Economical Planetary Gearheads - PE

Overview

Description

The PLE is the perfect economy alternative to the PS gearbox. This planetary gearbox was especially designed for all applications where a considerably low backlash is not of vital importance.

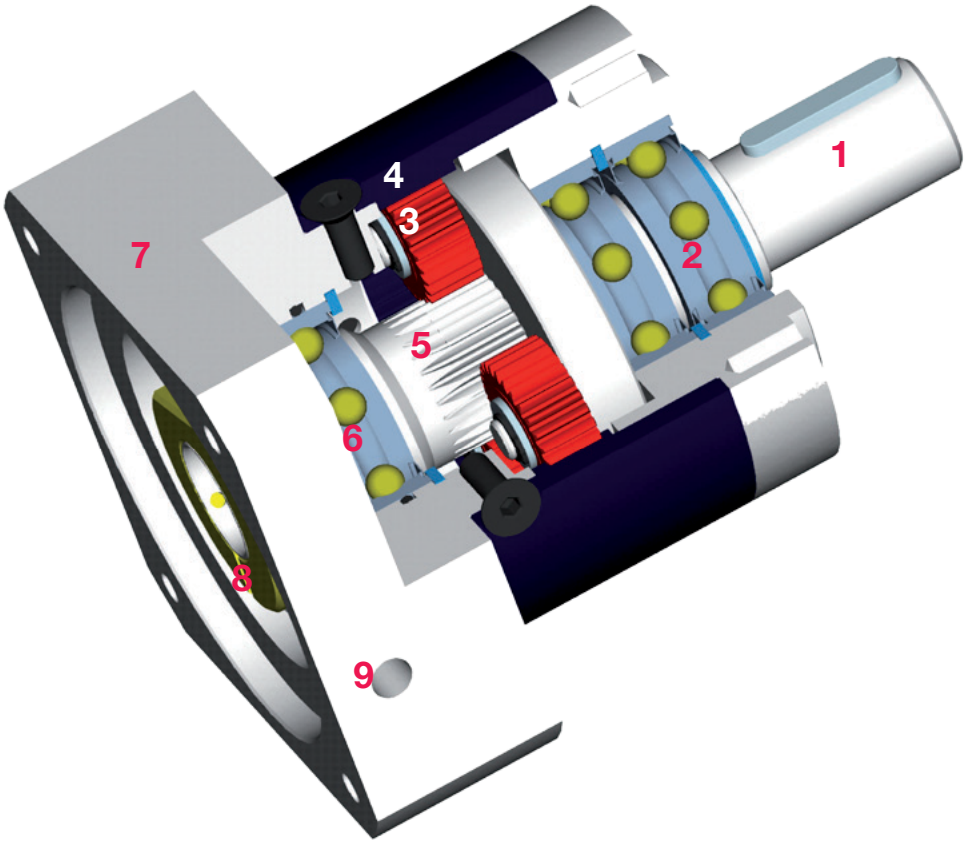
Features

- Excellent price/performance ratio
- Input speeds up to 8000 min^{-1}
- Low backlash
- High output torques
- PCS-2 system
- High efficiency (96 %)
- 22 ratios i=3...512
- Low noise
- High quality (ISO 9001)
- Any fitting position possible
- Simple motor fitting
- Life time lubrication
- Direction of rotation equidirectional
- Balanced motor pinion

Technical Characteristics Overview

Features	Unit	Division
Geometry		Planetary Gearheads
Type		Inline
Drives sizes	[mm]	60, 90, 115
Maximum input speed	[min^{-1}]	up to 13000
Nominal torque	[Nm]	260
Radial force	[N]	up to 2400
Service life	[h]	30000
Backlash	[arcmin]	< 8

Layout / Features



1 Output shaft
The input shaft is case-hardened and offers a very good torsional rigidity.

2 Output shaft bearing
Double ball bearings distribute the load evenly which results in a high radial and axial load bearing capacity.

3 Planet wheel
Case-hardened and precision ground.

4 Annulus gear in the housing
Case-hardened and precision ground.

5 Sun gear
Case-hardened and precision ground.

6 Sun gear bearing
The integral sun gear allows precise mounting within a few minutes. The inside of the gearhead is protected against contamination.

7 Mounting flanges
The gearheads are available with motor flanges for a variety of common servo and stepper motors.

8 Clamping bushing
Consists of clamp collar and clamp screw.
The proven clamped joint for the motor shaft with even pressure distribution ensures safe torque transmission even at high loads.

9 Fitting aperture
Easy access for tightening and loosening the clamped joint.

Technical Data

Parameter	Unit	Ratio		PE3	PE4	PE5
Nominal torque $T_{nom\ r}$ / Maximum permissible acceleration torque $T_{acc\ r}$ **$T_{nom\ r}$ / $T_{acc\ r}$** (1)(2)(3)(4)	[Nm]	1 step	3	28/45	85/136	115/184
			4	38/61	115/184	155/248
			5	40/64	110/176	195/312
			8	18/29	50/80	120/192
		2 step	9	44/70	130/208	210/336
			12	44/70	120/192	260/416
			15	44/70	110/176	230/368
			16	44/70	120/192	260/416
			20	44/70	120/192	260/416
			25	40/64	110/176	230/368
			32	44/70	120/192	260/416
			40	40/64	110/176	230/368
			64	18/29	50/80	120/192
		3 step	60	44/70	110/176	260/416
			80	44/70	120/192	260/416
			100	44/70	120/192	260/416
			120	44/70	110/176	230/368
			160	44/70	120/192	260/416
			200	40/64	110/176	230/368
			256	44/70	120/192	260/416
			320	40/64	110/176	230/368
			512	18/29	50/80	120/192
Emergency off torque $T_{em\ r}$ (5)	[Nm]			Double nominal torque $T_{nom\ r}$		
Nominal drive speed at 100 % $T_{nom\ r}$ $N_{nom\ r}$ (6)	[min^{-1}]	3		4450	2400	2550
		4		4400	2300	2500
		5		4500	2800	2500
		8		4500	4000	3500
		9		4500	2900	2650
		12		4500	4000	2650
		15		4500	3350	3200
		16		4500	4000	3100
		20...512		4500	4000	3500
Maximum drive speed $N_{max\ r}$ (6)	[min^{-1}]	3...512		13 000	7000	6500
Maximum radial force Pr_{max} (1) (7)	[N]			340	1700	2400
Maximum axial force Pa_{max} (1) (7)	[N]			450	2000	2100
Service life	[h]			30 000 (lifetime lubrication)		
Backlash	[arcmin]	(1 step)		< 12	< 8	< 8
		(2 step)		< 15	< 12	< 12
		(3 step)		< 18	< 14	< 14

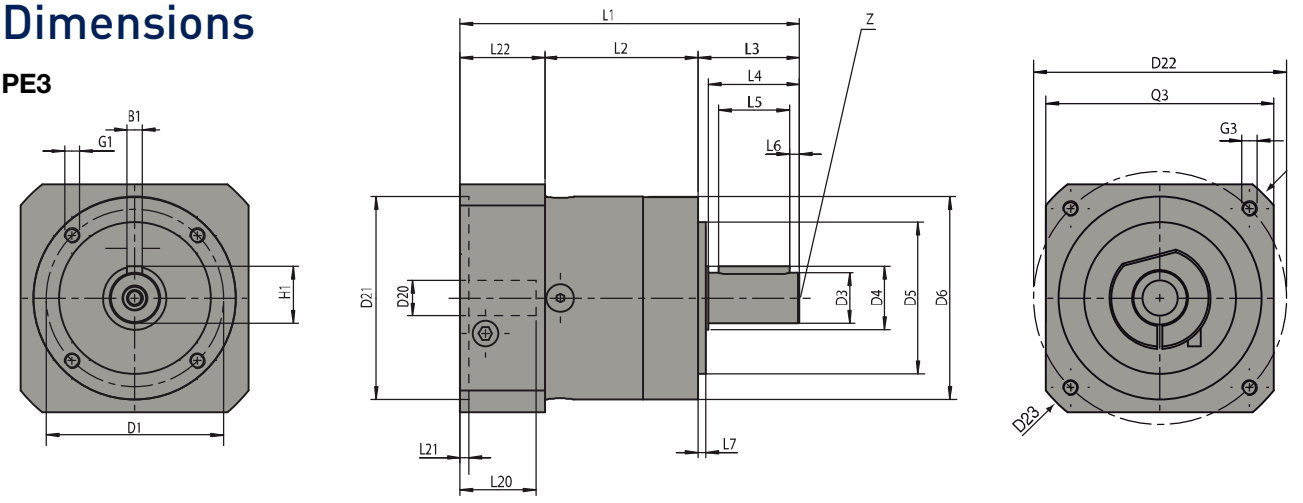
(1) the data refer to an output shaft speed of n_2=100 min^{-1} and application factor KA=1 as well as S1 operating mode for electrical machines and T=30 °C
(2) dependent on the respective motor shaft diameter
(3) with keyway: for dynamic loads
(4) permitted for 30 000 revolutions of the output shaft
(5) permitted 1000 times
(6) permitted operating temperatures may not be exceeded.
(7) referred to the center of the output shaft

Parameter	Unit	Ratio		PE3	PE4	PE5
Efficiency at nominal torque [8]	%	(1 step)		96		
		(2 step)		94		
		(3 step)		90		
Noise level at 3000 min^{-1} [9]	[dB (A)]			58	60	65
Torsional rigidity	[Nm/arcmin]	(1 step)		2.3	6	12
		(2 step)		2.5	6.5	13
		(3 step)		2.5	6.3	12
Operating temperature [10]	[°C]			-25 ... +90		
Lubrication				Lifetime lubrication		
Orientation				any		
Direction of Rotation				same as input		
Product Enclosure Rating				IP54		
Moment of inertia [11]	[kgmm^2]	1 step	3	13.5	77	263
			4	9.3	52	179
			5	7.8	45	153
			8	6.5	39	132
		2 step	9	13.1	74	262
			12	12.7	72	256
			15	7.7	71	253
			16	8.8	50	175
			20	7.5	44	150
			25	7.5	44	149
			32	6.4	39	130
			40	6.4	39	130
			64	6.4	39	130
		3 step	60	7.6	51	257
			80	7.5	50	150
			100	7.5	44	149
			120	6.4	70	250
			160	6.4	39	130
			200	6.4	39	130
			256	6.4	39	130
			320	6.4	39	130
			512	6.4	39	130
Weight	[kg]	(1 step)		0.9	3.2	6.6
		(2 step)		1.1	3.7	8.6
		(3 step)		1.3	4.2	10.6

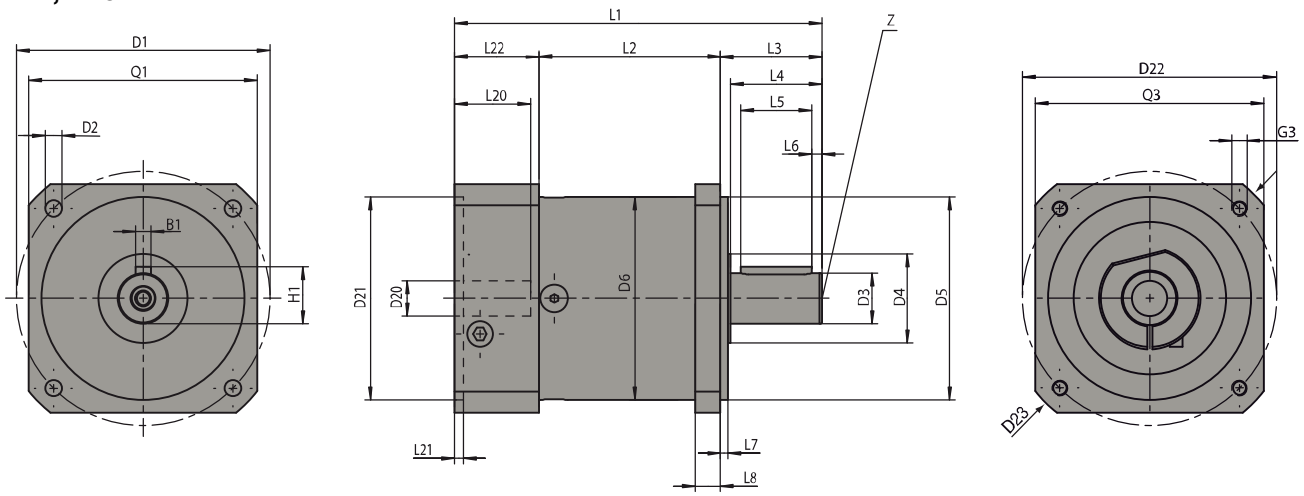
[8] depends on the ratio, n_2=100 min^{-1}
[9] Noise level at a distance of 1 m; measured at a drive speed of n_1=3000 min^{-1} without load; i=5
[10] referred to the center of the housing surface
[11] Inertia refers to the input shaft and to the standard motor shaft diameter D20

Dimensions

PE3



PE4, PE5



		Frame size		
All dimensions in mm		PE3	PE4	PE5
B1	Keyway DIN 6885 T1	5	6	8
D1	Flange bolt circle	52	100	130
D2	Mounting bore	-	6.5	8.5
D3	Shaft diameter	14	20	25
D4	Shaft collar	17	35	35
D5	Centering	40	80	110
D6	Housing diameter	60	80	115
D20	Hole	9	14	19
D21	Centering diameter for motor	40	80	95
D22	Bolt circle	63	100	115
D23	Diagonal dimension	80	115	145
G1	Tapped hole x depth	M5x8	-	-
G3	Tapped hole x depth	Depending on the adapter flange (see table with the motor-gearbox combinations)		
H1	Keyway DIN 6885 T1	16	22.5	28

			Frame size		
All dimensions in mm			PE3	PE4	PE5
L1	Overall length	1 step	106.5	145	201.5
		2 step	119	162.5	229.5
		3 step	131.5	180	257
L2	Housing length	1 step	47	71.5	99
		2 step	59.5	89	127
		3 step	72	106.5	154.5
L3	Input shaft end		35	40	55
L4	Shaft end to collar		30	36	50
L5	Length of keyway		25	28	40
L6	Distance to shaft end		2.5	4	5
L7	Pilot		3	3	4
L8	Flange width		-	10	15
L20	Shaft length motor		23	30	40
L21	Centering drive		2.5	3.5	3.5
L22	Motor flange length		24.5	33.5	47.5
Q1	Flange cross section		-	90	115
Q3	Flange cross section		60	90	115
Z	Centering bore DIN332, sheet 2, form DR		M5x12	M6x16	M10x22

Order Code

PE Gearheads

	1	2	3	4	5	6	7	8	9
Order example	**PE**	**3**	**003**	**10**	**M**	**038**	**063**	**06**	**20**

1	**Gearhead Type**	
	PE	Economy planetary gearbox
2	**Gearhead Size**	
	3	PE3
	4	PE4
	5	PE5
3	**Ratio**	
	003	3
	...	
	512	512
4	**Output shaft**	
	10	Input shaft with keyway
5	**Motor connection flange**	
	M	

6	**Pilot diameter**	
	038	38 mm
	...	
	130	130mm
7	**Distance between holes**	
	063	63 mm
	...	
	165	165 mm
8	**Shaft diameter**	
	06	6 mm
	...	
	24	24 mm
9	**Motor shaft length**	
	20	20 mm
	...	
	50	50 mm

Motor Gearhead Combination

	Motor 1	Motor 2	Motor 3	Order Code (Gearhead)	Mounting thread G3
PE3	SMH60/B08/09		MH056/B05/09	**PE3 XXX 10 M 040/063/09/20**	M5
			MH056/B05/11	PE3 XXX 10 M 040/063/11/23	M5
	SMH60/B05/11		MH070/B05/11	**PE3 XXX 10 M 060/075/11/23**	M5
			MH070/B05/14	PE3 XXX 10 M 060/075/14/23	M5
	SY56 (NEMA 23)			PE3 XXX 10 M 038/066/06/21	M5
	SY87 (NEMA 34)			PE3 XXX 10 M 073/098/09/32	M6
PE4	SMH60/B05/11		MH070/B05/11	**PE4 XXX 10 M 060/075/11/23**	M5
	SMH82/B08/14			**PE4 XXX 10 M 080/100/14/30**	M6
	SMH82/B08/19		MH105/B09/19	PE4 XXX 10 M 080/100/19/40	M6
	SMH82/B05/19	SMH100/B05/19	MH105/B05/19	**PE4 XXX 10 M 095/115/19/40**	M8
	SY107 (NEMA 42)			PE4 XXX 10 M 055/125/15/32	M8
	SY87 (NEMA 34)			PE4 XXX 10 M 073/098/09/32	M6
PE5	MH105/B09/19			PE5 XXX 10 M 080/100/19/40	M6
	SMH82/B05/19	SMH100/B05/19	MH105/B05/19	**PE5 XXX 10 M 095/115/19/40**	M6
	SMH100/B05/24		MH105/B05/24	PE5 XXX 10 M 095/115/24/50	M8
	SMH115/B05/24		MH105/B06/24	PE5 XXX 10 M 110/130/24/50	M8
			MH145/B05/24	PE5 XXX 10 M 130/165/24/50	M10

Bold = Preferred motor gearhead combinations
Only for motors with mounting bores (no mounting thread)