GEARKO®



PASSION FOR PRECISION TRANSMISSION

GEARKO® 2026 TW REV 1.0

CONTENTS

GEARKO
DRIVES THE PRECISION

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技術標準與品質保證
Technical Standards Quality Assurance











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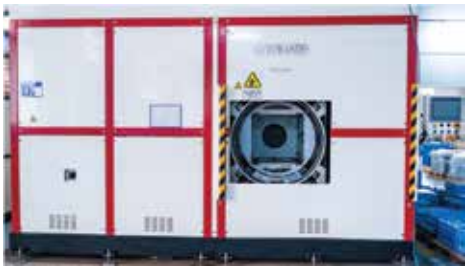
台灣格高的優勢
GearKo's Strength

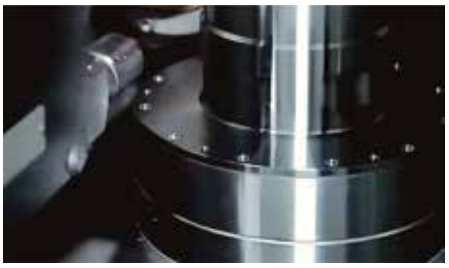
經過完整且嚴謹的檢驗與測試流程。
配備多項高精度量測與檢測設備, 確保品質管控的嚴謹性與細緻度。

Subjected to comprehensive inspection and testing procedures.
Equipped with advanced precision measurement and inspection instruments to ensure strict quality control and attention to detail.









GEARKO®

- 擁有經驗豐富且專業的品質管控與品質管理團隊
  Supported by an experienced and professional quality control and quality management team.

- 檢測設備配置完善, 具備完整的檢測標準與檢驗能力
  Equipped with comprehensive inspection equipment, along with complete testing standards and inspection capabilities.

- 建立完善的品質管理制度與監督考核機制, 符合 ISO 9000 標準要求
  Established a comprehensive quality management system and supervision mechanism in compliance with ISO 9000 standards.

- 所有零件皆經品質管理系統全面檢驗後, 再進行分類組裝
  All components undergo full inspection under the quality management system before classified assembly.

技術特點
Technical Features

01

新齒型設計
New Tooth Profile

全新的諧波齒形, 大幅增加嚙合深度及改善嚙合順滑性, 有效降低運行震動問題, 提高扭力承載30%, 並擴大諧波減速機的減速比範圍。

The new harmonic tooth profile significantly increases engagement depth and improves meshing smoothness, effectively reducing operational vibration issues. This innovation enhances torque capacity by 30% and expands the reduction ratio range of the harmonic reducer.

02

新材料應用
New Materials

歷時5年研發出來的柔輪材料, 具有高硬度高韌性特質, 比傳統材料提高2倍的抗拉力, 3倍的抗疲勞性, 大幅延長產品壽命並提高承載扭力。

After five years of development, the flexible wheel material features high hardness and high toughness. It offers twice the tensile strength and three times the fatigue resistance compared to traditional materials, significantly extending product lifespan and enhancing torque capacity.



Characteristics of Harmonic Drive
諧波傳動裝置的核心特點

創新製程工藝
New Manufacturing Processes

導入柔輪、剛輪、波產生器的新設備及新製程, 有效提升產品的穩定性, 搭配嚴格的品質管理及組裝工序, 保障品質均一性。

03

We have introduced new equipment and manufacturing processes for flexible wheels, rigid wheels, and wave generators, effectively improving product stability. Coupled with strict quality management and assembly procedures, we ensure uniform quality.

創新結構設計
New Structure

全新顛覆式諧波結構, 及客製化研發能力, 針對客戶不同的產品定位, 從工業等級到民用等級的各類需求, 提供全方位解決方案。

04

Our completely disruptive harmonic structure, combined with customized R&D capabilities, provides comprehensive solutions tailored to different product positions of our customers. We address various needs from industrial-grade to civilian-grade applications.

品質與服務優勢
Quality and Service Advantages

01

高精度
High Precision

所有產品出廠背隙≤1 arcmin, 傳動比精度可媲美國際標準

All products are shipped with backlash ≤1 arcmin, achieving precise transmission ratios comparable to international standards.

02

整合式服務
New Materials

從概念研發到產品量產, 從性能提升到成本優化, 從單一零件到系統整合, 我們始終致力於滿足客戶的傳動需求, 實踐「讓世界動起來」的企業願景。

From concept development to mass production, from performance enhancement to cost optimization, and from individual components to system integration, we are committed to meeting our customers' transmission needs while realizing our vision of "Driving the World Forward."

團隊優勢
Team Advantages

團隊擁有深厚且多元的傳動技術專業, 曾多次榮獲競賽肯定, 並成功實現多項跨領域諧波傳動應用, 能快速協助客戶解決各類技術挑戰。

The team possesses extensive and diverse expertise in transmission technology, has received recognition in multiple competitions, and has successfully implemented various cross-industry harmonic drive applications, enabling rapid and effective solutions to customer challenges.

05

專利技術
Patented Technology

我們於海內外累積擁有超過50項專利及多項著作權, 憑藉強大的研發實力, 為客戶提供專業且優質的技術服務, 協助產業與產品持續升級。

03

We have introduced new equipment and manufacturing processes for flexible wheels, rigid wheels, and wave generators, effectively improving product stability. Coupled with strict quality management and assembly procedures, we ensure uniform quality.

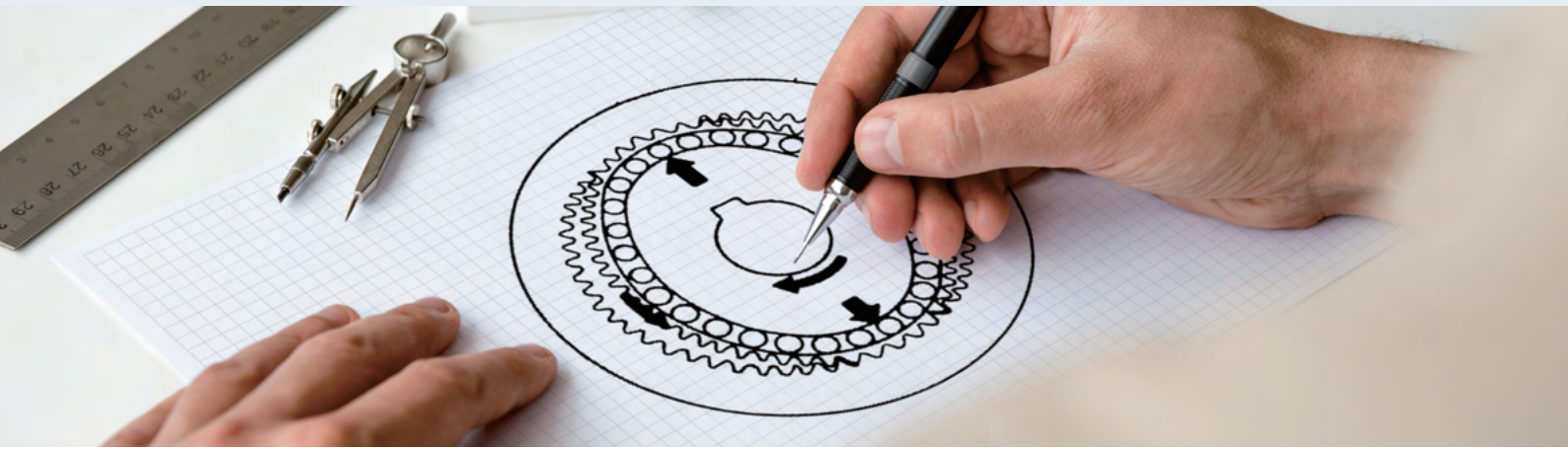
模組化產品
Product Modules

具備整合諧波減速機、直線馬達、伺服馬達、控制系統及延伸結構應用的模組化解決方案, 可為客戶提供便捷、快速且高品質的產品與服務。

04

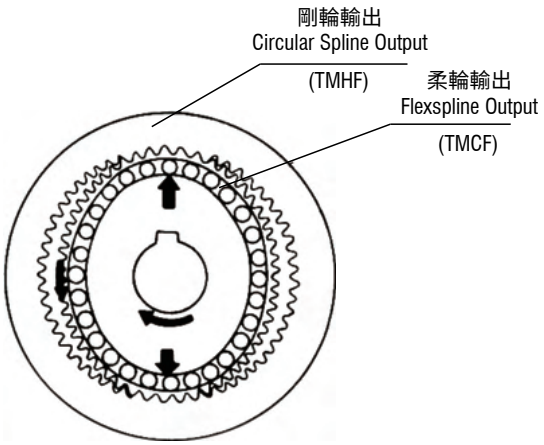
We provide modular solutions integrating harmonic reducers, linear motors, servo motors, control systems, and extended structural applications, enabling us to deliver convenient, fast, and high-quality products and services to our customers.

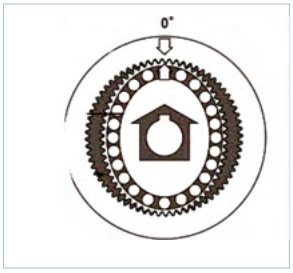
諧波減速機原理說明
Principle Description of Harmonic Reducer



諧波減速機的核心零件主要由內齒剛輪、外齒柔輪、柔性軸承及波產生器所組成。
當馬達驅動橢圓形波產生器旋轉時，波產生器會帶動內部的柔性軸承，使柔輪產生橢圓變形。於橢圓長軸位置，柔輪會與剛輪局部嚙合。由於柔輪與剛輪之間存在齒數差異，因此可形成減速效果並輸出高精度扭矩。

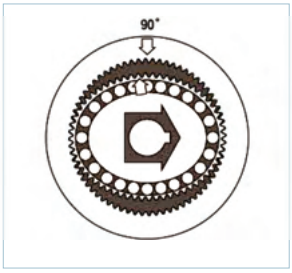
The core components of a harmonic reducer mainly consist of a circular spline, flexspline, flexible bearing, and wave generator.
When the motor drives the elliptical wave generator, the wave generator rotates inside the flexible bearing, causing the flexspline to deform into an elliptical shape. At the major axis of the ellipse, the flexspline partially engages with the circular spline. Due to the difference in the number of teeth between the two components, a reduction effect is generated, enabling high-precision torque output.





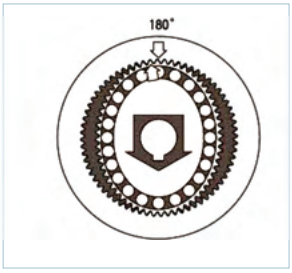
柔輪在波產生器的作用下會產生橢圓形變，因此在橢圓長軸位置，柔輪會與剛輪產生嚙合；而在短軸位置，則呈現完全分離的狀態。

Under the action of the wave generator, the flexspline deforms into an elliptical shape. At the major axis of the ellipse, the flexspline engages with the circular spline, while at the minor axis, the two components remain completely disengaged.



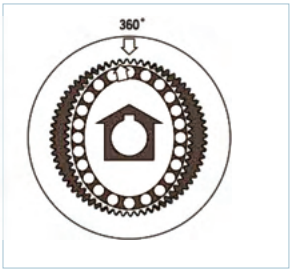
當剛輪固定不動時，波產生器順時針旋轉會使柔輪產生彈性變形，並帶動柔輪與剛輪的嚙合位置依序移動。

When the circular spline is fixed, the clockwise rotation of the wave generator causes the flexspline to deform elastically, resulting in the engagement position between the flexspline and circular spline shifting continuously.



當波產生器旋轉180度時，柔輪僅會朝逆時針方向移動一個齒距。

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



當波產生器旋轉一周（360度）後，由於柔輪的齒數比剛輪少2齒，因此柔輪會朝逆時針方向移動2個齒距。

After the wave generator completes one full rotation (360 degrees), the flexspline moves two teeth in the counterclockwise direction because it has two fewer teeth than the circular spline.

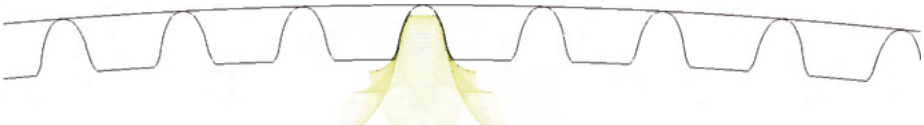
關於齒型
About Tooth Profile

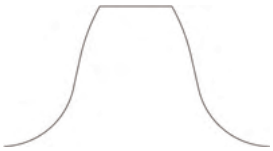


立體雙圓弧齒型
Three-Dimensional Double-Arc Tooth Profile

雙圓弧齒型是專為諧波傳動設計的特殊齒型，採用非傳統漸開線曲線，可實現連續嚙合，提升傳動穩定性與承載能力。
同時透過優化齒溝與齒根R角設計，可降低應力集中並提升耐用性。圖中為柔輪在剛輪固定下進行彈性變形時的運動狀態。

The double-arc tooth profile is a specialized gear design for harmonic drives. Unlike conventional involute profiles, it enables continuous engagement to improve transmission stability and load capacity.
Optimized tooth groove and root radius designs also help reduce stress concentration and enhance durability. The illustration shows the flexspline deforming elastically while the circular spline remains fixed.



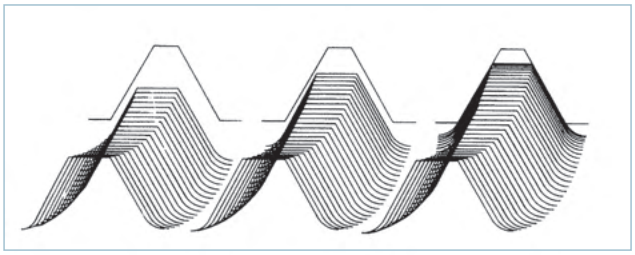


憑藉多年技術經驗，我們開發出獨創的「立體雙圓弧齒型」，進一步優化傳統雙圓弧齒型設計，使同時嚙合齒數由30%提升至35%，有效降低嚙合震動並提升扭力承載能力。
此技術可在柔輪與剛輪不同接觸截面間維持高精度且平順的嚙合效果，大幅提升諧波減速機的耐磨耗與使用壽命。

With years of accumulated expertise, we developed the proprietary “Three-Dimensional Double-Arc Tooth Profile” to further improve conventional double-arc gear designs. This innovation increases the simultaneous tooth engagement ratio from 30% to 35%, reducing vibration and enhancing torque capacity.
The design maintains smooth and precise engagement across different contact sections between the flexspline and circular spline, significantly improving wear resistance and service life.

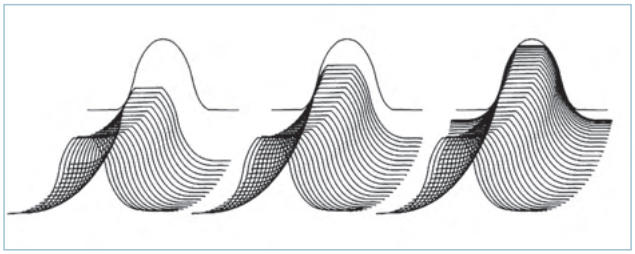
齒輪的嚙合路徑
Gear Engagement Path

傳統齒型 Traditional Gear Profile

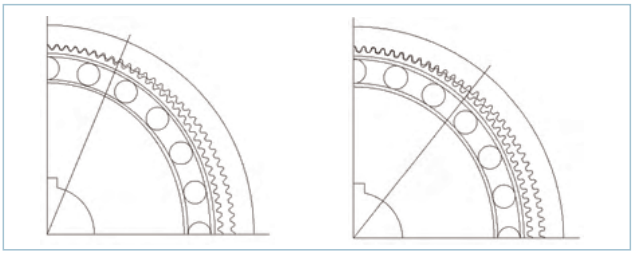




立體雙圓弧齒型 Three-Dimensional Double-Arc Tooth Profile



齒輪的嚙合區 Gear Engagement Zone



旋轉方向和減速比

杯型

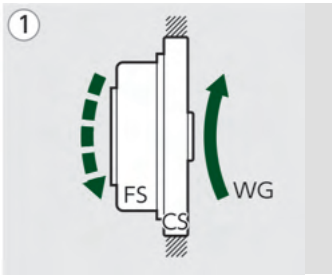
杯型諧波減速機的旋轉方向與減速比如下所示。

- 旋轉方向



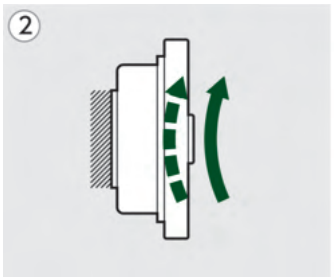
輸入 輸出

(註)若作為 5、6 的增速裝置使用，請先與本公司聯繫確認。



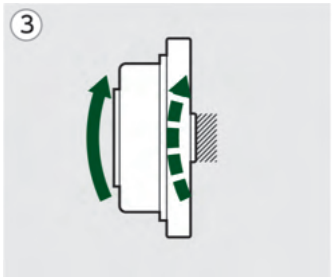
1. 減速裝置
輸入端:波產生器(WG)
輸出端:柔輪(FS)
固定端:剛輪(CS)

$$i=\frac{-1}{R}$$



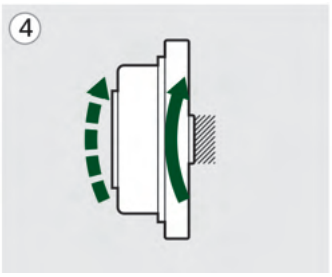
2. 減速裝置
輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$i=\frac{-1}{R+1}$$



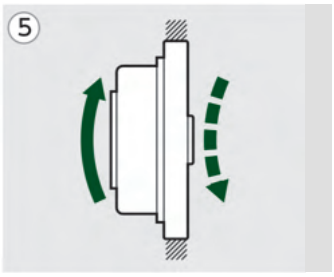
3. 減速裝置
輸入端:柔輪
輸出端:剛輪
固定端:波產生器

$$i=\frac{R}{R+1}$$



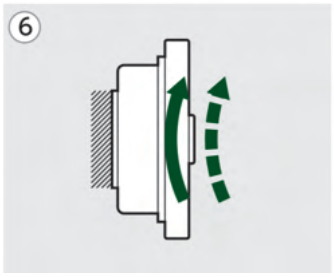
4. 增速裝置
輸入端:剛輪
輸出端:柔輪
固定端:波產生器

$$i=\frac{R+1}{R}$$



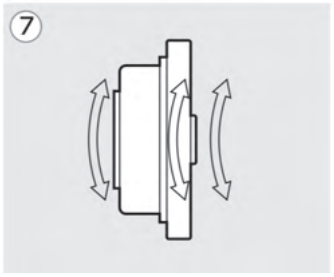
5. 增速裝置
輸入端:柔輪
輸出端:波產生器
固定端:剛輪

$$i=-R$$



6. 增速裝置
輸入端:剛輪
輸出端:波產生器
固定端:柔輪

$$i=-R+1$$



7. 差動裝置
當波產生器、柔輪與剛輪三者皆為旋轉狀態時，可採用1-6的組合方式。

- 減速比

諧波減速機的減速比由柔輪與剛輪的齒數差所決定。

柔輪的齒數:Zf

剛輪的齒數: Zc

例： 柔輪的齒數:200

剛輪的齒數:202

輸入端:波產生器
輸出端:柔輪
固定端:剛輪

$$減速比i1=\frac{1}{R1}=\frac{Zf-Zc}{Zf}$$

輸入端:波產生器
輸出端:柔輪
固定端:剛輪

$$減速比i1=\frac{1}{R1}=\frac{200-202}{200}=\frac{-1}{100}$$

輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$減速比i2=\frac{1}{R2}=\frac{Zc-Zf}{Zf}$$

輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$減速比i2=\frac{1}{R2}=\frac{202-200}{200}=\frac{1}{101}$$

Rotation Direction and Reduction Ratio

Cup Type

The rotation direction and reduction ratio of the cup-type harmonic reducer are shown below.

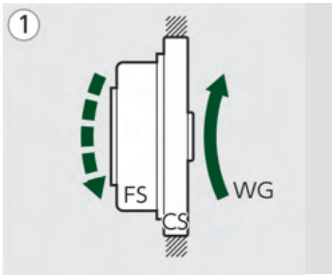
- Rotation Direction



R represents the reduction ratio value listed in the rating table.

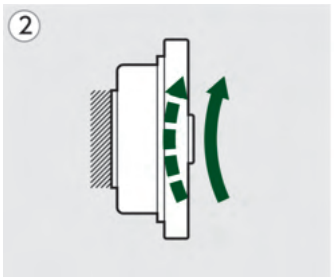
Input Output

(Note) Please contact us for confirmation before using Types 5 and 6 for speed increasing applications.



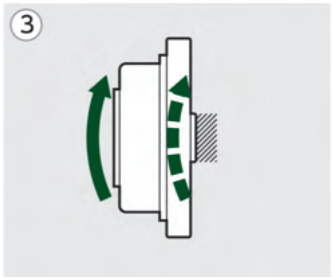
1. Reduction Type
Input: Wave Generator (WG)
Output: Flexspline (FS)
Fixed: Circular Spline (CS)

$$i=\frac{-1}{R}$$



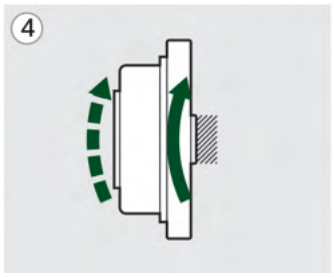
2. Reduction Type
Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline

$$i=\frac{-1}{R+1}$$



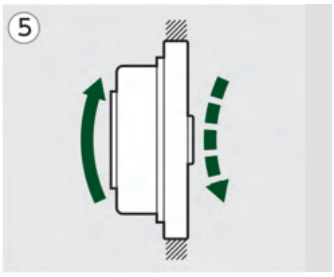
3. Reduction Type
Input: Flexspline
Output: Circular Spline
Fixed: Wave Generator

$$i=\frac{R}{R+1}$$



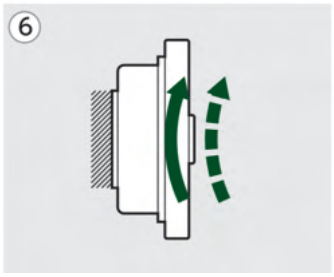
4. Speed Increasing Type
Input: Circular Spline
Output: Flexspline
Fixed: Wave Generator

$$i=\frac{R+1}{R}$$



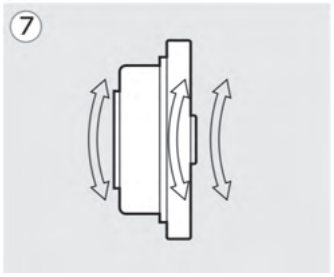
5. Speed Increasing Type
Input: Flexspline
Output: Wave Generator
Fixed: Circular Spline

$$i=-R$$



6. Speed Increasing Type
Input: Circular Spline
Output: Wave Generator
Fixed: Flexspline

$$i=-R+1$$



7. Differential Type
The Wave Generator, Flexspline, and Circular Spline are all rotating.
Configurations 1–6 may be combined for differential applications.

- Reduction Ratio

The reduction ratio of a harmonic reducer is determined by the difference in the number of teeth between the Flexspline and the Circular Spline.

Number of teeth of Flexspline: Zf

Number of teeth of Circular Spline: Zc

E.g.: Flexspline tooth count: 200

Circular Spline tooth count: 202

Input: Wave Generator
Output: Flexspline
Fixed: Circular Spline
} Reduction Ratio $i1=\frac{1}{R1}=\frac{Zf-Zc}{Zf}$

Input: Wave Generator
Output: Flexspline
Fixed: Circular Spline
} Reduction Ratio $i1=\frac{1}{R1}=\frac{200-202}{200}=\frac{-1}{100}$

Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline
} Reduction Ratio $i2=\frac{1}{R2}=\frac{Zc-Zf}{Zc}$

Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline
} Reduction Ratio $i2=\frac{1}{R2}=\frac{202-200}{200}=\frac{1}{101}$

旋轉方向和減速比

禮帽型

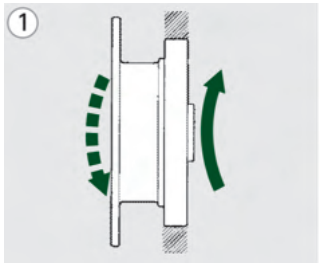
禮帽型諧波減速機的旋轉方向與減速比如下所示。

- 旋轉方向



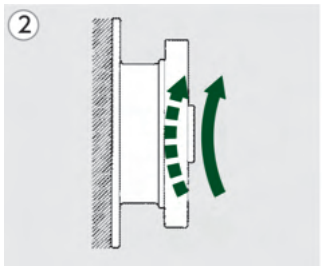
輸入 輸出

(註)若作為 5、6 的增速裝置使用，請先與本公司聯繫確認。



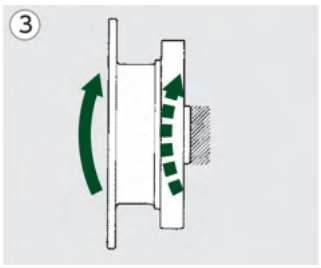
1. 減速裝置
輸入端:波產生器(WG)
輸出端:柔輪(FS)
固定端:剛輪(CS)

$$i=\frac{-1}{R}$$



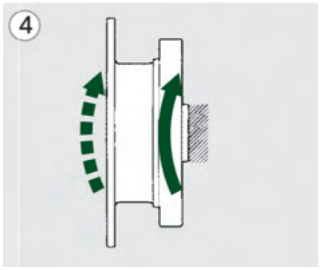
2. 減速裝置
輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$i=\frac{-1}{R+1}$$



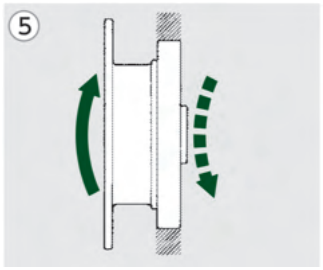
3. 減速裝置
輸入端:柔輪
輸出端:剛輪
固定端:波產生器

$$i=\frac{R}{R+1}$$



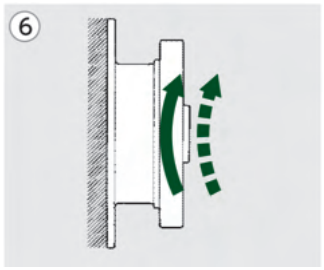
4. 增速裝置
輸入端:剛輪
輸出端:柔輪
固定端:波產生器

$$i=\frac{R+1}{R}$$



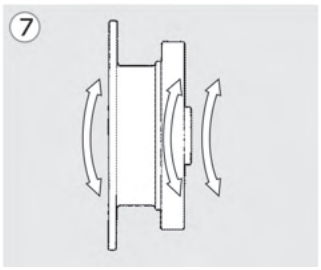
5. 增速裝置
輸入端:柔輪
輸出端:波產生器
固定端:剛輪

$$i=-R$$



6. 增速裝置
輸入端:剛輪
輸出端:波產生器
固定端:柔輪

$$i=-R+1$$



7. 差動裝置
當波產生器、柔輪與剛輪三者皆為旋轉狀態時，可採用1-6的組合方式。

- 減速比

諧波減速機的減速比由柔輪與剛輪的齒數差所決定。

柔輪的齒數:Zf

剛輪的齒數: Zc

例： 柔輪的齒數:198

剛輪的齒數:200

輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$減速比i1=\frac{1}{R1}=\frac{Zc-Zf}{Zc}$$

輸入端:波產生器
輸出端:剛輪
固定端:柔輪

$$減速比i1=\frac{1}{R1}=\frac{200-198}{200}=\frac{1}{100}$$

輸入端:波產生器
輸出端:柔輪
固定端:剛輪

$$減速比i2=\frac{1}{R2}=\frac{Zf-Zc}{Zf}$$

輸入端:波產生器
輸出端:柔輪
固定端:剛輪

$$減速比i2=\frac{1}{R2}=\frac{198-200}{198}=\frac{-1}{99}$$

Rotation Direction and Reduction Ratio

Hat Type

The rotation direction and reduction ratio of the hat-type harmonic reducer are shown below.

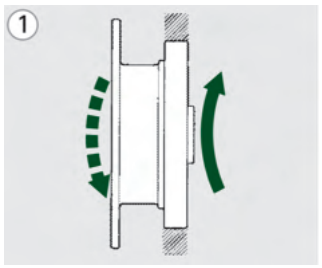
- 旋轉方向



R represents the reduction ratio values in the rating table.

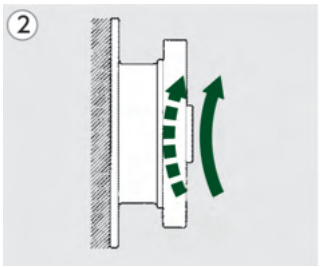
Input Output

(Note) Please contact us for confirmation before using Types 5 and 6 for speed increasing applications.



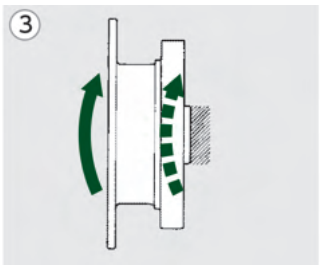
1. Reduction Type
Input: Wave Generator (WG)
Output: Flexspline (FS)
Fixed: Circular Spline (CS)

$$i=\frac{-1}{R}$$



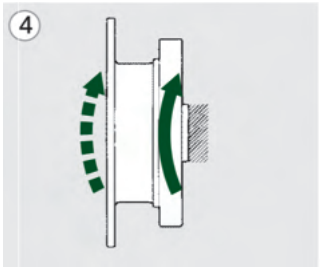
2. Reduction Type
Input: Wave Generator
Output: Circular Spline
Fixed: Flexspline

$$i=\frac{-1}{R+1}$$



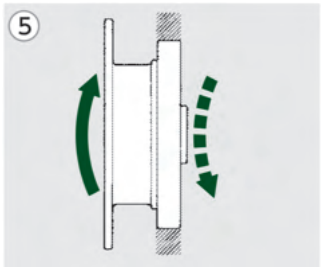
3. Reduction Type
Input: Flexspline
Output: Circular Spline
Fixed: Wave Generator

$$i=\frac{R}{R+1}$$



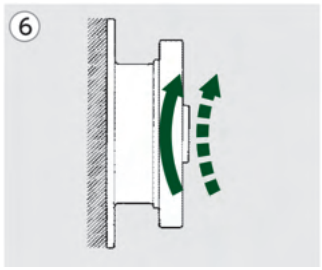
4. Speed Increasing Type
Input: Circular Spline
Output: Flexspline
Fixed: Wave Generator

$$i=\frac{R+1}{R}$$



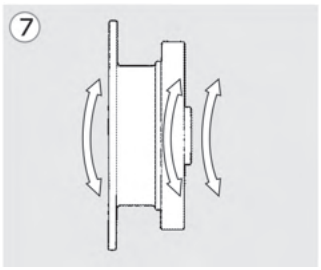
5. Speed Increasing Type
Input: Flexspline
Output: Wave Generator
Fixed: Circular Spline

$$i=-R$$



6. Speed Increasing Type
Input: Circular Spline
Output: Wave Generator
Fixed: Flexspline

$$i=-R+1$$



7. Differential Type
The Wave Generator, Flexspline, and Circular Spline are all rotating.
Configurations 1–6 may be combined for differential applications.

- Reduction Ratio

The reduction ratio of a harmonic reducer is determined by the difference in the number of teeth between the Flexspline and the Circular Spline.

Number of teeth of Flexspline: Zf

Number of teeth of Circular Spline: Zc

E.g.: Flexspline tooth count: 198

Circular Spline tooth count: 200

Input: Wave Generator
Output: Circluar Spline
Fixed: Flexspline

Reduction Ratio $i1=\frac{1}{R1}=\frac{Zc-Zf}{Zc}$

Input: Wave Generator
Output: Circluar Spline
Fixed: Flexspline

Reduction Ratio $i1=\frac{1}{R1}=\frac{200-198}{200}=\frac{1}{100}$

Input: Wave Generator
Output: Flexspline
Fixed: Circluar Spline

Reduction Ratio $i2=\frac{1}{R2}=\frac{Zf-Zc}{Zf}$

Input: Wave Generator
Output: Flexspline
Fixed: Circluar Spline

Reduction Ratio $i2=\frac{1}{R2}=\frac{198-200}{198}=\frac{-1}{99}$

諧波減速機選型說明

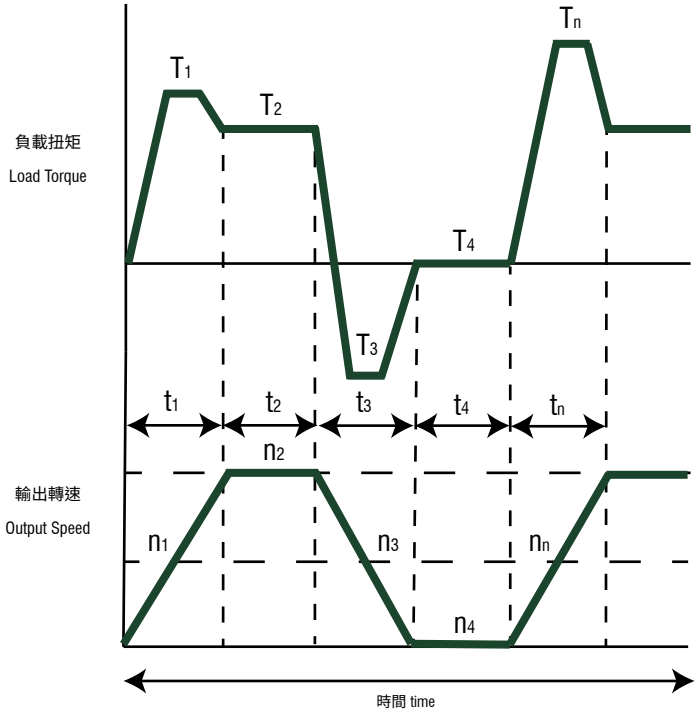
一般而言, 伺服系統很少長時間維持固定負載的運轉狀態。輸入轉速與負載扭矩會隨運轉條件而變化, 且在啟動、停止等過程中, 通常會產生較大的加減速扭矩。此外, 系統亦可能受到無法預期的衝擊扭矩影響。

選型時, 應將上述變動的負載扭矩換算為平均負載扭矩, 並以此作為產品選型的依據。

若為整合型產品, 由於輸出法蘭直接支撐部位 (輸出法蘭端) 採用高精度交叉滾子軸承, 因此還需確認最大允許靜態扭矩、交叉滾子軸承壽命及靜態安全係數是否符合應用需求。

確認負載扭矩模式

選型前, 請先確認設備的負載扭矩模式。請依下圖所示, 確認各項運轉條件及相關規格。



計算負載扭矩模式的各項數值

負載扭矩	T_n (Nm)
時間	t_n (sec)
輸出轉速	n_n (r/min)

最高轉速

最高輸出轉速 no ***max***

最高輸入轉速 ni ***max***

(由馬達等設備限制)

一般運轉模式

啟動時	T_1, t_1, n_1
正常運轉時	T_2, t_2, n_2
停止(減速)時	T_3, t_3, n_3
停機時	T_4, t_4, n_4

衝擊扭矩

施加衝擊扭矩時 T_s, t_s, n_s

要求壽命

L_{10} = L (小時)

型號選定流程圖

請依照下列流程圖進行型號選定。

若任一計算值超過額定規格表中的數值, 請選擇較大一級的型號, 或重新評估並降低負載扭矩條件。

依據負載扭矩模式, 計算作用於諧波減速機輸出端的平均負載扭矩: T***av*** (Nm)

$$T_{av} = \sqrt{\frac{n_1 \times t_1 \times |T_1|^3 + n_2 \times t_2 \times |T_2|^3 + \bullet\bullet n_n \times t_n \times |T_n|^3}{n_1 \times t_1 + n_2 \times t_2 + n_n \times t_n}}$$

↓

依下列條件進行型號初選: T_{av} ≤ 平均扭矩允許值 (請參閱各系列額定規格表)

↓

計算平均輸出轉速: no***av*** (r/min)　$no_{av}\ (r/min) = \frac{n_1 \times t_1 + n_2 \times t_2 + \bullet\bullet n_n \times t_n}{t_1 + t_2 + \bullet\bullet t_n}$

確認減速比 (R)
ni ***max***由馬達等加以限制。　$\frac{ni\ max}{no\ max} \geq R$

計算平均輸入轉速 (ni_{av})
(依據平均輸出轉速 no_{av} 與減速比 R)　$ni_{av} = no_{av} \times R$

計算最高輸入轉速 (ni_{max})
(依據最高輸出轉速 no_{max} 與減速比 R)　$ni_{max} = no_{max} \times R$

↓

重新評估運轉條件或重新選型

NG ← 確認初選型號的各項數值是否符合額定規格表。
ni_{av}≤容許平均輸入轉速 (r/min)
ni_{max}≤容許最高輸入轉速 (r/min)

OK ↓

NG ← 確認 T_1、T_3 是否符合額定規格表之啟動／停止容許峰值扭矩 (Nm)。

OK ↓

NG ← 計算容許次數 (N_s), 並確認是否符合使用條件。
(依據衝擊扭矩作用時的輸出轉速 n_s 與作用時間 t_s)

$$N_s = \frac{10^4}{2 \times (\frac{n_s \times R}{60}) \times t}$$

OK ↓

NG ← 計算出使用壽命時間。

$$L_{10} = 7000 \times \left(\frac{T_r}{T_{av}}\right)^3 \times \left(\frac{n_r}{ni_{av}}\right)\ (hr)$$

計算所得的使用壽命是否符合波產生器的要求壽命。

OK ↓

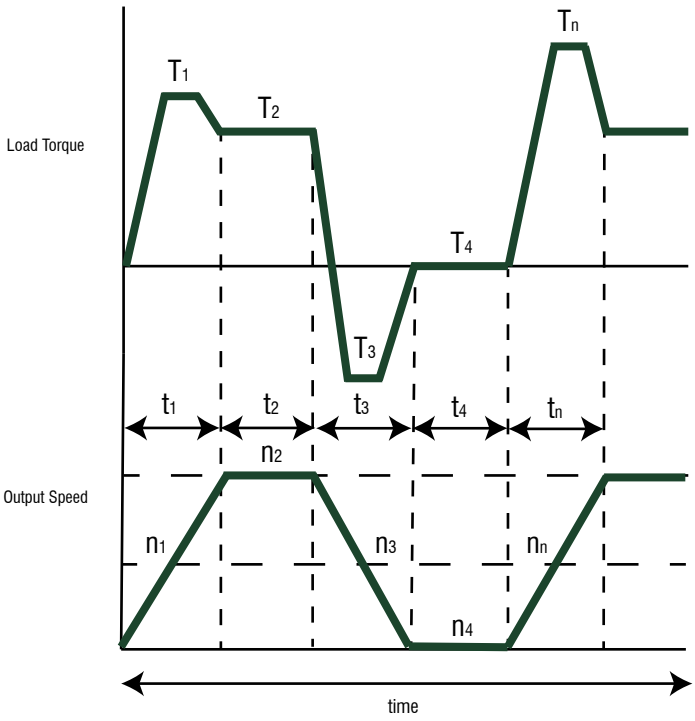
完成型號選定

Harmonic Reducer Selection Guide

In general, servo systems rarely operate under a constant load. The input speed and load torque vary with operating conditions, and high acceleration/deceleration torque is generated during start-up and stopping. In addition, unexpected shock loads may occur during operation.
When selecting a harmonic reducer, the varying load torque should be converted into an equivalent average load torque, which is then used as the basis for model selection.
For integrated models, the output flange is directly supported by a high-precision crossed roller bearing. Therefore, the maximum permissible static torque, crossed roller bearing life, and static safety factor should also be verified to ensure they meet the application requirements.

Confirm the Load Torque Profile

Before model selection, confirm the load torque profile of the application. Refer to the diagram below to identify the operating conditions and specifications.



Calculate the Values for the Load Torque Profile

Load Torque	T_n (Nm)
Time	t_n (sec)
Output Speed	n_n (r/min)

Maximum Speed

Maximum Output Speed	no ***max***
Maximum Input Speed	ni ***max***

(Limited by the motor or other drive equipment)

Normal Operating Mode

Start-up	T_1, t_1, n_1
Normal Operation	T_2, t_2, n_2
Stopping (Deceleration)	T_3, t_3, n_3
Standstill	T_4, t_4, n_4

Shock Torque

During Shock Torque Application T_s, t_s, n_s

Required Service Life

$L_{10} = L$ (hr)

Model Selection Flowchart

Follow the flowchart below to select the appropriate model.
If any calculated value exceeds the specifications listed in the rating table, select the next larger model or re-evaluate the operating conditions by reducing the load torque.

Calculate the average load torque applied to the output side of the harmonic reducer based on the load torque profile.: T***av*** (Nm)

$$T_{av} = \sqrt{\frac{n_1 \times t_1 \times |T_1|^3 + n_2 \times t_2 \times |T_2|^3 + \bullet\bullet n_n \times t_n \times |T_n|^3}{n_1 \times t_1 + n_2 \times t_2 + n_n \times t_n}}$$

Perform a preliminary model selection.
$T_{av} \leq$ Allowable Average Torque
(Refer to the rating table for each series.)

Calculate the Average Output Speed: no***av*** (r/min)

$$no_{av}\ (r/min) = \frac{n_1 \times t_1 + n_2 \times t_2 + \bullet\bullet n_n \times t_n}{t_1 + t_2 + \bullet\bullet t_n}$$

Verify the Reduction Ratio (R)
ni ***max*** is limited by the motor or other drive equipment.

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

Calculate the Average Input Speed (ni_{av})
(Based on the average output speed no_{av} and the reduction ratio R.)

$$ni_{av} = no_{av} \times R$$

Calculate the Maximum Input Speed (ni_{max})
(Based on the maximum output speed no_{max} and the reduction ratio R.)

$$ni_{max} = no_{max} \times R$$

Re-evaluate Operating Conditions or Select a Different Model

NG — Verify that the calculated values for the preliminary model comply with the rating table.
$ni_{av} \leq$ Allowable Average Input Speed (r/min)
$ni_{max} \leq$ Maximum Input Speed (r/min)

OK

NG — Verify that T_1, T_3 comply with the allowable peak torque during start-up and stopping (Nm).

OK

NG — Calculate the allowable number of shock events (N_s), and verify that it satisfies the operating conditions.
(Based on the output speed during shock torque application n_s and the shock duration. t_s)

$$N_s = \frac{10^4}{2 \times (\frac{n_s \times R}{60}) \times t}$$

OK

NG — Calculate the L10 Service Life.

$$L_{10} = 7000 \times \left(\frac{T_r}{T_{av}}\right)^3 \times \left(\frac{n_r}{ni_{av}}\right) \text{ (hr)}$$

Verify that the calculated service life satisfies the required life of the wave generator.

OK

Model Selection Completed

型號命名原則 Model Code

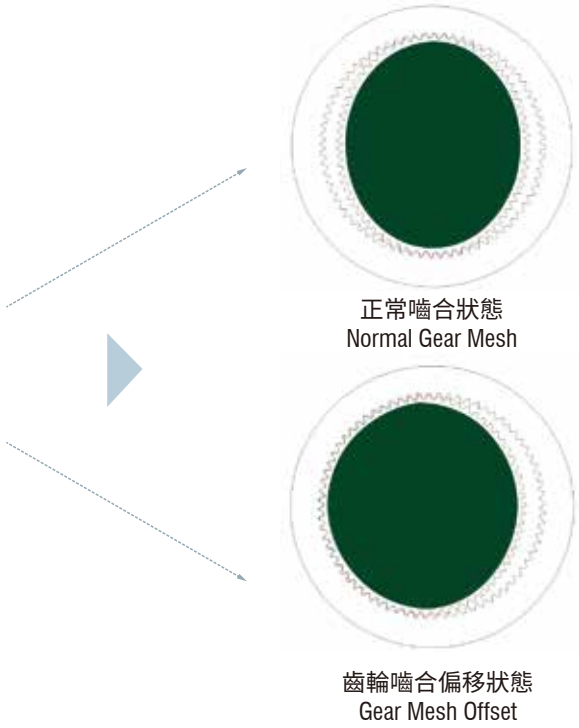
系列名稱 Model Name	型號 Model No.	減速比(備註) Reduction Ratio (Note)						型式 Type	波產生器形式 Wave Generator Type	特殊規格 Special Specifications
杯型 Cup Type 標準型 Standard: TMCF 加強型 Heavy-Duty: TMCG 扁平型 Flat: TMCD	14	30	50	80	100	-	-	A=零組件型 Component Type W=組合型 Combination Type	A = 一體產生器 Integrated Wave Generator	1 = 標準產品，可不標示 Standard Product (Code may be omitted) 2 =非標產品，標註與標準產品的不同之處 Custom Product (Specify deviations from the standard product)
	17	30	50	80	100	120	-			
	20	30	50	80	100	120	160			
	25	30	50	80	100	120	160			
	32	30	50	80	100	120	160			
	40	-	50	80	100	120	160			
禮帽型 Hat Type 標準型 Standard: TMHF 加強型 Heavy-Duty: TMHG 扁平型 Flat: TMHD	14	30	50	80	100	-	-	A=零組件型 Component Type W=組合型 Combination Type E=簡易組合型 Basic Combination Type	A = 一體產生器 Integrated Wave Generator K = 空心產生器 Hollow Wave Generator S = 實心產生器 Solid Wave Generator	
	17	30	50	80	100	120	-			
	20	30	50	80	100	120	160			
	25	30	50	80	100	120	160			
	32	30	50	80	100	120	160			
	40	-	50	80	100	120	160			
備註 Note	C 為杯型柔輪 C = Cup-Type Flexspline									
	H 為禮帽型柔輪 H = Hat-Type Flexspline									
	F 為標準型，標準軸向長度，不加強。 F = Standard Type Standard axial length without reinforced torque capacity.									
	G 為加強型，額定轉矩提高約 30%。加強型各型號無 30 減速比。 G = Heavy-Duty Type Rated torque increased by approximately 30%. 30:1 reduction ratio is not available for Heavy-Duty models.									
	D 為扁平型，軸向長度縮短約 50%。扁平型各型號無 30 減速比產品。 D = Flat Type Axial length reduced by approximately 50%. 30:1 reduction ratio is not available for Flat models.									

齒輪嚙合偏移
Gear Mesh Offset

齒輪嚙合偏移狀態
Gear Mesh Offset Condition

柔輪與剛輪的齒形於初始組裝時皆處於正常嚙合狀態。
然而, 若組裝過程中出現偏擺或偏心, 或於外部受到衝擊後重新組裝, 可能導致齒輪嚙合產生單側偏移。
此狀態稱為齒輪嚙合偏移。若持續於此狀態下運轉, 可能造成柔輪與剛輪磨耗不均, 進而影響產品壽命與傳動精度。

The Flexspline and Circular Spline are properly meshed during initial assembly.
However, assembly errors, eccentricity, or reassembly after external impact may cause the gear mesh to shift toward one side. This condition is referred to as Gear Mesh Offset. Continued operation under this condition may result in uneven wear of the Flexspline and Circular Spline, reducing service life and transmission accuracy.



- 齒輪嚙合偏移檢查方法 Inspection Procedure for Gear Mesh Offset

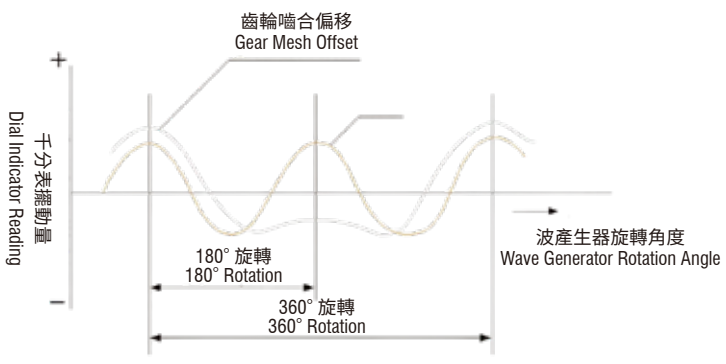
請依照下列方法確認是否發生齒輪嚙合偏移。
(1) 無負載狀態下, 以手輕轉輸入軸。若可均勻轉動, 則表示嚙合狀態正常；若轉動過程中出現阻力不均或卡滯現象, 則可能已發生齒輪嚙合偏移。
(2) 於無負載狀態下驅動減速機, 若馬達電流約為正常嚙合時的 2～3 倍, 則可能已發生齒輪嚙合偏移。

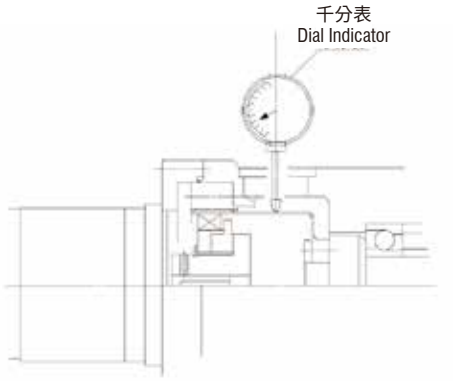
Confirm whether gear mesh offset has occurred using the following procedures.
(1) Rotate the input shaft gently by hand under no-load conditions. Smooth and uniform rotation indicates normal gear meshing. Uneven resistance or binding may indicate gear mesh offset.
(2) Operate the reducer under no-load conditions. If the motor current increases to approximately 2–3 times that of normal gear meshing, gear mesh offset may have occurred.

- 柔輪中部振動判定方法 Inspection Method for Flexspline Midpoint Vibration

正常組裝時, 千分表的擺動量會隨波產生器旋轉而呈現正弦波變化；若發生齒輪嚙合偏移, 柔輪將產生單側偏移, 因此可利用擺動量進行判斷。

Under normal assembly conditions, the dial indicator reading varies sinusoidally as the wave generator rotates. When gear mesh offset occurs, the Flexspline shifts toward one side. Therefore, the indicator reading can be used to determine whether gear mesh offset is present.





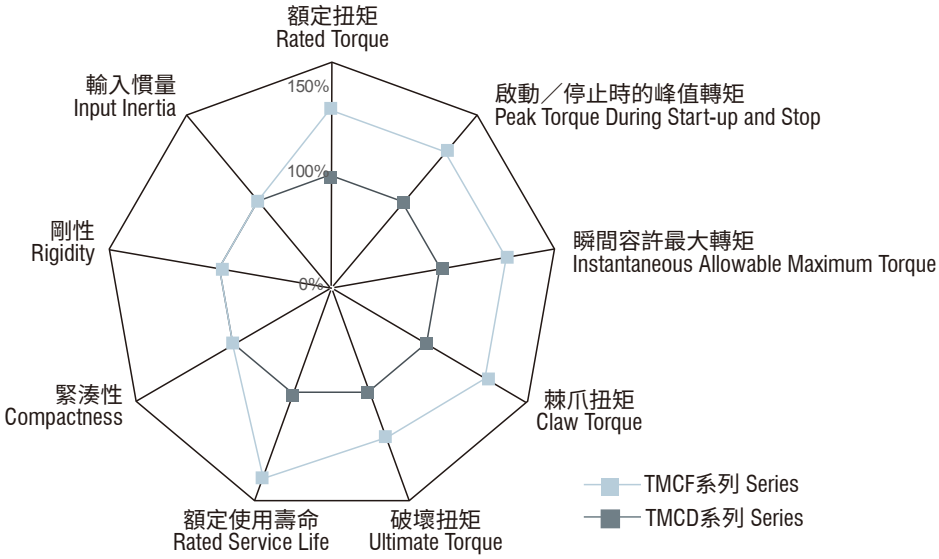
諧波減速機特色
Features of Harmonic Reducers

TMCF 系列組合型
TMCF Combination Series

TMCF 系列組合型可滿足高剛性、高轉矩容量、高精度及輕量化等自動化設備的應用需求，提供多元化的產品配置，協助使用者依不同應用選擇最適合的機型。
TMCF 系列採模組化組合設計，安裝容易，內建高精度交叉滾子軸承，可直接支撐外部負載。

The TMCF Combination Series is designed to meet the requirements of automation equipment demanding high rigidity, high torque capacity, high precision, and lightweight construction. A wide range of configurations allows users to select the most suitable model for their application.
Featuring a modular design, the TMCF Combination Series is easy to install and incorporates a high-precision crossed roller bearing capable of directly supporting external loads.

客製化選項 Customization Options



- 減速比變更 Ratio Options

減速比可依需求提供 30／20 或其他客製化規格。
Customized reduction ratios, including 30:1, 20:1, and other ratios, are available upon request.

- 外型尺寸變更 Dimension Options

外型尺寸可依客戶需求客製，例如外殼尺寸。
Housing dimensions can be customized to meet application requirements.

- 零組件配置變更 Configuration Options

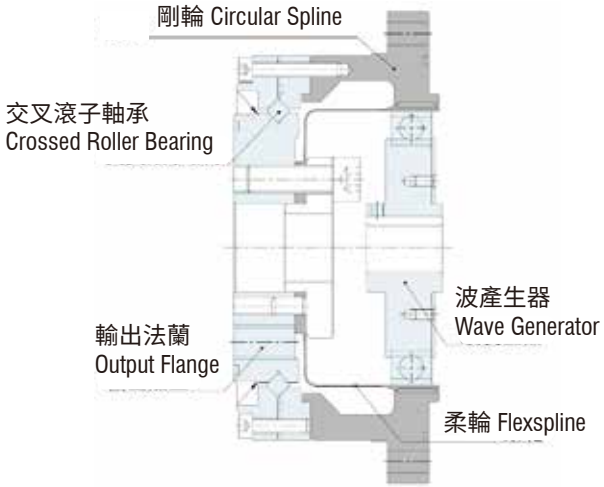
可依需求調整零組件配置，例如減速機與馬達的連接方式。
Component configurations can be customized, including different connection methods between the reducer and motor.

- 軸端配置變更 Shaft Options

輸入／輸出軸形式可依需求客製。
Input and output shaft configurations can be customized.

- 特殊需求 Special Options

可依特殊需求提供客製化設計。
Customized designs are available to meet special application requirements.



TMCF 系列組合型結構
Structure of the TMCF Combination Series

TMCF系列 Series

標準型 Standard Type

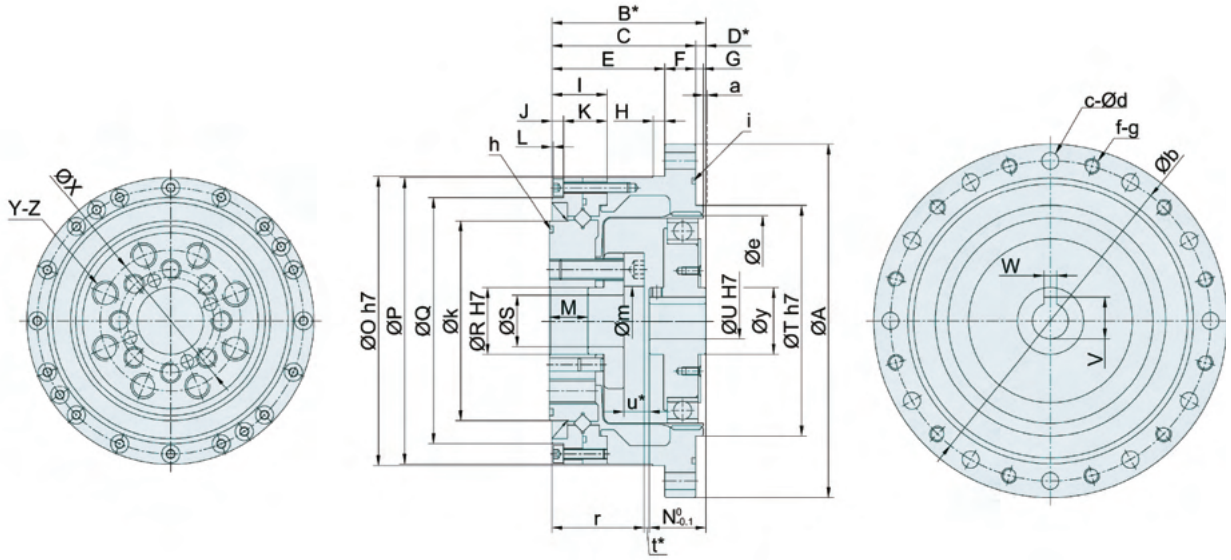
TMCF	25	—	100	W	A	規格1, 2/ Spec. 1,2
機型名稱 Model Name	型號 Model		減速比 Reduction Ratio	型式 Type	波產生器形式 Wave Generator Type	特殊規格 Special Specification

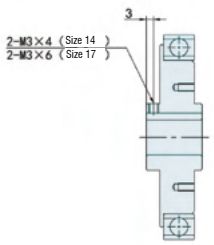
機型名稱 Model Name	型號 Model No.	減速比 Reduction Ratio						型式 Type	波產生器型式 Wave Generator Type	特殊規格 Special Specifications
TMCF	14	30	50	80	100	-	-	A = 組件型 Component Type W = 組合型 Combination Type	A = 一體產生器 Integrated Wave Generator	1 = 標準軸孔徑 Standard Bore 2 = 客製軸孔徑 Customized Bore
	17	30	50	80	100	120	-			
	20	30	50	80	100	120	160			
	25	30	50	80	100	120	160			
	32	30	50	80	100	120	160			
	40	-	50	80	100	120	160			

TMCF系列 Series 額定表 Specifications

型號 Size	減速比 Ratio	輸入 2000 r/min 時的額定扭矩 Rated Torque at 2000 r/min Input		啟動停止時的容許峰值扭矩 Allowable Peak Torque at Start/Stop		平均負載扭矩的容許最大值 Max. Allowable Average Load Torque		瞬間容許最大扭矩 Max. Momentary Torque		容許最高輸入轉速 (r/min) Max. Input Speed		容許平均輸入轉速 (r/min) Allowable Avg. Input Speed		轉動慣量 Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	油潤滑 Oil	潤滑脂潤滑 Grease	油潤滑 Oil	潤滑脂潤滑 Grease	I ×10⁻⁴ kgm²	J ×10⁻⁵ kgf·m·s²
14	30	4.0	0.41	9.0	0.92	6.8	0.69	17	1.7	14000	8500	6500	3500	0.033	0.034
	50	5.4	0.55	18	1.8	6.9	0.70	35	3.6						
	80	7.8	0.80	23	2.4	11	1.1	47	4.8						
	100	7.8	0.80	28	2.9	11	1.1	54	5.5						
17	30	8.8	0.90	16	1.6	12	1.2	30	3.1	10000	7300	6500	3500	0.079	0.081
	50	16	1.6	34	3.5	26	2.6	70	7.1						
	80	22	2.2	43	4.4	27	2.7	87	8.9						
	100	24	2.4	54	5.5	39	4.0	108	11						
	120	24	2.4	54	5.5	39	4.0	86	8.8						
20	30	15	1.5	27	2.8	20	2.0	50	5.1	10000	6500	6500	3500	0.193	0.197
	50	25	2.5	56	5.7	34	3.5	98	10						
	80	34	3.5	74	7.5	47	4.8	127	13						
	100	40	4.1	82	8.4	49	5.0	147	15						
	120	40	4.1	87	8.9	49	5.0	147	15						
	160	40	4.1	92	9.4	49	5.0	147	15						
25	30	27	2.8	50	5.1	38	3.9	95	9.7	7500	5600	5600	3500	0.413	0.421
	50	39	4.0	98	10	55	5.6	186	19						
	80	63	6.4	137	14	87	8.9	255	26						
	100	67	6.8	157	16	108	11	284	29						
	120	67	6.8	167	17	108	11	304	31						
	160	67	6.8	176	18	108	11	314	32						
32	30	54	5.5	100	10	75	7.7	200	20	7000	4800	4600	3500	1.69	1.72
	50	76	7.8	216	22	108	11	382	39						
	80	118	12	304	31	167	17	568	58						
	100	137	14	333	34	216	22	647	66						
	120	137	14	353	36	216	22	686	70						
	160	137	14	372	38	216	22	686	70						
40	50	137	14	402	41	196	20	686	70	5600	4000	3600	3000	4.50	4.59
	80	206	21	519	53	284	29	980	100						
	100	265	27	568	58	372	38	1080	110						
	120	294	30	617	63	451	46	1180	120						
	160	294	30	647	66	451	46	1180	120						

外型圖 Outline Drawing





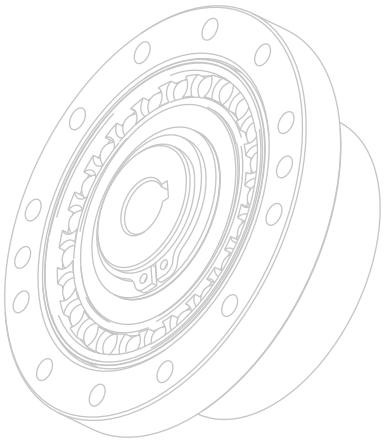
14、17 型波產生器外形（無鍵槽）
Wave Generator Profile for Sizes 14 and 17 (Without Keyway)

注：螺紋旋入長度必須在有效螺紋深度範圍內。若超過符號 Z 所示的尺寸，可能會造成柔輪損壞。
Note: The thread engagement length must be within the effective threaded depth. Exceeding dimension Z may damage the flexspline.

S 部為產品內部的通孔外形。
Section S indicates the through-hole profile inside the product.

輸出法蘭的形狀會因型號而有所不同。詳情請洽本公司授權代理商。
The shape of the output flange varies depending on the model. For details, please contact our authorized distributor.

尺寸詳情請以交貨規格圖為準。
For detailed dimensions, please refer to the delivery specification drawing.



TMCF 系列　尺寸表 TMCF Series　Dimensions

型號 Size / 符號 Symbol	14	17	20	25	32	40
ØA	73	79	93	107	138	160
B*	$49^{0}_{-0.9}$	$45^{0}_{-0.9}$	$45.5^{0}_{-1.0}$	$52^{0}_{-1.0}$	$62^{0}_{-1.1}$	$72.5^{0}_{-1.1}$
C	34	37	38	46	57	66.5
D*	$7^{0}_{-0.8}$	$8^{0}_{-0.4}$	$7.5^{0}_{-0.4}$	$6^{0}_{-0.5}$	$5^{0}_{-1.1}$	$6^{0}_{-1.1}$
E	27	29	28	36	45	50.5
F	7	8	10	10	12	16
G	2	2	3	3	3	4
H	3.5	4	5	5	5	5
I	16.5	16.5	16.5	18.5	22.5	24
J	4.5	4.5	4	4.5	5.5	7.5
K	12	12	12.5	14	17	16.5
L	0.5	0.5	0.5	0.5	1	1.5
M1	9.4	9.5	9	12	15	5
$N^{0}_{-0.1}$	17.6	19.5	20.1	20.2	22	27.5
ØO h7	56	63	72	86	113	127
ØP	55	62	70	85	112	126
ØQ	42.5	49.5	58	73	96	109
ØR1 H7	11	10	14	20	26	32
ØS	8	7	10	15	20	24
ØT h7	38	48	56	67 (68)	90	110
ØU h7	6	8	12	14	14	14
V	-	-	$13.8^{+0.1}_{0}$	$16.3^{+0.1}_{0}$	$16.3^{+0.1}_{0}$	$16.3^{+0.1}_{0}$
W Js9	-	-	4	5	5	5
ØX	23	27	32	42	55	68
Y	6	6	8	8	8	8
Z	M4×8	M5×10	M6×9	M8×12	M10×15	M10×15
a	1	1	1.5	1.5	1.5	2
Øb	65	71	82	96	125	144
c	6	6	6	8	12	8
Ød	4.5	4.5	5.5	5.5	6.6	9
Øe	38	45	53	66	86	106
f	6	6	6	6	12	8
g	M4	M4	M5	M5	M6	M8
h	28.4×0.4	33.8×0.6	40.2×0.8	52.6×1.5	68.6×1.5	81.2×1.35
i	51×1.4	61×0.4	70×1.4	85×1.4	107×1.4	128×1.6
Øk	31	38	45	58	78	90
Øm	10	10.5	15.5	20	27	34
r	21.4	23.5	23	29	37	39.5
t*	2	2	2.4	2.8	3	5.5
u*	6	7	7.4	8.8	11	15.5
Øy	14	18	21	26	26	32
重量 Weight (kg)	0.52	0.68	0.98	1.5	3.2	5.0

（註）(　) 內的尺寸為減速比 30 時的數值。*Note: Dimensions in ( ) are values for reduction ratio 30.*

- 附 * 符號的 B、D、t、u 尺寸，係指構成 TM Drive 的三個組件（波產生器、柔輪、剛輪）於軸向的組裝位置及容許公差。此尺寸會影響性能與強度，請務必嚴格遵守。
- *Dimensions B, D, t and u marked with * indicate the axial mounting positions and allowable tolerances of the three components of the TM Drive (Wave Generator, Flexspline, Circular Spline). These dimensions affect performance and strength; please observe them strictly.*
- 由於零組件的製造方法（鑄造、機械加工）不同，公差亦有所差異。未標註公差之尺寸，如需了解公差範圍，請洽詢本公司或授權代理商。
- *Tolerances vary depending on the manufacturing method of each part (casting, machining). For tolerance ranges of dimensions not specified, please contact us or an authorized distributor.*
- 產品出貨時，波產生器為獨立包裝。
- *At delivery, the Wave Generator is packaged separately.*

諧波減速機特色
Features of Harmonic Reducers

TMHF 系列組合型
TMHF Combination Series

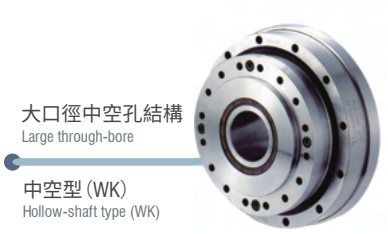
TMHF 系列採模組化組合設計, 安裝容易, 內建高精度交叉滾子軸承, 可直接支撐外部負載。
內建高剛性精密交叉滾子軸承, 作為主軸承, 可直接支撐外部負載。

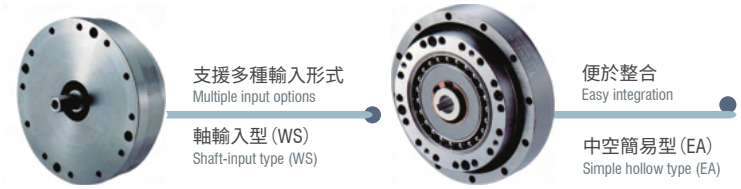
The TMHF Combination Series integrates a component-type core into an easy-to-use assembly.
A built-in high-rigidity precision crossed roller bearing serves as the main bearing and directly supports external loads.

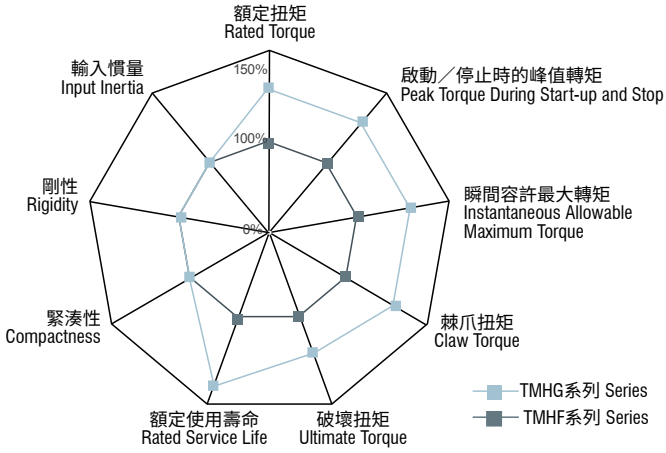
多種外型選項 Available Configurations

提供四種外型, 可依機械設備的設計需求選擇合適配置。

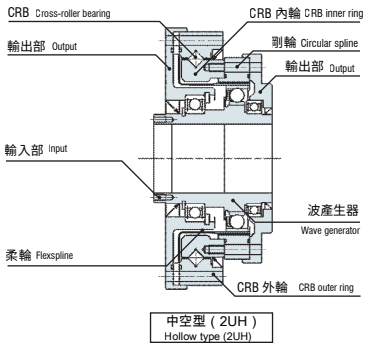
Four configurations are available to suit the design requirements of your equipment.

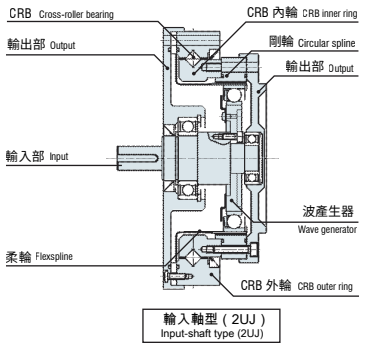


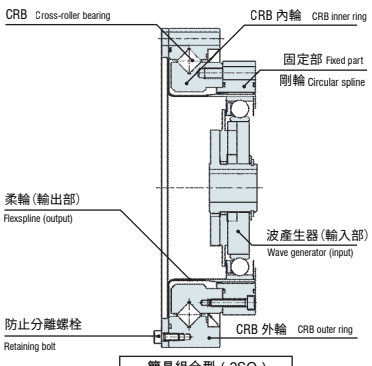


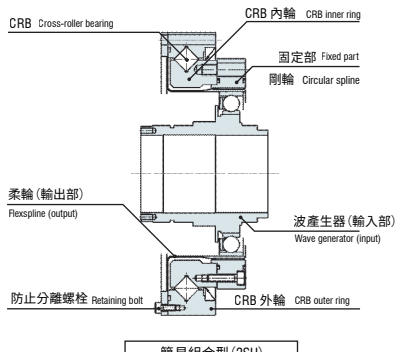


TMHF 系列組合型結構
TMHF Unit Construction









TMHF系列 Series

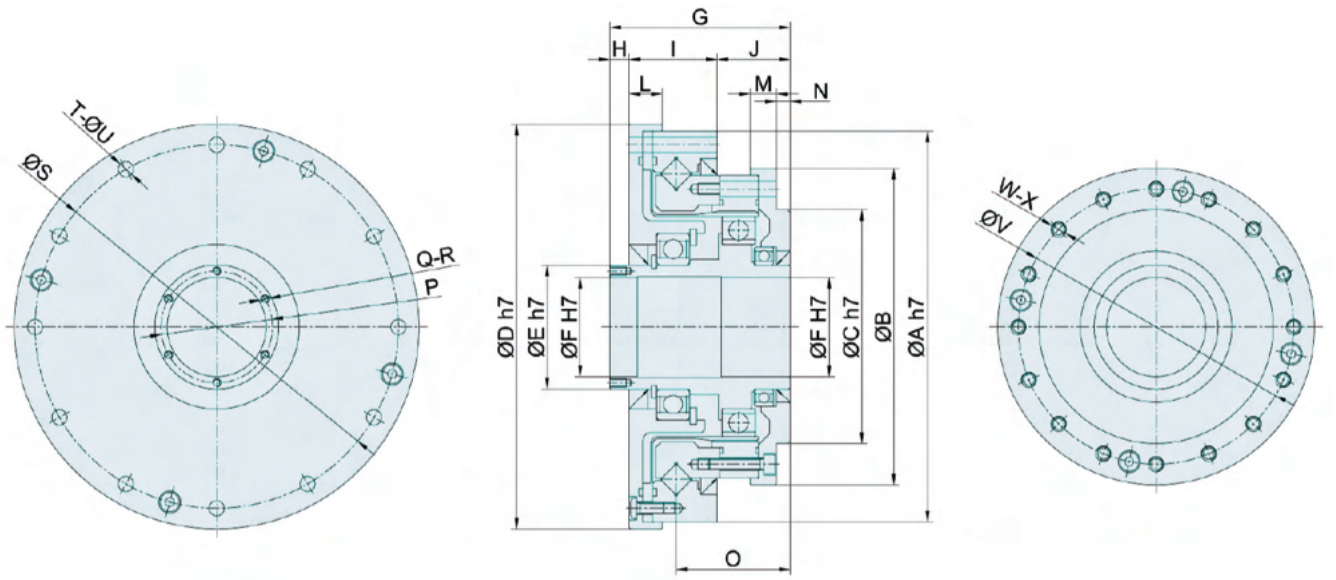
標準型
Standard Type

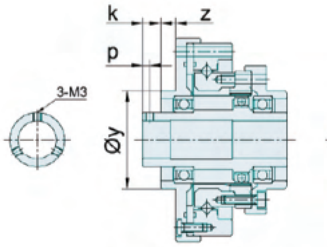
TMHF	25	—	100	W	K	規格1, 2/ Spec. 1,2
↓	↓		↓	↓	↓	↓
機型名稱 Model Name	型號 Model		減速比 Reduction Ratio	型式 Type	波產生器形式 Wave Generator Type	特殊規格 Special Specification

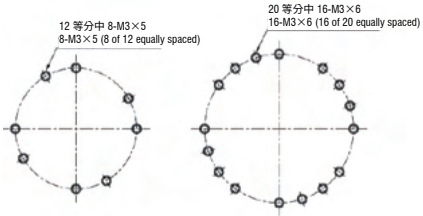
機型名稱 Model Name	型號 Model No.	減速比 Reduction Ratio						型式 Type	波產生器型式 Wave Generator Type	特殊規格 Special Specifications
TMHF	14	30	50	80	100	-	-	A = 組件型 Component Type W = 組合型 Combination Type E = 簡易組合型 Basic Combination Type	A = 一體產生器 Integrated Wave Generator K = 空心產生器 Hollow Wave Generator S = 實心產生器 Solid Wave Generator	1 = 標準軸孔徑 Standard Bore 2 = 客製軸孔徑 Customized Bore
	17	30	50	80	100	120	-			
	20	30	50	80	100	120	160			
	25	30	50	80	100	120	160			
	32	30	50	80	100	120	160			
	40	-	50	80	100	120	160			

TMHF系列 Series 額定表 Specifications

型號 Size	減速比 Ratio	輸入 2000 r/min 時的額定扭矩 Rated Torque at 2000 r/min Input		啟動停止時的容許峰值扭矩 Allowable Peak Torque at Start/Stop		平均負載扭矩的容許最大值 Max. Allowable Average Load Torque		瞬間容許最大扭矩 Max. Momentary Torque		容許最高輸入轉速 (r/min) Max. Input Speed		容許平均輸入轉速 (r/min) Allowable Avg. Input Speed		轉動慣量 Moment of Inertia	
		Nm	kgfm	Nm	kgfm	Nm	kgfm	Nm	kgfm	油潤滑 Oil	潤滑脂潤滑 Grease	油潤滑 Oil	潤滑脂潤滑 Grease	I ×10⁻⁴ kgm²	J ×10⁻⁵ kgf·m·s²
14	30	4.0	0.41	9.0	0.92	6.8	0.69	17	1.7	14000	8500	6500	3500	0.033	0.034
	50	5.4	0.55	18	1.8	6.9	0.70	35	3.6						
	80	7.8	0.80	23	2.4	11	1.1	47	4.8						
	100	7.8	0.80	28	2.9	11	1.1	54	5.5						
17	30	8.8	0.90	16	1.6	12	1.2	30	3.1	10000	7300	6500	3500	0.079	0.081
	50	16	1.6	34	3.5	26	2.6	70	7.1						
	80	22	2.2	43	4.4	27	2.7	87	8.9						
	100	24	2.4	54	5.5	39	4.0	108	11						
	120	24	2.4	54	5.5	39	4.0	86	8.8						
20	30	15	1.5	27	2.8	20	2.0	50	5.1	10000	6500	6500	3500	0.193	0.197
	50	25	2.5	56	5.7	34	3.5	98	10						
	80	34	3.5	74	7.5	47	4.8	127	13						
	100	40	4.1	82	8.4	49	5.0	147	15						
	120	40	4.1	87	8.9	49	5.0	147	15						
	160	40	4.1	92	9.4	49	5.0	147	15						
25	30	27	2.8	50	5.1	38	3.9	95	9.7	7500	5600	5600	3500	0.413	0.421
	50	39	4.0	98	10	55	5.6	186	19						
	80	63	6.4	137	14	87	8.9	255	26						
	100	67	6.8	157	16	108	11	284	29						
	120	67	6.8	167	17	108	11	304	31						
	160	67	6.8	176	18	108	11	314	32						
32	30	54	5.5	100	10	75	7.7	200	20	7000	4800	4600	3500	1.69	1.72
	50	76	7.8	216	22	108	11	382	39						
	80	118	12	304	31	167	17	568	58						
	100	137	14	333	34	216	22	647	66						
	120	137	14	353	36	216	22	686	70						
	160	137	14	372	38	216	22	686	70						
40	50	137	14	402	41	196	20	686	70	5600	4000	3600	3000	4.50	4.59
	80	206	21	519	53	284	29	980	100						
	100	265	27	568	58	372	38	1080	110						
	120	294	30	617	63	451	46	1180	120						
	160	294	30	647	66	451	46	1180	120						







型號 14、17 的輸入端形狀
Input End Shape for Sizes 14 & 17

型號14
Size 14

型號17
Size 17

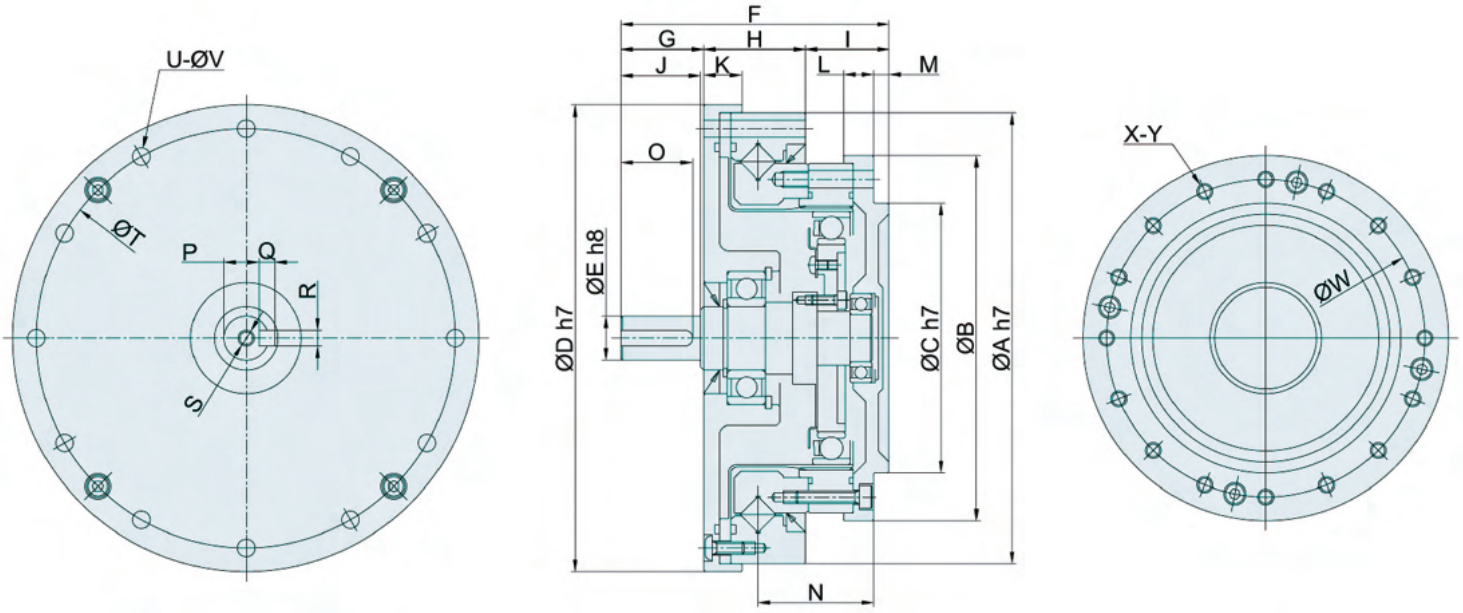
TMHF-WK 中空型 尺寸表 Hollow Shaft Type (WK) Dimensions

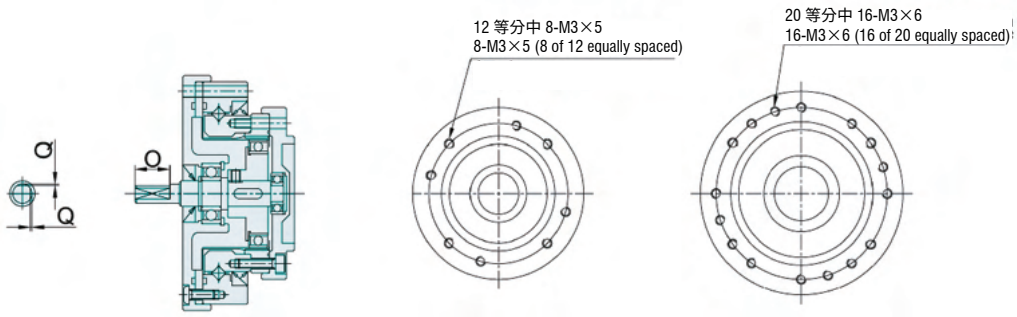
型號 Size / 符號 Symbol	14	17	20	25	32	40
ØA h7	70	80	90	110	142	170
ØB	54	64	75	90	115	140
ØC h7	36	45	50	60	85	100
ØD h7	74	84	95	115	147	175
ØE h7	20	25	30	38	45	59
ØF h7	14	19	21	29	36	46
G	52.5	56.5	51.5	55.5	65.5	79
H	12	12	5	6	7	8
I	20.5	23	25	26	32	38
J	20	21.5	21.5	23.5	26.5	33
K	6.5	6.5	-	-	-	-
L	9	10	10.5	10.5	12	14
M	8	8.5	9	8.5	9.5	13
N	7.5	8.5	7	6	5	7
O	21.7	23.9	25.5	29.6	36.4	44
ØP (P)	(2.5)	(2.5)	25.5	33.5	40.5	52
Q	3	3	6	6	6	6
R	M3	M3	M3×6	M3×6	M3×6	M4×8
ØS	64	74	84	102	132	158
T	8	12	12	12	12	12
ØU	3.5	3.5	3.5	4.5	5.5	6.6
ØV	44	54	62	77	100	122
W	12 等分中 8 處 8 of 12 equally spaced	20 等分中 16 處 16 of 20 equally spaced	16	16	16	16
X	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10
	Ø3.5×11.5	Ø3.5×12	Ø3.5×13.5	Ø4.5×15.5	Ø5.5×20.5	Ø6.6×25
ØY	36	45	-	-	-	-
Z	5.5	5.5	-	-	-	-

（註）若在安裝止口（凹圓）上使用此部位，請參照止口的避讓加工。

Note: When this portion is used on the mounting pilot (recess), refer to the relief machining of the pilot.

- 由於零組件的製造方法（鑄造、機械加工）不同，公差亦有所差異。未標註公差之尺寸，如需了解公差範圍，請洽詢本公司或授權代理商。
- *Tolerances vary depending on the manufacturing method of each part (casting, machining). For tolerance ranges of dimensions not specified, please contact us or an authorized distributor.*





型號 14、17 的輸入端形狀
Input End Shape for Sizes 14 & 17

型號14
Size 14

型號17
Size 17

TMHF-WS 軸輸入型　尺寸表 Shaft Input Type (WS)　Dimensions

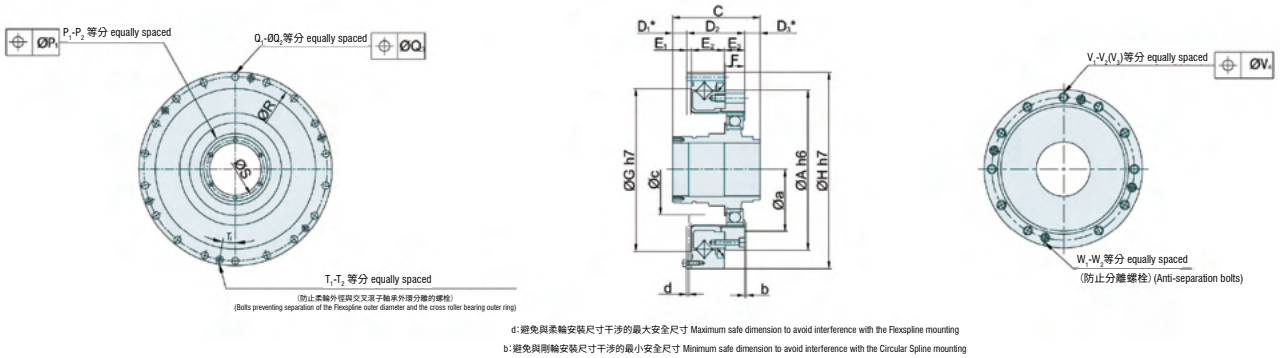
型號 Size / 符號 Symbol	14	17	20	25	32	40
ØA h7	70	80	90	110	142	170
ØB	54	64	75	90	115	140
ØC	36	45	50	60	85	100
ØD h7	74	84	95	115	147	175
ØE h6	6	8	10	14	14	16
F	50.5	56	63.5	72.5	84.5	100
G	15	17	21	26	26	31
H	20.5	23	25	26	32	38
I	15	16	17.5	20.5	26.5	31
J	14	16	20	25	25	30
K	9	10	10.5	10.5	12	14
L	8	8.5	9	8.5	9.5	13
M	2.5	3	3	3	5	5
N	21.7	23.9	25.5	29.6	36.4	44
O	11	12	16.5	22.5	22.5	27.5
P	-	-	$8.2^{0}_{-0.1}$	$11^{0}_{-0.1}$	$11^{0}_{-0.1}$	$13^{0}_{-0.1}$
Q	0.5	0.5	$3^{0}_{-0.025}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$
R	-	-	$3^{0}_{-0.025}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$	$5^{0}_{-0.030}$
S	-	-	M3×6	M5×10	M5×10	M5×10
ØT	64	74	84	102	132	158
U	8	12	12	12	12	12
ØV	3.5	3.5	3.5	4.5	5.5	6.6
ØW	44	54	62	77	100	122
X	12 等分中 8 處 8 of 12 equally spaced	20 等分中 16 處 16 of 20 equally spaced	16	16	16	16
Y	M3×5	M3×6	M3×6	M4×7	M5×8	M6×10
	Ø3.5×11.5	Ø3.5×12	Ø3.5×13.5	Ø4.5×15.5	Ø5.5×20.5	Ø6.6×25

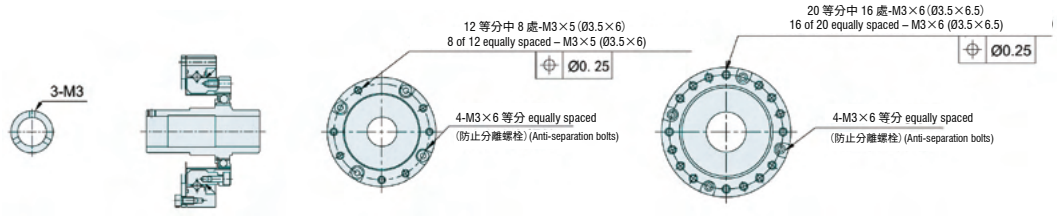
（註）若在安裝止口（凹圓）上使用此部位，請參照止口的避讓加工。

Note: When this portion is used on the mounting pilot (recess), refer to the relief machining of the pilot.

- 由於零組件的製造方法（鑄造、機械加工）不同，公差亦有所差異。未標註公差之尺寸，如需了解公差範圍，請洽詢本公司或授權代理商。
- *Tolerances vary depending on the manufacturing method of each part (casting, machining). For tolerance ranges of dimensions not specified, please contact us or an authorized distributor.*

簡易組合型(EK)
Basic Combination Type (EK)

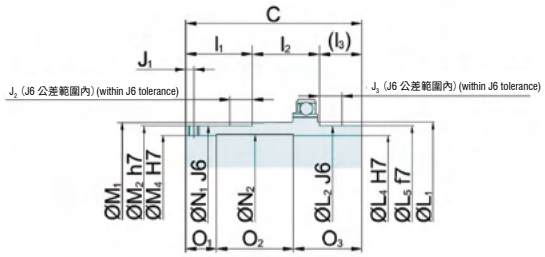


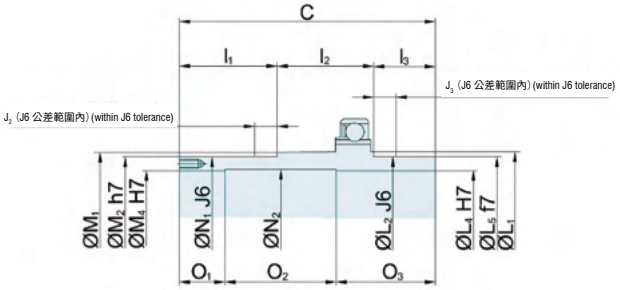


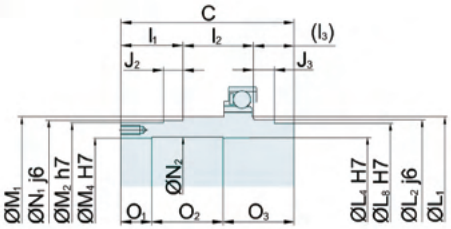
型號 14、17 輸入部的形狀
Input Shape for Sizes 14 & 17

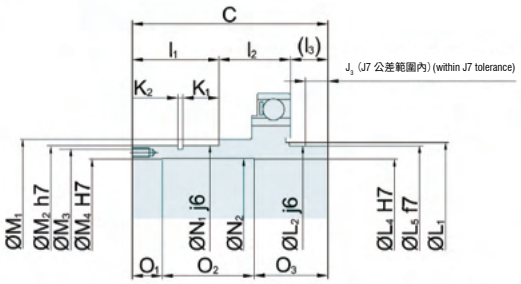
型號14
Size 14

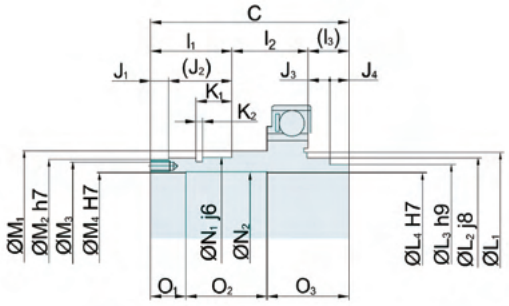
型號17
Size 17











(註)若在安裝止口(凹圓)上使用此部位, 請參照止口的避讓加工。

Note: When this portion is used on the mounting pilot (recess), refer to the relief machining of the pilot.

※ 詳細尺寸請以交貨規格圖確認。

※ For dimensional details, please refer to the delivery specification drawing.

尤其波產生器的形狀依型號而有所不同, 請務必以交貨規格圖確認。

In particular, the Wave Generator shape varies by model;

be sure to confirm it with the delivery specification drawing.

TMHF-EK 尺寸表 TMHF-EK Dimensions

型號 Size / 符號 Symbol		14	17	20	25	32	40
ØA h6		50	60	70	85	110	135
C		$52.5^{0}_{-0.1}$	$56.5^{0}_{-0.1}$	$51.5^{0}_{-0.1}$	$55.5^{0}_{-0.1}$	$65.5^{0}_{-0.1}$	$79^{0}_{-0.1}$
D_1*		$16^{+0.8}_{0}$	$16^{+0.9}_{0}$	9.5^{+1}_{0}	$10^{+1.1}_{0}$	$12^{+1.1}_{0}$	$13^{+1.1}_{0}$
D_2		23.5	26.5	29	34	42	51
D_3*		13	14	13	11.5	11.5	15
E_1		2.4	3	3	3.3	3.6	4
E_2		14.1	16	17.5	18.7	23.4	29
E_3		7	7.5	8.5	12	15	18
F		6	6.5	7.5	10	14	17
ØG H6		48	60	70	88	114	140
ØH h6		70	80	90	110	142	170
波產生器尺寸 Wave Generator Dimensions	I_1	20±0.1	21.5±0.1	19±0.1	20±0.1	29±0.1	34±0.1
	I_2	20±0.1	21.5±0.1	20±0.1	22.5±0.1	23.5±0.1	28±0.1
	I_3	(12.5)	(13.5)	(12.5)	(13)	(13)	(17)
	J_1	2.5	2.5	-	-	-	-
	J_2	7	7	7	6.5	-	-
	J_3	7	7	7	6.5	-	9.5
	J_4	-	-	-	-	-	(7.5)
	K_1	-	-	-	-	13.9	15.1
	K_2	-	-	-	-	1.9	2.2
	$ØL_1$	22	27	32	42	47	62
	$ØL_2$ j6	20	25	30	40	45	60
	$ØL_3$ h9	-	-	-	38	-	59
	$ØL_4$ H7	14	19	21	29	36	46
	$ØL_5$ f7	20	25	30	-	45	-
	$ØM_1$	22	27	32	42	49	65
	$ØM_2$ h7	20	25	30	38	45	59
	$ØM_3$	-	-	-	-	42.5	57
	$ØM_4$ H7	14	19	21	29	36	46
	$ØN_1$ j6	20	25	30	40	45	60
	$ØN_2$	14.5	19.5	21.5	29.5	36.5	46.5
	O_1	10	10	10	10	10	12
	O_2	22.5	24.5	(19.5)	22.5	(30.5)	(35)
	O_3	20	22	22	23	25	32
P_1		3	3	6	6	6	6
P_2		M3	M3	M3×6	M3×6	M3×6	M4×8
$ØP_3$		-	-	0.25	0.25	0.25	0.25
Q_1		8	12	12	12	12	12
$ØQ_2$		3.5	3.5	3.5	4.5	5.5	6.6
$ØQ_3$		0.25	0.25	0.25	0.25	0.25	0.3
ØR		64	74	84	102	132	158
ØS		-	-	25.5	33.5	40.5	52
T_1		2	4	4	4	4	6
T_2		M3×6	M3×6	M3×8	M3×8	M4×8	M4×10
T_3 [角度 Angle]		22.5°	15°	15°	15°	15°	15°
ØU		44	54	62	77	100	122
V_1		12 等分中 8 處 8 of 12 equally spaced	20 等分中 16 處 16 of 20 equally spaced	16	16	16	16
V_2		M3×5	M3×6	M3×6	M4×7	M5×8	M6×10
V_3		Ø3.5×6	Ø3.5×6.5	Ø3.5×7.5	Ø4.5×10	Ø5.5×14	Ø6.6×17
V_4		0.25	0.25	0.25	0.25	0.25	0.25
W_1		4	4	4	4	4	4
W_2		M3×6	M3×6	M3×8	M3×10	M4×16	M5×20
殼體內壁 Housing Inner Wall	a	38	45	53	66	86	106
	Øb	1	1	1.5	1.5	1.5	2
	c	31	38	45	56	73	90
	d	1.7	2.1	2	2	2	2

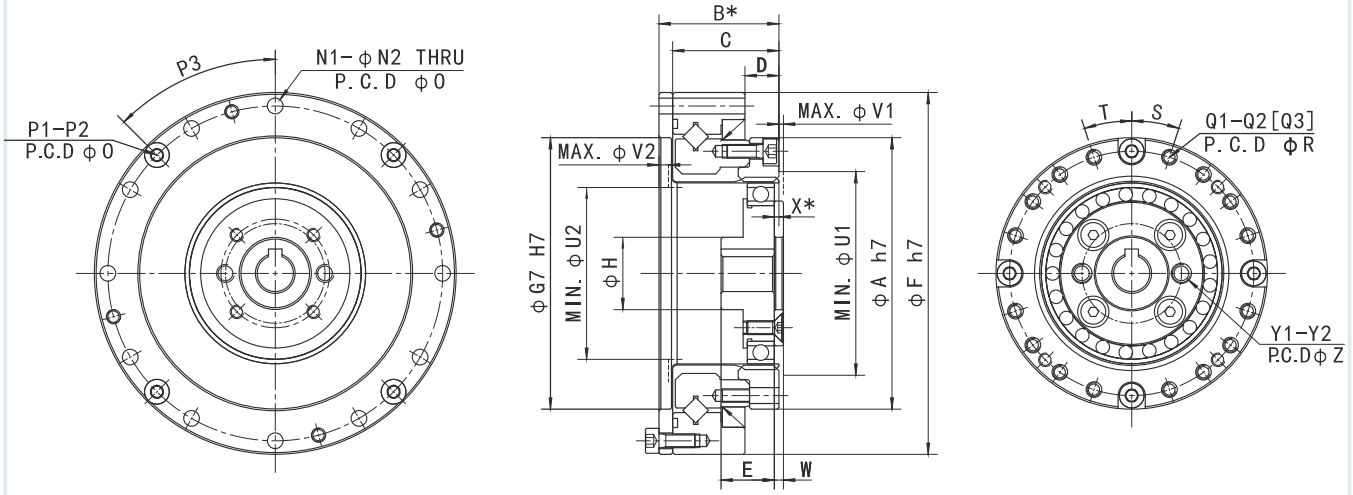
● 由於柔輪會產生彈性變形，為防止其與殼體接觸，請使用大於 a、b，小於 c、d 的殼體內壁尺寸。
● Since the Flexspline deforms elastically, use housing inner wall dimensions larger than a and b and smaller than c and d to prevent contact with the housing.

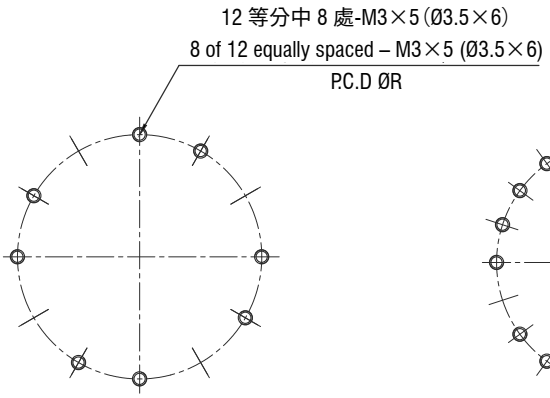
● 附 * 符號的 D1、D3 尺寸，係指構成 TM Drive 的三個組件（波產生器、柔輪、剛輪）於軸向的組裝位置及容許公差。此尺寸會影響性能與強度，請務必嚴格遵守。
*● Dimensions D1 and D3 marked with * indicate the axial mounting positions and allowable tolerances of the three components of the TM Drive (Wave Generator, Flexspline, Circular Spline). These dimensions affect performance and strength; please observe them strictly.*

● 由於零組件的製造方法（鑄造、機械加工）不同，公差亦有所差異。未標註公差之尺寸，如需了解公差範圍，請洽詢本公司或授權代理商。
● Tolerances vary depending on the manufacturing method of each part (casting, machining). For tolerance ranges of dimensions not specified, please contact us or an authorized distributor.

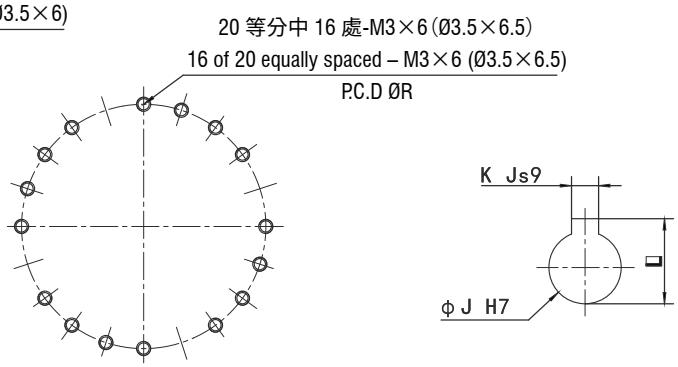
● 型號 14～40 的剛輪上沒有密封用的 O 型環槽，設計及安裝時請務必採取密封措施。產品出貨時，波產生器為獨立包裝。
● Sizes 14–40 have no O-ring groove for sealing on the Circular Spline; be sure to provide sealing in design and installation. At delivery, the Wave Generator is packaged separately.

簡易組合型(EA)
Basic Combination Type (EA)





型號14
Size 14



型號17
Size 17

※ 詳細尺寸請以交貨規格圖確認。

※ For dimensional details, please refer to the delivery specification drawing.

※ 公差依零組件的製造方法(鑄件、機械加工)而有所不同。未標註公差之尺寸,如需了解公差請洽詢本公司。

※ Tolerances vary depending on the manufacturing method (casting, machining). For tolerances of dimensions not specified, please contact us.

※ 請勿拆下防止分離螺栓。

※ Do not remove the anti-separation bolts.

TMHF-EA 尺寸表 TMHF-EA Dimensions

型號 Size / 符號 Symbol	14	17	20	25	32	40
ØA h6	50	60	70	85	110	135
B*	23.5	26.5	29	34	42	51
C	21.1	23.5	26	30.7	38.4	47
D	7	7.5	8.5	12	15	18
E	$10^{0}_{-0.1}$	$12.5^{0}_{-0.1}$	$14^{0}_{-0.1}$	$14.5^{0}_{-0.1}$	$15.5^{0}_{-0.1}$	$18.7^{0}_{-0.1}$
ØF h7	70	80	90	110	142	170
ØG H7	48	60	70	88	114	140
ØH	12.5	16	21	22	29	32
ØJ H7	8	8	14	14	19	19
K Js9	3	3	5	5	6	6
L	$9.4^{+0.1}_{0}$	$9.4^{+0.1}_{0}$	$16.3^{+0.1}_{0}$	$16.3^{+0.1}_{0}$	$21.8^{+0.1}_{0}$	$21.8^{+0.1}_{0}$
N_1	8	12	12	12	12	12
$ØN_2$	3.5	3.5	3.5	4.5	5.5	6.6
ØO [P.C.D.]	64	74	84	102	132	158
P_1	2	4	4	4	4	6
P_2	M3×6	M3×6	M3×8	M3×8	M4×8	M4×10
P_3 [角度 Angle]	22.5°	45°	45°	15°	15°	15°
Q_1	12 等分中 8 處 8 of 12 equally spaced	20 等分中 16 處 16 of 20 equally spaced	16	16	16	16
Q_2	M3×5	M3×6	M3×6	M4×8	M5×8	M6×10
Q_3	Ø3.5×6	Ø3.5×6.5	Ø3.5×7.5	Ø4.5×10	Ø5.5×14	Ø6.6×17
ØR [P.C.D.]	44	54	62	77	100	122
S [角度 Angle]	30°	18°	22.5°	22.5°	22.5°	22.5°
T [角度 Angle]	30°	18°	11.25°	11.25°	11.25°	11.25°
$ØU_1$	38	45	53	66	86	106
$ØU_2$	31	38	45	56	73	90
V_1	1	1	1.5	1.5	1.5	2
V_2	1.7	2.1	2	2	2	2
W	1.6	2	2	2	2	2
X*	1	1	1	1.5	1.5	2
Y_1	2	2	4	4	4	4
Y_2	M4	M4	M4	M5	M5	M5
ØZ [P.C.D.]	18	22	27	32	36	50

- 由於柔輪會產生彈性變形，為防止其與殼體接觸，請使用大於 U1、V1，小於 U2、V2 的殼體內壁尺寸。
- *Since the Flexspline deforms elastically, use housing inner wall dimensions larger than U1 and V1 and smaller than U2 and V2 to prevent contact with the housing.*

- 附 * 符號的 B、X 尺寸會影響減速機的性能與強度，請務必嚴格遵守。
- *Dimensions B and X marked with * affect the performance and strength of the reducer; please observe them strictly.*

- 由於零組件的製造方法（鑄造、機械加工）不同，公差亦有所差異。未標註公差之尺寸，如需了解公差範圍，請洽詢本公司或授權代理商。
- *Tolerances vary depending on the manufacturing method of each part (casting, machining). For tolerance ranges of dimensions not specified, please contact us or an authorized distributor.*

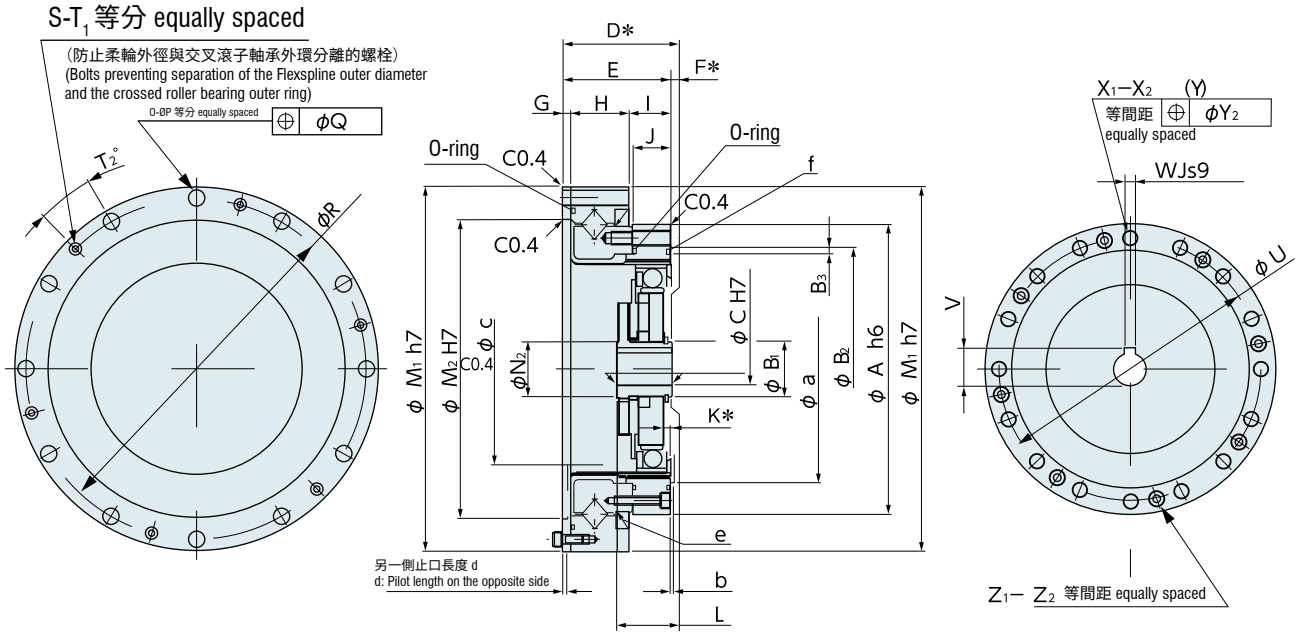
- 本尺寸表適用於一般結構（無 O 型環）。型號 14～40 的剛輪上沒有密封用的 O 型環槽，設計及安裝時請務必採取密封措施。附 O 型環結構請另洽本公司。
- *This table applies to the standard structure (without O-ring). Sizes 14–40 have no O-ring groove for sealing on the Circular Spline; be sure to provide sealing in design and installation. For the O-ring version, please contact us.*

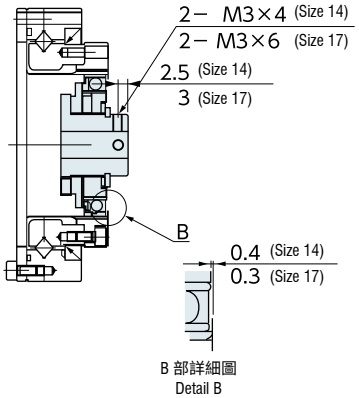
- 產品出貨時，波產生器為獨立包裝；波產生器的 J、L、K 三個尺寸可變更或追加工。
- *At delivery, the Wave Generator is packaged separately. Dimensions J, L and K of the Wave Generator can be modified or additionally machined.*

簡易組合型(EA)— 附 O 型環結構
Basic Combination Type (EA)– with O-ring

規格尺寸請另洽本公司

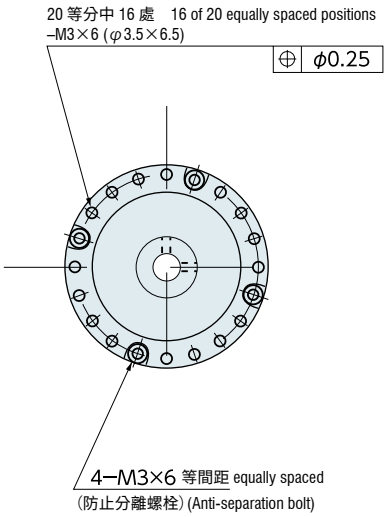
Please contact us for dimensions



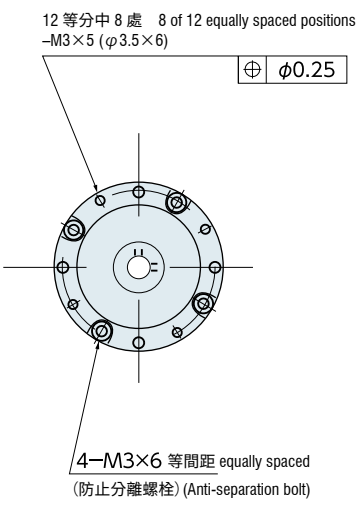


B 部詳細圖
Detail B

型號 14、17 波產生器形狀
Wave Generator Shape for Sizes 14 & 17



型號 17 形狀 / 請參照安裝止口的避讓加工。
Shape of Size 17 / Refer to the relief machining of the mounting pilot.



型號 14 形狀
Shape of Size 14

※詳細尺寸請確認交貨規格圖。

※For detailed dimensions, please refer to the delivery specification drawing.

※零件製造方式(鑄件、機械加工)不同, 公差也不同。
未標註公差之尺寸如需公差資訊, 請洽詢本公司。

※Tolerances vary by manufacturing method (casting or machining).
For tolerances of dimensions not marked, please contact us.

※請勿拆下防止分離螺栓。

※Do not remove the anti-separation bolts.

MEMO

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