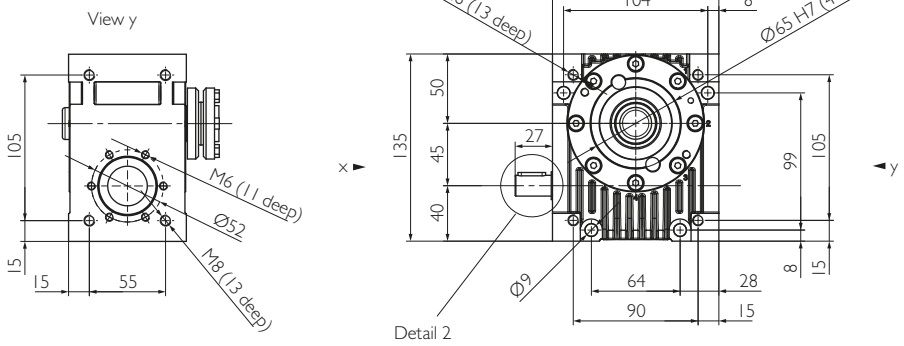
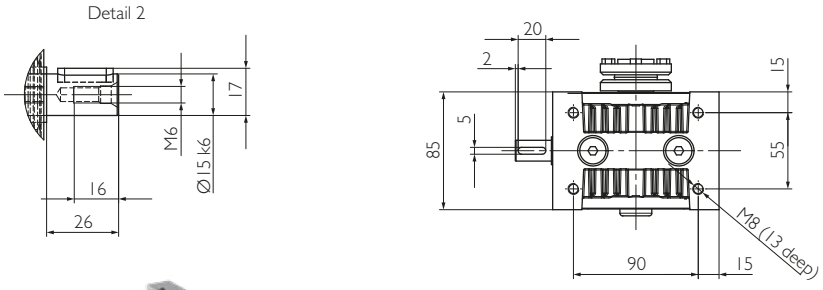
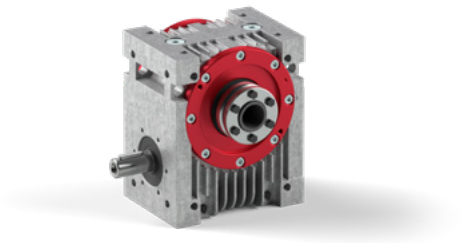
Input

C

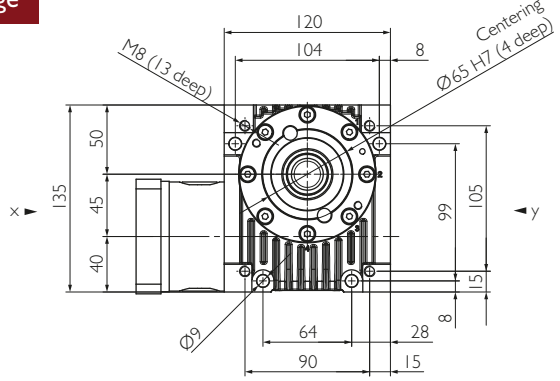


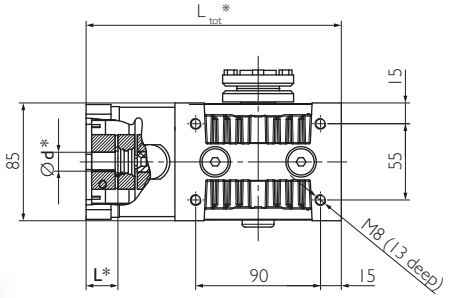


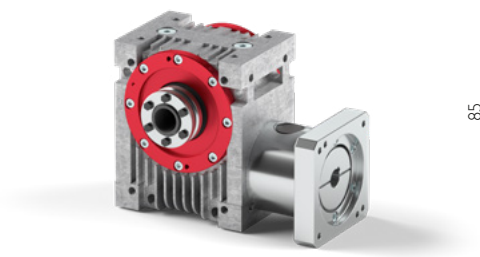


Example HPG 045 C2

C with option motor flange





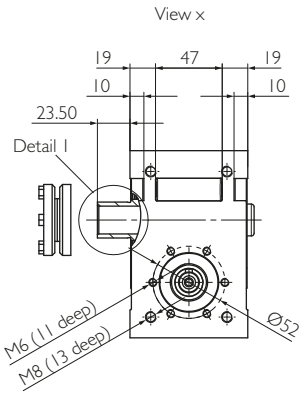


Example HPG 045 C1

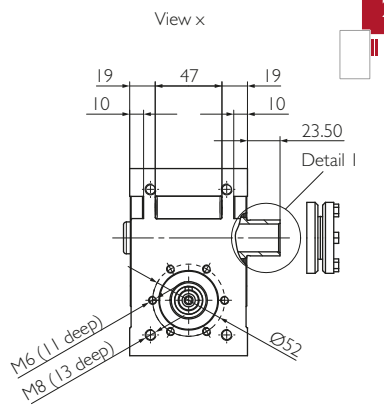
* Motor-specific gearbox dimensions

Output

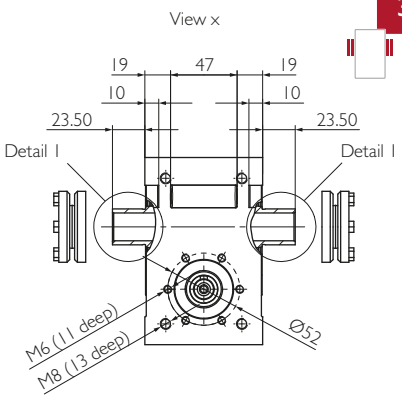
1

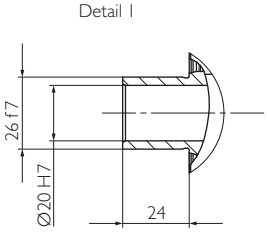


2



3





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]	52.7	73.9	83.9	80.5	70.8	81.7	75.5	73.9	75.0	77.9	54.5	79.4	54.5
		η	[%]	88	88	87	86	85	82	79	75	71	63	59	50	43
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	43.8	63.3	73.1	71.0	62.9	72.9	67.7	66.4	74.0	72.2	54.5	71.5	55.5
		η	[%]	89	89	88	87	86	84	81	77	73	65	60	53	45
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	37.4	55.4	64.8	63.4	56.5	65.8	61.3	60.3	67.2	65.6	55.5	65.1	55.5
		η	[%]	89	89	89	88	86	84	81	77	74	66	60	53	45
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	26.0	40.3	48.3	48.1	43.4	51.0	47.8	47.2	52.7	51.6	51.8	51.3	51.8
		η	[%]	88	89	88	87	85	83	80	75	72	64	58	52	45
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	20.0	31.6	38.5	38.7	35.2	41.6	39.2	38.8	43.3	42.5	42.7	42.3	42.7
		η	[%]	87	87	87	85	83	81	77	73	70	62	54	50	43
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	16.2	26.0	32.0	32.4	29.6	35.2	33.2	33.0	36.8	36.1	36.4	36.0	36.4
		η	[%]	85	86	85	84	81	79	75	70	66	58	51	46	40
Max. acceleration torque		T_{2B}	[Nm]	60	90									60	90	60
Emergency stop torque		T_{2Not}	[Nm]	120										80	120	80
Idling torque[a]		T_{012}	[Nm]	1.05			0.95				0.8					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<15	<12	<11	<11	<9	<8					<7		
	PR	j_t	[arcmin]	<10	<8	<7	<7	<6	<5.5					<5		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	1.6	2.8	3.6	4	4.3	4.5	4.9	5.3	5.5	5.8	5.5	6	5.5
Stability at the output		C_{2K}	[Nm/arcmin]	30												
Max. axial force[c) d)] at the output		F_{a2max}	[N]	720	1000	1600	2200	2800	2900	3300	3700	3900	4700	4700	4800	4800
Max. radial force[c) e)] at the output		F_{r2max}	[N]	700	820	1200	1400	1600	1600	1600	1700	1800	2000	2100	2200	2200
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	45	53	76	91	110	100	110	110	110	130	140	140	140
Max. axial force[c) d)] at the input		F_{a1max}	[N]	1400	980	860	1000	1300	1100	1300	1300	1200	1200	1200	1200	1200
Max. radial force[c) f)] at the input		F_{r1max}	[N]	510	470	430	510	590	550	610	630	580	610	600	620	600
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	120	57	34	24	19	13	10	9	8	7	6	6	6
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	148	85	62	52	47	41	38	37	36	35	34	34	34
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	235	172	149	139	134	128	125	124	123	122	121	121	121
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	4												
Weight with motor components		m	[kg]	≈ 5												
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 = 3000 rpm; ⅔ 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 65 mm from the middle of the casing.

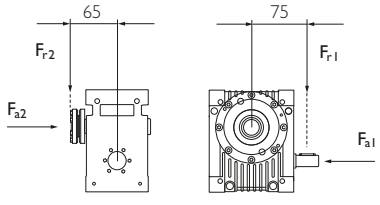
c) f) at a distance of 75 mm from the middle of the casing.

g) in relation to the input, including shrink disc at the output (output 1 & 2), with two shrink discs (output 3) increase values by 90/ i2 .

g) h) including elastomer coupling 5103-19 (calculated with drilled hole for motor shaft-Ø15)

g) i) including elastomer coupling 5103-24 (calculated with drilled hole for motor shaft-Ø20)

Bearing forces

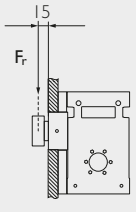


at the output at the input

Package

			Output flange including bearing & pinion				
Radial rigidity	C_3	[N/mm]	23000				
Speed	n_{2N}	[rpm]	1500	750	400	150	100
Max. radial force[j)]	F_{rmax}	[N]	1900	2400	2900	3200	3500

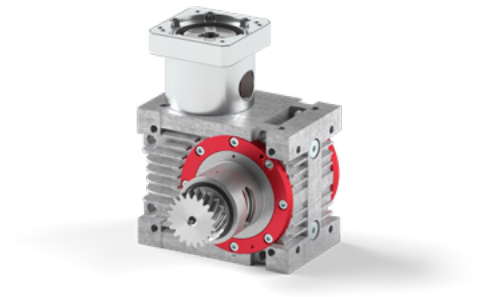
j) Bearing forces: Values valid at duty cycle of 40% at a distance of 15mm from the end of the bearing.

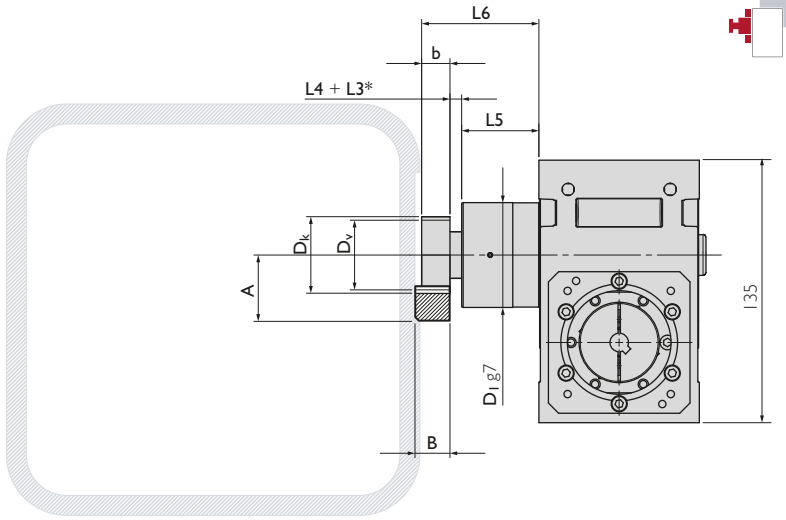


Detailed information about the **package, options & accessories** on pages 38 and 39.

Output flange including bearing & pinion a)

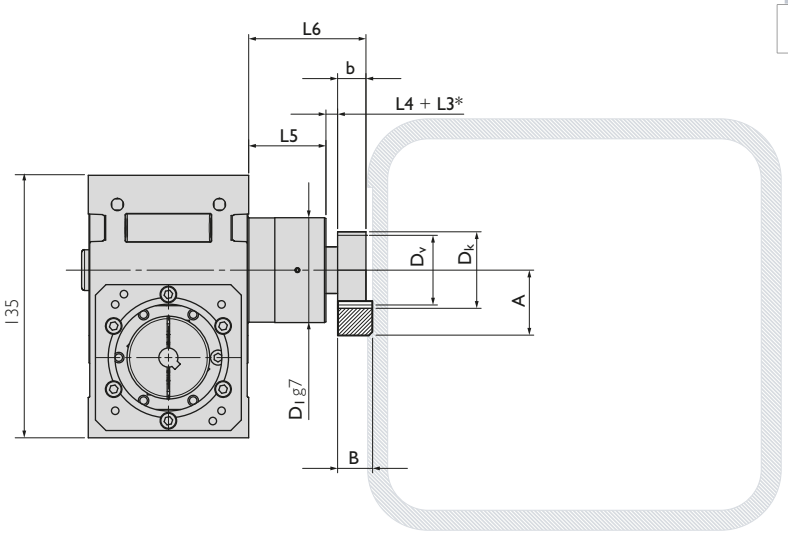
Package



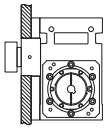


Example HPG 045 C2 Package

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

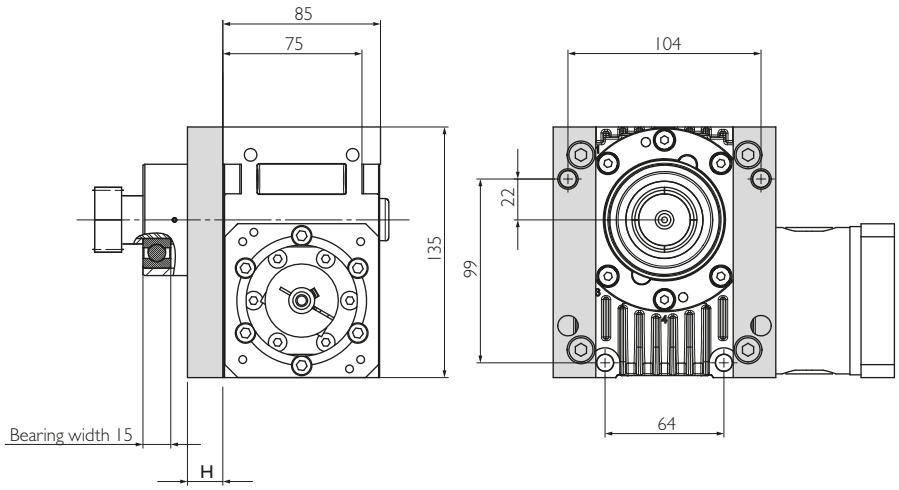
Helical modular pitch	Part. No.	m_n	P_t	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 1	211120	1.5	5.00	20	33.415	20	19	34.83	31.831	31.830	60	4.5	43	67.5
													53	77.5
Pinion 2	211216	2	6.66	16	39.575	20	24	39.15	33.953	35.153	60	8.0	43	71.0
													53	81.0

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

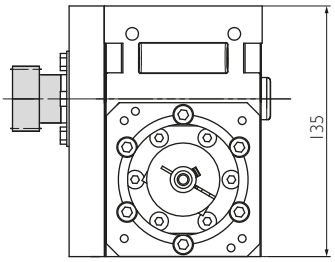
Straight modular pitch	Part. No.	m_n	P_n	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 3	201120	1.5	4.72	20	32.500	20	19	33.00	30.000	30.000	60	4.5	43	67.5
													53	77.5
Pinion 4	201216	2	6.28	16	38.600	20	24	37.20	32.000	33.200	60	8.0	43	71.0
													53	81.0

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

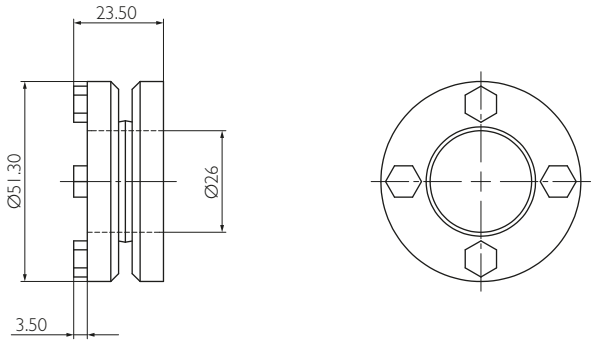


With pinion special solutions on request

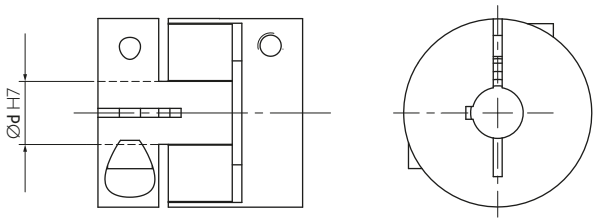


Casing can only be fastened with long screws as per the bore hole pattern.
Screws M6 of length 56mm + **H** + thread depth, tightening torque 9Nm.

Shrink disc

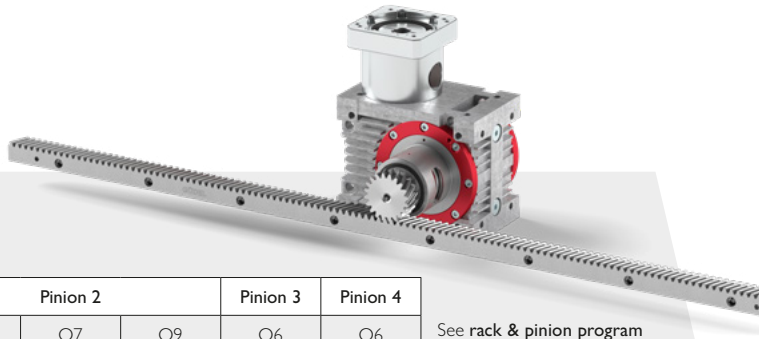


Elastomer coupling



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]	5004	1654	2510	7075	1760	4752	3638	4810
Max acceleration torque	T_{2B}	[Nm]	80	26	40	120	30	81	55	77
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.

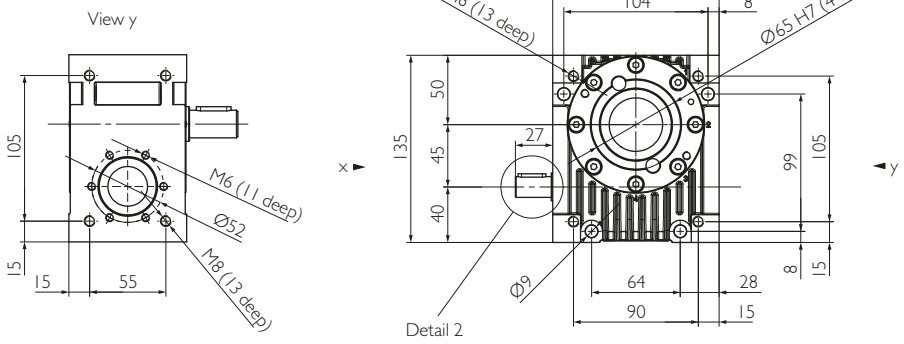
See **rack & pinion program** of your ideal drive train on pages 70 et seq.

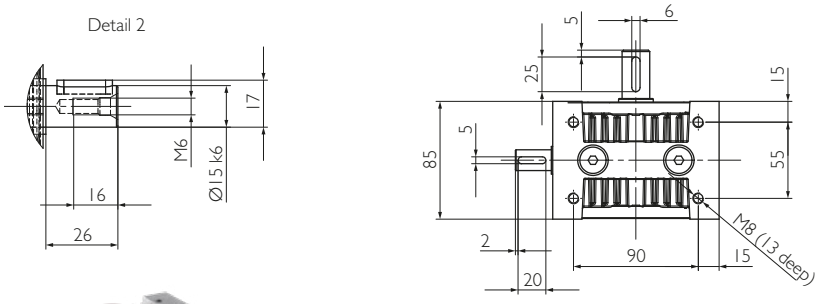
See **flowcharts** to find your ideal drive train on pages 88 et seq.

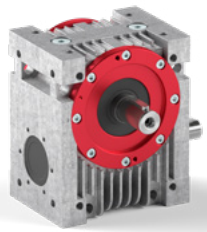
Input

Output

C

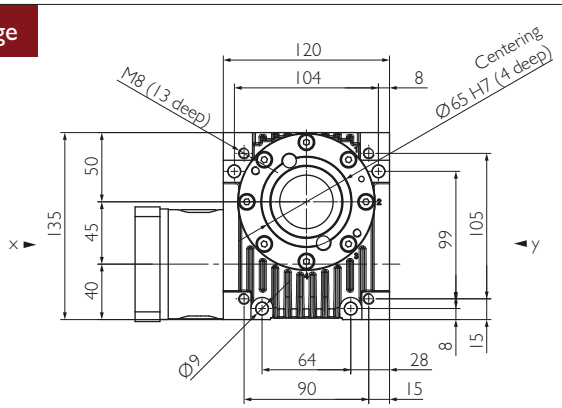


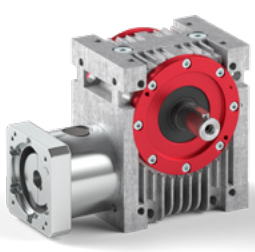


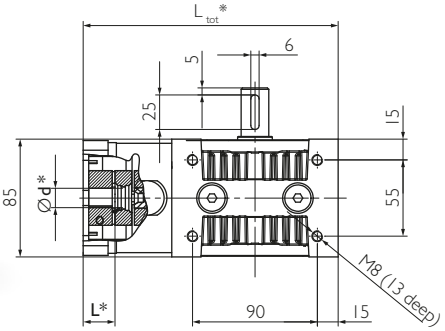


Example HPG 045 C4

C with option motor flange



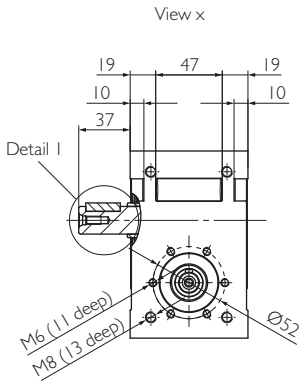




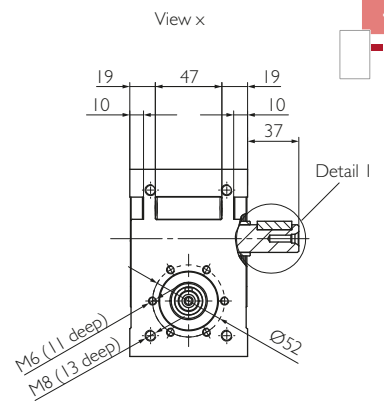
Example HPG 045 C5

* Motor-specific gearbox dimensions

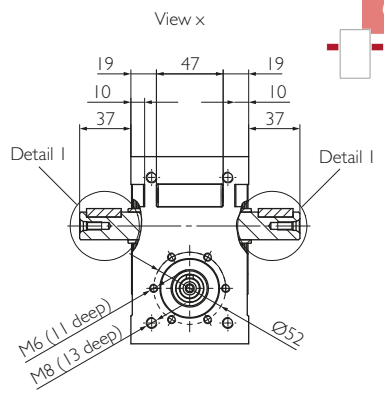
4

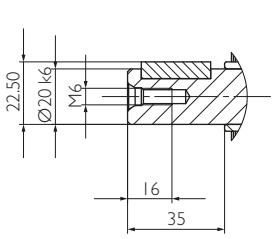


5



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]	52.7	73.9	83.9	80.5	70.8	81.7	75.5	73.9	75.0	77.9	54.5	79.4	54.5
		η	[%]	88	88	87	86	85	82	79	75	71	63	59	50	43
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	43.8	63.3	73.1	71.0	62.9	72.9	67.7	66.4	74.0	72.2	54.5	71.5	55.5
		η	[%]	89	89	88	87	86	84	81	77	73	65	60	53	45
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	37.4	55.4	64.8	63.4	56.5	65.8	61.3	60.3	67.2	65.6	55.5	65.1	55.5
		η	[%]	89	89	89	88	86	84	81	77	74	66	60	53	45
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	26.0	40.3	48.3	48.1	43.4	51.0	47.8	47.2	52.7	51.6	51.8	51.3	51.8
		η	[%]	88	89	88	87	85	83	80	75	72	64	58	52	45
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	20.0	31.6	38.5	38.7	35.2	41.6	39.2	38.8	43.3	42.5	42.7	42.3	42.7
		η	[%]	87	87	87	85	83	81	77	73	70	62	54	50	43
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	16.2	26.0	32.0	32.4	29.6	35.2	33.2	33.0	36.8	36.1	36.4	36.0	36.4
		η	[%]	85	86	85	84	81	79	75	70	66	58	51	46	40
Max. acceleration torque		T_{2B}	[Nm]	60	90									60	90	60
Emergency stop torque		T_{2Not}	[Nm]	120										80	120	80
Idling torque[a]		T_{012}	[Nm]	1.05			0.95				0.8					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<15	<12	<11	<11	<9	<8					<7		
	PR	j_t	[arcmin]	<10	<8	<7	<7	<6	<5.5					<5		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	1.6	2.8	3.6	4	4.3	4.5	4.9	5.3	5.5	5.8	5.5	6	5.5
Stability at the output		C_{2K}	[Nm/arcmin]	30												
Max. axial force[c) d)] at the output		F_{a2max}	[N]	720	1000	1600	2200	2800	2900	3300	3700	3900	4700	4700	4800	4800
Max. radial force[c) e)] at the output		F_{r2max}	[N]	700	820	1200	1400	1600	1600	1600	1700	1800	2000	2100	2200	2200
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	45	53	76	91	110	100	110	110	110	130	140	140	140
Max. axial force[c) d)] at the input		F_{a1max}	[N]	1400	980	860	1000	1300	1100	1300	1300	1200	1200	1200	1200	1200
Max. radial force[c) f)] at the input		F_{r1max}	[N]	510	470	430	510	590	550	610	630	580	610	600	620	600
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	120	57	34	24	19	13	10	9	8	7	6	6	6
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	148	85	62	52	47	41	38	37	36	35	34	34	34
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	235	172	149	139	134	128	125	124	123	122	121	121	121
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	4												
Weight with motor components		m	[kg]	≈ 5												
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														

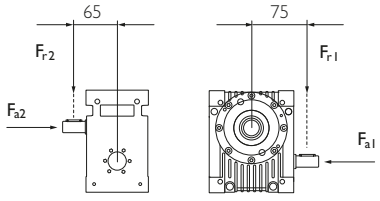
a) approximate, at n_1 = 3000 rpm and operating temperature.

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 = 3000 rpm; ⅔ 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 65 mm from the middle of the casing.
c) f) at a distance of 75 mm from the middle of the casing.

g) in relation to the input.
g) h) including elastomer coupling 5103-19 (calculated with drilled hole for motor shaft-Ø15)
g) i) including elastomer coupling 5103-24 (calculated with drilled hole for motor shaft-Ø20)

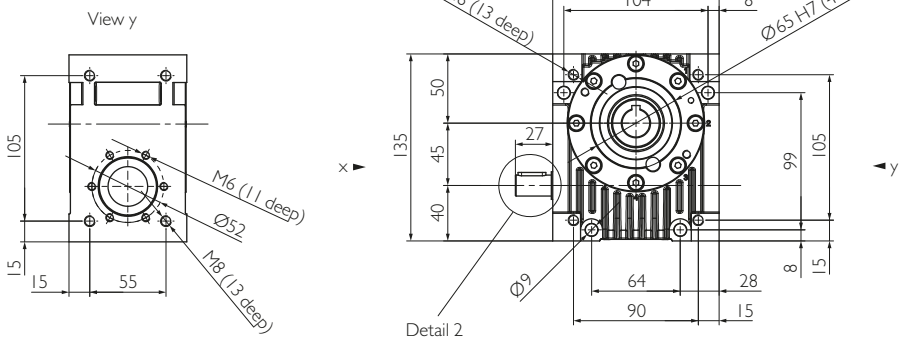
Bearing forces

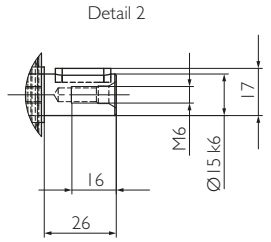


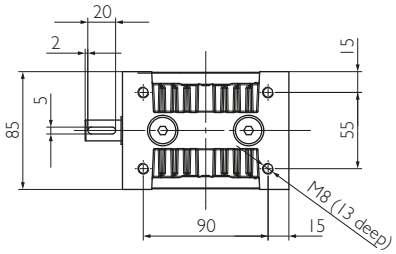
at the output at the input

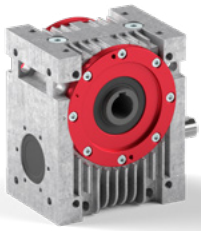
Input

C



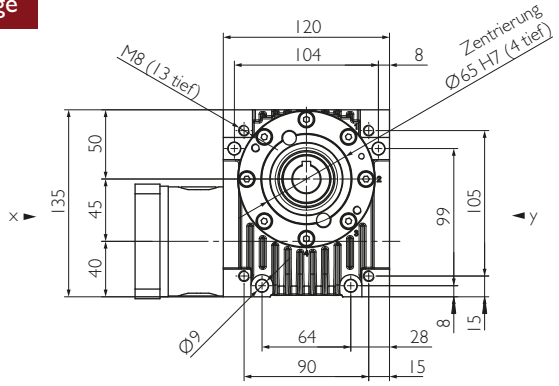


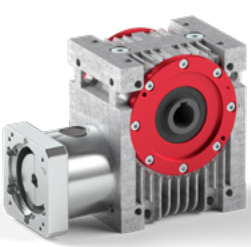


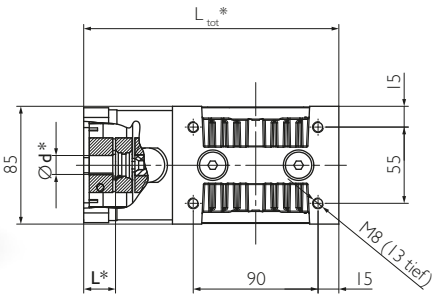


Example HPG 045 C7

C with option motor flange





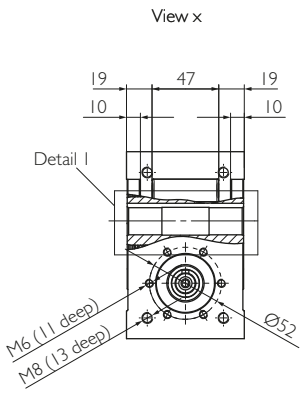


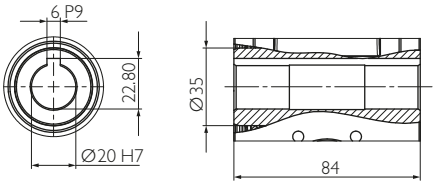
Example HPG 045 C7

* 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]	52.7	73.9	83.9	80.5	70.8	81.7	75.5	73.9	75.0	77.9	54.5	79.4	54.5
		η	[%]	88	88	87	86	85	82	79	75	71	63	59	50	43
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	43.8	63.3	73.1	71.0	62.9	72.9	67.7	66.4	74.0	72.2	54.5	71.5	55.5
		η	[%]	89	89	88	87	86	84	81	77	73	65	60	53	45
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	37.4	55.4	64.8	63.4	56.5	65.8	61.3	60.3	67.2	65.6	55.5	65.1	55.5
		η	[%]	89	89	89	88	86	84	81	77	74	66	60	53	45
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	26.0	40.3	48.3	48.1	43.4	51.0	47.8	47.2	52.7	51.6	51.8	51.3	51.8
		η	[%]	88	89	88	87	85	83	80	75	72	64	58	52	45
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	20.0	31.6	38.5	38.7	35.2	41.6	39.2	38.8	43.3	42.5	42.7	42.3	42.7
		η	[%]	87	87	87	85	83	81	77	73	70	62	54	50	43
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	16.2	26.0	32.0	32.4	29.6	35.2	33.2	33.0	36.8	36.1	36.4	36.0	36.4
		η	[%]	85	86	85	84	81	79	75	70	66	58	51	46	40
Max. acceleration torque		T_{2B}	[Nm]	60	90									60	90	60
Emergency stop torque		T_{2Not}	[Nm]	120										80	120	80
Idling torque[a]		T_{012}	[Nm]	1.05			0.95				0.8					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<15	<12	<11	<11	<9	<8					<7		
	PR	j_t	[arcmin]	<10	<8	<7	<7	<6	<5.5					<5		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	1.6	2.8	3.6	4	4.3	4.5	4.9	5.3	5.5	5.8	5.5	6	5.5
Stability at the output		C_{2K}	[Nm/arcmin]	30												
Max. axial force[c) d)] at the output		F_{a2max}	[N]	360	600	1100	1600	2200	2400	2700	3100	3200	4000	4300	4400	4400
Max. radial force[c) e)] at the output		F_{r2max}	[N]	370	580	780	1200	1400	1400	1400	1500	1500	1700	1900	1900	1900
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	24	38	51	75	89	88	91	96	98	110	120	120	120
Max. axial force[c) d)] at the input		F_{a1max}	[N]	1400	980	860	1000	1300	1100	1300	1300	1200	1200	1200	1200	1200
Max. radial force[c) f)] at the input		F_{r1max}	[N]	510	470	430	510	590	550	610	630	580	610	600	620	600
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	97	47	29	21	16	12	10	8	7	7	6	6	6
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	125	75	57	49	44	40	38	36	35	35	34	34	34
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	212	162	144	136	131	127	125	123	122	122	121	121	121
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	4												
Weight with motor components		m	[kg]	≈ 5												
Max. permissible housing temperature			[°C]	+90												
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Lubrication		synthetic gear oil (as per DIN 51502: CLP PG 460)														
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Protection class		IP65														

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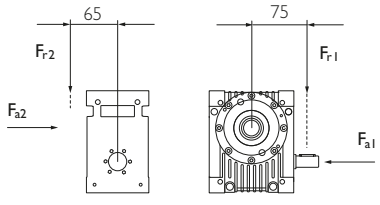
Bearing forces



at the output at the input

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