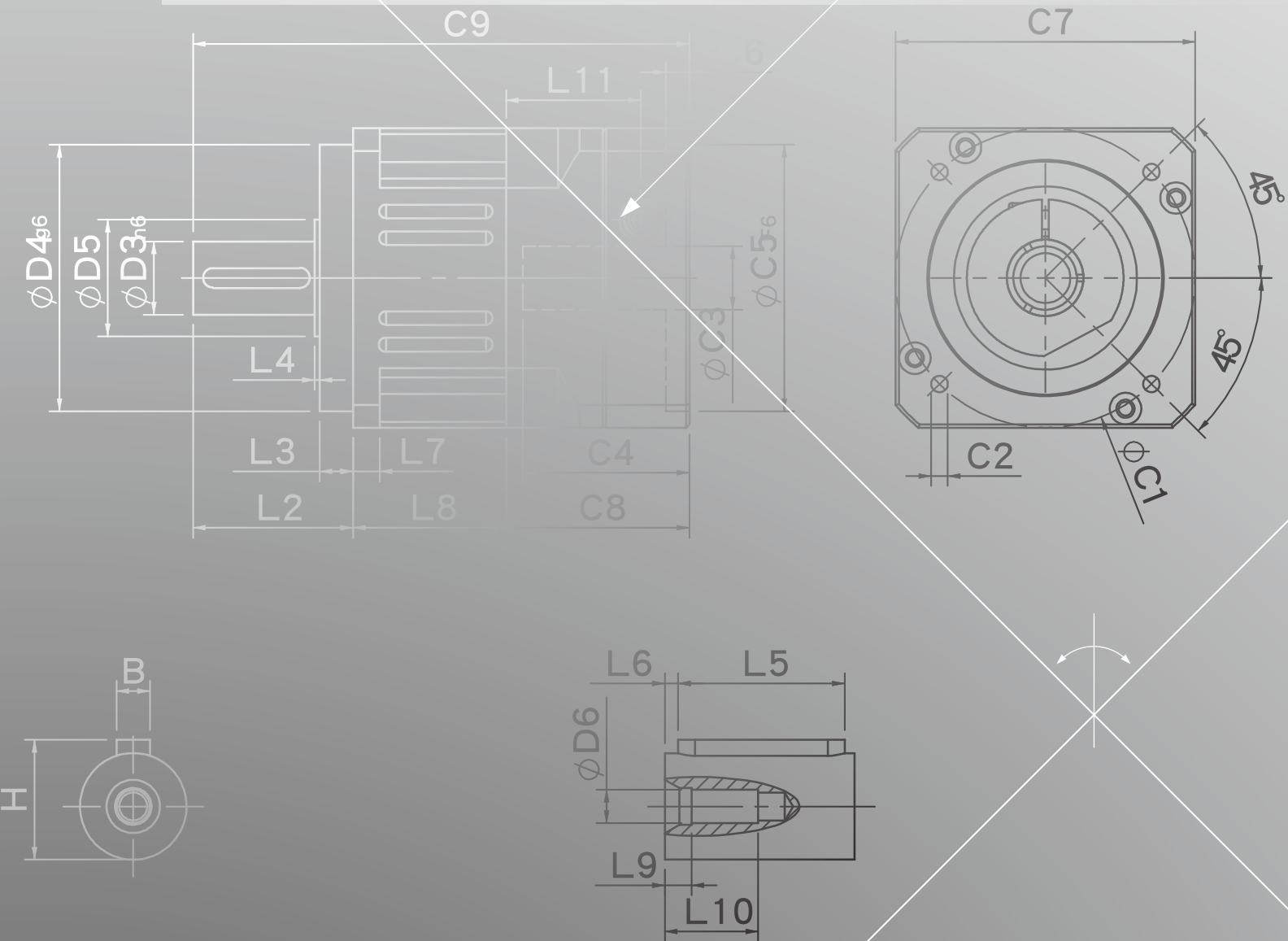
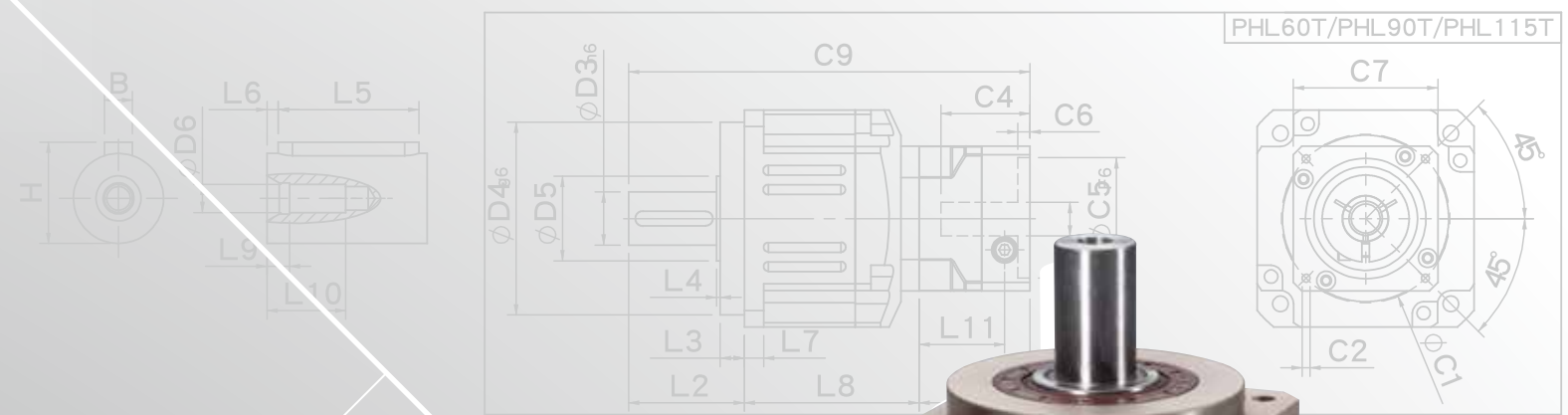
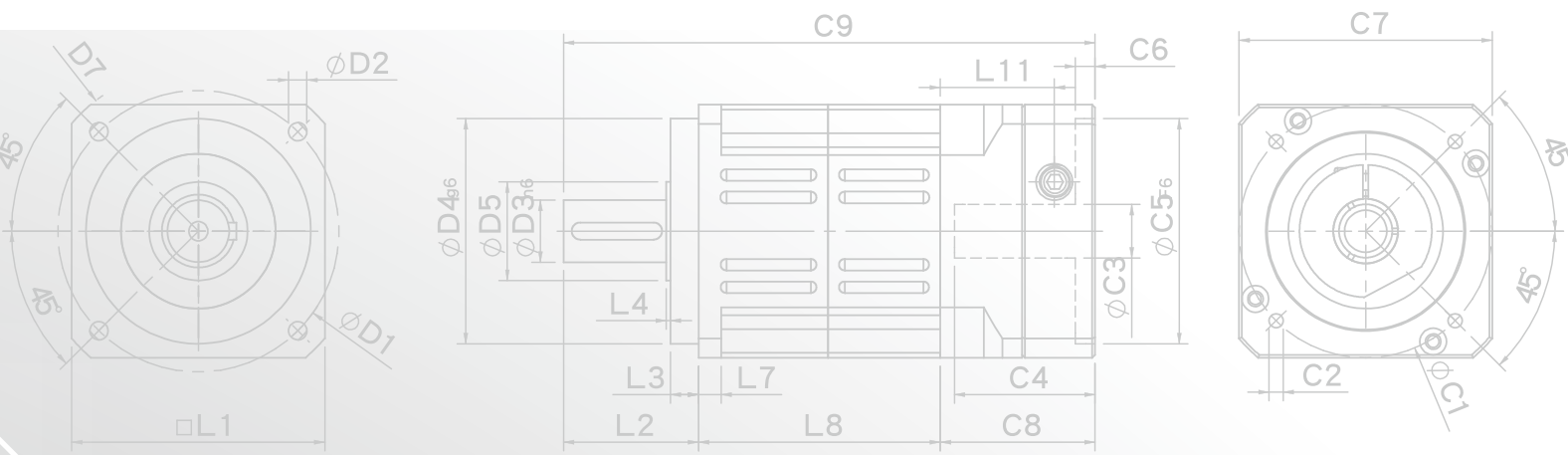
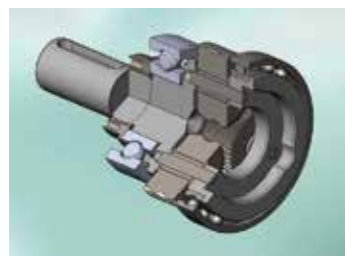


# PHL SERIES





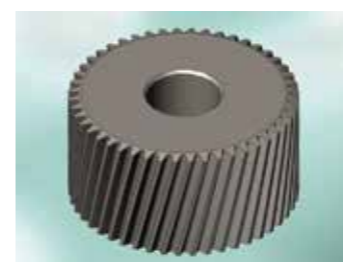
## PHL SERIES FEATURES



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.



Special locking mechanisms designed of the output shaft ensure its integration closely with positioning gear, power transmission efficiency, and eternal precision.



Alloy steel gear with unique heat treatment. Additionally, with gear grinding processing to get the best accuracy, high wear resistance and high impact toughness.



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



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.



**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.**



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.



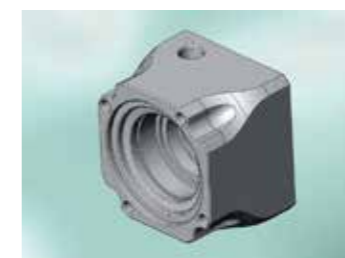
Input-end and motor shaft are coupled through a dynamic balanced collar clamping mechanism to ensure connection interface concentricity and zero slip power transmission at high speed.



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.



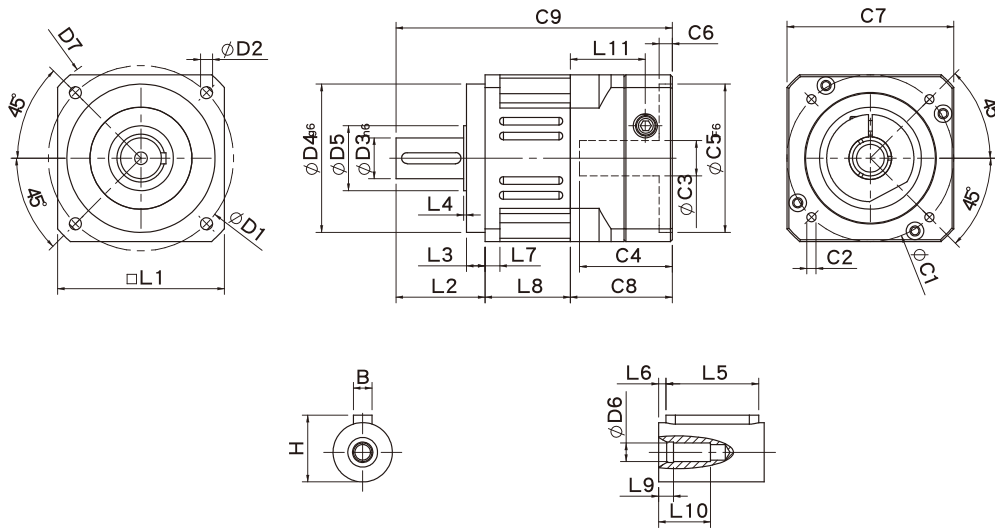
Planet gear transmission interface equipped with needle bearings, full needle roller bearings aligned without retainer achieve maximum exposure but smallest gap tolerances. Enhance over-all gear structure rigid and output torque.



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.

## PHL Single Stage Dimensions



## Specifications

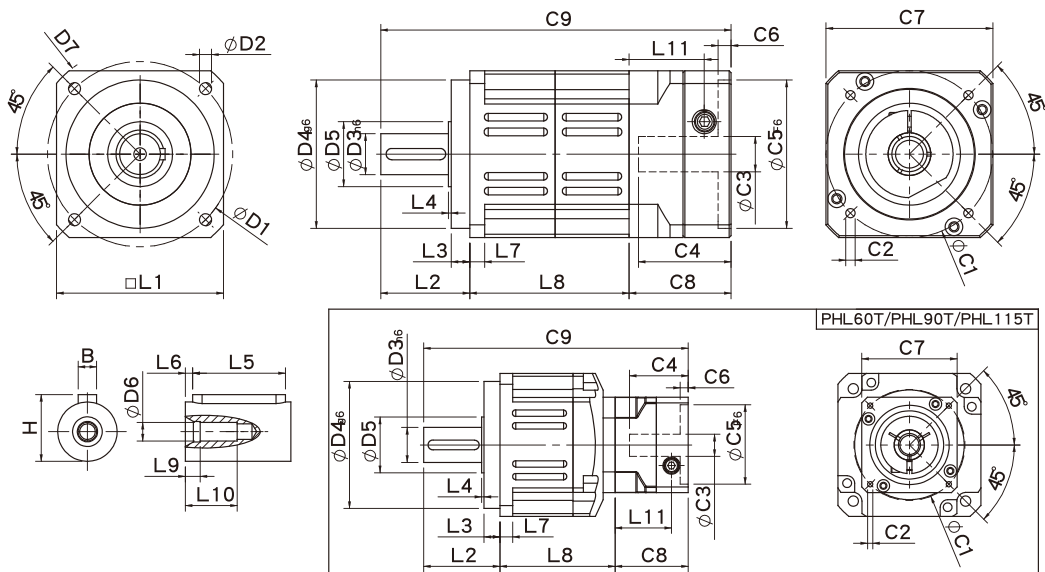
Unit:mm

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 <sup>2</sup>	46	70	90
C2 <sup>2</sup>	M4x0.7P	M5x0.8P	M6x1.0P
C3 <sup>2</sup>	≤8/≤11	≤14	≤19/≤24
C4 <sup>2</sup>	27	37	47
C5 <sup>2</sup> F6	30	50	70
C6 <sup>2</sup>	4	4	6
C7 <sup>2</sup>	42.6	60	90
C8 <sup>2</sup>	38.5	46	55
C9 <sup>2</sup>	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 <sup>2</sup>	46	70	46	90	70
C2 <sup>2</sup>	M4x0.7P	M5x0.8P	M5x0.8P	M6x1.0P	M5x0.8P
C3 <sup>2</sup>	≤8/≤11	≤14	≤8/≤11	≤19/≤24	≤14
C4 <sup>2</sup>	27	37	27	47	37
C5 <sup>2</sup> F6	30	50	30	70	50
C6 <sup>2</sup>	4	4	4	6	4
C7 <sup>2</sup>	42.6	60	42.6	90	60
C8 <sup>2</sup>	38.5	46	38.5	55	46
C9 <sup>2</sup>	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 Table

Specifications		Stage	Ratio	PHL-42	PHL-60	PHL-90
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	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			
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	$\leq 1$	$\leq 1$	$\leq 1$
		2	12-100	$\leq 3$	$\leq 3$	$\leq 3$
Precision Backlash P1	arcmin	1	3-10	$\leq 3$	$\leq 3$	$\leq 3$
		2	12-100	$\leq 5$	$\leq 5$	$\leq 5$
Standard Backlash P2	arcmin	1	3-10	$\leq 5$	$\leq 5$	$\leq 5$
		2	12-100	$\leq 7$	$\leq 7$	$\leq 7$
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	$\geq 97\%$		
		2	12-100	$\geq 94\%$		
Weight	kg	1	3-10	0.6	1.3	3.5
		2	12-100	0.9	2.0/1.6	5.6/3.9
Mounting Position	-	1,2	3-100	Any direction		
Noise Level <sup>2</sup>	dB(A)/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		PHL-42	PHL-60	PHL-90
1	3	Kg • cm <sup>2</sup>		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			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. Applied to the output shaft center @100rpm.						
* 2. Measured at 3000rpm with no load						
※ 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.

# SERVO MOTOR GEARHEADS



PHL

PHFR

PHF

PGH

PUR

PUL

PGLH

PGL

PGC

PGE

PGRH

PCR

PGFR

PGF

PBC

PBE

PAE

PAC

PAN

PGS

PNS