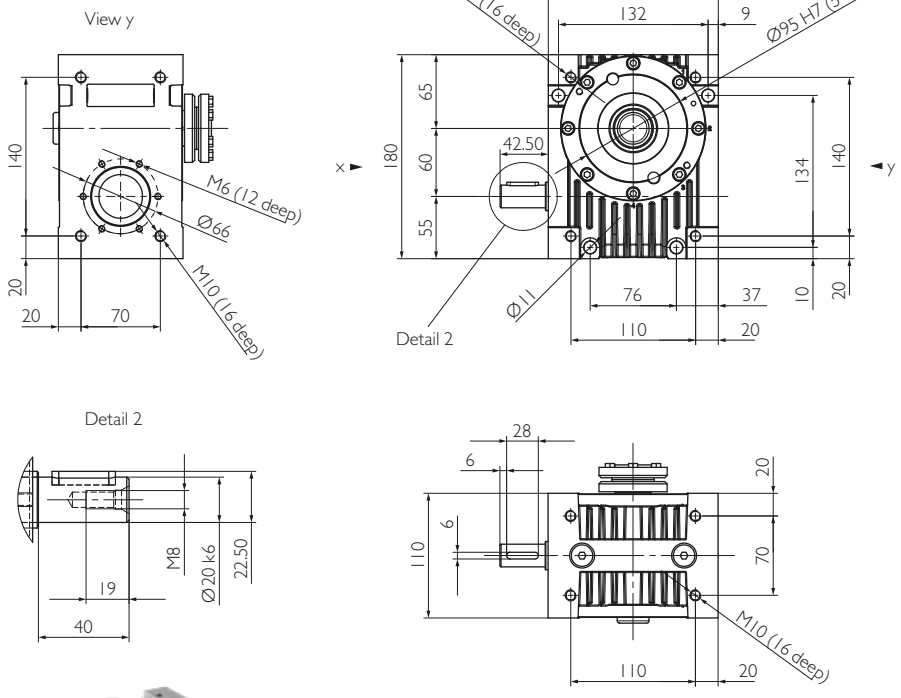
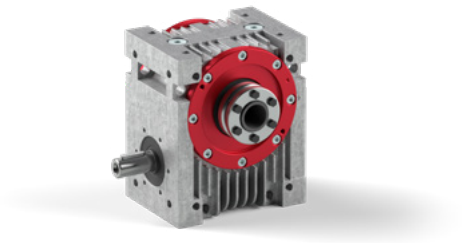
Input

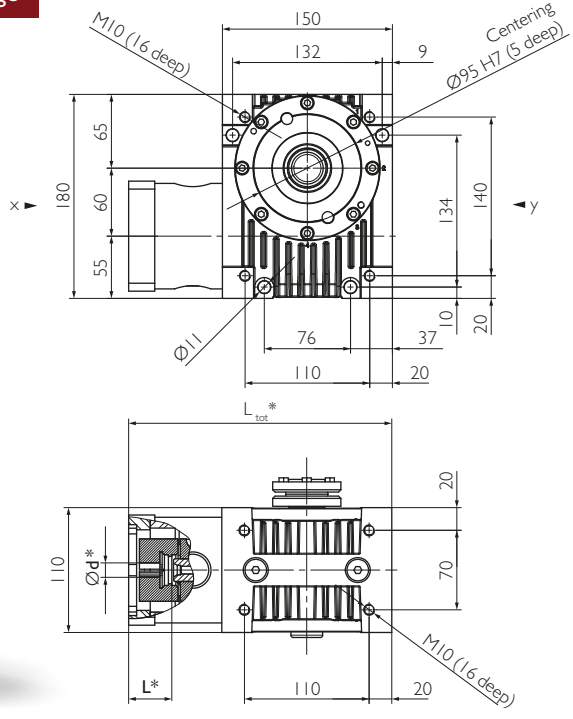
C

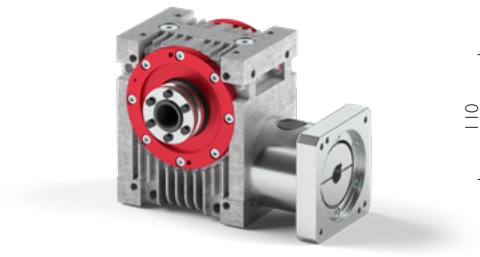




Example HPG 060 C2

C with option motor flange



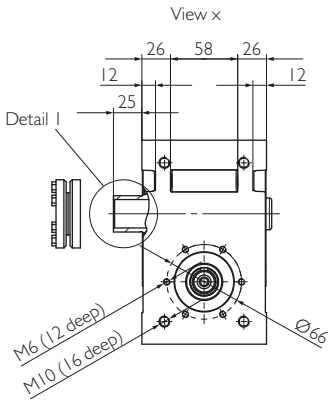


Example HPG 060 C3

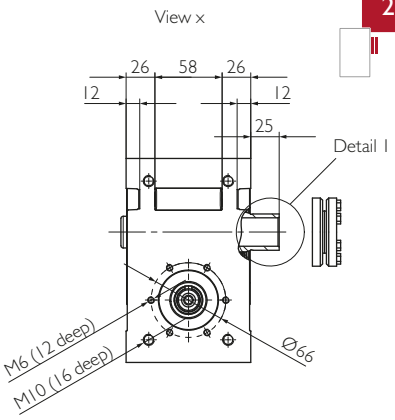
* Motor-specific gearbox dimensions

Output

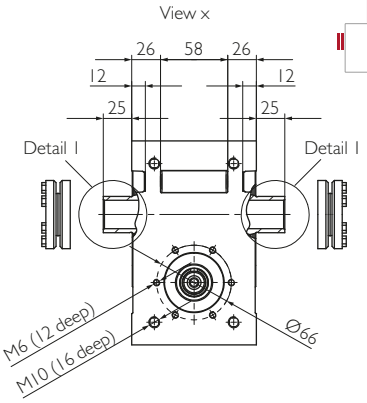
1

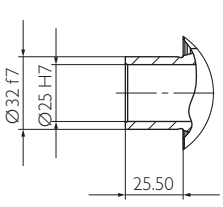


2



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]	135	192	219	211	186	215	199	195	195	202	144	209	144
		η	[%]	89	89	88	88	87	84	82	78	74	67	64	54	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	107	158	184	180	160	186	173	170	190	185	144	184	144
		η	[%]	90	90	90	89	88	86	84	81	77	70	65	56	53
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	89	135	159	157	140	164	153	151	168	165	144	163	144
		η	[%]	90	91	90	89	89	86	84	81	78	70	65	56	52
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	59	93	113	113	103	121	114	113	126	124	126	123	126
		η	[%]	90	90	90	89	88	86	83	80	77	69	64	55	50
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	44	71	88	89	81	96	91	90	101	99	101	98	101
		η	[%]	89	89	89	88	87	84	82	78	75	67	61	52	47
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	35	58	71	73	67	80	75	75	84	82	84	82	84
		η	[%]	88	88	88	87	85	83	80	75	72	64	58	48	44
Max. acceleration torque		T_{2B}	[Nm]	140	220									150	220	150
Emergency stop torque		T_{2Not}	[Nm]	300										200	300	200
Idling torque[a]		T_{012}	[Nm]	1.45			1.3				1.1					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<13	<10	<9	<9	<8	<7					<6		
	PR	j_t	[arcmin]	<9	<7	<6	<6	<5	<4.5					<4		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	2.5	4.8	7.6	8.6	10	11	12.1	13.3	14.5	15.4	15	16	15
Stability at the output		C_{2K}	[Nm/arcmin]	42												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	1300	1700	2600	3600	4400	4100	4500	5100	5300	6500	7300	7500	7500
Max. radial force[c)e)] at the output		F_{r2max}	[N]	1300	1500	2100	2500	2800	2400	2500	2600	2700	3100	3300	3300	3300
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	110	120	170	200	220	190	200	210	220	250	270	270	270
Max. axial force[c)d)] at the input		F_{a1max}	[N]	1700	990	750	1000	1400	1100	1400	1600	1200	1400	1300	1500	1300
Max. radial force[c)f)] at the input		F_{r1max}	[N]	690	510	390	520	720	560	710	760	610	650	620	690	630
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	467	221	135	95	74	52	42	34	31	27	26	25	25
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	582	336	250	210	189	167	157	149	146	142	141	140	140
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	721	475	389	349	328	306	296	288	285	281	280	279	279
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	9												
Weight with motor components		m	[kg]	≈ 11												
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 80 mm from the middle of the casing.

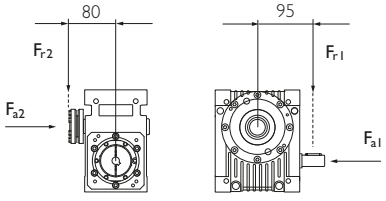
c) f) at a distance of 95 mm from the middle of the casing.

g) in relation to the input, including shrink disc at the output (output 1 & 2),
with two shrink discs (output 3) increase values by 200/i².

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

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

Bearing forces

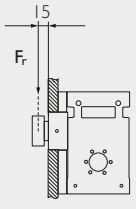


at the output at the input

Package

			Output flange including bearing & pinion				
Radial rigidity	C_3	[N/mm]	24000				
Speed	n_{2N}	[rpm]	1500	750	400	150	100
Max. radial force[j)]	F_{rmax}	[N]	2500	3200	4000	4500	5000

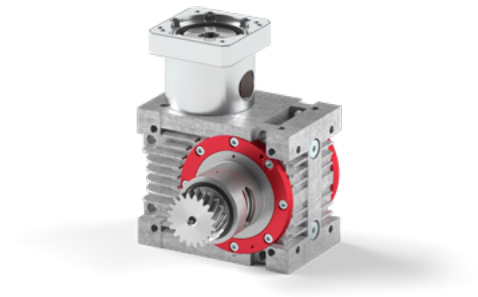
j) Bearing forces: Valid at duty cycle of 40% at a distance of 15mm from the end of the bearing.

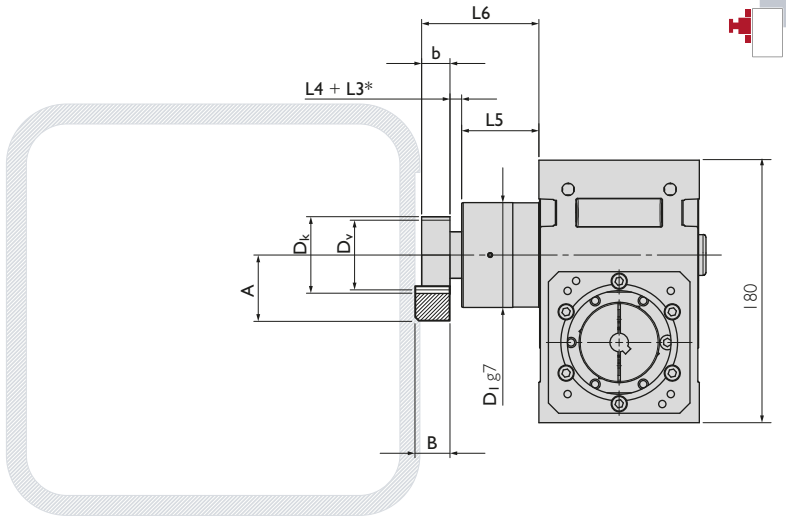


Detailed information about the **package, options & accessories** on pages 46 and 47.

Output flange including bearing & pinion a)

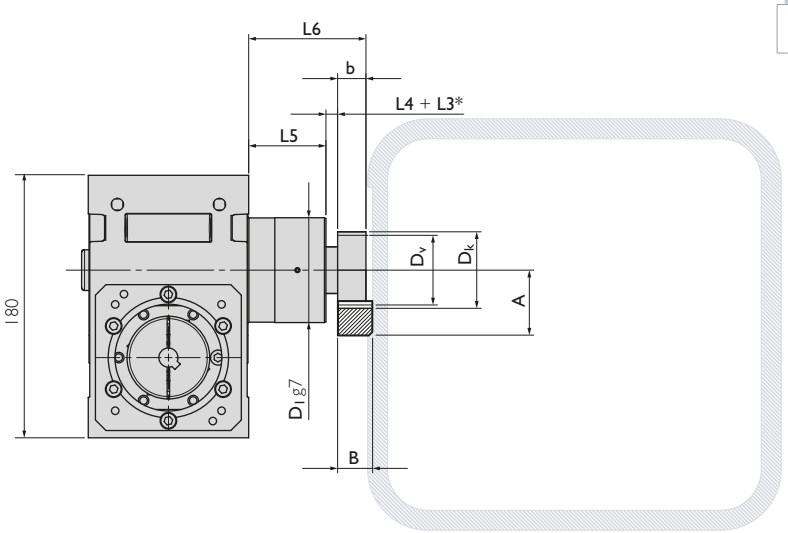
Package



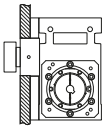


Example HPG 060 C2 Package

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.

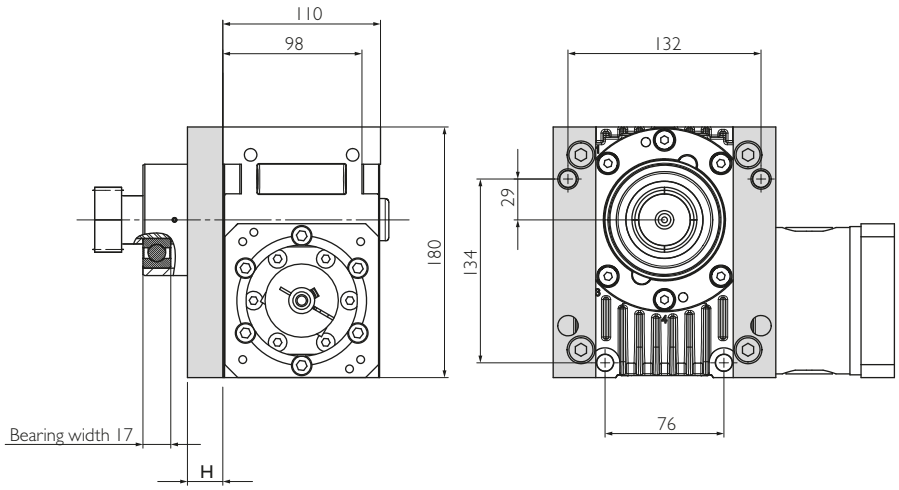
Helical modular pitch	Part. No.	m_n	P_t	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 1	211220	2	6.66	20	43.220	20	24	46.44	42.441	42.441	72	8	53	81
													58	86
													83	111
Pinion 2	211320	2.5	8.33	20	48.025	25	24	58.05	53.052	53.052	72	8	53	86
													58	91
													83	116
Pinion 3	211416	3	10.00	16	52.365	30	29	58.73	52.930	52.730	72	8	53	91
													58	96
													83	121

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

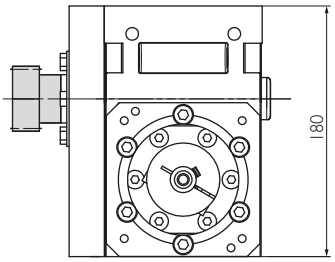
Straight modular pitch	Part. No.	m_n	P_n	z	A	b	B	D_k	D_0	D_v	D_1	L4	L5	L6
Pinion 4	201220	2	6.28	20	42.000	20	24	44.00	40.000	40.000	72	8	53	81
													58	86
													83	111
Pinion 5	201320	2.5	7.85	20	46.500	25	24	55.00	50.000	50.000	72	8	53	86
													58	91
													83	116
Pinion 6	201416	3	9.42	16	50.900	30	29	55.80	48.000	49.800	72	8	53	91
													58	96
													83	121

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

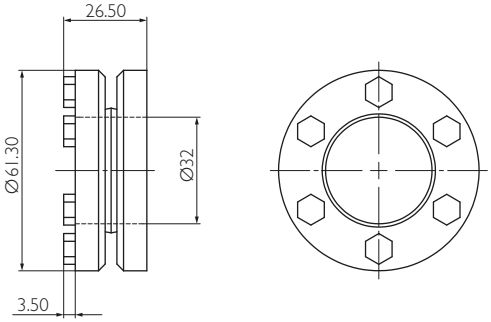


With pinion special solutions on request

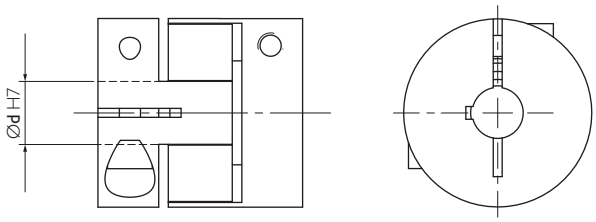


Casing can only be fastened with long screws as per the bore hole pattern.
Screws M6 of length 56mm + **H** + thread depth, tightening torque 9Nm.

Shrink disc

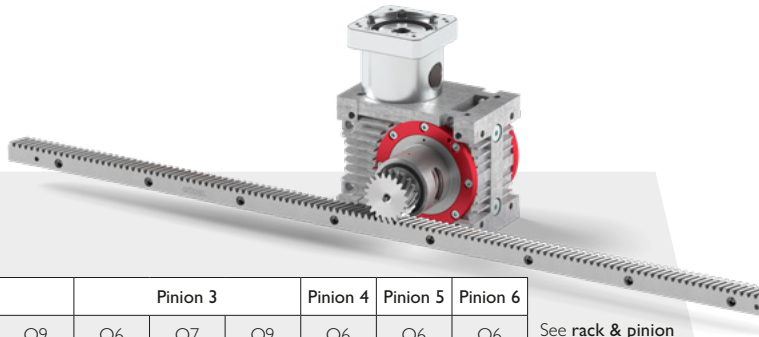


Elastomer coupling



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	Pinion 5	Pinion 6
			Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q6	Q6
Max acceleration force	F_{2B}	[N]	7490	2963	5036	11199	4703	8095	15272	4714	12273	5958	9004	12597
Max acceleration torque	T_{2B}	[Nm]	159	63	107	297	125	215	389	120	313	119	225	302
Precision			PR PS			PR PS			PR PS					
Feed force			High	Medium	Elevated	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.

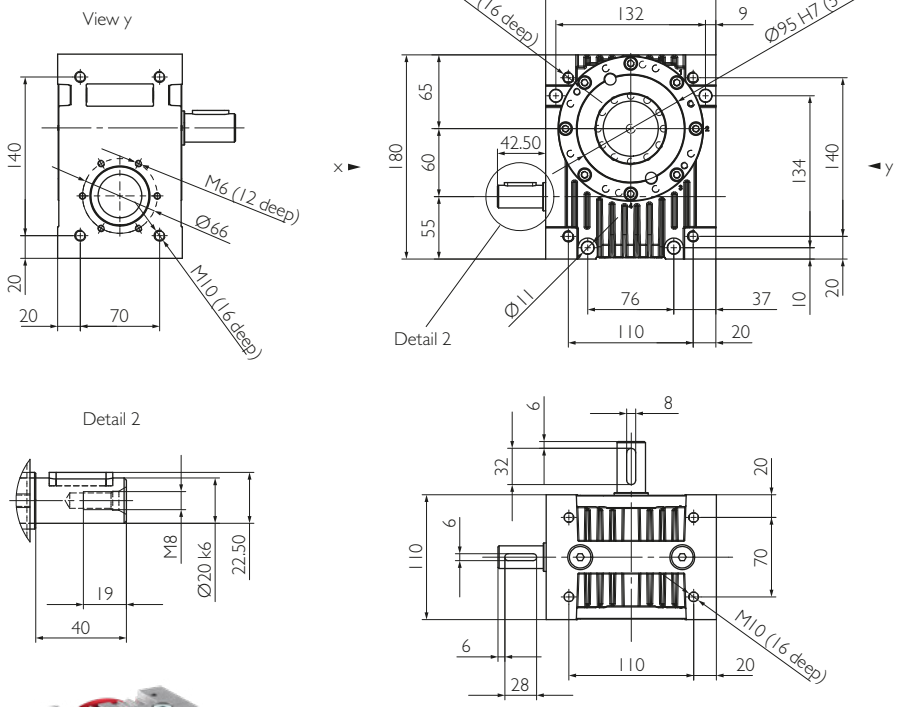
See **rack & pinion program** of your ideal drive train on pages 70 et seq.

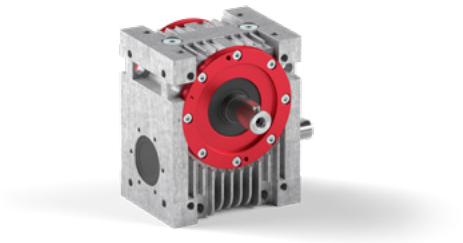
See **flowcharts** to find your ideal drive train on pages 88 et seq.

Input

Output

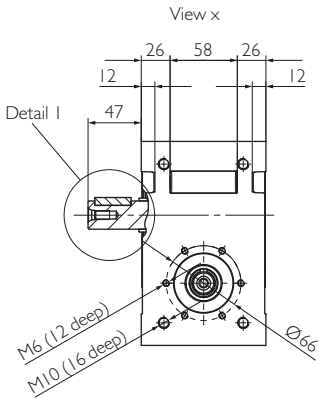
C



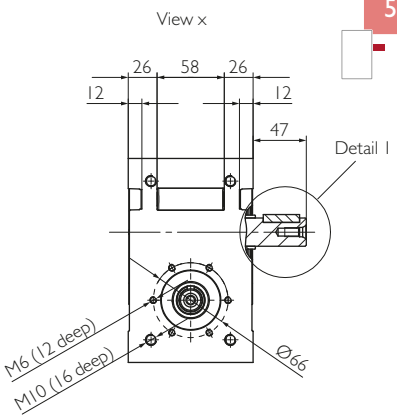


Example HPG 060 C4

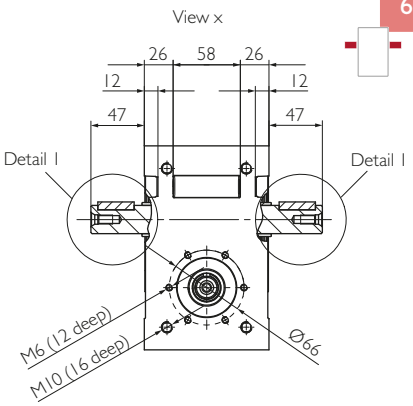
4



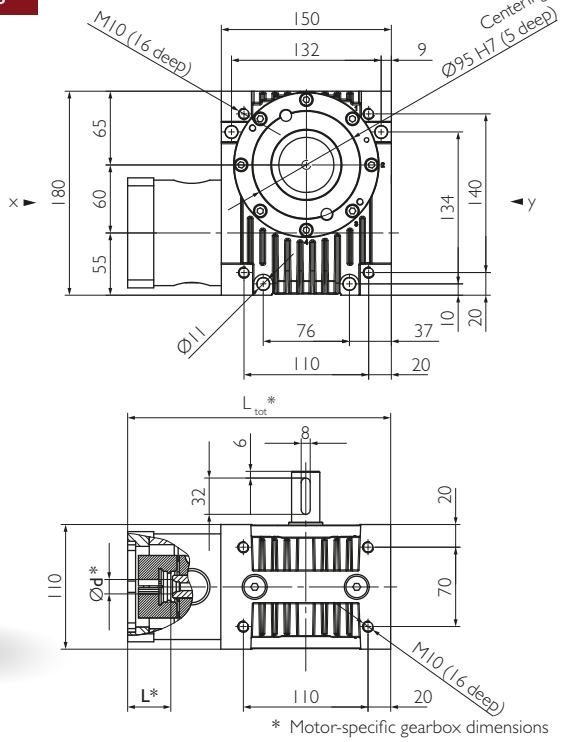
5

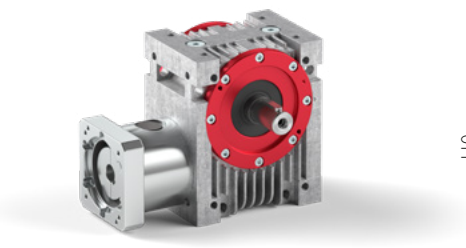


6



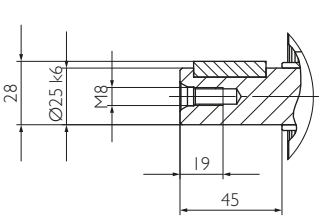
C with option motor flange





Example HPG 060 C6

* Motor-specific gearbox dimensions



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]	135	192	219	211	186	215	199	195	195	202	144	209	144
		η	[%]	89	89	88	88	87	84	82	78	74	67	64	54	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	107	158	184	180	160	186	173	170	190	185	144	184	144
		η	[%]	90	90	90	89	88	86	84	81	77	70	65	56	53
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	89	135	159	157	140	164	153	151	168	165	144	163	144
		η	[%]	90	91	90	89	89	86	84	81	78	70	65	56	52
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	59	93	113	113	103	121	114	113	126	124	126	123	126
		η	[%]	90	90	90	89	88	86	83	80	77	69	64	55	50
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	44	71	88	89	81	96	91	90	101	99	101	98	101
		η	[%]	89	89	89	88	87	84	82	78	75	67	61	52	47
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	35	58	71	73	67	80	75	75	84	82	84	82	84
		η	[%]	88	88	88	87	85	83	80	75	72	64	58	48	44
Max. acceleration torque		T_{2B}	[Nm]	140	220									150	220	150
Emergency stop torque		T_{2Not}	[Nm]	300										200	300	200
Idling torque[a]		T_{012}	[Nm]	1.45			1.3				1.1					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<13	<10	<9	<9	<8	<7					<6		
	PR	j_t	[arcmin]	<9	<7	<6	<6	<5	<4.5					<4		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	2.5	4.8	7.6	8.6	10	11	12.1	13.3	14.5	15.4	15	16	15
Stability at the output		C_{2K}	[Nm/arcmin]	42												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	1300	1700	2600	3600	4400	4100	4500	5100	5300	6500	7300	7500	7500
Max. radial force[c)e)] at the output		F_{r2max}	[N]	1300	1500	2100	2500	2800	2400	2500	2600	2700	3100	3300	3300	3300
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	110	120	170	200	220	190	200	210	220	250	270	270	270
Max. axial force[c)d)] at the input		F_{a1max}	[N]	1700	990	750	1000	1400	1100	1400	1600	1200	1400	1300	1500	1300
Max. radial force[c)f)] at the input		F_{r1max}	[N]	690	510	390	520	720	560	710	760	610	650	620	690	630
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	467	221	135	95	74	52	42	34	31	27	26	25	25
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	582	336	250	210	189	167	157	149	146	142	141	140	140
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	721	475	389	349	328	306	296	288	285	281	280	279	279
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	9												
Weight with motor components		m	[kg]	≈ 11												
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														

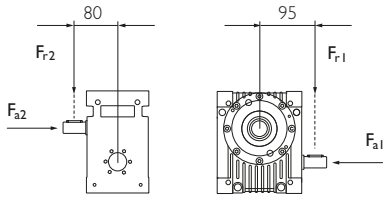
a) approximate, at n_1 = 3000 rpm and operating temperature.

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 80 mm from the middle of the casing.
c) f) at a distance of 95 mm from the middle of the casing.

g) in relation to the input.
g) h) including elastomer coupling 5103-24 (calculated with drilled hole for motor shaft-Ø20)
g) i) including elastomer coupling 5103-28 (calculated with drilled hole for motor shaft-Ø25)

Bearing forces



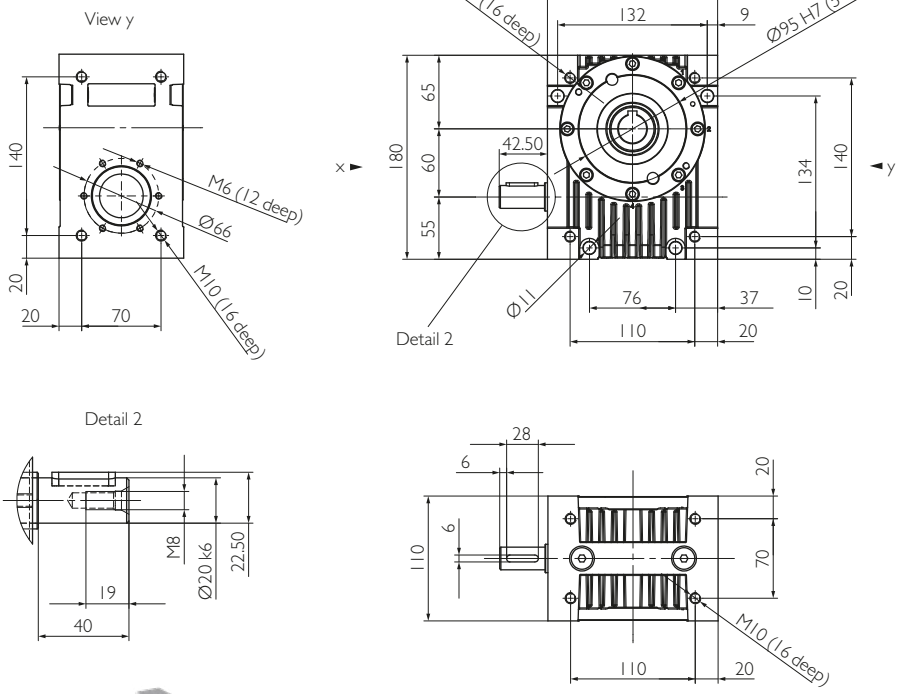
at the output at the input

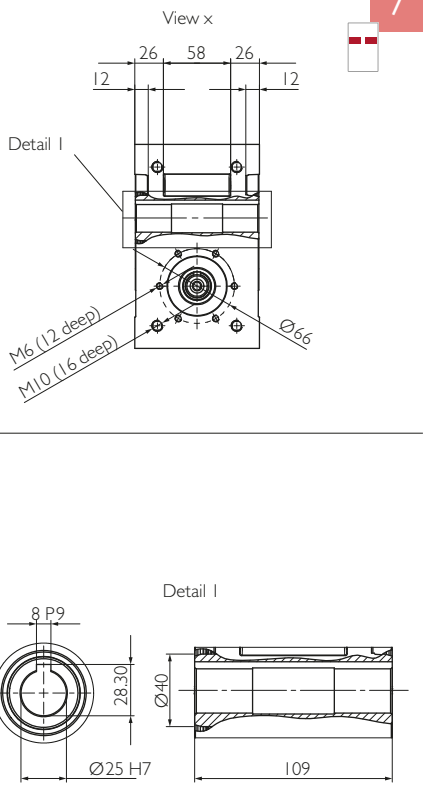
Input

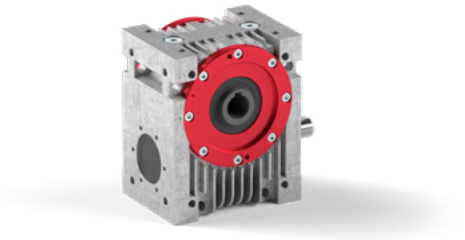
Output

C

7

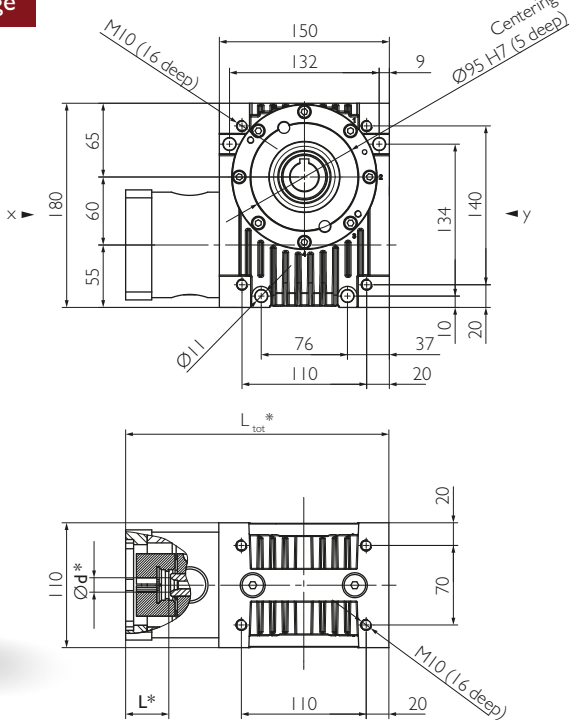


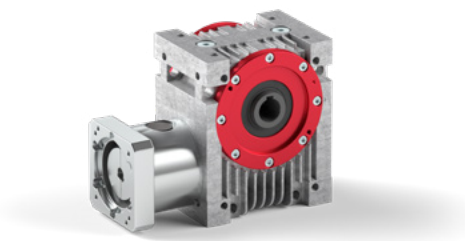




Example HPG 060 C7

C with option motor flange





Example HPG 060 C7

* Motor-specific gearbox dimensions

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]	135	192	219	211	186	215	199	195	195	202	144	209	144
		η	[%]	89	89	88	88	87	84	82	78	74	67	64	54	50
	n_{1N} = 1000 rpm	T_{2N}	[Nm]	107	158	184	180	160	186	173	170	190	185	144	184	144
		η	[%]	90	90	90	89	88	86	84	81	77	70	65	56	53
	n_{1N} = 1500 rpm	T_{2N}	[Nm]	89	135	159	157	140	164	153	151	168	165	144	163	144
		η	[%]	90	91	90	89	89	86	84	81	78	70	65	56	52
	n_{1N} = 3000 rpm	T_{2N}	[Nm]	59	93	113	113	103	121	114	113	126	124	126	123	126
		η	[%]	90	90	90	89	88	86	83	80	77	69	64	55	50
	n_{1N} = 4500 rpm	T_{2N}	[Nm]	44	71	88	89	81	96	91	90	101	99	101	98	101
		η	[%]	89	89	89	88	87	84	82	78	75	67	61	52	47
	n_{1N} = 6000 rpm	T_{2N}	[Nm]	35	58	71	73	67	80	75	75	84	82	84	82	84
		η	[%]	88	88	88	87	85	83	80	75	72	64	58	48	44
Max. acceleration torque		T_{2B}	[Nm]	140	220									150	220	150
Emergency stop torque		T_{2Not}	[Nm]	300										200	300	200
Idling torque[a]		T_{012}	[Nm]	1.45			1.3				1.1					
Max. input speed		n_{1Max}	[rpm]	6000												
Max. backlash[b] at the output	PS	j_t	[arcmin]	<13	<10	<9	<9	<8	<7					<6		
	PR	j_t	[arcmin]	<9	<7	<6	<6	<5	<4.5					<4		
Torsional rigidity from output to input		C_{t21}	[Nm/arcmin]	2.5	4.8	7.6	8.6	10	11	12.1	13.3	14.5	15.4	15	16	15
Stability at the output		C_{2K}	[Nm/arcmin]	42												
Max. axial force[c)d)] at the output		F_{a2max}	[N]	780	1100	1900	2800	3600	3300	3800	4300	4500	5600	6300	6400	6400
Max. radial force[c)e)] at the output		F_{r2max}	[N]	840	1200	1500	2200	2400	2000	2100	2300	2300	2700	2900	2900	2900
Max. overturning torque[c)] at the output		M_{2max}	[Nm]	67	95	120	170	190	160	170	180	190	220	230	240	230
Max. axial force[c)d)] at the input		F_{a1max}	[N]	1700	990	750	1000	1400	1100	1400	1600	1200	1400	1300	1500	1300
Max. radial force[c)f)] at the input		F_{r1max}	[N]	690	510	390	520	720	560	710	760	610	650	620	690	630
Mass moment of inertia[g)]		J_1	[10^{-6} kg m^2]	416	199	122	87	68	49	40	33	30	27	26	25	25
Mass moment of inertia[g) h)]		J_1	[10^{-6} kg m^2]	531	314	237	202	183	164	155	148	145	142	141	140	140
Mass moment of inertia[g) i)]		J_1	[10^{-6} kg m^2]	670	453	376	341	322	303	294	287	284	281	280	279	279
Service life		L_h	[h]	25000												
Weight without motor components		m	[kg]	8												
Weight with motor components		m	[kg]	≈ 10												
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 80 mm from the middle of the casing.

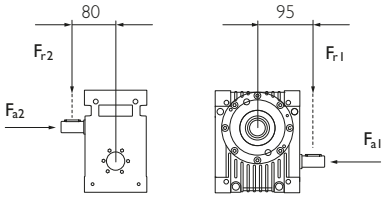
c) f) at a distance of 95 mm from the middle of the casing.

g) in relation to the input.

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

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

Bearing forces



at the output at the input

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