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PKX right-angle planetary geared motors

10.1 Overview

Helical-gear precision right-angle planetary geared motors

Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€€€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
Maintenance-free	✓
Small installation space	✓
Continuous operation without cooling	✓
(FKM sealing ring at the input)	
Reinforced output bearing	✓ (optional)
Compact and dynamic due to direct motor attachment	✓

Key: ★☆☆☆☆ good | ★★★★★ excellent
 € Economy | €€€€€ Premium

Technical data

i	3 – 210
M_{2acc}	13 – 3000 Nm
$\Delta\phi_2$	4 – 8.5 arcmin
η_{get}	≤ 96 %

10.2 Selection tables

The technical data specified in the selection tables applies to:

- Installation altitudes up to 1000 m above sea level
- Surrounding temperatures from 0 °C to 40 °C
- Drives with convection-cooled motors

An explanation of the formula symbols can be found in the Chapter [15.1](#).

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{2acc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} <small>EL1,2,5,6</small>	n_{1maxDB} <small>EL3,4</small>	n_{1maxZB}	J_1	$\Delta\varphi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/arcmin]	[kg]
P2KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 22$ Nm)																
375	18	19	63	0.91	P221_0040 KX301VF0020 MF LM401U	22	44	8.000	8/1	3500	3000	5500	2.5	8.5	1.5	7.7
429	15	17	106	0.91	P221_0070 KX301VF0010 MF LM401U	22	44	7.000	7/1	3000	2500	4500	2.7	7.5	1.7	7.7
600	11	12	75	1.3	P221_0050 KX301VF0010 MF LM401U	22	44	5.000	5/1	3000	2500	4500	2.7	8	1.6	7.7
750	8.8	9.5	60	1.6	P221_0040 KX301VF0010 MF LM401U	17	44	4.000	4/1	3000	2500	4500	2.7	8.5	1.5	7.7
750	17	18	118	0.81	P221_0040 KX301VF0010 MF LM402U	22	44	4.000	4/1	3000	2500	4500	4.1	8.5	1.5	9.4
P3KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 63$ Nm)																
143	46	50	43	0.98	P321_0070 KX301VF0030 MF LM401U	60	130	21.00	21/1	3500	3500	6000	2.4	5.5	3.7	8.4
188	35	38	50	1.1	P321_0080 KX301VF0020 MF LM401U	50	100	16.00	16/1	3500	3000	5500	2.5	5.5	3.7	8.4
200	33	36	33	1.3	P321_0050 KX301VF0030 MF LM401U	63	130	15.00	15/1	3500	3500	6000	2.4	6	3.6	8.4
214	31	33	39	1.5	P321_0070 KX301VF0020 MF LM401U	60	130	14.00	14/1	3500	3000	5500	2.5	5.5	3.7	8.4
250	26	28	33	1.3	P321_0040 KX301VF0030 MF LM401U	50	100	12.00	12/1	3500	3500	6000	2.4	6.5	3.2	8.4
300	22	24	30	1.9	P321_0050 KX301VF0020 MF LM401U	43	130	10.00	10/1	3500	3000	5500	2.5	6	3.6	8.4
300	43	44	58	0.99	P321_0050 KX301VF0020 MF LM402U	63	130	10.00	10/1	3500	3000	5500	3.8	6	3.6	10
375	18	19	30	1.9	P321_0040 KX301VF0020 MF LM401U	34	100	8.000	8/1	3500	3000	5500	2.5	6.5	3.2	8.4
375	34	35	58	0.99	P321_0040 KX301VF0020 MF LM402U	50	100	8.000	8/1	3500	3000	5500	3.8	6.5	3.2	10
429	15	17	38	2.6	P321_0070 KX301VF0010 MF LM401U	30	130	7.000	7/1	3000	2500	4500	2.7	5.5	3.7	8.4
429	30	31	74	1.3	P321_0070 KX301VF0010 MF LM402U	60	130	7.000	7/1	3000	2500	4500	4.1	5.5	3.7	10
429	41	42	100	0.96	P321_0070 KX301VF0010 MF LM403U	60	130	7.000	7/1	3000	2500	4500	5.4	5.5	3.7	12
500	13	14	30	1.9	P321_0030 KX301VF0020 MF LM401U	26	77	6.000	6/1	3500	3000	5500	2.5	7.5	2.5	8.4
500	26	27	58	0.99	P321_0030 KX301VF0020 MF LM402U	38	77	6.000	6/1	3500	3000	5500	3.9	7.5	2.5	10
600	11	12	27	3.6	P321_0050 KX301VF0010 MF LM401U	22	110	5.000	5/1	3000	2500	4500	2.8	6	3.6	8.4
600	21	22	52	1.8	P321_0050 KX301VF0010 MF LM402U	46	110	5.000	5/1	3000	2500	4500	4.1	6	3.6	10
600	29	30	71	1.3	P321_0050 KX301VF0010 MF LM403U	61	110	5.000	5/1	3000	2500	4500	5.4	6	3.6	12
750	8.8	9.5	25	3.9	P321_0040 KX301VF0010 MF LM401U	17	91	4.000	4/1	3000	2500	4500	2.8	6.5	3.2	8.4
750	17	18	49	2.0	P321_0040 KX301VF0010 MF LM402U	37	91	4.000	4/1	3000	2500	4500	4.1	6.5	3.2	10
750	23	24	66	1.4	P321_0040 KX301VF0010 MF LM403U	49	91	4.000	4/1	3000	2500	4500	5.4	6.5	3.2	12
1000	6.6	7.1	25	3.9	P321_0030 KX301VF0010 MF LM401U	13	68	3.000	3/1	3000	2500	4500	2.9	7.5	2.5	8.4
1000	13	13	49	2.0	P321_0030 KX301VF0010 MF LM402U	28	68	3.000	3/1	3000	2500	4500	4.2	7.5	2.5	10
1000	18	18	66	1.4	P321_0030 KX301VF0010 MF LM403U	37	68	3.000	3/1	3000	2500	4500	5.5	7.5	2.5	12
P4KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 120$ Nm)																
75	86	93	58	0.99	P422_0200 KX301VF0020 MF LM401U	120	240	40.00	40/1	3500	3000	5500	2.5	5.5	10	11
86	75	81	85	1.1	P422_0350 KX301VF0010 MF LM401U	120	240	35.00	35/1	3000	2500	4500	2.7	5.5	10	11
94	69	74	46	1.2	P422_0160 KX301VF0020 MF LM401U	120	240	32.00	32/1	3500	3000	5500	2.5	5.5	9.7	11
100	66	71	52	0.91	P421_0100 KX401VF0030 MF LM401U	100	200	30.00	30/1	3000	3000	5500	3.1	5	8.3	11
125	53	57	31	1.5	P421_0080 KX401VF0030 MF LM401U	100	200	24.00	24/1	3000	3000	5500	3.1	5.5	8.3	11
143	46	50	26	1.8	P421_0070 KX401VF0030 MF LM401U	90	240	21.00	21/1	3000	3000	5500	3.1	5.5	8.4	11
143	90	93	50	0.94	P421_0070 KX401VF0030 MF LM402U	110	240	21.00	21/1	3000	3000	5500	4.5	5.5	8.4	13
150	44	47	47	1.4	P421_0100 KX401VF0020 MF LM401U	86	200	20.00	20/1	2500	2500	5000	3.3	5	8.3	11
188	35	38	28	2.3	P421_0080 KX401VF0020 MF LM401U	69	200	16.00	16/1	2500	2500	5000	3.3	5.5	8.3	11
188	69	71	55	1.2	P421_0080 KX401VF0020 MF LM402U	100	200	16.00	16/1	2500	2500	5000	4.7	5.5	8.3	13
188	94	96	75	0.86	P421_0080 KX401VF0020 MF LM403U	100	200	16.00	16/1	2500	2500	5000	5.9	5.5	8.3	14
200	33	36	18	2.6	P421_0050 KX401VF0030 MF LM401U	65	240	15.00	15/1	3000	3000	5500	3.1	6	8.0	11
200	64	66	36	1.3	P421_0050 KX401VF0030 MF LM402U	120	240	15.00	15/1	3000	3000	5500	4.5	6	8.0	13
200	88	90	49	0.97	P421_0050 KX401VF0030 MF LM403U	120	240	15.00	15/1	3000	3000	5500	5.8	6	8.0	14
214	31	33	23	2.8	P421_0070 KX401VF0020 MF LM401U	60	240	14.00	14/1	2500	2500	5000	3.3	5.5	8.4	11
214	60	62	45	1.4	P421_0070 KX401VF0020 MF LM402U	110	240	14.00	14/1	2500	2500	5000	4.7	5.5	8.4	13
214	82	84	62	1.0	P421_0070 KX401VF0020 MF LM403U	110	240	14.00	14/1	2500	2500	5000	6.0	5.5	8.4	14
250	26	28	18	2.6	P421_0040 KX401VF0030 MF LM401U	52	210	12.00	12/1	3000	3000	5500	3.1	6.5	6.9	11
250	52	53	36	1.3	P421_0040 KX401VF0030 MF LM402U	97	210	12.00	12/1	3000	3000	5500	4.5	6.5	6.9	13
250	70	72	49	0.97	P421_0040 KX401VF0030 MF LM403U	97	210	12.00	12/1	3000	3000	5500	5.8	6.5	6.9	14
300	22	24	17	3.9	P421_0050 KX401VF0020 MF LM401U	43	240	10.00	10/1	2500	2500	5000	3.3	6	8.0	11
300	43	44	33	2.0	P421_0050 KX401VF0020 MF LM402U	93	240	10.00	10/1	2500	2500	5000	4.7	6	8.0	13
300	58	60	44	1.4	P421_0050 KX401VF0020 MF LM403U	120	240	10.00	10/1	2500	2500	5000	6.0	6	8.0	14
300	89	94	68	0.95	P421_0050 KX401VF0020 MF LM503U	120	240	10.00	10/1	2500	2500	5000	12	6	8.0	17
375	18	19	17	3.9	P421_0040 KX401VF0020 MF LM401U	34	210	8.000	8/1	2500	2500	5000	3.4	6.5	6.9	11

10.2 Selection tables 10 PKX right-angle planetary geared motors

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{2acc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} <small>EL1,2,5,6</small>	n_{1maxDB} <small>EL3,4</small>	n_{1maxZB}	J_1	$\Delta\varphi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/ arcmin]	[kg]
P4KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 120$ Nm)																
375	34	35	33	2.0	P421_0040 KX401VF0020 MF LM402U	74	210	8.000	8/1	2500	2500	5000	4.7	6.5	6.9	13
375	47	48	44	1.4	P421_0040 KX401VF0020 MF LM403U	97	210	8.000	8/1	2500	2500	5000	6.0	6.5	6.9	14
375	71	76	68	0.95	P421_0040 KX401VF0020 MF LM503U	97	210	8.000	8/1	2500	2500	5000	12	6.5	6.9	17
429	15	17	22	4.8	P421_0070 KX401VF0010 MF LM401U	30	240	7.000	7/1	2500	2000	4000	4.1	5.5	8.4	11
429	30	31	44	2.5	P421_0070 KX401VF0010 MF LM402U	65	240	7.000	7/1	2500	2000	4000	5.4	5.5	8.4	13
429	41	42	60	1.8	P421_0070 KX401VF0010 MF LM403U	86	240	7.000	7/1	2500	2000	4000	6.7	5.5	8.4	14
429	62	66	91	1.2	P421_0070 KX401VF0010 MF LM503U	110	240	7.000	7/1	2500	2000	4000	13	5.5	8.4	17
429	90	102	131	0.82	P421_0070 KX401VF0010 MF LM505U	110	240	7.000	7/1	2500	2000	4000	19	5.5	8.4	22
500	13	14	17	3.8	P421_0030 KX401VF0020 MF LM401U	26	150	6.000	6/1	2500	2500	5000	3.5	7.5	5.2	11
500	26	27	33	1.9	P421_0030 KX401VF0020 MF LM402U	56	150	6.000	6/1	2500	2500	5000	4.8	7.5	5.2	13
500	35	36	45	1.4	P421_0030 KX401VF0020 MF LM403U	73	150	6.000	6/1	2500	2500	5000	6.1	7.5	5.2	14
500	53	57	69	0.94	P421_0030 KX401VF0020 MF LM503U	73	150	6.000	6/1	2500	2500	5000	12	7.5	5.2	17
600	21	22	31	3.5	P421_0050 KX401VF0010 MF LM402U	46	240	5.000	5/1	2500	2000	4000	5.6	6	8.0	13
600	29	30	43	2.5	P421_0050 KX401VF0010 MF LM403U	61	240	5.000	5/1	2500	2000	4000	6.9	6	8.0	14
600	45	47	65	1.7	P421_0050 KX401VF0010 MF LM503U	97	240	5.000	5/1	2500	2000	4000	13	6	8.0	17
600	64	73	94	1.2	P421_0050 KX401VF0010 MF LM505U	120	240	5.000	5/1	2500	2000	4000	19	6	8.0	22
750	17	18	27	3.9	P421_0040 KX401VF0010 MF LM402U	37	210	4.000	4/1	2500	2000	4000	5.7	6.5	6.9	13
750	23	24	37	2.9	P421_0040 KX401VF0010 MF LM403U	49	210	4.000	4/1	2500	2000	4000	7.0	6.5	6.9	14
750	36	38	57	1.9	P421_0040 KX401VF0010 MF LM503U	78	210	4.000	4/1	2500	2000	4000	13	6.5	6.9	17
750	52	58	82	1.3	P421_0040 KX401VF0010 MF LM505U	97	210	4.000	4/1	2500	2000	4000	19	6.5	6.9	22
750	75	83	119	0.91	P421_0040 KX401VF0010 MF LM704U	97	210	4.000	4/1	2500	2000	4000	39	6.5	6.9	28
1000	13	13	32	3.4	P421_0030 KX401VF0010 MF LM402U	28	150	3.000	3/1	2500	2000	4000	6.1	7.5	5.2	13
1000	18	18	43	2.5	P421_0030 KX401VF0010 MF LM403U	37	150	3.000	3/1	2500	2000	4000	7.4	7.5	5.2	14
1000	27	28	66	1.6	P421_0030 KX401VF0010 MF LM503U	58	150	3.000	3/1	2500	2000	4000	13	7.5	5.2	17
1000	39	44	96	1.1	P421_0030 KX401VF0010 MF LM505U	73	150	3.000	3/1	2500	2000	4000	20	7.5	5.2	22
P5KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 300$ Nm)																
25	258	278	58	0.81	P522_0400 KX401VF0030 MF LM401U	300	600	120.0	120/1	3000	3000	5500	3.1	4.5	26	16
29	226	244	51	0.93	P522_0350 KX401VF0030 MF LM401U	300	600	105.0	105/1	3000	3000	5500	3.1	4.5	27	16
30	215	232	66	0.98	P522_0500 KX401VF0020 MF LM401U	300	600	100.0	100/1	2500	2500	5000	3.3	4	27	16
36	181	195	41	1.2	P522_0280 KX401VF0030 MF LM401U	300	600	84.00	84/1	3000	3000	5500	3.1	4.5	26	16
38	172	186	53	1.2	P522_0400 KX401VF0020 MF LM401U	300	600	80.00	80/1	2500	2500	5000	3.3	4.5	26	16
40	161	174	36	1.3	P522_0250 KX401VF0030 MF LM401U	300	600	75.00	75/1	3000	3000	5500	3.1	4.5	27	16
43	151	162	46	1.4	P522_0350 KX401VF0020 MF LM401U	300	600	70.00	70/1	2500	2500	5000	3.3	4.5	27	16
47	138	149	44	1.5	P522_0320 KX401VF0020 MF LM401U	250	500	64.00	64/1	2500	2500	5000	3.4	4.5	25	16
50	129	139	29	1.6	P522_0200 KX401VF0030 MF LM401U	250	600	60.00	60/1	3000	3000	5500	3.1	4.5	26	16
50	253	261	57	0.83	P522_0200 KX401VF0030 MF LM402U	300	600	60.00	60/1	3000	3000	5500	4.5	4.5	26	17
54	121	130	37	1.7	P522_0280 KX401VF0020 MF LM401U	240	600	56.00	56/1	2500	2500	5000	3.3	4.5	26	16
54	236	243	72	0.89	P522_0280 KX401VF0020 MF LM402U	300	600	56.00	56/1	2500	2500	5000	4.7	4.5	26	17
60	108	116	33	2.0	P522_0250 KX401VF0020 MF LM401U	210	600	50.00	50/1	2500	2500	5000	3.3	4.5	27	16
60	211	217	64	1.0	P522_0250 KX401VF0020 MF LM402U	300	600	50.00	50/1	2500	2500	5000	4.7	4.5	27	17
75	86	93	26	2.4	P522_0200 KX401VF0020 MF LM401U	170	600	40.00	40/1	2500	2500	5000	3.4	4.5	26	16
75	168	174	51	1.2	P522_0200 KX401VF0020 MF LM402U	300	600	40.00	40/1	2500	2500	5000	4.7	4.5	26	17
75	229	235	70	0.92	P522_0200 KX401VF0020 MF LM403U	300	600	40.00	40/1	2500	2500	5000	6.0	4.5	26	19
86	75	81	39	2.8	P522_0350 KX401VF0010 MF LM401U	150	600	35.00	35/1	2500	2000	4000	4.1	4.5	27	16
86	147	152	76	1.4	P522_0350 KX401VF0010 MF LM402U	300	600	35.00	35/1	2500	2000	4000	5.5	4.5	27	17
86	200	206	103	1.0	P522_0350 KX401VF0010 MF LM403U	300	600	35.00	35/1	2500	2000	4000	6.8	4.5	27	19
94	69	74	21	3.0	P522_0160 KX401VF0020 MF LM401U	140	600	32.00	32/1	2500	2500	5000	3.4	4.5	25	16
94	135	139	41	1.6	P522_0160 KX401VF0020 MF LM402U	290	600	32.00	32/1	2500	2500	5000	4.7	4.5	25	17
94	183	188	56	1.1	P522_0160 KX401VF0020 MF LM403U	300	600	32.00	32/1	2500	2500	5000	6.0	4.5	25	19
100	66	71	25	2.1	P521_0100 KX501VF0030 MF LM401U	130	500	30.00	30/1	3000	3000	5000	6.5	4	23	17
100	129	133	49	1.1	P521_0100 KX501VF0030 MF LM402U	250	500	30.00	30/1	3000	3000	5000	7.8	4	23	19
125	53	57	14	3.8	P521_0080 KX501VF0030 MF LM401U	100	500	24.00	24/1	3000	3000	5000	6.5	4.5	22	17
125	103	106	27	1.9	P521_0080 KX501VF0030 MF LM402U	220	500	24.00	24/1	3000	3000	5000	7.8	4.5	22	19
125	140	144	37	1.4	P521_0080 KX501VF0030 MF LM403U	250	500	24.00	24/1	3000	3000	5000	9.1	4.5	22	20
125	214	227	56	0.94	P521_0080 KX501VF0030 MF LM503U	250	500	24.00	24/1	3000	3000	5000	15	4.5	22	23
143	46	50	12	4.6	P521_0070 KX501VF0030 MF LM401U	90	600	21.00	21/1	3000	3000	5000	6.5	4.5	23	17
143	90	93	23	2.3	P521_0070 KX501VF0030 MF LM402U	190	600	21.00	21/1	3000	3000	5000	7.8	4.5	23	19
143	123	126	31	1.7	P521_0070 KX501VF0030 MF LM403U	260	600	21.00	21/1	3000	3000	5000	9.1	4.5	23	20
143	187	198	47	1.1	P521_0070 KX501VF0030 MF LM503U	270	600	21.00	21/1	3000	3000	5000	15	4.5	23	23
150	44	47	22	3.2	P521_0100 KX501VF0020 MF LM401U	86	500	20.00	20/1	2500	2500	4500	7.0	4	23	17
150	86	89	44	1.6	P521_0100 KX501VF0020 MF LM402U	190	500	20.00	20/1	2500	2500	4500	8.3	4	23	19
150	117	120	60	1.2	P521_0100 KX501VF0020 MF LM403U	250	500	20.00	20/1	2500	2500	4500	9.6	4	23	20
188	69	71	25	2.9	P521_0080 KX501VF0020 MF LM402U	150	500	16.00	16/1	2500	2500	4500	8.3	4.5	22	19
188	94	96	33	2.1	P521_0080 KX501VF0020 MF LM403U	200	500	16.00	16/1	2500	2500	4500	9.6	4.5	22	20

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{2acc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} EL1,2,5,6	n_{1maxDB} EL3,4	n_{1maxZB}	J_1	$\Delta\varphi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/ arcmin]	[kg]
P5KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 300$ Nm)																
188	143	151	51	1.4	P521_0080 KX501VF0020 MF LM503U	250	500	16.00	16/1	2500	2500	4500	16	4.5	22	23
188	206	234	74	0.97	P521_0080 KX501VF0020 MF LM505U	250	500	16.00	16/1	2500	2500	4500	22	4.5	22	28
200	64	66	16	3.3	P521_0050 KX501VF0030 MF LM402U	140	600	15.00	15/1	3000	3000	5000	7.9	5	20	19
200	88	90	22	2.4	P521_0050 KX501VF0030 MF LM403U	180	600	15.00	15/1	3000	3000	5000	9.2	5	20	20
200	134	142	34	1.6	P521_0050 KX501VF0030 MF LM503U	290	600	15.00	15/1	3000	3000	5000	15	5	20	23
200	193	219	49	1.1	P521_0050 KX501VF0030 MF LM505U	300	600	15.00	15/1	3000	3000	5000	22	5	20	28
214	60	62	20	3.5	P521_0070 KX501VF0020 MF LM402U	130	600	14.00	14/1	2500	2500	4500	8.4	4.5	23	19
214	82	84	28	2.6	P521_0070 KX501VF0020 MF LM403U	170	600	14.00	14/1	2500	2500	4500	9.7	4.5	23	20
214	125	132	42	1.7	P521_0070 KX501VF0020 MF LM503U	270	600	14.00	14/1	2500	2500	4500	16	4.5	23	23
214	181	205	61	1.2	P521_0070 KX501VF0020 MF LM505U	270	600	14.00	14/1	2500	2500	4500	22	4.5	23	28
250	52	53	16	3.3	P521_0040 KX501VF0030 MF LM402U	110	520	12.00	12/1	3000	3000	5000	7.9	5.5	17	19
250	70	72	22	2.4	P521_0040 KX501VF0030 MF LM403U	150	520	12.00	12/1	3000	3000	5000	9.2	5.5	17	20
250	107	113	33	1.6	P521_0040 KX501VF0030 MF LM503U	230	520	12.00	12/1	3000	3000	5000	15	5.5	17	23
250	155	175	48	1.1	P521_0040 KX501VF0030 MF LM505U	240	520	12.00	12/1	3000	3000	5000	22	5.5	17	28
300	43	44	15	4.9	P521_0050 KX501VF0020 MF LM402U	93	600	10.00	10/1	2500	2500	4500	8.4	5	20	19
300	58	60	20	3.6	P521_0050 KX501VF0020 MF LM403U	120	600	10.00	10/1	2500	2500	4500	9.7	5	20	20
300	89	94	30	2.4	P521_0050 KX501VF0020 MF LM503U	190	600	10.00	10/1	2500	2500	4500	16	5	20	23
300	129	146	44	1.6	P521_0050 KX501VF0020 MF LM505U	300	600	10.00	10/1	2500	2500	4500	22	5	20	28
300	187	207	64	1.1	P521_0050 KX501VF0020 MF LM704U	300	600	10.00	10/1	2500	2500	4500	42	5	20	34
300	247	286	84	0.85	P521_0050 KX501VF0020 MF LM706U	300	600	10.00	10/1	2500	2500	4500	59	5	20	41
375	34	35	14	4.9	P521_0040 KX501VF0020 MF LM402U	74	520	8.000	8/1	2500	2500	4500	8.5	5.5	17	19
375	47	48	20	3.6	P521_0040 KX501VF0020 MF LM403U	98	520	8.000	8/1	2500	2500	4500	9.8	5.5	17	20
375	71	76	30	2.4	P521_0040 KX501VF0020 MF LM503U	160	520	8.000	8/1	2500	2500	4500	16	5.5	17	23
375	103	117	43	1.6	P521_0040 KX501VF0020 MF LM505U	240	520	8.000	8/1	2500	2500	4500	22	5.5	17	28
375	150	166	63	1.1	P521_0040 KX501VF0020 MF LM704U	240	520	8.000	8/1	2500	2500	4500	42	5.5	17	34
375	197	229	83	0.86	P521_0040 KX501VF0020 MF LM706U	240	520	8.000	8/1	2500	2500	4500	59	5.5	17	41
429	41	42	27	4.5	P521_0070 KX501VF0010 MF LM403U	86	600	7.000	7/1	2500	2000	3500	12	4.5	23	20
429	62	66	41	2.9	P521_0070 KX501VF0010 MF LM503U	140	600	7.000	7/1	2500	2000	3500	18	4.5	23	23
429	90	102	59	2.0	P521_0070 KX501VF0010 MF LM505U	210	600	7.000	7/1	2500	2000	3500	24	4.5	23	28
429	131	145	86	1.4	P521_0070 KX501VF0010 MF LM704U	270	600	7.000	7/1	2500	2000	3500	44	4.5	23	34
429	173	200	113	1.1	P521_0070 KX501VF0010 MF LM706U	270	600	7.000	7/1	2500	2000	3500	62	4.5	23	41
500	26	27	15	4.7	P521_0030 KX501VF0020 MF LM402U	56	390	6.000	6/1	2500	2500	4500	9.0	6.5	14	19
500	35	36	21	3.4	P521_0030 KX501VF0020 MF LM403U	74	390	6.000	6/1	2500	2500	4500	10	6.5	14	20
500	53	57	32	2.2	P521_0030 KX501VF0020 MF LM503U	120	390	6.000	6/1	2500	2500	4500	16	6.5	14	23
500	77	88	46	1.6	P521_0030 KX501VF0020 MF LM505U	180	390	6.000	6/1	2500	2500	4500	23	6.5	14	28
500	112	124	67	1.1	P521_0030 KX501VF0020 MF LM704U	180	390	6.000	6/1	2500	2500	4500	42	6.5	14	34
500	148	171	88	0.81	P521_0030 KX501VF0020 MF LM706U	180	390	6.000	6/1	2500	2500	4500	60	6.5	14	41
600	45	47	29	4.1	P521_0050 KX501VF0010 MF LM503U	97	600	5.000	5/1	2500	2000	3500	18	5	20	23
600	64	73	42	2.8	P521_0050 KX501VF0010 MF LM505U	150	600	5.000	5/1	2500	2000	3500	25	5	20	28
600	94	104	61	2.0	P521_0050 KX501VF0010 MF LM704U	200	600	5.000	5/1	2500	2000	3500	45	5	20	34
600	123	143	81	1.5	P521_0050 KX501VF0010 MF LM706U	290	600	5.000	5/1	2500	2000	3500	62	5	20	41
750	36	38	25	4.8	P521_0040 KX501VF0010 MF LM503U	78	520	4.000	4/1	2500	2000	3500	19	5.5	17	23
750	52	58	37	3.3	P521_0040 KX501VF0010 MF LM505U	120	520	4.000	4/1	2500	2000	3500	25	5.5	17	28
750	75	83	53	2.3	P521_0040 KX501VF0010 MF LM704U	160	520	4.000	4/1	2500	2000	3500	45	5.5	17	34
750	99	114	70	1.7	P521_0040 KX501VF0010 MF LM706U	230	520	4.000	4/1	2500	2000	3500	62	5.5	17	41
1000	27	28	31	3.9	P521_0030 KX501VF0010 MF LM503U	58	390	3.000	3/1	2500	2000	3500	21	6.5	14	23
1000	39	44	44	2.7	P521_0030 KX501VF0010 MF LM505U	92	390	3.000	3/1	2500	2000	3500	27	6.5	14	28
1000	56	62	64	1.9	P521_0030 KX501VF0010 MF LM704U	120	390	3.000	3/1	2500	2000	3500	47	6.5	14	34
1000	74	86	85	1.4	P521_0030 KX501VF0010 MF LM706U	180	390	3.000	3/1	2500	2000	3500	64	6.5	14	41
P7KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 700$ Nm)																
14	452	487	54	0.97	P722_0700 KX501VF0030 MF LM401U	650	1250	210.0	210/1	3000	3000	5000	6.5	4	52	26
20	323	348	39	1.4	P722_0500 KX501VF0030 MF LM401U	630	1400	150.0	150/1	3000	3000	5000	6.5	4	52	26
21	301	325	49	1.5	P722_0700 KX501VF0020 MF LM401U	590	1250	140.0	140/1	2500	2500	4500	7.0	4	52	26
25	258	278	31	1.7	P722_0400 KX501VF0030 MF LM401U	510	1380	120.0	120/1	3000	3000	5000	6.5	4.5	51	26
25	505	521	60	0.87	P722_0400 KX501VF0030 MF LM402U	700	1380	120.0	120/1	3000	3000	5000	7.8	4.5	51	27
29	226	244	27	1.9	P722_0350 KX501VF0030 MF LM401U	440	1400	105.0	105/1	3000	3000	5000	6.5	4.5	52	26
29	442	456	53	1.0	P722_0350 KX501VF0030 MF LM402U	700	1400	105.0	105/1	3000	3000	5000	7.8	4.5	52	27
30	215	232	35	2.0	P722_0500 KX501VF0020 MF LM401U	420	1400	100.0	100/1	2500	2500	4500	7.0	4	52	26
30	421	434	68	1.0	P722_0500 KX501VF0020 MF LM402U	700	1400	100.0	100/1	2500	2500	4500	8.3	4	52	27
36	181	195	22	2.4	P722_0280 KX501VF0030 MF LM401U	350	1380	84.00	84/1	3000	3000	5000	6.5	4.5	51	26
36	354	365	42	1.2	P722_0280 KX501VF0030 MF LM402U	700	1380	84.00	84/1	3000	3000	5000	7.8	4.5	51	27
36	481	494	58	0.92	P722_0280 KX501VF0030 MF LM403U	700	1380	84.00	84/1	3000	3000	5000	9.1	4.5	51	29
38	172	186	28	2.6	P722_0400 KX501VF0020 MF LM401U	340	1380	80.00	80/1	2500	2500	4500	7.0	4.5	51	26
38	337	347	55	1.3	P722_0400 KX501VF0020 MF LM402U	700	1380	80.00	80/1	2500	2500	4500	8.3	4.5	51	27

10.2 Selection tables 10 PKX right-angle planetary geared motors

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{2acc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} EL1,2,5,6	n_{1maxDB} EL3,4	n_{1maxZB}	J_1	$\Delta\varphi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/ arcmin]	[kg]
P7KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 700$ Nm)																
38	458	471	74	0.96	P722_0400 KX501VF0020 MF LM403U	700	1380	80.00	80/1	2500	2500	4500	9.6	4.5	51	29
40	161	174	19	2.7	P722_0250 KX501VF0030 MF LM401U	320	1400	75.00	75/1	3000	3000	5000	6.5	4.5	52	26
40	316	326	38	1.4	P722_0250 KX501VF0030 MF LM402U	680	1400	75.00	75/1	3000	3000	5000	7.9	4.5	52	27
40	430	441	51	1.0	P722_0250 KX501VF0030 MF LM403U	700	1400	75.00	75/1	3000	3000	5000	9.2	4.5	52	29
43	151	162	24	2.9	P722_0350 KX501VF0020 MF LM401U	300	1400	70.00	70/1	2500	2500	4500	7.0	4.5	52	26
43	295	304	48	1.5	P722_0350 KX501VF0020 MF LM402U	640	1400	70.00	70/1	2500	2500	4500	8.4	4.5	52	27
43	401	412	65	1.1	P722_0350 KX501VF0020 MF LM403U	700	1400	70.00	70/1	2500	2500	4500	9.7	4.5	52	29
47	138	149	25	2.9	P722_0320 KX501VF0020 MF LM401U	270	1000	64.00	64/1	2500	2500	4500	7.2	4.5	51	26
47	269	278	48	1.5	P722_0320 KX501VF0020 MF LM402U	500	1000	64.00	64/1	2500	2500	4500	8.5	4.5	51	27
47	367	377	65	1.1	P722_0320 KX501VF0020 MF LM403U	500	1000	64.00	64/1	2500	2500	4500	9.8	4.5	51	29
50	129	139	15	3.4	P722_0200 KX501VF0030 MF LM401U	250	1400	60.00	60/1	3000	3000	5000	6.6	4.5	51	26
50	253	261	30	1.7	P722_0200 KX501VF0030 MF LM402U	540	1400	60.00	60/1	3000	3000	5000	7.9	4.5	51	27
50	344	353	41	1.3	P722_0200 KX501VF0030 MF LM403U	700	1400	60.00	60/1	3000	3000	5000	9.2	4.5	51	29
50	524	555	63	0.84	P722_0200 KX501VF0030 MF LM503U	700	1400	60.00	60/1	3000	3000	5000	15	4.5	51	32
54	121	130	20	3.7	P722_0280 KX501VF0020 MF LM401U	240	1380	56.00	56/1	2500	2500	4500	7.0	4.5	51	26
54	236	243	38	1.9	P722_0280 KX501VF0020 MF LM402U	510	1380	56.00	56/1	2500	2500	4500	8.4	4.5	51	27
54	321	330	52	1.4	P722_0280 KX501VF0020 MF LM403U	670	1380	56.00	56/1	2500	2500	4500	9.7	4.5	51	29
54	489	518	79	0.90	P722_0280 KX501VF0020 MF LM503U	700	1380	56.00	56/1	2500	2500	4500	16	4.5	51	32
60	108	116	17	4.1	P722_0250 KX501VF0020 MF LM401U	210	1400	50.00	50/1	2500	2500	4500	7.1	4.5	52	26
60	211	217	34	2.1	P722_0250 KX501VF0020 MF LM402U	450	1400	50.00	50/1	2500	2500	4500	8.4	4.5	52	27
60	286	294	46	1.5	P722_0250 KX501VF0020 MF LM403U	600	1400	50.00	50/1	2500	2500	4500	9.7	4.5	52	29
60	437	463	71	1.0	P722_0250 KX501VF0020 MF LM503U	700	1400	50.00	50/1	2500	2500	4500	16	4.5	52	32
75	168	174	27	2.6	P722_0200 KX501VF0020 MF LM402U	360	1400	40.00	40/1	2500	2500	4500	8.5	4.5	51	27
75	229	235	37	1.9	P722_0200 KX501VF0020 MF LM403U	480	1400	40.00	40/1	2500	2500	4500	9.8	4.5	51	29
75	349	370	57	1.3	P722_0200 KX501VF0020 MF LM503U	700	1400	40.00	40/1	2500	2500	4500	16	4.5	51	32
75	505	573	82	0.87	P722_0200 KX501VF0020 MF LM505U	700	1400	40.00	40/1	2500	2500	4500	22	4.5	51	36
86	147	152	40	3.0	P722_0350 KX501VF0010 MF LM402U	320	1400	35.00	35/1	2500	2000	3500	11	4.5	52	27
86	200	206	55	2.2	P722_0350 KX501VF0010 MF LM403U	420	1400	35.00	35/1	2500	2000	3500	12	4.5	52	29
86	306	324	83	1.4	P722_0350 KX501VF0010 MF LM503U	670	1400	35.00	35/1	2500	2000	3500	18	4.5	52	32
86	442	501	121	1.0	P722_0350 KX501VF0010 MF LM505U	700	1400	35.00	35/1	2500	2000	3500	25	4.5	52	36
94	135	139	22	3.3	P722_0160 KX501VF0020 MF LM402U	290	1380	32.00	32/1	2500	2500	4500	8.6	4.5	49	27
94	183	188	30	2.4	P722_0160 KX501VF0020 MF LM403U	380	1380	32.00	32/1	2500	2500	4500	9.9	4.5	49	29
94	279	296	45	1.6	P722_0160 KX501VF0020 MF LM503U	610	1380	32.00	32/1	2500	2500	4500	16	4.5	49	32
94	404	458	66	1.1	P722_0160 KX501VF0020 MF LM505U	700	1380	32.00	32/1	2500	2500	4500	22	4.5	49	36
100	267	283	141	1.1	P721_0100 KX701VF0030 MF LM503U	500	1000	30.00	30/1	2100	2100	4000	23	4	47	34
125	214	227	84	1.9	P721_0080 KX701VF0030 MF LM503U	470	1000	24.00	24/1	2100	2100	4000	23	4.5	49	34
125	310	351	122	1.3	P721_0080 KX701VF0030 MF LM505U	500	1000	24.00	24/1	2100	2100	4000	29	4.5	49	38
125	449	498	177	0.89	P721_0080 KX701VF0030 MF LM704U	500	1000	24.00	24/1	2100	2100	4000	49	4.5	49	44
143	187	198	67	2.4	P721_0070 KX701VF0030 MF LM503U	410	1250	21.00	21/1	2100	2100	4000	23	4.5	49	34
143	271	307	97	1.6	P721_0070 KX701VF0030 MF LM505U	640	1250	21.00	21/1	2100	2100	4000	29	4.5	49	38
143	393	435	141	1.1	P721_0070 KX701VF0030 MF LM704U	650	1250	21.00	21/1	2100	2100	4000	49	4.5	49	44
143	518	600	186	0.85	P721_0070 KX701VF0030 MF LM706U	650	1250	21.00	21/1	2100	2100	4000	66	4.5	49	51
150	178	189	127	1.7	P721_0100 KX701VF0020 MF LM503U	390	1000	20.00	20/1	1800	1800	3500	25	4	47	34
150	258	292	184	1.2	P721_0100 KX701VF0020 MF LM505U	500	1000	20.00	20/1	1800	1800	3500	32	4	47	38
150	375	415	267	0.80	P721_0100 KX701VF0020 MF LM704U	500	1000	20.00	20/1	1800	1800	3500	51	4	47	44
188	143	151	76	2.8	P721_0080 KX701VF0020 MF LM503U	310	1000	16.00	16/1	1800	1800	3500	25	4.5	49	34
188	206	234	110	1.9	P721_0080 KX701VF0020 MF LM505U	490	1000	16.00	16/1	1800	1800	3500	32	4.5	49	38
188	300	332	160	1.3	P721_0080 KX701VF0020 MF LM704U	500	1000	16.00	16/1	1800	1800	3500	51	4.5	49	44
188	394	457	211	1.0	P721_0080 KX701VF0020 MF LM706U	500	1000	16.00	16/1	1800	1800	3500	69	4.5	49	51
200	134	142	50	3.2	P721_0050 KX701VF0030 MF LM503U	290	1290	15.00	15/1	2100	2100	4000	23	5	46	34
200	193	219	72	2.2	P721_0050 KX701VF0030 MF LM505U	460	1290	15.00	15/1	2100	2100	4000	29	5	46	38
200	281	311	105	1.5	P721_0050 KX701VF0030 MF LM704U	590	1290	15.00	15/1	2100	2100	4000	49	5	46	44
200	370	429	138	1.1	P721_0050 KX701VF0030 MF LM706U	610	1290	15.00	15/1	2100	2100	4000	66	5	46	51
214	125	132	61	3.5	P721_0070 KX701VF0020 MF LM503U	270	1250	14.00	14/1	1800	1800	3500	25	4.5	49	34
214	181	205	88	2.4	P721_0070 KX701VF0020 MF LM505U	430	1250	14.00	14/1	1800	1800	3500	32	4.5	49	38
214	262	290	128	1.7	P721_0070 KX701VF0020 MF LM704U	550	1250	14.00	14/1	1800	1800	3500	51	4.5	49	44
214	345	400	168	1.3	P721_0070 KX701VF0020 MF LM706U	650	1250	14.00	14/1	1800	1800	3500	69	4.5	49	51
250	107	113	50	3.2	P721_0040 KX701VF0030 MF LM503U	230	1030	12.00	12/1	2100	2100	4000	23	5.5	43	34
250	155	175	72	2.2	P721_0040 KX701VF0030 MF LM505U	370	1030	12.00	12/1	2100	2100	4000	30	5.5	43	38
250	225	249	105	1.5	P721_0040 KX701VF0030 MF LM704U	470	1030	12.00	12/1	2100	2100	4000	49	5.5	43	44
250	296	343	138	1.1	P721_0040 KX701VF0030 MF LM706U	490	1030	12.00	12/1	2100	2100	4000	67	5.5	43	51
300	89	94	45	4.8	P721_0050 KX701VF0020 MF LM503U	190	1290	10.00	10/1	1800	1800	3500	26	5	46	34
300	129	146	65	3.3	P721_0050 KX701VF0020 MF LM505U	310	1290	10.00	10/1	1800	1800	3500	32	5	46	38
300	187	207	95	2.3	P721_0050 KX701VF0020 MF LM704U	390	1290	10.00	10/1	1800	1800	3500	52	5	46	44

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{zacc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} <small>EL1,2,5,6</small>	n_{1maxDB} <small>EL3,4</small>	n_{1maxZB}	J_1	$\Delta\varphi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/ arcmin]	[kg]
P7KX ($n_{1N} = 3000$ rpm, $M_{zacc,max} = 700$ Nm)																
300	247	286	125	1.7	P721_0050 KX701VF0020 MF LM706U	590	1290	10.00	10/1	1800	1800	3500	69	5	46	51
375	71	76	45	4.8	P721_0040 KX701VF0020 MF LM503U	160	1030	8.000	8/1	1800	1800	3500	26	5.5	43	34
375	103	117	65	3.3	P721_0040 KX701VF0020 MF LM505U	250	1030	8.000	8/1	1800	1800	3500	32	5.5	43	38
375	150	166	95	2.3	P721_0040 KX701VF0020 MF LM704U	310	1030	8.000	8/1	1800	1800	3500	52	5.5	43	44
375	197	229	125	1.7	P721_0040 KX701VF0020 MF LM706U	470	1030	8.000	8/1	1800	1800	3500	69	5.5	43	51
429	90	102	85	4.3	P721_0070 KX701VF0010 MF LM505U	210	1250	7.000	7/1	1800	1600	3000	43	4.5	49	38
429	131	145	123	2.9	P721_0070 KX701VF0010 MF LM704U	280	1250	7.000	7/1	1800	1600	3000	62	4.5	49	44
429	173	200	162	2.2	P721_0070 KX701VF0010 MF LM706U	410	1250	7.000	7/1	1800	1600	3000	80	4.5	49	51
500	53	57	45	4.8	P721_0030 KX701VF0020 MF LM503U	120	770	6.000	6/1	1800	1800	3500	27	6.5	37	34
500	77	88	65	3.3	P721_0030 KX701VF0020 MF LM505U	180	770	6.000	6/1	1800	1800	3500	34	6.5	37	38
500	112	124	95	2.3	P721_0030 KX701VF0020 MF LM704U	240	770	6.000	6/1	1800	1800	3500	53	6.5	37	44
500	148	171	125	1.7	P721_0030 KX701VF0020 MF LM706U	350	770	6.000	6/1	1800	1800	3500	71	6.5	37	51
600	94	104	88	4.1	P721_0050 KX701VF0010 MF LM704U	200	1130	5.000	5/1	1800	1600	3000	63	5	46	44
600	123	143	115	3.1	P721_0050 KX701VF0010 MF LM706U	290	1130	5.000	5/1	1800	1600	3000	81	5	46	51
750	75	83	80	4.5	P721_0040 KX701VF0010 MF LM704U	160	910	4.000	4/1	1800	1600	3000	65	5.5	43	44
750	99	114	105	3.4	P721_0040 KX701VF0010 MF LM706U	230	910	4.000	4/1	1800	1600	3000	82	5.5	43	51
1000	56	62	83	4.4	P721_0030 KX701VF0010 MF LM704U	120	680	3.000	3/1	1800	1600	3000	70	6.5	37	44
1000	74	86	109	3.3	P721_0030 KX701VF0010 MF LM706U	180	680	3.000	3/1	1800	1600	3000	87	6.5	37	51
P8KX ($n_{1N} = 3000$ rpm, $M_{zacc,max} = 1600$ Nm)																
21	1222	1296	262	0.82	P822_0700 KX701VF0020 MF LM503U	1400	2800	140.0	140/1	1800	1800	3500	25	4	164	54
29	917	972	145	1.1	P822_0350 KX701VF0030 MF LM503U	1600	3200	105.0	105/1	2100	2100	4000	23	4.5	168	54
30	873	925	187	1.1	P822_0500 KX701VF0020 MF LM503U	1600	3200	100.0	100/1	1800	1800	3500	25	4	167	54
36	733	777	145	1.1	P822_0280 KX701VF0030 MF LM503U	1600	3180	84.00	84/1	2100	2100	4000	23	4.5	163	54
38	698	740	187	1.1	P822_0400 KX701VF0020 MF LM503U	1520	3180	80.00	80/1	1800	1800	3500	25	4.5	161	54
40	655	694	103	1.5	P822_0250 KX701VF0030 MF LM503U	1430	3200	75.00	75/1	2100	2100	4000	23	4.5	166	54
40	947	1074	150	1.1	P822_0250 KX701VF0030 MF LM505U	1600	3200	75.00	75/1	2100	2100	4000	29	4.5	166	58
43	611	648	131	1.6	P822_0350 KX701VF0020 MF LM503U	1330	3200	70.00	70/1	1800	1800	3500	25	4.5	168	54
43	884	1002	189	1.1	P822_0350 KX701VF0020 MF LM505U	1600	3200	70.00	70/1	1800	1800	3500	32	4.5	168	58
47	559	592	149	1.4	P822_0320 KX701VF0020 MF LM503U	1200	2400	64.00	64/1	1800	1800	3500	26	4.5	157	54
47	808	916	216	0.99	P822_0320 KX701VF0020 MF LM505U	1200	2400	64.00	64/1	1800	1800	3500	32	4.5	157	58
50	524	555	83	1.9	P822_0200 KX701VF0030 MF LM503U	1140	3200	60.00	60/1	2100	2100	4000	23	4.5	164	54
50	758	859	120	1.3	P822_0200 KX701VF0030 MF LM505U	1600	3200	60.00	60/1	2100	2100	4000	30	4.5	164	58
50	1100	1218	174	0.91	P822_0200 KX701VF0030 MF LM704U	1600	3200	60.00	60/1	2100	2100	4000	49	4.5	164	64
54	489	518	131	1.6	P822_0280 KX701VF0020 MF LM503U	1070	3180	56.00	56/1	1800	1800	3500	25	4.5	163	54
54	707	802	189	1.1	P822_0280 KX701VF0020 MF LM505U	1600	3180	56.00	56/1	1800	1800	3500	32	4.5	163	58
60	437	463	93	2.3	P822_0250 KX701VF0020 MF LM503U	950	3200	50.00	50/1	1800	1800	3500	26	4.5	166	54
60	632	716	135	1.6	P822_0250 KX701VF0020 MF LM505U	1500	3200	50.00	50/1	1800	1800	3500	32	4.5	166	58
60	917	1015	196	1.1	P822_0250 KX701VF0020 MF LM704U	1600	3200	50.00	50/1	1800	1800	3500	52	4.5	166	64
60	1207	1399	259	0.83	P822_0250 KX701VF0020 MF LM706U	1600	3200	50.00	50/1	1800	1800	3500	69	4.5	166	71
75	349	370	75	2.9	P822_0200 KX701VF0020 MF LM503U	760	3200	40.00	40/1	1800	1800	3500	26	4.5	164	54
75	505	573	108	2.0	P822_0200 KX701VF0020 MF LM505U	1200	3200	40.00	40/1	1800	1800	3500	32	4.5	164	58
75	734	812	157	1.4	P822_0200 KX701VF0020 MF LM704U	1540	3200	40.00	40/1	1800	1800	3500	52	4.5	164	64
75	966	1119	207	1.0	P822_0200 KX701VF0020 MF LM706U	1600	3200	40.00	40/1	1800	1800	3500	69	4.5	164	71
86	306	324	110	3.3	P822_0350 KX701VF0010 MF LM503U	670	3200	35.00	35/1	1800	1600	3000	36	4.5	168	54
86	442	501	159	2.3	P822_0350 KX701VF0010 MF LM505U	1050	3200	35.00	35/1	1800	1600	3000	43	4.5	168	58
86	642	711	231	1.6	P822_0350 KX701VF0010 MF LM704U	1350	3200	35.00	35/1	1800	1600	3000	62	4.5	168	64
86	845	979	304	1.2	P822_0350 KX701VF0010 MF LM706U	1600	3200	35.00	35/1	1800	1600	3000	80	4.5	168	71
94	279	296	75	2.9	P822_0160 KX701VF0020 MF LM503U	610	3180	32.00	32/1	1800	1800	3500	26	4.5	158	54
94	404	458	108	2.0	P822_0160 KX701VF0020 MF LM505U	960	3180	32.00	32/1	1800	1800	3500	32	4.5	158	58
94	587	650	157	1.4	P822_0160 KX701VF0020 MF LM704U	1230	3180	32.00	32/1	1800	1800	3500	52	4.5	158	64
94	773	895	207	1.0	P822_0160 KX701VF0020 MF LM706U	1600	3180	32.00	32/1	1800	1800	3500	70	4.5	158	71
100	562	622	137	1.2	P821_0100 KX801VF0030 MF LM704U	1180	2400	30.00	30/1	1300	1300	3000	80	4	139	68
100	740	857	181	0.95	P821_0100 KX801VF0030 MF LM706U	1200	2400	30.00	30/1	1300	1300	3000	97	4	139	75
125	449	498	96	1.8	P821_0080 KX801VF0030 MF LM704U	940	2400	24.00	24/1	1300	1300	3000	80	4.5	142	68
125	592	686	127	1.4	P821_0080 KX801VF0030 MF LM706U	1200	2400	24.00	24/1	1300	1300	3000	97	4.5	142	75
143	393	435	67	2.5	P821_0070 KX801VF0030 MF LM704U	830	2800	21.00	21/1	1300	1300	3000	80	4.5	142	68
143	518	600	89	1.9	P821_0070 KX801VF0030 MF LM706U	1230	2800	21.00	21/1	1300	1300	3000	98	4.5	142	75
200	281	311	57	3.0	P821_0050 KX801VF0030 MF LM704U	590	2580	15.00	15/1	1300	1300	3000	81	5	128	68
200	370	429	75	2.3	P821_0050 KX801VF0030 MF LM706U	880	2580	15.00	15/1	1300	1300	3000	98	5	128	75
250	225	249	57	3.0	P821_0040 KX801VF0030 MF LM704U	470	2060	12.00	12/1	1300	1300	3000	82	5.5	111	68
250	296	343	75	2.3	P821_0040 KX801VF0030 MF LM706U	700	2060	12.00	12/1	1300	1300	3000	99	5.5	111	75
P9KX ($n_{1N} = 3000$ rpm, $M_{zacc,max} = 3000$ Nm)																
25	2201	2437	188	0.91	P922_0400 KX801VF0030 MF LM704U	3000	5530	120.0	120/1	1300	1300	3000	80	4.5	324	103
29	1926	2132	165	1.0	P922_0350 KX801VF0030 MF LM704U	3000	6000	105.0	105/1	1300	1300	3000	80	4.5	327	103

10.2 Selection tables 10 PKX right-angle planetary geared motors

n_{2N}	M_{2N}	$M_{2,0}$	a_{th}	S	Type	M_{2acc}	M_{2NOT}	i	i_{exakt}	n_{1maxDB} EL1,2,5,6	n_{1maxDB} EL3,4	n_{1maxZB}	J_1	$\Delta\phi_2$	C_2	m
[rpm]	[Nm]	[Nm]				[Nm]	[Nm]			[rpm]	[rpm]	[rpm]	[10 ⁻⁴ kgm ²]	[arcmin]	[Nm/ arcmin]	[kg]
P9KX ($n_{1N} = 3000$ rpm, $M_{2acc,max} = 3000$ Nm)																
36	1541	1706	132	1.3	P922_0280 KX801VF0030 MF LM704U	3000	5530	84.00	84/1	1300	1300	3000	80	4.5	326	103
36	2028	2350	174	0.99	P922_0280 KX801VF0030 MF LM706U	3000	5530	84.00	84/1	1300	1300	3000	98	4.5	326	110
40	1376	1523	118	1.5	P922_0250 KX801VF0030 MF LM704U	2890	6000	75.00	75/1	1300	1300	3000	81	4.5	324	103
40	1811	2098	155	1.1	P922_0250 KX801VF0030 MF LM706U	3000	6000	75.00	75/1	1300	1300	3000	98	4.5	324	110
50	1100	1218	94	1.8	P922_0200 KX801VF0030 MF LM704U	2310	6000	60.00	60/1	1300	1300	3000	81	4.5	319	103
50	1449	1679	124	1.4	P922_0200 KX801VF0030 MF LM706U	3000	6000	60.00	60/1	1300	1300	3000	99	4.5	319	110

10.3 Dimensional drawings

In this chapter you can find the dimensions of the geared motors.

There is a dimensional drawing for every possible shaft/housing design, each with the tables for gear unit dimensions, motor dimensions and geared motor dimensions.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download CAD models of our standard drives at <http://cad.stoeber.de>.

Combination options and the dimensions of forced ventilated geared motors can be found at <http://cad.stoeber.de>.

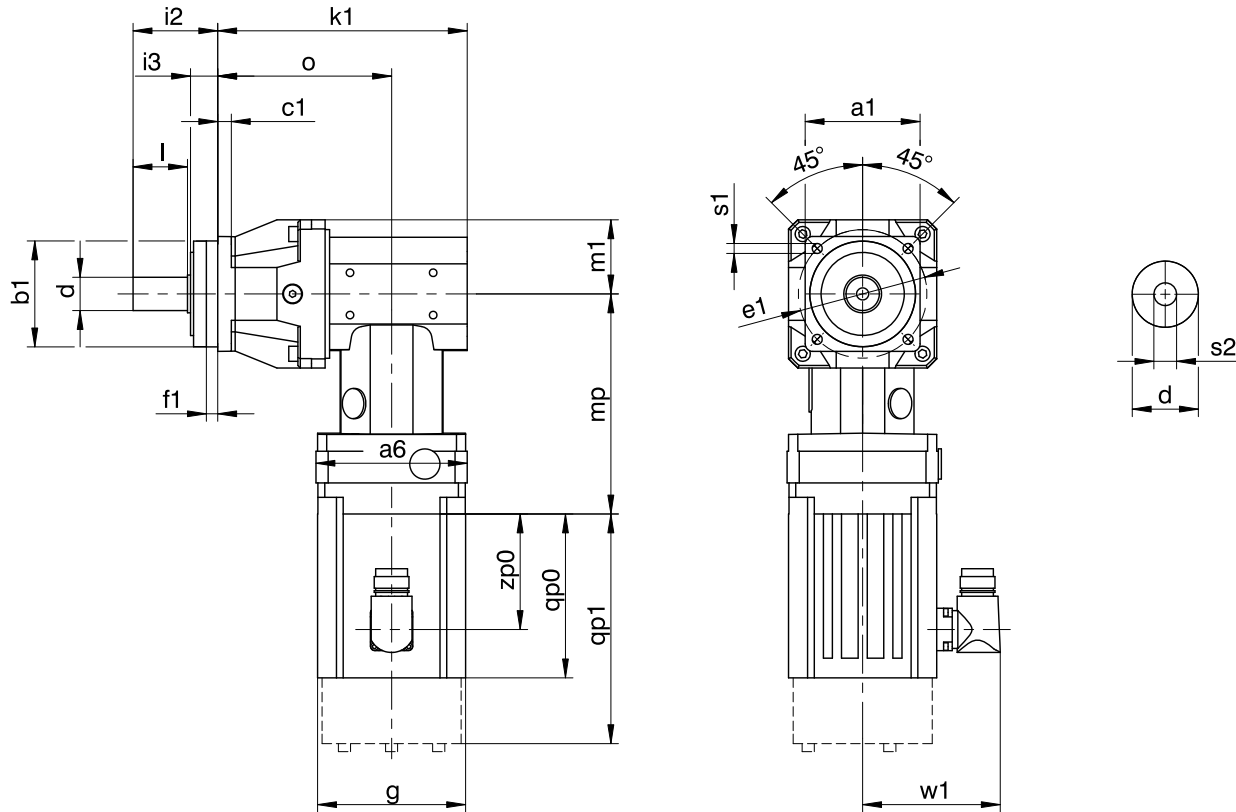
Tolerances

Solid shaft	Tolerance
Shaft \varnothing fit \leq 50 mm	DIN 748-1, ISO k6
Shaft \varnothing fit $>$ 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A
Balance quality	Q 2.5 (balanced with half feather key)

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

10.3.1 G shaft design (solid shaft without feather key)



qp0 Applies to motors without brake.

qp1 Applies to motors with brake.

Dimensions of gear units

Type	□a1	∅b1	c1	∅d	∅e1	f1	i2	i3	k1	l	m1	o	∅s1	s2
P221_KX301_	55	50 _{h6}	6	12 _{k6}	63	7.0	36	12	124.0	22	31.0	84.0	5.5	M4
P321_KX301_	72	60 _{h6}	7	16 _{k6}	75	7.5	48	18	136.0	28	36.0	96.0	5.5	M5
P421_KX401_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	163.0	36	49.0	113.0	6.6	M8
P422_KX301_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	193.5	36	49.0	153.5	6.6	M8
P521_KX501_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	188.0	58	57.0	129.0	9.0	M12
P522_KX401_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	220.5	58	57.0	170.5	9.0	M12
P721_KX701_	145	130 _{h6}	15	40 _{k6}	165	3.5	112	27	231.0	82	72.5	157.0	11.0	M16
P722_KX501_	145	130 _{h6}	15	40 _{k6}	165	3.5	112	27	265.0	82	72.5	206.0	11.0	M16
P821_KX801_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	305.0	82	95.0	213.0	13.5	M20
P822_KX701_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	339.5	82	95.0	265.5	13.5	M20
P922_KX801_	212	180 _{h6}	17	75 _{k6}	250	10.0	143	34	432.0	105	112.5	340.0	17.5	M20

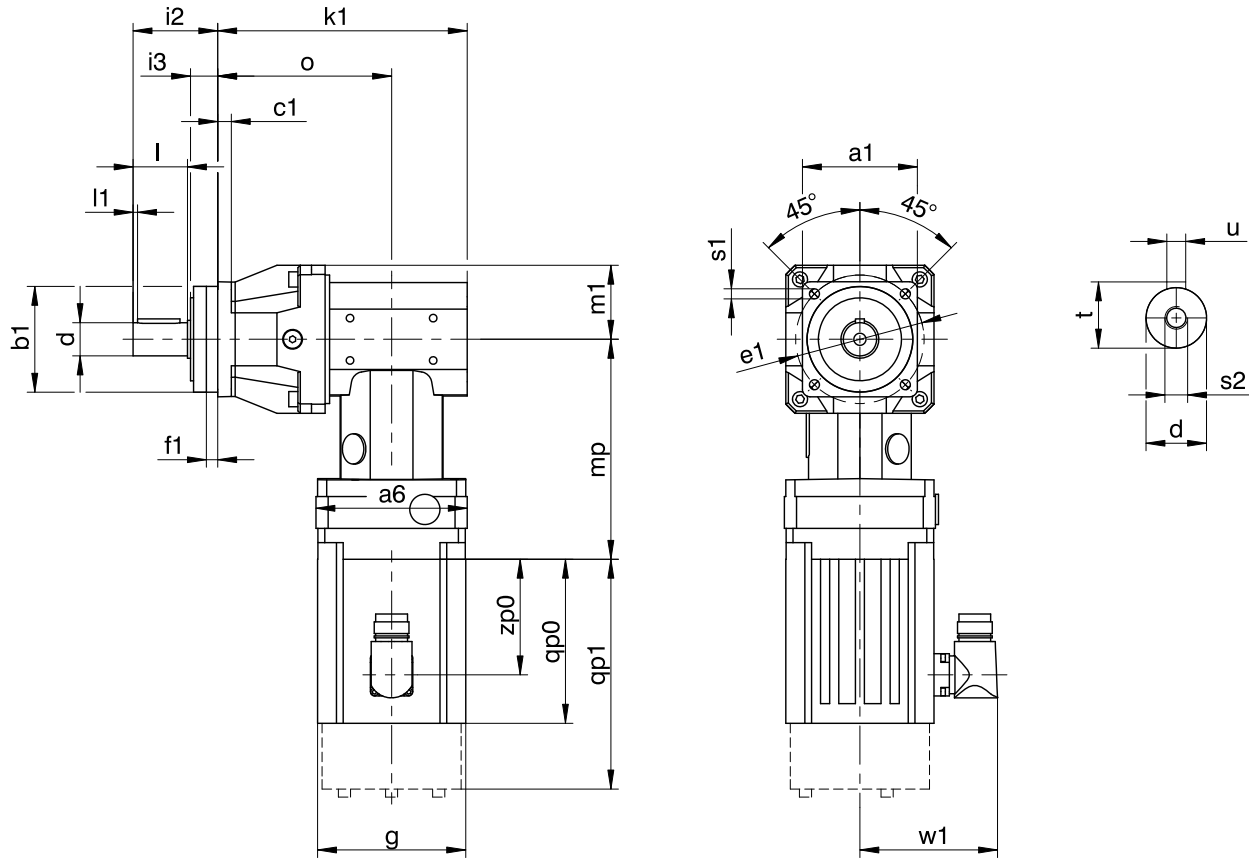
Dimensions of motors

Type	□g	qp0	qp1	w1	zp0
LM401U	98	108.5	152.0	91	76.5
LM402U	98	147.5	191.0	91	115.5
LM403U	98	178.5	222.0	91	146.5
LM503U	115	186.5	234.5	100	156.0
LM505U	115	256.5	304.5	100	226.0
LM704U	145	236.5	295.5	115	204.0
LM706U	145	306.5	365.5	115	274.0

Dimensions of geared motors

Type	LM4		LM5		LM7	
	□a6	mp	□a6	mp	□a6	mp
P221_KX301_	100	134.0	–	–	–	–
P321_KX301_	100	134.0	–	–	–	–
P421_KX401_	100	145.5	115	150.0	140	153.0
P422_KX301_	100	134.0	–	–	–	–
P521_KX501_	115	176.5	115	172.0	140	183.0
P522_KX401_	100	145.5	–	–	–	–
P721_KX701_	–	–	145	214.5	145	217.5
P722_KX501_	115	176.5	115	172.0	–	–
P821_KX801_	–	–	–	–	190	263.0
P822_KX701_	–	–	145	214.5	145	217.5
P922_KX801_	–	–	–	–	190	263.0

10.3.2 P shaft design (solid shaft with feather key)



qp0 Applies to motors without brake.

qp1 Applies to motors with brake.

Dimensions of gear units

Type	□a1	∅b1	c1	∅d	∅e1	f1	i2	i3	k1	l	l1	m1	o	∅s1	s2	t	u
P221_KX301_	55	50 _{h6}	6	12 _{k6}	63	7.0	36	12	124.0	22	2	31.0	84.0	5.5	M4	13.5	A4×4×18
P321_KX301_	72	60 _{h6}	7	16 _{k6}	75	7.5	48	18	136.0	28	2	36.0	96.0	5.5	M5	18.0	A5×5×22
P421_KX401_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	163.0	36	3	49.0	113.0	6.6	M8	24.5	A6×6×28
P422_KX301_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	193.5	36	3	49.0	153.5	6.6	M8	24.5	A6×6×28
P521_KX501_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	188.0	58	3	57.0	129.0	9.0	M12	35.0	A10×8×50
P522_KX401_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	220.5	58	3	57.0	170.5	9.0	M12	35.0	A10×8×50
P721_KX701_	145	130 _{h6}	15	40 _{k6}	165	3.5	112	27	231.0	82	4	72.5	157.0	11.0	M16	43.0	A12×8×70
P722_KX501_	145	130 _{h6}	15	40 _{k6}	165	3.5	112	27	265.0	82	4	72.5	206.0	11.0	M16	43.0	A12×8×70
P821_KX801_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	305.0	82	6	95.0	213.0	13.5	M20	59.0	A16×10×70
P822_KX701_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	339.5	82	6	95.0	265.5	13.5	M20	59.0	A16×10×70
P922_KX801_	212	180 _{h6}	17	75 _{k6}	250	10.0	143	34	432.0	105	7	112.5	340.0	17.5	M20	79.5	A20×12×90

Dimensions of motors

Type	□g	qp0	qp1	w1	zp0
LM401U	98	108.5	152.0	91	76.5
LM402U	98	147.5	191.0	91	115.5
LM403U	98	178.5	222.0	91	146.5
LM503U	115	186.5	234.5	100	156.0
LM505U	115	256.5	304.5	100	226.0
LM704U	145	236.5	295.5	115	204.0
LM706U	145	306.5	365.5	115	274.0

Dimensions of geared motors

Type	LM4		LM5		LM7	
	□a6	mp	□a6	mp	□a6	mp
P221_KX301_	100	134.0	–	–	–	–
P321_KX301_	100	134.0	–	–	–	–
P421_KX401_	100	145.5	115	150.0	140	153.0
P422_KX301_	100	134.0	–	–	–	–
P521_KX501_	115	176.5	115	172.0	140	183.0
P522_KX401_	100	145.5	–	–	–	–
P721_KX701_	–	–	145	214.5	145	217.5
P722_KX501_	115	176.5	115	172.0	–	–
P821_KX801_	–	–	–	–	190	263.0
P822_KX701_	–	–	145	214.5	145	217.5
P922_KX801_	–	–	–	–	190	263.0

10.4 Type designation

In this chapter, you can find an explanation of the type designation with the associated options.

Additional ordering information not included in the type designation can be found at the end of the chapter.

Sample code

P	7	2	1	S	G	R	0050	KX701VF	0030	MF	LM704U
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Explanation

Code	Designation	Design
P	Type	Planetary gear unit
7	Size	7 (example)
2	Generation	Generation 2
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
R	Bearing	Standard bearing
D		Axially reinforced bearing
Z		Radially reinforced bearing
0050	Transmission ratio of output ($i \times 10$)	$i = 5$ (example)
KX701 VF	Input	KX7 right-angle geared motor (example)
0030	Transmission ratio of input ($i \times 10$)	$i = 3$ (example)
MF	Attachment to motor	MF motor adapter
LM704U	Motor	LM Lean motor

In order to complete the type designation, also specify:

- A detailed type designation of the motor, see the chapter [\[2 \]](#)
- The installation position, see Chapter [\[10.5.2 \]](#)
- Radial shaft seal rings at the output made of FKM or NBR, see the chapter [\[10.6.3 \]](#)
- The position of the plug connector, see the chapter [\[10.5.4 \]](#)
- For reverse operation of the output shaft at $\pm 20^\circ$ to $\pm 90^\circ$ and horizontal installation, note the chapter [\[10.6.4 \]](#)

10.5 Product description

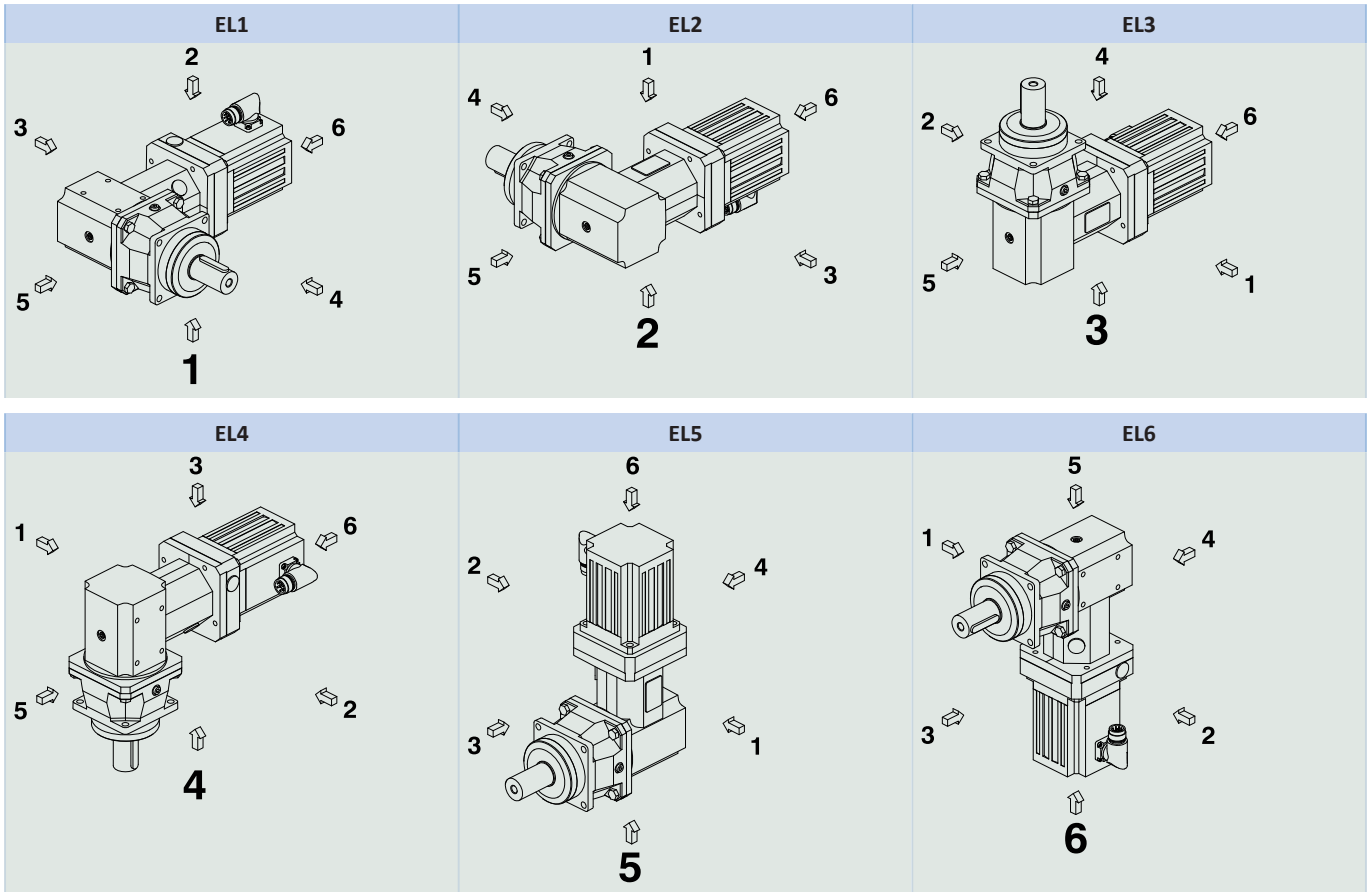
10.5.1 Installation conditions

The specified torques and forces only apply when attaching gear units at the machine side using screws of quality 10.9. In addition, the gear housing must be adjusted at the pilot (H7).

10.5.2 Installation positions

The following table shows the standard installation positions.

The numbers identify the gear unit sides. The installation position is defined by the gear side facing downwards.



Since the lubricant filling volume of the gear unit depends on the installation position, the installation position must be specified when ordering.

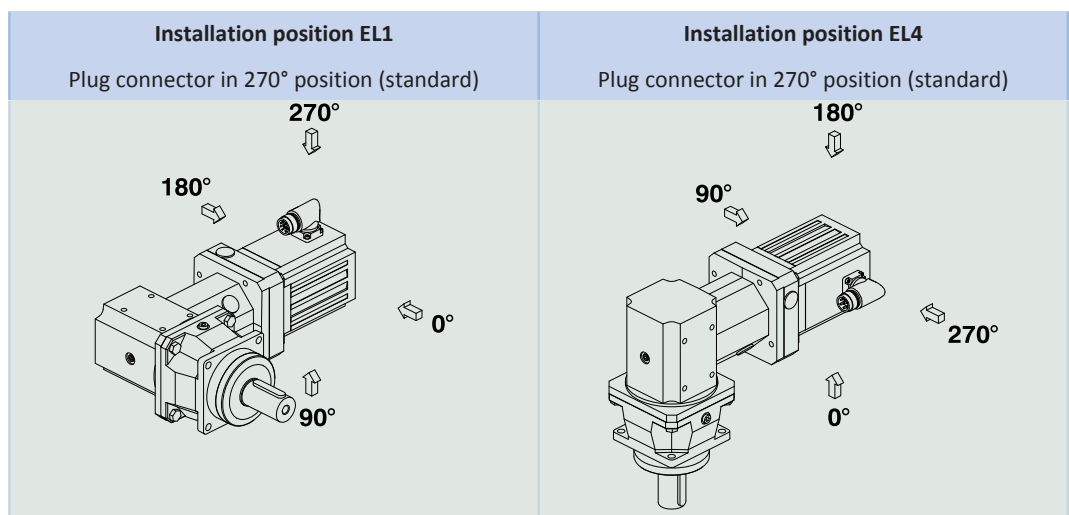
10.5.3 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate. The filling volume and the structure of the gear units depend on the installation position.

Only install the gear units in the intended installation position! Reposition the gear units only after consulting STOBER. Otherwise, STOBER assumes no liability for the gear units.

Lubricant filling quantities for gear units, document ID 441871, can be found online at <http://www.stoerber.de>

10.5.4 Position of the plug connector



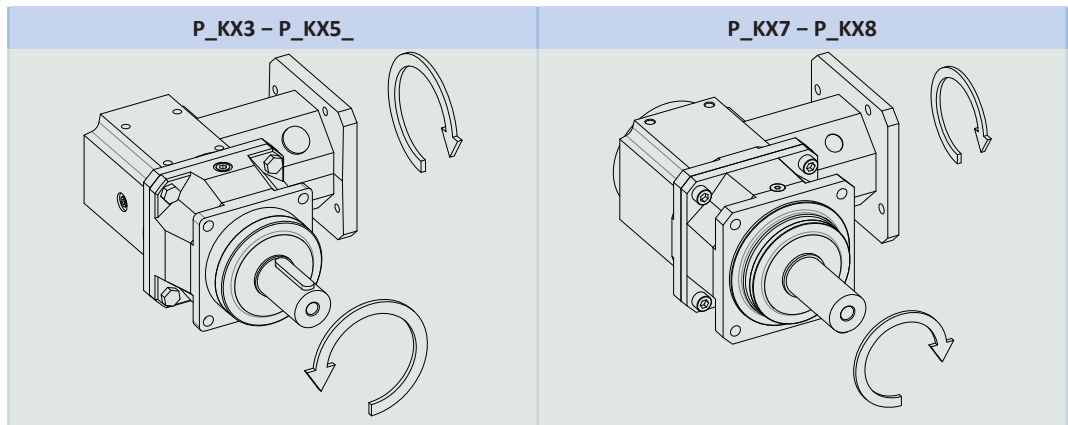
Indicate variations for your geared motor in the purchase order.

Note that the plug connector position rotates along with the geared motor if the geared motor is in another installation position.

10.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
(ATEX) Directive 2014/34/EU	Not suitable
Protection class: ¹	
Gear unit	IP65
Motor	IP56, optionally IP66

10.5.6 Direction of rotation



The pictures show installation position EL1.

10.6 Project configuration

Project your drives using our SERVOfsoft designing software. You can receive SERVOfsoft for free from your adviser at one of our sales centers. Observe the limit conditions in this chapter to ensure a safe design for your drives.

An explanation of the formula symbols can be found in Chapter Symbols in formulas.

10.6.1 Calculation of the operating point

Check the following conditions for operating points other than the nominal point M_{2N} specified in the selection tables.

For installation positions EL1, EL2, EL5, EL6:

$$n_{1m^*} \leq \frac{n_{1maxDBEL1,2,5,6}}{fB_T}$$

For installation positions EL3, EL4:

$$n_{1m^*} \leq \frac{n_{1maxDBEL3,4}}{fB_T}$$

$$n_{1max^*} \leq \frac{n_{1maxZB}}{fB_T}$$

$$M_{2eff^*} \leq M_{2th}$$

$$M_{2acc^*} \leq M_{2acc}$$

$$M_{2NOT^*} \leq M_{2NOT}$$

$$M_{2eq^*} \leq M_{2N} \cdot \frac{S}{fB_{op} \cdot fB_t}$$

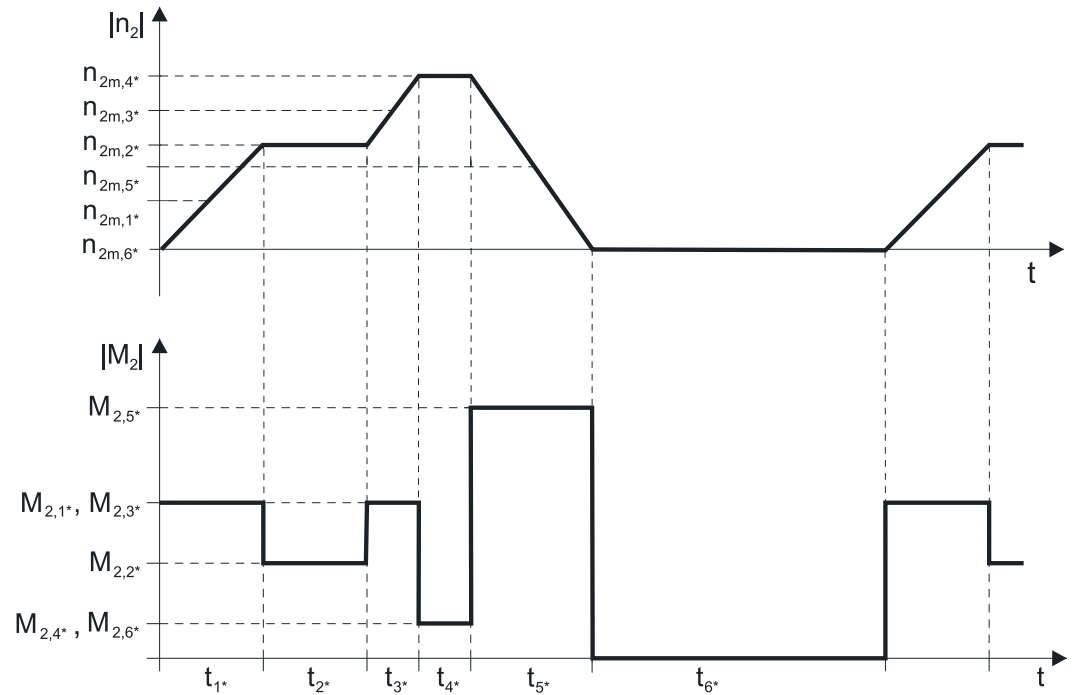
The values for $n_{1\max DBEL1,2,5,6}$, $n_{1\max DBEL3,4}$, $n_{1\max ZB}$, M_{2acc} , M_{2NOT} , M_{2N} and S can be found in the selection tables.

The values for f_{B_T} , $f_{B_{op}}$ and f_{B_t} can be found in the corresponding tables in this chapter.

Calculate the thermal limit torque M_{2th} for a duty cycle $> 50\%$.

Example of cyclic operation

The following calculations are based on a representation of the power taken from the output based in accordance with the following example:



Calculation of the actual average input speed

$$n_{1m*} = n_{2m*} \cdot i$$

$$n_{2m*} = \frac{|n_{2m,1*}| \cdot t_{1*} + \dots + |n_{2m,n*}| \cdot t_{n*}}{t_{1*} + \dots + t_{n*}}$$

If $t_{1*} + \dots + t_{5*} \geq 20$ min, calculate n_{2m*} without the rest phase t_{6*} .

The values for the ratio i can be found in the selection tables.

Calculation of the actual effective torque

$$M_{2eff*} = \sqrt{\frac{t_{1*} \cdot M_{2,1*}^2 + \dots + t_{n*} \cdot M_{2,n*}^2}{t_{1*} + \dots + t_{n*}}}$$

Calculation of the actual equivalent torque

$$M_{2eq*} = \sqrt[3]{\frac{|n_{2m,1*}| \cdot t_{1*} \cdot M_{2,1*}^3 + \dots + |n_{2m,n*}| \cdot t_{n*} \cdot M_{2,n*}^3}{|n_{2m,1*}| \cdot t_{1*} + \dots + |n_{2m,n*}| \cdot t_{n*}}}$$

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{20} > 50\%$ and the actual average input speed n_{1m*} . (At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m*} accordingly or select another geared motor size.)

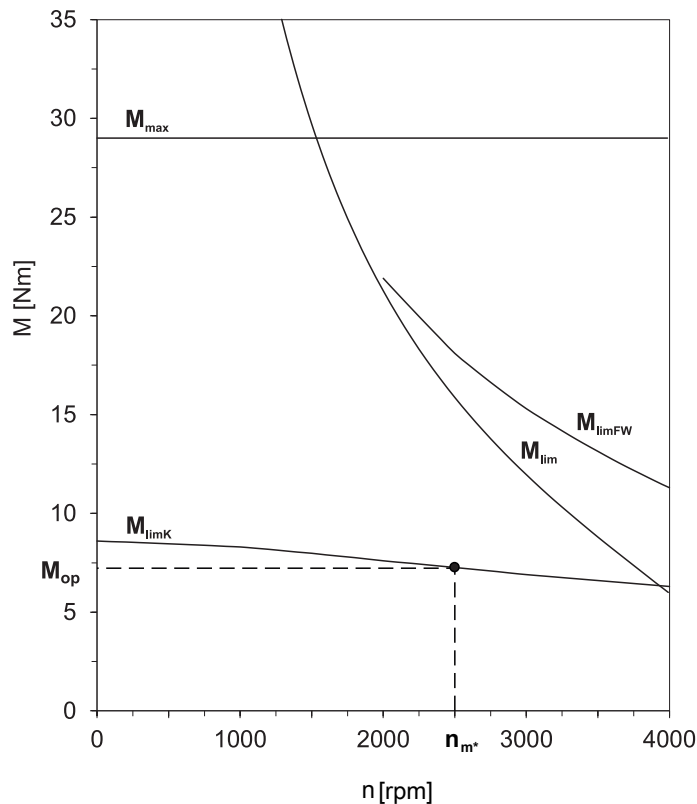
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

$$K_{mot,th} = 0,9 - \frac{a_{th}}{1000} \cdot athEL \cdot f_{B_T} \cdot \left(\frac{n_{1m*}}{1000}\right)^3$$

The values for i and a_{th} can be found in the selection tables.

The values for f_{B_T} can be found in the corresponding table in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m^*} can be found in the motor curve of Chapter [2.3]. Note the size and nominal speed n_N of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Installation position		a_{thEL}
EL1, 2, 5, 6		1.0
EL3, 4		1.1
Operating mode		fB_{op}
Uniform continuous operation		1.00
Cyclic operation		1.25
Reversing load cyclic operation		1.40
Run time		fB_t
Daily run time ≤ 8 h		1.00
Daily run time ≤ 16 h		1.15
Daily run time ≤ 24 h		1.20
Temperature		fB_T
Motor cooling	Surrounding temperature	
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

Notes

- The maximum permitted gear unit temperature (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc} , M_{2NOT}) in the selection tables.
- The values specified in the selection tables for M_{2acc} refer to the gear units with a solid shaft design without feather key (G). We recommend this shaft design in general for cyclic operation.

10.6.2 Permitted shaft loads for the output shaft

The values specified in the tables apply to the permitted shaft loads:

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m^*} \leq 100$ rpm ($F_{2ax^N} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

Permitted shaft loads for standard bearing R

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P2	17.0	500	1200	1300	34	36
P3	21.0	1000	2500	2500	88	88
P4	22.0	1500	4000	4500	160	180
P5	23.0	2300	6500	7000	338	364
P7	26.0	2900	8000	9000	536	603
P8	28.0	4700	13000	18000	897	1242
P9	40.0	6000	18000	27000	1665	2498

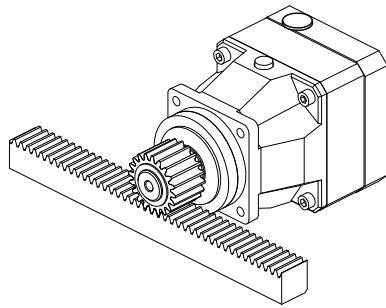


Fig. 1: Recommendation for bearing assignment R

Permitted shaft loads for axially reinforced bearing D

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	24.0	1400	2750	2750	105	105
P4	25.0	2250	4500	5000	194	215
P5	29.0	3500	7000	8000	406	464
P7	31.0	4500	9000	10000	648	720
P8	35.0	7500	15000	18000	1140	1368
P9	51.0	10000	20000	30000	2070	3105

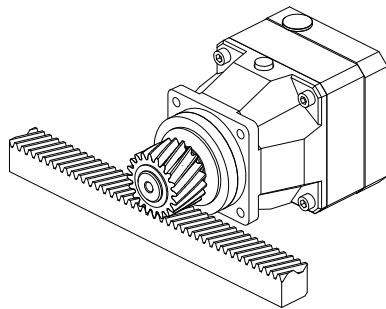


Fig. 2: Recommendation for bearing assignment D

Permitted shaft loads for radially reinforced bearing Z

Type	z_2 [mm]	F_{2ax100} [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	M_{2k100} [Nm]	$M_{2k,acc}$ [Nm]
P3	21.0	600	3000	3000	105	105
P4	22.0	1000	5000	5000	200	200
P5	23.0	1600	8000	8000	416	416
P7	26.0	2000	10000	10000	670	670
P8	28.0	3600	18000	18000	1242	1242
P9	40.0	5000	27000	35000	2500	3238

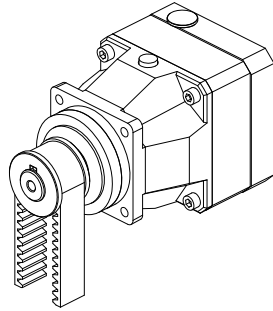


Fig. 3: Recommendation for bearing assignment Z

For other output speeds, download diagrams at <http://products.stoeber.de>.

The following applies to output speeds $n_{2m^*} > 100$ rpm:

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}}$$

$$F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}}$$

$$M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}}$$

The values for F_{2ax100} , $F_{2rad100}$ and M_{2k100} can be found in the table "Permitted shaft loads" in this chapter.

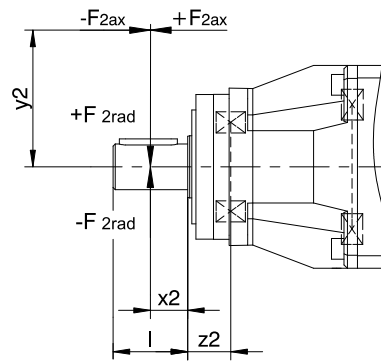


Fig. 4: Force application points

The specified values for $F_{2rad100}$ and $F_{2rad,acc}$ refer to an application of force at the center of the output shaft: $x_2 = l/2$.

Shaft dimensions can be found in the "Dimensional drawings" chapter.

The following applies to other force application points:

$$M_{2k,acc^*} = \frac{2 \cdot F_{2ax^*} \cdot y_2 + F_{2rad,acc^*} \cdot (x_2 + z_2)}{1000} \leq M_{2k,acc}$$

$$F_{2rad,acc^*} \leq F_{2rad,acc}$$

$$F_{2ax^*} \leq F_{2axN}$$

The values for $F_{2rad,acc}$ and $M_{2k,acc}$ can be found in the table "Permitted shaft loads" in this chapter.

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

In the event of EMERGENCY OFF operation (max. 1000 load changes), you can multiply the permitted forces and torques for F_{2ax100} , $F_{2rad100}$ and M_{2k100} by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |M_{2k,acc,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |M_{2k,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \dots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq M_{2kN}$$

$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \dots + |n_{2m,n^*}| \cdot t_{n^*}}} \leq F_{2radN}$$

The following apply to the bearing service life L_{10h} ($ED_{20} \leq 40\%$):

$$L_{10h} > 10000 \text{ h with } 1 < M_{2kN}/M_{2k^*} < 1.25$$

$$L_{10h} > 20000 \text{ h with } 1.25 < M_{2kN}/M_{2k^*} < 1.5$$

$$L_{10h} > 30000 \text{ h with } 1.5 < M_{2kN}/M_{2k^*}$$

For different duty cycles:

$$L_{10h} > L_{10h(ED_{20}=40\%)} \cdot \frac{40\%}{ED_{20}}$$

10.6.3 Recommendation for radial shaft seal rings

For a duty cycle $> 60\%$, we recommend radial shaft seal rings made of FKM.

Properties:

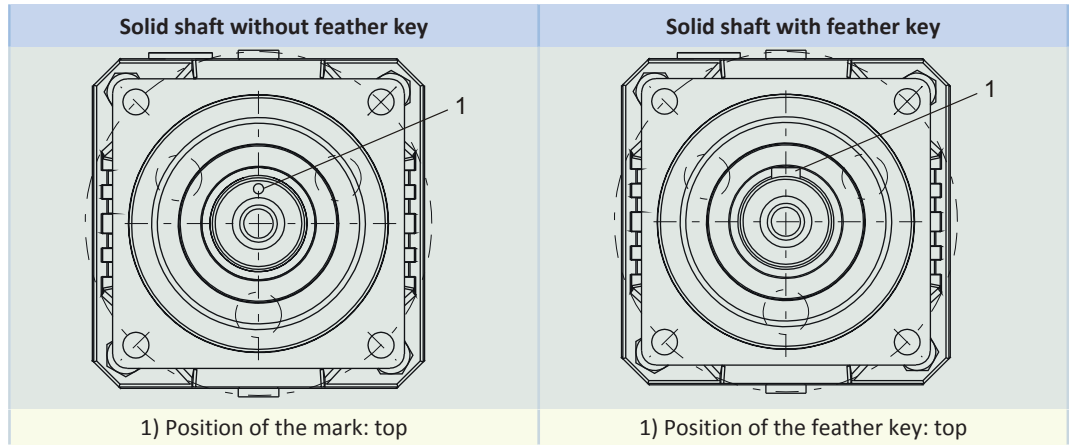
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance to mineral oils and greases
- For use in the food, beverage and pharmaceutical industries

Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leak-proofness. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear unit lubricant in case of a leak.

10.6.4 Reverse operation

To ensure lubrication of circulating geared parts during cyclic reverse operation from $\pm 20^\circ$ to $\pm 90^\circ$, pay careful attention to the position of the output shaft if the gear unit is installed horizontally as shown in the images below. The images show the center position of reverse operation. Cyclic reverse operation $\leq \pm 20^\circ$ on request.



Notes

- If you use the solid shaft without a feather key (G) with a mark, note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P) and clamp. In that case, the feather key functions for position orientation.

10.7 Additional documentation

Additional documentation related to the product can be found at <http://www.stoeber.de/en/download>

Enter the ID of the documentation in the Search... field.

Documentation	ID
Operating manual for KL/KS/PHK/PHKX/PHQK/PK/PKX right-angle gear units and right-angle geared motors	443004_en
Lubricant filling quantities for gear units	441871