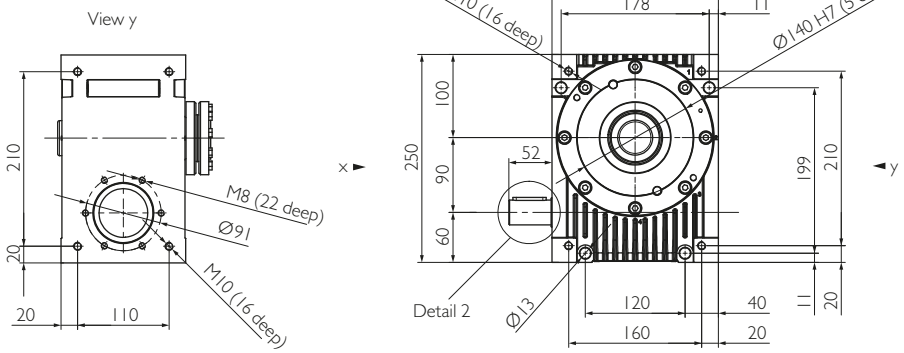
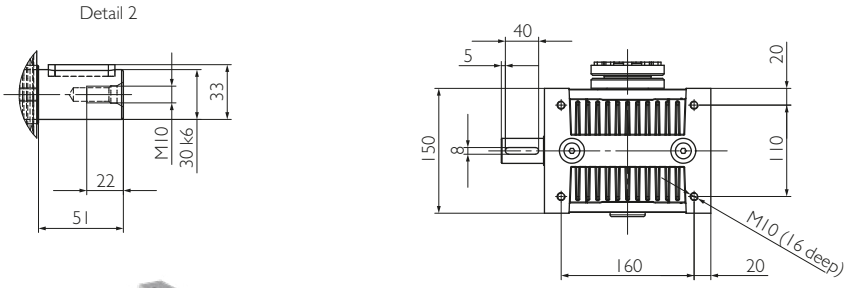
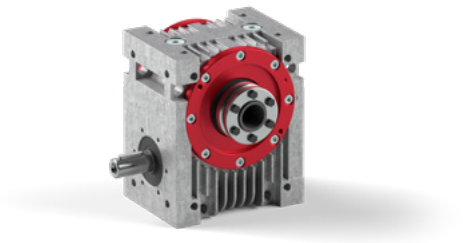
Input

C

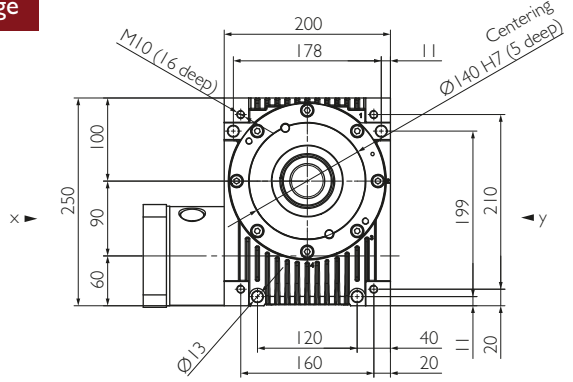


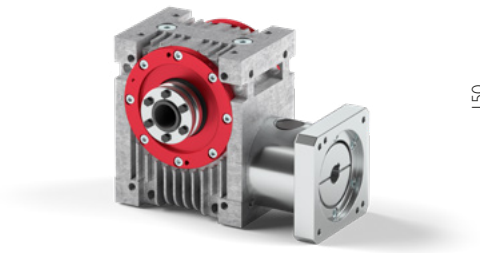




Example HPG 090 C2

C with option motor flange



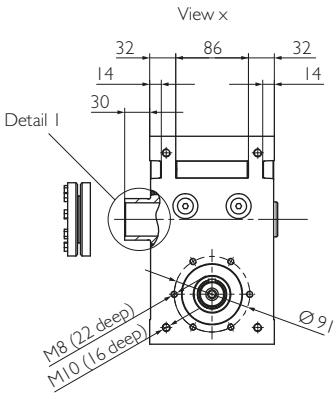


Example HPG 090 C1

* Motor-specific gearbox dimensions

Output

1



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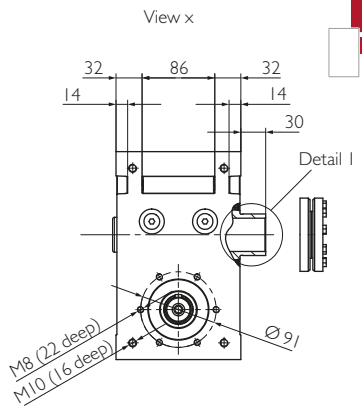

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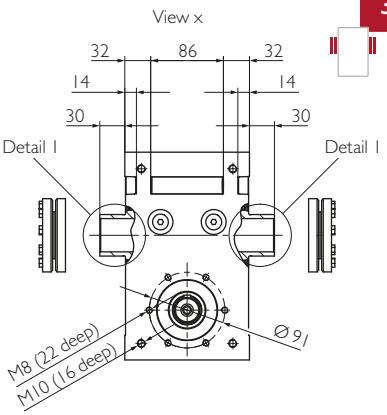
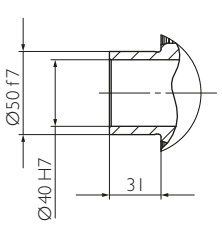




Ratio	i			2	3	4	5	6	8	10	13.33	16	24	30	47	60
Nominal torque at the output Efficiency	n_{1N} = 500 rpm	T_{2N}	[Nm]	469	679	784	761	674	782	726	712	700	727	527	752	527
		η	[%]	92	92	91	91	90	88	87	84	80	74	71	61	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	350	528	624	615	551	644	601	592	660	645	527	640	527
		η	[%]	92	92	92	92	91	89	88	85	82	76	72	63	57
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	279	432	518	516	466	547	513	507	565	553	527	550	527
		η	[%]	92	93	92	92	91	90	88	85	83	77	72	64	57
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	174	279	343	348	318	377	356	354	395	388	396	386	396
		η	[%]	92	92	92	92	91	89	88	85	82	76	70	62	55
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	126	206	257	262	241	288	273	272	303	298	305	297	305
		η	[%]	91	92	92	91	90	88	86	83	81	74	68	60	53
Max. acceleration torque		T_{2B}	[Nm]	470	790									530	790	530
Emergency stop torque		T_{2not}	[Nm]	900										700	900	700
Idling torque[a]		T_{012}	[Nm]	2.8			2.5				2					
Max. input speed		n_{1Max}	[rpm]	4500												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<10	<8	<7	<7	<6	<6					<5		
	PR	j_t	[arcmin]	<6.5	<5	<4.5	<4	<4	<3.5					<3		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	5.5	10.8	15.9	18.3	20.8	23.3	25.8	28.3	31.3	33.2	32	35	32
Stability at the output		C_{2K}	[Nm/arcmin]	95												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	6200	8200	7800	9200	11000	12000	14000	17000	18000	18000	18000	19000	19000
Max. radial force[c)e)] at the output		F_{r2max}	[N]	5300	6400	5500	5800	6500	6800	7500	8400	8600	8700	8800	8800	8800
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	590	700	600	640	710	750	830	920	940	960	970	970	970
Max. axial force[c)d)] at the input		F_{a1max}	[N]	3100	1600	1100	1700	2800	2000	2700	2900	2300	2500	2700	2600	2800
Max. radial force[c)f)] at the input		F_{r1max}	[N]	1500	910	640	990	1600	1200	1500	1700	1300	1400	1600	1500	1600
Mass moment of inertia[g)]		J_1	[10^{-5} kg m^2]	336	160	98	70	54	39	32	26	24	21	20	19	19
Mass moment of inertia[g)h)]		J_1	[10^{-5} kg m^2]	362	185	124	95	80	64	57	51	49	46	46	45	45
Mass moment of inertia[g)i)]		J_1	[10^{-5} kg m^2]	403	227	165	136	121	105	98	93	90	88	87	86	86
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	23												
Weight with motor components		m	[kg]	≈ 27												
Max. permissible housing temperature			[°C]	+90												
Ambient temperature			[°C]	-15 up to +50												
Lubrication		synthetic gear oil (as per DIN 51502: CLP PG 460)														
Painting		None														
Protection class		IP65														

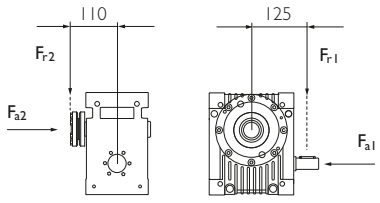
a) approximate, at n_1 = 3000 rpm and operating temperature.

b) Precision grade PS (standard backlash) for classic mechanical engineering applications.
Precision grade PR (reduced backlash) for precise process applications.

c) Bearing forces: Values valid at n_1 = 1500 rpm; ½ T_{2N} and duty cycle of 40%.
Consult with Güdel for composite bearing forces, axial and radial forces.
c) d) in relation to shaft center.
c) e) at a distance of 110 mm from the middle of the casing.
c) f) at a distance of 125 mm from the middle of the casing.

g) in relation to the input, including shrink disc at the output (output 1 & 2),
with two shrink discs (output 3) increase values by 115/i².
g) h) including elastomer coupling 5103-28 (calculated with drilled hole for motor shaft-Ø25)
g) i) including elastomer coupling 5103-38 (calculated with drilled hole for motor shaft-Ø45)

Bearing forces

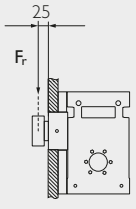


at the output at the input

Package

			Output flange including bearing & pinion				
Radial rigidity	C_3	[N/mm]	45000				
Speed	n_{2N}	[rpm]	1500	750	400	150	100
Max. radial force[j)]	F_{rmax}	[N]	4800	5900	7200	8800	9700

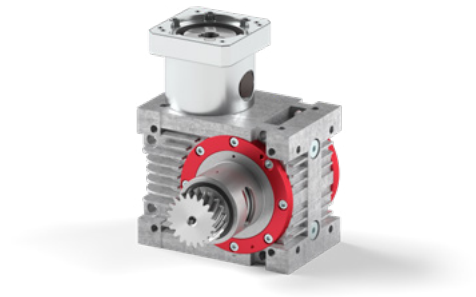
j) Bearing forces: Values valid at duty cycle of 40% at a distance of 25 mm from the end of the bearing.

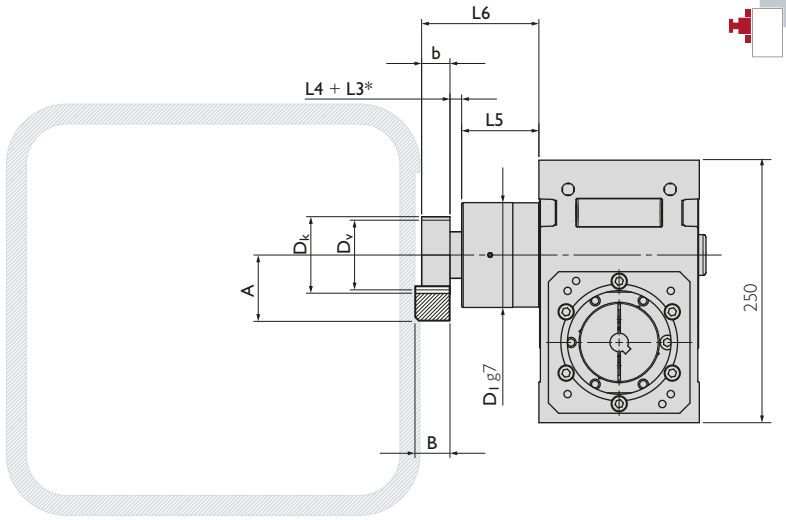


Detailed information about the **package, options & accessories** on pages 54 and 55.

Output flange including bearing & pinion a)

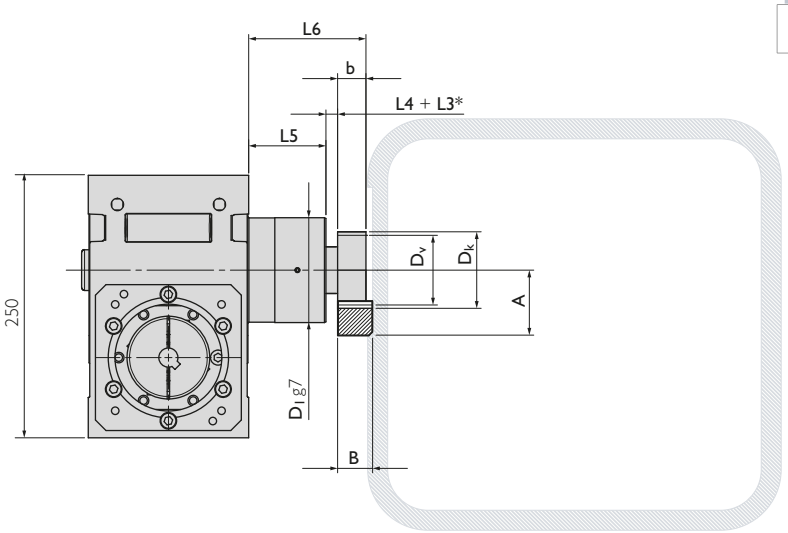
Package



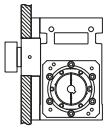


Example HPG 090 C2 Package

Package



a) The output flange must be supported by the customer supplied equipment at the bearing end (D1), in a hole with an H8 tolerance.



* **L3** for additional distance ring.

Geometric information

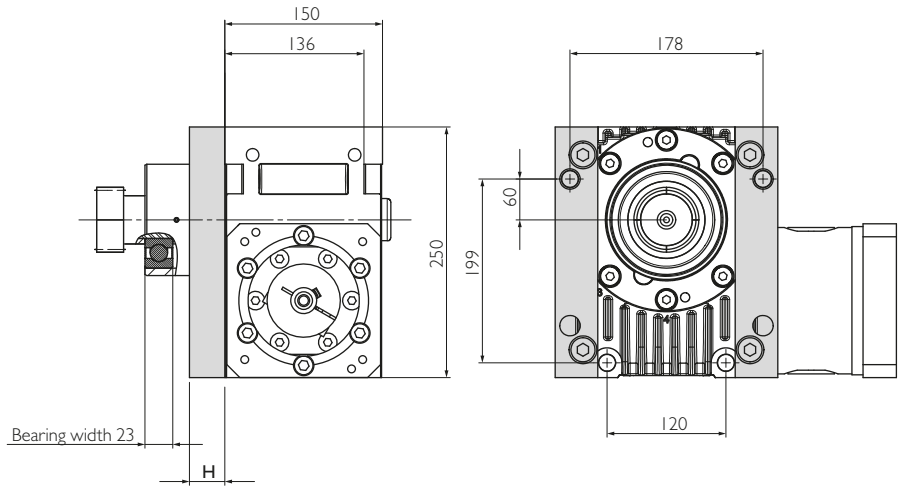
Helical modular pitch	Part. No.	m_n	P_t	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 1	211420	3	10.00	20	57.83	30	29	69.66	63.662	63.662	98	12.5	63.0	105.5
													104.5	147.0
Pinion 2	211520	4	13.33	20	77.44	40	39	92.88	84.883	84.883	98	18.0	63.0	121.0
													104.5	162.5

m_n: Normal module, P_t: Transverse pitch [mm], z: Number of teeth, D_v: Pitch circle diameter for design, D_0: Pitch circle diameter for calculation

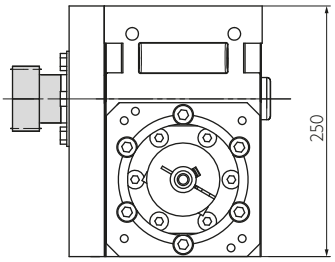
Straight modular pitch	Part. No.	m_n	P_n	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 3	201420	3	9.42	20	56.00	30	29	66.00	60.000	60.000	98	12.5	63.0	105.5
													104.5	147.0
Pinion 4	201520	4	12.57	20	75.00	40	39	88.00	80.000	80.000	98	18.0	63.0	121.0
													104.5	162.5

m_n: Normal module, P_n: Normal pitch [mm], z: Number of teeth, D_v: Pitch circle diameter for design, D_0: Pitch circle diameter for calculation

Spacer elements

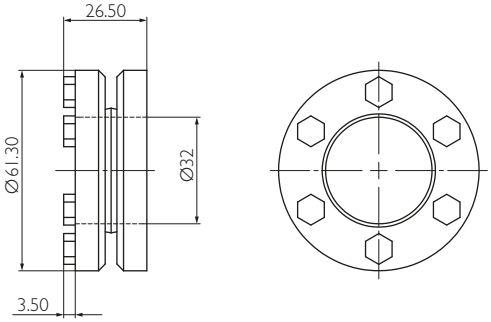


With pinion special solutions on request

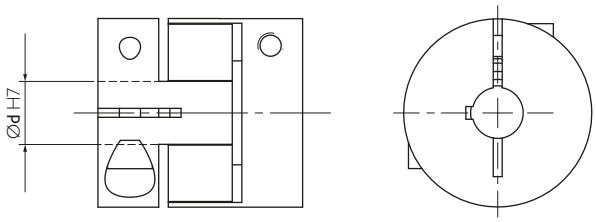


Casing can only be fastened with long screws as per the bore hole pattern.
Screws M6 of length 56mm + **H** + thread depth, tightening torque 9Nm.

Shrink disc

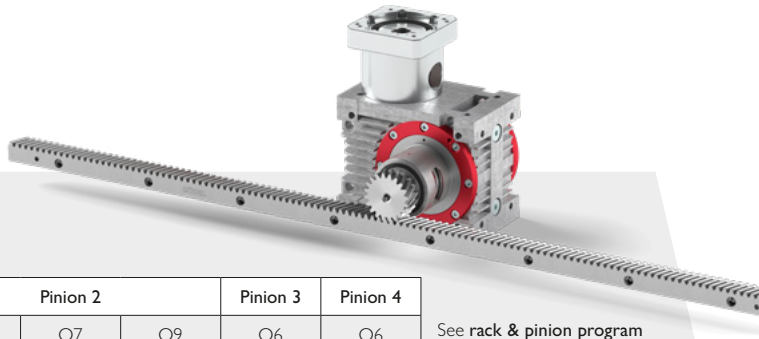


Elastomer coupling



For more details see **Motor Interface** on page 84 et. seq.

Your ideal drive train



Our function package with high-performance angle gearbox, output flange, pinion and rack by Güdel.

			Pinion 1			Pinion 2			Pinion 3	Pinion 4
			Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q6
Max acceleration force	F_{2B}	[N]	16163	7565	12980	28585	14084	24045	13697	24068
Max acceleration torque	T_{2B}	[Nm]	515	241	413	1213	598	1021	411	963
Precision			PR		PS	PR		PS		
Feed force			High	Medium	Elevated	High	Medium	Elevated		

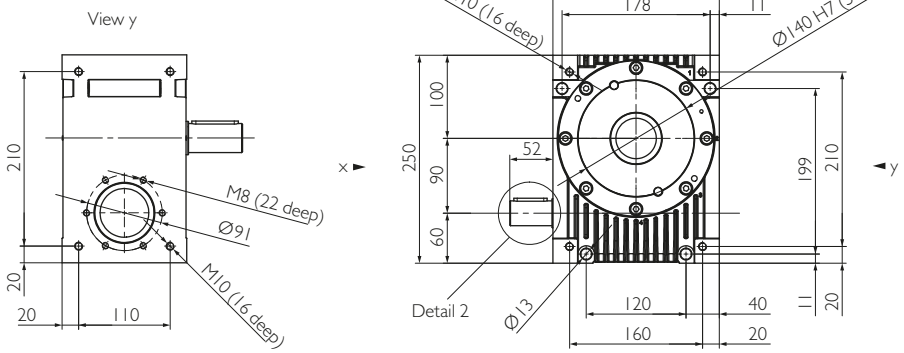
Above values for rack and pinion take into consideration a number of load cycles:
1×10^6 for the rack; 1×10^7 for the pinion. Both in pulsating operation.

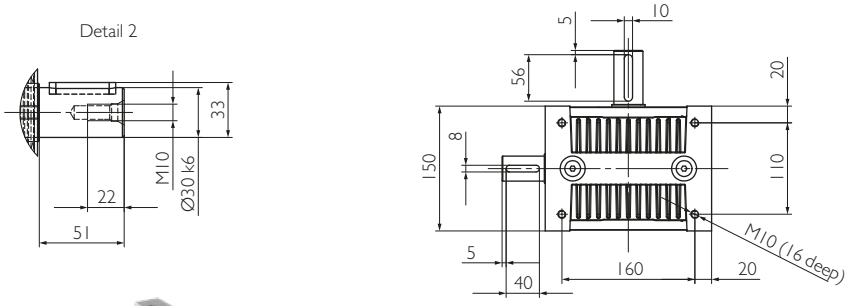
See **rack & pinion program** of your ideal drive train on pages 70 et seq.

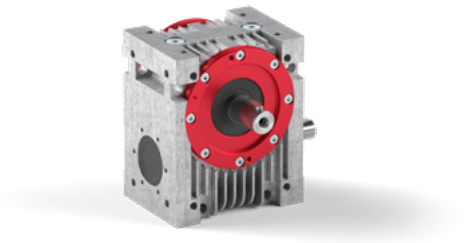
See **flowcharts** to find your ideal drive train on pages 88 et seq.

Input

C

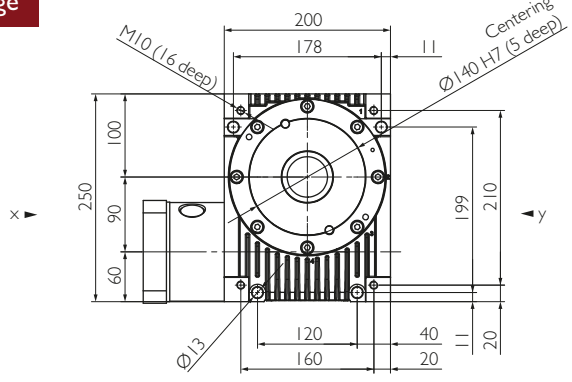


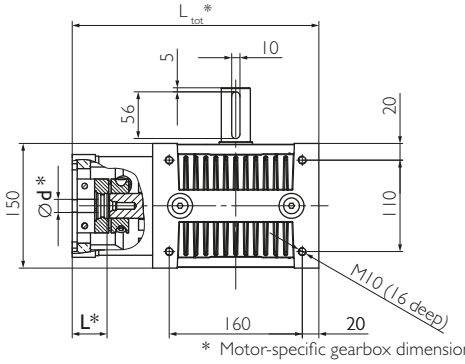


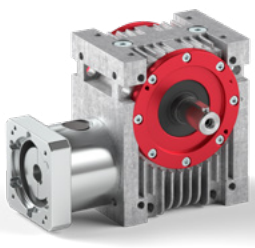


Example HPG 090 C4

C with option motor flange





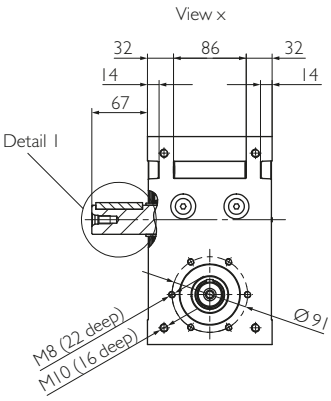


Example HPG 090 C6

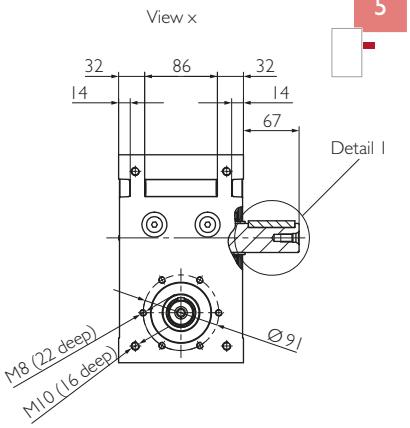
* Motor-specific gearbox dimensions

Output

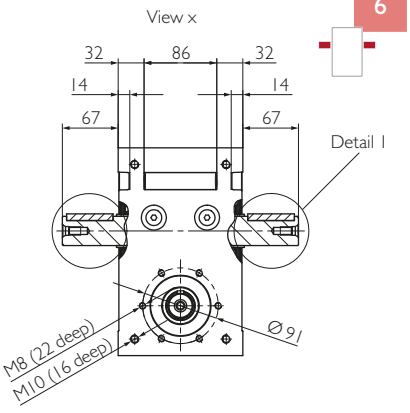
4

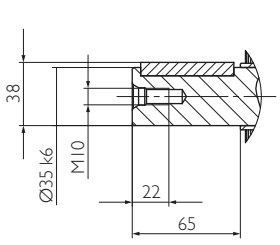


5



6





Ratio	i			2	3	4	5	6	8	10	13.33	16	24	30	47	60
Nominal torque at the output Efficiency	n_{1N} = 500 rpm	T_{2N}	[Nm]	469	679	784	761	674	782	726	712	700	727	527	752	527
		η	[%]	92	92	91	91	90	88	87	84	80	74	71	61	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	350	528	624	615	551	644	601	592	660	645	527	640	527
		η	[%]	92	92	92	92	91	89	88	85	82	76	72	63	57
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	279	432	518	516	466	547	513	507	565	553	527	550	527
		η	[%]	92	93	92	92	91	90	88	85	83	77	72	64	57
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	174	279	343	348	318	377	356	354	395	388	396	386	396
		η	[%]	92	92	92	92	91	89	88	85	82	76	70	62	55
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	126	206	257	262	241	288	273	272	303	298	305	297	305
		η	[%]	91	92	92	91	90	88	86	83	81	74	68	60	53
Max. acceleration torque		T_{2B}	[Nm]	470	790									530	790	530
Emergency stop torque		T_{2Not}	[Nm]	900										700	900	700
Idling torque[a]		T_{012}	[Nm]	2.8			2.5				2					
Max. input speed		n_{1Max}	[rpm]	4500												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<10	<8	<7	<7	<6	<6					<5		
	PR	j_t	[arcmin]	<6.5	<5	<4.5	<4	<4	<3.5					<3		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	5.5	10.8	15.9	18.3	20.8	23.3	25.8	28.3	31.3	33.2	32	35	32
Stability at the output		C_{2K}	[Nm/arcmin]	73												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	820	1400	1400	2800	4400	5000	6600	8300	8100	8700	9100	9200	9400
Max. radial force[c)e)] at the output		F_{r2max}	[N]	800	930	1000	1400	3000	3100	3700	4200	4300	4400	4500	4500	4600
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	88	100	110	160	330	350	400	460	470	490	500	500	500
Max. axial force[c)d)] at the input		F_{a1max}	[N]	3100	1600	1100	1700	2800	2000	2700	2900	2300	2500	2700	2600	2800
Max. radial force[c)f)] at the input		F_{r1max}	[N]	1500	910	640	990	1600	1200	1500	1700	1300	1400	1600	1500	1600
Mass moment of inertia[g)]		J_1	[10^{-5} kg m^2]	336	160	98	70	54	39	32	26	24	21	20	19	19
Mass moment of inertia[g)h)]		J_1	[10^{-5} kg m^2]	362	185	124	95	80	64	57	51	49	46	46	45	45
Mass moment of inertia[g)i)]		J_1	[10^{-5} kg m^2]	403	227	165	136	121	105	98	93	90	88	87	86	86
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	22												
Weight with motor components		m	[kg]	≈ 26												
Max. permissible housing temperature			[°C]	+90												
Ambient temperature			[°C]	-15 up to +50												
Lubrication		synthetic gear oil (as per DIN 51502: CLP PG 460)														
Painting		None														
Protection class		IP65														

a) approximate, at n_1 = 3000 rpm and operating temperature.

b) Precision grade PS (standard backlash) for classic mechanical engineering applications.
Precision grade PR (reduced backlash) for precise process applications.

c) Bearing forces: Values valid at n_1 = 1500 rpm; ½ T_{2N} and duty cycle of 40%.
Consult with Güdel for composite bearing forces, axial and radial forces.

c) d) in relation to shaft center.

c) e) at a distance of 110 mm from the middle of the casing.

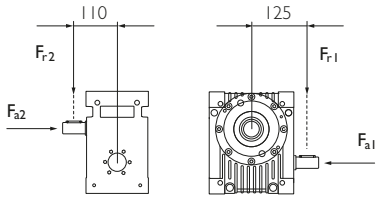
c) f) at a distance of 125 mm from the middle of the casing.

g) in relation to the input.

g) h) including elastomer coupling 5103-28 (calculated with drilled hole for motor shaft-Ø25)

g) i) including elastomer coupling 5103-38 (calculated with drilled hole for motor shaft-Ø45)

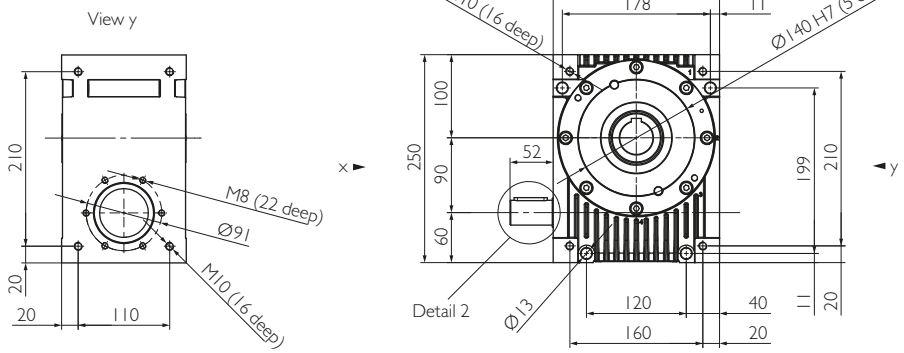
Bearing forces

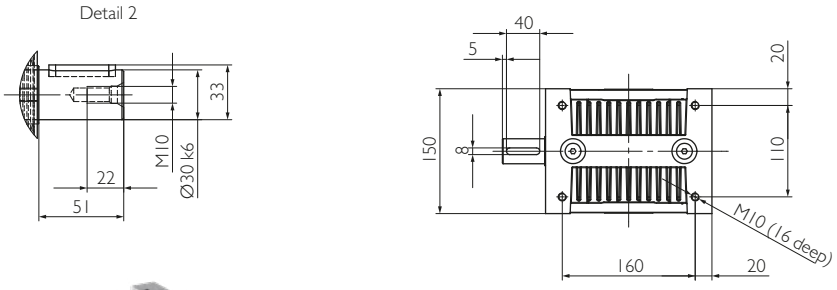


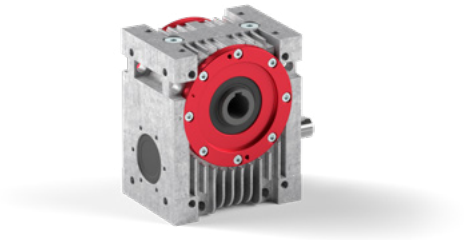
at the output at the input

Input

C

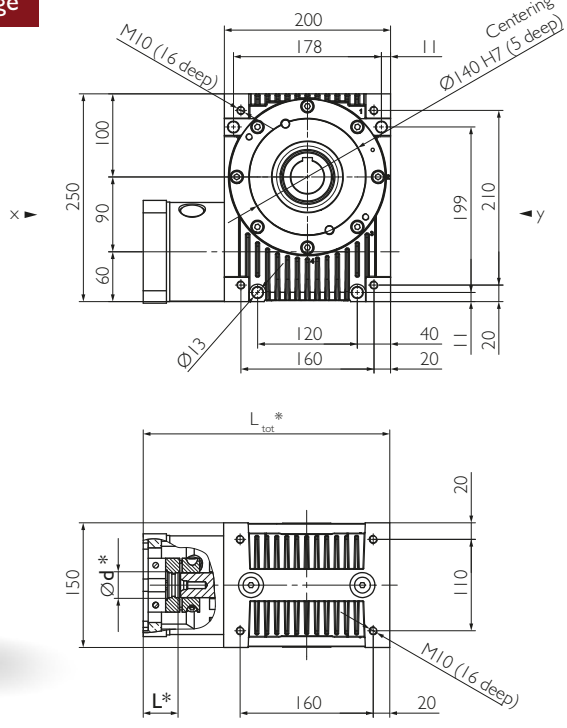


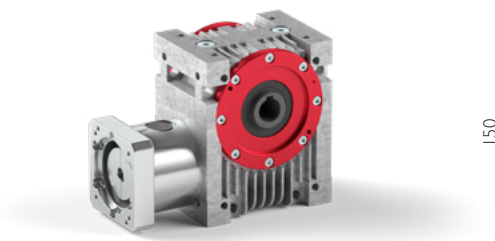




Example HPG 090 C7

C with option motor flange



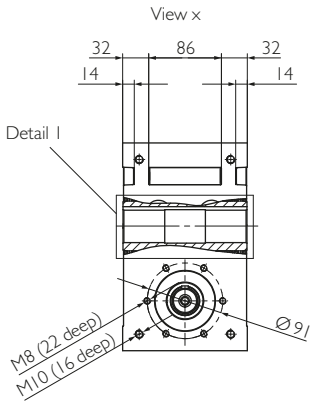


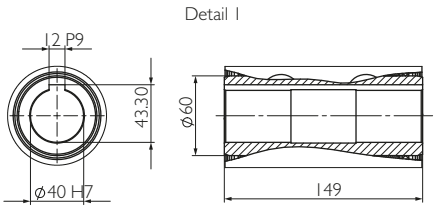
Example HPG 090 C7

* Motor-specific gearbox dimensions

Output

7





Ratio	i			2	3	4	5	6	8	10	13.33	16	24	30	47	60
Nominal torque at the output Efficiency	n_{1N} = 500 rpm	T_{2N}	[Nm]	469	679	784	761	674	782	726	712	700	727	527	752	527
		η	[%]	92	92	91	91	90	88	87	84	80	74	71	61	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	350	528	624	615	551	644	601	592	660	645	527	640	527
		η	[%]	92	92	92	92	91	89	88	85	82	76	72	63	57
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	279	432	518	516	466	547	513	507	565	553	527	550	527
		η	[%]	92	93	92	92	91	90	88	85	83	77	72	64	57
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	174	279	343	348	318	377	356	354	395	388	396	386	396
		η	[%]	92	92	92	92	91	89	88	85	82	76	70	62	55
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	126	206	257	262	241	288	273	272	303	298	305	297	305
		η	[%]	91	92	92	91	90	88	86	83	81	74	68	60	53
Max. acceleration torque		T_{2B}	[Nm]	470	790									530	790	530
Emergency stop torque		T_{2not}	[Nm]	900										700	900	700
Idling torque[a]		T_{012}	[Nm]	2.8			2.5				2					
Max. input speed		n_{1Max}	[rpm]	4500												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<10	<8	<7	<7	<6	<6					<5		
	PR	j_t	[arcmin]	<6.5	<5	<4.5	<4	<4	<3.5					<3		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	5.5	10.8	15.9	18.3	20.8	23.3	25.8	28.3	31.3	33.2	32	35	32
Stability at the output		C_{2K}	[Nm/arcmin]	95												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	6200	8200	7800	9200	11000	12000	14000	17000	18000	18000	18000	19000	19000
Max. radial force[c)e)] at the output		F_{r2max}	[N]	5300	6400	5500	5800	6500	6800	7500	8400	8600	8700	8800	8800	8800
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	590	700	600	640	710	750	830	920	940	960	970	970	970
Max. axial force[c)d)] at the input		F_{a1max}	[N]	3100	1600	1100	1700	2800	2000	2700	2900	2300	2500	2700	2600	2800
Max. radial force[c)f)] at the input		F_{r1max}	[N]	1500	910	640	990	1600	1200	1500	1700	1300	1400	1600	1500	1600
Mass moment of inertia[g)]		J_1	[10^{-5} kg m^2]	308	147	91	65	51	37	30	25	23	21	20	19	19
Mass moment of inertia[g)h)]		J_1	[10^{-5} kg m^2]	333	173	116	90	76	62	56	51	49	46	46	45	45
Mass moment of inertia[g)i)]		J_1	[10^{-5} kg m^2]	374	214	158	132	118	103	97	92	90	87	87	86	86
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	22												
Weight with motor components		m	[kg]	≈ 26												
Max. permissible housing temperature			[°C]	+90												
Ambient temperature			[°C]	-15 up to +50												
Lubrication		synthetic gear oil (as per DIN 51502: CLP PG 460)														
Painting		None														
Protection class		IP65														

a) approximate, at n_1 = 3000 rpm and operating temperature.

b) Precision grade PS (standard backlash) for classic mechanical engineering applications.
Precision grade PR (reduced backlash) for precise process applications.

c) Bearing forces: Values valid at n_1 = 1500 rpm; ½ T_{2N} and duty cycle of 40%.
Consult with Güdel for composite bearing forces, axial and radial forces.

c) d) in relation to shaft center.

c) e) at a distance of 110 mm from the middle of the casing.

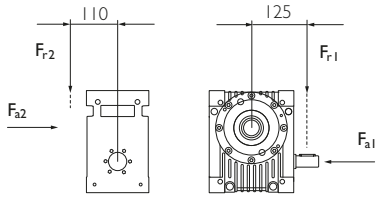
c) f) at a distance of 125 mm from the middle of the casing.

g) in relation to the input.

g) h) including elastomer coupling 5103-28 (calculated with drilled hole for motor shaft-Ø25)

g) i) including elastomer coupling 5103-38 (calculated with drilled hole for motor shaft-Ø45)

Bearing forces



at the output at the input

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