SP+ / SP+ HIGH SPEED – The classic all-rounder

SP+

The standard version of these low-backlash planetary gearboxes with output shaft is ideally suited for high positioning accuracy and highly dynamic cyclic operation. The SP+ HIGH SPEED is particularly appropriate for applications with maximum speeds during continuous operation.

Product highlights

Max. torsional backlash [arcmin] ≤ 1 – 6

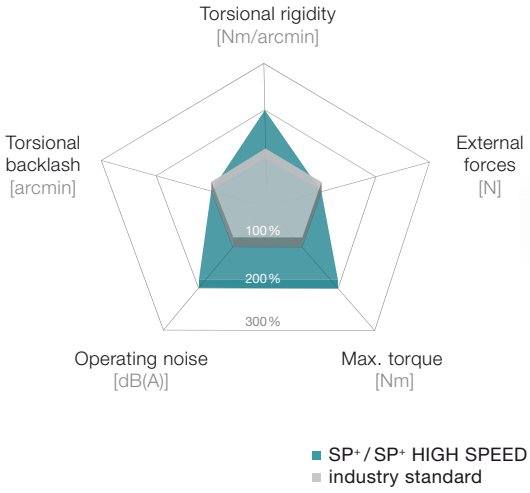
Various output configurations
Smooth shaft, shaft with key, splined shaft (DIN 5480), blind hollow shaft

High nominal speeds
SP+ HIGH SPEED version for applications in continuous operation

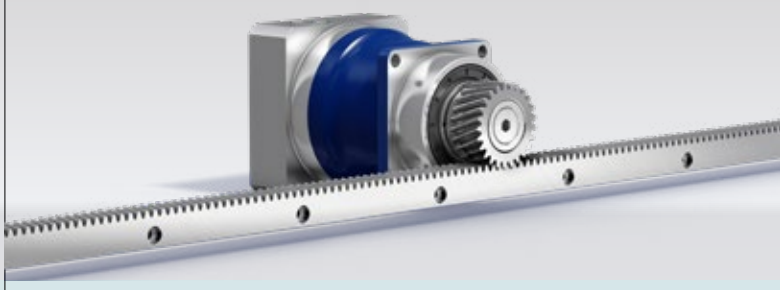
Flexible drive options
Clamping hub socket, coupling, optimized mass inertia, keyed clamping hub socket

Other gearbox models
Corrosion resistant design, ATEX, food-grade lubrication, low friction version

The SP+ compared to the industry standard



SP+ planetary gearbox in corrosion resistant design

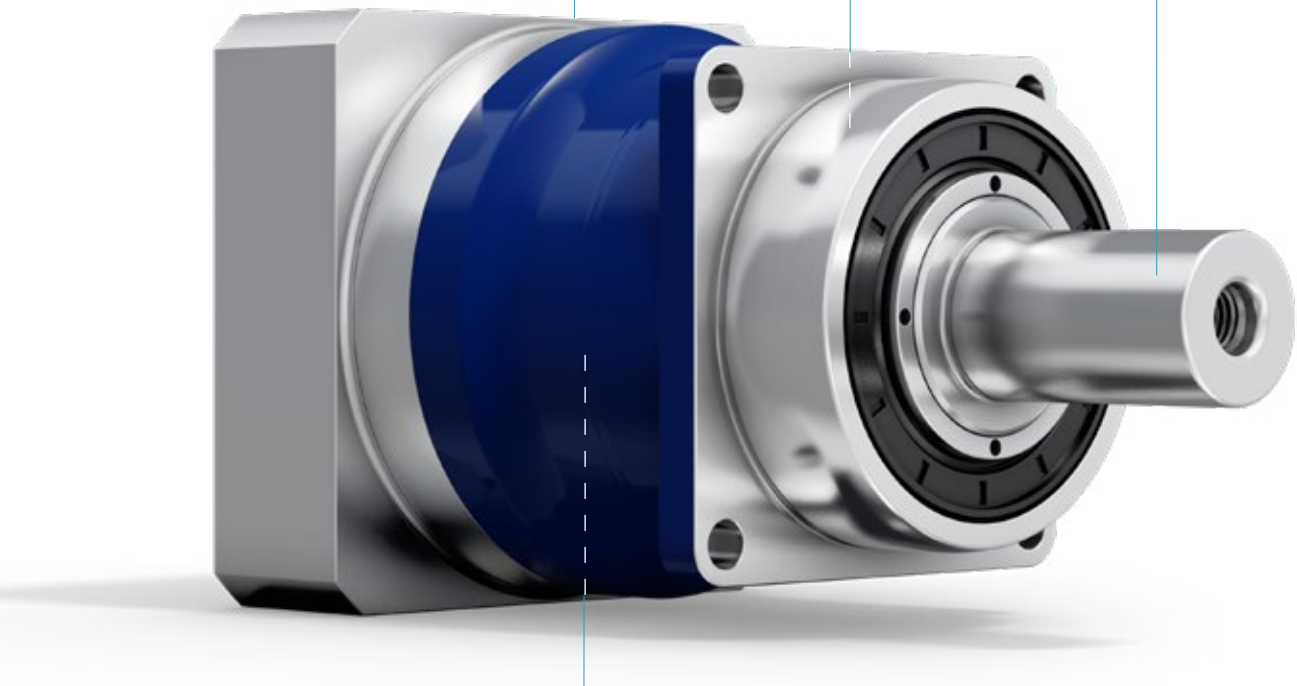


SP+ with rack and pinion

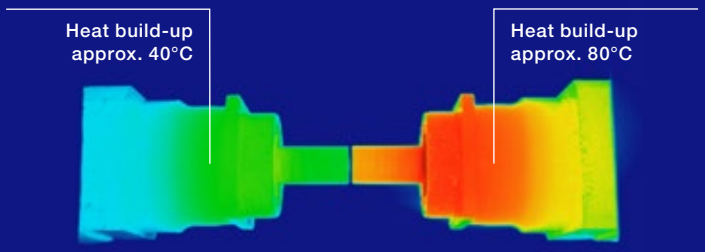
Connectivity of the motor shafts due to the large number of clamping hub diameters

Tapered roller bearing for absorbing axial and radial forces

Various output configurations



Extremely smooth running due to helical toothing



SP⁺ HIGH SPEED MC version

Industry standard

SP⁺ with metal bellows coupling

					1-stage					
Ratio			i		**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]			T_{2a}	*Nm*	48	67	67	67	51	51
				in.lb	425	595	595	595	453	453
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	36	50	50	50	38	38
				in.lb	319	443	443	443	336	336
Nominal torque (at n_{1N})			T_{2N}	*Nm*	21	27	27	26	26	27
				in.lb	190	239	236	226	230	237
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	96	109	109	109	100	100
				in.lb	850	965	965	965	885	885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	3300	3300	3300	4000	4000	4000
Max. input speed			n_{1Max}	*rpm*	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*	0.68	0.52	0.48	0.34	0.32	0.32
				in.lb	6.0	4.6	4.2	3.0	2.8	2.8
Max. backlash			j_t	*arcmin*	Standard ≤ 4 / Reduced ≤ 2					
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	3.5					
				in.lb/arcmin	31					
Max. axial force [c)]			F_{2AMax}	*N*	2400					
				lb_f	540					
Max. lateral force [c)]			F_{2QMax}	*N*	2800					
				lb_f	630					
Max. tilting moment			M_{2KMax}	*Nm*	152					
				in.lb	1345					
Efficiency at full load			η	%	97					
Service life			L_h	*h*	> 20000					
Weight (incl. standard adapter plate)			m	*kg*	1.9					
				lb_m	4.2					
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®)					BC2-00060AA016.000-X					
Bore diameter of coupling on the application side				*mm*	X = 012.000 - 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*	0.21	0.15	0.12	0.10	0.10	0.09
				10^{-3} in.lb.s²	0.19	0.13	0.11	0.09	0.09	0.08
	C	14	J_1	*kgcm²*	0.28	0.22	0.20	0.18	0.16	0.16
				10^{-3} in.lb.s²	0.25	0.19	0.18	0.16	0.14	0.14
	E	19	J_1	*kgcm²*	0.61	0.55	0.52	0.50	0.49	0.49
				10^{-3} in.lb.s²	0.54	0.49	0.46	0.44	0.43	0.43

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

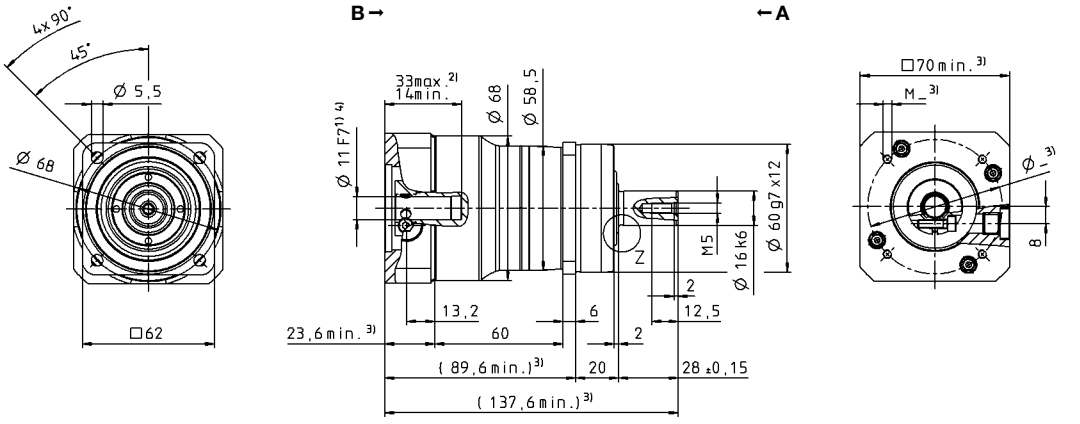
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

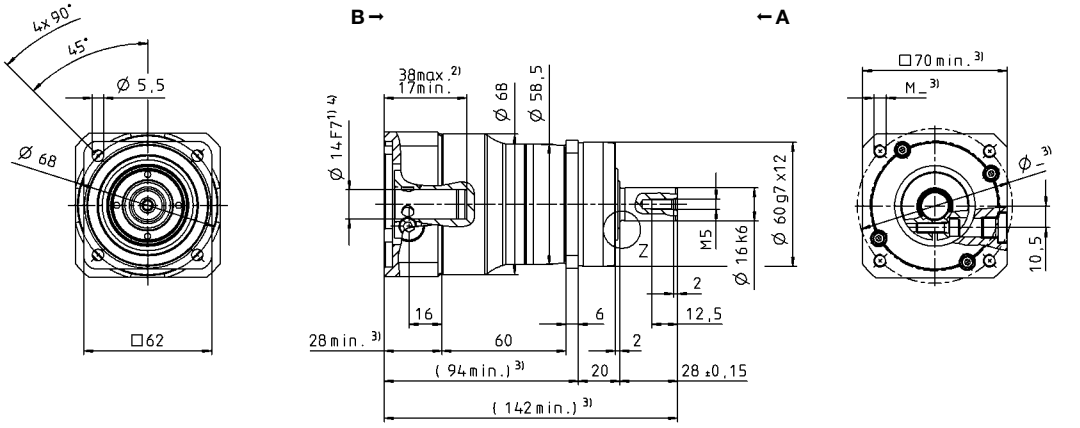
1-stage

Motor shaft diameter [mm]

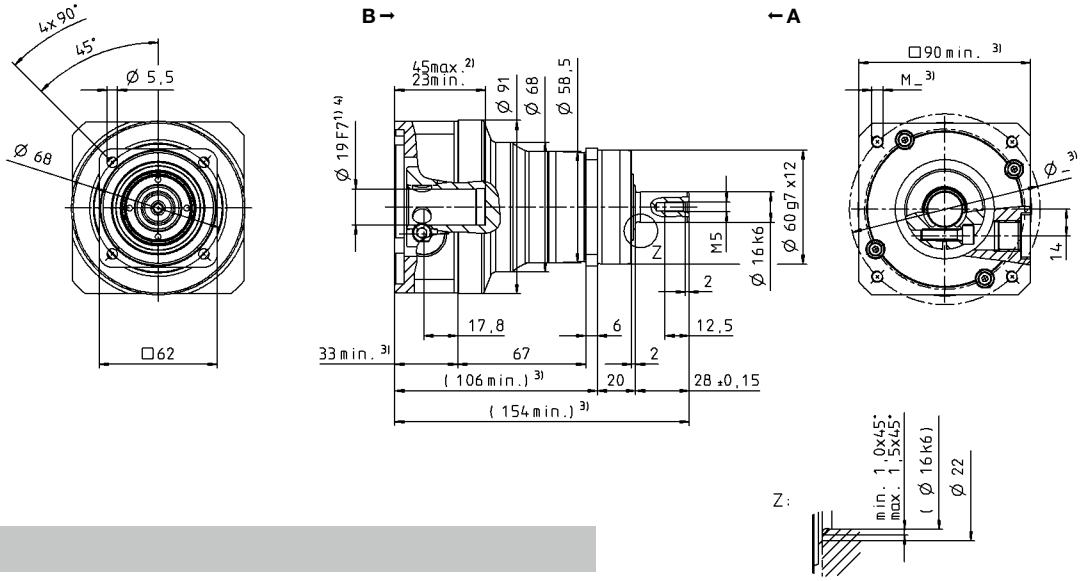
up to 11 [4] (B) clamping hub diameter



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

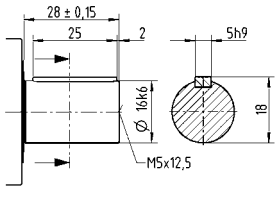


up to 19 [4] (E) clamping hub diameter

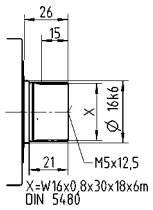


Other output variants

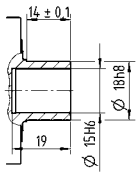
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]			T_{2a}	*Nm*	57	57	67	57	57	67	57	67	48	56	48
				in.lb	507	507	595	507	507	595	507	595	423	499	423
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	50	50	50	50	50	50	50	50	38	50	38
				in.lb	443	443	443	443	443	443	443	443	336	443	336
Nominal torque (at n_{1N})			T_{2N}	*Nm*	38	40	40	40	38	40	40	40	31	40	31
				in.lb	332	354	351	357	333	357	357	357	270	357	272
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	109	109	109	109	109	109	109	109	109	109	100
				in.lb	965	965	965	965	965	965	965	965	965	965	885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	4400	4400	4400	4400	4400	4400	4400	4800	4800	5500	5500
Max. input speed			n_{1Max}	*rpm*	8500	8500	8500	8500	8500	8500	8500	8500	8500	8500	8500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	0.28	0.25	0.23	0.22	0.24	0.20	0.20	0.19	0.19	0.17	0.18
				in.lb	2.5	2.2	2.0	1.9	2.1	1.8	1.8	1.7	1.7	1.5	1.6
Max. backlash			j_t	*arcmin*	Standard ≤ 6 / Reduced ≤ 4										
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	3.5										
				in.lb/arcmin	31										
Max. axial force [c)]			F_{2AMax}	*N*	2400										
				lb_f	540										
Max. lateral force [c)]			F_{2QMax}	*N*	2800										
				lb_f	630										
Max. tilting moment			M_{2KMax}	*Nm*	152										
				in.lb	1345										
Efficiency at full load			η	%	94										
Service life			L_h	*h*	> 20000										
Weight (incl. standard adapter plate)			*m*	*kg*	2.0										
				lb_m	4.4										
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®)					BC2-00060AA016.000-X										
Bore diameter of coupling on the application side				*mm*	X = 012.000 - 035.000										
Mass moment of inertia (relates to the drive)	B	11	J_1	$kgcm^2$	0.077	0.069	0.068	0.061	0.061	0.061	0.057	0.057	0.056	0.056	0.056
				10^{-3} *in.lb.s²*	0.068	0.061	0.060	0.054	0.054	0.054	0.050	0.050	0.050	0.050	0.050
Clamping hub diameter [mm]	C	14	J_1	$kgcm^2$	0.17	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.15
Optimized mass inertia version available on request				10^{-3} *in.lb.s²*	0.15	0.14	0.14	0.14	0.14	0.14	0.13	0.13	0.13	0.13	0.13

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

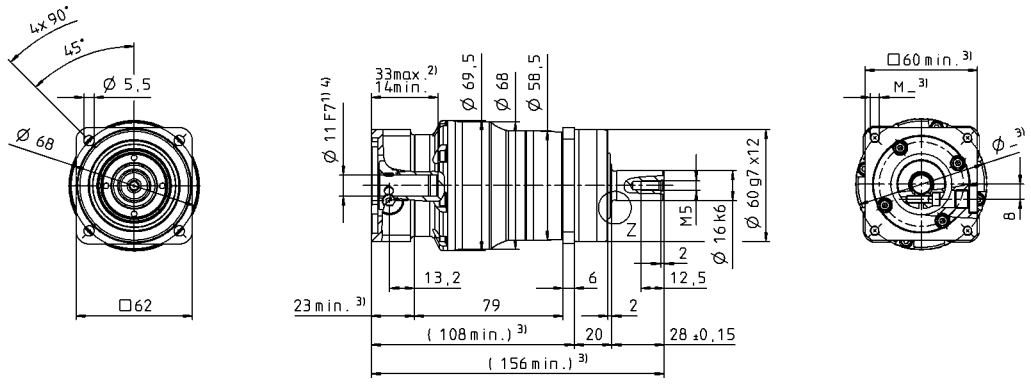
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

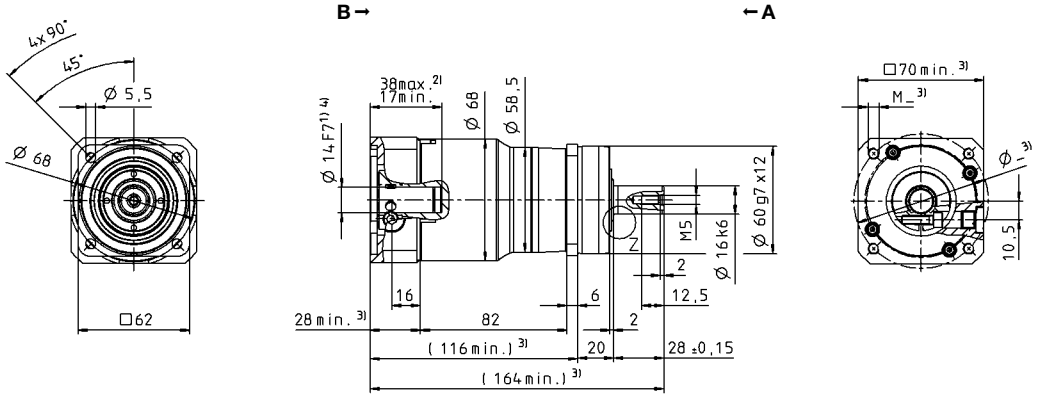
2-stage

Motor shaft diameter [mm]

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

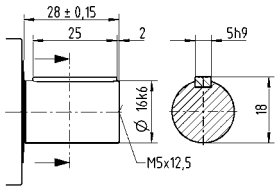


up to 14 [4] (C) clamping hub diameter

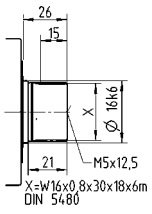


Other output variants

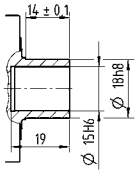
Shaft with key



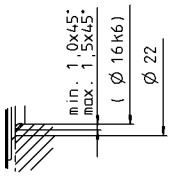
Splined shaft (DIN 5480)



Shaft mounted



Z:



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*			**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*		136	176	176	176	152	152
		in.lb		1204	1558	1558	1558	1345	1345
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		102	132	132	132	114	114
		in.lb		903	1168	1168	1168	1009	1009
Nominal torque (at n_{1N})	T_{2N}	*Nm*		63	81	81	81	80	81
		in.lb		558	719	716	719	712	720
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		139	185	250	250	250	250
		in.lb		1230	1640	2213	2213	2213	2213
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		2900	2900	2900	3100	3100	3100
Max. input speed	n_{1Max}	*rpm*		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*		1.5	1.4	0.96	0.72	0.55	0.52
		in.lb		14	12	8.5	6.4	4.9	4.6
Max. backlash	j_t	*arcmin*		Standard ≤ 4 / Reduced ≤ 2					
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		10					
		in.lb/arcmin		89					
Max. axial force [c)]	F_{2AMax}	*N*		3350					
		lb_f		754					
Max. lateral force [c)]	F_{2QMax}	*N*		4200					
		lb_f		945					
Max. tilting moment	M_{2KMax}	*Nm*		236					
		in.lb		2089					
Efficiency at full load	η	*%*		97					
Service life	L_h	*h*		> 20000					
Weight (incl. standard adapter plate)	*m*	*kg*		3.9					
		lb_m		8.6					
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*		≤ 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®)				BC2-00150AA022.000-X					
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*	0.86	0.61	0.51	0.42	0.38	0.38
				10⁻³ in.lb.s²	0.76	0.54	0.45	0.37	0.34	0.34
	E	19	J_1	*kgcm²*	1.03	0.78	0.68	0.59	0.54	0.54
				10⁻³ in.lb.s²	0.91	0.69	0.60	0.52	0.48	0.48
	G	24	J_1	*kgcm²*	2.40	2.15	2.05	1.96	1.91	1.91
				10⁻³ in.lb.s²	2.12	1.90	1.81	1.73	1.69	1.69

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

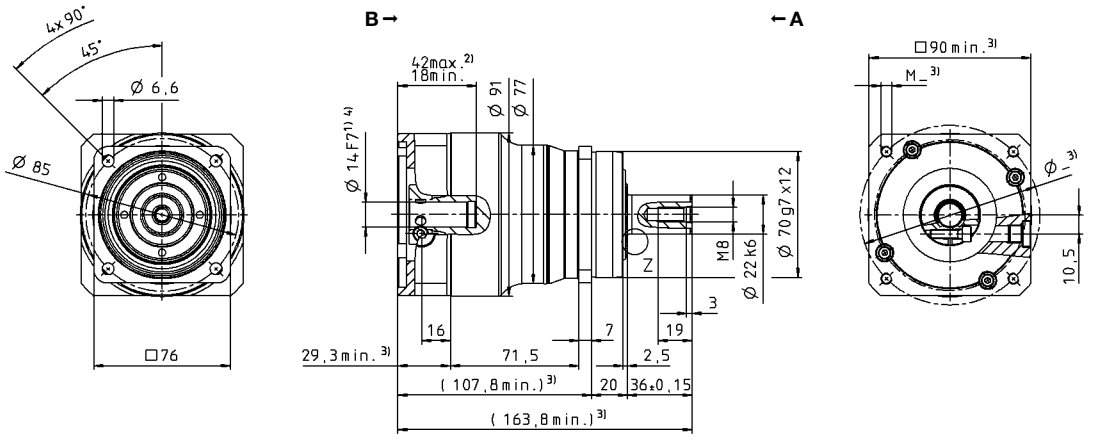
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

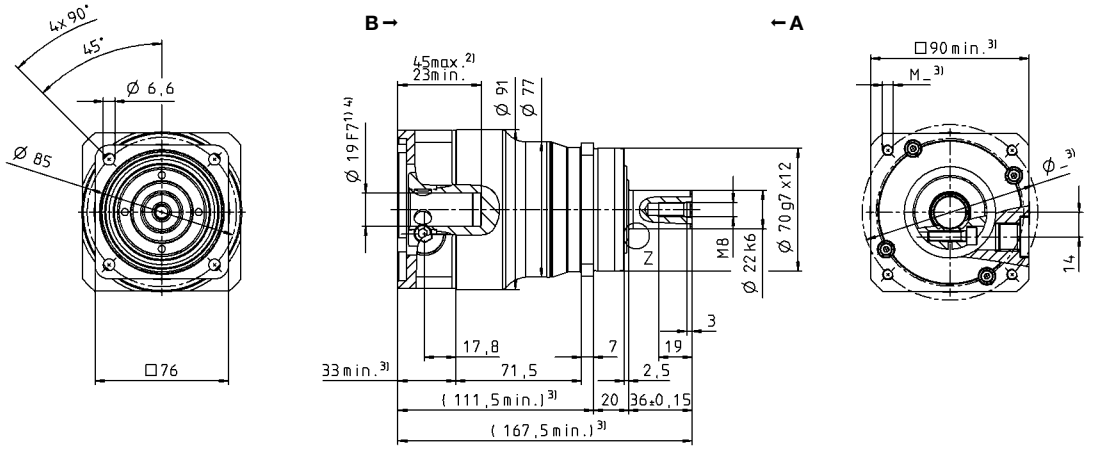
1-stage

Motor shaft diameter [mm]

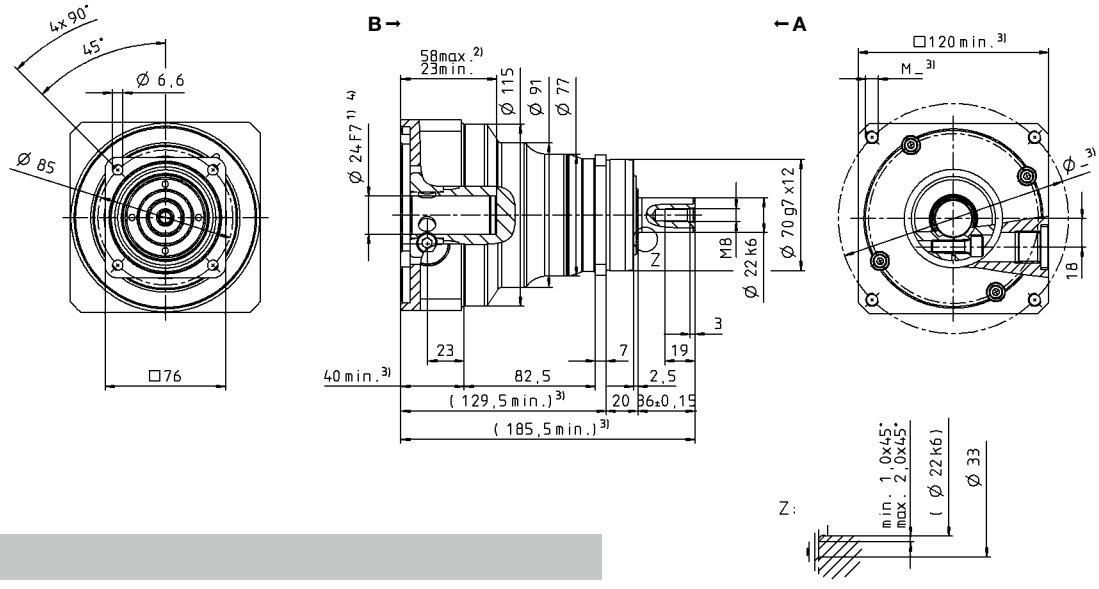
up to 14 [4] (C) clamping hub diameter



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

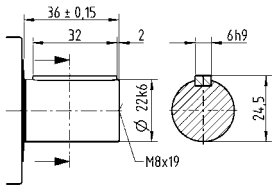


up to 24 [4] (G) clamping hub diameter

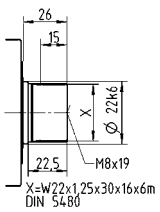


Other output variants

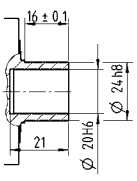
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]			T_{2a}	*Nm*	126	126	158	126	126	158	126	158	105	113	105
				in.lb	1118	1118	1398	1118	1118	1398	1118	1398	932	998	932
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	126	126	132	126	126	132	126	132	105	113	105
				in.lb	1118	1118	1168	1118	1118	1168	1118	1168	932	998	932
Nominal torque (at n_{1N})			T_{2N}	*Nm*	101	101	106	101	101	106	101	106	84	90	84
				in.lb	895	895	935	895	895	935	895	935	746	799	746
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	250	250	250	250	250	250	250	250	250	250	250
				in.lb	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213	2213
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	3500	3500	3500	3500	3500	3500	3500	3800	3800	4500	4500
Max. input speed			n_{1Max}	*rpm*	8500	8500	8500	8500	8500	8500	8500	8500	8500	8500	8500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	0.50	0.41	0.35	0.32	0.44	0.28	0.26	0.23	0.23	0.21	0.23
				in.lb	4.4	3.6	3.1	2.8	3.9	2.5	2.3	2.0	2.0	1.9	2.0
Max. backlash			j_t	*arcmin*	Standard ≤ 6 / Reduced ≤ 4										
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	10										
				in.lb/arcmin	89										
Max. axial force [c)]			F_{2AMax}	*N*	3350										
				lb_f	754										
Max. lateral force [c)]			F_{2QMax}	*N*	4200										
				lb_f	945										
Max. tilting moment			M_{2KMax}	*Nm*	236										
				in.lb	2089										
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®)					BC2-00150AA022.000-X										
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	B	11	J_1	$kgcm^2$	0.16	0.13	0.13	0.10	0.10	0.10	0.09	0.09	0.09	0.09	0.09
				10^{-3} $in.lb.s^2$	0.14	0.12	0.12	0.09	0.09	0.09	0.08	0.08	0.08	0.08	0.08
	C	14	J_1	$kgcm^2$	0.23	0.20	0.20	0.18	0.18	0.18	0.16	0.16	0.16	0.16	0.16
				10^{-3} $in.lb.s^2$	0.20	0.18	0.18	0.16	0.16	0.16	0.14	0.14	0.14	0.14	0.14
	E	19	J_1	$kgcm^2$	0.55	0.53	0.52	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49
				10^{-3} $in.lb.s^2$	0.49	0.47	0.46	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43

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

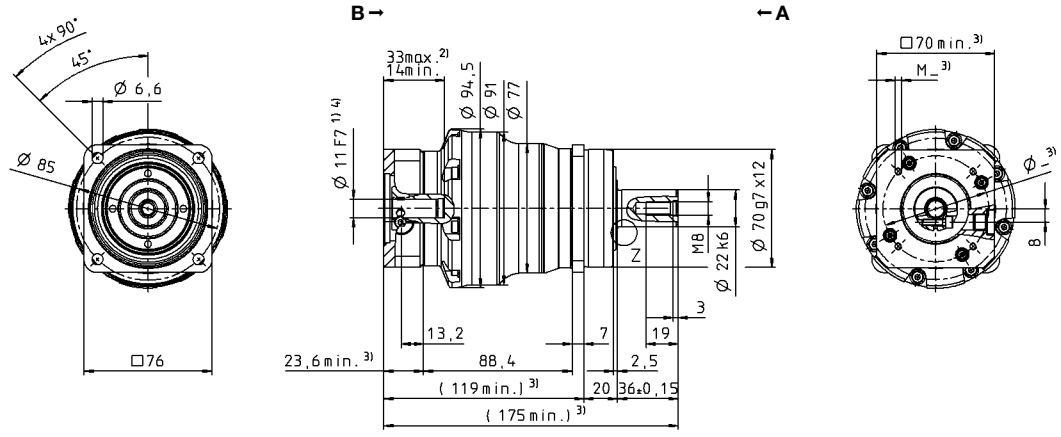
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

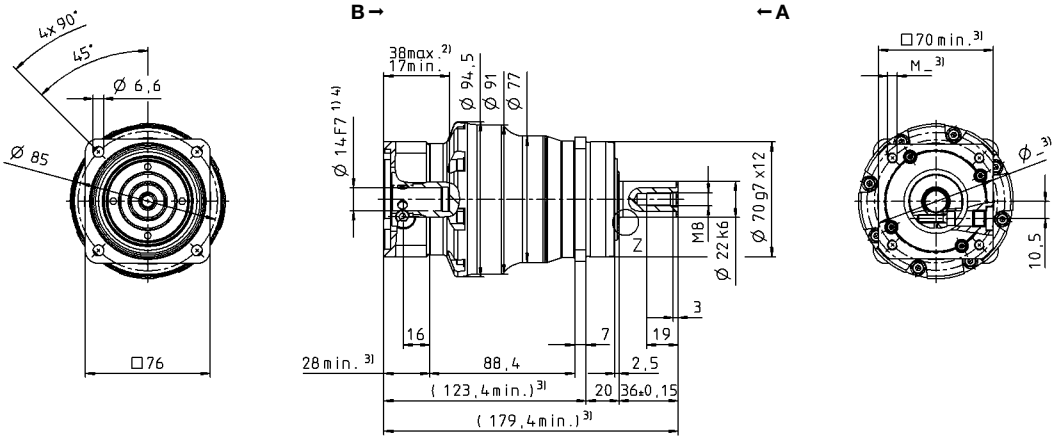
2-stage

Motor shaft diameter [mm]

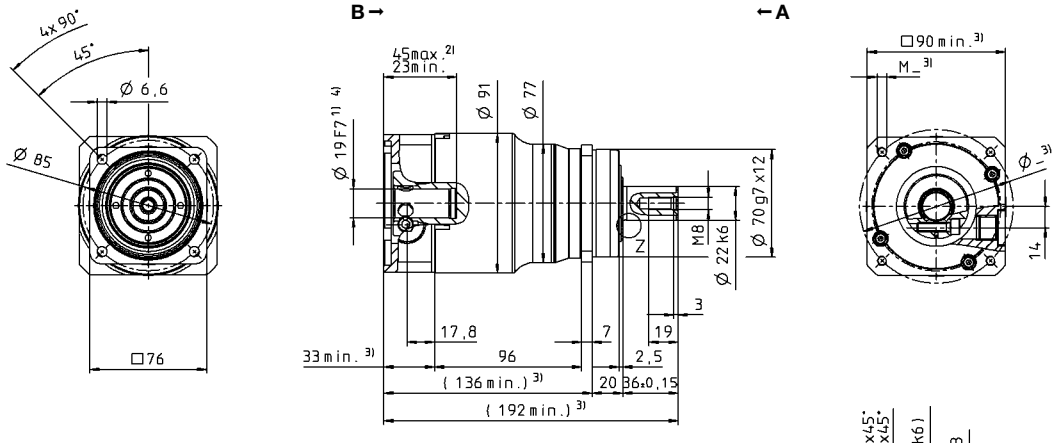
up to 11 [4] (B) clamping hub diameter

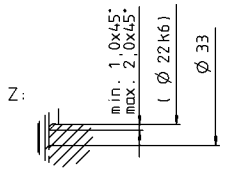


up to 14 [4] (C) [5] clamping hub diameter



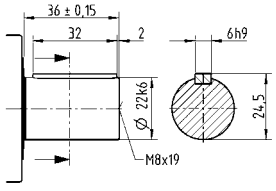
up to 19 [4] (E) clamping hub diameter



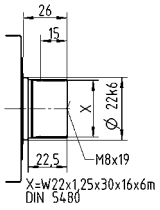


Other output variants

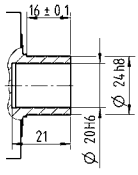
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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*		**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]			T_{2a}	*Nm*	376	495	495	428	376	376
				in.lb	3328	4381	4381	3784	3328	3328
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	282	378	378	378	282	282
				in.lb	2496	3346	3346	3346	2496	2496
Nominal torque (at n_{1N})			T_{2N}	*Nm*	131	171	169	166	166	174
				in.lb	1157	1510	1498	1473	1470	1538
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	500	625	625	625	625	625
				in.lb	4425	5532	5532	5532	5532	5532
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2500	2500	2500	2800	2800	2800
Max. input speed			n_{1Max}	*rpm*	5500	5500	5500	5500	5500	5500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	3.1	2.4	2.1	1.3	1.0	1.0
				in.lb	28	21	18	12	9.2	9.2
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1					
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	31					
				in.lb/arcmin	274					
Max. axial force [c)]			F_{2AMax}	*N*	5650					
				lb_f	1271					
Max. lateral force [c)]			F_{2QMax}	*N*	6600					
				lb_f	1485					
Max. tilting moment			M_{2KMax}	*Nm*	487					
				in.lb	4310					
Efficiency at full load			η	%	97					
Service life			L_h	*h*	> 20000					
Weight (incl. standard adapter plate)			*m*	*kg*	7.7					
				lb_m	17					
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®)					BC2-00300AA032.000-X					
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*	3.29	2.35	1.92	1.60	1.38	1.38
				10⁻³ in.lb.s²	2.91	2.08	1.70	1.42	1.22	1.22
	G	24	J_1	*kgcm²*	3.99	3.04	2.61	2.29	2.07	2.07
				10⁻³ in.lb.s²	3.53	2.69	2.31	2.03	1.83	1.83
	H	28	J_1	*kgcm²*	3.59	2.65	2.22	1.90	1.68	1.68
				10⁻³ in.lb.s²	3.18	2.35	1.96	1.68	1.49	1.49
	K	38	J_1	*kgcm²*	11.1	10.1	9.68	9.36	9.14	9.14
				10⁻³ in.lb.s²	9.82	8.94	8.57	8.28	8.09	8.09

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

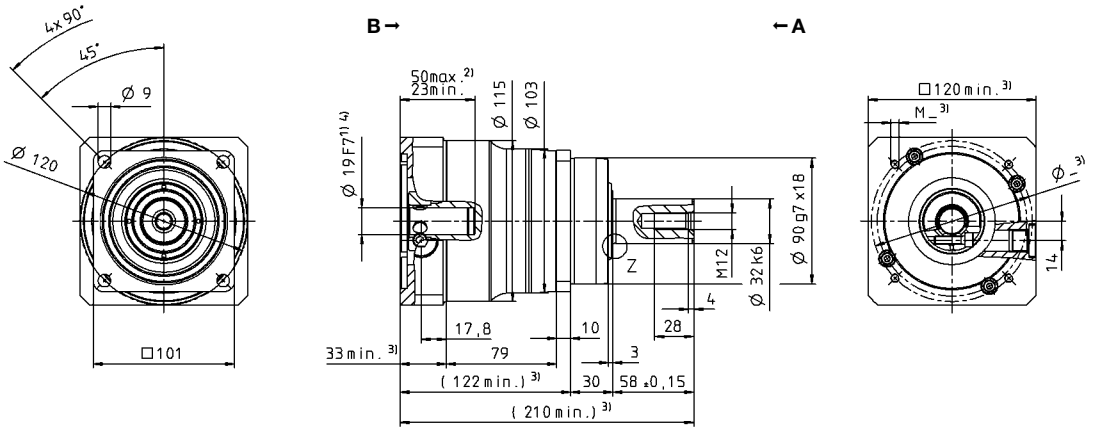
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

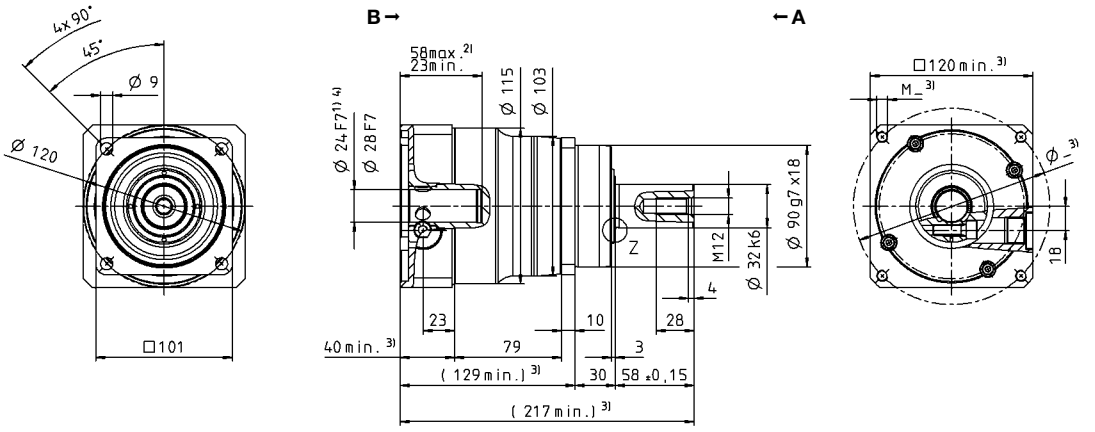
1-stage

Motor shaft diameter [mm]

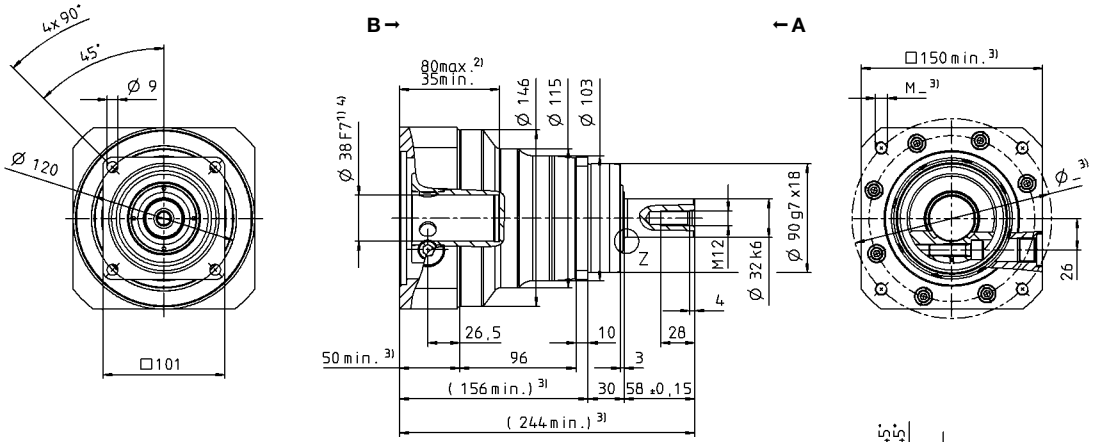
up to 19 [4] (E) clamping hub diameter

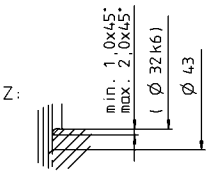


up to 24/28 [4] (G[5]/H) clamping hub diameter



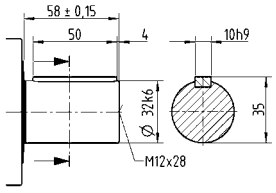
up to 38 [4] (K) clamping hub diameter



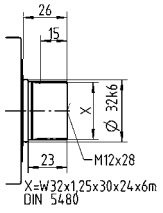


Other output variants

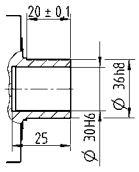
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]	T_{2a}		*Nm*	347	347	347	347	347	347	347	347	259	347	259
			in.lb	3067	3067	3067	3067	3067	3067	3067	3067	2288	3067	2288
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}		*Nm*	347	347	347	347	347	347	347	347	259	347	259
			in.lb	3067	3067	3067	3067	3067	3067	3067	3067	2288	3067	2288
Nominal torque (at n_{1N})	T_{2N}		*Nm*	243	259	257	277	243	277	277	277	207	277	207
			in.lb	2146	2295	2277	2453	2153	2453	2453	2453	1830	2453	1830
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}		*Nm*	625	625	625	625	625	625	625	625	625	625	625
			in.lb	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*	3100	3100	3100	3100	3100	3100	3100	3500	3500	4200	4200
Max. input speed	n_{1Max}		*rpm*	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500	6500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}		*Nm*	1.0	0.93	0.85	0.77	0.86	0.54	0.54	0.46	0.46	0.39	0.37
			in.lb	9.2	8.2	7.5	6.8	7.6	4.8	4.8	4.1	4.1	3.5	3.3
Max. backlash	j_t		*arcmin*	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity [b)]	C_{t21}		*Nm/arcmin*	31										
			in.lb/arcmin	274										
Max. axial force [c)]	F_{2AMax}		*N*	5650										
			lb_f	1271										
Max. lateral force [c)]	F_{2QMax}		*N*	6600										
			lb_f	1485										
Max. tilting moment	M_{2KMax}		*Nm*	487										
			in.lb	4310										
Efficiency at full load	η		%	94										
Service life	L_h		*h*	> 20000										
Weight (incl. standard adapter plate)	m		*kg*	7.9										
			lb_m	17.5										
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®)				BC2-00300AA032.000-X										
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	C	14	J_1	*kgcm²*	0.64	0.54	0.52	0.43	0.43	0.43	0.38	0.38	0.54	0.37	0.37
				10^{-3} in.lb.s²	0.57	0.48	0.46	0.38	0.38	0.38	0.34	0.34	0.48	0.33	0.33
	E	19	J_1	*kgcm²*	0.81	0.70	0.68	0.60	0.43	0.59	0.55	0.54	0.38	0.54	0.54
				10^{-3} in.lb.s²	0.72	0.62	0.60	0.53	0.38	0.52	0.49	0.48	0.34	0.48	0.48
	G	24	J_1	*kgcm²*	2.18	2.07	2.05	1.97	1.97	1.96	1.92	1.91	1.91	1.91	1.91
				10^{-3} in.lb.s²	1.93	1.83	1.81	1.74	1.74	1.73	1.70	1.69	1.69	1.69	1.69
	H	28	J_1	*kgcm²*	1.98	1.90	1.88	1.81	1.81	1.80	1.76	1.75	1.75	1.75	1.75
				10^{-3} in.lb.s²	1.75	1.68	1.66	1.60	1.60	1.59	1.56	1.55	1.55	1.55	1.55

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

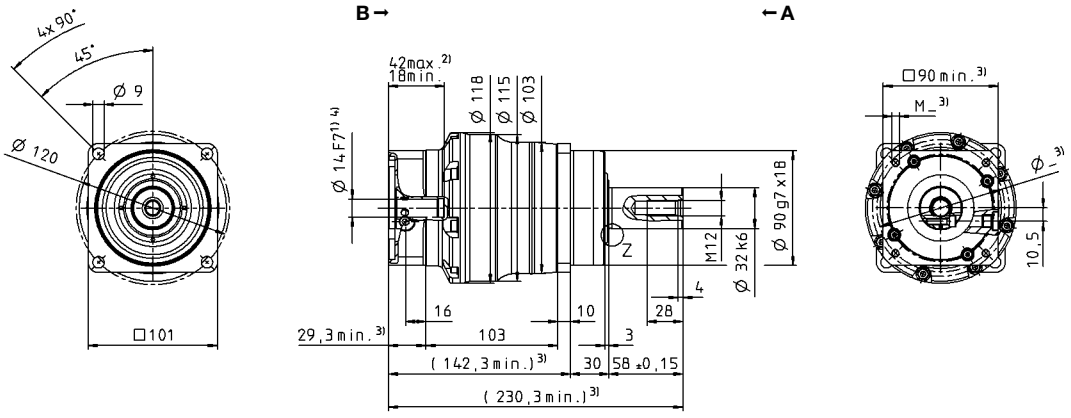
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A | View B

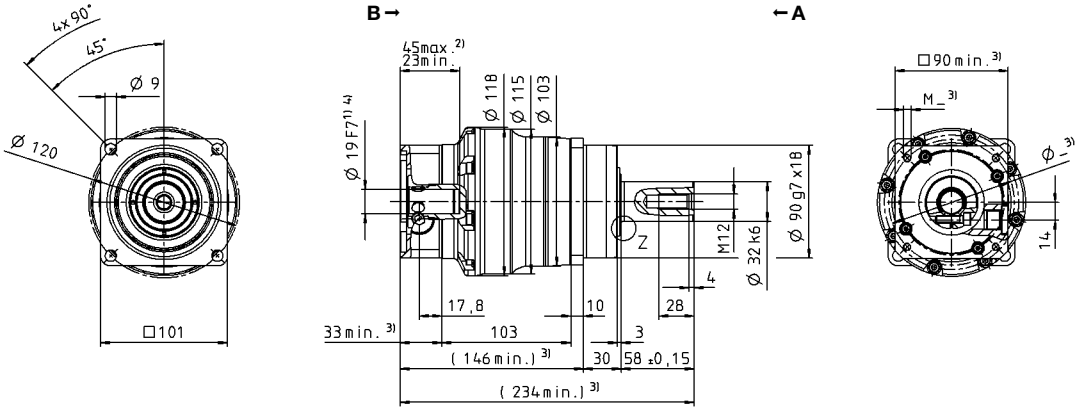
2-stage

Motor shaft diameter [mm]

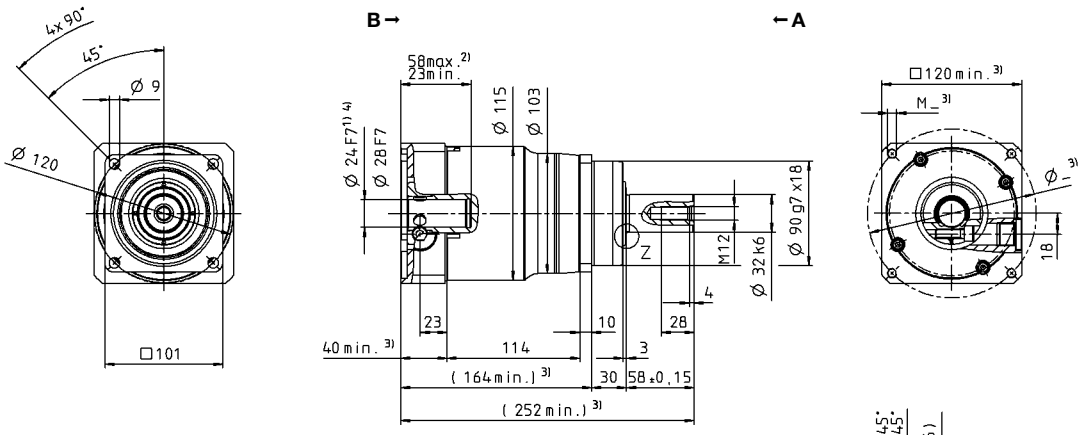
up to 14 [4] (C) clamping hub diameter



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

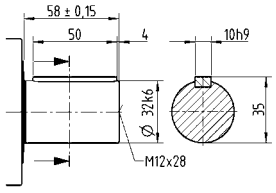


up to 24/28 [4] (G/H) clamping hub diameter

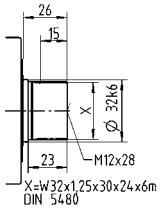


Other output variants

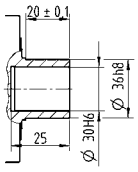
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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*		**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]			T_{2a}	*Nm*	624	1056	1056	825	720	720
				in.lb	5523	9346	9346	7302	6373	6373
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	468	792	792	792	636	636
				in.lb	4142	7010	7010	7010	5629	5629
Nominal torque (at n_{1N})			T_{2N}	*Nm*	202	335	333	319	312	327
				in.lb	1786	2962	2944	2820	2763	2894
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	1250	1350	1350	1350	1250	1250
				in.lb	11064	11949	11949	11949	11064	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2100	2100	2100	2600	2600	2600
Max. input speed			n_{1Max}	*rpm*	5000	5000	5000	5000	5000	5000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	6.7	5.4	4.4	3.0	2.5	2.2
				in.lb	60	47	39	27	23	19
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1					
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	53					
				in.lb/arcmin	469					
Max. axial force [c)]			F_{2AMax}	*N*	9870					
				lb_f	2221					
Max. lateral force [c)]			F_{2QMax}	*N*	9900					
				lb_f	2228					
Max. tilting moment			M_{2KMax}	*Nm*	952					
				in.lb	8426					
Efficiency at full load			η	*%*	97					
Service life			L_h	*h*	> 20000					
Weight (incl. standard adapter plate)			*m*	*kg*	17.2					
				lb_m	38					
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 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®)					BC2-00800AA040.000-X					
Bore diameter of coupling on the application side				*mm*	X = 040.000 - 075.000					
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	G	24	J_1	$kgcm^2$	10.7	7.82	6.79	5.84	5.28	5.28
				10^{-3} $in.lb.s^2$	9.47	6.92	6.01	5.17	4.67	4.67
	I	32	J_1	$kgcm^2$	13.8	11.0	9.95	9.00	8.44	8.44
				10^{-3} $in.lb.s^2$	12.2	9.74	8.81	7.97	7.47	7.47
	K	38	J_1	$kgcm^2$	14.9	12.1	11.0	10.1	9.51	9.51
				10^{-3} $in.lb.s^2$	13.2	10.7	9.74	8.94	8.42	8.42
	M	48	J_1	$kgcm^2$	29.5	26.7	25.6	24.7	24.2	24.2
				10^{-3} $in.lb.s^2$	26.1	23.6	22.7	21.9	21.4	21.4

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

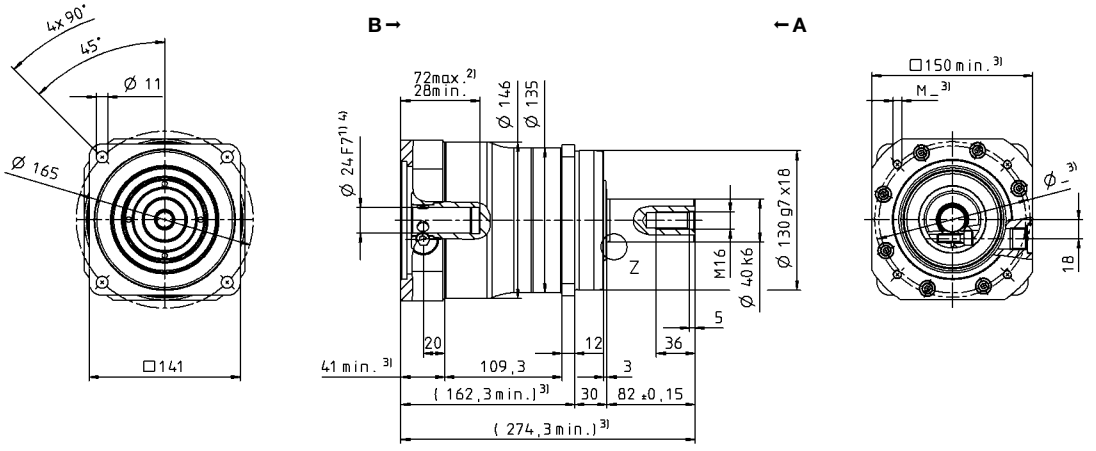
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

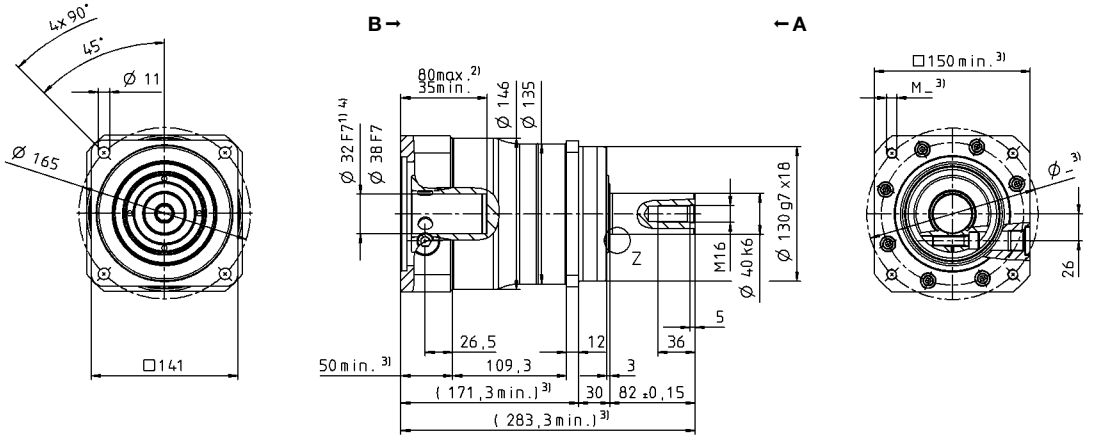
1-stage

Motor shaft diameter [mm]

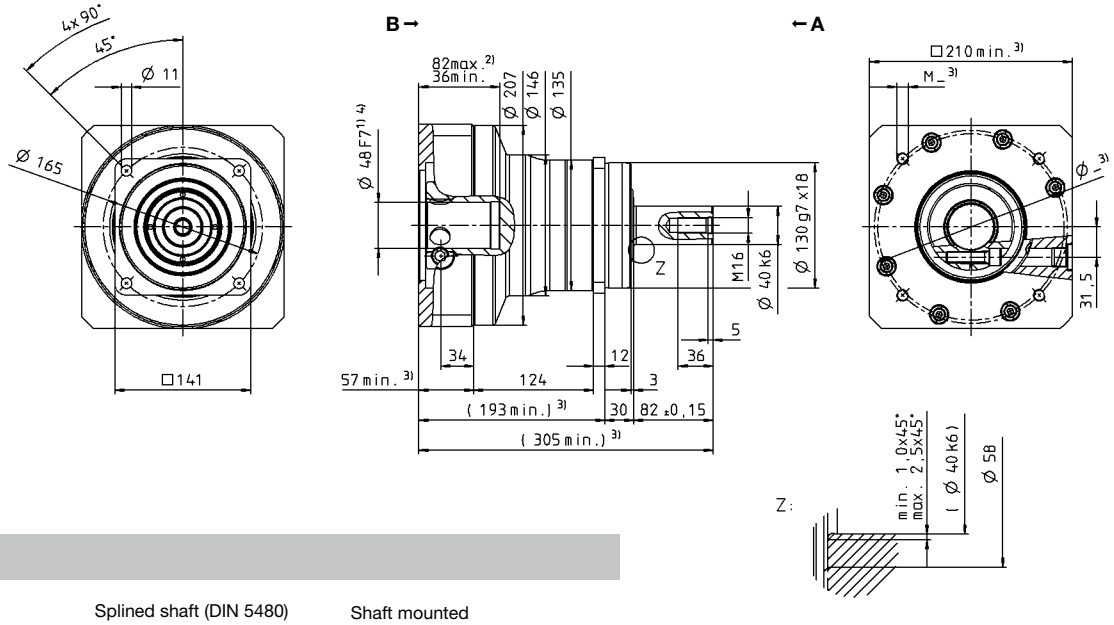
up to 24 [4] (G) clamping hub diameter



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

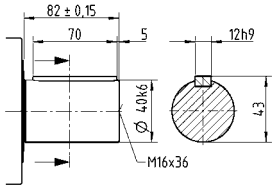


up to 48 [4] (M) clamping hub diameter

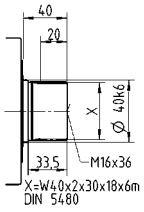


Other output variants

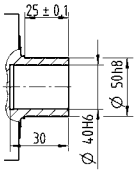
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]		T_{2a}	*Nm*	726	726	670	726	726	670	726	670	583	726	583
			in.lb	6426	6426	5934	6426	6426	5934	6426	5934	5160	6426	5160
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)		T_{2B}	*Nm*	726	726	670	726	726	670	726	670	583	726	583
			in.lb	6426	6426	5934	6426	6426	5934	6426	5930	5164	6426	5160
Nominal torque (at n_{1N})		T_{2N}	*Nm*	461	493	489	545	464	536	581	536	466	581	466
			in.lb	4078	4361	4332	4824	4104	4747	5141	4747	4128	5141	4128
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)		T_{2Not}	*Nm*	1350	1350	1350	1350	1350	1350	1350	1350	1350	1350	1250
			in.lb	11949	11949	11949	11949	11949	11949	11949	11949	11949	11949	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]		n_{1N}	*rpm*	2900	2900	2900	2900	2900	2900	2900	3200	3200	3200	3900
Max. input speed		n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)		T_{012}	*Nm*	2.4	2.1	2.0	1.8	1.6	1.2	1.2	1.1	1.1	0.88	0.80
			in.lb	21	19	17	16	14	11	11	9.4	9.4	7.8	7.1
Max. backlash		j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity [b)]		C_{t21}	*Nm/arcmin*	53										
			in.lb/arcmin	469										
Max. axial force [c)]		F_{2AMax}	*N*	9870										
			lb_f	2221										
Max. lateral force [c)]		F_{2QMax}	*N*	9900										
			lb_f	2228										
Max. tilting moment		M_{2KMax}	*Nm*	952										
			in.lb	8426										
Efficiency at full load		η	*%*	94										
Service life		L_h	*h*	> 20000										
Weight (incl. standard adapter plate)		m	*kg*	17										
			lb_m	37.6										
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)		L_{PA}	*dB(A)*	≤ 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®)				BC2-00800AA040.000-X										
Bore diameter of coupling on the application side			*mm*	X = 040.000 - 075.000										
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	E	19	J_1	*kgcm²*	2.50	2.01	1.97	1.65	1.65	1.63	1.40	1.39	1.39	1.38	1.38
				10^{-3} in.lb.s²	2.21	1.78	1.74	1.46	1.46	1.44	1.24	1.23	1.23	1.22	1.22
	G	24	J_1	*kgcm²*	3.19	2.71	2.67	2.34	2.34	2.32	2.10	2.08	2.08	2.08	2.07
				10^{-3} in.lb.s²	2.82	2.40	2.36	2.07	2.07	2.05	1.86	1.84	1.84	1.84	1.83
	K	38	J_1	*kgcm²*	10.3	9.77	9.73	9.41	9.41	9.39	9.16	9.15	9.15	9.14	9.14
				10^{-3} in.lb.s²	9.07	8.65	8.61	8.33	8.33	8.31	8.11	8.10	8.10	8.09	8.09

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

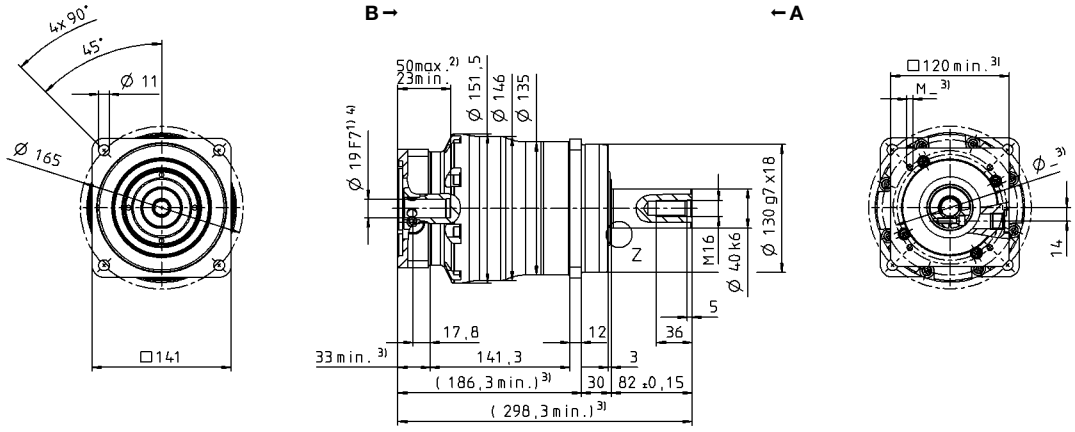
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

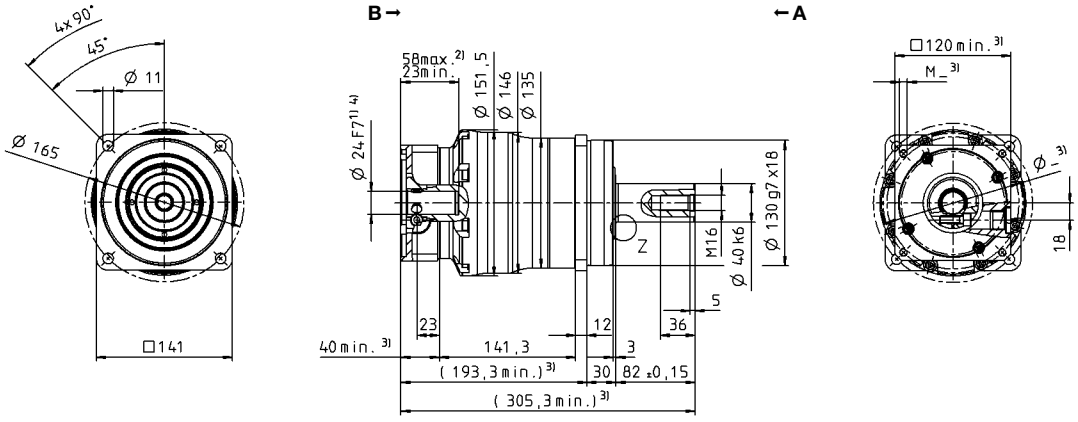
2-stage

Motor shaft diameter [mm]

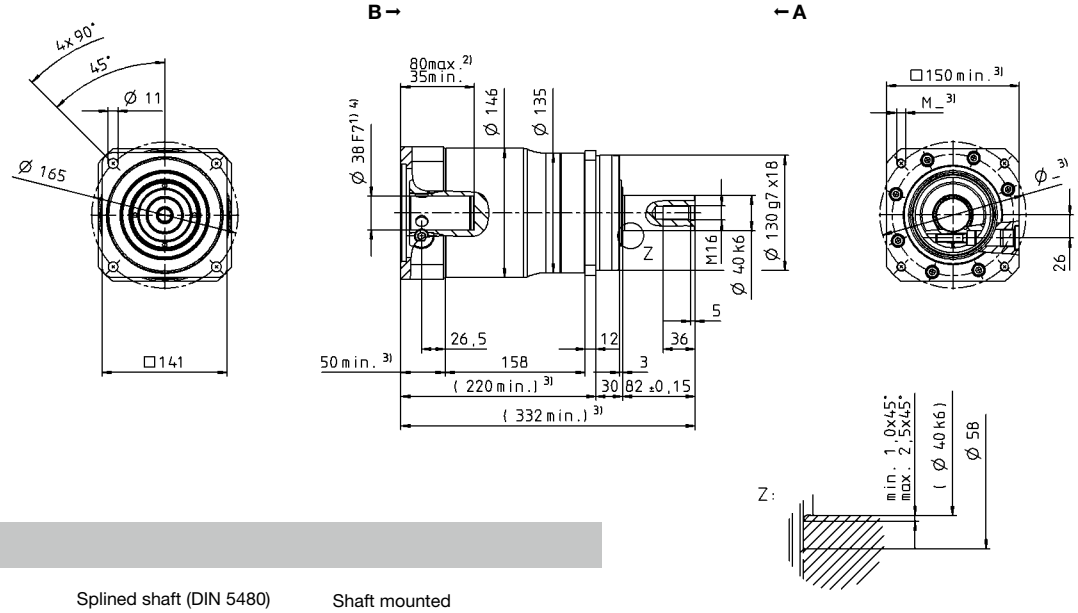
up to 19 [4] (E) clamping hub diameter



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

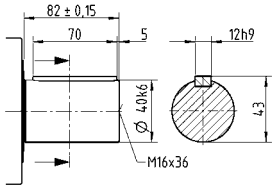


up to 38 [4] (K) clamping hub diameter

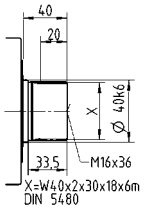


Other output variants

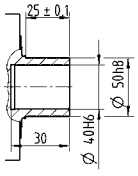
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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*	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]			T_{2a}	*Nm*	1552	1936	1936	1936	1552	1552
				in.lb	13736	17135	17135	17135	13736	13736
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	1164	1452	1452	1452	1164	1164
				in.lb	10302	12851	12851	12851	10302	10302
Nominal torque (at n_{1N})			T_{2N}	*Nm*	513	927	919	825	825	864
				in.lb	4544	8203	8134	7305	7305	7644
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	2750	2750	2750	2750	2750	2750
				in.lb	24340	24340	24340	24340	24340	24340
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	1500	1500	1500	2300	2300	2300
Max. input speed			n_{1Max}	*rpm*	4500	4500	4500	4500	4500	4500
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	15	12	8.0	5.6	5.6	3.8
				in.lb	135	103	71	50	50	34
Max. backlash			j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1					
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	175					
				in.lb/arcmin	1549					
Max. axial force [c)]			F_{2AMax}	*N*	15570					
				lb_f	3503					
Max. lateral force [c)]			F_{2QMax}	*N*	15400					
				lb_f	3465					
Max. tilting moment			M_{2KMax}	*Nm*	1600					
				in.lb	14161					
Efficiency at full load			η	%	97					
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)*	≤ 62					
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®)					BC2-01500AA055.000-X					
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*	50.8	33.9	27.9	22.2	22.2	19.2
				10^{-3} *in.lb.s²*	45.0	30.0	24.7	19.7	19.7	17.0
	M	48	J_1	*kgcm²*	58.2	41.2	35.3	29.6	29.6	26.5
				10^{-3} *in.lb.s²*	51.5	36.5	31.2	26.2	26.2	23.5
	N	55	J_1	*kgcm²*	65.7	49.7	44.0	38.5	38.5	35.4
				10^{-3} *in.lb.s²*	58.1	44.0	38.9	34.1	34.1	31.3

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

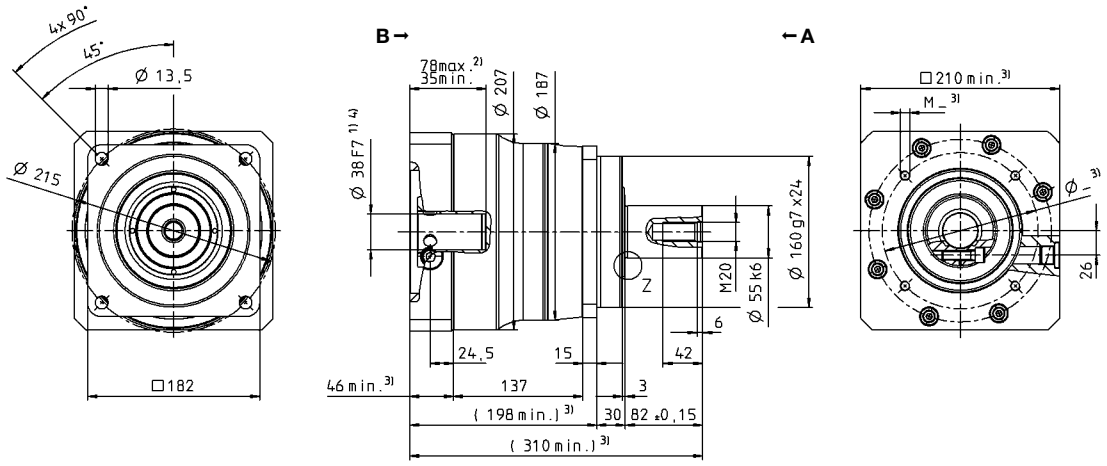
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

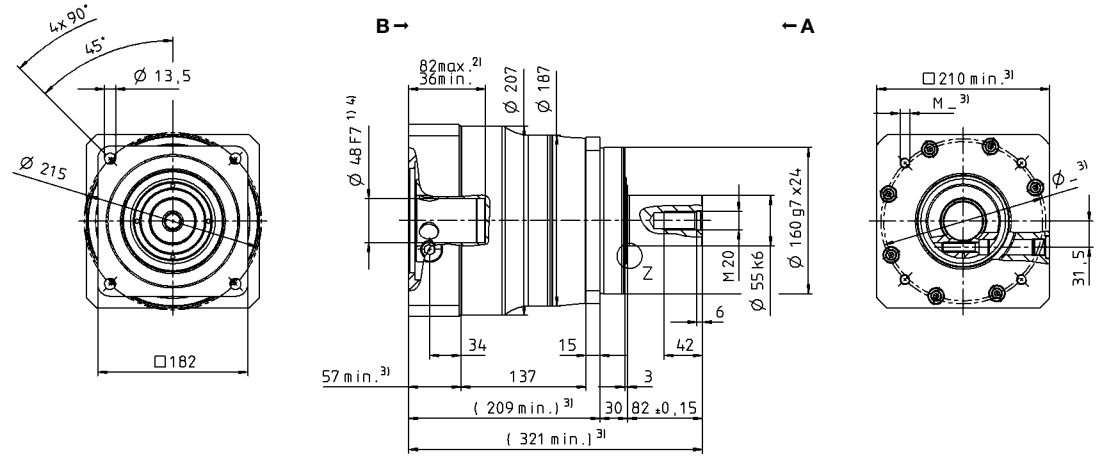
1-stage

Motor shaft diameter [mm]

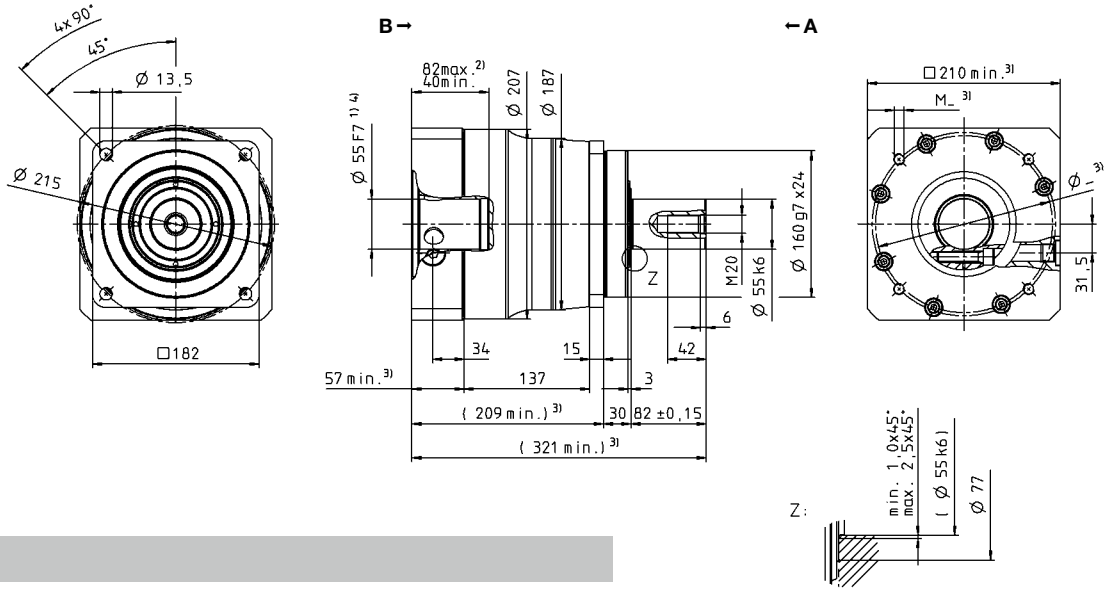
up to 38 [4] (K) clamping hub diameter



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

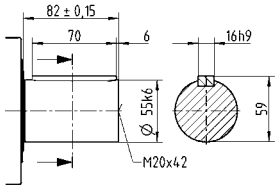


up to 55 [4] (N) [5] clamping hub diameter

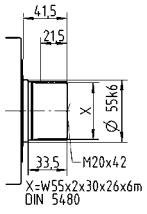


Other output variants

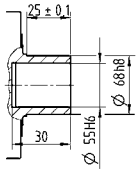
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]			T_{2a}	*Nm*	1485	1485	1857	1485	1485	1857	1485	1857	1238	1356	1238
				in.lb	13146	13146	16432	13146	13146	16432	13146	16432	10955	12000	10955
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	1452	1452	1452	1452	1452	1452	1452	1452	1164	1356	1164
				in.lb	12851	12851	12851	12851	12851	12851	12851	12851	10302	12002	10302
Nominal torque (at n_{1N})			T_{2N}	*Nm*	1162	1162	1162	1162	1162	1162	1162	1162	931	1085	931
				in.lb	10281	10281	10281	10281	10281	10281	10281	10281	8242	9600	8242
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750	2750
				in.lb	24340	24340	24340	24340	24340	24340	24340	24340	24340	24340	24340
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	2700	2700	2700	2700	2700	2700	2700	2900	2900	3200	3400
Max. input speed			n_{1Max}	*rpm*	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000	5000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	4.7	3.9	3.6	3.3	3.3	2.8	2.2	1.9	2.2	1.8	1.8
				in.lb	42	35	32	29	29	25	20	17	20	16	16
Max. backlash			j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	175										
				in.lb/arcmin	1549										
Max. axial force [c)]			F_{2AMax}	*N*	15570										
				lb_f	3503										
Max. lateral force [c)]			F_{2QMax}	*N*	15400										
				lb_f	3465										
Max. tilting moment			M_{2KMax}	*Nm*	1600										
				in.lb	14161										
Efficiency at full load			η	%	94										
Service life			L_h	*h*	> 20000										
Weight (incl. standard adapter plate)			*m*	*kg*	36.4										
				lb_m	80.4										
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®)					BC2-01500AA055.000-X										
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	$kgcm^2$	9.27	7.72	7.48	6.32	6.32	6.20	5.51	5.45	5.45	5.39	5.36
				10^{-3} *in.lb.s²*	8.20	6.83	6.62	5.59	5.59	5.49	4.88	4.82	4.82	4.77	4.74
	I	32	J_1	$kgcm^2$	12.4	10.9	10.6	9.48	9.48	9.36	8.67	9.68	8.55	8.55	8.52
				10^{-3} *in.lb.s²*	11.0	9.63	9.42	8.39	8.39	8.28	7.67	8.57	7.57	7.57	7.54
	K	38	J_1	$kgcm^2$	13.5	12.0	11.7	10.6	10.6	10.4	9.74	9.68	9.68	9.63	9.60
				10^{-3} *in.lb.s²*	12.0	10.6	10.4	9.34	9.34	9.23	8.62	8.57	8.57	8.52	8.50
	M	48	J_1	$kgcm^2$	28.1	26.6	26.3	25.2	25.2	25.1	24.4	24.3	24.3	24.3	24.3
				10^{-3} *in.lb.s²*	24.9	23.5	23.3	22.3	22.3	22.2	21.6	21.5	21.5	21.5	21.5

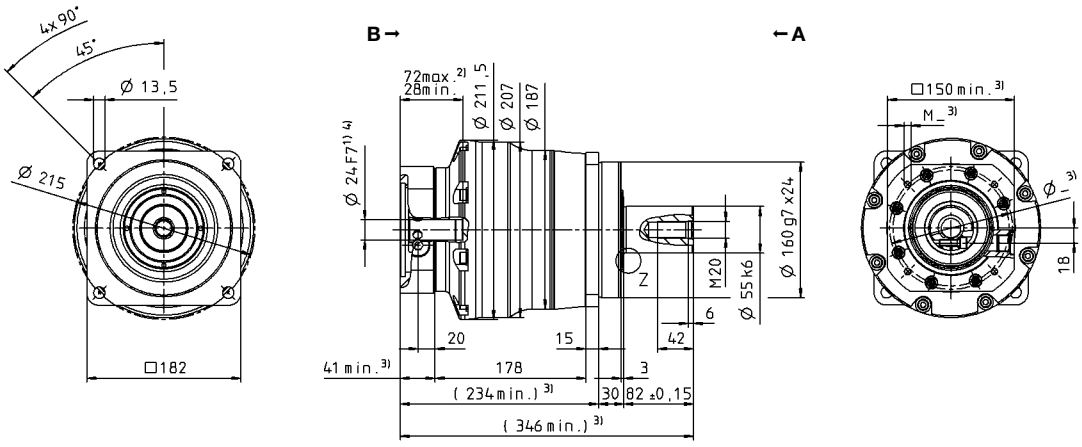
Please use our sizing software cymex® for a detailed sizing – **www.wittenstein-cymex.com**

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

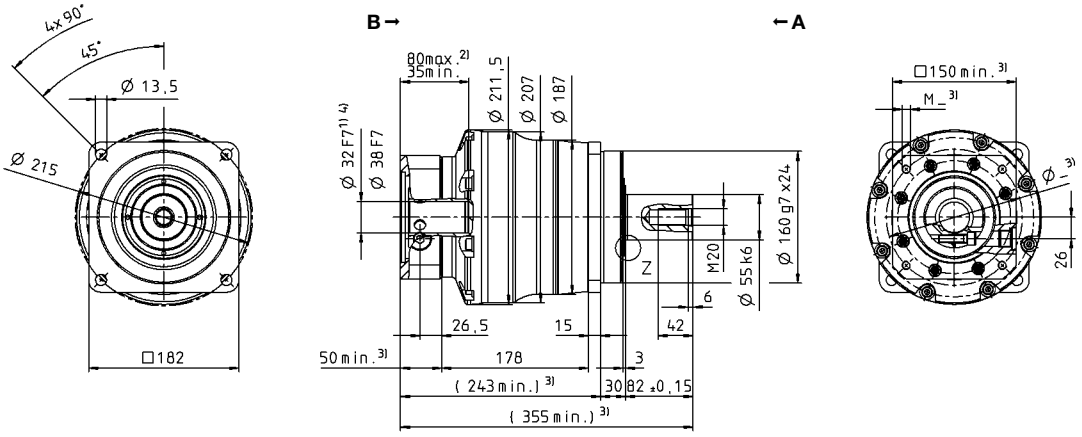
View A View B

2-stage

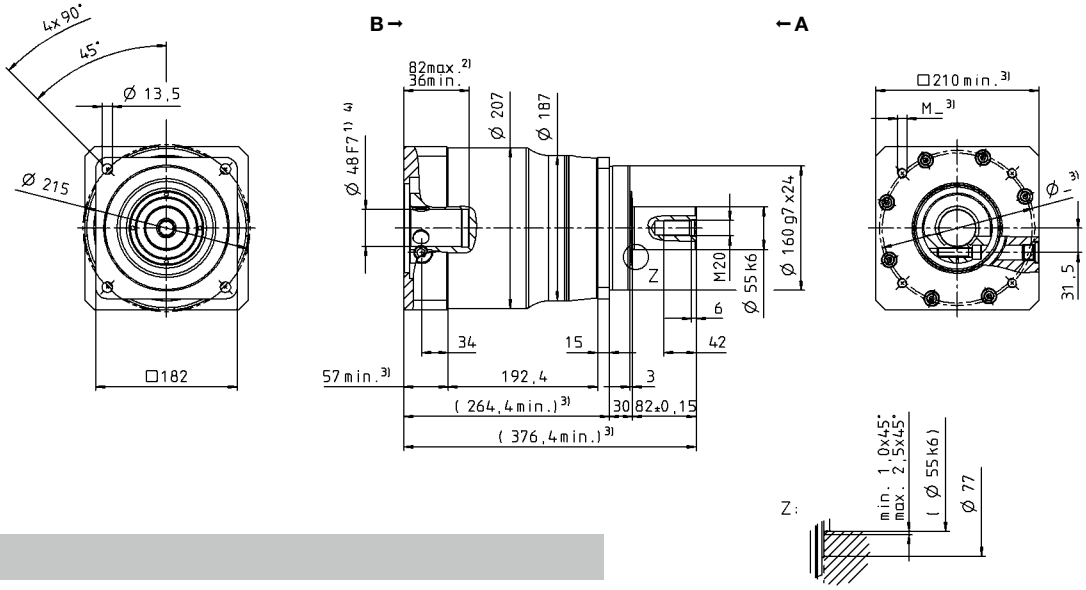
up to 24 [4] (G) clamping hub diameter



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



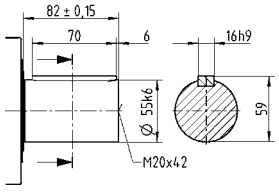
up to 48 [4] (M) clamping hub diameter



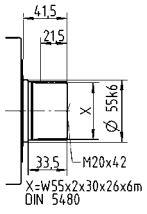
Motor shaft diameter [mm]

Other output variants

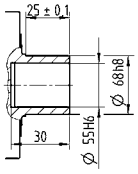
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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*			**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*		2560	4000	4000	3840	2800	2800
		in.lb		22658	35403	35403	33987	24782	24782
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		1920	3000	3000	2880	2280	2280
		in.lb		16994	26552	26552	25490	20180	20180
Nominal torque (at n_{1N})	T_{2N}	*Nm*		1536	1895	1767	1731	1631	1708
		in.lb		13595	16772	15641	15323	14432	15122
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		5900	5900	5900	5900	5900	5900
		in.lb		52220	52220	52220	52220	52220	52220
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		1200	1200	1500	1700	2000	2000
Max. input speed	n_{1Max}	*rpm*		3000	3000	3000	3000	3000	3000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*		26	19	15	8.8	8.8	6.4
		in.lb		227	164	129	78	78	57
Max. backlash	j_t	*arcmin*		Standard ≤ 3 / Reduced ≤ 1					
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		400					
		in.lb/arcmin		3540					
Max. axial force [c)]	F_{2AMax}	*N*		30000					
		lb_f		6750					
Max. lateral force [c)]	F_{2QMax}	*N*		21000					
		lb_f		4725					
Max. tilting moment	M_{2KMax}	*Nm*		3100					
		in.lb		27437					
Efficiency at full load	η	*%*		97					
Service life	L_h	*h*		> 20000					
Weight (incl. standard adapter plate)	*m*	*kg*		56					
		lb_m		123.8					
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®)				BC2-04000AA075.000-X					
Bore diameter of coupling on the application side		*mm*		X = 050.000 - 090.000					
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	N 55	J_1	*kgcm²*	139	94.3	76.9	61.5	61.5	53.1
			10^{-3} *in.lb.s²*	123	83.5	68.1	54.4	54.4	47.0

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

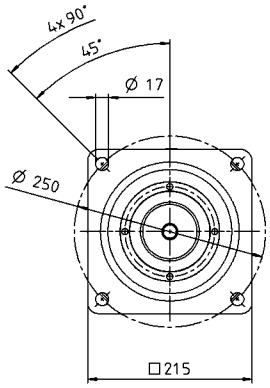
View A

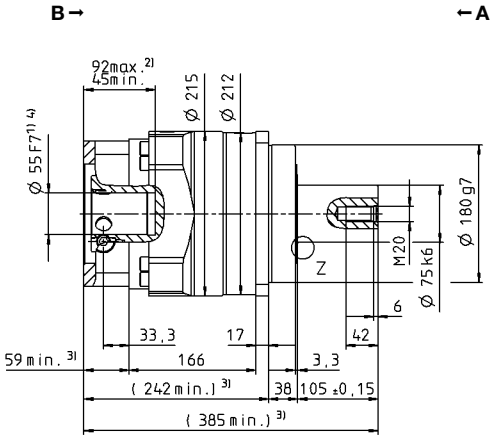
View B

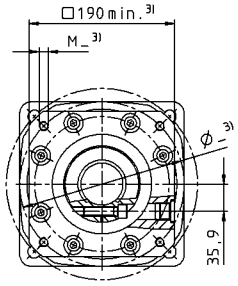
Motor shaft diameter [mm]

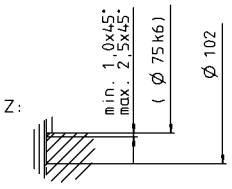
1-stage

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



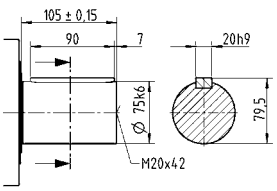




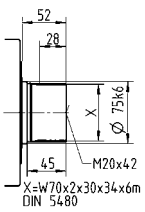


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]	T_{2a}	*Nm*	3159	3159	3949	3159	3159	3840	2880	3600	2043	2457	2043
		in.lb	27958	27958	34947	27958	27958	33987	25490	31863	18081	21745	18081
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	2880	3000	3000	2880	2880	2880	2840	2880	2043	2457	2043
		in.lb	25490	26552	26552	25490	25490	25490	25136	25490	18081	21745	18081
Nominal torque (at n_{1N})	T_{2N}	*Nm*	1274	1266	1567	1294	2200	1599	1358	1679	1634	1965	1634
		in.lb	11277	11205	13873	11452	19474	14150	12019	14861	14465	17396	14465
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900
		in.lb	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220
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	3000	3000
Max. input speed	n_{1Max}	*rpm*	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	5.6	5.2	4.8	4.5	4.5	3.6	3.4	3.0	3.0	2.6	2.4
		in.lb	50	46	43	39	39	32	30	27	27	23	21
Max. backlash	j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	400										
		in.lb/arcmin	3540										
Max. axial force [c)]	F_{2AMax}	*N*	30000										
		lb_f	6750										
Max. lateral force [c)]	F_{2QMax}	*N*	21000										
		lb_f	4725										
Max. tilting moment	M_{2KMax}	*Nm*	3100										
		in.lb	27437										
Efficiency at full load	η	*%*	94										
Service life	L_h	*h*	> 20000										
Weight (incl. standard adapter plate)	*m*	*kg*	53										
		lb_m	117										
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®)			BC2-04000AA075.000-X										
Bore diameter of coupling on the application side		*mm*	X = 050.000 - 090.000										
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] M 48 Optimized mass inertia version available on request	J_1	*kgcm²*	34.5	31.5	30.8	30.0	30.0	29.7	28.5	28.3	28.3	28.1	28.0
		10⁻³ in.lb.s²	30.5	27.9	27.3	26.6	26.6	26.3	25.2	25.0	25.0	24.9	24.8

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

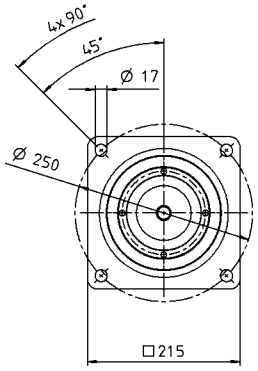
View A

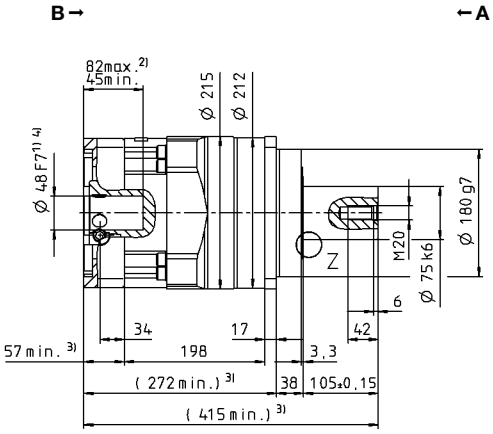
View B

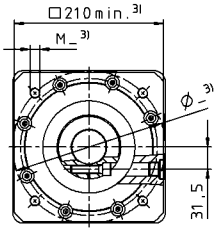
Motor shaft diameter [mm]

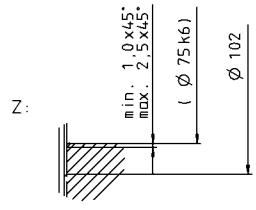
2-stage

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



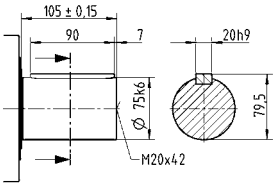




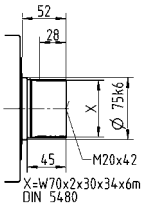


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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*		**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]		T_{2a}	*Nm*	4400	5700	5700	5700	4000	4000
			in.lb	38944	50450	50450	50450	35403	35403
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)		T_{2B}	*Nm*	3300	5400	5400	5160	4000	4000
			in.lb	29208	47794	47794	45670	35403	35403
Nominal torque (at n_{1N})		T_{2N}	*Nm*	2333	3038	2872	2737	2611	2735
			in.lb	20651	26885	25418	24223	23111	24208
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)		T_{2Not}	*Nm*	6850	8500	8500	8500	6850	6850
			in.lb	60628	75232	75232	75232	60628	60628
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]		n_{1N}	*rpm*	1000	1000	1200	1500	1700	1700
Max. input speed		n_{1Max}	*rpm*	3000	3000	3000	3000	3000	3000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)		T_{012}	*Nm*	32	24	19	12	12	10
			in.lb	283	212	164	106	106	89
Max. backlash		j_t	*arcmin*	Standard ≤ 3 / Reduced ≤ 1					
Torsional rigidity [b)]		C_{t21}	*Nm/arcmin*	550					
			in.lb/arcmin	4868					
Max. axial force [c)]		F_{2AMax}	*N*	33000					
			lb_f	7425					
Max. lateral force [c)]		F_{2QMax}	*N*	30000					
			lb_f	6750					
Max. tilting moment		M_{2KMax}	*Nm*	5000					
			in.lb	44254					
Efficiency at full load		η	%	97					
Service life		L_h	*h*	> 20000					
Weight (incl. standard adapter plate)		*m*	*kg*	77					
			lb_m	170.2					
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)		L_{PA}	*dB(A)*	≤ 66					
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®)				BC2-06000AA085.000-X					
Bore diameter of coupling on the application side			*mm*	X = 060.000 - 140.000					
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] Optimized mass inertia version available on request	O 60	J_1	$kgcm^2$	260	198	163	138	138	125
			10^{-3} $in.lb.s^2$	230	175	144	122	122	110

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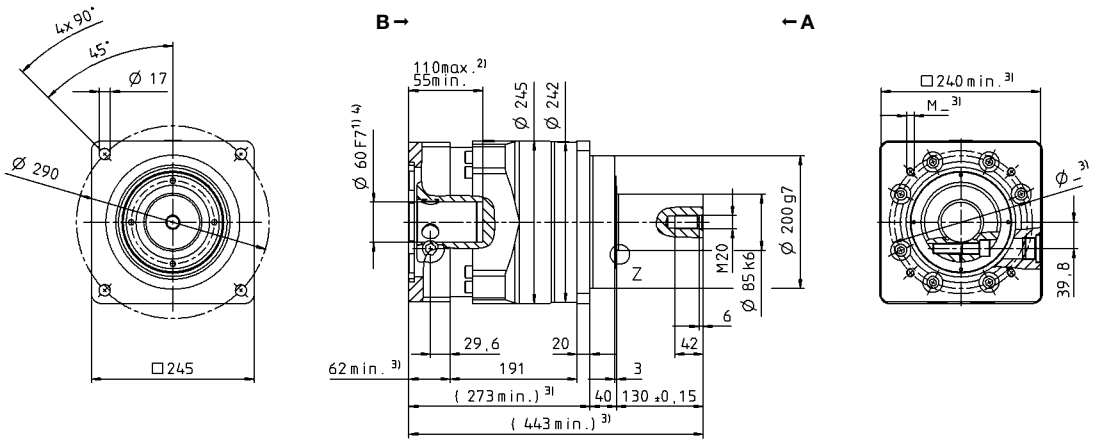
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

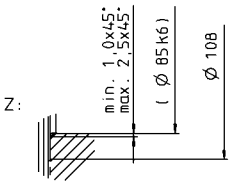
View A View B

Motor shaft diameter [mm]

1-stage

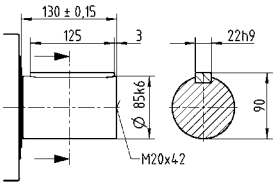
up to 60 [4] (O) [5] clamping hub diameter



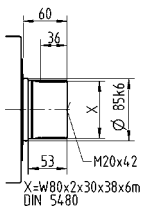


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]	T_{2a}	*Nm*	5446	5446	5700	5446	5446	5700	5446	5700	3642	5700	3642
		in.lb	48202	48202	50450	48202	48202	50450	48202	50450	32236	50450	32236
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	5400	5400	5400	5400	5400	5400	4400	5160	3642	4730	3642
		in.lb	47794	47794	47794	47794	47794	47794	38944	45670	32236	41864	32236
Nominal torque (at n_{1N})	T_{2N}	*Nm*	2658	2596	3198	2667	3754	3283	2803	3457	2914	3784	2914
		in.lb	23524	22976	28308	23607	33222	29060	24811	30600	25789	33491	25789
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	8500	8500	8500	8500	8500	8500	8500	8500	6850	8500	6850
		in.lb	75232	75232	75232	75232	75232	75232	75232	75232	60628	75232	60628
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	2300	2500	2500	2500	2500	2500	2500	2500	2500	2800	2800
Max. input speed	n_{1Max}	*rpm*	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	8.4	7.1	6.5	5.9	5.9	4.5	4.1	3.5	3.5	3.0	3.0
		in.lb	74	63	58	52	52	40	36	31	31	26	26
Max. backlash	j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	550										
		in.lb/arcmin	4868										
Max. axial force [c)]	F_{2AMax}	*N*	33000										
		lb_f	7425										
Max. lateral force [c)]	F_{2QMax}	*N*	30000										
		lb_f	6750										
Max. tilting moment	M_{2KMax}	*Nm*	5000										
		in.lb	44254										
Efficiency at full load	η	*%*	94										
Service life	L_h	*h*	> 20000										
Weight (incl. standard adapter plate)	*m*	*kg*	76										
		lb_m	168										
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®)			BC2-06000AA085.000-X										
Bore diameter of coupling on the application side		*mm*	X = 060.000 - 140.000										
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] M 48 Optimized mass inertia version available on request	J_1	*kgcm²*	39.2	34.6	33.2	30.5	30.5	29.7	28.2	27.9	27.6	27.6	27.5
		10^{-3} in.lb.s²	34.7	30.6	29.4	27.0	27.0	26.3	25.0	24.7	24.4	24.4	24.3

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

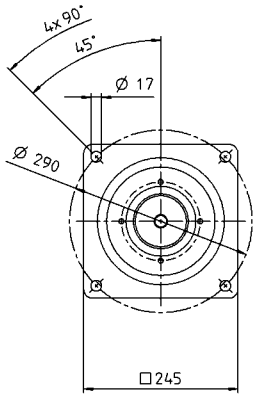
View A

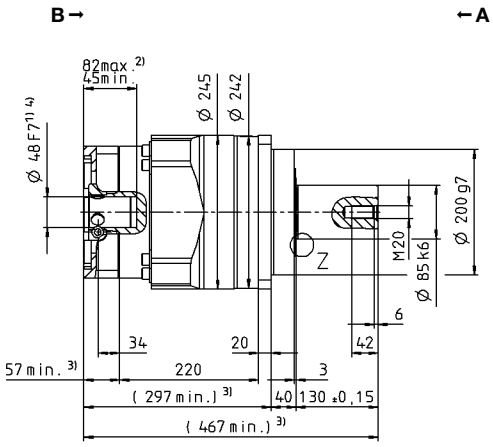
View B

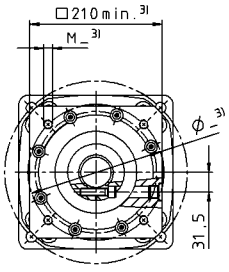
Motor shaft diameter [mm]

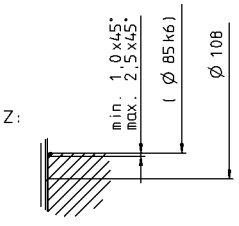
2-stage

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



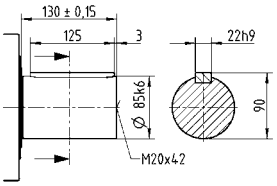




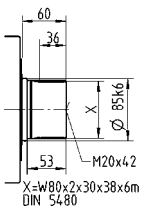


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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*		**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]		T_{2a}	*Nm*	68	90	90	90	70	70
			in.lb	602	797	797	797	620	620
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)		T_{2B}	*Nm*	68	90	90	90	70	70
			in.lb	602	797	797	797	620	620
Nominal torque (at n_{1N})		T_{2N}	*Nm*	41	51	51	52	50	53
			in.lb	362	448	447	459	441	468
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)		T_{2Not}	*Nm*	139	185	250	250	213	213
			in.lb	1230	1640	2213	2213	1885	1885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]		n_{1N}	*rpm*	4500	4500	4500	4500	4500	4500
Max. input speed		n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)		T_{012}	*Nm*	1.1	0.88	0.72	0.49	0.42	0.40
			in.lb	9.9	7.8	6.4	4.3	3.7	3.5
Max. backlash		j_t	*arcmin*	Standard ≤ 6 / Reduced ≤ 4					
Torsional rigidity [b)]		C_{t21}	*Nm/arcmin*	10					
			in.lb/arcmin	89					
Max. axial force [c)]		F_{2AMax}	*N*	3350					
			lb_f	754					
Max. lateral force [c)]		F_{2QMax}	*N*	4200					
			lb_f	945					
Max. tilting moment		M_{2KMax}	*Nm*	236					
			in.lb	2089					
Efficiency at full load		η	%	98.5					
Service life		L_h	*h*	> 30000					
Weight (incl. standard adapter plate)		*m*	*kg*	3.9					
			lb_m	8.6					
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)		L_{PA}	*dB(A)*	≤ 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®)				BC2-00080AA022.000-X					
Bore diameter of coupling on the application side			*mm*	X = 014.000 - 042.000					
Mass moment of inertia (relates to the drive)	E 19	J_1	$kgcm^2$	1.03	0.78	0.68	0.59	0.54	0.54
			10^{-3} $in.lb.s^2$	0.91	0.69	0.60	0.52	0.48	0.48
Clamping hub diameter [mm]	G 24	J_1	$kgcm^2$	2.40	2.15	2.05	1.96	1.91	1.91
			10^{-3} $in.lb.s^2$	2.12	1.90	1.81	1.73	1.69	1.69

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

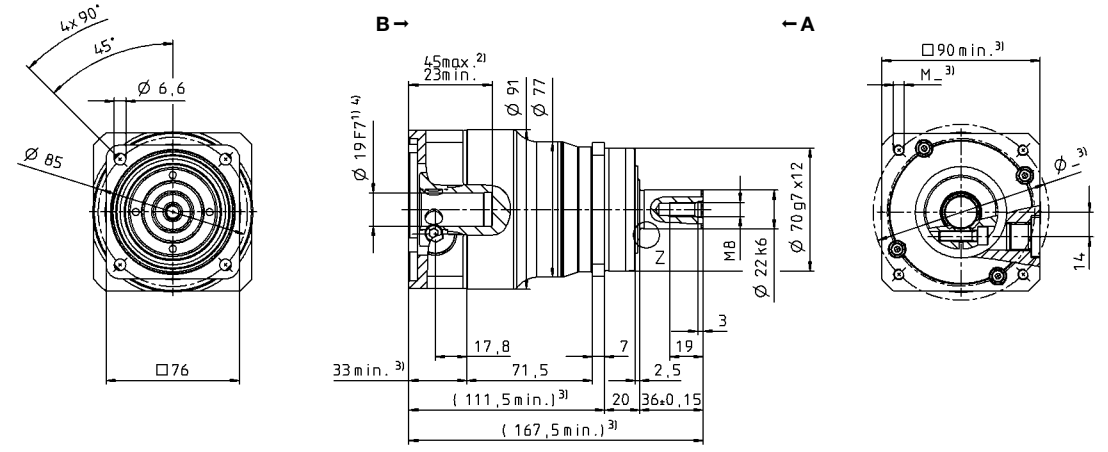
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

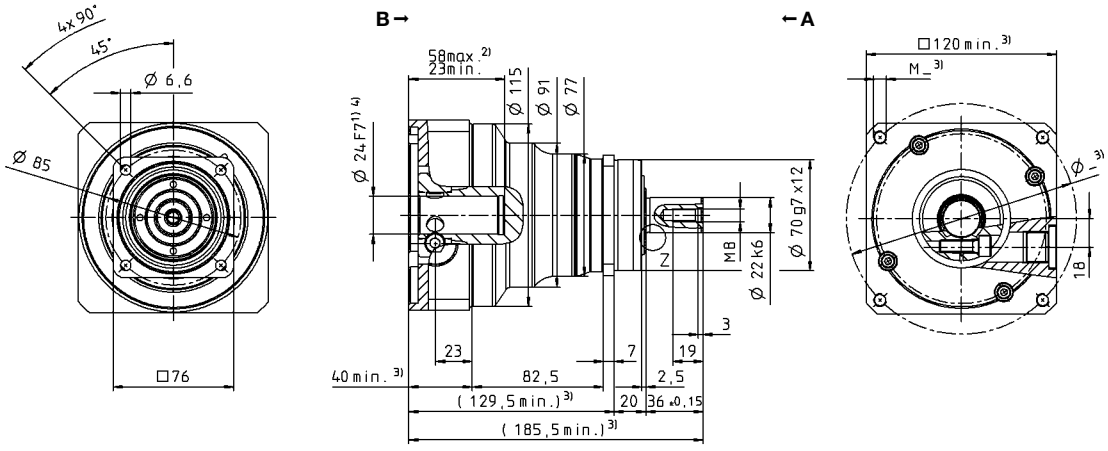
1-stage

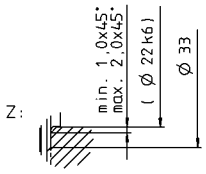
Motor shaft diameter [mm]

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



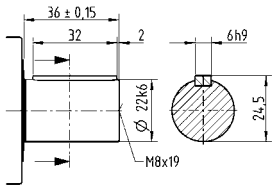
up to 24 [4] (G) clamping hub diameter



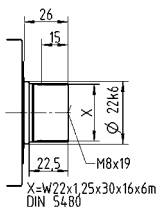


Other output variants

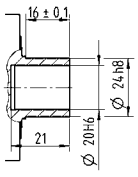
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]	T_{2a}	*Nm*		90	90	90	90	90	90	90	90	70	90	70
		in.lb		797	797	797	797	797	797	797	797	620	797	620
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		90	90	90	90	90	90	90	90	70	90	70
		in.lb		797	797	797	797	797	797	797	797	620	797	620
Nominal torque (at n_{1N})	T_{2N}	*Nm*		62	62	72	65	72	72	65	72	56	72	56
		in.lb		552	553	637	572	637	637	574	637	496	637	496
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		250	250	250	250	250	250	250	250	213	250	213
		in.lb		2213	2213	2213	2213	2213	2213	2213	2213	1885	2213	1885
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	*rpm*		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*		0.36	0.24	0.18	0.18	0.17	0.16	0.16	0.16	0.16	0.15	0.14
		in.lb		3.2	2.1	1.6	1.6	1.5	1.4	1.4	1.4	1.4	1.3	1.2
Max. backlash	j_t	*arcmin*		Standard ≤ 8 / Reduced ≤ 6										
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		10										
		in.lb/arcmin		89										
Max. axial force [c)]	F_{2AMax}	*N*		3350										
		lb_f		754										
Max. lateral force [c)]	F_{2QMax}	*N*		4200										
		lb_f		945										
Max. tilting moment	M_{2KMax}	*Nm*		236										
		in.lb		2089										
Efficiency at full load	η	*%*		96.5										
Service life	L_h	*h*		> 30000										
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®)				BC2-00080AA022.000-X										
Bore diameter of coupling on the application side			*mm*	X = 014.000 - 042.000										
Mass moment of inertia (relates to the drive)	C	14	J_1	*kgcm²*	0.23	0.20	0.20	0.18	0.18	0.18	0.16	0.16	0.16	0.16	0.16
				10^{-3} in.lb.s²	0.20	0.18	0.18	0.16	0.16	0.16	0.14	0.14	0.14	0.14	0.14
Clamping hub diameter [mm]	E	19	J_1	*kgcm²*	0.55	0.53	0.52	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49
				10^{-3} in.lb.s²	0.49	0.47	0.46	0.44	0.44	0.44	0.43	0.43	0.43	0.43	0.43

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

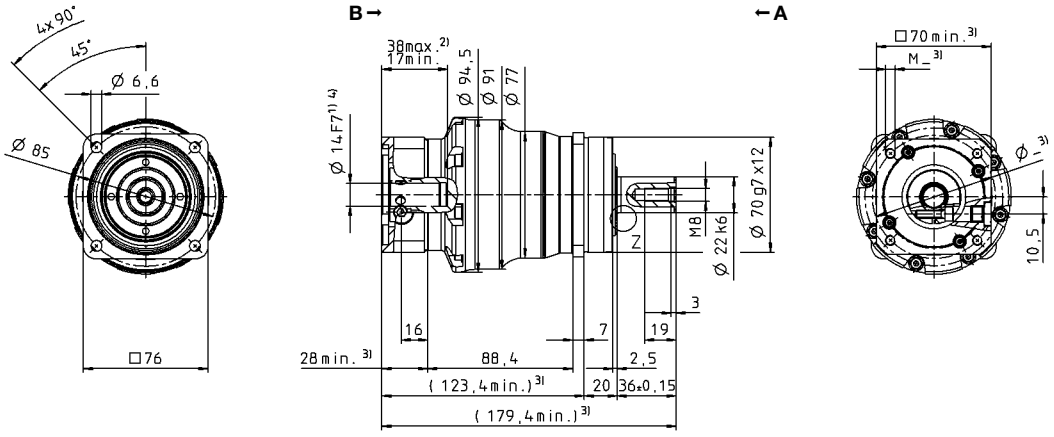
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

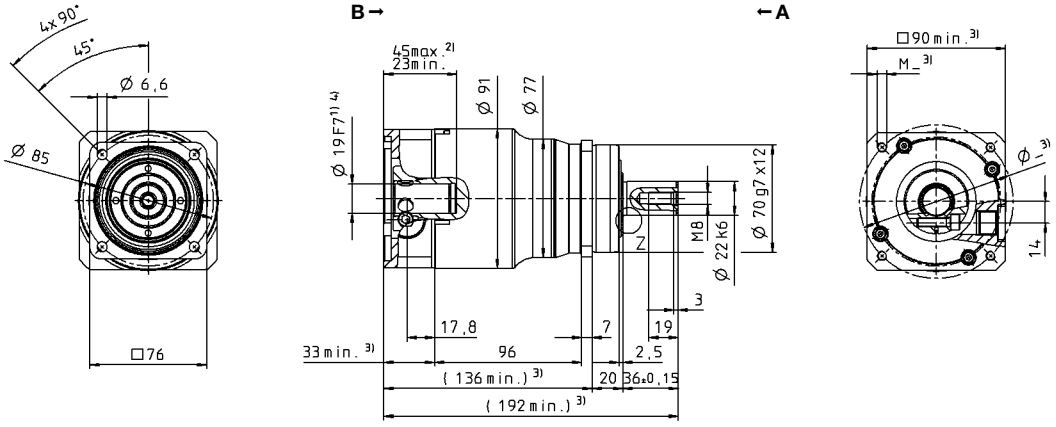
2-stage

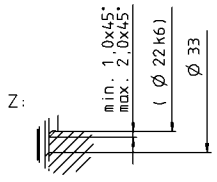
Motor shaft diameter [mm]

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



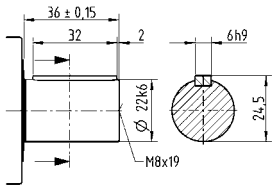
up to 19 [4] (E) clamping hub diameter



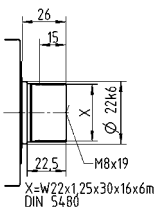


Other output variants

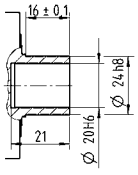
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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

				Standard version MC						Friction optimized version L					
Ratio	i			**3**	**4**	**5**	**7**	**8**	**10**	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*		180	240	240	240	180	180	180	240	240	240	180	180
		in.lb		1593	2124	2124	2124	1593	1593	1593	2124	2124	2124	1593	1593
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		180	240	240	240	180	180	180	240	240	240	180	180
		in.lb		1593	2124	2124	2124	1593	1593	1593	2124	2124	2124	1593	1593
Nominal torque (at n_{1N})	T_{2N}	*Nm*		76	95	91	93	93	97	76	95	91	93	93	97
		in.lb		677	838	806	823	821	861	677	838	806	823	821	861
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		454	625	625	625	599	599	454	625	625	625	599	599
		in.lb		4016	5532	5532	5532	5302	5302	4016	5532	5532	5532	5302	5302
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		3500	4000	4500	4500	4500	4500	3500	4000	4500	4500	4500	4500
Max. input speed	n_{1Max}	*rpm*		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*		2.0	1.8	1.4	0.84	0.78	0.64	0.9	0.8	0.6	0.5	0.4	0.4
		in.lb		17	16	12	7.4	6.9	5.7	8.0	7.1	5.3	4.4	3.5	3.5
Max. backlash	j_t	*arcmin*		Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		31											
		in.lb/arcmin		274											
Max. axial force [c)]	F_{2AMax}	*N*		5650						2000					
		lb_f		1271						450					
Max. lateral force [c)]	F_{2QMax}	*N*		6600						1000					
		lb_f		1485						225					
Max. tilting moment	M_{2KMax}	*Nm*		487						72					
		in.lb		4310						637					
Efficiency at full load	η	*%*		98.5						99					
Service life	L_h	*h*		> 30000											
Weight (incl. standard adapter plate)	m	*kg*		7.7											
		lb_m		17											
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						IP 52					
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BC2-00300AA032.000-X											
Bore diameter of coupling on the application side		*mm*		X = 024.000 - 060.000											
Mass moment of inertia (relates to the drive)	G 24	J_1	*kgcm²*	3.99	3.04	2.61	2.29	2.26	2.07	3.99	3.04	2.61	2.29	2.26	2.07
			10^{-3} *in.lb.s²*	3.53	2.69	2.31	2.03	2.00	1.83	3.53	2.69	2.31	2.03	2.00	1.83
Clamping hub diameter [mm]	K 38	J_1	*kgcm²*	11.1	10.1	9.68	9.36	9.55	9.14	11.1	10.1	9.68	9.36	9.55	9.14
			10^{-3} *in.lb.s²*	9.82	8.94	8.57	8.28	8.45	8.09	9.82	8.94	8.57	8.28	8.45	8.09

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

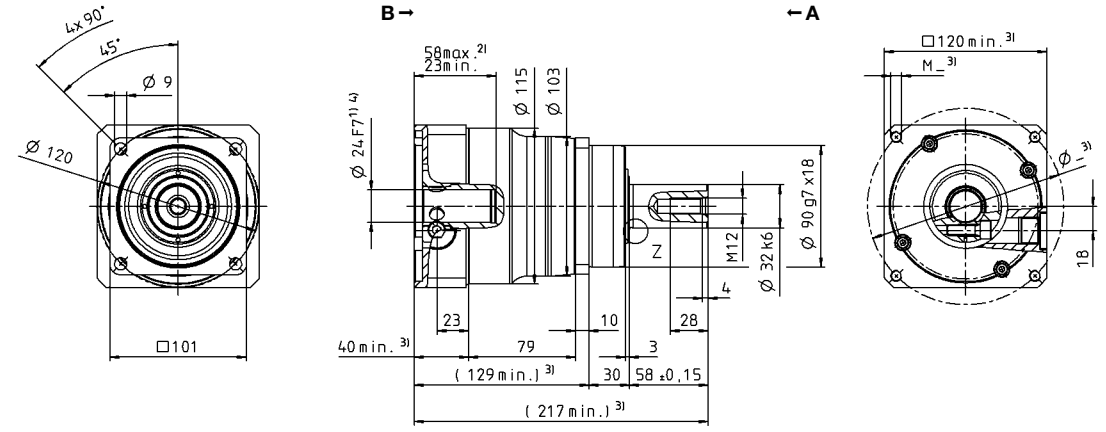
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

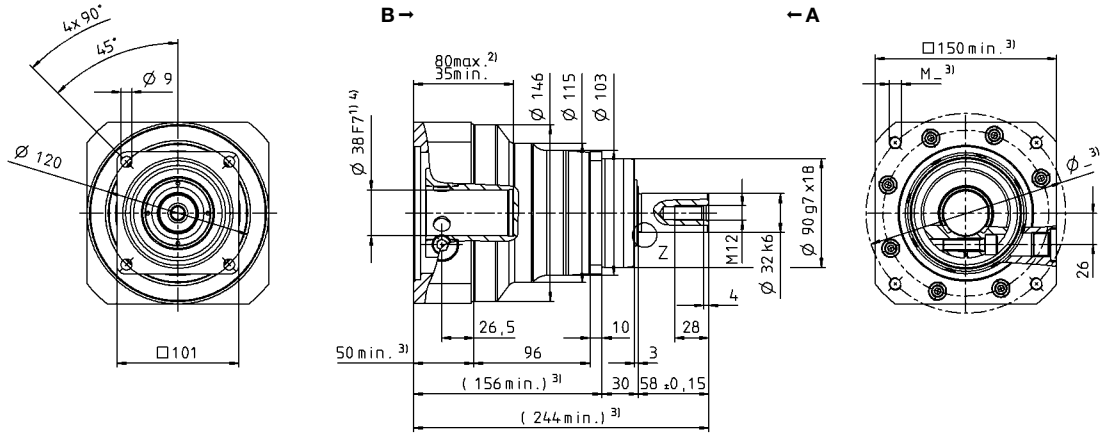
1-stage

Motor shaft diameter [mm]

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

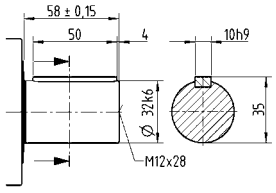


up to 38 [4] (K) clamping hub diameter

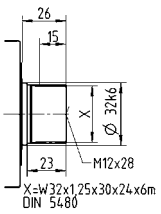


Other output variants

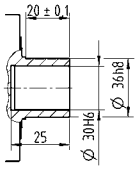
Shaft with key



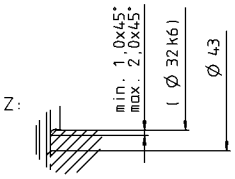
Splined shaft (DIN 5480)



Shaft mounted



Z:



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]			T_{2a}	*Nm*	240	240	240	240	240	240	240	240	180	240	180
				in.lb	2124	2124	2124	2124	2124	2124	2124	2124	1593	2124	1593
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	240	240	240	240	240	240	240	240	180	240	180
				in.lb	2124	2124	2124	2124	2124	2124	2124	2124	1593	2124	1593
Nominal torque (at n_{1N})			T_{2N}	*Nm*	138	148	149	164	141	164	183	182	144	189	144
				in.lb	1221	1313	1322	1453	1251	1450	1617	1614	1275	1673	1275
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	625	625	625	625	625	625	625	625	599	625	599
				in.lb	5532	5532	5532	5532	5532	5532	5532	5532	5302	5532	5302
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed			n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	0.52	0.53	0.48	0.43	0.38	0.28	0.40	0.25	0.25	0.20	0.19
				in.lb	4.6	4.7	4.2	3.8	3.4	2.5	3.5	2.2	2.2	1.8	1.7
Max. backlash			j_t	*arcmin*	Standard ≤ 6 / Reduced ≤ 4										
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	31										
				in.lb/arcmin	274										
Max. axial force [c)]			F_{2AMax}	*N*	5650										
				lb_f	1271										
Max. lateral force [c)]			F_{2QMax}	*N*	6600										
				lb_f	1485										
Max. tilting moment			M_{2KMax}	*Nm*	487										
				in.lb	4310										
Efficiency at full load			η	%	96.5										
Service life			L_h	*h*	> 30000										
Weight (incl. standard adapter plate)			*m*	*kg*	7.9										
				lb_m	17.5										
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®)					BC2-00300AA032.000-X										
Bore diameter of coupling on the application side				*mm*	X = 024.000 - 060.000										
Mass moment of inertia (relates to the drive)	E	19	J_1	$kgcm^2$	0.81	0.70	0.68	0.60	0.43	0.59	0.55	0.54	0.38	0.54	0.54
				10^{-3} *in.lb.s²*	0.72	0.62	0.60	0.53	0.38	0.52	0.49	0.48	0.34	0.48	0.48
Clamping hub diameter [mm]	G	24	J_1	$kgcm^2$	2.18	2.07	2.05	1.97	2.06	1.96	1.92	1.91	1.91	1.91	1.91
				10^{-3} *in.lb.s²*	1.93	1.83	1.81	1.74	1.82	1.73	1.70	1.69	1.69	1.69	1.69

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

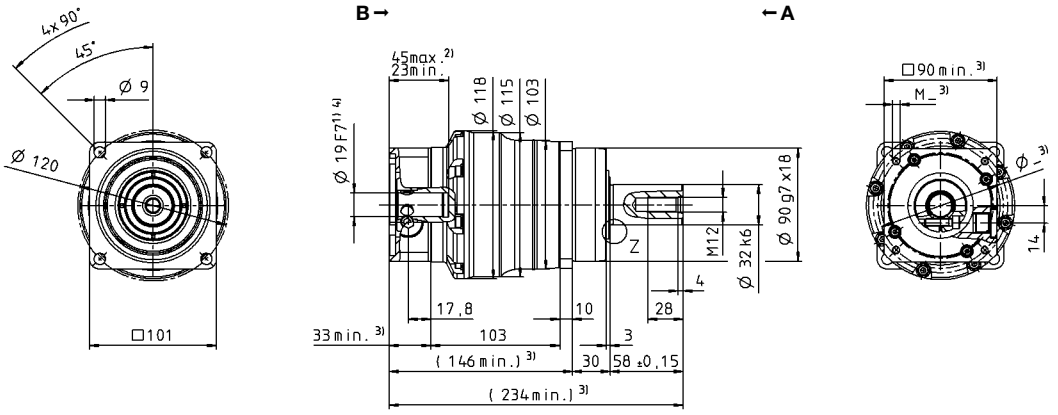
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

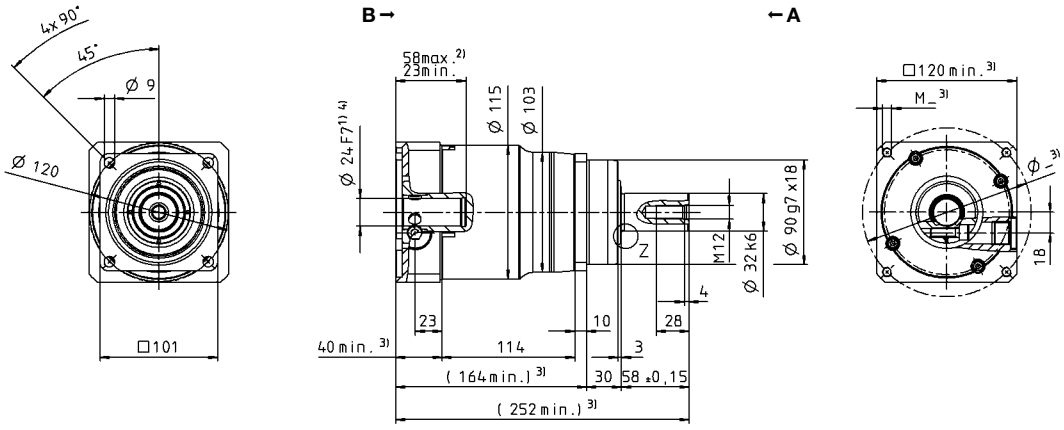
2-stage

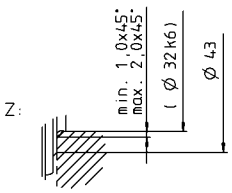
Motor shaft diameter [mm]

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



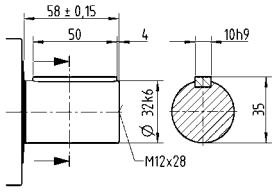
up to 24 [4] (G) clamping hub diameter



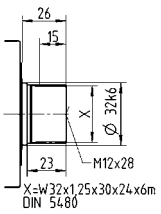


Other output variants

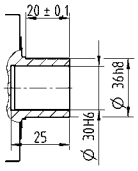
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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

				Standard version MC						Friction optimized version L					
Ratio	*i*			**3**	**4**	**5**	**7**	**8**	**10**	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*		310	480	480	480	380	380	310	480	480	480	380	380
		in.lb		2744	4248	4248	4248	3363	3363	2744	4248	4248	4248	3363	3363
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		310	480	480	480	380	380	310	480	480	480	380	380
		in.lb		2744	4248	4248	4248	3363	3363	2744	4248	4248	4248	3363	3363
Nominal torque (at n_{1N})	T_{2N}	*Nm*		127	195	182	187	186	195	127	195	182	187	186	195
		in.lb		1122	1730	1612	1656	1644	1727	1122	1730	1612	1656	1644	1727
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		1250	1350	1350	1350	1250	1250	1250	1350	1350	1350	1250	1250
		in.lb		11064	11949	11949	11949	11064	11064	11064	11949	11949	11949	11064	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		3000	3500	4500	4500	4500	4500	3000	3500	4500	4500	4500	4500
Max. input speed	n_{1Max}	*rpm*		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*		4.1	3.5	3.0	2.2	1.8	1.7	2.0	1.5	1.2	1.0	0.9	0.9
		in.lb		36	31	27	20	16	15	18	13	11	8.9	8.0	8.0
Max. backlash	j_t	*arcmin*		Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		53											
		in.lb/arcmin		469											
Max. axial force [c)]	F_{2AMax}	*N*		9870						3000					
		lb_f		2221						675					
Max. lateral force [c)]	F_{2QMax}	*N*		9900						1200					
		lb_f		2228						270					
Max. tilting moment	M_{2KMax}	*Nm*		952						110					
		in.lb		8426						974					
Efficiency at full load	η	*%*		98.5						99					
Service life	L_h	*h*		> 30000											
Weight (incl. standard adapter plate)	*m*	*kg*		17.2											
		lb_m		38											
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*		≤ 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						IP 52					
Metal bellows coupling (recommended product type – validate sizing with cymex®)				BC2-00500AA040.000-X											
Bore diameter of coupling on the application side		*mm*		X = 035.000 - 060.000											
Mass moment of inertia (relates to the drive)	K 38	J_1	*kgcm²*	14.9	12.1	11.0	10.1	10.1	9.5	14.9	12.1	11.0	10.1	10.1	9.5
			10^{-3} *in.lb.s²*	13.2	10.7	9.7	8.9	8.9	8.4	13.2	10.7	9.7	8.9	8.9	8.4
Clamping hub diameter [mm]	M 48	J_1	*kgcm²*	29.5	26.7	25.6	24.7	24.7	24.2	29.5	26.7	25.6	24.7	24.7	24.2
			10^{-3} *in.lb.s²*	26.1	23.6	22.7	21.9	21.9	21.4	26.1	23.6	22.7	21.9	21.9	21.4

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

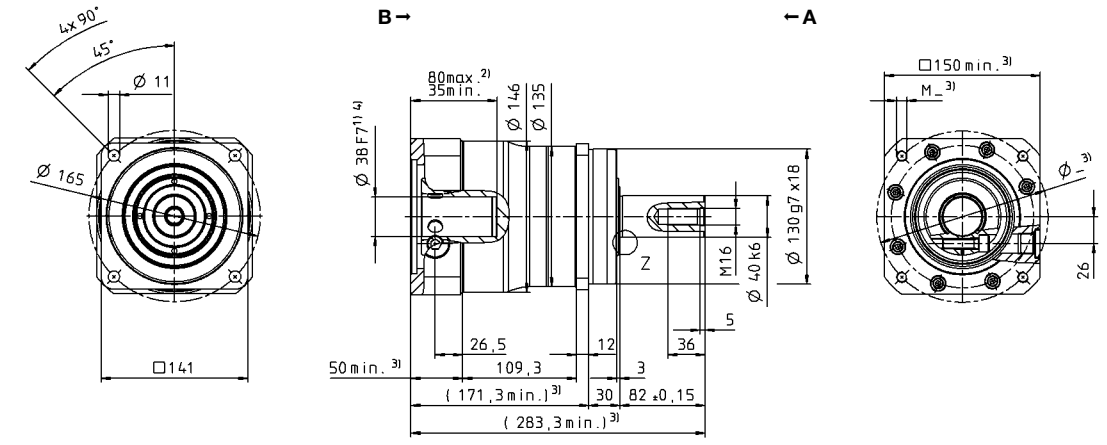
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

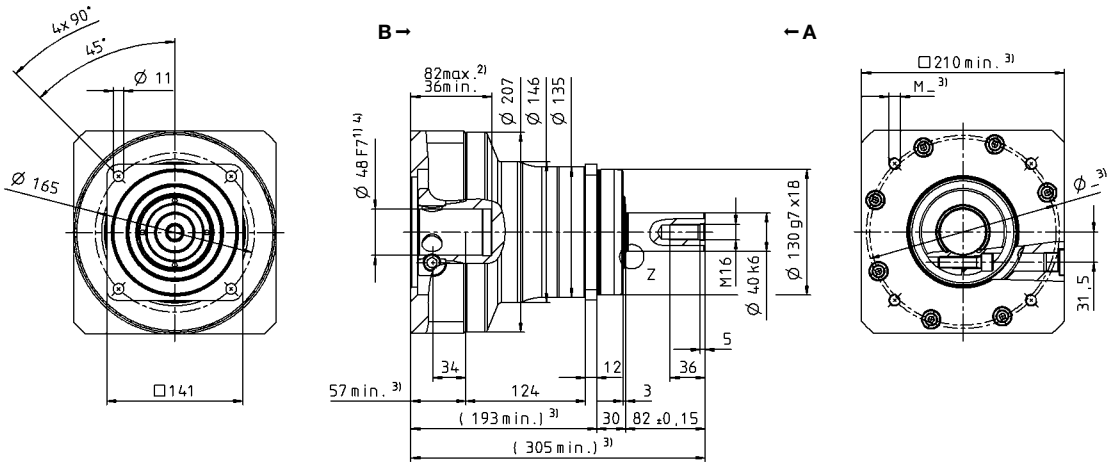
1-stage

Motor shaft diameter [mm]

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

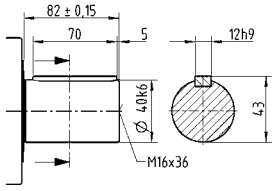


up to 48 [4] (M) clamping hub diameter

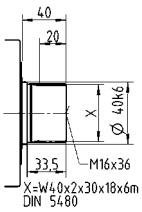


Other output variants

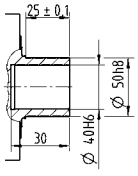
Shaft with key

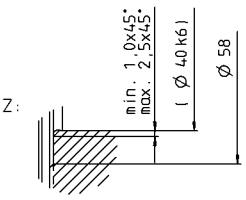


Splined shaft (DIN 5480)



Shaft mounted





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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]			T_{2a}	*Nm*	480	480	480	480	480	480	480	480	380	480	380
				in.lb	4248	4248	4248	4248	4248	4248	4248	4248	3363	4248	3363
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)			T_{2B}	*Nm*	480	480	480	480	480	480	480	480	380	480	380
				in.lb	4248	4248	4248	4248	4248	4248	4248	4248	3363	4248	3363
Nominal torque (at n_{1N})			T_{2N}	*Nm*	277	297	298	328	287	329	364	367	304	304	304
				in.lb	2447	2629	2636	2900	2544	2915	3219	3250	2691	2690	2691
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)			T_{2Not}	*Nm*	1350	1350	1350	1350	1350	1350	1350	1350	1250	1350	1250
				in.lb	11949	11949	11949	11949	11949	11949	11949	11949	11064	11949	11064
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]			n_{1N}	*rpm*	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed			n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)			T_{012}	*Nm*	1.1	1.0	0.96	0.80	0.72	0.60	0.55	0.45	0.45	0.40	0.40
				in.lb	9.7	9.2	8.5	7.1	6.4	5.3	4.9	4.0	4.0	3.5	3.5
Max. backlash			j_t	*arcmin*	Standard ≤ 6 / Reduced ≤ 4										
Torsional rigidity [b)]			C_{t21}	*Nm/arcmin*	53										
				in.lb/arcmin	469										
Max. axial force [c)]			F_{2AMax}	*N*	9870										
				lb_f	2221										
Max. lateral force [c)]			F_{2QMax}	*N*	9900										
				lb_f	2228										
Max. tilting moment			M_{2KMax}	*Nm*	952										
				in.lb	8426										
Efficiency at full load			η	%	96.5										
Service life			L_h	*h*	> 30000										
Weight (incl. standard adapter plate)			*m*	*kg*	17										
				lb_m	37.6										
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)			L_{PA}	*dB(A)*	≤ 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®)					BC2-00500AA040.000-X										
Bore diameter of coupling on the application side				*mm*	X = 035.000 - 060.000										
Mass moment of inertia (relates to the drive)	G	24	J_1	$kgcm^2$	3.19	2.71	2.67	2.34	1.65	2.32	2.10	2.08	2.08	2.08	2.07
				10^{-3} $in.lb.s^2$	2.82	2.40	2.36	2.07	1.46	2.05	1.86	1.84	1.84	1.84	1.83
Clamping hub diameter [mm]	K	38	J_1	$kgcm^2$	10.3	9.77	9.73	9.41	2.34	9.39	9.16	9.15	1.39	9.14	9.14
				10^{-3} $in.lb.s^2$	9.07	8.65	8.61	8.33	2.07	8.31	8.11	8.10	1.23	8.09	8.09

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

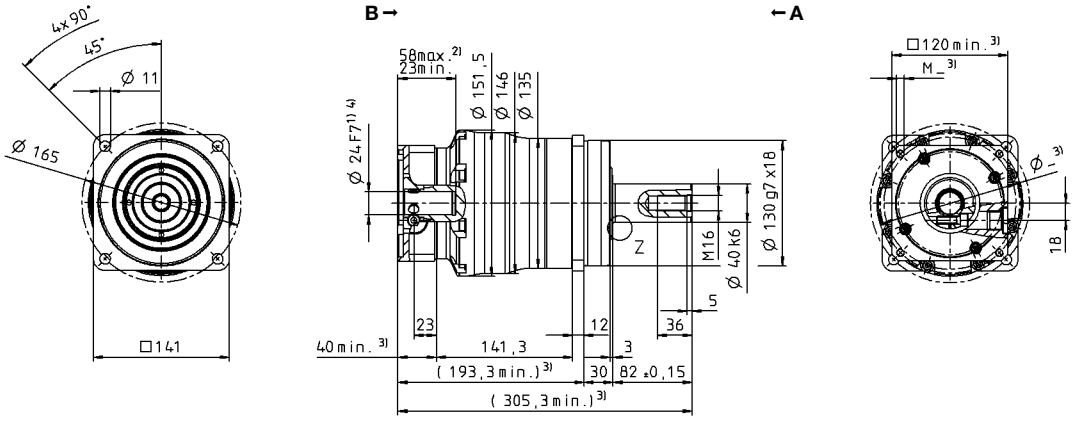
[a)] At max. 10 % F_{2QMax}
[b)] Valid for standard clamping hub diameter
[c)] Refers to center of the output shaft or flange
[d)] Please reduce input speed at higher ambient temperatures
[e)] Smooth shaft

View A View B

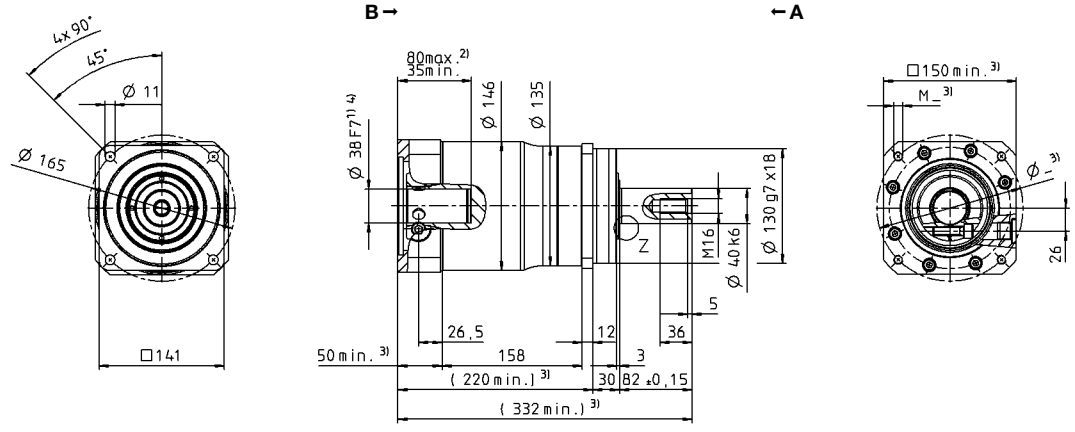
2-stage

Motor shaft diameter [mm]

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

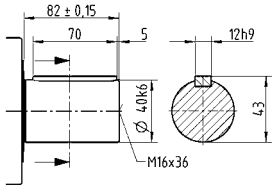


up to 38 [4] (K) clamping hub diameter

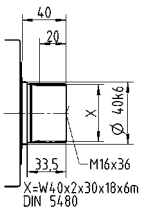


Other output variants

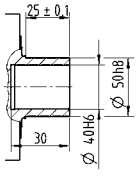
Shaft with key



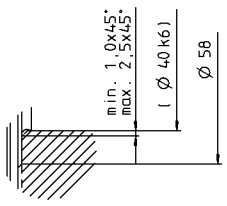
Splined shaft (DIN 5480)



Shaft mounted



Z:



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

			Standard version MC						Friction optimized version L					
Ratio	*i*		**3**	**4**	**5**	**7**	**8**	**10**	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*	700	880	880	880	700	700	700	880	880	880	700	700
		in.lb	6196	7789	7789	7789	6196	6196	6196	7789	7789	7789	6196	6196
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	700	880	880	880	700	700	700	880	880	880	700	700
		in.lb	6196	7789	7789	7789	6196	6196	6196	7789	7789	7789	6196	6196
Nominal torque (at n_{1N})	T_{2N}	*Nm*	289	492	379	469	465	488	289	492	379	469	465	488
		in.lb	2554	4355	3357	4151	4117	4316	2554	4355	3357	4151	4117	4316
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	2640	2750	2750	2750	2640	2640	2640	2750	2750	2750	2640	2640
		in.lb	23366	24340	24340	24340	23366	23366	23366	24340	24340	24340	23366	23366
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	3000	3500	4500	4500	4500	4500	3000	3500	4500	4500	4500	4500
Max. input speed	n_{1Max}	*rpm*	4500	6000	6000	6000	6000	6000	4500	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	9.8	8.2	6.6	4.4	4.4	3.2	3.8	3.0	2.3	1.8	1.7	1.6
		in.lb	87	73	58	39	39	28	34	27	20	16	15	14
Max. backlash	j_t	*arcmin*	Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	175											
		in.lb/arcmin	1549											
Max. axial force [c)]	F_{2AMax}	*N*	14150						5000					
		lb_f	3184						1125					
Max. lateral force [c)]	F_{2QMax}	*N*	15400						2000					
		lb_f	3465						450					
Max. tilting moment	M_{2KMax}	*Nm*	1600						208					
		in.lb	14161						1841					
Efficiency at full load	η	*%*	98.5						99					
Service life	L_h	*h*	> 30000											
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)*	≤ 62											
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						IP 52					
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-00800AA055.000-X											
Bore diameter of coupling on the application side		*mm*	X = 040.000 - 075.000											
Mass moment of inertia (relates to the drive) **M 48** Clamping hub diameter [mm]	J_1	$kgcm^2$	58.5	41.6	35.6	30.0	30.0	26.9	58.5	41.6	35.6	30.0	30.0	26.9
		10^{-3} $in.lb.s^2$	51.8	36.8	31.5	26.6	26.6	23.8	51.8	36.8	31.5	26.6	26.6	23.8

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

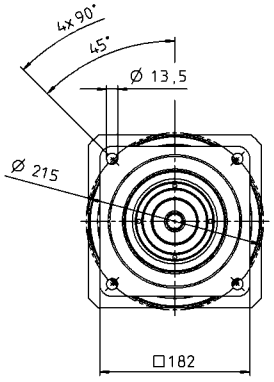
View A

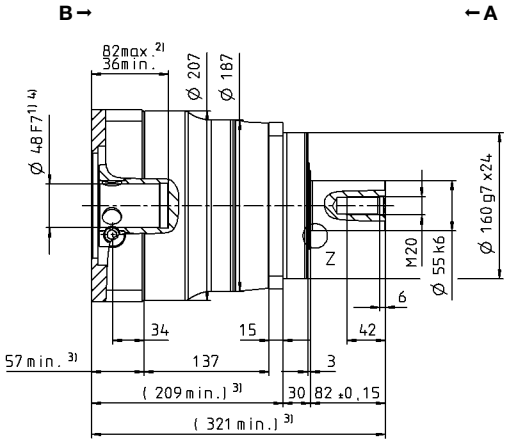
View B

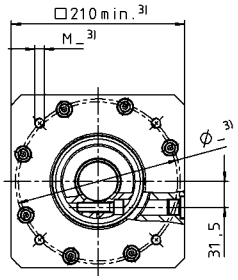
Motor shaft diameter [mm]

1-stage

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



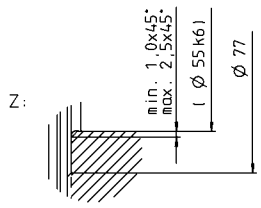




Planetary gearboxes

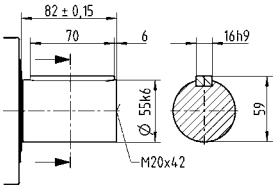
SP+

MC

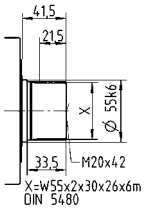


Other output variants

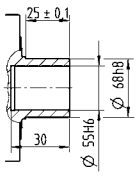
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]	T_{2a}	*Nm*		880	880	880	880	880	880	880	880	700	880	700
		in.lb		7789	7789	7789	7789	7789	7789	7789	7789	6196	7789	6196
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*		880	880	880	880	880	880	880	880	700	880	700
		in.lb		7789	7789	7789	7789	7789	7789	7789	7789	6196	7789	6196
Nominal torque (at n_{1N})	T_{2N}	*Nm*		696	704	704	704	704	704	704	704	560	704	560
		in.lb		6156	6231	6231	6231	6231	6231	6231	6231	4956	6231	4956
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*		2750	2750	2750	2750	2750	2750	2750	2750	2640	2750	2640
		in.lb		24340	24340	24340	24340	24340	24340	24340	24340	23366	24340	23366
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*		4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{1Max}	*rpm*		6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 3000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*		2.2	2.3	1.8	1.7	1.7	1.4	1.2	1.2	1.2	0.95	1.0
		in.lb		20	21	16	15	15	12	11	11	11	8.4	9.2
Max. backlash	j_t	*arcmin*		Standard ≤ 6 / Reduced ≤ 4										
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*		175										
		in.lb/arcmin		1549										
Max. axial force [c)]	F_{2AMax}	*N*		14150										
		lb_f		3184										
Max. lateral force [c)]	F_{2QMax}	*N*		15400										
		lb_f		3465										
Max. tilting moment	M_{2KMax}	*Nm*		1600										
		in.lb		14161										
Efficiency at full load	η	*%*		96.5										
Service life	L_h	*h*		> 30000										
Weight (incl. standard adapter plate)	m	*kg*		36.4										
		lb_m		80.4										
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®)				BC2-00800AA055.000-X										
Bore diameter of coupling on the application side		*mm*		X = 040.000 - 075.000										
Mass moment of inertia (relates to the drive) Clamping hub diameter [mm] K 38	J_1	*kgcm²*		13.5	12.0	11.7	10.6	10.6	10.4	9.74	9.68	5.45	9.63	9.60
		10^{-3} in.lb.s²		12.0	10.6	10.4	9.34	9.34	9.23	8.62	8.57	4.82	8.52	8.50

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

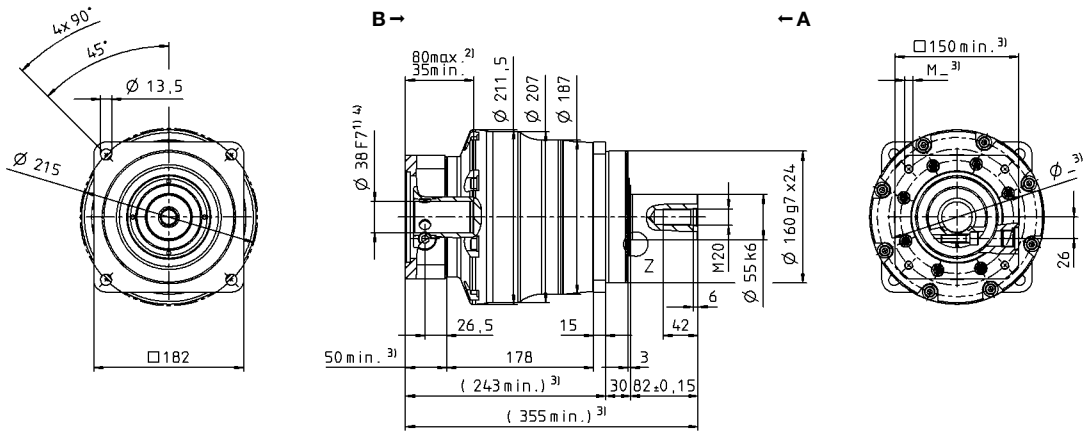
View A

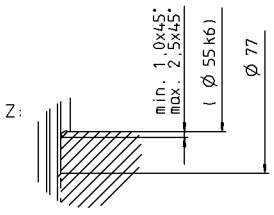
View B

Motor shaft diameter [mm]

2-stage

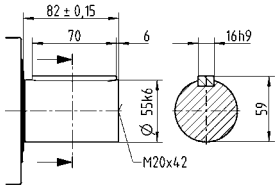
up to 38 [4] (K) [5] clamping hub diameter



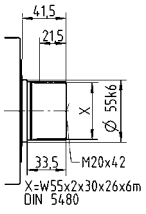


Other output variants

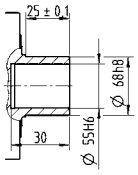
Shaft with key



Splined shaft (DIN 5480)



Shaft mounted



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

			Standard version MC						Friction optimized version L					
Ratio	*i*		**3**	**4**	**5**	**7**	**8**	**10**	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*	1200	2000	2000	1700	1200	1200	1200	2000	2000	1700	1200	1200
		in.lb	10621	17702	17702	15046	10621	10621	10621	17702	17702	15046	10621	10621
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	1200	2000	2000	1700	1200	1200	1200	2000	2000	1700	1200	1200
		in.lb	10621	17702	17702	15046	10621	10621	10621	17702	17702	15046	10621	10621
Nominal torque (at n_{1N})	T_{2N}	*Nm*	960	1260	1141	1169	960	960	960	1260	1141	1169	960	960
		in.lb	8497	11148	10098	10347	8497	8497	8497	11148	10098	10347	8497	8497
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900
		in.lb	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	2250	2500	3500	3500	3500	3500	2250	2500	3500	3500	3500	3500
Max. input speed	n_{1Max}	*rpm*	3400	6000	6000	6000	6000	6000	3400	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	12	11	8.4	5.6	5.6	4.4	5.5	4.9	4.6	4.0	3.8	3.6
		in.lb	108	99	74	50	50	39	49	43	41	35	34	32
Max. backlash	j_t	*arcmin*	Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	400											
		in.lb/arcmin	3540											
Max. axial force [c)]	F_{2AMax}	*N*	30000						8000					
		lb_f	6750						1800					
Max. lateral force [c)]	F_{2QMax}	*N*	21000						2500					
		lb_f	4725						563					
Max. tilting moment	M_{2KMax}	*Nm*	3100						310					
		in.lb	27437						2744					
Efficiency at full load	η	*%*	98.5						99					
Service life	L_h	*h*	> 30000											
Weight (incl. standard adapter plate)	*m*	*kg*	56											
		lb_m	123.8											
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						IP 52					
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-04000AA075.000-X											
Bore diameter of coupling on the application side		*mm*	X = 050.000 - 090.000											
Mass moment of inertia (relates to the drive) N 55 Clamping hub diameter [mm]	J_1	$kgcm^2$	139	94.3	76.9	61.5	61.5	53.1	139	94.3	76.9	61.5	61.5	53.1
		10^{-3} $in.lb.s^2$	123	83.5	68.1	54.4	54.4	47.0	123	83.5	68.1	54.4	54.4	47.0

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

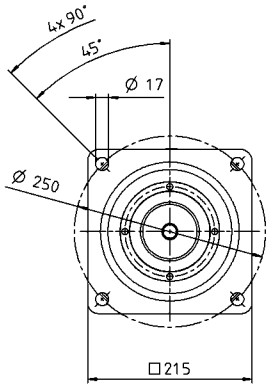
View A

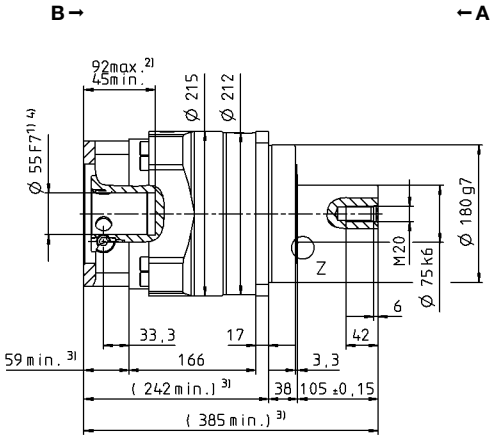
View B

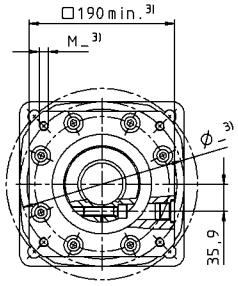
Motor shaft diameter [mm]

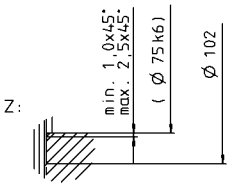
1-stage

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



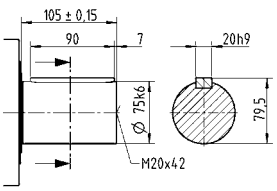




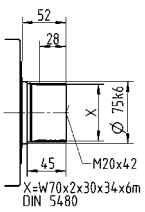


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]		T_{2a}	*Nm*	1680	1800	2000	1680	1680	1920	1040	1300	1200	1700	1200
			in.lb	14869	15931	17702	14869	14869	16994	9205	11506	10621	15046	10621
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)		T_{2B}	*Nm*	1680	1800	2000	1680	1680	1920	1040	1300	1200	1700	1200
			in.lb	14869	15931	17702	14869	14869	16994	9205	11506	10621	15046	10621
Nominal torque (at n_{1N})		T_{2N}	*Nm*	898	728	910	744	1344	929	787	984	960	1360	960
			in.lb	7949	6445	8056	6581	11895	8226	6969	8711	8497	12037	8497
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)		T_{2Not}	*Nm*	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900	5900
			in.lb	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220	52220
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]		n_{1N}	*rpm*	3500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed		n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)		T_{012}	*Nm*	3.4	3.1	2.9	2.6	2.6	2.0	2.0	1.8	1.8	1.6	1.6
			in.lb	30	27	25	23	23	18	18	16	16	14	14
Max. backlash		j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 4										
Torsional rigidity [b)]		C_{t21}	*Nm/arcmin*	400										
			in.lb/arcmin	3540										
Max. axial force [c)]		F_{2AMax}	*N*	30000										
			lb_f	6750										
Max. lateral force [c)]		F_{2QMax}	*N*	21000										
			lb_f	4725										
Max. tilting moment		M_{2KMax}	*Nm*	3100										
			in.lb	27437										
Efficiency at full load		η	*%*	96.5										
Service life		L_h	*h*	> 30000										
Weight (incl. standard adapter plate)		*m*	*kg*	53										
			lb_m	117.1										
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®)				BC2-04000AA075.000-X										
Bore diameter of coupling on the application side			*mm*	X = 050.000 - 090.000										
Mass moment of inertia (relates to the drive)	M	48	J_1	*kgcm²*	34.5	31.5	30.8	30.0	30.0	29.7	28.5	28.3	28.3	28.1	28.0
Clamping hub diameter [mm]				*10^{-3} in.lb.s²*	30.5	27.9	27.3	26.6	26.6	26.3	25.2	25.0	25.0	24.9	24.8

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

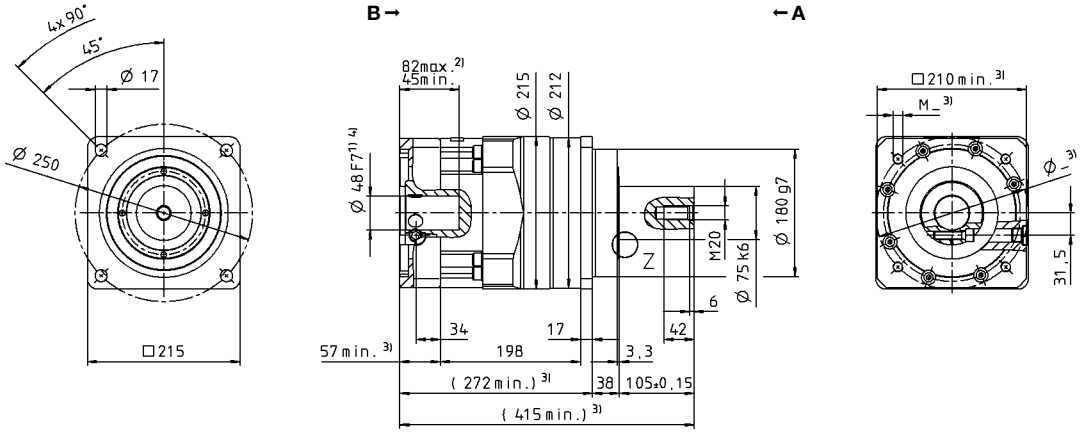
View A

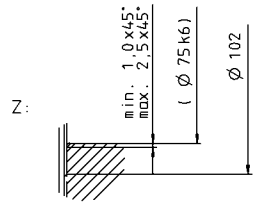
View B

Motor shaft diameter [mm]

2-stage

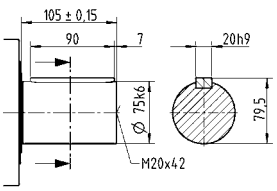
up to 48 [4] (M) [5] clamping hub diameter



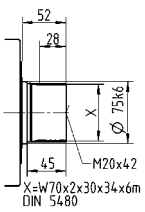


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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

			Standard version MC						Friction optimized version L					
Ratio	*i*		**3**	**4**	**5**	**7**	**8**	**10**	**3**	**4**	**5**	**7**	**8**	**10**
Max. torque [a) b) e)]	T_{2a}	*Nm*	1750	3500	3600	2700	1800	1800	1750	3500	3600	2700	1800	1800
		in.lb	15489	30978	31863	23897	15931	15931	15489	30978	31863	23897	15931	15931
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)	T_{2B}	*Nm*	1750	3500	3600	2700	1800	1800	1750	3500	3600	2700	1800	1800
		in.lb	15489	30978	31863	23897	15931	15931	15489	30978	31863	23897	15931	15931
Nominal torque (at n_{1N})	T_{2N}	*Nm*	1400	2029	1861	1910	1440	1440	1400	2029	1861	1910	1440	1440
		in.lb	12391	17955	16471	16909	12745	12745	12391	17955	16471	16909	12745	12745
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)	T_{2Not}	*Nm*	6850	8500	8500	8500	6850	6850	6850	8500	8500	8500	6850	6850
		in.lb	60628	75232	75232	75232	60628	60628	60628	75232	75232	75232	60628	60628
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]	n_{1N}	*rpm*	1750	2250	3000	3000	3000	3000	1750	2250	3000	3000	3000	3000
Max. input speed	n_{1Max}	*rpm*	3400	4000	5000	5000	5000	5000	3400	4000	5000	5000	5000	5000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)	T_{012}	*Nm*	18	16	12	8.6	8.6	5.8	8.0	7.0	6.0	5.0	4.8	4.2
		in.lb	159	141	107	77	77	51	71	62	53	44	43	37
Max. backlash	j_t	*arcmin*	Standard ≤ 4 / Reduced ≤ 2											
Torsional rigidity [b)]	C_{t21}	*Nm/arcmin*	550											
		in.lb/arcmin	4868											
Max. axial force [c)]	F_{2AMax}	*N*	33000						10000					
		lb_f	7425						2250					
Max. lateral force [c)]	F_{2QMax}	*N*	30000						2000					
		lb_f	6750						450					
Max. tilting moment	M_{2KMax}	*Nm*	5000						280					
		in.lb	44254						2478					
Efficiency at full load	η	*%*	98.5						99					
Service life	L_h	*h*	> 30000											
Weight (incl. standard adapter plate)	*m*	*kg*	77											
		lb_m	170.2											
Operating noise (at reference ratio and reference speed – ratio-specific values available in cymex®)	L_{PA}	*dB(A)*	≤ 66											
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						IP 52					
Metal bellows coupling (recommended product type – validate sizing with cymex®)			BC2-04000AA085.000-X											
Bore diameter of coupling on the application side		*mm*	X = 050.000 - 090.000											
Mass moment of inertia (relates to the drive) O 60 Clamping hub diameter [mm]	J_1	*kgcm²*	260	198	163	138	138	125	260	198	163	138	138	125
		10^{-3} in.lb.s²	230	175	144	122	122	110	230	175	144	122	122	110

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

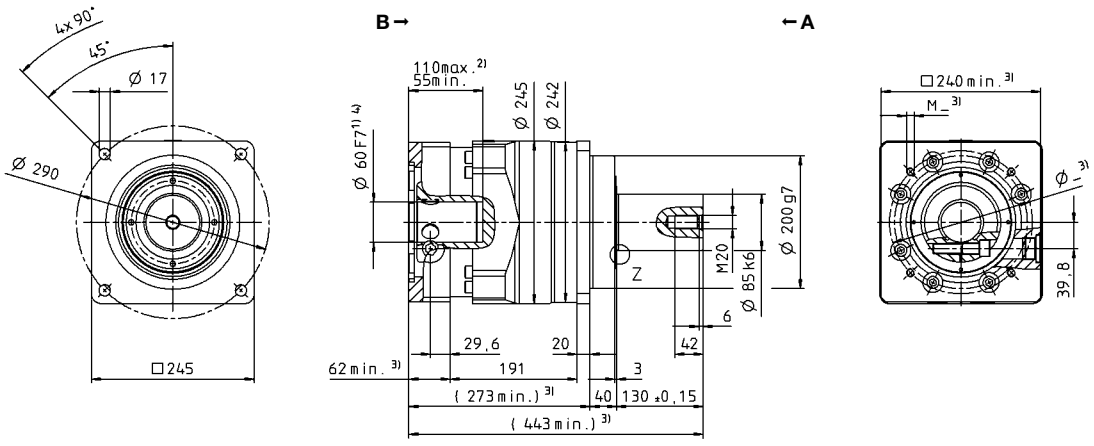
View A

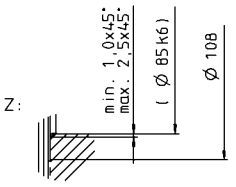
View B

Motor shaft diameter [mm]

1-stage

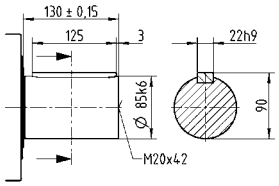
up to 60 [4] (O) [5] clamping hub diameter



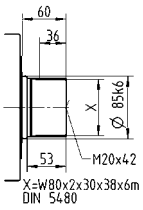


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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**	**25**	**28**	**32**	**35**	**40**	**50**	**64**	**70**	**100**
Max. torque [a) b) e)]		T_{2a}	*Nm*	3500	3500	3600	2900	2900	3600	1680	2100	1800	2700	1800
			in.lb	30978	30978	31863	25667	25667	31863	14869	18587	15931	23897	15931
Max. acceleration torque [b) e)] (max. 1000 cycles per hour)		T_{2B}	*Nm*	3500	3500	3600	2900	2900	3600	1680	2100	1800	2700	1800
			in.lb	30978	30978	31863	25667	25667	31863	14869	18587	15931	23897	15931
Nominal torque (at n_{1N})		T_{2N}	*Nm*	1950	1803	2266	1867	2320	2694	1344	1680	1440	2160	1440
			in.lb	17255	15960	20058	16521	20534	23843	11895	14869	12745	19118	12745
Emergency stop torque [a) b) e)] (permitted 1000 times during the service life of the gearbox)		T_{2Not}	*Nm*	8500	8500	8500	8500	8500	8500	8500	8500	6850	8500	6850
			in.lb	75232	75232	75232	75232	75232	75232	75232	75232	60628	75232	60628
Permitted average input speed (at T_{2N} and 20 °C ambient temperature) [d)]		n_{1N}	*rpm*	3500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed		n_{1Max}	*rpm*	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque [b)] (at n_1 = 2000 rpm and 20 °C gearbox temperature)		T_{012}	*Nm*	4.8	4.4	4.0	3.6	3.6	2.8	2.4	2.0	2.0	1.6	1.4
			in.lb	43	39	35	32	32	25	21	18	18	14	13
Max. backlash		j_t	*arcmin*	Standard ≤ 5 / Reduced ≤ 4										
Torsional rigidity [b)]		C_{t21}	*Nm/arcmin*	550										
			in.lb/arcmin	4868										
Max. axial force [c)]		F_{2AMax}	*N*	33000										
			lb_f	7425										
Max. lateral force [c)]		F_{2QMax}	*N*	30000										
			lb_f	6750										
Max. tilting moment		M_{2KMax}	*Nm*	5000										
			in.lb	44254										
Efficiency at full load		η	*%*	96.5										
Service life		L_h	*h*	> 30000										
Weight (incl. standard adapter plate)		*m*	*kg*	76										
			lb_m	168.0										
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®)				BC2-04000AA085.000-X										
Bore diameter of coupling on the application side			*mm*	X = 050.000 - 090.000										
Mass moment of inertia (relates to the drive)	M	48	J_1	*kgcm²*	34.5	31.5	30.8	30.0	30.0	29.7	28.5	28.3	28.3	28.1	28.0
Clamping hub diameter [mm]				*10^{-3} in.lb.s²*	30.5	27.9	27.3	26.6	26.6	26.3	25.2	25.1	25.1	24.9	24.8

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

[a)] At max. 10 % F_{2QMax}
[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
[e)] Smooth shaft

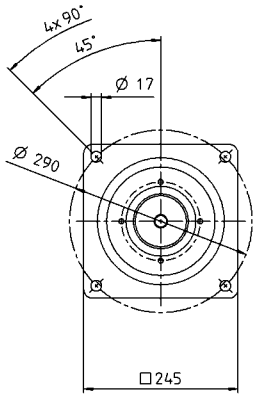
View A

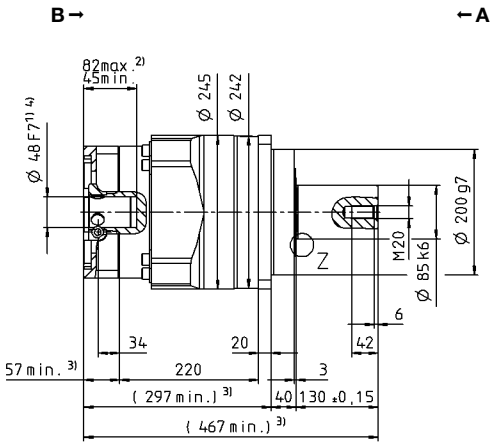
View B

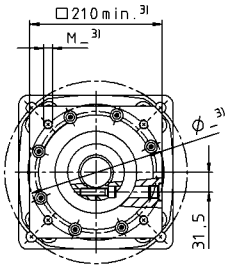
Motor shaft diameter [mm]

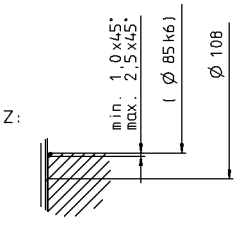
2-stage

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



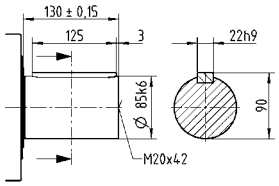




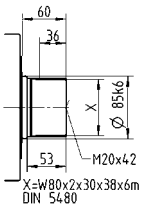


Other output variants

Shaft with key



Splined shaft (DIN 5480)



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

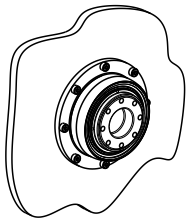
Explanation of variants deviating from the standard:

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).

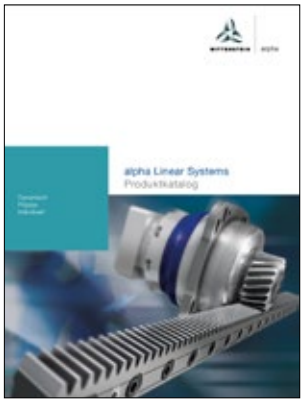
alpha Advanced Linear Systems

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.

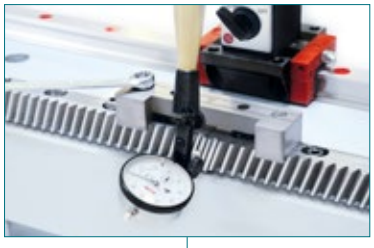
INIRA® adjusting: Simply safer and more precise

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

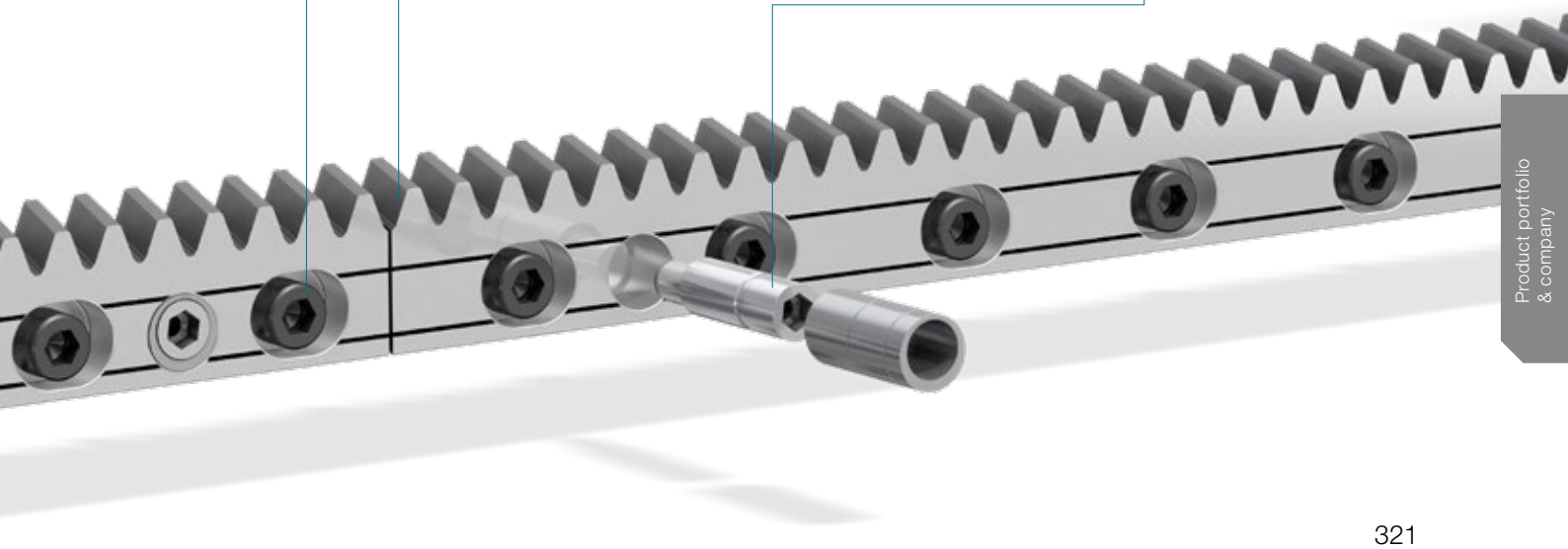
The previous method used for pinning racks was extremely time-consuming. Precision bores have to be drilled and the chips generated must be carefully removed from the assembly. INIRA® pinning now offers a completely new solution for the chipless pinning of racks, which reduces installation times considerably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

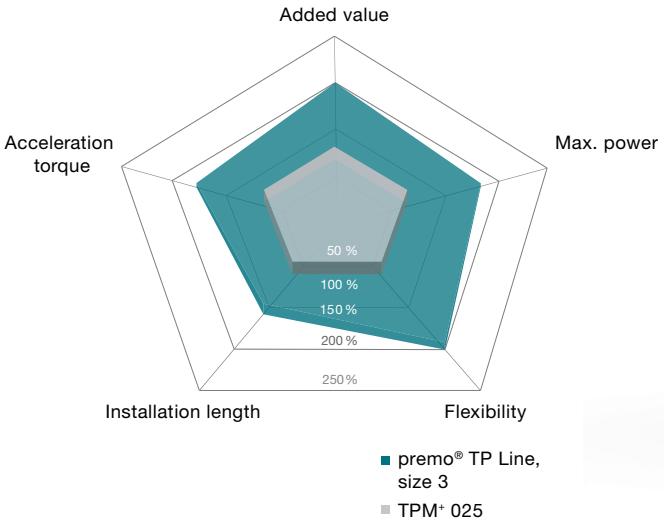
- Higher machine performance thanks to higher acceleration torque
- High torque density combined with a compact design allow for the realization of higher performance machines with significant space saving
- Improved connectivity to next generation controllers from leading system providers through the 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

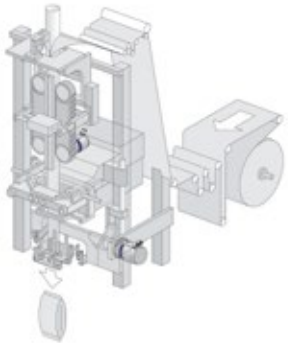
Flexible mechanical and electrical interfaces for high scalability

Variety of options for individually upgrading the basic configuration

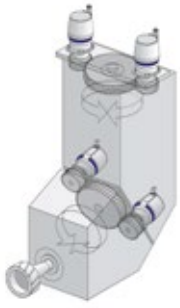


premo® application examples

Handling portal
premo® SP Line



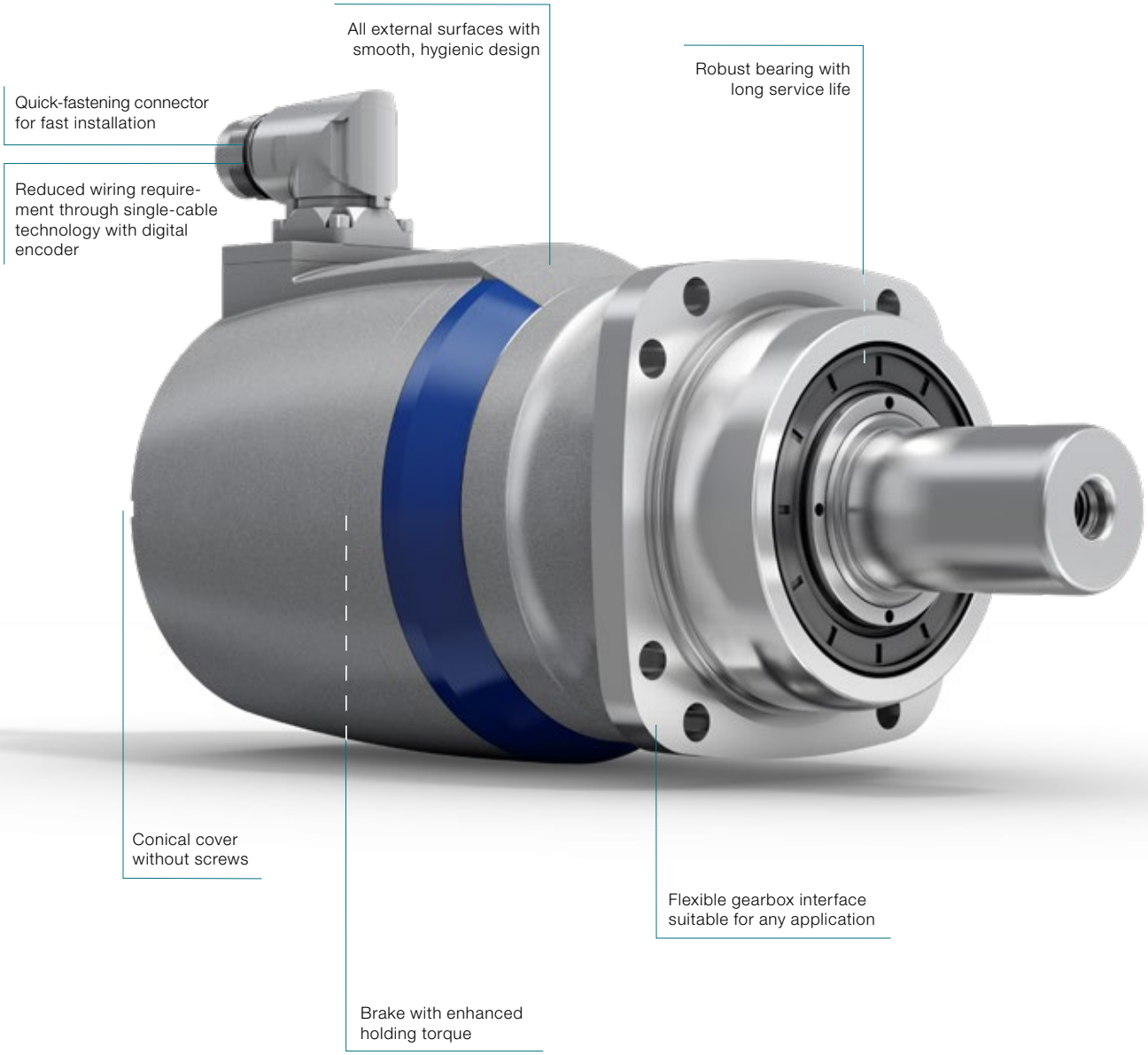
Fill and Seal machine
premo® TP Line



Milling cutter for a machining center
premo® XP Line

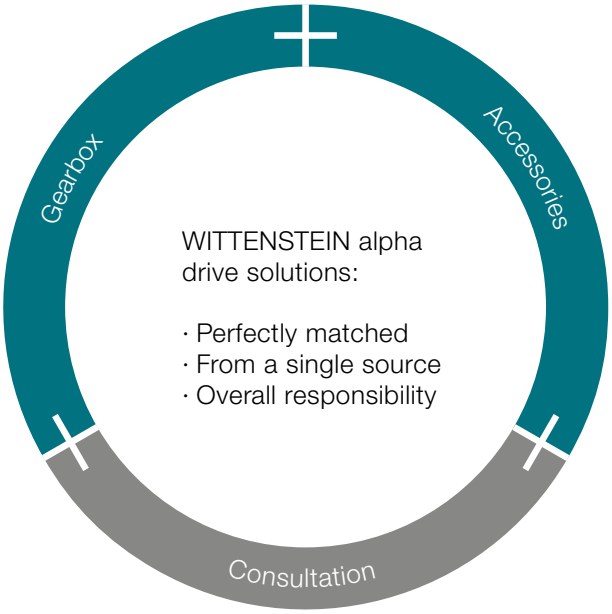
Typical fields of application and industry solutions

- 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)



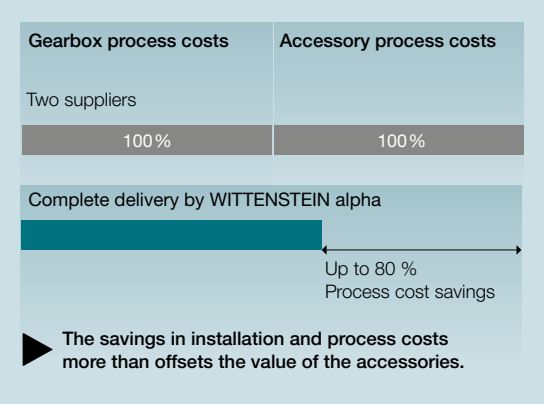
Accessories – smart additions for intelligent performance

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

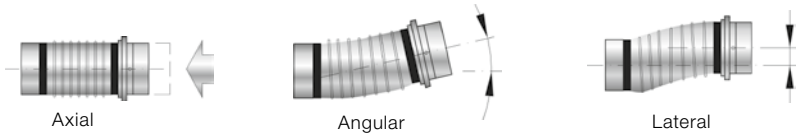
Preferred shrink disk series

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

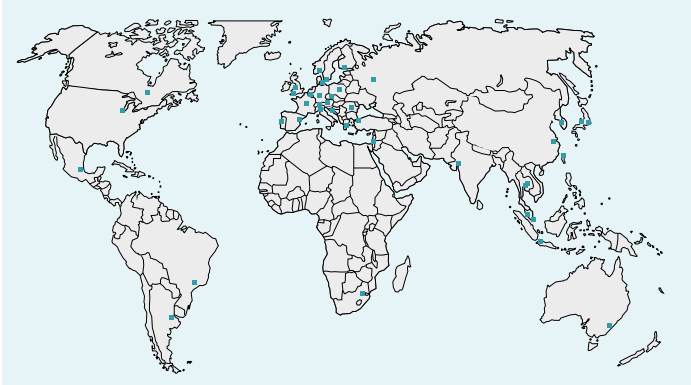
Our highly qualified and committed expert personnel will accompany you throughout the entire product lifecycle - around the clock. When it comes to customer support, you can count on us!

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

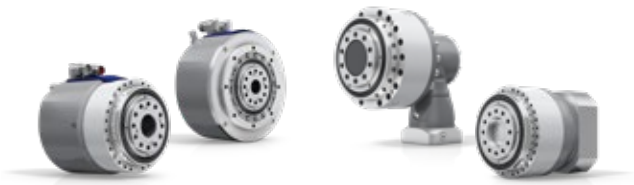
WITTENSTEIN alpha GmbH
High-precision servo drives and linear systems

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

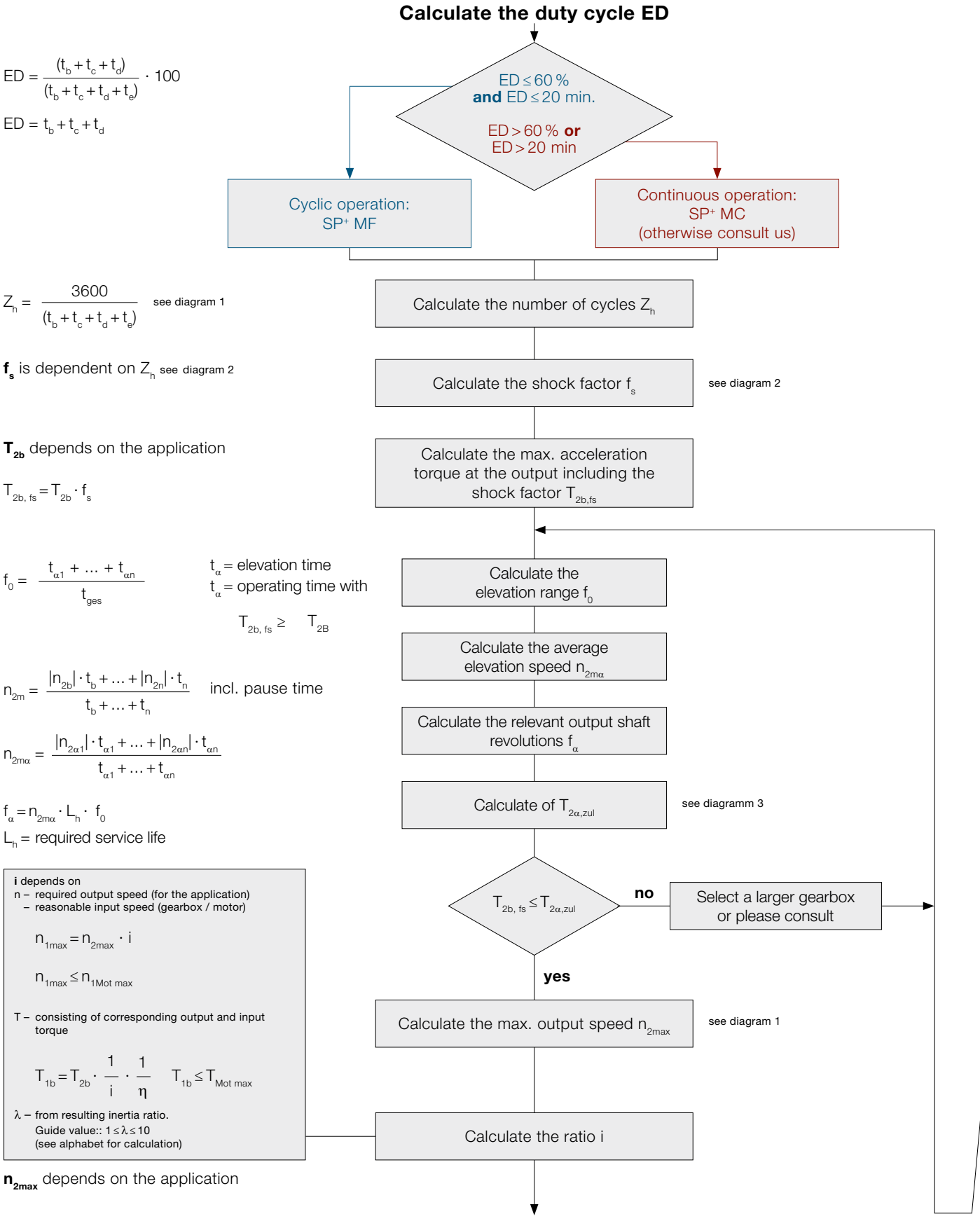
attocube systems AG
Nanoprecision drive and measurement technology solutions

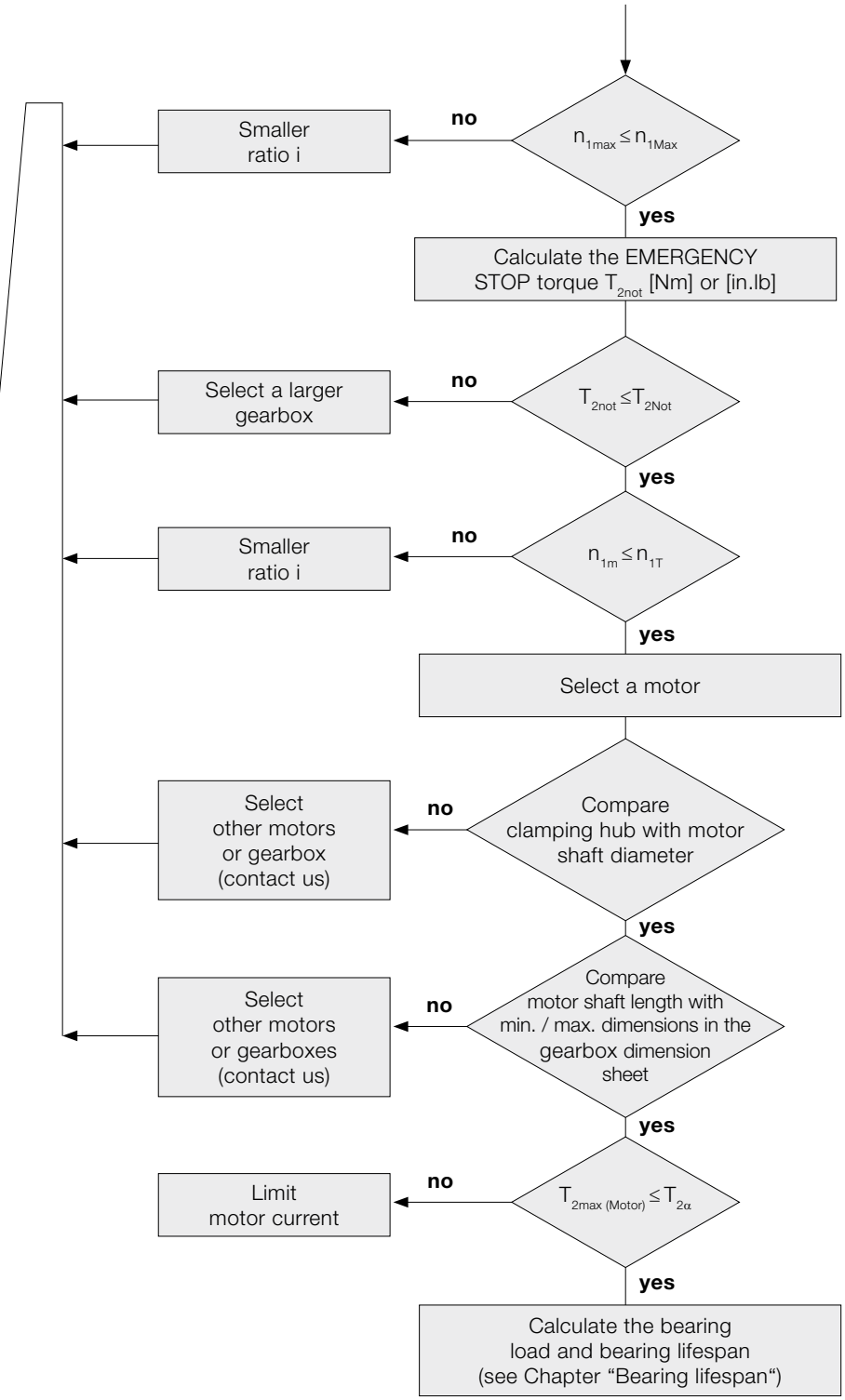
baramundi

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.

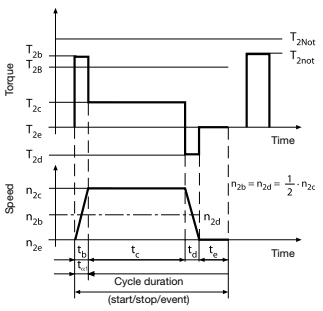


Diagram 2
Large number of cycles combined with short acceleration times may cause the drive train to vibrate. Use the shock factor f_s to include the resulting excess torque values in calculations.

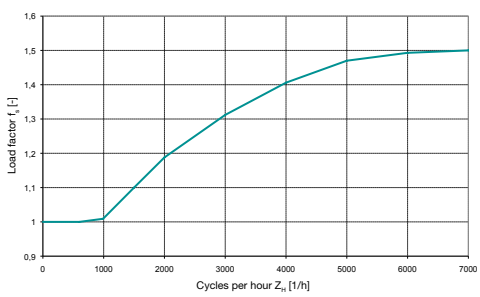
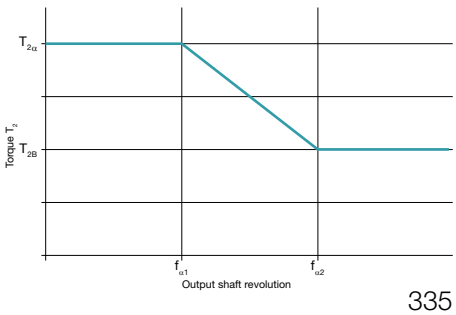
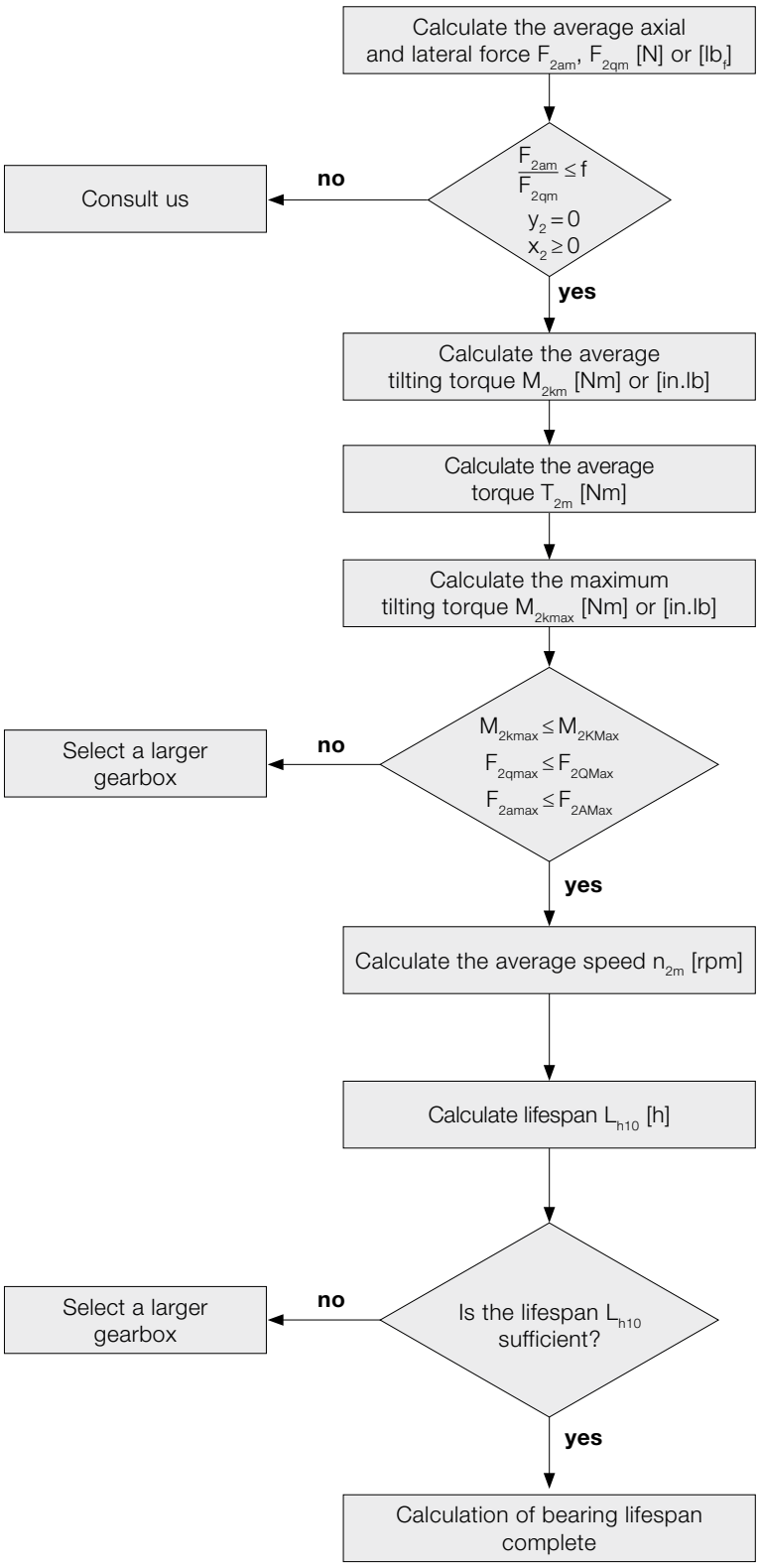


Diagram 3
The transmittable torque $T_{2\alpha,per}$ of the gearbox is dependent on the number of output shaft revolutions. In the lower output shaft revolution range, the fatigue strength range of the toothing can be fully utilized up to the maximum value $T_{2\alpha}$.



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

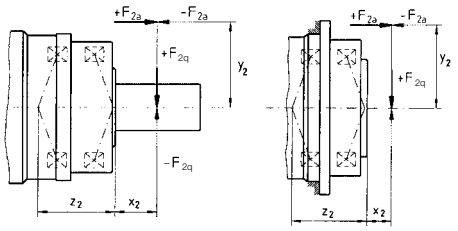
$$n_{2m} = \frac{n_{2b} \cdot t_b + \ldots + n_{2n} \cdot t_n}{t_b + \ldots + t_n}$$

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

	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

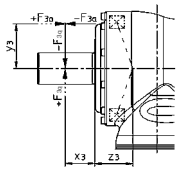
TK⁺/SK⁺/HG⁺/SC⁺/VH⁺/VS⁺/VT⁺: Calculation using cymex®.
Please contact us for further information.

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			

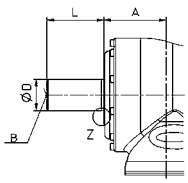
[a] Connection via shrink discs
[b] Refers to center of shaft
[c] See also page 336, “Detailed dimensioning – Gearbox“

Rearward drive:

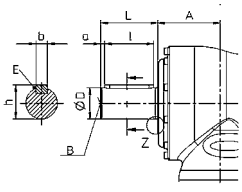


$$M_{3k} = F_{3a} \cdot y_3 + F_{3q} \cdot (x_3 + z_3)$$

Smooth shaft

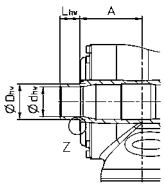


Shaft with key



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

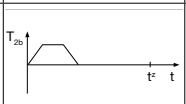
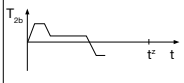
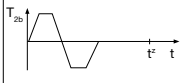
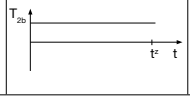
Worm gearboxes – Detailed sizing

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

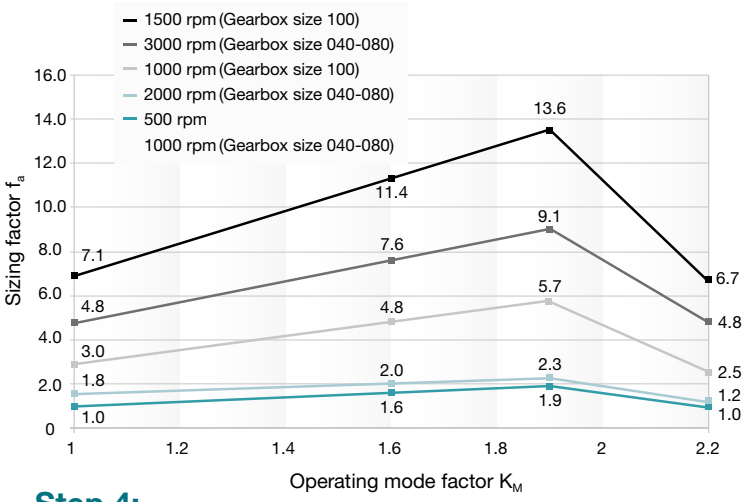
B: Sizing based on the application

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

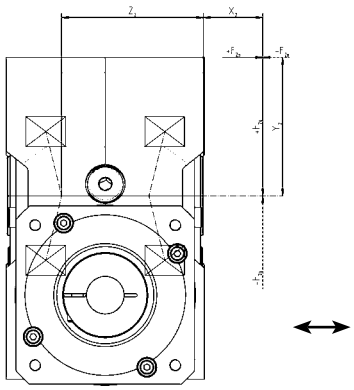
[a] The maximum torques depend on the ratio.
[b] First value for single-stage version, second value for two-stage version.

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

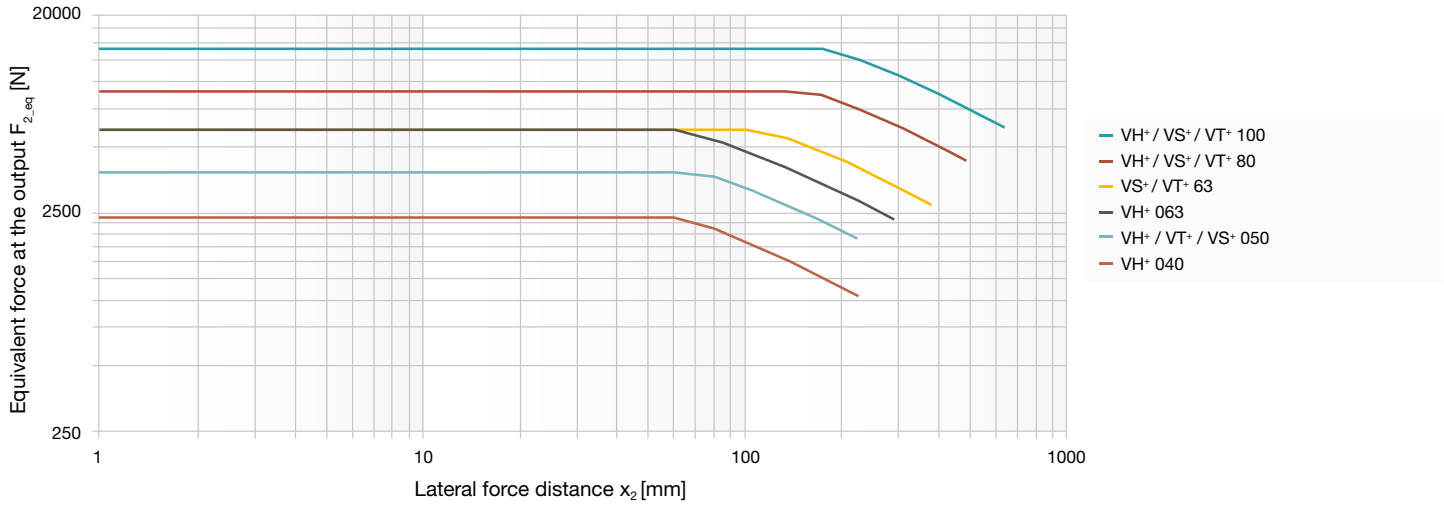
Step 7:

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

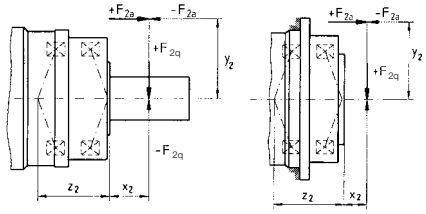
A degree is subdivided into 60 angular minutes (= 60 arcmin = 60‘).

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})

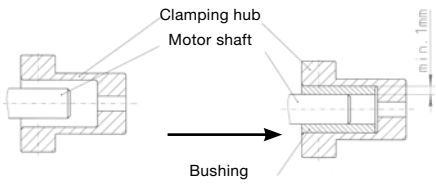
The axial force acting on a gearbox runs parallel to its output shaft or perpendicular to its output shaft. It may be applied with axial offset via a lever arm y_2 under certain circumstances, in which case it also generates a bending moment. If the axial force exceeds the permissible catalog values (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.

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

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

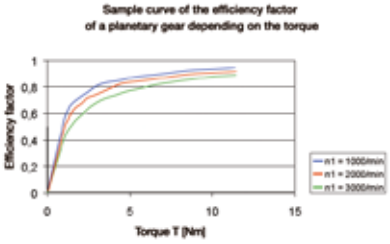
Emergency stop torque (T_{2Not})

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)

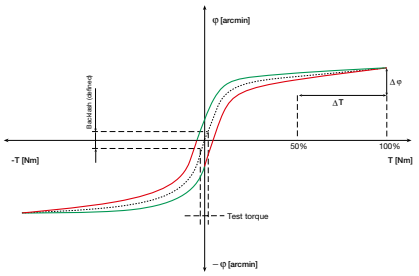
The HIGH SPEED version of our gearbox has been specially developed for applications in continuous operation at high input speeds, e.g. as found in the printing and packaging industries.

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

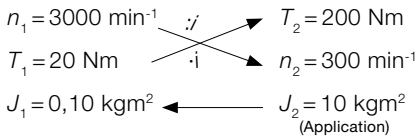
The positioning accuracy is determined by the angular deviation from a setpoint and equals the sum of the torsional angles due to load **→ (torsional rigidity and torsional backlash)** and kinetics **→ (synchronization error) occurring simultaneously in practise** .

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

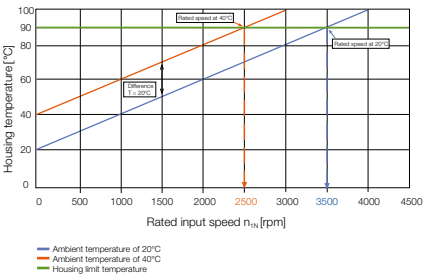
For applications with special safety requirements (e.g. vertical axes, clamped drives), we recommend exclusive use of our Premium and Advanced products (excluding V-Drive).

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

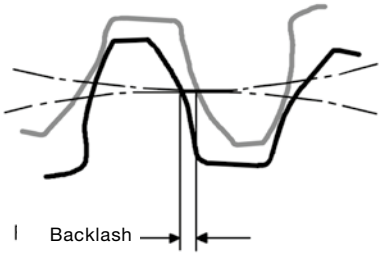
The tilting rigidity C_{2K} [Nm/arcmin] of the gearbox consists of the bending stiffness of the output or pinion shaft and the stiffness of the output bearing. It is defined as the quotient of tilting moment M_{2K} [Nm] and tilting angle Φ [arcmin] ($C_{2K} = M_{2K}/\Phi$).

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.



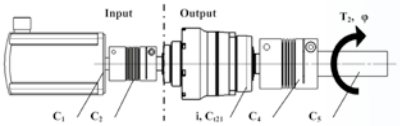
Torsional backlash is measured with the input shaft locked.

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

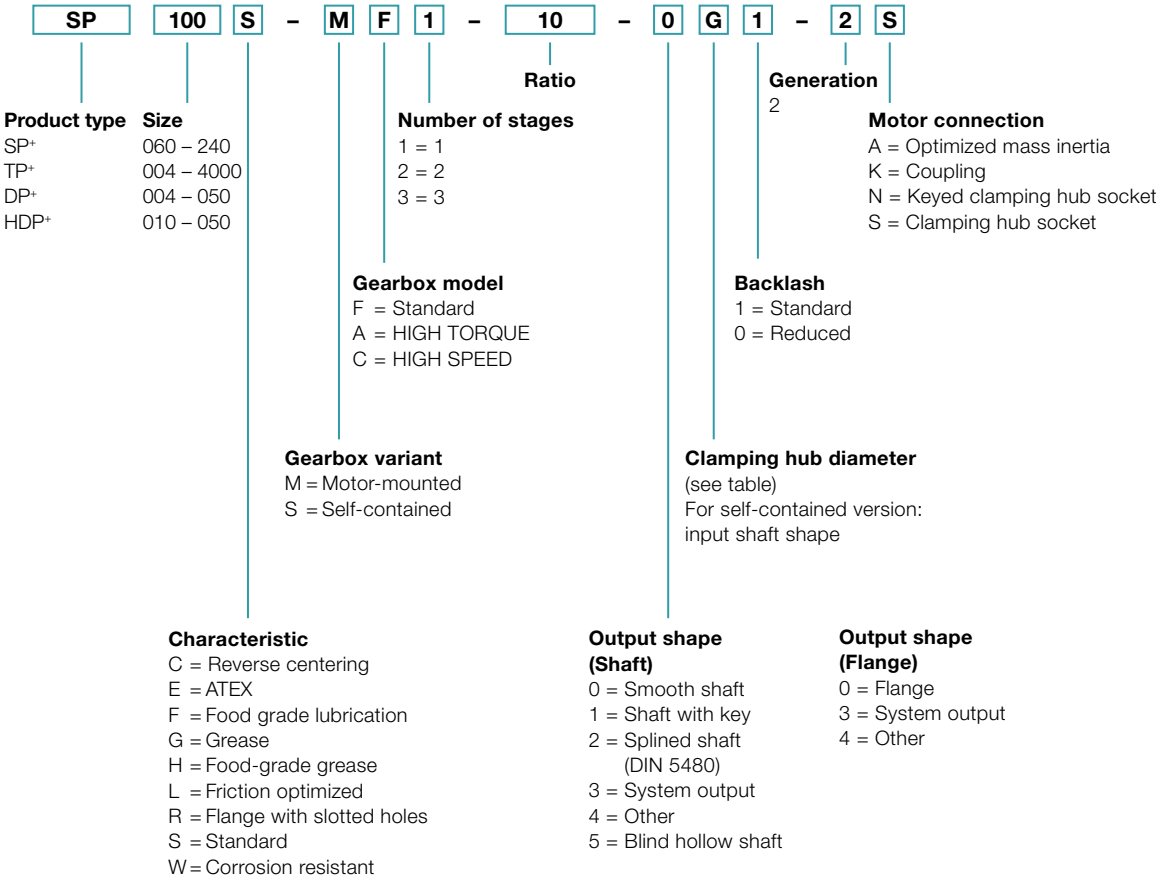
Symbol

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

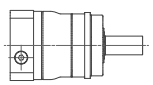
Index	Designation
Capital letter	Permissible values
Small letter	Actual values
1	Input
2	Output
A/a	Axial
B/b	Acceleration
c	Constant
d	Deceleration
e	Pause
h	Hours
K/k	Tilting
m	Mean
Max/max	Maximum
Mot	Motor
N	Nominal
Not/not	Emergency stop
0	No load
Q/q	Lateral
t	Torsional
T	Tangential

Ordering code – Planetary gearbox

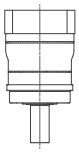


Mounting positions and clamping hub diameters

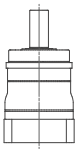
B5
Horizontal



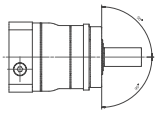
V1
Output vertical downwards



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

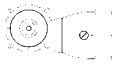
Output shape (Hollow shaft)
5 = Hollow shaft interface / Hollow shaft
6 = Hollow shaft interface / Hollow shaft interface

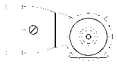
Mounting positions

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

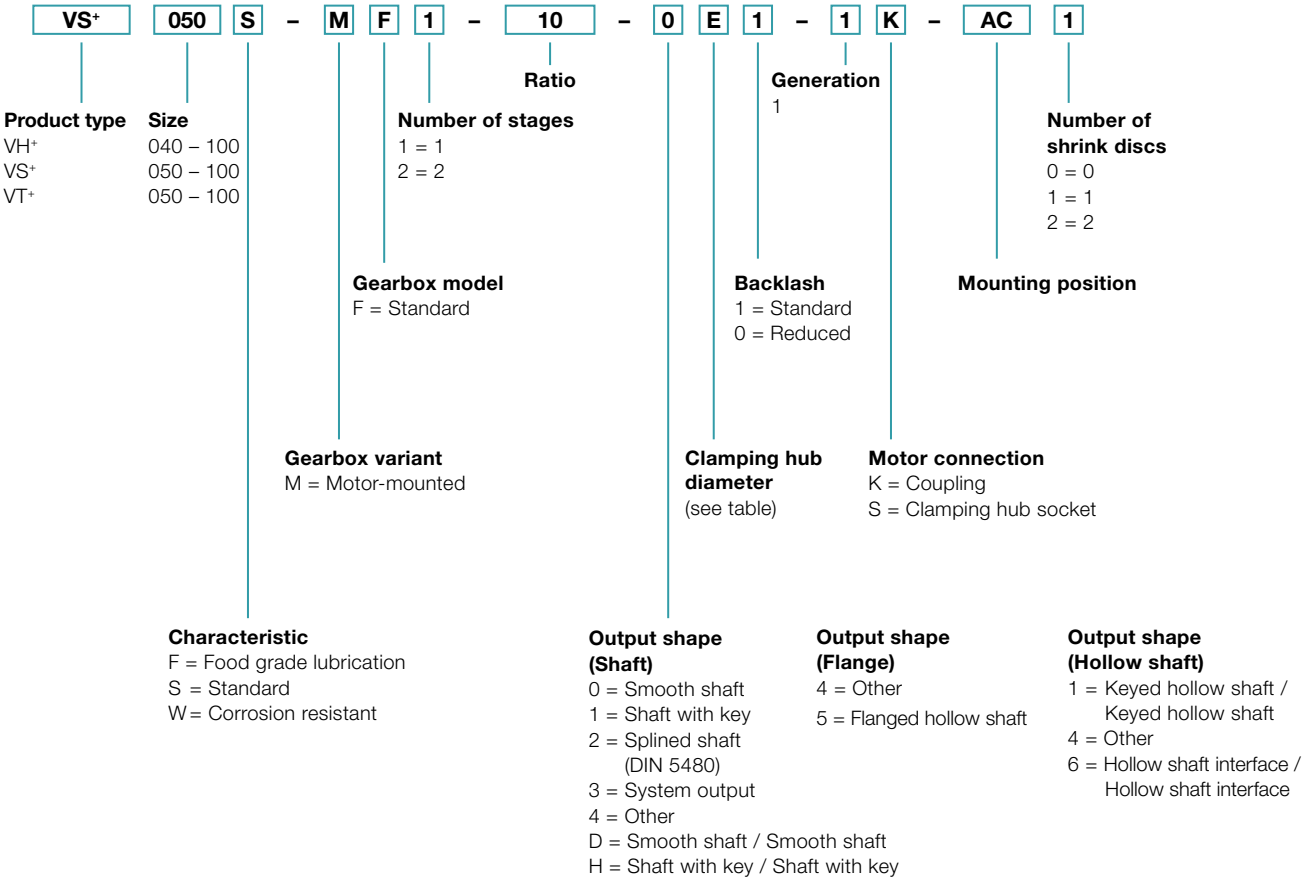
Output shape

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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