

PHL

PHL premium high precision gearboxes are square mounting flange, caged premium class helical planetary gears in an in-line housing through sizes 90. High torque capacity, quiet operation with backlash as low as <1 arc-min. The PHL high-precision planetary gearbox series have excellent product characteristics such as high efficiency, precision, reliability and long service life, and is most suitable for high-performance applications of precise positioning and high dynamic motion control, such as printing machinery, automation, robotics, etc.

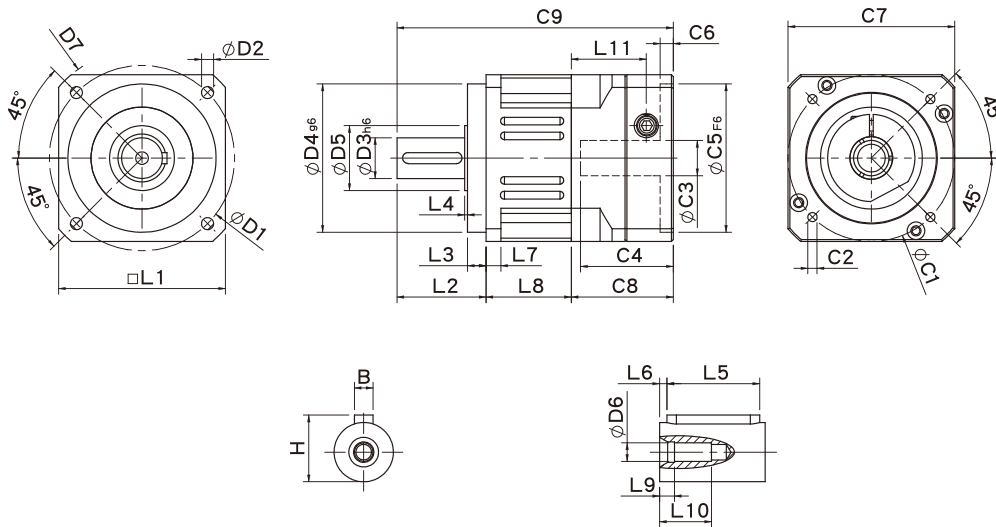


Frame Size (mm)	42, 60, 90
Ratio	3 : 1 - 100 : 1
Nominal Input Speed (rpm)	4000 - 5000
Max Input Speed (rpm)	8000 - 10000
Backlash (arc-min)	1 Stage : 1 - 5 2 Stages : 3 - 7
Noise Level (dBA / 1m)	56 - 60

Features

- ▶ Backlash as low as 1 arc-min, ultimate performance.
- ▶ One-piece planet carrier/output shaft, high rigidity and radial load capacity.
- ▶ Hardened and ground gearing, high wear resistance and impact toughness.
- ▶ One-piece ring gear/housing, high precision and torque output.
- ▶ Planets with full needle bearing support.
- ▶ IP65 enclosure and synthetic lubricant, maintenance-free service life.

PHL Single Stage Dimensions



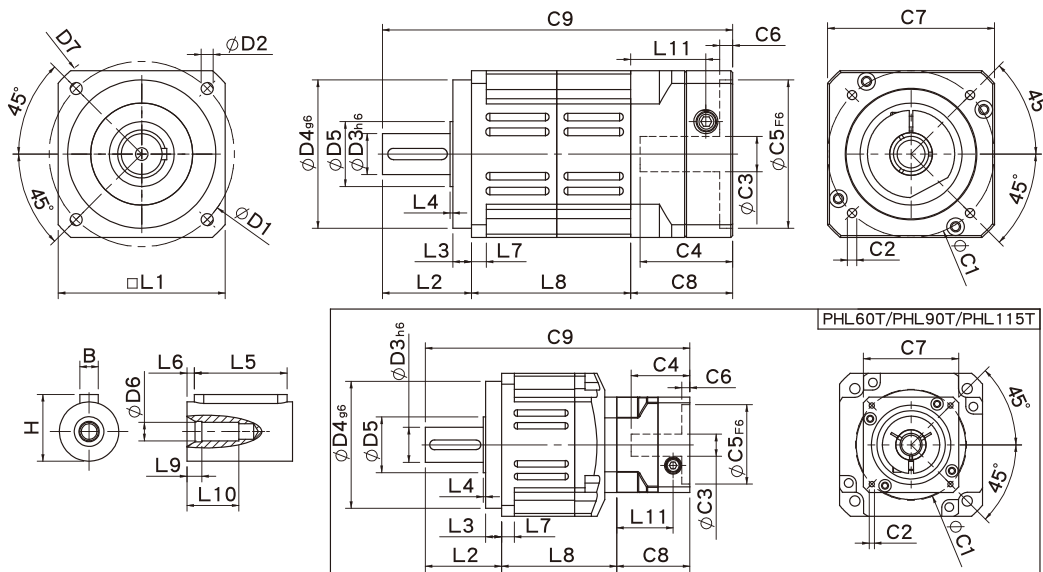
Specifications

Unit:mm

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/≤11	≤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 are motor specific dimensions (metric std shown). Size may vary according to motor flange.
- * Specification subject to change without notice.

PHL Double Stage Dimensions



Specifications

Unit:mm

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/≤11	≤14	≤8/≤11	≤19/≤24	≤14
C4 ²	27	37	27	47	37
C5 ^{2F6}	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 are motor specific dimensions (metric std shown). Size may vary according to motor flange.

* Specification subject to change without notice.

PHL Specifications

Specifications		Stage	Ratio	PHL42	PHL60	PHL90
Nominal Output Torque T_{2N}	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	
		Stage	Ratio	PHL42	PHL60(T)	PHL90(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	95.0		
100	11	37	95.0			
Emergency Stop Torque T_{2NOT}	N•m	(3.0 times of Nominal Output Torque) (*Max. Output Torque T_{2B} = 60% of Emergency Stop Torque)				
Nominal Input Speed n_{1N}	rpm	1,2	3-100	5000	5000	4000
Max. Input Speed n_{1max}	rpm	1,2	3-100	10000	10000	8000
Micro Backlash P0	arcmin	1	3-10	≤ 1	≤ 1	≤ 1
		2	15-100	≤ 3	≤ 3	≤ 3
Precision Backlash P1	arcmin	1	3-10	≤ 3	≤ 3	≤ 3
		2	15-100	≤ 5	≤ 5	≤ 5
Standard Backlash P2	arcmin	1	3-10	≤ 5	≤ 5	≤ 5
		2	15-100	≤ 7	≤ 7	≤ 7
Torsional Rigidity	N•m /arcmin	1,2	3-100	2.5	6	12
Max. Radial Load F_{2rB}^{-1}	N	1,2	3-100	760	1570	2780
Max. Axial Load F_{2aB}^{-1}	N	1,2	3-100	410	750	1870
Operating Temp.	°C	-10°C ~ +90°C				
Service Life	hr	20,000 (10,000 Continuous Operation)				
Efficiency	%	1	3-10	≥ 97%		
		2	15-100	≥ 94%		
Weight	kg	1	3-10	0.6	1.3	3.5
		2	15-100	0.9	2.0/1.6	5.6/3.9
Mounting Position	-	1,2	3-100	Any Direction		
Noise Level ²	dBA/1m	1,2	3-100	56	58	60
Protection Class	-	1,2	3-100	IP65		
Lubrication	-	1,2	3-100	Synthetic Lubricant		
Inertia (J1)						
Stage	Ratio	unit		PHL42	PHL60	PHL90
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
Stage	Ratio			PHL42	PHL60(T)	PHL90(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. Applied to the output shaft center at 100 rpm.
* 2. Environment noise level 30 dB; distance 1m; measured under free loading with input speed 3000 rpm; ratio = 10 (1-stage) or ratio = 100 (2-stage).
※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.