![Nidec logo] **Nidec**
All for dreams

CORONEX

CIRCULUTE

INDEX

齒型誕生後 40 年的進化

Circulute   Evolutionary improvement of gear teeth after 40 years

日本電產新寶的技術所孕育的齒形

Original gear tooth profile by Nidec-Shimpo

自 1975 年獨創 Circulute 齒形，開發出擺線式減速機（CORONET 減速機）後已有 40 年。現在 Circulute 齒形再度進化，開發出精密控制用減速機。發揮圓弧齒形的特色，達到「高效率」「無背隙」「靜音」，並且為因應廣泛用途而設計為「中空軸」。被視為用於機器人驅動關節、機床分度定位最佳的高剛性減速機。

※ Circulute 是由圓（Circle）及漸開線（Involute）組成的日本電產新寶獨創用詞

It was 1975 when "Coronet Reducers" with original gear tooth profile, Circulute, was born. 40 years later, through continuous improvement, a new generation reducer for high precision control is now introduced. Taking advantage of the circular internal gear shape, it has great characteristics such as "high efficiency", "zero backlash", "low noise", and "available hollow shaft" which expands the usage options. The new high rigidity reducer is perfect for robot joints and precision indexing for machine tools.

*The term "Circulute" is coined by Nidec-Shimpo, combining "circle" and "involute".

改良過往的 Circulute 齒形

Evolution in the tooth profile of the unique Circulute gear
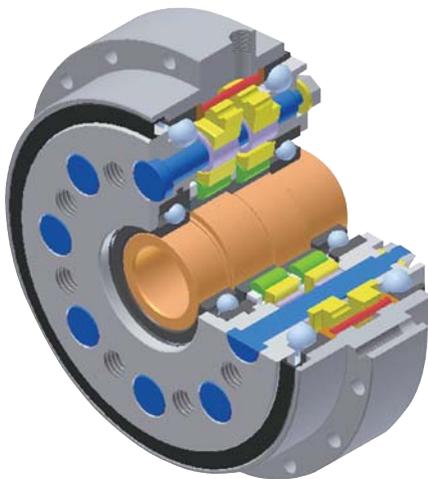
CORONEX 内部構造
CORONEX Internal Structure

新寶原創的齒形
Original tooth profile by Nidec-Shimpo

高精度無背隙
High accuracy with zero backlash

小尺寸
Compact size

高剛性
High rigidity

靜音
Low noise

高效率
High efficiency

中空入力軸
hollow input shaft

型號
Model code

ER － 025 P G － 059 － A

版本　Version
A

減速比　Ratio
1/59, 1/89, 1/119

潤滑　Lubrication
G：油脂潤滑　Grease lubrication

系列名　Series name
ER-P シリーズ

尺寸　Frame size
025, 042, 080, 130

構造
Structure

内齒輪
reducer case with internal pin slots

油封
oil sealing

主軸承（斜角滾珠軸承）
main bearing (angular ball bearing)

傳動銷
carrier pin

高速軸支撐軸承
high speed input shaft support bearing

偏心入力軸（高速軸）
eccentric input shaft (high speed shaft)

出力法蘭（低速軸）
output flange (low speed shaft)

軸套
bushing

偏心滾珠軸承
eccentric roller bearing

齒盤
wheel

墊片
spacer

內齒輪銷
internal pin

動作原理
Principle of speed reduction

① 在內齒輪固定的狀態下運轉高速軸，固定在高速軸上的偏心滾珠軸承也會朝同方向運轉。

With the reducer case (internal gear) fixed, the rotation of the high speed shaft makes the eccentric bearing to revolve.

② 齒盤與偏心滾珠軸承接觸成滾動狀態，偏心運動（公轉）的同時，與內齒輪銷依次咬合。

The wheel, movably fit to the eccentric bearing, rotates (actually an eccentric revolution movement) while engaging with the internal gear pins one by one.

③ 高速軸運轉 1 圈，齒盤會按與內齒輪的齒數差，朝高速軸運轉的反方向運轉（自轉）。

When the high speed input shaft completes one full rotation, the wheel slowly rotates in the opposite direction, by the gear teeth count differential.

④ 齒盤在高速公轉的同時進行低速自轉，齒盤的自轉通過傳動銷進行傳導，輸出到低速軸。

The wheel revolves at high speed while rotating at slow speed. The slow rotation is transmitted out to the low speed shaft (output flange) through the carrier pins.

⑤ 這種情況下的減速比 i，內齒輪的齒數（內齒輪銷數）=N，齒盤齒數 =n 時，計算公式如下：

The reduction ratio (i) is calculated according to the equation below, where N is the number of internal gear pins, n is the wheel gear count.

$$i = \frac{N - n}{n}$$

內齒輪銷 internal pin
傳動銷 carrier pin
內齒輪 internal gear
高速軸 high speed input shaft
偏心滾珠軸承 eccentric roller bearing
齒盤 wheel

高速軸運轉角=0°　　高速軸運轉角=120°

高速軸運轉角=240°　　高速軸運轉角=360°
high speed shaft rotation angle
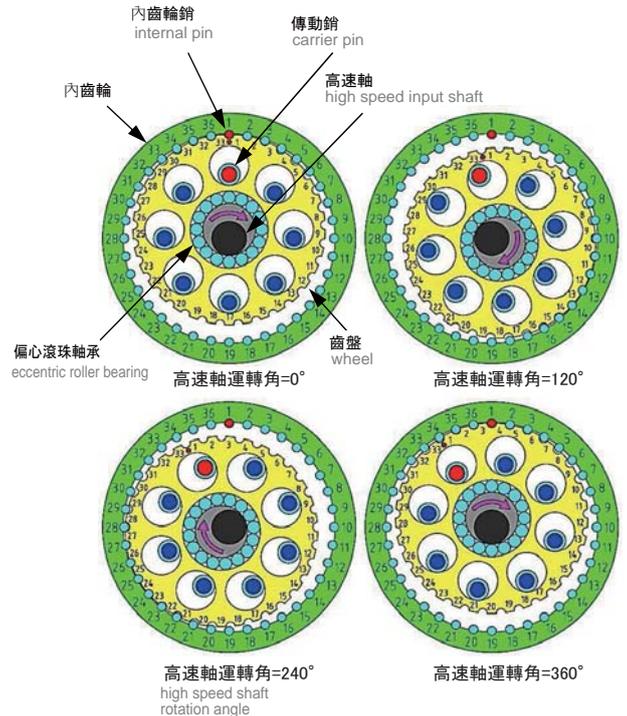
運轉方向及減速比
Direction of rotation and reduction ratio

固定內齒輪，低速軸出力 internal gear (reducer case) fixed and low speed flange output	內齒輪出力，固定低速軸 low speed flange fixed and internal gear (reducer case) output
高速軸運轉方向與低速軸運轉方向相反 output rotation is opposite direction of input rotation	高速軸運轉方向與內齒輪運轉方向相同 output rotation is same direction as input rotation
減速比 i = $\dfrac{-1}{R}$ ratio	減速比 i = $\dfrac{1}{R+1}$ ratio
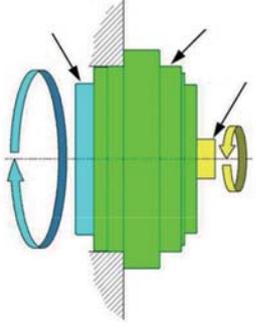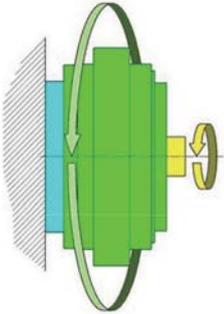
※ 高速軸入力
※ R 為減速機規格表中的減速比

* In both cases, input is from the high speed shaft
* Letter 'R' represents the 'Ratio' value in the performance table, next page. (59, 89 or 119)

性能表
Performance Table

尺寸 Size	減速比 Ratio R [※1]	額定出力力矩 Rated output torque ※2 [Nm]	額定出力轉速 Rated output speed [r/min]	容許加減速力矩 Allowable acceleration / deceleration torque ※3 [Nm]	緊急時最大力矩 Emergency stop torque ※4 [Nm]	容許入力轉速 Allowable output speed [r/min]	齒隙空動 Lost motion ※5 [arc min]	慣量 Moment of inertia [× 10⁻⁴kgm²]	重量 Weight [kg]
025P	59	245	15	612	1225	88	1.0	1.00	4.3
	89					58		0.84	
	119					44		0.79	
042P	59	412	15	1029	2058	72	1.0	2.70	6.9
	89					48		2.33	
	119					36		2.20	
080P	59	784	15	1960	3920	60	1.0	9.01	12
	89					40		7.95	
	119					30		7.57	
130P	59	1274	15	3185	6370	50	1.0	26.8	24
	89					33		23.4	
	119					25		22.3	

※1 R 值請套用前頁公式算出減速比
※2 出力轉速 15 r/min 時的容許最大值
※3 起動，停止時的容許最大值
※4 受衝擊時的容許最大值
※5 負荷為額定力矩×±3%時的扭轉角

* 1 Reduction ratio is to be calculated by the formula in the previous page, using R value in this table.
* 2 Maximum allowable value at the output speed of 15 r/min
* 3 Maximum allowable value at starting and stopping
* 4 Maximum allowable value when impact load is applied
* 5 Torsional backlash of output shaft, with input shaft fixed, when the torque load is changed between ±3% of rated torque

無負荷運轉力矩
No-load running torque

●無負荷運轉力矩定義
What is no-load running torque?

無負荷下運轉時所需的高速軸的力矩
（平均值，環境溫度：25℃，本公司建議潤滑脂）

Input (high speed shaft) torque needed to keep it running with no load.
(average value, ambient temperature: 25℃ , proper grease used)

入力軸運轉速度（r/min）
Input shaft speed
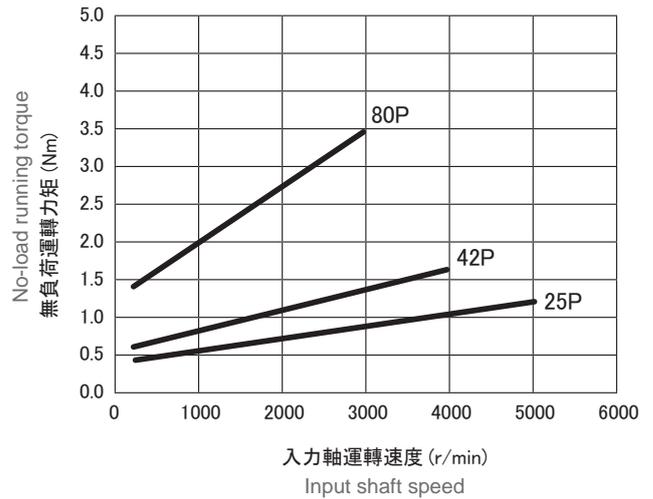
加速起動力矩
Output starting torque

●加速起動力矩
What is output starting torque?

無負荷下由低速軸開始運轉時，使低速軸開始運轉所需的力矩
（環境溫度：25℃，本公司建議潤滑脂）

Torque needed at output shaft (low speed shaft) for the output shaft to begin rotating.
(ambient temperature: 25℃ , proper grease used)

| 尺寸 Frame size	加速起動力矩 （代表值） Output starting torque (reference value)
	[Nm]
025P	30
042P	60
080P	70

角度傳達精度
Transmission angular accuracy

●角度傳達精度定義
What is transmission angular accuracy?

無負荷下使高速軸運轉時，理論上的低速軸運轉角度與實際上低速軸運轉角度的差

Difference of output shaft rotation angle between the measured value and the theoretical value, while input shaft is rotated with no load.

出力軸運轉角度（度）
Output shaft rotation angle (deg)
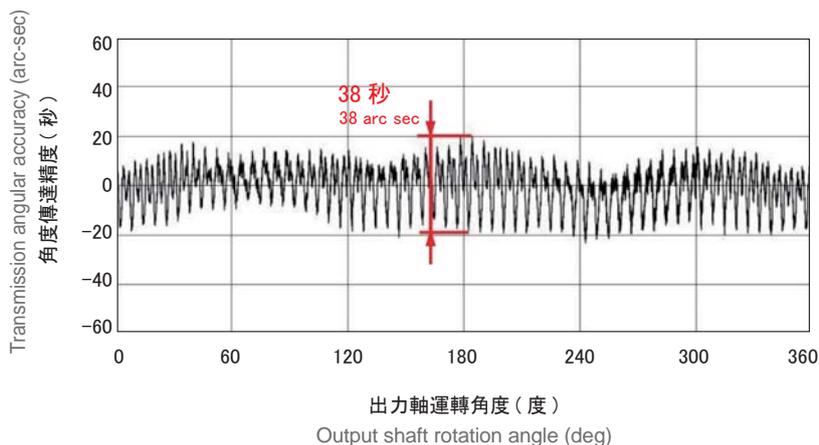
尺寸 Frame size	角度傳達精度 （代表值） Transmission angular accuracy (reference value)
	[arc sec]
025P	60
042P	50
080P	40

彈簧係數・齒隙空動・遲滯耗損

Spring coefficient・lost motion ・hysteresis loss

●遲滯耗損曲線定義

What is hysteresis curve?

固定高速軸，由低速軸施加力矩時，低速軸扭轉角與力矩之間的關係曲線圖

Diagram that shows the twisting angle of the output shaft (low speed shaft), plotted against the torque load applied to the output shaft, while the input shaft (high speed shaft) is fixed.

●彈簧係數（剛性）定義

What is spring coefficient (stiffness)?

遲滯耗損曲線幅中間點的額定力矩的 50% 與 100% 兩點相連直線的傾斜度

Slope of the hysteresis curve between the points where the applied torque is 50% and 100% of the rated value, defined at the mid-point curve of hysteresis.

## ●齒隙空動定義

What is lost motion?

遲滯耗損曲線幅中間點的額定力矩的± 3% 時的扭轉角

Difference in the twisting angle between the points where the applied torque is +3% of rated torque and -3%, defined at the mid-point curve of hysteresis.

●遲滯耗損定義

What is hysteresis loss?

遲滯耗損曲線的零力矩時的扭轉角

Difference in the twisting angle at zero input torque, going forward and going backward in the hysteresis curve.
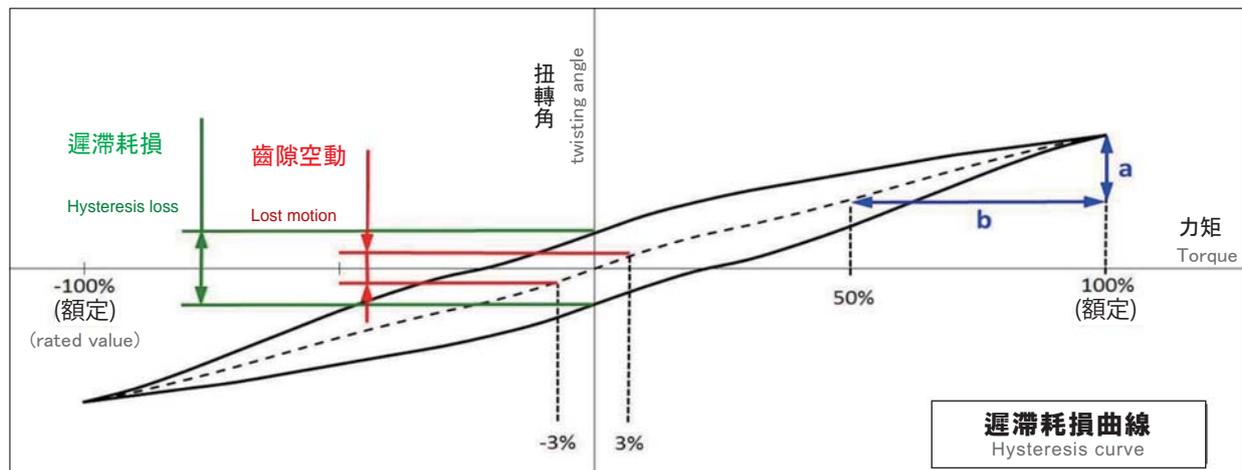
尺寸 Frame size	彈簧係數 （代表值） Stiffness (reference value)	齒隙空動 Lost motion		遲滯耗損 Hysteresis loss
	[Nm/arc min]	[arc min]	測定力矩 Measured torque [Nm]	[arc min]
025P	30		± 7.35	
042P	55	1.0	± 12.4	1.0
080P	105		± 23.5	

效率

Efficiency

（平均值, 出力運轉速度 :15r/min, 環境溫度 :25℃ ）

(Average value, output speed: 15r/min, ambient temperature: 25℃)
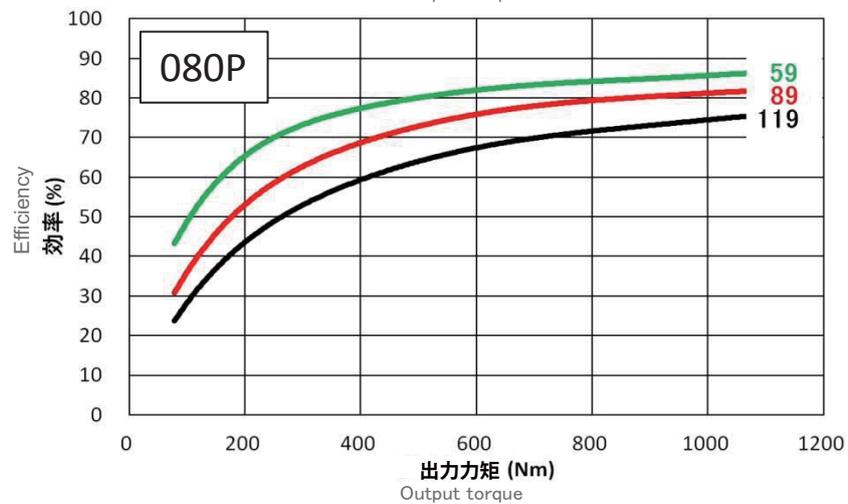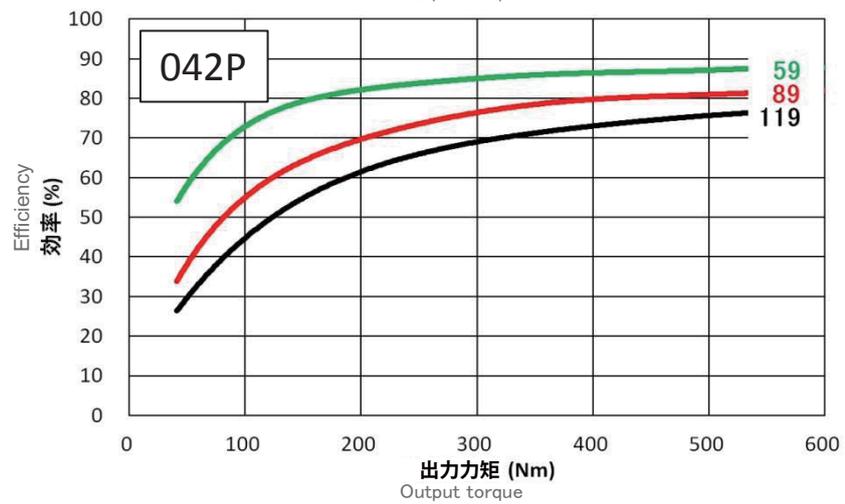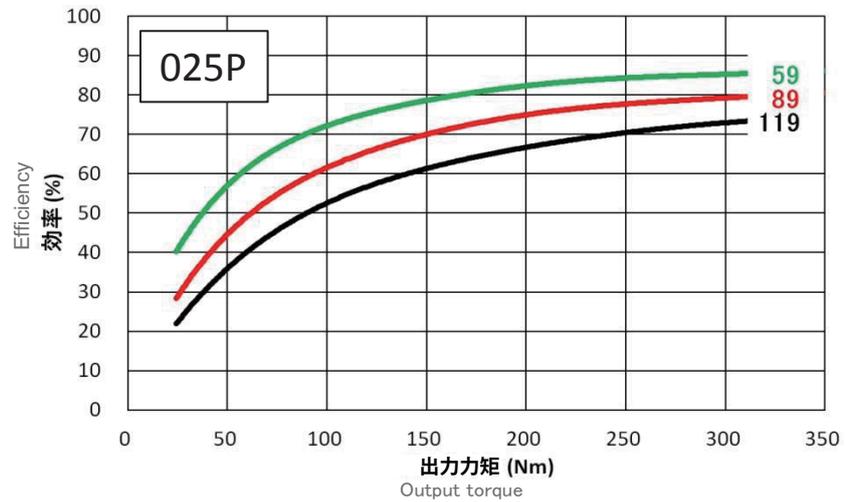
尺寸表
Dimensions table
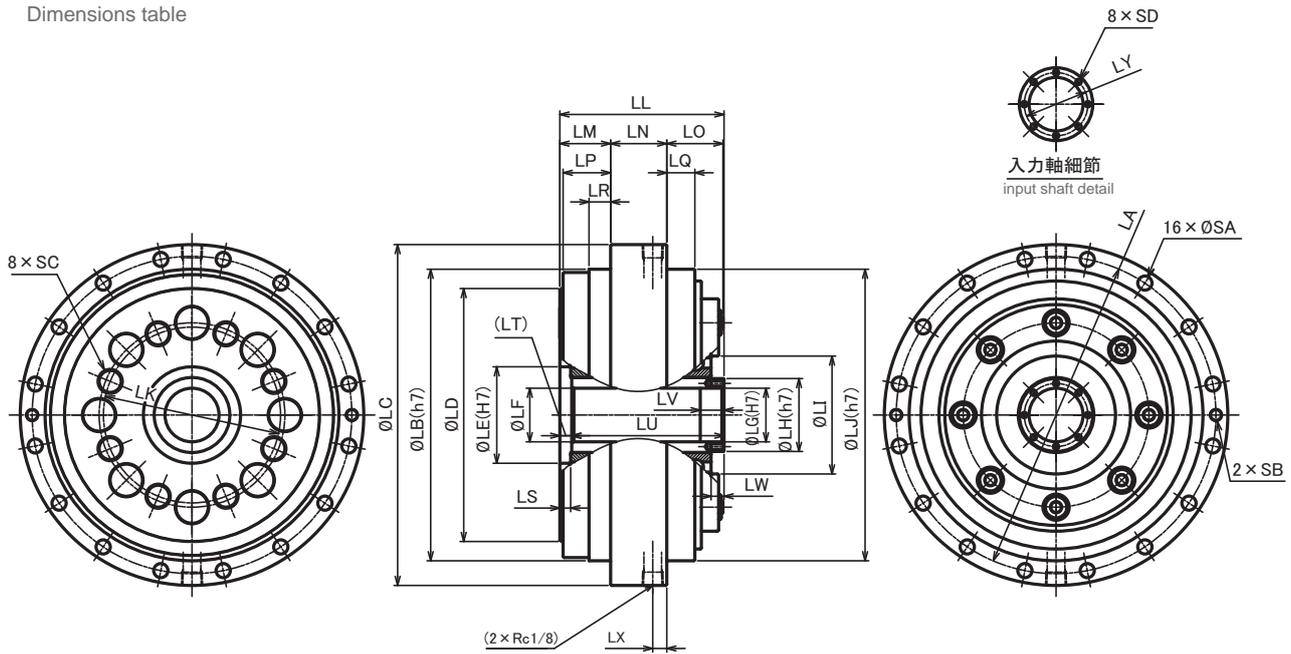
尺寸 Size	LA	LB	LC	LD	LE	LF	LG	LH	LI	LJ
025P	123.5	113	133	92	34	15	15	24	40	113
042P	148	136	159	118	45	25	25	34	55	136
080P	175	160	189	140	60	30	30	43	68	160
130P	238	220	256	175	70	45	45	59	87	220

尺寸 Size	LK	LL	LM	LN	LO	LP	LQ	LR	LS	LT
025P	67	67	20	22.5	23	18.5	13.5	10	4.5	5
042P	82	76	23.5	26	26	22	13	10	5	5.5
080P	103	92	26.5	34	31	24.5	16	10	6	6.5
130P	130	105	55	20	29.5	52.5	11	10	8	8.5

尺寸 Size	LU	LV	LW	LX	LY	SA	SB	SC	SD
025P	62	9	4.5	13.5	19.5	5.5	M5	M10 × 12	M3 × 6
042P	70.5	11	6	6.5	29.5	6.6	M6	M12 × 12	M3 × 6
080P	85.5	13	7	8	36	8.8	M8	M14 × 14	M4 × 8
130P	96.5	16	10	12.5	52	11	M10	M16 × 20	M5 × 10

[mm]

流程圖
Flowchart

減速機承受負荷條件的確認
reducer load condition confirmation

- 平均負荷力矩　　・ 最大負荷力矩
  average torque load　　maximum torque load
- 平均轉速　　　　・ 最高轉速
  average rotation speed　maximum rotation speed

負荷條件的再評估
load condition re-evaluation

假定一個減速機型號
tentative selection of a reducer model

壽命確認
part life span confirmation
計算壽命≧需求壽命
calculated life span ≧ required life span

NO

YES

主軸承的選用
main bearing evaluation
容許值≧慣量・軸向負荷
allowable value ≧ moment / axial load

NO

YES

高速軸的選用
high speed shaft evaluation
容許值≧慣量・軸向負荷
allowable value ≧ moment / axial load

NO

YES

型號的再評估
model re-evaluation

YES

NO

選定減速機的型號
reducer model is determined

型號選定

Model selection

① 減速機承受負荷條件的確認（運轉模式）

Operation data collection in preparation for life span calculation

t1：加速時間
accelerating period

t2：穩定運轉時間
accelerating period

t3：減速時間
decelerating period

t4：停止時間
stoppage time

n1：加速時平均出力轉速
accelerating periodaverage output speed during acceleration period

n2：穩定運轉時出力轉速
output speed during normal operation

n3：減速時平均出力轉速
average output speed during deceleration period

n4：出力轉速 = 0r/min
output speed = 0r/min

T1：加速時負荷力矩峰值
peak torque load during acceleration

T2：穩定運轉時負荷力矩
torque load during normal operation

T3：減速時負荷力矩峰值
peak torque load during deceleration

T4：停止時的負荷力矩
torque load during stoppage

② 依下列公式算出平均負荷力矩 Tao、最大負荷力矩 Tmo、平均出力轉速 nao、最高出力轉速 nmo。
須確認最大負荷力矩 Tmo 在容許加減速力矩以下、最高出力轉速 nmo 在容許出力轉速以下。

Using formulas below, determine average torque load (Tao), maximum torque load (Tmo), average output speed (nao), and maximum output speed (nmo)
Please confirm Tmo is below allowable acceleration/deceleration torque, and nmo is below allowable output speed.

$$Tao = \left(\frac{n_1 \cdot t_1 \cdot |T_1|^{10/3} + n_2 \cdot t_2 \cdot |T_2|^{10/3} + n_3 \cdot t_3 \cdot |T_3|^{10/3}}{n_1 \cdot t_1 + n_2 \cdot t_2 + n_3 \cdot t_3} \right)^{3/10}$$

$$nao = \frac{n_1 \cdot t_1 + n_2 \cdot t_2 + n_3 \cdot t_3}{t_1 + t_2 + t_3}$$

$Tmo = |T_1|, |T_2|, |T_3|, |T_4|$ 的最大值
greatest among $|T_1|, |T_2|, |T_3|, |T_4|$

$nmo = n_1, n_2, n_3$ 的最大值
greatest among n_1, n_2, n_3

③ 依下列公式得出減速機的計算壽命

Using the equation below, the life span of the reducer is calculated

$$Lh = 6000 \cdot \frac{no}{nao} \cdot \left(\frac{To}{Tao} \right)^{10/3}$$

To：減速機額定出力力矩
rated output torque

no：減速機額定出力轉速
rated output speed
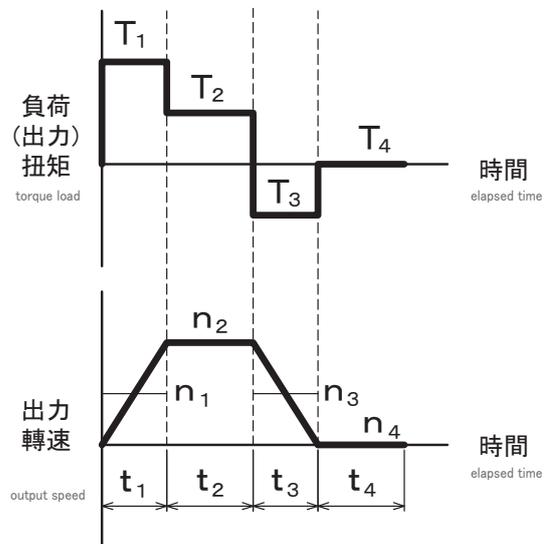
主軸承

Main bearing

① 依下列公式算出低速軸所承受的外部慣量 Mo

External moment applied to low speed axis, Mo, is to be calculated as follows.

$$Mo = Pr \cdot Lr + Pt \cdot Lt$$

Pr：低速軸承受的徑向負荷
Radial load on low speed axis

Pt：低速軸承受的軸向負荷
Axial load on low speed axis

Lr：低速軸承受的徑向負荷位置
Radial load application point on low speed axis

Lt：低速軸承受的軸向負荷位置
Axial load application point on low speed axis

② 須確認外部慣量及外部軸向負荷是否在容許慣量及容許軸向負荷的曲線範圍內。

External moment and external axial load must be less than the maximum allowable value.

尺寸 Size	La [mm]	Lb [mm]	容許慣量 Allowable moment [Nm]	容許軸向負荷 Allowable axial load [N]
025P	131	32	780	2610
042P	154	39.5	1666	5194
080P	189	49	2150	6530
130P	236	66.5	3430	13000

使用條件解析圖　Operation Condition Quick Guide
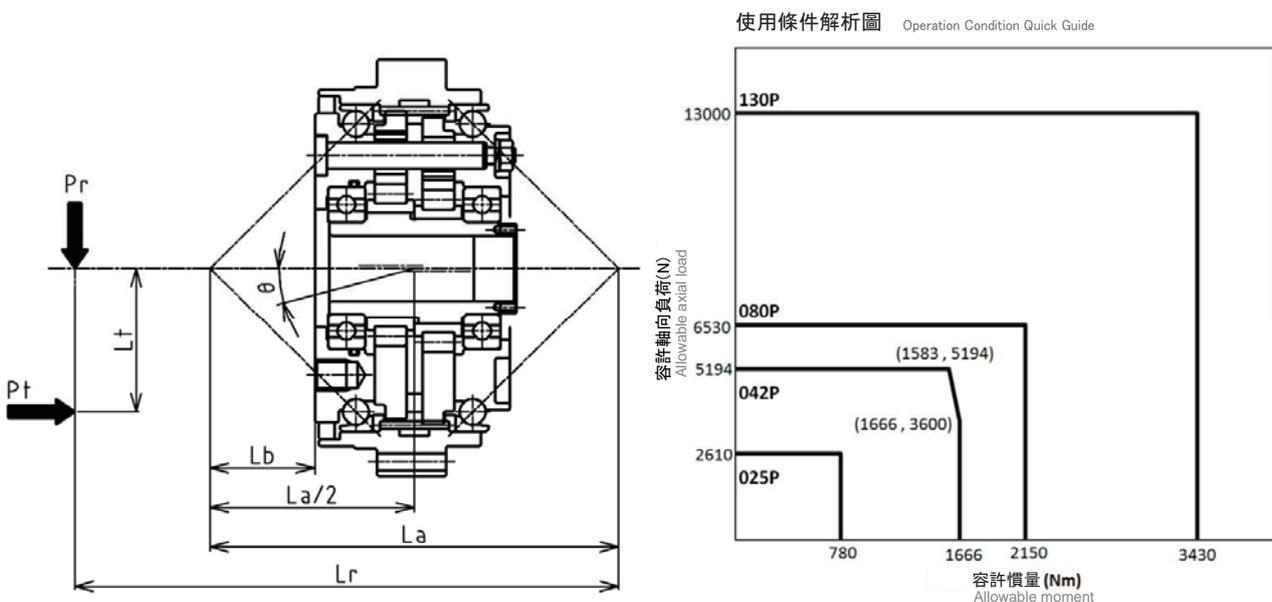
高速軸
High speed shaft

① 依下列公式算出高速軸所承受的外部慣量 Mi

External moment applied to high speed input shaft, Mi, is to be calculated as follows.

$$Mi = Wr \cdot Kr + Wt \cdot Kt$$

Wr：高速軸承受的徑向負荷
Radial load on high speed axis

Wt：高速軸承受的軸向負荷
Axial load on high speed axis

Kr：高速軸承受的徑向負荷位置
Radial load application point on high speed axis

Kt：高速軸承受的軸向負荷位置
Axial load application point on high speed axis

② 確認外部慣量及外部軸向負荷是否在容許慣量及容許軸向負荷的曲線範圍內。

External moment and external axial load must be less than the maximum allowable value.

③ 表中未記載的轉速 nx 時的容許慣量 Mrx 及容許軸向負荷 Wtx
可依以下公式計算。

Allowable moment, Mrx, and allowable axial load, Wtx, for a speed, nx, can be approximately interpolated by the following equations.

$$Mrx = Mr_{1785} \cdot \left(\frac{1785}{nx} \right)^{1/3} \qquad Wtx = Wt_{1785} \cdot \left(\frac{1785}{nx} \right)^{0.51}$$

Mr_{1785}：入力轉速 1785r/min 時的容許慣量
Allowable moment at the input speed of 1785r/min

Wt_{1785}：入力轉速 1785r/min 時的容許軸向負荷
Allowable axial load at the input speed of 1785r/min

尺寸 Size	Ka	Kb	容許慣量 Allowable moment				容許軸向負荷 Allowable axial load			
			入力 500r/min 時	入力 885r/min 時	入力 1335r/min 時	入力 1785r/min 時	入力 500r/min 時	入力 885r/min 時	入力 1335r/min 時	入力 1785r/min 時
	[mm]	[mm]	[Nm]	[Nm]	[Nm]	[Nm]	[N]	[N]	[N]	[N]
025P	56.5	10.5	8.9	7.3	6.4	5.8	665	497	403	348
042P	64	13	13	11	9.4	8.6	932	697	565	487
080P	78	15	16	13	11	10	1228	917	744	642
130P	88	19	32	26	23	21	1814	1356	1099	948

使用條件解析圖　Operation Condition Quick Guide

入力軸 1785r/min 時
When the input speed is 1785r/min

13
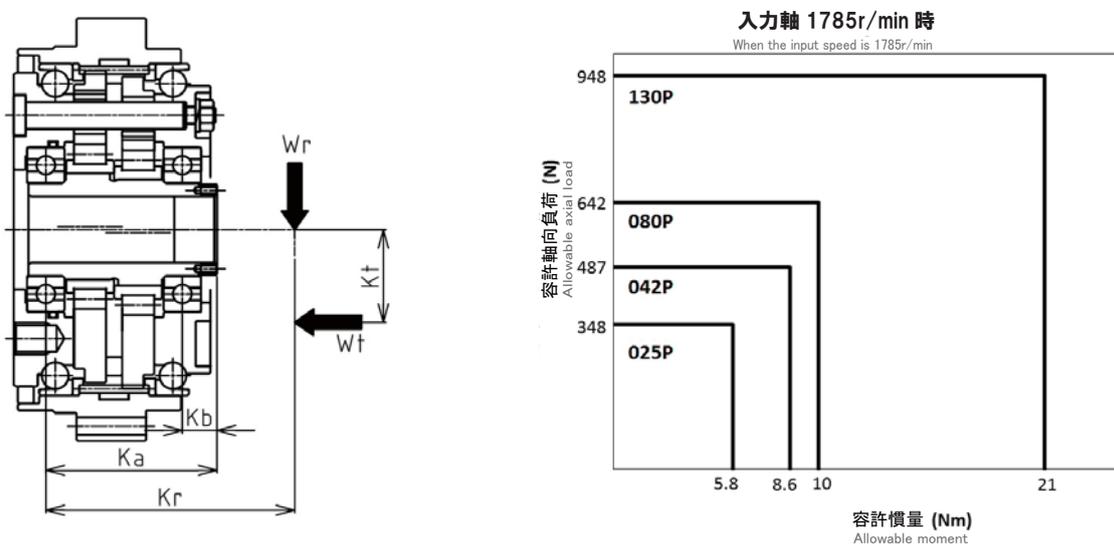
安裝零件設計
Mounting parts design

① 在設計安裝減速機所需零件時，請先確認減速機外型尺寸圖上所記載的尺寸。
Before the designing of mounting fixtures for reducers, please carefully review the dimension tables of the reducers.

② 馬達連接法蘭等入力部的零件與高速軸之間請準備油封安裝空間。
Please design sealing structure between the input shaft and its mating parts, such as motor adaptor.

③ 減速機與安裝所需零件之間，請使用下表所列液體密封劑等油封劑。
Please use sealing agent such as the liquid gasket in the table below, at the joint between reducer and mating parts.

④ 請根據減速機的安裝位置來決定在零件上設計注／排油孔。
Please consider building the grease supply/drain openings in the mounting fixtures, depending on the angle in which the reducer is installed.

※請勿在減速機的輸出法蘭端進行注／排油。
Please note that grease cannot be added or drained from output flange side.

※減速機的內齒輪外壁上設計有 2 處注／排油孔（Rc1/8）。但請注意可能會有僅憑該 2 處無法充滿所需填充量的情形。

Please note that sufficient feeding of grease may not be possible from the 2 built-in inlet holes at the circumference of the reducer case.

建議液體密封劑 Recommended liquid gasket	廠商 Manufacturer	性質・用途 Characteristics and applications
TB1207D	三鍵 ThreeBond Co.,Ltd.	聚矽氧無溶劑型 Silicone-base solvent-free type
TB1215		聚矽氧無溶劑型／不可用於銅及銅合金 Silicone-base solvent-free type/ Cannot be used for copper or copper alloy

安裝尺寸精度
Mounting parts dimensional tolerance

① 馬達等輸入部的建議安裝精度，以內孔「φf」為基準，同軸度請維持在「φg」以內。
安裝精度不良容易引起震動及噪音等問題。
Recommended attachment coaxiality tolerance for the input device, such as motors, shall be less than "φg" in the table below, with respect to the spigot projection "φf". Attachment misalignment can cause vibration and noise.

② 內齒輪的安裝請以內孔「φc」或「φf」為基準。
For the attachment of reducer case, use spigot joint "φc" or "φf".

③ 低速軸的安裝請以內孔「φb」為基準。
For the attachment to low speed flange, use spigot joint "φb".

④ 高速軸的安裝請以內孔「φd」或「φe」為基準。
For the attachment to high speed input shaft, use spigot joint "φd" or "φe".

尺寸 Size	b [mm]	c [mm]	d [mm]	e [mm]	f [mm]	g [mm]
025P	34 H7	113 h7	15 H7	24 h7	113 h7	0.03
042P	45 H7	136 h7	25 H7	34 h7	136 h7	0.03
080P	60 H7	160 h7	30 H7	43 h7	160 h7	0.03
130P	70 H7	220 h7	45 H7	59 h7	220 h7	0.03
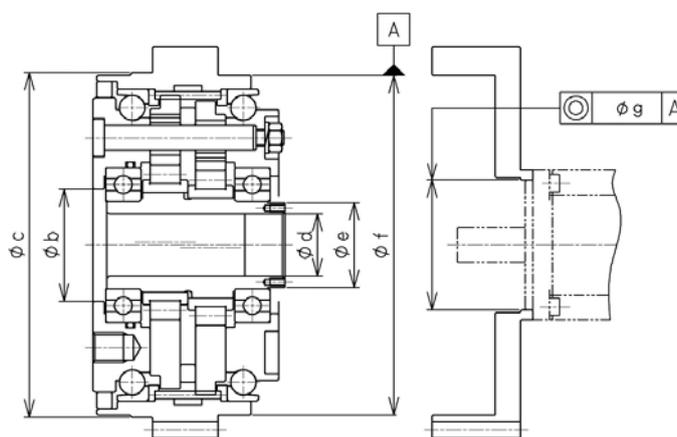
螺絲旋緊力矩
Bolt tightening torque

① 減速機的安裝及高・低速軸的安裝請使用內六角螺絲，旋緊力矩請參考右表。

　For the installation of the reducer and for the attachment to the input shaft and output flange, please use hex socket bolts and apply the tightening torque in the table to the right.

② 為防止內六角螺絲的鬆動及墊片的損傷，建議使用內六角螺絲專用碟形彈簧墊片。

　Use of the conical spring washers is recommended for the prevention of loosening and scratching of the hex socket bolts.

螺絲尺寸 Bolt size	旋緊力矩 Tightening torque [Nm]	旋緊軸力 Tightening axial force [N]
M3	1.9	2930
M4	4.3	5110
M5	8.7	8290
M6	15	11750
M8	36	21100
M10	71	33960
M12	125	48900
M14	200	67680
M16	310	92130

六角螺絲 (hexagon socket bolt)：JIS B1176
強度區分 (strength rating)：12.9 JIS B1051

螺絲栓入後的容許傳導力矩計算公式
Calculation for the transmittable torque at the bolt joint

①依以下公式計算螺絲栓入後的容許傳導力矩
　Calculation for the transmittable torque at the bolt joint

$$T = n \cdot F \cdot \mu \cdot \frac{D}{2000}$$

T：螺絲栓入後的容許傳導力矩（Nm）
　Transmittable torque at the bolt joint

n：安裝螺絲數量（支）
　Number of bolts

F：螺絲鎖緊軸力（N）
　Bolt tightening axial force

μ：摩擦係數（$\mu = 0.15$）
　Friction coefficient

D：螺絲安裝 P. C. D.（mm）
　Bolt attachment

② 減速機的各個螺絲栓入部位的螺絲尺寸、數量、PCD 及容許傳導力矩請參考下圖。

　The table below shows the bolt size, bolt count, bolt center diameter, and transmittable torque, at 3 reducer attachment interfaces.

尺寸 Size	減速機安裝部 Reducer frame attachment				低速軸安裝部 Low speed flange attachment			
	螺絲尺寸 Bolt size	螺絲數量 Number of bolts [本]	安裝 P.C.D. P.C.D. [mm]	容許傳導力矩 Allowable transmitting torque [Nm]	螺絲尺寸 Bolt size	螺絲數量 Number of bolts [本]	安裝 P.C.D. P.C.D. [mm]	容許傳導力矩 Allowable transmitting torque [Nm]
025P	M5	16	123.5	1229	M10	8	67	1365
042P	M6	16	148	2087	M12	8	82	2406
080P	M8	16	175	4431	M14	8	103	4183
130P	M10	16	238	9699	M16	8	130	7186

尺寸 Size	高速軸安裝部 High speed input shaft attachment			
	螺絲尺寸 Bolt size	螺絲數量 Number of bolts [本]	安裝 P.C.D. P.C.D. [mm]	容許傳導力矩 Allowable transmitting torque [Nm]
025P	M3	8	19.5	34
042P	M3	8	29.5	52
080P	M4	8	36	110
130P	M5	8	52	259

潤滑
Lubrication

① 減速機在出貨時未填入潤滑脂。請自行準備下表所建議潤滑脂，在安裝時封入必須量。

This reducer model is shipped without the grease enclosed. Please prepare the recommended grease in the table below and fill with the required amount during installation.

② 減速機中的潤滑脂必須填充量請參照下表。下表所示僅為減速機內部填充量，不包括減速機與安裝側之間的空間，請根據安裝方式及安裝側的空間調整潤滑脂填充量。

Please refer to the table below for the required grease amount. This required grease amount guideline accounts for inside the reducer only. Please put the attachment angle and the attachment spacing into considerations when determining the actual grease amount.

③ 減速機每運轉 20,000 小時，或每 3 ～ 5 年請更換一次潤滑脂。
Grease shall be replaced every 20,000 hours of operation or every 3-5 years.

建議潤滑脂名稱 Recommended grease	廠商名稱 Manufacturer	使用溫度範圍 Operating temperature range
MULTEMP FZ No.00 MULTEMP FZ №. 00	協同油脂株式會社 KYODO YUSHI CO.,LTD	−10 ～ 40℃（環境周圍） −10–40℃ (ambient temperature)

尺寸 Size	空間容積 Internal capacity	f	h	i	必須封入量 Required amount of grease		
					水平軸安裝 Horizontal shaft installation	垂直軸安裝 Vertical shaft installation	
						出力軸向下 Output shaft downward	出力軸向上 Output shaft upward
	［cc］	［mm］	［mm］	［mm］	［g］	［g］	［g］
025P	110	113	23	13.5	35	50	60
042P	160	136	24	6.5	55	70	85
080P	280	160	28.5	8	95	125	150
130P	570	220	26	12.5	195	250	300

空間容積範圍
scope range
(Internal capacity)

ø f

2×Rc1/8
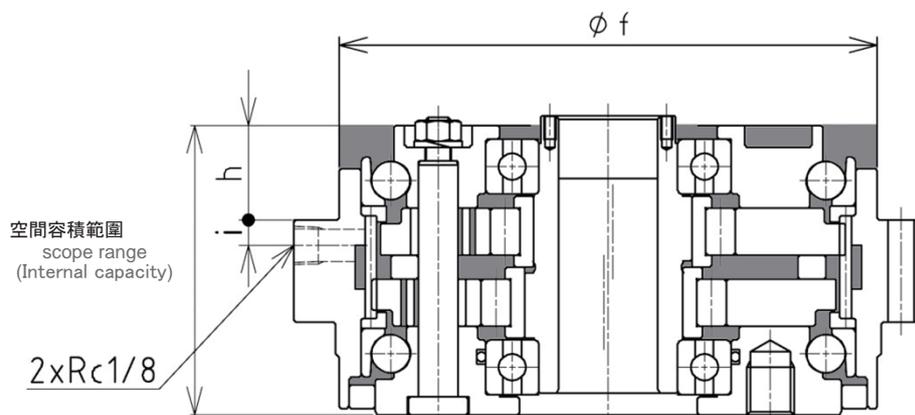
※ 圖為垂直安裝（出力軸向下）
*This diagram depicts vertical installation (output shaft facing down)

●例 1

●例 2

法蘭
flange

●例 3

●例 4

皮帶
belt

皮帶輪
pulley
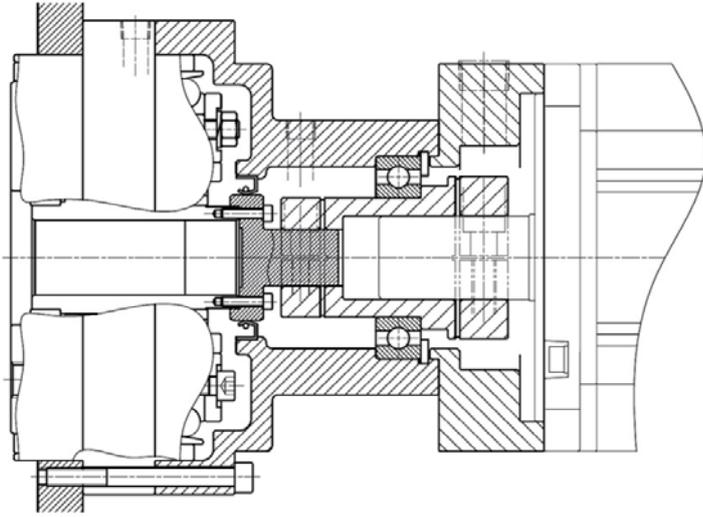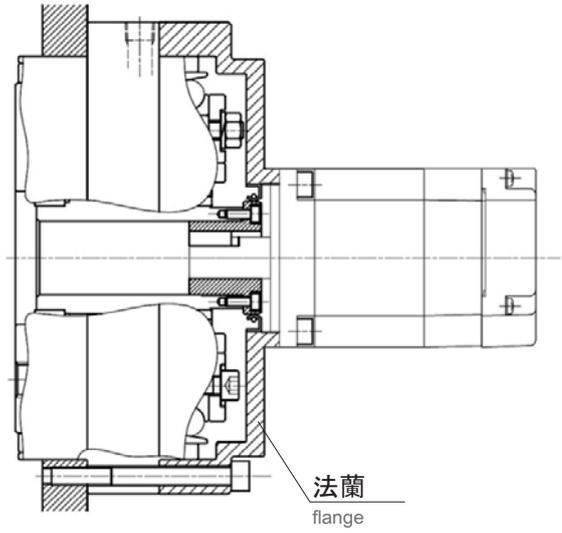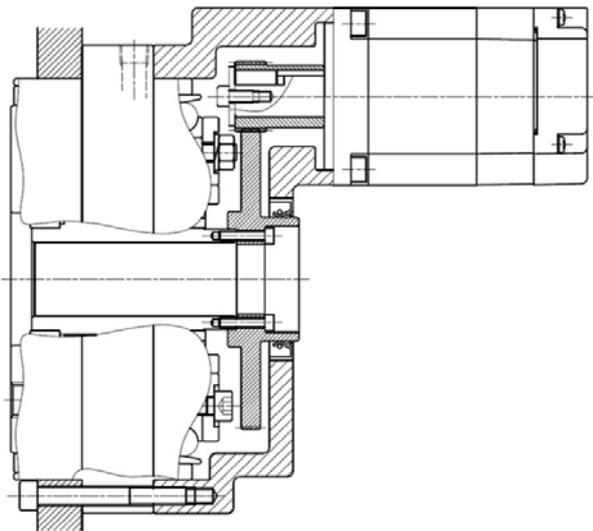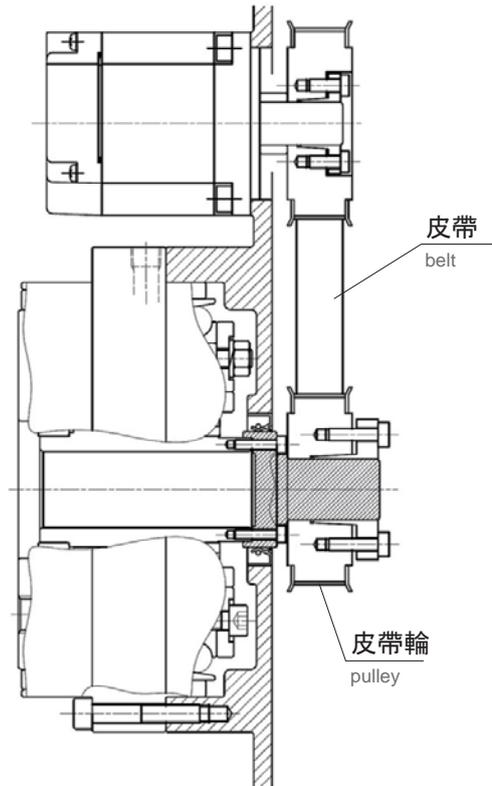
低速側 ←—————→ 高速側
low speed side　　　　high speed side

產品到貨時的確認事項

Please confirm the following items upon receipt of the reducer.

・確認到貨減速機型號與所訂減速機型號是否符合。
（型號銘牌貼於減速機本體或附於箱內）
・確認減速機本體及附屬品（2 個六角錐形栓）是否齊全。
・確認是否有生鏽及損傷的情形。
・在保管及組裝減速機時，請注意減速機內部勿混入垃圾・
粉塵等異物。

・Please make sure the model number you ordered matches the model number of the reducer you received. (Model number is on the tag plate, either included with the shipment or pre-attached to the reducer)
・Please make sure the accessories (tapered plugs with hexagon socket x 2pcs) are included with the reducer shipment.
・Please inspect for rust or damage.
・Please keep foreign materials such as dust or any loose particles away during the storage and/or assembling of the reducer.

設置及安裝

Please read before the installation.

・適用環境條件請參考下表。若使用環境不符合下列標準，或需使用於特殊環境（無塵室、食品設備、高濃度鹼性、高壓蒸氣等）時，請事先與本公司聯繫。
・環境溫度接近零度時，可能會因為轉速及力矩導致起動不良，需於 -10 ～ 0℃環境下使用時，請事先與本公司聯繫。
・減速機表面未做任何塗裝。請根據需求自行塗裝。

・Please refer to the table below for the operating environment.Please contact us before operation, if the operation environment does not satisfy these conditions or, operation is planned to be under special environment (e.g., used in a clean room, used for food processing equipments, exposed to concentrated alkaline or high pressure steam, etc.).
・Please contact us if the operation temperature is planned to be near -10 ～ 0℃ , because there is a possibility of starting difficulty depending on the speed and torque load.
・Reducer is delivered without surface coating or painting. Please apply surface treatment such as painting as needed.

環境條件 Operation Environment	環境溫度 Ambient Temperature	-10 ～ 40℃
	環境濕度 Ambient Humidity	85%以下　未凝結 Below 85%, No condensation.
	高度 Altitude	標高 1,000m 以下 Below 1000m.
	設置場所 Operation Site	無灰塵且通風良好的場所 環境中不含易燃・易爆・腐蝕性氣體及水蒸氣 須防水及其他各種液體 shall be well ventilated and dust free. shall be free of inflammable material, explosive material, corrosive gas, or steam. shall be protected from water or other liquid substance.

運轉時的注意事項

Please be aware of the following during the operation.

・請在規定負載範圍內使用。
・請在規定轉速範圍內使用。
・請注意減速機的表面溫度不可超過 60℃。
・如有以下情況請馬上停止設備並進行檢查。
　※ 溫度突然升高
　※ 突然發出雜音或震動變大
　※ 轉速突然變得不穩

・造成以上情況的可能原因如下，請馬上處理。
　※ 是否超過負荷
　※ 潤滑油不足、劣化或是使用本公司建議以外的製品
　※ 軸承、齒輪、傳動面是否損傷
　※ 與安裝機械的連結部接觸不良，或減速機安裝不良

・Please watch for overloading situation.
・Please make sure the rotation speed is within the specification.
・Please make sure the surface of the reducer is below 60℃
・Stop the operation immediately and inspect the device if following conditions are observed.
　*Abnormal temperature rise
　*Abnormal noise or vibration
　*Unstable rotational speed

・Please check for the following list of possible root causes for the abnormalities.
　*Overloading.
　*Insufficient lubricant, Degraded lubricant, Lubricant not on our recommendation list.
　*Any damage on bearings, gears, transmission interfaces.
　*Improper connection with mating parts. Improper installation of the reducers.

潤滑油管理
Lubricating procedure

・本減速機採油脂潤滑。
・減速機出貨時並未封入潤滑脂。請自行準備本公司建議
　之潤滑脂並進行填充。（詳情請參考 p.11,13）

・This reducer employs grease lubrication method.
・Grease is not filled in at the time of shipment from factory.
　Customer needs to prepare recommended grease and
　fill in. (Refer to P.11 and P.13 for detail)"

分解
Disassembly

・請勿自行分解或重組減速機

・Please do not attempt to disassemble and reassemble.

每日檢查項目
Please routinely monitor for following items.

・運轉中的減速機機殼溫度是否異常升高。
・軸承、齒輪部是否有雜音。
・減速機是否有異常震動。
・是否有潤滑油滲漏的情況。
　※ 發生異常狀況時請立即停止運轉，並與本公司聯繫。

・Over-heating of the reducer case
・Abnormal noise from bearing and gear
・Abnormal vibration from the reducer
・Lubricant leakage
　* If any abnormality is observed, please stop the operation
　　immediately and contact us.

定期檢查項目
As a scheduled maintenance, please check for the following items.

・是否有超過負荷或異常運轉的情況。
・安裝減速機的螺絲是否鬆動。
・電力系統是否有異常。
・潤滑脂是否有品質不良狀況。
　※ 發生異常狀況時請立即停止運轉，並與本公司聯繫。

・Overloading situation. Irregular rotation.
・Reducer mounting bolt tightness
・Abnormality in electric system
・Lubricant problem
　* If any abnormality is observed, please stop the operation
　　immediately and contact us.

廢棄方法
Scrapping

・廢棄減速機時，請依材質將零件分類，並根據政府工業廢棄
　物處理法規條例處理。
・零件材質可分為以下三種：

①橡膠、樹脂類零件：油封、軸承油封、軸承保持器
②潤滑脂：用乾布擦去零件上的潤滑脂後依油類廢棄辦法處理
③金屬類零件：以上零件以外的部分

・When the reducer is scrapped, follow local government
　rules and dispose as industrial waste.
・Components are separated into three material groups
　as follows.
　① Rubber・resin parts : Oil sealing, bearing sealing, bearing
　　retainer.
　② Grease : Wipe grease off with dry cloths and dispose as oil
　　and grease waste.
　③ Iron parts : Everything else.

產品保固
Warranty

①保固期間

・產品交貨後一年，或是運轉 2000 小時後，以先到期時間為準。

②保固內容

・保固期間，如因本公司疏失造成產品故障，免費進行維修或更換新品。

・保固範圍僅限產品本體。

・以下費用及損失不在保固範圍內：

a) 將本產品連結或組裝於其他裝置時，從該裝置上拆卸、安裝，或其他附帶的組裝工程及運送等所需費用

b) 因本產品故障導致使用者失去使用機會或業務中斷等間接損失

c) 其他所有衍生或附加損失

③保固除外責任

・以下內容不在保固範圍內，本公司得酌收費用以提供維修服務：

a) 不適當的使用條件、環境，或人為不當管理及使用

b) 產品的安裝不良，或是與其他裝置連接不良

c) 其他與本產品無關的原因所造成的故障

d) 使用非本公司指定的潤滑脂或耗材

e) 非由本公司進行的改造或維修

f) 天災、火災、電壓異常等不可抗力之因素

g) 違反使用說明書的操作規定或管理不當所發生的故障

h) 軸承、油封等耗材因磨損而進行更換

i) 其他非本公司責任的事由

① Warranty period

・Warranty is up to one year after the delivery or 2000 hours of operation, whichever is sooner.

② Warranty coverage

・When the product malfunctions for the reasons attributed to our company, we will repair or replace it free of charge during the warranty period.

・Scope of warranty is for the delivered product only.

・Following expense and damage are outside this warranty

a)Any expense associated with the removal of reducer from attached devices and mounting fixtures. Any expense associated with assembly and its related work and the freight, etc.

b)Indirect cost incurred at the user, such as lost opportunities and operation intermission.

c)All other secondary and contingent damage.

③ Warranty exemption

・Following cases are not covered by the warranty. Repair may be possible in some cases for a fee.

a)Parts are used in inadequate condition and environment. Parts are handled or used in inadequate manner by the user.

b)Parts installation or the connection with other devices are not done correctly.

c)The root cause of the problem is not the part delivered.

d)Lubricant or other supply used are not items designated by us.

e)There is a history of modification or repair done by somebody other than us.

f)The problem is due to extraneous accidents such as natural disaster, fire, electric power surge, etc.

g)The problem is from not following the operation manual, or from inadequate maintenance.

h)The scheduled replacement of consumable components such as bearing, oil sealing, etc.

i)All other circumstances where we are not at fault.

MEMO

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All for dreams