

MHD系列减速器性能参数

THE PERFORMANCE PARAMETER OF MHD SERIES REDUCER

项目 Item	减速比 Reduction ratio	输入 2000r/min 时的额定 转矩 rated torque under 2000r/min input	启动、停止 时的容许 最大转矩 the biggest admissible- torque when start and stop	平均负载 矩的容许 最大值 the admissible maximum value of average load torque	瞬间容许 最大转矩 the instant admissible maximum torque	容许最高 输入转速 the admissible highest input rev	容许平均 输入转速 the admissible average input rev	启动转矩 Starting torque	背隙 back lash	重量 weight	设计寿命 design lifespan
型号 Model		Nm	Nm	Nm	Nm	rpm	rpm	cNm	Arc sec	Kg	Hour
14	50	3.6	11.8	4.7	22.5	8200	3500	6.5	≤20	0.35	9000
	80	5.1	15	6.2	29			5.5	≤20		10000
	100	5.3	18.6	7.5	34.3			5	≤20		10000
17	50	10.8	22.5	17.6	47	7200	3500	20	≤20	0.45	9000
	80	14	39	21	54			18	≤20		10000
	100	15.7	36.3	26.5	69.6			17.9	≤20		10000
20	50	16.7	38.2	23.5	67.6	5500	3500	36.2	≤20	0.55	9000
	80	23	49	28	78			23.5	≤20		10000
	100	27	56	33.3	93			23	≤20		10000
25	50	26.5	67.6	38.2	124.5	4800	3500	41	≤20	0.95	9000
	80	42	91	62	157			36.5	≤20		10000
	100	46	108	73.5	180			36	≤20		10000
32	50	52	148	73.5	263	4000	3500	63	≤20	1.95	9000
	80	79	202	126	350			55	≤20		10000
	100	94	228	148	412			53	≤20		10000



MHD-S-C
帽型一体凸轮超薄整机
CAP-TYPE CAM SUPER-THIN MACHINE

柔轮为中空翻边结构, 超薄设计, 更节省空间。配有高精密及高刚性的交叉滚子轴承。

The flexspline is a hollow flanged structure, which is ultra-thin and saves space. Equipped with high precision and high rigidity cross roller bearings.

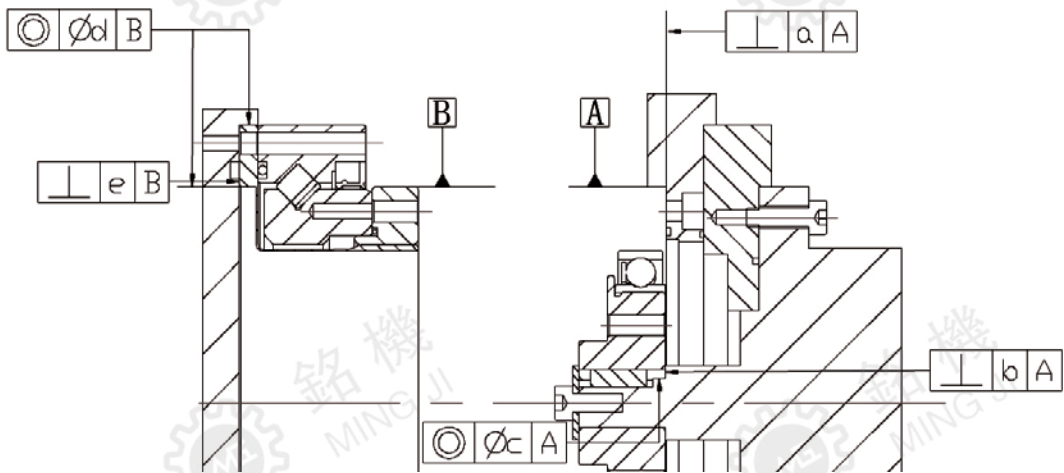
产品特点/Product characteristics

- 超薄型形状·中空结构
 - & Slim-shape hollow structure
- 紧凑简洁的设计
 - Compact and simple design
- 高转矩容量
 - High torque capacity
- 高刚性交叉滚子轴承
 - High rigidity crossed roller bearing

装配精度 ASSEMBLY ACCURACY REQUIREMENTS

组装设计时, 如果存在安装面变形等异常和勉强组装, 会降低产品性能。以下表格为组装壳体的推荐精度, 图以礼帽型简易组合减速器为例。

When assembling the design, if there is abnormality such as deformation of the mounting surface and bare assembly, the performance of the product will be degraded. The following table shows the recommended accuracy of the assembled housing. The figure is a simple combination of the top hat type reducer.



尺寸/ Size	14	17	20	25	32
a	0.011	0.015	0.017	0.024	0.026
b	0.017	0.020	0.020	0.024	0.024
	(0.008)	(0.010)	(0.010)	(0.012)	(0.012)
c	0.030	0.034	0.044	0.047	0.047
	(0.016)	(0.018)	(0.019)	(0.022)	(0.022)
d	0.015	0.018	0.019	0.022	0.022
e	0.016	0.021	0.027	0.035	0.042

()内的数值为一体式波发生器时的数值

The value in () is the value of the monolithic wave generator.

安装方式及步骤 INSTALLATION METHOD AND STEPS

与MHS减速器的安装方式及步骤一致

It is consistent with the installation method and steps of the MHS reducer.

安装注意事项 INSTALLATION PRECAUTIONS

由于组装时的错误, 减速器在运转时可能发生振动、异响等。请遵守下述注意事项实施组装。

Due to an error in assembly, the reducer may vibrate, abnormally sound, etc. during operation. Please follow the precautions below to implement the assembly.

波发生器的注意事项

Precautions for wave generator:

- 1. 请在组装时避免向波发生器轴承部位施加过度的力。可通过旋转使波发生器顺畅地实施插入。
- 2. 使用一体式波发生器时, 请注意把中心偏移、歪斜的影响控制在推荐值内。

- 1. Please avoid applying excessive force to the bearing part of the wave generator during assembly. The wave generator can be smoothly inserted by rotation.
- 2. When using the integrated wave generator, be careful to control the influence of the center offset and skew within the recommended values.

刚轮、柔轮的注意事项

Precautions for Circular spline and Flexspline:

- 1. 确认安装面的平坦度是否良好、是否歪斜。
- 2. 确认螺丝孔部是否隆起、有残余毛边或异物啮入。
- 3. 确认是否对壳体组装部实施了倒角加工以及避让加工, 以避免与刚轮干涉。
- 4. 当刚轮组装至外壳后, 确认其是否能够旋转, 是否有些部位存在干涉、卡紧。
- 5. 朝安装用螺栓孔插入螺栓时, 确认螺丝孔的位置是否正确、是否有由于螺栓歪斜加工等原因致使螺栓与刚轮/柔轮发生接触, 使螺栓旋转变沉重。
- 6. 请不要一次性按照规定转矩扭紧螺栓。请先使用约为规定转矩1/2的力实施临时拧紧, 然后再按照规定转矩拧紧。此外, 通常请按照对角线顺序依次拧紧螺栓。
- 7. 确认柔轮与刚轮组合时, 是否存在极端的单侧啮合。发生单侧偏移时, 可能是由于两个部件发生中心偏移或歪斜。
- 8. 向刚轮打销子可能造成旋转精度低下, 因此请尽可能避免。
- 9. 柔轮组装时, 请不要叩击开口部的齿轮前端或以过度力实施按压。
- 10. 确认与刚轮组合时, 是否存在极端的单侧啮合。发生单侧偏移时, 可能是由于两个部件发生中心偏移或歪斜。

- 1. Confirm that the flatness of the mounting surface is good,skewed or not
- 2. Check if the screw hole is raised, has residual burrs or foreign objects.
- 3. Confirm whether chamfering and avoidance machining are performed on the housing assembly to avoid interference with the rigid wheel.
- 4. When the Circular spline is assembled to the outer casing, confirm whether it can rotate, whether there is interference or jam in some parts.
- 5. When inserting the bolt into the mounting bolt hole, check if the screw hole is in the correct position, if there is any contact between the bolt and the Circular spline/flexspline due to the skewing of the bolt, etc., and the bolt will become heavy.
- 6. Please do not tighten the bolts at the specified torque at one time First perform the temporary tightening with a force of approximately 1/2 of the specified torque, and then tighten according to the specified torque. In addition, usually tighten the bolts in the diagonal order.
- 7. Confirm that there is extreme one-sided engagement when the flexspline is combined with the Circularspline. When a one-sided offset occurs, it may be due to a center offset or skew of the two components.
- 8. Pinning to the wheel may result in low rotation accuracy, so avoid it as much as possible.
- 9. When assembling the flexible wheel, do not hit the front end of the gear at the opening or press it with excessive force.
- 10. Confirm that there is extreme one-sided engagement when combined with the circular spline. When a one-sided offset occurs, it may be due to a center offset or skew of the two components.



润滑脂的注意事项

Precautions for Grease:

- 1. 柔性轴承上需要均匀涂抹润滑脂, 电机与安装用法兰连接形成的腔体需注入80%润滑脂。
- 2. 柔轮内壁上需均匀涂抹一层润滑脂, 柔轮与法兰连接形成的腔体需注入80%的润滑脂。
- 3. 简易组合型的减速器除齿根以外其他部位均没有涂抹润滑脂, 因此请根据具体情况对其余部位进行涂抹。
- 4. 润滑脂的性能会随温度产生变化, 温度越高劣化越快。为了保证润滑脂始终处于良好状态, 减速器高温段的热平衡温度应低于70℃, 温升小于40℃。
- 5. 减速器各运动部位的磨损主要受到润滑脂性能的影响, 在具备条件的情况下, 谐波减速器每运行3000小时应更换润滑脂。

- 1. The grease should be evenly applied on the flexible bearing. The cavity formed by connecting the motor to the mounting flange should be filled with 50% grease.
- 2. Apply a layer of grease evenly on the inner wall of the flexible wheel. The cavity formed by the connection between the flexible wheel and the flange should be filled with 50% grease.
- 3. The simple combination type reducer does not apply grease except for the root of the tooth, so apply the remaining parts according to the specific conditions.
- 4. The performance of the grease changes with temperature, and the higher the temperature, the faster the deterioration. In order to ensure that the grease is always in good condition, the heat balance temperature of the high temperature section of the reducer should be lower than 70 °C, and the temperature rise should be less than 40 °C.
- 5. The wear of each moving part of the reducer is mainly affected by the performance of the grease. When the condition is met, the harmonic reducer should be replaced every 3,000 hours of operation.

其他注意事项

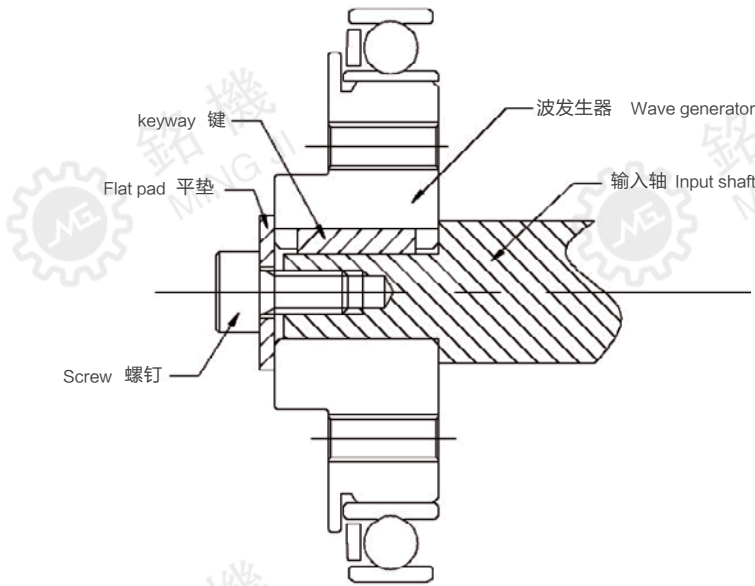
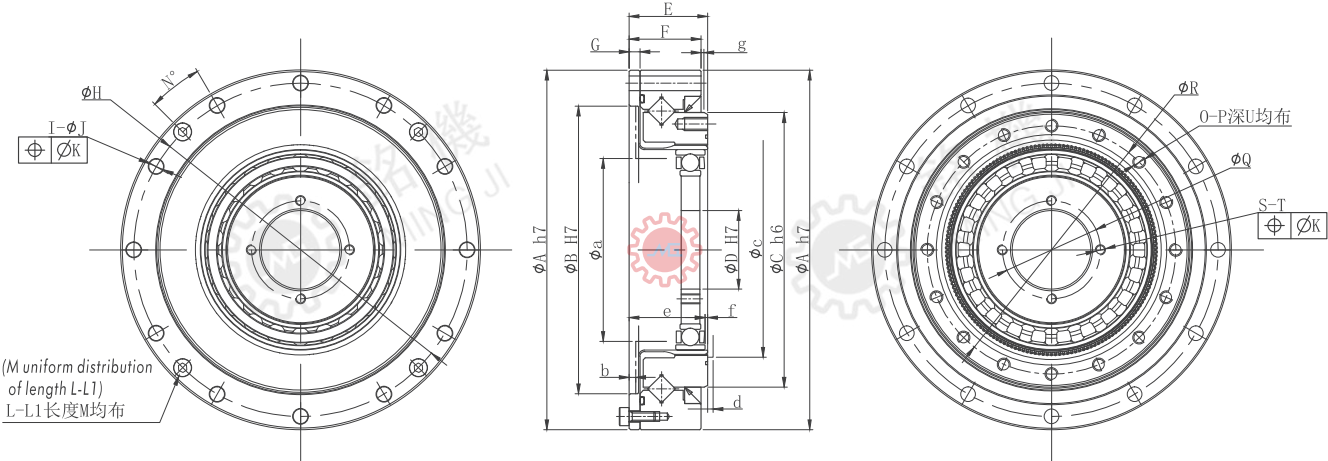
Other considerations

- 1. 谐波减速器必须在足够清洁的环境下安装, 安装过程不能有任何异物进入减速器内部, 以免使用过程中造成损坏。
- 2. 请确认减速器齿面及柔性轴承部分始终保持充分润滑。不建议齿面始终朝上使用, 会影响润滑效果。
- 3. 组装时, 需先将刚轮和柔轮组合安装到装置上后, 再组装上波发生器。
- 4. 装机时, 波发生生长轴对准减速器柔轮的长轴方向, 到位后用对应的螺钉将减速器固定, 螺钉稍微带紧。
- 5. 安装波发生器后, 请确认柔轮与刚轮啮合是180°对称。
- 6. 安装完成后请先低速(100rpm)运行, 如有异常振动或异常响声, 请立即停止, 重新检查安装是否正确或与我司联系, 避免因安装不正确造成减速器的损坏。
- 7. 与减速器连接固定的安装平面加工要求: 平面度0.01mm, 与轴线垂直度0.01mm, 螺纹孔或通孔与轴线同心度0.1mm。
- 8. 为防止润滑脂泄露, 以及维持减速机的耐久性, 必须针对不同的位置使用相应的密封机构, 例如: 旋转运动处使用油封、各零件配合面使用O型圈、螺孔使用螺丝胶。
- 9. 请严格按照图纸中减速器的避空尺寸来确定法兰和波发生器的设计尺寸, 如果超过避空尺寸, 会造成柔轮和法兰或者波发生器干涉, 影响减速器的使用寿命。
- 10. 请按照波发生器的安装深度要求设计减速器的安装, 减速器安装深度不同会影响到减速器的启动转矩和精度等参数。
- 11. 减速器表面没有实施防锈处理。需要实施防锈时请向表面涂抹防锈剂。

- 1. The harmonic reducer must be installed in a sufficiently clean environment. During the installation process, no foreign matter can enter the inside of the reducer to avoid damage during use.
- 2. Please confirm that the gear face and flexible bearing parts of the reducer are always fully lubricated. It is not recommended that the tooth surface be always facing up, which will affect the lubrication effect.
- 3. When assembling, the circular spline and the flexspline must be assembled on the device before assembling the upper wave generator.
- 4. When installed, the major axis aligned with the major axis direction of the wave generator flexspline gear unit, in place with the corresponding gear unit fixing screws, screws with a slightly tight.
- 5. After installing the wave generator, make sure that the flexspline and the circular spline are 180° symmetrical.
- 6. Please run at low speed (100 rpm) after installation. If there is abnormal vibration or abnormal noise, please stop immediately.re-check whether the installation is correct or contact us to avoid damage to the reducer due to incorrect installation.
- 7. Mounting plane machining requirements fixed with the reducer: flatness 0.01mm, perpendicular to the axis 0.01mm, threaded hole or through hole and axis concentricity 0.1mm.
- 8. In order to prevent grease leakage and maintain the durability of the reducer, the corresponding sealing mechanism must be used for different positions. For example, the oil seal is used for the rotary motion, the O-ring is used for the mating surface of each part, and the screw rubber is used for the screw hole.
- 9. Please strictly follow the dimensions of the reducer in the drawing to determine the design dimensions of the flange and wave generator. If it exceeds the size of the avoidance, it will cause interference between the flexspline and the flange or wave generator, affecting the service life of the reducer.
- 10. Please design the reducer according to the installation depth requirement of the wave generator.The installation depth of the reducer will affect the starting torque and accuracy of the reducer.
- 11.The surface of the reducer is not rust-proofed. When rust prevention is required, apply a rust preventive to the surface.

1. 输入轴有轴肩, 可以与波发生器直接连接固定。如下图

The input shaft has a shoulder that can be directly connected to the wave generator. As shown below



2. 输入轴有轴肩, 但长度过长, 可以在轴上加一个套筒(该套筒两面平行度需在0.01mm以内)后再与波发生器连接固定。如下图

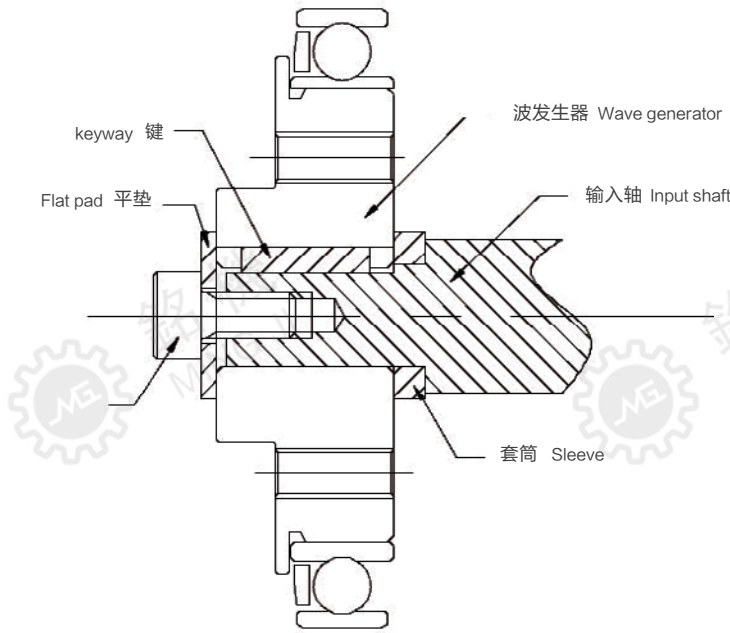
The input shaft has a shoulder, but the length is too long. A sleeve can be added to the shaft (the parallelism of the two sides of the sleeve should be within 0.01mm) and then connected to the wave generator. As shown below



MHD-S-C尺寸表 (Dimension form of MHD-S-C)

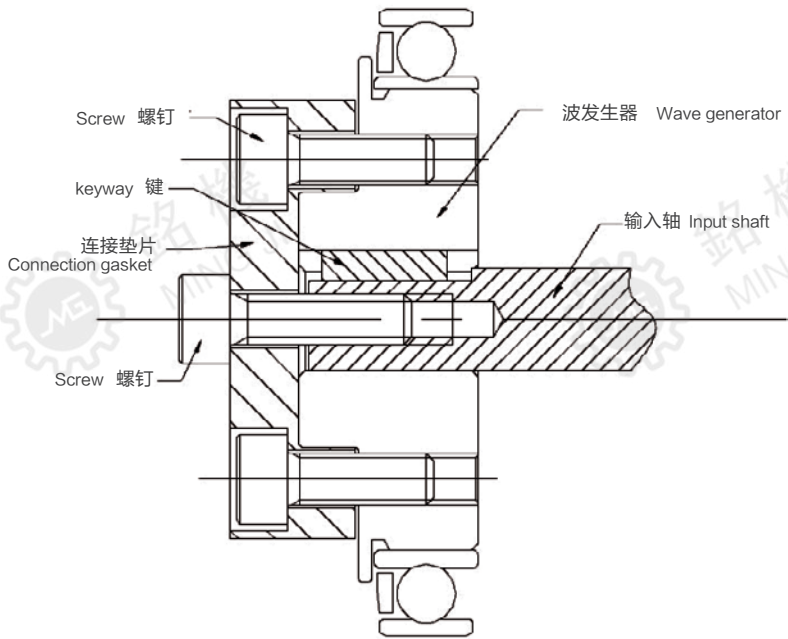
Unit/单位: mm

Model Dimension	14	17	20	25	32
ΦA h7	70 ⁰ _{-0.03}	80 ⁰ _{-0.03}	90 ⁰ _{-0.035}	110 ⁰ _{-0.035}	142 ⁰ _{-0.04}
ΦB H7	50 ^{+0.03} ₀	61 ^{+0.030} ₀	71 ^{+0.030} ₀	88 ^{+0.035} ₀	114 ^{+0.035} ₀
ΦC h6	49 ⁰ _{-0.016}	59 ⁰ _{-0.019}	59 ⁰ _{-0.019}	84 ⁰ _{-0.022}	110 ⁰ _{-0.022}
ΦD H7	11 ^{+0.018} ₀	15 ^{+0.018} ₀	15 ^{+0.021} ₀	24 ^{+0.021} ₀	32 ^{+0.025} ₀
E	17.5±0.1	18±0.1	19±0.1	22±0.1	27.9±0.1
F	15.5	16.5	17	20	23.6
G	2.4	3	3	3.3	3.6
ΦH	64	74	84	102	132
I	8	8	12	12	12
J	3.5	3.5	3.5	4.5	5.5
ΦK	0.25	0.25	0.25	0.25	0.25
L	2	2	2	4	4
L1	M3	M3	M3	M3	M4
M	6	6	6	8	10
N°	22.5	15	15	15	15
R	43	52	61.4	76	99
O	8	12	12	12	12
P	M3	M3	M3	M4	M5
U	4.5	4.5	4.5	6	8
ΦQ	17	21	26	30	40
S	4	4	4	4	4
T	M3	M3	M3	M3	M4
a	31	38	45	56	73
b	1.4	1.8	1.7	1.8	1.8
ΦC	36.5	45	53	66	86
d	1	1	1.5	1.5	2
e	15.7 ⁰ _{-0.2}	16.9 ⁰ _{-0.2}	17.8 ⁰ _{-0.2}	21.6 ⁰ _{-0.2}	27.3 ⁰ _{-0.2}
f	1.8	1.6	1.2	0.4	0.6
g(可用配合深度)	1.5	1.5	1.5	1.5	3.3
Weight/kg	0.33	0.42	0.52	0.91	1.87



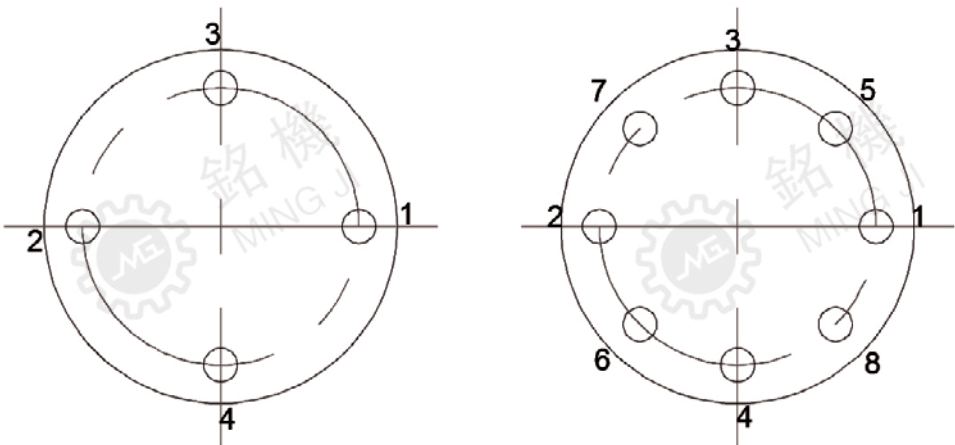
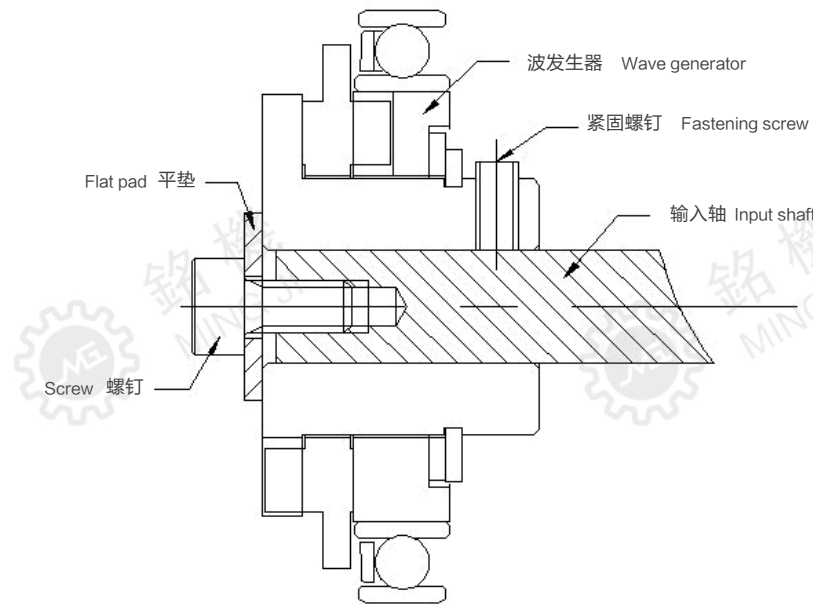
3. 输入轴无轴肩, 需用一个连接垫片先固定在波发生器上后再与输入轴连接固定。如下图

The input shaft has no shoulder. It needs to be fixed on the wave generator with a connecting washer before connecting with the input shaft. As shown below



4. 光轴输入, 先插入波发生器, 通过紧固螺钉将输入轴连接固定, 适用于小机型。如下图

For the optical axis input, first insert the wave generator, and fix the input shaft with the fastening screw, which is suitable for small models. As shown below



推荐螺钉紧固力矩表
(RECOMMENDED SCREW TIGHTENING TORQUE TABLE)

螺钉性能等级 Screw performance rating	12.9级(level)							
螺纹公称直径 Nominal diameter of thread	mm	3	4	5	6	8	10	12
紧定力矩 Tight set torque	N · m	2	4	9	15	35	70	125

一、润滑脂的使用注意事项

First. the use of grease notes

1. 填充润滑脂时, 向运转初期的各接触部位切实涂抹润滑脂
2. 除去各接触部密封阶段产生的初期磨损粉末
3. 为接触部位补充涂抹润滑脂

1. When filling the grease, apply grease to each contact part at the beginning of the operation.
2. Remove the initial wear powder from the sealing stage of each contact.
3. Apply grease to the contact portion supplementary

组合型、齿轮箱型的标准润滑方法为润滑脂润滑。

出厂前已封入润滑脂, 因此组装时无需注入、涂抹润滑脂。但是, 请注意简易组合型出厂时未封入润滑脂。

The standard lubrication method for combination and gearbox type is grease lubrication. Grease is sealed before leaving the factory, so there is no need to inject or apply grease when assembling. However, please note that the simple combination type is not sealed with grease at the factory.

其他注意事项

Other considerations

1. 请避免与其它润滑脂混用。此外, 组装到装置上时请将谐波减速机置于单独的客体内。
2. 在波发生器处于朝上的状态, 且朝单方向以固定负载(输入转速: 低于1000r/min)时使用谐波减速机, 可能引起润滑不良, 此时使用, 请咨询本公司相关技术人员。
3. 关于组合型润滑脂泄露虽然组合型已在设计构造时针对润滑脂泄露采用了相应的措施, 但请根据使用环境进行密封机构的强化。

1. Please avoid mixing with other greases. In addition, place the harmonic reducer in a separate housing when assembling to the unit.
2. When the wave generator is in the upward direction and the fixed speed load (input speed: less than 1000r/min) is used in one direction, the harmonic reducer may be used, which may cause poor lubrication. In this case, please consult our company.

Technical staff.

3. About combined grease leakage Although the combination type has been designed for the grease leakage when designing the structure, please strengthen the sealing mechanism according to the use environment.

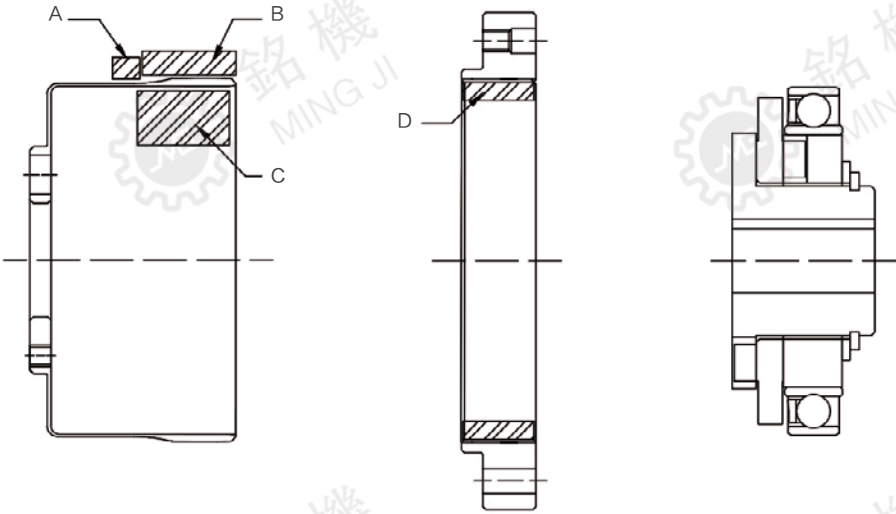
二. 润滑脂的涂抹要求

two. Grease application requirements

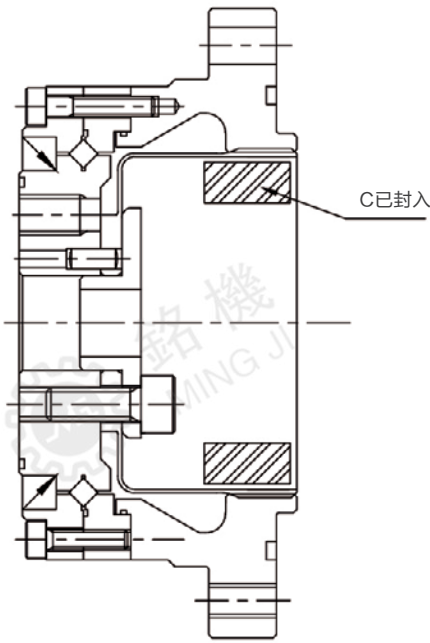
1. 润滑脂涂抹量(Grease application amount)

减速器型号 Reducer model	加油量 (ml) Refueling amount (ml)	减速器型号 Reducer model	加油量 (ml) Refueling amount (ml)	减速器型号 Reducer model	加油量 (ml) Refueling amount (ml)	减速器型号 Reducer model	加油量 (ml) Refueling amount (ml)
MCS-14	10	MHS-14	13.5	MHD-14	10	MCD-14	4
MCS-17	16	MHS-17	22.5	MHD-17	15	MCD-17	6.5
MCS-20	24	MHS-20	32	MHD-20	24	MCD-20	11.5
MCS-25	45.5	MHS-25	60	MHD-25	40	MCD-25	21.5
MCS-32	100	MHS-32	125	MHD-32	80	MCD-32	44

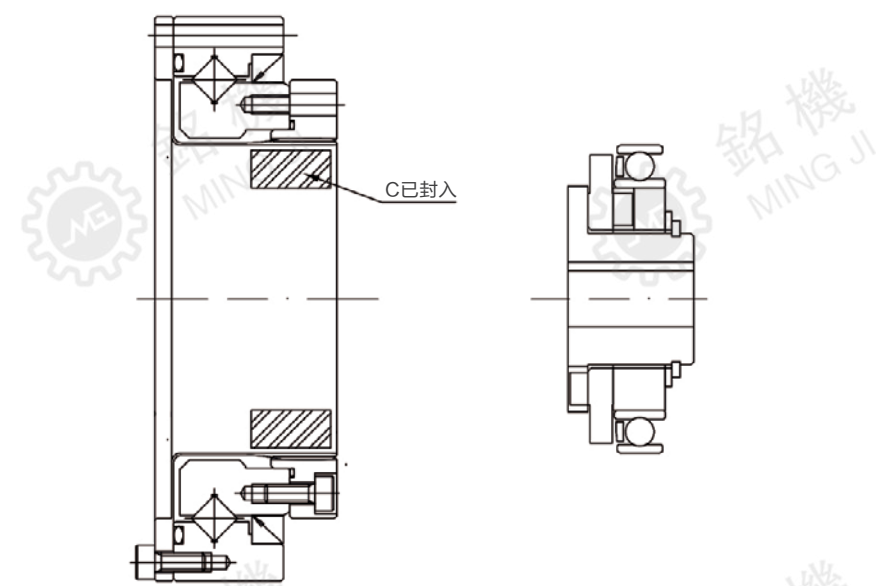
2. 润滑脂涂抹部位:



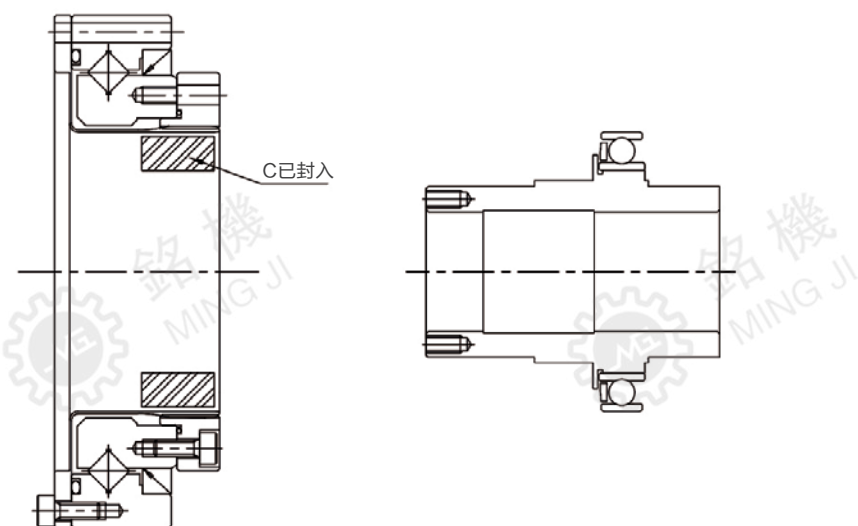
MCS-1系列



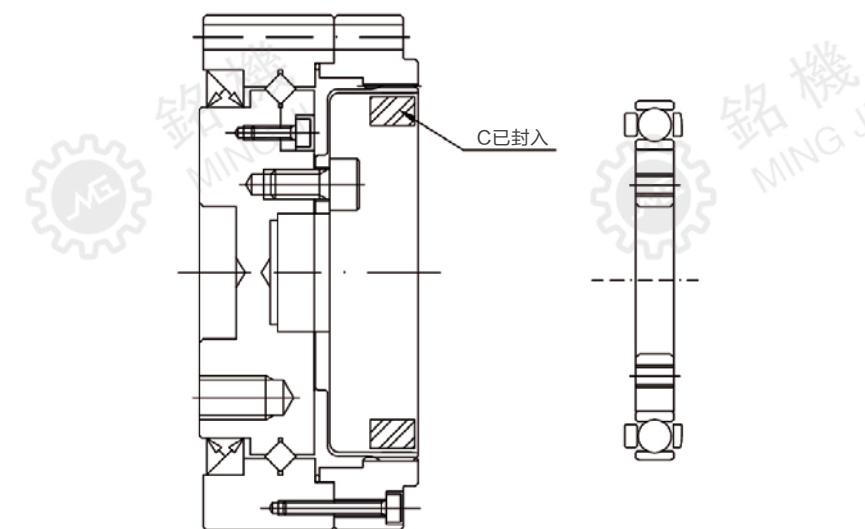
MCS-2系列



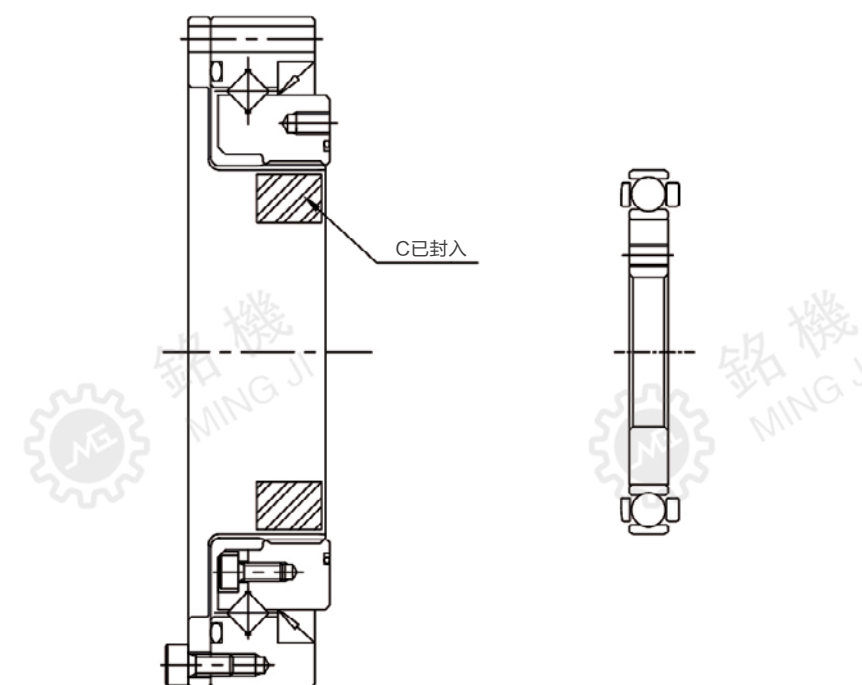
MHS-2系列



MHS-3系列



MCD-2系列



MHD-3系列