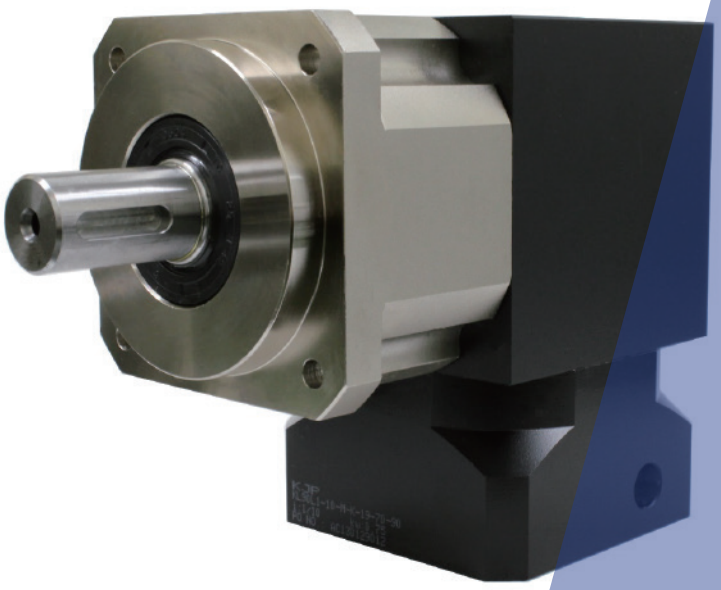


MFL 系列

節省空間 - 90 度轉角型減速機

Space-Saving Design Right-Angle Planetary Gearbox

- 一段背隙： ≦ 4 弧分
- 減數比 : 3-200
- 一段負載時效率達 94%

- 1 Stage-Minimal backlash: : ≦ 4 arc-min
- Ratio: 3-200
- High efficiency: 94%

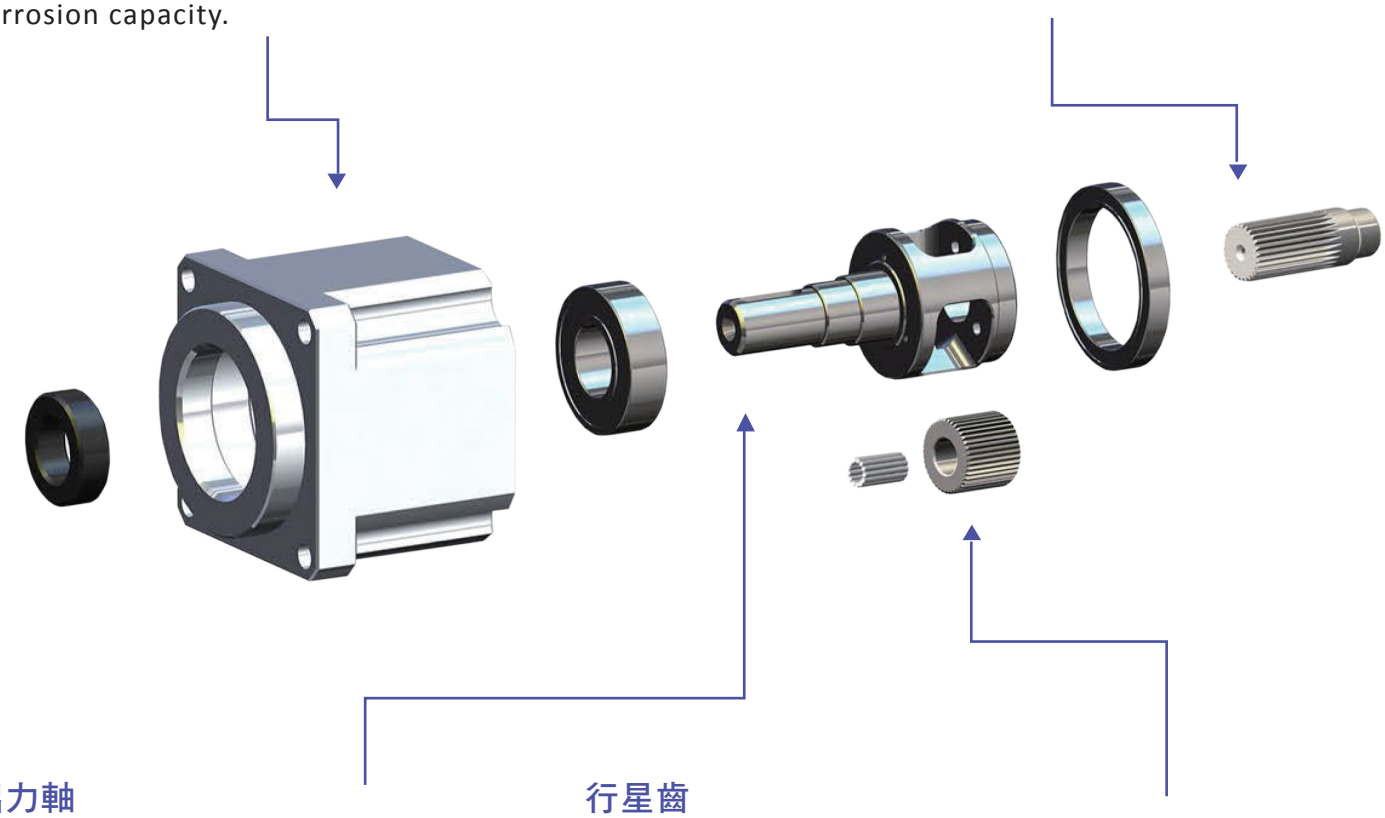
產品結構特點
COMPONENT CHARACTERISTICS

本體
採用鉻鉬合金鋼及一體成型設計，精密度高及輸出扭矩大，表面採用噴砂陽極處理，具有高抗蝕效果。

Ring Gear
With Cr-Mo alloy steel and one-piece construction for internal gear to deliver high precision and large output torque. Sandblasting and Anodizing painting on gearbox surface to improve the anti-corrosion capacity.

太陽齒
選用鎳鉻鉬合金鋼，齒面經滲碳熱處理，耐磨性高及耐高衝擊。齒型精修處理，能提升齒輪精度及降低噪音。

Sun Gear
Nickel chromium molybdenum alloy steel gear is manufactured with carburizing heat treatment for high abrasion resistance and impact toughness and by honing process to increase gear precision and low noise operation.

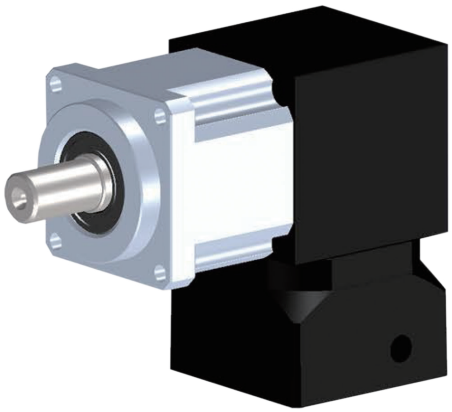


出力軸
使用鉻鉬合金鋼，採一體成型設計確保大扭力輸出之結構剛性，表面用無電解鎳處理，具備高防鏽蝕的功能。

Output Shaft
Cr-Mo alloy steel shaft with one-piece design and structural rigidity to ensure large torque output. Surface coated with electroless nickel plating for high resistance to corrosion.

行星齒
選用鎳鉻鉬合金鋼，齒面經滲碳熱處理，耐磨性高及耐高衝擊，齒型精修處理，能提升齒輪精度及降低噪音，內孔使用滿針滾針軸，具高耐磨與高強度。

Planetary Gear
Nickel chromium molybdenum alloy steel gear is manufactured with carburizing heat treatment for high abrasion resistance and impact toughness and by honing process to increase gear precision and low noise operation. Internal gear bore uses needle roller to obtain higher abrasion resistance and strength.

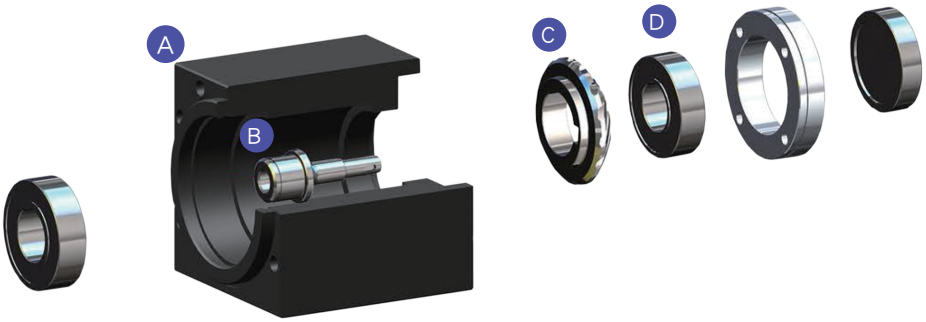


A 轉向本體

特殊加工能確保轉軸的同心度與入力軸的垂直度。本體使用鋁合金材質，大幅降低整體結構重量，表面陽極處裡提高防鏽等級。

Steering Gearbox

our specific treatment assures concentricity and alignment of the rotating shaft. Gearbox made with Aluminum alloy, decreased the weight. Anodizing painting on surface to improve the anti-corrosion capacity.



1 雙軸承設計

增加輸入的穩定性

Double Bearings

Double bearings design to enhance the input stability.

B 轉軸

採用鉻鉬合金鋼

Rotating Shaft

With nickel chromium molybdenum alloy steel.

C 螺旋傘齒輪

使用鎳鉻鉬合金鋼，表面滲碳處理，具耐磨與高衝擊特性

Helical Bevel Gear

With Cr-Mo alloy steel and carburizing heat treatment for high abrasion resistance and impact toughness.

D 滾珠軸承

轉軸簡支樑的支點使用滾珠軸承較滾針軸承有更大的支撐與壽命

Ball Bearing

Use the ball bearing instead of needle bearing on the simple beam for the better loading capacity and the longer life.

2 入力軸

採用模組化設計，能搭配各廠牌，伺服馬達出力軸，表面染黑處理。

Input Shaft

Modularized design can be used for various dimensions of servo motors. Shaft surface is coated with black oxide finishing

3 連接法蘭

採用模組化設計，適合各式伺服馬達組裝，表面採用噴砂陽極技術處理，提高防氧化效果。

Connecting Flange

Modularized design can be used for various dimensions of servo motors. Sandblasting and Anodizing painting on surface to improve the anti-corrosion capacity.

A — D

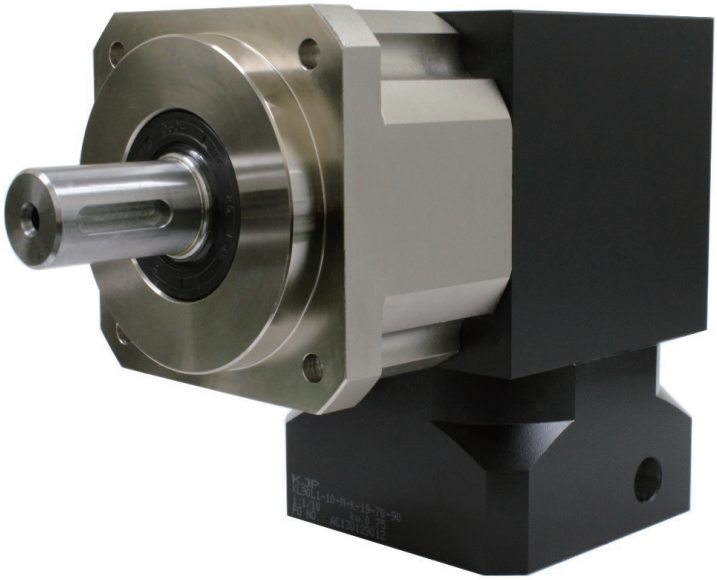
A-D 專利的後端整體結構

傘型齒背隙調整結構可同時調整軸承及傘型齒的組裝背隙。

Patented Structure Design

The structure of helical bevel gear can adjust bearing and bevel gear's backlash at the same time

機型代碼
MFL SERIES ORDERING CODE



MFL60 - L1 - 10 - M - K - Motor

型號 Mode
MFL60
MFL90
MFL120

段數 Stage
L1: (Ratio 3-20)
L2: (Ratio 25-200)

馬達 Motor
馬達廠牌、型號 Motor Brand & Model

減速比 Ratio
請參閱目錄第 46 頁，減速比組成表。 Please refer to page 46" Ratio Composition Table".

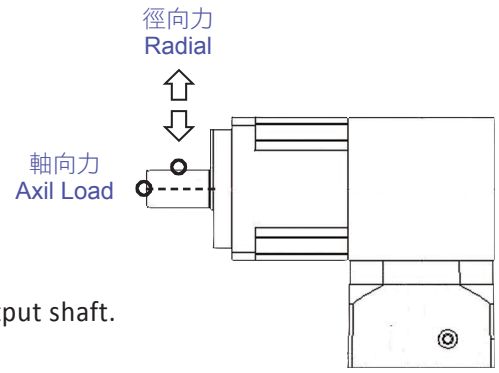
背隙 Backlash	
M:	標準背隙 Standard
H:	精密背隙 Precision

出力軸 Output shaft	
K:	軸帶鍵 With Key
S:	光軸 Without Key

輸出軸之容許徑向力
PERMITTED RADIAL & AXIAL LOADS ON OUTPUT SHAFT OF THE GEARBOX

容許徑向力 : 垂直於軸心的力量
容許軸向力 : 平行於軸心的力量

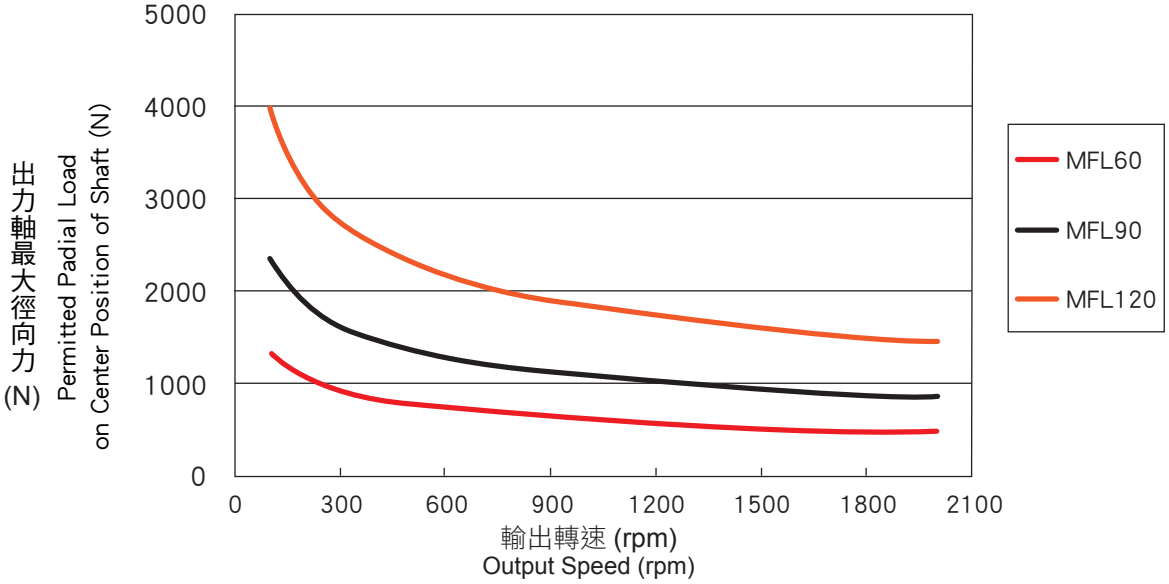
容許徑和容許軸向力與減速機的出力軸轉速及施力點的距離相關。
轉速越快，容許徑向力會降低。
負載的距離越遠，容許的徑向力也隨之降低。



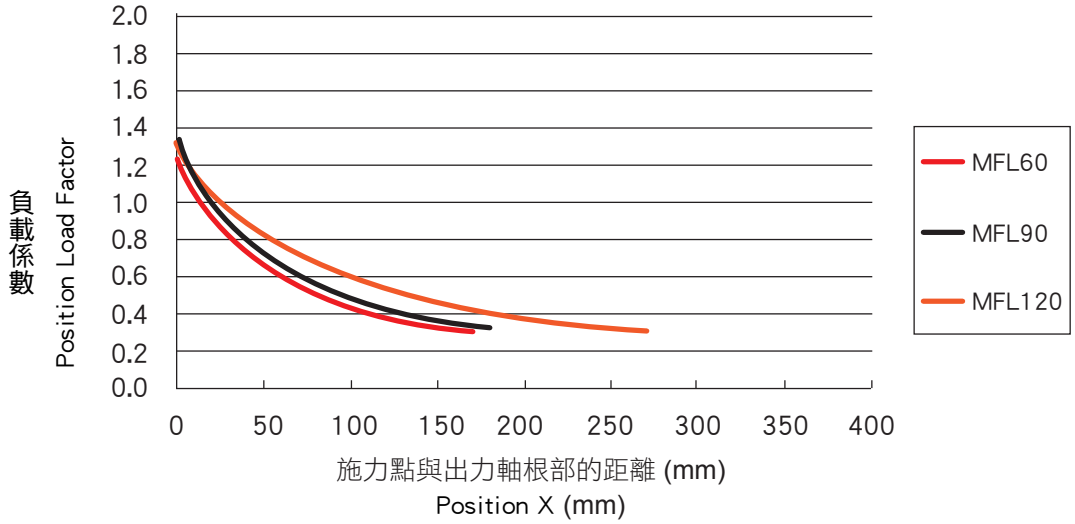
* Permitted Radial Load :The force exerts perpendicular to output shaft
* Permitted Axil Load :The force exerts parallel to output shaft

The radial & axial loads are related to the speed and application point on output shaft.
The radial & axial loads are decreased when the output shaft runs faster.
The radial & axial loads are decreased when the application points away from root segment of shaft.

徑向負荷表
Radial Load Chart (MFL)



負載係數表
Load Factor Chart (MFL)



減速比選用 . 轉動慣量表
RATIO SELECTION TABLE & MOMENT OF INERTIA TABLE

MFL 系列減速比選擇 MFL Series Ratio Composition Table		
	減速比 Ratio	
減速機型號 Model	一段式減速比 Stage (L1)	二段式減速比 Stage (L2)
MFL60	3，4，5，6，7，8，9，10，14，20	25，30，35，40，45，50，60，70，80， 90，100，120，140，180，200
MFL90	3，4，5，6，7，8，9，10，14，20	25，30，35，40，45，50，60，70，80， 90，100，120，140，180，200
MFL120	3，4，5，6，7，8，9，10，14，20	25，30，35，40，45，50，60，70，80，90， 100，120，140，180，200

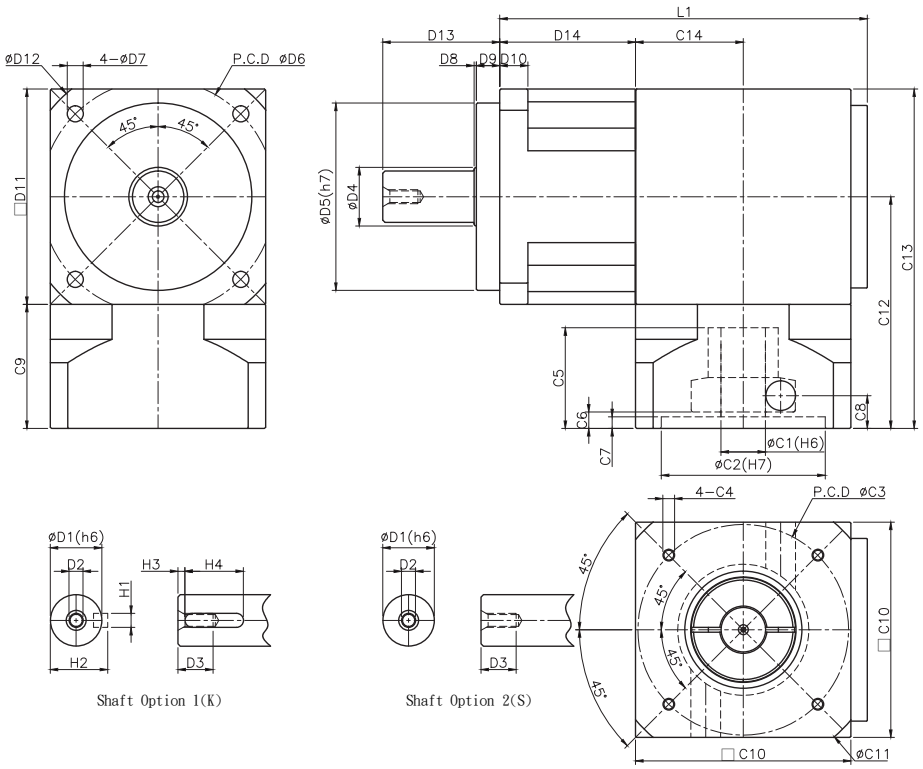
MFL 系列減速機轉動慣量表 MFL Series Moment of Inertial Table		
機型 Model	入力減速比 Gear Ratio	轉動慣量 Moment of inertial J1 kg*cm^2
MFL60	1：1	0.11
	1：2	0.10
MFL90	1：1	1.31
	1：2	1.15
MFL120	1：1	2.91
	1：2	2.48

MFL系列技術規格表 Technical Specifications						
規格 Specification	單位 Unit	段數 Stage	減速比 Ratio	MFL60	MFL90	MFL120
額定輸出扭矩 T_{2N} Normal Output Torque	Nm	L1	3	34	116	228
			4	35	120	236
			5	34	117	229
			6	33	113	222
			7	33	110	214
			8	35	100	236
			9	31	107	203
			10	29	94	184
			14	33	110	214
			20	29	94	184
		L2	25	34	117	229
			30	34	113	228
			35	34	117	229
			40	35	120	236
			45	31	107	203
			50	34	117	229
			60	33	113	222
			70	33	110	214
			80	35	100	236
			90	31	107	203
			100	29	94	184
			120	33	113	222
			140	29	94	184
			180	31	107	203
			200	29	94	184
急停扭矩 Emergency Stop Torque	Nm	L1，L2	3~200	3 倍額定輸出扭矩 3 Times of Nominal Output Torque		
額定輸入轉速 n_{1N} Normal Input Speed	rpm	L1，L2	3~200	3，000	3，000	2，500
最大輸入轉速 n_{1B} Max. Input Speed	rpm	L1，L2	3~200	6，000	6，000	5，000
精密背隙 H Precision Backlash	arcmin	L1	3~20	≦ 4	≦ 4	≦ 4
		L2	25~200	≦ 7	≦ 7	≦ 7
標準背隙 M Standard Backlash	arcmin	L1	3~20	≦ 6	≦ 6	≦ 6
		L2	25~200	≦ 9	≦ 9	≦ 9
扭轉剛性 Torsional Rigidity	Nm/arcmin	L1，L2	3~200	4	11	35
容許徑向力 F_{rB} Max. Radial Load	N	L1，L2	3~200	1，328	2，340	4，000
容許軸向力 F_{aB} Max. Axial Load	N	L1，L2	3~200	664	1，170	2，000
保固期 Warranty period	Y	L1，L2	3~200	1 年 / 1year		
全負載時效率 Efficiency of Full Load η	%	L1	3~20	≧ 94%		
		L2	25~200	≧ 91%		
淨重 Net Weight	kg	L1	3~20	2.26	6.85	13.5
		L2	25~200	2.56	8.05	15.88
使用溫度 Operating Temp	℃	L1，L2	3~200	-10℃ ~+90℃		
潤滑 Labrication		L1，L2	3~200	鋰基複合全合成潤滑油脂 Lithium Complex Synthetic Lubrication		
安裝方式 Mounting Position		L1，L2	3~200	任意方向 All Directions		
防護等級 Degree of Protrction		L1，L2	3~200	IP65		
噪音值 Running Noise	dBA	L1，L2	3~200	≦ 68	≦ 70	≦ 70

1. 上述單段減速機(未指定比數)相關規格，主要為使用各型號5比減速機所測得之數據.
2. 減速比： i = 輸入轉速/輸出轉速.
3. 背隙值： 為在2%額定輸出扭矩下測試所得之數據.
4. 最大徑向力及最大軸向力： 施力於出力軸中心位置，週期負載時間50%，轉速100rpm，條件下所測得之數據.
5. 運轉負載週期<60%狀況下，平均使用壽命如列表數據值；負載週期≧60%之連續運轉狀況下，平均使用壽命可能會降低至正常值的50%以下.
6. 噪音值： 距離1公尺，空載運轉，額定輸入轉速，條件下所測得之數據.

1.Above relative specifications of each model most are measured on 5 : 1 gear ratio
2.Rations : I = Nin / Nout
3.Backlash : Measured on 2% of nominal output torque
4.Max. Radial and Axial Load : Applied to the output shaft center, and 50% of duty time and at 100 rpm
5.Duty Cycle ＜ 60%, Average Lifetime = List Value; Duty Cycle ≧ 60%, Average Lifetime ＜ 50% List value
6.Noise Level : Numeric measured on idle running in 1m distance, and at nominal input speed

尺寸圖
DRAWING & DEMENSION



(單位：mm)
(Unit：mm)

尺寸 Size		MFL60	MFL90	MFL120
D1		16	22	32
D2		M5x0.8P	M6x1.0P	M8x1.25P
D3		12	15	20
D4		18	25	35
D5		50	80	110
D6		70	100	130
D7		5.5	6.8	8.7
D8		1.5	1	1
D9		7.5	10	12
D10		10	12	15
D11		60	92	120
D12		80	118	158
D13		35.5	50	65
D14		49	58	69
H1		5	6	10
H2		18	24.5	35
H3		3	5	3
H4		20	25	40
L1	一段 (stage 1)	114	157	194
	二段 (stage 2)	130	184.5	227.2
C1		6~14	14~19	16~24
C2		50	70	110
C3		70	90	145
C4		M5x0.8P(MAX)	M6x1.0P(MAX)	M8x1.25P(MAX)
C5		40	44	65
C6		6	7	20
C7		4	5	7
C8		12	14	28.5
C9		45	53	78
C10		60.4	92	120
C11		80	120	161
C12		75	99	138
C13		105	145	198
C14		31	46	60

* 註：C1-C6 為標準品最大尺寸，為公制標準馬達連接板尺寸，尺寸依搭配的馬達而改變。如超出尺寸屬特殊規格請與我司聯絡。
* Note : C1-C6 are metric standard specific dimensions of motor. Please contact us at vgm@vgmgear.com for other specification or customize product.

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