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Power. Precision. Partnership

precision gearboxes

NEUGART

Introduction

Impress with power and precision.
Inspire with partnership.

Dear Sir or Madam,
Power, precision and partnership – these values have guided our business philosophy and our work attitude for over 80 years. We are pleased to present you our re-designed and newly structured catalog, listing our product range and demonstrating our experience and performance.

Our offered product range includes numerous innovative, technologically mature, and highly reliable geared solutions for your power transmission, automation, or precisely controlled motion applications.

The six standard planetary gear series Neugart offers cover a wide range of applications; from highest precision and performance to highest economy. As a technology partner, we also provide customized solutions; specialized, custom designed gearboxes, or high precision gearing parts – tailored precisely to your specific needs.

Please contact us with any questions about the new catalog, our products, or services – we appreciate every opportunity to assist and meet your automation, precise motion and power transmission requirements.

Bernd Neugart
Managing partner

Thomas Herr
Managing partner

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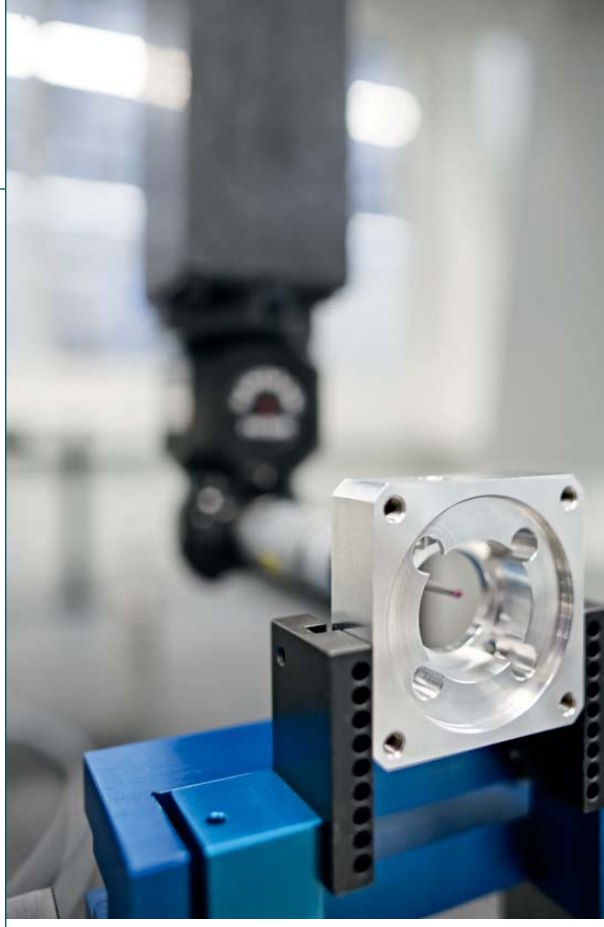
Perfection – in every detail. Our products.



Powerful and efficient:
Our precision planetary gearboxes.

Whether machine tools, precision die-casting machines, packaging, printing, textile machines, automation technology, or robotic painting systems:
Our precision planetary gearboxes are uniquely suited for your demanding applications, offering exceptional reliability. We offer more than just “standard” and we are continuously enhancing our products.

Innovative and individual:
Our specialized gearboxes.

Our custom, application specific, designs offer the highest performance, reliability, space saving compactness, and optimal fit. The gearboxes, designed by the experienced specialists of our engineering and R&D departments, will satisfy your most demanding, complex requirements, in virtually any application field.
Your benefit: Our designs are based on long years of well-proven experience, combined with the advantage of integrating the newest state-of-the-art methods and solutions.
Neugart’s 80+ years of dedication to excellence in gearing means that our custom components are second to none.

Reliable and highly precise:
Our gear parts.

We offer you numerous additional components relating to drive technology. Perfect for your needs and demands.

We offer
- Broad product range – standard gearboxes, as well as custom gearboxes and geared parts.
- Six highly flexible standard series – with many available options.
- Custom gearboxes – tailor-made for your specific requirements.
- Geared parts – we offer wide range of machining capabilities from hobbling to honing.
- High quality and flexibility – short product development and lead times

Power – at a high level.
Our quality.

Your satisfaction is our measuring stick, the quality of our products and services are always our top priority.

With our quality and environmental policy, we secure and expand our economic success in all international markets.

We are:

> Goal oriented.
Our concrete quality goals are the responsibility of the management and all employees.

> Committed.
High emphasis is on developing and maintaining motivated, qualified employees and optimized teams. In addition to ongoing education and training, our employees are given the authority and responsibility for their activities.

> Consistent.
We have a process of continuous improvements in place – and we combine the large steps of innovation by introducing new technologies with the small steps of continuous optimization.

> Verifiable.
We maintain and document a comprehensive quality and environmental management system that comprises all phases of the manufacturing of goods and services. All processes relevant for design, manufacturing quality management are recorded in the documentation of or QM/EM system.

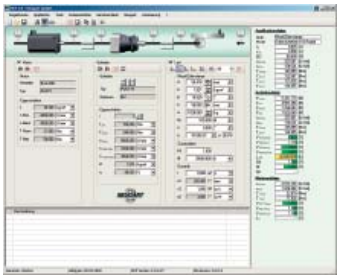
Your added benefit.
Our service.

We don‘t just make products; we create solutions – functional, economical and forward-looking. Therefore we provide, in close cooperation with our customers, a high level of application/product oriented service.

> From one source:
From consulting to development.
Your task, our job: we provide consulting and develop solutions for you and with you. More than 5% of our skilled employees are working in product research, development, and design.

> At the most current level:
Know-how and technology.
You can trust in the most innovative solutions as well as proven manufacturing methods and know-how by our highly skilled employees. NCP, our essential software drive train design and optimizing software, is available to you at no cost. Our website offers comprehensive download of information, including CAD drawings, dimension sheets, manuals, and instructions.

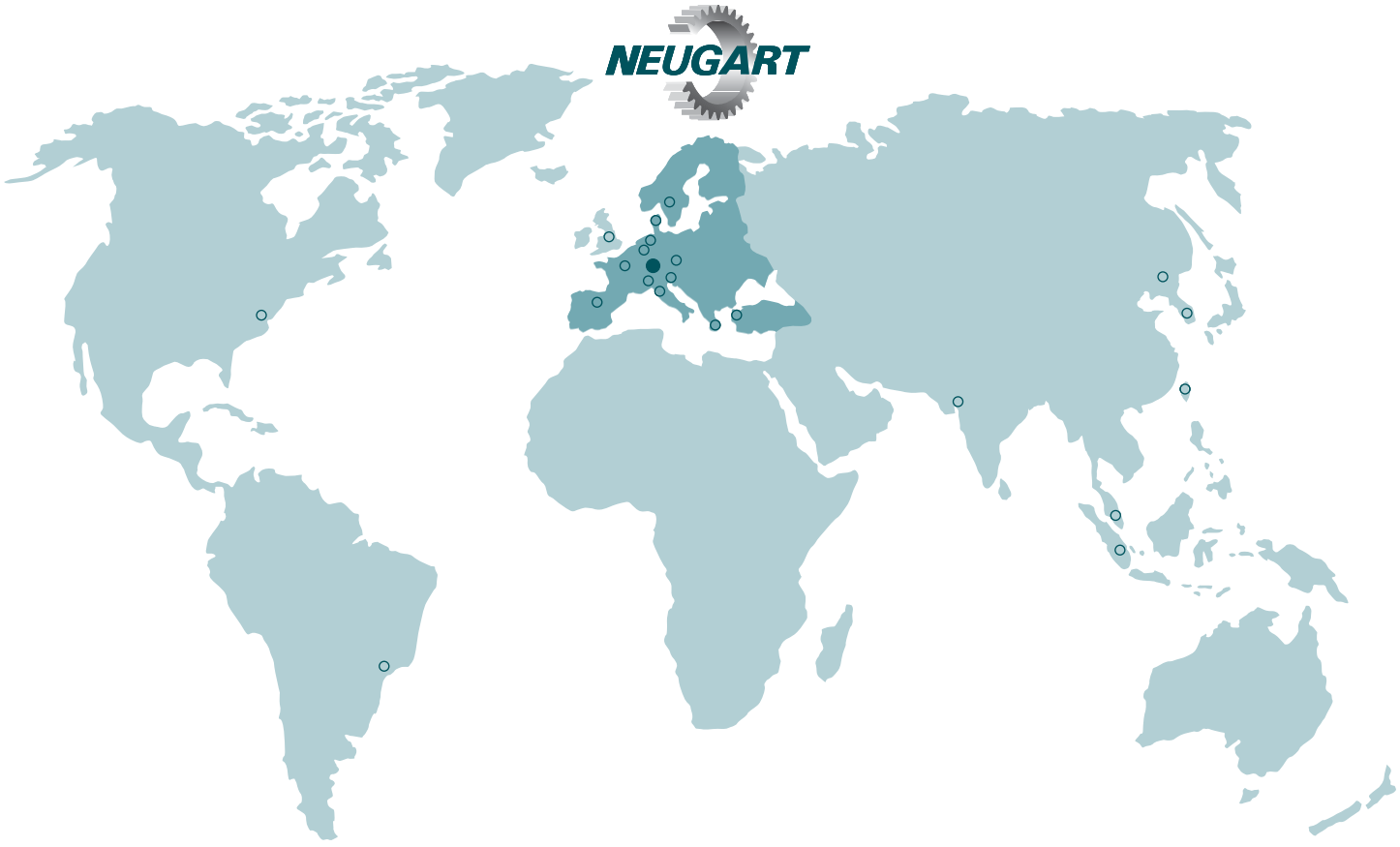
> In all circumstances:
Focus on efficiency.
You will benefit from our exceptional value; best performance at fair prices and ongoing cost optimization. With our recently expanded production facility, we guarantee optimal delivery times for our standard products.



Global support.
Our network.

Our exceptional product quality, support and service is appreciated worldwide: We are represented by subsidiaries or sales and service representatives in virtually every industrialized region of the world.

All key components of our products are exclusively manufactured in Germany. From assembly plants in the USA and China, we provide regional support to our customers, with a high level of flexibility, offering short delivery times and meeting local requirements.



Precision on the highest level

The PLN series is the standard Neugart inline high precision planetary gearhead for applications with very high precision requirements. Whether high torque density, minimal transmission error, low operating noise, lowest backlash, or exceptional reliability... – the PLN series satisfies all these requirements in every application.

- > Low backlash <3 arcmin (<1 arcmin optional)
- > High output torque – the industry's highest torque density
- > Precise, easy, and flexible motor mounting (PCS-2 system)
- > Balanced motor pinion
- > High efficiency (up to 98%)
- > Ground and honed gearing
- > 14 ratios 3:1 to 100:1
- > Low noise (<58 dB(A))
- > Consistent quality (ISO 9001 and 14001)
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options

Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N}[3][5]	Nm (lbin)	45 (398)	100 (885)	230 (2036)	450 (3983)	1000 (8850)	3	1
		60 (531)	140 (1239)	300 (2655)	600 (5310)	1300 (11505)	4	
		65 (575)	140 (1239)	260 (2301)	750 (6638)	1600 (14160)	5	
		40 (354)	80 (708)	150 (1328)	450 (3983)	1000 (8850)	8	
		27 (239)	60 (531)	125 (1106)	305 (2699)	630 (5576)	10	
		68 (602)	110 (974)	250 (2213)	780 (6903)	1500 (13275)	12	2
		68 (602)	110 (974)	250 (2213)	780 (6903)	1500 (13275)	15	
		77 (681)	150 (1328)	300 (2655)	1000 (8850)	1800 (15930)	16	
		77 (681)	150 (1328)	300 (2655)	1000 (8850)	1800 (15930)	20	
		65 (575)	140 (1239)	260 (2301)	900 (7965)	1800 (15930)	25	
		77 (681)	150 (1328)	300 (2655)	1000 (8850)	1800 (15930)	32	
		65 (575)	140 (1239)	260 (2301)	900 (7965)	1800 (15930)	40	
		40 (354)	80 (708)	150 (1328)	450 (3983)	1000 (8850)	64	
		27 (239)	60 (531)	125 (1106)	305 (2699)	630 (5576)	100	

Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations[3][5][8]	Nm (lbin)	72 (637)	160 (1416)	368 (3257)	720 (6372)	1600 (14160)	3	1
		96 (850)	224 (1982)	480 (4248)	960 (8496)	2080 (18408)	4	
		104 (920)	224 (1982)	416 (3682)	1200 (10620)	2560 (22656)	5	
		64 (566)	128 (1133)	240 (2124)	720 (6372)	1600 (14160)	8	
		43 (381)	96 (850)	200 (1770)	488 (4319)	1008 (8921)	10	
		109 (965)	176 (1558)	400 (3540)	1248 (11045)	2400 (21240)	12	2
		109 (965)	176 (1558)	400 (3540)	1248 (11045)	2400 (21240)	15	
		123 (1089)	240 (2124)	480 (4248)	1600 (14160)	2880 (25488)	16	
		123 (1089)	240 (2124)	480 (4248)	1600 (14160)	2880 (25488)	20	
		104 (920)	224 (1982)	416 (3682)	1440 (12744)	2880 (25488)	25	
		123 (1089)	240 (2124)	480 (4248)	1600 (14160)	2880 (25488)	32	
		104 (920)	224 (1982)	416 (3682)	1440 (12744)	2880 (25488)	40	
		64 (566)	128 (1133)	240 (2124)	720 (6372)	1600 (14160)	64	
		43 (381)	96 (850)	200 (1770)	488 (4319)	1008 (8921)	100	

Gearbox type		PLN	Z [2]
Gearbox life at full load	h	20,000	
Gearbox life at 88% nominal torque T_{2N} x 0,88		30,000	
Emergency stop torque[6]	Nm (lbin)	2 - times T_{2N}	
Efficiency at full load[7]	%	98	1
		95	2
Min. operating temp.[4]	°C (°F)	-25 (-13)	
Max. operating temp.[4]		+90 (194)	
Protection class		IP 65	
Lubrication		lifetime lubrication	
Mounting position		any	
Recommended motor flange / shaft tolerance		DIN 42955-R	

[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 n_2=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 n_2=100 rpm output shaft speed
[8] Permissible for 30,000 output shaft revolutions; see page 80

Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	Z [2]
Standard backlash[7]	arcmin	<3	<3	<3	<3	<3	1
		<5	<5	<5	<5	<5	2
Optional reduced backlash		<2	< 1	<1	<1	<1	
$Fr_{max.}$ for 20,000 h[3][4]	N (lb)	3200 (720)	5500 (1238)	6000 (1350)	12500 (2813)	21000 (4725)	
$Fa_{max.}$ for 20,000 h[3][4]		4400 (990)	6400 (1440)	8000 (1800)	15000 (3375)	21000 (4725)	
$Fr_{max.}$ for 30,000 h[3][4]		3200 (720)	4800 (1080)	5400 (1215)	11400 (2565)	18000 (4050)	
$Fa_{max.}$ for 30,000 h[3][4]		3900 (878)	5700 (1283)	7000 (1575)	13200 (2970)	18500 (4163)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	6 (53)	9 (80)	20 (177)	44 (389)	130 (1151)	1
		7 (62)	10 (89)	22 (195)	46 (407)	140 (1239)	2
Weight	kg (lb)	1.9 (4.19)	3.3 (7.28)	6.9 (15.21)	16.0 (35.28)	30.5 (67.25)	1
		2.4 (5.29)	4.2 (9.26)	9.5 (20.95)	20.5 (45.20)	45 (99.23)	2
Running noise[5]	dB(A)	58	60	65	68	72	
Max. recommended input speed[6]	min^{-1} (rpm)	14000	10000	8500	6500	6000	

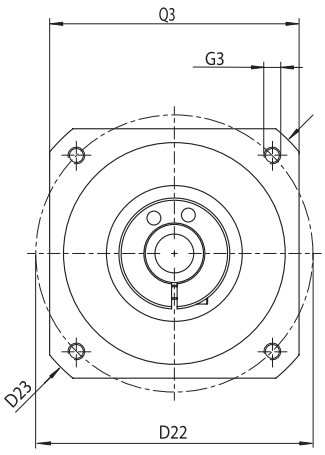
Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[6][7]	min^{-1} (rpm)	2580	2500	1880	1180	930	3
		2800	2560	1900	1210	940	4
		3100	2990	2410	1240	970	5
		4480	4990	4100	2170	1820	8
		5210	6050	4860	2810	2460	10
		3960	4240	3200	1620	1330	12
		4420	4880	3200	1880	1550	15
		4220	4360	3320	1630	1390	16
		4690	5000	3820	1890	1620	20
		5210	5570	4410	2230	1820	25
		5640	6000	5000	2530	2220	32
		6000	6000	5500	2910	2450	40
		6000	6000	5500	4010	3410	64
		6000	6000	5500	4500	3500	100

Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[6][7]	min^{-1} (rpm)	2020	1820	1250	800	600	3
		2090	1720	1190	770	580	4
		2300	2030	1560	770	580	5
		3720	3850	3060	1530	1230	8
		4610	4960	3830	2170	1850	10
		2990	3070	2190	1030	830	12
		3410	3580	2190	1220	990	15
		3240	3120	2270	1030	870	16
		3670	3640	2660	1220	1030	20
		4300	4250	3280	1520	1200	25
		4620	4920	3650	1710	1500	32
		5260	5630	4380	2080	1710	40
		6000	6000	5500	3430	2860	64
		6000	6000	5500	4300	3500	100

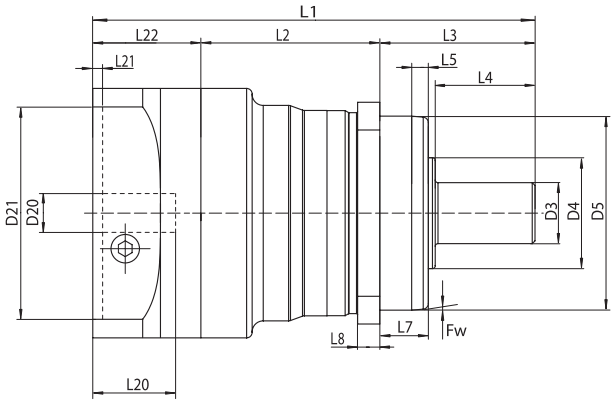
(1) Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
(2) Number of gear stages
(3) Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
(4) Measured at the middle of the gearbox housing surface
(5) Sound 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

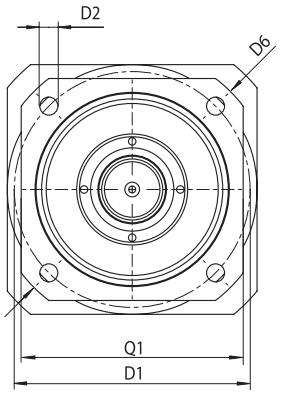
Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	0.40 (3.54)	1.01 (8.94)	3.14 (27.79)	16.77 (148.41)	54.20 (479.67)	3
		0.32 (2.83)	0.78 (6.90)	2.40 (21.24)	12.16 (107.62)	39.44 (349.04)	4
		0.28 (2.48)	0.68 (6.02)	2.16 (19.12)	10.31 (91.24)	33.38 (295.41)	5
		0.25 (2.21)	0.59 (5.22)	1.93 (17.08)	8.73 (77.26)	27.49 (243.29)	8
		0.25 (2.21)	0.57 (5.04)	1.90 (16.82)	8.35 (73.90)	25.97 (229.83)	10
		0.40 (3.54)	1.02 (9.03)	3.12 (27.61)	16.72 (147.97)	54.30 (480.56)	12
		0.38 (3.36)	0.95 (8.41)	2.95 (26.11)	15.19 (134.43)	52.50 (464.63)	15
		0.35 (3.10)	0.89 (7.88)	2.74 (24.25)	14.52 (128.50)	49.90 (441.62)	16
		0.33 (2.92)	0.82 (7.26)	2.57 (22.74)	13.05 (115.49)	45.03 (398.52)	20
		0.30 (2.66)	0.76 (6.73)	2.38 (21.06)	11.89 (105.23)	40.32 (356.83)	25
		0.32 (2.83)	0.77 (6.81)	2.41 (21.33)	11.94 (105.67)	40.36 (357.19)	32
		0.29 (2.57)	0.70 (6.20)	2.23 (19.74)	10.79 (95.49)	35.68 (315.77)	40
		0.26 (2.30)	0.63 (5.58)	2.03 (17.97)	9.39 (83.10)	30.36 (268.69)	64
		0.25 (2.21)	0.59 (5.22)	1.97 (17.43)	8.76 (77.53)	27.74 (245.50)	100

[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)



Input side view





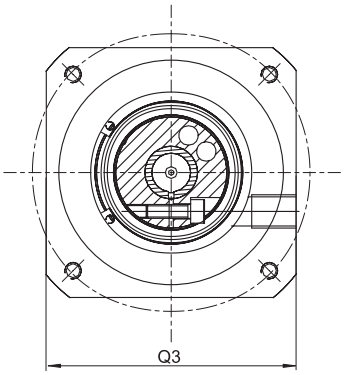
Output side view

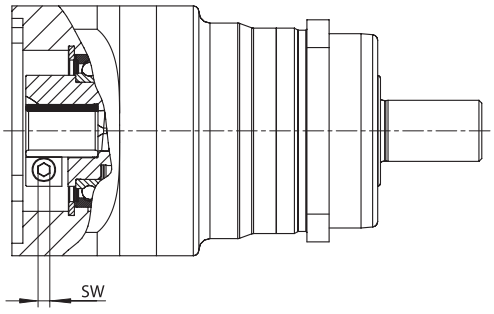
Type-Size		PLN 70	PLN 90	PLN 115	PLN 142	PLN 190	Z [2]
All dimensions in mm							
D1 Flange bolt hole circle		68-75	85	120	165	215	
D2 Mounting bolt hole diameter	4x	5.5	6.5	8.5	11	13.5	
D3 Output shaft diameter	k6	16	22	32	40	55	
D4 Output shaft collar diameter		35	40	45	70	80	
D5 Pilot diameter	g7	60	70	90	130	160	
D6 Output flange diagonal		92	100	140	185	240	
D20 Pinion bore diameter[1][4]		11	14	19	24	32	
D21 Motor centering pilot diameter[1]		60	80	95	130	180	
D22 Motor matching bolt circle diameter[1]		75	100	115	165	215	
D23 Motor matching adapter diagonal		92	116	145	185	240	
Fw Chamfer angle		5	5	5	5	5	
G3 Mounting hole thread x depth[1]	4x	M5 x 10	M6 x 12	M8 x 16	M10 x 20	M12 x 24	
L1 Overall length[3]		137.5	159.5	201	276	310.5	1
		166.5	191.5	241	335	382.5	2
L2 Main-body length		59	64.5	61.5	91.5	116	1
		88	96.5	101.5	150.5	188	2
L3 Output shaft length from mounting face		48	56	88	110	112	
L4 Output shaft length from collar		28	36	58	80	82	
L5 Chamfer length		8	6	8	8	10	
L7 Pilot length		19	17.5	28	28	28	
L8 Flange width		7	8	10	12	15	
L20 Reference motor shaft length [3]		23	30	40	50	60	
L21 Motor pilot depth		3	3.5	3.5	4	5	
L22 Reference motor adapter flange width[3]		30.5	39	51.5	74.5	82.5	
Q1 Gearbox output flange square	□	70	80	110	142	190	
Q3 Motor adapter square[1]		70	90	115	142	190	

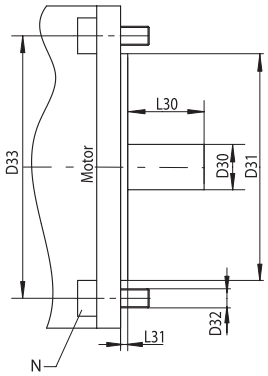
[1] Dimensions reference to the mounted motor-type, see page 12
[2] Number of gear stages
[3] For longer motor shaft > L20, actual minimal L22 dimension = L22 + (Motor shaft length – L20)
[4] For shaft fit j6 to k6

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		PLN 70		PLN 90		PLN 115		PLN 142		PLN 190	Z [2]
D30 Motor shaft diameter/ Available pinion bores / bushings[1][5]	mm	8/9/9.525/ 10/11/12/14/ 15.87/16/19		9.525/10/11/ 12/12.7/14/16/ 15.87/19/22/24		11/12.7/14/ 15.87/16/19/22/ 24/28/32/35		19/22/24/28/ 32/35/38/42		24/28/32/35/ 38/42/48	
D31 Motor pilot diameter[3]		any		any		any		any		any	
D32 Motor bolt hole diameter[3]		any		any		any		any		any	
D33 Hole circle diameter[3]		any		any		any		any		any	
L30 min. motor shaft length[1]	mm	16 (19[6])		19 (21[7])		21 (26[8])		26 (29[9])		30	
L31 pilot depth		any		any		any		any		any	
N Number of bolt holes		4		4		4		4		4	
Q3 Flange square[1]	□	70		90		115		140		190	
Recommended max. motor weight[4]	kg (lb)	10 (22.05)		15 (33.08)		34 (74.97)		50 (110.25)		75 (165.38)	
Motor type[1]		B5		B5		B5		B5		B5	
Recommended clamping screw tightening torque	Nm (lbin)	4.5 (40)	9.5 (84)	9.5 (84)	16.5 (146)	16.5 (146)	40 (354)	40 (354)	75 (664)	75 (664)	
SW wrench width	mm	3	4	4	5	5	6	6	8	8	

[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
[9] D30 > 35mm

OP 5: Spline type code

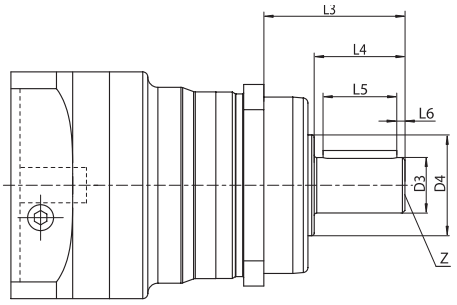
Type-Size	Spline type code	Tooth face width	Z Shaft end bore
PLN 70	DIN 5480 - W 16 x 0.8 x 30 x 18 x 7 m	15	DIN 332 DR M5x12.5
PLN 70-OP14	DIN 5480 - W 19 x 0.8 x 30 x 22 x 7 m	15	DIN 332 DR M6x16
PLN 90	DIN 5480 - W 22 x 0.8 x 30 x 26 x 7 m	21	DIN 332 DR M8x19
PLN 115	DIN 5480 - W 32 x 1.25 x 30 x 24 x 7m	42	DIN 332 DR M12x28
PLN 142	DIN 5480 - W 40 x 1.25 x 30 x 30 x 7m	65	DIN 332 DR M16x35
PLN 190	DIN 5480 - W 55 x 2 x 30 x 26 x 7m	65	DIN 332 DR M20x42

OP 7: Output shaft with key DIN 6885 T1 (1)

Type-Size		PLN 70	PLN 70-OP14	PLN 90	PLN 115	PLN 142	PLN 190
Key type (Height x width x length)		A5 x 5 x 25	A6 x 6 x 20	A6 x 6 x 28	A10 x 8 x 50	A12 x 8 x 65	A16 x 10 x 70
D3 [k6] Output shaft diameter	mm	16	19	22	32	40	55
L4 Output shaft length from collar		28	28	36	58	80	82
L5 Key length		25	20	28	50	65	70
L6 Distance from shaft end		2	4	4	4	8	6
Z Shaft end bore		M5 x 12.5	M6 x 16	M8 x 19	M12 x 28	M16 x 35	M20 x 42
Output torque sustainable 30 000 output shaft rotations(2)	Nm (lbin)	77 (681)	77 (681)	150 (1328)	300 (2655)	1000 (8850)	1800 (15930)

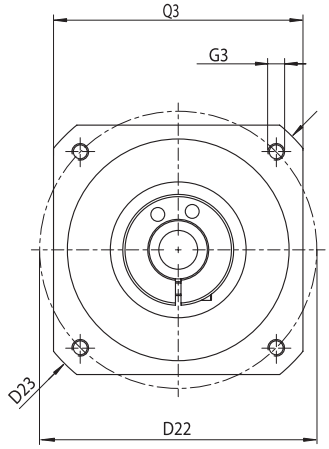
OP 8: Special / custom shaft (3)(4)

Output shaft diameter	D3	
Output shaft length from collar	L4	
Output shaft length from mounting face	L3	
Key length	L5	
Distance from shaft end	L6	
Key width	B	
Shaft end bore	Z	

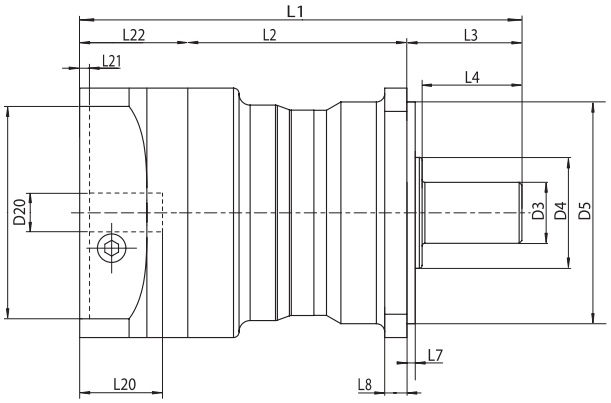


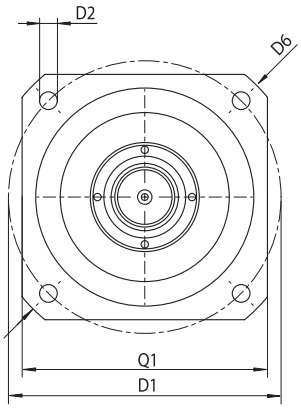
(1) Sketch for variables see OP 8
(2) Strength based on unidirectional dynamic load
(3) Fax page with data or send sketch with your inquiry
(4) On inquiry

OP 14: dimensions for the PLS output



Input side view





Output side view

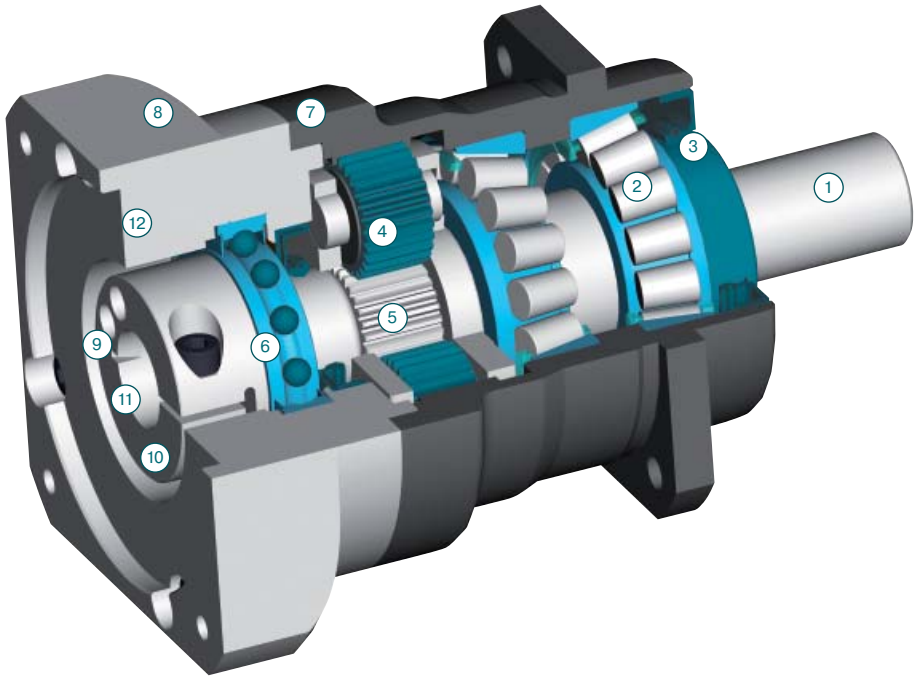
Type-Size		PLN 70 OP14	PLN 90 OP14	PLN 115 OP14	PLN 142 OP14	PLN 190 OP14	Z [2]
All dimensions in mm							
D1 Flange bolt hole circle		75	100	130	165	215	
D2 Mounting bolt hole diameter	4x	5.5	6.5	8.5	11	13.5	
D3 Output shaft diameter	k6	19	22	32	40	55	
D4 Output shaft collar diameter		35	40	45	70	80	
D5 Pilot diameter	h7	60	80	110	130	160	
D6 Output flange diagonal		92	116	145	185	240	
D20 Pinion bore diameter[1][4]		11	14	19	24	32	
D21 Motor centering pilot diameter[1]		60	80	95	130	180	
D22 Motor matching bolt circle diameter[1]		75	100	115	165	215	
D23 Motor matching adapter diagonal		92	116	145	185	240	
G3 Mounting hole thread x depth[1]	4x	M5 x 10	M6 x 12	M8 x 16	M10 x 20	M12 x 24	
L1 Overall length[3]		137.5	159.5	201	276	310.5	1
		166.5	191.5	241	335	382.5	2
L2 Main-body length		75	79	85	114.5	138	1
		104	111	125	173.5	210	2
L3 Output shaft length from mounting face		32	41.5	64.5	87	90	
L4 Output shaft length from collar		28	36	58	80	82	
L7 Pilot length		3	3	4.5	5	6	
L8 Flange width		7	8	10	20	20	
L20 Reference motor shaft length [3]		23	30	40	50	60	
L21 Motor pilot depth		3	3.5	3.5	4	5	
L22 Reference motor adapter flange width[3]		30.5	39	51.5	74.5	82.5	
Q1 Gearbox output flange square	□	70	90	115	142	190	
Q3 Motor adapter square[1]		70	90	115	142	190	

[1] Dimensions reference to the mounted motor-type, see page 12
[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

Type-Size		PLN 70 OP14	PLN 90 OP14	PLN 115 OP14	PLN 142 OP14	PLN 190 OP14	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	2380	2320	1740	1080	850	3
		2580	2370	1760	1100	860	4
		2850	2770	2220	1130	880	5
		4110	4620	3800	1990	1660	8
		4790	5610	4500	2570	2240	10
		3630	3920	2960	1480	1220	12
		4050	4510	2960	1720	1420	15
		3880	4030	3070	1490	1270	16
		4300	4620	3530	1730	1480	20
		4780	5150	4090	2040	1660	25
		5160	5980	4610	2310	2030	32
		5600	6000	5220	2660	2240	40
		6000	6000	5500	3680	3130	64
		6000	6000	5500	4300	3500	100

Type-Size		PLN 70 OP14	PLN 90 OP14	PLN 115 OP14	PLN 142 OP14	PLN 190 OP14	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	1850	1680	1160	730	540	3
		1910	1590	1100	710	520	4
		2110	1870	1440	700	520	5
		3410	3560	2820	1400	1120	8
		4230	4580	3540	1980	1690	10
		2730	2820	2020	940	760	12
		3110	3290	2020	1120	900	15
		2960	2870	2090	940	790	16
		3350	3340	2450	1110	940	20
		3940	3910	3020	1380	1090	25
		4230	4520	3350	1550	1360	32
		4810	5180	4030	1900	1560	40
		5910	6000	5500	3140	2610	64
		6000	6000	5500	3940	3400	100

[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81



1 Output shaft
Made of high-strength high quality steel for high shaft reliability

2 Output shaft bearing
Large high precision preloaded taper roller bearings for zero clearance

3 Shaft seal ring
Dedicated double lip seal, keeps the lubricant in, and the external contaminant out; IP 65

4 Planet gears
Precision zero helix angle gear with optimized profile modifications and crowning; case hardened and hard finished by honing

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
High speed ball bearings in floating arrangement, eliminating thrust loads from thermal expansion, and yet providing exact positioning for easy mounting

7 Housing with integrated ring gear
Ring gear is case hardened and precision honed for high loadability, minimum wear, consistent backlash

8 Motor matching adapter plate
Matches the gear head with virtually any servo motor; made of aluminum for enhanced thermal conductivity

9 Clamping ring
Balanced ring, suitable for high rpm, made of steel to allow high clamping forces for safe torque transfer

10 Clamping screw
High strength steel screw with special low pitch thread to generate a high clamping force

11 PCS System
Patented multiple closed slot Precision Clamping System – most reliable advanced system available today

12 Assembly bore
Access bore for the clamping screw

Compact, powerful, yet quiet

The WPLN series gearhead is the enhanced right angle high precision planetary gearhead for applications with very high precision, requiring a right angle configuration. The design of this unit features a hypoid right angle stage design (up to 10:1 ratio) and in higher ratios, an integration of the hypoid stage with high output torque planetary stage. As a result of the optimized, precision hardened and lapped hypoid gears, the noise generation is exceptionally low.

- > Low backlash <5 arcmin
- > High output torque - the industry‘s highest torque density
- > Small installation space
- > Precise, easy, and flexible motor mounting (PCS-2 system)
- > Balanced motor pinion
- > High efficiency (up to 96%)
- > Ground and honed gearing
- > 11 ratios 4:1 to 100:1
- > Low noise (<66 dB(A))
- > Consistent quality (ISO 9001 and 14001)
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options
- > Balanced motor connection

Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N} [3][5]	Nm (lbin)	45 (398)	90 (797)	160 (1416)	-	4	1
		42 (372)	75 (664)	140 (1239)	-	5	
		27 (239)	50 (443)	90 (797)	-	8	
		22 (195)	40 (354)	75 (664)	-	10	
		77 (681)	150 (1328)	300 (2655)	640 (5664)	16	2
		77 (681)	150 (1328)	300 (2655)	800 (7080)	20	
		65 (575)	140 (1239)	260 (2301)	700 (6195)	25	
		77 (681)	108 (956)	200 (1770)	360 (3186)	32	
		65 (575)	135 (1195)	250 (2213)	450 (3983)	40	
		40 (354)	80 (708)	150 (1328)	450 (3983)	64	
		27 (239)	60 (531)	125 (1106)	305 (2699)	100	

Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations [3][5][8]	Nm (lbin)	72 (637)	144 (1274)	256 (2266)	-	4	1
		67 (593)	120 (1062)	224 (1982)	-	5	
		43 (381)	80 (708)	144 (1274)	-	8	
		35 (310)	64 (566)	120 (1062)	-	10	
		123 (1089)	240 (2124)	480 (4248)	1024 (9062)	16	2
		123 (1089)	240 (2124)	480 (4248)	1280 (11328)	20	
		104 (920)	224 (1982)	416 (3682)	1120 (9912)	25	
		123 (1089)	172 (1522)	320 (2832)	576 (5098)	32	
		104 (920)	216 (1912)	400 (3540)	720 (6372)	40	
		64 (566)	128 (1133)	240 (2124)	720 (6372)	64	
		43 (381)	96 (850)	200 (1770)	488 (4319)	100	

Gearbox type		WPLN	Z [2]
Gearbox life at full load	h	20,000	
Gearbox life at 88% nominal torque T_{2N} x 0,88		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 65	
Lubrication		lifetime lubrication	
Mounting position		any	
Recommended motor flange / shaft tolerance		DIN 42955-R	
Direction of rotation		Drive and output sides in opposite directions	

(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 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 n_2=100 rpm output shaft speed
(8) Permissible for 30,000 output shaft revolutions; see page 80

Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	Z [2]
Standard backlash[7]	arcmin	<5	<5	<5	-	1
		<7	<7	<7	<7	2
$Fr_{max.}$ for 20,000 h[3][4]	N (lb)	3200 (720)	5200 (1170)	6000 (1350)	-	1
		3200 (720)	5500 (1238)	6000 (1350)	12500 (2813)	2
$Fa_{max.}$ for 20,000 h[3][4]		4300 (968)	5900 (1328)	7000 (1575)	-	1
		4400 (990)	6400 (1440)	8000 (1800)	15000 (3375)	2
$Fr_{max.}$ for 30,000 h[3][4]		3200 (720)	5200 (1170)	6000 (1350)	-	1
		3200 (720)	4800 (1080)	5400 (1215)	11400 (2565)	2
$Fa_{max.}$ for 30,000 h[3][4]		3700 (833)	5200 (1170)	6100 (1373)	-	1
		3900 (878)	5700 (1283)	7000 (1575)	13200 (2-970)	2
Torsional stiffness	Nm /arcmin (lbin /arcmin)	2.4 (21)	6.6 (58)	14.3 (127)	-	1
		2.4 (21)	11 (97)	34 (301)	58 (513)	2
Weight	kg (lb)	3.0 (6.62)	5.0 (11.03)	10.5 (23.15)	-	1
		3.9 (8.60)	5.3 (11.69)	9.2 (20.29)	21.5 (47.41)	2
Running noise[5]	dB(A)	66	67	68	70	
Max. recommended input speed[6]	min^{-1} (rpm)	16000	14000	9500	-	1
		16000	16000	14000	9500	2

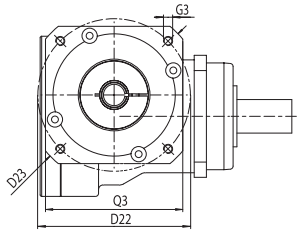
Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[6][8]	min^{-1} (rpm)	2850	2450	1700	-	4
		3250	2900	1950	-	5
		4150	3700	2450	-	8
		4500	4050	2600	-	10
		3100	3150	2650	1700	16
		3400	3500	2900	1750	20
		3700	3900	3350	2000	25
		3800	4300	3700	2450	32
		4100	4450	3900	2600	40
		4500	5300	4700	2900	64
		4750	5700	5050	3200	100

Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[6][8]	min^{-1} (rpm)	2100	1700	1200	-	4
		2450	2150	1450	-	5
		3450	3050	2050	-	8
		3900	3500	2250	-	10
		2550	2350	1900	1200	16
		2850	2700	2150	1200	20
		3250	3150	2650	1500	25
		3300	3650	3100	2100	32
		3700	3750	3250	2150	40
		4300	4900	4300	2550	64
		4650	5450	4800	3000	100

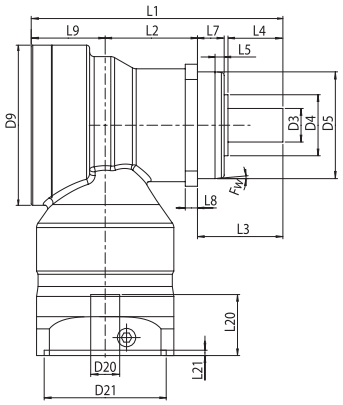
(1) Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
(2) Number of gear stages
(3) Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
(4) Measured at the middle of the gearbox housing surface
(5) Sound 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) Lower backlash on inquiry
(8) Exact definition see page 81

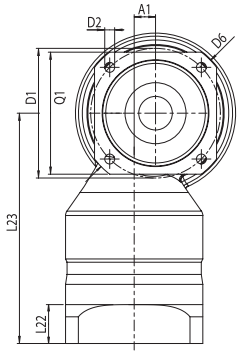
Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	0.654 (5.79)	1.331 (11.78)	5.924 (52.43)	-	4
		0.6 (5.31)	1.168 (10.34)	5.441 (48.15)	-	5
		0.532 (4.71)	1.004 (8.89)	4.989 (44.15)	-	8
		0.516 (4.57)	0.966 (8.55)	4.883 (43.21)	-	10
		0.639 (5.66)	0.642 (5.68)	1.366 (12.09)	6.082 (53.83)	16
		0.591 (5.23)	0.593 (5.25)	1.190 (10.53)	6.016 (53.24)	20
		0.590 (5.22)	0.591 (5.23)	1.186 (10.50)	5.500 (48.68)	25
		0.528 (4.67)	0.529 (4.68)	1.013 (8.97)	5.028 (44.50)	32
		0.528 (4.67)	0.528 (4.67)	1.011 (8.95)	5.012 (44.36)	40
		0.528 (4.67)	0.528 (4.67)	1.010 (8.94)	5.004 (44.29)	64
		0.514 (4.55)	0.514 (4.55)	0.970 (8.58)	4.892 (43.29)	100

[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)



Input side view





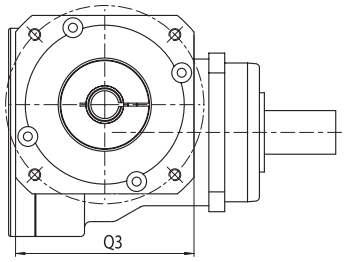
Output side view

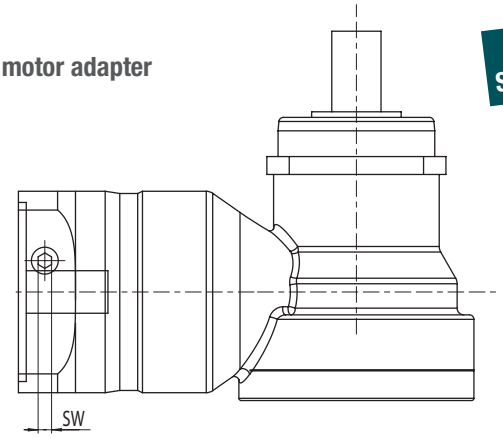
Type-Size		WPLN 70	WPLN 90	WPLN 115	WPLN 142	Z [2]
All dimensions in mm						
A1 Axle offset		10	14	20	-	1
		10	10	14	20	2
D1 Flange bolt hole circle		68-75	85	120	165	
D2 Mounting bolt hole diameter	4x	5.5	6.5	8.5	11	
D3 Output shaft diameter	k6	16	22	32	40	
D4 Output shaft collar diameter		30	40	45	-	1
		35	40	45	70	2
D5 Pilot diameter	h7	60	70	90	130	
D6 Output flange diagonal		92	100	140	185	
D9 Max. diameter		86	105	120	-	1
		86	86	105	120	2
D20 Pinion bore diameter[1][4]		11	14	19	-	1
		11	11	14	19	2
D21 Motor centering pilot diameter[1]		60	80	95	-	1
		60	60	80	95	2
D22 Motor matching bolt circle diameter[1]		75	100	115	-	1
		75	75	100	115	2
D23 Motor matching adapter diagonal		92	116	145	-	1
		92	92	116	145	2
Fw Chamfer angle	°	5	5	5	5	
G3 Mounting hole thread x depth[1]	4x	M5 x 10	M6 x 12	M8 x 16	-	1
		M5 x 10	M5 x 10	M6 x 12	M8 x 16	2
L1 Overall length[3]		137.5	165	218	-	1
		185	207	248.5	342.5	2
L2 Main-body length		46.5	60.5	73.5	-	1
		94	108	112	176	2
L3 Output shaft length from mounting face		48	56	88	110	
L4 Output shaft length from collar		28	36	58	80	
L5 Chamfer length		8	6	8	8	
L7 Pilot length		19	17.5	28	28	
L8 Flange width		7	8	10	12	
L9 Offset length		43	48.5	56.5	56.5	
L20 Reference motor shaft length [3]		23	30	40	-	1
		23	23	30	40	2
L21 Motor pilot depth		3	3.5	3.5	-	1
		3	3	3.5	3.5	2
L22 Reference motor adapter flange width[3]		19	25.5	27.5	-	1
		19	19	25.5	27.5	2
L23 Overall height[3]		136	151	187.5	-	1
		136	136	151	187.5	2
Q1 Gearbox output flange square		70	80	110	142	
Q3 Motor adapter square[1]	□	70	90	115	-	1
		70	70	90	115	2

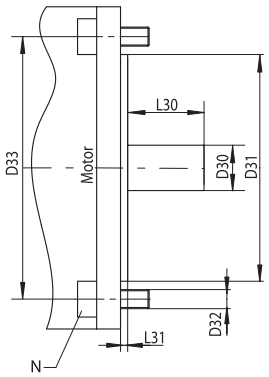
[1] Dimensions reference to the mounted motor-type, see page 24
[2] Number of gear stages
[3] For longer motor shaft > L20, actual minimal L22 dimension = L22 + (Motor shaft length – L20)
[4] For shaft fit j6 to k6

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		WPLN 70		WPLN 90			WPLN 115			WPLN 142		Z [2]
D30 Motor shaft diameter/ Available pinion bores / bushings[1][5]	mm	8/9/9.525/10/ 11/12/14/15.87/ 16/19		9.525/10/11/ 12/12.7/14/15.87/ 16/19/22/24			11/12.7/14/ 15.87/16/19/22/ 24/28/32/35			-		1
		8/9/9.525/10/ 11/12/14/15.87/ 16/19		8/9/9.525/10/ 11/12/12.7/14/ 15.87/16/19			9.525/10/11/ 12.7/14/15.87/ 16/19/22/24			11/12.7/14/ 15.87/16/19/22/ 24/28/32/35		2
D31 Motor pilot diameter[3]		any		any			any			any		
D32 Motor bolt hole diameter[3]		any		any			any			any		
D33 Hole circle diameter[3]		any		any			any			any		
G4 Motor mounting thread size		any		any			any			any		
L30 min. motor shaft length[1]	mm	20 (23[6])		23 (25[7])			25 (32[8])			-		1
		20 (23[6])		20 (23[7])			23 (25[8])			25 (32[9])		2
L31 pilot depth		any		any			any			any		
N Number of bolt holes		4		4			4			4		
Q3 Flange square[1]	□	70		90			115			-		1
		70		70			90			115		2
Recommended max. motor weight[4]	kg (lb)	10 (22.05)		15 (33.08)			34 (74.97)			50 (110.25)		
Motor type[1]		B5		B5			B5			B5		
Recommended clamping screw tightening torque	Nm (lbin)	4.5 (40)	9.5[6] (84)[6]	4.5 (40)	9.5 (84)	16.5[7] (146)[7]	9.5 (84)	16.5 (146)	40[9] (354)[9]	16.5 (146)	40[9] (354)[9]	
SW wrench width	mm	3	4[6]	3	4	5[7]	4	5	6[8]	5	6[9]	

[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
[9] D30 = 42 mm

- thermal length compensation with respect to the A end shield of the motor

OP 5: Spline type code[4]

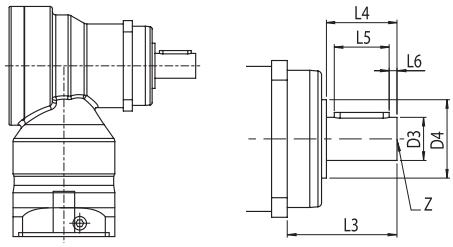
Type-Size	Spline type code	Tooth face width	Z Shaft end bore
WPLN 70	DIN 5480 - W 16 x 0.8 x 30 x 18 x 7 m	15	DIN 332 DR M5x12.5
WPLN 70-OP14	DIN 5480 - W 19 x 0.8 x 30 x 22 x 7 m	15	DIN 332 DR M6x16
WPLN 90	DIN 5480 - W 22 x 0.8 x 30 x 26 x 7 m	21	DIN 332 DR M8x19
WPLN 115	DIN 5480 - W 32 x 1.25 x 30 x 24 x 7m	42	DIN 332 DR M12x28
WPLN 142	DIN 5480 - W 40 x 1.25 x 30 x 30 x 7m	65	DIN 332 DR M16x35

OP 7: Output shaft with key DIN 6885 T1[1] [4]

Type-Size		WPLN 70	WPLN 70-OP14	WPLN 90	WPLN 115	WPLN 142
Key type (Height x width x length)		A5 x 5 x 25	A6 x 6 x 20	A6 x 6 x 28	A10 x 8 x 50	A12 x 8 x 65
D3 [k6] Output shaft diameter	mm	16	19	22	32	40
L4 Output shaft length from collar		28	28	36	58	80
L5 Key length		25	20	28	50	65
L6 Distance from shaft end		2	4	4	4	8
Z Shaft end bore		M5 x 12.5	M6 x 16	M8 x 19	M12 x 19	M16 x 35
Output torque sustainable 30 000 output shaft rotations[2]	Nm (lbin)	77 (681)	77 (681)	150 (1328)	300 (2655)	1000 (8850)

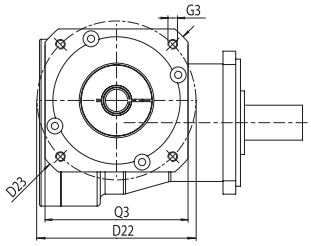
OP 8: Special / custom shaft[3][4]

Output shaft diameter	D3	
Output shaft length from collar	L4	
Output shaft length from mounting face	L3	
Key length	L5	
Distance from shaft end	L6	
Key width	B	
Shaft end bore	Z	

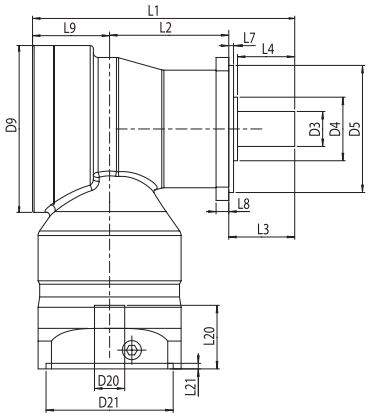


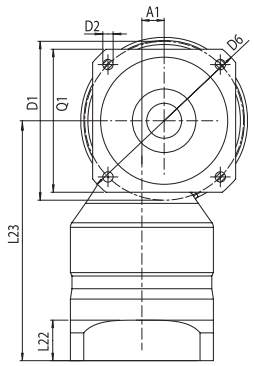
[1] Sketch for variables see OP 8
[2] Strength based on unidirectional dynamic load
[3] Fax page with data or send sketch with your inquiry
[4] On inquiry

OP 14: dimensions for the WPLS output



Input side view





Output side view

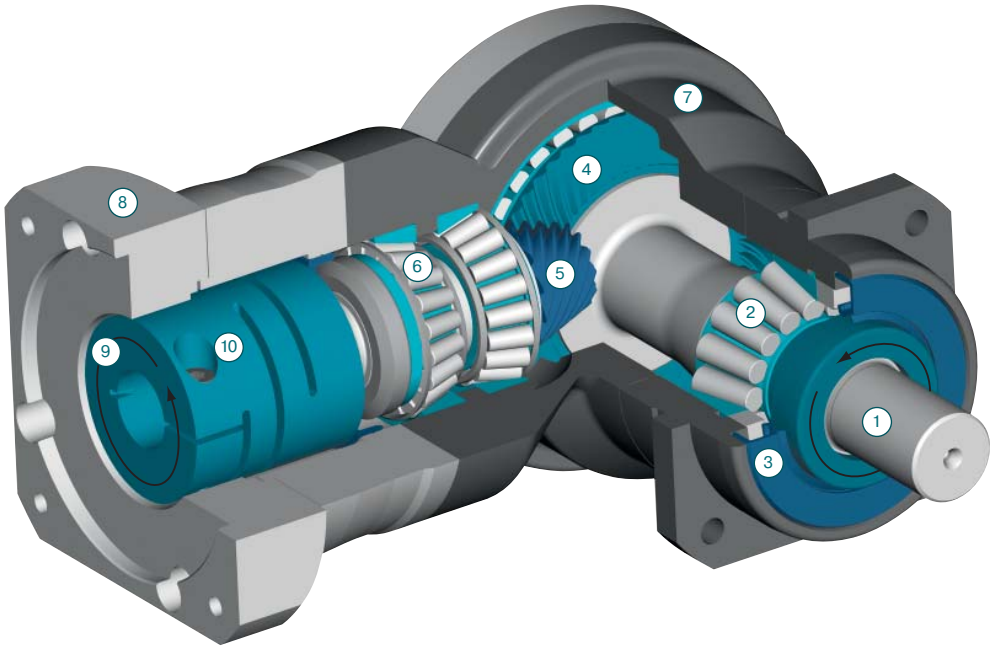
Type-Size		WPLN 70 OP 14	WPLN 90 OP 14	WPLN 115 OP 14	WPLN 142 OP 14	Z [2]
All dimensions in mm						
A1 Axle offset		10	14	20		1
		10	10	14	20	2
D1 Flange bolt hole circle		75	75	130	165	
D2 Mounting bolt hole diameter	4x	5.5	6.5	8.5	11	
D3 Output shaft diameter	k6	19	22	32	40	
D4 Output shaft collar diameter		30	40	45	-	1
		35	40	45	70	2
D5 Pilot diameter	h7	60	80	90	130	
D6 Output flange diagonal		92	116	140	185	
D9 Max. diameter		86	105	120	-	1
		86	86	105	120	2
D20 Pinion bore diameter[1][4]		11	14	19		1
		11	11	14	19	2
D21 Motor centering pilot diameter[1]		60	80	95		1
		60	60	80	95	2
D22 Motor matching bolt circle diameter[1]		75	100	115		1
		75	75	100	115	2
D23 Motor matching adapter diagonal		92	116	145		1
		92	92	116	145	2
G3 Mounting hole thread x depth[1]	4x	M5 x 10	M6 x 12	M8 x 16		1
		M5 x 10	M5 x 10	M6 x 12	M8 x 16	2
L1 Overall length[3]		137.5	165	218		1
		185	207	248.5	342.5	2
L2 Main-body length		62.5	75	97		1
		110	122.5	135.5	199	2
L3 Output shaft length from mounting face		32	41.5	64.5	87	
L4 Output shaft length from collar		28	36	58	80	
L7 Pilot length		3	3	4.5	5	
L8 Flange width		7	8	10	20	
L9 Offset length		43	48.5	56.5	56.5	
L20 Reference motor shaft length [3]		23	30	40		1
		23	23	30	40	2
L21 Motor pilot depth		3	3.5	3.5		1
		3	3	3.5	3.5	2
L22 Reference motor adapter flange width[3]		19	25.5	27.5	-	1
		19	19	25.5	27.5	2
L23 Overall height[3]		136	151	187.5		1
		136	136	151	187.5	2
Q1 Gearbox output flange square		70	80	110	142	
Q3 Motor adapter square[1]	□	70	90	115		1
		70	70	90	115	2

[1] Dimensions reference to the mounted motor-type, see page 24
[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

Type-Size		WPLN 70 OP 14	WPLN 90 OP 14	WPLN 115 OP 14	WPLN 142 OP 14	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpmrpm[2][3]	min^{-1} (rpm)	2650	2250	1600	-	4
		3000	2700	1800	-	5
		3850	3450	2250	-	8
		4150	3800	2400	-	10
		2900	2900	2400	1550	16
		3150	3200	2700	1600	20
		3450	3600	3100	1850	25
		3550	3950	3450	2300	32
		3800	4150	3600	2400	40
		4200	4900	4350	2700	64
		4450	5300	4700	3000	100

Type-Size		WPLN 70 OP 14	WPLN 90 OP 14	WPLN 115 OP 14	WPLN 142 OP 14	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	1900	1600	1100	-	4
		2250	1950	1300	-	5
		3200	2850	1850	-	8
		3600	3250	2050	-	10
		2350	2150	1700	1100	16
		2600	2450	1950	1100	20
		3000	2850	2400	1350	25
		3050	3350	2850	1950	32
		3400	3450	2950	2000	40
		4000	4550	4000	2350	64
		4350	5050	4450	2800	100

[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81



1 Output shaft
Made of high-strength high quality steel for high shaft reliability

2 Output shaft bearing
Large high precision preloaded taper roller bearings for zero clearance

3 Shaft seal ring
Dedicated double lip seal, keeps the lubricant in, and the external contaminant out; IP 65

4 Hypoid gear
Gearing optimized for maximal load capacity and quiet operation

5 Hypoid pinion
Gearing optimized for maximal load capacity and quiet operation

6 Drive shaft bearing
Pretensioned precision tapered roller bearing for zero play of the drive shaft

7 Gearbox housing
Black corrosion-protected housing made of aluminium for minimal mass and optimal ease of mounting

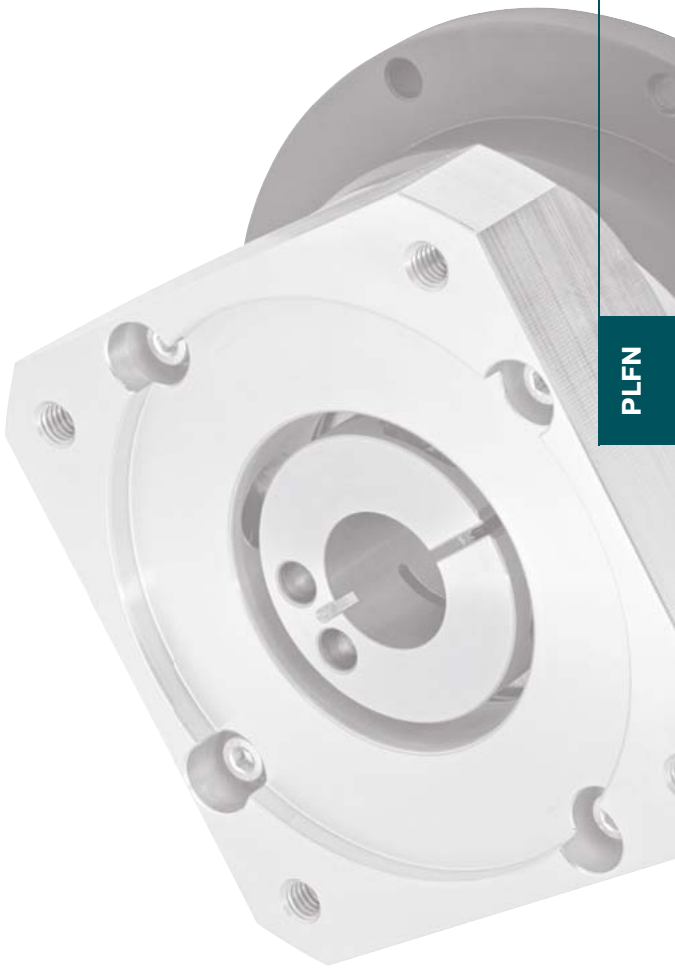
8 Motor matching adapter plate
Matches the gear head with virtually any servo motor; made of aluminum for enhanced thermal conductivity

9 Coupling
Balanced coupling for high rotational speeds and strong tension force for reliable transfer of torques

10 Clamping screw
High strength steel screw for reliable transfer of torques

For tough situations

Strong and compact: the PLFN gearboxes fulfills special demands. This gearbox model series is characterised by a highest level of stiffness paired with high performance, low backlash and compactness.



- > Low backlash <3 arcmin (<1 arcmin optional)
- > High output torque - the industry‘s highest torque density
- > Highest tilting stiffness
- > Precise, easy, and flexible motor mounting (PCS-2 system)
- > High efficiency (up to 98%)
- > Ground and honed gearing
- > 12 ratios 4:1 to 100:1
- > Low noise (<65 dB(A))
- > Consistent quality (ISO 9001 and 14001)
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options
- > Output flange similar to EN ISO 9409
- > Input and output rotate in the same direction

Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N} [3][5]	Nm (lbin)	60 (531)	140 (1239)	300 (2655)	600 (5310)	4	1
		65 (575)	140 (1239)	260 (2301)	750 (6638)	5	
		40 (354)	80 (708)	150 (1328)	450 (3983)	8	
		27 (239)	60 (531)	125 (1106)	305 (2699)	10	
		77 (681)	150 (1328)	300 (2655)	1000 (8850)	16	2
		77 (681)	150 (1328)	300 (2655)	1000 (8850)	20	
		65 (575)	140 (1239)	260 (2301)	900 (7965)	25	
		77 (681)	150 (1328)	300 (2655)	800 (7080)	32	
		65 (575)	140 (1239)	260 (2301)	800 (7080)	40	
		65 (575)	130 (1151)	260 (2301)	620 (5487)	50	
		40 (354)	80 (708)	150 (1328)	450 (3983)	64	
		27 (239)	60 (531)	125 (1106)	305 (2699)	100	

Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations [3][5][8]	Nm (lbin)	96 (850)	224 (1982)	480 (4248)	960 (8496)	4	1
		104 (920)	224 (1982)	416 (3682)	1200 (10620)	5	
		64 (566)	128 (1133)	240 (2124)	720 (6372)	8	
		43 (381)	96 (850)	200 (1770)	488 (4319)	10	
		123 (1089)	240 (2124)	480 (4248)	1600 (14160)	16	2
		123 (1089)	240 (2124)	480 (4248)	1600 (14160)	20	
		104 (920)	224 (1982)	416 (3682)	1440 (12744)	25	
		123 (1089)	240 (2124)	480 (4248)	1280 (11328)	32	
		104 (920)	224 (1982)	416 (3682)	1280 (11328)	40	
		104 (920)	208 (1841)	416 (3682)	992 (8779)	50	
		64 (566)	128 (1133)	240 (2124)	720 (6372)	64	
		43 (381)	96 (850)	200 (1770)	488 (4319)	100	

Gearbox type		PLFN	Z [2]
Gearbox life at full load	h	20,000	
Gearbox life at 88% nominal torque T_{2N} x 0,88		30,000	
Emergency stop torque [6]	Nm (lbin)	2 - times T_{2N}	
Efficiency at full load [7]	%	98	1
		95	2
Min. operating temp. [4]	°C (°F)	-25 (-13)	
Max. operating temp. [4]		+90 (194)	
Protection class		IP 65	
Lubrication		lifetime lubrication	
Mounting position		any	
Recommended motor flange / shaft tolerance		DIN 42955-R	

[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 n_2=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 n_2=100 rpm output shaft speed
[8] Permissible for 30,000 output shaft revolutions; see page 80

Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	Z [2]
Standard backlash[7]	arcmin	< 3	< 3	< 3	< 3	1
		< 5	< 5	< 5	< 5	2
Optional reduced backlash		<2	<1	< 1	< 1	
$Fr_{max.}$ for 20,000 h[3][4]	N (lb)	2400 (540)	4400 (990)	5500 (1238)	12000 (2700)	
$Fa_{max.}$ for 20,000 h[3][4]		4300 (968)	8200 (1845)	9500 (2138)	8500 (1913)	
$Fr_{max.}$ for 30,000 h[3][4]		2100 (473)	3900 (878)	4800 (1080)	11000 (2475)	
$Fa_{max.}$ for 30,000 h[3][4]		3800 (855)	7200 (1620)	8400 (1890)	7500 (1688)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	16 (142)	35 (310)	90 (797)	200 (1770)	1
		14 (124)	30 (266)	80 (708)	180 (1593)	2
Weight	kg (lb)	1.5 (3.31)	3.0 (6.62)	6.5 (14.33)	13 (28.67)	1
		2.2 (4.85)	4.0 (8.82)	8 (17.64)	16 (35.28)	2
Running noise[5]	dB(A)	< 65	< 65	< 68	< 70	
Max. recommended input speed[6]	min^{-1} (rpm)	14000	10000	8500	6500	

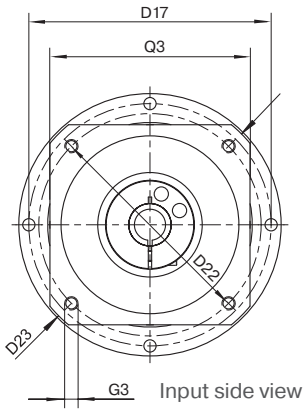
Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[6][8]	min^{-1} (rpm)	2450	2050	1550	1150	4
		2800	2450	1950	1200	5
		4100	4050	3300	2100	8
		4850	4950	4000	2700	10
		4300	4450	3850	2150	16
		4800	5100	4500	2600	20
		5400	5850	5500	3200	25
		5900	6000	6000	4250	32
		6000	6000	6000	4900	40
		6000	6000	6000	5500	50
		6000	6000	6000	5500	64
		6000	6000	6000	5500	100

Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[6][8]	min^{-1} (rpm)	1950	1500	1050	800	4
		2150	1800	1400	850	5
		3500	3300	2650	1550	8
		4400	4250	3350	2150	10
		3350	3200	2550	1300	16
		3850	3700	3050	1550	20
		4500	4400	3900	2000	25
		4900	5050	4400	2750	32
		5600	5900	5500	3250	40
		6000	6000	6000	3850	50
		6000	6000	6000	5500	64
		6000	6000	6000	5500	100

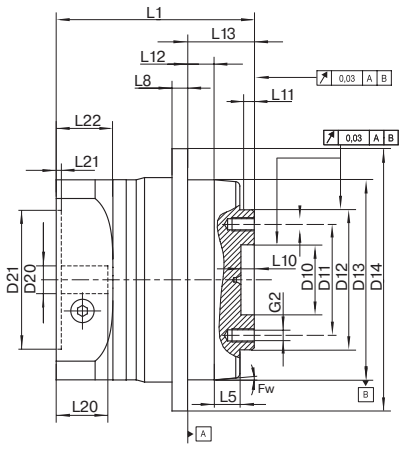
(1) Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
(2) Number of gear stages
(3) Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
(4) Reference to the rotating output flange face
(5) Sound pressure 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) Lower backlash on inquiry
(8) Exact definition see page 81

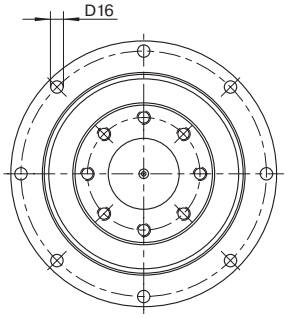
Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	i [1]
Mass moment of inertia [2]	$kgcm^2$ ($lbin\ s^2 \times 10^{-4}$)	0.29 (2.57)	0.92 (8.14)	2.94 (26.02)	11.78 (104.25)	4
		0.26 (2.30)	0.77 (6.81)	2.51 (22.21)	9.70 (85.85)	5
		0.22 (1.95)	0.63 (5.58)	2.08 (18.41)	7.71 (68.23)	8
		0.21 (1.86)	0.59 (5.22)	2.00 (17.70)	7.40 (65.49)	10
		0.32 (2.83)	0.58 (5.13)	1.73 (15.31)	6.73 (59.56)	16
		0.30 (2.66)	0.56 (4.96)	1.65 (14.60)	6.51 (57.61)	20
		0.27 (2.39)	0.45 (3.98)	1.30 (11.51)	5.00 (44.25)	25
		0.29 (2.57)	0.54 (4.78)	1.60 (14.16)	6.31 (55.84)	32
		0.26 (2.30)	0.43 (3.81)	1.24 (10.97)	4.82 (42.66)	40
		0.22 (1.95)	0.28 (2.48)	0.80 (7.08)	3.08 (27.26)	50
		0.23 (2.04)	0.30 (2.66)	0.85 (7.52)	3.11 (27.52)	64
		0.22 (1.95)	0.26 (2.30)	0.75 (6.64)	2.67 (23.63)	100

[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)



Input side view





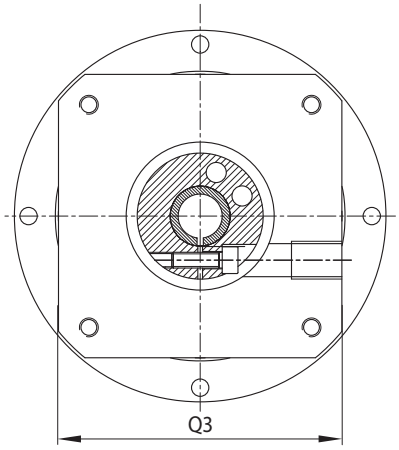
Output side view

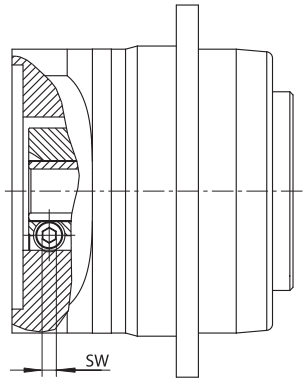
Type-Size		PLFN 64	PLFN 90	PLFN 110	PLFN 140	Z [2]
All dimensions in mm						
D10 Pilot diameter	H7	20	31.5	40	50	
D11 Motor matching bolt circle diameter		31.5	50	63	80	
D12 Pilot diameter	h7	40	63	80	100	
D13 Pilot diameter		64	90	110	140	
D14 outside diameter		86	118	145	179	
D16 Pinion bore diameter		4.5 8x45°	5.5 8x45°	5.5 8x45°	6.6 12x30°	
D17 Motor matching bolt circle diameter		79	109	135	168	
D20 Pinion bore diameter[1][4]		11	14	19	24	1
		11	11	14	19	2
D21 Motor centering pilot diameter[1]		60	80	95	130	1
		60	60	80	95	2
D22 Motor matching bolt circle diameter[1]		75	100	115	165	1
		75	75	100	115	2
D23 Motor matching adapter diagonal		92	116	145	185	1
		92	92	116	145	2
Fw Chamfer angle		3	5	5	5	
G2 Thread x depth		M5x7 8x45°	M6x10 8x45°	M6x12 12x22.5°/45°	M8x15 12x30°	
G3 Mounting hole thread x depth[1]	4x	M5x10	M6x12	M8x16	M10x20	1
		M5x10	M5x10	M6x12	M8x16	2
L1 Overall length[3]		71	89	108	157	1
		99.5	111	130	187.5	2
L5 Chamfer length		6	11.5	10.5	17	
L8 Flange width		4	7	8	10	
L10 Length of centering		4	6	6	6	
L11 Pilot depth		3	6	6	6	
L12 Pilot depth		10	12	12	14	
L13 Length of output flange		19.5	30	29	38	
L20 Reference motor shaft length [3]		23	30	40	50	1
		23	23	30	40	2
L21 Motor pilot depth		3	3.5	3.5	4	1
		3	3	3.5	3.5	2
L22 Reference motor adapter flange width[3]		19	25.5	27.5	50.5	1
		19	19	25.5	27.5	2
Q3 Motor adapter square[1]	□	70	90	115	142	1
		70	70	90	115	2

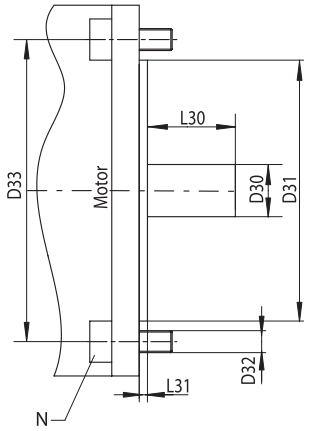
[1] Dimensions reference to the mounted motor-type, see 36
[2] Number of gear stages
[3] For longer motor shaft > L20, actual minimal L22 dimension = L22 + (Motor shaft length – L20)
[4] For shaft fit j6 to k6

OP 2: Motor Mount option
Note: B5 mounting depicted;
B14 motor mounting requires special/custom motor adapter

See page 77 for other options

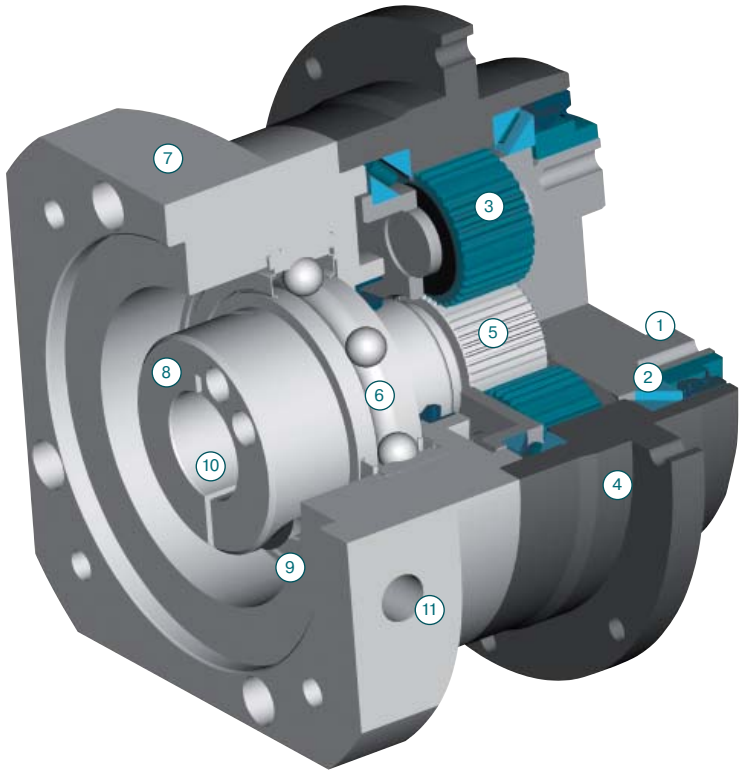






Type-Size		PLFN 64		PLFN 90			PLFN 110			PLFN 140		Z [2]
D30 Motor shaft diameter/ Available pinion bores / bushings[1][5]	mm	8/9/9.525/10/11/12/14/15.87/16/19		9.525/10/11/12/12.7/14/15.87/16/19/22/24			11/12.7/14/15.87/16/19/22/24/28/32/35			19/22/24/28/32/35/38/42/48		1
		8/9/9.525/10/11/12/14/15.87/16/19		8/9/9.525/10/11/12/14/15.87/16/19			9.525/10/11/12/12.7/14/15.87/16/19/22/24			11/12.7/14/15.87/16/19/22/24/28/32/35		2
D31 Motor pilot diameter[3]		any		any			any			any		
D32 Motor bolt hole diameter[3]		any		any			any			any		
D33 Hole circle diameter[3]		any		any			any			any		
D34 Output flange diagonal[1]	mm	92		116			146			185		
L30 Min. motor shaft length[1]	mm	16 (19[6])		19 (21[7])			21 (26[8])			26(29[9])		1
		16 (19[6])		16 (19[6])			19 (21[7])			21(26[8])		2
L31 Pilot depth		any		any			any			any		
N Number of bolt holes		4		4			4			5		
Q3 Flange square[1]	□	70		90			115			142		1
		70		70			90			115		2
Recommended max. motor weight[4]	kg (lb)	10 (22.05)		15 (33.08)			34 (74.97)			50 (110.25)		
Motor type[1]		B5		B5			B5			B6		
Recommended clamping screw tightening torque	Nm (lbin)	4.5 (40)	9.5[6] (84[6])	4.5 (40)	9.5 (84)	16.5[7] (146) [7]	9.5 (84)	16.5 (146)	40[8] (354)[8]	16.5 (146)	40[9] (354)[9]	
SW wrench width	mm	3	4[6]	3	4	5[7]	4	5	6[8]	5	6[9]	

[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
[9] D30 > 35mm



1 Output flange shaft
Made of high-strength high quality steel for utmost torsional stiffness

2 Output shaft bearing
Large high precision preloaded taper roller bearings for zero clearance

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
High speed ball bearings in floating arrangement, eliminating thrust loads from thermal expansion, and yet providing exact positioning for easy mounting

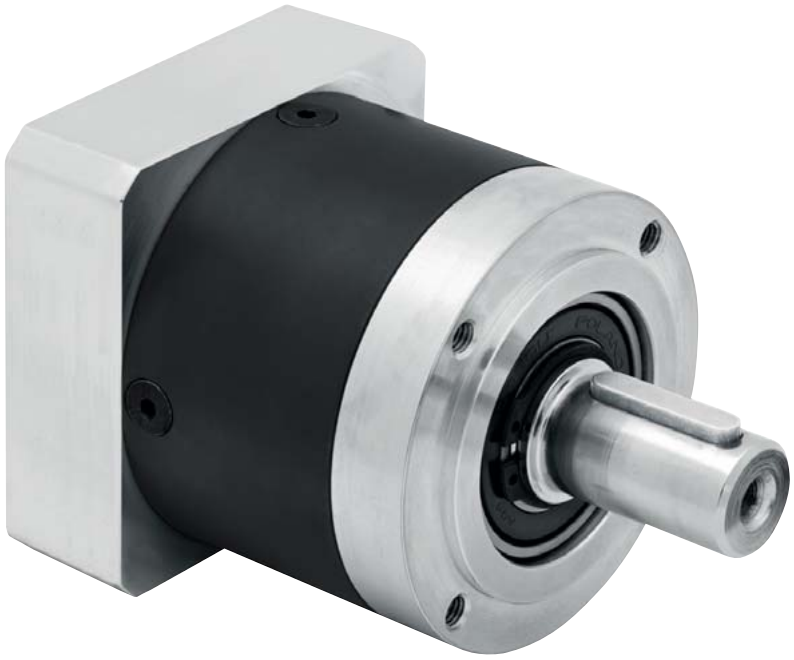
7 Motor matching adapter plate
Matches the gear head with virtually any servo motor; made of aluminum for enhanced thermal conductivity

8 Clamping ring
Balanced ring, suitable for high rpm, made of steel to allow high clamping forces for safe torque transfer

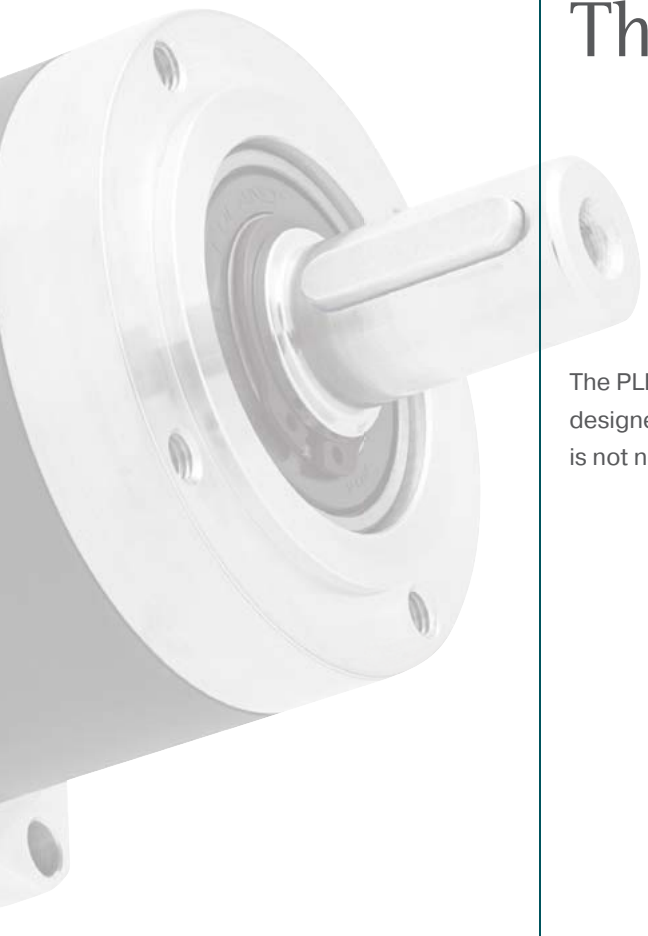
9 Clamping screw
High strength steel screw with special low pitch thread to generate a high clamping force

10 PCS-2 System
Precision Clamping System - most reliable advanced system available today

11 Assembly bore
Access bore for the clamping screw



The powerful alternative



The PLE is the perfect economy alternative to the PLN. We have specifically designed this planetary gear for all applications where a particularly low backlash is not necessarily the main focus.

- > Low backlash
- > High output torque - the industry‘s highest torque density
- > Precise, easy, and flexible motor mounting (PCS-2 system)
- > Balanced motor pinion
- > High efficiency (up to 96%)
- > 22 ratios 3:1 to 512:1
- > Low noise
- > Consistent quality (ISO 9001 and 14001)
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N} [3][5]	Nm (lbin)	11 (97)	28 (248)	85 (752)	115 (1018)	400 (3540)	3	1
		15 (133)	38 (336)	115 (1018)	155 (1372)	450 (3983)	4	
		14 (124)	40 (354)	110 (974)	195 (1726)	450 (3983)	5	
		6 (53)	18 (159)	50 (443)	120 (1062)	450 (3983)	8	
		16.5 (146)	44 (389)	130 (1151)	210 (1859)	-	9	2
		20 (177)	44 (389)	120 (1062)	260 (2301)	800 (7080)	12	
		18 (159)	44 (389)	110 (974)	230 (2036)	700 (6195)	15	
		20 (177)	44 (389)	120 (1062)	260 (2301)	800 (7080)	16	
		20 (177)	44 (389)	120 (1062)	260 (2301)	800 (7080)	20	
		18 (159)	40 (354)	110 (974)	230 (2036)	700 (6195)	25	
		20 (177)	44 (389)	120 (1062)	260 (2301)	800 (7080)	32	
		18 (159)	40 (354)	110 (974)	230 (2036)	700 (6195)	40	
		7.5 (66)	18 (159)	50 (443)	120 (1062)	450 (3983)	64	
		20 (177)	44 (389)	110 (974)	260 (2301)	-	60	3
		20 (177)	44 (389)	120 (1062)	260 (2301)	-	80	
		20 (177)	44 (389)	120 (1062)	260 (2301)	-	100	
		18 (159)	44 (389)	110 (974)	230 (2036)	-	120	
		20 (177)	44 (389)	120 (1062)	260 (2301)	-	160	
		18 (159)	40 (354)	110 (974)	230 (2036)	-	200	
		20 (177)	44 (389)	120 (1062)	260 (2301)	-	256	
		18 (159)	40 (354)	110 (974)	230 (2036)	-	320	
		7.5 (66)	18 (159)	50 (443)	120 (1062)	-	512	

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations [3][5][8]	Nm (lbin)	17.6 (156)	45 (398)	136 (1204)	184 (1628)	640 (5664)	3	1
		24 (212)	61 (540)	184 (1628)	248 (2195)	720 (6372)	4	
		22 (195)	64 (566)	176 (1558)	312 (2761)	720 (6372)	5	
		10 (89)	29 (257)	80 (708)	192 (1699)	720 (6372)	8	
		26 (230)	70 (620)	208 (1841)	336 (2974)	-	9	2
		32 (283)	70 (620)	192 (1699)	416 (3682)	1280 (11328)	12	
		29 (257)	70 (620)	176 (1558)	368 (3257)	1120 (9912)	15	
		32 (283)	70 (620)	192 (1699)	416 (3682)	1280 (11328)	16	
		32 (283)	70 (620)	192 (1699)	416 (3682)	1280 (11328)	20	
		29 (257)	64 (566)	176 (1558)	368 (3257)	1120 (9912)	25	
		32 (283)	70 (620)	192 (1699)	416 (3682)	1280 (11328)	32	
		29 (257)	64 (566)	176 (1558)	368 (3257)	1120 (9912)	40	
		12 (106)	29 (257)	80 (708)	192 (1699)	720 (6372)	64	
		32 (283)	70 (620)	176 (1558)	416 (3682)	-	60	3
		32 (283)	70 (620)	192 (1699)	416 (3682)	-	80	
		32 (283)	70 (620)	192 (1699)	416 (3682)	-	100	
		29 (257)	70 (620)	176 (1558)	368 (3257)	-	120	
		32 (283)	70 (620)	192 (1699)	416 (3682)	-	160	
		29 (257)	64 (566)	176 (1558)	368 (3257)	-	200	
		32 (283)	70 (620)	192 (1699)	416 (3682)	-	256	
		29 (257)	64 (566)	176 (1558)	368 (3257)	-	320	
		12 (106)	29 (257)	80 (708)	192 (1699)	-	512	

[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 n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[4] Dependent on the motor shaft diameter
[5] Keyed shaft subjected to dynamic unidirectional load
[6] Permissible for 30,000 output shaft revolutions; see page 80

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	i [1]	Z [2]
Nominal (rated continous 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)	210 (1859)	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	
		44 (389)	110 (974)	260 (2301)	60	3
		44 (389)	120 (1062)	260 (2301)	80	
		44 (389)	120 (1062)	260 (2301)	100	
		44 (389)	110 (974)	230 (2036)	120	
		44 (389)	120 (1062)	260 (2301)	160	
		40 (354)	110 (974)	230 (2036)	200	
		44 (389)	120 (1062)	260 (2301)	256	
		40 (354)	110 (974)	230 (2036)	320	
		18 (159)	50 (443)	120 (1062)	512	

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	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)	336 (2974)	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	
		70 (620)	176 (1558)	416 (3682)	60	3
		70 (620)	192 (1699)	416 (3682)	80	
		70 (620)	192 (1699)	416 (3682)	100	
		70 (620)	176 (1558)	368 (3257)	120	
		70 (620)	192 (1699)	416 (3682)	160	
		64 (566)	176 (1558)	368 (3257)	200	
		70 (620)	192 (1699)	416 (3682)	256	
		64 (566)	176 (1558)	368 (3257)	320	
		29 (257)	80 (708)	192 (1699)	512	

[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 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[4] Dependent on the motor shaft diameter
[5] Keyed shaft subjected to dynamic unidirectional load
[6] Permissible for 30,000 output shaft revolutions; see page 80

Gearbox type		PLE	Z [1]
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
		90	3
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	

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	Z [1]
Standard backlash	arcmin	< 24	< 16	< 9	< 8	< 6	1
		< 28	< 20	< 14	< 12	< 10	2
		< 30	< 22	< 16	< 14	-	3
$Fr_{max.}$ for 10,000 h[3][4]	N (lb)	200 (45)	500 (113)	950 (214)	2000 (450)	6000 (1350)	
$Fa_{max.}$ for 10,000 h[3][4]		200 (45)	600 (135)	1200 (270)	2800 (630)	8000 (1800)	
$Fr_{max.}$ for 30,000 h[3][4]		160 (36)	340 (77)	650 (146)	1500 (338)	4200 (945)	
$Fa_{max.}$ for 30,000 h[3][4]		160 (36)	450 (101)	900 (203)	2100 (473)	6000 (1350)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	1.0 (9)	2.3 (20)	6 (53)	12 (106)	38 (336)	1
		1.1 (10)	2.5 (22)	6.5 (58)	13 (115)	41 (363)	2
		1.0 (9)	2.5 (22)	6.3 (56)	12 (106)		3
Weight	kg (lb)	0.35 (0.77)	0.9 (1.98)	2.1 (4.63)	6.0 (13.23)	18 (39.69)	1
		0.45 (0.99)	1.1 (2.43)	2.6 (5.73)	8.0 (17.64)	22 (48.51)	2
		0.55 (1.21)	1.3 (2.87)	3.1 (6.84)	10.0 (22.05)		3
Running noise[5]	dB(A)	58	58	60	65	70	
Max. recommended input speed[6]	min^{-1} (rpm)	18000	13000	7000	6500	6500	

[1] Number of gear stages
[2] Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[3] Measured at the middle of the output shaft
[4] Measured at the middle of the gearbox housing surface
[5] Sound pressure level measured 1 m from the gearbox for ratio 5:1 at 3000 input rpm and no load
[6] Permissible about 1000 times during the gearbox life
[7] Ratio dependent; based on n_2=100 rpm output shaft speed
[8] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required

Gearbox type		PLE	Z [1]
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
		90	3
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	

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	Z [1]
Standard backlash	arcmin	< 16	< 9	< 8	1
		< 20	< 14	< 12	2
		< 22	< 16	< 14	3
$Fr_{max.}$ for 10,000 h[3][4]	N (lb)	1000 (225)	2500 (563)	3500 (788)	
$Fa_{max.}$ for 10,000 h[3][4]		1200 (270)	2800 (630)	2800 (630)	
$Fr_{max.}$ for 30,000 h[3][4]		700 (158)	1700 (383)	2400 (540)	
$Fa_{max.}$ for 30,000 h[3][4]		800 (180)	2000 (450)	2100 (473)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	2.3 (20)	6 (53)	12 (106)	1
		2.5 (22)	6.5 (58)	13 (115)	2
		2.5 (22)	6.3 (56)	12 (106)	3
Weight	kg (lb)	1.1 (2.43)	3.2 (7.06)	6.6 (14.55)	1
		1.3 (2.87)	3.7 (8.16)	8.6 (18.96)	2
		1.5 (3.31)	4.2 (9.26)	10.6 (23.37)	3
Running noise[5]	dB(A)	58	60	65	
Max. recommended input speed[6]	min^{-1} (rpm)	13000	7000	6500	

[1] Number of gear stages
[2] Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[3] Measured at the middle of the output shaft
[4] Measured at the middle of the gearbox housing surface
[5] Sound pressure level measured 1 m from the gearbox for ratio 5:1 at 3000 input rpm and no load
[6] Permissible about 1000 times during the gearbox life
[7] Ratio dependent; based on n_2=100 rpm output shaft speed
[8] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	5000	4500	3900	3500	1700	3
		5000	4500	3650	3500	1700	4
		5000	4500	4000	3500	2000	5
		5000	4500	4000	3500	2900	8
		5000	4500	4000	3500	-	9
		5000	4500	4000	3500	1950	12
		5000	4500	4000	3500	2600	15
		5000	4500	4000	3500	2300	16
		5000	4500	4000	3500	2700	20
		5000	4500	4000	3500	3000	25
		5000	4500	4000	3500	3000	32
		5000	4500	4000	3500	3000	40
		5000	4500	4000	3500	-	60
		5000	4500	4000	3500	3000	64
		5000	4500	4000	3500	-	80
		5000	4500	4000	3500	-	100
		5000	4500	4000	3500	-	120
		5000	4500	4000	3500	-	160
		5000	4500	4000	3500	-	200
		5000	4500	4000	3500	-	256
		5000	4500	4000	3500	-	320
		5000	4500	4000	3500	-	512

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	5000	4450	2400	2500	1000	3
		5000	4400	2150	2250	1000	4
		5000	4500	2650	2250	1150	5
		5000	4500	4000	3500	1750	8
		5000	4500	2700	2500	-	9
		5000	4500	3450	2500	1050	12
		5000	4500	4000	3250	1450	15
		5000	4500	4000	3000	1200	16
		5000	4500	4000	3500	1500	20
		5000	4500	4000	3500	2050	25
		5000	4500	4000	3500	2250	32
		5000	4500	4000	3500	2950	40
		5000	4500	4000	3500	-	60
		5000	4500	4000	3500	3000	64
		5000	4500	4000	3500	-	80
		5000	4500	4000	3500	-	100
		5000	4500	4000	3500	-	120
		5000	4500	4000	3500	-	160
		5000	4500	4000	3500	-	200
		5000	4500	4000	3500	-	256
		5000	4500	4000	3500	-	320
		5000	4500	4000	3500	-	512

[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	4500	3350	3500	3
		4500	3250	3500	4
		4500	3900	3500	5
		4500	4000	3500	8
		4500	4000	3500	9
		4500	4000	3500	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	60
		4500	4000	3500	64
		4500	4000	3500	80
		4500	4000	3500	100
		4500	4000	3500	120
		4500	4000	3500	160
		4500	4000	3500	200
		4500	4000	3500	256
		4500	4000	3500	320
		4500	4000	3500	512

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	3900	2200	2500	3
		3900	2000	2250	4
		4350	2450	2250	5
		4500	4000	3500	8
		4500	2600	2500	9
		4500	3350	2500	12
		4500	4000	3250	15
		4500	4000	3000	16
		4500	4000	3500	20
		4500	4000	3500	25
		4500	4000	3500	32
		4500	4000	3500	40
		4500	4000	3500	60
		4500	4000	3500	64
		4500	4000	3500	80
		4500	4000	3500	100
		4500	4000	3500	120
		4500	4000	3500	160
		4500	4000	3500	200
		4500	4000	3500	256
		4500	4000	3500	320
		4500	4000	3500	512

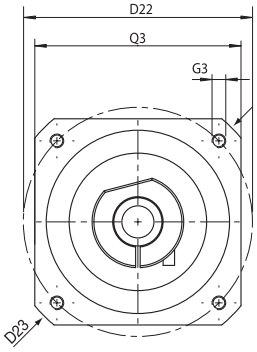
[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81

Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	0.031 (0.27)	0.135 (1.19)	0.77 (6.81)	2.63 (23.28)	12.14 (107.44)	3
		0.022 (0.19)	0.093 (0.82)	0.52 (4.60)	1.79 (15.84)	7.78 (68.85)	4
		0.019 (0.17)	0.078 (0.69)	0.45 (3.98)	1.53 (13.54)	6.07 (53.72)	5
		0.017 (0.15)	0.065 (0.58)	0.39 (3.45)	1.32 (11.68)	4.63 (40.98)	8
		0.030 (0.27)	0.131 (1.16)	0.74 (6.55)	2.62 (23.19)	-	9
		0.029 (0.26)	0.127 (1.12)	0.72 (6.37)	2.56 (22.66)	12.37 (109.47)	12
		0.023 (0.20)	0.077 (0.68)	0.71 (6.28)	2.53 (22.39)	12.35 (109.30)	15
		0.022 (0.19)	0.088 (0.78)	0.50 (4.43)	1.75 (15.49)	7.47 (66.11)	16
		0.019 (0.17)	0.075 (0.66)	0.44 (3.89)	1.50 (13.28)	6.65 (58.85)	20
		0.019 (0.17)	0.075 (0.66)	0.44 (3.89)	1.49 (13.19)	5.81 (51.42)	25
		0.017 (0.15)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	6.36 (56.29)	32
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	5.28 (46.73)	40
		0.029 (0.26)	0.076 (0.67)	0.51 (4.51)	2.57 (22.74)	-	60
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	4.50 (39.83)	64
		0.019 (0.17)	0.075 (0.66)	0.50 (4.43)	1.50 (13.28)	-	80
		0.019 (0.17)	0.075 (0.66)	0.44 (3.89)	1.49 (13.19)	-	100
		0.029 (0.26)	0.064 (0.57)	0.70 (6.20)	2.50 (22.13)	-	120
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	-	160
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	-	200
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	-	256
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	-	320
		0.016 (0.14)	0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	-	512

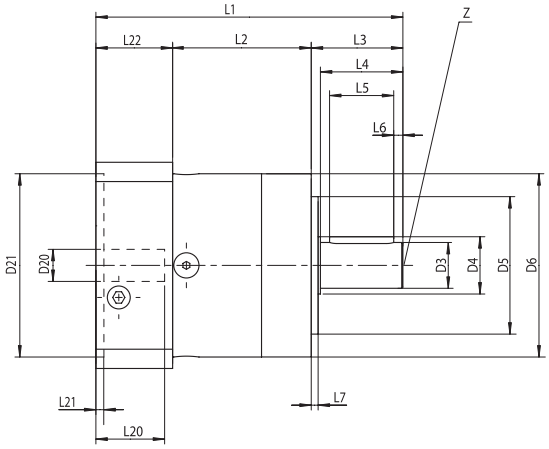
[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)

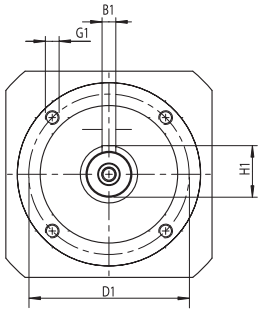
Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	0.135 (1.19)	0.77 (6.81)	2.63 (23.28)	3
		0.093 (0.82)	0.52 (4.60)	1.79 (15.84)	4
		0.078 (0.69)	0.45 (3.98)	1.53 (13.54)	5
		0.065 (0.58)	0.39 (3.45)	1.32 (11.68)	8
		0.131 (1.16)	0.74 (6.55)	2.62 (23.19)	9
		0.127 (1.12)	0.72 (6.37)	2.56 (22.66)	12
		0.077 (0.68)	0.71 (6.28)	2.53 (22.39)	15
		0.088 (0.78)	0.50 (4.43)	1.75 (15.49)	16
		0.075 (0.66)	0.44 (3.89)	1.50 (13.28)	20
		0.075 (0.66)	0.44 (3.89)	1.49 (13.19)	25
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	32
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	40
		0.076 (0.67)	0.51 (4.51)	2.57 (22.74)	60
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	64
		0.075 (0.66)	0.50 (4.43)	1.50 (13.28)	80
		0.075 (0.66)	0.44 (3.89)	1.49 (13.19)	100
		0.064 (0.57)	0.70 (6.20)	2.50 (22.13)	120
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	160
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	200
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	256
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	320
		0.064 (0.57)	0.39 (3.45)	1.30 (11.51)	512

[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)



Input side view

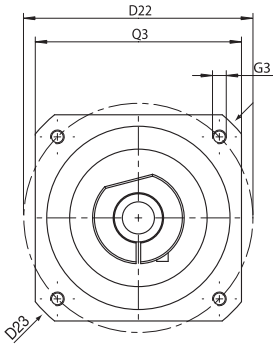




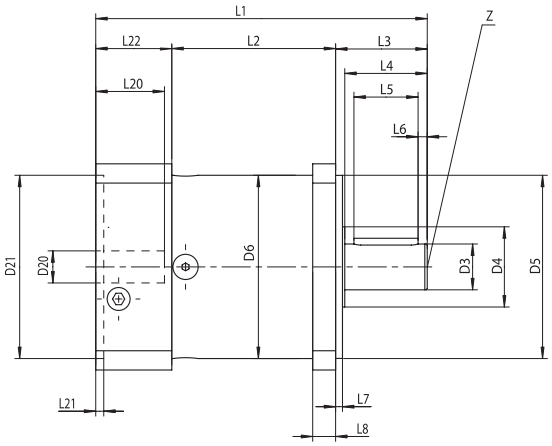
Output side view

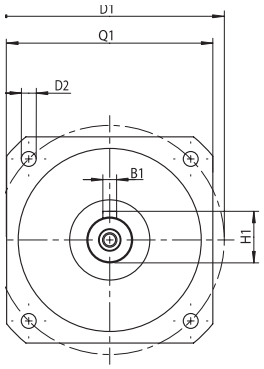
Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	Z [2]
All dimensions in mm							
B1 Key DIN 6885 T1		3	5	6	8	12	
D1 Flange bolt hole circle		34	52	70	100	145	
D3 Output shaft diameter	k6	10	14	20	25	40	
D4 Output shaft collar diameter		12	17	25	35	55	
D5 Pilot diameter	h7	26	40	60	80	130	
D6 Body diameter		40	60	80	115	160	
D20 Pinion bore diameter[1][4]		6	9	14	19	24	
D21 Motor centering pilot diameter[1]		30	40	80	95	130	
D22 Motor matching bolt circle diameter[1]		46	63	100	115	165	
D23 Motor matching adapter diagonal		54	80	116	145	185	
G1 Mounting hole thread x depth[1]	4x	M4x6	M5x8	M6x10	M10x16	M12x20	
G3 Mounting hole thread x depth[1]		M4x10	M5x12	M6x15	M8x20	M10x25	
H1 Key DIN 6885 T1		11.2	16	22.5	28	43	
L1 Overall length[3]		93.5	106.5	134	176.5	255.5	1
		106.5	118.5	151	203.5	305	2
		119	131.5	168.5	230.5	-	3
L2 Main-body length		39	47	60	74	104	1
		52	59	77.5	101	153.5	2
		64.5	72	95	128	-	3
L3 Output shaft length from mounting face		26	35	40	55	87	
L4 Output shaft length from collar		23	30	36	50	80	
L5 Key length		18	25	28	40	65	
L6 Distance from shaft end		2.5	2.5	4	5	8	
L7 Pilot length		2	3	3	4	5	
L20 Reference motor shaft length [3]		25	23	30	40	50	
L21 Motor pilot depth		3	2.5	3.5	3.5	4	
L22 Reference motor adapter flange width[3]		28.5	24.5	33.5	47.5	64.5	
Q3 Motor adapter square[1]	□	40	60	90	115	140	
Z Center bore DIN 332, page 2, form DR		M3x9	M5x12	M6x16	M10x22	M16x36	

[1] Dimensions reference to the mounted motor-type, see page 52
[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



Input side view



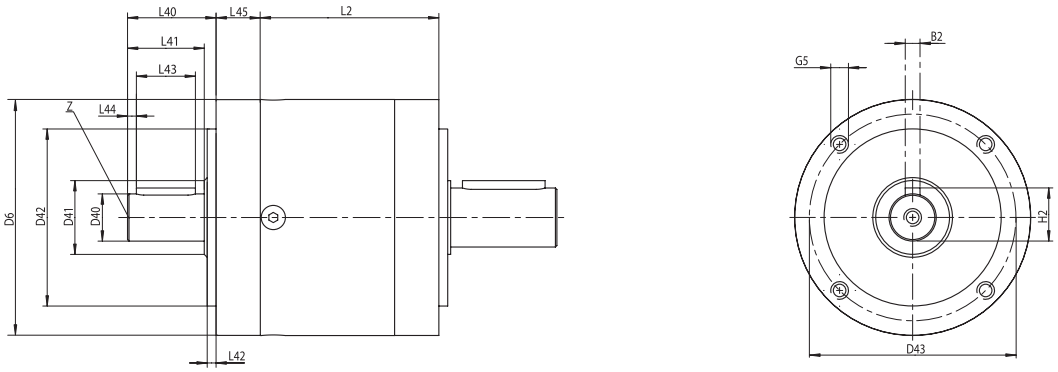


Output side view

Type-Size		PLE 60/70	PLE 80/90	PLE 120/115	Z [2]
All dimensions in mm					
B1 Key DIN 6885 T1		5	6	8	
D1 Flange bolt hole circle		75	100	130	
D2 Mounting bolt hole diameter	4x	5.5	6.5	8.5	
D3 Output shaft diameter	k6	16	20	25	
D4 Output shaft collar diameter		20	35	35	
D5 Pilot diameter	h7	60	80	110	
D6 Body diameter		60	80	115	
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	
G3 Mounting hole thread x depth[1]	4x	M5x8	M6x15	M8x20	
H1 Key DIN 6885 T1		18	22.5	28	
L1 Overall length[3]		111.5	145	201.5	1
		124	162	228.5	2
		136.5	179.5	255.5	3
L2 Main-body length		55	71.5	99	1
		67.5	88.5	126	2
		80	106	153	3
L3 Output shaft length from mounting face		32	40	55	
L4 Output shaft length from collar		28	36	50	
L5 Key length		20	28	40	
L6 Distance from shaft end		4	4	5	
L7 Pilot length		3	3	4	
L8 Flange width		10	10	15	
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	
Q1 Motor adapter square	□	70	90	115	
Q3 Motor adapter square[1]		60	90	115	
Z Center bore DIN 332, page 2, form DR		M5x12	M6x16	M10x22	

[1] Dimensions reference to the mounted motor-type, see page 52
[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 1: Solid input shaft [1]



Type-Size		PLE 40	PLE 60-60/70	PLE 80-80/90	PLE 120-120/115	PLE 160	Z [2]
B2 Key DIN 6885 T1	mm	2	3	5	6	10	
D6 Flange diameter		40	60	80	115	160	
D40 Output shaft diameter	j6	8	10	16	20	35	
D41 Output shaft collar diameter	mm	12	17	25	35	55	
D42 Pilot diameter	h7	26	40	60	80	110	
D43 Flange bolt hole circle	mm	34	52	70	100	130	
G5 Mounting hole thread x depth	4x	M4x6	M5x8	M6x10	M10x16	M10x25	
H2 Key DIN 6885 T1	mm	8.8	11.2	18	22.5	38	
L2 Main-body length		page 48	page 48	page 48	page 48	page 48	1
L40 Shaft length from input face		20	28	30	45	65	
L41 Output shaft length from collar		17	23	26	40	58	
L42 Pilot depth length		2	3	3	4	5	
L43 Key length		12	18	20	32	45	
L44 Distance from shaft end		2.5	2.5	3	4	7	
L45 Input flange length		10.2	12.7	15	31	58	
Max. recommended input speed[5]	min^{-1} (rpm)	18000	13000	7000	6500	4500	
Recommended max. mean input speed[3][5]		page 44	page 44	page 44	page 44	page 44	
Input shaft load axial[4]	N (lb)	120 (27)	300 (68)	500 (113)	1300 (293)	1600 (360)	
Input shaft load radial[4]		100 (23)	250 (56)	450 (101)	1000 (225)	1400 (315)	
Z Center bore DIN 332, page 2, form DR	4x	M3x9	M3x9	M5x12	M6x16	M12x28	

[1] Gearbox is flange mounted on both sides
[2] Number of gear stages
[3] These values refer to S1 - duty cycle and ambient temperature 20° C
[4] At the midpoint of the shaft n_1=1000 min^{-1} referred to 10,000 h lifetime
[5] Recommended operating temperature should not be exceeded

OP 1: Solid input shaft [1]

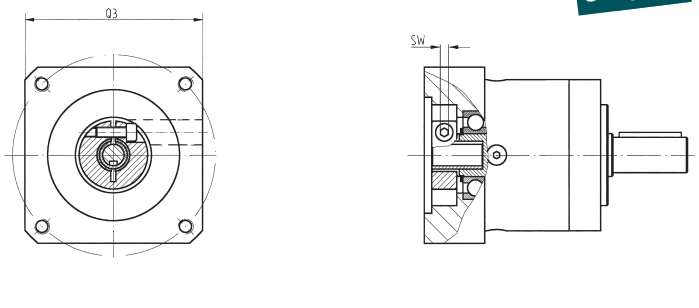
Type-Size		PLE 40	PLE 60	PLE 80	PLE 120	PLE 160	i [3]	Z [2]
Mass moment of inertia [4]	kgcm² (lbin s² x 10^{-4})	0.018 (0.16)	0.080 (0.71)	0.73 (6.46)	2.30 (20.36)	17 (150.45)	3	1
		0.010 (0.09)	0.048 (0.42)	0.35 (3.10)	1.85 (16.37)	12.5 (110.63)	4	
		0.006 (0.05)	0.037 (0.33)	0.24 (2.12)	1.42 (12.57)	11 (97.35)	5	
		0.005 (0.04)	0.027 (0.24)	0.18 (1.59)	1.40 (12.39)	9.5 (84.08)	8	
		0.017 (0.15)	0.087 (0.77)	0.73 (6.46)	2.50 (22.13)	-	9	2
		0.016 (0.14)	0.085 (0.75)	0.36 (3.19)	2.40 (21.24)	17 (150.45)	12	
		0.015 (0.13)	0.039 (0.35)	0.72 (6.37)	2.40 (21.24)	17 (150.45)	15	
		0.009 (0.08)	0.049 (0.43)	0.35 (3.10)	1.65 (14.60)	12.3 (108.86)	16	
		0.007 (0.06)	0.039 (0.35)	0.25 (2.21)	1.60 (14.16)	11.7 (103.55)	20	
		0.007 (0.06)	0.038 (0.34)	0.25 (2.21)	1.40 (12.39)	10.8 (95.58)	25	
		0.005 (0.04)	0.027 (0.24)	0.18 (1.59)	1.40 (12.39)	11.4 (100.89)	32	
		0.005 (0.04)	0.027 (0.24)	0.18 (1.59)	1.30 (11.51)	10.3 (91.16)	40	
		0.005 (0.04)	0.025 (0.22)	0.16 (1.42)	1.30 (11.51)	9.5 (84.08)	64	
		0.015 (0.13)	0.039 (0.35)	0.35 (3.10)	2.20 (19.47)	-	60	3
		0.007 (0.06)	0.039 (0.35)	0.28 (2.48)	1.60 (14.16)	-	80	
		0.007 (0.06)	0.039 (0.35)	0.25 (2.21)	1.40 (12.39)	-	100	
		0.013 (0.12)	0.016 (0.14)	0.70 (6.20)	2.20 (19.47)	-	120	
		0.005 (0.04)	0.016 (0.14)	0.18 (1.59)	1.50 (13.28)	-	160	
		0.005 (0.04)	0.016 (0.14)	0.18 (1.59)	1.30 (11.51)	-	200	
		0.005 (0.04)	0.016 (0.14)	0.18 (1.59)	1.30 (11.51)	-	256	
		0.005 (0.04)	0.016 (0.14)	0.16 (1.42)	1.20 (10.62)	-	320	
		0.005 (0.04)	0.016 (0.14)	0.16 (1.42)	1.20 (10.62)	-	512	

[1] Gearbox is flange mounted on both sides
[2] Number of gear stages
[3] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[4] The moment of inertia refers to input shaft

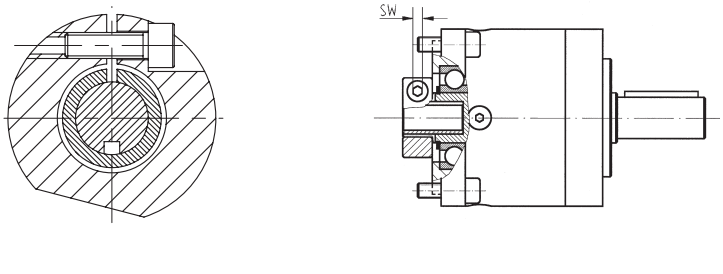
OP 2: Motor Mount option
Note: B5 mounting depicted;
B14 motor mounting requires special/custom motor adapter

See page 77 for other options

B5

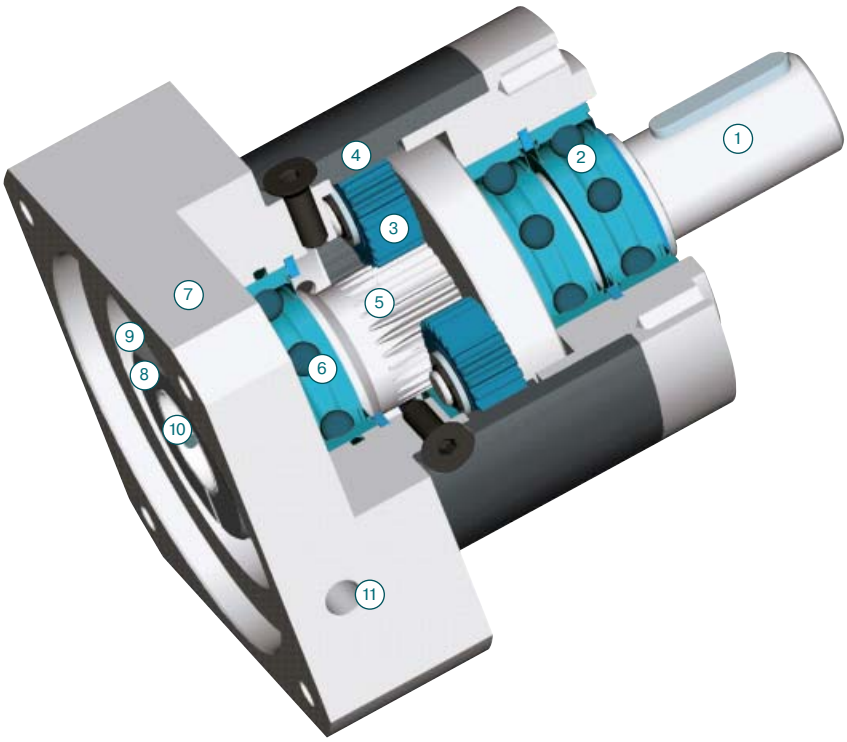


B14



Type-Size		PLE 40		PLE 60		PLE 80		PLE 120		PLE 160	Z [2]
D4 Motor mounting hole diameter[3]		any		any		any		any		any	
D30 Motor shaft diameter/ Available pinion bores / bushings[1][5]	mm	4/5/6/6.35/ 8/9/11		6/6.35/8/ 9/9.525/11/12/ 15.87/14/16/19		9.525/10/11/ 12/12.7/14/15.87/ 16/19/22/24		11/12.7/14/ 15.87/16/19/ 22/24/28/32/35		19/24/28/ 32/35	
D31 Motor pilot diameter[3]		any		any		any		any		any	
D32 Motor bolt hole diameter[3]		any		any		any		any		any	
D33 Hole circle diameter[3]		any		any		any		any		any	
D34 Output flange diagonal[1]	mm	54		80		116		145		185	
G4 Motor mounting thread size		any		any		any		any		any	
L30 Min. motor shaft length[1]	mm	12.5 (16[6])		16 (19[7])		19 (21[8])		21 (26[9])		26	
L31 Pilot depth		any		any		any		any		any	
N Number of bolt holes		4		4		4		4		4	
Q3 Flange square[1]	□	40		60		80		115		140	
Recommended max. motor weight[4]	kg (lb)	2 (4.41)		3.5 (7.72)		9 (19.85)		16.5 (36.38)		40 (88.20)	
Motor type[1]		B5/B14		B5/B14		B5/B14		B5/B14		B5/B14	
Recommended clamping screw tightening torque	Nm (lbin)	2 (18)	4.5 (40)	4.5 (40)	9.5 (84)	9.5 (84)	16.5 (146)	16.5 (146)	40 (354)	40 (354)	
SW wrench width	mm	2.5	3	3	4	4	5	5	6	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 > 9 mm
(7) D30 > 14 mm
(8) D30 > 19 mm
(9) D30 > 24 mm



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
High speed ball bearings in floating arrangement, eliminating thrust loads from thermal expansion, and yet providing exact positioning for easy mounting

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

For new perspectives

The WPLE is the logical refinement of our PLE series. This bevel gearbox series was designed especially for space-saving installation in a right-angle position of the motor/gearbox combination.

- > Low backlash
- > High output torque - the industry‘s highest torque density
- > Precise, easy, and flexible motor mounting (patented PCS®)
- > Balanced motor pinion
- > High efficiency (up to 94%)
- > 22 ratios 3:1 to 512:1
- > Low noise
- > Consistent quality (ISO 9001 and 14001)
- > Operable in any mounting positions
- > Lifetime lubrication
- > Numerous options

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N}[3][4][6]	Nm (lbin)	4.5 (40)	14 (124)	40 (354)	80 (708)	3	1
		6 (53)	19 (168)	53 (469)	105 (929)	4	
		7.5 (66)	24 (212)	67 (593)	130 (1151)	5	
		6 (53)	18 (159)	50 (443)	120 (1062)	8	
		16.5 (146)[7]	44 (389)[7]	130 (1151)[7]	210 (1859)[7]	9	2
		20 (177)[7]	44 (389)	120 (1062)[7]	260 (2301)[7]	12	
		18 (159)[7]	44 (389)	110 (974)	230 (2036)	15	
		20 (177)[7]	44 (389)	120 (1062)	260 (2301)	16	
		20 (177)[7]	44 (389)	120 (1062)	260 (2301)	20	
		18 (159)	40 (354)	110 (974)	230 (2036)	25	
		20 (177)	44 (389)	120 (1062)	260 (2301)	32	
		18 (159)	40 (354)	110 (974)	230 (2036)	40	
		7.5 (66)	18 (159)	50 (443)	120 (1062)	64	
		20 (177)	44 (389)	110 (974)	260 (2301)	60	3
		20 (177)	44 (389)	120 (1062)	260 (2301)	80	
		20 (177)	44 (389)	120 (1062)	260 (2301)	100	
		18 (159)	44 (389)	110 (974)	230 (2036)	120	
		20 (177)	44 (389)	120 (1062)	260 (2301)	160	
		18 (159)	40 (354)	110 (974)	230 (2036)	200	
		20 (177)	44 (389)	120 (1062)	260 (2301)	256	
		18 (159)	40 (354)	110 (974)	230 (2036)	320	
		7.5 (66)	18 (159)	50 (443)	120 (1062)	512	

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations[3][4][5][6]	Nm (lbin)	7 (62)	22 (195)	64 (566)	128 (1133)	3	1
		10 (89)	30 (266)	85 (752)	168 (1487)	4	
		12 (106)	38 (336)	107 (947)	208 (1841)	5	
		10 (89)	29 (257)	80 (708)	192 (1699)	8	
		26 (230)	70 (620)	208 (1841)	336 (2974)	9	2
		32 (283)	70 (620)	192 (1699)	416 (3682)	12	
		29 (257)	70 (620)	176 (1558)	368 (3257)	15	
		32 (283)	70 (620)	192 (1699)	416 (3682)	16	
		32 (283)	70 (620)	192 (1699)	416 (3682)	20	
		29 (257)	64 (566)	176 (1558)	368 (3257)	25	
		32 (283)	70 (620)	192 (1699)	416 (3682)	32	
		29 (257)	64 (566)	176 (1558)	368 (3257)	40	
		12 (106)	29 (257)	80 (708)	192 (1699)	64	
		32 (283)	70 (620)	176 (1558)	416 (3682)	60	3
		32 (283)	70 (620)	192 (1699)	416 (3682)	80	
		32 (283)	70 (620)	192 (1699)	416 (3682)	100	
		29 (257)	70 (620)	176 (1558)	368 (3257)	120	
		32 (283)	70 (620)	192 (1699)	416 (3682)	160	
		29 (257)	64 (566)	176 (1558)	368 (3257)	200	
		32 (283)	70 (620)	192 (1699)	416 (3682)	256	
		29 (257)	64 (566)	176 (1558)	368 (3257)	320	
		12 (106)	29 (257)	80 (708)	192 (1699)	512	

[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 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[4] Dependent on the motor shaft diameter
[5] Permissible for 30,000 output shaft revolutions; see page 80
[6] Keyed shaft subjected to dynamic unidirectional load
[7] Different lifetime 10,000 h at T_{2N}

Type-Size		WPLE 80/90	WPLE 120/115	i [1]	Z [2]
Nominal (rated continous duty) Output torque T_{2N}[3][4][6]	Nm (lbin)	40 (354)	80 (708)	3	1
		53 (469)	105 (929)	4	
		67 (593)	130 (1151)	5	
		50 (443)	120 (1062)	8	
		130 (1151)[7]	210 (1859)[7]	9	2
		120 (1062)[7]	260 (2301)[7]	12	
		110 (974)	230 (2036)	15	
		120 (1062)	260 (2301)	16	
		120 (1062)	260 (2301)	20	
		110 (974)	230 (2036)	25	
		120 (1062)	260 (2301)	32	
		110 (974)	230 (2036)	40	
		50 (443)	120 (1062)	64	
		110 (974)	260 (2301)	60	3
		120 (1062)	260 (2301)	80	
		120 (1062)	260 (2301)	100	
		110 (974)	230 (2036)	120	
		120 (1062)	260 (2301)	160	
		110 (974)	230 (2036)	200	
		120 (1062)	260 (2301)	256	
		110 (974)	230 (2036)	320	
		50 (443)	120 (1062)	512	

Type-Size		WPLE 80/90	WPLE 120/115	i [1]	Z [2]
Output torque sustainable 30,000 output shaft rotations[3][4][5][6]	Nm (lbin)	64 (566)	128 (1133)	3	1
		85 (752)	168 (1487)	4	
		107 (947)	208 (1841)	5	
		80 (708)	192 (1699)	8	
		208 (1841)	336 (2974)	9	2
		192 (1699)	416 (3682)	12	
		176 (1558)	368 (3257)	15	
		192 (1699)	416 (3682)	16	
		192 (1699)	416 (3682)	20	
		176 (1558)	368 (3257)	25	
		192 (1699)	416 (3682)	32	
		176 (1558)	368 (3257)	40	
		80 (708)	192 (1699)	64	
		176 (1558)	416 (3682)	60	3
		192 (1699)	416 (3682)	80	
		192 (1699)	416 (3682)	100	
		176 (1558)	368 (3257)	120	
		192 (1699)	416 (3682)	160	
		176 (1558)	368 (3257)	200	
		192 (1699)	416 (3682)	256	
		176 (1558)	368 (3257)	320	
		80 (708)	192 (1699)	512	

[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 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[4] Dependent on the motor shaft diameter
[5] Permissible for 30,000 output shaft revolutions; see page 80
[6] Keyed shaft subjected to dynamic unidirectional load
[7] Different lifetime 10,000 h at T_{2N}

Gearbox type		WPLE	Z [2]
Gearbox life at full load	h	20,000	
Gearbox life at 88% nominal torque T_{2N} x 0,88		30,000	
Emergency stop torque[6]	Nm (lbin)	2 - times T_{2N}	
Efficiency at full load[7]	%	94	1
		92	2
		88	3
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	
shaft seal		contact rubber seal of bearings	

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	Z [2]
Standard backlash	arcmin	< 30	< 22	< 15	< 12	1
		< 34	< 26	< 19	< 16	2
		< 36	< 28	< 21	< 18	3
$Fr_{max.}$ for 10,000 h[2][3]	N (lb)	200 (45)	500 (113)	950 (214)	2000 (450)	
$Fa_{max.}$ for 10,000 h[2][3]		200 (45)	600 (135)	1200 (270)	2800 (630)	
$Fr_{max.}$ for 30,000 h[2][3]		160 (36)	340 (77)	650 (146)	1500 (338)	
$Fa_{max.}$ for 30,000 h[2][3]		160 (36)	450 (101)	900 (203)	2100 (473)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	0.7 (6)	1.5 (13)	4.5 (40)	10 (89)	1
		1.1 (10)	2.5 (22)	6.5 (58)	13 (115)	2
		1.0 (9)	2.5 (22)	6.3 (56)	12 (106)	3
Weight	kg (lb)	0.51 (1.12)	1.7 (3.75)	4.4 (9.70)	12.0 (26.46)	1
		0.61 (1.35)	1.9 (4.19)	5.0 (11.03)	14.0 (30.87)	2
		0.71 (1.57)	2.1 (4.63)	5.5 (12.13)	16.0 (35.28)	3
Running noise[5]	dB(A)	68	70	73	75	
Max. recommended input speed[8]	min^{-1} (rpm)	18000	13000	7000	6500	

[1] Number of gear stages
[2] Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[3] Measured at the middle of the output shaft
[4] Measured at the middle of the gearbox housing surface
[5] Sound pressure level measured 1 m from the gearbox for ratio 5:1 at 3000 input rpm and no load
[6] Permissible about 1000 times during the gearbox life
[7] Ratio dependent; based on n_2=100 rpm output shaft speed
[8] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required

Gearbox type		WPLE	Z [2]
Gearbox life at full load	h	20,000	
Gearbox life at 88% nominal torque T_{2N} x 0,88		30,000	
Emergency stop torque[6]	Nm (lbin)	2 - times T_{2N}	
Efficiency at full load[7]	%	94	1
		92	2
		88	3
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	
shaft seal		contact rubber seal of bearings	

Type-Size		WPLE 80/90	WPLE 120/115	Z [2]
Standard backlash	arcmin	< 15	< 12	1
		< 19	< 16	2
		< 21	< 18	3
$Fr_{max.}$ for 10,000 h[2][3]	N (lb)	2500 (563)	3500 (788)	
$Fa_{max.}$ for 10,000 h[2][3]		2800 (630)	2800 (630)	
$Fr_{max.}$ for 30,000 h[2][3]		1700 (383)	2400 (540)	
$Fa_{max.}$ for 30,000 h[2][3]		2000 (450)	2100 (473)	
Torsional stiffness	Nm /arcmin (lbin /arcmin)	4.5 (40)	10 (89)	1
		6.5 (58)	13 (115)	2
		6.3 (56)	12 (106)	3
Weight	kg (lb)	5.5 (12.13)	12.6 (27.78)	1
		6.1 (13.45)	14.6 (32.19)	2
		6.6 (14.55)	16.6 (36.60)	3
Running noise[5]	dB(A)	73	75	
Max. recommended input speed[8]	min^{-1} (rpm)	7000	6500	

[1] Number of gear stages
[2] Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°C, 86°F ambient temperature
[3] Measured at the middle of the output shaft
[4] Measured at the middle of the gearbox housing surface
[5] Sound pressure level measured 1 m from the gearbox for ratio 5:1 at 3000 input rpm and no load
[6] Permissible about 1000 times during the gearbox life
[7] Ratio dependent; based on n_2=100 rpm output shaft speed
[8] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	5000	4500	4000	3500	3
		5000	4500	4000	3500	4
		5000	4500	4000	3500	5
		5000	4500	4000	3500	8
		5000	4500	3600	3450	9
		5000	4500	4000	3500	12
		5000	4500	4000	3500	15
		5000	4500	4000	3500	16
		5000	4500	4000	3500	20
		5000	4500	4000	3500	25
		5000	4500	4000	3500	32
		5000	4500	4000	3500	40
		5000	4500	4000	3500	60
		5000	4500	4000	3500	64
		5000	4500	4000	3500	80
		5000	4500	4000	3500	100
		5000	4500	4000	3500	120
		5000	4500	4000	3500	160
		5000	4500	4000	3500	200
		5000	4500	4000	3500	256
		5000	4500	4000	3500	320
		5000	4500	4000	3500	512

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	5000	4450	2750	2200	3
		5000	4450	2650	2150	4
		5000	4400	2650	2150	5
		5000	4500	4000	3300	8
		3350	3850	2150	2050	9
		5000	4500	2850	2150	12
		5000	4500	3550	2800	15
		5000	4500	3400	2650	16
		5000	4500	4000	3050	20
		5000	4500	4000	3500	25
		5000	4500	4000	3500	32
		5000	4500	4000	3500	40
		5000	4500	4000	3500	60
		5000	4500	4000	3500	64
		5000	4500	4000	3500	80
		5000	4500	4000	3500	100
		5000	4500	4000	3500	120
		5000	4500	4000	3500	160
		5000	4500	4000	3500	200
		5000	4500	4000	3500	256
		5000	4500	4000	3500	320
		5000	4500	4000	3500	512

[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81

Type-Size		WPLE 80/90	WPLE 120/115	i [1]
Recommended max. mean input speed at 50% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	3550	3500	3
		3700	3500	4
		3800	3500	5
		4000	3500	8
		3450	3450	9
		4000	3500	12
		4000	3500	15
		4000	3500	16
		4000	3500	20
		4000	3500	25
		4000	3500	32
		4000	3500	40
		4000	3500	60
		4000	3500	64
		4000	3500	80
		4000	3500	100
		4000	3500	120
		4000	3500	160
		4000	3500	200
		4000	3500	256
		4000	3500	320
		4000	3500	512

Type-Size		WPLE 80/90	WPLE 120/115	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[2][3]	min^{-1} (rpm)	2500	2200	3
		2500	2150	4
		2500	2150	5
		4000	3300	8
		2100	2050	9
		2850	2150	12
		3550	2800	15
		3400	2650	16
		4000	3050	20
		4000	3500	25
		4000	3500	32
		4000	3500	40
		4000	3500	60
		4000	3500	64
		4000	3500	80
		4000	3500	100
		4000	3500	120
		4000	3500	160
		4000	3500	200
		4000	3500	256
		4000	3500	320
		4000	3500	512

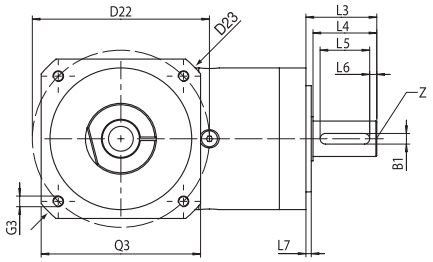
[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Recommended gearbox operating temperature should not be exceeded, consult Neugart in case higher than listed rpm is required
[3] Exact definition see page 81

Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	0.044 (0.39)	0.246 (2.18)	1.189 (10.52)	5.75 (50.89)	3
		0.035 (0.31)	0.204 (1.81)	0.939 (8.31)	3.91 (34.60)	4
		0.032 (0.28)	0.189 (1.67)	0.869 (7.69)	3.35 (29.65)	5
		0.030 (0.27)	0.176 (1.56)	0.809 (7.16)	2.89 (25.58)	8
		0.043 (0.38)	0.242 (2.14)	1.159 (10.26)	5.73 (50.71)	9
		0.042 (0.37)	0.238 (2.11)	1.139 (10.08)	5.60 (49.56)	12
		0.036 (0.32)	0.188 (1.66)	1.129 (9.99)	5.53 (48.94)	15
		0.035 (0.31)	0.199 (1.76)	0.919 (8.13)	3.83 (33.90)	16
		0.032 (0.28)	0.186 (1.65)	0.859 (7.60)	3.28 (29.03)	20
		0.032 (0.28)	0.186 (1.65)	0.859 (7.60)	3.26 (28.85)	25
		0.030 (0.27)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	32
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	40
		0.042 (0.37)	0.187 (1.65)	0.929 (8.22)	5.62 (49.74)	60
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	64
		0.032 (0.28)	0.186 (1.65)	0.919 (8.13)	3.28 (29.03)	80
		0.032 (0.28)	0.186 (1.65)	0.859 (7.60)	3.26 (28.85)	100
		0.042 (0.37)	0.175 (1.55)	1.119 (9.90)	5.47 (48.41)	120
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	160
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	200
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	256
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	320
		0.029 (0.26)	0.175 (1.55)	0.809 (7.16)	2.84 (25.13)	512

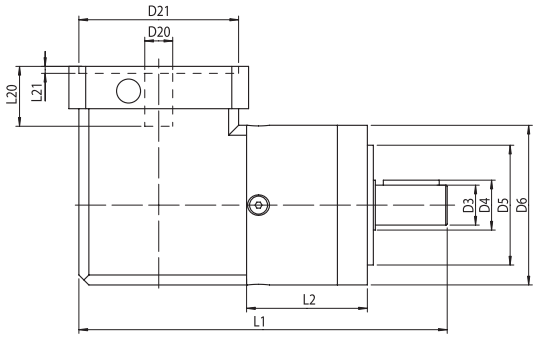
[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)

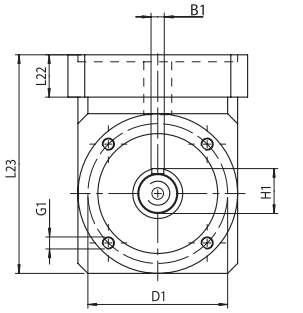
Type-Size		WPLE 80/90	WPLE 120/115	i [1]
Mass moment of inertia [2]	kgcm² (lbin s² x 10^{-4})	1.189 (10.52)	5.75 (50.89)	3
		0.939 (8.31)	3.91 (34.60)	4
		0.869 (7.69)	3.35 (29.65)	5
		0.809 (7.16)	2.89 (25.58)	8
		1.159 (10.26)	5.73 (50.71)	9
		1.139 (10.08)	5.60 (49.56)	12
		1.129 (9.99)	5.53 (48.94)	15
		0.919 (8.13)	3.83 (33.90)	16
		0.859 (7.60)	3.28 (29.03)	20
		0.859 (7.60)	3.26 (28.85)	25
		0.809 (7.16)	2.84 (25.13)	32
		0.809 (7.16)	2.84 (25.13)	40
		0.929 (8.22)	5.62 (49.74)	60
		0.809 (7.16)	2.84 (25.13)	64
		0.919 (8.13)	3.28 (29.03)	80
		0.859 (7.60)	3.26 (28.85)	100
		1.119 (9.90)	5.47 (48.41)	120
		0.809 (7.16)	2.84 (25.13)	160
		0.809 (7.16)	2.84 (25.13)	200
		0.809 (7.16)	2.84 (25.13)	256
		0.809 (7.16)	2.84 (25.13)	320
		0.809 (7.16)	2.84 (25.13)	512

[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)



Input side view

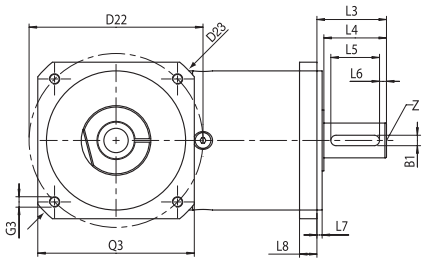




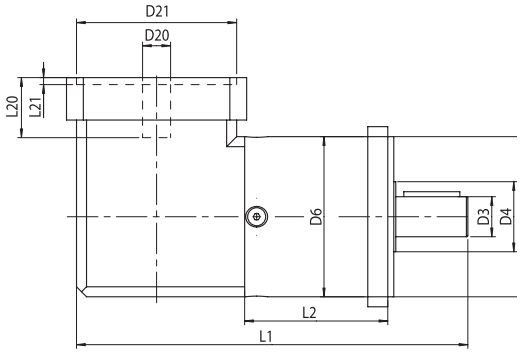
Output side view

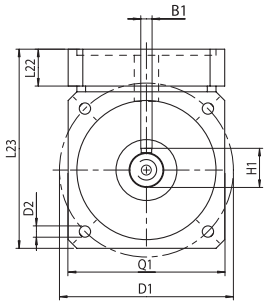
Type-Size		WPLE 40	WPLE 60	WPLE 80	WPLE 120	Z [2]
All dimensions in mm						
B1 Key DIN 6885 T1		3	5	6	8	
D1 Flange bolt hole circle		34	52	70	100	
D3 Output shaft diameter	h7	10	14	20	25	
D4 Output shaft collar diameter		12	17	25	35	
D5 Pilot diameter	h7	26	40	60	80	
D6 Body diameter		40	60	80	115	
D20 Pinion bore diameter[1][4]		6	9	14	19	
D21 Motor centering pilot diameter[1]		30	40	80	95	
D22 Motor matching bolt circle diameter[1]		46	63	100	115	
D23 Motor matching adapter diagonal		54	80	116	145	
G1 Mounting hole thread x depth[1]	4x	M4x6	M5x8	M6x10	M10x16	
G3 Mounting hole thread x depth[1]		M4x6	M5x8	M6x10	M8x20	
H1 Key DIN 6885 T1		11.2	16	22.5	28	
L1 Overall length[3]		110	147.5	184	249.5	1
		123	159.5	201.5	276.5	2
		135	172.5	219	303.5	3
L2 Main-body length		39	47	60	74	1
		52	59	77.5	101	2
		64	72	95	128	3
L3 Output shaft length from mounting face		26	35	40	55	
L4 Output shaft length from collar		23	30	36	50	
L5 Key length		18	25	28	40	
L6 Distance from shaft end		2.5	2.5	4	5	
L7 Pilot length		2	3	3	4	
L20 Reference motor shaft length [3]		25	23	30	40	
L21 Motor pilot depth		3	2.5	3.5	3.5	
L22 Reference motor adapter flange width[3]		19	16	21.2	21.8	
L23 Overall height[3]		68	85.5	109.5	145.5	1
Q3 Motor adapter square[1]	□	40	60	90	115	
Z Center bore DIN 332, page 2, form DR		M3x9	M5x12	M6x16	M10x22	

[1] Dimensions reference to the mounted motor-type, see page 66
[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



Input side view





Output side view

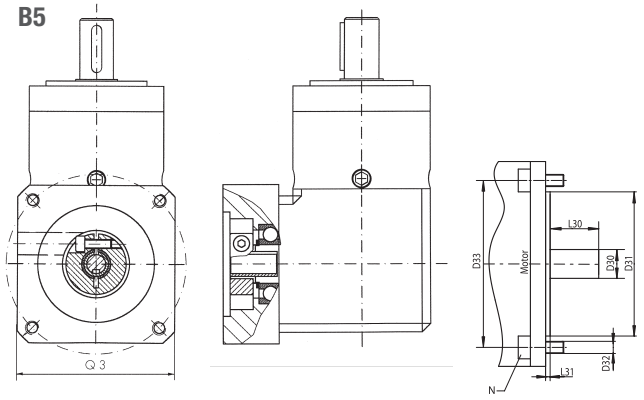
Type-Size		PLE 80/90	PLE 120/115	Z [2]
All dimensions in mm				
B1 Key DIN 6885 T1		6	8	
D1 Flange bolt hole circle		100	130	
D2 Mounting bolt hole diameter	4x	6.5	8.5	
D3 Output shaft diameter	h7	20	25	
D4 Output shaft collar diameter		35	35	
D5 Pilot diameter	h7	80	110	
D6 Body diameter		80	115	
D20 Pinion bore diameter[1][4]		14	19	
D21 Motor centering pilot diameter[1]		80	95	
D22 Motor matching bolt circle diameter[1]		100	115	
D23 Motor matching adapter diagonal		116	145	
G3 Mounting hole thread x depth[1]	4x	M6x15	M8x20	
H1 Key DIN 6885 T1		22.5	28	
L1 Overall length[3]		195.5	274.5	1
		212.5	301.5	2
		230	328.5	3
L2 Main-body length		71.5	99	1
		88.5	126	2
		106	153	3
L3 Output shaft length from mounting face		40	55	
L4 Output shaft length from collar		36	50	
L5 Key length		28	40	
L6 Distance from shaft end		4	5	
L7 Pilot length		3	4	
L8 Flange width		10	15	
L20 Reference motor shaft length [3]		30	40	
L21 Motor pilot depth		3.5	3.5	
L22 Reference motor adapter flange width[3]		21.2	21.8	
L23 Overall height[3]		114.5	145.5	1
Q1 Motor adapter square	□	90	115	
Q3 Motor adapter square[1]		90	115	
Z Center bore DIN 332, page 2, form DR		M6x16	M10x22	

[1] Dimensions reference to the mounted motor-type, see page 66
[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

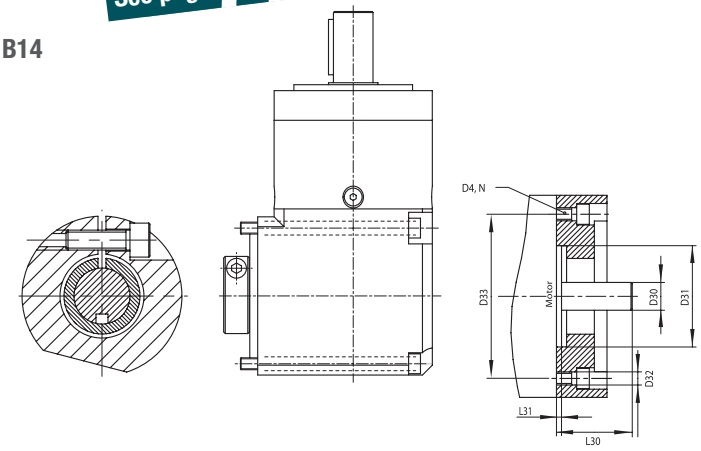
OP 2: Motor Mount option
Note: B5 mounting depicted;
B14 motor mounting requires special/custom motor adapter

See page 77 for other options

B5

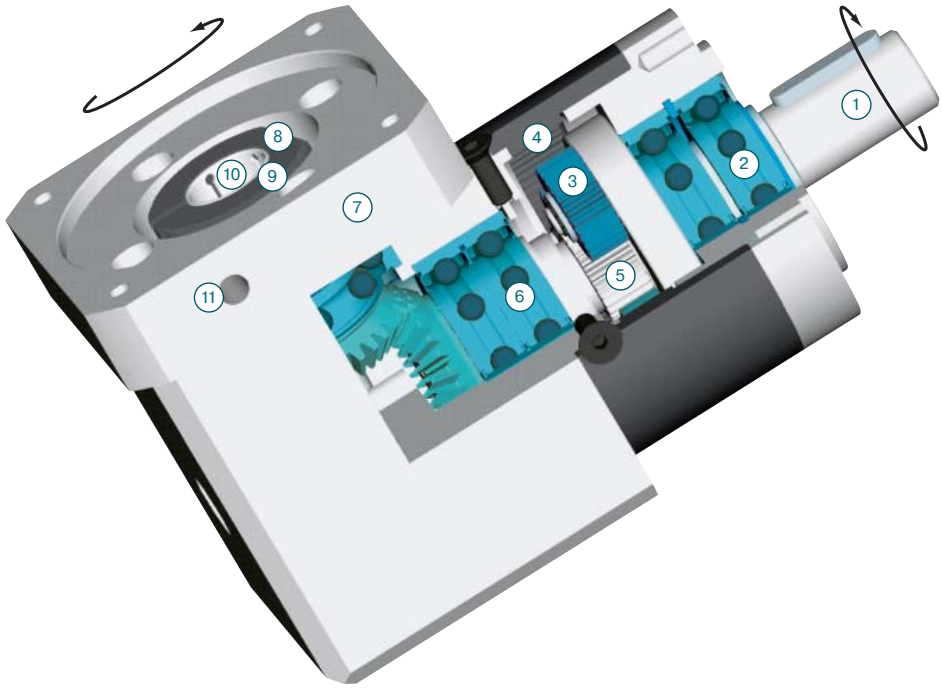


B14



Type-Size		WPLE 40	WPLE 60	WPLE 80-80/90	WPLE 120-120/115	Z [2]
D4 Motor mounting hole diameter[3]		any	any	any	any	
D30 Motor shaft diameter/ Available pinion bores / bushings[1][5]	mm	4/5/6/ 6.35/8/9	6/6.35/8/9/ 9.525/11/14	9.525/10/11/12/12.7/ 14/15.875/16/19	11/12.7/14/15.875/ 16/19/22/24	
D31 Motor pilot diameter[3]		any	any	any	any	
D32 Motor bolt hole diameter[3]		any	any	any	any	
D33 Hole circle diameter[3]		any	any	any	any	
G4 Motor mounting thread size		any	any	any	any	
L30 min. motor shaft length[1]	mm	12.5	16	19	21	
L31 pilot depth		any	any	any	any	
N Number of bolt holes		4	4	4	4	
Q3 Min flange square[1]	□	40	60	42	115	
Recommended max. motor weight[4]	kg (lb)	2 (4.41)	3.5 (7.72)	9 (19.85)	16 (35.28)	
Motor type[1]		B5/B14	B5/B14	B5/B14	B5/B14	
Recommended clamping screw tightening torque	Nm (lbin)	2 (18)	4.5 (40)	9.5 (84)	16.5 (146)	
SW wrench width	mm	2.5	3	4	5	

(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



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

Type-Size		PLFE 64	PLFE 90	PLFE 110	i [1]	Z [2]
Nominal (rated continous 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 n_2=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 n_2=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

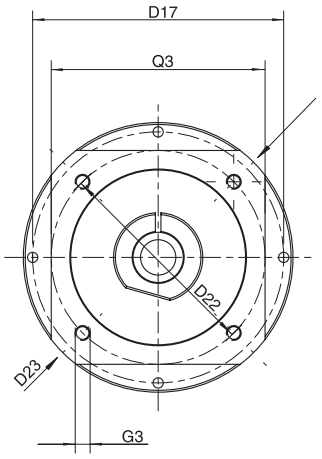
Type-Size		PLFE 64	PLFE 90	PLFE 110	i [1]
Recommended max. mean input speed at 100% rated continuous duty torque (S1) rpm[6][7]	min^{-1} (rpm)	3000	1900	1700	3
		3200	1800	1700	4
		3650	2250	1700	5
		4500	4000	3250	8
		4150	2500	2000	9
		4500	3200	2000	12
		4500	4000	2650	15
		4500	3800	2450	16
		4500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

[1] Ratio ($i=n_{1\ rpm\ high\ speed\ side}/n_{2\ rpm\ low\ speed\ side}$)
[2] Number of gear stages
[3] Values reference output shaft speed n_2=100 rpm, S1= 100% duty cycle, K_A=1 application factor and T=30°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

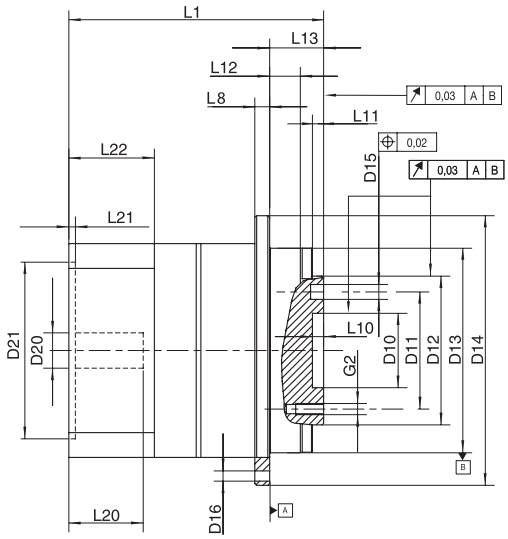
Type-Size		PLFE 64	PLFE 90	PLFE 110	i [1]
Mass moment of inertia[2]	kgcm² (lbin s² x 10^{-4})	0.183 (1.62)	1.01 (8.94)	3.43 (30.36)	3
		0.123 (1.09)	0.67 (5.93)	2.28 (20.18)	4
		0.097 (0.86)	0.53 (4.69)	1.84 (16.28)	5
		0.071 (0.63)	0.41 (3.63)	1.45 (12.83)	8
		0.145 (1.28)	0.79 (6.99)	2.87 (25.40)	9
		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

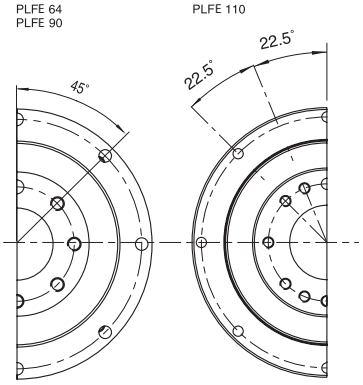
[1] Ratio ($i=n_{1\ \text{rpm high speed side}}/n_{2\ \text{rpm low speed side}}$)
[2] The moment of inertia relates to the high speed side (typically motor shaft)

flange according EN ISO 9409 with additional threads



Input side view





Output side view

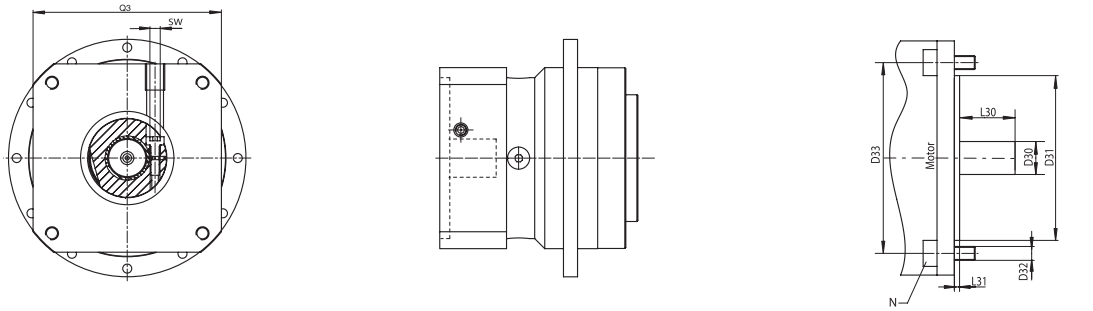
Type-Size		PLFE 64	PLFE 90	PLFE 110	Z (2)
All dimensions in mm					
D10 Pilot diameter	H7	20	31.5	40	
D11 Motor matching bolt circle diameter		31.5	50	63	
D12 Pilot diameter	h7	40	63	80	
D13 Pilot diameter		64	90	110	
D14 Outside diameter		86	118	145	
D15 Bore x depth	H7	5x6	6x7	6x7	
D16 Pinion bore 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

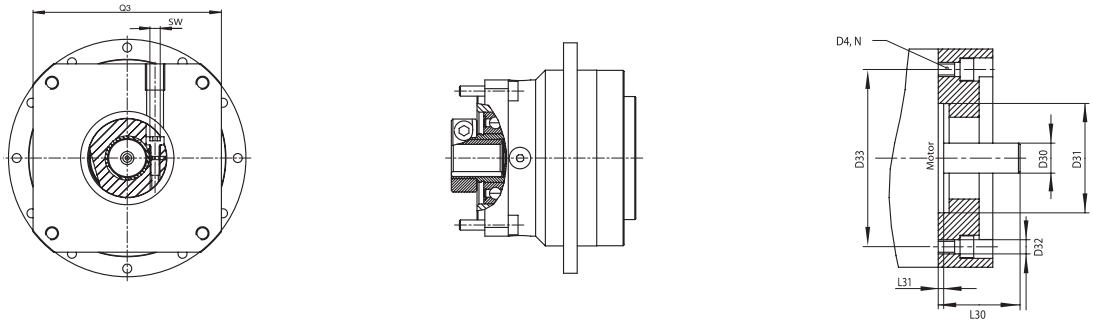
OP 2: Motor Mount option
Note: B5 mounting depicted;
B14 motor mounting requires special/custom motor adapter

See page 77 for other options

B5

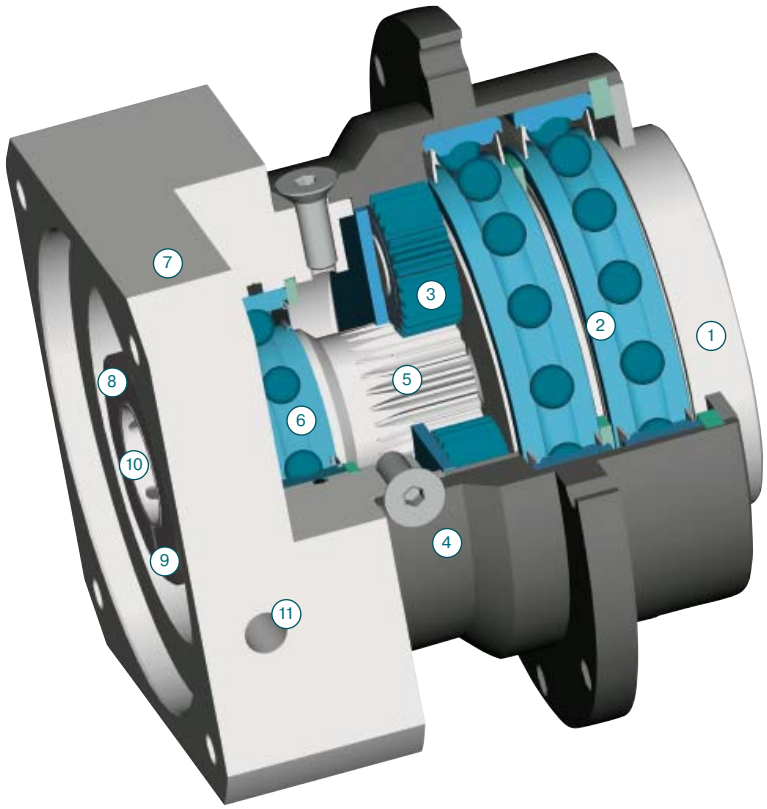


B14



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

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

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Precision machined optimized gear profile, case hardened and honed for high loadability, low running noise, minimum wear, and consistent backlash

6 Sun gear bearing
High speed ball bearings in floating arrangement, eliminating thrust loads from thermal expansion, and yet providing exact positioning for easy mounting

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

PLN 70 – 3 / Motor – OP 5 + 14

Gearbox type	Type-Size	ratio i	motor designation	Options	page
PLN					
	PLN 70	3 – 100	(Manufacturer-Model)	OP 2	12
	PLN 90			OP 5	13
	PLN 115			OP 7	13
	PLN 142			OP 8	13
	PLN 190			OP 14	14
				OP 16	77
				OP 17	77
				OP 18	77
WPLN					
	WPLN 70	4 – 100	(Manufacturer-Model)	OP 2	24
	WPLN 90			OP 5	25
	WPLN 115			OP 7	25
	WPLN 142			OP 8	25
				OP 14	26
				OP 16	77
				OP 17	77
PLFN					
	PLFN 64	4 – 100	(Manufacturer-Model)	OP 2	36
	PLFN 90			OP 16	77
	PLFN 110			OP 17	77
	PLFN 140			OP 18	77
PLE					
	PLE 40	3 – 512	(Manufacturer-Model)	OP 1	50
	PLE 60; PLE 60/70			OP 2	52
	PLE 80, PLE 80/90			OP 6	77
	PLE 120, PLE 120/115			OP 12	77
	PLE 160			OP 16	77
				OP 17	77
WPLE					
	WPLE 40	3 – 512	(Manufacturer-Model)	OP 2	66
	WPLE 60			OP 6	77
	WPLE 80, WPLE 80/90			OP 12	77
	WPLE 120, WPLE 120/115			OP 16	77
				OP 17	77
PLFE					
	PLFE 64	3 – 64	(Manufacturer-Model)	OP 2	74
	PLFE 90			OP 12	77
	PLFE 110			OP 16	77
				OP 17	77

OP 1: **Solid input shaft** [1]

OP 2: **Motor mounting**

OP 5: **Splined shaft** [1]

OP 6: **Smooth output shaft**
Smooth shaft without key/keyway or threaded bore in shaft end

OP 7: **Output shaft with key DIN 6885 T1** [1]

OP 8: **Special / custom shaft** [1]

OP 12: **ATEX** [1]
qualified after ATEX 94/9 EG for group II
category 2G/3G
temperature class: T4 X
Rating data could be updated, Please request separate data sheet!

OP 14: **Output flange and shaft similar to the (W)PLS output**

OP 16: **Food-grade lubrication**
special lubrication for application with special hygienic regulations

OP 17: **Low temperature lubrication**
special lubrication for application at extremely low temperatures; observe special conditions

OP 18: **Reduced backlash**

Other options on inquiry

[1] on inquiry

Conversion table	1 mm	0.0394 in
	1 N	0.225 lb_f
	1 kg	2.205 lb
	1 Nm	8.85 in lb
	1 $kgcm^2$	8.85 x 10^{-4} in lb s^2

1) required gearhead torque rating

detailed application data available? (acceleration- deceleration- torque, load and - motor inertias, speeds, cycle times, etc.)

yes → I: required gearhead torque rating

$T_{RGRT} = T_{MAT}$ (max. application torque)

no ↓

some basic application data available? (motor peak torque, load and motor inertia or inertia match ratio)

yes → II: required gearhead torque rating

$T_{RGRT} = [(T_{Mpeak} - T_{LR}) * (1-k) + T_{LR}] * i$

no ↓

selection only based on motor torque (peak-torque, continuous duty torque)

A → A: selected gearhead could be oversized

$T_{RGRT} = T_{Mpeak} * i$

B → B: selected gearhead could be undersized

$T_{RGRT} = T_{Mcont} * i$

C → C: gearhead selection adequate, slight probability of gearhead under-sizing

$T_{RGRT} = T_{Mcont} * 2,5 * i$

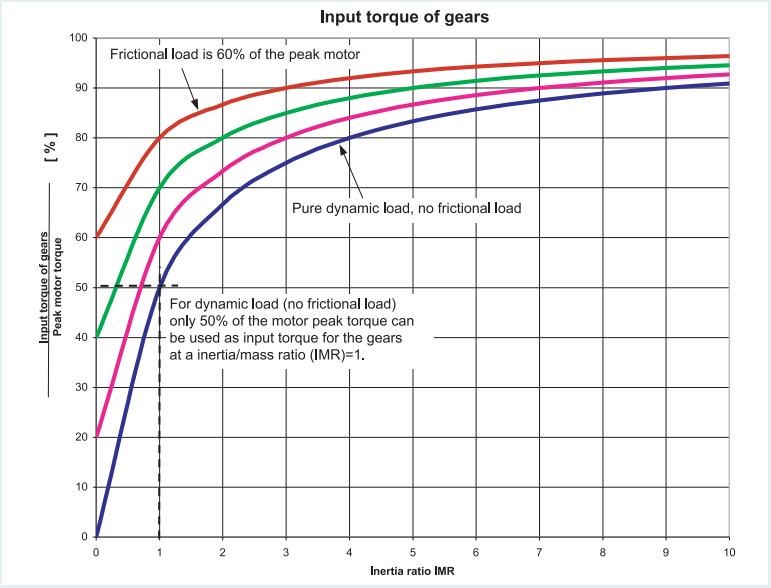
select gearhead size based on the criteria:

$T_{RGRT} \leq T_{2N}$ (2)

(1) it is recommended to compile data and use selection method I or II

(2) short cycle times and low cycle rates application the gearhead can be perhaps selected based on $T_{RGRT} < 1,6 * T_{2N}$. Contact Neugart for assistance.

T_{RGRT}	- required gearhead torque rating
T_{MAT}	- peak application torque
T_{Mpeak}	- peak motor torque
T_{Mcont}	- continuous duty motor torque
T_{2N}	- gearhead rated torque
i	- ratio
T_L	- friction load (non-dynamic load)
T_{LR}	- $T_{LR} = T_L / i$ load torque at the input
J_M	- motor inertia
J_L	- load inertia
J_{LR}	- $J_{LR} = J_L / i^2$ reflected load inertia to the input
k	- $k = J_M / (J_{LR} + J_M)$ inertia parameter
IMR	- $IMR = J_{LR} / J_M$ inertia match ratio; is closely related to inertia parameter ($k = 1 / (IMR+1)$



2) check motor / selected gearhead geometrical compatibility

- motor shaft diameter <= max possible input pinion (sun-gear) bore?
- motor weight permissible / support required?

3) check output shaft radial and axial loadability / output shaft bearing life (if applicable)

4) check application / ambient conditions -If In doubt please contact Neugart for assistance

- Is the IP class adequate?
- Is the mean input speed higher than recommended?
- Check if the operating temperature is higher than recommended?

Neugart's planetary gearboxes are designed for high-cycle operation. The listed T_{2N} nominal/rated torque relates to a continuous duty torque .
If the application torque is consistently lower than the nominal torque, then no further consideration is required.

If the application has a certain number of load cycles, at torque loads exceeding the rated torque value, the gearbox will function, but its life time will be reduced. Use the graph below to approximate the life, in number of output shaft rotations, for torque loads up to factor 1.6 higher than the rated torque.

Torque (Increase) factor
number of output shaft rotations

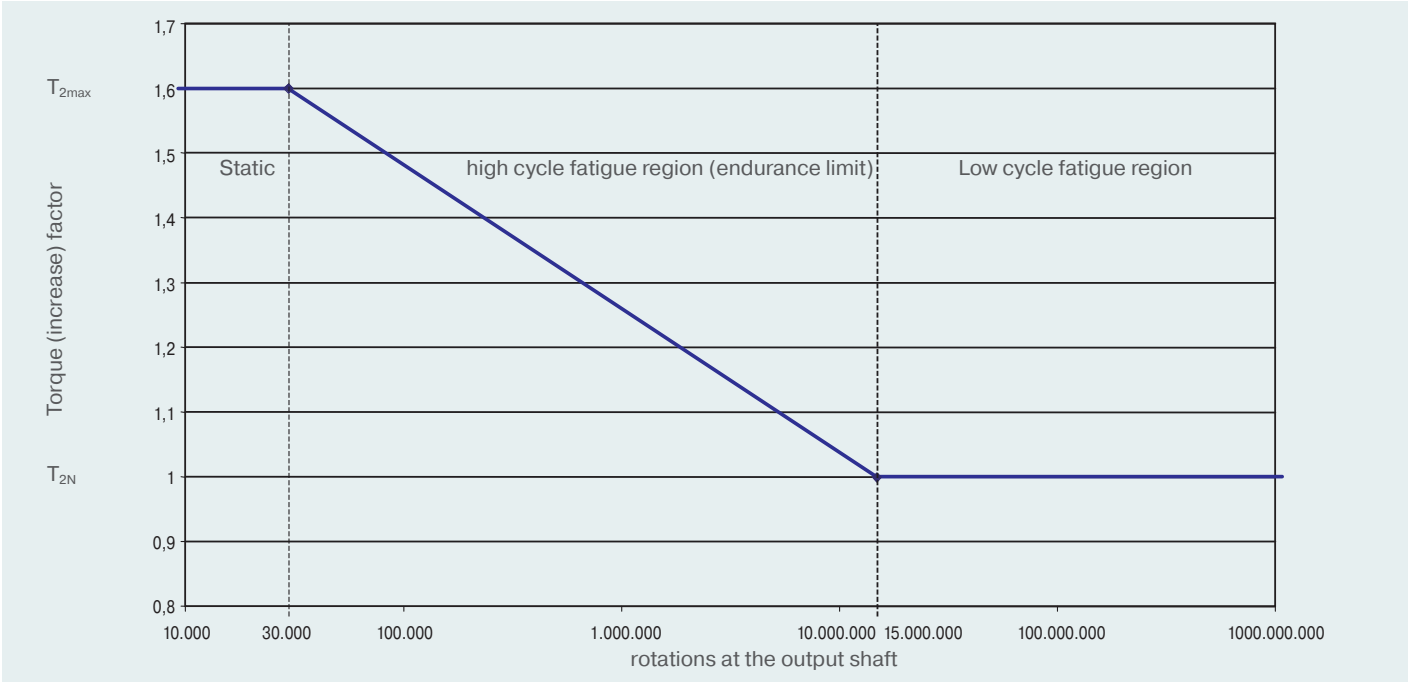


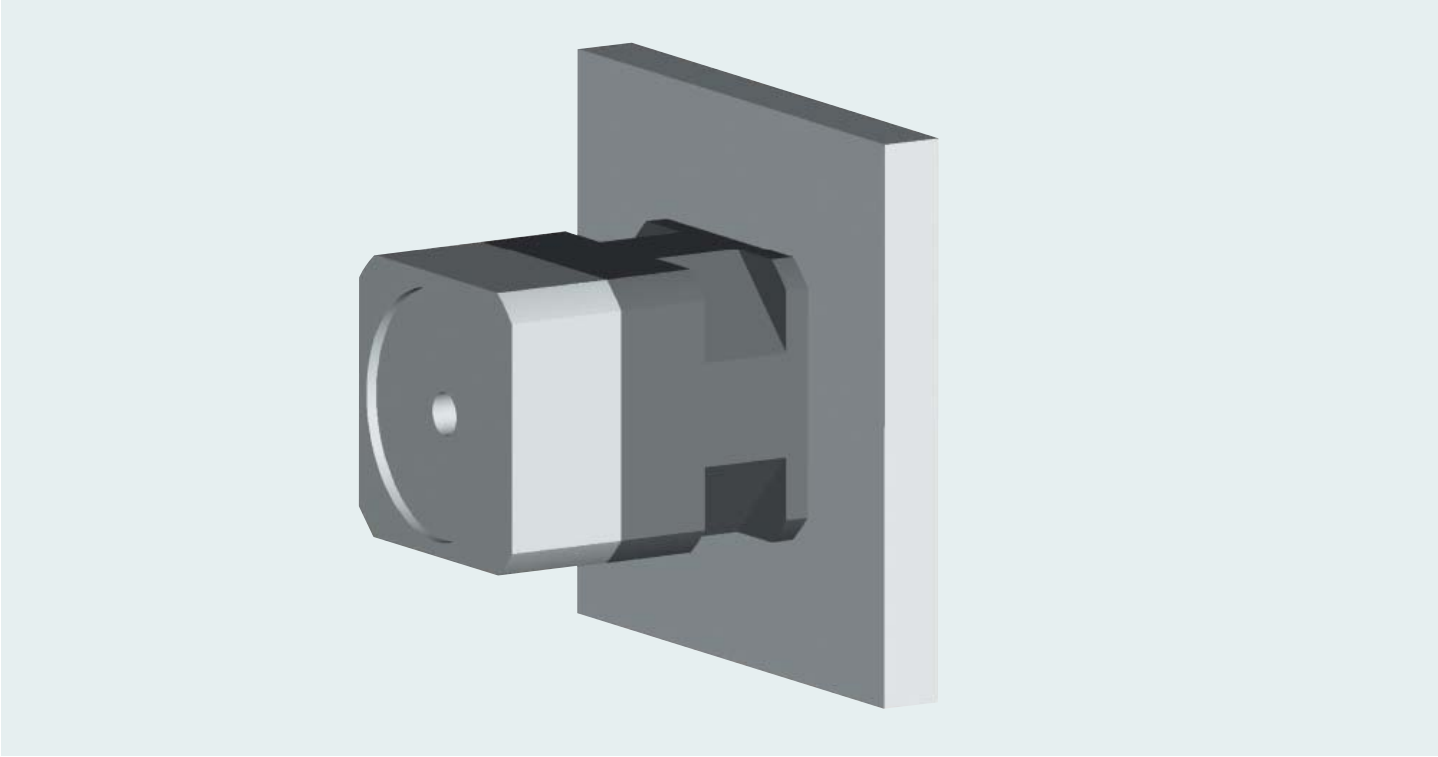
figure 1

Use the graph above or the formula below to determine the permissible transferable T_{2max} torque below, if the required number of output shaft rotations " Nrot." is between 30,000 and 15,000,000.

For 30,000 < Nrot. < 15,000,000 $f = -0,1039 \times \ln(100,000 / 30,000 \times Nrot.) + 2,79$

$T_{2max} = f * T_{2N}$

Note: if Nrot. > 15,000,000; $f = 1.6$
if Nrot. > 30,000; $f = 1$



Calculation of average (mean) rpm:

$$n_m = \frac{n_1 \cdot t_1 + \ldots + n_x \cdot t_x}{t_1 + \ldots + t_x}$$

n_m - average (mean) rpm
$n_1 \ldots n_x$ - different rpm's of an rpm- spectrum
$t_1 \ldots t_x$ - duration (sec) corresponding to the different rpm's

Assumed environmental conditions:

- Motor does not heat up the gearbox
- Mounting plate size (square) = 2 x gearbox size
- Mounting plate material: Steel
- Convection around the gearbox is not impaired/ obstructed
- Ambient temperature: 30°C
- Only one side of the gearbox is connected to the machinery (by the mounting plate)

For 100% rated torque:
Compare the calculated mean rpm n_m value to the listed max mean rpm at 100% torque;
Calculated mean rpm n_m shall be less than the listed rpm, otherwise, if no additional cooling is provided, there is a danger of overheating.

For 150% rated torque:
Compare the calculated mean rpm n_m value to the listed max mean rpm at 50% torque;
Calculated mean rpm n_m shall be less than the listed rpm, otherwise, if no additional cooling is provided, there is a danger of overheating.

The gearbox shall not exceed the listed max operating temperature of 90C.
If conditions are unfavorable, please reduce the speeds or consult Neugart.

Always an individual solution.

Customer-specific solutions such as planetary, spur-gear, and bevel gearboxes as well as any combination of these types of gears.

Our highly skilled and experienced engineers apply the latest research and development, together with long years of experience in the gear design field.

Using modern design and development tools, we have supplied our satisfied customers with reliable geared solutions in a wide range of industries/applications such as, printing presses, handling and assembly systems, die-cast machines, robotic painting systems, and medical engineering.

CUSTOM MADE GEARBOXES some examples

Example 1
Offset–A planetary gearbox for a spray-paint robot

The task
For a new generation of an articulated painting-robots, the gearbox rotating and swiveling axes of the spray head needed to be optimized – requiring weight reduction and a more compact size, while increasing torque loadability. Also a method of easy assembly and disassembly were requested for simple and fast maintenance.

Our solution
To satisfy these requirements, we developed a combined offset axis gear stage with a planetary gearbox.
Our design not only fulfilled the requirements, but also features higher life, increased overload capacity, and reduced backlash, compared with the previous design.

CUSTOM MADE GEARBOXES some examples

Example 2
A flat-profile, compact gearbox in a right angle configuration for a revolving door application.

The task
A revolving door manufacturer was looking for a solution to replace a number of custom design gearboxes for its different products, with a single gearbox. The requirements were a very compact, flat profile, lightweight gearbox, with extremely low running noise.

Our solution
Standard bevel gears were not suitable to solve this problem. The combination gearbox consisting of a two stage planetary and a crown gear output solved the task. With this design, all requirements and specifications were satisfied or exceeded.
To keep the running noise minimal, all gear sets were specially optimized.

External gears

Spur or helical gears, hobbed, ground and/or honed tooth profile up to quality ISO 5 (approx AGMA 13) module 0,5–3 mm max. outer diameter 250 mm

Internal gears

Broached or shaped
Module 0.3 - 3 up to quality ISO 7

Gear racks

Spur racks,
up to module 4; length 1000 mm

Helical racks,
up to module 1,25; length 400 mm

Bevel gears

Straight bevel gears milled up to Module 1.4, diameter 100 mm.

Straight bevel gears shaped up to module 2, diameter 120 mm.

customer-specific parts

- in house tool making
- expert support from conceptual design to end product

our material
- Polyamide
- Polyethylene
- Teflon
- PEEK

worm and thread shafts

worm and threaded shafts, precision-milled up to module 2

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