

# 高精度通用型 行星式減速機

Universal High-precision Planetary  
Gear Reducers

## 產品特點

Characteristics

### 高定位精度、低噪音

#### High-positioning accuracy and low noise

內部齒輪採用高級鎳鎢鉬合金鋼材，經深層的滲碳硬化處理後，再經精密齒面研磨，使得齒面光滑，耐磨性佳，精度高。

Inner gears are made of SNCM alloys. Deep carburizing is treated first and ground comes next. These procedures make gear surface smoother, endure higher abrasion resistance and perform higher accuracy.

### 高剛性

#### High torsional rigidity

輸出端採用歐製雙滾錐軸承支撐，可承受更大之軸向和徑向負載。箱體內環齒及行星托架皆為一體式結構，剛性佳。

Output shaft is supported with European-made double-row tapered roller bearings and sustains higher axial and radial loads. Ring gear and carrier are one-piece structure to obtain excellent torsional rigidity.

### 高起動

#### High dynamics

行星式結構的高精度，低慣性矩及平衡特性，配合伺服馬達驅動，可達到高起動的特性。

Good balance between the high accuracy and the low moments of inertia is highlighted in the planetary gear structure. High dynamics are achievable in coordination with the transmission of servo motors.

### 易安裝

#### Easy to install

減速機聯接板及輸入軸孔採彈性設計，能與各廠牌的伺服馬達相結合。

Input shaft bushings and connection plates come in various dimensions and can be compatible with all servo motors.

### 長壽命、免保養

#### Long service life and maintenance-free

採用德製優質人工合成潤滑油，流動性佳，富含極佳抗壓劑，齒箱內各零件間充分得到潤滑及保護，可免換機油。

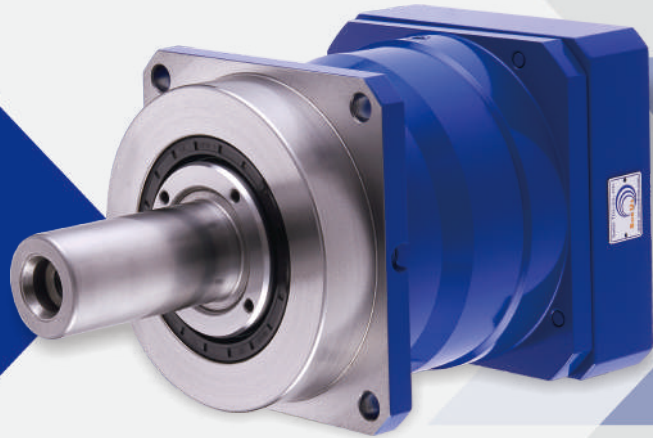
採用特製高品質、耐熱、耐磨不易變質之油封，減速機密封性佳。

Premium Germany-made synthetic oil is adopted with high circulation and anti-ultra-pressure additive. Components are thoroughly protected and lubricated in the gearbox. No oil change is required.

Stable, high-quality, heat-resistant and wear-resistant seals are in use to secure airtightness.

實心輸出軸，輸出端採用歐製雙滾錐軸承，內環齒及行星托架皆為一體結構。齒輪經深層滲碳硬化處理，再經精密齒面研磨。泛用於CNC機械之減速機

Solid output shaft is supported with double-row European-made tapered roller bearings. Ring gear and carrier are one-piece structure. Gear is treated with hardening and ground on surface. Universally applicable to CNC machine tools.



## 工具機業

### Machine Tool Industry

- ▶ CNC 龍門銑床 / CNC 龍門磨床  
CNC gantry type milling machine /  
CNC planning grinding machine
- ▶ CNC 綜合加工機 / CNC 深孔加工機  
CNC machine center /  
CNC deep hole drilling machine
- ▶ CNC 落地搪床  
CNC boring machine
- ▶ CNC 龍門鉋床 / CNC 沖床  
CNC planning shaping machine /  
CNC press machine
- ▶ CNC 重型車床  
CNC heavy-duty lathe

## 產業機械

### Special Purpose Machine

- ▶ 射出成型機 / 押出成型機 / 造紙機械  
Injection molding machine /  
extrusion molding machine /  
paper making machine
- ▶ 彎管機 / 彎板機  
Tube bending machine /  
plate bending machine
- ▶ 光電、半導體設備  
Photonic and semiconductor devices
- ▶ 雷射切割機 / 雷射焊接機  
Laser cutting machine /  
laser welding machine
- ▶ 木工機 / 雕刻機  
Woodworking machine /  
engraving machine
- ▶ 包裝機械 / 印刷機械  
Packing machine /  
printing machine

# PG 技術資料 Technical Data(單段1-Stage)

規 格 Size			PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240	
最大加速扭矩 $T_{2B}^{(1)}$ Output Torque	Nm	減速比 $i$										
		3	25	90	202	330	440	735	1055	1750	3600	
		4/5	47	115	270	350	510	810	1300	2600	4100	
		6	40	103	250	340	445	730	1180	2150	3780	
		7	40	100	240	310	440	700	1130	1680	3500	
		8	33	91	215	285	410	650	1040	1600	3300	
緊急停止扭矩 $T_{2Not}^{(2)}$ Emergency Stop Torque	Nm	3	60	240	630	800	1100	1700	3000	6200	9000	
		4/5	100	310	710	900	1260	1850	3250	6480	9500	
		6	85	280	650	800	1120	1700	2880	5500	8950	
		7	85	270	625	780	1100	1600	2800	5000	8650	
		8	77	250	550	690	1025	1470	2560	4600	7200	
		10	75	200	500	650	900	1250	2220	3900	6800	
額定輸出扭矩 $T_{2N}$ Nominal output Torque	Nm	3	15	60	135	195	315	500	880	1200	2000	
		4/5	26	78	185	240	340	550	1100	1900	2600	
		6	23	70	155	210	320	460	845	1580	2250	
		7	23	65	125	180	315	430	820	1050	1700	
		8	18	64	120	175	293	410	755	1000	1660	
		10	15	43	115	160	220	350	650	950	1550	
減速比 $i$		單段 1-Stage	3/4/5/6/7/8/10									
額定輸入轉速 $n_{1N}$ Nominal Input Speed	rpm	3/4/5	3300	3000	2600	2300	2200	1800	1500	1200	1100	
		6/7/8/10	4000	3200	2900	2700	2700	2500	2400	1700	1600	
最大輸入轉速 $n_{1Max}$ Max. Input Speed	rpm	3~10	6000	6000	4500	4000	3600	3200	3000	2500	2200	
徑向負荷力 $F_{rMax}^{(3)}$ Radial Load	N	3~10	2600	3800	6000	7500	9000	11500	14000	18000	27000	
軸向負荷力 $F_{aMax}^{(3)}$ Axial Load	N	3~10	2300	3200	5400	6700	9000	11300	14000	18000	27000	
超精密背隙 Micro Backlash	arcmin	3~10	-	≤1	≤1	≤1	≤1	≤1	≤1	≤1	≤1	
精密背隙 Reduced Backlash	arcmin	3~10	≤3	≤3	≤3	≤3	≤3	≤3	≤2	≤2	≤2	
標準背隙 Standard Backlash	arcmin	3~10	≤5	≤5	≤5	≤5	≤5	≤5	≤4	≤4	≤4	
扭轉剛性 Torsional Rigidity	Nm/ arcmin	3~10	3	8.5	23	35	50	95	150	220	355	
滿載時使用效率 Efficiency with Full Load	%	3~10	≥97									
使用壽命 $L_{h2}$ Service Life	h	3~10	20000									
重量 Weight	kg	3~10	2.5	4	8	12	16	23	33	56	85	
噪音值 $^{(4)}$ Noise Level	dB		≤60	≤62		≤65			≤66	≤68		
使用溫度範圍 Permissible Gear Reducer Temp	°C		- 10°C ~ + 90°C									
防護等級 Protection Class			IP 64									
潤滑油 Lubrication			人工合成潤滑油 Synthetic oil viscosity						ISO VG220			
轉動慣量 $J_1$ Mass Moments of Inertia	kg cm <sup>2</sup>	3	0.31	0.75	4.73	5.90	10.50	16.22	37.40	72.10	140.80	
		4	0.30	0.60	4.22	5.09	9.10	12.90	29.80	50.50	97.10	
		5	0.29	0.59	4.13	4.93	8.85	12.30	28.43	45.20	87.40	
		6	0.29	0.58	4.08	4.89	8.63	11.88	27.67	44.10	84.50	
		7	0.28	0.58	4.05	4.83	8.50	11.83	27.55	42.60	81.40	
		8	0.28	0.57	4.04	4.83	8.48	11.80	27.47	42.20	80.10	
		10	0.27	0.57	4.04	4.81	8.46	11.70	27.45	41.90	79.80	

註(1)本表適用於起動頻率1000次/小時以內，若超出時，請與本公司洽詢。

註(2)堪用期內可作1000次之動作。

註(3)輸出轉速100rpm作用於輸出軸中心。

註(4)噪音值測量於5比/輸入轉速3000rpm/距離1公尺/無負載運轉。

- 如您所需之減速比，非表內所有，請與本公司洽詢。
- 若為連續運轉使用，請與本公司洽詢。

Note (1) Data are measured at the frequency under 1000 times per hour.

Contact us if your data are beyond the presented table above.

Note (2) Operation can be up 1000 times in product life.

Note (3) Act at the center of output shaft in 100 rpm.

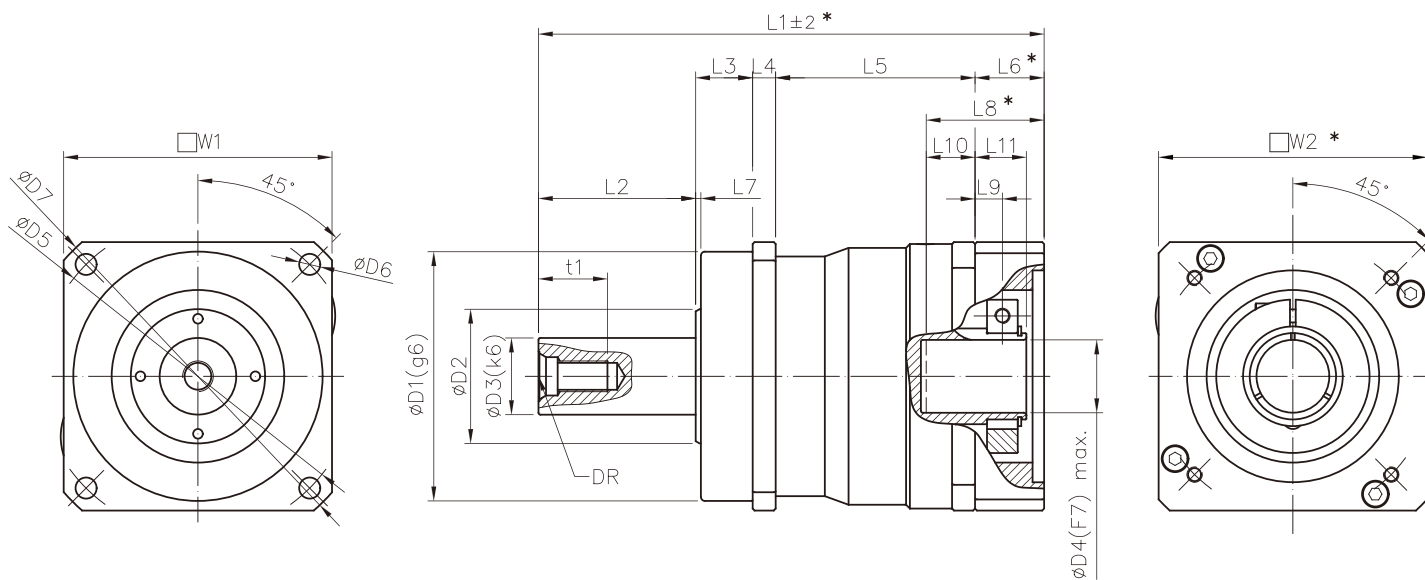
Note (4) Noise is inspected under the condition of ratio 5; input speed 3000 rpm; 1-meter distance and free load operation.

- If any customized ratios are unavailable from above, please contact us for more.
- Consult us if your mode is continuous operation.

# PG 尺寸 [ mm ] Dimensions [ mm ]



PG



規格 Size	PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240
W1	62	80	100	120	140	160	182	210	240
※ W2 min.	75	88	118	130	140	175	190	190	240
DR	M5	M8	M12	M12	M16	M16	M20	M20	M20
t1	12.5	19	28	28	36	36	42	42	42
D1(g6)	60	70	90	110	130	145	160	180	200
D2	30	40	55	60	70	85	95	125	140
D3(k6)	16	22	32	35	40	50	55	75	85
D4(F7) max.	14	19	32	35	38	42	48	55	60
D5	68	85	120	130	165	190	215	250	290
D6	5.5	6.6	9	9	11	13	13	17	17
D7	79	103	135	155	185	215	240	279	320
※ L1	135.5	161	213.5	232.5	262.5	266.5	297	349.5	422
L2	28	36	58	70	82	82	82	105	130
L3	20	20	30	30	30	30	30	38	40
L4	6	7	10	11	12	13.5	15	17	20
L5	60.5	73	87.5	93	104	106.5	122	139.5	154
※ L6 min.	22.5	25	28	28.5	34.5	34.5	48	50	78
L7	2	2	2	3	3	3	3	3	3
※ L8 min.	33	40	52	52	60	60	82	82	110
L9	10	11.5	11.5	12.8	14.3	14.3	17.8	18.5	22.5
L10	12	15	24	24	25.5	25.5	34	32	32
L11	18	20	22	24.5	27	27	33.5	34.5	41

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· 本公司的產品不斷的研究、發展。上表所示之尺寸力求精準，若有不符，仍以實物為準，如需確實之尺寸，可洽本公司。

· ※ Actual dimension marked above may vary from different servo motors.  
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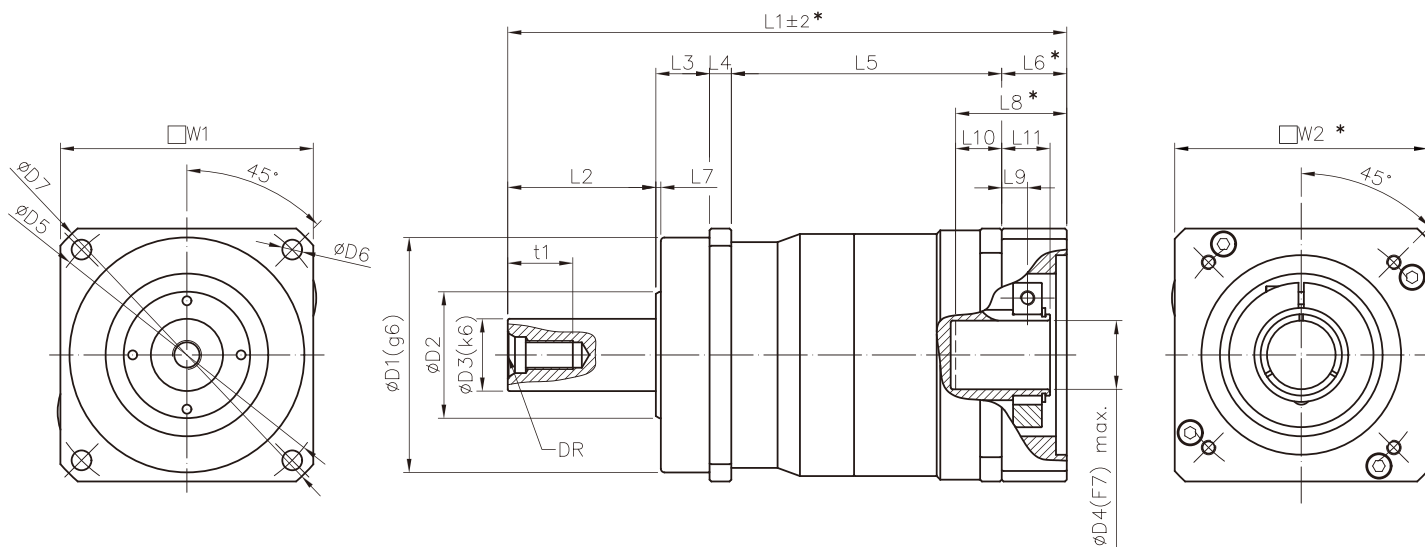
# PG 技術資料 Technical Data (雙段2-Stage)

規 格		Size	PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240	
最大加速扭矩 $T_{2B}^{(1)}$ Output Torque	Nm	減速比 $i$										
		12/15	25	90	202	330	440	735	1055	1750	3600	
		16/20/25/40/50	47	115	270	350	510	810	1300	2600	4100	
		30/60	40	103	250	340	445	730	1180	2150	3780	
		28/35/70	40	100	240	310	440	700	1130	1680	3500	
		80	33	91	215	285	410	650	1040	1600	3300	
緊急停止扭矩 $T_{2Not}^{(2)}$ Emergency Stop Torque	Nm	12/15	60	240	630	800	1100	1700	3000	6200	9000	
		16/20/25/40/50	100	310	710	900	1260	1850	3250	6480	9500	
		30/60	85	280	650	800	1120	1700	2880	5500	8950	
		28/35/70	85	270	625	780	1100	1600	2800	5000	8650	
		80	77	250	550	690	1025	1470	2560	4600	7200	
		100	75	200	500	650	900	1250	2220	3900	6800	
額定輸出扭矩 $T_{2N}$ Nominal output Torque	Nm	12/15	15	60	135	195	315	500	880	1200	2000	
		16/20/25/40/50	26	78	185	240	340	550	1100	1900	2600	
		30/60	23	70	155	210	320	460	845	1580	2250	
		28/35/70	23	65	125	180	315	430	820	1050	1700	
		80	18	64	120	175	293	410	755	1000	1660	
		100	15	43	115	160	220	350	650	950	1550	
減速比 $i$	雙段 2-Stage		12/15/16/20/25/28/30/35/40/50/60/70/80/100									
額定輸入轉速 $n_{1N}$ Nominal Input Speed	rpm	12~40	4400	3600	3200	3000	3000	2900	2800	2200	2000	
		50~60	4800	3900	3600	3300	3200	3100	3000	2400	2200	
		70~100	5500	4500	4200	3900	3500	3300	3200	2800	2400	
最大輸入轉速 $n_{1Max}$ Max. Input Speed	rpm	12~100	6000	6000	4500	4000	3600	3600	3600	3000	3000	
徑向負荷力 $F_{rMax}^{(3)}$ Radial Load	N	12~100	2600	3800	6000	7500	9000	11500	14000	18000	27000	
軸向負荷力 $F_{aMax}^{(3)}$ Axial Load	N	12~100	2300	3200	5400	6700	9000	11300	14000	18000	27000	
超精密背隙 Micro Backlash	arcmin	12~100	-	-	≤3	≤3	≤3	≤3	≤3	≤3	≤3	
精密背隙 Reduced Backlash	arcmin	12~100	≤5	≤5	≤5	≤5	≤5	≤5	≤4	≤4	≤4	
標準背隙 Standard Backlash	arcmin	12~100	≤7	≤7	≤7	≤7	≤7	≤7	≤6	≤6	≤6	
扭轉剛性 Torsional Rigidity	Nm/ arcmin	12~100	3	8.5	23	35	50	95	150	220	355	
滿載時使用效率 Efficiency with Full Load	%	12~100	≥94									
使用壽命 $L_{h2}$ Service Life	h	12~100	20000									
重量 Weight	kg	12~100	3.1	4.6	9.2	15.2	20.3	23.7	35.5	59	87	
噪音值 $^{(4)}$ Noise Level	dB		≤60	≤62		≤65			≤66	≤68		
使用溫度範圍 Permissible Gear Reducer Temp	°C		- 10°C ~ + 90°C									
防護等級 Protection Class			IP 64									
潤滑油 Lubrication			人工合成潤滑油 Synthetic oil viscosity						ISO VG220			
轉動慣量 $J_1$ Mass Moments of Inertia	kg cm <sup>2</sup>	12	0.31	0.75	4.73	5.90	10.50	10.50	11.00	37.50	37.70	
		15	0.31	0.75	4.73	5.90	10.50	10.50	11.00	37.50	37.70	
		16	0.30	0.60	4.20	5.09	9.00	9.30	9.30	30.00	31.30	
		20	0.30	0.60	4.20	5.07	9.00	9.20	9.30	30.00	31.00	
		25	0.29	0.59	4.12	4.91	8.83	9.00	9.05	28.70	30.10	
		28	0.30	0.59	4.20	5.07	9.00	9.20	9.20	29.90	31.00	
		30	-	0.58	4.08	4.90	8.63	8.65	9.65	27.70	29.05	
		35	0.30	0.58	4.12	4.91	8.82	8.90	9.03	28.80	30.08	
		40	0.27	0.56	4.04	4.80	8.45	8.50	8.52	27.70	28.70	
		50	0.27	0.56	4.04	4.80	8.45	8.49	8.52	27.70	28.70	
		60	0.27	0.56	4.04	4.80	8.45	8.49	8.52	27.70	28.55	
		70	0.27	0.56	4.04	4.80	8.45	8.49	8.50	27.70	28.50	
80	0.27	0.56	4.04	4.80	8.45	8.48	8.50	27.70	28.50			
100	0.27	0.56	4.04	4.80	8.45	8.48	8.50	27.70	28.50			

# PG 尺寸 [ mm ] Dimensions [ mm ]



PG



規格 Size	PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240
W1	62	80	100	120	140	160	182	210	240
※ W2 min.	72	88	118	130	140	140	140	190	190
DR	M5	M8	M12	M12	M16	M16	M20	M20	M20
t1	12.5	19	28	28	36	36	42	42	42
D1(g6)	60	70	90	110	130	145	160	180	200
D2	30	40	55	60	70	85	95	125	140
D3(k6)	16	22	32	35	40	50	55	75	85
D4(F7) max.	14	19	32	35	38	38	38	48	48
D5	68	85	120	130	165	190	215	250	290
D6	5.5	6.6	9	9	11	13	13	17	17
D7	79	103	135	155	185	215	240	279	320
※ L1	157.5	193	252	272.5	305.5	309.5	318	395.5	440
L2	28	36	58	70	82	82	82	105	130
L3	20	20	30	30	30	30	30	38	40
L4	6	7	10	11	12	13.5	15	17	20
L5	82.5	105	126	133	147	149.5	156.5	187.5	202
※ L6 min.	22.5	25	28	28.5	34.5	34.5	34.5	48	48
L7	2	2	2	3	3	3	3	3	3
※ L8 min.	33	40	52	52	60	60	60	82	82
L9	10	11.5	11.5	12.8	14.3	14.3	14.3	17.8	17.8
L10	12	15	24	24	25.5	25.5	25.5	34	34
L11	18	20	22	24.5	27	27	27	33.5	33.5

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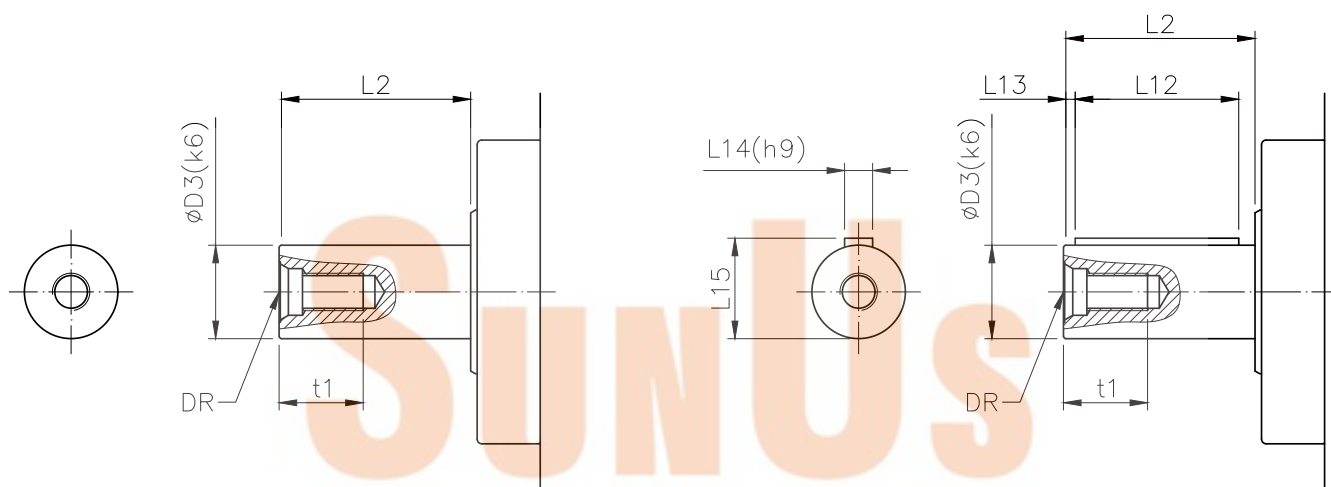
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# PG 輸出軸規格 Output Shaft Variations

## 1. 平滑式輸出軸 [mm]

Smooth output shaft [mm]

規格 Size		PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240
輸出軸直徑- $\varnothing$ Output shaft-diameter	<b>D3(k6)</b>	16	22	32	35	40	50	55	75	85
輸出軸長度 Output shaft length	<b>L2</b>	28	36	58	70	82	82	82	105	130
中心孔 Centering bore	<b>DR</b>	M5	M8	M12	M12	M16	M16	M20	M20	M20
中心孔螺紋深度 Depth of thread, centering bore	<b>t1</b>	12.5	19	28	28	36	36	42	42	42



### 1. 平滑式 [mm]

Smooth output shaft(mm)

### 2. 鍵槽式 [mm]

Keyway output shaft(mm)

## 2. 鍵槽式輸出軸 [mm]

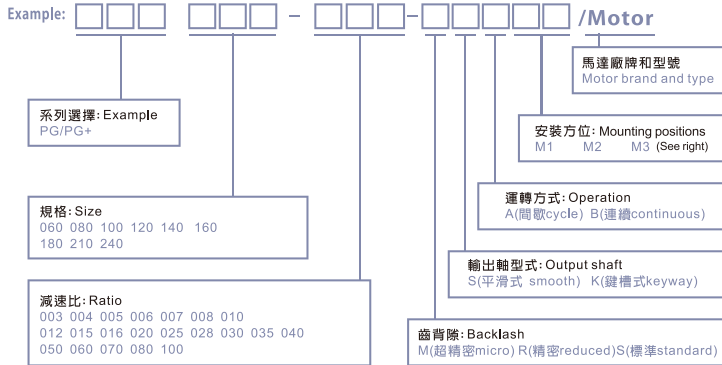
Keyway output shaft [mm]

規格 Size		PG060	PG080	PG100	PG120	PG140	PG160	PG180	PG210	PG240
輸出軸直徑- $\varnothing$ Output shaft-diameter	<b>D3(k6)</b>	16	22	32	35	40	50	55	75	85
輸出軸長度 Output shaft length	<b>L2</b>	28	36	58	70	82	82	82	105	130
鍵長 Key length	<b>L12</b>	25	32	50	63	70	70	70	90	125
鍵槽與軸端距離 Key location	<b>L13</b>	2	2	4	4	5	5	6	7	3
鍵寬 Key width	<b>L14(h9)</b>	5	6	10	10	12	14	16	20	22
輸出軸加鍵高度 Output shaft with key	<b>L15</b>	18	24.5	35	38	43	53.5	59	79.5	90
中心孔 Centering bore	<b>DR</b>	M5	M8	M12	M12	M16	M16	M20	M20	M20
中心孔螺紋深度 Depth of thread, centering bore	<b>t1</b>	12.5	19	28	28	36	36	42	42	42

# 高精度通用型行星式減速機

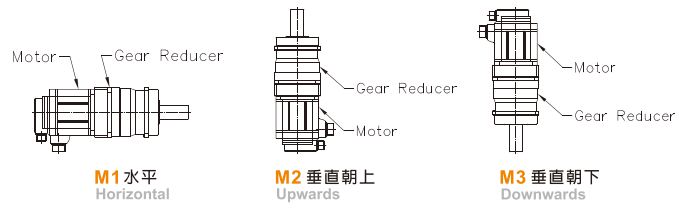
Universal high-precision planetary gear reducers

選用範列: **P G B 0 6 0 - 0 0 5 - R S A M 1** /MITSUBISHI-HC-KFS43

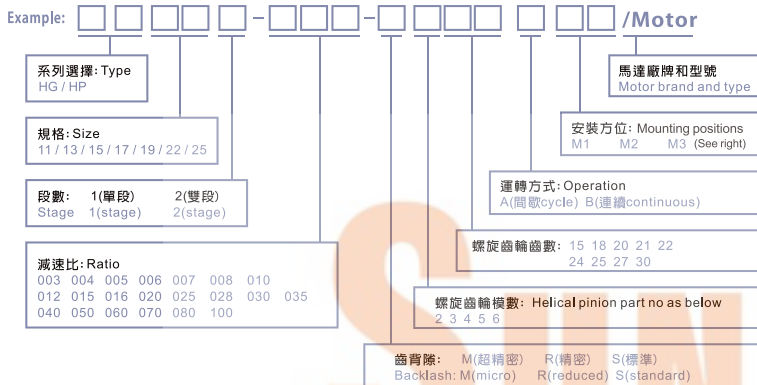


## 安裝方位

Mounting positions

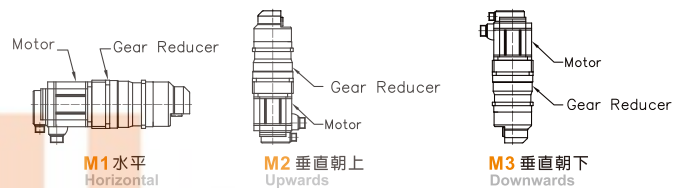


選用範列: **H G 1 1 1 - 0 0 5 - R 2 1 8 A M 1** /MITSUBISHI/HCSF5102

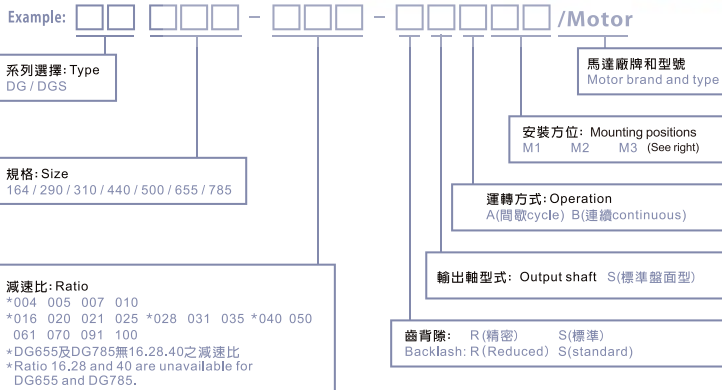


## 安裝方位

Mounting positions

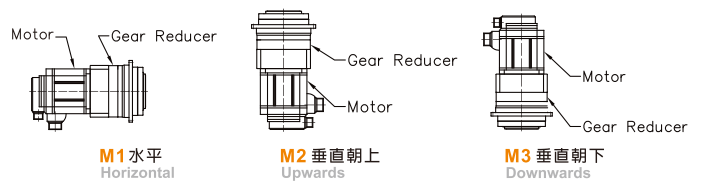


選用範列: **D G 1 6 4 - 0 0 5 - R S A M 1** /MITSUBISHI-HC-KFS43

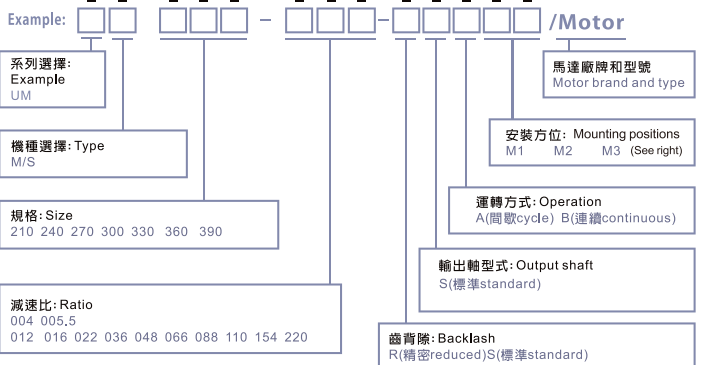


## 安裝方位

Mounting positions



選用範列: **U M 2 1 0 - 1 1 0 - R S A M 1** /MITSUBISHI-HC-KFS43



## 安裝方位

Mounting positions

