



**翔暉企業有限公司**  
**SHINE WEI ENT CO., LTD.**



**2017**

**高精密減速機**  
**High Precision Reducers**

## TD 減速機-產品介紹



TCS

P135-P137



TSH



P138-P140

## TD減速機部件介紹 - 1

### 減速機部件

- CRA交叉滾子軸承
- 波產生器（含薄型軸承）
- 撓性齒杯
- 環齒輪箱體



波產生器

撓性齒杯

環齒剛輪

CRA交叉軸承

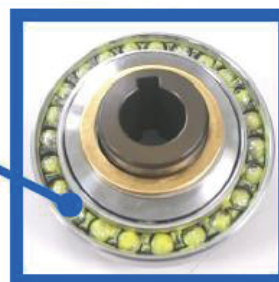


## TD減速機部件介紹 - 2

### TD 開發之波產生器

- 01dham 聯軸機構  
使波產生器具浮動效果
- 配合TPI齒形之凸輪

TD 薄型軸承



波產生器機構

### TD 薄型軸承

| TD 型號 | TD 薄型軸承    |
|-------|------------|
| 14    | SX05T01T2  |
| 17    | SX06T01T2  |
| 20    | SX07T01T2  |
| 25    | SX09T01T9X |
| 32    | SX12T01T9X |



## ■ TD減速機部件介紹 - 3

### 材料

- 高抗拉強度

### 齒形

- 根據日本IH齒形進行逆向分析
- FEM齒對齒合分析
- FEM齒面接觸應力分析

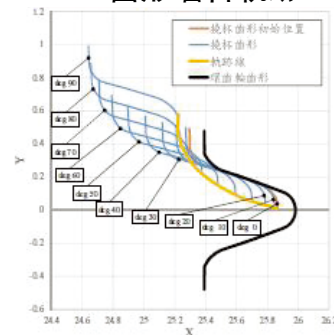
### 齒杯殼體

- 殼體外觀特殊設計
  - \* 增加可撓曲性
  - \* 避免應力集中

TD 撓性齒杯



TD 齒形嚙合軌跡



## ■ TD減速機部件介紹 - 4

### 材料-球墨鑄鐵

- 特殊材料 · 高抗拉強度
- 球墨潤滑

### 插齒

- 外齒現配加工
- 不具互換性

TD 環齒剛輪



# 客戶訂購資料

## TD減速機模組(TPI Strainwave Drive)

- 波產生器
- 撓性齒杯
- 環齒剛輪
- 交叉滾子軸承

TCS - 17 - 50 - UT

機型記號

機型記號

組合型 / 部件型記號

減速比記號

| 機 型 | 型 式 | 減速比 | 組合 / 部件型    |
|-----|-----|-----|-------------|
| TCS | 14  | 50  | 部件型 CT      |
|     | 17  | 80  | 組合型 UT      |
| TSH | 20  | 100 | 中空組合型 HUT   |
|     | 25  | 120 | 輸入軸組合型 SUT  |
|     | 32  | 160 | 標準簡易組合型 NST |
|     |     |     | 中空簡易組合型 HST |

## TD 型號規格一覽

| 型 號    | 減速比-型式       | 型 號    | 減速比-型式                  | 輸入2000 r/min 額定轉矩(Nm) |
|--------|--------------|--------|-------------------------|-----------------------|
| TCS-14 | 50 - CT(UT)  | TSH-14 | 50 - CT(HUT)(SUT)(NST)  | 5.4                   |
|        | 80 - CT(UT)  |        | 80 - CT(HUT)(SUT)(NST)  | 7.8                   |
|        | 100 - CT(UT) |        | 100 - CT(HUT)(SUT)(NST) | 7.8                   |
| TCS-17 | 50 - CT(UT)  | TSH-17 | 50 - CT(HUT)(NST)(HST)  | 16                    |
|        | 80 - CT(UT)  |        | 80 - CTH(UT)(NST)(HST)  | 22                    |
|        | 100 - CT(UT) |        | 100 - CT(HUT)(NST)(HST) | 24                    |
|        | 120 - CT(UT) |        | 120 - CT(HUT)(NST)(HST) | 24                    |
| TCS-20 | 50 - CT(UT)  | TSH-20 | 50 - CT(HUT)(NST)       | 25                    |
|        | 80 - CT(UT)  |        | 80 - CT(HUT)(NST)       | 34                    |
|        | 100 - CT(UT) |        | 100 - CT(HUT)(NST)      | 40                    |
|        | 120 - CT(UT) |        | 120 - CT(HUT)(NST)      | 40                    |
|        | 160 - CT(UT) |        | 160 - CT(HUT)(NST)      | 40                    |
| TCS-25 | 50 - CT(UT)  | TSH-25 | 50 - CT(NST)(HST)       | 39                    |
|        | 80 - CT(UT)  |        | 80 - CT(NST)(HST)       | 63                    |
|        | 100 - CT(UT) |        | 100 - CT(NST)(HST)      | 67                    |
|        | 120 - CT(UT) |        | 120 - CT(NST)(HST)      | 67                    |
|        | 160 - CT(UT) |        | 160 - CT(NST)(HST)      | 67                    |
| TCS-32 | 50 - CT(UT)  | TSH-32 | 50 - CT(HUT)(NST)(HST)  | 76                    |
|        | 80 - CT(UT)  |        | 80 - CT(HUT)(NST)(HST)  | 118                   |
|        | 100 - CT(UT) |        | 100 - CT(HUT)(NST)(HST) | 137                   |
|        | 120 - CT(UT) |        | 120 - CT(HUT)(NST)(HST) | 137                   |

# TCS 系列

# TCS SERIES



## Overview

- Type : TCS-14 ~ TCS-32
- Backlash :  $\leq 0.5-1.0$  Arc.min
- Ratio : 1/50 ~ 1/160

- 型 式 : TCS-14 ~ TCS-32
- 背 隙 :  $\leq 0.5-1.0$  弧分
- 減速比 : 1/50 ~ 1/160

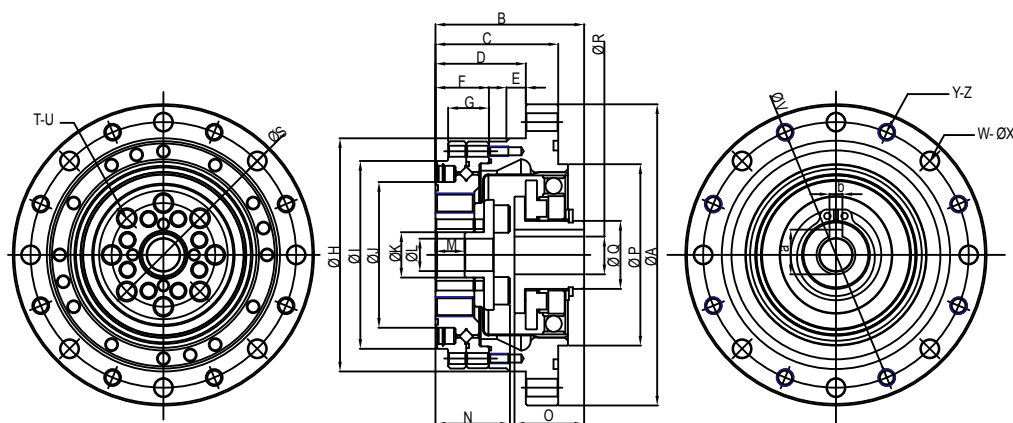
## TCS 系列規範表

| 型 號 | 減速比 | 輸入2000r/min<br>時的額定轉矩 |      | 起動停止時的<br>容許峰值轉矩 |      | 平均負載轉矩的<br>容許最大值 |      | 瞬間容許最大轉矩 |      | 容許最高輸入<br>轉速r/min |       | 容許平均輸入<br>轉速r/min |       | 慣轉動慣量                               |                                     |
|-----|-----|-----------------------|------|------------------|------|------------------|------|----------|------|-------------------|-------|-------------------|-------|-------------------------------------|-------------------------------------|
|     |     | Nm                    | kgfm | Nm               | kgfm | Nm               | kgfm | Nm       | kgfm | 油潤滑               | 潤滑脂潤滑 | 油潤滑               | 潤滑脂潤滑 | I<br>$\times 10^{-4} \text{ kgm}^2$ | J<br>$\times 10^{-5} \text{ kgm}^2$ |
| 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   |                   |       |                   |       |                                     |                                     |

( 注 ) 1.轉動慣量  $I = \frac{1}{4} GD^2$

# TCS-UT 組合型

\* 實際尺寸依承認圖提供為準



| 型 式<br>尺 寸 | 14   | 17   | 20   | 25   | 32   |
|------------|------|------|------|------|------|
| ØA         | 73   | 79   | 93   | 107  | 138  |
| B          | 41   | 45   | 45.5 | 52   | 62   |
| C          | 34   | 37   | 38   | 46   | 57   |
| D          | 27   | 29   | 28   | 36   | 45   |
| E          | 3.5  | 4.5  | 6    | 6    | 6    |
| F          | 16.5 | 16.5 | 16.5 | 18.5 | 22.5 |
| G          | 12   | 12   | 12   | 14   | 17   |
| ØH         | 56   | 63   | 72   | 86   | 113  |
| ØI         | 42.5 | 49.5 | 58   | 73   | 96   |
| ØJ         | 31   | 38   | 45   | 58   | 78   |
| ØK         | 11   | 10   | 14   | 20   | 26   |
| ØL         | 8    | 6    | 10   | 15   | 20   |
| M          | 9.4  | 9.5  | 9    | 12   | 15   |
| N          | 21.4 | 23.5 | 23   | 29   | 37   |
| O          | 18.5 | 20.7 | 21.5 | 21.6 | 23.6 |
| ØP         | 38   | 48   | 56   | 67   | 90   |
| ØQ         | 14   | 18   | 21   | 26   | 26   |
| ØR         | 6    | 8    | 12   | 14   | 14   |
| ØS         | 23   | 27   | 32   | 42   | 55   |
| T          | 6    | 6    | 8    | 8    | 8    |
| U          | M4   | M5   | M6   | M8   | M10  |
| ØV         | 65   | 71   | 82   | 96   | 125  |
| W          | 8    | 8    | 8    | 10   | 12   |
| ØX         | 4.5  | 4.5  | 5.5  | 5.5  | 6.5  |
| Y          | 8    | 8    | 8    | 10   | 12   |
| Z          | M4   | M4   | M5   | M5   | M6   |
| a          | -    | -    | 13.8 | 16.3 | 16.3 |
| b          | -    | -    | 4    | 5    | 5    |
| set screw  | 2-M3 | 2-M3 | -    | -    | -    |





# TSH 系列

## TSH SERIES

### Overview

- Type : TSH-14 ~ TSH-32
- Backlash :  $\leq 0.5-1.0$  Arc.min
- Ratio :  $1/50 \sim 1/160$



- 型 式 : TSH-14 ~ TSH-32
- 背 隙 :  $\leq 0.5-1.0$  弧分
- 減速比 :  $1/50 \sim 1/160$

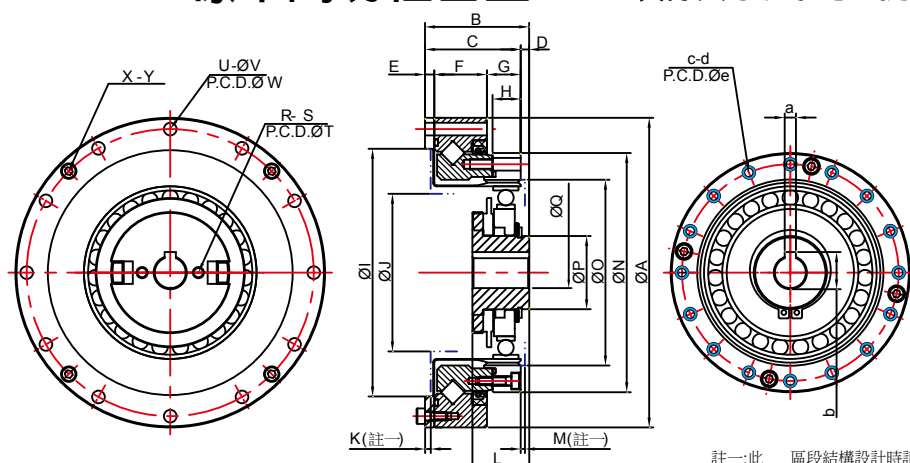
## TSH 系列規範表

| 型 號 | 減速比 | 輸入2000r/min<br>時的額定轉矩 |      | 起動停止時的<br>容許峰值轉矩 |      | 平均負載轉矩的<br>容許最大值 |      | 瞬間容許最大轉矩 |      | 容許最高輸入<br>轉速r/min |       | 容許平均輸入<br>轉速r/min |       |
|-----|-----|-----------------------|------|------------------|------|------------------|------|----------|------|-------------------|-------|-------------------|-------|
|     |     | Nm                    | kgfm | Nm               | kgfm | Nm               | kgfm | Nm       | kgfm | 油潤滑               | 潤滑脂潤滑 | 油潤滑               | 潤滑脂潤滑 |
| 14  | 30  | 4.0                   | 0.41 | 9.0              | 0.92 | 6.8              | 0.69 | 17       | 1.7  | 14000             | 8500  | 6500              | 3500  |
|     | 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  |
|     | 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  | 110      | 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  |
|     | 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  |
|     | 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  |
|     | 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   |                   |       |                   |       |

( 注 ) 1.轉動慣量  $I = \frac{1}{4} GD^2$

# TSH-NST 標準簡易組合型

\* 實際尺寸依承認圖提供為準

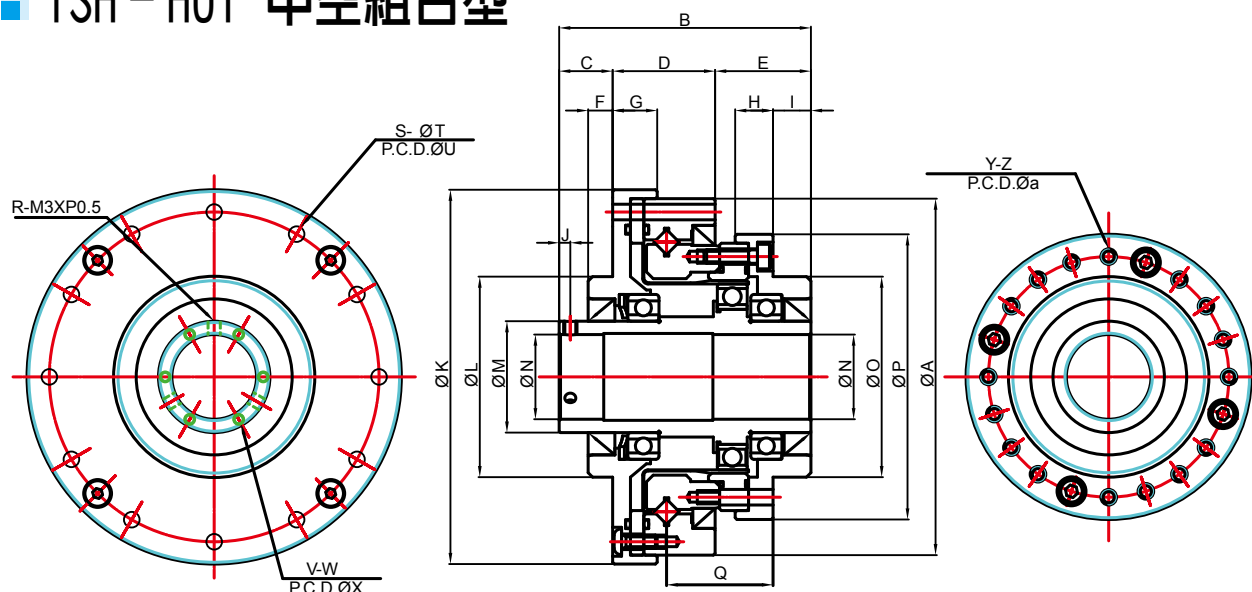


註一:此 區段結構設計時請依圖示建議規定讓開, 避免對減速機產生性能及壽命之影響。

| 型 式<br>尺 寸 | 14   | 17   | 20   | 25   | 32   |
|------------|------|------|------|------|------|
| ØA         | 70   | 80   | 90   | 110  | 142  |
| B          | 28.5 | 32.5 | 33.5 | 37   | 44   |
| C          | 23.5 | 26.5 | 29   | 34   | 42   |
| D          | 5    | 6    | 4.5  | 3    | 2    |
| E          | 2.4  | 3    | 3    | 3.3  | 3.6  |
| F          | 14.1 | 16   | 17.5 | 18.7 | 23.4 |
| G          | 7    | 7.5  | 8.5  | 12   | 15   |
| H          | 6    | 6.5  | 7.5  | 10   | 14   |
| ØI         | 48   | 60   | 70   | 88   | 114  |
| ØJ         | 32   | 38   | 45   | 56   | 75   |
| K          | 1.5  | 2    | 1.8  | 2    | 2    |
| L          | 17.6 | 19.5 | 20.1 | 20.2 | 22   |
| M          | 1    | 1    | 1.5  | 1.5  | 1.5  |
| ØN         | 50   | 60   | 70   | 85   | 110  |
| ØO         | 37   | 45   | 53   | 66   | 86.5 |
| ØP         | 14   | 18   | 21   | 26   | 26   |
| ØQ         | 8    | 8    | 11   | 11   | 14   |
| R          | -    | -    | 2    | 2    | -    |
| S          | -    | -    | M3   | M4   | -    |
| ØT         | -    | -    | 16   | 20   | -    |
| U          | 8    | 12   | 12   | 12   | 12   |
| ØV         | 3.5  | 3.5  | 3.5  | 4.5  | 5.5  |
| ØW         | 64   | 74   | 84   | 102  | 132  |
| X          | 2    | 4    | 4    | 4    | 4    |
| y          | M3   | M3   | M3   | M3   | M4   |
| a          | -    | -    | 4    | 4    | 5    |
| b          | -    | -    | 12.8 | 12.8 | 16.3 |
| c          | 8    | 16   | 16   | 16   | 16   |
| d          | M3   | M3   | M3   | M4   | M5   |
| Øe         | 44   | 54   | 62   | 77   | 100  |
| set screw  | 2-M3 | 2-M3 | -    | -    | -    |



## TSH - HUT 中空組合型

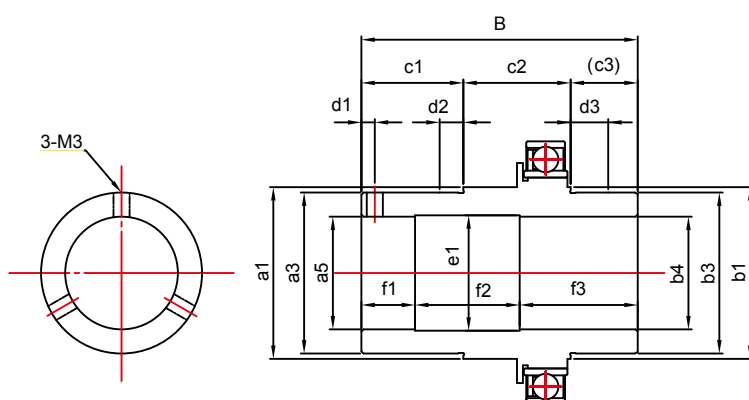
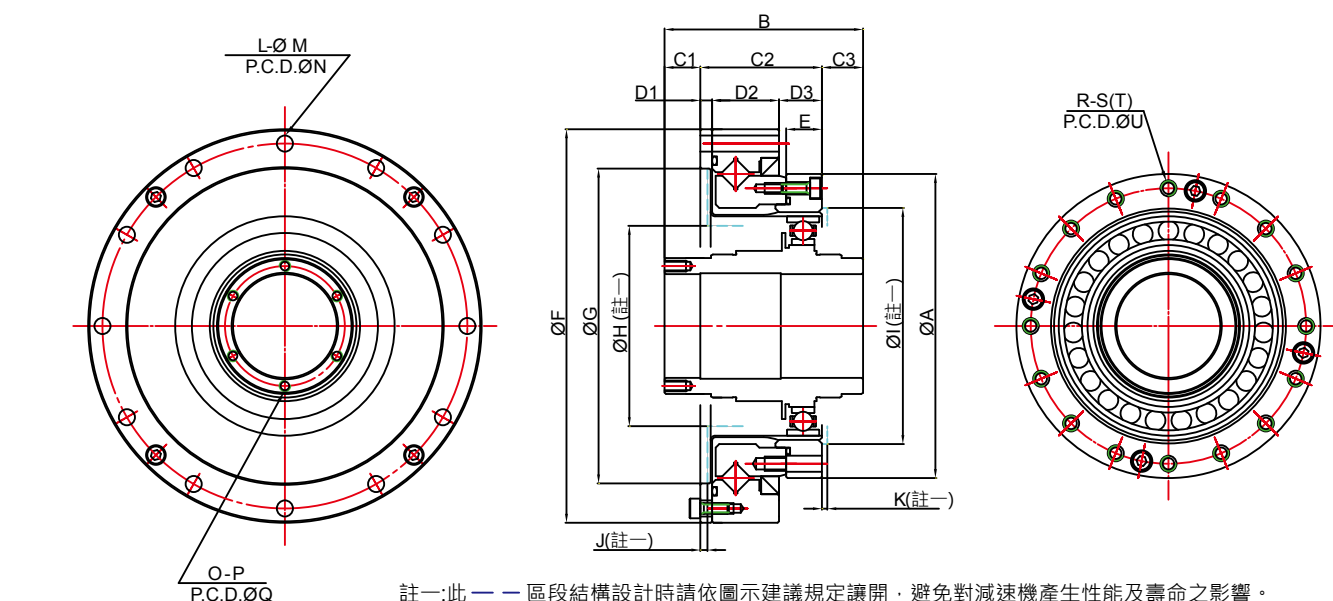


(單位:mm)

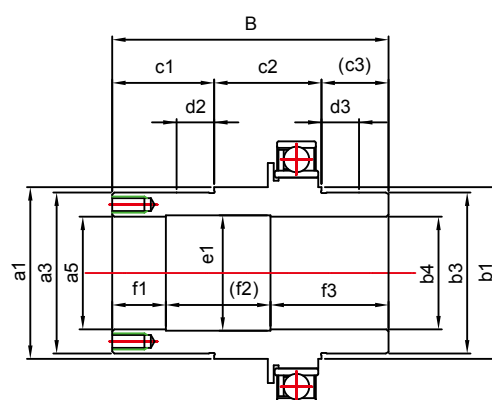
| 型 式<br>尺 寸 | 14       | 17        | 20   | 25   | 32   |
|------------|----------|-----------|------|------|------|
| ØA         | 70       | 80        | 90   | 110  | 142  |
| B          | 52.5     | 56.5      | 51.5 | 55.5 | 65.5 |
| C          | 12       | 12        | 5    | 6    | 7    |
| D          | 20.5     | 23        | 25   | 26   | 32   |
| E          | 20       | 21.5      | 21.5 | 23.5 | 26.5 |
| F          | 5.5      | 5.5       | -    | -    | -    |
| G          | 9        | 10        | 10.5 | 10.5 | 12   |
| H          | 8        | 8.5       | 9    | 8.5  | 9.5  |
| I          | 7.5      | 8.5       | 7    | 6    | 5    |
| J          | 2.5      | 2.5       | -    | -    | -    |
| ØK         | 74       | 84        | 95   | 115  | 147  |
| ØL         | 36       | 45        | -    | -    | -    |
| ØM         | 20       | 25        | 30   | 38   | 45   |
| ØN         | 14       | 19        | 21   | 29   | 36   |
| ØO         | 36       | 45        | 50   | 60   | 85   |
| ØP         | 54       | 64        | 75   | 90   | 115  |
| Q          | 21.7     | 23.9      | 25.5 | 29.6 | 36.4 |
| R          | 3        | 3         | -    | -    | -    |
| S          | 8        | 12        | 12   | 12   | 12   |
| ØT         | 3.5      | 3.5       | 3.5  | 4.5  | 5.5  |
| ØU         | 64       | 74        | 84   | 102  | 132  |
| V          | -        | -         | 6    | 6    | 6    |
| W          | -        | -         | M3x6 | M3x6 | M3x6 |
| ØX         | -        | -         | 25.5 | 33.5 | 40.5 |
| Y          | 12 均分中 8 | 20 均分中 16 | 16   | 16   | 16   |
| Z          | M3x5     | M3x6      | M3x6 | M4x7 | M5x8 |
| Øa         | 44       | 54        | 62   | 77   | 100  |



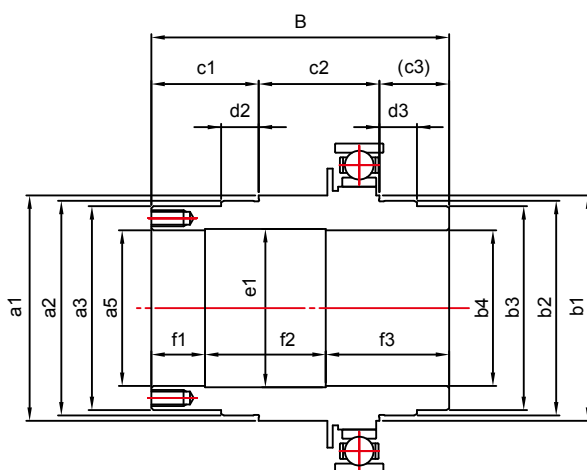
## TSH - HST 中空簡易組合型



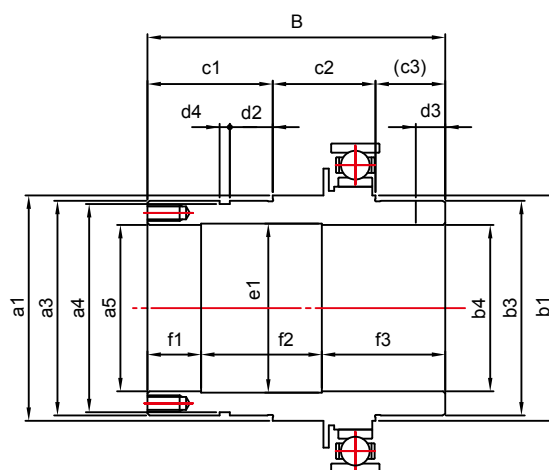
#14、#17



#20



#25

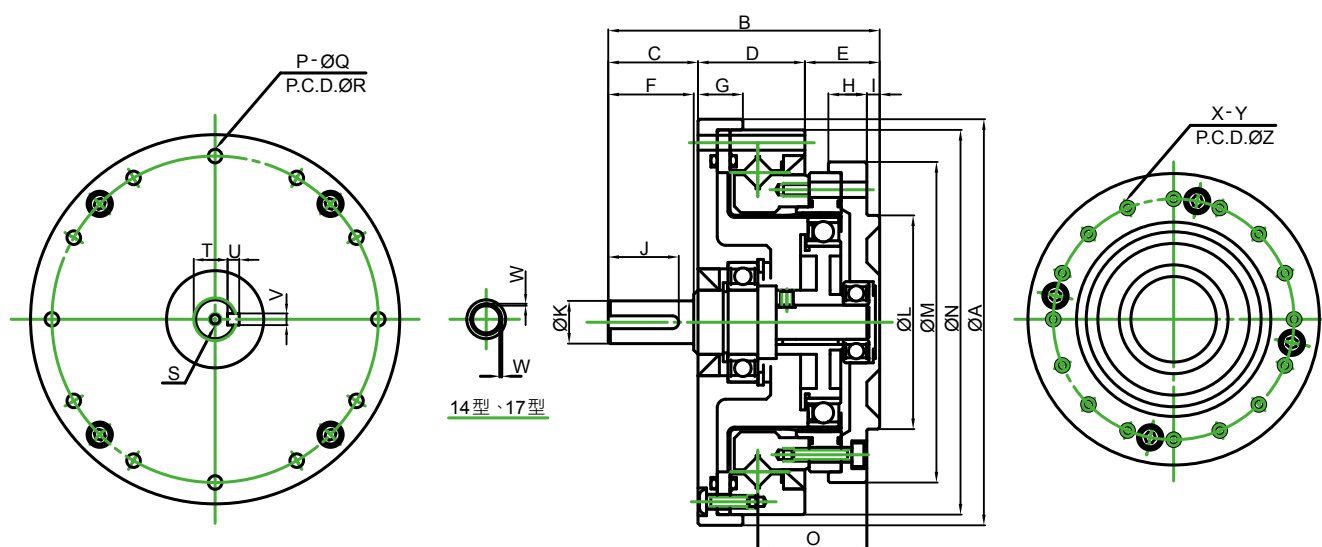


#32

(單位:mm)

| 型 式<br>尺 寸 | 14       | 17       | 20       | 25      | 32      |
|------------|----------|----------|----------|---------|---------|
| ØA         | 50       | 60       | 70       | 85      | 110     |
| B          | 52.5     | 56.5     | 51.5     | 55.5    | 65.5    |
| C1         | 16       | 16       | 9.5      | 10      | 12      |
| C2         | 23.5     | 26.5     | 29       | 34      | 42      |
| C3         | 13       | 14       | 13       | 11.5    | 11.5    |
| D1         | 2.4      | 3        | 3        | 3.3     | 3.6     |
| D2         | 14.1     | 16       | 17.5     | 18.7    | 23.4    |
| D3         | 7        | 7.5      | 8.5      | 12      | 15      |
| E          | 6        | 6.5      | 7.5      | 10      | 14      |
| ØF         | 70       | 80       | 90       | 110     | 142     |
| ØG         | 48       | 60       | 70       | 88      | 114     |
| ØH         | 31       | 38       | 45       | 56      | 73      |
| ØI         | 38       | 45       | 53       | 66      | 86      |
| J          | 1.7      | 2.1      | 1.8      | 2       | 2       |
| K          | 1        | 1        | 1.5      | 1.5     | 1.5     |
| L          | 8        | 12       | 12       | 12      | 12      |
| ØM         | 3.5      | 3.5      | 3.5      | 4.5     | 5.5     |
| ØN         | 64       | 74       | 84       | 102     | 132     |
| O          | -        | -        | 6        | 6       | 6       |
| P          | -        | -        | M3x6     | M3x6    | M3x6    |
| ØQ         | -        | -        | 25.5     | 33.5    | 40.5    |
| R          | 12 均分中 8 | 20 均分中16 | 16       | 16      | 16      |
| S          | M3x5     | M3x6     | M3x6     | M4x6    | M5x8    |
| T          | Ø3.5x6   | Ø3.5x6.5 | Ø3.5x7.5 | Ø4.5x10 | Ø5.5x14 |
| ØU         | 44       | 54       | 62       | 77      | 100     |
| a1         | 22       | 27       | 32       | 40      | 49      |
| a2         | 40       | -        | -        | -       | -       |
| a3         | 20       | 25       | 30       | 38      | 45      |
| a4         | -        | -        | -        | -       | 42.5    |
| a5         | 14       | 19       | 21       | 29      | 36      |
| b1         | 22       | 27       | 32       | 42      | 47      |
| b2         | -        | -        | -        | 40      | -       |
| b3         | 20       | 25       | 30       | 38      | 45      |
| b4         | 14       | 19       | 21       | 29      | 36      |
| c1         | 20       | 21.5     | 19       | 20      | 29      |
| c2         | 20       | 21.5     | 20       | 22.5    | 23.5    |
| c3         | 12.5     | 13.5     | 12.5     | 13      | 13      |
| d1         | 2.5      | 2.5      | -        | -       | -       |
| d2         | 7        | 7        | 7        | 7       | 13.9    |
| d3         | 7        | 7        | 7        | 7       | -       |
| d4         | -        | -        | -        | -       | 1.9     |
| e1         | 14.5     | 19.5     | 21.5     | 29.5    | 36.5    |
| f1         | 10       | 10       | 10       | 10      | 10      |
| f2         | 22.5     | 24.5     | 19.5     | 22.5    | 30.5    |
| f3         | 20       | 22       | 22       | 23      | 25      |

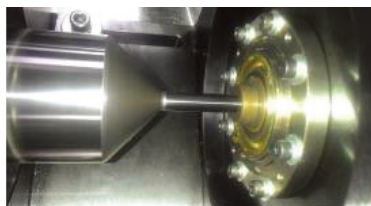
## TSH - SUT 輸入軸組合型



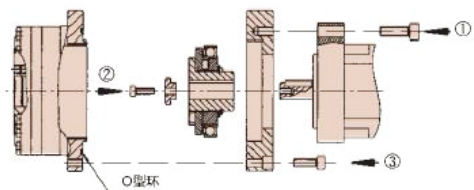
(單位:mm)

| 型 式 | 14       | 17        | 20   | 25    | 32    |
|-----|----------|-----------|------|-------|-------|
| 尺 寸 |          |           |      |       |       |
| ØA  | 74       | 84        | 95   | 115   | 147   |
| B   | 50.5     | 56        | 63.5 | 72.5  | 84.5  |
| C   | 15       | 17        | 21   | 26    | 26    |
| D   | 20.5     | 23        | 25   | 26    | 32    |
| E   | 15       | 16        | 17.5 | 20.5  | 26.5  |
| F   | 14       | 16        | 20   | 25    | 25    |
| G   | 9        | 10        | 10.5 | 10.5  | 12    |
| H   | 8        | 8.5       | 9    | 8.5   | 9.5   |
| I   | 2.5      | 3         | 3    | 3     | 5     |
| J   | 11       | 12        | 16.5 | 22.5  | 22.5  |
| ØK  | 6        | 8         | 10   | 14    | 14    |
| ØL  | 36       | 45        | 50   | 60    | 85    |
| ØM  | 54       | 64        | 75   | 90    | 115   |
| ØN  | 70       | 80        | 90   | 110   | 142   |
| O   | 11       | 12        | 16.5 | 22.5  | 22.5  |
| P   | 8        | 12        | 12   | 12    | 12    |
| ØQ  | 3.5      | 3.5       | 3.5  | 4.5   | 5.5   |
| ØR  | 64       | 74        | 84   | 102   | 132   |
| S   | -        | -         | M3x6 | M5x10 | M5x10 |
| T   | -        | -         | 8.2  | 11    | 11    |
| U   | -        | -         | 3    | 5     | 5     |
| V   | -        | -         | 3    | 5     | 5     |
| W   | 0.5      | 0.5       | -    | -     | -     |
| X   | 12 均分中 8 | 20 均分中 16 | 16   | 16    | 16    |
| Y   | M3x5     | M3x6      | M3x6 | M4x7  | M5x8  |
| ØZ  | 44       | 54        | 62   | 77    | 100   |

## ■ 簡易安裝步驟

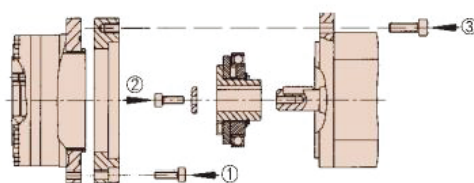


基本的安裝步驟可分為兩種，請根據馬達安裝面凹圓部的直徑選擇相對應的安裝步驟。



### ● 安裝步驟 1：

- (1) 馬達安裝面上安裝法蘭
- (2) 將波產生器安裝到馬達輸出軸上
- (3) 安裝減速機本體



### ● 安裝步驟 2：

- (1) 將法蘭安裝至減速機本體上
- (2) 將波產生器安裝到馬達輸出軸上
- (3) 在馬達安裝面上安裝法蘭（減速機）

## ■ 潤滑脂選用

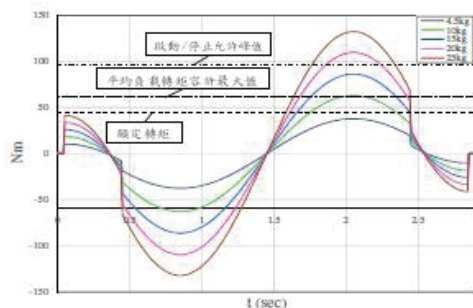
- 組合型的標準潤滑方式為滑脂潤滑，出廠前已封入滑脂，型號 #14、#17 採用Harmonic Grease Sk-2，型號 #20以上則採用Harmonic Grease SK-1A。





## ■ 耐久壽命試驗

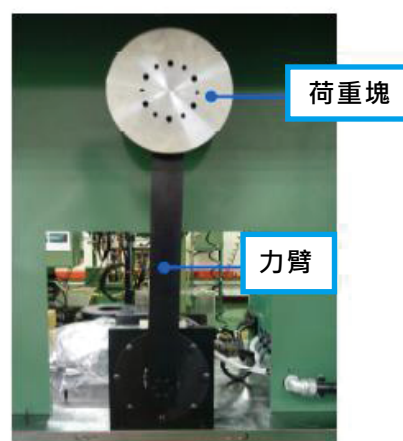
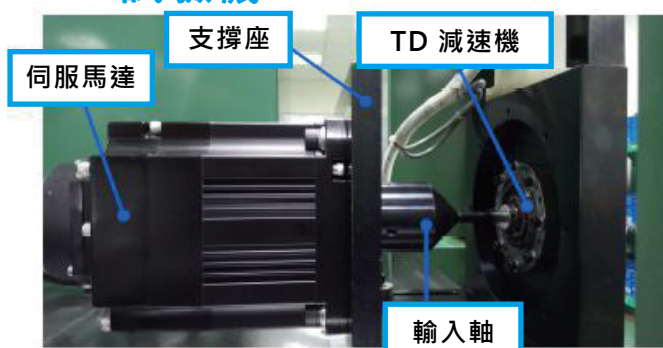
### ■ 試驗參數規劃評估



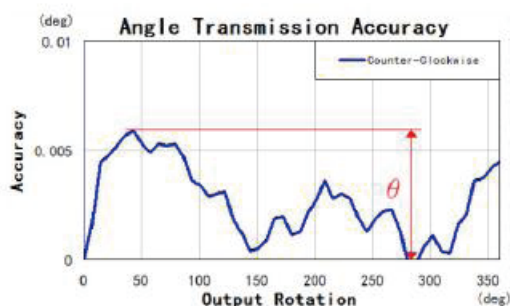
### ■ 試驗條件規劃

|        | TCS-17-50-UT | TCS-20-80-UT |
|--------|--------------|--------------|
| 力臂長    | 0.5 m        | 0.5 m        |
| 荷重塊    | 67.69 N      | 132.44 N     |
| 轉矩     | 33.85 Nm     | 66.22 Nm     |
| 額定轉矩   | 16.00 Nm     | 34.00 Nm     |
| 額定轉矩倍數 | 2.11         | 1.95         |

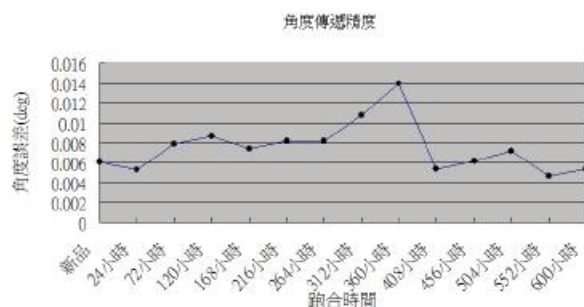
### ■ 試驗機



## ■ 角度傳遞精度試驗



|           | 角度傳遞精度  |
|-----------|---------|
| TPI 品(新品) | 0.0066° |
| H 品(新品)   | 0.0065° |



### 規格(arc min)

| 型式   | 14  | 17  | 20  | 25  | 32  |
|------|-----|-----|-----|-----|-----|
| 減速比  |     |     |     |     |     |
| 30   | 1.5 | 1.0 | 1.0 | 1.0 | 1.0 |
| 50以上 | 1.0 | 1.0 | 0.5 | 0.5 | 0.5 |

- TCS-17-50-UT測試達632小時失效，角度傳遞精度誤差最大0.014°，仍小於TPI 規格0.016° ( 1arc min)。



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