

- 1** Output shaft
Made of high-strength high quality steel for high shaft reliability
- 2** Output shaft bearing
Deep groove ball bearings with contact seals
- 3** Planet gears
Precision zero helix angle gear with optimized profile modifications and crowning; case hardened and hard finished by honing
- 4** Housing with integrated ring gear
Ring gear is case hardened and precision honed for high loadability, minimum wear, consistent backlash
- 5** Sun gear
Precision machined optimized gear profile, case hardened and honed for high loadability, low running noise, minimum wear, and consistent backlash
- 6** Sun gear bearing
Paired deep groove ball bearings
- 7** Motor matching adapter plate
Matches the gear head with virtually any servo motor; made of aluminum for enhanced thermal conductivity
- 8** Clamping ring
Balanced ring, suitable for high rpm, made of steel to allow high clamping forces for safe torque transfer
- 9** Clamping screw
High strength steel screw with special low pitch thread to generate a high clamping force
- 10** PCS System
Patented multiple closed slot Precision Clamping System - most reliable advanced system available today
- 11** Assembly bore
Access bore for the clamping screw
- 12** Bevel gears
Straight tooth bevel gears; hardened



When strengths complement one another

High output torque, high tilting rigidity and moderate backlash: the PLFE series is impressive in many aspects. The economy flange gearboxes combine the compactness of our PLFN with the economical aspects of the PLE gearboxes.

- > Low backlash
- > High output torque - the industry's highest torque density
- > Highest tilting stiffness
- > Precise, easy, and flexible motor mounting (PCS-2 System)
- > Balanced motor pinion
- > High efficiency (up to 96%)
- > 13 ratios 3:1 to 64:1
- > Low noise (< 65 dB(A))
- > Consistent quality (ISO 9001 and 14001)
- > Output flange according to EN ISO 9409
- > Direction of rotation equidirectional
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options



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9	CAD drawings, dimension sheets	www.neugartusa.com
10	Sizing/calculation/selection	NCP Software, free download from the Neugart website

Type-Size		PLFE 64	PLFE 90	PLFE 110	i ⁽¹⁾	Z ⁽²⁾
Nominal (rated continuous duty) Output torque T _{2N} ⁽³⁾⁽⁵⁾	Nm (lbin)	28 (248)	85 (752)	115 (1018)	3	1
		38 (336)	115 (1018)	155 (1372)	4	
		40 (354)	110 (974)	195 (1726)	5	
		18 (159)	50 (443)	120 (1062)	8	
		44 (389)	130 (1151)	240 (2124)	9	
	2	44 (389)	120 (1062)	260 (2301)	12	
		44 (389)	110 (974)	230 (2036)	15	
		44 (389)	120 (1062)	260 (2301)	16	
		44 (389)	120 (1062)	260 (2301)	20	
		40 (354)	110 (974)	230 (2036)	25	
		44 (389)	120 (1062)	260 (2301)	32	
		40 (354)	110 (974)	230 (2036)	40	
		18 (159)	50 (443)	120 (1062)	64	

Type-Size		PLFE 64	PLFE 90	PLFE 110	i ⁽¹⁾	Z ⁽²⁾
Output torque sustainable 30,000 output shaft rotations ⁽³⁾⁽⁵⁾⁽⁸⁾	Nm (lbin)	45 (398)	136 (1204)	184 (1628)	3	1
		61 (540)	184 (1628)	248 (2195)	4	
		64 (566)	176 (1558)	312 (2761)	5	
		29 (257)	80 (708)	192 (1699)	8	
		70 (620)	208 (1841)	384 (3398)	9	
	2	70 (620)	192 (1699)	416 (3682)	12	
		70 (620)	176 (1558)	368 (3257)	15	
		70 (620)	192 (1699)	416 (3682)	16	
		70 (620)	192 (1699)	416 (3682)	20	
		64 (566)	176 (1558)	368 (3257)	25	
		70 (620)	192 (1699)	416 (3682)	32	
		64 (566)	176 (1558)	368 (3257)	40	
		29 (257)	80 (708)	192 (1699)	64	

Gearbox type		PLFE	Z ⁽²⁾
Gearbox life at full load	h	30,000	
Emergency stop torque ⁽⁶⁾	Nm (lbin)	2 - times T _{2N}	
Efficiency at full load ⁽⁷⁾	%	96	1
		94	2
Min. operating temp. ⁽⁴⁾	°C (°F)	-25 (-13)	
Max. operating temp. ⁽⁴⁾		+90 (194)	
Protection class		IP 54	
Lubrication		lifetime lubrication	
Mounting position		any	
Recommended motor flange / shaft tolerance		DIN 42955-N	

(1) Ratio (i=n_{1 rpm high speed side}/n_{2 rpm low speed side})
 (2) Number of gear stages
 (3) Values reference output shaft speed n₂=100 rpm, S1= 100% duty cycle, K_a=1 application factor and T=30°C, 86°F ambient temperature
 (4) Measured at the middle of the gearbox housing surface
 (5) Dependent on the motor shaft diameter
 (6) Permissible about 1000 times during the gearbox life
 (7) Ratio dependent; based on n₂=100 rpm output shaft speed
 (8) Permissible for 30,000 output shaft revolutions; see page 80

Type-Size		PLFE 64	PLFE 90	PLFE 110	Z ⁽²⁾
Standard backlash	arcmin	< 16	< 9	< 8	1
		< 20	< 14	< 12	2
Fr _{max.} for 20,000 h ⁽³⁾⁽⁴⁾	N (lb)	550 (124)	1400 (315)	2400 (540)	
Fa _{max.} for 20,000 h ⁽³⁾⁽⁴⁾		1200 (270)	3000 (675)	3300 (743)	
Fr _{max.} for 30,000 h ⁽³⁾⁽⁴⁾		500 (113)	1200 (270)	2100 (473)	
Fa _{max.} for 30,000 h ⁽³⁾⁽⁴⁾		1200 (270)	3000 (675)	3300 (743)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	18 (159)	34 (301)	93 (823)	1
		12 (106)	25 (221)	68 (602)	2
Weight	kg (lb)	1.1 (2.43)	2.9 (6.39)	7.0 (15.44)	1
		1.5 (3.31)	3.3 (7.28)	9.0 (19.85)	2
Running noise ⁽⁵⁾	dB(A)	58	60	65	
Max. recommended input speed ⁽⁶⁾	min ⁻¹ (rpm)	13000	7000	6500	

Type-Size		PLFE 64	PLFE 90	PLFE 110	i ⁽¹⁾
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm ⁽⁶⁾⁽⁷⁾	min ⁻¹ (rpm)	3600	2750	2450	3
		4450	2800	2550	4
		4500	3400	2650	5
		4500	4000	3500	8
		4500	4000	3200	9
		4500	4000	3300	12
		4500	4000	3500	15
		4500	4000	3500	16
		4500	4000	3500	20
		4500	4000	3500	25
		4500	4000	3500	32
		4500	4000	3500	40
		4500	4000	3500	64

Type-Size		PLFE 64	PLFE 90	PLFE 110	i ⁽¹⁾
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm ⁽⁶⁾⁽⁷⁾	min ⁻¹ (rpm)	3000	1900	1700	3
		3200	1800	1700	4
		3650	2250	1700	5
		4500	4000	3250	8
		4150	2500	2000	9
		4500	3200	2000	12
		4500	4000	2650	15
		4500	3800	2450	16
		4500	4000	2900	20
		4500	4000	3500	25
		4500	4000	3500	32
		4500	4000	3500	40
		4500	4000	3500	64

⁽¹⁾ Ratio ($i = n_1 \text{ rpm high speed side} / n_2 \text{ rpm low speed side}$)

⁽²⁾ Number of gear stages

⁽³⁾ Values reference output shaft speed $n_2 = 100 \text{ rpm}$, S1= 100% duty cycle, $K_A = 1$ application factor and $T = 30^\circ\text{C}$, 86°F ambient temperature

⁽⁴⁾ Reference to the rotating output flange face

⁽⁵⁾ Sound pressure level measured 1 m from the gearbox for ratio 5:1 at 3000 input rpm and no load

⁽⁶⁾ Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required

⁽⁷⁾ Exact definition see page 81

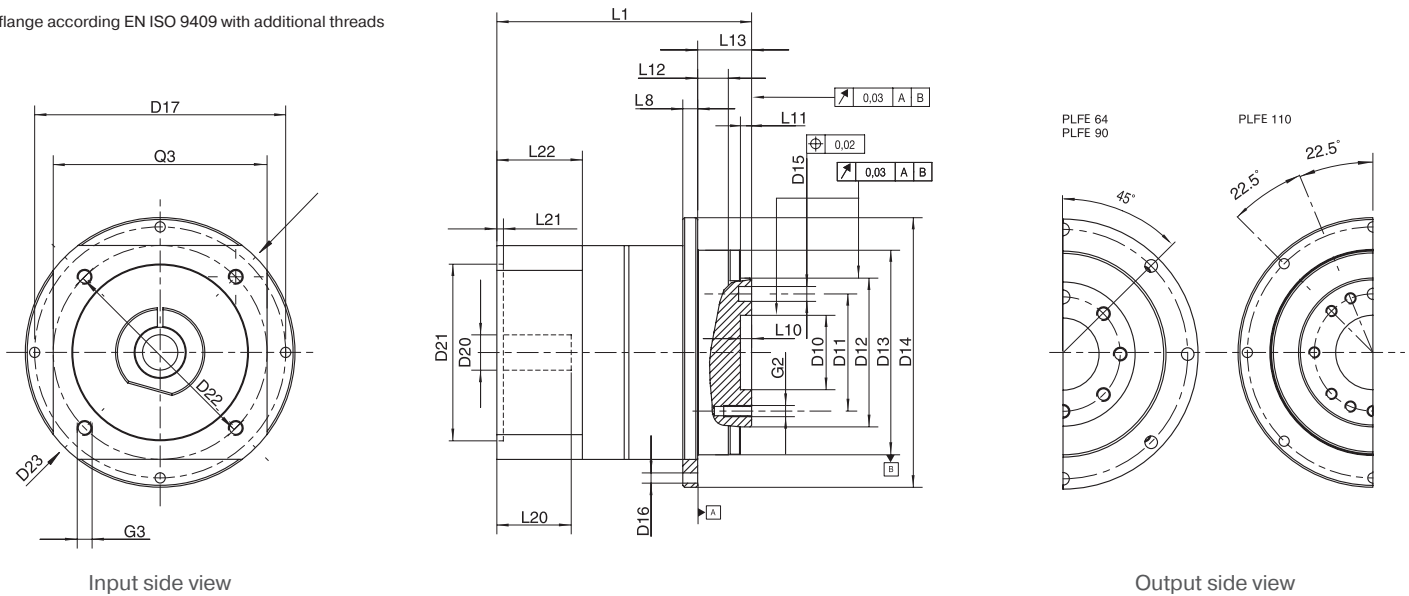


Type-Size		PLFE 64	PLFE 90	PLFE 110	i ⁽¹⁾
Mass moment of inertia ⁽²⁾	kgcm ² (lbin s ² x 10 ⁻⁴)	0.183 (1.62)	1.01 (8.94)	3.43 (30.36)	3
		0.123 (1.09)	0.67 (5.93)	2.28 (20.18)	4
		0.097 (0.86)	0.53 (4.69)	1.84 (16.28)	5
		0.071 (0.63)	0.41 (3.63)	1.45 (12.83)	8
		0.145 (1.28)	0.79 (6.99)	2.87 (25.40)	9
		0.134 (1.19)	0.75 (6.64)	2.75 (24.34)	12
		0.087 (0.77)	0.73 (6.46)	2.68 (23.72)	15
		0.101 (0.89)	0.54 (4.78)	1.96 (17.35)	16
		0.084 (0.74)	0.45 (3.98)	1.84 (16.28)	20
		0.084 (0.74)	0.44 (3.89)	1.64 (14.51)	25
		0.074 (0.65)	0.46 (4.07)	1.42 (12.57)	32
		0.073 (0.65)	0.46 (4.07)	1.40 (12.39)	40
		0.071 (0.63)	0.45 (3.98)	1.38 (12.21)	64

⁽¹⁾ Ratio (i=n_{1 rpm high speed side}/n_{2 rpm low speed side})

⁽²⁾ The moment of inertia relates to the high speed side (typically motor shaft)

flange according EN ISO 9409 with additional threads



Input side view

Output side view

Type-Size		PLFE 64	PLFE 90	PLFE 110	Z ⁽²⁾
All dimensions in mm					
D10 Pilot diameter	H7	20	31.5	40	
D11 Motor matching bolt circle diameter		31.5	50	63	
D12 Pilot diameter	h7	40	63	80	
D13 Pilot diameter		64	90	110	
D14 Outside diameter		86	118	145	
D15 Bore x depth	H7	5x6	6x7	6x7	
D16 Pinion bore diameter		4.5	5.5	5.5	
D17 Motor matching bolt circle diameter		79	109	135	
D20 Pinion bore diameter ⁽¹⁾⁽⁴⁾		9	14	19	
D21 Motor centering pilot diameter ⁽¹⁾		40	80	95	
D22 Motor matching bolt circle diameter ⁽¹⁾		63	100	115	
D23 Motor matching adapter diagonal		80	116	145	
G2 Thread x depth		7xM5x7	7xM6x10	11xM6x12	
G3 Mounting hole thread x depth ⁽¹⁾	4x	M5x12	M6x15	M8x20	
L1 Overall length ⁽³⁾		69.5	99	125	1
		82	116.5	152	2
L8 Flange width		4	7	8	
L10 Length of centering		4	6	6	
L11 Pilot depth		3	6	6	
L12 Pilot depth		7	10	10	
L13 Length of output flange		19.5	30	29	
L20 Reference motor shaft length ⁽³⁾		23	30	40	
L21 Motor pilot depth		2.5	3.5	3.5	
L22 Reference motor adapter flange width ⁽³⁾		24.5	33.5	47.5	
Q3 Motor adapter square ⁽¹⁾	□	60	90	115	

(1) Dimensions reference to the mounted motor-type, see page 74

(2) Number of gear stages

(3) For longer motor shaft > L20, actual minimal L22 dimension = L22 + (Motor shaft length - L20)

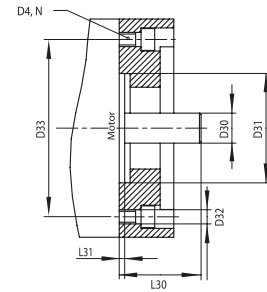
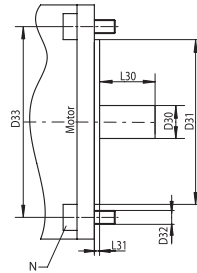
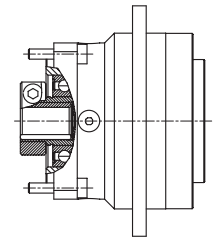
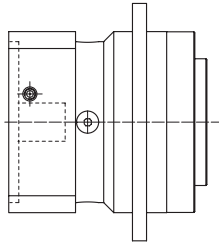
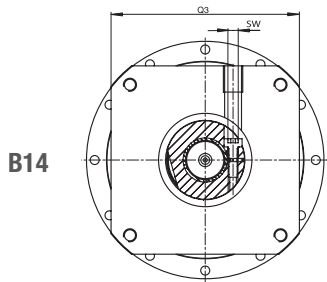
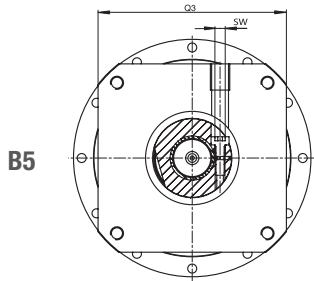
(4) For shaft fit j6 to k6

OP 2: Motor Mount option

Note: B5 mounting depicted;

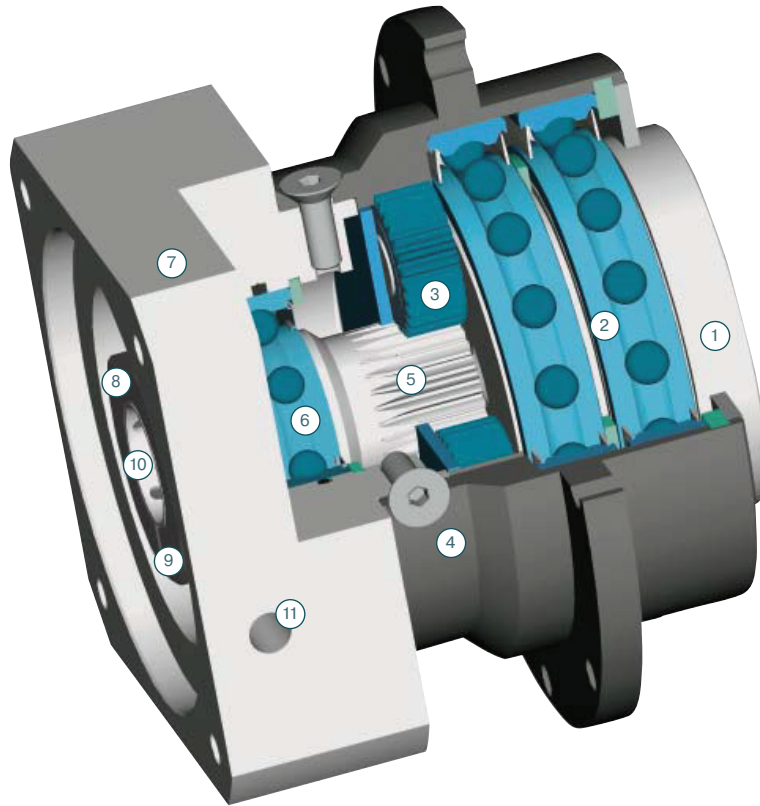
B14 motor mounting requires special/custom motor adapter

See page **77** for other options



Type-Size		PLFE 64		PLFE 90		PLFE 110		Z ⁽²⁾
D4 Motor mounting hole diameter ⁽³⁾		any		any		any		
D30 Motor shaft diameter/ Available pinion bores / bushings ⁽¹⁾⁽⁵⁾	mm	6/6.35/8/9/9.525/ 11/14/15.875 16/19		9.525/10/11/12/12.7/ 14/15.875 16/19/22/24		11/12.7/14/15.875/16/19/ 22/24/28/32/35		
D31 Motor pilot diameter ⁽³⁾		any		any		any		
D32 Motor bolt hole diameter ⁽³⁾		any		any		any		
D33 Hole circle diameter ⁽³⁾		any		any		any		
D34 Output flange diagonal ⁽¹⁾	mm	80		116		145		
G4 Motor mounting thread size		any		any		any		
L30 Min. motor shaft length ⁽¹⁾	mm	16 (19 ⁽⁶⁾)		19 (21 ⁽⁷⁾)		21 (26 ⁽⁸⁾)		
L31 pilot depth		any		any		any		
N Number of bolt holes		4		4		4		
Q3 Flange square ⁽¹⁾	□	60		90		115		
Recommended max. motor weight ⁽⁴⁾	kg (lb)	3.5 (7.72)		9 (19.85)		16.5 (36.38)		
Motor type ⁽¹⁾		B5/B14		B5/B14		B5/B14		
Recommended clamping screw tightening torque	Nm (lbin)	4.5 (40)	9.5 (84)	9.5 (84)	16.5 (146)	16.5 (146)	40 (354)	
SW wrench width	mm	3	4	4	5	5	6	

(1) Other dimensions on inquiry
 (2) Number of gear stages
 (3) Provided that flange dimensions are compatible
 (4) In horizontal and stationary mounting position
 (5) Shaft fit: j6; k6
 (6) D30 >14 mm
 (7) D30 >19 mm
 (8) D30 >24 mm



- 1** Output flange shaft
High strength one piece planet carrier & output shaft
- 2** Output shaft bearing
Large deep groove ball bearings with contact seals
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Precision zero helix angle gear with optimized profile modifications and crowning; case hardened and hard finished by honing
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High speed ball bearings in floating arrangement, eliminating thrust loads from thermal expansion, and yet providing exact positioning for easy mounting
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Access bore for the clamping screw