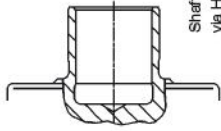


SP+ – The new generation

The classic all-rounder among planetary gearheads



NEW



Shaft mounted, mounted via HSD shrink disc



Shrink disc



Sensor flange



Couplings



Rack / Pinion



See our website and our separate flyer for more information about our washdown solutions

MF version

Designed for:

- Cyclic applications
- Reverse operation
- Highly dynamic applications
- Greater positioning accuracy

MC version (HIGH SPEED)

Designed for:

- Long duty cycles (>60%)
- High nominal speeds
- Temperature-sensitive applications
- Drive trains with high control quality

SP+

Specifications	Version		
	SP+	MF/MC	
Positioning accuracy	+	++	+++
Rigidity			
Smooth-running			
Speed capacity		MF	MC
Power density			
Max. axial/radial forces			

Accessories

- Rack / Pinion (see page 236)
- Shrink disc (see page 202)
- Couplings (see page 288)
- Sensor flange

Options

- Output shaft with key / Involute
- NEW: Shaft mounted, mounted via HSD shrink disc
- Washdown version
- ATEX version 
- Food-grade grease 
- Version with optimized mass moment of inertia

Ratio ^{a)}	1-stage							
	1	2	3	4	5	7	10	
Cymex [®] -optimized acceleration torque <small>(please contact us regarding the design)</small>	T _{25rpm}			58	60	54	-	
				513	531	478		
Max. acceleration torque <small>(max. 100 cycle period)</small>	T ₂₅			42	42	42	32	
				372	372	372	263	
Nominal output torque <small>(with n₂)</small>	T ₂₅			28	28	26	17	
				230	230	220	150	
Emergency stop torque <small>(permitted time limit: during the service life of the gearbox (with T₂₅ and 20°C ambient temperature))^{b)}</small>	T ₂₅			100	100	100	80	
				885	885	885	708	
Nominal input speed	n ₁			3300	3300	4000	4000	
				6000	6000	6000	6000	
Max. input speed	n _{1max}			0.9	0.7	0.4	0.3	
				8.0	6.2	5.3	2.7	
Mean no load running torque <small>(with n₂=3000 rpm and 20°C gearbox temperature)^{d)}</small>	T ₂₅₂			Standard ± 4 / Reduced ± 2				
				3.5				
Max. torsional backlash	J _t	arcmin						
				3.5				
Torsional rigidity	C ₂₃	$\frac{N \cdot mm}{°}$						
				31				
Max. axial force ^{e)}	F _{2max}	N		2400				
				540				
Max. radial force ^{e)}	F _{2rmax}	lb		2600				
				690				
Max. tilting torque	M _{2max}	Nm		152				
				1345				
Efficiency at full load	η	%		97				
				> 20000				
Service life <small>(For calculation, see the Chapter "Information")</small>	L _s	h		1.9				
				4.2				
Weight incl. standard adapter plate	m	kg		≤ 58				
				490				
Operating noise <small>(with n=10 and n₂=2000 rpm no load)</small>	L _{PK}	dB(A)		194				
				164				
Max. permitted housing temperature	F	°C		0.10-+4.0				
				32 to 104				
Ambient temperature	F	°C		Lubricated for life				
Lubrication	Lubricated for life							
Paint	BlueRAL 5002							
Direction of rotation	Motor and gearhead same direction							
Protection class	IP 65							
Moment of inertia <small>(please contact us)</small> <small>Clamping hub diameter (mm)</small>	B	11	J ₁	kgcm ²	0.21	0.15	0.12	0.10
					0.16	0.13	0.11	0.09
	C	14	J ₁	kgcm ²	0.28	0.22	0.20	0.18
					0.25	0.20	0.17	0.15
E	10	J ₁	kgcm ²	0.61	0.55	0.52	0.50	
				0.54	0.48	0.46	0.44	

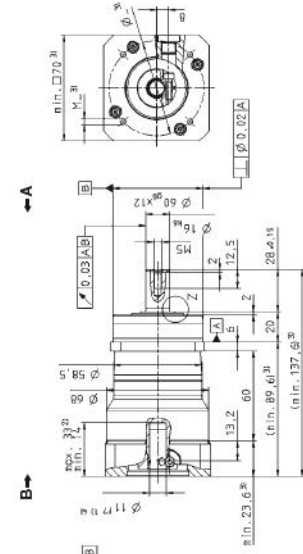
^{a)} Other ratios available on request.

^{b)} For higher ambient temperatures, please reduce input speed.

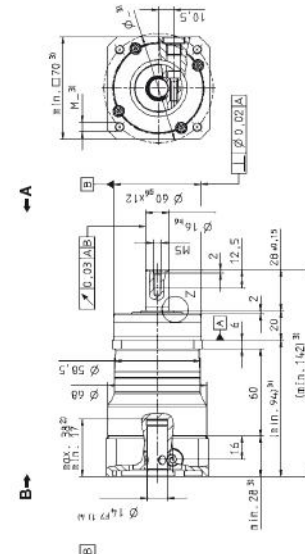
^{c)} Valid for clamping hub diameter of 14 mm.

^{d)} Refer to center of the output shaft or flange.

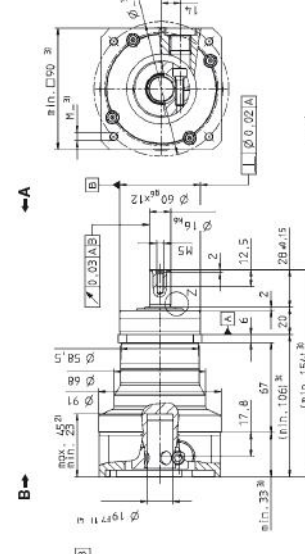
up to 11 ^{b)}(B)
clamping hub
diameter



up to 14 ^{c)}(C)
clamping hub
diameter¹⁾



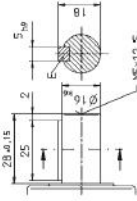
up to 19 ^{d)}(E)
clamping hub
diameter



Alternatives: Output shaft variants

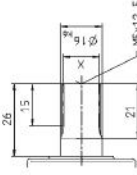
Keywayed output shaft in mm

F → W as per DIN 6056, sheet 1, 3, 5, 7, 8, 9, 10



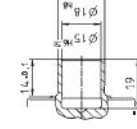
Involute gearing DIN 5480 in mm

X → W as per DIN 5480, sheet 1, 3, 4, 5, 6, 7, 8, 9, 10



Shaft mounted

M as per ISO 2818:2001



Non-oriented dimensions ± 1 mm

- Check motor shaft fit.
- Min./Max. permissible motor shaft length.
Long or motor shafts are adaptable, please contact us.
- The dimensions depend on the motor.
- Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
- Tolerance h9 for mounted shaft.

Motor mounting according to operating manual

Ratio ^{a)}	2-stage										
	16	20	25	28	35	40	50	70	100		
Cyclic ^{b)} optimized acceleration torque (please contact us regarding the design)	$T_{250\text{rpm}}$	58	58	60	56	60	56	60	54	—	
		513	513	531	513	531	513	531	478	—	
Max. acceleration torque (max. 100 rpm per sec)	T_{25}	42	42	42	42	42	42	42	42	32	
		372	372	372	372	372	372	372	372	283	
Nominal output torque (with n_{25})	T_{25}	26	26	26	26	26	26	26	26	17	
		230	230	230	230	230	230	230	230	150	
Emergency stop torque (permitted time during the service life of the gearbox (with T_{25} and 20°C ambient temperature) ^{h)})	T_{25}	100	100	100	100	100	100	100	100	80	
		885	885	885	885	885	885	885	885	708	
Nominal input speed	n_{25}	4400	4400	4400	4400	4400	4400	4400	5500	5500	
		rpm									
Max. input speed	n_{max}	6000	6000	6000	6000	6000	6000	6000	6000	6000	
		rpm									
Mean no load running torque (with n_{25} 2000 rpm and 20°C gearbox temperature) ⁴⁾	T_{25}	0.5	0.4	0.4	0.3	0.3	0.3	0.3	0.3	0.2	
		in.lb	4.4	3.5	3.5	2.7	2.7	2.7	2.7	1.8	
Max. torsional backlash	J_1	Standard ≤ 6 / Reduced ≤ 4									
		arcmin									
Torsional rigidity	C_{25}	3.5									
		N	31.0								
Max. axial force ⁴⁾	$F_{25,max}$	2400									
		lb	540								
Max. radial force ⁴⁾	$F_{25,max}$	2600									
		lb	600								
Max. tilting moment	$M_{25,max}$	152									
		in.lb	1345								
Efficiency at full load	η	94									
		%									
Service life (For calculation, see the Chapter "Information")	L_h	> 20000									
		h									
Weight incl. standard adapter plate	m	2.0									
		kg	4.4								
Operating noise (with n_{25} 2000 rpm and 20°C gearbox temperature)	L_{PK}	≤ 58									
		dB(A)									
Max. permitted housing temperature		+80									
		°C									
Ambient temperature		0 to +40									
		°C									
Lubrication		32 to 104									
Paint		Lubricated for life									
Direction of rotation		Blue RAL 5002									
Protection class		Motor and gearbox same direction									
Moment of inertia (please contact us)	B 11	J_1	0.077	0.069	0.068	0.061	0.057	0.057	0.056	0.056	
	C 14	J_1	0.069	0.061	0.054	0.054	0.050	0.050	0.050	0.050	
Changing hub diameter (mm)		J_1	0.17	0.16	0.16	0.16	0.15	0.15	0.15	0.15	
			0.15	0.15	0.14	0.14	0.14	0.13	0.13	0.13	

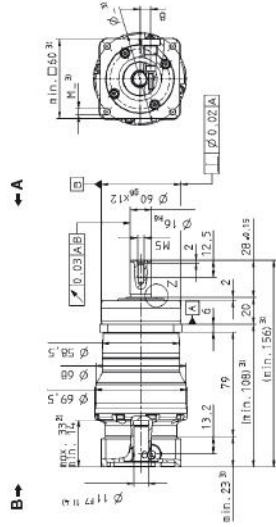
Reduced mass moments of inertia available on request.

^{a)} Other ratios available on request

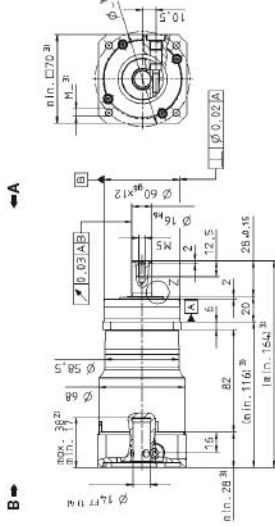
^{b)} For higher ambient temperatures, please reduce input speed

^{c)} Valid for clamping hub diameter of 11 mm

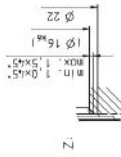
^{d)} Refers to center of the output shaft or flange



up to 11 ⁴⁾(B)
clamping hub
diameter



up to 14 ⁴⁾(C)
clamping hub
diameter

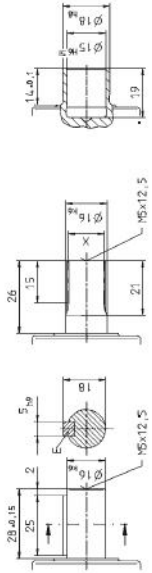


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key per DIN 68, sheet 1, 30 mA

Shaft mounted
Motor use is not recommended

Involute gearing DIN 5480 in mm
x = W 30 x 0.30 x 19 x 0.6, DIN 5480

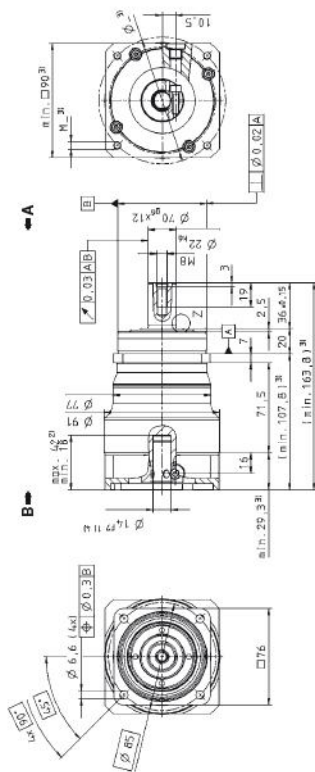


- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
- 5) Tolerance H9 for mounted shaft.

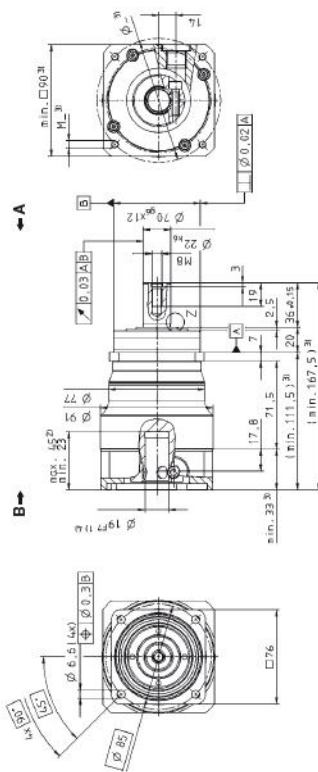
Motor mounting according to operating manual

Ratio ^{a)}	i	1-stage						
		3	4	5	7	10		
Cymex [®] optimized acceleration torque (please contact us regarding the design)	T _{25rpm}	Nm	142	160	142	142	100	
		in.lb	1254	1416	1254	1254	893	
Max. acceleration torque (max. 100 cycle per hour)	T ₂₅	Nm	85	110	110	110	85	
		in.lb	752	974	974	974	841	
Nominal output torque (with n ₂)	T _N	Nm	47	75	75	75	60	
		in.lb	416	664	664	664	460	
Emergency stop torque (permitted time times during the service life of the gearbox)	T _{stop}	Nm	200	250	250	200	200	
		in.lb	1770	2213	2213	1770	1770	
Nominal input speed	n _N	rpm	2900	2900	2900	3100	3100	
		rpm	6000	6000	6000	6000	6000	
Mean no load running torque (with n ₂ =3000 rpm and 20°C gearbox temperature ⁴)	T ₀₂₂	Nm	1.8	1.4	1.1	0.8	0.6	
		in.lb	15.9	12.4	9.7	7.1	5.3	
Max. torsional backlash	J _t	arcmin	Standard ≤ 4 / Reduced ≤ 2					
		in.arcmin						
Torsional rigidity	C ₂₁	$\frac{\text{Nm}}{\text{mm}}$	10	89	89	89	89	
		N	3350	3350	3350	3350	3350	
Max. axial force ⁴⁾	F _{2,Max}	lb	754	754	754	754	754	
		N	4200	4200	4200	4200	4200	
Max. radial force ⁴⁾	F _{3,Max}	lb	645	645	645	645	645	
		Nm	236	236	236	236	236	
Max. tilting moment	M _{2,Max}	in.lb	2089	2089	2089	2089	2089	
		%	97	97	97	97	97	
Efficiency at full load	η	h	> 20000					
		kg	3.9	3.9	3.9	3.9	3.9	
Service life (For calculation, see the Chapter "Information")	L ₅₀	h	8.0	8.0	8.0	8.0	8.0	
		lb _n	59	59	59	59	59	
Weight incl. standard adapter plate	m	kg	194	194	194	194	194	
		lb _n	430	430	430	430	430	
Operating noise (with n=10 and n ₂ =3000 rpm no load)	L _{PK}	dB(A)	≤ 59					
		°C	+80	+80	+80	+80	+80	
Max. permitted housing temperature	F	°C	0 to +40					
		°C	32 to 104					
Ambient temperature	F	°C	Lubricated for life					
		°C	Blue RAL 5002					
Lubrication			Motor and gearbox same direction					
			IP 65					
Paint			IP 65					
			IP 65					
Direction of rotation			Motor and gearbox same direction					
			IP 65					
Protection class			Motor and gearbox same direction					
			IP 65					
Moment of inertia (please contact us)	C 14	J ₁	kgcm ²	0.86	0.61	0.42	0.38	
	E 10	J ₁	kgcm ²	0.76	0.54	0.37	0.33	
Clamping hub diameter (mm)	G 24	J ₁	kgcm ²	1.03	0.68	0.59	0.54	
		J ₁	kgcm ²	0.91	0.60	0.52	0.48	
Reduced mass moments of inertia available on request.		J ₁	kgcm ²	2.40	2.15	1.96	1.91	
		J ₁	kgcm ²	2.12	1.90	1.73	1.69	

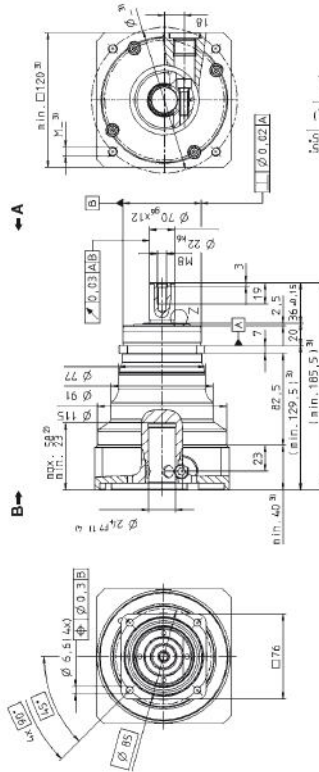
^{a)} Other ratios available on request.
^{b)} For higher ambient temperatures, please reduce input speed.
^{c)} Valid for clamping hub diameter of 19 mm.
^{d)} Refer to centre of the output shaft or flange.



up to 14.4(C)
clamping hub
diameter



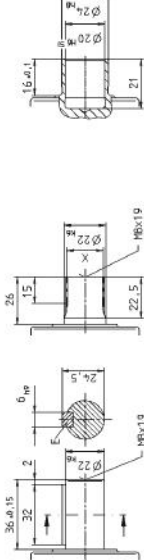
up to 19.4(E)
clamping hub
diameter



up to 24.4(G)
clamping hub
diameter

Alternatives: Output shaft variants

Keywayed output shaft in mm
 E → key per DIN 6885, sheet 1, form A
 Shaft mounted
 Motor is iso-bore type

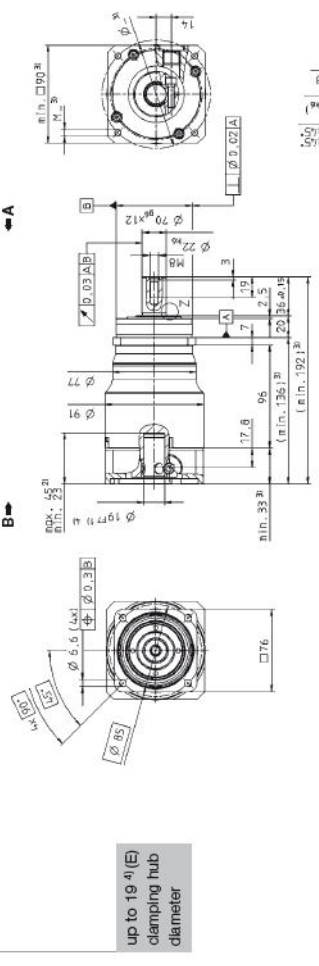
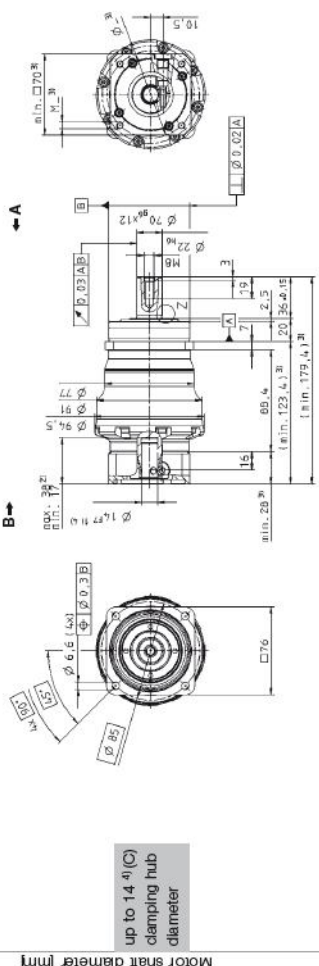
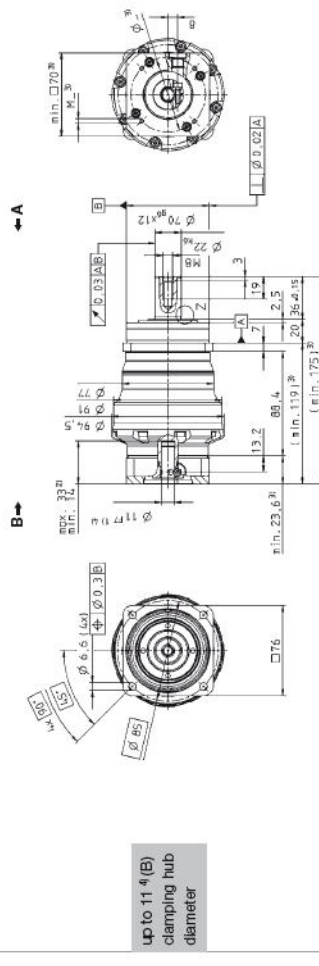


- Non-clerical dimensions ± 1 mm
- 1) Check motor shaft fit.
 - 2) Min./Max. permissible motor shaft length.
 - 3) The dimensions depend on the motor.
 - 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
 - 5) Tolerance H9 for mounted shaft.

▲ Motor mounting according to operating manual

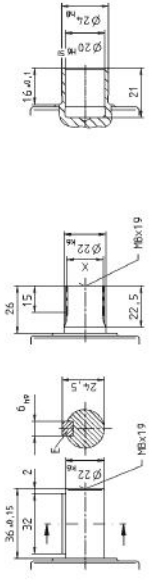
Ratio 4	i	2-stage												
		16	20	25	28	35	40	50	70	100				
Dynamic optimized acceleration torque (please contact us regarding the design)	T_{dyn}	Nm in.lb	142 1254	142 1254	160 1416	142 1254	142 1254	142 1254	142 1254	160 1416	135 1195	160 1416	142 1254	100 883
Max. acceleration torque (max. 100 cycle per hour)	T_{acc}	Nm in.lb	974 864	974 864	974 864	974 864	974 864	974 864	974 864	974 864	974 864	974 864	974 864	90 797
Nominal output torque (with n_N)	T_N	Nm in.lb	75 664	75 664	75 664	75 664	75 664	75 664	75 664	75 664	75 664	75 664	75 664	52 460
Emergency stop torque (permitted time during the service life of the gearbox (with T_N and 20°C ambient temperature) ⁴)	T_{stop}	Nm in.lb	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	200 1770
Nominal input speed (with T_N and 20°C ambient temperature) ⁴	n_N	rpm	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500	4500
Max. input speed	n_{lim}	rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_N , 2000 rpm and 20°C gearbox temperature) ⁴	T_{noL}	Nm in.lb	0.8 4.4	0.6 3.5	0.6 3.5	0.5 2.7	0.4 2.7	0.4 2.7	0.4 2.7	0.4 2.7	0.4 2.7	0.3 1.8	0.3 1.8	0.2 1.8
Max. torsional backlash	J_t	arcmin	Standard ≤ 6 / Reduced ≤ 4											
Torsional rigidity	C_{tr}	$\frac{Nm}{mm}$ $\frac{in\ lb}{in}$	10 80											
Max. axial force ⁴⁾	$F_{ax,lim}$	N lb	3950 754											
Max. radial force ⁴⁾	$F_{ra,lim}$	N lb	4200 945											
Max. tilting moment	$M_{til,lim}$	Nm in.lb	236 2069											
Efficiency at full load	η	%	94											
Service life (for calculation, see the Chapter "Information")	L_h	h	> 20000											
Weight incl. standard adapter plate	m	kg lb	3.6 8.0											
Operating noise (with 2000 and 2000 rpm no load)	L_{pK}	dB(A)	≤ 59											
Max. permitted housing temperature		°C	+80											
Ambient temperature		°C	0 to +40											
Lubrication			32 to 104											
Paint			Lubricated for life											
Direction of rotation			Blue RAL 5002											
Protection class			Motor and gearbox same direction											
Moment of inertia (please contact us)	B 11 C 14 E 10	J_1 J_2 J_3	kgcm ² in.lbf.in ²	0.16 0.14 0.23	0.13 0.11 0.20	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.089 0.079 0.16
Reduced mass moments of inertia available on request.				0.16 0.14 0.23	0.13 0.11 0.20	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.10 0.09 0.18	0.089 0.079 0.16

* Other ratios available on request
 1) For higher ambient temperatures, please reduce input speed
 2) Valid for clamping hub diameter of 14 mm
 3) Refer to centre of the output shaft or flange



Alternatives: Output shaft variants

Keywayed output shaft in mm
 E - key per DIN 6885, sheet 1, 80MA
 Shaft mounted
 Mounted ISO 9500/2000



- Non-olerated dimensions ± 1 mm
- 1) Check motor shaft fit.
 - 2) Min./Max. permissible motor shaft length.
 - 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) Tolerance H9 for mounted shaft.
- ▲ Motor mounting according to operating manual

		1-stage						
Ratio ^{a)}	<i>i</i>	3	4	5	7	10		
Cymex® optimized acceleration torque (please contact us regarding the design)	<i>T_{25rpm}</i>	-	370	400	330	260		
		-	3275	3540	2821	2301		
Max. acceleration torque (max. 100 cycles per hour)	<i>T₂₅</i>	235	315	315	315	235		
		2060	2788	2788	2788	2060		
Nominal output torque (with <i>n_N</i>)	<i>T_N</i>	120	170	170	120	1082		
		1062	1563	1549	1062	1082		
Emergency stop torque (permitted two times during the service life of the gearhead)	<i>T_N</i>	500	625	625	500	500		
		4425	5631	5631	4425	4425		
Nominal input speed	<i>n_N</i>	2500 rpm						
Max. input speed	<i>n_{Max}</i>	4500 rpm						
		9.5	2.7	2.4	1.6	1.4		
Mean no load running torque (with <i>n_N</i> , 1000 rpm and 20°C gearhead temperature) ^{b)}	<i>T₂₅</i>	31.0	23.9	21.2	14.2	12.4		
		Standard ≤ 3 / Reduced ≤ 1						
Max. torsional backlash	<i>J_t</i>	arcmin						
		in. mm						
Torsional rigidity	<i>C₂₅</i>	31						
		274						
Max. axial force ^{d)}	<i>F_{25Max}</i>	5650						
		1271						
Max. radial force ^{d)}	<i>F_{25RMax}</i>	6800						
		1465						
Max. tilting moment	<i>M_{25Max}</i>	487						
		4310						
Efficiency at full load	<i>η</i>	97						
		> 20000						
Service life (For calculation, see the Chapter "Information")	<i>L_h</i>	h						
		7.7						
Weight incl. standard adapter plate	<i>m</i>	kg						
		17.0						
Operating noise (with <i>n_N</i> and <i>n₂₅</i> = 3000 rpm no load)	<i>L_{PK}</i>	dB(A)						
		± 64						
Max. permitted housing temperature	<i>F</i>	°C						
		+80						
Ambient temperature	<i>F</i>	°C						
		0 to +40						
Lubrication	<i>F</i>	°C						
		82 to 104						
Paint		Lubricated for life						
		Blue PAL 5002						
Direction of rotation		Motor and gearhead same direction						
		IP 65						
Protection class		IP 65						
		Motor and gearhead same direction						
Moment of inertia (please contact us) <small>Clamping hub diameter (mm)</small>	E 19	<i>J₁</i>	3.29	2.35	1.92	1.60	1.38	
	G 24	<i>J₁</i>	2.91	2.06	1.70	1.42	1.22	
		<i>J₂</i>	3.69	3.04	2.61	2.29	2.07	
	H 28	<i>J₁</i>	3.53	2.69	2.31	1.83	1.68	
		<i>J₂</i>	3.01	2.53	2.17	1.69	1.68	
K 38	<i>J₁</i>	2.66	2.24	1.82	1.67	1.48		
	<i>J₂</i>	11.1	10.1	9.08	9.36	9.14		
	<i>J₃</i>	9.76	8.95	8.57	8.28	8.09		

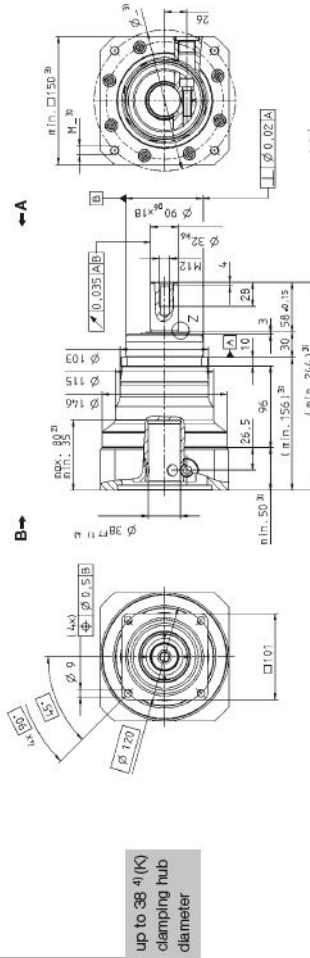
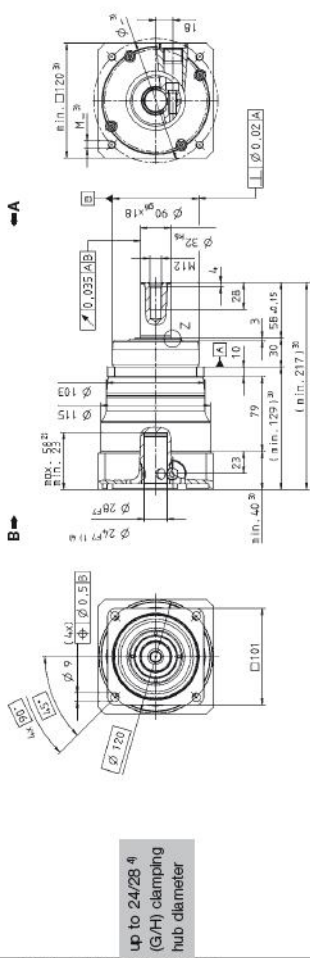
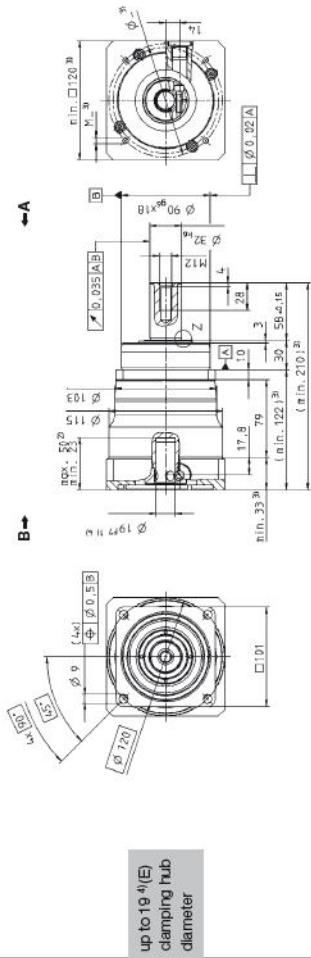
Reduced mass moments of inertia available on request.

^{a)} Other ratios available on request

^{b)} For higher ambient temperatures, please reduce input at speed

^{c)} Valid for clamping hub diameter of 24 mm

^{d)} Refers to centre of the output shaft or flange



Alternatives: Output shaft variants

Keyway output shaft in mm

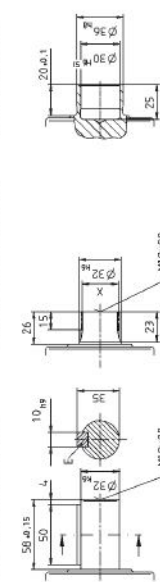
E = key per DIN 6885, sheet 1, form A

Involute gearing DIN 5480 in mm

X = W 2 x 1.25 x 20 x 24 x 27, DIN 5480

Shaft mounted

Mounted in housing



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 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) Tolerance H9 for mounted shaft.

Motor mounting according to operating manual

Ratio 4	i	2-stage										
		16	20	25	28	35	40	50	70	100		
Cymex® optimized acceleration torque (please contact us regarding the design)	$T_{2,95\%}$	370	370	400	370	400	370	400	370	400	330	280
		3275	3275	3540	3275	3540	3275	3540	3275	3540	2821	2301
Max. acceleration torque (max. 100 cycle per sec)	$T_{2,5}$	315	315	315	315	315	315	315	315	315	315	235
		2788	2788	2788	2788	2788	2788	2788	2788	2788	2788	2080
Nominal output torque (with $n_{2,1}$)	$T_{2,N}$	180	180	175	180	175	180	175	180	175	170	120
		1583	1583	1549	1583	1549	1583	1549	1583	1549	1505	1082
Emergency stop torque (permissible time during the service life of the gearbox)	$T_{2,EM}$	625	625	625	625	625	625	625	625	625	625	500
		5531	5531	5531	5531	5531	5531	5531	5531	5531	5531	4425
Nominal input speed (with $T_{2,N}$ and 20°C ambient temperature) ⁴⁾	$n_{2,N}$	3100	3100	3100	3100	3100	3100	3100	3100	3500	4200	4200
Max. input speed	$n_{2,Max}$	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
		1.5	1.2	1.1	0.9	0.8	0.7	0.6	0.6	0.5	0.5	0.5
Mean no load running torque (with $n_{2,N}$, 2000 rpm and 20°C gearbox temperature) ⁴⁾	$T_{2,0}$	13.3	10.6	9.7	8.6	7.1	6.2	5.3	4.4	4.4	4.4	4.4
Max. torsional backlash	J_1	Standard ≤ 5 / Reduced ≤ 3										
Torsional rigidity	C_{21}	31										
		274										
Max. axial force ⁴⁾	$F_{2,Max}$	5650										
		1271										
Max. radial force ⁴⁾	$F_{2,Max}$	6800										
		1485										
Max. tilting moment	$M_{2,Max}$	487										
		4310										
Efficiency at full load	η	94										
		> 20000										
Service life (For calculation, see the Chapter "Information")	L_h	7.9										
		17.5										
Weight incl. standard adapter plate	m	≤ 60										
		+80										
Operating noise (with 100 and 2000 rpm no load)	L_{pA}	194										
		0.10-40										
Max. permitted housing temperature	F	32 to 104										
		Lubricated for life										
Ambient temperature	F	Blue DAL 5002										
Lubrication		Motor and gearbox same direction										
Paint		IP 65										
Direction of rotation		IP 65										
		Motor and gearbox same direction										
		IP 65										
Protection class		IP 65										
		Motor and gearbox same direction										
		IP 65										
Moment of inertia (please contact us)	C 14	J_1	0.64	0.54	0.52	0.43	0.43	0.38	0.38	0.37	0.37	0.37
	E 10	J_1	0.57	0.47	0.46	0.36	0.36	0.34	0.33	0.33	0.33	0.33
	G 24	J_1	0.81	0.70	0.69	0.60	0.59	0.55	0.54	0.54	0.54	0.54
Clamping hub diameter (mm)		J_1	0.72	0.62	0.61	0.53	0.52	0.48	0.48	0.48	0.48	0.47
		J_1	2.18	2.07	2.05	1.97	1.96	1.82	1.82	1.82	1.82	1.82
		J_1	1.83	1.83	1.82	1.74	1.74	1.70	1.69	1.69	1.69	1.69

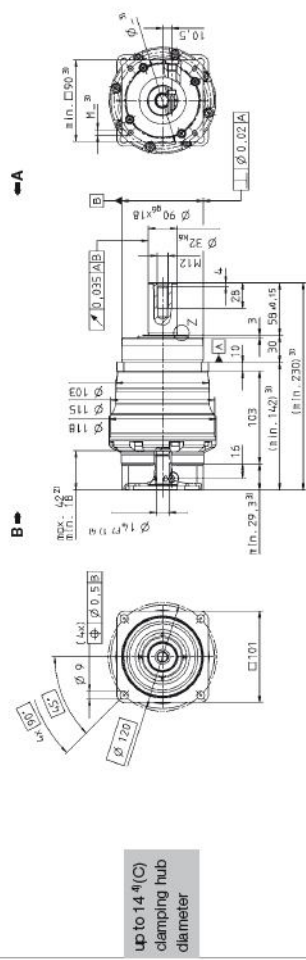
Reduced mass moments of inertia available on request.

* Other ratios available on request

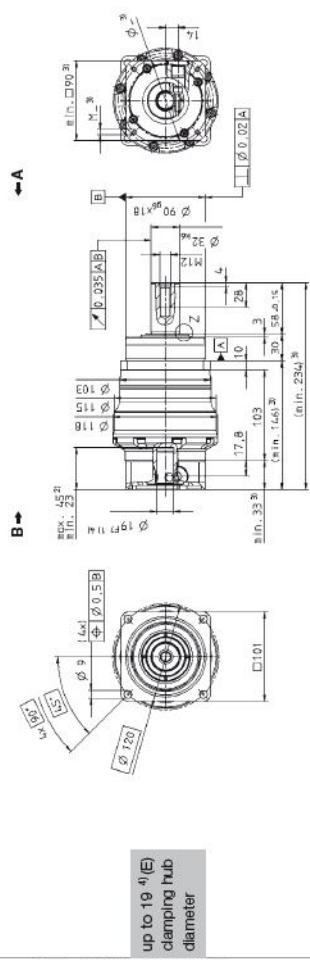
¹⁾ For higher ambient temperatures, please reduce input speed

²⁾ Valid for clamping hub diameter of 19 mm

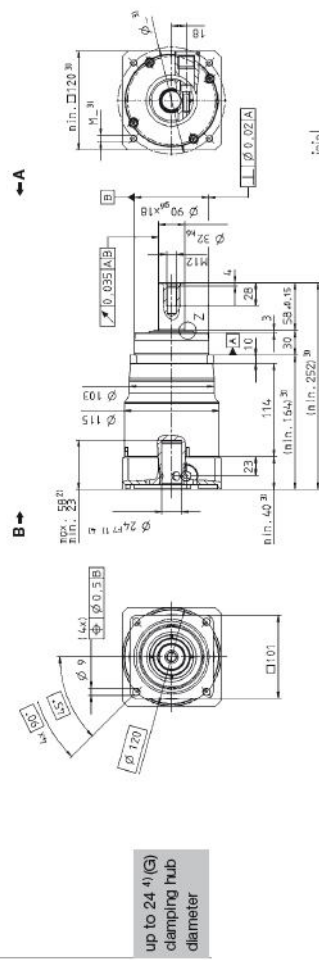
³⁾ Relate to centre of the output shaft or flange



up to 14 ⁴⁾(C)
clamping hub
diameter



up to 19 ⁴⁾(E)
clamping hub
diameter

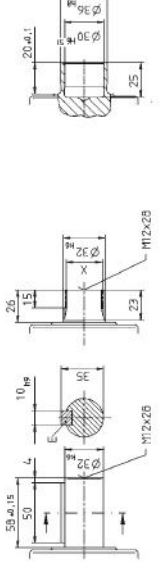


up to 24 ⁴⁾(G)
clamping hub
diameter

Alternatives: Output shaft variants

Keywayed output shaft in mm
E - key per DIN 6885, sheet 1, form A

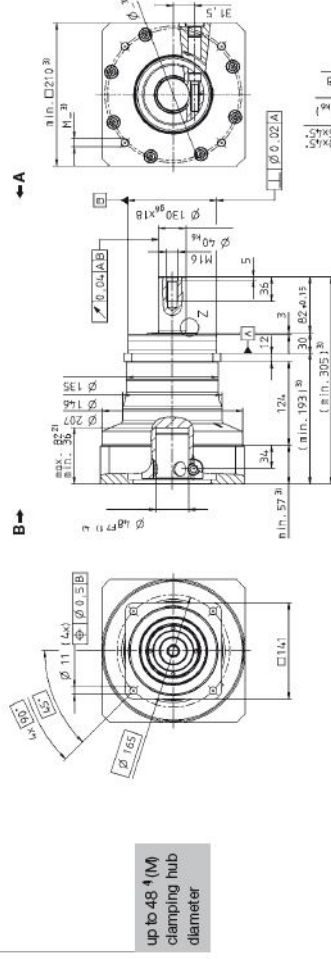
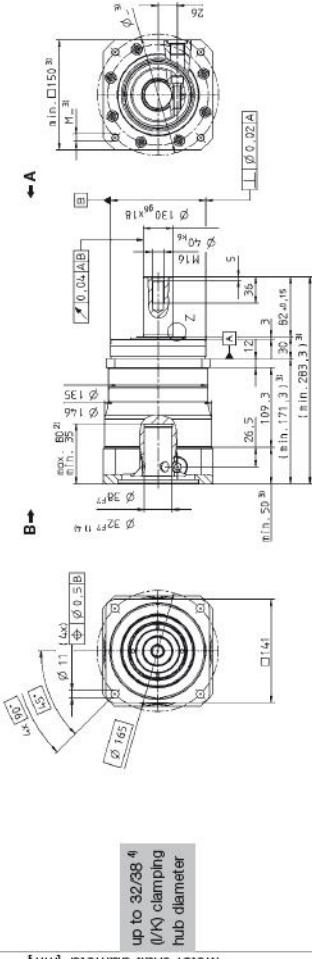
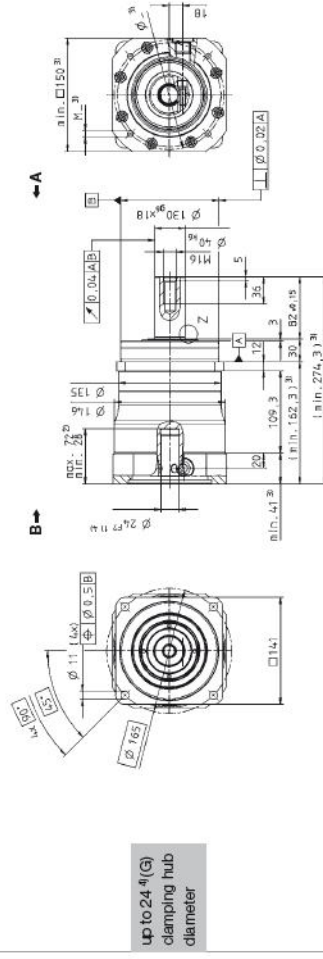
Shaft mounted
Mounted via ISO 14726



- Non-olerated dimensions ± 1 mm
- 1) Check motor shaft fit.
 - 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
 - 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) Tolerance H9 for mounted shaft.
- ▲ Motor mounting according to operating manual

Ratio ^{a)}	1-stage																																
	3	4	5	7	10	i	Nm in.lb	T _{25rpm} in.lb	T ₁₀ in.lb	T ₂₀ in.lb	T ₅₀ in.lb	n _N rpm	r _N rpm	T ₅₂ Nm in.lb	J _t	C ₂₀	F _{r,Max}	F _{s,Max}	M _{s,Max}	η	L _s	m	L _{PK}	Max. permitted housing temperature	Ambient temperature	Lubrication	Paint	Direction of rotation	Protection class				
3	4	5	7	10																													
Standard ≤ 3 / Reduced ≤ 1																																	
<p>Dynamic performance</p> <p>Symmetrical optimized acceleration torque (please contact us regarding the design)</p> <p>Max. acceleration torque (max. 100 cycles per hour)</p> <p>Nominal output torque (with n₂)</p> <p>Emergency stop torque (permitted time times during the service life of the gearhead (with T₅₀ and 20°C ambient temperature) ^{h)}</p> <p>Nominal input speed</p>													50	460	9670	2221	9900	2228	962	8425	97	> 20000	17.2	38.0	± 05	+40	194	0 to +10	32 to 104	Lubricated for life	BlueRAL 5002	Motor and gearhead same direction	IP 65
<p>Static performance</p> <p>Max. input speed</p> <p>Mean no load running torque (with n₁ = 3000 rpm and 20°C gearhead temperature) ^{h)}</p> <p>Max. torsional backlash</p> <p>Torsional rigidity</p> <p>Max. axial force ⁱ⁾</p> <p>Max. radial force ⁱ⁾</p> <p>Max. tilting moment</p> <p>Efficiency at full load</p> <p>Service life (For calculation, see the Chapter "Information")</p> <p>Weight incl. standard adapter plate</p> <p>Operating noise (with n=10 and n₂=3000 rpm no load)</p>													85	469	9670	2221	9900	2228	962	8425	97	> 20000	17.2	38.0	± 05	+40	194	0 to +10	32 to 104	Lubricated for life	BlueRAL 5002	Motor and gearhead same direction	IP 65
<p>Thermal performance</p> <p>Max. permitted housing temperature</p> <p>Ambient temperature</p>													85	469	9670	2221	9900	2228	962	8425	97	> 20000	17.2	38.0	± 05	+40	194	0 to +10	32 to 104	Lubricated for life	BlueRAL 5002	Motor and gearhead same direction	IP 65
<p>Mechanical performance</p> <p>Moment of inertia (please contact us)</p> <p>Clamping hub diameter (mm)</p>													85	469	9670	2221	9900	2228	962	8425	97	> 20000	17.2	38.0	± 05	+40	194	0 to +10	32 to 104	Lubricated for life	BlueRAL 5002	Motor and gearhead same direction	IP 65

^{a)} Other ratios available on request
^{b)} For higher ambient temperatures, please reduce input at speed
^{c)} Valid for clamping hub diameter of 98 mm
^{d)} Refers to center of the output shaft or flange

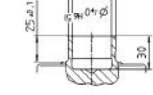
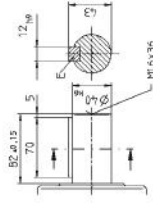


Alternatives: Output shaft variants

Keyway output shaft in mm
 E = key per DIN 6885, sheet 1, form A

Involute gearing DIN 5480 in mm
 x = W 40 x 2 x 30 x 18 mm, DIN 6540

Shaft mounted
 M6 x 0.5 ISO 2900

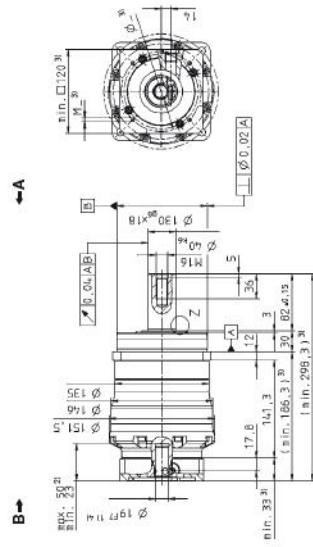


- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
- 5) Tolerance H9 for mounted shaft.

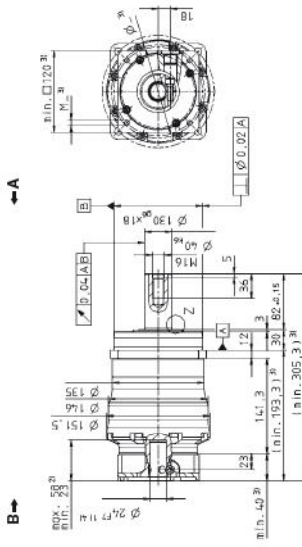
▲ Motor mounting according to operating manual

Ratio 4	i	2-stage												
		16	20	25	28	35	40	50	70	100				
Cyclic ¹⁾ optimized acceleration torque (please contact us regarding the design)	$T_{250\text{rpm}}$	Nm	710	755	710	755	710	755	710	755	680	680	680	680
		in.lb	6264	6264	6264	6264	6264	6264	6264	6264	6018	6018	6018	6018
Max. acceleration torque (max. 100 cycles per hour)	T_{25}	Nm	660	660	660	660	660	660	660	660	600	600	600	600
		in.lb	5841	5841	5841	5841	5841	5841	5841	5841	5341	5341	5341	5341
Nominal output torque (with n_{25})	T_{25}	Nm	360	360	360	360	360	360	360	360	360	360	360	360
		in.lb	3186	3186	3186	3186	3186	3186	3186	3186	3186	3186	3186	3186
Emergency stop torque (permitted time during the service life of the gearbox)	T_{25}	Nm	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250	1250
		in.lb	11083	11083	11083	11083	11083	11083	11083	11083	11083	11083	11083	11083
Nominal input speed	n_{25}	rpm	2900	2900	2900	2900	2900	2900	2900	2900	3200	3200	3200	3200
		rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000
Mean no load running torque (with $n_1 = 2000$ rpm and 20°C gearbox temperature) ²⁾	T_{25}	Nm	3.3	2.7	2.4	1.9	1.8	1.4	1.3	1.2	1.2	1.2	1.1	1.1
		in.lb	29.2	23.9	21.2	16.9	15.9	12.4	11.5	10.6	10.6	10.6	9.7	9.7
Max. torsional backlash	J_1	arcmin	Standard ≤ 5 / Reduced ≤ 3											
	C_{25}	mm	50											
Torsional rigidity	C_{25}	$\frac{\text{Nm}}{\text{mm}}$	469											
	F_{25}	N	9670											
Max. axial force ³⁾	F_{25}	lb	2221											
	F_{25}	N	9900											
Max. radial force ⁴⁾	F_{25}	lb	2228											
	F_{25}	N	992											
Max. tilting moment	M_{25}	Nm	8425											
		in.lb	94											
Efficiency at full load	η	%	> 20000											
	L_5	h	17											
Service life (For calculation, see the Chapter "Information")	m	kg	37.6											
	L_{PK}	dB(A)	≤ 63											
Operating noise (with 1000 and 2000 rpm no load)		°C	+80											
		°C	0 to +40											
Max. permitted housing temperature		°C	32 to 104											
			Lubricated for life											
Ambient temperature			Blue RAL 5002											
			Motor and gearbox same direction											
Lubrication			IP 65											
			Motor mounting according to operating manual											
Paint			Shaft mounted											
			Involute gearing DIN 5480 in mm											
Direction of rotation			Keywayed output shaft in mm											
			E = key per DIN 6885, sheet 1, form A											
Protection class			Shaft mounted											
			Non-keyed output shaft in mm											
Moment of inertia (please contact us)	E 19	J_1	kgcm ²	2.50	2.01	1.97	1.65	1.63	1.40	1.39	1.38	1.38	1.38	1.38
	G 24	J_1	kgcm ²	2.21	1.78	1.75	1.46	1.44	1.24	1.23	1.22	1.22	1.22	1.22
Clamping hub diameter (mm)	K 38	J_1	kgcm ²	3.19	2.71	2.67	2.34	2.32	2.10	2.08	2.06	2.06	2.07	2.07
		J_1	kgcm ²	2.82	2.40	2.36	2.07	2.05	1.85	1.85	1.84	1.84	1.83	1.83
Reduced mass moments of inertia available on request.		J_1	kgcm ²	10.3	9.77	9.73	9.41	9.39	9.16	9.15	9.14	9.14	9.14	9.14
		J_1	kgcm ²	9.07	8.65	8.61	8.33	8.31	8.11	8.10	8.09	8.09	8.09	8.09

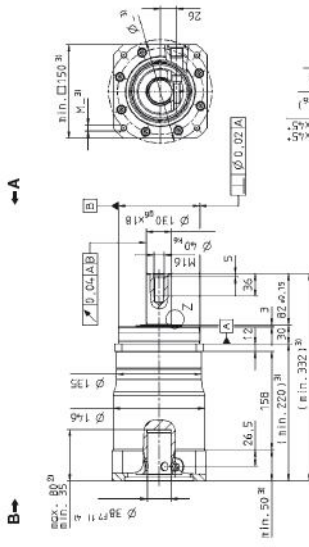
¹⁾ Other ratios available on request
²⁾ For higher ambient temperatures, please reduce input speed
³⁾ Valid for clamping hub diameter of 24 mm
⁴⁾ Refers to center of the output shaft or flange



up to 19⁴⁾(E)
clamping hub
diameter



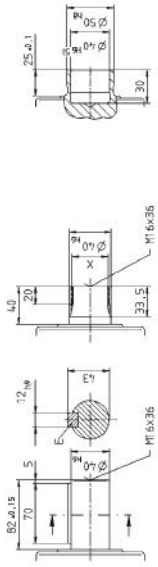
up to 24⁴⁾(G)
clamping hub
diameter



up to 38⁴⁾(K)
clamping hub
diameter

Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
 X = W 40 x 2 x 30 x 18 rpm, DIN 5440



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 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) Tolerance H9 for mounted shaft.

Motor mounting according to operating manual

Ratio ^{a)}	i	1-stage								
		3	4	5	7	10				
Optimized acceleration torque (please contact us regarding the design)	T_{25rpm}		1785	1860	1785	1400				
Max. acceleration torque (max. 100 cycles per hour)	T_{25}	970	1210	1210	15797	15797	12300			
	T_{25}	8585	10709	10709	10709	10709	6585			
Nominal output torque (with n_{25})	T_{25}	530	750	750	750	750	6638			
	T_{25}	4891	6638	6638	6638	6638	6638			
Emergency stop torque (permitted time during the service life of the gearbox (with T_{25} and 20°C ambient temperature) ^{h)})	T_{25}	2200	2750	2750	2750	2750	2200			
	T_{25}	19470	24338	24338	24338	24338	19470			
Nominal input speed	n_{25}	1500	1500	1500	2300	2300	2300			
Max. input speed	$n_{1,max}$	3500	3500	3500	3900	3900	3500			
	T_{25}	14.0	11.0	9.0	6.8	5.0	5.0			
Mean no load running torque (with n_{25} , 3000 rpm and 20°C gearbox temperature) ^{h)}	T_{25}	123.9	97.4	78.7	60.2	44.3	44.3			
	T_{25}									
Max. torsional backlash	J_t	Standard ≤ 3 / Reduced ≤ 1								
Torsional rigidity	C_{25}	175								
	C_{25}	1549								
Max. axial force ^{h)}	$F_{25,max}$	14150								
	$F_{25,max}$	3184								
Max. radial force ^{h)}	$F_{25,max}$	15400								
	$F_{25,max}$	3465								
Max. tilting moment	$M_{25,max}$	1800								
	$M_{25,max}$	14160								
Efficiency at full load	η	97								
	η	> 20000								
Service life (For calculation, see the Chapter "Information")	L_h	34								
	L_h	75.1								
Weight incl. standard adapter plate	m	± 88								
	m	+80								
Operating noise (with n_{25} and r_{25} = 3000 rpm no load)	L_{PK}	194								
	L_{PK}	0 to +10								
Max. permitted housing temperature	T_{PK}	32 to 104								
	T_{PK}	Lubricated for life								
Ambient temperature	T_{amb}	Blue PAL 5002								
Lubrication		Motor and gearbox same direction								
Paint		IP 65								
Direction of rotation		Motor and gearbox same direction								
		IP 65								
Protection class		Motor and gearbox same direction								
		IP 65								
Moment of inertia (please contact us)	J_1	50.8	33.9	27.9	22.2	19.2				
	J_2	45.0	30.0	24.7	19.7	17.0				
Clamping hub diameter (mm)	d_{cl}	58.2	41.2	35.3	29.6	26.5				
	d_{cl}	51.5	38.5	31.2	26.2	23.5				

Reduced mass moments of inertia available on request.

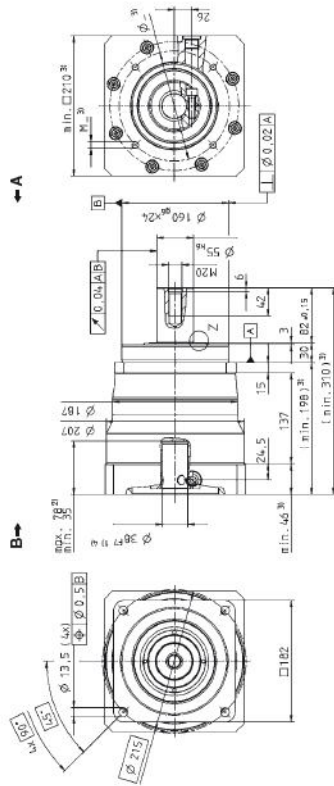
^{a)} Other ratios available on request

^{h)} For higher ambient temperatures, please reduce input speed

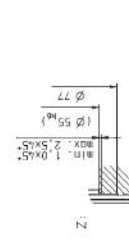
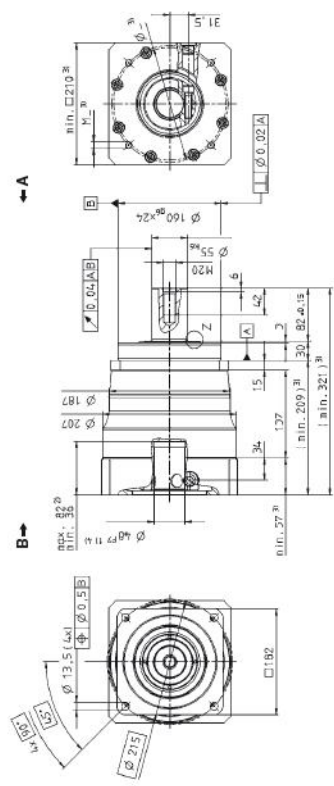
^{g)} Valid for clamping hub diameter of 48 mm

^{h)} Refers to center of the output shaft or flange

up to 38 ^{h)}(K) clamping hub diameter

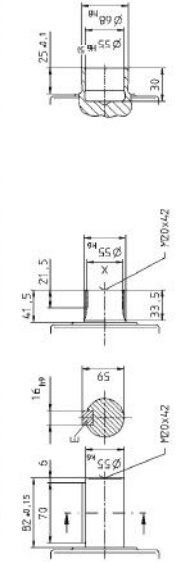


up to 48 ^{h)}(M) clamping hub diameter



Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
 $x = W \cdot 0.5 \times 2.30 \times 20 \times \sin \alpha$, DIN 5440

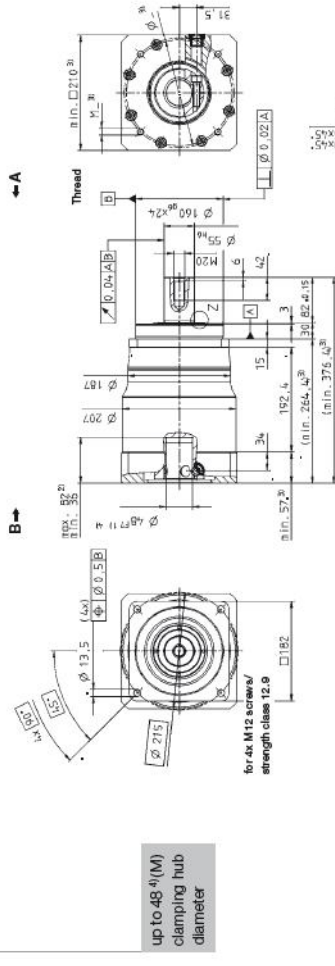
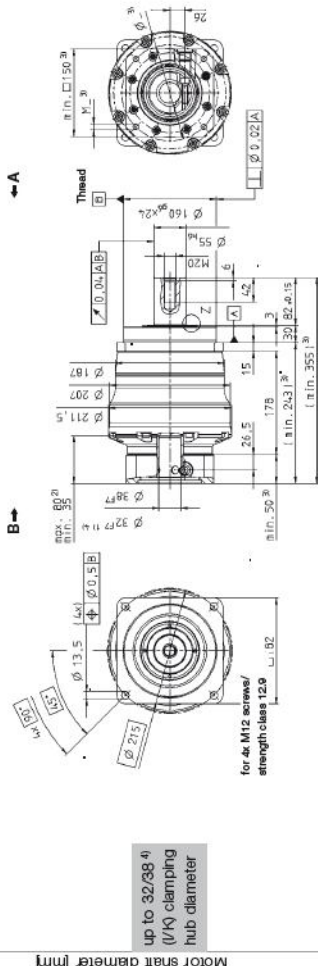
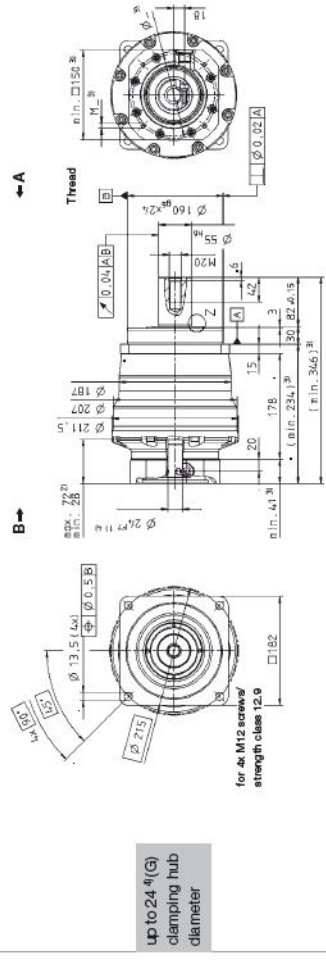


- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
- 5) Tolerance h9 for mounted shaft.

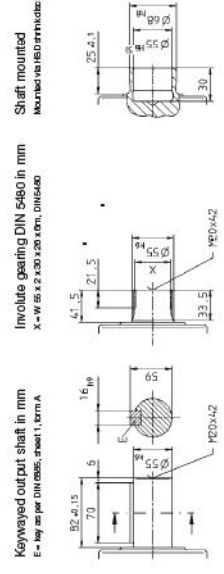
Motor mounting according to operating manual

Ratio 4	i	2-stage																					
		16	20	25	28	35	40	50	70	100													
Cyclic ^{a)} optimized acceleration torque (please contact us regarding the design)	T_{250pm}	Nm in.lb	1785 15797	1785 15797	1800 16227	1785 15797	1860 15797	1785 15797	1860 15797	1785 15797	1800 15797	1785 15797	1800 15797	1785 15797	1800 15797	1785 15797	1800 15797	1785 15797	1800 15797				
	Max. acceleration torque (max. 100 cycles per hour)	T_{100}	Nm in.lb	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709	1210 10709			
Nominal output torque (with n_N)	T_{2N}	Nm in.lb	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838	6638 5838				
	Emergency stop torque (permitted time times during the service life of the gearbox)	T_{2EM}	Nm in.lb	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338	2750 24338			
Nominal input speed (with n_N and 20°C ambient temperature) ^{b)}	n_N	rpm	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700	2700				
Max. input speed	n_{Max}	rpm	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000	4000			
	Mean no load running torque (with n_N , 2000 rpm and 20°C gearbox temperature) ^{c)}	T_{202}	Nm in.lb	5.3 46.9	4.3 38.1	3.9 34.5	3.1 27.4	2.8 24.8	2.3 20.4	2.3 20.4	2.1 18.6	1.9 16.8	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0	1.7 15.0		
Max. torsional backlash	J_1	arcmin in./mm	Standard ≤ 5 / Reduced ≤ 3																				
Torsional rigidity	C_{21}	$\frac{Nm}{mm}$ in./in.	175 1549																				
Max. axial force ^{d)}	F_{2Max}	N lb	14150 3184																				
Max. radial force ^{d)}	F_{2RMax}	N lb	15400 3465																				
Max. tilting moment	M_{2Max}	Nm in.lb	1800 14100																				
Efficiency at full load	η	%	94																				
Service life (For calculation, see the Chapter "Information")	L_h	h	> 20000																				
Weight incl. standard adapter plate	m	kg lb	36.4 80.4																				
Operating noise (with 100 mm and 2000 rpm no load)	L_{pA}	dB(A)	≤ 68																				
Max. permitted housing temperature	F	°C	+80																				
Ambient temperature	F	°C	0 to +40 32 to 104																				
Lubrication			Lubricated for life																				
Paint			Blue RAL 5002																				
Direction of rotation			Motor and gearbox same direction																				
Protection class			IP 65																				
Moment of inertia (please contact us)	G	24	J_1	kgcm ² in. ² oz ²	9.27	7.72	7.48	6.32	5.51	5.45	5.39	5.36	5.36	5.36	5.36	5.36	5.36	5.36	5.36	5.36			
				kgcm ² in. ² oz ²	8.20	6.83	6.62	5.59	4.88	4.82	4.77	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	4.74	
				kgcm ² in. ² oz ²	12.4	10.9	10.6	9.48	8.36	8.07	8.05	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02
				kgcm ² in. ² oz ²	11.0	9.63	9.42	8.39	7.27	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07	7.07
Clamping hub diameter (mm)	K	38	J_1	kgcm ² in. ² oz ²	13.5	12.0	11.7	10.6	10.4	9.74	9.68	9.63	9.60	9.60	9.60	9.60	9.60	9.60	9.60	9.60			
				kgcm ² in. ² oz ²	12.0	10.6	10.4	9.34	8.22	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02	8.02		
				kgcm ² in. ² oz ²	28.1	26.6	26.3	25.2	24.4	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	24.3	
				kgcm ² in. ² oz ²	24.9	23.5	23.3	22.3	22.2	21.6	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	21.5	

Reduced mass moments of inertia available on request.
^{a)} Other ratios available on request.
^{b)} For higher ambient temperatures, please reduce input speed.
^{c)} Valid for clamping hub diameter of 38 mm.
^{d)} Refers to center of the output shaft or flange.



Alternatives: Output shaft variants

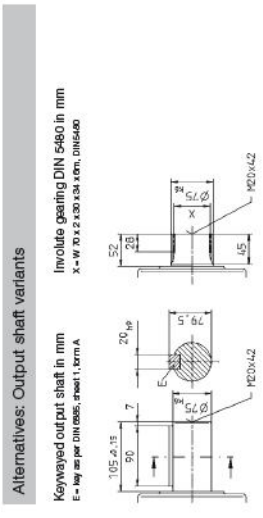
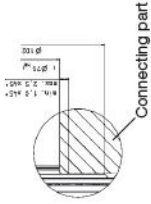
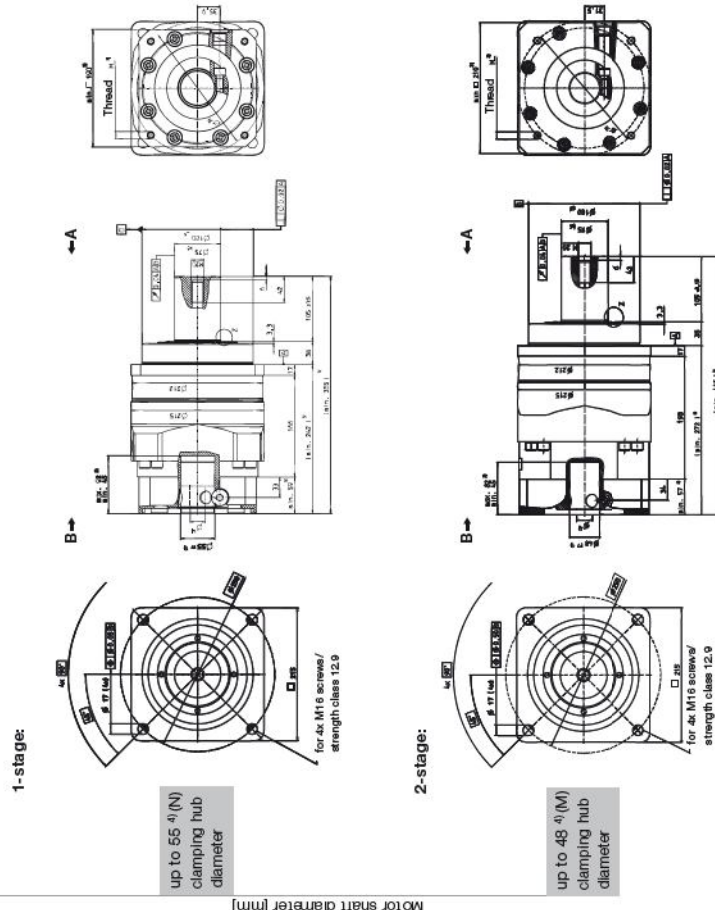


Non-olerated dimensions ± 1 mm
 1) Check motor shaft fit.
 2) Min./Max. permissible motor shaft length.
 3) The dimensions depend on the motor.
 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
 5) Tolerance fit for mounted shaft.

Motor mounting according to operating manual

Ratio 4	1-stage							2-stage							
	3	4	5	7	10	16	20	25	28	35	40	50	70	100	
Cymek®-optimized acceleration torque (please contact us regarding the design)	- Please contact us -														
	T_{acc} Nm in lb	1600	2500	2500	2400	1900	2400	2500	2500	2400	2400	2400	2400	2400	1800
Max. acceleration torque (max. 100 cycles per hour)	- Please contact us -														
	T_{st} in lb	14160	22125	22125	21240	16815	21240	22125	22125	21240	21240	21240	21240	21240	16815
Nominal output torque (with n_{21})	- Please contact us -														
	T_M in lb	9725	13275	13275	12300	8660	13275	13275	13275	13275	13275	13275	13275	13275	8660
Emergency stop torque (permitted time during the service life of the gearbox (with T_M and 20°C ambient temperature) ^h)	- Please contact us -														
	T_{stop} in lb	5000	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5200	5000
Nominal input speed (with T_M and 20°C ambient temperature) ^h	- Please contact us -														
	n_M rpm	1200	1200	1500	1700	2000	2500	2500	2500	2500	2500	2500	2500	2500	3000
Max. input speed	- Please contact us -														
	n_{Max} rpm	2500	2500	2500	2500	3500	3500	3500	3500	3500	3500	3500	3500	3500	3500
Mean no load running torque (with $n_1 = 2000$ rpm and 20°C gearbox temperature)	- Please contact us -														
	T_{int} Nm in lb	32	17	11	7.0	7.0	6.0	5.5	4.5	4.0	3.5	3.5	3.5	3.5	3.0
Max. torsional backlash	Standard ≤ 3 / Reduced ≤ 3														
	J_t arcmin	Standard ≤ 3 / Reduced ≤ 3													
Torsional rigidity	Standard ≤ 5 / Reduced ≤ 3														
	C_{DT} N/m/mm	400	3540	3540	3540	3540	3540	3540	3540	3540	3540	3540	3540	3540	3540
Max. axial force ^{a)}	Standard ≤ 5 / Reduced ≤ 3														
	F_{axMax} N lb	30000	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750	6750
Max. radial force ^{a)}	Standard ≤ 5 / Reduced ≤ 3														
	F_{radMax} N lb	21000	4725	4725	4725	4725	4725	4725	4725	4725	4725	4725	4725	4725	4725
Max. tilting moment	Standard ≤ 5 / Reduced ≤ 3														
	$M_{tiltMax}$ in lb	27485	2744	2744	2744	2744	2744	2744	2744	2744	2744	2744	2744	2744	2744
Efficiency at full load	Standard ≤ 5 / Reduced ≤ 3														
	η %	97	94	94	94	94	94	94	94	94	94	94	94	94	94
Service life (For calculation, see the Chapter "Information")	Standard ≤ 5 / Reduced ≤ 3														
	L_s h	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000	> 20000
Weight incl. standard adapter plate	Standard ≤ 5 / Reduced ≤ 3														
	m kg lb	56	124	124	124	124	124	124	124	124	124	124	124	124	
Operating noise (with $n=10$ and $r_1 = 2000$ rpm no load)	Standard ≤ 5 / Reduced ≤ 3														
	L_{RM} dB(A)	≤ 64													
Max. permitted housing temperature	Standard ≤ 5 / Reduced ≤ 3														
	T_C °C	+80													
Ambient temperature	Standard ≤ 5 / Reduced ≤ 3														
	T_C °C	0 to +40													
Lubrication	Standard ≤ 5 / Reduced ≤ 3														
	T_C °C	32 to 104													
Paint	Standard ≤ 5 / Reduced ≤ 3														
	Color	Blue RAL 5002													
Direction of rotation	Standard ≤ 5 / Reduced ≤ 3														
	Direction	Motor and gearhead same direction													
Protection class	Standard ≤ 5 / Reduced ≤ 3														
	IP	IP 65													
Moment of inertia (plus extra drive)	Standard ≤ 5 / Reduced ≤ 3														
	J kgcm ² in lb-in ²	M 48	34.5	31.5	30.8	30.0	29.7	28.5	28.3	28.1	28.0	28.0	28.0	28.0	28.0
Changing hub diameter (mm)	Standard ≤ 5 / Reduced ≤ 3														
	J_1 kgcm ² in lb-in ²	N 55	130.0	94.3	76.9	61.5	53.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1	45.1

Reduced mass moments of inertia available on request.
^{a)} Other ratios available on request.
^{h)} For higher ambient temperatures, please reduce input speed.
^{e)} Refers to center of the output shaft or flange.



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

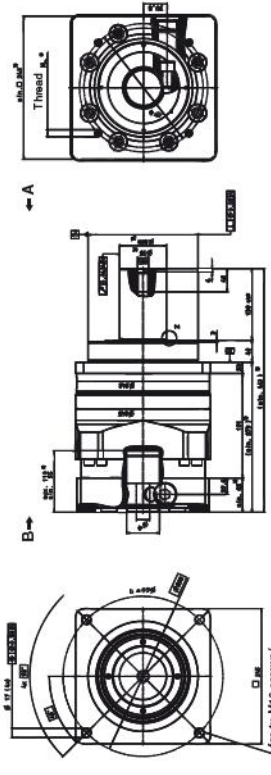
Motor mounting according to operating manual

Ratio 4	1-stage					2-stage								
	3	4	5	7	10	16	20	25	28	35	40	50	70	100
symmetrical optimized acceleration torque (please contact us regarding the design) Max. acceleration torque (max. 100 cycle per hour) Nominal output torque (with n _{0.2}) Emergency stop torque (permissible time during the service life of the gearhead (with T _{st} and zero ambient temperature) ^h) Nominal input speed Max. input speed Mean no load running torque (with n _{0.2} , 2000 rpm and zero gearhead temperature) Max. torsional backlash Torsional rigidity Max. axial force ⁱ⁾ Max. radial force ⁱ⁾ Max. tilting moment Efficiency at full load Service life (For calculation, see the Chapter "Information") Weight incl. standard adapter plate Operating noise (with n=0 and n=2000 rpm no load) Max. permitted housing temperature Ambient temperature Lubrication Paint Direction of rotation Protection class Moment of inertia (please contact us) (Changing hub diameter is not)	<i>i</i>	- Please contact us -												
	<i>T_{acc, sym}</i>	- Please contact us -												
	<i>T_{st}</i>	- Please contact us -												
	<i>T_{nom}</i>	- Please contact us -												
	<i>T_{stop}</i>	- Please contact us -												
	<i>n_{nom}</i>	- Please contact us -												
	<i>n_{max}</i>	- Please contact us -												
	<i>T_{0.2}</i>	- Please contact us -												
	<i>J_t</i>	- Please contact us -												
	<i>C_{DT}</i>	- Please contact us -												
<i>F_{ax, max}</i>	- Please contact us -													
<i>F_{rad, max}</i>	- Please contact us -													
<i>M_{tilt, max}</i>	- Please contact us -													
<i>η</i>	- Please contact us -													
<i>L_s</i>	- Please contact us -													
<i>m</i>	- Please contact us -													
<i>L_{RM}</i>	- Please contact us -													
Max. permitted housing temperature	- Please contact us -													
Ambient temperature	- Please contact us -													
Lubrication	- Please contact us -													
Paint	- Please contact us -													
Direction of rotation	- Please contact us -													
Protection class	- Please contact us -													
Moment of inertia	- Please contact us -													

Standard ≤ 3 / Reduced ≤ 1 | Standard ≤ 5 / Reduced ≤ 3

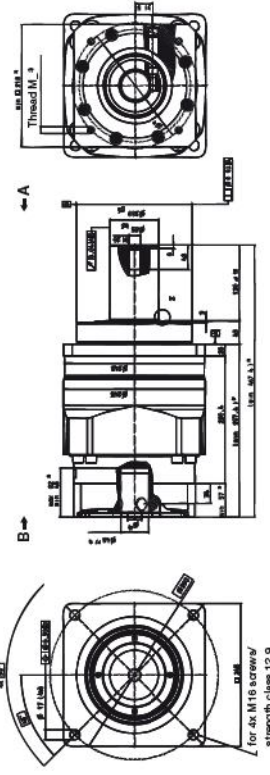
Other ratios available on request
 For higher ambient temperatures, please reduce input speed
 Refers to center of the output shaft or flange

1-stage:



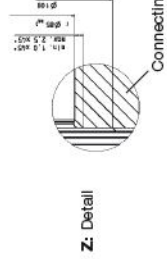
up to 60^{h)} (O) clamping hub diameter

2-stage:



up to 48^{h)} (M) clamping hub diameter

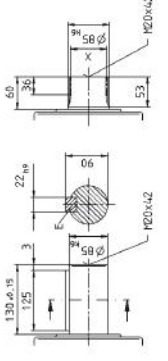
Motor shaft diameter [mm]



Z: Detail

Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
 x = W, 20 x 2 x 30 x 30 mm, DIN 5480



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

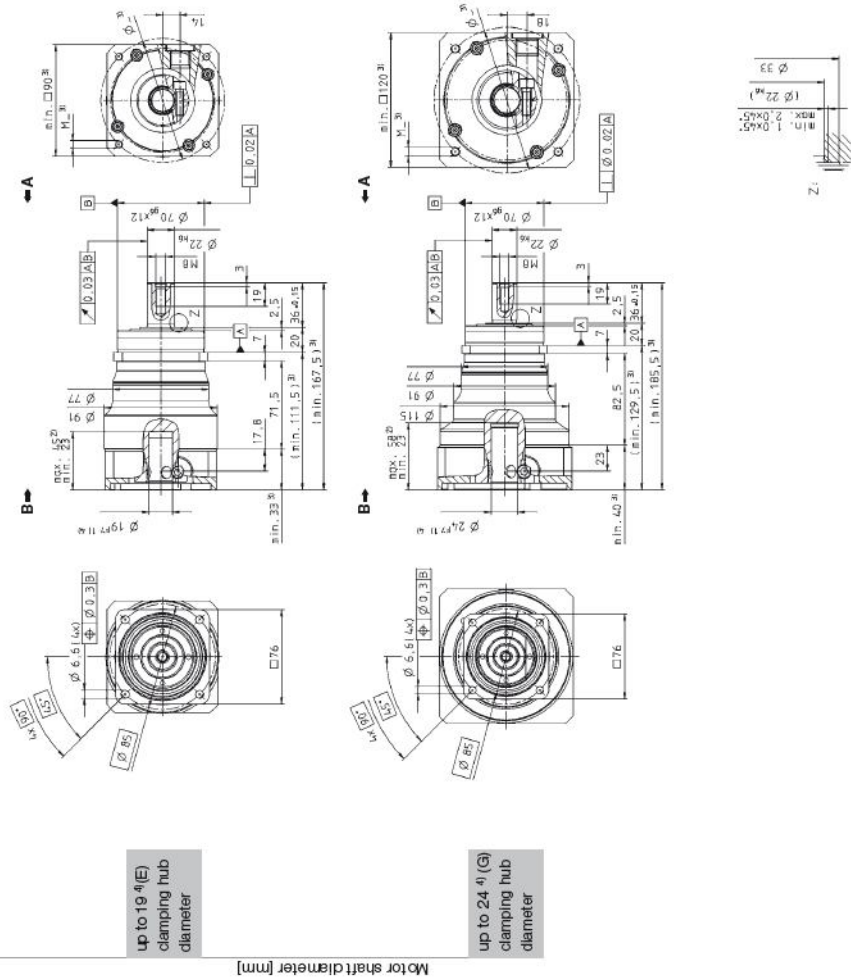
Ratio ^{a)}	i	1-stage					
		3	4	5	7	10	
Max. acceleration torque (max. 100 cycles per hour)	T_{2B} Nm in.lb	68 602	90 797	90 797	90 797	90 797	70 630
Cymax®-optimal nominal torque (please consult us regarding the design)	$T_{N,opt}$ Nm in.lb	-	60 531	60 531	60 531	60 531	35 310
Nominal output torque (with n_{21})	T_{2N} Nm in.lb	28 246	48 425	48 425	48 425	48 425	30 266
Emergency stop torque (permitted two times during the service life of the gearbox (with T_{2N} and 20°C ambient temperature) ^{b)}	T_{2EM} Nm in.lb	200 1770	250 2213	250 2213	250 2213	250 2213	200 1770
Nominal input speed	n_{21} rpm	4500	4500	4500	4500	4500	4500
Max. input speed	$n_{1,max}$ rpm	6000	6000	6000	6000	6000	6000
Mean no load running torque (with n_{21} 3000 rpm and 20°C gearbox temperature) ^{d)}	T_{2Z} Nm in.lb	1.4 12.4	1.1 9.7	0.9 8.0	0.6 5.3	0.5 4.4	0.5 4.4
Max. torsional backlash	J_1 arcmin	Standard ≤ 6 / Reduced ≤ 4					
Torsional rigidity	C_{21} Nm/mm	10					
Max. axial force ^{d)}	$F_{2,ax}$ N lb	3350					
Max. radial force ^{d)}	$F_{2,ra}$ N lb	4200					
Max. tilting moment	$M_{2,max}$ Nm in.lb	236					
Efficiency at full load	η %	99.5					
Service life (For calculation, see the Chapter "Information")	L_h h	> 30000					
Weight incl. standard adapter plate	m kg lb _m	3.9 8.6					
Operating noise (with n_{21} 0 and n_{21} 3000 rpm no load)	L_{PK} dB(A)	± 59					
Max. permitted housing temperature	T_F °C	+80					
Ambient temperature	T_A °C	0 to +40					
Lubrication		82 to 104 Lubricated for life					
Paint		Blue RAL 5002					
Direction of rotation		Motor and gearbox same direction					
Protection class		IP 65					
Moment of inertia (please consult us) <small>Clamping hub diameter (mm)</small>	E 19 J_1 kgcm ²	1.03	0.76	0.68	0.59	0.54	0.54
	G 24 J_1 kgcm ²	0.91	0.69	0.60	0.52	0.48	0.48
Reduced mass moments of inertia available on request.		2.40	2.15	2.05	1.96	1.91	1.91
		2.12	1.90	1.81	1.73	1.69	1.69

^{a)} Other ratios available on request

^{b)} For higher ambient temperatures, please reduce input speed

^{c)} Valid for clamping hub diameter of 19 mm

^{d)} Please to centre of the output shaft or flange



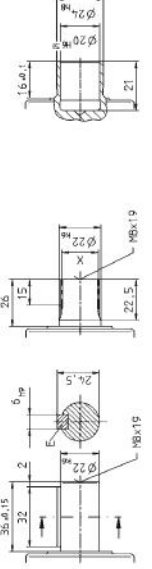
Alternatives: Output shaft variants

Keywayed output shaft in mm
E → key per DIN 6885, sheet 1, 3x1.6x1.6

Shaft mounted
Motor use is not recommended

Involute gearing DIN 5480 in mm

X = W 22 x 1.25 x 30x 10x 0.7, DIN 5480

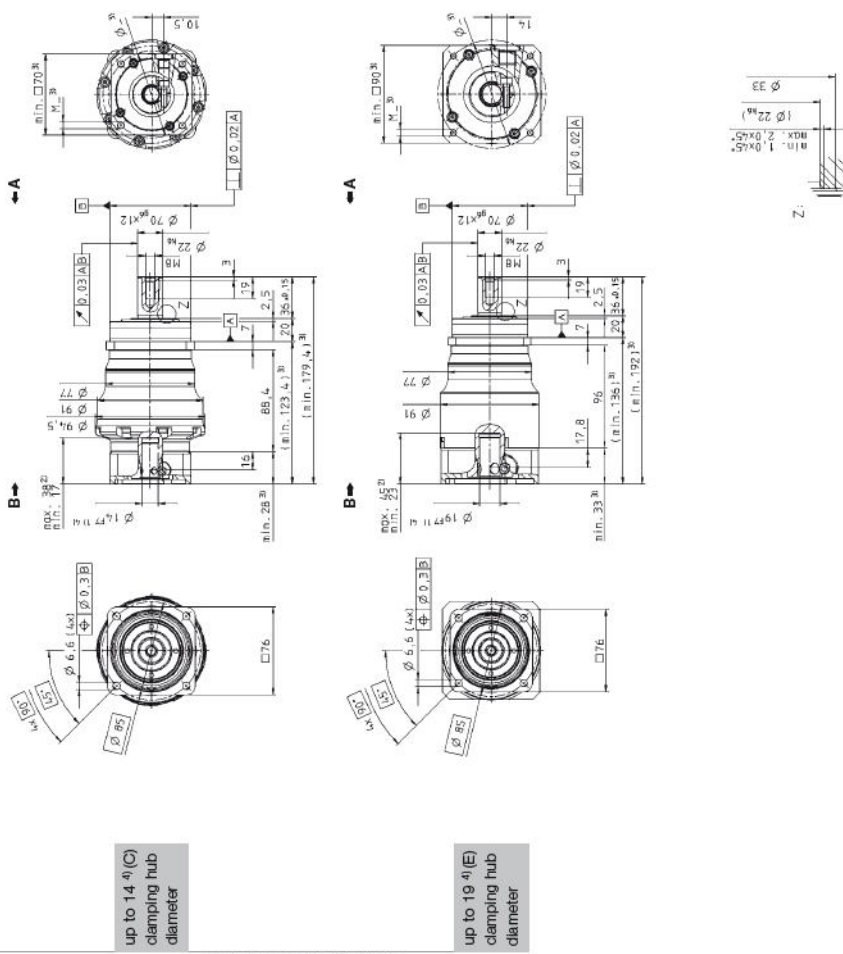


- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
- 5) Tolerance H9 for mounted shaft.

▲ Motor mounting according to operating manual

View A

View B



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 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) Tolerance H9 for mounted shaft.

▲ Motor mounting according to operating manual

up to 14 ⁴⁾(C)
clamping hub
diameter

up to 19 ⁴⁾(E)
clamping hub
diameter

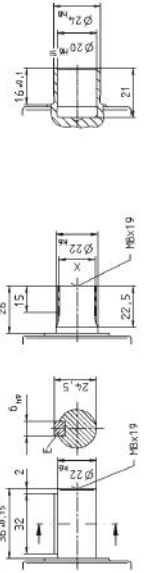
Motor shaft diameter [mm]

Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key per DIN 6885, sheet 1, 8mm A

Involute gearing DIN 5480 in mm
X = W 22 x 1.25 x 30 x 105 cm, DIN 5480

Shaft mounted
NORMUS ISO 80/200



Ratio 4	i	2-stage													
		16	20	25	28	35	40	50	70	100					
Max. acceleration torque (max. 100 cycles per hour)	T_{2B} Nm in.lb	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	90 797	
Cymax®-optimal nominal torque (please consult us regarding the design)	T_{2N} Nm in.lb	-	-	-	-	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	
Nominal output torque (with n_{2N})	T_{2N} Nm in.lb	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	60 531	
Emergency stop torque (permitted two times during the service life of the gearhead)	T_{2E} Nm in.lb	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	250 2213	
Nominal input speed (with T_{2N} and 20°C ambient temperature) ⁴⁾	n_{2N} rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	
Max. input speed	n_{2Max} rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	
Mean no load running torque (with $n_1 = 3000$ rpm and 20°C gearhead temperature) ⁴⁾	T_{20Z} Nm in.lb	0.5 4.4	0.4 3.5	0.4 3.5	0.3 2.7	0.3 2.7	0.2 1.8	0.2 1.8	0.2 1.8	0.2 1.8	0.2 1.8	0.2 1.8	0.2 1.8	0.2 1.8	
Max. torsional backlash	J_1 arcmin	Standard ≤ 8 / Reduced ≤ 6													
Torsional rigidity	C_{2Z} Nm/mm	10 80													
Max. axial force ⁴⁾	F_{2Max} N lb	3950 754													
Max. radial force ⁴⁾	F_{2RMax} N lb	4200 945													
Max. tilting moment	M_{2Max} Nm in.lb	238 2069													
Efficiency at full load	η %	96.5													
Service life (For calculation, see the Chapter "Information")	L_h h	> 30000													
Weight incl. standard adapter plate	m kg lb _m	3.6 8.0													
Operating noise (with n_{2N} and 20°C ambient temperature)	L_{pK} dB(A)	≤ 59													
Max. permitted housing temperature	F °C	+80 0 to +40													
Ambient temperature	F °C	32 to +04													
Lubrication		Lubricated for life													
Paint		Blue RAL 5002													
Direction of rotation		Motor and gearhead same direction													
Protection class		IP 65													
Moment of inertia (please consult us)	C	J_1 kgcm ² inches ²	0.23	0.20	0.20	0.18	0.18	0.18	0.16	0.16	0.16	0.16	0.16	0.16	0.16
	E	J_1 kgcm ² inches ²	0.20	0.16	0.16	0.16	0.16	0.16	0.15	0.15	0.15	0.15	0.14	0.14	0.14
Clamping hub diameter [mm]		J_1 kgcm ² inches ²	0.55	0.53	0.52	0.50	0.50	0.50	0.49	0.49	0.49	0.49	0.49	0.49	0.49

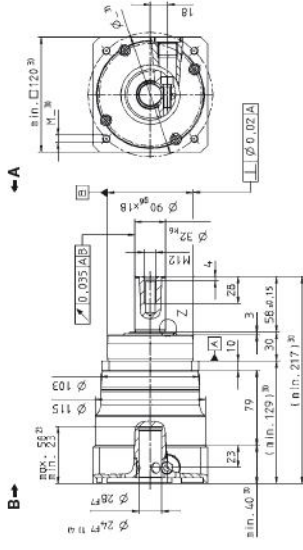
Reduced mass moments of inertia available on request.

⁴⁾ Other ratios available on request

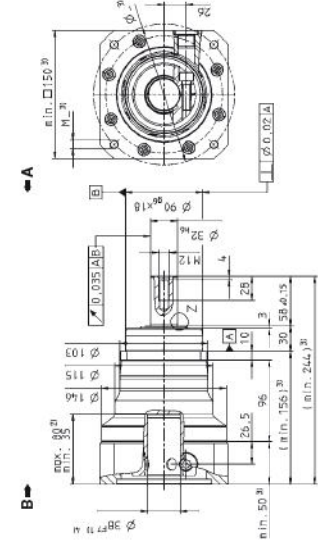
⁴⁾ For higher ambient temperatures, please reduce input speed

⁴⁾ Valid for clamping hub diameter of 14 mm

⁴⁾ Please to centre of the output shaft or flange

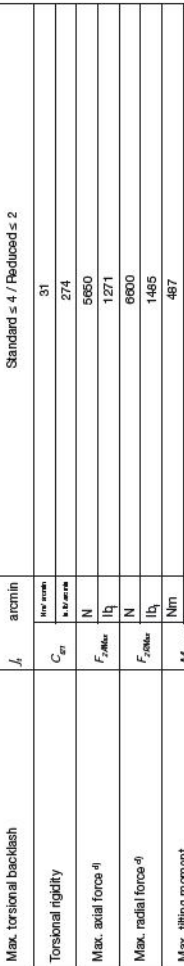


up to 24 ⁴⁾(G) clamping hub diameter



up to 38 ⁴⁾(K) clamping hub diameter

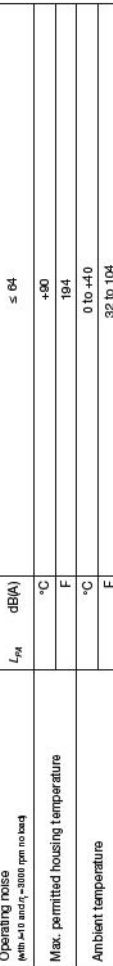
Ratio ^{a)}	1-stage							
	3	4	5	7	10			
Max. acceleration torque (max. 100 cycles per hour)	180 in.lb	240 2124	240 2124	240 2124	180 1583			
Cymax®-optimal nominal torque (please consult engineering department)	95 in.lb	135 1195	135 1195	135 1195	90 787			
Nominal output torque (with n _n)	70 in.lb	105 885	105 885	105 885	80 708			
Emergency stop torque (permitted 100 times during the service life of the gearbox (with T _{st} and 20°C ambient temperature) ^{h)}	500 in.lb	625 5631	625 5631	625 5631	500 4425			
Nominal input speed	3500 rpm	4000	4500	4500	4500			
Max. input speed	6000 rpm	6000	6000	6000	6000			
Mean no load running torque (with n _n = 3000 rpm and 20°C gearbox temperature) ^{h)}	2.4 in.lb	2.1 18.6	1.8 15.9	1.1 9.74	0.8 7.08			
Max. torsional backlash	Standard ≤ 4 / Reduced ≤ 2							
Torsional rigidity	31 in. mm / 2.74							
Max. axial force ⁴⁾	5650 N							
Max. radial force ⁴⁾	1271 lb							
Max. tilting moment	6800 Nm							
Efficiency at full load	487 4310 %							
Service life (For calculation, see the Chapter "Information")	98.5 > 30000 h							
Weight incl. standard adapter plate	7.7 17.0 kg lb _n							
Operating noise (with n=10 and n=3000 rpm no load)	L _{PK} dB(A) ≤ 64							
Max. permitted housing temperature	F +80 °C							
Ambient temperature	F 0 to +40 °C							
Lubrication	F 82 to 104 Lubricated for life							
Paint	Blue PAL 5002							
Direction of rotation	Motor and gearbox same direction							
Protection class	IP 65							
Moment of inertia (please consult engineering department) Clamping hub diameter (mm)	G	24	J _G kgcm ²	3.99	3.04	2.81	2.29	2.07
	K	38	J _K kgcm ²	9.53	2.69	2.91	2.03	1.83
Reduced mass moments of inertia available on request.			J _r kgcm ²	11.1	10.1	9.68	8.36	9.14
			J _r lb in. ²	9.78	8.95	8.57	8.28	8.09



Alternatives: Output shaft variants
Involute gearing DIN 5480 in mm
x = W 32 x 1.25 x 30 x 24 x cm, DIN 5400



Keywayed output shaft in mm
E = key per DIN 6026, sheet 1, form A



Shaft mounted
Motor vs. ISO 28026

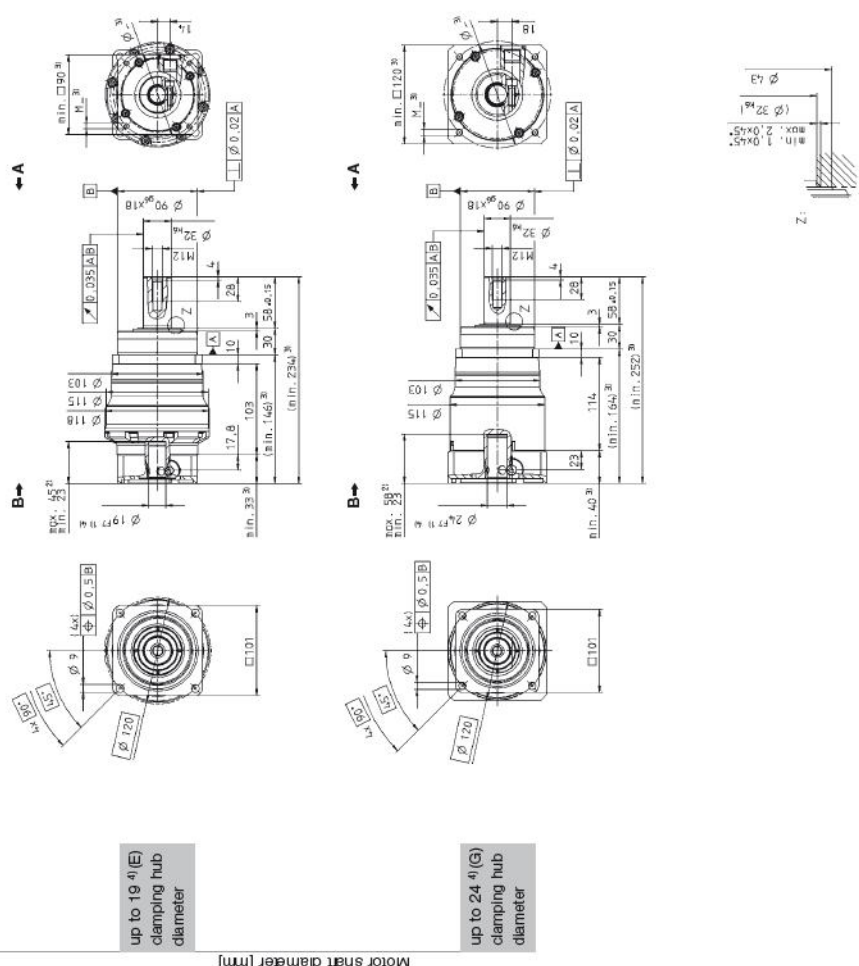


Motor mounting according to operating manual

- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 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) Tolerance H9 for mounted shaft.

Ratio 4	i	2-stage																			
		16	20	25	28	35	40	50	70	100											
Max. acceleration torque (max. 100 cycles per hour)	T_{2B}	240 in.lb	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	240 2124	
Symax®-optimal nominal torque (please consult us regarding the design)	T_{2N}	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Nominal output torque (with n_{2N})	T_{2N}	140 in.lb	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	140 1239	
Emergency stop torque (permitted two times during the service life of the gearbox)	T_{2E}	625 in.lb	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	625 5531	
Nominal input speed (with T_{2N} and 20°C ambient temperature) ⁴	n_{2N}	4500 rpm	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500	
Max. input speed	n_{2Max}	6000 rpm	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	
Mean no load running torque (with $n_1 = 3000$ rpm and 20°C gearbox temperature) ⁴	T_{2Z}	0.8 in.lb	0.7 6.2	0.6 5.3	0.5 4.4	0.4 3.5	0.4 3.5	0.4 3.5	0.4 3.5	0.4 3.5	0.4 3.5	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	0.3 2.7	
Max. torsional backlash	J_1	arcmin	Standard $\leq 6'$ / Reduced ≤ 4																		
Torsional rigidity	C_{2T}	$\frac{Nm}{mm}$ in.lbf/in	31																		
Max. axial force ⁴⁾	F_{2Max}	N	5650																		
Max. radial force ⁴⁾	F_{2RMax}	lb _f	1271																		
Max. tilting moment	M_{2Max}	Nm	6800																		
Efficiency at full load	η	%	487	4310	86.5																
Service life (For calculation, see the Chapter "Information")	L_h	h	> 30000																		
Weight incl. standard adapter plate	m	kg lb _m	7.9	17.5																	
Operating noise (with n_{100} and n_{200} - 2000 rpm no load)	L_{pK}	dB(A)	≤ 60																		
Max. permitted housing temperature	F	°C	+80																		
Ambient temperature	F	°C	0 to +40																		
Lubrication	F		82 to 104	Lubricated for life																	
Paint				Blue RAL 5002																	
Direction of rotation				Motor and gearbox same direction																	
Protection class				IP 65																	
Moment of inertia (please consult us)	E 19	J_1	kgcm ² in.lbf.in ²	0.81	0.70	0.69	0.60	0.59	0.55	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54	0.54
	G 24	J_2	kgcm ² in.lbf.in ²	0.72	0.62	0.61	0.53	0.52	0.49	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48	0.48
Clamping hub diameter (mm)				2.18	2.07	2.05	1.97	1.88	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82	1.82
Reduced mass moments of inertia available on request.				1.83	1.83	1.82	1.74	1.74	1.70	1.70	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69	1.69

¹ Other ratios available on request
² For higher ambient temperatures, please reduce input speed
³ Valid for clamping hub diameter of 19 mm
⁴ Please to centre of the output shaft or flange



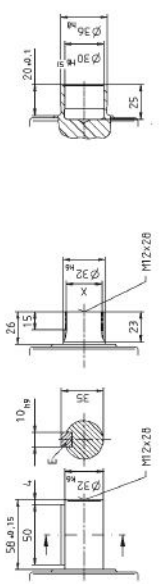
up to 19¹⁾ (E)
clamping hub diameter

up to 24¹⁾ (G)
clamping hub diameter

Motor shaft diameter [mm]

Alternatives: Output shaft variants

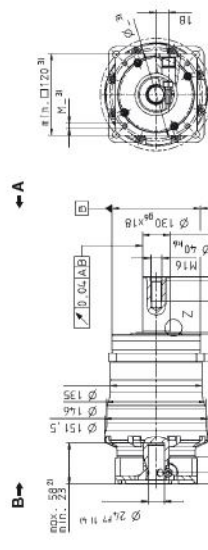
Involute gearing DIN 5480 in mm
 $x = W \cdot 2.5 \times 1.25 \times 20 \times 24 \times 30 \times 36 \times 42 \times 48 \times 54 \times 60$



- Non-olerated dimensions ± 1 mm
 1) Check motor shaft fit.
 2) Min./Max. permissible motor shaft length.
 3) Long or motor shafts are adaptable, please contact us.
 4) The dimensions depend on the motor.
 5) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.
 6) Tolerance fit for mounted shaft.
 Motor mounting according to operating manual

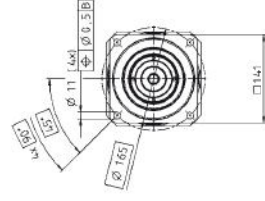


View B



up to 24^{a)} (G) clamping hub diameter

Mot or shaft diameter [mm]



up to 38^{a)} (K) clamping hub diameter

View A

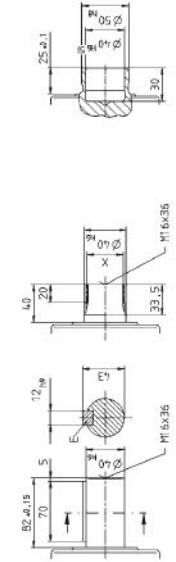
		2-stage									
		16	20	25	28	35	40	50	70	100	
Ratio 4	i										
	Max. acceleration torque (max. 100 cycles per hour)	480	480	480	480	480	480	480	480	480	480
Cymax®-optimal nominal torque (please consult us regarding necessary)	$T_{2\sigma}$	4248	4248	4248	4248	4248	4248	4248	4248	4248	4248
	$T_{10\sigma}$	290	290	290	290	290	290	290	290	290	290
Nominal output torque (with n_N)	T_N	2567	2567	2567	2567	2567	2567	2567	2567	2567	2567
	$T_{2\sigma}$	280	280	280	280	280	280	280	280	280	280
Emergency stop torque (gearbox free time during the service life of the gearbox)	$T_{2\sigma}$	2301	2478	2478	2567	2567	2567	2567	2301	1938	1000
	$T_{10\sigma}$	1250	1250	1250	1250	1250	1250	1250	1250	1250	1000
Nominal input speed (with T_N and 20°C ambient temperature) ⁴⁾	n_N	11083	11083	11083	11083	11083	11083	11083	11083	11083	8850
	n_N	4500	4500	4500	4500	4500	4500	4500	4500	4500	4500
Max. input speed	n_{Max}	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
	$T_{2\sigma}$	1.6	1.3	1.2	1.0	0.9	0.7	0.6	0.5	0.5	0.5
Mean no load running torque (with n_N , 1000 rpm and 20°C gearhead temperature) ¹⁾	$T_{2\sigma}$	14.2	11.5	10.6	8.9	8.0	6.2	5.3	4.4	4.4	4.4
	T_N	14.2	11.5	10.6	8.9	8.0	6.2	5.3	4.4	4.4	4.4
Max. torsional backlash	J_1	Standard ≤ 6 / Reduced ≤ 4									
	J_2	50									
Torsional rigidity	C_{T1}	469									
	C_{T2}	9670									
Max. axial force ²⁾	F_{AxMax}	2221									
	F_{RaxMax}	9000									
Max. radial force ³⁾	F_{Rax}	2228									
	F_{Rax}	932									
Max. tilting moment	M_{TMax}	8425									
	M_{TMax}	96.5									
Efficiency at full load	η	> 80000									
	η	17									
Service life (For calculation, see the Chapter "Information")	L_{10}	38									
	L_{10}	≤ 63									
Weight incl. standard adapter plate	m	+80									
	m	194									
Operating noise (with 100 mm and 2000 rpm no load)	L_{pA}	0.1 to -0.0									
	L_{pA}	82 to 104									
Max. permitted housing temperature	F	Lubricated for life									
	F	BlueRAL 5002									
Ambient temperature	F	Motor and gearhead same direction									
	F	IP 65									
Paint	F	Motor and gearhead same direction									
	F	IP 65									
Direction of rotation	F	Motor and gearhead same direction									
	F	IP 65									
Protection class	F	Motor and gearhead same direction									
	F	IP 65									
Moment of inertia (please consult us)	G	3.19	2.71	2.67	2.34	2.32	2.10	2.08	2.08	2.08	2.07
	K	2.82	2.40	2.36	2.07	2.05	1.85	1.85	1.85	1.85	1.83
Clamping hub diameter (mm)	G	10.3	9.77	9.73	9.41	9.39	9.16	9.15	9.14	9.14	9.14
	K	9.07	8.65	8.61	8.33	8.31	8.11	8.10	8.09	8.09	8.09

Reduced mass moments of inertia available on request.

¹⁾ For higher ambient temperatures, please reduce input speed
²⁾ Valid for clamping hub diameter of 24 mm
³⁾ Please to center of the output shaft or flange
⁴⁾ Other ratios available on request

Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
 $x = W / 40.2 \times 50 \times 18 \text{ km} / \text{DN}5480$



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 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) Tolerance H9 for mounted shaft.

▲ Motor mounting according to operating manual

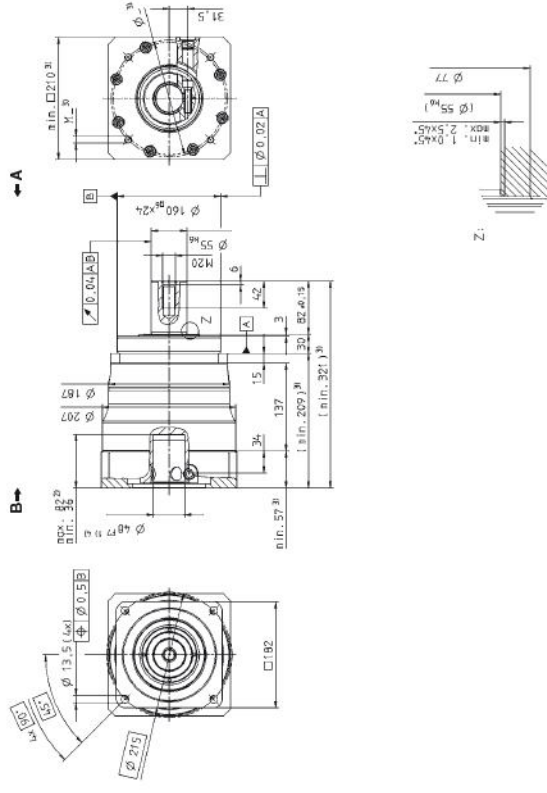
Ratio ^{a)}	i	1-stage						
		3	4	5	7	10		
Max. acceleration torque (max. 100 cycles per hour)	T_{2B} Nm in.lb	700 6195	860 7768	860 7768	860 7768	860 7768	700 6195	
Gymax®-optimal nominal torque (please consult engineering department)	$T_{2N,opt}$ Nm in.lb	350 3098	600 5310	600 5310	600 5310	600 5310	350 3098	
Nominal output torque (with n_{21})	T_{2N} Nm in.lb	290 2567	450 3983	450 3984	450 3983	450 3983	290 2540	
Emergency stop torque (permitted two times during the service life of the gearbox)	T_{2E} Nm in.lb	2200 19470	2750 24338	2750 24338	2750 24338	2750 24338	2200 19470	
Nominal input speed (with T_{2N} and 20°C ambient temperature) ^{b)}	n_{21} rpm	3000	3500	4500	4500	4500	3000	
Max. input speed	$n_{21,max}$ rpm	4500	6000	6000	6000	6000	4500	
Mean no load running torque (with $n_{21} = 3000$ rpm and 20°C gearbox temperature) ^{c)}	T_{2Z} Nm in.lb	10.2 90.3	7.7 68.1	6.2 54.9	4.5 39.8	3.2 28.3		
Max. torsional backlash	J_1 arcmin	Standard ≤ 4 / Reduced ≤ 2						
Torsional rigidity	C_{21} $\frac{\text{Nm}}{\text{arcmin}}$	175 1549						
Max. axial force ^{d)}	$F_{2,ax,max}$ N lb	14150 3184						
Max. radial force ^{d)}	$F_{2,rad,max}$ N lb	15400 3465						
Max. tilting moment	$M_{2,max}$ Nm in.lb	1800 14160						
Efficiency at full load	η %	98.5						
Service life (For calculation, see the Chapter "Information")	L_h h	> 30000						
Weight incl. standard adapter plate	m kg lb _m	34 75						
Operating noise (with n_{21} and T_{2N} at 3000 rpm no load)	L_{pK} dB(A)	≤ 68						
Max. permitted housing temperature	F	+80						
Ambient temperature	°C	0 to +40						
Lubrication	F	82 to 104						
Paint		Lubricated for life Blue PAL 5002						
Direction of rotation		Motor and gearbox same direction						
Protection class		IP 65						
Moment of inertia (please consult engineering department)	M 48 J_1 kgcm ² in ² lb ²	58.5	41.6	35.6	30.0	26.9	23.6	

Reduced mass moments of inertia available on request.

^{a)} Other ratios available on request
^{b)} For higher ambient temperatures, please reduce input speed
^{c)} Valid for clamping hub diameter of 48 mm
^{d)} Please to center of the output shaft or flange

Motor shaft diameter [mm]

up to 48 ^{a)} (M)
clamping hub diameter

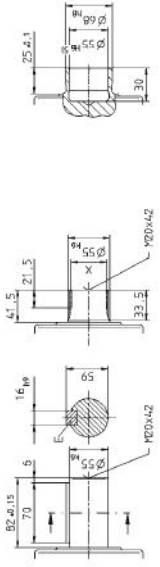


Alternatives: Output shaft variants

Keywayed output shaft in mm
E = key per DIN 68, sheet 1, 3xM4

Involute gearing DIN 580 in mm
x = W 55 x 2 x 20 x 20 x M, DIN 540

Shaft mounted
M 20 x 55 x 20 x 20



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length.
- 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) Tolerance H9 for mounted shaft.

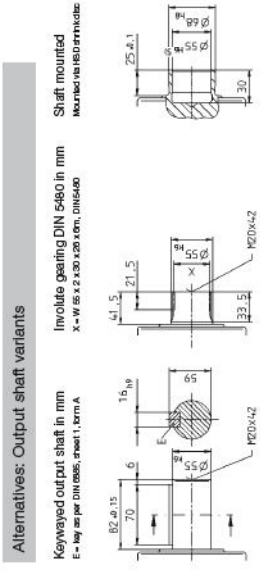
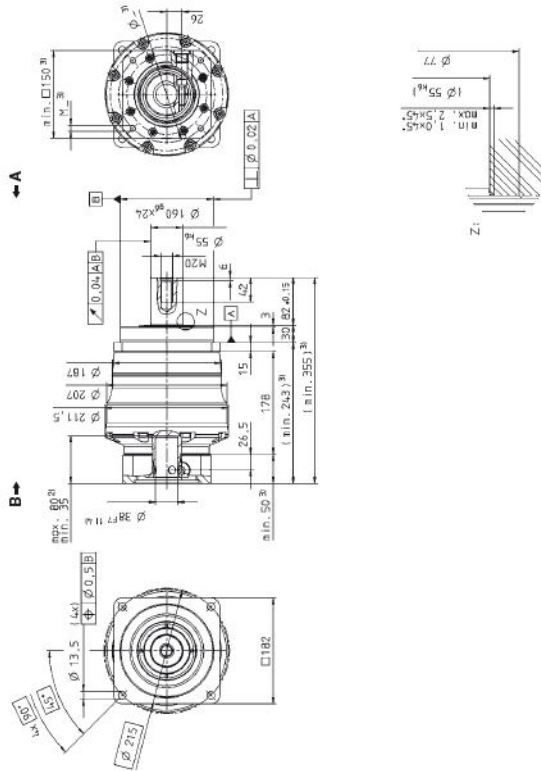
Motor mounting according to operating manual

Ratio 4	i	2-stage									
		16	20	25	28	35	40	50	70	100	
Max. acceleration torque (max. 100 cycles per hour)	T_{a2}	880	880	880	880	880	880	880	880	880	
Cymax®-optimal nominal torque (please consult engineering department)	$T_{n2,opt}$	7788	7788	7788	7788	7788	7788	7788	7788	7788	
Nominal output torque (with $n_{2,2}$)	T_{n2}	600	600	600	600	600	600	600	600	600	
Emergency stop torque (permissible time during the service life of the gearbox)	T_{s2}	2750	2750	2750	2750	2750	2750	2750	2750	2750	
Nominal input speed (with $n_{1,2}$ and 20°C ambient temperature) ^h	n_{12}	4500	4500	4500	4500	4500	4500	4500	4500	4500	
Max. input speed	$n_{12,max}$	6000	6000	6000	6000	6000	6000	6000	6000	6000	
Mean no load running torque (with $n_{1,2}$, 3000 rpm and 20°C gearbox temperature) ⁱ	T_{s2}	3.2	2.6	2.3	1.9	1.7	1.4	1.2	1.0	0.9	
Max. torsional backlash	J_1	Standard ≤ 6 / Reduced ≤ 4									
Torsional rigidity	C_{21}	175 149									
Max. axial force ⁴⁾	$F_{2,ax,max}$	14150									
Max. radial force ⁴⁾	$F_{2,rad,max}$	3184									
Max. tilting moment	$M_{2,tilt,max}$	15400									
Efficiency at full load	η	86.5									
Service life (For calculation, see the Chapter "Information")	L_h	> 30000									
	m	36 60									
Operating noise (with 1400 and 3000 rpm no load)	L_{pK}	≤ 68									
Max. permitted housing temperature	F	+80									
Ambient temperature	F	0 to +40 32 to 104									
Lubrication		Lubricated for life									
Paint		Blue RAL 5002									
Direction of rotation		Motor and gearbox same direction									
Protection class		IP 65									
Moment of inertia (plus extra drive) <small>(Changing hub diameter (mm))</small>	K 38 J_1	13.5	12.0	11.7	10.6	10.4	9.74	9.68	9.63	9.60	
		12.0	10.6	10.4	9.34	9.23	8.62	8.57	8.52	8.49	

Reduced mass moments of inertia available on request.
^h Other ratios available on request
ⁱ For higher ambient temperatures, please reduce input speed
⁴⁾ Valid for clamping hub diameter of 38 mm
⁵⁾ Please to center of the output shaft or flange

Motor shaft diameter [mm]

up to 38⁵⁾ (K)
clamping hub diameter



- Non-oriented dimensions ± 1 mm
- 1) Check motor shaft fit.
 - 2) Min./Max. permissible motor shaft length.
 - 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) Tolerance H9 for mounted shaft.
- ▲ Motor mounting according to operating manual

Ratio 4	1-stage							2-stage							
	3	4	5	7	10	16	20	25	28	35	40	50	70	100	
Max. acceleration torque (max. 100 cycles per hour)	- Please contact us -														
Cyclic ^{*)} optimal nominal torque (please consult engineering department)	T_{st}	1200	2000	1700	1200	1680	1800	2000	1680	1800	1680	1800	1680	1800	1200
	in lb	10620	17700	15046	10620	14368	15930	17700	14686	16042	16892	15045	16042	15045	10620
Nominal output torque (with n_{21})	T_M	800	1300	1150	1000	800	840	780	975	780	800	975	800	1000	800
	in lb	7065	11505	10176	8820	7060	7434	6903	8620	6903	7060	8620	6903	8620	7060
Emergency stop torque (permitted time during the service life of the gearbox)	T_{stop}	5000	5200	5200	5200	5000	5200	5200	5200	5200	5200	5200	5200	5200	5000
	in lb	44250	46020	46020	46020	44250	46020	46020	46020	46020	46020	46020	46020	46020	44250
Nominal input speed (with T_M and 20°C ambient temperature) ⁴⁾	n_M	2250	2500	3500	3500	3500	4500	4500	4500	4500	4500	4500	4500	4500	4500
	rpm	3400	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000	6000
Mean no load running torque (with $n_1 = 2000$ rpm and 20°C gearbox temperature)	T_{ext}	13.0	9.0	6.5	4.0	2.5	3.0	2.5	2.5	2.0	1.5	1.5	1.5	1.5	
	in lb	115.1	79.7	57.5	35.4	22.1	27	22	22	18	13	13	13	13	
Max. torsional backlash	J_t	Standard ≤ 4 / Reduced ≤ 4													
	arcmin	Standard ≤ 5 / Reduced ≤ 4													
Torsional rigidity	C_{DT}	400													
	N	3540													
Max. axial force ¹⁾	F_{axMax}	30000													
	lb _f	6750													
Max. radial force ²⁾	F_{raMax}	21000													
	lb _f	4725													
Max. tilting moment	$M_{tiltMax}$	3100													
	in lb	27435													
Efficiency at full load	η	98.5													
	%	98.5													
Service life (For calculation, see the Chapter "Information")	L_s	> 30000													
	h	> 30000													
Weight incl. standard adapter plate	m	56													
	kg	56													
Operating noise (with n_{10} and $n_{21} = 2000$ rpm no load)	L_{rM}	124													
	dB(A)	124													
Max. permitted housing temperature	T_C	≤ 64													
	°C	≤ 64													
Ambient temperature	T_C	+80													
	°C	+80													
Lubrication	T_C	0 to +40													
	F	32 to 194													
Paint		Lubricated for life													
		Blue RAL 5002													
Direction of rotation		Motor and gearhead same direction													
		Motor and gearhead same direction													
Protection class		IP 65													
		IP 65													
Moment of inertia (please consult us)	M 48 J_1	-	-	-	-	34.5	31.5	30.8	30.0	29.7	28.5	28.3	28.1	28.0	
	kgcm ²	-	-	-	-	30.5	27.9	27.3	26.6	26.3	25.2	25.0	24.9	24.8	
Changing hub diameter (mm)	N 55 J_1	130.0	94.3	76.9	61.5	53.1	-	-	-	-	-	-	-	-	
	mm	123.0	83.5	66.1	54.4	47.0	-	-	-	-	-	-	-	-	

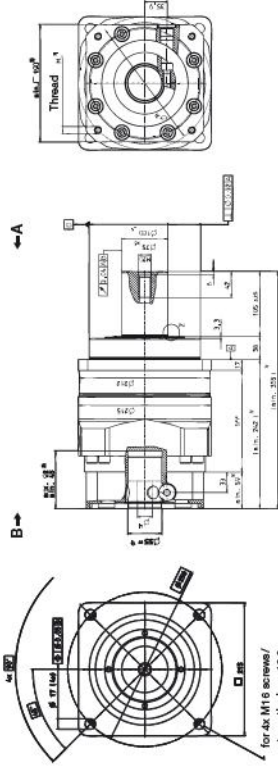
Reduced mass moments of inertia available on request.

¹⁾ Other ratios available on request

²⁾ For higher ambient temperatures, please reduce input speed

³⁾ Refers to center of the output shaft or flange

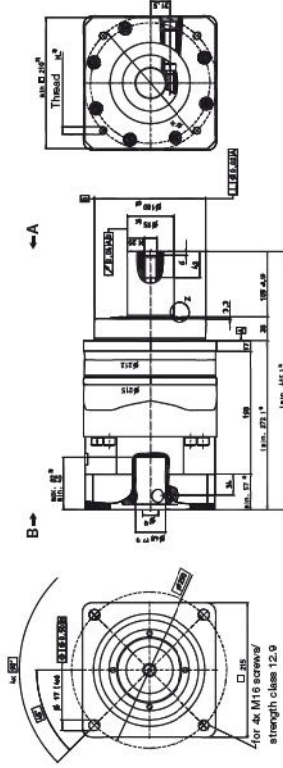
1-stage:



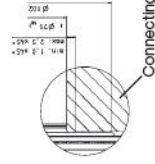
up to 55³⁾ (N)
clamping hub
diameter

Motor shaft diameter [mm]

2-stage:



up to 48³⁾ (M)
clamping hub
diameter

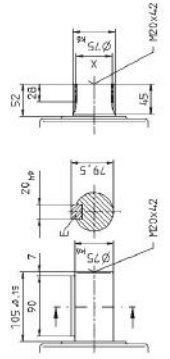


Z: Detail

Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
X = W 20 x 2 x 30 x 34 x 36, DIN 5480

Keywelded output shaft in mm
E = key per DIN 6885, sheet 1, form A



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual

Ratio 4	1-stage										2-stage																				
	3	4	5	7	10	16	20	25	28	35	40	50	70	100	3	4	5	7	10	16	20	25	28	35	40	50	70	100			
Max. acceleration torque (max. 100 cycles per hour)	- Please contact us -																														
Cymax®-optimal nominal torque (please consult us regarding feasibility)	T_{n1}	1750	3500	3600	2700	1800	3500	3600	2900	3600	1680	2100	2700	1800	15468	30975	31860	23686	15930	30975	31860	25965	31860	14868	18566	23685	15930				
	T_{n2}																														
Nominal output torque (with n_1)	T_{M1}	1400	1860	1770	1500	1100	1700	1770	1400	1840	1300	1625	1500	1100	12300	17346	15665	12275	9735	1542	15665	15311	16264	17061	11505	14361	18275	9735			
	T_{M2}																														
Emergency stop torque (permitted time times during the service life of the gearbox)	T_{st1}	6800	8500	8500	6800	5000	8500	8500	6800	8500	5000	6800	8500	6800	60180	75225	75225	75225	60180	75225	75225	75225	75225	75225	75225	75225	75225	60180			
	T_{st2}																														
Nominal input speed (with T_n and 20°C ambient temperature) ⁴	n_{in}	1750	2250	3000	3000	3000	3000	3000	3000	4500	4500	4500	4500	4500	1750	2250	3000	3000	3000	3000	4500	4500	4500	4500	4500	4500	4500	4500			
	n_{out}																														
Max. input speed	n_{max}	3400	4000	5000	5000	5000	6000	6000	6000	6000	6000	6000	6000	6000	3400	4000	5000	5000	5000	6000	6000	6000	6000	6000	6000	6000	6000	6000			
	n_{min}																														
Mean no load running torque (with $n_1=2000$ rpm and 20°C gearbox temperature)	T_{nr}	24	18	13	7.0	5.0	4.5	4.0	3.5	3.0	2.5	2.5	2.0	2.0	212	159	115	62	44	44	40	35	31	27	22	22	22	18			
	T_{nr2}																														
Max. torsional backlash	J_t	Standard ≤ 4 / Reduced ≤ 2															Standard ≤ 5 / Reduced ≤ 4														
	C_{GT}																														
Torsional rigidity	C_{GT}	550															4868														
	C_{GT}	4868															4868														
Max. axial force ¹⁾	F_{ax1}	33000															33000														
	F_{ax2}	7425															7425														
Max. radial force ²⁾	F_{ra1}	30000															30000														
	F_{ra2}	6750															6750														
Max. tilting moment	M_{tilt1}	5000															5000														
	M_{tilt2}	44250															44250														
Efficiency at full load	η	98.5															98.5														
	η_{min}	> 30000															> 30000														
Service life (For calculation, see the Chapter "Information")	L_s	77															76														
	h	170															168														
Weight incl. standard adapter plate	m																														
	W																														
Operating noise (with $n=10$ and $r_1=3000$ rpm no load)	L_{w1}	≤ 68															≤ 68														
	L_{w2}																														
Max. permitted housing temperature	T_{h1}	+80															+80														
	T_{h2}	0 to +40															194														
Ambient temperature	T_{amb1}	0 to +40															0 to +40														
	T_{amb2}	32 to 104															32 to 104														
Lubrication	L_{lub1}	Lubricated for life															Lubricated for life														
	L_{lub2}																														
Paint	P_1	Blue RAL 5002															Blue RAL 5002														
	P_2																														
Direction of rotation	R_1	Motor and gearbox same direction															Motor and gearbox same direction														
	R_2																														
Protection class	IP_1	IP 65															IP 65														
	IP_2																														
Moment of inertia (please consult us)	J_1	39.2															39.2														
	J_2	94.7															94.7														
Changing hub diameter (mm)	J_1	2602															165.0														
	J_2	230.3															175.4														

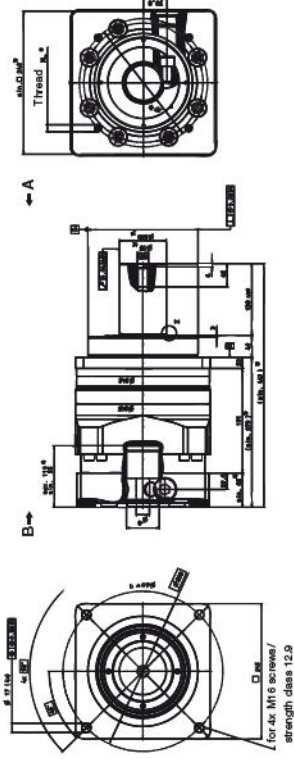
Reduced mass moments of inertia available on request.

¹⁾ Other ratios available on request

²⁾ For higher ambient temperatures, please reduce input speed

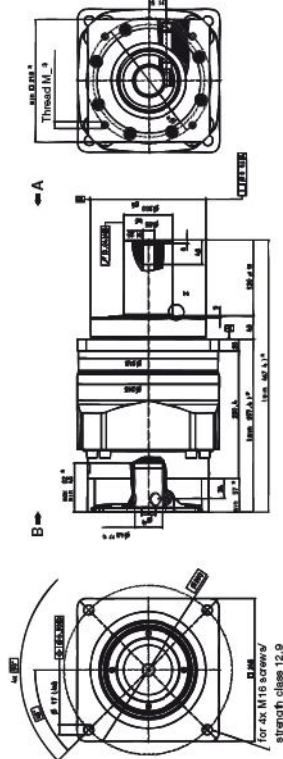
³⁾ Refers to center of the output shaft or flange

1-stage:

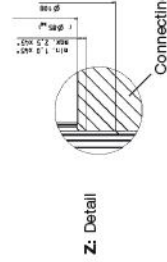


up to 60¹⁾ (O) clamping hub diameter

2-stage:



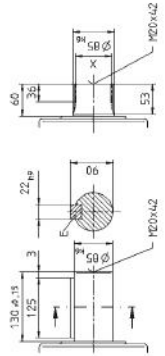
up to 48¹⁾ (M) clamping hub diameter



Z: Detail

Alternatives: Output shaft variants

Involute gearing DIN 5480 in mm
 $x = W_{0.02} \times 0.33 \times 0.38 \times n_m \times D_{IN5480}$



- 1) Check motor shaft fit.
- 2) Min./Max. permissible motor shaft length. Long or motor shafts are adaptable, please contact us.
- 3) The dimensions depend on the motor.
- 4) Smaller motor shaft diameter is compensated by a bushing with a minimum thickness of 1 mm.

Motor mounting according to operating manual