

10.3 Dimensional drawings

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

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

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

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

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

Combination options and the dimensions of forced ventilated geared motors can also be found at <https://configurator.stoeber.de/en-US/>.

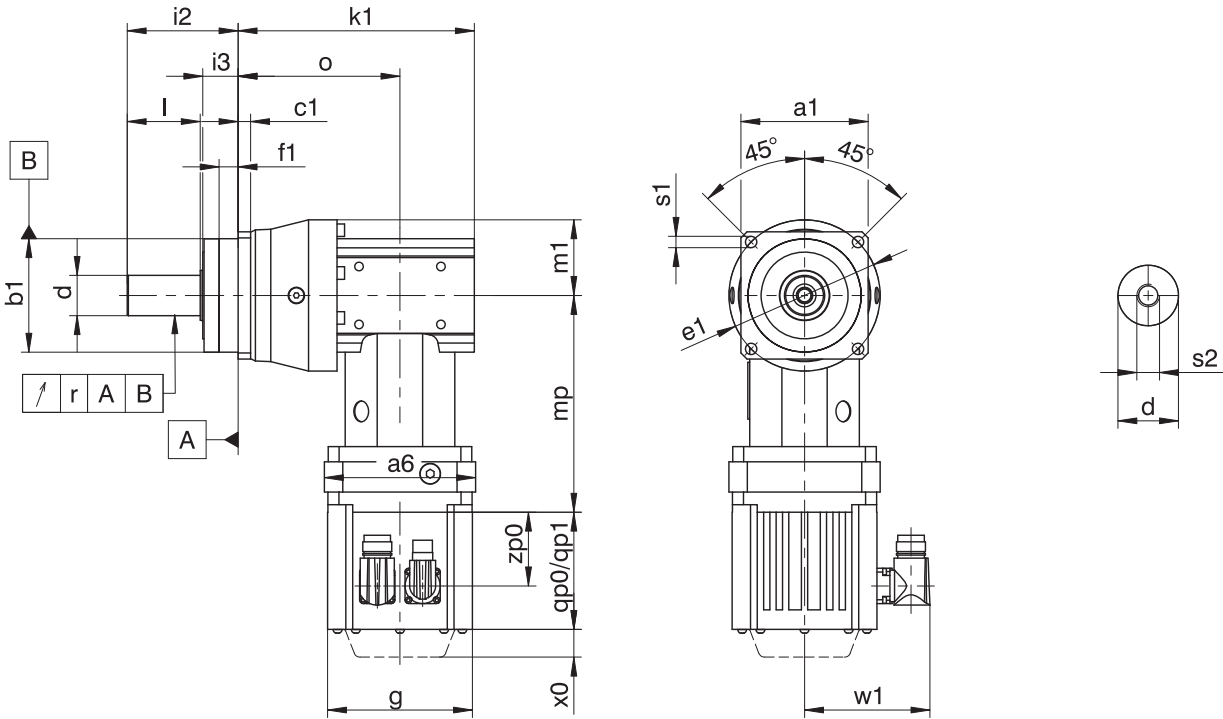
Tolerances

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

10.3.1
G shaft design (solid shaft without feather key)



- qp0

Applies to motors without brake.
- x0

Applies to encoders using an optical measuring method.
- The radial runout specification applies only to the reinforced bearing D.
- qp1

Applies to motors with brake.
- w1

Different for the One Cable Solution (OCS), see the chapter [17.4](#)

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	k1	l	m1	o	r	Øs1	s2
P231_KX301_	55	50 _{h6}	6	12 _{k6}	63	7.0	36	12	124.0	22	31	84.0	–	5.5	M4
P331_KX301_	72	60 _{h6}	7	16 _{k6}	75	7.5	48	18	131.0	28	36	91.0	0.025	5.5	M5
P332_KX301_	72	60 _{h6}	7	16 _{k6}	75	7.5	48	18	165.5	28	38	125.5	0.025	5.5	M5
P431_KX401_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	165.0	36	49	115.0	0.025	6.6	M8
P432_KX301_	76	70 _{h6}	9	22 _{k6}	85	7.5	56	18	180.0	36	50	140.0	0.025	6.6	M8
P531_KX501_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	187.5	58	58	128.5	0.030	9.0	M12
P532_KX401_	101	90 _{h6}	10	32 _{k6}	120	15.0	88	28	207.0	58	60	157.0	0.030	9.0	M12
P731_KX701_	144	130 _{h6}	15	40 _{k6}	165	3.5	112	27	232.5	82	75	158.5	0.035	11.0	M16
P732_KX501_	144	130 _{h6}	15	40 _{k6}	165	3.5	112	27	255.5	82	75	196.5	0.035	11.0	M16
P831_KX701_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	267.0	82	102	193.0	0.035	13.5	M20
P832_KX701_	190	160 _{h6}	15	55 _{k6}	215	10.0	112	27	324.5	82	102	250.5	0.035	13.5	M20
P932_KX701_	212	180 _{h6}	17	75 _{k6}	250	10.0	143	34	388.0	105	115	314.0	0.040	17.5	M20

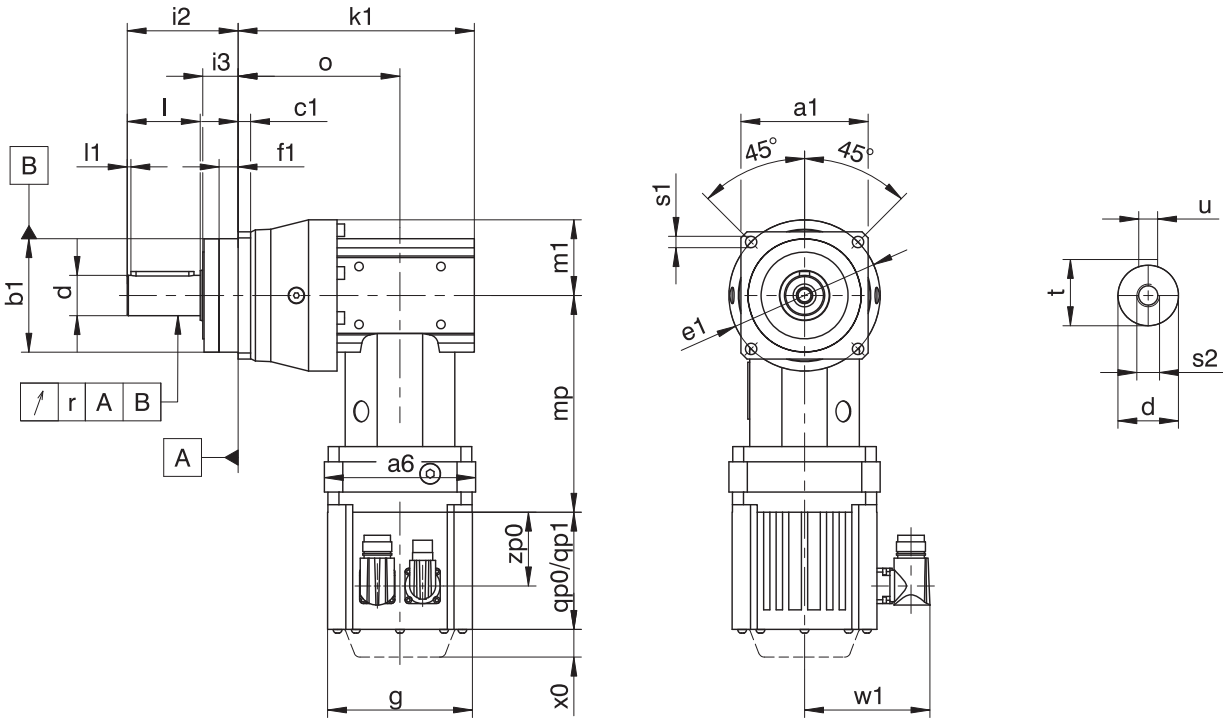
Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
EZ404U	98	173	221.5	91.0	22	131.0
EZ501U	115	93	147.5	100.0	22	58.5
EZ502U	115	118	172.5	100.0	22	83.5
EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
EZ705U	145	207	266.0	134.0	22	165.0
EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	□a6	mp	□a6	mp	□a6	mp	□a6	mp	□a6	mp
P231_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P331_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P332_KX301_	75	139.5	–	–	–	–	–	–	–	–
P431_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P432_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P531_KX501_	–	–	120	176.5	120	172.0	140	183.0	–	–
P532_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P731_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P732_KX501_	–	–	120	176.5	120	172.0	140	183.0	–	–
P831_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P832_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P932_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5

10.3.2 P shaft design (solid shaft with feather key)



- qp0

Applies to motors without brake.
- x0

Applies to encoders using an optical measuring method.
- The radial runout specification applies only to the reinforced bearing D.
- qp1

Applies to motors with brake.
- w1

Different for the One Cable Solution (OCS), see the chapter [17.4](#)

Dimensions of gear units

Type	□a1	Øb1	c1	Ød	Øe1	f1	i2	i3	k1	l	l1	m1	o	r	Øs1	s2	t	u
P231_KX301_	55	50 _{h6}	6	12 _{h6}	63	7.0	36	12	124.0	22	2	31	84.0	–	5.5	M4	13.5	A4×4×18
P331_KX301_	72	60 _{h6}	7	16 _{h6}	75	7.5	48	18	131.0	28	2	36	91.0	0.025	5.5	M5	18.0	A5×5×22
P332_KX301_	72	60 _{h6}	7	16 _{h6}	75	7.5	48	18	165.5	28	2	37.5	125.5	0.025	5.5	M5	18.0	A5×5×22
P431_KX401_	76	70 _{h6}	9	22 _{h6}	85	7.5	56	18	165.0	36	3	49	115.0	0.025	6.6	M8	24.5	A6×6×28
P432_KX301_	76	70 _{h6}	9	22 _{h6}	85	7.5	56	18	180.0	36	3	50	140.0	0.025	6.6	M8	24.5	A6×6×28
P531_KX501_	101	90 _{h6}	10	32 _{h6}	120	15.0	88	28	187.5	58	3	57.5	128.5	0.030	9.0	M12	35.0	A10×8×50
P532_KX401_	101	90 _{h6}	10	32 _{h6}	120	15.0	88	28	207.0	58	3	60	157.0	0.030	9.0	M12	35.0	A10×8×50
P731_KX701_	144	130 _{h6}	15	40 _{h6}	165	3.5	112	27	232.5	82	4	75	158.5	0.035	11.0	M16	43.0	A12×8×70
P732_KX501_	144	130 _{h6}	15	40 _{h6}	165	3.5	112	27	255.5	82	4	75	196.5	0.035	11.0	M16	43.0	A12×8×70
P831_KX701_	190	160 _{h6}	15	55 _{h6}	215	10.0	112	27	267.0	82	6	102	193.0	0.035	13.5	M20	59.0	A16×10×70
P832_KX701_	190	160 _{h6}	15	55 _{h6}	215	10.0	112	27	324.5	82	6	102	250.5	0.035	13.5	M20	59.0	A16×10×70
P932_KX701_	212	180 _{h6}	17	75 _{h6}	250	10.0	143	34	388.0	105	7	115	314.0	0.040	17.5	M20	79.5	A20×12×90

Dimensions of motors

Type	□g	qp0	qp1	w1	x0	zp0
EZ301U	72	90	130.0	55.5	21	54.5
EZ302U	72	112	152.0	55.5	21	76.5
EZ303U	72	134	174.0	55.5	21	98.5
EZ401U	98	98	146.5	91.0	22	56.0
EZ402U	98	123	171.5	91.0	22	81.0
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EZ501U	115	93	147.5	100.0	22	58.5
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EZ503U	115	143	197.5	100.0	22	108.5
EZ505U	115	193	247.5	100.0	22	158.5
EZ701U	145	102	161.0	115.0	22	64.0
EZ702U	145	127	186.0	115.0	22	89.0
EZ703U	145	152	211.0	115.0	22	114.0
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EZ802U	190	197	274.0	156.5	22	143.0
EZ803U	190	238	315.0	156.5	22	184.0
EZ805U	190	320	397.0	156.5	22	266.0

Dimensions of geared motors

Type	EZ3		EZ4		EZ5		EZ7		EZ8	
	□a6	mp	□a6	mp	□a6	mp	□a6	mp	□a6	mp
P231_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P331_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P332_KX301_	75	139.5	–	–	–	–	–	–	–	–
P431_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P432_KX301_	75	139.5	100	134.0	–	–	–	–	–	–
P531_KX501_	–	–	120	176.5	120	172.0	140	183.0	–	–
P532_KX401_	100	151.0	100	145.5	115	150.0	140	153.0	–	–
P731_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P732_KX501_	–	–	120	176.5	120	172.0	140	183.0	–	–
P831_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P832_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5
P932_KX701_	–	–	–	–	150	214.5	150	217.5	190	242.5

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

P	7	3	1	S	G	S	S	0050	KX701VF	0030	MF	EZ703U
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Explanation

Code	Designation	Design
P	Type	Planetary gear unit
7	Size	7 (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) ¹
S	Backlash	Standard
R		Reduced
0050	Transmission ratio of output (i x 10)	i = 5 (example)
KX701 VF	Input	KX7 right-angle geared motor (example)
0030	Transmission ratio of input (i x 10)	i = 3 (example)
MF	Motor adapter	Motor adapter with FlexiAdapt coupling
EZ703U	Motor	EZ synchronous servo motor

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

- A detailed type designation of the motor, see the chapter [▶ 17](#)
- Mounting position, see the chapter [▶ 10.5.3](#)
- Radial shaft seal rings at the output made of NBR or FKM (option), see the chapter [▶ 10.6.3](#)
- Position of the plug connectors, see the chapter [▶ 10.5.5](#)
- Reverse operation of the output shaft from ±20° to ±90° and horizontal installation, note the chapter [▶ 10.6.4](#)

10.4.1 Nameplate

An example geared motor nameplate is explained in the figure below.

1

2



STÖBER Antriebstechnik GmbH + Co. KG
Kieselbronner Str. 12, 75177 Pforzheim, DE
P332SPSS0400EZ301U
i=40,000; ; HC 150; 0,08 l
SN: 10430585 CD:

19/42



3

4

5

6

7

8

9

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

10.4.1.1 Supporting documents

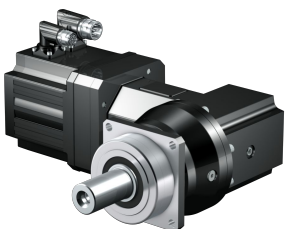
You can view or download supporting documents for the product by reading off the serial number on the nameplate of the product and entering it at the following address online:
<https://id.stober.com>

Alternatively, you can use a suitable mobile device to scan in the QR code on the nameplate of the product in order to be linked to the supporting documents.

10.5 Product description

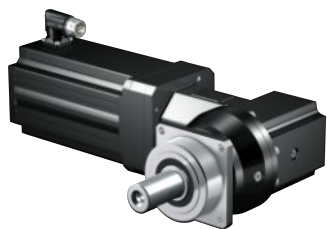
10.5.1 Input options

EZ synchronous servo motor



Catalog ID 442437_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.

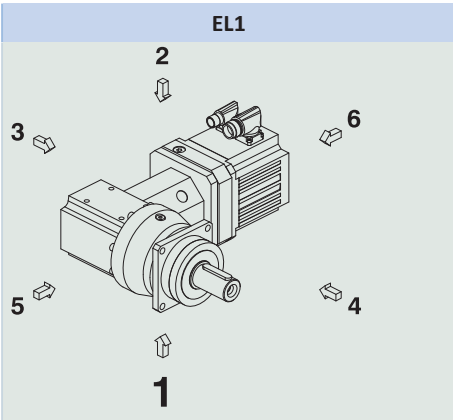
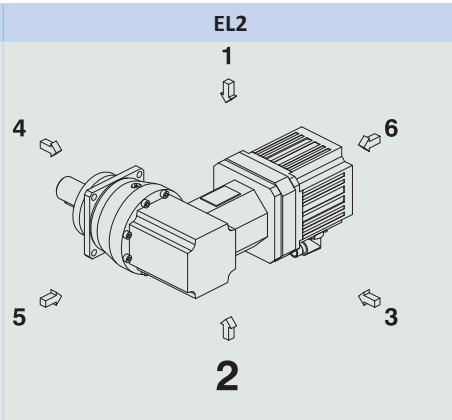
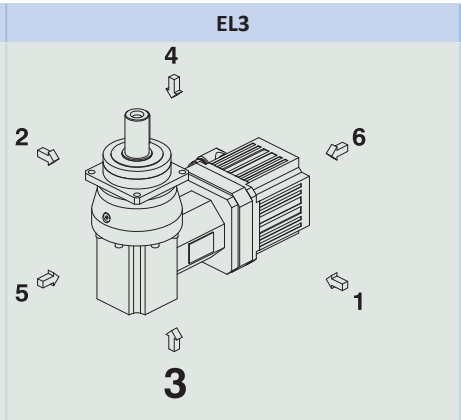
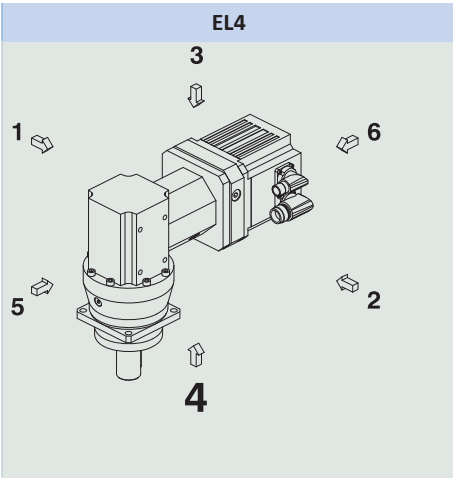
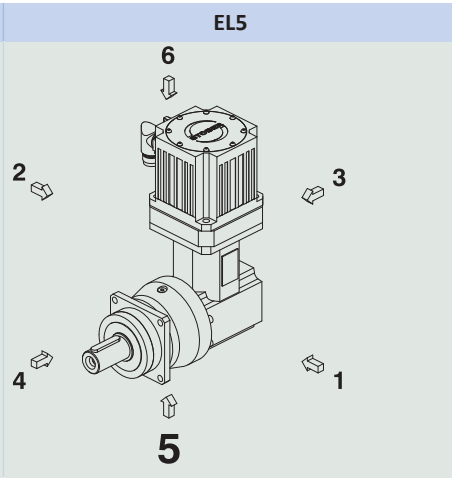
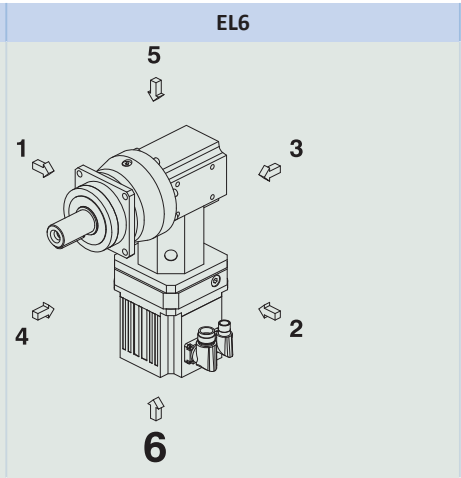
10.5.2 Installation conditions

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.

10.5.3 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.

EL1 	EL2 	EL3 
EL4 	EL5 	EL6 

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

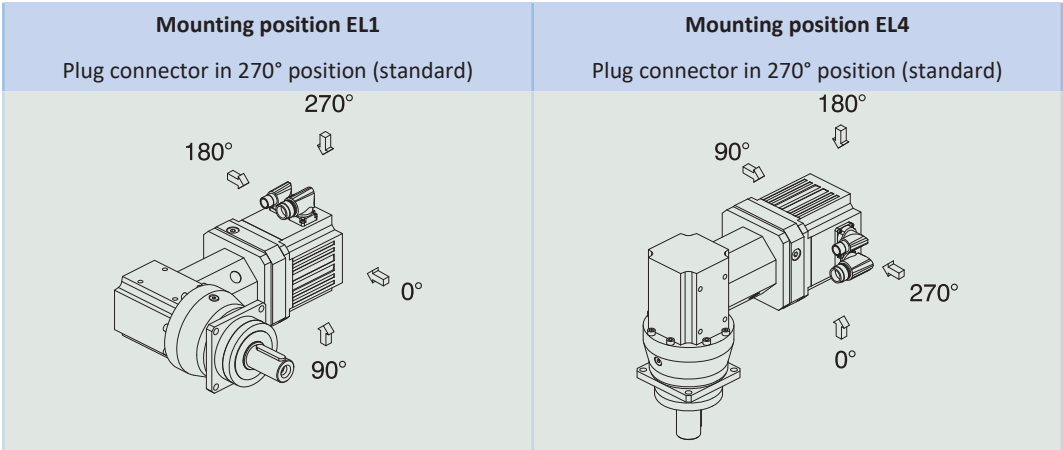
10.5.4 Lubricants

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.

10.5.5 Position of the plug connectors



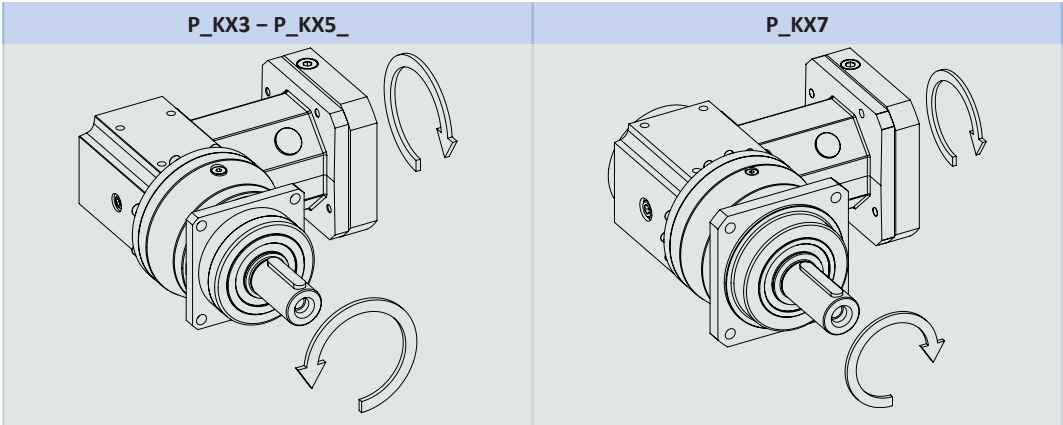
Indicate variations for your geared motor in the order.

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

10.5.6 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
Efficiency:	
η _{get} two-stage	96%
η _{get} three-stage	94%
Protection class: ²	
Gear unit	IP65
Motor	IP56, optionally IP66

10.5.7 Direction of rotation



The pictures show mounting position EL1.

²Observe the protection class of all the components.

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.

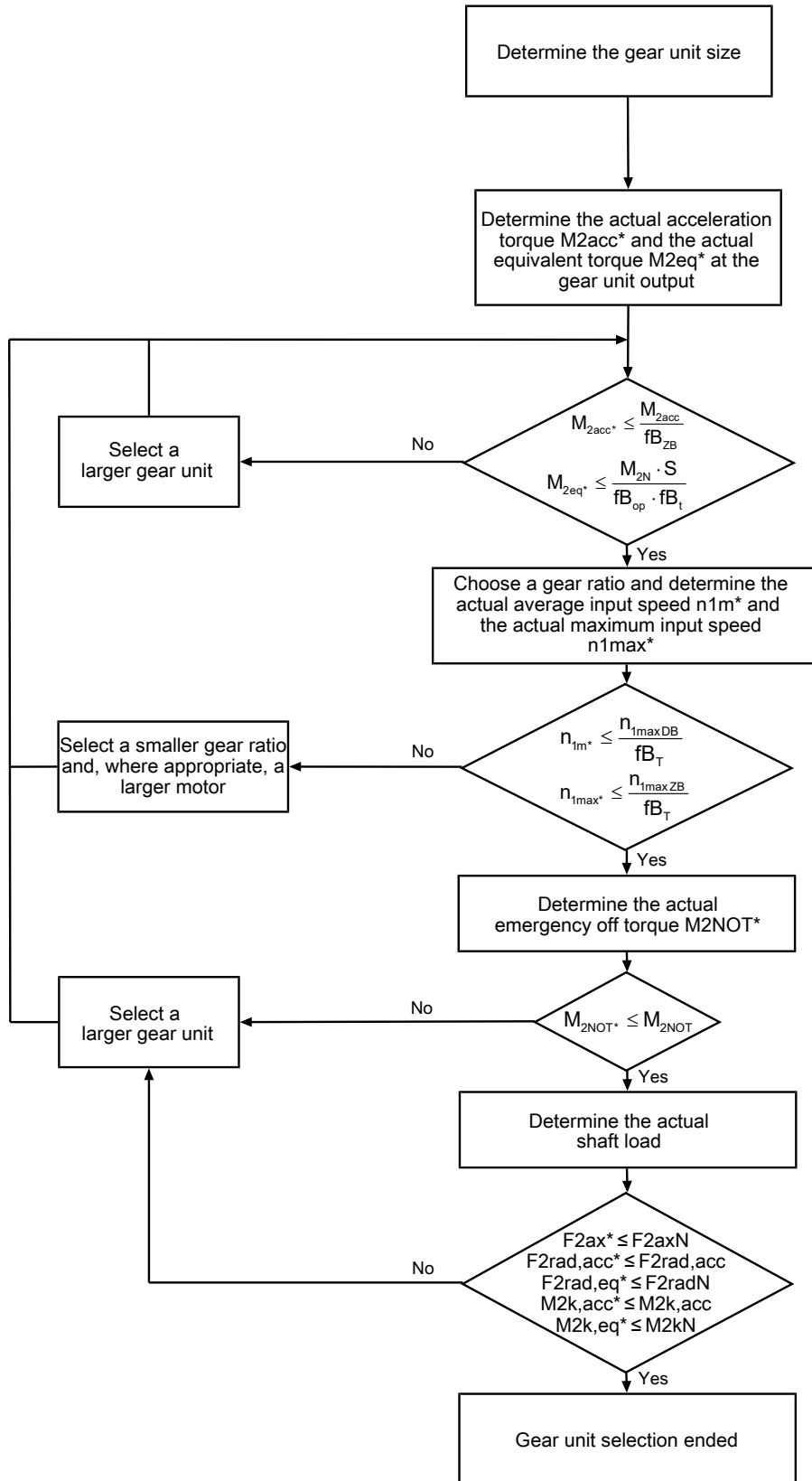
In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in Chapter [▶ 20.1](#).

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

10.6.1 Drive selection

Drive selection for gear units

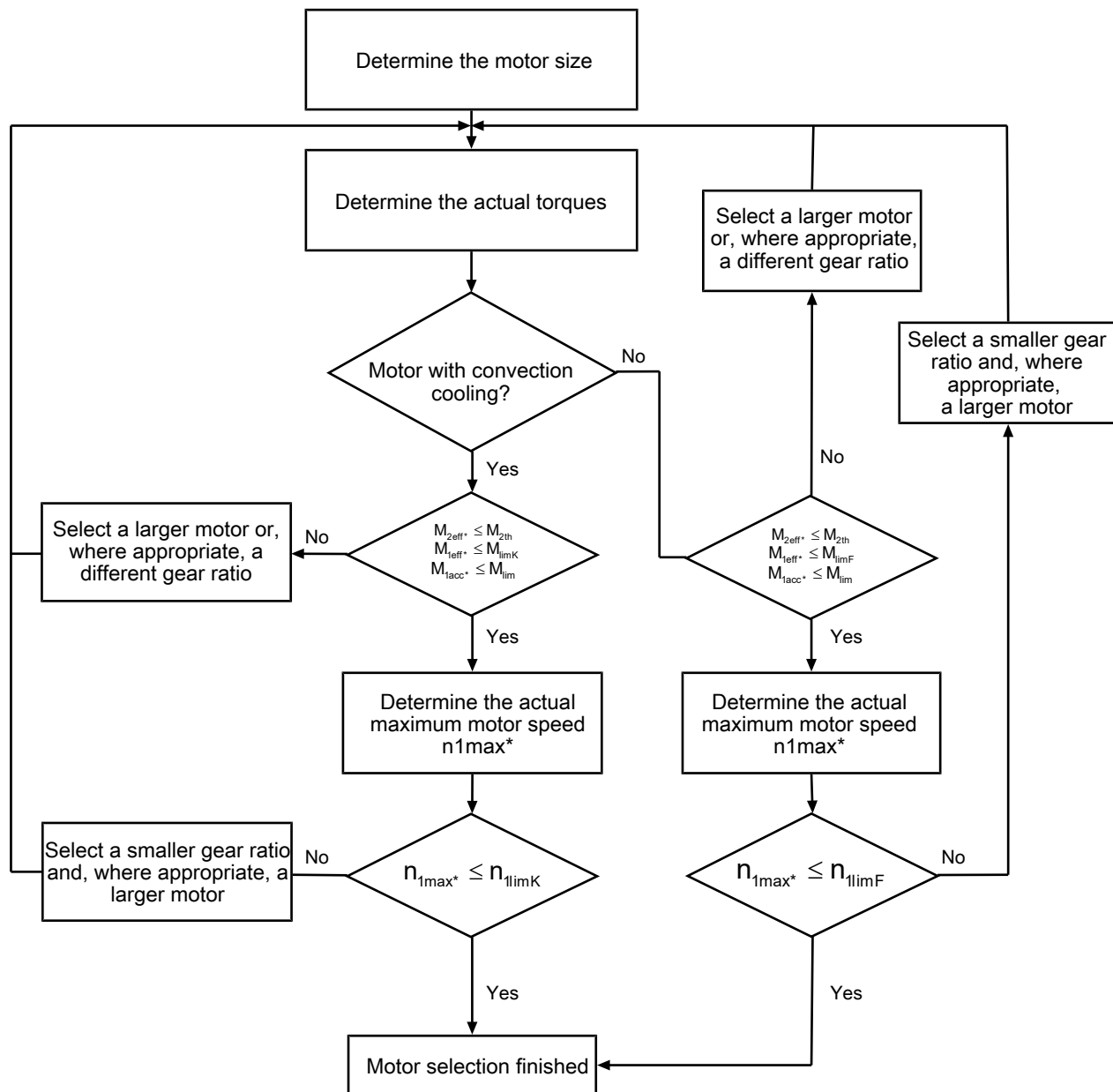


Calculate the forces and tilting torques in the chapter Permitted shaft loads.

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

The values for fB_T , fB_{op} , fB_t and fB_{ZB} can be found in the corresponding tables in this chapter.

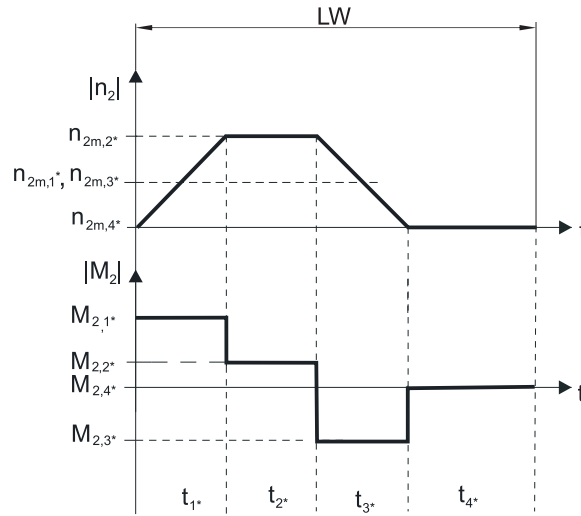
Drive selection for motors



The value for M_{lim} , M_{limK} , M_{limF} , n_{limK} and n_{limF} can be found in the motor characteristic curve in the chapter [► 17.3]. Note the size, nominal speed n_N and cooling type of the motor.

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 torques**

$$M_{2acc*} = J_{tot} \cdot \frac{\Delta n_2}{9,55 \cdot \Delta t} + M_{L*}$$

$$M_{1acc*} = \frac{M_{2acc*}}{i \cdot \eta_{get}} + J_1 \cdot \frac{\Delta n_1}{9,55 \cdot \Delta t}$$

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 $t_{1*} + \dots + t_{3*} \geq 6 \text{ min}$, 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 effective torque

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

Calculation of the actual 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

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

Calculation of the thermal limit torque

Calculate the thermal limit torque M_{2th} for a duty cycle $ED_{10} > 50\%$ and the actual average input speed n_{1m*} .
(At $K_{mot,th} \leq 0$ you must reduce the average input speed n_{1m*} accordingly or select another geared motor size.)

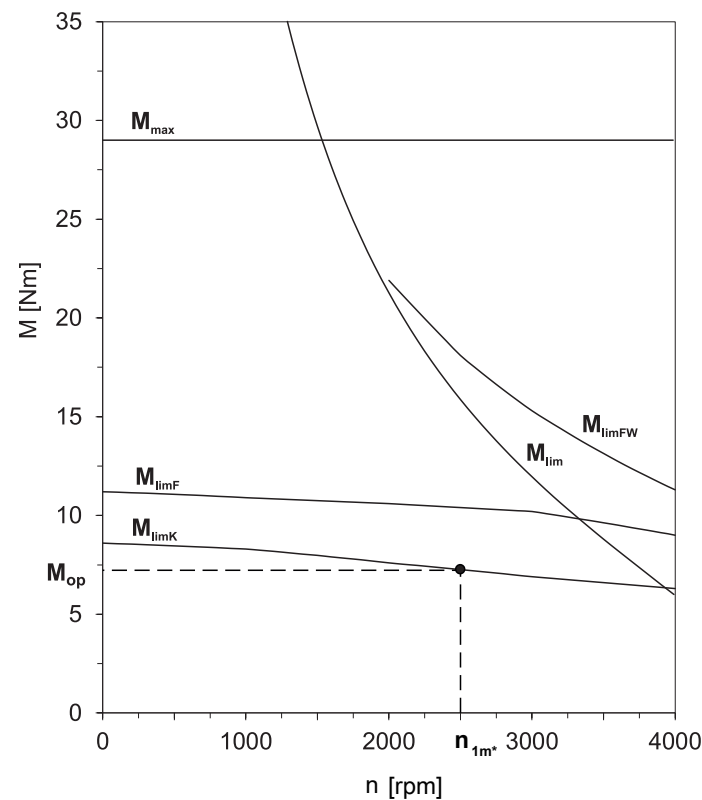
$$M_{2th} = M_{op} \cdot i \cdot K_{mot,th}$$

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

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

The values for a_{thEL} and fB_T can be found in the corresponding tables in this chapter.

The value for the torque of the motor at operating point M_{op} with the determined average input speed n_{1m*} can be found in the motor characteristic curve in the chapter [\[17.3\]](#). Note the size, nominal speed n_N and cooling type of the motor. The figure below shows an example of reading the torque M_{op} of a motor with convection cooling at the operating point.



Operating factors

Parameter a_{thEL}

Mounting position		a_{thEL}
EL1, 2, 5, 6		1.0
EL3, 4		1.1

Operating mode		fB_{op}
Uniform continuous operation		1.00
Cyclic operation		1.25
Reversing load cyclic operation		1.40

Run time		fB_t
Daily runtime ≤ 8 h		1.00
Daily runtime ≤ 16 h		1.15
Daily runtime ≤ 24 h		1.20

Cyclic operation		fB_{zB}
≤ 1000 load changes/hour (LW/h)		1.00
> 1000 load changes/hour (LW/h)		1.15

Temperature		fB_T
Motor cooling	Surrounding temperature	
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 (see the "Other product features" chapter) must not be exceeded. Doing so may result in damage to the geared motor.
- For braking from full speed (for example when the power fails or when setting up the machine), note the permitted gear unit torques (M_{2acc} , M_{2NOT}) in the selection tables.

10.6.2 Permitted shaft loads for the output shaft

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

- For shaft dimensions in accordance with the catalog
- For output speeds $n_{2m*} \leq 100$ rpm ($F_{2axN} = F_{2ax100}$; $F_{2radN} = F_{2rad100}$; $M_{2kN} = M_{2k100}$)
- 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

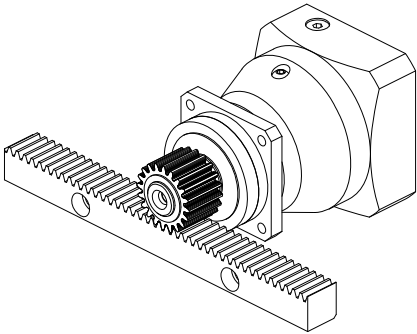


Fig. 1: Recommendation for bearing assignment S (e.g. for straight-cut gearing)

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

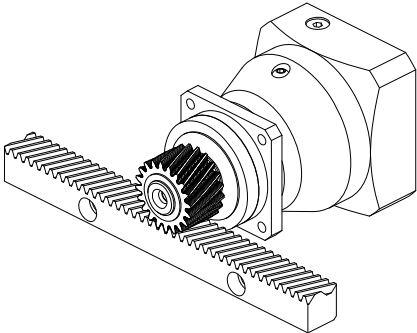


Fig. 2: Recommendation for bearing assignment D (e.g. for helical gearing)

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

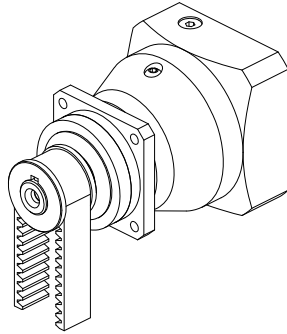


Fig. 3: Recommendation for bearing assignment Z (e.g. for belt drives)

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.

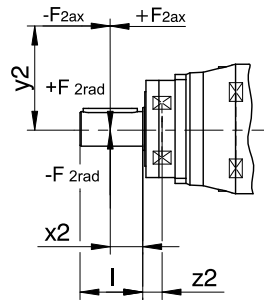


Fig. 4: Force application points

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

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

The following applies to other force application points:

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

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:

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

10.6.3 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:

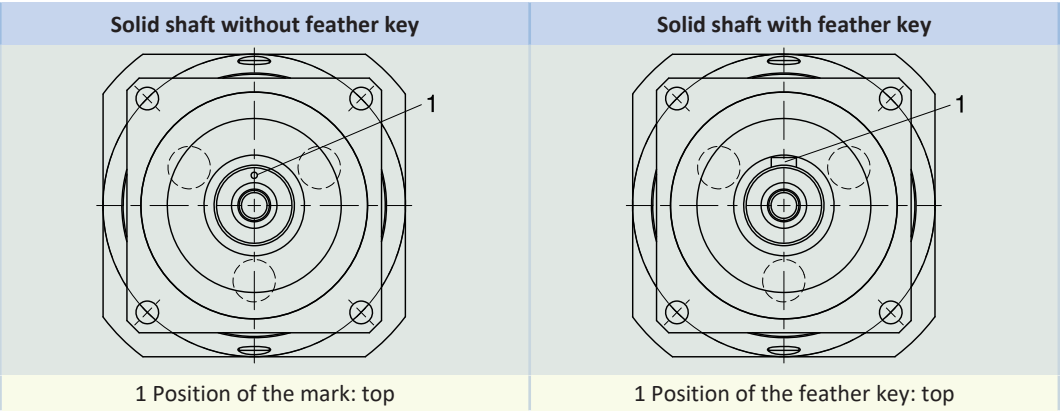
- Excellent temperature resistance
- High chemical stability
- Very good resistance to aging
- Excellent resistance in oils and greases
- For use in the food, beverage and pharmaceutical industries

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.

10.6.4 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.

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 P23KX – P93KX	443361_en