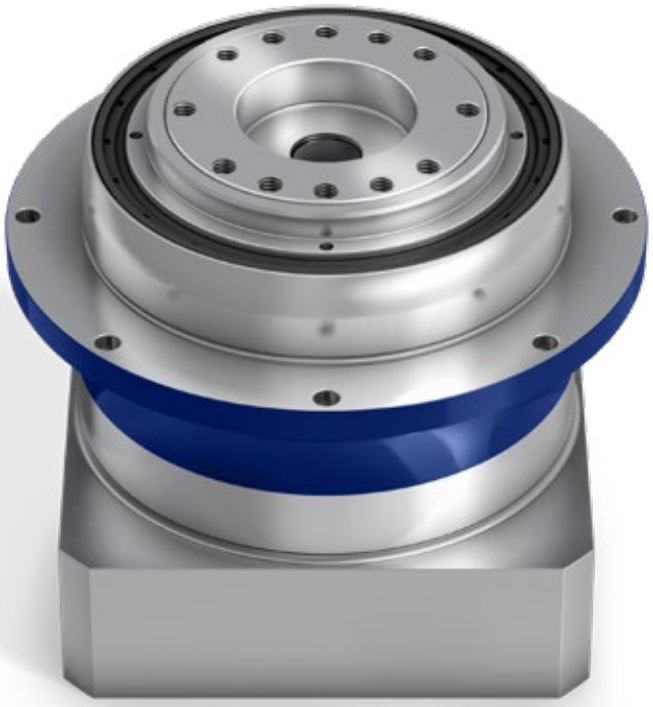
TP+ / TP+ HIGH TORQUE – Compact precision



TP+

Compact top performers with output flange. The standard version is ideally suited for high positioning accuracy and highly dynamic cyclic operation. The TP+ HIGH TORQUE is particularly appropriate for high-precision applications in which high torsional rigidity is required.

Product highlights

Max. torsional backlash [arcmin] ≤ 1 – 4

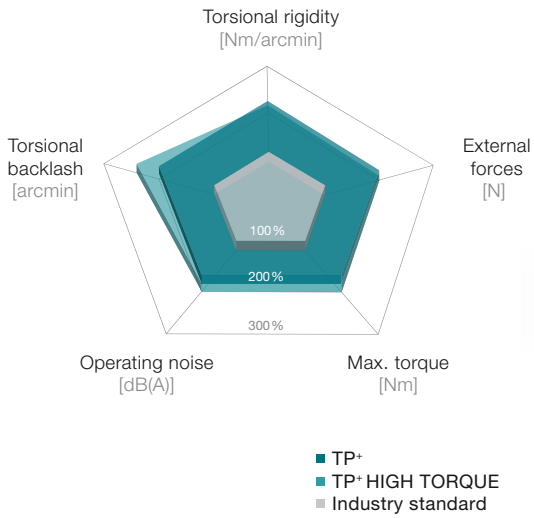
High torsional rigidity

Space-saving design

Flexible drive options
Clamping hub socket, optimized mass inertia, keyed clamping hub socket

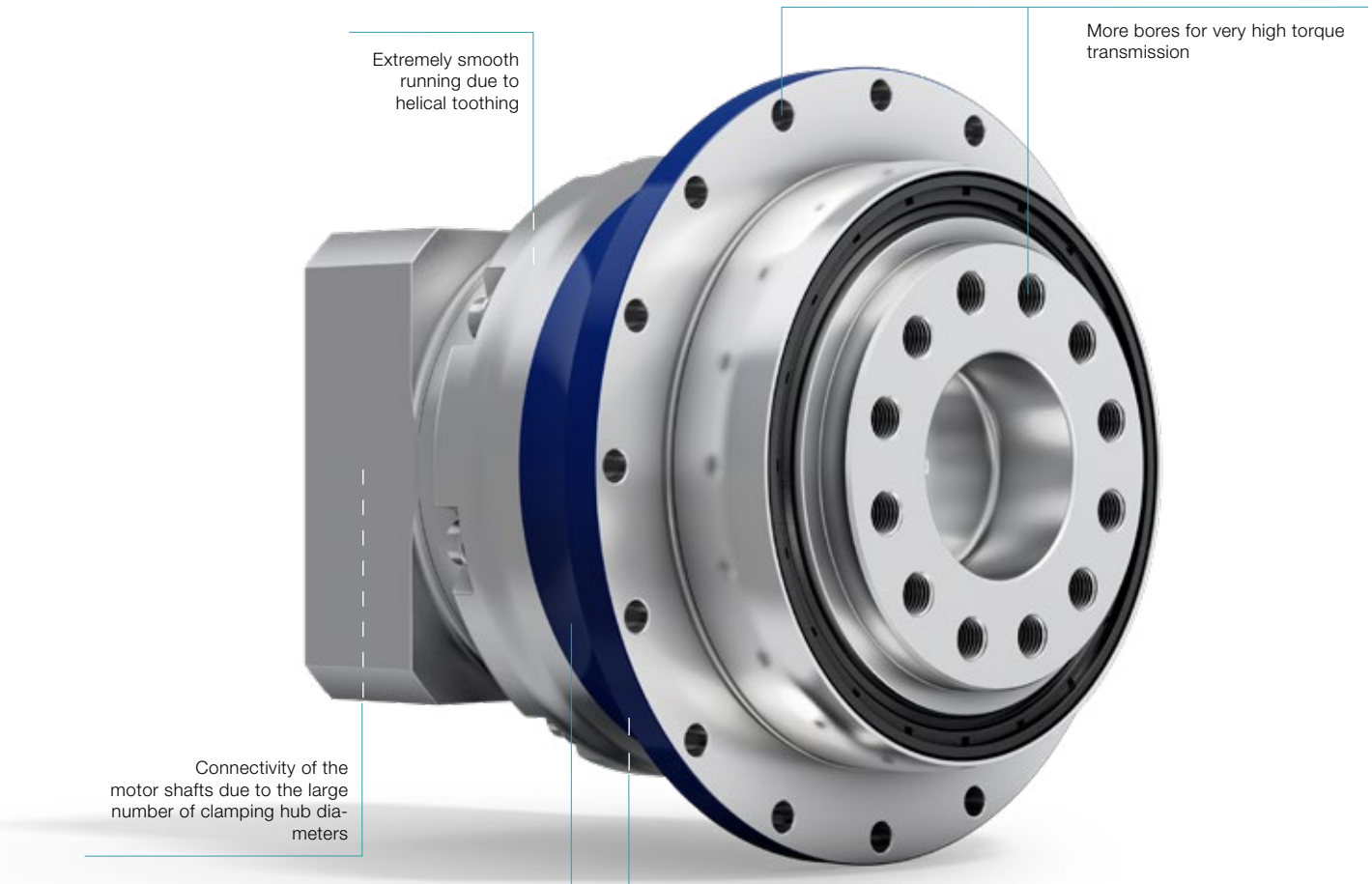
Other gearbox models
Corrosion resistant design, food-grade lubrication

TP+ compared to the industry standard

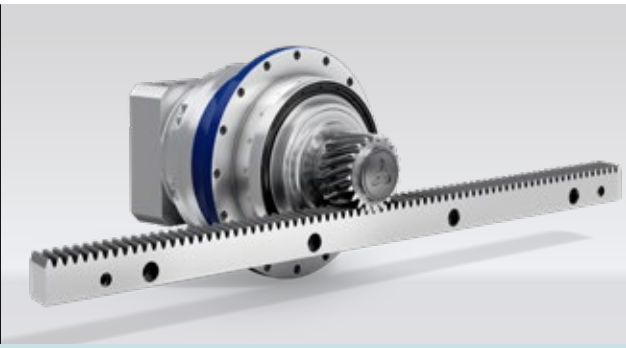


TP+ 2000 / 4000

TP+ in corrosion resistant design



TP⁺ HIGH TORQUE



TP⁺ HIGH TORQUE with rack and pinion

premo® TP Line

				1-stage				
Ratio			*i*	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b)]			*Nm*	83	83	83	56	56
			in.lb	735	735	735	496	496
Max. acceleration torque [b)] (max. 1000 cycles per hour)			*Nm*	66	66	66	42	42
			in.lb	584	584	584	372	372
Nominal torque (at n_{1N})			*Nm*	27	27	26	26	27
			in.lb	239	236	226	230	237
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			*Nm*	100	100	100	100	100
			in.lb	885	885	885	885	885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			*rpm*	3300	3300	4000	4000	4000
Max. input speed			*rpm*	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			*Nm*	0.56	0.48	0.37	0.37	0.31
			in.lb	5.0	4.2	3.3	3.3	2.7
Max. backlash			*arcmin*	Standard ≤ 4 / Reduced ≤ 2				
Torsional rigidity [b)]			*Nm/arcmin*	12	12	11	8	8
			in.lb/arcmin	106	106	97	71	71
Tilting rigidity			*Nm/arcmin*	85				
			in.lb/arcmin	752				
Max. axial force [c)]			*N*	2119				
			lb$_f$	477				
Max. tilting moment			*Nm*	110				
			in.lb	974				
Efficiency at full load			*η*	%	97			
Service life			*h*	> 20000				
Weight (incl. standard adapter plate)			*kg*	1.4				
			lb$_m$	3.1				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			*dB(A)*	≤ 55				
Max. permitted housing temperature			*°C*	+90				
			F	194				
Ambient temperature			*°C*	–15 to +40				
			F	5 to 104				
Lubrication				Lubricated for life				
Direction of rotation				In- and output same direction				
Protection class				IP 65				
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BCT-00015AAX-031.500				
Bore diameter of coupling on the application side			*mm*	X = 012.000 - 028.000				
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	B	11	J_1	*kgcm²*	0.17	0.14	0.11	0.11	0.09
				10^{-3} in.lb.s²	0.15	0.12	0.10	0.10	0.08
	C	14	J_1	*kgcm²*	0.25	0.21	0.18	0.18	0.17
				10^{-3} in.lb.s²	0.22	0.19	0.16	0.16	0.15
	E	19	J_1	*kgcm²*	0.57	0.54	0.51	0.51	0.49
				10^{-3} in.lb.s²	0.50	0.48	0.45	0.45	0.43

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

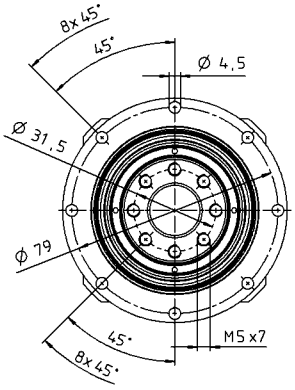
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

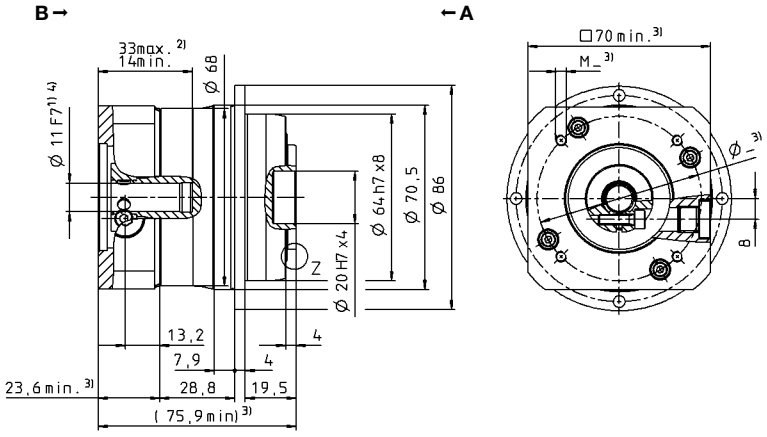
View A | View B

1-stage

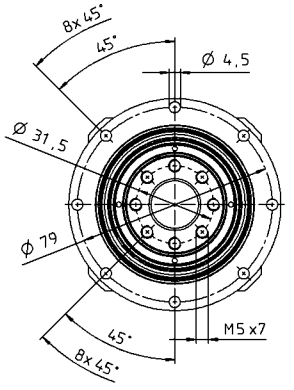
Motor shaft diameter [mm]

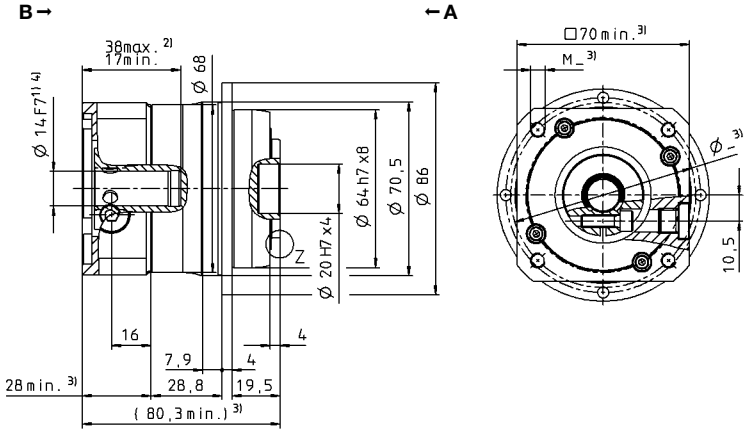
up to 11 [4] (B) clamping hub diameter



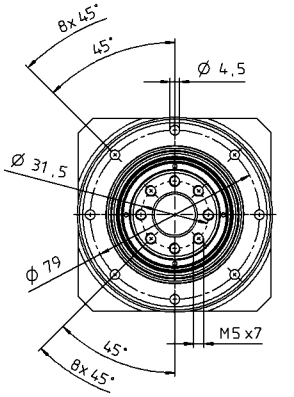


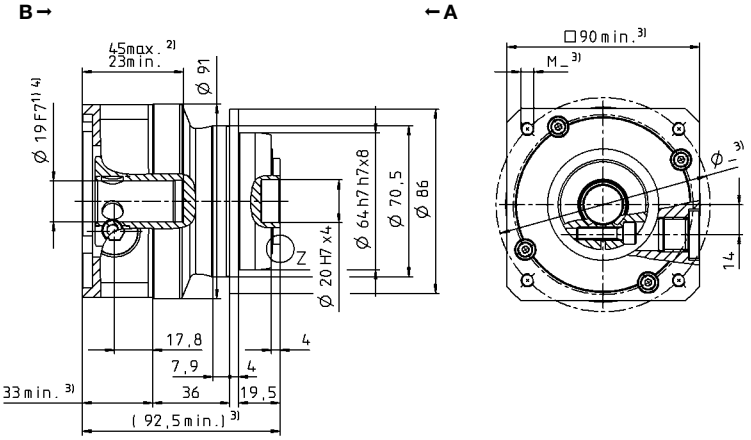
up to 14 [4] (C) [5] clamping hub diameter

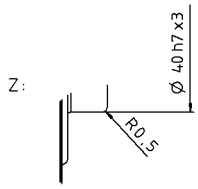




up to 19 [4] (E) clamping hub diameter







Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage														
Ratio			*i*	**16**	**20**	**21**	**25**	**28**	**31**	**32**	**35**	**40**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]			T_{2a}	*Nm*	57	57	60	72	57	50	57	72	57	72	49	48	56	43	48
				in.lb	507	507	533	634	507	442	507	634	507	634	435	423	499	385	423
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	57	57	48	66	57	48	57	66	57	66	49	42	56	38	42
				in.lb	507	507	425	584	504	425	507	584	507	584	434	372	496	336	372
Nominal torque (at n_{1N})			T_{2N}	*Nm*	39	41	32	41	45	36	39	45	46	48	39	34	45	31	34
				in.lb	342	365	286	361	403	320	343	399	406	421	341	297	399	272	297
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	100	100	100	100	100	100	100	100	100	100	100	100	100	100	100
				in.lb	885	885	885	885	885	885	885	885	885	885	885	885	885	885	885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	4000	4000	4000	4000	4000	4000	4000	4000	4000	4800	5500	4800	5500	5500	5500
Max. input speed			n_{1Max}	*rpm*	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	0.28	0.23	0.24	0.22	0.21	0.22	0.21	0.17	0.18	0.17	0.16	0.17	0.17	0.15	0.16
				in.lb	2.5	2.0	2.1	1.9	1.9	1.9	1.9	1.5	1.6	1.5	1.4	1.5	1.5	1.3	1.4
Max. backlash			j_t	*arcmin*	Standard ≤ 4 / Reduced ≤ 2														
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	12	12	10	12	12	9	12	12	11	12	9	12	11	7	8
				in.lb/arcmin	106	106	89	106	106	80	106	106	97	106	80	106	97	62	71
Tilting rigidity			C_{2K}	*Nm/arcmin*	85														
				in.lb/arcmin	752														
Max. axial force [c)]			F_{2AMax}	*N*	2119														
				lb$_f$	477														
Max. tilting moment			M_{2KMax}	*Nm*	110														
				in.lb	974														
Efficiency at full load			η	%	94														
Service life			L_h	*h*	> 20000														
Weight (incl. standard adapter plate)			*m*	*kg*	1.5														
				lb$_m$	3.3														
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 54														
Max. permitted housing temperature				*°C*	+90														
				F	194														
Ambient temperature				*°C*	–15 to +40														
				F	5 to 104														
Lubrication					Lubricated for life														
Direction of rotation					In- and output same direction														
Protection class					IP 65														
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00015AAX-031.500														
Bore diameter of coupling on the application side				*mm*	X = 012.000 - 028.000														
Mass moment of inertia (relates to the drive)	B	11	J_1	*kgcm²*	0.078	0.070	0.074	0.068	0.062	0.072	0.062	0.061	0.057	0.057	0.058	0.060	0.056	0.057	0.056
				10^{-3} in.lb.s²	0.069	0.062	0.065	0.060	0.055	0.064	0.055	0.054	0.050	0.050	0.051	0.053	0.050	0.050	0.050
Clamping hub diameter [mm]																			
Optimized mass inertia version available on request	C	14	J_1	*kgcm²*	0.17	0.17	0.17	0.16	0.16	0.17	0.16	0.16	0.15	0.15	0.15	0.16	0.15	0.15	0.15
				10^{-3} in.lb.s²	0.15	0.15	0.15	0.15	0.14	0.15	0.14	0.14	0.14	0.14	0.14	0.14	0.13	0.14	0.13

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

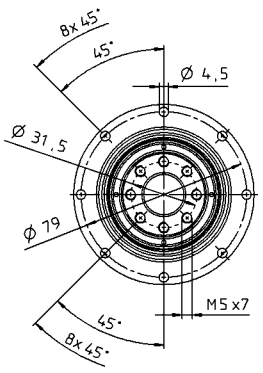
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

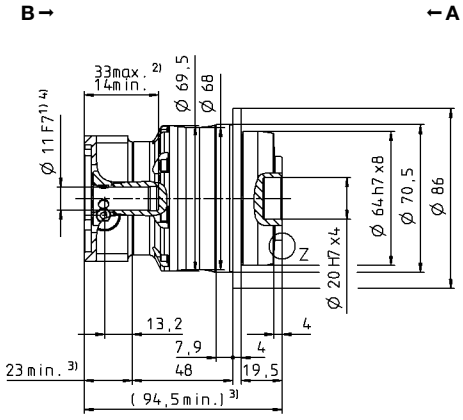
View A | View B

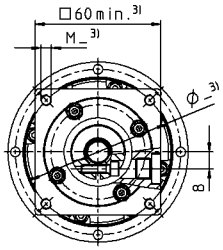
2-stage

Motor shaft diameter [mm]

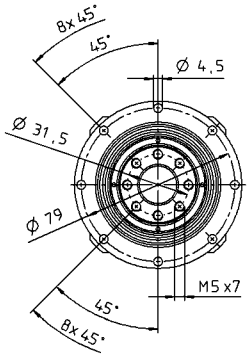
up to 11 [4] (B) [5] clamping hub diameter

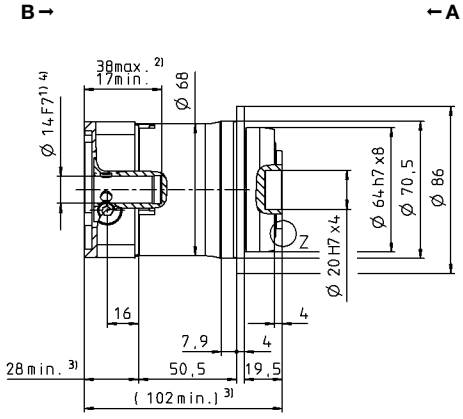


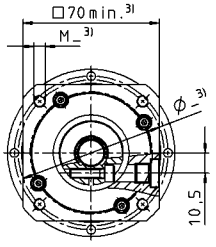


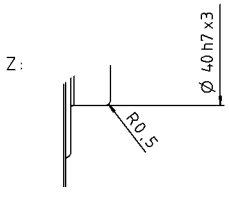


up to 14 [4] (C) clamping hub diameter









Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				1-stage				
Ratio			*i*	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b)]			T_{2a}	*Nm*	185	210	210	168	168
				in.lb	1640	1859	1859	1487	1487
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	172	172	172	126	126
				in.lb	1522	1522	1522	1115	1115
Nominal torque (at n_{1N})			T_{2N}	*Nm*	84	81	81	80	81
				in.lb	743	716	719	712	720
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	250	250	251	251	251
				in.lb	2213	2213	2222	2222	2222
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2600	2900	3100	3100	3100
Max. input speed			n_{1Max}	*rpm*	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	1.3	1.1	0.84	0.84	0.64
				in.lb	12	9.5	7.4	7.4	5.7
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	32	33	30	23	23
				in.lb/arcmin	283	292	266	204	204
Tilting rigidity			C_{2K}	*Nm/arcmin*	225				
				in.lb/arcmin	1991				
Max. axial force [c)]			F_{2AMax}	*N*	2795				
				lb_f	629				
Max. tilting moment			M_{2KMax}	*Nm*	270				
				in.lb	2390				
Efficiency at full load			η	%	97				
Service life			L_h	*h*	> 20000				
Weight (incl. standard adapter plate)			*m*	*kg*	3.8				
				lb_m	8.4				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 57				
Max. permitted housing temperature				*°C*	+90				
				F	194				
Ambient temperature				*°C*	–15 to +40				
				F	5 to 104				
Lubrication					Lubricated for life				
Direction of rotation					In- and output same direction				
Protection class					IP 65				
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00060AAX-050.000				
Bore diameter of coupling on the application side				*mm*	X = 014.000 - 035.000				
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	C	14	J_1	*kgcm²*	0.78	0.62	0.48	0.48	0.40
				10^{-3} *in.lb.s²*	0.69	0.55	0.42	0.42	0.35
	E	19	J_1	*kgcm²*	0.95	0.79	0.64	0.64	0.57
				10^{-3} *in.lb.s²*	0.84	0.70	0.57	0.57	0.50
	G	24	J_1	*kgcm²*	2.32	2.16	2.02	2.02	1.94
				10^{-3} *in.lb.s²*	2.05	1.91	1.79	1.79	1.72

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

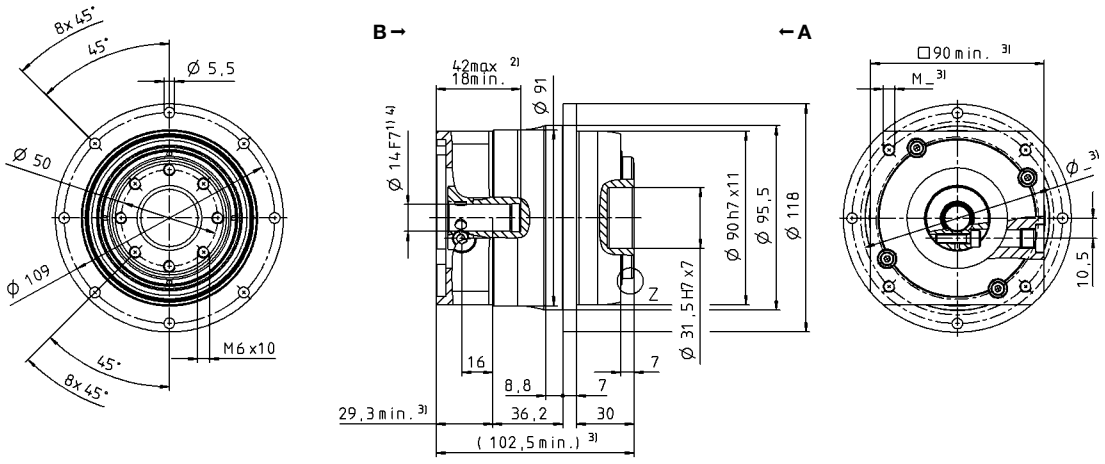
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

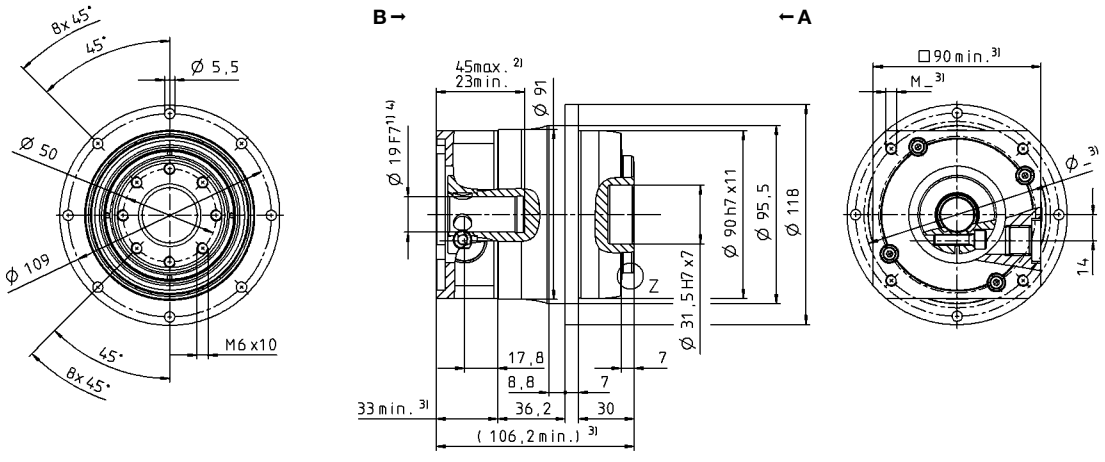
1-stage

Motor shaft diameter [mm]

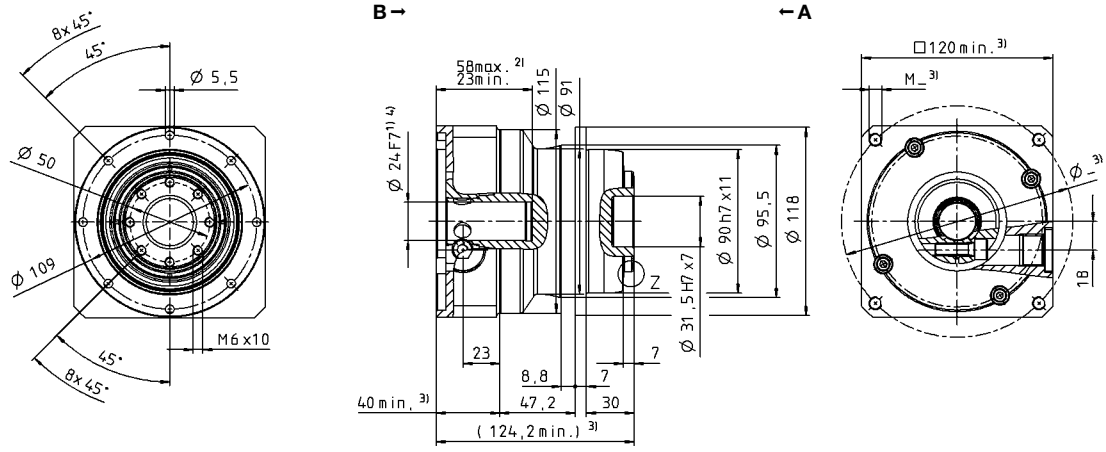
up to 14 [4] (C) clamping hub diameter

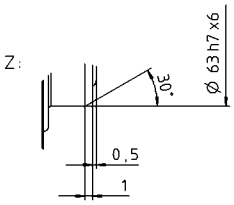


up to 19 [4] (E) [5] clamping hub diameter



up to 24 [4] (G) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage														
Ratio			*i*	**16**	**20**	**21**	**25**	**28**	**31**	**32**	**35**	**40**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]			T_{2a} *Nm*	157	126	133	158	157	121	157	158	154	158	121	105	157	96	105
			in.lb	1392	1118	1174	1398	1392	1071	1392	1398	1363	1398	1071	932	1392	848	932
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B} *Nm*	157	126	120	158	157	121	157	158	154	158	121	105	157	96	105
			in.lb	1392	1118	1062	1398	1392	1071	1392	1398	1363	1398	1071	932	1392	848	932
Nominal torque (at n_{1N})			T_{2N} *Nm*	106	101	96	124	107	87	119	126	112	126	97	84	126	77	84
			in.lb	935	895	850	1097	945	770	1053	1118	987	1118	857	746	1114	678	746
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not} *Nm*	251	251	251	251	251	251	251	251	251	251	251	251	251	251	251
			in.lb	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222	2222
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N} *rpm*	3500	3500	3500	3500	3500	3500	3500	3500	3500	3800	4500	3800	4500	4500	4500
Max. input speed			n_{1Max} *rpm*	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012} *Nm*	0.56	0.48	0.47	0.44	0.40	0.40	0.40	0.28	0.32	0.32	0.23	0.32	0.24	0.24	0.25
			in.lb	5.0	4.2	4.2	3.9	3.5	3.5	3.5	2.5	2.8	2.8	2.0	2.8	2.1	2.1	2.2
Max. backlash			j_t *arcmin*	Standard ≤ 3 / Reduced ≤ 1														
Torsional rigidity [b)]			C_{t21} *Nm/arcmin*	32	32	26	32	31	24	31	32	30	30	24	30	28	21	22
			in.lb/arcmin	283	283	230	283	274	212	274	283	266	266	212	266	248	186	195
Tilting rigidity			C_{2K} *Nm/arcmin*	225														
			in.lb/arcmin	1991														
Max. axial force [c)]			F_{2AMax} *N*	2795														
			lb$_f$	629														
Max. tilting moment			M_{2KMax} *Nm*	270														
			in.lb	2390														
Efficiency at full load			η *%*	94														
Service life			L_h *h*	> 20000														
Weight (incl. standard adapter plate)			*m* *kg*	3.6														
			lb$_m$	8.0														
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA} *dB(A)*	≤ 55														
Max. permitted housing temperature			*°C*	+90														
			F	194														
Ambient temperature			*°C*	–15 to +40														
			F	5 to 104														
Lubrication				Lubricated for life														
Direction of rotation				In- and output same direction														
Protection class				IP 65														
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BCT-00060AAX-050.000														
Bore diameter of coupling on the application side			*mm*	X = 014.000 - 035.000														
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	B	11	J_1 *kgcm²*	0.17	0.14	0.15	0.13	0.11	0.14	0.11	0.10	0.09	0.09	0.09	0.10	0.09	0.09	0.09
			10⁻³ in.lb.s²	0.15	0.12	0.13	0.12	0.10	0.12	0.10	0.09	0.08	0.08	0.08	0.09	0.08	0.08	0.08
	C	14	J_1 *kgcm²*	0.24	0.21	0.22	0.20	0.18	0.21	0.18	0.18	0.17	0.17	0.17	0.17	0.16	0.17	0.16
			10⁻³ in.lb.s²	0.21	0.19	0.20	0.18	0.16	0.18	0.16	0.16	0.15	0.15	0.15	0.15	0.15	0.15	0.14
	E	19	J_1 *kgcm²*	0.56	0.53	0.55	0.53	0.51	0.53	0.51	0.50	0.49	0.49	0.49	0.52	0.49	0.49	0.49
			10⁻³ in.lb.s²	0.50	0.47	0.48	0.47	0.45	0.47	0.45	0.44	0.43	0.43	0.43	0.46	0.43	0.43	0.43

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

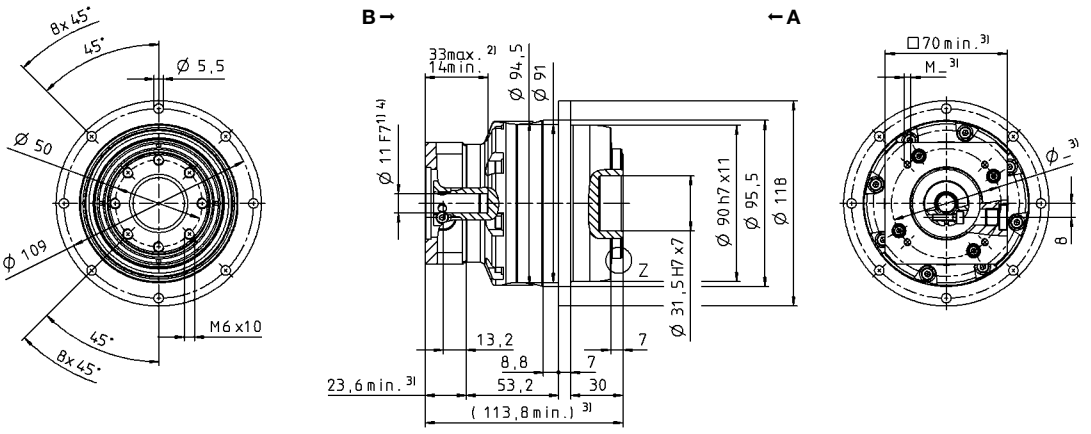
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

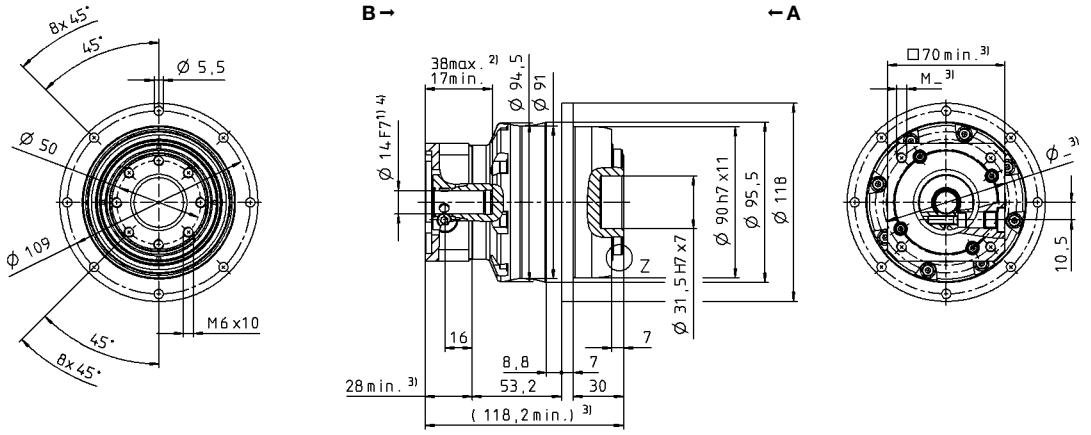
2-stage

Motor shaft diameter [mm]

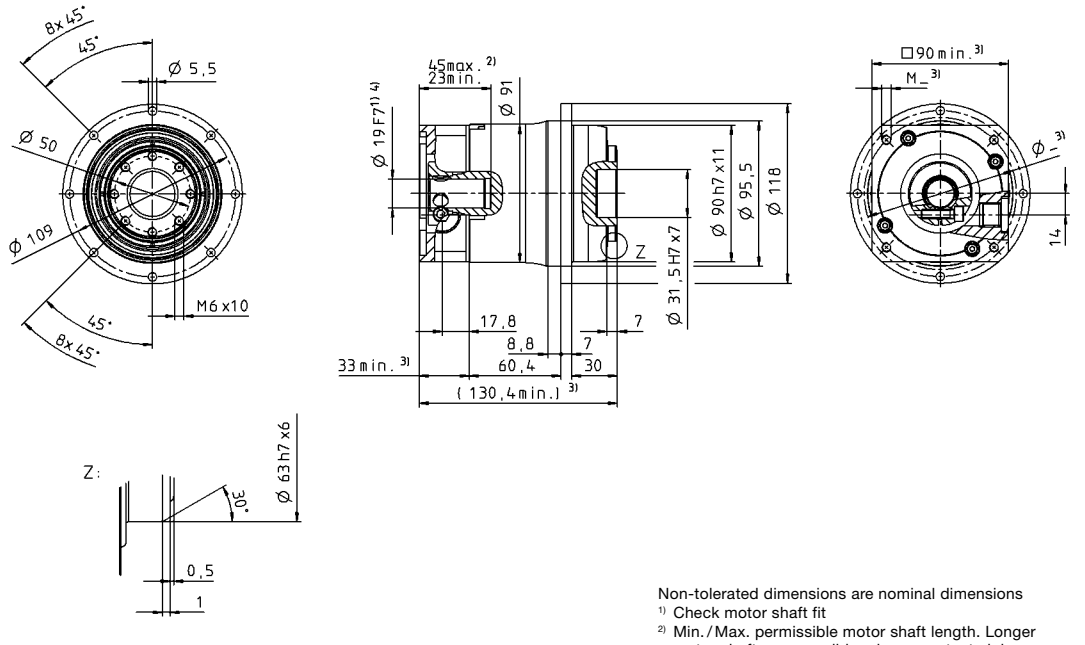
up to 11 [4] (B) clamping hub diameter



up to 14 [4] (C) [5] clamping hub diameter



up to 19 [4] (E) clamping hub diameter



Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

					1-stage				
Ratio			i		**4**	**5**	**7**	**8**	**10**
Max. torque [a) b)]			T_{2a}	*Nm*	352	380	352	352	352
				in.lb	3115	3363	3115	3115	3115
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	352	380	352	318	318
				in.lb	3115	3363	3115	2815	2815
Nominal torque (at n_{1N})			T_{2N}	*Nm*	175	169	172	172	180
				in.lb	1548	1498	1524	1521	1591
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	625	625	625	625	625
				in.lb	5532	5532	5532	5532	5532
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2300	2500	2500	2500	2500
Max. input speed			n_{1Max}	*rpm*	5500	5500	5500	5500	5500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	2.8	2.3	1.7	1.7	1.2
				in.lb	25	20	15	15	10
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	80	86	76	62	62
				in.lb/arcmin	708	761	673	549	549
Tilting rigidity			C_{2K}	*Nm/arcmin*	550				
				in.lb/arcmin	4868				
Max. axial force [c)]			F_{2AMax}	*N*	4800				
				lb$_f$	1080				
Max. tilting moment			M_{2KMax}	*Nm*	440				
				in.lb	3894				
Efficiency at full load			η	%	97				
Service life			L_h	*h*	> 20000				
Weight (incl. standard adapter plate)			m	*kg*	6.5				
				lb$_m$	14.4				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 61				
Max. permitted housing temperature				*°C*	+90				
				F	194				
Ambient temperature				*°C*	–15 to +40				
				F	5 to 104				
Lubrication					Lubricated for life				
Direction of rotation					In- and output same direction				
Protection class					IP 65				
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00150AAX-063.000				
Bore diameter of coupling on the application side				*mm*	X = 019.000 - 042.000				
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	E	19	J_1	*kgcm²*	2.59	2.11	1.69	1.69	1.45
				10^{-3} in.lb.s²	2.29	1.87	1.50	1.50	1.28
	G	24	J_1	*kgcm²*	3.28	2.80	2.38	2.38	2.14
				10^{-3} in.lb.s²	2.90	2.48	2.11	2.11	1.89
	H	28	J_1	*kgcm²*	2.89	2.41	1.99	1.99	1.75
				10^{-3} in.lb.s²	2.56	2.13	1.76	1.76	1.55
	K	38	J_1	*kgcm²*	10.3	9.87	9.45	9.45	9.21
				10^{-3} in.lb.s²	9.12	8.73	8.36	8.36	8.15

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

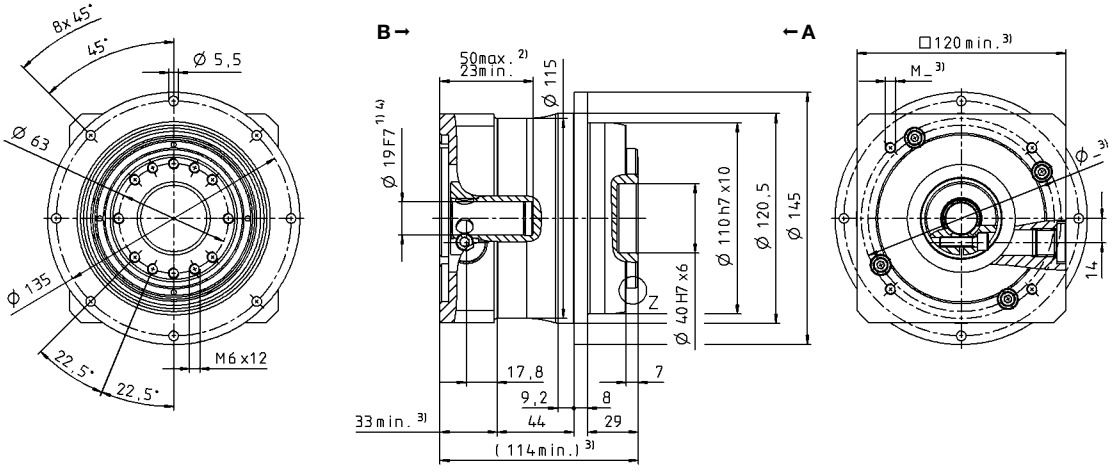
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A View B

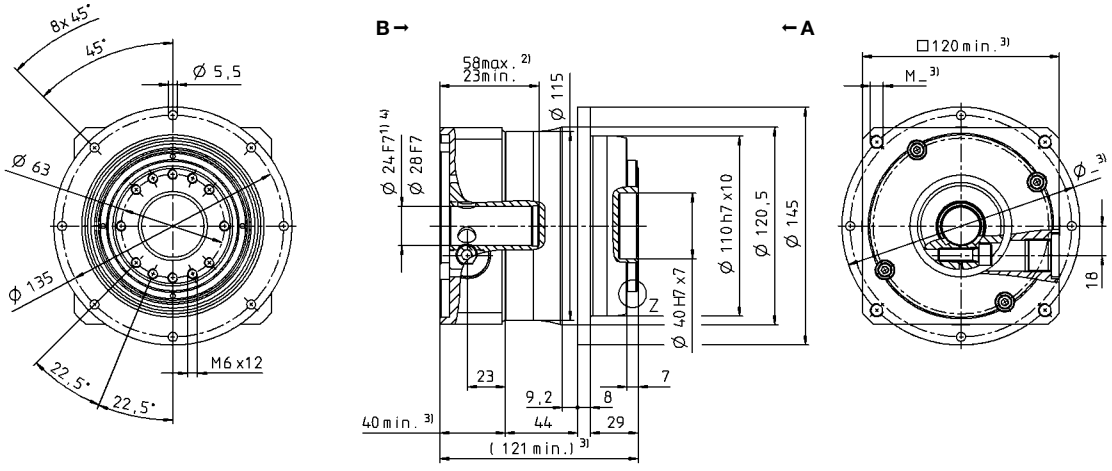
1-stage

Motor shaft diameter [mm]

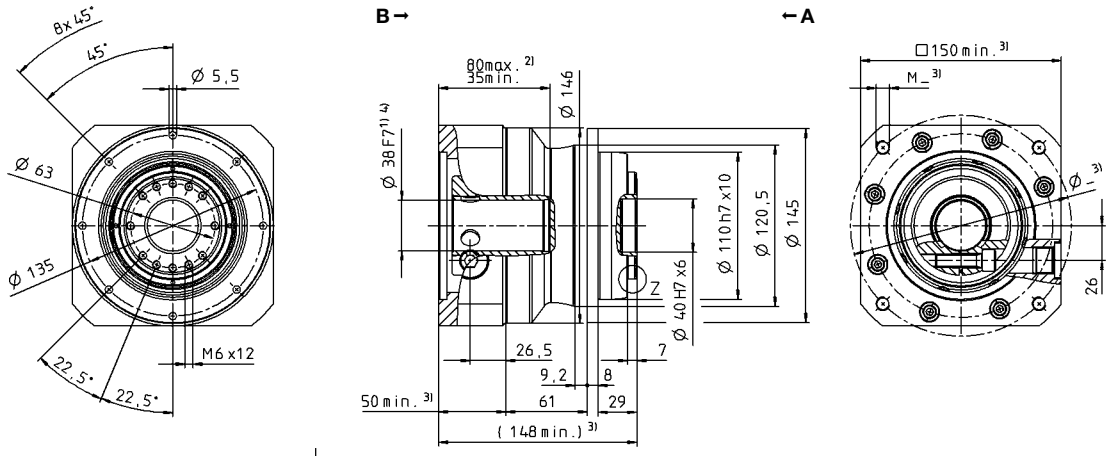
up to 19 [4] (E) clamping hub diameter

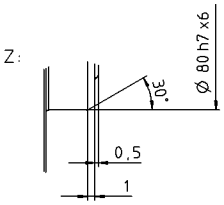


up to 24/28 [4] (G [5]/H) clamping hub diameter



up to 38 [4] (K) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage													
Ratio			*i*	**16**	**20**	**21**	**25**	**28**	**31**	**32**	**35**	**40**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]			T_{2a} *Nm*	352	352	352	380	352	352	352	380	352	380	352	352	352	352	352
			in.lb	3115	3115	3115	3363	3115	3115	3115	3363	3115	3363	3115	3115	3115	3115	3115
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B} *Nm*	352	352	330	380	352	330	352	380	352	380	308	292	352	275	292
			in.lb	3115	3115	2921	3363	3115	2921	3115	3363	3115	3363	2726	2584	3115	2434	2584
Nominal torque (at n_{1N})			T_{2N} *Nm*	250	267	211	265	282	231	251	294	282	304	246	233	282	220	233
			in.lb	2213	2366	1872	2348	2492	2047	2220	2598	2492	2691	2181	2064	2492	1947	2064
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not} *Nm*	625	625	625	625	625	625	625	625	625	625	625	625	625	625	625
			in.lb	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532	5532
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N} *rpm*	2800	2800	2800	2800	2800	2800	2800	2800	2800	3100	3500	3100	3500	4200	4200
Max. input speed			n_{1Max} *rpm*	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012} *Nm*	1.2	1.0	1.1	0.90	0.80	0.84	0.80	0.60	0.59	0.50	0.48	0.50	0.42	0.48	0.38
			in.lb	10	8.9	9.9	8.0	7.1	7.4	7.1	5.3	5.2	4.4	4.2	4.4	3.7	4.2	3.4
Max. backlash			j_t *arcmin*	Standard ≤ 3 / Reduced ≤ 1														
Torsional rigidity [b)]			C_{t21} *Nm/arcmin*	81	81	70	83	80	54	80	82	76	80	61	80	71	55	60
			in.lb/arcmin	717	717	620	735	708	478	708	726	673	708	540	708	628	487	531
Tilting rigidity			C_{2K} *Nm/arcmin*	550														
			in.lb/arcmin	4868														
Max. axial force [c)]			F_{2AMax} *N*	4800														
			lb$_f$	1080														
Max. tilting moment			M_{2KMax} *Nm*	440														
			in.lb	3894														
Efficiency at full load			η *%*	94														
Service life			L_h *h*	> 20000														
Weight (incl. standard adapter plate)			*m* *kg*	6.7														
			lb$_m$	14.8														
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA} *dB(A)*	≤ 58														
Max. permitted housing temperature			*°C*	+90														
			F	194														
Ambient temperature			*°C*	–15 to +40														
			F	5 to 104														
Lubrication				Lubricated for life														
Direction of rotation				In- and output same direction														
Protection class				IP 65														
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BCT-00150AAX-063.000														
Bore diameter of coupling on the application side			*mm*	X = 019.000 - 042.000														
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	C	14	J_1 *kgcm²*	0.66	0.55	0.60	0.53	0.44	0.55	0.44	0.43	0.38	0.38	0.39	0.40	0.37	0.38	0.37
			10^{-3} in.lb.s²	0.58	0.48	0.53	0.47	0.39	0.49	0.39	0.38	0.34	0.33	0.34	0.36	0.33	0.34	0.33
	E	19	J_1 *kgcm²*	0.83	0.71	0.77	0.70	0.61	0.72	0.61	0.60	0.55	0.55	0.55	0.57	0.54	0.55	0.54
			10^{-3} in.lb.s²	0.73	0.63	0.68	0.62	0.54	0.64	0.54	0.53	0.49	0.48	0.49	0.50	0.48	0.48	0.48
	G	24	J_1 *kgcm²*	2.20	2.08	2.14	2.07	1.98	2.09	1.98	1.97	1.92	1.92	1.92	2.00	1.91	1.92	1.91
			10^{-3} in.lb.s²	1.95	1.84	1.89	1.83	1.75	1.85	1.75	1.74	1.70	1.70	1.70	1.77	1.69	1.70	1.69
	H	28	J_1 *kgcm²*	2.00	1.91	1.96	1.89	1.82	1.85	1.89	1.81	1.76	1.76	1.76	1.83	1.75	1.75	1.75
			10^{-3} in.lb.s²	1.77	1.69	1.73	1.67	1.61	1.64	1.67	1.60	1.56	1.56	1.56	1.62	1.55	1.55	1.55

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

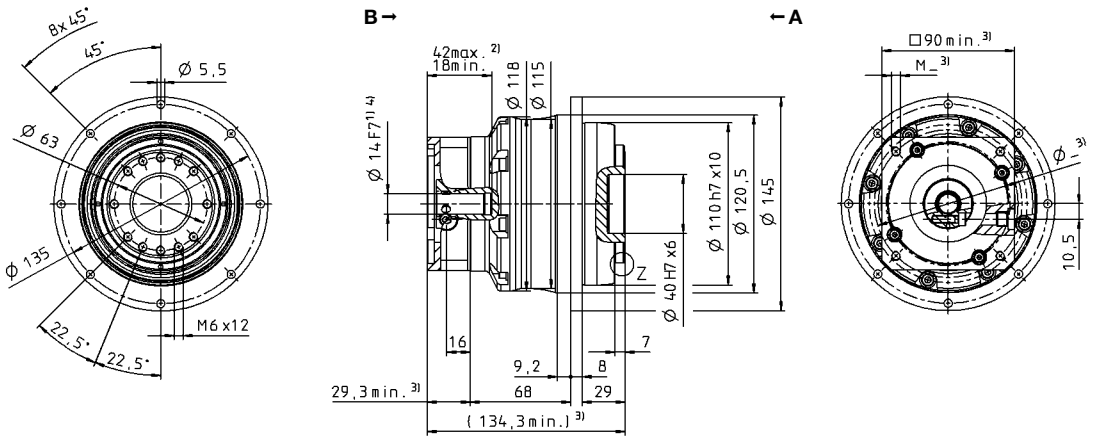
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A View B

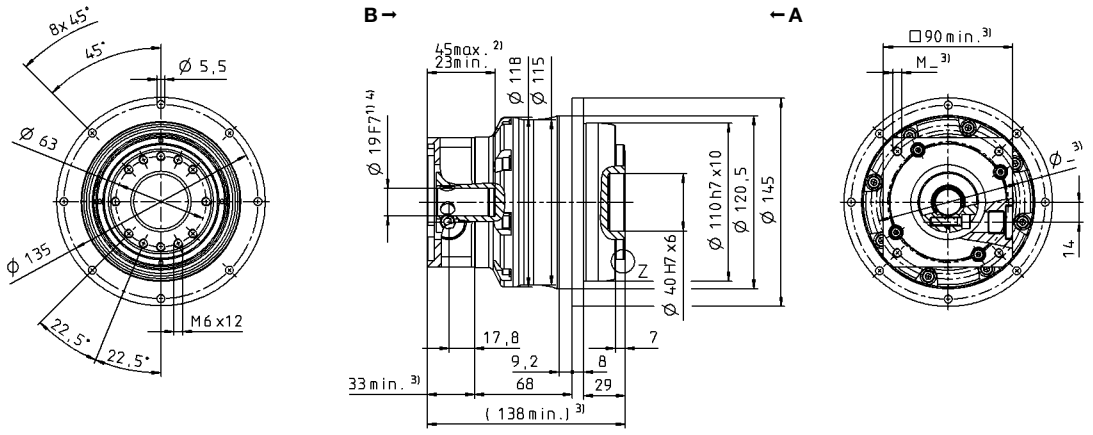
2-stage

Motor shaft diameter [mm]

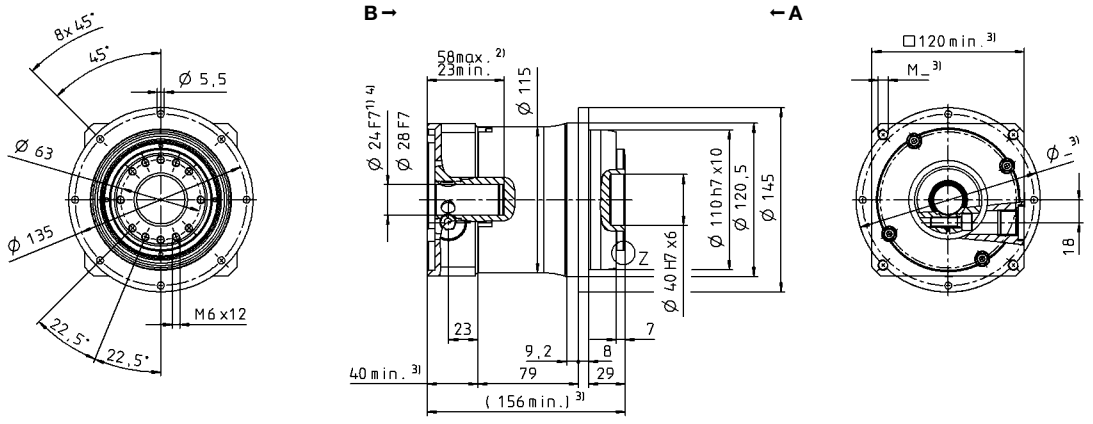
up to 14 [4] (C) clamping hub diameter

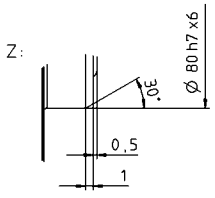


up to 19 [4] (E) [5] clamping hub diameter



up to 24/28 [4] (G/H) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

					1-stage				
Ratio			i		**4**	**5**	**7**	**8**	**10**
Max. torque [a) b)]			T_{2a}	*Nm*	992	992	868	720	720
				in.lb	8780	8780	7686	6373	6373
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	840	840	840	648	648
				in.lb	7435	7435	7435	5735	5735
Nominal torque (at n_{1N})			T_{2N}	*Nm*	345	337	322	316	331
				in.lb	3052	2987	2854	2796	2928
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	1250	1250	1250	1250	1250
				in.lb	11064	11064	11064	11064	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	1900	2000	2500	2500	2500
Max. input speed			n_{1Max}	*rpm*	5000	5000	5000	5000	5000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	6.5	5.3	3.8	3.8	2.9
				in.lb	57	47	33	33	26
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	190	187	159	123	123
				in.lb/arcmin	1682	1655	1407	1089	1089
Tilting rigidity			C_{2K}	*Nm/arcmin*	560				
				in.lb/arcmin	4956				
Max. axial force [c)]			F_{2AMax}	*N*	6130				
				lb_f	1379				
Max. tilting moment			M_{2KMax}	*Nm*	1335				
				in.lb	11816				
Efficiency at full load			η	%	97				
Service life			L_h	*h*	> 20000				
Weight (incl. standard adapter plate)			m	*kg*	14				
				lb_m	30.9				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 64				
Max. permitted housing temperature				*°C*	+90				
				F	194				
Ambient temperature				*°C*	–15 to +40				
				F	5 to 104				
Lubrication					Lubricated for life				
Direction of rotation					In- and output same direction				
Protection class					IP 65				
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00300AAX-080.000				
Bore diameter of coupling on the application side				*mm*	X = 024.000 - 060.000				
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	G	24	J_1	*kgcm²*	9.47	7.85	6.39	6.39	5.54
				10^{-3} *in.lb.s²*	8.38	6.95	5.66	5.66	4.90
	I	32	J_1	*kgcm²*	12.6	11.0	9.55	9.55	8.10
				10^{-3} *in.lb.s²*	11.2	9.74	8.45	8.45	7.17
	K	38	J_1	*kgcm²*	13.7	12.1	10.6	10.6	9.78
				10^{-3} *in.lb.s²*	12.1	10.7	9.38	9.38	8.66
	M	48	J_1	*kgcm²*	28.3	26.7	25.3	25.3	24.4
				10^{-3} *in.lb.s²*	25.1	23.6	22.4	22.4	21.6

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

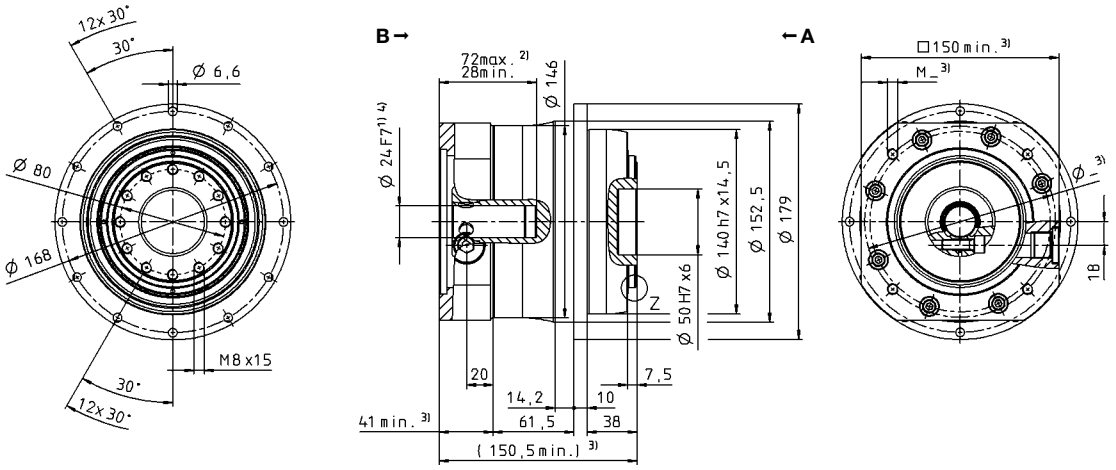
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A View B

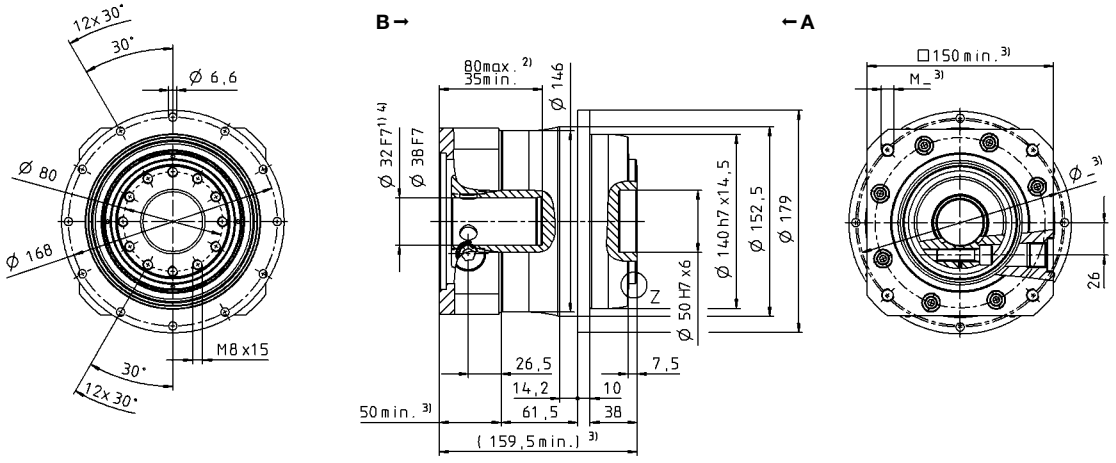
1-stage

Motor shaft diameter [mm]

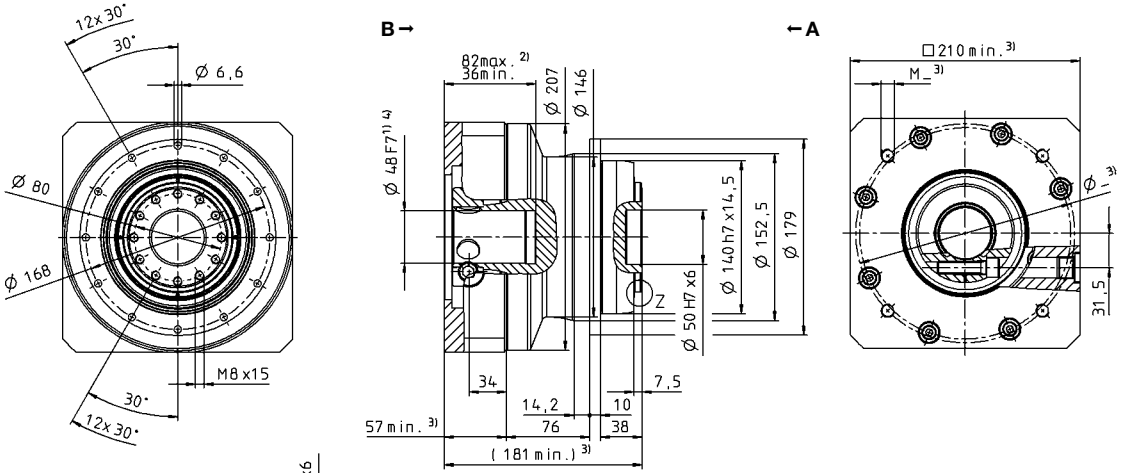
up to 24 [4] (G) clamping hub diameter

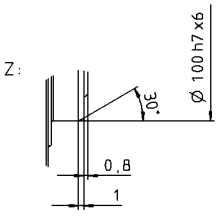


up to 32/38 [4] (I/K [5]) clamping hub diameter



up to 48 [4] (M) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage														
Ratio			*i*	**16**	**20**	**21**	**25**	**28**	**31**	**32**	**35**	**40**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]			T_{2a}	*Nm*	825	825	660	825	825	682	825	825	825	825	605	594	770	550	594
				in.lb	7302	7302	5842	7302	7302	6036	7302	7302	7302	7302	5355	5257	6815	4868	5257
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	825	825	660	825	825	682	825	825	825	825	605	594	770	550	594
				in.lb	7302	7302	5842	7302	7302	6036	7302	7302	7302	7302	5355	5257	6815	4868	5257
Nominal torque (at n_{1N})			T_{2N}	*Nm*	461	493	393	489	545	431	464	541	607	585	425	475	598	440	475
				in.lb	4078	4361	3476	4332	4824	3812	4104	4792	5370	5179	3765	4206	5291	3894	4206
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
				in.lb	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2900	2900	2900	2900	2900	2900	2900	2900	2900	3200	3200	3200	3200	3900	3900
Max. input speed			n_{1Max}	*rpm*	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250	6250
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	2.8	2.4	2.2	2.6	2.0	1.9	2.0	1.5	1.5	1.2	1.0	1.2	1.1	0.96	0.88
				in.lb	25	22	20	23	17	17	17	14	13	11	8.9	11	9.9	8.5	7.8
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1														
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	180	185	145	180	180	130	180	175	175	175	123	175	145	100	115
				in.lb/arcmin	1593	1637	1283	1593	1593	1151	1593	1549	1549	1549	1089	1549	1283	885	1018
Tilting rigidity			C_{2K}	*Nm/arcmin*	560														
				in.lb/arcmin	4956														
Max. axial force [c)]			F_{2AMax}	*N*	6130														
				lb$_f$	1379														
Max. tilting moment			M_{2KMax}	*Nm*	1379														
				in.lb	11816														
Efficiency at full load			η	*%*	94														
Service life			L_h	*h*	> 20000														
Weight (incl. standard adapter plate)			*m*	*kg*	14.1														
				lb$_m$	31.2														
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 58														
Max. permitted housing temperature				*°C*	+90														
				F	194														
Ambient temperature				*°C*	–15 to +40														
				F	5 to 104														
Lubrication					Lubricated for life														
Direction of rotation					In- and output same direction														
Protection class					IP 65														
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00300AAX-080.000														
Bore diameter of coupling on the application side				*mm*	X = 024.000 - 060.000														
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	E	19	J_1	*kgcm²*	2.53	2.08	2.30	2.01	1.67	2.12	1.67	1.64	1.44	1.42	1.46	1.51	1.41	1.43	1.40
				10^{-3} in.lb.s²	2.24	1.84	2.04	1.78	1.48	1.88	1.48	1.45	1.27	1.26	1.29	1.34	1.25	1.27	1.24
	G	24	J_1	*kgcm²*	3.22	2.77	2.99	2.70	2.37	2.81	2.37	2.33	2.13	2.12	2.15	2.20	2.10	2.12	2.09
				10^{-3} in.lb.s²	2.85	2.45	2.65	2.39	2.10	2.49	2.10	2.06	1.89	1.88	1.90	1.95	1.86	1.88	1.85
	K	38	J_1	*kgcm²*	10.3	9.83	10.1	9.77	9.43	9.88	9.43	9.40	9.20	9.18	9.22	9.50	9.17	9.19	9.16
				10^{-3} in.lb.s²	9.12	8.70	8.94	8.65	8.35	8.74	8.35	8.32	8.14	8.12	8.16	8.41	8.12	8.13	8.11

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

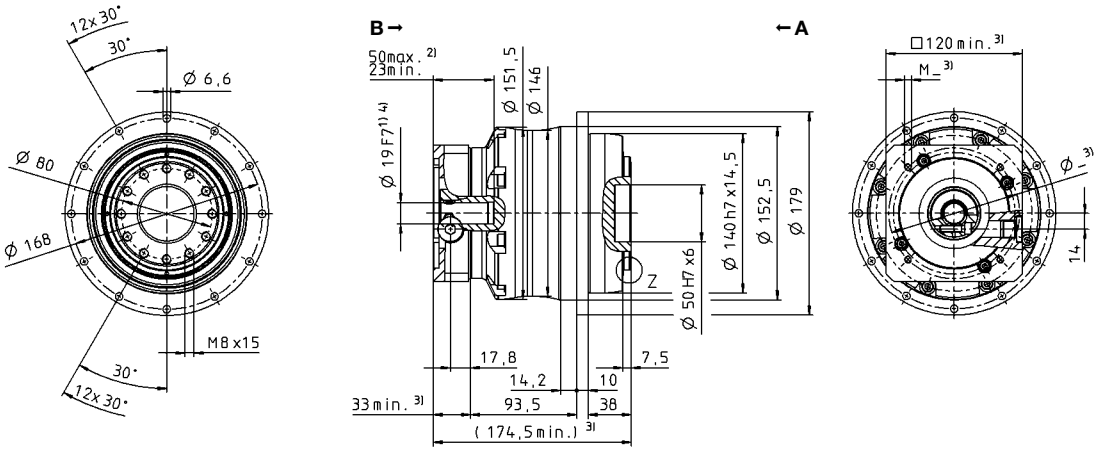
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

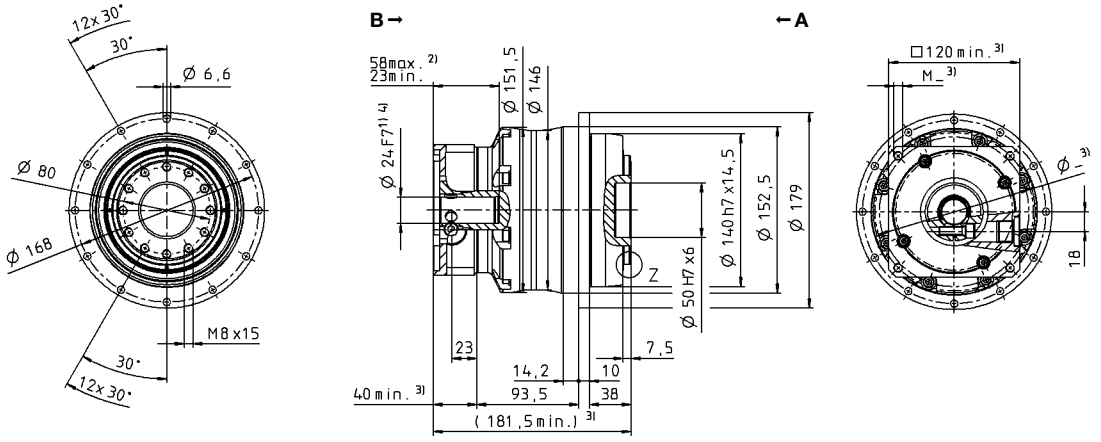
2-stage

Motor shaft diameter [mm]

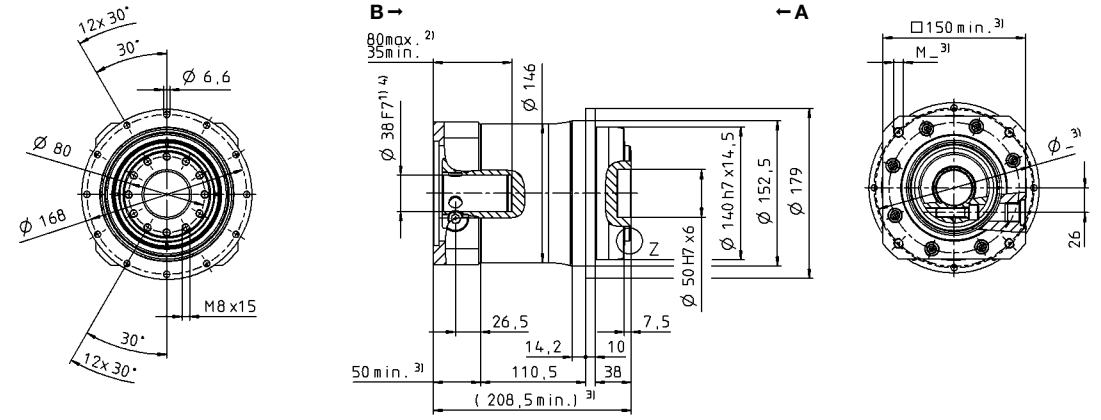
up to 19 [4] (E) clamping hub diameter

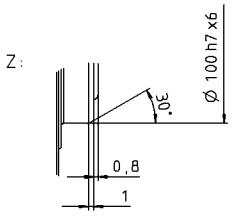


up to 24 [4] (G) [5] clamping hub diameter



up to 38 [4] (K) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				1-stage				
Ratio			*i*	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b)]			*Nm*	2560	2560	2560	2240	2240
	T_{2a}		*in.lb*	22658	22658	22658	19826	19826
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}		*Nm*	1920	1920	1920	1680	1680
			in.lb	16994	16994	16994	14869	14869
Nominal torque (at n_{1N})	T_{2N}		*Nm*	946	919	861	861	901
			in.lb	8375	8134	7618	7618	7972
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}		*Nm*	3075	3075	3075	3075	3075
			in.lb	27216	27216	27216	27216	27216
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}		*rpm*	1400	1500	2000	2000	2000
Max. input speed	n_{1Max}		*rpm*	4500	4500	4500	4500	4500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}		*Nm*	16	12	8.8	8.8	6.0
			in.lb	138	109	78	78	53
Max. backlash	j_t		*arcmin*	Standard ≤ 3 / Reduced ≤ 1				
Torsional rigidity [b)]	C_{t21}		*Nm/arcmin*	610	610	550	445	445
			in.lb/arcmin	5399	5399	4868	3939	3939
Tilting rigidity	C_{2K}		*Nm/arcmin*	1452				
			in.lb/arcmin	12851				
Max. axial force [c)]	F_{2AMax}		*N*	10050				
			lb_f	2261				
Max. tilting moment	M_{2KMax}		*Nm*	3280				
			in.lb	29031				
Efficiency at full load	η		%	97				
Service life	L_h		*h*	> 20000				
Weight (incl. standard adapter plate)	*m*		*kg*	30				
			lb_m	66.3				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}		*dB(A)*	≤ 68				
Max. permitted housing temperature			°C	+90				
			F	194				
Ambient temperature			°C	–15 to +40				
			F	5 to 104				
Lubrication				Lubricated for life				
Direction of rotation				In- and output same direction				
Protection class				IP 65				
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BCT-01500AAX-125.000				
Bore diameter of coupling on the application side			*mm*	X = 050.000 - 080.000				
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	K	38	J_1	*kgcm²*	44.5	34.6	25.5	25.5	20.6
				10^{-3} *in.lb.s²*	39.4	30.6	22.6	22.6	18.2
	M	48	J_1	*kgcm²*	58.8	41.9	32.9	32.9	28.0
				10^{-3} *in.lb.s²*	52.0	37.1	29.1	29.1	24.8
	N	55	J_1	*kgcm²*	61.5	51.5	42.3	42.3	37.3
				10^{-3} *in.lb.s²*	54.4	45.6	37.4	37.4	33.0

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

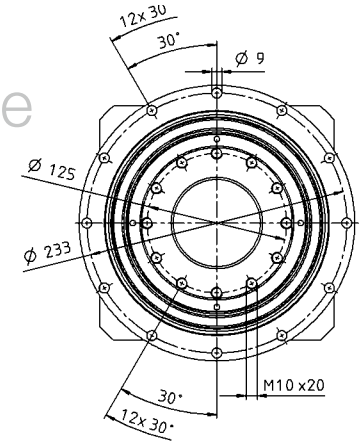
View A

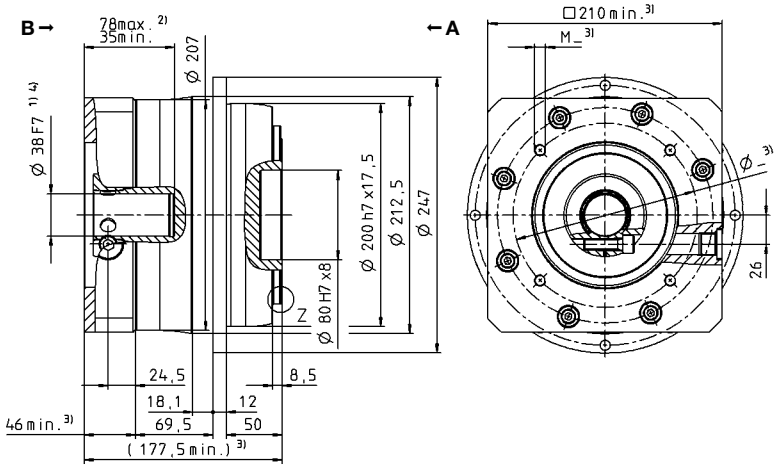
View B

1-stage

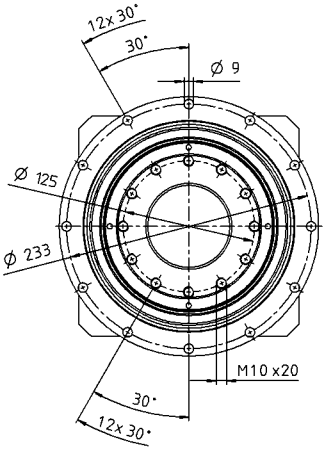
Motor shaft diameter [mm]

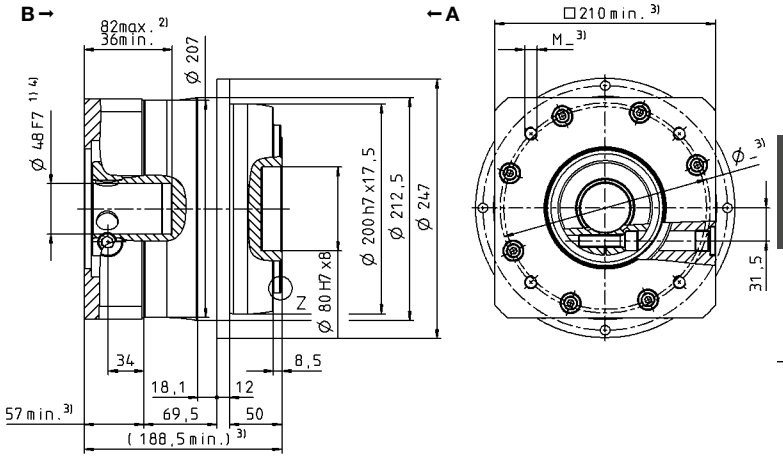
up to 38 [4] (K) clamping hub diameter



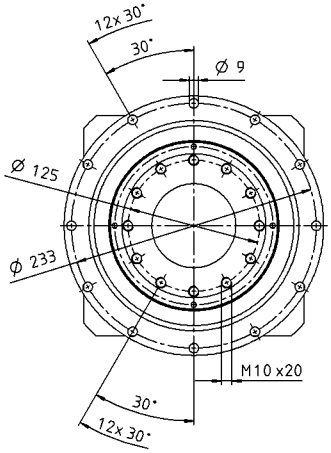


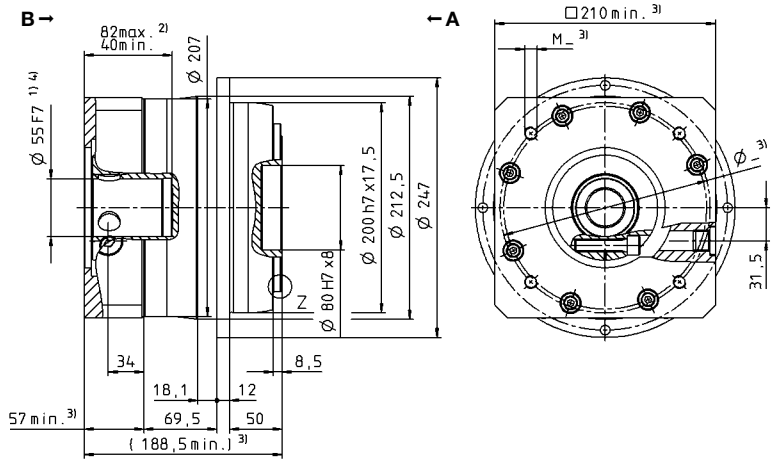
up to 48 [4] (M) [5] clamping hub diameter

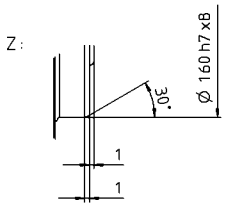




up to 55 [4] (N) clamping hub diameter







Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

					2-stage														
Ratio				*i*	**16**	**20**	**21**	**25**	**28**	**31**	**32**	**35**	**40**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]				T_{2a}	*Nm*	1760	1760	1540	1760	1760	1760	1760	1760	1760	1760	1540	1540	1760	1430	1540
					in.lb	15577	15577	13630	15577	15577	15577	15577	15577	15577	15577	13630	13630	15577	12657	13630
Max. acceleration torque [b)] (max. 1000 cycles per hour)				T_{2B}	*Nm*	1760	1760	1540	1760	1760	1760	1760	1760	1760	1760	1540	1540	1760	1430	1540
					in.lb	15577	15577	13630	15577	15577	15577	15577	15577	15577	15577	13630	13630	15577	12657	13630
Nominal torque (at n_{1N})				T_{2N}	*Nm*	1205	1240	1023	1278	1257	1065	1221	1408	1315	1408	1232	1232	1408	1144	1232
					in.lb	10669	10976	9051	11312	11121	9422	10807	12462	11636	12462	10904	10904	12462	10125	10904
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)				T_{2Not}	*Nm*	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075	3075
					in.lb	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216	27216
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]				n_{1N}	*rpm*	2500	2500	2500	2500	2500	2500	2500	2500	2500	2900	3200	2900	3200	3400	3400
Max. input speed				n_{1Max}	*rpm*	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625	5625
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)				T_{012}	*Nm*	7.0	5.8	5.2	5.2	4.5	4.4	4.5	3.1	3.0	2.5	2.1	2.5	2.0	1.8	1.8
					in.lb	52	52	46	46	40	39	40	28	27	22	18	22	18	16	16
Max. backlash				j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1														
Torsional rigidity [b)]				C_{t21}	*Nm/arcmin*	585	580	465	570	560	440	560	560	520	525	415	525	480	360	395
					in.lb/arcmin	5178	5133	4116	5045	4956	3894	4956	4956	4602	4647	3673	4647	4248	3186	3496
Tilting rigidity				C_{2K}	*Nm/arcmin*	1452														
					in.lb/arcmin	12851														
Max. axial force [c)]				F_{2AMax}	*N*	10050														
					lb$_f$	2261														
Max. tilting moment				M_{2KMax}	*Nm*	3280														
					in.lb	29031														
Efficiency at full load				η	%	94														
Service life				L_h	*h*	> 20000														
Weight (incl. standard adapter plate)				*m*	*kg*	34														
					lb$_m$	75.1														
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)				L_{PA}	*dB(A)*	≤ 61														
Max. permitted housing temperature					*°C*	+90														
					F	194														
Ambient temperature					*°C*	–15 to +40														
					F	5 to 104														
Lubrication						Lubricated for life														
Direction of rotation						In- and output same direction														
Protection class						IP 65														
Metal bellows coupling (recommended product type – validate sizing with cymex®)						BCT-01500AAX-125.000														
Bore diameter of coupling on the application side					*mm*	X = 050.000 - 080.000														
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	G	24	J_1		*kgcm²*	8.51	8.21	8.98	7.82	6.57	8.09	6.57	6.37	5.63	5.54	5.63	5.78	5.44	5.51	5.40
					10^{-3} in.lb.s²	7.53	7.27	7.95	6.92	5.81	7.16	5.81	5.64	4.98	4.90	4.98	5.12	4.81	4.88	4.78
	I	32	J_1		*kgcm²*	11.7	11.4	12.1	11.0	9.73	11.3	9.73	9.54	8.80	8.70	8.80	8.95	8.61	8.67	8.56
					10^{-3} in.lb.s²	10.4	10.1	10.7	9.74	8.61	10.0	8.61	8.44	7.79	7.70	7.79	7.92	7.62	7.67	7.58
	K	38	J_1		*kgcm²*	12.7	12.5	13.2	12.1	10.8	12.3	10.8	10.6	9.87	9.77	9.87	10.0	9.68	9.74	9.63
					10^{-3} in.lb.s²	11.2	11.1	11.7	10.7	9.56	10.9	9.56	9.39	8.73	8.65	8.73	8.87	8.57	8.62	8.52
	M	48	J_1		*kgcm²*	27.4	27.1	27.8	26.7	25.4	26.9	25.4	25.3	24.5	24.4	24.5	24.9	24.3	24.4	24.3
					10^{-3} in.lb.s²	24.3	24.0	24.6	23.6	22.5	23.8	22.5	22.4	21.7	21.6	21.7	22.0	21.5	21.6	21.5

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

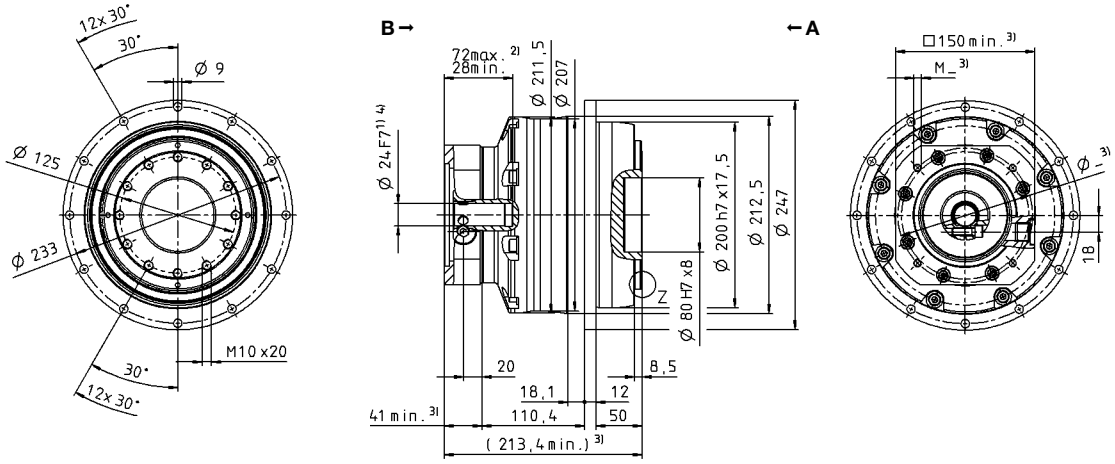
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

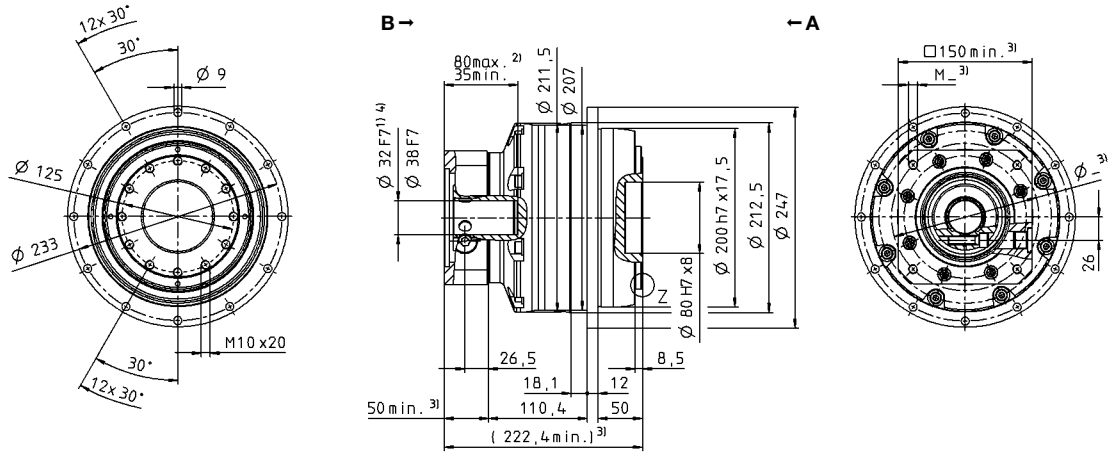
2-stage

Motor shaft diameter [mm]

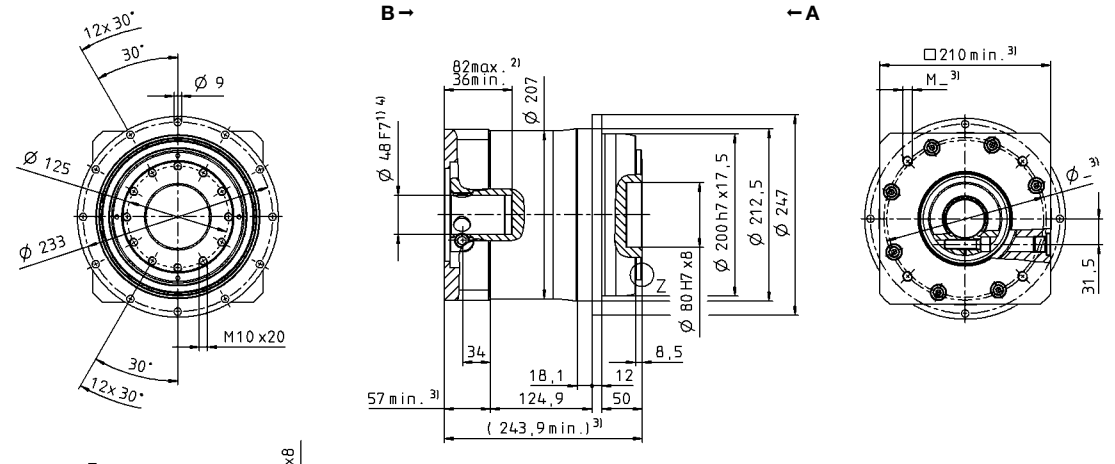
up to 24 [4] (G) clamping hub diameter

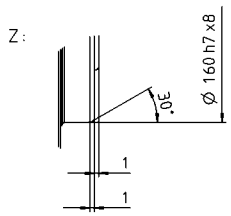


up to 32/38 [4] (I/K [5]) clamping hub diameter



up to 48 [4] (M) clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

			1-stage			
Ratio	*i*		**5**	**7**	**8**	**10**
Max. torque [a) b)]	T_{2a}	*Nm*	5600	5250	2800	2800
		in.lb	49564	46467	24782	24782
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	4200	3960	2280	2280
		in.lb	37173	35049	20180	20180
Nominal torque (at n_{1N})	T_{2N}	*Nm*	1996	1835	1815	1794
		in.lb	17666	16242	16063	15878
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	9900	9900	8557	8750
		in.lb	87623	87623	75733	77445
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	1000	1400	1400	1700
Max. input speed	n_{1Max}	*rpm*	3000	3000	3000	3000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	20	14	14	8.8
		in.lb	177	120	120	78
Max. backlash	j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	1000	900	700	700
		in.lb/arcmin	8851	7966	6196	6196
Tilting rigidity	C_{2K}	*Nm/arcmin*	5560			
		in.lb/arcmin	49210			
Max. axial force [c)]	F_{2AMax}	*N*	33000			
		lb_f	7425			
Max. tilting moment	M_{2KMax}	*Nm*	3900			
		in.lb	34518			
Efficiency at full load	η	*%*	95			
Service life	L_h	*h*	> 20000			
Weight (incl. standard adapter plate)	*m*	*kg*	60			
		lb_m	132.6			
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*	≤ 64			
Max. permitted housing temperature		*°C*	+90			
		F	194			
Ambient temperature		*°C*	–15 to +40			
		F	5 to 104			
Lubrication			Lubricated for life			
Direction of rotation			In- and output same direction			
Protection class			IP 65			
Metal bellows coupling (recommended product type – validate sizing with cymex®)			–			
Bore diameter of coupling on the application side		*mm*	–			
Mass moment of inertia (relates to the drive) **Clamping hub diameter [mm]** **Optimized mass inertia version available on request** **N** **55**	J_1	$kgcm^2$	82.6	61.2	61.2	49.5
		10^{-3} *in.lb.s²*	73.1	54.2	54.2	43.8

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

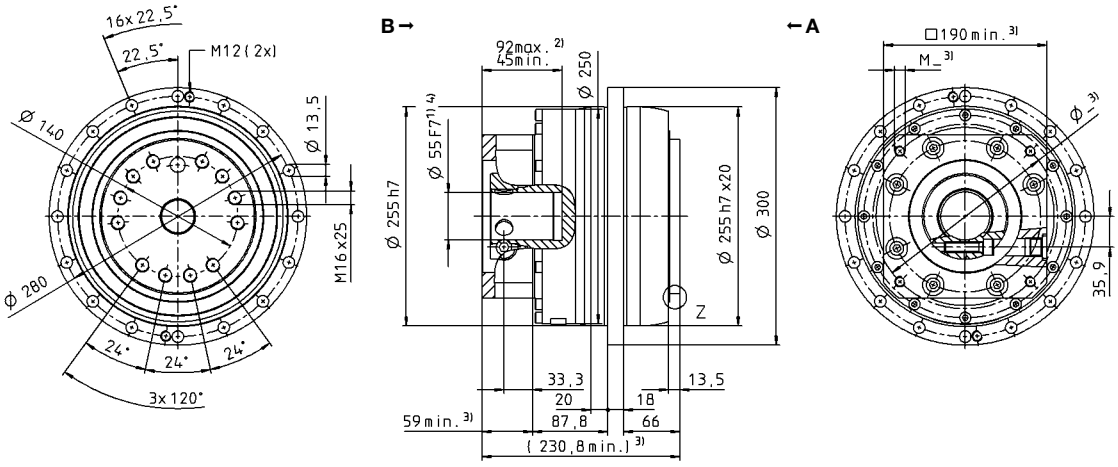
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

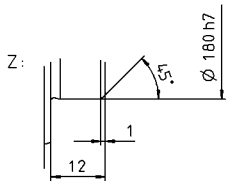
View A View B

Motor shaft diameter [mm]

1-stage

up to 55 [4] (N) [5]
clamping hub
diameter





Non-tolerated dimensions are nominal dimensions
[1] Check motor shaft fit
[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.
[3] The dimensions depend on the motor
[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm
[5] Standard clamping hub diameter

			2-stage											
Ratio	*i*		**20**	**21**	**25**	**31**	**32**	**35**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]	T_{2a}	*Nm*	3850	3740	3949	3850	3630	3949	3600	3080	2800	3630	2800	2800
		in.lb	34076	33102	34947	34076	32128	34947	31863	27260	24782	32128	24782	24782
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	3850	3740	3949	3850	3630	3949	3600	3080	2800	3630	2800	2800
		in.lb	34076	33102	34952	34076	32128	34952	31863	27260	24782	32128	24782	24782
Nominal torque (at n_{1N})	T_{2N}	*Nm*	1354	1456	1676	2114	2353	1710	1722	2070	2240	2339	2240	2240
		in.lb	11981	12888	14834	18709	20823	15131	15238	18320	19826	20698	19826	19826
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	9900	9870	9900	9156	9900	9900	9900	9008	9900	9900	8750	8750
		in.lb	87623	87357	87623	81035	87623	87623	87623	79728	87623	87623	77445	77445
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	2000	2000	2000	2000	2000	2000	2300	2400	2300	2400	2500	2500
Max. input speed	n_{1Max}	*rpm*	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	6.7	5.5	5.5	4.8	5.5	4.0	3.8	2.8	3.8	3.0	2.8	2.4
		in.lb	59	49	48	43	48	35	34	25	34	26	25	21
Max. backlash	j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	850	800	950	750	950	900	800	700	800	800	600	650
		in.lb/arcmin	7523	7081	8408	6638	8408	7966	7081	6196	7081	7081	5310	5753
Tilting rigidity	C_{2K}	*Nm/arcmin*	5560											
		in.lb/arcmin	49210											
Max. axial force [c)]	F_{2AMax}	*N*	33000											
		lb_f	7425											
Max. tilting moment	M_{2KMax}	*Nm*	5900											
		in.lb	52220											
Efficiency at full load	η	*%*	94											
Service life	L_h	*h*	> 20000											
Weight (incl. standard adapter plate)	*m*	*kg*	58.5											
		lb_m	129.3											
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*	≤ 61											
Max. permitted housing temperature		*°C*	+90											
		F	194											
Ambient temperature		*°C*	–15 to +40											
		F	5 to 104											
Lubrication			Lubricated for life											
Direction of rotation			In- and output same direction											
Protection class			IP 65											
Metal bellows coupling (recommended product type – validate sizing with cymex®)			–											
Bore diameter of coupling on the application side		*mm*	–											
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] M 48 Optimized mass inertia version available on request	J_1	*kgcm²*	27.5	27.0	25.9	25.6	22.4	22.4	21.5	21.4	25.8	21.3	21.2	21.2
		10^{-3} in.lb.s²	24.3	23.9	22.9	22.7	19.8	19.8	19.0	18.9	22.8	18.9	18.8	18.8

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

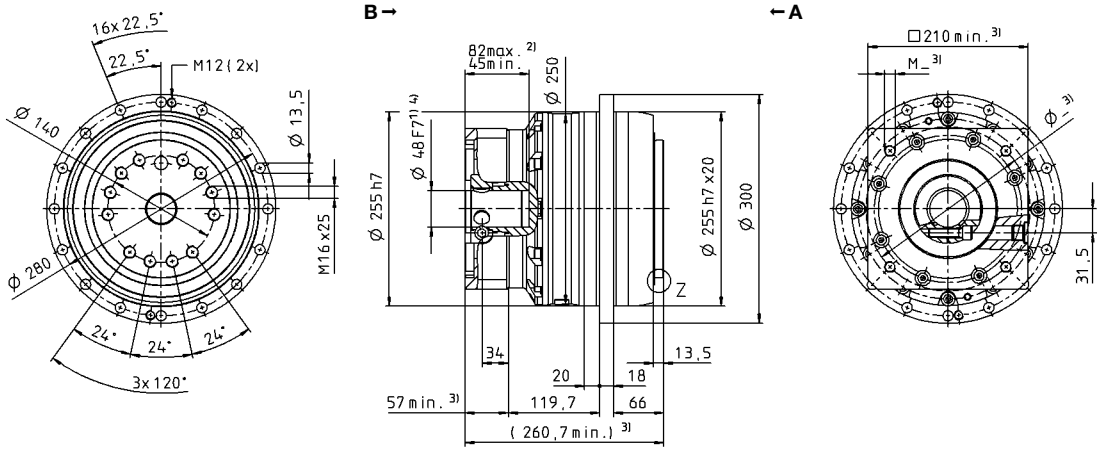
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

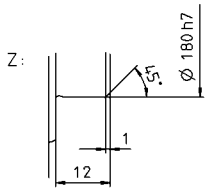
View A View B

Motor shaft diameter [mm]

2-stage

up to 48 [4] (M) [5]
clamping hub diameter





Non-tolerated dimensions are nominal dimensions
[1] Check motor shaft fit
[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.
[3] The dimensions depend on the motor
[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm
[5] Standard clamping hub diameter

			1-stage			
Ratio	*i*		**5**	**7**	**8**	**10**
Max. torque [a) b)]	T_{2a}	*Nm*	9600	6790	4000	4000
		in.lb	84968	60097	35403	35403
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	7200	6000	4000	4000
		in.lb	63726	53105	35403	35403
Nominal torque (at n_{1N})	T_{2N}	*Nm*	3131	2857	2830	2840
		in.lb	27711	25286	25049	25135
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	15000	15000	15000	15000
		in.lb	132762	132762	132762	132762
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	900	1300	1300	1500
Max. input speed	n_{1Max}	*rpm*	3000	3000	3000	3000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	27	19	19	12
		in.lb	242	170	170	110
Max. backlash	j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1			
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	1450	1300	1100	1100
		in.lb/arcmin	12834	11506	9736	9736
Tilting rigidity	C_{2K}	*Nm/arcmin*	9480			
		in.lb/arcmin	83906			
Max. axial force [c)]	F_{2AMax}	*N*	50000			
		lb_f	11250			
Max. tilting moment	M_{2KMax}	*Nm*	5500			
		in.lb	48679			
Efficiency at full load	η	*%*	95			
Service life	L_h	*h*	> 20000			
Weight (incl. standard adapter plate)	*m*	*kg*	82			
		lb_m	181.2			
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*	≤ 64			
Max. permitted housing temperature		*°C*	+90			
		F	194			
Ambient temperature		*°C*	–15 to +40			
		F	5 to 104			
Lubrication			Lubricated for life			
Direction of rotation			In- and output same direction			
Protection class			IP 65			
Metal bellows coupling (recommended product type – validate sizing with cymex®)			–			
Bore diameter of coupling on the application side		*mm*	–			
Mass moment of inertia (relates to the drive) **O** **60** Clamping hub diameter [mm] Optimized mass inertia version available on request	J_1	$kgcm^2$	182	142	142	120
		10^{-3} *in.lb.s²*	161	126	126	106

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

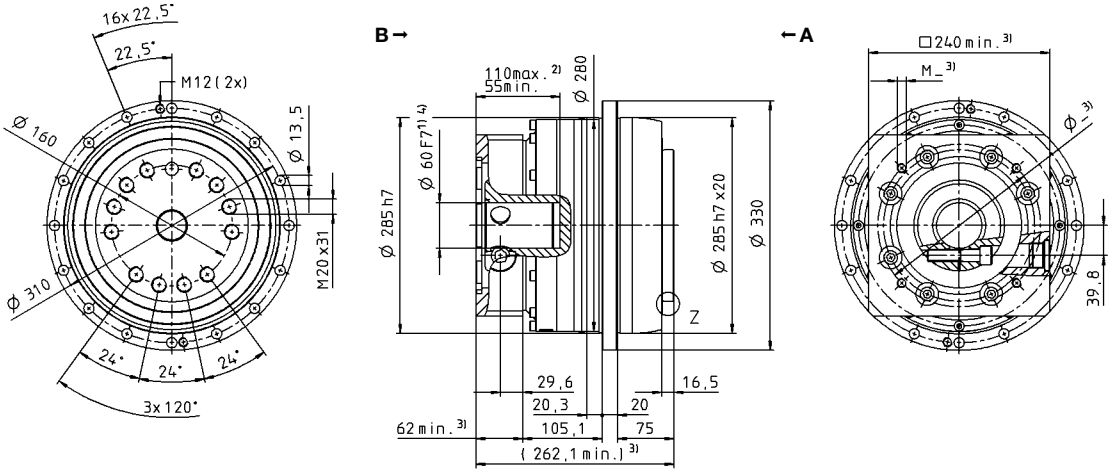
View A

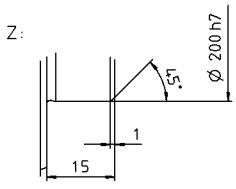
View B

Motor shaft diameter [mm]

1-stage

up to 60 [4] (O) [5]
clamping hub diameter





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[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

			2-stage											
Ratio	*i*		**20**	**21**	**25**	**31**	**32**	**35**	**50**	**61**	**64**	**70**	**91**	**100**
Max. torque [a) b)]	T_{2a}	*Nm*	5446	5718	6808	6354	5500	6808	4975	5280	4800	5500	4800	4800
		in.lb	48202	50612	60252	56239	48679	60252	44033	46732	42484	48679	42484	42484
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	5446	5718	6808	6324	5500	6808	4975	5280	4800	5500	4800	4800
		in.lb	48202	50612	60252	56239	48679	60252	44033	46732	42484	48679	42484	42484
Nominal torque (at n_{1N})	T_{2N}	*Nm*	3026	3270	3729	4086	4376	3828	3697	4224	3840	4400	3840	3840
		in.lb	26785	28944	33002	36160	38730	33878	32720	37386	33987	38944	33987	33987
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	15000	13928	15000	10854	15000	15000	15000	10678	15000	15000	15000	15000
		in.lb	132762	123274	132762	96063	132762	132762	132762	94513	132762	132762	132762	132762
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	1500	1500	1500	1500	1500	1500	2000	2100	2000	2100	2200	2200
Max. input speed	n_{1Max}	*rpm*	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375	4375
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	10	9.6	9.2	7.0	9.2	7.0	5.8	3.4	5.8	4.5	3.5	3.6
		in.lb	92	85	81	62	81	62	51	30	51	40	31	32
Max. backlash	j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	1400	1200	1450	1200	1450	1400	1300	1100	1300	1250	950	1050
		in.lb/arcmin	12391	10621	12834	10621	12834	12391	11506	9736	11506	11064	8408	9293
Tilting rigidity	C_{2K}	*Nm/arcmin*	9480											
		in.lb/arcmin	83906											
Max. axial force [c)]	F_{2AMax}	*N*	50000											
		lb_f	11250											
Max. tilting moment	M_{2KMax}	*Nm*	8800											
		in.lb	77887											
Efficiency at full load	η	*%*	94											
Service life	L_h	*h*	> 20000											
Weight (incl. standard adapter plate)	*m*	*kg*	77.5											
		lb_m	171.3											
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*	≤ 60											
Max. permitted housing temperature		*°C*	+90											
		F	194											
Ambient temperature		*°C*	–15 to +40											
		F	5 to 104											
Lubrication			Lubricated for life											
Direction of rotation			In- and output same direction											
Protection class			IP 65											
Metal bellows coupling (recommended product type – validate sizing with cymex®)			–											
Bore diameter of coupling on the application side		*mm*	–											
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] M 48 Optimized mass inertia version available on request	J_1	*kgcm²*	24.8	35.9	40.2	33.7	35.4	27.4	27.4	25.4	25.8	31.0	25.0	25.2
		10^{-3} in.lb.s²	21.9	31.8	35.6	29.8	31.3	24.2	24.2	22.5	22.8	27.4	22.1	22.3

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[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

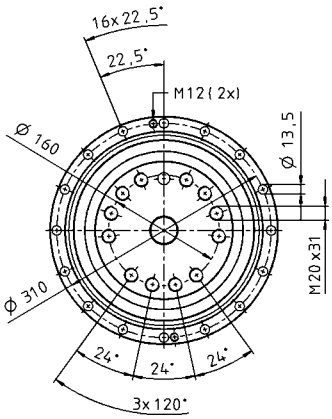
View A

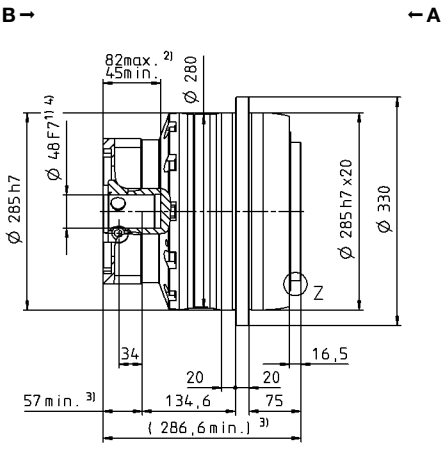
View B

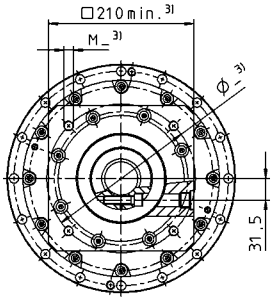
Motor shaft diameter [mm]

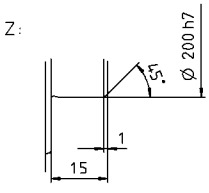
2-stage

up to 48 [4] (M) [5]
clamping hub
diameter









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[1] Check motor shaft fit

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[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage				3-stage			
Ratio			*i*	**22**	**27.5**	**38.5**	**55**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			*Nm*	315	315	315	315	315	315	315	315
	T_{2a}		*in.lb*	2788	2788	2788	2788	2788	2788	2788	2788
Max. acceleration torque [b)] (max. 1000 cycles per hour)	T_{2B}		*Nm*	230	230	230	230	230	230	230	230
			in.lb	2036	2036	2036	2036	2036	2036	2036	2036
Nominal torque (at n_{1N})	T_{2N}		*Nm*	140	137	139	147	184	184	181	184
			in.lb	1242	1213	1230	1303	1629	1629	1599	1629
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}		*Nm*	525	525	525	525	525	525	525	525
			in.lb	4647	4647	4647	4647	4647	4647	4647	4647
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}		*rpm*	4000	4000	4000	4000	4500	4500	4500	4500
Max. input speed	n_{1Max}		*rpm*	7500	7500	7500	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}		*Nm*	0.52	0.47	0.41	0.38	0.28	0.26	0.22	0.18
			in.lb	4.6	4.2	4.0	3.4	2.5	2.3	1.9	1.6
Max. backlash	j_t		*arcmin*	≤ 1							
Torsional rigidity [b)]	C_{t21}		*Nm/arcmin*	43	43	43	42	42	42	42	42
			in.lb/arcmin	381	381	381	372	372	372	372	372
Tilting rigidity	C_{2K}		*Nm/arcmin*	225							
			in.lb/arcmin	1991							
Max. axial force [c)]	F_{2AMax}		*N*	2795							
			lb_f	629							
Max. tilting moment	M_{2KMax}		*Nm*	400							
			in.lb	3540							
Efficiency at full load	η		%	94							
Service life	L_h		*h*	> 20000							
Weight (incl. standard adapter plate)	*m*		*kg*	3.2				3.6			
			lb_m	7.1				8.0			
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}		*dB(A)*	≤ 56							
Max. permitted housing temperature			°C	+90							
			F	194							
Ambient temperature			°C	–15 to +40							
			F	5 to 104							
Lubrication				Lubricated for life							
Direction of rotation				In- and output same direction							
Protection class				IP 65							
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BCT-00150AAX-050.00							
Bore diameter of coupling on the application side			*mm*	X = 016.000 - 038.000							
Mass moment of inertia (relates to the drive)	C	14	J_1	*kgcm²*	0.21	0.18	0.16	0.14	0.16	0.15	0.14	0.13
				10^{-3} in.lb.s²	0.19	0.16	0.14	0.12	0.14	0.13	0.12	0.12
Clamping hub diameter [mm]	E	19	J_1	*kgcm²*	0.52	0.50	0.47	0.46	-	-	-	-
Optimized mass inertia version available on request				*10^{-3} in.lb.s²*	0.46	0.44	0.42	0.41	-	-	-	-

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

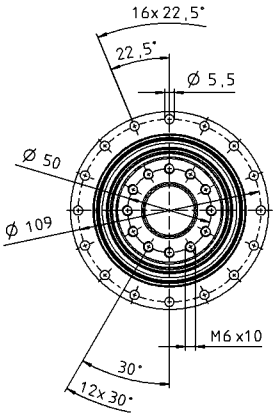
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

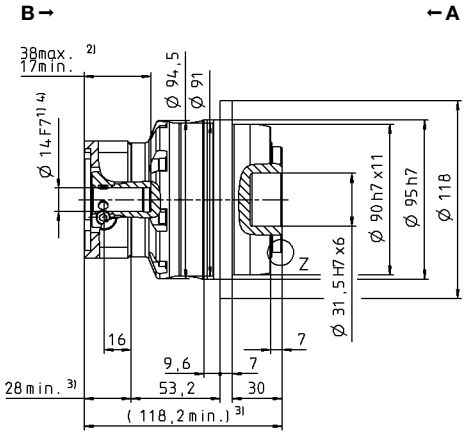
View A

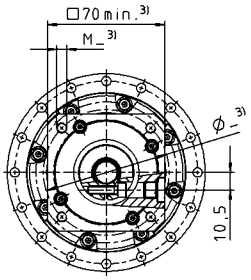
View B

2-stage

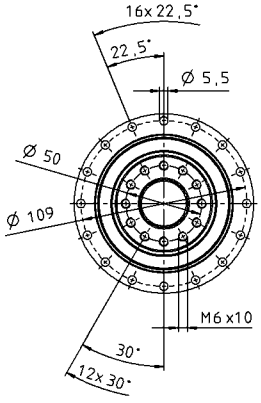
up to 14 [4] (C) [5] clamping hub diameter

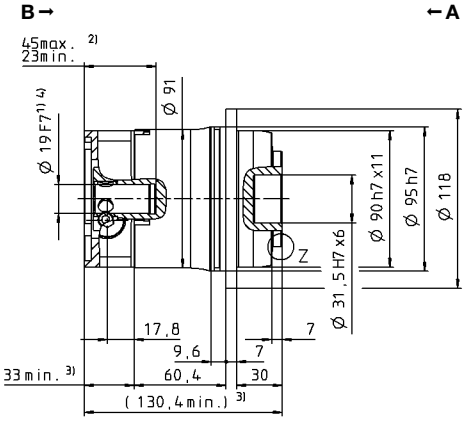


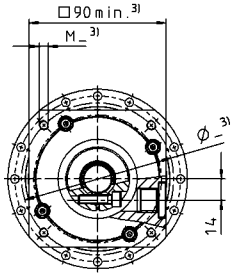




up to 19 [4] (E) clamping hub diameter

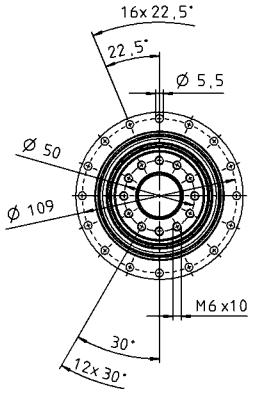


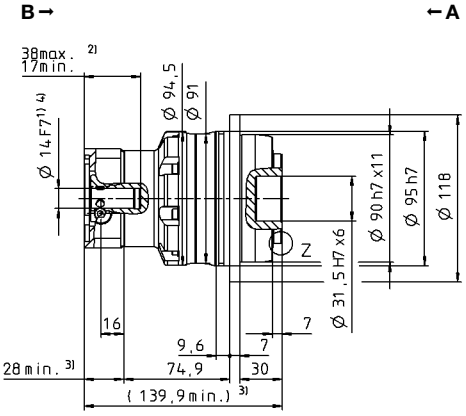


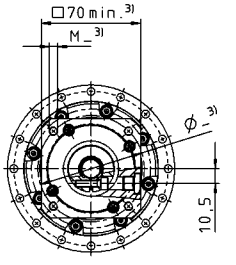


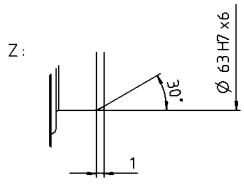
3-stage

up to 14 [4] (C) [5] clamping hub diameter









Motor shaft diameter [mm]

Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage				3-stage				
Ratio			*i*	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			T_{2a}	*Nm*	583	583	583	583	525	525	525	525	525
				in.lb	5160	5160	5160	5160	4645	4645	4645	4645	4645
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	530	530	530	530	480	480	480	480	480
				in.lb	4691	4691	4691	4691	4248	4248	4248	4248	4248
Nominal torque (at n_{1N})			T_{2N}	*Nm*	312	314	371	413	260	276	296	330	364
				in.lb	2762	2775	3286	3652	2304	2447	2617	2920	3222
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	1200	1200	1200	1200	1200	1200	1200	1200	1200
				in.lb	10621	10621	10621	10621	10621	10621	10621	10621	10621
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	3500	3500	3500	3500	4000	4000	4000	4000	4000
Max. input speed			n_{1Max}	*rpm*	7500	7500	7500	7500	7500	7500	7500	7500	7500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	1.0	0.87	0.78	0.70	0.62	0.52	0.44	0.35	0.27
				in.lb	9.2	7.7	6.9	6.2	5.5	4.6	3.9	3.1	2.4
Max. backlash			j_t	*arcmin*	≤ 1								
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	105	105	105	100	95	95	95	95	95
				in.lb/arcmin	929	929	929	885	841	841	841	841	841
Tilting rigidity			C_{2K}	*Nm/arcmin*	550								
				in.lb/arcmin	4868								
Max. axial force [c)]			F_{2AMax}	*N*	4800								
				lb_f	1080								
Max. tilting moment			M_{2KMax}	*Nm*	550								
				in.lb	4868								
Efficiency at full load			η	%	94								
Service life			L_h	*h*	> 20000								
Weight (incl. standard adapter plate)			*m*	*kg*	5.6				6.1				
				lb_m	12.4				13.5				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 58				≤ 56				
Max. permitted housing temperature				°C	+90								
				F	194								
Ambient temperature				°C	–15 to +40								
				F	5 to 104								
Lubrication					Lubricated for life								
Direction of rotation					In- and output same direction								
Protection class					IP 65								
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00300AAX-063.00								
Bore diameter of coupling on the application side				*mm*	X = 030.000 - 056.000								
Mass moment of inertia (relates to the drive)	E	19	J_1	$kgcm^2$	0.87	0.7	0.6	0.55	0.63	0.56	0.53	0.51	0.50
				10^{-3} *in.lb.s²*	0.77	0.62	0.53	0.49	0.56	0.50	0.47	0.45	0.44
Clamping hub diameter [mm]	G	24	J_1	$kgcm^2$	2.39	2.22	2.12	2.07	-	-	-	-	-
Optimized mass inertia version available on request				10^{-3} *in.lb.s²*	2.12	1.96	1.88	1.83	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

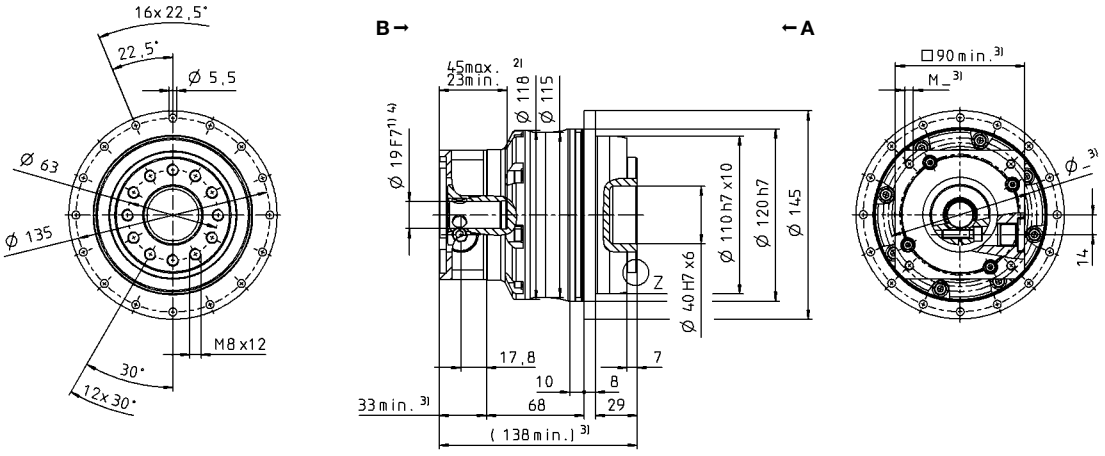
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

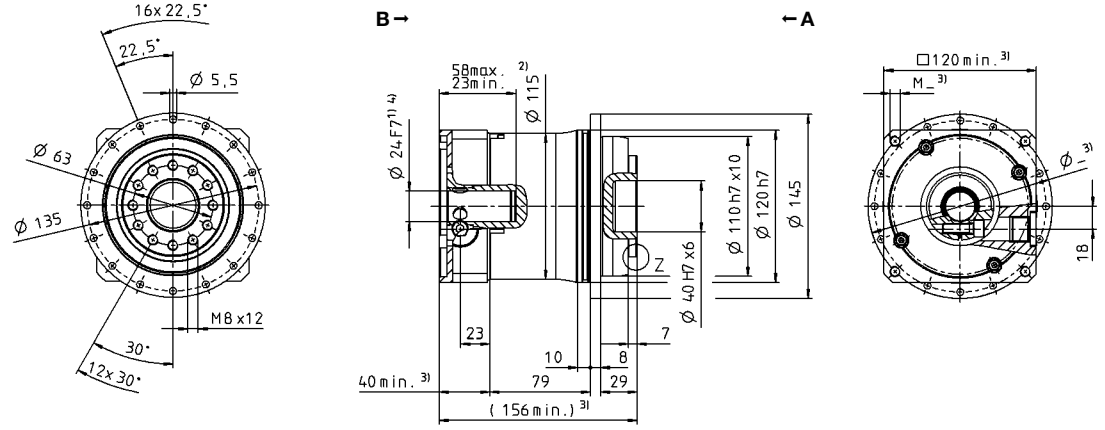
Motor shaft diameter [mm]

2-stage

up to 19 [4] (E) [5] clamping hub diameter

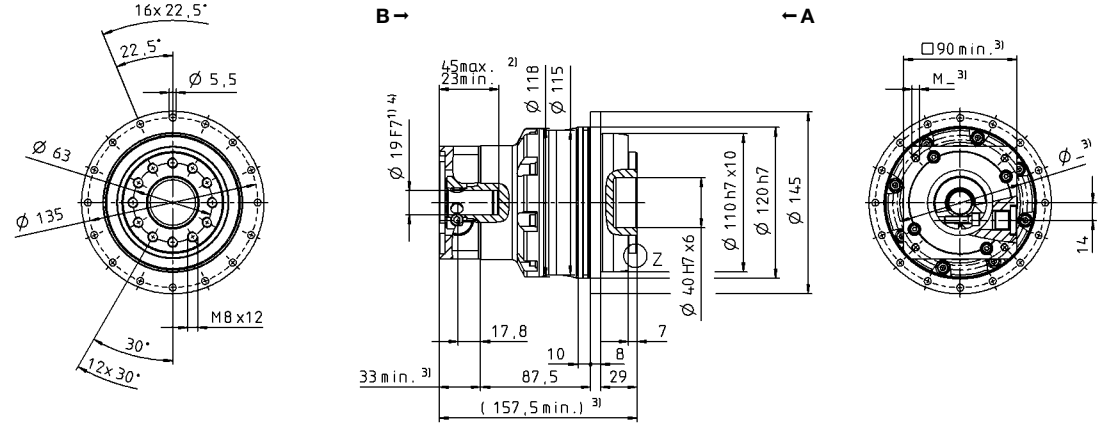


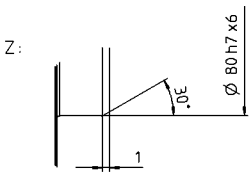
up to 24 [4] (G) clamping hub diameter



3-stage

up to 19 [4] (E) [5] clamping hub diameter





Non-tolerated dimensions are nominal dimensions

1) Check motor shaft fit
2) Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.
3) The dimensions depend on the motor
4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm
5) Standard clamping hub diameter

				2-stage				3-stage				
Ratio			*i*	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			*Nm*	1402	1402	1402	1402	1402	1402	1402	1402	1402
			in.lb	12406	12406	12406	12406	12406	12406	12406	12406	12406
Max. acceleration torque [b)] (max. 1000 cycles per hour)			*Nm*	992	992	992	992	992	992	992	992	992
			in.lb	8780	8780	8780	8780	8780	8780	8780	8780	8780
Nominal torque (at n_{1N})			*Nm*	523	566	638	717	723	794	794	794	794
			in.lb	4632	5005	5649	6348	6400	7024	7024	7024	7024
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			*Nm*	2375	2375	2375	2375	2375	2375	2375	2375	2375
			in.lb	21021	21021	21021	21021	21021	21021	21021	21021	21021
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			*rpm*	3000	3000	3000	3000	3500	3500	3500	3500	3500
Max. input speed			*rpm*	6250	6250	6250	6250	6250	6250	6250	6250	6250
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			*Nm*	2.7	2.4	2.1	1.7	1.8	1.3	1.1	0.9	0.72
			in.lb	23.9	21.2	18.9	15.0	15.9	11.5	10.1	8.0	6.4
Max. backlash			*arcmin*	≤ 1								
Torsional rigidity [b)]			*Nm/arcmin*	220	220	220	220	205	205	205	205	205
			in.lb/arcmin	1947	1947	1947	1947	1814	1814	1814	1814	1814
Tilting rigidity			*Nm/arcmin*	560								
			in.lb/arcmin	4956								
Max. axial force [c)]			*N*	6130								
			lb$_f$	1379								
Max. tilting moment			*Nm*	1335								
			in.lb	11816								
Efficiency at full load			*η*	%	94			92				
Service life			L_h	*h*	> 20000							
Weight (incl. standard adapter plate)			*m*	*kg*	12.5			13.4				
				lb$_m$	27.6			29.6				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 60			≤ 57				
Max. permitted housing temperature				*°C*	+90							
				F	194							
Ambient temperature				*°C*	–15 to +40							
				F	5 to 104							
Lubrication					Lubricated for life							
Direction of rotation					In- and output same direction							
Protection class					IP 65							
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-00300AAX-080.00							
Bore diameter of coupling on the application side				*mm*	X = 045.000 - 056.000							
Mass moment of inertia (relates to the drive)	G	24	J_1	*kgcm²*	3.80	3.33	3.00	2.80	2.60	2.40	2.20	2.10	2.10
				10^{-3} in.lb.s²	3.36	2.95	2.66	2.48	2.30	2.10	1.90	1.90	1.90
Clamping hub diameter [mm]	K	38	J_1	*kgcm²*	10.7	10.3	9.90	9.70	-	-	-	-	-
Optimized mass inertia version available on request				*10^{-3} in.lb.s²*	9.47	9.12	8.76	8.58	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

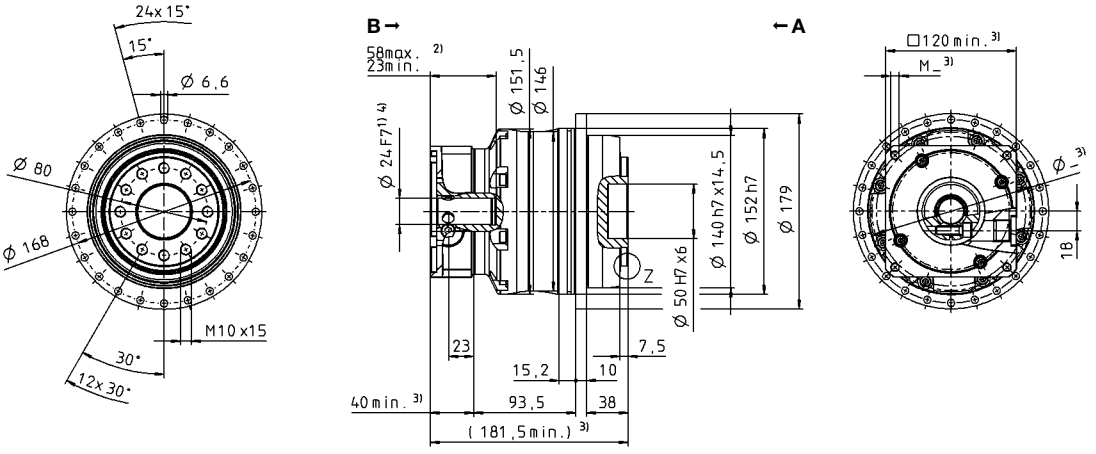
View A

View B

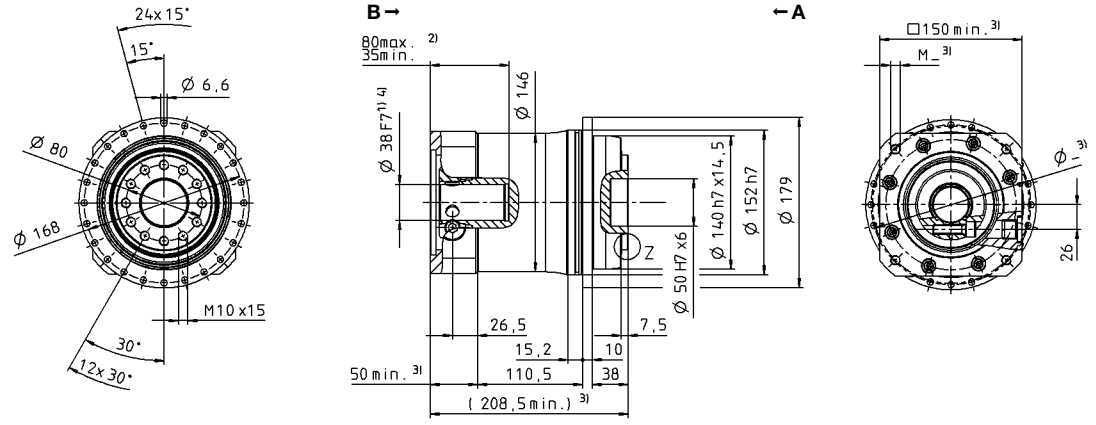
Motor shaft diameter [mm]

2-stage

up to 24 [4] (G) [5] clamping hub diameter

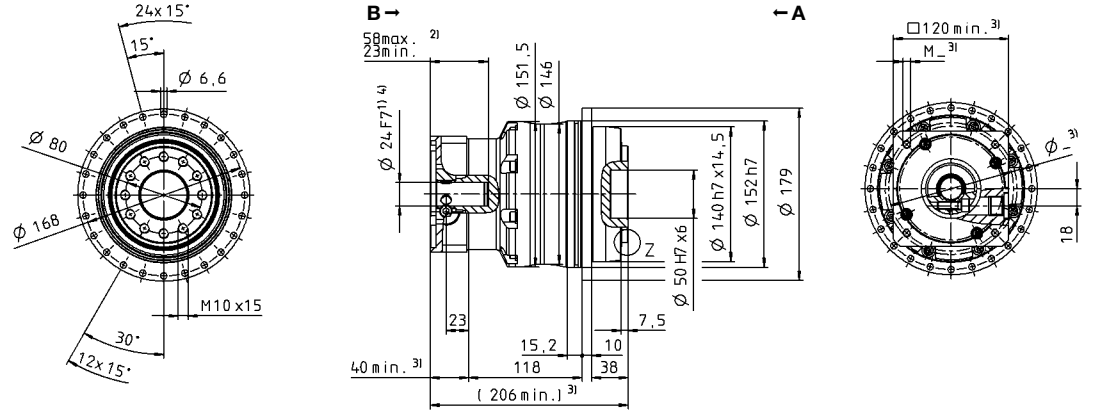


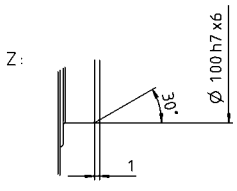
up to 38 [4] (K) clamping hub diameter



3-stage

up to 24 [4] (G) [5] clamping hub diameter





Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage				3-stage				
Ratio			*i*	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			T_{2a}	*Nm*	3822	3822	3822	3200	3023	3023	3023	3023	3023
				in.lb	33826	33826	33826	28323	26757	26757	26757	26757	26757
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	3100	3100	3100	2400	2600	2600	2600	2600	2600
				in.lb	27437	27437	27437	21242	23012	23012	23012	23012	23012
Nominal torque (at n_{1N})			T_{2N}	*Nm*	1546	1662	2149	1827	1649	1797	1924	2080	2080
				in.lb	13687	14708	19022	16169	14593	15909	17033	18410	18410
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	6500	6500	6500	6500	6500	6500	6500	6500	6500
				in.lb	57530	57530	57530	57530	57530	57530	57530	57530	57530
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2500	2500	2500	2500	3000	3000	3000	3000	3000
Max. input speed			n_{1Max}	*rpm*	5625	5625	5625	5625	5625	5625	5625	5625	5625
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	6.2	5.5	4.8	4.3	3.8	3.0	2.6	1.8	1.6
				in.lb	55.0	48.7	42.5	38.1	33.6	26.9	23	15.6	14.2
Max. backlash			j_t	*arcmin*	≤ 1								
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	730	725	715	670	650	650	650	650	650
				in.lb/arcmin	6461	6417	6328	5930	5753	5753	5753	5753	5753
Tilting rigidity			C_{2K}	*Nm/arcmin*	1452								
				in.lb/arcmin	12851								
Max. axial force [c)]			F_{2AMax}	*N*	10050								
				lb_f	2261								
Max. tilting moment			M_{2KMax}	*Nm*	3280								
				in.lb	29031								
Efficiency at full load			η	%	94								
Service life			L_h	*h*	> 20000								
Weight (incl. standard adapter plate)			*m*	*kg*	33.1				35.4				
				lb_m	73.2				78.2				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 61				≤ 59				
Max. permitted housing temperature				°C	+90								
				F	194								
Ambient temperature				°C	–15 to +40								
				F	5 to 104								
Lubrication					Lubricated for life								
Direction of rotation					In- and output same direction								
Protection class					IP 65								
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-01500AAX-125.00								
Bore diameter of coupling on the application side				*mm*	X = 055.000 - 070.000								
Mass moment of inertia (relates to the drive)	K	38	J_1	*kgcm²*	16.6	15.2	13.9	13.1	13.8	10.2	9.80	9.50	9.20
Clamping hub diameter [mm]				*10⁻³ in.lb.s²*	14.7	13.5	12.3	11.6	12.2	9.00	8.70	8.40	8.10
Optimized mass inertia version available on request	M	48	J_1	*kgcm²*	31.4	29.9	28.7	28.0	-	-	-	-	-
				10⁻³ in.lb.s²	27.8	26.5	25.4	24.8	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

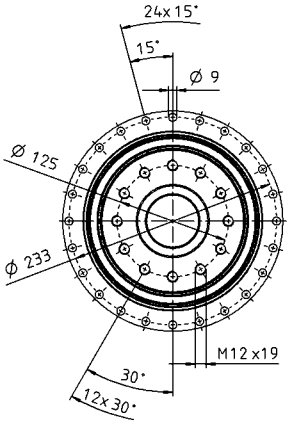
View A

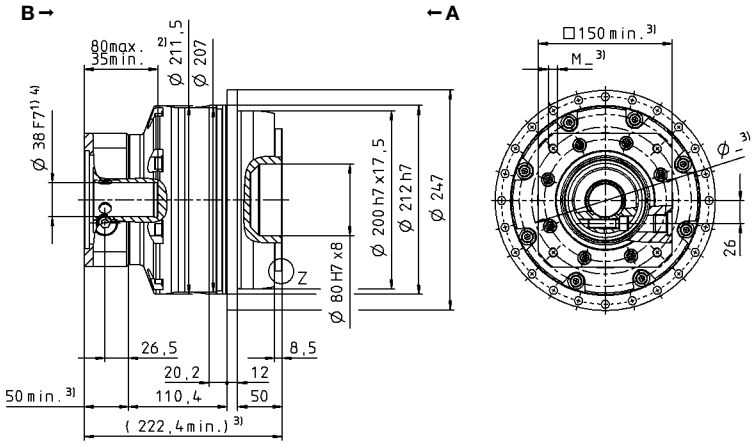
View B

Motor shaft diameter [mm]

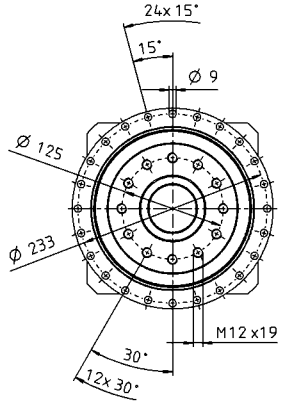
2-stage

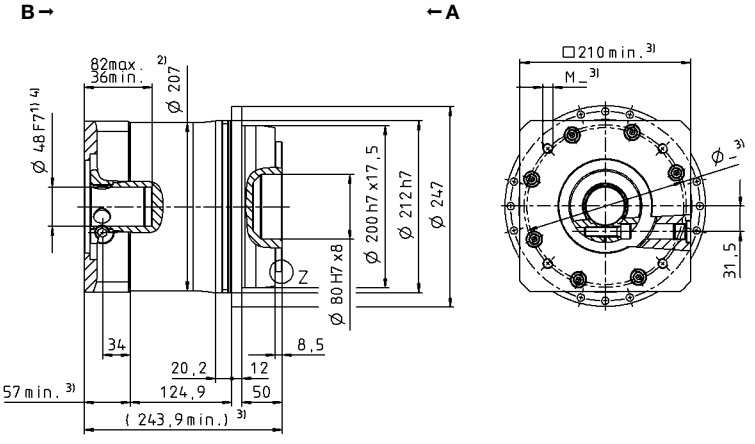
up to 38 [4] (K) [5] clamping hub diameter





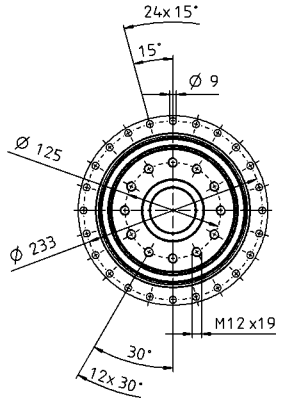
up to 48 [4] (M) clamping hub diameter

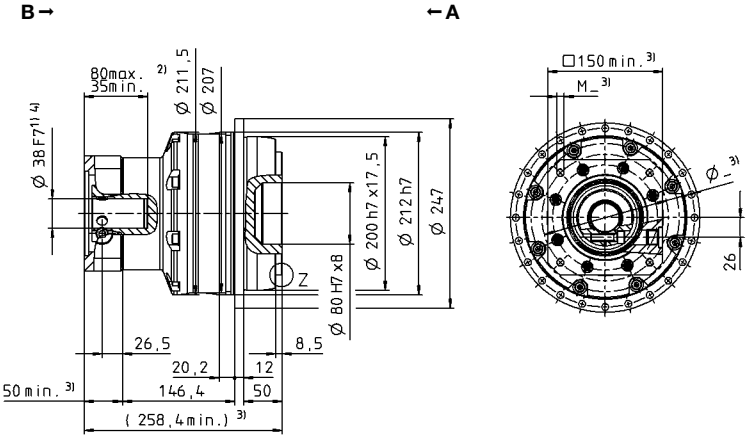


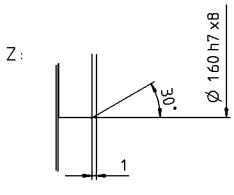


3-stage

up to 38 [4] (K) [5] clamping hub diameter







Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				1-stage	2-stage				3-stage				
Ratio			*i*		**5.5**	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			T_{2a}	*Nm*	7360	7535	7535	7535	5473	6987	6987	6987	6987	6987
				in.lb	65142	66691	66691	66691	48436	61838	61838	61838	61838	61838
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	5520	6600	6600	6600	4680	6600	6600	6600	6600	6600
				in.lb	48856	58415	58415	58415	41422	58415	58415	58415	58415	58415
Nominal torque (at n_{1N})			T_{2N}	*Nm*	2829	3566	3788	3884	3744	3216	3506	3750	4148	4617
				in.lb	25035	31563	33530	34378	33137	28465	31035	33186	36711	40863
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	10938	15333	15333	15296	15333	15333	15333	15333	15333	15333
				in.lb	96806	135709	135709	135377	135709	135709	135709	135709	135709	135709
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	1000	2000	2000	2000	2000	2000	2000	2000	2000	2000
Max. input speed			n_{1Max}	*rpm*	3125	4375	4375	4375	4375	4375	4375	4375	4375	4375
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	19	8.8	7.8	6.8	5.9	5.2	3.6	3.1	2.1	1.5
				in.lb	170	78	69	60	52	46	32	27	19	13
Max. backlash			j_t	*arcmin*	Standard ≤ 2 / Reduced ≤ 1	Standard ≤ 3 / Reduced ≤ 1.5								
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	1200	1200	1200	1200	1200	1200	1200	1200	1200	1200
				in.lb/arcmin	10621	10621	10621	10621	10621	10621	10621	10621	10621	10621
Tilting rigidity			C_{2K}	*Nm/arcmin*	5560									
				in.lb/arcmin	49210									
Max. axial force [c)]			F_{2AMax}	*N*	33000									
				lb_f	7425									
Max. tilting moment			M_{2KMax}	*Nm*	3900	6500								
				in.lb	34518	57530								
Efficiency at full load			η	%	95	93								
Service life			L_h	*h*	> 20000									
Weight (incl. standard adapter plate)			*m*	*kg*	55	64				67				
				lb_m	122	141				148				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 65	≤ 62				≤ 59				
Max. permitted housing temperature				°C	+90									
				F	194									
Ambient temperature				°C	–15 to +40									
				F	5 to 104									
Lubrication					Lubricated for life									
Direction of rotation					In- and output same direction									
Protection class					IP 65									
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-04000AAX-145.00									
Bore diameter of coupling on the application side				*mm*	X = 070.000 - 100.000									
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	K	38	J_1	*kgcm²*	-	-	-	-	-	16.6	12.9	11.6	10.3	9.50
				10^{-3} *in.lb.s²*	-	-	-	-	-	14.7	11.4	10.3	9.10	8.40
	M	48	J_1	*kgcm²*	-	30.8	27.6	24.9	23.0	-	-	-	-	-
				10^{-3} *in.lb.s²*	-	27.3	24.4	22.0	20.4	-	-	-	-	-
	N	55	J_1	*kgcm²*	129	-	-	-	-	-	-	-	-	-
				10^{-3} *in.lb.s²*	114	-	-	-	-	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

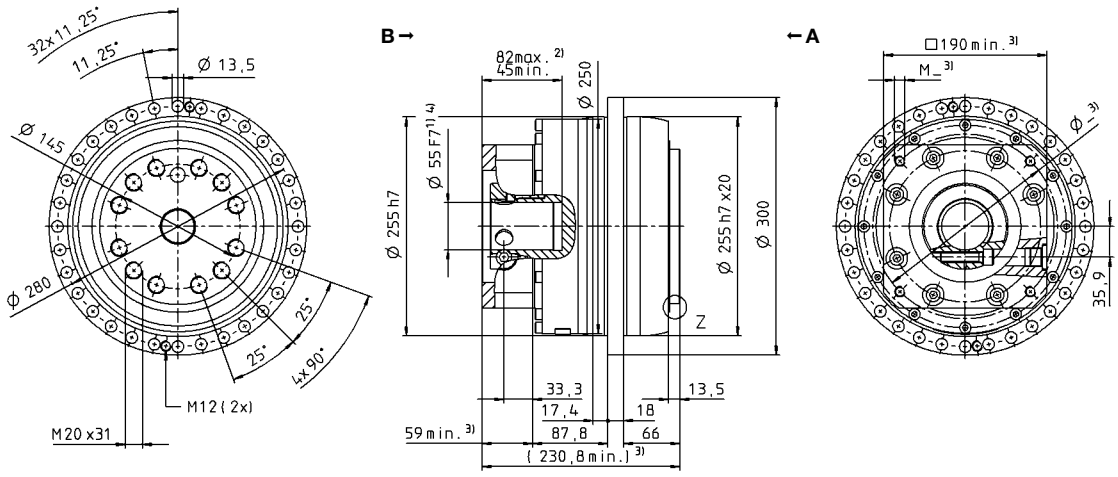
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

View A | View B

Motor shaft diameter [mm]

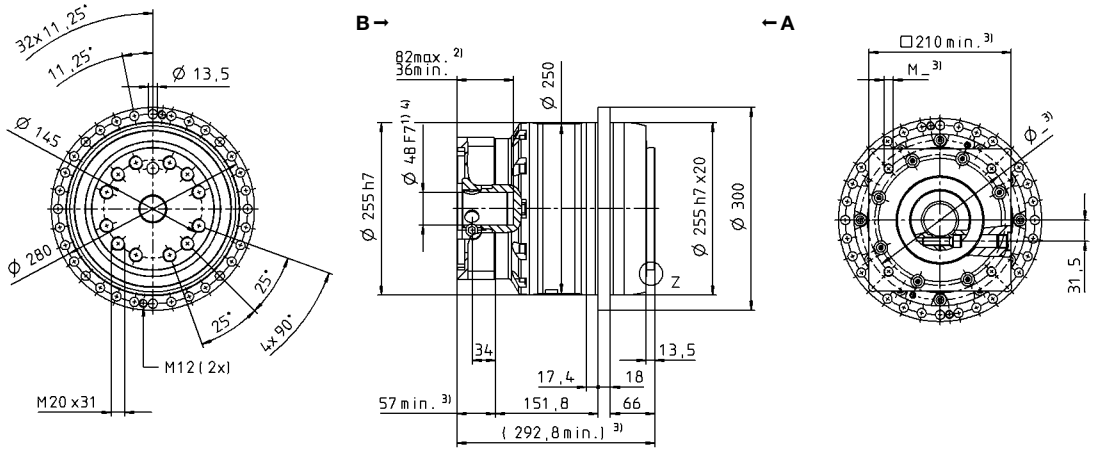
1-stage

up to 55 [4] (N) [5] clamping hub diameter



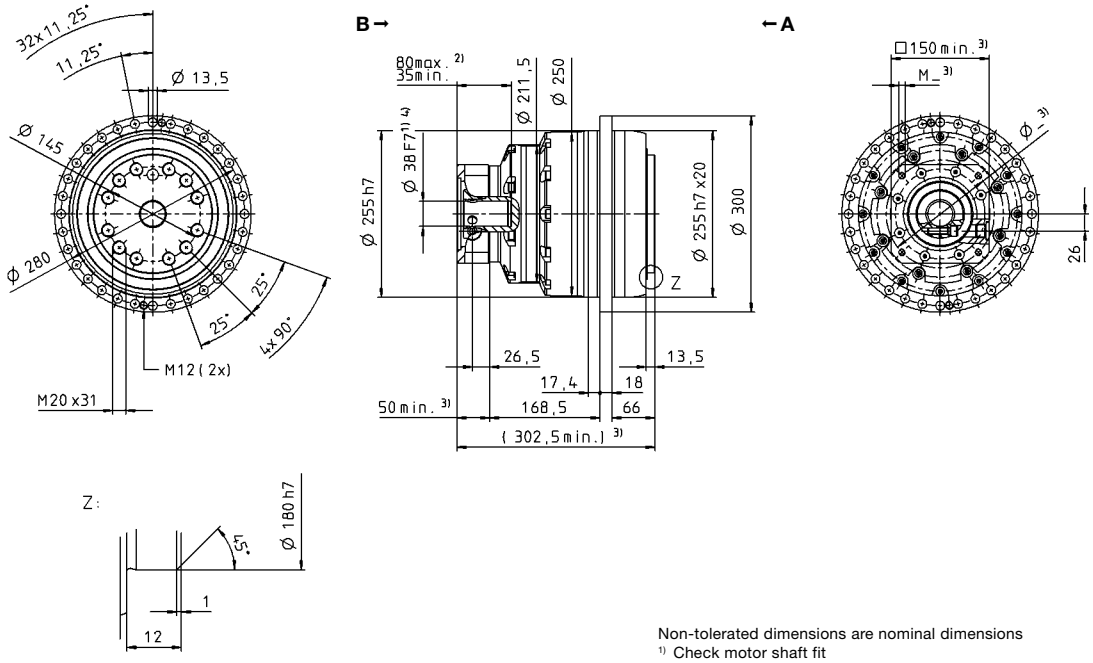
2-stage

up to 48 [4] (M) [5] clamping hub diameter



3-stage

up to 38 [4] (K) [5] clamping hub diameter



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[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

					1-stage	2-stage				3-stage				
Ratio			i		**5.5**	**22**	**27.5**	**38.5**	**55**	**66**	**88**	**110**	**154**	**220**
Max. torque [a) b)]			T_{2a}	*Nm*	10450	10450	10450	10450	10450	10450	10450	10450	10450	10450
				in.lb	92491	92491	92491	92491	92491	92491	92491	92491	92491	92491
Max. acceleration torque [b)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	9600	10450	10450	10450	8640	10450	10450	10450	10450	10450
				in.lb	84968	92491	92491	92491	76471	92491	92491	92491	92491	92491
Nominal torque (at n_{1N})			T_{2N}	*Nm*	4313	5068	4980	5057	5325	4941	7464	7396	7546	7907
				in.lb	38174	44858	44075	44759	47129	43731	66060	65462	66792	69986
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	18750	25000	25000	25000	25000	25000	25000	25000	25000	25000
				in.lb	165953	221270	221270	221270	221270	221270	221270	221270	221270	221270
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	900	1500	1500	1500	1500	1500	1500	1500	1500	1500
Max. input speed			n_{1Max}	*rpm*	3125	4375	4375	4375	4375	4375	4375	4375	4375	4375
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	27	11	10	8.9	7.8	6.8	5.0	4.7	3.6	3.0
				in.lb	241	100	89	79	69	60	45	42	32	27
Max. backlash			j_t	*arcmin*	Standard ≤ 2 / Reduced ≤ 1	Standard ≤ 3 / Reduced ≤ 1.5								
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	2000	2000	2000	1950	1900	1800	1800	1800	1800	1800
				in.lb/arcmin	17702	17702	17702	17259	16817	15931	15931	15931	15931	15931
Tilting rigidity			C_{2K}	*Nm/arcmin*	9480									
				in.lb/arcmin	83906									
Max. axial force [c)]			F_{2AMax}	*N*	50000									
				lb_f	11250									
Max. tilting moment			M_{2KMax}	*Nm*	6600	9500								
				in.lb	58415	84083								
Efficiency at full load			η	%	95	93								
Service life			L_h	*h*	> 20000									
Weight (incl. standard adapter plate)			m	*kg*	80	80				89				
				lb_m	177	177				197				
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 70	≤ 63				≤ 60				
Max. permitted housing temperature				°C	+90									
				F	194									
Ambient temperature				°C	–15 to +40									
				F	5 to 104									
Lubrication					Lubricated for life									
Direction of rotation					In- and output same direction									
Protection class					IP 65									
Metal bellows coupling (recommended product type – validate sizing with cymex®)					BCT-10000AAX-166.00									
Bore diameter of coupling on the application side				*mm*	X = 080.000 - 180.000									
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	K	38	J_1	*kgcm²*	-	-	-	-	-	17.9	13.5	11.9	10.5	9.70
				10^{-3} *in.lb.s²*	-	-	-	-	-	15.8	11.9	10.5	9.30	8.60
	M	48	J_1	*kgcm²*	-	43.8	36.9	30.5	27.0	32.7	28.3	26.7	25.2	24.4
				10^{-3} *in.lb.s²*	-	38.8	32.7	27.0	23.9	28.9	25.0	23.6	22.3	21.6
	O	60	J_1	*kgcm²*	175	-	-	-	-	-	-	-	-	-
				10^{-3} *in.lb.s²*	155	-	-	-	-	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

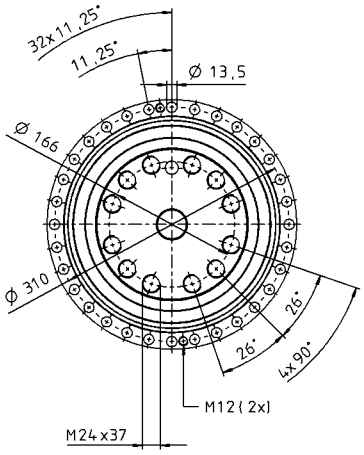
[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

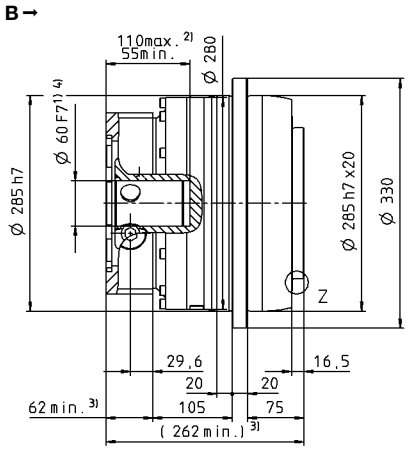
View A | View B

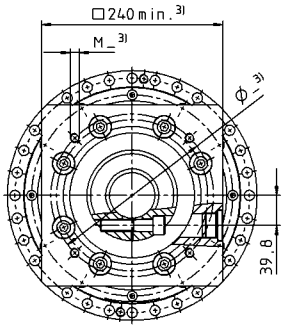
Motor shaft diameter [mm]

1-stage

up to 60 [4] (O) [5] clamping hub diameter

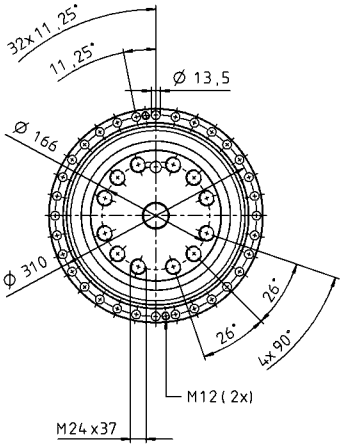


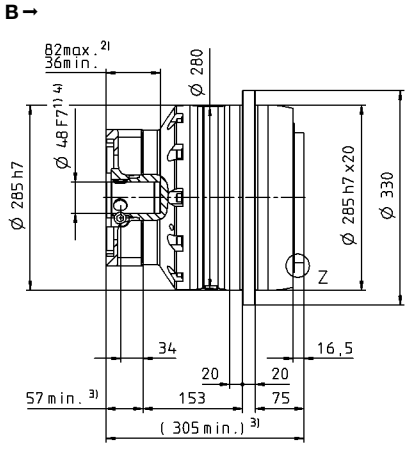


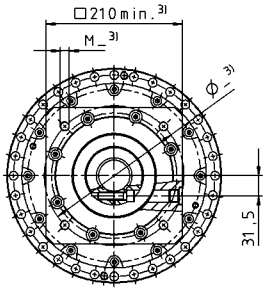


2-stage

up to 48 [4] (M) [5] clamping hub diameter

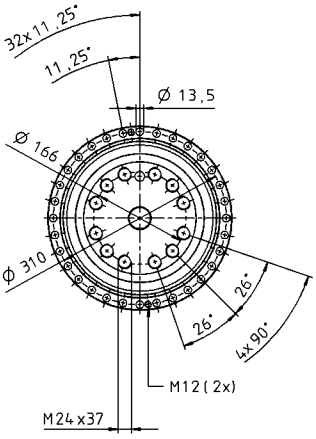


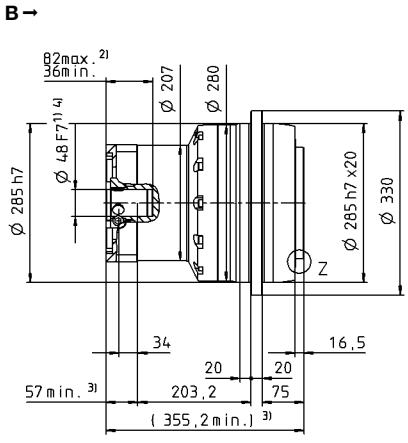


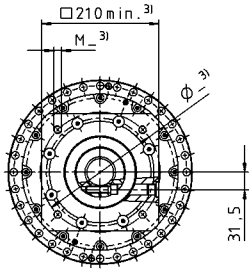


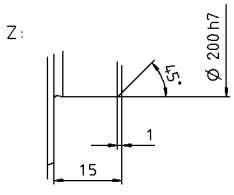
3-stage

up to 38/48 [4] (K/M [5]) clamping hub diameter









Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage		3-stage						
Ratio			*i*	**22**	**30.25**	**66**	**88**	**110**	**121**	**154**	**220**	**302.5**
Max. torque [a) b)]			*Nm*	22000	22000	22000	22000	22000	22000	22000	15600	21500
			in.lb	194718	194718	194718	194718	194718	194718	194718	138072	190292
Max. acceleration torque [b)] (max. 1000 cycles per hour)			*Nm*	22000	22000	22000	22000	22000	22000	22000	15600	21500
			in.lb	194718	194718	194718	194718	194718	194718	194718	138072	190292
Nominal torque (at n_{1N})			*Nm*	13500	13500	13500	13500	13500	13500	13500	10000	13500
			in.lb	119486	119486	119486	119486	119486	119486	119486	88508	119486
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			*Nm*	44000	44000	44000	44000	44000	44000	44000	44000	44000
			in.lb	389435	389435	389435	389435	389435	389435	389435	389435	389435
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			*rpm*	2000	2000	2500	2500	2500	2500	2500	2500	2500
Max. input speed			*rpm*	3000	3000	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)			*Nm*	17	13	7.5	6.0	5.0	5.0	4.5	4.0	4.0
			in.lb	151	115	66	53	44	44	40	35	35
Max. backlash			*arcmin*	≤ 3								
Torsional rigidity [b)]			*Nm/arcmin*	2900	2900	3000	3000	3000	3000	2950	2850	2850
			in.lb/arcmin	25667	25667	26552	26552	26552	26552	26110	25225	25225
Tilting rigidity			*Nm/arcmin*	13000								
			in.lb/arcmin	115060								
Max. axial force [c)]			*N*	100000								
			lb$_f$	22500								
Max. tilting moment			*Nm*	31600								
			in.lb	279685								
Efficiency at full load			*η*	95								
Service life			*h*	> 20000								
Weight (incl. standard adapter plate)			*kg*	190		185						
			lb$_m$	420		409						
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			*dB(A)*	≤ 68		≤ 66						
Max. permitted housing temperature			*°C*	+90								
			F	194								
Ambient temperature			*°C*	0 to +40								
			F	32 to 104								
Lubrication				Lubricated for life								
Direction of rotation				In- and output same direction								
Protection class				IP 65								
Metal bellows coupling (recommended product type – validate sizing with cymex®)				–								
Bore diameter of coupling on the application side			*mm*	–								
Mass moment of inertia (relates to the drive)	M	48	J_1	*kgcm²*	-	-	52	37	35	35	28	26	25
				10^{-3} in.lb.s²	-	-	46	33	31	31	25	23	22
Clamping hub diameter [mm]	N	55	J_1	*kgcm²*	101	74	-	-	-	-	-	-	-
Optimized mass inertia version available on request				*10^{-3} in.lb.s²*	89	65	-	-	-	-	-	-	-

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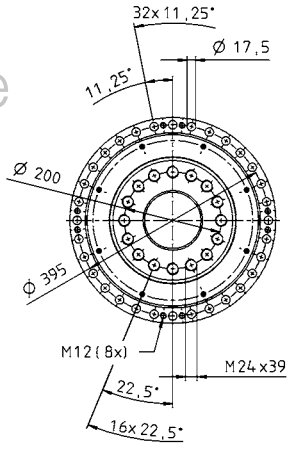
View A

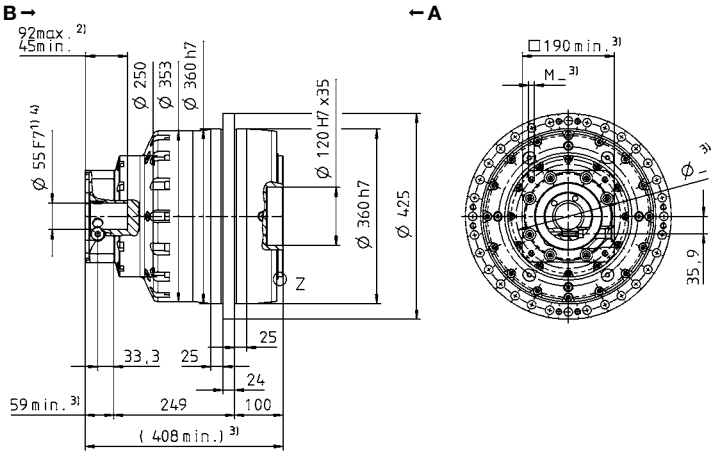
View B

Motor shaft diameter [mm]

2-stage

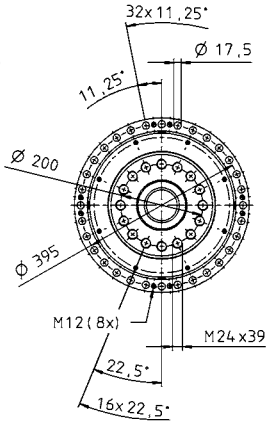
up to 55 [4] (N) [5] clamping hub diameter

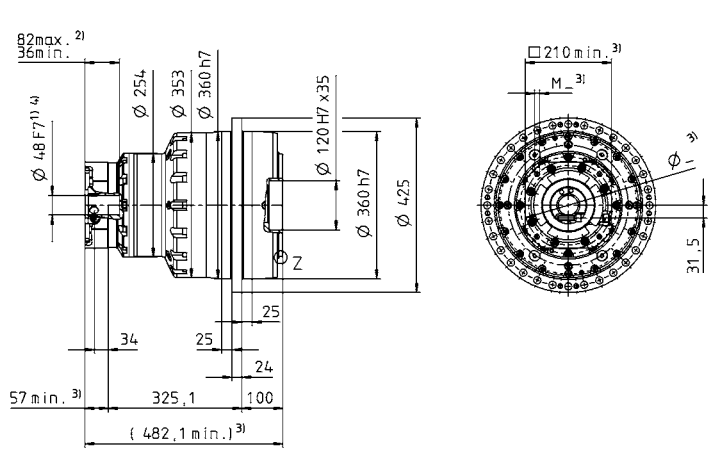


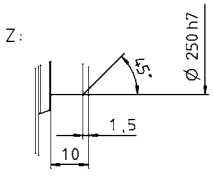


3-stage

up to 48 [4] (M) [5] clamping hub diameter







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[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

				2-stage		3-stage						
Ratio			*i*	**22**	**30.25**	**66**	**88**	**110**	**121**	**154**	**220**	**302.5**
Max. torque [a) b)]			*Nm*	40000	40000	40000	40000	40000	40000	40000	32000	40000
			T_{2a}	*in.lb*	354032	354032	354032	354032	354032	354032	354032	283226	354032
Max. acceleration torque [b)] (max. 1000 cycles per hour)			*Nm*	40000	40000	40000	40000	40000	40000	40000	32000	40000
			T_{2B}	*in.lb*	354032	354032	354032	354032	354032	354032	354032	283226	354032
Nominal torque (at n_{1N})			*Nm*	18000	18000	18000	18000	18000	18000	18000	16500	18000
			T_{2N}	*in.lb*	159314	159314	159314	159314	159314	159314	159314	146038	159314
Emergency stop torque [a) b)] (permitted 1000 times during the service life of the gearbox)			*Nm*	70000	70000	70000	70000	70000	70000	70000	61000	70000
			T_{2Not}	*in.lb*	619556	619556	619556	619556	619556	619556	619556	539899	619556
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	1500	1500	1500	1500	1500	1500	1500	1500	1500
Max. input speed			n_{1Max}	*rpm*	3000	3000	3000	3000	3000	3000	3000	3000	3000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)			*Nm*	26	21	15	12	10	10	8.5	7.5	7.5
			T_{012}	*in.lb*	230	186	133	106	89	89	75	66	66
Max. backlash			j_t	*arcmin*	≤ 4								
Torsional rigidity [b)]			*Nm/arcmin*	5300	5300	5800	5800	5800	5800	5700	5700	5700
			C_{t21}	*in.lb/arcmin*	46909	46909	51335	51335	51335	51335	50450	50450	50450
Tilting rigidity			*Nm/arcmin*	65000								
			C_{2K}	*in.lb/arcmin*	575302								
Max. axial force [c)]			*N*	140000								
			F_{2AMax}	lb_f	31500								
Max. tilting moment			*Nm*	58000		71400						
			M_{2KMax}	*in.lb*	513346		631947						
Efficiency at full load			η	%	95		93						
Service life			L_h	*h*	> 20000								
Weight (incl. standard adapter plate)			*m*	*kg*	350		380						
				lb_m	774		840						
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 70		≤ 68						
Max. permitted housing temperature				*°C*	+90								
				F	194								
Ambient temperature				*°C*	0 to +40								
				F	32 to 104								
Lubrication					Lubricated for life								
Direction of rotation					In- and output same direction								
Protection class					IP 65								
Metal bellows coupling (recommended product type – validate sizing with cymex®)					–								
Bore diameter of coupling on the application side				*mm*	–								
Mass moment of inertia (relates to the drive)	M	48	J_1	*kgcm²*	-	-	85	55	43	48	34	29	28
				10^{-3} in.lb.s²	-	-	75	49	38	42	30	26	25
Clamping hub diameter [mm]	O	60	J_1	*kgcm²*	230	174	-	-	-	-	-	-	-
Optimized mass inertia version available on request				*10^{-3} in.lb.s²*	204	154	-	-	-	-	-	-	-

Please use our sizing software cymex® for a detailed sizing **– www.wittenstein-cymex.com**

[a)] At max. 10 % M_{2KMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures

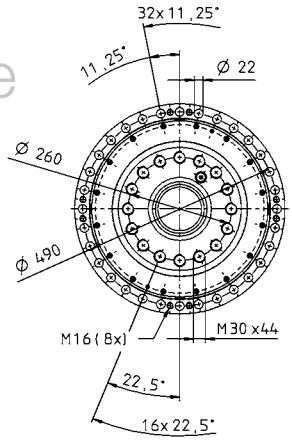
View A

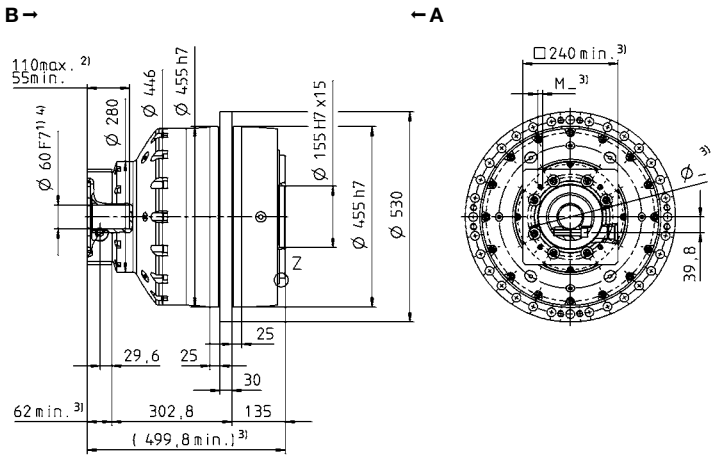
View B

Motor shaft diameter [mm]

2-stage

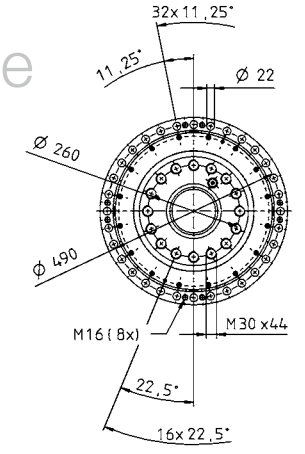
up to 60 [4] (O) [5] clamping hub diameter

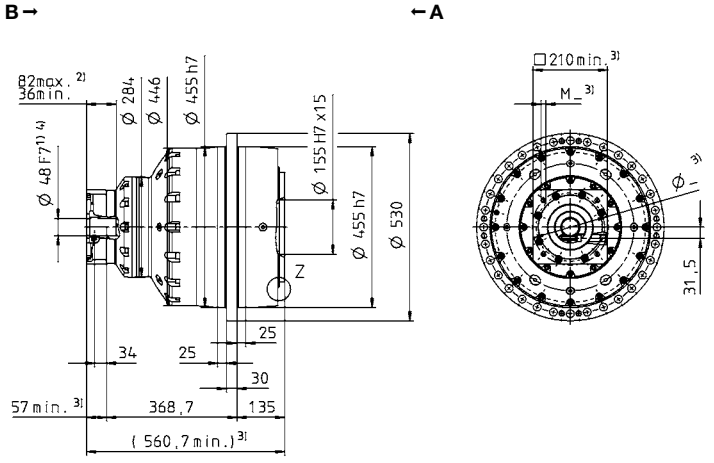


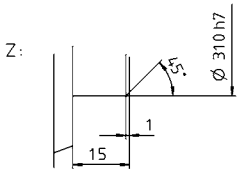


3-stage

up to 48 [4] (M) [5] clamping hub diameter







Non-tolerated dimensions are nominal dimensions

[1] Check motor shaft fit

[2] Min./Max. permissible motor shaft length. Longer motor shafts are possible, please contact alpha.

[3] The dimensions depend on the motor

[4] Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm

[5] Standard clamping hub diameter

Basic Line gearbox overview

Product type		CP	CPS	CPK	CPSK	CVH	CVS
Version		MF	MF	MF	MF	MF / MT	MF / MT
Ratio [c]	min. *i* =	3	3	3	3	7	7
	max. *i* =	100	100	100	100	40	40
Max. torsional backlash [arcmin] [c]	Standard	≤ 12	≤ 12	≤ 13	≤ 15	≤ 15	≤ 15
	Reduced	–	–	–	–	–	–
Output shape							
Smooth shaft		x	x	x	x	–	x
Shaft with key [d]		x	x	x	x	–	x
Splined shaft (DIN 5480)		–	–	–	–	–	–
Blind hollow shaft		–	–	–	–	–	–
Hollow shaft interface		–	–	–	–	x	–
Keyed hollow shaft		–	–	–	–	x	–
Flanged hollow shaft		–	–	–	–	–	–
Flange		–	–	–	–	–	–
System output		–	–	–	–	–	–
Output on both sides		–	–	–	–	x	x
Input type							
Motor-mounted		x	x	x	x	x	x
Self-contained version [b]		–	–	–	–	–	–
Characteristic							
Flange with slotted holes		–	–	–	–	–	–
ATEX [a]		–	–	–	–	–	–
Food-grade lubrication [a] [b]		x	x	x	x	x	x
Corrosion resistant [a] [b]		–	–	–	–	–	–
Optimized mass inertia [a]		–	–	–	–	–	–
System solutions							
Linear system (rack / pinion)		–	–	–	–	–	–
Servo actuator		–	–	–	–	–	–
Accessories (please refer to the product pages for further options)							
Coupling		x	x	x	x	–	x
Shrink disc		–	–	–	–	x	–

[a] Power reduction: technical data available on request
[b] Please contact WITTENSTEIN alpha
[c] In relation to reference sizes
[d] Power reduction: Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

Value Line gearbox overview

Product type		NP	NPL	NPS	NPT	NPR	NPK	NPLK	NPSK	NPTK	NPRK	NVH	NVS	HDV
Version		MF / MA	MF / MA	MF / MA	MF / MA	MF / MA	MF	MF	MF	MF	MF	MF	MF	MF / MT
Ratio [c]	min. i =	3	3	3	3	3	3	3	3	3	3	4	4	4
	max. i =	100	100	100	100	100	100	100	100	100	100	400	400	100
Max. torsional backlash [arcmin] [c]	Standard	≤ 8	≤ 8	≤ 8	≤ 8	≤ 8	≤ 11	≤ 11	≤ 11	≤ 11	≤ 11	≤ 6	≤ 6	≤ 10
	Reduced	–	–	–	–	–	–	–	–	–	–	–	–	–
Output type														
Smooth shaft		x	x	x	–	x	x	x	x	–	x	–	x	x
Shaft with key [d]		x	x	x	–	x	x	x	x	–	x	–	x	x
Splined shaft (DIN 5480)		–	x	x	–	x	–	x	x	–	x	–	–	–
Blind hollow shaft		–	–	–	–	–	–	–	–	–	–	–	–	–
Hollow shaft interface		–	–	–	–	–	–	–	–	–	–	x	–	–
Keyed hollow shaft		–	–	–	–	–	–	–	–	–	–	x	–	–
Flanged hollow shaft		–	–	–	–	–	–	–	–	–	–	–	–	–
Flange		–	–	–	x	–	–	–	–	x	–	–	–	–
System output		–	–	–	–	–	–	–	–	–	–	–	–	–
Output on both sides		–	–	–	–	–	–	–	–	–	–	x	x	–
Input type														
Motor-mounted		x	x	x	x	x	x	x	x	x	x	x	x	x
Self-contained version [b]		–	–	–	–	–	–	–	–	–	–	–	–	–
Characteristic														
Flange with slotted holes		–	–	–	–	x	–	–	–	–	x	–	–	–
ATEX [a]		–	–	–	–	–	–	–	–	–	–	–	–	–
Food-grade lubrication [a] [b]		x	x	x	x	x	x	x	x	x	x	x	x	x
Corrosion resistant [a] [b]		–	–	–	–	–	–	–	–	–	–	x	x	x
Optimized mass inertia [a]		–	–	–	–	–	–	–	–	–	–	–	–	–
System solutions														
Linear system (rack / pinion)		x	x	x	–	x	x	x	x	–	x	–	x	–
Servo actuator		–	–	–	–	–	–	–	–	–	–	–	–	x
Accessories (please refer to the product pages for further options)														
Coupling		x	x	x	x	x	x	x	x	–	x	–	x	–
Shrink disc		–	–	–	–	–	–	–	–	–	–	x	–	–

[a] Power reduction: technical data available on request
[b] Please contact WITTENSTEIN alpha
[c] In relation to reference sizes
[d] Power reduction: Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

Advanced Line gearbox overview

Product type		SP+	SP+ HIGH SPEED	SP+ HIGH SPEED friction optimized	TP+	TP+ HIGH TORQUE	HG+	SK+	SPK+
Version		MF	MC	MC-L	MF	MA	MF	MF	MF
Catalog page		26	26	26	80	80	128	140	150
Ratio [c]	min. i =	3	3	3	4	22	3	3	12
	max. i =	100	100	10	100	302.5	100	100	10000
Max. torsional backlash [arcmin] [c]	Standard	≤ 3	≤ 4	≤ 4	≤ 3	≤ 1	≤ 4	≤ 4	≤ 4
	Reduced	≤ 1	≤ 2	≤ 2	≤ 1	–	–	–	≤ 2
Output shape									
Smooth shaft		x	x	x	–	–	–	x	x
Shaft with key [d]		x	x	x	–	–	–	x	x
Splined shaft (DIN 5480)		x	x	x	–	–	–	x	x
Blind hollow shaft		x	x	x	–	–	–	–	x
Hollow shaft interface		–	–	–	–	–	x	–	–
Keyed hollow shaft		–	–	–	–	–	–	–	–
Flanged hollow shaft		–	–	–	–	–	–	–	–
Flange		–	–	–	x	x	–	–	–
System output		–	–	–	x	x	–	–	–
Output on both sides		–	–	–	–	–	x	x	x
Input type									
Motor-mounted		x	x	x	x	x	x	x	x
Self-contained version [b]		x	–	–	x	–	–	–	–
Characteristic									
Flange with slotted holes		x	–	–	–	–	–	–	–
ATEX [a]		x	x	–	–	–	x	x	–
Food-grade lubrication [a] [b]		x	x	x	x	x	x	x	x
Corrosion resistant [a] [b]		x	x	x	x	x	x	x	x
Optimized mass inertia [a]		x	x	x	x	x	–	–	–
System solutions									
Linear system (rack / pinion)		x	x	–	x	x	–	x	x
Servo actuator		x	–	–	x	x	–	–	–
Accessories (please refer to the product pages for further options)									
Coupling		x	x	x	x	x	–	x	x
Shrink disc		x	x	x	–	–	x	–	x

[a] Power reduction: technical data available on request
[b] Please contact WITTENSTEIN alpha
[c] In relation to reference sizes
[d] Power reduction: Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

TK+	TPK+	TPK+ HIGH TORQUE	SC+	SPC+	TPC+	VH+	VS+	VT+	DP+	HDP+
MF	MF	MA	MF	MF	MF	MF	MF	MF	MF / MA	MA
178	188	188	228	238	248	262	272	280	292	308
3	12	66	1	4	4	4	4	4	16	22
100	10000	5500	2	20	20	400	400	400	55	55
≤ 4	≤ 4	≤ 1.3	≤ 4	≤ 4	≤ 4	≤ 3	≤ 3	≤ 3	≤ 3	≤ 1
–	≤ 2	–	–	≤ 2	≤ 2	≤ 2	≤ 2	≤ 2	≤ 1	–
–	–	–	x	x	–	–	x	–	–	–
–	–	–	x	x	–	–	x	–	–	–
–	–	–	–	x	–	–	x	–	–	–
–	–	–	–	x	–	–	–	–	–	–
–	–	–	–	–	–	x	–	–	–	–
–	–	–	–	–	–	x	–	–	–	–
x	–	–	–	–	–	–	–	x	–	–
–	x	x	–	–	x	–	–	–	x	x
–	x	x	–	–	x	–	–	–	–	–
x	x	x	–	–	–	x	x	–	–	–
x	x	x	x	x	x	x	x	x	x	x
–	–	–	–	–	–	–	–	–	–	–
–	–	–	–	–	–	–	–	–	–	–
x	–	–	–	–	–	–	–	–	–	–
x	x	x	x	x	x	x	x	x	x	x
x	x	x	–	–	–	x	x	x	x	x
–	–	–	–	–	–	–	–	–	x	x
x	x	x	x	x	x	–	x	x	–	–
–	–	–	–	–	–	–	–	–	–	–
x	x	x	x	x	x	–	x	x	–	–
–	–	–	–	x	–	x	–	–	–	–

Premium Line gearbox overview

Product type		**XP+**	**RP+**	**XPK+**	**RPK+**	**XPC+**	**RPC+**
Version		MF / MC	MF / MA	MF	MA	MF	MA
Ratio [c]	min. *i* =	3	22	12	48	4	22
	max. *i* =	100	220	1000	5500	20	55
Max. torsional backlash [arcmin] [c]	Standard	≤ 3	≤ 1	≤ 4	≤ 1.3	≤ 4	≤ 1.3
	Reduced	≤ 1	–	≤ 2	–	≤ 2	–
Output shape							
Smooth shaft		x	–	x	–	x	–
Shaft with key [d]		x	–	x	–	x	–
Splined shaft (DIN 5480)		x	–	x	–	x	–
Blind hollow shaft		x	–	x	–	x	–
Hollow shaft interface		–	–	–	–	–	–
Keyed hollow shaft		–	–	–	–	–	–
Flanged hollow shaft		–	–	–	–	–	–
Flange		–	x	–	x	–	x
System output		x	x	x	x	x	x
Output on both sides		–	–	–	–	–	–
Input type							
Motor-mounted		x	x	x	x	x	x
Self-contained version [b]		x	–	–	–	–	–
Characteristic							
Flange with slotted holes		x	x	x	x	x	x
ATEX [a]		–	–	–	–	–	–
Food-grade lubrication [a] [b]		x	x	x	x	x	x
Corrosion resistant [a] [b]		–	–	–	–	–	–
Optimized mass inertia [a]		x	x	–	–	–	–
System solutions							
Linear system (rack / pinion)		x	x	x	x	x	x
Servo actuator		x	x	–	–	–	–
Accessories (please refer to the product pages for further options)							
Coupling		x	–	x	–	x	–
Shrink disc		x	–	x	–	x	–

[a] Power reduction: technical data available on request
[b] Please contact WITTENSTEIN alpha
[c] In relation to reference sizes
[d] Power reduction: Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

Overview of gearbox variants

S P | 100 | **S** | – | M | F | 1 | – | 10 | – | 0 | G | 1 | – | 2 | S

Characteristic:
B = Modular output combination
C = Reverse centering
E = ATEX
F = Food grade lubrication
G = Grease
H = Food-grade grease
L = Friction optimized
R = Flange with slotted holes
S = Standard
W = Corrosion resistant

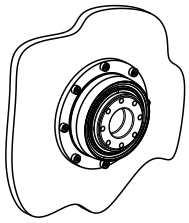
Explanation of variants deviating from the standard:

B = Modular output combination

An additional backward output type is available for hypoid gearboxes. See page 353 for details.

C = Reverse centering

To save space, this variant offers greater flexibility in mounting the product on the machine.



E = ATEX

Devices bearing the Ex symbol comply with EU Directive 2014/34/EN (ATEX) and are approved for use in defined explosion-prone zones. Performance data is limited and can be found in the operating instructions.

F = Food grade lubrication

These products are available with food-grade lubrication and can therefore be used in the food industry. Please note that the torque ratings in the catalog are reduced by 20 % (excluding V-Drive).

G = Grease

This variant allows you to lubricate selected products with grease instead of oil. Please note that the torque ratings in the catalog are reduced by 20 %.

H = Food-grade grease

This variant allows you to lubricate selected products with food-safe grease instead of oil. Please note that the torque ratings in the catalog are reduced by 40%.

L = Friction optimized

A friction-optimized variant is available for HIGH SPEED products.
Design changes allow the products to be used particularly in applications with high temperature sensitivity, high nominal speeds or long duty cycles.

R = Flange with slotted holes

This output type is designed for linear applications with rack and pinion or belt pulley. Integrated slotted holes enable easy positioning of the pinion or simple tensioning of the belt.

W = Corrosion resistant

These products can be used in corrosive environments, e.g. in the food industry, pharmaceutical industry or packaging industry. All external product areas have been designed to avoid corrosion. In addition the products are provided with food-grade grease lubrication. Please note that the torque ratings in the catalog are reduced by 20 % (excluding V-Drive).

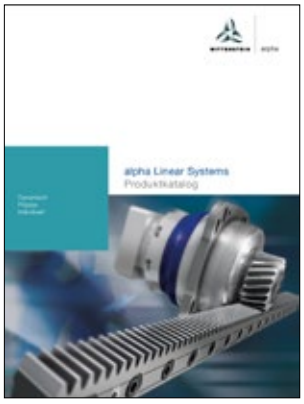
alpha Advanced Linear Systems

Strong performance in the advanced segment

Advanced Linaer Systems are adapted to applications with average to high demands in terms of smooth running, positioning accuracy and feed force. Different gearbox versions and options such as HIGH TORQUE or HIGH SPEED can be selected to utilize the most appropriate system for the application. Typical fields of application include wood, plastic and composite machining, machining centers and automation.

The alpha preferred linear system – The best of each segment

Our preferred linear systems in the Advanced Segment are always comprised of the perfect combination of gearbox, pinion, rack and lubrication system. The systems are optimized to achieve the required feed force, feed speed, rigidity and degree of utilization of the individual components.



For further information, refer to our alpha Linear Systems catalog and our website: www.wittenstein-alpha.com/linear-systems

For a wide range of applications

Linear systems from WITTENSTEIN alpha are suitable for a wide range of applications and industries. New standards and advantages have been achieved in the following areas:

- Smooth operation
- Positioning accuracy
- Feed force
- Power density
- Rigidity
- Easy installation
- Design options
- Scalability

Together with a comprehensive range of services, we pledge to support you from the initial concept to the design, installation and commissioning phase. We will also ensure a consistent supply of spare parts.

Your benefits at a glance

Perfectly adapted linear systems available with planetary, right-angle and worm gearboxes or as an actuator

Optionally with INIRA®

Large individual configuration range due to numerous pinion/gearbox combinations

INIRA®: The revolution in rack assembly

Simply scan the QR code using your smartphone to see INIRA® in action.

INIRA® combines our existing innovative concepts for the simple, safe and efficient installation of racks. INIRA® clamping, INIRA® adjusting and INIRA® pinning have already made the assembly process much faster, more accurate and more ergonomic. Available for the Advanced and Premium Linear Systems.

INIRA® clamping: Simply faster and more ergonomic

Previously, enormous effort was required to clamp racks to the machine bed using screw clamps. INIRA® clamping integrates the clamping device in the rack. The rack incorporates a mounting sleeve which is guided over the head of the fastening screw to ensure quick and ergonomic clamping.

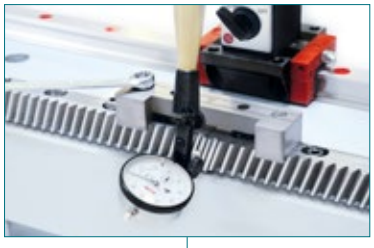
INIRA® adjusting: Simply safer and more precise

In combination with INIRA® clamping, INIRA® adjusting is the ideal solution for perfectly adjusting the transition between two rack segments. The innovative setting tool can adjust the transition extremely reliably and precisely, accurate to the micrometer.

INIRA® pinning: Simply better and more efficient

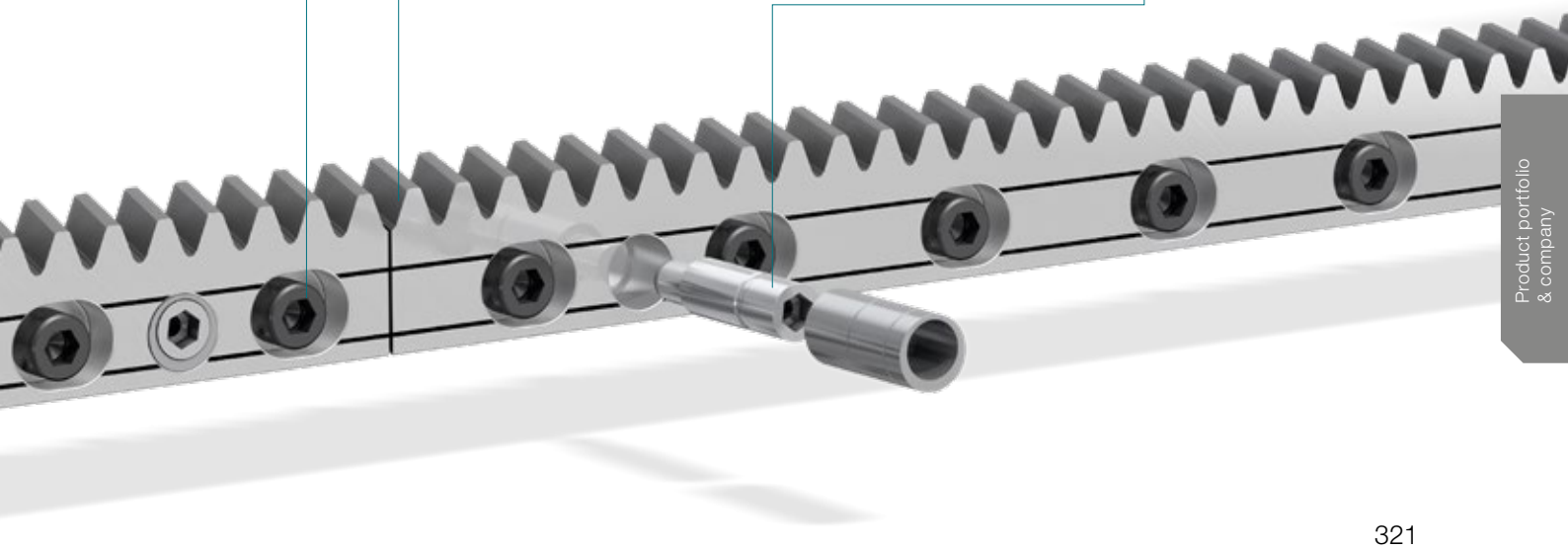
The previous method used for pinning racks was extremely time-consuming. Precision bores have to be drilled and the chips generated must be carefully removed from the assembly. INIRA® pinning now offers a completely new solution for the chipless pinning of racks, which reduces installation times considerably (time spent on each rack ~ 1 min).

INIRA® clamping



INIRA® adjusting

INIRA® pinning



Precision meets motion = premo® by WITTENSTEIN alpha

premo® is a new, powerful servo actuator platform that combines absolute precision with perfect movement. The central idea behind this first fully scalable servo actuator platform is uncompromising flexibility from the viewpoint of the user. Motors and gearboxes with application-related graduated performance characteristics can be configured modularly to individual servo actuators. The result is a highly versatile modular system with customizable power, designed for a wide variety of applications. The core of the servo actuator is a torsionally rigid precision gearbox with low backlash and excellent torque density combined with the equally powerful, permanent magnet servo motor with a split winding that guarantees low cogging and minimal velocity ripple.

premo® – clearly superior in performance

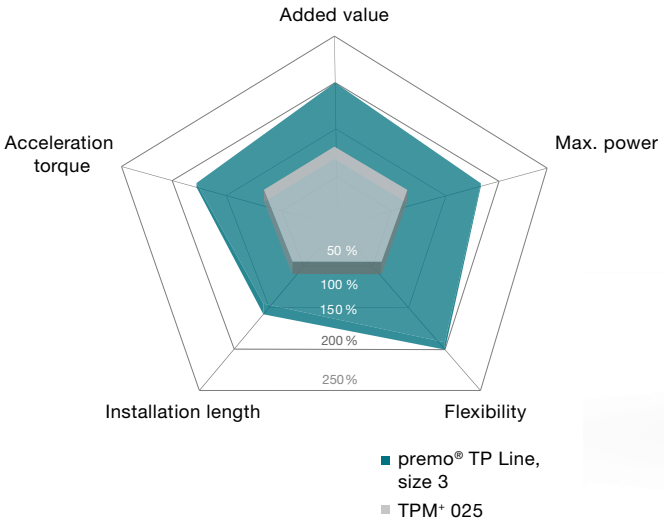
- Higher machine performance thanks to higher acceleration torque
- High torque density combined with a compact design allow for the realization of higher performance machines with significant space saving
- Improved connectivity to next generation controllers from leading system providers through the use of digital feedback (EnDat 2.2, DSL, HIPERFACE DSL®, DRIVE-CLiQ)
- Compatibility for high bus voltages up to 750 V DC
- Reduced wiring requirement through single-connector technology
- Improved reliability and safety through the use of more powerful brakes and SIL 2 encoders

Product highlights

Optimized power density for greater energy efficiency and productivity

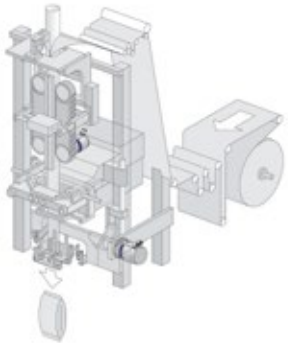
Flexible mechanical and electrical interfaces for high scalability

Variety of options for individually upgrading the basic configuration

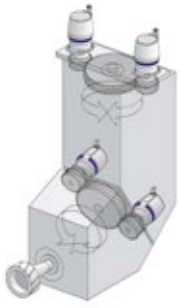


premo® application examples

Handling portal
premo® SP Line



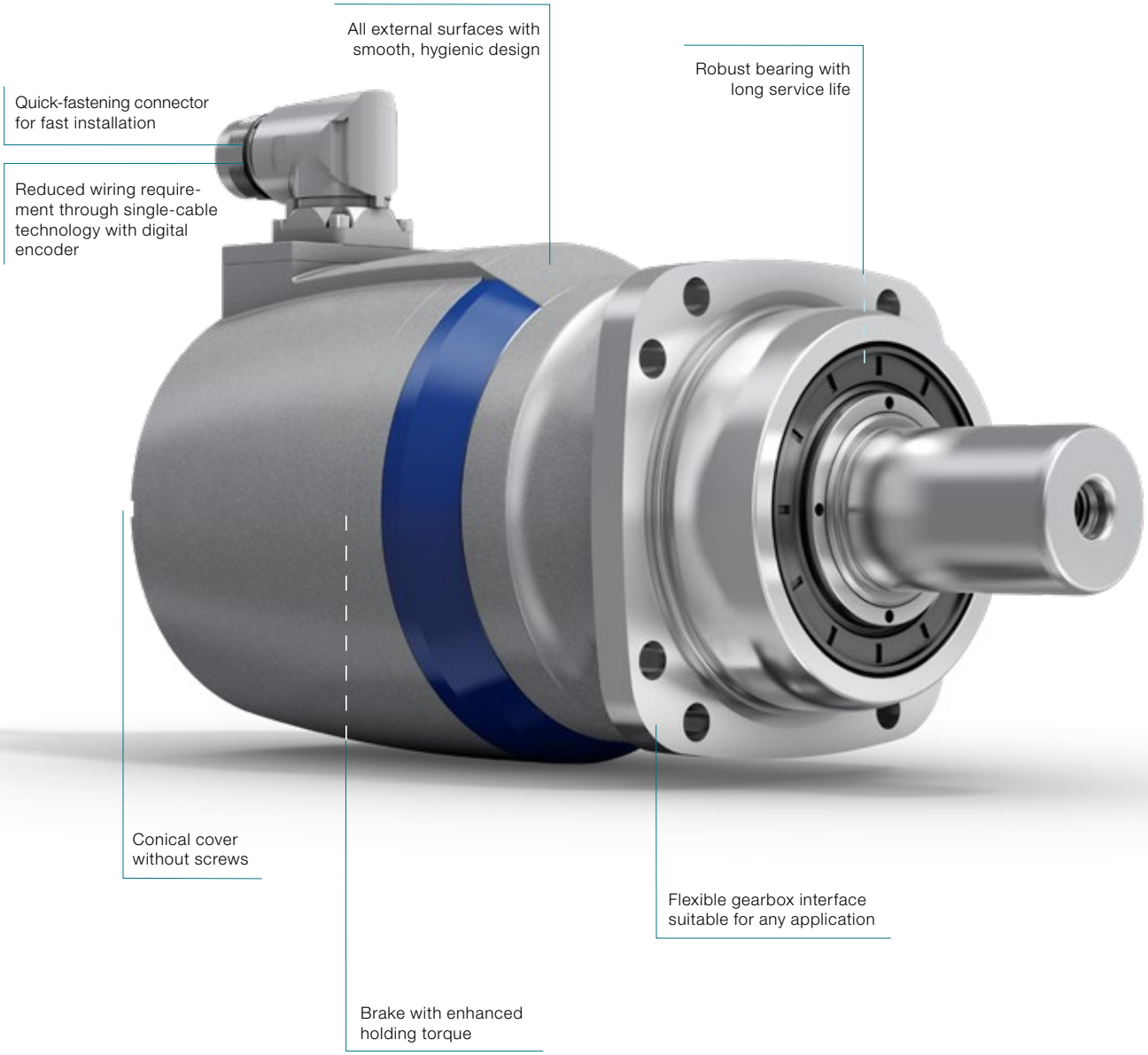
Fill and Seal machine
premo® TP Line



Milling cutter for a machining center
premo® XP Line

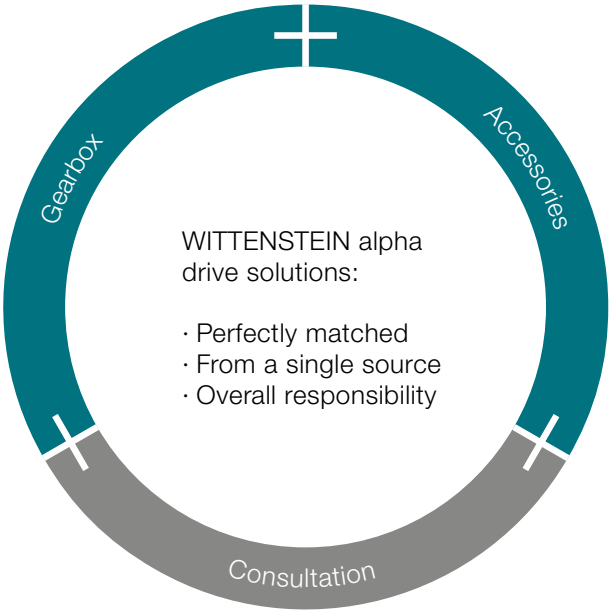
Typical fields of application and industry solutions

- Delta robot (axes 1–3, swivel axis)
- Handling portal (Z-axis, swivel / rotating axis)
- Machine tool reaming (rotating axes A–C, tool changer)
- Fill and Seal Machine (incl. jaw stroke, sealing jaw, blade)
- Folding carton packaging (incl. assembly / folding, filling valve)
- Plastic thermoform (tool axis)



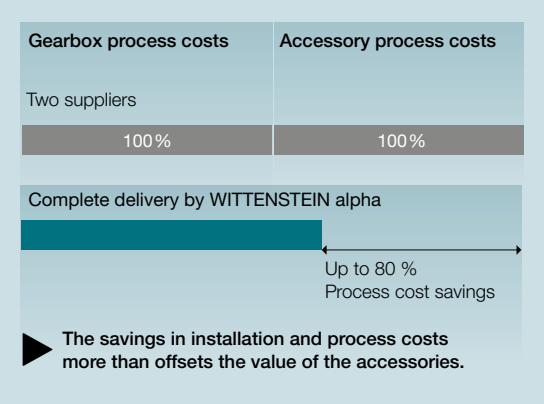
Accessories – smart additions for intelligent performance

Gearboxes, accessories and consulting from a single source



Optimization of your added value chain

Use the combination of gearbox and accessories in a complete package to streamline your internal processes.



Shrink disks

Shrink disks are frictional hub / shaft connections. Together with our hollow shaft or mounted shaft gearboxes for mounting directly on load shafts, machines can be designed to take up a minimal installation space.

The benefits:
· Simple mounting and removal
· Quick selection, easy and convenient
· Optional: corrosion resistant version

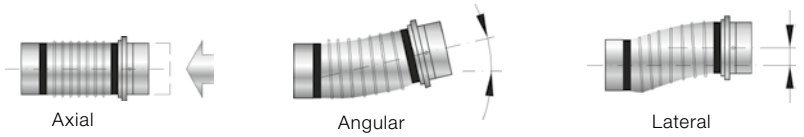
Preferred shrink disk series

To view a wide range of nickel-plated, stainless steel and other shrink disks as well as all the relevant technical data and dimensions, visit our homepage
www.wittenstein-alpha.com

Couplings

Couplings are used for compensating misalignment during assembly and material-related heat expansion

Compensation for shaft misalignment



Metal bellows coupling

- Compensation for shaft misalignment
- Completely backlash free
- Corrosion resistant version available as an option (BC2, BC3, BCT)
- High torsional rigidity

Elastomer coupling

- Compensation for shaft misalignment
- Completely backlash free
- Selectable torsional rigidity / damping
- Compact design
- Extremely simple installation (plug-in)

Torque limiter

- Compensation for shaft misalignment
- Completely backlash free
- Precise, preset overload protection (switch-off in 1 – 3 ms)
- Precise repeat accuracy
- Just one protection element per axis

Preferred coupling series

alpha Premium

alpha Advanced

alpha Value

alpha Basic

Preferred series are defined for the relevant gearbox segments to make selection easier. Preferred couplings are defined based on the maximum torque that the gearbox can transmit. Standard industrial conditions for the number of cycles (1000/h) and ambient temperature were adopted.

Please note that the coupling load is based on the torque that the gearbox can transmit and not the torque in your application. We recommend using our cymex®5 design software to create a more detailed design. (www.wittenstein-cymex.com)

For more coupling types, please visit
www.wittenstein-alpha.com

Support at each interaction stage

With the WITTENSTEIN alpha service concept, we are also setting new standards in the field of customer support.

Global presence

Our global consultation network will help you overcome your complex challenges through our extensive experience, a variety of design tools and individual engineering services.

Speed counts

Our speedline® team guarantees fast response times in the area of logistics. We provide on-site support during the installation and commissioning of mechanical systems to give you a sustained competitive edge.

Personal consultation

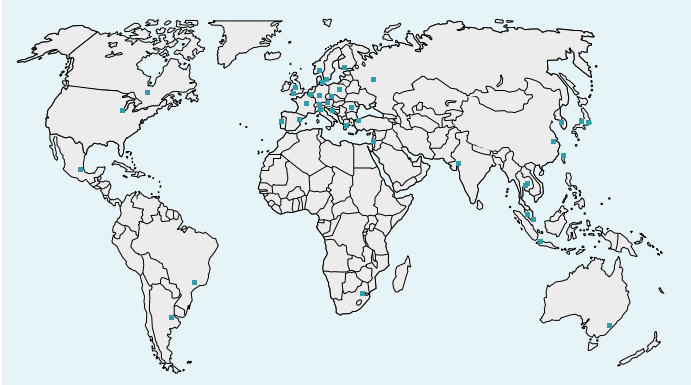
Our highly qualified and committed expert personnel will accompany you throughout the entire product lifecycle - around the clock. When it comes to customer support, you can count on us!

Design

Consultation
CAD POINT
SIZING ASSISTANT
Sizing software cymex®
Engineering

Installation

speedline® delivery
Installation on-site
Operating & installation instructions
Pick-up & return service



We are happy to advise you:

24 h service hotline: **+49 7931 493-12900**

No matter where you need us:
A comprehensive sales and service network provides quick availability and competent support worldwide.

Maintenance

24 h service hotline
Maintenance and inspection
Repair
cymex® statistics
Modernization

Training

Product training
Sizing training
Installation training
Service training

Support at each interaction stage

Design

Whatever your requirements are: we offer the right design methodology. Use the CAD POINT to gain easy access to CAD files, the SIZING ASSISTANT for creating simple designs, cymex® 5 for precise dimensioning and our engineering service for individual solutions.

Consultation

- Personal contact on-site
- Professional application calculations and drive design create the best solutions

Engineering

Catalog gearboxes:

- Advanced software tools for accurate calculation, simulation and analysis of the drive train
- Optimization of your productivity and reduction in development costs

Special gearboxes:

- Gearing design and development
- Development and production of special gearboxes
- Send all inquiries to: **sondergetriebe@wittenstein.de**

CAD POINT

- 3D data of selected solution
- Online comparison with motor geometry
- Transparent and simple selection of required components

SIZING ASSISTANT

- Efficient online design within seconds
- Convenient comparison function
- Automatic geometry adjustment

cymex® 5 sizing software

- Dimensioning, design and evaluation of the entire drive train
- Reliable, efficient design
- Optimization of drive system

Installation

All delivered products are perfectly matched to your application environment and fully operational right away.

Our service experts support you in the installation and commissioning of complex mechatronic systems, guaranteeing maximum availability of your plant.

speedline® delivery

Tel. +49 7931 493-10444

- Delivery of standard series in 24 or 48 hours ex works*
- Outstanding flexibility for fast deliveries at short notice

Operating and installation instructions

- Detailed explanations of how to use the product
- Motor installation videos
- Assembly videos on rack and pinion system

Installation on-site

- Professional installation
- Optimal integration of the system in your application
- Explanation of the drive function

Pick-up and return service

- Cost savings through minimization of downtimes
- Professional logistics organization
- Reduction of transport risks through customized, direct pick-up and delivery

* Non-binding delivery time depending on part availability.

Support at each interaction stage

Maintenance

WITTENSTEIN alpha guarantees fast repairs of the highest quality and precision – with short throughput times and intensive support. In addition, we will provide you with information about various measurements, material analyses and condition monitoring inspections. You can rely on short response times, unbureaucratic processing and individual support.

24 h service hotline

Tel. +49 7931 493-12900

- Available round the clock
- Personal, prompt service for resolving time-critical maintenance issues

Maintenance and inspection

- Documentation regarding condition and expected service life
- Maintaining required state
- Customized maintenance schedules

Repair

- Restoring to required state
- Short throughput times
- Immediate response in time-critical situations

cymex® statistics

- Systematic field data acquisition
- Reliability calculations (MTBF)
- Customized evaluations

Modernization

- Professional retrofitting
- Reliable compatibility testing of existing solutions

Training

Discover how our products function and how they can add value to your application. We offer you training courses at our premises or on-site at your plant. Benefit from practice-oriented learning methods and a highly skilled team of trainers.

Product training

Greater knowledge enables greater achievement. We will be pleased to share our expert knowledge with you: Profit from our many years of experience and learn more about the product portfolio of WITTENSTEIN alpha.

Installation training

We offer you individual training courses on-site for your system application of selected linear axes as well as professional installation.

Sizing training

Become a design expert! We will provide you with training courses on our design software, adapted to your requirements. Whether for beginners or experts, for occasional or regular users – we adapt our training course to your wishes and requirements.

Service training

Participation in a service training course is a prerequisite for sourcing spare parts at the parts list level. We offer you training courses at our premises or on-site at your plant. Moreover, we regularly host maintenance workshops at which the participants are instructed in safe handling during mounting of the motor to the gearbox as well as the independent replacement of wearing parts and gearbox assemblies.

The WITTENSTEIN group – The company and its fields of business

With approximately 2,900 employees worldwide, WITTENSTEIN SE stands for innovation, precision and excellence in the world of mechatronic drive technology, both nationally and internationally. The group is active in seven innovative fields of business. Furthermore, WITTENSTEIN SE is represented by some 60 subsidiaries in around 40 countries in all important technology and sales markets worldwide.

Our fields of expertise

We provide know-how for a host of different sectors:

- Machine and plant construction
- Software development
- Aerospace
- Automotive & E-mobility
- Energy
- Oil & Gas Exploration and Production
- Medical technology
- Measurement and testing technology
- Nanotechnology
- Simulation

The WITTENSTEIN Group

WITTENSTEIN | alpha

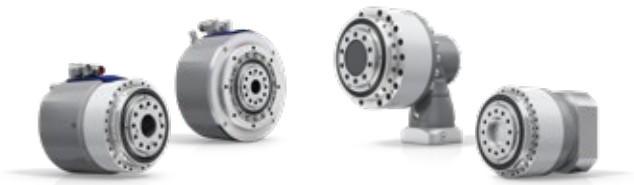
WITTENSTEIN alpha GmbH
High-precision servo drives and linear systems

WITTENSTEIN | cyber motor

WITTENSTEIN cyber motor GmbH
Highly dynamic servo motors and drive electronics

WITTENSTEIN | galaxie

WITTENSTEIN galaxie GmbH
Superior gearboxes and drive systems



WITTENSTEIN | motion control

WITTENSTEIN motion control GmbH
Customized linear and rotary servo systems

WITTENSTEIN | aerospace & simulation

WITTENSTEIN aerospace & simulation GmbH
Mechatronic drive systems for aerospace & simulation

attocube
WITTENSTEIN Group

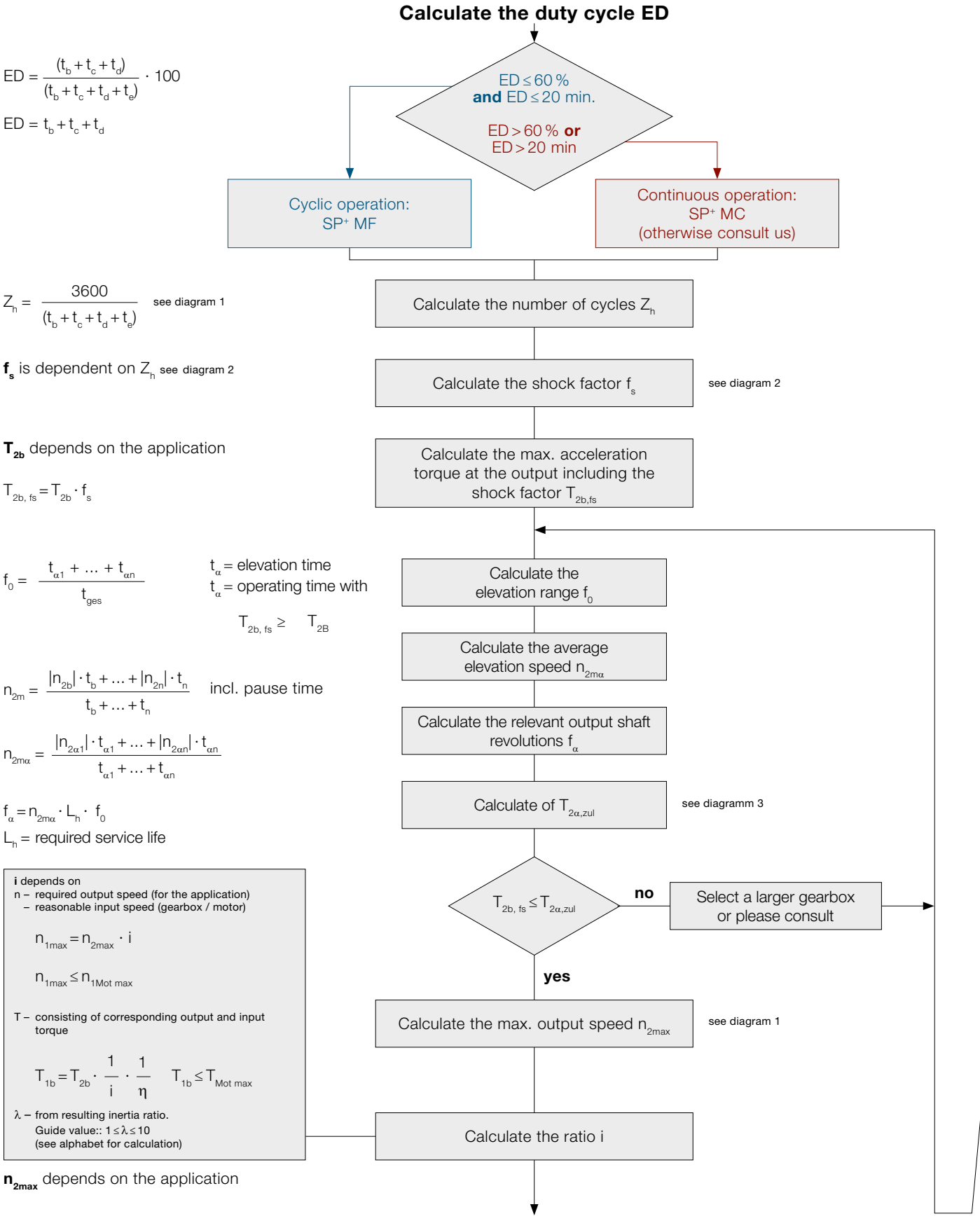
attocube systems AG
Nanoprecision drive and measurement technology solutions

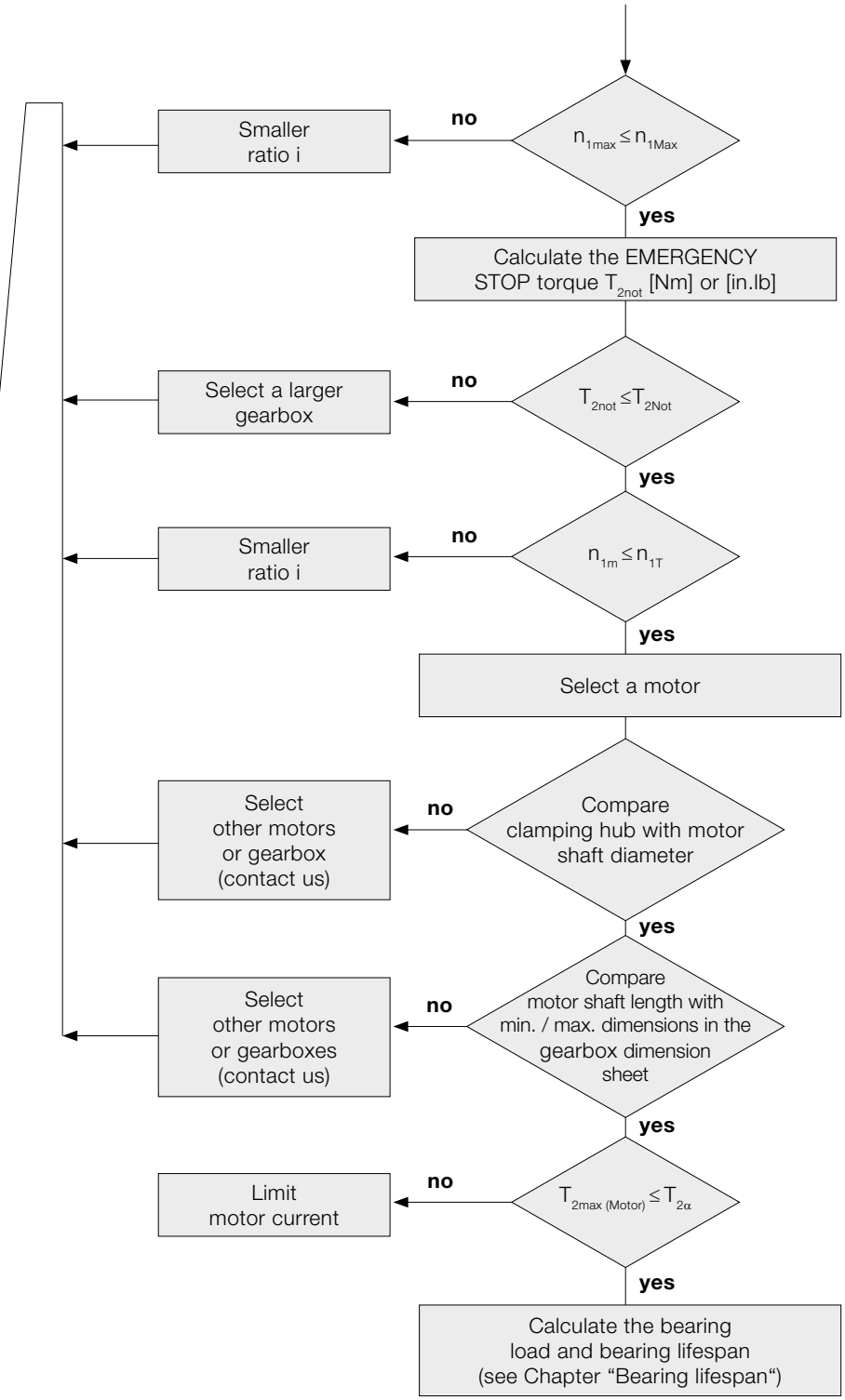
baramundi

baramundi software AG
Secure management of IT infrastructure in offices and production areas

Gearbox general – Detailed sizing

Cyclic operation **S5** and continuous operation **S1**





Please refer to the relevant technical data for information on the max. permissible characteristic values for your gearbox.

T_{2not} depends on the application

$n_{1m} = n_{2m} \cdot i$

$D_{W, Mot} \leq D_{clamping\ hub}$

The motor shaft must be inserted far enough into the clamping hub.

The motor shaft must protrude far enough into the clamping hub without making contact.

$T_{2max (Motor)} = T_{1max (Motor)} \cdot i \cdot \eta_{gearbox}$

The gearbox should not be damaged when the motor operates at full load, limit the motor current if necessary.

Diagram 1
Standard collective load at output. At input speeds up to rated speed n_{1N} or thermal speed limit n_{1T}, the temperature of the gearbox will not exceed 90 °C under average ambient conditions.

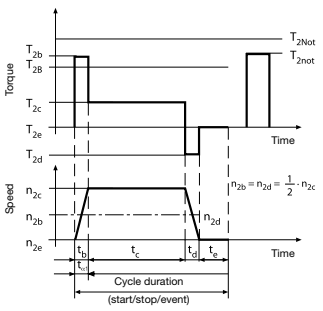


Diagram 2
Large number of cycles combined with short acceleration times may cause the drive train to vibrate. Use the shock factor f_s to include the resulting excess torque values in calculations.

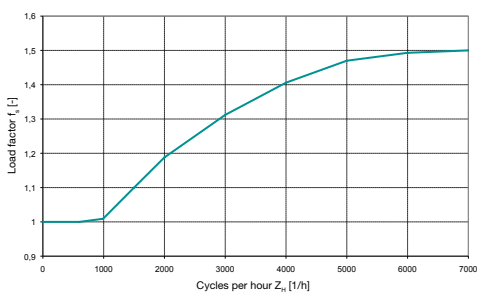
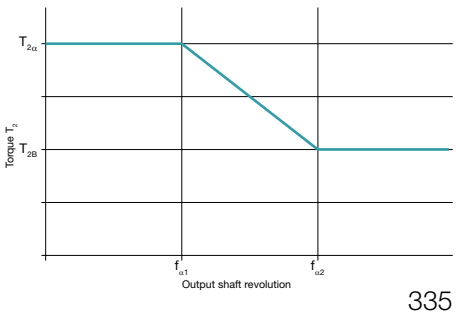
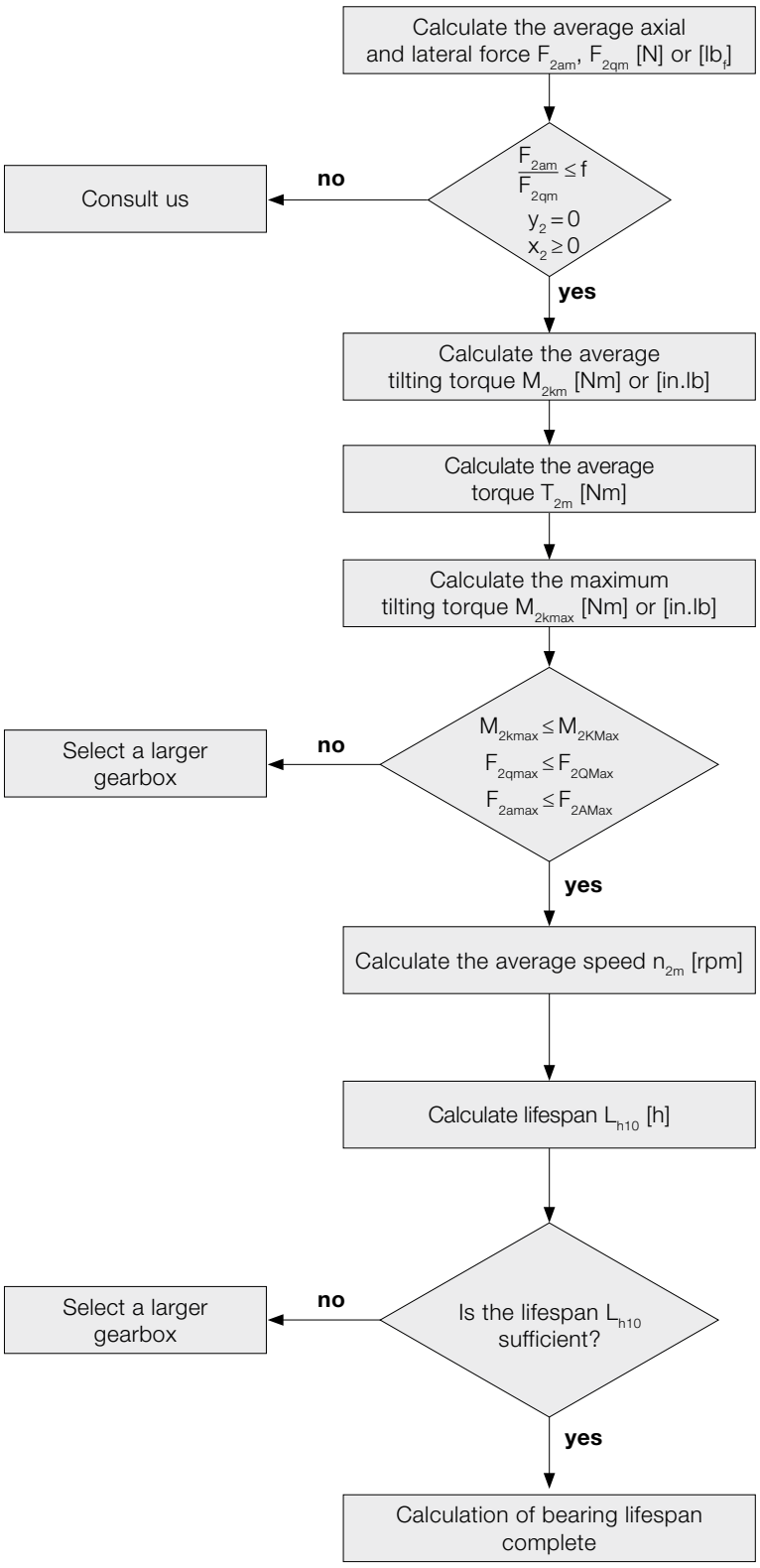


Diagram 3
The transmittable torque $T_{2\alpha,per}$ of the gearbox is dependent on the number of output shaft revolutions. In the lower output shaft revolution range, the fatigue strength range of the toothing can be fully utilized up to the maximum value $T_{2\alpha}$.



Gearbox general – Detailed sizing

Bearing lifespan L_{h10}



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

$$F_{2qm} = \sqrt[3]{\frac{|n_{2b}| \cdot t_b \cdot |F_{2qb}|^3 + \ldots + |n_{2n}| \cdot t_n \cdot |F_{2qn}|^3}{|n_{2b}| \cdot t_b + \ldots + |n_{2n}| \cdot t_n}}$$

$$M_{2km} = \frac{F_{2am} \cdot y_2 + F_{2qm} \cdot (x_2 + z_2)}{W}$$ a)

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

$$M_{2kmax} = \frac{F_{2amax} \cdot y_2 + F_{2qmax} \cdot (x_2 + z_2)}{W}$$ a)

a) x, y, z in mm

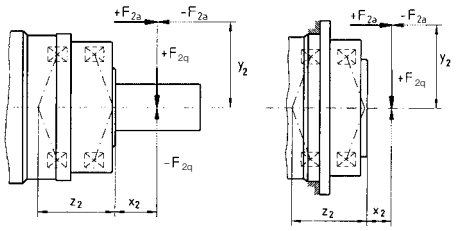
$$n_{2m} = \frac{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}{t_b + \ldots + t_n}$$

$$L_{h10} = \frac{16666}{n_{2m}} \cdot \left[\frac{K1_2}{M_{2km}}\right]^{p_2}$$

	metric	inch
W	1000	1

	TP⁺/TPK⁺	SP⁺/SPK⁺
f	0.37	0.40

Example with output shaft and flange:



SP⁺/SPK⁺/SPC⁺		060	075	100	140	180	210	240
z_2	[mm]	42.2	44.8	50.5	63.0	79.2	94.0	99.0
	[in]	1.66	1.76	1.99	2.48	3.12	3.70	3.90
$K1_2$	[Nm]	795	1109	1894	3854	9456	15554	19521
	[in.lb]	7036	9815	16762	34108	83686	137653	172761
p_2		3.33	3.33	3.33	3.33	3.33	3.33	3.33

TP⁺/TPK⁺/ TPC⁺/DP⁺		004	010	025	050	110	300	500	2000	4000
z_2	[mm]	57.6	82.7	94.5	81.2	106.8	140.6	157	216	283
	[in]	2.27	3.26	3.72	3.20	4.21	5.48	6.12	8.50	11.1
$K1_2$	[Nm]	536	1325	1896	4048	9839	18895	27251	96400	184000
	[in.lb]	4744	11726	16780	35825	87075	167220	241171	853140	1628400
p_2		3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33	3.33

HDP⁺		010	025	050
z_2	[mm]	90.4	99.1	83.5
	[in]	3.56	3.90	3.29
$K1_2$	[Nm]	1325	1896	4048
	[in.lb]	11726	16780	35825
p_2		3.33	3.33	3.33

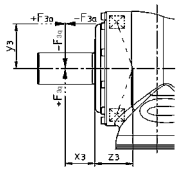
TK⁺/SK⁺/HG⁺/SC⁺/VH⁺/VS⁺/VT⁺: Calculation using cymex®.
Please contact us for further information.

Hypoid gearboxes – Detailed sizing

Gearbox types and sizes				TK+ 004 SK+ 060 HG+ 060	SPK+ 075 TPK+ 010 TPK+ 025 MA	TK+ 010 SK+ 075 HG+ 075	SPK+ 100 TPK+ 025 TPK+ 050 MA
Dimensions of rearward drive							
Solid shaft:	diameter	$øD_{k6}$	mm	16	16	22	22
	length	L	mm	28 ±0.15	28 ±0.15	36 ±0.15	36 ±0.15
Hollow shaft interface outer diameter		$øD_{h8}$	mm	18	18	24	24
Hollow shaft interface inner diameter		$ød_{h6}$	mm	15	15	20	20
Hollow shaft interface length		L_{hw}	mm	14	14	16	16
Distance from input axis		A	mm	42.9	42.9	52.6	52.6
Key dimensions (E = key as per DIN 6885, sheet 1, form A)		l	mm	25	25	32	32
		b_{h9}	mm	5	5	6	6
		a	mm	2	2	2	2
		h	mm	18	18	24.5	24.5
Output shaft threaded bore		B		M5x12.5	M5x12.5	M8x19	M8x19
Permissible load of rearward drive							
Max. acceleration torque [c]		$T_{3\alpha,zul}$		$= T_{2\alpha,zul}$ on the condition that $T_{2b,fs} + T_{3b,fs} \leq T_{2\alpha,zul}$	Please contact us	$= T_{2\alpha,zul}$ on the condition that $T_{2b,fs} + T_{3b,fs} \leq T_{2\alpha,zul}$	Please contact us
Nominal output torque [c]		T_{3N}		$= T_{2N} - T_{2n}$		$= T_{2N} - T_{2n}$	
EMERGENCY STOP torque [c]		T_{3Not}		$= T_{2Not} - T_{2not}$		$= T_{2Not} - T_{2not}$	
Max. axial force [b]		F_{3Amax}		1500	1500	1800	1800
Max. lateral force [b]		F_{3Qmax}		2300	2300	3000	3000
Max. tilting torque		M_{3Kmax}		60	60	100	100
Calculation of average tilting torque at the rearward drive							
Factor for tilting torque calculation		z_3	mm	11.9	11.9	15.6	15.6
Distance between axial force and center of gearbox		y_3	mm	Application-dependent			
Distance between lateral force and shaft collar		x_3	mm	Application-dependent			

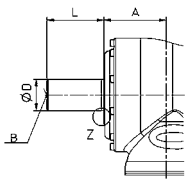
[a] Connection via shrink discs
[b] Refers to center of shaft
[c] See also page 336, “Detailed dimensioning – Gearbox“

Rearward drive:

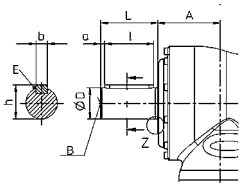


$$M_{3k} = F_{3a} \cdot y_3 + F_{3q} \cdot (x_3 + z_3)$$

Smooth shaft

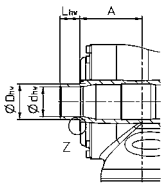


Shaft with key



TK+ 025 SK+ 100 HG+ 100	SPK+ 140 TPK+ 050 TPK+ 110 MA	TK+ 050 SK+ 140 HG+ 140	SPK+ 180 SPK+ 240 TPK+ 110 TPK+ 500 TPK+ 300 MA	TK+ 110 SK+ 180 HG+ 180	SPK+ 210 TPK+ 300 TPK+ 500 MA
32	32	40	40	55	55
58 ±0.15	58 ±0.15	82 ±0.15	82 ±0.15	82 ±0.15	82 ±0.15
36	36	50	50	68	68
30	30	40	40	55	55
20	20	25	25	25	25
63.5	63.5	87	87	107.8	107.8
50	50	70	70	70	70
10	10	12	12	16	16
4	4	5	5	6	6
35	35	43	43	59	59
M12x28	M12x28	M16x36	M16x36	M20x42	M20x42
= $T_{2\alpha,zul}$ on the condition that $T_{2b,fs} + T_{3b,fs} \leq T_{2\alpha,zul}$	Please contact us	= $T_{2\alpha,zul}$ on the condition that $T_{2b,fs} + T_{3b,fs} \leq T_{2\alpha,zul}$	Please contact us	= $T_{2\alpha,zul}$ on the condition that $T_{2b,fs} + T_{3b,fs} \leq T_{2\alpha,zul}$	Please contact us
= $T_{2N} - T_{2n}$		= $T_{2N} - T_{2n}$		= $T_{2N} - T_{2n}$	
= $T_{2Not} - T_{2not}$		= $T_{2Not} - T_{2not}$		= $T_{2Not} - T_{2not}$	
2000	2000	9900	9900	4000	4000
3300	3300	9500	9500	11500	11500
150	150	580	580	745	745
16.5	16.5	20	20	23.75	23.75
Application-dependent					
Application-dependent					

Hollow shaft interface [a)]



Hollow shaft

No connection possible

Cover

No connection possible

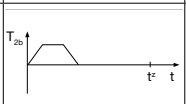
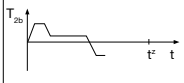
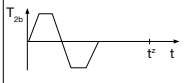
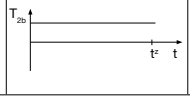
Worm gearboxes – Detailed sizing

A: Simplified sizing for servo motors based on the maximum motor torque: $\mathbf{M_{max} * i \leq T_{2\alpha}}$

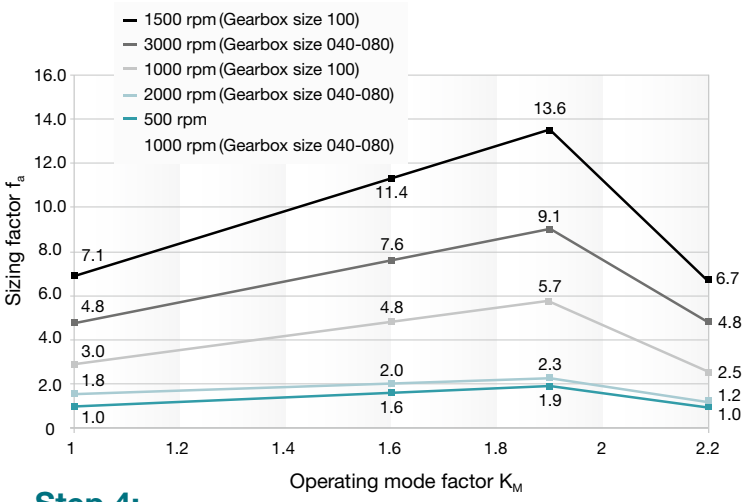
B: Sizing based on the application

Step 1:
Determine the application data
$\mathbf{T_{2b}}$= _____ **[Nm]** $\mathbf{n_{1n}}$= _____ **[rpm]**

Step 2:
Determine the operating mode factor $\mathbf{K_M}$= _____

Typical applications	Cycle	Torque characteristic	Operating mode factor K_M
Format changing, e.g. in packaging machines, drives for processing equipment, actuators etc.	**S5 operation:** Low duty cycle Small number of cycles Low dynamics		1.0
Tool changers with low dynamics, pick & place gantry axes, tire building machines etc.	**S5 operation:** Medium duty cycle Small number of cycles Medium dynamics		1.6
Linear axes in plasma, laser or water jet cutters, portals, tool changers with high dynamics	**S5 operation:** Medium duty cycle Medium number of cycles High dynamics		1.9
Roller drives in printing presses, star drives in rackers etc.	**S1 operation:** High duty cycle		2.2
cymex® 5 also allows sizing calculations for other applications / cycles!			

Step 3:
Determine the sizing factor f_a with the operating mode factor K_M $\mathbf{f_a}$= _____



Step 4:
Compare the equivalent application torque with the maximum gearbox $\mathbf{T_{2\alpha}}$ (see table, Step 5)

$\mathbf{T_{2\_eq} = f_a * T_{2b} \leq T_{2\alpha}}$

$\mathbf{T_{2\_eq}}$ = _____ * _____ ≤ $\mathbf{T_{2\alpha}}$

$\mathbf{T_{2\_eq}}$ = _____ **[Nm]** ≤ _____ **[Nm]**

We recommend using a vent screw for duty cycles ≥ 60 %, longer than 20 min (S1 operation) and n1N ≥ 3000 rpm.

Step 5: Quick selection of the technical data

			V-Drive Advanced				
			040	**050**	**063**	**080**	**100**
Ratio	i		4 - 400				
Maximum torque[a] (at n_1= 500 rpm)	$T_{2\alpha}$	Nm	74-106	165-204	319-372	578-785	1184-1505
		in.lb	655-938	1460-1805	2823-3292	5115-6947	10478-13319
Max. input speed	n_{1max}	rpm	6000	6000	4500	4000 / 4500[b]	3500 / 4000[b]
Max. lateral force	F_{2QMax}	N	2400	3800	6000	9000	14000
		lb_f	540	855	1350	2025	3150
Operating noise (with n_1 =3000 rpm no load)	L_{PA}	dB(A)	≤ 54	≤ 62	≤ 64	≤ 66	≤ 70
Max. torsional backlash	j_t	arcmin	≤ 3	≤ 3	≤ 3	≤ 3	≤ 3
Service life (For calculation see "Information")	L_h	h	> 20000	> 20000	> 20000	> 20000	> 20000

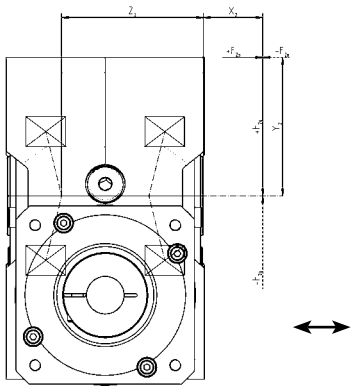
[a] The maximum torques depend on the ratio.
[b] First value for single-stage version, second value for two-stage version.

Account must be taken of the lateral and axial forces at the output:

Please also carry out steps 6 and 7 if forces are present at the output (e.g. if timing belt pulleys, pinions or levers are mounted there).

Step 6 (if external forces are present):

Determine the forces acting on the output and check the boundary conditions



Lateral force F_{2q} = _____ [N]
Lateral force distance x_2 = _____ [mm]
Axial force F_{2a} = _____ [N]
Axial force distance y_2 = _____ [mm]
(required if F_{2a} is present)

Conditions if axial force F_{2a} is present:

1. $F_{2a} \leq 0.25 * F_{2q} \Rightarrow$ (_____ ≤ 0.25 * _____) ☐ **Met** ☐ **Not met:** Sizing with cymex® 5

2. $y_2 \leq x_2 \Rightarrow$ (_____ ≤ _____) ☐ **Met** ☐ **Not met:** Sizing with cymex® 5

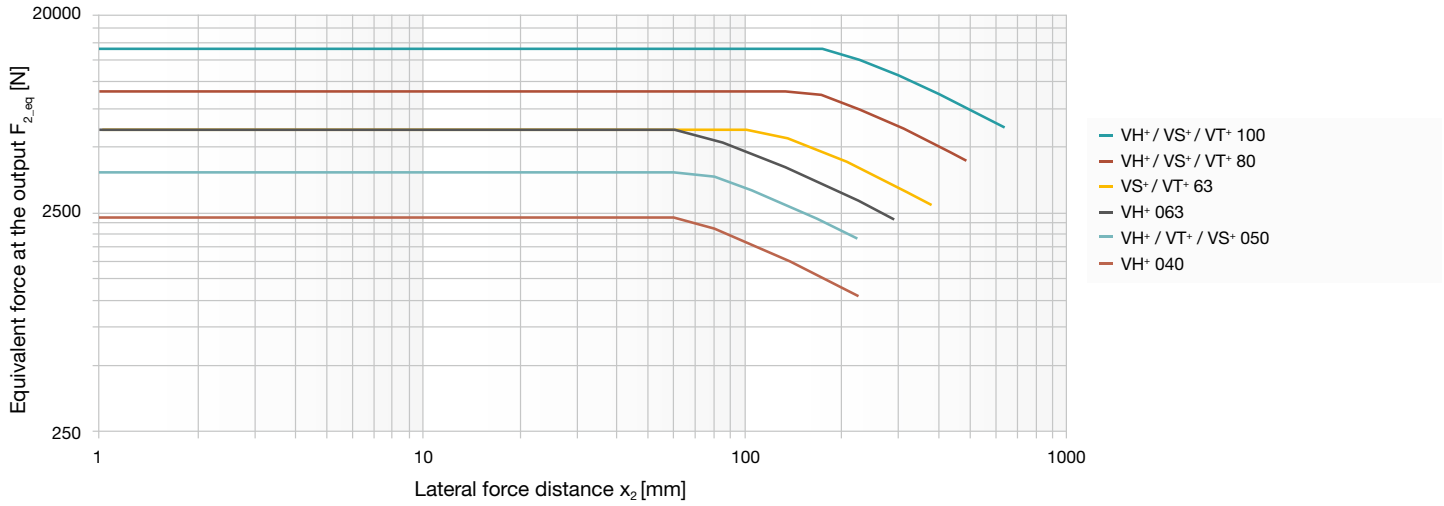
Step 7:

Determine the maximum equivalent force acting on the output F_{2_eq}

$F_{2\_eq} = F_{2q} + 0.25 * F_{2a} \leq F_{2QMax}$ (F_{2QMax} can be determined from the diagram below)

F_{2_eq} = _____ + 0.25 * _____ ≤ _____

F_{2_eq} = _____ [N] ≤ _____ [N] ☐ **Met** ☐ **Not met:** Sizing with cymex® 5



Glossary – the **alpha**bet

Adapter plate

WITTENSTEIN alpha uses a system of standardized adapter plates to connect the motor and the gearbox, making it possible to mount a WITTENSTEIN alpha gearbox to any desired motor without difficulty.

Angular minute

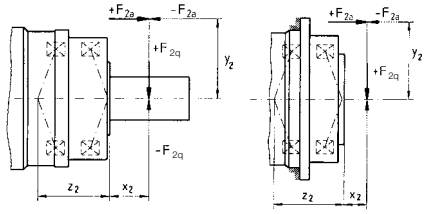
A degree is subdivided into 60 angular minutes (= 60 arcmin = 60‘).

Example:
If the torsional backlash is $j_t = 1$ arcmin, the output can be turned 1/60°. The repercussions for the application are determined by the arc length:
$b = 2 \cdot \pi \cdot r \cdot \alpha° / 360°$.
Example:
A pinion with a radius r = 50 mm mounted on a gearbox with torsional backlash $j_t = 3$ arcmin can be turned b = 0.04 mm.

Axial force (F_{2AMax})

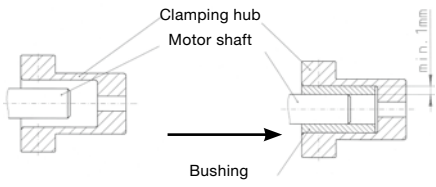
The axial force acting on a gearbox runs parallel to its output shaft or perpendicular to its output shaft. It may be applied with axial offset via a lever arm y_2 under certain circumstances, in which case it also generates a bending moment. If the axial force exceeds the permissible catalog values (max. axial force F_{2AMax}), additional design features (e.g. axial bearings) must be implemented to absorb these forces.

Example with output shaft and flange:



Bushing

If the motor shaft diameter is smaller than the **→ clamping hub**, a bushing is used to compensate the difference in diameter. The bushing must have a minimum thickness of 1 mm and a motor shaft diameter of 2 mm.



CAD POINT

Performance data, dimension sheets and CAD data for all types of gearbox can be found online in our CAD POINT together with comprehensive documentation of the selection.
(www.wittenstein-cad-point.com)

Clamping hub

The clamping hub ensures a frictional connection between the motor shaft and gearbox. A **→ bushing** is used as the connecting element if the motor shaft diameter is smaller than that of the clamping hub. Optionally, a positive connection via a parallel key is also possible.

Continuous operation (S1)

Continuous operation is defined by the **→ duty cycle**. If the duty cycle is greater than 60 % and / or longer than 20 minutes, this qualifies as continuous operation. **→ Operating modes**

Cyclic operation (S5)

Cyclic operation is defined via the **→ duty cycle**. If the duty cycle is less than 60 % and shorter than 20 minutes, it qualifies as cyclic operation **(→ operating modes)**.

cymex®

cymex® is the calculation software developed by our company for dimensioning complete drive trains. The software enables the precise simulation of motion and load variables. The software is available for download from our website (www.wittenstein-cymex.com). We can also provide training to enable you to make full use of all the possibilities provided by the software.

Degree of protection (IP)

The various degrees of protection are defined in DIN EN 60529 “Degrees of protection offered by enclosure (IP code)“. The IP degree of protection (International Protection) is represented by two digits. The first digit indicates the protection against the ingress of impurities and the second the protection against the ingress of water.

Example: **IP65**

Protection against the ingress of dust (dust-proof)	Protection against spray water

Duty cycle (DC)

The cycle determines the duty cycle DC. The times for acceleration (t_b), constant travel if applicable (t_c) and deceleration (t_d) combined yield the duty cycle in minutes. The duty cycle is expressed as a percentage with inclusion of the pause time t_e.

$$DC\ [\%] = \left[\frac{t_b + t_c + t_d}{t_b + t_c + t_d + t_e}\right] \cdot 100 \quad \frac{\text{Motion duration}}{\text{Cycle duration}}$$

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

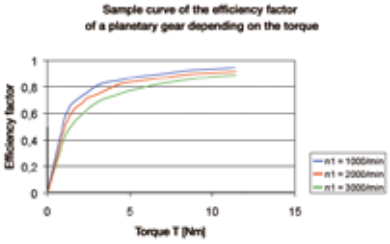
Emergency stop torque (T_{2Not})

The Emergency stop torque T_{2Not} is the maximum permissible torque at the gearbox output and must not be reached more than 1000 times during the life of the gearbox. It must never be exceeded!

Efficiency (η)

Efficiency [%] η is the ratio of output power to input power. Power lost through friction reduces efficiency to less than 1 or 100 %.

$$\eta = P_{off} / P_{on} = (P_{on} - P_{loss}) / P_{on}$$



WITTENSTEIN alpha always measures the efficiency of a gearbox during operation at full load. If the input power or torque are lower, the efficiency rating is also lower due to the constant no-load torque. Power losses do not increase as a result. A lower efficiency is also expected at high speeds (see illustration).

Ex symbol

Devices bearing the Ex symbol comply with EU Directive 94 / 9 / EC (ATEX) and are approved for use in defined explosion-hazardous zones.

Detailed information on explosion groups and categories, as well as further information on the relevant gearbox are available upon request.

Food-grade lubrication (F)

These products are designed with food-grade lubrication and can therefore be used in the food industry. Note the reduced torques compared to the standard products. (V-Drive excluded).
The exact torques can be found in cymex® 5 or CAD POINT.

HIGH SPEED (MC)

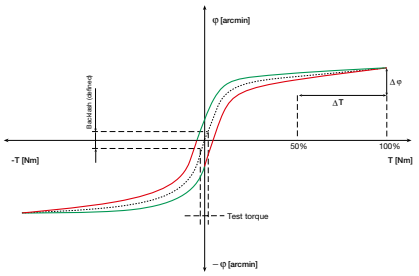
The HIGH SPEED version of our gearbox has been specially developed for applications in continuous operation at high input speeds, e.g. as found in the printing and packaging industries.

HIGH TORQUE (MA)

WITTENSTEIN alpha gearboxes are also available in a HIGH TORQUE version. These gearboxes are particularly suited to applications requiring extremely high torques and maximum stiffness.

Hysteresis curve

The hysteresis is measured to determine the torsional rigidity of a gearbox. The result of this measurement is known as the hysteresis curve.



If the input shaft is locked, the gearbox is continuously loaded and relieved at the output in both directions up to a defined torque. The torsional angle is plotted against the torque. This yields a closed curve from which the → **torsional backlash** and → **torsional rigidity** can be calculated.

Jerk (*j*)

Jerk is derived from acceleration and is defined as the change in acceleration within a unit of time. The term impact is used if the acceleration curve changes abruptly and the jerk is infinitely large.

Lateral force (F_{2QMax})

The max. lateral force F_{2QMax} [N] is the force component acting at right angles to the output shaft or parallel to the output flange. It acts perpendicular to the → axial force and can assume an axial distance of x_2 in relation to the shaft nut or shaft flange, which acts as a lever arm. The lateral force produces a bending moment (see also → axial force).

Mass inertia ratio (λ = Lambda)

The mass inertia ratio λ is the ratio of external inertia (application side) to internal inertia (motor and gearbox side). It is an important parameter determining the controllability of an application. Accurate control of dynamic processes becomes more difficult with differing mass moments of inertia and as λ becomes greater. WITTENSTEIN alpha recommends that a guideline value of $\lambda < 5$ is maintained. A gearbox reduces the external mass moment of inertia by a factor of $1/i^2$.

$$\lambda = \frac{J_{extern}}{J_{intern}}$$

J reduced externally at input:

$J'_{external} = J_{external} / i^2$

Simple applications ≤ 10

Dynamic applications ≤ 5

Highly dynamic applications ≤ 1

Mass moment of inertia (*J*)

The mass moment of inertia J [kg/cm²] is a measurement of the effort applied by an object to maintain its momentary condition (at rest or moving).

Mesh frequency (f_z)

The mesh frequency may cause problems regarding vibrations in an application, especially if the excitation frequency corresponds to a intrinsic frequency of the application. The mesh frequency can be calculated for planetary gearboxes from WITTENSTEIN alpha (exception: gearboxes with ratio i = 8) using the formula $f_z = 1.8 \cdot n_2$ [rpm] and on planetary gearboxes from WITTENSTEIN alpha, is independent of the ratio. If it does indeed become problematic, the intrinsic frequency of the system can be changed or another gearbox (e.g. hypoid gearbox) with a different mesh frequency can be selected.

No-load running torque (T_{012})

The no-load running torque T_{012} is the torque which must be applied to a gearbox in order to overcome the internal friction; it is therefore considered lost torque. The values specified in the catalog are calculated by WITTENSTEIN alpha at a speed of $n_1 = 3000$ rpm and an ambient temperature of 20 °C.

T_{012}: 0 (without load) 1→2 (from input side towards output side)

Idling torques decrease during operation.

NSF

Lubricants certified as grade H1 by the NSF (National Sanitation Foundation) can be used in the food sector where occasional unavoidable contact with food cannot be excluded.

Operating modes (continuous operation **S1** and cyclic operation **S5**)

Gearboxes are selected depending on whether the motion profile is characterized by frequent acceleration and deceleration phases in → **cyclic operation** (S5) as well as pauses, or whether it is designed for → **continuous operation** (S1), i.e. with long phases of constant motion.

Operating noise (L_{PA})

The gear ratio and speed affect the noise level. As a general rule: A higher speed means a higher noise level, while a higher ratio means a lower noise level. The values specified in our catalog are based on a reference ratio and speed. The reference speed is either n1= 3000 rpm or n1= 2000 rpm depending on the size of the gearbox. You can find ratio-specific values in cymex® – www.wittenstein-cymex.com.

Output shaft revolution (f_α)

Factor f_α determines the number of life time cycles for the required gearbox service life. It describes the number of revolutions at the output used to assess the torque permitted at the output.

→ Refer to this term for further details.

Glossary – the **alpha**bet

Positioning accuracy

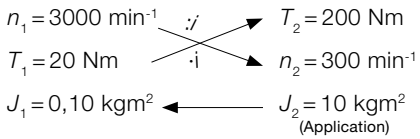
The positioning accuracy is determined by the angular deviation from a setpoint and equals the sum of the torsional angles due to load **→ (torsional rigidity and torsional backlash)** and kinetics **→ (synchronization error) occurring simultaneously in practise** .

Quality control

All Premium and Advanced gearboxes are subject to a final inspection before they leave the WITTENSTEIN alpha factory to ensure that they are all delivered within specification.

Ratio (*i*)

The gear ratio i indicates the factor by which the gearbox transforms the three relevant parameters of motion (speed, torque and mass moment of inertia). The factor is a result of the geometry of the gearing elements (Example: i = 10).



Safety note

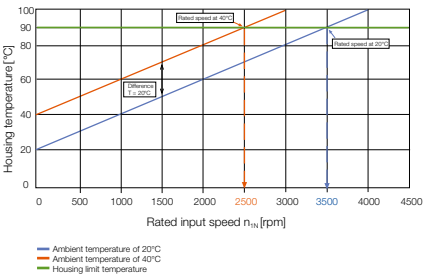
For applications with special safety requirements (e.g. vertical axes, clamped drives), we recommend exclusive use of our Premium and Advanced products (excluding V-Drive).

SIZING ASSISTANT

The online SIZING ASSISTANT from WITTENSTEIN alpha allows the efficient selection of a gearbox in seconds. You can use various motor or application entry options to select the right gearbox for your application in seconds (www.sizing-assistant.com).

Speed (*n*)

Two speeds are of relevance when dimensioning a gearbox: the maximum speed and the thermal speed limit at the input. The maximum permissible speed n_{1Max} must not be exceeded because it serves as the basis for dimensioning **→ cyclic operation**. The nominal speed n_{1N} must not be exceeded in **→ continuous operation**. The thermal speed limit n_{1T} at an ambient temperature of 20° C, is determined by the maximum gearbox temperature of T = 90° C at no-load. As can be seen in the diagram below, the temperature limit is reached more quickly in the presence of an elevated outside temperature. In other words: the nominal input speed must be reduced if the ambient temperature is high. The values applicable to your gearbox are available from WITTENSTEIN alpha on request.



Delivery of speedline®

If necessary, you can receive delivery of standard series in 24 or 48 hours ex works. Outstanding flexibility for fast deliveries at short notice

Synchronization

Synchronization refers to the measurable speed variation between the input and output during one revolution of the output shaft. It is caused by manufacturing tolerances and causes minute angular deviations and ratio fluctuations.

Technical data

You can download further technical data relating to the entire product portfolio from our website

Tilting rigidity

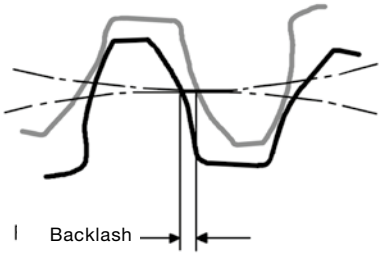
The tilting rigidity C_{2K} [Nm/arcmin] of the gearbox consists of the bending stiffness of the output or pinion shaft and the stiffness of the output bearing. It is defined as the quotient of tilting moment M_{2K} [Nm] and tilting angle Φ [arcmin] ($C_{2K} = M_{2K}/\Phi$).

Tilting torque (M_{2K})

The tilting torque M_{2K} is a result of the **→ axial and lateral forces** applied and their respective points of application in relation to the inner radial bearing on the output side.

Torsional backlash (j_t)

Torsional backlash j_t [arcmin] is the maximum angle of torsion of the output shaft in relation to the input. Simply put, the torsional backlash represents the gap between two tooth flanks.



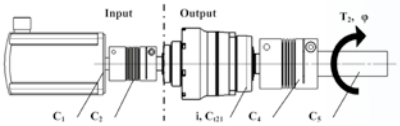
Torsional backlash is measured with the input shaft locked.

The output is then loaded with a defined test torque in order to overcome the internal gearbox friction. The main factor affecting torsional backlash is the face clearance between the gear teeth. The low torsional backlash of WITTENSTEIN alpha gearboxes is due to their high manufacturing accuracy and the specific combination of gear wheels.

Torsional rigidity (C_{t21})

Torsional rigidity [Nm/arcmin] C_{t21} is defined as the quotient of applied torque and resulting torsion angle ($C_{t21} = \Delta T/\Delta\Phi$). It shows the torque required to turn the output shaft by one angular minute. The torsional rigidity can be determined from the **→ hysteresis curve**.

Torsional rigidity C, angle of torsion Φ



Reduce all torsional rigidity values at the output:

$$C_{(n),out} = C_{(n),in} * i^2$$

with i = Gearbox ratio [-]

$C_{(n)}$ = Individual rigidity values [Nm/arcmin]

→ Refer to this term for further details.

Note: The torsional rigidity C_{t21} for the gearbox always relates to the output.

Series connection of torsional rigidity values

$1/C_{tot} = 1/C_{1,out} + 1/C_{2,out} + \ldots + 1/C_{(n)}$

Angle of torsion Φ [arcmin]

$\Phi = T_2 * 1/C_{tot}$
with T_2 = output torque [Nm]

Torque (*M*)

The torque is the actual driving force of a rotary motion. The force and lever arm combine to produce the torque that acts around the axis of rotation. $M = F \cdot l$

Torque ($T_{2\alpha}$)

$T_{2\alpha}$ represents the maximum torque transmitted by the gearbox. This value may decrease depending on the application-specific conditions and the precise evaluation of the movement profile.

Glossary – Formulae

Formulae

Torque [Nm]	$T = J \cdot \alpha$	J = Mass moment of inertia [kgm^2] α = Angular acceleration [1/s^2]
Torque [Nm]	$T = F \cdot l$	F = Force [N] l = Lever, length [m]
Acceleration force [N]	$F_b = m \cdot a$	m = Mass [kg] a = Linear acceleration [m/s^2]
Frictional force [N]	$F_{Reib} = m \cdot g \cdot \mu$	g = Acceleration due to gravity 9.81 m/s^2 μ = Coefficient of friction
Angular speed [1/s]	$\omega = 2 \cdot \pi \cdot n / 60$	n = Speed [rpm] π = PI = 3.14...
Linear speed [m/s]	$v = \omega \cdot r$	v = Linear speed [m/s] r = Radius [m]
Linear speed [m/s] (spindle)	$v_{sp} = \omega \cdot h / (2 \cdot \pi)$	h = Screw pitch [m]
Linear acceleration [m/s^2]	$a = v / t_b$	t_b = Acceleration time [s]
Angular acceleration [1/s^2]	$\alpha = \omega / t_b$	
Pinion path [mm]	$s = m_n \cdot z \cdot \pi / \cos \beta$	m_n = Normal module [mm] z = Number of teeth [-] β = Helix angle [°]

Conversion table

1 mm	= 0.039 in
1 Nm	= 8.85 in.lb
1 kgcm²	= 8.85 x 10^{-4} in.lb.s^2
1 N	= 0.225 lb_f
1 kg	= 2.21 lb_m

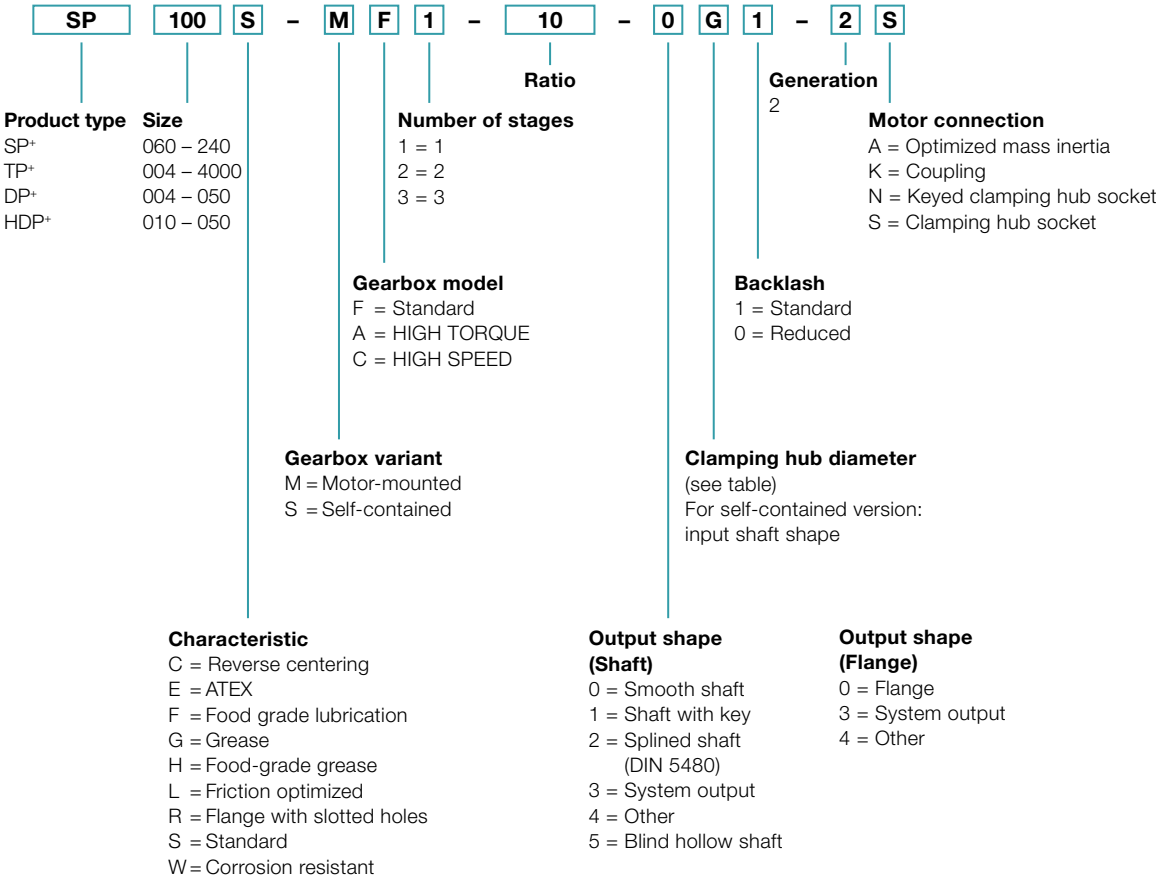
Symbol

Symbol	Unit	Designation
C	Nm/arcmin	Stiffness
ED	%, min	Duty cycle
F	N	Force
f_s	–	Load factor
f_e	–	Factor for duty cycle
i	–	Ratio
j	arcmin	Backlash
J	kgm^2	Mass moment of inertia
K1	Nm	Factor for bearing calculation
L	h	Service life
L_{PA}	dB(A)	Operating noise
m	kg	Mass
M	Nm	Torque
n	rpm	Speed
p	–	Exponent for bearing calculation
η	%	Efficiency
t	s	Time
T	Nm	Torque
v	m/min	Linear speed
z	1/h	Number of cycles

Index

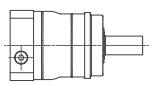
Index	Designation
Capital letter	Permissible values
Small letter	Actual values
1	Input
2	Output
A/a	Axial
B/b	Acceleration
c	Constant
d	Deceleration
e	Pause
h	Hours
K/k	Tilting
m	Mean
Max/max	Maximum
Mot	Motor
N	Nominal
Not/not	Emergency stop
0	No load
Q/q	Lateral
t	Torsional
T	Tangential

Ordering code – Planetary gearbox

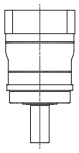


Mounting positions and clamping hub diameters

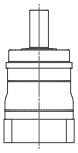
B5
Horizontal



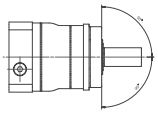
V1
Output vertical downwards



V3
Output vertical upwards



S
Can be tilted ±90° from a horizontal position



Clamping hub diameter
(see technical data sheet for possible diameters)

Code letter	mm	Code letter	mm
B	11	I	32
C	14	K	38
E	19	M	48
G	24	N	55
H	28	O	60

Intermediate sizes possible using bushings with a minimum thickness of 1 mm.

For information purposes only – not required when placing orders!

Exceptions:
- The mounting position of TP+ 2000 / 4000 must be specified.
- DP+ / HDP+ products are designed for mounting position B5 as standard!

If the mounting position is different, contact WITTENSTEIN alpha without fail.

Ordering code – Hypoid- / Bevel gearboxes

SPK+	100	S	–	M	F	2	–	50	–	0	E	1	–	1	K	0	1

Product type
SK+
SPK+
SC+
SPC+
HG+
TK+
TPK+
TPC+

Size
060 – 180
075 – 240
060 – 180
060 – 180
060 – 180
004 – 110
010 – 4000
004 – 180

Characteristic
B = Modular output combination
E = ATEX
F = Food grade lubrication
S = Standard
W = Corrosion resistant

Gearbox variant
M = Motor-mounted

Gearbox model
F = Standard
A = HIGH TORQUE

Number of stages
1 = 1
2 = 2
3 = 3
4 = 4

Ratio

Output shape (Shaft)
0 = Smooth shaft
1 = Shaft with key
2 = Splined shaft (DIN 5480)
3 = System output
4 = Other
5 = Blind hollow shaft

Clamping hub diameter
(see table)

Backlash
1 = Standard
0 = Reduced

Generation
1

Motor connection
K = Coupling
S = Clamping hub socket

Number of input stages
0 = 0
1 = 1

Number of output stages
0 = 0
1 = 1
2 = 2

Output shape (Flange)
0 = Flange
3 = System output
4 = Other
5 = Flanged hollow shaft

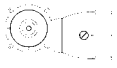
Output shape (Hollow shaft)
5 = Hollow shaft interface / Hollow shaft
6 = Hollow shaft interface / Hollow shaft interface

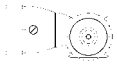
Mounting positions

B5 / V3
Output horizontal / motor shaft vertical upwards

B5 / V1
Output horizontal / motor shaft vertical downwards

V1 / B5
Output vertical downwards / motor shaft horizontal





V3 / B5
Output vertical upwards / motor shaft horizontal

B5 / B5
Output horizontal / motor shaft horizontal

Please note the orientation when placing your order.

Exceptions:
- The mounting position of TPK+ 2000 / 4000 must be specified.
- If the mounting position is different, contact WITTENSTEIN alpha without fail.

Characteristic: Modular output combination (B)

HG+ / SK+ / SPK+ / TK+ / TPK+

SK+ | 100 | **B** | – | M | F | 1 | – | 10 | – | **G** | E | 1 | / motor

Characteristic: **B = Modular output combination**
S = Standard

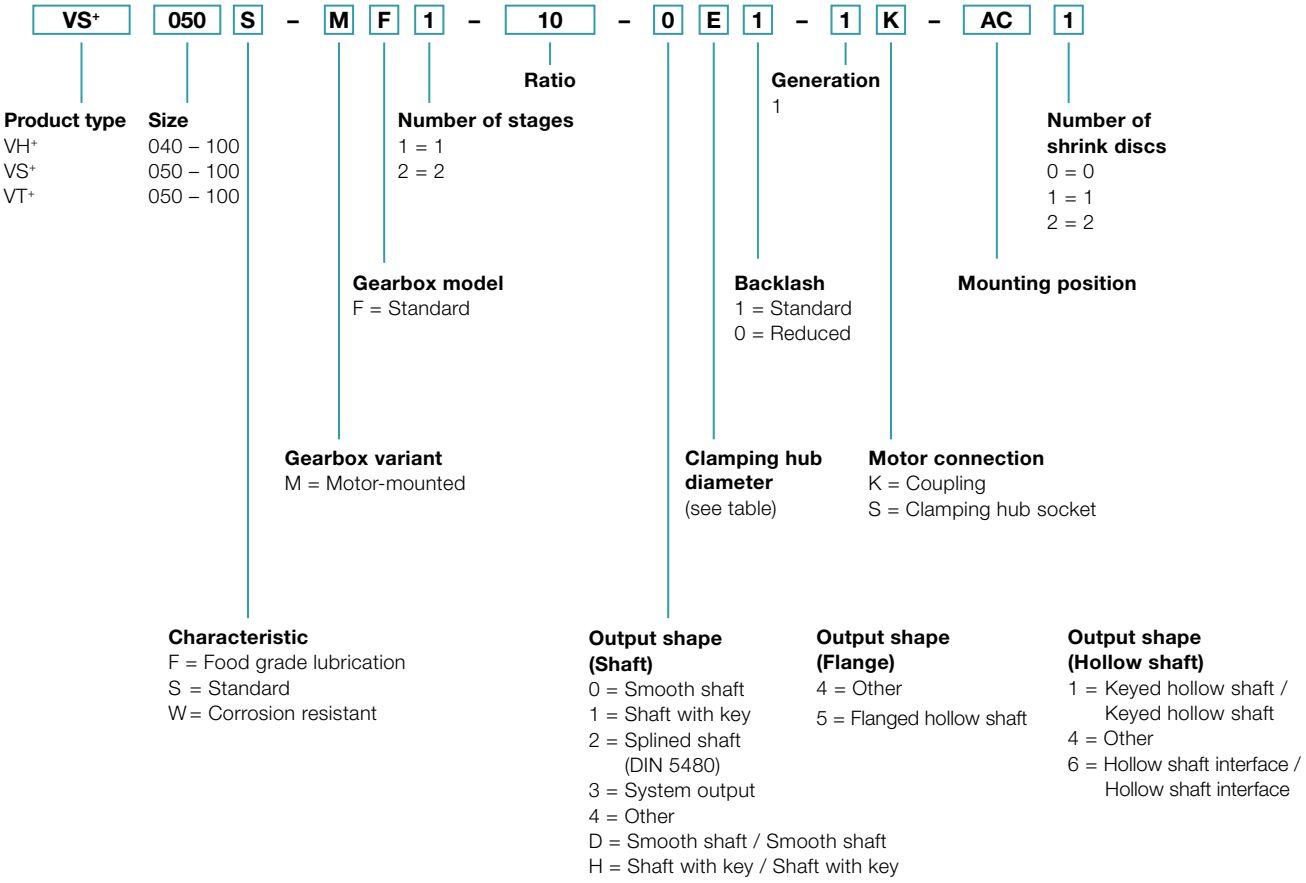
Output shape

When selecting an output combination from the modular system, please select the letter „B“ as the characteristic in the ordering code. The digit for the required output shape is the modular matrix system.
Example: If you opt for an SK+ with a smooth shaft and require an additional output in the form of a shaft with key, then select the letter „G“ and enter in the order key under „Output shape“.

	Backward / Output shape / Front	 Smooth shaft	 Shaft with key	 Hollow shaft interface	 Hollow shaft	 Cover
SK+ / SPK+	 Smooth shaft	**D**	**G**	**A**	**–**	**0***
SK+ / SPK+	 Shaft with key	**E**	**H**	**B**	**–**	**1***
SK+ / SPK+	 Splined shaft (DIN 5480)	**F**	**I**	**C**	**–**	**2***
SPK+	 Blind hollow shaft	**O**	**P**	**N**	**–**	**5***
TK+	 Flanged hollow shaft	**D**	**G**	**6**	**5***	**0**
TPK+	 Flange	**D**	**G**	**6**	**–**	**0***
HG+	 Hollow shaft	**D**	**G**	**6***	**5***	**0**

* Standard version: please specify characteristic „S“ in the order code

Ordering code – Worm gearboxes



Mounting positions and clamping hub diameters

Mounting position (only relevant for oil volume)

Output side A:
View of motor interface,
Output left
Only valid for VS+, VT+

AC


AF


AD


AG


AE


Output side B:
View of motor interface,
Output right
Only valid for VS+, VT+

BC


BF


BD


BG


BE


For VH+ and VS+ with dual-shaft output or hollow shaft, A and B in the mounting position must be replaced with 0 (zero).

Clamping hub diameter

(see technical data sheet for possible diameters)

Code letter	mm
B	11
C	14
E	19
G	24
H	28

Code letter	mm
I	32
K	38
M	48
N	55
O	60

Intermediate diameters possible in combination with a bushing with a minimum thickness of 1 mm.

YOUR NOTE

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