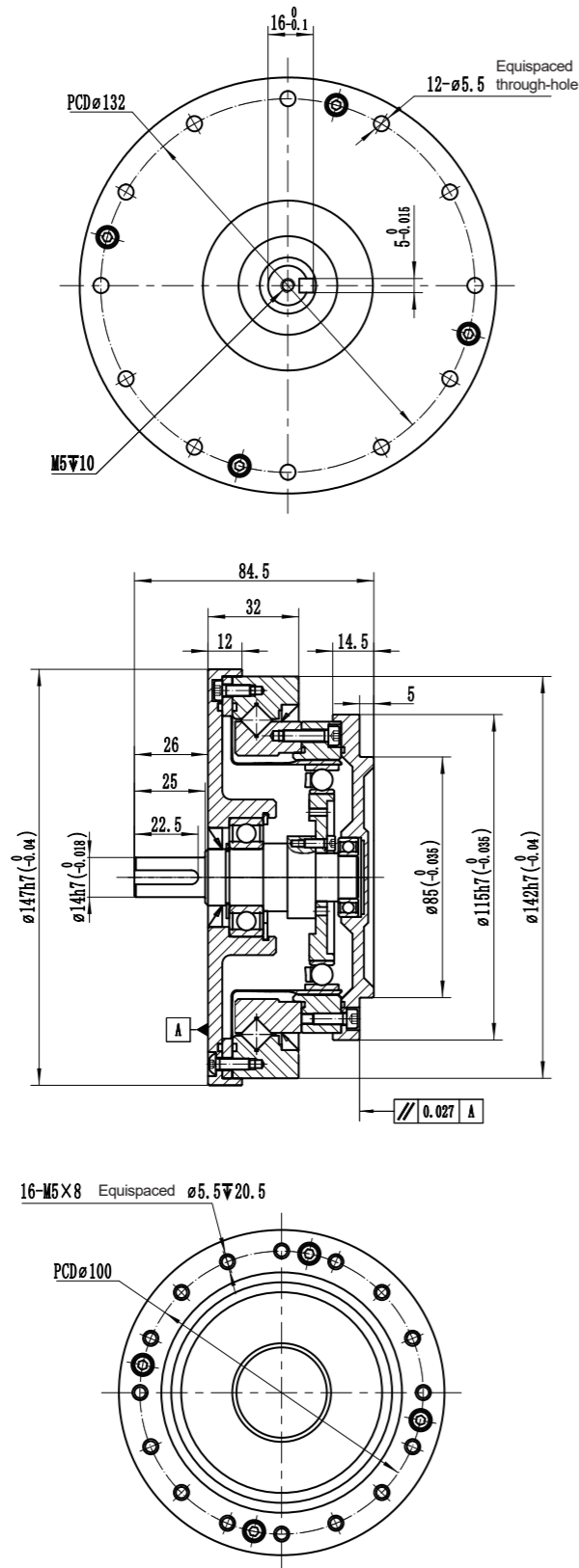


WSHG-25-XXX-IV





WSHG-32-XXX-IV



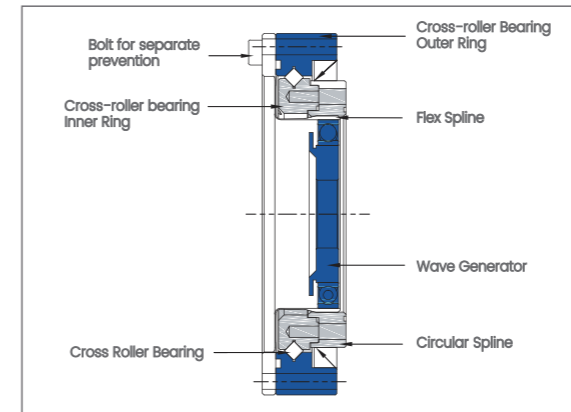
WSHD-I Series Reducer



WSHD-I series reducer

Hollow hat type simple combination (ultra-flat hollow shaft)

The WSHD-I series is a type that pursues the ultimate in flatness, the axial length is shortened by 50% comparing with the WSHG series. The flexspline has an ultra-thin hollow structure and is equipped with a high-rigidity roller cross bearing at the output end. It is very suitable for applications that require a flat design.



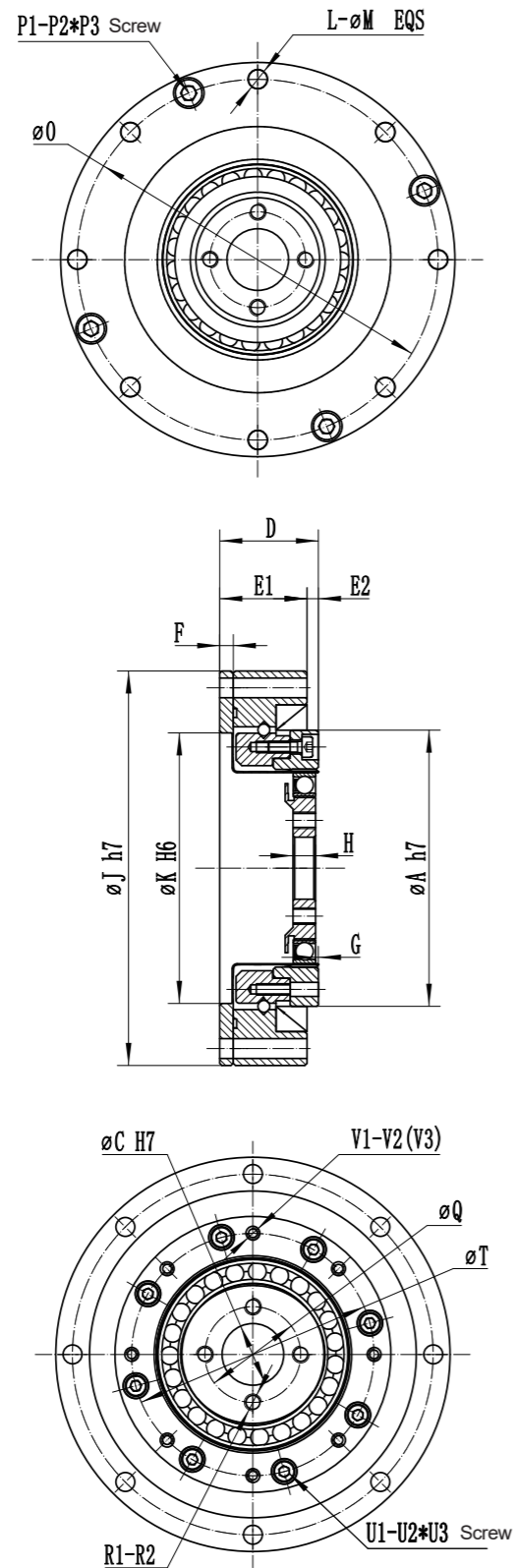
WSHD-I Series Features

- 1.Ultra-thin hollow structure
- 2.High rigidity
- 3.High torque capacity
- 4.Input-output coaxial
- 5.Excellent positioning and rotation accuracy

WSHD-I Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	3.5	11.4	4.6	23	8000	3500	15	10000
	100	5.1	18	7	33				
17	50	12	22	17	46	7000	3500	15	10000
	100	16	35	26	67				
20	50	16	37	23	66	6000	3500	15	10000
	100	28	54	32	90				
25	50	25	66	36	121	5500	3500	15	10000
	100	47	110	75	184				

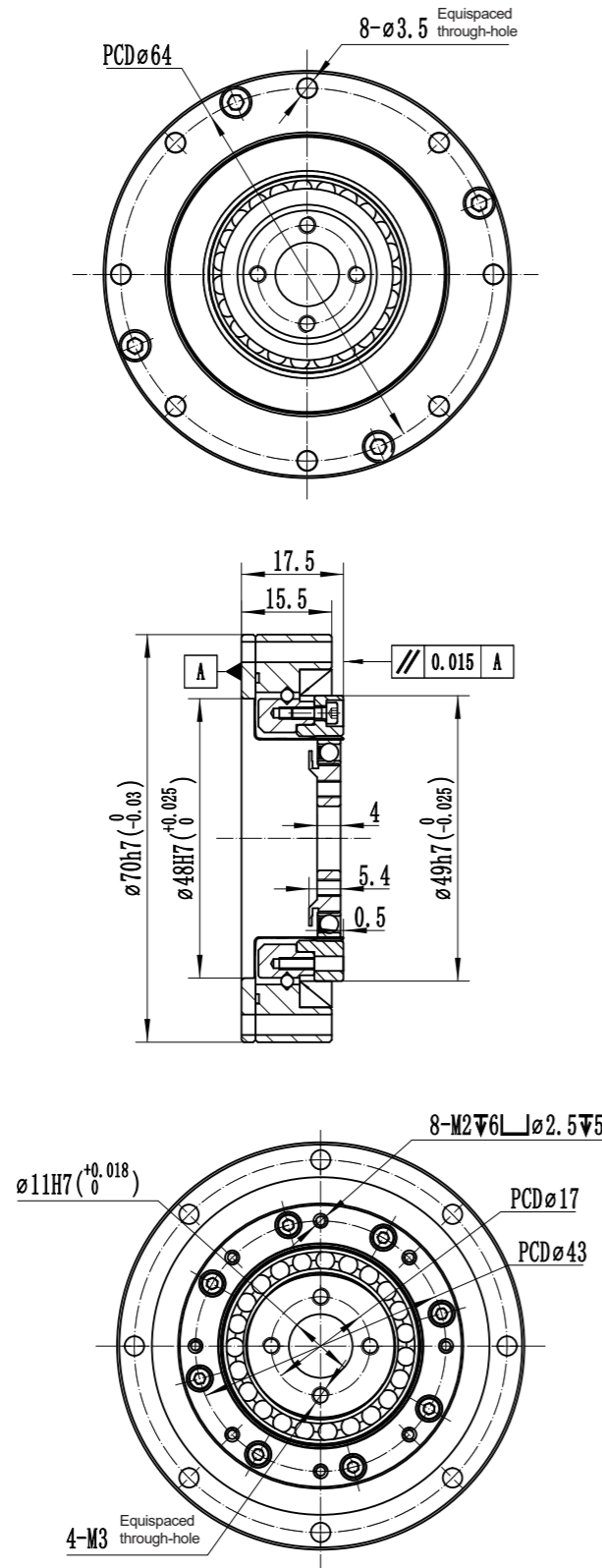
### WSHD-I Series Dimensional Drawing



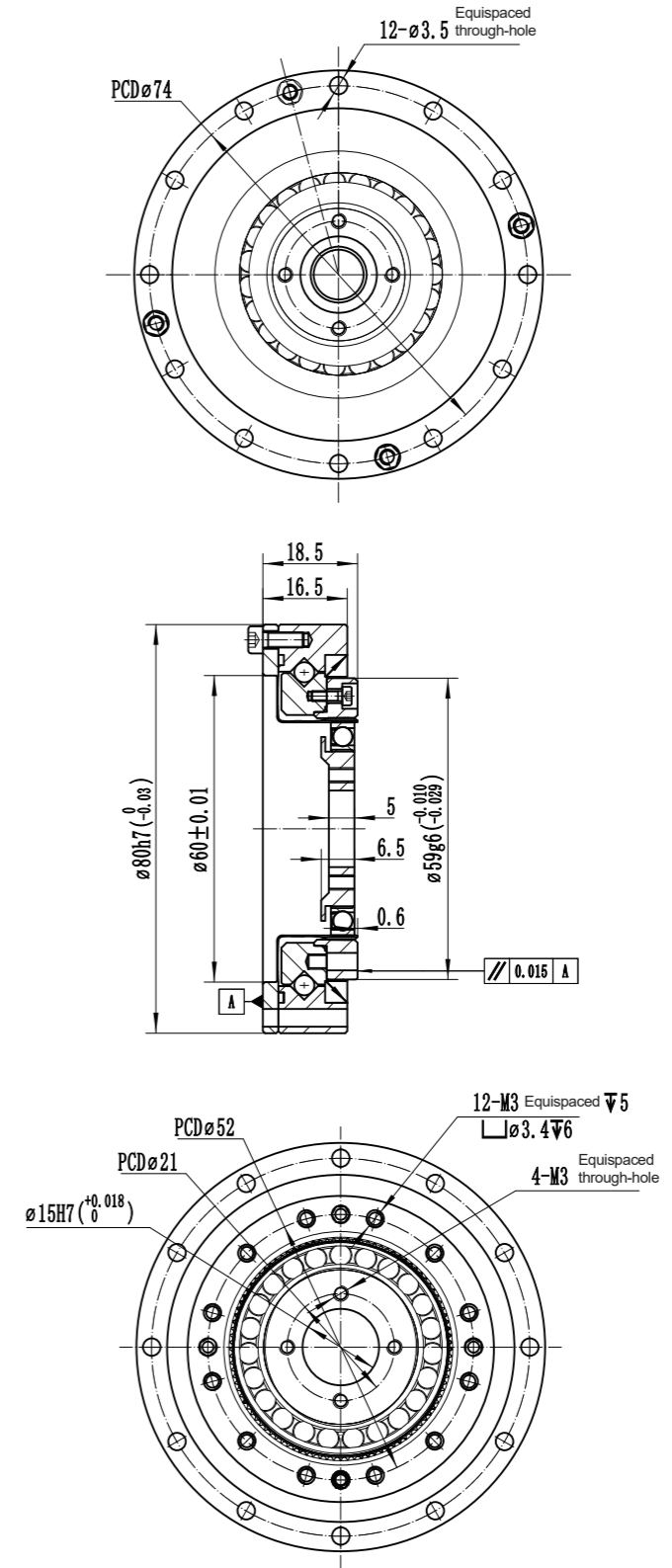
### WSHD-I Series Dimension

Model Symbol	14	17	20	25
ΦA h6	49	59	69	84
ΦC H7	11	15	20	24
D	17.5	18.5	19	22
E1	15.5	16.5	17	20
E2	2	2	2	2
F	2.4	3	3	3.3
G	0.5	0.6	0.6	0.7
H	4	5	5.2	6.3
ΦJ h7	70	80	90	110
ΦK H6	48	60	70	88
L	8	12	12	12
φM	3.5	3.5	3.5	4.5
ΦN	64	74	84	102
P1	4	4	4	4
P2	M3	M3	M3	M3
P3	6	8	8	8
ΦQ	17	21	26	30
R1	4	4	4	6
R2	M3	M3	M3	M4
ΦT	43	52	61.4	74
U1	8	4	4	4
U2	M2	M2	M3	M3
U3	6	6	6	6
V1	8	12	12	12
V2	M2 Deep 6	M3 Deep 5	M3 Deep 6	M4 Deep 6
V3	∅2.5 Deep 5	∅3.4 Deep 6	∅3.5 Deep 6	∅4.5 Deep 6
Weight(Kg)	0.33	0.42	0.52	0.7

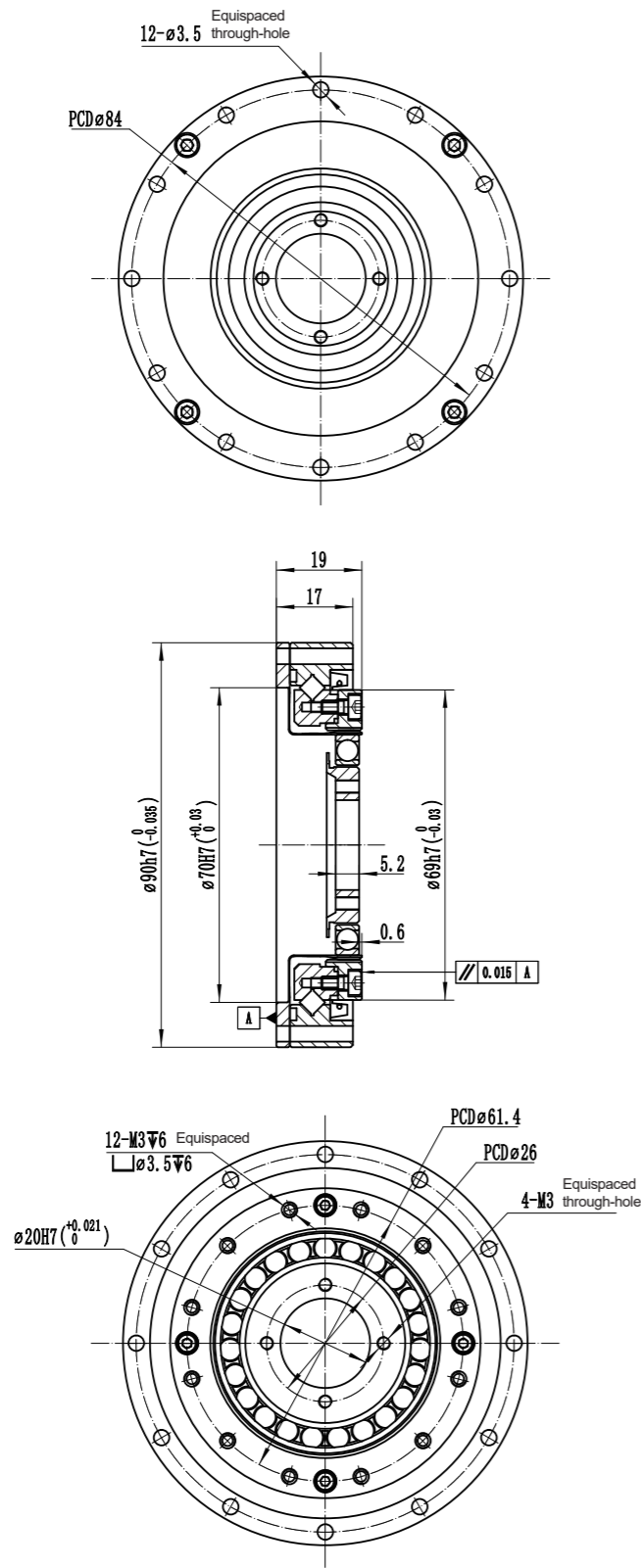
WSHD-14-XXX-I



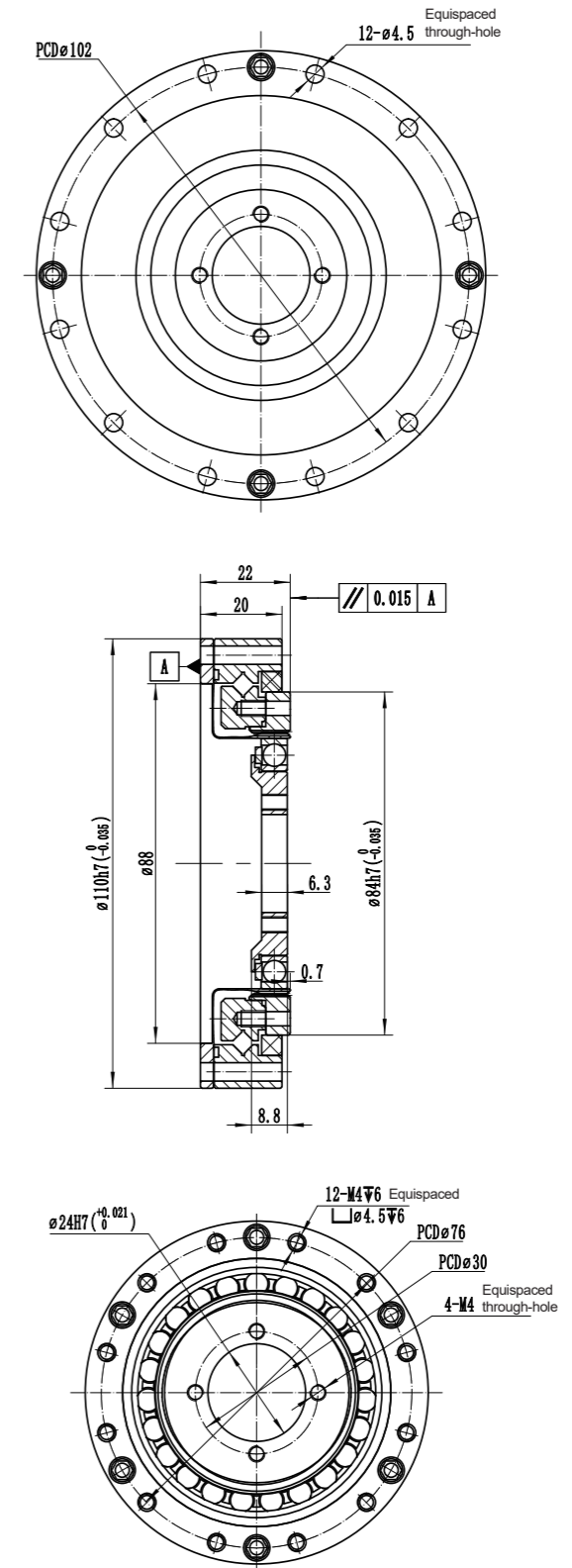
WSHD-17-XXX-I



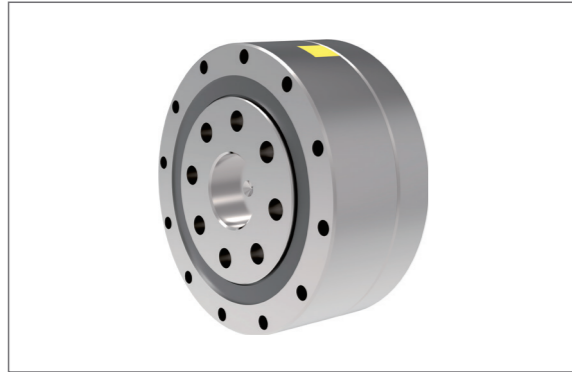
WSHD-20-XXX-I



WSHD-25-XXX-I



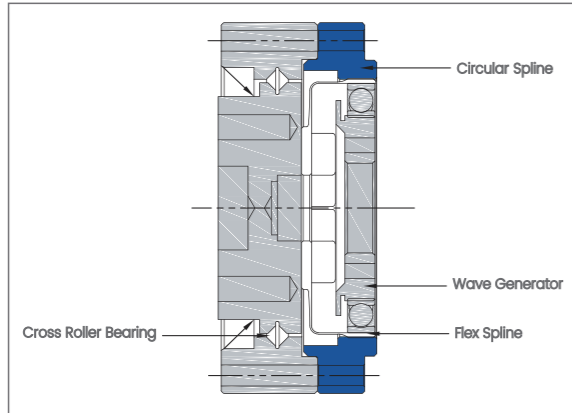
## WCSD-I Series Reducer



### WCSD-I series reducer

Cup-shaped combination type (ultra-flat)

WCSD-I series Committed to the lightweight and compact characteristics of harmonic gear transmission. While inheriting the excellent performance of traditional products, it also achieved a bold shape design. The whole machine design adopts an ultra-flat structure, which is lightweight and compact, and is very suitable for Used as robot end joint and client reducer.



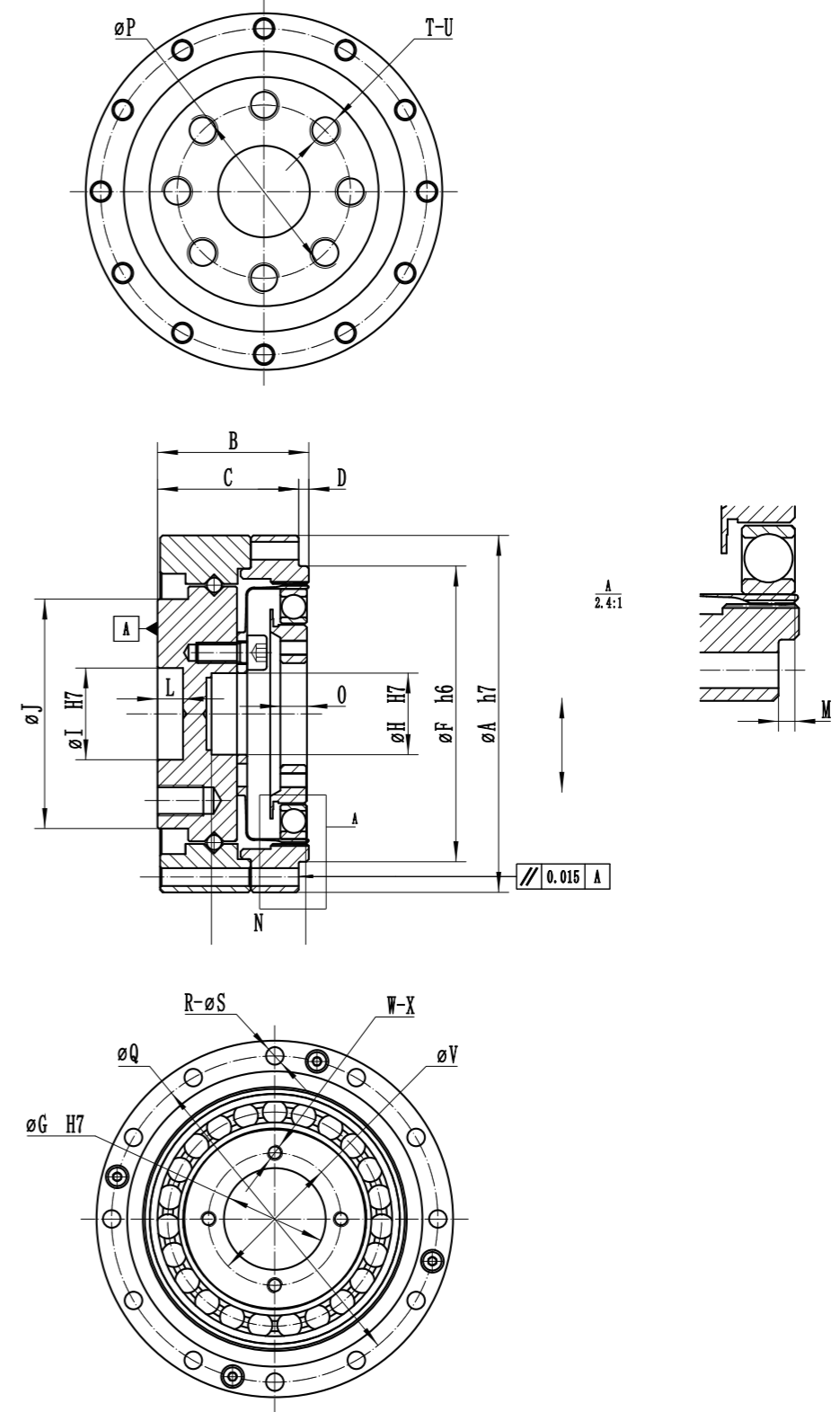
### WCSD-I Series Features

- 1.Ultra-flat structure
- 2.Lightweight and compact
- 3.High static moment capacity
- 4.Input and output coaxial
- 5.Excellent positioning accuracy and rotation accuracy

### WCSD-I Series Performance Parameter

Model	Ratio	Rated torque at input speed 2000r/min N*m	Allowable maximum starting & stopping Torque N*m	Allowable maximum torque at average load N*m	Instantaneous allowable maximum torque N*m	Allowable maximum input speed r/min	Allowable average input speed r/min	Backlash arc-sec	Lifespan hrs
14	50	3.5	11.4	4.6	23	8000	3500	15	10000
	100	5.1	18	7	33				
17	50	10.5	22	17	46	7000	3500	15	10000
	100	15	35	26	67				
20	50	16	37	23	66	6000	3500	15	10000
	100	27	54	32	90				

## WCSD-I Series Dimensional Drawing

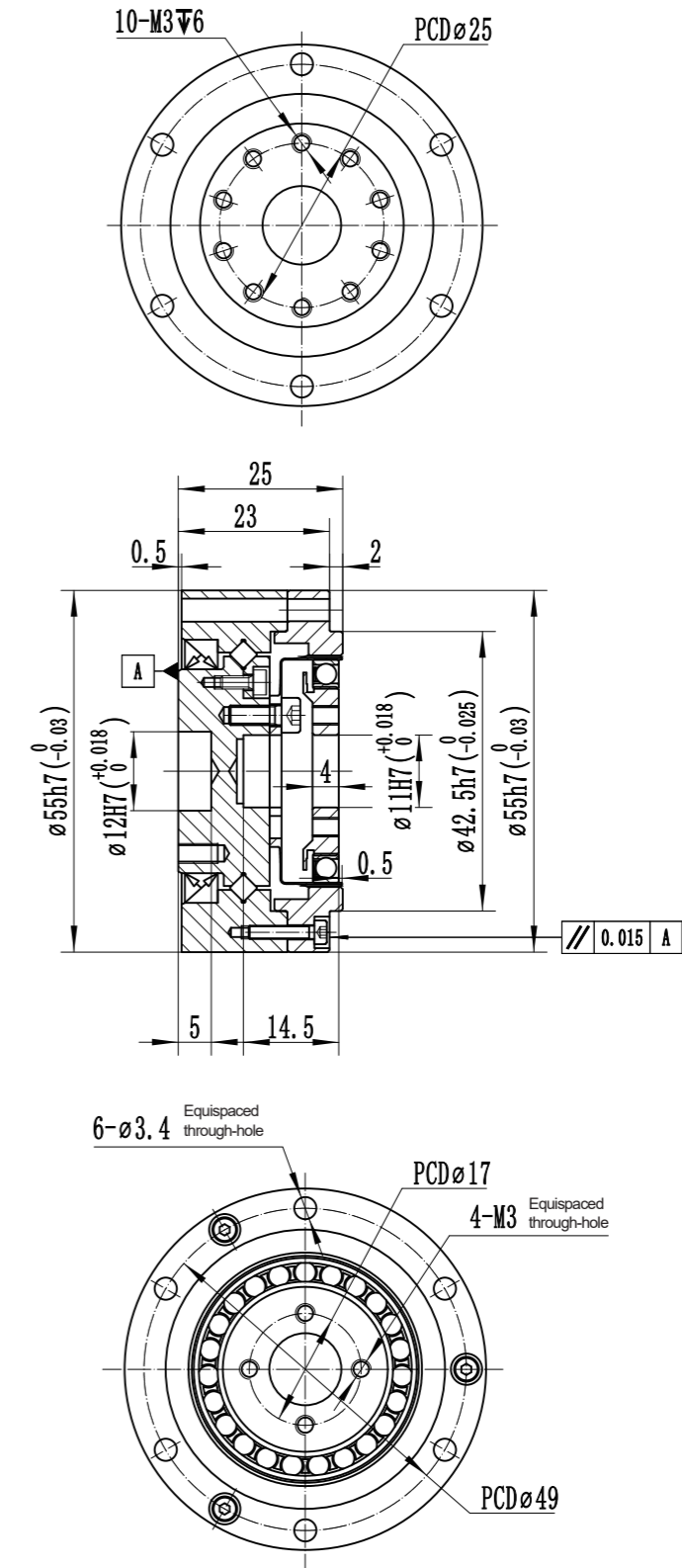




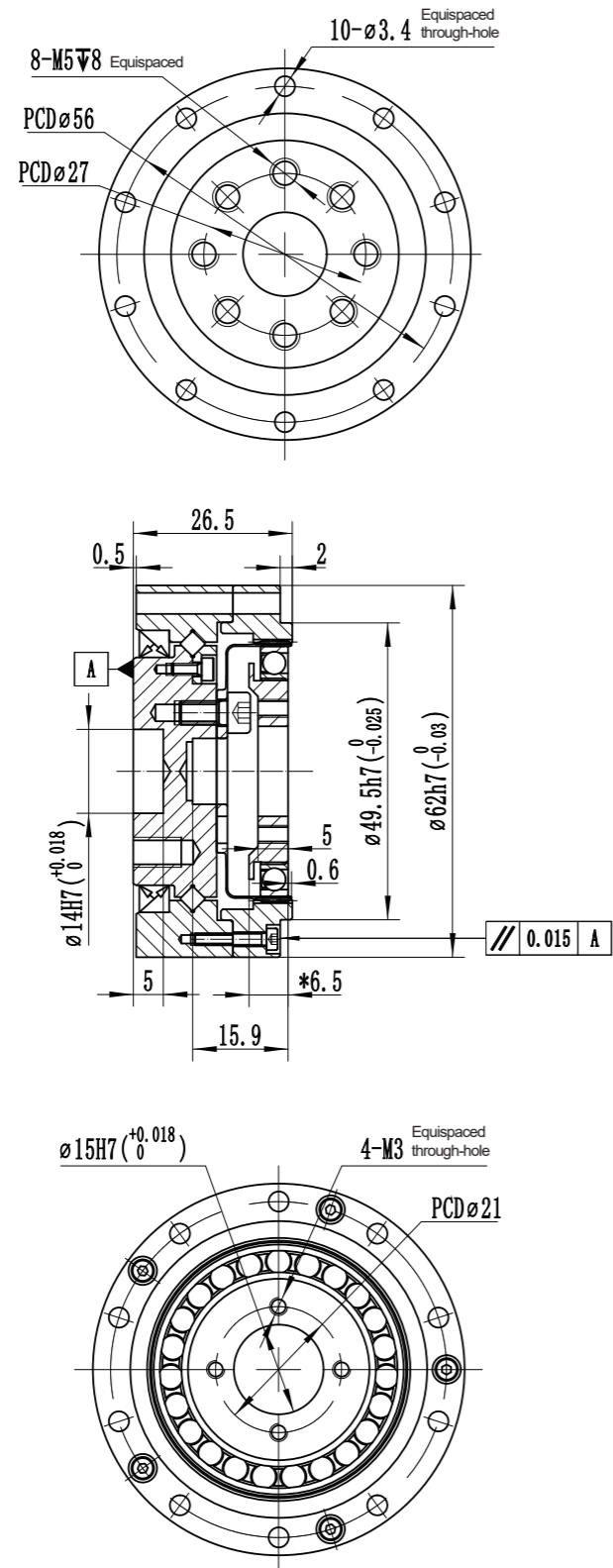
## WCSD-I Series Dimension

Model Symbol	14	17	20
φA h7	55	62	70
B	25	26.5	29.7
C	22.5	24	27.2
D	2	2	2
E	0.5	0.5	0.5
φF	42.5	49.5	58
φG H7	11	15	20
φH	11	11	16
φI h7	12	14	18
∅J	31	38	45
L	5	5	5
M	1.4	1.3	1.6
N	14.5	15.9	18.5
O	4	5	5.2
∅P	25	27	34
∅Q	49	56	64
R	6	10	12
S	∅3.4	∅3.4	∅3.5
T	10	8	8
U	M3 Deep 6	M5 Deep 8	M6 Deep 9
∅V	17	21	26
W	4	4	4
X	M3	M3	M3
Weight(Kg)	0.5	0.66	0.94

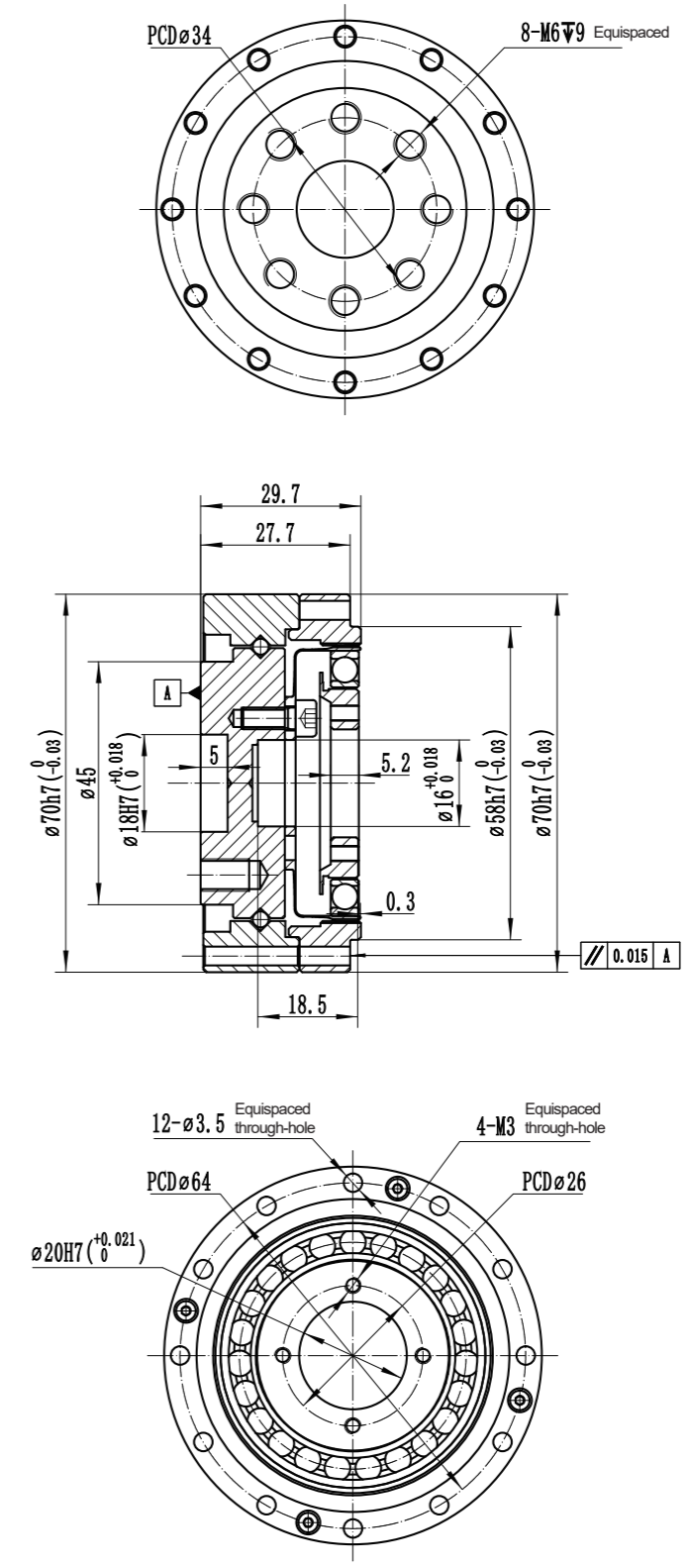
## WCSD-14-XXX-I



WCSD-17-XXX-I



WCSD-20-XXX-I

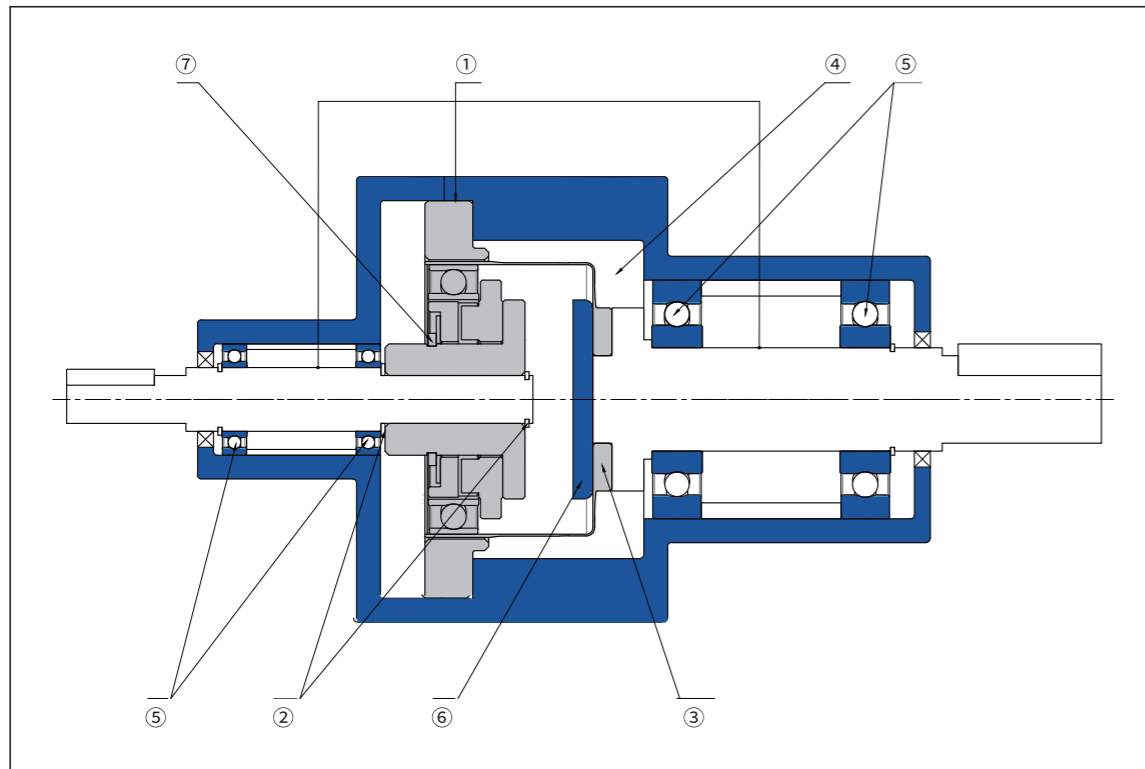


## Installation Guidelines

### Design Guidelines

To fully optimize the performance of the harmonic reducer, please consider the following points:

- 1.Ensure concentricity for the input shaft, flexspline, output shaft, and housing.
- 2.The wave generator generates axial forces, design the input shaft to withstand these forces.
- 3.As harmonic reducers are compact devices and with significant transmitting torque, use an appropriate tightening torque for the bolts to connect the flexspline and the output shaft.
- 4.Flexsplines undergo elastic deformation, so design the dimensions of the inner wall of the housing according to recommended sizes.
- 5.Match the input and output shafts with suitable bearings (allowing for 2-point support with clearance) capable of supporting radial and axial loads. Avoid applying unnecessary force to the wave generator and flexspline.
- 6.Ensure that the flange diameter for flexspline installation does not exceed the hub hole diameter, and round the corners on the flange connected to the membrane. Design all dimensions according to recommended sizes.
- 7.When using a C-type snap ring to secure the wave generator hub, ensure that the hook portion of the snap ring does not come into contact with the housing.



### Sealing Mechanism

To prevent lubricating grease leakage and maintain the high durability of the harmonic reducer, the following sealing mechanisms must be utilized.

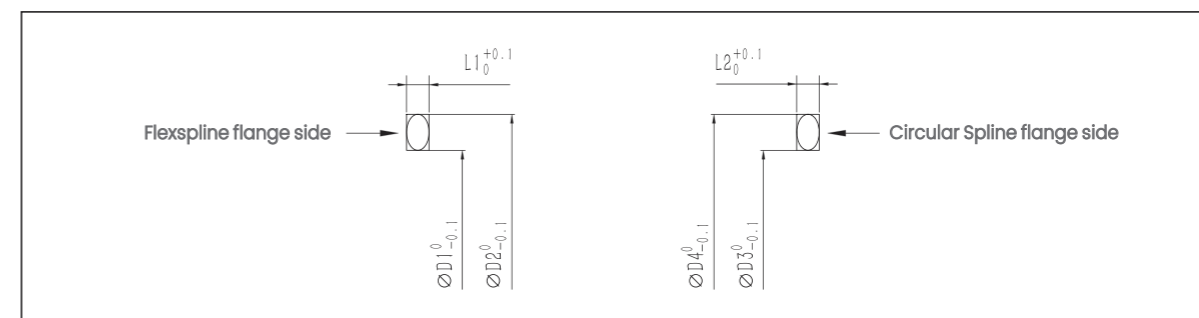
- 1.Rotary motion components: oil seal (spring-inserted), please pay attention to the presence of scratches on the shaft side.
- 2.Flange assembly surfaces, interlocking: O-ring, sealant. please ensure that the surfaces are not skewed, and check the engagement condition of the O-ring. (Refer to the table diagram below for the dimensions of the installed seal O-ring and O-ring groove during reducer assembly.)
- 3.Screw holes: use sealing screws or adhesive lockers with sealing effects (Leitai 243 is recommended) or sealing tape.

Sealing locations		Recommended sealing methods
Output side	Output flange central through-hole and assembly surface	Use O-ring (Refer to our company's product for installation)
	Mounting screws	Apply a sealing screw-locking agent with sealing effects (Leitai 243 is recommended)
Input side	Flange assembly surface	Use O-ring (Refer to our company's product for installation)
	Motor output shaft	If there is no oil seal, install the oil seal on the installation flange of the motor

Sealing O-ring and O-ring Groove Installation Dimensions Table

Model No.	Flexspline side				Circular Spline side			
	O-ring	O-ring groove			O-ring	O-ring groove		
		∅D1	∅D2	L1		∅D3	∅D4	L2
WSHG-14-II	52x1.5	53.3	56.5	0.89	-	-	-	-
WSHG-17-II	63x1.5	64.1	68.1	1.1	-	-	-	-
WSHG-20-II	72x2	72.6	78	1.5	53x1	54	56.8	0.75
WSHG-25-II	90x1.8	90	94.8	1.35	66x1.3	67	70.5	0.98
WSHG-32-II	116.2x1.9	117.6	123	1.5	87x1.5	88	92	1.13

Sealing O-ring and O-ring Groove Installation Dimension Diagram



## Assembly Precautions

Due to assembly errors, the harmonic reducer may experience vibrations and abnormal noises during operation. Please adhere to the following precautions during assembly:

### 1. Precautions for the Wave Generator

- (1) Avoid applying excessive force to the bearing area of the wave generator during assembly. Insert it smoothly by allowing the wave generator to rotate freely.
- (2) When using an integrated wave generator, pay special attention to keeping the effects of center offset and misalignment within recommended values.

### 2. Precautions for the Flexspline

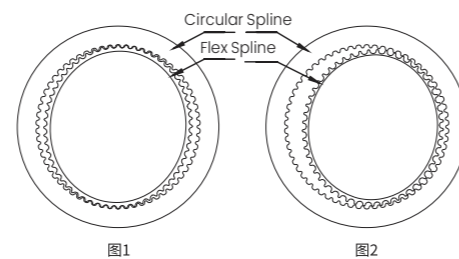
- (1) Confirm the flatness of the installation surface and check for misalignment.
- (2) Ensure there are no protrusions, residual burrs, or foreign objects in the screw holes.
- (3) Confirm whether chamfering and avoidance processing have been applied to the housing assembly to prevent interference with the flexspline.
- (4) After assembling the flexspline to the housing, verify its ability to rotate without interference or jamming at specific locations.
- (5) When inserting bolts into the screw holes for installation, ensure the correct position of the bolt holes to prevent contact between the bolts and the flexspline due to skewed processing.
- (6) Do not tighten the bolts to the specified torque all at once. Initially, temporarily tighten them with approximately half the specified torque, then tighten to the specified torque. Additionally, typically tighten the bolts in a diagonal sequence.
- (7) Avoid using a punch on the flexspline as it may result in reduced rotational accuracy; hence, minimize its use.

### 3. Precautions for the Circular Spline

- (1) Confirm the flatness of the installation surface and check for misalignment.
- (2) Ensure there are no protrusions, residual burrs, or foreign objects in the screw holes.
- (3) Confirm whether chamfering and avoidance processing have been applied to the housing assembly to prevent interference with the circular spline.
- (4) When inserting bolts into the screw holes for installation, ensure the correct position of the bolt holes to prevent contact between the bolts and the circular spline due to skewed processing.
- (5) Similar to the flexspline, do not tighten the bolts to the specified torque all at once. Initially, temporarily tighten them with approximately half the specified torque, then tighten to the specified torque. Additionally, typically tighten the bolts in a diagonal sequence.
- (6) Confirm the presence of extreme one-sided meshing when combined with the flexspline. Extreme offset may occur due to center offset or misalignment of the two components.
- (7) Avoid striking the gear front end or applying excessive force when pressing during the assembly of the circular spline.

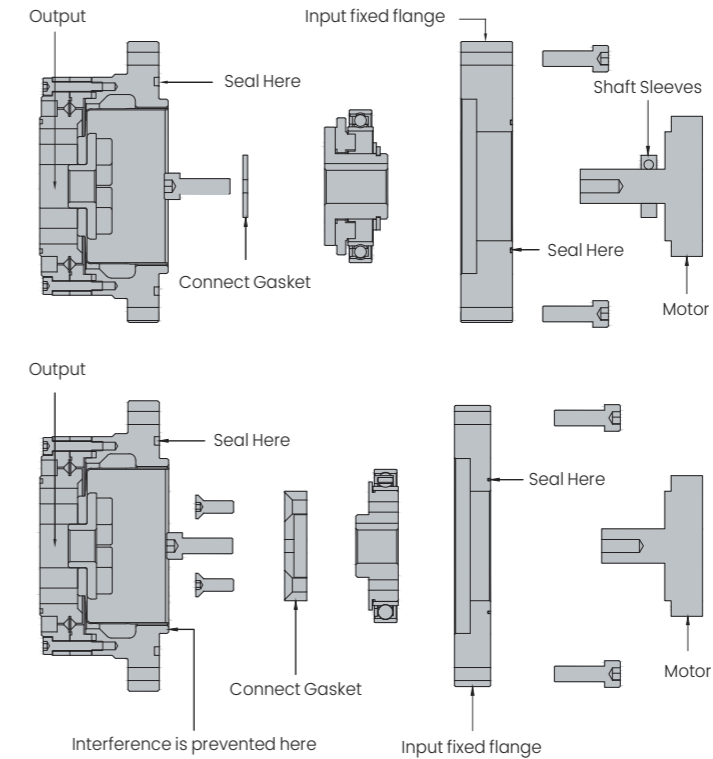
### 4. Others:

- (1) Install the harmonic reducer in a sufficiently clean environment, ensuring no foreign objects enter the reducer during the installation process to prevent damage during use.
- (2) Ensure that the gear surfaces and flexible bearing parts of the reducer remain adequately lubricated. It is not recommended to have the gear surface always facing upwards, as it may affect lubrication effectiveness.
- (3) After installing the wave generator, confirm that the engagement between the flexspline and the circular spline is 180° symmetric (Figure 1). Any deviation (Figure 2) may cause abnormal vibrations and quickly damage the flexspline.
- (4) After installation, run the reducer at low speed (100 rpm) first. If there is abnormal vibration or noise, stop immediately, recheck the installation, and contact our company to prevent damage to the reducer due to incorrect installation.



## Assembly Method

### 1. WCSG Installation (circular spline fixed, flex spline output)



1. Apply the grease evenly on the flexible bearing, and fill the cavity connected with the fixed flange and the motor with the grease (please use the specified grease, do not replace the grease randomly to avoid damage to the reducer). Install the wave generator on the motor shaft or connecting shaft of the input end, and fix it with screw and flat gasket or connecting end cover.

2. Apply the grease evenly on the flexible spine, and fill flex spline with the grease. The injection volume is approximately 80% of the cavity volume (please use the specified grease, do not replace the grease randomly to avoid damage to the reducer). Install the reducer according to the diagram. When installing, the long axis of the wave generator is aligned to the direction of the long axis of the reducer's flex spline. When in place, the reducer is fixed with the corresponding screw. The pre-tightening force of the screw is 0.5Nm.

3. Set the motor speed at about 100 rotations per minute, start the motor, and the screws shall be locked by means of crisscross for four to five times to increase the locking force of the screws equally. (for screw locking force, see page 96) all fixed screws shall be of grade 12.9 and shall be coated with Loctite 243 thread adhesive to prevent screw failure or loose during operation.

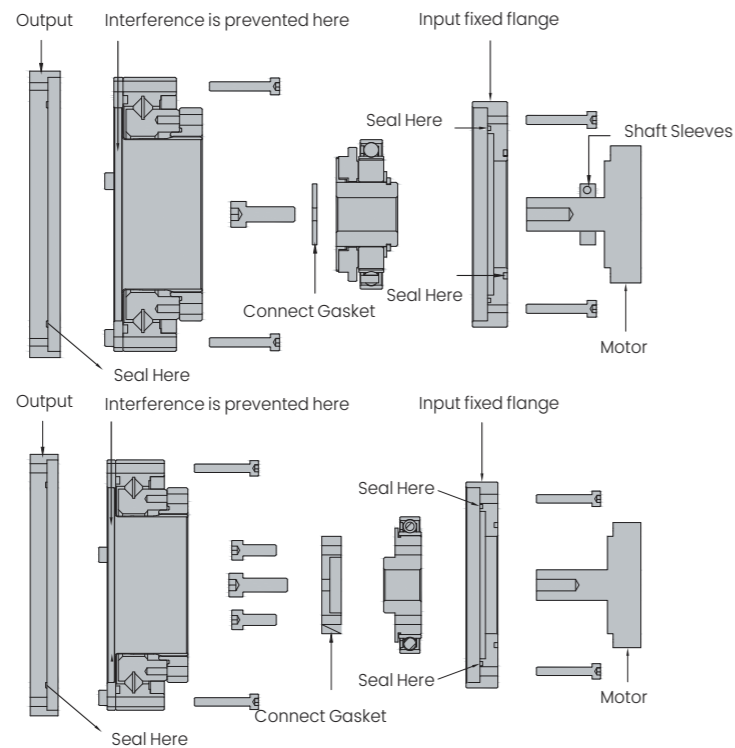
4. processing requirement for mounting surface that connected with reducer: flatness 0.01mm, vertical axis 0.01mm.

#### Note:

When the reducer is in use, if the output end is always horizontally facing down (it is not recommended to use in this way), please contact us if the lubricating oil injected into the inner wall of the flex spline exceeds the meshing tooth surface. Please use the specified lubricating grease, do not change the grease at will to avoid damage to the reducer. Static sealing shall be adopted between the circular spline of reducer and the installation plane of input end to ensure the grease will not leak during the use of reducer and avoid the damage of reducer when it works with little or no oil.



## 2.WSHG-I/II Installation (1) (circular spline fixed, flex spline output)

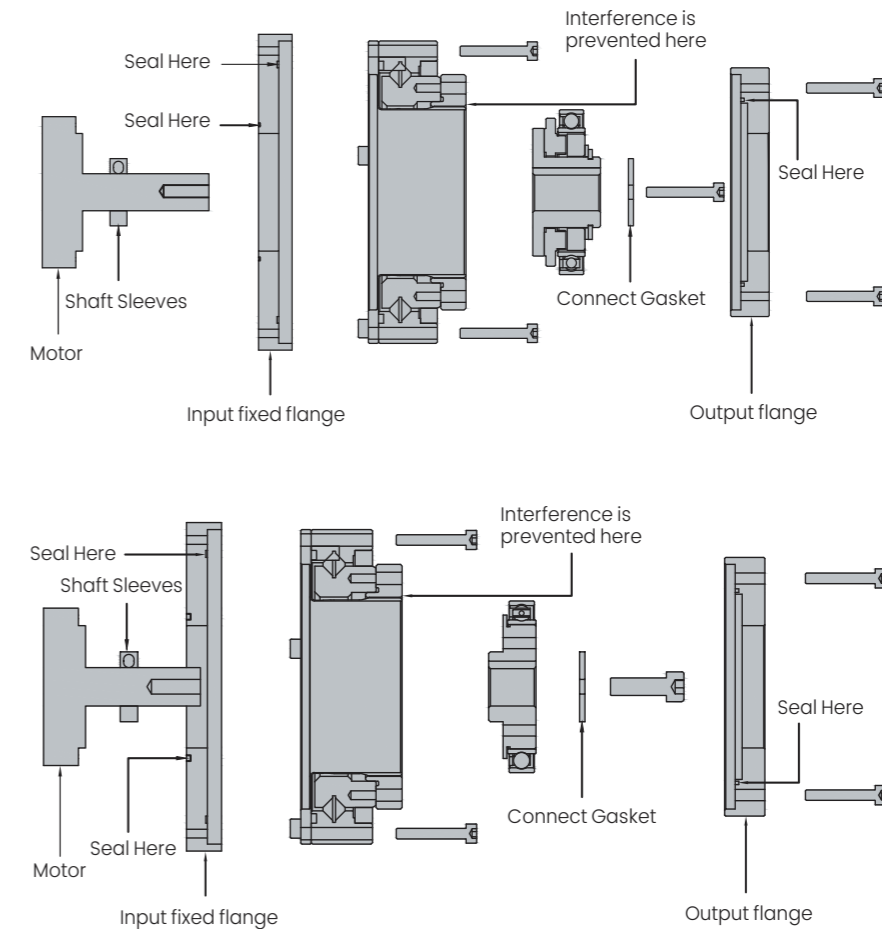


1. Apply the grease evenly on the flexible bearing, and fill the cavity connected with the fixed flange and the motor with the grease (please use the specified grease, do not replace the grease randomly to avoid damage to the reducer). Install the wave generator on the motor shaft or connecting shaft of the input end, and fix it with screw and flat gasket or connecting end cover.
2. Install the reducer according to the diagram. When installing, the long axis of the wave generator is aligned to the direction of the long axis of the reducer's flex spline. When in place, the reducer is fixed with the corresponding screw. The pre-tightening force of the screw is 0.5Nm.
3. Set the motor speed at about 100 rotations per minute, start the motor, and the screws shall be locked by means of crisscross for four to five times to increase the locking force of the screws equally. (for screw locking force, see page 96) all fixed screws shall be of grade 12.9 and shall be coated with Loctite 243 thread adhesive to prevent screw failure or loose during operation.
4. Apply a layer of grease evenly on the inner wall of the flexible pulley, and then inject the grease into the cavity of the flexible pulley. The injection amount is about 80% of the cavity of the flexible pulley.
5. The output end is also fixed according to step 3. All fixed screws shall be grade 12.9 and coated with Loctite 243 thread adhesive to prevent screw failure or loose during operation.
6. Machining requirements for installation plane fixed with reducer: plane degree 0.01mm, and axis perpendicular 0.01mm

## Note:

When the reducer is in use, if the output end is always horizontally facing down (it is not recommended to use in this way), please contact us if the lubricating oil injected into the inner wall of the flex spline exceeds the meshing tooth surface. Please use the specified lubricating grease, do not change the grease at will to avoid damage to the reducer. Static sealing shall be adopted between the circular spline of reducer and the installation plane of input end to ensure the grease will not leak during the use of reducer and avoid the damage of reducer when it works with little or no oil.

## 3.WSHG-I/II Installation (2) (Flex spline fixed, circular spline output)



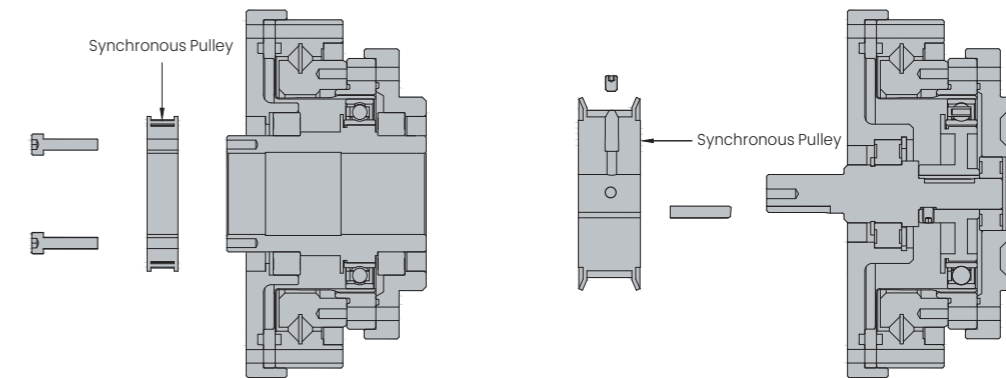


- 1.The reducer is installed at the input end and fixed with the corresponding screw. The screw pretightening force is 0.5Nm.
- 2.First, evenly apply a layer of grease on the inner wall of the flex spline, and then inject grease at the space B of the flex spline (please use the specified lubricating grease, and do not replace the grease at will to avoid damage to the reducer).
- 3.Install the reducer according to the diagram. When installing, the wave generator long axis aligned with the long axis of the flex spline, after installing in place, turn the wave generator, make the key on the CAM and the key on the input shaft alignment, install the key (key coated with Loctite 638 glue), with a screw plus large gasket to fix the wave generator on the shaft.
- 4.Apply grease uniformly on the flexible bearing and fill the cavity of A with grease (please use the specified lubricating grease and do not change grease at will to avoid damage to the reducer)
- 5.Set the motor speed at about 100 RPM, start the motor, and tighten the screws crossingly for four to five times with equal increase to the locking force corresponding to the screw. (The locking force for screws is shown on page 96.) All screws to be fastened shall be of grade 12.9 and coated with Loctite 243 thread adhesive to prevent failure or loose working
- 6.The output end is also fixed according to step 5.All fixing screws shall be of grade 12.9 and coated with Loctite 243 thread adhesive to prevent screw failure or loosening during operation.
- 7.Machining requirements for installation plane fixed with reducer: plane degree 0.01mm, and axis perpendicular 0.01mm.

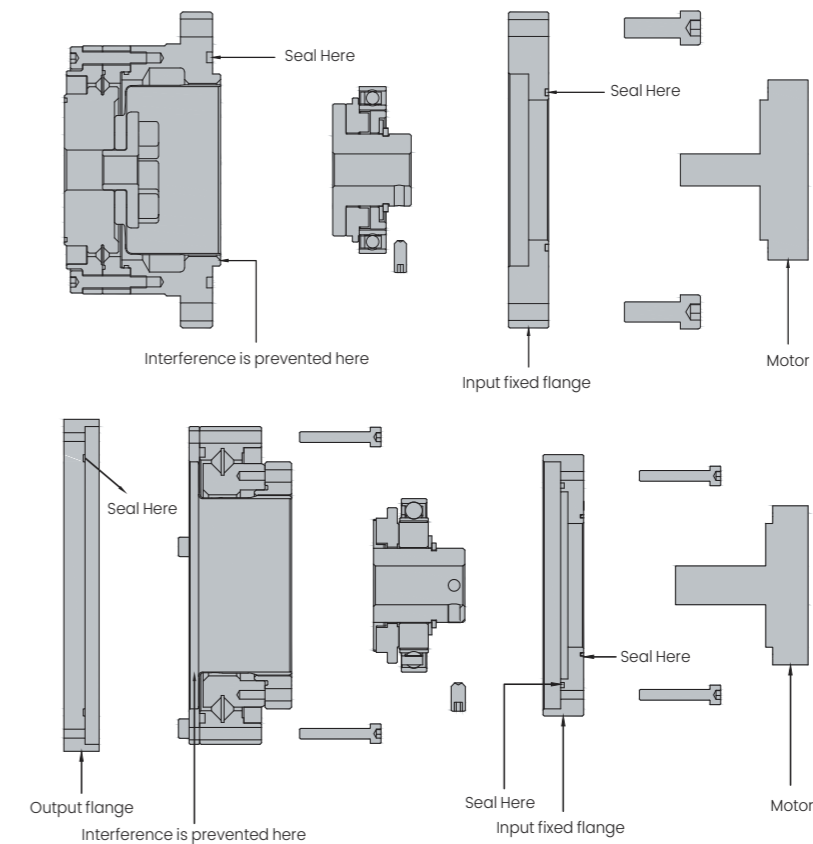
## Note:

When the reducer is in use, if the output end is always horizontally facing down (it is not recommended to use in this way), please contact us if the lubricating oil injected into the inner wall of the flex spline exceeds the meshing tooth surface. Please use the specified lubricating grease, do not change the grease at will to avoid damage to the reducer. Static sealing shall be adopted between the circular spline of reducer and the installation plane of input end to ensure the grease will not leak during the use of reducer and avoid the damage of reducer when it works with little or no oil.

## 4.WSHG-III Installation (3) (4) (Flex spline fixed, circular spline output)



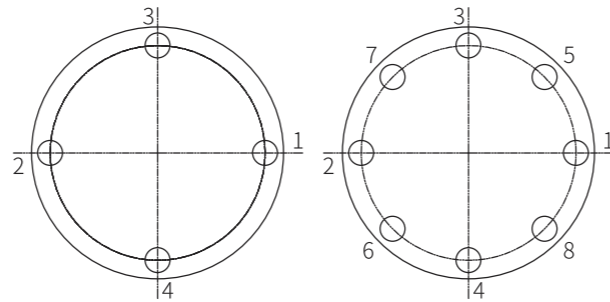
## 5.The reducer mount way when the motor shaft is smooth shaft



## 6. Screw locking method

1. Set motor speed at 100 rpm, and start motor. The screws are locked in crisscross manner. Try 4 to 5 times increased by degrees until it reaches corresponding locking force (see chart below).

2. Mounting plane processing requirements prescribed by connecting reducer: flatness 0.01mm, Screw locking method.



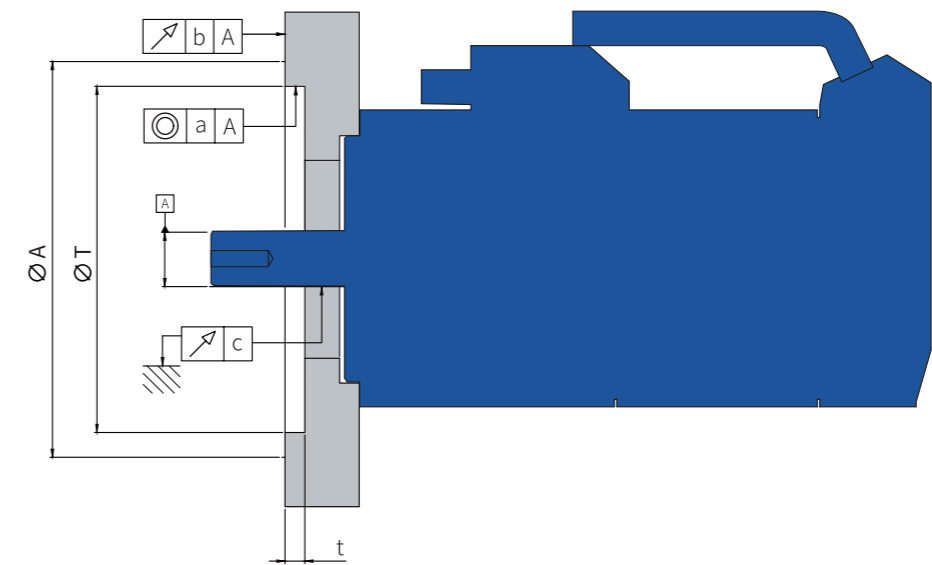
Screws correspond to locking force

		12.9						
Screw Nominal Diameter	mm	3	4	5	6	8	10	12
Locking Torque	N·m	2	4	9	15	35	70	125

## Installation accuracy of reducer

## Motor installation

Flange for motor installation: when the motor is installed on the combined type, the motor installation flange must be used for installation. The civil construction size and schedule of the flange base components for motor installation are shown in the following figure and table.

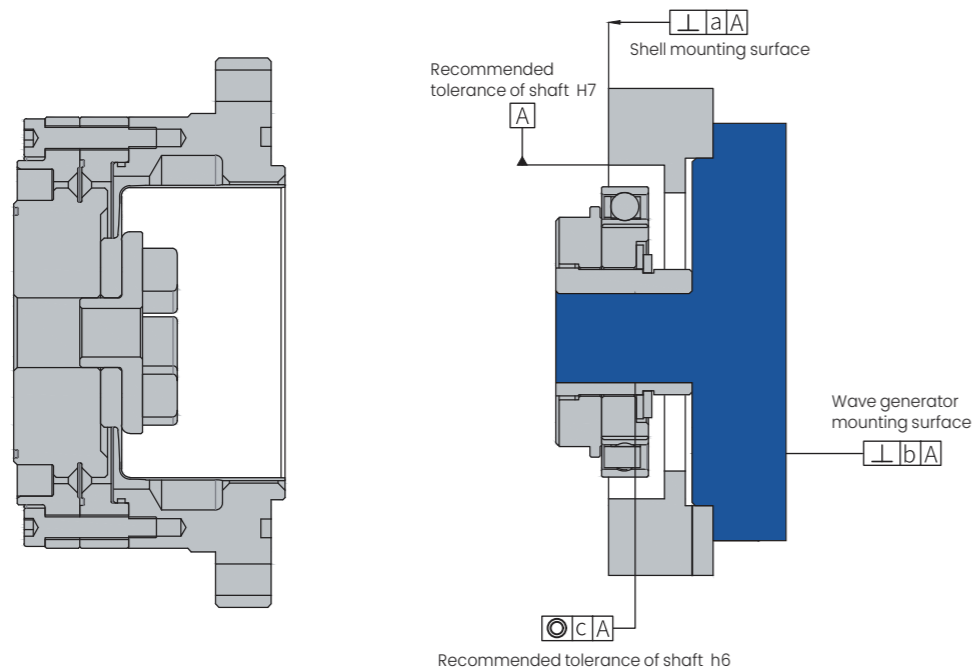


Unit:mm

Model Symbol	14	17	20	25	32
a	0.03	0.04	0.04	0.04	0.04
b	0.03	0.04	0.04	0.04	0.04
c	0.015	0.015	0.018	0.018	0.018
ØA	73	79	93	107	138
t	3	3	4.5	4.5	4.5
ØT	38H7	48H7	56H7	67H7	90H7

### WCSG - II Series assembly precision

Flange for motor installation: when installing the motor to the combined type, the motor mounting flange must be used for installation. Please refer to the following table and figure for mounting dimensions and precision of flange base components for motor installation.



Unit:mm

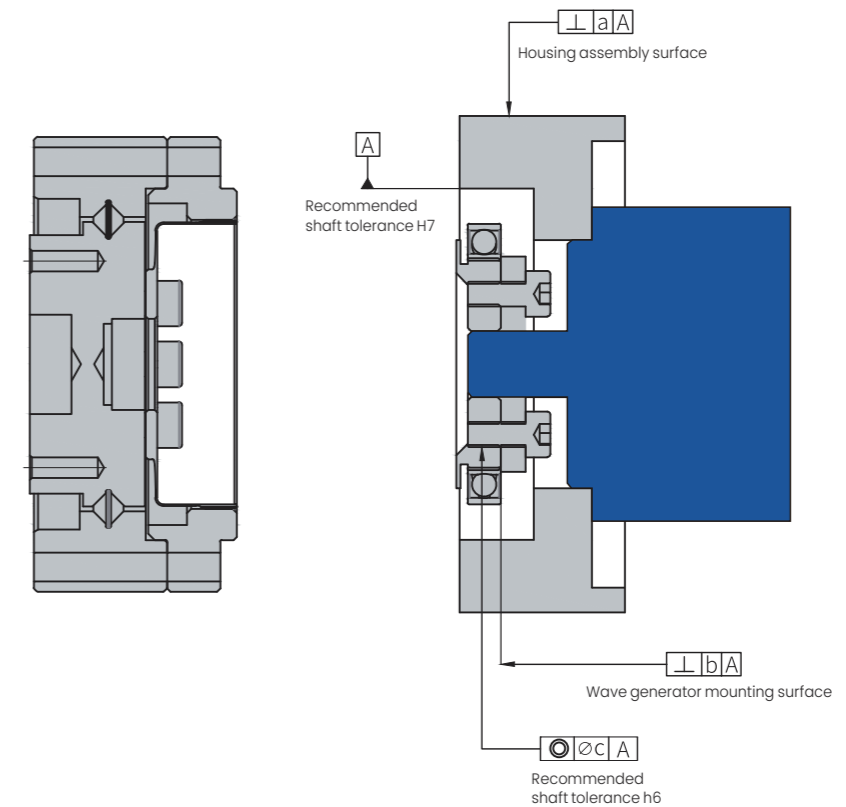
Model Symbol	14	17	20	25	32
a	0.011	0.015	0.017	0.024	0.026
b	0.017 (0.008)	0.020 (0.010)	0.020 (0.010)	0.024 (0.012)	0.024 (0.012)
c	0.030 (0.016)	0.034 (0.018)	0.044 (0.019)	0.047 (0.022)	0.050 (0.022)

The values in ( ) are those when the input unit (wave generator) is integrated structure.  
( When European coupling structure is not used)

### WCSD- I Series assembly precision

During assembly design, if there are abnormalities such as deformation of the mounting surface, or reluctant assembly, the product performance will be reduced. In order to give full play to the excellent performance of reducer, please pay attention to the following points and ensure to use the recommended precision of the assembled casing shown in the following picture and table.

- 1.The mounting surface is skewed and deformed
- 2.Foreign matter engaged-in
- 3.Burrs, bulges, and abnormal positions around the screw holes of the mounting holes
- 4.Insufficient chamfering of mounting concave round part
- 5.The roundness of the mounting concave round part is abnormal

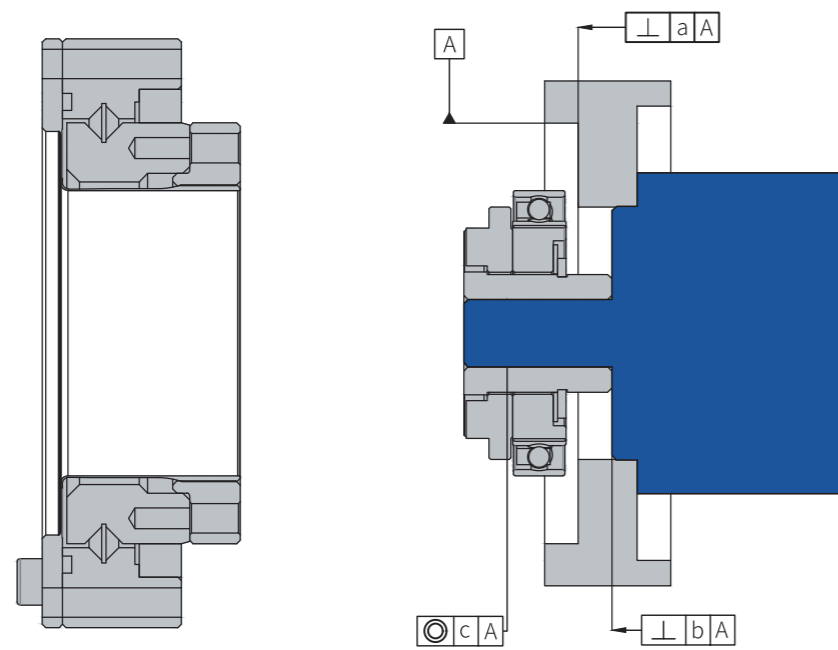


Unit:mm

Model Symbol	14	17	20	25	32
a	0.011	0.015	0.017	0.024	0.026
b	0.008	0.010	0.012	0.012	0.012
∅c	0.016	0.018	0.019	0.022	0.022

### WSHG-II series assembly precision

During assembly design, to insure that harmonic reducer in use with optimal performance, please insure that using the recommend precision of assemble housing as shown below. (see chart below).



Unit:mm

Model Symbol	14	17	20	25	32
a	0.011	0.015	0.017	0.024	0.026
b	0.017	0.020	0.020	0.024	0.024
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)
c	0.030	0.034	0.044	0.047	0.050
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)

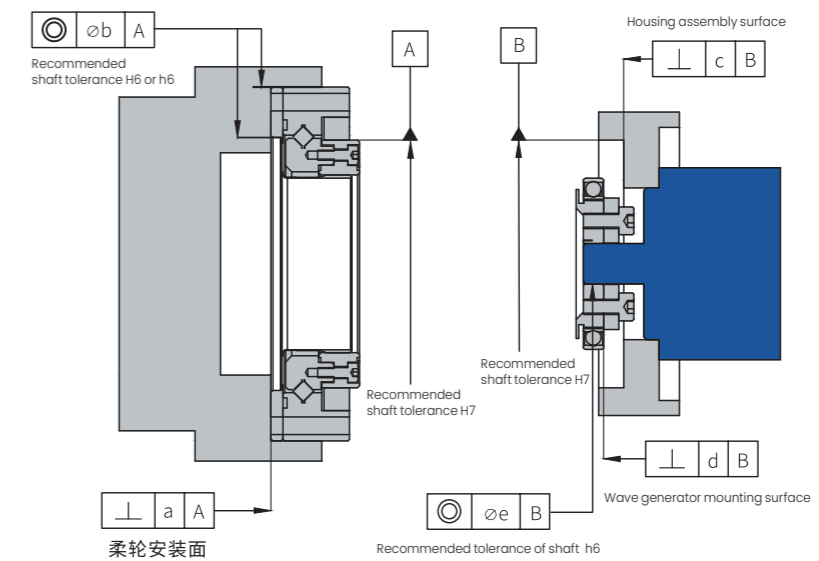
Value in ( ) is the numerical values when input unit(wave generator) is one-piece structure ( unused European coupling structure)

### WSHD-I(II) series assembly precision

During assembly design, product performance will be reduced if there is abnormal situation, such as deformation of mounting surface. Assembled reluctantly will decrease product performance as well.

To insure that harmonic reducer in use with optimal performance, please pay attention to the following points, and insure that using the recommend precision of assemble housing as shown below. (see chart below).

- 1.Deflection and distortion about assembled surface
- 2.Foreign body embedding
- 3.Screw hole of mounting hole appears burr around, bulge, and abnormal position
- 4.The chamfering concave part is insufficient
- 5.The roundness of installation concave part is abnormal



Unit:mm

Model Symbol	14	17	20	25	32
a	0.016	0.021	0.027	0.035	0.042
øb	0.015	0.018	0.019	0.022	0.022
c	0.011	0.012	0.013	0.014	0.016
d	0.008	0.010	0.012	0.012	0.012
øe	0.016	0.018	0.019	0.022	0.022



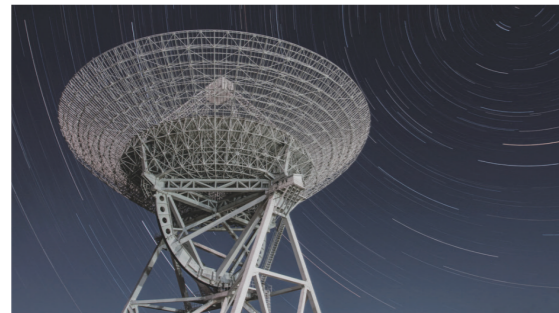
## Application area



Robots



Armarium



Communication equipment



Machine tool



Detection and analysis equipment



Printing equipment



Aerospace area



Semiconductor processing equipment

## Lubricating Grease Usage

### Harmonic Reducer Lubrication Requirements

- (1) Harmonic reducers undergo frequent start-stop and reciprocating movements, leading to wear and a decrease in precision. Therefore, the lubricating grease must possess excellent extreme pressure and anti-wear properties.
- (2) Robot joint structures are compact, have poor heat dissipation, and can experience elevated temperatures during prolonged continuous operation. The lubricating grease is required to exhibit good thermal stability and oxidation resistance.
- (3) Harmonic reducers frequently start and undergo reciprocating movements in confined spaces, enduring high-speed and high-load operations. Consequently, the grease must provide long-life lubrication, resist carbon buildup, remain color-stable, and avoid oil separation.
- (4) Due to friction, vibration, and collisions in the transmission gears of harmonic reducers, intense noise is generated. Lubricating grease is expected to have a strong oil film thickness and adhesion to effectively reduce noise.

In summary, the selected lubricating grease should possess excellent thermal stability, extreme pressure resistance, good noise reduction properties, and an exceptionally long service life.

### Harmonic Reducer Lubricating Grease Requirements

Our company currently uses a customized lubricating grease with the following characteristics:

- \*Contains organic molybdenum, effectively preventing localized high-temperature sintering under high-load operation.
- \*With special oil additives, it can effectively suppress wear in harmonic transmission, avoiding abnormal heating in confined spaces.
- \*Exhibits strong adhesion to sliding surfaces. With the assistance of special additives, it maintains an effective oil film on unlubricated surfaces, preventing wear and heat generation even during high-speed rotation.
- \*Broad operating temperature range: -40°C to 150°C.



## Performance Parameters of Lubricating Grease

Experiment Items	Experimental Conditions	Representative Parameters
Appearance	Visual inspection	Yellow
Thickening agent	/	Special lithium-based
Base oil	/	Highly refined mineral oil
Mixed needle penetration	25℃	280
Drop point℃	/	197
Copper corrosion	00℃,24h	Qualified
Separation stability mass%	100℃,24h	1.52
Evaporation loss mass%	99℃,22h	2.0
Low torque mN.m -40℃	Start operate	198 63

## Harmonic Reducer Lubricating Grease Requirements

- (1) For cup-type and cap-type hollow combination reducers, the internal concealed parts are pre-filled with lubricating grease before leaving the factory. However, when assembling the wave generator, it is necessary to inject and apply lubricating grease.
- (2) The input and output ends of the harmonic reducer must have a strictly sealed structure. For dynamic sealing locations, it is recommended to use skeleton oil seals for sealing. For static sealing locations, O-rings or sealing adhesives are recommended, and it must be ensured that the sealing surface is neither skewed nor damaged.
- (3) Use the recommended semi-fluid lubricating grease specifically designed for harmonic reducers and avoid mixing with other lubricating greases.
- (4) The method of using lubricating grease must follow the instructions. Please note that different models may require different amounts of lubricating grease for injection and application.
- (5) During the use of the harmonic reducer, if the wave generator remains consistently upward, it may lead to poor lubrication. In this case, increase the amount of lubricating grease injection or consult our company.
- (6) The performance of lubricating grease will change with temperature, and degradation occurs faster at higher temperatures. To ensure that the lubricating grease remains in good condition, the thermal balance temperature of the high-temperature end of the harmonic reducer should be below 70° C, with a temperature rise of less than 40°C.
- (7) The wear of various moving parts in the harmonic reducer is mainly influenced by the performance of the lubricating grease. Under favorable conditions, the lubricating grease should be replaced every 3000 hours of operation.

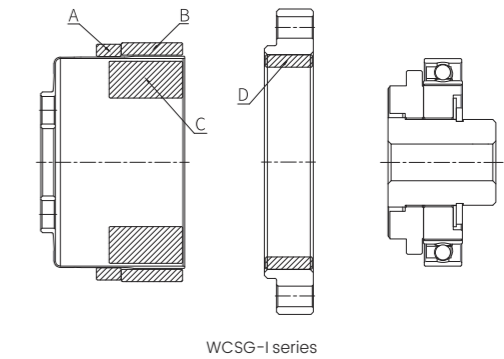
## Lubricating Grease Application Requirements

WCSG,WSHG series apply grease as per the following table

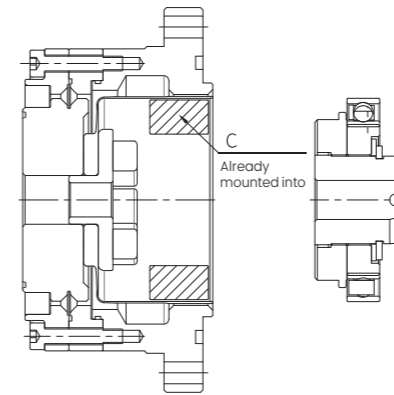
Amount of grease applied

Size	Grease area					D	Unit: g
	A	B	C				
			Horizontal use	Vertical use Upward Down			
14	0.3	0.3	6	8 9	0.3		
17	0.5	0.5	10	12 14	0.5		
20	0.8	0.8	16	18 21	0.8		
25	1.5	1.5	30	35 40	1.5		
32	3	3	60	70 80	3		

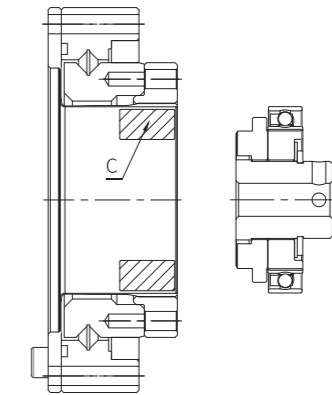
Grease area



WCSG-I series



WCSG-II series



WSHG-II series

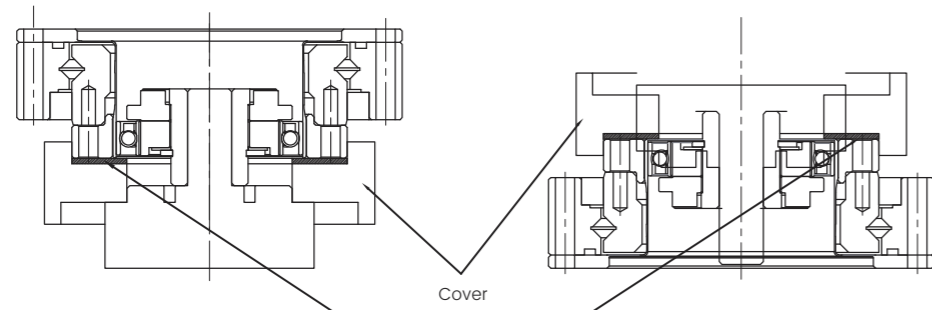
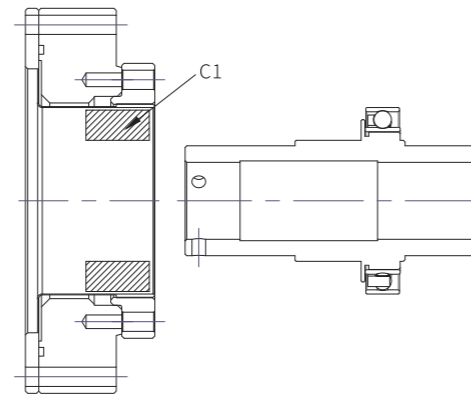
Pls. apply the grease for WSHG-III Series according to the following requirements

Amount of grease applied

Size	Grease area	
	C1	
14	5.5	
17	9.6	
20	10.3	
25	16	
32	26	

Unit: g

Grease area



Cover

50% of the space is filled

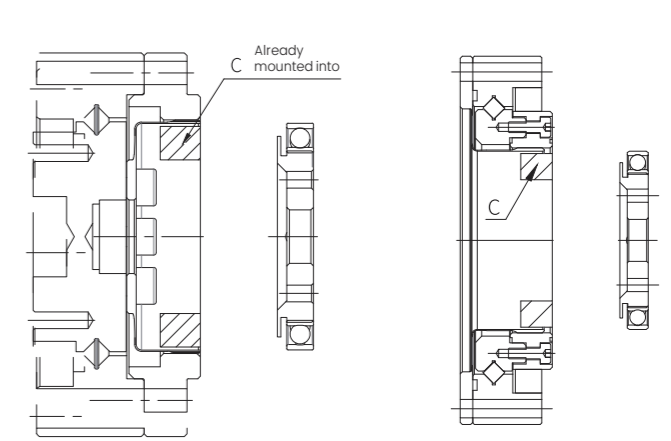
Pls. apply the grease for WSHD and WCSD Series according to the following requirements

Amount of grease applied

Size	Grease area		
	C		
	Horizontal use	Vertical use	
Upward		Down	
14	3	4	5
17	5	6	7
20	8	9	11
25	16	19	21
32	36	42	48

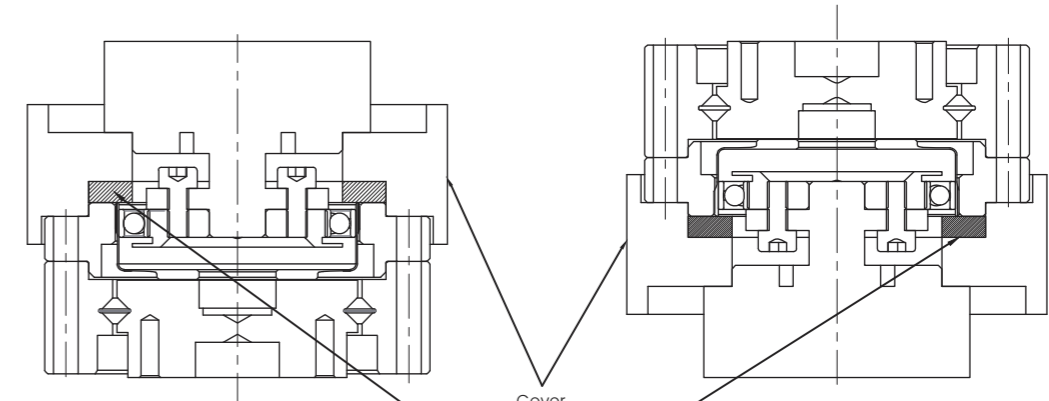
Unit: g

Grease area



WCSD series

WSHD series



Cover

50% of the space is filled

## Grease Change Time

The abrasion of the moving parts of reducer is greatly affected by the performance of the grease. The performance of the grease will change according to the temperature, the higher the temperature, the faster the deterioration, so it is necessary to change the grease. As shown in the figure below, when the average load torque is lower than the rated torque, the replacement time benchmark of the grease can be determined according to the relationship between the grease temperature and the total revolutions of the wave generator. When the average load torque exceeds the rated torque, the grease replacement time benchmark is calculated by the following formula.

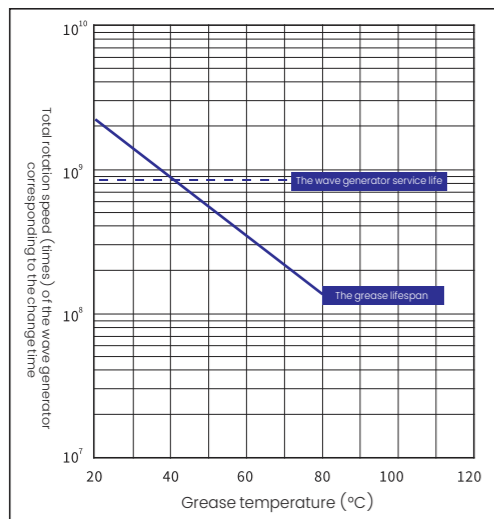
$$L_{GT} = L_{GTn} \times \left( \frac{T_r}{T_{av}} \right)^3$$

The formula for calculating when the average load torque exceeds the rated torque

$L_{GT}$	Change time beyond rated torque	Speed	—
$L_{GTn}$	Change time below rated torque	Speed	Refer to the figure below
$T_r$	The rated torque	Nm, kgfm	Refer to each series "parameter table"
$T_{av}$	Average load torque on the output side	—	Depending on the use condition

The sign of the formula

Grease change time:  $L_{GTn}$   
(when average load torque is lower than rated torque)



※ The service life of the wave generator indicates that the failure rate is 10%

Other notes:

1. Avoid mixing with other greases. In addition, when assembling to the device, please place the reducer in a separate housing.
2. When the wave generator is in an upward-facing state and rotating in a single direction at a low speed with a fixed load (input speed: less than 1000r/min), the use of reducer may cause poor lubrication, please consult Wanshsin.
3. Grease leakage for combined type. Although the combined type has been designed and constructed in response to grease leakage measures, but according to the use of the environment for sealing mechanism strengthening.

## Warranty

WANSHSIN harmonic reducer warranty period and warranty scope is as follows:

### Warranty Period

On the condition under normal assembly and lubrication state recorded in the product operation manual,  
The warranty period is either one year or the product runs up to 8,000 hours.

### Warranty Scope

Wanshsin is responsible for the repair or replacement of the product in case of failure caused by the manufacturing defects.


But the followings are not covered:


- (1) failure is caused by improper operation or illegal use.
- (2) failure is not caused by transformation or repair not by Wanshsin
- (3) failure not caused by the product.
- (4) Wanshsin is not responsible for the failure caused by natural disasters.

Moreover, the warranty here refers to the warranty of this product.


The company shall not be responsible for other losses caused by the failure of the product, the man-hours and expenses related to disassembling and assembling the equipment, etc.

## Precautions for safety use


 **Warning** Error in operation may result in death or serious injury.

 **Attention** Indicates that the wrong operation may result in injuries and property damage.


### About the scrap

 **Attention** Please treat according to industrial waste standard. Note: when scrapping, please treat as industrial waste.


### Design attentions (be sure to read the instructions when designing)

 <b>Attention</b>	<p><b>Please use under regulated conditions</b></p> <p>When using reducer, please comply with the following conditions.</p> <ol style="list-style-type: none"> <li>1. Ambient temperature: 0~40°C.</li> <li>2. Do not splash water, oil, etc.</li> <li>3. Non-corrosive, explosive gas.</li> <li>4. No dust such as metal powder.</li> </ol>	<p><b>please install according to the specified precision</b></p> <ol style="list-style-type: none"> <li>1. Assembly method, order, please follow the product catalog.</li> <li>2. Tightening method (using bolts, etc.), please follow our advice.</li> <li>3. If not assembled correctly, the operation may lead to vibration, shorten the service life, precision decline, damage and other faults.</li> </ol>
	<p><b>please install according to the specified precision</b></p> <ol style="list-style-type: none"> <li>1. Please design and assemble various parts correctly to ensure that they can meet the installation precision recommended in the product catalog.</li> <li>2. Failure to meet the specified precision may lead to vibration, shorten service life, precision decline, damage and other faults.</li> </ol>	<p><b>Please use the specified grease</b></p> <ol style="list-style-type: none"> <li>1. Do not use the grease recommended by Wanshsin may shorten the service life of the product. In addition, please change the grease according to the specified conditions.</li> <li>2. The combined product has been pre-sealed with grease. Please do not mix with other greases.</li> </ol>

### Notes for use (please be sure to read the manual when running)

 <b>Attention</b>	<p><b>Please handle the products and components with care</b></p> <ol style="list-style-type: none"> <li>1. Do not use a hammer and other hard hit each component and combination unit. In addition, please make sure that there are no cracks, dents, etc. caused by falling, etc. Otherwise, the product will be damaged.</li> <li>2. Performance cannot be guaranteed when used in a damaged state. It may also cause damage and other faults.</li> </ol>	<p><b>When in use, do not exceed the allowable torque</b></p> <ol style="list-style-type: none"> <li>1. Apply torque do not exceed the maximum allowable torque of the moment. Otherwise the bolts in the tightening part may become loose, shake, and damage, leading to product failure.</li> <li>2. If the output shaft is directly connected to the joint arm, it may be damaged due to the joint arm collision, the output shaft cannot be controlled.</li> </ol>
	<p><b>Do not change spare parts</b></p> <ol style="list-style-type: none"> <li>1. The parts of the product are made of matching processing. When used in conjunction with other suites, there is no guarantee that a particular performance will be achieved.</li> </ol>	<p><b>Do not disassemble the combined product</b></p> <ol style="list-style-type: none"> <li>1. It is strictly prohibited to disassemble and reassemble combined products. Otherwise its original performance will not be restored.</li> </ol>

### Use of grease

 <b>Warning</b>	<p><b>Installation precautions</b></p> <ol style="list-style-type: none"> <li>1. Splashing into the eye may cause inflammation. When operating, please wear protective glasses to avoid splashing into the eyes.</li> <li>2. Skin contact may cause inflammation. When operating, please wear protective gloves to avoid contact with the skin.</li> <li>3. Do not swallow (can cause diarrhea, vomiting, etc.).</li> <li>4. Be careful not to cut your finger when opening the container, please wear protective gloves.</li> <li>5. Please keep it out of reach of children.</li> </ol>	<p><b>Emergency Treatment</b></p> <ol style="list-style-type: none"> <li>1. In case of splash into the eyes, rinse immediately with water for 15 minutes and receive medical treatment.</li> <li>2. In case of contact with skin, wash thoroughly with water and soap.</li> <li>3. If swallowed, do not force it to vomit, should immediately accept medical treatment.</li> </ol>
	<p><b>Storage Method</b></p> <ol style="list-style-type: none"> <li>1. After use, please seal it to prevent dust, moisture and other mixed. Please keep it in the shade, away from direct sunlight.</li> <li>2. For long-term inventory of products, it is recommended to confirm whether the performance and rust prevention is good.</li> <li>3. Please refer to the delivery drawing for details of surface treatment.</li> </ol>	<p><b>Disposal of waste oil and waste containers</b></p> <ol style="list-style-type: none"> <li>1. The decree provides a treatment that users are obliged to implement. Please handle it correctly according to relevant laws and regulations. If you are not clear, please consult Wanshsin.</li> <li>2. Do not put pressure on empty containers, pressure may cause it to crack.</li> <li>3. Do not weld, heat, open or cut the container, otherwise there could be an explosion and the remains inside could catch fire.</li> </ol>