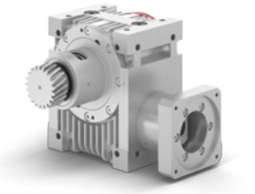
GÜDEL

Define the Code of your High Performance Angle Gearbox

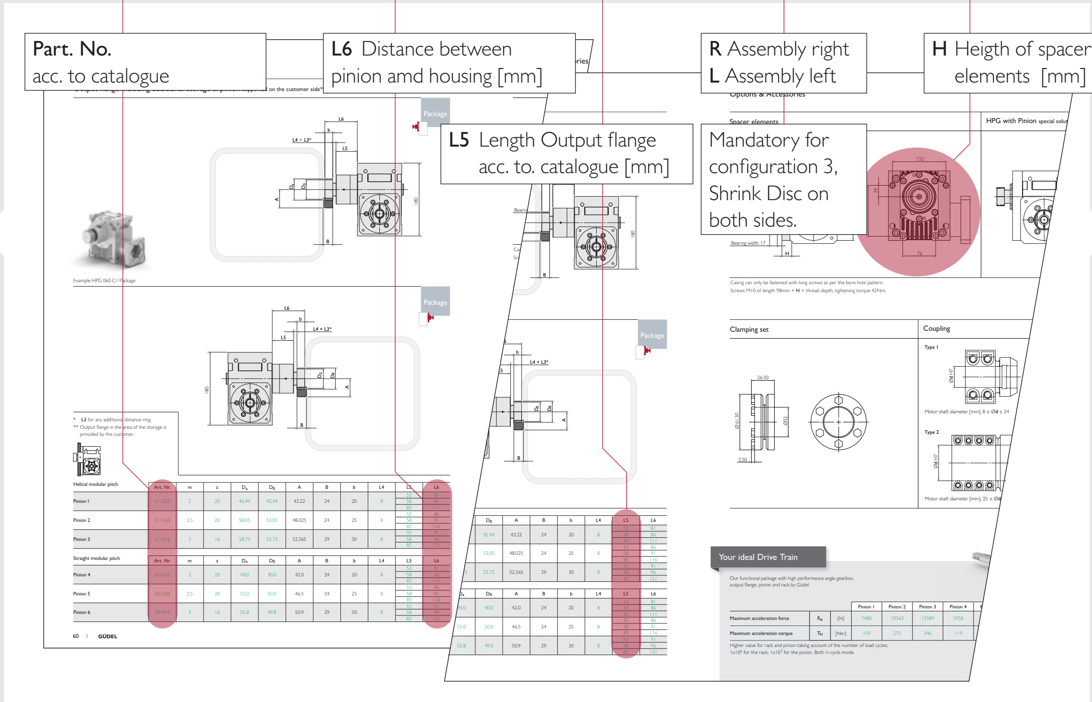
Package
(Output Flange including Bearing & Pinion)

Güdel Pinion		Request of the Output Flange		Assembly		Spacer Elements (optional)
211320	-	86	53	-	-	22

- Part. No. acc. to catalogue
- L6 Distance between pinion amd housing [mm]
- L5 Length Output flange acc. to. catalogue [mm]
- R Assembly right
- L Assembly left
- Mandatory for configuration 3, Shrink Disc on both sides.
- H Heigth of spacer elements [mm]



Example
HPG 060-A1-5-PS-0-211320-86-53-22-SU



Type	Size		Configuration			Ratio		Precision Grades		Centering		Mounting Position		
HPG	060	-	A	1	-	5	-	PS	-	0	-	SU	-	Motor

Type
HPG
High Performance Angle Gearbox

Size
030
045
060
090
120
180

Configuration

Input	Output
A	1
B	2
C	3
D	4
	5
	6
	7

Ratio
i =
2
3
4
5
6
8
10
13.33
16
24
30
47
60

Precision Grades
PS Standard circumferential backlash
PR Reduced circumferential backlash *

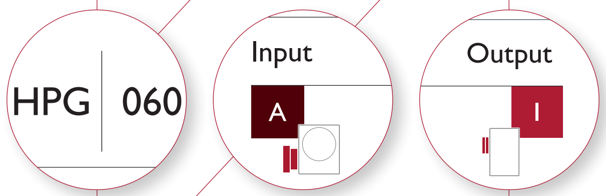
* PR can not be selected in sizes 030 and 180

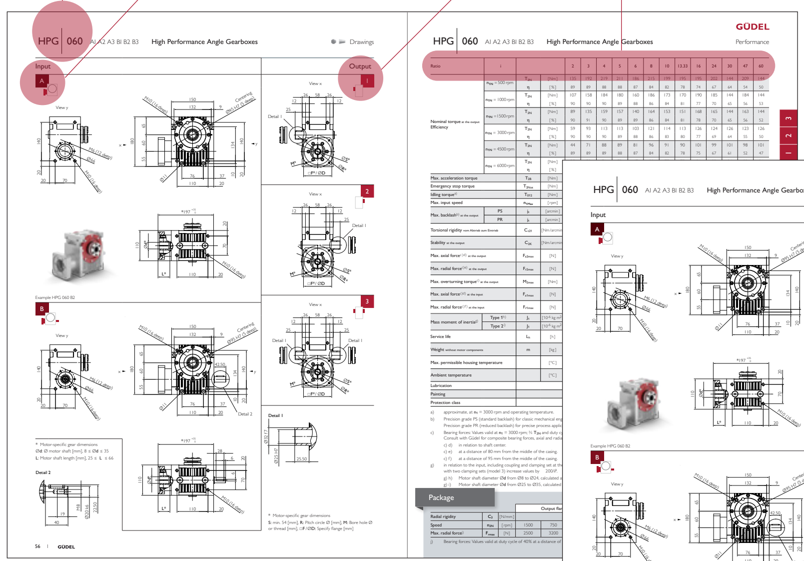
Centering
0 without
1 at input 1 for configuration C and D
2 at input 2 (input shaft) for configuration B and D
3 for input 1 and 2 for configuration B und D

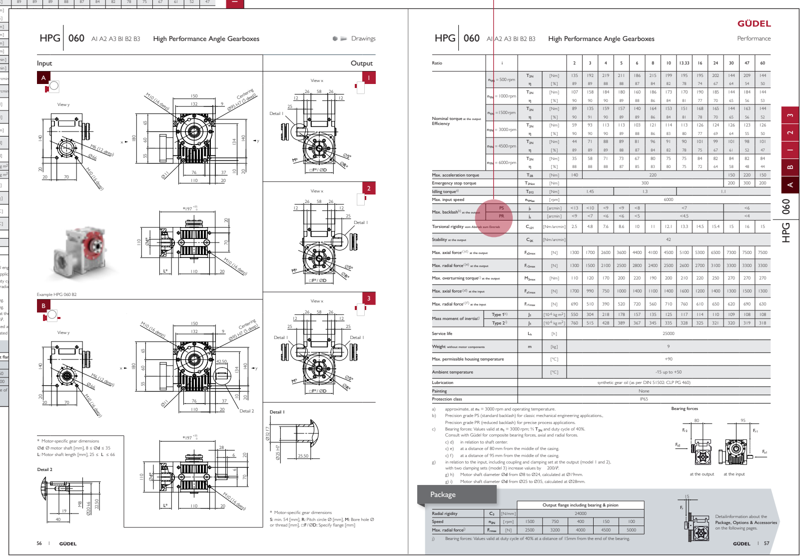
Mounting Position
SS vertical standing worm
SU vertical worm below
SL flat lying worm
SO vertical worm top

-	-	-	-	-	-	-

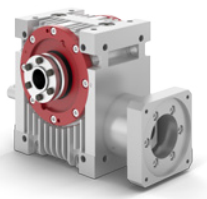
- Unless a pinion is required
- Unless a Package is required (Output Flange including Bearing & Pinion)
- Unless no spacer elements are required



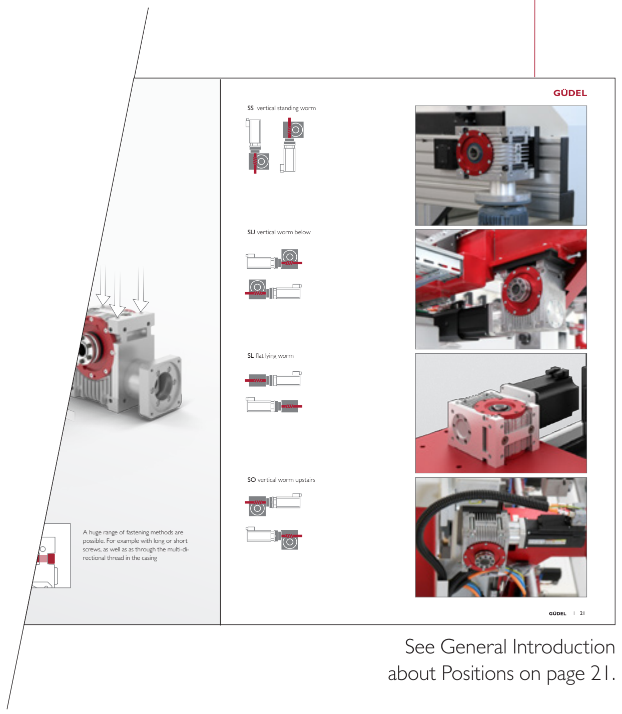




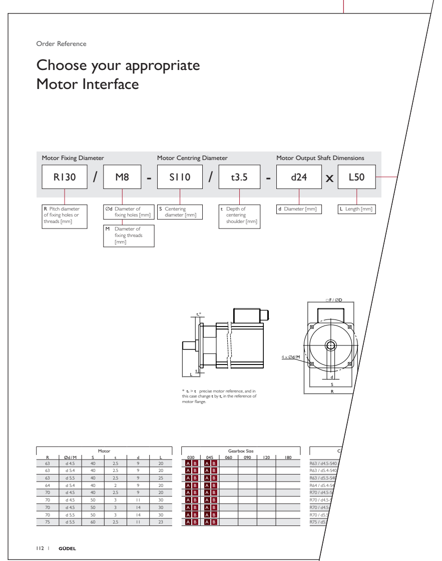
See Technical Data Sheets on pages 26 et seq.



Example
HPG 060-A1-5-PS-0-SU



See General Introduction about Positions on page 21.



See Motor Interfaces on pages 112 et seq.

Order Reference

Choose your appropriate Motor Interface

Motor Fixing Diameter			Motor Centring Diameter			Motor Output Shaft Dimensions		
R130	/	M8	- S110	/	t3.5	- d24	x	L50

R Pitch diameter of fixing holes or threads [mm]

Ød Diameter of fixing holes [mm]

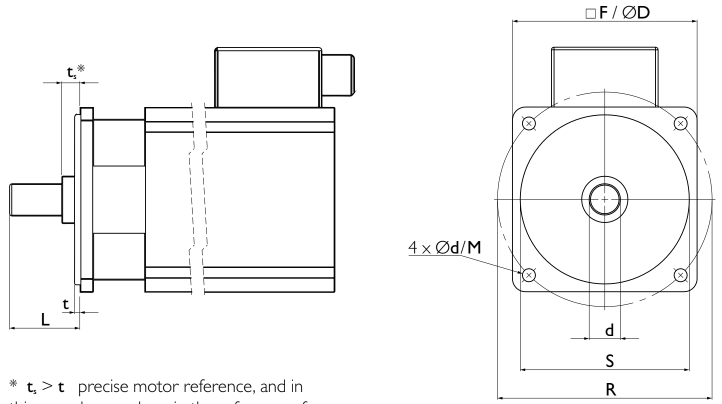
M Diameter of fixing threads [mm]

S Centering diameter [mm]

t Depth of centering shoulder [mm]

d Diameter [mm]

L Length [mm]



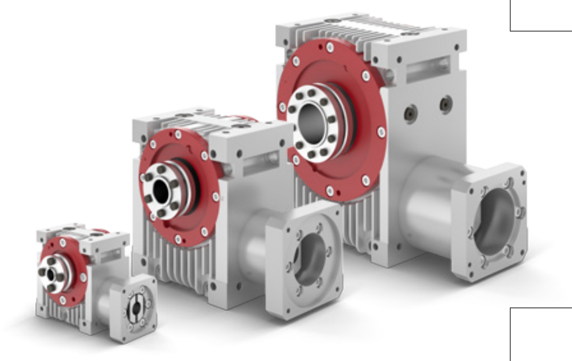
* $t_1 > t$ precise motor reference, and in this case change **t** by t_1 in the reference of motor flange.

Motor						Gearbox Size						Code
R	Ød / M	S	t	d	L	030	045	060	090	120	180	
63	d 4.5	40	2.5	9	20	A B	A B					R63 / d4.5-S40 / t2.5-d9×20
63	d 5.4	40	2.5	9	20	A B	A B					R63 / d5.4-S40 / t2.5-d9×20
63	d 5.5	40	2.5	9	25	A B	A B					R63 / d5.5-S40 / t2.5-d9×25
64	d 5.4	40	2	9	20	A B	A B					R64 / d5.4-S40 / t2-d9×20
70	d 4.5	40	2.5	9	20	A B	A B					R70 / d4.5-S40 / t2.5-d9×20
70	d 4.5	50	3	11	30	A B	A B					R70 / d4.5-S50 / t3-d11×30
70	d 4.5	50	3	14	30	A B	A B					R70 / d4.5-S50 / t3-d14×30
70	d 5.5	50	3	14	30	A B	A B					R70 / d5.5-S50 / t3-d14×30
75	d 5.5	60	2.5	11	23	A B	A B					R75 / d5.5-S60 / t2.5-d11×23

Motor						Gearbox Size						Code
R	Ød / M	S	t	d	L	030	045	060	090	120	180	
75	d 5.5	60	2.5	14	30	A B	A B	A B				R75 / d5.5-S60 / t2.5-d14×30
75	d 5.5	60	3	14	30	A B	A B	A B				R75 / d5.5-S60 / t3-d14×30
75	d 5.8	60	2.5	11	23	A B	A B					R75 / d5.8-S60 / t2.5-d11×23
75	d 6.5	60	3	14	30	A B	A B	A B				R75 / d6.5-S60 / t3-d14×30
90	d 6	70	3	19	35	A B*	A B	A B				R90 / d6-S70 / t3-d19×35
90	d 7	70	3	14	30	A B	A B	A B				R90 / d7-S70 / t3-d14×30
90	d 7	70	3	16	40	A B*	A B	A B				R90 / d7-S70 / t3-d16×40
95	d 6.6	50	2.5	14	30	A B	A B					R95 / d6.6-S50 / t2.5-d14×30
100	d 7	80	3	14	30	A B	A B	A B				R100 / d7-S80 / t3-d14×30
100	d 7	80	3	19	40	A B*	A B	A B	A B			R100 / d7-S80 / t3-d19×40
100	d 6.5	80	2.5	14	30	A B	A B	A B				R100 / d6.5-S80 / t2.5-d14×30
100	d 6.5	80	3	19	40	A B*	A B	A B	A B			R100 / d6.5-S80 / t3-d19×40
100	d 6.6	80	4	10	32	A B	A B*	A B				R100 / d6.6-S80 / t4-d10×32
100	d 6.6	80	5	14	37	A B*	A B*	A B				R100 / d6.6-S80 / t5-d14×37
100	d 6.6	80	5	16	40	A B*	A B*	A B	A B			R100 / d6.6-S80 / t5-d16×40
115	d 9	95	3	19	40		A B	A B	A B	A B		R115 / d9-S95 / t3-d19×40
115	d 7	95	3	24	45		A B	A B	A B	A B		R115 / d7-S95 / t3-d24×45
115	d 10	95	3	19	40		A B	A B	A B	A B		R115 / d10-S95 / t3-d19×40
130	d 9	95	3	19	40		A B	A B	A B	A B		R130 / d9-S95 / t3-d19×40
130	d 9	95	3	24	50		A B	A B	A B	A B		R130 / d9-S95 / t3-d24×50
130	d 9	110	3	24	50		A B	A B	A B	A B		R130 / d9-S110 / t3-d24×50
130	d 9	110	3.5	24	50		A B	A B	A B	A B		R130 / d9-S110 / t3.5-d24×50
130	d 9	110	3.5	19	40		A B	A B	A B	A B		R130 / d9-S110 / t3.5-d19×40
130	M8	110	3.5	19	40		A B	A B	A B	A B	A	R130 / M8-S110 / t3.5-d19×40
130	M8	110	3.5	24	50		A B	A B	A B	A B		R130 / M8-S110 / t3.5-d24×50
130	M8	110	3.5	28	60			A B	A B	A B	A B	R130 / M8-S110 / t3.5-d28×60
130	M8	110	3.5	38	80				A B	A B	A B	R130 / M8-S110 / t3.5-d38×80
145	d 9	110	6	19	55		A B*	A B	A B*	A B*		R145 / d9-S110 / t6-d19×55
145	d 9	110	6	19	58		A B*	A B	A B*	A B*		R145 / d9-S110 / t6-d19×58
145	d 9	110	6	22	58		A B*	A B	A B*	A B*	A B	R145 / d9-S110 / t6-d22×58
145	d 9	110	6	24	58		A B*	A B	A B*	A B*	A B	R145 / d9-S110 / t6-d24×58
145	d 9	110	6	28	63			A B	A B*	A B*	A B	R145 / d9-S110 / t6-d28×63
145	d 10	110	3.5	16	40		A B	A B	A B			R145 / d10-S110 / t3.5-d16×40
145	d 10	110	3.5	19	40		A B	A B	A B	A B		R145 / d10-S110 / t3.5-d19×40
165	d 11	110	4	24	50			A B	A B	A B		R165 / d11-S110 / t4-d24×50
165	d 11	130	3	28	60			A B	A B	A B	A B	R165 / d11-S130 / t3-d28×60
165	d 11	130	3.5	19	28			A B				R165 / d11-S130 / t3.5-d19×28
165	d 11	130	3.5	24	50			A B	A B	A B		R165 / d11-S130 / t3.5-d24×50
165	d 11	130	3.5	32	58			A B	A B	A B	A B	R165 / d11-S130 / t3.5-d32×58
165	d 11	130	4	32	58			A B	A B	A B	A B	R165 / d11-S130 / t4-d32×58
190	d 11	155	3.5	32	60				A B	A B	A B	R190 / d11-S155 / t3.5-d32×60
190	d 11	155	3.5	35	60				A B	A B	A B	R190 / d11-S155 / t3.5-d35×60
200	d 13.5	114.3	3.2	35	79				A B	A B	A B	R200 / d13.5-S114.3 / t3.2-d35×79
200	d 13.5	114.3	3.2	42	113					A B*	A B	R200 / d13.5-S114.3 / t3.2-d42×113
215	d 14	130	4	32	60				A B	A B	A B	R215 / d14-S130 / t4-d32×60
215	d 14	130	4	38	60				A B	A B	A B	R215 / d14-S130 / t4-d38×60
215	d 13	180	4	28	60				A B	A B	A B	R215 / d13-S180 / t4-d28×60
215	d 13	180	4	38	80				A B	A B	A B	R215 / d13-S180 / t4-d38×80
215	d 14	180	4	28	42				A B	A B		R215 / d14-S180 / t4-d28×42
215	d 14	180	4	28	60				A B	A B	A B	R215 / d14-S180 / t4-d28×60
215	d 14	180	4	32	58				A B	A B	A B	R215 / d14-S180 / t4-d32×58
215	d 14	180	4	32	60				A B	A B	A B	R215 / d14-S180 / t4-d32×60
215	d 14	180	4	32	80				A B	A B	A B	R215 / d14-S180 / t4-d32×80
215	d 14	180	4	38	80				A B	A B	A B	R215 / d14-S180 / t4-d38×80
235	d 13.5	200	4	42	116					A B*	A B	R235 / d13.5-S200 / t4-d42×116
265	d 13	230	4	38	80					A B	A B	R265 / d13-S230 / t4-d38×80
265	d 14	230	4	38	80					A B	A B	R265 / d14-S230 / t4-d38×80
265	d 14	230	4	55	110						A B	R265 / d14-S230 / t4-d55×110
300	d 18	250	5	42	110					A B	A B	R300 / d18-S250 / t5-d42×110
300	d 18	250	5	48	82					A B	A B	R300 / d18-S250 / t5-d48×82
300	d 18	250	5	48	110					A B	A B	R300 / d18-S250 / t5-d48×110
300	d 19	250	5	48	110					A B	A B	R300 / d19-S250 / t5-d48×110
350	d 18	300	5	55	110						A B	R350 / d18-S300 / t5-d55×110
350	d 18	300	5	60	110						A B	R350 / d18-S300 / t5-d60×110

* Motorenflansch dicker als üblich.

Calculate your High Performance Angle Gearbox



Define the maximum output speed n_{2max} [rpm]

Define ratio **i**

$n_{1max} < n_{1Max}$ — no → Select smaller ratio **i**

Define maximum acceleration torque T_{2b}

$T_{2b} < T_{2B}$ — no → Select larger gearbox

Define the emergency stop torque T_{2not} [Nm]

$T_{2not} < T_{2Not}$ — no → Select larger gearbox

Define the average nominal output torque T_{2m} [Nm]

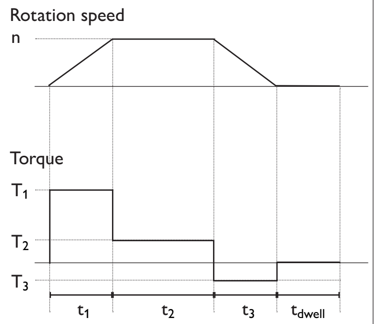
$$T_{2m} = 3\sqrt{\frac{(|n|/2)\times t_1\times|T_1|^3+|n|\times t_2\times|T_2|^3+(|n|/2)\times t_3\times|T_3|^3}{(|n|/2)\times t_1\times|n|\times t_2+(|n|/2)\times t_3}}$$

Define the average output speed n_{1m} [rpm]

$$n_{1m} = \frac{(|n|/2)\times t_1+|n|\times t_2\times(|n|/2)\times t_3}{t_1+t_2+t_3}$$

Define the duty cycle **ED**

$$ED = (t_1+t_2+t_3)/(t_1+t_2+t_3+t_{dwell})\times 100\%$$



Define the shock factor f_B

Input	S hock factor f_B
Polynomia	1.0
Standard Servo / Sinus2	1.1
FU / VFD	1.25
AC- Motor	1.4
External Output-shock	1.6

Define the starting frequency factor f_A

Starting frequency	Starting frequency factor f_A
< 60 / h	0.7
< 360 / h	0.8
< 1200 / h	1.0
< 3600 / h	1.3

Define the abrasion factor f_P

	Size					
	030	045	060	090	120	180
$n_{1m} <$ 500 rpm	5.50	3.00	1.70	1.10	1.00	1.00
$n_{1m} <$ 1000 rpm	4.00	2.30	1.40	1.05	1.00	1.00
$n_{1m} <$ 1500 rpm	3.30	2.00	1.30	1.05	1.00	1.00
$n_{1m} <$ 3000 rpm	2.30	1.50	1.15	1.05	1.00	1.00
$n_{1m} <$ 4500 rpm	1.70	1.30	1.05	1.00	1.00	
$n_{1m} <$ 6000 rpm	1.50	1.20	1.00			

Abrasion factor f_P* for high-accuracy applications, otherwise $f_P = 1$.

Define the duty factor f_{ED}

Duty cycle	Duty service factor f_{ED}
< 25%	0.7
< 40%	1.0
< 60%	1.2
< 70%	1.3
< 80%	1.4
< 100%	1.8

Define the **temperature factor** (ambient air) f_U

Ambient temperature	Temperature factor f_U
< 10°C	0.85
< 20°C	1.0
< 30°C	1.2
< 40°C	1.5
< 50°C	1.9

Define the **temperature factor** f_T

	Size					
	030	045	060	090	120	180
$n_{1m} <$ 500 rpm	0.40	0.40	0.40	0.60	0.80	0.90
$n_{1m} <$ 1000 rpm	0.40	0.40	0.45	0.70	0.90	1.10[a)]
$n_{1m} <$ 1500 rpm	0.40	0.40	0.55	0.80	1.20	1.30[a)]
$n_{1m} <$ 3000 rpm	0.40	0.40	0.70	0.95[a)]	2.00[a)]	2.40[b)]
$n_{1m} <$ 4500 rpm	0.40	0.40	0.70	1.00[a)]	2.80[a)]	
$n_{1m} <$ 6000 rpm	0.40	0.40	0.75			

a) Maximum duty cycle 80%
b) Maximum duty cycle 60%

$T_{2mech} = T_{2m} \times f_B \times f_A \times f_P$*

$T_{2mech} < T_{2N}$ — no → Select a larger gearbox

$T_{2therm} = T_{2m} \times f_{ED} \times f_T \times f_U$

$T_{2therm} < T_{2N}$ — no → Select a larger gearbox

Compare the tightening hub and the motor shaft diameter **Ød**

Transmittable torque of the coupling [Nm]

Motor shaft diameter Ød [mm]	Size					
	030	045	060	090	120	180
8	3.5					
9	3.9	6.8				
10	4.3	7.6	17.5			
11	4.8	8.3	19.2			
14	6.1	10.6	24.5	44.9		
16	6.9	12.1	28.0	51.3		
19	8.2	14.4	33.2	61.0	61.0	
22		19.1	38.4	70.6	70.6	168
24		20.8	41.9	77.0	77.0	183
28			42.3	89.8	89.8	214
32			48.4	103	103	244
35			52.9	112	112	267
38				133	122	290
42				147	135	321
48					168	367
55						420
60						458

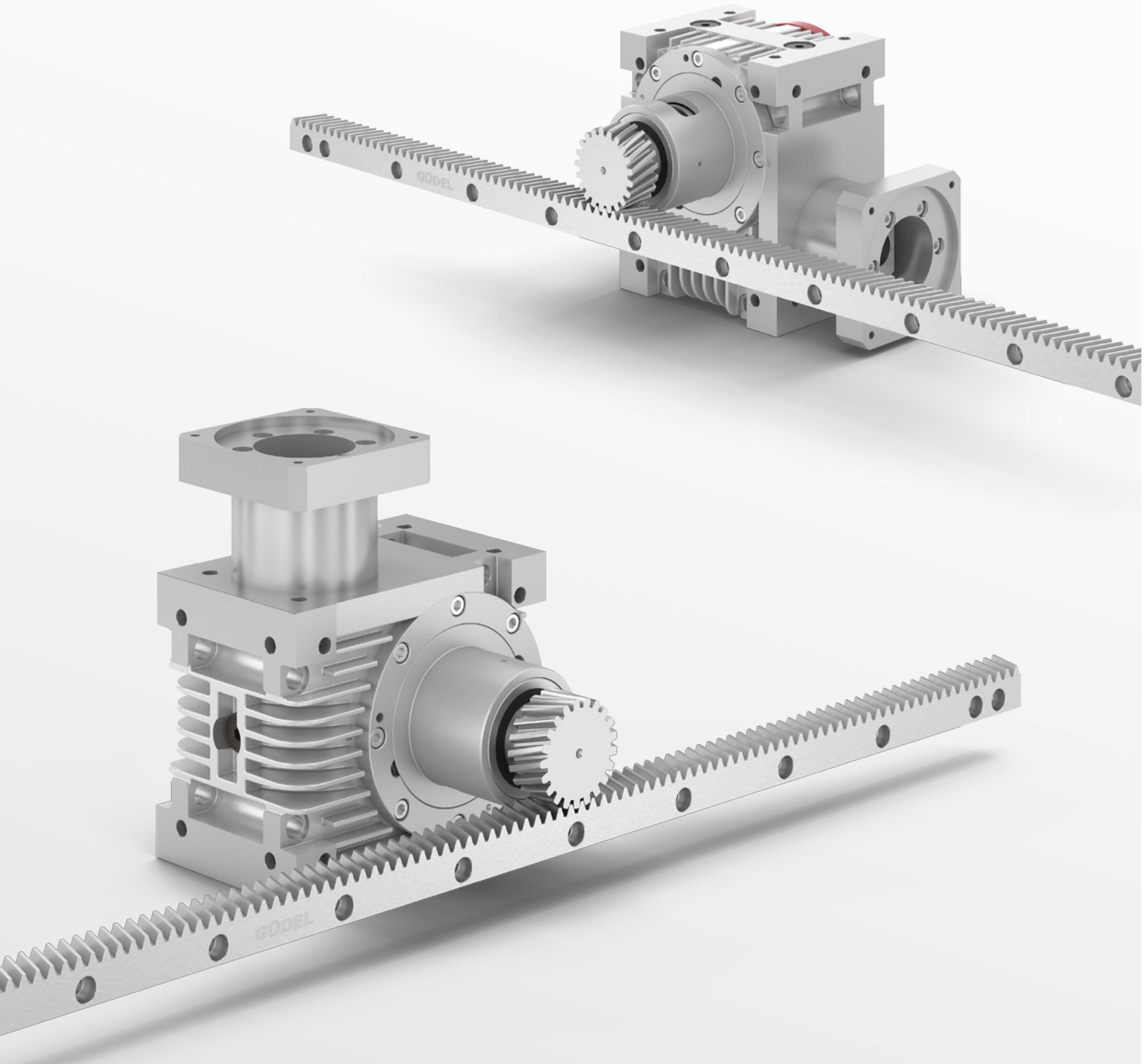
Compare the motor shaft length **L** with the min./ max. steps

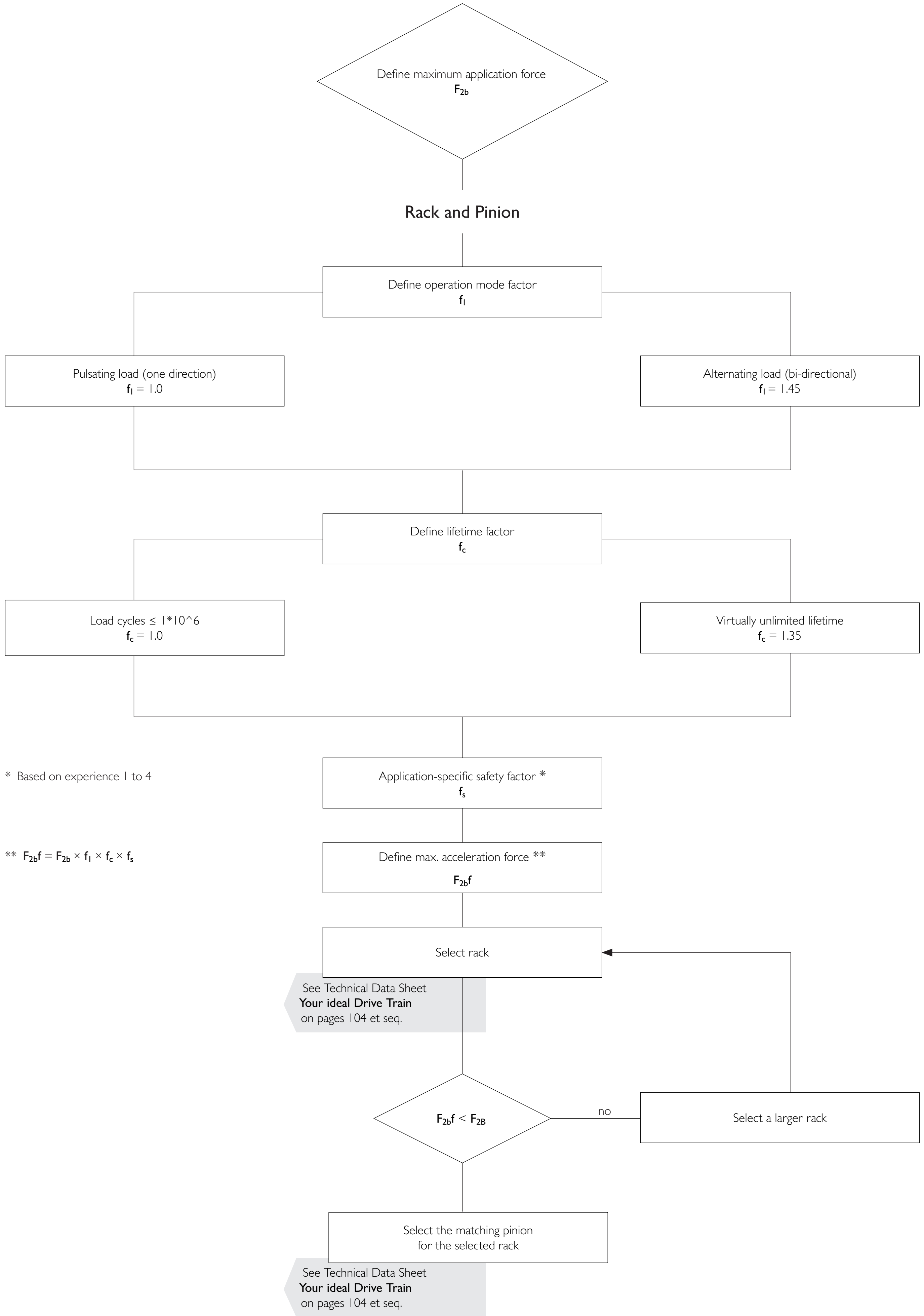
$T_{2maxmot} < T_{coupling}$ — no → Limit the motor current

$T_{2maxmot} < T_{2B}$ — no → Limit the motor current

HPG Gearbox design finished

Find your ideal Drive Train





* Based on experience 1 to 4

** $F_{2b}f = F_{2b} \times f_l \times f_c \times f_s$