

行星減速機產品系列圖

PLANETARY GEARHEADS SERIES LINEUP

PH Series

斜齒極精密型
鍍鎳系列
Exactitude Helical Series
Nickel-Plating

PHL
(鍍鎳)
(Nickel-Plating)



PHR
(鍍鎳)
(Nickel-Plating)



PHF
(鍍鎳)
(Nickel-Plating)



PG Series

斜/直齒精密型
鍍鎳/烤漆系列
Precision
Helical & Spur Series
Nickel-Plating /
Baking-Varnish

PGH
(鍍鎳斜齒)
(Helical, Nickel-Plating)



PGRH
(鍍鎳斜齒)
(Helical, Nickel-Plating)



PGF
(鍍鎳斜齒)
(Helical, Nickel-Plating)



PGL
(鍍鎳)
(Nickel-Plating)



PGR
(鍍鎳)
(Nickel-Plating)



PGLH
(烤漆斜齒)
(Helical, Baking-Varnish)



PGL
(烤漆)
(Baking-Varnish)



PGC
(烤漆)
(Baking-Varnish)



PGE
(烤漆)
(Baking-Varnish)



PE Series

直齒標準型
烤漆系列
Standard & Spur Series
Baking-Varnish

PELP
(烤漆)
(Baking-Varnish)



PEL
(烤漆)
(Baking-Varnish)



PEC
(烤漆)
(Baking-Varnish)



PEE
(烤漆)
(Baking-Varnish)

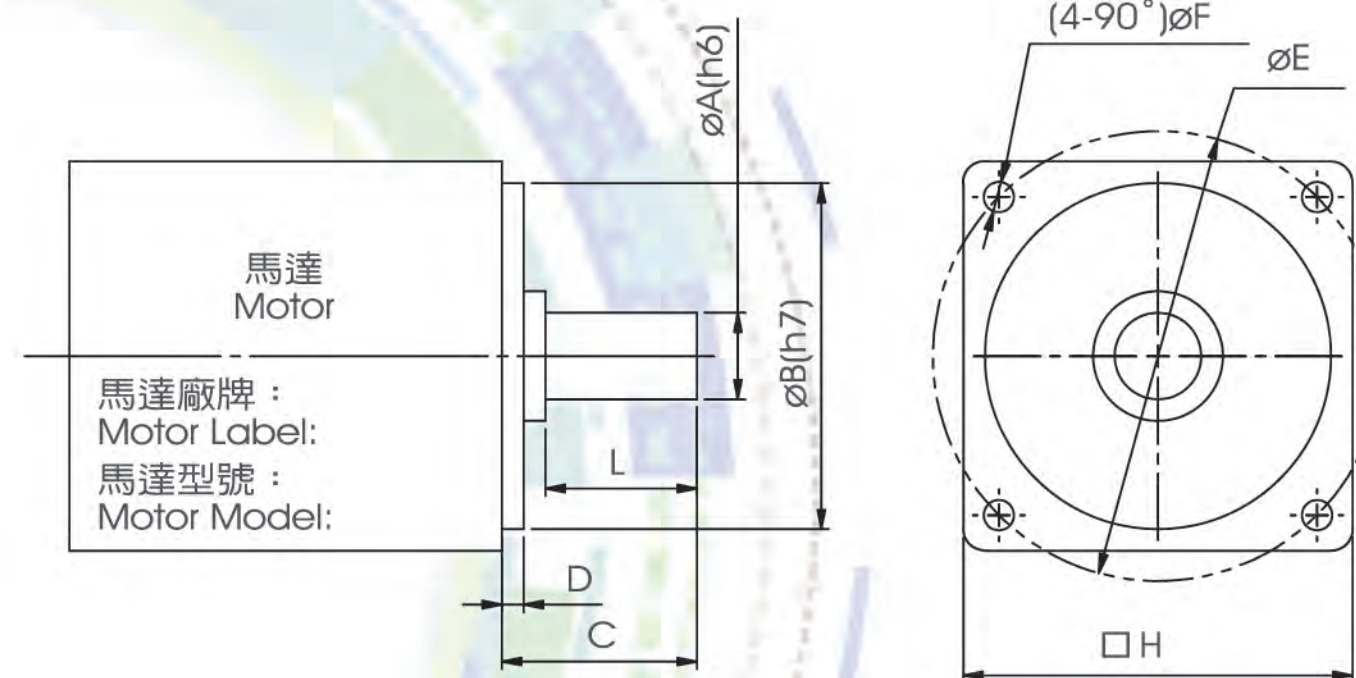


型號定義 CODING SYSTEM

P	行星式減速機 (Planetary)	
G	等級 (Grade)	H: 斜齒極精密型 Exactitude Helical Series G: 精密型 Precision Series E: 實用型 Efficient Series U: 重負荷型 Heavy Duty Series
L	本體與連結方式 (Connection)	L: 方形有法蘭面 Square Housing with Flange C: 圓形無法蘭面 Round Housing without Flange E: 圓形有法蘭面 Round Housing with Flange R: 直角型 Right Angle F: 圓盤連結型 Plate Type H: 方形法蘭面斜齒型 (適用於等級G精密型行星式減速機) Square Flange Helical Gear (Square Flange Helical Gear for G Grade (Precision Series) Only) B: 多比數型 Multi-Ratio Series T: 多輸出軸型 Multi-Shafted Series P: 輕負載型 Light Load Series
60	框號 (Size)	42:□42 60:□60 90:□90 115:□115 142:□142 180:□180 220:□220
30	減速比 (Speed Reduction Ratio)	單節式 Single Stage: 3, 4, 5, 6, 7, 8, 9, 10 雙節式 Double Stage: 12, 15, 20, 25, 30, 35, 40, 45, 50, 60, 70, 80, 90, 100 多節式 Multi-Stage: 125~1000
P1	背隙 (Backlash)	P0: 超精密級 Micro Backlash P1: 精密等級 Precision Backlash P2: 標準背隙 Standard Backlash
Y	特殊規格 (Customer Specification)	
MOTOR	馬達型號 (Motor Model)	

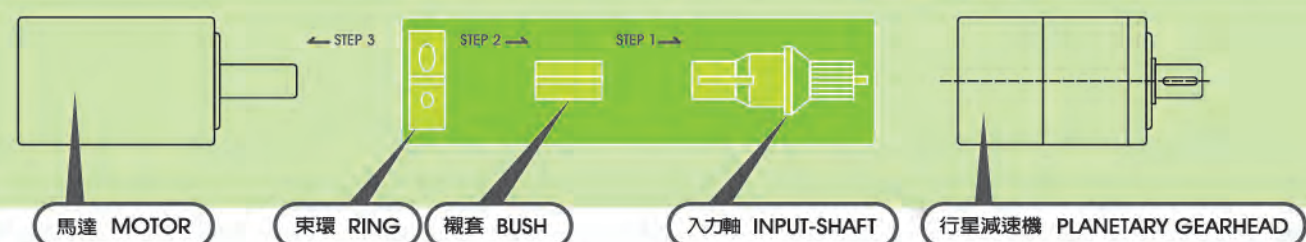


客戶填寫資料 FILL IN DATA OF MOTOR



規格 SPECIFICATIONS

Motor Shaft Dia.	Flange Dia.	Motor Shaft Length	Flange Height	P.C.D. of Bore	Bore Dia.	Motor Flange Square	Actual Length of Motor Shaft	Backlash
馬達軸外徑	馬達凸緣外徑	馬達軸長度	馬達凸緣高度	螺絲孔中心距	螺絲孔直徑	馬達面尺寸	馬達軸有效長	要求背隙
øA(h6)	øB(h7)	C	D	øE	øF	□H	L	P0/P1/P2



不一樣的馬達軸，
用不一樣的襯套。
Use different bushes for
different motor-shafts.

連結板上與馬達連接的孔位，可由使用者
提供資料，再由本公司代為加工。
At the customer's request, we may special
process the connection hole where the
bracket joins the motor.

- 束環、束環襯套、入力軸與馬達穩固組合後，請謹慎與行星式減速機結合後，以防止傷及減速機的内部結構。
After the ring, the bush, and the input-shaft are securely assembled with the motor, please join the parts with the planetary gearhead cautiously with a slight clockwise and /or counter-clockwise motion, until the planetary gearhead engages the input-shaft.

* 在正常的使用狀態下，本公司出廠的產品保固一年或20,000小時，以先到期為準。
Under normal usage and loading, our products come with a one-year or 20,000-hour limited warranty, whichever comes first.

*本公司生產行星式減速機皆經過專屬配對加工，保證壽命超長並確保背隙精度不變，榮獲國內外知名精密機械或半導體大廠選用，值得信賴。

*Sesame Planetary Gearheads are produced under strictly exclusive pairing process to ensure accuracy and lifespan.

行星減速機馬達安裝說明書

Planetary Gearbox with Motor Mounting Instructions

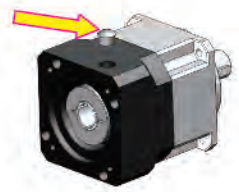
For General Type

- 1



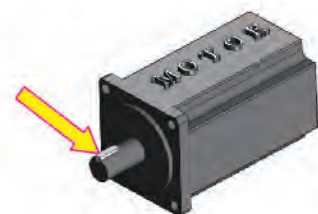
先確認馬達減速機規格是否正確，並將馬達與減速機之安裝面擦拭乾淨。

Check the motor and gearbox size. Clean the mounting surface.
- 2



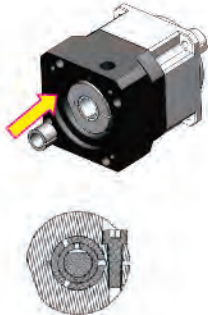
將連接板上扣式塞頭取下，轉動馬達鎖緊環，直到鎖緊環螺絲對準塞頭孔。

Take off the plug from the bracket. Revolve the set collar until the bolt is aligned with the hole.
- 3



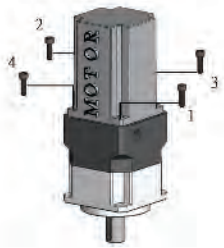
取下馬達上原先的鍵，如有必要，請安裝平衡鍵。

Remove the key from the shaft. Mounting the balance key if necessary.
- 4



確認馬達軸心尺寸，軸心太小選用適當襯套。

Make sure the motor shaft size. Choose the right bushing if necessary.
- 5



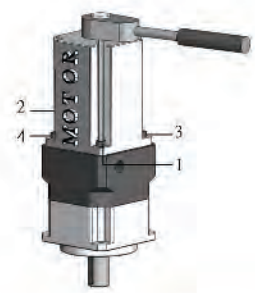
以螺絲扭力表(表一)建議扭力值的5%，依照1至4順序，將螺絲輕輕鎖上。

Tighten the mounting in 1~4 order with torque wrench to 5% specified torque. (See Table 1)
- 6



將馬達與減速機直立擺設，參照表二建議之扭力值，以扭力扳手將馬達鎖緊環螺絲鎖緊。

Tighten the set collar bolt with torque wrench to specified torque. (See Table 2)
- 7



以螺絲扭力表(表一)建議之扭力值，依照1至4順序，用扭力扳手將螺絲鎖緊。

Tighten the mounting in 1~4 order with torque wrench to specified torque. (See Table 1)
- 8



將扣式塞頭裝回。

Put the plug back on the adapter plate.

For Hollow Spindle

- 1



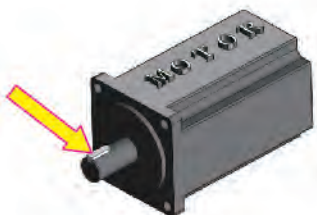
先確認馬達減速機規格是否正確，並將馬達與減速機之安裝面擦拭乾淨。

Check the motor and gearbox size. Clean the mounting surface.
- 2



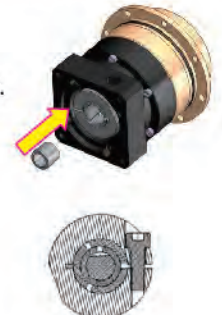
將連接板上扣式塞頭取下，轉動馬達鎖緊環，直到鎖緊環螺絲對準塞頭孔。

Take off the plug from the adapter plate. Revolve the set collar until the bolt is aligned with the hole.
- 3



取下馬達上原先的鍵，如有必要，請安裝平衡鍵。

Remove the key from the shaft. Mounting the balance key if necessary.
- 4



確認馬達軸心尺寸，軸心太小選用適當襯套。

Make sure the motor shaft size. Choose the right bushing if necessary.
- 5



以螺絲扭力表(表一)建議扭力值的5%，依照1至4順序，將螺絲輕輕鎖上。

Tighten the mounting in 1~4 order with torque wrench to 5% specified torque. (See Table 1)
- 6



將馬達與減速機直立擺設，參照表二建議之扭力值，以扭力扳手將馬達鎖緊環螺絲鎖緊。

Tighten the set collar bolt with torque wrench to specified torque. (See Table 2)
- 7



以螺絲扭力表(表一)建議之扭力值，依照1至4順序，用扭力扳手將螺絲鎖緊。

Tighten the mounting in 1~4 order with torque wrench to specified torque. (See Table 1)
- 8



將扣式塞頭裝回。

Put the plug back on the adapter plate.

PHL 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PHL42 (1 Stage)	≤ 8	-	-	-	-
PHL42 (2 Stage)	≤ 8	-	-	-	-
PHL60 (1 Stage) / PHL60 (2 Stage)	≤ 14	M4*0.7P*15L	3	4.9	44
PHL60T (2 Stage)	≤ 8	M3*0.5P*12L	2.5	2.1	19
PHL90 (1 Stage) / PHL90 (2 Stage)	≤ 24	M5*0.8P*20L	4	9.8	87
PHL90T (2 Stage)	≤ 14	M4*0.7P*15L	3	4.9	44
PHL115 (1 Stage)	-	-	-	-	-
PHL115T (1 Stage)	-	-	-	-	-

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PHL系列。

Note2: Applicable type: PHL series.

PHF、PGF 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PHF42 (1 Stage)	≤ 8	M3*0.5P*12L	2.5	2.1	19
PHF42 (2 Stage)	≤ 8	M3*0.5P*12L	2.5	2.1	19
PHF60 (1 Stage) / PHF60 (2 Stage)	≤ 14	M5*0.8P*15L	4	6.1	55
PHF60T (2 Stage)	≤ 8	M3*0.5P*12L	2.5	2.1	19
PHF90 (1 Stage) / PHF90 (2 Stage)	≤ 24	M6*1P*16L	5	17	151
PHF90T (2 Stage)	≤ 14	M5*0.8P*15L	4	6.1	55
PHF115 (1 Stage)	≤ 28	M8*1.25P*20L	6	25	222
PHF115T (2 Stage)	≤ 24	M6*1P*16L	5	17	151
PHF142 (1 Stage)	≤ 35	M10*1.5P*25L	8	49	434
PHF142T (2 Stage)	≤ 28	M8*1.25P*20L	6	25	222
PHF200 (1 Stage)	≤ 50	M12*1.75P*35L	10	85	753
PHF200T (2 Stage)	≤ 35	M10*1.5P*25L	8	49	434
PHF255 (1 Stage)	≤ 55	M14*2.0P*50L	12	137	1214
PHF255T (2 Stage)	≤ 50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PHF、PGF系列。

Note2: Applicable type: PHF、PGF series.

PGH、PGRH 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PGH42 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGH42 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGH60 (1 Stage) / PGH60 (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGH60T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGH90 (1 Stage) / PGH90 (2 Stage)	≤24	M6*1P*16L	5	17	151
PGH90T (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGH115 (1 Stage)	≤28	M8*1.25P*20L	6	25	222
PGH115T (2 Stage)	≤24	M6*1P*16L	5	17	151
PGH142 (1 Stage)	≤35	M10*1.5P*25L	8	49	434
PGH142T (2 Stage)	≤28	M8*1.25P*20L	6	25	222
PGH180 (1 Stage)	≤50	M12*1.75P*35L	10	85	753
PGH180T (2 Stage)	≤35	M10*1.5P*25L	8	49	434
PGH220 (1 Stage)	≤55	M14*2.0P*50L	12	137	1214
PGH220T (2 Stage)	≤50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGH、PGRH系列。

Note2: Applicable type : PGH、PGRH series.

PGLH 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PGLH42 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGLH42 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGLH60 (1 Stage) / PGLH60 (2 Stage)	≤14	M4*0.8P*15L	3	4.9	44
PGLH60T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGLH90 (1 Stage) / PGLH90 (2 Stage)	≤24	M5*1P*15L	4	9.8	87
PGLH90T (2 Stage)	≤14	M4*0.8P*15L	3	4.9	44
PGLH115 (1 Stage)	≤28	-	-	-	-
PGLH115T (2 Stage)	≤24	-	-	-	-

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGLH系列。

Note2: Applicable type : PGLH series.

PGL、PEL 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			N-m	In-lbs
PGL42 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGL42 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGL60 (1 Stage) / PGL60 (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGL60T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGL90 (1 Stage) / PGL90 (2 Stage)	≤24	M6*1P*16L	5	17	151
PGL90T (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGL115 (1 Stage)	≤28	M8*1.25P*20L	6	25	222
PGL115T (2 Stage)	≤24	M6*1P*16L	5	17	151
PGL142 (1 Stage)	≤35	M10*1.5P*25L	8	49	434
PGL142T (2 Stage)	≤28	M8*1.25P*20L	6	25	222
PGL180 (1 Stage)	≤50	M12*1.75P*35L	10	85	753
PGL180T (2 Stage)	≤35	M10*1.5P*25L	8	49	434
PGL220 (1 Stage)	≤55	M14*2.0P*50L	12	137	1214
PGL220T (2 Stage)	≤50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGL、PEL系列。

Note2: Applicable type: PGL、PEL series.

PGR 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			N-m	In-lbs
PGR42 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGR42 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGR60 (1 Stage) / PGR60 (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGR60T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGR90 (1 Stage) / PGR90 (2 Stage)	≤24	M6*1P*16L	5	17	151
PGR90T (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGR115 (1 Stage)	≤28	M8*1.25P*20L	6	25	222
PGR115T (2 Stage)	≤24	M6*1P*16L	5	17	151
PGR142 (1 Stage)	≤35	M10*1.5P*25L	8	49	434
PGR142T (2 Stage)	≤28	M8*1.25P*20L	6	25	222
PGR180 (1 Stage)	≤50	M12*1.75P*35L	10	85	753
PGR180T (2 Stage)	≤35	M10*1.5P*25L	8	49	434
PGR220 (1 Stage)	≤55	M14*2.0P*50L	12	137	1214
PGR220T (2 Stage)	≤50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGR系列。

Note2: Applicable type: PGR series.

PGC、PEC 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PGC50 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGC50 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGC70 (1 Stage) / PGC70 (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGC70T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGC90 (1 Stage) / PGC90 (2 Stage)	≤24	M6*1P*16L	5	17	151
PGC90T (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGC120 (1 Stage)	≤28	M8*1.25P*20L	6	25	222
PGC120T (2 Stage)	≤24	M6*1P*16L	5	17	151
PGC155(1 Stage)	≤35	M10*1.5P*25L	8	49	434
PGC155T (2 Stage)	≤28	M8*1.25P*20L	6	25	222
PGC205 (1 Stage)	≤50	M12*1.75P*35L	10	85	753
PGC205T (2 Stage)	≤35	M10*1.5P*25L	8	49	434
PGC235 (1 Stage)	≤55	M14*2.0P*50L	12	137	1214
PGC235T (2 Stage)	≤50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGC、PEC系列。

Note2: Applicable type : PGC、PEC series.

PGE、PEE 鎖緊扭力表(Tightening Torque Table)

與馬達組合鎖緊螺絲扭力建議表 (Table 1. Tightening Torque Recommended for Motor Mounting Bolt)

螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	強度8.8螺絲之鎖緊扭力 Strength 8.8 Tightening Torque		強度10.9螺絲之鎖緊扭力 Strength 10.9 Tightening Torque		強度12.9螺絲之鎖緊扭力 Strength 12.9 Tightening Torque	
	mm	N-m	In-lbs	N-m	In-lbs	N-m	In-lbs
M3*0.5P	2.5	1.3	12	1.8	16	2.1	19
M4*0.7P	3	3	27	4.1	37	4.9	44
M5*0.8P	4	6.1	55	8.2	73	9.8	87
M6*1P	5	11	98	14	124	17	151
M8*1.25P	6	25	222	34	302	41	364
M10*1.5P	8	49	434	67	594	80	709
M12*1.75P	10	85	753	116	1028	139	1232
M14*2P	12	137	1214	186	1648	223	1976
M16*2P	14	210	1860	286	2534	343	3038

馬達出力軸鎖緊環螺絲扭力建議表 (Table 2. Tightening Torque Recommended for Set Collar Bolt)

減速機型號 GearHead Model & Size	馬達軸徑 Motor Shaft Dia.	螺絲尺寸 Bolt Size	六角頭尺寸 Width Across Flats	鎖緊扭力 Tightening Torque	
	mm			mm	mm
PGE50 (1 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGE50 (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGE70 (1 Stage) / PGE70 (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGE70T (2 Stage)	≤8	M3*0.5P*12L	2.5	2.1	19
PGE90 (1 Stage) / PGE90 (2 Stage)	≤24	M6*1P*16L	5	17	151
PGE90T (2 Stage)	≤14	M5*0.8P*15L	4	6.1	55
PGE120 (1 Stage)	≤28	M8*1.25P*20L	6	25	222
PGE120T (2 Stage)	≤24	M6*1P*16L	5	17	151
PGE142(1 Stage)	≤35	M10*1.5P*25L	8	49	434
PGE142T (2 Stage)	≤28	M8*1.25P*20L	6	25	222
PGE180 (1 Stage)	≤50	M12*1.75P*35L	10	85	753
PGE180T (2 Stage)	≤35	M10*1.5P*25L	8	49	434
PGE220 (1 Stage)	≤55	M14*2.0P*50L	12	137	1214
PGE220T (2 Stage)	≤50	M12*1.75P*35L	10	85	753

註1：螺絲鎖緊扭力必須大於上述值。若有必要時，可以將鎖緊扭力多增加上述建議值的20%，以避免打滑。

Note1: Holding torques must be bigger than values shown above. Bolts can be tightened up to 20% higher for increased holding

註2：適用機種PGE、PEE系列。

Note2: Applicable type : PGE、PEE series.

減速機的選用

Selection of the Optimum Gearbox

如何選用減速機



S5週期運轉之建議事項

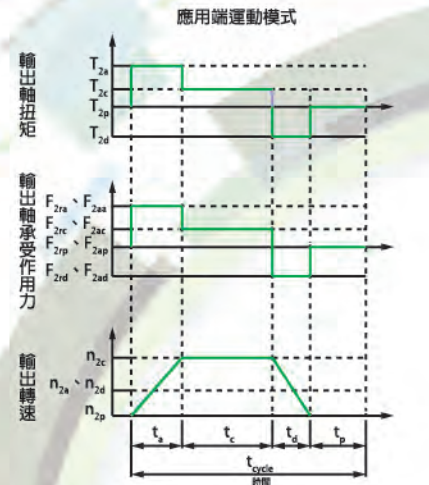
一般的應用慣量須符合以下公式

最適當的應用慣量須符合以下公式

$$\frac{J_L}{J_m^2} \leq 4 \times J_m$$

$$\frac{J_L}{J_m^2} \leq J_m$$

J_L 負載慣量
 J_m 馬達慣量



$$1. ED = \frac{t_{work}}{t_{cycle}} \times 100\%, t_{work} = t_a + t_c + t_d$$

下標說明: a. 加速, c. 等速
d. 減速, p. 停止

$$2. i = \frac{n_m}{n_{work}}$$

n_m 馬達輸出速度
 n_{work} 實際應用速度

$$3. T_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$4. T_{2max} = T_{2m} \times i \times f_s \times \eta$$

f_s 負載係數

f_s	週期次數/小時
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

$$T_{mB}$$
 馬達最大輸出扭矩
 η 減速機運轉效率

$$5. n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$$

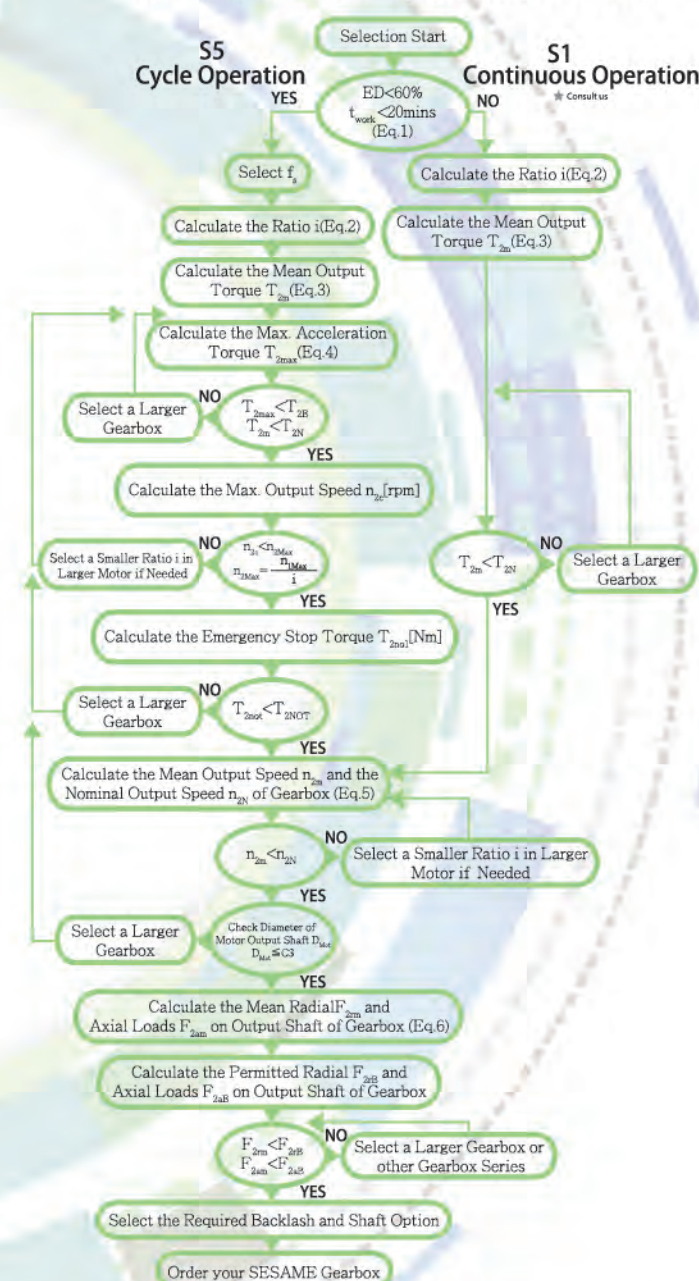
$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

$$n_{2N} = \frac{n_{1N}}{i}$$

$$6. F_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2a}^3 + n_{2c} \times t_c \times F_{2c}^3 + n_{2d} \times t_d \times F_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$F_{2em} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2a}^3 + n_{2c} \times t_c \times F_{2c}^3 + n_{2d} \times t_d \times F_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

Selection of the Optimum Gearbox



Recommended (for S5 Cycle Operation)

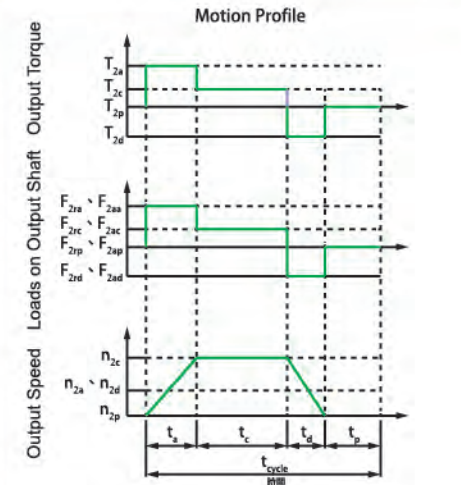
The general design is given for

$$\frac{J_L}{J_m^2} \leq 4 \times J_m$$

The optimal design is given for

$$\frac{J_L}{J_m^2} \leq J_m$$

J_L Load Inertia
 J_m Motor Inertia



$$1. ED = \frac{t_{work}}{t_{cycle}} \times 100\%, t_{work} = t_a + t_c + t_d$$

Index: a. Acceleration, c. Constant,
d. Deceleration, p. Pause

$$2. i = \frac{n_m}{n_{work}}$$

n_m Output Speed of the Motor
 n_{work} Working Speed

$$3. T_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times T_{2a}^3 + n_{2c} \times t_c \times T_{2c}^3 + n_{2d} \times t_d \times T_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

$$4. T_{2max} = T_{2m} \times i \times f_s \times \eta$$

Where f_s is

f_s	No. of Cycles / hr
1.0	0 ~ 1,000
1.1	1,000 ~ 1,500
1.3	1,500 ~ 2,000
1.6	2,000 ~ 3,000
1.8	3,000 ~ 5,000

$$T_{mB}$$
 Max. Output Torque of the Motor
 η Efficiency of the Gearbox

$$5. n_{2a} = n_{2d} = \frac{1}{2} \times n_{2c}$$

$$n_{2m} = \frac{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}{t_a + t_c + t_d}$$

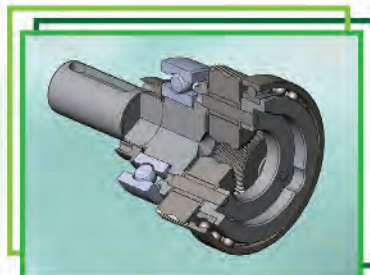
$$n_{2N} = \frac{n_{1N}}{i}$$

$$6. F_{2m} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2a}^3 + n_{2c} \times t_c \times F_{2c}^3 + n_{2d} \times t_d \times F_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

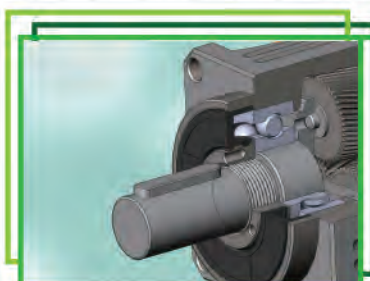
$$F_{2em} = 3 \sqrt{\frac{n_{2a} \times t_a \times F_{2a}^3 + n_{2c} \times t_c \times F_{2c}^3 + n_{2d} \times t_d \times F_{2d}^3}{n_{2a} \times t_a + n_{2c} \times t_c + n_{2d} \times t_d}}$$

PHL系列 產品特點

PHL SERIES FEATURES



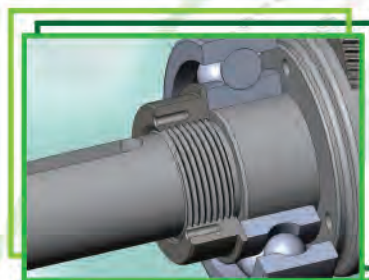
行星固定架及出力軸設計一體成型，且前後培林設定位置為大跨距，可達到最大扭轉剛性及出力軸高徑向負載能力。
 Planetary arm bracket and output shaft are one-piece constructed, setting bearing apart for larger span to reach the largest reverse rigid and contribute high axis radial load capacity.



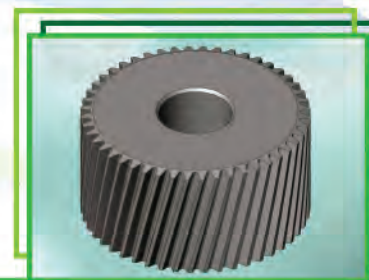
出力軸表面為研磨光面處理Ra 0.2μm，與油封搭配確保最低磨擦係數和減少啟動負載，保持最佳密封性，延長使用壽命。
 Grinding process Ra 0.2μm to smooth surface of output shaft, and with oil-seal to minimum friction coefficient and reducing start up load; result in the best seal-ability and extended lifespan.



本體獨家採用最新高科技材料，齒箱與內環齒一體鍛造成形，再經德國頂級插齒機加工。具有高精度，高扭力，耐磨耗等特點。
 The gear box and internal gear ring are one-piece constructed, and then processed with advanced Germany gear shaper machinery for high-precision, high torque and abrade consumption.
 Advanced electroless nickel plating surface treatment resists scratch and corrosion. Suitable for stringent require of high-tech equipment.



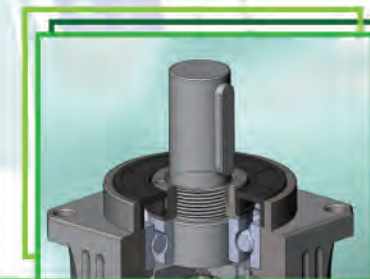
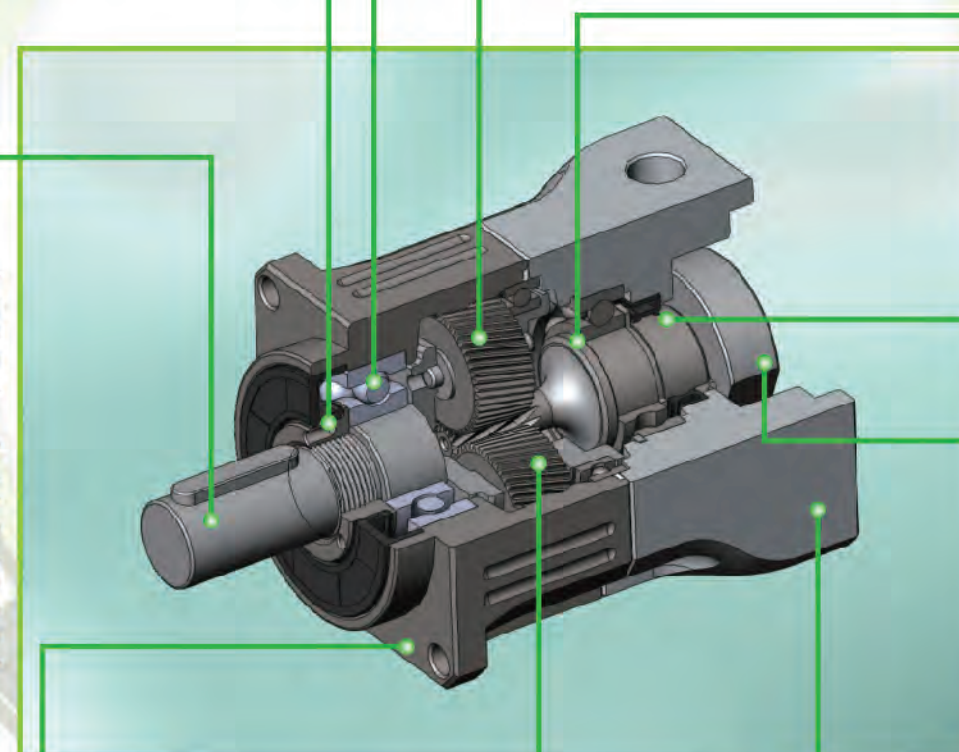
特殊出力軸鎖緊機構設計，確保減速機構緊密結合定位，動力傳輸效率高，永保精密度。
 Special locking mechanisms designed of the output shaft ensure its integration closely with positioning gear, power transmission efficiency, and eternal precision.



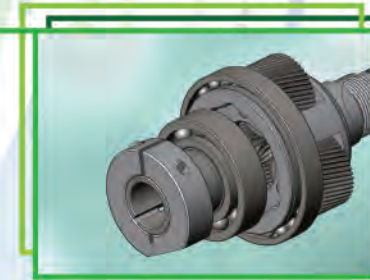
齒輪材質選用高級合金鋼，獨特真空滲碳及熱處理至最佳硬度，兼具表面硬度及心部韌度，並經過齒型研磨加工，以獲得最佳的精度、高耐磨耗及高耐衝擊韌性。
 Alloy steel gear with unique vacuum carburizing and heat treatment for the best surface hardness and inner core tenacity. Additionally, with gear grinding processing to get the best accuracy, high wear resistance and high impact toughness.



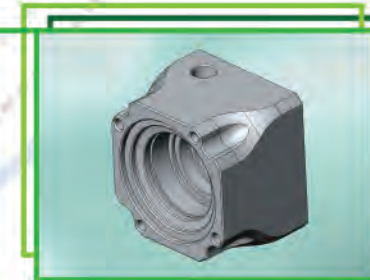
太陽齒前端軸承直接置入於行星固定架內，整體機械結構設計，以確保傳動元件的同軸度。
 The sun gear bearing is placed directly into the planetary arm bracket, the overall mechanical structure designed to ensure concentricity of the transmission components.



採用與世界知名品牌同款潤滑油，搭配高科技油封設計，上唇為防塵唇，下唇為防油唇。採IP65防護等級的密封設計，不洩漏、永久免保養。
 High-tech oil seal design on the upper lip guard against dust intruder, lower lip to guard against oil leak. Protection grade IP65 safeguards fully avoid leaking problem, and given it maintenance-free.



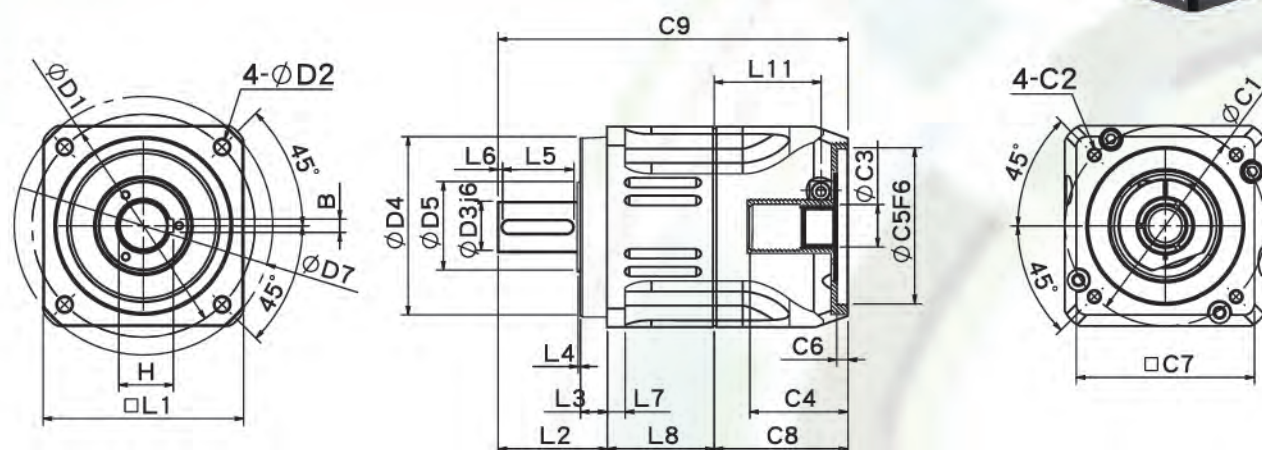
輸入端與馬達入力軸連結方法採用拴緊式機構，鎖緊環經過動平衡分析，確保高轉速下，結合界面的同心度及零滑差動力傳遞。
 Input-end and motor shaft are coupled through a dynamic balanced collar clamping mechanism to ensure connection interface concentricity and zero slip power transmission at high speed.

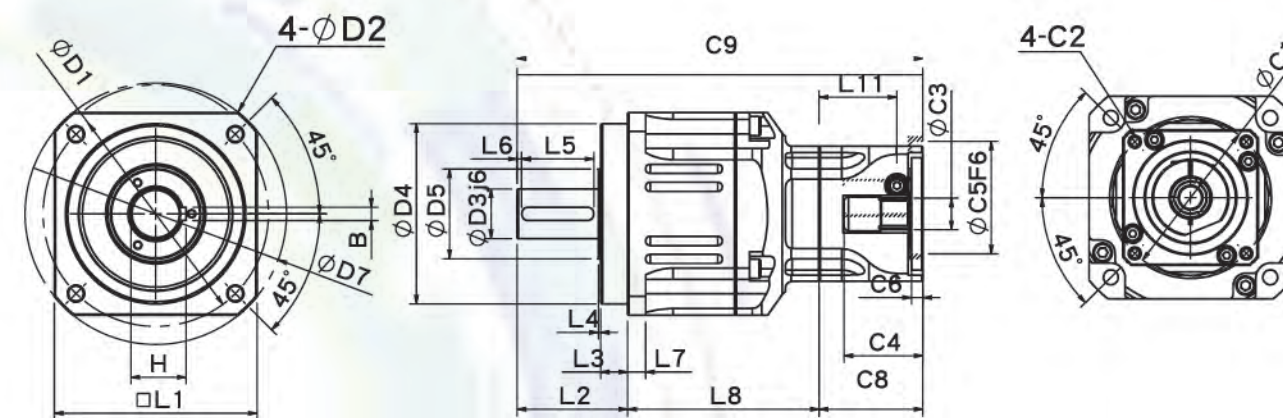


先進馬達連接板設計，配合入力軸襯套，安裝容易，可與各種廠牌之伺服、步進馬達完美搭配組合。
 Advanced motor bracket design coupled with the input shaft bushing is easy to mount to any servo or stepper motor.



行星齒輪傳動介面採用針狀軸承，滿針排列不含保持器，以達到最大接觸面積最小間隙公差，提高結構剛性及輸出扭力。
 Planet gear transmission interface equipped with needle bearings, full needle roller bearings aligned without retainer achieve maximum exposure but smallest gap tolerances. Enhance over-all gear structure rigid and output torque.

PHL單段外型尺寸圖 PHL Single Stage Dimensions


PHL雙段外型尺寸圖 PHL Double Stage Dimensions


規格(Specifications): Unit:mm

尺寸 Dimensions	PHL42	PHL60	PHL90	PHL115
D1	-	70	100	-
D2	-	5.5	6.6	-
D3	-	16	22	-
D4	-	50	80	-
D5	-	35	40	-
D7	-	79	116	-
L1	-	60	90	-
L2	-	38.5	49	-
L3	-	8	12	-
L4	-	1.5	1	-
L5	-	25	32	-
L6	-	2	2	-
L7	-	6.5	8	-
L8	-	37	48	-
L11	-	34.5	48	-
C1 ²	-	70	90	-
C2 ²	-	M5x0.8P	M6x1P	-
C3 ²	-	≤14	≤19	-
C4 ²	-	35	44	-
C5 ²	-	50	70	-
C6 ²	-	5	5	-
C7 ²	-	60	80	-
C8 ²	-	46	60	-
C9 ²	-	121.5	157	-
B	-	5	6	-
H	-	18	24.5	-

★ C1~C9是公製標準馬達連接板尺寸,請依所選用的馬達決定。

★ 本公司有權針對以上數據規格進行設計變更不先行告知。

★ C1~C9 are motor specific dimensions(metric std shown).
Size may vary according to the motor flange chosen.

★ Specification subject to change without notice.

規格(Specifications): Unit:mm

尺寸 Dimensions	PHL60T	PHL90T	PHL115T
D1	-	100	-
D2	-	6.6	-
D3 _{j6}	-	22	-
D4	-	80	-
D5	-	40	-
D7	-	116	-
L1	-	90	-
L2	-	49	-
L3	-	12	-
L4	-	1	-
L5	-	32	-
L6	-	2	-
L7	-	8	-
L8	-	85	-
L11	-	34.5	-
C1 ²	-	70	-
C2 ²	-	M5x0.8P	-
C3 ²	-	≤14	-
C4 ²	-	35	-
C5 ² _{G6}	-	50	-
C6 ²	-	5	-
C7 ²	-	60	-
C8 ²	-	46	-
C9 ²	-	180	-
B	-	6	-
H	-	24.5	-

★ C1~C9是公製標準馬達連接板尺寸,請依所選用的馬達決定。

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★ C1~C9 are motor specific dimensions(metric std shown).
Size may vary according to the motor flange chosen.

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PHL 性能規格共表 Specifications Table

規格 Specifications		節數 Stage	減速比 Ratio	PHL-42	PHL-60	PHL-90	PHL-115	
額定輸出力矩 T_{2N} Nominal Output Torque	N · m	1	3	19.0	52.0	124.0	197.0	
			4	18.0	47.5	133.0	275.0	
			5	21.0	57.0	152.0	313.0	
			6	19.0	52.0	142.5	295.0	
			7	18.0	47.5	133.0	285.0	
			8	16.0	43.0	114.0	247.0	
			9	13.5	38.0	95.0	218.0	
			10	13.5	38.0	95.0	218.0	
			2	減速比 Ratio	PHL-42	PHL-60 / PHL-60T	PHL-90 / PHL-90T	PHL-115T
				15	19.0	52.0	124.0	197.0
		20		18.0	47.5	133.0	275.0	
		25		21.0	57.0	152.0	313.0	
		30		19.0	52.0	142.5	295.0	
		35		18.0	47.5	133.0	285.0	
		40		16.0	43.0	114.0	247.0	
		45		13.5	38.0	95.0	218.0	
		50		21.0	57.0	152.0	313.0	
		60		19.0	52.0	142.5	295.0	
		70		18.0	47.5	133.0	285.0	
		80	16.0	43.0	114.0	247.0		
		90	13.5	38.0	95.0	218.0		
100	13.5	38.0	95.0	218.0				
急停力矩 T_{2NOT} Emergency Stop Torque	N · m	3.0 倍額定輸出力矩 (3.0 times of Nominal Output Torque) (* 最大輸出力矩 Max. Output Torque T_{2B} =60% of Emergency Stop Torque)						
額定輸入轉速 n_{1N} Nominal Input Speed	rpm	1,2	3-100	5000	5000	4000	4000	
最大輸入轉速 n_{1max} Max. Input Speed	rpm	1,2	3-100	10000	10000	8000	8000	
超精密背隙 Micro Backlash P0	arcmin	1	3-10	≤ 1	≤ 1	≤ 1	≤ 1	
		2	12-100	≤ 3	≤ 3	≤ 3	≤ 3	
精密背隙 Classic Backlash P1	arcmin	1	3-10	≤ 3	≤ 3	≤ 3	≤ 3	
		2	12-100	≤ 5	≤ 5	≤ 5	≤ 5	
標準背隙 Standard Backlash P2	arcmin	1	3-10	≤ 5	≤ 5	≤ 5	≤ 5	
		2	12-100	≤ 7	≤ 7	≤ 7	≤ 7	
扭轉剛性 Torsional Rigidity	N · m /arcmin	1,2	3-100	3	6	13	23	
容許徑向力 F_{2rB} ¹ Max. Radial Load	N	1,2	3-100	740	1450	3080	6360	
容許軸向力 F_{2aB} ¹ Max. Axial Load	N	1,2	3-100	370	725	1540	3150	
使用溫度 Operating Temp.	°C		3-100	-10 °C ~ +90 °C				
使用壽命 Service Life	hr		3-100	20,000 (10,000/ 連續運轉 Continuous operation)				
效率 Efficiency	%	1	3-10	≥ 97%				
		2	12-100	≥ 94%				
重量 Weight	kg	1	3-10	0.6	1.2	3.5	7.7	
		2	12-100	0.8	1.8/1.5	5.1/4.0	9	
安裝方向 Mounting Position	-	1,2	3-100	任意方向 Any direction				
噪音值 Noise Level ²	dBA/1m	1,2	3-100	56	58	60	63	
防護等級 Protection Class	-	1,2	3-100	IP65				
潤滑 Lubrication	-	1,2	3-100	全合成潤滑油脂 Synthetic Lubricant				
減速機轉動慣量 Inertia(J1)								
節數 Stage	減速比 Ratio	單位 unit		PHL-42	PHL-60	PHL-90	PHL-115	
1	3	Kg · cm ²		0.03	0.18	0.73	3.58	
	4/5			0.03	0.15	0.53	3.02	
	6/7			0.03	0.14	0.51	2.92	
	8/9/10			0.03	0.14	0.48	2.83	
	節數 Stage		減速比 Ratio		PHL-42	PHL-60(T)	PHL-90(T)	PHL-115T
2	15	Kg · cm ²		0.03	0.18(0.03)	0.73(0.18)	0.73	
	20/25			0.03	0.15(0.03)	0.53(0.14)	0.53	
	30/35			0.03	0.14(0.03)	0.48(0.14)	0.48	
	40/45/50/60/70/80/90/100			0.03	0.14(0.03)	0.47(0.14)	0.47	
1.輸出轉速 100rpm 時,作用於輸出軸中心位置 Applied to the output shaft center @100rpm. 2.3000rpm 空載量測 Measured at 3000rpm with no load								
※ 本公司有權對以上數據規格逕行設計變更不先行告知。 The above figures/specifications are subject to change without prior notice.								

1.輸出轉速 100rpm 時,作用於輸出軸中心位置 Applied to the output shaft center @100rpm. 2.3000rpm 空載量測 Measured at 3000rpm with no load

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產品因人為原因或天災等因素導致不良或損壞,不在保固範圍內。

Products due to human error, natural disasters or other factors lead to poor or damaged, will not be covered under warranty.

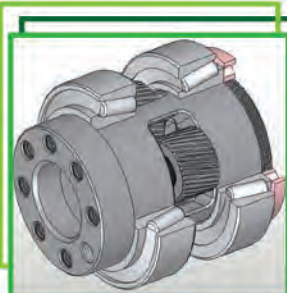

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PHR

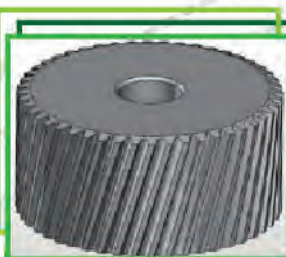
PHF

PHF系列 產品特點

PHF SERIES FEATURES



行星固定架及出力軸設計一體成型，且前後使用滾珠軸承，可承受軸向負載及徑向負載大於滾珠軸承地方，培林設定位置為大跨距，可達到最大扭轉剛性及出力軸高軸向負載及徑向負載能力。
Planetary arm bracket and output shaft are one-piece constructed, using tapered roller bearings can bear the axial load and radial load that are more than deep groove ball bearings. Setting the bearing apart for larger span to reach the largest torsional rigidity and contribute high axial load and radial load capacity.



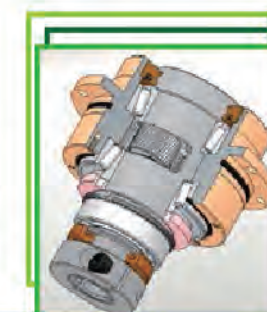
齒輪材質選用高級合金鋼，獨特真空滲碳及熱處理至最佳硬度，兼具表面硬度及心部韌度，並經過研磨加工，以獲得最佳的精度、高耐磨耗及高耐衝擊韌性。

Alloy steel gear with unique vacuum carburizing and heat treatment for the best surface hardness and inner core tenacity. Additionally, with gear grinding process-ing to get the best accuracy, high wear resistance and high wear resistance and high impact toughness.



行星齒輪傳動介面採用針狀軸承，滿針排列不含保持器，以達到最大接觸面積最小間隙公差，提高結構剛性及輸出扭力。

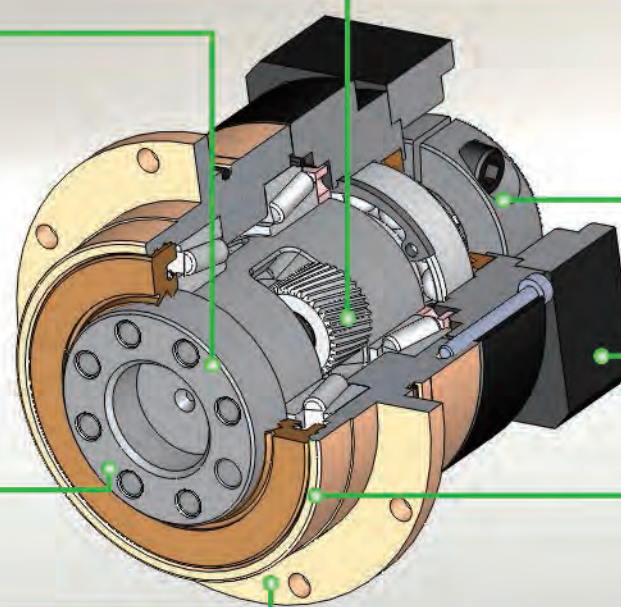
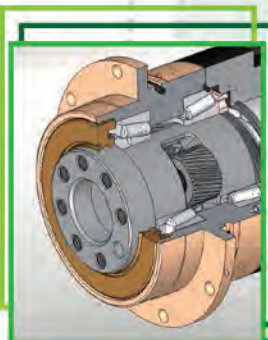
Planet gear transmission interface equipped with needle bearings, full needle roller bearings aligned without retainer achieve maximum exposure but smallest gap tolerances. Enhance over-all gear structure rigid and output torque.



輸入端與馬達入力軸連結方法採用栓緊式機構，鎖緊環經過動平衡分析，確保高轉速下，結合介面的同心度及零滑差動力傳遞。

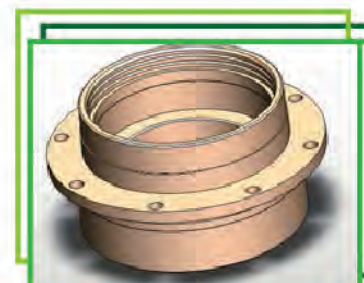
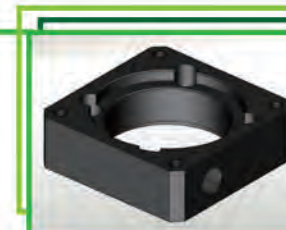
Input-end and motor shaft are coupled through a dynamic balanced collar clamping mechanism to ensure connection interface concentricity and zero slip power transmission at high speed.

出力軸表面為研磨光面處理Ra 0.2 μ m，與油封搭配確保最低磨擦係數和減少啟動負載，保持最佳密封性，延長使用壽命且出力軸為中空穴設計，可搭配圓形法蘭面連結，大幅縮小安裝的空間。
Grinding process Ra 0.2 μ m to smooth surface of output shaft, and with oil seal to minimum friction coefficient and reducing start up load; result in the best seal-ability and extended lifespan. Hollow out-put shaft connect perfectly with circular flange drastically reducing the installation space.



先進馬達連接板設計，配合入力軸襯套，安裝容易，可與各種廠牌之伺服、步進馬達完美搭配組合。

Advanced motor bracket design coupled with the input shaft bushing is easy to mount to any servo or stepper motor.

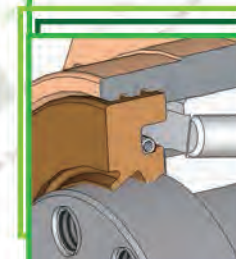


先進無電鍍表面處理，耐刮，耐腐蝕，最適合高科技設備嚴苛要求。本體齒箱與內環齒一體加工成形，再經德國頂級插齒機加工。具有高精度，高扭力，耐磨耗等特點。

Advanced electroless nickel plating surface treatment resists scratch and corrosion. Suitable for stringent require of high-tech equipment. The gear box and internal gear ring are one-piece constructed, and then processed with advanced Germany gear shaper machinery for high-precision, high torque and abrade consumption.

PHF系列整體設計上可容許伺服馬達高轉速的輸入，達到最大扭力輸出。出力軸為中空穴設計，可搭配圓形法蘭面連結，大幅縮小安裝的空間。精密斜齒輪設計及專業齒輪加工，製造出低運轉背隙、高效率、低噪音及長壽命的行星減速機。

PHF series overall design suitable for combination operation with servo motor high-speed input and achieves maximum torque output. Hollow out-put shaft connects perfectly with circular flange drastically reducing the installation space. Precision helical gear design and gear processing create a planetary gearhead with low backlash operation, high efficiency, low noise and long lifespan.

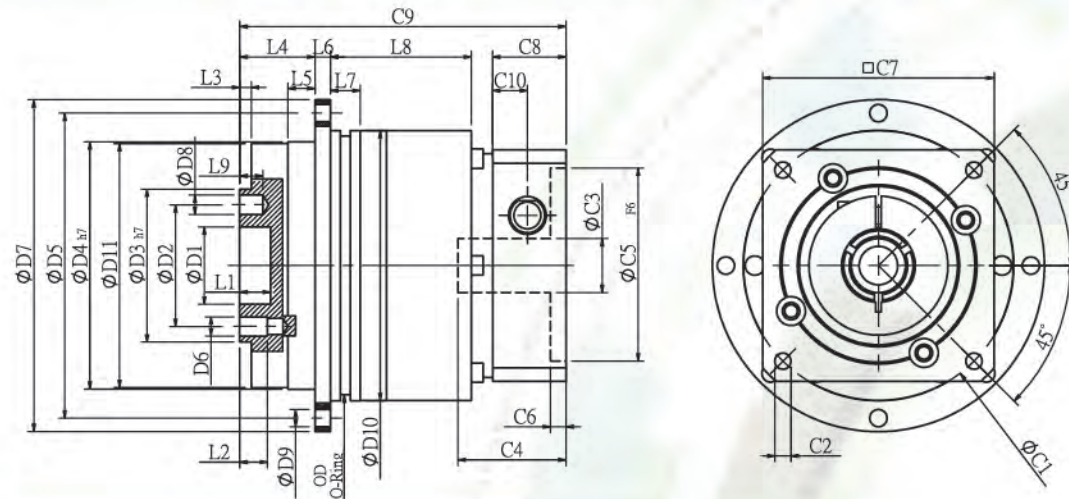


高科技油封設計上唇為防塵唇，下唇為防油唇。採IP65防護等級的密封設計，並採用高級潤滑油脂，不洩漏、免保養。

High-tech oil seal design on the upper lip guard against dust intruder, lower lip to guard against oil leak. Protection grade IP65 safeguards fully avoid leaking problem, and given it maintenance-free.



PHF單段外型尺寸圖 PHF Single Stage Dimensions



規格(Specifications): Unit:mm

尺寸 Dimensions	PHF42	PHF60	PHF90	PHF115
D1	-	20	31.5	-
D2	-	31.5	50	-
D3h7	-	40	63	-
D4h7	-	64	90	-
D5	-	79	109	-
D6	-	M5x0.8P	M6x1.0P	-
D7	-	86	118	-
D8	-	5	6	-
D9	-	4.5	5.5	-
D10	-	69.9	94.5	-
D11	-	63.2	89.2	-
L1	-	8	12	-
L2	-	7.2	12	-
L3	-	3	6	-
L4	-	19.5	30	-
L5	-	7	10	-
L6	-	4	7	-
L7	-	7.7	8	-
L8	-	37.5	36.5	-
L9	-	6	7	-
C1 ²	-	70	90	-
C2 ²	-	M5x0.8P	M6x1.0P	-
C3 ²	-	≤14	≤19	-
C4 ²	-	36.4	41.2	-
C5 ² F6	-	50	70	-
C6 ²	-	4	6.7	-
C7 ²	-	60	90	-
C8 ²	-	19	25.5	-
C9 ²	-	92.4	107	-
C10 ²	-	9	11.3	-
OD	-	66x2	86x3	-

★ C1~C9是公製標準馬達連接板尺寸,請依所選用的馬達決定。

★ C1~C9 are motor specific dimensions(metric std shown), Size may vary according to the motor flange chosen.

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★ Specification subject to change without notice.

PHF 性能規格共表 Specifications Table

規格 Specifications		節數 Stage	減速比 Ratio	PHF-42	PHF-60	PHF-90	PHF-115	PHF-142	PHF-200	PHF-255
額定輸出力矩 T_{2N} Nominal Output Torque	$N \cdot m$	1	3	-	40	105	180	310	520	1020
			4	16	43	110	240	450	990	1550
			5	17	50	130	290	530	1080	1800
			7	14	44	125	270	450	990	1600
			10	11	37	95	220	360	810	1350
		節數 Stage	減速比 Ratio	PHF-42	PHF-60 / PHF-60T	PHF-90 / PHF-90T	PHF-115T	PHF-142T	PHF-200T	PHF-255T
		2	15	-	40	105	180	310	520	1020
			20	16	43	110	240	450	990	1550
			25	17	50	130	290	530	1080	1800
			30	17	50	130	290	530	1080	1800
35	17		50	130	290	530	1080	1800		
40	17		50	130	290	530	1080	1800		
50	17		50	130	290	530	1080	1800		
70	14	44	125	270	450	990	1600			
100	11	37	95	220	360	810	1350			
急停力矩 T_{2NOT} Emergency Stop Torque	$N \cdot m$	3.0 倍額定輸出力矩 (3.0 times of Nominal Output Torque) (* 最大輸出力矩 Max. Output Torque T_{2B} =60% of Emergency Stop Torque)								
額定輸入轉速 n_{1N} Nominal Input Speed	rpm	1,2	3-100	5000	5000	4000	4000	3000	3000	2000
最大輸入轉速 n_{1max} Max. Input Speed	rpm	1,2	3-100	10000	10000	8000	8000	6000	6000	4000
超精密背隙 Micro Backlash P0	arcmin	1	3-10	≤2	≤2	≤2	≤1	≤1	≤1	≤1
		2	12-100	≤4	≤4	≤4	≤3	≤3	≤3	≤3
精密背隙 Classic Backlash P1	arcmin	1	3-10	≤4	≤4	≤4	≤3	≤3	≤3	≤3
		2	12-100	≤6	≤6	≤6	≤5	≤5	≤5	≤5
標準背隙 Standard Backlash P2	arcmin	1	3-10	≤6	≤6	≤6	≤5	≤5	≤5	≤5
		2	12-100	≤8	≤8	≤8	≤7	≤7	≤7	≤7
扭轉剛性 Torsional Rigidity	$N \cdot m$ /arcmin	1,2	3-100	6	12	28	75	130	400	920
容許彎曲力矩 M_{2KB} ¹ Max. Bending Moment	$N \cdot m$	1,2	3-100	43	125	260	503	1035	2950	8600
容許軸向力 F_{2aB} ¹ Max. Axial Load	N	1,2	3-100	1015	1340	2450	3890	5870	11690	29940
使用溫度 Operating Temp.	°C		3-100	-10 °C ~ +90 °C						
使用壽命 Service Life	hr		3-100	30,000 (15,000 / 連續運轉 Continuous operation)						
效率 Efficiency	%	1	3-10	≥ 97%						
		2	12-100	≥ 94%						
重量 Weight	kg	1	3-10	0.7	1.5	3.3	6.2	13.6	32.1	58.8
		2	12-100	1.1	2.3/1.8	6.0/4.1	8.1	17.9	38.6	72.5
安裝方向 Mounting Position	-	1,2	3-100	任意方向 Any direction						
噪音值 Noise Level ²	dBA/1m	1,2	3-100	56	58	60	63	65	67	70
防護等級 Protection Class	-	1,2	3-100	IP65						
潤滑 Lubrication	-	1,2	3-100	全合成潤滑油脂 Synthetic Lubricant						
減速機轉動慣量 Inertia(J1)										
節數 Stage	減速比 Ratio	單位 unit	PHF-42	PHF-60	PHF-90	PHF-115	PHF-142	PHF-200	PHF-255	
1	3	$Kg \cdot cm^2$	-	0.19	0.72	2.35	9.05	29.80	72.50	
	4		0.02	0.18	0.67	1.66	7.17	25.86	58.21	
	5		0.02	0.17	0.65	1.50	6.52	23.63	54.36	
	7		0.02	0.14	0.60	1.45	6.17	22.92	54.12	
	10		0.02	0.14	0.58	1.41	6.10	22.73	53.98	
節數 Stage	減速比 Ratio		PHF-42	PHF-60(T)	PHF-90(T)	PHF-115T	PHF-142T	PHF-200T	PHF-255T	
2	15/20/25		0.02	0.17(0.02)	0.65(0.17)	0.65	1.50	6.52	23.63	
	30/35/40		0.02	0.14(0.02)	0.60(0.14)	0.60	1.45	6.17	22.92	
	50/70/100		0.02	0.14(0.02)	0.58(0.14)	0.58	1.41	6.10	22.73	
1.輸出轉速 100rpm 時,作用於輸出軸中心位置 Applied to the output shaft center @100rpm. 2.3000rpm 空載量測 Measured at 3000rpm with no load										
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