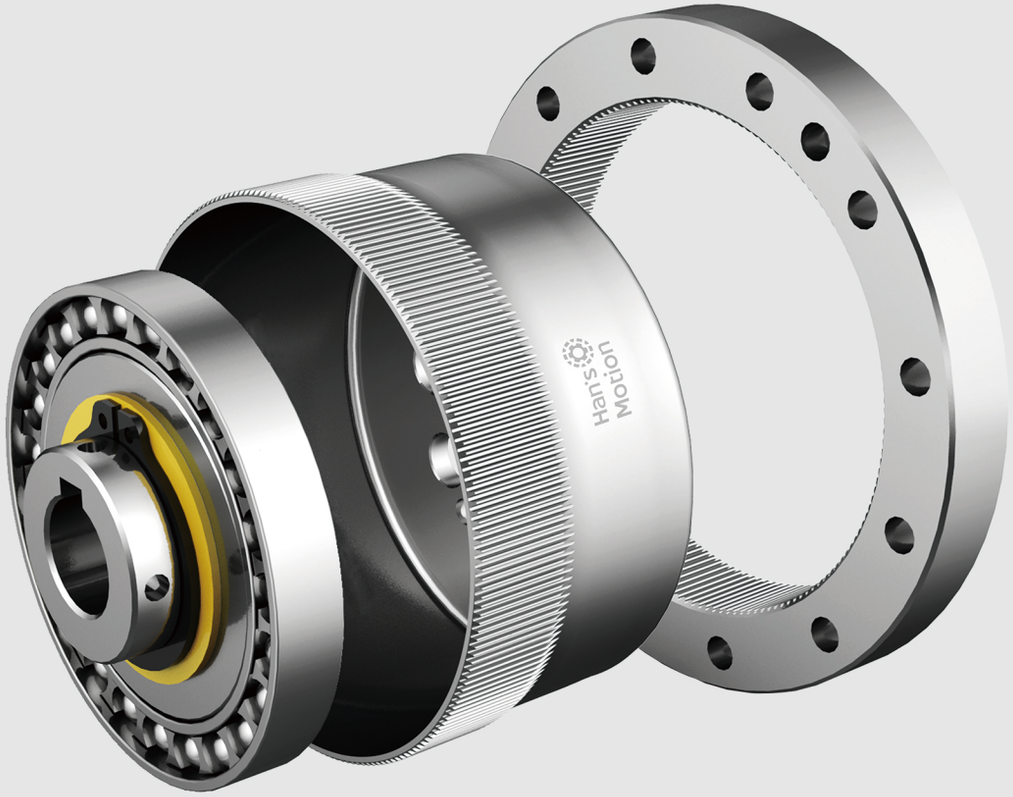
Han's Motion

Professional Manufacturer of
Precision Harmonic Gearbox



大族激光
HAN'S LASER

Motivated by a corporate philosophy of "artisanal spirit",
we will continuously enhance product value and improve our service.
We strive to become the most reliable expert of precision harmonic drive in the world.

Contents

Company profile

Shenzhen Han's Motion Technology Co., Ltd.(or Han's Motion for short) is a subsidiary of Han's Laser Technology Industry Group Co., Ltd. Han's Motion is specialized in the R&D, production and sale of precision speed reducer and device, robotic systems and electromechanical equipment.

We have strong professional technology excellent R & D and management teams, and we imported a batch of world first-class processing and testing equipment from abroad.We built an industrial robot engineering laboratory.Besides,our company has established close Industry-University-Research Collaboration with Tokyo University,Tsukuba University,etc.

Our products are for both domestic and foreign markets. Our products application covers in robots,aerospace. communication equipment. semi-conductor processing equipment, medical equipment, testing and analytical equipment, etc. We strive to become the most reliable expert of precision harmonic gearbox in the world.

Company culture

Leading fast service sharing

Business philosophy

Virya & Ingenuity

Virya : Diligent Vigorous Positive
Ingenuity : Modest Careful Persistent

Values

Customer First	Persistent striving
Embrace changes	Strong Responsibility
Self-criticism	Results-oriented

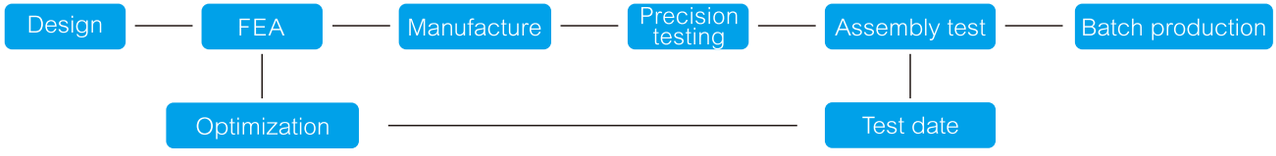
Our mission

Aim to provide our customers with first-class product and professional services;
we strive to become the most reliable expert of precision harmonic drive in the world.

R & D manufacturing

R&D process

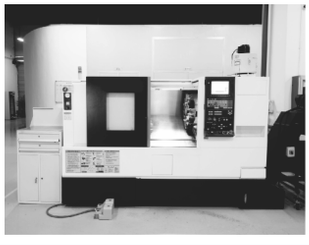
Based on theoretical calculation and finite element analysis, combined with the sophisticated detection system to obtain massive measured data, and by means of multi-objective regression optimization, Han's Motion team successfully broke through the customized design difficulties of double arc tooth profile and developed a breakthrough harmonic gearbox product.



Equipment investment

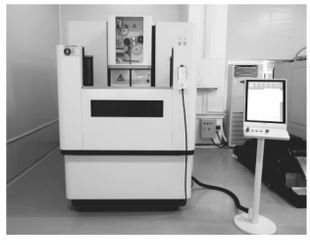
We imported a batch of world first class processing and manufacturing equipment, so we can provide strong guarantee for production team to produce high quality products.

Machining center



High precision lathe

High precision grinding machine



High precision wire cutting machine

Fabrication processing

The key component flexspline is made of imported high - quality materials, and adopts unique multi - process technology for heating processing. By optimizing the mechanical properties of the material, the precision of products can be guaranteed and the service life of the flexspline can be greatly improved.

Material heat treatment

Durometer

Metallurgical microscope

Quality control

As a key component of industrial production automation, the harmonic reducer must pass a series of stringent tests before it can be delivered.
Each finished product of Han's Motion harmonic drive, each process before leaving the factory is subjected to high standard and high quality control. After strict rigorous testing, it will eventually reach the customer.

Technical service

Service: drive value improvement

With the tenet of “provide customers with first-class products and professional service” and the service ideal of “customer first, professional and considerable, fast and efficient, and full life circle”, Han’s Motion has been providing customers with considerable full-life-circle services including presales, sales and aftersales services since its establishment.

Presales service

Customer service center

This is the information center for us communicating with you. In order to deliver the service information correctly and efficiently, we divide it into several parts, including product consultancy center, technical support center, equipment maintenance center and complaint and advice center.

We are always prepared for your calling and providing one-stop professional services including product introduction, price inquiring, technical support, customization needs and solutions, troubleshooting, repair, parts consultancy and sales, product complaint and service complaint.

Comprehensive customized technical solution

Han’s Motion owns mature solution team, senior engineers and rich experience. They can provide high-efficient and professional comprehensive customized solution based on customer’s needs.

Selling service

Consultative selling

Differentiated technical demands always exist, but we will try our best to help you optimize the option for product and realize the value optimization of product purchased.

Simplified Transportation

We provide professional on-door service. We will, to a large extent, make sure the product is delivered to you correctly and quickly through choosing convenient and quick transportation way.

Considerate installation

We provide customer with detailed product installation information and quickly solve the problem caused during installation through communication with and guidance of technical engineer and sometimes they will go to the installation site when necessary so as to realize the quick use of equipment.

After-sales service

Technical hotline

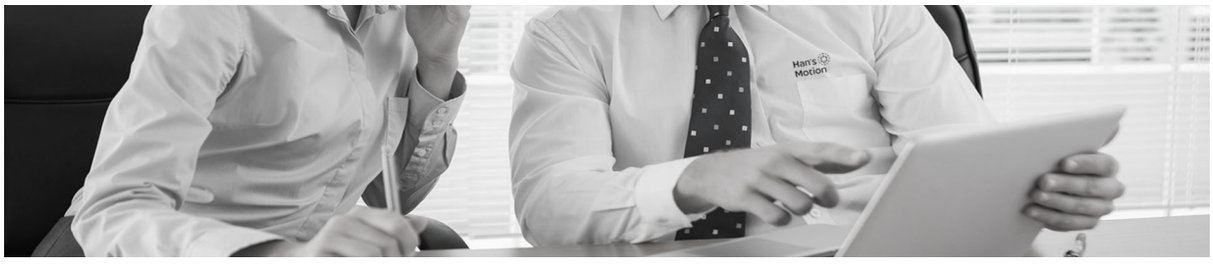
Han’s Motion team engineers provides customers with all - year - around comprehensive and extensive technical support, quickly responds to customer’s feedback and handles the help information in time.

On-site service

Make sure shortest responding time, quickly arrive in service site, provide installation guide, operation debugging, troubleshooting, product maintenance and technical upgrading services, provide preventative maintenance service to product in time to avoid fault during normal operation, and improve the equipment production capacity to the maximum.

Spare parts in-time delivery

We have complete product spare parts center that ensures we can send what you need in time when there is a fault in equipment so as to shorten the production interruption time because of equipment fault.



Principle of harmonic drive

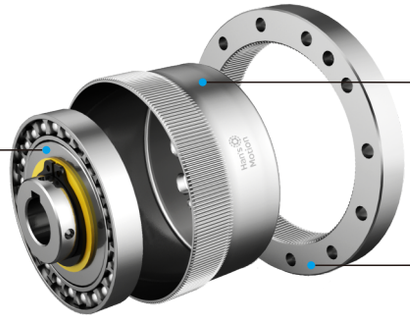
Principle of harmonic gearbox

The harmonic gear drive 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 the rigid component to realize mechanical drive, but with a flexible component instead,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. Except that the Former Soviet Union called this kind of transmission"Wave Transmission" or "Flexible Gear Drive", other countries like America, England, Germany, and Japan all called it "Harmonic Drive''.

The composition of the harmonic gear assembly

Wave generator

The wave generator is an assembly of a thin-raced ball bearing fitted onto the periphery of an elliptical cam. The inner ring of the bearing is fixed around the cam causing the outer ring of the bearing to conform to the same elliptical shape of the assembly. The wave generator is usually attached to the input shaft.



Flexspline

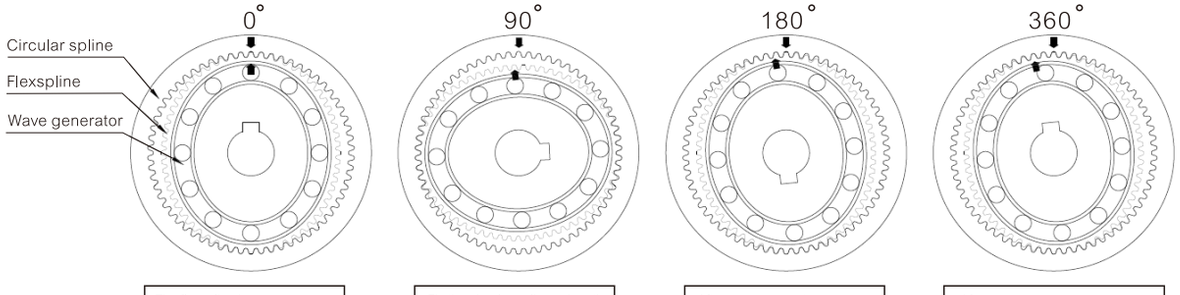
The flexspline is a thin-walled cup with outer teeth.The bottom of the flexspline (cup bottom) is called diaphram.The diaphragm is usually mounted onto the output shaft.

Circular spline

The circular spline is a rigid steel ring with teeth on the inside diameter. The circular spline has two more teeth than the flexspline. The circular spline is usually fixed to a casing.

Deceleration principle

The principle of harmonic gear transmission deceleration is to use the relative motion of the flexspine, circular spline and wave generator (mainly the controllable elastic deformation of the flexspline), to realize the motion and powertransmission. The elliptical cam in the wave generator rotates in the flexspline, causing the flexspline to deform.When the flexspline teeth and the circular spline teeth at both ends of the long shaft of the elliptical cam in the wave generator enter the engagement, the flexspline teeth at both ends of the short shaft are disengaged from the circular spline teeth. For the teeth between the long shaft and the short shaft of the wave generator, the half meshing state is gradually entering into the meshing along the different parts of the circumference of the flexspline and the circular spline, is called meshing and the half meshing state that is gradually disengaging is called engaging-out.The continuous rotation of elliptical cam in wave generator makes the flexspline deform constantly, which causes the teeth at the flexspline and circular spline to shift between the states of engaging-in, meshing, engaging-out and disengagement,thus realizing motion transmission from active wave generator to the flexspline.



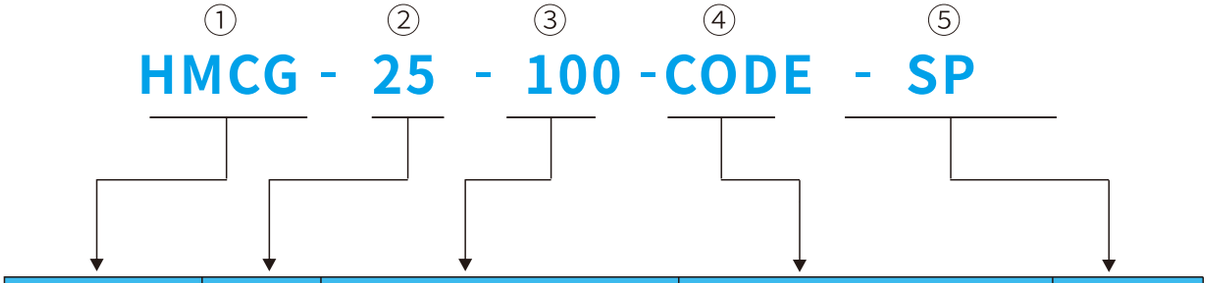
The flexspline in wave generator is bent into an elliptical shape, so the circular spline and the flexspline engage in the long shaft part, and that on the short shaft part is completely disengaged.

Fix the circular spline, when the wave generator rotates in clockwise, elastic deformation of flexspline occurs and come into engagement with circular spline.

After wave generator rotates 180 degrees, the flexspline only moves one tooth in counterclockwise.

After wave generator rotates (360 degrees), the flexspline anticlockwise moves 2 teeth due to the flexspline has 2 teeth less than the circular spline.

Product coding rules



Model name	Model NO.	Reduuction radio					Code(standard)	Special specification
HMCG	14	50	80	100	-	-	I: Component type II: Unit type II -E : Unit type (integral cam)	
	17	50	80	100	120	-		
	20	50	80	100	120	160		
	25	50	80	100	120	160		
	32	50	80	100	120	160		
	40	50	80	100	120	160		
HMCD	14	50	80	100	-	-	II : Unit type (super flat)	
	17	50	80	100	-	-		
	20	50	80	100	-	-		
	25	50	80	100	-	-		
	32	50	80	100	-	-		SP: Special None = Standard
HMHG	14	50	80	100	-	-	I: Unit type (hollow shaft) II: Simple unit type(standard type) II-E: Simple unit type(integral cam) III: Simple unit type(hollow shaft) IV: Unit type (input shaft) V: Unit type (hollow & long shaft)	
	17	50	80	100	120	-		
	20	50	80	100	120	160		
	25	50	80	100	120	160		
	32	50	80	100	120	160		
	40	50	80	100	120	160		
HMHD	14	50	80	100	-	-	I : Unit type (hollow shaft) III : Simple unit type (super flat hollow shaft)	
	17	50	80	100	-	-		
	20	50	80	100	-	-		
	25	50	80	100	-	-		
	32	50	80	100	-	-		

Note 1 : Model name

HM is short for Hans Motion
Flexspline ' shapes are divided into cup and hat,“C” refers to cup and “H” refers to hat.
Flexspline' lengths are divided into standard and dwarf, “S” refers to standard and “D” refers to dwarf.
"G" refers to high torque.

Note 2 : Specifications code

Specifications code	14	17	20	25	32	40
Pitch diameter of Flexspline	35.6	43.2	50.8	63.5	81.3	101.6

Technical characteristics

Han's Motion Technical team realized the tooth shape optimization design through the big data theory modeling, simulation optimization and performance verification, broke the constraint of experience accumulation and correction in the transmission design. We are seeking improvement and innovation been constantly in technical performance, product structure, processing technology, materials and features of harmonic drive. Through long-term technical accumulation, the key technologies of our harmonic drive has reached international level of similar products in the product accuracy, longevity, stability, noise control, and the technical indicators are in the forefront.

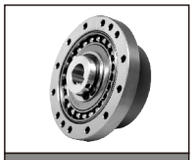
Innovative technologies

- Unique tooth profile
  Circular arc tooth shape, the quantity of teeth in engagement is up to 30% .
- Steady transmission
  Stable rotating due to teeth engagement.
- High accurate transmission
  Transmission error ≤ 1 arc min, backlash ≤ 10 arc sec.
- High torque capacity
  2 times higher than the conventional involute harmonic drive.
- Small size and light weight
  The length-diameter ratio of the flexspline is up to 1/2.

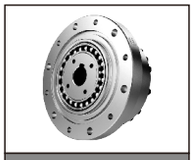
Product features

- Zero backlash, small clearance design, back clearance less than 10 arc-sec.
- With adoption of high-quality imported material and specially optimized heat treatment technology, its service life is greatly improved.
- Standardized connection size, good universality.
- Low noise, low vibration,smooth operation, stable performance, safe and reliable.

At present, the company has independently developed and produced 11 product series, over 300 models of harmonic gearbox. Cover the intelligent manufacturing industry and meet the requirements of different markets and application fields, such as industrial robots.


HMCG-I


HMCG- II


HMCG- II -E


HMCD-II

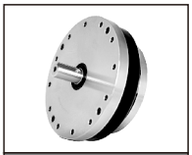

HMHD-III


HMHG-I


HMHG- II


HMHG- II -E


HMHG-III


HMHG-IV


HMHG-V

Terminology and Definition

1. Rated Torque

This indicates the permissible continuous load when the input rotational speed is 2000 r/min.

2. Permissible Peak Torque for Start/Stop

Load torque is larger than the steady torque which applied to reducer by the load interia moment for start and stop. Values from the ratings show the acceptable value at peak torque .

3. Permissible maximum momentary torque

Unexpected impact torque may be applied from the exterior except regular-load torque and load torque for emergency stop.
The maximum value of the impact torque must not exceed the maximum momentary torque, if not , it can damage the reducer.

4. Ratcheting Torque

When excess impact torque is applied during operation, the engagement of the teeth between the circular spline and the flexspline may be put momentarily out of alignment instead of damaging the flexspline. This phenomenon is called“ratcheting, and the torque is called“ratcheting torque”(see values on the corresponding page of each series).Operating the drive without fixing ratcheting will cause earlier teeth abrasion and shorter life of the wave generator bearing due to the effect of the grinding powder generated by ratcheting.

Please pay attention for below two points:
① When ratcheting is occur, the teeth may not be engaged correctly (out of alignment), Operating without fix it will cause vibration and damage the flexspline.
② Once ratcheting is occur, the tips of the teeth are worn and the torque value generated by ratcheting will be lowered.

5. Buckling Torque

When excess torque is applied to the flexspline(output) with the wave generator fixed,the flexspline causes elastic deformation, buckles on the body before long and will be destroyed.The torque at the time is called buckling torque.

Starting Torque(N·cm)

Model	14			17			20				25				32				40			
Reduction Ratio	50	80	100	50	80	100	50	80	100	120	50	80	100	120	50	80	100	120	50	80	100	120
HMCG-I	3.6	2.6	2.3	5.6	3.6	3.2	7.3	4.5	4.1	3.6	13	8.5	7.6	6.9	29	18	17	14	51	32	29	26
HMCG- II HMHG- II /III	4.5	3.1	2.8	6.7	4.4	3.7	8.6	5.4	4.7	4.2	17	10	8.8	8	34	21	20	17	61	39	34	31
HMHG- I	8.8	7.5	6.9	27	25	24	36	33	32	31	56	50	49	48	85	74	72	68	136	117	112	110
HMHG-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	72	52	47	44
HMHG-V	7.9	6.4	6	11.9	9.4	8.6	16	12.7	12	11.4	30.2	23.3	21.8	21	61.2	46.8	45.6	42	-	-	-	-

Model	14			17			20				25				32			
Reduction Ratio	50	80	100	50	80	100	50	80	100	120	50	80	100	120	50	80	100	120
HMCD	4.4	3.5	2.8	6.7	4.5	3.8	8.9	5.5	5.1	-	16	10	9.1	-	32	20	20	-
HMHD	6.2	5.2	4.8	10	9	9	13	12	11	-	20	18	17	-	30	28	25	-

Performance Parameter

HMCG、HMHG Series

Model	Reduction Ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave. load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽
14	50	7	23	9	46	8000	3500	20	90
	80	10	30	14	51			20	90
	100	10	36	14	70			10	90
17	50	21	44	34	91	7000	3500	20	90
	80	29	56	35	113			20	90
	100	31	70	51	143			10	90
	120	31	70	51	112			10	90
20	50	33	73	44	127	6000	3500	20	60
	80	44	96	61	165			20	60
	100	52	107	64	191			10	60
	120	52	113	64	191			10	60
	160	52	120	64	191			10	60
25	50	51	127	72	242	5500	3500	20	60
	80	82	178	113	332			20	60
	100	87	204	140	369			10	60
	120	87	217	140	395			10	60
	160	87	229	140	408			10	60
32	50	99	281	140	497	4500	3500	20	60
	80	153	395	217	738			10	60
	100	178	433	281	841			10	60
	120	178	459	281	892			10	60
	160	178	484	281	892			10	60
40	50	178	523	255	892	4000	3000	10	60
	80	268	675	369	1270			10	60
	100	345	738	484	1400			10	60
	120	382	802	586	1530			10	60
	160	382	841	586	1530			10	60

HMCG Series Ratcheting Torque(Nm)

Reduction Ratio \ Model	14	17	20	25	32	40
50	110	190	280	580	1200	2300
80	140	260	450	880	1800	3600
100	100	200	330	650	1300	2700
120	-	150	310	610	1200	2400
160	-	-	280	580	1200	2300

HMCG Series Buckling Torque (Nm)

Model	14	17	20	25	32	40
All Ratios	260	500	800	1700	3500	6700

HMHG Series Ratcheting Torque(Nm)

Reduction Ratio \ Model	14	17	20	25	32	40
50	110	190	280	580	1200	2300
80	140	260	450	880	1800	3600
100	100	200	330	650	1300	2700
120	-	150	310	610	1200	2400
160	-	-	280	580	1200	2300

HMHG Series Buckling Torque(Nm)

Model	14	17	20	25	32	40
All Ratios	210	420	700	1300	2800	5200

HMCD、HMHD Series

Model	Reduction Ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave. load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽
14	50	3.5	11.4	4.6	23	8000	3500	20	90
	80	5.1	15	6.2	29			20	90
	100	5.1	18	7	33			20	90
17	50	10.5	22	17	46	7000	3500	20	90
	80	14	29	21	54			20	90
	100	15	35	26	67			20	90
20	50	16	37	23	66	6000	3500	20	90
	80	23	49	28	78			10	90
	100	27	54	32	90			10	90
25	50	26	66	36	121	5500	3500	20	60
	80	42	91	62	157			10	60
	100	45	105	71	175			10	60
32	50	50	143	71	255	4500	3500	20	60
	80	79	202	126	350			10	60
	100	91	221	143	399			10	60

HMCD Series Ratcheting Torque(Nm)

Reduction Ratio \ Model	14	17	20	25	32
50	88	150	220	450	980
80	90	170	280	550	1050
100	84	160	260	500	1000

HMCD Series Buckling Torque(Nm)

Model	14	17	20	25	32
All Ratios	190	330	560	1000	2200

HMHD Series Ratcheting Torque(Nm)

Reduction Ratio \ Model	14	17	20	25	32
50	88	150	220	450	980
80	90	170	280	550	1050
100	84	160	260	500	1000

HMHD Series Buckling Torque(Nm)

Model	14	17	20	25	32
All Ratios	130	260	470	850	1800

Performance Parameter

HMCG HMHG Series Hysteresis Loss and Rigidity									
Model	Reduction Ratio	T1	T2	Hysteresis Loss	Torsional Stiffness (10000 Nm/rad)			Torsional Quantity (arcmin)	
		Nm	Nm	arcmin	K1	K2	K3	θ1	θ2
14	50	2	6.9	2	0.41	0.47	0.57	1.7	5.6
	>80			1	0.56	0.61	0.71	1.2	4.2
17	50	3.9	12	2	0.97	1.00	1.30	1.4	4.2
	>80			1	1.20	1.40	1.60	1.1	3.3
20	50	7	25	2	1.56	1.80	2.30	1.6	5.3
	>80			1	1.92	2.50	2.90	1.3	3.9
25	50	14	48	2	3.00	3.40	4.40	1.6	5.4
	>80			1	3.72	5.00	5.70	1.3	3.8
32	50	29	108	2	6.48	7.80	9.80	1.6	5.4
	>80			1	8.00	11.00	12.00	1.2	4.0
40	50	54	198	2	12.00	14.00	18.00	1.6	5.3
	>80			1	15.60	20.00	23.00	1.2	3.8

*The values of Rigidity in this table are for reference,the lower-limit value is about 80% of the value listed above..

HMCD HMHD Series Hysteresis Loss and Rigidity									
Model	Reduction Ratio	T1	T2	Hysteresis Loss	Torsional Stiffness (10000 Nm/rad)			Torsional Quantity (arcmin)	
		Nm	Nm	arcmin	K1	K2	K3	θ1	θ2
14	50	2	6.9	2.5	0.29	0.37	0.47	2.4	6.4
	>80			2	0.4	0.44	0.61	1.7	5.4
17	50	3.9	12	2	0.67	0.88	1.20	2.0	4.6
	>80			1	0.84	0.94	1.30	1.6	4.3
20	50	7	25	2	1.1	1.3	2	2.2	6.6
	>80			1	1.3	1.7	2.5	1.8	5.0
25	50	14	48	2	2	2.7	3.7	2.4	6.1
	>80			1	2.7	3.7	4.7	1.8	4.5
32	50	29	108	2	4.7	6.1	8.4	2.1	6.1
	>80			1	6.1	7.8	11	1.7	4.8

*The values of Rigidity in this table are for reference,the lower-limit value is about 80% of the value listed above..

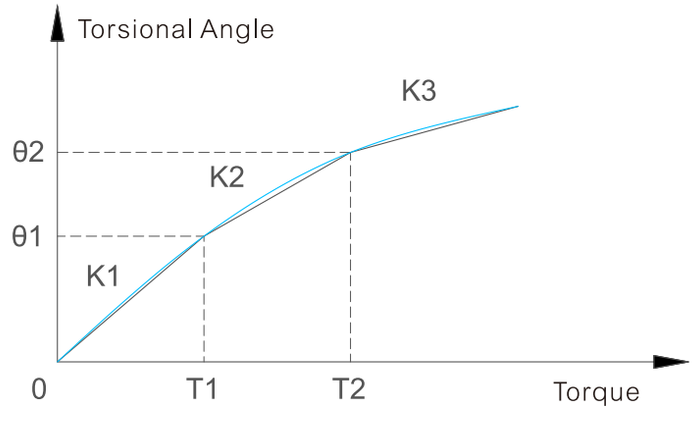
Rigidity

Fixing the input side (wave generator), the torsional angle and torsional stifness when applying torque to the output side (flexspline) generates torsion almost proportional to the torque on the output side.

Torsional Stifness=Torque T / Torsional Angle θ
K1…The torsional stifness of the torque from 0 to T1
K2…The torsional stifness of the torque from T1 to T2
K3…The torsional stifness of the torque from T3 to T4

Hysteresis Loss

Fixing the input side (wave generator), after the torque is applied up to the rated torque value, the torque is brought back to zero, the torsional angle will bot become absolutely zero and a small amount remains, this calls hysteresis loss.



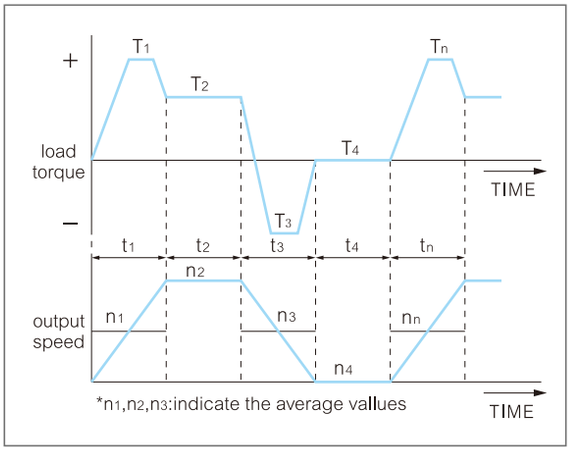
Selection process

Please select the model according to the following flow chart. Whenever a value exceeds the rating table, reconsider a larger model or consider to reduce the load torque and other conditions.

In general, the servo system can nearly impossible operate continuously with a certain amount of load. Input speed and load torque will change, and there will be a large torque effect when starting and stopping. In addition, there will be unexpected impact torque.

Confirmation of load torque mode

First, the mode of load torque must be mastered, please confirm the specifications shown below.



Calculate the values of each load torque mode

Load Torque	Tn (Nm)
Time	tn (sec)
The output speed	nn (r/min)

Normal mode of operation

Starting Time	T1, t1, n1
Steady operation time	T2, t2, n2
Stoping time (slowing)	T3, t3, n3
Break Time	T4, t4, n4

Maximum rotational speed

Maximum output speed	no *max*
Maximum input speed	ni *max*

(restricted by motor)

Impact torque

When impact torqueis applied	Ts, ts, ns

Calculate the average load torque applied to the output side of the harmonic drive according to the load torque model: T*av* (Nm)

$$Tav = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot |T_1|^3 + n_2 \cdot t_2 \cdot |T_2|^3 + \cdots n_n \cdot t_n \cdot |T_n|^3}{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}}$$

Select the model temporarily according to the following conditions
T*av* ≤ Maximum permissible value of average load torque (refer to the rated tables of each series)

- Calculate the average output speed: no *av* (r/min)

$$no\ av = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + \cdots n_n \cdot t_n}{t_1 + t_2 + \cdots t_n}$$

- Confirm the reduction ratio (R)
  ni *max* Will be restricted according to the motor

$$\frac{ni\ max}{no\ max} \geq R$$

- Calculate the average input speed(ni *av* (r/min))according to the average output speed(no *av*) and reduction ratio(R)

$$ni\ av = no\ av \cdot R$$

- Calculate the maximum input speed(no *max* (r/min))according to the maximum output speed(no *max*) and reduction ratio(R)

$$ni\ max = no\ max \cdot R$$

NO — Verify that the temporarily selected model is within value of the rated table.
ni *av* ≤ Permissible average input rotational speed(r/min)
ni *max* ≤ Permissible maximum input rotational speed(r/min)

NO — Confirm whether T1,T3 is within the allowable peak torque value of the rated table(Nm) when start or stop.

NO — Confirm whether T3 is within the permissible maximum momentary torque value(Nm) of the rated table.

NO — According to the output speed(ns)and time(ts) when impact torque is applied, calculate the allowable number and confirmed whether it is in accordance with the operating conditions.

$$Ns = \frac{10^4}{2 \cdot \frac{ns \cdot R}{60} \cdot t}\ (r) \cdots Ns \leq 1.0 \times 10^4\ (r)$$

Study working condition or model again

Model is selected

Main roller bearings Specification

Crossed roller bearing is used in the unit type to directly support the external load.

Crossed Roller Bearing Specification					
Series	Model	Rigidity	Permissible Static Torque	Rated Dynamic load	Rated Static Load
		10^4Nm/rad	Nm	$\times10^2$N	$\times10^2$N
HMCG-II HMCG-II-E	14	4.38	41	47	60.7
	17	7.75	64	52.9	75.5
	20	12.8	91	57.8	90
	25	24.2	156	96	151
	32	53.9	313	150	250
	40	91	450	213	365
HMHG-I HMHG-IV HMHG-II HMHG-II-E HMHG-III	14	8.5	74	58	86
	17	15.4	124	104	163
	20	25.2	187	146	220
	25	39.2	258	218	358
	32	100	580	382	654
	40	179	849	433	816
HMCD-II	14	4.38	41	47	60.7
	17	7.75	64	52.9	75.5
	20	12.8	91	57.8	90
	25	24.2	156	96	151
	32	53.9	313	150	250
HMHD-III	14	7.08	37	29	43
	17	12.7	62	52	81
	20	21	93	73	110
	25	21	129	109	179
	32	82.1	290	191	327

*The values of Rigidity in this table are for reference,the lower-limit value is about 80% of the value listed above..

Main roller bearings Specification

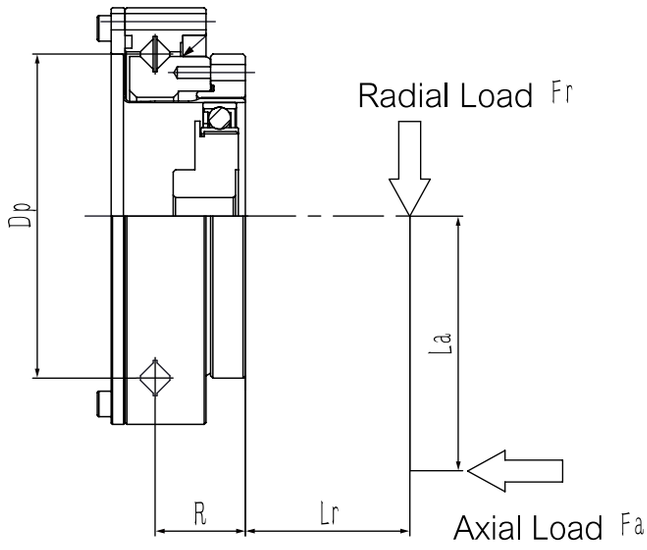
Make sure the maximum static load torque (Mmax) ≤Permissible static torque (MC)
M max=Fr max (Lr+R) +Fa max • La

Obtain the average radial load(Fra),the average axial load(Faa) and average output rotational speed(Noav)

$$Fra = \sqrt[10/3]{\frac{n_1t_1(|Fr_1|)^{10/3} + n_2t_2(|Fr_2|)^{10/3} \cdots + n_nt_n(|Fr_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots + n_nt_n}}$$

$$Faa = \sqrt[10/3]{\frac{n_1t_1(|Fa_1|)^{10/3} + n_2t_2(|Fa_2|)^{10/3} \cdots + n_nt_n(|Fa_n|)^{10/3}}{n_1t_1 + n_2t_2 \cdots + n_nt_n}}$$

$$Noav = \frac{n_1t_1 + n_2t_2 \cdots + n_nt_n}{t_1 + t_2 \cdots + t_n}$$



Obtain the load coefficienct

Obtain the load coefficienct	Radial Coefficienct(X)	Axial Coefficienct(Y)
$\frac{Faa}{Fra + 2(Fra(Lr + R) + Faa \cdot La) / Dp} \leq 1.5$	1	0.45
$\frac{Faa}{Fra + 2(Fra(Lr + R) + Faa \cdot La) / Dp} > 1.5$	0.67	0.67

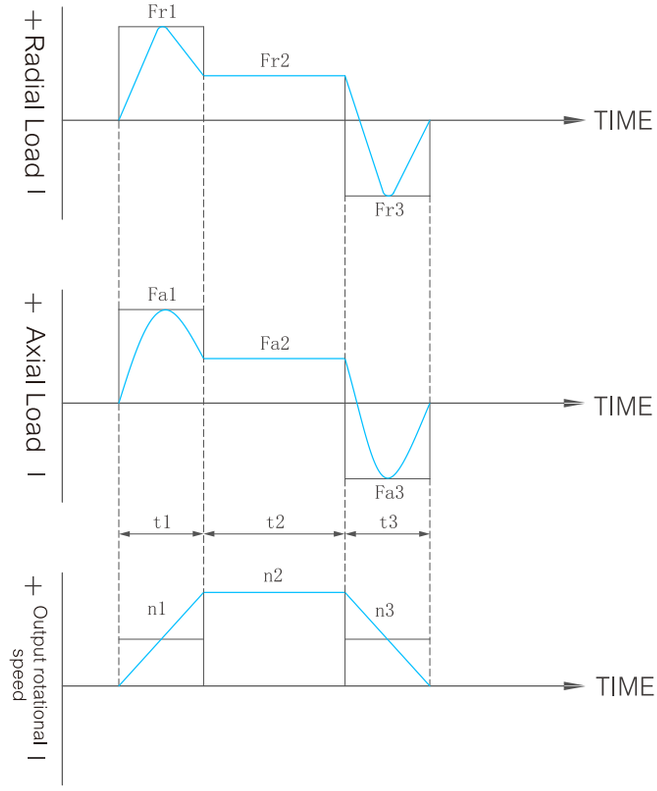
Obtain dynamic equivalent radial load(Pc)

$$Pc = X \cdot (Fra + \frac{2(Fra(Lr + R) + Faa \cdot La)}{Dp}) + Y \cdot Faa$$

Obtain the life time of bearing

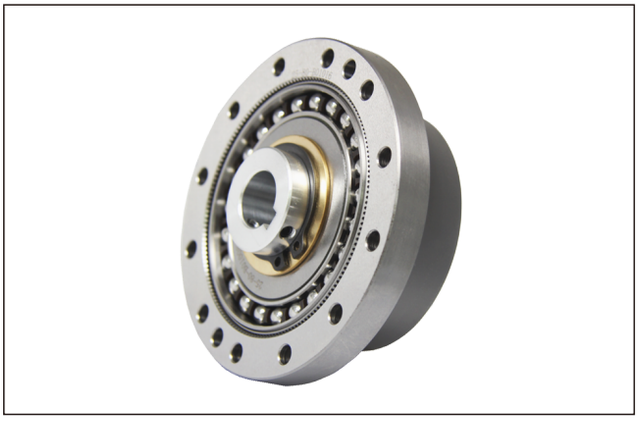
$$L_{10} = \frac{10^6}{60 \times Noav} \times (\frac{C}{fw \cdot Pc})^{10/3}$$

Load status	fw
Smooth operation without shock and vibration	1~1.2
Normal operation	1.2~1.5
With shock and vibration	1.5~3



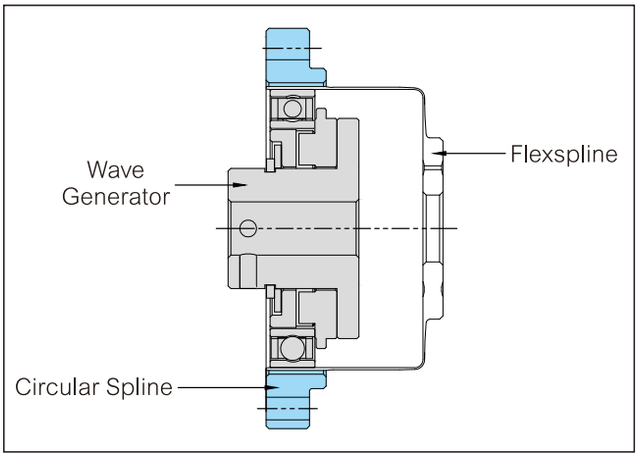
HMCG-I series Harmonic gearbox

HMCG-I series product details



Component type

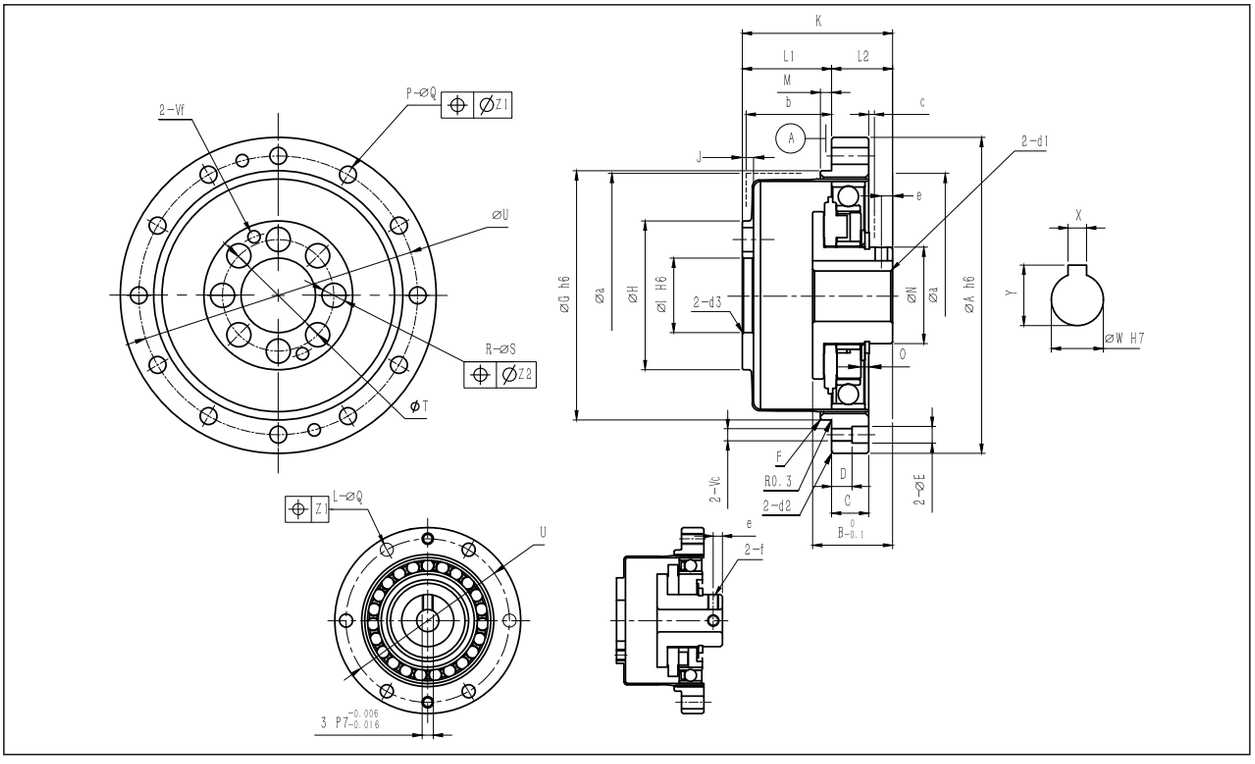
HMCG-I series consists of three basic components: flexspline, circular spline and wave generator. The flexspline is a cup-shaped standard structure, and its input shaft directly cooperates with the inner hole of wave generator and connects with it through flat key or fastening screw.



Product features

1.Three basic components
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been has been improved by 30%
7.Compared to HMCS series,life time has been has been improved by 43%

HMCG-Iseries dimension drawing



HMCG-I series Harmonic gearbox

HMCG-I series dimension table

unit : mm

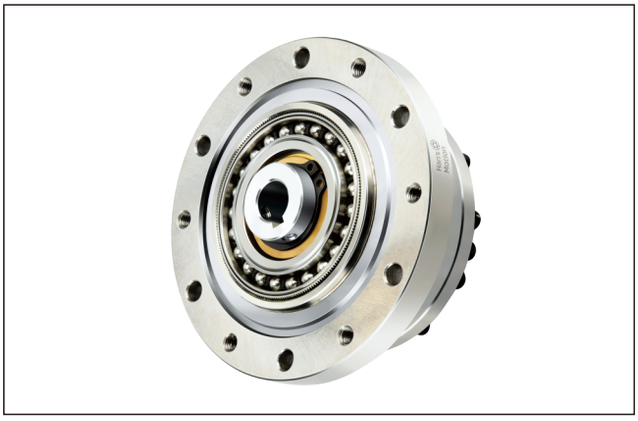
Symbol \ Modle		14	17	20	25	32	40
∅A h6		50	60	70	85	110	135
B		18.5	20.7	21.5	21.6	23.6	29.7
C		6	6.5	7.5	10	14	17
D		-	-	4	6	7	7
∅E		-	-	3.5	4.5	5.5	6.6
F		C0.3	C0.4	C0.4	C0.4	C0.4	C0.4
∅G h6		38	48	54	67	90	110
∅H		23	27.2	32	40	52	64
∅I H6		11	10	16	20	26	32
J		2.4	3	3	3	3.2	4.1
K		28.6±0.2	32.2±0.2	33.5±0.2	37.2±0.2	44±0.2	53±0.2
L1		17.5	20	21.5	24	28	34
L2		11.1	12.2	12	13.2	16	19
M		2	2.5	3	3	3	4
∅N		14	18	21	26	26	32
O		0.4	0.3	0.1	2.1	2.5	3.3
P		8	16	16	16	16	16
∅Q		3.5	3.4	3.5	4.5	5.5	6.6
R		6	6	8	8	8	8
∅S		4.5	5.5	5.5	6.6	9	11
T(PCD)		17	19	24	30	40	50
U(PCD)		44	54	62	75	100	120
Vc		M3	M3	M3	M4	M5	M6
Vf		M3	M3	M3	M4	M5	M6
∅W	Standard(H7)	6	8	11	14	14	14
	Maximum size	8	10	13	15	15	15
XJS9		-	-	4	5	5	5
Y		-	-	12.8	16.3	16.3	16.3
∅Z1		0.25	0.2	0.25	0.25	0.25	0.25
∅Z2		0.25	0.25	0.25	0.3	0.5	0.25
∅a		38	45	53	66	86	106
b		17.1	19	20.5	23	26.8	33
c		1	1	1.5	1.5	1.5	2
Cd1		0.4	0.4	0.4	0.4	0.4	0.5
Cd2		0.4	0.4	0.4	0.4	0.4	0.5
Cd3		0.5	0.5	0.5	0.5	0.5	0.5
e		2.5	3	-	-	-	-
f		M3X4	M3X6	-	-	-	-
Weight(kg)		0.100	0.17	0.26	0.43	0.91	1.8

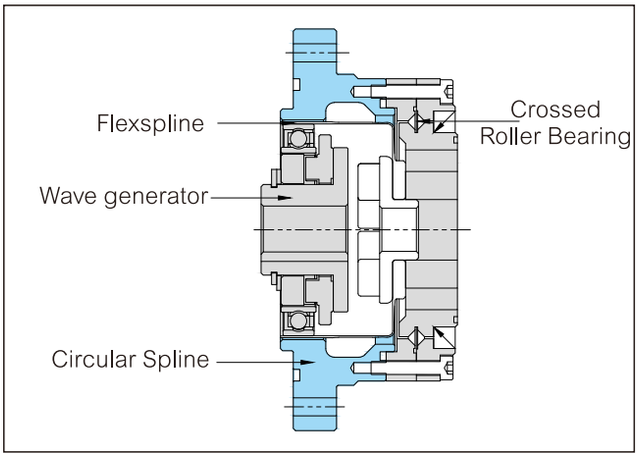
HMCG-I series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.1
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.17
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.26
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	0.43
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	0.91
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	1.8
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

HMCG-II series Harmonic gearbox

HMCG -II series product details





Unit Type

HMCG-II series flexspline belongs to cup-shaped standard structure and its input shaft connects with the inner hole of wave generator through Oldham coupling. Generally, the circular spline is fixed and flexspline as output.

Product features

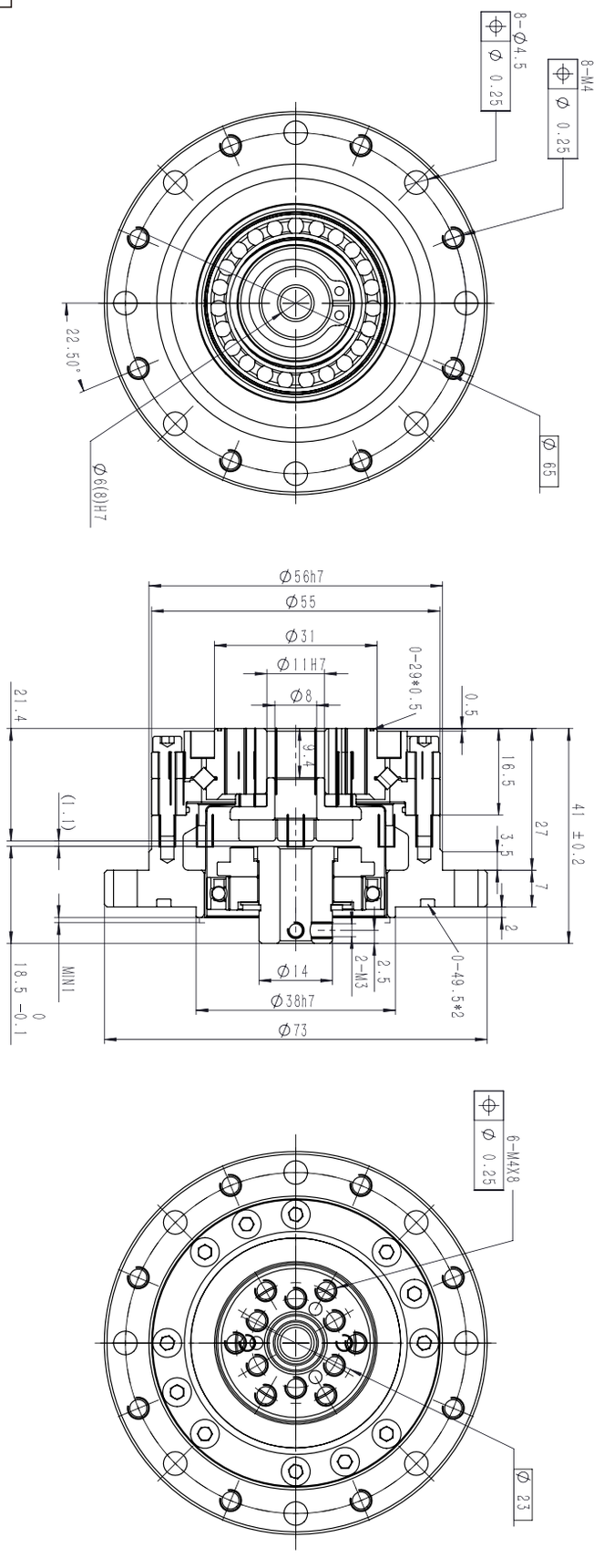
1.Cup-shaped standard structure
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

HMCG-II series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.52
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.68
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.98
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	1.5
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	3.2
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	5
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

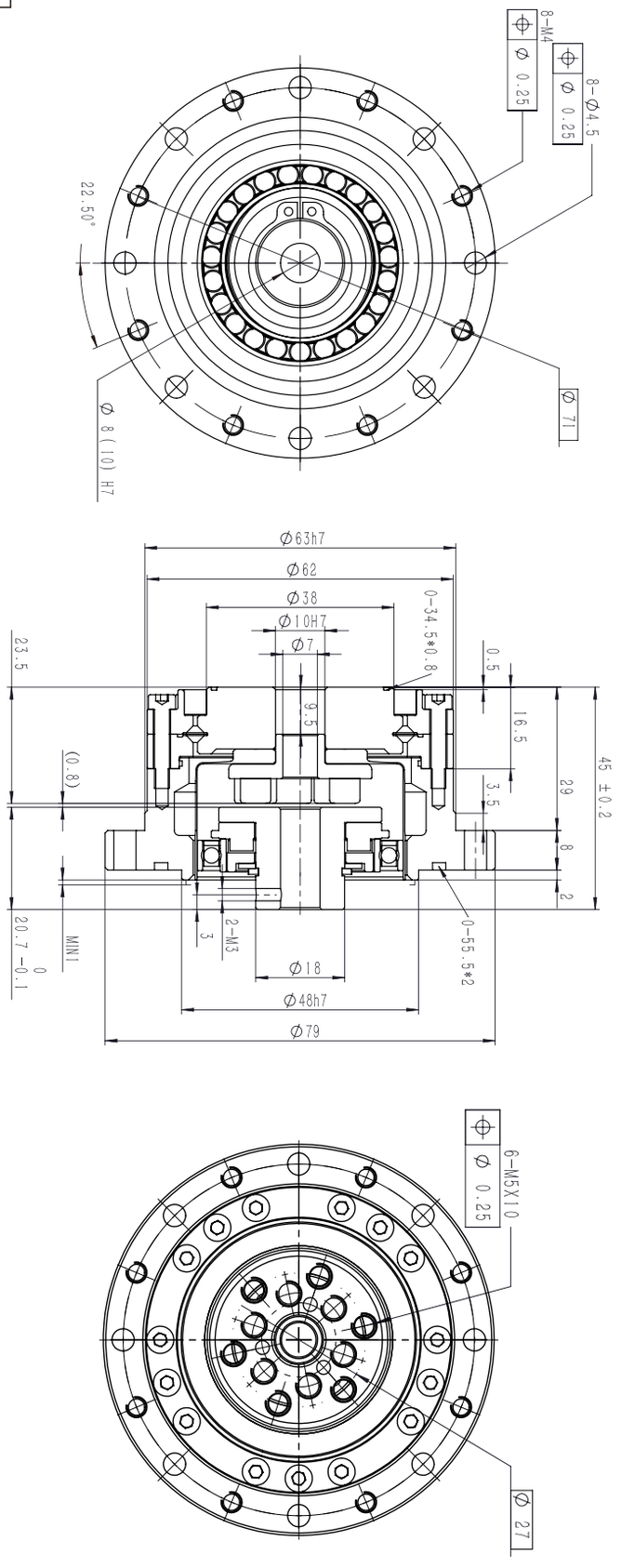
HMCG-II series Harmonic gearbox

HMCG-14-XX-II



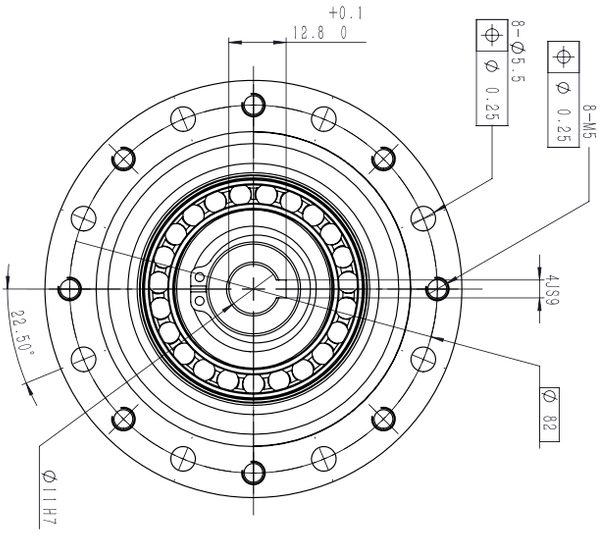
HMCG-II series Harmonic gearbox

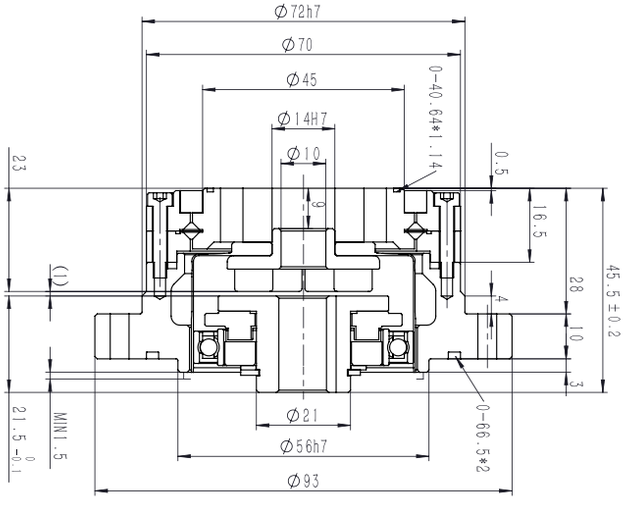
HMCG-17-XX-II

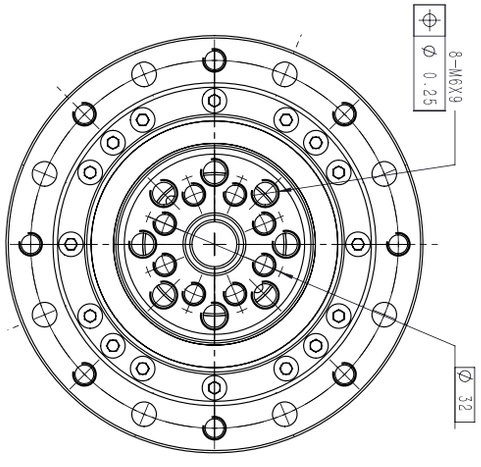


HMCG-II series Harmonic gearbox

HMCG-20-XX-II

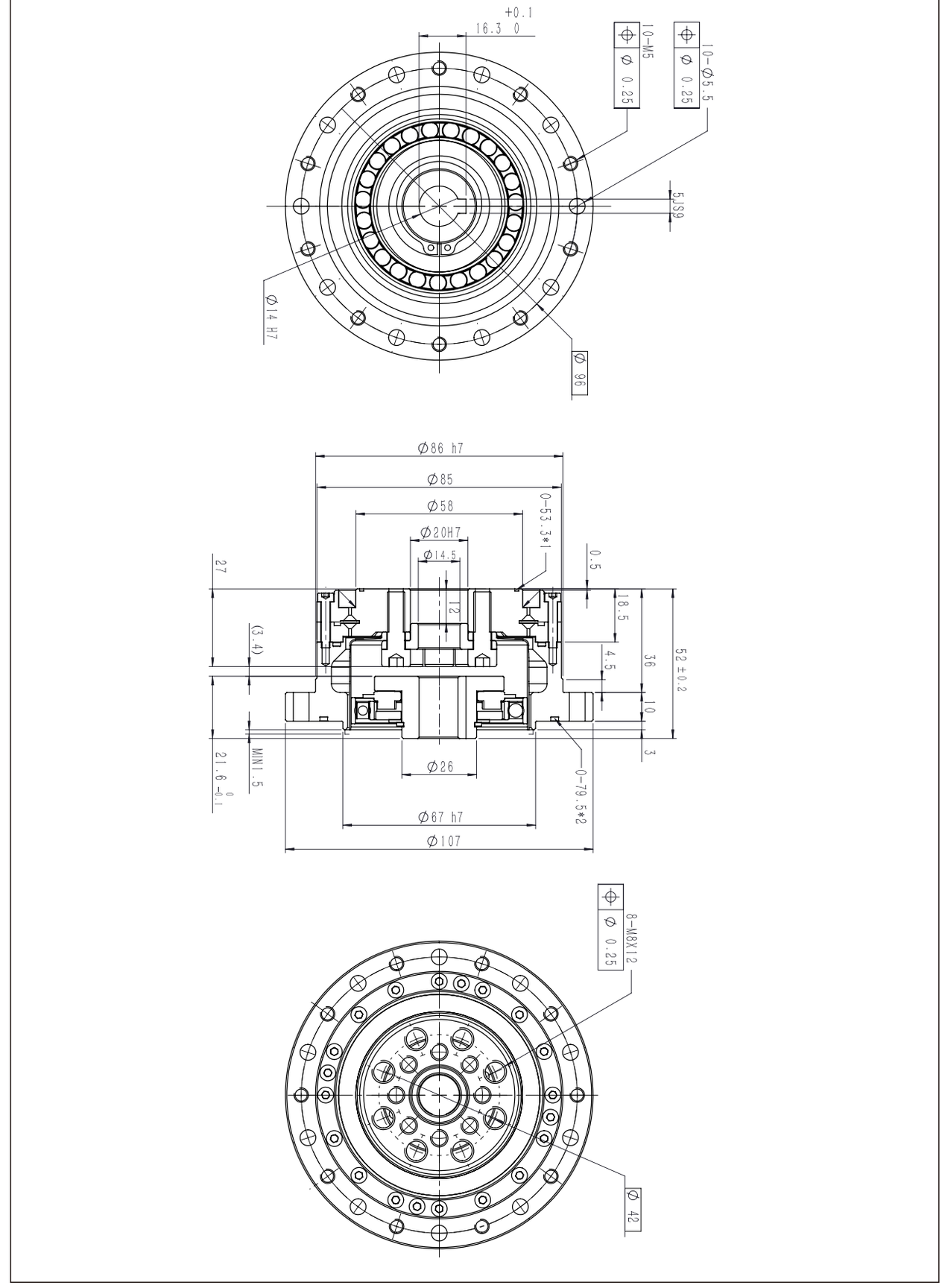






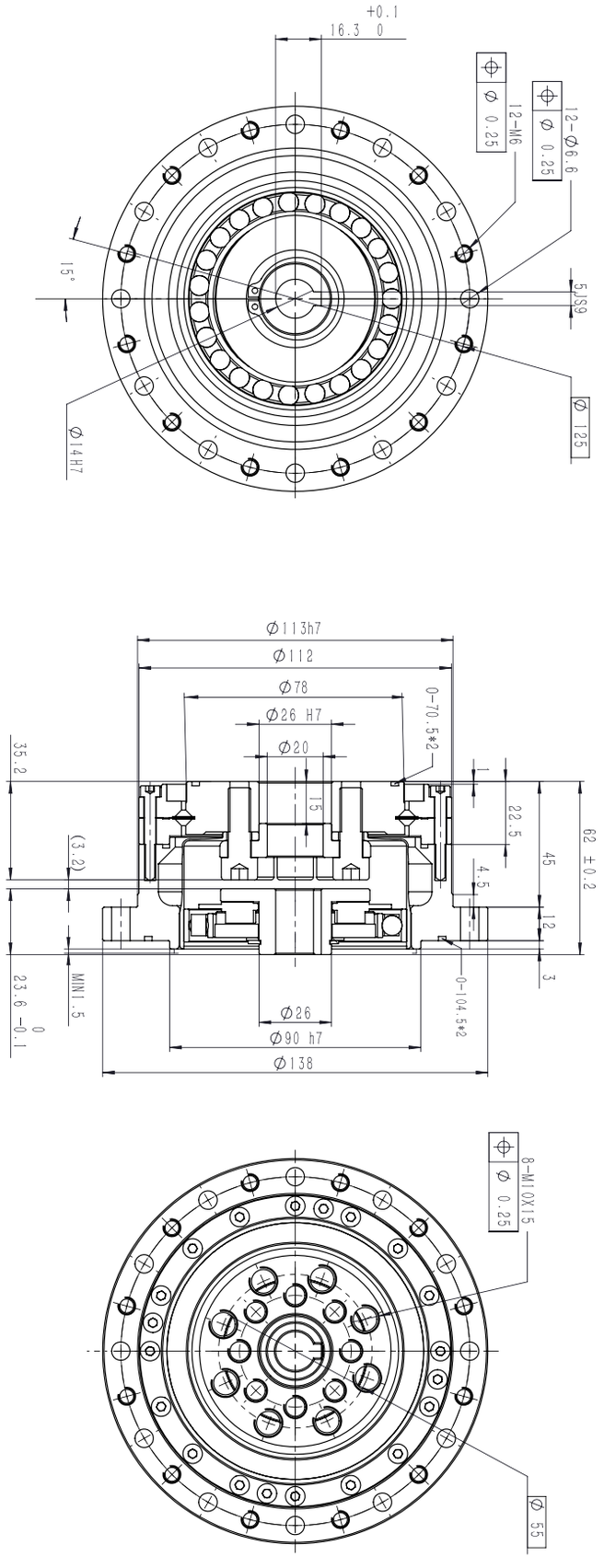
HMCG-II series Harmonic gearbox

HMCG-25-XX-II



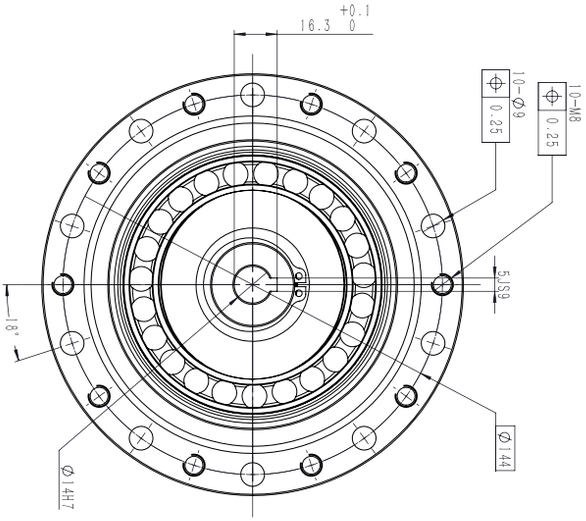
HMCG-II series Harmonic gearbox

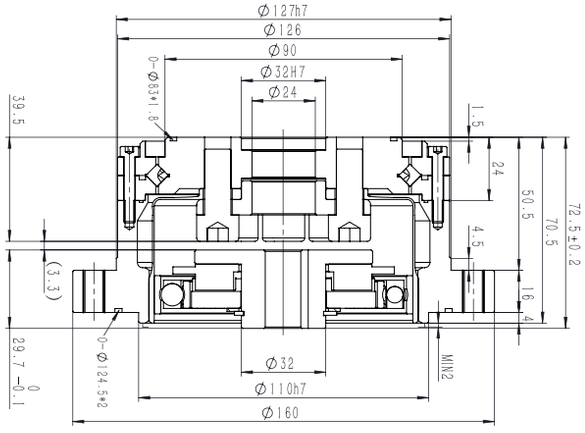
HMCG-32-XX-II

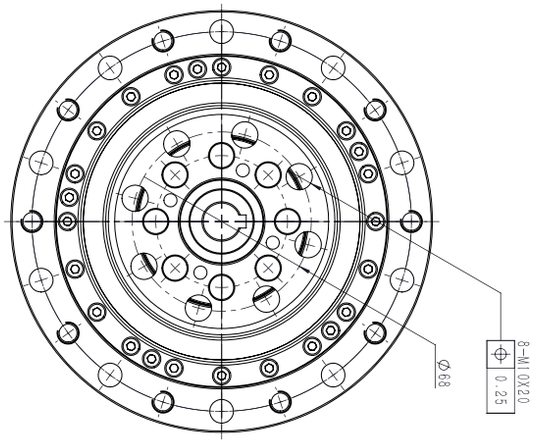


HMCG-II series Harmonic gearbox

HMCG-40-XX-II

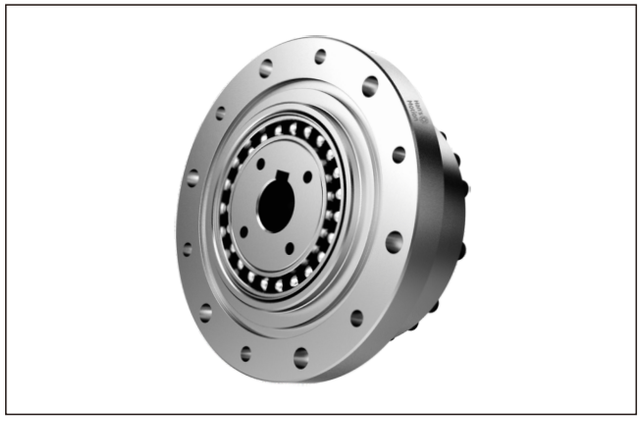






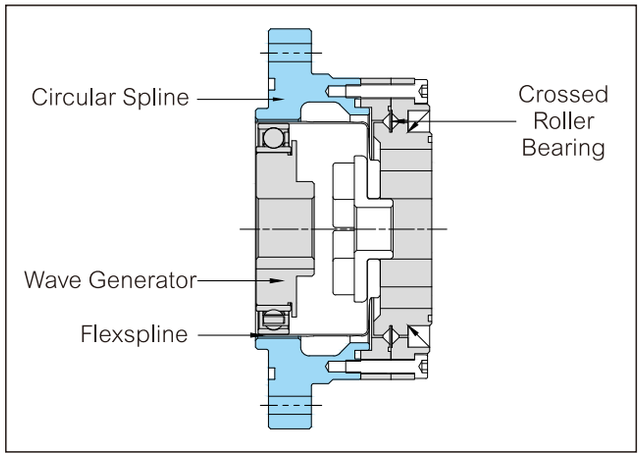
HMCG-II-E series Harmonic gearbox

HMCG- II -E series product details



Unit Type (integral cam)

HMCG-II-E series flexspline is cup-shaped standard structure, input shaft connect with wave generator inner hole directly, fixed through a flat key connection. Generally the circular spline is fixed, and the flexspline is connected to the output end.



Product features

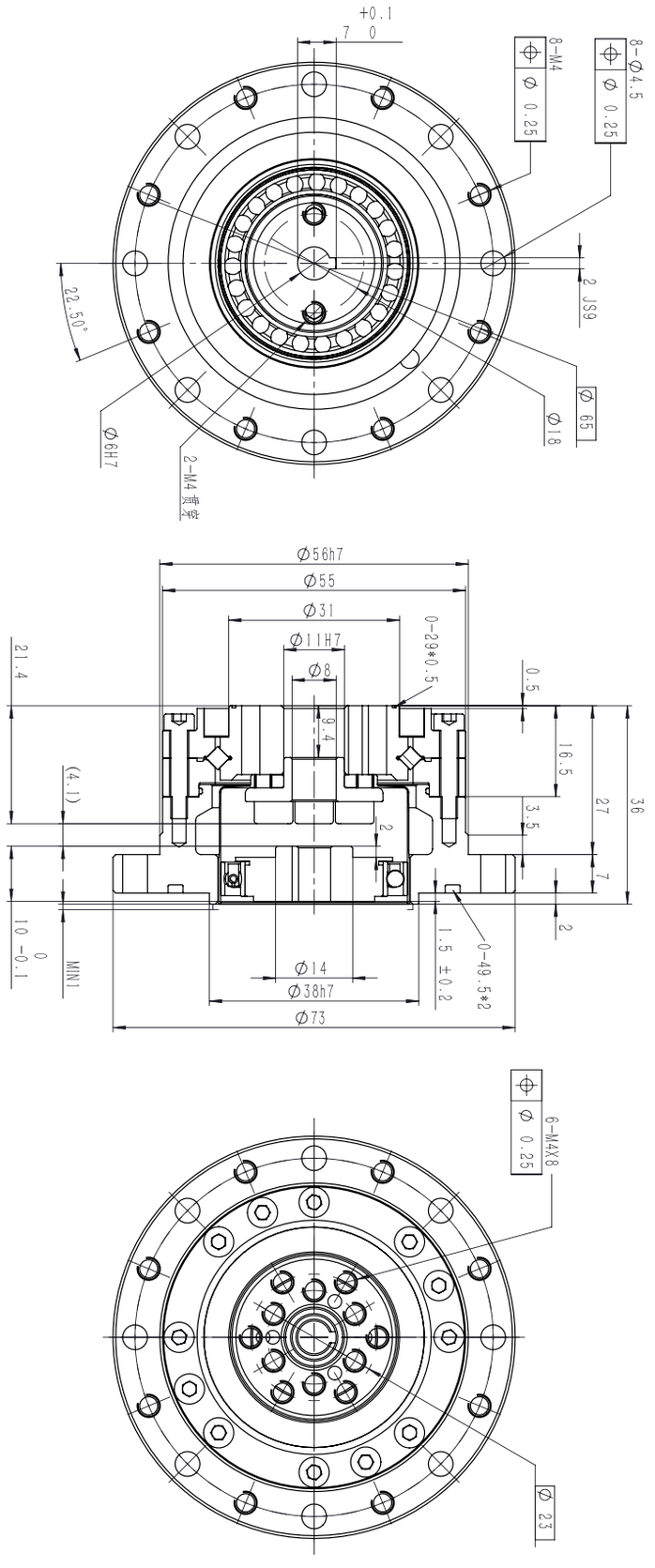
1.Cup-shaped integral cam structure
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

HMCG- II -E series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	≤	≤	kg
14	50	7	23	9	46	8000	3500	20	90	0.52
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.68
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.98
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	1.5
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	3.22
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	5.02
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

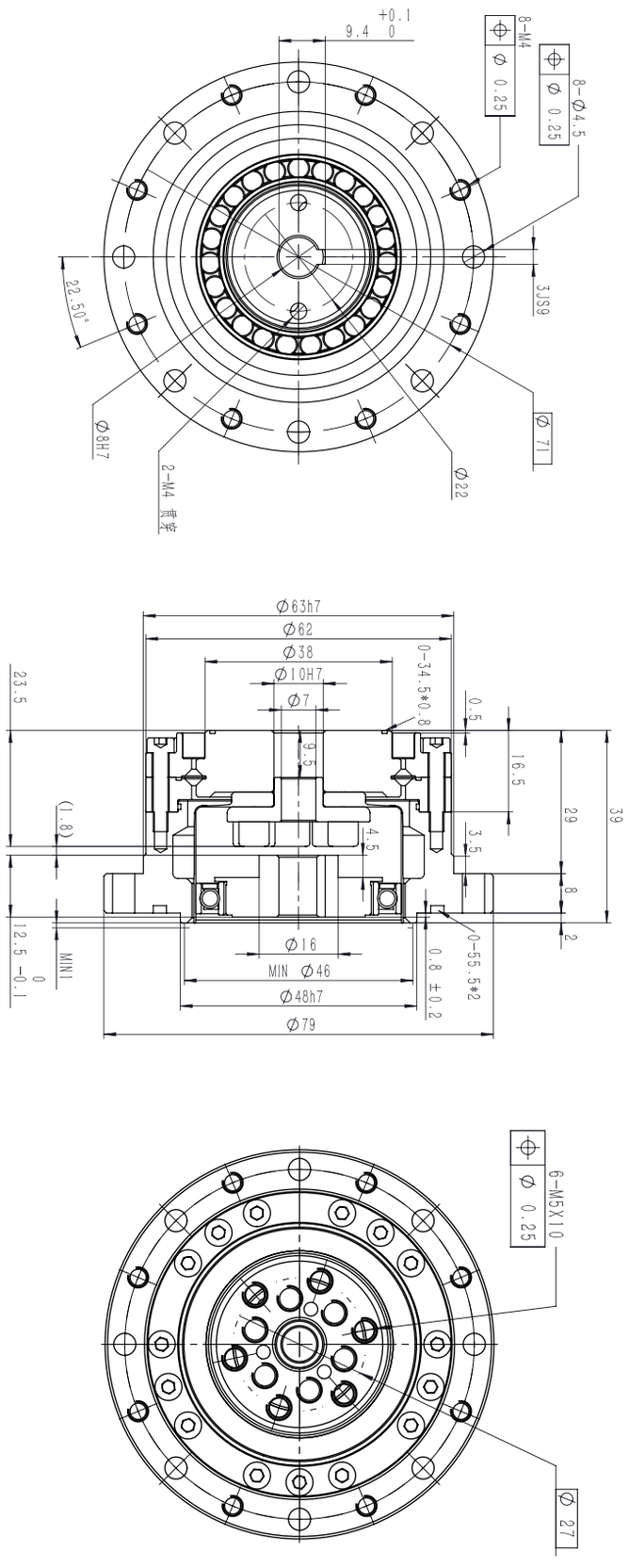
HMCG-II-E series Harmonic gearbox

HMCG-14-XX-II-E



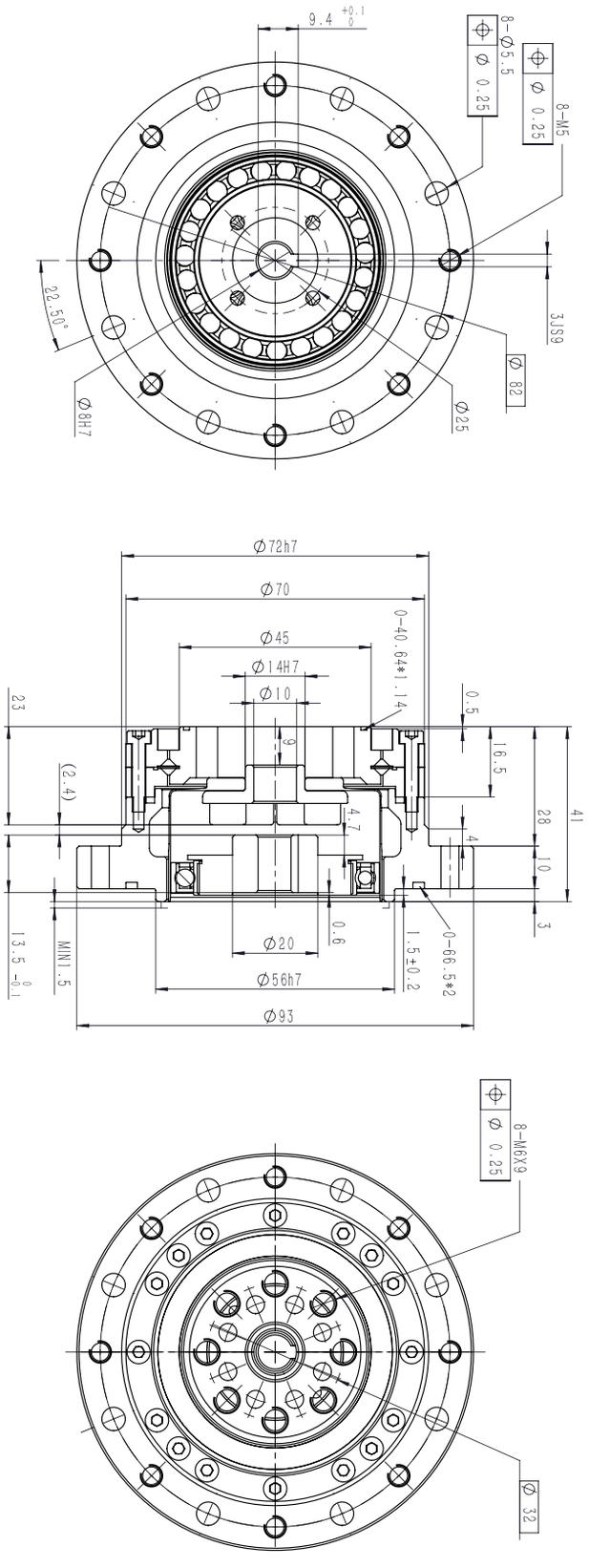
HMCG-II-E series Harmonic gearbox

HMCG-17-XX-II-E



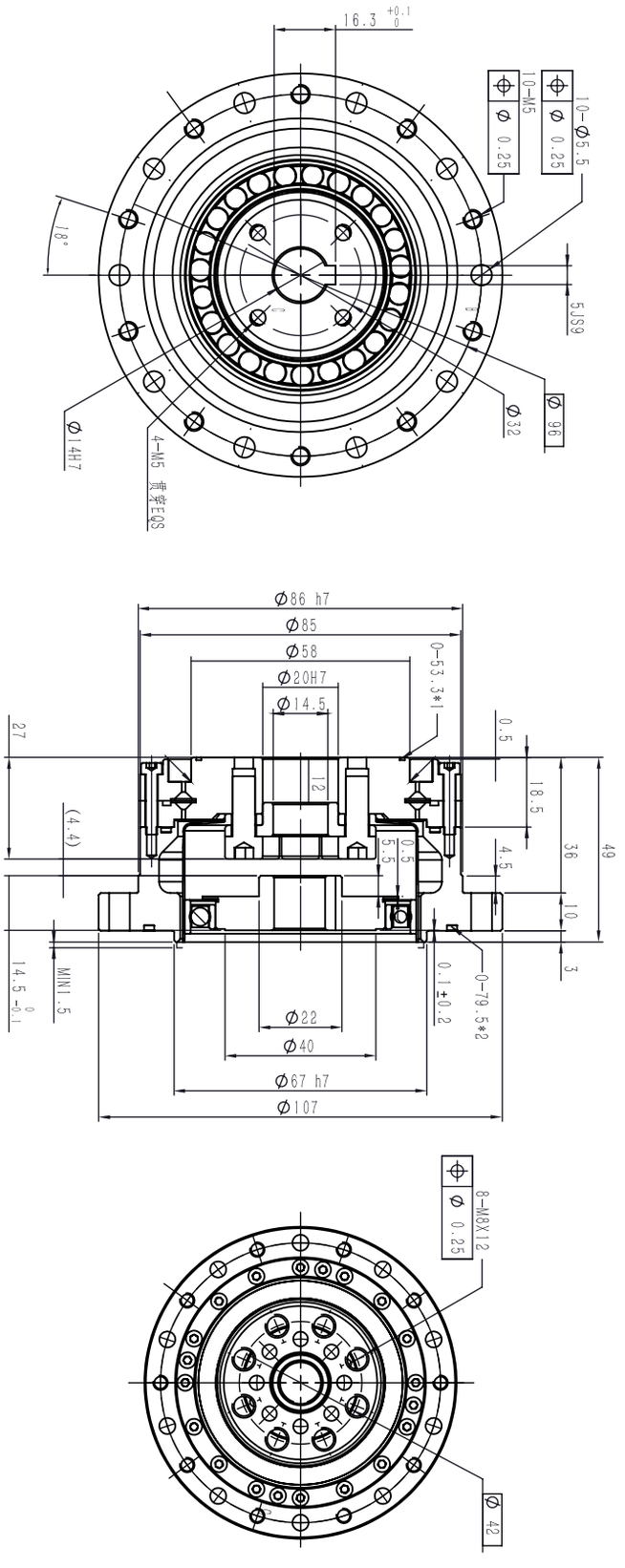
HMCG-II-E series Harmonic gearbox

HMCG-20-XX-II-E



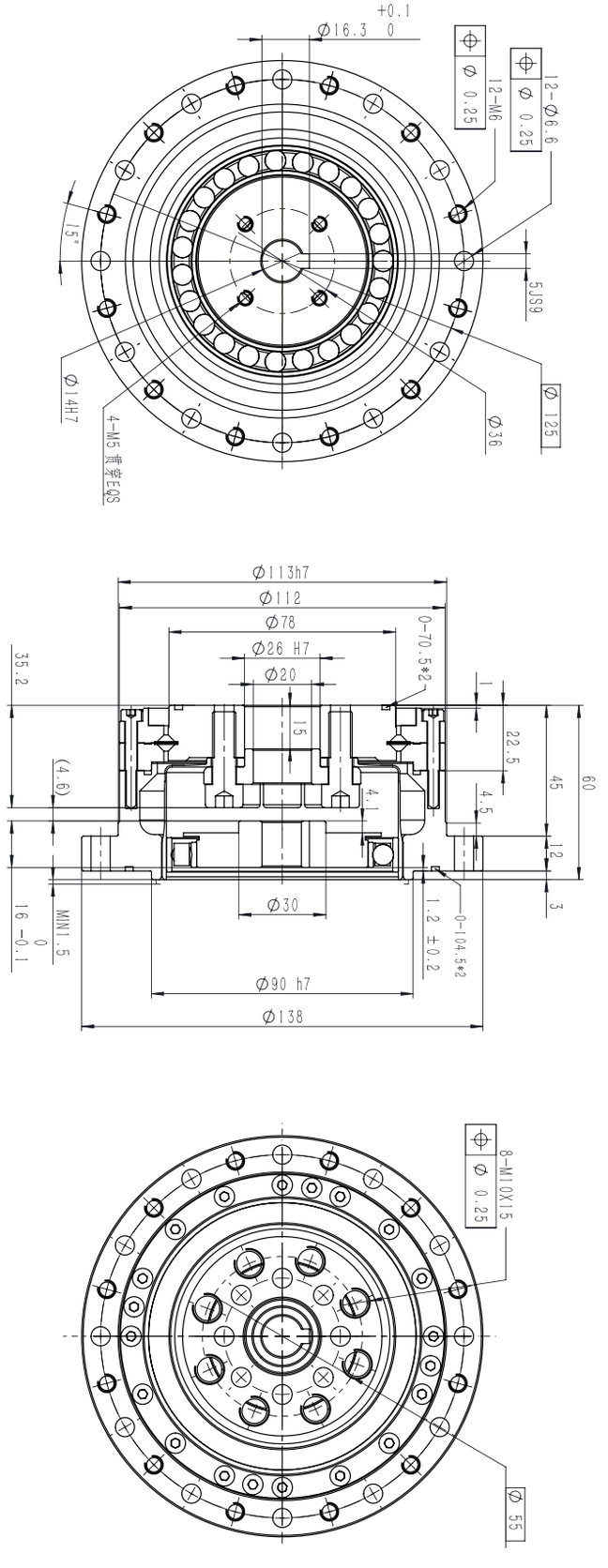
HMCG-II-E series Harmonic gearbox

HMCG-25-XX-II-E



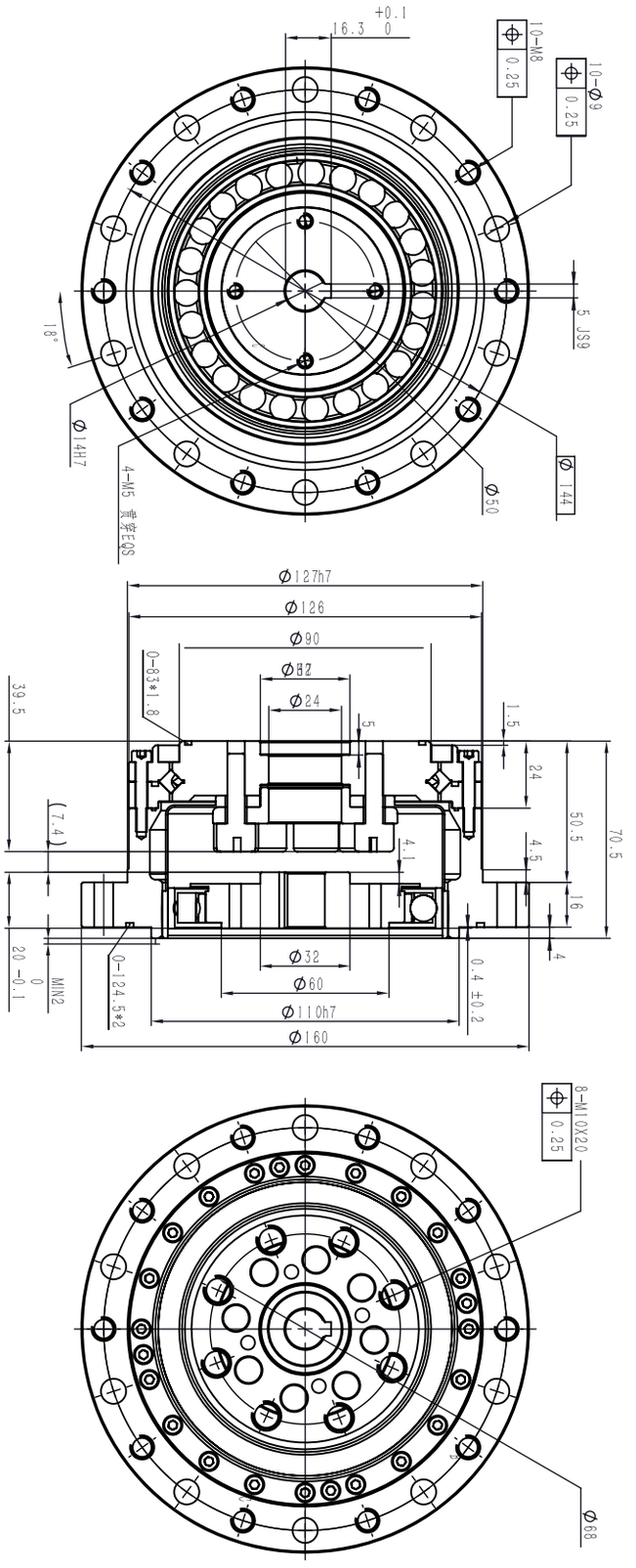
HMCG-II-E series Harmonic gearbox

HMCG-32-XX-II-E



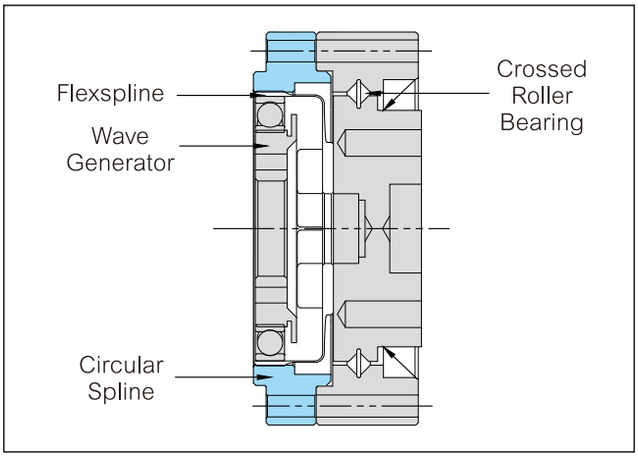
HMCG-II-E series Harmonic gearbox

HMCG-40-XX-II-E



HMCD-II series Harmonic gearbox

HMCD-II series product details



Unit Type (super flat)

HMCD-II series, with a commitment to light weight and compact size of harmonic gear transmission, not only inherits the advantages of traditional products, but also realizes bold shape design based on the market demands. The whole drive adopts super - flat structure that is light and compact, it is optimum for applications of robot end joint and customer side's drive.

Product features

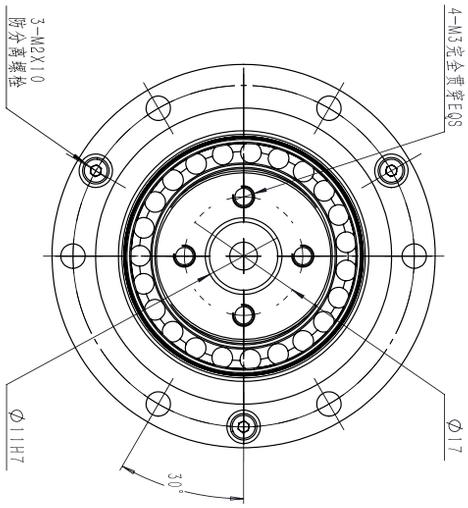
1. Superflat structure
2. Lightweight and compact
3. High static torque capacity
4. Input/output coaxial
5. Excellent positioning accuracy and rotation accuracy

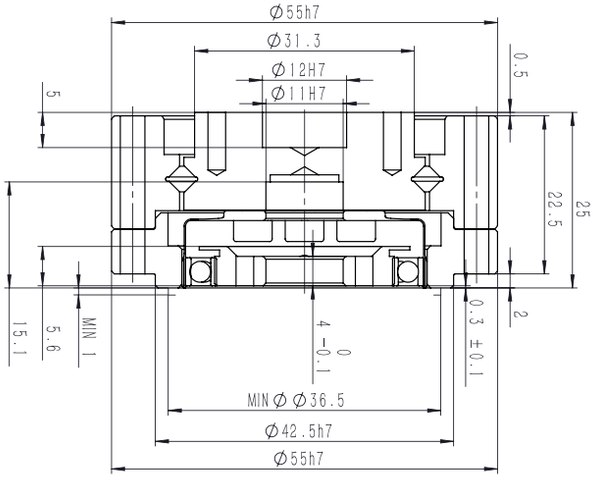
HMCD-II series performance parameter

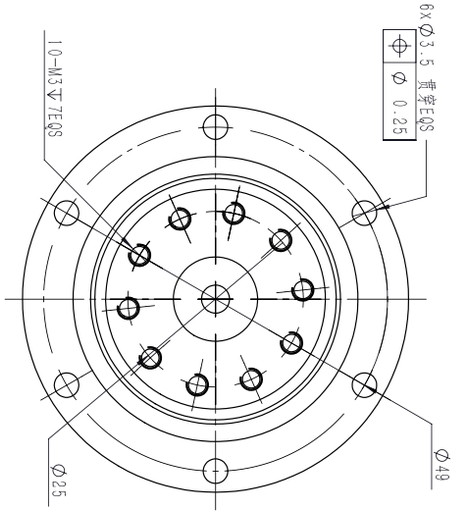
Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	3.5	11.4	4.6	23	8000	3500	20	90	0.5
	80	5.1	15	6.2	29			20	90	
	100	5.1	18	7	33			20	90	
17	50	10.5	22	17	46	7000	3500	20	90	0.66
	80	14	29	21	54			20	90	
	100	15	35	26	67			20	90	
20	50	16	37	23	66	6000	3500	20	90	0.94
	80	23	49	28	78			10	90	
	100	27	54	32	90			10	90	
25	50	26	66	36	121	5500	3500	20	60	1.7
	80	42	91	62	157			10	60	
	100	45	105	71	175			10	60	
32	50	50	143	71	255	4500	3500	20	60	3.3
	80	79	202	126	350			10	60	
	100	91	221	143	399			10	60	

HMCD-II series Harmonic gearbox

HMCD-14-XX-II

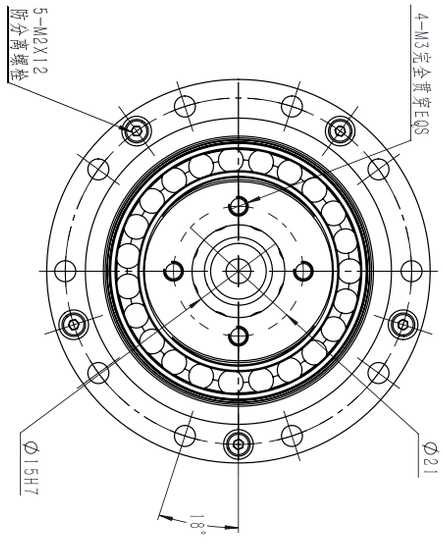


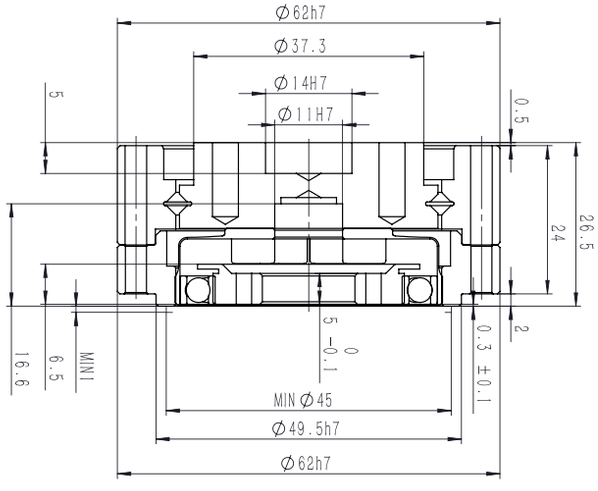


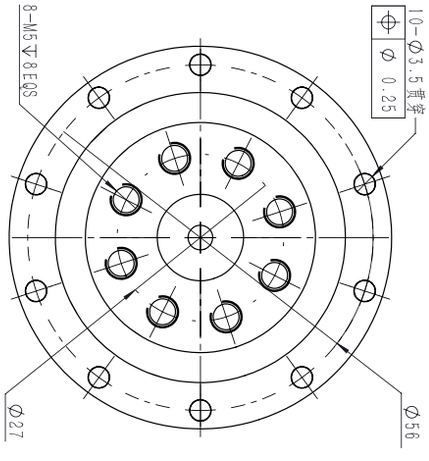


HMCD-II series Harmonic gearbox

HMCD-17-XX-II

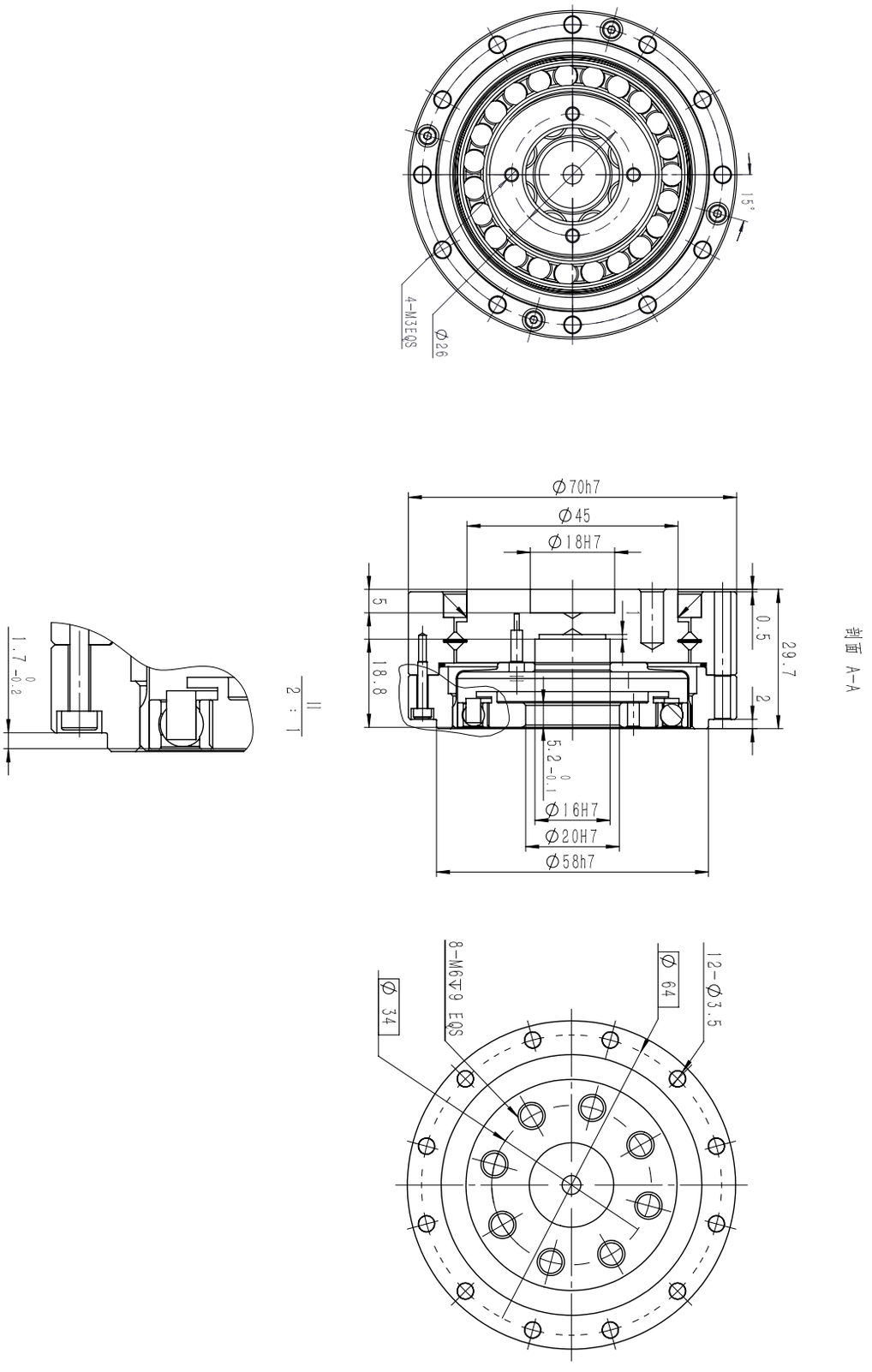






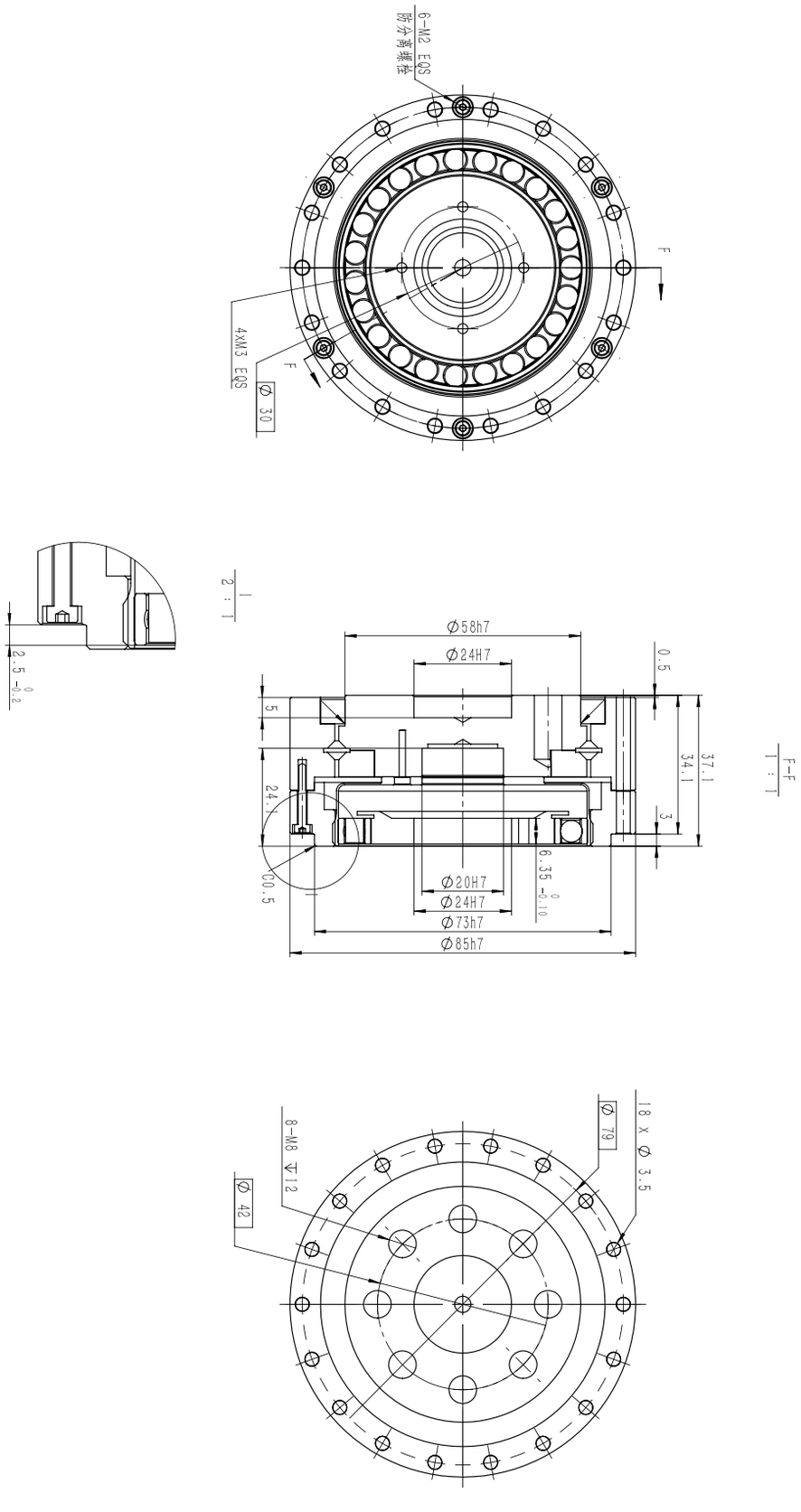
HMCD-II series Harmonic gearbox

HMCD-20-XX-II



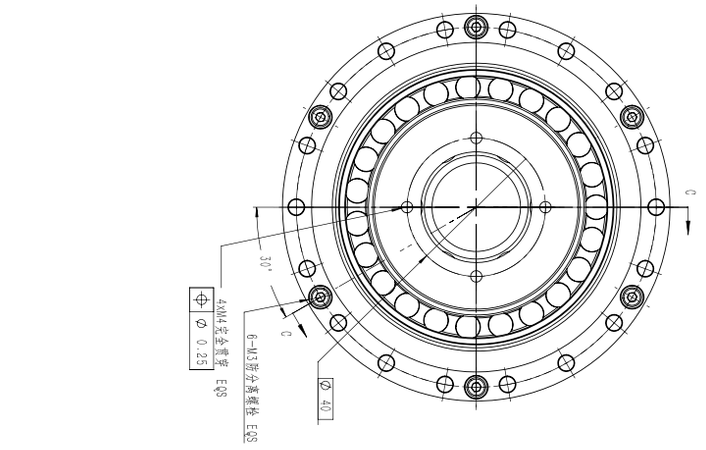
HMCD-II series Harmonic gearbox

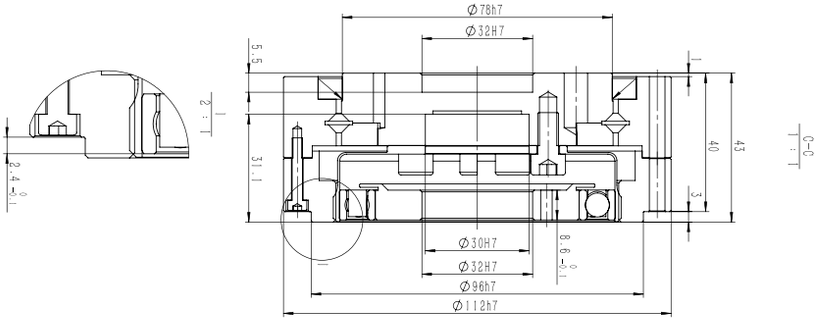
HMCD-25-XX- II

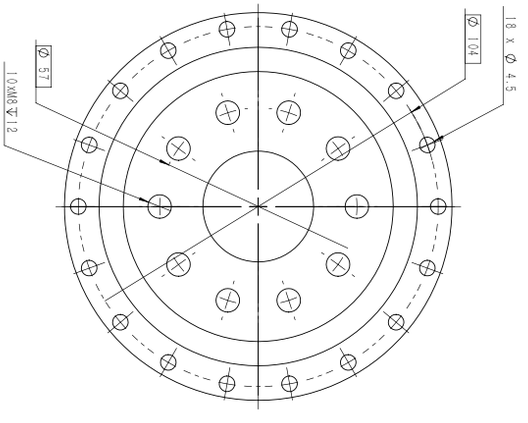


HMCD-II series Harmonic gearbox

HMCD-32-XX-II

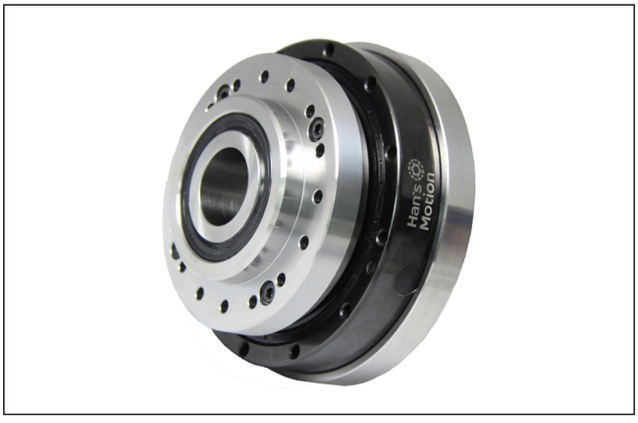


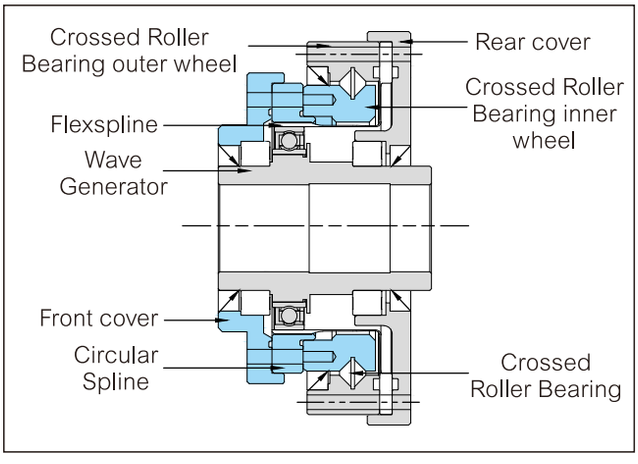




HMHG-I series Harmonic gearbox

HMHG-I series product details





Unit Type (hollow shaft)

HMHG-I series flexspline belongs to hollow flanging standard structure and there are large-caliber hollow shaft hole in the middle of wave generator cam. And support bearing is also designed inside the reducer. The reducer is fully sealed easy to install, especially suitable for the situation where there is a need to thread through the reducer center.

Product features

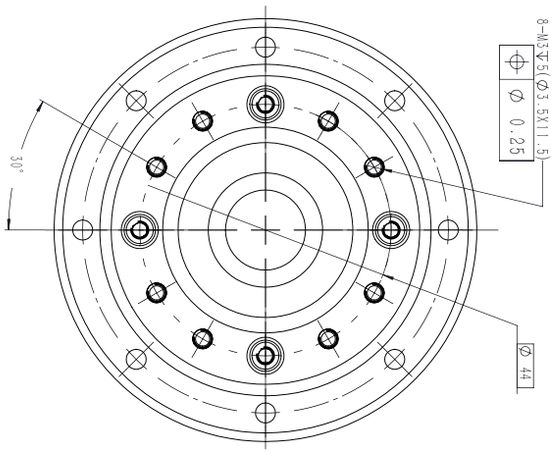
1.Large diameter - Hollow structure
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

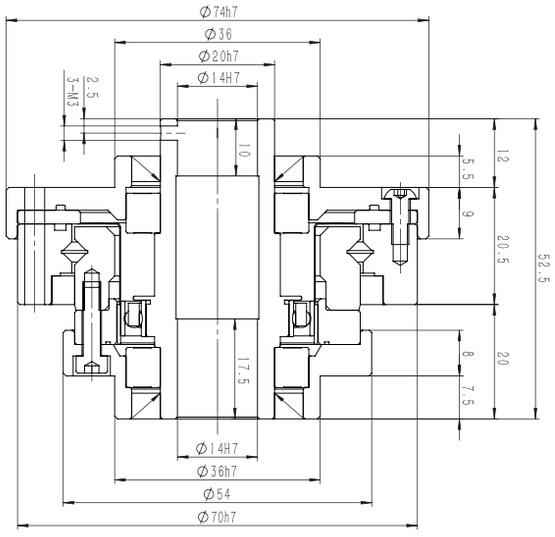
HMHG-I series performance parameter

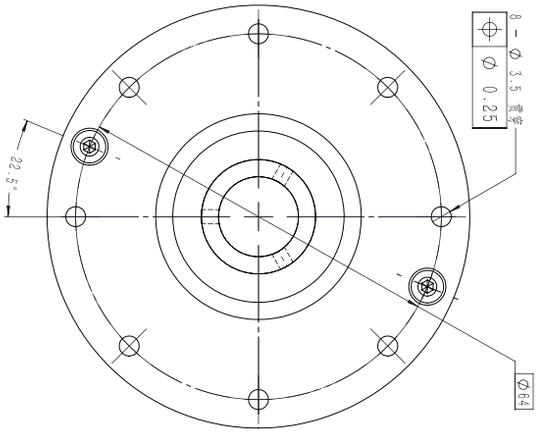
Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	≤	≤	kg
14	50	7	23	9	46	8000	3500	20	90	0.71
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	1
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	1.38
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	2.1
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	4.5
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	7.7
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

HMHG-I series Harmonic gearbox

HMHG-14-XX-I

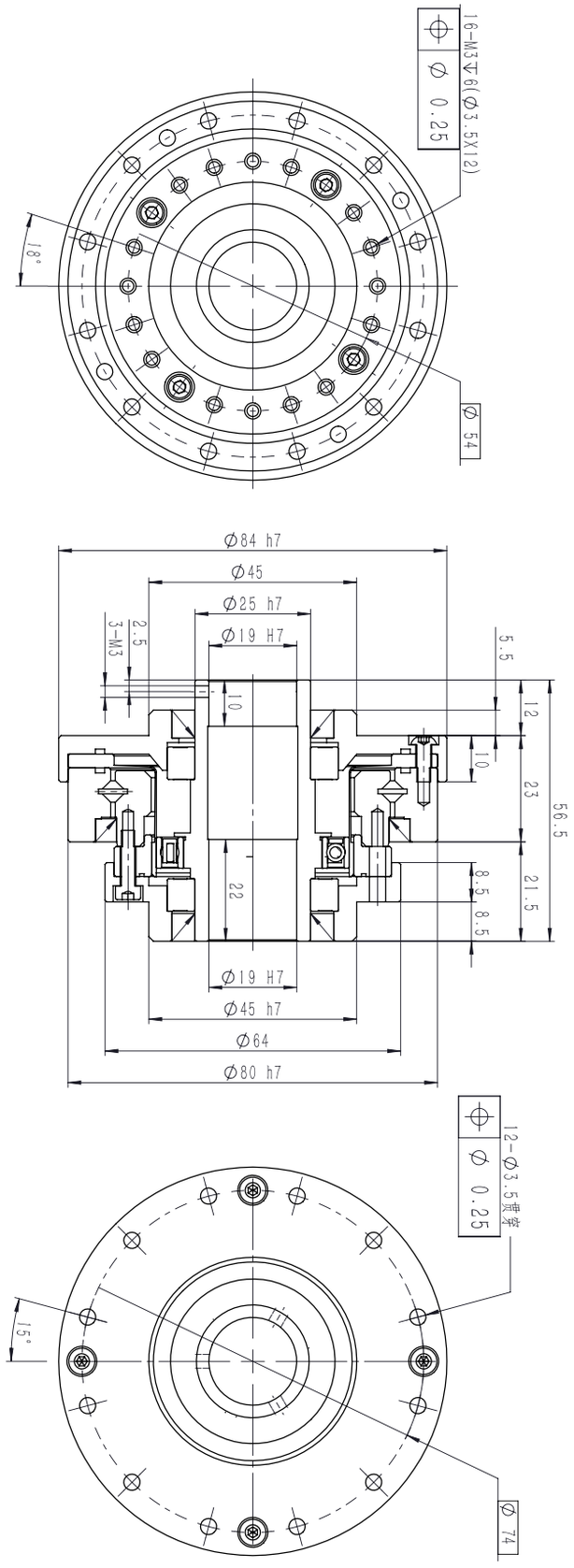






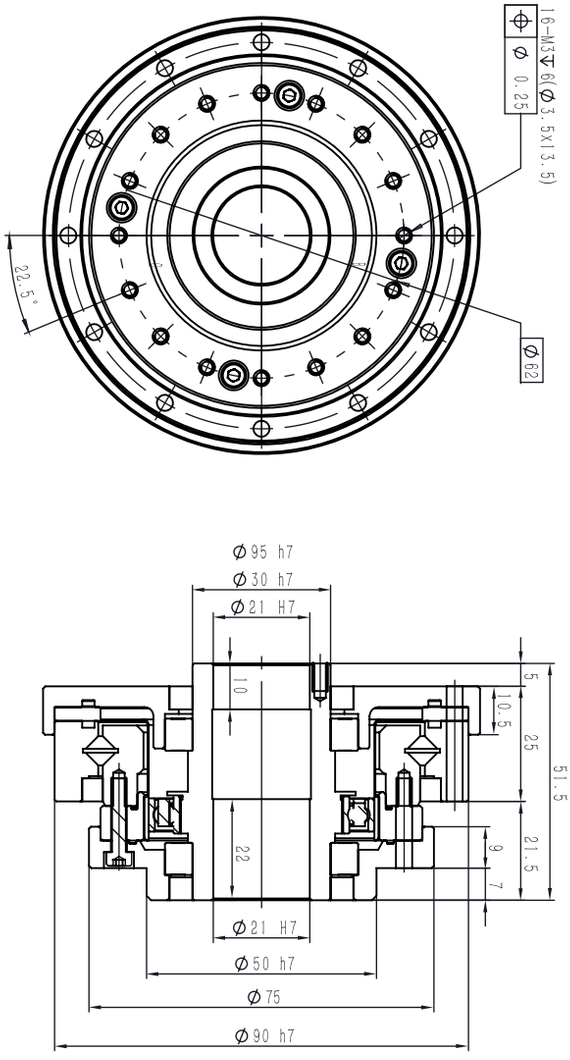
HMHG-I series Harmonic gearbox

HMHG-17-XX-I



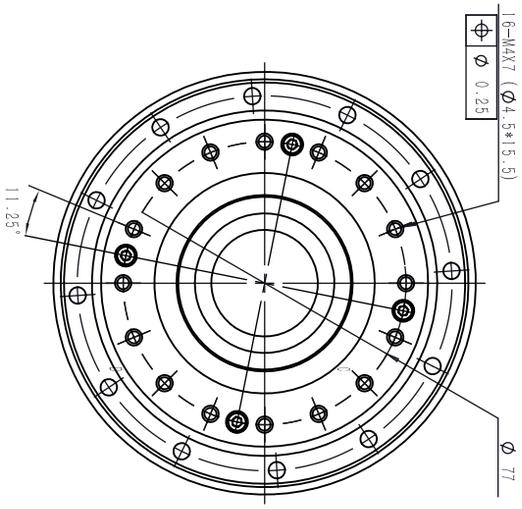
HMHG-I series Harmonic gearbox

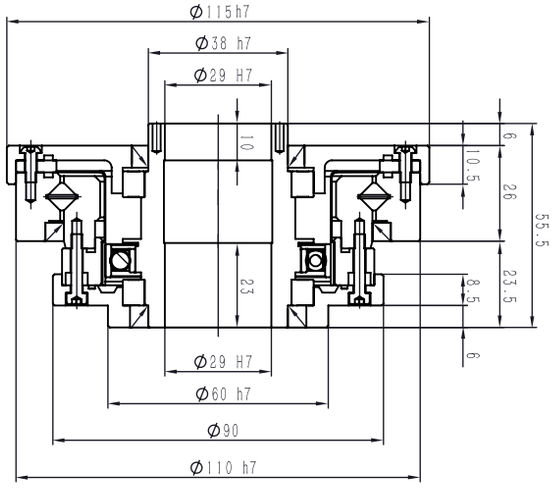
HMHG-20-XX-I

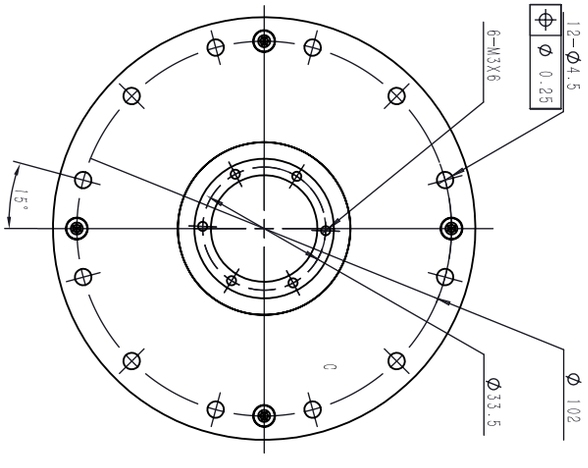


HMHG-I series Harmonic gearbox

HMHG-25-XX-I

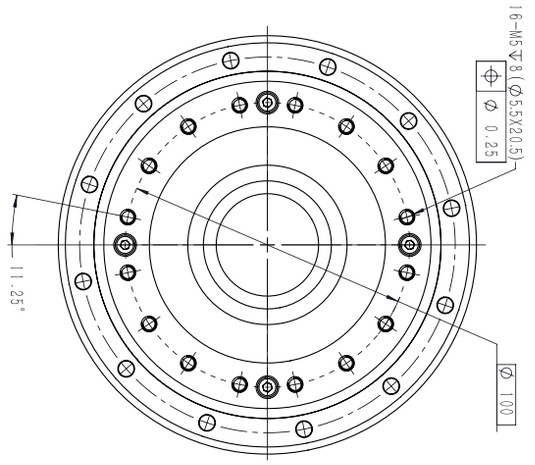


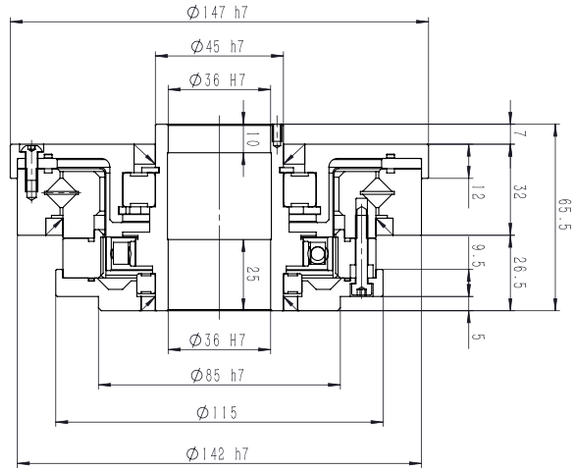


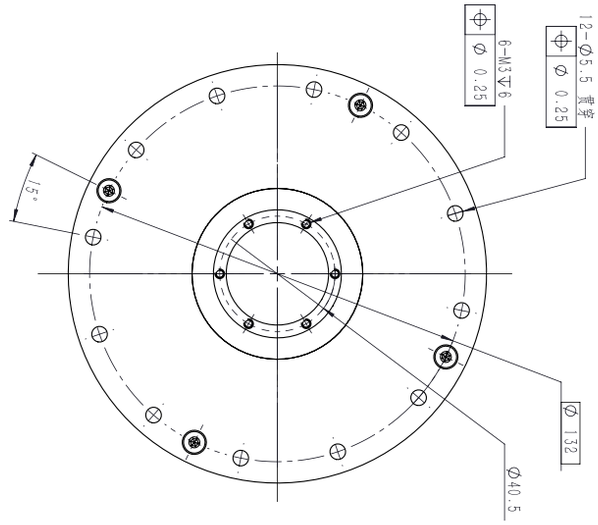


HMHG-I series Harmonic gearbox

HMHG-32-XX-I

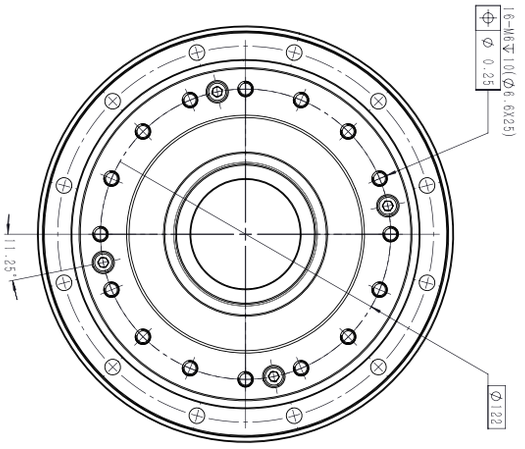


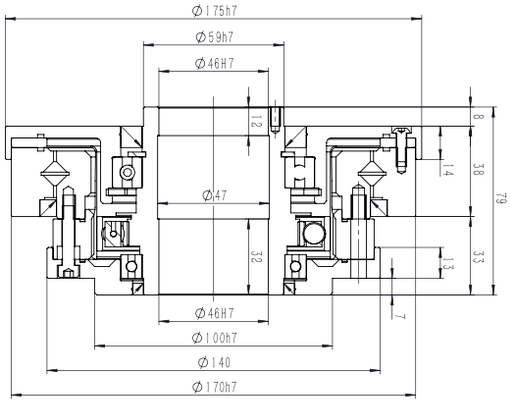


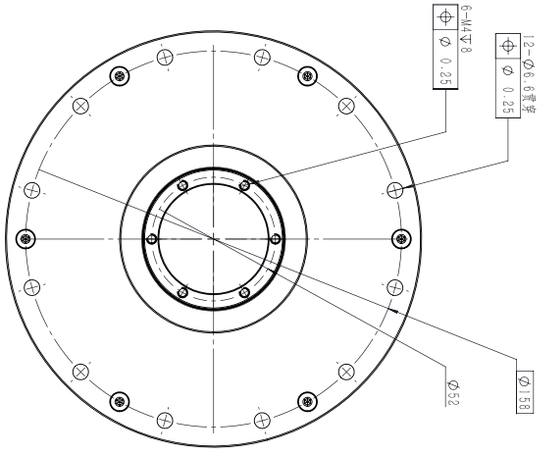


HMHG-I series Harmonic gearbox

HMHG-40-XX-I





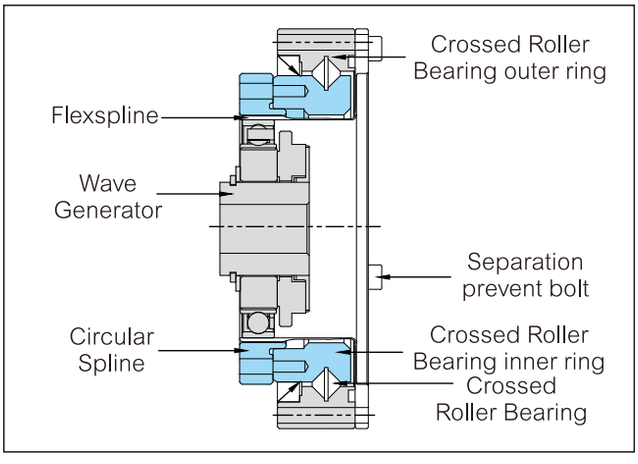


HMHG-II series Harmonic gearbox

HMHG- II series product details

Simple Unit Type (Oldham Coupling)

The flexspline of HMHG-II is hollow flanging standard structure, the whole drive is compact, the input shaft connects with inner hole of wave generator by Oldham coupling. It can be connected in two ways: circular spline fixed and flexspline as output, flexspline fixed and wave generator as the output.



Product features

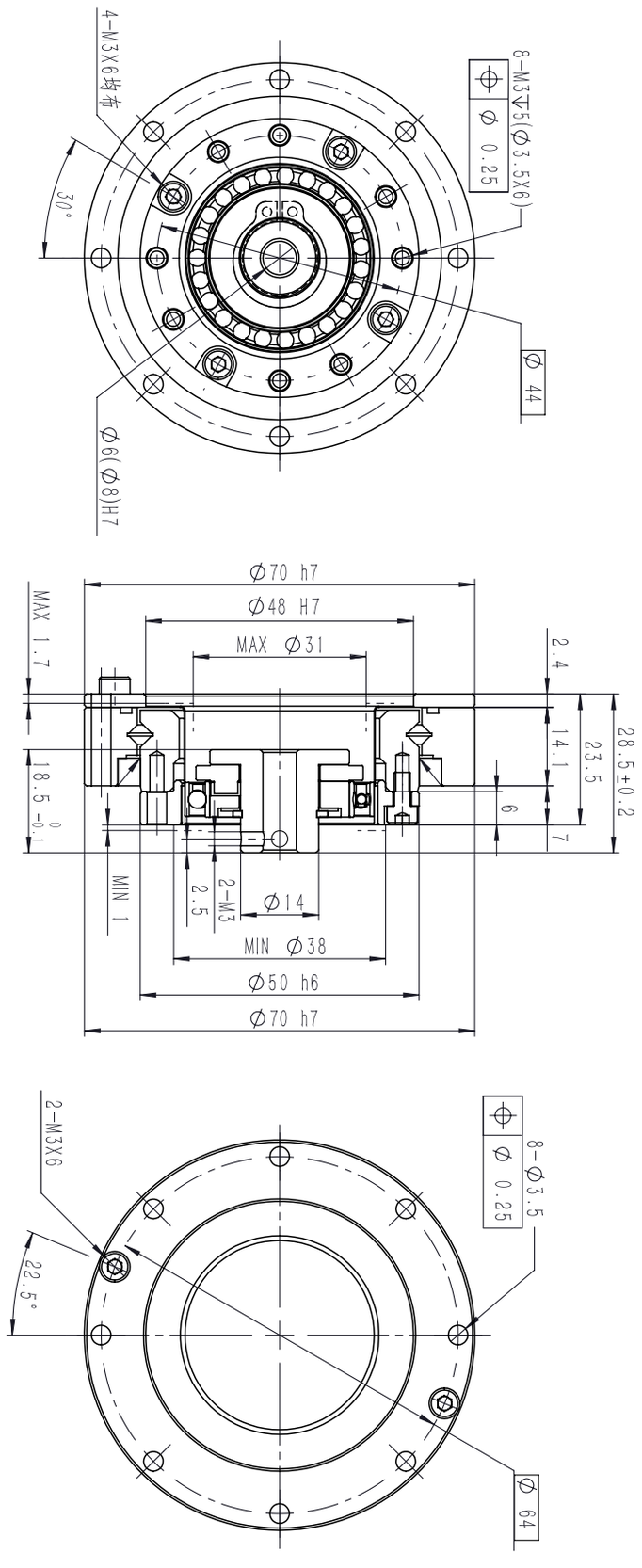
1.Flat and standard structure
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

HMHG- II series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.41
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.57
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.81
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	1.31
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	2.94
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	5.1
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

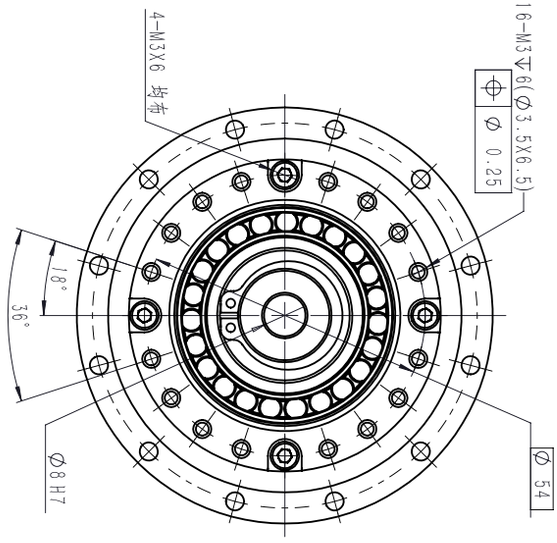
HMHG-II series Harmonic gearbox

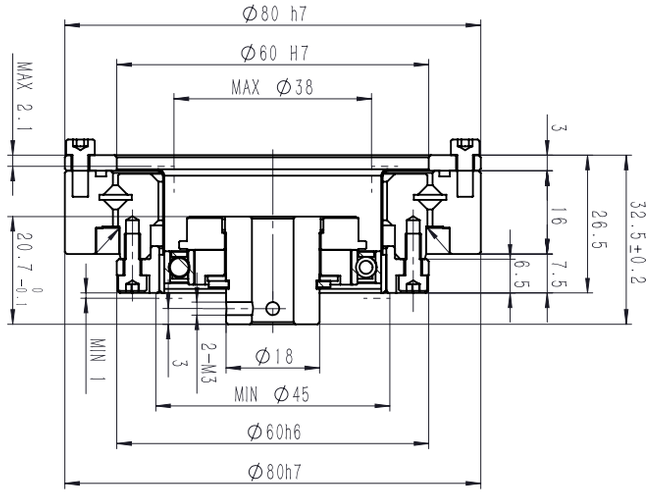
HMHG-14-XX-II

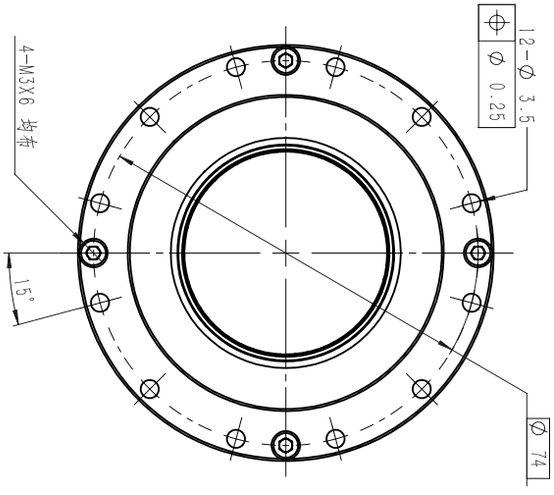


HMHG-II series Harmonic gearbox

HMHG-17-XX-II

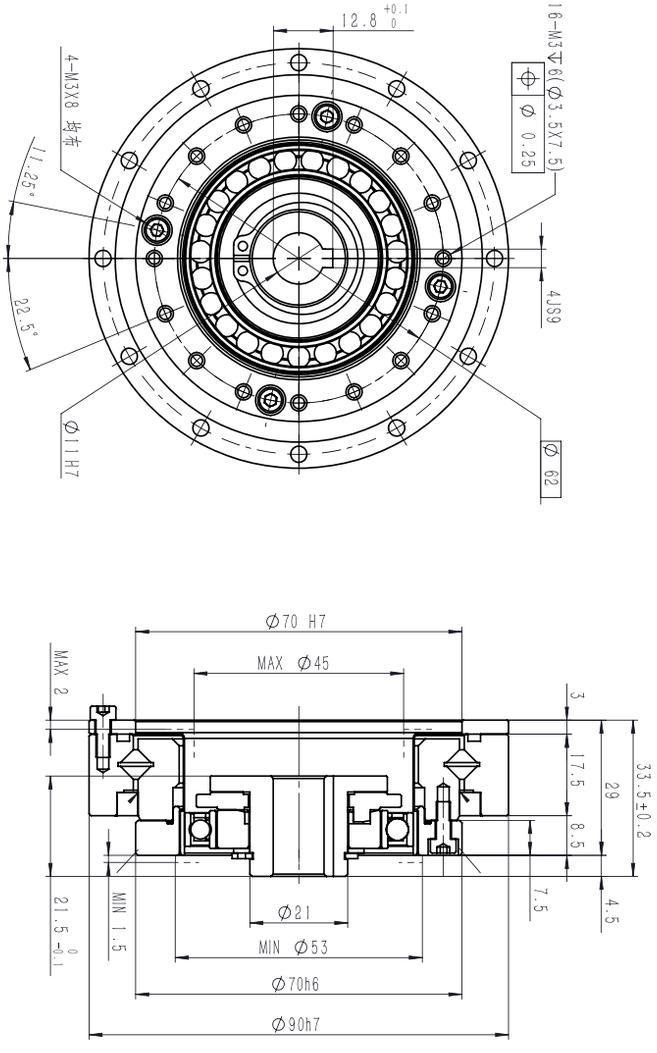






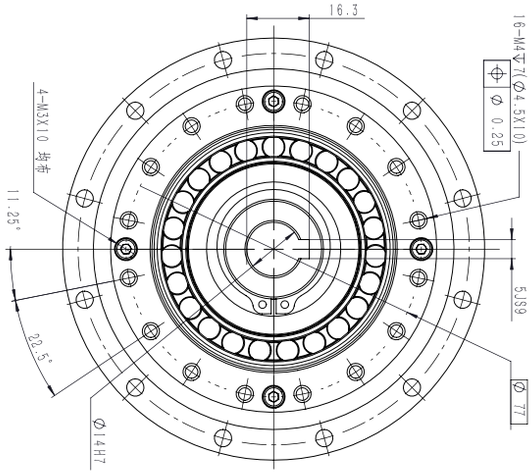
HMHG-II series Harmonic gearbox

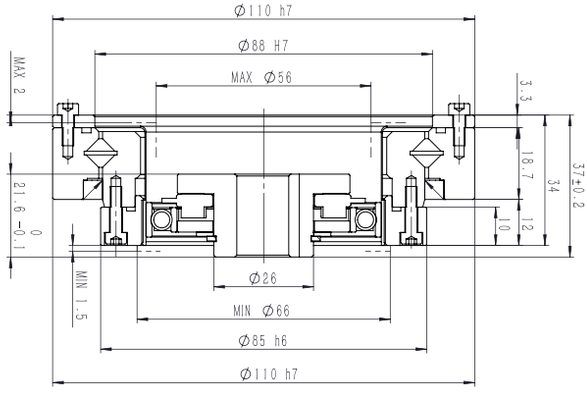
HMHG-20-XX-II

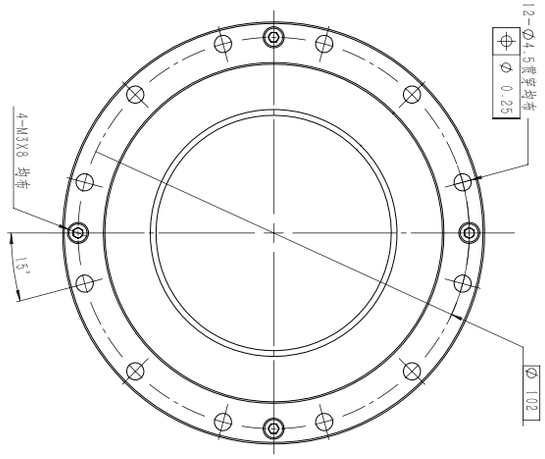


HMHG-II series Harmonic gearbox

HMHG-25-XX-II

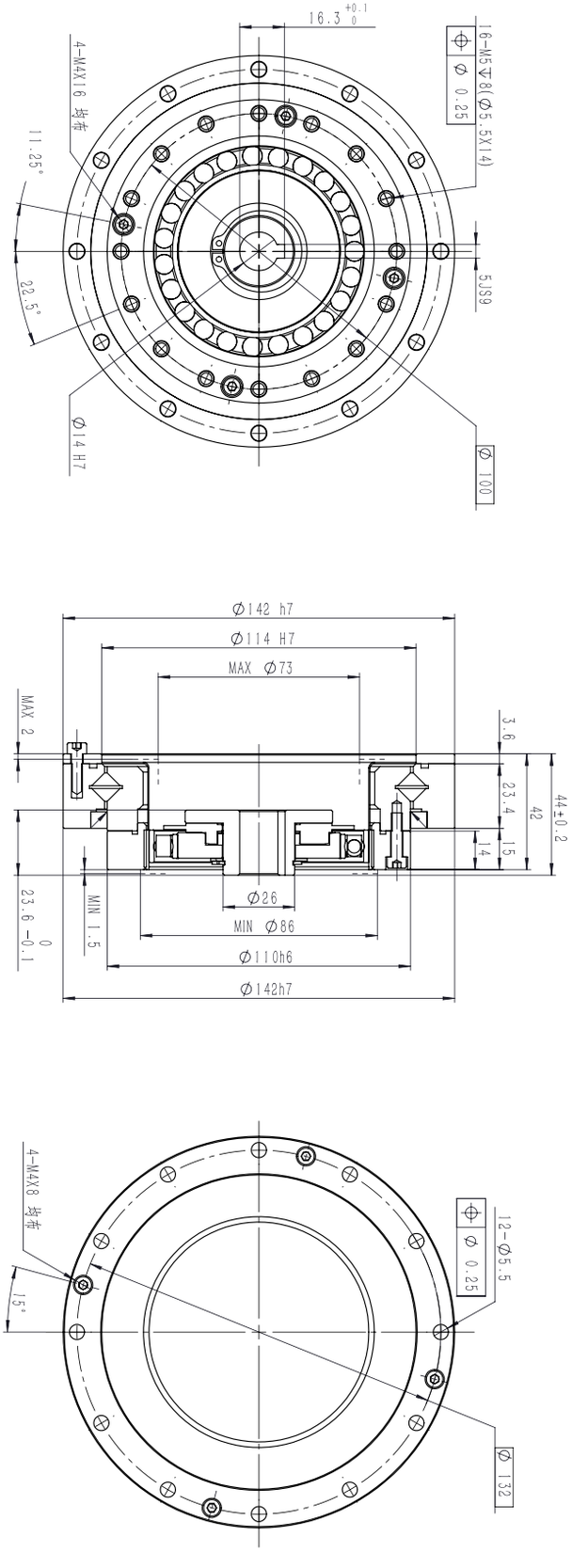






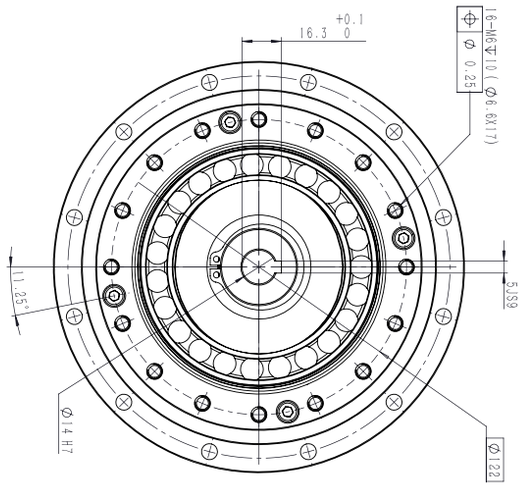
HMHG-II series Harmonic gearbox

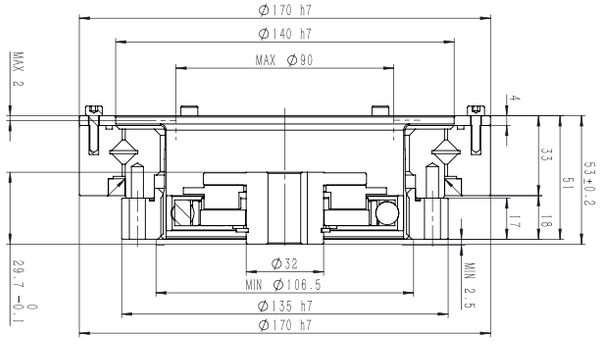
HMHG-32-XX-II

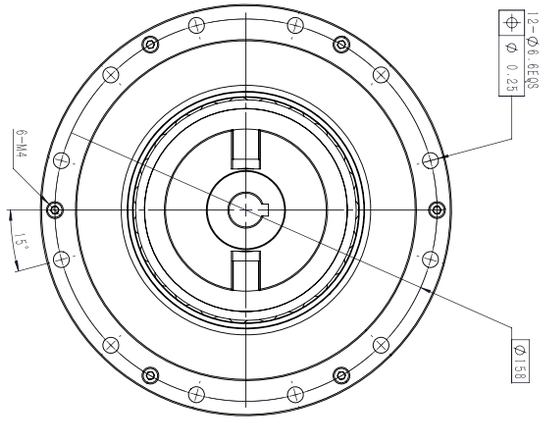


HMHG-II series Harmonic gearbox

HMHG-40-XX-II





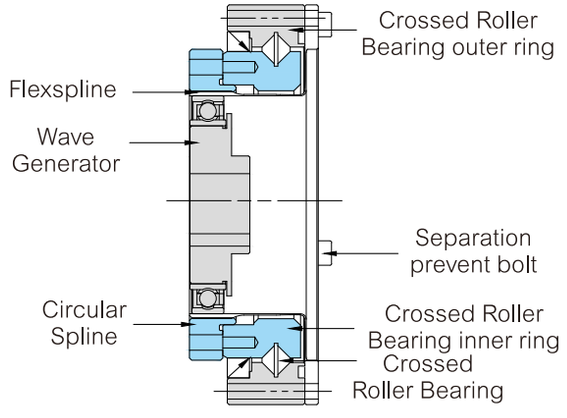


HMHG-II-E series Harmonic gearbox

HMHG- II -E series product details

Simple Unit type (integral cam)

The flexspline of HMHG-II-E is hollow flanging standardt structure, the whole drive is compact, the input shaft connects with inner hole of wave generator by integral cam. It can be connected in two ways: circular spline fixed and flexspline as the output, flexspline fixed and wave generator as the output.



Product features

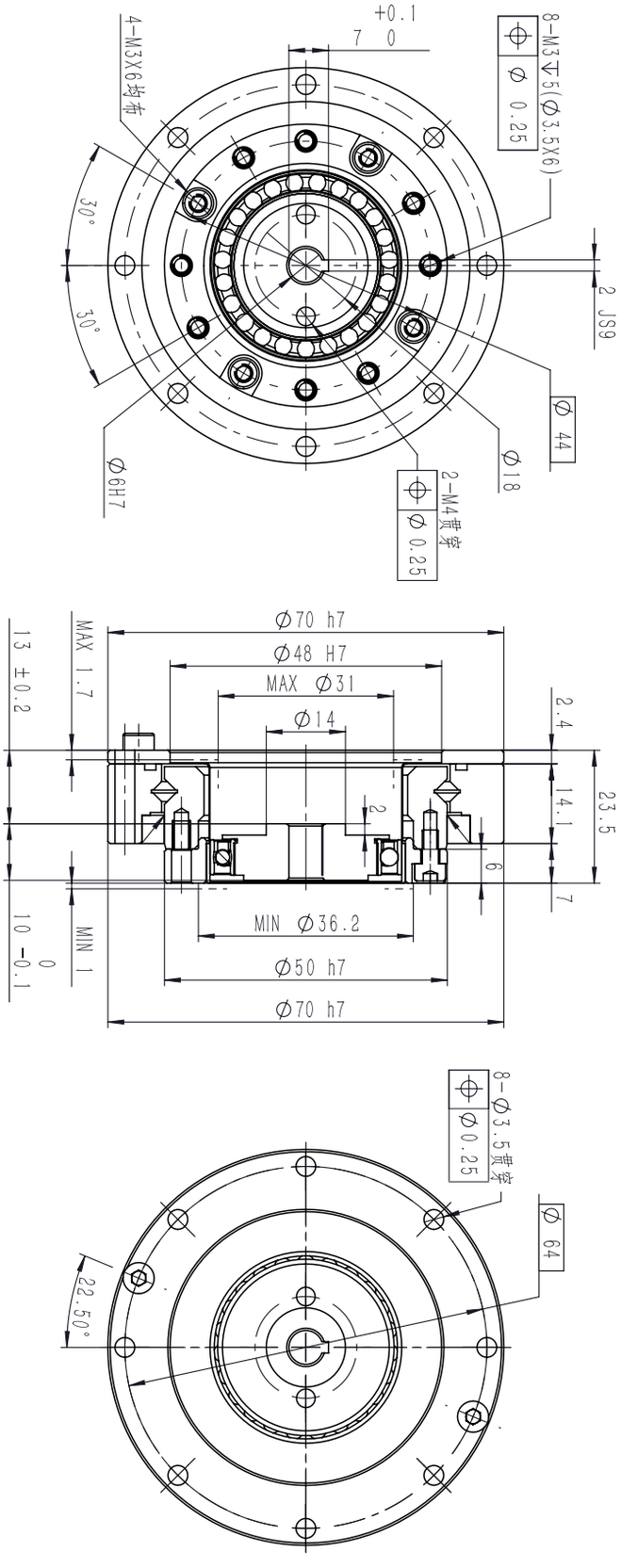
1.Flat and integral structure
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

HMHG- II -E series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.41
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.57
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.79
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	1.3
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	2.97
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	5.12
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

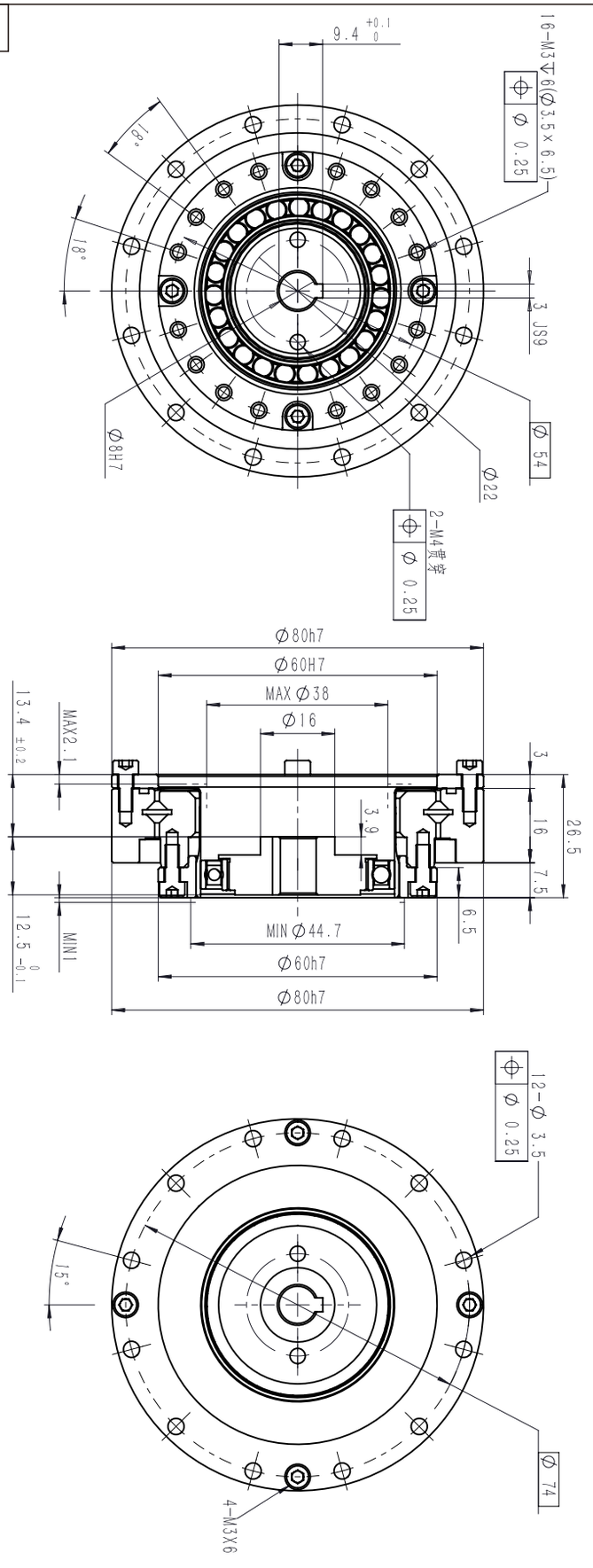
HMHG-II-E series Harmonic gearbox

HMHG-14-XX-II-E



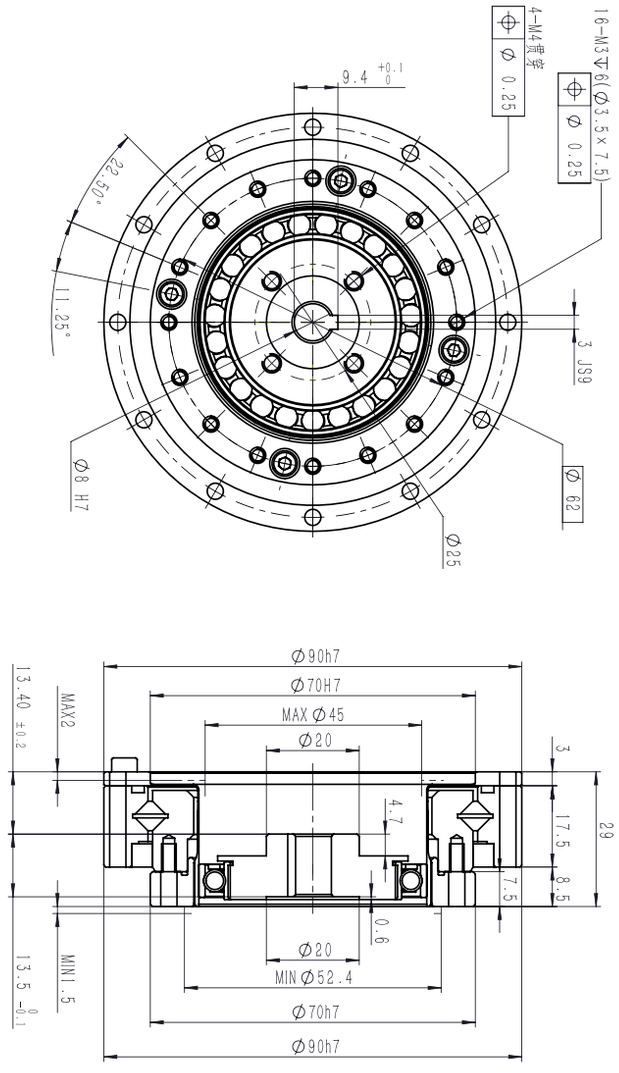
HMHG-II-E series Harmonic gearbox

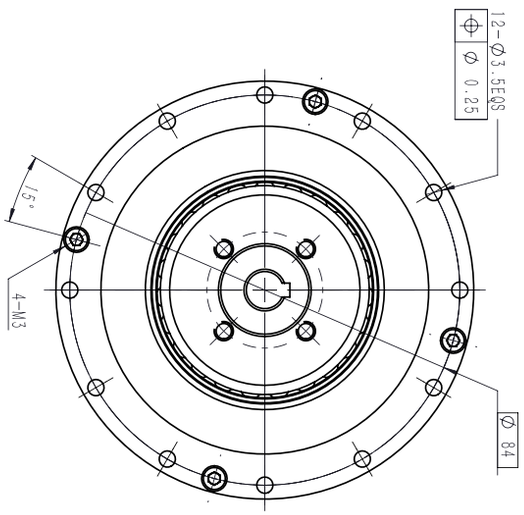
HMHG-17-XX-II-E



HMHG-II-E series Harmonic gearbox

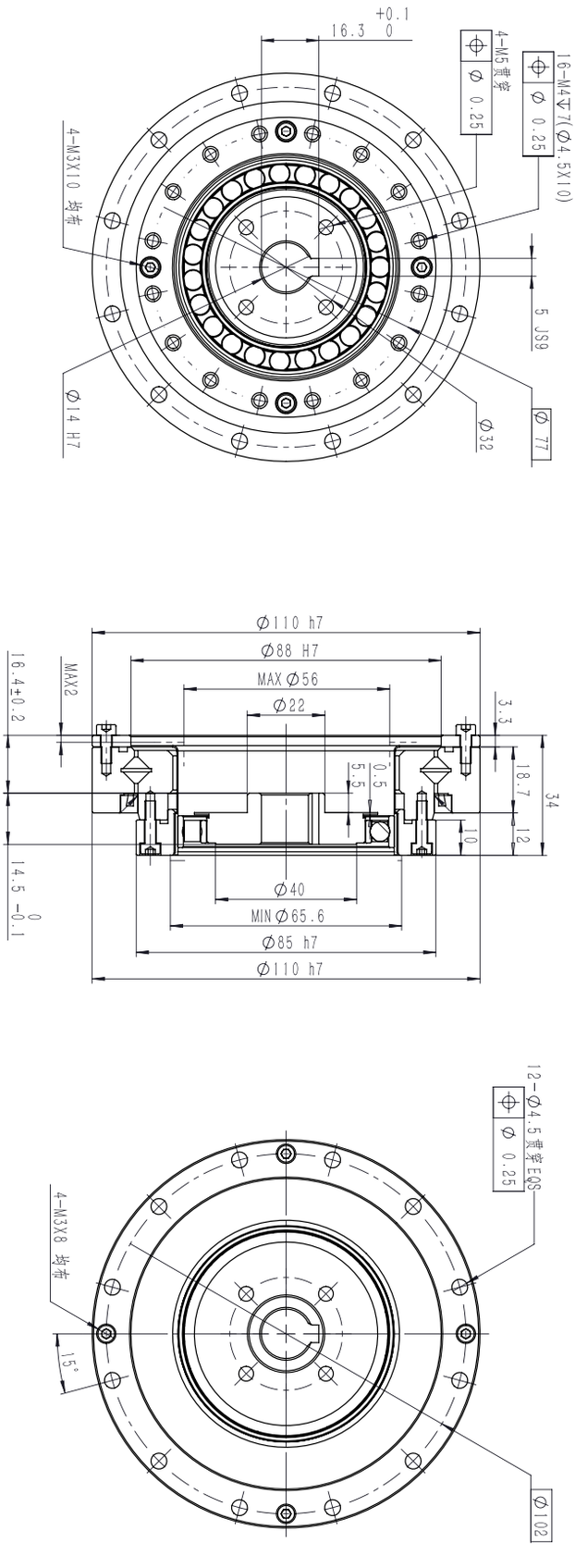
HMHG-20-XX-II-E





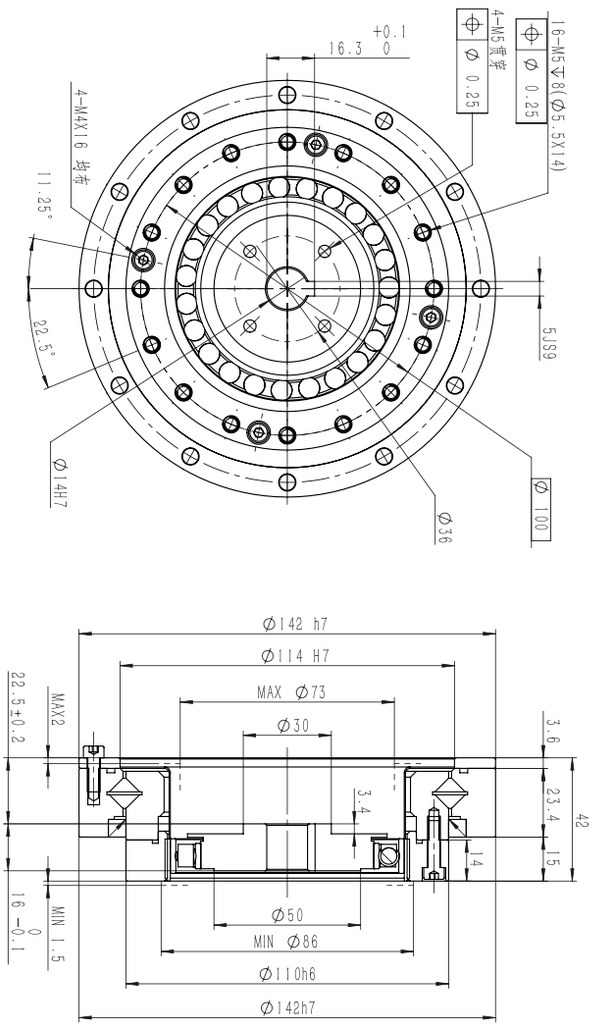
HMHG-II-E series Harmonic gearbox

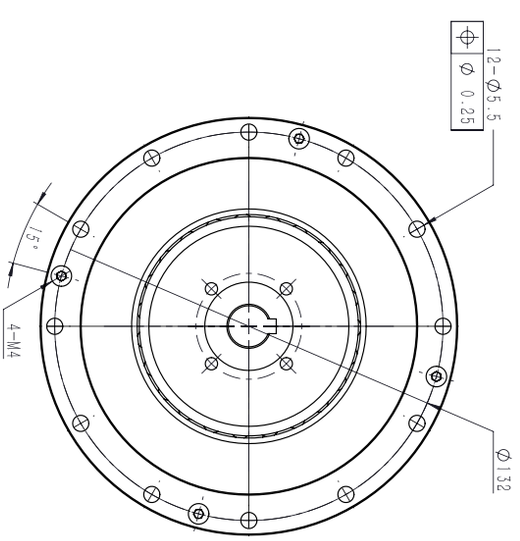
HMHG-25-XX-II-E



HMHG-II-E series Harmonic gearbox

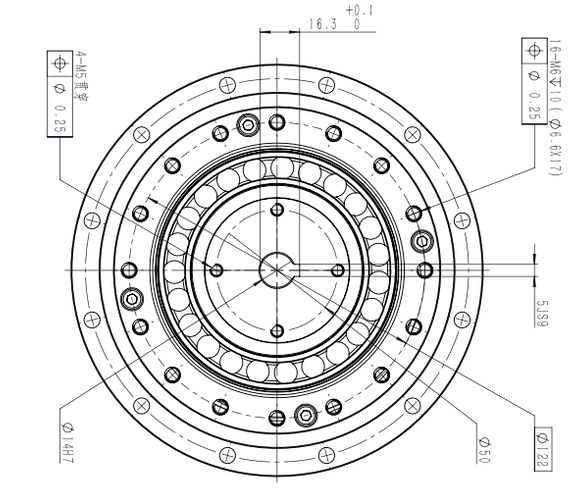
HMHG-32-XX-II-E

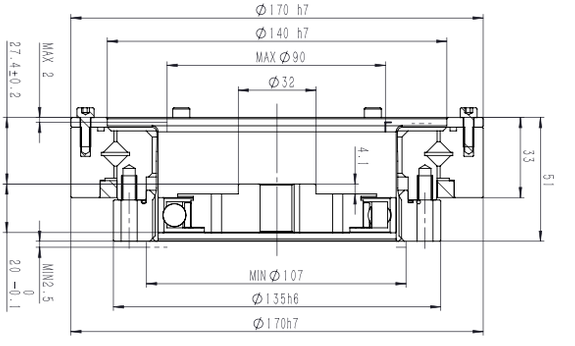


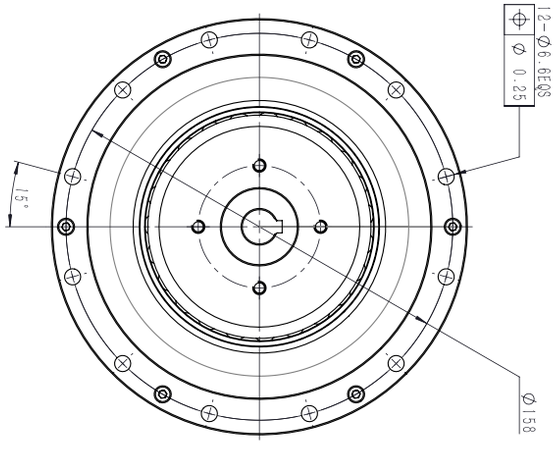


HMHG-II-E series Harmonic gearbox

HMHG-40-XX-II-E





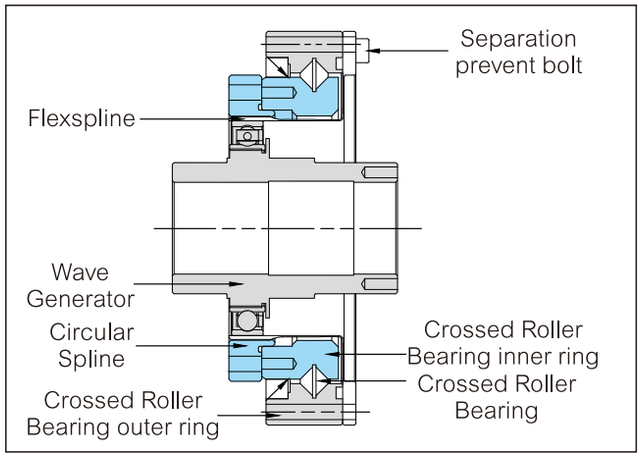


HMHG-III series Harmonic gearbox

HMHG-III series product details

Simple unit type (hollow shaft)

The flexspline of HMHG-III is hollow flanging standard type , the whole drive is compact. The wave generator with large hollow shaft, the crossed roller bearing to support the radial load and axial load. HMHG-III is easy for customization and assembling with simple structure.



Product features

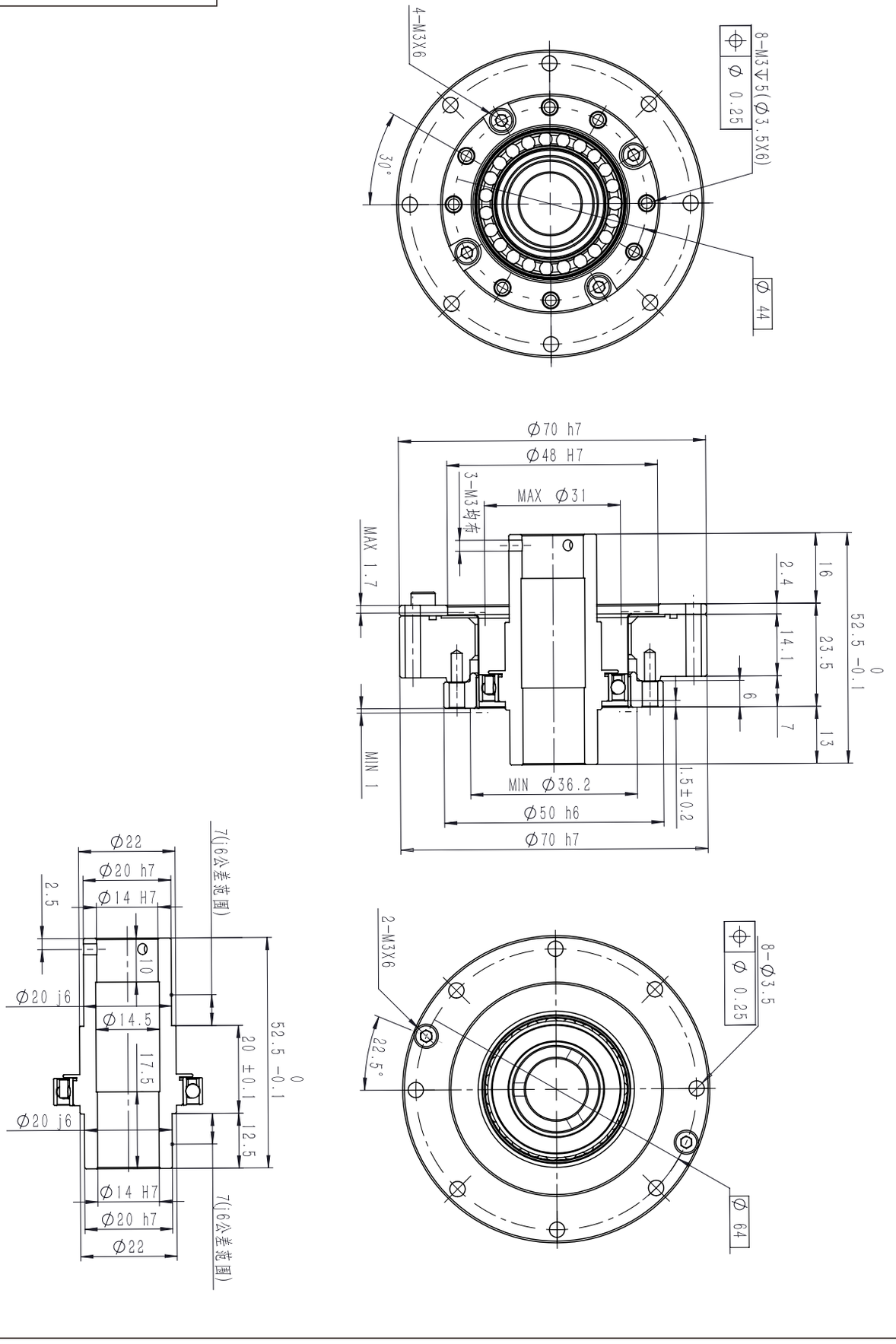
1.Easy to install and use
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMCS series, torque capacity has been improved by 30%
7.Compared to HMCS series,life time has been improved by 43%

HMHG-III series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.45
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.63
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	0.89
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	1.44
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	3.1
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	5.4
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

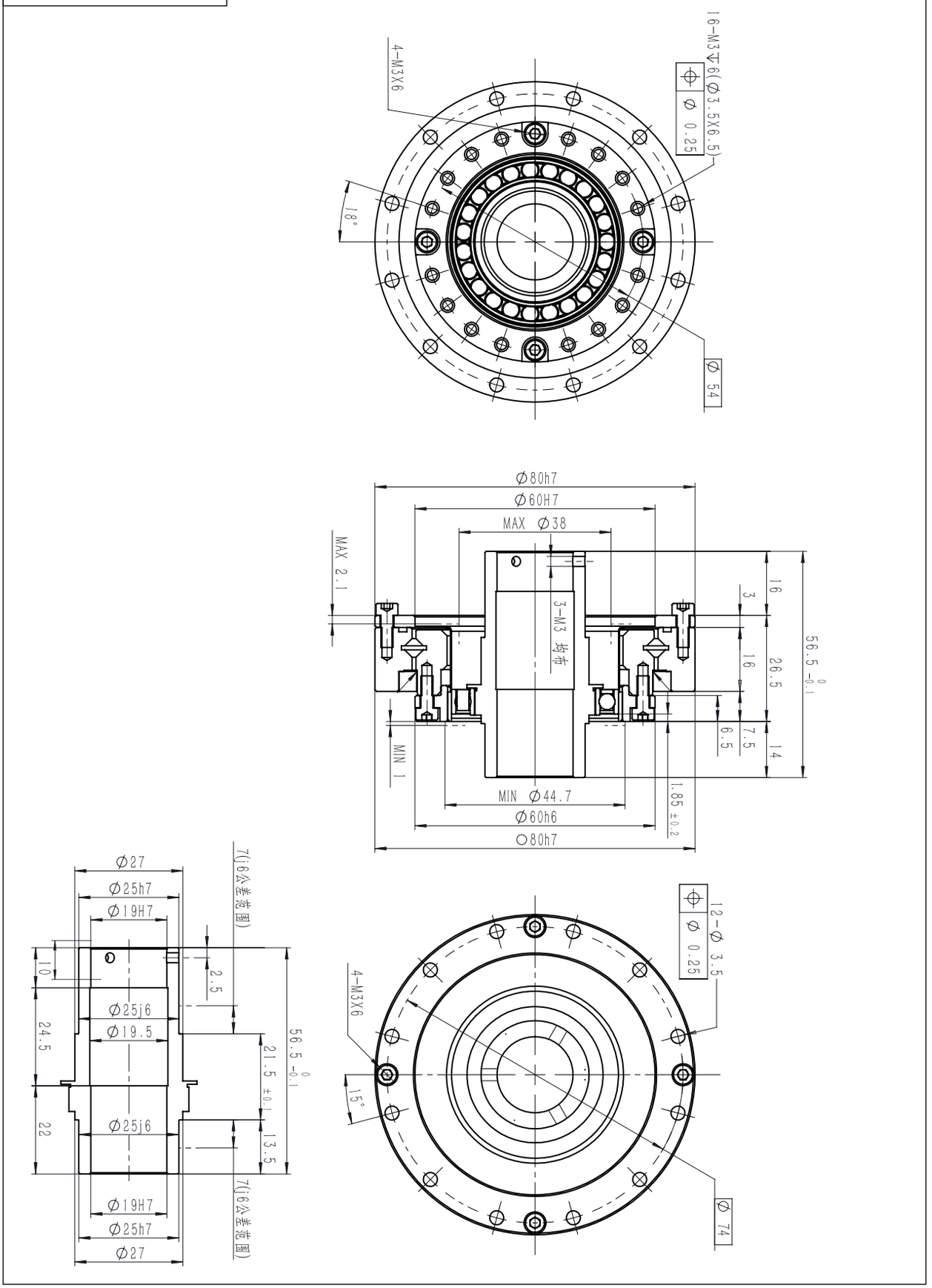
HMHG-III series Harmonic gearbox

HMHG-14-XX-III



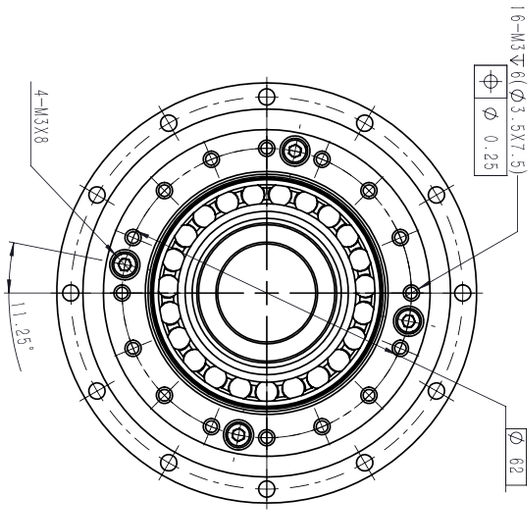
HMHG-III series Harmonic gearbox

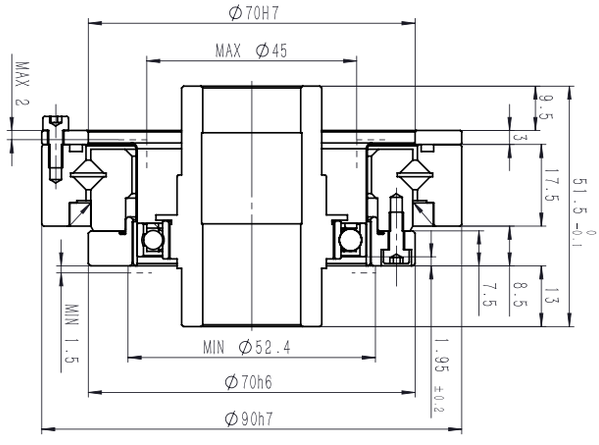
HMHG-17-XX-III

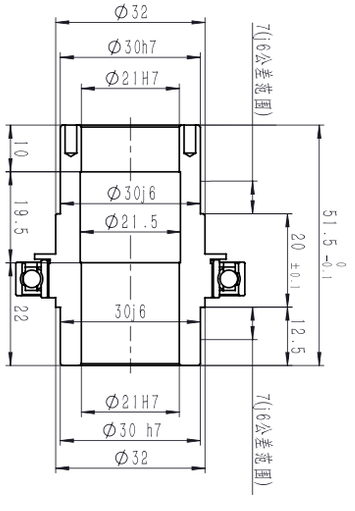


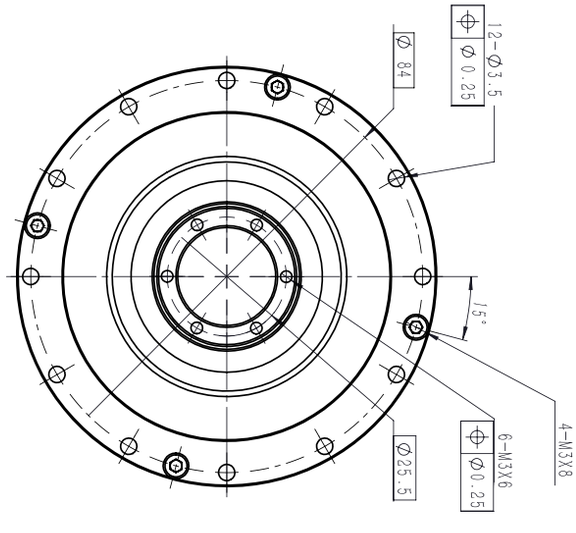
HMHG-III series Harmonic gearbox

HMHG-20-XX-III



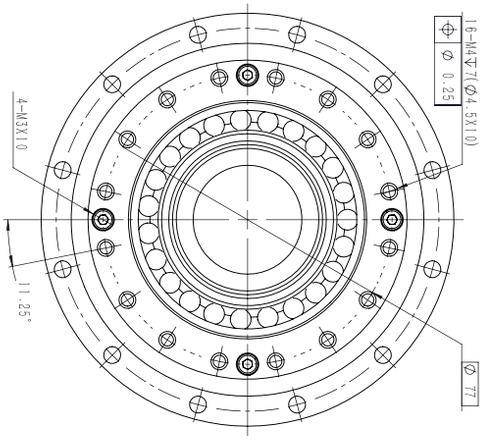


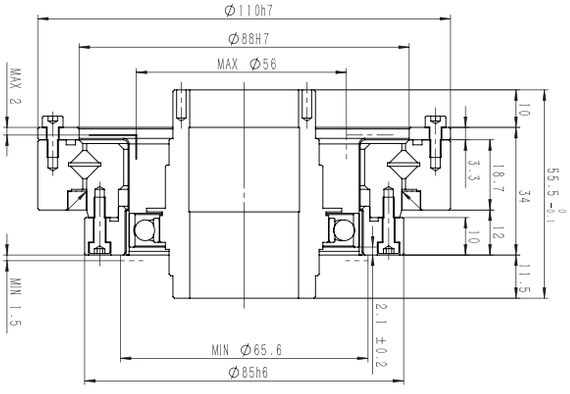


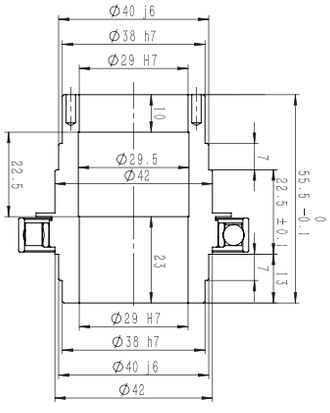


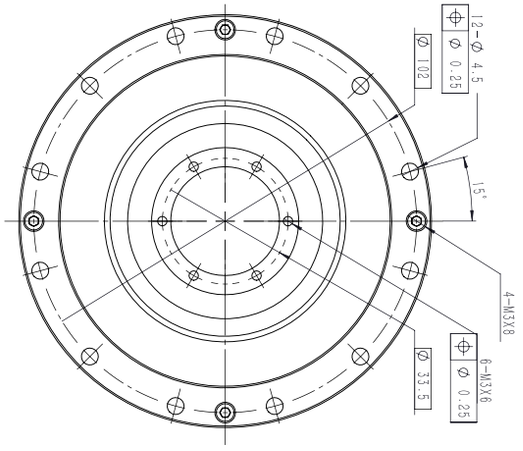
HMHG-III series Harmonic gearbox

HMHG-25-XX-III



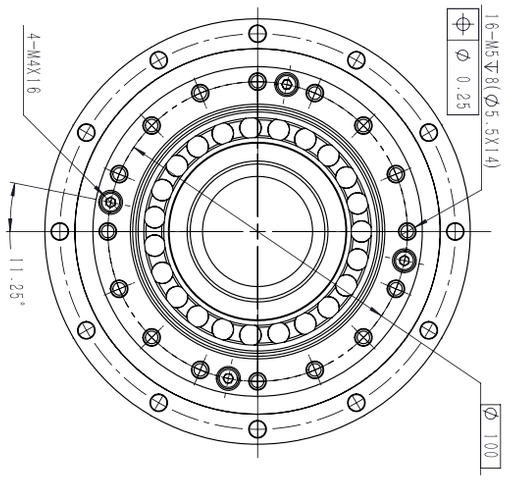


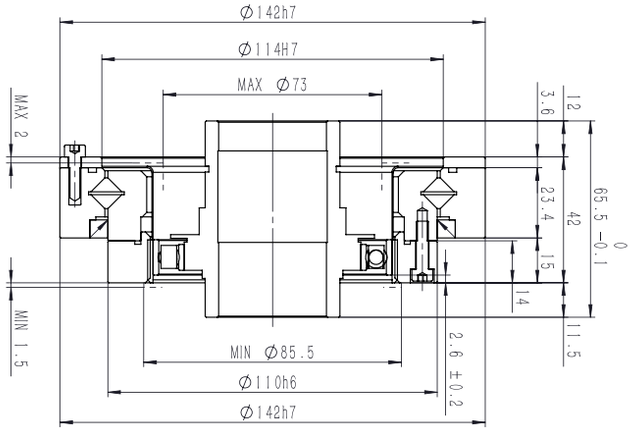


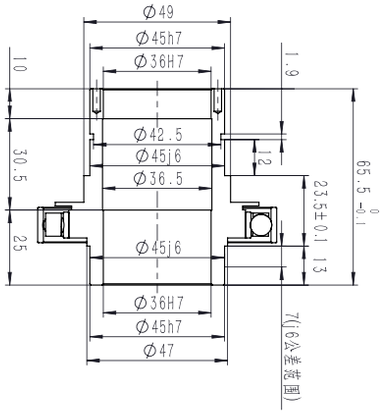


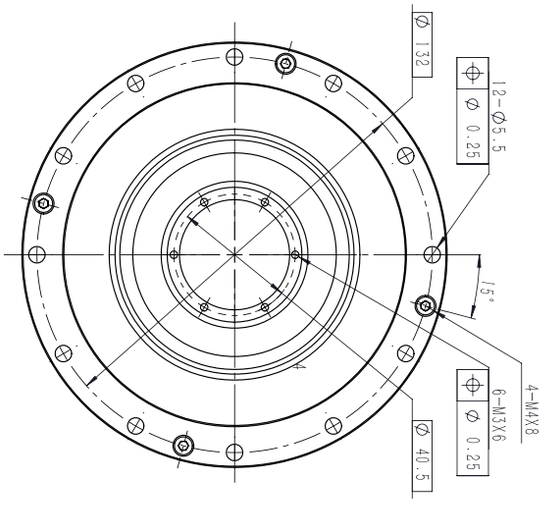
HMHG-III series Harmonic gearbox

HMHG-32-XX-III



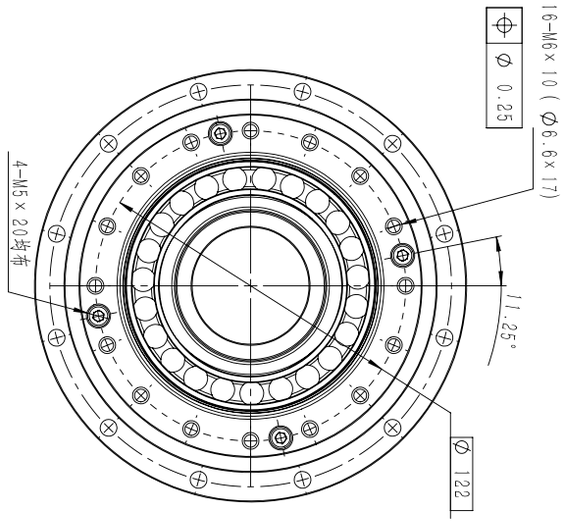


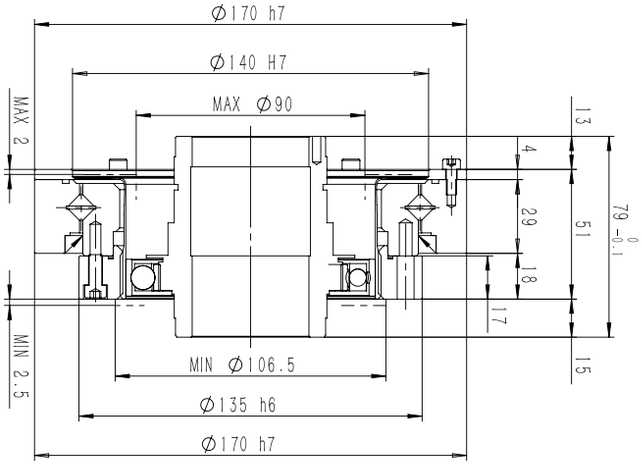


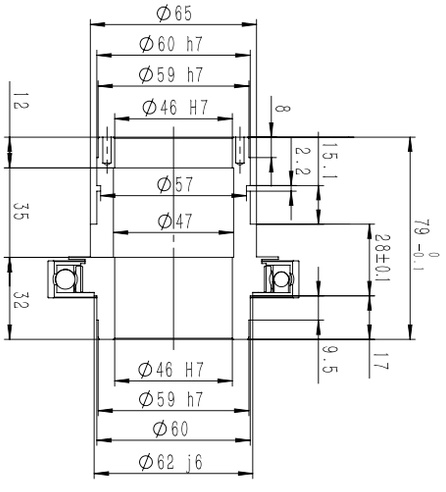


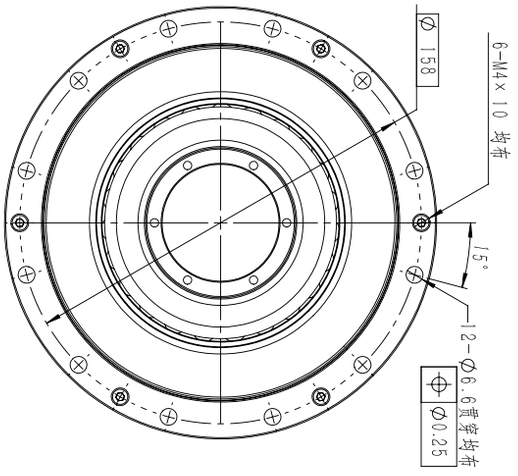
HMHG-III series Harmonic gearbox

HMHG-40-XX-III



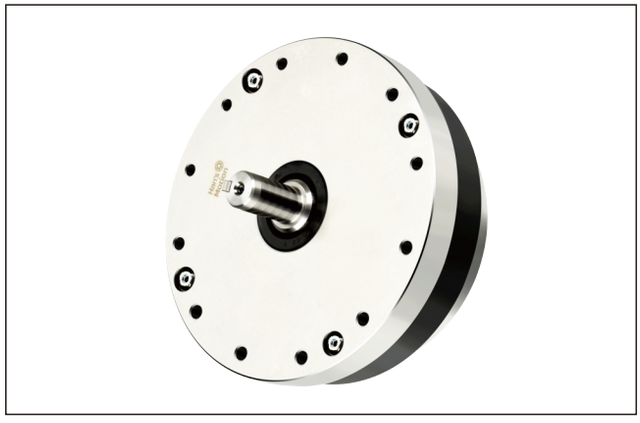






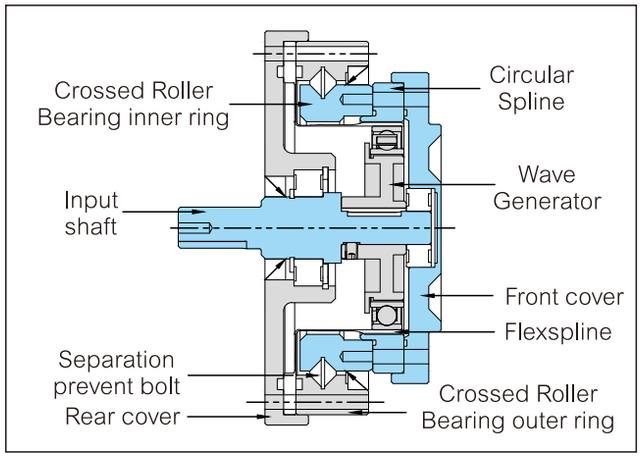
HMHG-IVseries Harmonic gearbox

HMHG-IV series product details



Unit type (input shaft))

The flexspline of HMHG-IV is hollow flanging standard type , the whole drive is compact. With input shaft support and the roller bearing is built-in, fullly sealed structure , easy to install, it's very suitable for the application of installing bevel gearing and synchronous belt in input end.



Product features

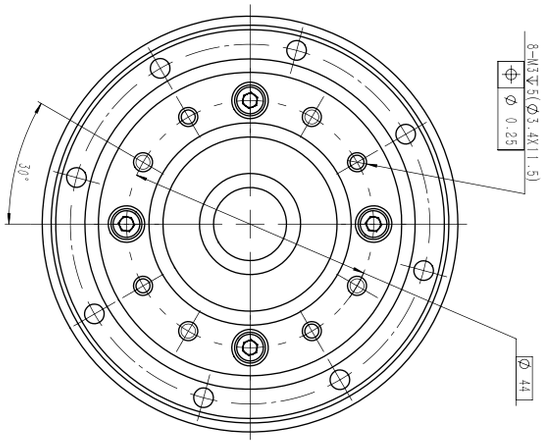
1.Various input pattern support
2.Compact and simple design
3.No Backlash
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy
6.Compared to HMHS series, torque capacity has been improved by 30%
7.Compared to HMHS series,life time has been improved by 43%

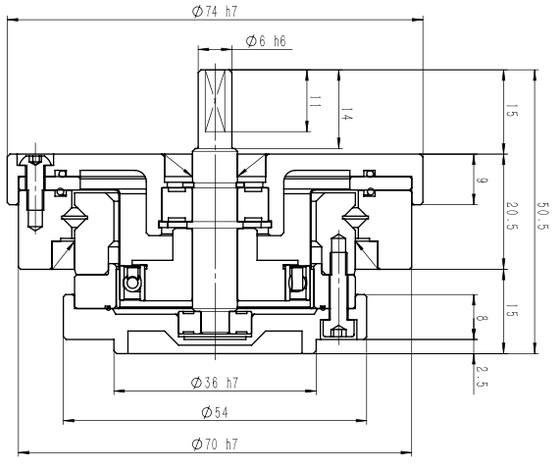
HMHG-IV series performance parameter

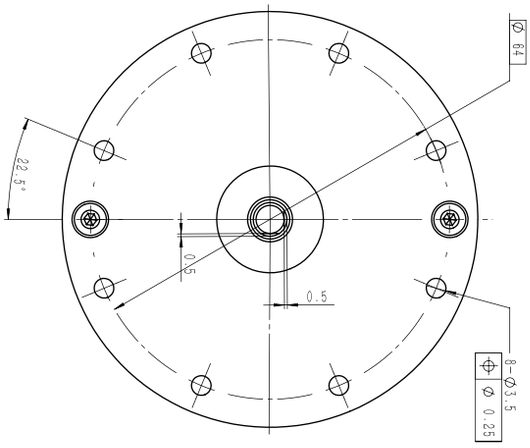
Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽	kg
14	50	7	23	9	46	8000	3500	20	90	0.66
	80	10	30	14	51			20	90	
	100	10	36	14	70			10	90	
17	50	21	44	34	91	7000	3500	20	90	0.94
	80	29	56	35	113			20	90	
	100	31	70	51	143			10	90	
20	50	33	73	44	127	6000	3500	20	60	1.38
	80	44	96	61	165			20	60	
	100	52	107	64	191			10	60	
	120	52	113	64	191			10	60	
25	50	51	127	72	242	5500	3500	20	60	2.1
	80	82	178	113	332			20	60	
	100	87	204	140	369			10	60	
	120	87	217	140	395			10	60	
32	50	99	281	140	497	4500	3500	20	60	4.4
	80	153	395	217	738			10	60	
	100	178	433	281	841			10	60	
	120	178	459	281	892			10	60	
40	50	178	523	255	892	4000	3000	10	60	7.3
	80	268	675	369	1270			10	60	
	100	345	738	484	1400			10	60	
	120	382	802	586	1530			10	60	

HMHG-IVseries Harmonic gearbox

HMHG-14-XX-IV

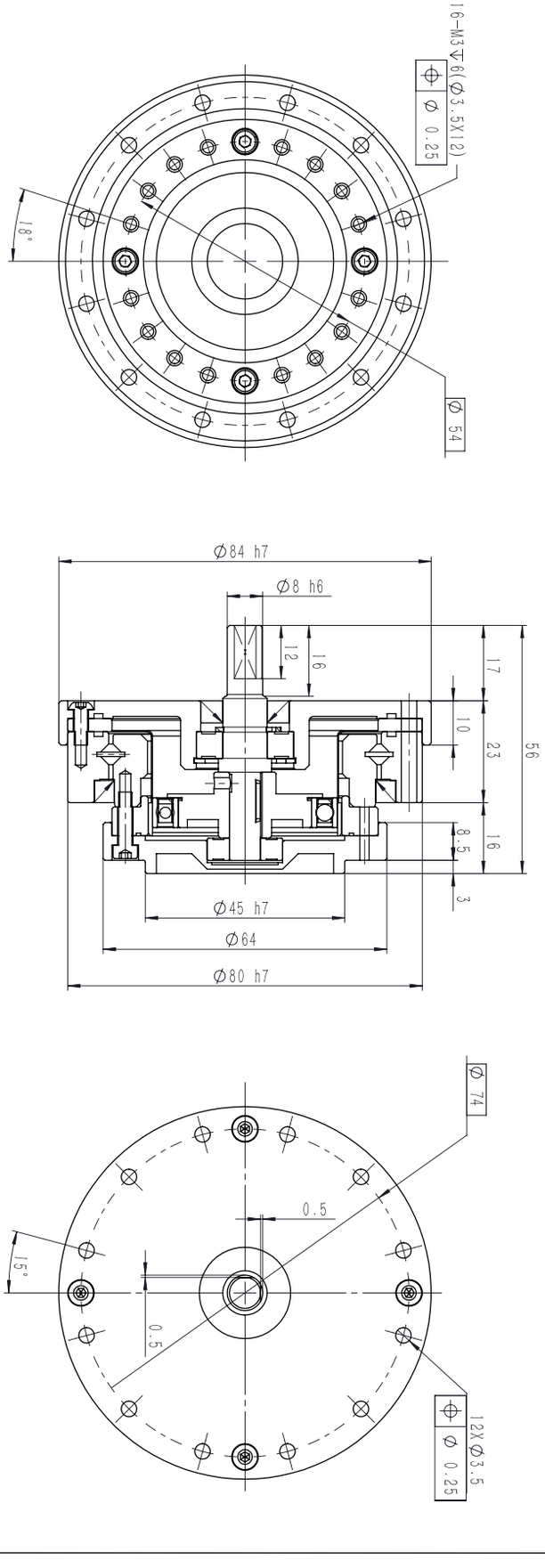






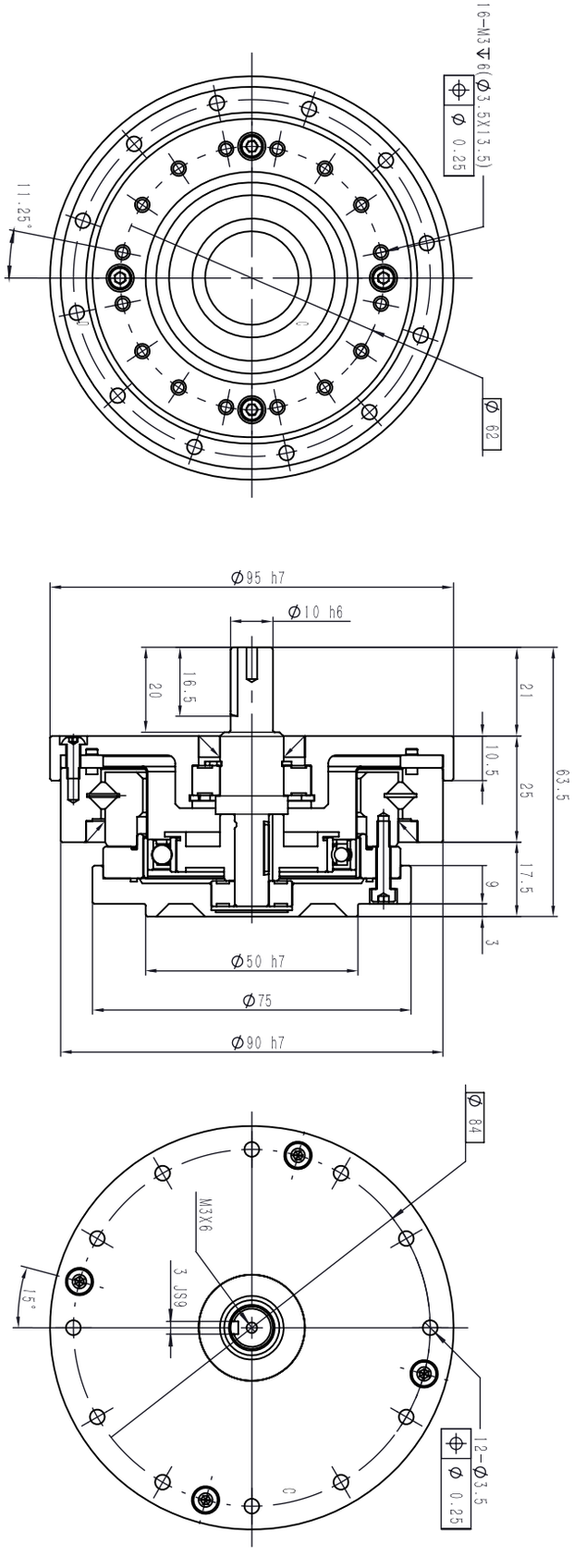
HMHG-IVseries Harmonic gearbox

HMHG-17-XX-IV



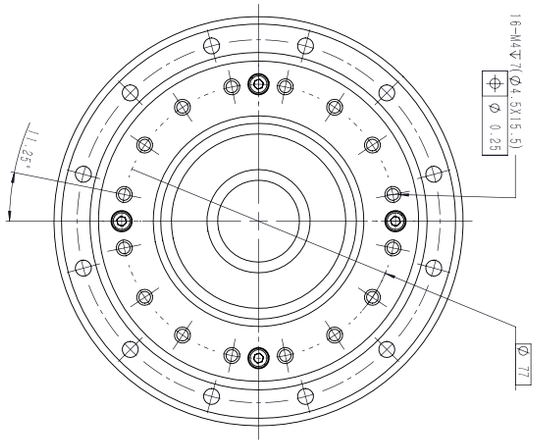
HMHG-IVseries Harmonic gearbox

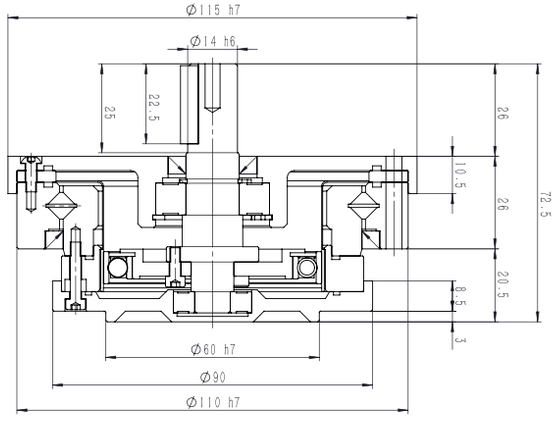
HMHG-20-XX-IV

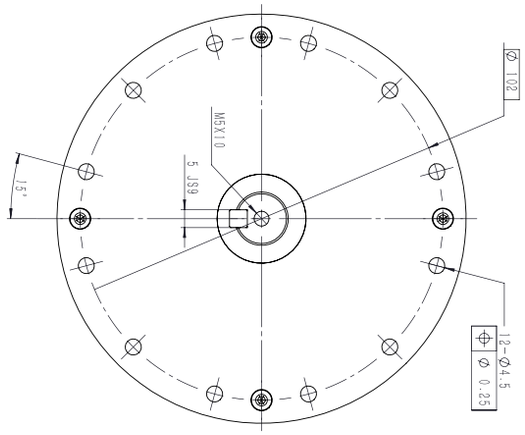


HMHG-IVseries Harmonic gearbox

HMHG-25-XX-IV

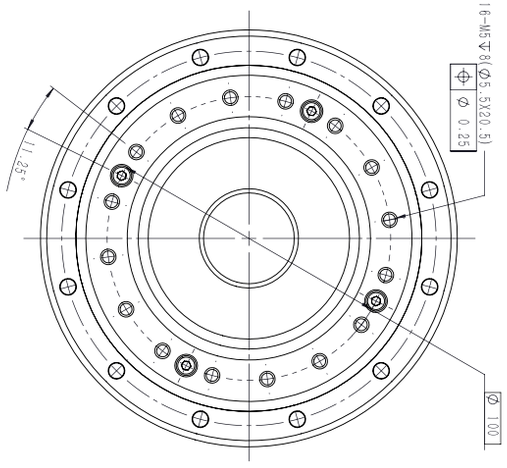


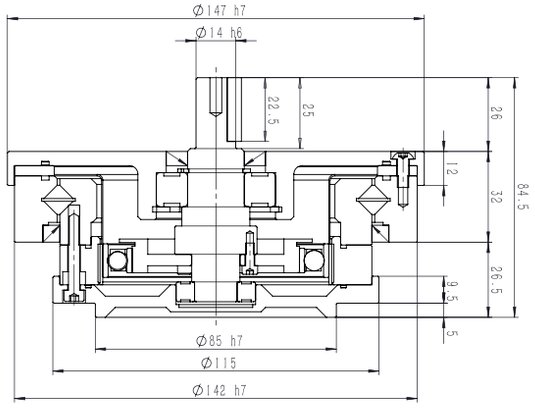


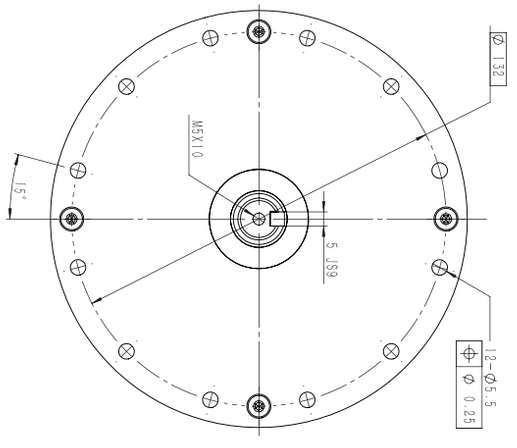


HMHG-IVseries Harmonic gearbox

HMHG-32-XX-IV

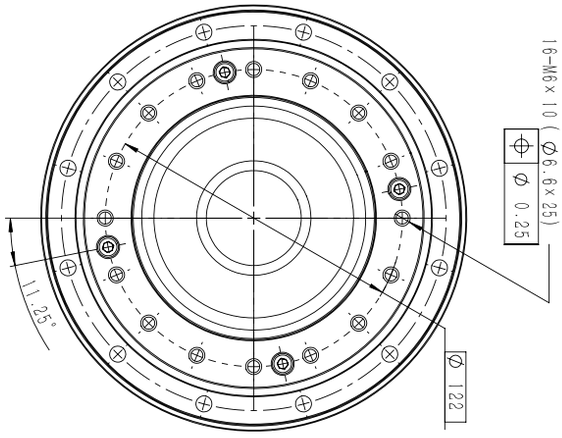


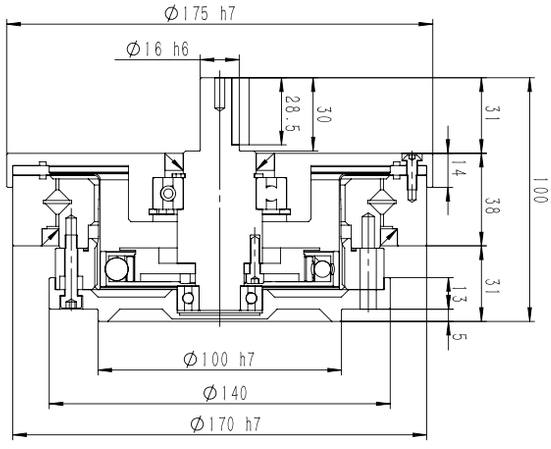


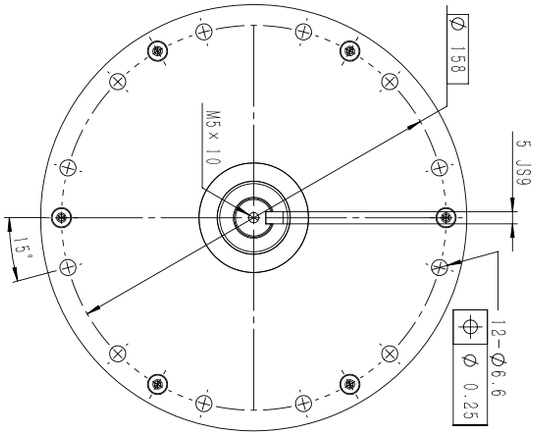


HMHG-IVseries Harmonic gearbox

HMHG-40-XX-IV





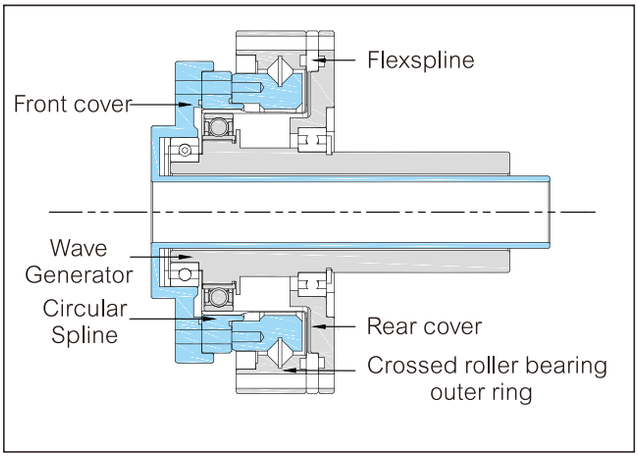


HMHG-V series Harmonic gearbox

HMHG-V series product details

Unit type (Hollow & Long Shaft)

The flexspline of HMHG-V is hollow flanging standard type , the input shaft can connect to motor directly, the cable can go through the low speed hollow shaft , encoder can be intsalled on both input and output side. Usually it's used for cobot and joint module application.



Product features

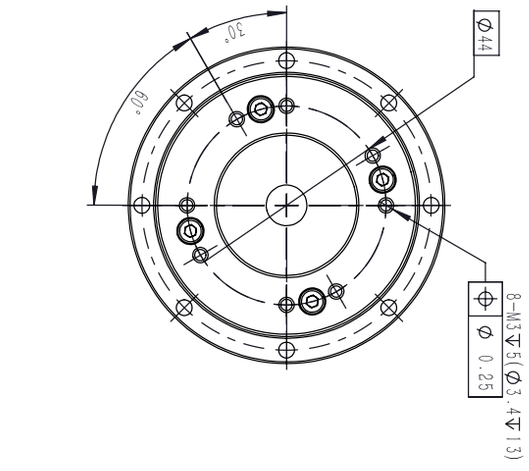
1.Cable can go through the hollow shaft, safer and reliable
2.Doubled torque/volume ratio, as well as modular design, make it more compact with motor
3.No Backlash
4.Excellent positioning accuracy and rotation accuracy
5.Installing position of motor and encoder is small
6.Compared to HMHS series, torque capacity has been improved by 30%
7.Compared to HMHS series,life time has been improved by 43%

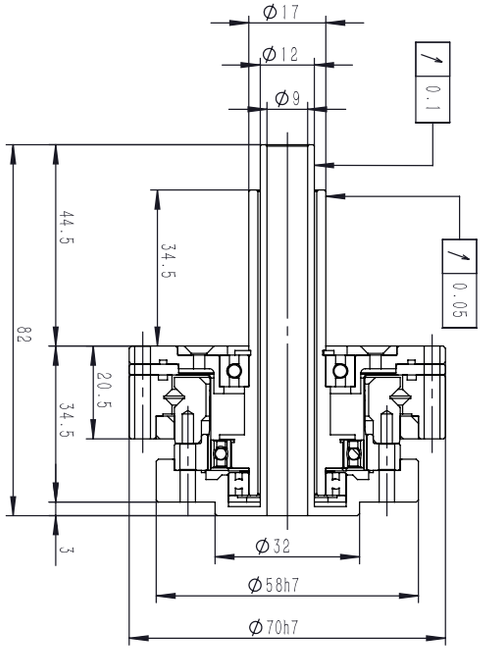
HMHG-V series performance parameter

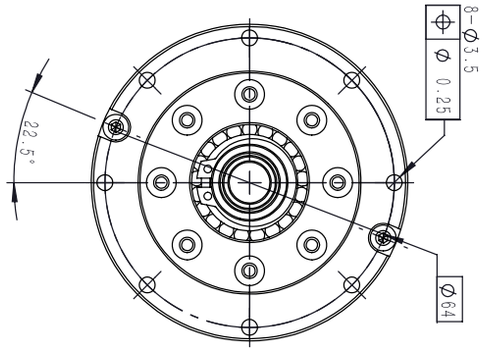
Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)
		Nm	Nm	Nm	Nm	r/min	r/min	⩽	⩽
14	50	7	23	9	46	8000	3500	20	90
	80	10	30	14	51			20	90
	100	10	36	14	70			10	90
17	50	21	44	34	91	7000	3500	20	90
	80	29	56	35	113			20	90
	100	31	70	51	143			10	90
20	50	33	73	44	127	6000	3500	20	60
	80	44	96	61	165			20	60
	100	52	107	64	191			10	60
	120	52	113	64	191			10	60
25	50	51	127	72	242	5500	3500	20	60
	80	82	178	113	332			20	60
	100	87	204	140	369			10	60
	120	87	217	140	395			10	60
32	50	99	281	140	497	4500	3500	20	60
	80	153	395	217	738			10	60
	100	178	433	281	841			10	60
	120	178	459	281	892			10	60
40	50	178	523	255	892	4000	3000	10	60
	80	268	675	369	1270			10	60
	100	345	738	484	1400			10	60
	120	382	802	586	1530			10	60

HMHG-V series Harmonic gearbox

HMHG-14-XX-V

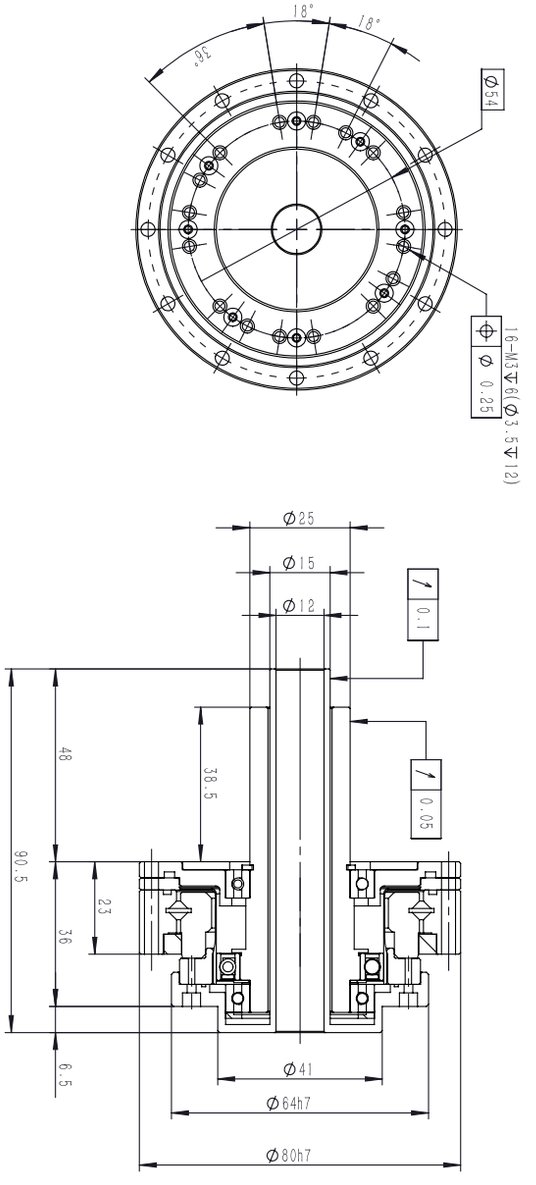






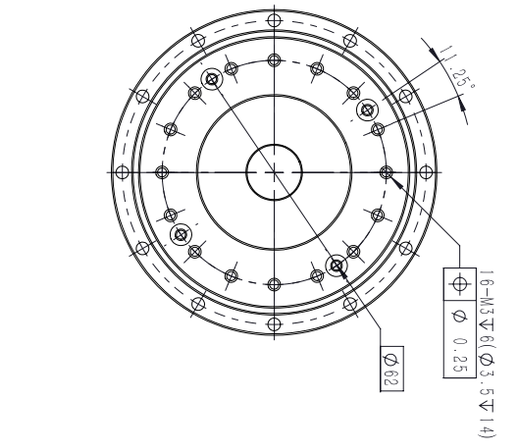
HMHG-V series Harmonic gearbox

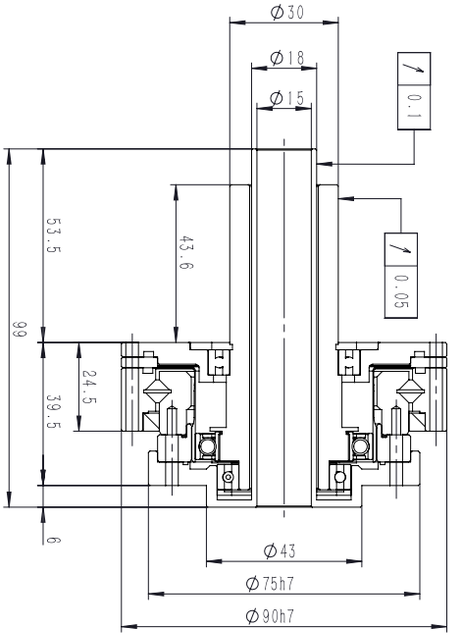
HMHG-17-XX-V

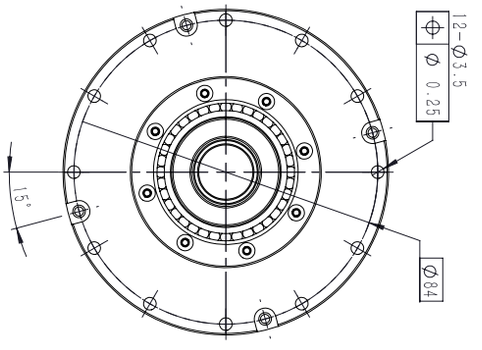


HMHG-V series Harmonic gearbox

HMHG-20-XX-V

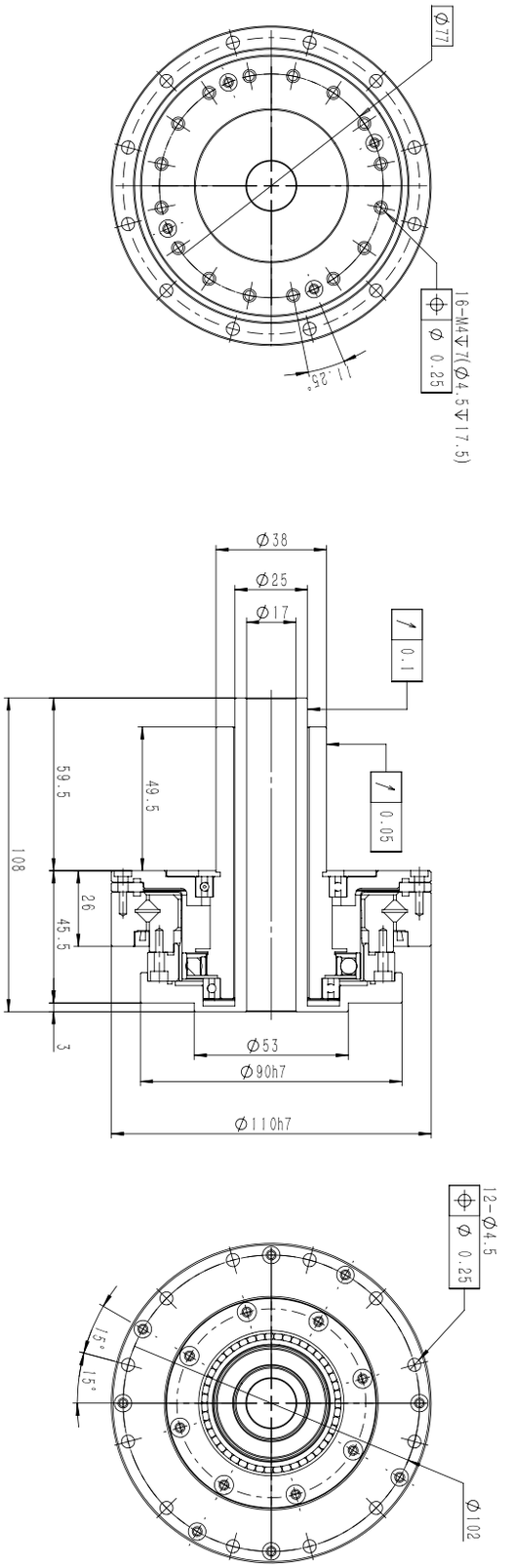






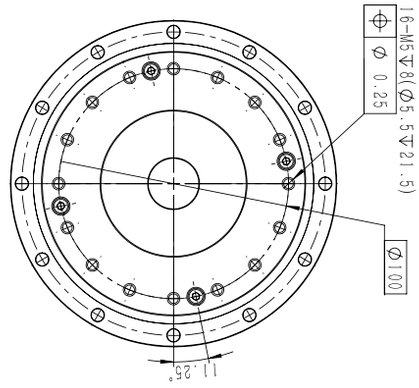
HMHG-V series Harmonic gearbox

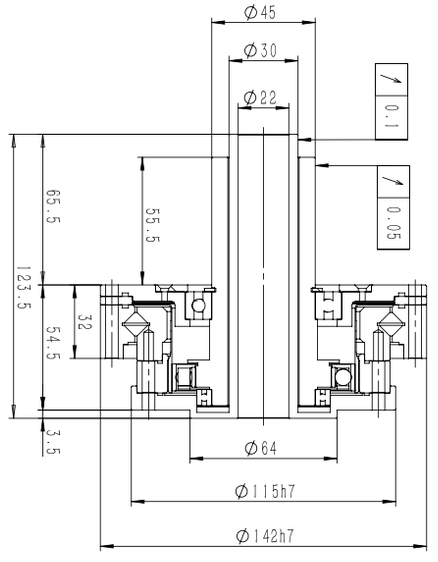
HMHG-25-XX-V

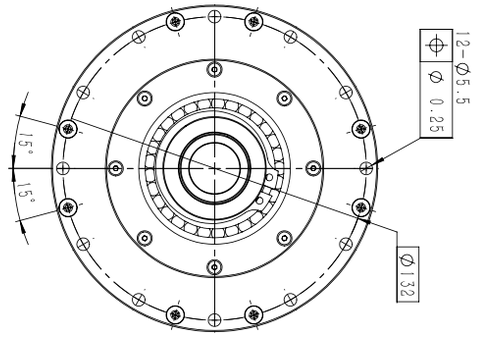


HMHG-V series Harmonic gearbox

HMHG-32-XX-V

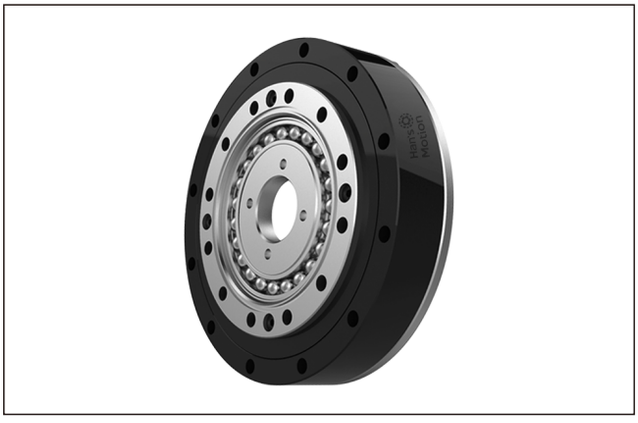






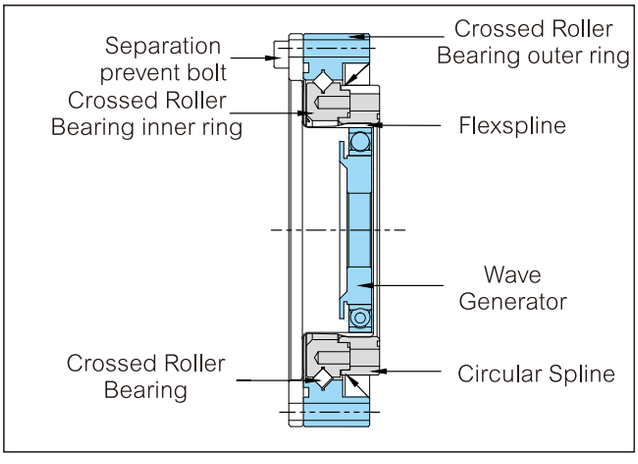
HMHD-III series Harmonic gearbox

HMHD-III series product details



Simple unit type (super flat hollow shaft)

HMHD-III series has pursued extremely flatness. Compare with HMHS series, the axial direction length is reduced by 50%. Flexspline is ultrathin and hollow flanging type, with high stiffness CRB. Usually it's used for the application that needs the flat design.



Product features

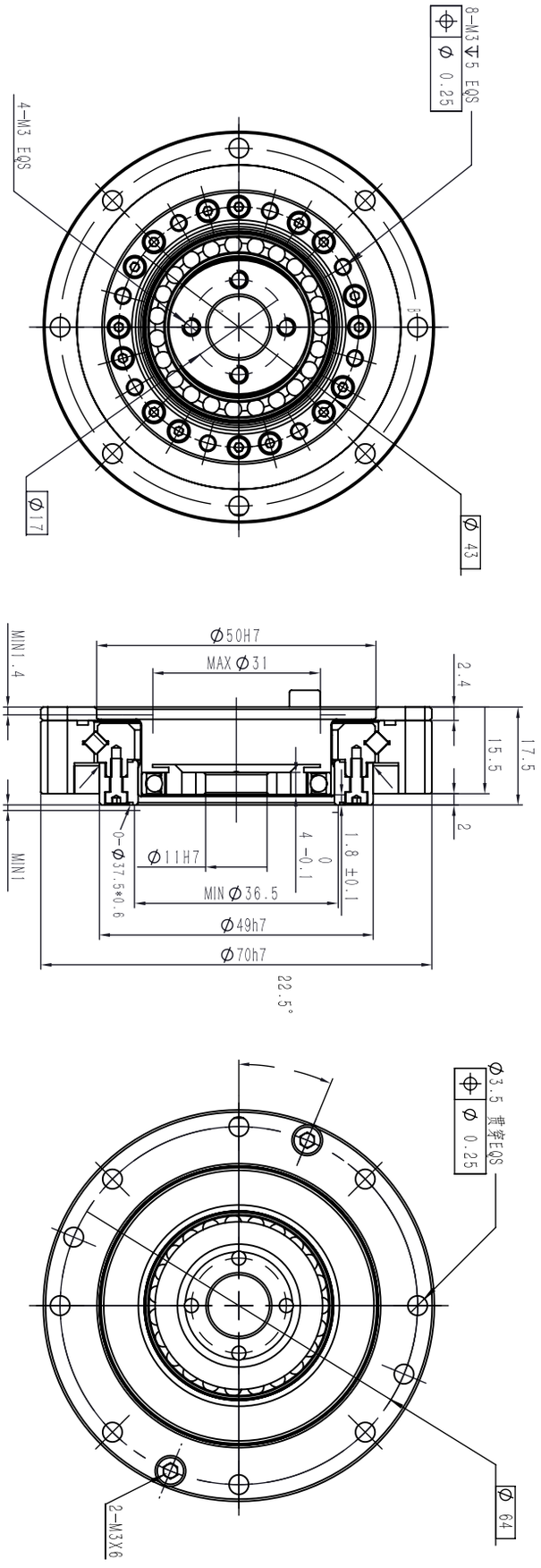
1.Ultra thin • Hollow structure
2.High stiffness
3.High torque capacity
4.Input/output coaxial
5.Excellent positioning accuracy and rotation accuracy

HMHD-III series performance parameter

Model	Reduction ratio	Rated torque at input 2000r/min	Permissible peak torque at start / stop	Permissible max. value of ave.load torque	Instantaneous permissible max. torque	Permissible max. input rotational speed	Permissible ave. input rotational speed	Backlash (arc sec)	Transmission accuracy (arc sec)	Weight
		Nm	Nm	Nm	Nm	r/min	r/min	≤	≤	kg
14	50	3.5	11.4	4.6	23	8000	3500	20	90	0.33
	80	5.1	15	6.2	29			20	90	
	100	5.1	18	7	33			20	90	
17	50	10.5	22	17	46	7000	3500	20	90	0.42
	80	14	29	21	54			20	90	
	100	15	35	26	67			20	90	
20	50	16	37	23	66	6000	3500	20	90	0.52
	80	23	49	28	78			10	90	
	100	27	54	32	90			10	90	
25	50	26	66	36	121	5500	3500	20	60	0.91
	80	42	91	62	157			10	60	
	100	45	105	71	175			10	60	
32	50	50	143	71	255	4500	3500	20	60	1.87
	80	79	202	126	350			10	60	
	100	91	221	143	399			10	60	

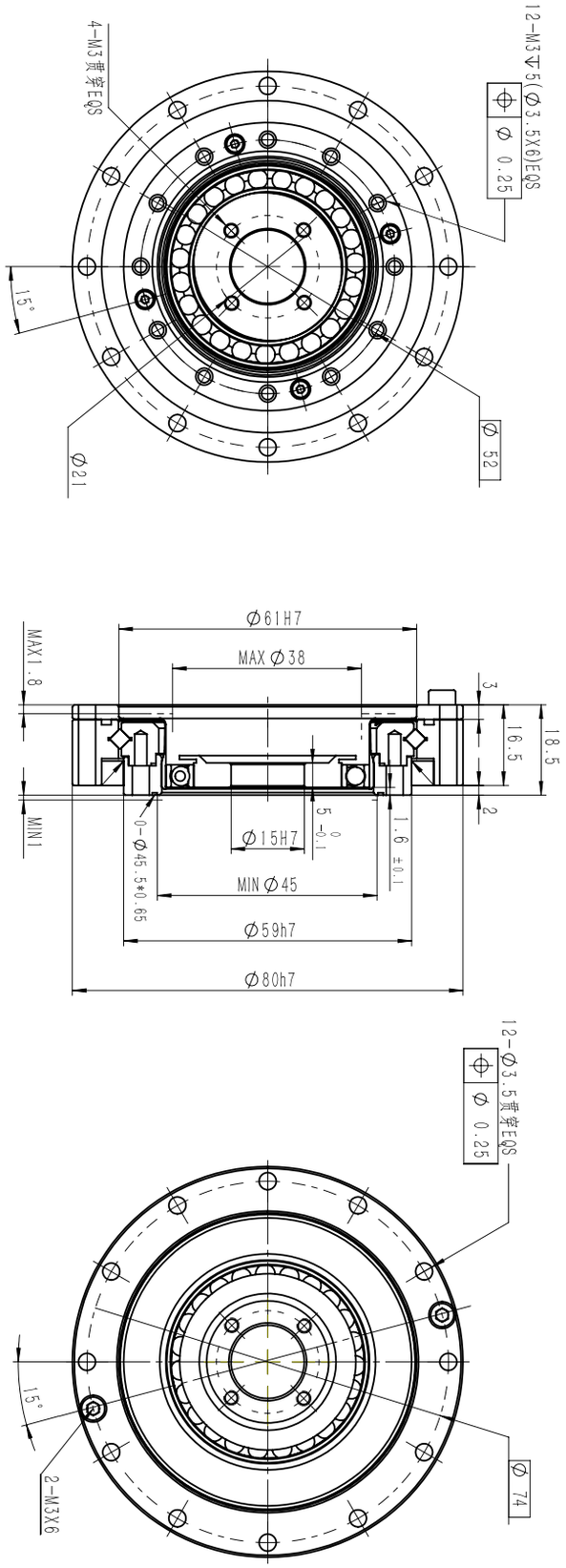
HMHD-III series Harmonic gearbox

HMHD-14-XX-III



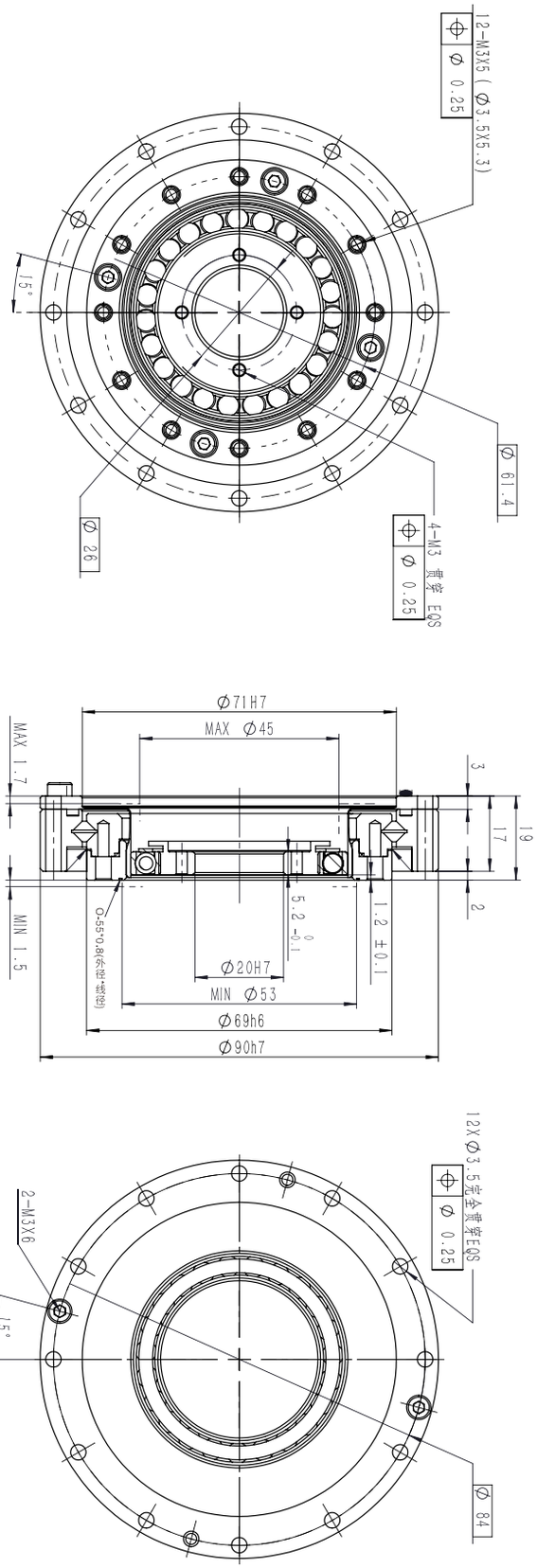
HMHD-III series Harmonic gearbox

HMHD-17-XX-III



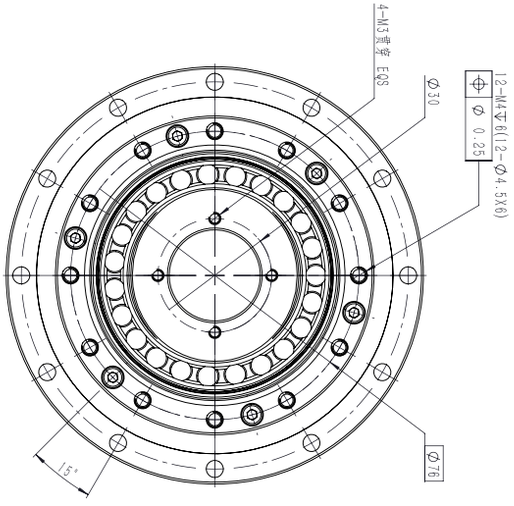
HMHD-III series Harmonic gearbox

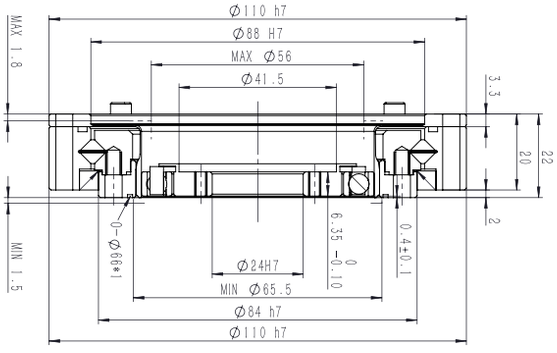
HMHD-20-XX-III

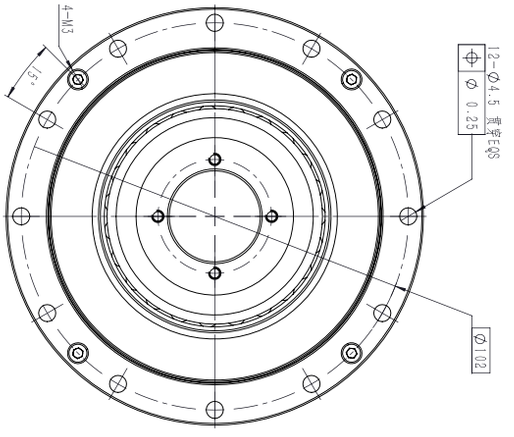


HMHD-III series Harmonic gearbox

HMHD-25-XX-III

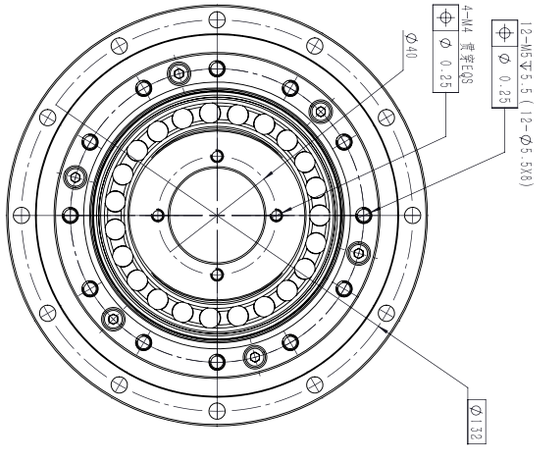


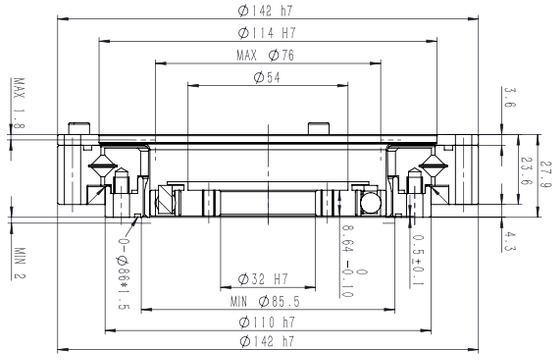


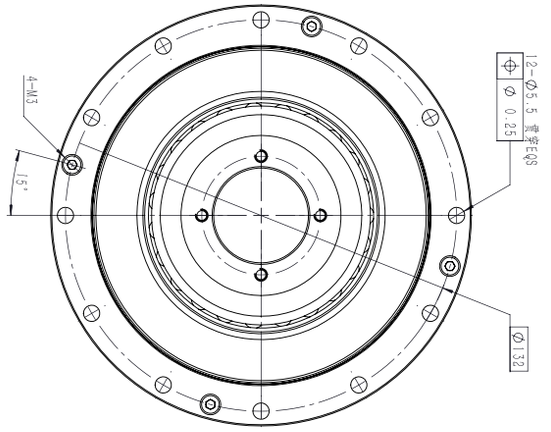


HMHD-III series Harmonic gearbox

HMHD-32-XX-III







Reducer Installation

一、Design guide

In order to give full play to the performance of harmonic reducer, please pay attention to the followings.

① The input shaft, circular spline, output shaft and case shall be concentric.

② An axial force can be generated on wave generator, input shaft should be designed to the stucture that can support the force.

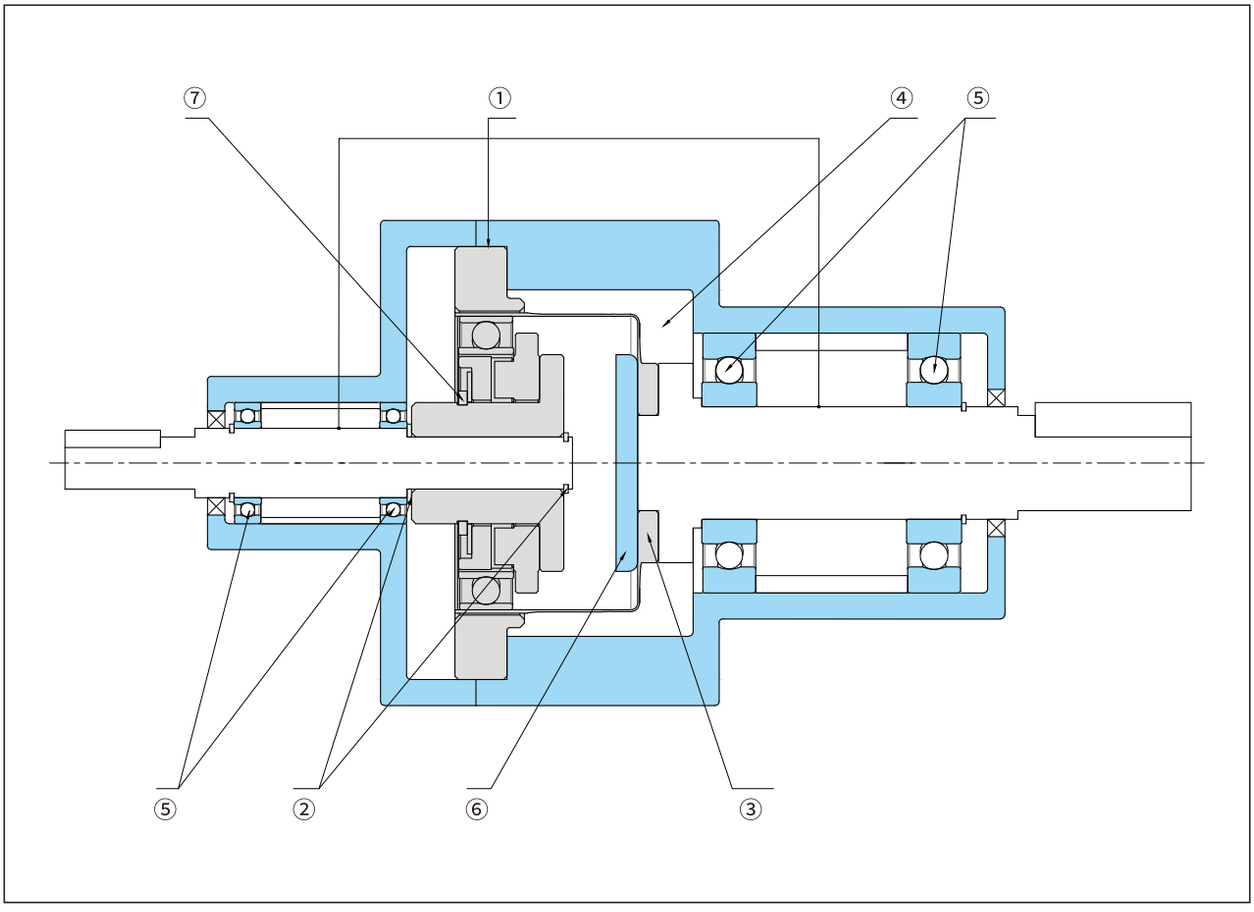
③ The harmonic reducer is small but can transmit a large torque, so please connect the flexspline and the output shaft with a bolt and compatible tightening torque.

④ Flexspilne can have elastic deformation, so please adopt the recommended size to design the inner wall of case.

⑤ The input shaft and ouput shaft must adopt the appropriate bearings (with space for two points support) and the structure that can bear all the radial load and axial load, so that there is no extra force apply to the wave generator and flexspline.

⑥ Please make sure the mounting flange diameter of the flexspline shall not exceed the hub hole diamter of flexspline,and process fillet on the flange that connects diaphragm. Please adopt the recommended size to design all parts.

⑦ Use C-type retaining rig to fix the hub of wave generator. Please make sure the hook of retaining ring shall not interfere with the case.



Reducer Installation

二、Sealing mechanism

To prevent lubrication grease from leakage and keep the durability of harmonic reducer, the following sealing mechanism must be required:

1.Rotating and sliding area: oil seal (with spring built -in), please take care if there is scratches on the shaft.

2.Flange mounting face, chimera: O-ring and sealant. Please notice whether the plane is skewed or the meshing of O-ring; (for the O-ring and groove for reducer installation, See chart below) .

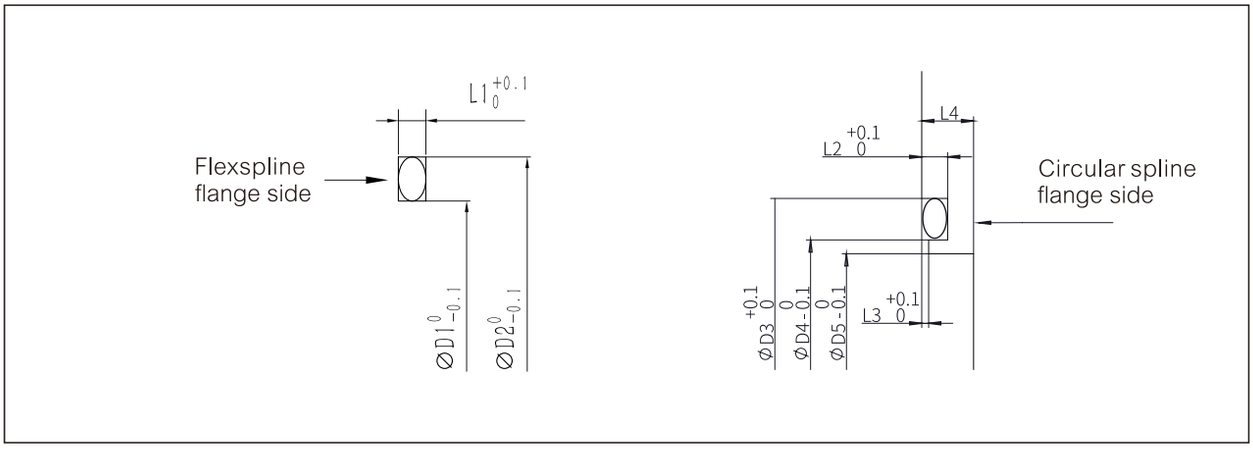
3.Screw hole part: use the screw locking agent with sealing effect (Loctite 243 is recommended) or sealing tape.

Area requiring sealing		Recommended sealing method
Output side	Through hole in the center of output flange or the mounting face of output flange	Using O-ring (the company product is attached)
	Spanner screw area	Screw locking agent with sealing effect (Loctite 243 is recommended)
Input side	Flange mounting face	Using O-ring (the company product is attached)
	Motor output shaft	Please select the motor with an oil seal. If the motor without oil seal, please attach the oil seal t o the motor mounting face.

O-ring and O-ring groove size

Product model	Flexspline				Circular spline						
	O-ring	O-ring groove			O-ring	O-ring groove					
		∅D1	∅D2	L1		∅D3	∅D4	∅D5	L2	L3	L4 MIN
HMHG-14-XX-II/III	55*1.5 (Outer dia*Wire dia)	51.1	55.5	1.2	37.8*0.6 (Outer dia*Wire dia)	38	36.5	36.2	0.45	0.15	1
HMHG-17-XX-II/III	64*1.5 (Outer dia*Wire dia)	60.5	64.5	1.2	47*1 (Outer dia*Wire dia)	48	45.5	44.7	0.75	0.2	1
HMHG-20-XX-II/III	72*1.5 (Outer dia*Wire dia)	70	74	1.2	56*1 (Outer dia*Wire dia)	56.2	53.8	52.4	0.75	0.2	1.5
HMHG-25-XX-II/III	93.6*1.8 (Outer dia*Wire dia)	89.8	94.6	1.4	70*1.5 (Outer dia*Wire dia)	70.5	66.8	65.6	1.2	0.3	1.5
HMHG-32-XX-II/III	119.5*2 (Inner dia*Wire dia)	117.6	123	1.5	86*1.5 (Inner dia*Wire dia)	90	86	85.5	1.1	0.3	1.5
HMHG-40-XX-II/III	144.5*2 (Inner dia*Wire dia)	148	142.6	1.5	109.5*1.5 (Inner dia*Wire dia)	112.4	108	106	1.2	0.4	2
HMHD-14-XX-III	55*1.5 (Outer dia*Wire dia)	51.5	55.5	1.2	37.5*0.6 (Inner dia*Wire dia)	O-ring groove is equipped in HMHD circular spline.					
HMHD-17-XX-III	64*1.5 (Outer dia*Wire dia)	60.5	64.5	1.2	45.5*0.65 (Inner dia*Wire dia)						
HMHD-20-XX-III	72*1.5 (Outer dia*Wire dia)	70	74	1.2	55*0.8 (Outer dia*Wire dia)						
HMHD-25-XX-III	93.6*1.8 (Outer dia*Wire dia)	89.8	94.6	1.4	66*1 (Inner dia*Wire dia)						
HMHG-32-XX-III	119.5*2 (Inner dia*Wire dia)	117.6	123	1.5	86*1.5 (Inner dia*Wire dia)						

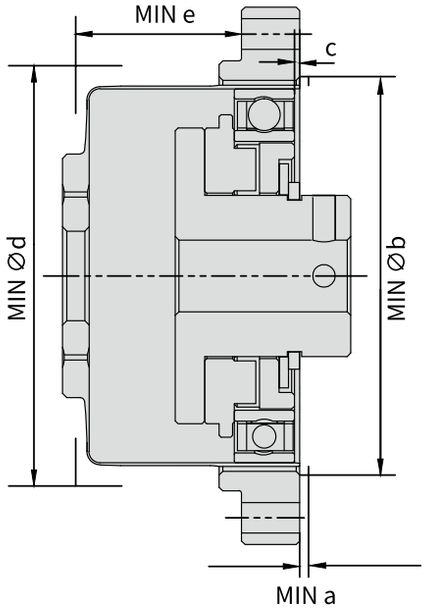
Dimensional drawing of O-ring and O-groove for reducer installation



Reducer Installation

三、The clearance size of reducer and the installation depth of wave generator

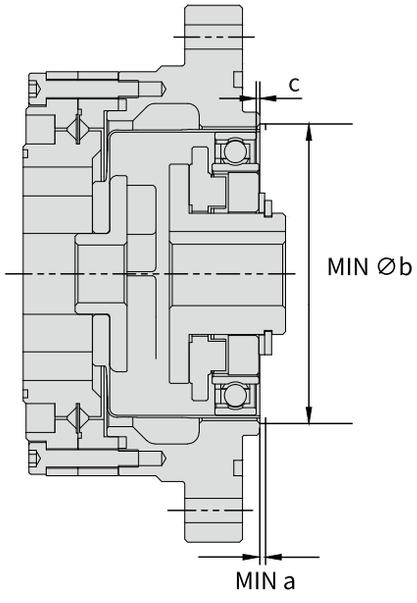
1. The clearance size of HMCG-I series harmonic drive and the installation depth of wave generator



HMCG-I Series unit:mm

Model	a	b	c	d	e
14	1	38	1.5±0.2	38	17.1
17	1	45	1.85±0.2	45	19
20	1.5	53	1.95±0.2	53	20.5
25	1.5	66	2.1±0.2	66	23
32	1.5	86	2.6±0.2	86	26.8
40	2	106	3.45±0.2	106	33

2. The clearance size of HMCG-II series harmonic drive and the installation depth of wave generator



HMCG-II Series unit:mm

Model	a	b	c
14	1	38	1.5±0.2
17	1	45	1.85±0.2
20	1.5	53	1.95±0.2
25	1.5	66	2.1±0.2
32	1.5	86	2.6±0.2
40	2	106	3.45±0.2

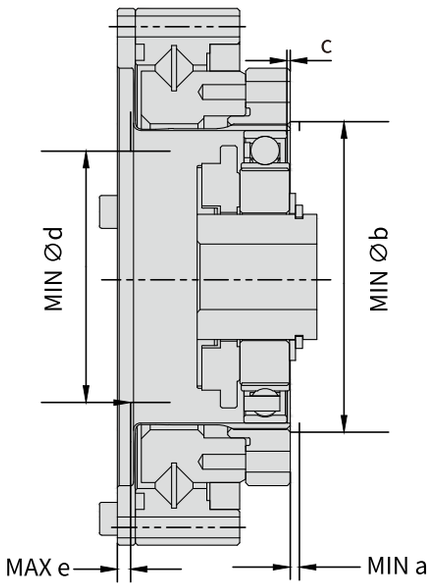
Note:① C refers to the distance between the end face of the outer ring of the flexible bearing and the end face of the circular spline.

② Please confirm the design size of the flange and wave generator in strict accordance with the clearance dimension of the harmonic drive. If the size exceeds the clearance dimension, it will cause interference of the flexspline and flange or wave generator and affect the service life of the harmonic drive.

③ The installation of the harmonic drive shall be designed according to the installation depth requirement of the wave generator. The different installation depth of the reducer will affect the parameters, such as the starting torque and precision of the reducer.

Reducer Installation

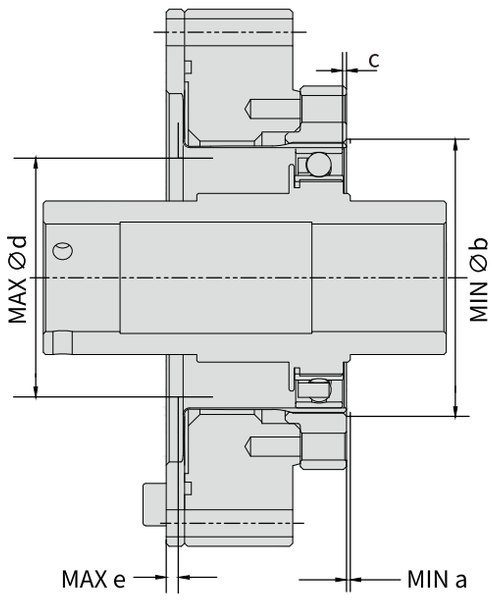
3. The clearance size of HMHG-**II** series harmonic drive and the installation depth of wave generator.



HMHG-**II** Series unit:mm

型号	a	b	c	d	e
14	1	36.2	1.5±0.2	31	1.7
17	1	44.7	1.85±0.2	38	2.1
20	1.5	52.4	1.95±0.2	45	2
25	1.5	65.6	2.1±0.2	56	2
32	1.5	85.5	2.6±0.2	73	2
40	2	106	3.45±0.2	90	2

4. The clearance size of HMHG-**III** series harmonic drive and the installation depth of wave generator.



HMHG-**III** Series unit:mm

型号	a	b	c	d	e
14	1	36.2	1.5±0.2	31	1.7
17	1	44.7	1.85±0.2	38	2.1
20	1.5	52.4	1.95±0.2	45	2
25	1.5	65.6	2.1±0.2	56	2
32	1.5	85.5	2.6±0.2	73	2
40	2	106	3.45±0.2	90	2

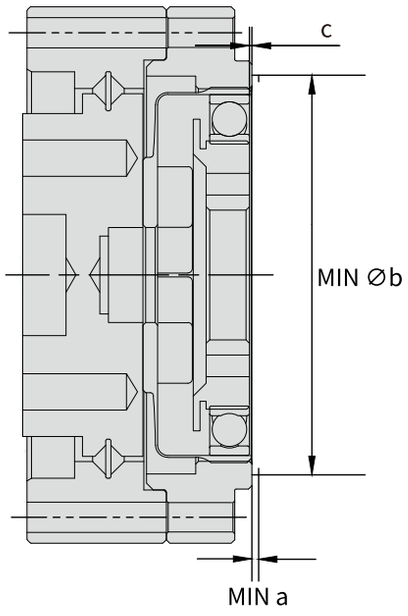
Note:① C refers to the distance between the end face of the outer ring of the flexible bearing and the end face of the circular spline.

② Please confirm the design size of the flange and wave generator in strict accordance with the clearance dimension of the harmonic drive. If the size exceeds the clearance dimension, it will cause interference of the flexspline and flange or wave generator and affect the service life of the harmonic drive.

③ The installation of the harmonic drive shall be designed according to the installation depth requirement of the wave generator. The different installation depth of the reducer will affect the parameters, such as the starting torque and precision of the reducer.

Reducer Installation

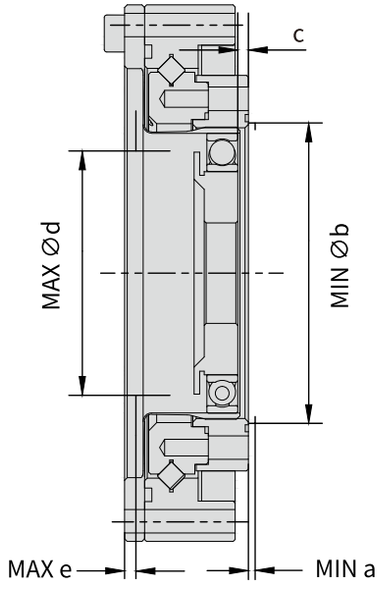
5. The clearance size of HMCD-II series harmonic drive and the installation depth of wave generator.



HMCD-**II** Series unit:mm

型号	a	b	c
14	1	36.5	0.3±0.1
17	1	45	0.3±0.1
20	1.5	53	0.3±0.1
25	1.5	66	0.4±0.1
32	2	86	0.5±0.1

6. The clearance size of HMHD-III series harmonic drive and the installation depth of wave generator.



HMHD-**III** Series unit:mm

型号	a	b	c	d	e
14	1	36.5	1.8±0.1	31	1.4
17	1	45	1.6±0.1	38	1.8
20	1.5	53	1.2±0.1	45	1.7
25	1.5	66	0.4±0.1	56	1.8
32	2	86	0.6±0.1	73	1.8

Note:① C refers to the distance between the end face of the outer ring of the flexible bearing and the end face of the circular spline.

② Please confirm the design size of the flange and wave generator in strict accordance with the clearance dimension of the harmonic drive. If the size exceeds the clearance dimension, it will cause interference of the flexspline and flange or wave generator and affect the service life of the harmonic drive.

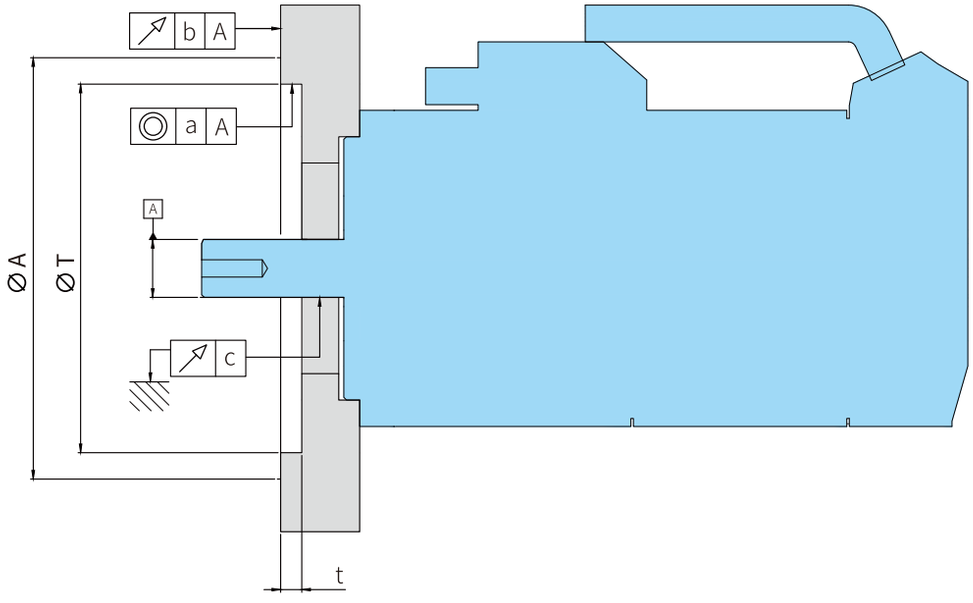
③ The installation of the harmonic drive shall be designed according to the installation depth requirement of the wave generator. The different installation depth of the reducer will affect the parameters, such as the starting torque and precision of the reducer.

Reducer Installation

四、Installation Precision

1.The installation of motor

A motor mounting flange is required for intsalling a motor on the unit type. The recommended size and precision of the basic flanges for motor mounting flange is shown as below:



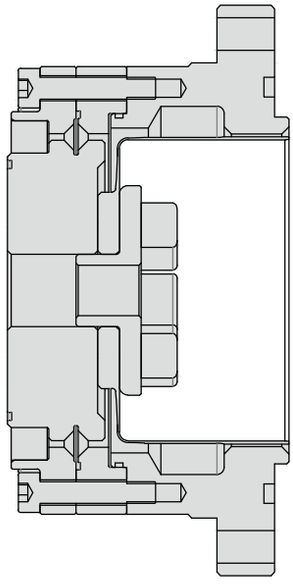
unit:mm

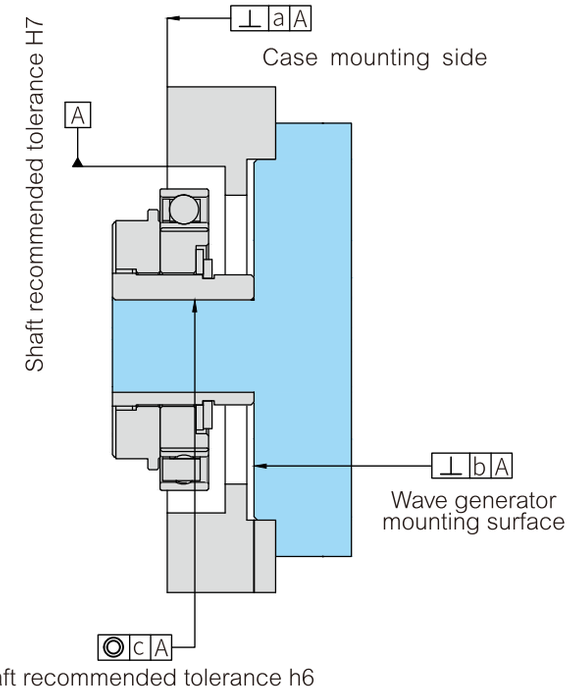
model / symbol	14	17	20	25	32	40
a	0.03	0.04	0.04	0.04	0.04	0.05
b	0.03	0.04	0.04	0.04	0.04	0.05
c	0.015	0.015	0.018	0.018	0.018	0.018
∅A	73	79	93	107	138	160
t	3	3	4.5	4.5	4.5	6
∅T	38H7	48H7	56H7	67H7	90H7	110H7

Reducer Installation

2. The intsallation precision of HMCG-II series

To fully bring out the excellent performance, please make sure to use the recommended precision of the case as shown in below figure and table.





unit:mm

model / symbol	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.0026
b	0.017	0.020	0.020	0.024	0.024	0.032
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
c	0.030	0.034	0.044	0.047	0.050	0.063
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.024)

*The value in () indicates the integral type of wave generator (Without Oldham's coupling)

Reducer Installation

3.The installation precision of HMCD-II series

On the installation design, abnormal and unreasonable installation that may cause the mounting surface deformation and may lower the performance.

To fully bring out the excellent performance, please pay attention to the below points and ensure to maintain the case with the precision in below figure and table.

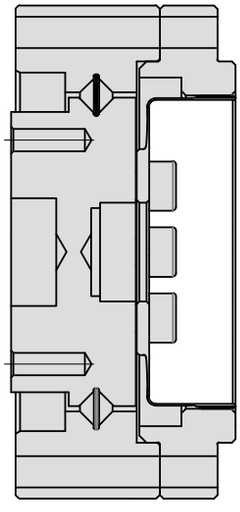
① Mounting surface deflection and deformation.

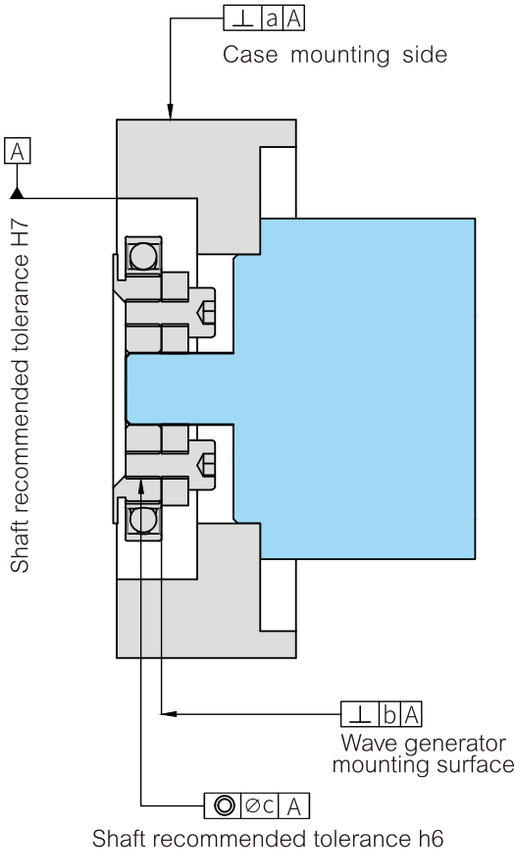
② Foreign matters occurs.

③ The surrounding rough edges, uplift and abnormal position of screw holes on the mounting holes.

④ Chamfering on the mounting faucet joint is insufficient.

⑤ Roundness on the mounting faucet joint is insufficient.





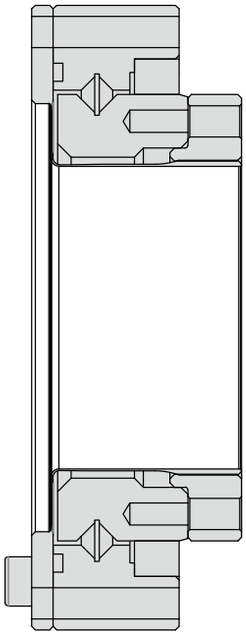
unit:mm

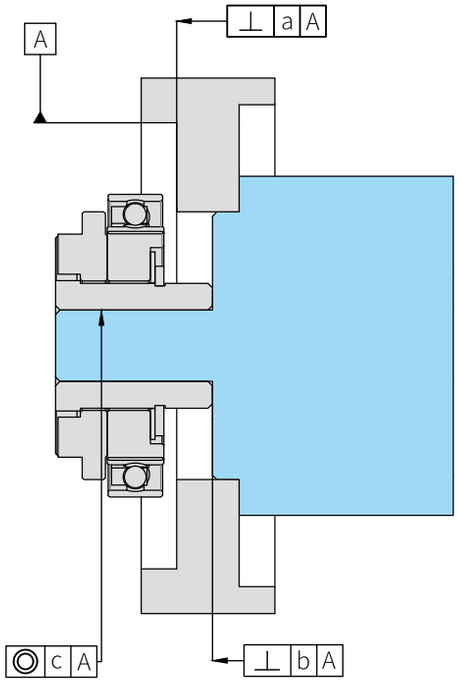
model / symbol	14	17	20	25	32
a	0.011	0.015	0.017	0.024	0.026
b	0.008	0.010	0.012	0.012	0.012
⌀c	0.016	0.018	0.019	0.022	0.022

Reducer Installation

4. The intsallation precision of HMHG-II series

To fully bring out the excellent performance, please pay attention to the below points and ensure to maintain the case with the precision in below figure and table.





unit:mm

model / symbol	14	17	20	25	32	40
a	0.011	0.015	0.017	0.024	0.026	0.026
b	0.017	0.020	0.020	0.024	0.024	0.032
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)	(0.012)
c	0.030	0.034	0.044	0.047	0.050	0.063
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)	(0.024)

*The value in () indicates the integral type of wave generator (Without Oldham's coupling)

Reducer Installation

5.The installation precision of HMHD-III series

On the installation design, abnormal and unreasonable installation that may cause the mounting surface deformation and may lower the performance.
To fully bring out the excellent performance, please pay attention to the below points and ensure to maintain the case with the precision in below figure and table.

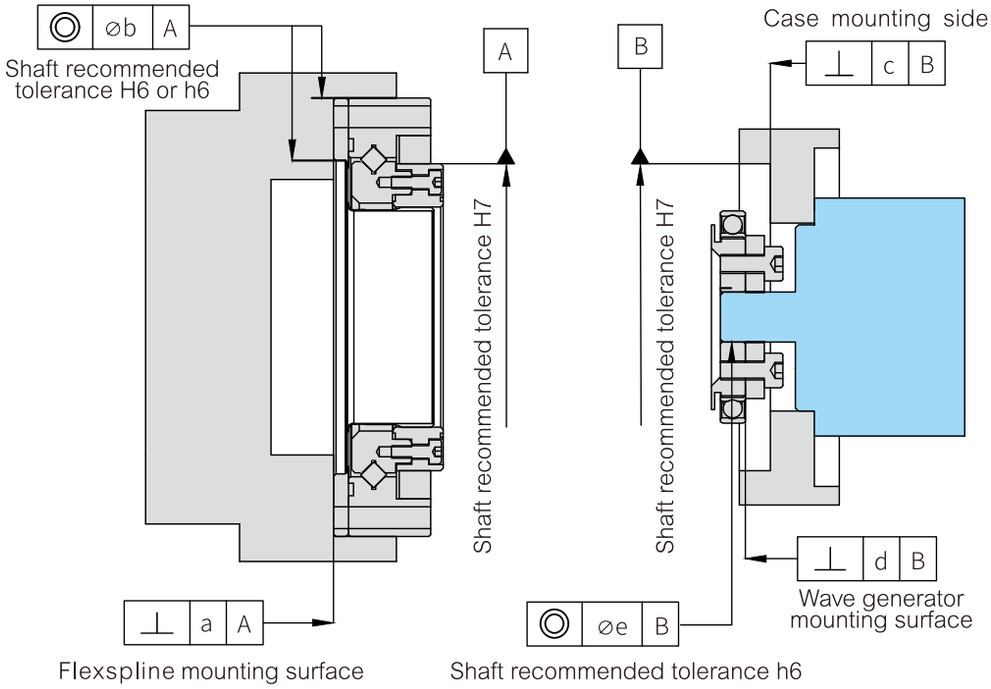
① Mounting surface deflection and deformation.

② Foreign matters occurs.

③ The surrounding rough edges, uplift and abnormal position of screw holes on the mounting holes.

④ Chamfering on the mounting faucet joint is insufficient.

⑤ Roundness on the mounting faucet joint is insufficient.



unit:mm

model / symbol	14	17	20	25	32
a	0.016	0.021	0.027	0.035	0.042
⌀b	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
⌀e	0.016	0.018	0.019	0.022	0.022

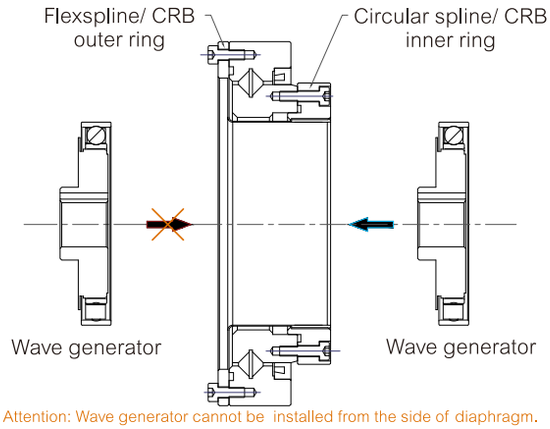
Reducer Installation

五、Assembly precautions

Due to problems during assembly, the harmonic reducer may generate vibration and abnormal sounds, please assembly according to the following precautions.

1. Wave generator precautions

① Do not exert excess force on the bearing part of wave generator during assembly. Make it insert smoothly through rotation.
② For the integral wave generator, please pay more attention and make sure the effect of misallignment and skewing with in the recommended range.
③ Install the wave generator after setting the circular spline and the flexspline on the equipment. Please take attention that the wave generator cannot be installed from the side of diaphragm.



Attention: Wave generator cannot be installed from the side of diaphragm.

2. Circular spline precautions

① Check the flatness of the mounting surface, is it poor or distorted?
② Check the screw hole area, is there any embossment, burr or trapped foreign matter found?
③ Check the house built-in area, does it have the processing of chamfering and relief working of the corner to prevent interference of circular spline?
④ After Installing the circular spline into case, check if the circular spline can rotate, does it interfere with or catch on any parts?
⑤ Does any bolt inserted into the mounting bolt hole interfere with the circular spline and rotate heavily due to the bolt hole being misaligned or oblique?
⑥ Do not tighten the bolts with the required torque all at once. Tighten the bolts temporarily with about half the required torque, then tighten them with the required torque. Tighten the bolts in an even,crisscross pattern.
⑦ Please try to avoid pinning the circular spline if possible, because it may reduce the rotational precision.

3.Flexspline precautions

① Check the flatness of the mounting surface, is it poor or distorted?
② Check the screw hole area, is there any embossment, burr or trapped foreign matter found?
③ Check the house built-in area, does it have the processing of chamfering and relief working of the corner to prevent interference of circular spline?
④ Does it engage with the circular spline in an extremely unbalanced way when it is combined? If it is unbalanced , they could be misaligned or not upright.
⑤ Does any bolt inserted into the mounting bolt hole interfere with the flexspline and rotate heavily due to the bolt hole being misaligned or oblique?
⑥ Do not tighten the bolts with the required torque all at once. Tighten the bolts temporarily with about half the required torque, then tighten them with the required torque. Tighten the bolts in an even,crisscross pattern.
⑦ When assembling it, avoid hitting the tip of the teeth on the opening and inserting the teeth with excessive force,

4.Other precautions

① This harmonic reducer must be installed in a clean environment. During the process of installation, do not allow any irrelevant objects to enter the interior of the reducer, lest the reducer is damaged during use.
② Make sure that the tooth surface and flexible bearing are always properly lubricated. To ensure good lubrication effect, it is not advisable that the tooth surface always face up.
③ After installing Wave Generator, make sure that the engagement of the flexspline and circular spline is symmetrical (180°, see Figure 1). If it deviates to one side (see Figure 2), it will cause abnormal vibration, and the flexspline will be damaged earlier.

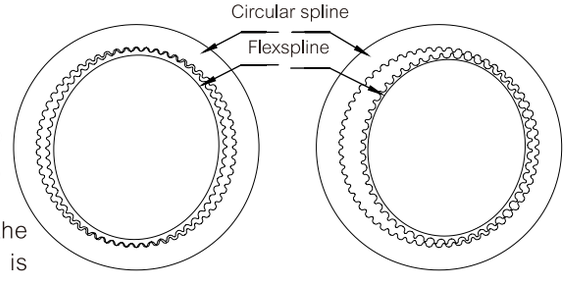


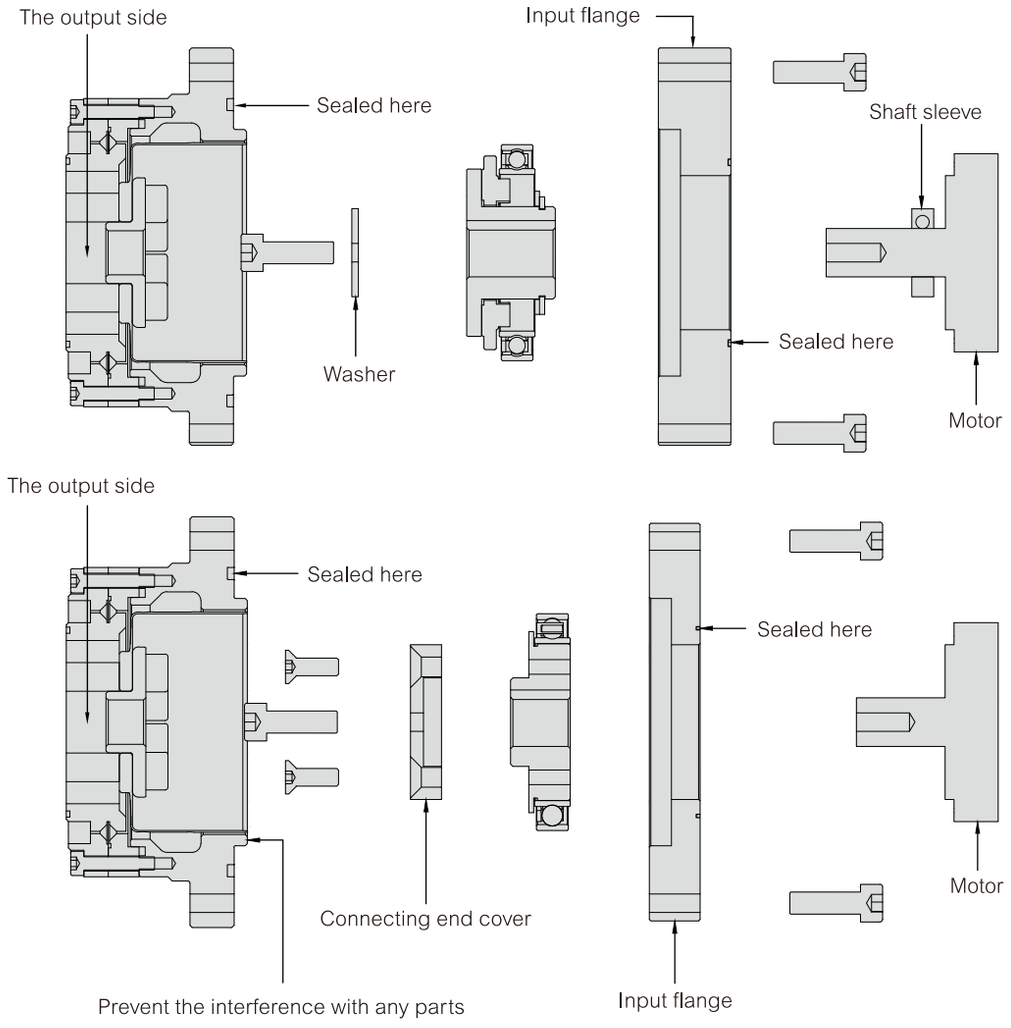
Figure 1 Figure 2

④ When the installation is completed, please run at low speed (100rpm) first, if there is vibration or abnormal sound, stop immediately and recheck whether the installation is correct or contact us to avoid damage to the reducer.

Reducer Installation

六、The installstion of harmonic gearbox

1.HMCG series connecting method 1 (fixed: circular spline, output: flexspline)



① Apply grease evenly to the flexible bearing. Fill the cavity of input flange and motor with lubricating grease (to avoid damage to the harmonic reducer, please use the specified grease). Install Wave Generator on the input end motor shaft or connecting shaft, and fix it with screws and flat washers.

② Apply a layer of lubricating grease evenly on the inner wall of the flexspline. Fille about 80% space of flexspline cavity with lubrication grease (to avoid damage to the reducer, please use the specified grease). Install the reducer according to the direction shown in the figure. During the process of installation, align the long axis of Wave Generator with that of the flexspline, then fix the reducer with screws , pre-tightening force of the screws: 0.5Nm).

③ Set the motor speed to around 100 rpm/min and start the motor. Tighten the screws in a crisscross manner, and increase to the locking force (corresponding to the screws) in 4 to 5 times (see page 87 for locking force). All connecting screws must be 12.9 grade and applied with Loctite 243 thread glue to prevent the screws from failing or loosening during work.

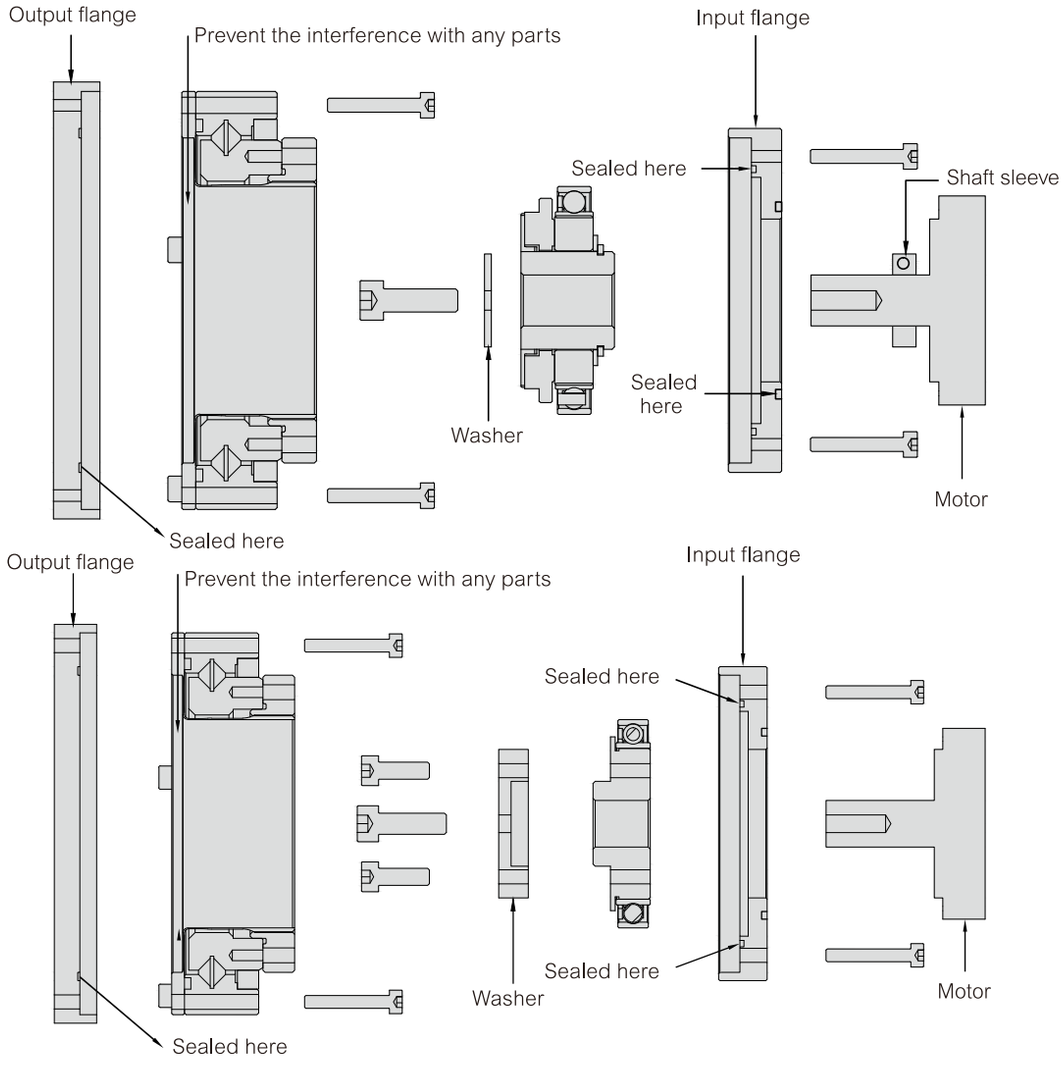
④ Requirements for the installation plane fixed to the reducer: flatness 0.01mm; 0.01mm perpendicular to the axis.

Note:

When using the reducer, if the output end is always horizontally downward (this is not recommended), the lubricating grease injected into the inner wall space of the flexspline must exceed the engagement tooth surface (or you can contact us.), Please use the specified lubricating grease. Static sealing must be used between the circular spline and the input mounting surface, so as to ensure that grease will not leak, and that the reducer will not be damaged due to little or a lack of oil.

Reducer Installation

2.HMHG series connecting method 1 (fixed: circular spline, output: flexspline)



① Apply grease evenly to the flexible bearing. Fill the cavity of input flange and motor with lubricating grease (to avoid damage to the harmonic reducer, please use the specified grease). Install Wave Generator on the input end motor shaft or connecting shaft, and fix it with screws and flat washers.

② Install the reducer in the direction shown in the figure. During the process of installation, make sure the long axis of Wave Generator is aligned with that of the reducer flexspline. Then fix the reducer with screws (pre-tightening force of the screws is 0.5Nm).

③ Set the motor speed to around 100 rpm/min and start the motor. Tighten the screws in a crisscross manner, and increase to the locking force (corresponding to the screws) in 4 to 5 times (see page 87 for locking force). All connected screws must be 12.9 grade and applied with Loctite 243 thread glue to prevent the screws from failing or loosening during work.

④ Apply a layer of lubricating grease evenly on the inner wall of the flexspline. Add grease into space of the flexspline (the volume is about 80% of the flexspline). Please use the specified lubricating grease to avoid damage to the reducer.

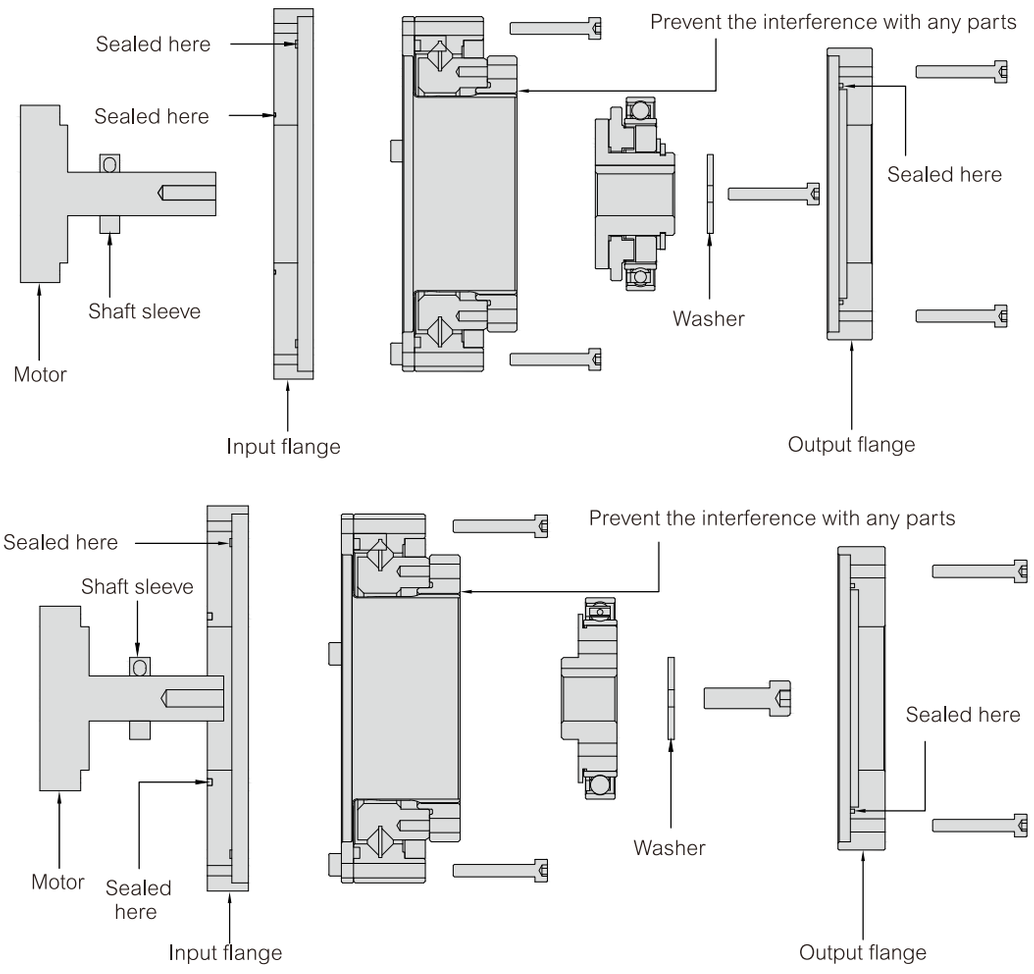
⑤ The ouput side is also fixed by referring to step 3. All connecting and fixed screws must be 12.9 grade and applied with Loctite 243 thread glue to prevent the screws from failing or loosening during work.

⑥ Requirements for the installation plane connected and fixed to the reducer: flatness 0.01mm; 0.01mm perpendicular to the axis.

Note:
When using the reducer, if the output end is always horizontally downward (this is not recommended), the lubricating grease injected into the inner wall space of the flexspline must exceed the engagement tooth surface, that is (or you can contact us). Please use the specified lubricating grease. Static sealing must be used between the reducer circular spline and the installation plane of the output end, and between the flexspline and the installation plane of the input end, so as to ensure that grease will not leak, and that the reducer will not be damaged due to little or a lack of oil.

Reducer Installation

3.HMHG series connecting method 2 (fixed: flexspline, output: circular spline)



① Install the reducer onto the input side and fix it with corresponding screws (pre-tightening force of screws: 0.5Nm).

② Apply a layer of lubricating grease evenly on the inner wall of the flexible gear. Then add lubricating grease into Space B of flexspline, and the volume is about 80% of the flexspline cavity (please use the specified grease).

③ Install the reducer in the direction shown in the figure. During the process of installation, make sure the long axis of Wave Generator is aligned with that of the flexspline . Turn Wave Generator to align the key way on the cam with that on the input shaft, install the key (coat the key with Loctite 638 glue), and fix Wave Generator onto the shaft with screws and large washers.

④ Apply lubricating grease evenly to the flexible bearing. Fill the cavity at A with lubricating grease (please use the specified lubricating grease to avoid damage to the reducer).

⑤ Set the motor speed to around 100 rpm/min and start the motor. Tighten the screws in a crisscross manner, and increase to the locking force corresponding to the screws in 4 to 5 times (see page 87 for locking force). All connecting and fixed screws must be 12.9 grade and applied with Loctite 243 thread glue to prevent the screws from failing or loosening during work.

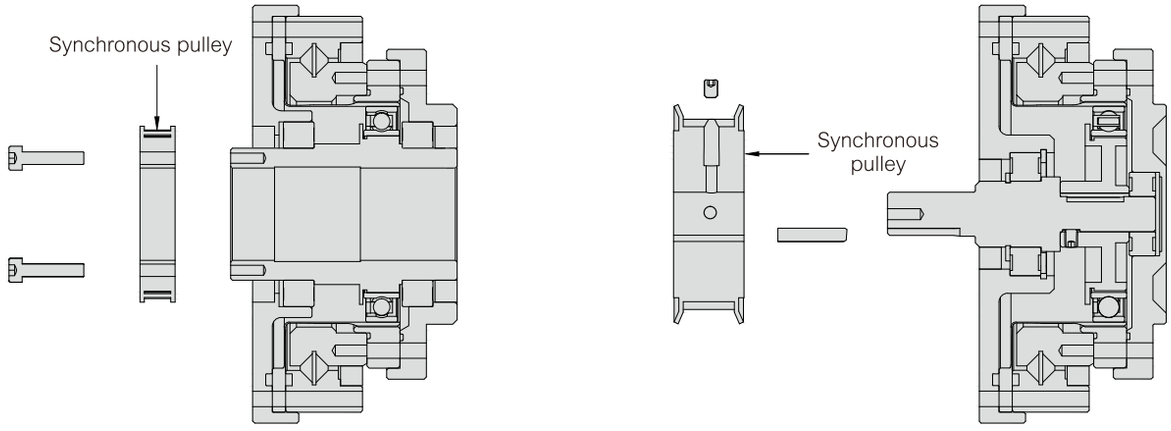
⑥ The output side is also fixed by referring to Step 5. All connecting and fixed screws must be 12.9 grade and applied with Loctite 243 thread glue to prevent the screws from failing or loosening during work.

⑦ Requirements for the installation plane connected and fixed to the reducer: flatness 0.01mm; 0.01mm perpendicular to the axis.

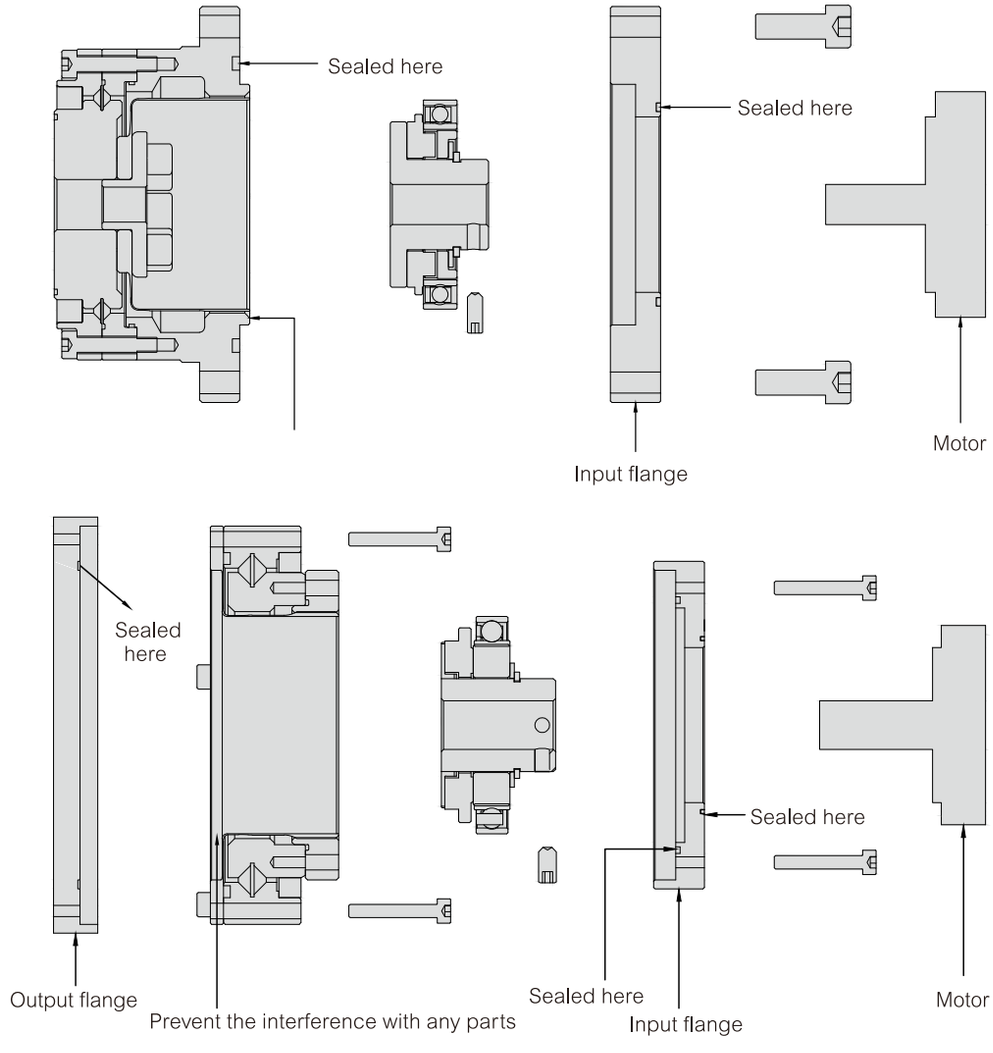
Note:
When using the reducer, if the output end is always horizontally downward (this is not recommended), the lubricating grease injected into the inner wall space of the flexible gear must exceed the engagement tooth surface(or you can contact us). Static sealing must be used between the circular spline and the installation plane of the output end, and between the flexspline and the installation plane of the input end ,so as to ensure that grease will not leak, and that the reducer will not be damaged due to little or a lack of oil.

Reducer Installation

4.HMHG series connecting method 3,4



5.The connection method with the harmonic drive when the motor shaft is optical axis

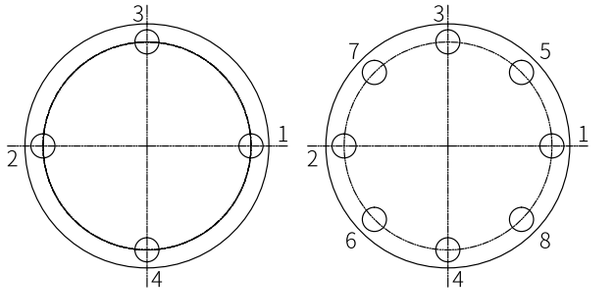


Reducer Installation

6.Lockintg Screws

① Set the motor speed to around 100 rpm/min and start the motor. Tighten the screws in a crisscross manner, and increase to the locking force (corresponding to the screws) in 4 to 5 times (see below table for locking force).

② Requirements for the installation plane connected and fixed to the reducer: flatness 0.01mm; 0.01mm perpendicular to the axis.



Screw level and recommended tightening torque

Screw performance level		12.9						
Thread nominal diameter	mm	3	4	5	6	8	10	12
Tightening torque	N·m	2	4	9	15	35	70	125

Use of grease

一、Precautions of grease lubrication

① Before shipment, lubricating grease is added into the concealed part of the cup & hat type hollow reducers, but it is needed to add and apply lubricating grease when installing Wave Generator.
② The input & output end of the reducer must be designed with strict sealing structure. Skeleton-type oil sealing can be used to seal dynamic sealing parts. O-ring or sealant can be used to seal static sealing parts, and the sealing surface must not be skewed or damaged.
③ It is recommended to use semi-fluid lubricating grease dedicated for harmonic reducers and do not mix with other greases.
④ Lubricating grease must be used according to the instructions specified in the manual. Please note that different models requires varied amount of injected and applied grease.
⑤ If Wave Generator is always facing upwards, it may result in poor lubrication. In this case, increase the amount of grease or consult us.
⑥ The performance of lubricating grease changes with temperature; the higher the temperature is, the faster the grease deteriorates. To ensure that the grease is always in good condition, the thermal equilibrium temperature of the high temperature end of the reducer should be lower than 70℃, and the temperature rise should be less than 40℃.
⑦ The wear of each moving part of the reducer is mainly affected by the performance of lubricating grease. When conditions permit, lubricating grease should be replaced every 3000 hours of operation.

二、Requirements for the grease application

1.The grease application should be refer to the following application guide for HMCG-I, HMCG-II and HMHG-II series

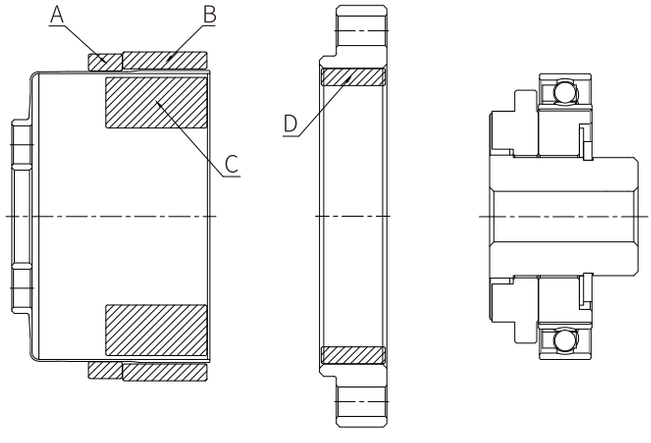
① Application quantity

unit : g

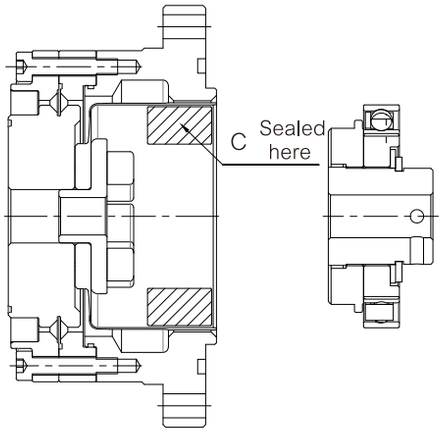
Size	Labricated area					
	A	B	C			D
			Horizontal use	Vertically use		
				Upward	Downward	
14	0.3	0.3	6	8	9	0.3
17	0.5	0.5	10	12	14	0.5
20	0.8	0.8	16	18	21	0.8
25	1.5	1.5	30	35	40	1.5
32	3	3	60	70	80	3
40	6	6	120	130	150	6

② Labricated area

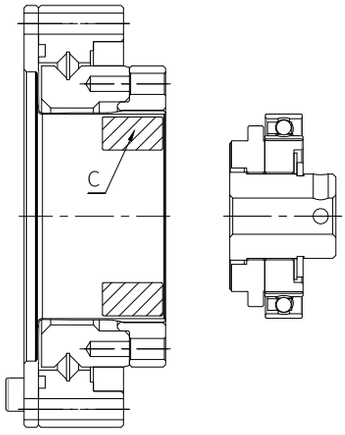
HMCG-I series



Use of grease



HMCG-II series



HMHG-II series

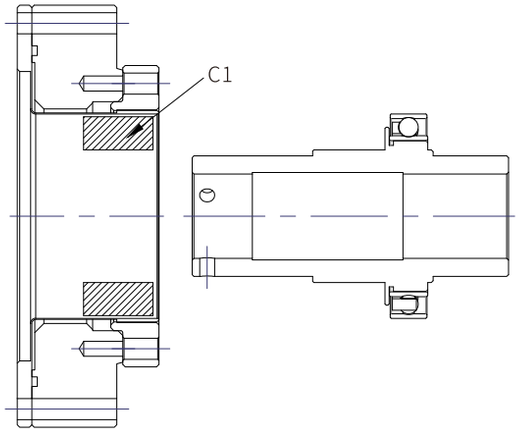
2.The grease application should be refer to the following application guide for HMHG-III

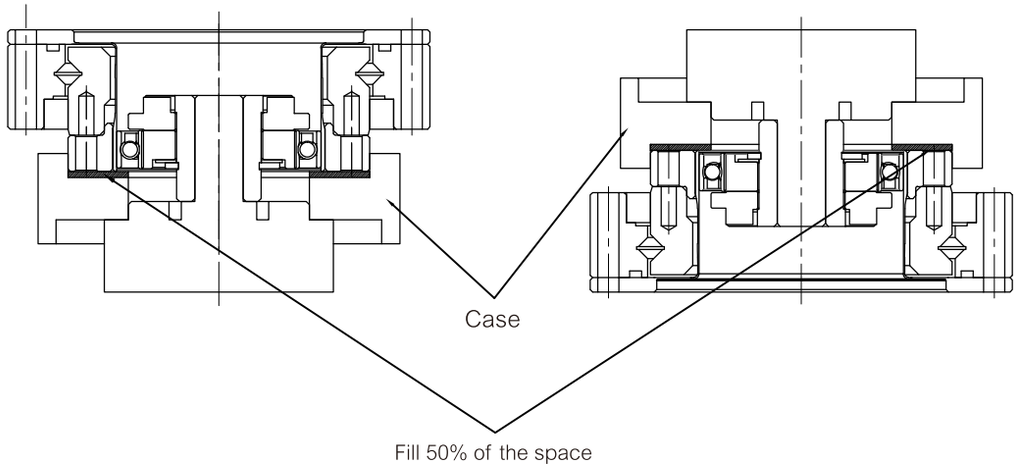
① Labrication grease quantity

unit : g

Size	Labricated area
	C1
14	5.5
17	9.6
20	10.3
25	16
32	26
40	60

② Labricated area





Use of grease

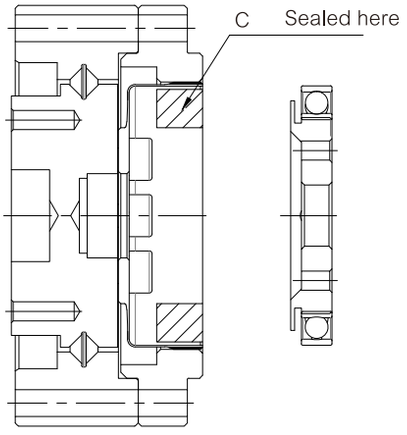
3.The grease application should be refer to the following application guide for HMCD-II,HMHD-III

① Labrication grease quantity

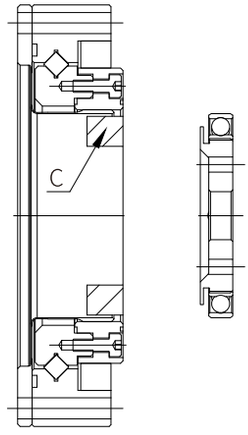
unit : g

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

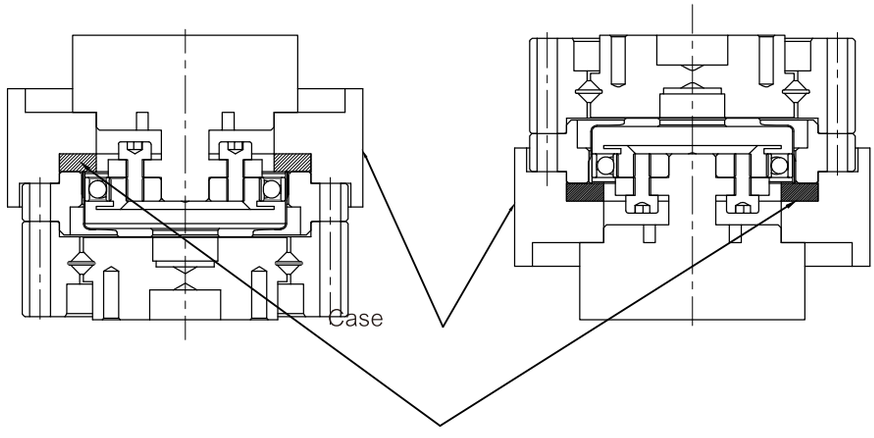
② Labricated area



HMCD-II series



HMHD-III series



Fill 50% of the space

Use of grease

The replace timing for lubrication grease

Abrasion of the sliding parts of harmonic reducer is influenced by lubricating grease.
Lubricating grease performance varies by temperature and deteriorates rapidly as the temperature rises. So the grease have to be replaced earlier than usual, The graph below indicates the time to replace the grease from the relation between grease from the following calculation formula when the average load torque is equal to or less than the rated torque. Obtain the time to replace the grease from the below calculation formula when the average load torque exceeds the rated torque.

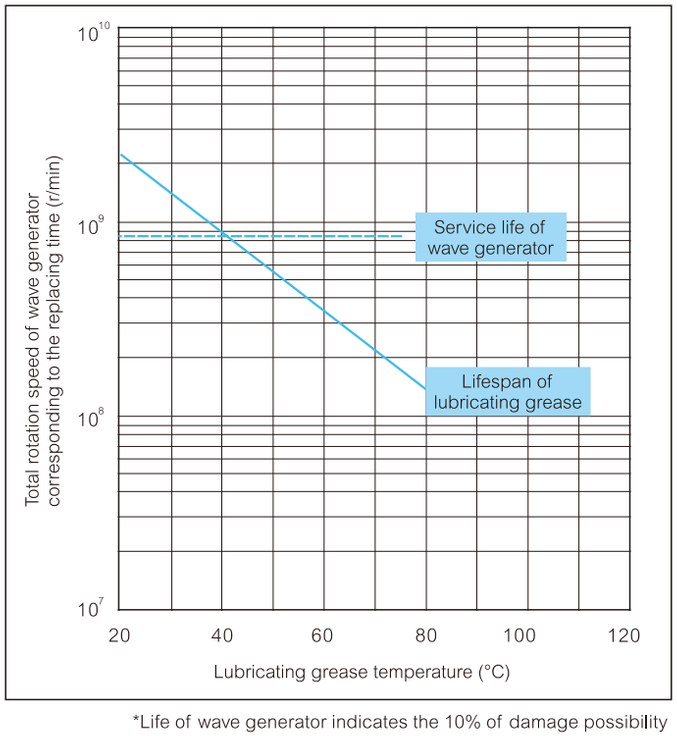
The formula when average load torque exceeds than the rated torque

$$L_{GT}=L_{GTn}\times\left(\frac{Tr}{Tav}\right)^3$$

L_{GT}	The replacing time when it is larger than the rated torque	Rotation speed	–
L_{GTn}	The replacing time when it is smaller than the rated torque	Rotation speed	Refer to the figure on the following
Tr	Rated torque	Nm, kgfm	Refer to the "Parameter Table" of all series
Tav	The average load torque on output side	–	Determined based on use condition

Symbols in formula

Lubricating grease replacing time: L_{GTH}
(when average load torque is eaqual to or less than rated torque)



*Life of wave generator indicates the 10% of damage possibility

Other precautions

1. Do not use it with other grease. The harmonic reducer should be placed in an independent case to be built into the equipment.

2. When using the wave generator with facing upward in one direction and at a low speed (input rotation speed : < 1000 r/min), it may cause lubrication problem, please consult our company.

3. Grease leakage for unit type
Unit type structure is designed in view of grease leakage prevention. But, please perform enhancement of seal mechanism depending on operating enviroment.

About warranty

Han's Motion harmonic reducer warranty period and terms as below:

The warranty period

Under the condition of properly used, handled and maintained followed the technical instructions, this catalogue, all the products are warranted for the shorter period of either one year after delivery or 8,000 hours.

The warranty terms

During the warranty period, all the products are warranted against defects in workmanship and materials, our company shall be responsible for repairing or replacing the product.

However, the warranty is not applied to below :
(1) User's improper installation, inadequate maintenance, misapplication, or misuse.
(2) Disassembling, modification or repair by others than Han's Motion.
(3) Problems caused by other than the products.
(4) Natural disaster or other reasons that do not belong to Han's Motion's responsibility.

The warranty temrs is only valid for Han's Motion products.

Han's Motion shall not be liable for consequential damages of other equipment cause by the defective products, and shall not be liable for the incidental and consequential expenses and the labor costs for detaching and installing to the driven equipment.

Precautions for safe use

⚠ Warning	Mistaken operation may result in death or serious injury.
⚠ Caution	Mistaken operation may may lead to injury and property damage.

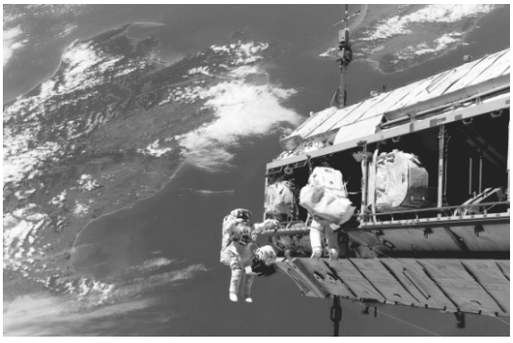
About Discarding	
⚠ Caution	Please dispose of according to industrial waste standards. • Please discard as industrial waste when discarding

Design precaution: you must read the catalogue before designing the equipment		
⚠ Caution	Use only in specific enviroment • Please make sure the following environmental conditions are complied with : Ambient temperature: 0 to 40 No splashing of water or oil Do not expose to corrosive or explosive gas No metal dust or other dust	Please install the equipment in a specified manner. • Please carry out assembly precisely in the specified order according to the requirements of the catalogue. • Please observe our recommended tightening methods (like bolts used) • Improperly assembly of equipment can cause troubles such as generation of vibration, reduction of life time, deterioration of precision and breakdown.
	Please install the equipment in a specified precision • Design and assemble the components correctly to keep the recommended installation precision on the catalog • Failure to reach the precision can result in troubles such as vibration, reduction of life, deterioration of precision and breakdown.	Please use the specified grease • Do not use the other lubricated grease than our recommended products, it can reduce the life time. Replace the grease according to the specified conditions. • For the unit type, the grease is sealed in it, please do not mix with other grease.

Operational precautions: you must read the catalogue before operation		
⚠ Caution	Be careful in handling products and parts • Do not give strong shock to parts and units by hammers, etc., No dropping and do the fall prevention without scratching or bruising them, it can cause the damage to reducer • The performance may not be retained if you use the equipment in damage condition. It can also cause the problems such as breakdown.	Do not exceed the allowable torque • Do not apply exceed the moment allowable maximum torque, otherwise it can cause troubles like loose tightenting botlts, generation of backlash and breakdown. • The joint arm directly attached to the output shaft can damage the arm and make the output shaft uncontrollable
	Do not change the matching components • Parts of this product are manufactured in conjunction with processing. When used in combination with other suites, there is no guarantee that they will perform well.	Do not disassemble combined products • Disassembly and reassembly of composite products is strictly prohibited. Otherwise, its original performance cannot be restored.

Use of grease	
⚠ Warning	Installation precautions • Splashing into the eyes can cause inflammation. When operating, please wear protective glasses to avoid splashing into the eyes. • Touching the skin can cause inflammation. Please wear protective gloves to avoid contact with the skin. • Don't swallow it (It can cause diarrhea, vomiting, etc.). • Be careful not to scratch your finger when opening the container. Please wear protective gloves. • Keep it out of children's reach. Emergency treatment: •In case of splashing into the eyes, please rinse immediately with water for 15 minutes and receive medical treatment. •In case of contacting with skin, rinse thoroughly with water and soap. •In case of swallowing, please do not vomit, and should be treated by a doctor immediately.
⚠ Caution	Preservation methods • After use, please seal it to prevent dust, moisture and other mixing. Please keep in the shade to avoid direct sunlight. • For long - term inventory of products, it is recommended to confirm the performance and rust prevention. • Please refer to the delivery drawings for details of surface processing. Treatment of waste oil and waste containers • The law stipulates the treatment method that the user is obligated to implement. • Please follow the relevant laws and regulations to deal with it correctly. If you are not clear, please consult our company first and then deal with it. • Do not apply pressure on empty containers. Pressure can cause it to break. • Please do not weld, heat, hole or cut the container. Otherwise there could be an explosion, and the remnants inside could burn up.

Product applications

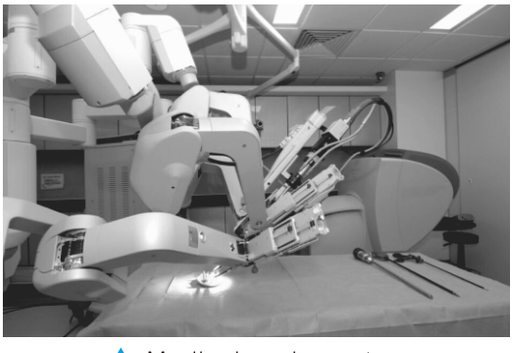


▲ Aerospace

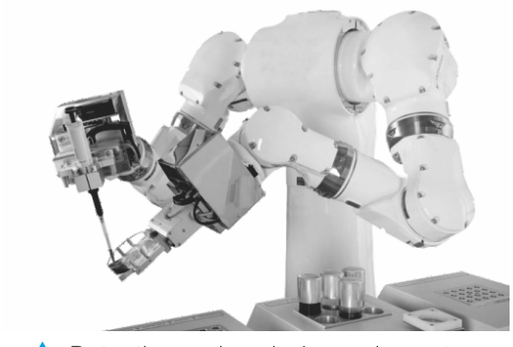
▲ Communication equipment

▲ Robot

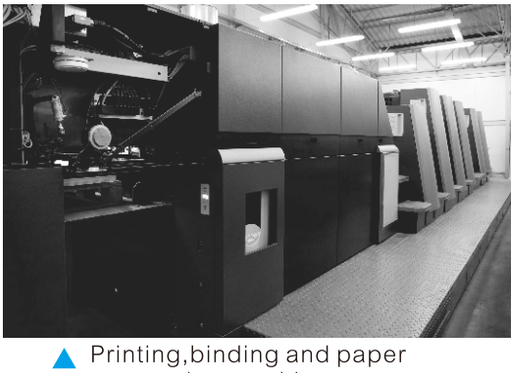
▲ Semiconductor equipment



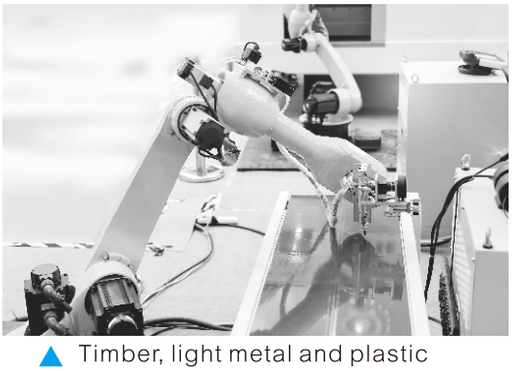
▲ Medical equipment



▲ Detection and analysis equipment



▲ Printing,binding and paper processing machine



▲ Timber, light metal and plastic processing machine

Han's Motion

Professional Manufacturer of
Precision Harmonic Gearbox

VER.2023.05

Our company keeps upgrading the products, if there is inconsistency between the contents, parameters and pictures in the sample book and the actual product, the actual product shall govern.
Products shall be subject to any changes without additional notices Our company reserves the right of final interpretation of the sample book.

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