

# ServoStop

Servo gear units with brake



**STÖBER**



**ServoStop**

**Servo gear units with brake**

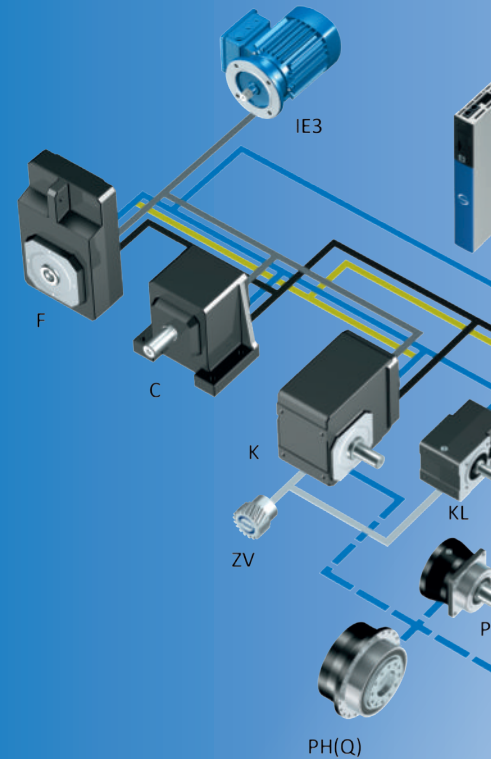
# One partner. All the possibilities.

STOBER has developed and produced excellent drive technology since 1934 and is active internationally with around 1000 employees at 12 locations. STOBER impresses machine manufacturers in wide-ranging industries and markets around the world with tailor-made, highly efficient drive systems for demanding movements.



"Our vision is to be the preferred partner for perfect movement."

- Rainer Wegener, CEO of STOBER.



## ServoStop – what you can expect!

Learn more about ServoStop, the motor adapter with integrated brake for STOBER servo gear units. Play it safe with STOBER: The STOBER 2-brake solution, which features diverse redundancy and combines a ServoStop spring-loaded brake and the permanent magnet brake of a synchronous servo motor, fully meets the normative requirements. However, what makes the system safe is the combination of this solution with the STOBER SD6 drive controller, the SE6 safety module and the safe brake management system integrated into it. We are happy to give you advice.

## At home in the world of demanding motion

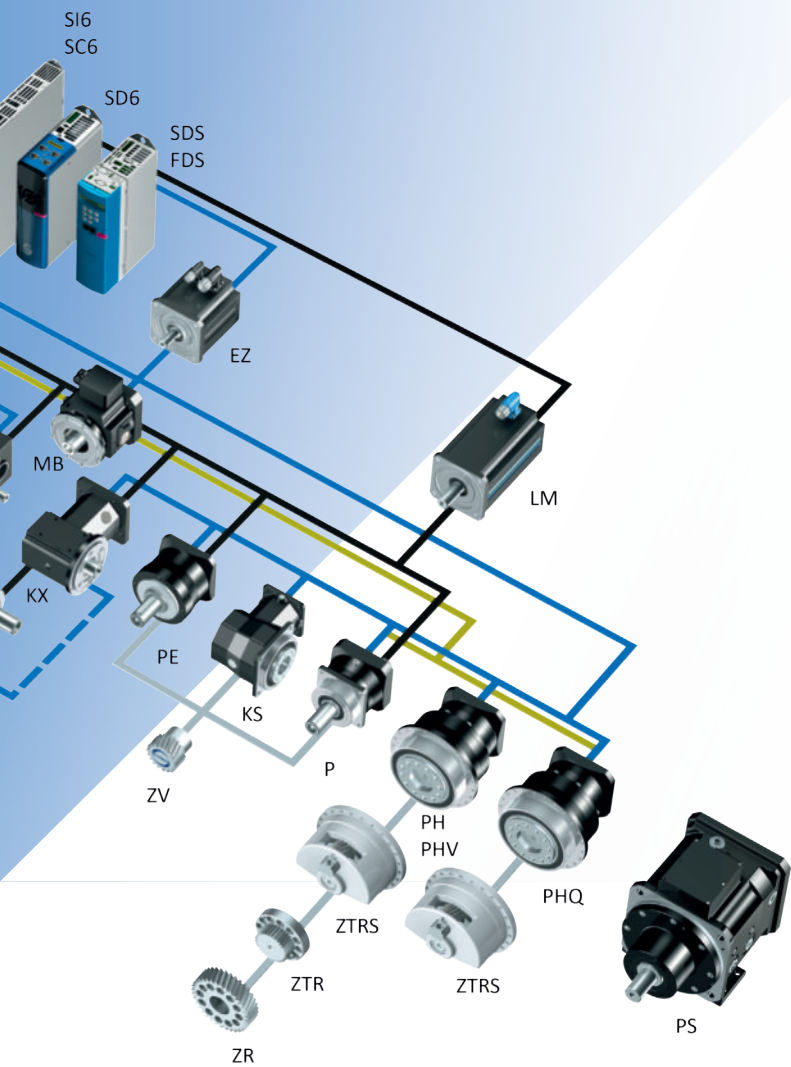
**Gear units**

**Geared motors**

**Motors**

**Cables and drive controllers**





## Everything from a single source.

The STOBER drive system consisting of gear units, motors, cables and drive controllers has a modular design and is freely scalable—for tailor-made, compact and powerful machine concepts. It can be adapted to your individual requirements and combined as needed in nearly all industries and applications areas.

We check every single component and how it works together with others, taking on the responsibility for the complete drive train. For you, this means that one contact partner, certified operating safety and maximum availability are guaranteed.

### Need special solutions?

Numerous one-of-a-kind product highlights and project-related adjustments make it possible. With a holistic approach to your specific task, we work together on individualized solutions that are optimally coordinated to your requirements. Dedicated and solution-oriented in the support of your visions and projects.

### STOBER moves integrally and precisely.

We put ideas in motion with passion and a great deal of dedication. In the process, we rely on our decades of experience and an exceptionally broad range of products. Our customers benefit from precise, practical system solutions with uncompromising quality and expert individual consultation.



## STOBER moves as a team and with personality.

As a family-owned company, it is very important to us to maintain close relationships and treat each other with trust. We put people first.

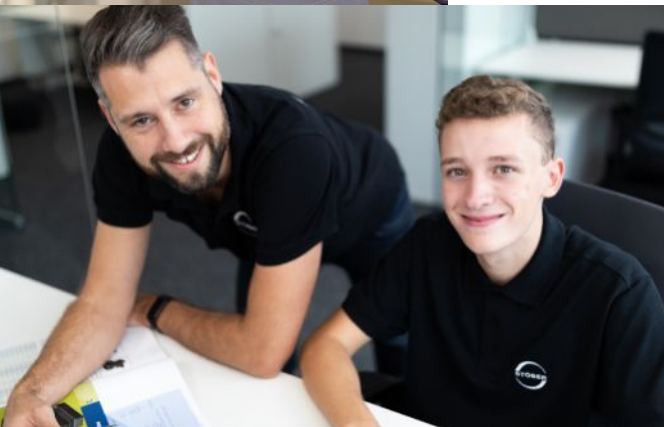
We are committed to the well-being of our employees, identify with the expectations of our customers, and show personal commitment to mutual success.



"We have installed gear units, motors and drive controllers from STOBER in nearly all our systems. STOBER supports us in new projects from the first stroke of a pencil in the design phase until commissioning. Our years of cooperation are shaped by openness and honesty and emanate a rather special spirit. The technical consulting, the support—that is real, experienced partnership"

- Jürgen Leicht, Managing Partner of Leicht Stanzautomatation.





### **Working together. Worldwide. Successfully.**

With an eye to the future, STOBER is facing the challenges of digitalization and investing in integrated solutions and a strong global presence in production, sales and service. STOBER China was founded at the end of 2019. As a result, we are present in more than 40 countries around in the world at 12 locations and with 80 service partners.



**STOBER drives  
Systems technology  
Taicang, China.**



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# 1 Selection tool

## 1.1 Inline and offset gear units



Product chapter

P

C

F

PH

PHQ

Chapter number

[▶ 2](#)

[▶ 5](#)

[▶ 6](#)

[▶ 3](#)

[▶ 4](#)

### Technical data

$M_{1\text{Bstat}}$	8 – 300 Nm	8 – 160 Nm	8 – 160 Nm	8 – 160 Nm	8 – 300 Nm
$i$	3 – 100	2 – 70	4.3 – 140	4 – 100	5.5 – 300
$M_{2\text{acc}}$	109 – 3450 Nm	47 – 4800 Nm	100 – 1100 Nm	144 – 7500 Nm	198 – 35370 Nm
$\Delta\phi_2$	1 – 4 arcmin	10 – 20 arcmin	5 – 11 arcmin	1 – 3 arcmin	1 – 3 arcmin
$\eta_{\text{get}}$	95 – 97 %	97 %	97 %	93 – 96 %	90 – 96 %

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

### Features

Power density	★★★★☆	★☆☆☆☆	★☆☆☆☆	★★★★☆	★★★★★
Backlash	★★★★★	★★☆☆☆	★★★☆☆	★★★★★	★★★★★
Price category	€€	€	€	€€€	€€€€
Shaft load	★★★★☆	★☆☆☆☆	★★★☆☆	★★★★★	★★★★★
Smooth operation	★★★★☆	★★★☆☆	★★★☆☆	★★★★☆	★★★★☆
Torsional stiffness	★★★☆☆	★☆☆☆☆	★★★☆☆	★★★★☆	★★★★★
Mass moment of inertia	★★★★☆	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Key	★☆☆☆☆ good   ★★★★★ excellent € Economy   €€€€€ Premium				

Shaft design					
Solid shaft with feather key	✓	✓	✓		
Solid shaft without feather key	✓	C0 – C5: ✓ Starting at C6: Re- quest	✓		
Hollow shaft with keyway			✓		
Hollow shaft with shrink ring			✓		
Flange shaft				✓	✓
Bearing design					
Standard	✓	✓	✓	✓	✓
Axially reinforced	✓				
Radially reinforced	✓				
Reinforced				✓ (PH3 – PH5)	✓ (PHQ4 – PHQ5)

# 1 Selection tool

## 1.2 Right-angle gear units



Product chapter

PK

PHK

PHQK

K

Chapter number

[▶ 7](#)

[▶ 8](#)

[▶ 9](#)

[▶ 10](#)

### Technical data

$M_{1Bstat}$	8 – 100 Nm	8 – 160 Nm	8 – 160 Nm	8 – 160 Nm
$i$	12 – 390	16 – 466	22 – 591	4 – 99
$M_{2acc}$	200 – 3105 Nm	355 – 7500 Nm	492 – 43000 Nm	93 – 7700 Nm
$\Delta\phi_2$	1.5 – 5 arcmin	1.5 – 4.5 arcmin	1.5 – 4 arcmin	1.5 – 12 arcmin
$\eta_{get}$	94 %	92 – 93 %	92 – 93 %	96 – 97 %

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

### Features

Power density	★★★★☆	★★★★☆	★★★★★	★★☆☆☆
Backlash	★★★★★	★★★★★	★★★★★	★★★☆☆
Price category	€€€	€€€€	€€€€€	€€
Shaft load	★★★★☆	★★★★★	★★★★★	★★★☆☆
Smooth operation	★★★☆☆	★★★☆☆	★★★☆☆	★★☆☆☆
Torsional stiffness	★★★☆☆	★★★★☆	★★★★★	★★☆☆☆
Mass moment of inertia	★★★★☆	★★★★☆	★★★★☆	★★★★☆
Key	★★☆☆☆ good   ★★★★★ excellent € Economy   €€€€€ Premium			

Shaft design	PK	PHK	PHQK	K
Solid shaft with feather key	✓			✓
Solid shaft without feather key	✓			K1 – K4: ✓ Starting at K5: Request
Solid shaft on both sides				✓
Hollow shaft with keyway				✓
Hollow shaft with shrink ring				✓
Flange shaft		✓	✓	✓
Bearing design	PK	PHK	PHQK	K
Standard	✓	✓	✓	✓
Axially reinforced	✓			
Radially reinforced	✓			
Reinforced		✓ (PH5)	✓ (PHQ5)	

# 1 Selection tool

## 1.2 Right-angle gear units

# 1 Selection tool

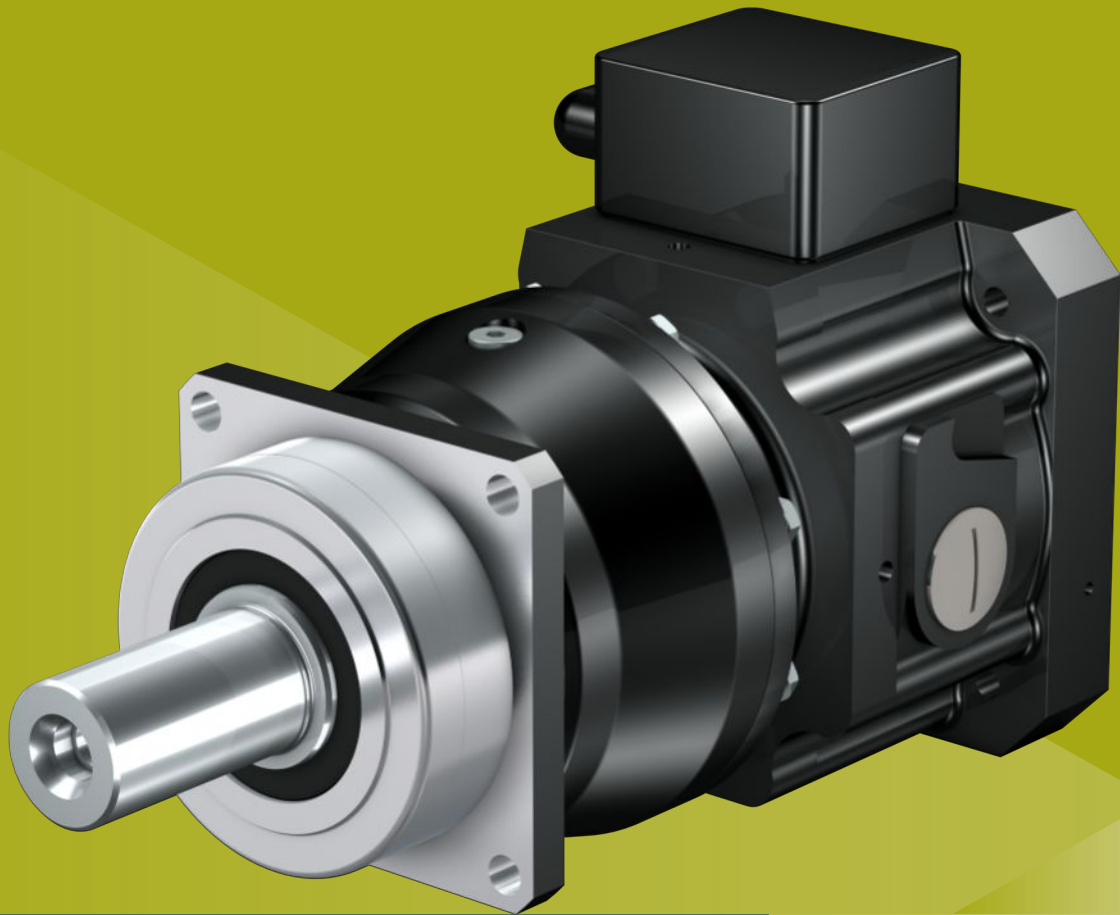
## 1.2 Right-angle gear units



## 2 P planetary gear units

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## 2 Planetary gear units

P

### 2.1 Overview

Helical-gear precision planetary gear units with integrated brake

#### Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★☆☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
Any mounting position	✓
Continuous operation without cooling	✓
Reinforced output bearing	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 300 Nm
$i$	3 – 100
$M_{2acc}$	109 – 3450 Nm
$\Delta\phi_2$	1 – 4 arcmin
$\eta_{get}$	95 – 97 %

## 2.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	Type	$M_{1\text{Bstat}}$	$M_{M,\text{Bmax}}$	$n_{1\text{maxDB}}$	$n_{1\text{maxZB}}$	$J_1$	$m$	$C_2$	$\Delta\varphi_2$	$\Delta\varphi_{2\text{red}}$	$L_{\text{pA}}$	$M_{2\text{N}}$	$M_{2\text{acc}}$	$M_{2\text{accHT}}$	$M_{2\text{NOT}}$
		[Nm]	[Nm]	[rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[Nm/arcmin]	[arcmin]	[arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P531 (<math>M_{2\text{acc,max}} = 291 \text{ Nm}</math>)</b>															
3.000	P531_0030 MB23	8.0	31	2500	4000	9.1	13	8.8	3.0	1.0	64	109	109	109	183
3.000	P531_0030 MB23	12	25	2500	4000	9.1	13	8.8	3.0	1.0	64	109	109	109	183
3.000	P531_0030 MB23	16	20	2500	4000	9.1	13	8.8	3.0	1.0	64	109	109	109	183
3.000	P531_0030 MB23	24	8.4	2500	4000	9.1	13	8.8	3.0	1.0	64	109	109	109	183
3.000	P531_0030 MB23	30	–	2500	4000	9.1	13	8.8	3.0	1.0	64	109	109	109	183
4.000	P531_0040 MB23	8.0	31	3000	4000	7.5	13	13	3.0	1.0	62	146	146	146	244
4.000	P531_0040 MB23	12	25	3000	4000	7.5	13	13	3.0	1.0	62	146	146	146	244
4.000	P531_0040 MB23	16	20	3000	4000	7.5	13	13	3.0	1.0	62	146	146	146	244
4.000	P531_0040 MB23	24	8.4	3000	4000	7.5	13	13	3.0	1.0	62	146	146	146	244
4.000	P531_0040 MB23	30	–	3000	4000	7.5	13	13	3.0	1.0	62	146	146	146	244
5.000	P531_0050 MB23	8.0	31	3500	4000	7.0	13	17	3.0	1.0	60	182	182	182	306
5.000	P531_0050 MB23	12	25	3500	4000	7.0	13	17	3.0	1.0	60	182	182	182	306
5.000	P531_0050 MB23	16	20	3500	4000	7.0	13	17	3.0	1.0	60	182	182	182	306
5.000	P531_0050 MB23	24	8.4	3500	4000	7.0	13	17	3.0	1.0	60	182	182	182	306
5.000	P531_0050 MB23	30	–	3500	4000	7.0	13	17	3.0	1.0	60	182	182	182	306
7.000	P531_0070 MB23	8.0	31	3700	4000	6.6	13	21	3.0	1.0	59	210	255	255	428
7.000	P531_0070 MB23	12	25	3700	4000	6.6	13	21	3.0	1.0	59	210	255	255	428
7.000	P531_0070 MB23	16	20	3700	4000	6.6	13	21	3.0	1.0	59	210	255	255	428
7.000	P531_0070 MB23	24	8.4	3700	4000	6.6	13	21	3.0	1.0	59	210	255	255	428
7.000	P531_0070 MB23	30	–	3700	4000	6.6	13	21	3.0	1.0	59	210	255	255	428
8.000	P531_0080 MB23	8.0	31	3700	4000	6.6	13	19	3.0	1.0	58	200	291	291	489
8.000	P531_0080 MB23	12	25	3700	4000	6.6	13	19	3.0	1.0	58	200	291	291	489
8.000	P531_0080 MB23	16	20	3700	4000	6.6	13	19	3.0	1.0	58	200	291	291	489
8.000	P531_0080 MB23	24	8.4	3700	4000	6.6	13	19	3.0	1.0	58	200	291	291	489
8.000	P531_0080 MB23	30	–	3700	4000	6.6	13	19	3.0	1.0	58	200	291	291	489
10.000	P531_0100 MB23	8.0	31	3700	4000	6.5	13	22	3.0	1.0	57	180	288	288	575
10.000	P531_0100 MB23	12	25	3700	4000	6.5	13	22	3.0	1.0	57	180	288	288	575
10.000	P531_0100 MB23	16	20	3700	4000	6.5	13	22	3.0	1.0	57	180	288	288	575
10.000	P531_0100 MB23	24	8.4	3700	4000	6.5	13	22	3.0	1.0	57	180	288	288	575
10.000	P531_0100 MB23	30	–	3700	4000	6.5	13	22	3.0	1.0	57	180	288	288	575
<b>P731 (<math>M_{2\text{acc,max}} = 700 \text{ Nm}</math>)</b>															
3.000	P731_0030 MB33	16	104	2200	4000	35	25	14	3.0	1.0	65	291	291	291	550
3.000	P731_0030 MB33	24	92	2200	4000	35	25	14	3.0	1.0	65	291	291	291	550
3.000	P731_0030 MB33	32	81	2200	4000	35	25	14	3.0	1.0	65	291	291	291	550
3.000	P731_0030 MB33	45	63	2200	4000	35	25	14	3.0	1.0	65	291	291	291	550
3.000	P731_0030 MB33	90	–	2200	4000	35	25	14	3.0	1.0	65	291	291	291	550
4.000	P731_0040 MB33	16	104	2500	4000	30	25	22	3.0	1.0	63	388	388	388	733
4.000	P731_0040 MB33	24	92	2500	4000	30	25	22	3.0	1.0	63	388	388	388	733
4.000	P731_0040 MB33	32	81	2500	4000	30	25	22	3.0	1.0	63	388	388	388	733
4.000	P731_0040 MB33	45	63	2500	4000	30	25	22	3.0	1.0	63	388	388	388	733
4.000	P731_0040 MB33	90	–	2500	4000	30	25	22	3.0	1.0	63	388	388	388	733
5.000	P731_0050 MB33	16	104	2700	4000	28	25	29	3.0	1.0	61	440	485	485	917
5.000	P731_0050 MB33	24	92	2700	4000	28	25	29	3.0	1.0	61	440	485	485	917
5.000	P731_0050 MB33	32	81	2700	4000	28	25	29	3.0	1.0	61	440	485	485	917
5.000	P731_0050 MB33	45	63	2700	4000	28	25	29	3.0	1.0	61	440	485	485	917
5.000	P731_0050 MB33	90	–	2700	4000	28	25	29	3.0	1.0	61	440	485	485	917
7.000	P731_0070 MB33	16	104	3000	4000	27	25	38	3.0	1.0	60	440	679	679	1283
7.000	P731_0070 MB33	24	92	3000	4000	27	25	38	3.0	1.0	60	440	679	679	1283
7.000	P731_0070 MB33	32	81	3000	4000	27	25	38	3.0	1.0	60	440	679	679	1283
7.000	P731_0070 MB33	45	63	3000	4000	27	25	38	3.0	1.0	60	440	679	679	1283
7.000	P731_0070 MB33	90	–	3000	4000	27	25	38	3.0	1.0	60	440	679	679	1283
8.000	P731_0080 MB33	16	104	3000	4000	26	25	40	3.0	1.0	59	400	668	700	1336
8.000	P731_0080 MB33	24	92	3000	4000	26	25	40	3.0	1.0	59	400	668	700	1336
8.000	P731_0080 MB33	32	81	3000	4000	26	25	40	3.0	1.0	59	400	668	700	1336
8.000	P731_0080 MB33	45	63	3000	4000	26	25	40	3.0	1.0	59	400	668	700	1336
8.000	P731_0080 MB33	90	–	3000	4000	26	25	40	3.0	1.0	59	400	668	700	1336

2.2 Selection tables 2 P planetary gear units

i	Type	$M_{1Befat}$	$M_{M,Bmax}$	$n_{1maxDB}$	$n_{1maxZB}$	$J_1$	$m$	$C_2$	$\Delta\varphi_2$	$\Delta\varphi_{2red}$	$L_{pA}$	$M_{2N}$	$M_{2acc}$	$M_{2accHT}$	$M_{2NOT}$
		[Nm]	[Nm]	[rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[Nm/arcmin]	[arcmin]	[arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P731 (<math>M_{2acc,max} = 700</math> Nm)</b>															
10.00	P731_0100 MB33	16	78	3000	4000	26	25	43	3.0	1.0	58	350	575	575	1150
10.00	P731_0100 MB33	24	67	3000	4000	26	25	43	3.0	1.0	58	350	575	575	1150
10.00	P731_0100 MB33	32	56	3000	4000	26	25	43	3.0	1.0	58	350	575	575	1150
10.00	P731_0100 MB33	45	37	3000	4000	26	25	43	3.0	1.0	58	350	575	575	1150
<b>P732 (<math>M_{2acc,max} = 805</math> Nm)</b>															
12.00	P732_0120 MB23	8.0	31	2500	4000	7.7	22	46	4.0	2.0	62	295	428	428	718
12.00	P732_0120 MB23	12	25	2500	4000	7.7	22	46	4.0	2.0	62	295	428	428	718
12.00	P732_0120 MB23	16	20	2500	4000	7.7	22	46	4.0	2.0	62	295	428	428	718
12.00	P732_0120 MB23	24	8.4	2500	4000	7.7	22	46	4.0	2.0	62	295	428	428	718
12.00	P732_0120 MB23	30	–	2500	4000	7.7	22	46	4.0	2.0	62	295	428	428	718
16.00	P732_0160 MB23	8.0	31	3000	4000	7.4	22	54	4.0	2.0	62	450	570	570	958
16.00	P732_0160 MB23	12	25	3000	4000	7.4	22	54	4.0	2.0	62	450	570	570	958
16.00	P732_0160 MB23	16	20	3000	4000	7.4	22	54	4.0	2.0	62	450	570	570	958
16.00	P732_0160 MB23	24	8.4	3000	4000	7.4	22	54	4.0	2.0	62	450	570	570	958
16.00	P732_0160 MB23	30	–	3000	4000	7.4	22	54	4.0	2.0	62	450	570	570	958
20.00	P732_0200 MB23	8.0	31	3000	4000	7.2	22	57	4.0	2.0	62	460	713	713	1197
20.00	P732_0200 MB23	12	25	3000	4000	7.2	22	57	4.0	2.0	62	460	713	713	1197
20.00	P732_0200 MB23	16	20	3000	4000	7.2	22	57	4.0	2.0	62	460	713	713	1197
20.00	P732_0200 MB23	24	8.4	3000	4000	7.2	22	57	4.0	2.0	62	460	713	713	1197
20.00	P732_0200 MB23	30	–	3000	4000	7.2	22	57	4.0	2.0	62	460	713	713	1197
25.00	P732_0250 MB23	8.0	31	3500	4000	6.9	22	59	4.0	2.0	60	500	805	805	1496
25.00	P732_0250 MB23	12	25	3500	4000	6.9	22	59	4.0	2.0	60	500	805	805	1496
25.00	P732_0250 MB23	16	20	3500	4000	6.9	22	59	4.0	2.0	60	500	805	805	1496
25.00	P732_0250 MB23	24	8.4	3500	4000	6.9	22	59	4.0	2.0	60	500	805	805	1496
25.00	P732_0250 MB23	30	–	3500	4000	6.9	22	59	4.0	2.0	60	500	805	805	1496
28.00	P732_0280 MB23	8.0	24	3700	4000	6.6	22	60	4.0	2.0	59	538	700	700	1400
28.00	P732_0280 MB23	12	19	3700	4000	6.6	22	60	4.0	2.0	59	538	700	700	1400
28.00	P732_0280 MB23	16	13	3700	4000	6.6	22	60	4.0	2.0	59	538	700	700	1400
28.00	P732_0280 MB23	24	1.9	3700	4000	6.6	22	60	4.0	2.0	59	538	700	700	1400
32.00	P732_0320 MB23	8.0	28	3000	4000	7.2	22	55	4.0	2.0	62	470	730	730	1460
32.00	P732_0320 MB23	12	22	3000	4000	7.2	22	55	4.0	2.0	62	470	730	730	1460
32.00	P732_0320 MB23	16	17	3000	4000	7.2	22	55	4.0	2.0	62	470	730	730	1460
32.00	P732_0320 MB23	24	5.4	3000	4000	7.2	22	55	4.0	2.0	62	470	730	730	1460
35.00	P732_0350 MB23	8.0	24	3700	4000	6.6	22	61	4.0	2.0	59	540	770	805	1540
35.00	P732_0350 MB23	12	18	3700	4000	6.6	22	61	4.0	2.0	59	540	770	805	1540
35.00	P732_0350 MB23	16	13	3700	4000	6.6	22	61	4.0	2.0	59	540	770	805	1540
35.00	P732_0350 MB23	24	1.6	3700	4000	6.6	22	61	4.0	2.0	59	540	770	805	1540
40.00	P732_0400 MB23	8.0	14	3700	4000	6.5	22	61	4.0	2.0	57	454	700	700	1400
40.00	P732_0400 MB23	12	8.0	3700	4000	6.5	22	61	4.0	2.0	57	454	700	700	1400
40.00	P732_0400 MB23	16	2.4	3700	4000	6.5	22	61	4.0	2.0	57	454	700	700	1400
50.00	P732_0500 MB23	8.0	13	3700	4000	6.5	22	62	4.0	2.0	57	565	770	805	1540
50.00	P732_0500 MB23	12	7.8	3700	4000	6.5	22	62	4.0	2.0	57	565	770	805	1540
50.00	P732_0500 MB23	16	2.2	3700	4000	6.5	22	62	4.0	2.0	57	565	770	805	1540
56.00	P732_0560 MB23	8.0	8.6	3700	4000	6.6	22	56	4.0	2.0	59	500	650	650	1300
56.00	P732_0560 MB23	12	3.0	3700	4000	6.6	22	56	4.0	2.0	59	500	650	650	1300
70.00	P732_0700 MB23	8.0	7.4	3700	4000	6.4	22	59	4.0	2.0	57	584	762	799	1525
70.00	P732_0700 MB23	12	1.8	3700	4000	6.4	22	59	4.0	2.0	57	584	762	799	1525
80.00	P732_0800 MB23	8.0	2.1	3700	4000	6.4	22	56	4.0	2.0	57	477	620	620	1240
<b>P831 (<math>M_{2acc,max} = 1521</math> Nm)</b>															
3.000	P831_0030 MB43	50	154	1800	3000	111	50	21	3.0	1.0	66	589	652	652	978
3.000	P831_0030 MB43	72	123	1800	3000	111	50	21	3.0	1.0	66	589	652	652	978
3.000	P831_0030 MB43	100	84	1800	3000	111	50	21	3.0	1.0	66	589	652	652	978
3.000	P831_0030 MB43	160	–	1800	3000	111	50	21	3.0	1.0	66	589	652	652	978
4.000	P831_0040 MB43	50	154	2000	3000	88	50	34	3.0	1.0	64	786	869	869	1304
4.000	P831_0040 MB43	72	123	2000	3000	88	50	34	3.0	1.0	64	786	869	869	1304
4.000	P831_0040 MB43	100	84	2000	3000	88	50	34	3.0	1.0	64	786	869	869	1304
4.000	P831_0040 MB43	160	–	2000	3000	88	50	34	3.0	1.0	64	786	869	869	1304
5.000	P831_0050 MB43	50	154	2500	3000	80	50	48	3.0	1.0	62	982	1086	1086	1630
5.000	P831_0050 MB43	72	123	2500	3000	80	50	48	3.0	1.0	62	982	1086	1086	1630
5.000	P831_0050 MB43	100	84	2500	3000	80	50	48	3.0	1.0	62	982	1086	1086	1630
5.000	P831_0050 MB43	160	–	2500	3000	80	50	48	3.0	1.0	62	982	1086	1086	1630
7.000	P831_0070 MB43	50	154	2800	3000	75	50	73	3.0	1.0	61	1000	1521	1521	2281
7.000	P831_0070 MB43	72	123	2800	3000	75	50	73	3.0	1.0	61	1000	1521	1521	2281
7.000	P831_0070 MB43	100	84	2800	3000	75	50	73	3.0	1.0	61	1000	1521	1521	2281
7.000	P831_0070 MB43	160	–	2800	3000	75	50	73	3.0	1.0	61	1000	1521	1521	2281
8.000	P831_0080 MB43	50	154	2800	3000	73	50	82	3.0	1.0	60	850	1500	1500	2607

i	Type	M <sub>1Befat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>PA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>P831 (M<sub>2acc,max</sub> = 1521 Nm)</b>															
8.000	P831_0080 MB43	72	123	2800	3000	73	50	82	3.0	1.0	60	850	1500	1500	2607
8.000	P831_0080 MB43	100	84	2800	3000	73	50	82	3.0	1.0	60	850	1500	1500	2607
8.000	P831_0080 MB43	160	–	2800	3000	73	50	82	3.0	1.0	60	850	1500	1500	2607
10.00	P831_0100 MB43	50	154	2800	3000	72	50	95	3.0	1.0	59	850	1380	1380	2760
10.00	P831_0100 MB43	72	123	2800	3000	72	50	95	3.0	1.0	59	850	1380	1380	2760
10.00	P831_0100 MB43	100	84	2800	3000	72	50	95	3.0	1.0	59	850	1380	1380	2760
10.00	P831_0100 MB43	160	–	2800	3000	72	50	95	3.0	1.0	59	850	1380	1380	2760
<b>P832 (M<sub>2acc,max</sub> = 2000 Nm)</b>															
12.00	P832_0120 MB33	16	104	2200	4000	31	45	107	4.0	2.0	63	800	1140	1140	2155
12.00	P832_0120 MB33	24	92	2200	4000	31	45	107	4.0	2.0	63	800	1140	1140	2155
12.00	P832_0120 MB33	32	81	2200	4000	31	45	107	4.0	2.0	63	800	1140	1140	2155
12.00	P832_0120 MB33	45	63	2200	4000	31	45	107	4.0	2.0	63	800	1140	1140	2155
12.00	P832_0120 MB33	90	–	2200	4000	31	45	107	4.0	2.0	63	800	1140	1140	2155
16.00	P832_0160 MB33	16	104	2700	4000	30	45	131	4.0	2.0	63	1100	1520	1520	2873
16.00	P832_0160 MB33	24	92	2700	4000	30	45	131	4.0	2.0	63	1100	1520	1520	2873
16.00	P832_0160 MB33	32	81	2700	4000	30	45	131	4.0	2.0	63	1100	1520	1520	2873
16.00	P832_0160 MB33	45	63	2700	4000	30	45	131	4.0	2.0	63	1100	1520	1520	2873
16.00	P832_0160 MB33	90	–	2700	4000	30	45	131	4.0	2.0	63	1100	1520	1520	2873
20.00	P832_0200 MB33	16	104	2700	4000	29	45	146	4.0	2.0	63	1250	1840	1900	3230
20.00	P832_0200 MB33	24	92	2700	4000	29	45	146	4.0	2.0	63	1250	1840	1900	3230
20.00	P832_0200 MB33	32	81	2700	4000	29	45	146	4.0	2.0	63	1250	1840	1900	3230
20.00	P832_0200 MB33	45	63	2700	4000	29	45	146	4.0	2.0	63	1250	1840	1900	3230
20.00	P832_0200 MB33	90	–	2700	4000	29	45	146	4.0	2.0	63	1250	1840	1900	3230
25.00	P832_0250 MB33	16	88	2900	4000	28	45	155	4.0	2.0	61	1300	1840	2000	3230
25.00	P832_0250 MB33	24	77	2900	4000	28	45	155	4.0	2.0	61	1300	1840	2000	3230
25.00	P832_0250 MB33	32	66	2900	4000	28	45	155	4.0	2.0	61	1300	1840	2000	3230
25.00	P832_0250 MB33	45	47	2900	4000	28	45	155	4.0	2.0	61	1300	1840	2000	3230
28.00	P832_0280 MB33	16	58	3000	4000	27	45	155	4.0	2.0	60	1100	1600	1600	3200
28.00	P832_0280 MB33	24	47	3000	4000	27	45	155	4.0	2.0	60	1100	1600	1600	3200
28.00	P832_0280 MB33	32	36	3000	4000	27	45	155	4.0	2.0	60	1100	1600	1600	3200
28.00	P832_0280 MB33	45	18	3000	4000	27	45	155	4.0	2.0	60	1100	1600	1600	3200
32.00	P832_0320 MB33	16	59	2700	4000	29	45	148	4.0	2.0	63	1173	1525	1595	3049
32.00	P832_0320 MB33	24	48	2700	4000	29	45	148	4.0	2.0	63	1173	1525	1595	3049
32.00	P832_0320 MB33	32	37	2700	4000	29	45	148	4.0	2.0	63	1173	1525	1595	3049
32.00	P832_0320 MB33	45	18	2700	4000	29	45	148	4.0	2.0	63	1173	1525	1595	3049
35.00	P832_0350 MB33	16	57	3000	4000	27	45	164	4.0	2.0	60	1415	1840	2000	3230
35.00	P832_0350 MB33	24	45	3000	4000	27	45	164	4.0	2.0	60	1415	1840	2000	3230
35.00	P832_0350 MB33	32	34	3000	4000	27	45	164	4.0	2.0	60	1415	1840	2000	3230
35.00	P832_0350 MB33	45	16	3000	4000	27	45	164	4.0	2.0	60	1415	1840	2000	3230
40.00	P832_0400 MB33	16	34	3000	4000	26	45	160	4.0	2.0	58	1097	1600	1600	3200
40.00	P832_0400 MB33	24	23	3000	4000	26	45	160	4.0	2.0	58	1097	1600	1600	3200
40.00	P832_0400 MB33	32	12	3000	4000	26	45	160	4.0	2.0	58	1097	1600	1600	3200
50.00	P832_0500 MB33	16	33	3000	4000	26	45	168	4.0	2.0	58	1415	1840	2000	3230
50.00	P832_0500 MB33	24	22	3000	4000	26	45	168	4.0	2.0	58	1415	1840	2000	3230
50.00	P832_0500 MB33	32	10	3000	4000	26	45	168	4.0	2.0	58	1415	1840	2000	3230
56.00	P832_0560 MB33	16	20	3000	4000	27	45	155	4.0	2.0	60	1062	1380	1380	2760
56.00	P832_0560 MB33	24	8.5	3000	4000	27	45	155	4.0	2.0	60	1062	1380	1380	2760
70.00	P832_0700 MB33	16	17	3000	4000	26	45	161	4.0	2.0	58	1238	1610	1610	3220
70.00	P832_0700 MB33	24	5.7	3000	4000	26	45	161	4.0	2.0	58	1238	1610	1610	3220
80.00	P832_0800 MB33	16	7.1	3000	4000	26	45	157	4.0	2.0	58	1062	1380	1380	2760
100.0	P832_1000 MB33	16	0.2	3000	4000	26	45	147	4.0	2.0	58	1015	1320	1320	2640
<b>P931 (M<sub>2acc,max</sub> = 2300 Nm)</b>															
4.000	P931_0040 MB53	200	275	1800	3000	282	101	102	3.0	–	70	1271	1271	–	2541
4.000	P931_0040 MB53	300	135	1800	3000	282	101	102	3.0	–	70	1271	1271	–	2541
5.000	P931_0050 MB53	200	275	2000	3000	264	101	139	3.0	–	68	1588	1588	–	3177
5.000	P931_0050 MB53	300	135	2000	3000	264	101	139	3.0	–	68	1588	1588	–	3177
7.000	P931_0070 MB53	200	275	2300	3000	251	101	197	3.0	–	66	2100	2224	–	4447
7.000	P931_0070 MB53	300	135	2300	3000	251	101	197	3.0	–	66	2100	2224	–	4447
10.00	P931_0100 MB53	200	122	2500	3000	244	101	234	3.0	–	64	1769	2300	–	4600
<b>P932 (M<sub>2acc,max</sub> = 3450 Nm)</b>															
16.00	P932_0160 MB43	50	154	2000	3000	89	84	253	4.0	–	64	2000	3000	–	5107
16.00	P932_0160 MB43	72	123	2000	3000	89	84	253	4.0	–	64	2000	3000	–	5107
16.00	P932_0160 MB43	100	84	2000	3000	89	84	253	4.0	–	64	2000	3000	–	5107
16.00	P932_0160 MB43	160	–	2000	3000	89	84	253	4.0	–	64	2000	3000	–	5107
20.00	P932_0200 MB43	50	154	2000	3000	87	84	293	4.0	–	64	2483	3450	–	6384
20.00	P932_0200 MB43	72	123	2000	3000	87	84	293	4.0	–	64	2483	3450	–	6384

2.2 Selection tables 2 P planetary gear units

i	Type	M <sub>1Befat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>P932 (M<sub>2acc,max</sub> = 3450 Nm)</b>															
20.00	P932_0200 MB43	100	84	2000	3000	87	84	293	4.0	–	64	2483	3450	–	6384
20.00	P932_0200 MB43	160	–	2000	3000	87	84	293	4.0	–	64	2483	3450	–	6384
25.00	P932_0250 MB43	50	126	2500	3000	80	84	326	4.0	–	62	2441	3300	–	6600
25.00	P932_0250 MB43	72	95	2500	3000	80	84	326	4.0	–	62	2441	3300	–	6600
25.00	P932_0250 MB43	100	56	2500	3000	80	84	326	4.0	–	62	2441	3300	–	6600
28.00	P932_0280 MB43	50	71	2800	3000	75	84	336	4.0	–	61	2280	3000	–	6000
28.00	P932_0280 MB43	72	40	2800	3000	75	84	336	4.0	–	61	2280	3000	–	6000
28.00	P932_0280 MB43	100	0.6	2800	3000	75	84	336	4.0	–	61	2280	3000	–	6000
35.00	P932_0350 MB43	50	70	2800	3000	75	84	359	4.0	–	61	2376	3300	–	6600
35.00	P932_0350 MB43	72	39	2800	3000	75	84	359	4.0	–	61	2376	3300	–	6600
35.00	P932_0350 MB43	100	0.2	2800	3000	75	84	359	4.0	–	61	2376	3300	–	6600
40.00	P932_0400 MB43	50	28	2800	3000	72	84	360	4.0	–	59	2000	3000	–	6000
50.00	P932_0500 MB43	50	28	2800	3000	72	84	376	4.0	–	59	2295	3200	–	6400
70.00	P932_0700 MB43	50	7.1	2800	3000	72	84	361	4.0	–	59	2387	3156	–	6312

## 2.3 Dimensional drawings

In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

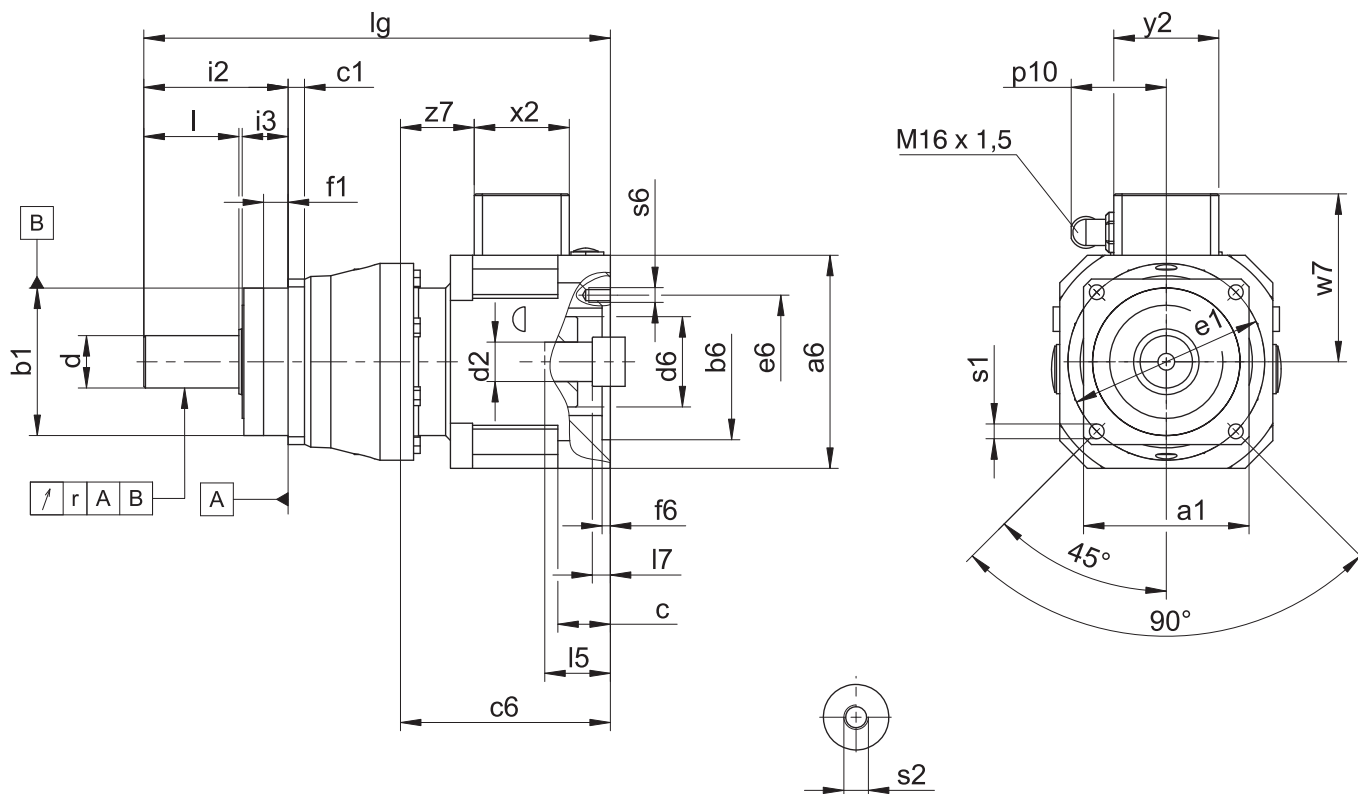
### Tolerances

Solid shaft	Tolerance
Fit	ISO k6
Feather keys	DIN 6885-1, high form A
Balancing	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

### 2.3.1 G shaft design (solid shaft without feather key)



- The radial runout specification applies only to the reinforced bearing D.

#### Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	l	r	Øs1	s2
P531	101	90 <sub>h6</sub>	10	32 <sub>k6</sub>	120	15.0	88	28	58	0.030	9.0	M12
P731	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	112	27	82	0.035	11.0	M16
P732	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	112	27	82	0.035	11.0	M16
P831	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	112	27	82	0.035	13.5	M20
P832	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	112	27	82	0.035	13.5	M20
P931	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	143	34	105	0.040	17.5	M20
P932	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	143	34	105	0.040	17.5	M20

#### Example dimensions for the motor connection + total length

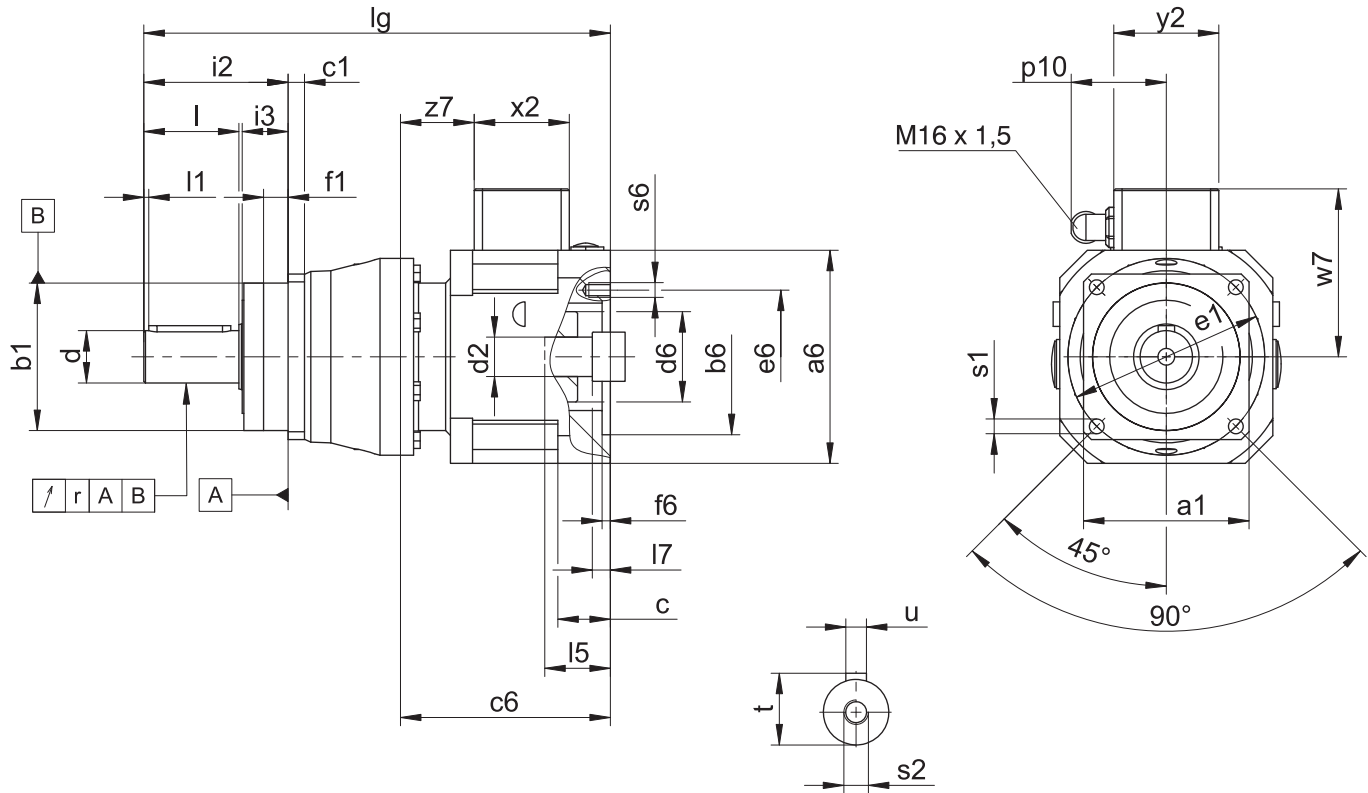
Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	lg	p10	s6	w7	x2	y2	z7
P531_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P531_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P531_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P731_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	345.5	59	M10	115.4	58	64	57.0
P731_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	345.5	59	M10	115.4	58	64	57.0
P732_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P732_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P732_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P831_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	407.0	59	M12	134.9	58	64	75.5
P831_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	407.0	59	M12	134.9	58	64	75.5
P832_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	437.5	59	M10	115.4	58	64	57.0
P832_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	437.5	59	M10	115.4	58	64	57.0
P931_MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	521.0	66	M16	192.0	75	80	98.0
P932_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	559.0	59	M12	134.9	58	64	75.5
P932_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	559.0	59	M12	134.9	58	64	75.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6, l5 and lg are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.



### 2.3.2 P shaft design (solid shaft with feather key)



- The radial runout specification applies only to the reinforced bearing D.

#### Dimensions of gear units

Type	□a1	∅b1	c1	∅d	∅e1	f1	i2	i3	l	l1	r	∅s1	s2	t	u
P531	101	90 <sub>h6</sub>	10	32 <sub>k6</sub>	120	15.0	88	28	58	3	0.030	9.0	M12	35.0	A10×8×50
P731	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	112	27	82	4	0.035	11.0	M16	43.0	A12×8×70
P732	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	112	27	82	4	0.035	11.0	M16	43.0	A12×8×70
P831	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	112	27	82	6	0.035	13.5	M20	59.0	A16×10×70
P832	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	112	27	82	6	0.035	13.5	M20	59.0	A16×10×70
P931	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	143	34	105	7	0.040	17.5	M20	79.5	A20×12×90
P932	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	143	34	105	7	0.040	17.5	M20	79.5	A20×12×90

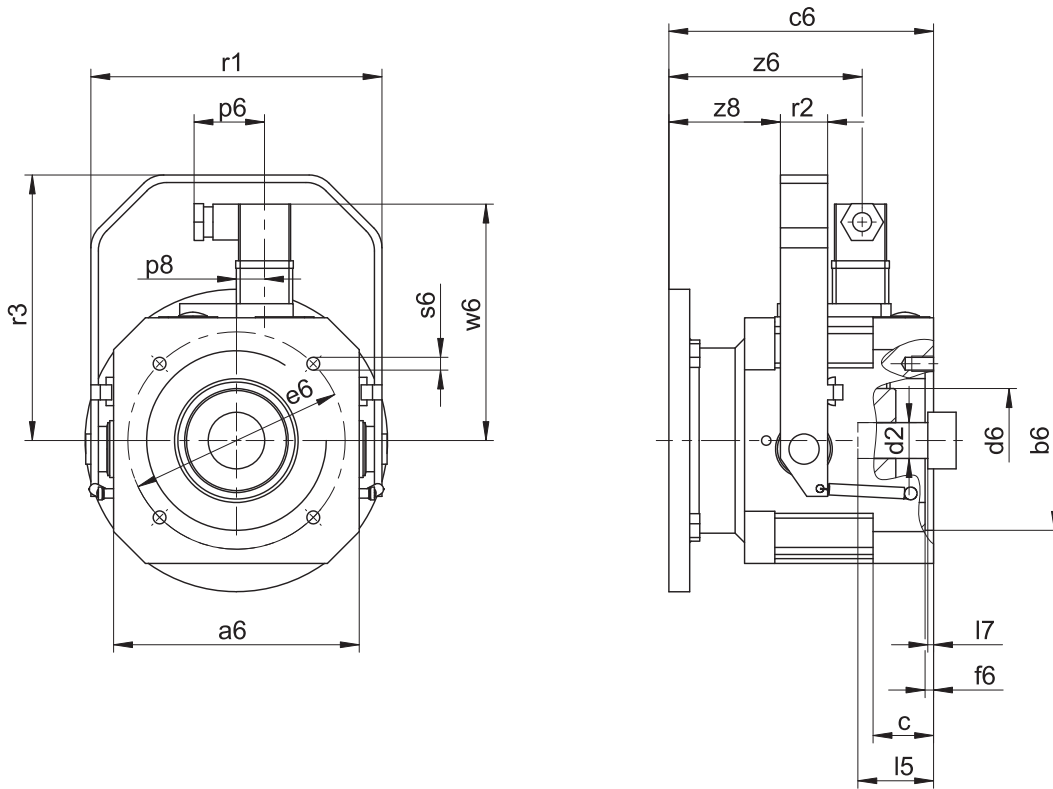
#### Example dimensions for the motor connection + total length

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	lg	p10	s6	w7	x2	y2	z7
P531_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P531_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P531_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	285.5	59	M8	102.9	58	64	46.5
P731_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	345.5	59	M10	115.4	58	64	57.0
P731_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	345.5	59	M10	115.4	58	64	57.0
P732_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P732_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P732_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	377.5	59	M8	102.9	58	64	46.5
P831_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	407.0	59	M12	134.9	58	64	75.5
P831_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	407.0	59	M12	134.9	58	64	75.5
P832_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	437.5	59	M10	115.4	58	64	57.0
P832_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	437.5	59	M10	115.4	58	64	57.0
P931_MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	521.0	66	M16	192.0	75	80	98.0
P932_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	559.0	59	M12	134.9	58	64	75.5
P932_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	559.0	59	M12	134.9	58	64	75.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6, l5 and lg are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 2.3.3 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	37.25	14.825	294	30	264.0	M16	192.0	152.0	106.0

## 2.4 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.

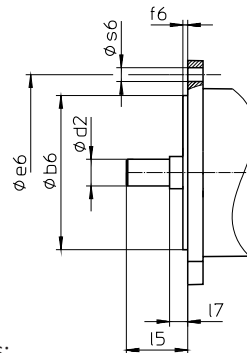
### Example code

P	5	3	1	S	G	S	S	0100	MB	2	3
---	---	---	---	---	---	---	---	------	----	---	---

### Explanation

Code	Designation	Design
P	Type	Planetary gear unit
5	Size	5 (example)
3	Generation	Generation 3
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key
P		Solid shaft with feather key
S	Bearing	Standard bearing
D		Axially reinforced bearing (P3 – P9)
Z		Radially reinforced bearing (P3 – P9) <sup>1</sup>
S	Backlash	Standard
R		Reduced
0100	Transmission ratio (i x 10)	i = 10 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:

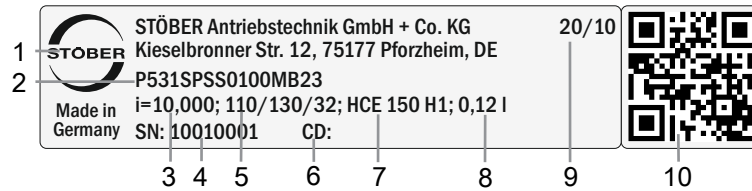


- Motor type or motor dimensions:  
To choose a suitable motor connection, use the STOBBER Configurator at <https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.
- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 2.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, note the chapter [▶ 2.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 2.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 2.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 2.5.5]
- Manual release (optional), see the chapter [▶ 2.3.3]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 2.5.2.6]

<sup>1</sup> Not for reduced-backlash option.

## 2.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.

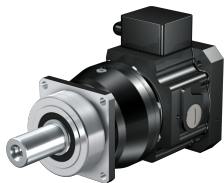


Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Serial number of the gear unit
5	Dimensions of the motor adapter (diameter of pilot/bolt circle/motor shaft)
6	Customer-specific data
7	Lubricant specification
8	Lubricant fill volume
9	Date of manufacture (year/calendar week)
10	QR code (link to product information)

## 2.5 Product description

### 2.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



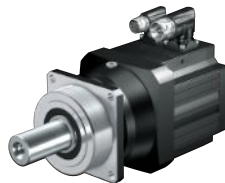
Catalog ID 443234\_en

Motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

LM Lean motor



Catalog ID 443016\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 2.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 2.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

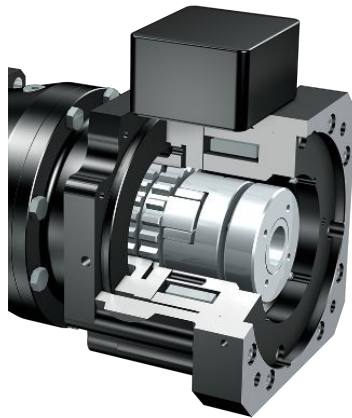


Fig. 1: Motor adapter with ServoStop brake

### 2.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 2.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 2.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 2.5.2.5 Brake technical data

Technical data for operation at 24 V DC (±10%)

Type	M <sub>1Bstat</sub> [Nm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	Δφ <sub>B</sub> [arcmin]	t <sub>1B,DC</sub> [ms]	t <sub>2B</sub> [ms]	P <sub>N,B</sub> [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

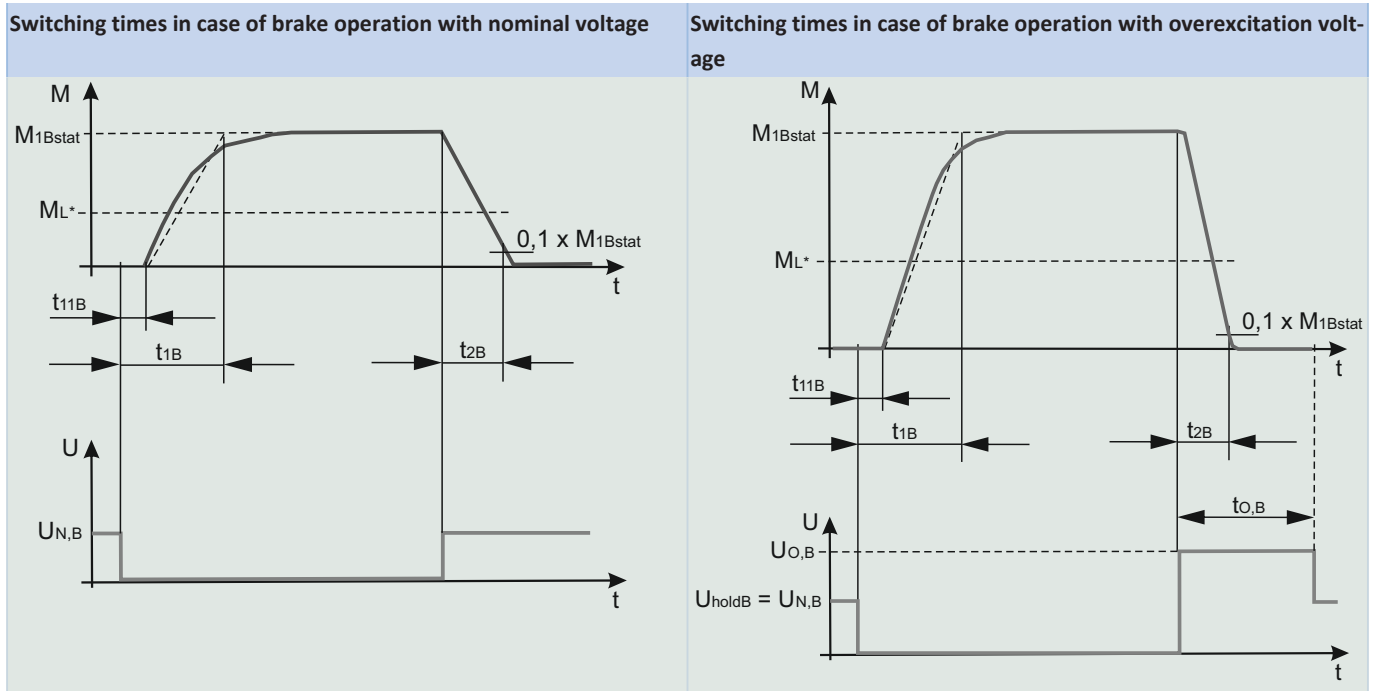
Δφ<sub>B</sub>: With the brake closed, a higher total backlash results (Δφ<sub>tot</sub> = Δφ<sub>2</sub> + Δφ<sub>B</sub> / i).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage U<sub>LINE</sub> 220 – 275 V AC ± 5%, 50/60 Hz)

Type	M <sub>1Bstat</sub> [Nm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	Δφ <sub>B</sub> [arcmin]	t <sub>1B,DC</sub> [ms]	t <sub>1B,AC</sub> [ms]	t <sub>2B</sub> [ms]	P <sub>O,B</sub> [W]	P <sub>holdB</sub> [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

Δφ<sub>B</sub>: With the brake closed, a higher total backlash results (Δφ<sub>tot</sub> = Δφ<sub>2</sub> + Δφ<sub>B</sub> / i).

### 2.5.2.6 Brake switching times



### 2.5.3 Installation conditions

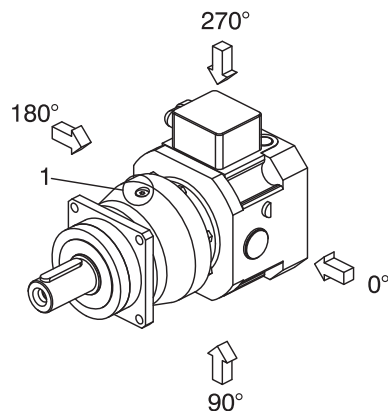
The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 12.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

### 2.5.4 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

You will receive lubricants for use in the food industry upon request.

### 2.5.5 Position of the terminal box/plug connector



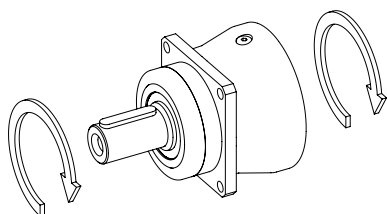
In the standard version, the terminal box/plug connector is attached in the 270° position (relative to the oil drain plug (1) of the planetary gear unit). Indicate variations for your gear unit in the order.

## 2.5.6 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ single-stage	97%
$\eta_{\text{get}}$ two-stage	95%
Protection class: <sup>2</sup>	IP65

## 2.5.7 Direction of rotation

The input and output rotate in the same direction.



## 2.6 Project configuration

Project your drives using our SERVOSOFT designing software. Download SERVOSOFT for free at <https://www.stoeber.de/en/ServoSoft>.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

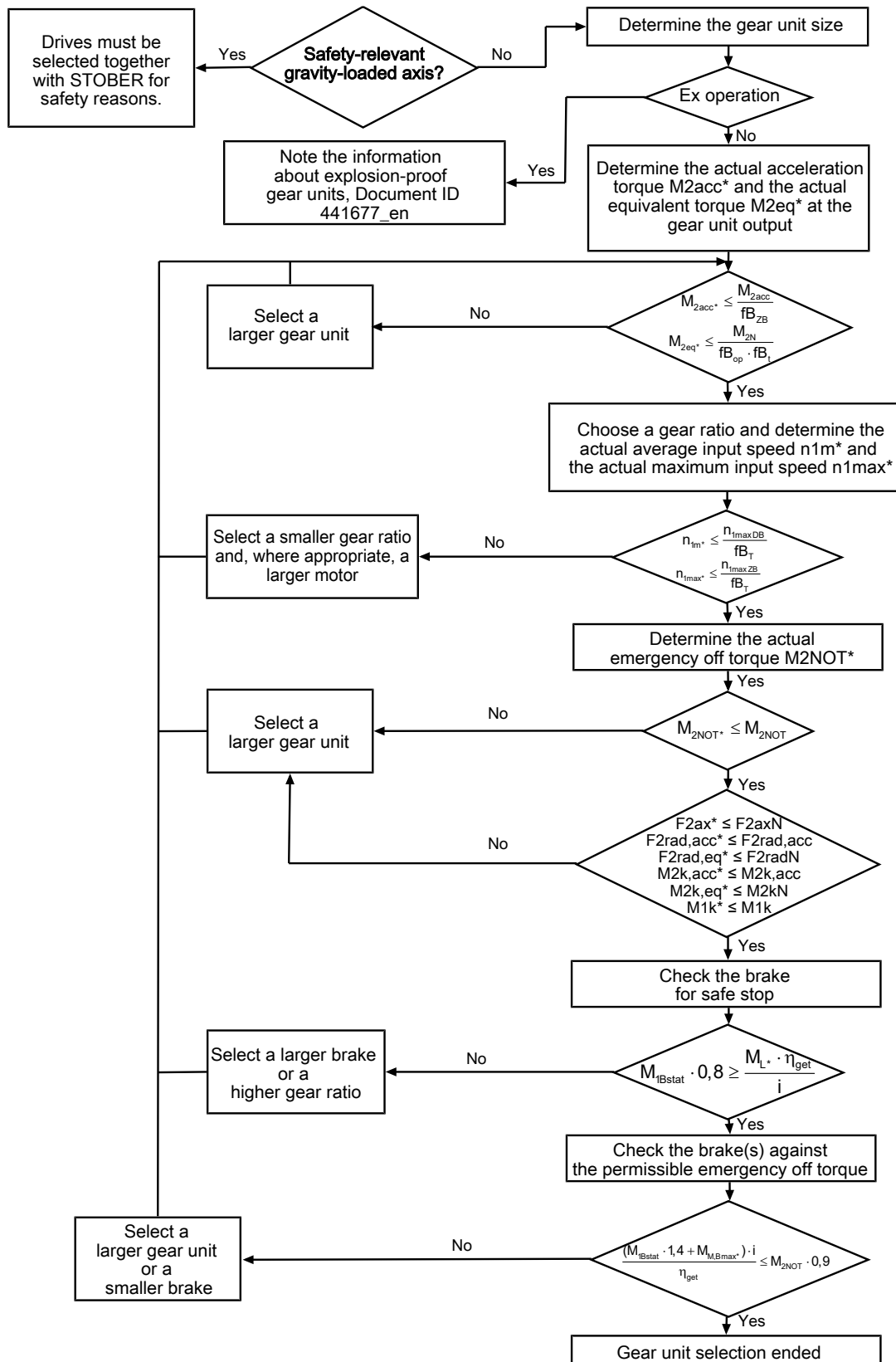
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.



### 2.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

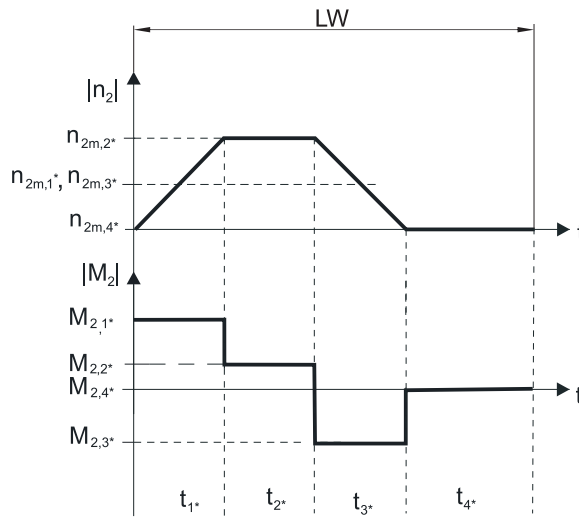
Refer to the selection tables for the values for  $n_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{1,8max}$  can be found in the manufacturer catalog.

The values for  $f_{Bt}$ ,  $f_{Bop}$ ,  $f_{Bt}$  and  $f_{BzB}$  can be found in the corresponding tables in this chapter.

**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 maximum acceleration torque**

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**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  $t_{1*} + \dots + t_{3*} \geq 6$  min, calculate  $n_{2m*}$  without the rest phase  $t_{4*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20
Cyclic operation	$fB_{zB}$
$\leq 1000$ load changes/hour (LW/h)	1.00
$> 1000$ load changes/hour (LW/h)	1.15

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ °C}$	0.9
	$\leq 30\text{ °C}$	1.0
	$\leq 40\text{ °C}$	1.15
Motor with convection cooling	$\leq 20\text{ °C}$	1.0
	$\leq 30\text{ °C}$	1.1
	$\leq 40\text{ °C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 90\text{ °C}$  must not be exceeded. Doing so may result in damage to the gear unit.

## 2.6.2 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  $n_{2m^*} \leq 100\text{ rpm}$  ( $F_{2axN} = F_{2ax100}$ ;  $F_{2radN} = F_{2rad100}$ ;  $M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

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	17.5	1000	2500	2500	79	79
P4	18.5	1500	4000	4500	146	164
P5	19.5	2300	6500	7000	315	340
P7	23.0	2900	8500	9000	544	576
P8	24.5	4700	13000	18000	852	1179
P9	33.0	6000	18000	27000	1539	2309

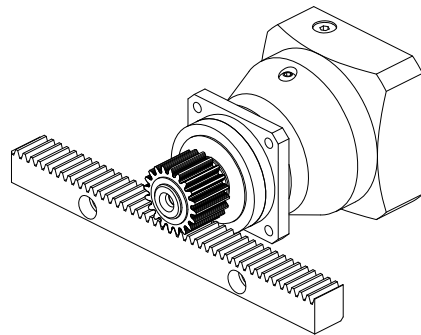


Fig. 2: Recommendation for bearing assignment S (e.g. for straight-cut gearing)

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	20.0	2500	2750	2750	94	94
P4	22.5	4000	4500	5000	182	203
P5	25.5	6000	7000	8000	382	436
P7	29.0	10000	9500	10000	665	700
P8	32.0	15500	15000	18000	1095	1314
P9	44.0	25000	20000	30000	1930	2895

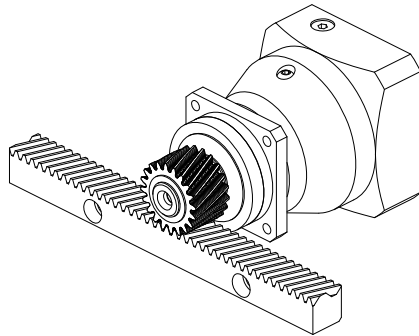


Fig. 3: Recommendation for bearing assignment D (e.g. for helical gearing)

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	17.5	600	3000	3000	95	95
P4	18.5	1000	5000	5000	183	183
P5	19.5	1600	8000	8000	388	388
P7	23.0	2000	10000	10000	640	640
P8	24.5	3600	18000	18000	1179	1179
P9	33.0	5000	27000	35000	2309	2993

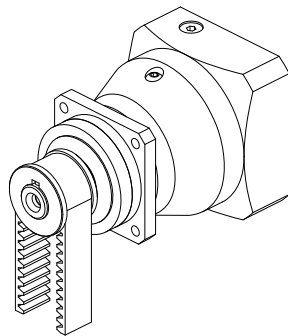


Fig. 4: Recommendation for bearing assignment Z (e.g. for belt drives)

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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.

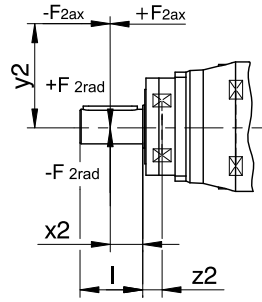


Fig. 5: Force application points

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:**

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

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:**

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

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

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

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

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

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

**For different duty cycles:**

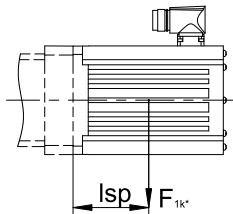
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 2.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STÖBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 2.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

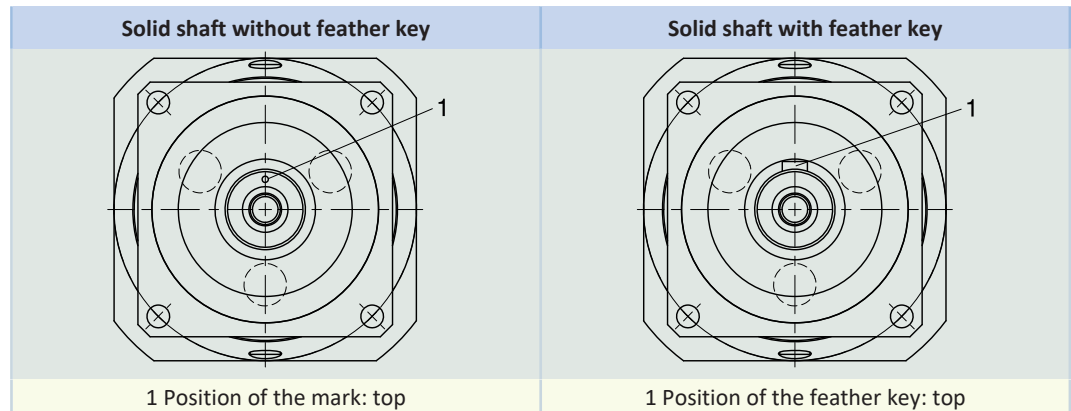
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance in oils and greases
- For use in the food, beverage and pharmaceutical industries

#### Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. 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.

## 2.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams 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), you must note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P). In that case, the feather key functions for position orientation. For a backlash-free connection, also use a clamp.

## 2.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

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

Documentation	ID
Operating manual gear units, geared motors P23 – P93	443356_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en





# 3 PH planetary gear units

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## 3 Planetary gear units

# PH

### 3.1 Overview

High-performance precision planetary gear units with integrated brake

#### Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
Any mounting position	✓
Continuous operation without cooling	✓
Stiff output bearings due to pretension	✓
Reinforced output bearing (PH3 – PH5)	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	4 – 100
$M_{2acc}$	144 – 7500 Nm
$\Delta\phi_2$	1 – 3 arcmin
$\eta_{get}$	93 – 96 %

## 3.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	Type	M <sub>1Bstat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>PH531 (M<sub>2acc,max</sub> = 288 Nm)</b>															
4.000	PH531_0040 MB23	8.0	31	2200	4000	7.9	13	17	3.0	1.0	62	144	144	144	242
4.000	PH531_0040 MB23	12	25	2200	4000	7.9	13	17	3.0	1.0	62	144	144	144	242
4.000	PH531_0040 MB23	16	20	2200	4000	7.9	13	17	3.0	1.0	62	144	144	144	242
4.000	PH531_0040 MB23	24	8.4	2200	4000	7.9	13	17	3.0	1.0	62	144	144	144	242
4.000	PH531_0040 MB23	30	–	2200	4000	7.9	13	17	3.0	1.0	62	144	144	144	242
5.000	PH531_0050 MB23	8.0	31	2500	4000	7.3	13	24	3.0	1.0	60	180	180	180	302
5.000	PH531_0050 MB23	12	25	2500	4000	7.3	13	24	3.0	1.0	60	180	180	180	302
5.000	PH531_0050 MB23	16	20	2500	4000	7.3	13	24	3.0	1.0	60	180	180	180	302
5.000	PH531_0050 MB23	24	8.4	2500	4000	7.3	13	24	3.0	1.0	60	180	180	180	302
5.000	PH531_0050 MB23	30	–	2500	4000	7.3	13	24	3.0	1.0	60	180	180	180	302
7.000	PH531_0070 MB23	8.0	31	3000	4000	6.9	13	35	3.0	1.0	59	210	252	252	423
7.000	PH531_0070 MB23	12	25	3000	4000	6.9	13	35	3.0	1.0	59	210	252	252	423
7.000	PH531_0070 MB23	16	20	3000	4000	6.9	13	35	3.0	1.0	59	210	252	252	423
7.000	PH531_0070 MB23	24	8.4	3000	4000	6.9	13	35	3.0	1.0	59	210	252	252	423
7.000	PH531_0070 MB23	30	–	3000	4000	6.9	13	35	3.0	1.0	59	210	252	252	423
10.00	PH531_0100 MB23	8.0	31	3300	4000	6.6	13	38	3.0	1.0	57	180	288	288	575
10.00	PH531_0100 MB23	12	25	3300	4000	6.6	13	38	3.0	1.0	57	180	288	288	575
10.00	PH531_0100 MB23	16	20	3300	4000	6.6	13	38	3.0	1.0	57	180	288	288	575
10.00	PH531_0100 MB23	24	8.4	3300	4000	6.6	13	38	3.0	1.0	57	180	288	288	575
10.00	PH531_0100 MB23	30	–	3300	4000	6.6	13	38	3.0	1.0	57	180	288	288	575
<b>PH731 (M<sub>2acc,max</sub> = 672 Nm)</b>															
4.000	PH731_0040 MB33	16	104	1900	4000	31	24	29	3.0	1.0	63	384	384	384	726
4.000	PH731_0040 MB33	24	92	1900	4000	31	24	29	3.0	1.0	63	384	384	384	726
4.000	PH731_0040 MB33	32	81	1900	4000	31	24	29	3.0	1.0	63	384	384	384	726
4.000	PH731_0040 MB33	45	63	1900	4000	31	24	29	3.0	1.0	63	384	384	384	726
4.000	PH731_0040 MB33	90	–	1900	4000	31	24	29	3.0	1.0	63	384	384	384	726
5.000	PH731_0050 MB33	16	104	2200	4000	29	24	41	3.0	1.0	61	440	480	480	907
5.000	PH731_0050 MB33	24	92	2200	4000	29	24	41	3.0	1.0	61	440	480	480	907
5.000	PH731_0050 MB33	32	81	2200	4000	29	24	41	3.0	1.0	61	440	480	480	907
5.000	PH731_0050 MB33	45	63	2200	4000	29	24	41	3.0	1.0	61	440	480	480	907
5.000	PH731_0050 MB33	90	–	2200	4000	29	24	41	3.0	1.0	61	440	480	480	907
7.000	PH731_0070 MB33	16	104	2500	4000	27	24	62	3.0	1.0	60	440	672	672	1270
7.000	PH731_0070 MB33	24	92	2500	4000	27	24	62	3.0	1.0	60	440	672	672	1270
7.000	PH731_0070 MB33	32	81	2500	4000	27	24	62	3.0	1.0	60	440	672	672	1270
7.000	PH731_0070 MB33	45	63	2500	4000	27	24	62	3.0	1.0	60	440	672	672	1270
7.000	PH731_0070 MB33	90	–	2500	4000	27	24	62	3.0	1.0	60	440	672	672	1270
10.00	PH731_0100 MB33	16	77	2500	4000	26	24	77	3.0	1.0	58	350	575	575	1150
10.00	PH731_0100 MB33	24	66	2500	4000	26	24	77	3.0	1.0	58	350	575	575	1150
10.00	PH731_0100 MB33	32	55	2500	4000	26	24	77	3.0	1.0	58	350	575	575	1150
10.00	PH731_0100 MB33	45	36	2500	4000	26	24	77	3.0	1.0	58	350	575	575	1150
<b>PH732 (M<sub>2acc,max</sub> = 908 Nm)</b>															
16.00	PH732_0160 MB23	8.0	31	3000	4000	7.4	22	126	3.0	1.0	62	450	558	558	937
16.00	PH732_0160 MB23	12	25	3000	4000	7.4	22	126	3.0	1.0	62	450	558	558	937
16.00	PH732_0160 MB23	16	20	3000	4000	7.4	22	126	3.0	1.0	62	450	558	558	937
16.00	PH732_0160 MB23	24	8.4	3000	4000	7.4	22	126	3.0	1.0	62	450	558	558	937
16.00	PH732_0160 MB23	30	–	3000	4000	7.4	22	126	3.0	1.0	62	450	558	558	937
20.00	PH732_0200 MB23	8.0	31	3000	4000	7.0	22	138	3.0	1.0	62	460	698	698	1172
20.00	PH732_0200 MB23	12	25	3000	4000	7.0	22	138	3.0	1.0	62	460	698	698	1172
20.00	PH732_0200 MB23	16	20	3000	4000	7.0	22	138	3.0	1.0	62	460	698	698	1172
20.00	PH732_0200 MB23	24	8.4	3000	4000	7.0	22	138	3.0	1.0	62	460	698	698	1172
20.00	PH732_0200 MB23	30	–	3000	4000	7.0	22	138	3.0	1.0	62	460	698	698	1172
25.00	PH732_0250 MB23	8.0	31	3500	4000	6.9	22	152	3.0	1.0	60	500	866	872	1465
25.00	PH732_0250 MB23	12	25	3500	4000	6.9	22	152	3.0	1.0	60	500	866	872	1465
25.00	PH732_0250 MB23	16	20	3500	4000	6.9	22	152	3.0	1.0	60	500	866	872	1465
25.00	PH732_0250 MB23	24	8.4	3500	4000	6.9	22	152	3.0	1.0	60	500	866	872	1465

3.2 Selection tables 3 PH planetary gear units

i	Type	M <sub>1Bstat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>PH732 (M<sub>2acc,max</sub> = 908 Nm)</b>															
25.00	PH732_0250 MB23	30	–	3500	4000	6.9	22	152	3.0	1.0	60	500	866	872	1465
28.00	PH732_0280 MB23	8.0	23	3700	4000	7.2	22	163	3.0	1.0	59	540	770	880	1540
28.00	PH732_0280 MB23	12	18	3700	4000	7.2	22	163	3.0	1.0	59	540	770	880	1540
28.00	PH732_0280 MB23	16	12	3700	4000	7.2	22	163	3.0	1.0	59	540	770	880	1540
28.00	PH732_0280 MB23	24	0.8	3700	4000	7.2	22	163	3.0	1.0	59	540	770	880	1540
35.00	PH732_0350 MB23	8.0	23	3700	4000	6.9	22	164	3.0	1.0	59	540	866	908	1720
35.00	PH732_0350 MB23	12	17	3700	4000	6.9	22	164	3.0	1.0	59	540	866	908	1720
35.00	PH732_0350 MB23	16	12	3700	4000	6.9	22	164	3.0	1.0	59	540	866	908	1720
35.00	PH732_0350 MB23	24	0.5	3700	4000	6.9	22	164	3.0	1.0	59	540	866	908	1720
40.00	PH732_0400 MB23	8.0	13	3700	4000	7.1	22	167	3.0	1.0	57	540	770	770	1540
40.00	PH732_0400 MB23	12	7.3	3700	4000	7.1	22	167	3.0	1.0	57	540	770	770	1540
40.00	PH732_0400 MB23	16	1.7	3700	4000	7.1	22	167	3.0	1.0	57	540	770	770	1540
50.00	PH732_0500 MB23	8.0	13	3700	4000	6.8	22	167	3.0	1.0	57	600	830	834	1660
50.00	PH732_0500 MB23	12	7.1	3700	4000	6.8	22	167	3.0	1.0	57	600	830	834	1660
50.00	PH732_0500 MB23	16	1.5	3700	4000	6.8	22	167	3.0	1.0	57	600	830	834	1660
70.00	PH732_0700 MB23	8.0	6.8	3700	4000	6.6	22	151	3.0	1.0	57	600	809	847	1617
70.00	PH732_0700 MB23	12	1.2	3700	4000	6.6	22	151	3.0	1.0	57	600	809	847	1617
<b>PH831 (M<sub>2acc,max</sub> = 1505 Nm)</b>															
4.000	PH831_0040 MB43	50	154	1400	3000	96	52	39	3.0	1.0	64	778	860	860	1290
4.000	PH831_0040 MB43	72	123	1400	3000	96	52	39	3.0	1.0	64	778	860	860	1290
4.000	PH831_0040 MB43	100	84	1400	3000	96	52	39	3.0	1.0	64	778	860	860	1290
4.000	PH831_0040 MB43	160	–	1400	3000	96	52	39	3.0	1.0	64	778	860	860	1290
5.000	PH831_0050 MB43	50	154	1600	3000	85	52	59	3.0	1.0	62	972	1075	1075	1613
5.000	PH831_0050 MB43	72	123	1600	3000	85	52	59	3.0	1.0	62	972	1075	1075	1613
5.000	PH831_0050 MB43	100	84	1600	3000	85	52	59	3.0	1.0	62	972	1075	1075	1613
5.000	PH831_0050 MB43	160	–	1600	3000	85	52	59	3.0	1.0	62	972	1075	1075	1613
7.000	PH831_0070 MB43	50	154	2000	3000	78	52	101	3.0	1.0	61	1000	1505	1505	2258
7.000	PH831_0070 MB43	72	123	2000	3000	78	52	101	3.0	1.0	61	1000	1505	1505	2258
7.000	PH831_0070 MB43	100	84	2000	3000	78	52	101	3.0	1.0	61	1000	1505	1505	2258
7.000	PH831_0070 MB43	160	–	2000	3000	78	52	101	3.0	1.0	61	1000	1505	1505	2258
10.00	PH831_0100 MB43	50	154	2200	3000	74	52	149	3.0	1.0	59	850	1392	1392	2784
10.00	PH831_0100 MB43	72	123	2200	3000	74	52	149	3.0	1.0	59	850	1392	1392	2784
10.00	PH831_0100 MB43	100	84	2200	3000	74	52	149	3.0	1.0	59	850	1392	1392	2784
10.00	PH831_0100 MB43	160	–	2200	3000	74	52	149	3.0	1.0	59	850	1392	1392	2784
<b>PH832 (M<sub>2acc,max</sub> = 2300 Nm)</b>															
16.00	PH832_0160 MB33	16	104	2500	4000	30	47	256	3.0	1.0	63	1100	1488	1488	2812
16.00	PH832_0160 MB33	24	92	2500	4000	30	47	256	3.0	1.0	63	1100	1488	1488	2812
16.00	PH832_0160 MB33	32	81	2500	4000	30	47	256	3.0	1.0	63	1100	1488	1488	2812
16.00	PH832_0160 MB33	45	63	2500	4000	30	47	256	3.0	1.0	63	1100	1488	1488	2812
16.00	PH832_0160 MB33	90	–	2500	4000	30	47	256	3.0	1.0	63	1100	1488	1488	2812
20.00	PH832_0200 MB33	16	104	2500	4000	29	47	320	3.0	1.0	63	1250	1860	1860	3515
20.00	PH832_0200 MB33	24	92	2500	4000	29	47	320	3.0	1.0	63	1250	1860	1860	3515
20.00	PH832_0200 MB33	32	81	2500	4000	29	47	320	3.0	1.0	63	1250	1860	1860	3515
20.00	PH832_0200 MB33	45	63	2500	4000	29	47	320	3.0	1.0	63	1250	1860	1860	3515
20.00	PH832_0200 MB33	90	–	2500	4000	29	47	320	3.0	1.0	63	1250	1860	1860	3515
25.00	PH832_0250 MB33	16	86	2700	4000	28	47	370	3.0	1.0	61	1300	2100	2300	4200
25.00	PH832_0250 MB33	24	75	2700	4000	28	47	370	3.0	1.0	61	1300	2100	2300	4200
25.00	PH832_0250 MB33	32	64	2700	4000	28	47	370	3.0	1.0	61	1300	2100	2300	4200
25.00	PH832_0250 MB33	45	46	2700	4000	28	47	370	3.0	1.0	61	1300	2100	2300	4200
28.00	PH832_0280 MB33	16	56	3000	4000	29	47	369	3.0	1.0	60	1100	2000	2000	3929
28.00	PH832_0280 MB33	24	45	3000	4000	29	47	369	3.0	1.0	60	1100	2000	2000	3929
28.00	PH832_0280 MB33	32	33	3000	4000	29	47	369	3.0	1.0	60	1100	2000	2000	3929
28.00	PH832_0280 MB33	45	15	3000	4000	29	47	369	3.0	1.0	60	1100	2000	2000	3929
35.00	PH832_0350 MB33	16	55	3000	4000	28	47	424	3.0	1.0	60	1450	2100	2300	4200
35.00	PH832_0350 MB33	24	44	3000	4000	28	47	424	3.0	1.0	60	1450	2100	2300	4200
35.00	PH832_0350 MB33	32	33	3000	4000	28	47	424	3.0	1.0	60	1450	2100	2300	4200
35.00	PH832_0350 MB33	45	15	3000	4000	28	47	424	3.0	1.0	60	1450	2100	2300	4200
40.00	PH832_0400 MB33	16	32	3000	4000	29	47	398	3.0	1.0	58	1100	1920	1936	3840
40.00	PH832_0400 MB33	24	21	3000	4000	29	47	398	3.0	1.0	58	1100	1920	1936	3840
40.00	PH832_0400 MB33	32	10	3000	4000	29	47	398	3.0	1.0	58	1100	1920	1936	3840
50.00	PH832_0500 MB33	16	32	3000	4000	28	47	448	3.0	1.0	58	1557	2100	2300	4200
50.00	PH832_0500 MB33	24	21	3000	4000	28	47	448	3.0	1.0	58	1557	2100	2300	4200
50.00	PH832_0500 MB33	32	9.6	3000	4000	28	47	448	3.0	1.0	58	1557	2100	2300	4200
70.00	PH832_0700 MB33	16	18	3000	4000	27	47	408	3.0	1.0	58	1422	1848	1936	3696
70.00	PH832_0700 MB33	24	6.9	3000	4000	27	47	408	3.0	1.0	58	1422	1848	1936	3696
100.0	PH832_1000 MB33	16	0.7	3000	4000	26	47	328	3.0	1.0	58	1062	1380	1380	2760

i	Type	$M_{1Bstat}$	$M_{M,Bmax}$	$n_{1maxDB}$	$n_{1maxZB}$	$J_1$	$m$	$C_2$	$\Delta\varphi_2$	$\Delta\varphi_{2red}$	$L_{pA}$	$M_{2N}$	$M_{2acc}$	$M_{2accHT}$	$M_{2NOT}$
		[Nm]	[Nm]	[rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[Nm/arcmin]	[arcmin]	[arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH942 (<math>M_{2acc,max} = 5000 \text{ Nm}</math>)</b>															
12.00	PH942_0120 MB43	50	154	1800	3000	120	89	290	3.0	1.0	66	2260	2500	2500	3750
12.00	PH942_0120 MB43	72	123	1800	3000	120	89	290	3.0	1.0	66	2260	2500	2500	3750
12.00	PH942_0120 MB43	100	84	1800	3000	120	89	290	3.0	1.0	66	2260	2500	2500	3750
12.00	PH942_0120 MB43	160	–	1800	3000	120	89	290	3.0	1.0	66	2260	2500	2500	3750
16.00	PH942_0160 MB43	50	154	2000	3000	92	89	432	3.0	1.0	64	3000	3333	3333	5000
16.00	PH942_0160 MB43	72	123	2000	3000	92	89	432	3.0	1.0	64	3000	3333	3333	5000
16.00	PH942_0160 MB43	100	84	2000	3000	92	89	432	3.0	1.0	64	3000	3333	3333	5000
16.00	PH942_0160 MB43	160	–	2000	3000	92	89	432	3.0	1.0	64	3000	3333	3333	5000
18.00	PH942_0180 MB43	50	154	1800	3000	114	89	487	3.0	1.0	66	3000	3750	3750	5625
18.00	PH942_0180 MB43	72	123	1800	3000	114	89	487	3.0	1.0	66	3000	3750	3750	5625
18.00	PH942_0180 MB43	100	84	1800	3000	114	89	487	3.0	1.0	66	3000	3750	3750	5625
18.00	PH942_0180 MB43	160	–	1800	3000	114	89	487	3.0	1.0	66	3000	3750	3750	5625
20.00	PH942_0200 MB43	50	154	2500	3000	83	89	558	3.0	1.0	62	3000	4166	4166	6250
20.00	PH942_0200 MB43	72	123	2500	3000	83	89	558	3.0	1.0	62	3000	4166	4166	6250
20.00	PH942_0200 MB43	100	84	2500	3000	83	89	558	3.0	1.0	62	3000	4166	4166	6250
20.00	PH942_0200 MB43	160	–	2500	3000	83	89	558	3.0	1.0	62	3000	4166	4166	6250
24.00	PH942_0240 MB43	50	154	2000	3000	89	89	644	3.0	1.0	64	3000	5000	5000	7500
24.00	PH942_0240 MB43	72	123	2000	3000	89	89	644	3.0	1.0	64	3000	5000	5000	7500
24.00	PH942_0240 MB43	100	84	2000	3000	89	89	644	3.0	1.0	64	3000	5000	5000	7500
24.00	PH942_0240 MB43	160	–	2000	3000	89	89	644	3.0	1.0	64	3000	5000	5000	7500
28.00	PH942_0280 MB43	50	154	2800	3000	77	89	740	3.0	1.0	61	3500	5000	5000	8749
28.00	PH942_0280 MB43	72	123	2800	3000	77	89	740	3.0	1.0	61	3500	5000	5000	8749
28.00	PH942_0280 MB43	100	84	2800	3000	77	89	740	3.0	1.0	61	3500	5000	5000	8749
28.00	PH942_0280 MB43	160	–	2800	3000	77	89	740	3.0	1.0	61	3500	5000	5000	8749
30.00	PH942_0300 MB43	50	154	2500	3000	81	89	758	3.0	1.0	62	3300	5000	5000	9374
30.00	PH942_0300 MB43	72	123	2500	3000	81	89	758	3.0	1.0	62	3300	5000	5000	9374
30.00	PH942_0300 MB43	100	84	2500	3000	81	89	758	3.0	1.0	62	3300	5000	5000	9374
30.00	PH942_0300 MB43	160	–	2500	3000	81	89	758	3.0	1.0	62	3300	5000	5000	9374
32.00	PH942_0320 MB43	50	128	2800	3000	75	89	786	3.0	1.0	60	3200	4600	4600	9200
32.00	PH942_0320 MB43	72	97	2800	3000	75	89	786	3.0	1.0	60	3200	4600	4600	9200
32.00	PH942_0320 MB43	100	58	2800	3000	75	89	786	3.0	1.0	60	3200	4600	4600	9200
40.00	PH942_0400 MB43	50	89	2800	3000	73	89	851	3.0	1.0	59	3200	4600	4600	9200
40.00	PH942_0400 MB43	72	58	2800	3000	73	89	851	3.0	1.0	59	3200	4600	4600	9200
40.00	PH942_0400 MB43	100	19	2800	3000	73	89	851	3.0	1.0	59	3200	4600	4600	9200
42.00	PH942_0420 MB43	50	129	2800	3000	75	89	890	3.0	1.0	61	3500	5000	5000	10000
42.00	PH942_0420 MB43	72	98	2800	3000	75	89	890	3.0	1.0	61	3500	5000	5000	10000
42.00	PH942_0420 MB43	100	59	2800	3000	75	89	890	3.0	1.0	61	3500	5000	5000	10000
48.00	PH942_0480 MB43	50	104	2800	3000	74	89	919	3.0	1.0	60	3500	5000	5000	10000
48.00	PH942_0480 MB43	72	74	2800	3000	74	89	919	3.0	1.0	60	3500	5000	5000	10000
48.00	PH942_0480 MB43	100	34	2800	3000	74	89	919	3.0	1.0	60	3500	5000	5000	10000
60.00	PH942_0600 MB43	50	70	2800	3000	72	89	957	3.0	1.0	59	3500	5000	5000	10000
60.00	PH942_0600 MB43	72	39	2800	3000	72	89	957	3.0	1.0	59	3500	5000	5000	10000
<b>PH1042 (<math>M_{2acc,max} = 7500 \text{ Nm}</math>)</b>															
18.00	PH1042_0180 MB43	50	154	1800	3000	116	105	575	3.0	–	66	3390	3750	–	5625
18.00	PH1042_0180 MB43	72	123	1800	3000	116	105	575	3.0	–	66	3390	3750	–	5625
18.00	PH1042_0180 MB43	100	84	1800	3000	116	105	575	3.0	–	66	3390	3750	–	5625
18.00	PH1042_0180 MB43	160	–	1800	3000	116	105	575	3.0	–	66	3390	3750	–	5625
24.00	PH1042_0240 MB43	50	154	2000	3000	90	105	811	3.0	–	64	4520	5000	–	7500
24.00	PH1042_0240 MB43	72	123	2000	3000	90	105	811	3.0	–	64	4520	5000	–	7500
24.00	PH1042_0240 MB43	100	84	2000	3000	90	105	811	3.0	–	64	4520	5000	–	7500
24.00	PH1042_0240 MB43	160	–	2000	3000	90	105	811	3.0	–	64	4520	5000	–	7500
30.00	PH1042_0300 MB43	50	154	2500	3000	82	105	1000	3.0	–	62	5000	6250	–	9374
30.00	PH1042_0300 MB43	72	123	2500	3000	82	105	1000	3.0	–	62	5000	6250	–	9374
30.00	PH1042_0300 MB43	100	84	2500	3000	82	105	1000	3.0	–	62	5000	6250	–	9374
30.00	PH1042_0300 MB43	160	–	2500	3000	82	105	1000	3.0	–	62	5000	6250	–	9374
42.00	PH1042_0420 MB43	50	154	2800	3000	76	105	1244	3.0	–	61	5000	7500	–	13124
42.00	PH1042_0420 MB43	72	123	2800	3000	76	105	1244	3.0	–	61	5000	7500	–	13124
42.00	PH1042_0420 MB43	100	84	2800	3000	76	105	1244	3.0	–	61	5000	7500	–	13124
42.00	PH1042_0420 MB43	160	–	2800	3000	76	105	1244	3.0	–	61	5000	7500	–	13124
60.00	PH1042_0600 MB43	50	89	2800	3000	73	105	1379	3.0	–	59	4900	7000	–	14000
60.00	PH1042_0600 MB43	72	58	2800	3000	73	105	1379	3.0	–	59	4900	7000	–	14000
60.00	PH1042_0600 MB43	100	19	2800	3000	73	105	1379	3.0	–	59	4900	7000	–	14000



## 3.3 Dimensional drawings

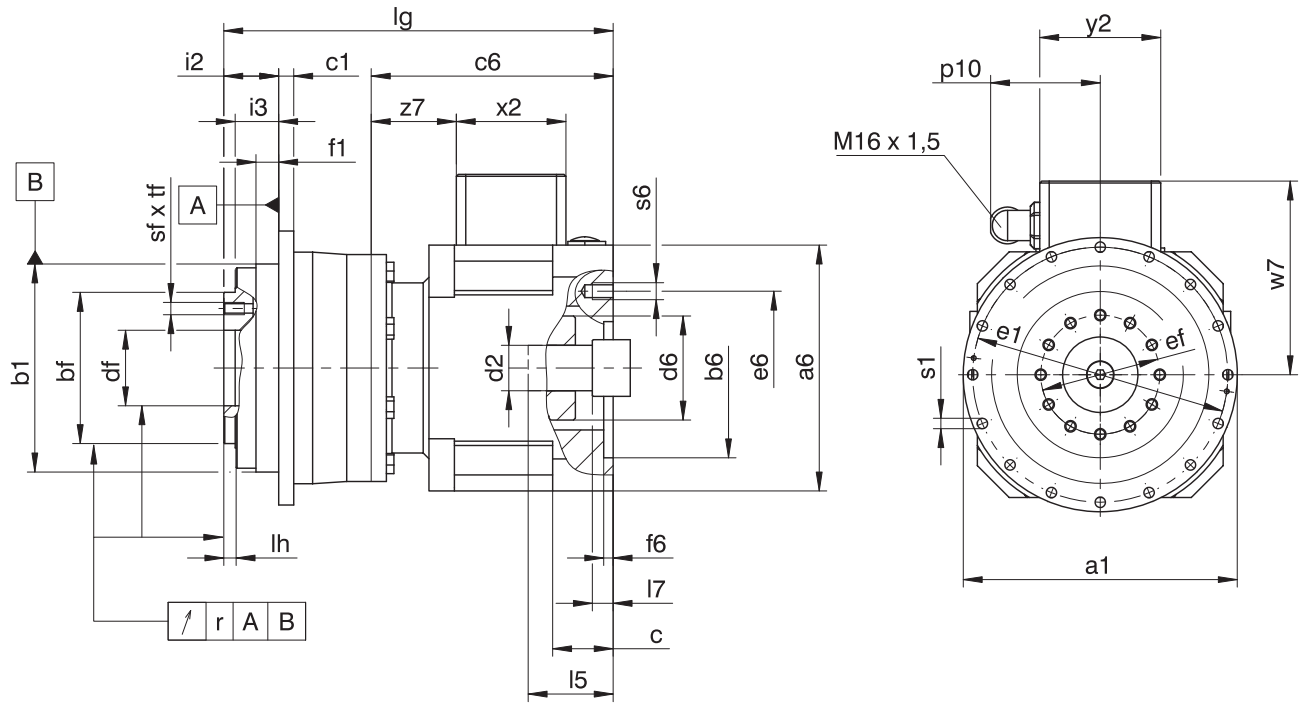
In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

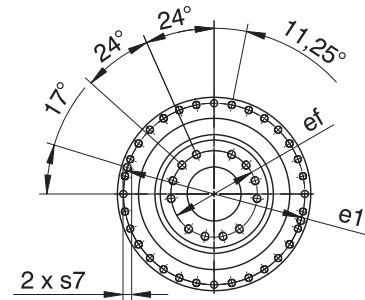
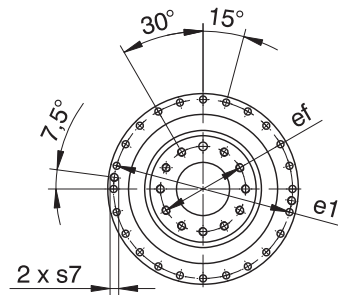
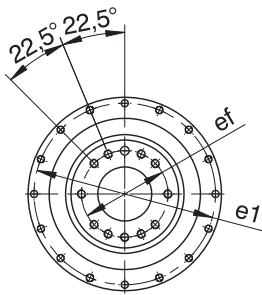
### 3.3.1 F shaft design (flange shaft)



PH5

PH7/PH8

PH9/PH10



Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PH531	145	110 <sub>h7</sub>	80 <sub>h7</sub>	8	40.0 <sup>H6</sup>	135	63.0	12	29.0	23.0	6	0.020	5.5	–	M6	11
PH731	179	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50.0 <sup>H6</sup>	168	80.0	12	38.0	32.0	6	0.025	6.6	–	M8	14
PH732	179	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50.0 <sup>H6</sup>	168	80.0	12	38.0	32.0	6	0.025	6.6	–	M8	14
PH831	247	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80.0 <sup>H6</sup>	233	125.0	15	50.0	42.0	8	0.030	9.0	M10	M10	18
PH832	247	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80.0 <sup>H6</sup>	233	125.0	15	50.0	42.0	8	0.030	9.0	M10	M10	18
PH942	300	255 <sub>h7</sub>	180 <sub>h7</sub>	18	90.0 <sup>H6</sup>	280	140.0	20	66.0	55.0	12	0.030	13.5	M8	M16	24
PH1042	330	285 <sub>h7</sub>	200 <sub>h7</sub>	20	95.0 <sup>H6</sup>	310	160.0	20	75.0	60.0	10	0.040	13.5	M10	M20	28



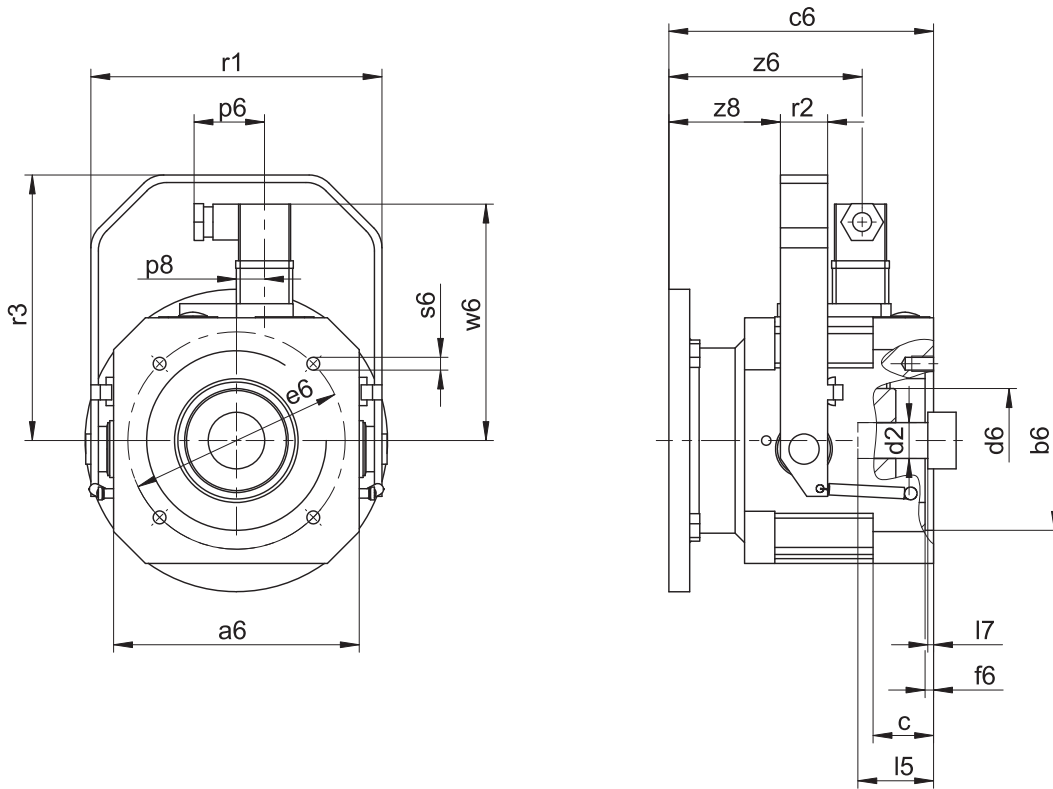
## Example dimensions for the motor connection + total length

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	lg	p10	s6	w7	x2	y2	z7
PH531_MB23	95 <sup>F8</sup>	115	24	72	130	32	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PH531_MB23	95 <sup>F8</sup>	130	24	72	130	32	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PH531_MB23	110 <sup>F8</sup>	130	24	72	130	32	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PH731_MB33	110 <sup>F8</sup>	165	32	81	155	39	147	65	4.5	20	242.0	59	M10	115.4	58	64	57.0
PH731_MB33	130 <sup>F8</sup>	165	32	81	155	39	147	65	4.5	20	242.0	59	M10	115.4	58	64	57.0
PH732_MB23	95 <sup>F8</sup>	115	24	72	130	32	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PH732_MB23	95 <sup>F8</sup>	130	24	72	130	32	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PH732_MB23	110 <sup>F8</sup>	130	24	72	130	32	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PH831_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	313.5	59	M12	134.9	58	64	75.5
PH831_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	313.5	59	M12	134.9	58	64	75.5
PH832_MB33	110 <sup>F8</sup>	165	32	81	155	39	147	65	4.5	20	344.0	59	M10	115.4	58	64	57.0
PH832_MB33	130 <sup>F8</sup>	165	32	81	155	39	147	65	4.5	20	344.0	59	M10	115.4	58	64	57.0
PH942_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	430.0	59	M12	134.9	58	64	75.5
PH942_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	430.0	59	M12	134.9	58	64	75.5
PH1042_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	446.0	59	M12	134.9	58	64	75.5
PH1042_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	446.0	59	M12	134.9	58	64	75.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6, l5 and lg are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 3.3.2 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	37.25	14.825	294	30	264.0	M16	192.0	152.0	106.0

## 3.4 Type designation

This chapter shows you an explanation of the type designation for sizes PH3 – PH8 with the associated options.

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

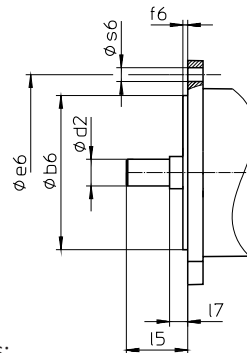
### Example code

PH	5	3	1	S	F	S	S	0100	MB	2	3
----	---	---	---	---	---	---	---	------	----	---	---

### Explanation

Code	Designation	Design
PH	Type	Planetary gear unit
5	Size	5 (example)
3	Generation	Generation 3
4		Generation 4
1	Stages	Single-stage
2		Two-stage
S	Housing	Standard
F	Shaft	Flange shaft
S	Bearing	Standard bearing
V		Reinforced bearing (PH3 – PH5)
S	Backlash	Standard
R		Reduced (PH3 – PH9)
0100	Transmission ratio (i x 10)	i = 10 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

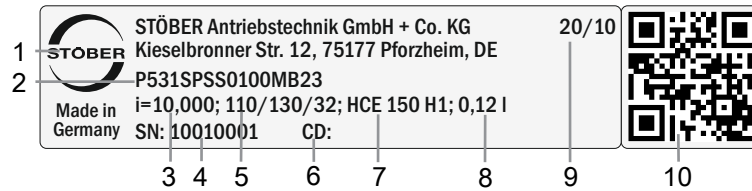
To choose a suitable motor connection, use the STOBBER Configurator at

<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 3.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, see the chapter [▶ 3.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 3.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 3.5.2.3]
- Manual release (optional), see the chapter [▶ 3.3.2]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 3.5.2.6]

### 3.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.

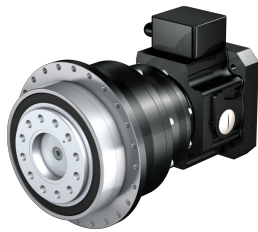


Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Serial number of the gear unit
5	Dimensions of the motor adapter (diameter of pilot/bolt circle/motor shaft)
6	Customer-specific data
7	Lubricant specification
8	Lubricant fill volume
9	Date of manufacture (year/calendar week)
10	QR code (link to product information)

## 3.5 Product description

### 3.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

Motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 3.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 3.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

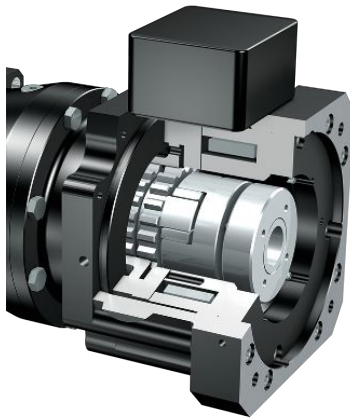


Fig. 1: Motor adapter with ServoStop brake

### 3.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 3.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 3.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 3.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

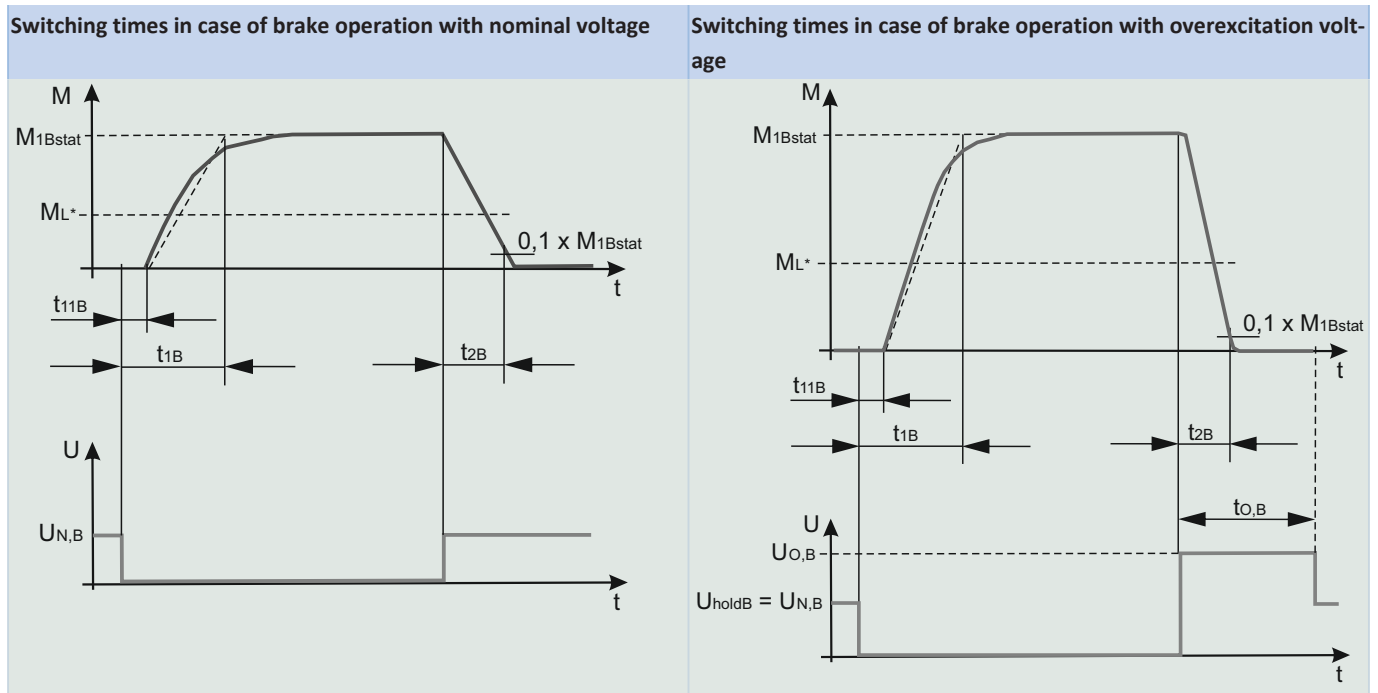
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 3.5.2.6 Brake switching times



### 3.5.3 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When the flange shaft and gear housing are fastened on the machine side using screws of strength class 12.9
- When the gear housings are adjusted at pilot  $\phi b1$ . The machine-side fit must be H7.
- When the flange shaft is adjusted using the connecting element at pilot  $\phi bf$  or  $\phi df$

### 3.5.4 Lubricants

STOBER fills the gear units with the amount and type of lubricant specified on the nameplate.

You will receive lubricants for use in the food industry upon request.

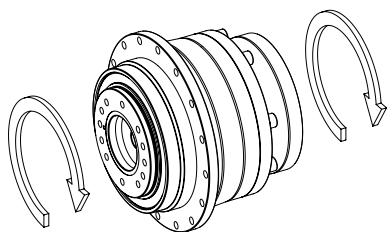
### 3.5.5 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	$\leq 90 \text{ }^\circ\text{C}$
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{get}$ single-stage	96%
$\eta_{get}$ two-stage	93%
Protection class: <sup>1</sup>	IP65

<sup>1</sup> Observe the protection class of all the components.

### 3.5.6 Direction of rotation

The input and output rotate in the same direction.



## 3.6 Project configuration

Project your drives using our SERVOfsoft designing software. Download SERVOfsoft for free at <https://www.stoeber.de/en/ServoSoft>.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

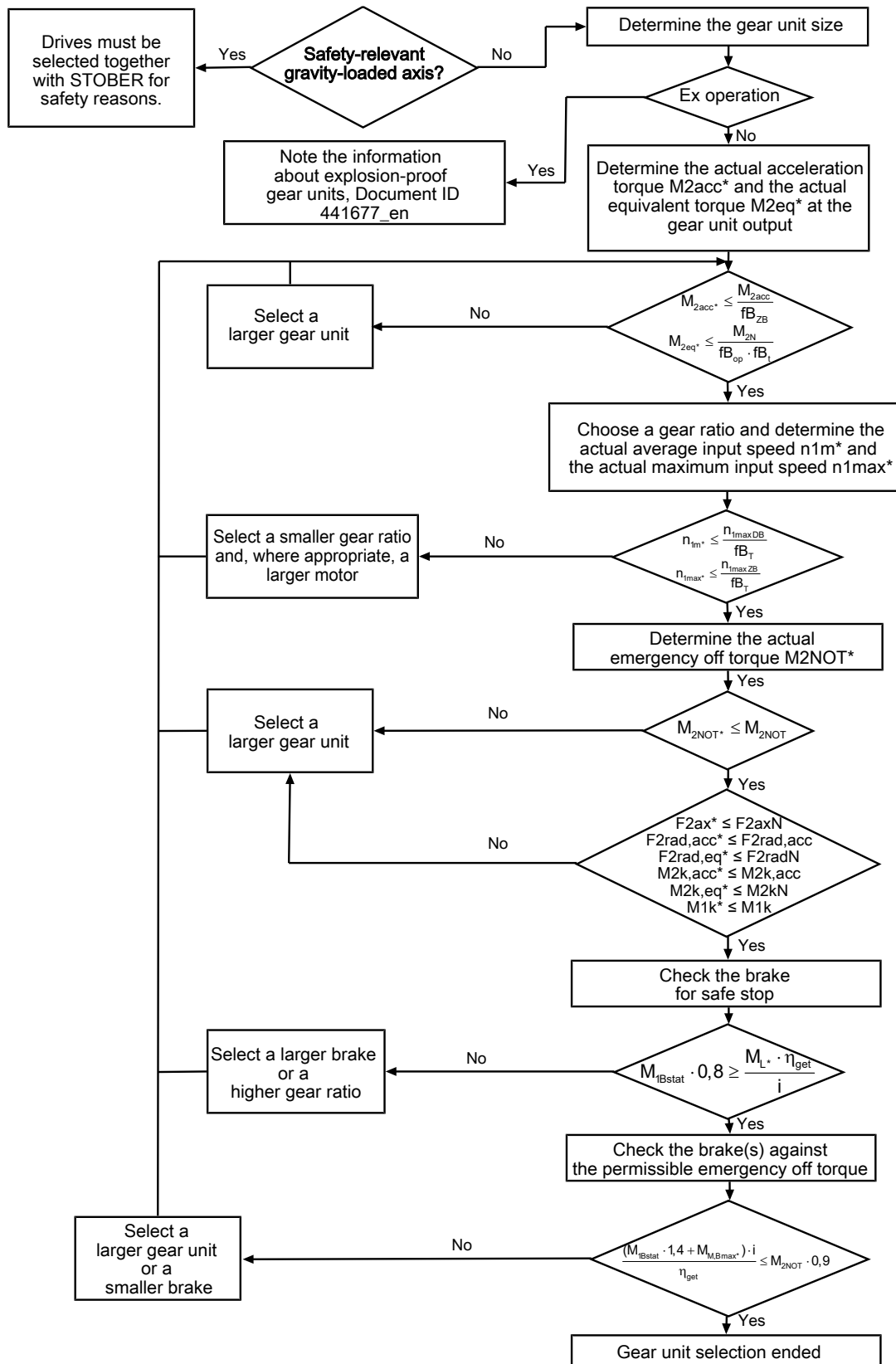
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.



### 3.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

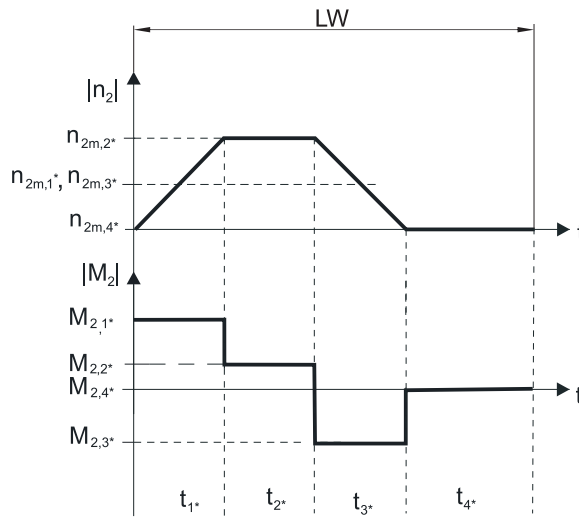
Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

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

**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 maximum acceleration torque**

$$M_{2acc^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**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  $t_{1^*} + \dots + t_{3^*} \geq 6$  min, calculate  $n_{2m^*}$  without the rest phase  $t_{4^*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20
Cyclic operation	$fB_{zB}$
$\leq 1000$ load changes/hour (LW/h)	1.00
$> 1000$ load changes/hour (LW/h)	1.15

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	≤ 20 °C	0.9
	≤ 30 °C	1.0
	≤ 40 °C	1.15
Motor with convection cooling	≤ 20 °C	1.0
	≤ 30 °C	1.1
	≤ 40 °C	1.25

**Notes**

- The maximum permitted gear unit temperature of ≤ 90 °C must not be exceeded. Doing so may result in damage to the gear unit.

### 3.6.2 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 ( $F_{2axN} = F_{2ax100}$ ;  $F_{2radN} = F_{2rad100}$ ;  $M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PH3	62.5	1650	1613	1613	101	101	75
PH4	83.0	2150	3095	3571	257	296	192
PH5	97.0	4150	4536	4897	440	475	429
PH7	86.0	6150	17045	17045	1466	1466	500
PH8	125.5	10050	27778	27778	3486	3486	1550
PH9	155.0	33000	48387	70968	7500	11000	7500
PH10	171.0	50000	51462	73099	8800	12500	9500

**Permitted shaft loads for reinforced bearing V**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PH3	66.5	2200	2250	2250	150	150	80
PH4	88.5	2900	4000	4000	354	354	217
PH5	104.0	5000	5500	5500	572	572	478

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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.

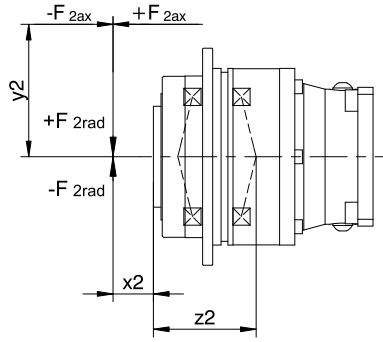


Fig. 2: Force application points

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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:**

$$M_{2k,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |M_{2k,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |M_{2k,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |F_{2rad,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |F_{2rad,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

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

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

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

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

**For different duty cycles:**

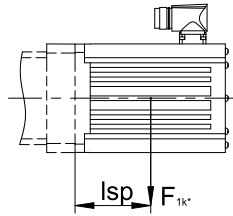
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 3.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STÖBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 3.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

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

#### Leak-proofness

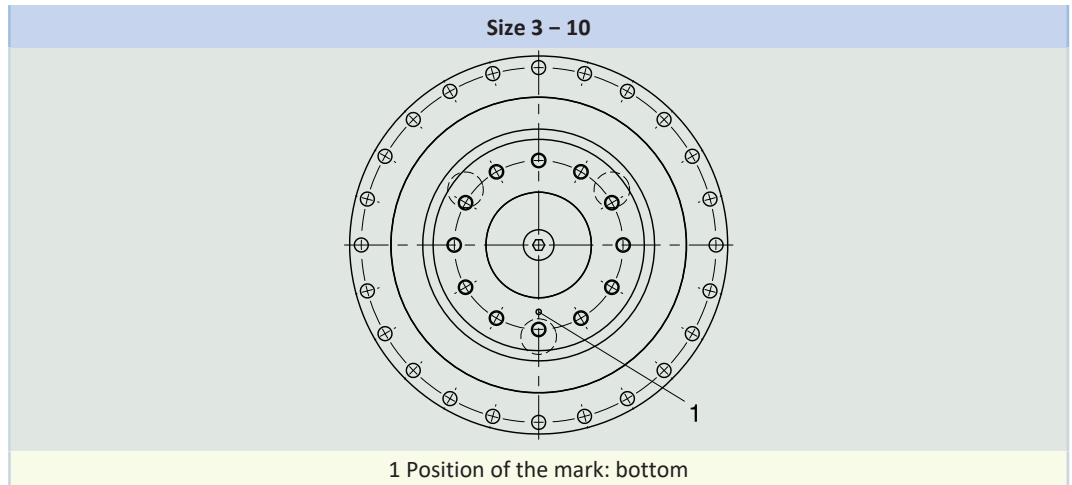
Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear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

### 3.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams below.

The images show the center position of reverse operation.

Cyclic reverse operation  $\leq \pm 20^\circ$  on request.



Please note that the hole pattern may be different, depending on the size of the planetary gear unit.

## 3.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

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

Documentation	ID
Operating manual gear units, geared motors PH33 – PH83, PH94 – PH104	443354_de
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en

## 4 PHQ planetary gear units

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## 4 Planetary gear units

# PHQ

### 4.1 Overview

Quattro-Power for maximum power density with integrated brake

#### Features

Power density	★★★★★
Backlash	★★★★★
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★★
Mass moment of inertia	★★★★☆
Helical gearing	✓
Any mounting position (single/two stage)	✓
High power density	✓
Continuous operation without cooling	✓
Stiff output bearings due to pretension	✓
Reinforced output bearing (PHQ4 – PHQ5)	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 300 Nm
$i$	5.5 – 300
$M_{2acc}$	198 – 35370 Nm
$\Delta\phi_2$	1 – 3 arcmin
$\eta_{get}$	90 – 96 %



## 4.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	Type	M <sub>1Bstat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>PHQ531 (M<sub>2acc,max</sub> = 198 Nm)</b>															
5.500	PHQ531_0055 MB23	8.0	31	2500	4000	7.1	13	29	3.0	1.0	60	198	198	198	333
5.500	PHQ531_0055 MB23	12	25	2500	4000	7.1	13	29	3.0	1.0	60	198	198	198	333
5.500	PHQ531_0055 MB23	16	20	2500	4000	7.1	13	29	3.0	1.0	60	198	198	198	333
5.500	PHQ531_0055 MB23	24	8.4	2500	4000	7.1	13	29	3.0	1.0	60	198	198	198	333
5.500	PHQ531_0055 MB23	30	–	2500	4000	7.1	13	29	3.0	1.0	60	198	198	198	333
<b>PHQ731 (M<sub>2acc,max</sub> = 528 Nm)</b>															
5.500	PHQ731_0055 MB33	16	104	2200	4000	28	24	49	3.0	1.0	61	500	528	528	998
5.500	PHQ731_0055 MB33	24	92	2200	4000	28	24	49	3.0	1.0	61	500	528	528	998
5.500	PHQ731_0055 MB33	32	81	2200	4000	28	24	49	3.0	1.0	61	500	528	528	998
5.500	PHQ731_0055 MB33	45	63	2200	4000	28	24	49	3.0	1.0	61	500	528	528	998
5.500	PHQ731_0055 MB33	90	–	2200	4000	28	24	49	3.0	1.0	61	500	528	528	998
<b>PHQ732 (M<sub>2acc,max</sub> = 1050 Nm)</b>															
22.00	PHQ732_0220 MB23	8.0	31	3000	4000	7.3	22	167	3.0	1.0	62	650	767	767	1289
22.00	PHQ732_0220 MB23	12	25	3000	4000	7.3	22	167	3.0	1.0	62	650	767	767	1289
22.00	PHQ732_0220 MB23	16	20	3000	4000	7.3	22	167	3.0	1.0	62	650	767	767	1289
22.00	PHQ732_0220 MB23	24	8.4	3000	4000	7.3	22	167	3.0	1.0	62	650	767	767	1289
22.00	PHQ732_0220 MB23	30	–	3000	4000	7.3	22	167	3.0	1.0	62	650	767	767	1289
27.50	PHQ732_0280 MB23	8.0	31	3500	4000	6.9	22	183	3.0	1.0	60	650	959	959	1611
27.50	PHQ732_0280 MB23	12	25	3500	4000	6.9	22	183	3.0	1.0	60	650	959	959	1611
27.50	PHQ732_0280 MB23	16	20	3500	4000	6.9	22	183	3.0	1.0	60	650	959	959	1611
27.50	PHQ732_0280 MB23	24	8.4	3500	4000	6.9	22	183	3.0	1.0	60	650	959	959	1611
27.50	PHQ732_0280 MB23	30	–	3500	4000	6.9	22	183	3.0	1.0	60	650	959	959	1611
38.50	PHQ732_0390 MB23	8.0	23	3700	4000	6.6	22	198	3.0	1.0	59	680	1050	1050	2100
38.50	PHQ732_0390 MB23	12	17	3700	4000	6.6	22	198	3.0	1.0	59	680	1050	1050	2100
38.50	PHQ732_0390 MB23	16	12	3700	4000	6.6	22	198	3.0	1.0	59	680	1050	1050	2100
38.50	PHQ732_0390 MB23	24	0.4	3700	4000	6.6	22	198	3.0	1.0	59	680	1050	1050	2100
55.00	PHQ732_0550 MB23	8.0	13	3700	4000	6.5	22	202	3.0	1.0	57	680	1050	1050	2100
55.00	PHQ732_0550 MB23	12	7.0	3700	4000	6.5	22	202	3.0	1.0	57	680	1050	1050	2100
55.00	PHQ732_0550 MB23	16	1.4	3700	4000	6.5	22	202	3.0	1.0	57	680	1050	1050	2100
<b>PHQ831 (M<sub>2acc,max</sub> = 1183 Nm)</b>															
5.500	PHQ831_0055 MB43	50	154	1500	3000	82	52	71	3.0	1.0	62	1069	1183	1183	1774
5.500	PHQ831_0055 MB43	72	123	1500	3000	82	52	71	3.0	1.0	62	1069	1183	1183	1774
5.500	PHQ831_0055 MB43	100	84	1500	3000	82	52	71	3.0	1.0	62	1069	1183	1183	1774
5.500	PHQ831_0055 MB43	160	–	1500	3000	82	52	71	3.0	1.0	62	1069	1183	1183	1774
<b>PHQ832 (M<sub>2acc,max</sub> = 3300 Nm)</b>															
22.00	PHQ832_0220 MB33	16	104	2500	4000	30	48	417	3.0	1.0	63	1700	2046	2046	3867
22.00	PHQ832_0220 MB33	24	92	2500	4000	30	48	417	3.0	1.0	63	1700	2046	2046	3867
22.00	PHQ832_0220 MB33	32	81	2500	4000	30	48	417	3.0	1.0	63	1700	2046	2046	3867
22.00	PHQ832_0220 MB33	45	63	2500	4000	30	48	417	3.0	1.0	63	1700	2046	2046	3867
27.50	PHQ832_0280 MB33	16	78	2700	4000	28	48	489	3.0	1.0	61	1700	2558	2558	4834
27.50	PHQ832_0280 MB33	24	67	2700	4000	28	48	489	3.0	1.0	61	1700	2558	2558	4834
27.50	PHQ832_0280 MB33	32	56	2700	4000	28	48	489	3.0	1.0	61	1700	2558	2558	4834
27.50	PHQ832_0280 MB33	45	38	2700	4000	28	48	489	3.0	1.0	61	1700	2558	2558	4834
38.50	PHQ832_0390 MB33	16	50	3000	4000	27	48	569	3.0	1.0	60	1700	2800	3300	4964
38.50	PHQ832_0390 MB33	24	38	3000	4000	27	48	569	3.0	1.0	60	1700	2800	3300	4964
38.50	PHQ832_0390 MB33	32	27	3000	4000	27	48	569	3.0	1.0	60	1700	2800	3300	4964
38.50	PHQ832_0390 MB33	45	9.0	3000	4000	27	48	569	3.0	1.0	60	1700	2800	3300	4964
55.00	PHQ832_0550 MB33	16	28	3000	4000	26	48	605	3.0	1.0	58	1700	2700	2990	4964
55.00	PHQ832_0550 MB33	24	17	3000	4000	26	48	605	3.0	1.0	58	1700	2700	2990	4964
55.00	PHQ832_0550 MB33	32	5.6	3000	4000	26	48	605	3.0	1.0	58	1700	2700	2990	4964
<b>PHQ833 (M<sub>2acc,max</sub> = 3300 Nm)</b>															
88.00	PHQ833_0880 MB23	8.0	19	3000	4000	7.4	43	665	3.0	1.0	62	1700	2800	2970	4964
88.00	PHQ833_0880 MB23	12	14	3000	4000	7.4	43	665	3.0	1.0	62	1700	2800	2970	4964
88.00	PHQ833_0880 MB23	16	8.1	3000	4000	7.4	43	665	3.0	1.0	62	1700	2800	2970	4964
110.0	PHQ833_1100 MB23	8.0	13	3000	4000	7.3	43	681	3.0	1.0	62	1700	2800	3300	4964

4.2 Selection tables 4 PHQ planetary gear units

i	Type	M <sub>1Bstat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>PHQ833 (M<sub>2acc,max</sub> = 3300 Nm)</b>															
110.0	PHQ833_1100 MB23	12	7.6	3000	4000	7.3	43	681	3.0	1.0	62	1700	2800	3300	4964
110.0	PHQ833_1100 MB23	16	2.0	3000	4000	7.3	43	681	3.0	1.0	62	1700	2800	3300	4964
137.5	PHQ833_1380 MB23	8.0	8.3	3500	4000	6.9	43	691	3.0	1.0	60	1700	2800	3300	4964
137.5	PHQ833_1380 MB23	12	2.7	3500	4000	6.9	43	691	3.0	1.0	60	1700	2800	3300	4964
154.0	PHQ833_1540 MB23	8.0	6.2	3700	4000	6.6	43	694	3.0	1.0	59	1700	2800	3300	4964
154.0	PHQ833_1540 MB23	12	0.6	3700	4000	6.6	43	694	3.0	1.0	59	1700	2800	3300	4964
192.5	PHQ833_1930 MB23	8.0	2.7	3700	4000	6.6	43	699	3.0	1.0	59	1700	2800	3300	4964
220.0	PHQ833_2200 MB23	8.0	1.0	3700	4000	6.5	43	697	3.0	1.0	57	1700	2800	3300	4964
<b>PHQ942 (M<sub>2acc,max</sub> = 6600 Nm)</b>															
18.00	PHQ942_0180 MB43	50	154	1800	3000	114	100	503	3.0	1.0	66	3390	3750	3750	5625
18.00	PHQ942_0180 MB43	72	123	1800	3000	114	100	503	3.0	1.0	66	3390	3750	3750	5625
18.00	PHQ942_0180 MB43	100	84	1800	3000	114	100	503	3.0	1.0	66	3390	3750	3750	5625
18.00	PHQ942_0180 MB43	160	-	1800	3000	114	100	503	3.0	1.0	66	3390	3750	3750	5625
24.00	PHQ942_0240 MB43	50	154	2000	3000	89	100	676	3.0	1.0	64	3800	5000	5000	7500
24.00	PHQ942_0240 MB43	72	123	2000	3000	89	100	676	3.0	1.0	64	3800	5000	5000	7500
24.00	PHQ942_0240 MB43	100	84	2000	3000	89	100	676	3.0	1.0	64	3800	5000	5000	7500
24.00	PHQ942_0240 MB43	160	-	2000	3000	89	100	676	3.0	1.0	64	3800	5000	5000	7500
30.00	PHQ942_0300 MB43	50	154	2500	3000	81	100	801	3.0	1.0	62	4200	6250	6250	9374
30.00	PHQ942_0300 MB43	72	123	2500	3000	81	100	801	3.0	1.0	62	4200	6250	6250	9374
30.00	PHQ942_0300 MB43	100	84	2500	3000	81	100	801	3.0	1.0	62	4200	6250	6250	9374
30.00	PHQ942_0300 MB43	160	-	2500	3000	81	100	801	3.0	1.0	62	4200	6250	6250	9374
42.00	PHQ942_0420 MB43	50	154	2800	3000	75	100	949	3.0	1.0	61	4500	6600	6600	13124
42.00	PHQ942_0420 MB43	72	123	2800	3000	75	100	949	3.0	1.0	61	4500	6600	6600	13124
42.00	PHQ942_0420 MB43	100	84	2800	3000	75	100	949	3.0	1.0	61	4500	6600	6600	13124
42.00	PHQ942_0420 MB43	160	-	2800	3000	75	100	949	3.0	1.0	61	4500	6600	6600	13124
60.00	PHQ942_0600 MB43	50	89	2800	3000	72	100	1024	3.0	1.0	59	4500	6600	6600	13200
60.00	PHQ942_0600 MB43	72	58	2800	3000	72	100	1024	3.0	1.0	59	4500	6600	6600	13200
60.00	PHQ942_0600 MB43	100	19	2800	3000	72	100	1024	3.0	1.0	59	4500	6600	6600	13200
<b>PHQ943 (M<sub>2acc,max</sub> = 6600 Nm)</b>															
72.00	PHQ943_0720 MB33	16	104	2200	4000	32	96	1082	3.0	1.0	63	3800	6480	6480	12247
72.00	PHQ943_0720 MB33	24	92	2200	4000	32	96	1082	3.0	1.0	63	3800	6480	6480	12247
72.00	PHQ943_0720 MB33	32	81	2200	4000	32	96	1082	3.0	1.0	63	3800	6480	6480	12247
72.00	PHQ943_0720 MB33	45	63	2200	4000	32	96	1082	3.0	1.0	63	3800	6480	6480	12247
72.00	PHQ943_0720 MB33	90	-	2200	4000	32	96	1082	3.0	1.0	63	3800	6480	6480	12247
96.00	PHQ943_0960 MB33	16	74	2500	4000	30	96	1134	3.0	1.0	63	3800	6600	6600	13200
96.00	PHQ943_0960 MB33	24	62	2500	4000	30	96	1134	3.0	1.0	63	3800	6600	6600	13200
96.00	PHQ943_0960 MB33	32	51	2500	4000	30	96	1134	3.0	1.0	63	3800	6600	6600	13200
96.00	PHQ943_0960 MB33	45	33	2500	4000	30	96	1134	3.0	1.0	63	3800	6600	6600	13200
120.0	PHQ943_1200 MB33	16	54	2500	4000	30	96	1155	3.0	1.0	63	4200	6600	6600	13200
120.0	PHQ943_1200 MB33	24	43	2500	4000	30	96	1155	3.0	1.0	63	4200	6600	6600	13200
120.0	PHQ943_1200 MB33	32	32	2500	4000	30	96	1155	3.0	1.0	63	4200	6600	6600	13200
120.0	PHQ943_1200 MB33	45	14	2500	4000	30	96	1155	3.0	1.0	63	4200	6600	6600	13200
150.0	PHQ943_1500 MB33	16	39	2700	4000	28	96	1171	3.0	1.0	61	4200	6600	6600	13200
150.0	PHQ943_1500 MB33	24	28	2700	4000	28	96	1171	3.0	1.0	61	4200	6600	6600	13200
150.0	PHQ943_1500 MB33	32	17	2700	4000	28	96	1171	3.0	1.0	61	4200	6600	6600	13200
168.0	PHQ943_1680 MB33	16	32	3000	4000	27	96	1179	3.0	1.0	60	3800	6600	6600	13200
168.0	PHQ943_1680 MB33	24	21	3000	4000	27	96	1179	3.0	1.0	60	3800	6600	6600	13200
168.0	PHQ943_1680 MB33	32	10	3000	4000	27	96	1179	3.0	1.0	60	3800	6600	6600	13200
210.0	PHQ943_2100 MB33	16	21	3000	4000	27	96	1184	3.0	1.0	60	4200	6600	6600	13200
210.0	PHQ943_2100 MB33	24	10	3000	4000	27	96	1184	3.0	1.0	60	4200	6600	6600	13200
240.0	PHQ943_2400 MB33	16	16	3000	4000	26	96	1185	3.0	1.0	58	3800	6600	6600	13200
240.0	PHQ943_2400 MB33	24	4.8	3000	4000	26	96	1185	3.0	1.0	58	3800	6600	6600	13200
300.0	PHQ943_3000 MB33	16	8.3	3000	4000	26	96	1189	3.0	1.0	58	4200	6600	6600	13200
<b>PHQ1042 (M<sub>2acc,max</sub> = 10000 Nm)</b>															
24.00	PHQ1042_0240 MB53	200	230	1800	3000	282	167	1454	3.0	-	65	6500	7310	-	14620
24.00	PHQ1042_0240 MB53	300	90	1800	3000	282	167	1454	3.0	-	65	6500	7310	-	14620
30.00	PHQ1042_0300 MB53	200	134	2000	3000	264	167	1624	3.0	-	63	6500	9137	-	18275
42.00	PHQ1042_0420 MB53	200	15	2300	3000	251	167	1797	3.0	-	62	6500	10000	-	20000
<b>PHQ1043 (M<sub>2acc,max</sub> = 10000 Nm)</b>															
96.00	PHQ1043_0960 MB43	50	55	2000	3000	88	147	1905	3.0	-	64	6500	10000	-	20000
96.00	PHQ1043_0960 MB43	72	24	2000	3000	88	147	1905	3.0	-	64	6500	10000	-	20000
120.0	PHQ1043_1200 MB43	50	30	2000	3000	87	147	1955	3.0	-	64	6500	10000	-	20000
150.0	PHQ1043_1500 MB43	50	10	2500	3000	80	147	1991	3.0	-	62	6500	10000	-	20000
168.0	PHQ1043_1680 MB43	50	1.5	2800	3000	75	147	2008	3.0	-	61	6500	10000	-	20000

i	Type	M <sub>1Bstat</sub> [Nm]	M <sub>M,Bmax</sub> [Nm]	n <sub>1maxDB</sub> [rpm]	n <sub>1maxZB</sub> [rpm]	J <sub>1</sub> [kgcm <sup>2</sup> ]	m [kg]	C <sub>2</sub> [Nm/arcmin]	Δφ <sub>2</sub> [arcmin]	Δφ <sub>2red</sub> [arcmin]	L <sub>pA</sub> [dB(A)]	M <sub>2N</sub> [Nm]	M <sub>2acc</sub> [Nm]	M <sub>2accHT</sub> [Nm]	M <sub>2NOT</sub> [Nm]
<b>PHQ1143 (M<sub>2acc,max</sub> = 22000 Nm)</b>															
96.00	PHQ1143_0960 MB43	50	154	2000	3000	95	256	3082	3.0	–	64	13000	19354	–	29030
96.00	PHQ1143_0960 MB43	72	123	2000	3000	95	256	3082	3.0	–	64	13000	19354	–	29030
96.00	PHQ1143_0960 MB43	100	84	2000	3000	95	256	3082	3.0	–	64	13000	19354	–	29030
96.00	PHQ1143_0960 MB43	160	–	2000	3000	95	256	3082	3.0	–	64	13000	19354	–	29030
120.0	PHQ1143_1200 MB43	50	110	2000	3000	92	256	3215	3.0	–	62	13000	22000	–	36288
120.0	PHQ1143_1200 MB43	72	79	2000	3000	92	256	3215	3.0	–	62	13000	22000	–	36288
120.0	PHQ1143_1200 MB43	100	40	2000	3000	92	256	3215	3.0	–	62	13000	22000	–	36288
150.0	PHQ1143_1500 MB43	50	74	2500	3000	83	256	3314	3.0	–	62	13000	22000	–	40000
150.0	PHQ1143_1500 MB43	72	43	2500	3000	83	256	3314	3.0	–	62	13000	22000	–	40000
150.0	PHQ1143_1500 MB43	100	4.0	2500	3000	83	256	3314	3.0	–	62	13000	22000	–	40000
168.0	PHQ1143_1680 MB43	50	59	2800	3000	77	256	3360	3.0	–	61	13000	22000	–	40000
168.0	PHQ1143_1680 MB43	72	28	2800	3000	77	256	3360	3.0	–	61	13000	22000	–	40000
210.0	PHQ1143_2100 MB43	50	33	2800	3000	76	256	3403	3.0	–	61	13000	22000	–	40000
210.0	PHQ1143_2100 MB43	72	2.1	2800	3000	76	256	3403	3.0	–	61	13000	22000	–	40000
240.0	PHQ1143_2400 MB43	50	20	2800	3000	73	256	3416	3.0	–	59	13000	22000	–	40000
300.0	PHQ1143_3000 MB43	50	2.0	2800	3000	73	256	3439	3.0	–	59	13000	22000	–	40000
<b>PHQ1243 (M<sub>2acc,max</sub> = 35370 Nm)</b>															
96.00	PHQ1243_0960 MB53	200	170	1800	3000	295	501	5809	3.0	–	65	25000	28296	–	56592
96.00	PHQ1243_0960 MB53	300	30	1800	3000	295	501	5809	3.0	–	65	25000	28296	–	56592
120.0	PHQ1243_1200 MB53	200	80	2000	3000	273	501	5965	3.0	–	63	25000	35370	–	70740



## 4.3 Dimensional drawings

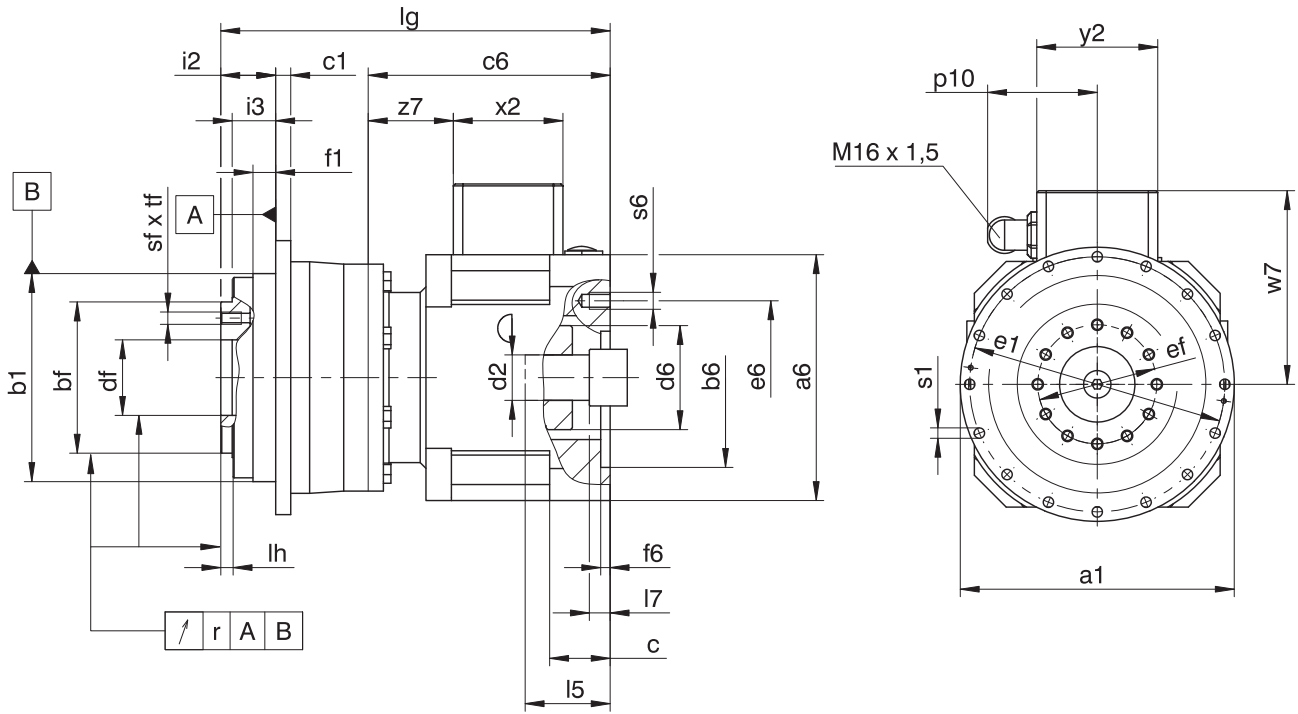
In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

### 4.3.1 PHQ5 – PHQ10 F shaft design (flange shaft)

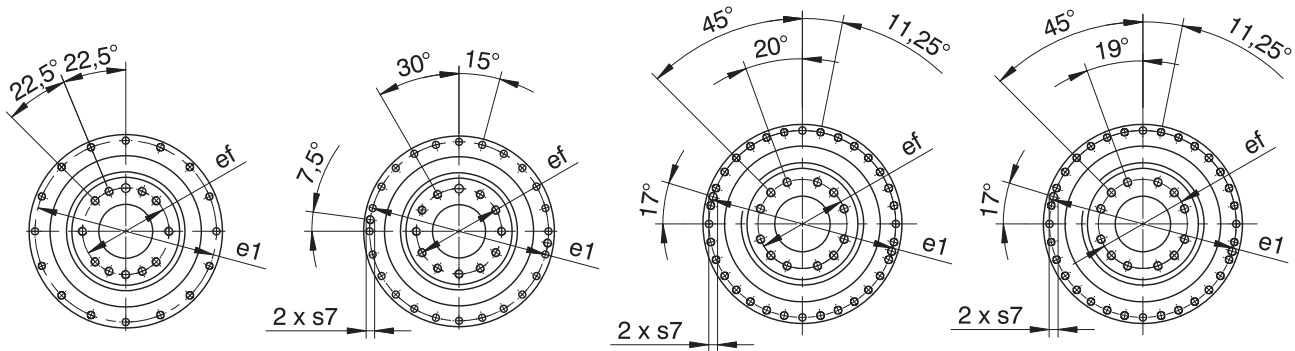


PHQ5

PHQ7/PHQ8

PHQ9

PHQ10



## Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	i2	i3	lh	r	Øs1	s7	sf	tf
PHQ531	145 <sub>h7</sub>	110 <sub>h7</sub>	80 <sub>h7</sub>	8	40.0 <sup>H6</sup>	135	63	12	29	23	6	0.020	5.5	–	M8	12
PHQ731	179 <sub>h7</sub>	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50.0 <sup>H6</sup>	168	80	12	38	32	6	0.025	6.6	–	M10	16
PHQ732	179 <sub>h7</sub>	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50.0 <sup>H6</sup>	168	80	12	38	32	6	0.025	6.6	–	M10	16
PHQ831	247 <sub>h7</sub>	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80.0 <sup>H6</sup>	233	125	15	50	42	8	0.030	9.0	M10	M12	17
PHQ832	247 <sub>h7</sub>	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80.0 <sup>H6</sup>	233	125	15	50	42	8	0.030	9.0	M10	M12	17
PHQ833	247 <sub>h7</sub>	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80.0 <sup>H6</sup>	233	125	15	50	42	8	0.030	9.0	M10	M12	17
PHQ942	300 <sub>h7</sub>	255 <sub>h7</sub>	180 <sub>h7</sub>	18	90.0 <sup>H6</sup>	280	145	20	66	55	12	0.030	13.5	M8	M20	28
PHQ943	300 <sub>h7</sub>	255 <sub>h7</sub>	180 <sub>h7</sub>	18	90.0 <sup>H6</sup>	280	145	20	66	55	12	0.030	13.5	M8	M20	28
PHQ1042	330 <sub>h7</sub>	285 <sub>h7</sub>	200 <sub>h7</sub>	20	95.0 <sup>H6</sup>	310	166	20	75	60	10	0.040	13.5	M10	M24	35
PHQ1043	330 <sub>h7</sub>	285 <sub>h7</sub>	200 <sub>h7</sub>	20	95.0 <sup>H6</sup>	310	166	20	75	60	10	0.040	13.5	M10	M24	35

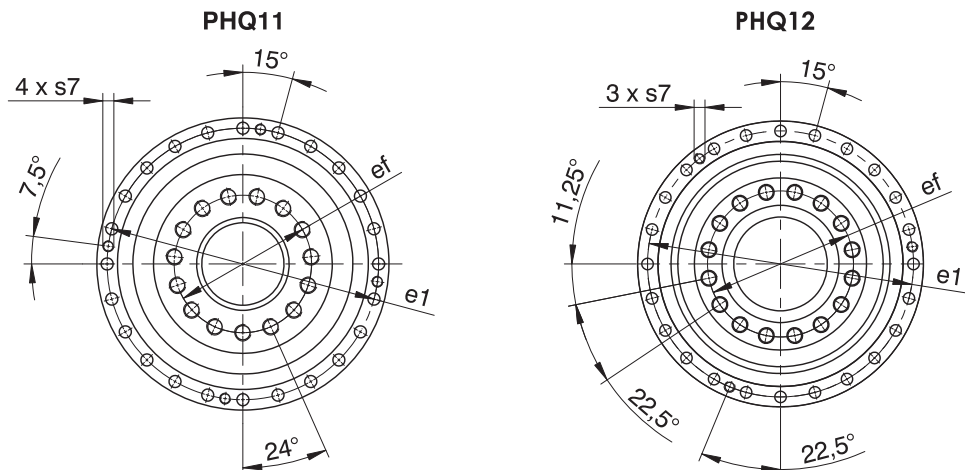
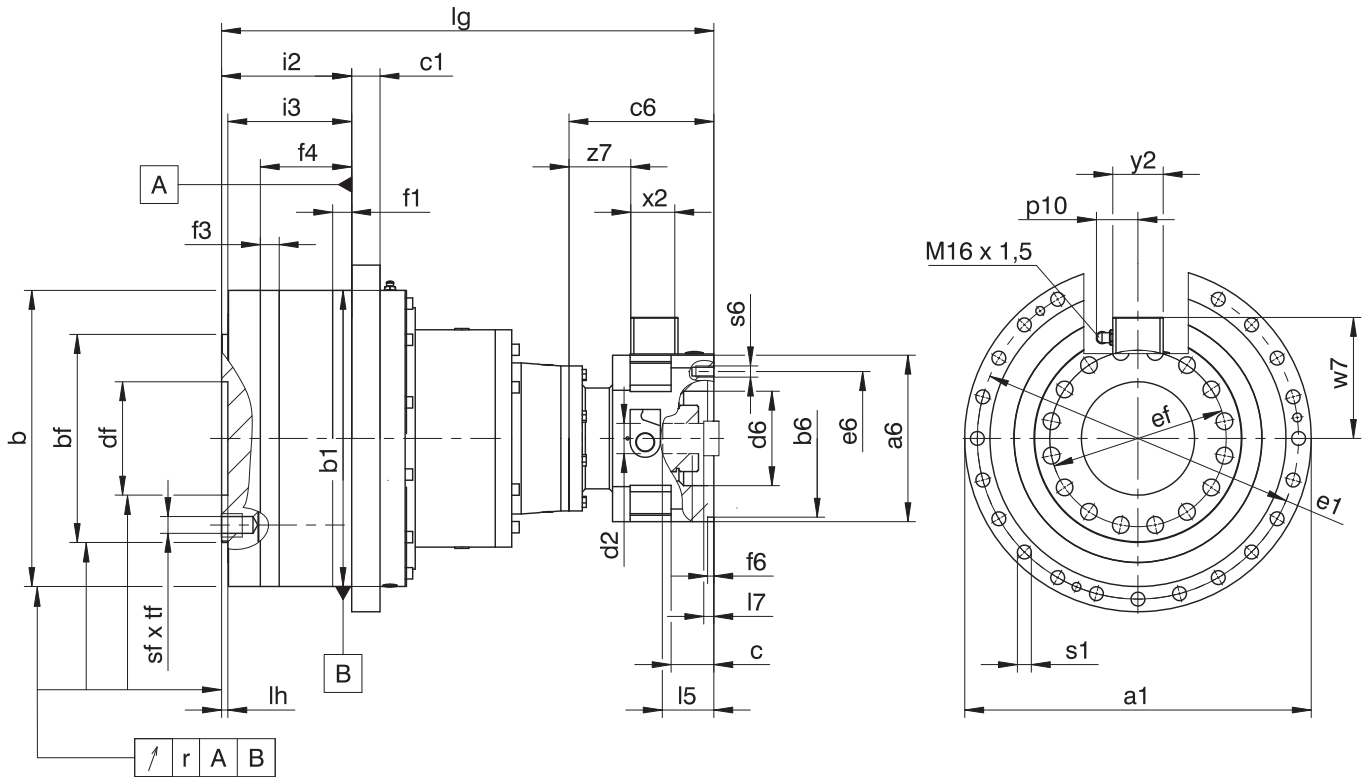
## Example dimensions for the motor connection + total length

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	lg	p10	s6	w7	x2	y2	z7
PHQ531_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PHQ531_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PHQ531_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	207.0	59	M8	102.9	58	64	46.5
PHQ731_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	242.0	59	M10	115.4	58	64	57.0
PHQ731_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	242.0	59	M10	115.4	58	64	57.0
PHQ732_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PHQ732_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PHQ732_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	274.0	59	M8	102.9	58	64	46.5
PHQ831_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	313.5	59	M12	134.9	58	64	75.5
PHQ831_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	313.5	59	M12	134.9	58	64	75.5
PHQ832_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	344.0	59	M10	115.4	58	64	57.0
PHQ832_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	344.0	59	M10	115.4	58	64	57.0
PHQ833_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	376.0	59	M8	102.9	58	64	46.5
PHQ833_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	376.0	59	M8	102.9	58	64	46.5
PHQ833_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	376.0	59	M8	102.9	58	64	46.5
PHQ942_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	430.0	59	M12	134.9	58	64	75.5
PHQ942_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	430.0	59	M12	134.9	58	64	75.5
PHQ943_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	460.5	59	M10	115.4	58	64	57.0
PHQ943_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	460.5	59	M10	115.4	58	64	57.0
PHQ1042_MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	515.0	66	M16	192.0	75	80	98.0
PHQ1043_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	553.0	59	M12	134.9	58	64	75.5
PHQ1043_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	553.0	59	M12	134.9	58	64	75.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6, l5 and lg are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 4.3.2 PHQ11 – PHQ12 F shaft design (flange shaft)



Dimensions of gear units

Type	Øa1	Øb	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	f3	f4	i2	i3	lh	r	Øs1	s7	sf	tf
PHQ1143	425	365 <sub>g6</sub>	365 <sub>h6</sub>	260 <sub>h7</sub>	32	120.0 <sup>H6</sup>	395	200	30	30	120	190.0	180.0	10	0.040	17.5	M16	M24	35.5
PHQ1243	550	470 <sub>g6</sub>	470 <sub>h6</sub>	330 <sub>h7</sub>	45	180.0 <sup>H7</sup>	510	280	30	30	145	206.5	195.5	10	0.040	22.0	M16	M30	47.0

Example dimensions for the motor connection + total length

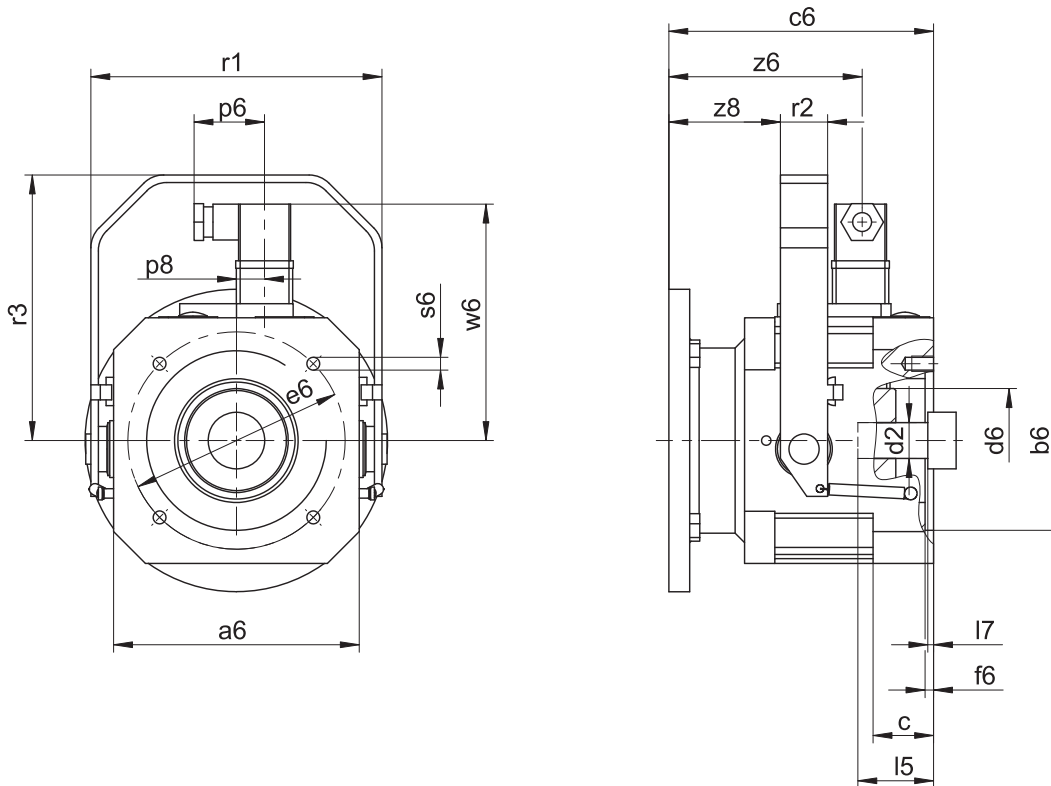
Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	lg	p10	s6	w7	x2	y2	z7
PHQ1143_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	623.5	59	M12	134.9	58	64	75.5
PHQ1143_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	623.5	59	M12	134.9	58	64	75.5
PHQ1243_MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	781.5	66	M16	192.0	75	80	98.0

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6, l5 and lg are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.



### 4.3.3 Motor adapter design with plug connector and manual release



#### Dimensions

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	129	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	91.2	48.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	147	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	99.7	58.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	176	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	120.2	75.5
MB53	250 <sup>F8</sup>	300	48	115	264	68.0	230	105	10.0	22	37.25	14.825	294	30	264.0	M16	192.0	152.0	106.0

## 4.4 Type designation

This chapter shows you an explanation of the type designation for sizes PHQ7 – PHQ8 with the associated options.

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

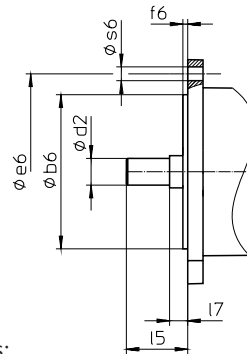
### Example code

PHQ	8	3	3	S	F	S	S	0880	MB	2	3
-----	---	---	---	---	---	---	---	------	----	---	---

### Explanation

Code	Designation	Design
PHQ	Type	Planetary gear unit
8	Size	8 (example)
3	Generation	Generation 3
4		Generation 4
1	Stages	Single-stage
2		Two-stage
3		Three-stage
S	Housing	Standard
F	Shaft	Flange shaft
S	Bearing	Standard bearing
V		Reinforced bearing (PHQ4 – PHQ5)
S	Backlash	Standard
R		Reduced (PHQ4 – PHQ9)
0880	Transmission ratio (i x 10)	i = 88 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

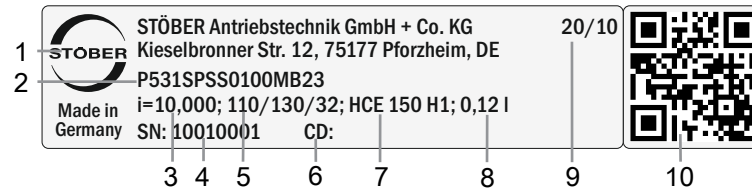
To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:  
To choose a suitable motor connection, use the STOEGER Configurator at <https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.
- Mounting position (for three-stage gear units), see the chapter [▶ 4.5.4]
- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 4.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, see the chapter [▶ 4.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 4.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 4.5.2.3]
- Manual release (optional), see the chapter [▶ 4.3.3]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 4.5.2.6]

## 4.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.

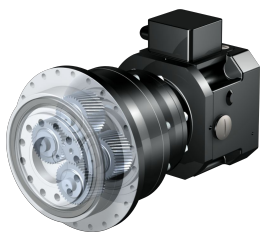


Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Serial number of the gear unit
5	Dimensions of the motor adapter (diameter of pilot/bolt circle/motor shaft)
6	Customer-specific data
7	Lubricant specification
8	Lubricant fill volume
9	Date of manufacture (year/calendar week)
10	QR code (link to product information)

## 4.5 Product description

### 4.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

Motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 4.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 4.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

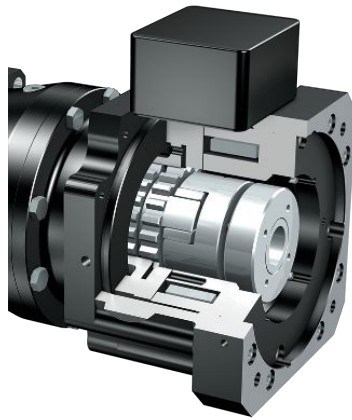


Fig. 1: Motor adapter with ServoStop brake

### 4.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 4.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

#### 4.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

#### 4.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

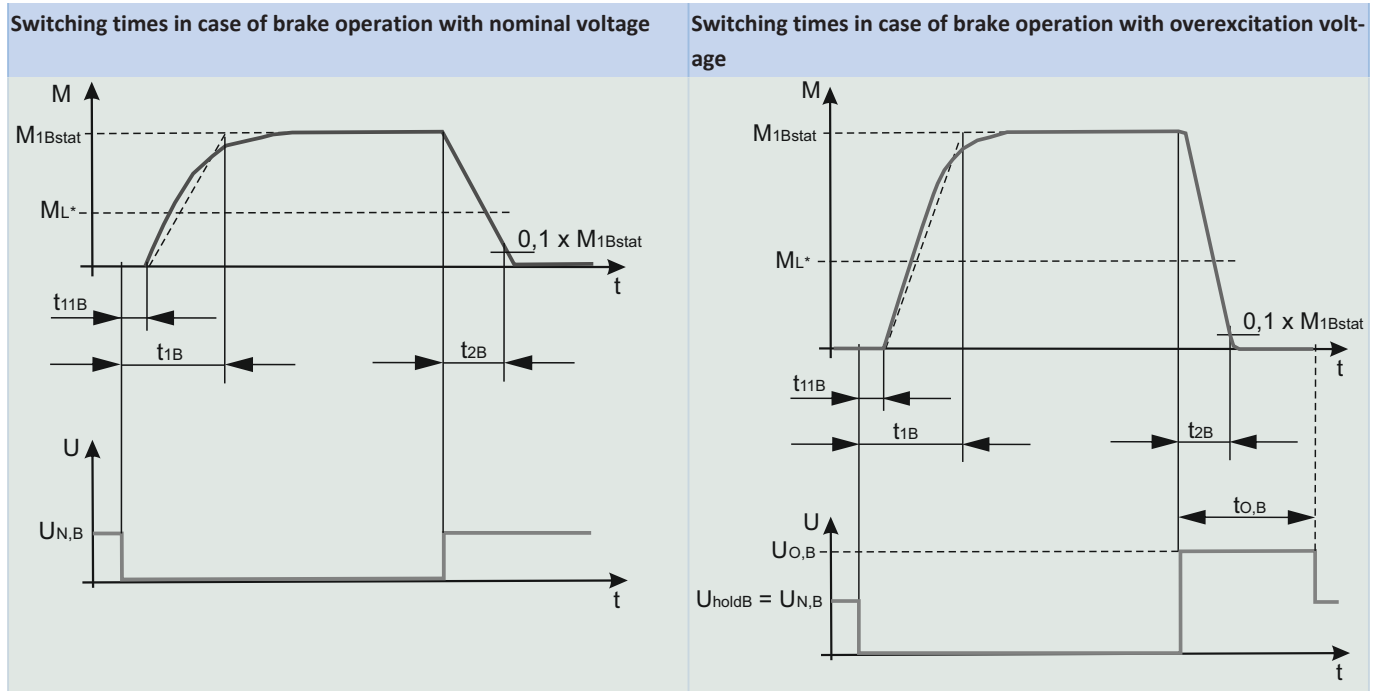
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 4.5.2.6 Brake switching times



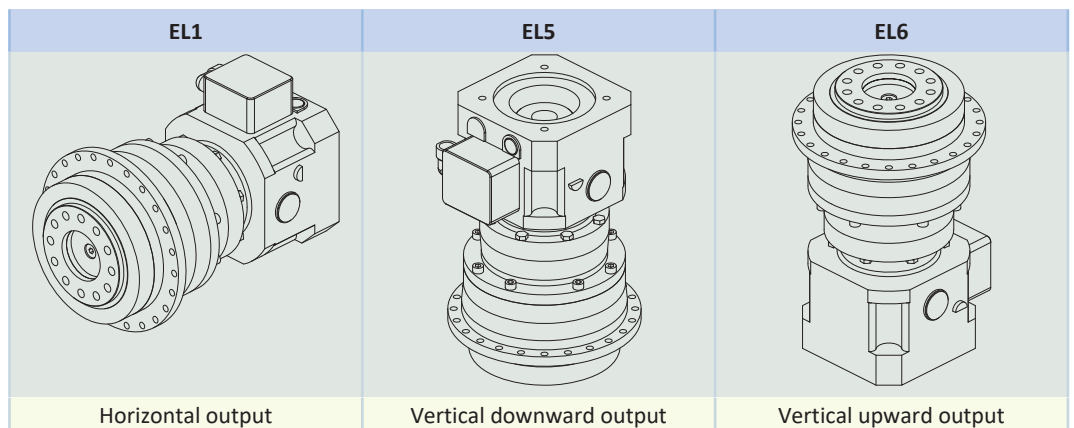
### 4.5.3 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

- When the flange shaft and gear housing are fastened on the machine side using screws of strength class 12.9
- When the gear housings are adjusted at pilot  $\phi b1$ , and also at pilot  $\phi b$  for sizes PHQ11 and PHQ12. The machine-side fit must be H7.
- When the flange shaft is adjusted using the connecting element at pilot  $\phi bf$  or  $\phi df$

### 4.5.4 Mounting positions

The following table shows the standard mounting positions. Please indicate the mounting position when ordering 3-stage gear units.



### 4.5.5 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 mounting position.

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

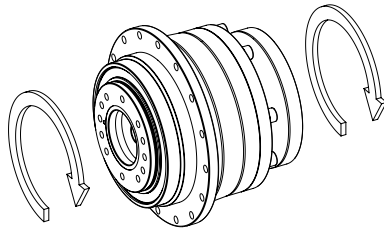
You will receive lubricants for use in the food industry upon request.

## 4.5.6 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	$\leq 90 \text{ }^\circ\text{C}$
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ single-stage	96%
$\eta_{\text{get}}$ two-stage	93%
$\eta_{\text{get}}$ three-stage	90%
Protection class: <sup>1</sup>	IP65

## 4.5.7 Direction of rotation

The input and output rotate in the same direction.



## 4.6 Project configuration

Project your drives using our SERVOSOFT designing software. Download SERVOSOFT for free at <https://www.stoeber.de/en/ServoSoft>.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

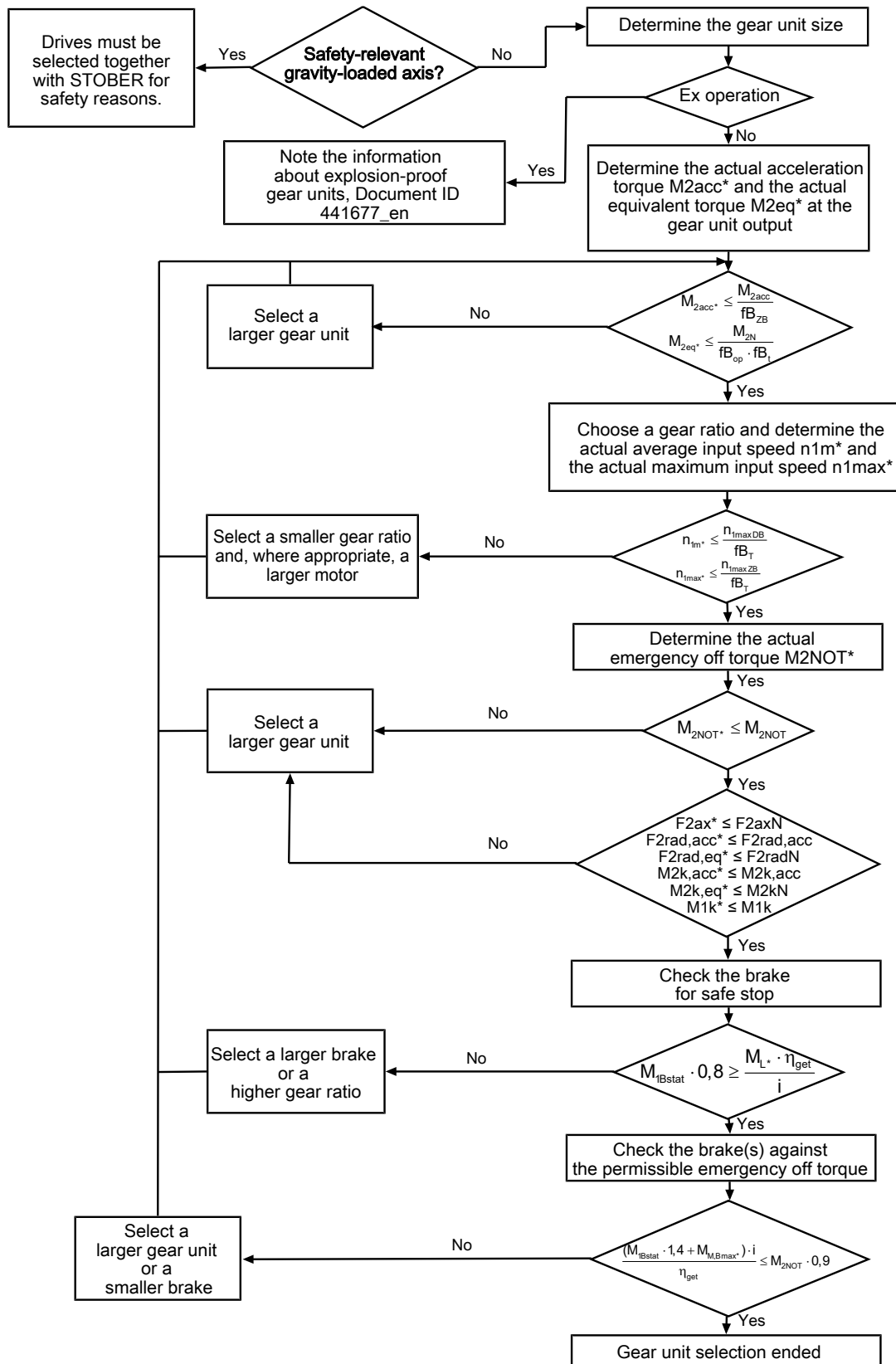
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

<sup>1</sup>Observe the protection class of all the components.

### 4.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

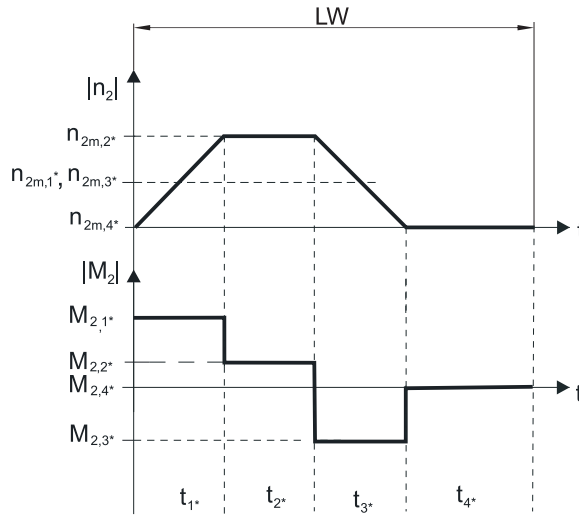
The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

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



**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 maximum acceleration torque**

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**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  $t_{1*} + \dots + t_{3*} \geq 6$  min, calculate  $n_{2m*}$  without the rest phase  $t_{4*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.00
Reversing load cyclic operation	1.00
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20
Cyclic operation	$fB_{zB}$
$\leq 1000$ load changes/hour (LW/h)	1.00
$> 1000$ load changes/hour (LW/h)	1.15

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ }^\circ\text{C}$	0.9
	$\leq 30\text{ }^\circ\text{C}$	1.0
	$\leq 40\text{ }^\circ\text{C}$	1.15
Motor with convection cooling	$\leq 20\text{ }^\circ\text{C}$	1.0
	$\leq 30\text{ }^\circ\text{C}$	1.1
	$\leq 40\text{ }^\circ\text{C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 90\text{ }^\circ\text{C}$  must not be exceeded. Doing so may result in damage to the gear unit.

## 4.6.2 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  $n_{2m^*} \leq 100\text{ rpm}$  ( $F_{2axN} = F_{2ax100}$ ;  $F_{2radN} = F_{2rad100}$ ;  $M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PHQ4	83.0	2150	3095	3929	257	326	192
PHQ5	97.0	4150	4536	4897	440	475	429
PHQ7	86.0	6150	17045	17045	1466	1466	500
PHQ8	125.5	10050	27778	33333	3486	4183	1550
PHQ9	155.0	33000	48387	70968	7500	11000	7500
PHQ10	171.0	50000	51462	73099	8800	12500	9500
PHQ11	231.0	60000	47619	69264	11000	16000	11500
PHQ12	281.0	70000	64057	106761	18000	30000	14000

**Permitted shaft loads for reinforced bearing V**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PHQ4	88.5	2900	4000	4000	354	354	217
PHQ5	104.0	5000	5500	5500	572	572	478

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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

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

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

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

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

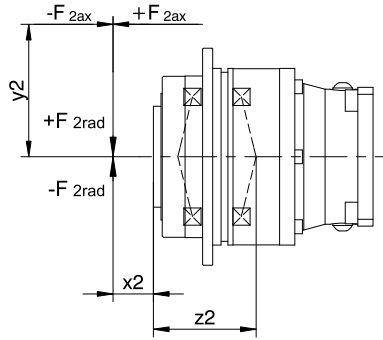


Fig. 2: Force application points

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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:**

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

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

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

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

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

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

**For different duty cycles:**

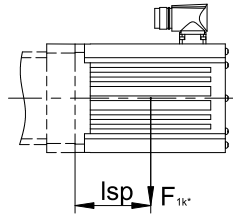
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 4.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STÖBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 4.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

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

#### Leak-proofness

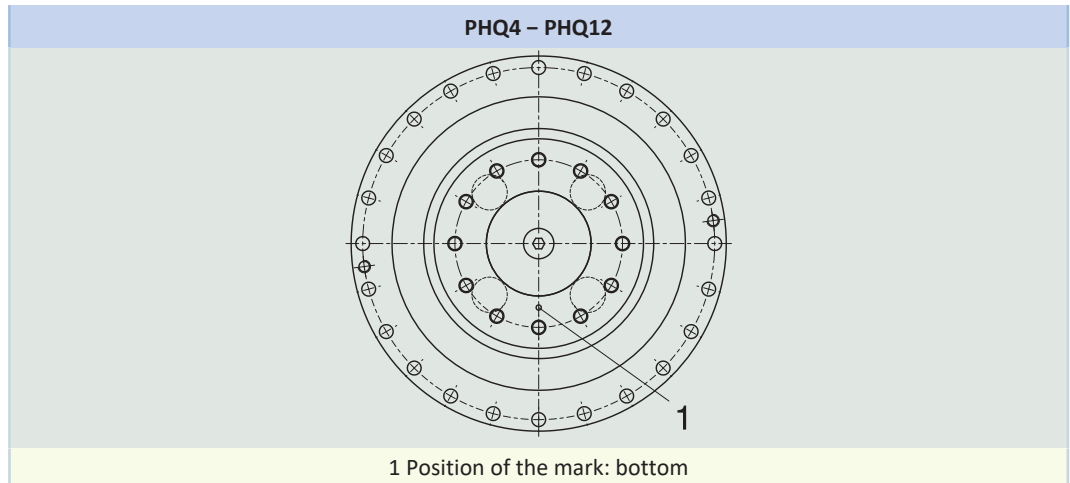
Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear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

## 4.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams below.

The images show the center position of reverse operation.

Cyclic reverse operation  $\leq \pm 20^\circ$  on request.



Please note that the hole pattern may be different, depending on the size of the planetary gear unit.

## 4.7 Additional documentation

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

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

Documentation	ID
Operating manual gear units, geared motors PHQ43 – PHQ83, PHQ94 – PHQ124	443353_de
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en



# 5 C helical gear units

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## 5 Helical gear units

# C

### 5.1 Overview

Compact helical gear units with integrated brake

#### Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
FKM seal ring at the input	✓
Reinforced output bearing	✓ (on request)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

Key ★☆☆☆☆ good | ★★★★★ excellent

€ Economy | €€€€€ Premium

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	2 – 70
$M_{2acc}$	47 – 4800 Nm
$\Delta\phi_2$	10 – 20 arcmin
$\eta_{get}$	97 %



## 5.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	i <sub>exakt</sub>	Type	M <sub>IBstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>	
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]	
<b>C002 (M<sub>2acc,max</sub> = 72 Nm)</b>															
1.997	1480/741	C002_0020 MB23	8.0	31	7.9	16	20.0	1.0	3500	3000	4000	35	52	110	
1.997	1480/741	C002_0020 MB23	12	25	7.9	16	20.0	1.0	3500	3000	4000	35	52	110	
1.997	1480/741	C002_0020 MB23	16	20	7.9	16	20.0	1.0	3500	3000	4000	35	52	110	
1.997	1480/741	C002_0020 MB23	24	8.4	7.9	16	20.0	1.0	3500	3000	4000	35	52	110	
1.997	1480/741	C002_0020 MB23	30	–	7.9	16	20.0	1.0	3500	3000	4000	35	52	110	
2.769	36/13	C002_0028 MB23	8.0	23	7.6	16	20.0	1.1	3500	3000	4000	39	58	110	
2.769	36/13	C002_0028 MB23	12	18	7.6	16	20.0	1.1	3500	3000	4000	39	58	110	
2.769	36/13	C002_0028 MB23	16	12	7.6	16	20.0	1.1	3500	3000	4000	39	58	110	
2.769	36/13	C002_0028 MB23	24	1.1	7.6	16	20.0	1.1	3500	3000	4000	39	58	110	
3.067	46/15	C002_0031 MB23	8.0	20	7.5	16	20.0	1.1	3700	3600	4000	40	60	110	
3.067	46/15	C002_0031 MB23	12	15	7.5	16	20.0	1.1	3700	3600	4000	40	60	110	
3.067	46/15	C002_0031 MB23	16	8.9	7.5	16	20.0	1.1	3700	3600	4000	40	60	110	
3.318	1702/513	C002_0033 MB23	8.0	18	7.5	16	20.0	1.2	3700	3600	4000	41	62	110	
3.318	1702/513	C002_0033 MB23	12	12	7.5	16	20.0	1.2	3700	3600	4000	41	62	110	
3.318	1702/513	C002_0033 MB23	16	6.5	7.5	16	20.0	1.2	3700	3600	4000	41	62	110	
3.835	441/115	C002_0038 MB23	8.0	14	7.4	16	20.0	1.2	3700	3600	4000	43	65	110	
3.835	441/115	C002_0038 MB23	12	8.2	7.4	16	20.0	1.2	3700	3600	4000	43	65	110	
3.835	441/115	C002_0038 MB23	16	2.6	7.4	16	20.0	1.2	3700	3600	4000	43	65	110	
4.149	1813/437	C002_0041 MB23	8.0	12	7.4	16	20.0	1.2	3700	3600	4000	44	65	110	
4.149	1813/437	C002_0041 MB23	12	6.3	7.4	16	20.0	1.2	3700	3600	4000	44	65	110	
4.149	1813/437	C002_0041 MB23	16	0.7	7.4	16	20.0	1.2	3700	3600	4000	44	65	110	
4.680	117/25	C002_0047 MB23	8.0	9.3	7.4	16	20.0	1.2	4000	4000	4000	46	65	110	
4.680	117/25	C002_0047 MB23	12	3.7	7.4	16	20.0	1.2	4000	4000	4000	46	65	110	
5.063	481/95	C002_0051 MB23	8.0	7.8	7.4	16	20.0	1.2	4000	4000	4000	47	65	110	
5.063	481/95	C002_0051 MB23	12	2.2	7.4	16	20.0	1.2	4000	4000	4000	47	65	110	
5.824	99/17	C002_0058 MB23	8.0	5.3	7.3	16	20.0	1.2	4000	4000	4000	49	65	110	
6.300	2035/323	C002_0063 MB23	8.0	4.0	7.3	16	20.0	1.2	4000	4000	4000	51	65	110	
7.714	54/7	C002_0077 MB23	8.0	1.2	7.3	16	20.0	1.2	4000	4000	4000	54	65	110	
8.235	667/81	C002_0082 MB23	8.0	1.5	7.5	16	16.0	1.6	3700	3600	4000	60	72	120	
9.228	1495/162	C002_0092 MB23	8.0	0.2	7.4	16	16.0	1.6	3700	3600	4000	60	65	120	
<b>C102 (M<sub>2acc,max</sub> = 138 Nm)</b>															
2.018	1128/559	C102_0020 MB23	8.0	31	9.1	21	18.0	2.0	3100	2600	4000	70	73	123	
2.018	1128/559	C102_0020 MB23	12	25	9.1	21	18.0	2.0	3100	2600	4000	70	73	123	
2.018	1128/559	C102_0020 MB23	16	20	9.1	21	18.0	2.0	3100	2600	4000	70	73	123	
2.018	1128/559	C102_0020 MB23	24	8.4	9.1	21	18.0	2.0	3100	2600	4000	70	73	123	
2.018	1128/559	C102_0020 MB23	30	–	9.1	21	18.0	2.0	3100	2600	4000	70	73	123	
2.018	1128/559	C102_0020 MB33	16	70	30	28	18.0	2.3	3100	2600	4000	70	104	214	
2.018	1128/559	C102_0020 MB33	24	59	30	28	18.0	2.3	3100	2600	4000	70	104	214	
2.018	1128/559	C102_0020 MB33	32	48	30	28	18.0	2.3	3100	2600	4000	70	104	214	
2.018	1128/559	C102_0020 MB33	45	29	30	28	18.0	2.3	3100	2600	4000	70	104	214	
2.177	468/215	C102_0022 MB23	8.0	31	9.0	21	18.0	2.1	3100	2600	4000	71	79	133	
2.177	468/215	C102_0022 MB23	12	25	9.0	21	18.0	2.1	3100	2600	4000	71	79	133	
2.177	468/215	C102_0022 MB23	16	20	9.0	21	18.0	2.1	3100	2600	4000	71	79	133	
2.177	468/215	C102_0022 MB23	24	8.4	9.0	21	18.0	2.1	3100	2600	4000	71	79	133	
2.177	468/215	C102_0022 MB23	30	–	9.0	21	18.0	2.1	3100	2600	4000	71	79	133	
2.177	468/215	C102_0022 MB33	16	66	30	28	18.0	2.4	3100	2600	4000	71	107	220	
2.177	468/215	C102_0022 MB33	24	55	30	28	18.0	2.4	3100	2600	4000	71	107	220	
2.177	468/215	C102_0022 MB33	32	43	30	28	18.0	2.4	3100	2600	4000	71	107	220	
2.177	468/215	C102_0022 MB33	45	25	30	28	18.0	2.4	3100	2600	4000	71	107	220	
2.394	2303/962	C102_0024 MB23	8.0	31	8.7	21	18.0	2.2	3100	2600	4000	74	87	146	
2.394	2303/962	C102_0024 MB23	12	25	8.7	21	18.0	2.2	3100	2600	4000	74	87	146	
2.394	2303/962	C102_0024 MB23	16	20	8.7	21	18.0	2.2	3100	2600	4000	74	87	146	
2.394	2303/962	C102_0024 MB23	24	8.4	8.7	21	18.0	2.2	3100	2600	4000	74	87	146	

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C102 (M<sub>2acc,max</sub> = 138 Nm)</b>														
2.394	2303/962	C102_0024 MB23	30	–	8.7	21	18.0	2.2	3100	2600	4000	74	87	146
2.394	2303/962	C102_0024 MB33	16	56	29	28	18.0	2.5	3100	2600	4000	74	110	214
2.394	2303/962	C102_0024 MB33	24	44	29	28	18.0	2.5	3100	2600	4000	74	110	214
2.394	2303/962	C102_0024 MB33	32	33	29	28	18.0	2.5	3100	2600	4000	74	110	214
2.394	2303/962	C102_0024 MB33	45	15	29	28	18.0	2.5	3100	2600	4000	74	110	214
2.582	1911/740	C102_0026 MB23	8.0	31	8.6	21	18.0	2.3	3100	2600	4000	75	94	158
2.582	1911/740	C102_0026 MB23	12	25	8.6	21	18.0	2.3	3100	2600	4000	75	94	158
2.582	1911/740	C102_0026 MB23	16	20	8.6	21	18.0	2.3	3100	2600	4000	75	94	158
2.582	1911/740	C102_0026 MB23	24	8.4	8.6	21	18.0	2.3	3100	2600	4000	75	94	158
2.582	1911/740	C102_0026 MB23	30	–	8.6	21	18.0	2.3	3100	2600	4000	75	94	158
2.582	1911/740	C102_0026 MB33	16	52	29	28	18.0	2.6	3100	2600	4000	75	113	220
2.582	1911/740	C102_0026 MB33	24	41	29	28	18.0	2.6	3100	2600	4000	75	113	220
2.582	1911/740	C102_0026 MB33	32	30	29	28	18.0	2.6	3100	2600	4000	75	113	220
2.582	1911/740	C102_0026 MB33	45	11	29	28	18.0	2.6	3100	2600	4000	75	113	220
3.091	2491/806	C102_0031 MB23	8.0	31	8.2	21	18.0	2.5	3600	3100	4000	80	112	189
3.091	2491/806	C102_0031 MB23	12	25	8.2	21	18.0	2.5	3600	3100	4000	80	112	189
3.091	2491/806	C102_0031 MB23	16	20	8.2	21	18.0	2.5	3600	3100	4000	80	112	189
3.091	2491/806	C102_0031 MB23	24	8.4	8.2	21	18.0	2.5	3600	3100	4000	80	112	189
3.091	2491/806	C102_0031 MB23	30	–	8.2	21	18.0	2.5	3600	3100	4000	80	112	189
3.091	2491/806	C102_0031 MB33	16	40	29	28	18.0	2.7	3600	3100	4000	80	120	220
3.091	2491/806	C102_0031 MB33	24	29	29	28	18.0	2.7	3600	3100	4000	80	120	220
3.091	2491/806	C102_0031 MB33	32	17	29	28	18.0	2.7	3600	3100	4000	80	120	220
3.334	2067/620	C102_0033 MB23	8.0	31	8.2	21	18.0	2.6	3600	3100	4000	82	121	204
3.334	2067/620	C102_0033 MB23	12	25	8.2	21	18.0	2.6	3600	3100	4000	82	121	204
3.334	2067/620	C102_0033 MB23	16	20	8.2	21	18.0	2.6	3600	3100	4000	82	121	204
3.334	2067/620	C102_0033 MB23	24	8.4	8.2	21	18.0	2.6	3600	3100	4000	82	121	204
3.334	2067/620	C102_0033 MB23	30	–	8.2	21	18.0	2.6	3600	3100	4000	82	121	204
3.334	2067/620	C102_0033 MB33	16	35	29	28	18.0	2.8	3600	3100	4000	82	123	220
3.334	2067/620	C102_0033 MB33	24	24	29	28	18.0	2.8	3600	3100	4000	82	123	220
3.334	2067/620	C102_0033 MB33	32	13	29	28	18.0	2.8	3600	3100	4000	82	123	220
3.883	1363/351	C102_0039 MB23	8.0	31	7.9	21	18.0	2.7	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB23	12	25	7.9	21	18.0	2.7	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB23	16	20	7.9	21	18.0	2.7	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB23	24	8.4	7.9	21	18.0	2.7	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB23	30	–	7.9	21	18.0	2.7	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB33	16	27	28	28	18.0	2.8	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB33	24	16	28	28	18.0	2.8	3600	3100	4000	86	130	220
3.883	1363/351	C102_0039 MB33	32	4.7	28	28	18.0	2.8	3600	3100	4000	86	130	220
4.189	377/90	C102_0042 MB23	8.0	31	7.9	21	18.0	2.8	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB23	12	25	7.9	21	18.0	2.8	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB23	16	20	7.9	21	18.0	2.8	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB23	24	8.4	7.9	21	18.0	2.8	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB23	30	–	7.9	21	18.0	2.8	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB33	16	23	28	28	18.0	2.9	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB33	24	12	28	28	18.0	2.9	3600	3100	4000	89	130	220
4.189	377/90	C102_0042 MB33	32	1.0	28	28	18.0	2.9	3600	3100	4000	89	130	220
4.658	3149/676	C102_0047 MB23	8.0	30	7.7	21	18.0	2.8	3800	3500	4000	92	130	220
4.658	3149/676	C102_0047 MB23	12	24	7.7	21	18.0	2.8	3800	3500	4000	92	130	220
4.658	3149/676	C102_0047 MB23	16	19	7.7	21	18.0	2.8	3800	3500	4000	92	130	220
4.658	3149/676	C102_0047 MB23	24	7.6	7.7	21	18.0	2.8	3800	3500	4000	92	130	220
4.658	3149/676	C102_0047 MB33	16	19	28	28	18.0	2.9	3800	3500	4000	92	130	220
4.658	3149/676	C102_0047 MB33	24	7.6	28	28	18.0	2.9	3800	3500	4000	92	130	220
5.025	201/40	C102_0050 MB23	8.0	27	7.7	21	18.0	2.9	3800	3500	4000	94	130	220
5.025	201/40	C102_0050 MB23	12	21	7.7	21	18.0	2.9	3800	3500	4000	94	130	220
5.025	201/40	C102_0050 MB23	16	16	7.7	21	18.0	2.9	3800	3500	4000	94	130	220
5.025	201/40	C102_0050 MB23	24	4.6	7.7	21	18.0	2.9	3800	3500	4000	94	130	220
5.025	201/40	C102_0050 MB33	16	16	28	28	18.0	3.0	3800	3500	4000	94	130	220
5.025	201/40	C102_0050 MB33	24	4.6	28	28	18.0	3.0	3800	3500	4000	94	130	220
5.875	47/8	C102_0059 MB23	8.0	21	7.6	21	18.0	2.9	3800	3500	4000	99	130	220
5.875	47/8	C102_0059 MB23	12	16	7.6	21	18.0	2.9	3800	3500	4000	99	130	220
5.875	47/8	C102_0059 MB23	16	10	7.6	21	18.0	2.9	3800	3500	4000	99	130	220
5.875	47/8	C102_0059 MB33	16	10	28	28	18.0	3.0	3800	3500	4000	99	130	220
6.338	507/80	C102_0063 MB23	8.0	19	7.6	21	18.0	3.0	3800	3500	4000	102	130	220
6.338	507/80	C102_0063 MB23	12	14	7.6	21	18.0	3.0	3800	3500	4000	102	130	220

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C102 (M<sub>2acc,max</sub> = 138 Nm)</b>														
6.338	507/80	C102_0063 MB23	16	7.9	7.6	21	18.0	3.0	3800	3500	4000	102	130	220
6.338	507/80	C102_0063 MB33	16	7.9	28	28	18.0	3.0	3800	3500	4000	102	130	220
7.796	3243/416	C102_0078 MB23	8.0	13	7.4	21	18.0	3.0	4000	3900	4000	109	130	220
7.796	3243/416	C102_0078 MB23	12	7.8	7.4	21	18.0	3.0	4000	3900	4000	109	130	220
7.796	3243/416	C102_0078 MB23	16	2.2	7.4	21	18.0	3.0	4000	3900	4000	109	130	220
7.796	3243/416	C102_0078 MB33	16	2.2	28	28	18.0	3.1	4000	3900	4000	109	130	220
8.263	1537/186	C102_0083 MB23	8.0	14	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
8.263	1537/186	C102_0083 MB23	12	8.6	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
8.263	1537/186	C102_0083 MB23	16	3.0	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
8.263	1537/186	C102_0083 MB33	16	3.0	28	28	15.0	3.8	3600	3100	4000	120	138	240
9.326	3180/341	C102_0093 MB23	8.0	11	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
9.326	3180/341	C102_0093 MB23	12	5.7	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
9.326	3180/341	C102_0093 MB23	16	0.1	7.9	21	15.0	3.8	3600	3100	4000	120	138	240
9.326	3180/341	C102_0093 MB33	16	0.1	28	28	15.0	3.8	3600	3100	4000	120	138	240
10.38	841/81	C102_0105 MB23	8.0	9.0	7.7	21	15.0	3.8	3600	3100	4000	120	138	240
10.38	841/81	C102_0105 MB23	12	3.4	7.7	21	15.0	3.8	3600	3100	4000	120	138	240
11.72	1160/99	C102_0115 MB23	8.0	6.7	7.7	21	15.0	3.8	3600	3100	4000	120	138	240
11.72	1160/99	C102_0115 MB23	12	1.1	7.7	21	15.0	3.8	3600	3100	4000	120	138	240
12.46	1943/156	C102_0125 MB23	8.0	5.6	7.6	21	15.0	3.9	3800	3500	4000	120	138	240
12.46	1943/156	C102_0125 MB23	12	–	7.6	21	15.0	3.9	3800	3500	4000	120	138	240
14.06	2010/143	C102_0140 MB23	8.0	3.7	7.6	21	15.0	3.9	3800	3500	4000	120	138	240
15.71	377/24	C102_0155 MB23	8.0	2.1	7.5	21	15.0	3.9	3800	3500	4000	120	138	240
17.73	195/11	C102_0175 MB23	8.0	0.6	7.5	21	15.0	3.9	3800	3500	4000	120	138	240
<b>C202 (M<sub>2acc,max</sub> = 230 Nm)</b>														
2.009	432/215	C202_0020 MB23	8.0	31	11	25	17.0	2.8	3000	2600	4000	73	73	123
2.009	432/215	C202_0020 MB23	12	25	11	25	17.0	2.8	3000	2600	4000	73	73	123
2.009	432/215	C202_0020 MB23	16	20	11	25	17.0	2.8	3000	2600	4000	73	73	123
2.009	432/215	C202_0020 MB23	24	8.4	11	25	17.0	2.8	3000	2600	4000	73	73	123
2.009	432/215	C202_0020 MB23	30	–	11	25	17.0	2.8	3000	2600	4000	73	73	123
2.009	432/215	C202_0020 MB33	16	104	33	32	17.0	3.5	3000	2600	4000	106	159	350
2.009	432/215	C202_0020 MB33	24	92	33	32	17.0	3.5	3000	2600	4000	106	159	350
2.009	432/215	C202_0020 MB33	32	81	33	32	17.0	3.5	3000	2600	4000	106	159	350
2.009	432/215	C202_0020 MB33	45	63	33	32	17.0	3.5	3000	2600	4000	106	159	350
2.009	432/215	C202_0020 MB33	90	–	33	32	17.0	3.5	3000	2600	4000	106	159	350
2.184	2160/989	C202_0022 MB23	8.0	31	11	25	17.0	3.1	3000	2600	4000	79	79	133
2.184	2160/989	C202_0022 MB23	12	25	11	25	17.0	3.1	3000	2600	4000	79	79	133
2.184	2160/989	C202_0022 MB23	16	20	11	25	17.0	3.1	3000	2600	4000	79	79	133
2.184	2160/989	C202_0022 MB23	24	8.4	11	25	17.0	3.1	3000	2600	4000	79	79	133
2.184	2160/989	C202_0022 MB23	30	–	11	25	17.0	3.1	3000	2600	4000	79	79	133
2.184	2160/989	C202_0022 MB33	16	104	33	32	17.0	3.7	3000	2600	4000	109	163	350
2.184	2160/989	C202_0022 MB33	24	92	33	32	17.0	3.7	3000	2600	4000	109	163	350
2.184	2160/989	C202_0022 MB33	32	81	33	32	17.0	3.7	3000	2600	4000	109	163	350
2.184	2160/989	C202_0022 MB33	45	63	33	32	17.0	3.7	3000	2600	4000	109	163	350
2.184	2160/989	C202_0022 MB33	90	–	33	32	17.0	3.7	3000	2600	4000	109	163	350
2.475	99/40	C202_0025 MB23	8.0	31	10	25	17.0	3.4	3000	2600	4000	90	90	151
2.475	99/40	C202_0025 MB23	12	25	10	25	17.0	3.4	3000	2600	4000	90	90	151
2.475	99/40	C202_0025 MB23	16	20	10	25	17.0	3.4	3000	2600	4000	90	90	151
2.475	99/40	C202_0025 MB23	24	8.4	10	25	17.0	3.4	3000	2600	4000	90	90	151
2.475	99/40	C202_0025 MB23	30	–	10	25	17.0	3.4	3000	2600	4000	90	90	151
2.475	99/40	C202_0025 MB33	16	76	31	32	17.0	4.1	3000	2600	4000	114	170	278
2.475	99/40	C202_0025 MB33	24	64	31	32	17.0	4.1	3000	2600	4000	114	170	278
2.475	99/40	C202_0025 MB33	32	53	31	32	17.0	4.1	3000	2600	4000	114	170	278
2.475	99/40	C202_0025 MB33	45	35	31	32	17.0	4.1	3000	2600	4000	114	170	278
2.690	495/184	C202_0027 MB23	8.0	31	10	25	17.0	3.7	3000	2600	4000	98	98	164
2.690	495/184	C202_0027 MB23	12	25	10	25	17.0	3.7	3000	2600	4000	98	98	164
2.690	495/184	C202_0027 MB23	16	20	10	25	17.0	3.7	3000	2600	4000	98	98	164
2.690	495/184	C202_0027 MB23	24	8.4	10	25	17.0	3.7	3000	2600	4000	98	98	164
2.690	495/184	C202_0027 MB23	30	–	10	25	17.0	3.7	3000	2600	4000	98	98	164
2.690	495/184	C202_0027 MB33	16	76	30	32	17.0	4.3	3000	2600	4000	117	175	302
2.690	495/184	C202_0027 MB33	24	64	30	32	17.0	4.3	3000	2600	4000	117	175	302
2.690	495/184	C202_0027 MB33	32	53	30	32	17.0	4.3	3000	2600	4000	117	175	302
2.690	495/184	C202_0027 MB33	45	35	30	32	17.0	4.3	3000	2600	4000	117	175	302
3.103	90/29	C202_0031 MB23	8.0	31	9.3	25	17.0	4.1	3500	3100	4000	113	113	190
3.103	90/29	C202_0031 MB23	12	25	9.3	25	17.0	4.1	3500	3100	4000	113	113	190

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C202 (M<sub>2acc,max</sub> = 230 Nm)</b>														
3.103	90/29	C202_0031 MB23	16	20	9.3	25	17.0	4.1	3500	3100	4000	113	113	190
3.103	90/29	C202_0031 MB23	24	8.4	9.3	25	17.0	4.1	3500	3100	4000	113	113	190
3.103	90/29	C202_0031 MB23	30	–	9.3	25	17.0	4.1	3500	3100	4000	113	113	190
3.103	90/29	C202_0031 MB33	16	76	30	32	17.0	4.6	3500	3100	4000	123	184	348
3.103	90/29	C202_0031 MB33	24	64	30	32	17.0	4.6	3500	3100	4000	123	184	348
3.103	90/29	C202_0031 MB33	32	53	30	32	17.0	4.6	3500	3100	4000	123	184	348
3.103	90/29	C202_0031 MB33	45	35	30	32	17.0	4.6	3500	3100	4000	123	184	348
3.373	2250/667	C202_0034 MB23	8.0	31	9.2	25	17.0	4.3	3500	3100	4000	123	123	206
3.373	2250/667	C202_0034 MB23	12	25	9.2	25	17.0	4.3	3500	3100	4000	123	123	206
3.373	2250/667	C202_0034 MB23	16	20	9.2	25	17.0	4.3	3500	3100	4000	123	123	206
3.373	2250/667	C202_0034 MB23	24	8.4	9.2	25	17.0	4.3	3500	3100	4000	123	123	206
3.373	2250/667	C202_0034 MB23	30	–	9.2	25	17.0	4.3	3500	3100	4000	123	123	206
3.373	2250/667	C202_0034 MB33	16	68	30	32	17.0	4.8	3500	3100	4000	126	189	350
3.373	2250/667	C202_0034 MB33	24	57	30	32	17.0	4.8	3500	3100	4000	126	189	350
3.373	2250/667	C202_0034 MB33	32	46	30	32	17.0	4.8	3500	3100	4000	126	189	350
3.373	2250/667	C202_0034 MB33	45	28	30	32	17.0	4.8	3500	3100	4000	126	189	350
3.888	486/125	C202_0039 MB23	8.0	31	8.7	25	17.0	4.6	3500	3100	4000	132	141	238
3.888	486/125	C202_0039 MB23	12	25	8.7	25	17.0	4.6	3500	3100	4000	132	141	238
3.888	486/125	C202_0039 MB23	16	20	8.7	25	17.0	4.6	3500	3100	4000	132	141	238
3.888	486/125	C202_0039 MB23	24	8.4	8.7	25	17.0	4.6	3500	3100	4000	132	141	238
3.888	486/125	C202_0039 MB23	30	–	8.7	25	17.0	4.6	3500	3100	4000	132	141	238
3.888	486/125	C202_0039 MB33	16	56	29	32	17.0	5.0	3500	3100	4000	132	198	350
3.888	486/125	C202_0039 MB33	24	45	29	32	17.0	5.0	3500	3100	4000	132	198	350
3.888	486/125	C202_0039 MB33	32	34	29	32	17.0	5.0	3500	3100	4000	132	198	350
3.888	486/125	C202_0039 MB33	45	16	29	32	17.0	5.0	3500	3100	4000	132	198	350
4.226	486/115	C202_0042 MB23	8.0	31	8.6	25	17.0	4.8	3500	3100	4000	136	154	258
4.226	486/115	C202_0042 MB23	12	25	8.6	25	17.0	4.8	3500	3100	4000	136	154	258
4.226	486/115	C202_0042 MB23	16	20	8.6	25	17.0	4.8	3500	3100	4000	136	154	258
4.226	486/115	C202_0042 MB23	24	8.4	8.6	25	17.0	4.8	3500	3100	4000	136	154	258
4.226	486/115	C202_0042 MB23	30	–	8.6	25	17.0	4.8	3500	3100	4000	136	154	258
4.226	486/115	C202_0042 MB33	16	50	29	32	17.0	5.2	3500	3100	4000	136	200	350
4.226	486/115	C202_0042 MB33	24	39	29	32	17.0	5.2	3500	3100	4000	136	200	350
4.226	486/115	C202_0042 MB33	32	28	29	32	17.0	5.2	3500	3100	4000	136	200	350
4.226	486/115	C202_0042 MB33	45	9.3	29	32	17.0	5.2	3500	3100	4000	136	200	350
4.667	14/3	C202_0047 MB23	8.0	31	8.3	25	17.0	5.0	3700	3500	4000	140	170	285
4.667	14/3	C202_0047 MB23	12	25	8.3	25	17.0	5.0	3700	3500	4000	140	170	285
4.667	14/3	C202_0047 MB23	16	20	8.3	25	17.0	5.0	3700	3500	4000	140	170	285
4.667	14/3	C202_0047 MB23	24	8.4	8.3	25	17.0	5.0	3700	3500	4000	140	170	285
4.667	14/3	C202_0047 MB23	30	–	8.3	25	17.0	5.0	3700	3500	4000	140	170	285
4.667	14/3	C202_0047 MB33	16	43	29	32	17.0	5.3	3700	3500	4000	140	200	350
4.667	14/3	C202_0047 MB33	24	32	29	32	17.0	5.3	3700	3500	4000	140	200	350
4.667	14/3	C202_0047 MB33	32	21	29	32	17.0	5.3	3700	3500	4000	140	200	350
4.667	14/3	C202_0047 MB33	45	2.5	29	32	17.0	5.3	3700	3500	4000	140	200	350
5.072	350/69	C202_0051 MB23	8.0	31	8.2	25	17.0	5.1	3700	3500	4000	144	184	310
5.072	350/69	C202_0051 MB23	12	25	8.2	25	17.0	5.1	3700	3500	4000	144	184	310
5.072	350/69	C202_0051 MB23	16	20	8.2	25	17.0	5.1	3700	3500	4000	144	184	310
5.072	350/69	C202_0051 MB23	24	8.4	8.2	25	17.0	5.1	3700	3500	4000	144	184	310
5.072	350/69	C202_0051 MB23	30	–	8.2	25	17.0	5.1	3700	3500	4000	144	184	310
5.072	350/69	C202_0051 MB33	16	38	29	32	17.0	5.4	3700	3500	4000	144	200	350
5.072	350/69	C202_0051 MB33	24	27	29	32	17.0	5.4	3700	3500	4000	144	200	350
5.072	350/69	C202_0051 MB33	32	15	29	32	17.0	5.4	3700	3500	4000	144	200	350
5.791	666/115	C202_0058 MB23	8.0	31	8.0	25	17.0	5.3	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB23	12	25	8.0	25	17.0	5.3	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB23	16	20	8.0	25	17.0	5.3	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB23	24	8.4	8.0	25	17.0	5.3	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB23	30	–	8.0	25	17.0	5.3	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB33	16	30	28	32	17.0	5.5	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB33	24	19	28	32	17.0	5.5	3700	3500	4000	151	200	350
5.791	666/115	C202_0058 MB33	32	8.0	28	32	17.0	5.5	3700	3500	4000	151	200	350
6.295	3330/529	C202_0063 MB23	8.0	31	8.0	25	17.0	5.4	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB23	12	25	8.0	25	17.0	5.4	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB23	16	20	8.0	25	17.0	5.4	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB23	24	8.4	8.0	25	17.0	5.4	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB23	30	–	8.0	25	17.0	5.4	3700	3500	4000	155	200	350

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C202 (M<sub>2acc,max</sub> = 230 Nm)</b>														
6.295	3330/529	C202_0063 MB33	16	26	28	32	17.0	5.6	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB33	24	15	28	32	17.0	5.6	3700	3500	4000	155	200	350
6.295	3330/529	C202_0063 MB33	32	3.7	28	32	17.0	5.6	3700	3500	4000	155	200	350
7.800	39/5	C202_0078 MB23	8.0	28	7.7	25	17.0	5.6	4000	3900	4000	167	200	350
7.800	39/5	C202_0078 MB23	12	22	7.7	25	17.0	5.6	4000	3900	4000	167	200	350
7.800	39/5	C202_0078 MB23	16	17	7.7	25	17.0	5.6	4000	3900	4000	167	200	350
7.800	39/5	C202_0078 MB23	24	5.6	7.7	25	17.0	5.6	4000	3900	4000	167	200	350
7.800	39/5	C202_0078 MB33	16	17	28	32	17.0	5.7	4000	3900	4000	167	200	350
7.800	39/5	C202_0078 MB33	24	5.6	28	32	17.0	5.7	4000	3900	4000	167	200	350
8.190	475/58	C202_0082 MB23	8.0	31	8.7	25	14.0	7.6	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB23	12	25	8.7	25	14.0	7.6	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB23	16	20	8.7	25	14.0	7.6	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB23	24	8.4	8.7	25	14.0	7.6	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB23	30	–	8.7	25	14.0	7.6	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB33	16	20	29	32	14.0	7.8	3500	3100	4000	200	230	400
8.190	475/58	C202_0082 MB33	24	9.0	29	32	14.0	7.8	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB23	8.0	26	8.7	25	14.0	7.7	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB23	12	20	8.7	25	14.0	7.7	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB23	16	15	8.7	25	14.0	7.7	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB23	24	3.6	8.7	25	14.0	7.7	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB33	16	15	29	32	14.0	7.9	3500	3100	4000	200	230	400
9.387	2450/261	C202_0094 MB33	24	3.6	29	32	14.0	7.9	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB23	8.0	23	8.3	25	14.0	7.8	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB23	12	17	8.3	25	14.0	7.8	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB23	16	12	8.3	25	14.0	7.8	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB23	24	0.4	8.3	25	14.0	7.8	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB33	16	12	29	32	14.0	8.0	3500	3100	4000	200	230	400
10.26	513/50	C202_0105 MB33	24	0.4	29	32	14.0	8.0	3500	3100	4000	200	230	400
11.76	294/25	C202_0120 MB23	8.0	18	8.3	25	14.0	7.9	3500	3100	4000	200	230	400
11.76	294/25	C202_0120 MB23	12	13	8.3	25	14.0	7.9	3500	3100	4000	200	230	400
11.76	294/25	C202_0120 MB23	16	7.3	8.3	25	14.0	7.9	3500	3100	4000	200	230	400
11.76	294/25	C202_0120 MB33	16	7.3	29	32	14.0	8.1	3500	3100	4000	200	230	400
12.32	665/54	C202_0125 MB23	8.0	17	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
12.32	665/54	C202_0125 MB23	12	12	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
12.32	665/54	C202_0125 MB23	16	6.0	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
12.32	665/54	C202_0125 MB33	16	6.0	29	32	14.0	8.1	3700	3500	4000	200	230	400
14.12	3430/243	C202_0140 MB23	8.0	14	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
14.12	3430/243	C202_0140 MB23	12	7.9	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
14.12	3430/243	C202_0140 MB23	16	2.3	8.0	25	14.0	8.0	3700	3500	4000	200	230	400
14.12	3430/243	C202_0140 MB33	16	2.3	29	32	14.0	8.1	3700	3500	4000	200	230	400
15.28	703/46	C202_0155 MB23	8.0	12	7.8	25	14.0	8.1	3700	3500	4000	200	230	400
15.28	703/46	C202_0155 MB23	12	6.0	7.8	25	14.0	8.1	3700	3500	4000	200	230	400
15.28	703/46	C202_0155 MB23	16	0.4	7.8	25	14.0	8.1	3700	3500	4000	200	230	400
15.28	703/46	C202_0155 MB33	16	0.4	28	32	14.0	8.1	3700	3500	4000	200	230	400
17.52	3626/207	C202_0175 MB23	8.0	8.7	7.8	25	14.0	8.1	3700	3500	4000	200	230	400
17.52	3626/207	C202_0175 MB23	12	3.1	7.8	25	14.0	8.1	3700	3500	4000	200	230	400
20.58	247/12	C202_0210 MB23	8.0	5.8	7.6	25	14.0	8.2	4000	3900	4000	200	230	400
20.58	247/12	C202_0210 MB23	12	0.2	7.6	25	14.0	8.2	4000	3900	4000	200	230	400
23.59	637/27	C202_0240 MB23	8.0	3.6	7.6	25	14.0	8.2	4000	3900	4000	200	230	400
24.64	1577/64	C202_0250 MB23	8.0	3.0	7.5	25	14.0	8.2	4000	3900	4000	200	230	400
28.24	4067/144	C202_0280 MB23	8.0	1.2	7.5	25	14.0	8.2	4000	3900	4000	200	230	400
30.69	399/13	C202_0310 MB23	8.0	0.2	7.4	25	14.0	8.2	4000	3900	4000	200	230	400
<b>C302 (M<sub>2acc,max</sub> = 400 Nm)</b>														
2.020	608/301	C302_0020 MB33	16	104	36	37	16.0	3.8	2700	2300	4000	174	196	370
2.020	608/301	C302_0020 MB33	24	92	36	37	16.0	3.8	2700	2300	4000	174	196	370
2.020	608/301	C302_0020 MB33	32	81	36	37	16.0	3.8	2700	2300	4000	174	196	370
2.020	608/301	C302_0020 MB33	45	63	36	37	16.0	3.8	2700	2300	4000	174	196	370
2.020	608/301	C302_0020 MB33	90	–	36	37	16.0	3.8	2700	2300	4000	174	196	370
2.020	608/301	C302_0020 MB43	50	146	84	51	16.0	4.3	2700	2300	3000	174	261	499
2.020	608/301	C302_0020 MB43	72	115	84	51	16.0	4.3	2700	2300	3000	174	261	499
2.020	608/301	C302_0020 MB43	100	76	84	51	16.0	4.3	2700	2300	3000	174	261	499
2.177	468/215	C302_0022 MB33	16	104	36	37	16.0	4.1	2700	2300	4000	178	211	399
2.177	468/215	C302_0022 MB33	24	92	36	37	16.0	4.1	2700	2300	4000	178	211	399
2.177	468/215	C302_0022 MB33	32	81	36	37	16.0	4.1	2700	2300	4000	178	211	399



5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C302 (M<sub>2acc,max</sub> = 400 Nm)</b>														
2.177	468/215	C302_0022 MB33	45	63	36	37	16.0	4.1	2700	2300	4000	178	211	399
2.177	468/215	C302_0022 MB33	90	–	36	37	16.0	4.1	2700	2300	4000	178	211	399
2.177	468/215	C302_0022 MB43	50	146	83	51	16.0	4.5	2700	2300	3000	178	267	538
2.177	468/215	C302_0022 MB43	72	115	83	51	16.0	4.5	2700	2300	3000	178	267	538
2.177	468/215	C302_0022 MB43	100	76	83	51	16.0	4.5	2700	2300	3000	178	267	538
2.510	1634/651	C302_0025 MB33	16	104	34	37	16.0	4.6	2700	2300	4000	187	243	460
2.510	1634/651	C302_0025 MB33	24	92	34	37	16.0	4.6	2700	2300	4000	187	243	460
2.510	1634/651	C302_0025 MB33	32	81	34	37	16.0	4.6	2700	2300	4000	187	243	460
2.510	1634/651	C302_0025 MB33	45	63	34	37	16.0	4.6	2700	2300	4000	187	243	460
2.510	1634/651	C302_0025 MB33	90	–	34	37	16.0	4.6	2700	2300	4000	187	243	460
2.510	1634/651	C302_0025 MB43	50	104	82	51	16.0	5.0	2700	2300	3000	187	280	499
2.510	1634/651	C302_0025 MB43	72	73	82	51	16.0	5.0	2700	2300	3000	187	280	499
2.510	1634/651	C302_0025 MB43	100	34	82	51	16.0	5.0	2700	2300	3000	187	280	499
2.705	1677/620	C302_0027 MB33	16	104	34	37	16.0	4.8	2700	2300	4000	192	262	496
2.705	1677/620	C302_0027 MB33	24	92	34	37	16.0	4.8	2700	2300	4000	192	262	496
2.705	1677/620	C302_0027 MB33	32	81	34	37	16.0	4.8	2700	2300	4000	192	262	496
2.705	1677/620	C302_0027 MB33	45	63	34	37	16.0	4.8	2700	2300	4000	192	262	496
2.705	1677/620	C302_0027 MB33	90	–	34	37	16.0	4.8	2700	2300	4000	192	262	496
2.705	1677/620	C302_0027 MB43	50	104	81	51	16.0	5.2	2700	2300	3000	192	287	538
2.705	1677/620	C302_0027 MB43	72	73	81	51	16.0	5.2	2700	2300	3000	192	287	538
2.705	1677/620	C302_0027 MB43	100	34	81	51	16.0	5.2	2700	2300	3000	192	287	538
3.110	1045/336	C302_0031 MB23	8.0	31	11	30	16.0	4.5	3200	2800	4000	113	113	190
3.110	1045/336	C302_0031 MB23	12	25	11	30	16.0	4.5	3200	2800	4000	113	113	190
3.110	1045/336	C302_0031 MB23	16	20	11	30	16.0	4.5	3200	2800	4000	113	113	190
3.110	1045/336	C302_0031 MB23	24	8.4	11	30	16.0	4.5	3200	2800	4000	113	113	190
3.110	1045/336	C302_0031 MB23	30	–	11	30	16.0	4.5	3200	2800	4000	113	113	190
3.110	1045/336	C302_0031 MB33	16	104	33	37	16.0	5.2	3200	2800	4000	201	301	550
3.110	1045/336	C302_0031 MB33	24	92	33	37	16.0	5.2	3200	2800	4000	201	301	550
3.110	1045/336	C302_0031 MB33	32	81	33	37	16.0	5.2	3200	2800	4000	201	301	550
3.110	1045/336	C302_0031 MB33	45	63	33	37	16.0	5.2	3200	2800	4000	201	301	550
3.110	1045/336	C302_0031 MB33	90	–	33	37	16.0	5.2	3200	2800	4000	201	301	550
3.110	1045/336	C302_0031 MB43	50	84	80	51	16.0	5.5	3000	2800	3000	201	301	550
3.110	1045/336	C302_0031 MB43	72	54	80	51	16.0	5.5	3000	2800	3000	201	301	550
3.110	1045/336	C302_0031 MB43	100	14	80	51	16.0	5.5	3000	2800	3000	201	301	550
3.352	429/128	C302_0034 MB23	8.0	31	11	30	16.0	4.8	3200	2800	4000	122	122	205
3.352	429/128	C302_0034 MB23	12	25	11	30	16.0	4.8	3200	2800	4000	122	122	205
3.352	429/128	C302_0034 MB23	16	20	11	30	16.0	4.8	3200	2800	4000	122	122	205
3.352	429/128	C302_0034 MB23	24	8.4	11	30	16.0	4.8	3200	2800	4000	122	122	205
3.352	429/128	C302_0034 MB23	30	–	11	30	16.0	4.8	3200	2800	4000	122	122	205
3.352	429/128	C302_0034 MB33	16	104	32	37	16.0	5.4	3200	2800	4000	206	309	550
3.352	429/128	C302_0034 MB33	24	92	32	37	16.0	5.4	3200	2800	4000	206	309	550
3.352	429/128	C302_0034 MB33	32	81	32	37	16.0	5.4	3200	2800	4000	206	309	550
3.352	429/128	C302_0034 MB33	45	63	32	37	16.0	5.4	3200	2800	4000	206	309	550
3.352	429/128	C302_0034 MB33	90	–	32	37	16.0	5.4	3200	2800	4000	206	309	550
3.352	429/128	C302_0034 MB43	50	73	80	51	16.0	5.7	3000	2800	3000	206	309	550
3.352	429/128	C302_0034 MB43	72	42	80	51	16.0	5.7	3000	2800	3000	206	309	550
3.352	429/128	C302_0034 MB43	100	3.2	80	51	16.0	5.7	3000	2800	3000	206	309	550
3.878	190/49	C302_0039 MB23	8.0	31	9.8	30	16.0	5.2	3200	2800	4000	141	141	237
3.878	190/49	C302_0039 MB23	12	25	9.8	30	16.0	5.2	3200	2800	4000	141	141	237
3.878	190/49	C302_0039 MB23	16	20	9.8	30	16.0	5.2	3200	2800	4000	141	141	237
3.878	190/49	C302_0039 MB23	24	8.4	9.8	30	16.0	5.2	3200	2800	4000	141	141	237
3.878	190/49	C302_0039 MB23	30	–	9.8	30	16.0	5.2	3200	2800	4000	141	141	237
3.878	190/49	C302_0039 MB33	16	101	32	37	16.0	5.7	3200	2800	4000	216	324	550
3.878	190/49	C302_0039 MB33	24	90	32	37	16.0	5.7	3200	2800	4000	216	324	550
3.878	190/49	C302_0039 MB33	32	79	32	37	16.0	5.7	3200	2800	4000	216	324	550
3.878	190/49	C302_0039 MB33	45	61	32	37	16.0	5.7	3200	2800	4000	216	324	550
3.878	190/49	C302_0039 MB43	50	54	79	51	16.0	6.0	3000	2800	3000	216	324	550
3.878	190/49	C302_0039 MB43	72	23	79	51	16.0	6.0	3000	2800	3000	216	324	550
4.179	117/28	C302_0042 MB23	8.0	31	9.7	30	16.0	5.4	3200	2800	4000	152	152	255
4.179	117/28	C302_0042 MB23	12	25	9.7	30	16.0	5.4	3200	2800	4000	152	152	255
4.179	117/28	C302_0042 MB23	16	20	9.7	30	16.0	5.4	3200	2800	4000	152	152	255
4.179	117/28	C302_0042 MB23	24	8.4	9.7	30	16.0	5.4	3200	2800	4000	152	152	255
4.179	117/28	C302_0042 MB23	30	–	9.7	30	16.0	5.4	3200	2800	4000	152	152	255
4.179	117/28	C302_0042 MB33	16	92	31	37	16.0	5.9	3200	2800	4000	221	330	550

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C302 (M<sub>2acc,max</sub> = 400 Nm)</b>														
4.179	117/28	C302_0042 MB33	24	81	31	37	16.0	5.9	3200	2800	4000	221	330	550
4.179	117/28	C302_0042 MB33	32	70	31	37	16.0	5.9	3200	2800	4000	221	330	550
4.179	117/28	C302_0042 MB33	45	52	31	37	16.0	5.9	3200	2800	4000	221	330	550
4.179	117/28	C302_0042 MB43	50	45	79	51	16.0	6.1	3000	2800	3000	221	330	550
4.179	117/28	C302_0042 MB43	72	14	79	51	16.0	6.1	3000	2800	3000	221	330	550
4.675	589/126	C302_0047 MB23	8.0	31	9.2	30	16.0	5.7	3500	3100	4000	170	170	286
4.675	589/126	C302_0047 MB23	12	25	9.2	30	16.0	5.7	3500	3100	4000	170	170	286
4.675	589/126	C302_0047 MB23	16	20	9.2	30	16.0	5.7	3500	3100	4000	170	170	286
4.675	589/126	C302_0047 MB23	24	8.4	9.2	30	16.0	5.7	3500	3100	4000	170	170	286
4.675	589/126	C302_0047 MB23	30	–	9.2	30	16.0	5.7	3500	3100	4000	170	170	286
4.675	589/126	C302_0047 MB33	16	80	31	37	16.0	6.1	3500	3100	4000	230	330	550
4.675	589/126	C302_0047 MB33	24	69	31	37	16.0	6.1	3500	3100	4000	230	330	550
4.675	589/126	C302_0047 MB33	32	58	31	37	16.0	6.1	3500	3100	4000	230	330	550
4.675	589/126	C302_0047 MB33	45	40	31	37	16.0	6.1	3500	3100	4000	230	330	550
4.675	589/126	C302_0047 MB43	50	33	79	51	16.0	6.3	3000	3000	3000	230	330	550
4.675	589/126	C302_0047 MB43	72	1.9	79	51	16.0	6.3	3000	3000	3000	230	330	550
5.038	403/80	C302_0050 MB23	8.0	31	9.1	30	16.0	5.8	3500	3100	4000	183	183	308
5.038	403/80	C302_0050 MB23	12	25	9.1	30	16.0	5.8	3500	3100	4000	183	183	308
5.038	403/80	C302_0050 MB23	16	20	9.1	30	16.0	5.8	3500	3100	4000	183	183	308
5.038	403/80	C302_0050 MB23	24	8.4	9.1	30	16.0	5.8	3500	3100	4000	183	183	308
5.038	403/80	C302_0050 MB23	30	–	9.1	30	16.0	5.8	3500	3100	4000	183	183	308
5.038	403/80	C302_0050 MB33	16	73	31	37	16.0	6.2	3500	3100	4000	236	330	550
5.038	403/80	C302_0050 MB33	24	62	31	37	16.0	6.2	3500	3100	4000	236	330	550
5.038	403/80	C302_0050 MB33	32	51	31	37	16.0	6.2	3500	3100	4000	236	330	550
5.038	403/80	C302_0050 MB33	45	32	31	37	16.0	6.2	3500	3100	4000	236	330	550
5.038	403/80	C302_0050 MB43	50	25	78	51	16.0	6.4	3000	3000	3000	236	330	550
5.859	2584/441	C302_0059 MB23	8.0	31	8.6	30	16.0	6.1	3500	3100	4000	213	213	358
5.859	2584/441	C302_0059 MB23	12	25	8.6	30	16.0	6.1	3500	3100	4000	213	213	358
5.859	2584/441	C302_0059 MB23	16	20	8.6	30	16.0	6.1	3500	3100	4000	213	213	358
5.859	2584/441	C302_0059 MB23	24	8.4	8.6	30	16.0	6.1	3500	3100	4000	213	213	358
5.859	2584/441	C302_0059 MB23	30	–	8.6	30	16.0	6.1	3500	3100	4000	213	213	358
5.859	2584/441	C302_0059 MB33	16	60	30	37	16.0	6.4	3500	3100	4000	248	330	550
5.859	2584/441	C302_0059 MB33	24	48	30	37	16.0	6.4	3500	3100	4000	248	330	550
5.859	2584/441	C302_0059 MB33	32	37	30	37	16.0	6.4	3500	3100	4000	248	330	550
5.859	2584/441	C302_0059 MB33	45	19	30	37	16.0	6.4	3500	3100	4000	248	330	550
5.859	2584/441	C302_0059 MB43	50	12	78	51	16.0	6.6	3000	3000	3000	248	330	550
6.314	221/35	C302_0063 MB23	8.0	31	8.5	30	16.0	6.2	3500	3100	4000	230	230	386
6.314	221/35	C302_0063 MB23	12	25	8.5	30	16.0	6.2	3500	3100	4000	230	230	386
6.314	221/35	C302_0063 MB23	16	20	8.5	30	16.0	6.2	3500	3100	4000	230	230	386
6.314	221/35	C302_0063 MB23	24	8.4	8.5	30	16.0	6.2	3500	3100	4000	230	230	386
6.314	221/35	C302_0063 MB23	30	–	8.5	30	16.0	6.2	3500	3100	4000	230	230	386
6.314	221/35	C302_0063 MB33	16	54	30	37	16.0	6.5	3500	3100	4000	254	330	550
6.314	221/35	C302_0063 MB33	24	42	30	37	16.0	6.5	3500	3100	4000	254	330	550
6.314	221/35	C302_0063 MB33	32	31	30	37	16.0	6.5	3500	3100	4000	254	330	550
6.314	221/35	C302_0063 MB33	45	13	30	37	16.0	6.5	3500	3100	4000	254	330	550
6.314	221/35	C302_0063 MB43	50	6.0	78	51	16.0	6.6	3000	3000	3000	254	330	550
7.841	494/63	C302_0078 MB23	8.0	31	8.1	30	16.0	6.5	3800	3500	4000	273	285	479
7.841	494/63	C302_0078 MB23	12	25	8.1	30	16.0	6.5	3800	3500	4000	273	285	479
7.841	494/63	C302_0078 MB23	16	20	8.1	30	16.0	6.5	3800	3500	4000	273	285	479
7.841	494/63	C302_0078 MB23	24	8.4	8.1	30	16.0	6.5	3800	3500	4000	273	285	479
7.841	494/63	C302_0078 MB23	30	–	8.1	30	16.0	6.5	3800	3500	4000	273	285	479
7.841	494/63	C302_0078 MB33	16	39	30	37	16.0	6.7	3800	3500	4000	273	330	550
7.841	494/63	C302_0078 MB33	24	28	30	37	16.0	6.7	3800	3500	4000	273	330	550
7.841	494/63	C302_0078 MB33	32	16	30	37	16.0	6.7	3800	3500	4000	273	330	550
8.250	33/4	C302_0083 MB23	8.0	31	9.8	30	13.0	8.0	3200	2800	4000	300	300	504
8.250	33/4	C302_0083 MB23	12	25	9.8	30	13.0	8.0	3200	2800	4000	300	300	504
8.250	33/4	C302_0083 MB23	16	20	9.8	30	13.0	8.0	3200	2800	4000	300	300	504
8.250	33/4	C302_0083 MB23	24	8.4	9.8	30	13.0	8.0	3200	2800	4000	300	300	504
8.250	33/4	C302_0083 MB23	30	–	9.8	30	13.0	8.0	3200	2800	4000	300	300	504
8.250	33/4	C302_0083 MB33	16	52	32	37	13.0	8.2	3200	2800	4000	335	400	700
8.250	33/4	C302_0083 MB33	24	40	32	37	13.0	8.2	3200	2800	4000	335	400	700
8.250	33/4	C302_0083 MB33	32	29	32	37	13.0	8.2	3200	2800	4000	335	400	700
8.250	33/4	C302_0083 MB33	45	11	32	37	13.0	8.2	3200	2800	4000	335	400	700
8.250	33/4	C302_0083 MB43	50	4.1	79	51	13.0	8.3	3000	2800	3000	335	400	700

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C302 (M<sub>2acc,max</sub> = 400 Nm)</b>														
9.310	3575/384	C302_0093 MB23	8.0	31	9.7	30	13.0	8.1	3200	2800	4000	339	339	569
9.310	3575/384	C302_0093 MB23	12	25	9.7	30	13.0	8.1	3200	2800	4000	339	339	569
9.310	3575/384	C302_0093 MB23	16	20	9.7	30	13.0	8.1	3200	2800	4000	339	339	569
9.310	3575/384	C302_0093 MB23	24	8.4	9.7	30	13.0	8.1	3200	2800	4000	339	339	569
9.310	3575/384	C302_0093 MB23	30	–	9.7	30	13.0	8.1	3200	2800	4000	339	339	569
9.310	3575/384	C302_0093 MB33	16	43	31	37	13.0	8.3	3200	2800	4000	349	350	700
9.310	3575/384	C302_0093 MB33	24	32	31	37	13.0	8.3	3200	2800	4000	349	350	700
9.310	3575/384	C302_0093 MB33	32	21	31	37	13.0	8.3	3200	2800	4000	349	350	700
9.310	3575/384	C302_0093 MB33	45	2.6	31	37	13.0	8.3	3200	2800	4000	349	350	700
10.29	72/7	C302_0105 MB23	8.0	31	9.1	30	13.0	8.2	3200	2800	4000	350	374	629
10.29	72/7	C302_0105 MB23	12	25	9.1	30	13.0	8.2	3200	2800	4000	350	374	629
10.29	72/7	C302_0105 MB23	16	20	9.1	30	13.0	8.2	3200	2800	4000	350	374	629
10.29	72/7	C302_0105 MB23	24	8.4	9.1	30	13.0	8.2	3200	2800	4000	350	374	629
10.29	72/7	C302_0105 MB23	30	–	9.1	30	13.0	8.2	3200	2800	4000	350	374	629
10.29	72/7	C302_0105 MB33	16	37	31	37	13.0	8.4	3200	2800	4000	350	400	700
10.29	72/7	C302_0105 MB33	24	26	31	37	13.0	8.4	3200	2800	4000	350	400	700
10.29	72/7	C302_0105 MB33	32	15	31	37	13.0	8.4	3200	2800	4000	350	400	700
11.61	325/28	C302_0115 MB23	8.0	31	9.1	30	13.0	8.3	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB23	12	25	9.1	30	13.0	8.3	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB23	16	20	9.1	30	13.0	8.3	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB23	24	8.4	9.1	30	13.0	8.3	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB23	30	–	9.1	30	13.0	8.3	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB33	16	30	31	37	13.0	8.5	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB33	24	19	31	37	13.0	8.5	3200	2800	4000	350	350	700
11.61	325/28	C302_0115 MB33	32	7.8	31	37	13.0	8.5	3200	2800	4000	350	350	700
12.40	62/5	C302_0125 MB23	8.0	31	8.7	30	13.0	8.4	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB23	12	25	8.7	30	13.0	8.4	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB23	16	20	8.7	30	13.0	8.4	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB23	24	8.4	8.7	30	13.0	8.4	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB23	30	–	8.7	30	13.0	8.4	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB33	16	27	30	37	13.0	8.5	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB33	24	16	30	37	13.0	8.5	3500	3100	4000	350	400	700
12.40	62/5	C302_0125 MB33	32	4.5	30	37	13.0	8.5	3500	3100	4000	350	400	700
13.99	2015/144	C302_0140 MB23	8.0	31	8.7	30	13.0	8.4	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB23	12	25	8.7	30	13.0	8.4	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB23	16	20	8.7	30	13.0	8.4	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB23	24	8.4	8.7	30	13.0	8.4	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB23	30	–	8.7	30	13.0	8.4	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB33	16	21	30	37	13.0	8.5	3500	3100	4000	350	350	700
13.99	2015/144	C302_0140 MB33	24	10	30	37	13.0	8.5	3500	3100	4000	350	350	700
15.54	544/35	C302_0155 MB23	8.0	28	8.3	30	13.0	8.5	3500	3100	4000	350	400	700
15.54	544/35	C302_0155 MB23	12	23	8.3	30	13.0	8.5	3500	3100	4000	350	400	700
15.54	544/35	C302_0155 MB23	16	17	8.3	30	13.0	8.5	3500	3100	4000	350	400	700
15.54	544/35	C302_0155 MB23	24	5.7	8.3	30	13.0	8.5	3500	3100	4000	350	400	700
15.54	544/35	C302_0155 MB33	16	17	30	37	13.0	8.6	3500	3100	4000	350	400	700
15.54	544/35	C302_0155 MB33	24	5.7	30	37	13.0	8.6	3500	3100	4000	350	400	700
17.54	1105/63	C302_0175 MB23	8.0	24	8.3	30	13.0	8.5	3500	3100	4000	350	350	700
17.54	1105/63	C302_0175 MB23	12	18	8.3	30	13.0	8.5	3500	3100	4000	350	350	700
17.54	1105/63	C302_0175 MB23	16	12	8.3	30	13.0	8.5	3500	3100	4000	350	350	700
17.54	1105/63	C302_0175 MB23	24	1.2	8.3	30	13.0	8.5	3500	3100	4000	350	350	700
17.54	1105/63	C302_0175 MB33	16	12	30	37	13.0	8.6	3500	3100	4000	350	350	700
17.54	1105/63	C302_0175 MB33	24	1.2	30	37	13.0	8.6	3500	3100	4000	350	350	700
20.80	104/5	C302_0210 MB23	8.0	18	7.9	30	13.0	8.6	3800	3500	4000	350	400	700
20.80	104/5	C302_0210 MB23	12	13	7.9	30	13.0	8.6	3800	3500	4000	350	400	700
20.80	104/5	C302_0210 MB23	16	7.0	7.9	30	13.0	8.6	3800	3500	4000	350	400	700
20.80	104/5	C302_0210 MB33	16	7.0	30	37	13.0	8.6	3800	3500	4000	350	400	700
23.47	845/36	C302_0230 MB23	8.0	15	7.9	30	13.0	8.6	3800	3500	4000	350	350	700
23.47	845/36	C302_0230 MB23	12	9.2	7.9	30	13.0	8.6	3800	3500	4000	350	350	700
23.47	845/36	C302_0230 MB23	16	3.6	7.9	30	13.0	8.6	3800	3500	4000	350	350	700
23.47	845/36	C302_0230 MB33	16	3.6	30	37	13.0	8.7	3800	3500	4000	350	350	700
24.80	124/5	C302_0250 MB23	8.0	13	7.7	30	13.0	8.6	3800	3500	4000	350	400	700
24.80	124/5	C302_0250 MB23	12	7.8	7.7	30	13.0	8.6	3800	3500	4000	350	400	700
24.80	124/5	C302_0250 MB23	16	2.2	7.7	30	13.0	8.6	3800	3500	4000	350	400	700
24.80	124/5	C302_0250 MB33	16	2.2	28	37	13.0	8.7	3800	3500	4000	350	400	700



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C302 (M<sub>2acc,max</sub> = 400 Nm)</b>														
27.99	2015/72	C302_0280 MB23	8.0	11	7.7	30	13.0	8.7	3800	3500	4000	350	350	700
27.99	2015/72	C302_0280 MB23	12	5.0	7.7	30	13.0	8.7	3800	3500	4000	350	350	700
31.04	776/25	C302_0310 MB23	8.0	8.5	7.6	30	13.0	8.7	3800	3500	4000	350	400	700
31.04	776/25	C302_0310 MB23	12	2.9	7.6	30	13.0	8.7	3800	3500	4000	350	400	700
35.03	1261/36	C302_0350 MB23	8.0	6.2	7.6	30	13.0	8.7	3800	3500	4000	350	350	700
35.03	1261/36	C302_0350 MB23	12	0.6	7.6	30	13.0	8.7	3800	3500	4000	350	350	700
41.35	2688/65	C302_0410 MB23	8.0	3.6	7.4	30	13.0	8.7	3800	3500	4000	350	400	700
46.67	140/3	C302_0470 MB23	8.0	1.9	7.4	30	13.0	8.7	3800	3500	4000	350	350	700
49.75	2736/55	C302_0500 MB23	8.0	1.1	7.4	30	13.0	8.7	3800	3500	4000	350	400	700
<b>C402 (M<sub>2acc,max</sub> = 600 Nm)</b>														
1.968	551/280	C402_0020 MB33	16	104	46	47	15.0	5.4	2500	2100	3500	191	191	361
1.968	551/280	C402_0020 MB33	24	92	46	47	15.0	5.4	2500	2100	3500	191	191	361
1.968	551/280	C402_0020 MB33	32	81	46	47	15.0	5.4	2500	2100	3500	191	191	361
1.968	551/280	C402_0020 MB33	45	63	46	47	15.0	5.4	2500	2100	3500	191	191	361
1.968	551/280	C402_0020 MB33	90	–	46	47	15.0	5.4	2500	2100	3500	191	191	361
1.968	551/280	C402_0020 MB43	50	154	94	61	15.0	6.4	2500	2100	3000	251	376	533
1.968	551/280	C402_0020 MB43	72	123	94	61	15.0	6.4	2500	2100	3000	251	376	533
1.968	551/280	C402_0020 MB43	100	84	94	61	15.0	6.4	2500	2100	3000	251	376	533
1.968	551/280	C402_0020 MB43	160	–	94	61	15.0	6.4	2500	2100	3000	251	376	533
2.456	609/248	C402_0025 MB33	16	104	41	47	15.0	7.1	2500	2100	3500	238	238	450
2.456	609/248	C402_0025 MB33	24	92	41	47	15.0	7.1	2500	2100	3500	238	238	450
2.456	609/248	C402_0025 MB33	32	81	41	47	15.0	7.1	2500	2100	3500	238	238	450
2.456	609/248	C402_0025 MB33	45	63	41	47	15.0	7.1	2500	2100	3500	238	238	450
2.456	609/248	C402_0025 MB33	90	–	41	47	15.0	7.1	2500	2100	3500	238	238	450
2.456	609/248	C402_0025 MB43	50	154	89	61	15.0	8.2	2500	2100	3000	270	405	665
2.456	609/248	C402_0025 MB43	72	123	89	61	15.0	8.2	2500	2100	3000	270	405	665
2.456	609/248	C402_0025 MB43	100	84	89	61	15.0	8.2	2500	2100	3000	270	405	665
2.456	609/248	C402_0025 MB43	160	–	89	61	15.0	8.2	2500	2100	3000	270	405	665
3.099	1537/496	C402_0031 MB33	16	104	37	47	15.0	9.1	2900	2500	4000	292	301	568
3.099	1537/496	C402_0031 MB33	24	92	37	47	15.0	9.1	2900	2500	4000	292	301	568
3.099	1537/496	C402_0031 MB33	32	81	37	47	15.0	9.1	2900	2500	4000	292	301	568
3.099	1537/496	C402_0031 MB33	45	63	37	47	15.0	9.1	2900	2500	4000	292	301	568
3.099	1537/496	C402_0031 MB33	90	–	37	47	15.0	9.1	2900	2500	4000	292	301	568
3.099	1537/496	C402_0031 MB43	50	154	85	61	15.0	10	2900	2500	3000	292	437	838
3.099	1537/496	C402_0031 MB43	72	123	85	61	15.0	10	2900	2500	3000	292	437	838
3.099	1537/496	C402_0031 MB43	100	84	85	61	15.0	10	2900	2500	3000	292	437	838
3.099	1537/496	C402_0031 MB43	160	–	85	61	15.0	10	2900	2500	3000	292	437	838
3.894	841/216	C402_0039 MB23	8.0	31	13	40	15.0	9.2	2900	2500	4000	142	142	238
3.894	841/216	C402_0039 MB23	12	25	13	40	15.0	9.2	2900	2500	4000	142	142	238
3.894	841/216	C402_0039 MB23	16	20	13	40	15.0	9.2	2900	2500	4000	142	142	238
3.894	841/216	C402_0039 MB23	24	8.4	13	40	15.0	9.2	2900	2500	4000	142	142	238
3.894	841/216	C402_0039 MB23	30	–	13	40	15.0	9.2	2900	2500	4000	142	142	238
3.894	841/216	C402_0039 MB33	16	104	35	47	15.0	11	2900	2500	4000	315	378	714
3.894	841/216	C402_0039 MB33	24	92	35	47	15.0	11	2900	2500	4000	315	378	714
3.894	841/216	C402_0039 MB33	32	81	35	47	15.0	11	2900	2500	4000	315	378	714
3.894	841/216	C402_0039 MB33	45	63	35	47	15.0	11	2900	2500	4000	315	378	714
3.894	841/216	C402_0039 MB33	90	–	35	47	15.0	11	2900	2500	4000	315	378	714
3.894	841/216	C402_0039 MB43	50	121	83	61	15.0	12	2900	2500	3000	315	472	850
3.894	841/216	C402_0039 MB43	72	90	83	61	15.0	12	2900	2500	3000	315	472	850
3.894	841/216	C402_0039 MB43	100	51	83	61	15.0	12	2900	2500	3000	315	472	850
4.682	899/192	C402_0047 MB23	8.0	31	12	40	15.0	11	3300	2800	4000	170	170	286
4.682	899/192	C402_0047 MB23	12	25	12	40	15.0	11	3300	2800	4000	170	170	286
4.682	899/192	C402_0047 MB23	16	20	12	40	15.0	11	3300	2800	4000	170	170	286
4.682	899/192	C402_0047 MB23	24	8.4	12	40	15.0	11	3300	2800	4000	170	170	286
4.682	899/192	C402_0047 MB23	30	–	12	40	15.0	11	3300	2800	4000	170	170	286
4.682	899/192	C402_0047 MB33	16	104	34	47	15.0	12	3300	2800	4000	335	454	850
4.682	899/192	C402_0047 MB33	24	92	34	47	15.0	12	3300	2800	4000	335	454	850
4.682	899/192	C402_0047 MB33	32	81	34	47	15.0	12	3300	2800	4000	335	454	850
4.682	899/192	C402_0047 MB33	45	63	34	47	15.0	12	3300	2800	4000	335	454	850
4.682	899/192	C402_0047 MB33	90	–	34	47	15.0	12	3300	2800	4000	335	454	850
4.682	899/192	C402_0047 MB43	50	88	81	61	15.0	13	3000	2800	3000	335	502	850
4.682	899/192	C402_0047 MB43	72	58	81	61	15.0	13	3000	2800	3000	335	502	850
4.682	899/192	C402_0047 MB43	100	18	81	61	15.0	13	3000	2800	3000	335	502	850
5.891	377/64	C402_0059 MB23	8.0	31	10	40	15.0	12	3300	2800	4000	214	214	360

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C402 (M<sub>2acc,max</sub> = 600 Nm)</b>														
5.891	377/64	C402_0059 MB23	12	25	10	40	15.0	12	3300	2800	4000	214	214	360
5.891	377/64	C402_0059 MB23	16	20	10	40	15.0	12	3300	2800	4000	214	214	360
5.891	377/64	C402_0059 MB23	24	8.4	10	40	15.0	12	3300	2800	4000	214	214	360
5.891	377/64	C402_0059 MB23	30	–	10	40	15.0	12	3300	2800	4000	214	214	360
5.891	377/64	C402_0059 MB33	16	104	32	47	15.0	14	3300	2800	4000	361	542	850
5.891	377/64	C402_0059 MB33	24	92	32	47	15.0	14	3300	2800	4000	361	542	850
5.891	377/64	C402_0059 MB33	32	81	32	47	15.0	14	3300	2800	4000	361	542	850
5.891	377/64	C402_0059 MB33	45	63	32	47	15.0	14	3300	2800	4000	361	542	850
5.891	377/64	C402_0059 MB33	90	–	32	47	15.0	14	3300	2800	4000	361	542	850
5.891	377/64	C402_0059 MB43	50	56	80	61	15.0	14	3000	2800	3000	361	542	850
5.891	377/64	C402_0059 MB43	72	25	80	61	15.0	14	3000	2800	3000	361	542	850
7.816	2001/256	C402_0078 MB23	8.0	31	9.3	40	15.0	14	3500	3200	4000	284	284	478
7.816	2001/256	C402_0078 MB23	12	25	9.3	40	15.0	14	3500	3200	4000	284	284	478
7.816	2001/256	C402_0078 MB23	16	20	9.3	40	15.0	14	3500	3200	4000	284	284	478
7.816	2001/256	C402_0078 MB23	24	8.4	9.3	40	15.0	14	3500	3200	4000	284	284	478
7.816	2001/256	C402_0078 MB23	30	–	9.3	40	15.0	14	3500	3200	4000	284	284	478
7.816	2001/256	C402_0078 MB33	16	73	31	47	15.0	15	3500	3200	4000	397	550	850
7.816	2001/256	C402_0078 MB33	24	61	31	47	15.0	15	3500	3200	4000	397	550	850
7.816	2001/256	C402_0078 MB33	32	50	31	47	15.0	15	3500	3200	4000	397	550	850
7.816	2001/256	C402_0078 MB33	45	32	31	47	15.0	15	3500	3200	4000	397	550	850
7.816	2001/256	C402_0078 MB43	50	25	79	61	15.0	15	3000	3000	3000	397	550	850
8.285	3339/403	C402_0083 MB33	16	94	35	47	12.0	19	2900	2500	4000	550	600	1100
8.285	3339/403	C402_0083 MB33	24	82	35	47	12.0	19	2900	2500	4000	550	600	1100
8.285	3339/403	C402_0083 MB33	32	71	35	47	12.0	19	2900	2500	4000	550	600	1100
8.285	3339/403	C402_0083 MB33	45	53	35	47	12.0	19	2900	2500	4000	550	600	1100
8.285	3339/403	C402_0083 MB43	50	46	82	61	12.0	19	2900	2500	3000	550	600	1100
8.285	3339/403	C402_0083 MB43	72	15	82	61	12.0	19	2900	2500	3000	550	600	1100
9.261	3445/372	C402_0093 MB33	16	81	35	47	12.0	19	2900	2500	4000	550	550	1100
9.261	3445/372	C402_0093 MB33	24	70	35	47	12.0	19	2900	2500	4000	550	550	1100
9.261	3445/372	C402_0093 MB33	32	59	35	47	12.0	19	2900	2500	4000	550	550	1100
9.261	3445/372	C402_0093 MB33	45	41	35	47	12.0	19	2900	2500	4000	550	550	1100
9.261	3445/372	C402_0093 MB43	50	34	82	61	12.0	20	2900	2500	3000	550	550	1100
9.261	3445/372	C402_0093 MB43	72	2.9	82	61	12.0	20	2900	2500	3000	550	550	1100
10.41	406/39	C402_0105 MB23	8.0	31	12	40	12.0	19	2900	2500	4000	379	379	636
10.41	406/39	C402_0105 MB23	12	25	12	40	12.0	19	2900	2500	4000	379	379	636
10.41	406/39	C402_0105 MB23	16	20	12	40	12.0	19	2900	2500	4000	379	379	636
10.41	406/39	C402_0105 MB23	24	8.4	12	40	12.0	19	2900	2500	4000	379	379	636
10.41	406/39	C402_0105 MB33	16	70	33	47	12.0	20	2900	2500	4000	550	600	1100
10.41	406/39	C402_0105 MB33	24	59	33	47	12.0	20	2900	2500	4000	550	600	1100
10.41	406/39	C402_0105 MB33	32	47	33	47	12.0	20	2900	2500	4000	550	600	1100
10.41	406/39	C402_0105 MB33	45	29	33	47	12.0	20	2900	2500	4000	550	600	1100
10.41	406/39	C402_0105 MB43	50	22	81	61	12.0	20	2900	2500	3000	550	600	1100
11.64	1885/162	C402_0115 MB23	8.0	31	11	40	12.0	19	2900	2500	4000	423	423	711
11.64	1885/162	C402_0115 MB23	12	25	11	40	12.0	19	2900	2500	4000	423	423	711
11.64	1885/162	C402_0115 MB23	16	20	11	40	12.0	19	2900	2500	4000	423	423	711
11.64	1885/162	C402_0115 MB23	24	8.4	11	40	12.0	19	2900	2500	4000	423	423	711
11.64	1885/162	C402_0115 MB23	30	–	11	40	12.0	19	2900	2500	4000	423	423	711
11.64	1885/162	C402_0115 MB33	16	60	33	47	12.0	20	2900	2500	4000	550	550	1100
11.64	1885/162	C402_0115 MB33	24	49	33	47	12.0	20	2900	2500	4000	550	550	1100
11.64	1885/162	C402_0115 MB33	32	38	33	47	12.0	20	2900	2500	4000	550	550	1100
11.64	1885/162	C402_0115 MB33	45	20	33	47	12.0	20	2900	2500	4000	550	550	1100
11.64	1885/162	C402_0115 MB43	50	13	81	61	12.0	21	2900	2500	3000	550	550	1100
12.52	651/52	C402_0125 MB23	8.0	31	11	40	12.0	20	3300	2800	4000	455	455	765
12.52	651/52	C402_0125 MB23	12	25	11	40	12.0	20	3300	2800	4000	455	455	765
12.52	651/52	C402_0125 MB23	16	20	11	40	12.0	20	3300	2800	4000	455	455	765
12.52	651/52	C402_0125 MB23	24	8.4	11	40	12.0	20	3300	2800	4000	455	455	765
12.52	651/52	C402_0125 MB23	30	–	11	40	12.0	20	3300	2800	4000	455	455	765
12.52	651/52	C402_0125 MB33	16	54	32	47	12.0	20	3300	2800	4000	550	600	1100
12.52	651/52	C402_0125 MB33	24	43	32	47	12.0	20	3300	2800	4000	550	600	1100
12.52	651/52	C402_0125 MB33	32	32	32	47	12.0	20	3300	2800	4000	550	600	1100
12.52	651/52	C402_0125 MB33	45	14	32	47	12.0	20	3300	2800	4000	550	600	1100
12.52	651/52	C402_0125 MB43	50	6.7	80	61	12.0	21	3000	2800	3000	550	600	1100
13.99	2015/144	C402_0140 MB23	8.0	31	11	40	12.0	20	3300	2800	4000	509	509	855

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C402 (M<sub>2acc,max</sub> = 600 Nm)</b>														
13.99	2015/144	C402_0140 MB23	12	25	11	40	12.0	20	3300	2800	4000	509	509	855
13.99	2015/144	C402_0140 MB23	16	20	11	40	12.0	20	3300	2800	4000	509	509	855
13.99	2015/144	C402_0140 MB23	24	8.4	11	40	12.0	20	3300	2800	4000	509	509	855
13.99	2015/144	C402_0140 MB23	30	–	11	40	12.0	20	3300	2800	4000	509	509	855
13.99	2015/144	C402_0140 MB33	16	46	32	47	12.0	21	3300	2800	4000	550	550	1100
13.99	2015/144	C402_0140 MB33	24	35	32	47	12.0	21	3300	2800	4000	550	550	1100
13.99	2015/144	C402_0140 MB33	32	24	32	47	12.0	21	3300	2800	4000	550	550	1100
13.99	2015/144	C402_0140 MB33	45	5.6	32	47	12.0	21	3300	2800	4000	550	550	1100
15.75	63/4	C402_0160 MB23	8.0	31	9.7	40	12.0	20	3300	2800	4000	550	573	962
15.75	63/4	C402_0160 MB23	12	25	9.7	40	12.0	20	3300	2800	4000	550	573	962
15.75	63/4	C402_0160 MB23	16	20	9.7	40	12.0	20	3300	2800	4000	550	573	962
15.75	63/4	C402_0160 MB23	24	8.4	9.7	40	12.0	20	3300	2800	4000	550	573	962
15.75	63/4	C402_0160 MB23	30	–	9.7	40	12.0	20	3300	2800	4000	550	573	962
15.75	63/4	C402_0160 MB33	16	39	31	47	12.0	21	3300	2800	4000	550	600	1100
15.75	63/4	C402_0160 MB33	24	27	31	47	12.0	21	3300	2800	4000	550	600	1100
15.75	63/4	C402_0160 MB33	32	16	31	47	12.0	21	3300	2800	4000	550	600	1100
17.60	845/48	C402_0175 MB23	8.0	31	9.7	40	12.0	21	3300	2800	4000	550	550	1076
17.60	845/48	C402_0175 MB23	12	25	9.7	40	12.0	21	3300	2800	4000	550	550	1076
17.60	845/48	C402_0175 MB23	16	20	9.7	40	12.0	21	3300	2800	4000	550	550	1076
17.60	845/48	C402_0175 MB23	24	8.4	9.7	40	12.0	21	3300	2800	4000	550	550	1076
17.60	845/48	C402_0175 MB23	30	–	9.7	40	12.0	21	3300	2800	4000	550	550	1076
17.60	845/48	C402_0175 MB33	16	32	31	47	12.0	21	3300	2800	4000	550	550	1100
17.60	845/48	C402_0175 MB33	24	21	31	47	12.0	21	3300	2800	4000	550	550	1100
17.60	845/48	C402_0175 MB33	32	9.8	31	47	12.0	21	3300	2800	4000	550	550	1100
20.90	4347/208	C402_0210 MB23	8.0	31	8.9	40	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB23	12	25	8.9	40	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB23	16	20	8.9	40	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB23	24	8.4	8.9	40	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB23	30	–	8.9	40	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB33	16	24	31	47	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB33	24	12	31	47	12.0	21	3500	3200	4000	550	600	1100
20.90	4347/208	C402_0210 MB33	32	1.1	31	47	12.0	21	3500	3200	4000	550	600	1100
23.36	1495/64	C402_0230 MB23	8.0	30	8.8	40	12.0	21	3500	3200	4000	550	550	1100
23.36	1495/64	C402_0230 MB23	12	24	8.8	40	12.0	21	3500	3200	4000	550	550	1100
23.36	1495/64	C402_0230 MB23	16	19	8.8	40	12.0	21	3500	3200	4000	550	550	1100
23.36	1495/64	C402_0230 MB23	24	7.5	8.8	40	12.0	21	3500	3200	4000	550	550	1100
23.36	1495/64	C402_0230 MB33	16	19	31	47	12.0	21	3500	3200	4000	550	550	1100
23.36	1495/64	C402_0230 MB33	24	7.5	31	47	12.0	21	3500	3200	4000	550	550	1100
24.92	324/13	C402_0250 MB23	8.0	27	8.5	40	12.0	21	3500	3200	4000	550	600	1100
24.92	324/13	C402_0250 MB23	12	22	8.5	40	12.0	21	3500	3200	4000	550	600	1100
24.92	324/13	C402_0250 MB23	16	16	8.5	40	12.0	21	3500	3200	4000	550	600	1100
24.92	324/13	C402_0250 MB23	24	4.9	8.5	40	12.0	21	3500	3200	4000	550	600	1100
24.92	324/13	C402_0250 MB33	16	16	29	47	12.0	21	3500	3200	4000	550	600	1100
24.92	324/13	C402_0250 MB33	24	4.9	29	47	12.0	21	3500	3200	4000	550	600	1100
27.86	195/7	C402_0280 MB23	8.0	23	8.5	40	12.0	21	3500	3200	4000	550	550	1100
27.86	195/7	C402_0280 MB23	12	18	8.5	40	12.0	21	3500	3200	4000	550	550	1100
27.86	195/7	C402_0280 MB23	16	12	8.5	40	12.0	21	3500	3200	4000	550	550	1100
27.86	195/7	C402_0280 MB23	24	0.9	8.5	40	12.0	21	3500	3200	4000	550	550	1100
27.86	195/7	C402_0280 MB33	16	12	29	47	12.0	22	3500	3200	4000	550	550	1100
27.86	195/7	C402_0280 MB33	24	0.9	29	47	12.0	22	3500	3200	4000	550	550	1100
31.15	405/13	C402_0310 MB23	8.0	20	8.1	40	12.0	21	3500	3200	4000	550	600	1100
31.15	405/13	C402_0310 MB23	12	14	8.1	40	12.0	21	3500	3200	4000	550	600	1100
31.15	405/13	C402_0310 MB23	16	8.4	8.1	40	12.0	21	3500	3200	4000	550	600	1100
31.15	405/13	C402_0310 MB33	16	8.4	29	47	12.0	22	3500	3200	4000	550	600	1100
34.82	975/28	C402_0350 MB23	8.0	16	8.1	40	12.0	22	3500	3200	4000	550	550	1100
34.82	975/28	C402_0350 MB23	12	11	8.1	40	12.0	22	3500	3200	4000	550	550	1100
34.82	975/28	C402_0350 MB23	16	5.2	8.1	40	12.0	22	3500	3200	4000	550	550	1100
34.82	975/28	C402_0350 MB33	16	5.2	29	47	12.0	22	3500	3200	4000	550	550	1100
41.75	7056/169	C402_0420 MB23	8.0	12	7.7	40	12.0	22	3500	3200	4000	550	600	1100
41.75	7056/169	C402_0420 MB23	12	6.2	7.7	40	12.0	22	3500	3200	4000	550	600	1100
41.75	7056/169	C402_0420 MB23	16	0.6	7.7	40	12.0	22	3500	3200	4000	550	600	1100
41.75	7056/169	C402_0420 MB33	16	0.6	28	47	12.0	22	3500	3200	4000	550	600	1100
46.67	140/3	C402_0470 MB23	8.0	9.4	7.7	40	12.0	22	3500	3200	4000	550	550	1100
46.67	140/3	C402_0470 MB23	12	3.8	7.7	40	12.0	22	3500	3200	4000	550	550	1100

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C402 (M<sub>2acc,max</sub> = 600 Nm)</b>														
50.19	1305/26	C402_0500 MB23	8.0	7.9	7.6	40	12.0	22	3500	3200	4000	550	600	1100
50.19	1305/26	C402_0500 MB23	12	2.3	7.6	40	12.0	22	3500	3200	4000	550	600	1100
56.10	9425/168	C402_0560 MB23	8.0	5.9	7.6	40	12.0	22	3500	3200	4000	550	550	1100
56.10	9425/168	C402_0560 MB23	12	0.3	7.6	40	12.0	22	3500	3200	4000	550	550	1100
62.52	8127/130	C402_0630 MB23	8.0	2.8	7.5	40	12.0	22	3500	3200	4000	501	600	1002
69.88	559/8	C402_0700 MB23	8.0	2.5	7.5	40	12.0	22	3500	3200	4000	550	550	1100
<b>C502 (M<sub>2acc,max</sub> = 920 Nm)</b>														
1.976	81/41	C502_0020 MB33	16	104	59	59	14.0	5.8	2400	2000	3200	192	192	362
1.976	81/41	C502_0020 MB33	24	92	59	59	14.0	5.8	2400	2000	3200	192	192	362
1.976	81/41	C502_0020 MB33	32	81	59	59	14.0	5.8	2400	2000	3200	192	192	362
1.976	81/41	C502_0020 MB33	45	63	59	59	14.0	5.8	2400	2000	3200	192	192	362
1.976	81/41	C502_0020 MB33	90	–	59	59	14.0	5.8	2400	2000	3200	192	192	362
1.976	81/41	C502_0020 MB43	50	154	112	73	14.0	6.9	2400	2000	3000	388	429	644
1.976	81/41	C502_0020 MB43	72	123	112	73	14.0	6.9	2400	2000	3000	388	429	644
1.976	81/41	C502_0020 MB43	100	84	112	73	14.0	6.9	2400	2000	3000	388	429	644
1.976	81/41	C502_0020 MB43	160	–	112	73	14.0	6.9	2400	2000	3000	388	429	644
3.077	477/155	C502_0031 MB33	16	104	44	59	14.0	10	2800	2400	4000	298	298	564
3.077	477/155	C502_0031 MB33	24	92	44	59	14.0	10	2800	2400	4000	298	298	564
3.077	477/155	C502_0031 MB33	32	81	44	59	14.0	10	2800	2400	4000	298	298	564
3.077	477/155	C502_0031 MB33	45	63	44	59	14.0	10	2800	2400	4000	298	298	564
3.077	477/155	C502_0031 MB33	90	–	44	59	14.0	10	2800	2400	4000	298	298	564
3.077	477/155	C502_0031 MB43	50	154	92	73	14.0	11	2800	2400	3000	451	667	834
3.077	477/155	C502_0031 MB43	72	123	92	73	14.0	11	2800	2400	3000	451	667	834
3.077	477/155	C502_0031 MB43	100	84	92	73	14.0	11	2800	2400	3000	451	667	834
3.077	477/155	C502_0031 MB43	160	–	92	73	14.0	11	2800	2400	3000	451	667	834
3.867	58/15	C502_0039 MB33	16	104	40	59	14.0	13	2800	2400	4000	375	375	709
3.867	58/15	C502_0039 MB33	24	92	40	59	14.0	13	2800	2400	4000	375	375	709
3.867	58/15	C502_0039 MB33	32	81	40	59	14.0	13	2800	2400	4000	375	375	709
3.867	58/15	C502_0039 MB33	45	63	40	59	14.0	13	2800	2400	4000	375	375	709
3.867	58/15	C502_0039 MB33	90	–	40	59	14.0	13	2800	2400	4000	375	375	709
3.867	58/15	C502_0039 MB43	50	154	88	73	14.0	14	2800	2400	3000	487	730	1047
3.867	58/15	C502_0039 MB43	72	123	88	73	14.0	14	2800	2400	3000	487	730	1047
3.867	58/15	C502_0039 MB43	100	84	88	73	14.0	14	2800	2400	3000	487	730	1047
3.867	58/15	C502_0039 MB43	160	–	88	73	14.0	14	2800	2400	3000	487	730	1047
4.629	162/35	C502_0046 MB23	8.0	31	15	52	14.0	12	3100	2700	4000	168	168	283
4.629	162/35	C502_0046 MB23	12	25	15	52	14.0	12	3100	2700	4000	168	168	283
4.629	162/35	C502_0046 MB23	16	20	15	52	14.0	12	3100	2700	4000	168	168	283
4.629	162/35	C502_0046 MB23	24	8.4	15	52	14.0	12	3100	2700	4000	168	168	283
4.629	162/35	C502_0046 MB23	30	–	15	52	14.0	12	3100	2700	4000	168	168	283
4.629	162/35	C502_0046 MB33	16	104	37	59	14.0	14	3100	2700	4000	449	449	849
4.629	162/35	C502_0046 MB33	24	92	37	59	14.0	14	3100	2700	4000	449	449	849
4.629	162/35	C502_0046 MB33	32	81	37	59	14.0	14	3100	2700	4000	449	449	849
4.629	162/35	C502_0046 MB33	45	63	37	59	14.0	14	3100	2700	4000	449	449	849
4.629	162/35	C502_0046 MB33	90	–	37	59	14.0	14	3100	2700	4000	449	449	849
4.629	162/35	C502_0046 MB43	50	154	85	73	14.0	15	3000	2700	3000	517	775	1236
4.629	162/35	C502_0046 MB43	72	123	85	73	14.0	15	3000	2700	3000	517	775	1236
4.629	162/35	C502_0046 MB43	100	84	85	73	14.0	15	3000	2700	3000	517	775	1236
4.629	162/35	C502_0046 MB43	160	–	85	73	14.0	15	3000	2700	3000	517	775	1236
5.850	117/20	C502_0059 MB33	16	104	35	59	14.0	16	3100	2700	4000	559	567	1072
5.850	117/20	C502_0059 MB33	24	92	35	59	14.0	16	3100	2700	4000	559	567	1072
5.850	117/20	C502_0059 MB33	32	81	35	59	14.0	16	3100	2700	4000	559	567	1072
5.850	117/20	C502_0059 MB33	45	63	35	59	14.0	16	3100	2700	4000	559	567	1072
5.850	117/20	C502_0059 MB33	90	–	35	59	14.0	16	3100	2700	4000	559	567	1072
5.850	117/20	C502_0059 MB43	50	117	82	73	14.0	17	3000	2700	3000	559	800	1250
5.850	117/20	C502_0059 MB43	72	86	82	73	14.0	17	3000	2700	3000	559	800	1250
5.850	117/20	C502_0059 MB43	100	47	82	73	14.0	17	3000	2700	3000	559	800	1250
7.763	621/80	C502_0078 MB23	8.0	31	11	52	14.0	17	3400	3000	4000	282	282	474
7.763	621/80	C502_0078 MB23	12	25	11	52	14.0	17	3400	3000	4000	282	282	474
7.763	621/80	C502_0078 MB23	16	20	11	52	14.0	17	3400	3000	4000	282	282	474
7.763	621/80	C502_0078 MB23	24	8.4	11	52	14.0	17	3400	3000	4000	282	282	474
7.763	621/80	C502_0078 MB23	30	–	11	52	14.0	17	3400	3000	4000	282	282	474
7.763	621/80	C502_0078 MB33	16	104	33	59	14.0	18	3400	3000	4000	614	753	1250
7.763	621/80	C502_0078 MB33	24	92	33	59	14.0	18	3400	3000	4000	614	753	1250
7.763	621/80	C502_0078 MB33	32	81	33	59	14.0	18	3400	3000	4000	614	753	1250

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C502 (M<sub>2acc,max</sub> = 920 Nm)</b>														
7.763	621/80	C502_0078 MB33	45	63	33	59	14.0	18	3400	3000	4000	614	753	1250
7.763	621/80	C502_0078 MB33	90	–	33	59	14.0	18	3400	3000	4000	614	753	1250
7.763	621/80	C502_0078 MB43	50	71	80	73	14.0	19	3000	3000	3000	614	800	1250
7.763	621/80	C502_0078 MB43	72	40	80	73	14.0	19	3000	3000	3000	614	800	1250
7.763	621/80	C502_0078 MB43	100	0.6	80	73	14.0	19	3000	3000	3000	614	800	1250
8.263	1537/186	C502_0083 MB33	16	104	40	59	12.0	20	2800	2400	4000	800	802	1515
8.263	1537/186	C502_0083 MB33	24	92	40	59	12.0	20	2800	2400	4000	800	802	1515
8.263	1537/186	C502_0083 MB33	32	81	40	59	12.0	20	2800	2400	4000	800	802	1515
8.263	1537/186	C502_0083 MB33	45	63	40	59	12.0	20	2800	2400	4000	800	802	1515
8.263	1537/186	C502_0083 MB33	90	–	40	59	12.0	20	2800	2400	4000	800	802	1515
8.263	1537/186	C502_0083 MB43	50	99	87	73	12.0	20	2800	2400	3000	800	920	1600
8.263	1537/186	C502_0083 MB43	72	68	87	73	12.0	20	2800	2400	3000	800	920	1600
8.263	1537/186	C502_0083 MB43	100	29	87	73	12.0	20	2800	2400	3000	800	920	1600
9.261	3445/372	C502_0093 MB33	16	104	40	59	12.0	20	2800	2400	4000	800	850	1600
9.261	3445/372	C502_0093 MB33	24	92	40	59	12.0	20	2800	2400	4000	800	850	1600
9.261	3445/372	C502_0093 MB33	32	81	40	59	12.0	20	2800	2400	4000	800	850	1600
9.261	3445/372	C502_0093 MB33	45	63	40	59	12.0	20	2800	2400	4000	800	850	1600
9.261	3445/372	C502_0093 MB33	90	–	40	59	12.0	20	2800	2400	4000	800	850	1600
9.261	3445/372	C502_0093 MB43	50	81	87	73	12.0	21	2800	2400	3000	800	850	1600
9.261	3445/372	C502_0093 MB43	72	50	87	73	12.0	21	2800	2400	3000	800	850	1600
9.261	3445/372	C502_0093 MB43	100	11	87	73	12.0	21	2800	2400	3000	800	850	1600
10.38	841/81	C502_0105 MB33	16	104	37	59	12.0	21	2800	2400	4000	800	920	1600
10.38	841/81	C502_0105 MB33	24	92	37	59	12.0	21	2800	2400	4000	800	920	1600
10.38	841/81	C502_0105 MB33	32	81	37	59	12.0	21	2800	2400	4000	800	920	1600
10.38	841/81	C502_0105 MB33	45	63	37	59	12.0	21	2800	2400	4000	800	920	1600
10.38	841/81	C502_0105 MB33	90	–	37	59	12.0	21	2800	2400	4000	800	920	1600
10.38	841/81	C502_0105 MB43	50	65	85	73	12.0	21	2800	2400	3000	800	920	1600
10.38	841/81	C502_0105 MB43	72	34	85	73	12.0	21	2800	2400	3000	800	920	1600
11.64	1885/162	C502_0115 MB33	16	98	37	59	12.0	21	2800	2400	4000	800	850	1600
11.64	1885/162	C502_0115 MB33	24	86	37	59	12.0	21	2800	2400	4000	800	850	1600
11.64	1885/162	C502_0115 MB33	32	75	37	59	12.0	21	2800	2400	4000	800	850	1600
11.64	1885/162	C502_0115 MB33	45	57	37	59	12.0	21	2800	2400	4000	800	850	1600
11.64	1885/162	C502_0115 MB43	50	50	85	73	12.0	21	2800	2400	3000	800	850	1600
11.64	1885/162	C502_0115 MB43	72	19	85	73	12.0	21	2800	2400	3000	800	850	1600
12.43	87/7	C502_0125 MB23	8.0	31	13	52	12.0	20	3100	2700	4000	452	452	760
12.43	87/7	C502_0125 MB23	12	25	13	52	12.0	20	3100	2700	4000	452	452	760
12.43	87/7	C502_0125 MB23	16	20	13	52	12.0	20	3100	2700	4000	452	452	760
12.43	87/7	C502_0125 MB23	24	8.4	13	52	12.0	20	3100	2700	4000	452	452	760
12.43	87/7	C502_0125 MB23	30	–	13	52	12.0	20	3100	2700	4000	452	452	760
12.43	87/7	C502_0125 MB33	16	90	35	59	12.0	21	3100	2700	4000	800	920	1600
12.43	87/7	C502_0125 MB33	24	79	35	59	12.0	21	3100	2700	4000	800	920	1600
12.43	87/7	C502_0125 MB33	32	68	35	59	12.0	21	3100	2700	4000	800	920	1600
12.43	87/7	C502_0125 MB33	45	49	35	59	12.0	21	3100	2700	4000	800	920	1600
12.43	87/7	C502_0125 MB43	50	42	83	73	12.0	21	3000	2700	3000	800	920	1600
12.43	87/7	C502_0125 MB43	72	12	83	73	12.0	21	3000	2700	3000	800	920	1600
13.93	195/14	C502_0140 MB23	8.0	31	13	52	12.0	21	3100	2700	4000	507	507	851
13.93	195/14	C502_0140 MB23	12	25	13	52	12.0	21	3100	2700	4000	507	507	851
13.93	195/14	C502_0140 MB23	16	20	13	52	12.0	21	3100	2700	4000	507	507	851
13.93	195/14	C502_0140 MB23	24	8.4	13	52	12.0	21	3100	2700	4000	507	507	851
13.93	195/14	C502_0140 MB23	30	–	13	52	12.0	21	3100	2700	4000	507	507	851
13.93	195/14	C502_0140 MB33	16	78	35	59	12.0	21	3100	2700	4000	800	850	1600
13.93	195/14	C502_0140 MB33	24	67	35	59	12.0	21	3100	2700	4000	800	850	1600
13.93	195/14	C502_0140 MB33	32	55	35	59	12.0	21	3100	2700	4000	800	850	1600
13.93	195/14	C502_0140 MB33	45	37	35	59	12.0	21	3100	2700	4000	800	850	1600
13.93	195/14	C502_0140 MB43	50	30	83	73	12.0	22	3000	2700	3000	800	850	1600
15.71	377/24	C502_0155 MB33	16	67	34	59	12.0	22	3100	2700	4000	800	920	1600
15.71	377/24	C502_0155 MB33	24	55	34	59	12.0	22	3100	2700	4000	800	920	1600
15.71	377/24	C502_0155 MB33	32	44	34	59	12.0	22	3100	2700	4000	800	920	1600
15.71	377/24	C502_0155 MB33	45	26	34	59	12.0	22	3100	2700	4000	800	920	1600
15.71	377/24	C502_0155 MB43	50	19	81	73	12.0	22	3000	2700	3000	800	920	1600
17.60	845/48	C502_0175 MB33	16	57	34	59	12.0	22	3100	2700	4000	800	850	1600
17.60	845/48	C502_0175 MB33	24	46	34	59	12.0	22	3100	2700	4000	800	850	1600
17.60	845/48	C502_0175 MB33	32	35	34	59	12.0	22	3100	2700	4000	800	850	1600
17.60	845/48	C502_0175 MB33	45	16	34	59	12.0	22	3100	2700	4000	800	850	1600



5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C502 (M<sub>2acc,max</sub> = 920 Nm)</b>														
17.60	845/48	C502_0175 MB43	50	9.3	81	73	12.0	22	3000	2700	3000	800	850	1600
20.84	667/32	C502_0210 MB23	8.0	31	10	52	12.0	22	3400	3000	4000	758	758	1274
20.84	667/32	C502_0210 MB23	12	25	10	52	12.0	22	3400	3000	4000	758	758	1274
20.84	667/32	C502_0210 MB23	16	20	10	52	12.0	22	3400	3000	4000	758	758	1274
20.84	667/32	C502_0210 MB23	24	8.4	10	52	12.0	22	3400	3000	4000	758	758	1274
20.84	667/32	C502_0210 MB23	30	–	10	52	12.0	22	3400	3000	4000	758	758	1274
20.84	667/32	C502_0210 MB33	16	45	32	59	12.0	22	3400	3000	4000	800	920	1600
20.84	667/32	C502_0210 MB33	24	33	32	59	12.0	22	3400	3000	4000	800	920	1600
20.84	667/32	C502_0210 MB33	32	22	32	59	12.0	22	3400	3000	4000	800	920	1600
20.84	667/32	C502_0210 MB33	45	4.0	32	59	12.0	22	3400	3000	4000	800	920	1600
23.36	1495/64	C502_0230 MB23	8.0	31	10	52	12.0	22	3400	3000	4000	800	850	1427
23.36	1495/64	C502_0230 MB23	12	25	10	52	12.0	22	3400	3000	4000	800	850	1427
23.36	1495/64	C502_0230 MB23	16	20	10	52	12.0	22	3400	3000	4000	800	850	1427
23.36	1495/64	C502_0230 MB23	24	8.4	10	52	12.0	22	3400	3000	4000	800	850	1427
23.36	1495/64	C502_0230 MB23	30	–	10	52	12.0	22	3400	3000	4000	800	850	1427
23.36	1495/64	C502_0230 MB33	16	37	32	59	12.0	22	3400	3000	4000	800	850	1600
23.36	1495/64	C502_0230 MB33	24	26	32	59	12.0	22	3400	3000	4000	800	850	1600
23.36	1495/64	C502_0230 MB33	32	15	32	59	12.0	22	3400	3000	4000	800	850	1600
25.07	2407/96	C502_0250 MB23	8.0	31	9.5	52	12.0	22	3400	3000	4000	800	912	1532
25.07	2407/96	C502_0250 MB23	12	25	9.5	52	12.0	22	3400	3000	4000	800	912	1532
25.07	2407/96	C502_0250 MB23	16	20	9.5	52	12.0	22	3400	3000	4000	800	912	1532
25.07	2407/96	C502_0250 MB23	24	8.4	9.5	52	12.0	22	3400	3000	4000	800	912	1532
25.07	2407/96	C502_0250 MB23	30	–	9.5	52	12.0	22	3400	3000	4000	800	912	1532
25.07	2407/96	C502_0250 MB33	16	33	31	59	12.0	22	3400	3000	4000	800	920	1600
25.07	2407/96	C502_0250 MB33	24	22	31	59	12.0	22	3400	3000	4000	800	920	1600
25.07	2407/96	C502_0250 MB33	32	11	31	59	12.0	22	3400	3000	4000	800	920	1600
28.10	5395/192	C502_0280 MB23	8.0	31	9.4	52	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB23	12	25	9.4	52	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB23	16	20	9.4	52	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB23	24	8.4	9.4	52	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB23	30	–	9.4	52	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB33	16	27	31	59	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB33	24	16	31	59	12.0	22	3400	3000	4000	800	850	1600
28.10	5395/192	C502_0280 MB33	32	4.9	31	59	12.0	22	3400	3000	4000	800	850	1600
31.23	406/13	C502_0310 MB23	8.0	31	8.8	52	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB23	12	25	8.8	52	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB23	16	20	8.8	52	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB23	24	8.4	8.8	52	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB23	30	–	8.8	52	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB33	16	22	29	59	12.0	22	3400	3000	4000	800	920	1600
31.23	406/13	C502_0310 MB33	24	11	29	59	12.0	22	3400	3000	4000	800	920	1600
35.00	35/1	C502_0350 MB23	8.0	29	8.8	52	12.0	22	3400	3000	4000	800	850	1600
35.00	35/1	C502_0350 MB23	12	23	8.8	52	12.0	22	3400	3000	4000	800	850	1600
35.00	35/1	C502_0350 MB23	16	18	8.8	52	12.0	22	3400	3000	4000	800	850	1600
35.00	35/1	C502_0350 MB23	24	6.3	8.8	52	12.0	22	3400	3000	4000	800	850	1600
35.00	35/1	C502_0350 MB33	16	18	29	59	12.0	22	3400	3000	4000	800	850	1600
35.00	35/1	C502_0350 MB33	24	6.3	29	59	12.0	22	3400	3000	4000	800	850	1600
41.69	667/16	C502_0420 MB23	8.0	22	8.2	52	12.0	22	3400	3000	4000	800	920	1600
41.69	667/16	C502_0420 MB23	12	17	8.2	52	12.0	22	3400	3000	4000	800	920	1600
41.69	667/16	C502_0420 MB23	16	11	8.2	52	12.0	22	3400	3000	4000	800	920	1600
41.69	667/16	C502_0420 MB33	16	11	29	59	12.0	23	3400	3000	4000	800	920	1600
46.72	1495/32	C502_0470 MB23	8.0	19	8.2	52	12.0	23	3400	3000	4000	800	850	1600
46.72	1495/32	C502_0470 MB23	12	13	8.2	52	12.0	23	3400	3000	4000	800	850	1600
46.72	1495/32	C502_0470 MB23	16	7.5	8.2	52	12.0	23	3400	3000	4000	800	850	1600
46.72	1495/32	C502_0470 MB33	16	7.5	29	59	12.0	23	3400	3000	4000	800	850	1600
49.82	1943/39	C502_0500 MB23	8.0	17	7.9	52	12.0	23	3400	3000	4000	800	920	1600
49.82	1943/39	C502_0500 MB23	12	11	7.9	52	12.0	23	3400	3000	4000	800	920	1600
49.82	1943/39	C502_0500 MB23	16	5.6	7.9	52	12.0	23	3400	3000	4000	800	920	1600
49.82	1943/39	C502_0500 MB33	16	5.6	28	59	12.0	23	3400	3000	4000	800	920	1600
55.83	335/6	C502_0560 MB23	8.0	14	7.9	52	12.0	23	3400	3000	4000	800	850	1600
55.83	335/6	C502_0560 MB23	12	8.2	7.9	52	12.0	23	3400	3000	4000	800	850	1600
55.83	335/6	C502_0560 MB23	16	2.6	7.9	52	12.0	23	3400	3000	4000	800	850	1600
55.83	335/6	C502_0560 MB33	16	2.6	28	59	12.0	23	3400	3000	4000	800	850	1600
62.43	4495/72	C502_0620 MB23	8.0	8.8	7.7	52	12.0	23	3400	3000	4000	714	857	1428

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C502 (M<sub>2acc,max</sub> = 920 Nm)</b>														
62.43	4495/72	C502_0620 MB23	12	3.2	7.7	52	12.0	23	3400	3000	4000	714	857	1428
69.97	10075/144	C502_0700 MB23	8.0	8.8	7.7	52	12.0	23	3400	3000	4000	800	850	1600
69.97	10075/144	C502_0700 MB23	12	3.2	7.7	52	12.0	23	3400	3000	4000	800	850	1600
<b>C612 (M<sub>2acc,max</sub> = 1650 Nm)</b>														
4.184	2745/656	C612_0042 MB43	50	154	129	88	10.0	28	2300	1900	3000	822	909	1364
4.184	2745/656	C612_0042 MB43	72	123	129	88	10.0	28	2300	1900	3000	822	909	1364
4.184	2745/656	C612_0042 MB43	100	84	129	88	10.0	28	2300	1900	3000	822	909	1364
4.184	2745/656	C612_0042 MB43	160	–	129	88	10.0	28	2300	1900	3000	822	909	1364
5.083	61/12	C612_0051 MB43	50	154	118	88	10.0	35	2300	1900	3000	989	1104	1657
5.083	61/12	C612_0051 MB43	72	123	118	88	10.0	35	2300	1900	3000	989	1104	1657
5.083	61/12	C612_0051 MB43	100	84	118	88	10.0	35	2300	1900	3000	989	1104	1657
5.083	61/12	C612_0051 MB43	160	–	118	88	10.0	35	2300	1900	3000	989	1104	1657
5.854	240/41	C612_0059 MB43	50	154	123	88	10.0	41	2300	1900	3000	1037	1272	1908
5.854	240/41	C612_0059 MB43	72	123	123	88	10.0	41	2300	1900	3000	1037	1272	1908
5.854	240/41	C612_0059 MB43	100	84	123	88	10.0	41	2300	1900	3000	1037	1272	1908
5.854	240/41	C612_0059 MB43	160	–	123	88	10.0	41	2300	1900	3000	1037	1272	1908
6.518	3233/496	C612_0065 MB33	16	104	55	74	10.0	40	2700	2300	3800	632	632	1195
6.518	3233/496	C612_0065 MB33	24	92	55	74	10.0	40	2700	2300	3800	632	632	1195
6.518	3233/496	C612_0065 MB33	32	81	55	74	10.0	40	2700	2300	3800	632	632	1195
6.518	3233/496	C612_0065 MB33	45	63	55	74	10.0	40	2700	2300	3800	632	632	1195
6.518	3233/496	C612_0065 MB33	90	–	55	74	10.0	40	2700	2300	3800	632	632	1195
6.518	3233/496	C612_0065 MB43	50	154	108	88	10.0	45	2700	2300	3000	1075	1416	2124
6.518	3233/496	C612_0065 MB43	72	123	108	88	10.0	45	2700	2300	3000	1075	1416	2124
6.518	3233/496	C612_0065 MB43	100	84	108	88	10.0	45	2700	2300	3000	1075	1416	2124
6.518	3233/496	C612_0065 MB43	160	–	108	88	10.0	45	2700	2300	3000	1075	1416	2124
7.111	64/9	C612_0071 MB43	50	154	114	88	10.0	48	2300	1900	3000	1107	1380	2318
7.111	64/9	C612_0071 MB43	72	123	114	88	10.0	48	2300	1900	3000	1107	1380	2318
7.111	64/9	C612_0071 MB43	100	84	114	88	10.0	48	2300	1900	3000	1107	1380	2318
7.111	64/9	C612_0071 MB43	160	–	114	88	10.0	48	2300	1900	3000	1107	1380	2318
8.190	1769/216	C612_0082 MB33	16	104	48	74	10.0	48	2700	2300	3800	794	794	1501
8.190	1769/216	C612_0082 MB33	24	92	48	74	10.0	48	2700	2300	3800	794	794	1501
8.190	1769/216	C612_0082 MB33	32	81	48	74	10.0	48	2700	2300	3800	794	794	1501
8.190	1769/216	C612_0082 MB33	45	63	48	74	10.0	48	2700	2300	3800	794	794	1501
8.190	1769/216	C612_0082 MB33	90	–	48	74	10.0	48	2700	2300	3800	794	794	1501
8.190	1769/216	C612_0082 MB43	50	154	101	88	10.0	52	2700	2300	3000	1160	1650	2669
8.190	1769/216	C612_0082 MB43	72	123	101	88	10.0	52	2700	2300	3000	1160	1650	2669
8.190	1769/216	C612_0082 MB43	100	84	101	88	10.0	52	2700	2300	3000	1160	1650	2669
8.190	1769/216	C612_0082 MB43	160	–	101	88	10.0	52	2700	2300	3000	1160	1650	2669
9.118	848/93	C612_0091 MB33	16	104	52	74	10.0	52	2700	2300	3800	884	884	1672
9.118	848/93	C612_0091 MB33	24	92	52	74	10.0	52	2700	2300	3800	884	884	1672
9.118	848/93	C612_0091 MB33	32	81	52	74	10.0	52	2700	2300	3800	884	884	1672
9.118	848/93	C612_0091 MB33	45	63	52	74	10.0	52	2700	2300	3800	884	884	1672
9.118	848/93	C612_0091 MB33	90	–	52	74	10.0	52	2700	2300	3800	884	884	1672
9.118	848/93	C612_0091 MB43	50	154	105	88	10.0	55	2700	2300	3000	1202	1380	2600
9.118	848/93	C612_0091 MB43	72	123	105	88	10.0	55	2700	2300	3000	1202	1380	2600
9.118	848/93	C612_0091 MB43	100	84	105	88	10.0	55	2700	2300	3000	1202	1380	2600
9.118	848/93	C612_0091 MB43	160	–	105	88	10.0	55	2700	2300	3000	1202	1380	2600
10.11	3721/368	C612_0100 MB33	16	104	44	74	10.0	55	3000	2600	4000	981	981	1854
10.11	3721/368	C612_0100 MB33	24	92	44	74	10.0	55	3000	2600	4000	981	981	1854
10.11	3721/368	C612_0100 MB33	32	81	44	74	10.0	55	3000	2600	4000	981	981	1854
10.11	3721/368	C612_0100 MB33	45	63	44	74	10.0	55	3000	2600	4000	981	981	1854
10.11	3721/368	C612_0100 MB33	90	–	44	74	10.0	55	3000	2600	4000	981	981	1854
10.11	3721/368	C612_0100 MB43	50	154	97	88	10.0	58	3000	2600	3000	1244	1650	2900
10.11	3721/368	C612_0100 MB43	72	123	97	88	10.0	58	3000	2600	3000	1244	1650	2900
10.11	3721/368	C612_0100 MB43	100	84	97	88	10.0	58	3000	2600	3000	1244	1650	2900
10.11	3721/368	C612_0100 MB43	160	–	97	88	10.0	58	3000	2600	3000	1244	1650	2900
11.46	928/81	C612_0115 MB33	16	104	47	74	10.0	58	2700	2300	3800	1111	1111	2100
11.46	928/81	C612_0115 MB33	24	92	47	74	10.0	58	2700	2300	3800	1111	1111	2100
11.46	928/81	C612_0115 MB33	32	81	47	74	10.0	58	2700	2300	3800	1111	1111	2100
11.46	928/81	C612_0115 MB33	45	63	47	74	10.0	58	2700	2300	3800	1111	1111	2100
11.46	928/81	C612_0115 MB33	90	–	47	74	10.0	58	2700	2300	3800	1111	1111	2100
11.46	928/81	C612_0115 MB43	50	128	100	88	10.0	61	2700	2300	3000	1297	1380	2600
11.46	928/81	C612_0115 MB43	72	97	100	88	10.0	61	2700	2300	3000	1297	1380	2600
11.46	928/81	C612_0115 MB43	100	58	100	88	10.0	61	2700	2300	3000	1297	1380	2600

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C612 (M<sub>2acc,max</sub> = 1650 Nm)</b>														
12.58	2013/160	C612_0125 MB33	16	104	40	74	10.0	60	3000	2600	4000	1220	1220	2306
12.58	2013/160	C612_0125 MB33	24	92	40	74	10.0	60	3000	2600	4000	1220	1220	2306
12.58	2013/160	C612_0125 MB33	32	81	40	74	10.0	60	3000	2600	4000	1220	1220	2306
12.58	2013/160	C612_0125 MB33	45	63	40	74	10.0	60	3000	2600	4000	1220	1220	2306
12.58	2013/160	C612_0125 MB33	90	–	40	74	10.0	60	3000	2600	4000	1220	1220	2306
12.58	2013/160	C612_0125 MB43	50	131	93	88	10.0	63	3000	2600	3000	1338	1650	2900
12.58	2013/160	C612_0125 MB43	72	100	93	88	10.0	63	3000	2600	3000	1338	1650	2900
12.58	2013/160	C612_0125 MB43	100	61	93	88	10.0	63	3000	2600	3000	1338	1650	2900
14.15	976/69	C612_0140 MB33	16	104	43	74	10.0	63	3000	2600	4000	1300	1372	2593
14.15	976/69	C612_0140 MB33	24	92	43	74	10.0	63	3000	2600	4000	1300	1372	2593
14.15	976/69	C612_0140 MB33	32	81	43	74	10.0	63	3000	2600	4000	1300	1372	2593
14.15	976/69	C612_0140 MB33	45	63	43	74	10.0	63	3000	2600	4000	1300	1372	2593
14.15	976/69	C612_0140 MB33	90	–	43	74	10.0	63	3000	2600	4000	1300	1372	2593
14.15	976/69	C612_0140 MB43	50	90	96	88	10.0	65	3000	2600	3000	1300	1380	2600
14.15	976/69	C612_0140 MB43	72	60	96	88	10.0	65	3000	2600	3000	1300	1380	2600
14.15	976/69	C612_0140 MB43	100	20	96	88	10.0	65	3000	2600	3000	1300	1380	2600
16.20	1037/64	C612_0160 MB33	16	104	36	74	10.0	65	3200	2900	4000	1450	1572	2900
16.20	1037/64	C612_0160 MB33	24	92	36	74	10.0	65	3200	2900	4000	1450	1572	2900
16.20	1037/64	C612_0160 MB33	32	81	36	74	10.0	65	3200	2900	4000	1450	1572	2900
16.20	1037/64	C612_0160 MB33	45	63	36	74	10.0	65	3200	2900	4000	1450	1572	2900
16.20	1037/64	C612_0160 MB33	90	–	36	74	10.0	65	3200	2900	4000	1450	1572	2900
16.20	1037/64	C612_0160 MB43	50	86	89	88	10.0	67	3000	2900	3000	1450	1650	2900
16.20	1037/64	C612_0160 MB43	72	55	89	88	10.0	67	3000	2900	3000	1450	1650	2900
16.20	1037/64	C612_0160 MB43	100	16	89	88	10.0	67	3000	2900	3000	1450	1650	2900
17.60	88/5	C612_0175 MB33	16	104	39	74	10.0	66	3000	2600	4000	1300	1380	2600
17.60	88/5	C612_0175 MB33	24	92	39	74	10.0	66	3000	2600	4000	1300	1380	2600
17.60	88/5	C612_0175 MB33	32	81	39	74	10.0	66	3000	2600	4000	1300	1380	2600
17.60	88/5	C612_0175 MB33	45	63	39	74	10.0	66	3000	2600	4000	1300	1380	2600
17.60	88/5	C612_0175 MB33	90	–	39	74	10.0	66	3000	2600	4000	1300	1380	2600
17.60	88/5	C612_0175 MB43	50	59	92	88	10.0	68	3000	2600	3000	1300	1380	2600
17.60	88/5	C612_0175 MB43	72	28	92	88	10.0	68	3000	2600	3000	1300	1380	2600
19.61	549/28	C612_0195 MB33	16	104	34	74	10.0	68	3200	2900	4000	1450	1650	2900
19.61	549/28	C612_0195 MB33	24	92	34	74	10.0	68	3200	2900	4000	1450	1650	2900
19.61	549/28	C612_0195 MB33	32	81	34	74	10.0	68	3200	2900	4000	1450	1650	2900
19.61	549/28	C612_0195 MB33	45	63	34	74	10.0	68	3200	2900	4000	1450	1650	2900
19.61	549/28	C612_0195 MB33	90	–	34	74	10.0	68	3200	2900	4000	1450	1650	2900
19.61	549/28	C612_0195 MB43	50	59	82	88	10.0	69	3000	2900	3000	1450	1650	2900
19.61	549/28	C612_0195 MB43	72	28	82	88	10.0	69	3000	2900	3000	1450	1650	2900
22.67	68/3	C612_0230 MB33	16	78	36	74	10.0	69	3200	2900	4000	1300	1380	2600
22.67	68/3	C612_0230 MB33	24	67	36	74	10.0	69	3200	2900	4000	1300	1380	2600
22.67	68/3	C612_0230 MB33	32	55	36	74	10.0	69	3200	2900	4000	1300	1380	2600
22.67	68/3	C612_0230 MB33	45	37	36	74	10.0	69	3200	2900	4000	1300	1380	2600
22.67	68/3	C612_0230 MB43	50	30	89	88	10.0	70	3000	2900	3000	1300	1380	2600
24.93	5185/208	C612_0250 MB33	16	79	33	74	10.0	70	3200	2900	4000	1450	1650	2900
24.93	5185/208	C612_0250 MB33	24	68	33	74	10.0	70	3200	2900	4000	1450	1650	2900
24.93	5185/208	C612_0250 MB33	32	57	33	74	10.0	70	3200	2900	4000	1450	1650	2900
24.93	5185/208	C612_0250 MB33	45	39	33	74	10.0	70	3200	2900	4000	1450	1650	2900
24.93	5185/208	C612_0250 MB43	50	32	80	88	10.0	71	3000	2900	3000	1450	1650	2900
24.93	5185/208	C612_0250 MB43	72	0.8	80	88	10.0	71	3000	2900	3000	1450	1650	2900
27.43	192/7	C612_0270 MB33	16	60	34	74	10.0	71	3200	2900	4000	1300	1380	2600
27.43	192/7	C612_0270 MB33	24	49	34	74	10.0	71	3200	2900	4000	1300	1380	2600
27.43	192/7	C612_0270 MB33	32	38	34	74	10.0	71	3200	2900	4000	1300	1380	2600
27.43	192/7	C612_0270 MB33	45	20	34	74	10.0	71	3200	2900	4000	1300	1380	2600
27.43	192/7	C612_0270 MB43	50	13	82	88	10.0	71	3000	2900	3000	1300	1380	2600
32.41	1037/32	C612_0320 MB33	16	56	31	74	10.0	72	3200	2900	4000	1450	1650	2900
32.41	1037/32	C612_0320 MB33	24	45	31	74	10.0	72	3200	2900	4000	1450	1650	2900
32.41	1037/32	C612_0320 MB33	32	33	31	74	10.0	72	3200	2900	4000	1450	1650	2900
32.41	1037/32	C612_0320 MB33	45	15	31	74	10.0	72	3200	2900	4000	1450	1650	2900
32.41	1037/32	C612_0320 MB43	50	8.1	79	88	10.0	72	3000	2900	3000	1450	1650	2900
34.87	1360/39	C612_0350 MB33	16	43	32	74	10.0	72	3200	2900	4000	1300	1380	2600
34.87	1360/39	C612_0350 MB33	24	31	32	74	10.0	72	3200	2900	4000	1300	1380	2600
34.87	1360/39	C612_0350 MB33	32	20	32	74	10.0	72	3200	2900	4000	1300	1380	2600
34.87	1360/39	C612_0350 MB33	45	2.1	32	74	10.0	72	3200	2900	4000	1300	1380	2600
39.40	1891/48	C612_0390 MB33	16	32	29	74	10.0	72	3200	2900	4000	1221	1465	2441



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C612 (M<sub>2acc,max</sub> = 1650 Nm)</b>														
39.40	1891/48	C612_0390 MB33	24	20	29	74	10.0	72	3200	2900	4000	1221	1465	2441
39.40	1891/48	C612_0390 MB33	32	9.3	29	74	10.0	72	3200	2900	4000	1221	1465	2441
45.33	136/3	C612_0450 MB33	16	28	31	74	10.0	73	3200	2900	4000	1300	1380	2600
45.33	136/3	C612_0450 MB33	24	16	31	74	10.0	73	3200	2900	4000	1300	1380	2600
45.33	136/3	C612_0450 MB33	32	5.3	31	74	10.0	73	3200	2900	4000	1300	1380	2600
55.11	496/9	C612_0550 MB33	16	19	29	74	10.0	73	3200	2900	4000	1300	1380	2600
55.11	496/9	C612_0550 MB33	24	7.6	29	74	10.0	73	3200	2900	4000	1300	1380	2600
68.89	620/9	C612_0690 MB33	16	11	29	74	10.0	74	3200	2900	4000	1300	1380	2600
<b>C712 (M<sub>2acc,max</sub> = 2760 Nm)</b>														
4.259	477/112	C712_0043 MB43	50	154	178	123	10.0	34	2200	1900	2800	837	925	1388
4.259	477/112	C712_0043 MB43	72	123	178	123	10.0	34	2200	1900	2800	837	925	1388
4.259	477/112	C712_0043 MB43	100	84	178	123	10.0	34	2200	1900	2800	837	925	1388
4.259	477/112	C712_0043 MB43	160	–	178	123	10.0	34	2200	1900	2800	837	925	1388
5.311	1827/344	C712_0053 MB43	50	154	153	123	10.0	46	2200	1900	2800	1043	1154	1731
5.311	1827/344	C712_0053 MB43	72	123	153	123	10.0	46	2200	1900	2800	1043	1154	1731
5.311	1827/344	C712_0053 MB43	100	84	153	123	10.0	46	2200	1900	2800	1043	1154	1731
5.311	1827/344	C712_0053 MB43	160	–	153	123	10.0	46	2200	1900	2800	1043	1154	1731
7.357	3480/473	C712_0074 MB43	50	154	147	123	10.0	66	2200	1900	2800	1445	1599	2398
7.357	3480/473	C712_0074 MB43	72	123	147	123	10.0	66	2200	1900	2800	1445	1599	2398
7.357	3480/473	C712_0074 MB43	100	84	147	123	10.0	66	2200	1900	2800	1445	1599	2398
7.357	3480/473	C712_0074 MB43	160	–	147	123	10.0	66	2200	1900	2800	1445	1599	2398
8.490	4347/512	C712_0085 MB43	50	154	120	123	10.0	74	2600	2300	3000	1668	1845	2767
8.490	4347/512	C712_0085 MB43	72	123	120	123	10.0	74	2600	2300	3000	1668	1845	2767
8.490	4347/512	C712_0085 MB43	100	84	120	123	10.0	74	2600	2300	3000	1668	1845	2767
8.490	4347/512	C712_0085 MB43	160	–	120	123	10.0	74	2600	2300	3000	1668	1845	2767
9.912	4599/464	C712_0099 MB33	16	104	60	110	10.0	76	2900	2600	4000	961	961	1817
9.912	4599/464	C712_0099 MB33	24	92	60	110	10.0	76	2900	2600	4000	961	961	1817
9.912	4599/464	C712_0099 MB33	32	81	60	110	10.0	76	2900	2600	4000	961	961	1817
9.912	4599/464	C712_0099 MB33	45	63	60	110	10.0	76	2900	2600	4000	961	961	1817
9.912	4599/464	C712_0099 MB33	90	–	60	110	10.0	76	2900	2600	4000	961	961	1817
9.912	4599/464	C712_0099 MB43	50	154	113	123	10.0	83	2900	2600	3000	1947	2154	3231
9.912	4599/464	C712_0099 MB43	72	123	113	123	10.0	83	2900	2600	3000	1947	2154	3231
9.912	4599/464	C712_0099 MB43	100	84	113	123	10.0	83	2900	2600	3000	1947	2154	3231
9.912	4599/464	C712_0099 MB43	160	–	113	123	10.0	83	2900	2600	3000	1947	2154	3231
11.76	1035/88	C712_0120 MB43	50	154	118	123	10.0	91	2600	2300	3000	2000	2300	3833
11.76	1035/88	C712_0120 MB43	72	123	118	123	10.0	91	2600	2300	3000	2000	2300	3833
11.76	1035/88	C712_0120 MB43	100	84	118	123	10.0	91	2600	2300	3000	2000	2300	3833
11.76	1035/88	C712_0120 MB43	160	–	118	123	10.0	91	2600	2300	3000	2000	2300	3833
13.18	4851/368	C712_0130 MB33	16	104	51	110	10.0	91	2900	2600	4000	1279	1279	2417
13.18	4851/368	C712_0130 MB33	24	92	51	110	10.0	91	2900	2600	4000	1279	1279	2417
13.18	4851/368	C712_0130 MB33	32	81	51	110	10.0	91	2900	2600	4000	1279	1279	2417
13.18	4851/368	C712_0130 MB33	45	63	51	110	10.0	91	2900	2600	4000	1279	1279	2417
13.18	4851/368	C712_0130 MB33	90	–	51	110	10.0	91	2900	2600	4000	1279	1279	2417
13.18	4851/368	C712_0130 MB43	50	154	104	123	10.0	96	2900	2600	3000	2250	2760	4296
13.18	4851/368	C712_0130 MB43	72	123	104	123	10.0	96	2900	2600	3000	2250	2760	4296
13.18	4851/368	C712_0130 MB43	100	84	104	123	10.0	96	2900	2600	3000	2250	2760	4296
13.18	4851/368	C712_0130 MB43	160	–	104	123	10.0	96	2900	2600	3000	2250	2760	4296
13.73	4380/319	C712_0135 MB33	16	104	59	110	10.0	93	2900	2600	4000	1332	1332	2517
13.73	4380/319	C712_0135 MB33	24	92	59	110	10.0	93	2900	2600	4000	1332	1332	2517
13.73	4380/319	C712_0135 MB33	32	81	59	110	10.0	93	2900	2600	4000	1332	1332	2517
13.73	4380/319	C712_0135 MB33	45	63	59	110	10.0	93	2900	2600	4000	1332	1332	2517
13.73	4380/319	C712_0135 MB33	90	–	59	110	10.0	93	2900	2600	4000	1332	1332	2517
13.73	4380/319	C712_0135 MB43	50	154	112	123	10.0	98	2900	2600	3000	2000	2300	4000
13.73	4380/319	C712_0135 MB43	72	123	112	123	10.0	98	2900	2600	3000	2000	2300	4000
13.73	4380/319	C712_0135 MB43	100	84	112	123	10.0	98	2900	2600	3000	2000	2300	4000
13.73	4380/319	C712_0135 MB43	160	–	112	123	10.0	98	2900	2600	3000	2000	2300	4000
16.73	1071/64	C712_0165 MB33	16	104	44	110	10.0	101	3100	2900	4000	1623	1623	3068
16.73	1071/64	C712_0165 MB33	24	92	44	110	10.0	101	3100	2900	4000	1623	1623	3068
16.73	1071/64	C712_0165 MB33	32	81	44	110	10.0	101	3100	2900	4000	1623	1623	3068
16.73	1071/64	C712_0165 MB33	45	63	44	110	10.0	101	3100	2900	4000	1623	1623	3068
16.73	1071/64	C712_0165 MB33	90	–	44	110	10.0	101	3100	2900	4000	1623	1623	3068
16.73	1071/64	C712_0165 MB43	50	154	97	123	10.0	105	3000	2900	3000	2400	2760	4800
16.73	1071/64	C712_0165 MB43	72	123	97	123	10.0	105	3000	2900	3000	2400	2760	4800
16.73	1071/64	C712_0165 MB43	100	84	97	123	10.0	105	3000	2900	3000	2400	2760	4800

5.2 Selection tables 5 C helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C712 (M<sub>2acc,max</sub> = 2760 Nm)</b>														
16.73	1071/64	C712_0165 MB43	160	–	97	123	10.0	105	3000	2900	3000	2400	2760	4800
18.26	420/23	C712_0185 MB33	16	104	49	110	10.0	104	2900	2600	4000	1771	1771	3348
18.26	420/23	C712_0185 MB33	24	92	49	110	10.0	104	2900	2600	4000	1771	1771	3348
18.26	420/23	C712_0185 MB33	32	81	49	110	10.0	104	2900	2600	4000	1771	1771	3348
18.26	420/23	C712_0185 MB33	45	63	49	110	10.0	104	2900	2600	4000	1771	1771	3348
18.26	420/23	C712_0185 MB33	90	–	49	110	10.0	104	2900	2600	4000	1771	1771	3348
18.26	420/23	C712_0185 MB43	50	121	102	123	10.0	107	2900	2600	3000	2000	2300	4000
18.26	420/23	C712_0185 MB43	72	90	102	123	10.0	107	2900	2600	3000	2000	2300	4000
18.26	420/23	C712_0185 MB43	100	51	102	123	10.0	107	2900	2600	3000	2000	2300	4000
20.67	1323/64	C712_0210 MB33	16	104	40	110	10.0	107	3100	2900	4000	1850	2005	3790
20.67	1323/64	C712_0210 MB33	24	92	40	110	10.0	107	3100	2900	4000	1850	2005	3790
20.67	1323/64	C712_0210 MB33	32	81	40	110	10.0	107	3100	2900	4000	1850	2005	3790
20.67	1323/64	C712_0210 MB33	45	63	40	110	10.0	107	3100	2900	4000	1850	2005	3790
20.67	1323/64	C712_0210 MB33	90	–	40	110	10.0	107	3100	2900	4000	1850	2005	3790
20.67	1323/64	C712_0210 MB43	50	133	93	123	10.0	110	3000	2900	3000	2400	2760	4800
20.67	1323/64	C712_0210 MB43	72	102	93	123	10.0	110	3000	2900	3000	2400	2760	4800
20.67	1323/64	C712_0210 MB43	100	63	93	123	10.0	110	3000	2900	3000	2400	2760	4800
23.18	255/11	C712_0230 MB33	16	104	43	110	10.0	110	3100	2900	4000	2000	2249	4000
23.18	255/11	C712_0230 MB33	24	92	43	110	10.0	110	3100	2900	4000	2000	2249	4000
23.18	255/11	C712_0230 MB33	32	81	43	110	10.0	110	3100	2900	4000	2000	2249	4000
23.18	255/11	C712_0230 MB33	45	63	43	110	10.0	110	3100	2900	4000	2000	2249	4000
23.18	255/11	C712_0230 MB33	90	–	43	110	10.0	110	3100	2900	4000	2000	2249	4000
23.18	255/11	C712_0230 MB43	50	81	96	123	10.0	112	3000	2900	3000	2000	2300	4000
23.18	255/11	C712_0230 MB43	72	50	96	123	10.0	112	3000	2900	3000	2000	2300	4000
23.18	255/11	C712_0230 MB43	100	11	96	123	10.0	112	3000	2900	3000	2000	2300	4000
25.31	405/16	C712_0250 MB33	16	104	37	110	10.0	112	3100	2900	4000	1958	2455	4641
25.31	405/16	C712_0250 MB33	24	92	37	110	10.0	112	3100	2900	4000	1958	2455	4641
25.31	405/16	C712_0250 MB33	32	81	37	110	10.0	112	3100	2900	4000	1958	2455	4641
25.31	405/16	C712_0250 MB33	45	63	37	110	10.0	112	3100	2900	4000	1958	2455	4641
25.31	405/16	C712_0250 MB33	90	–	37	110	10.0	112	3100	2900	4000	1958	2455	4641
25.31	405/16	C712_0250 MB43	50	96	84	123	10.0	114	3000	2900	3000	2400	2760	4800
25.31	405/16	C712_0250 MB43	72	65	84	123	10.0	114	3000	2900	3000	2400	2760	4800
25.31	405/16	C712_0250 MB43	100	26	84	123	10.0	114	3000	2900	3000	2400	2760	4800
28.64	315/11	C712_0290 MB33	16	100	39	110	10.0	114	3100	2900	4000	2000	2300	4000
28.64	315/11	C712_0290 MB33	24	88	39	110	10.0	114	3100	2900	4000	2000	2300	4000
28.64	315/11	C712_0290 MB33	32	77	39	110	10.0	114	3100	2900	4000	2000	2300	4000
28.64	315/11	C712_0290 MB33	45	59	39	110	10.0	114	3100	2900	4000	2000	2300	4000
28.64	315/11	C712_0290 MB43	50	52	92	123	10.0	116	3000	2900	3000	2000	2300	4000
28.64	315/11	C712_0290 MB43	72	21	92	123	10.0	116	3000	2900	3000	2000	2300	4000
33.80	2163/64	C712_0340 MB33	16	102	34	110	10.0	116	3100	2900	4000	2011	2760	4800
33.80	2163/64	C712_0340 MB33	24	90	34	110	10.0	116	3100	2900	4000	2011	2760	4800
33.80	2163/64	C712_0340 MB33	32	79	34	110	10.0	116	3100	2900	4000	2011	2760	4800
33.80	2163/64	C712_0340 MB33	45	61	34	110	10.0	116	3100	2900	4000	2011	2760	4800
33.80	2163/64	C712_0340 MB43	50	54	81	123	10.0	117	3000	2900	3000	2400	2760	4800
33.80	2163/64	C712_0340 MB43	72	23	81	123	10.0	117	3000	2900	3000	2400	2760	4800
35.07	2700/77	C712_0350 MB33	16	77	37	110	10.0	116	3100	2900	4000	2000	2300	4000
35.07	2700/77	C712_0350 MB33	24	66	37	110	10.0	116	3100	2900	4000	2000	2300	4000
35.07	2700/77	C712_0350 MB33	32	55	37	110	10.0	116	3100	2900	4000	2000	2300	4000
35.07	2700/77	C712_0350 MB33	45	37	37	110	10.0	116	3100	2900	4000	2000	2300	4000
35.07	2700/77	C712_0350 MB43	50	30	84	123	10.0	118	3000	2900	3000	2000	2300	4000
41.02	2625/64	C712_0410 MB33	16	67	32	110	10.0	118	3100	2900	4000	2077	2514	4189
41.02	2625/64	C712_0410 MB33	24	56	32	110	10.0	118	3100	2900	4000	2077	2514	4189
41.02	2625/64	C712_0410 MB33	32	44	32	110	10.0	118	3100	2900	4000	2077	2514	4189
41.02	2625/64	C712_0410 MB33	45	26	32	110	10.0	118	3100	2900	4000	2077	2514	4189
41.02	2625/64	C712_0410 MB43	50	19	80	123	10.0	119	3000	2900	3000	2095	2514	4189
46.82	515/11	C712_0470 MB33	16	52	34	110	10.0	119	3100	2900	4000	2000	2300	4000
46.82	515/11	C712_0470 MB33	24	41	34	110	10.0	119	3100	2900	4000	2000	2300	4000
46.82	515/11	C712_0470 MB33	32	30	34	110	10.0	119	3100	2900	4000	2000	2300	4000
46.82	515/11	C712_0470 MB33	45	12	34	110	10.0	119	3100	2900	4000	2000	2300	4000
46.82	515/11	C712_0470 MB43	50	4.6	81	123	10.0	120	3000	2900	3000	2000	2300	4000
56.82	625/11	C712_0570 MB33	16	39	32	110	10.0	120	3100	2900	4000	2000	2300	4000
56.82	625/11	C712_0570 MB33	24	28	32	110	10.0	120	3100	2900	4000	2000	2300	4000
56.82	625/11	C712_0570 MB33	32	17	32	110	10.0	120	3100	2900	4000	2000	2300	4000
69.55	765/11	C712_0700 MB33	16	28	30	110	10.0	121	3100	2900	4000	2000	2300	4000

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>C712 (M<sub>2acc,max</sub> = 2760 Nm)</b>														
69.55	765/11	C712_0700 MB33	24	17	30	110	10.0	121	3100	2900	4000	2000	2300	4000
69.55	765/11	C712_0700 MB33	32	5.4	30	110	10.0	121	3100	2900	4000	2000	2300	4000
<b>C812 (M<sub>2acc,max</sub> = 4800 Nm)</b>														
6.670	767/115	C812_0067 MB43	50	154	214	183	10.0	65	2500	2200	3000	1310	1449	2174
6.670	767/115	C812_0067 MB43	72	123	214	183	10.0	65	2500	2200	3000	1310	1449	2174
6.670	767/115	C812_0067 MB43	100	84	214	183	10.0	65	2500	2200	3000	1310	1449	2174
6.670	767/115	C812_0067 MB43	160	–	214	183	10.0	65	2500	2200	3000	1310	1449	2174
9.043	208/23	C812_0090 MB43	50	154	203	183	10.0	104	2500	2200	3000	1776	1965	2947
9.043	208/23	C812_0090 MB43	72	123	203	183	10.0	104	2500	2200	3000	1776	1965	2947
9.043	208/23	C812_0090 MB43	100	84	203	183	10.0	104	2500	2200	3000	1776	1965	2947
9.043	208/23	C812_0090 MB43	160	–	203	183	10.0	104	2500	2200	3000	1776	1965	2947
10.15	944/93	C812_0100 MB43	50	154	156	183	10.0	95	2700	2400	3000	1994	2206	3308
10.15	944/93	C812_0100 MB43	72	123	156	183	10.0	95	2700	2400	3000	1994	2206	3308
10.15	944/93	C812_0100 MB43	100	84	156	183	10.0	95	2700	2400	3000	1994	2206	3308
10.15	944/93	C812_0100 MB43	160	–	156	183	10.0	95	2700	2400	3000	1994	2206	3308
12.75	5546/435	C812_0125 MB43	50	154	135	183	10.0	108	2700	2400	3000	2504	2770	4155
12.75	5546/435	C812_0125 MB43	72	123	135	183	10.0	108	2700	2400	3000	2504	2770	4155
12.75	5546/435	C812_0125 MB43	100	84	135	183	10.0	108	2700	2400	3000	2504	2770	4155
12.75	5546/435	C812_0125 MB43	160	–	135	183	10.0	108	2700	2400	3000	2504	2770	4155
13.76	1280/93	C812_0140 MB43	50	154	151	183	10.0	144	2700	2400	3000	2703	2990	4486
13.76	1280/93	C812_0140 MB43	72	123	151	183	10.0	144	2700	2400	3000	2703	2990	4486
13.76	1280/93	C812_0140 MB43	100	84	151	183	10.0	144	2700	2400	3000	2703	2990	4486
13.76	1280/93	C812_0140 MB43	160	–	151	183	10.0	144	2700	2400	3000	2703	2990	4486
17.10	1180/69	C812_0170 MB43	50	154	117	183	10.0	122	2900	2700	3000	3359	3716	5574
17.10	1180/69	C812_0170 MB43	72	123	117	183	10.0	122	2900	2700	3000	3359	3716	5574
17.10	1180/69	C812_0170 MB43	100	84	117	183	10.0	122	2900	2700	3000	3359	3716	5574
17.10	1180/69	C812_0170 MB43	160	–	117	183	10.0	122	2900	2700	3000	3359	3716	5574
17.29	1504/87	C812_0175 MB43	50	154	132	183	10.0	162	2700	2400	3000	3396	3756	5634
17.29	1504/87	C812_0175 MB43	72	123	132	183	10.0	162	2700	2400	3000	3396	3756	5634
17.29	1504/87	C812_0175 MB43	100	84	132	183	10.0	162	2700	2400	3000	3396	3756	5634
17.29	1504/87	C812_0175 MB43	160	–	132	183	10.0	162	2700	2400	3000	3396	3756	5634
20.26	6077/300	C812_0200 MB43	50	154	109	183	10.0	128	2900	2700	3000	3661	4401	6602
20.26	6077/300	C812_0200 MB43	72	123	109	183	10.0	128	2900	2700	3000	3661	4401	6602
20.26	6077/300	C812_0200 MB43	100	84	109	183	10.0	128	2900	2700	3000	3661	4401	6602
20.26	6077/300	C812_0200 MB43	160	–	109	183	10.0	128	2900	2700	3000	3661	4401	6602
23.19	1600/69	C812_0230 MB43	50	154	116	183	10.0	178	2900	2700	3000	3600	4140	7200
23.19	1600/69	C812_0230 MB43	72	123	116	183	10.0	178	2900	2700	3000	3600	4140	7200
23.19	1600/69	C812_0230 MB43	100	84	116	183	10.0	178	2900	2700	3000	3600	4140	7200
23.19	1600/69	C812_0230 MB43	160	–	116	183	10.0	178	2900	2700	3000	3600	4140	7200
26.06	3127/120	C812_0260 MB43	50	154	100	183	10.0	134	2900	2700	3000	3796	4800	8400
26.06	3127/120	C812_0260 MB43	72	123	100	183	10.0	134	2900	2700	3000	3796	4800	8400
26.06	3127/120	C812_0260 MB43	100	84	100	183	10.0	134	2900	2700	3000	3796	4800	8400
26.06	3127/120	C812_0260 MB43	160	–	100	183	10.0	134	2900	2700	3000	3796	4800	8400
27.47	412/15	C812_0270 MB43	50	154	108	183	10.0	185	2900	2700	3000	3600	4140	7200
27.47	412/15	C812_0270 MB43	72	123	108	183	10.0	185	2900	2700	3000	3600	4140	7200
27.47	412/15	C812_0270 MB43	100	84	108	183	10.0	185	2900	2700	3000	3600	4140	7200
27.47	412/15	C812_0270 MB43	160	–	108	183	10.0	185	2900	2700	3000	3600	4140	7200
33.59	2183/65	C812_0340 MB43	50	148	94	183	10.0	139	2900	2700	3000	3957	4800	8400
33.59	2183/65	C812_0340 MB43	72	118	94	183	10.0	139	2900	2700	3000	3957	4800	8400
33.59	2183/65	C812_0340 MB43	100	78	94	183	10.0	139	2900	2700	3000	3957	4800	8400
35.33	106/3	C812_0350 MB43	50	108	100	183	10.0	192	2900	2700	3000	3600	4140	7200
35.33	106/3	C812_0350 MB43	72	77	100	183	10.0	192	2900	2700	3000	3600	4140	7200
35.33	106/3	C812_0350 MB43	100	38	100	183	10.0	192	2900	2700	3000	3600	4140	7200
39.94	2596/65	C812_0400 MB43	50	95	85	183	10.0	141	2900	2700	3000	3785	4542	7570
39.94	2596/65	C812_0400 MB43	72	65	85	183	10.0	141	2900	2700	3000	3785	4542	7570
39.94	2596/65	C812_0400 MB43	100	25	85	183	10.0	141	2900	2700	3000	3785	4542	7570
45.54	592/13	C812_0460 MB43	50	68	94	183	10.0	196	2900	2700	3000	3600	4140	7200
45.54	592/13	C812_0460 MB43	72	37	94	183	10.0	196	2900	2700	3000	3600	4140	7200
54.15	704/13	C812_0540 MB43	50	46	85	183	10.0	198	2900	2700	3000	3600	4140	7200
54.15	704/13	C812_0540 MB43	72	15	85	183	10.0	198	2900	2700	3000	3600	4140	7200
68.89	620/9	C812_0690 MB43	50	21	82	183	10.0	200	2900	2700	3000	3600	4140	7200



## 5.3 Dimensional drawings

In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

### Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

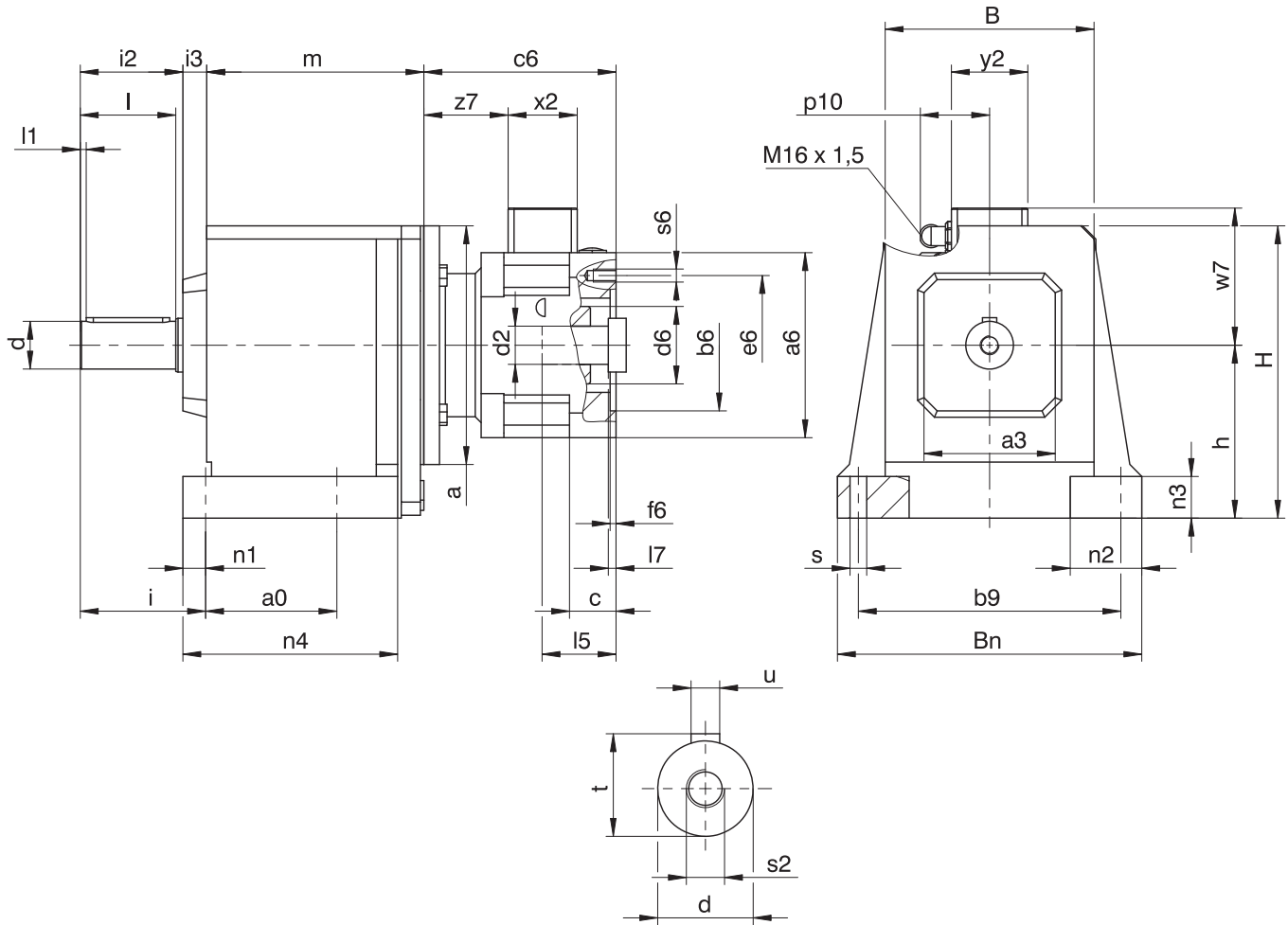
Solid shaft	Tolerance
Shaft $\varnothing$ fit $\leq$ 50 mm	DIN 748-1, ISO k6
Shaft $\varnothing$ fit $>$ 50 mm	DIN 748-1, ISO m6
Feather keys	DIN 6885-1, high form A

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

### 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

### 5.3.1 Solid shaft design with feather key, N housing design (foot)



C612: Motor adapter and gear unit are sometimes non-coaxial.

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

#### Dimensions of gear units

Type	a0	a3	b9	B	Bn	Ød	h	H	i	i2	i3	l	l1	n1	n2	n3	n4	Øs	s2	t	u
C0	62	60	110	92	132	20 <sub>k6</sub>	82	144	55	44	13	40	3	11	35	20	95.0	7	M6	22.5	A6×6×32
C1	70	80	150	124	176	25 <sub>k6</sub>	102	177	67	54	15	50	5	13	42	25	117.5	9	M10	28.0	A8×7×40
C2	85	95	170	138	200	30 <sub>k6</sub>	115	195	79	65	21	60	5	14	50	30	134.5	11	M10	33.0	A8×7×50
C3	105	95	185	150	215	30 <sub>k6</sub>	130	215	79	65	20	60	5	14	50	30	153.5	11	M10	33.0	A8×7×50
C4	110	110	220	175	255	40 <sub>k6</sub>	145	245	105	86	20	80	5	19	60	35	180.0	14	M16	43.0	A12×8×70
C5	130	130	245	192	290	40 <sub>k6</sub>	170	290	108	86	21	80	5	22	70	40	197.0	18	M16	43.0	A12×8×70
C6	215	177	245	225	300	50 <sub>k6</sub>	200	315	130	106	47	100	5	25	75	40	265.0	18	M16	53.5	A14×9×90
C7	235	192	300	265	365	60 <sub>m6</sub>	235	375	163	127	58	120	5	25	90	50	285.0	18	M20	64.0	A18×11×100
C8	300	223	340	310	435	70 <sub>m6</sub>	290	450	190	148	70	140	5	29	95	55	360.0	22	M20	74.5	A20×12×125

Type	MB23		MB33		MB43	
	a	m	a	m	a	m
C002	∅160	101.5	–	–	–	–
C102	∅160	122.0	∅200	124.0	–	–
C202	∅160	133.0	∅200	135.0	–	–
C302	∅160	152.5	∅200	154.5	∅250	157.5
C402	∅160	180.0	∅200	182.0	∅250	185.0
C502	∅160	200.0	∅200	202.0	∅250	205.0
C612	–	–	∅200	180.0	∅250	183.0
C712	–	–	∅200	201.0	∅250	203.0
C812	–	–	–	–	∅250	237.0

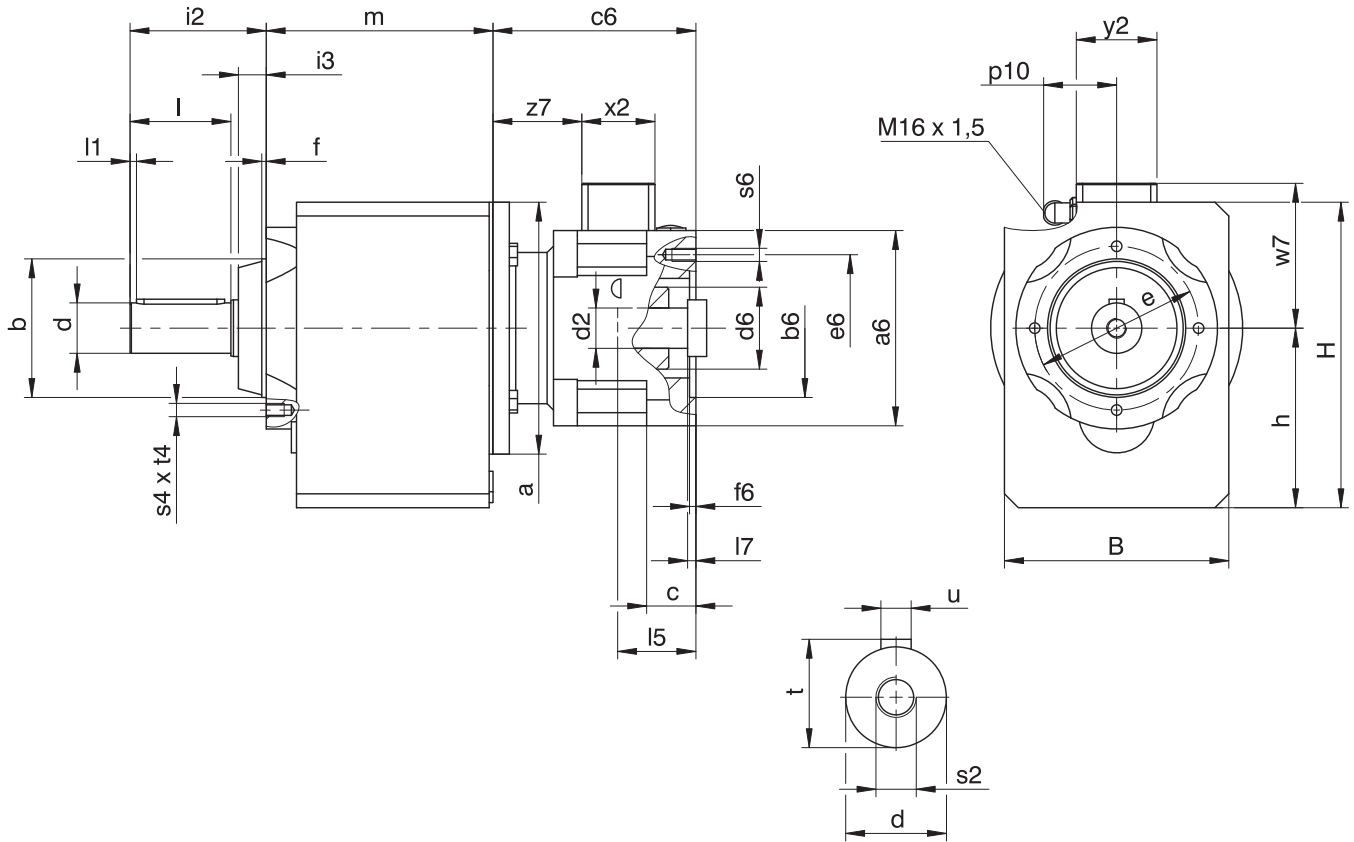
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
C_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
C_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

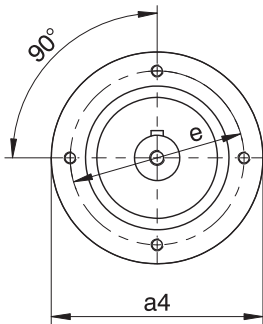
In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

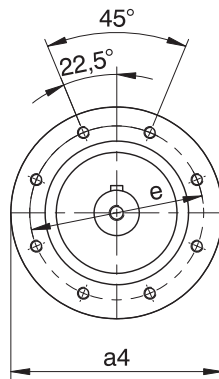
### 5.3.2 Solid shaft design with feather key, G housing design (pitch circle diameter)



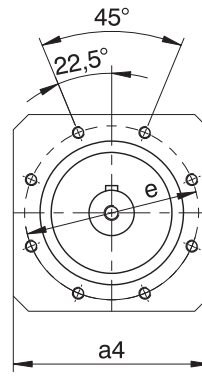
C0 – C4



C5



C6 – C8



C612: Motor adapter and gear unit are sometimes non-coaxial.

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

Dimensions of gear units

Type	a4	Øb	B	Ød	Øe	f	h	H	i2	i3	l	l1	s2	s4	t	t4	u
C0	Ø87	55 <sub>j6</sub>	97	20 <sub>k6</sub>	75	3.0	79.0	141.0	58	14	40	3	M6	M6	22.5	10	A6×6×32
C1	Ø120	80 <sub>j6</sub>	130	25 <sub>k6</sub>	100	3.0	100.0	175.0	71	17	50	5	M10	M6	28.0	13	A8×7×40
C2	Ø140	95 <sub>j6</sub>	142	30 <sub>k6</sub>	115	3.0	112.0	192.0	87	22	60	5	M10	M8	33.0	13	A8×7×50
C3	Ø140	95 <sub>j6</sub>	154	30 <sub>k6</sub>	115	3.0	127.0	212.0	87	22	60	5	M10	M8	33.0	13	A8×7×50
C4	Ø160	110 <sub>j6</sub>	178	40 <sub>k6</sub>	130	3.5	142.5	242.5	108	22	80	5	M16	M10	43.0	16	A12×8×70
C5	Ø192	130 <sub>j6</sub>	195	40 <sub>k6</sub>	165	3.5	166.0	286.0	109	23	80	5	M16	M10	43.0	16	A12×8×70
C6	□180	140 <sub>j6</sub>	225	50 <sub>k6</sub>	165	5.0	195.0	310.0	136	30	100	5	M16	M10	53.5	16	A14×9×90
C7	□195	155 <sub>j6</sub>	265	60 <sub>m6</sub>	185	8.0	231.0	371.0	164	37	120	5	M20	M12	64.0	19	A18×11×100
C8	□226	185 <sub>j6</sub>	310	70 <sub>m6</sub>	215	5.0	285.0	445.0	185	37	140	5	M20	M12	74.5	19	A20×12×125



Type	MB23		MB33		MB43	
	a	m	a	m	a	m
C002	∅160	100	–	–	–	–
C102	∅160	120	∅200	122	–	–
C202	∅160	132	∅200	134	–	–
C302	∅160	151	∅200	153	∅250	156
C402	∅160	178	∅200	180	∅250	183
C502	∅160	198	∅200	200	∅250	203
C612	–	–	∅200	197	∅250	200
C712	–	–	∅200	222	∅250	224
C812	–	–	–	–	∅250	270

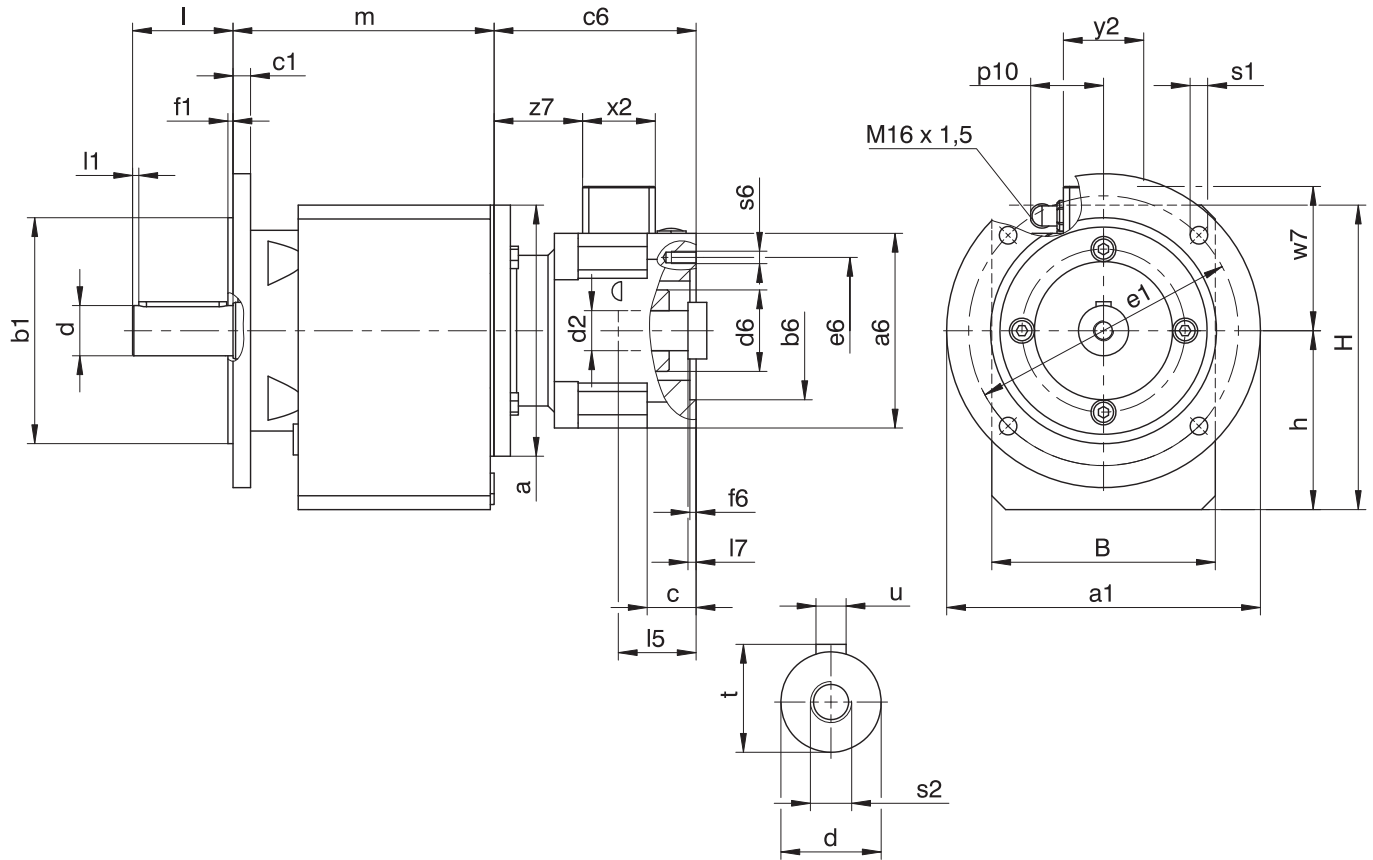
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
C_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
C_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 5.3.3 Solid shaft design with feather key, F housing design (round flange)



C612: Motor adapter and gear unit are sometimes non-coaxial.

Options: C0 – C5 also available with solid shaft without feather key; on request starting at C6.

#### Dimensions of gear units

Type	$\varnothing a1$	$\varnothing b1$	B	c1	$\varnothing d$	$\varnothing e1$	f1	h	H	l	l1	$\varnothing s1$	s2	t	u
C0	160	110 <sub>j6</sub>	97	10	20 <sub>k6</sub>	130	3.0	79.0	141.0	40	3	9	M6	22.5	A6×6×32
C1	200	130 <sub>j6</sub>	130	12	25 <sub>k6</sub>	165	3.5	100.0	175.0	50	5	11	M10	28.0	A8×7×40
C2	200	130 <sub>j6</sub>	142	12	30 <sub>k6</sub>	165	3.5	112.0	192.0	60	5	11	M10	33.0	A8×7×50
C3	250	180 <sub>j6</sub>	154	12	30 <sub>k6</sub>	215	4.0	127.0	212.0	60	5	14	M10	33.0	A8×7×50
C4	250	180 <sub>j6</sub>	178	14	40 <sub>k6</sub>	215	4.0	142.5	242.5	80	5	14	M16	43.0	A12×8×70
C5	300	230 <sub>j6</sub>	195	16	40 <sub>k6</sub>	265	4.0	166.0	286.0	80	5	14	M16	43.0	A12×8×70
C6	300	230 <sub>j6</sub>	225	17	50 <sub>k6</sub>	265	4.0	195.0	310.0	100	5	14	M16	53.5	A14×9×90
C7	350	250 <sub>h6</sub>	265	18	60 <sub>m6</sub>	300	5.0	231.0	371.0	120	5	18	M20	64.0	A18×11×100
C8	400	300 <sub>h6</sub>	310	20	70 <sub>m6</sub>	350	5.0	285.0	445.0	140	5	18	M20	74.5	A20×12×125

#### Dimensions of additional round flanges

Type	$\varnothing a1$	$\varnothing b1$	c1	$\varnothing e1$	f1	$\varnothing s1$
C0	120	80 <sub>j6</sub>	10	100	3.0	7
C0	140	95 <sub>j6</sub>	10	115	3.0	9
C1	140	95 <sub>j6</sub>	8	115	3.5	9
C1	160	110 <sub>j6</sub>	10	130	3.5	9
C2	160	110 <sub>j6</sub>	10	130	3.5	9
C2	250	180 <sub>j6</sub>	12	215	4.0	14
C3	160	110 <sub>j6</sub>	10	130	3.5	9
C3	200	130 <sub>j6</sub>	12	165	3.5	11
C4	200	130 <sub>j6</sub>	14	165	3.5	11
C4	300	230 <sub>j6</sub>	14	265	4.0	14
C5	250	180 <sub>j6</sub>	14	215	4.0	14
C8	350	250 <sub>h6</sub>	18	300	5.0	18
C8	450	350 <sub>h6</sub>	20	400	5.0	18

Type	MB23		MB33		MB43	
	a	m	a	m	a	m
C002	∅160	118	–	–	–	–
C102	∅160	141	∅200	143	–	–
C202	∅160	159	∅200	161	–	–
C302	∅160	178	∅200	180	∅250	183
C402	∅160	206	∅200	208	∅250	211
C502	∅160	227	∅200	229	∅250	232
C612	–	–	∅200	233	∅250	236
C712	–	–	∅200	266	∅250	268
C812	–	–	–	–	∅250	315

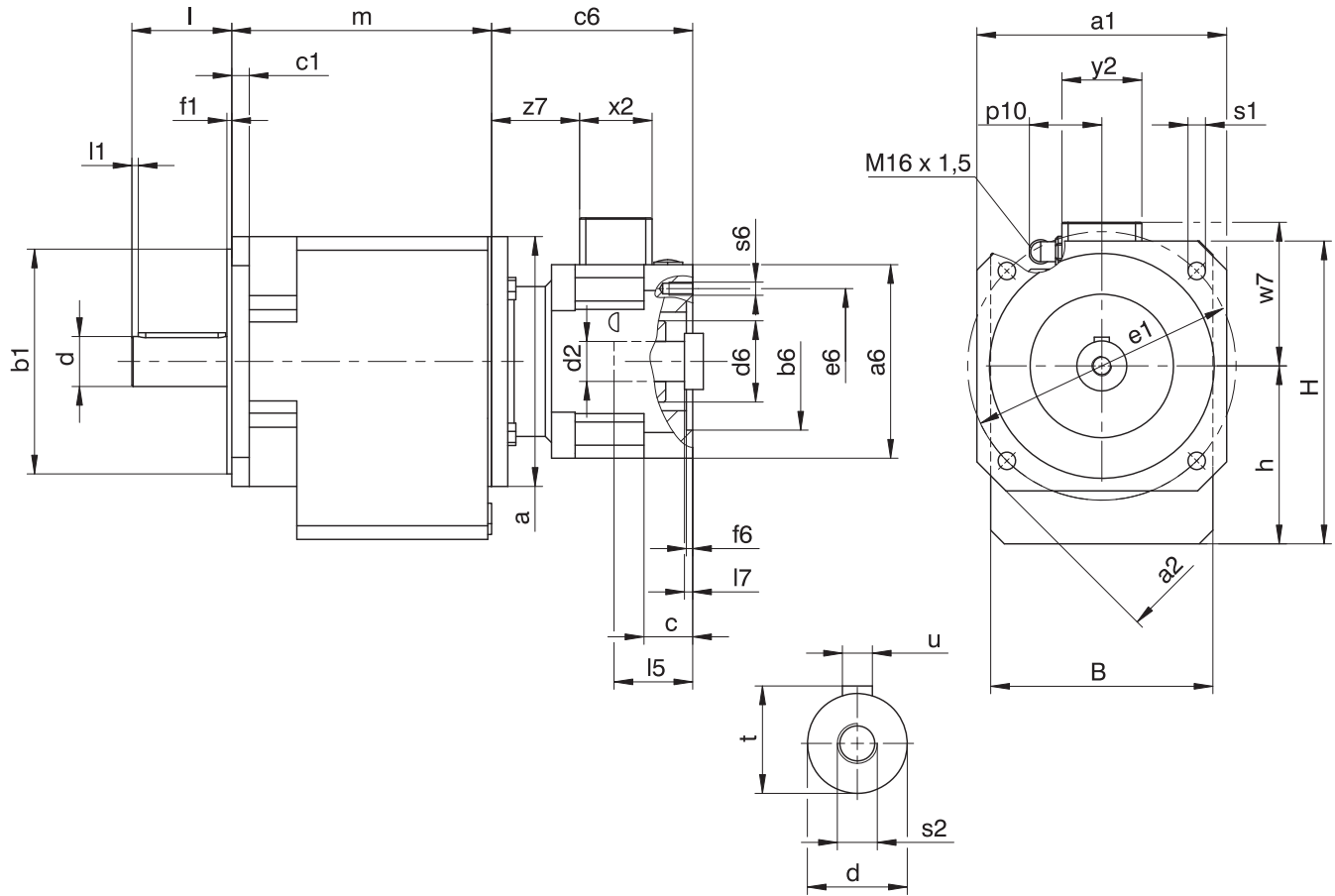
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
C_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
C_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 5.3.4 Solid shaft design with feather key, Q housing design (square flange)



C612: Motor adapter and gear unit are sometimes non-coaxial.

**Options:** C0 – C4 also available with solid shaft without feather key.

#### Dimensions of gear units

Type	□a1	□a2	∅b1	B	c1	∅d	∅e1	f1	h	H	l	l1	∅s1	s2	t	u
C0	124	160	110 <sub>j6</sub>	97	9	20 <sub>k6</sub>	130	3.0	79.0	141.0	40	3	9	M6	22.5	A6×6×32
C1	145	192	130 <sub>j6</sub>	130	11	25 <sub>k6</sub>	165	3.5	100.0	175.0	50	5	11	M10	28.0	A8×7×40
C2	145	192	130 <sub>j6</sub>	142	11	30 <sub>k6</sub>	165	3.5	112.0	192.0	60	5	11	M10	33.0	A8×7×50
C3	200	250	180 <sub>j6</sub>	154	14	30 <sub>k6</sub>	215	4.0	127.0	212.0	60	5	14	M10	33.0	A8×7×50
C4	200	250	180 <sub>j6</sub>	178	14	40 <sub>k6</sub>	215	4.0	142.5	242.5	80	5	14	M16	43.0	A12×8×70

Type	MB23		MB33		MB43	
	a	m	a	m	a	m
C002	∅160	118	-	-	-	-
C102	∅160	141	∅200	143	-	-
C202	∅160	159	∅200	161	-	-
C302	∅160	178	∅200	180	∅250	183
C402	∅160	206	∅200	208	∅250	211

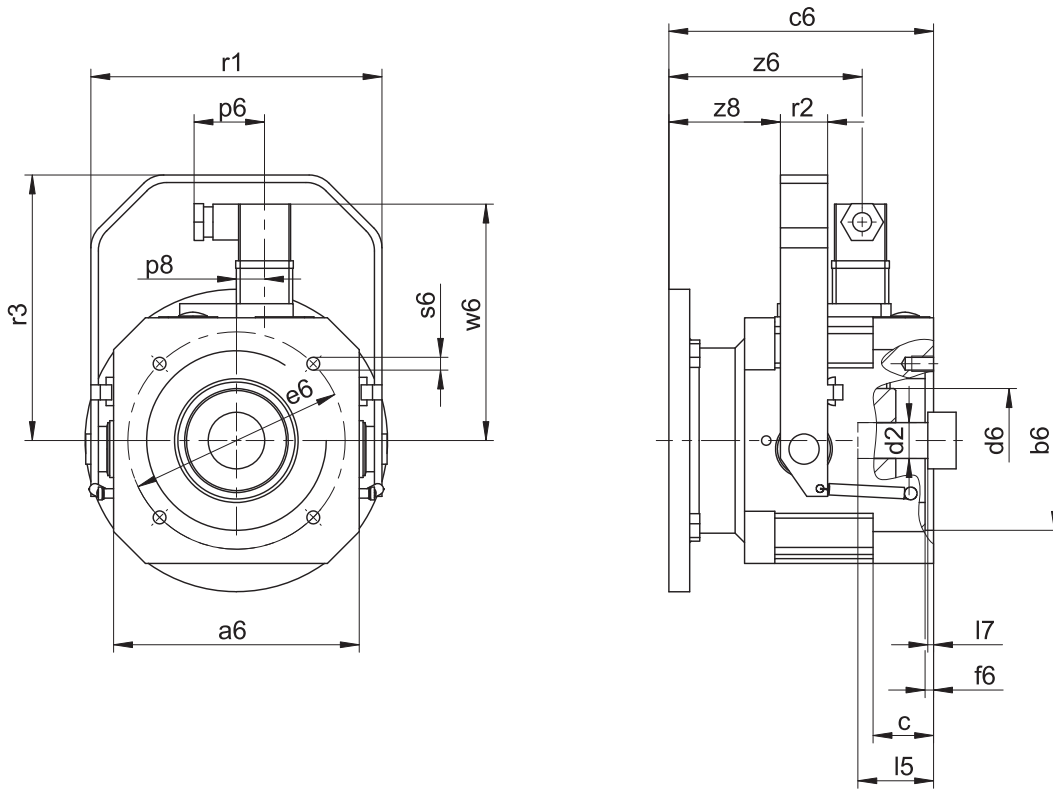
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
C_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
C_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
C_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
C_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

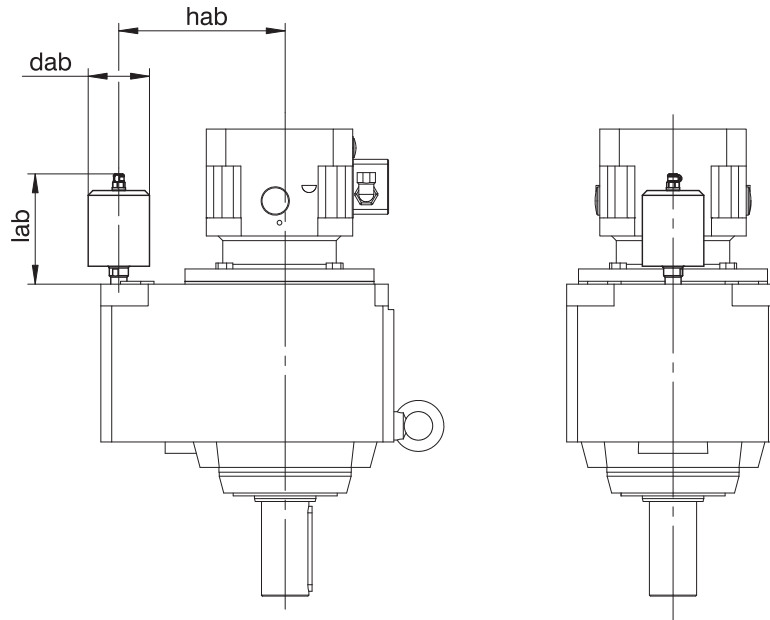
### 5.3.5 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5

### 5.3.6 Oil expansion tank



#### Dimensions

Type	MB33			MB43		
	dab	hab	lab	dab	hab	lab
C612	65	170	114.5	65	170	115.5
C712	73	205	129.5	73	205	129.5
C812	–	–	–	73	255	129.5

More information can be found in the chapter [▶ 5.6.5](#)

## 5.4 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.

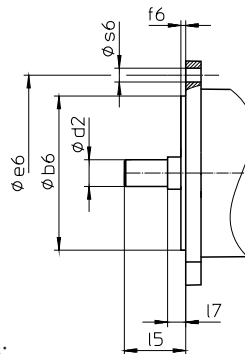
### Example code

C	2	0	2	N	0280	MB	2	3
---	---	---	---	---	------	----	---	---

### Explanation

Code	Designation	Design
C	Type	Helical gear unit
2	Size	2 (example)
0	Generation	Generation 0
1		Generation 1
2	Stages	Two-stage
3		Three-stage
G	Housing	Pitch circle diameter
F		Round flange
Q		Square flange
N		Foot
0280	Transmission ratio (i x 10 rounded)	i = 28.24 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

To choose a suitable motor connection, use the STÖBER Configurator at

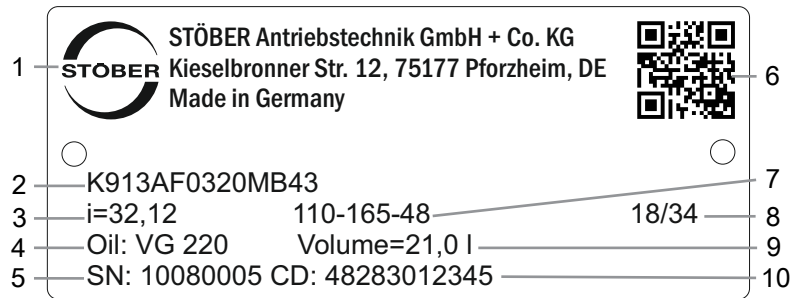
<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Mounting position, see the chapter [▶ 5.5.6]
- Oil expansion tank (recommended for gear units in mounting position EL5), see the chapter [▶ 5.6.5]
- Standard or reinforced output bearing
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 5.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 5.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 5.5.8]
- Manual release (optional), see the chapter [▶ 5.3.5]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 5.5.2.6]



## 5.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 5.5 Product description

### 5.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

MR motor adapter for attaching asynchronous motors



On request

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

LM Lean motor



Catalog ID 443016\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 5.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 5.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

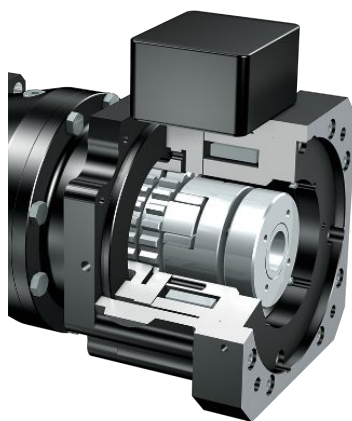


Fig. 1: Motor adapter with ServoStop brake

### 5.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 5.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 5.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 5.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

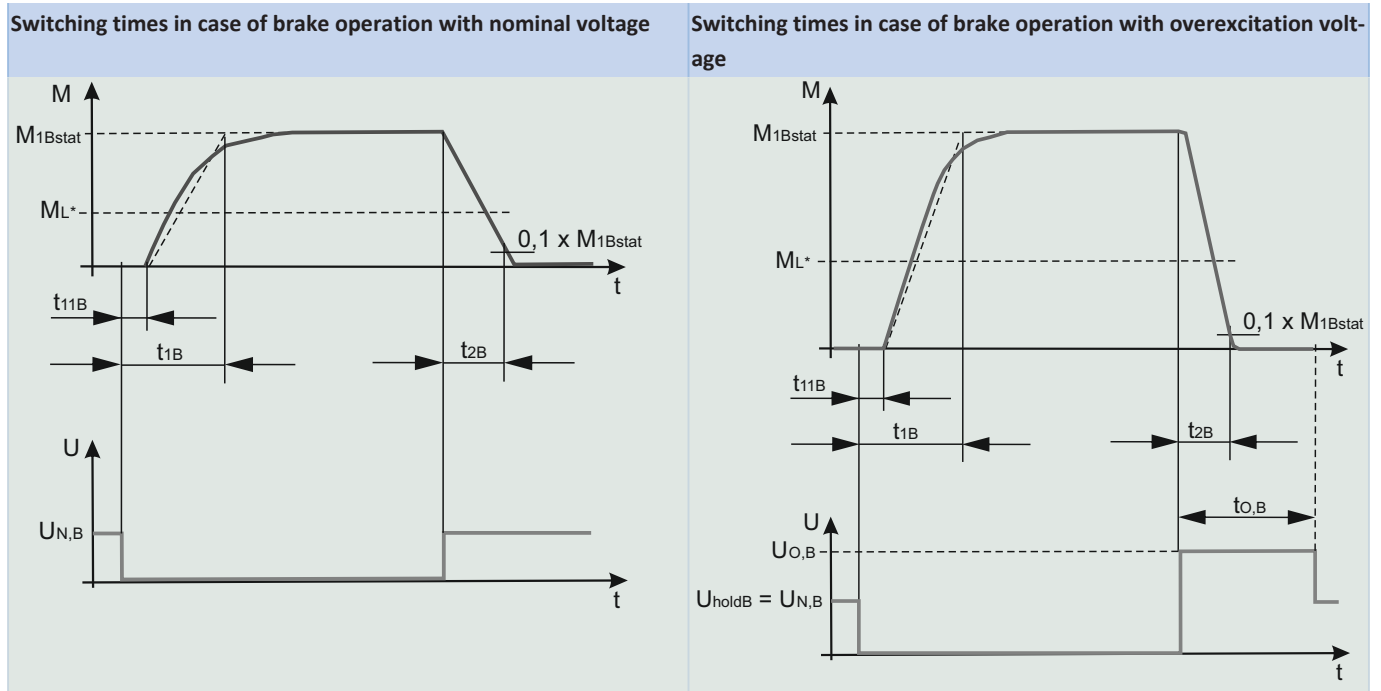
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

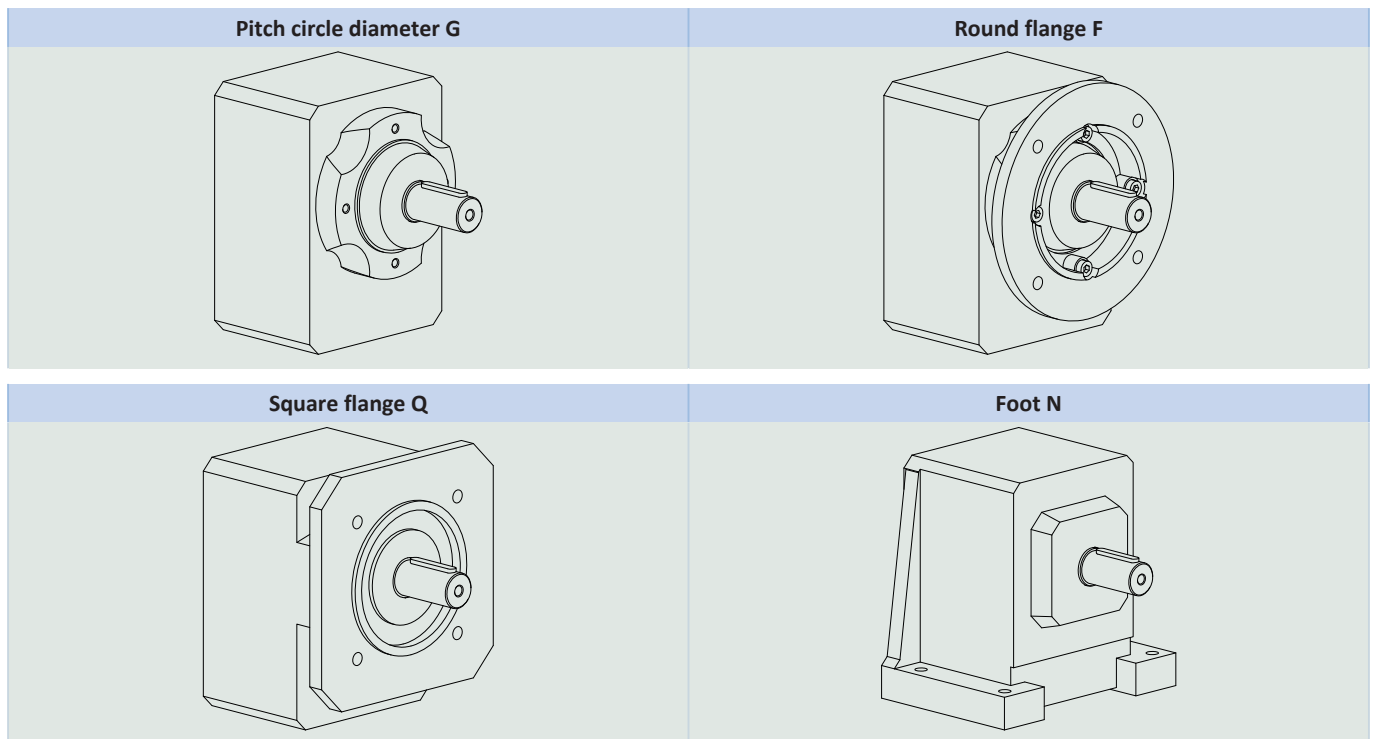
Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 5.5.2.6 Brake switching times



### 5.5.3 Housing design



	G	F	Q	N
C0	✓	✓	✓	✓
C1	✓	✓	✓	✓
C2	✓	✓	✓	✓
C3	✓	✓	✓	✓
C4	✓	✓	✓	✓
C5	✓	✓	-	✓
C6	✓	✓	-	✓
C7	✓	✓	-	✓
C8	✓	✓	-	✓
C9	✓	✓	-	✓

## 5.5.4 Shaft design

Gear units in sizes C0 – C9 come standard with a solid shaft with feather key.

Gear units in sizes C0 – C5 can be ordered with the option of a solid shaft without feather key. Only upon request starting at size C6.

## 5.5.5 Installation conditions

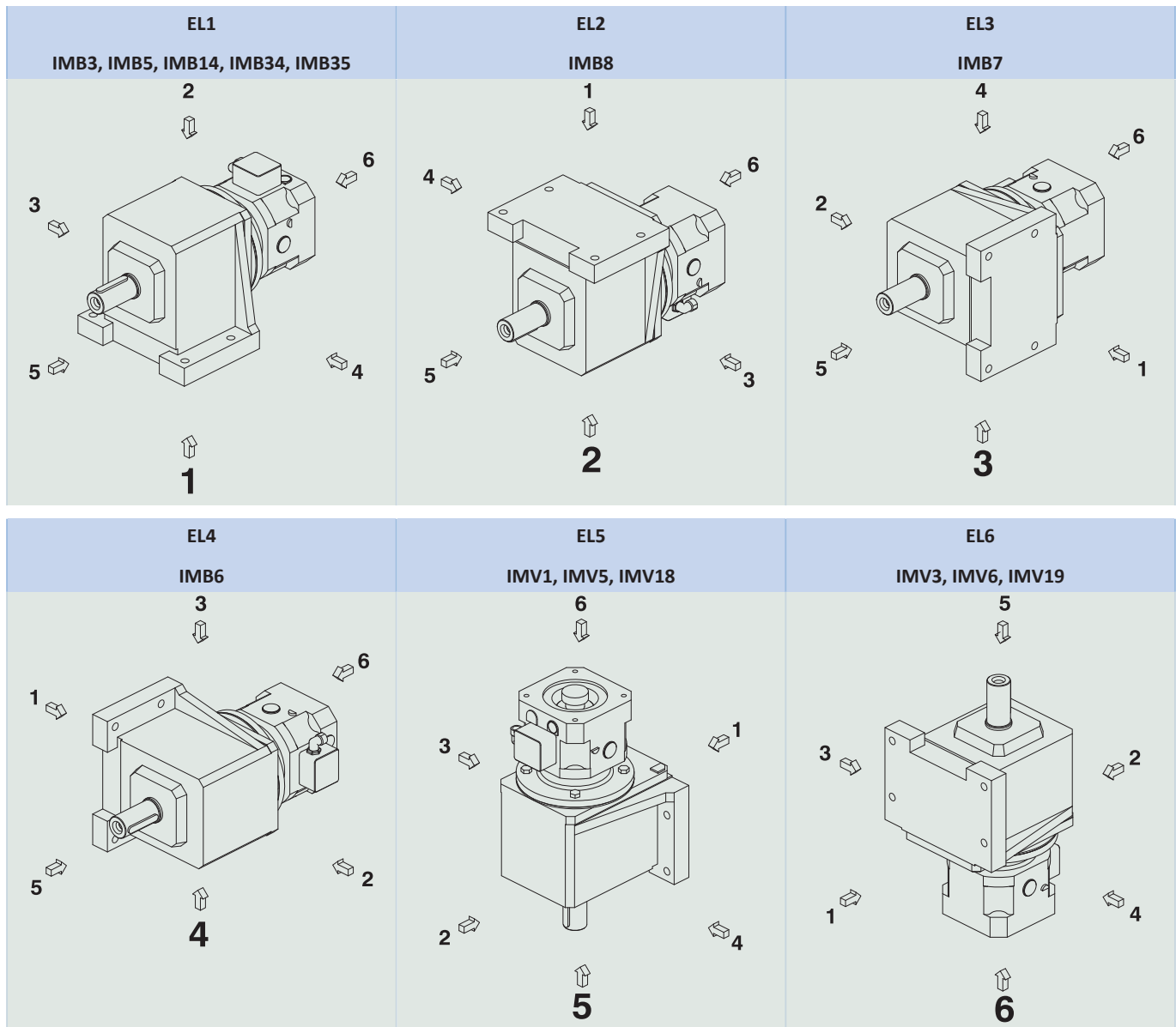
### Fastening the gear units on the machine side using the pitch circle diameter

The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 10.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

## 5.5.6 Mounting positions

The following table shows the standard mounting positions.

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



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

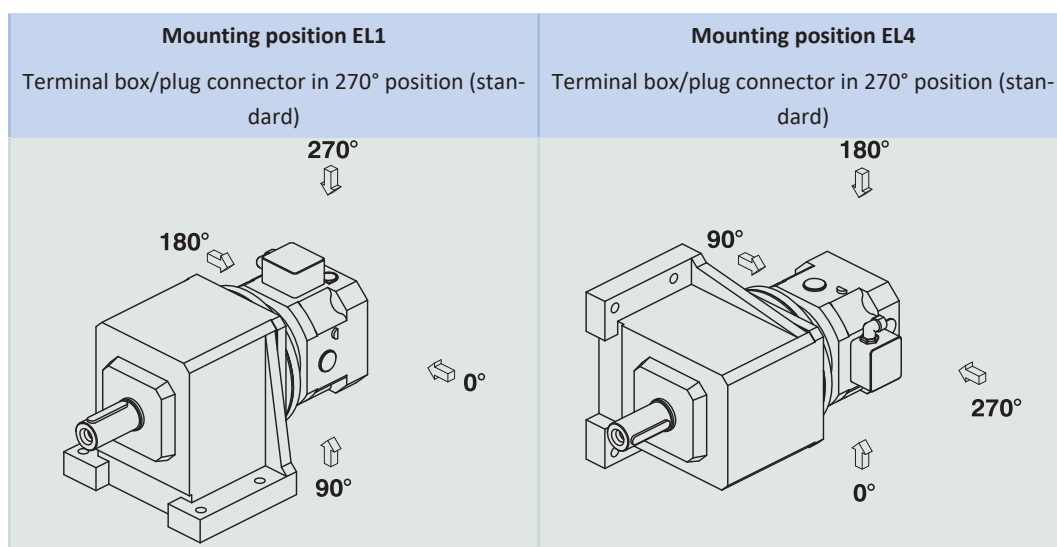
## 5.5.7 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

## 5.5.8 Position of the terminal box/plug connector



Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

## 5.5.9 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ two-stage	97%
$\eta_{\text{get}}$ three-stage	96%
Protection class: <sup>1</sup>	IP65

## 5.5.10 Maintenance

The instructions for maintenance can be found in the operating manual, ID 443027\_en, at <http://www.stoerber.de/en/downloads/>. Enter the ID of the documentation in the Search... field.

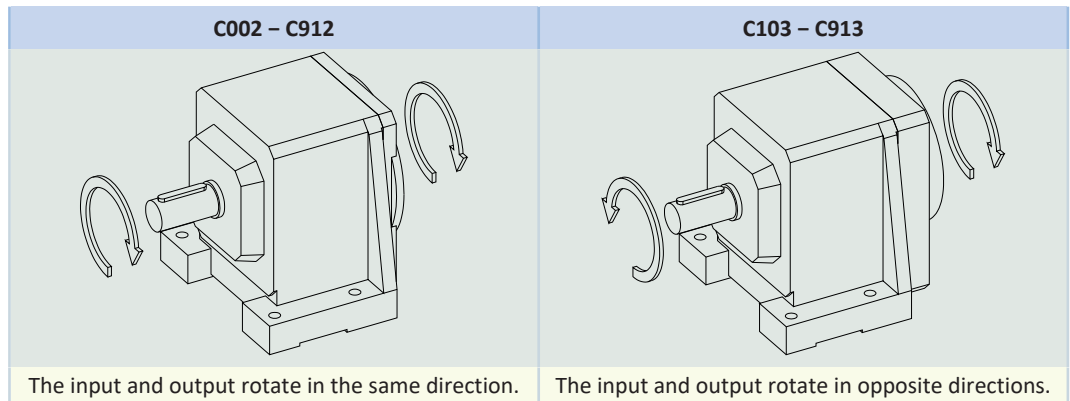
### Ventilation

Air release valves are fitted as a standard feature and independently of installation position for gear unit sizes C6 to C9.

For the position and dimensions of the air release valve, refer to the 3D model.

Download the 3D model at <https://configurator.stoerber.de/en-US/>.

### 5.5.11 Direction of rotation



The pictures show mounting position EL1.

## 5.6 Project configuration

Project your drives using our SERVOfsoft designing software. Download SERVOfsoft for free at <https://www.stoeber.de/en/ServoSoft>.

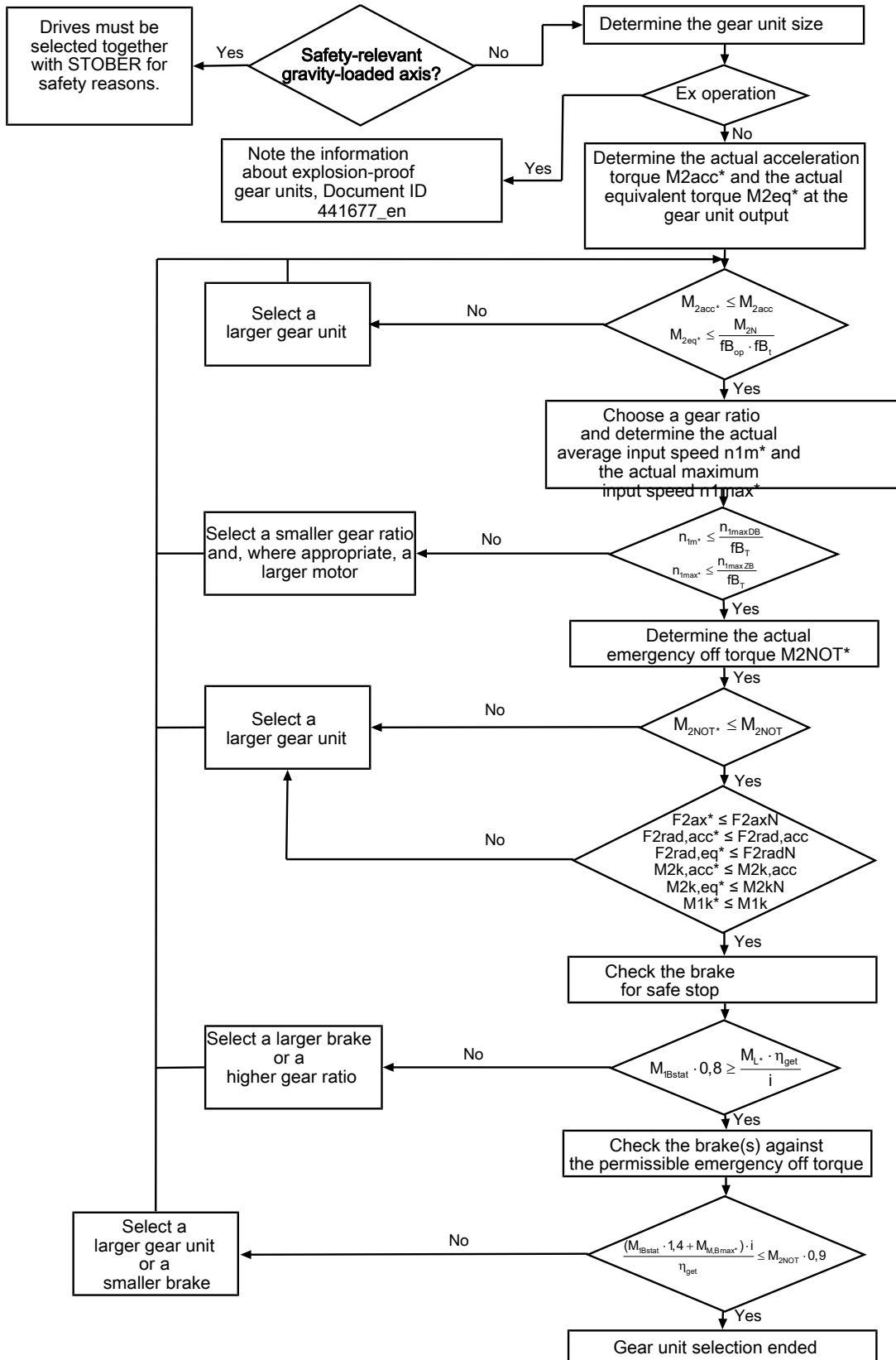
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

### 5.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$ ,  $M_{2NOT}$  and  $M_{2N}$ .

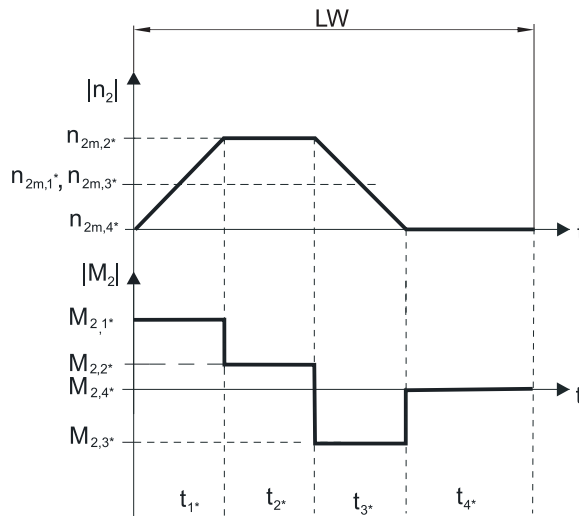
The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

The values for  $fb_T$ ,  $fb_{op}$  and  $fb_t$  can be found in the corresponding tables in this chapter.



**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 maximum acceleration torque**

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**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  $t_{1*} + \dots + t_{3*} \geq 6$  min, calculate  $n_{2m*}$  without the rest phase  $t_{4*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ }^\circ\text{C}$	0.9
	$\leq 30\text{ }^\circ\text{C}$	1.0
	$\leq 40\text{ }^\circ\text{C}$	1.15
Motor with convection cooling	$\leq 20\text{ }^\circ\text{C}$	1.0
	$\leq 30\text{ }^\circ\text{C}$	1.1
	$\leq 40\text{ }^\circ\text{C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 80\text{ }^\circ\text{C}$  must not be exceeded. Doing so may result in damage to the gear unit.

### 5.6.2 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  $n_{2m^*} \leq 20\text{ rpm}$  ( $F_{2axN} = F_{2ax20}$ ;  $F_{2radN} = F_{2rad20}$ ;  $M_{2kN} = M_{2k20}$ )
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

**Permitted shaft loads**

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
C0	20.0	500	1900	1900	80	80
C1	30.0	850	3400	3400	190	190
C2	30.0	1050	4200	4200	260	260
C3	30.0	1400	5650	5650	350	350
C4	35.0	2400	9700	9700	750	750
C5	42.0	3000	11000	11000	900	900
C6	40.0	4000	16000	16000	1500	1500
C7	45.0	5500	22000	22000	2400	2400
C8	50.0	7500	30000	30000	3700	3700
C9	55.0	9500	37000	37000	5200	5200

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

The following applies to output speeds  $n_{2m^*} > 20\text{ rpm}$ :

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

$$F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

$$M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

The values for  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  can be found in the table "Permitted shaft loads" in this chapter.

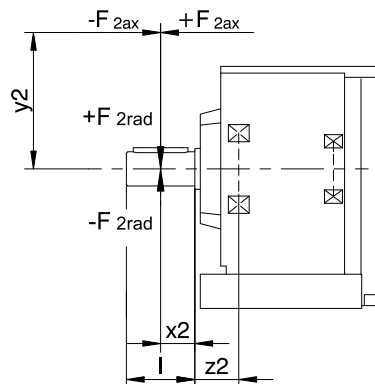


Fig. 2: Force application points

The specified values for  $F_{2rad20}$  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:

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

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  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  by a factor of two.

Also note the calculation for equivalent values:

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

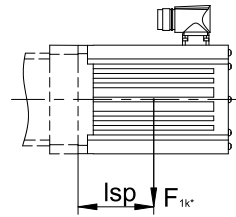
$$F_{2rad,eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \dots + |n_{2m,n^*}| \cdot t_{n^*}}}$$

### 5.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 5.6.4 Radial shaft seal rings

#### Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. 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.

### 5.6.5 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

#### Notes

- We recommend using an oil expansion tank in mounting position EL5 (additional cost) for fast running gear units with an input speed  $n_1 > 1750$  rpm and gear ratios  $i < 20$ .
- The oil expansion tank can only be used with certain sizes; see the chapter Oil expansion tank

## 5.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

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

Documentation	ID
Operating manual gear units, geared motors C	443365_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en

# 6 F offset helical gear units

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## 6 Offset helical gear units

F

### 6.1 Overview

Offset helical gear units with large axial distances with integrated brake

#### Features

Power density	★★★★☆
Backlash	★★★★☆
Price category	€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
FKM seal ring at the input	✓
Large axial distances, suitable for confined situations	✓
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	4.3 – 140
$M_{2acc}$	100 – 1100 Nm
$\Delta\phi_2$	5 – 11 arcmin
$\eta_{get}$	97 %

## 6.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	i <sub>exakt</sub>	Type	M <sub>1Betst</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redll</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F102 (M<sub>2acc,max</sub> = 120 Nm)</b>															
4.308	56/13	F102_0043 MB23	8.0	29	8.7	21	11.0	8.0	5.2	3500	3000	4000	69	103	200
4.308	56/13	F102_0043 MB23	12	24	8.7	21	11.0	8.0	5.2	3500	3000	4000	69	103	200
4.308	56/13	F102_0043 MB23	16	18	8.7	21	11.0	8.0	5.2	3500	3000	4000	69	103	200
4.308	56/13	F102_0043 MB23	24	6.9	8.7	21	11.0	8.0	5.2	3500	3000	4000	69	103	200
6.462	84/13	F102_0065 MB23	8.0	16	7.9	21	11.0	8.0	5.8	3500	3000	4000	79	105	200
6.462	84/13	F102_0065 MB23	12	10	7.9	21	11.0	8.0	5.8	3500	3000	4000	79	105	200
6.462	84/13	F102_0065 MB23	16	4.6	7.9	21	11.0	8.0	5.8	3500	3000	4000	79	105	200
7.156	322/45	F102_0072 MB23	8.0	13	7.8	21	11.0	8.0	6.0	3700	3600	4000	81	105	200
7.156	322/45	F102_0072 MB23	12	7.6	7.8	21	11.0	8.0	6.0	3700	3600	4000	81	105	200
7.156	322/45	F102_0072 MB23	16	2.0	7.8	21	11.0	8.0	6.0	3700	3600	4000	81	105	200
8.948	1029/115	F102_0089 MB23	8.0	8.3	7.6	21	11.0	8.0	6.2	3700	3600	4000	88	105	200
8.948	1029/115	F102_0089 MB23	12	2.7	7.6	21	11.0	8.0	6.2	3700	3600	4000	88	105	200
10.92	273/25	F102_0110 MB23	8.0	4.8	7.5	21	11.0	8.0	6.3	4000	4000	4000	94	105	200
13.59	231/17	F102_0135 MB23	8.0	1.6	7.4	21	11.0	8.0	6.4	4000	4000	4000	101	105	200
18.46	1495/81	F102_0185 MB23	8.0	0.2	7.5	21	11.0	6.0	7.6	3700	3600	4000	111	120	240
<b>F202 (M<sub>2acc,max</sub> = 270 Nm)</b>															
4.680	2616/559	F202_0047 MB23	8.0	31	11	30	11.0	8.0	10	3100	2600	4000	140	170	286
4.680	2616/559	F202_0047 MB23	12	25	11	30	11.0	8.0	10	3100	2600	4000	140	170	286
4.680	2616/559	F202_0047 MB23	16	20	11	30	11.0	8.0	10	3100	2600	4000	140	170	286
4.680	2616/559	F202_0047 MB23	24	8.4	11	30	11.0	8.0	10	3100	2600	4000	140	170	286
4.680	2616/559	F202_0047 MB23	30	–	11	30	11.0	8.0	10	3100	2600	4000	140	170	286
4.680	2616/559	F202_0047 MB33	16	52	32	37	11.0	8.0	12	3100	2600	4000	140	210	400
4.680	2616/559	F202_0047 MB33	24	41	32	37	11.0	8.0	12	3100	2600	4000	140	210	400
4.680	2616/559	F202_0047 MB33	32	30	32	37	11.0	8.0	12	3100	2600	4000	140	210	400
4.680	2616/559	F202_0047 MB33	45	12	32	37	11.0	8.0	12	3100	2600	4000	140	210	400
5.552	5341/962	F202_0056 MB23	8.0	31	10	30	11.0	8.0	11	3100	2600	4000	149	202	339
5.552	5341/962	F202_0056 MB23	12	25	10	30	11.0	8.0	11	3100	2600	4000	149	202	339
5.552	5341/962	F202_0056 MB23	16	20	10	30	11.0	8.0	11	3100	2600	4000	149	202	339
5.552	5341/962	F202_0056 MB23	24	8.4	10	30	11.0	8.0	11	3100	2600	4000	149	202	339
5.552	5341/962	F202_0056 MB23	30	–	10	30	11.0	8.0	11	3100	2600	4000	149	202	339
5.552	5341/962	F202_0056 MB33	16	40	31	37	11.0	8.0	12	3100	2600	4000	149	210	400
5.552	5341/962	F202_0056 MB33	24	29	31	37	11.0	8.0	12	3100	2600	4000	149	210	400
5.552	5341/962	F202_0056 MB33	32	18	31	37	11.0	8.0	12	3100	2600	4000	149	210	400
7.167	5777/806	F202_0072 MB23	8.0	31	9.1	30	11.0	8.0	13	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB23	12	25	9.1	30	11.0	8.0	13	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB23	16	20	9.1	30	11.0	8.0	13	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB23	24	8.4	9.1	30	11.0	8.0	13	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB23	30	–	9.1	30	11.0	8.0	13	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB33	16	26	30	37	11.0	8.0	14	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB33	24	15	30	37	11.0	8.0	14	3600	3100	4000	162	210	400
7.167	5777/806	F202_0072 MB33	32	3.9	30	37	11.0	8.0	14	3600	3100	4000	162	210	400
9.006	3161/351	F202_0090 MB23	8.0	28	8.5	30	11.0	8.0	14	3600	3100	4000	175	210	400
9.006	3161/351	F202_0090 MB23	12	22	8.5	30	11.0	8.0	14	3600	3100	4000	175	210	400
9.006	3161/351	F202_0090 MB23	16	16	8.5	30	11.0	8.0	14	3600	3100	4000	175	210	400
9.006	3161/351	F202_0090 MB23	24	5.2	8.5	30	11.0	8.0	14	3600	3100	4000	175	210	400
9.006	3161/351	F202_0090 MB33	16	16	29	37	11.0	8.0	14	3600	3100	4000	175	210	400
9.006	3161/351	F202_0090 MB33	24	5.2	29	37	11.0	8.0	14	3600	3100	4000	175	210	400
10.80	7303/676	F202_0110 MB23	8.0	21	8.1	30	11.0	8.0	14	3800	3500	4000	185	210	400
10.80	7303/676	F202_0110 MB23	12	16	8.1	30	11.0	8.0	14	3800	3500	4000	185	210	400
10.80	7303/676	F202_0110 MB23	16	9.9	8.1	30	11.0	8.0	14	3800	3500	4000	185	210	400
10.80	7303/676	F202_0110 MB33	16	9.9	29	37	11.0	8.0	15	3800	3500	4000	185	210	400
13.63	109/8	F202_0135 MB23	8.0	14	7.8	30	11.0	8.0	15	3800	3500	4000	200	210	400
13.63	109/8	F202_0135 MB23	12	8.8	7.8	30	11.0	8.0	15	3800	3500	4000	200	210	400

6.2 Selection tables 6 F offset helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F202 (M<sub>2acc,max</sub> = 270 Nm)</b>															
13.63	109/8	F202_0135 MB23	16	3.2	7.8	30	11.0	8.0	15	3800	3500	4000	200	210	400
13.63	109/8	F202_0135 MB33	16	3.2	28	37	11.0	8.0	15	3800	3500	4000	200	210	400
18.65	6360/341	F202_0185 MB23	8.0	11	8.1	30	11.0	6.0	17	3600	3100	4000	222	270	480
18.65	6360/341	F202_0185 MB23	12	5.7	8.1	30	11.0	6.0	17	3600	3100	4000	222	270	480
18.65	6360/341	F202_0185 MB23	16	0.1	8.1	30	11.0	6.0	17	3600	3100	4000	222	270	480
18.65	6360/341	F202_0185 MB33	16	0.1	29	37	11.0	6.0	17	3600	3100	4000	222	270	480
23.43	2320/99	F202_0230 MB23	8.0	6.7	7.8	30	11.0	6.0	17	3600	3100	4000	240	270	480
23.43	2320/99	F202_0230 MB23	12	1.1	7.8	30	11.0	6.0	17	3600	3100	4000	240	270	480
28.11	4020/143	F202_0280 MB23	8.0	3.7	7.7	30	11.0	6.0	18	3800	3500	4000	240	270	480
35.46	390/11	F202_0350 MB23	8.0	0.6	7.5	30	11.0	6.0	18	3800	3500	4000	240	270	480
<b>F302 (M<sub>2acc,max</sub> = 450 Nm)</b>															
4.644	4992/1075	F302_0046 MB23	8.0	31	15	37	11.0	8.0	12	3000	2600	4000	169	169	284
4.644	4992/1075	F302_0046 MB23	12	25	15	37	11.0	8.0	12	3000	2600	4000	169	169	284
4.644	4992/1075	F302_0046 MB23	16	20	15	37	11.0	8.0	12	3000	2600	4000	169	169	284
4.644	4992/1075	F302_0046 MB23	24	8.4	15	37	11.0	8.0	12	3000	2600	4000	169	169	284
4.644	4992/1075	F302_0046 MB23	30	–	15	37	11.0	8.0	12	3000	2600	4000	169	169	284
4.644	4992/1075	F302_0046 MB33	16	100	37	44	11.0	8.0	14	3000	2600	4000	233	349	650
4.644	4992/1075	F302_0046 MB33	24	89	37	44	11.0	8.0	14	3000	2600	4000	233	349	650
4.644	4992/1075	F302_0046 MB33	32	77	37	44	11.0	8.0	14	3000	2600	4000	233	349	650
4.644	4992/1075	F302_0046 MB33	45	59	37	44	11.0	8.0	14	3000	2600	4000	233	349	650
5.720	143/25	F302_0057 MB23	8.0	31	13	37	11.0	8.0	14	3000	2600	4000	208	208	350
5.720	143/25	F302_0057 MB23	12	25	13	37	11.0	8.0	14	3000	2600	4000	208	208	350
5.720	143/25	F302_0057 MB23	16	20	13	37	11.0	8.0	14	3000	2600	4000	208	208	350
5.720	143/25	F302_0057 MB23	24	8.4	13	37	11.0	8.0	14	3000	2600	4000	208	208	350
5.720	143/25	F302_0057 MB23	30	–	13	37	11.0	8.0	14	3000	2600	4000	208	208	350
5.720	143/25	F302_0057 MB33	16	76	33	44	11.0	8.0	16	3000	2600	4000	250	350	642
5.720	143/25	F302_0057 MB33	24	64	33	44	11.0	8.0	16	3000	2600	4000	250	350	642
5.720	143/25	F302_0057 MB33	32	53	33	44	11.0	8.0	16	3000	2600	4000	250	350	642
5.720	143/25	F302_0057 MB33	45	35	33	44	11.0	8.0	16	3000	2600	4000	250	350	642
7.172	208/29	F302_0072 MB23	8.0	31	11	37	11.0	8.0	16	3500	3100	4000	261	261	438
7.172	208/29	F302_0072 MB23	12	25	11	37	11.0	8.0	16	3500	3100	4000	261	261	438
7.172	208/29	F302_0072 MB23	16	20	11	37	11.0	8.0	16	3500	3100	4000	261	261	438
7.172	208/29	F302_0072 MB23	24	8.4	11	37	11.0	8.0	16	3500	3100	4000	261	261	438
7.172	208/29	F302_0072 MB23	30	–	11	37	11.0	8.0	16	3500	3100	4000	261	261	438
7.172	208/29	F302_0072 MB33	16	57	32	44	11.0	8.0	17	3500	3100	4000	269	350	650
7.172	208/29	F302_0072 MB33	24	46	32	44	11.0	8.0	17	3500	3100	4000	269	350	650
7.172	208/29	F302_0072 MB33	32	34	32	44	11.0	8.0	17	3500	3100	4000	269	350	650
7.172	208/29	F302_0072 MB33	45	16	32	44	11.0	8.0	17	3500	3100	4000	269	350	650
8.986	5616/625	F302_0090 MB23	8.0	31	9.8	37	11.0	8.0	17	3500	3100	4000	290	327	549
8.986	5616/625	F302_0090 MB23	12	25	9.8	37	11.0	8.0	17	3500	3100	4000	290	327	549
8.986	5616/625	F302_0090 MB23	16	20	9.8	37	11.0	8.0	17	3500	3100	4000	290	327	549
8.986	5616/625	F302_0090 MB23	24	8.4	9.8	37	11.0	8.0	17	3500	3100	4000	290	327	549
8.986	5616/625	F302_0090 MB23	30	–	9.8	37	11.0	8.0	17	3500	3100	4000	290	327	549
8.986	5616/625	F302_0090 MB33	16	41	30	44	11.0	8.0	18	3500	3100	4000	290	350	650
8.986	5616/625	F302_0090 MB33	24	30	30	44	11.0	8.0	18	3500	3100	4000	290	350	650
8.986	5616/625	F302_0090 MB33	32	18	30	44	11.0	8.0	18	3500	3100	4000	290	350	650
8.986	5616/625	F302_0090 MB33	45	0.1	30	44	11.0	8.0	18	3500	3100	4000	290	350	650
10.79	1456/135	F302_0110 MB23	8.0	31	9.1	37	11.0	8.0	18	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB23	12	25	9.1	37	11.0	8.0	18	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB23	16	20	9.1	37	11.0	8.0	18	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB23	24	8.4	9.1	37	11.0	8.0	18	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB23	30	–	9.1	37	11.0	8.0	18	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB33	16	30	30	44	11.0	8.0	19	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB33	24	19	30	44	11.0	8.0	19	3700	3500	4000	308	350	650
10.79	1456/135	F302_0110 MB33	32	7.8	30	44	11.0	8.0	19	3700	3500	4000	308	350	650
13.38	7696/575	F302_0135 MB23	8.0	31	8.5	37	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB23	12	25	8.5	37	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB23	16	20	8.5	37	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB23	24	8.4	8.5	37	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB23	30	–	8.5	37	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB33	16	20	29	44	11.0	8.0	19	3700	3500	4000	331	350	650
13.38	7696/575	F302_0135 MB33	24	8.8	29	44	11.0	8.0	19	3700	3500	4000	331	350	650
18.77	4900/261	F302_0190 MB23	8.0	26	9.1	37	11.0	6.0	21	3500	3100	4000	371	450	800
18.77	4900/261	F302_0190 MB23	12	20	9.1	37	11.0	6.0	21	3500	3100	4000	371	450	800



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F302 (M<sub>2acc,max</sub> = 450 Nm)</b>															
18.77	4900/261	F302_0190 MB23	16	15	9.1	37	11.0	6.0	21	3500	3100	4000	371	450	800
18.77	4900/261	F302_0190 MB23	24	3.6	9.1	37	11.0	6.0	21	3500	3100	4000	371	450	800
18.77	4900/261	F302_0190 MB33	16	15	30	44	11.0	6.0	21	3500	3100	4000	371	450	800
18.77	4900/261	F302_0190 MB33	24	3.6	30	44	11.0	6.0	21	3500	3100	4000	371	450	800
23.52	588/25	F302_0240 MB23	8.0	18	8.6	37	11.0	6.0	21	3500	3100	4000	400	450	800
23.52	588/25	F302_0240 MB23	12	13	8.6	37	11.0	6.0	21	3500	3100	4000	400	450	800
23.52	588/25	F302_0240 MB23	16	7.3	8.6	37	11.0	6.0	21	3500	3100	4000	400	450	800
23.52	588/25	F302_0240 MB33	16	7.3	29	44	11.0	6.0	21	3500	3100	4000	400	450	800
28.23	6860/243	F302_0280 MB23	8.0	14	8.2	37	11.0	6.0	21	3700	3500	4000	400	450	800
28.23	6860/243	F302_0280 MB23	12	7.9	8.2	37	11.0	6.0	21	3700	3500	4000	400	450	800
28.23	6860/243	F302_0280 MB23	16	2.3	8.2	37	11.0	6.0	21	3700	3500	4000	400	450	800
28.23	6860/243	F302_0280 MB33	16	2.3	29	44	11.0	6.0	22	3700	3500	4000	400	450	800
35.03	7252/207	F302_0350 MB23	8.0	8.7	7.9	37	11.0	6.0	22	3700	3500	4000	400	450	800
35.03	7252/207	F302_0350 MB23	12	3.1	7.9	37	11.0	6.0	22	3700	3500	4000	400	450	800
47.19	1274/27	F302_0470 MB23	8.0	3.6	7.7	37	11.0	6.0	22	4000	3900	4000	400	450	800
56.49	4067/72	F302_0560 MB23	8.0	1.2	7.5	37	11.0	6.0	22	4000	3900	4000	400	450	800
<b>F402 (M<sub>2acc,max</sub> = 700 Nm)</b>															
4.678	1408/301	F402_0047 MB33	16	104	44	52	10.0	7.0	21	2700	2300	4000	386	454	858
4.678	1408/301	F402_0047 MB33	24	92	44	52	10.0	7.0	21	2700	2300	4000	386	454	858
4.678	1408/301	F402_0047 MB33	32	81	44	52	10.0	7.0	21	2700	2300	4000	386	454	858
4.678	1408/301	F402_0047 MB33	45	63	44	52	10.0	7.0	21	2700	2300	4000	386	454	858
4.678	1408/301	F402_0047 MB33	90	–	44	52	10.0	7.0	21	2700	2300	4000	386	454	858
4.678	1408/301	F402_0047 MB43	50	135	91	66	10.0	7.0	23	2700	2300	3000	386	550	1100
4.678	1408/301	F402_0047 MB43	72	104	91	66	10.0	7.0	23	2700	2300	3000	386	550	1100
4.678	1408/301	F402_0047 MB43	100	65	91	66	10.0	7.0	23	2700	2300	3000	386	550	1100
5.813	3784/651	F402_0058 MB33	16	104	39	52	10.0	7.0	25	2700	2300	4000	415	550	1066
5.813	3784/651	F402_0058 MB33	24	92	39	52	10.0	7.0	25	2700	2300	4000	415	550	1066
5.813	3784/651	F402_0058 MB33	32	81	39	52	10.0	7.0	25	2700	2300	4000	415	550	1066
5.813	3784/651	F402_0058 MB33	45	63	39	52	10.0	7.0	25	2700	2300	4000	415	550	1066
5.813	3784/651	F402_0058 MB33	90	–	39	52	10.0	7.0	25	2700	2300	4000	415	550	1066
5.813	3784/651	F402_0058 MB43	50	95	87	66	10.0	7.0	27	2700	2300	3000	415	550	1100
5.813	3784/651	F402_0058 MB43	72	64	87	66	10.0	7.0	27	2700	2300	3000	415	550	1100
5.813	3784/651	F402_0058 MB43	100	25	87	66	10.0	7.0	27	2700	2300	3000	415	550	1100
7.202	605/84	F402_0072 MB23	8.0	31	14	46	10.0	7.0	25	3200	2800	4000	262	262	440
7.202	605/84	F402_0072 MB23	12	25	14	46	10.0	7.0	25	3200	2800	4000	262	262	440
7.202	605/84	F402_0072 MB23	16	20	14	46	10.0	7.0	25	3200	2800	4000	262	262	440
7.202	605/84	F402_0072 MB23	24	8.4	14	46	10.0	7.0	25	3200	2800	4000	262	262	440
7.202	605/84	F402_0072 MB23	30	–	14	46	10.0	7.0	25	3200	2800	4000	262	262	440
7.202	605/84	F402_0072 MB33	16	104	36	52	10.0	7.0	28	3200	2800	4000	445	550	1100
7.202	605/84	F402_0072 MB33	24	92	36	52	10.0	7.0	28	3200	2800	4000	445	550	1100
7.202	605/84	F402_0072 MB33	32	81	36	52	10.0	7.0	28	3200	2800	4000	445	550	1100
7.202	605/84	F402_0072 MB33	45	63	36	52	10.0	7.0	28	3200	2800	4000	445	550	1100
7.202	605/84	F402_0072 MB33	90	–	36	52	10.0	7.0	28	3200	2800	4000	445	550	1100
7.202	605/84	F402_0072 MB43	50	63	84	66	10.0	7.0	30	3000	2800	3000	445	550	1100
7.202	605/84	F402_0072 MB43	72	33	84	66	10.0	7.0	30	3000	2800	3000	445	550	1100
8.980	440/49	F402_0090 MB23	8.0	31	12	46	10.0	7.0	28	3200	2800	4000	327	327	549
8.980	440/49	F402_0090 MB23	12	25	12	46	10.0	7.0	28	3200	2800	4000	327	327	549
8.980	440/49	F402_0090 MB23	16	20	12	46	10.0	7.0	28	3200	2800	4000	327	327	549
8.980	440/49	F402_0090 MB23	24	8.4	12	46	10.0	7.0	28	3200	2800	4000	327	327	549
8.980	440/49	F402_0090 MB23	30	–	12	46	10.0	7.0	28	3200	2800	4000	327	327	549
8.980	440/49	F402_0090 MB33	16	85	34	52	10.0	7.0	31	3200	2800	4000	479	550	1100
8.980	440/49	F402_0090 MB33	24	73	34	52	10.0	7.0	31	3200	2800	4000	479	550	1100
8.980	440/49	F402_0090 MB33	32	62	34	52	10.0	7.0	31	3200	2800	4000	479	550	1100
8.980	440/49	F402_0090 MB33	45	44	34	52	10.0	7.0	31	3200	2800	4000	479	550	1100
8.980	440/49	F402_0090 MB43	50	37	81	66	10.0	7.0	33	3000	2800	3000	479	550	1100
8.980	440/49	F402_0090 MB43	72	6.1	81	66	10.0	7.0	33	3000	2800	3000	479	550	1100
10.83	682/63	F402_0110 MB23	8.0	31	11	46	10.0	7.0	31	3500	3100	4000	394	394	662
10.83	682/63	F402_0110 MB23	12	25	11	46	10.0	7.0	31	3500	3100	4000	394	394	662
10.83	682/63	F402_0110 MB23	16	20	11	46	10.0	7.0	31	3500	3100	4000	394	394	662
10.83	682/63	F402_0110 MB23	24	8.4	11	46	10.0	7.0	31	3500	3100	4000	394	394	662
10.83	682/63	F402_0110 MB23	30	–	11	46	10.0	7.0	31	3500	3100	4000	394	394	662
10.83	682/63	F402_0110 MB33	16	66	32	52	10.0	7.0	33	3500	3100	4000	510	550	1100
10.83	682/63	F402_0110 MB33	24	55	32	52	10.0	7.0	33	3500	3100	4000	510	550	1100
10.83	682/63	F402_0110 MB33	32	44	32	52	10.0	7.0	33	3500	3100	4000	510	550	1100

6.2 Selection tables 6 F offset helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redll</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F402 (M<sub>2acc,max</sub> = 700 Nm)</b>															
10.83	682/63	F402_0110 MB33	45	26	32	52	10.0	7.0	33	3500	3100	4000	510	550	1100
10.83	682/63	F402_0110 MB43	50	19	80	66	10.0	7.0	34	3000	3000	3000	510	550	1100
13.57	5984/441	F402_0135 MB23	8.0	31	9.5	46	10.0	7.0	33	3500	3100	4000	494	494	829
13.57	5984/441	F402_0135 MB23	12	25	9.5	46	10.0	7.0	33	3500	3100	4000	494	494	829
13.57	5984/441	F402_0135 MB23	16	20	9.5	46	10.0	7.0	33	3500	3100	4000	494	494	829
13.57	5984/441	F402_0135 MB23	24	8.4	9.5	46	10.0	7.0	33	3500	3100	4000	494	494	829
13.57	5984/441	F402_0135 MB23	30	–	9.5	46	10.0	7.0	33	3500	3100	4000	494	494	829
13.57	5984/441	F402_0135 MB33	16	48	31	52	10.0	7.0	35	3500	3100	4000	550	550	1100
13.57	5984/441	F402_0135 MB33	24	37	31	52	10.0	7.0	35	3500	3100	4000	550	550	1100
13.57	5984/441	F402_0135 MB33	32	26	31	52	10.0	7.0	35	3500	3100	4000	550	550	1100
13.57	5984/441	F402_0135 MB33	45	7.8	31	52	10.0	7.0	35	3500	3100	4000	550	550	1100
13.57	5984/441	F402_0135 MB43	50	0.8	79	66	10.0	7.0	36	3000	3000	3000	550	550	1100
18.62	3575/192	F402_0185 MB23	8.0	31	10	46	10.0	5.0	36	3200	2800	4000	611	677	1138
18.62	3575/192	F402_0185 MB23	12	25	10	46	10.0	5.0	36	3200	2800	4000	611	677	1138
18.62	3575/192	F402_0185 MB23	16	20	10	46	10.0	5.0	36	3200	2800	4000	611	677	1138
18.62	3575/192	F402_0185 MB23	24	8.4	10	46	10.0	5.0	36	3200	2800	4000	611	677	1138
18.62	3575/192	F402_0185 MB23	30	–	10	46	10.0	5.0	36	3200	2800	4000	611	677	1138
18.62	3575/192	F402_0185 MB33	16	43	32	52	10.0	5.0	37	3200	2800	4000	611	700	1400
18.62	3575/192	F402_0185 MB33	24	32	32	52	10.0	5.0	37	3200	2800	4000	611	700	1400
18.62	3575/192	F402_0185 MB33	32	21	32	52	10.0	5.0	37	3200	2800	4000	611	700	1400
18.62	3575/192	F402_0185 MB33	45	2.6	32	52	10.0	5.0	37	3200	2800	4000	611	700	1400
23.21	325/14	F402_0230 MB23	8.0	31	9.6	46	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB23	12	25	9.6	46	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB23	16	20	9.6	46	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB23	24	8.4	9.6	46	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB23	30	–	9.6	46	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB33	16	30	31	52	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB33	24	19	31	52	10.0	5.0	37	3200	2800	4000	658	700	1400
23.21	325/14	F402_0230 MB33	32	7.8	31	52	10.0	5.0	37	3200	2800	4000	658	700	1400
27.99	2015/72	F402_0280 MB23	8.0	31	9.0	46	10.0	5.0	37	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB23	12	25	9.0	46	10.0	5.0	37	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB23	16	20	9.0	46	10.0	5.0	37	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB23	24	8.4	9.0	46	10.0	5.0	37	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB23	30	–	9.0	46	10.0	5.0	37	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB33	16	21	31	52	10.0	5.0	38	3500	3100	4000	700	700	1400
27.99	2015/72	F402_0280 MB33	24	10	31	52	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB23	8.0	24	8.5	46	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB23	12	18	8.5	46	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB23	16	12	8.5	46	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB23	24	1.2	8.5	46	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB33	16	12	30	52	10.0	5.0	38	3500	3100	4000	700	700	1400
35.08	2210/63	F402_0350 MB33	24	1.2	30	52	10.0	5.0	38	3500	3100	4000	700	700	1400
46.94	845/18	F402_0470 MB23	8.0	15	8.0	46	10.0	5.0	38	3800	3500	4000	700	700	1400
46.94	845/18	F402_0470 MB23	12	9.2	8.0	46	10.0	5.0	38	3800	3500	4000	700	700	1400
46.94	845/18	F402_0470 MB23	16	3.6	8.0	46	10.0	5.0	38	3800	3500	4000	700	700	1400
46.94	845/18	F402_0470 MB33	16	3.6	30	52	10.0	5.0	38	3800	3500	4000	700	700	1400
55.97	2015/36	F402_0560 MB23	8.0	11	7.8	46	10.0	5.0	38	3800	3500	4000	700	700	1400
55.97	2015/36	F402_0560 MB23	12	5.0	7.8	46	10.0	5.0	38	3800	3500	4000	700	700	1400
70.06	1261/18	F402_0700 MB23	8.0	6.2	7.6	46	10.0	5.0	38	3800	3500	4000	700	700	1400
70.06	1261/18	F402_0700 MB23	12	0.6	7.6	46	10.0	5.0	38	3800	3500	4000	700	700	1400
93.33	280/3	F402_0930 MB23	8.0	1.9	7.4	46	10.0	5.0	39	3800	3500	4000	700	700	1400
<b>F602 (M<sub>2acc,max</sub> = 1100 Nm)</b>															
4.546	1273/280	F602_0045 MB33	16	104	65	79	10.0	7.0	27	2500	2100	3500	441	441	833
4.546	1273/280	F602_0045 MB33	24	92	65	79	10.0	7.0	27	2500	2100	3500	441	441	833
4.546	1273/280	F602_0045 MB33	32	81	65	79	10.0	7.0	27	2500	2100	3500	441	441	833
4.546	1273/280	F602_0045 MB33	45	63	65	79	10.0	7.0	27	2500	2100	3500	441	441	833
4.546	1273/280	F602_0045 MB33	90	–	65	79	10.0	7.0	27	2500	2100	3500	441	441	833
4.546	1273/280	F602_0045 MB43	50	154	113	93	10.0	7.0	31	2500	2100	3000	638	957	1232
4.546	1273/280	F602_0045 MB43	72	123	113	93	10.0	7.0	31	2500	2100	3000	638	957	1232
4.546	1273/280	F602_0045 MB43	100	84	113	93	10.0	7.0	31	2500	2100	3000	638	957	1232
4.546	1273/280	F602_0045 MB43	160	–	113	93	10.0	7.0	31	2500	2100	3000	638	957	1232
5.673	1407/248	F602_0057 MB33	16	104	53	79	10.0	7.0	35	2500	2100	3500	550	550	1040
5.673	1407/248	F602_0057 MB33	24	92	53	79	10.0	7.0	35	2500	2100	3500	550	550	1040
5.673	1407/248	F602_0057 MB33	32	81	53	79	10.0	7.0	35	2500	2100	3500	550	550	1040

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F602 (M<sub>2acc,max</sub> = 1100 Nm)</b>															
5.673	1407/248	F602_0057 MB33	45	63	53	79	10.0	7.0	35	2500	2100	3500	550	550	1040
5.673	1407/248	F602_0057 MB33	90	–	53	79	10.0	7.0	35	2500	2100	3500	550	550	1040
5.673	1407/248	F602_0057 MB43	50	154	101	93	10.0	7.0	39	2500	2100	3000	687	1000	1537
5.673	1407/248	F602_0057 MB43	72	123	101	93	10.0	7.0	39	2500	2100	3000	687	1000	1537
5.673	1407/248	F602_0057 MB43	100	84	101	93	10.0	7.0	39	2500	2100	3000	687	1000	1537
5.673	1407/248	F602_0057 MB43	160	–	101	93	10.0	7.0	39	2500	2100	3000	687	1000	1537
7.159	3551/496	F602_0072 MB33	16	104	45	79	10.0	7.0	43	2900	2500	4000	694	694	1312
7.159	3551/496	F602_0072 MB33	24	92	45	79	10.0	7.0	43	2900	2500	4000	694	694	1312
7.159	3551/496	F602_0072 MB33	32	81	45	79	10.0	7.0	43	2900	2500	4000	694	694	1312
7.159	3551/496	F602_0072 MB33	45	63	45	79	10.0	7.0	43	2900	2500	4000	694	694	1312
7.159	3551/496	F602_0072 MB33	90	–	45	79	10.0	7.0	43	2900	2500	4000	694	694	1312
7.159	3551/496	F602_0072 MB43	50	125	93	93	10.0	7.0	47	2900	2500	3000	743	1000	1600
7.159	3551/496	F602_0072 MB43	72	94	93	93	10.0	7.0	47	2900	2500	3000	743	1000	1600
7.159	3551/496	F602_0072 MB43	100	55	93	93	10.0	7.0	47	2900	2500	3000	743	1000	1600
8.995	1943/216	F602_0090 MB23	8.0	31	18	73	10.0	7.0	43	2900	2500	4000	327	327	550
8.995	1943/216	F602_0090 MB23	12	25	18	73	10.0	7.0	43	2900	2500	4000	327	327	550
8.995	1943/216	F602_0090 MB23	16	20	18	73	10.0	7.0	43	2900	2500	4000	327	327	550
8.995	1943/216	F602_0090 MB23	24	8.4	18	73	10.0	7.0	43	2900	2500	4000	327	327	550
8.995	1943/216	F602_0090 MB23	30	–	18	73	10.0	7.0	43	2900	2500	4000	327	327	550
8.995	1943/216	F602_0090 MB33	16	104	40	79	10.0	7.0	50	2900	2500	4000	801	873	1600
8.995	1943/216	F602_0090 MB33	24	92	40	79	10.0	7.0	50	2900	2500	4000	801	873	1600
8.995	1943/216	F602_0090 MB33	32	81	40	79	10.0	7.0	50	2900	2500	4000	801	873	1600
8.995	1943/216	F602_0090 MB33	45	63	40	79	10.0	7.0	50	2900	2500	4000	801	873	1600
8.995	1943/216	F602_0090 MB33	90	–	40	79	10.0	7.0	50	2900	2500	4000	801	873	1600
8.995	1943/216	F602_0090 MB43	50	85	87	93	10.0	7.0	54	2900	2500	3000	801	1000	1600
8.995	1943/216	F602_0090 MB43	72	54	87	93	10.0	7.0	54	2900	2500	3000	801	1000	1600
8.995	1943/216	F602_0090 MB43	100	15	87	93	10.0	7.0	54	2900	2500	3000	801	1000	1600
10.82	2077/192	F602_0110 MB23	8.0	31	15	73	10.0	7.0	49	3300	2800	4000	394	394	661
10.82	2077/192	F602_0110 MB23	12	25	15	73	10.0	7.0	49	3300	2800	4000	394	394	661
10.82	2077/192	F602_0110 MB23	16	20	15	73	10.0	7.0	49	3300	2800	4000	394	394	661
10.82	2077/192	F602_0110 MB23	24	8.4	15	73	10.0	7.0	49	3300	2800	4000	394	394	661
10.82	2077/192	F602_0110 MB23	30	–	15	73	10.0	7.0	49	3300	2800	4000	394	394	661
10.82	2077/192	F602_0110 MB33	16	104	37	79	10.0	7.0	56	3300	2800	4000	852	1000	1600
10.82	2077/192	F602_0110 MB33	24	92	37	79	10.0	7.0	56	3300	2800	4000	852	1000	1600
10.82	2077/192	F602_0110 MB33	32	81	37	79	10.0	7.0	56	3300	2800	4000	852	1000	1600
10.82	2077/192	F602_0110 MB33	45	63	37	79	10.0	7.0	56	3300	2800	4000	852	1000	1600
10.82	2077/192	F602_0110 MB33	90	–	37	79	10.0	7.0	56	3300	2800	4000	852	1000	1600
10.82	2077/192	F602_0110 MB43	50	59	84	93	10.0	7.0	59	3000	2800	3000	852	1000	1600
10.82	2077/192	F602_0110 MB43	72	28	84	93	10.0	7.0	59	3000	2800	3000	852	1000	1600
13.61	871/64	F602_0135 MB23	8.0	31	13	73	10.0	7.0	56	3300	2800	4000	495	495	832
13.61	871/64	F602_0135 MB23	12	25	13	73	10.0	7.0	56	3300	2800	4000	495	495	832
13.61	871/64	F602_0135 MB23	16	20	13	73	10.0	7.0	56	3300	2800	4000	495	495	832
13.61	871/64	F602_0135 MB23	24	8.4	13	73	10.0	7.0	56	3300	2800	4000	495	495	832
13.61	871/64	F602_0135 MB23	30	–	13	73	10.0	7.0	56	3300	2800	4000	495	495	832
13.61	871/64	F602_0135 MB33	16	80	34	79	10.0	7.0	61	3300	2800	4000	920	1000	1600
13.61	871/64	F602_0135 MB33	24	69	34	79	10.0	7.0	61	3300	2800	4000	920	1000	1600
13.61	871/64	F602_0135 MB33	32	58	34	79	10.0	7.0	61	3300	2800	4000	920	1000	1600
13.61	871/64	F602_0135 MB33	45	40	34	79	10.0	7.0	61	3300	2800	4000	920	1000	1600
13.61	871/64	F602_0135 MB43	50	33	82	93	10.0	7.0	63	3000	2800	3000	920	1000	1600
13.61	871/64	F602_0135 MB43	72	1.8	82	93	10.0	7.0	63	3000	2800	3000	920	1000	1600
18.52	3445/186	F602_0185 MB33	16	72	37	79	10.0	5.0	70	2900	2500	4000	1019	1100	2000
18.52	3445/186	F602_0185 MB33	24	61	37	79	10.0	5.0	70	2900	2500	4000	1019	1100	2000
18.52	3445/186	F602_0185 MB33	32	49	37	79	10.0	5.0	70	2900	2500	4000	1019	1100	2000
18.52	3445/186	F602_0185 MB33	45	31	37	79	10.0	5.0	70	2900	2500	4000	1019	1100	2000
18.52	3445/186	F602_0185 MB43	50	24	84	93	10.0	5.0	71	2900	2500	3000	1019	1100	2000
23.27	1885/81	F602_0230 MB23	8.0	31	13	73	10.0	5.0	70	2900	2500	4000	847	847	1422
23.27	1885/81	F602_0230 MB23	12	25	13	73	10.0	5.0	70	2900	2500	4000	847	847	1422
23.27	1885/81	F602_0230 MB23	16	20	13	73	10.0	5.0	70	2900	2500	4000	847	847	1422
23.27	1885/81	F602_0230 MB23	24	8.4	13	73	10.0	5.0	70	2900	2500	4000	847	847	1422
23.27	1885/81	F602_0230 MB23	30	–	13	73	10.0	5.0	70	2900	2500	4000	847	847	1422
23.27	1885/81	F602_0230 MB33	16	53	34	79	10.0	5.0	72	2900	2500	4000	1100	1100	2000
23.27	1885/81	F602_0230 MB33	24	41	34	79	10.0	5.0	72	2900	2500	4000	1100	1100	2000
23.27	1885/81	F602_0230 MB33	32	30	34	79	10.0	5.0	72	2900	2500	4000	1100	1100	2000
23.27	1885/81	F602_0230 MB33	45	12	34	79	10.0	5.0	72	2900	2500	4000	1100	1100	2000

6.2 Selection tables 6 F offset helical gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>F602 (M<sub>2acc,max</sub> = 1100 Nm)</b>															
23.27	1885/81	F602_0230 MB43	50	5.0	82	93	10.0	5.0	73	2900	2500	3000	1100	1100	2000
27.99	2015/72	F602_0280 MB23	8.0	31	11	73	10.0	5.0	72	3300	2800	4000	1018	1018	1710
27.99	2015/72	F602_0280 MB23	12	25	11	73	10.0	5.0	72	3300	2800	4000	1018	1018	1710
27.99	2015/72	F602_0280 MB23	16	20	11	73	10.0	5.0	72	3300	2800	4000	1018	1018	1710
27.99	2015/72	F602_0280 MB23	24	8.4	11	73	10.0	5.0	72	3300	2800	4000	1018	1018	1710
27.99	2015/72	F602_0280 MB23	30	–	11	73	10.0	5.0	72	3300	2800	4000	1018	1018	1710
27.99	2015/72	F602_0280 MB33	16	40	33	79	10.0	5.0	74	3300	2800	4000	1100	1100	2000
27.99	2015/72	F602_0280 MB33	24	29	33	79	10.0	5.0	74	3300	2800	4000	1100	1100	2000
27.99	2015/72	F602_0280 MB33	32	18	33	79	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB23	8.0	31	10	73	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB23	12	25	10	73	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB23	16	20	10	73	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB23	24	8.4	10	73	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB23	30	–	10	73	10.0	5.0	74	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB33	16	27	32	79	10.0	5.0	75	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB33	24	16	32	79	10.0	5.0	75	3300	2800	4000	1100	1100	2000
35.21	845/24	F602_0350 MB33	32	4.8	32	79	10.0	5.0	75	3300	2800	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB23	8.0	26	9.1	73	10.0	5.0	75	3500	3200	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB23	12	21	9.1	73	10.0	5.0	75	3500	3200	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB23	16	15	9.1	73	10.0	5.0	75	3500	3200	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB23	24	3.8	9.1	73	10.0	5.0	75	3500	3200	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB33	16	15	31	79	10.0	5.0	76	3500	3200	4000	1100	1100	2000
46.72	1495/32	F602_0470 MB33	24	3.8	31	79	10.0	5.0	76	3500	3200	4000	1100	1100	2000
55.71	390/7	F602_0560 MB23	8.0	20	8.7	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
55.71	390/7	F602_0560 MB23	12	15	8.7	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
55.71	390/7	F602_0560 MB23	16	8.9	8.7	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
55.71	390/7	F602_0560 MB33	16	8.9	29	79	10.0	5.0	76	3500	3200	4000	1100	1100	2000
69.64	975/14	F602_0700 MB23	8.0	14	8.2	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
69.64	975/14	F602_0700 MB23	12	8.3	8.2	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
69.64	975/14	F602_0700 MB23	16	2.7	8.2	73	10.0	5.0	76	3500	3200	4000	1100	1100	2000
69.64	975/14	F602_0700 MB33	16	2.7	29	79	10.0	5.0	77	3500	3200	4000	1100	1100	2000
93.33	280/3	F602_0930 MB23	8.0	7.5	7.8	73	10.0	5.0	77	3500	3200	4000	1100	1100	2000
93.33	280/3	F602_0930 MB23	12	1.9	7.8	73	10.0	5.0	77	3500	3200	4000	1100	1100	2000
112.2	9425/84	F602_1120 MB23	8.0	4.4	7.6	73	10.0	5.0	77	3500	3200	4000	1100	1100	2000
139.8	559/4	F602_1400 MB23	8.0	1.3	7.5	73	10.0	5.0	77	3500	3200	4000	1100	1100	2000

## 6.3 Dimensional drawings

In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

### Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

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

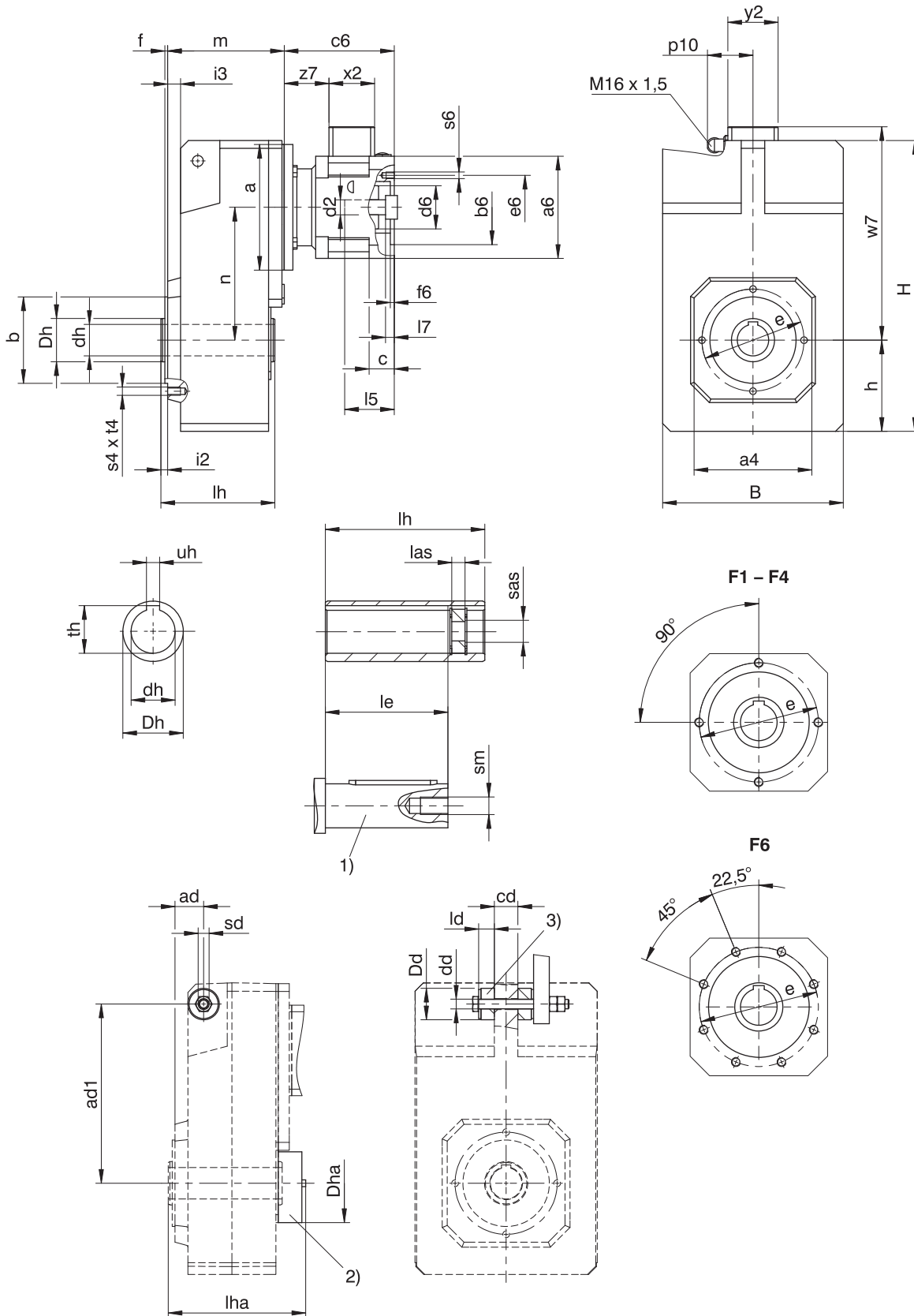
Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7
Feather keys	DIN 6885-1, high form

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

### 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

### 6.3.1 A shaft design (hollow shaft), G housing design (pitch circle diameter)



- 1) The length of the machine shaft must be at least 2.2 x  $\varnothing dh$  and the length of the feather key must be at least 2 x  $\varnothing dh$ .
- 2) Cover (optional)
- 3) Rubber buffer for torque arm bracket (optional). Dimension  $\varnothing Dd$  = outer diameter of the rubber buffer when not tensioned.

## Dimensions of gear units

Type	□a4	ad	ad1	Øb	B	cd	Ødd	Ødh	ØDd	ØDh	ØDha	Øe	f	h	H	i2	i3	ld	le	lh	las	lha	s4	sd	sm	sas	t4	th	uh
F1	100	28.5	150	70 <sub>g</sub>	145	20	11.0 <sup>+0.5</sup>	20 <sup>H7</sup>	30	35	70	85	2.5	74	238.0	6.5	12.5	15	73	95	12	112	M8	M10	M6	M8	13	22.8	6 <sup>JS9</sup>
F2	130	32.0	181	95 <sub>g</sub>	180	22	11.0 <sup>+0.5</sup>	25 <sup>H7</sup>	30	45	82	115	3.0	93	299.0	8.0	15.0	15	92	115	12	132	M8	M10	M10	M12	13	28.3	8 <sup>JS9</sup>
F3	150	36.5	205	110 <sub>g</sub>	206	30	14.0 <sup>+0.5</sup>	30 <sup>H7</sup>	37	50	88	130	3.5	106	335.5	8.5	16.5	20	103	130	12	157	M10	M12	M10	M12	16	33.3	8 <sup>JS9</sup>
F4	150	36.5	228	110 <sub>g</sub>	230	30	14.0 <sup>+0.5</sup>	40 <sup>H7</sup>	37	55	100	130	3.5	116	370.0	8.5	16.5	20	114	145	12	175	M10	M12	M16	M20	16	43.3	12 <sup>JS9</sup>
F6	180	44.5	270	130 <sub>g</sub>	265	35	22.0 <sup>+0.5</sup>	50 <sup>H7</sup>	60	70	115	165	3.5	137	433.0	10.5	20.5	30	143	180	12	194	M10	M20	M16	M20	16	53.8	14 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	Ø160	101.5	102.0	–	–	–	–	–	–
F202	Ø160	119.0	131.0	Ø200	121.0	131.0	–	–	–
F302	Ø160	133.5	149.5	Ø200	135.5	149.5	–	–	–
F402	Ø160	148.5	169.0	Ø200	150.5	169.0	Ø250	153.5	169.0
F602	Ø160	179.5	196.0	Ø200	181.5	196.0	Ø250	184.5	196.0

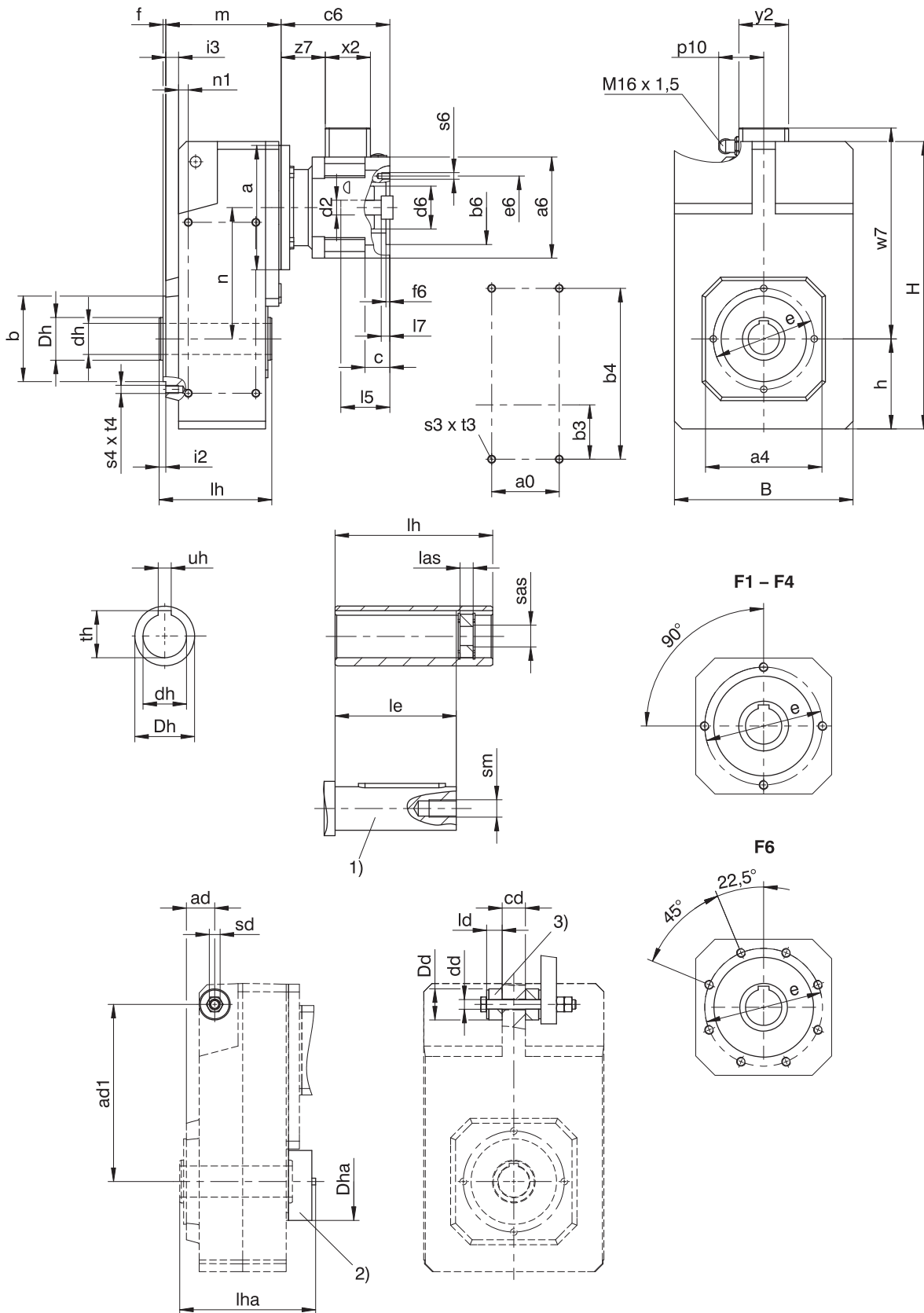
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.2 A shaft design (hollow shaft), GN housing design (pitch circle diameter + side fastening)



- 1) The length of the machine shaft must be at least  $2.2 \times \varnothing dh$  and the length of the feather key must be at least  $2 \times \varnothing dh$ .
- 2) Cover (optional)
- 3) Rubber buffer for torque arm bracket (optional). Dimension  $\varnothing Dd$  = outer diameter of the rubber buffer when not tensioned.



## Dimensions of gear units

Type	a0	□a4	ad	ad1	Øb	b3	b4	B	cd	Ødd	Ødh	ØDd	ØDh	ØDha	Øe	f	h	H
F1	50	100	28.5	150	70 <sub>js</sub>	40	140	145	20	11.0 <sup>+0.5</sup>	20 <sup>H7</sup>	30	35	70	85	2.5	74	238.0
F2	64	130	32.0	181	95 <sub>js</sub>	55	175	180	22	11.0 <sup>+0.5</sup>	25 <sup>H7</sup>	30	45	82	115	3.0	93	299.0
F3	72	150	36.5	205	110 <sub>js</sub>	60	200	206	30	14.0 <sup>+0.5</sup>	30 <sup>H7</sup>	37	50	88	130	3.5	106	335.5
F4	87	150	36.5	228	110 <sub>js</sub>	70	220	230	30	14.0 <sup>+0.5</sup>	40 <sup>H7</sup>	37	55	100	130	3.5	116	370.0
F6	108	180	44.5	270	130 <sub>js</sub>	85	270	265	35	22.0 <sup>+0.5</sup>	50 <sup>H7</sup>	60	70	115	165	3.5	137	433.0

Type	i2	i3	ld	le	lh	las	lha	n1	s3	s4	sd	sm	sas	t3	t4	th	uh
F1	6.5	12.5	15	73	95	12	112	10.0	M6	M8	M10	M6	M8	11	13	22.8	6 <sup>JS9</sup>
F2	8.0	15.0	15	92	115	12	132	10.5	M8	M8	M10	M10	M12	13	13	28.3	8 <sup>JS9</sup>
F3	8.5	16.5	20	103	130	12	157	12.5	M10	M10	M12	M10	M12	16	16	33.3	8 <sup>JS9</sup>
F4	8.5	16.5	20	114	145	12	175	12.5	M10	M10	M12	M16	M20	16	16	43.3	12 <sup>JS9</sup>
F6	10.5	20.5	30	143	180	12	194	15.5	M12	M10	M20	M16	M20	19	16	53.8	14 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	Ø160	101.5	102.0	–	–	–	–	–	–
F202	Ø160	119.0	131.0	Ø200	121.0	131.0	–	–	–
F302	Ø160	133.5	149.5	Ø200	135.5	149.5	–	–	–
F402	Ø160	148.5	169.0	Ø200	150.5	169.0	Ø250	153.5	169.0
F602	Ø160	179.5	196.0	Ø200	181.5	196.0	Ø250	184.5	196.0

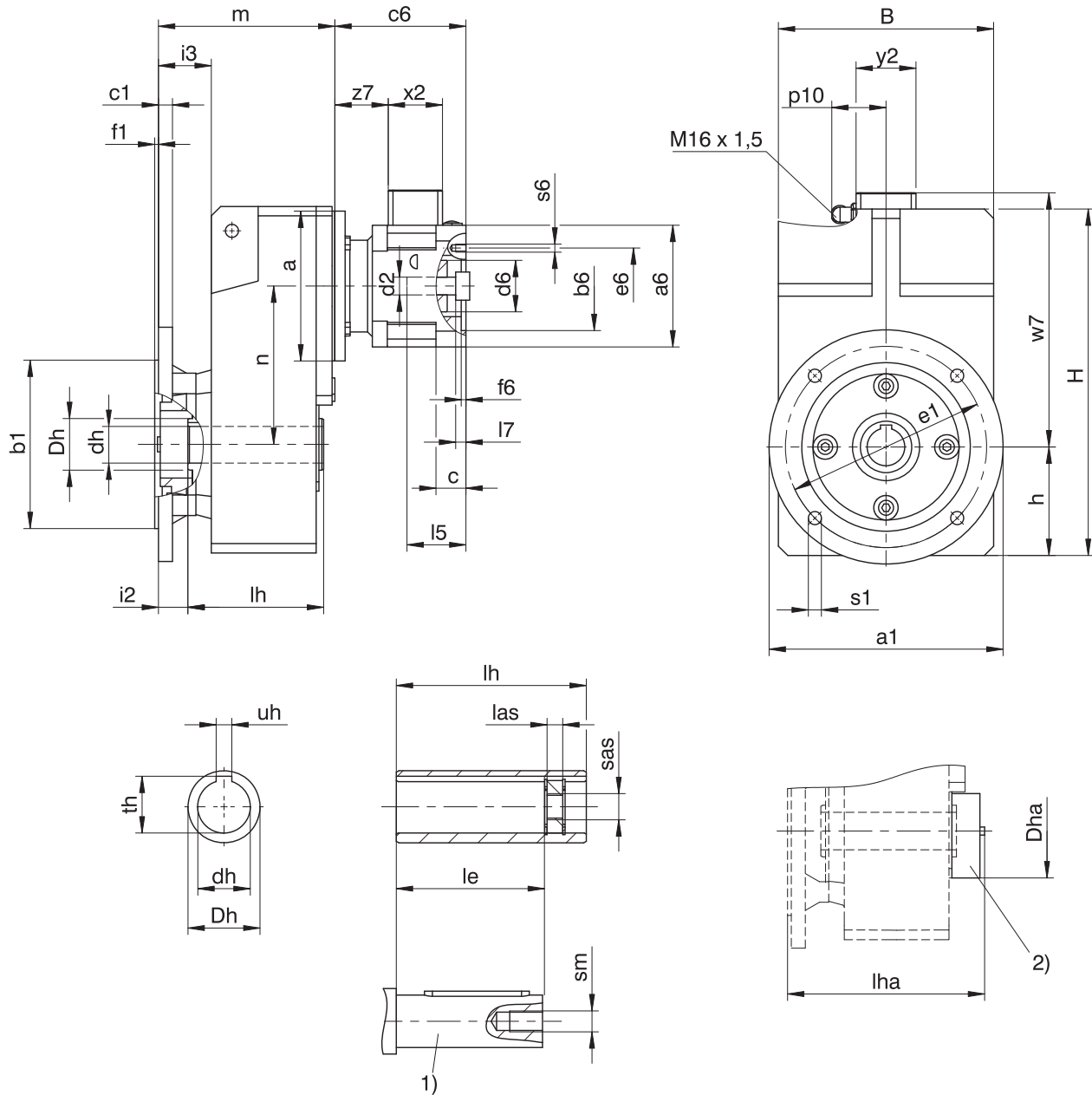
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.3 A shaft design (hollow shaft), F housing design (round flange)



- 1) The length of the machine shaft must be at least 2.2 x  $\varnothing dh$  and the length of the feather key must be at least 2 x  $\varnothing dh$ .
- 2) Cover (optional)

#### Dimensions of gear units

Type	$\varnothing a1$	$\varnothing b1$	B	c1	$\varnothing dh$	$\varnothing Dh$	$\varnothing Dha$	$\varnothing e1$	f1	h	H	i2	i3	le	lh	las	lha	$\varnothing s1$	sm	sas	th	uh
F1	160	110 <sub>f6</sub>	145	10	20 <sup>H7</sup>	35	70	130	3.5	74	238.0	25.5	44.5	73	95	12	112	9	M6	M8	22.8	6 <sup>JS9</sup>
F2	200	130 <sub>f6</sub>	180	14	25 <sup>H7</sup>	45	82	165	3.5	93	299.0	30.0	53.0	92	115	12	132	11	M10	M12	28.3	8 <sup>JS9</sup>
F3	250	180 <sub>f6</sub>	206	15	30 <sup>H7</sup>	50	88	215	4.0	106	335.5	31.5	56.5	103	130	12	157	14	M10	M12	33.3	8 <sup>JS9</sup>
F4	250	180 <sub>f6</sub>	230	15	40 <sup>H7</sup>	55	100	215	4.0	116	370.0	31.5	56.5	114	145	12	175	14	M16	M20	43.3	12 <sup>JS9</sup>
F6	300	230 <sub>f6</sub>	265	17	50 <sup>H7</sup>	70	115	265	4.0	137	433.0	29.5	60.5	143	180	12	194	14	M16	M20	53.8	14 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	133.5	102.0	–	–	–	–	–	–
F202	∅160	157.0	131.0	∅200	159.0	131.0	–	–	–
F302	∅160	173.5	149.5	∅200	175.5	149.5	–	–	–
F402	∅160	188.5	169.0	∅200	190.5	169.0	∅250	193.5	169.0
F602	∅160	219.5	196.0	∅200	221.5	196.0	∅250	224.5	196.0

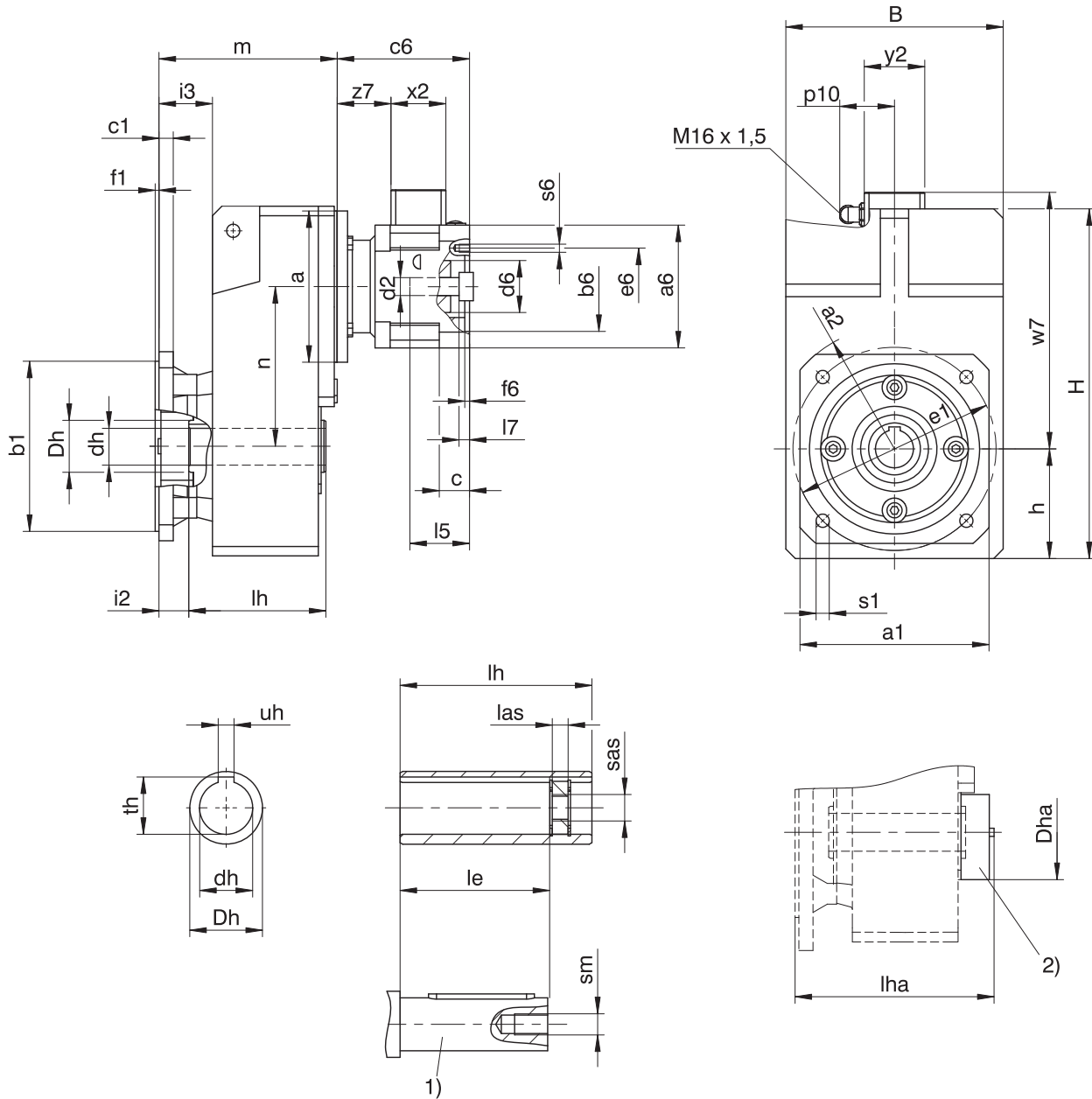
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.4 A shaft design (hollow shaft), Q housing design (square flange)



- 1) The length of the machine shaft must be at least 2.2 x  $\varnothing dh$  and the length of the feather key must be at least 2 x  $\varnothing dh$ .      2) Cover (optional)

#### Dimensions of gear units

Type	□a1	□a2	∅b1	B	c1	∅dh	∅Dh	∅Dha	∅e1	f1	h	H	i2	i3	le	lh	las	lha	∅s1	sm	sas	th	uh
F1	125	160	110 <sub>β</sub>	145	10	20 <sup>H7</sup>	35	70	130	3.5	74	238.0	25.5	44.5	73	95	12	112	9	M6	M8	22.8	6 <sup>JS9</sup>
F2	150	195	130 <sub>β</sub>	180	14	25 <sup>H7</sup>	45	82	165	3.5	93	299.0	30.0	53.0	92	115	12	132	11	M10	M12	28.3	8 <sup>JS9</sup>
F3	200	260	180 <sub>β</sub>	206	15	30 <sup>H7</sup>	50	88	215	4.0	106	335.5	31.5	56.5	103	130	12	157	14	M10	M12	33.3	8 <sup>JS9</sup>
F4	200	260	180 <sub>β</sub>	230	15	40 <sup>H7</sup>	55	100	215	4.0	116	370.0	31.5	56.5	114	145	12	175	14	M16	M20	43.3	12 <sup>JS9</sup>
F6	250	325	230 <sub>β</sub>	265	17	50 <sup>H7</sup>	70	115	265	4.0	137	433.0	29.5	60.5	143	180	12	194	14	M16	M20	53.8	14 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	133.5	102.0	–	–	–	–	–	–
F202	∅160	157.0	131.0	∅200	159.0	131.0	–	–	–
F302	∅160	173.5	149.5	∅200	175.5	149.5	–	–	–
F402	∅160	188.5	169.0	∅200	190.5	169.0	∅250	193.5	169.0
F602	∅160	219.5	196.0	∅200	221.5	196.0	∅250	224.5	196.0

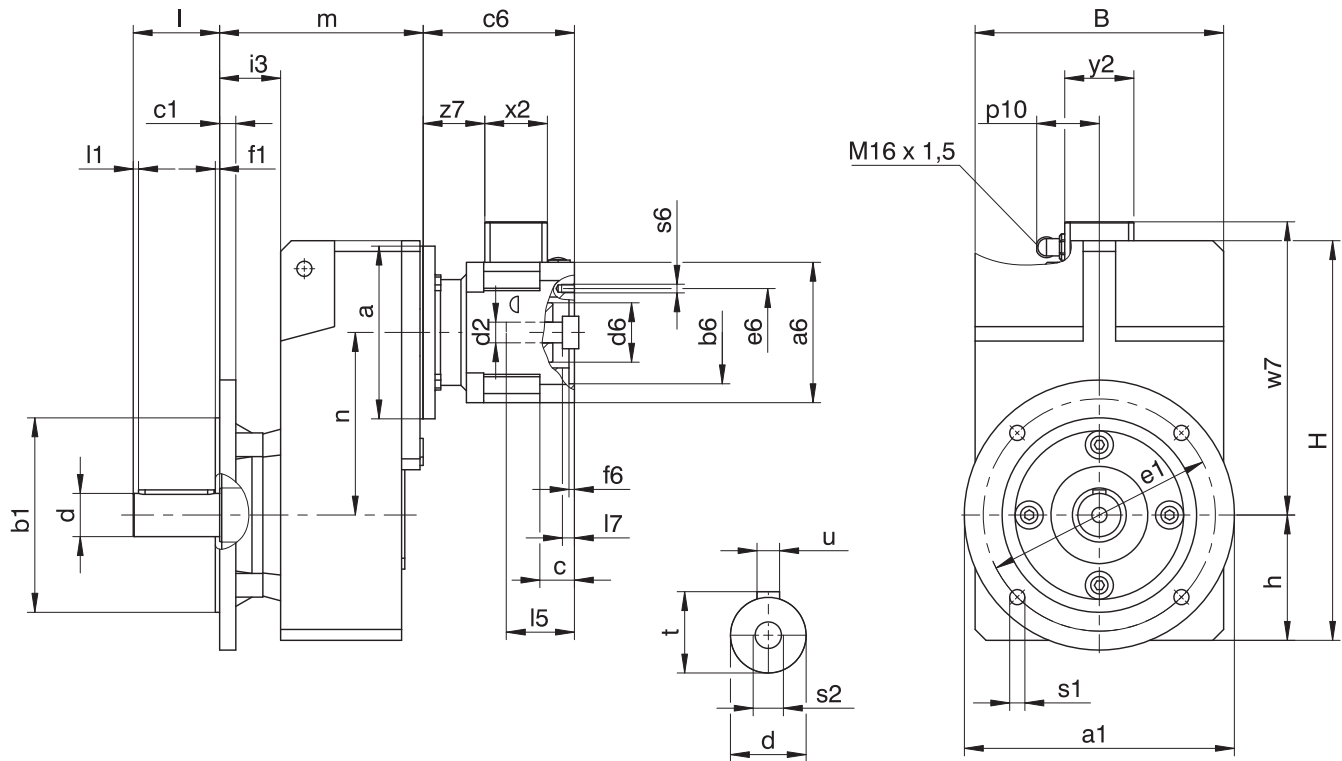
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.5 V shaft design (solid shaft), F housing design (round flange)



Dimensions of gear units

Type	Øa1	Øb1	B	c1	Ød	Øe1	f1	h	H	i3	l	l1	Øs1	s2	t	u
F1	160	110 <sub>js</sub>	145	10	25 <sub>ks</sub>	130	3.5	74	238.0	44.5	50	5	9	M10	28.0	A8×7×40
F2	200	130 <sub>js</sub>	180	14	30 <sub>ks</sub>	165	3.5	93	299.0	53.0	60	5	11	M10	33.0	A8×7×50
F3	250	180 <sub>js</sub>	206	15	35 <sub>ks</sub>	215	4.0	106	335.5	56.5	70	5	14	M12	38.0	A10×8×60
F4	250	180 <sub>js</sub>	230	15	40 <sub>ks</sub>	215	4.0	116	370.0	56.5	80	5	14	M16	43.0	A12×8×70
F6	300	230 <sub>js</sub>	265	17	50 <sub>ks</sub>	265	4.0	137	433.0	60.5	100	5	14	M16	53.5	A14×9×90

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	Ø160	133.5	102.0	-	-	-	-	-	-
F202	Ø160	157.0	131.0	Ø200	159.0	131.0	-	-	-
F302	Ø160	173.5	149.5	Ø200	175.5	149.5	-	-	-
F402	Ø160	188.5	169.0	Ø200	190.5	169.0	Ø250	193.5	169.0
F602	Ø160	219.5	196.0	Ø200	221.5	196.0	Ø250	224.5	196.0

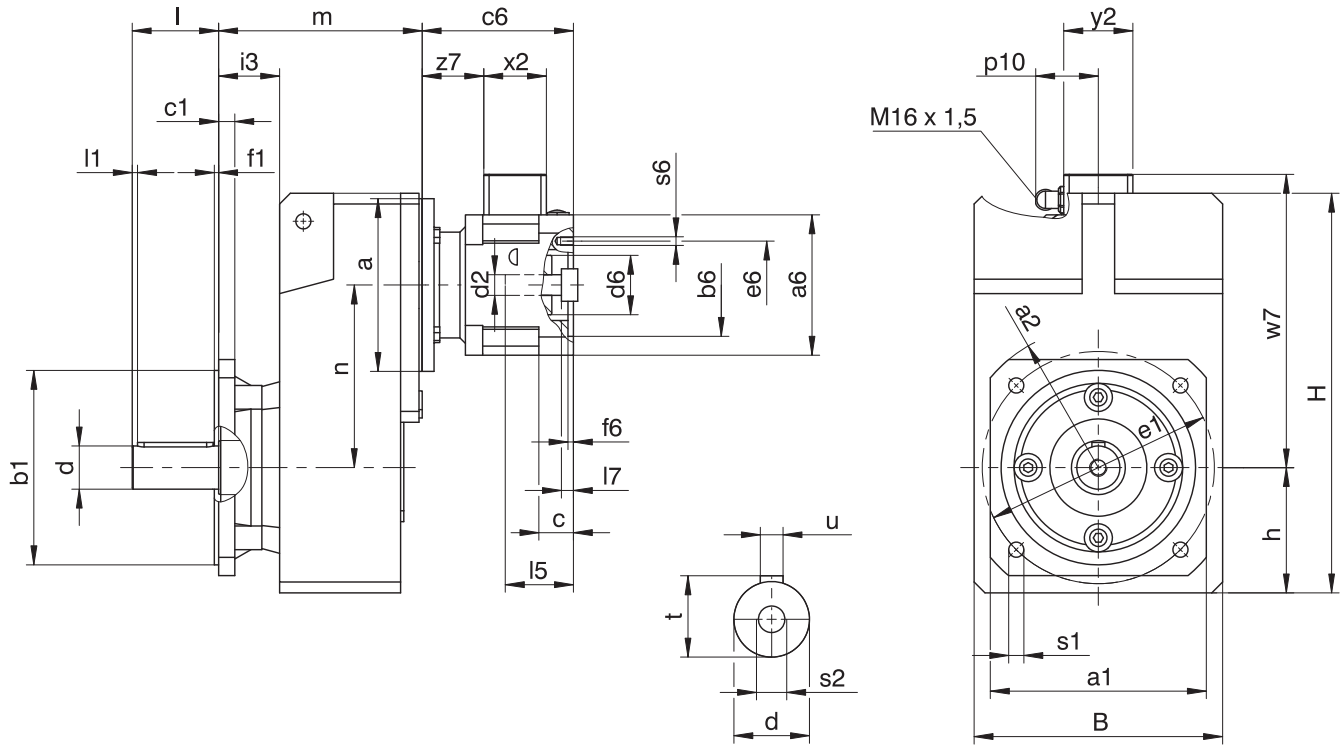
Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.6 V shaft design (solid shaft), Q housing design (square flange)



Dimensions of gear units

Type	□a1	□a2	∅b1	c1	B	∅d	∅e1	f1	h	H	i3	l	l1	∅s1	s2	t	u
F1	125	160	110 <sub>js</sub>	10	145	25 <sub>js</sub>	130	3.5	74	238.0	44.5	50	5	9	M10	28.0	A8×7×40
F2	150	195	130 <sub>js</sub>	14	180	30 <sub>js</sub>	165	3.5	93	299.0	53.0	60	5	11	M10	33.0	A8×7×50
F3	200	260	180 <sub>js</sub>	15	206	35 <sub>js</sub>	215	4.0	106	335.5	56.5	70	5	14	M12	38.0	A10×8×60
F4	200	260	180 <sub>js</sub>	15	230	40 <sub>js</sub>	215	4.0	116	370.0	56.5	80	5	14	M16	43.0	A12×8×70
F6	250	325	230 <sub>js</sub>	17	265	50 <sub>js</sub>	265	4.0	137	433.0	60.5	100	5	14	M16	53.5	A14×9×90

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	133.5	102.0	-	-	-	-	-	-
F202	∅160	157.0	131.0	∅200	159.0	131.0	-	-	-
F302	∅160	173.5	149.5	∅200	175.5	149.5	-	-	-
F402	∅160	188.5	169.0	∅200	190.5	169.0	∅250	193.5	169.0
F602	∅160	219.5	196.0	∅200	221.5	196.0	∅250	224.5	196.0

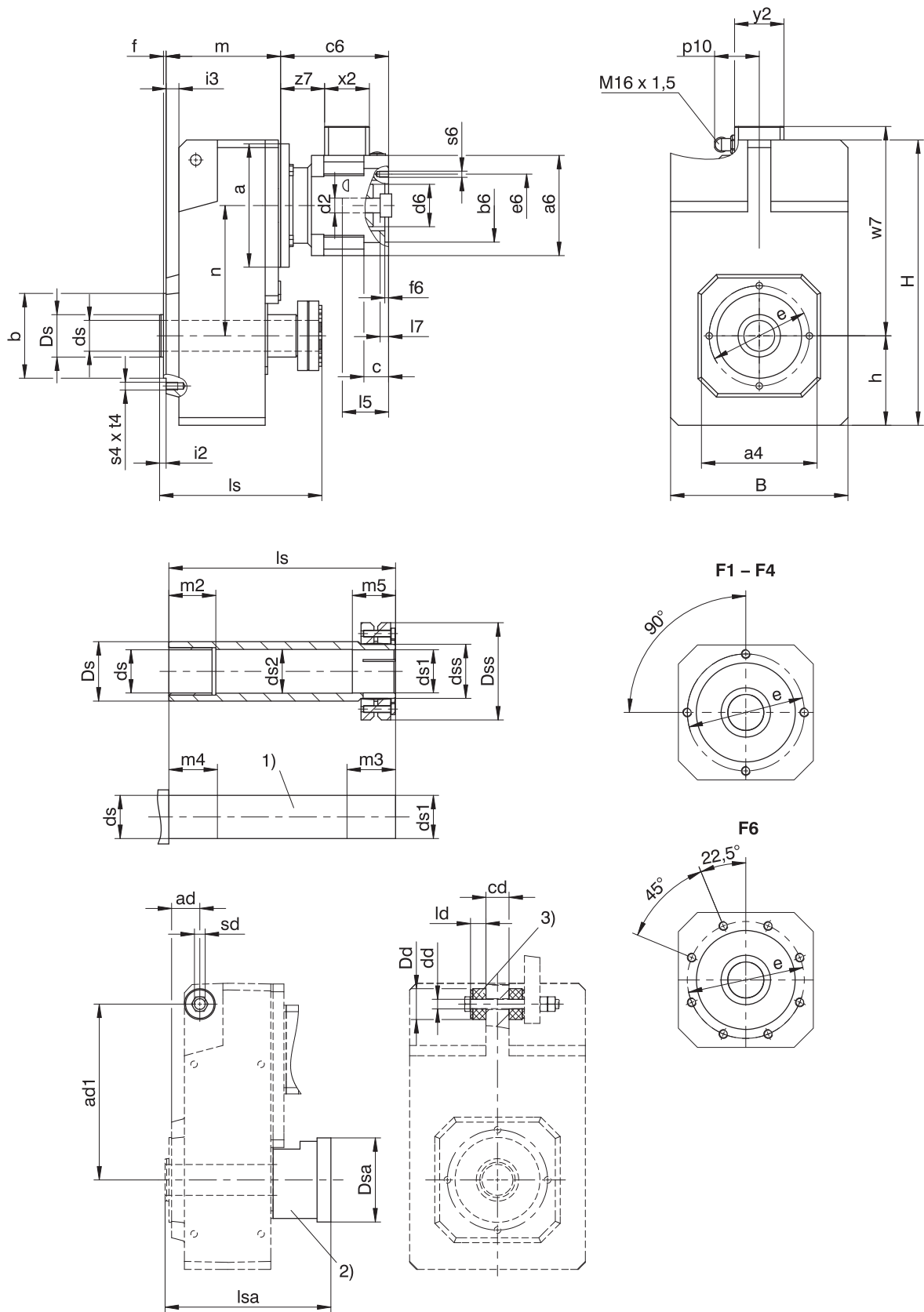
Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.7 S shaft design (hollow shaft with shrink ring), G housing design (pitch circle diameter)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.
- 2) Cover (optional)
- 3) Rubber buffer for torque arm bracket (optional). Dimension  $\varnothing D_d$  = outer diameter of the rubber buffer when not tensioned.



## Dimensions of gear units

Type	□a4	ad	ad1	∅b	B	cd	∅dd	∅ds	∅ds1	∅ds2	∅dss	∅Dd	∅Ds	∅Dsa	∅Dss	∅e	f	h	H	i2	i3	ld	ls	lsa	m2	m3	m4	m5	s4	sd	t4
F1	100	28.5	150	70 <sub>f</sub>	145	20	11.0 <sup>+0.5</sup>	20 <sup>H9</sup>	20 <sub>H9</sub> <sup>H7</sup>	20.5	24	30	35	63	50	85	2.5	74	238.0	6.5	12.5	15	146	150	20	31	25	26	M8	M10	13
F2	130	32.0	181	95 <sub>f</sub>	180	22	11.0 <sup>+0.5</sup>	25 <sup>H9</sup>	25 <sub>H9</sub> <sup>H7</sup>	25.5	30	30	45	73	60	115	3.0	93	299.0	8.0	15.0	15	175	180	20	37	25	32	M8	M10	13
F3	150	36.5	205	110 <sub>f</sub>	206	30	14.0 <sup>+0.5</sup>	30 <sup>H9</sup>	30 <sub>H9</sub> <sup>H7</sup>	30.5	36	37	50	83	72	130	3.5	106	335.5	8.5	16.5	20	192	196	25	37	30	32	M10	M12	16
F4	150	36.5	228	110 <sub>f</sub>	230	30	14.0 <sup>+0.5</sup>	40 <sup>H9</sup>	40 <sub>H9</sub> <sup>H7</sup>	40.5	50	37	55	108	90	130	3.5	116	370.0	8.5	16.5	20	210	215	40	45	45	40	M10	M12	16
F6	180	44.5	270	130 <sub>f</sub>	265	35	22.0 <sup>+0.5</sup>	50 <sup>H9</sup>	50 <sub>H9</sub> <sup>H7</sup>	50.5	62	60	70	128	106	165	3.5	137	433.0	10.5	20.5	30	248	251	40	47	45	42	M10	M20	16

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	101.5	102.0	–	–	–	–	–	–
F202	∅160	119.0	131.0	∅200	121.0	131.0	–	–	–
F302	∅160	133.5	149.5	∅200	135.5	149.5	–	–	–
F402	∅160	148.5	169.0	∅200	150.5	169.0	∅250	153.5	169.0
F602	∅160	179.5	196.0	∅200	181.5	196.0	∅250	184.5	196.0

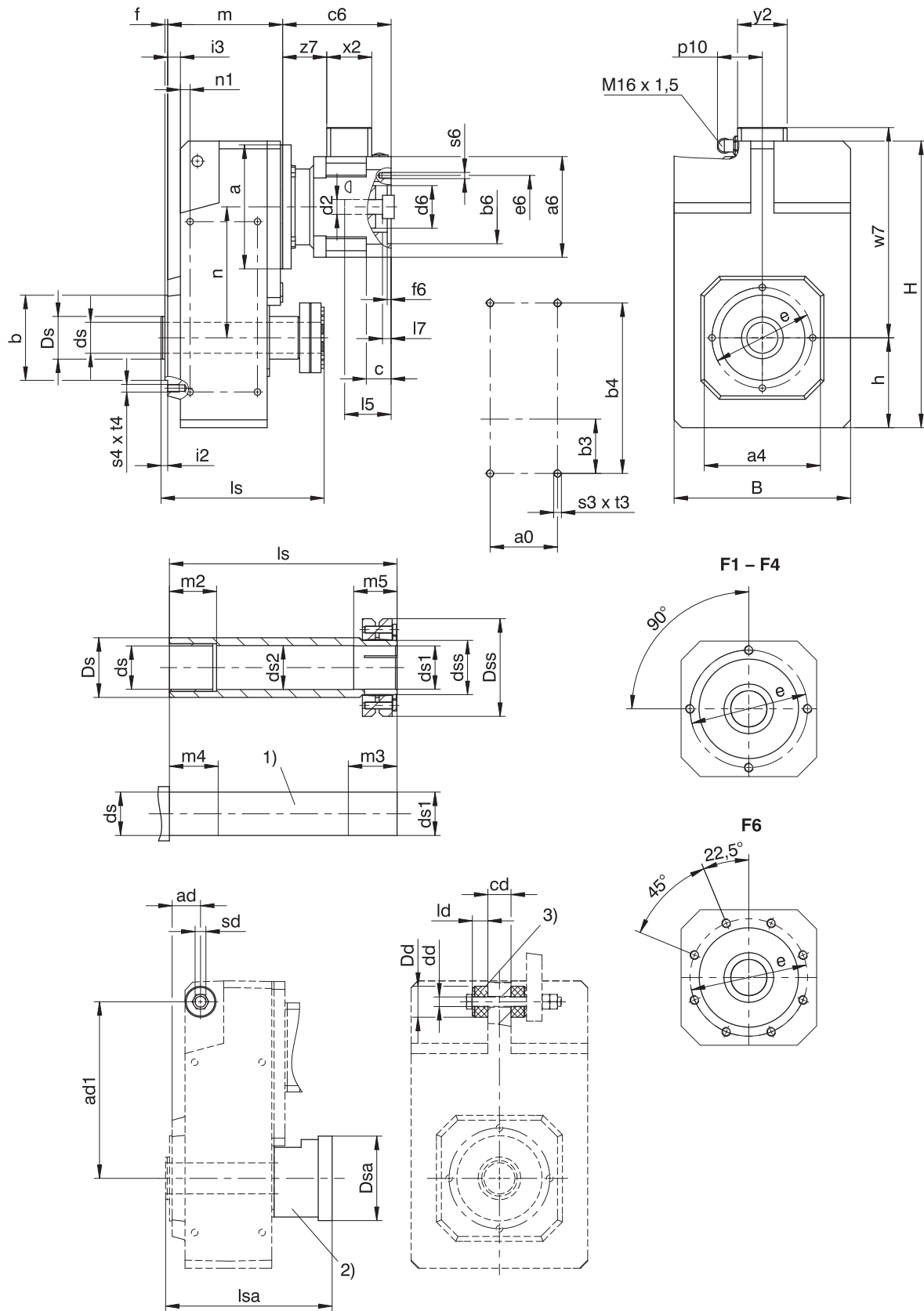
## Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.8 S shaft design (hollow shaft with shrink ring), GN housing design (pitch circle diameter + side fastening)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.
- 2) Cover (optional)
- 3) Rubber buffer for torque arm bracket (optional). Dimension  $\varnothing D_d$  = outer diameter of the rubber buffer when not tensioned.

## Dimensions of gear units

Type	a0	□a4	ad	ad1	∅b	b3	b4	B	cd	∅dd	∅ds	∅ds1	∅ds2	∅dss	∅Dd	∅Ds	∅Dsa	∅Dss
F1	50	100	28.5	150	70 <sub>f6</sub>	40	140	145	20	11.0 <sup>+0.5</sup>	20 <sub>h9</sub>	20 <sub>h9</sub> <sup>H7</sup>	20.5	24	30	35	63	50
F2	64	130	32.0	181	95 <sub>f6</sub>	55	175	180	22	11.0 <sup>+0.5</sup>	25 <sub>h9</sub>	25 <sub>h9</sub> <sup>H7</sup>	25.5	30	30	45	73	60
F3	72	150	36.5	205	110 <sub>f6</sub>	60	200	206	30	14.0 <sup>+0.5</sup>	30 <sub>h9</sub>	30 <sub>h9</sub> <sup>H7</sup>	30.5	36	37	50	83	72
F4	87	150	36.5	228	110 <sub>f6</sub>	70	220	230	30	14.0 <sup>+0.5</sup>	40 <sub>h9</sub>	40 <sub>h9</sub> <sup>H7</sup>	40.5	50	37	55	108	90
F6	108	180	44.5	270	130 <sub>f6</sub>	85	270	265	35	22.0 <sup>+0.5</sup>	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	60	70	128	106

Type	∅e	f	h	H	i2	i3	ld	ls	lsa	n1	m2	m3	m4	m5	s3	s4	sd	t3	t4
F1	85	2.5	74	238.0	6.5	12.5	15	146	150	10	20	31	25	26	M6	M8	M10	11	13
F2	115	3.0	93	299.0	8.0	15.0	15	175	180	10.5	20	37	25	32	M8	M8	M10	13	13
F3	130	3.5	106	335.5	8.5	16.5	20	192	196	12.5	25	37	30	32	M10	M10	M12	16	16
F4	130	3.5	116	370.0	8.5	16.5	20	210	215	12.5	40	45	45	40	M10	M10	M12	16	16
F6	165	3.5	137	433.0	10.5	20.5	30	248	251	15.5	40	47	45	42	M12	M10	M20	19	16

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	101.5	102.0	–	–	–	–	–	–
F202	∅160	119.0	131.0	∅200	121.0	131.0	–	–	–
F302	∅160	133.5	149.5	∅200	135.5	149.5	–	–	–
F402	∅160	148.5	169.0	∅200	150.5	169.0	∅250	153.5	169.0
F602	∅160	179.5	196.0	∅200	181.5	196.0	∅250	184.5	196.0

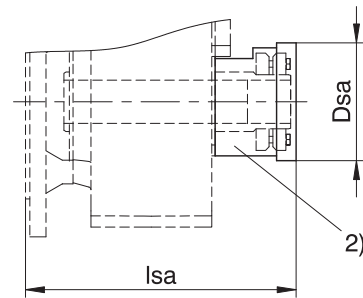
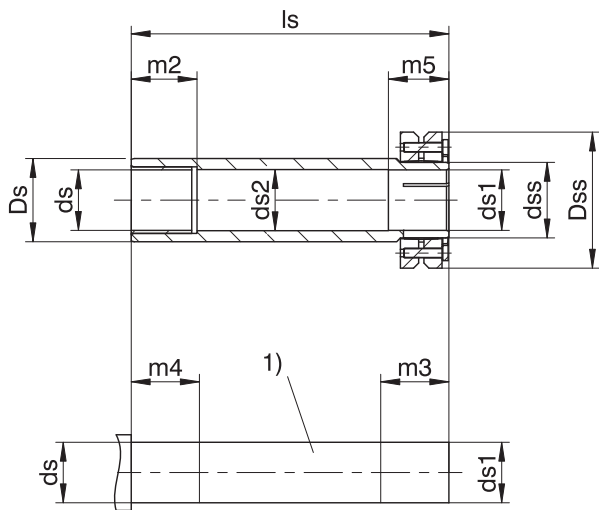
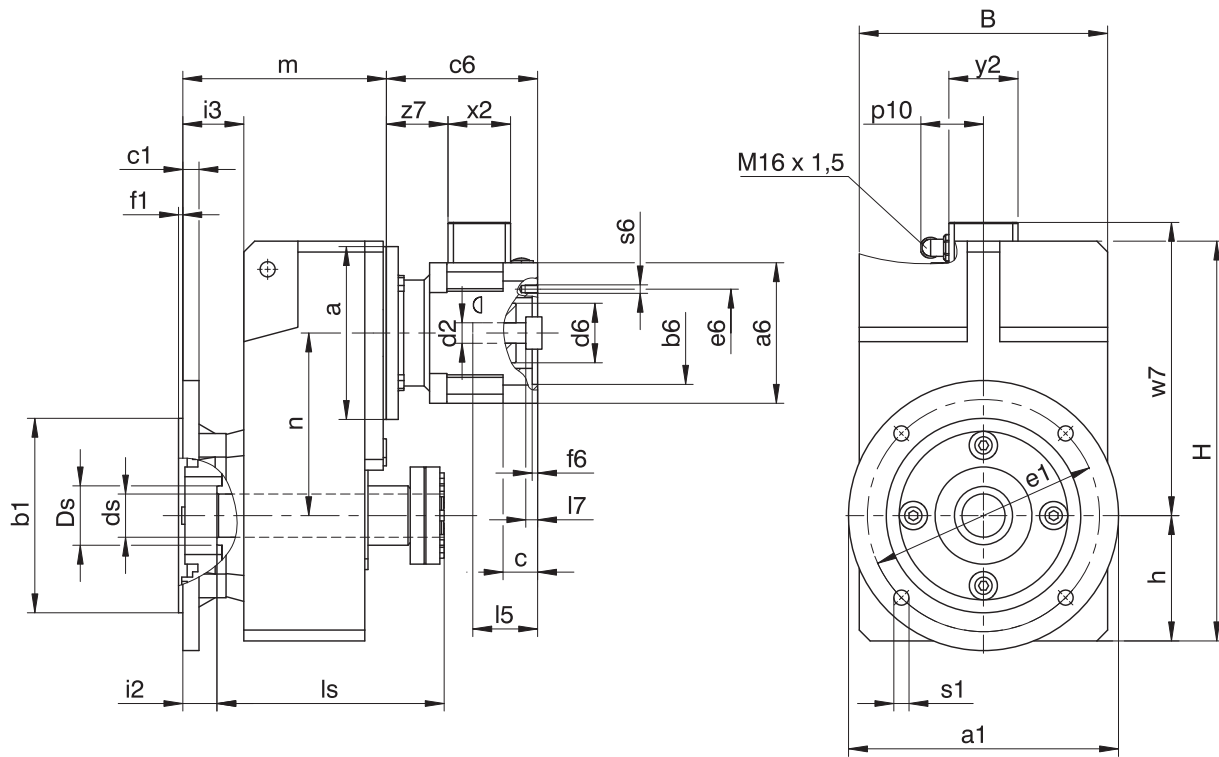
## Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.9 S shaft design (hollow shaft with shrink ring), F housing design (round flange)



1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.

2) Cover (optional)

**Dimensions of gear units**

Type	$\varnothing a_1$	$\varnothing b_1$	B	c1	$\varnothing ds$	$\varnothing ds_1$	$\varnothing ds_2$	$\varnothing ds_3$	$\varnothing D_s$	$\varnothing D_{sa}$	$\varnothing D_{ss}$	$\varnothing e_1$	f1	h	H	i2	i3	ls	lsa	m2	m3	m4	m5	$\varnothing s_1$
F1	160	110 <sub>f6</sub>	145	10	20 <sub>h9</sub>	20 <sub>h7</sub>	20.5	24	35	63	50	130	3.5	74	238.0	25.5	44.5	146	150	20	31	25	26	9
F2	200	130 <sub>f6</sub>	180	14	25 <sub>h9</sub>	25 <sub>h7</sub>	25.5	30	45	73	60	165	3.5	93	299.0	30.0	53.0	175	180	20	37	25	32	11
F3	250	180 <sub>f6</sub>	206	15	30 <sub>h9</sub>	30 <sub>h7</sub>	30.5	36	50	83	72	215	4.0	106	335.5	31.5	56.5	192	196	25	37	30	32	14
F4	250	180 <sub>f6</sub>	230	15	40 <sub>h9</sub>	40 <sub>h7</sub>	40.5	50	55	108	90	215	4.0	116	370.0	31.5	56.5	210	215	40	45	45	40	14
F6	300	230 <sub>f6</sub>	265	17	50 <sub>h9</sub>	50 <sub>h7</sub>	50.5	62	70	128	106	265	4.0	137	433.0	29.5	60.5	248	251	40	47	45	42	14

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	133.5	102.0	–	–	–	–	–	–
F202	∅160	157.0	131.0	∅200	159.0	131.0	–	–	–
F302	∅160	173.5	149.5	∅200	175.5	149.5	–	–	–
F402	∅160	188.5	169.0	∅200	190.5	169.0	∅250	193.5	169.0
F602	∅160	219.5	196.0	∅200	221.5	196.0	∅250	224.5	196.0

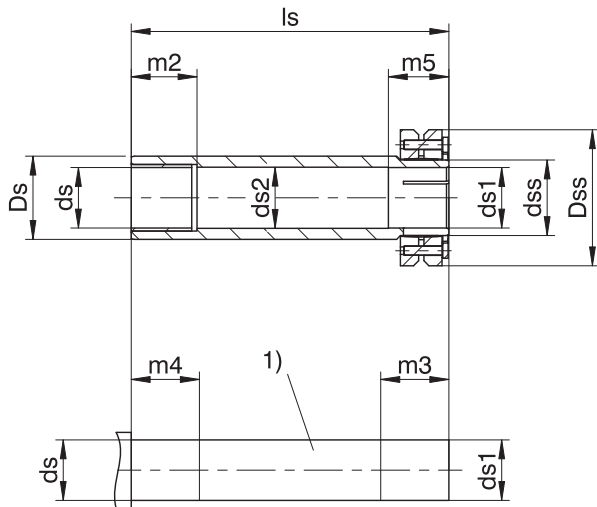
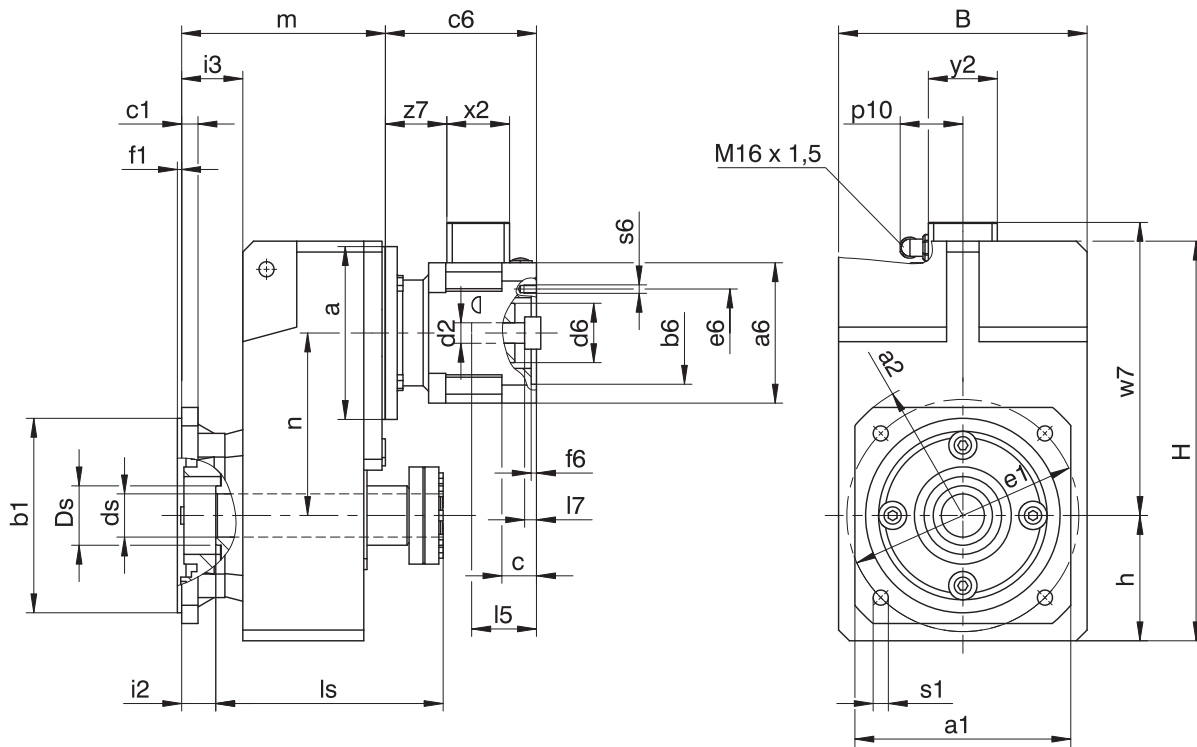
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.10 S shaft design (hollow shaft with shrink ring), Q housing design (square flange)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value. 2) Cover (optional)

#### Dimensions of gear units

Type	$\square a_1$	$\square a_2$	$\varnothing b_1$	B	c1	$\varnothing ds$	$\varnothing ds_1$	$\varnothing ds_2$	$\varnothing ds_3$	$\varnothing D_s$	$\varnothing D_{sa}$	$\varnothing D_{ss}$	$\varnothing e_1$	f1	h	H	i2	i3	ls	lsa	m2	m3	m4	m5	$\varnothing s_1$
F1	125	160	$110_{\beta}$	145	10	$20_{H9}$	$20_{H7}$	20.5	24	35	63	50	130	3.5	74	238.0	25.5	44.5	146	150	20	31	25	26	9
F2	150	195	$130_{\beta}$	180	14	$25_{H9}$	$25_{H7}$	25.5	30	45	73	60	165	3.5	93	299.0	30.0	53.0	175	180	20	37	25	32	11
F3	200	260	$180_{\beta}$	206	15	$30_{H9}$	$30_{H7}$	30.5	36	50	83	72	215	4.0	106	335.5	31.5	56.5	192	196	25	37	30	32	14
F4	200	260	$180_{\beta}$	230	15	$40_{H9}$	$40_{H7}$	40.5	50	55	108	90	215	4.0	116	370.0	31.5	56.5	210	215	40	45	45	40	14
F6	250	325	$230_{\beta}$	265	17	$50_{H9}$	$50_{H7}$	50.5	62	70	128	106	265	4.0	137	433.0	29.5	60.5	248	251	40	47	45	42	14

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
F102	∅160	133.5	102.0	–	–	–	–	–	–
F202	∅160	157.0	131.0	∅200	159.0	131.0	–	–	–
F302	∅160	173.5	149.5	∅200	175.5	149.5	–	–	–
F402	∅160	188.5	169.0	∅200	190.5	169.0	∅250	193.5	169.0
F602	∅160	219.5	196.0	∅200	221.5	196.0	∅250	224.5	196.0

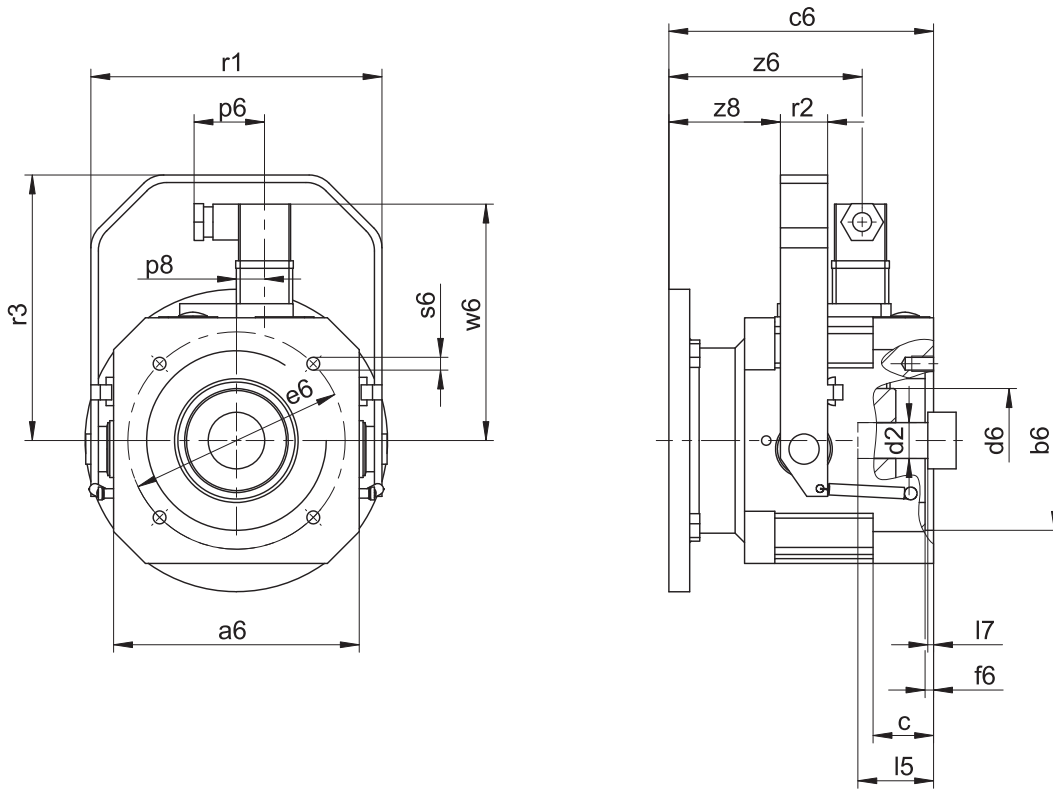
#### Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
F_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
F_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
F_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
F_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 6.3.11 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5



## 6.4 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.

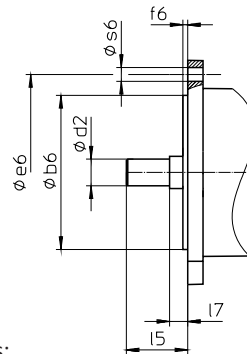
### Example code

F	2	0	2	A	G	0280	MB	2	3
---	---	---	---	---	---	------	----	---	---

### Explanation

Code	Designation	Design
F	Type	Offset helical gear unit
2	Size	2 (example)
0	Generation	Generation 0
2	Stages	Two-stage
3		Three-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
V		Solid shaft
G	Housing	Pitch circle diameter
F		Round flange
Q		Square flange
GN		Pitch circle diameter + side fastening
0280	Transmission ratio (i x 10 rounded)	i = 28.11 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

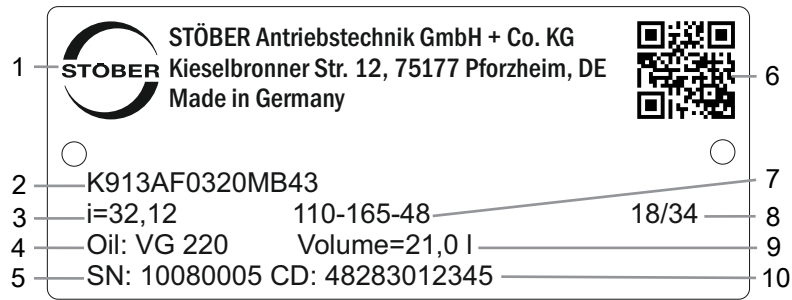
To choose a suitable motor connection, use the STOBBER Configurator at

<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Mounting position, see the chapter [▶ 6.5.6]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 6.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 6.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 6.5.8]
- Manual release (optional), see the chapter [▶ 6.3.11]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 6.5.2.6]

## 6.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 6.5 Product description

### 6.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

MR motor adapter for attaching asynchronous motors



On request

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

LM Lean motor



Catalog ID 443016\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 6.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 6.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

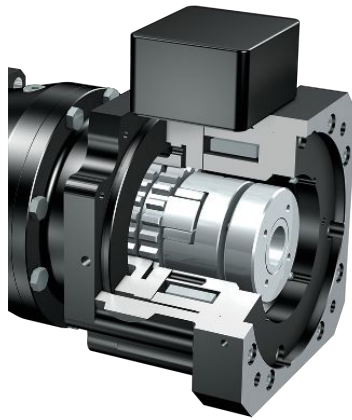


Fig. 1: Motor adapter with ServoStop brake

### 6.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 6.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 6.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 6.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

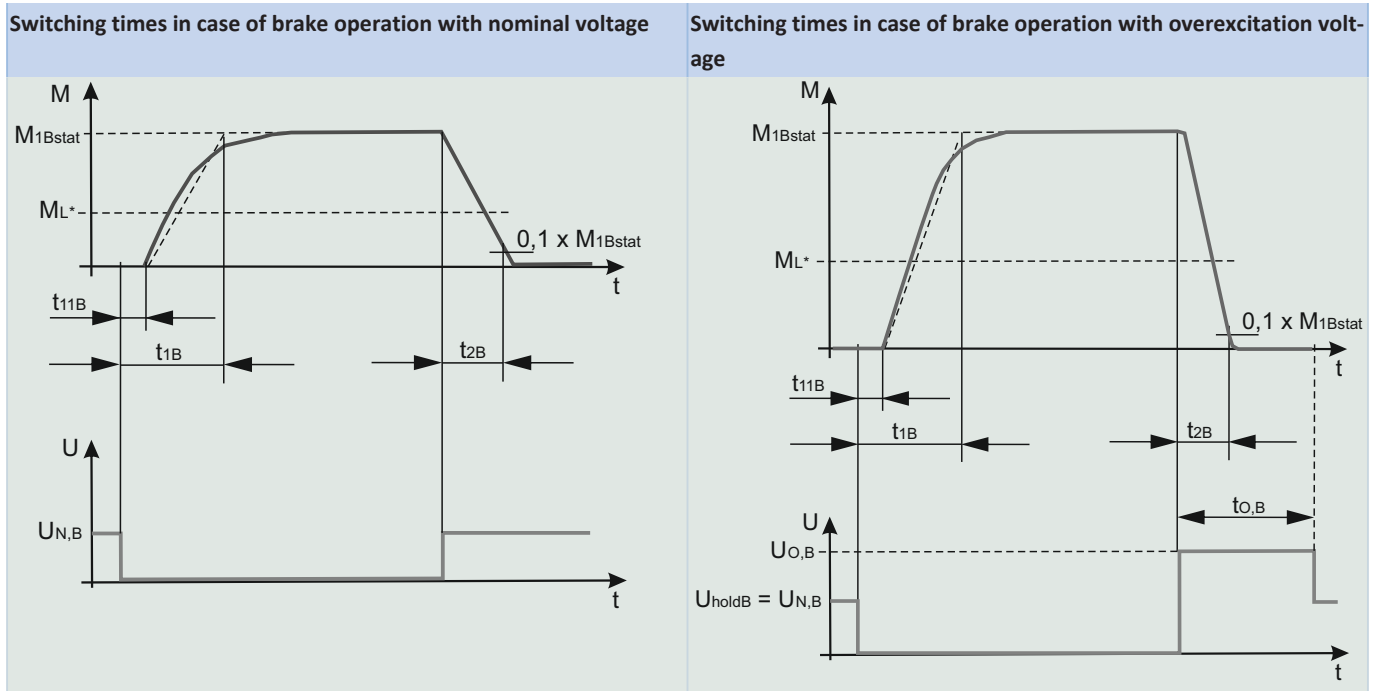
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

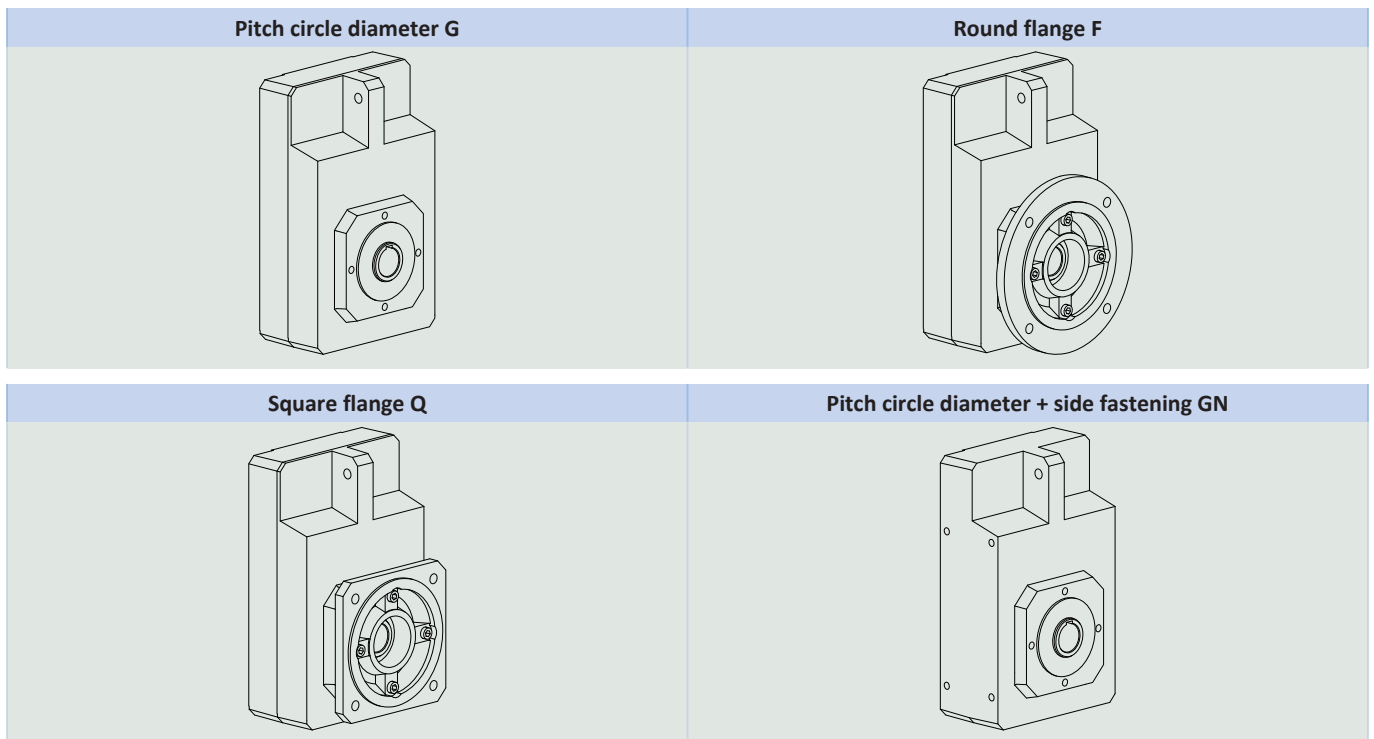
Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 6.5.2.6 Brake switching times



### 6.5.3 Housing design



	G	F	Q	GN
F1	✓	✓	✓	✓
F2	✓	✓	✓	✓
F3	✓	✓	✓	✓
F4	✓	✓	✓	✓
F6	✓	✓	✓	✓

### 6.5.4 Combinatorial shaft/housing design

Shaft design	Housing design				
	Code	G	F	Q	GN
Hollow shaft with keyway	A	AG	AF	AQ	AGN
Hollow shaft with shrink ring	S	SG	SF	SQ	SGN
Solid shaft	V	-	VF	VQ	-

### 6.5.5 Installation conditions

**Hollow shaft**

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6. Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit. Maximum deviation ≤ 0.03 mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

**Hollow shaft with shrink ring**

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be ISO h9.

Select a material for the machine shaft with a permitted surface pressure of  $p \geq 325 \text{ N/mm}^2$ .

Possible materials:

- C45E +QT
- 42CrMo4

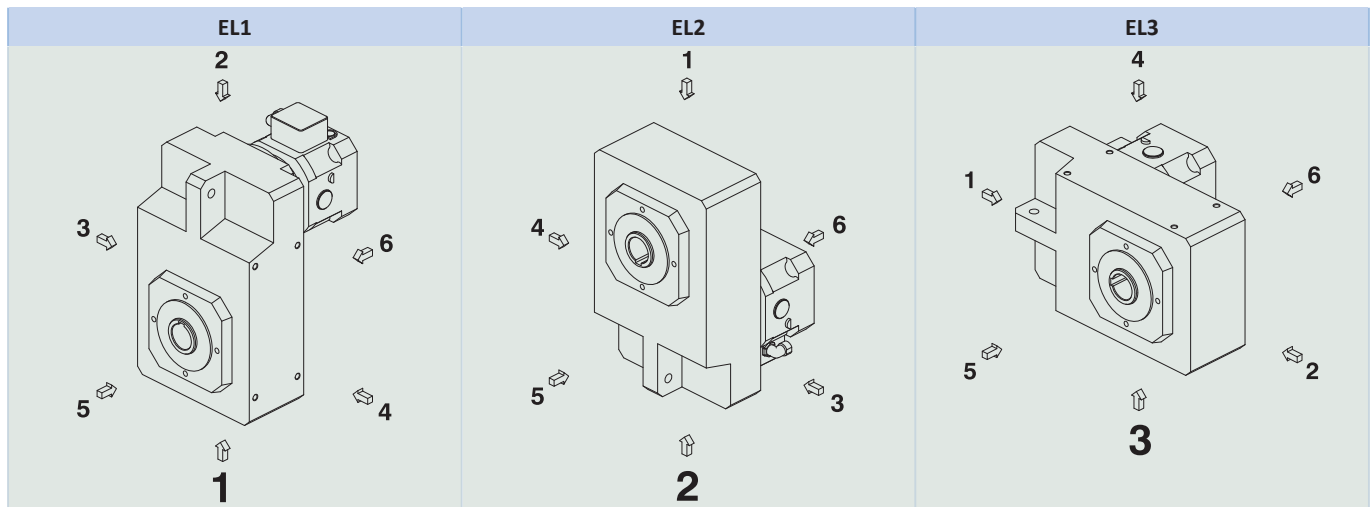
**Fastening the gear units on the machine side using the pitch circle diameter**

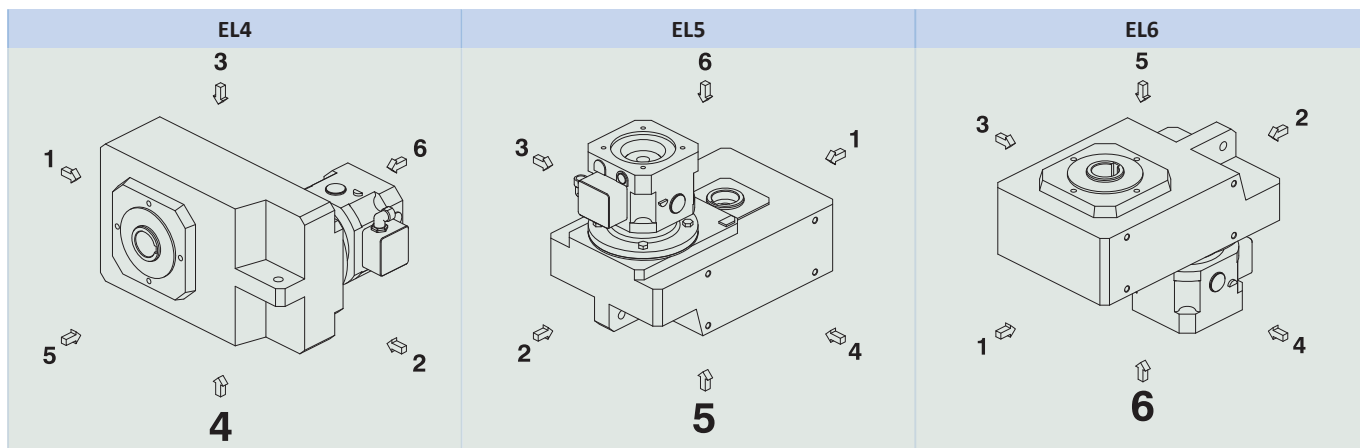
The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 10.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

### 6.5.6 Mounting positions

The following table shows the standard mounting positions.

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





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

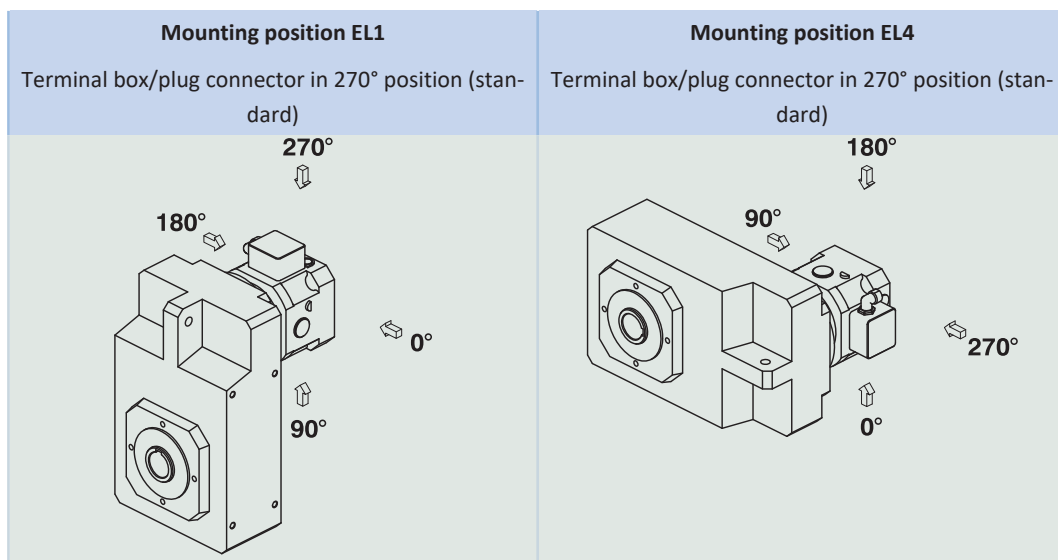
## 6.5.7 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

## 6.5.8 Position of the terminal box/plug connector



Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

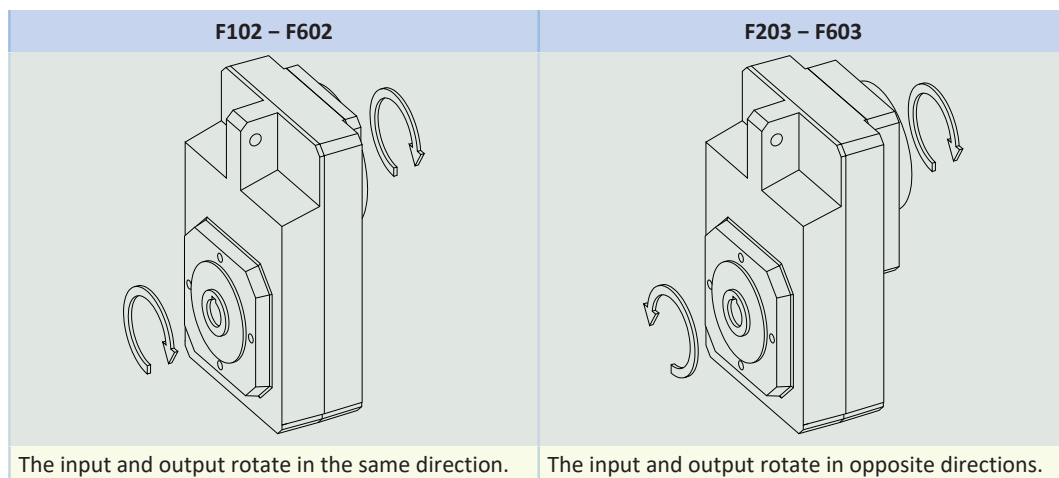
## 6.5.9 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ two-stage	97%
$\eta_{\text{get}}$ three-stage	96%
Protection class: <sup>1</sup>	IP65

<sup>1</sup> Observe the protection class of all the components.

### 6.5.10 Direction of rotation

Solid shaft (V), hollow shaft with keyway (A), hollow shaft with shrink ring (S)



The pictures show mounting position EL1.

## 6.6 Project configuration

Project your drives using our SERVOSOFT designing software. Download SERVOSOFT for free at <https://www.stoeber.de/en/ServoSoft>.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

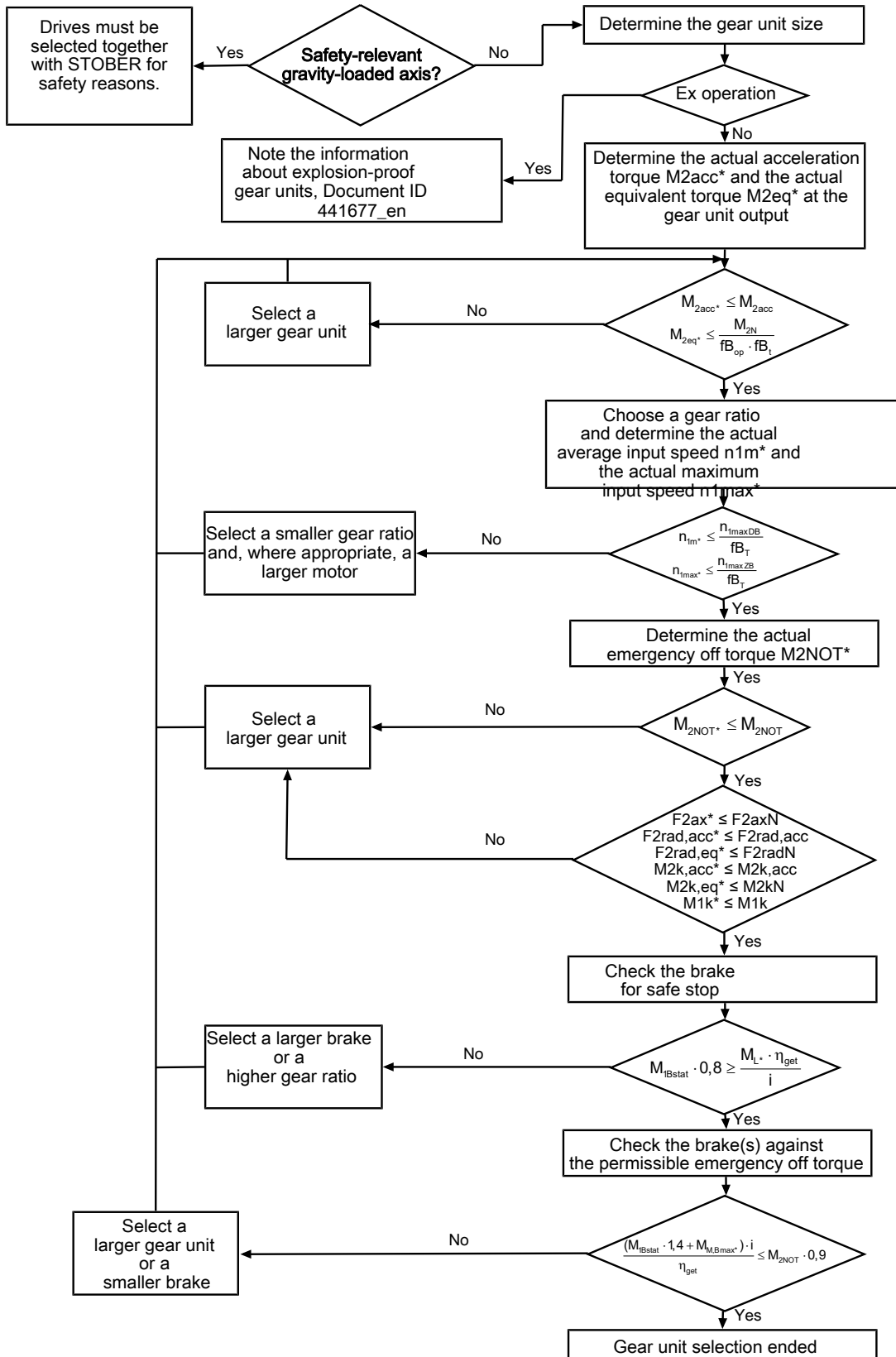
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.



### 6.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

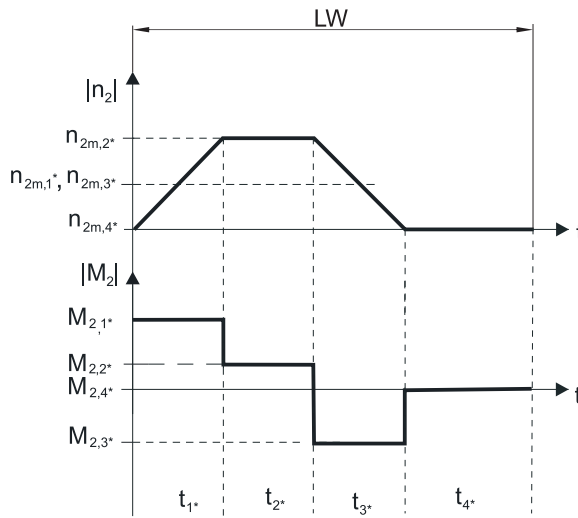
Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$ ,  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

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

**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 maximum acceleration torque**

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**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  $t_{1*} + \dots + t_{3*} \geq 6$  min, calculate  $n_{2m*}$  without the rest phase  $t_{4*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	fB <sub>op</sub>
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40
Run time	fB <sub>t</sub>
Daily runtime ≤ 8 h	1.00
Daily runtime ≤ 16 h	1.15
Daily runtime ≤ 24 h	1.20

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ }^\circ\text{C}$	0.9
	$\leq 30\text{ }^\circ\text{C}$	1.0
	$\leq 40\text{ }^\circ\text{C}$	1.15
Motor with convection cooling	$\leq 20\text{ }^\circ\text{C}$	1.0
	$\leq 30\text{ }^\circ\text{C}$	1.1
	$\leq 40\text{ }^\circ\text{C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 80\text{ }^\circ\text{C}$  must not be exceeded. Doing so may result in damage to the gear unit.

### 6.6.2 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  $n_{2m^*} \leq 20\text{ rpm}$  ( $F_{2axN} = F_{2ax20}$ ;  $F_{2radN} = F_{2rad20}$ ;  $M_{2kN} = M_{2k20}$ )
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

#### 6.6.2.1 V shaft design

**Permitted shaft loads for V shaft design (solid shaft)**

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
F1	35.0	1100	4200	4200	260	260
F2	41.0	1400	5400	5400	400	400
F3	43.0	1900	7500	7500	600	600
F4	44.0	2350	9250	9250	800	800
F6	44.0	3100	12500	12500	1200	1200

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

The following applies to output speeds  $n_{2m^*} > 20\text{ rpm}$ :

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

$$F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

$$M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

The values for  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  can be found in the table "Permitted shaft loads" in this chapter.

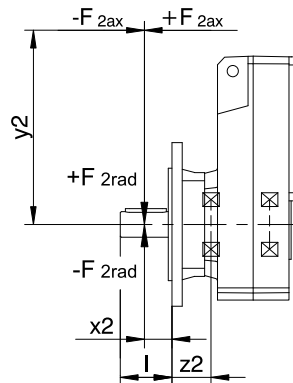


Fig. 2: Force application points for solid shaft

The specified values for  $F_{2rad20}$  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:

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

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  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  by a factor of two.

Also note the calculation for equivalent values:

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

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

### 6.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
F1	30.0	900	4200	4200	175	175
F2	33.0	1200	5400	5400	250	250
F3	33.0	1350	7500	7500	375	375
F4	39.0	1900	9250	9250	550	550
F6	45.0	2200	12500	12500	800	800

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
F1	30.0	900	4200	4200	175	175
F2	33.0	1200	5400	5400	250	250
F3	33.0	1350	7500	7500	375	375
F4	39.0	1900	9250	9250	550	550
F6	45.0	2200	12500	12500	800	800

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

The following applies to output speeds  $n_{2m^*} > 20$  rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}}$$

$$F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}}$$

$$M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}}$$

The values for  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  can be found in the table "Permitted shaft loads" in this chapter.

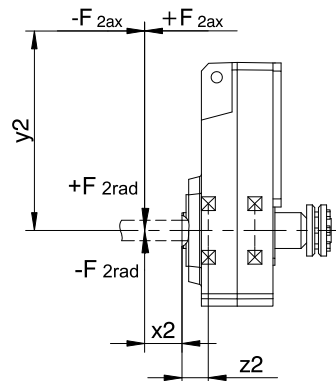


Fig. 3: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  by a factor of two.

Also note the calculation for equivalent values:

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

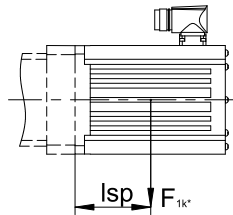
$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1}| \cdot t_{1^*} + \dots + |n_{2m,n^*}| \cdot t_{n^*}}}$$

### 6.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOBBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 6.6.4 Radial shaft seal rings

#### Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. 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.

## 6.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

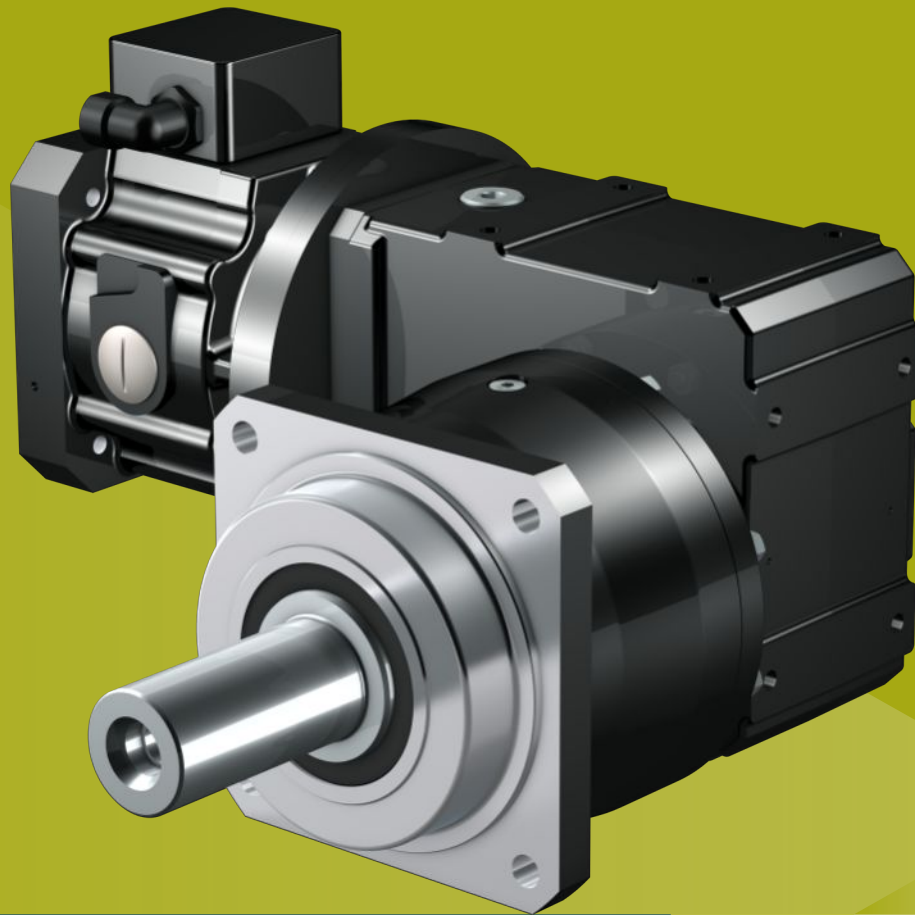
Enter the ID of the documentation in the Search term field.

Documentation	ID
Operating manual gear units, geared motors F	443366_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en

# 7 PK right-angle planetary gear units

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7

## Right-angle planetary gear units

PK

### 7.1 Overview

Helical-gear precision right-angle planetary gear units with integrated brake

#### Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€
Shaft load	★★★★☆
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
Continuous operation without cooling	✓
Reinforced output bearing	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

Key ★☆☆☆☆ good | ★★★★★ excellent

€ Economy | €€€€€ Premium

#### Technical data

$M_{1Bstat}$	8 – 100 Nm
$i$	12 – 390
$M_{2acc}$	200 – 3105 Nm
$\Delta\phi_2$	1.5 – 5 arcmin
$\eta_{get}$	94 %



## 7.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P531K (M<sub>2acc,max</sub> = 385 Nm)</b>																	
12.00	12/1	P531_0030K102_0040 MB23	8.0	17	3300	2800	4000	8.2	25	5.0	3.0	20	60	120	200	200	400
12.00	12/1	P531_0030K102_0040 MB23	12	11	3300	2800	4000	8.2	25	5.0	3.0	20	60	120	200	200	400
12.00	12/1	P531_0030K102_0040 MB23	16	5.8	3300	2800	4000	8.2	25	5.0	3.0	20	60	120	200	200	400
16.00	16/1	P531_0040K102_0040 MB23	8.0	21	3300	2800	4000	8.1	25	4.5	2.5	25	60	210	300	320	600
16.00	16/1	P531_0040K102_0040 MB23	12	15	3300	2800	4000	8.1	25	4.5	2.5	25	60	210	300	320	600
16.00	16/1	P531_0040K102_0040 MB23	16	9.4	3300	2800	4000	8.1	25	4.5	2.5	25	60	210	300	320	600
20.00	20/1	P531_0050K102_0040 MB23	8.0	18	3300	2800	4000	8.1	25	4.0	2.0	27	60	220	350	390	700
20.00	20/1	P531_0050K102_0040 MB23	12	13	3300	2800	4000	8.1	25	4.0	2.0	27	60	220	350	390	700
20.00	20/1	P531_0050K102_0040 MB23	16	7.2	3300	2800	4000	8.1	25	4.0	2.0	27	60	220	350	390	700
27.84	7600/273	P531_0050K102_0056 MB23	8.0	10	3300	2800	4000	7.9	25	4.0	2.0	28	60	220	350	390	700
27.84	7600/273	P531_0050K102_0056 MB23	12	4.5	3300	2800	4000	7.9	25	4.0	2.0	28	60	220	350	390	700
30.00	30/1	P531_0050K102_0060 MB23	8.0	8.6	3300	2800	4000	7.7	25	4.0	2.0	28	60	220	350	390	700
30.00	30/1	P531_0050K102_0060 MB23	12	3.0	3300	2800	4000	7.7	25	4.0	2.0	28	60	220	350	390	700
33.22	299/9	P531_0050K102_0066 MB23	8.0	6.6	3600	3300	4000	7.6	25	4.0	2.0	28	58	220	350	390	700
33.22	299/9	P531_0050K102_0066 MB23	12	1.0	3600	3300	4000	7.6	25	4.0	2.0	28	58	220	350	390	700
41.55	1911/46	P531_0050K102_0083 MB23	8.0	3.1	3600	3300	4000	7.5	25	4.0	2.0	28	58	220	350	390	700
46.25	8740/189	P531_0050K102_0092 MB23	8.0	1.6	3600	3300	4000	7.5	25	4.0	2.0	29	58	220	350	390	700
<b>P731K (M<sub>2acc,max</sub> = 840 Nm)</b>																	
12.00	12/1	P731_0030K202_0040 MB23	8.0	31	3000	2600	4000	10	39	4.5	2.5	33	63	300	423	420	711
12.00	12/1	P731_0030K202_0040 MB23	12	25	3000	2600	4000	10	39	4.5	2.5	33	63	300	423	420	711
12.00	12/1	P731_0030K202_0040 MB23	16	20	3000	2600	4000	10	39	4.5	2.5	33	63	300	423	420	711
12.00	12/1	P731_0030K202_0040 MB23	24	8.4	3000	2600	4000	10	39	4.5	2.5	33	63	300	423	420	711
12.00	12/1	P731_0030K202_0040 MB23	30	–	3000	2600	4000	10	39	4.5	2.5	33	63	300	423	420	711
12.00	12/1	P731_0030K202_0040 MB33	16	48	3000	2600	4000	31	46	4.5	2.5	35	63	300	500	500	1000
12.00	12/1	P731_0030K202_0040 MB33	24	37	3000	2600	4000	31	46	4.5	2.5	35	63	300	500	500	1000
12.00	12/1	P731_0030K202_0040 MB33	32	26	3000	2600	4000	31	46	4.5	2.5	35	63	300	500	500	1000
12.00	12/1	P731_0030K202_0040 MB33	45	7.6	3000	2600	4000	31	46	4.5	2.5	35	63	300	500	500	1000
16.00	16/1	P731_0040K202_0040 MB23	8.0	31	3000	2600	4000	9.8	39	4.5	2.5	43	63	440	565	560	948
16.00	16/1	P731_0040K202_0040 MB23	12	25	3000	2600	4000	9.8	39	4.5	2.5	43	63	440	565	560	948
16.00	16/1	P731_0040K202_0040 MB23	16	20	3000	2600	4000	9.8	39	4.5	2.5	43	63	440	565	560	948
16.00	16/1	P731_0040K202_0040 MB23	24	8.4	3000	2600	4000	9.8	39	4.5	2.5	43	63	440	565	560	948
16.00	16/1	P731_0040K202_0040 MB23	30	–	3000	2600	4000	9.8	39	4.5	2.5	43	63	440	565	560	948
16.00	16/1	P731_0040K202_0040 MB33	16	52	3000	2600	4000	30	46	4.5	2.5	45	63	440	677	680	1400
16.00	16/1	P731_0040K202_0040 MB33	24	40	3000	2600	4000	30	46	4.5	2.5	45	63	440	677	680	1400
16.00	16/1	P731_0040K202_0040 MB33	32	29	3000	2600	4000	30	46	4.5	2.5	45	63	440	677	680	1400
16.00	16/1	P731_0040K202_0040 MB33	45	11	3000	2600	4000	30	46	4.5	2.5	45	63	440	677	680	1400
20.00	20/1	P731_0050K202_0040 MB23	8.0	31	3000	2600	4000	9.7	39	4.0	2.0	48	63	440	706	710	1186
20.00	20/1	P731_0050K202_0040 MB23	12	25	3000	2600	4000	9.7	39	4.0	2.0	48	63	440	706	710	1186
20.00	20/1	P731_0050K202_0040 MB23	16	20	3000	2600	4000	9.7	39	4.0	2.0	48	63	440	706	710	1186
20.00	20/1	P731_0050K202_0040 MB23	24	8.4	3000	2600	4000	9.7	39	4.0	2.0	48	63	440	706	710	1186
20.00	20/1	P731_0050K202_0040 MB23	30	–	3000	2600	4000	9.7	39	4.0	2.0	48	63	440	706	710	1186
20.00	20/1	P731_0050K202_0040 MB33	16	46	3000	2600	4000	30	46	4.0	2.0	50	63	440	805	840	1610
20.00	20/1	P731_0050K202_0040 MB33	24	35	3000	2600	4000	30	46	4.0	2.0	50	63	440	805	840	1610
20.00	20/1	P731_0050K202_0040 MB33	32	23	3000	2600	4000	30	46	4.0	2.0	50	63	440	805	840	1610
20.00	20/1	P731_0050K202_0040 MB33	45	5.2	3000	2600	4000	30	46	4.0	2.0	50	63	440	805	840	1610
25.89	10535/407	P731_0050K202_0052 MB23	8.0	31	3000	2600	4000	8.9	39	4.0	2.0	50	63	440	805	840	1534
25.89	10535/407	P731_0050K202_0052 MB23	12	25	3000	2600	4000	8.9	39	4.0	2.0	50	63	440	805	840	1534
25.89	10535/407	P731_0050K202_0052 MB23	16	20	3000	2600	4000	8.9	39	4.0	2.0	50	63	440	805	840	1534
25.89	10535/407	P731_0050K202_0052 MB23	24	8.4	3000	2600	4000	8.9	39	4.0	2.0	50	63	440	805	840	1534
25.89	10535/407	P731_0050K202_0052 MB23	30	–	3000	2600	4000	8.9	39	4.0	2.0	50	63	440	805	840	1534
25.89	10535/407	P731_0050K202_0052 MB33	16	30	3000	2600	4000	29	46	4.0	2.0	51	63	440	805	840	1610
25.89	10535/407	P731_0050K202_0052 MB33	24	19	3000	2600	4000	29	46	4.0	2.0	51	63	440	805	840	1610
25.89	10535/407	P731_0050K202_0052 MB33	32	7.9	3000	2600	4000	29	46	4.0	2.0	51	63	440	805	840	1610

7.2 Selection tables 7 PK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P731K (M<sub>2acc,max</sub> = 840 Nm)</b>																	
28.00	28/1	P731_0070K102_0040 MB23	8.0	31	3300	2800	4000	8.1	32	4.0	2.0	49	60	440	664	660	1561
28.00	28/1	P731_0070K102_0040 MB23	12	25	3300	2800	4000	8.1	32	4.0	2.0	49	60	440	664	660	1561
28.00	28/1	P731_0070K102_0040 MB23	16	20	3300	2800	4000	8.1	32	4.0	2.0	49	60	440	664	660	1561
28.00	28/1	P731_0070K102_0040 MB23	24	8.4	3300	2800	4000	8.1	32	4.0	2.0	49	60	440	664	660	1561
28.00	28/1	P731_0070K102_0040 MB23	30	-	3300	2800	4000	8.1	32	4.0	2.0	49	60	440	664	660	1561
30.00	30/1	P731_0050K202_0060 MB23	8.0	31	3000	2600	4000	8.9	39	4.0	2.0	51	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB23	12	25	3000	2600	4000	8.9	39	4.0	2.0	51	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB23	16	20	3000	2600	4000	8.9	39	4.0	2.0	51	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB23	24	8.4	3000	2600	4000	8.9	39	4.0	2.0	51	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB23	30	-	3000	2600	4000	8.9	39	4.0	2.0	51	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB33	16	23	3000	2600	4000	29	46	4.0	2.0	52	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB33	24	12	3000	2600	4000	29	46	4.0	2.0	52	63	440	805	840	1610
30.00	30/1	P731_0050K202_0060 MB33	32	0.6	3000	2600	4000	29	46	4.0	2.0	52	63	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB23	8.0	30	3500	3100	4000	8.3	39	4.0	2.0	51	61	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB23	12	24	3500	3100	4000	8.3	39	4.0	2.0	51	61	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB23	16	18	3500	3100	4000	8.3	39	4.0	2.0	51	61	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB23	24	7.2	3500	3100	4000	8.3	39	4.0	2.0	51	61	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB33	16	18	3500	3100	4000	29	46	4.0	2.0	52	61	440	805	840	1610
33.42	11395/341	P731_0050K202_0067 MB33	24	7.2	3500	3100	4000	29	46	4.0	2.0	52	61	440	805	840	1610
38.98	1520/39	P731_0070K102_0056 MB23	8.0	23	3300	2800	4000	7.9	32	4.0	2.0	50	60	440	741	740	1561
38.98	1520/39	P731_0070K102_0056 MB23	12	17	3300	2800	4000	7.9	32	4.0	2.0	50	60	440	741	740	1561
38.98	1520/39	P731_0070K102_0056 MB23	16	12	3300	2800	4000	7.9	32	4.0	2.0	50	60	440	741	740	1561
38.98	1520/39	P731_0070K102_0056 MB23	24	0.3	3300	2800	4000	7.9	32	4.0	2.0	50	60	440	741	740	1561
40.00	40/1	P731_0100K102_0040 MB23	8.0	13	3300	2800	4000	8.1	32	3.5	1.5	49	60	350	575	580	1150
40.00	40/1	P731_0100K102_0040 MB23	12	7.5	3300	2800	4000	8.1	32	3.5	1.5	49	60	350	575	580	1150
40.00	40/1	P731_0100K102_0040 MB23	16	1.9	3300	2800	4000	8.1	32	3.5	1.5	49	60	350	575	580	1150
41.99	12470/297	P731_0050K202_0084 MB23	8.0	21	3500	3100	4000	8.0	39	4.0	2.0	52	61	440	805	840	1610
41.99	12470/297	P731_0050K202_0084 MB23	12	16	3500	3100	4000	8.0	39	4.0	2.0	52	61	440	805	840	1610
41.99	12470/297	P731_0050K202_0084 MB23	16	10	3500	3100	4000	8.0	39	4.0	2.0	52	61	440	805	840	1610
41.99	12470/297	P731_0050K202_0084 MB33	16	10	3500	3100	4000	28	46	4.0	2.0	52	61	440	805	840	1610
42.00	42/1	P731_0070K102_0060 MB23	8.0	20	3300	2800	4000	7.7	32	4.0	2.0	51	60	440	760	760	1561
42.00	42/1	P731_0070K102_0060 MB23	12	15	3300	2800	4000	7.7	32	4.0	2.0	51	60	440	760	760	1561
42.00	42/1	P731_0070K102_0060 MB23	16	9.1	3300	2800	4000	7.7	32	4.0	2.0	51	60	440	760	760	1561
45.95	11395/248	P731_0050K202_0092 MB23	8.0	18	3500	3100	4000	8.1	39	4.0	2.0	52	61	440	805	840	1610
45.95	11395/248	P731_0050K202_0092 MB23	12	13	3500	3100	4000	8.1	39	4.0	2.0	52	61	440	805	840	1610
45.95	11395/248	P731_0050K202_0092 MB23	16	7.3	3500	3100	4000	8.1	39	4.0	2.0	52	61	440	805	840	1610
45.95	11395/248	P731_0050K202_0092 MB33	16	7.3	3500	3100	4000	29	46	4.0	2.0	53	61	440	805	840	1610
46.51	2093/45	P731_0070K102_0066 MB23	8.0	17	3600	3300	4000	7.6	32	4.0	2.0	51	58	440	786	790	1561
46.51	2093/45	P731_0070K102_0066 MB23	12	12	3600	3300	4000	7.6	32	4.0	2.0	51	58	440	786	790	1561
46.51	2093/45	P731_0070K102_0066 MB23	16	6.0	3600	3300	4000	7.6	32	4.0	2.0	51	58	440	786	790	1561
55.68	15200/273	P731_0100K102_0056 MB23	8.0	6.3	3300	2800	4000	7.9	32	3.5	1.5	50	60	350	575	580	1150
55.68	15200/273	P731_0100K102_0056 MB23	12	0.7	3300	2800	4000	7.9	32	3.5	1.5	50	60	350	575	580	1150
57.73	6235/108	P731_0050K202_0115 MB23	8.0	12	3500	3100	4000	7.9	39	4.0	2.0	53	61	440	805	840	1610
57.73	6235/108	P731_0050K202_0115 MB23	12	6.8	3500	3100	4000	7.9	39	4.0	2.0	53	61	440	805	840	1610
57.73	6235/108	P731_0050K202_0115 MB23	16	1.2	3500	3100	4000	7.9	39	4.0	2.0	53	61	440	805	840	1610
57.73	6235/108	P731_0050K202_0115 MB33	16	1.2	3500	3100	4000	28	46	4.0	2.0	53	61	440	805	840	1610
58.16	13377/230	P731_0070K102_0083 MB23	8.0	12	3600	3300	4000	7.5	32	4.0	2.0	51	58	440	805	840	1561
58.16	13377/230	P731_0070K102_0083 MB23	12	5.9	3600	3300	4000	7.5	32	4.0	2.0	51	58	440	805	840	1561
58.16	13377/230	P731_0070K102_0083 MB23	16	0.3	3600	3300	4000	7.5	32	4.0	2.0	51	58	440	805	840	1561
60.00	60/1	P731_0100K102_0060 MB23	8.0	5.0	3300	2800	4000	7.7	32	3.5	1.5	50	60	350	575	580	1150
64.74	1748/27	P731_0070K102_0092 MB23	8.0	9.2	3600	3300	4000	7.5	32	4.0	2.0	51	58	440	805	840	1561
64.74	1748/27	P731_0070K102_0092 MB23	12	3.6	3600	3300	4000	7.5	32	4.0	2.0	51	58	440	805	840	1561
66.44	598/9	P731_0100K102_0066 MB23	8.0	3.5	3600	3300	4000	7.6	32	3.5	1.5	50	58	350	575	580	1150
69.26	14405/208	P731_0050K202_0140 MB23	8.0	8.5	3900	3500	4000	7.7	39	4.0	2.0	53	59	440	805	840	1610
69.26	14405/208	P731_0050K202_0140 MB23	12	2.9	3900	3500	4000	7.7	39	4.0	2.0	53	59	440	805	840	1610
70.98	3549/50	P731_0070K102_0100 MB23	8.0	7.4	4000	3800	4000	7.4	32	4.0	2.0	51	56	440	805	840	1561
70.98	3549/50	P731_0070K102_0100 MB23	12	1.8	4000	3800	4000	7.4	32	4.0	2.0	51	56	440	805	840	1561
80.96	1862/23	P731_0070K102_0115 MB23	8.0	5.1	3600	3300	4000	7.4	32	4.0	2.0	51	58	440	805	840	1561
83.09	1911/23	P731_0100K102_0083 MB23	8.0	0.5	3600	3300	4000	7.5	32	3.5	1.5	50	58	350	575	580	1150
87.35	2795/32	P731_0050K202_0175 MB23	8.0	4.4	3900	3500	4000	7.5	39	4.0	2.0	53	59	440	805	840	1610
88.33	3003/34	P731_0070K102_0125 MB23	8.0	3.8	4000	3800	4000	7.3	32	4.0	2.0	52	56	440	805	840	1561
98.80	494/5	P731_0070K102_0140 MB23	8.0	2.2	4000	3800	4000	7.4	32	4.0	2.0	52	56	440	805	840	1561
115.9	14835/128	P731_0050K202_0230 MB23	8.0	0.6	4000	3900	4000	7.4	39	4.0	2.0	53	57	440	805	840	1610
117.0	117/1	P731_0070K102_0165 MB23	8.0	0.1	4000	4000	4000	7.3	32	4.0	2.0	52	54	440	805	840	1561

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
					EL1,2	EL3,4,5,6											
<b>P831K (M<sub>2acc,max</sub> = 1867 Nm)</b>																	
12.00	12/1	P831_0030K302_0040 MB23	8.0	31	2700	2300	4000	15	60	4.5	2.5	58	66	423	423	420	711
12.00	12/1	P831_0030K302_0040 MB23	12	25	2700	2300	4000	15	60	4.5	2.5	58	66	423	423	420	711
12.00	12/1	P831_0030K302_0040 MB23	16	20	2700	2300	4000	15	60	4.5	2.5	58	66	423	423	420	711
12.00	12/1	P831_0030K302_0040 MB23	24	8.4	2700	2300	4000	15	60	4.5	2.5	58	66	423	423	420	711
12.00	12/1	P831_0030K302_0040 MB23	30	–	2700	2300	4000	15	60	4.5	2.5	58	66	423	423	420	711
12.00	12/1	P831_0030K302_0040 MB33	16	104	2700	2300	4000	37	67	4.5	2.5	65	66	593	889	890	2134
12.00	12/1	P831_0030K302_0040 MB33	24	92	2700	2300	4000	37	67	4.5	2.5	65	66	593	889	890	2134
12.00	12/1	P831_0030K302_0040 MB33	32	81	2700	2300	4000	37	67	4.5	2.5	65	66	593	889	890	2134
12.00	12/1	P831_0030K302_0040 MB33	45	63	2700	2300	4000	37	67	4.5	2.5	65	66	593	889	890	2134
12.00	12/1	P831_0030K302_0040 MB33	90	–	2700	2300	4000	37	67	4.5	2.5	65	66	593	889	890	2134
16.00	16/1	P831_0040K302_0040 MB23	8.0	31	2700	2300	4000	13	60	4.0	2.0	82	66	565	565	560	948
16.00	16/1	P831_0040K302_0040 MB23	12	25	2700	2300	4000	13	60	4.0	2.0	82	66	565	565	560	948
16.00	16/1	P831_0040K302_0040 MB23	16	20	2700	2300	4000	13	60	4.0	2.0	82	66	565	565	560	948
16.00	16/1	P831_0040K302_0040 MB23	24	8.4	2700	2300	4000	13	60	4.0	2.0	82	66	565	565	560	948
16.00	16/1	P831_0040K302_0040 MB23	30	–	2700	2300	4000	13	60	4.0	2.0	82	66	565	565	560	948
16.00	16/1	P831_0040K302_0040 MB33	16	104	2700	2300	4000	35	67	4.0	2.0	90	66	790	1186	1190	2845
16.00	16/1	P831_0040K302_0040 MB33	24	92	2700	2300	4000	35	67	4.0	2.0	90	66	790	1186	1190	2845
16.00	16/1	P831_0040K302_0040 MB33	32	81	2700	2300	4000	35	67	4.0	2.0	90	66	790	1186	1190	2845
16.00	16/1	P831_0040K302_0040 MB33	45	63	2700	2300	4000	35	67	4.0	2.0	90	66	790	1186	1190	2845
16.00	16/1	P831_0040K302_0040 MB33	90	–	2700	2300	4000	35	67	4.0	2.0	90	66	790	1186	1190	2845
20.00	20/1	P831_0050K302_0040 MB23	8.0	31	2700	2300	4000	13	60	4.0	2.0	103	66	706	706	710	1186
20.00	20/1	P831_0050K302_0040 MB23	12	25	2700	2300	4000	13	60	4.0	2.0	103	66	706	706	710	1186
20.00	20/1	P831_0050K302_0040 MB23	16	20	2700	2300	4000	13	60	4.0	2.0	103	66	706	706	710	1186
20.00	20/1	P831_0050K302_0040 MB23	24	8.4	2700	2300	4000	13	60	4.0	2.0	103	66	706	706	710	1186
20.00	20/1	P831_0050K302_0040 MB23	30	–	2700	2300	4000	13	60	4.0	2.0	103	66	706	706	710	1186
20.00	20/1	P831_0050K302_0040 MB33	16	104	2700	2300	4000	35	67	4.0	2.0	111	66	988	1482	1480	3230
20.00	20/1	P831_0050K302_0040 MB33	24	92	2700	2300	4000	35	67	4.0	2.0	111	66	988	1482	1480	3230
20.00	20/1	P831_0050K302_0040 MB33	32	81	2700	2300	4000	35	67	4.0	2.0	111	66	988	1482	1480	3230
20.00	20/1	P831_0050K302_0040 MB33	45	63	2700	2300	4000	35	67	4.0	2.0	111	66	988	1482	1480	3230
20.00	20/1	P831_0050K302_0040 MB33	90	–	2700	2300	4000	35	67	4.0	2.0	111	66	988	1482	1480	3230
26.88	215/8	P831_0050K302_0054 MB23	8.0	31	2700	2300	4000	11	60	4.0	2.0	113	66	948	948	950	1593
26.88	215/8	P831_0050K302_0054 MB23	12	25	2700	2300	4000	11	60	4.0	2.0	113	66	948	948	950	1593
26.88	215/8	P831_0050K302_0054 MB23	16	20	2700	2300	4000	11	60	4.0	2.0	113	66	948	948	950	1593
26.88	215/8	P831_0050K302_0054 MB23	24	8.4	2700	2300	4000	11	60	4.0	2.0	113	66	948	948	950	1593
26.88	215/8	P831_0050K302_0054 MB23	30	–	2700	2300	4000	11	60	4.0	2.0	113	66	948	948	950	1593
26.88	215/8	P831_0050K302_0054 MB33	16	76	2700	2300	4000	31	67	4.0	2.0	118	66	1090	1636	1640	3108
26.88	215/8	P831_0050K302_0054 MB33	24	64	2700	2300	4000	31	67	4.0	2.0	118	66	1090	1636	1640	3108
26.88	215/8	P831_0050K302_0054 MB33	32	53	2700	2300	4000	31	67	4.0	2.0	118	66	1090	1636	1640	3108
26.88	215/8	P831_0050K302_0054 MB33	45	35	2700	2300	4000	31	67	4.0	2.0	118	66	1090	1636	1640	3108
28.00	28/1	P831_0070K202_0040 MB23	8.0	31	3000	2600	4000	9.9	55	3.5	1.5	114	63	790	988	990	1660
28.00	28/1	P831_0070K202_0040 MB23	12	25	3000	2600	4000	9.9	55	3.5	1.5	114	63	790	988	990	1660
28.00	28/1	P831_0070K202_0040 MB23	16	20	3000	2600	4000	9.9	55	3.5	1.5	114	63	790	988	990	1660
28.00	28/1	P831_0070K202_0040 MB23	24	8.4	3000	2600	4000	9.9	55	3.5	1.5	114	63	790	988	990	1660
28.00	28/1	P831_0070K202_0040 MB23	30	–	3000	2600	4000	9.9	55	3.5	1.5	114	63	790	988	990	1660
28.00	28/1	P831_0070K202_0040 MB33	16	65	3000	2600	4000	30	62	3.5	1.5	119	63	790	1185	1180	2887
28.00	28/1	P831_0070K202_0040 MB33	24	54	3000	2600	4000	30	62	3.5	1.5	119	63	790	1185	1180	2887
28.00	28/1	P831_0070K202_0040 MB33	32	43	3000	2600	4000	30	62	3.5	1.5	119	63	790	1185	1180	2887
28.00	28/1	P831_0070K202_0040 MB33	45	24	3000	2600	4000	30	62	3.5	1.5	119	63	790	1185	1180	2887
30.00	30/1	P831_0050K302_0060 MB23	8.0	31	2700	2300	4000	11	60	4.0	2.0	115	66	1059	1059	1060	1778
30.00	30/1	P831_0050K302_0060 MB23	12	25	2700	2300	4000	11	60	4.0	2.0	115	66	1059	1059	1060	1778
30.00	30/1	P831_0050K302_0060 MB23	16	20	2700	2300	4000	11	60	4.0	2.0	115	66	1059	1059	1060	1778
30.00	30/1	P831_0050K302_0060 MB23	24	8.4	2700	2300	4000	11	60	4.0	2.0	115	66	1059	1059	1060	1778
30.00	30/1	P831_0050K302_0060 MB23	30	–	2700	2300	4000	11	60	4.0	2.0	115	66	1059	1059	1060	1778
30.00	30/1	P831_0050K302_0060 MB33	16	69	2700	2300	4000	33	67	4.0	2.0	120	66	1100	1697	1700	3230
30.00	30/1	P831_0050K302_0060 MB33	24	58	2700	2300	4000	33	67	4.0	2.0	120	66	1100	1697	1700	3230
30.00	30/1	P831_0050K302_0060 MB33	32	46	2700	2300	4000	33	67	4.0	2.0	120	66	1100	1697	1700	3230
30.00	30/1	P831_0050K302_0060 MB33	45	28	2700	2300	4000	33	67	4.0	2.0	120	66	1100	1697	1700	3230
30.55	336/11	P831_0070K202_0044 MB23	8.0	31	3000	2600	4000	9.5	55	3.5	1.5	116	63	813	1078	1080	1811
30.55	336/11	P831_0070K202_0044 MB23	12	25	3000	2600	4000	9.5	55	3.5	1.5	116	63	813	1078	1080	1811
30.55	336/11	P831_0070K202_0044 MB23	16	20	3000	2600	4000	9.5	55	3.5	1.5	116	63	813	1078	1080	1811
30.55	336/11	P831_0070K202_0044 MB23	24	8.4	3000	2600	4000	9.5	55	3.5	1.5	116	63	813	1078	1080	1811
30.55	336/11	P831_0070K202_0044 MB23	30	–	3000	2600	4000	9.5	55	3.5	1.5	116	63	813	1078	1080	1811
30.55	336/11	P831_0070K202_0044 MB33	16	58	3000	2600	4000	30	62	3.5	1.5	120	63	813	1220	1220	2887
30.55	336/11	P831_0070K202_0044 MB33	24	46	3000	2600	4000	30	62	3.5	1.5	120	63	813	1220	1220	2887

7.2 Selection tables 7 PK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P831K (M<sub>2acc,max</sub> = 1867 Nm)</b>																	
30.55	336/11	P831_0070K202_0044 MB33	32	35	3000	2600	4000	30	62	3.5	1.5	120	63	813	1220	1220	2887
30.55	336/11	P831_0070K202_0044 MB33	45	17	3000	2600	4000	30	62	3.5	1.5	120	63	813	1220	1220	2887
36.24	14749/407	P831_0070K202_0052 MB23	8.0	31	3000	2600	4000	9.0	55	3.5	1.5	119	63	861	1279	1280	2148
36.24	14749/407	P831_0070K202_0052 MB23	12	25	3000	2600	4000	9.0	55	3.5	1.5	119	63	861	1279	1280	2148
36.24	14749/407	P831_0070K202_0052 MB23	16	20	3000	2600	4000	9.0	55	3.5	1.5	119	63	861	1279	1280	2148
36.24	14749/407	P831_0070K202_0052 MB23	24	8.4	3000	2600	4000	9.0	55	3.5	1.5	119	63	861	1279	1280	2148
36.24	14749/407	P831_0070K202_0052 MB23	30	–	3000	2600	4000	9.0	55	3.5	1.5	119	63	861	1279	1280	2148
36.24	14749/407	P831_0070K202_0052 MB33	16	45	3000	2600	4000	30	62	3.5	1.5	122	63	861	1291	1290	2887
36.24	14749/407	P831_0070K202_0052 MB33	24	34	3000	2600	4000	30	62	3.5	1.5	122	63	861	1291	1290	2887
36.24	14749/407	P831_0070K202_0052 MB33	32	23	3000	2600	4000	30	62	3.5	1.5	122	63	861	1291	1290	2887
36.24	14749/407	P831_0070K202_0052 MB33	45	4.5	3000	2600	4000	30	62	3.5	1.5	122	63	861	1291	1290	2887
36.96	2365/64	P831_0050K302_0074 MB23	8.0	31	2700	2300	4000	10	60	4.0	2.0	119	66	1100	1304	1300	2191
36.96	2365/64	P831_0050K302_0074 MB23	12	25	2700	2300	4000	10	60	4.0	2.0	119	66	1100	1304	1300	2191
36.96	2365/64	P831_0050K302_0074 MB23	16	20	2700	2300	4000	10	60	4.0	2.0	119	66	1100	1304	1300	2191
36.96	2365/64	P831_0050K302_0074 MB23	24	8.4	2700	2300	4000	10	60	4.0	2.0	119	66	1100	1304	1300	2191
36.96	2365/64	P831_0050K302_0074 MB23	30	–	2700	2300	4000	10	60	4.0	2.0	119	66	1100	1304	1300	2191
36.96	2365/64	P831_0050K302_0074 MB33	16	52	2700	2300	4000	31	67	4.0	2.0	122	66	1100	1819	1820	3230
36.96	2365/64	P831_0050K302_0074 MB33	24	40	2700	2300	4000	31	67	4.0	2.0	122	66	1100	1819	1820	3230
36.96	2365/64	P831_0050K302_0074 MB33	32	29	2700	2300	4000	31	67	4.0	2.0	122	66	1100	1819	1820	3230
36.96	2365/64	P831_0050K302_0074 MB33	45	11	2700	2300	4000	31	67	4.0	2.0	122	66	1100	1819	1820	3230
40.00	40/1	P831_0100K202_0040 MB23	8.0	31	3000	2600	4000	9.8	55	3.5	1.5	124	63	850	1380	1380	2371
40.00	40/1	P831_0100K202_0040 MB23	12	25	3000	2600	4000	9.8	55	3.5	1.5	124	63	850	1380	1380	2371
40.00	40/1	P831_0100K202_0040 MB23	16	20	3000	2600	4000	9.8	55	3.5	1.5	124	63	850	1380	1380	2371
40.00	40/1	P831_0100K202_0040 MB23	24	8.4	3000	2600	4000	9.8	55	3.5	1.5	124	63	850	1380	1380	2371
40.00	40/1	P831_0100K202_0040 MB23	30	–	3000	2600	4000	9.8	55	3.5	1.5	124	63	850	1380	1380	2371
40.00	40/1	P831_0100K202_0040 MB33	16	36	3000	2600	4000	30	62	3.5	1.5	126	63	850	1380	1380	2760
40.00	40/1	P831_0100K202_0040 MB33	24	25	3000	2600	4000	30	62	3.5	1.5	126	63	850	1380	1380	2760
40.00	40/1	P831_0100K202_0040 MB33	32	14	3000	2600	4000	30	62	3.5	1.5	126	63	850	1380	1380	2760
42.00	42/1	P831_0070K202_0060 MB23	8.0	31	3000	2600	4000	9.0	55	3.5	1.5	122	63	904	1356	1360	2490
42.00	42/1	P831_0070K202_0060 MB23	12	25	3000	2600	4000	9.0	55	3.5	1.5	122	63	904	1356	1360	2490
42.00	42/1	P831_0070K202_0060 MB23	16	20	3000	2600	4000	9.0	55	3.5	1.5	122	63	904	1356	1360	2490
42.00	42/1	P831_0070K202_0060 MB23	24	8.4	3000	2600	4000	9.0	55	3.5	1.5	122	63	904	1356	1360	2490
42.00	42/1	P831_0070K202_0060 MB23	30	–	3000	2600	4000	9.0	55	3.5	1.5	122	63	904	1356	1360	2490
42.00	42/1	P831_0070K202_0060 MB33	16	36	3000	2600	4000	30	62	3.5	1.5	124	63	904	1356	1360	2887
42.00	42/1	P831_0070K202_0060 MB33	24	25	3000	2600	4000	30	62	3.5	1.5	124	63	904	1356	1360	2887
42.00	42/1	P831_0070K202_0060 MB33	32	13	3000	2600	4000	30	62	3.5	1.5	124	63	904	1356	1360	2887
46.34	5375/116	P831_0050K302_0093 MB23	8.0	31	3200	2800	4000	9.2	60	4.0	2.0	122	64	1100	1635	1630	2747
46.34	5375/116	P831_0050K302_0093 MB23	12	25	3200	2800	4000	9.2	60	4.0	2.0	122	64	1100	1635	1630	2747
46.34	5375/116	P831_0050K302_0093 MB23	16	20	3200	2800	4000	9.2	60	4.0	2.0	122	64	1100	1635	1630	2747
46.34	5375/116	P831_0050K302_0093 MB23	24	8.4	3200	2800	4000	9.2	60	4.0	2.0	122	64	1100	1635	1630	2747
46.34	5375/116	P831_0050K302_0093 MB23	30	–	3200	2800	4000	9.2	60	4.0	2.0	122	64	1100	1635	1630	2747
46.34	5375/116	P831_0050K302_0093 MB33	16	37	3200	2800	4000	30	67	4.0	2.0	124	64	1100	1840	1870	3230
46.34	5375/116	P831_0050K302_0093 MB33	24	25	3200	2800	4000	30	67	4.0	2.0	124	64	1100	1840	1870	3230
46.34	5375/116	P831_0050K302_0093 MB33	32	14	3200	2800	4000	30	67	4.0	2.0	124	64	1100	1840	1870	3230
46.78	15953/341	P831_0070K202_0067 MB23	8.0	31	3500	3100	4000	8.4	55	3.5	1.5	123	61	937	1406	1410	2773
46.78	15953/341	P831_0070K202_0067 MB23	12	25	3500	3100	4000	8.4	55	3.5	1.5	123	61	937	1406	1410	2773
46.78	15953/341	P831_0070K202_0067 MB23	16	20	3500	3100	4000	8.4	55	3.5	1.5	123	61	937	1406	1410	2773
46.78	15953/341	P831_0070K202_0067 MB23	24	8.4	3500	3100	4000	8.4	55	3.5	1.5	123	61	937	1406	1410	2773
46.78	15953/341	P831_0070K202_0067 MB23	30	–	3500	3100	4000	8.4	55	3.5	1.5	123	61	937	1406	1410	2773
46.78	15953/341	P831_0070K202_0067 MB33	16	30	3500	3100	4000	29	62	3.5	1.5	125	61	937	1406	1410	2887
46.78	15953/341	P831_0070K202_0067 MB33	24	19	3500	3100	4000	29	62	3.5	1.5	125	61	937	1406	1410	2887
46.78	15953/341	P831_0070K202_0067 MB33	32	7.5	3500	3100	4000	29	62	3.5	1.5	125	61	937	1406	1410	2887
49.83	14749/296	P831_0070K202_0071 MB23	8.0	31	3000	2600	4000	8.6	55	3.5	1.5	123	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB23	12	25	3000	2600	4000	8.6	55	3.5	1.5	123	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB23	16	20	3000	2600	4000	8.6	55	3.5	1.5	123	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB23	24	8.4	3000	2600	4000	8.6	55	3.5	1.5	123	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB23	30	–	3000	2600	4000	8.6	55	3.5	1.5	123	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB33	16	27	3000	2600	4000	29	62	3.5	1.5	125	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB33	24	15	3000	2600	4000	29	62	3.5	1.5	125	63	957	1436	1440	2887
49.83	14749/296	P831_0070K202_0071 MB33	32	4.3	3000	2600	4000	29	62	3.5	1.5	125	63	957	1436	1440	2887
51.77	21070/407	P831_0100K202_0052 MB23	8.0	31	3000	2600	4000	8.9	55	3.5	1.5	127	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB23	12	25	3000	2600	4000	8.9	55	3.5	1.5	127	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB23	16	20	3000	2600	4000	8.9	55	3.5	1.5	127	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB23	24	8.4	3000	2600	4000	8.9	55	3.5	1.5	127	63	850	1380	1380	2760



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
					EL1,2	EL3,4,5,6											
<b>P831K (M<sub>2acc,max</sub> = 1867 Nm)</b>																	
51.77	21070/407	P831_0100K202_0052 MB23	30	–	3000	2600	4000	8.9	55	3.5	1.5	127	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB33	16	23	3000	2600	4000	29	62	3.5	1.5	128	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB33	24	12	3000	2600	4000	29	62	3.5	1.5	128	63	850	1380	1380	2760
51.77	21070/407	P831_0100K202_0052 MB33	32	0.3	3000	2600	4000	29	62	3.5	1.5	128	63	850	1380	1380	2760
58.05	1161/20	P831_0050K302_0115 MB23	8.0	31	3200	2800	4000	8.6	60	4.0	2.0	124	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB23	12	25	3200	2800	4000	8.6	60	4.0	2.0	124	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB23	16	20	3200	2800	4000	8.6	60	4.0	2.0	124	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB23	24	8.4	3200	2800	4000	8.6	60	4.0	2.0	124	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB23	30	–	3200	2800	4000	8.6	60	4.0	2.0	124	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB33	16	25	3200	2800	4000	29	67	4.0	2.0	126	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB33	24	14	3200	2800	4000	29	67	4.0	2.0	126	64	1100	1840	1870	3230
58.05	1161/20	P831_0050K302_0115 MB33	32	2.3	3200	2800	4000	29	67	4.0	2.0	126	64	1100	1840	1870	3230
58.78	17458/297	P831_0070K202_0084 MB23	8.0	30	3500	3100	4000	8.0	55	3.5	1.5	125	61	1000	1494	1490	2887
58.78	17458/297	P831_0070K202_0084 MB23	12	25	3500	3100	4000	8.0	55	3.5	1.5	125	61	1000	1494	1490	2887
58.78	17458/297	P831_0070K202_0084 MB23	16	19	3500	3100	4000	8.0	55	3.5	1.5	125	61	1000	1494	1490	2887
58.78	17458/297	P831_0070K202_0084 MB23	24	8.0	3500	3100	4000	8.0	55	3.5	1.5	125	61	1000	1494	1490	2887
58.78	17458/297	P831_0070K202_0084 MB33	16	19	3500	3100	4000	29	62	3.5	1.5	126	61	1000	1494	1490	2887
58.78	17458/297	P831_0070K202_0084 MB33	24	8.0	3500	3100	4000	29	62	3.5	1.5	126	61	1000	1494	1490	2887
60.00	60/1	P831_0100K202_0060 MB23	8.0	28	3000	2600	4000	8.9	55	3.5	1.5	128	63	850	1380	1380	2760
60.00	60/1	P831_0100K202_0060 MB23	12	22	3000	2600	4000	8.9	55	3.5	1.5	128	63	850	1380	1380	2760
60.00	60/1	P831_0100K202_0060 MB23	16	17	3000	2600	4000	8.9	55	3.5	1.5	128	63	850	1380	1380	2760
60.00	60/1	P831_0100K202_0060 MB23	24	5.4	3000	2600	4000	8.9	55	3.5	1.5	128	63	850	1380	1380	2760
60.00	60/1	P831_0100K202_0060 MB33	16	17	3000	2600	4000	29	62	3.5	1.5	129	63	850	1380	1380	2760
60.00	60/1	P831_0100K202_0060 MB33	24	5.4	3000	2600	4000	29	62	3.5	1.5	129	63	850	1380	1380	2760
64.33	15953/248	P831_0070K202_0092 MB23	8.0	27	3500	3100	4000	8.2	55	3.5	1.5	125	61	1000	1494	1490	2887
64.33	15953/248	P831_0070K202_0092 MB23	12	21	3500	3100	4000	8.2	55	3.5	1.5	125	61	1000	1494	1490	2887
64.33	15953/248	P831_0070K202_0092 MB23	16	16	3500	3100	4000	8.2	55	3.5	1.5	125	61	1000	1494	1490	2887
64.33	15953/248	P831_0070K202_0092 MB23	24	4.4	3500	3100	4000	8.2	55	3.5	1.5	125	61	1000	1494	1490	2887
64.33	15953/248	P831_0070K202_0092 MB33	16	16	3500	3100	4000	29	62	3.5	1.5	126	61	1000	1494	1490	2887
64.33	15953/248	P831_0070K202_0092 MB33	24	4.4	3500	3100	4000	29	62	3.5	1.5	126	61	1000	1494	1490	2887
66.83	22790/341	P831_0100K202_0067 MB23	8.0	24	3500	3100	4000	8.3	55	3.5	1.5	129	61	850	1380	1380	2760
66.83	22790/341	P831_0100K202_0067 MB23	12	18	3500	3100	4000	8.3	55	3.5	1.5	129	61	850	1380	1380	2760
66.83	22790/341	P831_0100K202_0067 MB23	16	13	3500	3100	4000	8.3	55	3.5	1.5	129	61	850	1380	1380	2760
66.83	22790/341	P831_0100K202_0067 MB23	24	1.4	3500	3100	4000	8.3	55	3.5	1.5	129	61	850	1380	1380	2760
66.83	22790/341	P831_0100K202_0067 MB33	16	13	3500	3100	4000	29	62	3.5	1.5	130	61	850	1380	1380	2760
66.83	22790/341	P831_0100K202_0067 MB33	24	1.4	3500	3100	4000	29	62	3.5	1.5	130	61	850	1380	1380	2760
69.68	7525/108	P831_0050K302_0140 MB23	8.0	28	3500	3100	4000	8.3	60	4.0	2.0	125	62	1100	1840	1870	3230
69.68	7525/108	P831_0050K302_0140 MB23	12	22	3500	3100	4000	8.3	60	4.0	2.0	125	62	1100	1840	1870	3230
69.68	7525/108	P831_0050K302_0140 MB23	16	17	3500	3100	4000	8.3	60	4.0	2.0	125	62	1100	1840	1870	3230
69.68	7525/108	P831_0050K302_0140 MB23	24	5.7	3500	3100	4000	8.3	60	4.0	2.0	125	62	1100	1840	1870	3230
69.68	7525/108	P831_0050K302_0140 MB33	16	17	3500	3100	4000	29	67	4.0	2.0	126	62	1100	1840	1870	3230
69.68	7525/108	P831_0050K302_0140 MB33	24	5.7	3500	3100	4000	29	67	4.0	2.0	126	62	1100	1840	1870	3230
70.51	20167/286	P831_0070K202_0100 MB23	8.0	23	3900	3500	4000	7.8	55	3.5	1.5	126	59	1000	1494	1490	2887
70.51	20167/286	P831_0070K202_0100 MB23	12	18	3900	3500	4000	7.8	55	3.5	1.5	126	59	1000	1494	1490	2887
70.51	20167/286	P831_0070K202_0100 MB23	16	12	3900	3500	4000	7.8	55	3.5	1.5	126	59	1000	1494	1490	2887
70.51	20167/286	P831_0070K202_0100 MB23	24	1.1	3900	3500	4000	7.8	55	3.5	1.5	126	59	1000	1494	1490	2887
70.51	20167/286	P831_0070K202_0100 MB33	16	12	3900	3500	4000	28	62	3.5	1.5	127	59	1000	1494	1490	2887
70.51	20167/286	P831_0070K202_0100 MB33	24	1.1	3900	3500	4000	28	62	3.5	1.5	127	59	1000	1494	1490	2887
80.82	8729/108	P831_0070K202_0115 MB23	8.0	19	3500	3100	4000	7.9	55	3.5	1.5	126	61	1000	1494	1490	2887
80.82	8729/108	P831_0070K202_0115 MB23	12	13	3500	3100	4000	7.9	55	3.5	1.5	126	61	1000	1494	1490	2887
80.82	8729/108	P831_0070K202_0115 MB23	16	7.8	3500	3100	4000	7.9	55	3.5	1.5	126	61	1000	1494	1490	2887
80.82	8729/108	P831_0070K202_0115 MB33	16	7.8	3500	3100	4000	28	62	3.5	1.5	127	61	1000	1494	1490	2887
83.97	24940/297	P831_0100K202_0084 MB23	8.0	17	3500	3100	4000	8.0	55	3.5	1.5	130	61	850	1380	1380	2760
83.97	24940/297	P831_0100K202_0084 MB23	12	11	3500	3100	4000	8.0	55	3.5	1.5	130	61	850	1380	1380	2760
83.97	24940/297	P831_0100K202_0084 MB23	16	5.4	3500	3100	4000	8.0	55	3.5	1.5	130	61	850	1380	1380	2760
83.97	24940/297	P831_0100K202_0084 MB33	16	5.4	3500	3100	4000	28	62	3.5	1.5	130	61	850	1380	1380	2760
86.47	7955/92	P831_0050K302_0175 MB23	8.0	20	3500	3100	4000	8.0	60	4.0	2.0	126	62	1100	1840	1870	3230
86.47	7955/92	P831_0050K302_0175 MB23	12	15	3500	3100	4000	8.0	60	4.0	2.0	126	62	1100	1840	1870	3230
86.47	7955/92	P831_0050K302_0175 MB23	16	9.2	3500	3100	4000	8.0	60	4.0	2.0	126	62	1100	1840	1870	3230
86.47	7955/92	P831_0050K302_0175 MB33	16	9.2	3500	3100	4000	28	67	4.0	2.0	127	62	1100	1840	1870	3230
88.94	3913/44	P831_0070K202_0125 MB23	8.0	16	3900	3500	4000	7.6	55	3.5	1.5	127	59	1000	1494	1490	2887
88.94	3913/44	P831_0070K202_0125 MB23	12	11	3900	3500	4000	7.6	55	3.5	1.5	127	59	1000	1494	1490	2887
88.94	3913/44	P831_0070K202_0125 MB23	16	5.1	3900	3500	4000	7.6	55	3.5	1.5	127	59	1000	1494	1490	2887
88.94	3913/44	P831_0070K202_0125 MB33	16	5.1	3900	3500	4000	28	62	3.5	1.5	127	59	1000	1494	1490	2887

7.2 Selection tables 7 PK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P831K (M<sub>2acc,max</sub> = 1867 Nm)</b>																	
91.90	11395/124	P831_0100K202_0092 MB23	8.0	14	3500	3100	4000	8.1	55	3.5	1.5	130	61	850	1380	1380	2760
91.90	11395/124	P831_0100K202_0092 MB23	12	8.6	3500	3100	4000	8.1	55	3.5	1.5	130	61	850	1380	1380	2760
91.90	11395/124	P831_0100K202_0092 MB23	16	3.0	3500	3100	4000	8.1	55	3.5	1.5	130	61	850	1380	1380	2760
91.90	11395/124	P831_0100K202_0092 MB33	16	3.0	3500	3100	4000	29	62	3.5	1.5	131	61	850	1380	1380	2760
96.96	20167/208	P831_0070K202_0140 MB23	8.0	14	3900	3500	4000	7.7	55	3.5	1.5	127	59	1000	1494	1490	2887
96.96	20167/208	P831_0070K202_0140 MB23	12	8.4	3900	3500	4000	7.7	55	3.5	1.5	127	59	1000	1494	1490	2887
96.96	20167/208	P831_0070K202_0140 MB23	16	2.8	3900	3500	4000	7.7	55	3.5	1.5	127	59	1000	1494	1490	2887
96.96	20167/208	P831_0070K202_0140 MB33	16	2.8	3900	3500	4000	28	62	3.5	1.5	127	59	1000	1494	1490	2887
115.5	6235/54	P831_0100K202_0115 MB23	8.0	9.0	3500	3100	4000	7.9	55	3.5	1.5	131	61	850	1380	1380	2760
115.5	6235/54	P831_0100K202_0115 MB23	12	3.4	3500	3100	4000	7.9	55	3.5	1.5	131	61	850	1380	1380	2760
116.5	2795/24	P831_0050K302_0230 MB23	8.0	12	3800	3500	4000	7.7	60	4.0	2.0	127	60	1100	1840	1870	3230
116.5	2795/24	P831_0050K302_0230 MB23	12	6.7	3800	3500	4000	7.7	60	4.0	2.0	127	60	1100	1840	1870	3230
116.5	2795/24	P831_0050K302_0230 MB23	16	1.1	3800	3500	4000	7.7	60	4.0	2.0	127	60	1100	1840	1870	3230
116.5	2795/24	P831_0050K302_0230 MB33	16	1.1	3800	3500	4000	28	67	4.0	2.0	127	60	1100	1840	1870	3230
118.0	20769/176	P831_0070K202_0170 MB23	8.0	9.5	4000	3900	4000	7.5	55	3.5	1.5	127	57	1000	1494	1490	2887
118.0	20769/176	P831_0070K202_0170 MB23	12	3.9	4000	3900	4000	7.5	55	3.5	1.5	127	57	1000	1494	1490	2887
122.3	3913/32	P831_0070K202_0175 MB23	8.0	8.8	3900	3500	4000	7.6	55	3.5	1.5	128	59	1000	1494	1490	2887
122.3	3913/32	P831_0070K202_0175 MB23	12	3.2	3900	3500	4000	7.6	55	3.5	1.5	128	59	1000	1494	1490	2887
138.5	14405/104	P831_0100K202_0140 MB23	8.0	5.7	3900	3500	4000	7.7	55	3.5	1.5	131	59	850	1380	1380	2760
138.5	14405/104	P831_0100K202_0140 MB23	12	0.1	3900	3500	4000	7.7	55	3.5	1.5	131	59	850	1380	1380	2760
139.4	17845/128	P831_0050K302_0280 MB23	8.0	8.4	3800	3500	4000	7.6	60	4.0	2.0	127	60	1100	1840	1870	3230
139.4	17845/128	P831_0050K302_0280 MB23	12	2.8	3800	3500	4000	7.6	60	4.0	2.0	127	60	1100	1840	1870	3230
142.3	7826/55	P831_0070K202_0200 MB23	8.0	6.0	4000	3900	4000	7.4	55	3.5	1.5	128	57	1000	1494	1490	2887
142.3	7826/55	P831_0070K202_0200 MB23	12	0.4	4000	3900	4000	7.4	55	3.5	1.5	128	57	1000	1494	1490	2887
162.3	20769/128	P831_0070K202_0230 MB23	8.0	3.9	4000	3900	4000	7.4	55	3.5	1.5	128	57	1000	1494	1490	2887
173.7	4515/26	P831_0050K302_0350 MB23	8.0	4.6	3800	3500	4000	7.4	60	4.0	2.0	127	60	1100	1840	1870	3230
174.7	2795/16	P831_0100K202_0175 MB23	8.0	2.2	3900	3500	4000	7.5	55	3.5	1.5	131	59	850	1380	1380	2760
175.9	1935/11	P831_0070K202_0250 MB23	8.0	2.7	4000	3900	4000	7.3	55	3.5	1.5	128	57	1000	1494	1490	2887
195.7	3913/20	P831_0070K202_0280 MB23	8.0	1.3	4000	3900	4000	7.4	55	3.5	1.5	128	57	1000	1494	1490	2887
231.1	1849/8	P831_0050K302_0460 MB23	8.0	0.6	3800	3500	4000	7.3	60	4.0	2.0	128	60	1100	1840	1870	3230
<b>P931K (M<sub>2acc,max</sub> = 3105 Nm)</b>																	
28.00	28/1	P931_0070K402_0040 MB33	16	104	2600	2200	3800	40	92	3.5	–	256	69	2076	2635	–	4979
28.00	28/1	P931_0070K402_0040 MB33	24	92	2600	2200	3800	40	92	3.5	–	256	69	2076	2635	–	4979
28.00	28/1	P931_0070K402_0040 MB33	32	81	2600	2200	3800	40	92	3.5	–	256	69	2076	2635	–	4979
28.00	28/1	P931_0070K402_0040 MB33	45	63	2600	2200	3800	40	92	3.5	–	256	69	2076	2635	–	4979
28.00	28/1	P931_0070K402_0040 MB33	90	–	2600	2200	3800	40	92	3.5	–	256	69	2076	2635	–	4979
28.00	28/1	P931_0070K402_0040 MB43	50	118	2600	2200	3000	87	106	3.5	–	266	69	2076	3105	–	6210
28.00	28/1	P931_0070K402_0040 MB43	72	87	2600	2200	3000	87	106	3.5	–	266	69	2076	3105	–	6210
28.00	28/1	P931_0070K402_0040 MB43	100	48	2600	2200	3000	87	106	3.5	–	266	69	2076	3105	–	6210
30.55	336/11	P931_0070K402_0044 MB33	16	104	2600	2200	3800	38	92	3.5	–	263	69	2100	2874	–	5432
30.55	336/11	P931_0070K402_0044 MB33	24	92	2600	2200	3800	38	92	3.5	–	263	69	2100	2874	–	5432
30.55	336/11	P931_0070K402_0044 MB33	32	81	2600	2200	3800	38	92	3.5	–	263	69	2100	2874	–	5432
30.55	336/11	P931_0070K402_0044 MB33	45	63	2600	2200	3800	38	92	3.5	–	263	69	2100	2874	–	5432
30.55	336/11	P931_0070K402_0044 MB33	90	–	2600	2200	3800	38	92	3.5	–	263	69	2100	2874	–	5432
30.55	336/11	P931_0070K402_0044 MB43	50	102	2600	2200	3000	86	106	3.5	–	271	69	2100	3105	–	6210
30.55	336/11	P931_0070K402_0044 MB43	72	71	2600	2200	3000	86	106	3.5	–	271	69	2100	3105	–	6210
30.55	336/11	P931_0070K402_0044 MB43	100	32	2600	2200	3000	86	106	3.5	–	271	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB33	16	104	2600	2200	3800	35	92	3.5	–	276	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB33	24	92	2600	2200	3800	35	92	3.5	–	276	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB33	32	81	2600	2200	3800	35	92	3.5	–	276	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB33	45	63	2600	2200	3800	35	92	3.5	–	276	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB33	90	–	2600	2200	3800	35	92	3.5	–	276	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB43	50	69	2600	2200	3000	83	106	3.5	–	282	69	2100	3105	–	6210
37.95	12943/341	P931_0070K402_0054 MB43	72	38	2600	2200	3000	83	106	3.5	–	282	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB33	16	103	2600	2200	3800	36	92	3.5	–	281	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB33	24	92	2600	2200	3800	36	92	3.5	–	281	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB33	32	80	2600	2200	3800	36	92	3.5	–	281	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB33	45	62	2600	2200	3800	36	92	3.5	–	281	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB43	50	55	2600	2200	3000	84	106	3.5	–	286	69	2100	3105	–	6210
42.00	42/1	P931_0070K402_0060 MB43	72	24	2600	2200	3000	84	106	3.5	–	286	69	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB23	8.0	31	3000	2600	4000	12	85	3.5	–	276	67	1660	1660	–	2788
47.03	1505/32	P931_0070K402_0067 MB23	12	25	3000	2600	4000	12	85	3.5	–	276	67	1660	1660	–	2788
47.03	1505/32	P931_0070K402_0067 MB23	16	20	3000	2600	4000	12	85	3.5	–	276	67	1660	1660	–	2788
47.03	1505/32	P931_0070K402_0067 MB23	24	8.4	3000	2600	4000	12	85	3.5	–	276	67	1660	1660	–	2788

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P931K (M<sub>2acc,max</sub> = 3105 Nm)</b>																	
47.03	1505/32	P931_0070K402_0067 MB23	30	–	3000	2600	4000	12	85	3.5	–	276	67	1660	1660	–	2788
47.03	1505/32	P931_0070K402_0067 MB33	16	89	3000	2600	4000	34	92	3.5	–	286	67	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB33	24	78	3000	2600	4000	34	92	3.5	–	286	67	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB33	32	67	3000	2600	4000	34	92	3.5	–	286	67	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB33	45	49	3000	2600	4000	34	92	3.5	–	286	67	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB43	50	42	3000	2600	3000	81	106	3.5	–	290	67	2100	3105	–	6210
47.03	1505/32	P931_0070K402_0067 MB43	72	11	3000	2600	3000	81	106	3.5	–	290	67	2100	3105	–	6210
52.19	12943/248	P931_0070K402_0075 MB33	16	78	2600	2200	3800	34	92	3.5	–	289	69	2100	3105	–	6210
52.19	12943/248	P931_0070K402_0075 MB33	24	67	2600	2200	3800	34	92	3.5	–	289	69	2100	3105	–	6210
52.19	12943/248	P931_0070K402_0075 MB33	32	56	2600	2200	3800	34	92	3.5	–	289	69	2100	3105	–	6210
52.19	12943/248	P931_0070K402_0075 MB33	45	38	2600	2200	3800	34	92	3.5	–	289	69	2100	3105	–	6210
52.19	12943/248	P931_0070K402_0075 MB43	50	31	2600	2200	3000	82	106	3.5	–	293	69	2100	3105	–	6210
58.64	645/11	P931_0070K402_0084 MB23	8.0	31	3000	2600	4000	10	85	3.5	–	286	67	2069	2069	–	3476
58.64	645/11	P931_0070K402_0084 MB23	12	25	3000	2600	4000	10	85	3.5	–	286	67	2069	2069	–	3476
58.64	645/11	P931_0070K402_0084 MB23	16	20	3000	2600	4000	10	85	3.5	–	286	67	2069	2069	–	3476
58.64	645/11	P931_0070K402_0084 MB23	24	8.4	3000	2600	4000	10	85	3.5	–	286	67	2069	2069	–	3476
58.64	645/11	P931_0070K402_0084 MB23	30	–	3000	2600	4000	10	85	3.5	–	286	67	2069	2069	–	3476
58.64	645/11	P931_0070K402_0084 MB33	16	67	3000	2600	4000	32	92	3.5	–	292	67	2100	3105	–	6210
58.64	645/11	P931_0070K402_0084 MB33	24	56	3000	2600	4000	32	92	3.5	–	292	67	2100	3105	–	6210
58.64	645/11	P931_0070K402_0084 MB33	32	45	3000	2600	4000	32	92	3.5	–	292	67	2100	3105	–	6210
58.64	645/11	P931_0070K402_0084 MB33	45	27	3000	2600	4000	32	92	3.5	–	292	67	2100	3105	–	6210
58.64	645/11	P931_0070K402_0084 MB43	50	20	3000	2600	3000	80	106	3.5	–	295	67	2100	3105	–	6210
64.67	16555/256	P931_0070K402_0092 MB23	8.0	31	3000	2600	4000	11	85	3.5	–	289	67	2100	2282	–	3833
64.67	16555/256	P931_0070K402_0092 MB23	12	25	3000	2600	4000	11	85	3.5	–	289	67	2100	2282	–	3833
64.67	16555/256	P931_0070K402_0092 MB23	16	20	3000	2600	4000	11	85	3.5	–	289	67	2100	2282	–	3833
64.67	16555/256	P931_0070K402_0092 MB23	24	8.4	3000	2600	4000	11	85	3.5	–	289	67	2100	2282	–	3833
64.67	16555/256	P931_0070K402_0092 MB23	30	–	3000	2600	4000	11	85	3.5	–	289	67	2100	2282	–	3833
64.67	16555/256	P931_0070K402_0092 MB33	16	59	3000	2600	4000	33	92	3.5	–	295	67	2100	3105	–	6210
64.67	16555/256	P931_0070K402_0092 MB33	24	48	3000	2600	4000	33	92	3.5	–	295	67	2100	3105	–	6210
64.67	16555/256	P931_0070K402_0092 MB33	32	37	3000	2600	4000	33	92	3.5	–	295	67	2100	3105	–	6210
64.67	16555/256	P931_0070K402_0092 MB33	45	18	3000	2600	4000	33	92	3.5	–	295	67	2100	3105	–	6210
64.67	16555/256	P931_0070K402_0092 MB43	50	11	3000	2600	3000	80	106	3.5	–	297	67	2100	3105	–	6210
70.69	9331/132	P931_0070K402_0100 MB23	8.0	31	3400	3000	4000	9.6	85	3.5	–	292	65	2100	2494	–	4190
70.69	9331/132	P931_0070K402_0100 MB23	12	25	3400	3000	4000	9.6	85	3.5	–	292	65	2100	2494	–	4190
70.69	9331/132	P931_0070K402_0100 MB23	16	20	3400	3000	4000	9.6	85	3.5	–	292	65	2100	2494	–	4190
70.69	9331/132	P931_0070K402_0100 MB23	24	8.4	3400	3000	4000	9.6	85	3.5	–	292	65	2100	2494	–	4190
70.69	9331/132	P931_0070K402_0100 MB23	30	–	3400	3000	4000	9.6	85	3.5	–	292	65	2100	2494	–	4190
70.69	9331/132	P931_0070K402_0100 MB33	16	52	3400	3000	4000	31	92	3.5	–	296	65	2100	3105	–	6210
70.69	9331/132	P931_0070K402_0100 MB33	24	41	3400	3000	4000	31	92	3.5	–	296	65	2100	3105	–	6210
70.69	9331/132	P931_0070K402_0100 MB33	32	30	3400	3000	4000	31	92	3.5	–	296	65	2100	3105	–	6210
70.69	9331/132	P931_0070K402_0100 MB33	45	11	3400	3000	4000	31	92	3.5	–	296	65	2100	3105	–	6210
70.69	9331/132	P931_0070K402_0100 MB43	50	4.4	3000	3000	3000	79	106	3.5	–	298	65	2100	3105	–	6210
80.63	645/8	P931_0070K402_0115 MB23	8.0	31	3000	2600	4000	9.9	85	3.5	–	295	67	2100	2845	–	4779
80.63	645/8	P931_0070K402_0115 MB23	12	25	3000	2600	4000	9.9	85	3.5	–	295	67	2100	2845	–	4779
80.63	645/8	P931_0070K402_0115 MB23	16	20	3000	2600	4000	9.9	85	3.5	–	295	67	2100	2845	–	4779
80.63	645/8	P931_0070K402_0115 MB23	24	8.4	3000	2600	4000	9.9	85	3.5	–	295	67	2100	2845	–	4779
80.63	645/8	P931_0070K402_0115 MB23	30	–	3000	2600	4000	9.9	85	3.5	–	295	67	2100	2845	–	4779
80.63	645/8	P931_0070K402_0115 MB33	16	43	3000	2600	4000	32	92	3.5	–	298	67	2100	3105	–	6210
80.63	645/8	P931_0070K402_0115 MB33	24	32	3000	2600	4000	32	92	3.5	–	298	67	2100	3105	–	6210
80.63	645/8	P931_0070K402_0115 MB33	32	20	3000	2600	4000	32	92	3.5	–	298	67	2100	3105	–	6210
80.63	645/8	P931_0070K402_0115 MB33	45	2.2	3000	2600	4000	32	92	3.5	–	298	67	2100	3105	–	6210
88.61	2924/33	P931_0070K402_0125 MB23	8.0	31	3400	3000	4000	8.8	85	3.5	–	296	65	2100	3105	–	5252
88.61	2924/33	P931_0070K402_0125 MB23	12	25	3400	3000	4000	8.8	85	3.5	–	296	65	2100	3105	–	5252
88.61	2924/33	P931_0070K402_0125 MB23	16	20	3400	3000	4000	8.8	85	3.5	–	296	65	2100	3105	–	5252
88.61	2924/33	P931_0070K402_0125 MB23	24	8.4	3400	3000	4000	8.8	85	3.5	–	296	65	2100	3105	–	5252
88.61	2924/33	P931_0070K402_0125 MB23	30	–	3400	3000	4000	8.8	85	3.5	–	296	65	2100	3105	–	5252
88.61	2924/33	P931_0070K402_0125 MB33	16	37	3400	3000	4000	31	92	3.5	–	299	65	2100	3105	–	6210
88.61	2924/33	P931_0070K402_0125 MB33	24	26	3400	3000	4000	31	92	3.5	–	299	65	2100	3105	–	6210
88.61	2924/33	P931_0070K402_0125 MB33	32	15	3400	3000	4000	31	92	3.5	–	299	65	2100	3105	–	6210
97.20	9331/96	P931_0070K402_0140 MB23	8.0	31	3400	3000	4000	9.2	85	3.5	–	298	65	2100	3105	–	5761
97.20	9331/96	P931_0070K402_0140 MB23	12	25	3400	3000	4000	9.2	85	3.5	–	298	65	2100	3105	–	5761
97.20	9331/96	P931_0070K402_0140 MB23	16	20	3400	3000	4000	9.2	85	3.5	–	298	65	2100	3105	–	5761
97.20	9331/96	P931_0070K402_0140 MB23	24	8.4	3400	3000	4000	9.2	85	3.5	–	298	65	2100	3105	–	5761
97.20	9331/96	P931_0070K402_0140 MB23	30	–	3400	3000	4000	9.2	85	3.5	–	298	65	2100	3105	–	5761

7.2 Selection tables 7 PK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>P931K (M<sub>2acc,max</sub> = 3105 Nm)</b>																	
97.20	9331/96	P931_0070K402_0140 MB33	16	32	3400	3000	4000	31	92	3.5	–	300	65	2100	3105	–	6210
97.20	9331/96	P931_0070K402_0140 MB33	24	21	3400	3000	4000	31	92	3.5	–	300	65	2100	3105	–	6210
97.20	9331/96	P931_0070K402_0140 MB33	32	9.3	3400	3000	4000	31	92	3.5	–	300	65	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB23	8.0	31	3600	3300	4000	8.2	85	3.5	–	300	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB23	12	25	3600	3300	4000	8.2	85	3.5	–	300	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB23	16	20	3600	3300	4000	8.2	85	3.5	–	300	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB23	24	8.4	3600	3300	4000	8.2	85	3.5	–	300	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB23	30	–	3600	3300	4000	8.2	85	3.5	–	300	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB33	16	22	3600	3300	4000	30	92	3.5	–	302	63	2100	3105	–	6210
118.6	3913/33	P931_0070K402_0170 MB33	24	11	3600	3300	4000	30	92	3.5	–	302	63	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB23	8.0	31	3400	3000	4000	8.6	85	3.5	–	300	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB23	12	25	3400	3000	4000	8.6	85	3.5	–	300	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB23	16	20	3400	3000	4000	8.6	85	3.5	–	300	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB23	24	8.4	3400	3000	4000	8.6	85	3.5	–	300	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB23	30	–	3400	3000	4000	8.6	85	3.5	–	300	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB33	16	21	3400	3000	4000	30	92	3.5	–	302	65	2100	3105	–	6210
121.8	731/6	P931_0070K402_0175 MB33	24	9.6	3400	3000	4000	30	92	3.5	–	302	65	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB23	8.0	26	3600	3300	4000	7.9	85	3.5	–	302	63	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB23	12	20	3600	3300	4000	7.9	85	3.5	–	302	63	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB23	16	15	3600	3300	4000	7.9	85	3.5	–	302	63	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB23	24	3.6	3600	3300	4000	7.9	85	3.5	–	302	63	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB33	16	15	3600	3300	4000	28	92	3.5	–	303	63	2100	3105	–	6210
141.4	9331/66	P931_0070K402_0200 MB33	24	3.6	3600	3300	4000	28	92	3.5	–	303	63	2100	3105	–	6210
163.0	3913/24	P931_0070K402_0230 MB23	8.0	21	3600	3300	4000	8.1	85	3.5	–	302	63	2100	3105	–	6210
163.0	3913/24	P931_0070K402_0230 MB23	12	15	3600	3300	4000	8.1	85	3.5	–	302	63	2100	3105	–	6210
163.0	3913/24	P931_0070K402_0230 MB23	16	9.9	3600	3300	4000	8.1	85	3.5	–	302	63	2100	3105	–	6210
163.0	3913/24	P931_0070K402_0230 MB33	16	9.9	3600	3300	4000	30	92	3.5	–	303	63	2100	3105	–	6210
177.0	29197/165	P931_0070K402_0250 MB23	8.0	19	3600	3300	4000	7.7	85	3.5	–	303	63	2100	3105	–	6210
177.0	29197/165	P931_0070K402_0250 MB23	12	13	3600	3300	4000	7.7	85	3.5	–	303	63	2100	3105	–	6210
177.0	29197/165	P931_0070K402_0250 MB23	16	7.3	3600	3300	4000	7.7	85	3.5	–	303	63	2100	3105	–	6210
177.0	29197/165	P931_0070K402_0250 MB33	16	7.3	3600	3300	4000	28	92	3.5	–	304	63	2100	3105	–	6210
194.4	9331/48	P931_0070K402_0280 MB23	8.0	16	3600	3300	4000	7.8	85	3.5	–	303	63	2100	3105	–	6210
194.4	9331/48	P931_0070K402_0280 MB23	12	10	3600	3300	4000	7.8	85	3.5	–	303	63	2100	3105	–	6210
194.4	9331/48	P931_0070K402_0280 MB23	16	4.7	3600	3300	4000	7.8	85	3.5	–	303	63	2100	3105	–	6210
194.4	9331/48	P931_0070K402_0280 MB33	16	4.7	3600	3300	4000	28	92	3.5	–	304	63	2100	3105	–	6210
235.7	33712/143	P931_0070K402_0340 MB23	8.0	9.0	3600	3300	4000	7.5	85	3.5	–	304	63	2100	3105	–	5613
235.7	33712/143	P931_0070K402_0340 MB23	12	3.4	3600	3300	4000	7.5	85	3.5	–	304	63	2100	3105	–	5613
243.3	29197/120	P931_0070K402_0350 MB23	8.0	10	3600	3300	4000	7.6	85	3.5	–	304	63	2100	3105	–	6210
243.3	29197/120	P931_0070K402_0350 MB23	12	4.8	3600	3300	4000	7.6	85	3.5	–	304	63	2100	3105	–	6210
283.6	34314/121	P931_0070K402_0410 MB23	8.0	2.1	3600	3300	4000	7.4	85	3.5	–	304	63	2092	2510	–	4446
324.2	4214/13	P931_0070K402_0460 MB23	8.0	5.0	3600	3300	4000	7.5	85	3.5	–	304	63	2100	3105	–	6210
389.9	17157/44	P931_0070K402_0560 MB23	8.0	2.1	3600	3300	4000	7.4	85	3.5	–	305	63	2100	3105	–	6113



## 7.3 Dimensional drawings

In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

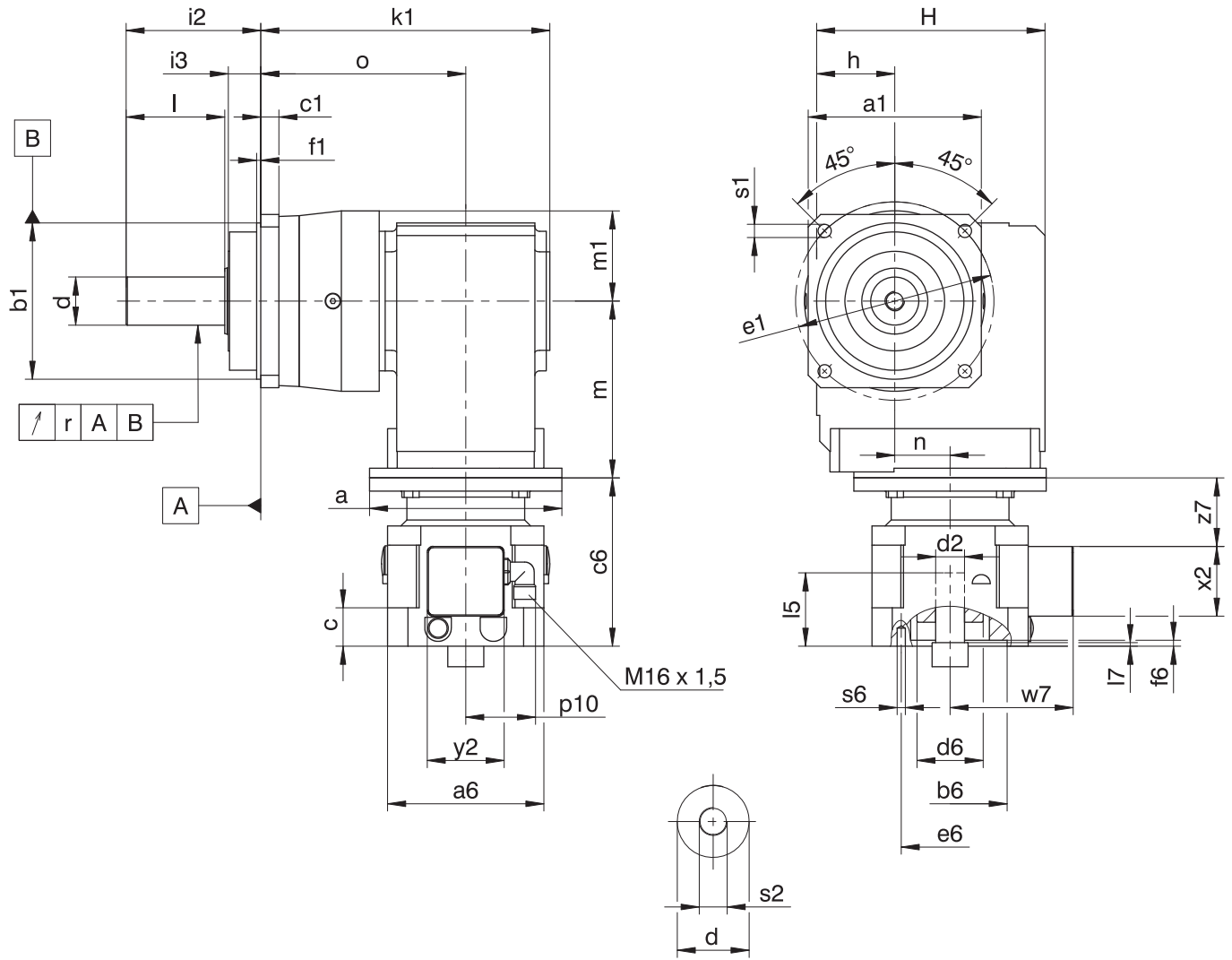
### Tolerances

Solid shaft	Tolerance
Fit	ISO k6
Feather keys	DIN 6885-1, high form A
Balancing	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

### 7.3.1 G shaft design (solid shaft without feather key)



- The radial runout specification applies only to the reinforced bearing D.

#### Dimensions of gear units

Type	□a1	∅b1	c1	∅d	∅e1	f1	h	H	i2	i3	k1	l	m1	o	r	∅s1	s2
P531_K102_	101	90 <sub>h6</sub>	10	32 <sub>k6</sub>	120	15.0	60	160	88	28	199.5	58	60.0	143.5	0.030	9.0	M12
P731_K102_	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	60	160	112	27	212.5	82	75.0	156.5	0.035	11.0	M16
P731_K202_	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	65	190	112	27	240.5	82	75.0	170.5	0.035	11.0	M16
P831_K202_	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	65	190	112	27	277.5	82	102.0	207.5	0.035	13.5	M20
P831_K302_	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	75	213	112	27	291.0	82	102.0	215.0	0.035	13.5	M20
P931_K402_	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	90	240	143	34	350.5	105	115.0	260.5	0.040	17.5	M20

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
P531_K102_	∅160	128	36	-	-	-	-	-	-
P731_K102_	∅160	128	36	-	-	-	-	-	-
P731_K202_	∅160	147	46	∅200	149	46	-	-	-
P831_K202_	∅160	147	46	∅200	149	46	-	-	-
P831_K302_	∅160	167	53	∅200	169	53	-	-	-
P931_K402_	∅160	187	60	∅200	189	60	∅250	192	60

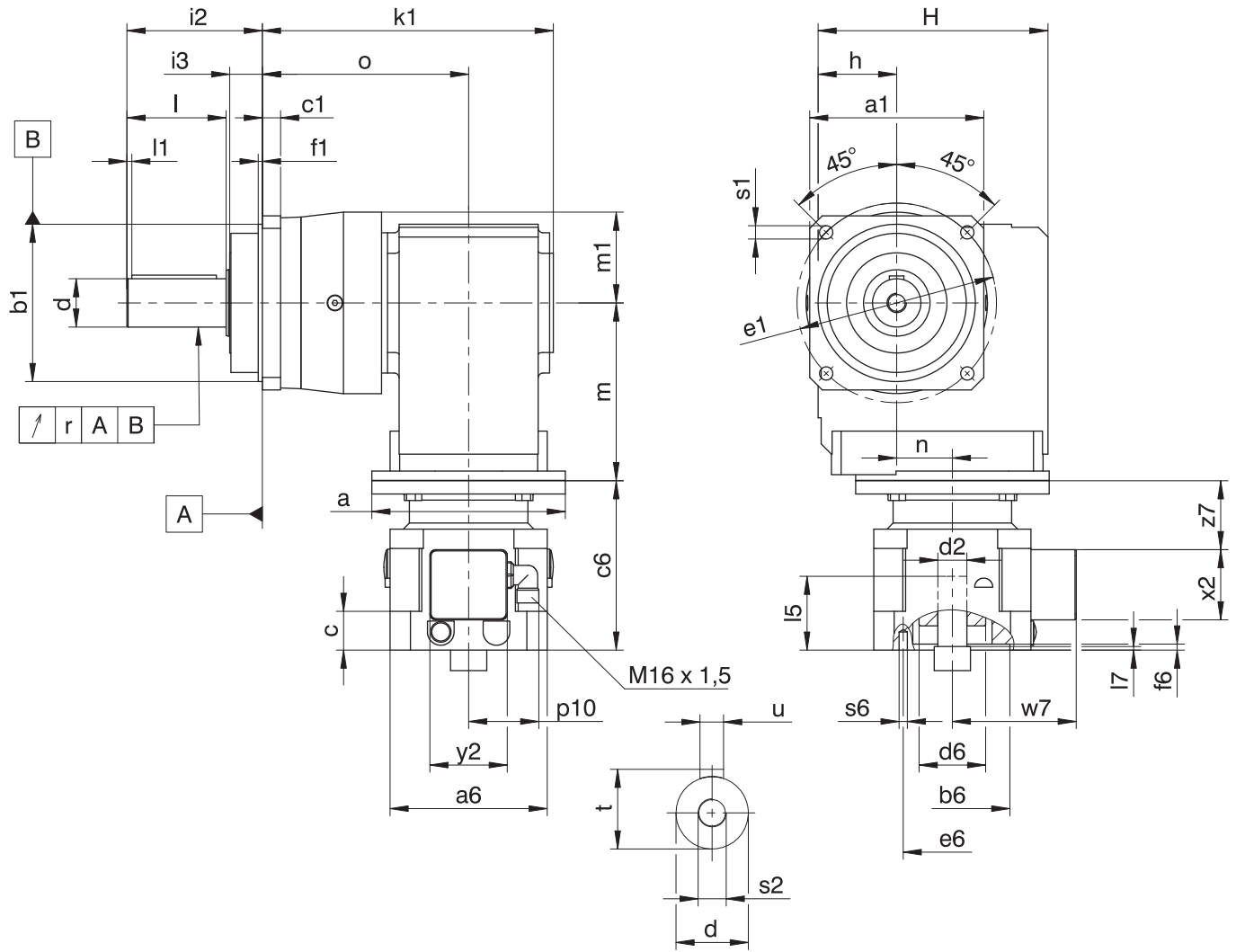
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
PK_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PK_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PK_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
PK_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 7.3.2 P shaft design (solid shaft with feather key)



- The radial runout specification applies only to the reinforced bearing D.

#### Dimensions of gear units

Type	□a1	∅b1	c1	∅d	∅e1	f1	h	H	i2	i3	k1	l	l1	m1	o	r	∅s1	s2	t	u
P531_K102_	101	90 <sub>h6</sub>	10	32 <sub>k6</sub>	120	15.0	60	160	88	28	199.5	58	3	60.0	143.5	0.030	9.0	M12	35.0	A10×8×50
P731_K102_	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	60	160	112	27	212.5	82	4	75.0	156.5	0.035	11.0	M16	43.0	A12×8×70
P731_K202_	144	130 <sub>h6</sub>	15	40 <sub>k6</sub>	165	3.5	65	190	112	27	240.5	82	4	75.0	170.5	0.035	11.0	M16	43.0	A12×8×70
P831_K202_	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	65	190	112	27	277.5	82	6	102.0	207.5	0.035	13.5	M20	59.0	A16×10×70
P831_K302_	190	160 <sub>h6</sub>	15	55 <sub>k6</sub>	215	10.0	75	213	112	27	291.0	82	6	102.0	215.0	0.035	13.5	M20	59.0	A16×10×70
P931_K402_	212	180 <sub>h6</sub>	17	75 <sub>k6</sub>	250	10.0	90	240	143	34	350.5	105	7	115.0	260.5	0.040	17.5	M20	79.5	A20×12×90

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
P531_K102_	∅160	128	36	-	-	-	-	-	-
P731_K102_	∅160	128	36	-	-	-	-	-	-
P731_K202_	∅160	147	46	∅200	149	46	-	-	-
P831_K202_	∅160	147	46	∅200	149	46	-	-	-
P831_K302_	∅160	167	53	∅200	169	53	-	-	-
P931_K402_	∅160	187	60	∅200	189	60	∅250	192	60

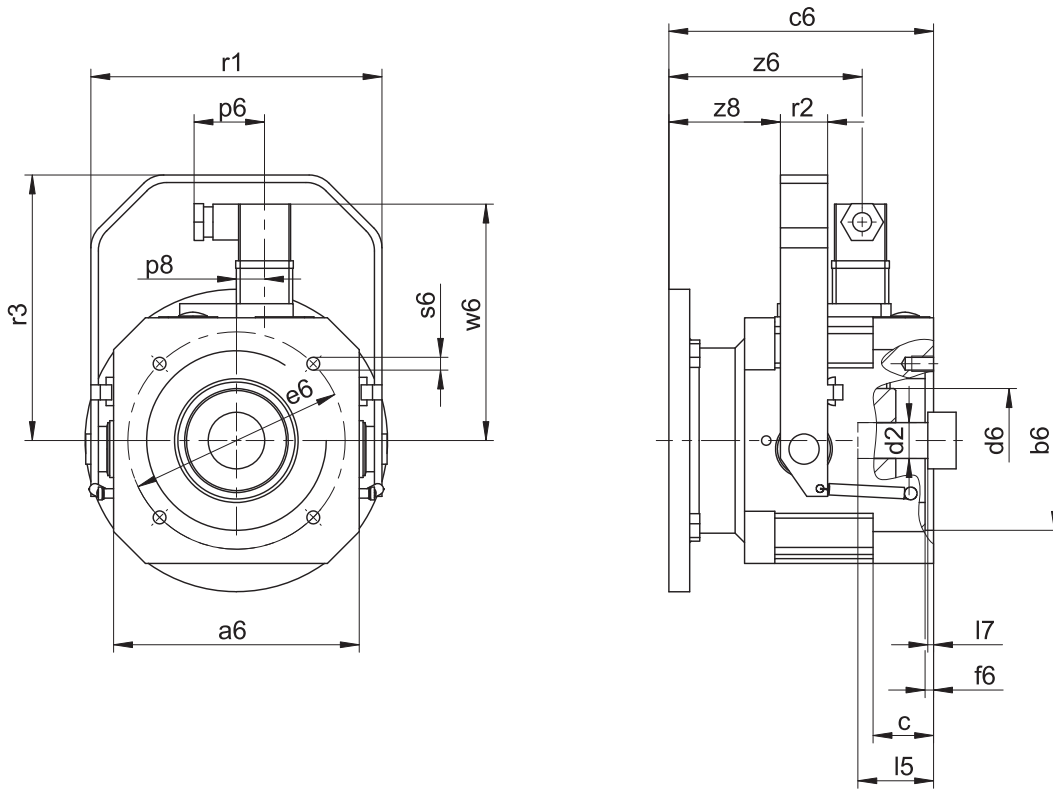
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
PK_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PK_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PK_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PK_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
PK_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 7.3.3 Motor adapter design with plug connector and manual release



#### Dimensions

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5

## 7.4 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.

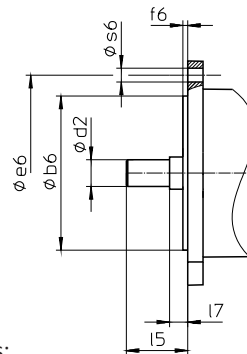
### Example code

P	5	3	1	S	G	S	S	0050	K102VF	0060	MB	2	3
---	---	---	---	---	---	---	---	------	--------	------	----	---	---

### Explanation

Code	Designation	Design
P	Type	Planetary gear unit
5	Size	5 (example)
3	Generation	Generation 3
1	Stages	Single-stage
S	Housing	Standard
G	Shaft	Solid shaft without feather key Solid shaft with feather key
S	Bearing	Standard bearing
D		Axially reinforced bearing (P3 – P9)
Z		Radially reinforced bearing (P3 – P9) <sup>1</sup>
S	Backlash	Standard
R		Reduced
0050	Transmission ratio of output (i x 10)	i = 5 (example)
K102VF	Input	K1 right-angle geared motor (example)
0060	Transmission ratio of input (i x 10)	i = 6 (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

To choose a suitable motor connection, use the STOBBER Configurator at

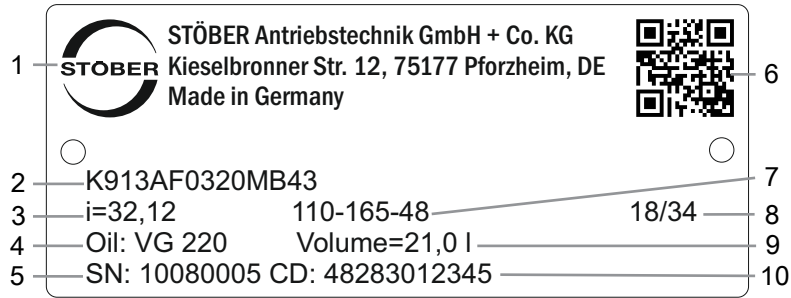
<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Mounting position, see the chapter [▶ 7.5.4]
- Output gear unit side 3 or 4, see the chapter [▶ 7.5.4]
- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 7.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, see the chapter [▶ 7.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 7.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 7.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 7.5.6]
- Manual release (optional), see the chapter [▶ 7.3.3]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 7.5.2.6]

<sup>1</sup> Not for reduced-backlash option.

### 7.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.

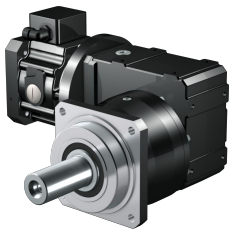


Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 7.5 Product description

### 7.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



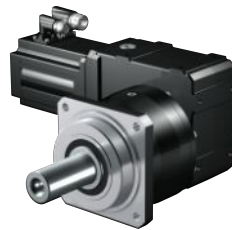
Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



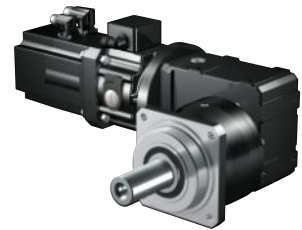
Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.



## 7.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 7.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

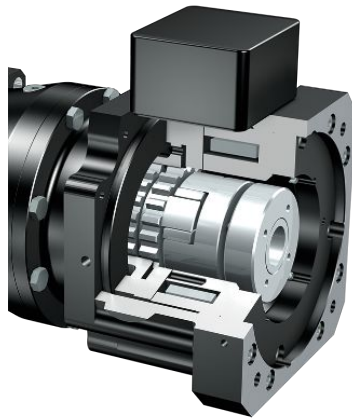


Fig. 1: Motor adapter with ServoStop brake

### 7.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 7.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 7.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 7.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

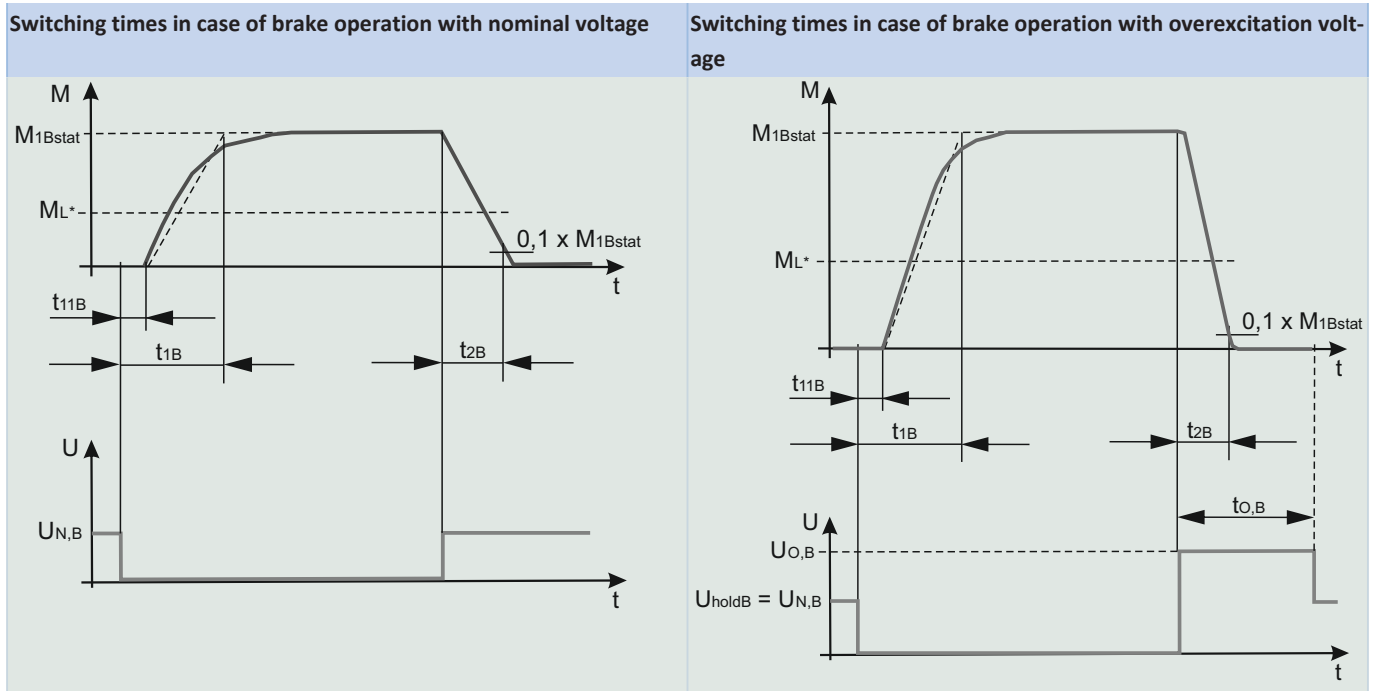
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 7.5.2.6 Brake switching times



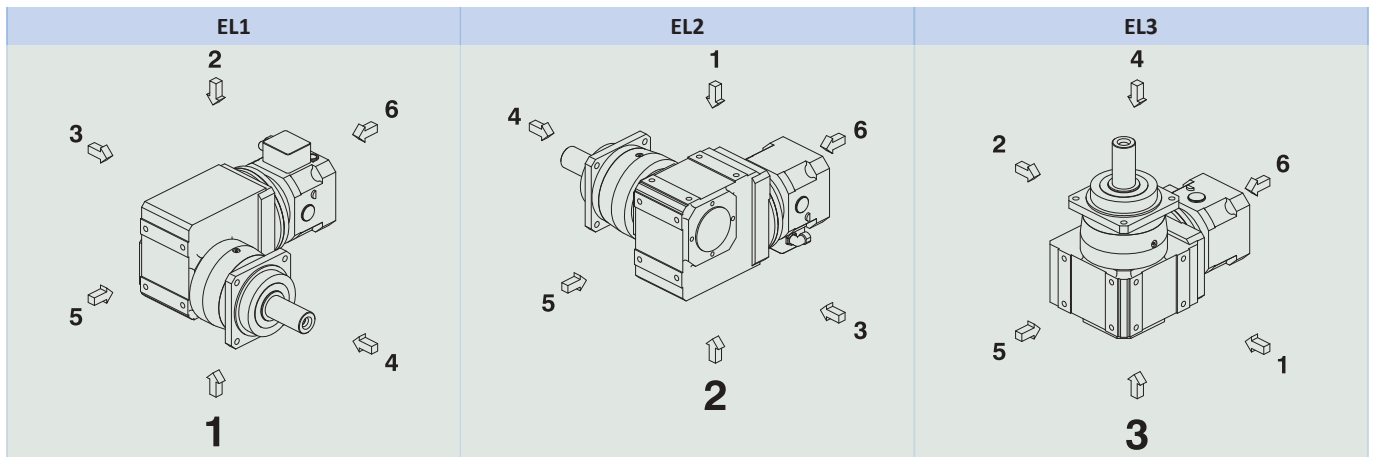
### 7.5.3 Installation conditions

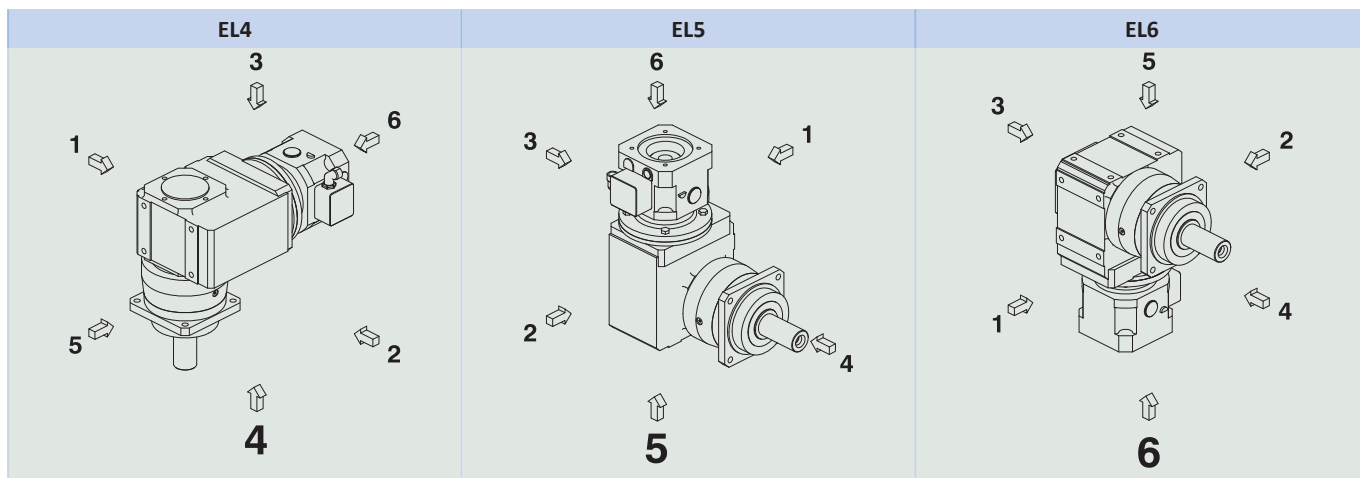
The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 12.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

### 7.5.4 Mounting positions

The following table shows the standard mounting positions.

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





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

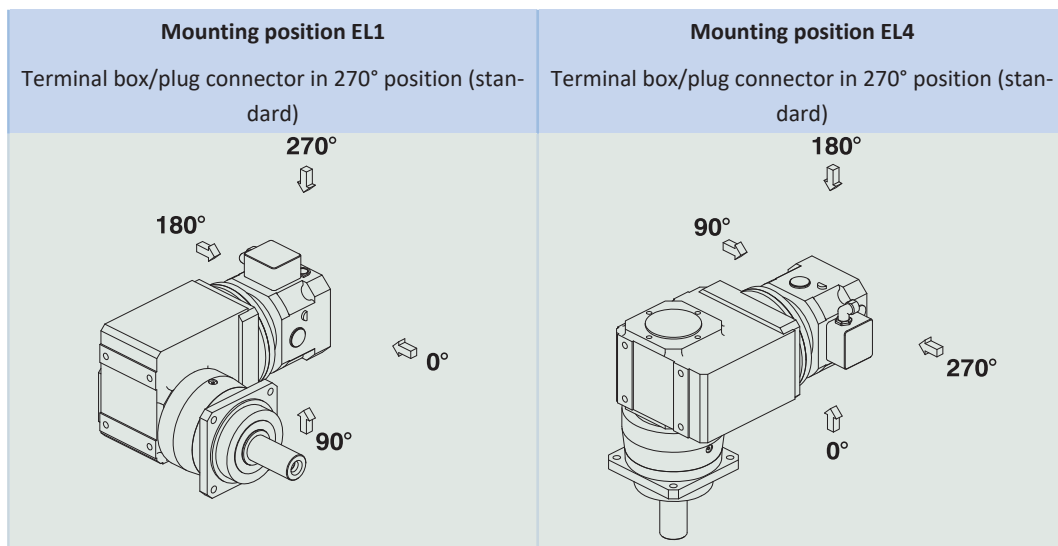
### 7.5.5 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

### 7.5.6 Position of the terminal box/plug connector



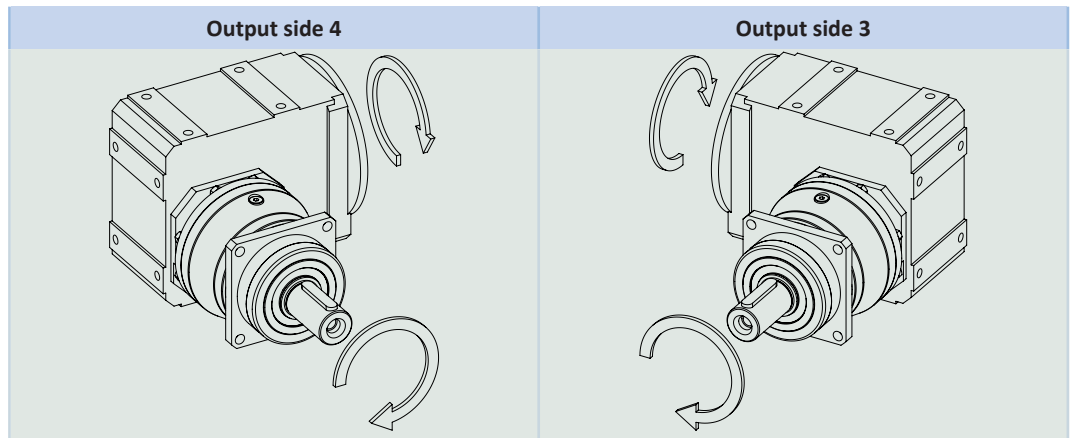
Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

### 7.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ three-stage	94%
Protection class: <sup>2</sup>	IP65

## 7.5.8 Direction of rotation



The pictures show mounting position EL1.

## 7.6 Project configuration

Project your drives using our SERVOnsoft designing software. Download SERVOnsoft for free at <https://www.stoeber.de/en/ServoSoft>.

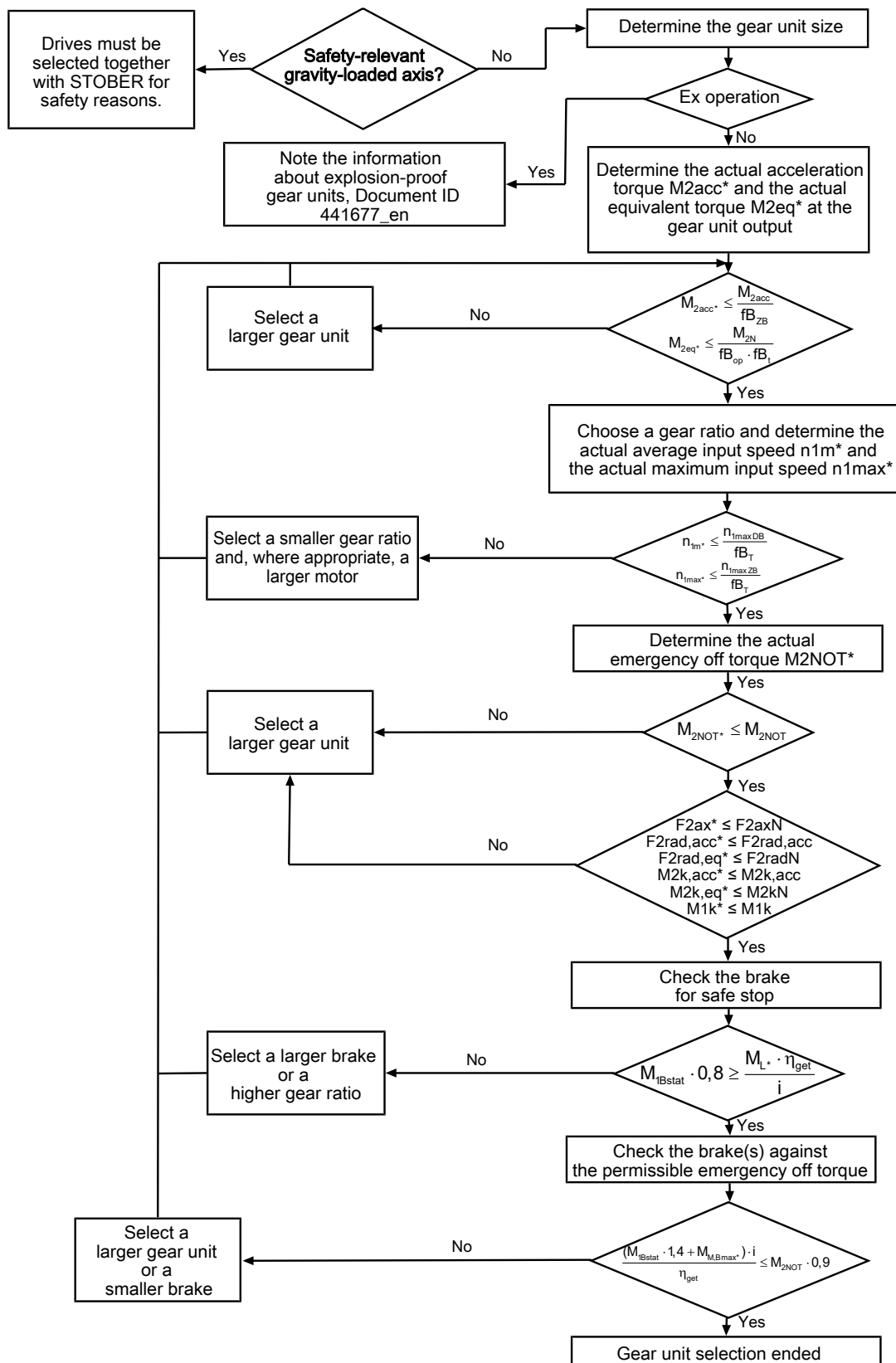
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

### 7.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

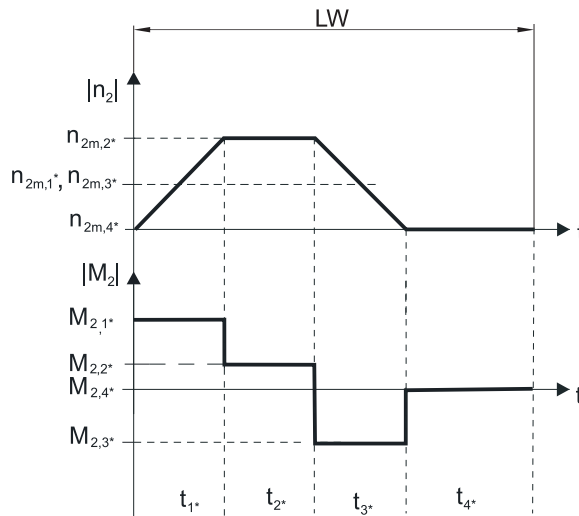
Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

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

**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 maximum acceleration torque**

$$M_{2acc^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**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  $t_{1^*} + \dots + t_{3^*} \geq 6$  min, calculate  $n_{2m^*}$  without the rest phase  $t_{4^*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20
Cyclic operation	$fB_{zB}$
$\leq 1000$ load changes/hour (LW/h)	1.00
$> 1000$ load changes/hour (LW/h)	1.15

Temperature		$fB_T$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ }^\circ\text{C}$	0.9
	$\leq 30\text{ }^\circ\text{C}$	1.0
	$\leq 40\text{ }^\circ\text{C}$	1.15
Motor with convection cooling	$\leq 20\text{ }^\circ\text{C}$	1.0
	$\leq 30\text{ }^\circ\text{C}$	1.1
	$\leq 40\text{ }^\circ\text{C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 90\text{ }^\circ\text{C}$  must not be exceeded. Doing so may result in damage to the gear unit.
- $M_{2acc}, M_{2accHT}$ : Solid shaft design without feather key (we generally recommend this shaft design for cyclic operation)

### 7.6.2 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  $n_{2m^*} \leq 100\text{ rpm}$  ( $F_{2axN} = F_{2ax100}; F_{2radN} = F_{2rad100}; M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

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	17.5	1000	2500	2500	79	79
P4	18.5	1500	4000	4500	146	164
P5	19.5	2300	6500	7000	315	340
P7	23.0	2900	8500	9000	544	576
P8	24.5	4700	13000	18000	852	1179
P9	33.0	6000	18000	27000	1539	2309

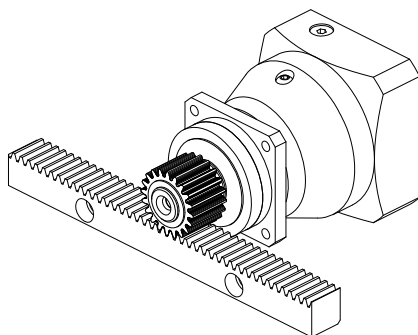


Fig. 2: Recommendation for bearing assignment S (e.g. for straight-cut gearing)



## 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	20.0	2500	2750	2750	94	94
P4	22.5	4000	4500	5000	182	203
P5	25.5	6000	7000	8000	382	436
P7	29.0	10000	9500	10000	665	700
P8	32.0	15500	15000	18000	1095	1314
P9	44.0	25000	20000	30000	1930	2895

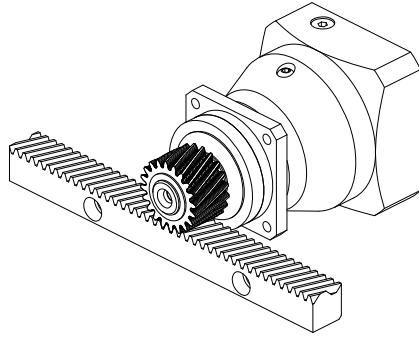


Fig. 3: Recommendation for bearing assignment D (e.g. for helical gearing)

## 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	17.5	600	3000	3000	95	95
P4	18.5	1000	5000	5000	183	183
P5	19.5	1600	8000	8000	388	388
P7	23.0	2000	10000	10000	640	640
P8	24.5	3600	18000	18000	1179	1179
P9	33.0	5000	27000	35000	2309	2993

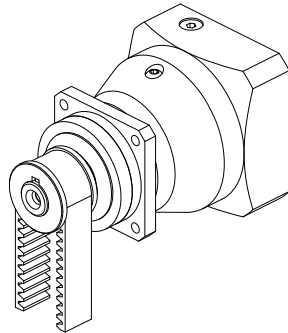


Fig. 4: Recommendation for bearing assignment Z (e.g. for belt drives)

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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

$$F_{2axN} = \frac{F_{2ax100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}} \quad F_{2radN} = \frac{F_{2rad100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}} \quad M_{2kN} = \frac{M_{2k100}}{\sqrt[3]{\frac{n_{2m^*}}{100 \text{ rpm}}}}$$

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

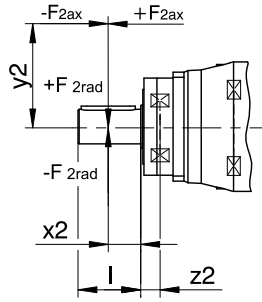


Fig. 5: Force application points

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:

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

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:

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

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

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

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

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

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

For different duty cycles:

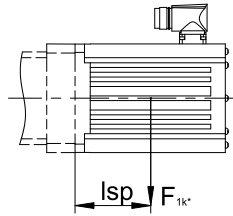
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 7.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOBBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 7.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

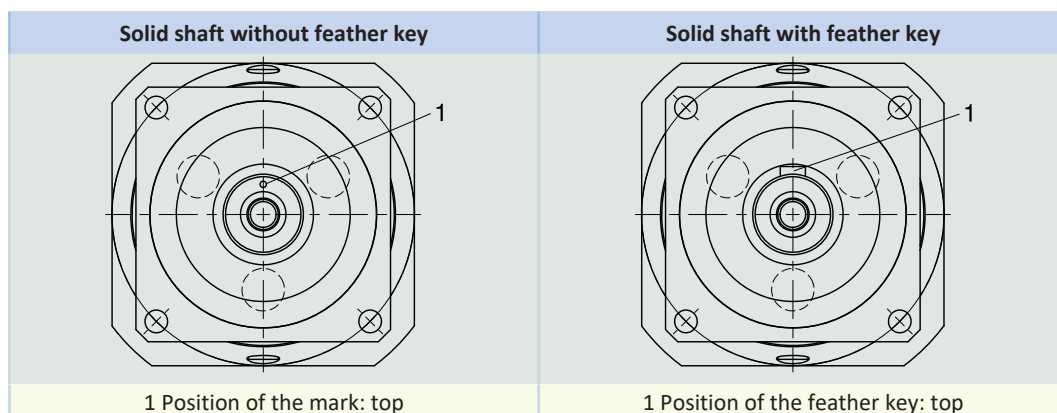
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance in oils and greases
- For use in the food, beverage and pharmaceutical industries

#### Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. 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.

## 7.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams 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), you must note the position of the mark during assembly.
- As an alternative, you can use the solid shaft with a feather key (P). In that case, the feather key functions for position orientation. For a backlash-free connection, also use a clamp.

## 7.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

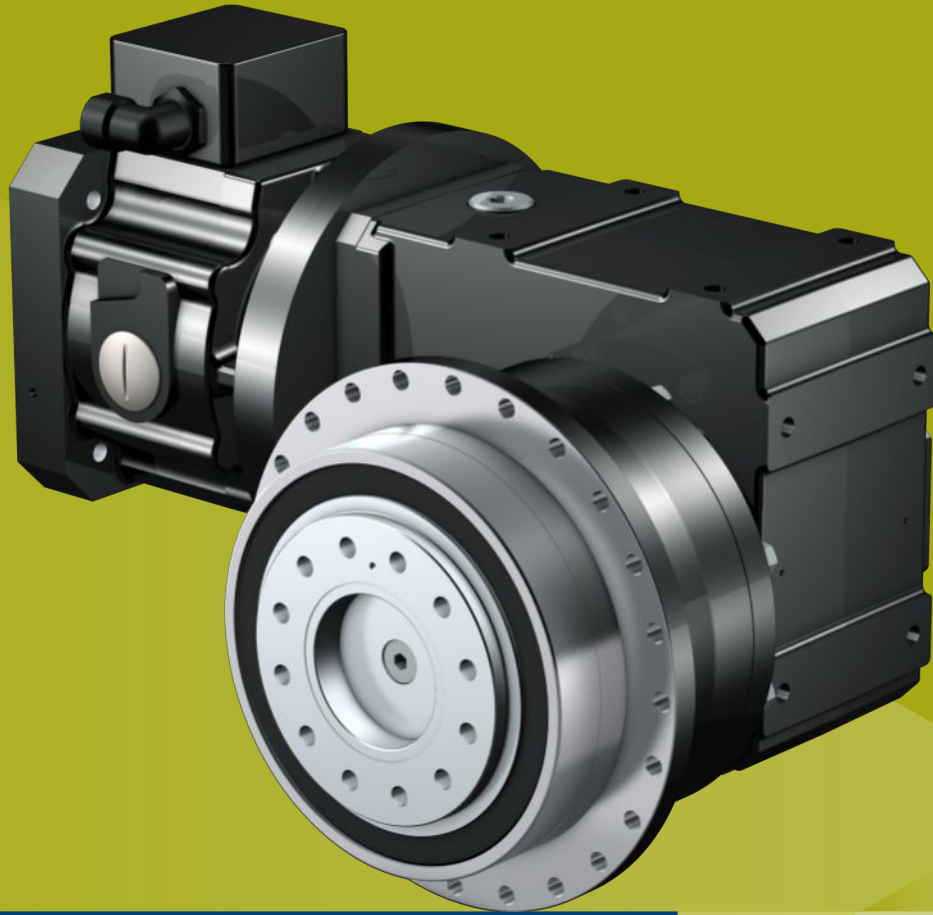
Enter the ID of the documentation in the Search term field.

Documentation	ID
Operating manual gear units, geared motors P53K – P93K	443360_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en

## 8 PHK right-angle planetary gear units

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8

## Right-angle planetary gear units

PHK

### 8.1 Overview

High-performance precision right-angle planetary gear units with integrate brake

#### Features

Power density	★★★★☆
Backlash	★★★★★
Price category	€€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★☆
Mass moment of inertia	★★★★☆
Helical gearing	✓
Continuous operation without cooling	✓
Stiff output bearings due to pretension	✓
Reinforced output bearing (PH3 – PH5)	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	16 – 466
$M_{2acc}$	355 – 7500 Nm
$\Delta\phi_2$	1.5 – 4.5 arcmin
$\eta_{get}$	92 – 93 %

## 8.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2zacc</sub>	M <sub>2zaccHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH531K (M<sub>2zacc,max</sub> = 400 Nm)</b>																	
16.00	16/1	PH531_0040K102_0040 MB23	8.0	25	3300	2800	4000	8.1	26	4.5	2.5	45	60	210	355	380	696
16.00	16/1	PH531_0040K102_0040 MB23	12	20	3300	2800	4000	8.1	26	4.5	2.5	45	60	210	355	380	696
16.00	16/1	PH531_0040K102_0040 MB23	16	14	3300	2800	4000	8.1	26	4.5	2.5	45	60	210	355	380	696
16.00	16/1	PH531_0040K102_0040 MB23	24	2.9	3300	2800	4000	8.1	26	4.5	2.5	45	60	210	355	380	696
20.00	20/1	PH531_0050K102_0040 MB23	8.0	18	3300	2800	4000	8.1	26	4.0	2.0	55	60	220	385	400	705
20.00	20/1	PH531_0050K102_0040 MB23	12	13	3300	2800	4000	8.1	26	4.0	2.0	55	60	220	385	400	705
20.00	20/1	PH531_0050K102_0040 MB23	16	7.1	3300	2800	4000	8.1	26	4.0	2.0	55	60	220	385	400	705
27.84	7600/273	PH531_0050K102_0056 MB23	8.0	10	3300	2800	4000	7.9	26	4.0	2.0	58	60	220	385	400	705
27.84	7600/273	PH531_0050K102_0060 MB23	12	4.4	3300	2800	4000	7.9	26	4.0	2.0	58	60	220	385	400	705
30.00	30/1	PH531_0050K102_0060 MB23	8.0	8.5	3300	2800	4000	7.7	26	4.0	2.0	59	60	220	385	400	705
30.00	30/1	PH531_0050K102_0060 MB23	12	2.9	3300	2800	4000	7.7	26	4.0	2.0	59	60	220	385	400	705
33.22	299/9	PH531_0050K102_0066 MB23	8.0	6.6	3600	3300	4000	7.6	26	4.0	2.0	59	58	220	385	400	705
33.22	299/9	PH531_0050K102_0066 MB23	12	1.0	3600	3300	4000	7.6	26	4.0	2.0	59	58	220	385	400	705
41.55	1911/46	PH531_0050K102_0083 MB23	8.0	3.0	3600	3300	4000	7.5	26	4.0	2.0	60	58	220	385	400	705
46.25	8740/189	PH531_0050K102_0092 MB23	8.0	1.6	3600	3300	4000	7.5	26	4.0	2.0	60	58	220	385	400	705
<b>PH731K (M<sub>2zacc,max</sub> = 924 Nm)</b>																	
16.00	16/1	PH731_0040K202_0040 MB23	8.0	31	3000	2600	4000	9.9	38	4.5	2.5	77	63	440	559	560	939
16.00	16/1	PH731_0040K202_0040 MB23	12	25	3000	2600	4000	9.9	38	4.5	2.5	77	63	440	559	560	939
16.00	16/1	PH731_0040K202_0040 MB23	16	20	3000	2600	4000	9.9	38	4.5	2.5	77	63	440	559	560	939
16.00	16/1	PH731_0040K202_0040 MB23	24	8.4	3000	2600	4000	9.9	38	4.5	2.5	77	63	440	559	560	939
16.00	16/1	PH731_0040K202_0040 MB23	30	–	3000	2600	4000	9.9	38	4.5	2.5	77	63	440	559	560	939
16.00	16/1	PH731_0040K202_0040 MB33	16	65	3000	2600	4000	30	45	4.5	2.5	84	63	440	670	670	1667
16.00	16/1	PH731_0040K202_0040 MB33	24	54	3000	2600	4000	30	45	4.5	2.5	84	63	440	670	670	1667
16.00	16/1	PH731_0040K202_0040 MB33	32	43	3000	2600	4000	30	45	4.5	2.5	84	63	440	670	670	1667
16.00	16/1	PH731_0040K202_0040 MB33	45	24	3000	2600	4000	30	45	4.5	2.5	84	63	440	670	670	1667
20.00	20/1	PH731_0050K202_0040 MB23	8.0	31	3000	2600	4000	9.8	38	4.0	2.0	96	63	440	698	700	1173
20.00	20/1	PH731_0050K202_0040 MB23	12	25	3000	2600	4000	9.8	38	4.0	2.0	96	63	440	698	700	1173
20.00	20/1	PH731_0050K202_0040 MB23	16	20	3000	2600	4000	9.8	38	4.0	2.0	96	63	440	698	700	1173
20.00	20/1	PH731_0050K202_0040 MB23	24	8.4	3000	2600	4000	9.8	38	4.0	2.0	96	63	440	698	700	1173
20.00	20/1	PH731_0050K202_0040 MB23	30	–	3000	2600	4000	9.8	38	4.0	2.0	96	63	440	698	700	1173
20.00	20/1	PH731_0050K202_0040 MB33	16	50	3000	2600	4000	30	45	4.0	2.0	102	63	440	838	840	1720
20.00	20/1	PH731_0050K202_0040 MB33	24	38	3000	2600	4000	30	45	4.0	2.0	102	63	440	838	840	1720
20.00	20/1	PH731_0050K202_0040 MB33	32	27	3000	2600	4000	30	45	4.0	2.0	102	63	440	838	840	1720
20.00	20/1	PH731_0050K202_0040 MB33	45	9.1	3000	2600	4000	30	45	4.0	2.0	102	63	440	838	840	1720
25.89	10535/407	PH731_0050K202_0052 MB23	8.0	31	3000	2600	4000	8.9	38	4.0	2.0	103	63	440	882	900	1519
25.89	10535/407	PH731_0050K202_0052 MB23	12	25	3000	2600	4000	8.9	38	4.0	2.0	103	63	440	882	900	1519
25.89	10535/407	PH731_0050K202_0052 MB23	16	20	3000	2600	4000	8.9	38	4.0	2.0	103	63	440	882	900	1519
25.89	10535/407	PH731_0050K202_0052 MB23	24	8.4	3000	2600	4000	8.9	38	4.0	2.0	103	63	440	882	900	1519
25.89	10535/407	PH731_0050K202_0052 MB23	30	–	3000	2600	4000	8.9	38	4.0	2.0	103	63	440	882	900	1519
25.89	10535/407	PH731_0050K202_0052 MB33	16	33	3000	2600	4000	29	45	4.0	2.0	108	63	440	882	910	1720
25.89	10535/407	PH731_0050K202_0052 MB33	24	22	3000	2600	4000	29	45	4.0	2.0	108	63	440	882	910	1720
25.89	10535/407	PH731_0050K202_0052 MB33	32	11	3000	2600	4000	29	45	4.0	2.0	108	63	440	882	910	1720
28.00	28/1	PH731_0070K102_0040 MB23	8.0	31	3300	2800	4000	8.1	31	4.0	2.0	100	60	438	657	660	1545
28.00	28/1	PH731_0070K102_0040 MB23	12	25	3300	2800	4000	8.1	31	4.0	2.0	100	60	438	657	660	1545
28.00	28/1	PH731_0070K102_0040 MB23	16	20	3300	2800	4000	8.1	31	4.0	2.0	100	60	438	657	660	1545
28.00	28/1	PH731_0070K102_0040 MB23	24	8.4	3300	2800	4000	8.1	31	4.0	2.0	100	60	438	657	660	1545
28.00	28/1	PH731_0070K102_0040 MB23	30	–	3300	2800	4000	8.1	31	4.0	2.0	100	60	438	657	660	1545
30.00	30/1	PH731_0050K202_0060 MB23	8.0	31	3000	2600	4000	8.9	38	4.0	2.0	106	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB23	12	25	3000	2600	4000	8.9	38	4.0	2.0	106	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB23	16	20	3000	2600	4000	8.9	38	4.0	2.0	106	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB23	24	8.4	3000	2600	4000	8.9	38	4.0	2.0	106	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB23	30	–	3000	2600	4000	8.9	38	4.0	2.0	106	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB33	16	26	3000	2600	4000	29	45	4.0	2.0	110	63	440	882	920	1720

8.2 Selection tables 8 PHK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH731K (M<sub>2acc,max</sub> = 924 Nm)</b>																	
30.00	30/1	PH731_0050K202_0060 MB33	24	14	3000	2600	4000	29	45	4.0	2.0	110	63	440	882	920	1720
30.00	30/1	PH731_0050K202_0060 MB33	32	3.2	3000	2600	4000	29	45	4.0	2.0	110	63	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB23	8.0	31	3500	3100	4000	8.3	38	4.0	2.0	108	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB23	12	25	3500	3100	4000	8.3	38	4.0	2.0	108	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB23	16	20	3500	3100	4000	8.3	38	4.0	2.0	108	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB23	24	8.4	3500	3100	4000	8.3	38	4.0	2.0	108	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB23	30	–	3500	3100	4000	8.3	38	4.0	2.0	108	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB33	16	21	3500	3100	4000	29	45	4.0	2.0	111	61	440	882	920	1720
33.42	11395/341	PH731_0050K202_0067 MB33	24	9.5	3500	3100	4000	29	45	4.0	2.0	111	61	440	882	920	1720
38.98	1520/39	PH731_0070K102_0056 MB23	8.0	22	3300	2800	4000	7.9	31	4.0	2.0	105	60	440	733	730	1545
38.98	1520/39	PH731_0070K102_0056 MB23	12	16	3300	2800	4000	7.9	31	4.0	2.0	105	60	440	733	730	1545
38.98	1520/39	PH731_0070K102_0056 MB23	16	11	3300	2800	4000	7.9	31	4.0	2.0	105	60	440	733	730	1545
40.00	40/1	PH731_0100K102_0040 MB23	8.0	13	3300	2800	4000	8.1	31	3.5	1.5	100	60	350	575	580	1150
40.00	40/1	PH731_0100K102_0040 MB23	12	7.3	3300	2800	4000	8.1	31	3.5	1.5	100	60	350	575	580	1150
40.00	40/1	PH731_0100K102_0040 MB23	16	1.7	3300	2800	4000	8.1	31	3.5	1.5	100	60	350	575	580	1150
41.99	12470/297	PH731_0050K202_0084 MB23	8.0	23	3500	3100	4000	8.0	38	4.0	2.0	111	61	440	882	920	1720
41.99	12470/297	PH731_0050K202_0084 MB23	12	18	3500	3100	4000	8.0	38	4.0	2.0	111	61	440	882	920	1720
41.99	12470/297	PH731_0050K202_0084 MB23	16	12	3500	3100	4000	8.0	38	4.0	2.0	111	61	440	882	920	1720
41.99	12470/297	PH731_0050K202_0084 MB23	24	0.7	3500	3100	4000	8.0	38	4.0	2.0	111	61	440	882	920	1720
41.99	12470/297	PH731_0050K202_0084 MB33	16	12	3500	3100	4000	28	45	4.0	2.0	113	61	440	882	920	1720
41.99	12470/297	PH731_0050K202_0084 MB33	24	0.7	3500	3100	4000	28	45	4.0	2.0	113	61	440	882	920	1720
42.00	42/1	PH731_0070K102_0060 MB23	8.0	20	3300	2800	4000	7.7	31	4.0	2.0	106	60	440	752	750	1545
42.00	42/1	PH731_0070K102_0060 MB23	12	14	3300	2800	4000	7.7	31	4.0	2.0	106	60	440	752	750	1545
42.00	42/1	PH731_0070K102_0060 MB23	16	8.4	3300	2800	4000	7.7	31	4.0	2.0	106	60	440	752	750	1545
45.95	11395/248	PH731_0050K202_0092 MB23	8.0	20	3500	3100	4000	8.1	38	4.0	2.0	112	61	440	882	920	1720
45.95	11395/248	PH731_0050K202_0092 MB23	12	15	3500	3100	4000	8.1	38	4.0	2.0	112	61	440	882	920	1720
45.95	11395/248	PH731_0050K202_0092 MB23	16	9.0	3500	3100	4000	8.1	38	4.0	2.0	112	61	440	882	920	1720
45.95	11395/248	PH731_0050K202_0092 MB33	16	9.0	3500	3100	4000	29	45	4.0	2.0	114	61	440	882	920	1720
46.51	2093/45	PH731_0070K102_0066 MB23	8.0	17	3600	3300	4000	7.6	31	4.0	2.0	106	58	440	778	780	1545
46.51	2093/45	PH731_0070K102_0066 MB23	12	11	3600	3300	4000	7.6	31	4.0	2.0	106	58	440	778	780	1545
46.51	2093/45	PH731_0070K102_0066 MB23	16	5.4	3600	3300	4000	7.6	31	4.0	2.0	106	58	440	778	780	1545
55.68	15200/273	PH731_0100K102_0056 MB23	8.0	6.1	3300	2800	4000	7.9	31	3.5	1.5	103	60	350	575	580	1150
55.68	15200/273	PH731_0100K102_0056 MB23	12	0.5	3300	2800	4000	7.9	31	3.5	1.5	103	60	350	575	580	1150
57.73	6235/108	PH731_0050K202_0115 MB23	8.0	14	3500	3100	4000	7.9	38	4.0	2.0	114	61	440	882	920	1720
57.73	6235/108	PH731_0050K202_0115 MB23	12	8.2	3500	3100	4000	7.9	38	4.0	2.0	114	61	440	882	920	1720
57.73	6235/108	PH731_0050K202_0115 MB23	16	2.6	3500	3100	4000	7.9	38	4.0	2.0	114	61	440	882	920	1720
57.73	6235/108	PH731_0050K202_0115 MB33	16	2.6	3500	3100	4000	28	45	4.0	2.0	115	61	440	882	920	1720
58.16	13377/230	PH731_0070K102_0083 MB23	8.0	11	3600	3300	4000	7.5	31	4.0	2.0	108	58	440	838	840	1545
58.16	13377/230	PH731_0070K102_0083 MB23	12	5.5	3600	3300	4000	7.5	31	4.0	2.0	108	58	440	838	840	1545
60.00	60/1	PH731_0100K102_0060 MB23	8.0	4.9	3300	2800	4000	7.7	31	3.5	1.5	103	60	350	575	580	1150
64.74	1748/27	PH731_0070K102_0092 MB23	8.0	8.8	3600	3300	4000	7.5	31	4.0	2.0	108	58	440	868	870	1545
64.74	1748/27	PH731_0070K102_0092 MB23	12	3.2	3600	3300	4000	7.5	31	4.0	2.0	108	58	440	868	870	1545
66.44	598/9	PH731_0100K102_0066 MB23	8.0	3.3	3600	3300	4000	7.6	31	3.5	1.5	103	58	350	575	580	1150
69.26	14405/208	PH731_0050K202_0140 MB23	8.0	9.6	3900	3500	4000	7.7	38	4.0	2.0	115	59	440	882	920	1720
69.26	14405/208	PH731_0050K202_0140 MB23	12	4.0	3900	3500	4000	7.7	38	4.0	2.0	115	59	440	882	920	1720
70.98	3549/50	PH731_0070K102_0100 MB23	8.0	7.0	4000	3800	4000	7.4	31	4.0	2.0	109	56	440	840	840	1545
70.98	3549/50	PH731_0070K102_0100 MB23	12	1.4	4000	3800	4000	7.4	31	4.0	2.0	109	56	440	840	840	1545
80.96	1862/23	PH731_0070K102_0115 MB23	8.0	4.8	3600	3300	4000	7.4	31	4.0	2.0	109	58	440	869	870	1545
83.09	1911/23	PH731_0100K102_0083 MB23	8.0	0.4	3600	3300	4000	7.5	31	3.5	1.5	104	58	350	575	580	1150
87.35	2795/32	PH731_0050K202_0175 MB23	8.0	5.3	3900	3500	4000	7.5	38	4.0	2.0	115	59	440	882	920	1720
88.33	3003/34	PH731_0070K102_0125 MB23	8.0	3.5	4000	3800	4000	7.3	31	4.0	2.0	109	56	440	840	840	1545
98.80	494/5	PH731_0070K102_0140 MB23	8.0	1.9	4000	3800	4000	7.4	31	4.0	2.0	110	56	440	869	870	1545
115.9	14835/128	PH731_0050K202_0230 MB23	8.0	1.2	4000	3900	4000	7.4	38	4.0	2.0	116	57	440	882	920	1720
<b>PH831K (M<sub>2acc,max</sub> = 1848 Nm)</b>																	
16.00	16/1	PH831_0040K302_0040 MB23	8.0	31	2700	2300	4000	14	62	4.0	2.0	119	66	559	559	560	939
16.00	16/1	PH831_0040K302_0040 MB23	12	25	2700	2300	4000	14	62	4.0	2.0	119	66	559	559	560	939
16.00	16/1	PH831_0040K302_0040 MB23	16	20	2700	2300	4000	14	62	4.0	2.0	119	66	559	559	560	939
16.00	16/1	PH831_0040K302_0040 MB23	24	8.4	2700	2300	4000	14	62	4.0	2.0	119	66	559	559	560	939
16.00	16/1	PH831_0040K302_0040 MB23	30	–	2700	2300	4000	14	62	4.0	2.0	119	66	559	559	560	939
16.00	16/1	PH831_0040K302_0040 MB33	16	104	2700	2300	4000	36	69	4.0	2.0	137	66	782	1174	1170	2816
16.00	16/1	PH831_0040K302_0040 MB33	24	92	2700	2300	4000	36	69	4.0	2.0	137	66	782	1174	1170	2816
16.00	16/1	PH831_0040K302_0040 MB33	32	81	2700	2300	4000	36	69	4.0	2.0	137	66	782	1174	1170	2816
16.00	16/1	PH831_0040K302_0040 MB33	45	63	2700	2300	4000	36	69	4.0	2.0	137	66	782	1174	1170	2816
16.00	16/1	PH831_0040K302_0040 MB33	90	–	2700	2300	4000	36	69	4.0	2.0	137	66	782	1174	1170	2816



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH831K (M<sub>2acc,max</sub> = 1848 Nm)</b>																	
20.00	20/1	PH831_0050K302_0040 MB23	8.0	31	2700	2300	4000	13	62	4.0	2.0	167	66	698	698	700	1173
20.00	20/1	PH831_0050K302_0040 MB23	12	25	2700	2300	4000	13	62	4.0	2.0	167	66	698	698	700	1173
20.00	20/1	PH831_0050K302_0040 MB23	16	20	2700	2300	4000	13	62	4.0	2.0	167	66	698	698	700	1173
20.00	20/1	PH831_0050K302_0040 MB23	24	8.4	2700	2300	4000	13	62	4.0	2.0	167	66	698	698	700	1173
20.00	20/1	PH831_0050K302_0040 MB23	30	–	2700	2300	4000	13	62	4.0	2.0	167	66	698	698	700	1173
20.00	20/1	PH831_0050K302_0040 MB33	16	104	2700	2300	4000	35	69	4.0	2.0	188	66	978	1467	1470	3520
20.00	20/1	PH831_0050K302_0040 MB33	24	92	2700	2300	4000	35	69	4.0	2.0	188	66	978	1467	1470	3520
20.00	20/1	PH831_0050K302_0040 MB33	32	81	2700	2300	4000	35	69	4.0	2.0	188	66	978	1467	1470	3520
20.00	20/1	PH831_0050K302_0040 MB33	45	63	2700	2300	4000	35	69	4.0	2.0	188	66	978	1467	1470	3520
20.00	20/1	PH831_0050K302_0040 MB33	90	–	2700	2300	4000	35	69	4.0	2.0	188	66	978	1467	1470	3520
26.88	215/8	PH831_0050K302_0054 MB23	8.0	31	2700	2300	4000	11	62	4.0	2.0	195	66	938	938	940	1577
26.88	215/8	PH831_0050K302_0054 MB23	12	25	2700	2300	4000	11	62	4.0	2.0	195	66	938	938	940	1577
26.88	215/8	PH831_0050K302_0054 MB23	16	20	2700	2300	4000	11	62	4.0	2.0	195	66	938	938	940	1577
26.88	215/8	PH831_0050K302_0054 MB23	24	8.4	2700	2300	4000	11	62	4.0	2.0	195	66	938	938	940	1577
26.88	215/8	PH831_0050K302_0054 MB23	30	–	2700	2300	4000	11	62	4.0	2.0	195	66	938	938	940	1577
26.88	215/8	PH831_0050K302_0054 MB33	16	76	2700	2300	4000	31	69	4.0	2.0	210	66	1079	1619	1620	3140
26.88	215/8	PH831_0050K302_0054 MB33	24	64	2700	2300	4000	31	69	4.0	2.0	210	66	1079	1619	1620	3140
26.88	215/8	PH831_0050K302_0054 MB33	32	53	2700	2300	4000	31	69	4.0	2.0	210	66	1079	1619	1620	3140
26.88	215/8	PH831_0050K302_0054 MB33	45	35	2700	2300	4000	31	69	4.0	2.0	210	66	1079	1619	1620	3140
28.00	28/1	PH831_0070K202_0040 MB23	8.0	31	3000	2600	4000	10	57	3.5	1.5	198	63	782	978	980	1643
28.00	28/1	PH831_0070K202_0040 MB23	12	25	3000	2600	4000	10	57	3.5	1.5	198	63	782	978	980	1643
28.00	28/1	PH831_0070K202_0040 MB23	16	20	3000	2600	4000	10	57	3.5	1.5	198	63	782	978	980	1643
28.00	28/1	PH831_0070K202_0040 MB23	24	8.4	3000	2600	4000	10	57	3.5	1.5	198	63	782	978	980	1643
28.00	28/1	PH831_0070K202_0040 MB23	30	–	3000	2600	4000	10	57	3.5	1.5	198	63	782	978	980	1643
28.00	28/1	PH831_0070K202_0040 MB33	16	65	3000	2600	4000	31	64	3.5	1.5	213	63	782	1173	1170	2917
28.00	28/1	PH831_0070K202_0040 MB33	24	54	3000	2600	4000	31	64	3.5	1.5	213	63	782	1173	1170	2917
28.00	28/1	PH831_0070K202_0040 MB33	32	43	3000	2600	4000	31	64	3.5	1.5	213	63	782	1173	1170	2917
28.00	28/1	PH831_0070K202_0040 MB33	45	24	3000	2600	4000	31	64	3.5	1.5	213	63	782	1173	1170	2917
30.00	30/1	PH831_0050K302_0060 MB23	8.0	31	2700	2300	4000	11	62	4.0	2.0	203	66	1048	1048	1050	1760
30.00	30/1	PH831_0050K302_0060 MB23	12	25	2700	2300	4000	11	62	4.0	2.0	203	66	1048	1048	1050	1760
30.00	30/1	PH831_0050K302_0060 MB23	16	20	2700	2300	4000	11	62	4.0	2.0	203	66	1048	1048	1050	1760
30.00	30/1	PH831_0050K302_0060 MB23	24	8.4	2700	2300	4000	11	62	4.0	2.0	203	66	1048	1048	1050	1760
30.00	30/1	PH831_0050K302_0060 MB23	30	–	2700	2300	4000	11	62	4.0	2.0	203	66	1048	1048	1050	1760
30.00	30/1	PH831_0050K302_0060 MB33	16	79	2700	2300	4000	33	69	4.0	2.0	216	66	1100	1679	1680	3646
30.00	30/1	PH831_0050K302_0060 MB33	24	68	2700	2300	4000	33	69	4.0	2.0	216	66	1100	1679	1680	3646
30.00	30/1	PH831_0050K302_0060 MB33	32	57	2700	2300	4000	33	69	4.0	2.0	216	66	1100	1679	1680	3646
30.00	30/1	PH831_0050K302_0060 MB33	45	39	2700	2300	4000	33	69	4.0	2.0	216	66	1100	1679	1680	3646
30.55	336/11	PH831_0070K202_0044 MB23	8.0	31	3000	2600	4000	9.7	57	3.5	1.5	204	63	805	1067	1070	1792
30.55	336/11	PH831_0070K202_0044 MB23	12	25	3000	2600	4000	9.7	57	3.5	1.5	204	63	805	1067	1070	1792
30.55	336/11	PH831_0070K202_0044 MB23	16	20	3000	2600	4000	9.7	57	3.5	1.5	204	63	805	1067	1070	1792
30.55	336/11	PH831_0070K202_0044 MB23	24	8.4	3000	2600	4000	9.7	57	3.5	1.5	204	63	805	1067	1070	1792
30.55	336/11	PH831_0070K202_0044 MB23	30	–	3000	2600	4000	9.7	57	3.5	1.5	204	63	805	1067	1070	1792
30.55	336/11	PH831_0070K202_0044 MB33	16	58	3000	2600	4000	30	64	3.5	1.5	217	63	805	1207	1210	2917
30.55	336/11	PH831_0070K202_0044 MB33	24	46	3000	2600	4000	30	64	3.5	1.5	217	63	805	1207	1210	2917
30.55	336/11	PH831_0070K202_0044 MB33	32	35	3000	2600	4000	30	64	3.5	1.5	217	63	805	1207	1210	2917
30.55	336/11	PH831_0070K202_0044 MB33	45	17	3000	2600	4000	30	64	3.5	1.5	217	63	805	1207	1210	2917
36.24	14749/407	PH831_0070K202_0052 MB23	8.0	31	3000	2600	4000	9.1	57	3.5	1.5	215	63	852	1265	1270	2126
36.24	14749/407	PH831_0070K202_0052 MB23	12	25	3000	2600	4000	9.1	57	3.5	1.5	215	63	852	1265	1270	2126
36.24	14749/407	PH831_0070K202_0052 MB23	16	20	3000	2600	4000	9.1	57	3.5	1.5	215	63	852	1265	1270	2126
36.24	14749/407	PH831_0070K202_0052 MB23	24	8.4	3000	2600	4000	9.1	57	3.5	1.5	215	63	852	1265	1270	2126
36.24	14749/407	PH831_0070K202_0052 MB23	30	–	3000	2600	4000	9.1	57	3.5	1.5	215	63	852	1265	1270	2126
36.24	14749/407	PH831_0070K202_0052 MB33	16	45	3000	2600	4000	30	64	3.5	1.5	225	63	852	1278	1280	2917
36.24	14749/407	PH831_0070K202_0052 MB33	24	34	3000	2600	4000	30	64	3.5	1.5	225	63	852	1278	1280	2917
36.24	14749/407	PH831_0070K202_0052 MB33	32	23	3000	2600	4000	30	64	3.5	1.5	225	63	852	1278	1280	2917
36.24	14749/407	PH831_0070K202_0052 MB33	45	4.5	3000	2600	4000	30	64	3.5	1.5	225	63	852	1278	1280	2917
36.96	2365/64	PH831_0050K302_0074 MB23	8.0	31	2700	2300	4000	10	62	4.0	2.0	215	66	1100	1290	1290	2168
36.96	2365/64	PH831_0050K302_0074 MB23	12	25	2700	2300	4000	10	62	4.0	2.0	215	66	1100	1290	1290	2168
36.96	2365/64	PH831_0050K302_0074 MB23	16	20	2700	2300	4000	10	62	4.0	2.0	215	66	1100	1290	1290	2168
36.96	2365/64	PH831_0050K302_0074 MB23	24	8.4	2700	2300	4000	10	62	4.0	2.0	215	66	1100	1290	1290	2168
36.96	2365/64	PH831_0050K302_0074 MB23	30	–	2700	2300	4000	10	62	4.0	2.0	215	66	1100	1290	1290	2168
36.96	2365/64	PH831_0050K302_0074 MB33	16	60	2700	2300	4000	31	69	4.0	2.0	225	66	1100	1800	1800	3646
36.96	2365/64	PH831_0050K302_0074 MB33	24	49	2700	2300	4000	31	69	4.0	2.0	225	66	1100	1800	1800	3646
36.96	2365/64	PH831_0050K302_0074 MB33	32	38	2700	2300	4000	31	69	4.0	2.0	225	66	1100	1800	1800	3646
36.96	2365/64	PH831_0050K302_0074 MB33	45	20	2700	2300	4000	31	69	4.0	2.0	225	66	1100	1800	1800	3646

8.2 Selection tables 8 PHK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH831K (M<sub>2acc,max</sub> = 1848 Nm)</b>																	
40.00	40/1	PH831_0100K202_0040 MB23	8.0	31	3000	2600	4000	9.8	57	3.5	1.5	231	63	850	1392	1390	2347
40.00	40/1	PH831_0100K202_0040 MB23	12	25	3000	2600	4000	9.8	57	3.5	1.5	231	63	850	1392	1390	2347
40.00	40/1	PH831_0100K202_0040 MB23	16	20	3000	2600	4000	9.8	57	3.5	1.5	231	63	850	1392	1390	2347
40.00	40/1	PH831_0100K202_0040 MB23	24	8.4	3000	2600	4000	9.8	57	3.5	1.5	231	63	850	1392	1390	2347
40.00	40/1	PH831_0100K202_0040 MB23	30	-	3000	2600	4000	9.8	57	3.5	1.5	231	63	850	1392	1390	2347
40.00	40/1	PH831_0100K202_0040 MB33	16	36	3000	2600	4000	30	64	3.5	1.5	241	63	850	1392	1390	2784
40.00	40/1	PH831_0100K202_0040 MB33	24	25	3000	2600	4000	30	64	3.5	1.5	241	63	850	1392	1390	2784
40.00	40/1	PH831_0100K202_0040 MB33	32	14	3000	2600	4000	30	64	3.5	1.5	241	63	850	1392	1390	2784
42.00	42/1	PH831_0070K202_0060 MB23	8.0	31	3000	2600	4000	9.1	57	3.5	1.5	222	63	895	1342	1340	2464
42.00	42/1	PH831_0070K202_0060 MB23	12	25	3000	2600	4000	9.1	57	3.5	1.5	222	63	895	1342	1340	2464
42.00	42/1	PH831_0070K202_0060 MB23	16	20	3000	2600	4000	9.1	57	3.5	1.5	222	63	895	1342	1340	2464
42.00	42/1	PH831_0070K202_0060 MB23	24	8.4	3000	2600	4000	9.1	57	3.5	1.5	222	63	895	1342	1340	2464
42.00	42/1	PH831_0070K202_0060 MB23	30	-	3000	2600	4000	9.1	57	3.5	1.5	222	63	895	1342	1340	2464
42.00	42/1	PH831_0070K202_0060 MB33	16	36	3000	2600	4000	30	64	3.5	1.5	230	63	895	1342	1340	2917
42.00	42/1	PH831_0070K202_0060 MB33	24	25	3000	2600	4000	30	64	3.5	1.5	230	63	895	1342	1340	2917
42.00	42/1	PH831_0070K202_0060 MB33	32	13	3000	2600	4000	30	64	3.5	1.5	230	63	895	1342	1340	2917
46.34	5375/116	PH831_0050K302_0093 MB23	8.0	31	3200	2800	4000	9.3	62	4.0	2.0	225	64	1100	1618	1620	2718
46.34	5375/116	PH831_0050K302_0093 MB23	12	25	3200	2800	4000	9.3	62	4.0	2.0	225	64	1100	1618	1620	2718
46.34	5375/116	PH831_0050K302_0093 MB23	16	20	3200	2800	4000	9.3	62	4.0	2.0	225	64	1100	1618	1620	2718
46.34	5375/116	PH831_0050K302_0093 MB23	24	8.4	3200	2800	4000	9.3	62	4.0	2.0	225	64	1100	1618	1620	2718
46.34	5375/116	PH831_0050K302_0093 MB23	30	-	3200	2800	4000	9.3	62	4.0	2.0	225	64	1100	1618	1620	2718
46.34	5375/116	PH831_0050K302_0093 MB33	16	44	3200	2800	4000	30	69	4.0	2.0	232	64	1100	1848	1850	3646
46.34	5375/116	PH831_0050K302_0093 MB33	24	32	3200	2800	4000	30	69	4.0	2.0	232	64	1100	1848	1850	3646
46.34	5375/116	PH831_0050K302_0093 MB33	32	21	3200	2800	4000	30	69	4.0	2.0	232	64	1100	1848	1850	3646
46.34	5375/116	PH831_0050K302_0093 MB33	45	2.9	3200	2800	4000	30	69	4.0	2.0	232	64	1100	1848	1850	3646
46.78	15953/341	PH831_0070K202_0067 MB23	8.0	31	3500	3100	4000	8.5	57	3.5	1.5	226	61	928	1391	1390	2744
46.78	15953/341	PH831_0070K202_0067 MB23	12	25	3500	3100	4000	8.5	57	3.5	1.5	226	61	928	1391	1390	2744
46.78	15953/341	PH831_0070K202_0067 MB23	16	20	3500	3100	4000	8.5	57	3.5	1.5	226	61	928	1391	1390	2744
46.78	15953/341	PH831_0070K202_0067 MB23	24	8.4	3500	3100	4000	8.5	57	3.5	1.5	226	61	928	1391	1390	2744
46.78	15953/341	PH831_0070K202_0067 MB23	30	-	3500	3100	4000	8.5	57	3.5	1.5	226	61	928	1391	1390	2744
46.78	15953/341	PH831_0070K202_0067 MB33	16	30	3500	3100	4000	29	64	3.5	1.5	232	61	928	1391	1390	2917
46.78	15953/341	PH831_0070K202_0067 MB33	24	19	3500	3100	4000	29	64	3.5	1.5	232	61	928	1391	1390	2917
46.78	15953/341	PH831_0070K202_0067 MB33	32	7.5	3500	3100	4000	29	64	3.5	1.5	232	61	928	1391	1390	2917
49.83	14749/296	PH831_0070K202_0071 MB23	8.0	31	3000	2600	4000	8.7	57	3.5	1.5	228	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB23	12	25	3000	2600	4000	8.7	57	3.5	1.5	228	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB23	16	20	3000	2600	4000	8.7	57	3.5	1.5	228	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB23	24	8.4	3000	2600	4000	8.7	57	3.5	1.5	228	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB23	30	-	3000	2600	4000	8.7	57	3.5	1.5	228	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB33	16	27	3000	2600	4000	29	64	3.5	1.5	234	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB33	24	15	3000	2600	4000	29	64	3.5	1.5	234	63	947	1421	1420	2917
49.83	14749/296	PH831_0070K202_0071 MB33	32	4.3	3000	2600	4000	29	64	3.5	1.5	234	63	947	1421	1420	2917
51.77	21070/407	PH831_0100K202_0052 MB23	8.0	31	3000	2600	4000	9.0	57	3.5	1.5	242	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB23	12	25	3000	2600	4000	9.0	57	3.5	1.5	242	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB23	16	20	3000	2600	4000	9.0	57	3.5	1.5	242	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB23	24	8.4	3000	2600	4000	9.0	57	3.5	1.5	242	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB23	30	-	3000	2600	4000	9.0	57	3.5	1.5	242	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB33	16	23	3000	2600	4000	29	64	3.5	1.5	248	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB33	24	11	3000	2600	4000	29	64	3.5	1.5	248	63	850	1392	1390	2784
51.77	21070/407	PH831_0100K202_0052 MB33	32	0.3	3000	2600	4000	29	64	3.5	1.5	248	63	850	1392	1390	2784
58.05	1161/20	PH831_0050K302_0115 MB23	8.0	31	3200	2800	4000	8.7	62	4.0	2.0	232	64	1100	1848	1850	3406
58.05	1161/20	PH831_0050K302_0115 MB23	12	25	3200	2800	4000	8.7	62	4.0	2.0	232	64	1100	1848	1850	3406
58.05	1161/20	PH831_0050K302_0115 MB23	16	20	3200	2800	4000	8.7	62	4.0	2.0	232	64	1100	1848	1850	3406
58.05	1161/20	PH831_0050K302_0115 MB23	24	8.4	3200	2800	4000	8.7	62	4.0	2.0	232	64	1100	1848	1850	3406
58.05	1161/20	PH831_0050K302_0115 MB23	30	-	3200	2800	4000	8.7	62	4.0	2.0	232	64	1100	1848	1850	3406
58.05	1161/20	PH831_0050K302_0115 MB33	16	30	3200	2800	4000	29	69	4.0	2.0	237	64	1100	1848	1850	3646
58.05	1161/20	PH831_0050K302_0115 MB33	24	19	3200	2800	4000	29	69	4.0	2.0	237	64	1100	1848	1850	3646
58.05	1161/20	PH831_0050K302_0115 MB33	32	7.8	3200	2800	4000	29	69	4.0	2.0	237	64	1100	1848	1850	3646
58.78	17458/297	PH831_0070K202_0084 MB23	8.0	30	3500	3100	4000	8.1	57	3.5	1.5	233	61	1000	1478	1480	2917
58.78	17458/297	PH831_0070K202_0084 MB23	12	25	3500	3100	4000	8.1	57	3.5	1.5	233	61	1000	1478	1480	2917
58.78	17458/297	PH831_0070K202_0084 MB23	16	19	3500	3100	4000	8.1	57	3.5	1.5	233	61	1000	1478	1480	2917
58.78	17458/297	PH831_0070K202_0084 MB23	24	8.0	3500	3100	4000	8.1	57	3.5	1.5	233	61	1000	1478	1480	2917
58.78	17458/297	PH831_0070K202_0084 MB33	16	19	3500	3100	4000	29	64	3.5	1.5	237	61	1000	1478	1480	2917
58.78	17458/297	PH831_0070K202_0084 MB33	24	8.0	3500	3100	4000	29	64	3.5	1.5	237	61	1000	1478	1480	2917
60.00	60/1	PH831_0100K202_0060 MB23	8.0	28	3000	2600	4000	9.0	57	3.5	1.5	247	63	850	1392	1390	2784

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH831K (M<sub>2acc,max</sub> = 1848 Nm)</b>																	
60.00	60/1	PH831_0100K202_0060 MB23	12	22	3000	2600	4000	9.0	57	3.5	1.5	247	63	850	1392	1390	2784
60.00	60/1	PH831_0100K202_0060 MB23	16	16	3000	2600	4000	9.0	57	3.5	1.5	247	63	850	1392	1390	2784
60.00	60/1	PH831_0100K202_0060 MB23	24	5.3	3000	2600	4000	9.0	57	3.5	1.5	247	63	850	1392	1390	2784
60.00	60/1	PH831_0100K202_0060 MB33	16	16	3000	2600	4000	29	64	3.5	1.5	251	63	850	1392	1390	2784
60.00	60/1	PH831_0100K202_0060 MB33	24	5.3	3000	2600	4000	29	64	3.5	1.5	251	63	850	1392	1390	2784
64.33	15953/248	PH831_0070K202_0092 MB23	8.0	27	3500	3100	4000	8.2	57	3.5	1.5	235	61	1000	1478	1480	2917
64.33	15953/248	PH831_0070K202_0092 MB23	12	21	3500	3100	4000	8.2	57	3.5	1.5	235	61	1000	1478	1480	2917
64.33	15953/248	PH831_0070K202_0092 MB23	16	16	3500	3100	4000	8.2	57	3.5	1.5	235	61	1000	1478	1480	2917
64.33	15953/248	PH831_0070K202_0092 MB23	24	4.4	3500	3100	4000	8.2	57	3.5	1.5	235	61	1000	1478	1480	2917
64.33	15953/248	PH831_0070K202_0092 MB33	16	16	3500	3100	4000	29	64	3.5	1.5	238	61	1000	1478	1480	2917
64.33	15953/248	PH831_0070K202_0092 MB33	24	4.4	3500	3100	4000	29	64	3.5	1.5	238	61	1000	1478	1480	2917
66.83	22790/341	PH831_0100K202_0067 MB23	8.0	24	3500	3100	4000	8.4	57	3.5	1.5	249	61	850	1392	1390	2784
66.83	22790/341	PH831_0100K202_0067 MB23	12	18	3500	3100	4000	8.4	57	3.5	1.5	249	61	850	1392	1390	2784
66.83	22790/341	PH831_0100K202_0067 MB23	16	13	3500	3100	4000	8.4	57	3.5	1.5	249	61	850	1392	1390	2784
66.83	22790/341	PH831_0100K202_0067 MB23	24	1.3	3500	3100	4000	8.4	57	3.5	1.5	249	61	850	1392	1390	2784
66.83	22790/341	PH831_0100K202_0067 MB33	16	13	3500	3100	4000	29	64	3.5	1.5	253	61	850	1392	1390	2784
66.83	22790/341	PH831_0100K202_0067 MB33	24	1.3	3500	3100	4000	29	64	3.5	1.5	253	61	850	1392	1390	2784
69.68	7525/108	PH831_0050K302_0140 MB23	8.0	31	3500	3100	4000	8.3	62	4.0	2.0	236	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB23	12	25	3500	3100	4000	8.3	62	4.0	2.0	236	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB23	16	20	3500	3100	4000	8.3	62	4.0	2.0	236	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB23	24	8.4	3500	3100	4000	8.3	62	4.0	2.0	236	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB23	30	–	3500	3100	4000	8.3	62	4.0	2.0	236	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB33	16	21	3500	3100	4000	29	69	4.0	2.0	239	62	1100	1848	1850	3646
69.68	7525/108	PH831_0050K302_0140 MB33	24	10	3500	3100	4000	29	69	4.0	2.0	239	62	1100	1848	1850	3646
70.51	20167/286	PH831_0070K202_0100 MB23	8.0	23	3900	3500	4000	7.8	57	3.5	1.5	236	59	1000	1478	1480	2917
70.51	20167/286	PH831_0070K202_0100 MB23	12	18	3900	3500	4000	7.8	57	3.5	1.5	236	59	1000	1478	1480	2917
70.51	20167/286	PH831_0070K202_0100 MB23	16	12	3900	3500	4000	7.8	57	3.5	1.5	236	59	1000	1478	1480	2917
70.51	20167/286	PH831_0070K202_0100 MB23	24	1.1	3900	3500	4000	7.8	57	3.5	1.5	236	59	1000	1478	1480	2917
70.51	20167/286	PH831_0070K202_0100 MB33	16	12	3900	3500	4000	28	64	3.5	1.5	239	59	1000	1478	1480	2917
70.51	20167/286	PH831_0070K202_0100 MB33	24	1.1	3900	3500	4000	28	64	3.5	1.5	239	59	1000	1478	1480	2917
80.82	8729/108	PH831_0070K202_0115 MB23	8.0	19	3500	3100	4000	7.9	57	3.5	1.5	238	61	1000	1478	1480	2917
80.82	8729/108	PH831_0070K202_0115 MB23	12	13	3500	3100	4000	7.9	57	3.5	1.5	238	61	1000	1478	1480	2917
80.82	8729/108	PH831_0070K202_0115 MB23	16	7.8	3500	3100	4000	7.9	57	3.5	1.5	238	61	1000	1478	1480	2917
80.82	8729/108	PH831_0070K202_0115 MB33	16	7.8	3500	3100	4000	28	64	3.5	1.5	241	61	1000	1478	1480	2917
83.97	24940/297	PH831_0100K202_0084 MB23	8.0	17	3500	3100	4000	8.0	57	3.5	1.5	253	61	850	1392	1390	2784
83.97	24940/297	PH831_0100K202_0084 MB23	12	11	3500	3100	4000	8.0	57	3.5	1.5	253	61	850	1392	1390	2784
83.97	24940/297	PH831_0100K202_0084 MB33	16	5.4	3500	3100	4000	8.0	57	3.5	1.5	253	61	850	1392	1390	2784
83.97	24940/297	PH831_0100K202_0084 MB33	16	5.4	3500	3100	4000	29	64	3.5	1.5	256	61	850	1392	1390	2784
86.47	7955/92	PH831_0050K302_0175 MB23	8.0	24	3500	3100	4000	8.0	62	4.0	2.0	239	62	1100	1848	1850	3646
86.47	7955/92	PH831_0050K302_0175 MB23	12	19	3500	3100	4000	8.0	62	4.0	2.0	239	62	1100	1848	1850	3646
86.47	7955/92	PH831_0050K302_0175 MB23	16	13	3500	3100	4000	8.0	62	4.0	2.0	239	62	1100	1848	1850	3646
86.47	7955/92	PH831_0050K302_0175 MB23	24	1.7	3500	3100	4000	8.0	62	4.0	2.0	239	62	1100	1848	1850	3646
86.47	7955/92	PH831_0050K302_0175 MB33	16	13	3500	3100	4000	28	69	4.0	2.0	241	62	1100	1848	1850	3646
86.47	7955/92	PH831_0050K302_0175 MB33	24	1.7	3500	3100	4000	28	69	4.0	2.0	241	62	1100	1848	1850	3646
88.94	3913/44	PH831_0070K202_0125 MB23	8.0	16	3900	3500	4000	7.6	57	3.5	1.5	240	59	1000	1478	1480	2917
88.94	3913/44	PH831_0070K202_0125 MB23	12	11	3900	3500	4000	7.6	57	3.5	1.5	240	59	1000	1478	1480	2917
88.94	3913/44	PH831_0070K202_0125 MB23	16	5.1	3900	3500	4000	7.6	57	3.5	1.5	240	59	1000	1478	1480	2917
88.94	3913/44	PH831_0070K202_0125 MB33	16	5.1	3900	3500	4000	28	64	3.5	1.5	242	59	1000	1478	1480	2917
91.90	11395/124	PH831_0100K202_0092 MB23	8.0	14	3500	3100	4000	8.1	57	3.5	1.5	254	61	850	1392	1390	2784
91.90	11395/124	PH831_0100K202_0092 MB23	12	8.6	3500	3100	4000	8.1	57	3.5	1.5	254	61	850	1392	1390	2784
91.90	11395/124	PH831_0100K202_0092 MB23	16	3.0	3500	3100	4000	8.1	57	3.5	1.5	254	61	850	1392	1390	2784
91.90	11395/124	PH831_0100K202_0092 MB33	16	3.0	3500	3100	4000	29	64	3.5	1.5	256	61	850	1392	1390	2784
96.96	20167/208	PH831_0070K202_0140 MB23	8.0	14	3900	3500	4000	7.7	57	3.5	1.5	240	59	1000	1478	1480	2917
96.96	20167/208	PH831_0070K202_0140 MB23	12	8.4	3900	3500	4000	7.7	57	3.5	1.5	240	59	1000	1478	1480	2917
96.96	20167/208	PH831_0070K202_0140 MB23	16	2.8	3900	3500	4000	7.7	57	3.5	1.5	240	59	1000	1478	1480	2917
96.96	20167/208	PH831_0070K202_0140 MB33	16	2.8	3900	3500	4000	28	64	3.5	1.5	242	59	1000	1478	1480	2917
115.5	6235/54	PH831_0100K202_0115 MB23	8.0	9.0	3500	3100	4000	7.9	57	3.5	1.5	256	61	850	1392	1390	2784
115.5	6235/54	PH831_0100K202_0115 MB23	12	3.4	3500	3100	4000	7.9	57	3.5	1.5	256	61	850	1392	1390	2784
116.5	2795/24	PH831_0050K302_0230 MB23	8.0	15	3800	3500	4000	7.7	62	4.0	2.0	242	60	1100	1848	1850	3646
116.5	2795/24	PH831_0050K302_0230 MB23	12	9.4	3800	3500	4000	7.7	62	4.0	2.0	242	60	1100	1848	1850	3646
116.5	2795/24	PH831_0050K302_0230 MB23	16	3.8	3800	3500	4000	7.7	62	4.0	2.0	242	60	1100	1848	1850	3646
116.5	2795/24	PH831_0050K302_0230 MB33	16	3.8	3800	3500	4000	28	69	4.0	2.0	243	60	1100	1848	1850	3646
118.0	20769/176	PH831_0070K202_0170 MB23	8.0	9.5	4000	3900	4000	7.5	57	3.5	1.5	242	57	1000	1478	1480	2917
118.0	20769/176	PH831_0070K202_0170 MB23	12	3.9	4000	3900	4000	7.5	57	3.5	1.5	242	57	1000	1478	1480	2917

8.2 Selection tables 8 PHK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH831K (M<sub>2acc,max</sub> = 1848 Nm)</b>																	
122.3	3913/32	PH831_0070K202_0175 MB23	8.0	8.8	3900	3500	4000	7.6	57	3.5	1.5	242	59	1000	1478	1480	2917
122.3	3913/32	PH831_0070K202_0175 MB23	12	3.2	3900	3500	4000	7.6	57	3.5	1.5	242	59	1000	1478	1480	2917
138.5	14405/104	PH831_0100K202_0140 MB23	8.0	5.6	3900	3500	4000	7.7	57	3.5	1.5	257	59	850	1392	1390	2784
138.5	14405/104	PH831_0100K202_0140 MB23	12	-	3900	3500	4000	7.7	57	3.5	1.5	257	59	850	1392	1390	2784
139.4	17845/128	PH831_0050K302_0280 MB23	8.0	11	3800	3500	4000	7.6	62	4.0	2.0	243	60	1100	1848	1850	3646
139.4	17845/128	PH831_0050K302_0280 MB23	12	5.1	3800	3500	4000	7.6	62	4.0	2.0	243	60	1100	1848	1850	3646
142.3	7826/55	PH831_0070K202_0200 MB23	8.0	6.0	4000	3900	4000	7.4	57	3.5	1.5	243	57	1000	1478	1480	2917
142.3	7826/55	PH831_0070K202_0200 MB23	12	0.4	4000	3900	4000	7.4	57	3.5	1.5	243	57	1000	1478	1480	2917
162.3	20769/128	PH831_0070K202_0230 MB23	8.0	3.9	4000	3900	4000	7.4	57	3.5	1.5	243	57	1000	1478	1480	2917
173.7	4515/26	PH831_0050K302_0350 MB23	8.0	6.4	3800	3500	4000	7.4	62	4.0	2.0	243	60	1100	1848	1850	3646
173.7	4515/26	PH831_0050K302_0350 MB23	12	0.8	3800	3500	4000	7.4	62	4.0	2.0	243	60	1100	1848	1850	3646
174.7	2795/16	PH831_0100K202_0175 MB23	8.0	2.2	3900	3500	4000	7.6	57	3.5	1.5	258	59	850	1392	1390	2784
175.9	1935/11	PH831_0070K202_0250 MB23	8.0	2.7	4000	3900	4000	7.3	57	3.5	1.5	244	57	1000	1478	1480	2917
195.7	3913/20	PH831_0070K202_0280 MB23	8.0	1.3	4000	3900	4000	7.4	57	3.5	1.5	244	57	1000	1478	1480	2917
231.1	1849/8	PH831_0050K302_0460 MB23	8.0	1.8	3800	3500	4000	7.3	62	4.0	2.0	244	60	1100	1848	1850	3585
<b>PH941K (M<sub>2acc,max</sub> = 5000 Nm)</b>																	
32.54	17081/525	PH941_0040K513_0081 MB33	16	104	1900	1800	3200	45	104	4.5	2.5	422	72	2758	2986	2990	5644
32.54	17081/525	PH941_0040K513_0081 MB33	24	92	1900	1800	3200	45	104	4.5	2.5	422	72	2758	2986	2990	5644
32.54	17081/525	PH941_0040K513_0081 MB33	32	81	1900	1800	3200	45	104	4.5	2.5	422	72	2758	2986	2990	5644
32.54	17081/525	PH941_0040K513_0081 MB33	45	63	1900	1800	3200	45	104	4.5	2.5	422	72	2758	2986	2990	5644
32.54	17081/525	PH941_0040K513_0081 MB33	90	-	1900	1800	3200	45	104	4.5	2.5	422	72	2758	2986	2990	5644
32.54	17081/525	PH941_0040K513_0081 MB43	50	120	1900	1800	3000	92	117	4.5	2.5	441	72	2758	3840	3840	7500
32.54	17081/525	PH941_0040K513_0081 MB43	72	90	1900	1800	3000	92	117	4.5	2.5	441	72	2758	3840	3840	7500
32.54	17081/525	PH941_0040K513_0081 MB43	100	50	1900	1800	3000	92	117	4.5	2.5	441	72	2758	3840	3840	7500
40.60	203/5	PH941_0040K513_0100 MB33	16	104	1900	1800	3200	40	104	4.5	2.5	454	72	2884	3726	3730	7042
40.60	203/5	PH941_0040K513_0100 MB33	24	92	1900	1800	3200	40	104	4.5	2.5	454	72	2884	3726	3730	7042
40.60	203/5	PH941_0040K513_0100 MB33	32	81	1900	1800	3200	40	104	4.5	2.5	454	72	2884	3726	3730	7042
40.60	203/5	PH941_0040K513_0100 MB33	45	63	1900	1800	3200	40	104	4.5	2.5	454	72	2884	3726	3730	7042
40.60	203/5	PH941_0040K513_0100 MB33	90	-	1900	1800	3200	40	104	4.5	2.5	454	72	2884	3726	3730	7042
40.60	203/5	PH941_0040K513_0100 MB43	50	83	1900	1800	3000	88	117	4.5	2.5	468	72	2884	3840	3840	7500
40.60	203/5	PH941_0040K513_0100 MB43	72	52	1900	1800	3000	88	117	4.5	2.5	468	72	2884	3840	3840	7500
40.60	203/5	PH941_0040K513_0100 MB43	100	13	1900	1800	3000	88	117	4.5	2.5	468	72	2884	3840	3840	7500
48.80	17081/350	PH941_0060K513_0081 MB33	16	104	1900	1800	3200	44	104	4.0	2.0	635	72	3000	4479	4480	8465
48.80	17081/350	PH941_0060K513_0081 MB33	24	92	1900	1800	3200	44	104	4.0	2.0	635	72	3000	4479	4480	8465
48.80	17081/350	PH941_0060K513_0081 MB33	32	81	1900	1800	3200	44	104	4.0	2.0	635	72	3000	4479	4480	8465
48.80	17081/350	PH941_0060K513_0081 MB33	45	63	1900	1800	3200	44	104	4.0	2.0	635	72	3000	4479	4480	8465
48.80	17081/350	PH941_0060K513_0081 MB33	90	-	1900	1800	3200	44	104	4.0	2.0	635	72	3000	4479	4480	8465
48.80	17081/350	PH941_0060K513_0081 MB43	50	99	1900	1800	3000	91	117	4.0	2.0	653	72	3000	5000	5000	10000
48.80	17081/350	PH941_0060K513_0081 MB43	72	68	1900	1800	3000	91	117	4.0	2.0	653	72	3000	5000	5000	10000
48.80	17081/350	PH941_0060K513_0081 MB43	100	29	1900	1800	3000	91	117	4.0	2.0	653	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB33	16	104	1900	1800	3200	40	104	4.0	2.0	666	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB33	24	92	1900	1800	3200	40	104	4.0	2.0	666	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB33	32	81	1900	1800	3200	40	104	4.0	2.0	666	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB33	45	63	1900	1800	3200	40	104	4.0	2.0	666	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB33	90	-	1900	1800	3200	40	104	4.0	2.0	666	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB43	50	66	1900	1800	3000	87	117	4.0	2.0	679	72	3000	5000	5000	10000
60.90	609/10	PH941_0060K513_0100 MB43	72	35	1900	1800	3000	87	117	4.0	2.0	679	72	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB33	16	85	2300	2200	3600	36	104	4.0	2.0	688	70	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB33	24	74	2300	2200	3600	36	104	4.0	2.0	688	70	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB33	32	63	2300	2200	3600	36	104	4.0	2.0	688	70	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB33	45	44	2300	2200	3600	36	104	4.0	2.0	688	70	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB43	50	37	2300	2200	3000	84	117	4.0	2.0	697	70	3000	5000	5000	10000
76.85	1537/20	PH941_0060K513_0130 MB43	72	6.7	2300	2200	3000	84	117	4.0	2.0	697	70	3000	5000	5000	10000
96.56	26071/270	PH941_0060K513_0160 MB23	8.0	31	2300	2200	3600	13	97	4.0	2.0	689	70	3000	3323	3320	5583
96.56	26071/270	PH941_0060K513_0160 MB23	12	25	2300	2200	3600	13	97	4.0	2.0	689	70	3000	3323	3320	5583
96.56	26071/270	PH941_0060K513_0160 MB23	16	20	2300	2200	3600	13	97	4.0	2.0	689	70	3000	3323	3320	5583
96.56	26071/270	PH941_0060K513_0160 MB23	24	8.4	2300	2200	3600	13	97	4.0	2.0	689	70	3000	3323	3320	5583
96.56	26071/270	PH941_0060K513_0160 MB23	30	-	2300	2200	3600	13	97	4.0	2.0	689	70	3000	3323	3320	5583
96.56	26071/270	PH941_0060K513_0160 MB33	16	63	2300	2200	3600	34	104	4.0	2.0	703	70	3000	5000	5000	10000
96.56	26071/270	PH941_0060K513_0160 MB33	24	52	2300	2200	3600	34	104	4.0	2.0	703	70	3000	5000	5000	10000
96.56	26071/270	PH941_0060K513_0160 MB33	32	41	2300	2200	3600	34	104	4.0	2.0	703	70	3000	5000	5000	10000
96.56	26071/270	PH941_0060K513_0160 MB33	45	23	2300	2200	3600	34	104	4.0	2.0	703	70	3000	5000	5000	10000
96.56	26071/270	PH941_0060K513_0160 MB43	50	16	2300	2200	3000	82	117	4.0	2.0	709	70	3000	5000	5000	10000
116.1	27869/240	PH941_0060K513_0195 MB23	8.0	31	2800	2500	4000	11	97	4.0	2.0	701	68	3000	3996	4000	6714



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH941K (M<sub>2acc,max</sub> = 5000 Nm)</b>																	
116.1	27869/240	PH941_0060K513_0195 MB23	12	25	2800	2500	4000	11	97	4.0	2.0	701	68	3000	3996	4000	6714
116.1	27869/240	PH941_0060K513_0195 MB23	16	20	2800	2500	4000	11	97	4.0	2.0	701	68	3000	3996	4000	6714
116.1	27869/240	PH941_0060K513_0195 MB23	24	8.4	2800	2500	4000	11	97	4.0	2.0	701	68	3000	3996	4000	6714
116.1	27869/240	PH941_0060K513_0195 MB23	30	–	2800	2500	4000	11	97	4.0	2.0	701	68	3000	3996	4000	6714
116.1	27869/240	PH941_0060K513_0195 MB33	16	49	2800	2500	4000	33	104	4.0	2.0	711	68	3000	5000	5000	10000
116.1	27869/240	PH941_0060K513_0195 MB33	24	38	2800	2500	4000	33	104	4.0	2.0	711	68	3000	5000	5000	10000
116.1	27869/240	PH941_0060K513_0195 MB33	32	26	2800	2500	4000	33	104	4.0	2.0	711	68	3000	5000	5000	10000
116.1	27869/240	PH941_0060K513_0195 MB33	45	8.1	2800	2500	4000	33	104	4.0	2.0	711	68	3000	5000	5000	10000
116.1	27869/240	PH941_0060K513_0195 MB43	50	1.1	2800	2500	3000	81	117	4.0	2.0	715	68	3000	5000	5000	10000
146.1	11687/80	PH941_0060K513_0240 MB23	8.0	31	2800	2500	4000	10	97	4.0	2.0	711	68	3000	5000	5000	8447
146.1	11687/80	PH941_0060K513_0240 MB23	12	25	2800	2500	4000	10	97	4.0	2.0	711	68	3000	5000	5000	8447
146.1	11687/80	PH941_0060K513_0240 MB23	16	20	2800	2500	4000	10	97	4.0	2.0	711	68	3000	5000	5000	8447
146.1	11687/80	PH941_0060K513_0240 MB23	24	8.4	2800	2500	4000	10	97	4.0	2.0	711	68	3000	5000	5000	8447
146.1	11687/80	PH941_0060K513_0240 MB23	30	–	2800	2500	4000	10	97	4.0	2.0	711	68	3000	5000	5000	8447
146.1	11687/80	PH941_0060K513_0240 MB33	16	34	2800	2500	4000	32	104	4.0	2.0	718	68	3000	5000	5000	10000
146.1	11687/80	PH941_0060K513_0240 MB33	24	23	2800	2500	4000	32	104	4.0	2.0	718	68	3000	5000	5000	10000
146.1	11687/80	PH941_0060K513_0240 MB33	32	12	2800	2500	4000	32	104	4.0	2.0	718	68	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB23	8.0	31	3400	3000	4000	9.1	97	4.0	2.0	719	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB23	12	25	3400	3000	4000	9.1	97	4.0	2.0	719	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB23	16	20	3400	3000	4000	9.1	97	4.0	2.0	719	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB23	24	8.4	3400	3000	4000	9.1	97	4.0	2.0	719	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB23	30	–	3400	3000	4000	9.1	97	4.0	2.0	719	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB33	16	20	3400	3000	4000	31	104	4.0	2.0	723	66	3000	5000	5000	10000
193.8	62031/320	PH941_0060K513_0320 MB33	24	9.0	3400	3000	4000	31	104	4.0	2.0	723	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB23	8.0	25	3400	3000	4000	8.6	97	4.0	2.0	722	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB23	12	19	3400	3000	4000	8.6	97	4.0	2.0	722	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB23	16	13	3400	3000	4000	8.6	97	4.0	2.0	722	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB23	24	2.1	3400	3000	4000	8.6	97	4.0	2.0	722	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB33	16	13	3400	3000	4000	29	104	4.0	2.0	725	66	3000	5000	5000	10000
231.2	8091/35	PH941_0060K513_0390 MB33	24	2.1	3400	3000	4000	29	104	4.0	2.0	725	66	3000	5000	5000	10000
289.0	8091/28	PH941_0060K513_0480 MB23	8.0	17	3400	3000	4000	8.2	97	4.0	2.0	725	66	3000	5000	5000	10000
289.0	8091/28	PH941_0060K513_0480 MB23	12	12	3400	3000	4000	8.2	97	4.0	2.0	725	66	3000	5000	5000	10000
289.0	8091/28	PH941_0060K513_0480 MB23	16	6.2	3400	3000	4000	8.2	97	4.0	2.0	725	66	3000	5000	5000	10000
289.0	8091/28	PH941_0060K513_0480 MB33	16	6.2	3400	3000	4000	29	104	4.0	2.0	727	66	3000	5000	5000	10000
387.3	25172/65	PH941_0060K513_0650 MB23	8.0	10	3400	3000	4000	7.8	97	4.0	2.0	727	66	3000	5000	5000	10000
387.3	25172/65	PH941_0060K513_0650 MB23	12	4.5	3400	3000	4000	7.8	97	4.0	2.0	727	66	3000	5000	5000	10000
465.6	26071/56	PH941_0060K513_0780 MB23	8.0	6.5	3400	3000	4000	7.6	97	4.0	2.0	728	66	3000	5000	5000	10000
465.6	26071/56	PH941_0060K513_0780 MB23	12	0.9	3400	3000	4000	7.6	97	4.0	2.0	728	66	3000	5000	5000	10000
<b>PH1041K (M<sub>2acc,max</sub> = 7500 Nm)</b>																	
48.64	255285/5248	PH1041_0060K613_0081 MB33	16	104	1800	1700	3000	57	148	4.0	–	967	75	4464	4464	–	8437
48.64	255285/5248	PH1041_0060K613_0081 MB33	24	92	1800	1700	3000	57	148	4.0	–	967	75	4464	4464	–	8437
48.64	255285/5248	PH1041_0060K613_0081 MB33	32	81	1800	1700	3000	57	148	4.0	–	967	75	4464	4464	–	8437
48.64	255285/5248	PH1041_0060K613_0081 MB33	45	63	1800	1700	3000	57	148	4.0	–	967	75	4464	4464	–	8437
48.64	255285/5248	PH1041_0060K613_0081 MB33	90	–	1800	1700	3000	57	148	4.0	–	967	75	4464	4464	–	8437
48.64	255285/5248	PH1041_0060K613_0081 MB43	50	154	1800	1700	3000	110	162	4.0	–	1012	75	5000	7500	–	15000
48.64	255285/5248	PH1041_0060K613_0081 MB43	72	123	1800	1700	3000	110	162	4.0	–	1012	75	5000	7500	–	15000
48.64	255285/5248	PH1041_0060K613_0081 MB43	100	84	1800	1700	3000	110	162	4.0	–	1012	75	5000	7500	–	15000
48.64	255285/5248	PH1041_0060K613_0081 MB43	160	–	1800	1700	3000	110	162	4.0	–	1012	75	5000	7500	–	15000
75.77	9699/128	PH1041_0060K613_0125 MB33	16	104	2200	2000	3500	43	148	4.0	–	1097	73	5000	6954	–	13144
75.77	9699/128	PH1041_0060K613_0125 MB33	24	92	2200	2000	3500	43	148	4.0	–	1097	73	5000	6954	–	13144
75.77	9699/128	PH1041_0060K613_0125 MB33	32	81	2200	2000	3500	43	148	4.0	–	1097	73	5000	6954	–	13144
75.77	9699/128	PH1041_0060K613_0125 MB33	45	63	2200	2000	3500	43	148	4.0	–	1097	73	5000	6954	–	13144
75.77	9699/128	PH1041_0060K613_0125 MB33	90	–	2200	2000	3500	43	148	4.0	–	1097	73	5000	6954	–	13144
75.77	9699/128	PH1041_0060K613_0125 MB43	50	94	2200	2000	3000	91	162	4.0	–	1120	73	5000	7500	–	15000
75.77	9699/128	PH1041_0060K613_0125 MB43	72	63	2200	2000	3000	91	162	4.0	–	1120	73	5000	7500	–	15000
75.77	9699/128	PH1041_0060K613_0125 MB43	100	24	2200	2000	3000	91	162	4.0	–	1120	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB33	16	104	2200	2000	3500	39	148	4.0	–	1136	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB33	24	92	2200	2000	3500	39	148	4.0	–	1136	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB33	32	81	2200	2000	3500	39	148	4.0	–	1136	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB33	45	63	2200	2000	3500	39	148	4.0	–	1136	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB33	90	–	2200	2000	3500	39	148	4.0	–	1136	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB43	50	60	2200	2000	3000	87	162	4.0	–	1151	73	5000	7500	–	15000
95.21	54839/576	PH1041_0060K613_0160 MB43	72	29	2200	2000	3000	87	162	4.0	–	1151	73	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB23	8.0	31	2600	2300	4000	15	141	4.0	–	1129	71	3922	3922	–	6589

8.2 Selection tables 8 PHK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1.2 [rpm]	EL3.4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PH1041K (M<sub>2acc,max</sub> = 7500 Nm)</b>																	
114.0	51057/448	PH1041_0060K613_0190 MB23	12	25	2600	2300	4000	15	141	4.0	–	1129	71	3922	3922	–	6589
114.0	51057/448	PH1041_0060K613_0190 MB23	16	20	2600	2300	4000	15	141	4.0	–	1129	71	3922	3922	–	6589
114.0	51057/448	PH1041_0060K613_0190 MB23	24	8.4	2600	2300	4000	15	141	4.0	–	1129	71	3922	3922	–	6589
114.0	51057/448	PH1041_0060K613_0190 MB23	30	–	2600	2300	4000	15	141	4.0	–	1129	71	3922	3922	–	6589
114.0	51057/448	PH1041_0060K613_0190 MB33	16	86	2600	2300	4000	37	148	4.0	–	1157	71	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB33	24	75	2600	2300	4000	37	148	4.0	–	1157	71	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB33	32	64	2600	2300	4000	37	148	4.0	–	1157	71	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB33	45	46	2600	2300	4000	37	148	4.0	–	1157	71	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB43	50	39	2600	2300	3000	84	162	4.0	–	1168	71	5000	7500	–	15000
114.0	51057/448	PH1041_0060K613_0190 MB43	72	7.9	2600	2300	3000	84	162	4.0	–	1168	71	5000	7500	–	15000
144.0	73749/512	PH1041_0060K613_0240 MB33	16	64	2600	2300	4000	35	148	4.0	–	1176	71	5000	7500	–	15000
144.0	73749/512	PH1041_0060K613_0240 MB33	24	52	2600	2300	4000	35	148	4.0	–	1176	71	5000	7500	–	15000
144.0	73749/512	PH1041_0060K613_0240 MB33	32	41	2600	2300	4000	35	148	4.0	–	1176	71	5000	7500	–	15000
144.0	73749/512	PH1041_0060K613_0240 MB33	45	23	2600	2300	4000	35	148	4.0	–	1176	71	5000	7500	–	15000
144.0	73749/512	PH1041_0060K613_0240 MB43	50	16	2600	2300	3000	82	162	4.0	–	1183	71	5000	7500	–	15000
191.1	391437/2048	PH1041_0060K613_0320 MB23	8.0	31	3100	2800	4000	11	141	4.0	–	1180	69	5000	6578	–	11051
191.1	391437/2048	PH1041_0060K613_0320 MB23	12	25	3100	2800	4000	11	141	4.0	–	1180	69	5000	6578	–	11051
191.1	391437/2048	PH1041_0060K613_0320 MB23	16	20	3100	2800	4000	11	141	4.0	–	1180	69	5000	6578	–	11051
191.1	391437/2048	PH1041_0060K613_0320 MB23	24	8.4	3100	2800	4000	11	141	4.0	–	1180	69	5000	6578	–	11051
191.1	391437/2048	PH1041_0060K613_0320 MB23	30	–	3100	2800	4000	11	141	4.0	–	1180	69	5000	6578	–	11051
191.1	391437/2048	PH1041_0060K613_0320 MB33	16	42	3100	2800	4000	33	148	4.0	–	1190	69	5000	7500	–	15000
191.1	391437/2048	PH1041_0060K613_0320 MB33	24	31	3100	2800	4000	33	148	4.0	–	1190	69	5000	7500	–	15000
191.1	391437/2048	PH1041_0060K613_0320 MB33	32	20	3100	2800	4000	33	148	4.0	–	1190	69	5000	7500	–	15000
191.1	391437/2048	PH1041_0060K613_0320 MB33	45	1.8	3100	2800	4000	33	148	4.0	–	1190	69	5000	7500	–	15000
229.9	470859/2048	PH1041_0060K613_0380 MB23	8.0	31	3100	2800	4000	9.9	141	4.0	–	1189	69	5000	7500	–	13293
229.9	470859/2048	PH1041_0060K613_0380 MB23	12	25	3100	2800	4000	9.9	141	4.0	–	1189	69	5000	7500	–	13293
229.9	470859/2048	PH1041_0060K613_0380 MB23	16	20	3100	2800	4000	9.9	141	4.0	–	1189	69	5000	7500	–	13293
229.9	470859/2048	PH1041_0060K613_0380 MB23	24	8.4	3100	2800	4000	9.9	141	4.0	–	1189	69	5000	7500	–	13293
229.9	470859/2048	PH1041_0060K613_0380 MB23	30	–	3100	2800	4000	9.9	141	4.0	–	1189	69	5000	7500	–	13293
229.9	470859/2048	PH1041_0060K613_0380 MB33	16	31	3100	2800	4000	32	148	4.0	–	1196	69	5000	7500	–	15000
229.9	470859/2048	PH1041_0060K613_0380 MB33	24	20	3100	2800	4000	32	148	4.0	–	1196	69	5000	7500	–	15000
229.9	470859/2048	PH1041_0060K613_0380 MB33	32	9.1	3100	2800	4000	32	148	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB23	8.0	31	3100	2800	4000	9.1	141	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB23	12	25	3100	2800	4000	9.1	141	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB23	16	20	3100	2800	4000	9.1	141	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB23	24	8.4	3100	2800	4000	9.1	141	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB23	30	–	3100	2800	4000	9.1	141	4.0	–	1196	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB33	16	21	3100	2800	4000	30	148	4.0	–	1201	69	5000	7500	–	15000
286.4	119133/416	PH1041_0060K613_0480 MB33	24	9.7	3100	2800	4000	30	148	4.0	–	1201	69	5000	7500	–	15000
382.3	391437/1024	PH1041_0060K613_0640 MB23	8.0	21	3100	2800	4000	8.3	141	4.0	–	1202	69	5000	7500	–	15000
382.3	391437/1024	PH1041_0060K613_0640 MB23	12	16	3100	2800	4000	8.3	141	4.0	–	1202	69	5000	7500	–	15000
382.3	391437/1024	PH1041_0060K613_0640 MB23	16	10	3100	2800	4000	8.3	141	4.0	–	1202	69	5000	7500	–	15000
382.3	391437/1024	PH1041_0060K613_0640 MB33	16	10	3100	2800	4000	29	148	4.0	–	1205	69	5000	7500	–	15000
456.8	380091/832	PH1041_0060K613_0760 MB23	8.0	16	3100	2800	4000	8.0	141	4.0	–	1204	69	5000	7500	–	15000
456.8	380091/832	PH1041_0060K613_0760 MB23	12	10	3100	2800	4000	8.0	141	4.0	–	1204	69	5000	7500	–	15000
456.8	380091/832	PH1041_0060K613_0760 MB23	16	4.7	3100	2800	4000	8.0	141	4.0	–	1204	69	5000	7500	–	15000
456.8	380091/832	PH1041_0060K613_0760 MB33	16	4.7	3100	2800	4000	29	148	4.0	–	1206	69	5000	7500	–	15000



### 8.3 Dimensional drawings

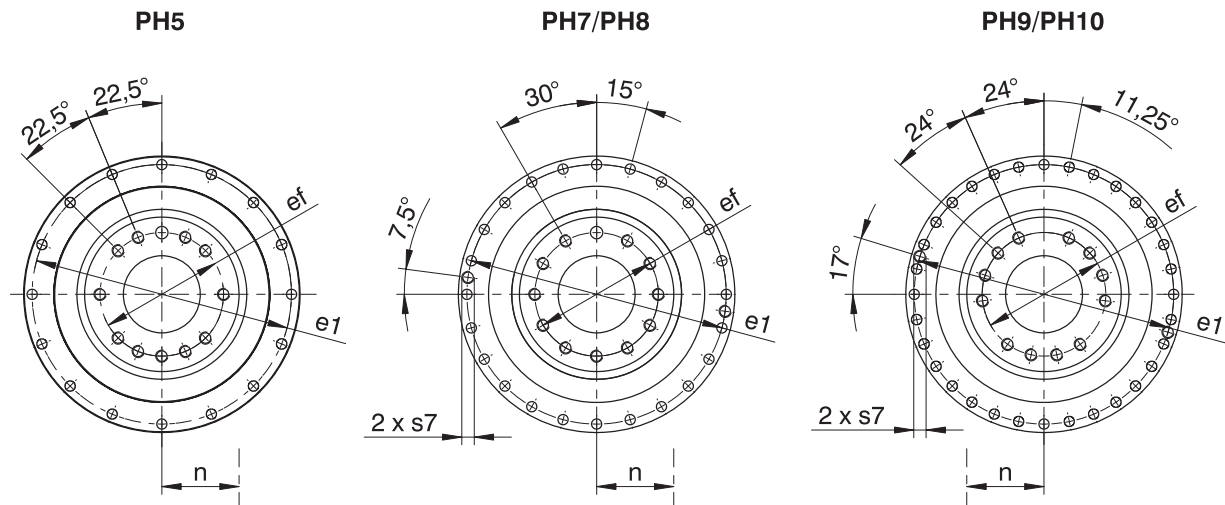
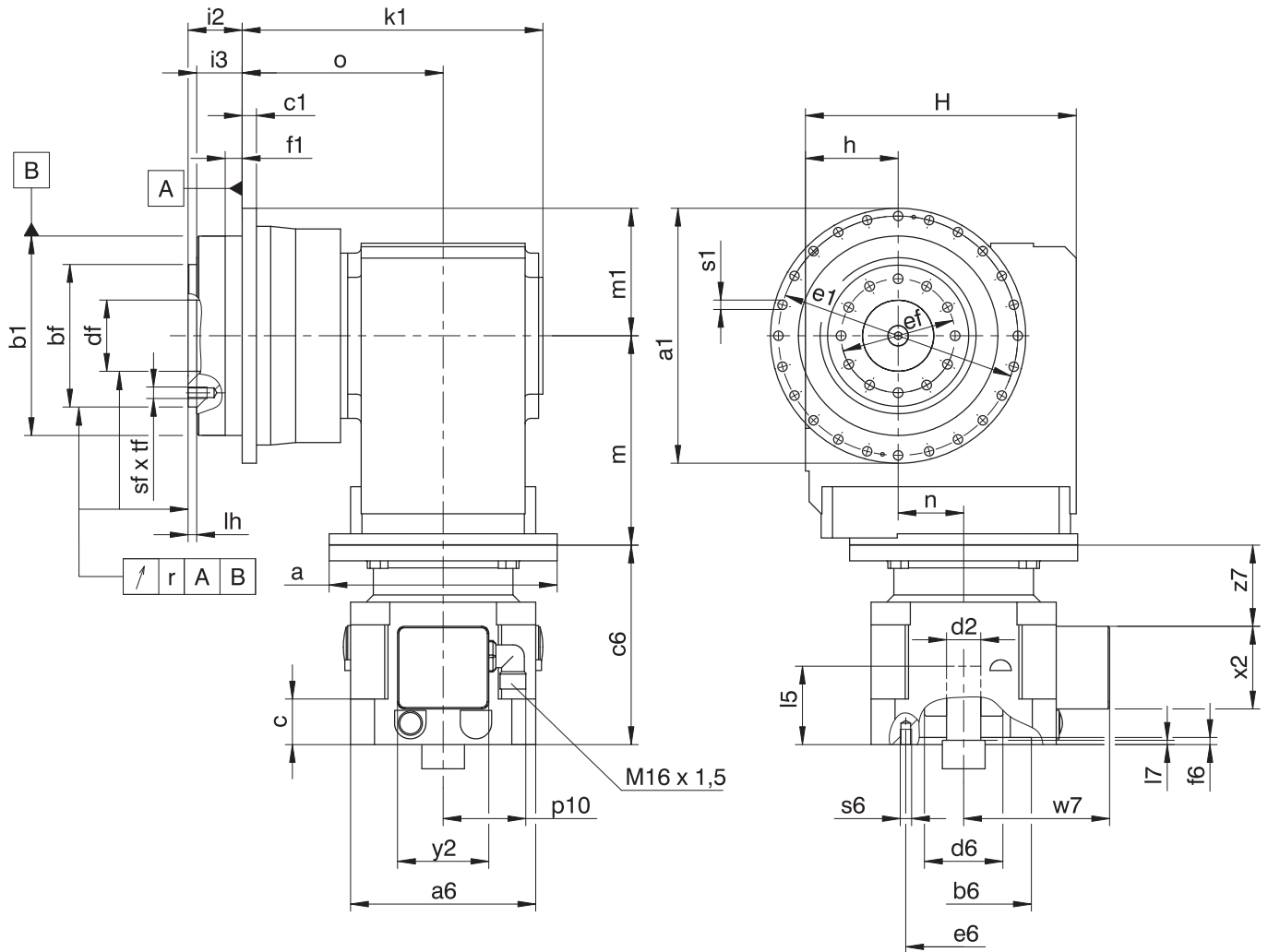
In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

#### 8.3.1 F shaft design (flange shaft)





## Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	h	H	i2	i3	k1	lh	m1	o	r	Øs1	s7	sf	tf
PH531_K102_	145 <sub>h7</sub>	110 <sub>h7</sub>	80 <sub>h7</sub>	8	40 <sup>H6</sup>	135	63	12	60	160	29	23	180.0	6	72.5	124.0	0.020	5.5	–	M6	11
PH731_K102_	179 <sub>h7</sub>	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50 <sup>H6</sup>	168	80	12	60	160	38	32	183.0	6	89.5	127.0	0.025	6.6	–	M8	14
PH731_K202_	179 <sub>h7</sub>	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50 <sup>H6</sup>	168	80	12	65	190	38	32	211.0	6	89.5	141.0	0.025	6.6	–	M8	14
PH831_K202_	247 <sub>h7</sub>	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80 <sup>H6</sup>	233	125	15	65	190	50	42	246.0	8	123.5	176.0	0.030	9.0	M10	M10	18
PH831_K302_	247 <sub>h7</sub>	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80 <sup>H6</sup>	233	125	15	75	213	50	42	259.5	8	123.5	183.5	0.030	9.0	M10	M10	18
PH941_K513_	300	255 <sub>h7</sub>	180 <sub>h7</sub>	18	90 <sup>H6</sup>	280	140	20	160	260	66	55	292.5	12	150.0	196.5	0.030	13.5	M8	M16	24
PH1041_K613_	330	285 <sub>h7</sub>	200 <sub>h7</sub>	20	95 <sup>H6</sup>	310	160	20	190	310	75	60	318.5	10	165.0	215.0	0.040	13.5	M10	M20	28

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
PH531_K102_	Ø160	128	36	–	–	–	–	–	–
PH731_K102_	Ø160	128	36	–	–	–	–	–	–
PH731_K202_	Ø160	147	46	Ø200	149	46	–	–	–
PH831_K202_	Ø160	147	46	Ø200	149	46	–	–	–
PH831_K302_	Ø160	167	53	Ø200	169	53	–	–	–
PH941_K513_	Ø160	172	15	Ø200	174	15	Ø250	177	15
PH1041_K613_	Ø160	191	18	Ø200	193	18	Ø250	196	18

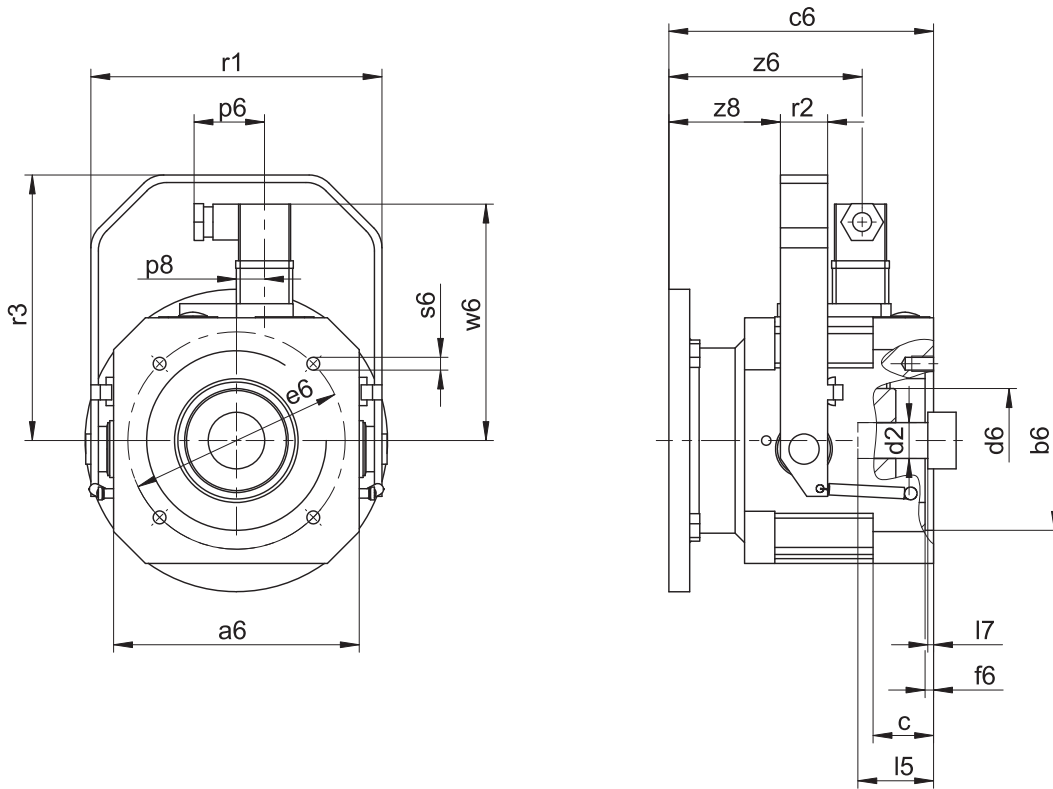
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
PHK_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHK_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHK_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHK_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHK_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHK_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
PHK_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 8.3.2 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5

## 8.4 Type designation

This chapter shows you 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.

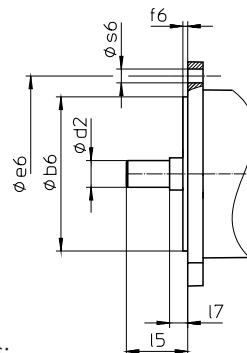
### Example code

PH	7	3	1	S	F	S	S	0100	K102VF	0040	MB	2	3
----	---	---	---	---	---	---	---	------	--------	------	----	---	---

### Explanation

Code	Designation	Design
PH	Type	Planetary gear unit
7	Size	7 (example)
3	Generation	Generation 3
4		Generation 4
1	Stages	Single-stage
S	Housing	Standard
F	Shaft	Flange shaft
S	Bearing	Standard bearing
V		Reinforced bearing (PH3 – PH5)
S	Backlash	Standard
R		Reduced (PH3 – PH9)
0100	Transmission ratio of output ( $i \times 10$ )	$i = 10$ (example)
K102VF	Input	K1 right-angle geared motor (example)
0040	Transmission ratio of input ( $i \times 10$ )	$i = 4$ (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

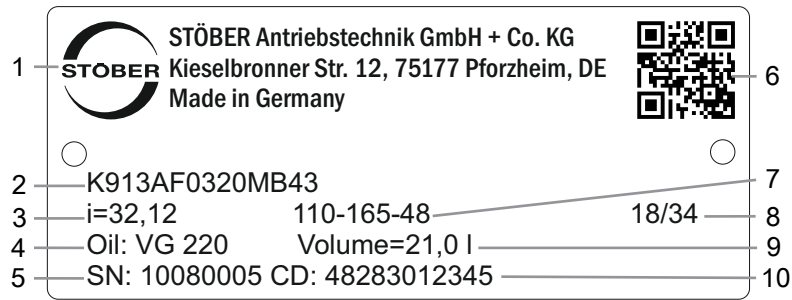
To choose a suitable motor connection, use the STOBBER Configurator at

<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Mounting position, see the chapter [▶ 8.5.4]
- Output gear unit side 3 or 4, see the chapter [▶ 8.5.4]
- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 8.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, see the chapter [▶ 8.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 8.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 8.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 8.5.6]
- Manual release (optional), see the chapter [▶ 8.3.2]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 8.5.2.6]

## 8.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 8.5 Product description

### 8.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 8.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 8.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

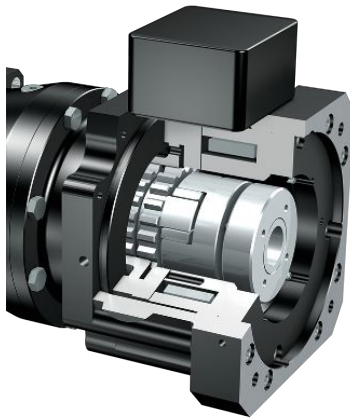


Fig. 1: Motor adapter with ServoStop brake

### 8.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 8.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 8.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 8.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

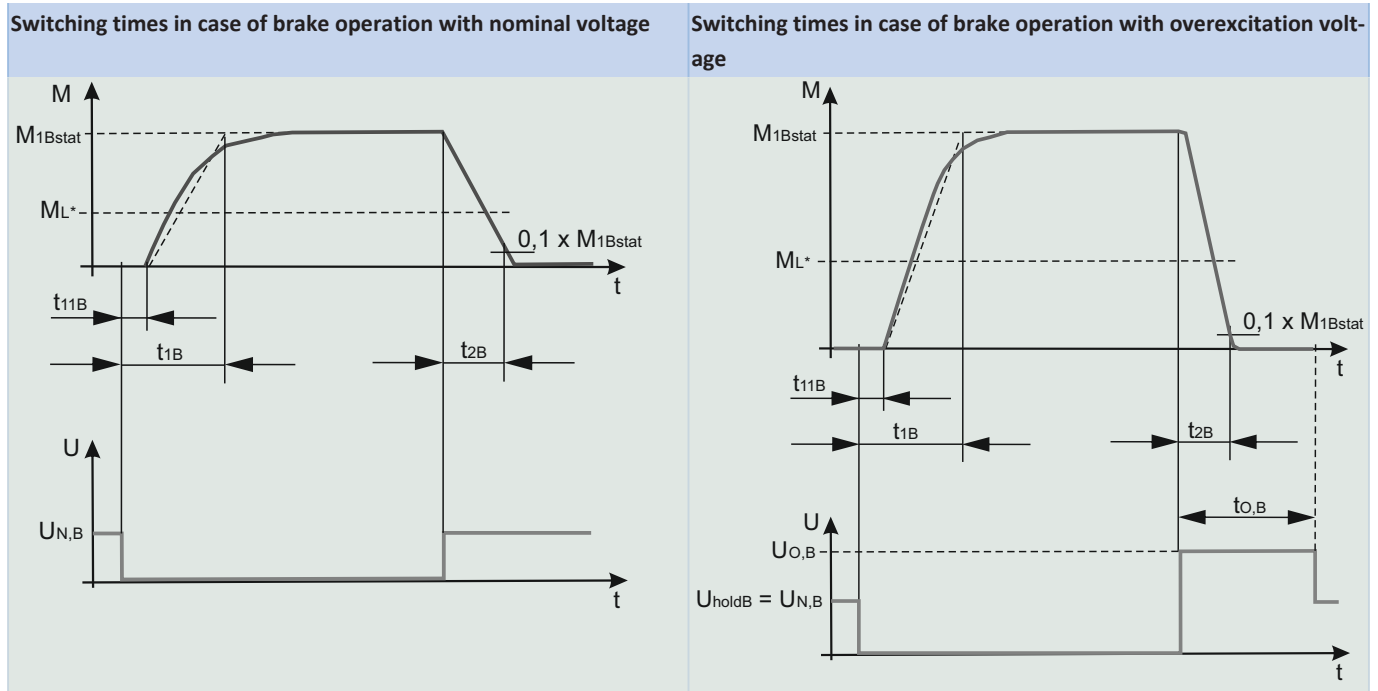
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 8.5.2.6 Brake switching times



### 8.5.3 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

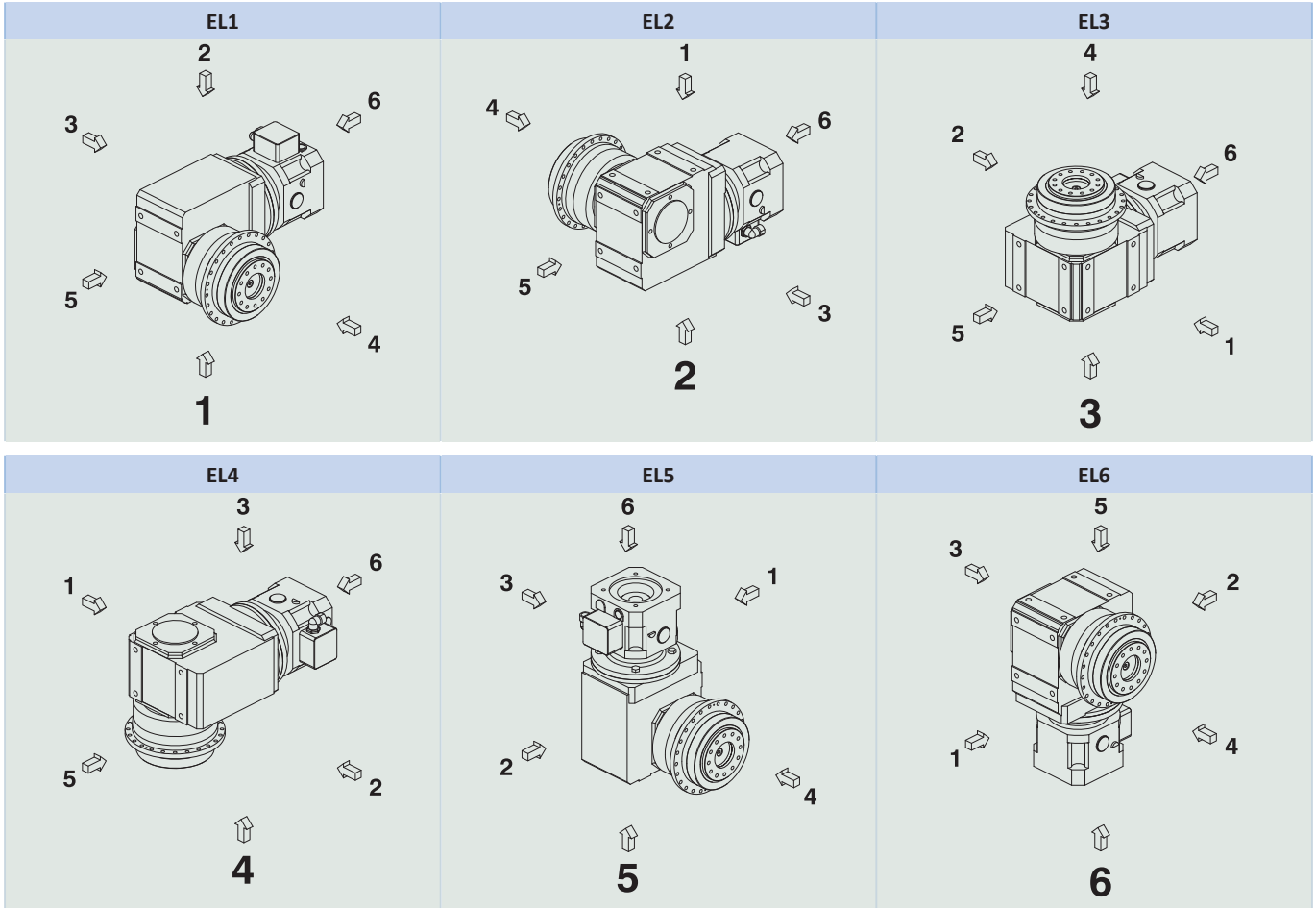
- When the flange shaft and gear housing are fastened on the machine side using screws of strength class 12.9
- When the gear housings are adjusted at pilot  $\varnothing b1$ . The machine-side fit must be H7.
- When the flange shaft is adjusted using the connecting element at pilot  $\varnothing bf$  or  $\varnothing df$

### 8.5.4 Mounting positions

The following table shows the standard mounting positions.

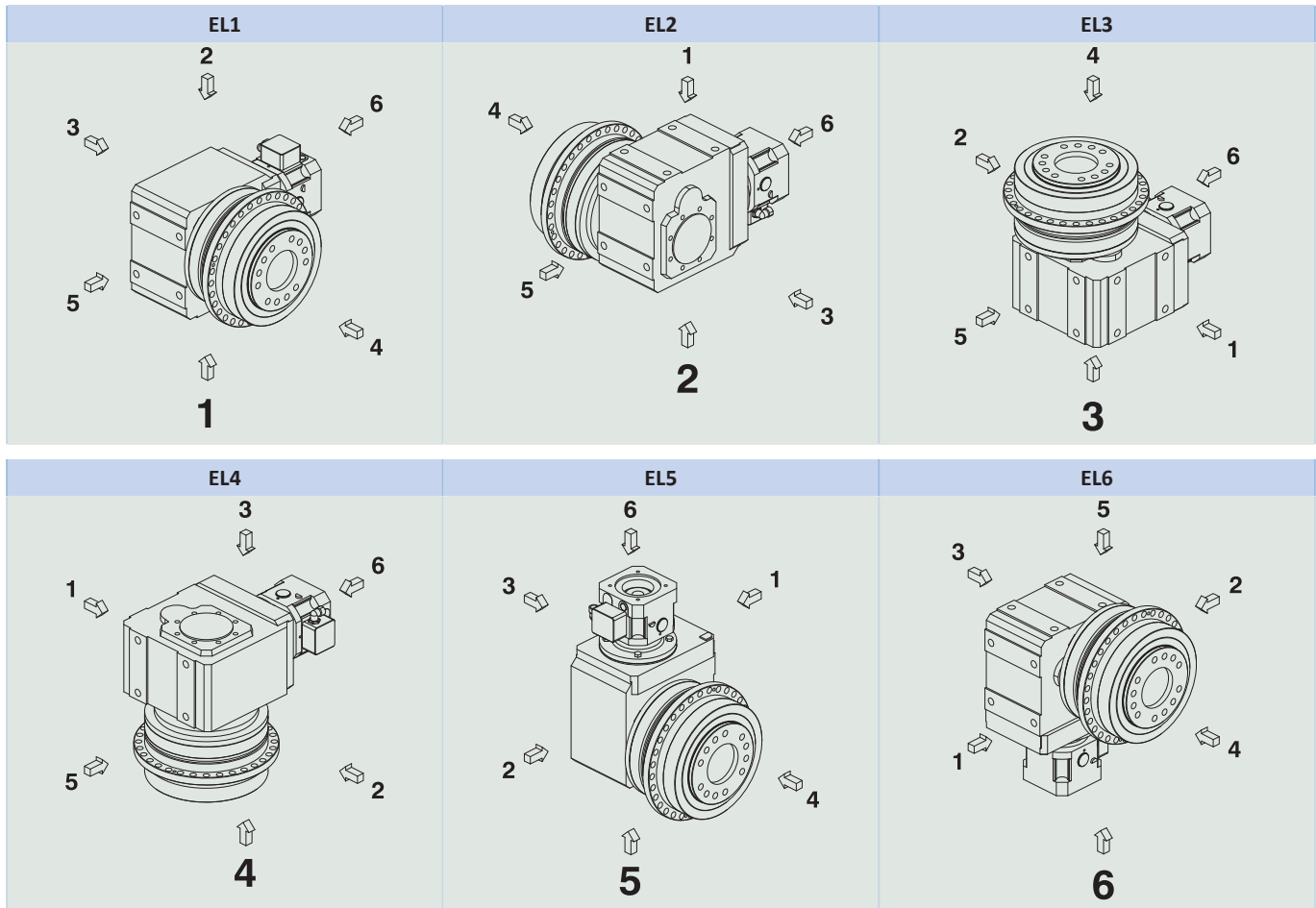
The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

PH5K1 – PH8K3





PH9K5 – PH10K6



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

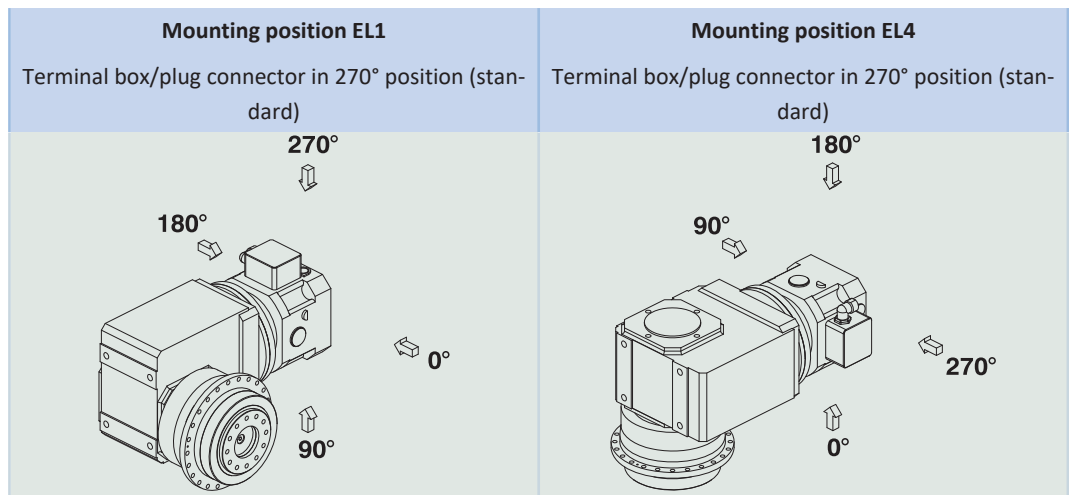
### 8.5.5 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

### 8.5.6 Position of the terminal box/plug connector



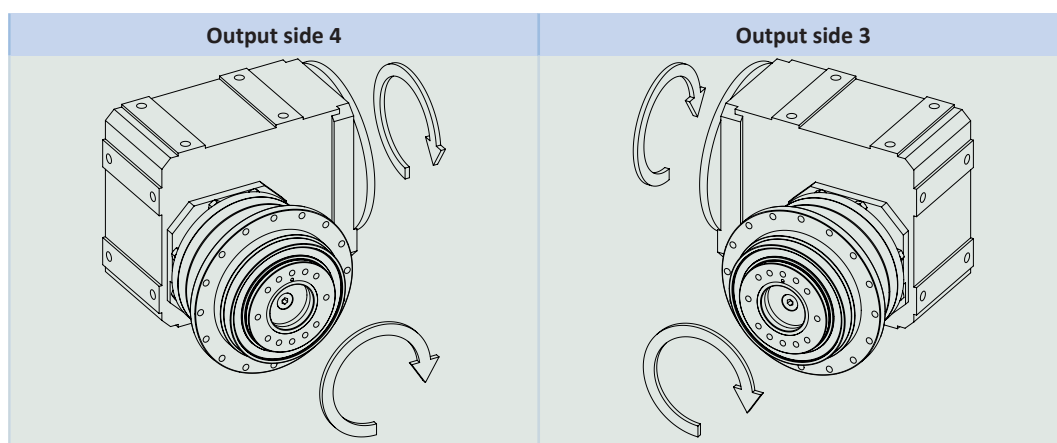
Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

## 8.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ three-stage	93%
$\eta_{\text{get}}$ four-stage	92%
Protection class: <sup>1</sup>	IP65

## 8.5.8 Direction of rotation



The pictures show mounting position EL1.

## 8.6 Project configuration

Project your drives using our SERVOSOFT designing software. Download SERVOSOFT for free at <https://www.stoeber.de/en/ServoSoft>.

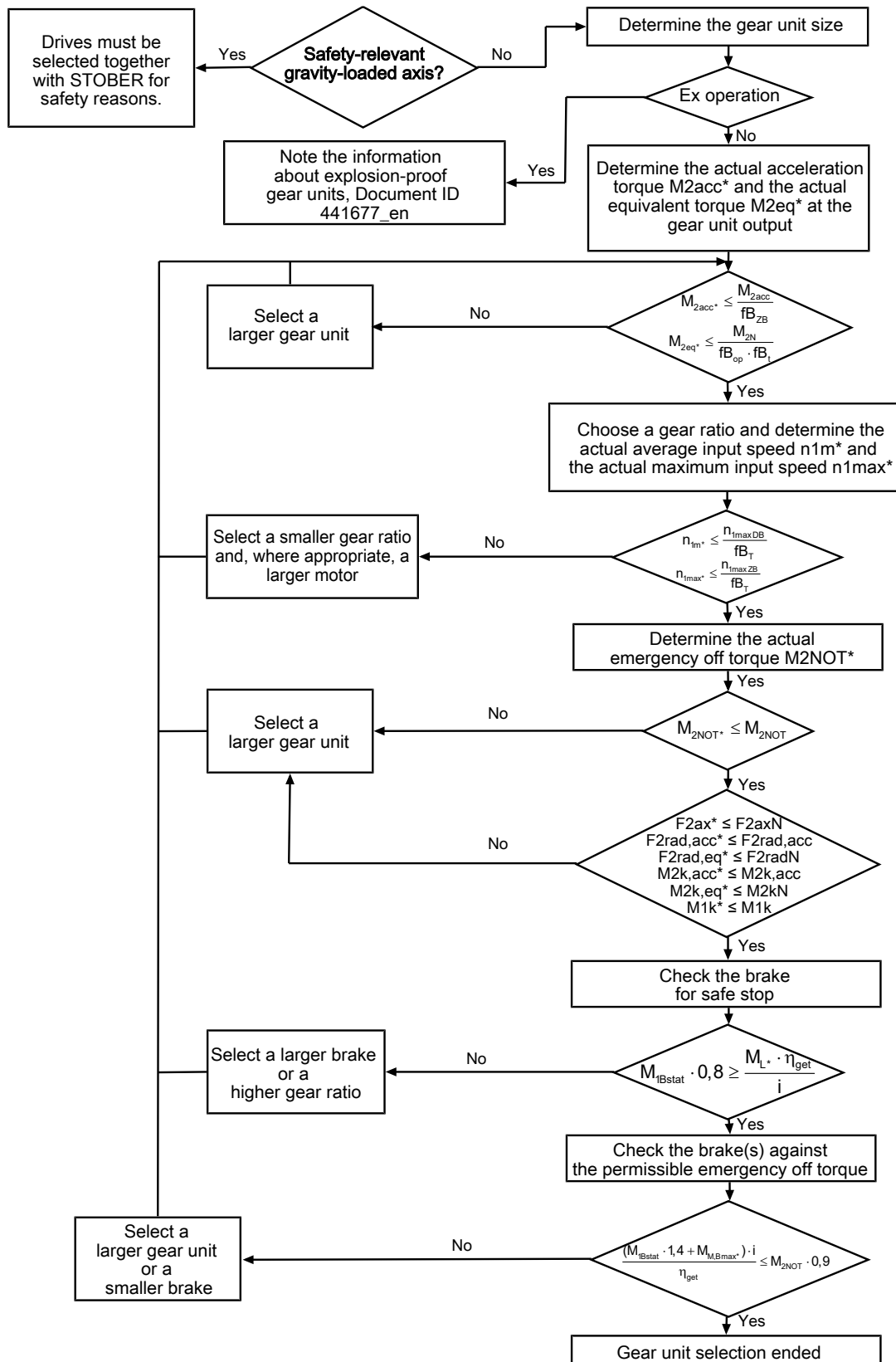
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

### 8.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

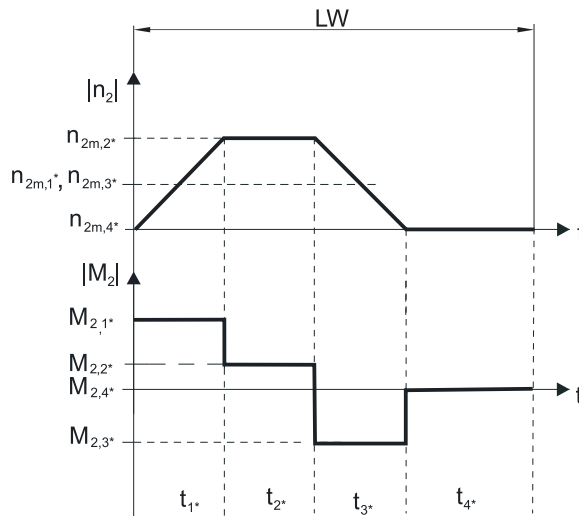
Refer to the selection tables for the values for  $n_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

The values for  $f_{BT}$ ,  $f_{Bop}$ ,  $f_{Bt}$  and  $f_{BzB}$  can be found in the corresponding tables in this chapter.

**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 maximum acceleration torque**

$$M_{2acc} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L}$$

**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  $t_1 + \dots + t_3 \geq 6$  min, calculate  $n_{2m}$  without the rest phase  $t_4$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L}$$

**Calculation of the actual equivalent torque**

$$M_{2eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |M_{2,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |M_{2,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

**Operating factors**

<b>Operating mode</b>	<b>fB<sub>op</sub></b>
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40
<b>Run time</b>	<b>fB<sub>t</sub></b>
Daily runtime ≤ 8 h	1.00
Daily runtime ≤ 16 h	1.15
Daily runtime ≤ 24 h	1.20
<b>Cyclic operation</b>	<b>fB<sub>ZB</sub></b>
≤ 1000 load changes/hour (LW/h)	1.00
> 1000 load changes/hour (LW/h)	1.15

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ }^\circ\text{C}$	0.9
	$\leq 30\text{ }^\circ\text{C}$	1.0
	$\leq 40\text{ }^\circ\text{C}$	1.15
Motor with convection cooling	$\leq 20\text{ }^\circ\text{C}$	1.0
	$\leq 30\text{ }^\circ\text{C}$	1.1
	$\leq 40\text{ }^\circ\text{C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 90\text{ }^\circ\text{C}$  must not be exceeded. Doing so may result in damage to the gear unit.

### 8.6.2 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  $n_{2m^*} \leq 100\text{ rpm}$  ( $F_{2axN} = F_{2ax100}$ ;  $F_{2radN} = F_{2rad100}$ ;  $M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PH3	62.5	1650	1613	1613	101	101	75
PH4	83.0	2150	3095	3571	257	296	192
PH5	97.0	4150	4536	4897	440	475	429
PH7	86.0	6150	17045	17045	1466	1466	500
PH8	125.5	10050	27778	27778	3486	3486	1550
PH9	155.0	33000	48387	70968	7500	11000	7500
PH10	171.0	50000	51462	73099	8800	12500	9500

**Permitted shaft loads for reinforced bearing V**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PH3	66.5	2200	2250	2250	150	150	80
PH4	88.5	2900	4000	4000	354	354	217
PH5	104.0	5000	5500	5500	572	572	478

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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

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

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

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

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

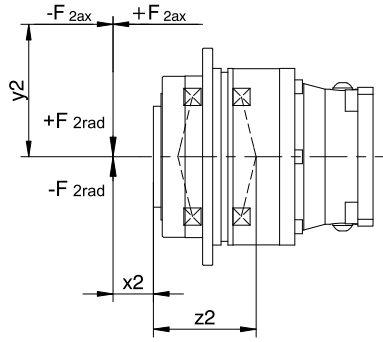


Fig. 2: Force application points

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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:**

$$M_{2k,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |M_{2k,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |M_{2k,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |F_{2rad,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |F_{2rad,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

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

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

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

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

**For different duty cycles:**

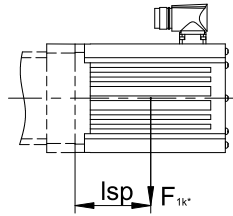
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 8.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOBBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 8.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

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

#### Leak-proofness

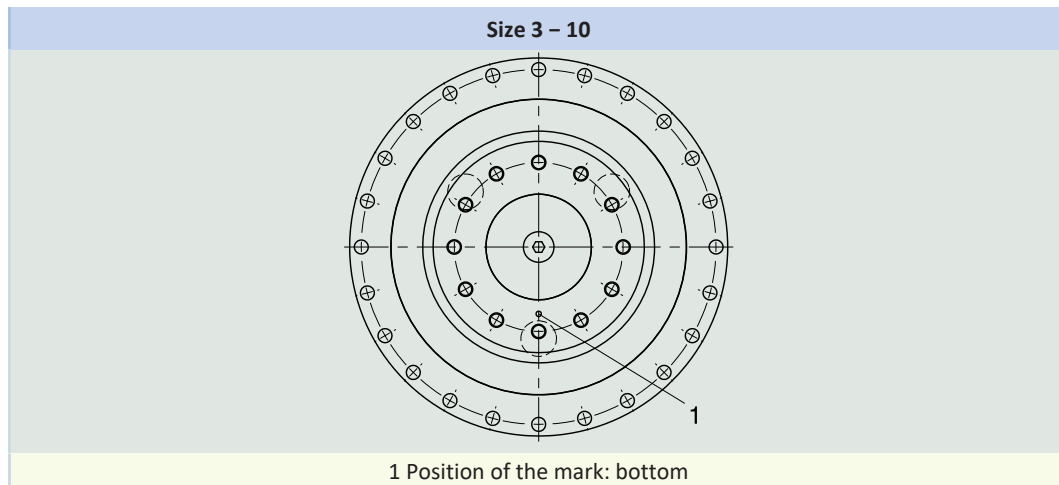
Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear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

### 8.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams below.

The images show the center position of reverse operation.

Cyclic reverse operation  $\leq \pm 20^\circ$  on request.



Please note that the hole pattern may be different, depending on the size of the planetary gear unit.

## 8.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

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

Documentation	ID
Operating manual gear units, geared motors PH53K – PH83K, PH94K – PH104K	443358_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en



# 9 PHQK right-angle planetary gear units

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9

## Right-angle planetary gear units

# PHQK

### 9.1 Overview

Quattro-Power precision right-angle planetary gear units with integrated brake

#### Features

Power density	★★★★★
Backlash	★★★★★
Price category	€€€€€
Shaft load	★★★★★
Smooth operation	★★★★☆
Torsional stiffness	★★★★★
Mass moment of inertia	★★★★☆
Helical gearing	✓
High power density	✓
Continuous operation without cooling	✓
Stiff output bearings due to pretension	✓
Reinforced output bearing (PHQ4 – PHQ5)	✓ (optional)
Safe braking in case of power outage	✓
Safe support of the load with gravity-loaded axes	✓
Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling	✓

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

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	22 – 591
$M_{2acc}$	492 – 43000 Nm
$\Delta\phi_2$	1.5 – 4 arcmin
$\eta_{get}$	92 – 93 %

## 9.2 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#)].

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>	n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>Zred</sub>	C <sub>2</sub>	L <sub>PA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>	
			[Nm]	[Nm]	<sup>EL1,2</sup> [rpm]	<sup>EL3,4,5,6</sup> [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ531K (M<sub>2acc,max</sub> = 550 Nm)</b>																	
22.00	22/1	PHQ531_0055K102_0040 MB23	8.0	25	3300	2800	4000	8.1	26	4.0	2.0	63	60	280	516	520	948
22.00	22/1	PHQ531_0055K102_0040 MB23	12	19	3300	2800	4000	8.1	26	4.0	2.0	63	60	280	516	520	948
22.00	22/1	PHQ531_0055K102_0040 MB23	16	14	3300	2800	4000	8.1	26	4.0	2.0	63	60	280	516	520	948
22.00	22/1	PHQ531_0055K102_0040 MB23	24	2.5	3300	2800	4000	8.1	26	4.0	2.0	63	60	280	516	520	948
30.62	8360/273	PHQ531_0055K102_0056 MB23	8.0	15	3300	2800	4000	7.9	26	4.0	2.0	67	60	280	550	550	948
30.62	8360/273	PHQ531_0055K102_0056 MB23	12	9.1	3300	2800	4000	7.9	26	4.0	2.0	67	60	280	550	550	948
30.62	8360/273	PHQ531_0055K102_0056 MB23	16	3.5	3300	2800	4000	7.9	26	4.0	2.0	67	60	280	550	550	948
33.00	33/1	PHQ531_0055K102_0060 MB23	8.0	13	3300	2800	4000	7.7	26	4.0	2.0	67	60	280	550	550	948
33.00	33/1	PHQ531_0055K102_0060 MB23	12	7.3	3300	2800	4000	7.7	26	4.0	2.0	67	60	280	550	550	948
33.00	33/1	PHQ531_0055K102_0060 MB23	16	1.7	3300	2800	4000	7.7	26	4.0	2.0	67	60	280	550	550	948
36.54	3289/90	PHQ531_0055K102_0066 MB23	8.0	11	3600	3300	4000	7.6	26	4.0	2.0	68	58	280	550	550	948
36.54	3289/90	PHQ531_0055K102_0066 MB23	12	4.9	3600	3300	4000	7.6	26	4.0	2.0	68	58	280	550	550	948
45.70	21021/460	PHQ531_0055K102_0083 MB23	8.0	6.2	3600	3300	4000	7.5	26	4.0	2.0	69	58	280	550	550	948
45.70	21021/460	PHQ531_0055K102_0083 MB23	12	0.6	3600	3300	4000	7.5	26	4.0	2.0	69	58	280	550	550	948
50.87	9614/189	PHQ531_0055K102_0092 MB23	8.0	4.4	3600	3300	4000	7.5	26	4.0	2.0	69	58	280	550	550	948
55.77	5577/100	PHQ531_0055K102_0100 MB23	8.0	3.0	4000	3800	4000	7.4	26	4.0	2.0	69	56	280	550	550	948
63.61	1463/23	PHQ531_0055K102_0115 MB23	8.0	1.3	3600	3300	4000	7.4	26	4.0	2.0	70	58	280	550	550	948
69.40	4719/68	PHQ531_0055K102_0125 MB23	8.0	0.2	4000	3800	4000	7.3	26	4.0	2.0	70	56	280	550	550	948
<b>PHQ731K (M<sub>2acc,max</sub> = 1050 Nm)</b>																	
22.00	22/1	PHQ731_0055K202_0040 MB23	8.0	31	3000	2600	4000	9.7	38	4.0	2.0	112	63	500	768	770	1291
22.00	22/1	PHQ731_0055K202_0040 MB23	12	25	3000	2600	4000	9.7	38	4.0	2.0	112	63	500	768	770	1291
22.00	22/1	PHQ731_0055K202_0040 MB23	16	20	3000	2600	4000	9.7	38	4.0	2.0	112	63	500	768	770	1291
22.00	22/1	PHQ731_0055K202_0040 MB23	24	8.4	3000	2600	4000	9.7	38	4.0	2.0	112	63	500	768	770	1291
22.00	22/1	PHQ731_0055K202_0040 MB23	30	–	3000	2600	4000	9.7	38	4.0	2.0	112	63	500	768	770	1291
22.00	22/1	PHQ731_0055K202_0040 MB33	16	58	3000	2600	4000	30	45	4.0	2.0	119	63	500	921	920	2100
22.00	22/1	PHQ731_0055K202_0040 MB33	24	46	3000	2600	4000	30	45	4.0	2.0	119	63	500	921	920	2100
22.00	22/1	PHQ731_0055K202_0040 MB33	32	35	3000	2600	4000	30	45	4.0	2.0	119	63	500	921	920	2100
22.00	22/1	PHQ731_0055K202_0040 MB33	45	17	3000	2600	4000	30	45	4.0	2.0	119	63	500	921	920	2100
24.00	24/1	PHQ731_0055K202_0044 MB23	8.0	31	3000	2600	4000	9.4	38	4.0	2.0	115	63	500	838	840	1408
24.00	24/1	PHQ731_0055K202_0044 MB23	12	25	3000	2600	4000	9.4	38	4.0	2.0	115	63	500	838	840	1408
24.00	24/1	PHQ731_0055K202_0044 MB23	16	20	3000	2600	4000	9.4	38	4.0	2.0	115	63	500	838	840	1408
24.00	24/1	PHQ731_0055K202_0044 MB23	24	8.4	3000	2600	4000	9.4	38	4.0	2.0	115	63	500	838	840	1408
24.00	24/1	PHQ731_0055K202_0044 MB23	30	–	3000	2600	4000	9.4	38	4.0	2.0	115	63	500	838	840	1408
24.00	24/1	PHQ731_0055K202_0044 MB33	16	51	3000	2600	4000	30	45	4.0	2.0	122	63	500	948	950	2100
24.00	24/1	PHQ731_0055K202_0044 MB33	24	40	3000	2600	4000	30	45	4.0	2.0	122	63	500	948	950	2100
24.00	24/1	PHQ731_0055K202_0044 MB33	32	29	3000	2600	4000	30	45	4.0	2.0	122	63	500	948	950	2100
24.00	24/1	PHQ731_0055K202_0044 MB33	45	10	3000	2600	4000	30	45	4.0	2.0	122	63	500	948	950	2100
28.47	2107/74	PHQ731_0055K202_0052 MB23	8.0	31	3000	2600	4000	8.9	38	4.0	2.0	120	63	500	994	990	1670
28.47	2107/74	PHQ731_0055K202_0052 MB23	12	25	3000	2600	4000	8.9	38	4.0	2.0	120	63	500	994	990	1670
28.47	2107/74	PHQ731_0055K202_0052 MB23	16	20	3000	2600	4000	8.9	38	4.0	2.0	120	63	500	994	990	1670
28.47	2107/74	PHQ731_0055K202_0052 MB23	24	8.4	3000	2600	4000	8.9	38	4.0	2.0	120	63	500	994	990	1670
28.47	2107/74	PHQ731_0055K202_0052 MB23	30	–	3000	2600	4000	8.9	38	4.0	2.0	120	63	500	994	990	1670
28.47	2107/74	PHQ731_0055K202_0052 MB33	16	39	3000	2600	4000	29	45	4.0	2.0	126	63	500	1004	1000	2100
28.47	2107/74	PHQ731_0055K202_0052 MB33	24	28	3000	2600	4000	29	45	4.0	2.0	126	63	500	1004	1000	2100
28.47	2107/74	PHQ731_0055K202_0052 MB33	32	17	3000	2600	4000	29	45	4.0	2.0	126	63	500	1004	1000	2100
33.00	33/1	PHQ731_0055K202_0060 MB23	8.0	31	3000	2600	4000	8.9	38	4.0	2.0	124	63	500	1050	1050	1936
33.00	33/1	PHQ731_0055K202_0060 MB23	12	25	3000	2600	4000	8.9	38	4.0	2.0	124	63	500	1050	1050	1936
33.00	33/1	PHQ731_0055K202_0060 MB23	16	20	3000	2600	4000	8.9	38	4.0	2.0	124	63	500	1050	1050	1936
33.00	33/1	PHQ731_0055K202_0060 MB23	24	8.4	3000	2600	4000	8.9	38	4.0	2.0	124	63	500	1050	1050	1936
33.00	33/1	PHQ731_0055K202_0060 MB23	30	–	3000	2600	4000	8.9	38	4.0	2.0	124	63	500	1050	1050	1936
33.00	33/1	PHQ731_0055K202_0060 MB33	16	31	3000	2600	4000	29	45	4.0	2.0	128	63	500	1050	1050	2100
33.00	33/1	PHQ731_0055K202_0060 MB33	24	20	3000	2600	4000	29	45	4.0	2.0	128	63	500	1050	1050	2100
33.00	33/1	PHQ731_0055K202_0060 MB33	32	8.5	3000	2600	4000	29	45	4.0	2.0	128	63	500	1050	1050	2100

9.2 Selection tables 9 PHQK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ731K (M<sub>2acc,max</sub> = 1050 Nm)</b>																	
36.76	2279/62	PHQ731_0055K202_0067 MB23	8.0	31	3500	3100	4000	8.3	38	4.0	2.0	126	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB23	12	25	3500	3100	4000	8.3	38	4.0	2.0	126	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB23	16	20	3500	3100	4000	8.3	38	4.0	2.0	126	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB23	24	8.4	3500	3100	4000	8.3	38	4.0	2.0	126	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB23	30	–	3500	3100	4000	8.3	38	4.0	2.0	126	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB33	16	25	3500	3100	4000	29	45	4.0	2.0	129	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB33	24	14	3500	3100	4000	29	45	4.0	2.0	129	61	500	1050	1050	2100
36.76	2279/62	PHQ731_0055K202_0067 MB33	32	3.1	3500	3100	4000	29	45	4.0	2.0	129	61	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB23	8.0	31	3000	2600	4000	8.6	38	4.0	2.0	127	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB23	12	25	3000	2600	4000	8.6	38	4.0	2.0	127	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB23	16	20	3000	2600	4000	8.6	38	4.0	2.0	127	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB23	24	8.4	3000	2600	4000	8.6	38	4.0	2.0	127	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB23	30	–	3000	2600	4000	8.6	38	4.0	2.0	127	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB33	16	23	3000	2600	4000	29	45	4.0	2.0	130	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB33	24	11	3000	2600	4000	29	45	4.0	2.0	130	63	500	1050	1050	2100
39.15	23177/592	PHQ731_0055K202_0071 MB33	32	0.2	3000	2600	4000	29	45	4.0	2.0	130	63	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB23	8.0	27	3500	3100	4000	8.0	38	4.0	2.0	130	61	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB23	12	21	3500	3100	4000	8.0	38	4.0	2.0	130	61	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB23	16	16	3500	3100	4000	8.0	38	4.0	2.0	130	61	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB23	24	4.5	3500	3100	4000	8.0	38	4.0	2.0	130	61	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB33	16	16	3500	3100	4000	28	45	4.0	2.0	132	61	500	1050	1050	2100
46.18	1247/27	PHQ731_0055K202_0084 MB33	24	4.5	3500	3100	4000	28	45	4.0	2.0	132	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB23	8.0	24	3500	3100	4000	8.1	38	4.0	2.0	131	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB23	12	18	3500	3100	4000	8.1	38	4.0	2.0	131	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB23	16	12	3500	3100	4000	8.1	38	4.0	2.0	131	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB23	24	1.2	3500	3100	4000	8.1	38	4.0	2.0	131	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB33	16	12	3500	3100	4000	29	45	4.0	2.0	132	61	500	1050	1050	2100
50.55	25069/496	PHQ731_0055K202_0092 MB33	24	1.2	3500	3100	4000	29	45	4.0	2.0	132	61	500	1050	1050	2100
55.40	2881/52	PHQ731_0055K202_0100 MB23	8.0	21	3900	3500	4000	7.8	38	4.0	2.0	131	59	500	1050	1050	2100
55.40	2881/52	PHQ731_0055K202_0100 MB23	12	15	3900	3500	4000	7.8	38	4.0	2.0	131	59	500	1050	1050	2100
55.40	2881/52	PHQ731_0055K202_0100 MB23	16	9.4	3900	3500	4000	7.8	38	4.0	2.0	131	59	500	1050	1050	2100
55.40	2881/52	PHQ731_0055K202_0100 MB33	16	9.4	3900	3500	4000	28	45	4.0	2.0	133	59	500	1050	1050	2100
63.50	13717/216	PHQ731_0055K202_0115 MB23	8.0	17	3500	3100	4000	7.9	38	4.0	2.0	132	61	500	1050	1050	2100
63.50	13717/216	PHQ731_0055K202_0115 MB23	12	11	3500	3100	4000	7.9	38	4.0	2.0	132	61	500	1050	1050	2100
63.50	13717/216	PHQ731_0055K202_0115 MB23	16	5.3	3500	3100	4000	7.9	38	4.0	2.0	132	61	500	1050	1050	2100
63.50	13717/216	PHQ731_0055K202_0115 MB33	16	5.3	3500	3100	4000	28	45	4.0	2.0	134	61	500	1050	1050	2100
69.88	559/8	PHQ731_0055K202_0125 MB23	8.0	14	3900	3500	4000	7.6	38	4.0	2.0	133	59	500	1050	1050	2100
69.88	559/8	PHQ731_0055K202_0125 MB23	12	8.4	3900	3500	4000	7.6	38	4.0	2.0	133	59	500	1050	1050	2100
69.88	559/8	PHQ731_0055K202_0125 MB23	16	2.8	3900	3500	4000	7.6	38	4.0	2.0	133	59	500	1050	1050	2100
69.88	559/8	PHQ731_0055K202_0125 MB33	16	2.8	3900	3500	4000	28	45	4.0	2.0	134	59	500	1050	1050	2100
76.18	31691/416	PHQ731_0055K202_0140 MB23	8.0	12	3900	3500	4000	7.7	38	4.0	2.0	133	59	500	1050	1050	2100
76.18	31691/416	PHQ731_0055K202_0140 MB23	12	6.3	3900	3500	4000	7.7	38	4.0	2.0	133	59	500	1050	1050	2100
76.18	31691/416	PHQ731_0055K202_0140 MB23	16	0.7	3900	3500	4000	7.7	38	4.0	2.0	133	59	500	1050	1050	2100
76.18	31691/416	PHQ731_0055K202_0140 MB33	16	0.7	3900	3500	4000	28	45	4.0	2.0	134	59	500	1050	1050	2100
92.72	2967/32	PHQ731_0055K202_0170 MB23	8.0	7.8	4000	3900	4000	7.4	38	4.0	2.0	134	57	500	1050	1050	2100
92.72	2967/32	PHQ731_0055K202_0170 MB23	12	2.2	4000	3900	4000	7.4	38	4.0	2.0	134	57	500	1050	1050	2100
96.08	6149/64	PHQ731_0055K202_0175 MB23	8.0	7.1	3900	3500	4000	7.5	38	4.0	2.0	134	59	500	1050	1050	2100
96.08	6149/64	PHQ731_0055K202_0175 MB23	12	1.5	3900	3500	4000	7.5	38	4.0	2.0	134	59	500	1050	1050	2100
111.8	559/5	PHQ731_0055K202_0200 MB23	8.0	4.5	4000	3900	4000	7.4	38	4.0	2.0	135	57	500	1050	1050	2100
127.5	32637/256	PHQ731_0055K202_0230 MB23	8.0	2.6	4000	3900	4000	7.4	38	4.0	2.0	135	57	500	1050	1050	2100
138.2	1935/14	PHQ731_0055K202_0250 MB23	8.0	1.5	4000	3900	4000	7.3	38	4.0	2.0	135	57	500	1050	1050	2100
153.7	6149/40	PHQ731_0055K202_0280 MB23	8.0	0.2	4000	3900	4000	7.4	38	4.0	2.0	135	57	500	1050	1050	2100
<b>PHQ831K (M<sub>2acc,max</sub> = 3168 Nm)</b>																	
22.00	22/1	PHQ831_0055K402_0040 MB33	16	104	2600	2200	3800	39	82	3.5	1.5	284	69	1400	2049	2050	3872
22.00	22/1	PHQ831_0055K402_0040 MB33	24	92	2600	2200	3800	39	82	3.5	1.5	284	69	1400	2049	2050	3872
22.00	22/1	PHQ831_0055K402_0040 MB33	32	81	2600	2200	3800	39	82	3.5	1.5	284	69	1400	2049	2050	3872
22.00	22/1	PHQ831_0055K402_0040 MB33	45	63	2600	2200	3800	39	82	3.5	1.5	284	69	1400	2049	2050	3872
22.00	22/1	PHQ831_0055K402_0040 MB33	90	–	2600	2200	3800	39	82	3.5	1.5	284	69	1400	2049	2050	3872
22.00	22/1	PHQ831_0055K402_0040 MB43	50	119	2600	2200	3000	87	96	3.5	1.5	304	69	1400	2421	2420	4964
22.00	22/1	PHQ831_0055K402_0040 MB43	72	88	2600	2200	3000	87	96	3.5	1.5	304	69	1400	2421	2420	4964
22.00	22/1	PHQ831_0055K402_0040 MB43	100	49	2600	2200	3000	87	96	3.5	1.5	304	69	1400	2421	2420	4964
24.00	24/1	PHQ831_0055K402_0044 MB33	16	104	2600	2200	3800	38	82	3.5	1.5	298	69	1400	2235	2240	4224
24.00	24/1	PHQ831_0055K402_0044 MB33	24	92	2600	2200	3800	38	82	3.5	1.5	298	69	1400	2235	2240	4224
24.00	24/1	PHQ831_0055K402_0044 MB33	32	81	2600	2200	3800	38	82	3.5	1.5	298	69	1400	2235	2240	4224

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ831K (M<sub>2acc,max</sub> = 3168 Nm)</b>																	
24.00	24/1	PHQ831_0055K402_0044 MB33	45	63	2600	2200	3800	38	82	3.5	1.5	298	69	1400	2235	2240	4224
24.00	24/1	PHQ831_0055K402_0044 MB33	90	–	2600	2200	3800	38	82	3.5	1.5	298	69	1400	2235	2240	4224
24.00	24/1	PHQ831_0055K402_0044 MB43	50	103	2600	2200	3000	86	96	3.5	1.5	316	69	1400	2493	2490	4964
24.00	24/1	PHQ831_0055K402_0044 MB43	72	73	2600	2200	3000	86	96	3.5	1.5	316	69	1400	2493	2490	4964
24.00	24/1	PHQ831_0055K402_0044 MB43	100	33	2600	2200	3000	86	96	3.5	1.5	316	69	1400	2493	2490	4964
29.82	1849/62	PHQ831_0055K402_0054 MB33	16	104	2600	2200	3800	35	82	3.5	1.5	327	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB33	24	92	2600	2200	3800	35	82	3.5	1.5	327	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB33	32	81	2600	2200	3800	35	82	3.5	1.5	327	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB33	45	63	2600	2200	3800	35	82	3.5	1.5	327	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB33	90	–	2600	2200	3800	35	82	3.5	1.5	327	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB43	50	70	2600	2200	3000	83	96	3.5	1.5	341	69	1400	2680	2680	4964
29.82	1849/62	PHQ831_0055K402_0054 MB43	72	39	2600	2200	3000	83	96	3.5	1.5	341	69	1400	2680	2680	4964
33.00	33/1	PHQ831_0055K402_0060 MB33	16	104	2600	2200	3800	36	82	3.5	1.5	339	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB33	24	92	2600	2200	3800	36	82	3.5	1.5	339	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB33	32	81	2600	2200	3800	36	82	3.5	1.5	339	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB33	45	63	2600	2200	3800	36	82	3.5	1.5	339	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB33	90	–	2600	2200	3800	36	82	3.5	1.5	339	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB43	50	56	2600	2200	3000	84	96	3.5	1.5	351	69	1400	2772	2770	4964
33.00	33/1	PHQ831_0055K402_0060 MB43	72	25	2600	2200	3000	84	96	3.5	1.5	351	69	1400	2772	2770	4964
36.95	2365/64	PHQ831_0055K402_0067 MB23	8.0	31	3000	2600	4000	12	75	3.5	1.5	327	67	1290	1290	1290	2168
36.95	2365/64	PHQ831_0055K402_0067 MB23	12	25	3000	2600	4000	12	75	3.5	1.5	327	67	1290	1290	1290	2168
36.95	2365/64	PHQ831_0055K402_0067 MB23	16	20	3000	2600	4000	12	75	3.5	1.5	327	67	1290	1290	1290	2168
36.95	2365/64	PHQ831_0055K402_0067 MB23	24	8.4	3000	2600	4000	12	75	3.5	1.5	327	67	1290	1290	1290	2168
36.95	2365/64	PHQ831_0055K402_0067 MB23	30	–	3000	2600	4000	12	75	3.5	1.5	327	67	1290	1290	1290	2168
36.95	2365/64	PHQ831_0055K402_0067 MB33	16	90	3000	2600	4000	33	82	3.5	1.5	349	67	1400	2800	2880	4964
36.95	2365/64	PHQ831_0055K402_0067 MB33	24	79	3000	2600	4000	33	82	3.5	1.5	349	67	1400	2800	2880	4964
36.95	2365/64	PHQ831_0055K402_0067 MB33	32	68	3000	2600	4000	33	82	3.5	1.5	349	67	1400	2800	2880	4964
36.95	2365/64	PHQ831_0055K402_0067 MB33	45	50	3000	2600	4000	33	82	3.5	1.5	349	67	1400	2800	2880	4964
36.95	2365/64	PHQ831_0055K402_0067 MB43	50	43	3000	2600	3000	81	96	3.5	1.5	359	67	1400	2800	2880	4964
36.95	2365/64	PHQ831_0055K402_0067 MB43	72	12	3000	2600	3000	81	96	3.5	1.5	359	67	1400	2800	2880	4964
41.01	20339/496	PHQ831_0055K402_0075 MB33	16	79	2600	2200	3800	34	82	3.5	1.5	358	69	1400	2800	2980	4964
41.01	20339/496	PHQ831_0055K402_0075 MB33	24	68	2600	2200	3800	34	82	3.5	1.5	358	69	1400	2800	2980	4964
41.01	20339/496	PHQ831_0055K402_0075 MB33	32	57	2600	2200	3800	34	82	3.5	1.5	358	69	1400	2800	2980	4964
41.01	20339/496	PHQ831_0055K402_0075 MB33	45	38	2600	2200	3800	34	82	3.5	1.5	358	69	1400	2800	2980	4964
41.01	20339/496	PHQ831_0055K402_0075 MB43	50	31	2600	2200	3000	82	96	3.5	1.5	366	69	1400	2800	2980	4964
41.01	20339/496	PHQ831_0055K402_0075 MB43	72	0.7	2600	2200	3000	82	96	3.5	1.5	366	69	1400	2800	2980	4964
46.07	645/14	PHQ831_0055K402_0084 MB23	8.0	31	3000	2600	4000	10	75	3.5	1.5	349	67	1400	1609	1610	2703
46.07	645/14	PHQ831_0055K402_0084 MB23	12	25	3000	2600	4000	10	75	3.5	1.5	349	67	1400	1609	1610	2703
46.07	645/14	PHQ831_0055K402_0084 MB23	16	20	3000	2600	4000	10	75	3.5	1.5	349	67	1400	1609	1610	2703
46.07	645/14	PHQ831_0055K402_0084 MB23	24	8.4	3000	2600	4000	10	75	3.5	1.5	349	67	1400	1609	1610	2703
46.07	645/14	PHQ831_0055K402_0084 MB23	30	–	3000	2600	4000	10	75	3.5	1.5	349	67	1400	1609	1610	2703
46.07	645/14	PHQ831_0055K402_0084 MB33	16	68	3000	2600	4000	32	82	3.5	1.5	366	67	1400	2800	3100	4964
46.07	645/14	PHQ831_0055K402_0084 MB33	24	57	3000	2600	4000	32	82	3.5	1.5	366	67	1400	2800	3100	4964
46.07	645/14	PHQ831_0055K402_0084 MB33	32	46	3000	2600	4000	32	82	3.5	1.5	366	67	1400	2800	3100	4964
46.07	645/14	PHQ831_0055K402_0084 MB33	45	27	3000	2600	4000	32	82	3.5	1.5	366	67	1400	2800	3100	4964
46.07	645/14	PHQ831_0055K402_0084 MB43	50	20	3000	2600	3000	80	96	3.5	1.5	373	67	1400	2800	3100	4964
50.81	26015/512	PHQ831_0055K402_0092 MB23	8.0	31	3000	2600	4000	11	75	3.5	1.5	357	67	1400	1774	1770	2981
50.81	26015/512	PHQ831_0055K402_0092 MB23	12	25	3000	2600	4000	11	75	3.5	1.5	357	67	1400	1774	1770	2981
50.81	26015/512	PHQ831_0055K402_0092 MB23	16	20	3000	2600	4000	11	75	3.5	1.5	357	67	1400	1774	1770	2981
50.81	26015/512	PHQ831_0055K402_0092 MB23	24	8.4	3000	2600	4000	11	75	3.5	1.5	357	67	1400	1774	1770	2981
50.81	26015/512	PHQ831_0055K402_0092 MB23	30	–	3000	2600	4000	11	75	3.5	1.5	357	67	1400	1774	1770	2981
50.81	26015/512	PHQ831_0055K402_0092 MB33	16	59	3000	2600	4000	33	82	3.5	1.5	371	67	1400	2800	3170	4964
50.81	26015/512	PHQ831_0055K402_0092 MB33	24	48	3000	2600	4000	33	82	3.5	1.5	371	67	1400	2800	3170	4964
50.81	26015/512	PHQ831_0055K402_0092 MB33	32	37	3000	2600	4000	33	82	3.5	1.5	371	67	1400	2800	3170	4964
50.81	26015/512	PHQ831_0055K402_0092 MB33	45	19	3000	2600	4000	33	82	3.5	1.5	371	67	1400	2800	3170	4964
50.81	26015/512	PHQ831_0055K402_0092 MB43	50	12	3000	2600	3000	80	96	3.5	1.5	377	67	1400	2800	3170	4964
55.54	1333/24	PHQ831_0055K402_0100 MB23	8.0	31	3400	3000	4000	9.6	75	3.5	1.5	364	65	1400	1939	1940	3258
55.54	1333/24	PHQ831_0055K402_0100 MB23	12	25	3400	3000	4000	9.6	75	3.5	1.5	364	65	1400	1939	1940	3258
55.54	1333/24	PHQ831_0055K402_0100 MB23	16	20	3400	3000	4000	9.6	75	3.5	1.5	364	65	1400	1939	1940	3258
55.54	1333/24	PHQ831_0055K402_0100 MB23	24	8.4	3400	3000	4000	9.6	75	3.5	1.5	364	65	1400	1939	1940	3258
55.54	1333/24	PHQ831_0055K402_0100 MB23	30	–	3400	3000	4000	9.6	75	3.5	1.5	364	65	1400	1939	1940	3258
55.54	1333/24	PHQ831_0055K402_0100 MB33	16	53	3400	3000	4000	31	82	3.5	1.5	376	65	1400	2800	3170	4964
55.54	1333/24	PHQ831_0055K402_0100 MB33	24	41	3400	3000	4000	31	82	3.5	1.5	376	65	1400	2800	3170	4964
55.54	1333/24	PHQ831_0055K402_0100 MB33	32	30	3400	3000	4000	31	82	3.5	1.5	376	65	1400	2800	3170	4964



9.2 Selection tables 9 PHQK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ831K (M<sub>2acc,max</sub> = 3168 Nm)</b>																	
55.54	1333/24	PHQ831_0055K402_0100 MB33	45	12	3400	3000	4000	31	82	3.5	1.5	376	65	1400	2800	3170	4964
55.54	1333/24	PHQ831_0055K402_0100 MB43	50	4.9	3000	3000	3000	79	96	3.5	1.5	381	65	1400	2800	3170	4964
63.35	7095/112	PHQ831_0055K402_0115 MB23	8.0	31	3000	2600	4000	9.8	75	3.5	1.5	371	67	1400	2212	2210	3716
63.35	7095/112	PHQ831_0055K402_0115 MB23	12	25	3000	2600	4000	9.8	75	3.5	1.5	371	67	1400	2212	2210	3716
63.35	7095/112	PHQ831_0055K402_0115 MB23	16	20	3000	2600	4000	9.8	75	3.5	1.5	371	67	1400	2212	2210	3716
63.35	7095/112	PHQ831_0055K402_0115 MB23	24	8.4	3000	2600	4000	9.8	75	3.5	1.5	371	67	1400	2212	2210	3716
63.35	7095/112	PHQ831_0055K402_0115 MB23	30	–	3000	2600	4000	9.8	75	3.5	1.5	371	67	1400	2212	2210	3716
63.35	7095/112	PHQ831_0055K402_0115 MB33	16	43	3000	2600	4000	32	82	3.5	1.5	381	67	1400	2800	3170	4964
63.35	7095/112	PHQ831_0055K402_0115 MB33	24	32	3000	2600	4000	32	82	3.5	1.5	381	67	1400	2800	3170	4964
63.35	7095/112	PHQ831_0055K402_0115 MB33	32	21	3000	2600	4000	32	82	3.5	1.5	381	67	1400	2800	3170	4964
63.35	7095/112	PHQ831_0055K402_0115 MB33	45	2.7	3000	2600	4000	32	82	3.5	1.5	381	67	1400	2800	3170	4964
69.62	1462/21	PHQ831_0055K402_0125 MB23	8.0	31	3400	3000	4000	8.8	75	3.5	1.5	376	65	1400	2431	2430	4084
69.62	1462/21	PHQ831_0055K402_0125 MB23	12	25	3400	3000	4000	8.8	75	3.5	1.5	376	65	1400	2431	2430	4084
69.62	1462/21	PHQ831_0055K402_0125 MB23	16	20	3400	3000	4000	8.8	75	3.5	1.5	376	65	1400	2431	2430	4084
69.62	1462/21	PHQ831_0055K402_0125 MB23	24	8.4	3400	3000	4000	8.8	75	3.5	1.5	376	65	1400	2431	2430	4084
69.62	1462/21	PHQ831_0055K402_0125 MB23	30	–	3400	3000	4000	8.8	75	3.5	1.5	376	65	1400	2431	2430	4084
69.62	1462/21	PHQ831_0055K402_0125 MB33	16	37	3400	3000	4000	31	82	3.5	1.5	384	65	1400	2800	3170	4964
69.62	1462/21	PHQ831_0055K402_0125 MB33	24	26	3400	3000	4000	31	82	3.5	1.5	384	65	1400	2800	3170	4964
69.62	1462/21	PHQ831_0055K402_0125 MB33	32	15	3400	3000	4000	31	82	3.5	1.5	384	65	1400	2800	3170	4964
76.37	14663/192	PHQ831_0055K402_0140 MB23	8.0	31	3400	3000	4000	9.2	75	3.5	1.5	380	65	1400	2667	2670	4480
76.37	14663/192	PHQ831_0055K402_0140 MB23	12	25	3400	3000	4000	9.2	75	3.5	1.5	380	65	1400	2667	2670	4480
76.37	14663/192	PHQ831_0055K402_0140 MB23	16	20	3400	3000	4000	9.2	75	3.5	1.5	380	65	1400	2667	2670	4480
76.37	14663/192	PHQ831_0055K402_0140 MB23	24	8.4	3400	3000	4000	9.2	75	3.5	1.5	380	65	1400	2667	2670	4480
76.37	14663/192	PHQ831_0055K402_0140 MB23	30	–	3400	3000	4000	9.2	75	3.5	1.5	380	65	1400	2667	2670	4480
76.37	14663/192	PHQ831_0055K402_0140 MB33	16	32	3400	3000	4000	31	82	3.5	1.5	387	65	1400	2800	3170	4964
76.37	14663/192	PHQ831_0055K402_0140 MB33	24	21	3400	3000	4000	31	82	3.5	1.5	387	65	1400	2800	3170	4964
76.37	14663/192	PHQ831_0055K402_0140 MB33	32	9.7	3400	3000	4000	31	82	3.5	1.5	387	65	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB23	8.0	31	3600	3300	4000	8.2	75	3.5	1.5	386	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB23	12	25	3600	3300	4000	8.2	75	3.5	1.5	386	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB23	16	20	3600	3300	4000	8.2	75	3.5	1.5	386	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB23	24	8.4	3600	3300	4000	8.2	75	3.5	1.5	386	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB23	30	–	3600	3300	4000	8.2	75	3.5	1.5	386	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB33	16	22	3600	3300	4000	30	82	3.5	1.5	391	63	1400	2800	3170	4964
93.16	559/6	PHQ831_0055K402_0170 MB33	24	11	3600	3300	4000	30	82	3.5	1.5	391	63	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB23	8.0	31	3400	3000	4000	8.6	75	3.5	1.5	387	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB23	12	25	3400	3000	4000	8.6	75	3.5	1.5	387	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB23	16	20	3400	3000	4000	8.6	75	3.5	1.5	387	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB23	24	8.4	3400	3000	4000	8.6	75	3.5	1.5	387	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB23	30	–	3400	3000	4000	8.6	75	3.5	1.5	387	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB33	16	21	3400	3000	4000	30	82	3.5	1.5	391	65	1400	2800	3170	4964
95.73	8041/84	PHQ831_0055K402_0175 MB33	24	9.9	3400	3000	4000	30	82	3.5	1.5	391	65	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB23	8.0	26	3600	3300	4000	7.9	75	3.5	1.5	390	63	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB23	12	21	3600	3300	4000	7.9	75	3.5	1.5	390	63	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB23	16	15	3600	3300	4000	7.9	75	3.5	1.5	390	63	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB23	24	3.9	3600	3300	4000	7.9	75	3.5	1.5	390	63	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB33	16	15	3600	3300	4000	28	82	3.5	1.5	393	63	1400	2800	3170	4964
111.1	1333/12	PHQ831_0055K402_0200 MB33	24	3.9	3600	3300	4000	28	82	3.5	1.5	393	63	1400	2800	3170	4964
128.1	6149/48	PHQ831_0055K402_0230 MB23	8.0	21	3600	3300	4000	8.1	75	3.5	1.5	392	63	1400	2800	3170	4964
128.1	6149/48	PHQ831_0055K402_0230 MB23	12	16	3600	3300	4000	8.1	75	3.5	1.5	392	63	1400	2800	3170	4964
128.1	6149/48	PHQ831_0055K402_0230 MB23	16	10	3600	3300	4000	8.1	75	3.5	1.5	392	63	1400	2800	3170	4964
128.1	6149/48	PHQ831_0055K402_0230 MB33	16	10	3600	3300	4000	30	82	3.5	1.5	395	63	1400	2800	3170	4964
139.0	4171/30	PHQ831_0055K402_0250 MB23	8.0	19	3600	3300	4000	7.7	75	3.5	1.5	393	63	1400	2800	3170	4964
139.0	4171/30	PHQ831_0055K402_0250 MB23	12	13	3600	3300	4000	7.7	75	3.5	1.5	393	63	1400	2800	3170	4964
139.0	4171/30	PHQ831_0055K402_0250 MB23	16	7.5	3600	3300	4000	7.7	75	3.5	1.5	393	63	1400	2800	3170	4964
139.0	4171/30	PHQ831_0055K402_0250 MB33	16	7.5	3600	3300	4000	28	82	3.5	1.5	396	63	1400	2800	3170	4964
152.7	14663/96	PHQ831_0055K402_0280 MB23	8.0	16	3600	3300	4000	7.8	75	3.5	1.5	394	63	1400	2800	3170	4964
152.7	14663/96	PHQ831_0055K402_0280 MB23	12	10	3600	3300	4000	7.8	75	3.5	1.5	394	63	1400	2800	3170	4964
152.7	14663/96	PHQ831_0055K402_0280 MB23	16	4.8	3600	3300	4000	7.8	75	3.5	1.5	394	63	1400	2800	3170	4964
152.7	14663/96	PHQ831_0055K402_0280 MB33	16	4.8	3600	3300	4000	28	82	3.5	1.5	396	63	1400	2800	3170	4964
185.2	2408/13	PHQ831_0055K402_0340 MB23	8.0	9.0	3600	3300	4000	7.5	75	3.5	1.5	396	63	1400	2464	2460	4456
185.2	2408/13	PHQ831_0055K402_0340 MB23	12	3.4	3600	3300	4000	7.5	75	3.5	1.5	396	63	1400	2464	2460	4456
191.2	45881/240	PHQ831_0055K402_0350 MB23	8.0	11	3600	3300	4000	7.6	75	3.5	1.5	396	63	1400	2800	3170	4964
191.2	45881/240	PHQ831_0055K402_0350 MB23	12	5.0	3600	3300	4000	7.6	75	3.5	1.5	396	63	1400	2800	3170	4964
222.8	2451/11	PHQ831_0055K402_0410 MB23	8.0	2.1	3600	3300	4000	7.4	75	3.5	1.5	397	63	1400	1952	1950	3529

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ831K (M<sub>2acc,max</sub> = 3168 Nm)</b>																	
254.7	3311/13	PHQ831_0055K402_0460 MB23	8.0	5.1	3600	3300	4000	7.5	75	3.5	1.5	398	63	1400	2800	3170	4964
306.4	2451/8	PHQ831_0055K402_0560 MB23	8.0	2.1	3600	3300	4000	7.4	75	3.5	1.5	398	63	1400	2684	2680	4853
<b>PHQ941K (M<sub>2acc,max</sub> = 5760 Nm)</b>																	
44.08	1102/25	PHQ941_0060K513_0073 MB33	16	104	1900	1800	3200	46	105	4.0	2.0	646	72	3800	4046	4050	7646
44.08	1102/25	PHQ941_0060K513_0073 MB33	24	92	1900	1800	3200	46	105	4.0	2.0	646	72	3800	4046	4050	7646
44.08	1102/25	PHQ941_0060K513_0073 MB33	32	81	1900	1800	3200	46	105	4.0	2.0	646	72	3800	4046	4050	7646
44.08	1102/25	PHQ941_0060K513_0073 MB33	45	63	1900	1800	3200	46	105	4.0	2.0	646	72	3800	4046	4050	7646
44.08	1102/25	PHQ941_0060K513_0073 MB33	90	–	1900	1800	3200	46	105	4.0	2.0	646	72	3800	4046	4050	7646
44.08	1102/25	PHQ941_0060K513_0073 MB43	50	141	1900	1800	3000	93	118	4.0	2.0	670	72	3800	5760	5760	11250
44.08	1102/25	PHQ941_0060K513_0073 MB43	72	110	1900	1800	3000	93	118	4.0	2.0	670	72	3800	5760	5760	11250
44.08	1102/25	PHQ941_0060K513_0073 MB43	100	71	1900	1800	3000	93	118	4.0	2.0	670	72	3800	5760	5760	11250
48.80	17081/350	PHQ941_0060K513_0081 MB33	16	104	1900	1800	3200	44	105	4.0	2.0	666	72	3800	4479	4480	8465
48.80	17081/350	PHQ941_0060K513_0081 MB33	24	92	1900	1800	3200	44	105	4.0	2.0	666	72	3800	4479	4480	8465
48.80	17081/350	PHQ941_0060K513_0081 MB33	32	81	1900	1800	3200	44	105	4.0	2.0	666	72	3800	4479	4480	8465
48.80	17081/350	PHQ941_0060K513_0081 MB33	45	63	1900	1800	3200	44	105	4.0	2.0	666	72	3800	4479	4480	8465
48.80	17081/350	PHQ941_0060K513_0081 MB33	90	–	1900	1800	3200	44	105	4.0	2.0	666	72	3800	4479	4480	8465
48.80	17081/350	PHQ941_0060K513_0081 MB43	50	120	1900	1800	3000	91	118	4.0	2.0	686	72	3800	5760	5760	11250
48.80	17081/350	PHQ941_0060K513_0081 MB43	72	90	1900	1800	3000	91	118	4.0	2.0	686	72	3800	5760	5760	11250
48.80	17081/350	PHQ941_0060K513_0081 MB43	100	50	1900	1800	3000	91	118	4.0	2.0	686	72	3800	5760	5760	11250
55.01	8526/155	PHQ941_0060K513_0092 MB33	16	104	1900	1800	3200	41	105	4.0	2.0	686	72	3800	5048	5050	9542
55.01	8526/155	PHQ941_0060K513_0092 MB33	24	92	1900	1800	3200	41	105	4.0	2.0	686	72	3800	5048	5050	9542
55.01	8526/155	PHQ941_0060K513_0092 MB33	32	81	1900	1800	3200	41	105	4.0	2.0	686	72	3800	5048	5050	9542
55.01	8526/155	PHQ941_0060K513_0092 MB33	45	63	1900	1800	3200	41	105	4.0	2.0	686	72	3800	5048	5050	9542
55.01	8526/155	PHQ941_0060K513_0092 MB33	90	–	1900	1800	3200	41	105	4.0	2.0	686	72	3800	5048	5050	9542
55.01	8526/155	PHQ941_0060K513_0092 MB43	50	99	1900	1800	3000	88	118	4.0	2.0	703	72	3800	5760	5760	11250
55.01	8526/155	PHQ941_0060K513_0092 MB43	72	68	1900	1800	3000	88	118	4.0	2.0	703	72	3800	5760	5760	11250
55.01	8526/155	PHQ941_0060K513_0092 MB43	100	29	1900	1800	3000	88	118	4.0	2.0	703	72	3800	5760	5760	11250
60.90	609/10	PHQ941_0060K513_0100 MB33	16	104	1900	1800	3200	40	105	4.0	2.0	700	72	3800	5589	5590	10564
60.90	609/10	PHQ941_0060K513_0100 MB33	24	92	1900	1800	3200	40	105	4.0	2.0	700	72	3800	5589	5590	10564
60.90	609/10	PHQ941_0060K513_0100 MB33	32	81	1900	1800	3200	40	105	4.0	2.0	700	72	3800	5589	5590	10564
60.90	609/10	PHQ941_0060K513_0100 MB33	45	63	1900	1800	3200	40	105	4.0	2.0	700	72	3800	5589	5590	10564
60.90	609/10	PHQ941_0060K513_0100 MB33	90	–	1900	1800	3200	40	105	4.0	2.0	700	72	3800	5589	5590	10564
60.90	609/10	PHQ941_0060K513_0100 MB43	50	83	1900	1800	3000	87	118	4.0	2.0	714	72	3800	5760	5760	11250
60.90	609/10	PHQ941_0060K513_0100 MB43	72	52	1900	1800	3000	87	118	4.0	2.0	714	72	3800	5760	5760	11250
60.90	609/10	PHQ941_0060K513_0100 MB43	100	13	1900	1800	3000	87	118	4.0	2.0	714	72	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB33	16	104	2300	2200	3600	37	105	4.0	2.0	715	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB33	24	92	2300	2200	3600	37	105	4.0	2.0	715	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB33	32	81	2300	2200	3600	37	105	4.0	2.0	715	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB33	45	63	2300	2200	3600	37	105	4.0	2.0	715	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB33	90	–	2300	2200	3600	37	105	4.0	2.0	715	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB43	50	64	2300	2200	3000	85	118	4.0	2.0	727	70	3800	5760	5760	11250
69.41	10759/155	PHQ941_0060K513_0115 MB43	72	33	2300	2200	3000	85	118	4.0	2.0	727	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB33	16	99	2300	2200	3600	36	105	4.0	2.0	725	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB33	24	87	2300	2200	3600	36	105	4.0	2.0	725	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB33	32	76	2300	2200	3600	36	105	4.0	2.0	725	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB33	45	58	2300	2200	3600	36	105	4.0	2.0	725	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB43	50	51	2300	2200	3000	84	118	4.0	2.0	735	70	3800	5760	5760	11250
76.85	1537/20	PHQ941_0060K513_0130 MB43	72	20	2300	2200	3000	84	118	4.0	2.0	735	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB23	8.0	31	2300	2200	3600	13	98	4.0	2.0	716	70	3002	3002	3000	5043
87.22	11774/135	PHQ941_0060K513_0145 MB23	12	25	2300	2200	3600	13	98	4.0	2.0	716	70	3002	3002	3000	5043
87.22	11774/135	PHQ941_0060K513_0145 MB23	16	20	2300	2200	3600	13	98	4.0	2.0	716	70	3002	3002	3000	5043
87.22	11774/135	PHQ941_0060K513_0145 MB23	24	8.4	2300	2200	3600	13	98	4.0	2.0	716	70	3002	3002	3000	5043
87.22	11774/135	PHQ941_0060K513_0145 MB23	30	–	2300	2200	3600	13	98	4.0	2.0	716	70	3002	3002	3000	5043
87.22	11774/135	PHQ941_0060K513_0145 MB33	16	84	2300	2200	3600	35	105	4.0	2.0	735	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB33	24	73	2300	2200	3600	35	105	4.0	2.0	735	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB33	32	62	2300	2200	3600	35	105	4.0	2.0	735	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB33	45	44	2300	2200	3600	35	105	4.0	2.0	735	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB43	50	37	2300	2200	3000	82	118	4.0	2.0	742	70	3800	5760	5760	11250
87.22	11774/135	PHQ941_0060K513_0145 MB43	72	5.7	2300	2200	3000	82	118	4.0	2.0	742	70	3800	5760	5760	11250
96.56	26071/270	PHQ941_0060K513_0160 MB23	8.0	31	2300	2200	3600	13	98	4.0	2.0	725	70	3323	3323	3320	5583
96.56	26071/270	PHQ941_0060K513_0160 MB23	12	25	2300	2200	3600										

9.2 Selection tables 9 PHQK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
PHQ941K (M <sub>2acc,max</sub> = 5760 Nm)																	
96.56	26071/270	PHQ941_0060K513_0160 MB33	16	74	2300	2200	3600	34	105	4.0	2.0	741	70	3800	5760	5760	11250
96.56	26071/270	PHQ941_0060K513_0160 MB33	24	63	2300	2200	3600	34	105	4.0	2.0	741	70	3800	5760	5760	11250
96.56	26071/270	PHQ941_0060K513_0160 MB33	32	51	2300	2200	3600	34	105	4.0	2.0	741	70	3800	5760	5760	11250
96.56	26071/270	PHQ941_0060K513_0160 MB33	45	33	2300	2200	3600	34	105	4.0	2.0	741	70	3800	5760	5760	11250
96.56	26071/270	PHQ941_0060K513_0160 MB43	50	26	2300	2200	3000	82	118	4.0	2.0	748	70	3800	5760	5760	11250
104.9	6293/60	PHQ941_0060K513_0175 MB23	8.0	31	2800	2500	4000	12	98	4.0	2.0	732	68	3610	3610	3610	6064
104.9	6293/60	PHQ941_0060K513_0175 MB23	12	25	2800	2500	4000	12	98	4.0	2.0	732	68	3610	3610	3610	6064
104.9	6293/60	PHQ941_0060K513_0175 MB23	16	20	2800	2500	4000	12	98	4.0	2.0	732	68	3610	3610	3610	6064
104.9	6293/60	PHQ941_0060K513_0175 MB23	24	8.4	2800	2500	4000	12	98	4.0	2.0	732	68	3610	3610	3610	6064
104.9	6293/60	PHQ941_0060K513_0175 MB23	30	–	2800	2500	4000	12	98	4.0	2.0	732	68	3610	3610	3610	6064
104.9	6293/60	PHQ941_0060K513_0175 MB33	16	66	2800	2500	4000	33	105	4.0	2.0	746	68	3800	5760	5760	11250
104.9	6293/60	PHQ941_0060K513_0175 MB33	24	55	2800	2500	4000	33	105	4.0	2.0	746	68	3800	5760	5760	11250
104.9	6293/60	PHQ941_0060K513_0175 MB33	32	44	2800	2500	4000	33	105	4.0	2.0	746	68	3800	5760	5760	11250
104.9	6293/60	PHQ941_0060K513_0175 MB33	45	26	2800	2500	4000	33	105	4.0	2.0	746	68	3800	5760	5760	11250
104.9	6293/60	PHQ941_0060K513_0175 MB43	50	19	2800	2500	3000	81	118	4.0	2.0	751	68	3800	5760	5760	11250
116.1	27869/240	PHQ941_0060K513_0195 MB23	8.0	31	2800	2500	4000	11	98	4.0	2.0	739	68	3800	3996	4000	6714
116.1	27869/240	PHQ941_0060K513_0195 MB23	12	25	2800	2500	4000	11	98	4.0	2.0	739	68	3800	3996	4000	6714
116.1	27869/240	PHQ941_0060K513_0195 MB23	16	20	2800	2500	4000	11	98	4.0	2.0	739	68	3800	3996	4000	6714
116.1	27869/240	PHQ941_0060K513_0195 MB23	24	8.4	2800	2500	4000	11	98	4.0	2.0	739	68	3800	3996	4000	6714
116.1	27869/240	PHQ941_0060K513_0195 MB23	30	–	2800	2500	4000	11	98	4.0	2.0	739	68	3800	3996	4000	6714
116.1	27869/240	PHQ941_0060K513_0195 MB33	16	58	2800	2500	4000	33	105	4.0	2.0	750	68	3800	5760	5760	11250
116.1	27869/240	PHQ941_0060K513_0195 MB33	24	46	2800	2500	4000	33	105	4.0	2.0	750	68	3800	5760	5760	11250
116.1	27869/240	PHQ941_0060K513_0195 MB33	32	35	2800	2500	4000	33	105	4.0	2.0	750	68	3800	5760	5760	11250
116.1	27869/240	PHQ941_0060K513_0195 MB33	45	17	2800	2500	4000	33	105	4.0	2.0	750	68	3800	5760	5760	11250
116.1	27869/240	PHQ941_0060K513_0195 MB43	50	10	2800	2500	3000	81	118	4.0	2.0	755	68	3800	5760	5760	11250
132.0	2639/20	PHQ941_0060K513_0220 MB23	8.0	31	2800	2500	4000	10	98	4.0	2.0	746	68	3800	4541	4540	7629
132.0	2639/20	PHQ941_0060K513_0220 MB23	12	25	2800	2500	4000	10	98	4.0	2.0	746	68	3800	4541	4540	7629
132.0	2639/20	PHQ941_0060K513_0220 MB23	16	20	2800	2500	4000	10	98	4.0	2.0	746	68	3800	4541	4540	7629
132.0	2639/20	PHQ941_0060K513_0220 MB23	24	8.4	2800	2500	4000	10	98	4.0	2.0	746	68	3800	4541	4540	7629
132.0	2639/20	PHQ941_0060K513_0220 MB23	30	–	2800	2500	4000	10	98	4.0	2.0	746	68	3800	4541	4540	7629
132.0	2639/20	PHQ941_0060K513_0220 MB33	16	48	2800	2500	4000	32	105	4.0	2.0	755	68	3800	5760	5760	11250
132.0	2639/20	PHQ941_0060K513_0220 MB33	24	37	2800	2500	4000	32	105	4.0	2.0	755	68	3800	5760	5760	11250
132.0	2639/20	PHQ941_0060K513_0220 MB33	32	26	2800	2500	4000	32	105	4.0	2.0	755	68	3800	5760	5760	11250
132.0	2639/20	PHQ941_0060K513_0220 MB33	45	7.4	2800	2500	4000	32	105	4.0	2.0	755	68	3800	5760	5760	11250
132.0	2639/20	PHQ941_0060K513_0220 MB43	50	0.4	2800	2500	3000	80	118	4.0	2.0	758	68	3800	5760	5760	11250
146.1	11687/80	PHQ941_0060K513_0240 MB23	8.0	31	2800	2500	4000	10	98	4.0	2.0	750	68	3800	5028	5030	8447
146.1	11687/80	PHQ941_0060K513_0240 MB23	12	25	2800	2500	4000	10	98	4.0	2.0	750	68	3800	5028	5030	8447
146.1	11687/80	PHQ941_0060K513_0240 MB23	16	20	2800	2500	4000	10	98	4.0	2.0	750	68	3800	5028	5030	8447
146.1	11687/80	PHQ941_0060K513_0240 MB23	24	8.4	2800	2500	4000	10	98	4.0	2.0	750	68	3800	5028	5030	8447
146.1	11687/80	PHQ941_0060K513_0240 MB23	30	–	2800	2500	4000	10	98	4.0	2.0	750	68	3800	5028	5030	8447
146.1	11687/80	PHQ941_0060K513_0240 MB33	16	41	2800	2500	4000	32	105	4.0	2.0	758	68	3800	5760	5760	11250
146.1	11687/80	PHQ941_0060K513_0240 MB33	24	30	2800	2500	4000	32	105	4.0	2.0	758	68	3800	5760	5760	11250
146.1	11687/80	PHQ941_0060K513_0240 MB33	32	19	2800	2500	4000	32	105	4.0	2.0	758	68	3800	5760	5760	11250
146.1	11687/80	PHQ941_0060K513_0240 MB33	45	0.6	2800	2500	4000	32	105	4.0	2.0	758	68	3800	5760	5760	11250
175.1	14007/80	PHQ941_0060K513_0290 MB23	8.0	31	3400	3000	4000	9.2	98	4.0	2.0	757	66	3800	5760	5760	10123
175.1	14007/80	PHQ941_0060K513_0290 MB23	12	25	3400	3000	4000	9.2	98	4.0	2.0	757	66	3800	5760	5760	10123
175.1	14007/80	PHQ941_0060K513_0290 MB23	16	20	3400	3000	4000	9.2	98	4.0	2.0	757	66	3800	5760	5760	10123
175.1	14007/80	PHQ941_0060K513_0290 MB23	24	8.4	3400	3000	4000	9.2	98	4.0	2.0	757	66	3800	5760	5760	10123
175.1	14007/80	PHQ941_0060K513_0290 MB23	30	–	3400	3000	4000	9.2	98	4.0	2.0	757	66	3800	5760	5760	10123
175.1	14007/80	PHQ941_0060K513_0290 MB33	16	31	3400	3000	4000	31	105	4.0	2.0	762	66	3800	5760	5760	11250
175.1	14007/80	PHQ941_0060K513_0290 MB33	24	19	3400	3000	4000	31	105	4.0	2.0	762	66	3800	5760	5760	11250
175.1	14007/80	PHQ941_0060K513_0290 MB33	32	8.3	3400	3000	4000	31	105	4.0	2.0	762	66	3800	5760	5760	11250
193.8	62031/320	PHQ941_0060K513_0320 MB23	8.0	31	3400	3000	4000	9.1	98	4.0	2.0	759	66	3800	5760	5760	11208
193.8	62031/320	PHQ941_0060K513_0320 MB23	12	25	3400	3000	4000	9.1	98	4.0	2.0	759	66	3800	5760	5760	11208
193.8	62031/320	PHQ941_0060K513_0320 MB23	16	20	3400	3000	4000	9.1	98	4.0	2.0	759	66	3800	5760	5760	11208
193.8	62031/320	PHQ941_0060K513_0320 MB23	24	8.4	3400	3000	4000	9.1	98	4.0	2.0	759	66	3800	5760	5760	11208
193.8	62031/320	PHQ941_0060K513_0320 MB23	30	–	3400	3000	4000	9.1	98	4.0	2.0	759	66	3800	5760	5760	11208
193.8	62031/320	PHQ941_0060K513_0320 MB33	16	26	3400	3000	4000	31	105	4.0	2.0	763	66	3800	5760	5760	11250
193.8	62031/320	PHQ941_0060K513_0320 MB33	24	14	3400	3000	4000	31	105	4.0	2.0	763	66	3800	5760	5760	11250
193.8	62031/320	PHQ941_0060K513_0320 MB33	32	3.1	3400	3000	4000	31	105	4.0	2.0	763	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB23	8.0	31	3400	3000	4000	8.7	98	4.0	2.0	761	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB23	12	25	3400	3000	4000	8.7	98	4.0	2.0	761	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB23	16	20	3400	3000	4000	8.7	98	4.0	2.0	761	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB23	24	8.4	3400	3000	4000	8.7	98	4.0	2.0	761	66	3800	5760	5760	11250



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ941K (M<sub>2acc,max</sub> = 5760 Nm)</b>																	
208.8	1044/5	PHQ941_0060K513_0350 MB23	30	–	3400	3000	4000	8.7	98	4.0	2.0	761	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB33	16	22	3400	3000	4000	29	105	4.0	2.0	765	66	3800	5760	5760	11250
208.8	1044/5	PHQ941_0060K513_0350 MB33	24	11	3400	3000	4000	29	105	4.0	2.0	765	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB23	8.0	29	3400	3000	4000	8.6	98	4.0	2.0	763	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB23	12	23	3400	3000	4000	8.6	98	4.0	2.0	763	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB23	16	18	3400	3000	4000	8.6	98	4.0	2.0	763	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB23	24	6.6	3400	3000	4000	8.6	98	4.0	2.0	763	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB33	16	18	3400	3000	4000	29	105	4.0	2.0	766	66	3800	5760	5760	11250
231.2	8091/35	PHQ941_0060K513_0390 MB33	24	6.6	3400	3000	4000	29	105	4.0	2.0	766	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB23	8.0	24	3400	3000	4000	8.2	98	4.0	2.0	765	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB23	12	19	3400	3000	4000	8.2	98	4.0	2.0	765	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB23	16	13	3400	3000	4000	8.2	98	4.0	2.0	765	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB23	24	2.0	3400	3000	4000	8.2	98	4.0	2.0	765	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB33	16	13	3400	3000	4000	29	105	4.0	2.0	767	66	3800	5760	5760	11250
261.0	261/1	PHQ941_0060K513_0440 MB33	24	2.0	3400	3000	4000	29	105	4.0	2.0	767	66	3800	5760	5760	11250
289.0	8091/28	PHQ941_0060K513_0480 MB23	8.0	21	3400	3000	4000	8.2	98	4.0	2.0	766	66	3800	5760	5760	11250
289.0	8091/28	PHQ941_0060K513_0480 MB23	12	15	3400	3000	4000	8.2	98	4.0	2.0	766	66	3800	5760	5760	11250
289.0	8091/28	PHQ941_0060K513_0480 MB23	16	9.8	3400	3000	4000	8.2	98	4.0	2.0	766	66	3800	5760	5760	11250
289.0	8091/28	PHQ941_0060K513_0480 MB33	16	9.8	3400	3000	4000	29	105	4.0	2.0	768	66	3800	5760	5760	11250
349.8	22736/65	PHQ941_0060K513_0580 MB23	8.0	15	3400	3000	4000	7.8	98	4.0	2.0	767	66	3800	5760	5760	11250
349.8	22736/65	PHQ941_0060K513_0580 MB23	12	9.8	3400	3000	4000	7.8	98	4.0	2.0	767	66	3800	5760	5760	11250
349.8	22736/65	PHQ941_0060K513_0580 MB23	16	4.2	3400	3000	4000	7.8	98	4.0	2.0	767	66	3800	5760	5760	11250
349.8	22736/65	PHQ941_0060K513_0580 MB33	16	4.2	3400	3000	4000	28	105	4.0	2.0	769	66	3800	5760	5760	11250
387.3	25172/65	PHQ941_0060K513_0650 MB23	8.0	13	3400	3000	4000	7.8	98	4.0	2.0	768	66	3800	5760	5760	11250
387.3	25172/65	PHQ941_0060K513_0650 MB23	12	7.2	3400	3000	4000	7.8	98	4.0	2.0	768	66	3800	5760	5760	11250
387.3	25172/65	PHQ941_0060K513_0650 MB23	16	1.6	3400	3000	4000	7.8	98	4.0	2.0	768	66	3800	5760	5760	11250
387.3	25172/65	PHQ941_0060K513_0650 MB33	16	1.6	3400	3000	4000	28	105	4.0	2.0	769	66	3800	5760	5760	11250
420.5	841/2	PHQ941_0060K513_0700 MB23	8.0	9.0	3400	3000	4000	7.6	98	4.0	2.0	769	66	3800	5673	5670	10259
420.5	841/2	PHQ941_0060K513_0700 MB23	12	3.4	3400	3000	4000	7.6	98	4.0	2.0	769	66	3800	5673	5670	10259
465.6	26071/56	PHQ941_0060K513_0780 MB23	8.0	8.8	3400	3000	4000	7.6	98	4.0	2.0	769	66	3800	5760	5760	11250
465.6	26071/56	PHQ941_0060K513_0780 MB23	12	3.2	3400	3000	4000	7.6	98	4.0	2.0	769	66	3800	5760	5760	11250
523.7	26187/50	PHQ941_0060K513_0870 MB23	8.0	2.4	3400	3000	4000	7.5	98	4.0	2.0	769	66	3800	4765	4760	8617
579.9	115971/200	PHQ941_0060K513_0970 MB23	8.0	2.4	3400	3000	4000	7.5	98	4.0	2.0	770	66	3800	5275	5280	9540
<b>PHQ1041K (M<sub>2acc,max</sub> = 10000 Nm)</b>																	
45.38	59535/1312	PHQ1041_0060K713_0076 MB43	50	154	1700	1600	2700	142	178	4.0	–	1210	78	6500	9329	–	13993
45.38	59535/1312	PHQ1041_0060K713_0076 MB43	72	123	1700	1600	2700	142	178	4.0	–	1210	78	6500	9329	–	13993
45.38	59535/1312	PHQ1041_0060K713_0076 MB43	100	84	1700	1600	2700	142	178	4.0	–	1210	78	6500	9329	–	13993
45.38	59535/1312	PHQ1041_0060K713_0076 MB43	160	–	1700	1600	2700	142	178	4.0	–	1210	78	6500	9329	–	13993
50.24	263655/5248	PHQ1041_0060K713_0084 MB43	50	154	1700	1600	2700	138	178	4.0	–	1263	78	6500	10000	–	15492
50.24	263655/5248	PHQ1041_0060K713_0084 MB43	72	123	1700	1600	2700	138	178	4.0	–	1263	78	6500	10000	–	15492
50.24	263655/5248	PHQ1041_0060K713_0084 MB43	100	84	1700	1600	2700	138	178	4.0	–	1263	78	6500	10000	–	15492
50.24	263655/5248	PHQ1041_0060K713_0084 MB43	160	–	1700	1600	2700	138	178	4.0	–	1263	78	6500	10000	–	15492
55.13	441/8	PHQ1041_0060K713_0092 MB43	50	154	1700	1600	2700	127	178	4.0	–	1305	78	6500	10000	–	17000
55.13	441/8	PHQ1041_0060K713_0092 MB43	72	123	1700	1600	2700	127	178	4.0	–	1305	78	6500	10000	–	17000
55.13	441/8	PHQ1041_0060K713_0092 MB43	100	84	1700	1600	2700	127	178	4.0	–	1305	78	6500	10000	–	17000
55.13	441/8	PHQ1041_0060K713_0092 MB43	160	–	1700	1600	2700	127	178	4.0	–	1305	78	6500	10000	–	17000
61.03	1953/32	PHQ1041_0060K713_0100 MB43	50	154	1700	1600	2700	124	178	4.0	–	1345	78	6500	10000	–	18820
61.03	1953/32	PHQ1041_0060K713_0100 MB43	72	123	1700	1600	2700	124	178	4.0	–	1345	78	6500	10000	–	18820
61.03	1953/32	PHQ1041_0060K713_0100 MB43	100	84	1700	1600	2700	124	178	4.0	–	1345	78	6500	10000	–	18820
61.03	1953/32	PHQ1041_0060K713_0100 MB43	160	–	1700	1600	2700	124	178	4.0	–	1345	78	6500	10000	–	18820
70.69	70119/992	PHQ1041_0060K713_0120 MB33	16	104	2000	1900	3200	60	164	4.0	–	1353	76	6487	6487	–	12261
70.69	70119/992	PHQ1041_0060K713_0120 MB33	24	92	2000	1900	3200	60	164	4.0	–	1353	76	6487	6487	–	12261
70.69	70119/992	PHQ1041_0060K713_0120 MB33	32	81	2000	1900	3200	60	164	4.0	–	1353	76	6487	6487	–	12261
70.69	70119/992	PHQ1041_0060K713_0120 MB33	45	63	2000	1900	3200	60	164	4.0	–	1353	76	6487	6487	–	12261
70.69	70119/992	PHQ1041_0060K713_0120 MB33	90	–	2000	1900	3200	60	164	4.0	–	1353	76	6487	6487	–	12261
70.69	70119/992	PHQ1041_0060K713_0120 MB43	50	154	2000	1900	3000	113	178	4.0	–	1394	76	6500	10000	–	20000
70.69	70119/992	PHQ1041_0060K713_0120 MB43	72	123	2000	1900	3000	113	178	4.0	–	1394	76	6500	10000	–	20000
70.69	70119/992	PHQ1041_0060K713_0120 MB43	100	84	2000	1900	3000	113	178	4.0	–	1394	76	6500	10000	–	20000
70.69	70119/992	PHQ1041_0060K713_0120 MB43	160	–	2000	1900	3000	113	178	4.0	–	1394	76	6500	10000	–	20000
78.26	10017/128	PHQ1041_0060K713_0130 MB33	16	104	2000	1900	3200	58	164	4.0	–	1387	76	6500	7182	–	13574
78.26	10017/128	PHQ1041_0060K713_0130 MB33	24	92	2000	1900	3200	58	164	4.0	–	1387	76	6500	7182	–	13574
78.26	10017/128	PHQ1041_0060K713_0130 MB33	32	81	2000	1900	3200	58	164	4.0	–	1387	76	6500	7182	–	13574
78.26	10017/128	PHQ1041_0060K713_0130 MB33	45	63	2000	1900	3200	58	164	4.0	–	1387	76	6500	7182	–	13574
78.26	10017/128	PHQ1041_0060K713_0130 MB33	90	–	2000	1900	3200	58	164	4.0	–	1387	76	6500	7182	–	13574

9.2 Selection tables 9 PHQK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ1041K (M<sub>2acc,max</sub> = 10000 Nm)</b>																	
78.26	10017/128	PHQ1041_0060K713_0130 MB43	50	141	2000	1900	3000	111	178	4.0	–	1422	76	6500	10000	–	20000
78.26	10017/128	PHQ1041_0060K713_0130 MB43	72	110	2000	1900	3000	111	178	4.0	–	1422	76	6500	10000	–	20000
78.26	10017/128	PHQ1041_0060K713_0130 MB43	100	71	2000	1900	3000	111	178	4.0	–	1422	76	6500	10000	–	20000
88.81	1421/16	PHQ1041_0060K713_0150 MB33	16	104	2000	1900	3200	52	164	4.0	–	1423	76	6500	8151	–	15405
88.81	1421/16	PHQ1041_0060K713_0150 MB33	24	92	2000	1900	3200	52	164	4.0	–	1423	76	6500	8151	–	15405
88.81	1421/16	PHQ1041_0060K713_0150 MB33	32	81	2000	1900	3200	52	164	4.0	–	1423	76	6500	8151	–	15405
88.81	1421/16	PHQ1041_0060K713_0150 MB33	45	63	2000	1900	3200	52	164	4.0	–	1423	76	6500	8151	–	15405
88.81	1421/16	PHQ1041_0060K713_0150 MB33	90	–	2000	1900	3200	52	164	4.0	–	1423	76	6500	8151	–	15405
88.81	1421/16	PHQ1041_0060K713_0150 MB43	50	116	2000	1900	3000	104	178	4.0	–	1451	76	6500	10000	–	20000
88.81	1421/16	PHQ1041_0060K713_0150 MB43	72	85	2000	1900	3000	104	178	4.0	–	1451	76	6500	10000	–	20000
88.81	1421/16	PHQ1041_0060K713_0150 MB43	100	46	2000	1900	3000	104	178	4.0	–	1451	76	6500	10000	–	20000
98.33	6293/64	PHQ1041_0060K713_0165 MB33	16	104	2000	1900	3200	50	164	4.0	–	1446	76	6500	9024	–	17056
98.33	6293/64	PHQ1041_0060K713_0165 MB33	24	92	2000	1900	3200	50	164	4.0	–	1446	76	6500	9024	–	17056
98.33	6293/64	PHQ1041_0060K713_0165 MB33	32	81	2000	1900	3200	50	164	4.0	–	1446	76	6500	9024	–	17056
98.33	6293/64	PHQ1041_0060K713_0165 MB33	45	63	2000	1900	3200	50	164	4.0	–	1446	76	6500	9024	–	17056
98.33	6293/64	PHQ1041_0060K713_0165 MB33	90	–	2000	1900	3200	50	164	4.0	–	1446	76	6500	9024	–	17056
98.33	6293/64	PHQ1041_0060K713_0165 MB43	50	98	2000	1900	3000	103	178	4.0	–	1470	76	6500	10000	–	20000
98.33	6293/64	PHQ1041_0060K713_0165 MB43	72	67	2000	1900	3000	103	178	4.0	–	1470	76	6500	10000	–	20000
98.33	6293/64	PHQ1041_0060K713_0165 MB43	100	28	2000	1900	3000	103	178	4.0	–	1470	76	6500	10000	–	20000
109.7	80703/736	PHQ1041_0060K713_0185 MB33	16	104	2400	2200	3600	46	164	4.0	–	1467	74	6500	10000	–	19020
109.7	80703/736	PHQ1041_0060K713_0185 MB33	24	92	2400	2200	3600	46	164	4.0	–	1467	74	6500	10000	–	19020
109.7	80703/736	PHQ1041_0060K713_0185 MB33	32	81	2400	2200	3600	46	164	4.0	–	1467	74	6500	10000	–	19020
109.7	80703/736	PHQ1041_0060K713_0185 MB33	45	63	2400	2200	3600	46	164	4.0	–	1467	74	6500	10000	–	19020
109.7	80703/736	PHQ1041_0060K713_0185 MB33	90	–	2400	2200	3600	46	164	4.0	–	1467	74	6500	10000	–	19020
109.7	80703/736	PHQ1041_0060K713_0185 MB43	50	81	2400	2200	3000	99	178	4.0	–	1487	74	6500	10000	–	20000
109.7	80703/736	PHQ1041_0060K713_0185 MB43	72	50	2400	2200	3000	99	178	4.0	–	1487	74	6500	10000	–	20000
109.7	80703/736	PHQ1041_0060K713_0185 MB43	100	11	2400	2200	3000	99	178	4.0	–	1487	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB33	16	104	2400	2200	3600	45	164	4.0	–	1484	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB33	24	92	2400	2200	3600	45	164	4.0	–	1484	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB33	32	81	2400	2200	3600	45	164	4.0	–	1484	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB33	45	63	2400	2200	3600	45	164	4.0	–	1484	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB33	90	–	2400	2200	3600	45	164	4.0	–	1484	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB43	50	66	2400	2200	3000	98	178	4.0	–	1500	74	6500	10000	–	20000
121.4	357399/2944	PHQ1041_0060K713_0200 MB43	72	35	2400	2200	3000	98	178	4.0	–	1500	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB33	16	99	2400	2200	3600	41	164	4.0	–	1499	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB33	24	87	2400	2200	3600	41	164	4.0	–	1499	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB33	32	76	2400	2200	3600	41	164	4.0	–	1499	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB33	45	58	2400	2200	3600	41	164	4.0	–	1499	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB43	50	51	2400	2200	3000	94	178	4.0	–	1512	74	6500	10000	–	20000
136.4	43659/320	PHQ1041_0060K713_0230 MB43	72	20	2400	2200	3000	94	178	4.0	–	1512	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB33	16	87	2400	2200	3600	41	164	4.0	–	1510	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB33	24	76	2400	2200	3600	41	164	4.0	–	1510	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB33	32	65	2400	2200	3600	41	164	4.0	–	1510	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB33	45	46	2400	2200	3600	41	164	4.0	–	1510	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB43	50	39	2400	2200	3000	94	178	4.0	–	1521	74	6500	10000	–	20000
151.1	193347/1280	PHQ1041_0060K713_0250 MB43	72	8.6	2400	2200	3000	94	178	4.0	–	1521	74	6500	10000	–	20000
175.7	22491/128	PHQ1041_0060K713_0290 MB33	16	72	2900	2600	4000	37	164	4.0	–	1523	72	6500	10000	–	20000
175.7	22491/128	PHQ1041_0060K713_0290 MB33	24	60	2900	2600	4000	37	164	4.0	–	1523	72	6500	10000	–	20000
175.7	22491/128	PHQ1041_0060K713_0290 MB33	32	49	2900	2600	4000	37	164	4.0	–	1523	72	6500	10000	–	20000
175.7	22491/128	PHQ1041_0060K713_0290 MB33	45	31	2900	2600	4000	37	164	4.0	–	1523	72	6500	10000	–	20000
175.7	22491/128	PHQ1041_0060K713_0290 MB43	50	24	2900	2600	3000	90	178	4.0	–	1531	72	6500	10000	–	20000
194.5	99603/512	PHQ1041_0060K713_0320 MB33	16	63	2900	2600	4000	37	164	4.0	–	1530	72	6500	10000	–	20000
194.5	99603/512	PHQ1041_0060K713_0320 MB33	24	51	2900	2600	4000	37	164	4.0	–	1530	72	6500	10000	–	20000
194.5	99603/512	PHQ1041_0060K713_0320 MB33	32	40	2900	2600	4000	37	164	4.0	–	1530	72	6500	10000	–	20000
194.5	99603/512	PHQ1041_0060K713_0320 MB33	45	22	2900	2600	4000	37	164	4.0	–	1530	72	6500	10000	–	20000
194.5	99603/512	PHQ1041_0060K713_0320 MB43	50	15	2900	2600	3000	90	178	4.0	–	1536	72	6500	10000	–	20000
212.6	1701/8	PHQ1041_0060K713_0350 MB33	16	55	2900	2600	4000	35	164	4.0	–	1535	72	6500	10000	–	20000
212.6	1701/8	PHQ1041_0060K713_0350 MB33	24	44	2900	2600	4000	35	164	4.0	–	1535	72	6500	10000	–	20000
212.6	1701/8	PHQ1041_0060K713_0350 MB33	32	33	2900	2600	4000	35	164	4.0	–	1535	72	6500	10000	–	20000
212.6	1701/8	PHQ1041_0060K713_0350 MB33	45	15	2900	2600	4000	35	164	4.0	–	1535	72	6500	10000	–	20000
212.6	1701/8	PHQ1041_0060K713_0350 MB43	50	7.7	2900	2600	3000	83	178	4.0	–	1540	72	6500	10000	–	20000
235.4	7533/32	PHQ1041_0060K713_0390 MB33	16	48	2900	2600	4000	35	164	4.0	–	1539	72	6500	10000	–	20000
235.4	7533/32	PHQ1041_0060K713_0390 MB33	24	37	2900	2600	4000	35	164	4.0	–	1539	72	6500	10000	–	20000
235.4	7533/32	PHQ1041_0060K713_0390 MB33	32	25	2900	2600	4000	35	164	4.0	–	1539	72	6500	10000	–	20000

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ1041K (M<sub>2acc,max</sub> = 10000 Nm)</b>																	
235.4	7533/32	PHQ1041_0060K713_0390 MB33	45	7.2	2900	2600	4000	35	164	4.0	–	1539	72	6500	10000	–	20000
235.4	7533/32	PHQ1041_0060K713_0390 MB43	50	0.2	2900	2600	3000	82	178	4.0	–	1544	72	6500	10000	–	20000
270.3	112455/416	PHQ1041_0060K713_0450 MB33	16	39	2900	2600	4000	33	164	4.0	–	1544	72	6500	10000	–	20000
270.3	112455/416	PHQ1041_0060K713_0450 MB33	24	28	2900	2600	4000	33	164	4.0	–	1544	72	6500	10000	–	20000
270.3	112455/416	PHQ1041_0060K713_0450 MB33	32	16	2900	2600	4000	33	164	4.0	–	1544	72	6500	10000	–	20000
299.3	498015/1664	PHQ1041_0060K713_0500 MB33	16	33	2900	2600	4000	33	164	4.0	–	1547	72	6500	10000	–	20000
299.3	498015/1664	PHQ1041_0060K713_0500 MB33	24	22	2900	2600	4000	33	164	4.0	–	1547	72	6500	10000	–	20000
299.3	498015/1664	PHQ1041_0060K713_0500 MB33	32	10	2900	2600	4000	33	164	4.0	–	1547	72	6500	10000	–	20000
351.4	22491/64	PHQ1041_0060K713_0590 MB33	16	25	2900	2600	4000	32	164	4.0	–	1551	72	6500	10000	–	20000
351.4	22491/64	PHQ1041_0060K713_0590 MB33	24	13	2900	2600	4000	32	164	4.0	–	1551	72	6500	10000	–	20000
351.4	22491/64	PHQ1041_0060K713_0590 MB33	32	2.2	2900	2600	4000	32	164	4.0	–	1551	72	6500	10000	–	20000
389.1	99603/256	PHQ1041_0060K713_0650 MB33	16	20	2900	2600	4000	31	164	4.0	–	1553	72	6500	10000	–	20000
389.1	99603/256	PHQ1041_0060K713_0650 MB33	24	8.9	2900	2600	4000	31	164	4.0	–	1553	72	6500	10000	–	20000
427.2	13671/32	PHQ1041_0060K713_0710 MB33	16	16	2900	2600	4000	30	164	4.0	–	1554	72	6500	10000	–	20000
427.2	13671/32	PHQ1041_0060K713_0710 MB33	24	5.1	2900	2600	4000	30	164	4.0	–	1554	72	6500	10000	–	20000
473.0	60543/128	PHQ1041_0060K713_0790 MB33	16	13	2900	2600	4000	29	164	4.0	–	1555	72	6500	10000	–	20000
473.0	60543/128	PHQ1041_0060K713_0790 MB33	24	1.3	2900	2600	4000	29	164	4.0	–	1555	72	6500	10000	–	20000
534.0	68355/128	PHQ1041_0060K713_0890 MB33	16	8.5	2900	2600	4000	29	164	4.0	–	1556	72	6500	10000	–	20000
591.2	302715/512	PHQ1041_0060K713_0990 MB33	16	5.5	2900	2600	4000	29	164	4.0	–	1557	72	6500	10000	–	20000
<b>PHQ1141K (M<sub>2acc,max</sub> = 22000 Nm)</b>																	
44.67	3127/70	PHQ1141_0060K813_0074 MB43	50	154	1600	1500	2600	228	319	4.0	–	1747	81	8302	9183	–	13775
44.67	3127/70	PHQ1141_0060K813_0074 MB43	72	123	1600	1500	2600	228	319	4.0	–	1747	81	8302	9183	–	13775
44.67	3127/70	PHQ1141_0060K813_0074 MB43	100	84	1600	1500	2600	228	319	4.0	–	1747	81	8302	9183	–	13775
44.67	3127/70	PHQ1141_0060K813_0074 MB43	160	–	1600	1500	2600	228	319	4.0	–	1747	81	8302	9183	–	13775
49.46	96937/1960	PHQ1141_0060K813_0082 MB43	50	154	1600	1500	2600	214	319	4.0	–	1861	81	9192	10167	–	15251
49.46	96937/1960	PHQ1141_0060K813_0082 MB43	72	123	1600	1500	2600	214	319	4.0	–	1861	81	9192	10167	–	15251
49.46	96937/1960	PHQ1141_0060K813_0082 MB43	100	84	1600	1500	2600	214	319	4.0	–	1861	81	9192	10167	–	15251
49.46	96937/1960	PHQ1141_0060K813_0082 MB43	160	–	1600	1500	2600	214	319	4.0	–	1861	81	9192	10167	–	15251
55.70	11977/215	PHQ1141_0060K813_0093 MB43	50	154	1600	1500	2600	186	319	4.0	–	1983	81	10352	11452	–	17177
55.70	11977/215	PHQ1141_0060K813_0093 MB43	72	123	1600	1500	2600	186	319	4.0	–	1983	81	10352	11452	–	17177
55.70	11977/215	PHQ1141_0060K813_0093 MB43	100	84	1600	1500	2600	186	319	4.0	–	1983	81	10352	11452	–	17177
55.70	11977/215	PHQ1141_0060K813_0093 MB43	160	–	1600	1500	2600	186	319	4.0	–	1983	81	10352	11452	–	17177
61.67	53041/860	PHQ1141_0060K813_0105 MB43	50	154	1600	1500	2600	177	319	4.0	–	2077	81	11462	12679	–	19018
61.67	53041/860	PHQ1141_0060K813_0105 MB43	72	123	1600	1500	2600	177	319	4.0	–	2077	81	11462	12679	–	19018
61.67	53041/860	PHQ1141_0060K813_0105 MB43	100	84	1600	1500	2600	177	319	4.0	–	2077	81	11462	12679	–	19018
61.67	53041/860	PHQ1141_0060K813_0105 MB43	160	–	1600	1500	2600	177	319	4.0	–	2077	81	11462	12679	–	19018
89.05	28497/320	PHQ1141_0060K813_0150 MB43	50	154	1900	1800	3000	133	319	4.0	–	2329	79	13000	18307	–	27461
89.05	28497/320	PHQ1141_0060K813_0150 MB43	72	123	1900	1800	3000	133	319	4.0	–	2329	79	13000	18307	–	27461
89.05	28497/320	PHQ1141_0060K813_0150 MB43	100	84	1900	1800	3000	133	319	4.0	–	2329	79	13000	18307	–	27461
89.05	28497/320	PHQ1141_0060K813_0150 MB43	160	–	1900	1800	3000	133	319	4.0	–	2329	79	13000	18307	–	27461
98.59	126201/1280	PHQ1141_0060K813_0165 MB43	50	154	1900	1800	3000	129	319	4.0	–	2378	79	13000	20268	–	30403
98.59	126201/1280	PHQ1141_0060K813_0165 MB43	72	123	1900	1800	3000	129	319	4.0	–	2378	79	13000	20268	–	30403
98.59	126201/1280	PHQ1141_0060K813_0165 MB43	100	84	1900	1800	3000	129	319	4.0	–	2378	79	13000	20268	–	30403
98.59	126201/1280	PHQ1141_0060K813_0165 MB43	160	–	1900	1800	3000	129	319	4.0	–	2378	79	13000	20268	–	30403
104.0	30149/290	PHQ1141_0060K813_0175 MB33	16	104	2300	2100	3500	70	305	4.0	–	2344	77	9541	9541	–	18033
104.0	30149/290	PHQ1141_0060K813_0175 MB33	24	92	2300	2100	3500	70	305	4.0	–	2344	77	9541	9541	–	18033
104.0	30149/290	PHQ1141_0060K813_0175 MB33	32	81	2300	2100	3500	70	305	4.0	–	2344	77	9541	9541	–	18033
104.0	30149/290	PHQ1141_0060K813_0175 MB33	45	63	2300	2100	3500	70	305	4.0	–	2344	77	9541	9541	–	18033
104.0	30149/290	PHQ1141_0060K813_0175 MB33	90	–	2300	2100	3500	70	305	4.0	–	2344	77	9541	9541	–	18033
104.0	30149/290	PHQ1141_0060K813_0175 MB43	50	154	2300	2100	3000	123	319	4.0	–	2401	77	13000	21372	–	32058
104.0	30149/290	PHQ1141_0060K813_0175 MB43	72	123	2300	2100	3000	123	319	4.0	–	2401	77	13000	21372	–	32058
104.0	30149/290	PHQ1141_0060K813_0175 MB43	100	84	2300	2100	3000	123	319	4.0	–	2401	77	13000	21372	–	32058
104.0	30149/290	PHQ1141_0060K813_0175 MB43	160	–	2300	2100	3000	123	319	4.0	–	2401	77	13000	21372	–	32058
115.1	133517/1160	PHQ1141_0060K813_0190 MB33	16	104	2300	2100	3500	67	305	4.0	–	2391	77	10563	10563	–	19965
115.1	133517/1160	PHQ1141_0060K813_0190 MB33	24	92	2300	2100	3500	67	305	4.0	–	2391	77	10563	10563	–	19965
115.1	133517/1160	PHQ1141_0060K813_0190 MB33	32	81	2300	2100	3500	67	305	4.0	–	2391	77	10563	10563	–	19965
115.1	133517/1160	PHQ1141_0060K813_0190 MB33	45	63	2300	2100	3500	67	305	4.0	–	2391	77	10563	10563	–	19965
115.1	133517/1160	PHQ1141_0060K813_0190 MB33	90	–	2300	2100	3500	67	305	4.0	–	2391	77	10563	10563	–	19965
115.1	133517/1160	PHQ1141_0060K813_0190 MB43	50	154	2300	2100	3000	120	319	4.0	–	2439	77	13000	22000	–	35492
115.1	133517/1160	PHQ1141_0060K813_0190 MB43	72	123	2300	2100	3000	120	319	4.0	–	2439	77	13000	22000	–	35492
115.1	133517/1160	PHQ1141_0060K813_0190 MB43	100	84	2300	2100	3000	120	319	4.0	–	2439	77	13000	22000	–	35492
115.1	133517/1160	PHQ1141_0060K813_0190 MB43	160	–	2300	2100	3000	120	319	4.0	–	2439	77	13000	22000	–	35492
138.3	31801/230	PHQ1141_0060K813_0230 MB33	16	104	2300	2100	3500	56	305	4.0	–	2458	77	12689	12689	–	23983
138.3	31801/230	PHQ1141_0060K813_0230 MB33	24	92	2300	2100	3500	56	305	4.0	–	2458	77	12689	12689	–	23983

9.2 Selection tables 9 PHQK right-angle planetary gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ1141K (M<sub>2acc,max</sub> = 22000 Nm)</b>																	
138.3	31801/230	PHQ1141_0060K813_0230 MB33	32	81	2300	2100	3500	56	305	4.0	–	2458	77	12689	12689	–	23983
138.3	31801/230	PHQ1141_0060K813_0230 MB33	45	63	2300	2100	3500	56	305	4.0	–	2458	77	12689	12689	–	23983
138.3	31801/230	PHQ1141_0060K813_0230 MB33	90	–	2300	2100	3500	56	305	4.0	–	2458	77	12689	12689	–	23983
138.3	31801/230	PHQ1141_0060K813_0230 MB43	50	154	2300	2100	3000	109	319	4.0	–	2493	77	13000	22000	–	42636
138.3	31801/230	PHQ1141_0060K813_0230 MB43	72	123	2300	2100	3000	109	319	4.0	–	2493	77	13000	22000	–	42636
138.3	31801/230	PHQ1141_0060K813_0230 MB43	100	84	2300	2100	3000	109	319	4.0	–	2493	77	13000	22000	–	42636
138.3	31801/230	PHQ1141_0060K813_0230 MB43	160	–	2300	2100	3000	109	319	4.0	–	2493	77	13000	22000	–	42636
153.1	140833/920	PHQ1141_0060K813_0260 MB33	16	104	2300	2100	3500	54	305	4.0	–	2487	77	13000	14049	–	26552
153.1	140833/920	PHQ1141_0060K813_0260 MB33	24	92	2300	2100	3500	54	305	4.0	–	2487	77	13000	14049	–	26552
153.1	140833/920	PHQ1141_0060K813_0260 MB33	32	81	2300	2100	3500	54	305	4.0	–	2487	77	13000	14049	–	26552
153.1	140833/920	PHQ1141_0060K813_0260 MB33	45	63	2300	2100	3500	54	305	4.0	–	2487	77	13000	14049	–	26552
153.1	140833/920	PHQ1141_0060K813_0260 MB33	90	–	2300	2100	3500	54	305	4.0	–	2487	77	13000	14049	–	26552
153.1	140833/920	PHQ1141_0060K813_0260 MB43	50	154	2300	2100	3000	107	319	4.0	–	2516	77	13000	22000	–	44000
153.1	140833/920	PHQ1141_0060K813_0260 MB43	72	123	2300	2100	3000	107	319	4.0	–	2516	77	13000	22000	–	44000
153.1	140833/920	PHQ1141_0060K813_0260 MB43	100	84	2300	2100	3000	107	319	4.0	–	2516	77	13000	22000	–	44000
153.1	140833/920	PHQ1141_0060K813_0260 MB43	160	–	2300	2100	3000	107	319	4.0	–	2516	77	13000	22000	–	44000
175.5	7021/40	PHQ1141_0060K813_0290 MB33	16	104	2800	2500	4000	47	305	4.0	–	2518	75	13000	16109	–	30446
175.5	7021/40	PHQ1141_0060K813_0290 MB33	24	92	2800	2500	4000	47	305	4.0	–	2518	75	13000	16109	–	30446
175.5	7021/40	PHQ1141_0060K813_0290 MB33	32	81	2800	2500	4000	47	305	4.0	–	2518	75	13000	16109	–	30446
175.5	7021/40	PHQ1141_0060K813_0290 MB33	45	63	2800	2500	4000	47	305	4.0	–	2518	75	13000	16109	–	30446
175.5	7021/40	PHQ1141_0060K813_0290 MB33	90	–	2800	2500	4000	47	305	4.0	–	2518	75	13000	16109	–	30446
175.5	7021/40	PHQ1141_0060K813_0290 MB43	50	137	2800	2500	3000	100	319	4.0	–	2541	75	13000	22000	–	44000
175.5	7021/40	PHQ1141_0060K813_0290 MB43	72	106	2800	2500	3000	100	319	4.0	–	2541	75	13000	22000	–	44000
175.5	7021/40	PHQ1141_0060K813_0290 MB43	100	67	2800	2500	3000	100	319	4.0	–	2541	75	13000	22000	–	44000
194.3	31093/160	PHQ1141_0060K813_0320 MB33	16	104	2800	2500	4000	46	305	4.0	–	2537	75	13000	17835	–	33709
194.3	31093/160	PHQ1141_0060K813_0320 MB33	24	92	2800	2500	4000	46	305	4.0	–	2537	75	13000	17835	–	33709
194.3	31093/160	PHQ1141_0060K813_0320 MB33	32	81	2800	2500	4000	46	305	4.0	–	2537	75	13000	17835	–	33709
194.3	31093/160	PHQ1141_0060K813_0320 MB33	45	63	2800	2500	4000	46	305	4.0	–	2537	75	13000	17835	–	33709
194.3	31093/160	PHQ1141_0060K813_0320 MB33	90	–	2800	2500	4000	46	305	4.0	–	2537	75	13000	17835	–	33709
194.3	31093/160	PHQ1141_0060K813_0320 MB43	50	117	2800	2500	3000	99	319	4.0	–	2556	75	13000	22000	–	44000
194.3	31093/160	PHQ1141_0060K813_0320 MB43	72	86	2800	2500	3000	99	319	4.0	–	2556	75	13000	22000	–	44000
194.3	31093/160	PHQ1141_0060K813_0320 MB43	100	47	2800	2500	3000	99	319	4.0	–	2556	75	13000	22000	–	44000
216.8	8673/40	PHQ1141_0060K813_0360 MB33	16	104	2800	2500	4000	42	305	4.0	–	2553	75	13000	19900	–	37610
216.8	8673/40	PHQ1141_0060K813_0360 MB33	24	92	2800	2500	4000	42	305	4.0	–	2553	75	13000	19900	–	37610
216.8	8673/40	PHQ1141_0060K813_0360 MB33	32	81	2800	2500	4000	42	305	4.0	–	2553	75	13000	19900	–	37610
216.8	8673/40	PHQ1141_0060K813_0360 MB33	45	63	2800	2500	4000	42	305	4.0	–	2553	75	13000	19900	–	37610
216.8	8673/40	PHQ1141_0060K813_0360 MB33	90	–	2800	2500	4000	42	305	4.0	–	2553	75	13000	19900	–	37610
216.8	8673/40	PHQ1141_0060K813_0360 MB43	50	98	2800	2500	3000	95	319	4.0	–	2569	75	13000	22000	–	44000
216.8	8673/40	PHQ1141_0060K813_0360 MB43	72	67	2800	2500	3000	95	319	4.0	–	2569	75	13000	22000	–	44000
216.8	8673/40	PHQ1141_0060K813_0360 MB43	100	28	2800	2500	3000	95	319	4.0	–	2569	75	13000	22000	–	44000
240.1	38409/160	PHQ1141_0060K813_0400 MB33	16	104	2800	2500	4000	41	305	4.0	–	2566	75	13000	22000	–	41639
240.1	38409/160	PHQ1141_0060K813_0400 MB33	24	92	2800	2500	4000	41	305	4.0	–	2566	75	13000	22000	–	41639
240.1	38409/160	PHQ1141_0060K813_0400 MB33	32	81	2800	2500	4000	41	305	4.0	–	2566	75	13000	22000	–	41639
240.1	38409/160	PHQ1141_0060K813_0400 MB33	45	63	2800	2500	4000	41	305	4.0	–	2566	75	13000	22000	–	41639
240.1	38409/160	PHQ1141_0060K813_0400 MB33	90	–	2800	2500	4000	41	305	4.0	–	2566	75	13000	22000	–	41639
240.1	38409/160	PHQ1141_0060K813_0400 MB43	50	81	2800	2500	3000	94	319	4.0	–	2578	75	13000	22000	–	44000
240.1	38409/160	PHQ1141_0060K813_0400 MB43	72	51	2800	2500	3000	94	319	4.0	–	2578	75	13000	22000	–	44000
240.1	38409/160	PHQ1141_0060K813_0400 MB43	100	11	2800	2500	3000	94	319	4.0	–	2578	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB33	16	104	2800	2500	4000	38	305	4.0	–	2576	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB33	24	92	2800	2500	4000	38	305	4.0	–	2576	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB33	32	81	2800	2500	4000	38	305	4.0	–	2576	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB33	45	63	2800	2500	4000	38	305	4.0	–	2576	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB33	90	–	2800	2500	4000	38	305	4.0	–	2576	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB43	50	67	2800	2500	3000	86	319	4.0	–	2587	75	13000	22000	–	44000
265.5	531/2	PHQ1141_0060K813_0440 MB43	72	36	2800	2500	3000	86	319	4.0	–	2587	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB33	16	101	2800	2500	4000	38	305	4.0	–	2585	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB33	24	90	2800	2500	4000	38	305	4.0	–	2585	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB33	32	79	2800	2500	4000	38	305	4.0	–	2585	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB33	45	61	2800	2500	4000	38	305	4.0	–	2585	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB43	50	54	2800	2500	3000	85	319	4.0	–	2593	75	13000	22000	–	44000
293.9	16461/56	PHQ1141_0060K813_0490 MB43	72	23	2800	2500	3000	85	319	4.0	–	2593	75	13000	22000	–	44000
354.5	42539/120	PHQ1141_0060K813_0590 MB33	16	80	2800	2500	4000	35	305	4.0	–	2597	75	13000	22000	–	44000
354.5	42539/120	PHQ1141_0060K813_0590 MB33	24	69	2800	2500	4000	35	305	4.0	–	2597	75	13000	22000	–	44000
354.5	42539/120	PHQ1141_0060K813_0590 MB33	32	58	2800	2500	4000	35	305	4.0	–	2597	75	13000	22000	–	44000



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red</sub>	C <sub>2</sub>	L <sub>pA</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2accHT</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	EL1,2 [rpm]	EL3,4,5,6 [rpm]	[rpm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[Nm/ arcmin]	[dB(A)]	[Nm]	[Nm]	[Nm]	[Nm]
<b>PHQ1141K (M<sub>2acc,max</sub> = 22000 Nm)</b>																	
354.5	42539/120	PHQ1141_0060K813_0590 MB33	45	40	2800	2500	4000	35	305	4.0	–	2597	75	13000	22000	–	44000
354.5	42539/120	PHQ1141_0060K813_0590 MB43	50	33	2800	2500	3000	82	319	4.0	–	2603	75	13000	22000	–	44000
354.5	42539/120	PHQ1141_0060K813_0590 MB43	72	1.7	2800	2500	3000	82	319	4.0	–	2603	75	13000	22000	–	44000
392.5	188387/480	PHQ1141_0060K813_0650 MB33	16	70	2800	2500	4000	34	305	4.0	–	2602	75	13000	22000	–	44000
392.5	188387/480	PHQ1141_0060K813_0650 MB33	24	59	2800	2500	4000	34	305	4.0	–	2602	75	13000	22000	–	44000
392.5	188387/480	PHQ1141_0060K813_0650 MB33	32	48	2800	2500	4000	34	305	4.0	–	2602	75	13000	22000	–	44000
392.5	188387/480	PHQ1141_0060K813_0650 MB33	45	30	2800	2500	4000	34	305	4.0	–	2602	75	13000	22000	–	44000
392.5	188387/480	PHQ1141_0060K813_0650 MB43	50	23	2800	2500	3000	82	319	4.0	–	2606	75	13000	22000	–	44000
430.2	10325/24	PHQ1141_0060K813_0720 MB33	16	62	2800	2500	4000	33	305	4.0	–	2605	75	13000	22000	–	44000
430.2	10325/24	PHQ1141_0060K813_0720 MB33	24	51	2800	2500	4000	33	305	4.0	–	2605	75	13000	22000	–	44000
430.2	10325/24	PHQ1141_0060K813_0720 MB33	32	40	2800	2500	4000	33	305	4.0	–	2605	75	13000	22000	–	44000
430.2	10325/24	PHQ1141_0060K813_0720 MB33	45	21	2800	2500	4000	33	305	4.0	–	2605	75	13000	22000	–	44000
430.2	10325/24	PHQ1141_0060K813_0720 MB43	50	14	2800	2500	3000	81	319	4.0	–	2609	75	13000	22000	–	44000
476.3	45725/96	PHQ1141_0060K813_0790 MB33	16	54	2800	2500	4000	33	305	4.0	–	2609	75	13000	22000	–	44000
476.3	45725/96	PHQ1141_0060K813_0790 MB33	24	43	2800	2500	4000	33	305	4.0	–	2609	75	13000	22000	–	44000
476.3	45725/96	PHQ1141_0060K813_0790 MB33	32	32	2800	2500	4000	33	305	4.0	–	2609	75	13000	22000	–	44000
476.3	45725/96	PHQ1141_0060K813_0790 MB33	45	13	2800	2500	4000	33	305	4.0	–	2609	75	13000	22000	–	44000
476.3	45725/96	PHQ1141_0060K813_0790 MB43	50	6.3	2800	2500	3000	80	319	4.0	–	2612	75	13000	22000	–	44000
526.6	21063/40	PHQ1141_0060K813_0880 MB33	16	33	2800	2500	4000	30	305	4.0	–	2611	75	13000	19387	–	35060
526.6	21063/40	PHQ1141_0060K813_0880 MB33	24	21	2800	2500	4000	30	305	4.0	–	2611	75	13000	19387	–	35060
526.6	21063/40	PHQ1141_0060K813_0880 MB33	32	10	2800	2500	4000	30	305	4.0	–	2611	75	13000	19387	–	35060
583.0	93279/160	PHQ1141_0060K813_0970 MB33	16	33	2800	2500	4000	30	305	4.0	–	2613	75	13000	21465	–	38819
583.0	93279/160	PHQ1141_0060K813_0970 MB33	24	21	2800	2500	4000	30	305	4.0	–	2613	75	13000	21465	–	38819
583.0	93279/160	PHQ1141_0060K813_0970 MB33	32	10	2800	2500	4000	30	305	4.0	–	2613	75	13000	21465	–	38819
<b>PHQ1241K (M<sub>2acc,max</sub> = 43000 Nm)</b>																	
75.15	221247/2944	PHQ1241_0060K913_0125 MB43	50	154	1800	1800	2800	245	565	4.0	–	3547	82	13966	15449	–	23174
75.15	221247/2944	PHQ1241_0060K913_0125 MB43	72	123	1800	1800	2800	245	565	4.0	–	3547	82	13966	15449	–	23174
75.15	221247/2944	PHQ1241_0060K913_0125 MB43	100	84	1800	1800	2800	245	565	4.0	–	3547	82	13966	15449	–	23174
75.15	221247/2944	PHQ1241_0060K913_0125 MB43	160	–	1800	1800	2800	245	565	4.0	–	3547	82	13966	15449	–	23174
114.4	915/8	PHQ1241_0060K913_0190 MB43	50	154	2200	2100	3000	169	565	4.0	–	4106	80	21257	23514	–	35270
114.4	915/8	PHQ1241_0060K913_0190 MB43	72	123	2200	2100	3000	169	565	4.0	–	4106	80	21257	23514	–	35270
114.4	915/8	PHQ1241_0060K913_0190 MB43	100	84	2200	2100	3000	169	565	4.0	–	4106	80	21257	23514	–	35270
114.4	915/8	PHQ1241_0060K913_0190 MB43	160	–	2200	2100	3000	169	565	4.0	–	4106	80	21257	23514	–	35270
143.7	266631/1856	PHQ1241_0060K913_0240 MB43	50	154	2200	2100	3000	144	565	4.0	–	4294	80	25000	29533	–	44299
143.7	266631/1856	PHQ1241_0060K913_0240 MB43	72	123	2200	2100	3000	144	565	4.0	–	4294	80	25000	29533	–	44299
143.7	266631/1856	PHQ1241_0060K913_0240 MB43	100	84	2200	2100	3000	144	565	4.0	–	4294	80	25000	29533	–	44299
143.7	266631/1856	PHQ1241_0060K913_0240 MB43	160	–	2200	2100	3000	144	565	4.0	–	4294	80	25000	29533	–	44299
192.7	141825/736	PHQ1241_0060K913_0320 MB43	50	154	2600	2500	3000	122	565	4.0	–	4451	78	25000	39614	–	59421
192.7	141825/736	PHQ1241_0060K913_0320 MB43	72	123	2600	2500	3000	122	565	4.0	–	4451	78	25000	39614	–	59421
192.7	141825/736	PHQ1241_0060K913_0320 MB43	100	84	2600	2500	3000	122	565	4.0	–	4451	78	25000	39614	–	59421
192.7	141825/736	PHQ1241_0060K913_0320 MB43	160	–	2600	2500	3000	122	565	4.0	–	4451	78	25000	39614	–	59421
228.3	584319/2560	PHQ1241_0060K913_0380 MB43	50	154	2600	2500	3000	112	565	4.0	–	4511	78	25000	43000	–	70385
228.3	584319/2560	PHQ1241_0060K913_0380 MB43	72	123	2600	2500	3000	112	565	4.0	–	4511	78	25000	43000	–	70385
228.3	584319/2560	PHQ1241_0060K913_0380 MB43	100	84	2600	2500	3000	112	565	4.0	–	4511	78	25000	43000	–	70385
228.3	584319/2560	PHQ1241_0060K913_0380 MB43	160	–	2600	2500	3000	112	565	4.0	–	4511	78	25000	43000	–	70385
293.6	300669/1024	PHQ1241_0060K913_0490 MB43	50	154	2600	2500	3000	102	565	4.0	–	4570	78	25000	43000	–	80000
293.6	300669/1024	PHQ1241_0060K913_0490 MB43	72	123	2600	2500	3000	102	565	4.0	–	4570	78	25000	43000	–	80000
293.6	300669/1024	PHQ1241_0060K913_0490 MB43	100	84	2600	2500	3000	102	565	4.0	–	4570	78	25000	43000	–	80000
293.6	300669/1024	PHQ1241_0060K913_0490 MB43	160	–	2600	2500	3000	102	565	4.0	–	4570	78	25000	43000	–	80000
378.4	629703/1664	PHQ1241_0060K913_0630 MB43	50	105	2600	2500	3000	95	565	4.0	–	4607	78	25000	43000	–	80000
378.4	629703/1664	PHQ1241_0060K913_0630 MB43	72	74	2600	2500	3000	95	565	4.0	–	4607	78	25000	43000	–	80000
378.4	629703/1664	PHQ1241_0060K913_0630 MB43	100	35	2600	2500	3000	95	565	4.0	–	4607	78	25000	43000	–	80000
450.0	187209/416	PHQ1241_0060K913_0750 MB43	50	77	2600	2500	3000	86	565	4.0	–	4624	78	25000	43000	–	80000
450.0	187209/416	PHQ1241_0060K913_0750 MB43	72	46	2600	2500	3000	86	565	4.0	–	4624	78	25000	43000	–	80000
450.0	187209/416	PHQ1241_0060K913_0750 MB43	100	6.8	2600	2500	3000	86	565	4.0	–	4624	78	25000	43000	–	80000
572.5	293105/512	PHQ1241_0060K913_0950 MB43	50	27	2600	2500	3000	83	565	4.0	–	4640	78	25000	37154	–	67191

### 9.3 Dimensional drawings

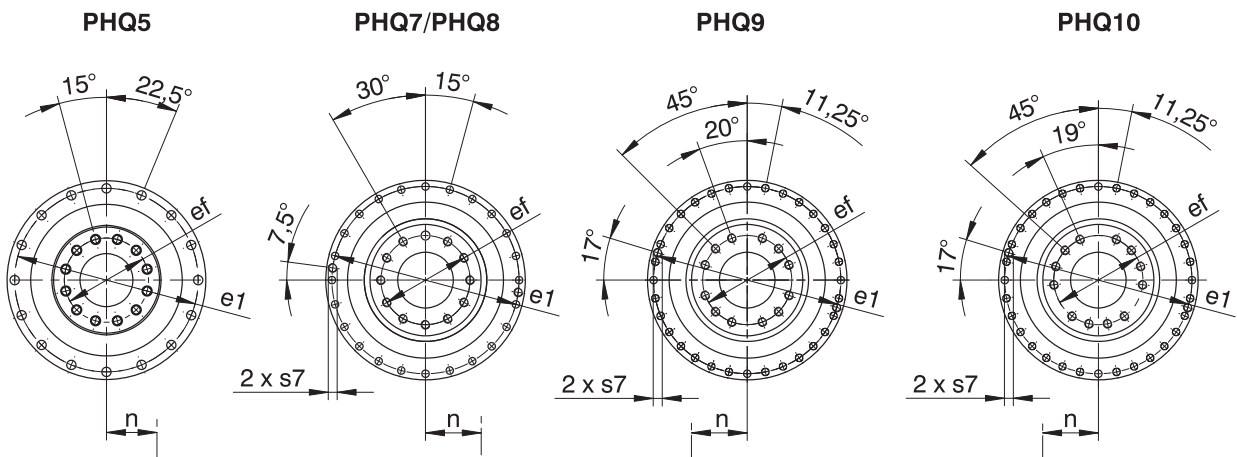
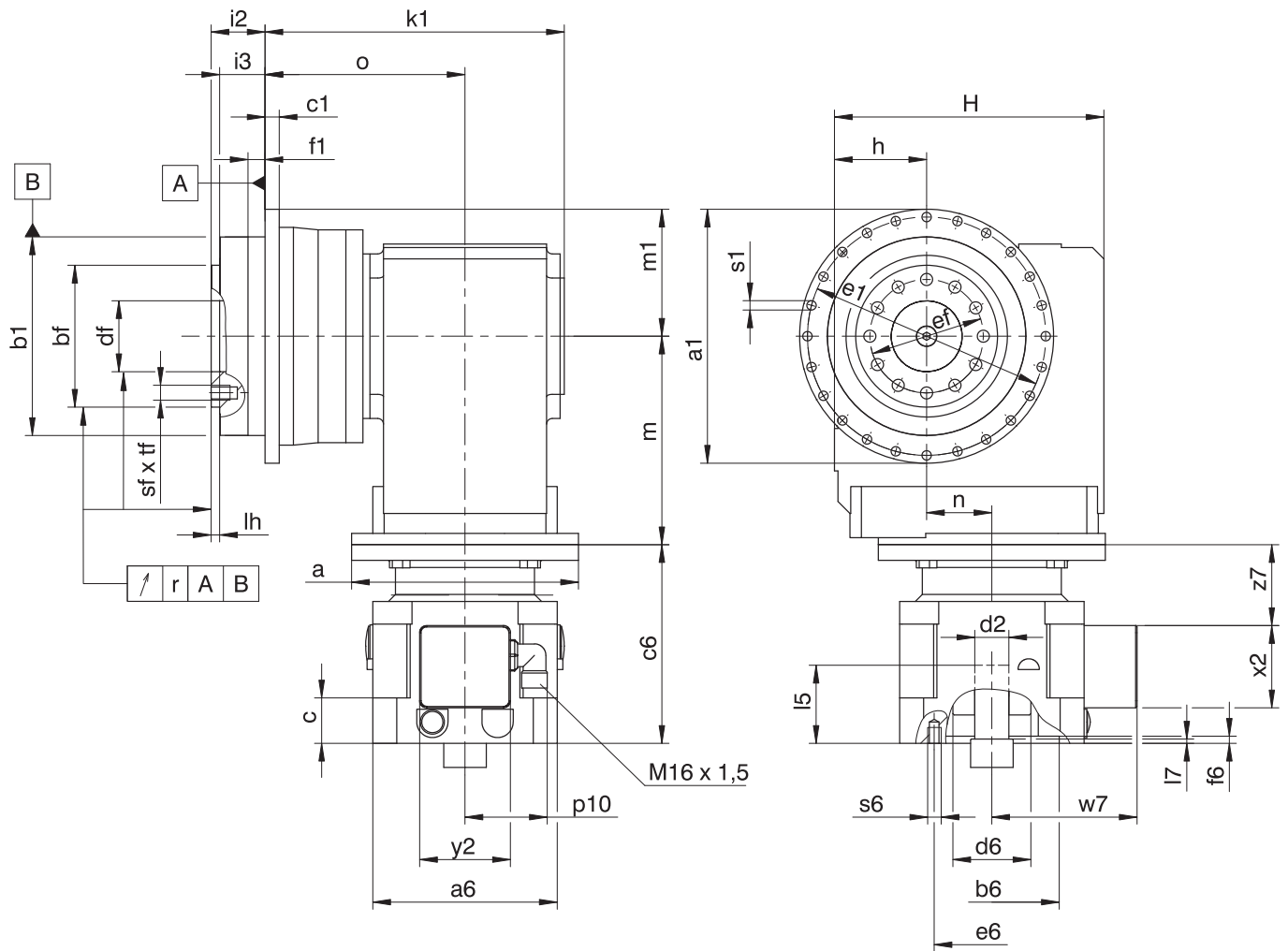
In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

#### 9.3.1 PHQ5 – PHQ10 F shaft design (flange shaft)



Dimensions of gear units

Type	Øa1	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	h	H	i2	i3	k1	lh	m1	o	r	Øs1	s7	sf	tf
PHQ531_K102_	145	110 <sub>h7</sub>	80 <sub>h7</sub>	8	40 <sup>H6</sup>	135	63	12	60	160	29	23	180.0	6	72.5	124.0	0.020	5.5	–	M8	12
PHQ731_K202_	179	140 <sub>h7</sub>	100 <sub>h7</sub>	10	50 <sup>H6</sup>	168	80	12	65	190	38	32	211.0	6	89.5	141.0	0.025	6.6	–	M10	16
PHQ831_K402_	247	200 <sub>h7</sub>	160 <sub>h7</sub>	12	80 <sup>H6</sup>	233	125	15	90	240	50	42	289.0	8	123.5	199.0	0.030	9.0	M10	M12	17
PHQ941_K513_	300	255 <sub>h7</sub>	180 <sub>h7</sub>	18	90 <sup>H6</sup>	280	145	20	160	260	66	55	292.5	12	150.0	196.5	0.030	13.5	M8	M20	28
PHQ1041_K713_	330	285 <sub>h7</sub>	200 <sub>h7</sub>	20	95 <sup>H6</sup>	310	166	20	212	342	75	60	354.5	10	165.0	238.0	0.040	13.5	M10	M24	35

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
PHQ531_K102_	Ø160	128	36	–	–	–	–	–	–
PHQ731_K202_	Ø160	147	46	Ø200	149	46	–	–	–
PHQ831_K402_	Ø160	187	60	Ø200	189	60	Ø250	192	60
PHQ941_K513_	Ø160	172	15	Ø200	174	15	Ø250	177	15
PHQ1041_K713_	–	–	–	Ø200	221	20	Ø250	224	20

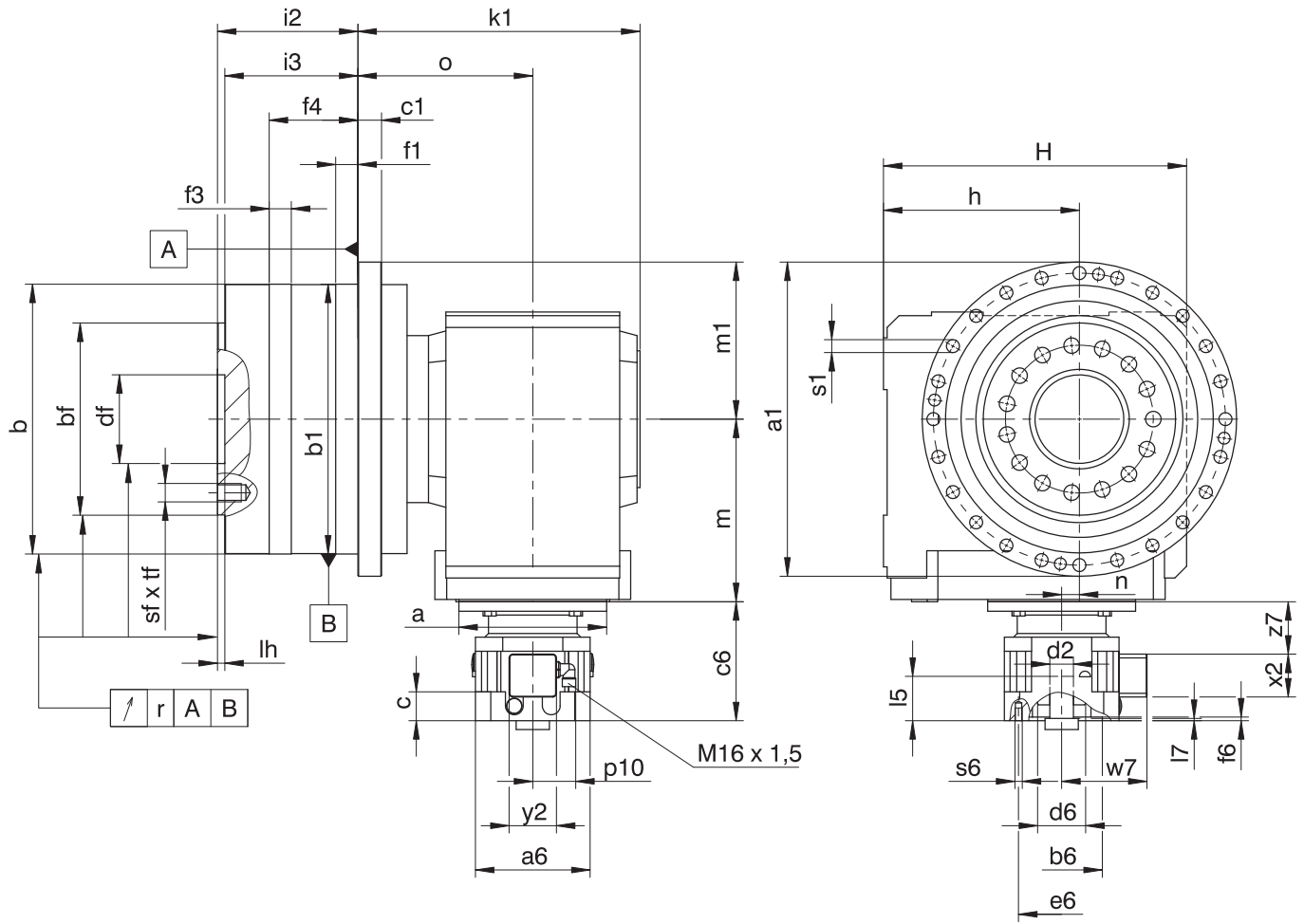
Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
PHQK_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHQK_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHQK_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
PHQK_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHQK_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHQK_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
PHQK_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

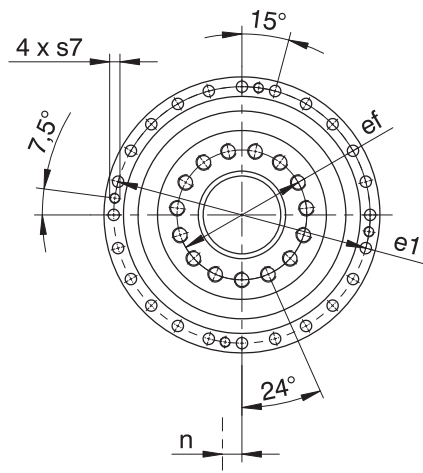
In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

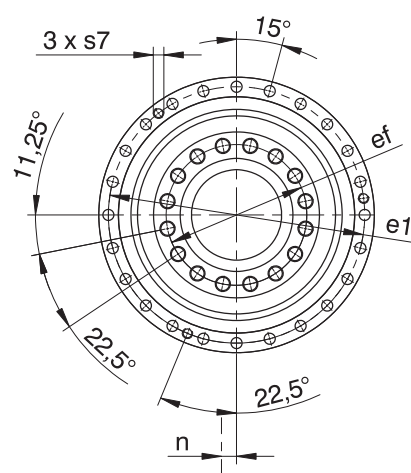
### 9.3.2 PHQ11 – PHQ12 F shaft design (flange shaft)



PHQ11



PHQ12





Dimensions of gear units

Type	Øa1	Øb	Øb1	Øbf	c1	Ødf	Øe1	Øef	f1	f3	f4	h	H	i2	i3	k1	lh	m1	o	r	Øs1	s7	sf	tf
PHQ1141_K813_	425	365 <sub>g6</sub>	365 <sub>h6</sub>	260 <sub>h7</sub>	32	120 <sup>H6</sup>	395	200	30	30	120	265	410	190	180	381.5	10	212.5	236.5	0.040	17.5	M16	M24	35.5
PHQ1241_K913_	550	470 <sub>g6</sub>	470 <sub>h6</sub>	330 <sub>h7</sub>	45	180 <sup>H7</sup>	510	280	30	30	145	315	495	206.5	195.5	452.0	10	275.0	282.0	0.040	22.0	M16	M30	47

Type	MB33			MB43		
	a	m	n	a	m	n
PHQ1141_K813_	Ø200	247	24	Ø250	249	24
PHQ1241_K913_	–	–	–	Ø250	294	25

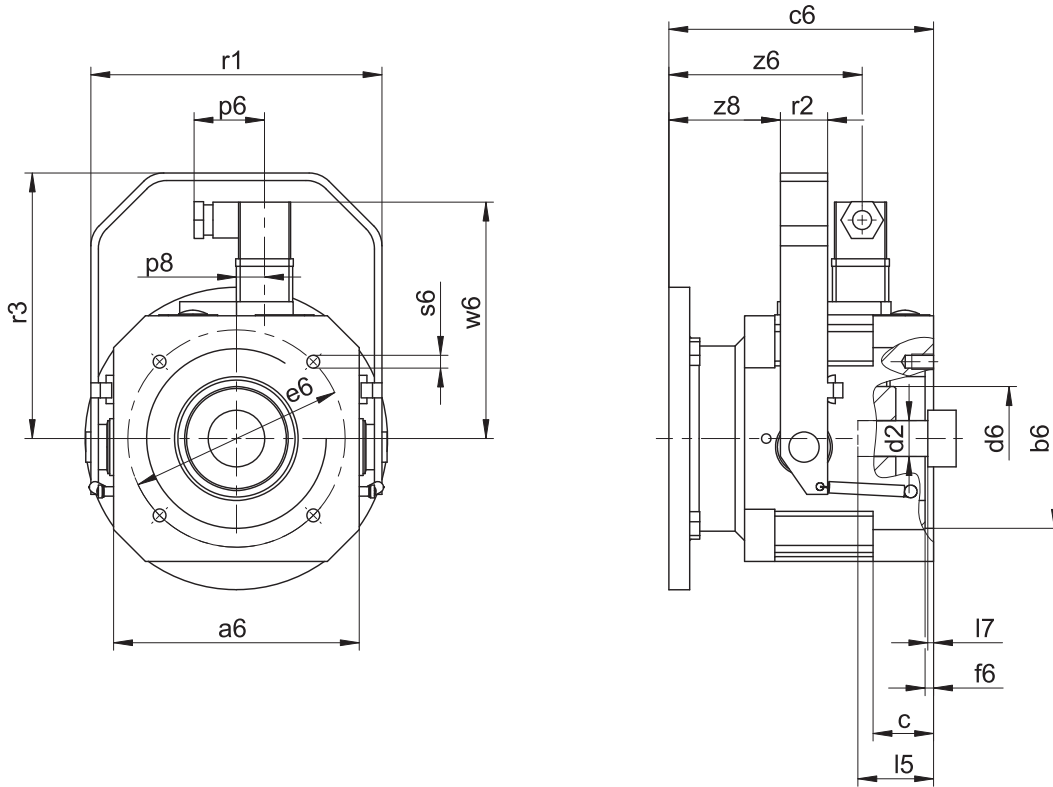
Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	I5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
PHQK_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHQK_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
PHQK_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
PHQK_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and I5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 9.3.3 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5

## 9.4 Type designation

This chapter shows you 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.

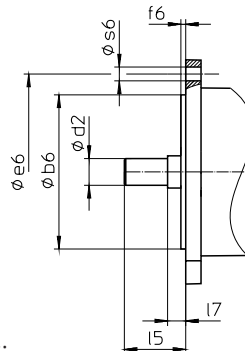
### Example code

PHQ	7	3	1	S	F	S	S	0055	K202VF	0115	MB	2	3
-----	---	---	---	---	---	---	---	------	--------	------	----	---	---

### Explanation

Code	Designation	Design
PHQ	Type	Planetary gear unit
7	Size	7 (example)
3	Generation	Generation 3
4		Generation 4
1	Stages	Single-stage
S	Housing	Standard
F	Shaft	Flange shaft
S	Bearing	Standard bearing
V		Reinforced bearing (PHQ4 – PHQ5)
S	Backlash	Standard
R		Reduced (PHQ4 – PHQ9)
0055	Transmission ratio of output ( $i \times 10$ )	$i = 5.5$ (example)
K202VF	Input	K2 right-angle geared motor (example)
0115	Transmission ratio of input ( $i \times 10$ rounded)	$i = 11.57$ (example)
MB	Motor adapter	ServoStop motor adapter with brake
2	Size	2 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:

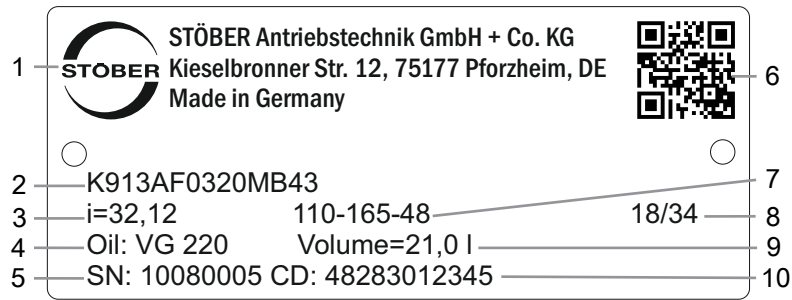
To choose a suitable motor connection, use the STOBBER Configurator at

<https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.

- Mounting position, see the chapter [▶ 9.5.4]
- Output gear unit side 3 or 4, see the chapter [▶ 9.5.4]
- Radial shaft seal rings at the output made of NBR or FKM, see the chapter [▶ 9.6.4]
- For reverse operation of the output shaft from  $\pm 20^\circ$  to  $\pm 90^\circ$  and horizontal installation, see the chapter [▶ 9.6.5]
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 9.5.2.5]
- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 9.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 9.5.6]
- Manual release (optional), see the chapter [▶ 9.3.3]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 9.5.2.6]

## 9.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 9.5 Product description

### 9.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

## 9.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

### 9.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

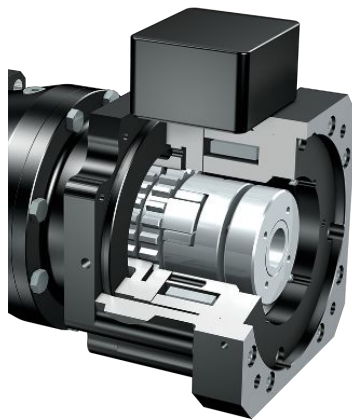


Fig. 1: Motor adapter with ServoStop brake

### 9.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 9.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 9.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 9.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

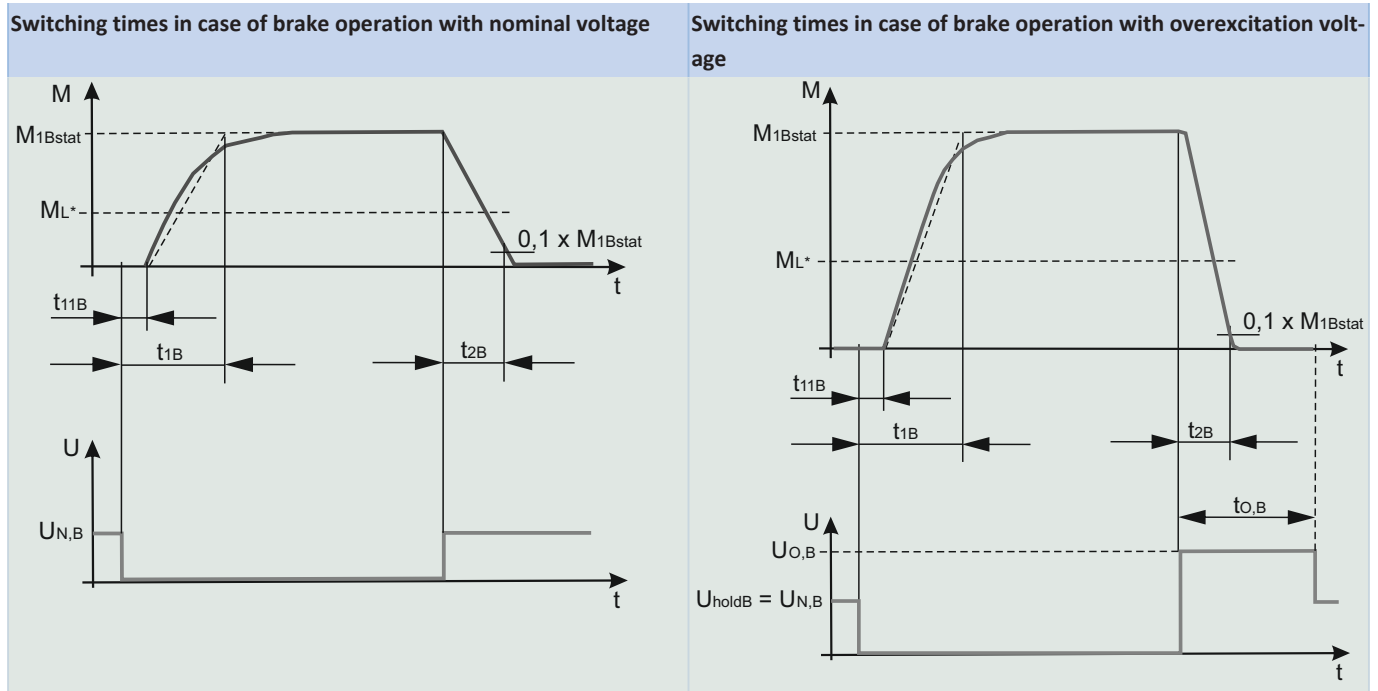
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm 5\%$ , 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

### 9.5.2.6 Brake switching times



### 9.5.3 Installation conditions

The torque and force values listed in this catalog are valid under the following conditions:

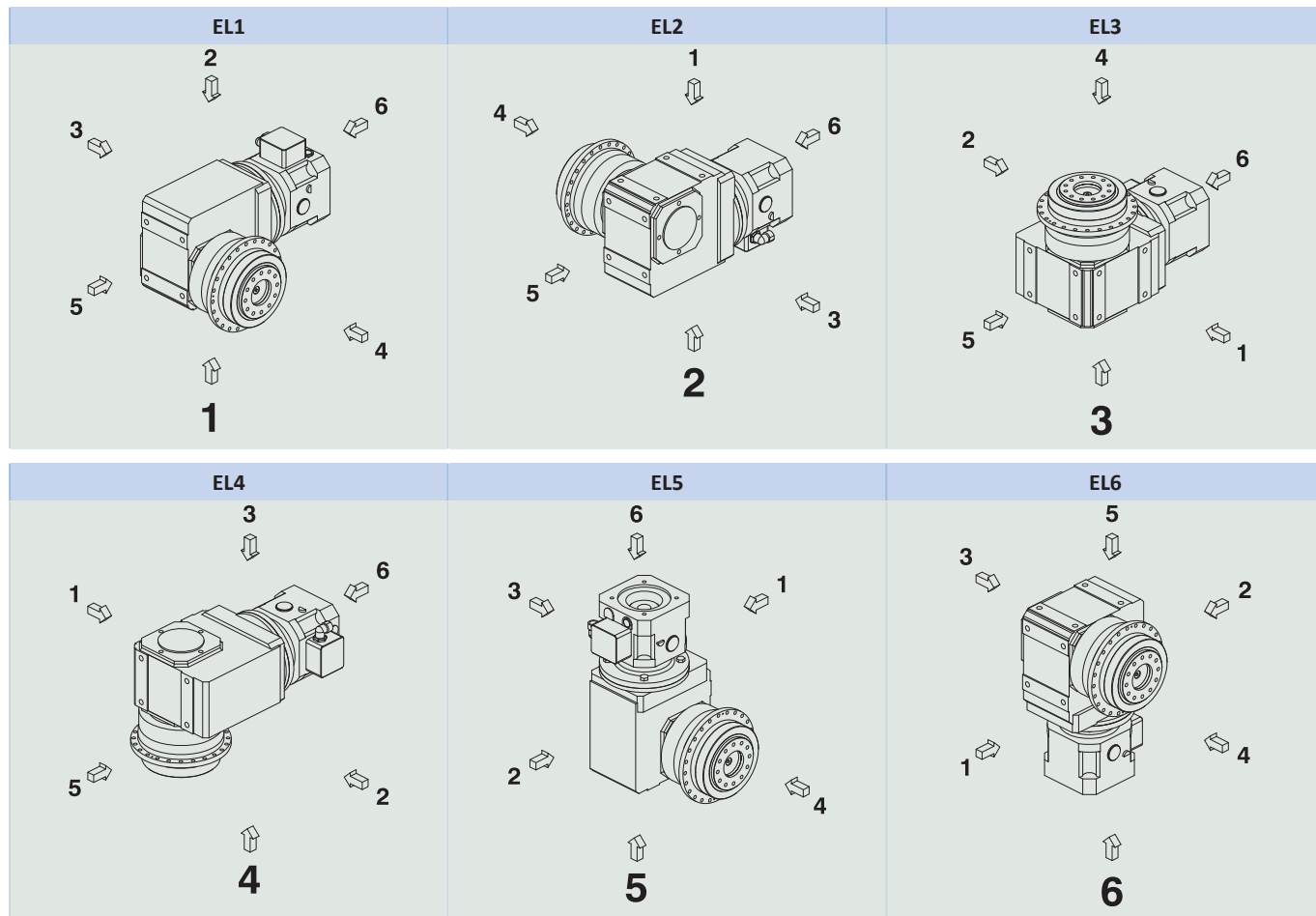
- When the flange shaft and gear housing are fastened on the machine side using screws of strength class 12.9
- When the gear housings are adjusted at pilot  $\varnothing b1$ . The machine-side fit must be H7.
- When the flange shaft is adjusted using the connecting element at pilot  $\varnothing bf$  or  $\varnothing df$

### 9.5.4 Mounting positions

The following table shows the standard mounting positions.

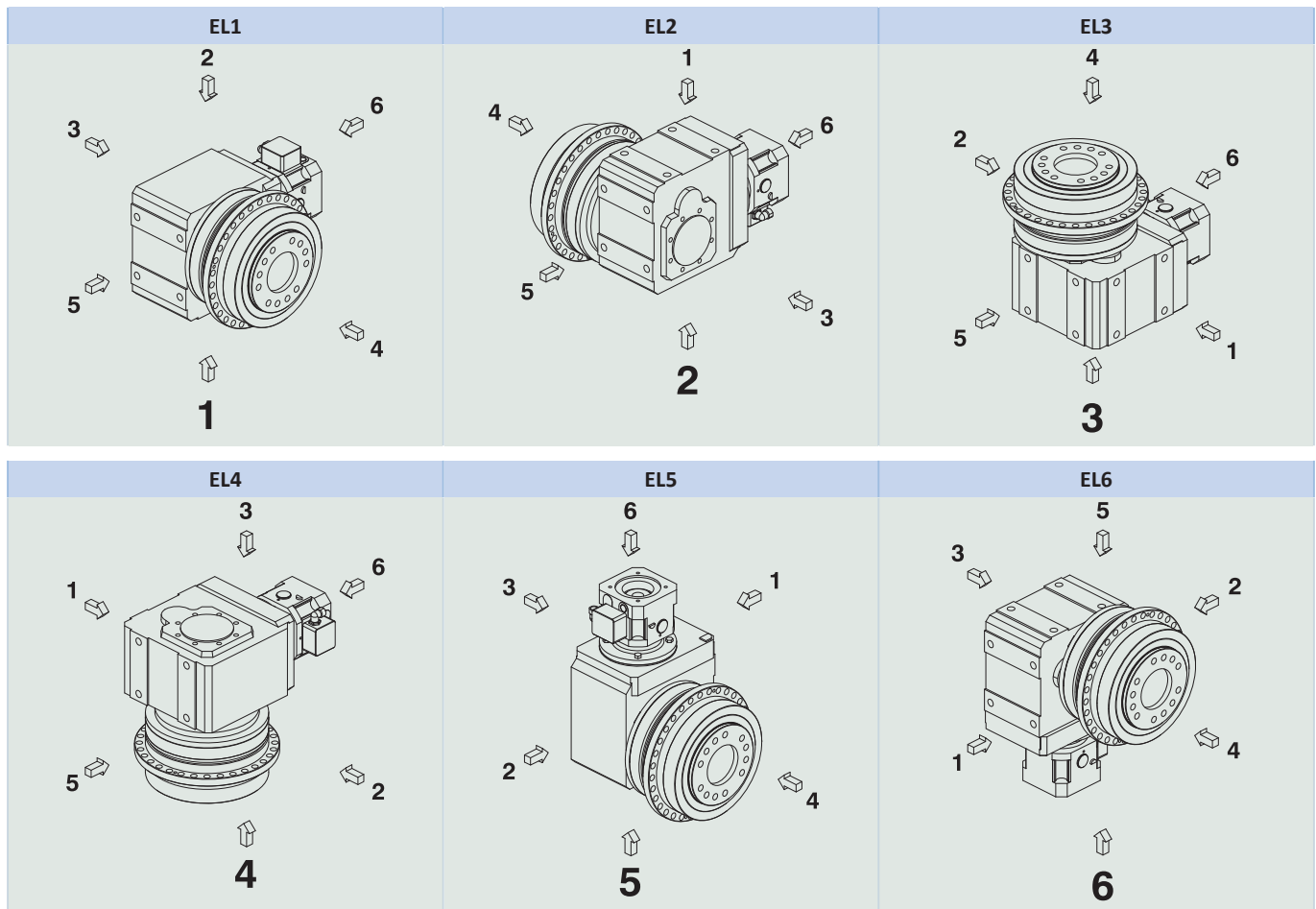
The numbers identify the gear unit sides. The mounting position is defined by the gear side facing downwards.

PHQ5K1 – PHQ8K4





## PHQ9K5 – PHQ12K9



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

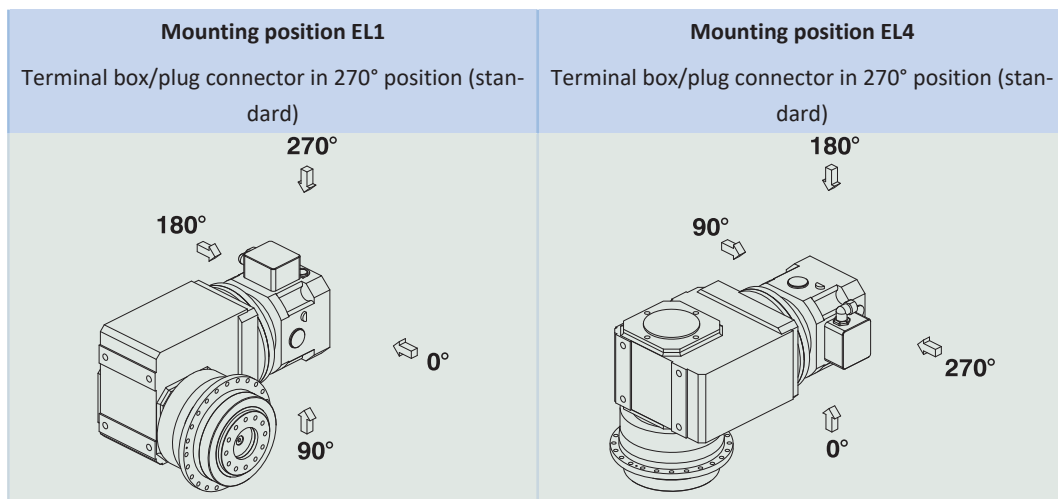
## 9.5.5 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

### 9.5.6 Position of the terminal box/plug connector



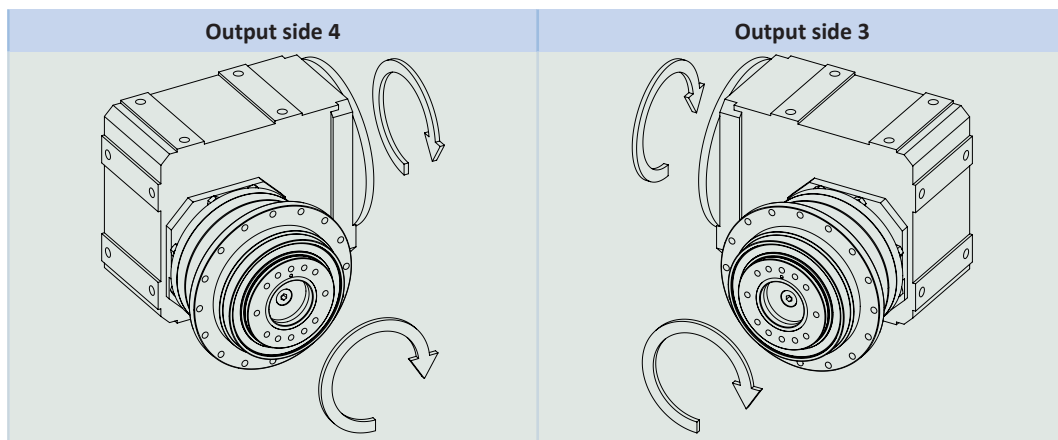
Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

### 9.5.7 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 90 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ three-stage	93%
$\eta_{\text{get}}$ four-stage	92%
$\eta_{\text{get}}$ five-stage	90%
Protection class: <sup>1</sup>	IP65

### 9.5.8 Direction of rotation



The pictures show mounting position EL1.

## 9.6 Project configuration

Project your drives using our SERVSoft designing software. Download SERVSoft for free at <https://www.stoeber.de/en/ServoSoft>.

It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

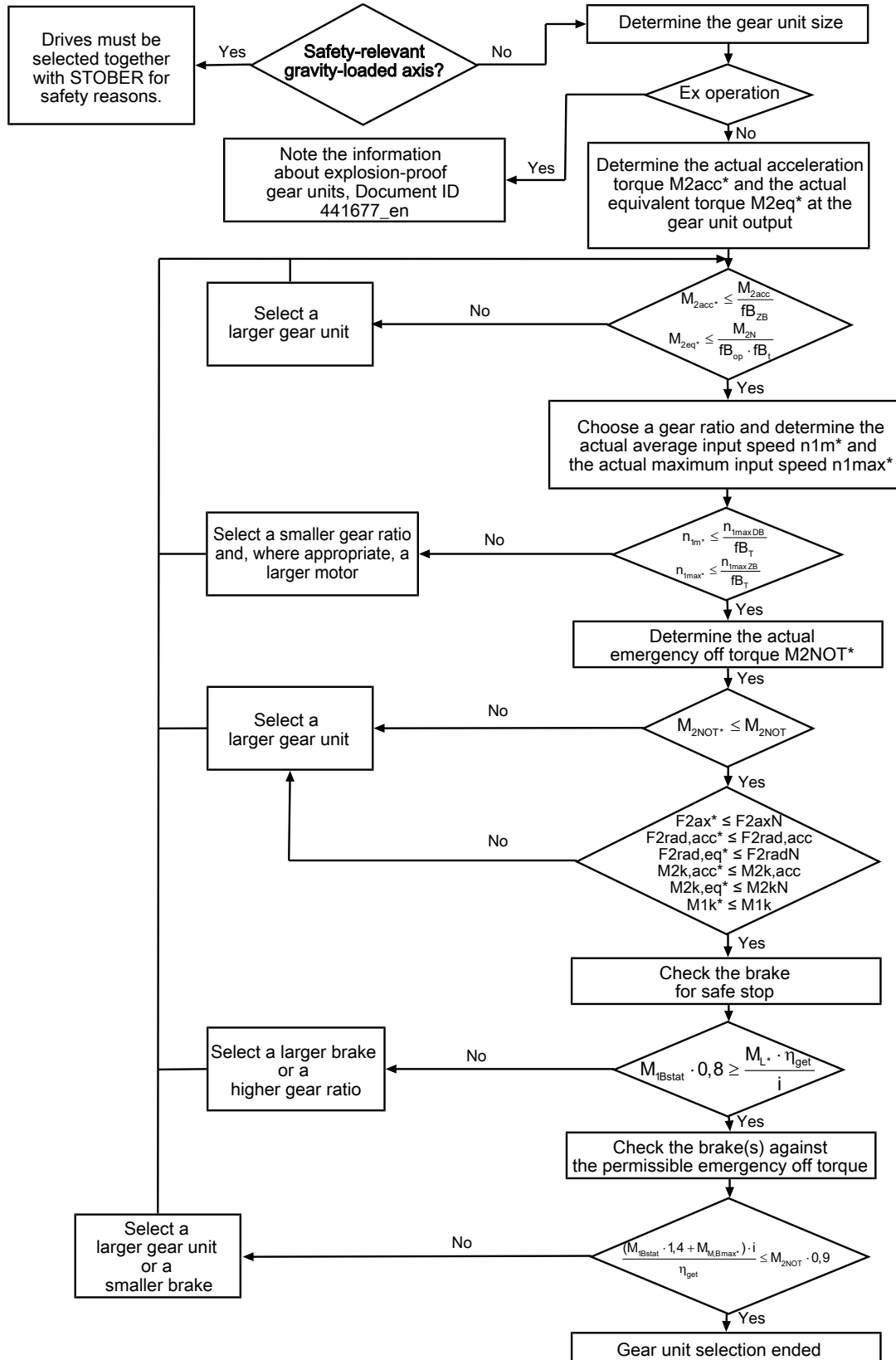
<sup>1</sup> Observe the protection class of all the components.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

### 9.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

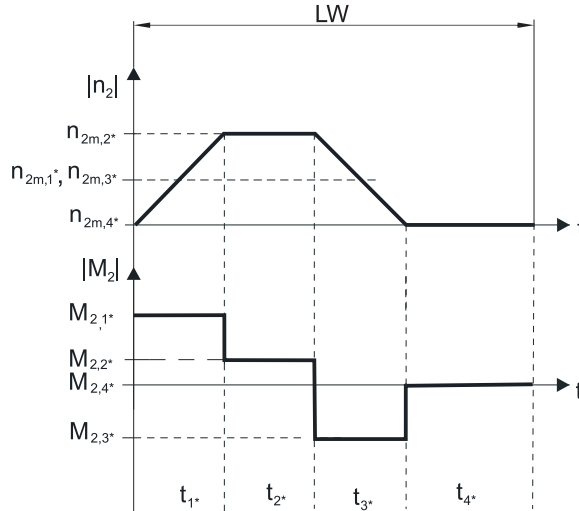
Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{fBstat}$ ,  $M_{fBmax}$ ,  $M_{2acc}$  ( $M_{2accHT}$  for reduced backlash),  $M_{2NOT}$  and  $M_{2N}$ .

The values for the available maximum motor brake torque  $M_{M,Bmax^*}$  can be found in the manufacturer catalog.

The values for  $fB_T$ ,  $fB_{op}$ ,  $fB_i$  and  $fB_{zB}$  can be found in the corresponding tables in this chapter.

**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 maximum acceleration torque**

$$M_{2acc^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**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  $t_1^* + \dots + t_3^* \geq 6$  min, calculate  $n_{2m^*}$  without the rest phase  $t_4^*$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**Calculation of the actual equivalent torque**

$$M_{2eq^*} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_1^* \cdot |M_{2,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_n^* \cdot |M_{2,n^*}|^3}{|n_{2m,1^*}| \cdot t_1^* + \dots + |n_{2m,n^*}| \cdot t_n^*}}$$

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40

Run time	$fB_i$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20

Cyclic operation		$f_{B_{zB}}$
$\leq 1000$ load changes/hour (LW/h)		1.00
$> 1000$ load changes/hour (LW/h)		1.15

Temperature		$f_{B_T}$
Motor cooling	Surrounding temperature	
Motor with forced ventilation	$\leq 20$ °C	0.9
	$\leq 30$ °C	1.0
	$\leq 40$ °C	1.15
Motor with convection cooling	$\leq 20$ °C	1.0
	$\leq 30$ °C	1.1
	$\leq 40$ °C	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 90$  °C must not be exceeded. Doing so may result in damage to the gear unit.

### 9.6.2 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 ( $F_{2axN} = F_{2ax100}$ ;  $F_{2radN} = F_{2rad100}$ ;  $M_{2kN} = M_{2k100}$ )
- Only if radial forces on the gear unit are stabilized by its pilots (housing, flange shaft)

**Permitted shaft loads for standard bearing S**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PHQ4	83.0	2150	3095	3929	257	326	192
PHQ5	97.0	4150	4536	4897	440	475	429
PHQ7	86.0	6150	17045	17045	1466	1466	500
PHQ8	125.5	10050	27778	33333	3486	4183	1550
PHQ9	155.0	33000	48387	70968	7500	11000	7500
PHQ10	171.0	50000	51462	73099	8800	12500	9500
PHQ11	231.0	60000	47619	69264	11000	16000	11500
PHQ12	281.0	70000	64057	106761	18000	30000	14000

**Permitted shaft loads for reinforced bearing V**

Type	$z_2$ [mm]	$F_{2ax100}$ [N]	$F_{2rad100}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k100}$ [Nm]	$M_{2k,acc}$ [Nm]	$C_{2k}$ [Nm/ arcmin]
PHQ4	88.5	2900	4000	4000	354	354	217
PHQ5	104.0	5000	5500	5500	572	572	478

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

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.

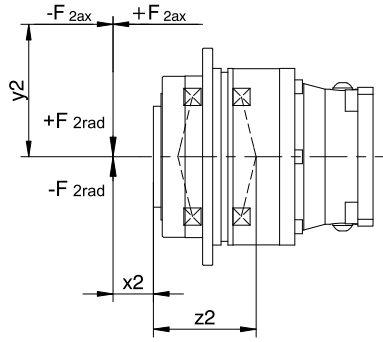


Fig. 2: Force application points

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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:**

$$M_{2k,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |M_{2k,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |M_{2k,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |F_{2rad,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |F_{2rad,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

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

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

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

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

**For different duty cycles:**

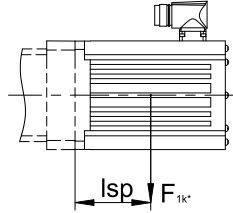
$$L_{10h} > L_{10h(ED_{10}=40\%)} \cdot \frac{40\%}{ED_{10}}$$

### 9.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOBBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 9.6.4 Recommendation for radial shaft seal rings

For a duty cycle > 60% and higher surrounding temperatures, we recommend radial shaft seal rings made of FKM at the output.

Properties:

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

#### Leak-proofness

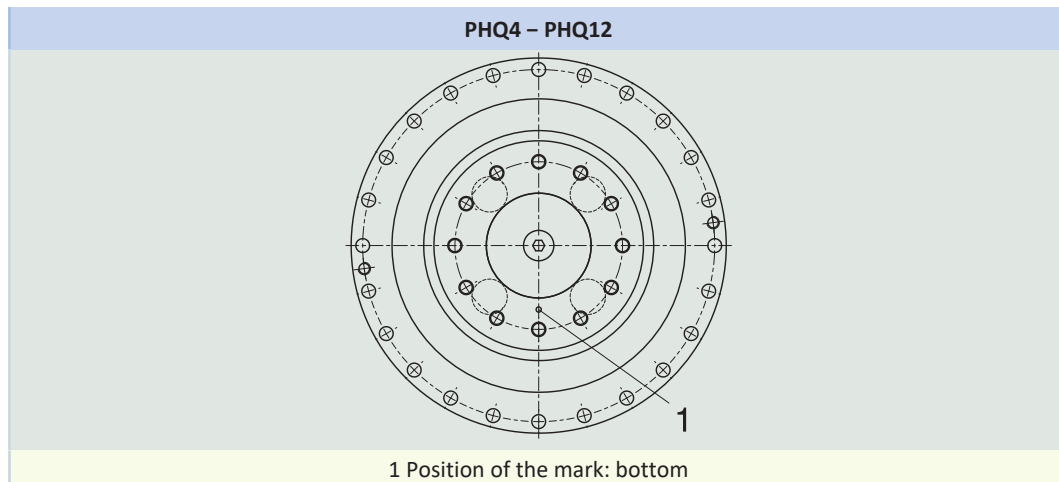
Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. However, a leak cannot be fully ruled out over the length of use of a gear unit. If you use a gear unit with goods incompatible with the lubricant, you must take measures to prevent direct contact with the gear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

### 9.6.5 Reverse operation

To ensure lubrication for circulating gearing parts during cyclic reverse operation from  $\pm 20^\circ$  to  $\pm 90^\circ$  at the output, pay careful attention to the position of the output shaft for the horizontal mounting of the gear unit, as shown in the diagrams below.

The images show the center position of reverse operation.

Cyclic reverse operation  $\leq \pm 20^\circ$  on request.



Please note that the hole pattern may be different, depending on the size of the planetary gear unit.

## 9.7 Additional documentation

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

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

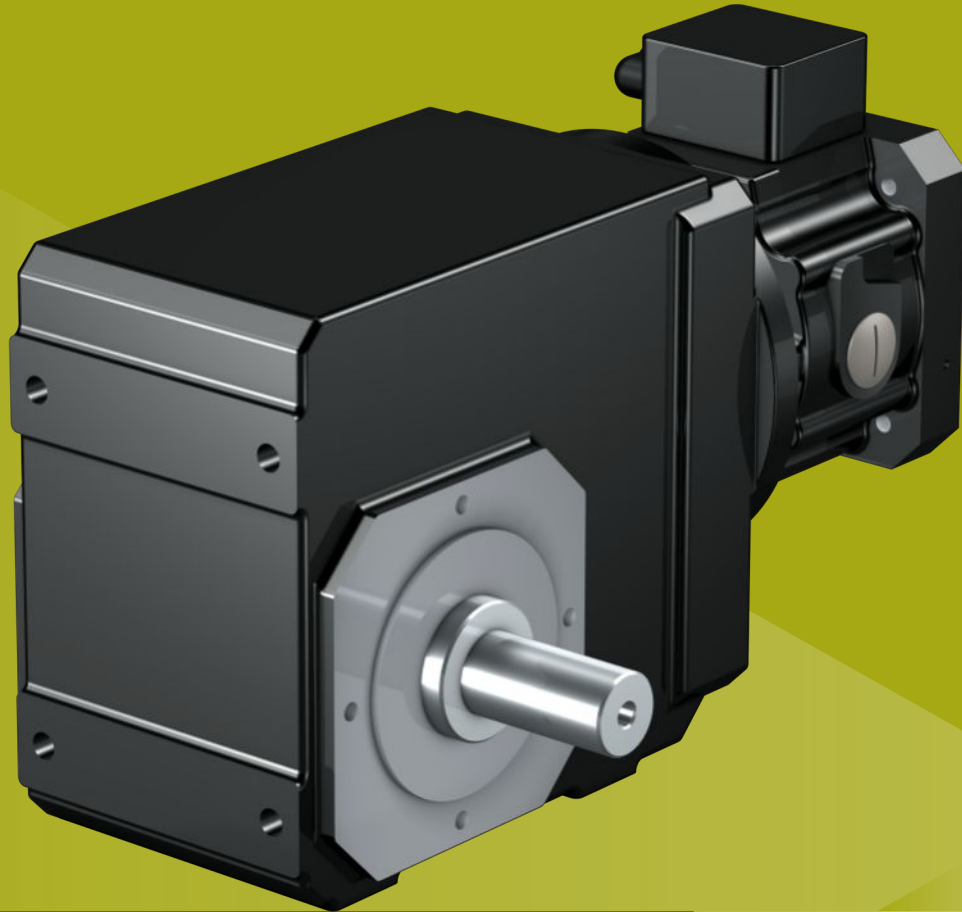
Documentation	ID
Operating manual gear units, geared motors PHQ53K – PHQ83K, PHQ94K – PHQ124K	443357_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en



# 10 K helical bevel gear units

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# 10

## Helical bevel gear units

# K

### 10.1 Overview

Highly rigid, helical-gearred right-angle gear units with integrate brake

#### Features

- Power density ★★★★★
- Backlash ★★★★★
- Price category €€
- Shaft load ★★★★★
- Smooth operation ★★★★★
- Torsional stiffness ★★★★★
- Mass moment of inertia ★★★★★
- Helical gearing ✓
- FKM seal ring at the input ✓
- Reinforced output bearing (K5 – K8) ✓ (on request)
- Safe braking in case of power outage ✓
- Safe support of the load with gravity-loaded axes ✓
- Easy and reliable attachment to any synchronous servo motor thanks to backlash-free plug-in coupling ✓

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

#### Technical data

$M_{1Bstat}$	8 – 160 Nm
$i$	4 – 99
$M_{2acc}$	93 – 7700 Nm
$\Delta\phi_2$	1.5 – 12 arcmin
$\eta_{get}$	96 – 97 %

## 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
- Without consideration for thermal limiting performance

For all other technical data, refer to <https://configurator.stoeber.de/en-US/>.

An explanation of the formula symbols can be found in the chapter [▶ 12.1](#).

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redI</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K102 (M<sub>2acc,max</sub> = 135 Nm)</b>																
4.000	4/1	K102_0040 MB23	8.0	31	8.0	20	12.0	6.0	–	5.1	3300	2800	4000	65	98	220
4.000	4/1	K102_0040 MB23	12	25	8.0	20	12.0	6.0	–	5.1	3300	2800	4000	65	98	220
4.000	4/1	K102_0040 MB23	16	20	8.0	20	12.0	6.0	–	5.1	3300	2800	4000	65	98	220
4.000	4/1	K102_0040 MB23	24	8.4	8.0	20	12.0	6.0	–	5.1	3300	2800	4000	65	98	220
4.000	4/1	K102_0040 MB23	30	–	8.0	20	12.0	6.0	–	5.1	3300	2800	4000	65	98	220
5.568	1520/273	K102_0056 MB23	8.0	26	7.8	20	12.0	6.0	–	5.8	3300	2800	4000	73	109	240
5.568	1520/273	K102_0056 MB23	12	21	7.8	20	12.0	6.0	–	5.8	3300	2800	4000	73	109	240
5.568	1520/273	K102_0056 MB23	16	15	7.8	20	12.0	6.0	–	5.8	3300	2800	4000	73	109	240
5.568	1520/273	K102_0056 MB23	24	4.0	7.8	20	12.0	6.0	–	5.8	3300	2800	4000	73	109	240
6.000	6/1	K102_0060 MB23	8.0	21	7.7	20	12.0	6.0	–	5.9	3300	2800	4000	75	112	220
6.000	6/1	K102_0060 MB23	12	15	7.7	20	12.0	6.0	–	5.9	3300	2800	4000	75	112	220
6.000	6/1	K102_0060 MB23	16	9.6	7.7	20	12.0	6.0	–	5.9	3300	2800	4000	75	112	220
6.644	299/45	K102_0066 MB23	8.0	18	7.6	20	12.0	6.0	–	6.1	3600	3300	4000	77	116	220
6.644	299/45	K102_0066 MB23	12	12	7.6	20	12.0	6.0	–	6.1	3600	3300	4000	77	116	220
6.644	299/45	K102_0066 MB23	16	6.5	7.6	20	12.0	6.0	–	6.1	3600	3300	4000	77	116	220
8.309	1911/230	K102_0083 MB23	8.0	12	7.5	20	12.0	6.0	–	6.3	3600	3300	4000	83	125	220
8.309	1911/230	K102_0083 MB23	12	6.3	7.5	20	12.0	6.0	–	6.3	3600	3300	4000	83	125	220
8.309	1911/230	K102_0083 MB23	16	0.7	7.5	20	12.0	6.0	–	6.3	3600	3300	4000	83	125	220
9.249	1748/189	K102_0092 MB23	8.0	11	7.5	20	12.0	6.0	–	6.4	3600	3300	4000	86	129	240
9.249	1748/189	K102_0092 MB23	12	5.9	7.5	20	12.0	6.0	–	6.4	3600	3300	4000	86	129	240
9.249	1748/189	K102_0092 MB23	16	0.3	7.5	20	12.0	6.0	–	6.4	3600	3300	4000	86	129	240
10.14	507/50	K102_0100 MB23	8.0	7.7	7.4	20	12.0	6.0	–	6.5	4000	3800	4000	89	125	220
10.14	507/50	K102_0100 MB23	12	2.1	7.4	20	12.0	6.0	–	6.5	4000	3800	4000	89	125	220
11.57	266/23	K102_0115 MB23	8.0	6.9	7.4	20	12.0	6.0	–	6.5	3600	3300	4000	93	135	240
11.57	266/23	K102_0115 MB23	12	1.3	7.4	20	12.0	6.0	–	6.5	3600	3300	4000	93	135	240
12.62	429/34	K102_0125 MB23	8.0	4.0	7.3	20	12.0	6.0	–	6.6	4000	3800	4000	96	125	220
14.11	494/35	K102_0140 MB23	8.0	3.6	7.4	20	12.0	6.0	–	6.6	4000	3800	4000	99	135	240
16.71	117/7	K102_0165 MB23	8.0	0.3	7.3	20	12.0	6.0	–	6.7	4000	4000	4000	105	125	220
17.56	2090/119	K102_0175 MB23	8.0	0.7	7.3	20	12.0	6.0	–	6.7	4000	3800	4000	107	135	240
<b>K202 (M<sub>2acc,max</sub> = 220 Nm)</b>																
4.000	4/1	K202_0040 MB23	8.0	31	9.6	27	10.0	5.0	1.5	7.1	3000	2600	4000	116	146	244
4.000	4/1	K202_0040 MB23	12	25	9.6	27	10.0	5.0	1.5	7.1	3000	2600	4000	116	146	244
4.000	4/1	K202_0040 MB23	16	20	9.6	27	10.0	5.0	1.5	7.1	3000	2600	4000	116	146	244
4.000	4/1	K202_0040 MB23	24	8.4	9.6	27	10.0	5.0	1.5	7.1	3000	2600	4000	116	146	244
4.000	4/1	K202_0040 MB23	30	–	9.6	27	10.0	5.0	1.5	7.1	3000	2600	4000	116	146	244
4.000	4/1	K202_0040 MB33	16	65	30	34	10.0	5.0	1.5	8.0	3000	2600	4000	116	174	400
4.000	4/1	K202_0040 MB33	24	54	30	34	10.0	5.0	1.5	8.0	3000	2600	4000	116	174	400
4.000	4/1	K202_0040 MB33	32	43	30	34	10.0	5.0	1.5	8.0	3000	2600	4000	116	174	400
4.000	4/1	K202_0040 MB33	45	24	30	34	10.0	5.0	1.5	8.0	3000	2600	4000	116	174	400
4.364	48/11	K202_0044 MB23	8.0	31	9.3	27	10.0	5.0	1.5	7.5	3000	2600	4000	120	159	267
4.364	48/11	K202_0044 MB23	12	25	9.3	27	10.0	5.0	1.5	7.5	3000	2600	4000	120	159	267
4.364	48/11	K202_0044 MB23	16	20	9.3	27	10.0	5.0	1.5	7.5	3000	2600	4000	120	159	267
4.364	48/11	K202_0044 MB23	24	8.4	9.3	27	10.0	5.0	1.5	7.5	3000	2600	4000	120	159	267
4.364	48/11	K202_0044 MB23	30	–	9.3	27	10.0	5.0	1.5	7.5	3000	2600	4000	120	159	267
4.364	48/11	K202_0044 MB33	16	58	30	34	10.0	5.0	1.5	8.4	3000	2600	4000	120	180	400
4.364	48/11	K202_0044 MB33	24	46	30	34	10.0	5.0	1.5	8.4	3000	2600	4000	120	180	400
4.364	48/11	K202_0044 MB33	32	35	30	34	10.0	5.0	1.5	8.4	3000	2600	4000	120	180	400
4.364	48/11	K202_0044 MB33	45	17	30	34	10.0	5.0	1.5	8.4	3000	2600	4000	120	180	400
5.177	2107/407	K202_0052 MB23	8.0	31	8.8	27	10.0	5.0	1.5	8.2	3000	2600	4000	127	188	316
5.177	2107/407	K202_0052 MB23	12	25	8.8	27	10.0	5.0	1.5	8.2	3000	2600	4000	127	188	316
5.177	2107/407	K202_0052 MB23	16	20	8.8	27	10.0	5.0	1.5	8.2	3000	2600	4000	127	188	316
5.177	2107/407	K202_0052 MB23	24	8.4	8.8	27	10.0	5.0	1.5	8.2	3000	2600	4000	127	188	316
5.177	2107/407	K202_0052 MB23	30	–	8.8	27	10.0	5.0	1.5	8.2	3000	2600	4000	127	188	316

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K202 (M<sub>2acc,max</sub> = 220 Nm)</b>																
5.177	2107/407	K202_0052 MB33	16	45	29	34	10.0	5.0	1.5	8.9	3000	2600	4000	127	190	400
5.177	2107/407	K202_0052 MB33	24	34	29	34	10.0	5.0	1.5	8.9	3000	2600	4000	127	190	400
5.177	2107/407	K202_0052 MB33	32	23	29	34	10.0	5.0	1.5	8.9	3000	2600	4000	127	190	400
5.177	2107/407	K202_0052 MB33	45	4.5	29	34	10.0	5.0	1.5	8.9	3000	2600	4000	127	190	400
6.000	6/1	K202_0060 MB23	8.0	31	8.9	27	10.0	5.0	1.5	8.7	3000	2600	4000	133	200	367
6.000	6/1	K202_0060 MB23	12	25	8.9	27	10.0	5.0	1.5	8.7	3000	2600	4000	133	200	367
6.000	6/1	K202_0060 MB23	16	20	8.9	27	10.0	5.0	1.5	8.7	3000	2600	4000	133	200	367
6.000	6/1	K202_0060 MB23	24	8.4	8.9	27	10.0	5.0	1.5	8.7	3000	2600	4000	133	200	367
6.000	6/1	K202_0060 MB23	30	-	8.9	27	10.0	5.0	1.5	8.7	3000	2600	4000	133	200	367
6.000	6/1	K202_0060 MB33	16	36	29	34	10.0	5.0	1.5	9.3	3000	2600	4000	133	200	400
6.000	6/1	K202_0060 MB33	24	25	29	34	10.0	5.0	1.5	9.3	3000	2600	4000	133	200	400
6.000	6/1	K202_0060 MB33	32	13	29	34	10.0	5.0	1.5	9.3	3000	2600	4000	133	200	400
6.683	2279/341	K202_0067 MB23	8.0	31	8.3	27	10.0	5.0	1.5	9.0	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB23	12	25	8.3	27	10.0	5.0	1.5	9.0	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB23	16	20	8.3	27	10.0	5.0	1.5	9.0	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB23	24	8.4	8.3	27	10.0	5.0	1.5	9.0	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB23	30	-	8.3	27	10.0	5.0	1.5	9.0	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB33	16	30	29	34	10.0	5.0	1.5	9.5	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB33	24	19	29	34	10.0	5.0	1.5	9.5	3500	3100	4000	138	207	400
6.683	2279/341	K202_0067 MB33	32	7.5	29	34	10.0	5.0	1.5	9.5	3500	3100	4000	138	207	400
7.118	2107/296	K202_0071 MB23	8.0	31	8.5	27	10.0	5.0	1.5	9.2	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB23	12	25	8.5	27	10.0	5.0	1.5	9.2	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB23	16	20	8.5	27	10.0	5.0	1.5	9.2	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB23	24	8.4	8.5	27	10.0	5.0	1.5	9.2	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB23	30	-	8.5	27	10.0	5.0	1.5	9.2	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB33	16	27	29	34	10.0	5.0	1.5	9.6	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB33	24	15	29	34	10.0	5.0	1.5	9.6	3000	2600	4000	141	211	400
7.118	2107/296	K202_0071 MB33	32	4.3	29	34	10.0	5.0	1.5	9.6	3000	2600	4000	141	211	400
8.397	2494/297	K202_0084 MB23	8.0	30	7.9	27	10.0	5.0	1.5	9.5	3500	3100	4000	149	220	400
8.397	2494/297	K202_0084 MB23	12	25	7.9	27	10.0	5.0	1.5	9.5	3500	3100	4000	149	220	400
8.397	2494/297	K202_0084 MB23	16	19	7.9	27	10.0	5.0	1.5	9.5	3500	3100	4000	149	220	400
8.397	2494/297	K202_0084 MB23	24	8.0	7.9	27	10.0	5.0	1.5	9.5	3500	3100	4000	149	220	400
8.397	2494/297	K202_0084 MB33	16	19	28	34	10.0	5.0	1.5	9.9	3500	3100	4000	149	220	400
8.397	2494/297	K202_0084 MB33	24	8.0	28	34	10.0	5.0	1.5	9.9	3500	3100	4000	149	220	400
9.190	2279/248	K202_0092 MB23	8.0	27	8.1	27	10.0	5.0	1.5	9.7	3500	3100	4000	153	220	400
9.190	2279/248	K202_0092 MB23	12	21	8.1	27	10.0	5.0	1.5	9.7	3500	3100	4000	153	220	400
9.190	2279/248	K202_0092 MB23	16	16	8.1	27	10.0	5.0	1.5	9.7	3500	3100	4000	153	220	400
9.190	2279/248	K202_0092 MB23	24	4.4	8.1	27	10.0	5.0	1.5	9.7	3500	3100	4000	153	220	400
9.190	2279/248	K202_0092 MB33	16	16	29	34	10.0	5.0	1.5	10	3500	3100	4000	153	220	400
9.190	2279/248	K202_0092 MB33	24	4.4	29	34	10.0	5.0	1.5	10	3500	3100	4000	153	220	400
10.07	2881/286	K202_0100 MB23	8.0	23	7.8	27	10.0	5.0	1.5	9.9	3900	3500	4000	158	220	400
10.07	2881/286	K202_0100 MB23	12	18	7.8	27	10.0	5.0	1.5	9.9	3900	3500	4000	158	220	400
10.07	2881/286	K202_0100 MB23	16	12	7.8	27	10.0	5.0	1.5	9.9	3900	3500	4000	158	220	400
10.07	2881/286	K202_0100 MB23	24	1.1	7.8	27	10.0	5.0	1.5	9.9	3900	3500	4000	158	220	400
10.07	2881/286	K202_0100 MB33	16	12	28	34	10.0	5.0	1.5	10	3900	3500	4000	158	220	400
10.07	2881/286	K202_0100 MB33	24	1.1	28	34	10.0	5.0	1.5	10	3900	3500	4000	158	220	400
11.55	1247/108	K202_0115 MB23	8.0	19	7.8	27	10.0	5.0	1.5	10	3500	3100	4000	166	220	400
11.55	1247/108	K202_0115 MB23	12	13	7.8	27	10.0	5.0	1.5	10	3500	3100	4000	166	220	400
11.55	1247/108	K202_0115 MB23	16	7.8	7.8	27	10.0	5.0	1.5	10	3500	3100	4000	166	220	400
11.55	1247/108	K202_0115 MB33	16	7.8	28	34	10.0	5.0	1.5	10	3500	3100	4000	166	220	400
12.71	559/44	K202_0125 MB23	8.0	16	7.6	27	10.0	5.0	1.5	10	3900	3500	4000	171	220	400
12.71	559/44	K202_0125 MB23	12	11	7.6	27	10.0	5.0	1.5	10	3900	3500	4000	171	220	400
12.71	559/44	K202_0125 MB23	16	5.1	7.6	27	10.0	5.0	1.5	10	3900	3500	4000	171	220	400
12.71	559/44	K202_0125 MB33	16	5.1	28	34	10.0	5.0	1.5	10	3900	3500	4000	171	220	400
13.85	2881/208	K202_0140 MB23	8.0	14	7.7	27	10.0	5.0	1.5	10	3900	3500	4000	176	220	400
13.85	2881/208	K202_0140 MB23	12	8.4	7.7	27	10.0	5.0	1.5	10	3900	3500	4000	176	220	400
13.85	2881/208	K202_0140 MB23	16	2.8	7.7	27	10.0	5.0	1.5	10	3900	3500	4000	176	220	400
13.85	2881/208	K202_0140 MB33	16	2.8	28	34	10.0	5.0	1.5	10	3900	3500	4000	176	220	400
16.86	2967/176	K202_0170 MB23	8.0	9.5	7.4	27	10.0	5.0	1.5	10	4000	3900	4000	188	220	400
16.86	2967/176	K202_0170 MB23	12	3.9	7.4	27	10.0	5.0	1.5	10	4000	3900	4000	188	220	400
17.47	559/32	K202_0175 MB23	8.0	8.8	7.5	27	10.0	5.0	1.5	10	3900	3500	4000	190	220	400
17.47	559/32	K202_0175 MB23	12	3.2	7.5	27	10.0	5.0	1.5	10	3900	3500	4000	190	220	400
20.33	1118/55	K202_0200 MB23	8.0	6.0	7.4	27	10.0	5.0	1.5	10	4000	3900	4000	200	220	400
20.33	1118/55	K202_0200 MB23	12	0.4	7.4	27	10.0	5.0	1.5	10	4000	3900	4000	200	220	400

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redl</sub>	Δφ <sub>2redr</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K202 (M<sub>2acc,max</sub> = 220 Nm)</b>																
23.18	2967/128	K202_0230 MB23	8.0	3.9	7.4	27	10.0	5.0	1.5	10	4000	3900	4000	200	220	400
25.13	1935/77	K202_0250 MB23	8.0	2.7	7.3	27	10.0	5.0	1.5	11	4000	3900	4000	200	220	400
27.95	559/20	K202_0280 MB23	8.0	1.3	7.4	27	10.0	5.0	1.5	11	4000	3900	4000	200	220	400
<b>K302 (M<sub>2acc,max</sub> = 385 Nm)</b>																
4.000	4/1	K302_0040 MB23	8.0	31	12	32	10.0	4.0	1.5	9.2	2700	2300	4000	146	146	244
4.000	4/1	K302_0040 MB23	12	25	12	32	10.0	4.0	1.5	9.2	2700	2300	4000	146	146	244
4.000	4/1	K302_0040 MB23	16	20	12	32	10.0	4.0	1.5	9.2	2700	2300	4000	146	146	244
4.000	4/1	K302_0040 MB23	24	8.4	12	32	10.0	4.0	1.5	9.2	2700	2300	4000	146	146	244
4.000	4/1	K302_0040 MB23	30	–	12	32	10.0	4.0	1.5	9.2	2700	2300	4000	146	146	244
4.000	4/1	K302_0040 MB33	16	104	34	39	10.0	4.0	1.5	11	2700	2300	4000	204	306	700
4.000	4/1	K302_0040 MB33	24	92	34	39	10.0	4.0	1.5	11	2700	2300	4000	204	306	700
4.000	4/1	K302_0040 MB33	32	81	34	39	10.0	4.0	1.5	11	2700	2300	4000	204	306	700
4.000	4/1	K302_0040 MB33	45	63	34	39	10.0	4.0	1.5	11	2700	2300	4000	204	306	700
4.000	4/1	K302_0040 MB33	90	–	34	39	10.0	4.0	1.5	11	2700	2300	4000	204	306	700
4.364	48/11	K302_0044 MB23	8.0	31	12	32	10.0	4.0	1.5	9.9	2700	2300	4000	159	159	267
4.364	48/11	K302_0044 MB23	12	25	12	32	10.0	4.0	1.5	9.9	2700	2300	4000	159	159	267
4.364	48/11	K302_0044 MB23	16	20	12	32	10.0	4.0	1.5	9.9	2700	2300	4000	159	159	267
4.364	48/11	K302_0044 MB23	24	8.4	12	32	10.0	4.0	1.5	9.9	2700	2300	4000	159	159	267
4.364	48/11	K302_0044 MB23	30	–	12	32	10.0	4.0	1.5	9.9	2700	2300	4000	159	159	267
4.364	48/11	K302_0044 MB33	16	104	33	39	10.0	4.0	1.5	12	2700	2300	4000	210	315	700
4.364	48/11	K302_0044 MB33	24	92	33	39	10.0	4.0	1.5	12	2700	2300	4000	210	315	700
4.364	48/11	K302_0044 MB33	32	81	33	39	10.0	4.0	1.5	12	2700	2300	4000	210	315	700
4.364	48/11	K302_0044 MB33	45	63	33	39	10.0	4.0	1.5	12	2700	2300	4000	210	315	700
4.364	48/11	K302_0044 MB33	90	–	33	39	10.0	4.0	1.5	12	2700	2300	4000	210	315	700
5.375	43/8	K302_0054 MB23	8.0	31	10	32	10.0	4.0	1.5	11	2700	2300	4000	196	196	328
5.375	43/8	K302_0054 MB23	12	25	10	32	10.0	4.0	1.5	11	2700	2300	4000	196	196	328
5.375	43/8	K302_0054 MB23	16	20	10	32	10.0	4.0	1.5	11	2700	2300	4000	196	196	328
5.375	43/8	K302_0054 MB23	24	8.4	10	32	10.0	4.0	1.5	11	2700	2300	4000	196	196	328
5.375	43/8	K302_0054 MB23	30	–	10	32	10.0	4.0	1.5	11	2700	2300	4000	196	196	328
5.375	43/8	K302_0054 MB33	16	76	31	39	10.0	4.0	1.5	13	2700	2300	4000	225	337	603
5.375	43/8	K302_0054 MB33	24	64	31	39	10.0	4.0	1.5	13	2700	2300	4000	225	337	603
5.375	43/8	K302_0054 MB33	32	53	31	39	10.0	4.0	1.5	13	2700	2300	4000	225	337	603
5.375	43/8	K302_0054 MB33	45	35	31	39	10.0	4.0	1.5	13	2700	2300	4000	225	337	603
6.000	6/1	K302_0060 MB23	8.0	31	11	32	10.0	4.0	1.5	12	2700	2300	4000	218	218	367
6.000	6/1	K302_0060 MB23	12	25	11	32	10.0	4.0	1.5	12	2700	2300	4000	218	218	367
6.000	6/1	K302_0060 MB23	16	20	11	32	10.0	4.0	1.5	12	2700	2300	4000	218	218	367
6.000	6/1	K302_0060 MB23	24	8.4	11	32	10.0	4.0	1.5	12	2700	2300	4000	218	218	367
6.000	6/1	K302_0060 MB23	30	–	11	32	10.0	4.0	1.5	12	2700	2300	4000	218	218	367
6.000	6/1	K302_0060 MB33	16	79	32	39	10.0	4.0	1.5	13	2700	2300	4000	233	350	700
6.000	6/1	K302_0060 MB33	24	68	32	39	10.0	4.0	1.5	13	2700	2300	4000	233	350	700
6.000	6/1	K302_0060 MB33	32	57	32	39	10.0	4.0	1.5	13	2700	2300	4000	233	350	700
6.000	6/1	K302_0060 MB33	45	39	32	39	10.0	4.0	1.5	13	2700	2300	4000	233	350	700
6.740	2150/319	K302_0067 MB23	8.0	31	9.4	32	10.0	4.0	1.5	13	3200	2800	4000	242	245	412
6.740	2150/319	K302_0067 MB23	12	25	9.4	32	10.0	4.0	1.5	13	3200	2800	4000	242	245	412
6.740	2150/319	K302_0067 MB23	16	20	9.4	32	10.0	4.0	1.5	13	3200	2800	4000	242	245	412
6.740	2150/319	K302_0067 MB23	24	8.4	9.4	32	10.0	4.0	1.5	13	3200	2800	4000	242	245	412
6.740	2150/319	K302_0067 MB23	30	–	9.4	32	10.0	4.0	1.5	13	3200	2800	4000	242	245	412
6.740	2150/319	K302_0067 MB33	16	68	30	39	10.0	4.0	1.5	14	3200	2800	4000	242	364	700
6.740	2150/319	K302_0067 MB33	24	57	30	39	10.0	4.0	1.5	14	3200	2800	4000	242	364	700
6.740	2150/319	K302_0067 MB33	32	46	30	39	10.0	4.0	1.5	14	3200	2800	4000	242	364	700
6.740	2150/319	K302_0067 MB33	45	28	30	39	10.0	4.0	1.5	14	3200	2800	4000	242	364	700
7.391	473/64	K302_0074 MB23	8.0	31	9.8	32	10.0	4.0	1.5	13	2700	2300	4000	250	269	452
7.391	473/64	K302_0074 MB23	12	25	9.8	32	10.0	4.0	1.5	13	2700	2300	4000	250	269	452
7.391	473/64	K302_0074 MB23	16	20	9.8	32	10.0	4.0	1.5	13	2700	2300	4000	250	269	452
7.391	473/64	K302_0074 MB23	24	8.4	9.8	32	10.0	4.0	1.5	13	2700	2300	4000	250	269	452
7.391	473/64	K302_0074 MB23	30	–	9.8	32	10.0	4.0	1.5	13	2700	2300	4000	250	269	452
7.391	473/64	K302_0074 MB33	16	60	30	39	10.0	4.0	1.5	14	2700	2300	4000	250	375	700
7.391	473/64	K302_0074 MB33	24	49	30	39	10.0	4.0	1.5	14	2700	2300	4000	250	375	700
7.391	473/64	K302_0074 MB33	32	38	30	39	10.0	4.0	1.5	14	2700	2300	4000	250	375	700
7.391	473/64	K302_0074 MB33	45	20	30	39	10.0	4.0	1.5	14	2700	2300	4000	250	375	700
8.444	2322/275	K302_0084 MB23	8.0	31	8.8	32	10.0	4.0	1.5	14	3200	2800	4000	261	307	516
8.444	2322/275	K302_0084 MB23	12	25	8.8	32	10.0	4.0	1.5	14	3200	2800	4000	261	307	516
8.444	2322/275	K302_0084 MB23	16	20	8.8	32	10.0	4.0	1.5	14	3200	2800	4000	261	307	516
8.444	2322/275	K302_0084 MB23	24	8.4	8.8	32	10.0	4.0	1.5	14	3200	2800	4000	261	307	516

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K302 (M<sub>2acc,max</sub> = 385 Nm)</b>																
8.444	2322/275	K302_0084 MB23	30	–	8.8	32	10.0	4.0	1.5	14	3200	2800	4000	261	307	516
8.444	2322/275	K302_0084 MB33	16	50	29	39	10.0	4.0	1.5	15	3200	2800	4000	261	385	700
8.444	2322/275	K302_0084 MB33	24	39	29	39	10.0	4.0	1.5	15	3200	2800	4000	261	385	700
8.444	2322/275	K302_0084 MB33	32	28	29	39	10.0	4.0	1.5	15	3200	2800	4000	261	385	700
8.444	2322/275	K302_0084 MB33	45	9.4	29	39	10.0	4.0	1.5	15	3200	2800	4000	261	385	700
9.267	1075/116	K302_0093 MB23	8.0	31	9.1	32	10.0	4.0	1.5	14	3200	2800	4000	270	337	566
9.267	1075/116	K302_0093 MB23	12	25	9.1	32	10.0	4.0	1.5	14	3200	2800	4000	270	337	566
9.267	1075/116	K302_0093 MB23	16	20	9.1	32	10.0	4.0	1.5	14	3200	2800	4000	270	337	566
9.267	1075/116	K302_0093 MB23	24	8.4	9.1	32	10.0	4.0	1.5	14	3200	2800	4000	270	337	566
9.267	1075/116	K302_0093 MB23	30	–	9.1	32	10.0	4.0	1.5	14	3200	2800	4000	270	337	566
9.267	1075/116	K302_0093 MB33	16	44	30	39	10.0	4.0	1.5	15	3200	2800	4000	270	385	700
9.267	1075/116	K302_0093 MB33	24	32	30	39	10.0	4.0	1.5	15	3200	2800	4000	270	385	700
9.267	1075/116	K302_0093 MB33	32	21	30	39	10.0	4.0	1.5	15	3200	2800	4000	270	385	700
9.267	1075/116	K302_0093 MB33	45	2.9	30	39	10.0	4.0	1.5	15	3200	2800	4000	270	385	700
10.14	3010/297	K302_0100 MB23	8.0	31	8.4	32	10.0	4.0	1.5	15	3500	3100	4000	278	369	619
10.14	3010/297	K302_0100 MB23	12	25	8.4	32	10.0	4.0	1.5	15	3500	3100	4000	278	369	619
10.14	3010/297	K302_0100 MB23	16	20	8.4	32	10.0	4.0	1.5	15	3500	3100	4000	278	369	619
10.14	3010/297	K302_0100 MB23	24	8.4	8.4	32	10.0	4.0	1.5	15	3500	3100	4000	278	369	619
10.14	3010/297	K302_0100 MB23	30	–	8.4	32	10.0	4.0	1.5	15	3500	3100	4000	278	369	619
10.14	3010/297	K302_0100 MB33	16	38	29	39	10.0	4.0	1.5	15	3500	3100	4000	278	385	700
10.14	3010/297	K302_0100 MB33	24	27	29	39	10.0	4.0	1.5	15	3500	3100	4000	278	385	700
10.14	3010/297	K302_0100 MB33	32	15	29	39	10.0	4.0	1.5	15	3500	3100	4000	278	385	700
10.14	3010/297	K302_0100 MB33	45	–	29	39	10.0	4.0	1.5	15	3500	3100	4000	278	385	700
11.61	1161/100	K302_0115 MB23	8.0	31	8.6	32	10.0	4.0	1.5	15	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB23	12	25	8.6	32	10.0	4.0	1.5	15	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB23	16	20	8.6	32	10.0	4.0	1.5	15	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB23	24	8.4	8.6	32	10.0	4.0	1.5	15	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB23	30	–	8.6	32	10.0	4.0	1.5	15	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB33	16	30	29	39	10.0	4.0	1.5	16	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB33	24	19	29	39	10.0	4.0	1.5	16	3200	2800	4000	291	385	700
11.61	1161/100	K302_0115 MB33	32	7.8	29	39	10.0	4.0	1.5	16	3200	2800	4000	291	385	700
12.58	3182/253	K302_0125 MB23	8.0	31	8.0	32	10.0	4.0	1.5	15	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB23	12	25	8.0	32	10.0	4.0	1.5	15	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB23	16	20	8.0	32	10.0	4.0	1.5	15	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB23	24	8.4	8.0	32	10.0	4.0	1.5	15	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB23	30	–	8.0	32	10.0	4.0	1.5	15	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB33	16	26	29	39	10.0	4.0	1.5	16	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB33	24	15	29	39	10.0	4.0	1.5	16	3500	3100	4000	298	385	700
12.58	3182/253	K302_0125 MB33	32	3.8	29	39	10.0	4.0	1.5	16	3500	3100	4000	298	385	700
13.94	1505/108	K302_0140 MB23	8.0	31	8.2	32	10.0	4.0	1.5	15	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB23	12	25	8.2	32	10.0	4.0	1.5	15	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB23	16	20	8.2	32	10.0	4.0	1.5	15	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB23	24	8.4	8.2	32	10.0	4.0	1.5	15	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB23	30	–	8.2	32	10.0	4.0	1.5	15	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB33	16	21	29	39	10.0	4.0	1.5	16	3500	3100	4000	309	385	700
13.94	1505/108	K302_0140 MB33	24	10	29	39	10.0	4.0	1.5	16	3500	3100	4000	309	385	700
16.94	559/33	K302_0170 MB23	8.0	25	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
16.94	559/33	K302_0170 MB23	12	19	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
16.94	559/33	K302_0170 MB23	16	14	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
16.94	559/33	K302_0170 MB23	24	2.5	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
16.94	559/33	K302_0170 MB33	16	14	28	39	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
16.94	559/33	K302_0170 MB33	24	2.5	28	39	10.0	4.0	1.5	16	3800	3500	4000	330	385	700
17.29	1591/92	K302_0175 MB23	8.0	24	7.9	32	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
17.29	1591/92	K302_0175 MB23	12	19	7.9	32	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
17.29	1591/92	K302_0175 MB23	16	13	7.9	32	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
17.29	1591/92	K302_0175 MB23	24	1.7	7.9	32	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
17.29	1591/92	K302_0175 MB33	16	13	28	39	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
17.29	1591/92	K302_0175 MB33	24	1.7	28	39	10.0	4.0	1.5	16	3500	3100	4000	332	385	700
20.28	3569/176	K302_0200 MB23	8.0	19	7.6	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
20.28	3569/176	K302_0200 MB23	12	13	7.6	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
20.28	3569/176	K302_0200 MB23	16	7.7	7.6	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
20.28	3569/176	K302_0200 MB33	16	7.7	28	39	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
23.29	559/24	K302_0230 MB23	8.0	15	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
23.29	559/24	K302_0230 MB23	12	9.4	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
23.29	559/24	K302_0230 MB23	16	3.8	7.7	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redl</sub>	Δφ <sub>2redr</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K302 (M<sub>2acc,max</sub> = 385 Nm)</b>																
23.29	559/24	K302_0230 MB33	16	3.8	28	39	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
25.26	3612/143	K302_0250 MB23	8.0	13	7.5	32	10.0	4.0	1.5	16	3800	3500	4000	347	385	693
25.26	3612/143	K302_0250 MB23	12	7.2	7.5	32	10.0	4.0	1.5	16	3800	3500	4000	347	385	693
25.26	3612/143	K302_0250 MB23	16	1.6	7.5	32	10.0	4.0	1.5	16	3800	3500	4000	347	385	693
27.88	3569/128	K302_0280 MB23	8.0	11	7.5	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
27.88	3569/128	K302_0280 MB23	12	5.1	7.5	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
33.62	1849/55	K302_0340 MB23	8.0	1.8	7.3	32	10.0	4.0	1.5	16	3800	3500	4000	250	300	501
34.73	903/26	K302_0350 MB23	8.0	6.4	7.4	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
34.73	903/26	K302_0350 MB23	12	0.8	7.4	32	10.0	4.0	1.5	16	3800	3500	4000	350	385	700
46.23	1849/40	K302_0460 MB23	8.0	1.8	7.3	32	10.0	4.0	1.5	16	3800	3500	4000	344	385	688
<b>K402 (M<sub>2acc,max</sub> = 600 Nm)</b>																
4.000	4/1	K402_0040 MB33	16	104	39	53	10.0	4.0	1.5	16	2600	2200	3800	306	388	733
4.000	4/1	K402_0040 MB33	24	92	39	53	10.0	4.0	1.5	16	2600	2200	3800	306	388	733
4.000	4/1	K402_0040 MB33	32	81	39	53	10.0	4.0	1.5	16	2600	2200	3800	306	388	733
4.000	4/1	K402_0040 MB33	45	63	39	53	10.0	4.0	1.5	16	2600	2200	3800	306	388	733
4.000	4/1	K402_0040 MB33	90	–	39	53	10.0	4.0	1.5	16	2600	2200	3800	306	388	733
4.000	4/1	K402_0040 MB43	50	154	86	67	10.0	4.0	1.5	18	2600	2200	3000	306	459	1078
4.000	4/1	K402_0040 MB43	72	123	86	67	10.0	4.0	1.5	18	2600	2200	3000	306	459	1078
4.000	4/1	K402_0040 MB43	100	84	86	67	10.0	4.0	1.5	18	2600	2200	3000	306	459	1078
4.000	4/1	K402_0040 MB43	160	–	86	67	10.0	4.0	1.5	18	2600	2200	3000	306	459	1078
4.364	48/11	K402_0044 MB33	16	104	37	53	10.0	4.0	1.5	17	2600	2200	3800	315	423	800
4.364	48/11	K402_0044 MB33	24	92	37	53	10.0	4.0	1.5	17	2600	2200	3800	315	423	800
4.364	48/11	K402_0044 MB33	32	81	37	53	10.0	4.0	1.5	17	2600	2200	3800	315	423	800
4.364	48/11	K402_0044 MB33	45	63	37	53	10.0	4.0	1.5	17	2600	2200	3800	315	423	800
4.364	48/11	K402_0044 MB33	90	–	37	53	10.0	4.0	1.5	17	2600	2200	3800	315	423	800
4.364	48/11	K402_0044 MB43	50	146	85	67	10.0	4.0	1.5	19	2600	2200	3000	315	472	1078
4.364	48/11	K402_0044 MB43	72	115	85	67	10.0	4.0	1.5	19	2600	2200	3000	315	472	1078
4.364	48/11	K402_0044 MB43	100	76	85	67	10.0	4.0	1.5	19	2600	2200	3000	315	472	1078
5.422	1849/341	K402_0054 MB33	16	104	35	53	10.0	4.0	1.5	20	2600	2200	3800	338	508	994
5.422	1849/341	K402_0054 MB33	24	92	35	53	10.0	4.0	1.5	20	2600	2200	3800	338	508	994
5.422	1849/341	K402_0054 MB33	32	81	35	53	10.0	4.0	1.5	20	2600	2200	3800	338	508	994
5.422	1849/341	K402_0054 MB33	45	63	35	53	10.0	4.0	1.5	20	2600	2200	3800	338	508	994
5.422	1849/341	K402_0054 MB33	90	–	35	53	10.0	4.0	1.5	20	2600	2200	3800	338	508	994
5.422	1849/341	K402_0054 MB43	50	104	83	67	10.0	4.0	1.5	22	2600	2200	3000	338	508	1078
5.422	1849/341	K402_0054 MB43	72	73	83	67	10.0	4.0	1.5	22	2600	2200	3000	338	508	1078
5.422	1849/341	K402_0054 MB43	100	34	83	67	10.0	4.0	1.5	22	2600	2200	3000	338	508	1078
6.000	6/1	K402_0060 MB33	16	104	36	53	10.0	4.0	1.5	22	2600	2200	3800	350	525	1100
6.000	6/1	K402_0060 MB33	24	92	36	53	10.0	4.0	1.5	22	2600	2200	3800	350	525	1100
6.000	6/1	K402_0060 MB33	32	81	36	53	10.0	4.0	1.5	22	2600	2200	3800	350	525	1100
6.000	6/1	K402_0060 MB33	45	63	36	53	10.0	4.0	1.5	22	2600	2200	3800	350	525	1100
6.000	6/1	K402_0060 MB33	90	–	36	53	10.0	4.0	1.5	22	2600	2200	3800	350	525	1100
6.000	6/1	K402_0060 MB43	50	90	83	67	10.0	4.0	1.5	23	2600	2200	3000	350	525	1100
6.000	6/1	K402_0060 MB43	72	59	83	67	10.0	4.0	1.5	23	2600	2200	3000	350	525	1100
6.000	6/1	K402_0060 MB43	100	20	83	67	10.0	4.0	1.5	23	2600	2200	3000	350	525	1100
6.719	215/32	K402_0067 MB23	8.0	31	11	46	10.0	4.0	1.5	20	3000	2600	4000	244	244	411
6.719	215/32	K402_0067 MB23	12	25	11	46	10.0	4.0	1.5	20	3000	2600	4000	244	244	411
6.719	215/32	K402_0067 MB23	16	20	11	46	10.0	4.0	1.5	20	3000	2600	4000	244	244	411
6.719	215/32	K402_0067 MB23	24	8.4	11	46	10.0	4.0	1.5	20	3000	2600	4000	244	244	411
6.719	215/32	K402_0067 MB23	30	–	11	46	10.0	4.0	1.5	20	3000	2600	4000	244	244	411
6.719	215/32	K402_0067 MB33	16	104	33	53	10.0	4.0	1.5	23	3000	2600	4000	363	545	1100
6.719	215/32	K402_0067 MB33	24	92	33	53	10.0	4.0	1.5	23	3000	2600	4000	363	545	1100
6.719	215/32	K402_0067 MB33	32	81	33	53	10.0	4.0	1.5	23	3000	2600	4000	363	545	1100
6.719	215/32	K402_0067 MB33	45	63	33	53	10.0	4.0	1.5	23	3000	2600	4000	363	545	1100
6.719	215/32	K402_0067 MB33	90	–	33	53	10.0	4.0	1.5	23	3000	2600	4000	363	545	1100
6.719	215/32	K402_0067 MB43	50	73	81	67	10.0	4.0	1.5	24	3000	2600	3000	363	545	1100
6.719	215/32	K402_0067 MB43	72	42	81	67	10.0	4.0	1.5	24	3000	2600	3000	363	545	1100
6.719	215/32	K402_0067 MB43	100	2.9	81	67	10.0	4.0	1.5	24	3000	2600	3000	363	545	1100
7.456	1849/248	K402_0075 MB33	16	104	34	53	10.0	4.0	1.5	24	2600	2200	3800	376	564	1100
7.456	1849/248	K402_0075 MB33	24	92	34	53	10.0	4.0	1.5	24	2600	2200	3800	376	564	1100
7.456	1849/248	K402_0075 MB33	32	81	34	53	10.0	4.0	1.5	24	2600	2200	3800	376	564	1100
7.456	1849/248	K402_0075 MB33	45	63	34	53	10.0	4.0	1.5	24	2600	2200	3800	376	564	1100
7.456	1849/248	K402_0075 MB33	90	–	34	53	10.0	4.0	1.5	24	2600	2200	3800	376	564	1100
7.456	1849/248	K402_0075 MB43	50	59	82	67	10.0	4.0	1.5	25	2600	2200	3000	376	564	1100
7.456	1849/248	K402_0075 MB43	72	28	82	67	10.0	4.0	1.5	25	2600	2200	3000	376	564	1100

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K402 (M<sub>2acc,max</sub> = 600 Nm)</b>																
8.377	645/77	K402_0084 MB23	8.0	31	10	46	10.0	4.0	1.5	23	3000	2600	4000	305	305	512
8.377	645/77	K402_0084 MB23	12	25	10	46	10.0	4.0	1.5	23	3000	2600	4000	305	305	512
8.377	645/77	K402_0084 MB23	16	20	10	46	10.0	4.0	1.5	23	3000	2600	4000	305	305	512
8.377	645/77	K402_0084 MB23	24	8.4	10	46	10.0	4.0	1.5	23	3000	2600	4000	305	305	512
8.377	645/77	K402_0084 MB23	30	–	10	46	10.0	4.0	1.5	23	3000	2600	4000	305	305	512
8.377	645/77	K402_0084 MB33	16	92	32	53	10.0	4.0	1.5	25	3000	2600	4000	391	587	1100
8.377	645/77	K402_0084 MB33	24	81	32	53	10.0	4.0	1.5	25	3000	2600	4000	391	587	1100
8.377	645/77	K402_0084 MB33	32	70	32	53	10.0	4.0	1.5	25	3000	2600	4000	391	587	1100
8.377	645/77	K402_0084 MB33	45	52	32	53	10.0	4.0	1.5	25	3000	2600	4000	391	587	1100
8.377	645/77	K402_0084 MB43	50	45	80	67	10.0	4.0	1.5	26	3000	2600	3000	391	587	1100
8.377	645/77	K402_0084 MB43	72	14	80	67	10.0	4.0	1.5	26	3000	2600	3000	391	587	1100
9.238	2365/256	K402_0092 MB23	8.0	31	11	46	10.0	4.0	1.5	24	3000	2600	4000	336	336	565
9.238	2365/256	K402_0092 MB23	12	25	11	46	10.0	4.0	1.5	24	3000	2600	4000	336	336	565
9.238	2365/256	K402_0092 MB23	16	20	11	46	10.0	4.0	1.5	24	3000	2600	4000	336	336	565
9.238	2365/256	K402_0092 MB23	24	8.4	11	46	10.0	4.0	1.5	24	3000	2600	4000	336	336	565
9.238	2365/256	K402_0092 MB23	30	–	11	46	10.0	4.0	1.5	24	3000	2600	4000	336	336	565
9.238	2365/256	K402_0092 MB33	16	82	33	53	10.0	4.0	1.5	26	3000	2600	4000	404	600	1100
9.238	2365/256	K402_0092 MB33	24	70	33	53	10.0	4.0	1.5	26	3000	2600	4000	404	600	1100
9.238	2365/256	K402_0092 MB33	32	59	33	53	10.0	4.0	1.5	26	3000	2600	4000	404	600	1100
9.238	2365/256	K402_0092 MB33	45	41	33	53	10.0	4.0	1.5	26	3000	2600	4000	404	600	1100
9.238	2365/256	K402_0092 MB43	50	34	80	67	10.0	4.0	1.5	27	3000	2600	3000	404	600	1100
9.238	2365/256	K402_0092 MB43	72	3.2	80	67	10.0	4.0	1.5	27	3000	2600	3000	404	600	1100
10.10	1333/132	K402_0100 MB23	8.0	31	9.4	46	10.0	4.0	1.5	25	3400	3000	4000	367	367	617
10.10	1333/132	K402_0100 MB23	12	25	9.4	46	10.0	4.0	1.5	25	3400	3000	4000	367	367	617
10.10	1333/132	K402_0100 MB23	16	20	9.4	46	10.0	4.0	1.5	25	3400	3000	4000	367	367	617
10.10	1333/132	K402_0100 MB23	24	8.4	9.4	46	10.0	4.0	1.5	25	3400	3000	4000	367	367	617
10.10	1333/132	K402_0100 MB23	30	–	9.4	46	10.0	4.0	1.5	25	3400	3000	4000	367	367	617
10.10	1333/132	K402_0100 MB33	16	73	31	53	10.0	4.0	1.5	27	3400	3000	4000	416	600	1100
10.10	1333/132	K402_0100 MB33	24	61	31	53	10.0	4.0	1.5	27	3400	3000	4000	416	600	1100
10.10	1333/132	K402_0100 MB33	32	50	31	53	10.0	4.0	1.5	27	3400	3000	4000	416	600	1100
10.10	1333/132	K402_0100 MB33	45	32	31	53	10.0	4.0	1.5	27	3400	3000	4000	416	600	1100
10.10	1333/132	K402_0100 MB43	50	25	79	67	10.0	4.0	1.5	28	3000	3000	3000	416	600	1100
11.52	645/56	K402_0115 MB23	8.0	31	9.7	46	10.0	4.0	1.5	26	3000	2600	4000	419	419	704
11.52	645/56	K402_0115 MB23	12	25	9.7	46	10.0	4.0	1.5	26	3000	2600	4000	419	419	704
11.52	645/56	K402_0115 MB23	16	20	9.7	46	10.0	4.0	1.5	26	3000	2600	4000	419	419	704
11.52	645/56	K402_0115 MB23	24	8.4	9.7	46	10.0	4.0	1.5	26	3000	2600	4000	419	419	704
11.52	645/56	K402_0115 MB23	30	–	9.7	46	10.0	4.0	1.5	26	3000	2600	4000	419	419	704
11.52	645/56	K402_0115 MB33	16	61	32	53	10.0	4.0	1.5	28	3000	2600	4000	435	600	1100
11.52	645/56	K402_0115 MB33	24	50	32	53	10.0	4.0	1.5	28	3000	2600	4000	435	600	1100
11.52	645/56	K402_0115 MB33	32	39	32	53	10.0	4.0	1.5	28	3000	2600	4000	435	600	1100
11.52	645/56	K402_0115 MB33	45	20	32	53	10.0	4.0	1.5	28	3000	2600	4000	435	600	1100
11.52	645/56	K402_0115 MB43	50	13	79	67	10.0	4.0	1.5	28	3000	2600	3000	435	600	1100
12.66	2924/231	K402_0125 MB23	8.0	31	8.7	46	10.0	4.0	1.5	27	3400	3000	4000	449	460	774
12.66	2924/231	K402_0125 MB23	12	25	8.7	46	10.0	4.0	1.5	27	3400	3000	4000	449	460	774
12.66	2924/231	K402_0125 MB23	16	20	8.7	46	10.0	4.0	1.5	27	3400	3000	4000	449	460	774
12.66	2924/231	K402_0125 MB23	24	8.4	8.7	46	10.0	4.0	1.5	27	3400	3000	4000	449	460	774
12.66	2924/231	K402_0125 MB23	30	–	8.7	46	10.0	4.0	1.5	27	3400	3000	4000	449	460	774
12.66	2924/231	K402_0125 MB33	16	53	31	53	10.0	4.0	1.5	28	3400	3000	4000	449	600	1100
12.66	2924/231	K402_0125 MB33	24	42	31	53	10.0	4.0	1.5	28	3400	3000	4000	449	600	1100
12.66	2924/231	K402_0125 MB33	32	31	31	53	10.0	4.0	1.5	28	3400	3000	4000	449	600	1100
12.66	2924/231	K402_0125 MB33	45	13	31	53	10.0	4.0	1.5	28	3400	3000	4000	449	600	1100
12.66	2924/231	K402_0125 MB43	50	5.9	78	67	10.0	4.0	1.5	29	3000	3000	3000	449	600	1100
13.89	1333/96	K402_0140 MB23	8.0	31	9.1	46	10.0	4.0	1.5	27	3400	3000	4000	463	505	849
13.89	1333/96	K402_0140 MB23	12	25	9.1	46	10.0	4.0	1.5	27	3400	3000	4000	463	505	849
13.89	1333/96	K402_0140 MB23	16	20	9.1	46	10.0	4.0	1.5	27	3400	3000	4000	463	505	849
13.89	1333/96	K402_0140 MB23	24	8.4	9.1	46	10.0	4.0	1.5	27	3400	3000	4000	463	505	849
13.89	1333/96	K402_0140 MB23	30	–	9.1	46	10.0	4.0	1.5	27	3400	3000	4000	463	505	849
13.89	1333/96	K402_0140 MB33	16	47	31	53	10.0	4.0	1.5	29	3400	3000	4000	463	600	1100
13.89	1333/96	K402_0140 MB33	24	36	31	53	10.0	4.0	1.5	29	3400	3000	4000	463	600	1100
13.89	1333/96	K402_0140 MB33	32	24	31	53	10.0	4.0	1.5	29	3400	3000	4000	463	600	1100
13.89	1333/96	K402_0140 MB33	45	6.2	31	53	10.0	4.0	1.5	29	3400	3000	4000	463	600	1100
16.94	559/33	K402_0170 MB23	8.0	31	8.1	46	10.0	4.0	1.5	29	3600	3300	4000	495	600	1035
16.94	559/33	K402_0170 MB23	12	25	8.1	46	10.0	4.0	1.5	29	3600	3300	4000	495	600	1035
16.94	559/33	K402_0170 MB23	16	20	8.1	46	10.0	4.0	1.5	29	3600	3300	4000	495	600	1035



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K402 (M<sub>2acc,max</sub> = 600 Nm)</b>																
16.94	559/33	K402_0170 MB23	24	8.4	8.1	46	10.0	4.0	1.5	29	3600	3300	4000	495	600	1035
16.94	559/33	K402_0170 MB23	30	–	8.1	46	10.0	4.0	1.5	29	3600	3300	4000	495	600	1035
16.94	559/33	K402_0170 MB33	16	34	30	53	10.0	4.0	1.5	29	3600	3300	4000	495	600	1100
16.94	559/33	K402_0170 MB33	24	23	30	53	10.0	4.0	1.5	29	3600	3300	4000	495	600	1100
16.94	559/33	K402_0170 MB33	32	12	30	53	10.0	4.0	1.5	29	3600	3300	4000	495	600	1100
17.41	731/42	K402_0175 MB23	8.0	31	8.6	46	10.0	4.0	1.5	29	3400	3000	4000	499	600	1064
17.41	731/42	K402_0175 MB23	12	25	8.6	46	10.0	4.0	1.5	29	3400	3000	4000	499	600	1064
17.41	731/42	K402_0175 MB23	16	20	8.6	46	10.0	4.0	1.5	29	3400	3000	4000	499	600	1064
17.41	731/42	K402_0175 MB23	24	8.4	8.6	46	10.0	4.0	1.5	29	3400	3000	4000	499	600	1064
17.41	731/42	K402_0175 MB23	30	–	8.6	46	10.0	4.0	1.5	29	3400	3000	4000	499	600	1064
17.41	731/42	K402_0175 MB33	16	33	30	53	10.0	4.0	1.5	29	3400	3000	4000	499	600	1100
17.41	731/42	K402_0175 MB33	24	22	30	53	10.0	4.0	1.5	29	3400	3000	4000	499	600	1100
17.41	731/42	K402_0175 MB33	32	10	30	53	10.0	4.0	1.5	29	3400	3000	4000	499	600	1100
20.20	1333/66	K402_0200 MB23	8.0	31	7.9	46	10.0	4.0	1.5	29	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB23	12	25	7.9	46	10.0	4.0	1.5	29	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB23	16	20	7.9	46	10.0	4.0	1.5	29	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB23	24	8.4	7.9	46	10.0	4.0	1.5	29	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB23	30	–	7.9	46	10.0	4.0	1.5	29	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB33	16	25	28	53	10.0	4.0	1.5	30	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB33	24	14	28	53	10.0	4.0	1.5	30	3600	3300	4000	524	600	1100
20.20	1333/66	K402_0200 MB33	32	2.7	28	53	10.0	4.0	1.5	30	3600	3300	4000	524	600	1100
23.29	559/24	K402_0230 MB23	8.0	30	8.0	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
23.29	559/24	K402_0230 MB23	12	24	8.0	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
23.29	559/24	K402_0230 MB23	16	19	8.0	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
23.29	559/24	K402_0230 MB23	24	7.6	8.0	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
23.29	559/24	K402_0230 MB33	16	19	30	53	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
23.29	559/24	K402_0230 MB33	24	7.6	30	53	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
25.28	4171/165	K402_0250 MB23	8.0	23	7.7	46	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
25.28	4171/165	K402_0250 MB23	12	18	7.7	46	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
25.28	4171/165	K402_0250 MB23	16	12	7.7	46	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
25.28	4171/165	K402_0250 MB23	24	1.0	7.7	46	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
25.28	4171/165	K402_0250 MB33	16	12	28	53	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
25.28	4171/165	K402_0250 MB33	24	1.0	28	53	10.0	4.0	1.5	30	3600	3300	4000	501	600	1001
27.77	1333/48	K402_0280 MB23	8.0	23	7.8	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
27.77	1333/48	K402_0280 MB23	12	18	7.8	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
27.77	1333/48	K402_0280 MB23	16	12	7.8	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
27.77	1333/48	K402_0280 MB23	24	1.0	7.8	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
27.77	1333/48	K402_0280 MB33	16	12	28	53	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
27.77	1333/48	K402_0280 MB33	24	1.0	28	53	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
33.68	4816/143	K402_0340 MB23	8.0	9.0	7.5	46	10.0	4.0	1.5	30	3600	3300	4000	389	467	778
33.68	4816/143	K402_0340 MB23	12	3.4	7.5	46	10.0	4.0	1.5	30	3600	3300	4000	389	467	778
34.76	4171/120	K402_0350 MB23	8.0	16	7.6	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
34.76	4171/120	K402_0350 MB23	12	11	7.6	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
34.76	4171/120	K402_0350 MB23	16	5.2	7.6	46	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
34.76	4171/120	K402_0350 MB33	16	5.2	28	53	10.0	4.0	1.5	30	3600	3300	4000	550	600	1100
40.51	4902/121	K402_0410 MB23	8.0	2.1	7.4	46	10.0	4.0	1.5	30	3600	3300	4000	308	370	616
46.31	602/13	K402_0460 MB23	8.0	9.0	7.5	46	10.0	4.0	1.5	31	3600	3300	4000	535	600	1069
46.31	602/13	K402_0460 MB23	12	3.4	7.5	46	10.0	4.0	1.5	31	3600	3300	4000	535	600	1069
55.71	2451/44	K402_0560 MB23	8.0	2.1	7.4	46	10.0	4.0	1.5	31	3600	3300	4000	424	508	847
<b>K513 (M<sub>2acc,max</sub> = 1000 Nm)</b>																
7.347	551/75	K513_0073 MB33	16	104	45	59	10.0	5.0	2.0	34	1900	1800	3200	694	702	1327
7.347	551/75	K513_0073 MB33	24	92	45	59	10.0	5.0	2.0	34	1900	1800	3200	694	702	1327
7.347	551/75	K513_0073 MB33	32	81	45	59	10.0	5.0	2.0	34	1900	1800	3200	694	702	1327
7.347	551/75	K513_0073 MB33	45	63	45	59	10.0	5.0	2.0	34	1900	1800	3200	694	702	1327
7.347	551/75	K513_0073 MB33	90	–	45	59	10.0	5.0	2.0	34	1900	1800	3200	694	702	1327
7.347	551/75	K513_0073 MB43	50	141	92	72	10.0	5.0	2.0	37	1900	1800	3000	694	1000	1800
7.347	551/75	K513_0073 MB43	72	110	92	72	10.0	5.0	2.0	37	1900	1800	3000	694	1000	1800
7.347	551/75	K513_0073 MB43	100	71	92	72	10.0	5.0	2.0	37	1900	1800	3000	694	1000	1800
8.134	17081/2100	K513_0081 MB33	16	104	43	59	10.0	5.0	2.0	36	1900	1800	3200	718	778	1470
8.134	17081/2100	K513_0081 MB33	24	92	43	59	10.0	5.0	2.0	36	1900	1800	3200	718	778	1470
8.134	17081/2100	K513_0081 MB33	32	81	43	59	10.0	5.0	2.0	36	1900	1800	3200	718	778	1470
8.134	17081/2100	K513_0081 MB33	45	63	43	59	10.0	5.0	2.0	36	1900	1800	3200	718	778	1470
8.134	17081/2100	K513_0081 MB33	90	–	43	59	10.0	5.0	2.0	36	1900	1800	3200	718	778	1470
8.134	17081/2100	K513_0081 MB43	50	120	91	72	10.0	5.0	2.0	39	1900	1800	3000	718	1000	1800

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K513 (M<sub>2acc,max</sub> = 1000 Nm)</b>																
8.134	17081/2100	K513_0081 MB43	72	90	91	72	10.0	5.0	2.0	39	1900	1800	3000	718	1000	1800
8.134	17081/2100	K513_0081 MB43	100	50	91	72	10.0	5.0	2.0	39	1900	1800	3000	718	1000	1800
9.168	1421/155	K513_0092 MB33	16	104	40	59	10.0	5.0	2.0	38	1900	1800	3200	748	876	1657
9.168	1421/155	K513_0092 MB33	24	92	40	59	10.0	5.0	2.0	38	1900	1800	3200	748	876	1657
9.168	1421/155	K513_0092 MB33	32	81	40	59	10.0	5.0	2.0	38	1900	1800	3200	748	876	1657
9.168	1421/155	K513_0092 MB33	45	63	40	59	10.0	5.0	2.0	38	1900	1800	3200	748	876	1657
9.168	1421/155	K513_0092 MB33	90	-	40	59	10.0	5.0	2.0	38	1900	1800	3200	748	876	1657
9.168	1421/155	K513_0092 MB43	50	99	88	72	10.0	5.0	2.0	40	1900	1800	3000	748	1000	1800
9.168	1421/155	K513_0092 MB43	72	68	88	72	10.0	5.0	2.0	40	1900	1800	3000	748	1000	1800
9.168	1421/155	K513_0092 MB43	100	29	88	72	10.0	5.0	2.0	40	1900	1800	3000	748	1000	1800
10.15	203/20	K513_0100 MB33	16	104	39	59	10.0	5.0	2.0	40	1900	1800	3200	773	970	1800
10.15	203/20	K513_0100 MB33	24	92	39	59	10.0	5.0	2.0	40	1900	1800	3200	773	970	1800
10.15	203/20	K513_0100 MB33	32	81	39	59	10.0	5.0	2.0	40	1900	1800	3200	773	970	1800
10.15	203/20	K513_0100 MB33	45	63	39	59	10.0	5.0	2.0	40	1900	1800	3200	773	970	1800
10.15	203/20	K513_0100 MB33	90	-	39	59	10.0	5.0	2.0	40	1900	1800	3200	773	970	1800
10.15	203/20	K513_0100 MB43	50	83	87	72	10.0	5.0	2.0	42	1900	1800	3000	773	1000	1800
10.15	203/20	K513_0100 MB43	72	52	87	72	10.0	5.0	2.0	42	1900	1800	3000	773	1000	1800
10.15	203/20	K513_0100 MB43	100	13	87	72	10.0	5.0	2.0	42	1900	1800	3000	773	1000	1800
11.57	10759/930	K513_0115 MB33	16	104	37	59	10.0	5.0	2.0	42	2300	2200	3600	808	1000	1800
11.57	10759/930	K513_0115 MB33	24	92	37	59	10.0	5.0	2.0	42	2300	2200	3600	808	1000	1800
11.57	10759/930	K513_0115 MB33	32	81	37	59	10.0	5.0	2.0	42	2300	2200	3600	808	1000	1800
11.57	10759/930	K513_0115 MB33	45	63	37	59	10.0	5.0	2.0	42	2300	2200	3600	808	1000	1800
11.57	10759/930	K513_0115 MB33	90	-	37	59	10.0	5.0	2.0	42	2300	2200	3600	808	1000	1800
11.57	10759/930	K513_0115 MB43	50	64	85	72	10.0	5.0	2.0	43	2300	2200	3000	808	1000	1800
11.57	10759/930	K513_0115 MB43	72	33	85	72	10.0	5.0	2.0	43	2300	2200	3000	808	1000	1800
12.81	1537/120	K513_0130 MB33	16	99	36	59	10.0	5.0	2.0	43	2300	2200	3600	836	1000	1800
12.81	1537/120	K513_0130 MB33	24	87	36	59	10.0	5.0	2.0	43	2300	2200	3600	836	1000	1800
12.81	1537/120	K513_0130 MB33	32	76	36	59	10.0	5.0	2.0	43	2300	2200	3600	836	1000	1800
12.81	1537/120	K513_0130 MB33	45	58	36	59	10.0	5.0	2.0	43	2300	2200	3600	836	1000	1800
12.81	1537/120	K513_0130 MB43	50	51	84	72	10.0	5.0	2.0	44	2300	2200	3000	836	1000	1800
12.81	1537/120	K513_0130 MB43	72	20	84	72	10.0	5.0	2.0	44	2300	2200	3000	836	1000	1800
14.54	5887/405	K513_0145 MB23	8.0	31	13	52	10.0	5.0	2.0	42	2300	2200	3600	521	521	875
14.54	5887/405	K513_0145 MB23	12	25	13	52	10.0	5.0	2.0	42	2300	2200	3600	521	521	875
14.54	5887/405	K513_0145 MB23	16	20	13	52	10.0	5.0	2.0	42	2300	2200	3600	521	521	875
14.54	5887/405	K513_0145 MB23	24	8.4	13	52	10.0	5.0	2.0	42	2300	2200	3600	521	521	875
14.54	5887/405	K513_0145 MB23	30	-	13	52	10.0	5.0	2.0	42	2300	2200	3600	521	521	875
14.54	5887/405	K513_0145 MB33	16	84	35	59	10.0	5.0	2.0	44	2300	2200	3600	872	1000	1800
14.54	5887/405	K513_0145 MB33	24	73	35	59	10.0	5.0	2.0	44	2300	2200	3600	872	1000	1800
14.54	5887/405	K513_0145 MB33	32	62	35	59	10.0	5.0	2.0	44	2300	2200	3600	872	1000	1800
14.54	5887/405	K513_0145 MB33	45	44	35	59	10.0	5.0	2.0	44	2300	2200	3600	872	1000	1800
14.54	5887/405	K513_0145 MB43	50	37	82	72	10.0	5.0	2.0	45	2300	2200	3000	872	1000	1800
14.54	5887/405	K513_0145 MB43	72	5.7	82	72	10.0	5.0	2.0	45	2300	2200	3000	872	1000	1800
16.09	26071/1620	K513_0160 MB23	8.0	31	12	52	10.0	5.0	2.0	43	2300	2200	3600	577	577	969
16.09	26071/1620	K513_0160 MB23	12	25	12	52	10.0	5.0	2.0	43	2300	2200	3600	577	577	969
16.09	26071/1620	K513_0160 MB23	16	20	12	52	10.0	5.0	2.0	43	2300	2200	3600	577	577	969
16.09	26071/1620	K513_0160 MB23	24	8.4	12	52	10.0	5.0	2.0	43	2300	2200	3600	577	577	969
16.09	26071/1620	K513_0160 MB23	30	-	12	52	10.0	5.0	2.0	43	2300	2200	3600	577	577	969
16.09	26071/1620	K513_0160 MB33	16	74	34	59	10.0	5.0	2.0	45	2300	2200	3600	900	1000	1800
16.09	26071/1620	K513_0160 MB33	24	63	34	59	10.0	5.0	2.0	45	2300	2200	3600	900	1000	1800
16.09	26071/1620	K513_0160 MB33	32	51	34	59	10.0	5.0	2.0	45	2300	2200	3600	900	1000	1800
16.09	26071/1620	K513_0160 MB33	45	33	34	59	10.0	5.0	2.0	45	2300	2200	3600	900	1000	1800
16.09	26071/1620	K513_0160 MB43	50	26	82	72	10.0	5.0	2.0	46	2300	2200	3000	900	1000	1800
17.48	6293/360	K513_0175 MB23	8.0	31	12	52	10.0	5.0	2.0	44	2800	2500	4000	627	627	1053
17.48	6293/360	K513_0175 MB23	12	25	12	52	10.0	5.0	2.0	44	2800	2500	4000	627	627	1053
17.48	6293/360	K513_0175 MB23	16	20	12	52	10.0	5.0	2.0	44	2800	2500	4000	627	627	1053
17.48	6293/360	K513_0175 MB23	24	8.4	12	52	10.0	5.0	2.0	44	2800	2500	4000	627	627	1053
17.48	6293/360	K513_0175 MB23	30	-	12	52	10.0	5.0	2.0	44	2800	2500	4000	627	627	1053
17.48	6293/360	K513_0175 MB33	16	66	33	59	10.0	5.0	2.0	46	2800	2500	4000	900	1000	1800
17.48	6293/360	K513_0175 MB33	24	55	33	59	10.0	5.0	2.0	46	2800	2500	4000	900	1000	1800
17.48	6293/360	K513_0175 MB33	32	44	33	59	10.0	5.0	2.0	46	2800	2500	4000	900	1000	1800
17.48	6293/360	K513_0175 MB33	45	26	33	59	10.0	5.0	2.0	46	2800	2500	4000	900	1000	1800
17.48	6293/360	K513_0175 MB43	50	19	81	72	10.0	5.0	2.0	47	2800	2500	3000	900	1000	1800
19.35	27869/1440	K513_0195 MB23	8.0	31	11	52	10.0	5.0	2.0	45	2800	2500	4000	694	694	1166
19.35	27869/1440	K513_0195 MB23	12	25	11	52	10.0	5.0	2.0	45	2800	2500	4000	694	694	1166

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K513 (M<sub>2acc,max</sub> = 1000 Nm)</b>																
19.35	27869/1440	K513_0195 MB23	16	20	11	52	10.0	5.0	2.0	45	2800	2500	4000	694	694	1166
19.35	27869/1440	K513_0195 MB23	24	8.4	11	52	10.0	5.0	2.0	45	2800	2500	4000	694	694	1166
19.35	27869/1440	K513_0195 MB23	30	-	11	52	10.0	5.0	2.0	45	2800	2500	4000	694	694	1166
19.35	27869/1440	K513_0195 MB33	16	58	33	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
19.35	27869/1440	K513_0195 MB33	24	46	33	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
19.35	27869/1440	K513_0195 MB33	32	35	33	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
19.35	27869/1440	K513_0195 MB33	45	17	33	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
19.35	27869/1440	K513_0195 MB43	50	10	81	72	10.0	5.0	2.0	47	2800	2500	3000	900	1000	1800
21.99	2639/120	K513_0220 MB23	8.0	31	10	52	10.0	5.0	2.0	46	2800	2500	4000	788	788	1325
21.99	2639/120	K513_0220 MB23	12	25	10	52	10.0	5.0	2.0	46	2800	2500	4000	788	788	1325
21.99	2639/120	K513_0220 MB23	16	20	10	52	10.0	5.0	2.0	46	2800	2500	4000	788	788	1325
21.99	2639/120	K513_0220 MB23	24	8.4	10	52	10.0	5.0	2.0	46	2800	2500	4000	788	788	1325
21.99	2639/120	K513_0220 MB23	30	-	10	52	10.0	5.0	2.0	46	2800	2500	4000	788	788	1325
21.99	2639/120	K513_0220 MB33	16	48	32	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
21.99	2639/120	K513_0220 MB33	24	37	32	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
21.99	2639/120	K513_0220 MB33	32	26	32	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
21.99	2639/120	K513_0220 MB33	45	7.4	32	59	10.0	5.0	2.0	47	2800	2500	4000	900	1000	1800
21.99	2639/120	K513_0220 MB43	50	0.4	80	72	10.0	5.0	2.0	48	2800	2500	3000	900	1000	1800
24.35	11687/480	K513_0240 MB23	8.0	31	10	52	10.0	5.0	2.0	47	2800	2500	4000	873	873	1466
24.35	11687/480	K513_0240 MB23	12	25	10	52	10.0	5.0	2.0	47	2800	2500	4000	873	873	1466
24.35	11687/480	K513_0240 MB23	16	20	10	52	10.0	5.0	2.0	47	2800	2500	4000	873	873	1466
24.35	11687/480	K513_0240 MB23	24	8.4	10	52	10.0	5.0	2.0	47	2800	2500	4000	873	873	1466
24.35	11687/480	K513_0240 MB23	30	-	10	52	10.0	5.0	2.0	47	2800	2500	4000	873	873	1466
24.35	11687/480	K513_0240 MB33	16	41	32	59	10.0	5.0	2.0	48	2800	2500	4000	900	1000	1800
24.35	11687/480	K513_0240 MB33	24	30	32	59	10.0	5.0	2.0	48	2800	2500	4000	900	1000	1800
24.35	11687/480	K513_0240 MB33	32	19	32	59	10.0	5.0	2.0	48	2800	2500	4000	900	1000	1800
24.35	11687/480	K513_0240 MB33	45	0.6	32	59	10.0	5.0	2.0	48	2800	2500	4000	900	1000	1800
29.18	4669/160	K513_0290 MB23	8.0	31	9.2	52	10.0	5.0	2.0	47	3400	3000	4000	900	1000	1758
29.18	4669/160	K513_0290 MB23	12	25	9.2	52	10.0	5.0	2.0	47	3400	3000	4000	900	1000	1758
29.18	4669/160	K513_0290 MB23	16	20	9.2	52	10.0	5.0	2.0	47	3400	3000	4000	900	1000	1758
29.18	4669/160	K513_0290 MB23	24	8.4	9.2	52	10.0	5.0	2.0	47	3400	3000	4000	900	1000	1758
29.18	4669/160	K513_0290 MB23	30	-	9.2	52	10.0	5.0	2.0	47	3400	3000	4000	900	1000	1758
29.18	4669/160	K513_0290 MB33	16	31	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
29.18	4669/160	K513_0290 MB33	24	19	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
29.18	4669/160	K513_0290 MB33	32	8.3	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB23	8.0	31	9.1	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB23	12	25	9.1	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB23	16	20	9.1	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB23	24	8.4	9.1	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB23	30	-	9.1	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB33	16	26	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB33	24	14	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
32.31	20677/640	K513_0320 MB33	32	3.1	31	59	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB23	8.0	31	8.7	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB23	12	25	8.7	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB23	16	20	8.7	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB23	24	8.4	8.7	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB23	30	-	8.7	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB33	16	22	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
34.80	174/5	K513_0350 MB33	24	11	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB23	8.0	29	8.6	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB23	12	23	8.6	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB23	16	18	8.6	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB23	24	6.6	8.6	52	10.0	5.0	2.0	48	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB33	16	18	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
38.53	2697/70	K513_0390 MB33	24	6.6	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB23	8.0	24	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB23	12	19	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB23	16	13	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB23	24	2.0	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB33	16	13	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
43.50	87/2	K513_0440 MB33	24	2.0	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
48.16	2697/56	K513_0480 MB23	8.0	21	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
48.16	2697/56	K513_0480 MB23	12	15	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redl</sub>	Δφ <sub>2redr</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K513 (M<sub>2acc,max</sub> = 1000 Nm)</b>																
48.16	2697/56	K513_0480 MB23	16	9.8	8.2	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
48.16	2697/56	K513_0480 MB33	16	9.8	29	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
58.30	11368/195	K513_0580 MB23	8.0	15	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
58.30	11368/195	K513_0580 MB23	12	9.8	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
58.30	11368/195	K513_0580 MB23	16	4.2	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
58.30	11368/195	K513_0580 MB33	16	4.2	28	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
64.54	12586/195	K513_0650 MB23	8.0	13	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
64.54	12586/195	K513_0650 MB23	12	7.2	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
64.54	12586/195	K513_0650 MB23	16	1.6	7.8	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
64.54	12586/195	K513_0650 MB33	16	1.6	28	59	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
70.08	841/12	K513_0700 MB23	8.0	9.0	7.6	52	10.0	5.0	2.0	49	3400	3000	4000	821	985	1641
70.08	841/12	K513_0700 MB23	12	3.4	7.6	52	10.0	5.0	2.0	49	3400	3000	4000	821	985	1641
77.59	26071/336	K513_0780 MB23	8.0	8.8	7.6	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
77.59	26071/336	K513_0780 MB23	12	3.2	7.6	52	10.0	5.0	2.0	49	3400	3000	4000	900	1000	1800
87.29	8729/100	K513_0870 MB23	8.0	2.4	7.5	52	10.0	5.0	2.0	49	3400	3000	4000	689	827	1379
96.64	38657/400	K513_0970 MB23	8.0	2.4	7.5	52	10.0	5.0	2.0	49	3400	3000	4000	763	916	1526
<b>K613 (M<sub>2acc,max</sub> = 1600 Nm)</b>																
7.323	19215/2624	K613_0073 MB33	16	104	58	80	10.0	5.0	2.0	47	1800	1700	3000	700	700	1323
7.323	19215/2624	K613_0073 MB33	24	92	58	80	10.0	5.0	2.0	47	1800	1700	3000	700	700	1323
7.323	19215/2624	K613_0073 MB33	32	81	58	80	10.0	5.0	2.0	47	1800	1700	3000	700	700	1323
7.323	19215/2624	K613_0073 MB33	45	63	58	80	10.0	5.0	2.0	47	1800	1700	3000	700	700	1323
7.323	19215/2624	K613_0073 MB33	90	–	58	80	10.0	5.0	2.0	47	1800	1700	3000	700	700	1323
7.323	19215/2624	K613_0073 MB43	50	154	111	94	10.0	5.0	2.0	52	1800	1700	3000	916	1375	2352
7.323	19215/2624	K613_0073 MB43	72	123	111	94	10.0	5.0	2.0	52	1800	1700	3000	916	1375	2352
7.323	19215/2624	K613_0073 MB43	100	84	111	94	10.0	5.0	2.0	52	1800	1700	3000	916	1375	2352
7.323	19215/2624	K613_0073 MB43	160	–	111	94	10.0	5.0	2.0	52	1800	1700	3000	916	1375	2352
8.107	85095/10496	K613_0081 MB33	16	104	56	80	10.0	5.0	2.0	51	1800	1700	3000	775	775	1465
8.107	85095/10496	K613_0081 MB33	24	92	56	80	10.0	5.0	2.0	51	1800	1700	3000	775	775	1465
8.107	85095/10496	K613_0081 MB33	32	81	56	80	10.0	5.0	2.0	51	1800	1700	3000	775	775	1465
8.107	85095/10496	K613_0081 MB33	45	63	56	80	10.0	5.0	2.0	51	1800	1700	3000	775	775	1465
8.107	85095/10496	K613_0081 MB33	90	–	56	80	10.0	5.0	2.0	51	1800	1700	3000	775	775	1465
8.107	85095/10496	K613_0081 MB43	50	154	109	94	10.0	5.0	2.0	56	1800	1700	3000	948	1422	2604
8.107	85095/10496	K613_0081 MB43	72	123	109	94	10.0	5.0	2.0	56	1800	1700	3000	948	1422	2604
8.107	85095/10496	K613_0081 MB43	100	84	109	94	10.0	5.0	2.0	56	1800	1700	3000	948	1422	2604
8.107	85095/10496	K613_0081 MB43	160	–	109	94	10.0	5.0	2.0	56	1800	1700	3000	948	1422	2604
11.41	22631/1984	K613_0115 MB33	16	104	44	80	10.0	5.0	2.0	63	2200	2000	3500	1062	1091	2061
11.41	22631/1984	K613_0115 MB33	24	92	44	80	10.0	5.0	2.0	63	2200	2000	3500	1062	1091	2061
11.41	22631/1984	K613_0115 MB33	32	81	44	80	10.0	5.0	2.0	63	2200	2000	3500	1062	1091	2061
11.41	22631/1984	K613_0115 MB33	45	63	44	80	10.0	5.0	2.0	63	2200	2000	3500	1062	1091	2061
11.41	22631/1984	K613_0115 MB33	90	–	44	80	10.0	5.0	2.0	63	2200	2000	3500	1062	1091	2061
11.41	22631/1984	K613_0115 MB43	50	149	92	94	10.0	5.0	2.0	66	2200	2000	3000	1062	1594	2900
11.41	22631/1984	K613_0115 MB43	72	118	92	94	10.0	5.0	2.0	66	2200	2000	3000	1062	1594	2900
11.41	22631/1984	K613_0115 MB43	100	79	92	94	10.0	5.0	2.0	66	2200	2000	3000	1062	1594	2900
12.63	3233/256	K613_0125 MB33	16	104	43	80	10.0	5.0	2.0	66	2200	2000	3500	1099	1207	2282
12.63	3233/256	K613_0125 MB33	24	92	43	80	10.0	5.0	2.0	66	2200	2000	3500	1099	1207	2282
12.63	3233/256	K613_0125 MB33	32	81	43	80	10.0	5.0	2.0	66	2200	2000	3500	1099	1207	2282
12.63	3233/256	K613_0125 MB33	45	63	43	80	10.0	5.0	2.0	66	2200	2000	3500	1099	1207	2282
12.63	3233/256	K613_0125 MB33	90	–	43	80	10.0	5.0	2.0	66	2200	2000	3500	1099	1207	2282
12.63	3233/256	K613_0125 MB43	50	128	91	94	10.0	5.0	2.0	69	2200	2000	3000	1099	1600	2900
12.63	3233/256	K613_0125 MB43	72	97	91	94	10.0	5.0	2.0	69	2200	2000	3000	1099	1600	2900
12.63	3233/256	K613_0125 MB43	100	58	91	94	10.0	5.0	2.0	69	2200	2000	3000	1099	1600	2900
14.33	12383/864	K613_0145 MB33	16	104	40	80	10.0	5.0	2.0	69	2200	2000	3500	1146	1370	2590
14.33	12383/864	K613_0145 MB33	24	92	40	80	10.0	5.0	2.0	69	2200	2000	3500	1146	1370	2590
14.33	12383/864	K613_0145 MB33	32	81	40	80	10.0	5.0	2.0	69	2200	2000	3500	1146	1370	2590
14.33	12383/864	K613_0145 MB33	45	63	40	80	10.0	5.0	2.0	69	2200	2000	3500	1146	1370	2590
14.33	12383/864	K613_0145 MB33	90	–	40	80	10.0	5.0	2.0	69	2200	2000	3500	1146	1370	2590
14.33	12383/864	K613_0145 MB43	50	104	87	94	10.0	5.0	2.0	72	2200	2000	3000	1146	1600	2900
14.33	12383/864	K613_0145 MB43	72	73	87	94	10.0	5.0	2.0	72	2200	2000	3000	1146	1600	2900
14.33	12383/864	K613_0145 MB43	100	34	87	94	10.0	5.0	2.0	72	2200	2000	3000	1146	1600	2900
15.87	54839/3456	K613_0160 MB33	16	104	39	80	10.0	5.0	2.0	71	2200	2000	3500	1186	1517	2867
15.87	54839/3456	K613_0160 MB33	24	92	39	80	10.0	5.0	2.0	71	2200	2000	3500	1186	1517	2867
15.87	54839/3456	K613_0160 MB33	32	81	39	80	10.0	5.0	2.0	71	2200	2000	3500	1186	1517	2867
15.87	54839/3456	K613_0160 MB33	45	63	39	80	10.0	5.0	2.0	71	2200	2000	3500	1186	1517	2867
15.87	54839/3456	K613_0160 MB33	90	–	39	80	10.0	5.0	2.0	71	2200	2000	3500	1186	1517	2867

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K613 (M<sub>2acc,max</sub> = 1600 Nm)</b>																
15.87	54839/3456	K613_0160 MB43	50	87	87	94	10.0	5.0	2.0	73	2200	2000	3000	1186	1600	2900
15.87	54839/3456	K613_0160 MB43	72	56	87	94	10.0	5.0	2.0	73	2200	2000	3000	1186	1600	2900
15.87	54839/3456	K613_0160 MB43	100	17	87	94	10.0	5.0	2.0	73	2200	2000	3000	1186	1600	2900
17.16	549/32	K613_0170 MB23	8.0	31	15	73	10.0	5.0	2.0	68	2600	2300	4000	615	615	1033
17.16	549/32	K613_0170 MB23	12	25	15	73	10.0	5.0	2.0	68	2600	2300	4000	615	615	1033
17.16	549/32	K613_0170 MB23	16	20	15	73	10.0	5.0	2.0	68	2600	2300	4000	615	615	1033
17.16	549/32	K613_0170 MB23	24	8.4	15	73	10.0	5.0	2.0	68	2600	2300	4000	615	615	1033
17.16	549/32	K613_0170 MB23	30	–	15	73	10.0	5.0	2.0	68	2600	2300	4000	615	615	1033
17.16	549/32	K613_0170 MB33	16	104	37	80	10.0	5.0	2.0	73	2600	2300	4000	1217	1600	2900
17.16	549/32	K613_0170 MB33	24	92	37	80	10.0	5.0	2.0	73	2600	2300	4000	1217	1600	2900
17.16	549/32	K613_0170 MB33	32	81	37	80	10.0	5.0	2.0	73	2600	2300	4000	1217	1600	2900
17.16	549/32	K613_0170 MB33	45	63	37	80	10.0	5.0	2.0	73	2600	2300	4000	1217	1600	2900
17.16	549/32	K613_0170 MB33	90	–	37	80	10.0	5.0	2.0	73	2600	2300	4000	1217	1600	2900
17.16	549/32	K613_0170 MB43	50	75	85	94	10.0	5.0	2.0	75	2600	2300	3000	1217	1600	2900
17.16	549/32	K613_0170 MB43	72	45	85	94	10.0	5.0	2.0	75	2600	2300	3000	1217	1600	2900
17.16	549/32	K613_0170 MB43	100	5.4	85	94	10.0	5.0	2.0	75	2600	2300	3000	1217	1600	2900
18.99	17019/896	K613_0190 MB23	8.0	31	15	73	10.0	5.0	2.0	70	2600	2300	4000	681	681	1144
18.99	17019/896	K613_0190 MB23	12	25	15	73	10.0	5.0	2.0	70	2600	2300	4000	681	681	1144
18.99	17019/896	K613_0190 MB23	16	20	15	73	10.0	5.0	2.0	70	2600	2300	4000	681	681	1144
18.99	17019/896	K613_0190 MB23	24	8.4	15	73	10.0	5.0	2.0	70	2600	2300	4000	681	681	1144
18.99	17019/896	K613_0190 MB23	30	–	15	73	10.0	5.0	2.0	70	2600	2300	4000	681	681	1144
18.99	17019/896	K613_0190 MB33	16	104	37	80	10.0	5.0	2.0	74	2600	2300	4000	1259	1600	2900
18.99	17019/896	K613_0190 MB33	24	92	37	80	10.0	5.0	2.0	74	2600	2300	4000	1259	1600	2900
18.99	17019/896	K613_0190 MB33	32	81	37	80	10.0	5.0	2.0	74	2600	2300	4000	1259	1600	2900
18.99	17019/896	K613_0190 MB33	45	63	37	80	10.0	5.0	2.0	74	2600	2300	4000	1259	1600	2900
18.99	17019/896	K613_0190 MB33	90	–	37	80	10.0	5.0	2.0	74	2600	2300	4000	1259	1600	2900
18.99	17019/896	K613_0190 MB43	50	61	84	94	10.0	5.0	2.0	76	2600	2300	3000	1259	1600	2900
18.99	17019/896	K613_0190 MB43	72	31	84	94	10.0	5.0	2.0	76	2600	2300	3000	1259	1600	2900
21.68	5551/256	K613_0220 MB33	16	93	35	80	10.0	5.0	2.0	76	2600	2300	4000	1316	1600	2900
21.68	5551/256	K613_0220 MB33	24	81	35	80	10.0	5.0	2.0	76	2600	2300	4000	1316	1600	2900
21.68	5551/256	K613_0220 MB33	32	70	35	80	10.0	5.0	2.0	76	2600	2300	4000	1316	1600	2900
21.68	5551/256	K613_0220 MB33	45	52	35	80	10.0	5.0	2.0	76	2600	2300	4000	1316	1600	2900
21.68	5551/256	K613_0220 MB43	50	45	82	94	10.0	5.0	2.0	77	2600	2300	3000	1316	1600	2900
21.68	5551/256	K613_0220 MB43	72	14	82	94	10.0	5.0	2.0	77	2600	2300	3000	1316	1600	2900
24.01	24583/1024	K613_0240 MB33	16	82	34	80	10.0	5.0	2.0	77	2600	2300	4000	1361	1600	2900
24.01	24583/1024	K613_0240 MB33	24	70	34	80	10.0	5.0	2.0	77	2600	2300	4000	1361	1600	2900
24.01	24583/1024	K613_0240 MB33	32	59	34	80	10.0	5.0	2.0	77	2600	2300	4000	1361	1600	2900
24.01	24583/1024	K613_0240 MB33	45	41	34	80	10.0	5.0	2.0	77	2600	2300	4000	1361	1600	2900
24.01	24583/1024	K613_0240 MB43	50	34	82	94	10.0	5.0	2.0	78	2600	2300	3000	1361	1600	2900
24.01	24583/1024	K613_0240 MB43	72	3.1	82	94	10.0	5.0	2.0	78	2600	2300	3000	1361	1600	2900
28.77	29463/1024	K613_0290 MB23	8.0	31	11	73	10.0	5.0	2.0	77	3100	2800	4000	1031	1031	1733
28.77	29463/1024	K613_0290 MB23	12	25	11	73	10.0	5.0	2.0	77	3100	2800	4000	1031	1031	1733
28.77	29463/1024	K613_0290 MB23	16	20	11	73	10.0	5.0	2.0	77	3100	2800	4000	1031	1031	1733
28.77	29463/1024	K613_0290 MB23	24	8.4	11	73	10.0	5.0	2.0	77	3100	2800	4000	1031	1031	1733
28.77	29463/1024	K613_0290 MB23	30	–	11	73	10.0	5.0	2.0	77	3100	2800	4000	1031	1031	1733
28.77	29463/1024	K613_0290 MB33	16	64	33	80	10.0	5.0	2.0	79	3100	2800	4000	1446	1600	2900
28.77	29463/1024	K613_0290 MB33	24	53	33	80	10.0	5.0	2.0	79	3100	2800	4000	1446	1600	2900
28.77	29463/1024	K613_0290 MB33	32	42	33	80	10.0	5.0	2.0	79	3100	2800	4000	1446	1600	2900
28.77	29463/1024	K613_0290 MB33	45	24	33	80	10.0	5.0	2.0	79	3100	2800	4000	1446	1600	2900
28.77	29463/1024	K613_0290 MB43	50	17	80	94	10.0	5.0	2.0	79	3000	2800	3000	1446	1600	2900
31.86	130479/4096	K613_0320 MB23	8.0	31	11	73	10.0	5.0	2.0	78	3100	2800	4000	1142	1142	1919
31.86	130479/4096	K613_0320 MB23	12	25	11	73	10.0	5.0	2.0	78	3100	2800	4000	1142	1142	1919
31.86	130479/4096	K613_0320 MB23	16	20	11	73	10.0	5.0	2.0	78	3100	2800	4000	1142	1142	1919
31.86	130479/4096	K613_0320 MB23	24	8.4	11	73	10.0	5.0	2.0	78	3100	2800	4000	1142	1142	1919
31.86	130479/4096	K613_0320 MB23	30	–	11	73	10.0	5.0	2.0	78	3100	2800	4000	1142	1142	1919
31.86	130479/4096	K613_0320 MB33	16	56	33	80	10.0	5.0	2.0	79	3100	2800	4000	1450	1600	2900
31.86	130479/4096	K613_0320 MB33	24	45	33	80	10.0	5.0	2.0	79	3100	2800	4000	1450	1600	2900
31.86	130479/4096	K613_0320 MB33	32	34	33	80	10.0	5.0	2.0	79	3100	2800	4000	1450	1600	2900
31.86	130479/4096	K613_0320 MB33	45	15	33	80	10.0	5.0	2.0	79	3100	2800	4000	1450	1600	2900
31.86	130479/4096	K613_0320 MB43	50	8.3	80	94	10.0	5.0	2.0	80	3000	2800	3000	1450	1600	2900
34.61	35441/1024	K613_0350 MB23	8.0	31	9.9	73	10.0	5.0	2.0	78	3100	2800	4000	1241	1241	2084
34.61	35441/1024	K613_0350 MB23	12	25	9.9	73	10.0	5.0	2.0	78	3100	2800	4000	1241	1241	2084
34.61	35441/1024	K613_0350 MB23	16	20	9.9	73	10.0	5.0	2.0	78	3100	2800	4000	1241	1241	2084
34.61	35441/1024	K613_0350 MB23	24	8.4	9.9	73	10.0	5.0	2.0	78	3100	2800	4000	1241	1241	2084



10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K613 (M<sub>2acc,max</sub> = 1600 Nm)</b>																
34.61	35441/1024	K613_0350 MB23	30	–	9.9	73	10.0	5.0	2.0	78	3100	2800	4000	1241	1241	2084
34.61	35441/1024	K613_0350 MB33	16	50	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
34.61	35441/1024	K613_0350 MB33	24	38	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
34.61	35441/1024	K613_0350 MB33	32	27	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
34.61	35441/1024	K613_0350 MB33	45	9.1	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
34.61	35441/1024	K613_0350 MB43	50	2.1	79	94	10.0	5.0	2.0	80	3000	2800	3000	1450	1600	2900
38.32	156953/4096	K613_0380 MB23	8.0	31	9.8	73	10.0	5.0	2.0	79	3100	2800	4000	1374	1374	2308
38.32	156953/4096	K613_0380 MB23	12	25	9.8	73	10.0	5.0	2.0	79	3100	2800	4000	1374	1374	2308
38.32	156953/4096	K613_0380 MB23	16	20	9.8	73	10.0	5.0	2.0	79	3100	2800	4000	1374	1374	2308
38.32	156953/4096	K613_0380 MB23	24	8.4	9.8	73	10.0	5.0	2.0	79	3100	2800	4000	1374	1374	2308
38.32	156953/4096	K613_0380 MB23	30	–	9.8	73	10.0	5.0	2.0	79	3100	2800	4000	1374	1374	2308
38.32	156953/4096	K613_0380 MB33	16	43	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
38.32	156953/4096	K613_0380 MB33	24	32	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
38.32	156953/4096	K613_0380 MB33	32	20	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
38.32	156953/4096	K613_0380 MB33	45	2.1	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
38.32	156953/4096	K613_0380 MB33	45	2.1	32	80	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2900
43.11	8967/208	K613_0430 MB23	8.0	31	9.1	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1546	2596
43.11	8967/208	K613_0430 MB23	12	25	9.1	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1546	2596
43.11	8967/208	K613_0430 MB23	16	20	9.1	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1546	2596
43.11	8967/208	K613_0430 MB23	24	8.4	9.1	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1546	2596
43.11	8967/208	K613_0430 MB23	30	–	9.1	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1546	2596
43.11	8967/208	K613_0430 MB33	16	35	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
43.11	8967/208	K613_0430 MB33	24	24	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
43.11	8967/208	K613_0430 MB33	32	13	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
47.73	39711/832	K613_0480 MB23	8.0	31	9.0	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2875
47.73	39711/832	K613_0480 MB23	12	25	9.0	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2875
47.73	39711/832	K613_0480 MB23	16	20	9.0	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2875
47.73	39711/832	K613_0480 MB23	24	8.4	9.0	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2875
47.73	39711/832	K613_0480 MB23	30	–	9.0	73	10.0	5.0	2.0	80	3100	2800	4000	1450	1600	2875
47.73	39711/832	K613_0480 MB33	16	30	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
47.73	39711/832	K613_0480 MB33	24	19	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
47.73	39711/832	K613_0480 MB33	32	7.5	30	80	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB23	8.0	31	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB23	12	25	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB23	16	20	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB23	24	8.4	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB23	30	–	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB33	16	21	29	80	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
57.55	29463/512	K613_0580 MB33	24	9.8	29	80	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB23	8.0	28	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB23	12	22	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB23	16	17	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB23	24	5.6	8.3	73	10.0	5.0	2.0	81	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB33	16	17	29	80	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
63.71	130479/2048	K613_0640 MB33	24	5.6	29	80	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
68.77	28609/416	K613_0690 MB23	8.0	22	8.0	73	10.0	5.0	2.0	81	3100	2800	4000	1314	1577	2628
68.77	28609/416	K613_0690 MB23	12	16	8.0	73	10.0	5.0	2.0	81	3100	2800	4000	1314	1577	2628
68.77	28609/416	K613_0690 MB23	16	10	8.0	73	10.0	5.0	2.0	81	3100	2800	4000	1314	1577	2628
68.77	28609/416	K613_0690 MB33	16	10	29	80	10.0	5.0	2.0	82	3100	2800	4000	1314	1577	2628
76.14	126697/1664	K613_0760 MB23	8.0	22	8.0	73	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
76.14	126697/1664	K613_0760 MB23	12	16	8.0	73	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
76.14	126697/1664	K613_0760 MB23	16	10	8.0	73	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
76.14	126697/1664	K613_0760 MB33	16	10	29	80	10.0	5.0	2.0	82	3100	2800	4000	1450	1600	2900
86.18	66185/768	K613_0860 MB23	8.0	8.2	7.7	73	10.0	5.0	2.0	82	3100	2800	4000	971	1165	1942
86.18	66185/768	K613_0860 MB23	12	2.6	7.7	73	10.0	5.0	2.0	82	3100	2800	4000	971	1165	1942
95.41	293105/3072	K613_0950 MB23	8.0	8.2	7.7	73	10.0	5.0	2.0	82	3100	2800	4000	1075	1290	2150
95.41	293105/3072	K613_0950 MB23	12	2.6	7.7	73	10.0	5.0	2.0	82	3100	2800	4000	1075	1290	2150
<b>K713 (M<sub>2acc,max</sub> = 2600 Nm)</b>																
7.563	19845/2624	K713_0076 MB43	50	154	141	122	10.0	5.0	2.0	68	1700	1600	2700	1464	1620	2429
7.563	19845/2624	K713_0076 MB43	72	123	141	122	10.0	5.0	2.0	68	1700	1600	2700	1464	1620	2429
7.563	19845/2624	K713_0076 MB43	100	84	141	122	10.0	5.0	2.0	68	1700	1600	2700	1464	1620	2429
7.563	19845/2624	K713_0076 MB43	160	–	141	122	10.0	5.0	2.0	68	1700	1600	2700	1464	1620	2429
8.373	87885/10496	K713_0084 MB43	50	154	137	122	10.0	5.0	2.0	75	1700	1600	2700	1568	1793	2690
8.373	87885/10496	K713_0084 MB43	72	123	137	122	10.0	5.0	2.0	75	1700	1600	2700	1568	1793	2690
8.373	87885/10496	K713_0084 MB43	100	84	137	122	10.0	5.0	2.0	75	1700	1600	2700	1568	1793	2690

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K713 (M<sub>2acc,max</sub> = 2600 Nm)</b>																
8.373	87885/10496	K713_0084 MB43	160	–	137	122	10.0	5.0	2.0	75	1700	1600	2700	1568	1793	2690
9.188	147/16	K713_0092 MB43	50	154	126	122	10.0	5.0	2.0	80	1700	1600	2700	1618	1968	2951
9.188	147/16	K713_0092 MB43	72	123	126	122	10.0	5.0	2.0	80	1700	1600	2700	1618	1968	2951
9.188	147/16	K713_0092 MB43	100	84	126	122	10.0	5.0	2.0	80	1700	1600	2700	1618	1968	2951
9.188	147/16	K713_0092 MB43	160	–	126	122	10.0	5.0	2.0	80	1700	1600	2700	1618	1968	2951
10.17	651/64	K713_0100 MB43	50	154	123	122	10.0	5.0	2.0	86	1700	1600	2700	1674	2178	3267
10.17	651/64	K713_0100 MB43	72	123	123	122	10.0	5.0	2.0	86	1700	1600	2700	1674	2178	3267
10.17	651/64	K713_0100 MB43	100	84	123	122	10.0	5.0	2.0	86	1700	1600	2700	1674	2178	3267
10.17	651/64	K713_0100 MB43	160	–	123	122	10.0	5.0	2.0	86	1700	1600	2700	1674	2178	3267
11.78	23373/1984	K713_0120 MB33	16	104	60	108	10.0	5.0	2.0	87	2000	1900	3200	1126	1126	2129
11.78	23373/1984	K713_0120 MB33	24	92	60	108	10.0	5.0	2.0	87	2000	1900	3200	1126	1126	2129
11.78	23373/1984	K713_0120 MB33	32	81	60	108	10.0	5.0	2.0	87	2000	1900	3200	1126	1126	2129
11.78	23373/1984	K713_0120 MB33	45	63	60	108	10.0	5.0	2.0	87	2000	1900	3200	1126	1126	2129
11.78	23373/1984	K713_0120 MB33	90	–	60	108	10.0	5.0	2.0	87	2000	1900	3200	1126	1126	2129
11.78	23373/1984	K713_0120 MB43	50	154	113	122	10.0	5.0	2.0	93	2000	1900	3000	1758	2523	3784
11.78	23373/1984	K713_0120 MB43	72	123	113	122	10.0	5.0	2.0	93	2000	1900	3000	1758	2523	3784
11.78	23373/1984	K713_0120 MB43	100	84	113	122	10.0	5.0	2.0	93	2000	1900	3000	1758	2523	3784
11.78	23373/1984	K713_0120 MB43	160	–	113	122	10.0	5.0	2.0	93	2000	1900	3000	1758	2523	3784
13.04	3339/256	K713_0130 MB33	16	104	58	108	10.0	5.0	2.0	92	2000	1900	3200	1247	1247	2357
13.04	3339/256	K713_0130 MB33	24	92	58	108	10.0	5.0	2.0	92	2000	1900	3200	1247	1247	2357
13.04	3339/256	K713_0130 MB33	32	81	58	108	10.0	5.0	2.0	92	2000	1900	3200	1247	1247	2357
13.04	3339/256	K713_0130 MB33	45	63	58	108	10.0	5.0	2.0	92	2000	1900	3200	1247	1247	2357
13.04	3339/256	K713_0130 MB33	90	–	58	108	10.0	5.0	2.0	92	2000	1900	3200	1247	1247	2357
13.04	3339/256	K713_0130 MB43	50	154	111	122	10.0	5.0	2.0	98	2000	1900	3000	1818	2600	4190
13.04	3339/256	K713_0130 MB43	72	123	111	122	10.0	5.0	2.0	98	2000	1900	3000	1818	2600	4190
13.04	3339/256	K713_0130 MB43	100	84	111	122	10.0	5.0	2.0	98	2000	1900	3000	1818	2600	4190
13.04	3339/256	K713_0130 MB43	160	–	111	122	10.0	5.0	2.0	98	2000	1900	3000	1818	2600	4190
14.80	1421/96	K713_0150 MB33	16	104	51	108	10.0	5.0	2.0	98	2000	1900	3200	1415	1415	2674
14.80	1421/96	K713_0150 MB33	24	92	51	108	10.0	5.0	2.0	98	2000	1900	3200	1415	1415	2674
14.80	1421/96	K713_0150 MB33	32	81	51	108	10.0	5.0	2.0	98	2000	1900	3200	1415	1415	2674
14.80	1421/96	K713_0150 MB33	45	63	51	108	10.0	5.0	2.0	98	2000	1900	3200	1415	1415	2674
14.80	1421/96	K713_0150 MB33	90	–	51	108	10.0	5.0	2.0	98	2000	1900	3200	1415	1415	2674
14.80	1421/96	K713_0150 MB43	50	154	104	122	10.0	5.0	2.0	103	2000	1900	3000	1896	2600	4755
14.80	1421/96	K713_0150 MB43	72	123	104	122	10.0	5.0	2.0	103	2000	1900	3000	1896	2600	4755
14.80	1421/96	K713_0150 MB43	100	84	104	122	10.0	5.0	2.0	103	2000	1900	3000	1896	2600	4755
14.80	1421/96	K713_0150 MB43	160	–	104	122	10.0	5.0	2.0	103	2000	1900	3000	1896	2600	4755
16.39	6293/384	K713_0165 MB33	16	104	50	108	10.0	5.0	2.0	102	2000	1900	3200	1567	1567	2961
16.39	6293/384	K713_0165 MB33	24	92	50	108	10.0	5.0	2.0	102	2000	1900	3200	1567	1567	2961
16.39	6293/384	K713_0165 MB33	32	81	50	108	10.0	5.0	2.0	102	2000	1900	3200	1567	1567	2961
16.39	6293/384	K713_0165 MB33	45	63	50	108	10.0	5.0	2.0	102	2000	1900	3200	1567	1567	2961
16.39	6293/384	K713_0165 MB33	90	–	50	108	10.0	5.0	2.0	102	2000	1900	3200	1567	1567	2961
16.39	6293/384	K713_0165 MB43	50	154	103	122	10.0	5.0	2.0	107	2000	1900	3000	1962	2600	4800
16.39	6293/384	K713_0165 MB43	72	123	103	122	10.0	5.0	2.0	107	2000	1900	3000	1962	2600	4800
16.39	6293/384	K713_0165 MB43	100	84	103	122	10.0	5.0	2.0	107	2000	1900	3000	1962	2600	4800
16.39	6293/384	K713_0165 MB43	160	–	103	122	10.0	5.0	2.0	107	2000	1900	3000	1962	2600	4800
18.28	26901/1472	K713_0185 MB33	16	104	46	108	10.0	5.0	2.0	106	2400	2200	3600	1747	1747	3302
18.28	26901/1472	K713_0185 MB33	24	92	46	108	10.0	5.0	2.0	106	2400	2200	3600	1747	1747	3302
18.28	26901/1472	K713_0185 MB33	32	81	46	108	10.0	5.0	2.0	106	2400	2200	3600	1747	1747	3302
18.28	26901/1472	K713_0185 MB33	45	63	46	108	10.0	5.0	2.0	106	2400	2200	3600	1747	1747	3302
18.28	26901/1472	K713_0185 MB33	90	–	46	108	10.0	5.0	2.0	106	2400	2200	3600	1747	1747	3302
18.28	26901/1472	K713_0185 MB43	50	154	99	122	10.0	5.0	2.0	110	2400	2200	3000	2034	2600	4800
18.28	26901/1472	K713_0185 MB43	72	123	99	122	10.0	5.0	2.0	110	2400	2200	3000	2034	2600	4800
18.28	26901/1472	K713_0185 MB43	100	84	99	122	10.0	5.0	2.0	110	2400	2200	3000	2034	2600	4800
18.28	26901/1472	K713_0185 MB43	160	–	99	122	10.0	5.0	2.0	110	2400	2200	3000	2034	2600	4800
20.23	119133/5888	K713_0200 MB33	16	104	45	108	10.0	5.0	2.0	109	2400	2200	3600	1934	1934	3656
20.23	119133/5888	K713_0200 MB33	24	92	45	108	10.0	5.0	2.0	109	2400	2200	3600	1934	1934	3656
20.23	119133/5888	K713_0200 MB33	32	81	45	108	10.0	5.0	2.0	109	2400	2200	3600	1934	1934	3656
20.23	119133/5888	K713_0200 MB33	45	63	45	108	10.0	5.0	2.0	109	2400	2200	3600	1934	1934	3656
20.23	119133/5888	K713_0200 MB33	90	–	45	108	10.0	5.0	2.0	109	2400	2200	3600	1934	1934	3656
20.23	119133/5888	K713_0200 MB43	50	134	98	122	10.0	5.0	2.0	112	2400	2200	3000	2105	2600	4800
20.23	119133/5888	K713_0200 MB43	72	103	98	122	10.0	5.0	2.0	112	2400	2200	3000	2105	2600	4800
20.23	119133/5888	K713_0200 MB43	100	64	98	122	10.0	5.0	2.0	112	2400	2200	3000	2105	2600	4800
22.74	14553/640	K713_0230 MB33	16	104	41	108	10.0	5.0	2.0	112	2400	2200	3600	2174	2174	4109
22.74	14553/640	K713_0230 MB33	24	92	41	108	10.0	5.0	2.0	112	2400	2200	3600	2174	2174	4109

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K713 (M<sub>2acc,max</sub> = 2600 Nm)</b>																
22.74	14553/640	K713_0230 MB33	32	81	41	108	10.0	5.0	2.0	112	2400	2200	3600	2174	2174	4109
22.74	14553/640	K713_0230 MB33	45	63	41	108	10.0	5.0	2.0	112	2400	2200	3600	2174	2174	4109
22.74	14553/640	K713_0230 MB33	90	-	41	108	10.0	5.0	2.0	112	2400	2200	3600	2174	2174	4109
22.74	14553/640	K713_0230 MB43	50	112	94	122	10.0	5.0	2.0	115	2400	2200	3000	2188	2600	4800
22.74	14553/640	K713_0230 MB43	72	81	94	122	10.0	5.0	2.0	115	2400	2200	3000	2188	2600	4800
22.74	14553/640	K713_0230 MB43	100	42	94	122	10.0	5.0	2.0	115	2400	2200	3000	2188	2600	4800
25.18	64449/2560	K713_0250 MB33	16	104	41	108	10.0	5.0	2.0	114	2400	2200	3600	2264	2407	4549
25.18	64449/2560	K713_0250 MB33	24	92	41	108	10.0	5.0	2.0	114	2400	2200	3600	2264	2407	4549
25.18	64449/2560	K713_0250 MB33	32	81	41	108	10.0	5.0	2.0	114	2400	2200	3600	2264	2407	4549
25.18	64449/2560	K713_0250 MB33	45	63	41	108	10.0	5.0	2.0	114	2400	2200	3600	2264	2407	4549
25.18	64449/2560	K713_0250 MB33	90	-	41	108	10.0	5.0	2.0	114	2400	2200	3600	2264	2407	4549
25.18	64449/2560	K713_0250 MB43	50	94	94	122	10.0	5.0	2.0	117	2400	2200	3000	2264	2600	4800
25.18	64449/2560	K713_0250 MB43	72	63	94	122	10.0	5.0	2.0	117	2400	2200	3000	2264	2600	4800
25.18	64449/2560	K713_0250 MB43	100	24	94	122	10.0	5.0	2.0	117	2400	2200	3000	2264	2600	4800
29.29	7497/256	K713_0290 MB33	16	104	37	108	10.0	5.0	2.0	117	2900	2600	4000	2381	2600	4800
29.29	7497/256	K713_0290 MB33	24	92	37	108	10.0	5.0	2.0	117	2900	2600	4000	2381	2600	4800
29.29	7497/256	K713_0290 MB33	32	81	37	108	10.0	5.0	2.0	117	2900	2600	4000	2381	2600	4800
29.29	7497/256	K713_0290 MB33	45	63	37	108	10.0	5.0	2.0	117	2900	2600	4000	2381	2600	4800
29.29	7497/256	K713_0290 MB33	90	-	37	108	10.0	5.0	2.0	117	2900	2600	4000	2381	2600	4800
29.29	7497/256	K713_0290 MB43	50	71	90	122	10.0	5.0	2.0	119	2900	2600	3000	2381	2600	4800
29.29	7497/256	K713_0290 MB43	72	40	90	122	10.0	5.0	2.0	119	2900	2600	3000	2381	2600	4800
29.29	7497/256	K713_0290 MB43	100	1.0	90	122	10.0	5.0	2.0	119	2900	2600	3000	2381	2600	4800
32.42	33201/1024	K713_0320 MB33	16	104	37	108	10.0	5.0	2.0	119	2900	2600	4000	2400	2600	4800
32.42	33201/1024	K713_0320 MB33	24	92	37	108	10.0	5.0	2.0	119	2900	2600	4000	2400	2600	4800
32.42	33201/1024	K713_0320 MB33	32	81	37	108	10.0	5.0	2.0	119	2900	2600	4000	2400	2600	4800
32.42	33201/1024	K713_0320 MB33	45	63	37	108	10.0	5.0	2.0	119	2900	2600	4000	2400	2600	4800
32.42	33201/1024	K713_0320 MB33	90	-	37	108	10.0	5.0	2.0	119	2900	2600	4000	2400	2600	4800
32.42	33201/1024	K713_0320 MB43	50	57	90	122	10.0	5.0	2.0	120	2900	2600	3000	2400	2600	4800
32.42	33201/1024	K713_0320 MB43	72	27	90	122	10.0	5.0	2.0	120	2900	2600	3000	2400	2600	4800
35.44	567/16	K713_0350 MB33	16	94	35	108	10.0	5.0	2.0	120	2900	2600	4000	2400	2600	4800
35.44	567/16	K713_0350 MB33	24	83	35	108	10.0	5.0	2.0	120	2900	2600	4000	2400	2600	4800
35.44	567/16	K713_0350 MB33	32	72	35	108	10.0	5.0	2.0	120	2900	2600	4000	2400	2600	4800
35.44	567/16	K713_0350 MB33	45	54	35	108	10.0	5.0	2.0	120	2900	2600	4000	2400	2600	4800
35.44	567/16	K713_0350 MB43	50	47	83	122	10.0	5.0	2.0	121	2900	2600	3000	2400	2600	4800
35.44	567/16	K713_0350 MB43	72	16	83	122	10.0	5.0	2.0	121	2900	2600	3000	2400	2600	4800
39.23	2511/64	K713_0390 MB33	16	83	35	108	10.0	5.0	2.0	121	2900	2600	4000	2400	2600	4800
39.23	2511/64	K713_0390 MB33	24	72	35	108	10.0	5.0	2.0	121	2900	2600	4000	2400	2600	4800
39.23	2511/64	K713_0390 MB33	32	60	35	108	10.0	5.0	2.0	121	2900	2600	4000	2400	2600	4800
39.23	2511/64	K713_0390 MB33	45	42	35	108	10.0	5.0	2.0	121	2900	2600	4000	2400	2600	4800
39.23	2511/64	K713_0390 MB43	50	35	82	122	10.0	5.0	2.0	122	2900	2600	3000	2400	2600	4800
39.23	2511/64	K713_0390 MB43	72	4.5	82	122	10.0	5.0	2.0	122	2900	2600	3000	2400	2600	4800
45.05	37485/832	K713_0450 MB33	16	69	33	108	10.0	5.0	2.0	122	2900	2600	4000	2400	2600	4800
45.05	37485/832	K713_0450 MB33	24	58	33	108	10.0	5.0	2.0	122	2900	2600	4000	2400	2600	4800
45.05	37485/832	K713_0450 MB33	32	47	33	108	10.0	5.0	2.0	122	2900	2600	4000	2400	2600	4800
45.05	37485/832	K713_0450 MB33	45	29	33	108	10.0	5.0	2.0	122	2900	2600	4000	2400	2600	4800
45.05	37485/832	K713_0450 MB43	50	22	81	122	10.0	5.0	2.0	123	2900	2600	3000	2400	2600	4800
49.88	166005/3328	K713_0500 MB33	16	60	33	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
49.88	166005/3328	K713_0500 MB33	24	49	33	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
49.88	166005/3328	K713_0500 MB33	32	38	33	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
49.88	166005/3328	K713_0500 MB33	45	20	33	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
49.88	166005/3328	K713_0500 MB43	50	13	80	122	10.0	5.0	2.0	123	2900	2600	3000	2400	2600	4800
58.57	7497/128	K713_0590 MB33	16	48	32	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
58.57	7497/128	K713_0590 MB33	24	37	32	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
58.57	7497/128	K713_0590 MB33	32	26	32	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
58.57	7497/128	K713_0590 MB33	45	7.5	32	108	10.0	5.0	2.0	123	2900	2600	4000	2400	2600	4800
58.57	7497/128	K713_0590 MB43	50	0.5	79	122	10.0	5.0	2.0	124	2900	2600	3000	2400	2600	4800
64.85	33201/512	K713_0650 MB33	16	41	31	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
64.85	33201/512	K713_0650 MB33	24	30	31	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
64.85	33201/512	K713_0650 MB33	32	19	31	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
64.85	33201/512	K713_0650 MB33	45	0.7	31	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
71.20	4557/64	K713_0710 MB33	16	30	29	108	10.0	5.0	2.0	124	2900	2600	4000	2173	2600	4346
71.20	4557/64	K713_0710 MB33	24	19	29	108	10.0	5.0	2.0	124	2900	2600	4000	2173	2600	4346
71.20	4557/64	K713_0710 MB33	32	7.7	29	108	10.0	5.0	2.0	124	2900	2600	4000	2173	2600	4346
78.83	20181/256	K713_0790 MB33	16	30	29	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800



i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/ arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K713 (M<sub>2acc,max</sub> = 2600 Nm)</b>																
78.83	20181/256	K713_0790 MB33	24	19	29	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
78.83	20181/256	K713_0790 MB33	32	7.6	29	108	10.0	5.0	2.0	124	2900	2600	4000	2400	2600	4800
89.00	22785/256	K713_0890 MB33	16	9.9	29	108	10.0	5.0	2.0	125	2900	2600	4000	1671	2006	3343
98.54	100905/1024	K713_0990 MB33	16	9.9	29	108	10.0	5.0	2.0	125	2900	2600	4000	1850	2221	3701
<b>K813 (M<sub>2acc,max</sub> = 4650 Nm)</b>																
7.445	3127/420	K813_0074 MB43	50	154	224	176	10.0	5.0	2.0	83	1600	1500	2600	1441	1594	2391
7.445	3127/420	K813_0074 MB43	72	123	224	176	10.0	5.0	2.0	83	1600	1500	2600	1441	1594	2391
7.445	3127/420	K813_0074 MB43	100	84	224	176	10.0	5.0	2.0	83	1600	1500	2600	1441	1594	2391
7.445	3127/420	K813_0074 MB43	160	-	224	176	10.0	5.0	2.0	83	1600	1500	2600	1441	1594	2391
8.243	96937/11760	K813_0082 MB43	50	154	210	176	10.0	5.0	2.0	93	1600	1500	2600	1596	1765	2648
8.243	96937/11760	K813_0082 MB43	72	123	210	176	10.0	5.0	2.0	93	1600	1500	2600	1596	1765	2648
8.243	96937/11760	K813_0082 MB43	100	84	210	176	10.0	5.0	2.0	93	1600	1500	2600	1596	1765	2648
8.243	96937/11760	K813_0082 MB43	160	-	210	176	10.0	5.0	2.0	93	1600	1500	2600	1596	1765	2648
9.284	11977/1290	K813_0093 MB43	50	154	183	176	10.0	5.0	2.0	105	1600	1500	2600	1797	1988	2982
9.284	11977/1290	K813_0093 MB43	72	123	183	176	10.0	5.0	2.0	105	1600	1500	2600	1797	1988	2982
9.284	11977/1290	K813_0093 MB43	100	84	183	176	10.0	5.0	2.0	105	1600	1500	2600	1797	1988	2982
9.284	11977/1290	K813_0093 MB43	160	-	183	176	10.0	5.0	2.0	105	1600	1500	2600	1797	1988	2982
10.28	53041/5160	K813_0105 MB43	50	154	174	176	10.0	5.0	2.0	115	1600	1500	2600	1990	2201	3302
10.28	53041/5160	K813_0105 MB43	72	123	174	176	10.0	5.0	2.0	115	1600	1500	2600	1990	2201	3302
10.28	53041/5160	K813_0105 MB43	100	84	174	176	10.0	5.0	2.0	115	1600	1500	2600	1990	2201	3302
10.28	53041/5160	K813_0105 MB43	160	-	174	176	10.0	5.0	2.0	115	1600	1500	2600	1990	2201	3302
14.84	9499/640	K813_0150 MB43	50	154	132	176	10.0	5.0	2.0	146	1900	1800	3000	2873	3178	4767
14.84	9499/640	K813_0150 MB43	72	123	132	176	10.0	5.0	2.0	146	1900	1800	3000	2873	3178	4767
14.84	9499/640	K813_0150 MB43	100	84	132	176	10.0	5.0	2.0	146	1900	1800	3000	2873	3178	4767
14.84	9499/640	K813_0150 MB43	160	-	132	176	10.0	5.0	2.0	146	1900	1800	3000	2873	3178	4767
16.43	42067/2560	K813_0165 MB43	50	154	128	176	10.0	5.0	2.0	154	1900	1800	3000	3181	3519	5278
16.43	42067/2560	K813_0165 MB43	72	123	128	176	10.0	5.0	2.0	154	1900	1800	3000	3181	3519	5278
16.43	42067/2560	K813_0165 MB43	100	84	128	176	10.0	5.0	2.0	154	1900	1800	3000	3181	3519	5278
16.43	42067/2560	K813_0165 MB43	160	-	128	176	10.0	5.0	2.0	154	1900	1800	3000	3181	3519	5278
17.33	30149/1740	K813_0175 MB33	16	104	69	162	10.0	5.0	2.0	149	2300	2100	3500	1656	1656	3131
17.33	30149/1740	K813_0175 MB33	24	92	69	162	10.0	5.0	2.0	149	2300	2100	3500	1656	1656	3131
17.33	30149/1740	K813_0175 MB33	32	81	69	162	10.0	5.0	2.0	149	2300	2100	3500	1656	1656	3131
17.33	30149/1740	K813_0175 MB33	45	63	69	162	10.0	5.0	2.0	149	2300	2100	3500	1656	1656	3131
17.33	30149/1740	K813_0175 MB33	90	-	69	162	10.0	5.0	2.0	149	2300	2100	3500	1656	1656	3131
17.33	30149/1740	K813_0175 MB43	50	154	122	176	10.0	5.0	2.0	157	2300	2100	3000	3354	3710	5566
17.33	30149/1740	K813_0175 MB43	72	123	122	176	10.0	5.0	2.0	157	2300	2100	3000	3354	3710	5566
17.33	30149/1740	K813_0175 MB43	100	84	122	176	10.0	5.0	2.0	157	2300	2100	3000	3354	3710	5566
17.33	30149/1740	K813_0175 MB43	160	-	122	176	10.0	5.0	2.0	157	2300	2100	3000	3354	3710	5566
19.18	133517/6960	K813_0190 MB33	16	104	66	162	10.0	5.0	2.0	156	2300	2100	3500	1834	1834	3466
19.18	133517/6960	K813_0190 MB33	24	92	66	162	10.0	5.0	2.0	156	2300	2100	3500	1834	1834	3466
19.18	133517/6960	K813_0190 MB33	32	81	66	162	10.0	5.0	2.0	156	2300	2100	3500	1834	1834	3466
19.18	133517/6960	K813_0190 MB33	45	63	66	162	10.0	5.0	2.0	156	2300	2100	3500	1834	1834	3466
19.18	133517/6960	K813_0190 MB33	90	-	66	162	10.0	5.0	2.0	156	2300	2100	3500	1834	1834	3466
19.18	133517/6960	K813_0190 MB43	50	154	119	176	10.0	5.0	2.0	163	2300	2100	3000	3579	4108	6162
19.18	133517/6960	K813_0190 MB43	72	123	119	176	10.0	5.0	2.0	163	2300	2100	3000	3579	4108	6162
19.18	133517/6960	K813_0190 MB43	100	84	119	176	10.0	5.0	2.0	163	2300	2100	3000	3579	4108	6162
19.18	133517/6960	K813_0190 MB43	160	-	119	176	10.0	5.0	2.0	163	2300	2100	3000	3579	4108	6162
23.04	31801/1380	K813_0230 MB33	16	104	55	162	10.0	5.0	2.0	166	2300	2100	3500	2203	2203	4164
23.04	31801/1380	K813_0230 MB33	24	92	55	162	10.0	5.0	2.0	166	2300	2100	3500	2203	2203	4164
23.04	31801/1380	K813_0230 MB33	32	81	55	162	10.0	5.0	2.0	166	2300	2100	3500	2203	2203	4164
23.04	31801/1380	K813_0230 MB33	45	63	55	162	10.0	5.0	2.0	166	2300	2100	3500	2203	2203	4164
23.04	31801/1380	K813_0230 MB33	90	-	55	162	10.0	5.0	2.0	166	2300	2100	3500	2203	2203	4164
23.04	31801/1380	K813_0230 MB43	50	154	108	176	10.0	5.0	2.0	172	2300	2100	3000	3805	4650	7402
23.04	31801/1380	K813_0230 MB43	72	123	108	176	10.0	5.0	2.0	172	2300	2100	3000	3805	4650	7402
23.04	31801/1380	K813_0230 MB43	100	84	108	176	10.0	5.0	2.0	172	2300	2100	3000	3805	4650	7402
23.04	31801/1380	K813_0230 MB43	160	-	108	176	10.0	5.0	2.0	172	2300	2100	3000	3805	4650	7402
25.51	140833/5520	K813_0260 MB33	16	104	54	162	10.0	5.0	2.0	171	2300	2100	3500	2439	2439	4610
25.51	140833/5520	K813_0260 MB33	24	92	54	162	10.0	5.0	2.0	171	2300	2100	3500	2439	2439	4610
25.51	140833/5520	K813_0260 MB33	32	81	54	162	10.0	5.0	2.0	171	2300	2100	3500	2439	2439	4610
25.51	140833/5520	K813_0260 MB33	45	63	54	162	10.0	5.0	2.0	171	2300	2100	3500	2439	2439	4610
25.51	140833/5520	K813_0260 MB33	90	-	54	162	10.0	5.0	2.0	171	2300	2100	3500	2439	2439	4610
25.51	140833/5520	K813_0260 MB43	50	154	107	176	10.0	5.0	2.0	176	2300	2100	3000	3936	4650	8195
25.51	140833/5520	K813_0260 MB43	72	123	107	176	10.0	5.0	2.0	176	2300	2100	3000	3936	4650	8195
25.51	140833/5520	K813_0260 MB43	100	84	107	176	10.0	5.0	2.0	176	2300	2100	3000	3936	4650	8195

10.2 Selection tables 10 K helical bevel gear units

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2red1</sub>	Δφ <sub>2redl</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K813 (M<sub>2acc,max</sub> = 4650 Nm)</b>																
25.51	140833/5520	K813_0260 MB43	160	–	107	176	10.0	5.0	2.0	176	2300	2100	3000	3936	4650	8195
29.25	7021/240	K813_0290 MB33	16	104	47	162	10.0	5.0	2.0	176	2800	2500	4000	2797	2797	5286
29.25	7021/240	K813_0290 MB33	24	92	47	162	10.0	5.0	2.0	176	2800	2500	4000	2797	2797	5286
29.25	7021/240	K813_0290 MB33	32	81	47	162	10.0	5.0	2.0	176	2800	2500	4000	2797	2797	5286
29.25	7021/240	K813_0290 MB33	45	63	47	162	10.0	5.0	2.0	176	2800	2500	4000	2797	2797	5286
29.25	7021/240	K813_0290 MB33	90	–	47	162	10.0	5.0	2.0	176	2800	2500	4000	2797	2797	5286
29.25	7021/240	K813_0290 MB43	50	154	100	176	10.0	5.0	2.0	180	2800	2500	3000	4120	4650	8400
29.25	7021/240	K813_0290 MB43	72	123	100	176	10.0	5.0	2.0	180	2800	2500	3000	4120	4650	8400
29.25	7021/240	K813_0290 MB43	100	84	100	176	10.0	5.0	2.0	180	2800	2500	3000	4120	4650	8400
29.25	7021/240	K813_0290 MB43	160	–	100	176	10.0	5.0	2.0	180	2800	2500	3000	4120	4650	8400
32.39	31093/960	K813_0320 MB33	16	104	46	162	10.0	5.0	2.0	180	2800	2500	4000	3096	3096	5852
32.39	31093/960	K813_0320 MB33	24	92	46	162	10.0	5.0	2.0	180	2800	2500	4000	3096	3096	5852
32.39	31093/960	K813_0320 MB33	32	81	46	162	10.0	5.0	2.0	180	2800	2500	4000	3096	3096	5852
32.39	31093/960	K813_0320 MB33	45	63	46	162	10.0	5.0	2.0	180	2800	2500	4000	3096	3096	5852
32.39	31093/960	K813_0320 MB33	90	–	46	162	10.0	5.0	2.0	180	2800	2500	4000	3096	3096	5852
32.39	31093/960	K813_0320 MB43	50	153	99	176	10.0	5.0	2.0	183	2800	2500	3000	4200	4650	8400
32.39	31093/960	K813_0320 MB43	72	122	99	176	10.0	5.0	2.0	183	2800	2500	3000	4200	4650	8400
32.39	31093/960	K813_0320 MB43	100	83	99	176	10.0	5.0	2.0	183	2800	2500	3000	4200	4650	8400
36.14	2891/80	K813_0360 MB33	16	104	42	162	10.0	5.0	2.0	183	2800	2500	4000	3187	3455	6530
36.14	2891/80	K813_0360 MB33	24	92	42	162	10.0	5.0	2.0	183	2800	2500	4000	3187	3455	6530
36.14	2891/80	K813_0360 MB33	32	81	42	162	10.0	5.0	2.0	183	2800	2500	4000	3187	3455	6530
36.14	2891/80	K813_0360 MB33	45	63	42	162	10.0	5.0	2.0	183	2800	2500	4000	3187	3455	6530
36.14	2891/80	K813_0360 MB33	90	–	42	162	10.0	5.0	2.0	183	2800	2500	4000	3187	3455	6530
36.14	2891/80	K813_0360 MB43	50	130	95	176	10.0	5.0	2.0	186	2800	2500	3000	4200	4650	8400
36.14	2891/80	K813_0360 MB43	72	99	95	176	10.0	5.0	2.0	186	2800	2500	3000	4200	4650	8400
36.14	2891/80	K813_0360 MB43	100	60	95	176	10.0	5.0	2.0	186	2800	2500	3000	4200	4650	8400
40.01	12803/320	K813_0400 MB33	16	104	41	162	10.0	5.0	2.0	185	2800	2500	4000	3528	3825	7229
40.01	12803/320	K813_0400 MB33	24	92	41	162	10.0	5.0	2.0	185	2800	2500	4000	3528	3825	7229
40.01	12803/320	K813_0400 MB33	32	81	41	162	10.0	5.0	2.0	185	2800	2500	4000	3528	3825	7229
40.01	12803/320	K813_0400 MB33	45	63	41	162	10.0	5.0	2.0	185	2800	2500	4000	3528	3825	7229
40.01	12803/320	K813_0400 MB33	90	–	41	162	10.0	5.0	2.0	185	2800	2500	4000	3528	3825	7229
40.01	12803/320	K813_0400 MB43	50	111	94	176	10.0	5.0	2.0	188	2800	2500	3000	4200	4650	8400
40.01	12803/320	K813_0400 MB43	72	80	94	176	10.0	5.0	2.0	188	2800	2500	3000	4200	4650	8400
40.01	12803/320	K813_0400 MB43	100	41	94	176	10.0	5.0	2.0	188	2800	2500	3000	4200	4650	8400
44.25	177/4	K813_0440 MB33	16	104	38	162	10.0	5.0	2.0	187	2800	2500	4000	3373	4230	7995
44.25	177/4	K813_0440 MB33	24	92	38	162	10.0	5.0	2.0	187	2800	2500	4000	3373	4230	7995
44.25	177/4	K813_0440 MB33	32	81	38	162	10.0	5.0	2.0	187	2800	2500	4000	3373	4230	7995
44.25	177/4	K813_0440 MB33	45	63	38	162	10.0	5.0	2.0	187	2800	2500	4000	3373	4230	7995
44.25	177/4	K813_0440 MB33	90	–	38	162	10.0	5.0	2.0	187	2800	2500	4000	3373	4230	7995
44.25	177/4	K813_0440 MB43	50	93	86	176	10.0	5.0	2.0	189	2800	2500	3000	4200	4650	8400
44.25	177/4	K813_0440 MB43	72	63	86	176	10.0	5.0	2.0	189	2800	2500	3000	4200	4650	8400
44.25	177/4	K813_0440 MB43	100	23	86	176	10.0	5.0	2.0	189	2800	2500	3000	4200	4650	8400
48.99	5487/112	K813_0490 MB33	16	104	38	162	10.0	5.0	2.0	189	2800	2500	4000	3734	4650	8400
48.99	5487/112	K813_0490 MB33	24	92	38	162	10.0	5.0	2.0	189	2800	2500	4000	3734	4650	8400
48.99	5487/112	K813_0490 MB33	32	81	38	162	10.0	5.0	2.0	189	2800	2500	4000	3734	4650	8400
48.99	5487/112	K813_0490 MB33	45	63	38	162	10.0	5.0	2.0	189	2800	2500	4000	3734	4650	8400
48.99	5487/112	K813_0490 MB33	90	–	38	162	10.0	5.0	2.0	189	2800	2500	4000	3734	4650	8400
48.99	5487/112	K813_0490 MB43	50	78	85	176	10.0	5.0	2.0	190	2800	2500	3000	4200	4650	8400
48.99	5487/112	K813_0490 MB43	72	47	85	176	10.0	5.0	2.0	190	2800	2500	3000	4200	4650	8400
48.99	5487/112	K813_0490 MB43	100	7.5	85	176	10.0	5.0	2.0	190	2800	2500	3000	4200	4650	8400
59.08	42539/720	K813_0590 MB33	16	100	35	162	10.0	5.0	2.0	191	2800	2500	4000	3464	4650	8400
59.08	42539/720	K813_0590 MB33	24	89	35	162	10.0	5.0	2.0	191	2800	2500	4000	3464	4650	8400
59.08	42539/720	K813_0590 MB33	32	78	35	162	10.0	5.0	2.0	191	2800	2500	4000	3464	4650	8400
59.08	42539/720	K813_0590 MB33	45	59	35	162	10.0	5.0	2.0	191	2800	2500	4000	3464	4650	8400
59.08	42539/720	K813_0590 MB43	50	52	82	176	10.0	5.0	2.0	192	2800	2500	3000	4200	4650	8400
59.08	42539/720	K813_0590 MB43	72	22	82	176	10.0	5.0	2.0	192	2800	2500	3000	4200	4650	8400
65.41	188387/2880	K813_0650 MB33	16	88	34	162	10.0	5.0	2.0	192	2800	2500	4000	3836	4650	8400
65.41	188387/2880	K813_0650 MB33	24	77	34	162	10.0	5.0	2.0	192	2800	2500	4000	3836	4650	8400
65.41	188387/2880	K813_0650 MB33	32	66	34	162	10.0	5.0	2.0	192	2800	2500	4000	3836	4650	8400
65.41	188387/2880	K813_0650 MB33	45	47	34	162	10.0	5.0	2.0	192	2800	2500	4000	3836	4650	8400
65.41	188387/2880	K813_0650 MB43	50	40	82	176	10.0	5.0	2.0	193	2800	2500	3000	4200	4650	8400
65.41	188387/2880	K813_0650 MB43	72	9.7	82	176	10.0	5.0	2.0	193	2800	2500	3000	4200	4650	8400
71.70	10325/144	K813_0720 MB33	16	64	33	162	10.0	5.0	2.0	193	2800	2500	4000	3579	4327	7212
71.70	10325/144	K813_0720 MB33	24	53	33	162	10.0	5.0	2.0	193	2800	2500	4000	3579	4327	7212

i	i <sub>exakt</sub>	Type	M <sub>1Bstat</sub>	M <sub>M,Bmax</sub>	J <sub>1</sub>	m	Δφ <sub>2</sub>	Δφ <sub>2redI</sub>	Δφ <sub>2redII</sub>	C <sub>2</sub>	n <sub>1maxDB</sub>		n <sub>1maxZB</sub>	M <sub>2N</sub>	M <sub>2acc</sub>	M <sub>2NOT</sub>
			[Nm]	[Nm]	[kgcm <sup>2</sup> ]	[kg]	[arcmin]	[arcmin]	[arcmin]	[Nm/arcmin]	EL1,2,3,4 [rpm]	EL5,6 [rpm]	[rpm]	[Nm]	[Nm]	[Nm]
<b>K813 (M<sub>2acc,max</sub> = 4650 Nm)</b>																
71.70	10325/144	K813_0720 MB33	32	42	33	162	10.0	5.0	2.0	193	2800	2500	4000	3579	4327	7212
71.70	10325/144	K813_0720 MB33	45	24	33	162	10.0	5.0	2.0	193	2800	2500	4000	3579	4327	7212
71.70	10325/144	K813_0720 MB43	50	17	81	176	10.0	5.0	2.0	193	2800	2500	3000	3606	4327	7212
79.38	45725/576	K813_0790 MB33	16	64	33	162	10.0	5.0	2.0	193	2800	2500	4000	3962	4650	7986
79.38	45725/576	K813_0790 MB33	24	53	33	162	10.0	5.0	2.0	193	2800	2500	4000	3962	4650	7986
79.38	45725/576	K813_0790 MB33	32	42	33	162	10.0	5.0	2.0	193	2800	2500	4000	3962	4650	7986
79.38	45725/576	K813_0790 MB33	45	24	33	162	10.0	5.0	2.0	193	2800	2500	4000	3962	4650	7986
79.38	45725/576	K813_0790 MB43	50	17	80	176	10.0	5.0	2.0	194	2800	2500	3000	3993	4650	7986
87.76	7021/80	K813_0880 MB33	16	33	30	162	10.0	5.0	2.0	194	2800	2500	4000	2805	3366	5610
87.76	7021/80	K813_0880 MB33	24	21	30	162	10.0	5.0	2.0	194	2800	2500	4000	2805	3366	5610
87.76	7021/80	K813_0880 MB33	32	10	30	162	10.0	5.0	2.0	194	2800	2500	4000	2805	3366	5610
97.17	31093/320	K813_0970 MB33	16	33	30	162	10.0	5.0	2.0	194	2800	2500	4000	3106	3727	6211
97.17	31093/320	K813_0970 MB33	24	21	30	162	10.0	5.0	2.0	194	2800	2500	4000	3106	3727	6211
97.17	31093/320	K813_0970 MB33	32	10	30	162	10.0	5.0	2.0	194	2800	2500	4000	3106	3727	6211
<b>K913 (M<sub>2acc,max</sub> = 7700 Nm)</b>																
12.53	73749/5888	K913_0125 MB43	50	154	240	290	10.0	5.0	–	197	1800	1800	2800	2425	2682	4023
12.53	73749/5888	K913_0125 MB43	72	123	240	290	10.0	5.0	–	197	1800	1800	2800	2425	2682	4023
12.53	73749/5888	K913_0125 MB43	100	84	240	290	10.0	5.0	–	197	1800	1800	2800	2425	2682	4023
12.53	73749/5888	K913_0125 MB43	160	–	240	290	10.0	5.0	–	197	1800	1800	2800	2425	2682	4023
19.06	305/16	K913_0190 MB43	50	154	167	290	10.0	5.0	–	271	2200	2100	3000	3690	4082	6123
19.06	305/16	K913_0190 MB43	72	123	167	290	10.0	5.0	–	271	2200	2100	3000	3690	4082	6123
19.06	305/16	K913_0190 MB43	100	84	167	290	10.0	5.0	–	271	2200	2100	3000	3690	4082	6123
19.06	305/16	K913_0190 MB43	160	–	167	290	10.0	5.0	–	271	2200	2100	3000	3690	4082	6123
23.94	88877/3712	K913_0240 MB43	50	154	143	290	10.0	5.0	–	303	2200	2100	3000	4635	5127	7691
23.94	88877/3712	K913_0240 MB43	72	123	143	290	10.0	5.0	–	303	2200	2100	3000	4635	5127	7691
23.94	88877/3712	K913_0240 MB43	100	84	143	290	10.0	5.0	–	303	2200	2100	3000	4635	5127	7691
23.94	88877/3712	K913_0240 MB43	160	–	143	290	10.0	5.0	–	303	2200	2100	3000	4635	5127	7691
32.12	47275/1472	K913_0320 MB43	50	154	121	290	10.0	5.0	–	332	2600	2500	3000	6217	6877	10316
32.12	47275/1472	K913_0320 MB43	72	123	121	290	10.0	5.0	–	332	2600	2500	3000	6217	6877	10316
32.12	47275/1472	K913_0320 MB43	100	84	121	290	10.0	5.0	–	332	2600	2500	3000	6217	6877	10316
32.12	47275/1472	K913_0320 MB43	160	–	121	290	10.0	5.0	–	332	2600	2500	3000	6217	6877	10316
38.04	194773/5120	K913_0380 MB43	50	154	112	290	10.0	5.0	–	345	2600	2500	3000	6776	7700	12220
38.04	194773/5120	K913_0380 MB43	72	123	112	290	10.0	5.0	–	345	2600	2500	3000	6776	7700	12220
38.04	194773/5120	K913_0380 MB43	100	84	112	290	10.0	5.0	–	345	2600	2500	3000	6776	7700	12220
38.04	194773/5120	K913_0380 MB43	160	–	112	290	10.0	5.0	–	345	2600	2500	3000	6776	7700	12220
48.94	100223/2048	K913_0490 MB43	50	154	102	290	10.0	5.0	–	357	2600	2500	3000	7000	7700	14000
48.94	100223/2048	K913_0490 MB43	72	123	102	290	10.0	5.0	–	357	2600	2500	3000	7000	7700	14000
48.94	100223/2048	K913_0490 MB43	100	84	102	290	10.0	5.0	–	357	2600	2500	3000	7000	7700	14000
48.94	100223/2048	K913_0490 MB43	160	–	102	290	10.0	5.0	–	357	2600	2500	3000	7000	7700	14000
63.07	209901/3328	K913_0630 MB43	50	121	95	290	10.0	5.0	–	366	2600	2500	3000	7000	7700	14000
63.07	209901/3328	K913_0630 MB43	72	90	95	290	10.0	5.0	–	366	2600	2500	3000	7000	7700	14000
63.07	209901/3328	K913_0630 MB43	100	51	95	290	10.0	5.0	–	366	2600	2500	3000	7000	7700	14000
75.00	62403/832	K913_0750 MB43	50	91	86	290	10.0	5.0	–	370	2600	2500	3000	7000	7700	14000
75.00	62403/832	K913_0750 MB43	72	60	86	290	10.0	5.0	–	370	2600	2500	3000	7000	7700	14000
75.00	62403/832	K913_0750 MB43	100	21	86	290	10.0	5.0	–	370	2600	2500	3000	7000	7700	14000
95.41	293105/3072	K913_0950 MB43	50	27	83	290	10.0	5.0	–	373	2600	2500	3000	5375	6450	10751



## 10.3 Dimensional drawings

In this chapter, you can find the dimensions of the gear units as well as example dimensions of the mountable motor adapters.

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 3D models of our standard drives at <https://configurator.stoeber.de/en-US/>.

### Tolerances

Axis height in accordance with DIN 747	Tolerance
Up to 50 mm	-0.4 mm
Up to 250 mm	-0.5 mm
Up to 630 mm	-0.6 mm

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

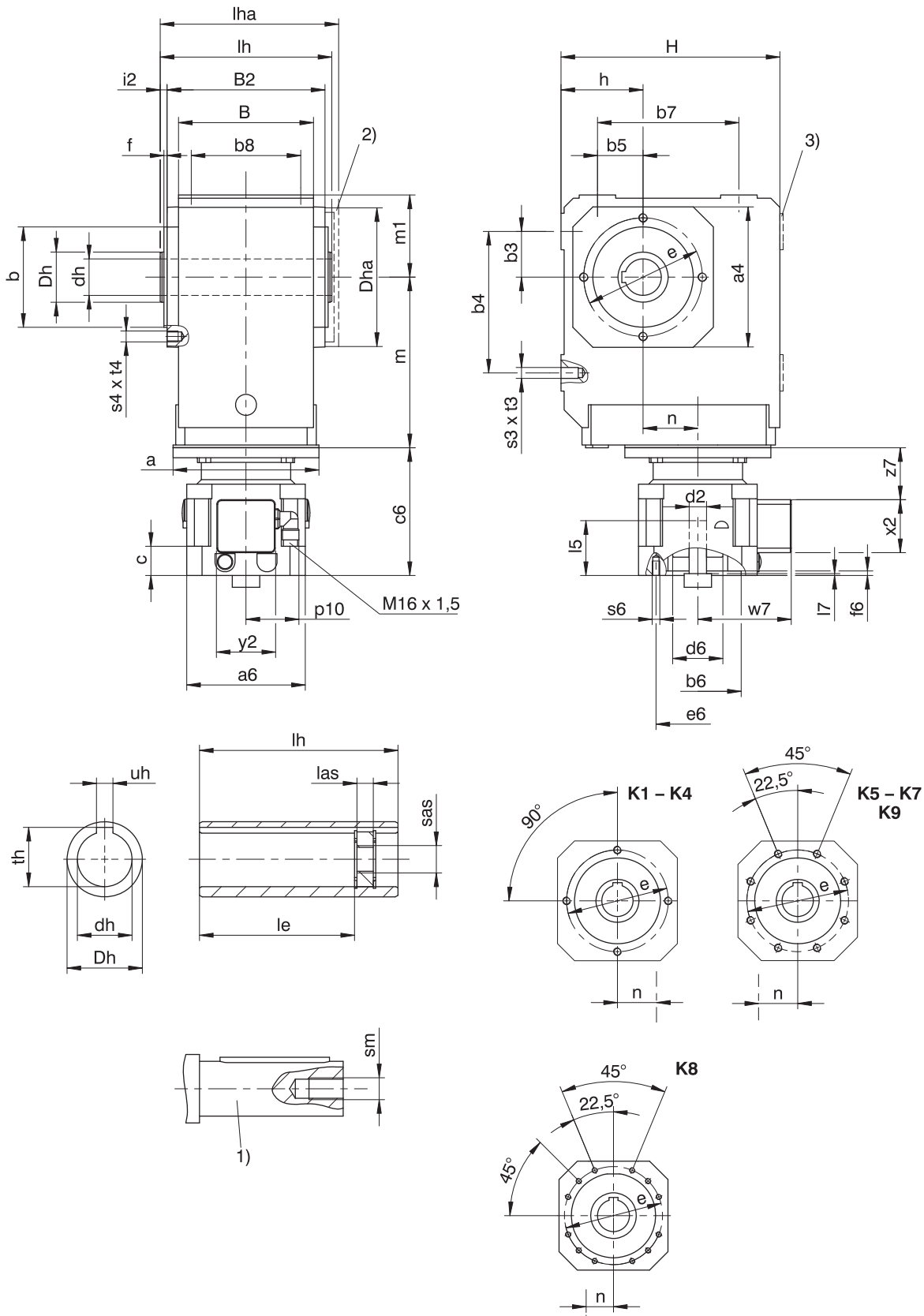
Hollow shaft	Tolerance
Hollow shaft hole fit	ISO H7
Feather keys	DIN 6885-1, high form K1 $\varnothing$ 30: DIN 6885-3, low form

Flange	Pilot tolerance
Up to 300 mm	ISO j6
Starting at 350 mm	ISO h6

### 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 A shaft design (hollow shaft), G housing design (pitch circle diameter)



- 1) The length of the machine shaft must be at least  $2.2 \times \varnothing d_h$  and the length of the feather key must be at least  $2 \times \varnothing d_h$ .
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)

## Dimensions of gear units

Type	□a4	∅b	b3	b4	b5	b7	b8	B	B2	∅dh	∅Dh	Dha	∅e	f	h	H	i2	le	lh	las	lha	m1	s3	s4	sm	sas	t3	t4	th	uh
K1	105	75 <sub>js6</sub>	30	90	30	90	70	90	106	20 <sup>H7</sup>	40	□105	90	3.0	60	160	7.0	98.0	120	12	127.0	60	M8	M8	M6	M8	13	13	22.8	6 <sup>JS9</sup>
K1	105	75 <sub>js6</sub>	30	90	30	90	70	90	106	25 <sup>H7</sup>	40	□105	90	3.0	60	160	7.0	98.0	120	12	127.0	60	M8	M8	M10	M12	13	13	28.3	8 <sup>JS9</sup>
K1	105	75 <sub>js6</sub>	30	90	30	90	70	90	106	30 <sup>H7</sup>	40	□105	90	3.0	60	160	7.0	93.5	120	12	127.0	60	M8	M8	M10	M12	13	13	32.0	8 <sup>JS9</sup>
K2	116	82 <sub>js6</sub>	35	115	35	115	90	115	134	30 <sup>H7</sup>	45	□116	100	3.0	65	190	7.0	121.5	148	12	156.0	65	M10	M8	M10	M12	16	13	33.3	8 <sup>JS9</sup>
K3	132	95 <sub>js6</sub>	40	130	40	130	105	130	146	35 <sup>H7</sup>	50	□132	115	3.0	75	213	7.0	125.0	160	12	168.0	75	M10	M8	M12	M16	16	13	38.3	10 <sup>JS9</sup>
K4	152	110 <sub>js6</sub>	50	155	50	155	120	148	173	40 <sup>H7</sup>	55	□152	130	3.5	90	240	7.5	157.0	188	12	197.5	90	M12	M10	M16	M20	19	16	43.3	12 <sup>JS9</sup>
K5	145	110 <sub>js6</sub>	40	140	100	140	125	160	185	50 <sup>H7</sup>	65	□145	130	3.5	160	260	7.5	164.0	200	12	209.5	100	M16	M10	M16	M20	26	16	53.8	14 <sup>JS9</sup>
K6	180	140 <sub>js6</sub>	50	160	110	160	130	168	200	50 <sup>H7</sup>	70	∅183	165	3.5	190	310	7.5	179.0	215	12	224.5	120	M16	M10	M16	M20	26	16	53.8	14 <sup>JS9</sup>
K7	195	155 <sub>js6</sub>	55	180	125	180	145	190	226	60 <sup>H7</sup>	85	∅205	185	3.5	212	342	8.0	214.0	242	12	252.0	125	M20	M12	M20	M24	33	19	64.4	18 <sup>JS9</sup>
K8	226	185 <sub>js6</sub>	75	240	165	240	185	235	282	70 <sup>H7</sup>	100	∅184	215	4.0	265	410	9.0	263.0	300	20	311.0	145	M24	M12	M20	M24	38	19	74.9	20 <sup>JS9</sup>
K9	280	230 <sub>js6</sub>	95	280	185	280	225	285	330	90 <sup>H7</sup>	120	∅230	265	5.0	315	495	10.0	302.0	350	26	361.0	180	M30	M16	M24	M30	48	26	95.4	25 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	∅160	128	36.0	–	–	–	–	–	–
K202	∅160	147	46.0	∅200	149	46.0	–	–	–
K302	∅160	167	52.5	∅200	169	52.5	–	–	–
K402	∅160	187	60.0	∅200	189	60.0	∅250	192	60.0
K513	∅160	172	15.0	∅200	174	15.0	∅250	177	15.0
K613	∅160	191	18.0	∅200	193	18.0	∅250	196	18.0
K713	–	–	–	∅200	221	20.0	∅250	224	20.0
K813	–	–	–	∅200	247	24.0	∅250	249	24.0
K913	–	–	–	–	–	–	∅250	294	25.0

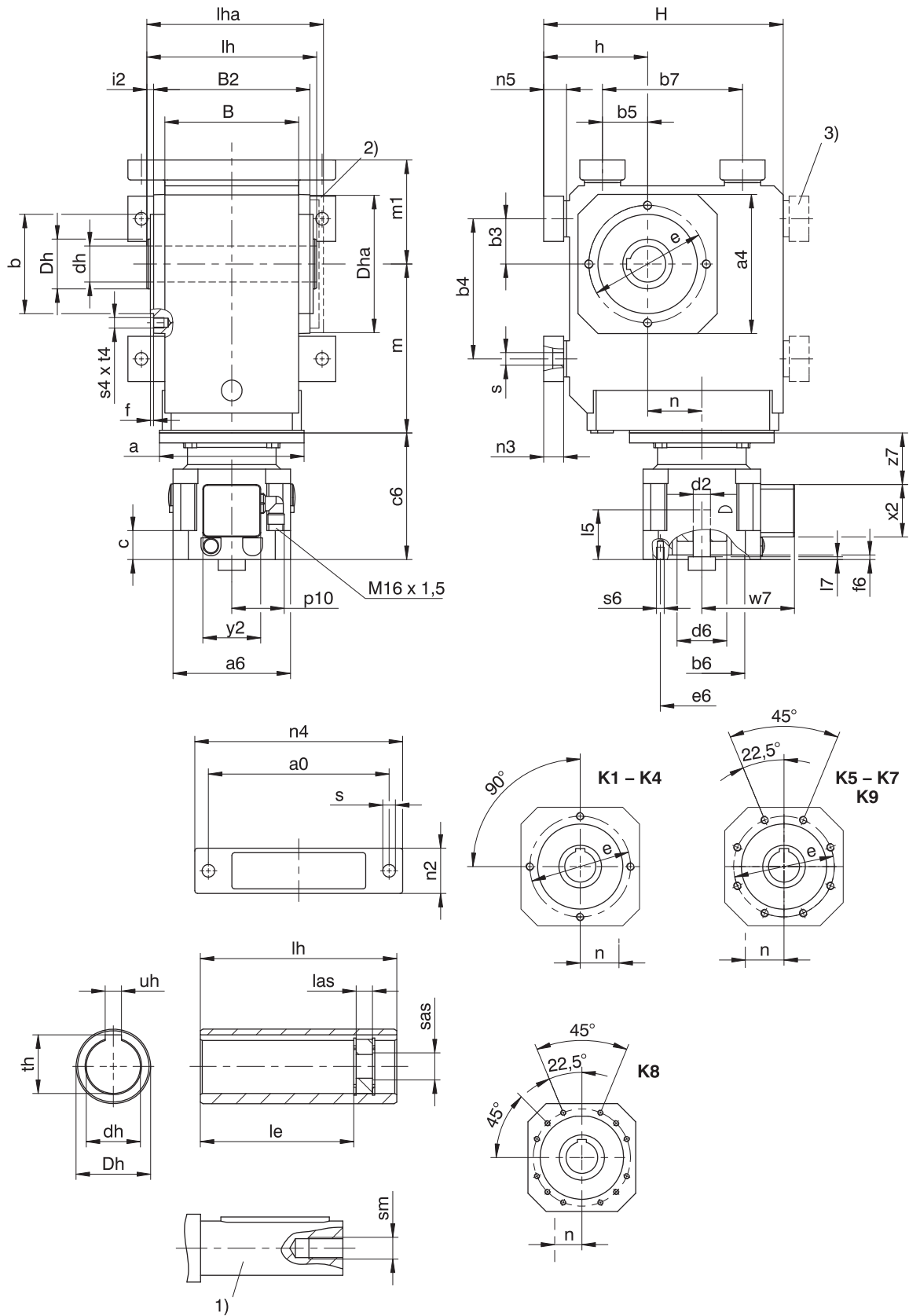
## Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.2 A shaft design (hollow shaft), NG housing design (foot + pitch circle diameter)



- 1) The length of the machine shaft must be at least  $2.2 \times \varnothing dh$  and the length of the feather key must be at least  $2 \times \varnothing dh$ .
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)



Dimensions of gear units

Type	a0	□a4	∅b	b3	b4	b5	b7	B	B2	∅dh	∅Dh	Dha	∅e	f	h	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	∅s	s4	sm	sas	t4	th	uh
K1	115	105	75 <sub>F8</sub>	30	90	30	90	90	106	20 <sup>H7</sup>	40	□105	90	3.0	75	175	7.0	98.0	120	12	127.0	75	30	13	140	15	9.0	M8	M6	M8	13	22.8	6 <sup>JS9</sup>
K1	115	105	75 <sub>F8</sub>	30	90	30	90	90	106	25 <sup>H7</sup>	40	□105	90	3.0	75	175	7.0	98.0	120	12	127.0	75	30	13	140	15	9.0	M8	M10	M12	13	28.3	8 <sup>JS9</sup>
K1	115	105	75 <sub>F8</sub>	30	90	30	90	90	106	30 <sup>H7</sup>	40	□105	90	3.0	75	175	7.0	93.5	120	12	127.0	75	30	13	140	15	9.0	M8	M10	M12	13	32.0	8 <sup>JS9</sup>
K2	155	116	82 <sub>F8</sub>	35	115	35	115	115	134	30 <sup>H7</sup>	45	□116	100	3.0	88	213	7.0	121.5	148	12	156.0	88	40	20	185	23	11.0	M8	M10	M12	13	33.3	8 <sup>JS9</sup>
K3	170	132	95 <sub>F8</sub>	40	130	40	130	130	146	35 <sup>H7</sup>	50	□132	115	3.0	98	236	7.0	125.0	160	12	168.0	98	45	20	200	23	11.0	M8	M12	M16	13	38.3	10 <sup>JS9</sup>
K4	200	152	110 <sub>F8</sub>	50	155	50	155	148	173	40 <sup>H7</sup>	55	□152	130	3.5	115	265	7.5	157.0	188	12	197.5	115	50	22	230	25	14.0	M10	M16	M20	16	43.3	12 <sup>JS9</sup>
K5	200	145	110 <sub>F8</sub>	40	140	100	140	160	185	50 <sup>H7</sup>	65	□145	130	3.5	190	290	7.5	164.0	200	12	209.5	130	60	27	240	30	18.0	M10	M16	M20	16	53.8	14 <sup>JS9</sup>
K6	210	180	140 <sub>F8</sub>	50	160	110	160	168	200	50 <sup>H7</sup>	70	∅183	165	3.5	220	340	7.5	179.0	215	12	224.5	150	65	27	250	30	18.5	M10	M16	M20	16	53.8	14 <sup>JS9</sup>
K7	241	195	155 <sub>F8</sub>	55	180	125	180	190	226	60 <sup>H7</sup>	85	∅205	185	3.5	250	380	8.0	214.0	242	12	252.0	163	70	35	290	38	23.0	M12	M20	M24	19	64.4	18 <sup>JS9</sup>
K8	300	226	185 <sub>F8</sub>	75	240	165	240	235	282	70 <sup>H7</sup>	100	∅184	215	4.0	310	455	9.0	263.0	300	20	311.0	190	85	41	360	45	27.0	M12	M20	M24	19	74.9	20 <sup>JS9</sup>
K9	360	280	230 <sub>F8</sub>	95	280	185	280	285	330	90 <sup>H7</sup>	120	∅230	265	5.0	365	545	10.0	302.0	350	26	361.0	230	95	46	430	50	31.0	M16	M24	M30	26	95.4	25 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	∅160	128	36.0	-	-	-	-	-	-
K202	∅160	147	46.0	∅200	149	46.0	-	-	-
K302	∅160	167	52.5	∅200	169	52.5	-	-	-
K402	∅160	187	60.0	∅200	189	60.0	∅250	192	60.0
K513	∅160	172	15.0	∅200	174	15.0	∅250	177	15.0
K613	∅160	191	18.0	∅200	193	18.0	∅250	196	18.0
K713	-	-	-	∅200	221	20.0	∅250	224	20.0
K813	-	-	-	∅200	247	24.0	∅250	249	24.0
K913	-	-	-	-	-	-	∅250	294	25.0

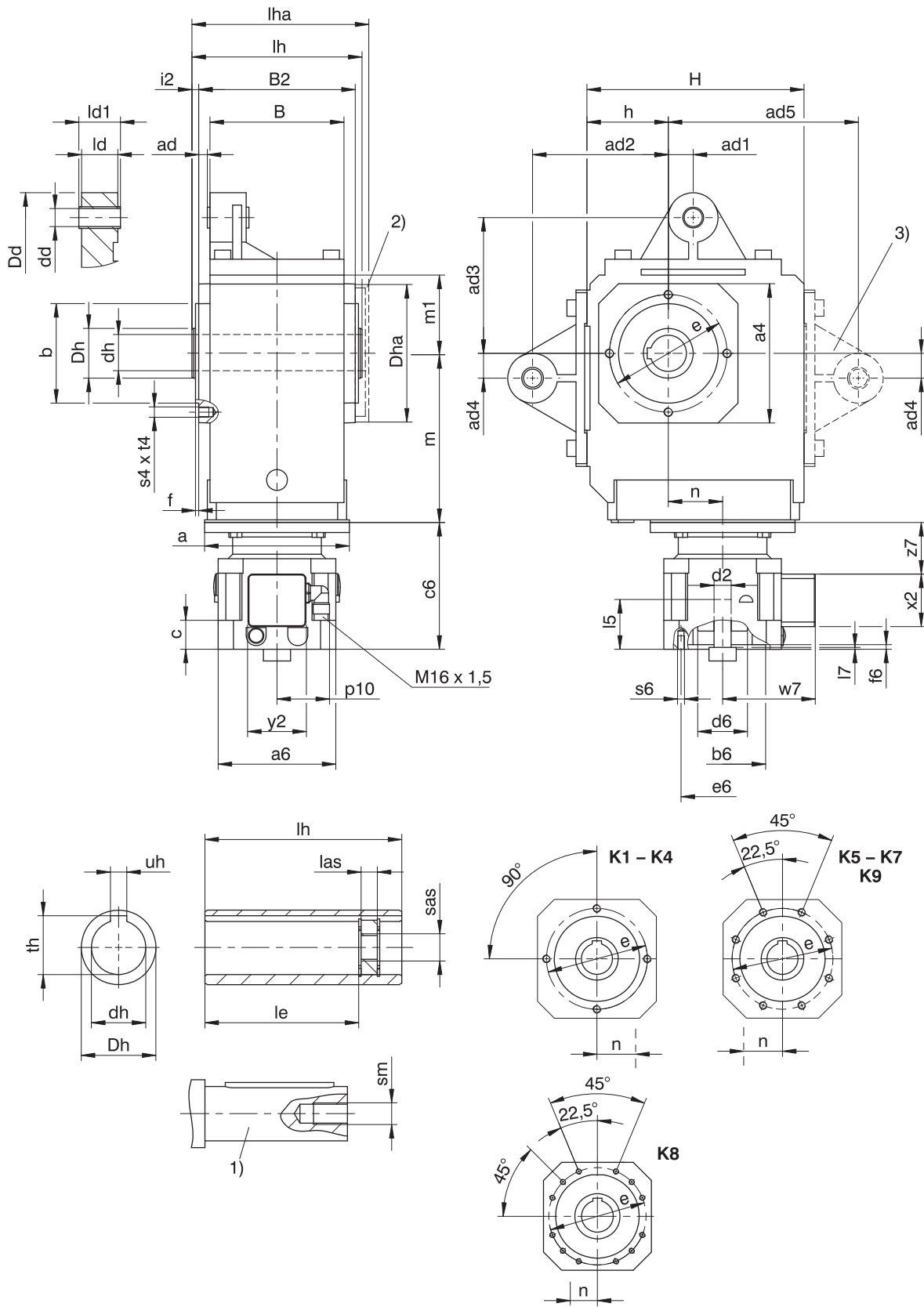
Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.3 A shaft design (hollow shaft), GD housing design (pitch circle diameter + torque arm bracket)



- 1) The length of the machine shaft must be at least  $2.2 \times \varnothing dh$  and the length of the feather key must be at least  $2 \times \varnothing dh$ .
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)
- If you brace the gear units without the torque arm brackets provided by the manufacturer for this purpose, the dimensions for  $ad_2$  and  $ad_3$  must meet the specified value.

## Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	ad5	Øb	B	B2	Ødd	Ødh	ØDd	ØDh	Dha	Øe	f
K1	105	6.0	15.0	90	90	15.0	130	75 <sub>j6</sub>	90	106	12 <sup>H9</sup>	20 <sup>H7</sup>	43	40	□105	90	3.0
K1	105	6.0	15.0	90	90	15.0	130	75 <sub>j6</sub>	90	106	12 <sup>H9</sup>	25 <sup>H7</sup>	43	40	□105	90	3.0
K1	105	6.0	15.0	90	90	15.0	130	75 <sub>j6</sub>	90	106	12 <sup>H9</sup>	30 <sup>H7</sup>	43	40	□105	90	3.0
K2	116	6.5	22.5	100	100	22.5	–	82 <sub>j6</sub>	115	134	16 <sup>H9</sup>	30 <sup>H7</sup>	45	45	□116	100	3.0
K3	132	5.0	25.0	120	120	25.0	–	95 <sub>j6</sub>	130	146	16 <sup>H9</sup>	35 <sup>H7</sup>	45	50	□132	115	3.0
K4	152	9.5	27.5	150	150	27.5	–	110 <sub>j6</sub>	148	173	20 <sup>H9</sup>	40 <sup>H7</sup>	55	55	□152	130	3.5
K5	145	9.5	30.0	250	190	30.0	–	110 <sub>j6</sub>	160	185	20 <sup>H9</sup>	50 <sup>H7</sup>	58	65	□145	130	3.5
K6	180	13.0	30.0	250	180	30.0	–	140 <sub>j6</sub>	168	200	20 <sup>H9</sup>	50 <sup>H7</sup>	58	70	Ø183	165	3.5
K7	195	15.0	35.0	300	213	35.0	–	155 <sub>j6</sub>	190	226	20 <sup>H9</sup>	60 <sup>H7</sup>	68	85	Ø205	185	3.5
K8	226	17.0	45.0	350	230	45.0	–	185 <sub>j6</sub>	235	282	24 <sup>H9</sup>	70 <sup>H7</sup>	72	100	Ø184	215	4.0
K9	280	16.0	45.0	450	315	45.0	–	230 <sub>j6</sub>	285	330	24 <sup>H9</sup>	90 <sup>H7</sup>	75	120	Ø230	265	5.0

Type	h	H	i2	ld	ld1	le	lh	las	lha	m1	s4	sm	sas	t4	th	uh
K1	60	160	7.0	24	28	98.0	120	12	127.0	60	M8	M6	M8	13	22.8	6 <sup>JS9</sup>
K1	60	160	7.0	24	28	98.0	120	12	127.0	60	M8	M10	M12	13	28.3	8 <sup>JS9</sup>
K1	60	160	7.0	24	28	93.5	120	12	127.0	60	M8	M10	M12	13	32.0	8 <sup>JS9</sup>
K2	65	190	7.0	32	38	121.5	148	12	156.0	65	M8	M10	M12	13	33.3	8 <sup>JS9</sup>
K3	75	213	7.0	32	38	125.0	160	12	168.0	75	M8	M12	M16	13	38.3	10 <sup>JS9</sup>
K4	90	240	7.5	40	46	157.0	188	12	197.5	90	M10	M16	M20	16	43.3	12 <sup>JS9</sup>
K5	160	260	7.5	40	46	164.0	200	12	209.5	100	M10	M16	M20	16	53.8	14 <sup>JS9</sup>
K6	190	310	7.5	40	46	179.0	215	12	224.5	120	M10	M16	M20	16	53.8	14 <sup>JS9</sup>
K7	212	342	8.0	64	70	214.0	242	12	252.0	125	M12	M20	M24	19	64.4	18 <sup>JS9</sup>
K8	265	410	9.0	102	115	263.0	300	20	311.0	145	M12	M20	M24	19	74.9	20 <sup>JS9</sup>
K9	315	495	10.0	102	115	302.0	350	26	361.0	180	M16	M24	M30	26	95.4	25 <sup>JS9</sup>

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

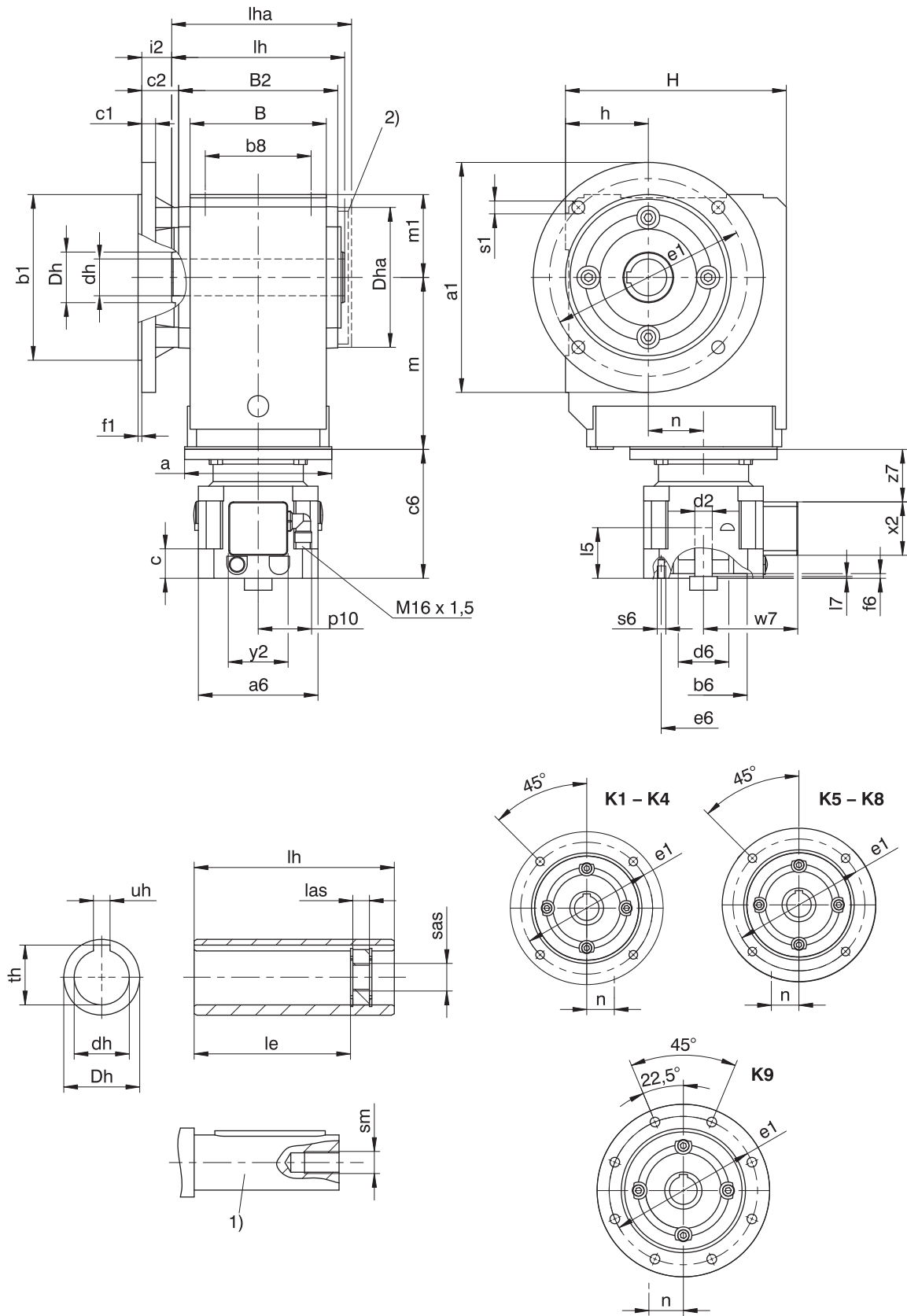
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.4 A shaft design (hollow shaft), F housing design (round flange)



1) The length of the machine shaft must be at least 2.2 x  $\varnothing dh$  and the length of the feather key must be at least 2 x  $\varnothing dh$ .

2) Cover (optional)

## Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ødh	ØDh	Dha	Øe1	f1	h	H	i2	le	lh	las	lha	m1	Øs1	sm	sas	th	uh
K1	160	110 <sub>h6</sub>	70	90	106	10	32.0	20 <sup>H7</sup>	40	□105	130	3.5	60	160	25.0	98.0	120	12	127.0	60	9	M6	M8	22.8	6 <sup>JS9</sup>
K1	160	110 <sub>h6</sub>	70	90	106	10	32.0	25 <sup>H7</sup>	40	□105	130	3.5	60	160	25.0	98.0	120	12	127.0	60	9	M10	M12	28.3	8 <sup>JS9</sup>
K1	160	110 <sub>h6</sub>	70	90	106	10	32.0	30 <sup>H7</sup>	40	□105	130	3.5	60	160	25.0	93.5	120	12	127.0	60	9	M10	M12	32.0	8 <sup>JS9</sup>
K2	200	130 <sub>h6</sub>	90	115	134	12	32.0	30 <sup>H7</sup>	45	□116	165	3.5	65	190	25.0	121.5	148	12	156.0	65	11	M10	M12	33.3	8 <sup>JS9</sup>
K3	200	130 <sub>h6</sub>	105	130	146	14	38.0	35 <sup>H7</sup>	50	□132	165	3.5	75	213	31.0	125.0	160	12	168.0	75	11	M12	M16	38.3	10 <sup>JS9</sup>
K4	250	180 <sub>h6</sub>	120	148	173	15	40.0	40 <sup>H7</sup>	55	□152	215	4.0	90	240	32.5	157.0	188	12	197.5	90	14	M16	M20	43.3	12 <sup>JS9</sup>
K5	250	180 <sub>h6</sub>	125	160	185	15	39.5	50 <sup>H7</sup>	65	□145	215	4.0	160	260	32.0	164.0	200	12	209.5	100	14	M16	M20	53.8	14 <sup>JS9</sup>
K6	300	230 <sub>h6</sub>	130	168	200	17	36.0	50 <sup>H7</sup>	70	Ø183	265	4.0	190	310	28.5	179.0	215	12	224.5	120	14	M16	M20	53.8	14 <sup>JS9</sup>
K7	350	250 <sub>h6</sub>	145	190	226	18	44.0	60 <sup>H7</sup>	85	Ø205	300	5.0	212	342	36.0	214.0	242	12	252.0	125	18	M20	M24	64.4	18 <sup>JS9</sup>
K8	400	300 <sub>h6</sub>	185	235	282	20	45.0	70 <sup>H7</sup>	100	Ø184	350	5.0	265	410	36.0	263.0	300	20	311.0	145	18	M20	M24	74.9	20 <sup>JS9</sup>
K9	450	350 <sub>h6</sub>	225	285	330	23	50.0	90 <sup>H7</sup>	120	Ø230	400	5.0	315	495	40.0	302.0	350	26	361.0	180	18	M24	M30	95.4	25 <sup>JS9</sup>

## Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95 <sub>h6</sub>	10	115	3.0	9
K2	160	110 <sub>h6</sub>	12	130	3.5	9
K3	160	110 <sub>h6</sub>	14	130	3.5	9
K3	250	180 <sub>h6</sub>	14	215	4.0	14
K8	350	250 <sub>h6</sub>	18	300	5.0	18
K8	450	350 <sub>h6</sub>	20	400	5.0	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

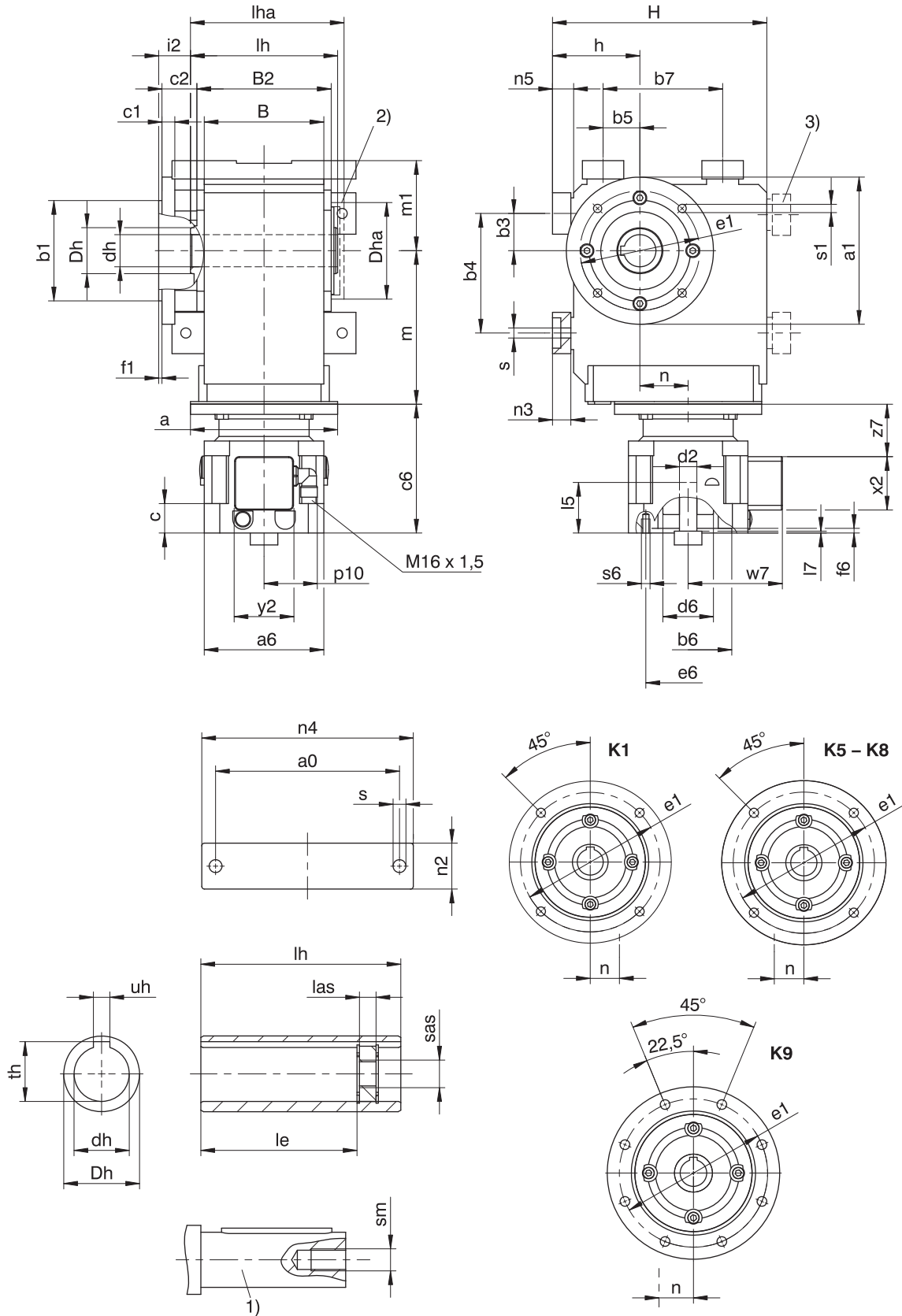
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.5 A shaft design (hollow shaft), NF housing design (foot + round flange)



- 1) The length of the machine shaft must be at least  $2.2 \times \varnothing dh$  and the length of the feather key must be at least  $2 \times \varnothing dh$ .
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)

## Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	c2	Ødh	ØDh	Dha	Øe1	f1	h
K1	115	160	110 <sub>f6</sub>	30	90	30	90	90	106	10	32.0	20 <sup>H7</sup>	40	□105	130	3.5	75
K1	115	160	110 <sub>f6</sub>	30	90	30	90	90	106	10	32.0	25 <sup>H7</sup>	40	□105	130	3.5	75
K1	115	160	110 <sub>f6</sub>	30	90	30	90	90	106	10	32.0	30 <sup>H7</sup>	40	□105	130	3.5	75
K5	200	250	180 <sub>f6</sub>	40	140	100	140	160	185	15	39.5	50 <sup>H7</sup>	65	□145	215	4.0	190
K6	210	300	230 <sub>f6</sub>	50	160	110	160	168	200	17	36.0	50 <sup>H7</sup>	70	Ø183	265	4.0	220
K7	241	350	250 <sub>h6</sub>	55	180	125	180	190	226	18	44.0	60 <sup>H7</sup>	85	Ø205	300	5.0	250
K8	300	400	300 <sub>h6</sub>	75	240	165	240	235	282	20	45.0	70 <sup>H7</sup>	100	Ø184	350	5.0	310
K9	360	450	350 <sub>h6</sub>	95	280	185	280	285	330	23	50.0	90 <sup>H7</sup>	120	Ø230	400	5.0	365

Type	H	i2	le	lh	las	lha	m1	n2	n3	n4	n5	Øs	Øs1	sm	sas	th	uh
K1	175	25.0	98.0	120	12	127.0	75	30	13	140	15	9.0	9	M6	M8	22.8	6 <sup>JS9</sup>
K1	175	25.0	98.0	120	12	127.0	75	30	13	140	15	9.0	9	M10	M12	28.3	8 <sup>JS9</sup>
K1	175	25.0	93.5	120	12	127.0	75	30	13	140	15	9.0	9	M10	M12	32.0	8 <sup>JS9</sup>
K5	290	32.0	164.0	200	12	209.5	130	60	27	240	30	18.0	14	M16	M20	53.8	14 <sup>JS9</sup>
K6	340	28.5	179.0	215	12	224.5	150	65	27	250	30	18.5	14	M16	M20	53.8	14 <sup>JS9</sup>
K7	380	36.0	214.0	242	12	252.0	163	70	35	290	38	23.0	18	M20	M24	64.4	18 <sup>JS9</sup>
K8	455	36.0	263.0	300	20	311.0	190	85	41	360	45	27.0	18	M20	M24	74.9	20 <sup>JS9</sup>
K9	545	40.0	302.0	350	26	361.0	230	95	46	430	50	31.0	18	M24	M30	95.4	25 <sup>JS9</sup>

## Dimensions of additional round flanges

Type	Øa1	Øb1	c1	c2	Øe1	f1	Øs1
K1	140	95 <sub>f6</sub>	10	32	115	3	9
K8	350	250 <sub>h6</sub>	18	45	300	5	18
K8	450	350 <sub>h6</sub>	20	45	400	5	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.





Dimensions of gear units

Type	□a4	∅b	b3	b4	b5	b7	b8	B	B2	∅ds	∅ds1	∅ds2	∅dss	∅Ds	∅Dsa	∅Dss	∅e	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	s3	s4	t3	t4
K1	105	75 <sub>F8</sub>	30	90	30	90	70	90	106	25 <sub>H9</sub>	25 <sub>H7</sub>	25.5	30	40	80	60	90	3.0	60	160	7.0	149	163	60	20	34	25	29	M8	M8	13	13
K2	116	82 <sub>F8</sub>	35	115	35	115	90	115	134	30 <sub>H9</sub>	30 <sub>H7</sub>	30.5	36	45	88	72	100	3.0	65	190	7.0	178	193	65	25	39	30	34	M10	M8	16	13
K3	132	95 <sub>F8</sub>	40	130	40	130	105	130	146	35 <sub>H9</sub>	35 <sub>H7</sub>	35.5	44	50	101	80	115	3.0	75	213	7.0	190	206	75	30	39	35	34	M10	M8	16	13
K4	152	110 <sub>F8</sub>	50	155	50	155	120	148	173	40 <sub>H9</sub>	40 <sub>H7</sub>	40.5	50	55	114	88	130	3.5	90	240	7.5	220	243	90	40	39	45	34	M12	M10	19	16
K5	145	110 <sub>F8</sub>	40	140	100	140	125	160	185	50 <sub>H9</sub>	50 <sub>H7</sub>	50.5	62	65	116	106	130	3.5	160	260	7.5	237	254	100	40	44	45	39	M16	M10	26	16
K6	180	140 <sub>F8</sub>	50	160	110	160	130	168	200	50 <sub>H9</sub>	50 <sub>H7</sub>	50.5	62	70	128	106	165	3.5	190	310	7.5	254	276	120	40	45	45	40	M16	M10	26	16
K7	195	155 <sub>H8</sub>	55	180	125	180	145	190	226	60 <sub>H8</sub>	60 <sub>H7</sub>	62.0	75	85	161.5	138	185	3.5	212	342	8.0	278	314	125	40	45	45	40	M20	M12	33	19
K8	226	185 <sub>H8</sub>	75	240	165	240	185	235	282	70 <sub>H8</sub>	70 <sub>H7</sub>	72.0	90	100	193	155	215	4.0	265	410	9.0	352	378	145	50	60	60	50	M24	M12	38	19
K9	280	230 <sub>H8</sub>	95	280	185	280	225	285	330	90 <sub>H8</sub>	90 <sub>H7</sub>	92.0	120	120	244	200	265	5.0	315	495	10.0	418	428	180	60	70	70	60	M30	M16	48	26

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	∅160	128	36.0	–	–	–	–	–	–
K202	∅160	147	46.0	∅200	149	46.0	–	–	–
K302	∅160	167	52.5	∅200	169	52.5	–	–	–
K402	∅160	187	60.0	∅200	189	60.0	∅250	192	60.0
K513	∅160	172	15.0	∅200	174	15.0	∅250	177	15.0
K613	∅160	191	18.0	∅200	193	18.0	∅250	196	18.0
K713	–	–	–	∅200	221	20.0	∅250	224	20.0
K813	–	–	–	∅200	247	24.0	∅250	249	24.0
K913	–	–	–	–	–	–	∅250	294	25.0

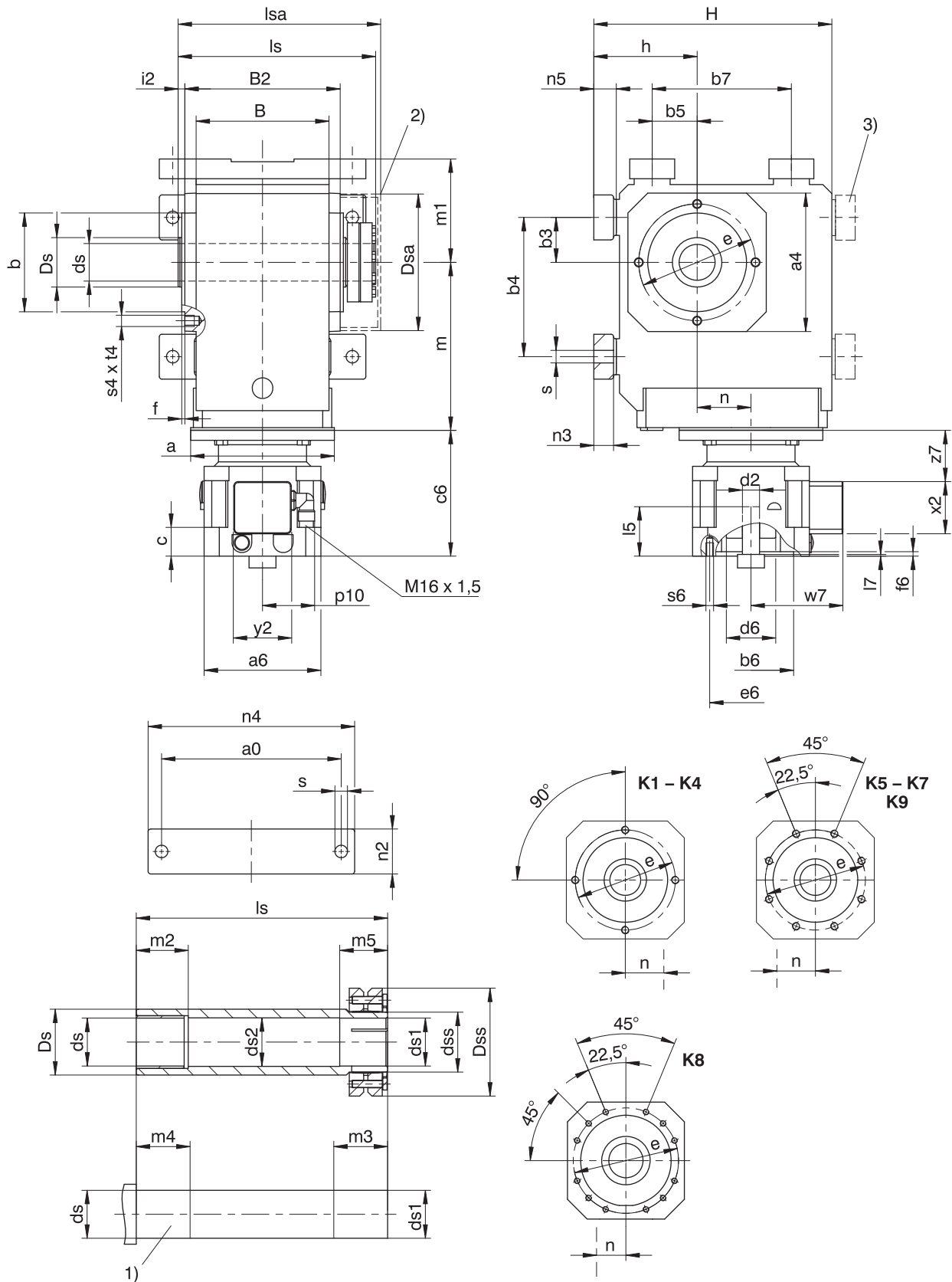
Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.7 S shaft design (hollow shaft with shrink ring), NG housing design (foot + pitch circle diameter)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)

## Dimensions of gear units

Type	a0	a4	Øb	b3	b4	b5	b7	B	B2	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa
K1	115	105	75 <sub>f6</sub>	30	90	30	90	90	106	25 <sub>h9</sub>	25 <sub>h9</sub> <sup>H7</sup>	25.5	30	40	80
K2	155	116	82 <sub>f6</sub>	35	115	35	115	115	134	30 <sub>h9</sub>	30 <sub>h9</sub> <sup>H7</sup>	30.5	36	45	88
K3	170	132	95 <sub>f6</sub>	40	130	40	130	130	146	35 <sub>h9</sub>	35 <sub>h9</sub> <sup>H7</sup>	35.5	44	50	101
K4	200	152	110 <sub>f6</sub>	50	155	50	155	148	173	40 <sub>h9</sub>	40 <sub>h9</sub> <sup>H7</sup>	40.5	50	55	114
K5	200	145	110 <sub>f6</sub>	40	140	100	140	160	185	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	65	116
K6	210	180	140 <sub>f6</sub>	50	160	110	160	168	200	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	70	128
K7	241	195	155 <sub>f6</sub>	55	180	125	180	190	226	60 <sub>h6</sub>	60 <sub>h6</sub> <sup>H7</sup>	62.0	75	85	161.5
K8	300	226	185 <sub>f6</sub>	75	240	165	240	235	282	70 <sub>h6</sub>	70 <sub>h6</sub> <sup>H7</sup>	72.0	90	100	193
K9	360	280	230 <sub>f6</sub>	95	280	185	280	285	330	90 <sub>h6</sub>	90 <sub>h6</sub> <sup>H7</sup>	92.0	120	120	244

Type	ØDss	Øe	f	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	s4	t4
K1	60	90	3.0	75	175	7.0	149	163	75	20	34	25	29	30	13	140	15	9.0	M8	13
K2	72	100	3.0	88	213	7.0	178	193	88	25	39	30	34	40	20	185	23	11.0	M8	13
K3	80	115	3.0	98	236	7.0	190	206	98	30	39	35	34	45	20	200	23	11.0	M8	13
K4	88	130	3.5	115	265	7.5	220	243	115	40	39	45	34	50	22	230	25	14.0	M10	16
K5	106	130	3.5	190	290	7.5	237	254	130	40	44	45	39	60	27	240	30	18.0	M10	16
K6	106	165	3.5	220	340	7.5	254	276	150	40	45	45	40	65	27	250	30	18.5	M10	16
K7	138	185	3.5	250	380	8.0	278	314	163	40	45	45	40	70	35	290	38	23.0	M12	19
K8	155	215	4.0	310	455	9.0	352	378	190	50	60	60	50	85	41	360	45	27.0	M12	19
K9	200	265	5.0	365	545	10.0	418	428	230	60	70	70	60	95	46	430	50	31.0	M16	26

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

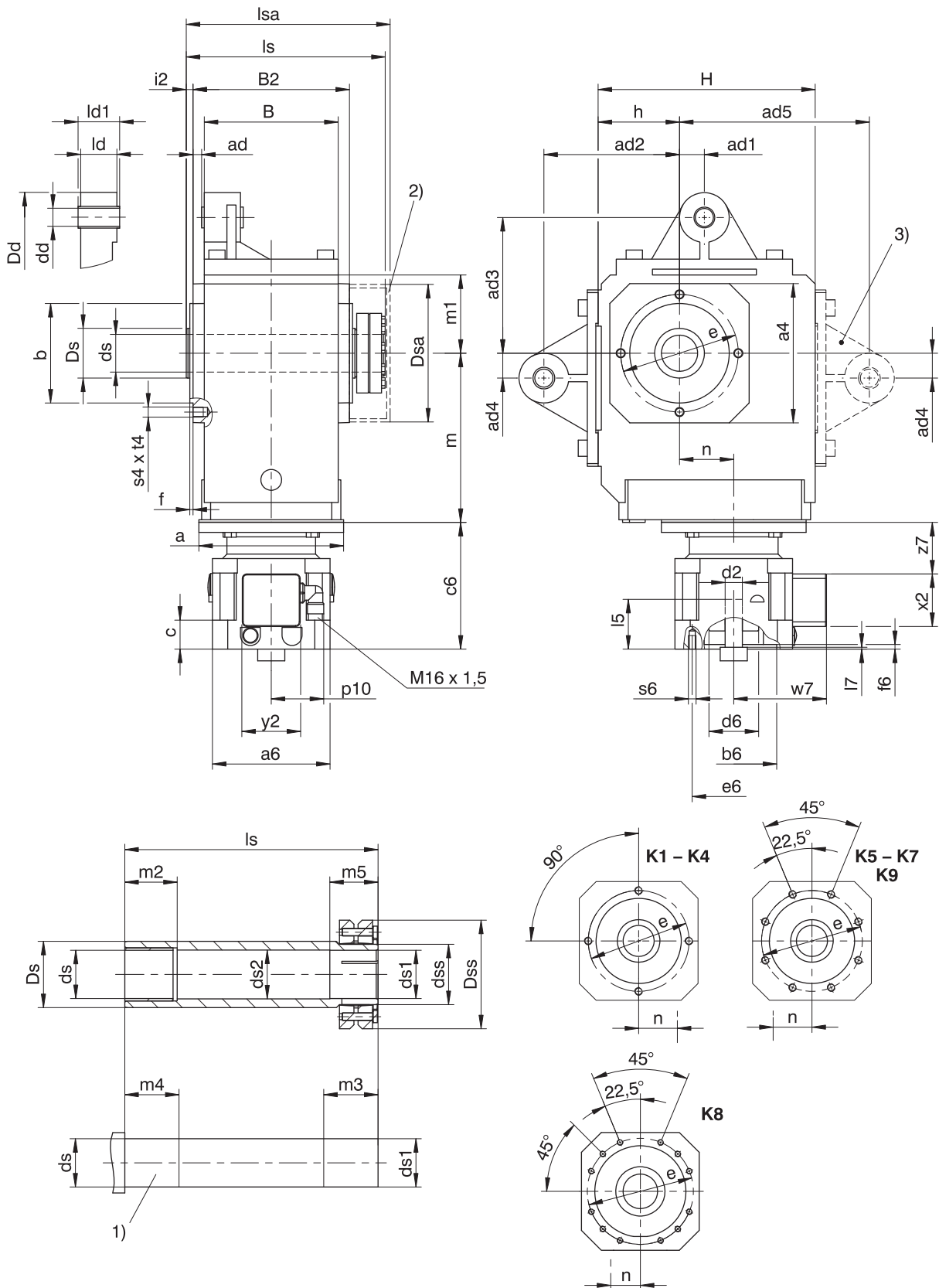
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.8 S shaft design (hollow shaft with shrink ring), GD housing design (pitch circle diameter + torque arm bracket)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)

- If you brace the gear units without the torque arm brackets provided by the manufacturer for this purpose, the dimensions for  $ad_2$  and  $ad_3$  must meet the specified value.

Dimensions of gear units

Type	□a4	ad	ad1	ad2	ad3	ad4	ad5	Øb	B	B2	Ødd	Øds	Øds1	Øds2	Ødss	ØDd	ØDs	ØDsa
K1	105	6.0	15.0	90	90	15.0	130	75 <sub>j6</sub>	90	106	12 <sup>H9</sup>	25 <sub>h9</sub>	25 <sub>h9</sub> <sup>H7</sup>	25.5	30	43	40	80
K2	116	6.5	22.5	100	100	22.5	–	82 <sub>j6</sub>	115	134	16 <sup>H9</sup>	30 <sub>h9</sub>	30 <sub>h9</sub> <sup>H7</sup>	30.5	36	45	45	88
K3	132	5.0	25.0	120	120	25.0	–	95 <sub>j6</sub>	130	146	16 <sup>H9</sup>	35 <sub>h9</sub>	35 <sub>h9</sub> <sup>H7</sup>	35.5	44	45	50	101
K4	152	9.5	27.5	150	150	27.5	–	110 <sub>j6</sub>	148	173	20 <sup>H9</sup>	40 <sub>h9</sub>	40 <sub>h9</sub> <sup>H7</sup>	40.5	50	55	55	114
K5	145	9.5	30.0	250	190	30.0	–	110 <sub>j6</sub>	160	185	20 <sup>H9</sup>	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	58	65	116
K6	180	13.0	30.0	250	180	30.0	–	140 <sub>j6</sub>	168	200	20 <sup>H9</sup>	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	58	70	128
K7	195	15.0	35.0	300	213	35.0	–	155 <sub>h6</sub>	190	226	20 <sup>H9</sup>	60 <sub>h6</sub>	60 <sub>h6</sub> <sup>H7</sup>	62.0	75	68	85	161.5
K8	226	17.0	45.0	350	230	45.0	–	185 <sub>h6</sub>	235	282	24 <sup>H9</sup>	70 <sub>h6</sub>	70 <sub>h6</sub> <sup>H7</sup>	72.0	90	72	100	193
K9	280	16.0	45.0	450	315	45.0	–	230 <sub>h6</sub>	285	330	24 <sup>H9</sup>	90 <sub>h6</sub>	90 <sub>h6</sub> <sup>H7</sup>	92.0	120	75	120	244

Type	ØDss	Øe	f	h	H	i2	ld	ld1	ls	lsa	m1	m2	m3	m4	m5	s4	t4
K1	60	90	3.0	60	160	7.0	24	28	149	163	60	20	34	25	29	M8	13
K2	72	100	3.0	65	190	7.0	32	38	178	193	65	25	39	30	34	M8	13
K3	80	115	3.0	75	213	7.0	32	38	190	206	75	30	39	35	34	M8	13
K4	88	130	3.5	90	240	7.5	40	46	220	243	90	40	39	45	34	M10	16
K5	106	130	3.5	160	260	7.5	40	46	237	254	100	40	44	45	39	M10	16
K6	106	165	3.5	190	310	7.5	40	46	254	276	120	40	45	45	40	M10	16
K7	138	185	3.5	212	342	8.0	64	70	278	314	125	40	45	45	40	M12	19
K8	155	215	4.0	265	410	9.0	102	115	352	378	145	50	60	60	50	M12	19
K9	200	265	5.0	315	495	10.0	102	115	418	428	180	60	70	70	60	M16	26

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

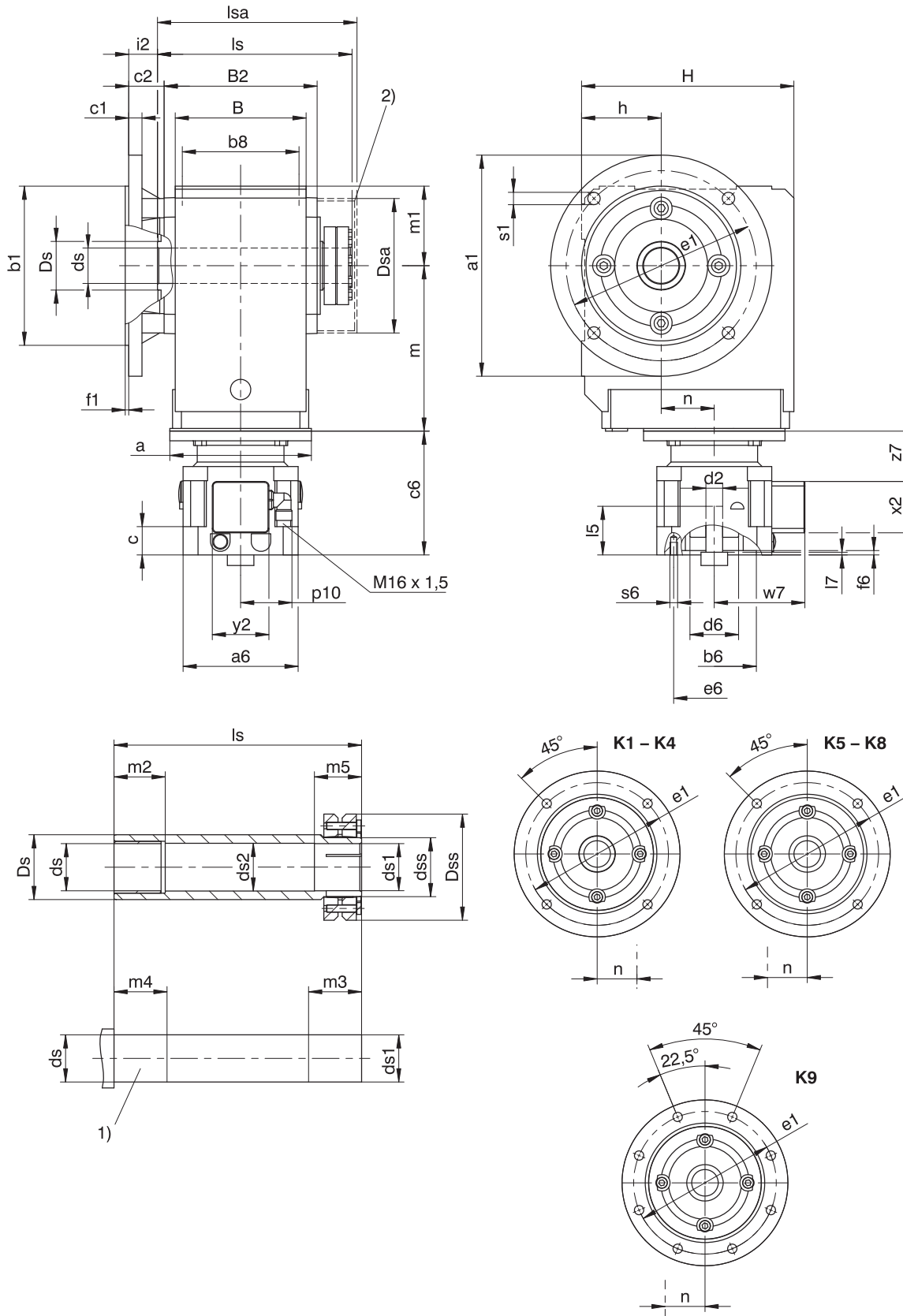
Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.9 S shaft design (hollow shaft with shrink ring), F housing design (round flange)



1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.

2) Cover (optional)

Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	Øs1
K1	160	110 <sub>F8</sub>	70	90	106	10	32.0	25 <sub>H9</sub>	25 <sub>H7</sub>	25.5	30	40	80	60	130	3.5	60	160	25.0	149	163	60	20	34	25	29	9
K2	200	130 <sub>F8</sub>	90	115	134	12	32.0	30 <sub>H9</sub>	30 <sub>H7</sub>	30.5	36	45	88	72	165	3.5	65	190	25.0	178	193	65	25	39	30	34	11
K3	200	130 <sub>F8</sub>	105	130	146	14	38.0	35 <sub>H9</sub>	35 <sub>H7</sub>	35.5	44	50	101	80	165	3.5	75	213	31.0	190	206	75	30	39	35	34	11
K4	250	180 <sub>F8</sub>	120	148	173	15	40.0	40 <sub>H9</sub>	40 <sub>H7</sub>	40.5	50	55	114	88	215	4.0	90	240	32.5	220	243	90	40	39	45	34	14
K5	250	180 <sub>F8</sub>	125	160	185	15	39.5	50 <sub>H9</sub>	50 <sub>H7</sub>	50.5	62	65	116	106	215	4.0	160	260	32.0	237	254	100	40	44	45	39	14
K6	300	230 <sub>F8</sub>	130	168	200	17	36.0	50 <sub>H9</sub>	50 <sub>H7</sub>	50.5	62	70	128	106	265	4.0	190	310	28.5	254	276	120	40	45	45	40	14
K7	350	250 <sub>H6</sub>	145	190	226	18	44.0	60 <sub>H6</sub>	60 <sub>H7</sub>	62.0	75	85	161.5	138	300	5.0	212	342	36.0	278	314	125	40	45	45	40	18
K8	400	300 <sub>H6</sub>	185	235	282	20	45.0	70 <sub>H6</sub>	70 <sub>H7</sub>	72.0	90	100	193	155	350	5.0	265	410	36.0	352	378	145	50	60	60	50	18
K9	450	350 <sub>H6</sub>	225	285	330	23	50.0	90 <sub>H6</sub>	90 <sub>H7</sub>	92.0	120	120	244	200	400	5.0	315	495	40.0	418	428	180	60	70	70	60	18

Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95 <sub>F8</sub>	10	115	3.0	9
K2	160	110 <sub>F8</sub>	12	130	3.5	9
K3	160	110 <sub>F8</sub>	14	130	3.5	9
K3	250	180 <sub>F8</sub>	14	215	4.0	14
K8	350	250 <sub>H6</sub>	18	300	5.0	18
K8	450	350 <sub>H6</sub>	20	400	5.0	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

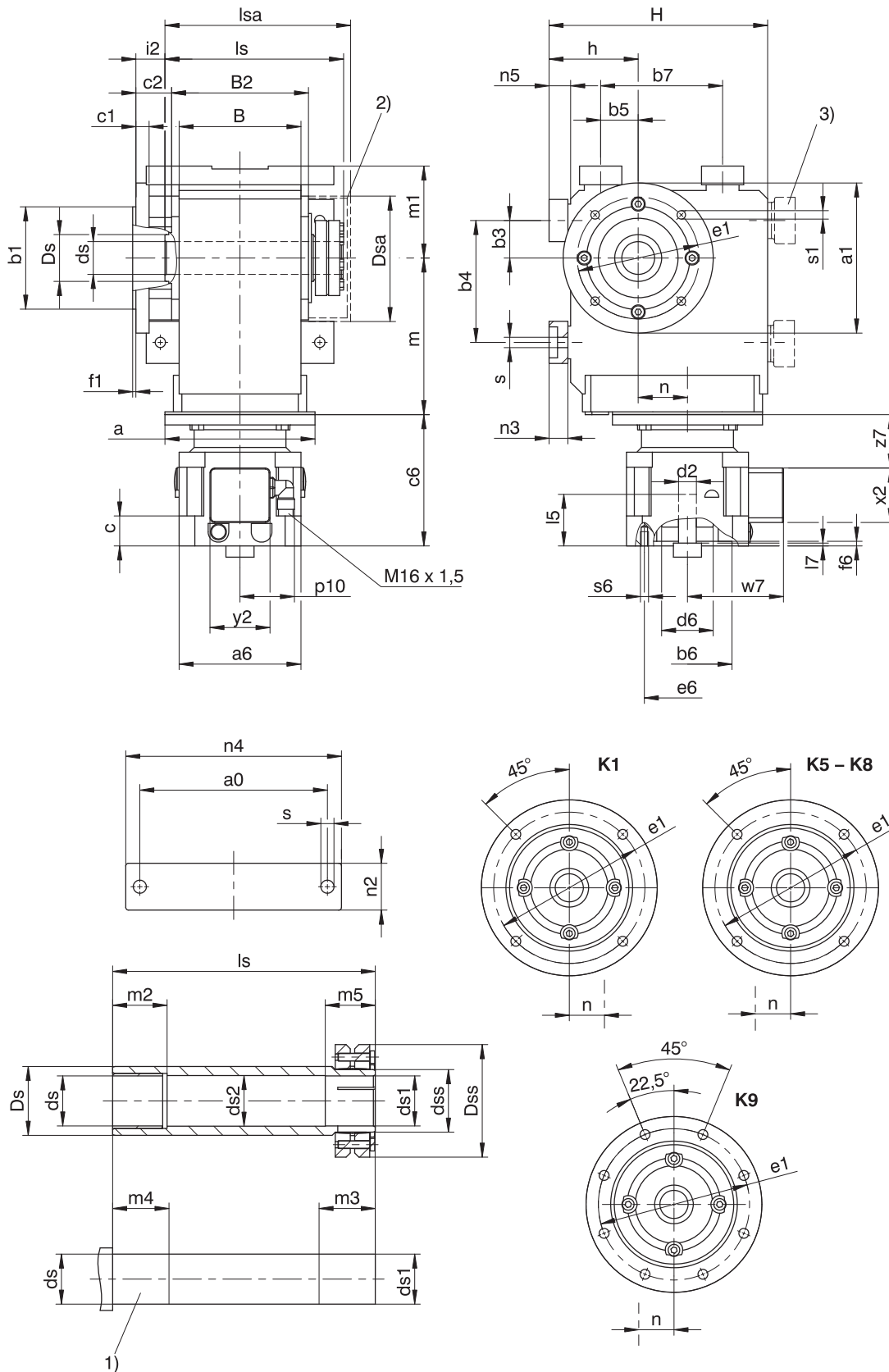
Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.10 S shaft design (hollow shaft with shrink ring), NF housing design (foot + round flange)



- 1) Machine shaft: The dimension  $l_s$  must meet or exceed the specified value.
- 2) Cover (optional)
- 3) Only for K1 (other sizes on request)



## Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	Øds	Øds1	Øds2	Ødss	ØDs	ØDsa	ØDss
K1	115	160	110 <sub>h6</sub>	30	90	30	90	90	106	10	25 <sub>h9</sub>	25 <sub>h9</sub> <sup>H7</sup>	25.5	30	40	80	60
K5	200	250	180 <sub>h6</sub>	40	140	100	140	160	185	15	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	65	116	106
K6	210	300	230 <sub>h6</sub>	50	160	110	160	168	200	17	50 <sub>h9</sub>	50 <sub>h9</sub> <sup>H7</sup>	50.5	62	70	128	106
K7	241	350	250 <sub>h6</sub>	55	180	125	180	190	226	18	60 <sub>h6</sub>	60 <sub>h6</sub> <sup>H7</sup>	62.0	75	85	161.5	138
K8	300	400	300 <sub>h6</sub>	75	240	165	240	235	282	20	70 <sub>h6</sub>	70 <sub>h6</sub> <sup>H7</sup>	72.0	90	100	193	155
K9	360	450	350 <sub>h6</sub>	95	280	185	280	285	330	23	90 <sub>h6</sub>	90 <sub>h6</sub> <sup>H7</sup>	92.0	120	120	244	200

Type	Øe1	f1	h	H	i2	ls	lsa	m1	m2	m3	m4	m5	n2	n3	n4	n5	Øs	Øs1
K1	130	3.5	75	175	25.0	149	163	75	20	34	25	29	30	13	140	15	9.0	9
K5	215	4.0	190	290	32.0	237	254	130	40	44	45	39	60	27	240	30	18.0	14
K6	265	4.0	220	340	28.5	254	276	150	40	45	45	40	65	27	250	30	18.5	14
K7	300	5.0	250	380	36.0	278	314	163	40	45	45	40	70	35	290	38	23.0	18
K8	350	5.0	310	455	36.0	352	378	190	50	60	60	50	85	41	360	45	27.0	18
K9	400	5.0	365	545	40.0	418	428	230	60	70	70	60	95	46	430	50	31.0	18

## Dimensions of additional round flanges

Type	Øa1	Øb1	c1	c2	Øe1	f1	Øs1
K1	140	95 <sub>h6</sub>	10	32	115	3	9
K8	350	250 <sub>h6</sub>	18	45	300	5	18
K8	450	350 <sub>h6</sub>	20	45	400	5	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

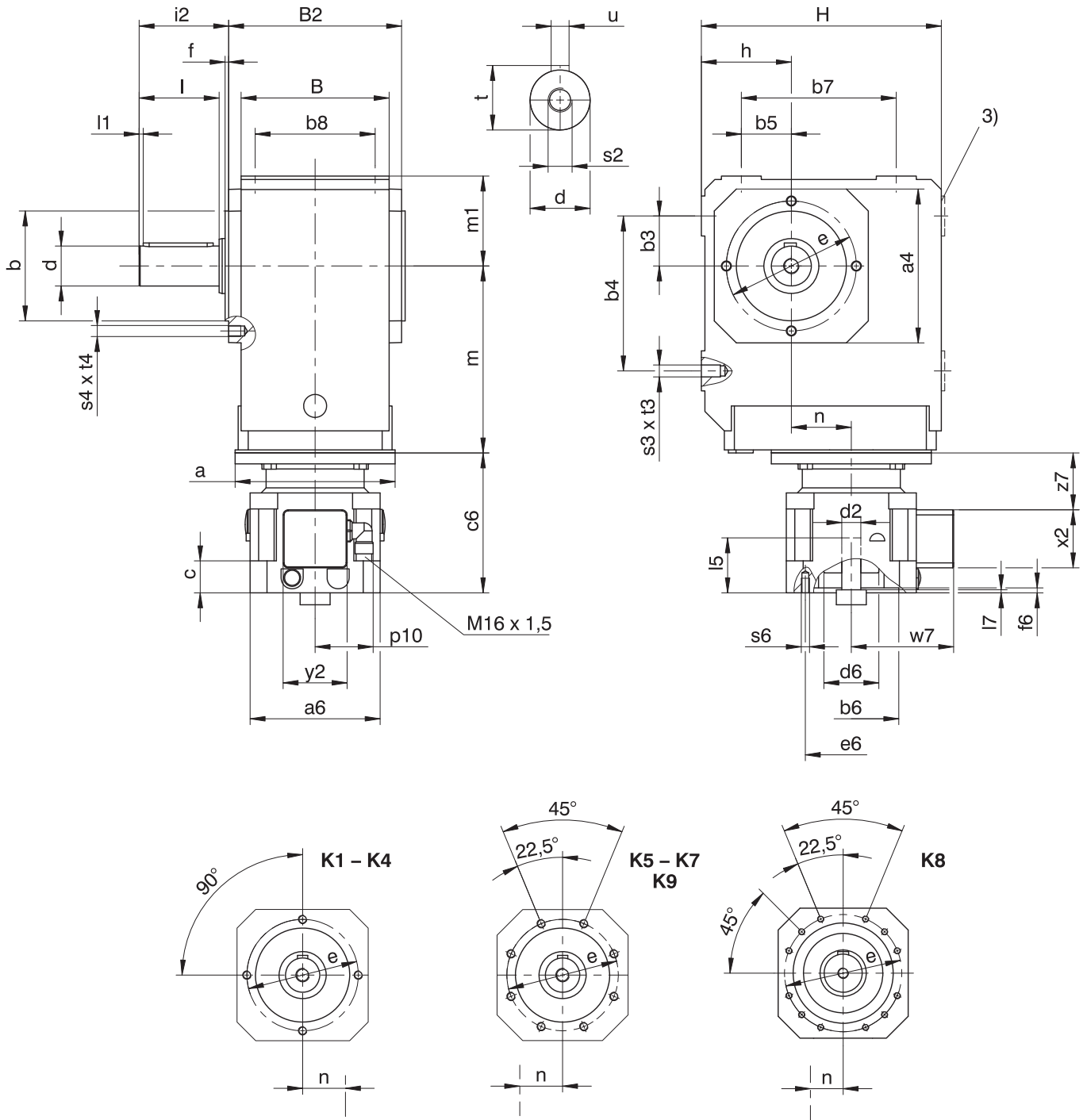
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STÖBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.11 V shaft design (solid shaft), G housing design (pitch circle diameter)



3) Only for K1 (other sizes on request)

- K1 - K4: Solid shaft without feather key available, on request starting at K5.

- K1 - K9: Solid shaft on both sides available.

## Dimensions of gear units

Type	□a4	∅b	b3	b4	b5	b7	b8	B	B2	∅d	∅e	f	h	H	i2	l	l1	m1	s2	s3	s4	t	t3	t4	u
K1	105	75 <sub>g6</sub>	30	90	30	90	70	90	106	25 <sub>k6</sub>	90	3.0	60	160	62.0	50	4	60	M10	M8	M8	28.0	13	13	A8×7×40
K2	116	82 <sub>g6</sub>	35	115	35	115	90	115	134	30 <sub>k6</sub>	100	3.0	65	190	68.0	60	4	65	M10	M10	M8	33.0	16	13	A8×7×50
K3	132	95 <sub>g6</sub>	40	130	40	130	105	130	146	30 <sub>k6</sub>	115	3.0	75	213	69.0	60	4	75	M10	M10	M8	33.0	16	13	A8×7×50
K4	152	110 <sub>g6</sub>	50	155	50	155	120	148	173	40 <sub>k6</sub>	130	3.5	90	240	89.5	80	4	90	M16	M12	M10	43.0	19	16	A12×8×70
K5	145	110 <sub>g6</sub>	40	140	100	140	125	160	185	45 <sub>k6</sub>	130	3.5	160	260	129.5	90	4	100	M16	M16	M10	48.5	26	16	A14×9×80
K6	180	140 <sub>g6</sub>	50	160	110	160	130	168	200	50 <sub>k6</sub>	165	3.5	190	310	136.0	100	4	120	M16	M16	M10	53.5	26	16	A14×9×90
K7	195	155 <sub>g6</sub>	55	180	125	180	145	190	226	60 <sub>m6</sub>	185	3.5	212	342	164.0	120	4	125	M20	M20	M12	64.0	33	19	A18×11×110
K8	226	185 <sub>g6</sub>	75	240	165	240	185	235	282	70 <sub>m6</sub>	215	4.0	265	410	185.0	140	5	145	M20	M24	M12	74.5	38	19	A20×12×125
K9	280	230 <sub>g6</sub>	95	280	185	280	225	285	330	90 <sub>m6</sub>	265	5.0	315	495	220.0	170	8	180	M24	M30	M16	95.0	48	26	A25×14×140

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	∅160	128	36.0	–	–	–	–	–	–
K202	∅160	147	46.0	∅200	149	46.0	–	–	–
K302	∅160	167	52.5	∅200	169	52.5	–	–	–
K402	∅160	187	60.0	∅200	189	60.0	∅250	192	60.0
K513	∅160	172	15.0	∅200	174	15.0	∅250	177	15.0
K613	∅160	191	18.0	∅200	193	18.0	∅250	196	18.0
K713	–	–	–	∅200	221	20.0	∅250	224	20.0
K813	–	–	–	∅200	247	24.0	∅250	249	24.0
K913	–	–	–	–	–	–	∅250	294	25.0

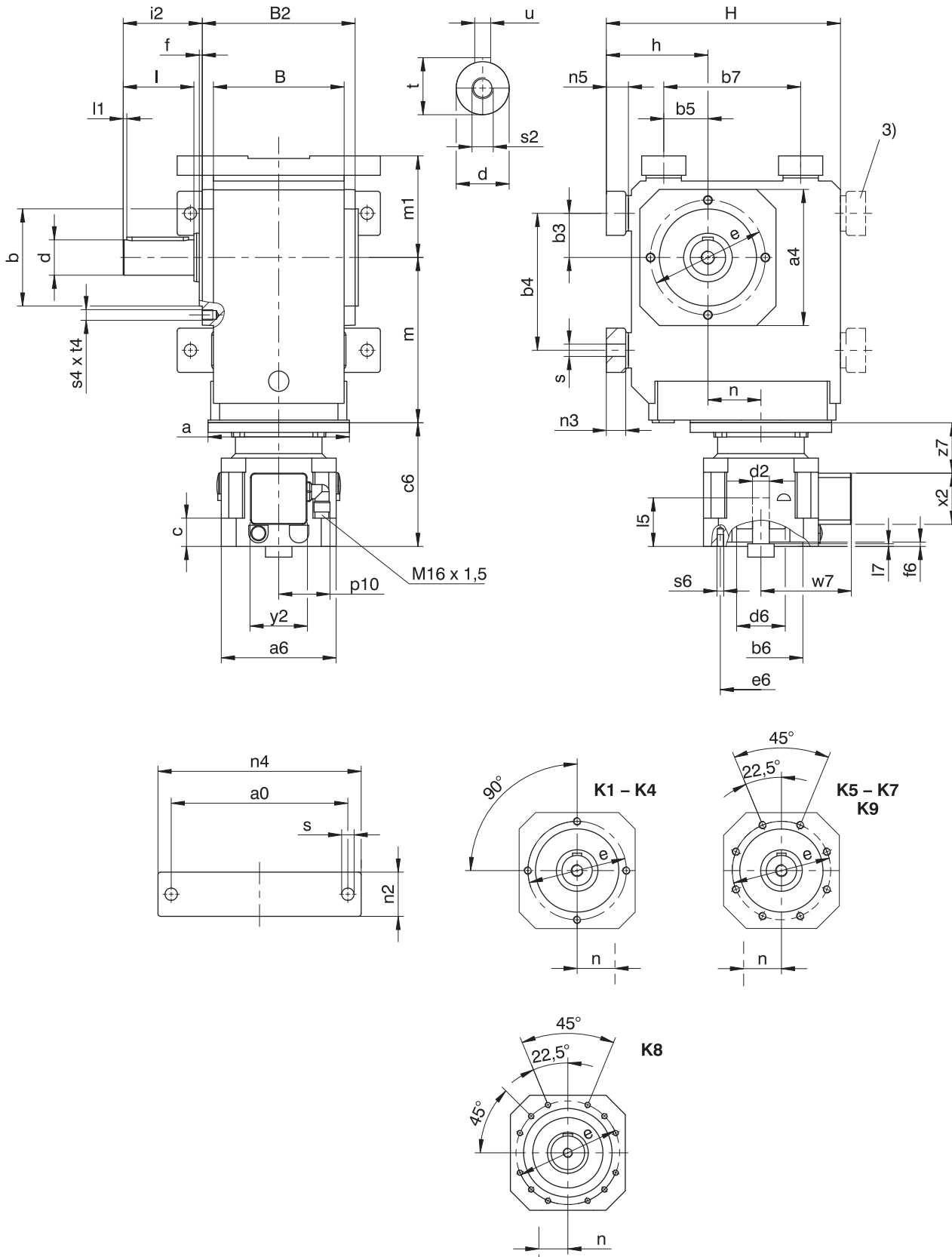
## Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

### 10.3.12 V shaft design (solid shaft), NG housing design (foot + pitch circle diameter)



3) Only for K1 (other sizes on request)

- K1 - K10: Solid shaft on both sides available.

- K1 - K4: Solid shaft without feather key available, on request starting at K5.

## Dimensions of gear units

Type	a0	□a4	∅b	b3	b4	b5	b7	B	B2	∅d	∅e	f	h	H	i2	l	l1	m1	n2	n3	n4	n5	∅s	s2	s4	t	t4	u
K1	115	105	75 <sub>js</sub>	30	90	30	90	90	106	25 <sub>ks</sub>	90	3.0	75	175	62.0	50	4	75	30	13	140	15	9.0	M10	M8	28.0	13	A8×7×40
K2	155	116	82 <sub>js</sub>	35	115	35	115	115	134	30 <sub>ks</sub>	100	3.0	88	213	68.0	60	4	88	40	20	185	23	11.0	M10	M8	33.0	13	A8×7×50
K3	170	132	95 <sub>js</sub>	40	130	40	130	130	146	30 <sub>ks</sub>	115	3.0	98	236	69.0	60	4	98	45	20	200	23	11.0	M10	M8	33.0	13	A8×7×50
K4	200	152	110 <sub>js</sub>	50	155	50	155	148	173	40 <sub>ks</sub>	130	3.5	115	265	89.5	80	4	115	50	22	230	25	14.0	M16	M10	43.0	16	A12×8×70
K5	200	145	110 <sub>js</sub>	40	140	100	140	160	185	45 <sub>ks</sub>	130	3.5	190	290	129.5	90	4	130	60	27	240	30	18.0	M16	M10	48.5	16	A14×9×80
K6	210	180	140 <sub>js</sub>	50	160	110	160	168	200	50 <sub>ks</sub>	165	3.5	220	340	136.0	100	4	150	65	27	250	30	18.5	M16	M10	53.5	16	A14×9×90
K7	241	195	155 <sub>js</sub>	55	180	125	180	190	226	60 <sub>ms</sub>	185	3.5	250	380	164.0	120	4	163	70	35	290	38	23.0	M20	M12	64.0	19	A18×11×110
K8	300	226	185 <sub>js</sub>	75	240	165	240	235	282	70 <sub>ms</sub>	215	4.0	310	455	185.0	140	5	190	85	41	360	45	27.0	M20	M12	74.5	19	A20×12×125
K9	360	280	230 <sub>js</sub>	95	280	185	280	285	330	90 <sub>ms</sub>	265	5.0	365	545	220.0	170	8	230	95	46	430	50	31.0	M24	M16	95.0	26	A25×14×140

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	∅160	128	36.0	–	–	–	–	–	–
K202	∅160	147	46.0	∅200	149	46.0	–	–	–
K302	∅160	167	52.5	∅200	169	52.5	–	–	–
K402	∅160	187	60.0	∅200	189	60.0	∅250	192	60.0
K513	∅160	172	15.0	∅200	174	15.0	∅250	177	15.0
K613	∅160	191	18.0	∅200	193	18.0	∅250	196	18.0
K713	–	–	–	∅200	221	20.0	∅250	224	20.0
K813	–	–	–	∅200	247	24.0	∅250	249	24.0
K913	–	–	–	–	–	–	∅250	294	25.0

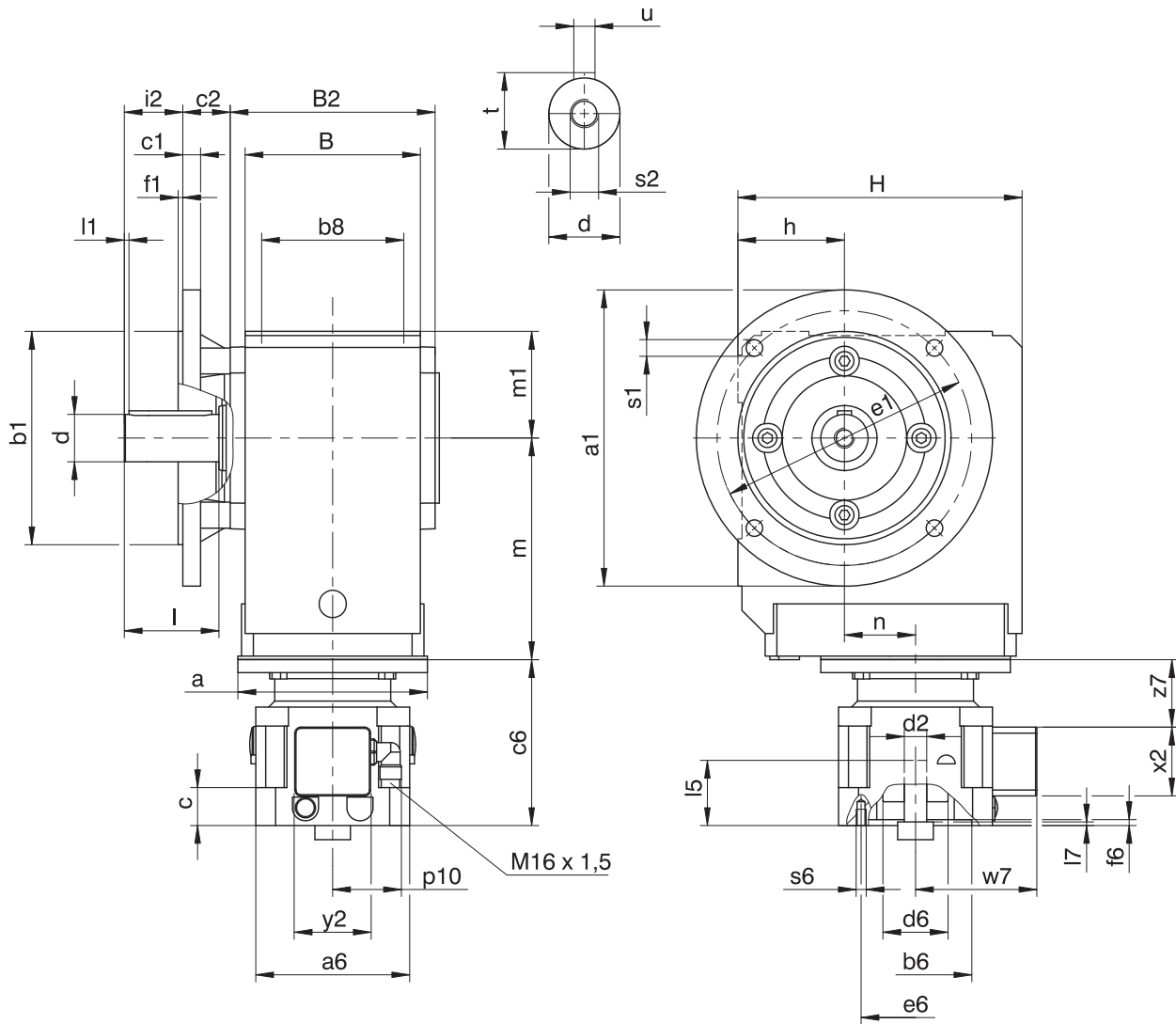
## Example dimensions for the motor connection

Type	∅b6	∅e6	∅d2max	l5	□a6	c	c6	∅d6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

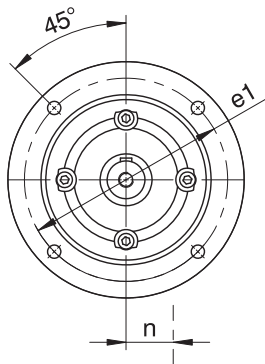
In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

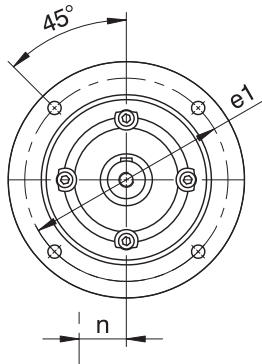
### 10.3.13 V shaft design (solid shaft), F housing design (round flange)



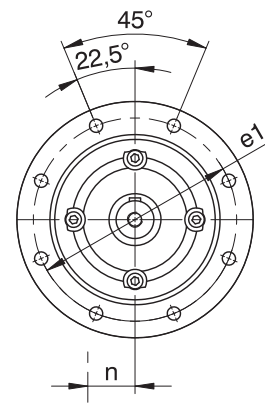
**K1 - K4**



**K5 - K8**



**K9**



- K1 - K4: Solid shaft without feather key available, on request starting at K5.

- K1 - K9: Solid shaft on both sides available.

## Dimensions of gear units

Type	Øa1	Øb1	b8	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	Øs1	s2	t	u
K1	160	110 <sub>js</sub>	70	90	106	10	32.0	25 <sub>h6</sub>	130	3.5	60	160	30.0	50	4	60	9	M10	28.0	A8×7×40
K2	200	130 <sub>js</sub>	90	115	134	12	32.0	30 <sub>h6</sub>	165	3.5	65	190	36.0	60	4	65	11	M10	33.0	A8×7×50
K3	200	130 <sub>js</sub>	105	130	146	14	38.0	30 <sub>h6</sub>	165	3.5	75	213	31.0	60	4	75	11	M10	33.0	A8×7×50
K4	250	180 <sub>js</sub>	120	148	173	15	40.0	40 <sub>h6</sub>	215	4.0	90	240	49.5	80	4	90	14	M16	43.0	A12×8×70
K5	250	180 <sub>js</sub>	125	160	185	15	39.5	45 <sub>h6</sub>	215	4.0	160	260	90.0	90	4	100	14	M16	48.5	A14×9×80
K6	300	230 <sub>js</sub>	130	168	200	17	36.0	50 <sub>h6</sub>	265	4.0	190	310	100.0	100	4	120	14	M16	53.5	A14×9×90
K7	350	250 <sub>h6</sub>	145	190	226	18	44.0	60 <sub>h6</sub>	300	5.0	212	342	120.0	120	4	125	18	M20	64.0	A18×11×110
K8	400	300 <sub>h6</sub>	185	235	282	20	45.0	70 <sub>h6</sub>	350	5.0	265	410	140.0	140	5	145	18	M20	74.5	A20×12×125
K9	450	350 <sub>h6</sub>	225	285	330	23	50.0	90 <sub>h6</sub>	400	5.0	315	495	170.0	170	8	180	18	M24	95.0	A25×14×140

## Dimensions of additional round flanges

Type	Øa1	Øb1	c1	Øe1	f1	Øs1
K1	140	95 <sub>js</sub>	10	115	3.0	9
K2	160	110 <sub>js</sub>	12	130	3.5	9
K3	160	110 <sub>js</sub>	14	130	3.5	9
K3	250	180 <sub>js</sub>	14	215	4.0	14
K8	350	250 <sub>h6</sub>	18	300	5.0	18
K8	450	350 <sub>h6</sub>	20	400	5.0	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K202	Ø160	147	46.0	Ø200	149	46.0	–	–	–
K302	Ø160	167	52.5	Ø200	169	52.5	–	–	–
K402	Ø160	187	60.0	Ø200	189	60.0	Ø250	192	60.0
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

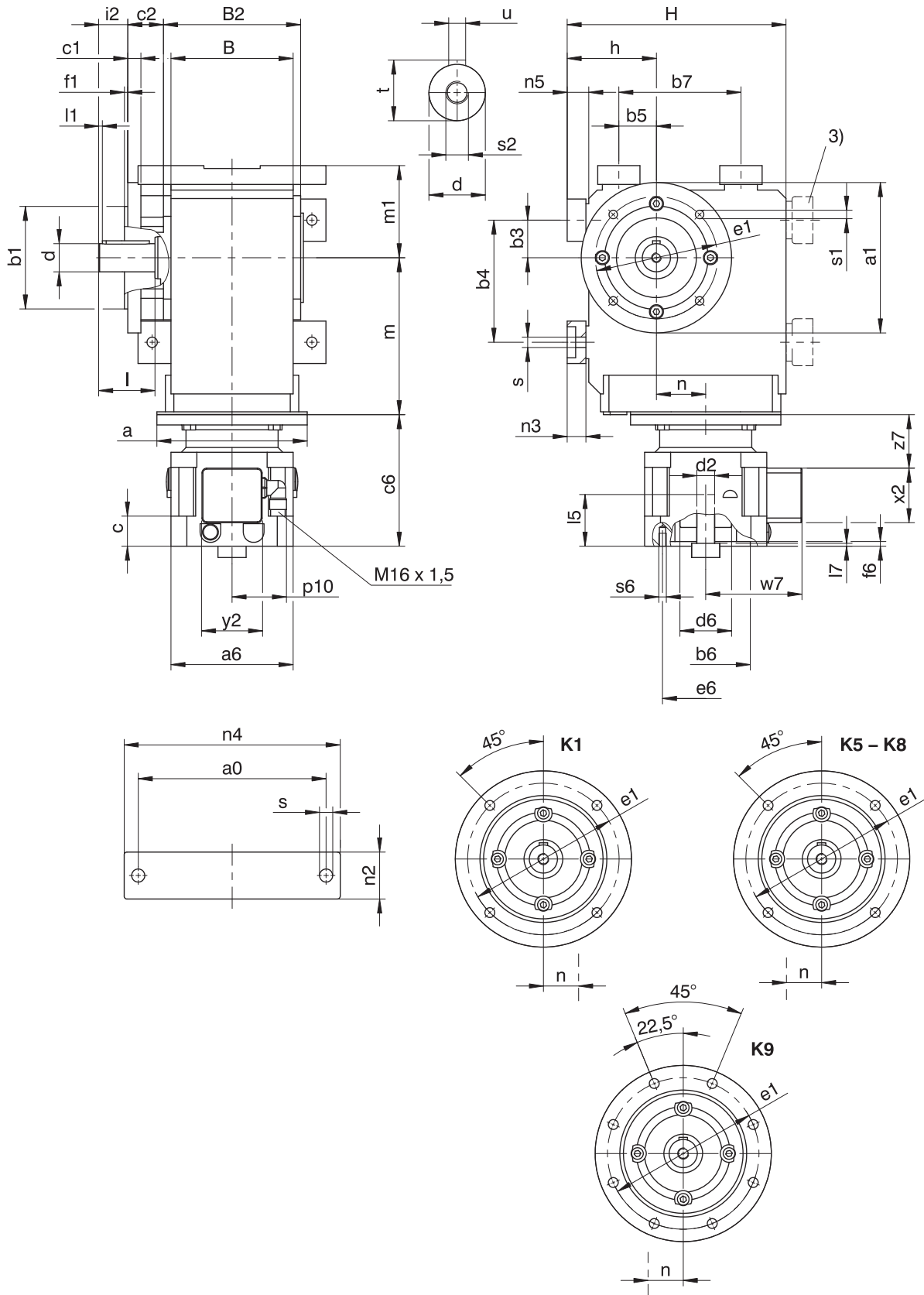
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOEGER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

10.3.14 V shaft design (solid shaft), NF housing design (foot + round flange)



3) Only for K1 (other sizes on request)

- K1 - K10: Solid shaft on both sides available.

- K1 - K4: Solid shaft without feather key available, on request starting at K5.



## Dimensions of gear units

Type	a0	Øa1	Øb1	b3	b4	b5	b7	B	B2	c1	c2	Ød	Øe1	f1	h	H	i2	l	l1	m1	n2	n3	n4	n5	Øs	Øs1	s2	t	u
K1	115	160	110 <sub>f6</sub>	30	90	30	90	90	106	10	32.0	25 <sub>k6</sub>	130	3.5	75	175	30.0	50	4	75	30	13	140	15	9.0	9	M10	28.0	A8×7×40
K5	200	250	180 <sub>f6</sub>	40	140	100	140	160	185	15	39.5	45 <sub>k6</sub>	215	4.0	190	290	90.0	90	4	130	60	27	240	30	18.0	14	M16	48.5	A14×9×80
K6	210	300	230 <sub>f6</sub>	50	160	110	160	168	200	17	36.0	50 <sub>k6</sub>	265	4.0	220	340	100.0	100	4	150	65	27	250	30	18.5	14	M16	53.5	A14×9×90
K7	241	350	250 <sub>h6</sub>	55	180	125	180	190	226	18	44.0	60 <sub>m6</sub>	300	5.0	250	380	120.0	120	4	163	70	35	290	38	23.0	18	M20	64.0	A18×11×110
K8	300	400	300 <sub>h6</sub>	75	240	165	240	235	282	20	45.0	70 <sub>m6</sub>	350	5.0	310	455	140.0	140	5	190	85	41	360	45	27.0	18	M20	74.5	A20×12×125
K9	360	450	350 <sub>h6</sub>	95	280	185	280	285	330	23	50.0	90 <sub>m6</sub>	400	5.0	365	545	170.0	170	8	230	95	46	430	50	31.0	18	M24	95.0	A25×14×140

## Dimensions of additional round flanges

Type	Øa1	Øb1	c1	c2	Øe1	f1	Øs1
K1	140	95 <sub>f6</sub>	10	32	115	3	9
K8	350	250 <sub>h6</sub>	18	45	300	5	18
K8	450	350 <sub>h6</sub>	20	45	400	5	18

Type	MB23			MB33			MB43		
	a	m	n	a	m	n	a	m	n
K102	Ø160	128	36.0	–	–	–	–	–	–
K513	Ø160	172	15.0	Ø200	174	15.0	Ø250	177	15.0
K613	Ø160	191	18.0	Ø200	193	18.0	Ø250	196	18.0
K713	–	–	–	Ø200	221	20.0	Ø250	224	20.0
K813	–	–	–	Ø200	247	24.0	Ø250	249	24.0
K913	–	–	–	–	–	–	Ø250	294	25.0

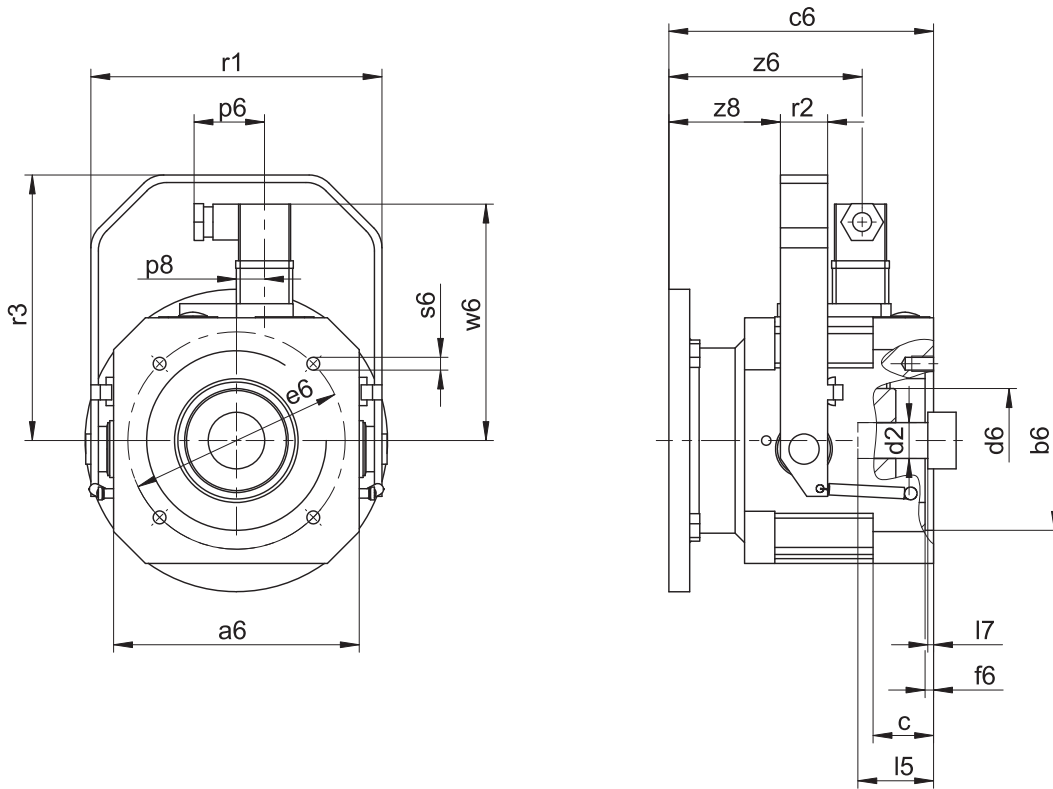
## Example dimensions for the motor connection

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p10	s6	w7	x2	y2	z7
K_MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	59	M8	102.9	58	64	57.5
K_MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	59	M10	115.4	58	64	71.0
K_MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5
K_MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	59	M12	134.9	58	64	93.5

In the table above, you will find example motor connection dimensions for the MB motor adapter. **Note that when dimension c is lengthened (depending on the motor used), dimensions c6 and l5 are also lengthened accordingly.**

You will find additional motor connection dimensions for the MB motor adapter in our STOBBER Configurator at <https://configurator.stoeber.de/en-US/>. Here, you can directly download a 3D model of your drive.

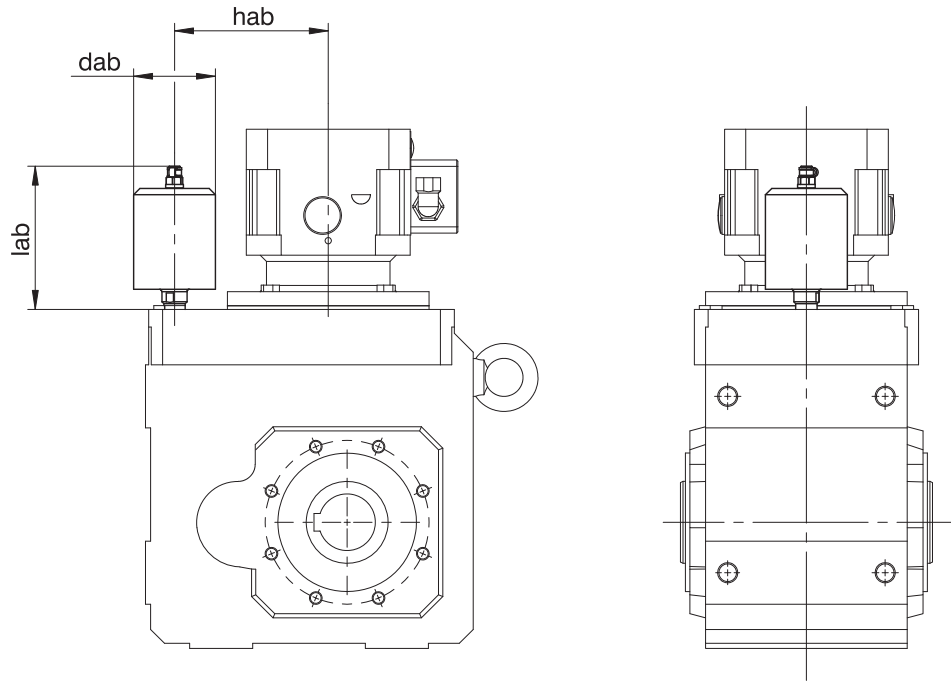
### 10.3.15 Motor adapter design with plug connector and manual release



**Dimensions**

Type	Øb6	Øe6	Ød2max	l5	□a6	c	c6	Ød6	f6	l7	p6	p8	r1	r2	r3	s6	w6	z6	z8
MB23	95 <sup>F8</sup>	115	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	95 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB23	110 <sup>F8</sup>	130	24	72	130	32.0	140	55	4.5	19	37.25	14.825	154	25	140.5	M8	122.4	102.2	59.0
MB33	110 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB33	130 <sup>F8</sup>	165	32	81	155	39.0	161	65	4.5	20	37.25	14.825	179	25	165.5	M10	136.4	113.7	72.5
MB43	130 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5
MB43	180 <sup>F8</sup>	215	38	96	194	47.5	194	80	5.0	16	37.25	14.825	222	30	195.5	M12	156.4	138.2	93.5

### 10.3.16 Oil expansion tank



**Dimensions**

Type	MB23			MB33			MB43		
	dab	hab	lab	dab	hab	lab	dab	hab	lab
K513	65	122.0	113.5	65	130.0	165.0	65	167.0	165.0
K613	65	148.5	116.5	65	148.5	116.5	65	198.5	165.0
K713	-	-	-	65	170.0	114.5	65	170.0	115.5
K813	-	-	-	73	205.0	129.5	73	205.0	129.5
K913	-	-	-	-	-	-	73	255.0	129.5

More information can be found in the chapter [▶ 10.6.5](#)

## 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.

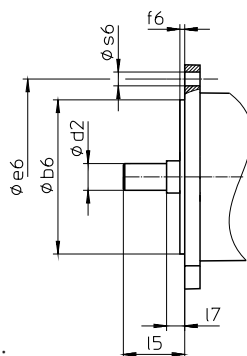
### Example code

K	9	1	3	A	G	0320	MB	4	3
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### Explanation

Code	Designation	Design
K	Type	Helical bevel gear unit
9	Size	9 (example)
0	Generation	Generation 0
1		Generation 1
2	Stages	Two-stage
3		Three-stage
A	Shaft	Hollow shaft with keyway
S		Hollow shaft with shrink ring
V		Solid shaft
G	Housing	Pitch circle diameter
F		Round flange
NG		Foot + pitch circle diameter
NF		Foot + round flange
GD		Pitch circle diameter + torque arm bracket
NGD		Foot + pitch circle diameter + torque arm bracket
0320	Transmission ratio (i x 10)	i = 32 (example)
MB	Motor adapter	ServoStop motor adapter with brake
4	Size	4 (example)
3	Generation	Generation 3

To complete the type designation, also specify the following in your order:



- Motor type or motor dimensions:
 

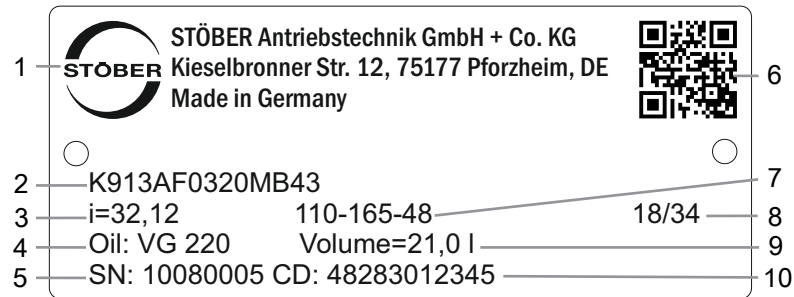
To choose a suitable motor connection, use the STOBBER Configurator at <https://configurator.stoeber.de/en-US/> and choose your motor or the dimensions of the motor connection.
- Mounting position, see the chapter [▶ 10.5.6]
- Attachment of solid shaft: gear unit side 3 or 4; solid shaft on both sides
- Attachment of hollow shaft with keyway: entry side 3 or 4
- Attachment of hollow shaft with shrink ring: shrink ring on gear unit side 3 or 4
- Attachment of foot plates: gear unit side 1 or 5
- Attachment of flange: gear unit side 3 or 4
- Pitch circle diameter: gear unit side 3 or 4
- Attachment of torque arm bracket: torque arm bracket on gear unit side 1 or 5, eye on gear unit side 3 or 4
- Oil expansion tank (recommended for gear units in mounting position EL5), see the chapter [▶ 10.6.5]
- Backlash: Standard/class II/class I. Backlash class II and class I for an additional charge.
- Standard or reinforced output bearing
- Braking torque  $M_{1Bstat}$  of the motor adapter in Nm, see the chapter [▶ 10.5.2.5]

- Electrical connection using terminal boxes or plug connectors, see the chapter [▶ 10.5.2.3]
- Position of the terminal box/plug connector, see the chapter [▶ 10.5.8]
- Manual release (optional), see the chapter [▶ 10.3.15]
- Nominal voltage of brake  $U_{N,B}$  24 V or 104 V, see the chapter [▶ 10.5.2.6]

An explanation of the gear unit sides can be found in the chapter [▶ 10.5.6].

## 10.4.1 Nameplate

An example gear unit nameplate is explained in the figure below.



Code	Designation
1	Name of manufacturer
2	Type designation
3	Gear ratio of the gear unit
4	Lubricant specification
5	Serial number of the gear unit
6	QR code (link to product information)
7	Dimensions of the motor adapter (pilot/bolt circle/motor shaft diameter)
8	Date of manufacture (year/calendar week)
9	Lubricant fill volume
10	Customer-specific data

## 10.5 Product description

### 10.5.1 Input options

MB motor adapter with brake for attaching synchronous servo motors



Catalog ID 443234\_en

ME motor adapter for attaching synchronous servo motors



Catalog ID 443054\_en

MR motor adapter for attaching asynchronous motors



On request

EZ synchronous servo motor



Catalog ID 442437\_en

MB motor adapter + EZ synchronous servo motor



Catalog ID 443311\_en

LM Lean motor



Catalog ID 443016\_en

The corresponding catalogs can be found at <http://www.stoeber.de/en/downloads/>

Enter the ID of the catalog in the Search term field.

### 10.5.2 ServoStop motor adapter with brake (MB)

In this chapter, you will find the description and technical data of the motor adapter with brake.

#### 10.5.2.1 Properties

- Electrically actuated spring-loaded brake for dry running
- Featuring backlash-free plug-in coupling (jaw coupling) for easy removal of the motor with the axis braked in any position
- Electrical release monitoring in the terminal box of the motor adapter
- Manual monitoring of wear via air gap checks with a feeler gauge
- As a single brake or together with the motor brake as a redundant brake system
- Manual release (optional)
- Radial shaft seal rings made of FKM with two sealing lips
- Four oil drain holes to protect the brake from oiling up in case of leakage
- Fast and easy motor attachment

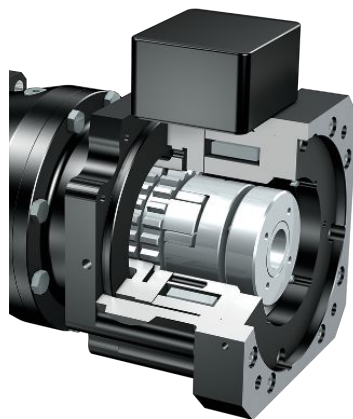


Fig. 1: Motor adapter with ServoStop brake

### 10.5.2.2 Brake

A quiescent current brake is integrated into the motor adapter. It has the function of a holding brake. Braking from full speed, e.g. in case of a voltage drop or an emergency off in hazard situations, is still possible.

The brake can be used as a single brake or together with the motor brake as a redundant brake system.

#### Function

The brakes installed in the motor adapter are electrically actuated spring-loaded brakes for dry running. In the de-energized state, braking takes place using spring force. The brake is released by an electromagnetic DC coil before the motor is switched on. The switch-on time  $t_{2B}$  (release time) is the time until the anchor plate releases from the axially moving brake disc and is magnetically held to the coil body. In this state, the brake is released and the coupling hub can rotate. In order to switch off (motor and brake), the residual magnetic flux of the iron parts (anchor and coil body) must be reduced; the associated time  $t_{11B}$  until the start of torque generation is defined as a response delay when linking. The link time  $t_{1B}$  is the time until the braking torque has built up to the nominal braking torque.

#### Manual release

Optionally, the brake can be equipped with a manual release.

Pressing the manual release deactivates the electronic actuation of the brake. Before pressing the manual release, you must establish the safety of the machine (e.g. protection against falling).

### 10.5.2.3 Electrical connection

- Terminal box (standard)
- Plug connector (optional, not possible in combination with release monitoring)

### 10.5.2.4 Monitoring

For monitoring the brake system, there are generally two options:

- Manual monitoring of wear via air gap checks with a feeler gauge
- Electrical release monitoring in the terminal box with a non-contact and wear-free proximity switch

### 10.5.2.5 Brake technical data

Technical data for operation at 24 V DC ( $\pm 10\%$ )

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{2B}$ [ms]	$P_{N,B}$ [W]
MB23	8.0	6.3	8.5	32.0	65	55	30
MB23	12	6.3	8.5	32.0	55	80	30
MB33	16	26	14	26.0	150	60	37
MB33	24	26	14	26.0	120	85	37
MB33	32	26	14	26.0	95	100	37
MB33	45	26	14	26.0	80	120	37
MB43	50	69	26	19.0	150	100	55
MB43	72	69	26	19.0	120	150	55
MB43	100	69	26	19.0	90	200	55
MB53	200	236	61	17.0	200	250	86

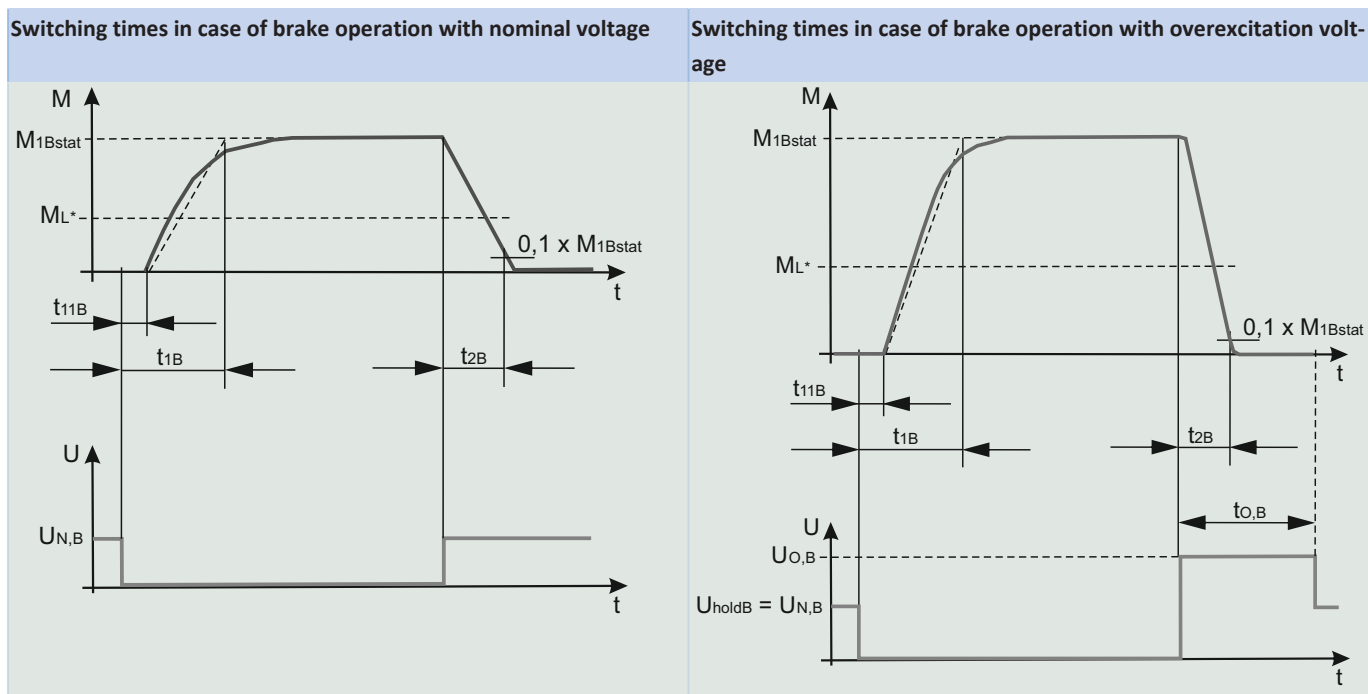
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

Technical data for operation with high-speed rectifier 104 V DC (supply voltage  $U_{LINE}$  220 – 275 V AC  $\pm$  5%, 50/60 Hz)

Type	$M_{1Bstat}$ [Nm]	$J_1$ [kgcm <sup>2</sup> ]	$m$ [kg]	$\Delta\phi_B$ [arcmin]	$t_{1B,DC}$ [ms]	$t_{1B,AC}$ [ms]	$t_{2B}$ [ms]	$P_{O,B}$ [W]	$P_{holdB}$ [W]
MB23	8.0	6.3	8.5	32.0	65	360	20	101	26
MB23	12	6.3	8.5	32.0	55	280	25	101	26
MB23	16	6.3	8.5	32.0	50	230	35	101	26
MB23	24	6.3	8.5	32.0	45	180	50	101	26
MB23	30	6.3	8.5	32.0	40	160	60	101	26
MB33	16	26	14	26.0	150	800	25	125	32
MB33	24	26	14	26.0	120	650	35	125	32
MB33	32	26	14	26.0	95	500	40	125	32
MB33	45	26	14	26.0	80	400	50	125	32
MB33	90	26	14	26.0	50	250	90	125	32
MB43	50	69	26	19.0	150	900	50	148	38
MB43	72	69	26	19.0	120	700	75	148	38
MB43	100	69	26	19.0	90	500	100	148	38
MB43	160	69	26	19.0	60	300	150	148	38
MB53	200	236	61	17.0	200	800	110	200	50
MB53	300	236	61	17.0	170	600	150	200	50
MB53	400	236	61	17.0	120	400	200	200	50

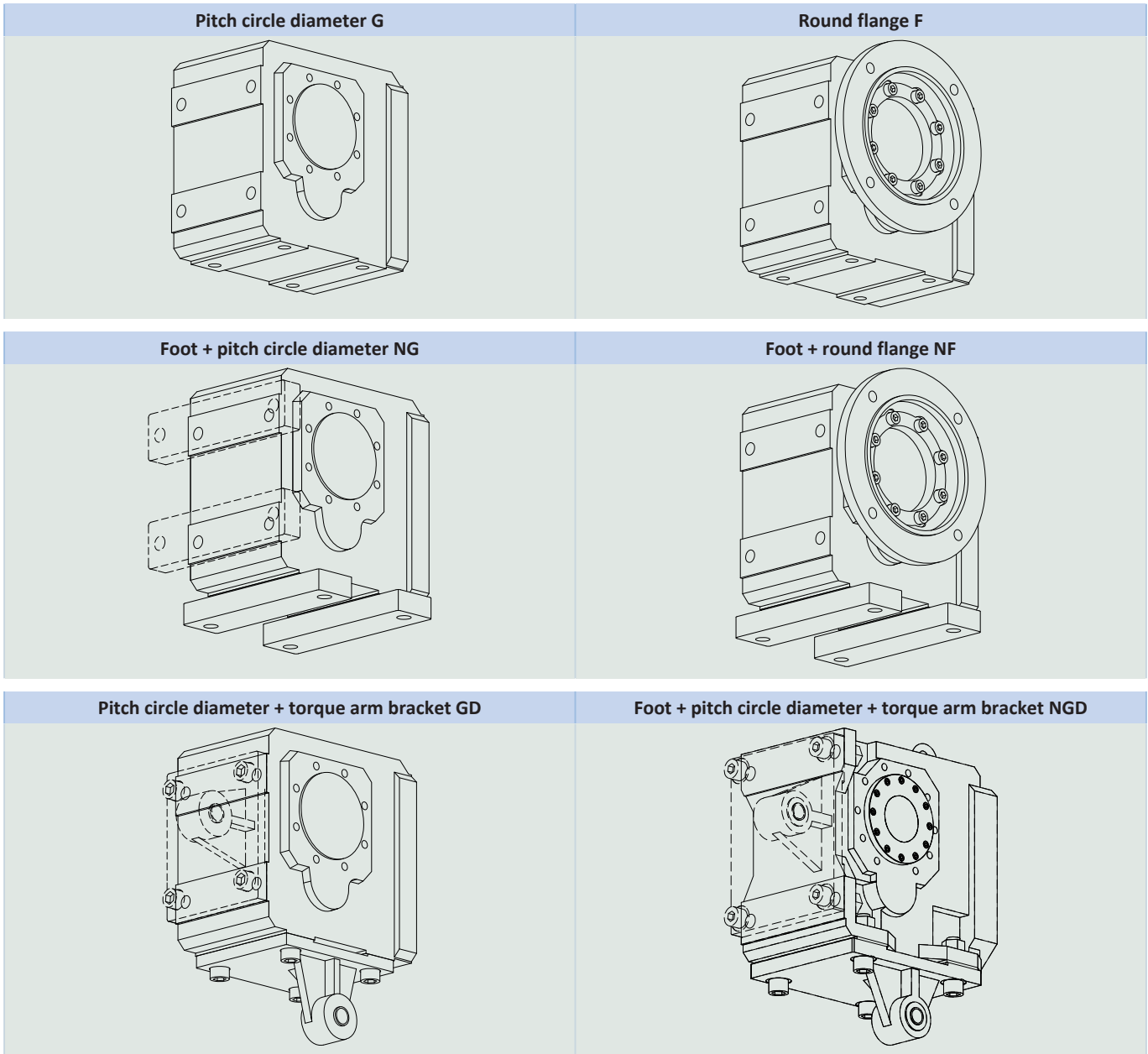
$\Delta\phi_B$ : With the brake closed, a higher total backlash results ( $\Delta\phi_{tot} = \Delta\phi_2 + \Delta\phi_B / i$ ).

10.5.2.6 Brake switching times





### 10.5.3 Housing design



	G	F	NG	NF	GD	NGD
K1	✓	✓	✓	✓	✓	-
K2	✓	✓	✓	-	✓	-
K3	✓	✓	✓	-	✓	-
K4	✓	✓	✓	-	✓	-
K5	✓	✓	✓	✓	✓	-
K6	✓	✓	✓	✓	✓	-
K7	✓	✓	✓	✓	✓	-
K8	✓	✓	✓	✓	✓	-
K9	✓	✓	✓	✓	✓	-
K10	-	-	✓	✓	-	✓

## 10.5.4 Combinatorial shaft/housing design

Shaft design	Housing design						
	Code	G	F	NG	NF	GD	NGD
Hollow shaft with keyway	A	AG	AF	ANG	ANF	AGD	ANGD
Hollow shaft with shrink ring	S	SG	SF	SNG	SNF	SGD	SNGD
Solid shaft <sup>1)</sup>	V	VG	VF	VNG	VNF	–	–

<sup>1)</sup> Gear units in sizes K1 – K10 come with a solid shaft with feather key as standard. Gear units in sizes K1 – K4 can be ordered with the option of a solid shaft without feather key. Only upon request starting at size K5.

## 10.5.5 Installation conditions

### Hollow shaft

The hollow shaft hole tolerance is ISO H7. The tolerance of the machine shaft must be ISO k6.

Take care to align the machine shaft with the gear unit hollow shaft when attaching the gear unit.

Maximum deviation  $\leq 0.03$  mm.

For simpler assembly and disassembly of the machine shaft, the hollow shafts are equipped with a spiral groove (as a grease deposit).

A hardened, threaded keeper plate is included in the scope of delivery. You also have the option to order the hollow shaft without a keeper plate.

### Hollow shaft with shrink ring

The tolerance of the hollow shaft hole is ISO H7.

The machine shaft must be executed as follows:

Gear unit type	Tolerance
K1 to K6	ISO h9
K7 to K10	ISO h6

Select a material for the machine shaft with a permitted surface pressure of  $p \geq 325$  N/mm<sup>2</sup>.

Possible materials:

- C45E +QT
- 42CrMo4

### Fastening the gear units on the machine side using the pitch circle diameter

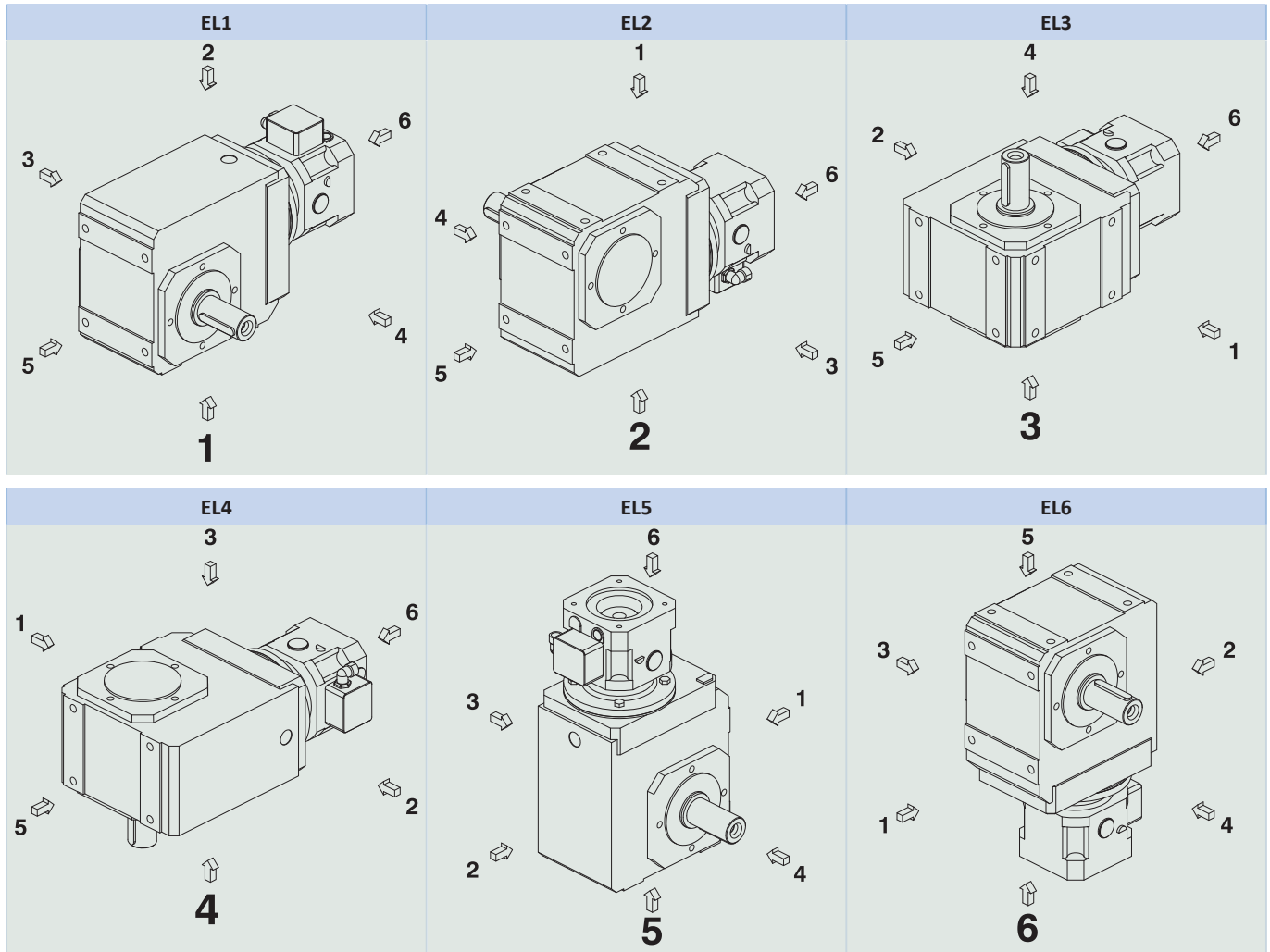
The specified torques and forces only apply when gear units are fastened on the machine side using screws of strength class 10.9. In addition, the gear housings must be adjusted at the pilot. The machine-side fit must be H7.

## 10.5.6 Mounting positions

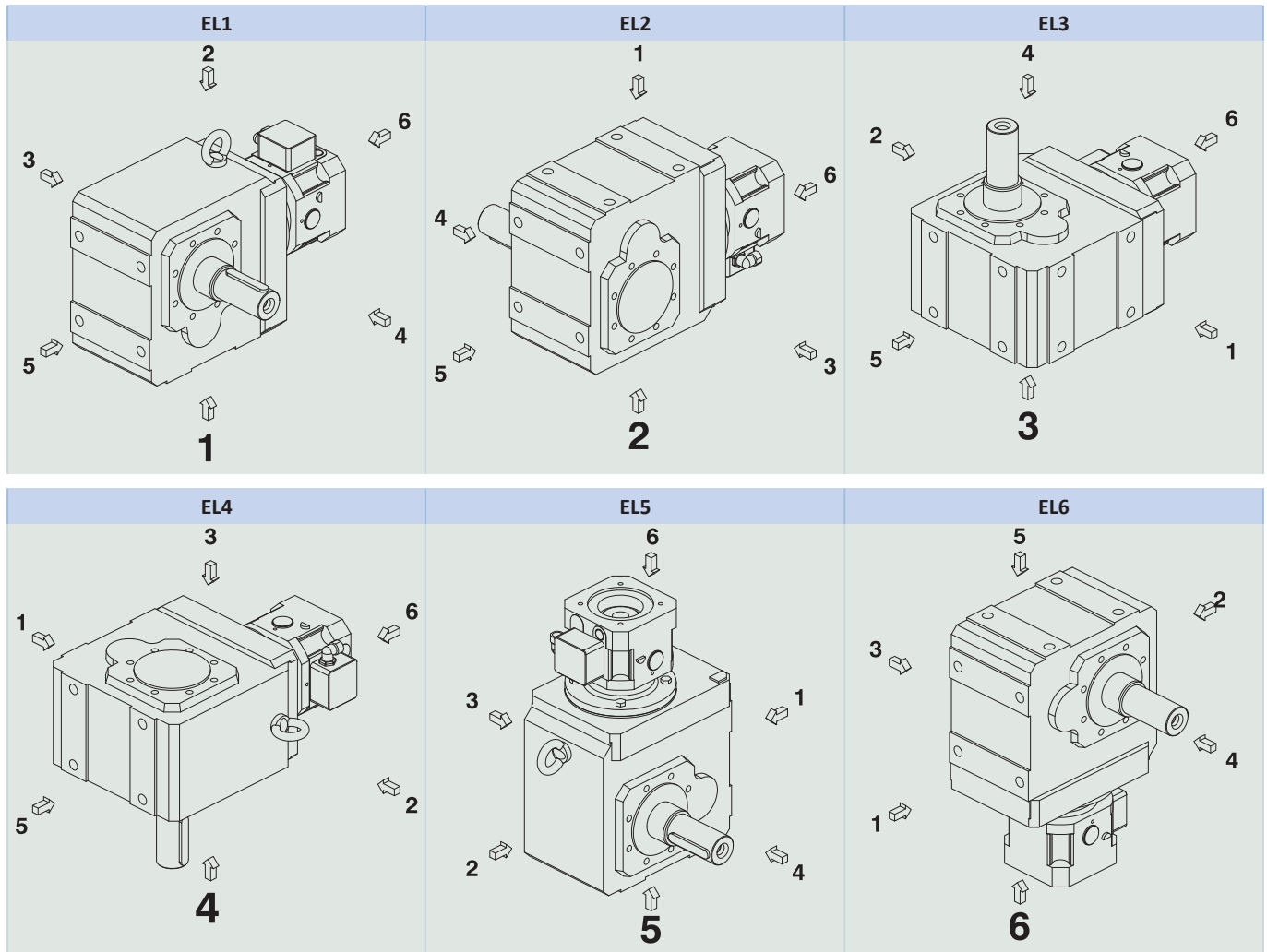
The following table shows the standard mounting positions.

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

Mounting positions for gear unit sizes K1 – K4



Mounting positions for gear unit sizes K5 – K10



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

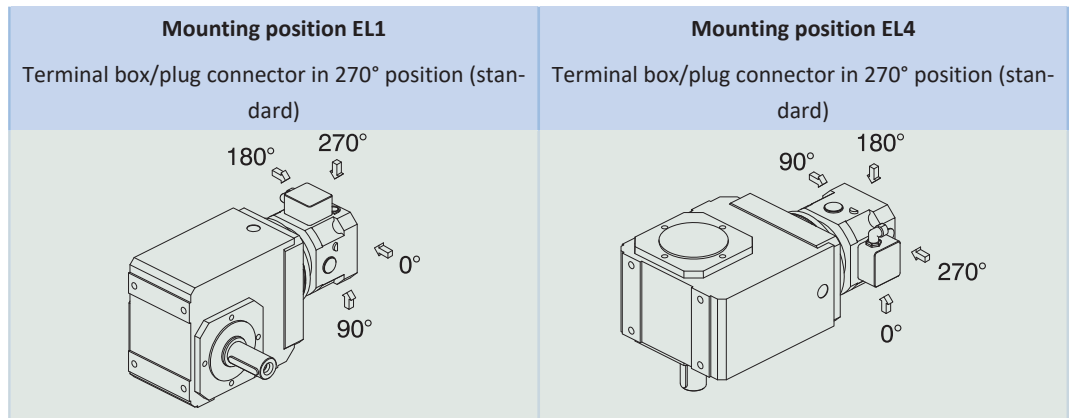
### 10.5.7 Lubricants

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 mounting position.

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

You will receive lubricants for use in the food industry upon request.

## 10.5.8 Position of the terminal box/plug connector



Indicate variations for your gear unit in the order.

Note that the terminal box/plug connector position rotates along with the gear unit if the geared motor is in another mounting position.

## 10.5.9 Other product features

Feature	Value
Max. permitted gear unit temperature (on the surface of the gear unit)	≤ 80 °C
Paint	Black RAL 9005
Explosion-proof design in accordance with (ATEX) Directive 2014/34/EU (optional)	Not available
<b>Efficiency:</b>	
$\eta_{\text{get}}$ two-stage	97%
$\eta_{\text{get}}$ three-stage	96%
$\eta_{\text{get}}$ four-stage	94%
Protection class: <sup>1</sup>	IP65

## 10.5.10 Maintenance

The instructions for maintenance can be found in the operating manual, ID 443027\_en, at <http://www.stoeber.de/en/downloads/>. Enter the ID of the documentation in the Search... field.

### Ventilation

Air release valves are fitted as a standard feature and independently of installation position for gear unit sizes K5 to K10.

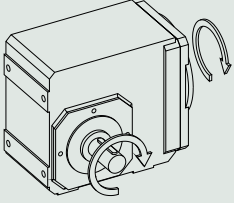
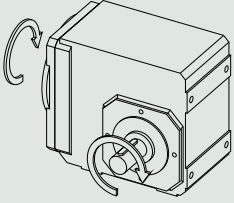
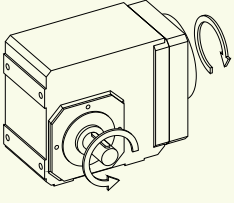
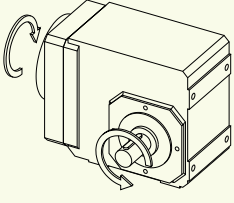
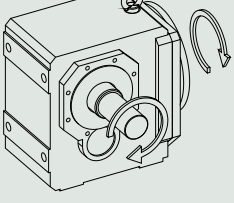
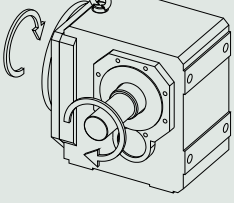
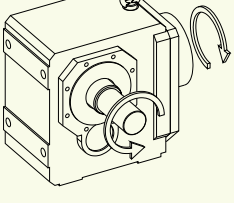
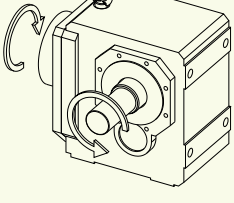
For the position and dimensions of the air release valve, refer to the 3D model.

Download the 3D model at <https://configurator.stoeber.de/en-US/>.

<sup>1</sup> Observe the protection class of all the components.

### 10.5.11 Direction of rotation

Solid shaft (V), solid shaft on both sides (V), hollow shaft with keyway (A)

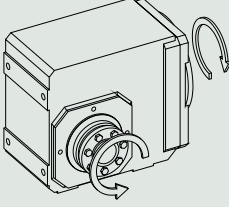
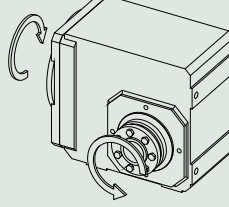
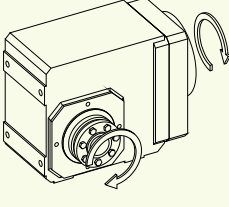
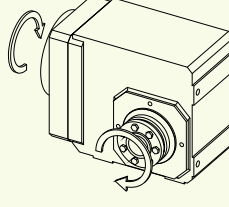
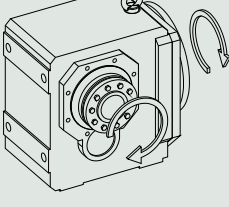
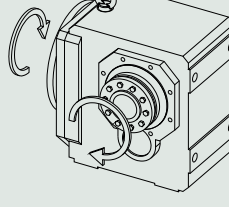
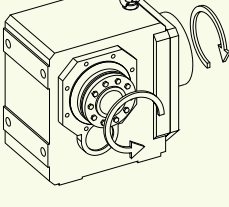
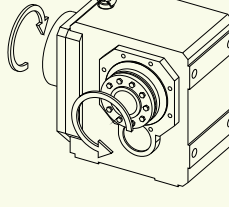
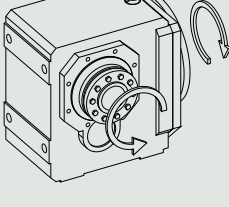
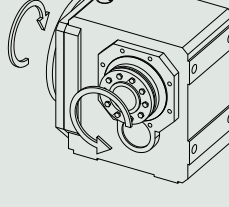
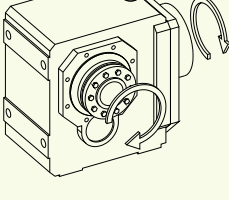
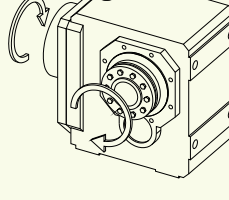
Type	Output side 4	Output side 3
K102 – K402		
K203 – K403		
K513 – K1013		
K514 – K1014		

The specified directions of rotation also apply to gear units with hollow shaft (A) if the entry side of the machine shaft corresponds to the side of the solid shaft that is shown.

The direction of rotation for the shaft design of a solid shaft on both sides corresponds to the direction of rotation for output side 4.

The pictures show mounting position EL1.

## Hollow shaft with shrink ring (S)

Type	Shrink ring side 4	Shrink ring side 3
K102 – K402		
K203 – K403		
K513 – K813		
K514 – K814		
K913 – K1013		
K914 – K1014		

The pictures show mounting position EL1.

## 10.6 Project configuration

Project your drives using our SERVOnsoft designing software. Download SERVOnsoft for free at <https://www.stoeber.de/en/ServoSoft>.

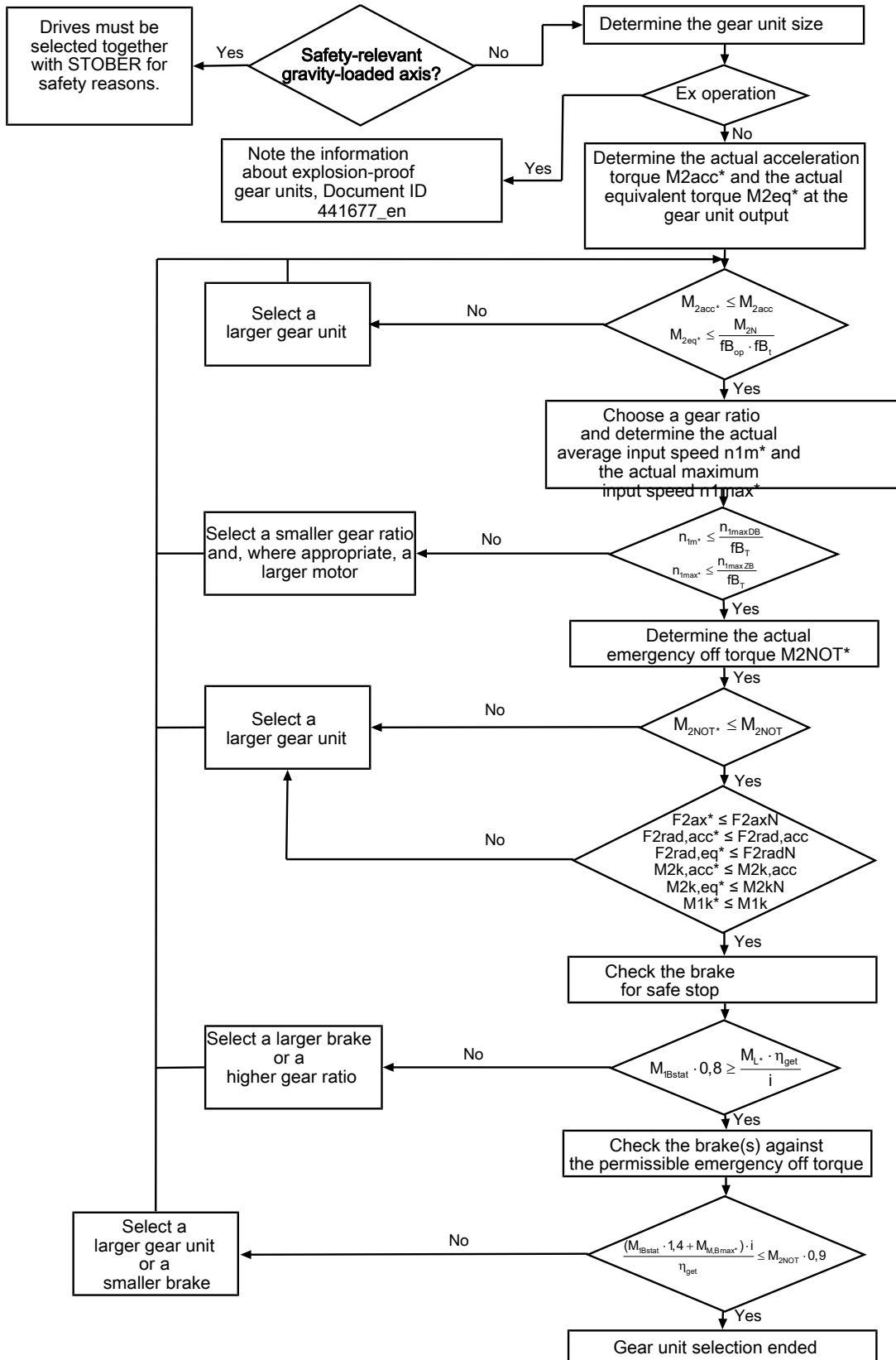
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in the chapter Formula symbols.

### 10.6.1 Drive selection

The formula symbols for values actually present in the application are marked with \*.



Calculate the forces and tilting torques in the chapter Permitted shaft loads.

Refer to the selection tables for the values for  $\eta_{get}$ ,  $i$ ,  $n_{1maxDB}$ ,  $n_{1maxZB}$ ,  $M_{1Bstat}$ ,  $M_{2acc}$ ,  $M_{2NOT}$  and  $M_{2N}$ .

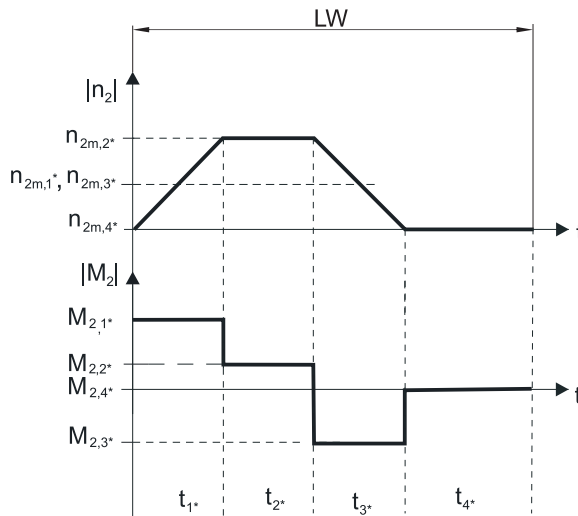
The values for the available maximum motor brake torque  $M_{1Bmax}$  can be found in the manufacturer catalog.

The values for  $fb_T$ ,  $fb_{op}$  and  $fb_t$  can be found in the corresponding tables in this chapter.



**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 maximum acceleration torque**

$$M_{2acc^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**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  $t_{1^*} + \dots + t_{3^*} \geq 6$  min, calculate  $n_{2m^*}$  without the rest phase  $t_{4^*}$ .

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

**Calculation of the actual emergency-off torque**

$$M_{2NOT^*} = J_{tot} \cdot \frac{\Delta n_2}{9.55 \cdot \Delta t} + M_{L^*}$$

**Calculation of the actual equivalent torque**

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

**Operating factors**

Operating mode	$fB_{op}$
Uniform continuous operation	1.00
Cyclic operation	1.25
Reversing load cyclic operation	1.40
Run time	$fB_t$
Daily runtime $\leq 8$ h	1.00
Daily runtime $\leq 16$ h	1.15
Daily runtime $\leq 24$ h	1.20

Temperature		$f_{B_T}$
<b>Motor cooling</b>	<b>Surrounding temperature</b>	
Motor with forced ventilation	$\leq 20\text{ °C}$	0.9
	$\leq 30\text{ °C}$	1.0
	$\leq 40\text{ °C}$	1.15
Motor with convection cooling	$\leq 20\text{ °C}$	1.0
	$\leq 30\text{ °C}$	1.1
	$\leq 40\text{ °C}$	1.25

**Notes**

- The maximum permitted gear unit temperature of  $\leq 80\text{ °C}$  must not be exceeded. Doing so may result in damage to the gear unit.

## 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  $n_{2m^*} \leq 20\text{ rpm}$  ( $F_{2axN} = F_{2ax20}$ ;  $F_{2radN} = F_{2rad20}$ ;  $M_{2kN} = M_{2k20}$ )
- Only if radial forces on the gear unit are stabilized by its pilots for the pitch circle diameter and flange housing design

### 10.6.2.1 V shaft design

**Permitted shaft loads for V shaft design (solid shaft)**

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
K1	40.0	1900	5000	5000	325	325
K2	42.0	2100	6000	6000	430	430
K3	45.0	2400	7000	7000	525	525
K4	52.0	3500	11200	11200	1050	1050
K5	72.0	3500	13450	13450	1580	1580
K6	72.0	4000	16000	16000	1960	1960
K7	85.0	5500	22000	22000	3200	3200
K8	60.0	7250	29000	29000	3800	3800
K9	87.0	16500	65000	65000	11200	11200
K10	84.0	25000	80000	80000	15200	15200

Reduced values apply in the case of a V shaft design (solid shaft) in conjunction with an NF housing design (foot + round flange):

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
K10	132.0	25000	64000	64000	15200	15200

For the V solid shaft design on both sides, the values for  $F_{2rad20}$  and  $M_{2k20}$  must be multiplied by a factor of 0.7.

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

The following applies to output speeds  $n_{2m^*} > 20\text{ rpm}$ :

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}} \quad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}} \quad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m^*}}{20\text{ rpm}}}}$$

The values for  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  can be found in the table "Permitted shaft loads" in this chapter.

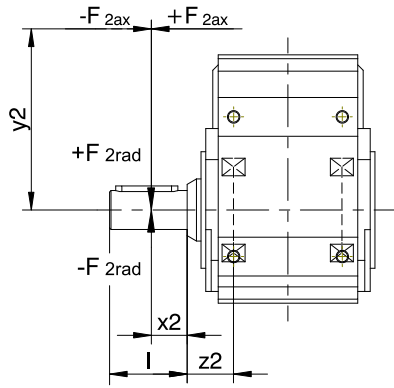


Fig. 2: Force application points for solid shaft

The specified values for  $F_{2rad20}$  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:

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

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  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  by a factor of two.

Also note the calculation for equivalent values:

$$M_{2k,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |M_{2k,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |M_{2k,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1}| \cdot t_1 \cdot |F_{2rad,acc,1}|^3 + \dots + |n_{2m,n}| \cdot t_n \cdot |F_{2rad,acc,n}|^3}{|n_{2m,1}| \cdot t_1 + \dots + |n_{2m,n}| \cdot t_n}}$$

### 10.6.2.2 A and S shaft design

Permitted shaft loads for A shaft design (hollow shaft with keyway)

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
K1	40.0	1900	5000	5000	240	240
K2	42.0	2100	6000	6000	310	310
K3	45.0	2400	7000	7000	380	380
K4	52.0	3500	11200	11200	740	740
K5	39.0	2500	13450	13450	1000	1000
K6	42.0	3000	16000	16000	1300	1300
K7	45.0	4100	22000	22000	2100	2100
K8	50.0	5300	29000	29000	2600	2600
K9	56.0	7000	65000	65000	3600	3600
K10	56.0	9000	80000	80000	5000	5000

Permitted shaft loads for S shaft design (hollow shaft with shrink ring)

Type	$z_2$ [mm]	$F_{2ax20}$ [N]	$F_{2rad20}$ [N]	$F_{2rad,acc}$ [N]	$M_{2k20}$ [Nm]	$M_{2k,acc}$ [Nm]
K1	40.0	1900	5000	5000	240	240
K2	42.0	2100	6000	6000	310	310
K3	45.0	2400	7000	7000	380	380
K4	52.0	3500	11200	11200	740	740
K5	39.0	2500	13450	13450	1000	1000
K6	42.0	3000	16000	16000	1300	1300
K7	45.0	4100	22000	22000	2100	2100
K8	50.0	5300	29000	29000	2600	2600
K9	56.0	7000	65000	65000	3600	3600
K10	56.0	9000	80000	80000	5000	5000

For other output speeds, download diagrams at <https://configurator.stoeber.de/en-US/>.

The following applies to output speeds  $n_{2m^*} > 20$  rpm:

$$F_{2axN} = \frac{F_{2ax20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}} \quad F_{2radN} = \frac{F_{2rad20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}} \quad M_{2kN} = \frac{M_{2k20}}{\sqrt[3]{\frac{n_{2m^*}}{20 \text{ rpm}}}}$$

The values for  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  can be found in the table "Permitted shaft loads" in this chapter.

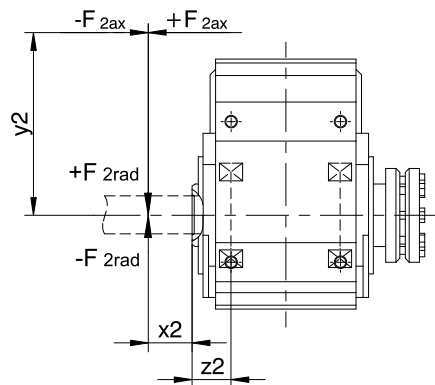


Fig. 3: Force application points for hollow shaft

You can determine the permitted radial forces from the permitted tilting torque  $M_{2kN}$  and  $M_{2k,acc}$ . The actual radial forces may not exceed the permitted radial forces. The permitted radial forces pertain to the shaft end ( $x_2 = 0$ ).

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

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  $F_{2ax20}$ ,  $F_{2rad20}$  and  $M_{2k20}$  by a factor of two.

Also note the calculation for equivalent values:

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

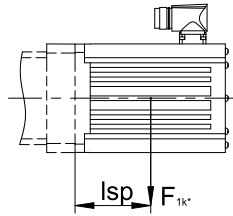
$$F_{2rad,eq} = \sqrt[3]{\frac{|n_{2m,1^*}| \cdot t_{1^*} \cdot |F_{2rad,acc,1^*}|^3 + \dots + |n_{2m,n^*}| \cdot t_{n^*} \cdot |F_{2rad,acc,n^*}|^3}{|n_{2m,1^*}| \cdot t_{1^*} + \dots + |n_{2m,n^*}| \cdot t_{n^*}}}$$

### 10.6.3 Permitted breakdown torques at the gear unit input

For a horizontal mounting position of the motor, verify that the permitted breakdown torque at the gear unit input is not exceeded before installation on a STOEBER gear unit. You can find information for how to do that in this chapter.

Calculate the actual breakdown torque as follows:

$$M_{1k^*} = F_{1k^*} \cdot l_{sp} \leq M_{1k}$$



Type	$M_{1k}$ [Nm]
MB23	45
MB33	90
MB43	200
MB53	450

### 10.6.4 Radial shaft seal rings

#### Leak-proofness

Our gear units are equipped with high-quality radial shaft seal rings and checked for leaks. 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.

### 10.6.5 Oil expansion tank

The gear units have a higher fill level in mounting position EL5. The oil expansion tank prevents oil from escaping out of the gear unit.

#### Notes

- We recommend using an oil expansion tank in mounting position EL5 (additional cost) for fast running gear units with an input speed  $n_1 > 1750$  rpm and gear ratios  $i < 20$ .
- The oil expansion tank can only be used with certain sizes; see the chapter Oil expansion tank

## 10.7 Additional documentation

Additional documentation related to the product can be found at

<http://www.stoeber.de/en/downloads/>

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

Documentation	ID
Operating manual gear units, geared motors K	443364_en
Operating manual for MB23/MB33/MB43/MB53 ServoStop motor adapters with brake	443287_en



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## 12 Appendix

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## 12.1 Formula symbols

The formula symbols for values actually present in the application are marked with \*.

Symbol	Unit	Explanation
$C_2$	Nm/ arcmin	Torsional stiffness relative to the gear unit output for $M_{2acc}$
$\Delta n_2$	rpm	Speed difference at the output
$\Delta\phi_2$	arcmin	Backlash at the output shaft with a blocked input
		Without brake backlash
$\Delta\phi_{2red}$	arcmin	Reduced backlash at the output shaft with a blocked input
		Without brake backlash
$\Delta\phi_{2redI}$	arcmin	Reduced backlash (backlash class I) at the output shaft with a blocked input
		Without brake backlash
$\Delta\phi_{2redII}$	arcmin	Reduced backlash (backlash class II) at the output shaft with a blocked input
		Without brake backlash
$\Delta\phi_B$	arcmin	Brake backlash
$\Delta\phi_{tot}$	arcmin	Total backlash
$\Delta t$	s	Timespan
$d_{MW}$	mm	Motor shaft diameter
$ED_{10}$	%	Duty cycle based on 10 minutes
$\eta_{get}$	%	Efficiency of the gear unit at nominal torque
$F_{1k*}$	N	Static and dynamic loads present in the application from the weight of the motor, mass acceleration and vibrations at the gear unit input
$F_{2ax*}$	N	Actual axial force at the gear unit output
$F_{2ax100}$	N	Permitted axial force at the gear unit output for $n_{2m*} \leq 100$ rpm (without radial force)
$F_{2ax20}$	N	Permitted axial force at the gear unit output for $n_{2m*} \leq 20$ rpm (without radial force)
$F_{2axN}$	N	Permitted nominal axial force at the gear unit output (without radial force)
$F_{2rad*}$	N	Actual radial force on the gear unit output
$F_{2rad,acc}$	N	Permitted radial acceleration force at the gear unit output
$F_{2rad,acc*}$	N	Radial acceleration force present at the gear unit output
$F_{2rad,acc,1*}$	N	Radial acceleration force present at the gear unit output in the first time period
$F_{2rad,acc,n*}$	N	Radial acceleration force present at the gear unit output in the nth time period
$F_{2rad,eq*}$	N	Actual equivalent force at the gear unit output
$F_{2rad100}$	N	Permitted radial force at the gear unit output for $n_{2m*} \leq 100$ rpm
$F_{2rad20}$	N	Permitted radial force on the gear unit output for $n_{2m*} \leq 20$ rpm
$F_{2radN}$	N	Permitted nominal radial force at the gear unit output
$fB_{op}$	–	Operating mode operating factor
$fB_t$	–	Runtime operating factor
$fB_T$	–	Temperature operating factor
$fB_{ZB}$	–	Operating factor for cyclic operation
$i$	–	Gear ratio
$J_1$	kgcm <sup>2</sup>	Mass moment of inertia relative to the gear unit input
$J_{tot}$	kgm <sup>2</sup>	Total mass moment of inertia (based on the motor shaft)
$l$	mm	Length of the output shaft
$L_{10h}$	h	Bearing service life
$L_{pA}$	dBA	Sound pressure level of the gear unit at $n_{1N} = 2000$ rpm
$l_{sp}$	m	Distance between the motor's center of mass and the gear unit input's center of mass
LW	-	Load change: A load change (LW) corresponds to an acceleration and a deceleration.
$m$	kg	Weight (for gear units without lubricant)
$M$	Nm	Torque
$M_{1Bstat}$	Nm	Static braking torque of the brake in the motor adapter (tolerance +40%, -20%)



Symbol	Unit	Explanation
$M_{1k}$	Nm	Permitted tilting torque at the gear unit input
$M_{1k}^*$	Nm	Existing tilting torque on the gear unit input
$ M_2 $	Nm	Absolute value of torque on the output
$M_{2,1}^* - M_{2,4}^*$	Nm	Actual torque in the respective time segment (1 to 4)
$M_{2,n}^*$	Nm	Actual torque in the n-th time segment
$M_{2acc}$	Nm	Maximum permitted acceleration torque on the gear unit output
$M_{2acc}^*$	Nm	Actual acceleration torque on the gear unit output
$M_{2accHT}$	Nm	Maximum permitted acceleration torque on the gear unit output with reduced backlash
$M_{2acc,max}$	Nm	Maximum permitted acceleration torque of a group of gear units of the same size
$M_{2eq}^*$	Nm	Equivalent torque present on the gear unit output
$M_{2k}^*$	Nm	Actual tilting torque on the gear unit output
$M_{2k,acc}$	Nm	Permitted acceleration tilting torque at the gear unit output
$M_{2k,acc}^*$	Nm	Acceleration tilting torque present at the gear unit output
$M_{2k,acc,1}^*$	Nm	Acceleration tilting torque present at the gear unit output in the first time period
$M_{2k,acc,n}^*$	Nm	Acceleration tilting torque present at the gear unit output in the nth time period
$M_{2k,eq}^*$	Nm	Actual equivalent tilting torque on the gear unit output
$M_{2k100}$	Nm	Permitted tilting torque on the gear unit output for $n_{2m}^* \leq 100$ rpm
$M_{2k20}$	Nm	Permitted tilting torque on the gear unit output for $n_{2m}^* \leq 20$ rpm
$M_{2kN}$	Nm	Permitted nominal tilting torque at the gear unit output
$M_{2N}$	Nm	Nominal torque on the gear unit output (relative to $n_{1N} = 1500$ rpm)
$M_{2NOT}$	Nm	Gear unit emergency-off torque on the gear unit output for max. 1000 load changes
$M_{2NOT}^*$	Nm	Actual emergency off torque for the gear unit on the gear unit output
$M_{L^*}$	Nm	Actual load torque
$M_{M,Bmax}$	Nm	Maximum permitted motor torque for the gear unit in a redundant brake system including any tolerances of the braking torque
$M_{M,Bmax}^*$	Nm	Maximum available motor torque for the gear unit in a redundant brake system including any tolerances of the braking torque
$n_{1m}^*$	rpm	Actual average input speed
$n_{1max}^*$	rpm	Actual maximum input speed
$n_{1maxDB}$	min <sup>-1</sup>	Maximum permitted input speed of the gear unit in continuous operation (at surrounding temperature of 20 °C)
$n_{1maxZB}$	min <sup>-1</sup>	Maximum permitted input speed of the gear unit in cyclic operation (at surrounding temperature of 20 °C)
$ n_2 $	rpm	Absolute value of output speed
$n_{2m}^*$	rpm	Actual average output speed
$n_{2m,1}^* - n_{2m,4}^*$	rpm	Actual average output speed in the respective time segment (1 to 4)
$n_{2m,n}^*$	rpm	Actual average output speed in the n-th time segment
$P_{holdB}$	W	Holding capacity of the brake
$P_{N,B}$	W	Nominal power of the brake
$P_{O,B}$	W	Overexcitation output of the brake
$t$	s	Time
$t_{1^*} - t_{4^*}$	s	Duration of the respective time segment (1 to 4)
$t_{11B}$	ms	Response delay: time from when the current is turned off until the torque increases
$t_{1B}$	ms	Linking time: time from when the current is turned off until the nominal braking torque is reached
$t_{1B,AC}$	ms	Linking time: time from when the current is turned off until the nominal braking torque is reached with AC-side switching of the brake rectifier
$t_{1B,DC}$	ms	Linking time: time from when the current is turned off until the nominal braking torque is reached with DC-side switching of the brake rectifier
$t_{2B}$	ms	Disengagement time: time from when the current is turned on until the torque begins to drop
$t_n^*$	s	Duration of the n-th time segment

Symbol	Unit	Explanation
$t_{O,B}$	ms	Overexcitation time of the brake
U	V	Voltage
$U_{holdB}$	V	Withstand voltage of the brake
$U_{LINE}$	V	Supply voltage
$U_{N,B}$	V	Nominal voltage of brake
$U_{O,B}$	V	Overexcitation voltage of the brake
$x_2$	mm	Distance of the shaft shoulder to the force application point
$y_2$	mm	Distance of the shaft axis to the axial force application point
$z_2$	mm	Distance of the shaft shoulder to the middle of the output bearing

## 12.2 Trademarks

The following names are trademarks or registered trademarks of STÖBER:

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## 12.3 Sales terms and delivery conditions

You can find our current sales terms and delivery conditions at <http://www.stoeber.de/en/gtc>.

## 12.4 Legal notice

ServoStop servo gear units with brake catalog ID 443234\_en.

You can find current versions of PDF files online at <http://www.stoeber.de/en/downloads/>.





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