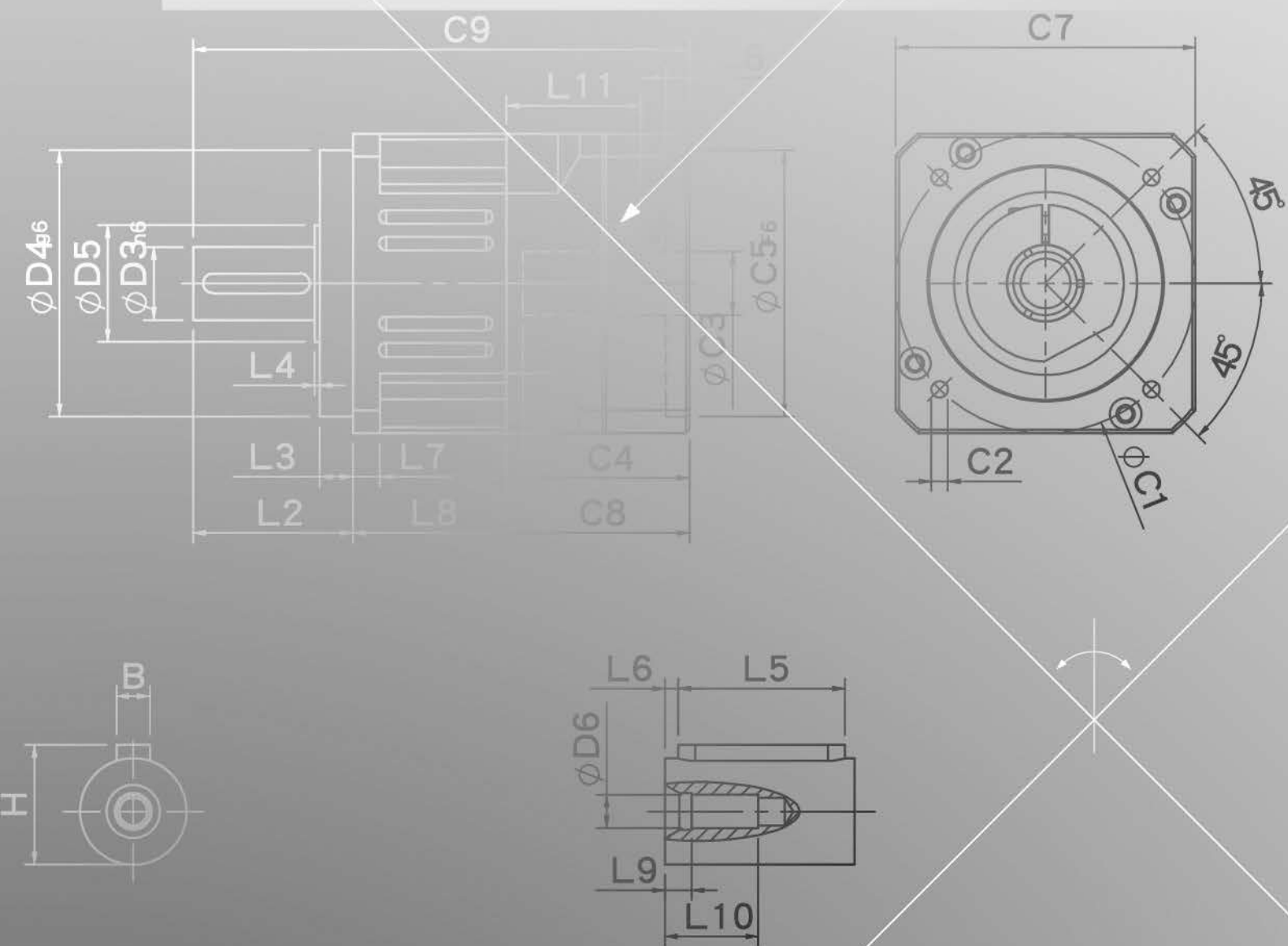
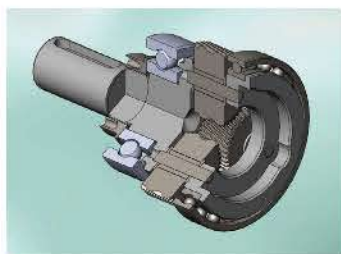


PHL SERIES



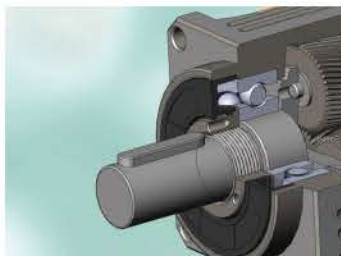


PHL SERIES FEATURES PHL系列 產品特點



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 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.



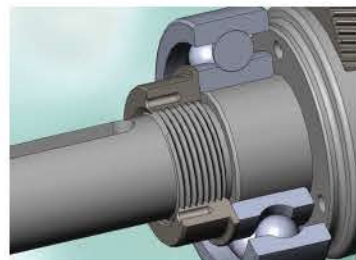
本體獨家採用最新高科技材料，齒箱與內環齒一體鍛造成形，再經德國頂級插齒機加工。

具有高精度，高扭力，耐磨耗等特點。

先進無電鍍鍍表面處理，耐刮，耐腐蝕，最適合高科技設備嚴苛要求。

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.



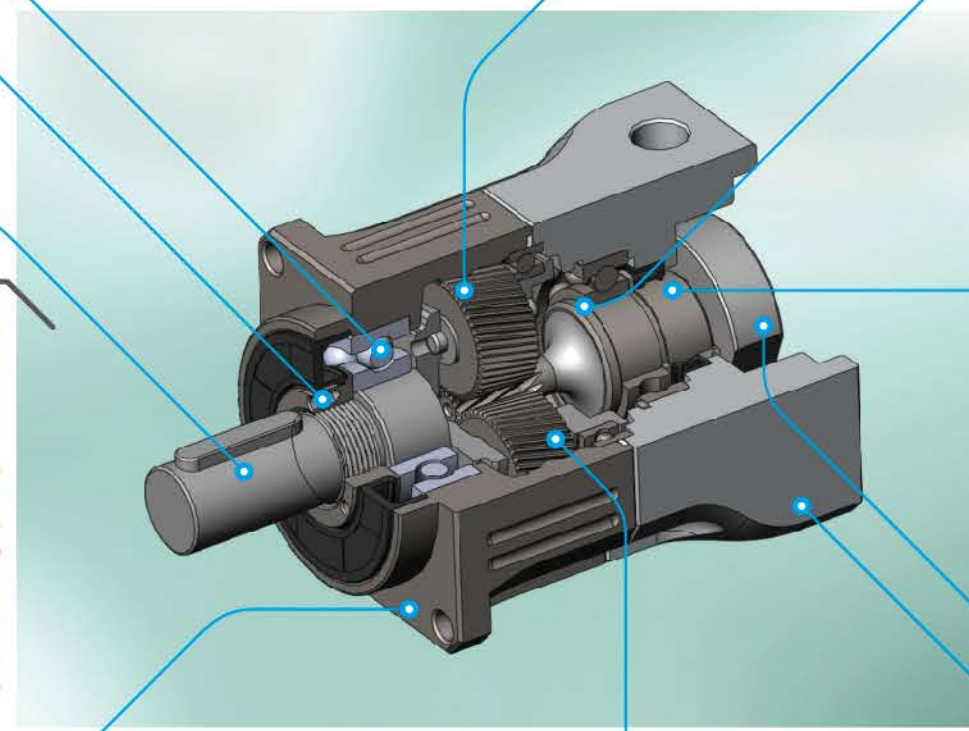
齒輪材質選用高級合金鋼，獨特熱處理至最佳硬度，並經過齒型研磨加工，以獲得最佳的精度、高耐磨耗及高耐衝擊韌性。

Alloy steel gear with unique heat treatment. 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心度。

The sun gear bearing is placed directly into the planetary arm bracket, the overall mechanical structure designed to ensure concentricity of the transmission components.



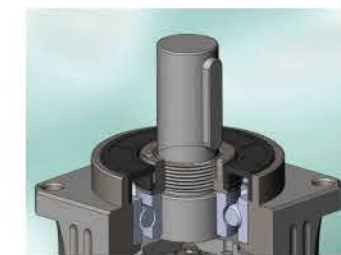
PHL系列採用螺旋齒輪設計，提升齒形嚙合率達30%以上，特殊螺旋角設計，可降低軸向推力、容許伺服馬達高轉速的輸入，達到最大扭力輸出。精密齒輪設計及專業齒輪加工，製造出低運轉背隙、高效率、運轉平順、低噪音及長壽命的行星減速機。

PHL series helical gear design, enhance tooth engagement rate of 30% or more, special helix design, which reduces the axial thrust, allowing high-speed servo motor input, maximum torque output. Precision gear design and professional gear processing create a low backlash operation, high efficiency, smooth running, low noise and long life of the planetary gear.



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.



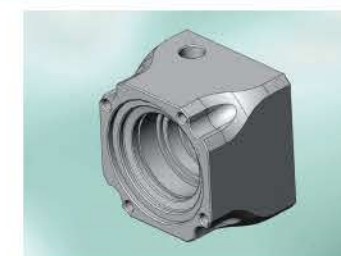
採用與世界知名品牌同欸潤滑油，搭配高科技油封設計，上唇為防塵唇，下唇為防油唇。採IP65防護等級的密封設計，不洩漏、永久免保養。

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.

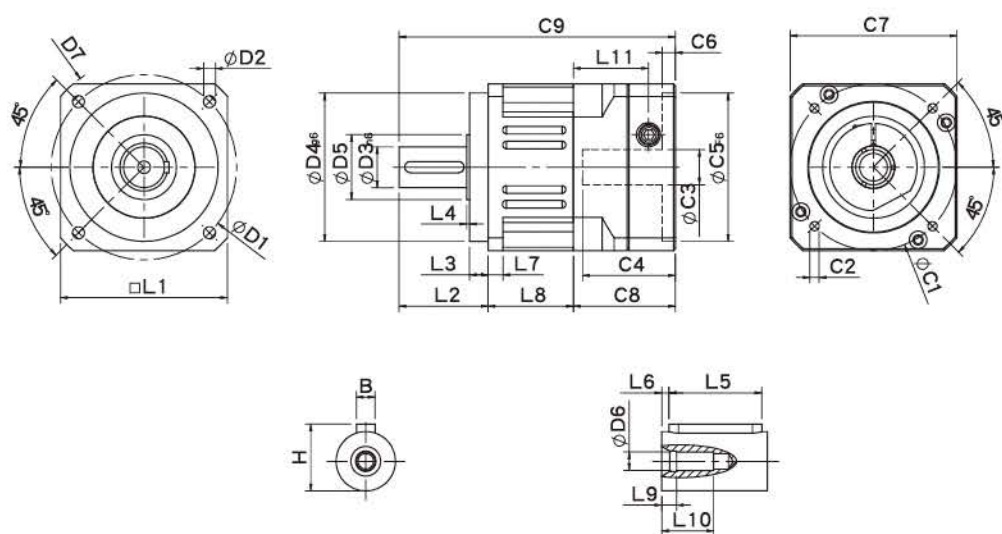


先進馬達連接板設計，配合入力軸襯套，安裝容易，可與各種廠牌之伺服、步進馬達完美搭配組合。

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

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

PHL Single Stage Dimensions PHL單段外型尺寸圖



Specifications 規格

Unit:mm

尺寸 Dimensions	PHL42	PHL60	PHL90
D1	50	70	100
D2	3.4	5.5	6.5
D3 _{h6}	13	16	22
D4 _{g6}	35	50	80
D5	15	25	35
D6	M4x0.7P	M5x0.8P	M8x1.25P
D7	56	80	118
L1	42.6	60	90
L2	26	37	48
L3	5.5	7	10
L4	1	1.5	1.5
L5	15	25	32
L6	2	2	3
L7	4	6	8
L8	28.3	37	46
L9	4	4	4.5
L10	14	16.5	20.5
L11	29	35.5	40.5
C1 ²	46	70	90
C2 ²	M4x0.7P	M5x0.8P	M6x1.0P
C3 ²	≤8	≤14	≤19/≤24
C4 ²	27	37	47
C5 ² _{F6}	30	50	70
C6 ²	4	4	6
C7 ²	42.6	60	90
C8 ²	38.5	46	55
C9 ²	92.8	120	149
B	5	5	6
H	15	18	24.5

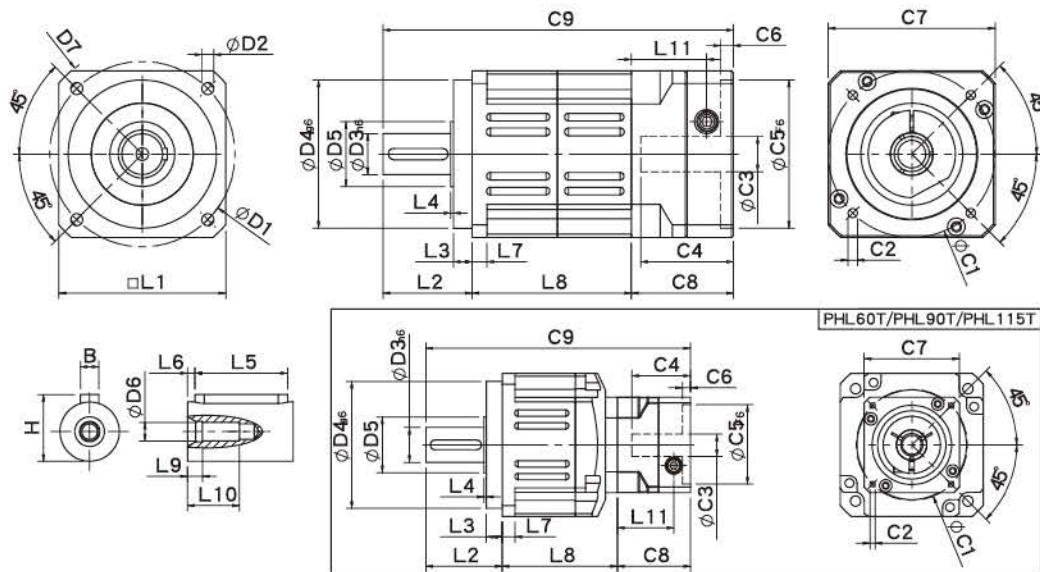
★ C1~C9是公製標準馬達連接板尺寸,請依所選用的馬達決定。

★ 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 motor flange.

★ Specification subject to change without notice.

PHL Double Stage Dimensions PHL雙段外型尺寸圖



Specifications 規格

Unit:mm

尺寸 Dimensions	PHL42	PHL60	PHL60T	PHL90	PHL90T
D1	50	70		100	
D2	3.4	5.5		6.5	
D3 _{h6}	13	16		22	
D4 _{g6}	35	50		80	
D5	15	25		35	
D6	M4x0.7P	M5x0.8P		M8x1.25P	
D7	56	80		118	
L1	42.6	60		90	
L2	26	37		48	
L3	5.5	7		10	
L4	1.5	1.5		1.5	
L5	15	25		32	
L6	2	2		3	
L7	4	6		8	
L8	55.3	70	65.5	86	78.5
L9	4	4		4.5	
L10	14	16.5		20.5	
L11	29	35.5	29	40.5	35.5
C1 ²	46	70	46	90	70
C2 ²	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M5x0.8P
C3 ²	≤8	≤14	≤8	≤19/≤24	≤14
C4 ²	27	37	27	47	37
C5 ² _{F6}	30	50	30	70	50
C6 ²	4	4	4	6	4
C7 ²	42.6	60	42.6	90	60
C8 ²	38.5	46	38.5	55	46
C9 ²	119.8	153	141	189	172.5
B	5	5		6	
H	15	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 motor flange.

★ Specification subject to change without notice.

● PHL Specifications Table PHL性能規格共表

規格 Specifications		節數 Stage	減速比 Ratio	PHL-42	PHL-60	PHL-90
額定輸出力矩 T _{2N} Nominal Output Torque	N • m	1	3	19	53	145
			4	20	55	150
			5	17	54	140
			6	15	46	135
			7	14	44	125
			8	12	41	110
			9	11	37	95.0
			10	11	37	95.0
		節數 Stage	減速比 Ratio	PHL-42	PHL-60(T)	PHL-90(T)
		2	15	19	53	145
			20	20	55	150
			25	17	54	140
			30	17	54	140
			35	17	54	140
			40	17	54	140
			45	17	54	140
			50	17	54	140
			60	15	46	135
70	14		44	125		
80	12		41	110		
90	11		37	95		
100	11	37	95			
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
最大輸入轉速 n _{1max} Max. Input Speed	rpm	1,2	3-100	10000	10000	8000
超精密背隙 Micro Backlash P0	arcmin	1	3-10	≤ 1	≤ 1	≤ 1
		2	12-100	≤ 3	≤ 3	≤ 3
精密背隙 Precision Backlash P1	arcmin	1	3-10	≤ 3	≤ 3	≤ 3
		2	12-100	≤ 5	≤ 5	≤ 5
標準背隙 Standard Backlash P2	arcmin	1	3-10	≤ 5	≤ 5	≤ 5
		2	12-100	≤ 7	≤ 7	≤ 7
扭轉剛性Torsional Rigidity	N • m /arcmin	1,2	3-100	2.5	6	12
容許徑向力 F _{2re} ¹ Max. Radial Load	N • m	1,2	3-100	760	1570	2780
容許軸向力 F _{2aB} ¹ Max. Axial Load	N	1,2	3-100	410	750	1870
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	1.3	3.5
		2	12-100	0.9	2.0/1.6	5.6/3.9
安裝方向 Mounting Position	-	1,2	3-100	任意方向Any direction		
噪音值 Noise Level ²	dB(A)/1m	1,2	3-100	56	58	60
防護等級 Protection Class	-	1,2	3-100	IP65		
潤滑 Lubrication	-	1,2	3-100	全合成潤滑油 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
1	3	Kg • cm ²		0.03	0.23	0.97
	4			0.02	0.18	0.67
	5			0.02	0.17	0.65
	6/7/8			0.02	0.14	0.60
	9/10			0.02	0.14	0.58
節數Stage	減速比Ratio			PHL-42	PHL-60(T)	PHL-90(T)
2	15/20/25			0.02	0.17(0.02)	0.65(0.17)
	30/35/40			0.02	0.14(0.02)	0.60(0.14)
	45/50/60/70/80/90/100			0.02	0.14(0.02)	0.58(0.14)

* 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 空載重測 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 空載重測 Measured at 3000rpm with no load

※本公司有權對以上數據規格進行設計變更不先行告知。 The above figures/specifications are subject to change without prior notice.

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

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。

SERVO MOTOR GEARHEADS



PHL PHFR PHF PGH PUR PIL PGLH PGL PGC PGE PGRH PGR PGFR PGF PBC PBE PAE PAC PAN PGS PNS