S Version
Self-Contained Gear Reducer

TP - Compact Precision

TP Low-Backlash Planetary Gear Reducer

M Version
Motor-Mounted Gear Reducer

K Version
Right Angle Gear Reducer

alpha

3

7

11

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TOP 100

GOLD 2003

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The „Best of TOP100 Germany“ prize is among the highest-profile awards for medium-sized companies. 454 companies took part in the competition.

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Compact precision

compact\'käm-pakt\adj.1: closely and firmly put together; solid; taking little space
precision\pri-'sizh-en\n: the quality or state of being precise: **EXACTNESS**

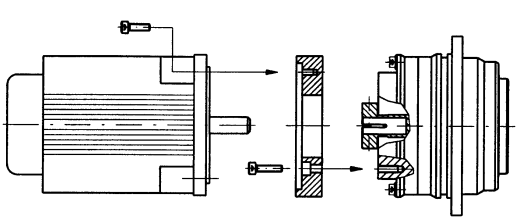
The world's largest servomotor manufacturers and machine builders embrace alpha as the standard of excellence and exactness for applications requiring precision planetary gear reducers. Since the birth of the servomotor, alpha's innovative designs, unsurpassed technical expertise and dedication to quality have brought alpha the largest installed customer base worldwide for precision **low-backlash planetary gear reducers.** Our commitment to excellence and worldwide support allow our partners to be more competitive and successful in today's global economy.

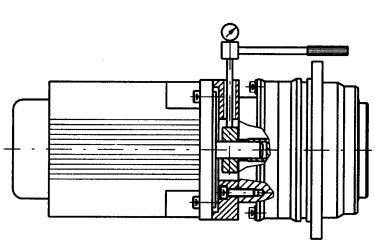
alpha's expertise in precision gear technology can be found in a wide range of highly dynamic and continuous running applications including:

Industrial robots, material handling systems, automation systems, high speed packaging and converting machines, modern machine tools, printing presses, silk screening machines, automated guided vehicles, injection molding equipment, semiconductor manufacturing equipment, food processing equipment and many more.

Highest quality
- case hardened and finished ground high carbon alloy steel gears guarantee the lowest backlash and highest service life available
- 100% inspection of all gear reducer components and 100% testing of completed reducers ensure the highest level of quality assurance
- intrinsically high safety factors offer protection against the most destructive emergency stops and crashes

Revolutionary developments
- ingeniously simple yet most advanced patented motor mounting system offers thermal expansion compensation, guaranteeing long servomotor life
- creative solutions in design and production to ensure maximum torque transmission, highest efficiency, and the lowest audible noise available
- fully automated manufacturing and assembly cells guarantee premium quality, high precision and fast delivery





Energy efficient
- high efficiency and low mass moments of inertia enhance the performance of servo systems while minimizing energy requirements
- minimizing energy requirements, reducing motor and drive electronics size conserve valuable natural resources for generations to come
- alpha's commitment to the environment is to develop the highest efficiency products possible through optimization of design and manufacturing

Modular mounting system
- the most flexible modular mounting system in the world guarantees fast and error free mounting to any servomotor
- standardized mounting kits allow customers the ability to stock one gear reducer and mount to many different servomotors
- mounting kits are standard and compatible throughout the entire alpha product range offering complete flexibility at reduced cost

Worldwide partnerships
- factory trained sales agencies and direct offices worldwide guarantee qualified global support at your facility or your customer's facility
- the market requires zero-maintenance: alpha's gear reducers are maintenance-free and lubricated for life - a perfect partner
- alpha's experience and reputation for producing the most reliable gear reducers available offer the highest level of safety in the most demanding applications

TP M-Version

Product characteristics

Extremely quiet the unique reducer kinematics yield the quietest planetary reducer on the market

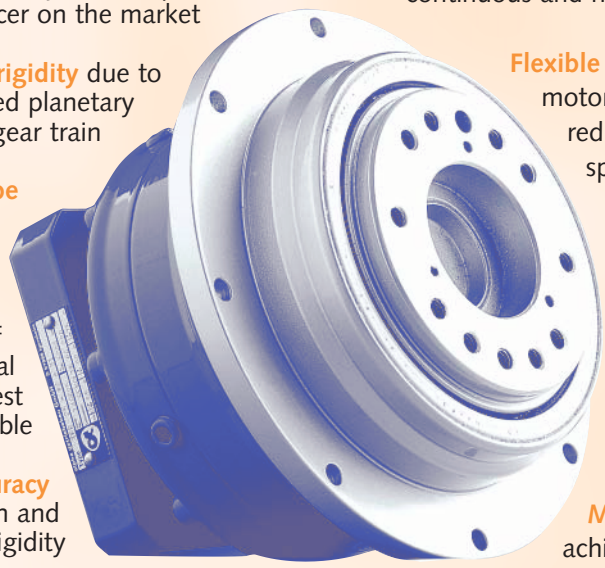
High torsional rigidity due to output flange and optimized planetary gear train

Extremely compact shape a result of an integrated design concept

Dynamic response time the lowest moments of inertia and highest torsional rigidity yield the best settling time available

Superior positioning accuracy resulting from low backlash and high torsional rigidity

Advanced patented motor mounting with integrated thermal length compensation, longer motor bearing life guaranteed



Engineered for any duty cycle ideally suited for continuous and highly dynamic cyclic operations

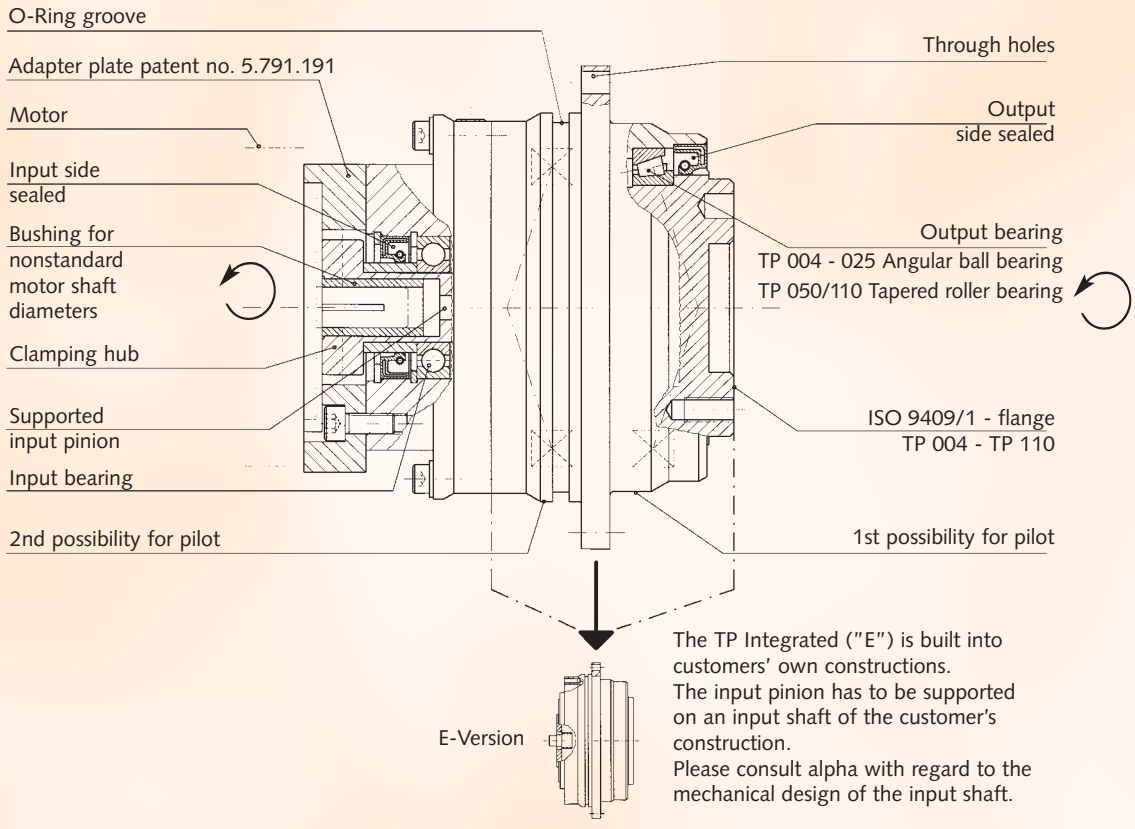
Flexible motor mounting field interchangeable motor mounting kits allow stocking one reducer for any customer`s motor specification

Quick and easy mounting mounts in minutes to any servomotor

True running gear train provides exceptionally quiet operation, high efficiency and smooth torque transmission

Minimum backlash ≤ 1arcmin achieved using precision ground gearing without shimming

Product details



Conversion Table:

1 in.lb	= 0.113 Nm
1 in. lb.s²	= 1130 kgcm²
1 lb_f	= 4.44 N
1 lb_m	= 0.4535 kg

Technical data

Size				TP 004	TP 010	TP 025	TP 050	TP 110	TP 300	TP 500
max. Acceleration Torque [1]	T_{2B}	in.lb(Nm)	i = 5, 7, 31	354 (40)	885 (100)	2655 (300)	5753 (650)	-	-	-
			i = 10, 21, 61, 91	283 (32)	708 (80)	2213 (250)	4425 (500)	-	-	-
			i = 5, 7, 10, 21	-	-	-	-	9735 (1100)	-	-
			i = 31	-	-	-	-	14160 (1600)	30975 (3500)	53100 (6000)
			i = 61, 91	-	-	-	-	11505 (1300)	24780 (2800)	42480 (4800)
Emergency Stop [2]	T_{2Not}	in.lb(Nm)		885 (100)	2213 (250)	5531 (625)	11063 (1250)	24338 (2750)	77438 (8750)	132750 (15000)
Nominal Output Torque	T_{2N}	in.lb(Nm)	i = 5, 7, 31	221 (25)	443 (50)	1505 (170)	3275 (370)	-	-	-
			i = 10, 21, 61, 91	133 (15)	310 (35)	885 (100)	1947 (220)	-	-	-
			i = 5, 7, 10, 21	-	-	-	-	5664 (640)	-	-
			i = 31	-	-	-	-	10886 (1230)	19470 (2200)	32745 (3700)
			i = 61, 91	-	-	-	-	6195 (700)	14160 (1600)	25665 (2900)
max. Input Speed	n_{1Max}	rpm	1-stage	6000	6000	4500	4000	3500	-	-
			2-stage			6000	5000	4500	3000	3000
Nominal Input Speed [3]	n_{1N}	rpm	i = 5, 7	3000	2500	2000	1600	1100	-	-
			i = 10	3500	3000	2500	2100	1600	-	-
			i = 21, 31	4500	3800	3100	2600	2100	1600	1300
			i = 61	6000	4700	3700	3300	2600	1900	1500
			i = 91	6000	5300	4500	4100	3300	2200	1800
Ratios [4]	i		1-stage	5 / 7 / 10					-	
			2-stage	21 / 31 / 61 / 91					31 / 61 / 91	
Torsional Backlash	j_t	arcmin	standard	≤ 5	≤ 3					
			reduced	≤ 3	≤ 1				-	
Torsional Rigidity	C_{t21}	in.lb(Nm)/arcmin	1-stage i = 5	85 (9.5)	274 (31)	752 (85)	1513 (171)	3876 (438)	-	-
			2-stage i = 31	60 (6.8)	186 (21)	496 (56)	1044 (118)	2655 (300)	4956 (560)	6514 (736)
max. Axial Load [5]	F_{2AMax}	lb_f (N)		367 (1630)	484 (2150)	934 (4150)	1379 (6130)	2261 (10050)	7425 (33000)	11250 (50000)
max. Tilting Mom.	M_{2KMax}	in.lb(Nm)		805 (91)	2080 (235)	3655 (413)	11461 (1295)	27116 (3064)	52215 (5900)	77880 (8800)
No-load Running Torque [6] (n_1=3000 rpm)	T_{012}	in.lb(Nm)	i = 5	2.65 (0.30)	8.94 (1.01)	19.73 (2.23)	49.56 (5.6)	115.04 (13.0)	-	-
			i = 31	1.33 (0.15)	2.21 (0.25)	3.54 (0.4)	11.50 (1.3)	24.78 (2.80)		
			i = 91	0.71 (0.08)	2.04 (0.23)	2.65 (0.30)	4.33 (0.49)	1.15 (0.13)		
Tilting Rigidity	C_{2K}	in.lb(Nm)/arcmin		752 (85)	1991 (225)	4868 (550)	4956 (560)	12850 (1452)	49206 (5560)	83898 (9480)
Efficiency with full load	η	%	1-stage	≥ 96					-	
			2-stage	≥ 93						
Weight	m	lb_m(kg)	1-stage	2.7 (1.2)	5.7 (2.6)	10.1 (4.6)	21.2 (9.6)	52.9 (24.0)	-	-
			2-stage	2.9 (1.3)	6.2 (2.8)	10.4 (4.7)	21.4 (9.7)	53.1 (24.1)	121.3 (55)	187.4 (85)
Lubrication				Synthetic oil viscosity ISO VG220						
Paint				Blue RAL 5002						
Mounting Position				Please advise with order						
Permissible Gear Reducer Temp. °C				- 10°C to + 90°C						
Direction of Rotation				Motor and gear reducer same direction						
Degree of Gearbox Protection				IP 64						
Noise level (n_1=3000 rpm)	L_{PA}	dB(A)	1-stage	≤ 68			≤ 70		-	-
			2-stage	≤ 64			≤ 65		≤ 67	≤ 69

[1] 1000 cycles per hour.
[2] 1000 times during the service life.
[3] at 20°C ambient temperature (if you have higher ambient temperature, please reduce the n_{1N} speed). In case of S1-conditions, please contact alpha.
[4] Further ratios see operations page 21.
[5] applied to the flange centre.
[6] at 20°C gear reducer temperature.

The dimensions of the two-stage gear reducers are different between variant 1 and 2. This difference is based on the choice of the motor shaft / clamping hub diameter (D10), which causes a change in dimensions (D11, L11, L14, L15, L18) within the size, shown in figure 1 and 2 on this page.
Because of this design difference we offer two variants of gear reducers, variant 1 (figure 1) with very low moment of inertia and variant 2 (figure 2) where a larger motor can be mounted.

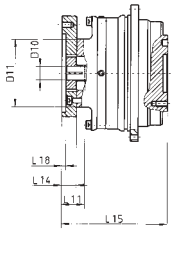


Figure 1 (Variant I) very low mass moments of inertia

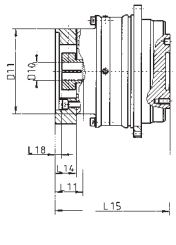
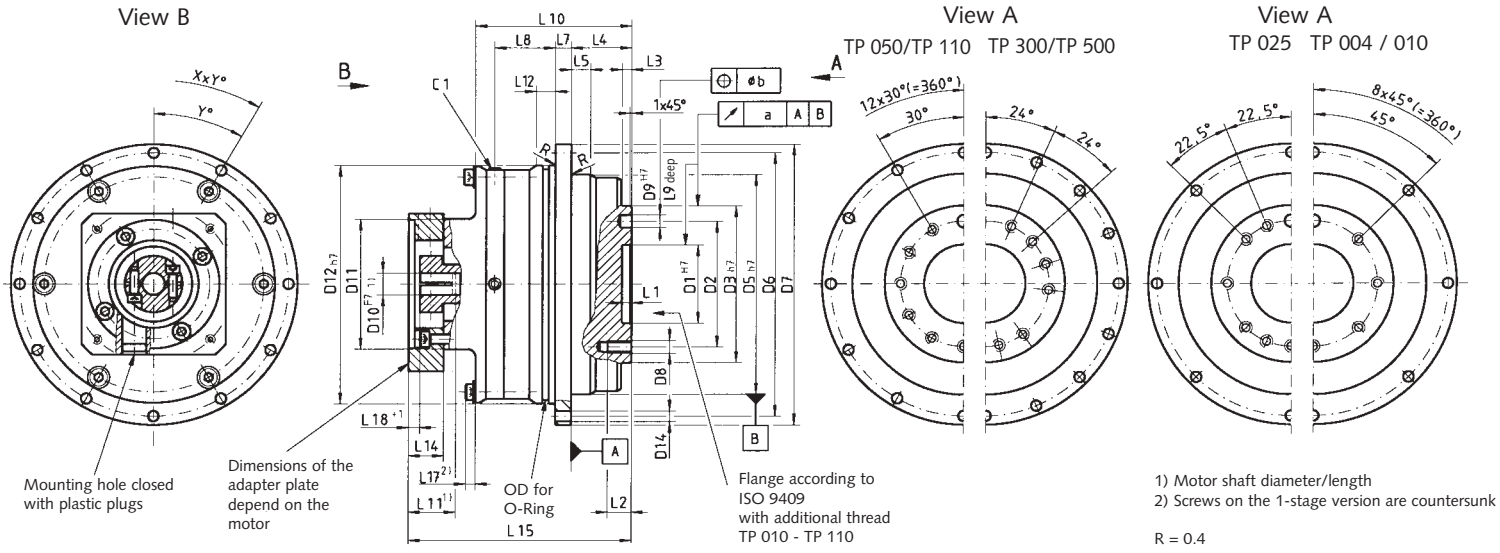


Figure 2 (Variant II) larger motor can be mounted

Variant I
Variant II

Dimensions [in.(mm)]

1 in. = 25.4 mm



Size		TP 004		TP 010		TP 025		TP 050		TP 110		TP 300	TP 500
Gear Stages		1	2	1	2	1	2	1	2	1	2	2	2
a		0.0012 (0.03)		0.0012 (0.03)		0.0012 (0.03)		0.0012 (0.03)		0.0016 (0.04)		0.0020 (0.05)	0.0020 (0.05)
b		0.0008 (0.02)		0.0008 (0.02)		0.0008 (0.02)		0.0008 (0.02)		0.0008 (0.02)		-	-
C1		- [3]		3xM8x1		3xM8x1		3xM8x1		3xM12x1.5		4xM12x1.5	4xM14x1.5
D1 H7 [4]		0.7874 (20)		1.2402 (31.5)		1.5748 (40)		1.9685 (50)		3.1496 (80)		0	0
D2		1.2402 (31.5)		1.9685 (50)		2.4803 (63)		3.1496 (80)		4.9213 (125)		5.5118 (140)	6.2992 (160)
D3 h7 [4]		1.5748 (40)		2.4803 (63)		3.1496 (80)		3.9370 (100)		6.2992 (160)		7.0866 (180)	7.8740 (200)
D5 h7 [4]		2.5197 (64)		3.5433 (90)		4.3307 (110)		5.5118 (140)		7.8740 (200)		10.0394 (255)	11.2205 (285)
D6 [2]		3.1102 (79)		4.2913 (109)		5.3150 (135)		6.6142 (168)		9.1732 (233)		11.0236 (280)	12.2047 (310)
D7		3.3858 (86)		4.6457 (118)		5.7087 (145)		7.0472 (179)		9.7244 (247)		11.8110 (300)	12.9921 (330)
D8		7xM5		7xM6		11xM6		11xM8		11xM10		12xM16	12xM20
D9 H7 [4]		0.1969 (5)		0.2362 (6)		0.2362 (6)		0.3150 (8)		0.3937 (10)		0	0
D10 [2] F7 [4]	Variant I	max. 0.5512 (14)	max. 0.4331 (11)	max. 0.7480 (19)	max. 0.4331 (11)	max. 1.2598 (32)	max. 0.5512 (14)	max. 1.4960 (38)	max.1.7480 (19)	max.1.8898 (48)	max.1.1024 (28)	max. 1.3780 (35)	max.1.8898 (48)
	Variant II	-	-	-	max. 0.5512 (14)	-	max. 0.7480 (19)	-	max. 1.2598 (32)	-	max.1.4960 (38)	-	-
D11 [2]	Variant I	2.7362 (69.5)	2.7362 (69.5)	3.7008 (94)	2.7559 (70)	4.6850 (119)	2.7559 (70)	5.9449 (151)	3.2677 (83)	8.3071 (211)	4.7244 (120)	□ 5.5118 (140)	□ 7.4803 (190)
(comp. D10)	Variant II	-	-	-	2.7559 (70)	-	3.5433 (90)	-	4.3307 (110)	-	5.9842 (152)	-	-
D12 h7 [4]		2.7559 (70)		3.7402 (95)		4.7244 (120)		5.9842 (152)		8.3464 (212)		10.0394 (255)	11.2205 (285)
D14		8x0.1771 (4.5)		8x0.2165 (5.5)		8x0.2165 (5.5)		12x0.2598 (6.6)		12x0.3543 (9)		16x0.5315 (13.5)	16x0.5315 (13.5)
L1 [2]		0.1575 (4)		0.2362 (6)		0.2362 (6)		0.2362 (6)		0.3150 (8)		0	0
L2		0.2756 (7)		0.3937 (10)		0.4724 (12)		0.5906 (15)		0.7874 (20)		0.9843 (25)	1.1811 (30)
L3		0.1181 (3)		0.2362 (6)		0.2362 (6)		0.2362 (6)		0.3150 (8)		0.4724 (12)	0.5906 (15)
L4		0.7677 (19.5)		1.1811 (30)		1.1417 (29)		1.4961 (38)		1.9685 (50)		2.5984 (66)	1.9528 (75)
L5		0.2756 (7)		0.3937 (10)		0.3937 (10)		0.5748 (14.6)		0.5906 (15)		0.7874 (20)	0.7874 (20)
L7 [2]		0.1575 (4)		0.2756 (7)		0.3150 (8)		0.3937 (10)		0.4724 (12)		0.7087 (18)	0.7874 (20)
L8		-		1.0630 (27)		1.2992 (33)		1.4961 (38)		1.8504 (47)		2.4961 (63.4)	2.7559 (70)
L9		0.2362 (6)		0.2756 (7)		0.2756 (7)		0.2756 (7)		0.3937 (10)		0	0
L10		2.1260 (54)	2.5591 (65)	2.8740 (73)		3.2677 (83)	3.1102 (79)	4.1732 (106)	3.8583 (98)	5.3740 (136.5)	4.9016 (124.5)	6.2205 (158)	6.8898 (175)
L11 min. [2]	Variant I	0.5512 (14)	0.4921 (12.5)	0.9055 (23)	0.5906 (15)	1.1811 (30)	0.5906 (15)	1.2598 (32)	0.9055 (23)	1.7717 (45)	1.1811 (30)	1.2598 (32)	1.7717 (45)
(comp. D10)	Variant II	-	-	-	0.5906 (15)	-	0.9055 (23)	-	1.1811 (30)	-	1.2598 (32)	-	-
L11 max. [2]	Variant I	1.1811 (30)	0.9055 (23)	1.5748 (40)	1.1811 (30)	1.9685 (50)	1.1811 (30)	2.3622 (60)	1.5748 (40)	3.2283 (82)	1.9685 (50)	2.3622 (60)	4.7244 (120)
(comp. D10)	Variant II	-	-	-	1.1811 (30)	-	1.5748 (40)	-	1.9685 (50)	-	2.3622 (60)	-	-
L12		0.3031 (7.7)		0.3937 (10)		0.3937 (10)		0.4724 (12)		0.5906 (15)		0.7874 (20)	0.7874 (20)
L14 [2]	Variant I	0.5906 (15)	0.4724 (12)	0.8661 (22)	0.5906 (15)	1.1024 (28)	0.5906 (15)	1.2008 (30.5)	0.8661 (22)	1.4764 (37.5)	1.1024 (28)	1.2008 (30.5)	1.4764 (37.5)
(comp. D10)	Variant II	-	-	-	0.5906 (15)	-	0.8661 (22)	-	1.1024 (28)	-	1.2008 (30.5)	-	-
L15 [2]	Variant I	2.7165 (69)	3.0315 (77)	3.7402 (95)	3.9370 (100)	4.3701 (111)	4.3110 (109.5)	5.3740 (136.5)	5.5118 (140)	6.8504 (174)	6.8307 (173.5)	10.9055 (277)	12.8740 (327)
(comp. D10)	Variant II	-	-	-	4.1142 (104.5)	-	4.7835 (121.5)	-	5.9842 (152)	-	7.4016 (188)	-	-
L17		0	0	0	0.1969 (5)	0	0.2441 (6.2)	0	0.2953 (7.5)	0	0.3937 (10)	0.2362 (6)	0.1181 (3)
L18 [2] +0.03937 (1)	Variant I	0.1575 (4)	0.1378 (3.5)	0.2953 (7.5)	0.1496 (3.8)	0.2756 (7)	0.1496 (3.8)	0.2953 (7.5)	0.2520 (6.4)	0.3346 (8.5)	0.2520 (6.4)	0.2756 (7)	0.3937 (10)
(comp. D10)	Variant II	-	-	-	0.1575 (4.0)	-	0.2402 (6.1)	-	0.2717 (6.9)	-	0.1969 (5.0)	-	-
OD		2.5984 (66) x 0.0787 (2)		3.5433 (90) x 0.1181 (3)		4.3307 (110) x 0.1181 (3)		5.7087 (145) x 0.1181 (3)		7.874 (200) x 0.1969 (5)		9.370 (238) x 0.197 (5)	10.63 (270) x 0.236 (6)
X		0.3150 (8)		0.3150 (8)		0.3150 (8)		12		12		16	16
Y		1.7717 (45)		1.7717 (45)		1.7717 (45)		30		30		22.5	22.5

[2] Dimensions depend on the motor.
[3] without drain plug.
[4] Please reference page 19 for tolerance conversions.

1 in. lb.s² = 1130 kgcm²
1 in. = 25.4 mm
1 in.lb = 0.113 Nm

Mass moments of inertia J_1 [in.lb.s²(kgcm²)] applies to the input

Gear reducer size	Motor shaft diameter [in.(mm)]	Ratio i single-stage 5	7	10	Ratio i two-stage 21	31	61	91
TP 004	≤ 0.4331 (11)	12.04[1] (0.136)	97.35[1] (0.110)	84.96[1] (0.096)	51.33[1] (0.058)	49.56[1] (0.056)	46.90[1] (0.053)	46.02[1] (0.052)
	> 0.4331 (11) ≤ 0.5512 (14)	65.35[1] (0.166)	12.39[1] (0.140)	11.15[1] (0.126)	-	-	-	-
TP 010	≤ 0.3937 (10)	-	-	-	11.51[1] (0.13)	10.62[1](0.12)	7.97[1] (0.09)	7.97[1] (0.09)
	> 0.3937 (10) ≤ 0.4331 (11)	49.56[1] (0.56)	39.83[1] (0.45)	34.52[1] (0.39)	10.62[1] (0.12)	9.74[1] (0.11)	7.97[1] (0.09)	7.97[1] (0.09)
	> 0.4331 (11) ≤ 0.5512 (14)	53.99[1] (0.61)	43.37[1] (0.49)	38.06[1] (0.43)	15.05[1] (0.17)	14.16[1] (0.16)	12.39[1] (0.14)	12.39[1] (0.14)
	> 0.5512 (14) ≤ 0.7480 (19)	57.53[1] (0.65)	47.79[1] (0.54)	42.48[1] (0.48)	-	-	-	-
TP 025	≤ 0.4331 (11)	-	-	-	1.77[2] (0.20)	1.50[2] (0.17)	1.06[2] (0.12)	1.06[2] (0.12)
	> 0.4331 (11) ≤ 0.5512 (14)	16.82[2] (1.90)	13.36[2] (1.51)	11.51[2] (1.30)	2.04[2] (0.23)	1.77[2] (0.20)	1.33[2] (0.15)	1.33[2] (0.15)
	> 0.5512 (14) ≤ 0.7480 (19)	17.70[2] (2.00)	14.34[2] (1.62)	12.48[2] (1.41)	4.60[2] (0.52)	4.34[2] (0.49)	3.89[2] (0.44)	3.89[2] (0.44)
	> 0.7480 (19) ≤ 0.9449 (24)	23.54[2] (2.66)	20.09[2] (2.27)	18.23[2] (2.06)	-	-	-	-
	> 0.9449 (24) ≤ 1.1024 (28)	30.00[2] (3.39)	26.55[2] (3.00)	24.69[2] (2.79)	-	-	-	-
	> 1.1024 (28) ≤ 1.2598 (32)	38.94 (4.40)	35.58 (4.02)	31.86 (3.60)	-	-	-	-
TP 050	≤ 0.4331 (11)	-	-	-	6.28[2] (0.71)	5.31[2] (0.60)	3.54[2] (0.40)	3.45[2] (0.39)
	> 0.4331 (11) ≤ 0.5512 (14)	-	-	-	6.64[2] (0.75)	5.75[2] (0.65)	3.98[2] (0.45)	3.89[2] (0.44)
	> 0.5512 (14) ≤ 0.7480 (19)	46.20[2] (5.22)	32.39[2] (3.66)	26.46[2] (2.99)	7.08[2] (0.80)	6.11[2] (0.69)	4.34[2] (0.49)	4.25[2] (0.48)
	> 0.7480 (19) ≤ 0.9449 (24)	51.24[2] (5.79)	37.52[2] (4.24)	31.51[2] (3.56)	20.18[2] (2.28)	19.20[2] (2.17)	17.43[2] (1.97)	17.35[2] (1.96)
	> 0.9449 (24) ≤ 1.2598 (32)	76.38[2] (8.63)	62.66[2] (7.08)	56.73[2] (6.41)	34.96 (3.95)	33.98 (3.84)	32.21 (3.64)	32.13 (3.63)
	> 1.2598 (32) ≤ 1.3780 (35)	74.96[2] (8.47)	61.24[2] (6.92)	55.31[2] (6.25)	-	-	-	-
	> 1.3780 (35) ≤ 1.4961 (38)	102.30 (11.56)	88.50 (10.00)	82.57 (9.33)	-	-	-	-
TP 110	≤ 0.5512 (14)	-	-	-	2.56[3] (2.89)	2.06[3] (2.33)	1.28[3] (1.45)	1.22[3] (1.38)
	> 0.5512 (14) ≤ 0.7480 (19)	-	-	-	2.65[3] (2.99)	2.15[3] (2.43)	1.38[3] (1.56)	1.32[3] (1.49)
	> 0.7480 (19) ≤ 0.9449 (24)	-	-	-	3.21[3] (3.63)	2.72[3] (3.07)	1.95[3] (2.20)	1.89[3] (2.14)
	> 0.9449 (24) ≤ 1.1024 {28)	-	-	-	3.62[3] (4.09)	3.12[3] (3.53)	2.46[3] (2.78)	2.41[3] (2.72)
	> 1.1024 {28) ≤ 1.2598 (32)	28.36[3] (32.04)	20.74[3] (23.43)	16.82[3] (19.0)	-	-	-	-
	> 1.2598 (32) ≤ 1.3780 (35)	-	-	-	6.35[3] (7.18)	5.85[3] (6.61)	5.07[3] (5.73)	5.02[3] (5.67)
	> 1.3780 (35) ≤ 1.4961 (38)	29.14[3] (32.93)	21.52[3] (24.32)	17.60[3] (19.89)	90.71 (10.25)	85.76 (9,69)	77.79 (8.79)	77.26 (8.73)
	> 1.4961 (38) ≤ 1.8898 (48)	32.40[3] (36.61)	24.78[3] (28.00)	20.86[3] (23.57)	-	-	-	-
TP 300	≤ 1.3780 (35)	-	-	-	-	13.28[3] (15.0)	10.80[3] (12.2)	10.62[3] (12.0)
TP 500	≤ 1.8898 (48)	-	-	-	-	38.59[3] (43.6)	32.83[3] (37.1)	32.48[3] (36.7)

[1] For in.lb.s²-unit please multiply each figure by 10^{-5} [2] For in.lb.s²-unit please multiply each figure by 10^{-4} [3] For in.lb.s²-unit please multiply each figure by 10^{-3}

Quick Selection

A detailed gear reducer selection can be found on pages 16 to 20

Cycle Operation S5
(for number of cycles ≤ 1000)

Duty cycle < 60%

1. Determine the max. motor acceleration torque
   T_{1BMot} [in.lb(Nm)]
2. Determine the actual max. acceleration torque on the reducer output T_{2b} [in.lb(Nm)]
   $T_{2b} = T_{1BMot} \times i$
3. Compare the actual max. acceleration torque T_{2b} [in.lb(Nm)] with the max. permissible acceleration torque T_{2B} [in.lb(Nm)] on the reducer output.
   $T_{2b} \leq T_{2B}$
4. Compare the motor shaft diameter D_{Mot} [in.(mm)] with the dimension D10 [in.(mm)]
   $D_{Mot} \leq D10$
5. Compare the motor shaft length L_{Mot} [in.(mm)] with the dimension L11 [in.(mm)]
   $L11_{min} \leq L_{Mot} \leq L11_{max}$

Continuous Operation S1
(use FPM-seals, indicate this in your order)

Duty cycle ≥ 60%

1. Determine the nominal motor torque
   T_{1NMot} [in.lb(Nm)]
2. Determine the actual nominal torque at the reducer output T_{2n} [in.lb(Nm)]
   $T_{2n} = T_{1NMot} \times i$
3. Compare the actual nominal torque T_{2n} [in.lb(Nm)] with the permissible nominal torque T_{2N} [in.lb(Nm)] at the reducer output
   $T_{2n} \leq T_{2N}$
4. Determine the nominal input speed
   n_{1n} [rpm]
5. Compare the nominal input speed n_{1n} [rpm] with the permissible nominal speed n_{1N} [rpm]
   $n_{1n} \leq n_{1N}$
6. Compare the motor shaft diameter D_{Mot} [in.(mm)] with the dimension D10 [in.(mm)]
   $D_{Mot} \leq D10$
7. Compare the motor shaft length L_{Mot} [in.(mm)] with the dimension of L11 [in.(mm)]

TP S-Version

Product characteristics

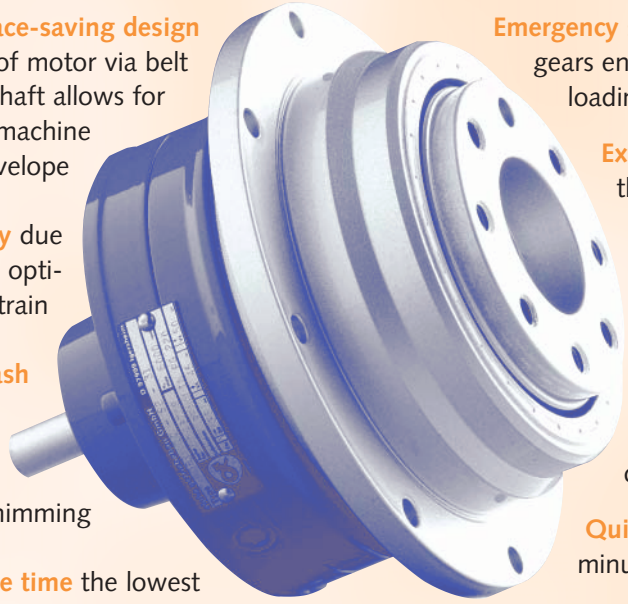
Space-saving design parallel mounting of motor via belt or gear coupled shaft allows for the most compact machine envelope

High torsional rigidity due to output flange and optimized planetary gear train

Minimum backlash ≤ 1arcmin achieved using precision ground gearing without shimming

Dynamic response time the lowest moment of inertia and highest torsional rigidity yield the best settling time available

Superior positioning accuracy resulting from low backlash and high torsional rigidity



Emergency stop protection case hardened gears ensure resiliency during extreme shock loading

Extremely compact shape the result of an integrated design concept

Extremely quiet the unique reducer kinematics yield the quietest planetary reducer on the market

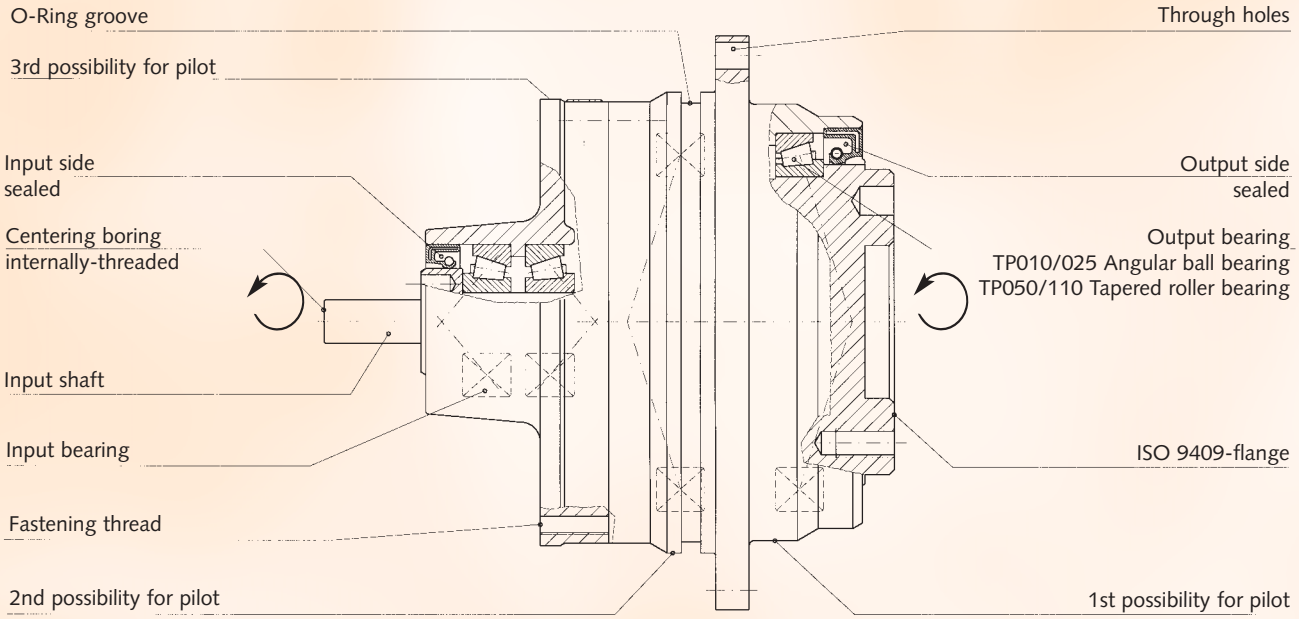
Engineered for any cycle ideally suited for continuous and highly dynamic cyclic operations

Quick and easy mounting mounts in minutes to any servomotor

True running gear train provides exceptionally quiet operation, high efficiency and smooth torque transmission

Very easy to install owing to input fastening thread for coupling flanges

Product details



Conversion Table:

1 in.lb	= 0.113 Nm
1 in. lb.s²	= 1130 kgcm²
1 lb_f	= 4.44 N
1 lb_m	= 0.4535 kg

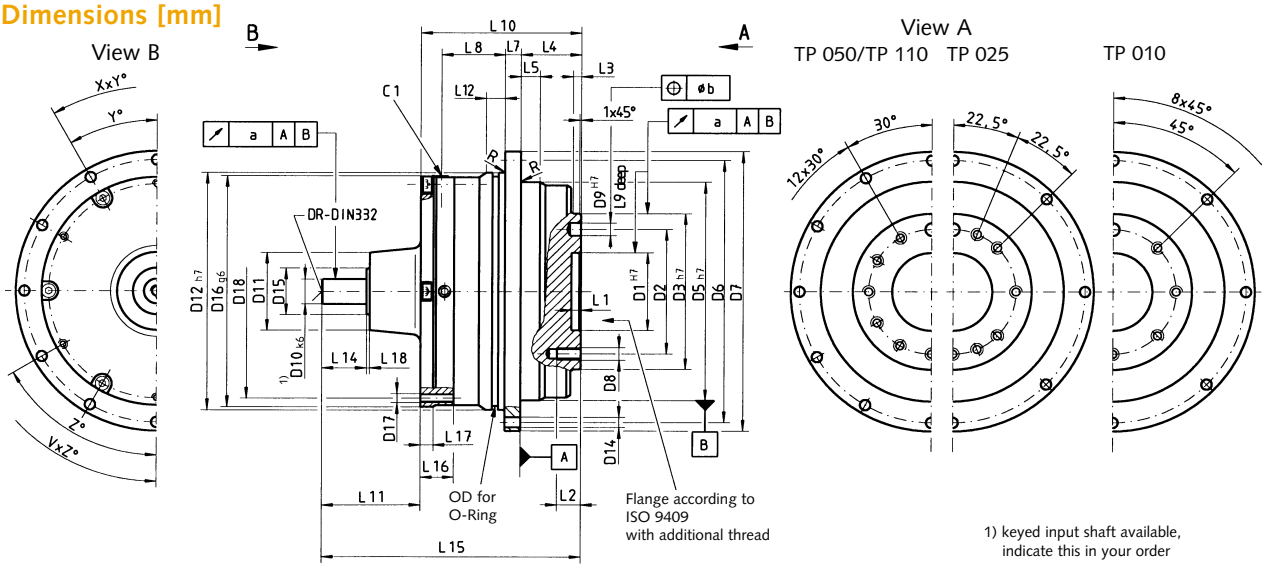
Technical data

Size				TP 010	TP 025	TP 050	TP 110
max. Acceleration Torque [1]	T_{2B}	in.lb(Nm)	i = 5, 7, 31	885 (100)	2655 (300)	5753 (650)	-
			i = 10, 21, 61, 91	708 (80)	2213 (250)	4425 (500)	-
			i = 5, 7, 10, 21	-	-	-	9735 (1100)
			i = 31	-	-	-	14160 (1600)
			i = 61, 91	-	-	-	11505 (1300)
Emergency Stop [2]	T_{2Not}	in.lb(Nm)		2213 (250)	5531 (625)	11063 (1250)	24338 (2750)
Nominal Output Torque	T_{2N}	in.lb(Nm)	i = 5, 7, 31	443 (50)	1505 (170)	3275 (370)	-
			i = 10, 21, 61, 91	310 (35)	885 (100)	1947 (220)	-
			i = 5, 7, 10, 21	-	-	-	5664 (640)
			i = 31	-	-	-	10886 (1230)
			i = 61, 91	-	-	-	6195 (700)
max. Input Speed	n_{1Max}	rpm	1-stage	6000	4500	4000	3500
			2-stage		6000	5000	4500
Nominal Input Speed [3]	n_{1N}	rpm	i = 5, 7	1300	1000	800	600
			i = 10	1500	1300	1100	800
			i = 21, 31	1900	1600	1300	1100
			i = 61	2400	1900	1700	1300
			i = 91	2700	2300	2100	1700
Ratios [4]	i		1-stage	5 / 7 / 10			
			2-stage	21 / 31 / 61 / 91			
Torsional Backlash	j_t	arcmin	standard	≤ 3			
			reduced	≤ 1			
Torsional Rigidity	C_{t21}	in.lb(Nm)/arcmin	1-stage i = 5	274 (31)	752 (85)	1513 (171)	3876 (438)
			2-stage i = 91	150 (17)	381 (43)	779 (88)	2478 (280)
max. Axial Load [5] (Output)	F_{2AMax}	lb_f (N)		484 (2150)	934 (4150)	1379 (6130)	2261 (10050)
max. Tilting Moment	Output M_{2KMax}	in.lb(Nm)		2080 (235)	3655 (413)	11461 (1295)	27116 (3064)
	Input M_{1KMax}	in.lb(Nm)	1-stage	584 (66)	1000 (113)	2053 (232)	4018 (454)
			2-stage	204 (23)	230 (26)	584 (66)	1000 (113)
max. Axial Load [5] (Input)	F_{1AMax}	lb_f (N)	1-stage	259 (1150)	360 (1600)	608 (2700)	1058 (4700)
			2-stage	203 (900)	214 (950)	259 (1150)	360 (1600)
max. Radial Load [5] (Input)	F_{1RMax}	lb_f (N)	1-stage	293 (1300)	428 (1900)	675 (3000)	1013 (4500)
			2-stage	113 (500)	124 (550)	293 (1300)	428 (1900)
No-load Running Torque [6] (n_1=3000 rpm)	T_{012}	in.lb(Nm)	i = 10			46.91 (5.3)	
			i = 31	3.54 (0.4)		15.93 (1.8)	
			i = 91		4.43 (0.5)		
Tilting Rigidity	C_{2K}	in.lb(Nm)/arcmin		1991 (225)	4868 (550)	4956 (560)	12850 (1452)
Efficiency with full load	η	%	1-stage	≥ 95			
			2-stage	≥ 92			
Weight	m	lb_m(kg)		7.1 (3.2)	11.5 (5.2)	22.7 (10.3)	56.0 (25.4)
Lubrication				Synthetic oil viscosity ISO VG220			
Paint				Blue RAL 5002			
Mounting Position				Please advise with order			
Permissible Gear Reducer Temp.	°C			- 10°C to + 90°C			
Direction of Rotation				Motor and gear reducer same direction			
Degree of Gearbox Protection				IP 64			
Noise level (n_1=3000 rpm)	L_{PA}	dB(A)	1-stage	≤ 68		≤ 70	
			2-stage	≤ 64		≤ 65	

[1] 1000 cycles per hour.
[2] 1000 times during the service life.
[3] at 20°C ambient temperature (if you have higher ambient temperature, please reduce the n_{1N} speed). In case of S1-conditions, please contact alpha.
[4] Further ratios see operations page 21.
[5] applied to the flange/shaft centre.
[6] at 20°C gear reducer temperature.

1 in. = 25.4 mm

Dimensions [mm]



1) keyed input shaft available, indicate this in your order

Size		TP 010	TP 025	TP 050	TP 110
Gear Stages		1 / 2	1 / 2	1 / 2	1 / 2
a		0.0012 (0.03)	0.0012 (0.03)	0.0012 (0.03)	0.0016 (0.04)
b		0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)
C1		3xM8x1	3xM8x1	3xM8x1	3xM12x1.5
DR		M5 / M3	M8 / M4	M12 / M5	M16 / M8
D1	H7[2)]	1.2402 (31.5)	1.5748 (40)	1.9685 (50)	3.1496 (80)
D2		1.9685 (50)	2.4803 (63)	3.1496 (80)	4.9213 (125)
D3	h7[2)]	2.4803 (63)	3.1496 (80)	3.9370 (100)	6.2992 (160)
D5	h7[2)]	3.5433 (90)	4.3307 (110)	5.5118 (140)	7.8740 (200)
D6		4.2913 (109)	5.3150 (135)	6.6142 (168)	9.1732 (233)
D7		4.6457 (118)	5.7087 (145)	7.0472 (179)	9.7244 (247)
D8		7xM6	11xM6	11xM8	11xM10
D9	H7[2)]	0.2362 (6)	0.2362 (6)	0.3150 (8)	0.3937 (10)
D10	k6[2)]	0.6299 (16) / 0.3543 (9)	0.8661 (22) / 0.4724 (12)	1.2598 (32) / 0.2699 (16)	1.5748 (40) / 0.8661 (22)
D11		1.8898 (48) / 1.4961 (38)	2.3622 (60) / 1.5748 (40)	3.0709 (78) / 1.9685 (50)	3.8583 (98) / 2.4803 (62)
D12	h7[2)]	3.7401 (95)	4.7244 (120)	5.9842 (152)	8.3464 (212)
D14		8 x 0.2165 (5.5)	8 x 0.2165 (5.5)	12 x 0.2598 (6.6)	12 x 0.3543 (9)
D15		1.1811 (30) / 0.8661 (22)	1.4961 (38) / 0.9843 (25)	2.1654 (55) / 1.1811 (30)	2.7559 (70) / 1.4961 (38)
D16	g6[2)]	3.6220 (92)	4.6457 (118)	5.8268 (148)	8.1890 (208)
D17		4xM4	4xM5	6xM6	6xM8
D18		3.3071 (84)	4.2126 (107)	5.3937 (137)	7.5984 (193)
L1		0.2362 (6)	0.2362 (6)	0.2362 (6)	0.3150 (8)
L2		0.3937 (10)	0.4724 (12)	0.5906 (15)	0.7874 (20)
L3		0.2362 (6)	0.2362 (6)	0.2362 (6)	0.3150 (8)
L4		1.1811 (30)	1.1417 (29)	1.4961 (38)	1.9685 (50)
L5		0.3937 (10)	0.3937 (10)	0.5748 (14.6)	0.5906 (15)
L7		0.2756 (7)	0.3150 (8)	0.3937 (10)	0.4724 (12)
L8		1.063 (27)	1.2992 (33)	1.5748 (40)	1.8307 (46.5)
L9		0.2756 (7)	0.2756 (7)	0.2756 (7)	0.3937 (10)
L10		2.8937 (73.5)	3.1693 (80.5)	3.8583 (98)	4.9016 (124.5)
L11		1.7323 (44)	2.1457 (54.5) / 1.6732 (42.5)	3.0709 (78) / 2.5591 (65)	4.1535 (105.5) / 2.8937 (73.5)
L12		0.3937 (10)	0.3937 (10)	0.4724 (12)	0.5906 (15)
L14		1.1024 (28) / 0.7874 (20)	1.4173 (36) / 0.7087 (18)	2.2835 (58) / 1.1024 (28)	3.2283 (82) / 1.4173 (36)
L15		4.6457 (118) / 4.626 (117.5)	5.315 (135) / 4.8425 (123)	6.9291 (176) / 6.4173 (163)	9.0551 (230) / 7.7953 (198)
L16		0.5709 (14.5)	0.6102 (15.5)	0.7087 (18)	0.9055 (23)
L17		0.1969 (5)	0.2362 (6)	0.315 (8)	0.3937 (10)
L18		0.0788 (2) / 0.0394 (1)	0.0788 (2) / 0.0394 (1)	0.0788 (2)	0.1181 (3) / 0.0788 (2)
OD		3.5433 (90) x 0.1181 (3)	4.3307 (110) x 0.1181 (3)	5.7087 (145) x 0.1181 (3)	7.874 (200) x 0.1969 (5)
R		0.0157 (0.4)	0.0157 (0.4)	0.0157 (0.4)	0.0157 (0.4)
V		4	4	6	6
X		8	8	12	12
Y		45	45	30	30
Z		90	90	60	60

2) Please reference page 19 for tolerance conversions.

1 in. lb.s² = 1130 kgcm²
1 in. lb = 0.113 Nm

Mass moments of inertia J_1 [in.lb.s²(kgcm²)] applies to the input

Gear reducer	Ratio i single-stage			Ratio i two-stage			
size	5	7	10	21	31	61	91
TP 010	46.91[1] (0.53)	37.17[1] (0.42)	31.86[1] (0.36)	7.97[1] (0.09)	7.08[1] (0.08)	5.31[1] (0.06)	5.31[1] (0.06)
TP 025	14.25[2] (1.61)	10.89[2] (1.23)	9.03[2] (1.02)	1.77[2] (0.20)	1.42[2] (0.16)	1.06[2] (0.12)	0.97[2] (0.11)
TP 050	51.68[2] (5.84)	37.88[2] (4.28)	31.86[2] (3.60)	5.93[2] (0.67)	4.96[2] (0.56)	3.19[2] (0.36)	3.10[2] (0.35)
TP 110	25.08[3] (28.34)	17.35[3] (19.60)	13.43[3] (15.17)	2.19[3] (2.48)	1.70[3] (1.92)	0.92[3] (1.04)	0.86[3] (0.97)

[1] For in.lb.s²-unit please multiply each figure by 10^{-5}
[2] For in.lb.s²-unit please multiply each figure by 10^{-4}
[3] For in.lb.s²-unit please multiply each figure by 10^{-3}

Quick Selection

A detailed gear reducer selection can be found on pages 16 to 20

Cycle Operation S5
(for number of cycles ≤ 1000)

Duty cycle < 60%

1. Determine the max. motor acceleration torque
   T_{1BMot} [in.lb(Nm)]
2. Determine the actual max. acceleration torque at the reducer output T_{2b} [in.lb(Nm)]
   $T_{2b} = T_{1BMot} \times i$
3. Compare the actual max. acceleration torque T_{2b} [in.lb(Nm)] with the max. permissible acceleration torque T_{2B} [in.lb(Nm)] at the reducer output
   $T_{2b} \leq T_{2B}$

Continuous Operation S1
(use FPM-seals, indicate this in your order)

Duty cycle ≥ 60%

1. Determine the nominal motor torque
   T_{1NMot} [in.lb(Nm)]
2. Determine the actual nominal torque at the reducer output T_{2n} [in.lb(Nm)]
   $T_{2n} = T_{1NMot} \times i$
3. Compare the actual nominal torque T_{2n} [in.lb(Nm)] with the permissible nominal torque T_{2N} [in.lb(Nm)] at the reducer output
   $T_{2n} \leq T_{2N}$
4. Determine the nominal input speed
   n_{1n} [rpm]
5. Compare the actual input speed n_{1n} [rpm] with the permissible nominal speed n_{1N} [rpm]
   $n_{1n} \leq n_{1N}$

TP K-Version

Product characteristics

Flexible motor mounting field interchangeable motor mounting kits allow stocking one reducer for any customer's motor specification

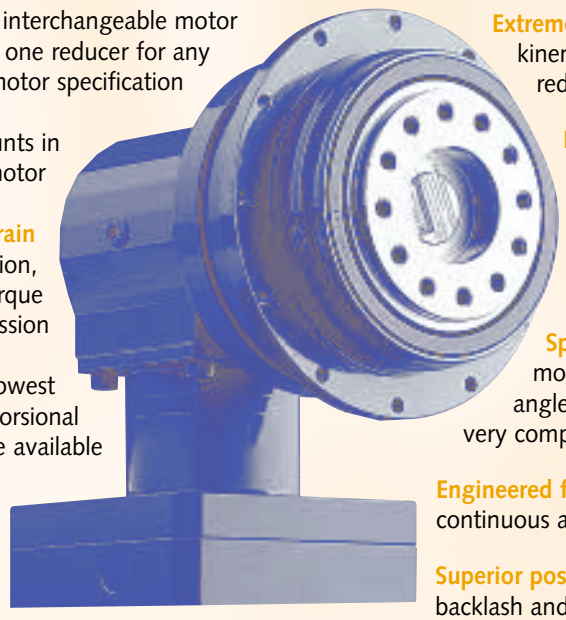
Quick and easy mounting mounts in minutes to any servomotor

True running gear train provides exceptionally quiet operation, high efficiency and smooth torque transmission

Dynamic response time the lowest moments of inertia and highest torsional rigidity yield the best settling time available

Emergency stop protection case hardened gears ensure resiliency during extreme shock loading

Advanced patented motor mounting with integrated thermal length compensation, longer motor bearing life is guaranteed



Extremely quiet the unique reducer kinematics yield the quietest planetary reducer on the market

Highest torsional rigidity due to output flange and optimized planetary gear train

Extremely compact shape a result of an integrated design concept

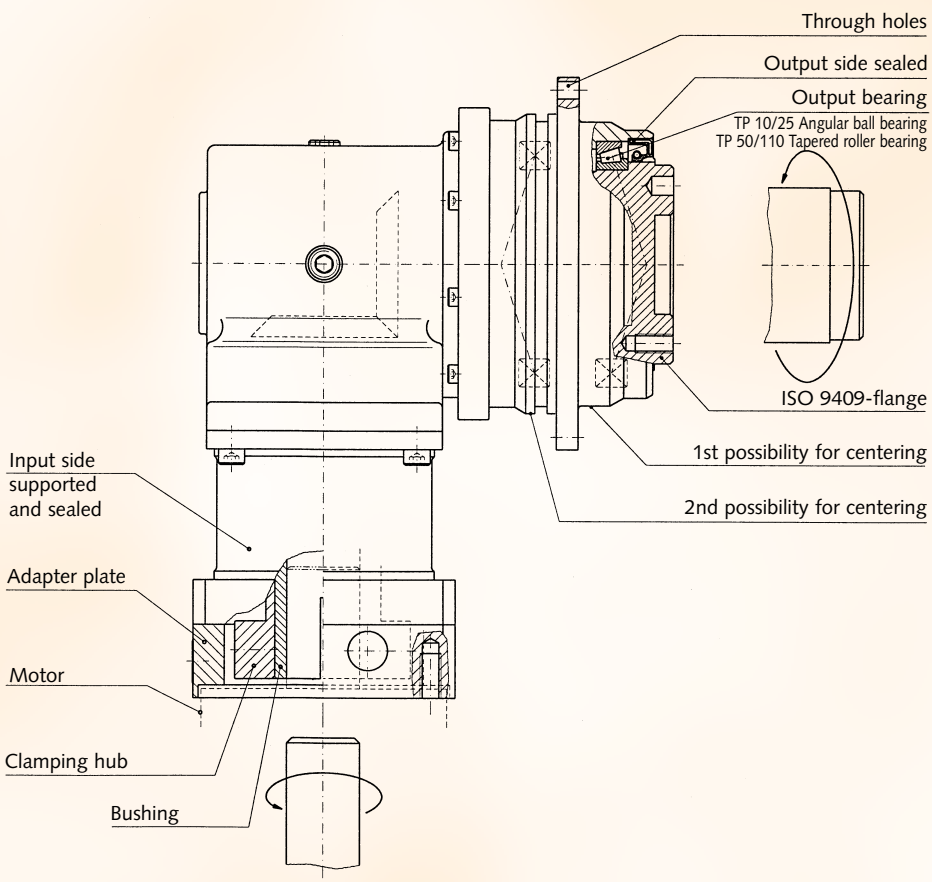
Space-saving design motor orientation enabled by right-angle spiral bevel gearing allows for a very compact machine envelope

Engineered for any duty cycle ideally suited for continuous and highly dynamic cyclic operations

Superior positioning accuracy resulting from low backlash and high torsional rigidity yield the best settling time available

Low backlash because of compensation of tolerances without distortions

Product details



Technical data

Size				TPK 010	TPK 025	TPK 050	TPK 110	TPK 300[6]
max. Acceleration Torque [1]	T_{2B}	in.lb(Nm)	i = 5, 7, 10, 14, 62	885 (100)	2655 (300)	5753 (650)	-	-
			i = 20, 42, 122, 182	708 (80)	2213 (250)	4425 (500)	-	-
			i = 5, 7, 10, 14, 20, 42	-	-	-	9735 (1100)	-
			i = 62	-	-	-	14159 (1600)	30973 (3500)
			i = 122, 182	-	-	-	11505 (1300)	24779 (2800)
Emergency Stop [2]	T_{2Not}	in.lb(Nm)		2213 (250)	5531 (625)	11063 (1250)	24338 (2750)	77434 (8750)
Nominal Output Torque	T_{2N}	in.lb(Nm)	i = 5, 7, 10, 14, 62	443 (50)	1505 (170)	3275 (370)	-	-
			i = 20, 42, 122, 182	310 (35)	885 (100)	1947 (220)	-	-
			i = 5, 7, 10, 14, 20, 42	-	-	-	5664 (640)	-
			i = 62	-	-	-	10886 (1230)	19469 (2200)
			i = 122, 182	-	-	-	6195 (700)	14160 (1600)
max. Input Speed	n_{1Max}	rpm	2-stage	6000	4500	4000	3500	-
			3-stage		6000	4500	4000	3000
Nominal Input Speed [3]	n_{1N}	rpm	i = 5, 7	1600	1400	1000	700	-
			i = 10, 14, 20	2300	1900	1500	1000	-
			i ≥ 42	3300	3300	3300	2900	2400
Ratios [6]	i		2-stage	5 / 7 / 10 / 14 / 20				-
			3-stage	42 / 62 / 122 / 182				
Torsional Backlash	j_t	arcmin	standard	≤ 4				
			reduced	≤ 2				
Torsional Rigidity	C_{t21}	n.lb(Nm)/arcmin	2-stage i = 5	137 (15.5)	381 (43)	947 (107)	2567 (290)	-
			3-stage i = 182	150 (17)	381 (43)	929 (105)	2478 (280)	4425 (500)
max. Axial Load [4]	F_{2AMax}	lb_f(N)		484 (2150)	934 (4150)	1379 (6130)	2261 (10050)	7432 (33000)
max. Tilting Moment	M_{2KMax}	in.lb(Nm)		2080 (235)	3655 (413)	11461 (1295)	27116 (3064)	52212 (5900)
No-load Running Torque [5] (n_1=3000 rpm)	T_{012}	in.lb(Nm)	i = 5		28 (3.2)			
			i = 42			18 (2)	62 (7)	
			i = 62	7 (0.75)				
			i = 182				27 (3)	40 (4.5)
Tilting Rigidity	C_{2K}	in.lb(Nm)/arcmin		1991 (225)	4868 (550)	4956 (560)	12850 (1452)	49204 (5560)
Efficiency with full load	η	%	2-stage	≥ 93				
			3-stage	≥ 90				
Weight	m	lb_m(kg)	2-stage	15.4 (7.0)	25.4 (11.5)	50.7 (23.0)	105.8 (48.0)	-
			3-stage	10.8 (4.9)	15.4 (7.0)	30.4 (13.8)	64.6 (29.3)	143.3 (65)
Lubrication				Synthetic oil viscosity ISO VG220				
Paint				Blue RAL 5002				
Mounting Position				Please advise with order				
Permissible Gear Reducer Temp.		°C		- 10°C to + 90°C				
Direction of Rotation			Motor and gear reducer same direction					
Degree of Gearbox Protection				IP 64				
Noise level (n_1=3000 rpm)	L_{PA}	dB(A)		≤ 68	≤ 70	≤ 71	≤ 72	≤ 75

[1] 1000 cycles per hour.

[2] 1000 times during the service life.

[3] If you require higher n_{1N} speed please contact alpha.
At 20°C ambient temperature (if you have higher ambient temperature, please reduce the n_{1N} speed).
In case of S1-conditions, please contact alpha.

[4] applied to the flange centre.

[5] at 20°C gear reducer temperature.

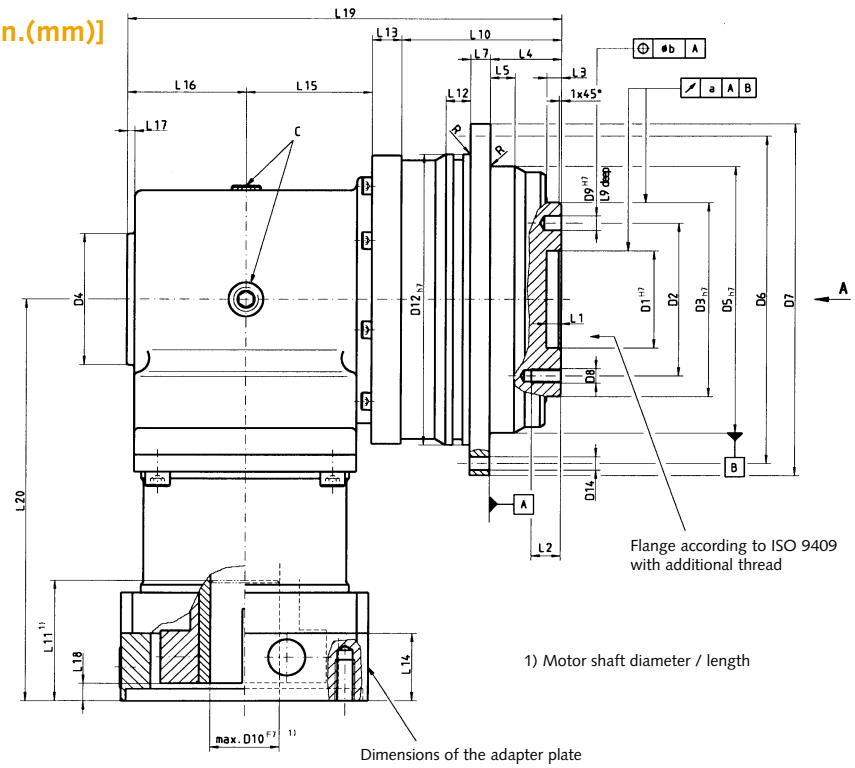
[6] i = 42 not available for TPK300

Conversion Table:

1 in.lb	= 0.113 Nm
1 in. lb.s²	= 1130 kgcm²
1 lb_f	= 4.44 N
1 lb_m	= 0.4535 kg

Dimensions [in.(mm)]

1 in. = 25.4 mm



Size		TPK 010	TPK 025	TPK 050	TPK 110	TPK 300
Gear Stages		2 / 3	2 / 3	2 / 3	2 / 3	3
a		0.0012 (0.03)	0.0012 (0.03)	0.0012 (0.03)	0.0016 (0.04)	0.0020 (0.05)
b		0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	0.0008 (0.02)	-
C		3xM8x1	3xM12x1.5 / 3xM8x1	3xM12x1.5 / 3xM8x1	3xM12x1.5	4xM12x1.5
D1	H7[2)]	1.2402 (31.5)	1.5748 (40)	1.9685 (50)	3.1496 (80)	o
D2		1.9685 (50)	2.4803 (63)	3.1496 (80)	4.9213 (125)	5.5118 (140)
D3	h7[2)]	2.4803 (63)	3.1496 (80)	3.9370 (100)	6.2992 (160)	7.0866 (180)
D4		1.6535 (42)	2.1260 (54)	2.7559 (70)	3.9370 (100)	2.7560 (70)
D5	h7[2)]	3.5433 (90)	4.3307 (110)	5.5118 (140)	7.8740 (200)	10.0394 (255)
D6		4.2913 (109)	5.3150 (135)	6.6142 (168)	9.1732 (233)	11.0236 (280)
D7		4.6457 (118)	5.7087 (145)	7.0472 (179)	9.7244 (247)	11.8110 (300)
D8		7xM6	11xM6	11xM8	11xM10	12xM16
D9	H7[2)]	0.2362 (6)	0.2362 (6)	0.3150 (8)	0.3937 (10)	o
D10	F7[2)]	0.7480 (19) / 0.5512 (14)	1.1024 (28) / 0.5512 (14)	1.3780 (35) / 0.7480 (19)	1.8898 (48) / 1.1024 (28)	1.3780 (35)
D12	h7[2)]	3.7402 (95)	4.7244 (120)	5.9842 (152)	8.3464 (212)	10.0394 (255)
D14		8x0.2165 (5.5)	8x0.2165 (5.5)	12x0.2598 (6.6)	12x0.3543 (9)	16x0.5315 (13.5)
L1		0.2362 (6)	0.2362 (6)	0.2362 (6)	0.3150 (8)	o
L2		0.3937 (10)	0.4724 (12)	0.5906 (15)	0.7874 (20)	0.9843 (25)
L3		0.2362 (6)	0.2362 (6)	0.2362 (6)	0.3150 (8)	0.4724 (12)
L4		1.1811 (30)	1.1417 (29)	1.4961 (38)	1.9685 (50)	2.5984 (66)
L5		0.3937 (10)	0.3937 (10)	0.5748 (14.6)	0.5906 (15)	0.7874 (20)
L7		0.2756 (7)	0.3150 (8)	0.3937 (10)	0.4724 (12)	0.7087 (18)
L9		0.2756 (7)	0.2756 (7)	0.2756 (7)	0.3937 (10)	o
L10		2.3228 (59)	2.5591 (65)	3.1496 (80)	3.9961 (101.5)	5.5118 (140)
L11	min.	0.9055 (23) / 0.5906 (15)	1.1811 (30) / 0.5906 (15)	1.2598 (32) / 0.9055 (23)	1.7717 (45) / 1.1811 (30)	1.2598 (32)
	max.	1.5748 (40) / 1.1811 (30)	1.9685 (50) / 1.1811 (30)	2.3622 (60) / 1.5748 (40)	3.2283 (82) / 1.9685 (50)	2.3622 (60)
L12		0.3937 (10)	0.3937 (10)	0.4724 (12)	0.5906 (15)	0.7874 (20)
L13		0.4724 (12) / 0.6496 (16.5)	0.4724 (12) / 0.5709 (18)	0.6890 (17.5) / 0.7874 (20)	1.3189 (33.5) / 1.0118 (25.7)	0.9252 (23.5)
L14		0.8661 (22) / 0.5906 (15)	1.1024 (28) / 0.5906 (15)	1.2008 (30.5) / 0.8661 (22)	1.4764 (37.5) / 1.1024 (28)	1.2008 (30.5)
L15		1.9488 (49.5) / 1.2598 (32)	2.0079 (51) /1.2598 (32)	2.8543 (72.5) / 1.9488 (49.5)	3.4252 (87) / 2.0079 (51)	2.8543 (72.5)
L16		1.6929 (43) / 1.4764 (37.5)	1.8898 (48) / 1.4764 (37.5)	2.2835 (58) / 1.6929 (43)	3.2677 (83) / 1.8898 (48)	2.2835 (58)
L17		0.4134 (10.5) / 0.2953 (7.5)	0.1181 (3) / 0.2953 (7.5)	0.2165 (5.5) / 0.4134 (10.5)	0.3150 (8) / 0.1181 (3)	0.2165 (5.5)
L18		0.2756 (7) / 0.1969 (5)	0.3150 (8) / 0.2953 (7.5)	0.2362 (6) / 0.2756 (7)	0.4134 (10.5) / 0.3150 (8)	0.2362 (6)
L19		6.4370 (163.5) / 5.7087 (145)	6.9291 (176) / 6.0039 (152.5)	8.9764 (228) / 7.5787 (192.5)	12.0079 (305) / 8.9055 (226.2)	11.5749 (294)
L20		5.6693 (144) / 4.8622 (123.5)	6.5354 (166) / 4.8622 (123.5)	7.4606 (189.5) / 5.6693 (144)	9.9606 (253) / 6.5354 (166)	7.4606 (189.5)
R		0.0157 (0.4)	0.0157 (0.4)	0.0157 (0.4)	0.0157 (0.4)	0.0157 (0.4)

2) Please reference page 19 for tolerance conversions.

Mass moments of inertia J_1 [in.lb.s²(kgcm²)] applies to the input

1 in.	= 25.4 mm
1 in. lb.s²	= 1130 kgcm²
1 in.lb	= 0.113 Nm

Gear reducer	Ratio i 2-stage					Ratio i 3-stage			
Size	5	7	10	14	20	42	62	122	182
TPK 010	31.33[1] (3.54)	30.27[1] (3.42)	21.15[1] (2.39)	20.89[1] (2.36)	20.8[1] (2.35)	5.96[1] (0.673)	5.94[1] (0.671)	5.89[1] (0.666)	5.89[1] (0.666)
TPK 025	10.97[2] (12.4)	10.62[2] (12.0)	7.24[2] (8.18)	7.16[2] (8.09)	7.11[2] (8.03)	0.61[2] (0.688)	0.60[2] (0.678)	0.59[2] (0.666)	0.59[2] (0.666)
TPK 050	25.49[2] (28.8)	24.07[2] (27.2)	16.37[2] (18.5)	16.02[2] (18.1)	15.93[2] (18.0)	2.14[2] (2.42)	2.12[2] (2.40)	2.08[2] (2.35)	2.07[2] (2.34)
TPK 110	17.70[3] (200)	16.99[3] (192)	8.49[3] (95.9)	8.31[3] (93.9)	8.21[3] (92.8)	0.74[3] (8.41)	0.73[3] (8.27)	0.71[3] (8.05)	0.71[3] (8.03)
TPK 300							1.60[3] (18.9)	1.60[3] (18.2)	1.60[3] (18.1)

[1] For in.lb.s²-unit please multiply each figure by 10^{-4}
[2] For in.lb.s²-unit please multiply each figure by 10^{-3}
[3] For in.lb.s²-unit please multiply each figure by 10^{-2}

J_1 is not dependent on the motor shaft diameter

Quick Selection

A detailed gear reducer selection can be found on pages 16 to 20

Cycle Operation S5

(for number of cycles ≤ 1000)

Duty cycle < 60%

1. Determine the max. motor acceleration torque
   T_{1BMot} [in.lb(Nm)]
2. Determine the max. acceleration torque at the reducer output T_{2b} [in.lb(Nm)]
   $T_{2b} = T_{1BMot} \times i$
3. Compare the actual max. acceleration torque T_{2b} [in.lb(Nm)] with the max. permissible acceleration torque T_{2B} [in.lb(Nm)] on the reducer output
   $T_{2b} \leq T_{2B}$
4. Compare the motor shaft diameter D_{Mot} [in.(mm)] with the dimension D10 [in.(mm)]
   $D_{Mot} \leq D10$
5. Compare the motor shaft length L_{Mot} [in.(mm)] with the dimension L11 [in.(mm)]
   $L11_{min} \leq L_{Mot} \leq L11_{max}$

Continuous Operation S1

(use FPM-seals, indicate this in your order)

Duty cycle ≥ 60%

1. Determine the nominal motor torque **T_{1NMot} [in.lb(Nm)]**
2. Determine the actual nominal torque at the reducer output T_{2n} [in.lb(Nm)]
   $T_{2n} = T_{1NMot} \times i$
3. Compare the actual nominal torque T_{2n} [in.lb(Nm)] with the permissible nominal torque T_{2N} [in.lb(Nm)] at the reducer output
   $T_{2n} \leq T_{2N}$
4. Determine the nominal input speed
   n_{1n} [rpm]
5. Compare the nominal input speed n_{1n} [rpm] with the permissible nominal speed n_{1N} [rpm]
   $n_{1n} \leq n_{1N}$
6. Compare the motor shaft diameter D_{Mot} [in.(mm)] with the dimension D10 [in.(mm)]
   $D_{Mot} \leq D10$
7. Compare the motor shaft length L_{Mot} [mm] with the dimension of L11 [mm]
   $L11_{min} \leq L_{Mot} \leq L11_{max}$

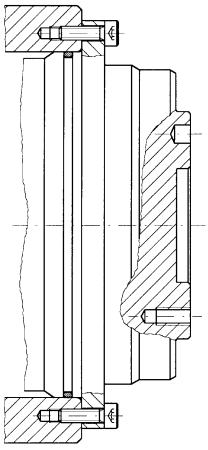
Mounting versions

Mounting versions of the housing

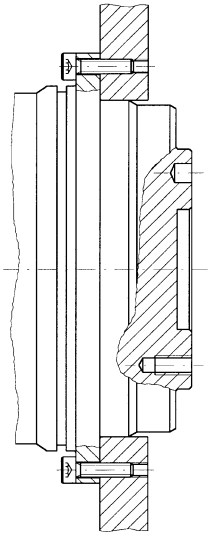
The centering features of the gearbox housing yield two possibilities for mounting (see Fig. beside).

An O-ring can be fitted to seal the gearbox housing if version a) is chosen.

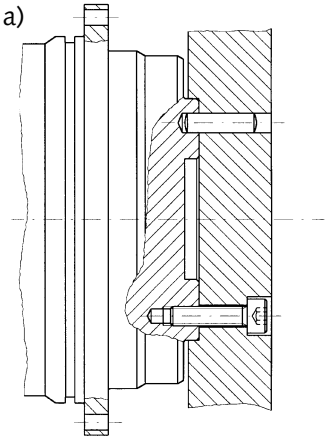
a)



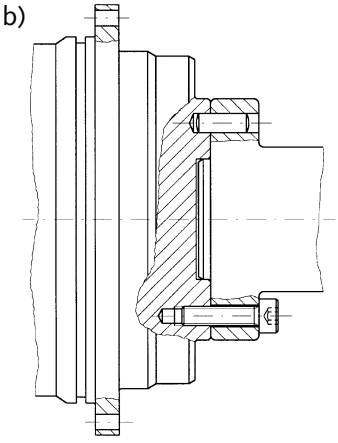
b)



a)



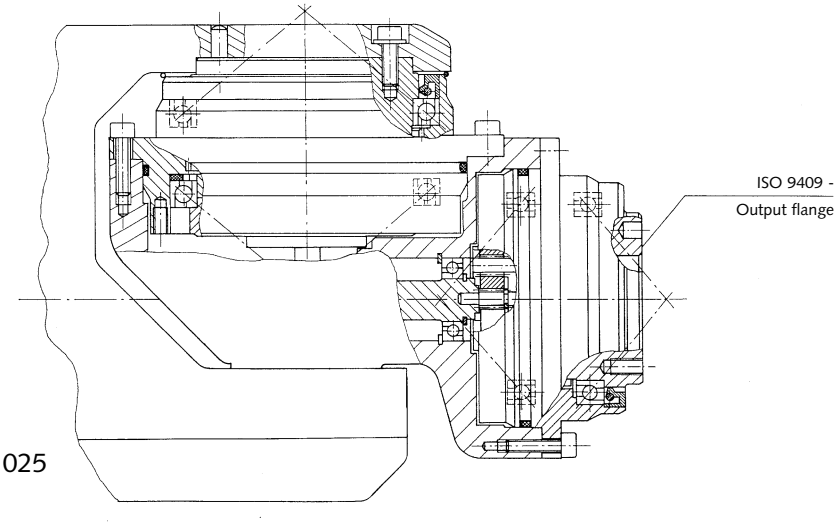
b)



Mounting versions of the output flange

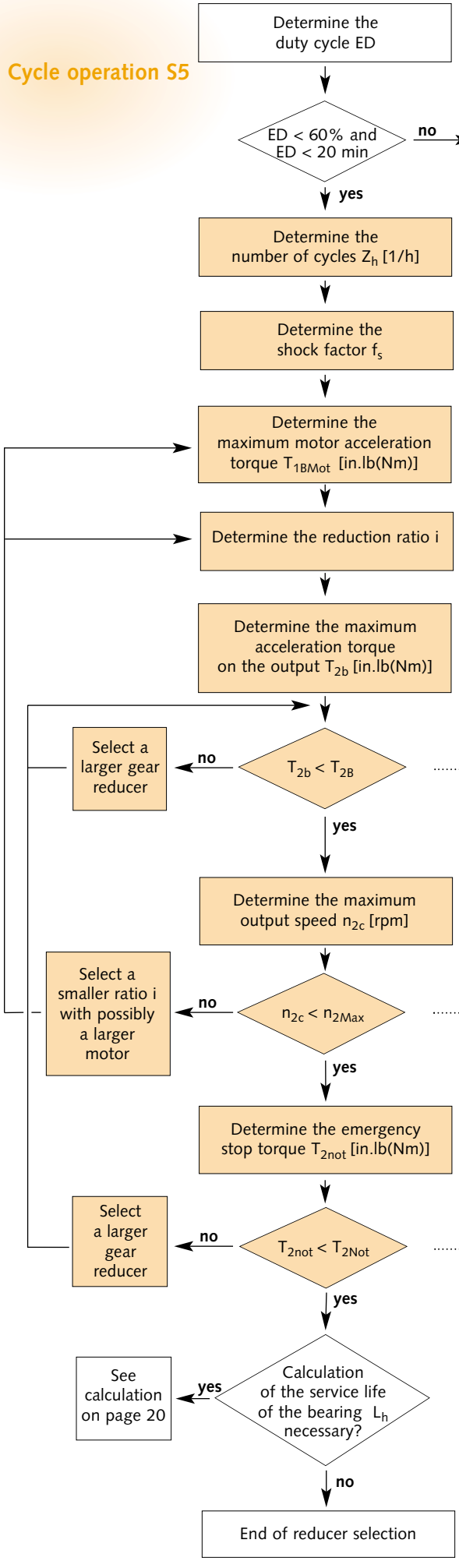
The ISO-output flange has two possibilities for centering as well as an index bore.

a) External centering
b) Internal centering

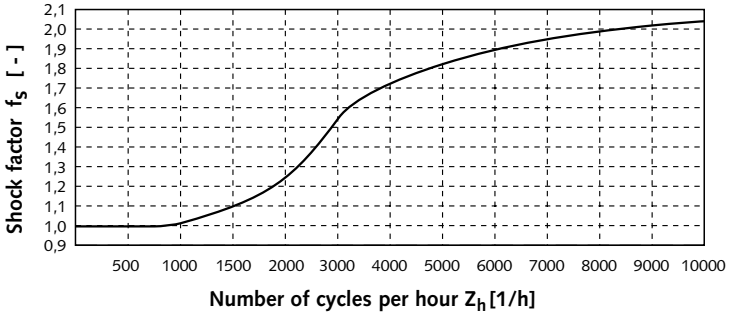


Installation example: TP 010 and TP 025
Integrated in a robot hand

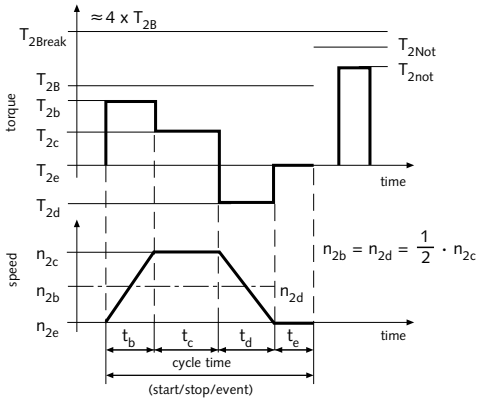
Cycle operation S5



Rapid reversals in combination with short acceleration times may cause vibration within the drive assembly. The resulting overloads should be calculated using the shock factor f_s.



All usual loads at the output



Version		η [%]
M	1-stage	≥96
	2-stage	≥93
S	1-stage	≥95
	2-stage	≥92
K	2-stage	≥93
	3-stage	≥90

1 in.lb = 0.113 Nm

	Version		TP004[1]	TP010	TP025	TP050	TP110	TP300[2]	TP500[1]
T_{2B}	M/S	i=5/7/31	354 (40)	885 (100)	2655 (300)	5753 (650)	-	-	-
in.lb(Nm)		i=10/21/61/91	283 (32)	708 (80)	2213 (250)	4425 (500)	-	-	-
		i=5/7/10/21	-	-	-	-	9735 (1100)	-	-
		i=31	-	-	-	-	14160 (1600)	30975 (3500)	53100 (6000)
		i=61/91	-	-	-	-	11505 (1300)	24780 (2800)	42480 (4800)
	K	i=5/7/10/14/62	-	885 (100)	2655 (300)	5753 (650)	-	-	-
		i=20/42/122/182	-	708 (80)	2213 (250)	4425 (500)	-	-	-
		i=5/7/10/14/20/42	-	-	-	-	9735 (1100)	-	-
		i=62	-	-	-	-	14159 (1600)	30973 (3500)[2]	-
		i=122/182	-	-	-	-	11505 (1300)	24779 (2800)[2]	-

[1] only available as M-Version.
[2] K-Version only 3-stage.

	Version		TP004[1]	TP010	TP025	TP050	TP110	TP300[2]	TP500[1]
n_{1Max}	M/S	1-stage	6000	6000	4500	4000	3500	-	-
		2-stage			6000	5000	4500	3000	3000
[rpm]	K	2-stage	-	6000	4500	4000	3500	-	-
		3-stage	-		6000	4500	4000	3000	-

[1] only available as M-Version.
[2] K-Version only 3-stage.

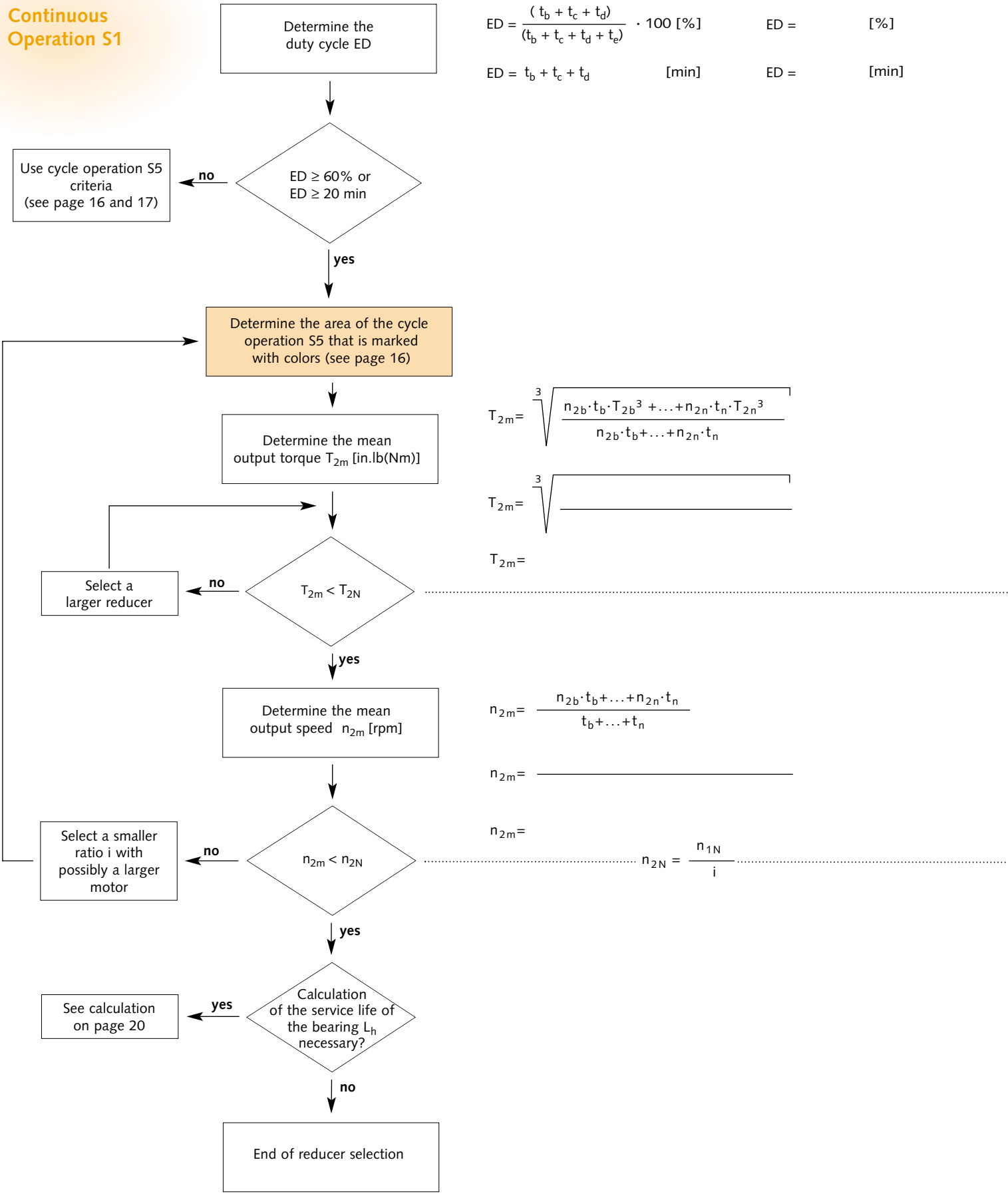
	Version		TP004[1]	TP010	TP025	TP050	TP110	TP300[2]	TP500[1]
T_{2Not}	M/S/K		885 (100)	2213 (250)	5531 (625)	11063 (1250)	24338 (2750)	77438 (8750)	132750 (15000)
in.lb(Nm)									

[1] only available as M-Version.
[2] K-Version only 3-stage.

Save time, let alpha do the sizing for you.
Call (847) 439-0700, and ask for our application engineering department.

Designation and index see page 19

Continuous Operation S1



$$ED = \frac{(t_b + t_c + t_d)}{(t_b + t_c + t_d + t_e)} \cdot 100\ [\%] \qquad ED = \qquad [\%]$$

$$ED = t_b + t_c + t_d \ [\text{min}] \qquad ED = \qquad [\text{min}]$$

$$T_{2m} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot T_{2b}^3 + \ldots + n_{2n} \cdot t_n \cdot T_{2n}^3}{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}}$$

$$T_{2m} = \sqrt[3]{\qquad\qquad}$$

$$T_{2m} =$$

$$n_{2m} = \frac{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}{t_b + \ldots + t_n}$$

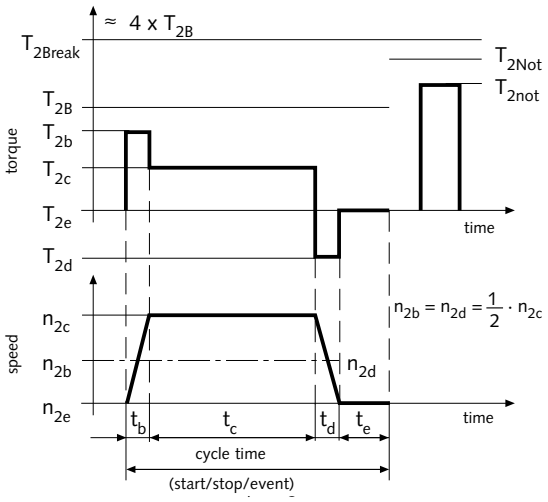
$$n_{2m} = \qquad\qquad$$

$$n_{2m} =$$

$$n_{2N} = \frac{n_{1N}}{i}$$

Save time, let alpha do the sizing for you.
Call (847) 439-0700, and ask for our application engineering department.

All usual loads at the output



For continuous operation applications, the nominal output torque and nominal input speeds must be kept within the specifications as listed in the tables below. If the gear reducer is loaded below or at the nominal torque T_{2n}, the gearing has sufficient fatigue strength. If the input speeds are lower than or equal to the nominal speed n_{1n} and the ambient conditions are nominal (20°C), the gear reducer temperature will not exceed 90°C.

1 in.lb = 0.113 Nm

Version			TP004[1]	TP010	TP025	TP050	TP110	TP300[1]	TP500[1]
T_{2N} [in.lb(Nm)]	M/S	i=5/7/31	221 (25)	443 (50)	1505 (170)	3275 (370)	-	-	-
		i=10/21/61/91	133 (15)	310 (35)	885 (100)	1947 (220)	-	-	-
		i=5/7/10/21	-	-	-	-	5664 (640)	-	-
		i=31	-	-	-	-	10886 (1230)	19470 (2200)	32745 (3700)
		i=61/91	-	-	-	-	6195 (700)	14160 (1600)	25665 (2900)
	K	i=5/7/10/14/62	-	443 (50)	1505 (170)	3275 (370)	-	-	-
		i=20/42/122/182	-	310 (35)	885 (100)	1947 (220)	-	-	-
		i=5/7/10/14/20/42	-	-	-	-	5664 (640)	-	-
		i=62	-	-	-	-	10886 (1230)	19470 (2200)	-
		i=122/182	-	-	-	-	6195 (700)	14160 (1600)	-

[1] only available as M-Version.

Version			TP004[1]	TP010	TP025	TP050	TP110	TP300[1]	TP500[1]
n_{1N} [rpm]	M	i=5/7	3000	2500	2000	1600	1100	-	-
		i=10	3500	3000	2500	2100	1600	-	-
		i=21/31	4500	3800	3100	2600	2100	1600	1300
		i=61	6000	4700	3700	3300	2600	1900	1500
		i=91	6000	5300	4500	4100	3300	2200	1800
	S	i=5/7	-	1300	1000	800	600	-	-
		i=10	-	1500	1300	1100	800	-	-
		i=21/31	-	1900	1600	1300	1100	-	-
		i=61	-	2400	1900	1700	1300	-	-
		i=91	-	2700	2300	2100	1700	-	-
	K	i=5/7	-	1600	1400	1000	700	-	-
		i=10/14/20	-	2300	1900	1500	1000	-	-
		i≥42	-	3300	3300	3300	2900	2400	-

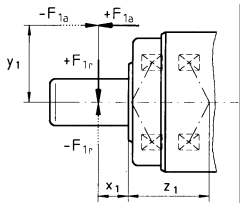
[1] only available as M-Version.

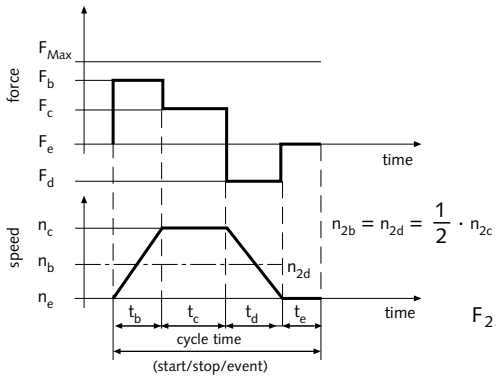
Nominal dimension range [in.(mm)] from - to	Tolerances H7	F7	h7	g6	k6
0.1181 - 0.2362 (3 - 6)	+0.00047 (+0.012) 0 (0)				
0.2362 - 0.3937 (6 - 10)	+0.00059 (+0.012) 0 (0)				+0.00039 (+0.010) +0.00004 (+0.001)
0.3937 - 0.7087 (10 - 18)	+0.00071 (+0.018) 0 (0)	+0.00134 (+0.034) +0.00063 (+0.016)			+0.00047 (+0.012) +0.00004 (+0.001)
0.7087 - 1.1811 (18 - 30)	+0.00083 (+0.021) 0 (0)	+0.00161 (+0.041) +0.00079 (+0.020)			+0.00059 (+0.015) +0.00008 (+0.002)
1.1811 - 1.9685 (30 - 50)	+0.00098 (+0.025) 0 (0)	+0.00197 (+0.050) +0.00098 (+0.025)			+0.00071 (+0.018) +0.00008 (+0.002)
1.9685 - 3.1496 (50 - 80)	+0.00118 (+0.030) 0 (0)		0 (0) -0.00118 (-0.030)		
3.1496 - 4.7244 (80 - 120)			0 (0) -0.00138 (-0.035)	-0.00047 (-0.012) -0.00134 (-0.034)	
4.7244 - 7.0866 (120 - 180)			0 (0) -0.00157 (-0.040)	-0.00055 (-0.014) -0.00154 (-0.039)	
7.0866 - 9.8425 (180 - 250)			0 (0) -0.00181 (-0.046)	-0.00059 (-0.015) -0.00173 (-0.044)	
9.8425 - 12.4016 (250 - 315)			0 (0) -0.00205 (-0.052)		

Symbol	Unit	Designation
C	in.lb(Nm)/arcmin	rigidity
ED	%	duty cycle
F	lb_f(N)	force
f_s	-	shock factor
i	-	ratio
j	arcmin	backlash
K1	in.lb(Nm)	bearing calculation factor
L	h	service life
M	in.lb(Nm)	moment
n	rpm	speed
p	-	bearing calculation exponent
η	%	efficiency
t	s	time
T	in.lb(Nm)	torque
x	in.(mm)	distance of the radial load from the shaft collar
y	in.(mm)	distance of the axial load from the center of the gear reducer
z	in.(mm)	constant
Z	1/h	number of cycles per hour

Index	
capital letters	permissible values
small letters	actual values
1	input
2	output
A/a	axial
B/b	acceleration
Break	break
c	constant
d	delay
e	pause
h	hours
K/k	tilt
m	mean
Max/max	maximum
Mot	motor
N	nominal
Not/not	emergency stop
0	no-load running
R/r	radial
t	torsional

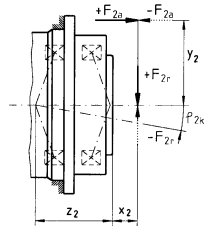
Input (S - Version)





$$n_{2b} = n_{2d} = \frac{1}{2} \cdot n_{2c}$$

Output (M/S/K - Version)



$$F_{1am} = \sqrt[3]{\frac{n_{1b} \cdot t_b \cdot F_{1ab}^3 + \ldots + n_{1n} \cdot t_n \cdot F_{1an}^3}{n_{1b} \cdot t_b + \ldots + n_{1n} \cdot t_n}}$$

$$F_{1rm} = \sqrt[3]{\frac{n_{1b} \cdot t_b \cdot F_{1rb}^3 + \ldots + n_{1n} \cdot t_n \cdot F_{1rn}^3}{n_{1b} \cdot t_b + \ldots + n_{1n} \cdot t_n}}$$

$$F_{2am} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot F_{2ab}^3 + \ldots + n_{2n} \cdot t_n \cdot F_{2an}^3}{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}}$$

$$F_{2rm} = \sqrt[3]{\frac{n_{2b} \cdot t_b \cdot F_{2rb}^3 + \ldots + n_{2n} \cdot t_n \cdot F_{2rn}^3}{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}}$$

Determine the mean axial and radial force F_{am}, F_{rm} [lb_f(N)]

TP10 TP25 2-stage: $\frac{F_{1am}}{F_{1rm}} \le 0.37$ and $\frac{F_{1am}}{F_{1rm}} \le 1.14$, $x_1 > 0$

TP04 -TP25: $\frac{F_{2am}}{F_{2rm}} \le 1.14$

TP50 -TP500: $\frac{F_{2am}}{F_{2rm}} \le 0.37$, $x_2 > 0$

no → Consult alpha!

yes

Conversion Table:

1 in.lb	= 0.113 Nm
1 lb_f	= 4.44 N
1 in.	= 25.4 mm

Determine the mean tilting moment M_{km} [in.lb(Nm)]

$$M_{1km} = \frac{F_{1am} \cdot y_1 + F_{1rm} \cdot (x_1 + z_1)}{1000}$$

$$M_{2km} = \frac{F_{2am} \cdot y_2 + F_{2rm} \cdot (x_2 + z_2)}{1000}$$

S-Version		TP010	TP025	TP050	TP110
z_1[in.(mm)]	1-stage	1.4567 (37)	1.6240 (41.25)	1.8996 (48.25)	2.3524 (59.75)
	2-stage	1.4094 (35.8)	1.4961 (38)	1.4567 (37)	1.6240 (41.25)

	Version	TP004	TP010	TP025	TP050	TP110	TP300	TP500
z_2 [in.(mm)]	M/S/K	2.0394 (51.8)	2.7992 (71.1)	3.4724 (88.2)	3.0157 (76.6)	3.9134 (99.4)	5.2795 (134.1)	6.0157 (152.8)

Determine the maximum tilting moment M_{kmax} [in.lb(Nm)]

$$M_{1kmax} = \frac{F_{1amax} \cdot y_1 + F_{1rmax} \cdot (x_1 + z_1)}{1000}$$

$$M_{2kmax} = \frac{F_{2amax} \cdot y_2 + F_{2rmax} \cdot (x_2 + z_2)}{1000}$$

$M_{kmax} \le M_{KMax}$, $F_{amax} \le F_{AMax}$

no → Select a larger reducer (Gear reducer selection)

	Version	TP004	TP010	TP025	TP050	TP110	TP300	TP500
M_{2KMax} [in.lb(Nm)]	M/S/K	805 (91)	2080 (235)	3655 (413)	11461 (1295)	27116 (3064)	52215 (5900)	77880 (8800)
F_{2AMax} [lb_f(N)]	M/S/K	367 (1630)	484 (2150)	934 (4150)	1379 (6130)	2261 (10050)	7425 (33000)	11250 (50000)

yes

S-Version		TP010	TP025	TP050	TP110
M_{1KMax} [in.lb(Nm)]	1-stage	584 (66)	1000 (113)	2053 (232)	4018 (454)
	2-stage	204 (23)	230 (26)	584 (66)	1000 (113)
F_{1AMax} [lb_f(N)]	1-stage	259 (1150)	360 (1600)	608 (2700)	1058 (4700)
	2-stage	203 (900)	214 (950)	259 (1150)	360 (1600)

Determine the mean speed n_m [rpm]

$$n_{2m} = \frac{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}{t_b + \ldots + t_n}$$

Determine the mean service life L_h [h]

$$n_{1m} = \frac{n_{1b} \cdot t_b + \ldots + n_{1n} \cdot t_n}{t_b + \ldots + t_n}$$

$$L_{h2} = \frac{16666}{n_{2m}} \cdot \left[\frac{K1_2}{M_{2km}}\right]^{p_2}$$

$$L_{h1} = \frac{16666}{n_{1m}} \cdot \left[\frac{K1_1}{M_{1km}}\right]^{p_1}$$

	Version	TP004	TP010	TP025	TP050	TP110	TP300	TP500
p_2	M/S/K	3	3	3	3.33	3.33	3.33	3.33
$K1_2$ [in.lb(Nm)]	M/S/K	3363 (380)	8708 (984)	15333 (1732.5)	34294 (3875)	81128 (9167)	99863 (11284)	145264 (16414)

Enough life time L_h?

no → Select a larger reducer (Gear reducer selection)

S-Version		TP010	TP025	TP050	TP110
p_1	1-stage	3.33	3.33	3.33	3.33
	2-stage	3	3	3.33	3.33
$K1_1$	1-stage	4929 (557)	8341 (942.5)	16727 (1890)	31860 (3600)
[in.lb(Nm)]	2-stage	1938 (219)	2407 (272)	4929 (557)	8341 (942.5)

yes

Calculation of the tilting angle necessary?

no → End of the bearing service life calculation L_h

yes

$$\varphi_{2kmax} = \frac{M_{2kmax}}{C_{2K}}$$

	Version	TP004	TP010	TP025	TP050	TP110	TP300	TP500
C_{2K} in.lb(Nm)/arcmin	M/S/K	-	1991 (225)	4868 (550)	4956 (560)	12850 (1452)	49206 (5560)	83898 (9480)

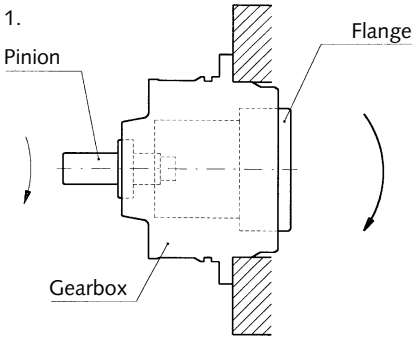
Determine the tilting angle φ_{kmax}

Designations and index see page 19

Possible Operation Modes:

The input pinion, output flange or gearbox housing of the TP-gear reducer can be used as the output or fixed in a TP-gear reducer.
The following diagram illustrates the resulting seven different modes of operation and the corresponding formulae for determining the transmission ratios.
Please observe that depending on the mounting version the permissible speeds and torques will change. Please contact alpha.

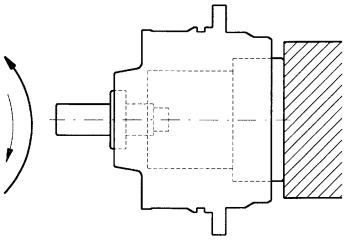
1.



Input: Pinion
Output: Flange
Fixed: Gearbox

$i_1 = i$

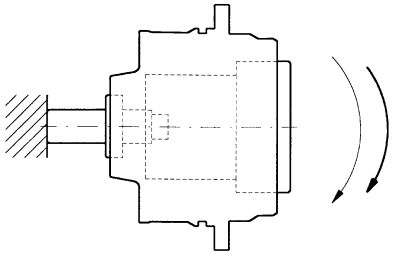
2.



Input: Pinion
Output: Gearbox
Fixed: Flange

$i_2 = - (i - 1)$

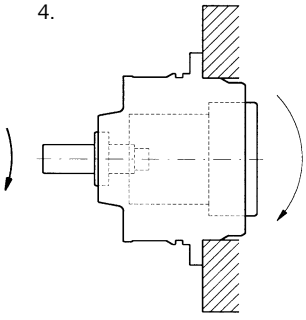
3.



Input: Gearbox
Output: Flange
Fixed: Pinion

$i_3 = \frac{i}{i - 1}$

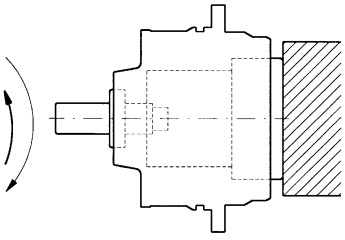
4.



Input: Flange
Output: Pinion
Fixed: Gearbox

$i_4 = \frac{1}{i}$

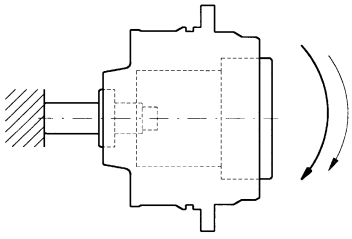
5.



Input: Gearbox
Output: Pinion
Fixed: Flange

$i_5 = - \frac{1}{i - 1}$

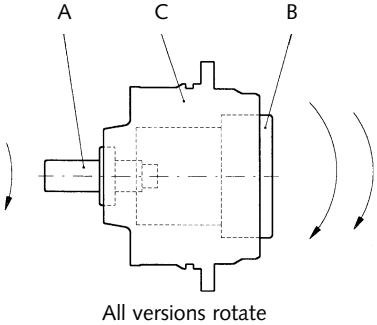
6.



Input: Flange
Output: Gearbox
Fixed: Pinion

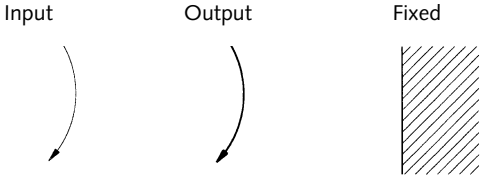
$i_6 = \frac{i - 1}{i}$

7. Differential and Variable- speed gear



All versions rotate
$n_A - i \cdot n_B - (1 - i) \cdot n_C = 0$

n_A : Pinion speed
n_B : Flange speed
n_C : Gearbox speed



i : Ratio
i_{1-6} : Ratio for the particular application

Ordering Code

TP 010 - MF2 - 61 - 021/Motor - V3

Gear Reducer Type
TP 004 / TP 010 / 025 / 050 / 110 / 300 / 500

Reducer Design
M = Motor-mounted "M"
E = Integrated "E"
S = Self-contained "S"
TP 004 / TP 300 / TP 500 only "M"

Reducer Execution
F = Standard
FPM seals (Viton®)
X = Customized

Number of Stages
1 = 1-stage
2 = 2-stage

Ratio i
TP 004 - TP 110: 1-stage = 5 / 7 / 10
2-stage = 21 / 31 / 61 / 91
TP 300 + TP 500: 2-stage = 31 / 61 / 91

Mounting Position (see below)

Motor Designation
(Manufacturer-Type)
isn't necessary for E- and S-versions

Backlash
1 = Standard
0 = Reduced

Clamping hub bore Diameter
M-version: Code number - see table below
E-version: 0 = only input pinion
S-version: 0 = smooth input shaft
1 = keyed input shaft

Type of Output flange
0 = Standard
4 = Customized

Code Number - Clamping hub bore diameter (TP)

1 in. = 25.4 mm

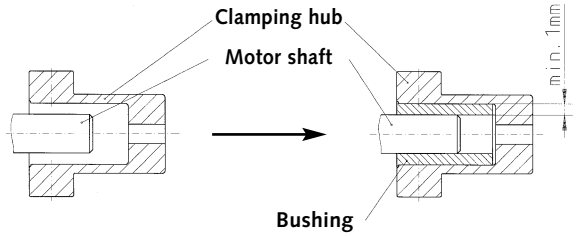
Gear stages	1	2	1	2	1	2	1	2	1	2	2	2
Motor shaft-Ø [in.(mm)]*	TP 004		TP 010		TP 025		TP 050		TP 110		TP 300	TP 500
0.3937 (10)	x	x	x	1	x	x	x	x	x	x	x	x
0.4331 (11)	1	1	2	2	x	2	x	1	x	x	x	x
0.5512 (14)	2	-	3	3	3	3	x	2	x	1	x	x
0.7480 (19)	-	-	4	-	4	4	3	3	x	2	x	x
0.9449 (24)	-	-	-	-	5	-	4	4	x	3	x	x
1.1024 (28)	-	-	-	-	6	-	x	-	x	4	x	x
1.2598 (32)	-	-	-	-	7	-	5	5	5	x	x	x
1.3780 (35)	-	-	-	-	-	-	6	-	x	6	1	x
1.4961 (38)	-	-	-	-	-	-	7	-	7	7	-	x
1.8898 (48)	-	-	-	-	-	-	-	-	8	-	-	1

* If your motor shaft diameter is not listed, add 2mm to diameter and select next higher size.

- = choose next larger gear reducer
x = choose next larger code number

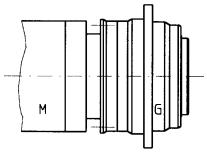
Bushing

If the motor shaft and the clamping hub diameter do not fit together . . .

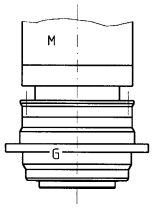


. . . a bushing is used.

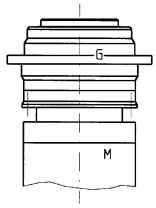
Mounting Position



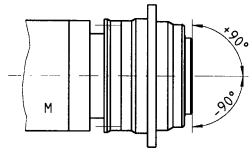
B5-horizontal



V1-vertical, with output flange facing downwards



V3-vertical, with output flange facing upwards



S-can be pivoted ± 90° from the horizontal

M = Motor
G = Gear reducer

Ordering Code

TPK 010 - MF2 - 20 - 021/Motor - V3/B5

Gear Reducer Type
TPK 010 / 025 / 050 / 110 / 300

Reducer Design
M = Motor-mounted "M"

Reducer Execution
F = Standard
FPM seals (Viton®)
X = Customized

Stages
2 = 2-stage
3 = 3-stage
TPK 300 only 3-stage

Ratio i
2-stage = 5 / 7 / 10 / 14 / 20
3-stage = 42 / 62 / 122 / 182
TPK 300 not available with i = 42

Type of Output flange
0 = Standard
4 = Customized

Clamping hub bore Diameter
Code numbers - see table below

Backlash
1 = Standard ≤ 4 arcmin
0 = Reduced ≤ 2 arcmin

Motor Designation
(Manufacturer-Type)

Mounting Position (see below)

Code Number - Clamping hub bore diameter (TPK)

1 in. = 25.4 mm

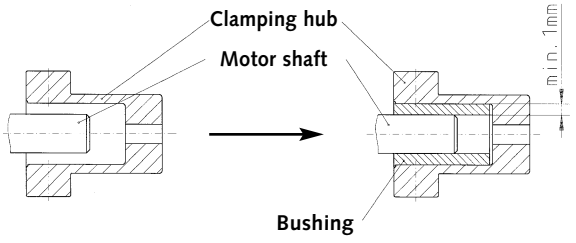
Gear stages	2	3	2	3	2	3	2	3	3
Motor shaft-Ø [in.(mm)]*	TPK 010		TPK 025		TPK 050		TPK 110		TPK 300
0.5512 (14)	x	3	x	3	x	x	x	x	x
0.7480 (19)	4	-	x	-	x	3	x	x	x
1.1024 (28)	-	-	6	-	x	-	x	4	x
1.3780 (35)	-	-	-	-	6	-	x	-	5
1.8898 (48)	-	-	-	-	-	-	8	-	-

* If your motor shaft diameter is not listed, add 2mm to diameter and select next higher size.

- = choose next larger gear reducer
x = choose next larger code number

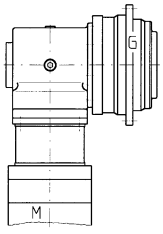
Bushing

If the motor shaft- and the clamping hub diameter do not fit together . . .

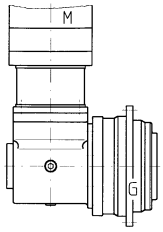


. . . a bushing is used.

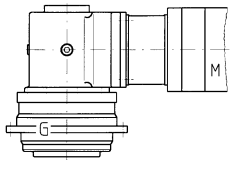
Mounting Position



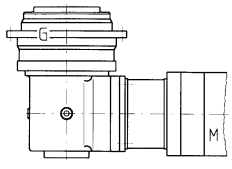
B5/V3-Output flange horizontal, Motor shaft facing upwards



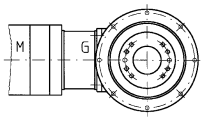
B5/V1-Output flange horizontal, Motor shaft facing downwards



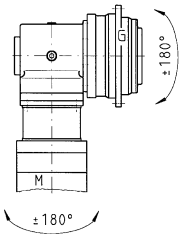
V1/B5-Output flange facing downwards, Motor shaft horizontal



V3/B5-Output flange facing upwards, Motor shaft horizontal



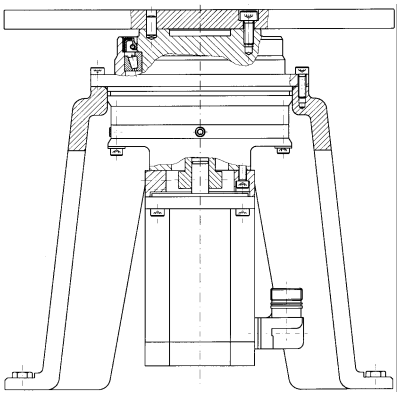
B5/B5-Output flange and motor shaft horizontal



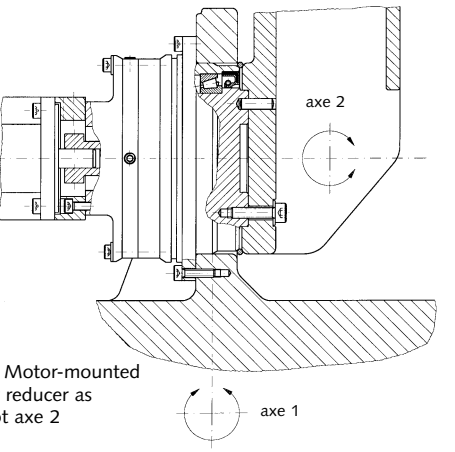
S-can be pivoted 360°

M = Motor
G = Gear reducer

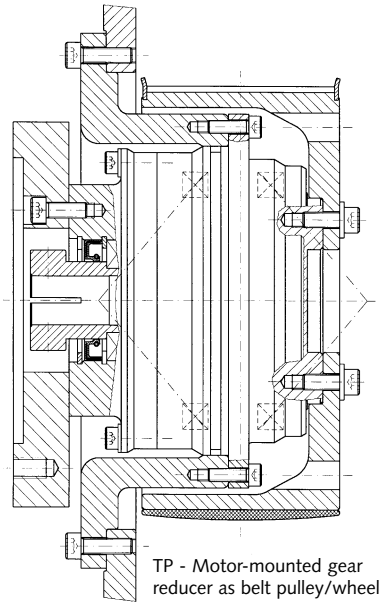
Installation Examples



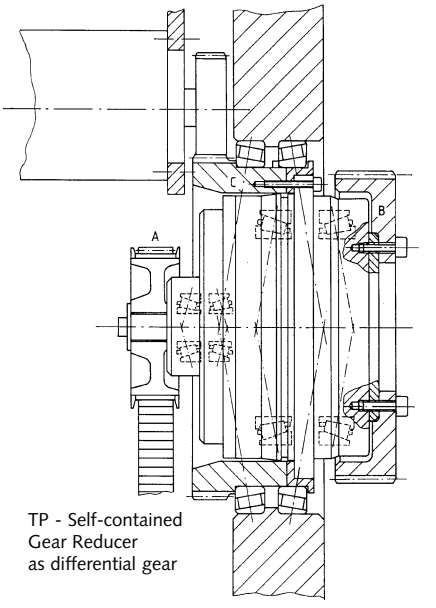
TP - Motor-mounted gear reducer as turnable



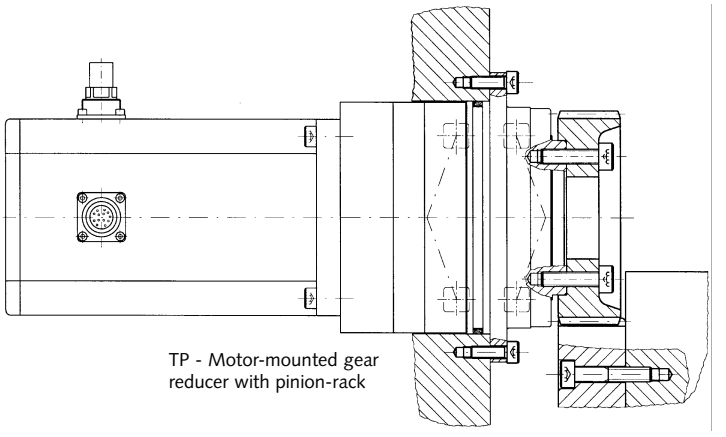
TP - Motor-mounted gear reducer as robot axe 2



TP - Motor-mounted gear reducer as belt pulley/wheel drive



TP - Self-contained Gear Reducer as differential gear



TP - Motor-mounted gear reducer with pinion-rack