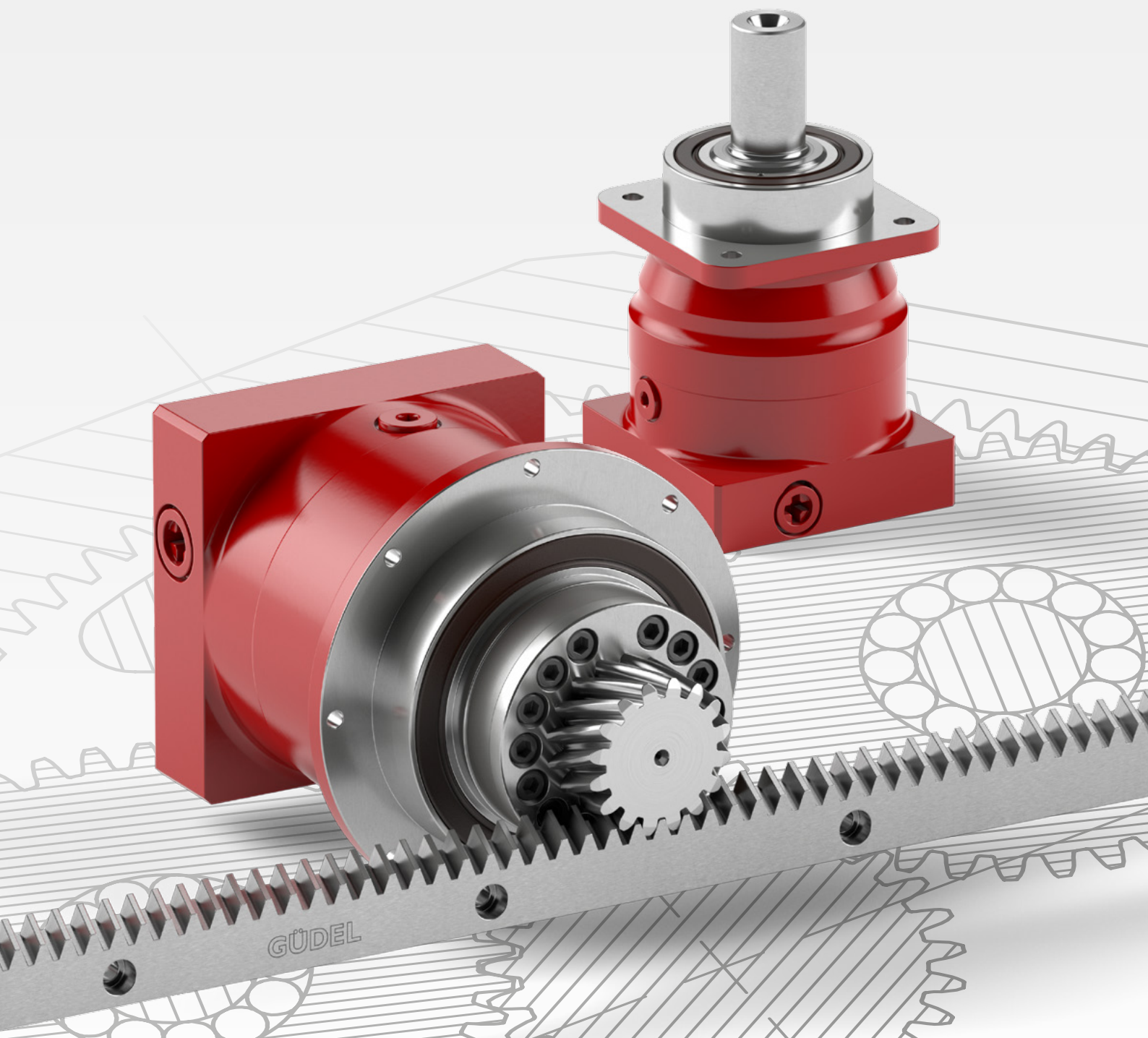


High precision
planetary gearboxes



High precision planetary gearboxes
GÜDEL



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High precision planetary gearboxes

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Companies worldwide

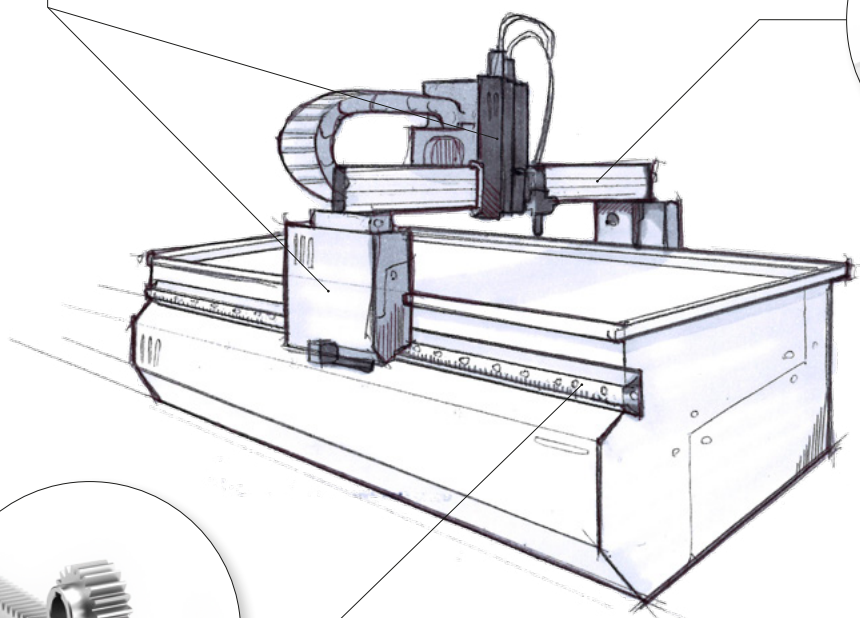
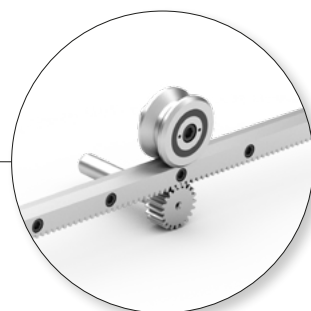
Güdel worldwide	144
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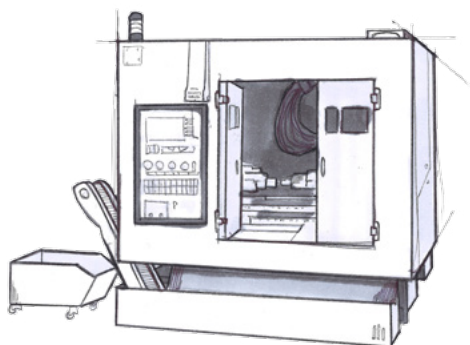
Products meet industry

Güdel offers a wide range of products and solutions to key industries. Our global sales and service network provides our customers with first-class consultation and support services around the globe, for the entire product life cycle.

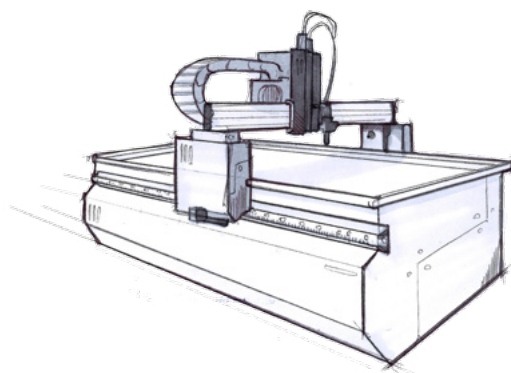
Güdel gearboxes are available in four different precision grades. Combined with the appropriate rack, available in three quality classes Q6, Q7 and Q9, an ideal drivetrain can be configured according to the application requirements.

Güdel in every axis

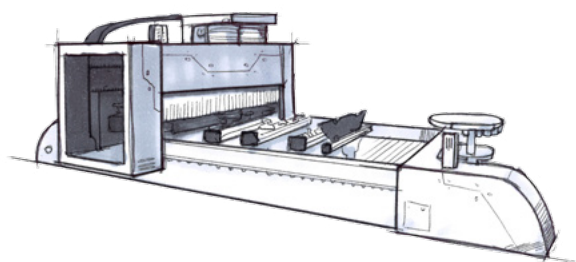




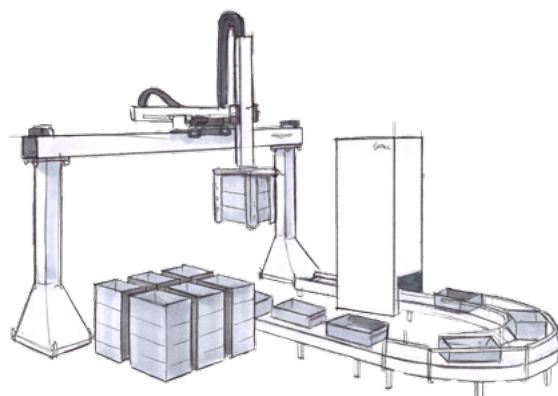
Machine tools



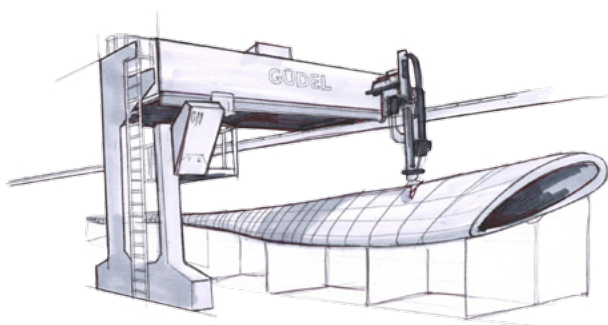
Cutting machines
laser, plasma, water, glass



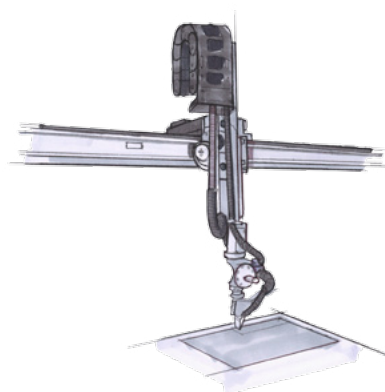
Wood, plastic and composite
processing machines



Robotics, automation and
handling technology



Wind and energy



Aerospace and defense technology

Take five – The product at a glance

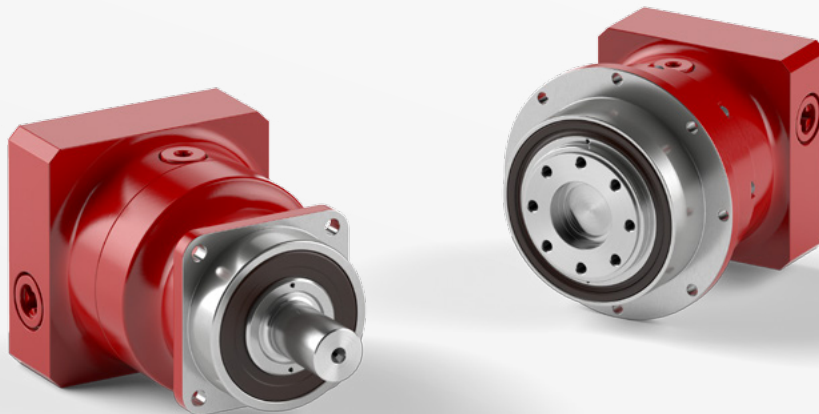
Due to their outstanding mechanical properties, planetary gearboxes are found in a wide spectrum of industrial applications. Güdel high-precision planetary gearboxes provide the ideal solution for demanding operations. Performance details and drawings are found on the technical datasheets.

Precision – With regard to angular backlash, our extensive experience in the design and the manufacture of high-performance gearboxes gives us the ability to provide all products in four different precision grades: I, 3, 5 and I2 arcmin

Sizes – Our portfolio includes five sizes: 080, I00, I40, I80 and 240. Additional sizes are available upon request.

Ratios – A wide range of ratios can be selected – starting from 3 up to I000. Depending on the ratio the gearbox will either have one, two or three stages.

NRH and NRHP

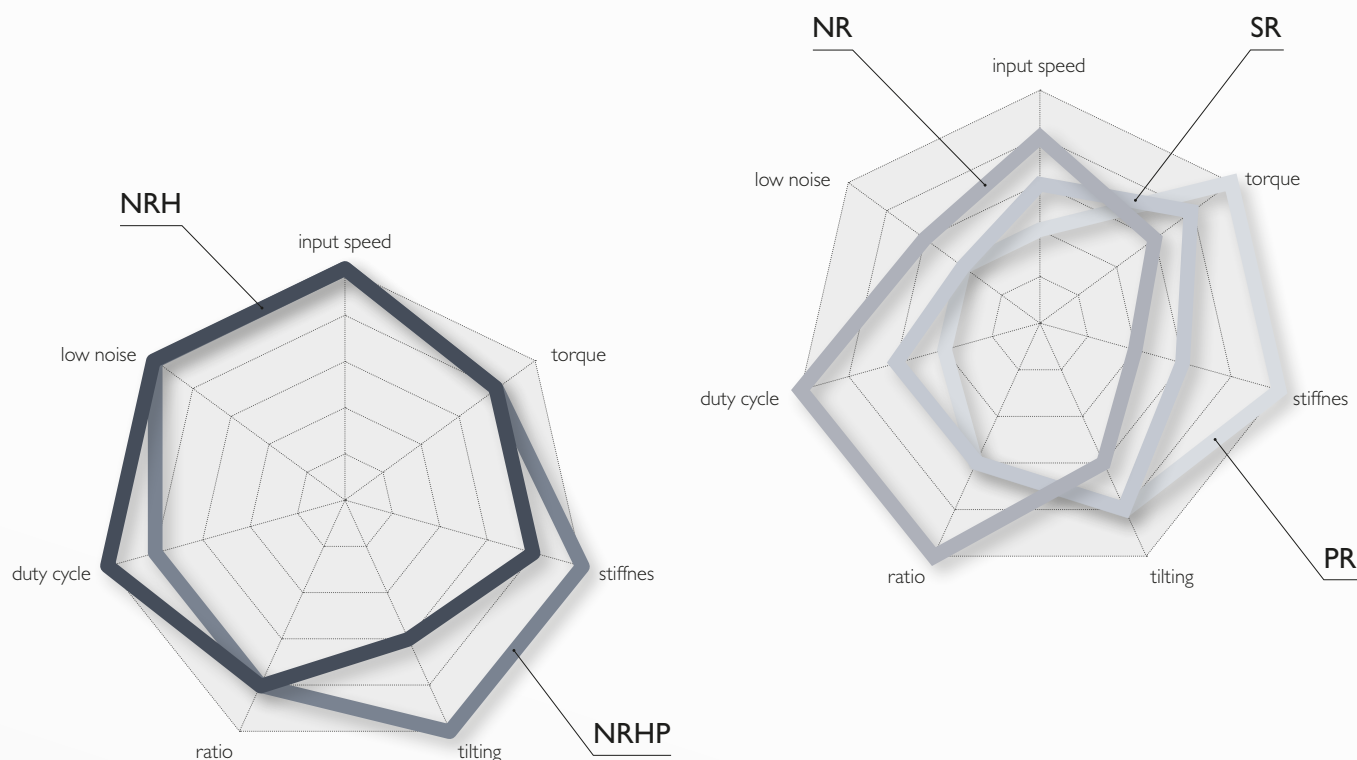


NRH type – For high precision

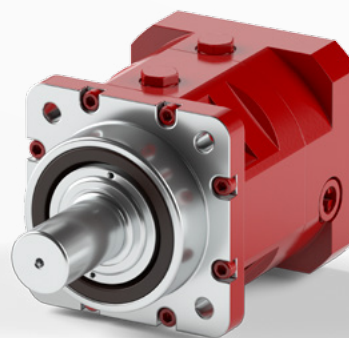
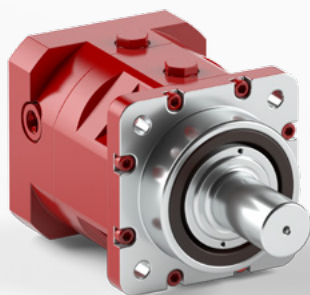
The NRH planetary gearbox with optimized helical gearset teeth was developed for highly demanding applications. These gearbox is perfect for applications ranging from basic machine design to printing, packaging, and robotics. Designed for high speed and acceleration – and for perfect production flows.

NRHP type – For high stiffness

The NRHP flange mount planetary gearbox offer superior torsional stiffness and tilt rigidity, perfectly suited for high precision processes and production flows.



NR, SR and PR



NR type – For high flexibility

For use in most applications that require torque, precision and high speed operation in continuous S1 and discontinuous S5 duty cycles.

SR type – For high torque

Without an increase in size, the SR range provides 33% more torque than the NR range and is used in discontinuous duty cycles of S5 and more.

PR type – For hyper torque

Without an increase in size, the PR range operates with 100% more torque than the NR and is used in discontinuous duty cycles of up to S5.

Five types to cover a wide range of application requirements

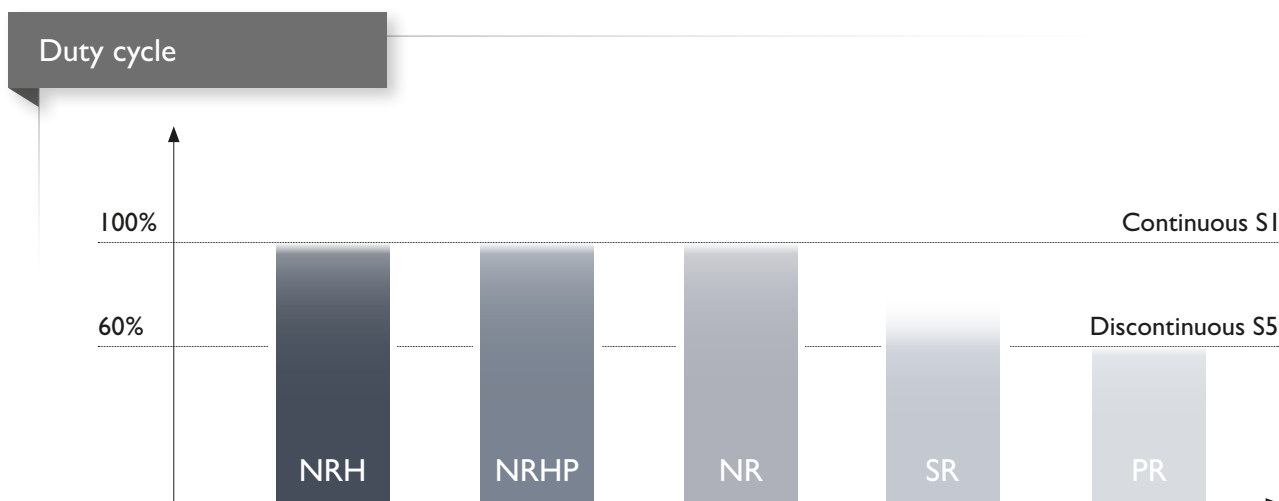
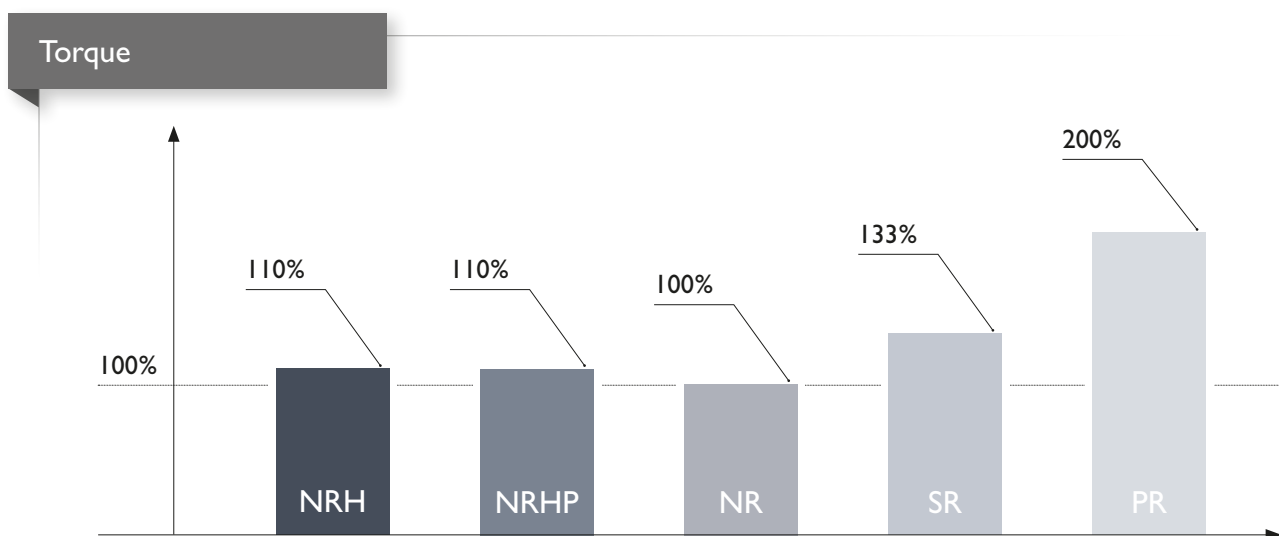
Our five types, NRH, NRHP, NR, SR, and PR provide you with a broad performance spectrum. Input speeds range up to 6000RPM, and output torques up to 5600 Nm.

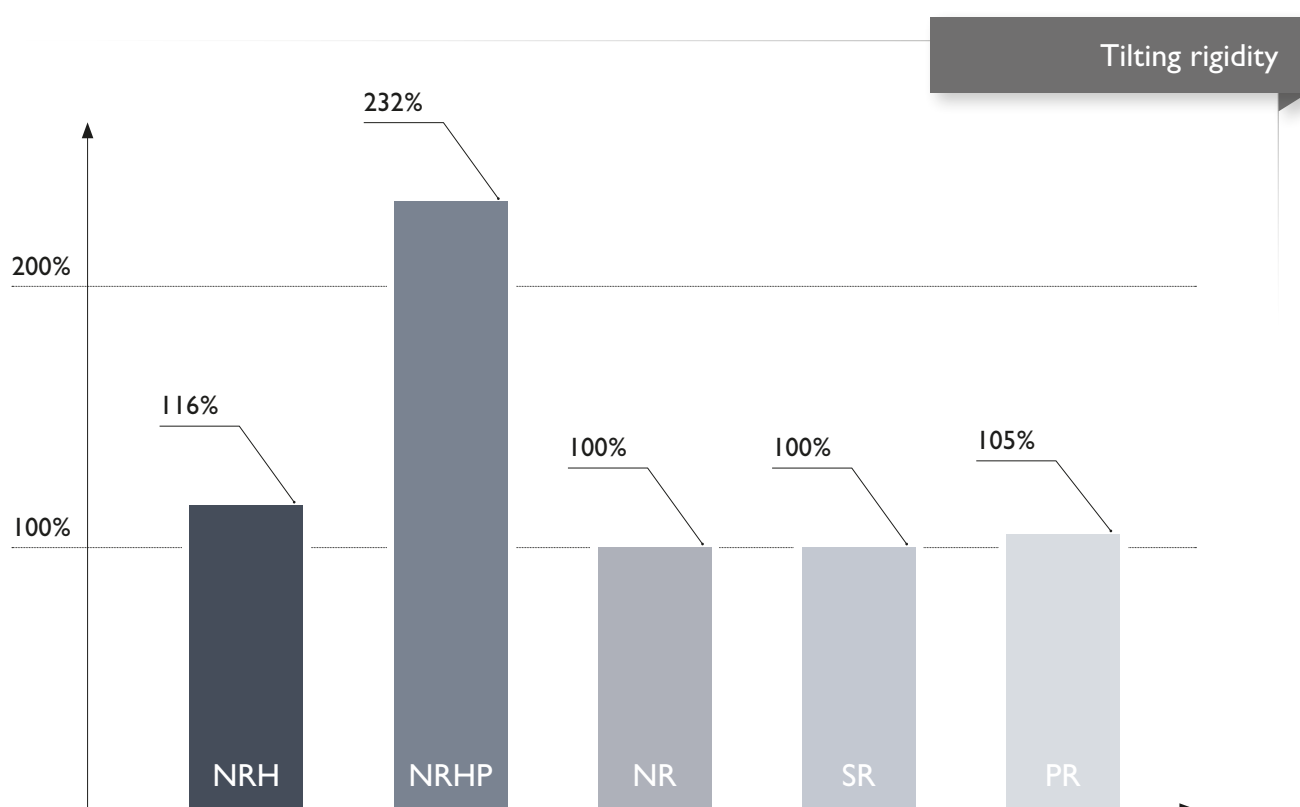
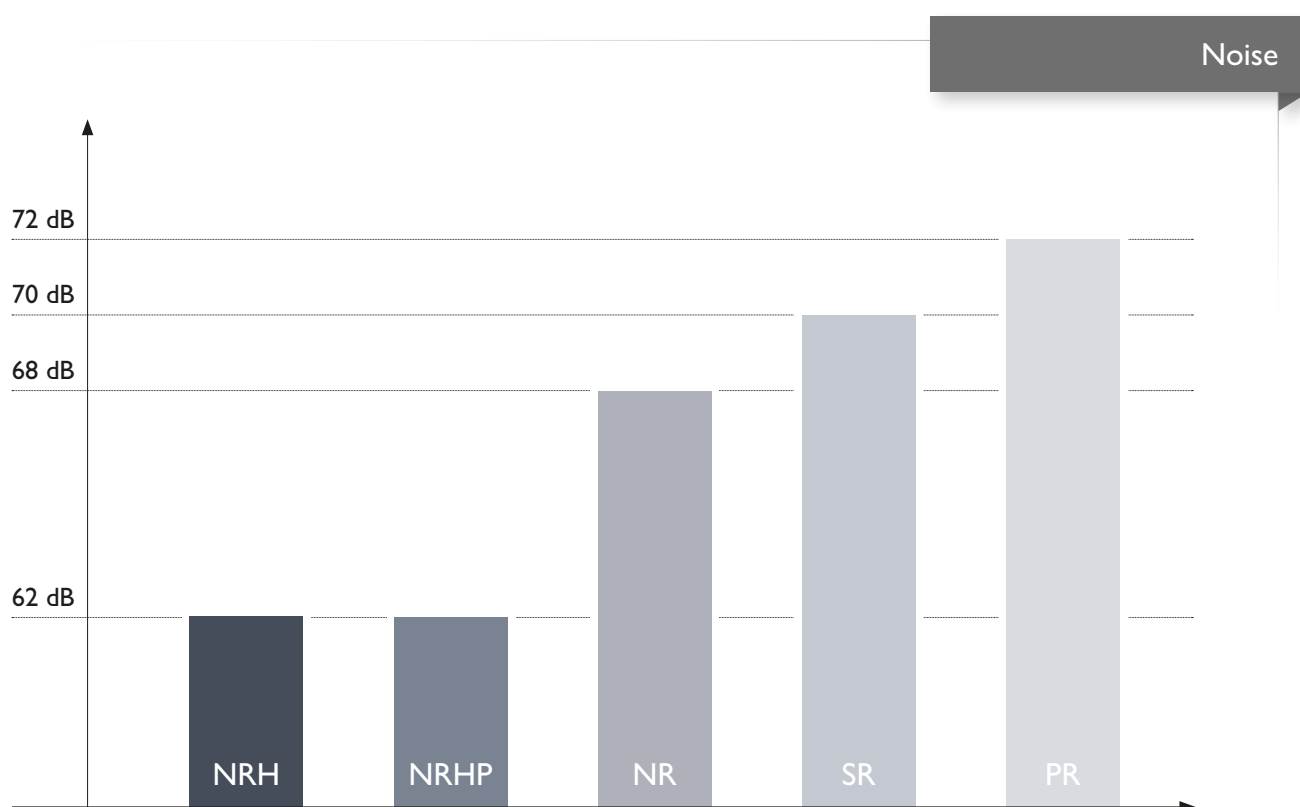
The NRH and NRHP types provide an excellent combination of performance characteristics: torque, speed, precision, low noise, and high duty cycle. The NRHP is suitable when high stiffness and tilting rigidity is required.

The NR type offers flexibility and modularity, with the largest range of sizes, stages, and ratios.

The SR and PR ranges focus specifically on high torque or even hyper torque which needs to be performed in a limited space.

For each gearbox size, the three ranges of the NR, SR, and PR family have the same body. Minor variations at the output adapt the product to the higher torque capacity.





Make your decision – Range, speed & torque

Use the technical summaries to make your preselection from the five main gearbox types. Base your gearbox selection on the most important requirements for your particular application: torque, gearbox size, duty cycle, angular backlash, ratio, and speed.

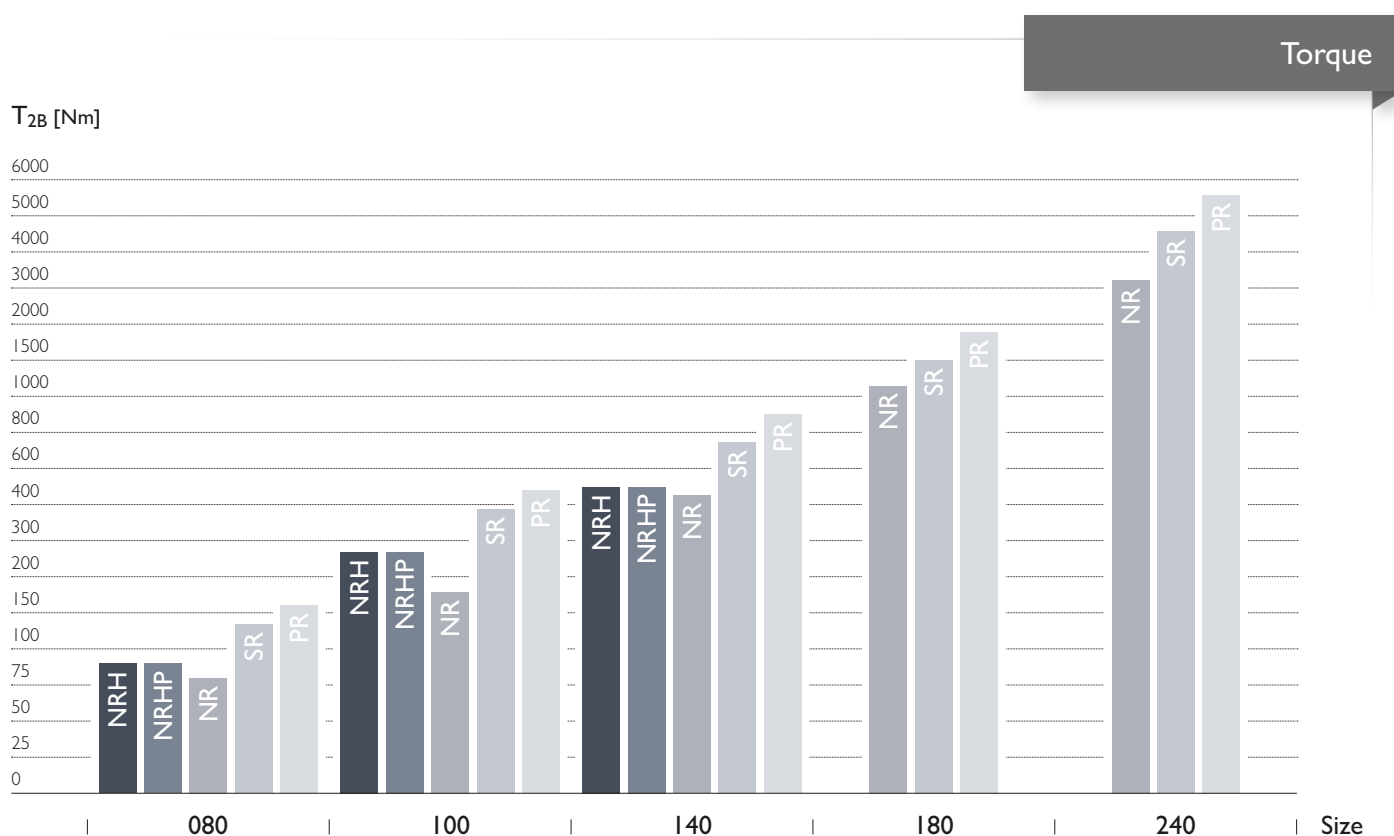
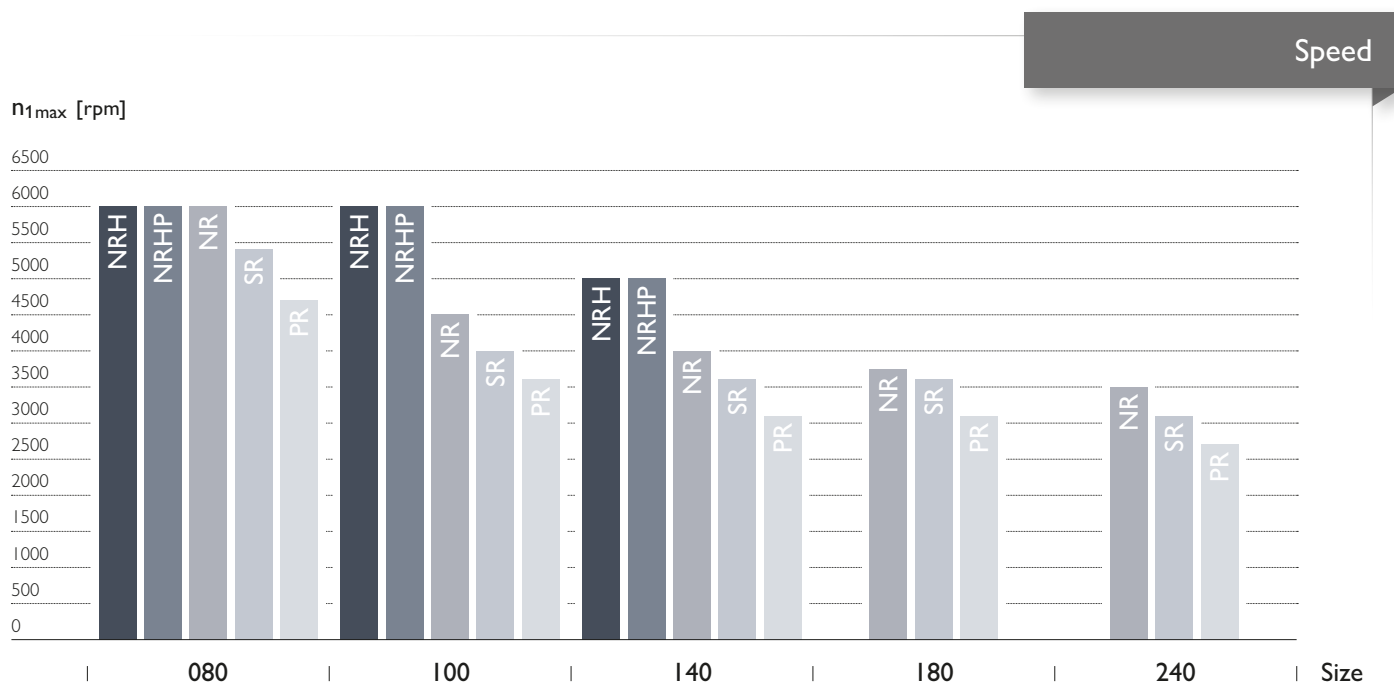
Select NRH or NRHP for high input speeds, or the NR type when modularity and a wide range of sizes, stages, and ratios is most important.

Choose the SR or PR type if your application requires high or hyper torque. The following graphs are based on a ratio of 12 in a discontinuous S5 duty cycle. Compare the maximum input speed $n_{1\max}$ and acceleration torque T_{2B} for the five types.

Types

		NRH	NRHP	NR	SR	PR
Torque		110%	110%	100%	around 133%	around 200%
Duty cycle	S5	60%	60%	60%	60%	60%
	S1	100%	100%	100%	–	–
Angular backlash	Precision	P 1 P 3 P 5	P 1 P 3 P 5	P 1 P 3 P 5 P 12	P 1 P 3 P 5 P 12	P 1 P 3 P 5 P 12
	arcmin	≤ 1 ≤ 3 ≤ 5	≤ 1 ≤ 3 ≤ 5	≤ 1 ≤ 3 ≤ 5 ≤ 12	≤ 1 ≤ 3 ≤ 5 ≤ 12	≤ 1 ≤ 3 ≤ 5 ≤ 12
Ratio *	1-stage	3, 4, 5, 7, 10	3, 4, 5, 7, 10	3, 4, 5, 7, 10	4	3
	2-stage	12, 16, 20, 25, 30, 35, 40, 50, 70, 100	12, 16, 20, 25, 30, 35, 40, 50, 70, 100	12, 16, 20, 25, 30, 35, 40, 50, 70, 100	12, 16, 20, 28, 40	9, 12, 15, 21, 30
	3-stage	–	–	36, 45, 60, 75, 90, 105, 120, 150, 210, 300	60, 80, 100, 112, 120, 140, 160, 200, 280, 400	36, 45, 60, 75, 90, 105, 120, 150, 210, 300

* Other ratios are available on request.



Great adaptability – Standard & optional inputs

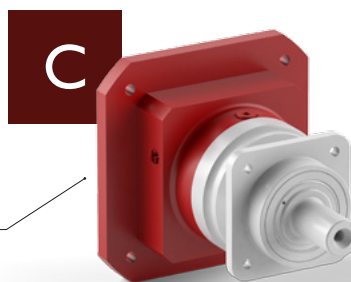
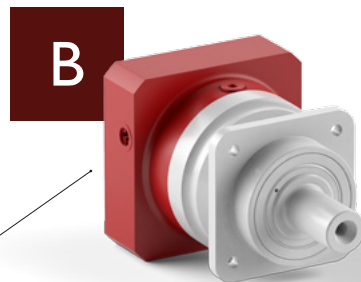
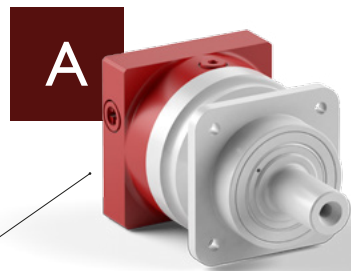
Due to our modular system, all common servo motors can be easily mounted on our planetary gearboxes. Optional inputs such as primary shaft can be provided on request. We have a standard flange solution for the most commonly used servo motors. Depending on the range of the gearbox, we offer a total of three standard input versions. Your selection of an input will depend on the geometric dimensions of the motor.

Standard outputs

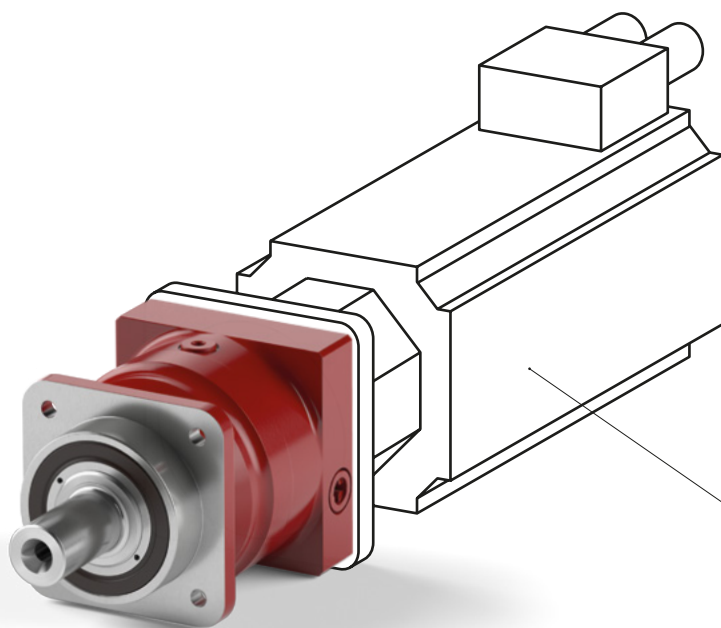
Small motor

Medium motor

Long motor



Standard inputs

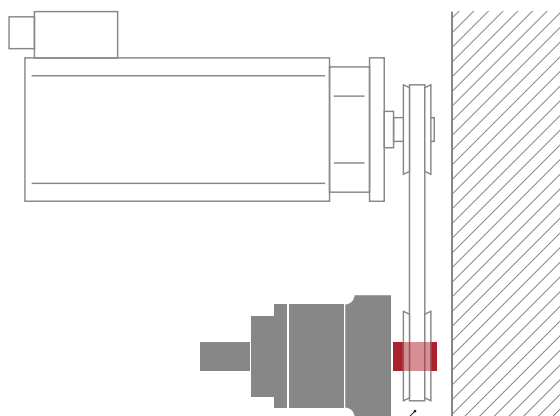


AM – Motor adaptability

Optional inputs

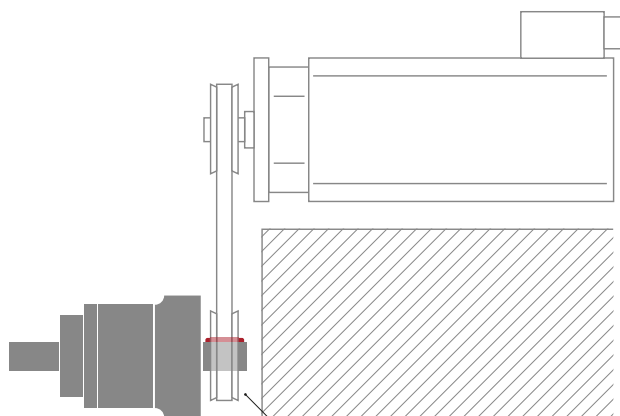
For special applications, in which the motor cannot be directly mounted on the gearbox, it is possible to fit the gearbox with an optional input shaft.

Example AL

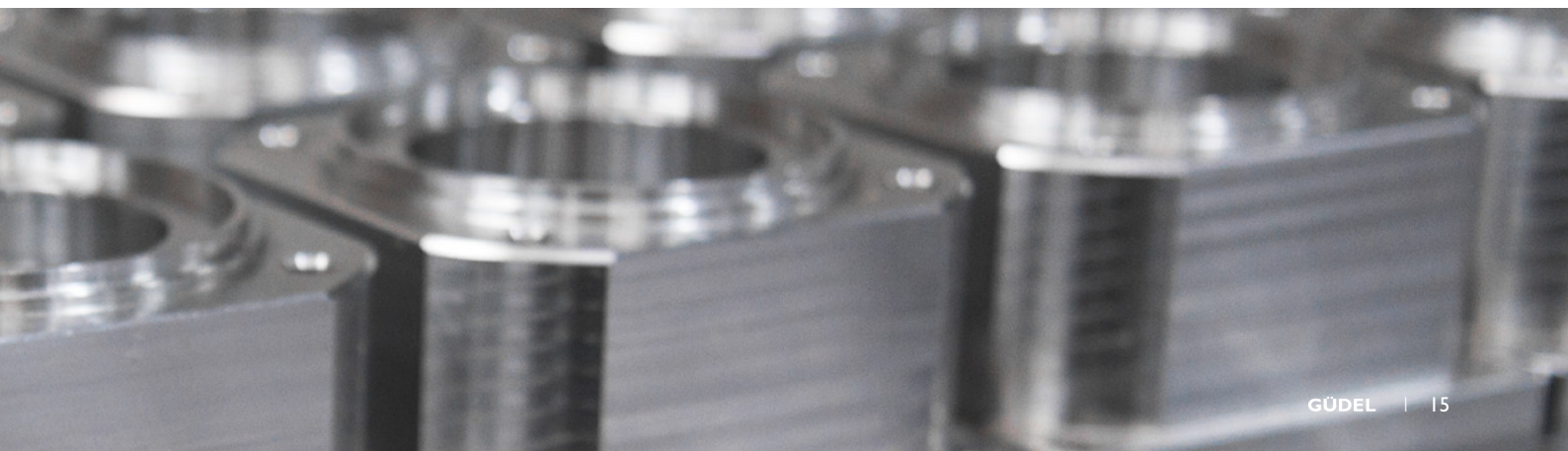


AL – Smooth primary shaft

Example AC



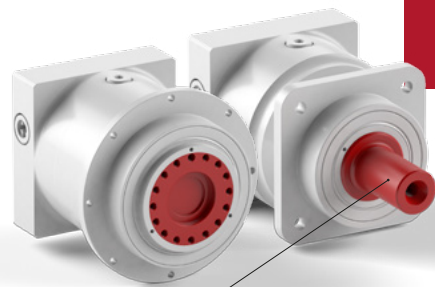
AC – Keyway primary shaft



Unlimited flexibility – standard and optional outputs

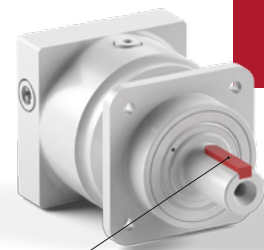
To meet your requirements, our planetary gearboxes offers six output options to cover the broadest possible range of applications. Three standard outputs are available in stock, with three additional outputs available upon request. Please don't hesitate to contact us if your application requires a configuration not shown here.

Standard outputs



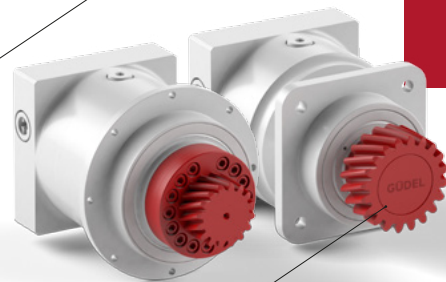
Smooth output shaft and flange

The reference standard output with dimensions according to market standards.



Keyway output shaft

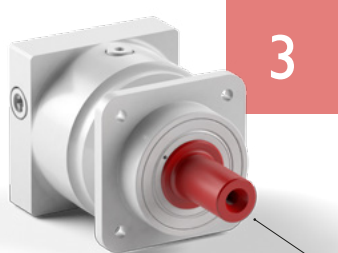
A keyway according to DIN 6885 can be added to the smooth shaft.



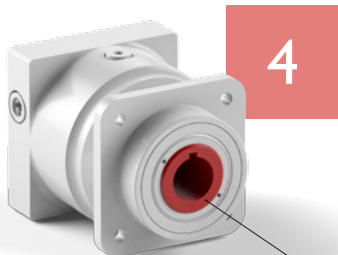
Integrated output pinion

The integrated output pinion is a unique solution – combining rack, pinion and gearbox. This function package creates an ideal drive train.





Optional outputs



Customized output shaft

Please contact us, if the standard output shafts do not meet your specification.

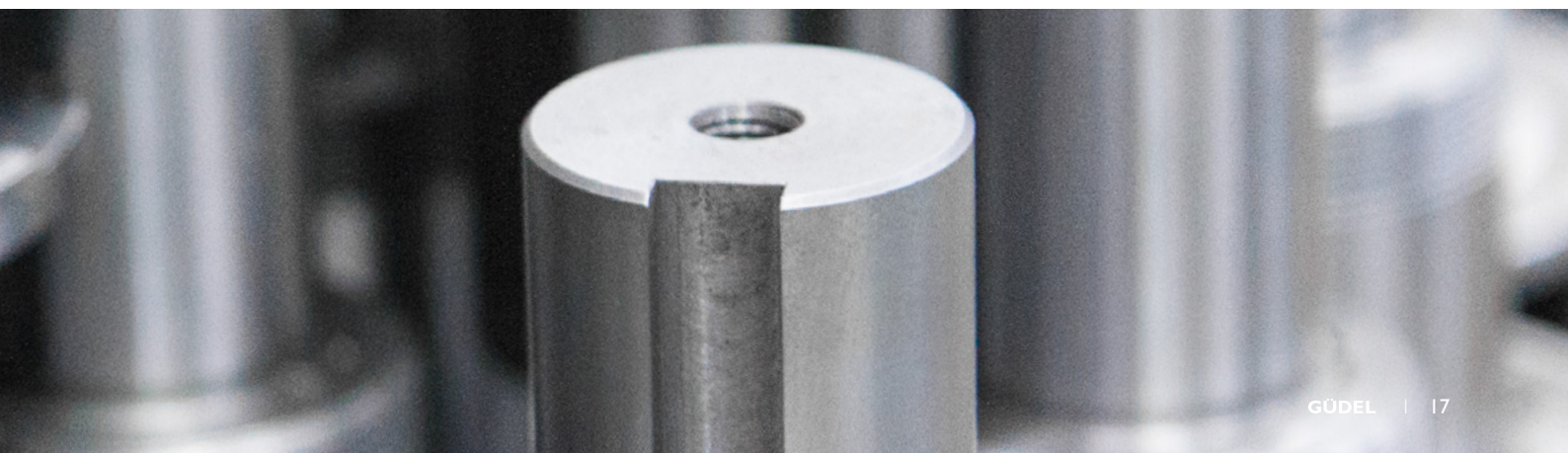


Hollow keyway output

On request we can provide you with a hollow keyway output. Please find the details on the technical information pages.

Splined output shaft

Splined output shafts are available on request. Please specify dimensions as well as type of spline (standard) and tolerances required.



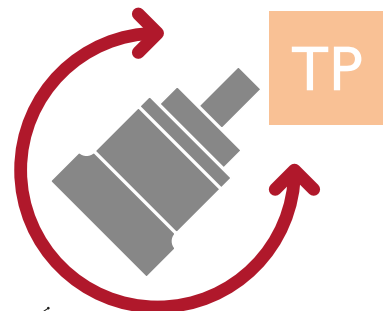
Reliability – Regardless of the mounting position

Our high-performance planetary gearboxes can be used in any mounting orientation. Whether your application requires a horizontal output (HI), vertical with upright facing output (VI), or vertical with downward-facing output (V2) – the universal TP configuration covers any orientation.

For specific applications, including continuous operation SI together with high input speed, we recommend the use of an additional air-vent plug (breather). This air-vent plug can be installed at any time – even as a retrofit on installed gearboxes.

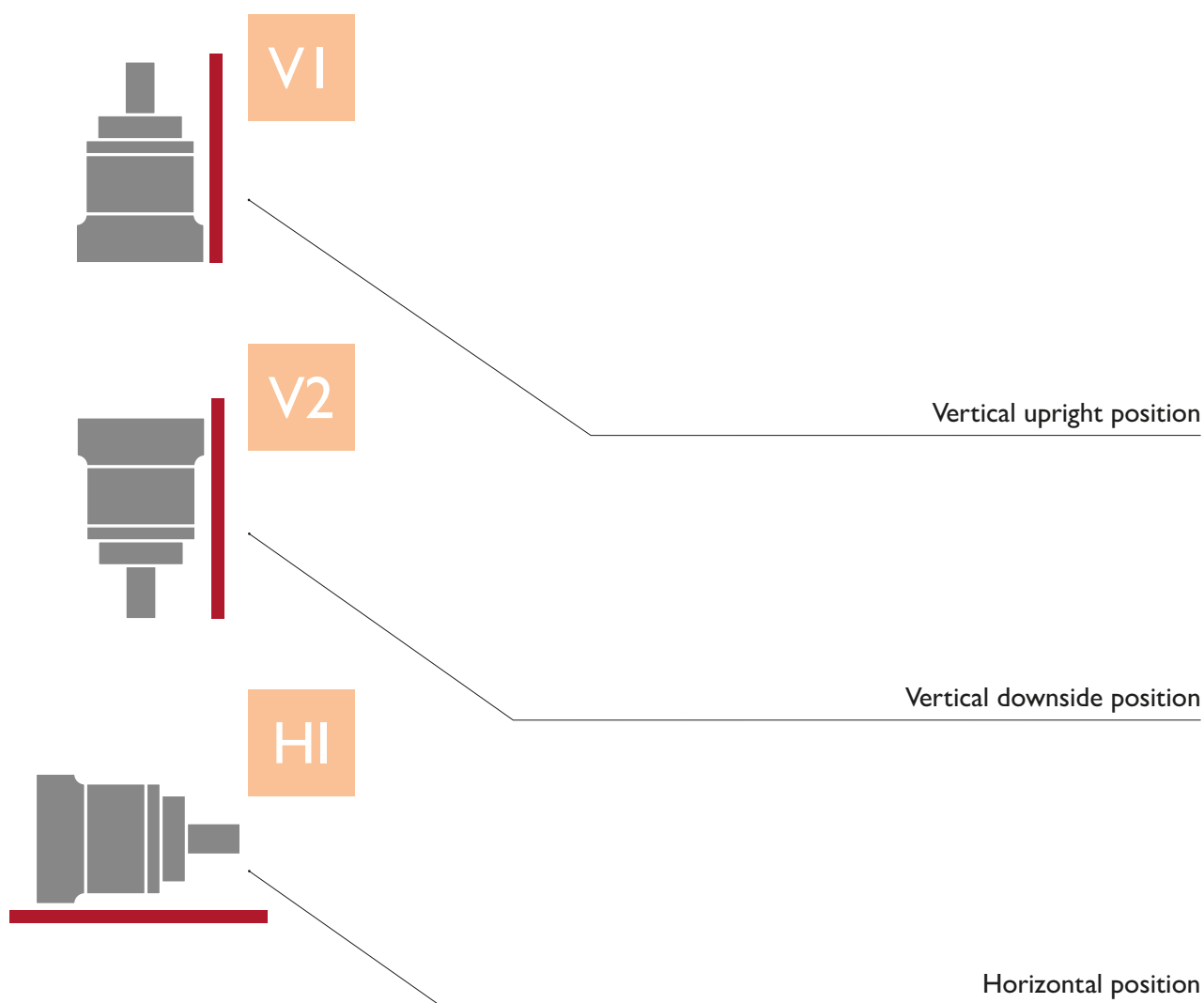
In order to optimize gearbox performance, we recommend specifying the actual mounting position VI, V2 or HI, especially for ratios requiring a 3-stage gearbox.

Mounting positions

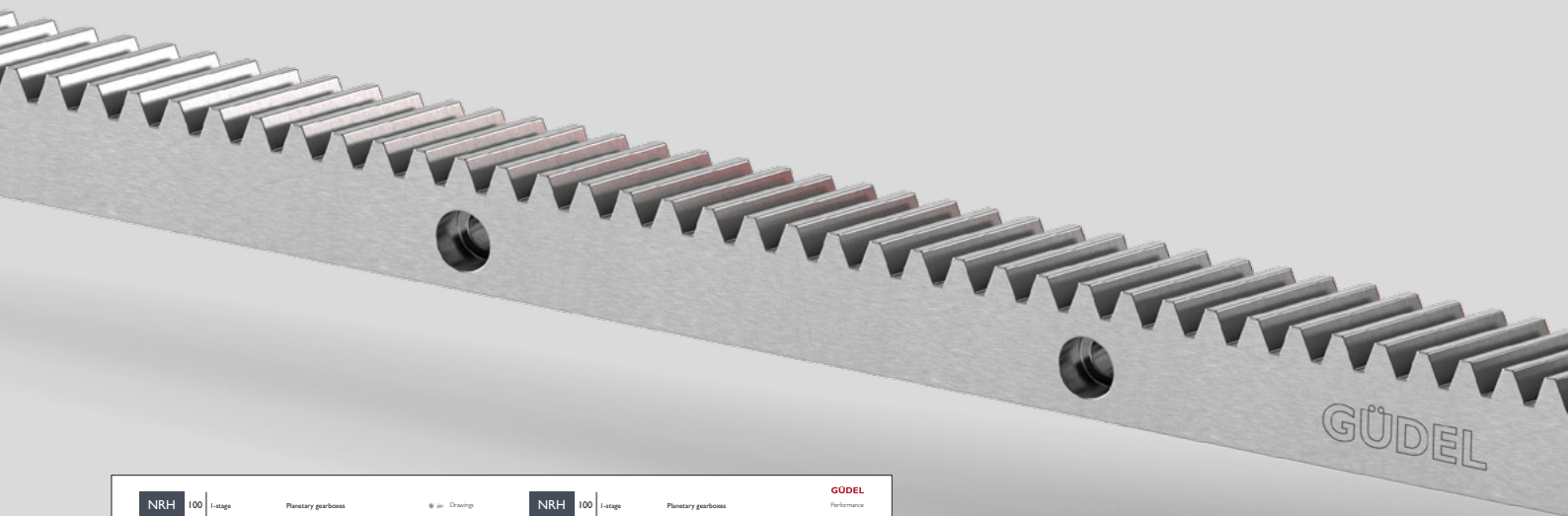


All positions





For applications in the food, pharmaceutical or clean-room sectors, we can supply a wide range of components with special coatings, stainless steel finishes, or specialized lubricants. If you can't find the product you're looking for in this catalog, please don't hesitate to contact us directly.

[illegible]

Detailed information on the
technical data sheets
on pages 28 et seq.


Pinion


Rack


Quality


Q7


Q9


Helical

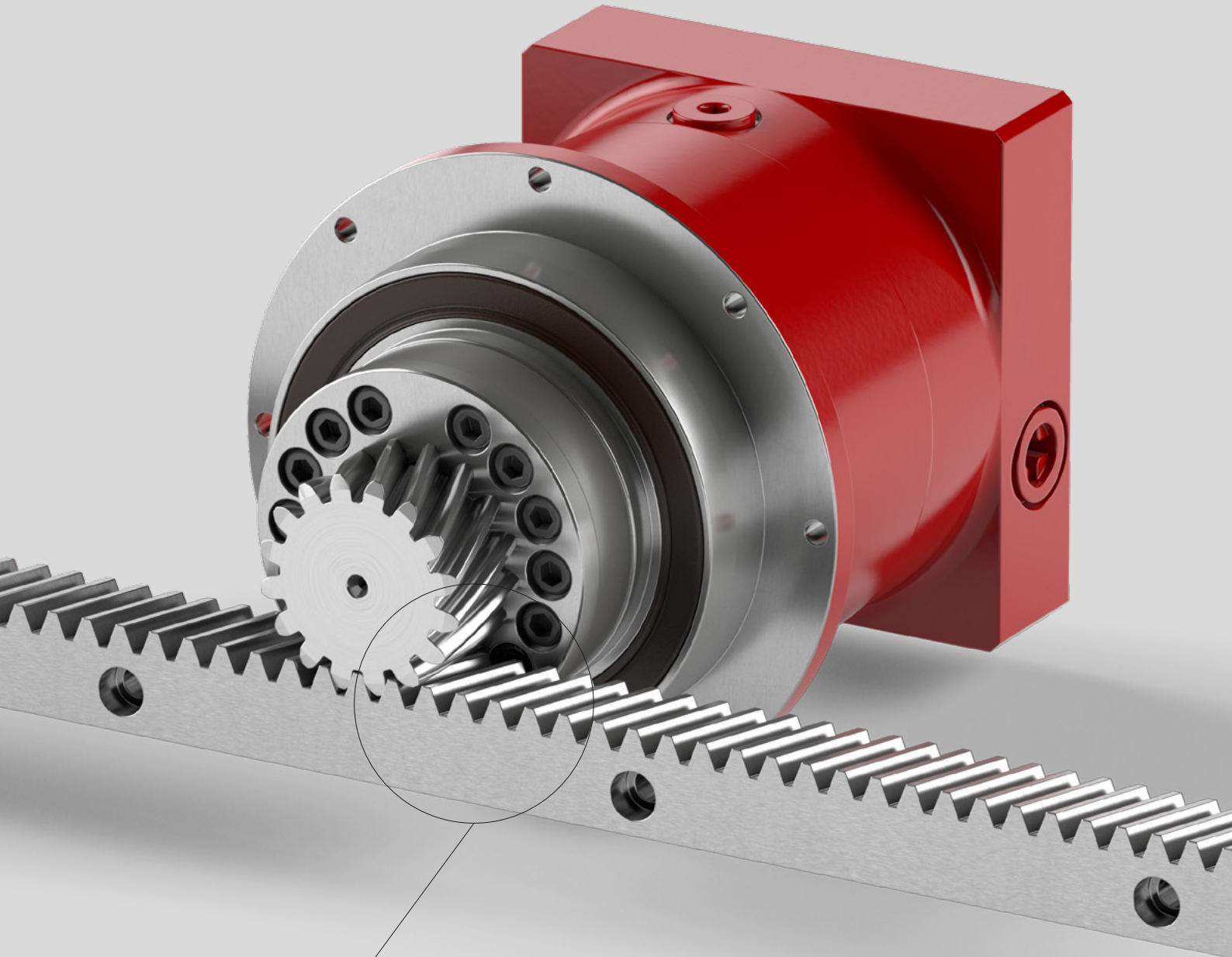

Steel


Hardened


Ground


Milled

	High-end applications		Standard applications		Basic applications	
Rack	Q6		Q7		Q9	
Gearbox	P1	P3	P3	P5	P5	P12
Precision	High				Standard	
Feed force	High		Medium		Elevated	



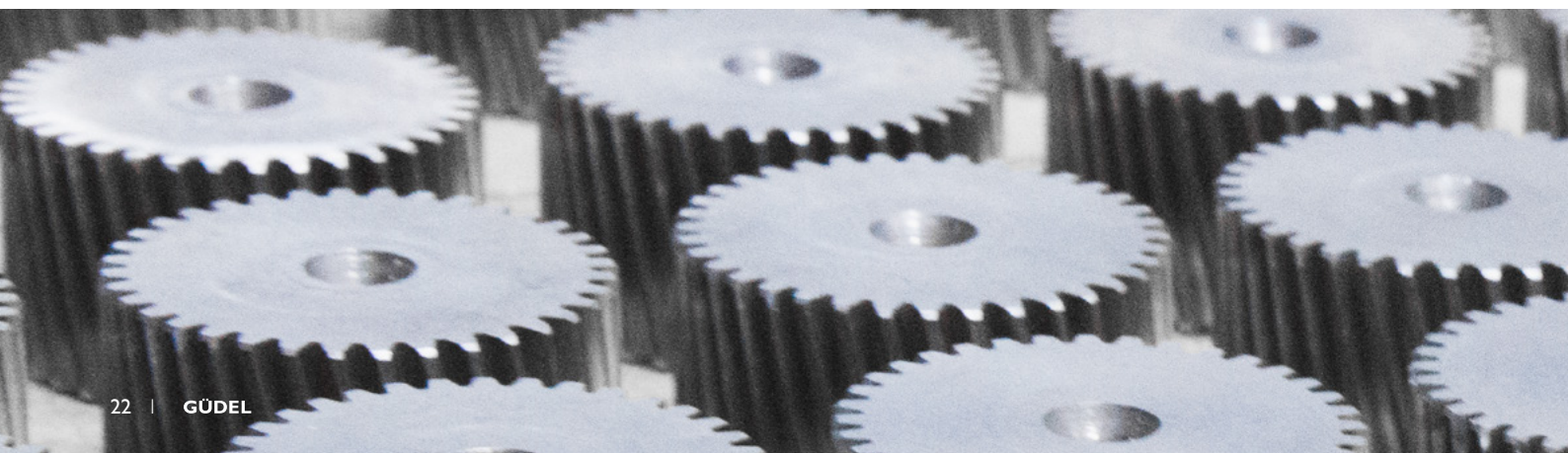
Quality in accordance with
DIN 3962 Q6 hardened
and ground

Find your right size – Performance & configuration

High performance

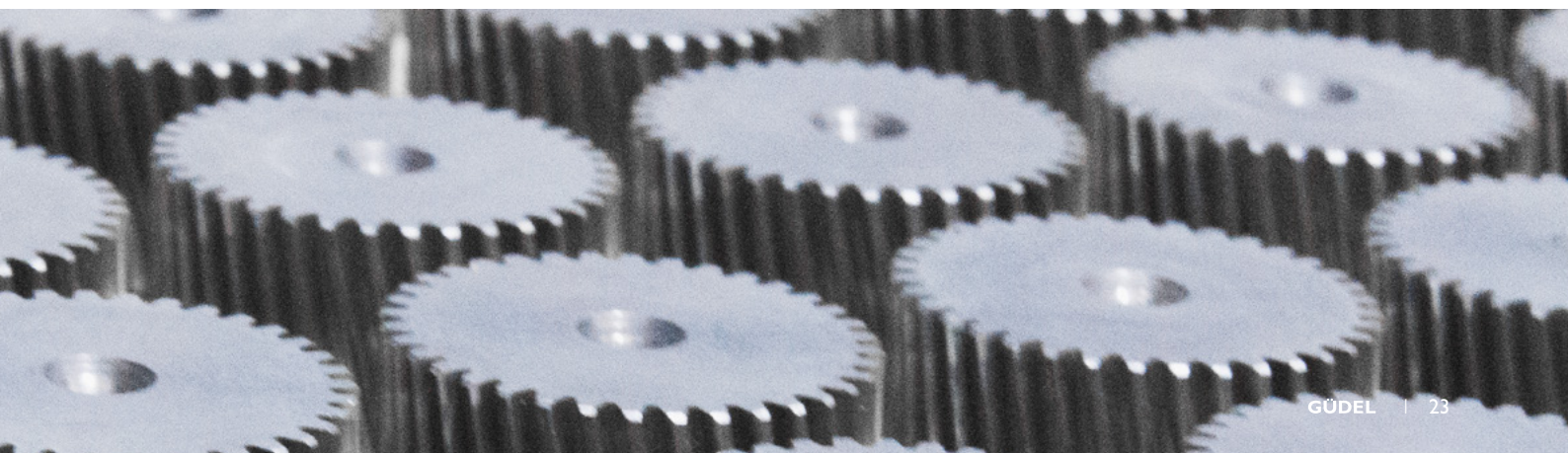
High stiffness

Size	NRH			NRHP		
	T _{2B} [Nm]	Stage	Page	T _{2B} [Nm]	Stage	Page
080	≤ 110	1	28-29	≤ 110	1	40-41
		2	30-31		2	42-43
100	≤ 350	1	32-33	≤ 350	1	44-45
		2	34-35		2	46-47
140	≤ 650	1	36-37	≤ 650	1	48-49
		2	38-39		2	50-51



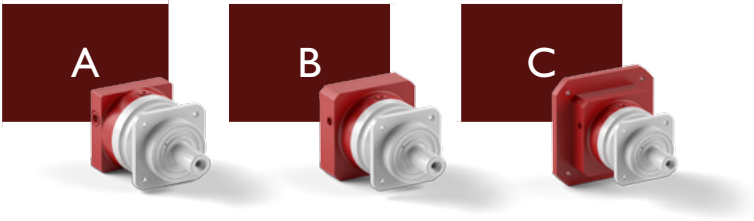
High modularity
High torque
Hyper torque

NR			SR			PR			Size
T _{2B} [Nm]	Stage	Page	T _{2B} [Nm]	Stage	Page	T _{2B} [Nm]	Stage	Page	
≤ 100	1	52-53	≤ 150	1	82-83	≤ 160	1	102-103	080
	2	54-55		2			2		
	3	56-57		3	84-85		3	104-105	
≤ 304	1	58-59	≤ 404	1	86-87	≤ 556	1	106-107	100
	2	60-61		2			2		
	3	62-63		3	88-89		3	108-109	
≤ 600	1	64-65	≤ 750	1	90-91	≤ 900	1	110-111	140
	2	66-67		2			2		
	3	68-69		3	92-93		3	112-113	
≤ 1150	1	70-71	≤ 1500	1	94-95	≤ 1925	1	114-115	180
	2	72-73		2			2		
	3	74-75		3	96-97		3	116-117	
≤ 3800	1	76-77	≤ 4800	1	98-99	≤ 5600	1	118-119	240
	2	78-79		2			2		
	3	80-81		3	100-101		3	120-121	



Find your right configuration – Available inputs and outputs

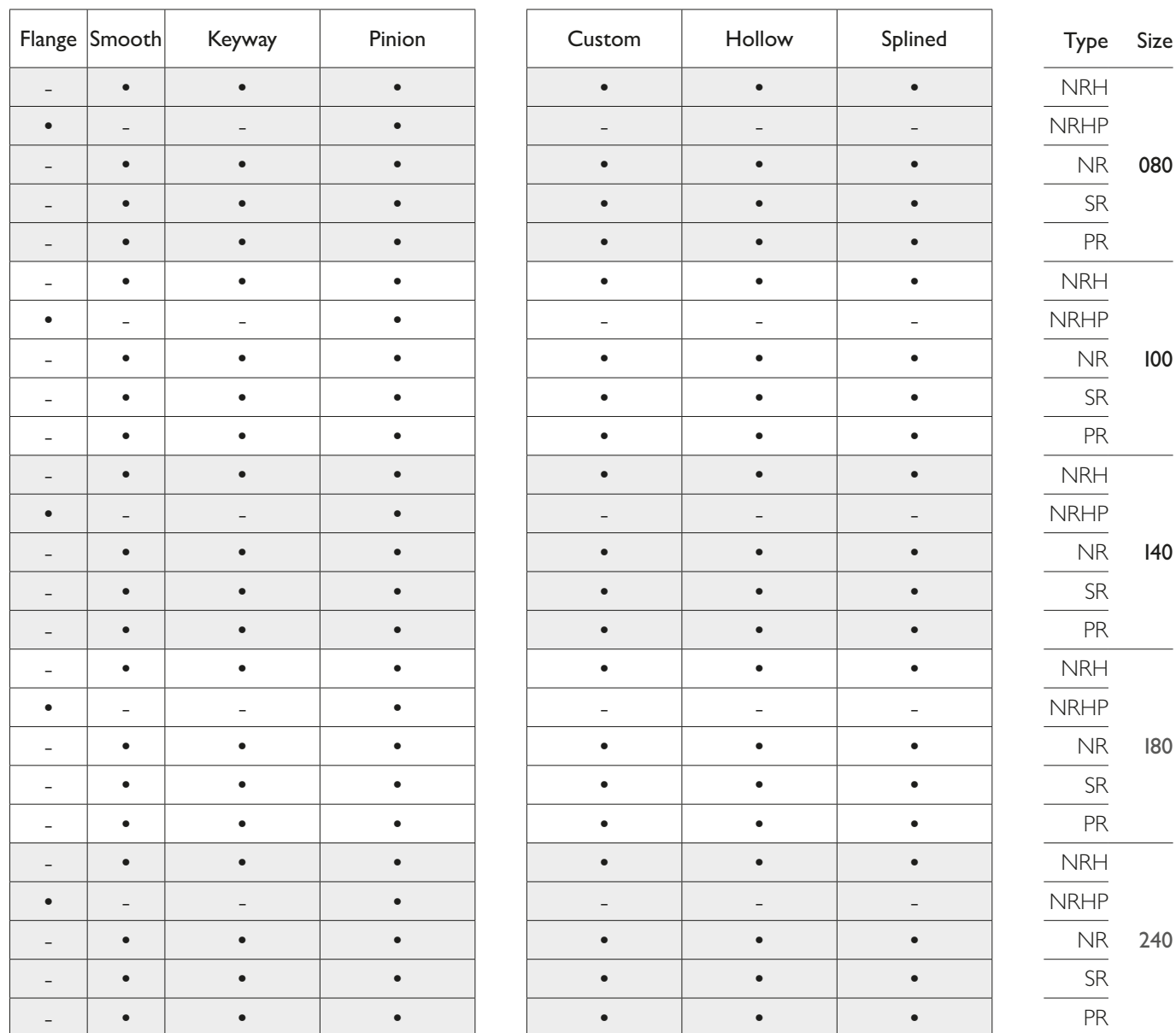
Standard inputs



Size	Type	Small	Medium	Long
080	NRH	•	•	•
	NRHP	•	•	•
	NR	•	•	*
	SR	•	•	*
	PR	•	•	*
100	NRH	•	•	•
	NRHP	•	•	•
	NR	•	•	*
	SR	•	•	*
	PR	•	•	*
140	NRH	•	•	•
	NRHP	•	•	•
	NR	•	•	•
	SR	•	•	•
	PR	•	•	•
180	NRH	-	-	-
	NRHP	-	-	-
	NR	•	•	•
	SR	•	•	•
	PR	•	•	•
240	NRH	-	-	-
	NRHP	-	-	-
	NR	•	•	*
	SR	•	•	*
	PR	•	•	*

• Available / * We provide additional flanges for bigger motors on request.

Optional outputs



- Available / * We provide additional flanges for bigger motors on request.



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Technical data sheets

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Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	65	75	76	76	60
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	85	110	110	110	90
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 900	2 900	2 900	3 100	3 100
Maximum input speed S5		n _{1max}	[rpm]	5 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	50	50	50	35
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	72	72	72	44
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	2 600	2 600	2 800	2 800
Maximum input speed S1		n _{1max}	[rpm]	–	2 900	2 900	3 100	3 100
Emergency stop torque ^{d)}		T _{2not}	[Nm]	250	250	250	250	200
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	4				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	9	10.7	11	9.9	7.7
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285				
Max. axial force on output shaft ^{f)}		F _a max	[N]	3 600				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	1.103	0.881	0.796	0.724	0.688
	Ø 14			1.093	0.871	0.786	0.714	0.678
	Ø 19			1.856	1.634	1.549	1.477	1.441
	Ø 24			2.184	1.962	1.877	1.805	1.769

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an Input Ø of 24 mm in I-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			P1		P5
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1×10⁶ for the rack; 1×10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

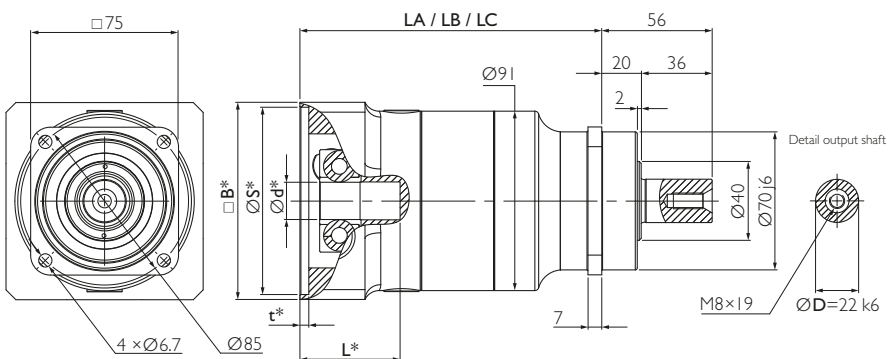
A	for motor shaft	$L \leq 50$
B	for motor shaft	$50 < L \leq 55$
C	for motor shaft	$55 < L \leq 60$

		1-stage	2-stage
LA	[mm]	116.1	153.1
LB	[mm]	125.1	162.1
LC	[mm]	130.1	167.1

Output

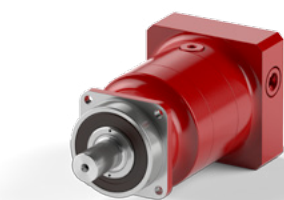
Standard

Optional



* depending on the motor: See pages 100 et seq.

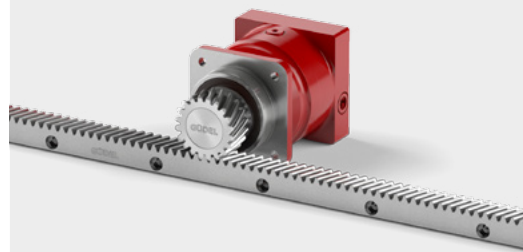
Option 3 on request. Adjustments can reduce capacity.



Example NRH 080 A0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	—	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *	i		2-stage									
			12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	75	90	90	90	75	90	90	90	90	60
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	85	110	110	110	90	110	110	110	110	90
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	3 300	3 500	3 500	3 500	3 500	3 500	3 500	3 800	4 500	4 500
Maximum input speed S5	n _{1max}	[rpm]	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	50	50	50	50	40	50	50	50	50	35
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	72	72	72	72	72	72	72	72	72	47
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	2 300	3 100	3 100	3 100	3 100	3 100	3 100	3 400	4 000	4 000
Maximum input speed S1	n _{1max}	[rpm]	3 300	3 300	3 500	3 500	3 500	3 500	3 500	3 800	4 500	4 500
Emergency stop torque ^{d)}	T _{2not}	[Nm]	250	250	250	250	250	250	250	250	250	200
Efficiency	η	[%]	94									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	5.5									
Angular backlash	i _k	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	8.7	10.7	10.7	10.6	8.7	10.6	10	9.9	9.3	7.3
Noise ⁱ⁾	L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	3 600									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.864	0.851	0.845	0.773	0.685	0.713	0.683	0.682	0.681
	Ø 14			0.854	0.841	0.835	0.763	0.675	0.703	0.673	0.672	0.671
	Ø 19			1.617	1.604	1.598	1.526	1.438	1.466	1.436	1.435	1.434
	Ø 24			1.945	1.932	1.926	1.854	1.766	1.794	1.764	1.763	1.762

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an Input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			P1		P5
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

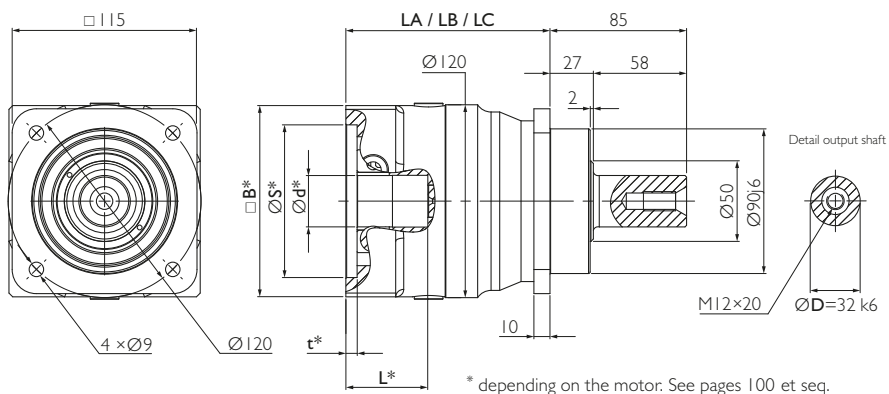
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

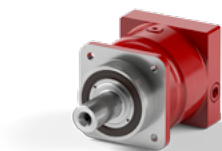
Input

A	for motor shaft	$L \leq 54$	$\varnothing d \leq 24$	result in LA
B	for motor shaft	$54 < L \leq 65$	$\varnothing d \leq 38$	result in LB
C	for motor shaft	$65 < L \leq 80$	$\varnothing d \leq 38$	result in LC

		I-stage	2-stage
LA	[mm]	130	181
LB	[mm]	141	192
LC	[mm]	161	212



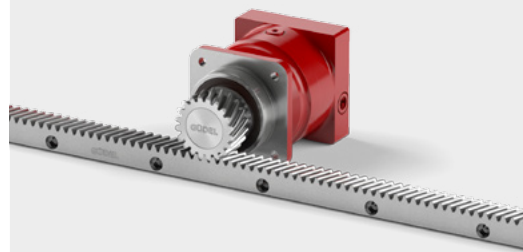
* depending on the motor: See pages 100 et seq.



Example NRH 100 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

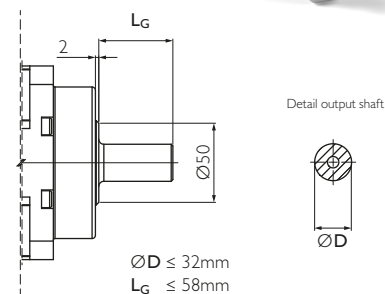
m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Output

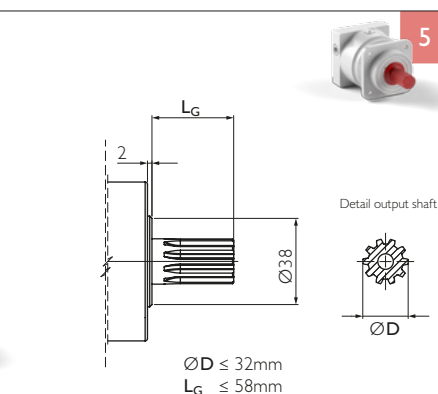
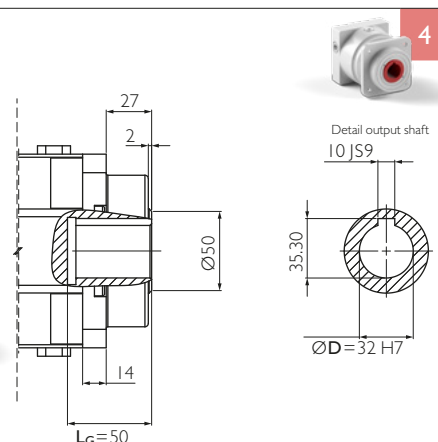
Standard



Optional



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42" hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	200	260	270	250	150
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	320	350	350	330	265
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 500	2 500	2 500	2 800	2 800
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	175	175	175	115
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	250	250	250	190
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	2 200	2 200	2 500	2 500
Maximum input speed S1		n _{1max}	[rpm]	–	2 500	2 500	2 800	2 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	500	630	630	630	630
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	7				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	34	42	44	44	37
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	5 700				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	4.56	3.061	2.504	2.047	1.806
	Ø 14			4.54	3.041	2.484	2.027	1.786
	Ø 19			5.3	3.801	3.244	2.787	2.546
	Ø 24			5.62	4.121	3.564	3.107	2.866
	Ø 32			6.66	5.161	4.604	4.147	3.906
	Ø 35			12.79	11.291	10.734	10.277	10.036
	Ø 38			12.76	11.261	10.704	10.247	10.006

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an Input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			P1			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

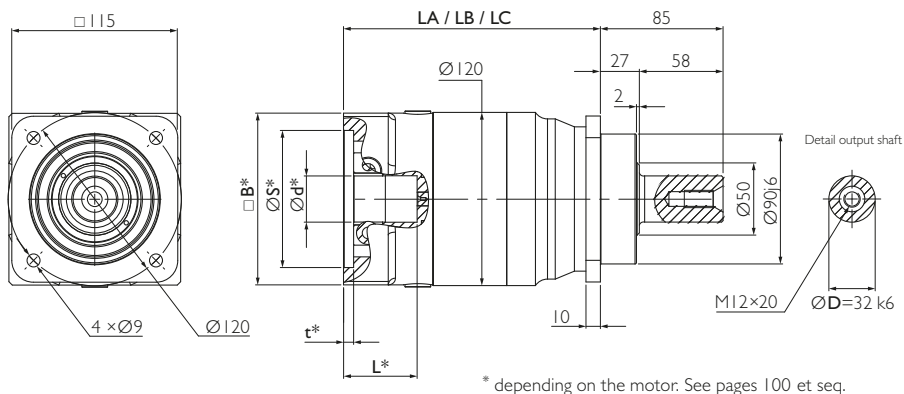
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 54$	$\varnothing d \leq 24$	result in LA
B	for motor shaft	$54 < L \leq 65$	$\varnothing d \leq 38$	result in LB
C	for motor shaft	$65 < L \leq 80$	$\varnothing d \leq 38$	result in LC

		1-stage	2-stage
LA	[mm]	130	181
LB	[mm]	141	192
LC	[mm]	161	212



* depending on the motor: See pages 100 et seq.

Output

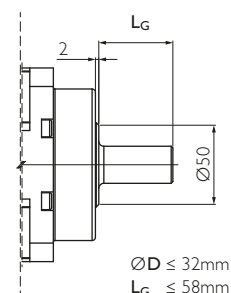
Optional



0



3



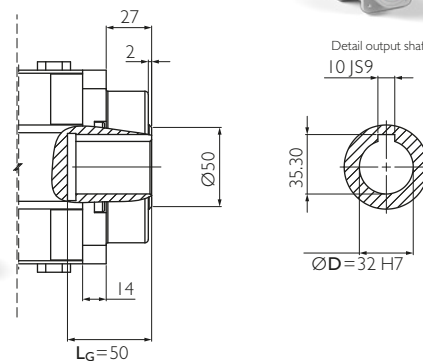
Detail output shaft



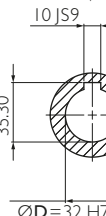
Option 3 on request. Adjustments can reduce capacity.



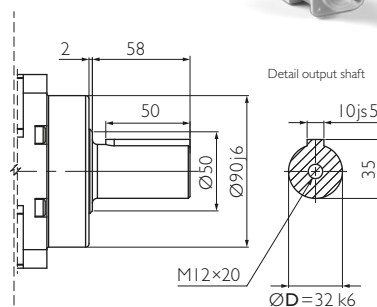
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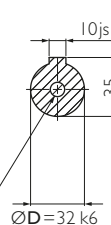
Detail output shaft



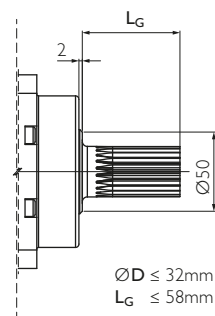
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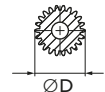
Detail output shaft



5



Detail output shaft



Option 5 on request. Adjustments can reduce capacity.

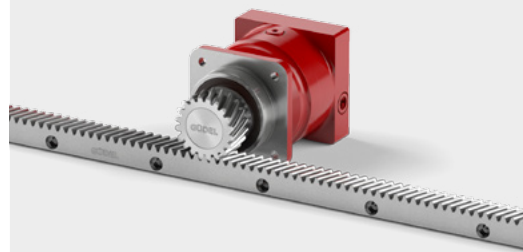
Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

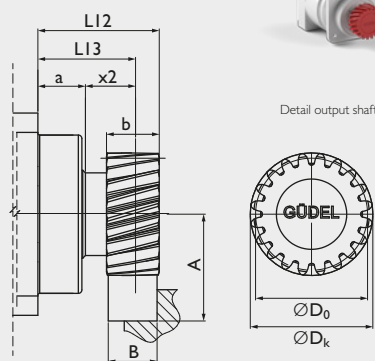
Quality 6f24 DIN 3962 / 63 / 67

Your ideal drive train

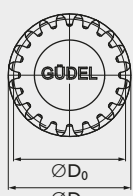
Function Package with gearbox, rack and pinion from Güdel



2



Detail output shaft



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	200	260	270	270	200	270	260	270	250	150
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	320	350	350	350	320	350	350	320	330	265
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 900	3 100	3 100	3 100	3 100	3 100	3 100	3 500	4 200	4 200
Maximum input speed S5		n _{1max}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	175	175	175	175	175	175	175	175	175	115
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	250	250	250	250	250	250	250	250	250	190
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	2 000	2 200	2 800	2 800	2 800	2 800	2 800	3 100	3 800	3 800
Maximum input speed S1		n _{1max}	[rpm]	2 900	3 100	3 100	3 100	3 100	3 100	3 100	3 500	4 200	4 200
Emergency stop torque ^{d)}		T _{2not}	[Nm]	630	630	630	630	630	630	630	630	630	630
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	12									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	34	44	44	44	34	44	42	44	44	37
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	5 700									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	2.934	2.841	2.806	2.34	1.786	1.964	1.771	1.765	1.761	1.758
	Ø 14			2.914	2.821	2.786	2.32	1.766	1.944	1.751	1.745	1.741	1.738
	Ø 19			3.674	3.581	3.546	3.08	2.526	2.704	2.511	2.505	2.501	2.498
	Ø 24			3.994	3.901	3.866	3.4	2.846	3.024	2.831	2.825	2.821	2.818
	Ø 32			5.034	4.941	4.906	4.44	3.886	4.064	3.871	3.865	3.861	3.858
	Ø 35			11.164	11.071	11.036	10.57	10.016	10.194	10.001	9.995	9.991	9.988
	Ø 38			11.134	11.041	11.006	10.54	9.986	10.164	9.971	9.965	9.961	9.958

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	400	490	500	470	310
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	520	650	650	650	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 100	2 100	2 100	2 600	2 600
Maximum input speed S5		n _{1max}	[rpm]	3 500	4 000	4 000	4 000	4 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	260	260	260	130
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	370	370	370	220
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	1 900	1 900	2 300	2 300
Maximum input speed S1		n _{1max}	[rpm]	–	2 100	2 100	2 600	2 600
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 260
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	15				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	90	101	107	106	98
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	11.83	7.32	5.647	4.224	3.499
	Ø24			12.15	7.64	5.967	4.544	3.819
	Ø32			18.01	13.5	11.827	10.404	9.679
	Ø35			18.6	14.09	12.417	10.994	10.269
	Ø38			19.07	14.56	12.887	11.464	10.739
	Ø42			19.4	14.89	13.217	11.794	11.069
	Ø48			23.38	18.87	17.197	15.774	15.049

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			P1			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

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on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

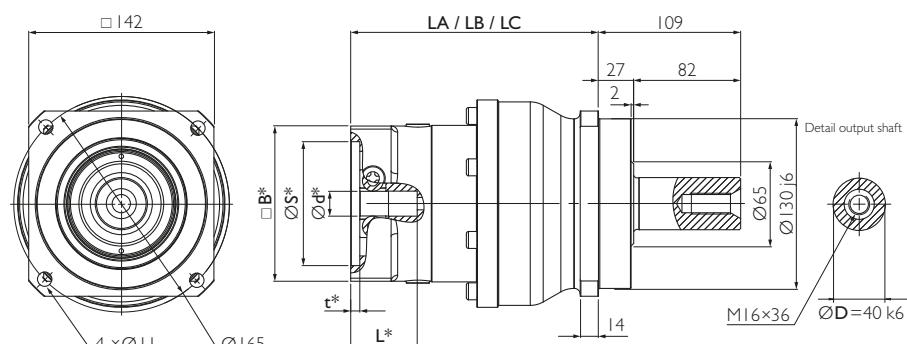
A	for motor shaft	$L \leq 54$
B	for motor shaft	$54 < L \leq 65$
C	for motor shaft	$65 < L \leq 80$

		1-stage	2-stage
LA	[mm]	160	193
LB	[mm]	212	204
LC	[mm]		224

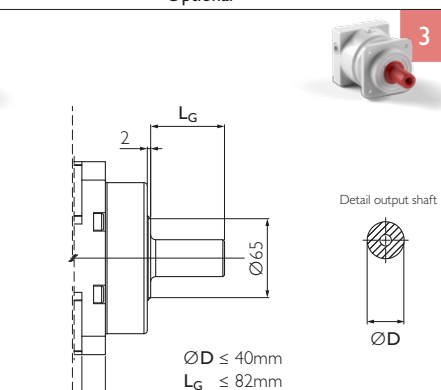
Output

Standard

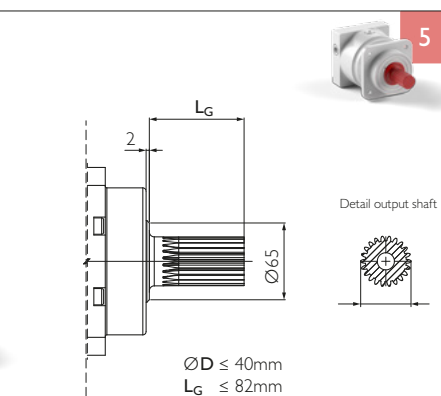
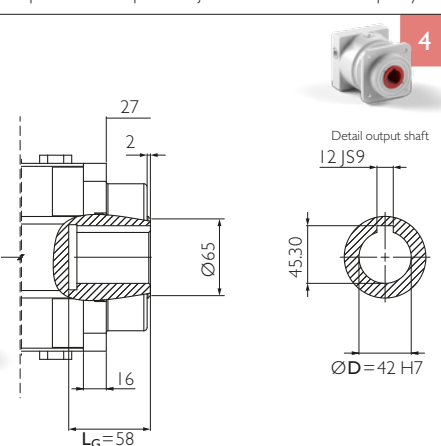
Optional



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.

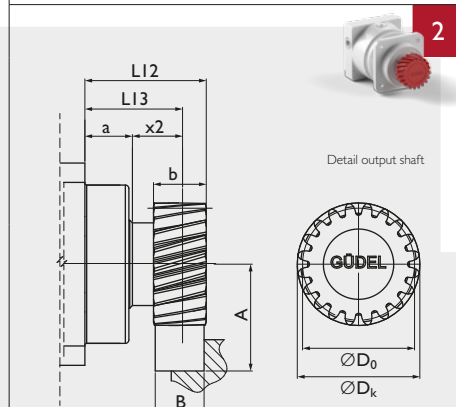
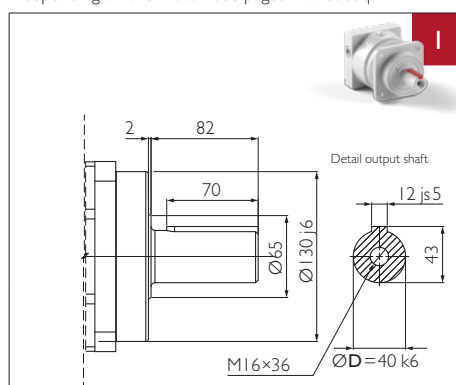
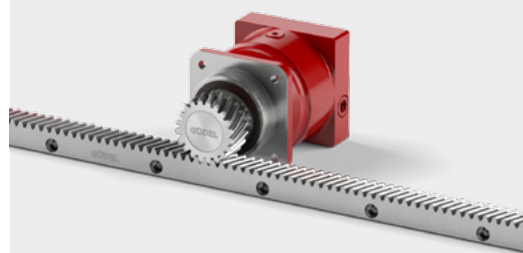


Option 5 on request. Adjustments can reduce capacity.

Example NRH 140 A0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	400	490	500	500	400	500	490	500	470	310
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	520	650	650	650	600	650	650	650	650	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 700	2 900	2 900	2 900	2 900	2 900	2 900	3 200	3 200	3 900
Maximum input speed S5		n _{1max}	[rpm]	4 500	4 500	4 500	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	260	260	260	260	260	260	260	260	260	150
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	370	370	370	370	370	370	370	370	370	220
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 900	2 600	2 600	2 600	2 600	2 600	2 600	2 900	2 900	3 500
Maximum input speed S1		n _{1max}	[rpm]	2 700	2 900	2 900	2 900	2 900	2 900	2 900	3 200	3 200	3 900
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 260
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	17									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	80	91	97	97	80	97	91	97	95	80
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300									
Color				Red, RAL 3003									
Inertia in kg.cm ^{2h)}	Ø14	J ₁	[kgcm ²]	3.251	2.969	2.864	2.369	1.82	1.971	1.775	1.759	1.744	1.737
	Ø19			4.011	3.729	3.624	3.129	2.58	2.731	2.535	2.519	2.504	2.497
	Ø24			4.331	4.049	3.944	3.449	2.9	3.051	2.855	2.839	2.824	2.817
	Ø32			5.371	5.089	4.984	4.489	3.94	4.091	3.895	3.879	3.864	3.857
	Ø35			11.501	11.219	11.114	10.619	10.07	10.221	10.025	10.009	9.994	9.987
	Ø38			11.471	11.189	11.084	10.589	10.04	10.191	9.995	9.979	9.964	9.957

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

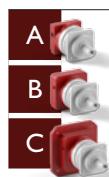
Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

Output



for motor shaft

 $L \leq 50$ $\varnothing d \leq 19$

result in LA

B

for motor shaft

$$50 < L \leq 55$$
$$\varnothing d \leq 24$$

result in **LB**

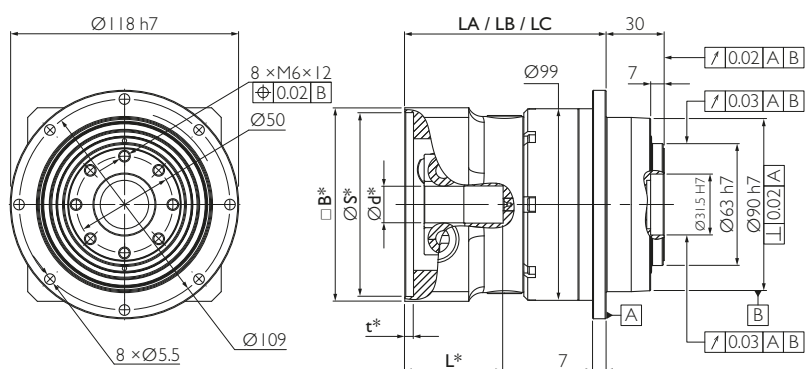
C

for motor shaft

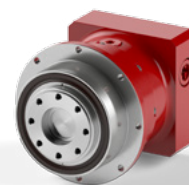
 $55 < L \leq 60$
$$\varnothing d \leq 24$$

result in LC

		1-stage	2-stage
LA	[mm]	104	141
LB	[mm]	113	150
LC	[mm]	118	155



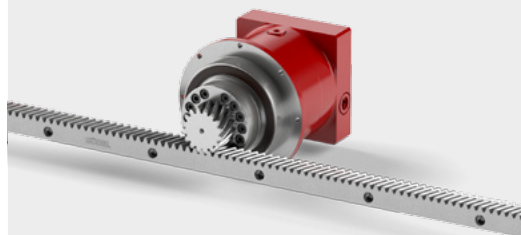
* depending on the motor. See pages 100 et seq.



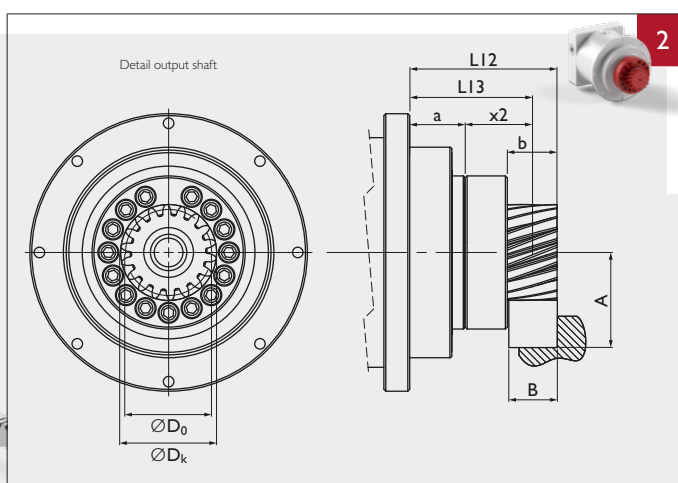
Example NRHP 080 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from
Güdel



Pinion



Material	16MnCr5 DIN 1.7131
Teeth	pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42", hardened (58 ⁺⁴ ₀ HRC), ground, crowned
Quality	6f24 DIN 3962 / 63 / 67

		m_n	P_t	z	A	b	D_k	D_0	D_v	L_{I2}	L_{I3}	x_2	a	M
Pinion I	[-]	2	6.67	16	39.577	26	39.15	33.953	35.153	75.0	62.0	32.0	30	0.6

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	65	75	76	76	60
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	85	110	110	110	90
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 300	2 300	2 900	3 100	3 100
Maximum input speed S5		n _{1max}	[rpm]	4 000	5 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	50	50	50	35
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	72	72	72	44
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	2 000	2 000	2 200	2 200
Maximum input speed S1		n _{1max}	[rpm]	–	2 900	2 900	3 100	3 100
Emergency stop torque ^{d)}		T _{2not}	[Nm]	250	250	250	250	200
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	4.9				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Tilting moment		M _{kmax}	[Nm]	348				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	32	38	40	36	28
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	252				
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	2 300				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	1.897	1.327	1.083	0.871	0.759
	Ø 14			1.887	1.317	1.073	0.861	0.749
	Ø 19			2.65	2.08	1.836	1.624	1.512
	Ø 24			2.978	2.408	2.164	1.952	1.84

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an Input Ø of 24 mm in I-stage and 19 mm in 2-stage.

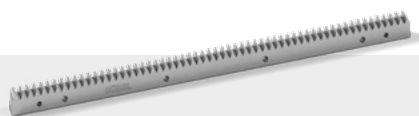
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 075	1 760	4 752
Max acceleration torque	T _{2B}	[Nm]	120	30	81
Precision			P1		P5
Feed force			High	Medium	Elevated

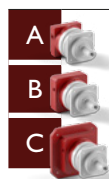
Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

Output



for motor shaft

$$L \leq 50$$
$$\varnothing d \leq 19$$

result in LA

for motor shaft

$$50 < L \leq 55$$
$$\varnothing d \leq 24$$

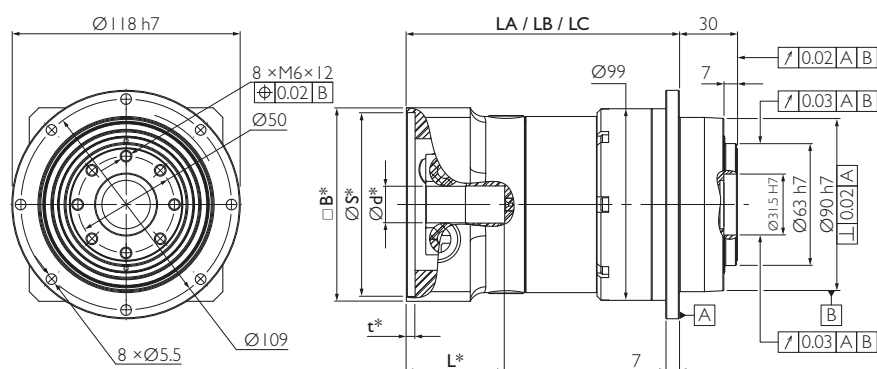
result in **LB**

for motor shaft

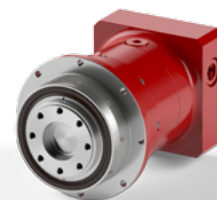
 $55 < L \leq 60$
$$\varnothing d \leq 24$$

result in LC

		1-stage	2-stage
LA	[mm]	104	141
LB	[mm]	113	150
LC	[mm]	118	155



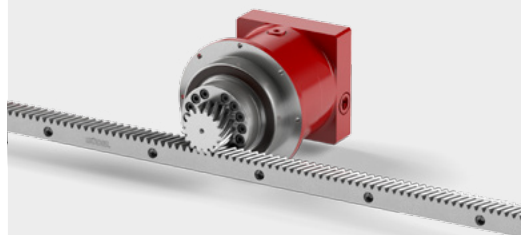
* depending on the motor. See pages 100 et seq.



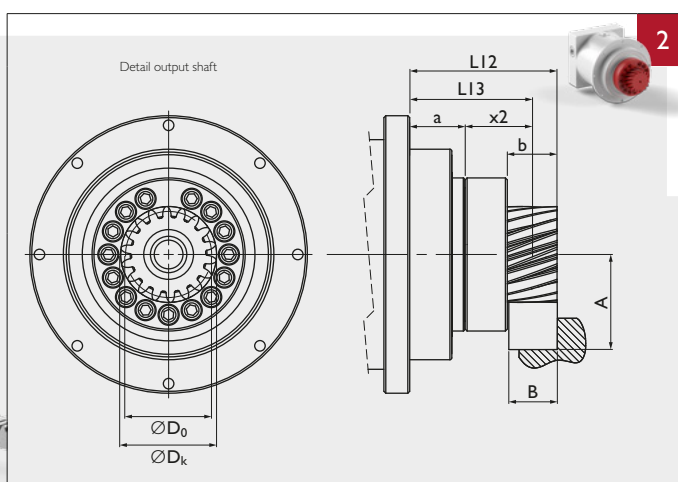
Example NRHP 080 A0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from
Güdel



Pinion



Material	16MnCr5 DIN 1.7131
Teeth	pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42", hardened (58 ⁺⁴ ₀ HRC), ground, crowned
Quality	6f24 DIN 3962 / 63 / 67

		m _n	P _t	z	A	b	D _k	D ₀	D _v	L12	L13	x2	a	M
Pinion I	[-]	2	6.67	16	39.577	26	39.15	33.953	35.153	75.0	62.0	32.0	30	0.6

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	75	90	90	90	75	90	90	90	90	60
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	85	110	110	110	90	110	110	110	110	90
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	3 600	3 600	3 600	3 600	3 600	3 500	3 500	3 800	4 500	4 500
Maximum input speed S5		n _{1max}	[rpm]	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	50	50	50	50	40	50	50	50	50	35
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	72	72	72	72	72	72	72	72	72	47
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	2 300	2 500	2 500	2 500	2 500	2 500	2 500	3 000	2 800	3 100
Maximum input speed S1		n _{1max}	[rpm]	3 300	3 500	3 500	3 500	3 500	3 500	3 500	3 800	4 000	4 500
Emergency stop torque ^{d)}		T _{2not}	[Nm]	250	250	250	250	250	250	250	250	250	200
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	6.5									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Tilting moment		M _{kmax}	[Nm]	348									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	32	38	38	39	32	39	35	36	34	27
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	252									
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	2 300									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.937	0.937	0.886	0.8	0.693	0.727	0.688	0.685	0.683	0.6559
	Ø 14			0.927	0.927	0.876	0.79	0.683	0.717	0.678	0.675	0.673	0.6459
	Ø 19			1.69	1.69	1.639	1.553	1.446	1.48	1.441	1.438	1.436	1.4089
	Ø 24			2.018	2.018	1.967	1.881	1.774	1.808	1.769	1.766	1.764	1.7369

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.

At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an Input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

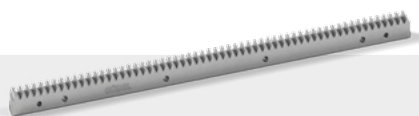
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 075	1 760	4 752
Max acceleration torque	T _{2B}	[Nm]	120	30	81
Precision			P1		P5
Feed force			High	Medium	Elevated

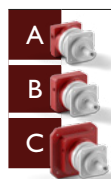
Above values for rack and pinion take into consideration a number of load cycles: 1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

Output



for motor shaft

 $L \leq 54$
$$\varnothing d \leq 24$$

result in LA

for motor shaft

$$54 < L \leq 65$$
$$\varnothing d \leq 38$$

result in **LB**

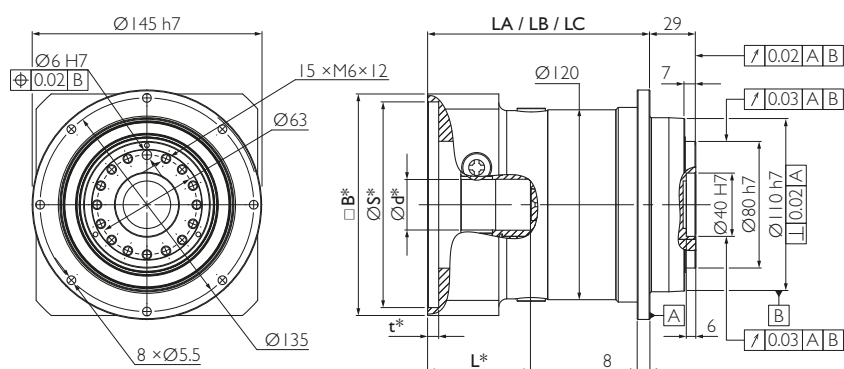
for motor shaft

$$65 < \mathbf{L} \leq 80$$
 $\varnothing d \leq 38$

result in LC



		1-stage	2-stage
LA	[mm]	129.5	180.5
LB	[mm]	140.5	191.5
LC	[mm]	160.5	211.5



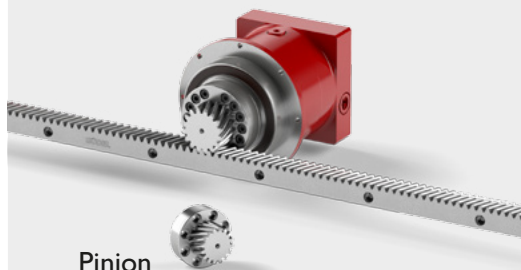
* depending on the motor. See pages 100 et seq.



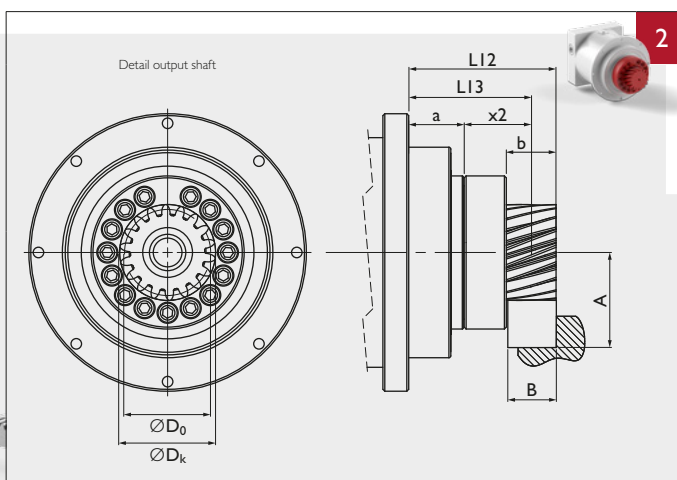
Example NRHP 100 A0, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from
Güdel



Pinion



Material	16MnCr5 DIN 1.7131
Teeth	pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42", hardened (58 ⁺⁴ ₀ HRC), ground, crowned
Quality	6f24 DIN 3962 / 63 / 67

		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	16	39.577	26	39.15	33.953	35.153	77.0	64.0	35.0	29	1.0
Pinion 2	[-]	2	6.67	21	44.282	26	48.56	44.563	—	77.0	64.0	35.0	29	1.0
Pinion 3	[-]	2.5	8.33	16	43.471	26	48.94	42.441	43.941	77.0	64.0	35.0	29	1.0
Pinion 4	[-]	3	10.00	14	49.182	32	52.36	44.563	46.363	83.0	67.0	38.0	29	1.2

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	200	260	270	250	150
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	320	350	350	330	265
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 300	2 300	2 600	2 600	2 600
Maximum input speed S5		n _{1max}	[rpm]	1 700	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	175	175	175	115
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	250	250	250	190
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	1 500	1 600	1 800	1 800
Maximum input speed S1		n _{1max}	[rpm]	–	2 000	2 000	2 800	2 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	500	630	630	630	630
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	9				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Tilting moment		M _{kmax}	[Nm]	614				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	78	82	88	78	64
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	458				
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	4 800				
Color				Red, RAL 3003				
Inertia in kg.cm² ^{h)}	Ø11	J ₁	[kgcm²]	6.134	3.95	3.072	2.337	1.948
	Ø14			6.114	3.93	3.052	2.317	1.928
	Ø19			6.874	4.69	3.812	3.077	2.688
	Ø24			7.194	5.01	4.132	3.397	3.008
	Ø32			8.234	6.05	5.172	4.437	4.048
	Ø35			14.364	12.18	11.302	10.567	10.178
	Ø38			14.334	12.15	11.272	10.537	10.148

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 24 mm in I-stage and 19 mm in 2-stage.

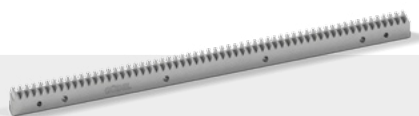
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2			Pinion 3			Pinion 4		
			Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 075	1 760	4 752	7 505	3 217	5 016	10 570	2 813	7 620	15 076	3 661	11 052
Max acceleration torque	T _{2B}	[Nm]	120	30	81	167	72	112	224	60	162	336	82	246
Precision			P1		P5	P1		P5	P1		P5	P1		P5
Feed force			High	Medium	Elevated	High	Medium	Elevated	High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1×10⁶ for the rack; 1×10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your
ideal drive train on
pages 140 et seq.

More on the technical
datasheets your ideal
drive train on pages
124 et seq.

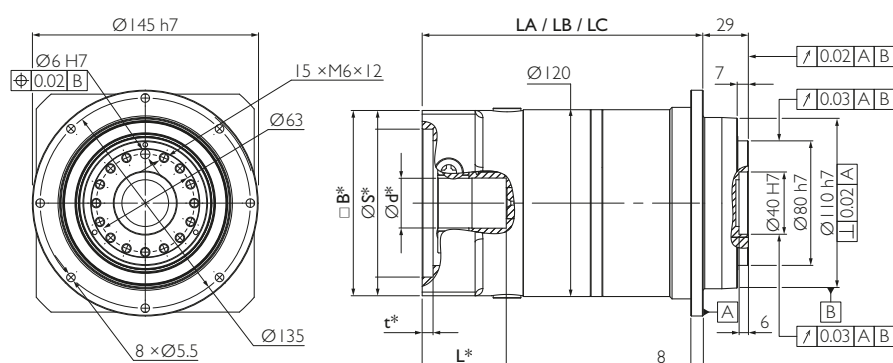
Input

Output

A	for motor shaft	$L \leq 54$	$\varnothing d \leq 24$	result in LA
B	for motor shaft	$54 < L \leq 65$	$\varnothing d \leq 38$	result in LB
C	for motor shaft	$65 < L \leq 80$	$\varnothing d \leq 38$	result in LC

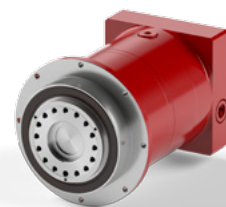


		1-stage	2-stage
LA	[mm]	129.5	180.5
LB	[mm]	140.5	191.5
LC	[mm]	160.5	211.5



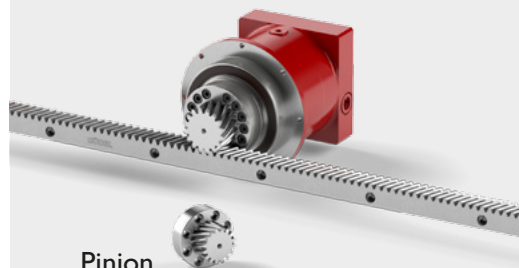
* depending on the motor. See pages 100 et seq.

Example NRHP 100 A0, 2-stage



Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion

		m_n	P_t	z	A	b	D_k	D_0	D_v	L12	L13	x2	a	M
Pinion 1	[-]	2	6.67	16	39.577	26	39.15	33.953	35.153	77.0	64.0	35.0	29	1.0
Pinion 2	[-]	2	6.67	21	44.282	26	48.56	44.563	—	77.0	64.0	35.0	29	1.0
Pinion 3	[-]	2.5	8.33	16	43.471	26	48.94	42.441	43.941	77.0	64.0	35.0	29	1.0
Pinion 4	[-]	3	10.00	14	49.182	32	52.36	44.563	46.363	83.0	67.0	38.0	29	1.2

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M: Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	200	260	270	270	200	270	260	270	250	150
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	320	350	350	350	320	350	350	320	330	265
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 400	2 900	2 900	2 900	2 900	2 900	2 900	3 200	3 600	4 300
Maximum input speed S5		n _{1max}	[rpm]	5 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	175	175	175	175	175	175	175	175	175	115
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	250	250	250	250	250	250	250	250	250	190
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	2 000	2 000	2 000	2 000	2 000	2 000	2 000	2 000	2 000	2 500
Maximum input speed S1		n _{1max}	[rpm]	3 000	3 100	3 100	3 100	3 100	3 100	3 100	3 500	3 500	4 000
Emergency stop torque ^{d)}		T _{2not}	[Nm]	630	630	630	630	630	630	630	630	630	630
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	12.5									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Tilting moment		M _{kmax}	[Nm]	614									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	78	81	87	87	87	87	81	87	77	64
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	458									
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	4 800									
Color				Red, RAL 3003									
Inertia in kg.cm² ^{h)}	Ø11	J ₁	[kgcm²]	3.033	2.896	2.841	2.363	1.802	1.976	1.78	1.771	1.764	1.76
	Ø14			3.013	2.876	2.821	2.343	1.782	1.956	1.76	1.751	1.744	1.74
	Ø19			3.773	3.636	3.581	3.103	2.542	2.716	2.52	2.511	2.504	2.5
	Ø24			4.093	3.956	3.901	3.423	2.862	3.036	2.84	2.831	2.824	2.82
	Ø32			5.133	4.996	4.941	4.463	3.902	4.076	3.88	3.871	3.864	3.86
	Ø35			11.263	11.126	11.071	10.593	10.032	10.206	10.01	10.001	9.994	9.99
	Ø38			11.233	11.096	11.041	10.563	10.002	10.176	9.98	9.971	9.964	9.96

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2			Pinion 3			Pinion 4		
			Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 075	1 760	4 752	7 505	3 217	5 016	10 570	2 813	7 620	15 076	3 661	11 052
Max acceleration torque	T _{2B}	[Nm]	120	30	81	167	72	112	224	60	162	336	82	246
Precision			P1		P5	P1		P5	P1		P5	P1		P5
Feed force			High	Medium	Elevated	High	Medium	Elevated	High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart calculate your ideal drive train on pages 140 et seq.

More on the technical datasheets your ideal drive train on pages 124 et seq.

Input

Output



for motor shaft

 $L \leq 62$ $\varnothing d \leq 38$

result in LA



for motor shaft

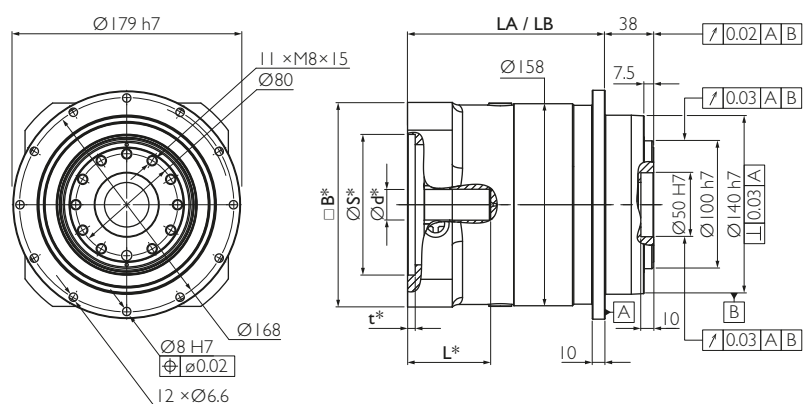
 $62 < L \leq 115$ $\varnothing d \leq 48$

result in LB



0

		I-stage	2-stage
LA	[mm]	154.5	187.5
LB	[mm]	206.5	198.5
LC	[mm]		218.5



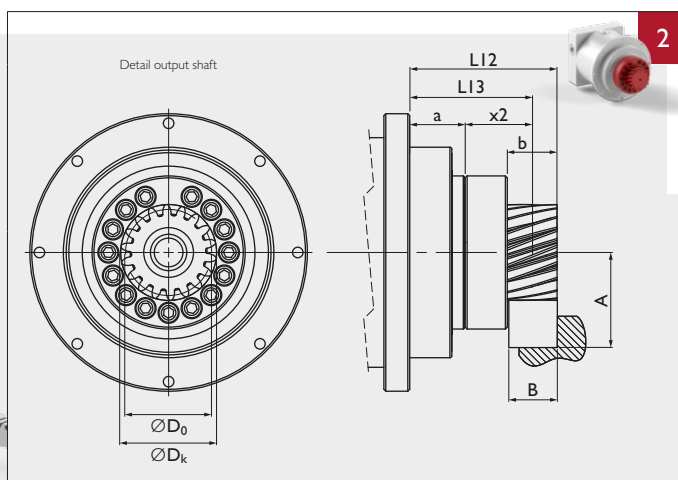
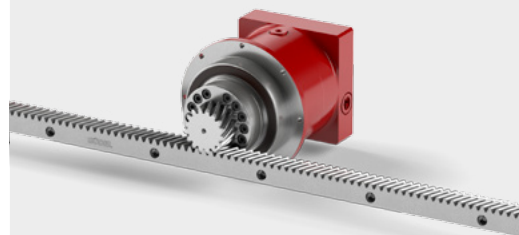
* depending on the motor. See pages 100 et seq.



Example NRHP I40 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



2

Material 16MnCr5
DIN 1.7131
Teeth pressure angle $\alpha = 20^\circ$,
helical teeth left,
19°31'42",
hardened (58⁺⁴ HRC),
ground, crowned
Quality 6f24 DIN 3962 / 63 / 67

Pinion



	m_n	P_t	z	A	b	D_k	D_0	D_v	L_{12}	L_{13}	$\times 2$	a	M
Pinion 1	[-]	2.5	8.33	21	49.352	26	60.70	55.704	—	89.0	76.0	38.0	1.9
Pinion 2	[-]	3	10.00	18	54.648	32	63.30	57.296	—	95.0	79.0	41.0	2.0

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	400	490	500	470	310
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	520	650	650	650	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 500	1 900	2 100	2 500	2 600
Maximum input speed S5		n _{1max}	[rpm]	2 500	4 000	4 000	4 000	4 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	–	260	260	260	130
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	–	370	370	370	220
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	–	900	1 000	1 200	1 200
Maximum input speed S1		n _{1max}	[rpm]	–	1 600	1 600	2 600	2 600
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 260
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	17				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5				
Tilting moment		M _{kmax}	[Nm]	1 400				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	180	195	193	164	128
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	934				
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	7 600				
Color				Red, RAL 3003				
Inertia in kg.cm² ^{h)}	Ø19	J ₁	[kgcm²]	16.069	9.704	7.173	5.003	3.881
	Ø24			16.389	10.024	7.493	5.323	4.201
	Ø32			22.249	15.884	13.353	11.183	10.061
	Ø35			22.839	16.474	13.943	11.773	10.651
	Ø38			23.309	16.944	14.413	12.243	11.121
	Ø42			23.639	17.274	14.743	12.573	11.451
	Ø48			27.619	21.254	18.723	16.553	15.431

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 24 mm in I-stage and 19 mm in 2-stage.

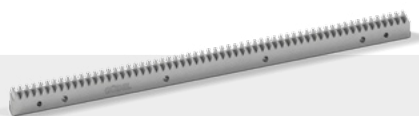
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	11 216	5 197	8 053	15 790	6 350	12 686
Max acceleration torque	T _{2B}	[Nm]	312	145	224	452	182	363
Precision			PI			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

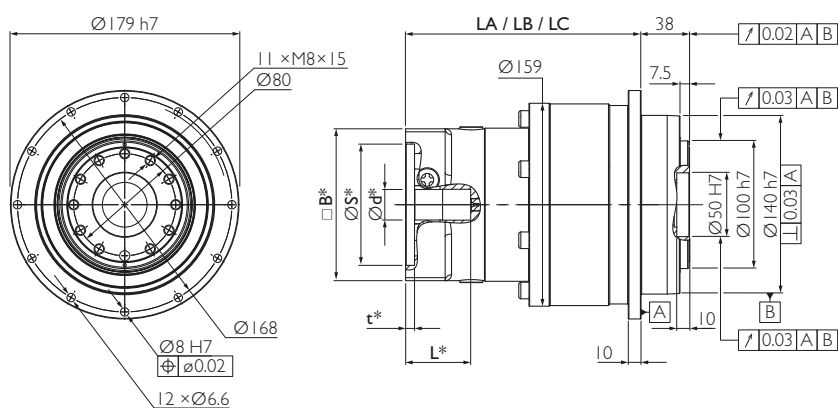
Input

Output

A	for motor shaft	$L \leq 54$	$\varnothing d \leq 32$	result in LA
B	for motor shaft	$54 < L \leq 65$	$\varnothing d \leq 38$	result in LB
C	for motor shaft	$65 < L \leq 80$	$\varnothing d \leq 38$	result in LC



		I-stage	2-stage
LA	[mm]	154.5	287.5
LB	[mm]	206.5	198.5
LC	[mm]		218.5

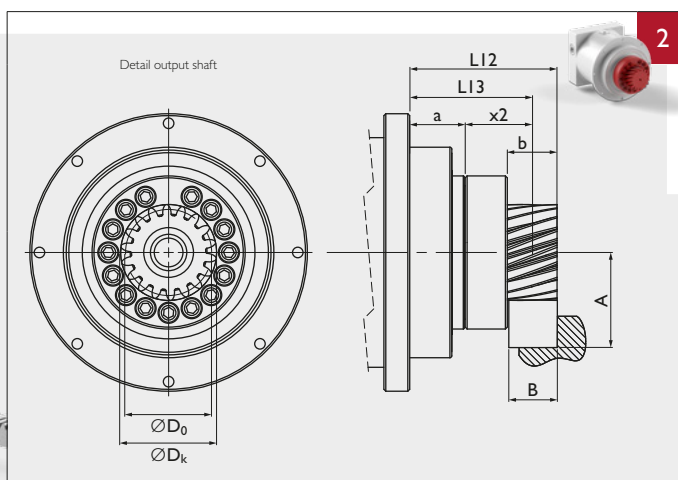
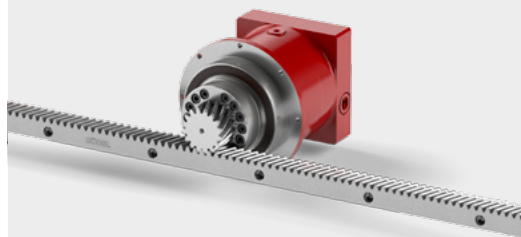


* depending on the motor. See pages 100 et seq.

Example NRHP 140 A0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Material 16MnCr5
DIN 1.7131
Teeth pressure angle $\alpha = 20^\circ$,
helical teeth left,
 $19^\circ 31' 42''$,
hardened (58^{+4}_{-0} HRC),
ground, crowned
Quality 6f24 DIN 3962 / 63 / 67

Pinion



	m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	2.5	8.33	21	49.352	26	60.70	55.704	—	89.0	76.0	38.0	1.9
Pinion 2	[-]	3	10.00	18	54.648	32	63.30	57.296	—	95.0	79.0	41.0	2.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	400	490	500	500	400	500	490	500	470	310
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	520	650	650	650	600	650	650	650	650	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 900	2 900	2 900	3 000	3 000	3 000	3 000	3 300	3 300	4 000
Maximum input speed S5		n _{1max}	[rpm]	4 200	4 200	4 200	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	260	260	260	260	260	260	260	260	260	150
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	370	370	370	370	370	370	370	370	370	220
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 400	1 400	1 800	1 800	2 000	2 000	2 000	2 000	2 200	2 200
Maximum input speed S1		n _{1max}	[rpm]	2 700	2 900	2 800	2 800	2 800	2 800	2 800	3 000	3 000	3 200
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 260
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	20									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5									
Tilting moment		M _{kmax}	[Nm]	1 400									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	170	185	185	183	160	183	177	178	147	117
Tilting rigidity ^{e)}		C _{t2}	[Nm/arcmin]	934									
Noise ⁱ⁾		L _{pA}	[dB(A)]	< 62									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	7 600									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	3.556	3.158	3	2.457	1.869	2.014	1.805	1.78	1.758	1.747
	Ø19			4.316	3.918	3.76	3.217	2.629	2.774	2.565	2.54	2.518	2.507
	Ø24			4.636	4.238	4.08	3.537	2.949	3.094	2.885	2.86	2.838	2.827
	Ø32			5.676	5.278	5.12	4.577	3.989	4.134	3.925	3.9	3.878	3.867
	Ø35			11.806	11.408	11.25	10.707	10.119	10.264	10.055	10.03	10.008	9.997
	Ø38			11.776	11.378	11.22	10.677	10.089	10.234	10.025	10	9.978	9.967

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	11 216	5 197	8 053	15 790	6 350	12 686
Max acceleration torque	T _{2B}	[Nm]	312	145	224	452	182	363
Precision			PI			P5		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 45$ $6 \leq \varnothing d \leq 19$

result in LA

for motor shaft

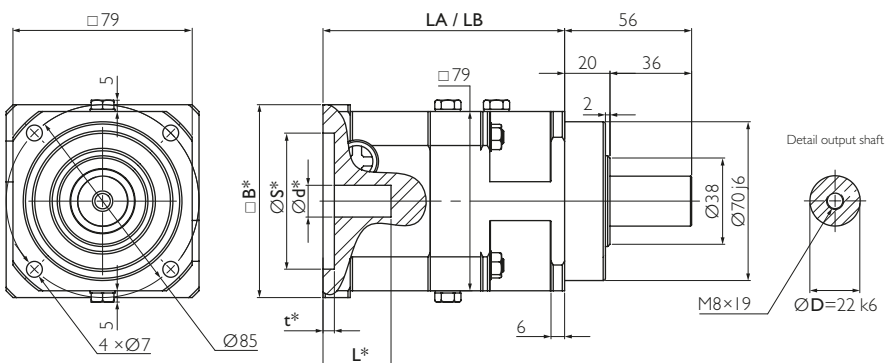
 $45 < L \leq 55$ $19 < \varnothing d \leq 24$

result in LB

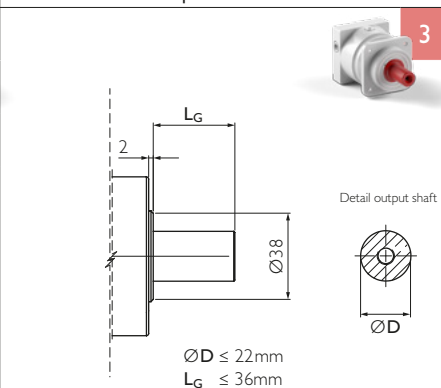
		I-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160

Output

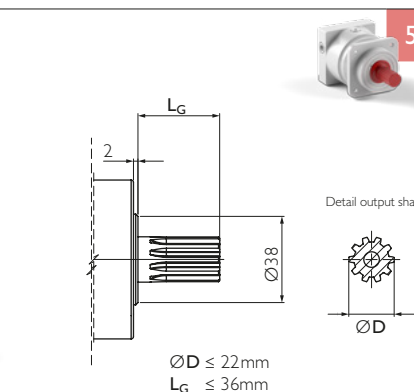
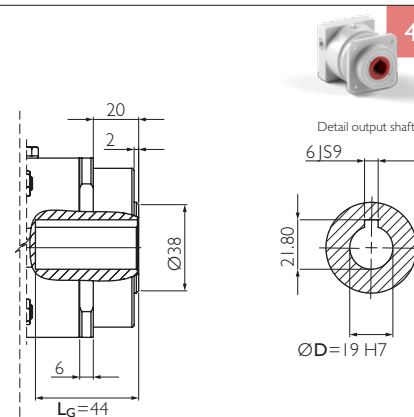
Optional



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

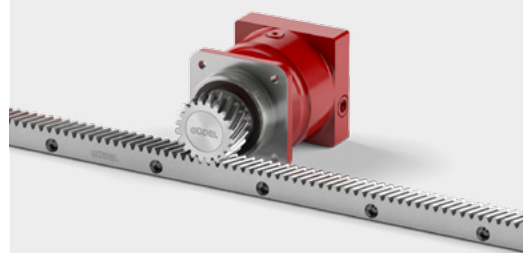
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example NR 080 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	—	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	60	68	68	68	54
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	80	100	100	100	82
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 900	2 900	2 900	3 100	3 100
Maximum input speed S5		n _{1max}	[rpm]	5 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	25	46	46	46	25
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	40	71	71	71	45
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	2 000	2 600	2 600	2 800	2 800
Maximum input speed S1		n _{1max}	[rpm]	2 900	2 900	2 900	3 100	3 100
Emergency stop torque ^{d)}		T _{2not}	[Nm]	200	250	250	220	177
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	4				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤12				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	10.6	11.2	11.3	11.5	10.3
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 68				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	3 600				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.62	0.46	0.40	0.35	0.31
	Ø 14			1.18	1.02	0.95	0.90	0.87
	Ø 19			1.19	1.03	0.97	0.91	0.88
	Ø 24			2.01	1.85	1.78	1.73	1.70

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an Input Ø of 19 mm in I-stage and 14 mm in 2- and 3-stage.

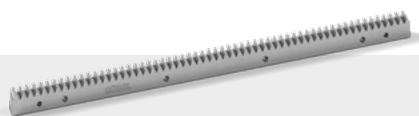
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			P1		P12
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 45$ $6 \leq \varnothing d \leq 19$

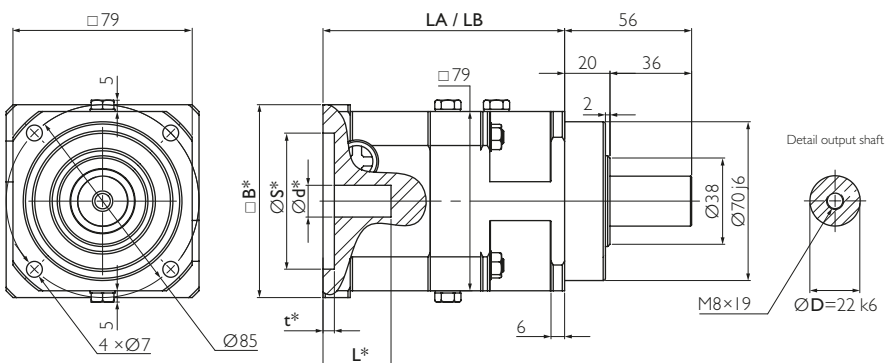
result in LA

for motor shaft

 $45 < L \leq 55$ $19 < \varnothing d \leq 24$

result in LB

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160



* depending on the motor: See pages 100 et seq.

Output

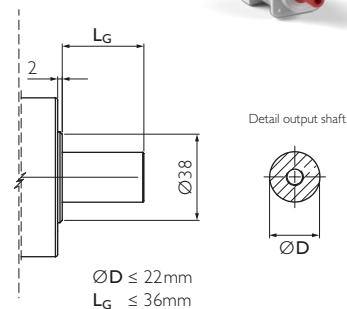
Optional



0



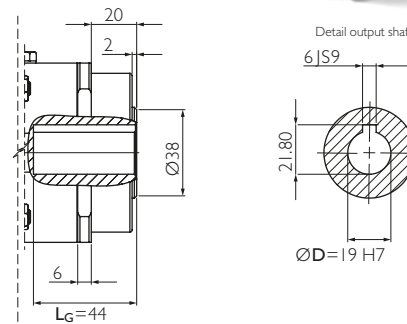
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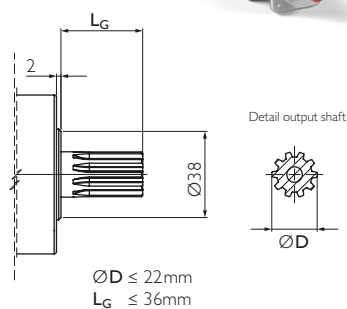
Option 3 on request. Adjustments can reduce capacity.



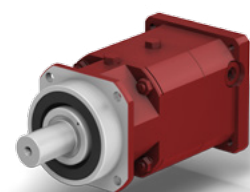
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 $\varnothing D = 19 \text{ H7}$ $\varnothing D = 19 \text{ H7}$ 

5



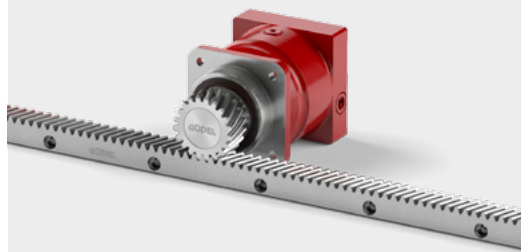
Option 5 on request. Adjustments can reduce capacity.



Example NR 080 A0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	–	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *	i		2-stage									
			12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	60	68	68	68	60	68	68	68	68	54
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	80	100	100	100	80	100	100	100	100	82
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	3 300	3 500	3 500	3 500	3 500	3 500	3 500	3 800	4 500	4 500
Maximum input speed S5	n _{1max}	[rpm]	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	43	43	43	43	43	43	43	43	43	30
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	68	68	68	68	68	68	68	68	68	40
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	2 300	3 100	3 100	3 100	3 100	3 100	3 100	3 400	4 000	4 000
Maximum input speed S1	n _{1max}	[rpm]	3 300	3 500	3 500	3 500	3 500	3 500	3 500	3 800	4 500	4 500
Emergency stop torque ^{d)}	T _{2not}	[Nm]	200	250	250	250	200	250	250	250	220	177
Efficiency	η	[%]	94									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	5									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	10.62	10.62	10.77	10.77	10.10	10.77	10.62	10.77	10.36	9.31
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 68									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	3 600									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.46	0.45	0.45	0.39	0.31	0.34	0.31	0.31	0.31
	Ø 14			1.01	1.00	1.00	0.94	0.86	0.89	0.86	0.86	0.86
	Ø 19			1.03	1.02	1.01	0.96	0.88	0.91	0.88	0.88	0.88
	Ø 24			1.84	1.83	1.83	1.77	1.69	1.72	1.69	1.69	1.69

* Other ratios available: 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			PI		PI2
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 45$ $6 \leq \varnothing d \leq 19$

result in LA

for motor shaft

 $45 < L \leq 55$ $19 < \varnothing d \leq 24$

result in LB

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160

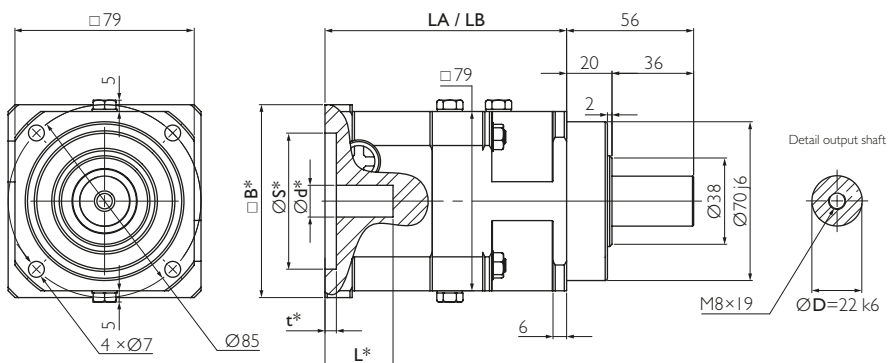
Output

Standard

Optional

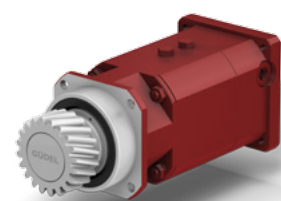
0

3



* depending on the motor: See pages 100 et seq.

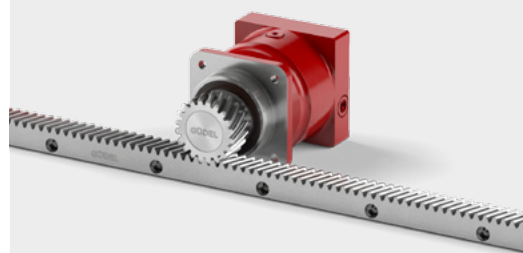
Option 3 on request. Adjustments can reduce capacity.



Example NR 080 A2, 3-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	—	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *	i		3-stage									
			105	125	175	200	250	300	400	500	700	1 000
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	68	68	68	68	68	60	68	68	68	54
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	100	100	100	100	100	80	100	100	100	82
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Maximum input speed S5	n _{1max}	[rpm]	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000	6 000
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	50	50	50	50	50	50	50	50	50	50
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	68	68	68	68	68	68	68	68	68	68
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
Maximum input speed S1	n _{1max}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Emergency stop torque ^{d)}	T _{2not}	[Nm]	250	250	250	250	250	200	250	250	220	177
Efficiency	η	[%]	92									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	6									
Angular backlash	i _k	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	9.31	10.21	10.21	10.21	10.21	9.60	9.60	10.36	10.36	9.31
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 68									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	3 600									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø 11	J ₁	[kg·cm ²]	0.34	0.39	0.34	0.31	0.31	0.31	0.31	0.31	0.31
	Ø 14			0.90	0.94	0.89	0.86	0.86	0.86	0.86	0.86	0.86
	Ø 19			0.91	0.95	0.91	0.88	0.88	0.88	0.88	0.88	0.88
	Ø 24			1.73	1.77	1.72	1.69	1.69	1.69	1.69	1.69	1.69

* Other ratios available. 112, 120, 140, 147, 150, 160, 196, 210, 245, 280, 343, 350, 490 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an Input Ø of 19 mm in 1-stage and 14 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			PI		PI2
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

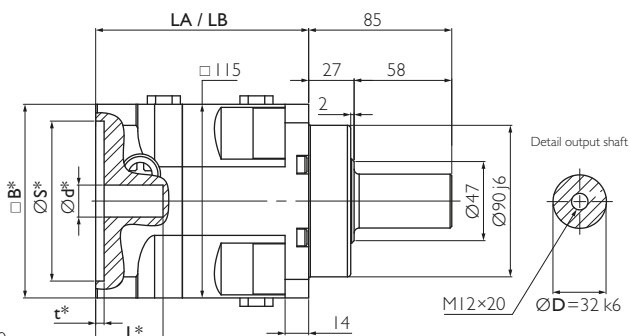
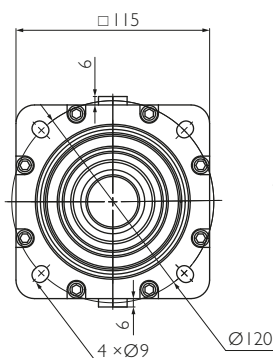
A	for motor shaft	$L \leq 50$	$9 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 64$	$24 < \varnothing d \leq 35$	result in LB

Output

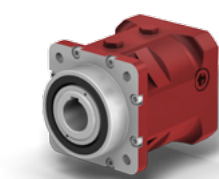
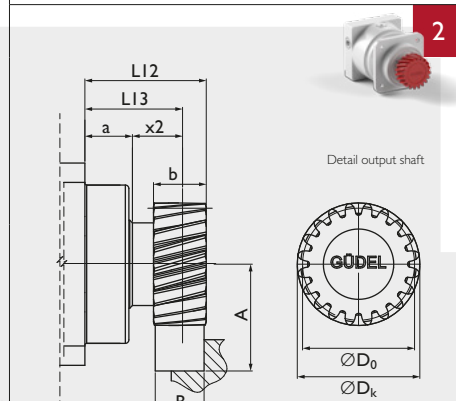
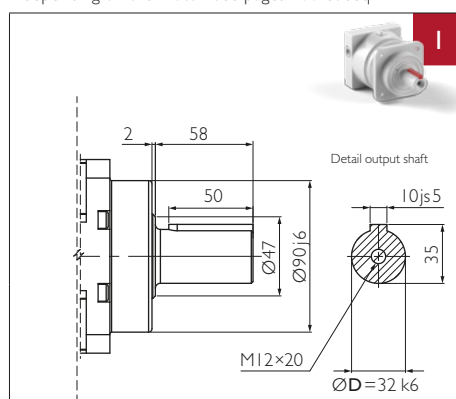
Standard

Optional

		I-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216



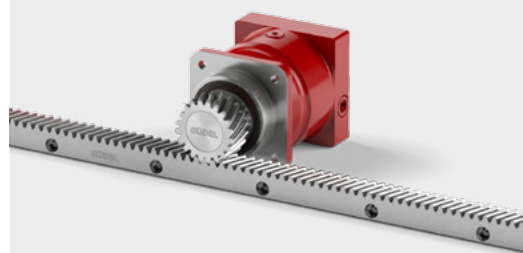
* depending on the motor: See pages 100 et seq.



Example NR 100 A4, I-stage

Your ideal drive train

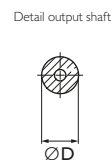
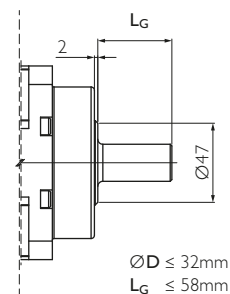
Function Package with gearbox, rack and pinion from Güdel



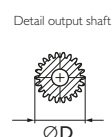
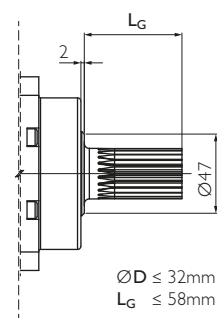
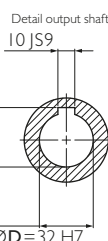
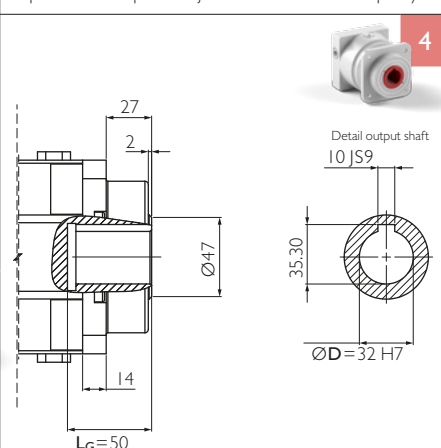
Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]
 $\varnothing D \leq 32\text{mm}$
 $L_g \leq 58\text{mm}$

Option 3 on request. Adjustments can reduce capacity.


 $\varnothing D \leq 32\text{mm}$
 $L_g \leq 58\text{mm}$

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42" hardened (58⁺⁴/₋₁ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	174	226	235	217	130
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	278	304	304	287	230
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 500	2 500	2 500	2 800	2 800
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	70	122	122	122	87
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	165	217	217	217	165
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 700	2 200	2 200	2 500	2 500
Maximum input speed S1		n _{1max}	[rpm]	2 500	2 500	2 500	2 800	2 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	435	565	587	543	326
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	8				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤12				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	32.0	39.0	40.7	41.6	34.3
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 69				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	6 000				
Color				Red, RAL 3003				
Inertia in kg.cm² ^{h)}	Ø14	J ₁	[kgcm²]	4.08	2.83	2.32	1.88	1.62
	Ø19			4.08	2.83	2.32	1.88	1.62
	Ø24			4.09	2.84	2.33	1.89	1.63
	Ø32			7.29	6.04	5.53	5.09	4.83
	Ø35			9.92	8.67	8.16	7.72	7.46

- a) Nominal output torque when operating at n_{1N}.
b) 1000 cycles per hour max.
c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.
d) Valid 1000 times the gearbox life.

- e) Valid for an input Ø of 24 mm in I-stage and 19 mm in 2- and 3-stage.
f) Values for 300 rpm.
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
h) Depending on the motor output shaft Ø.
i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 50$ $9 \leq \varnothing d \leq 24$

result in LA

for motor shaft

 $51 < L \leq 64$ $24 < \varnothing d \leq 35$

result in LB

		1-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216

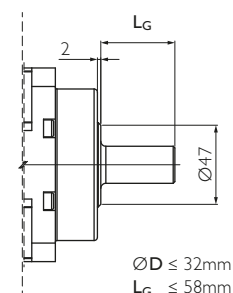
Output

Standard

Optional

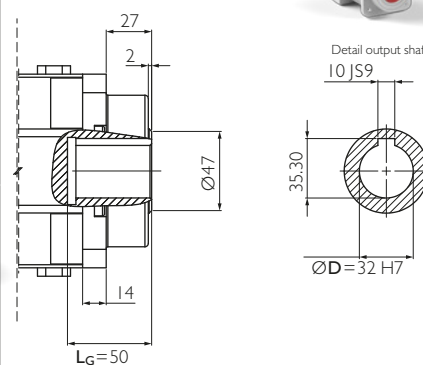
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3

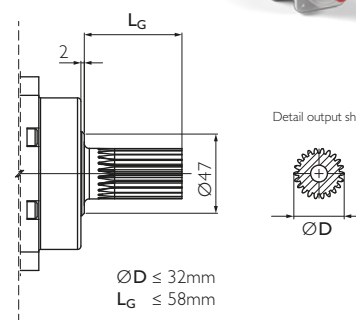


Option 3 on request. Adjustments can reduce capacity.

4



5

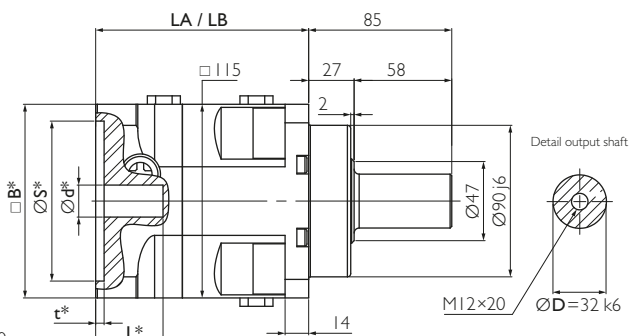
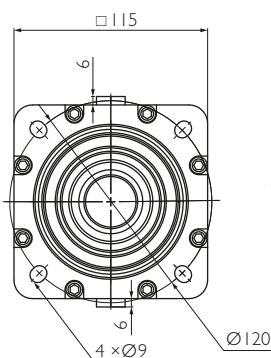


Option 5 on request. Adjustments can reduce capacity.

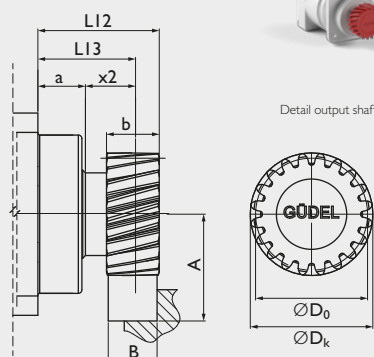
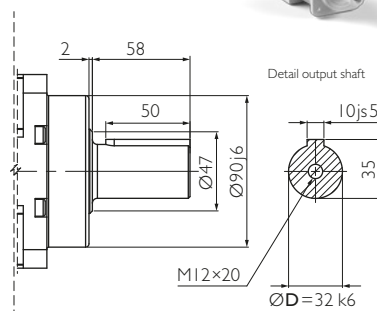
Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67



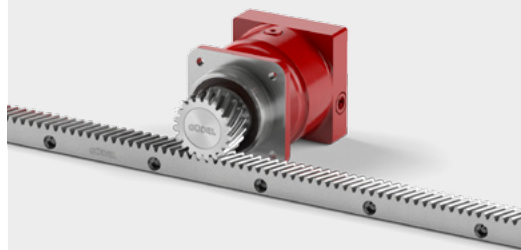
* depending on the motor: See pages 100 et seq.



Example NR 100 B0, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *			2-stage									
	i		12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	174	226	235	235	174	235	226	235	217	130
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	278	278	304	304	278	304	304	278	287	230
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	2 900	3 100	3 100	3 100	3 100	3 100	3 100	3 500	4 200	4 200
Maximum input speed S5	n _{1max}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	122	122	122	130	130	130	130	130	130	87
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	217	217	217	217	217	217	217	217	217	165
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	2 000	2 200	2 800	2 800	2 800	2 800	2 800	3 100	3 800	3 800
Maximum input speed S1	n _{1max}	[rpm]	2 900	3 100	3 100	3 100	3 100	3 100	3 100	3 500	4 200	4 200
Emergency stop torque ^{d)}	T _{2not}	[Nm]	435	565	587	587	435	587	565	587	543	326
Efficiency	η	[%]	94									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	10									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	30.6	37.0	36.7	38.7	30.6	38.7	37.0	38.7	39.6	32.6
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 69									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	6 000									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	2.76	2.69	2.23	2.21	1.61	1.82	1.60	1.59	1.59
	Ø19			2.76	2.69	2.23	2.21	1.61	1.82	1.60	1.59	1.59
	Ø24			2.77	2.70	2.24	2.22	1.62	1.83	1.61	1.60	1.60
	Ø32			5.97	5.97	5.44	5.42	4.82	5.03	4.81	4.80	4.80
	Ø35			8.60	8.53	8.07	8.05	7.45	7.66	7.44	7.43	7.43

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.

At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

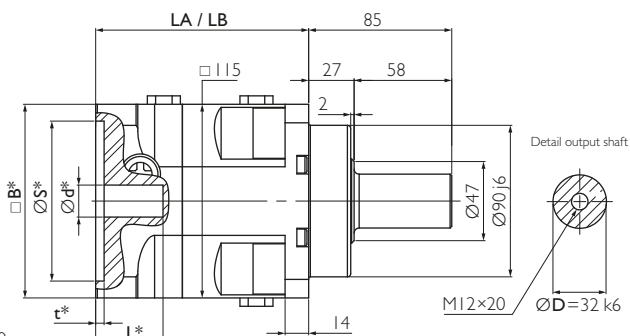
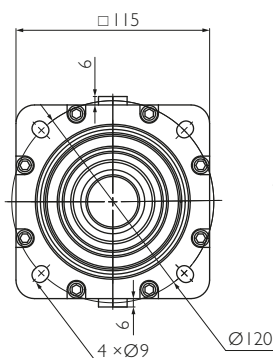
A	for motor shaft	$L \leq 50$	$9 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 64$	$24 < \varnothing d \leq 35$	result in LB

Output

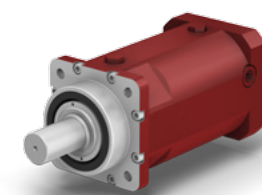
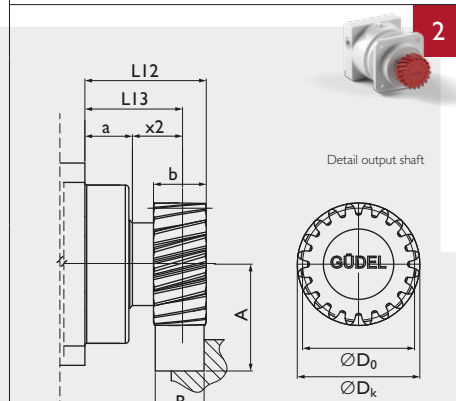
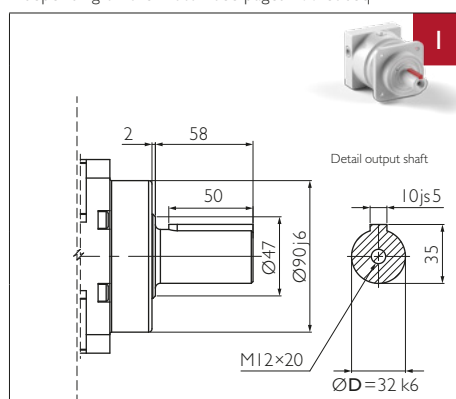
Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216



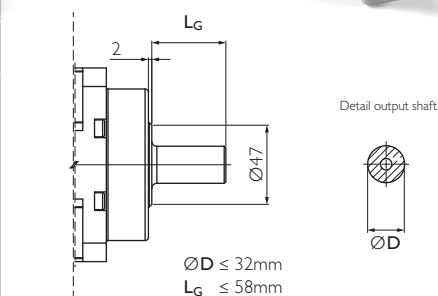
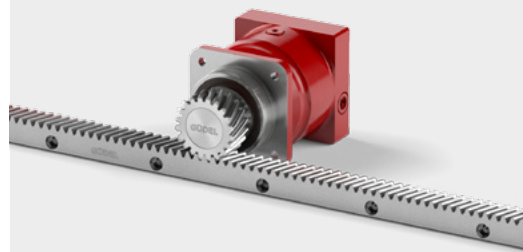
* depending on the motor: See pages 100 et seq.



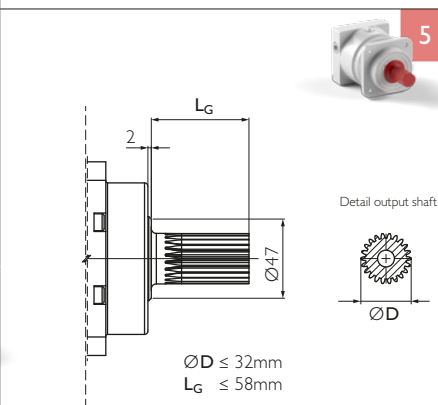
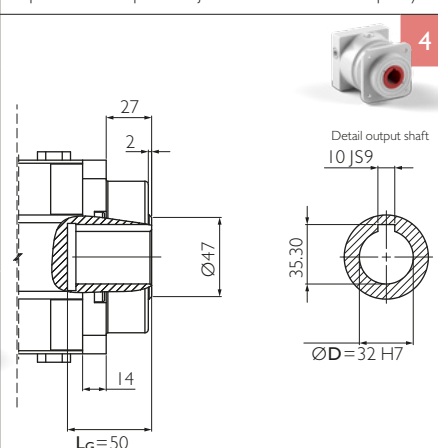
Example NR 100 A0, 3-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *			3-stage									
	i		105	125	175	200	250	300	400	500	700	1 000
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	235	245	245	245	245	200	250	245	250	140
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	304	300	300	300	300	255	305	304	290	180
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200
Maximum input speed S5	n _{1max}	[rpm]	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000	5 000
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	122	122	122	122	122	70	122	122	122	87
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	217	217	217	217	217	165	217	217	217	140
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800
Maximum input speed S1	n _{1max}	[rpm]	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200	4 200
Emergency stop torque ^{d)}	T _{2not}	[Nm]	600	600	600	600	600	500	600	600	550	350
Efficiency	η	[%]	91									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	12									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	36.7	36.7	36.7	36.7	36.7	35.2	35.2	36.7	36.7	30.8
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 69									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	6 000									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	1.82	2.21	1.82	1.59	1.59	1.59	1.59	1.59	1.59
	Ø19			1.82	2.21	1.82	1.59	1.59	1.59	1.59	1.59	1.59
	Ø24			1.83	2.22	1.83	1.60	1.60	1.60	1.60	1.60	1.60
	Ø32			5.03	5.42	5.03	4.80	4.80	4.80	4.80	4.80	4.80
	Ø35			7.66	8.05	7.66	7.43	7.43	7.43	7.43	7.43	7.43

* Other ratios available. 112, 120, 140, 147, 150, 160, 196, 210, 245, 280, 343, 350, 490 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

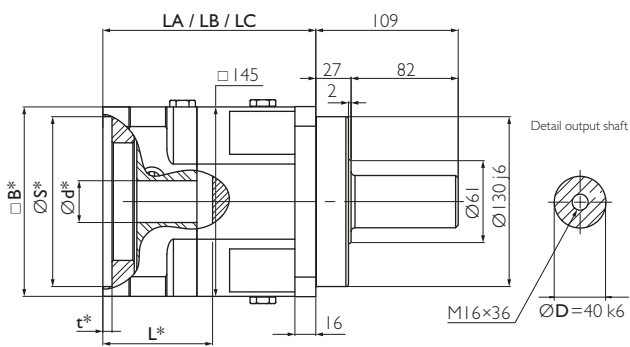
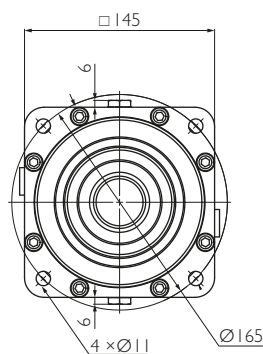
A	for motor shaft	$L \leq 50$	$9 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 64$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

Output

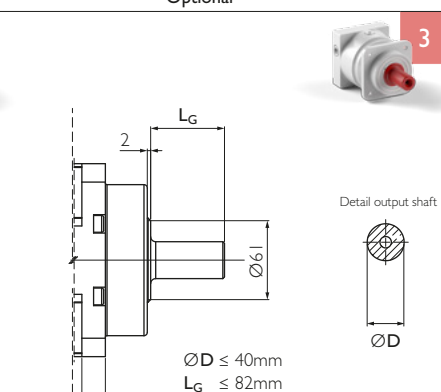
Standard

Optional

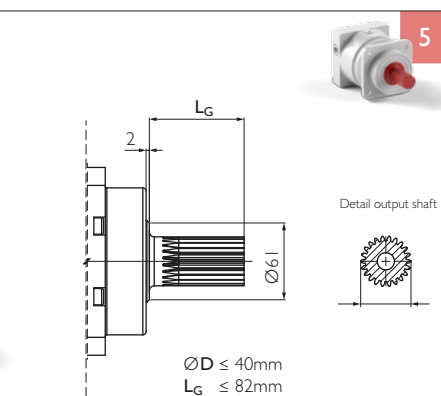
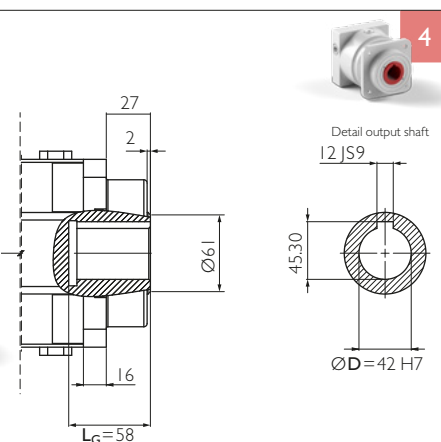
		I-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.

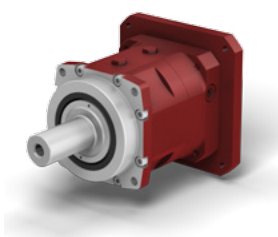


Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

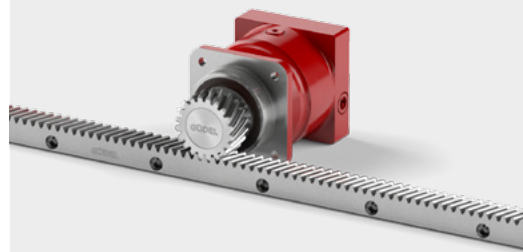
Quality 6f24 DIN 3962 / 63 / 67



Example NR 140 C0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	390	480	490	450	270
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	500	600	600	540	476
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 100	2 100	2 100	2 600	2 600
Maximum input speed S5		n _{1max}	[rpm]	3 500	4 000	4 000	4 000	4 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	150	250	250	250	125
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	250	365	365	365	220
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 500	1 900	1 900	2 300	2 300
Maximum input speed S1		n _{1max}	[rpm]	2 100	2 100	2 100	2 600	2 600
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 250	1 300	1 300	1 100	900
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	14				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	89.9	101.3	108.0	106.2	98.9
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 70				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300				
Color				Red, RAL 3003				
Inertia in kg·cm ² ^{h)}	Ø14	J ₁	[kg·cm ²]	10.98	7.12	5.60	4.31	3.56
	Ø19			10.98	7.12	5.60	4.31	3.56
	Ø24			11.99	8.13	6.61	5.32	4.57
	Ø32			14.19	10.33	8.81	7.52	6.77
	Ø35			17.02	13.16	11.64	10.35	9.60
	Ø38			22.21	18.35	16.83	15.54	14.79
	Ø42			21.81	17.95	16.43	15.14	14.39

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

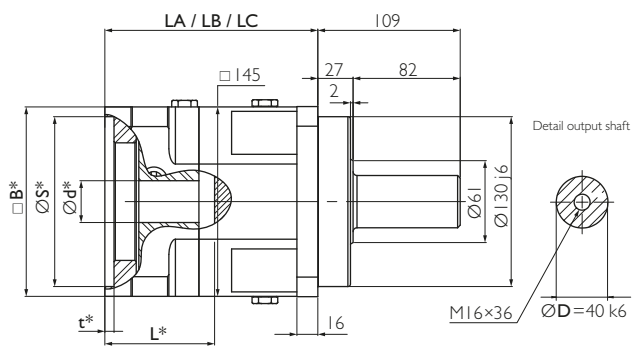
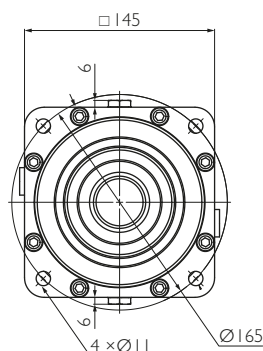
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 51$	$14 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 63$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

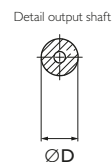
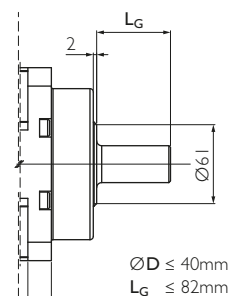
		1-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	



* depending on the motor: See pages 100 et seq.

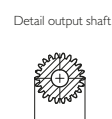
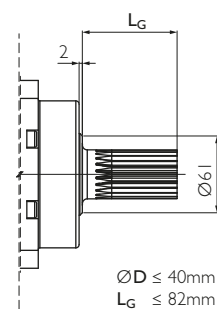
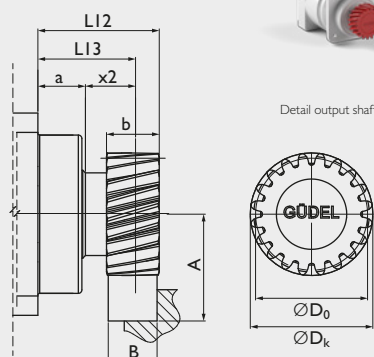
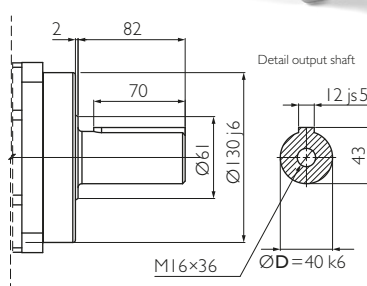
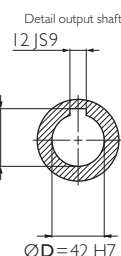
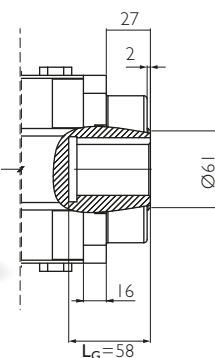
Output

Optional



$\varnothing D \leq 40\text{mm}$
 $L_G \leq 82\text{mm}$

Option 3 on request. Adjustments can reduce capacity.



$\varnothing D \leq 40\text{mm}$
 $L_G \leq 82\text{mm}$

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

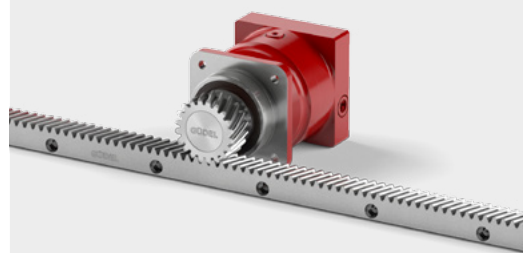
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example NR 140 A2, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	390	480	490	490	390	490	480	490	450	270
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	500	600	600	600	600	600	600	600	540	476
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 700	2 900	2 900	2 900	2 900	2 900	2 900	3 200	3 200	3 900
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	250	250	250	250	250	250	250	250	250	220
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	365	365	365	365	365	365	365	365	365	365
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 900	2 600	2 600	2 600	2 600	2 600	2 600	2 900	2 900	3 500
Maximum input speed S1		n _{1max}	[rpm]	2 700	2 900	2 900	2 900	2 900	2 900	2 900	3 200	3 200	3 900
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 250	1 300	1 300	1 300	1 250	1 300	1 300	1 300	1 100	900
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	18									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	80.9	91.1	97.2	97.2	80.9	97.2	91.1	97.2	95.4	80.0
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 70									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø14	J _I	[kgcm ²]	6.86	6.63	5.29	5.23	3.52	4.12	3.48	3.46	3.45	3.44
	Ø19			6.86	6.63	5.29	5.23	3.52	4.12	3.48	3.46	3.45	3.44
	Ø24			7.87	7.64	6.30	6.24	4.53	5.13	4.49	4.47	4.46	4.45
	Ø32			10.07	9.84	8.50	8.44	6.73	7.33	6.69	6.67	6.66	6.65
	Ø35			12.90	12.67	11.33	11.27	9.56	10.16	9.52	9.50	9.49	9.48
	Ø38			18.09	17.86	16.52	16.46	14.75	15.35	14.71	14.69	14.68	14.67
	Ø42			17.69	17.46	16.12	16.06	14.35	14.95	14.31	14.29	14.28	14.27

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI	PI2		PI	PI2	
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

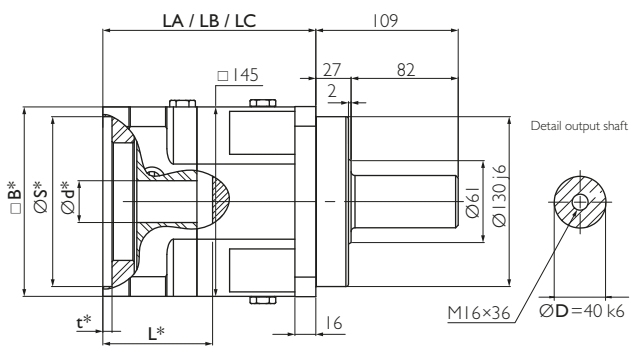
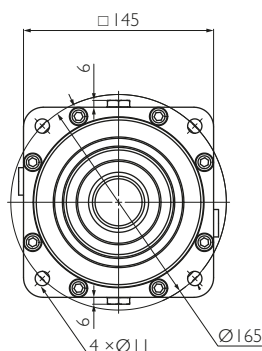
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 51$	$14 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 63$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	



* depending on the motor: See pages 100 et seq.

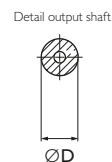
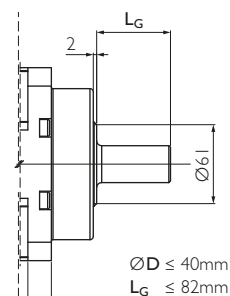
Output

Standard

Optional

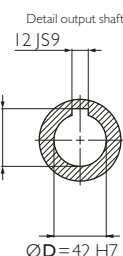
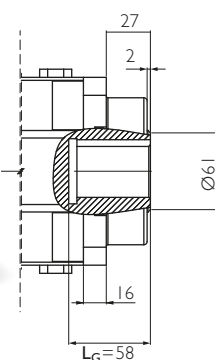
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3

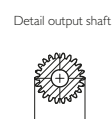
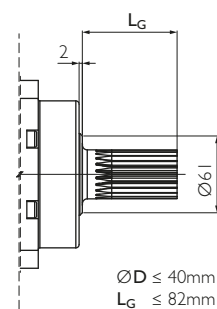


Option 3 on request. Adjustments can reduce capacity.

4



5



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

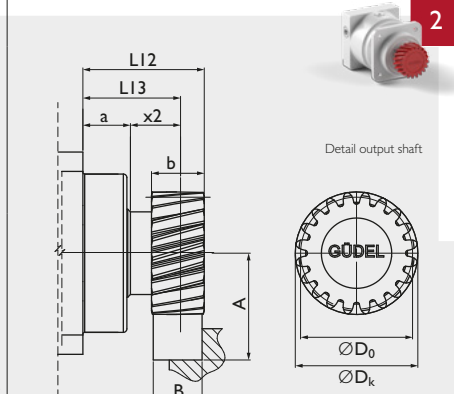
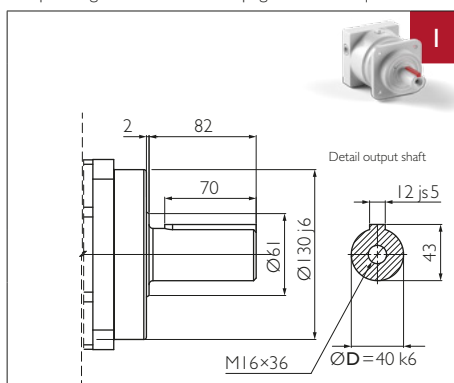
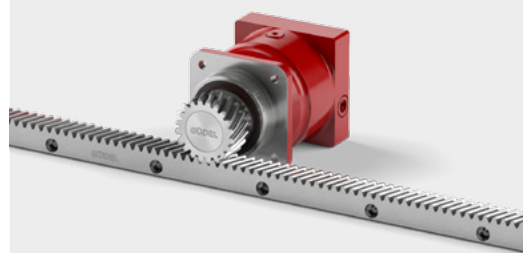
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example NR 140 A4, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *			3-stage									
	i		105	125	175	200	250	300	400	500	700	1 000
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	490	490	490	490	490	390	480	490	450	270
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	600	600	600	600	600	600	600	600	540	476
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900
Maximum input speed S5	n _{1max}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	270	270	270	270	270	270	270	270	270	270
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	365	365	365	365	365	365	365	365	365	365
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500
Maximum input speed S1	n _{1max}	[rpm]	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900	3 900
Emergency stop torque ^{d)}	T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 300	1 250	1 300	1 300	1 100	900
Efficiency	η	[%]	91									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	22									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	87	87	87	87	87	73	82	87	86	80
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 70									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	10 300									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	4.11	5.21	4.11	3.46	3.46	3.44	3.44	3.44	3.44
	Ø19			4.11	5.21	4.11	3.46	3.46	3.44	3.44	3.44	3.44
	Ø24			5.12	6.22	5.12	4.47	4.47	4.45	4.45	4.45	4.45
	Ø32			7.32	8.42	7.32	6.67	6.67	6.65	6.65	6.65	6.65
	Ø35			10.15	11.25	10.15	9.50	9.50	9.48	9.48	9.48	9.48
	Ø38			15.34	16.44	15.34	14.69	14.69	14.67	14.67	14.67	14.67
	Ø42			14.94	16.04	14.94	14.29	14.29	14.27	14.27	14.27	14.27

- * Other ratios available. 112, 120, 140, 147, 150, 160, 196, 210, 245, 280, 343, 350, 490 on request.
- a) Nominal output torque when operating at n_{1N}.
- b) 1000 cycles per hour max.
- c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

- d) Valid 1000 times the gearbox life.
- e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.
- f) Values for 300 rpm.
- g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
- h) Depending on the motor output shaft Ø.
- i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

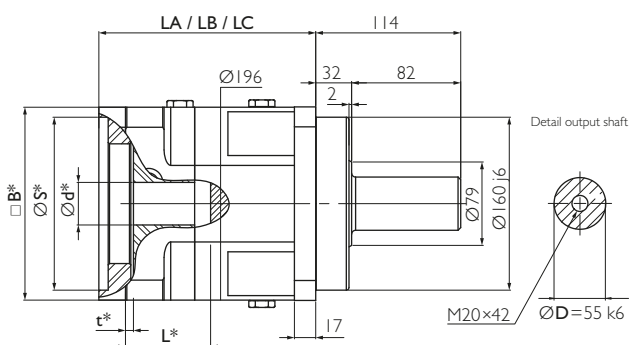
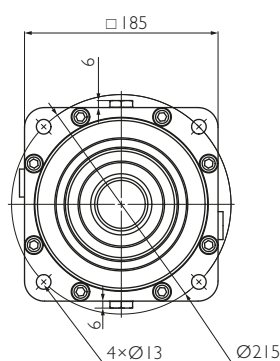
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		I-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



* depending on the motor: See pages 100 et seq.

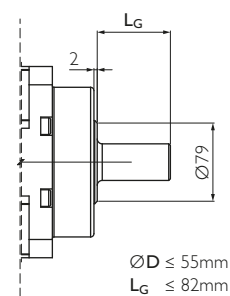
Output

Standard

Optional

0

3

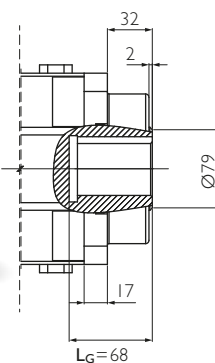


Detail output shaft

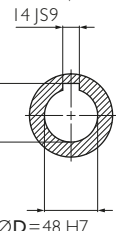


Option 3 on request. Adjustments can reduce capacity.

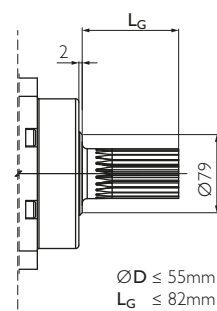
4



Detail output shaft



5



Detail output shaft

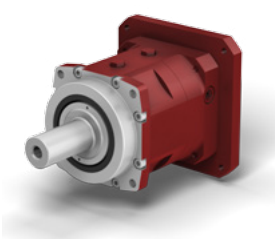


Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

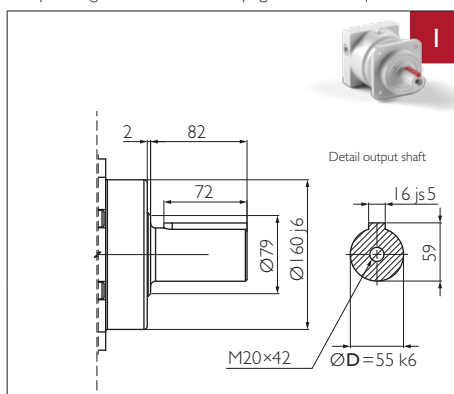
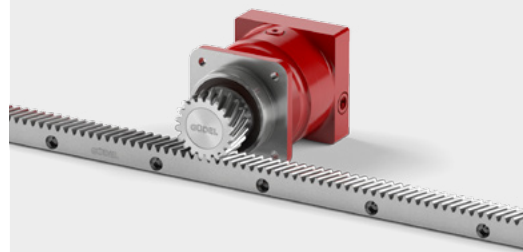
Quality 6f24 DIN 3962 / 63 / 67



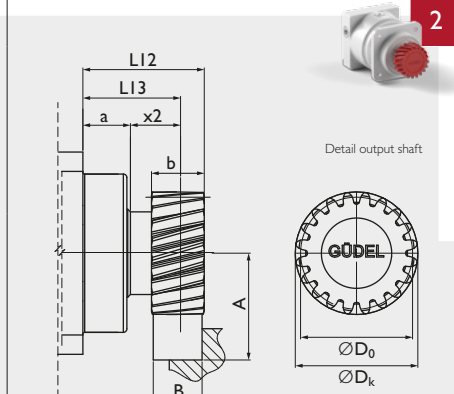
Example NR 180 C0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



1



2

Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	4	13.33	20	77.441	40	92.88	84.883	—	83.5	63.5	31.5	32	1.5
Pinion 2	[-]	5	16.67	20	87.052	50	116.10	106.103	—	89.5	64.5	32.5	32	3.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	750	770	780	760	680
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 150	1 150	1 150	1 150	880
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 500	1 500	1 500	2 300	2 300
Maximum input speed S5		n _{1max}	[rpm]	3 000	3 500	3 500	3 500	3 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	380	380	380	380	340
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	560	560	560	560	570
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 100	1 300	1 300	2 100	2 100
Maximum input speed S1		n _{1max}	[rpm]	1 500	1 500	1 500	2 300	2 300
Emergency stop torque ^{d)}		T _{2not}	[Nm]	2 550	2 780	2 780	2 780	2 250
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	32				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	156.3	182.7	193.5	210.1	183.3
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Same way input / output				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 15 500 / End of output shaft: 11 500				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	15 000				
Color				Red, RAL 3003				
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	38.19	23.35	17.21	12.12	9.18
	Ø24			39.24	24.40	18.26	13.17	10.23
	Ø32			41.45	26.61	20.47	15.38	12.44
	Ø35			44.37	29.53	23.39	18.30	15.36
	Ø38			49.97	35.13	28.99	23.90	20.96
	Ø42			49.47	34.63	28.49	23.40	20.46
	Ø48			49.87	35.03	28.89	23.80	20.86

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	28 585	14 084	24 045	44 505	23 785	40 048
Max acceleration torque	T _{2B}	[Nm]	1 213	598	1 021	2 361	1 262	2 125
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

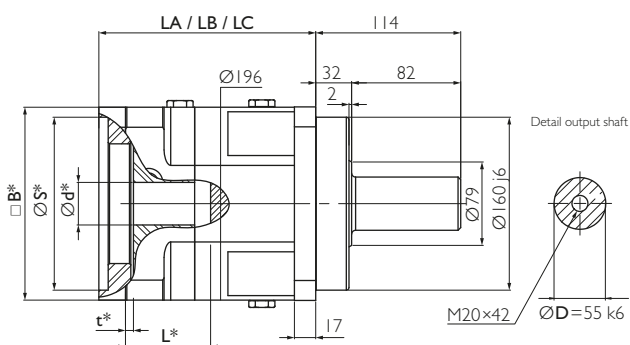
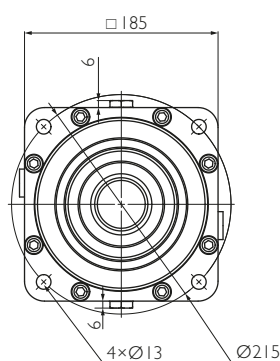
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



* depending on the motor: See pages 100 et seq.

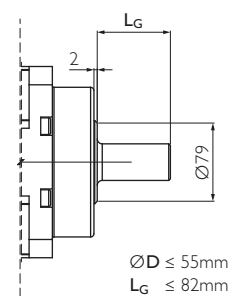
Output

Standard

Optional

0

3

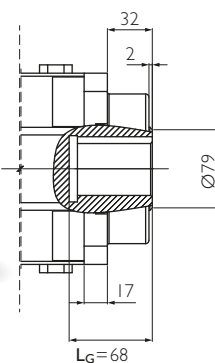


Detail output shaft

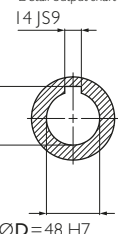


Option 3 on request. Adjustments can reduce capacity.

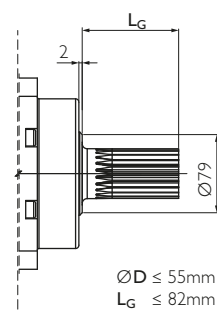
4



Detail output shaft



5



Detail output shaft



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

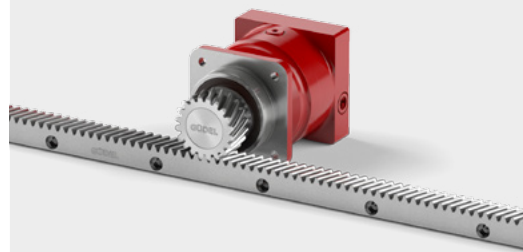
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example NR 180 A5, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	4	13.33	20	77.441	40	92.88	84.883	—	83.5	63.5	31.5	32	1.5
Pinion 2	[-]	5	16.67	20	87.052	50	116.10	106.103	—	89.5	64.5	32.5	32	3.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	750	770	780	780	750	780	770	780	760	680
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 150	1 150	1 150	1 150	1 150	1 150	1 150	1 150	1 150	880
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 500	2 700	2 700	2 700	2 700	2 700	2 700	2 900	2 900	3 400
Maximum input speed S5		n _{1max}	[rpm]	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	380	380	380	380	380	380	380	380	380	340
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	560	560	560	560	560	560	560	560	570	570
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 700	2 400	2 400	2 400	2 400	2 400	2 400	2 600	2 600	3 000
Maximum input speed S1		n _{1max}	[rpm]	2 500	2 700	2 700	2 700	2 700	2 700	2 700	2 900	2 900	3 400
Emergency stop torque ^{d)}		T _{2not}	[Nm]	2 780	2 780	2 780	2 780	2 550	2 780	2 780	2 780	2 780	2 250
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	39									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	140.6	164.4	174.0	174.0	140.6	174.0	164.4	174.0	189.2	165.0
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 15 500 / End of output shaft: 11 500									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	15 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	23.57	22.65	16.76	16.51	9.22	11.77	9.07	9.01	8.96	8.93
	Ø24			24.62	23.7	17.81	17.56	10.27	12.82	10.12	10.06	10.01	9.98
	Ø32			26.83	25.91	20.02	19.77	12.48	15.03	12.33	12.27	12.22	12.19
	Ø35			29.75	28.83	22.94	22.69	15.4	17.95	15.25	15.19	15.14	15.11
	Ø38			35.35	34.43	28.54	28.29	21	23.55	20.85	20.79	20.74	20.71
	Ø42			34.85	33.93	28.04	27.79	20.5	23.05	20.35	20.29	20.24	20.21
	Ø48			35.25	34.33	28.44	28.19	20.9	23.45	20.75	20.69	20.64	20.61

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	28 585	14 084	24 045	44 505	23 785	40 048
Max acceleration torque	T _{2B}	[Nm]	1 213	598	1 021	2 361	1 262	2 125
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

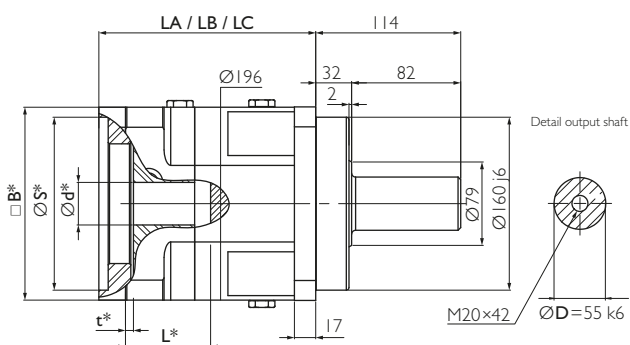
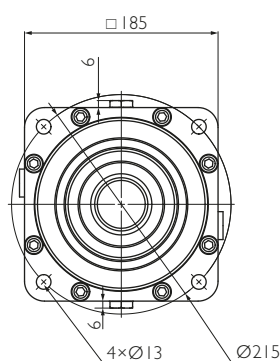
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



* depending on the motor: See pages 100 et seq.

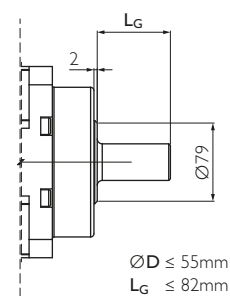
Output

Standard

Optional

0

3

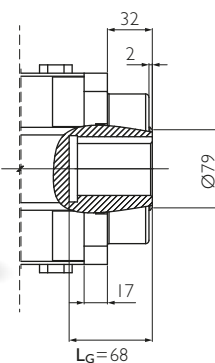


Detail output shaft

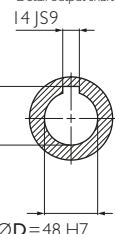


Option 3 on request. Adjustments can reduce capacity.

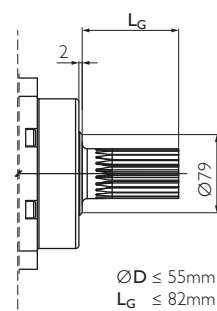
4



Detail output shaft



5



Detail output shaft



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

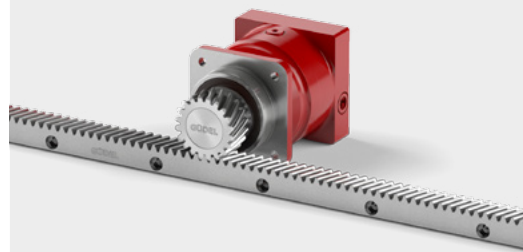
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example NR 180 A0, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	4	13.33	20	77.441	40	92.88	84.883	—	83.5	63.5	31.5	32	1.5
Pinion 2	[-]	5	16.67	20	87.052	50	116.10	106.103	—	89.5	64.5	32.5	32	3.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *			3-stage									
	i		105	125	175	200	250	300	400	500	700	1 000
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	780	780	780	780	780	750	770	780	760	680
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	1 150	1 150	1 150	1 150	1 150	1 150	1 150	1 150	1 150	880
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400
Maximum input speed S5	n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	400	400	400	400	400	400	400	400	400	340
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	570	570	570	570	570	570	570	570	570	570
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000
Maximum input speed S1	n _{1max}	[rpm]	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400	3 400
Emergency stop torque ^{d)}	T _{2not}	[Nm]	2 780	2 780	2 780	2 780	2 780	2 550	2 780	2 780	2 780	2 250
Efficiency	η	[%]	91									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	46									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	165.3	165.3	165.5	133.3	165.3	133.3	156.3	165.3	179.5	156.6
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 15 500 / End of output shaft: 11 500									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	15 000									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø19	J ₁	[kg·cm ²]	11.77	16.48	11.77	9.00	9.00	8.93	8.93	8.93	8.93
	Ø24			12.82	17.53	12.82	10.05	10.05	9.98	9.98	9.98	9.98
	Ø32			15.03	19.74	15.03	12.26	12.26	12.19	12.19	12.19	12.19
	Ø35			17.95	22.66	17.95	15.18	15.18	15.11	15.11	15.11	15.11
	Ø38			23.55	28.26	23.55	20.78	20.78	20.71	20.71	20.71	20.71
	Ø42			23.05	27.76	23.05	20.28	20.28	20.21	20.21	20.21	20.21
	Ø48			23.45	28.16	23.45	20.68	20.68	20.61	20.61	20.61	20.61

- * Other ratios available. 112, 120, 140, 147, 150, 160, 196, 210, 245, 280, 343, 350, 490 on request.
- a) Nominal output torque when operating at n_{1N}.
- b) 1000 cycles per hour max.
- c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

- d) Valid 1000 times the gearbox life.
- e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.
- f) Values for 300 rpm.
- g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
- h) Depending on the motor output shaft Ø.
- i) With i=10 and n_{1N}=3000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	28 585	14 084	24 045	44 505	23 785	40 048
Max acceleration torque	T _{2B}	[Nm]	1 213	598	1 021	2 361	1 262	2 125
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 85$ $24 \leq \varnothing d \leq 48$

Standard

result in LA

for motor shaft

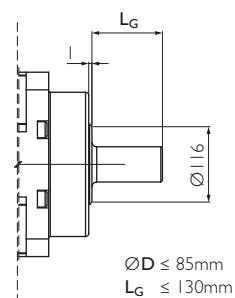
 $85 < L \leq 115$ $48 < \varnothing d \leq 55$

result in LB

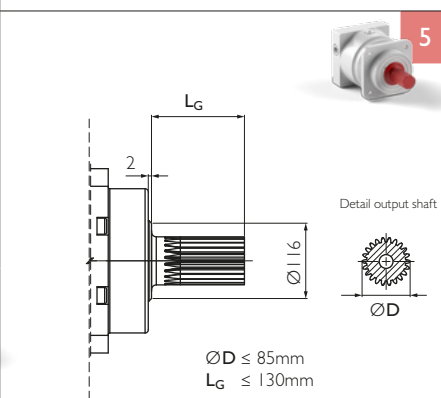
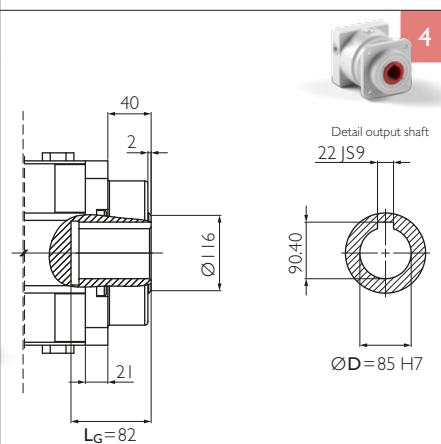
Output

Optional

		I-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	



Option 3 on request. Adjustments can reduce capacity.

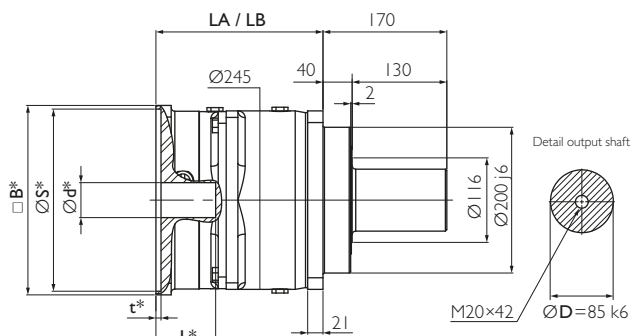
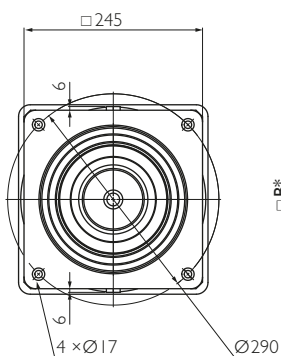


Option 5 on request. Adjustments can reduce capacity.

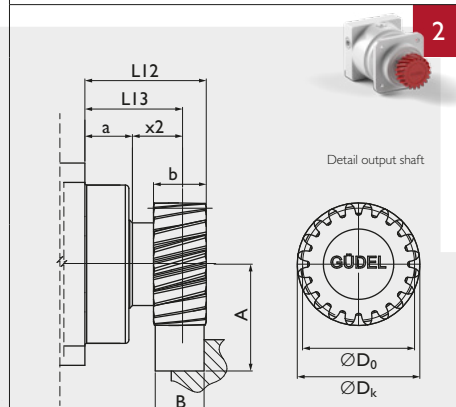
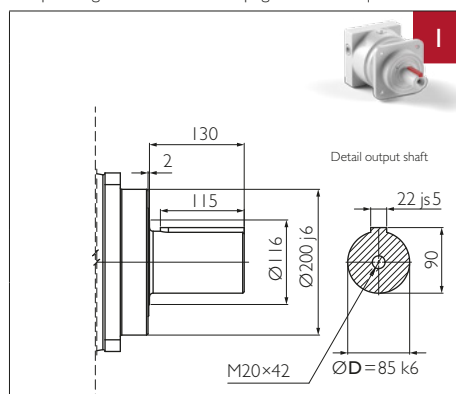
Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67



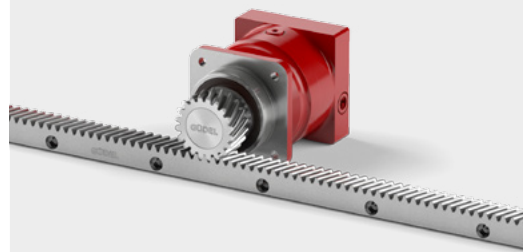
* depending on the motor: See pages 100 et seq.



Example NR 240 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	5	16.67	24	97.662	50	137.32	127.324	—	112.5	87.5	47.5	40	5.4
Pinion 2	[-]	6	20.00	20	106.662	60	139.32	127.324	—	111.0	81.0	41.0	40	5.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage				
				3	4	5	7	10
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	2 400	2 700	2 700	2 500	1 700
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	3 400	3 800	3 800	3 600	2 400
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 000	1 000	1 000	1 500	1 500
Maximum input speed S5		n _{1max}	[rpm]	2 000	2 200	2 200	2 200	2 200
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	1 400	1 600	1 600	1 600	1 600
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	1 750	1 750	1 750	1 750	1 750
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	700	900	900	1 350	1 350
Maximum input speed S1		n _{1max}	[rpm]	1 000	1 000	1 000	1 500	1 500
Emergency stop torque ^{d)}		T _{2not}	[Nm]	6 900	8 500	8 500	8 500	6 800
Efficiency		η	[%]	97				
Lifetime		L _h	[h]	> 20 000				
Weight		M	[kg]	70				
Angular backlash		j _t	[arcmin]	Precision P I ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P I2 ≤ 12				
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	626	684	698	728	698
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72				
Max. permitted housing temperature ^{g)}		T	[°C]	90				
Protection class				IP 65				
Direction of rotation				Motor way				
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 30 000 / End of output shaft: 20 000				
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000				
Color				Red, RAL 3003				
Inertia in kg·cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	151.00	83.30	58.00	36.80	24.30
	Ø32			153.20	85.50	60.20	39.00	26.50
	Ø35			158.50	90.80	65.50	44.30	31.80
	Ø38			161.90	94.20	68.90	47.70	35.20
	Ø42			161.40	93.70	68.40	47.20	34.70
	Ø48			161.60	93.90	68.60	47.40	34.90
	Ø55			184.20	116.50	91.20	70.00	57.50

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

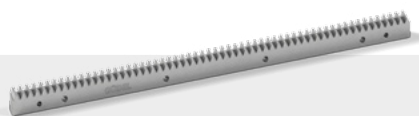
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=2000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	44 786	29 748	39 992	63 300	-	59 005
Max acceleration torque	T _{2B}	[Nm]	2 851	1 894	2 546	4 030	-	3 756
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Available ratios *		i		2-stage									
				12	16	20	25	30	35	40	50	70	100
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	2 400	2 700	2 700	2 700	2 400	2 700	2 700	2 700	2 500	1 700
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	3 200	3 800	3 800	3 800	3 200	3 800	3 800	3 800	3 600	2 200
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 700	1 900	1 900	1 900	1 900	1 900	1 900	2 100	2 100	2 400
Maximum input speed S5		n _{1max}	[rpm]	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500
Nominal torque S1 ^{a)}		T _{2N}	[Nm]	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600
Acceleration torque S1 ^{b)}		T _{2B}	[Nm]	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750
Nominal input speed S1 ^{c)}		n _{1N}	[rpm]	1 200	1 700	1 700	1 700	1 700	1 700	1 700	1 900	1 900	2 100
Maximum input speed S1		n _{1max}	[rpm]	1 700	1 900	1 900	1 900	1 900	1 900	1 900	2 100	2 100	2 400
Emergency stop torque ^{d)}		T _{2not}	[Nm]	6 900	8 500	8 500	8 500	6 900	8 500	8 500	8 500	8 500	6 800
Efficiency		η	[%]	94									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	90									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	564.5	582.0	599.5	599.5	564.5	599.5	582.0	599.5	587.8	564.5
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 30 000 / End of output shaft: 20 000									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	79.1	74.9	73.3	51.5	23.6	33.5	22.9	22.7	22.4	22.3
	Ø32			81.3	77.1	75.5	53.7	25.8	35.7	25.1	24.9	24.6	24.5
	Ø35			86.6	82.4	80.8	59	31.1	41	30.4	30.2	29.9	29.8
	Ø38			90	85.8	84.2	62.4	34.5	44.4	33.8	33.6	33.3	33.2
	Ø42			89.5	85.3	83.7	61.9	34	43.9	33.3	33.1	32.8	32.7
	Ø48			89.7	85.5	83.9	62.1	34.2	44.1	33.5	33.3	33	32.9
	Ø55			112.3	108.1	106.5	84.7	56.8	66.7	56.1	55.9	55.6	55.5

* Other ratios available. 9, 15, 21, 27, 28, 49 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=2000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	44 786	29 748	39 992	63 300	-	59 005
Max acceleration torque	T _{2B}	[Nm]	2 851	1 894	2 546	4 030	-	3 756
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 85$ $24 \leq \varnothing d \leq 48$

Standard

result in LA

for motor shaft

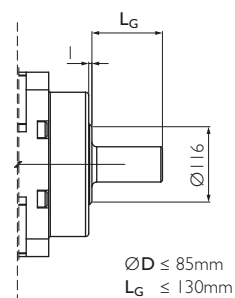
 $85 < L \leq 115$ $48 < \varnothing d \leq 55$

result in LB

Output

Optional

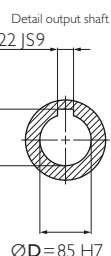
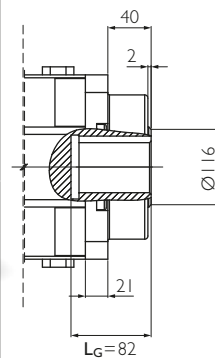
		1-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	



Detail output shaft



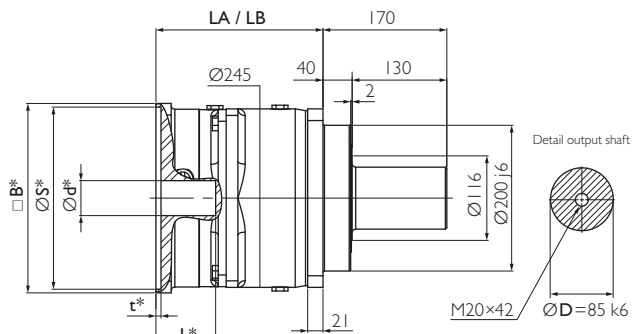
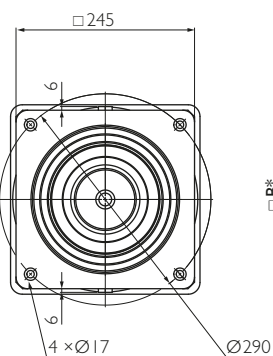
Option 3 on request. Adjustments can reduce capacity.



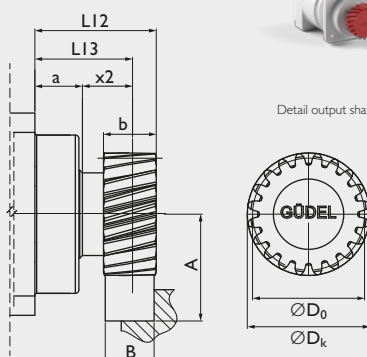
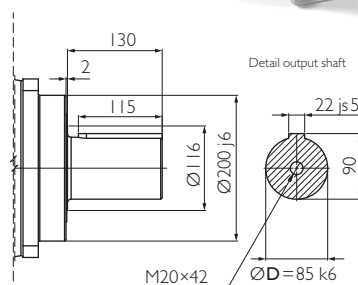
Detail output shaft

22 JS9

90.40

 $\varnothing D = 85\text{ H7}$ 

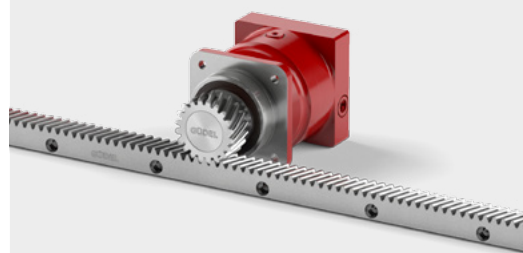
* depending on the motor: See pages 100 et seq.



Example NR 240 A2, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	L12	L13	x2	a	M
Pinion 1	[-]	5	16.67	24	97.662	50	137.32	127.324	—	112.5	87.5	47.5	40	5.4
Pinion 2	[-]	6	20.00	20	106.662	60	139.32	127.324	—	111.0	81.0	41.0	40	5.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *			3-stage									
	i		105	125	175	200	250	300	400	500	700	1 000
Nominal torque S5 ^{a)}	T _{2N}	[Nm]	2 700	2 700	2 700	2 700	2 700	2 400	2 700	2 700	2 500	1 500
Acceleration torque S5 ^{b)}	T _{2B}	[Nm]	3 800	3 800	3 800	3 800	3 800	3 000	3 800	3 800	3 600	2 200
Nominal input speed S5 ^{c)}	n _{1N}	[rpm]	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400
Maximum input speed S5	n _{1max}	[rpm]	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500
Nominal torque S1 ^{a)}	T _{2N}	[Nm]	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600
Acceleration torque S1 ^{b)}	T _{2B}	[Nm]	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750	1 750
Nominal input speed S1 ^{c)}	n _{1N}	[rpm]	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100
Maximum input speed S1	n _{1max}	[rpm]	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400	2 400
Emergency stop torque ^{d)}	T _{2not}	[Nm]	8 500	8 500	8 500	8 500	8 500	6 900	8 500	8 500	8 500	6 800
Efficiency	η	[%]	91									
Lifetime	L _h	[h]	> 20 000									
Weight	M	[kg]	110									
Angular backlash	j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}	C _{t2}	[Nm/arcmin]	538	538	538	538	538	506	524	538	556	524
Noise ⁱ⁾	L _{pA}	[dB(A)]	≤ 72									
Max. permitted housing temperature ^{g)}	T	[°C]	90									
Protection class			IP 65									
Direction of rotation			Same way input / output									
Max. radial force on output shaft ^{f)}	F _{rmax}	[N]	Center of output shaft: 30 000 / End of output shaft: 20 000									
Max. axial force on output shaft ^{f)}	F _{amax}	[N]	34 000									
Color			Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	35.10	51.30	35.10	22.80	22.60	22.30	22.30	22.30	22.30
	Ø32			37.30	53.50	37.30	25.00	24.80	24.50	24.50	24.50	24.50
	Ø35			42.60	58.80	42.60	30.30	30.10	29.80	29.80	29.80	29.80
	Ø38			46.00	62.20	46.00	33.70	33.50	33.20	33.20	33.20	33.20
	Ø42			45.50	61.70	45.50	33.20	33.00	32.70	32.70	32.70	32.70
	Ø48			45.70	61.70	45.70	33.40	33.20	32.90	32.90	32.90	32.90
	Ø55			68.30	84.50	68.30	56.00	55.80	55.50	55.50	55.50	55.50

* Other ratios available. 112, 120, 140, 147, 150, 160, 196, 210, 245, 280, 343, 350, 490 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

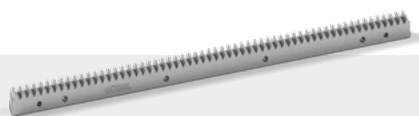
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=2000 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	44 786	29 748	39 992	63 300	-	59 005
Max acceleration torque	T _{2B}	[Nm]	2 851	1 894	2 546	4 030	-	3 756
Precision			PI			PI2		
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

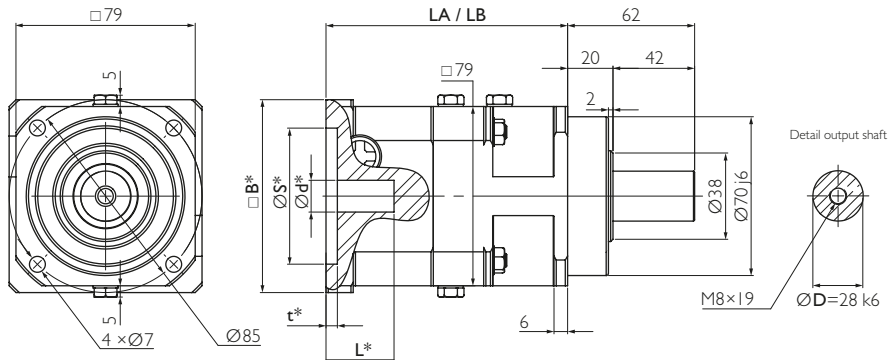
A	for motor shaft	$L \leq 45$	$6 \leq \varnothing d \leq 19$	result in LA
B	for motor shaft	$45 < L \leq 55$	$19 < \varnothing d \leq 24$	result in LB

Output

Standard

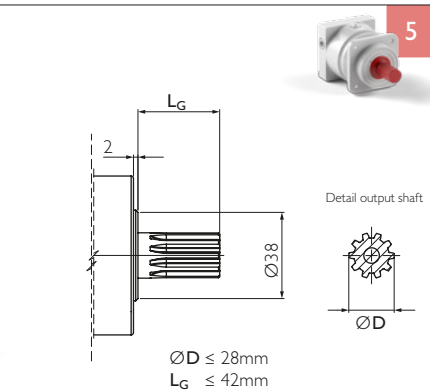
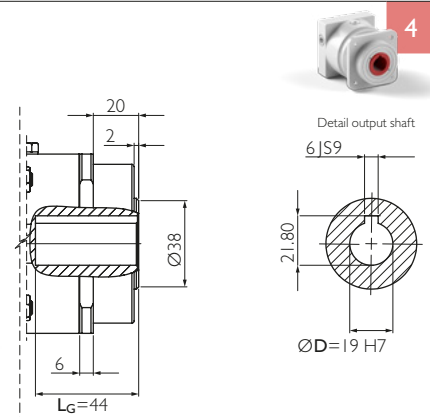
Optional

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160

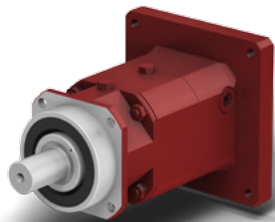


* depending on the motor: See pages 100 et seq.

Option 3 on request. Adjustments can reduce capacity.



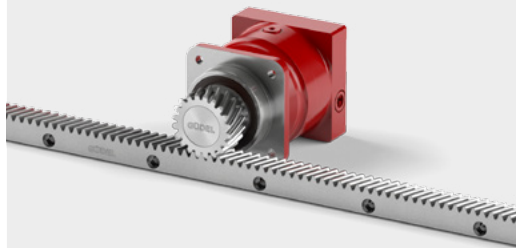
Option 5 on request. Adjustments can reduce capacity.



Example SR 080 B0, 2-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m _n	P _t	z	A	b	D _k	D ₀	D _v	L12	L13	x2	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	–	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage 4	12	16	2-stage 20		28	40
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	95	95	95	95	95	95	95
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	150	140	140	140	140	140	140
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 600	2 900	3 100	3 100	3 100	3 100	3 100
Maximum input speed S5		n _{1max}	[rpm]	5 400	5 400	5 400	5 400	5 400	5 400	5 400
Emergency stop torque ^{d)}		T _{2not}	[Nm]	250	250	250	250	250	250	250
Efficiency		η	[%]	96	93					
Lifetime		L _h	[h]	> 20 000						
Weight		M	[kg]	4	5					
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12						
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	11.7	11.1	11.1	11.3	11.1	11.1	11.1
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 70						
Max. permitted housing temperature ^{g)}		T	[°C]	90						
Protection class				IP 65						
Direction of rotation				Same way input / output						
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285						
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	3 600						
Color				Red, RAL 3003						
Inertia in kg.cm² ^{h)}	Ø 11	J ₁	[kgcm²]	0.46	0.46	0.45	0.45	0.34	0.31	
	Ø 14			1.02	1.01	1.00	1.00	0.89	0.86	
	Ø 19			1.03	1.03	1.02	1.01	0.91	0.88	
	Ø 24			1.85	1.84	1.83	1.83	1.72	1.69	

- a) Nominal output torque when operating at n_{1N}.
b) 1 000 cycles per hour max.
c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.
d) Valid 1 000 times the gearbox life.

- e) Valid for an input Ø of 19mm in 1-stage and 14mm in 2- and 3-stage.
f) Values for 300 rpm.
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
h) Depending on the motor output shaft Ø.
i) With i=10 and n_{1N}=2500 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			PI	PI2	
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 45$ $6 \leq \varnothing d \leq 19$

result in LA

for motor shaft

 $45 < L \leq 55$ $19 < \varnothing d \leq 24$

result in LB

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160

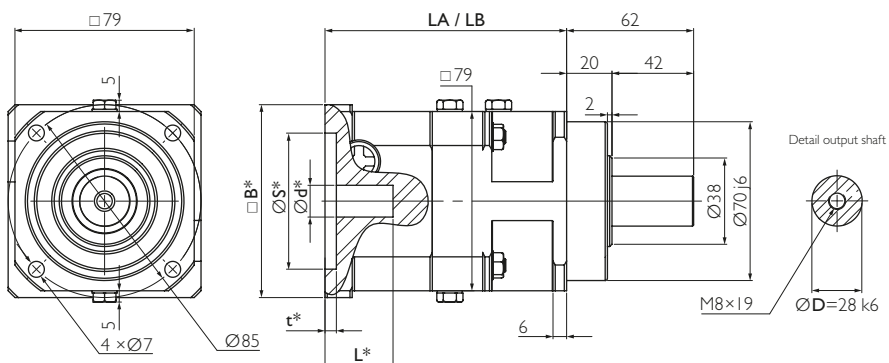
Output

Standard

Optional

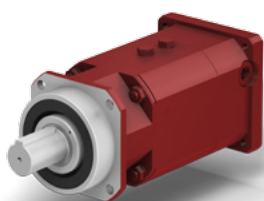
0

3



* depending on the motor: See pages 100 et seq.

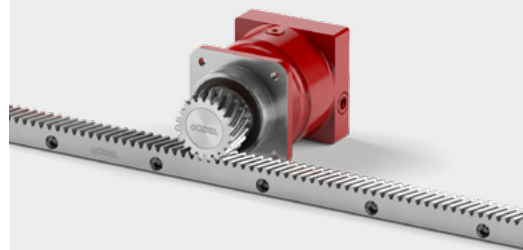
Option 3 on request. Adjustments can reduce capacity.



Example SR 080 A1, 3-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion I	[-]	2	6.67	20	43.221	25	46.44	42.441	—	52.5	40.0	20.0	20	0.3

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		3-stage									
				60	80	100	112	120	140	160	200	280	400
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	95	95	95	95	95	95	95	95	95	95
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	140	140	140	140	140	140	140	140	140	140
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
Maximum input speed S5		n _{1max}	[rpm]	5 400	5 400	5 400	5 400	5 400	5 400	5 400	5 400	5 400	5 400
Emergency stop torque ^{d)}		T _{2not}	[Nm]	250	250	250	250	250	250	250	250	250	250
Efficiency		η	[%]	90									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	6									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	10.7	10.7	9.8	10.6	10.6	10.7	10.6	10.7	10.6	10.1
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 70									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	3 600									
Color				Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.46	0.45	0.31	0.34	0.31	0.34	0.31	0.31	0.31	0.31
	Ø 14			1.01	1.00	0.86	0.89	0.86	0.89	0.86	0.86	0.86	0.86
	Ø 19			1.03	1.02	0.88	0.91	0.88	0.91	0.88	0.88	0.88	0.88
	Ø 24			1.84	1.83	1.69	1.72	1.69	1.72	1.69	1.69	1.69	1.69

* Other ratios available. 36, 64, 84, 180, 196, 300, 360, 500, 600, 700, 1 000 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 19 mm in 1-stage and 14 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With i=10 and n_{1N}=2500 rpm no load.

Rack



			Pinion I		
			Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 490	2 963	5 036
Max acceleration torque	T _{2B}	[Nm]	159	63	107
Precision			P1	P12	
Feed force			High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

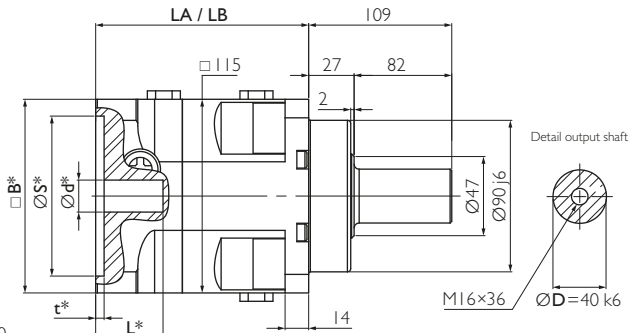
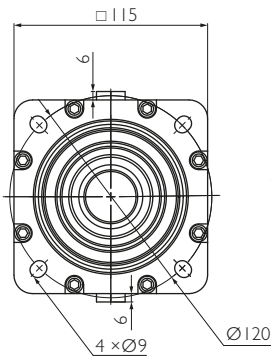
A	for motor shaft	$L \leq 50$	$9 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 64$	$24 < \varnothing d \leq 35$	result in LB

Output

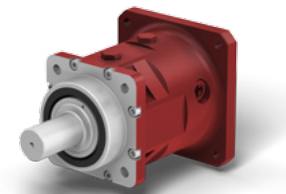
Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216



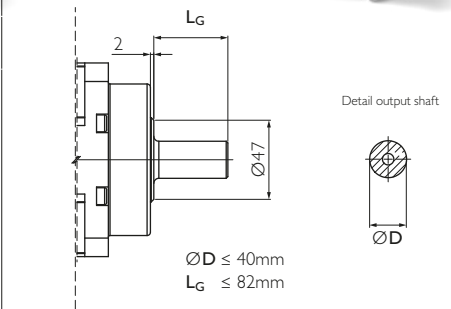
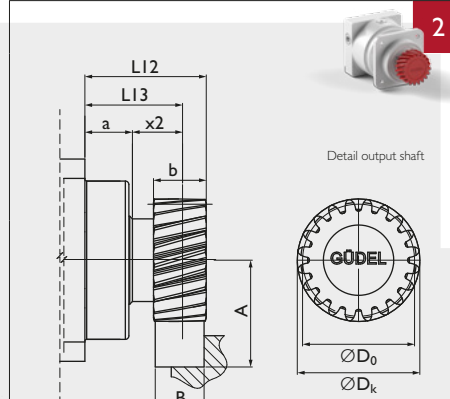
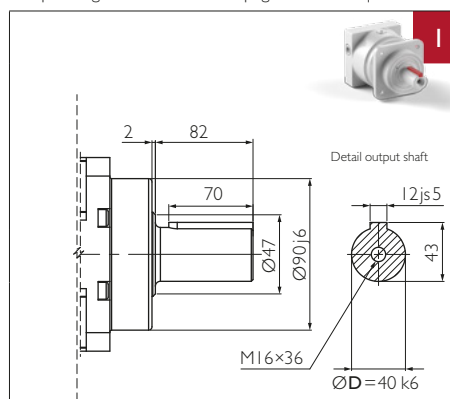
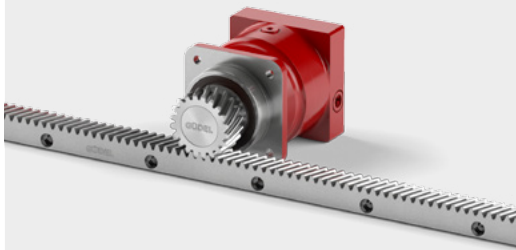
* depending on the motor: See pages 100 et seq.



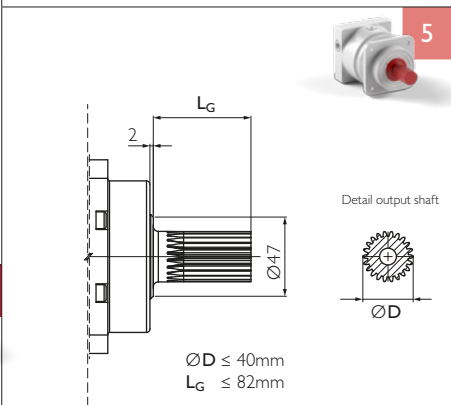
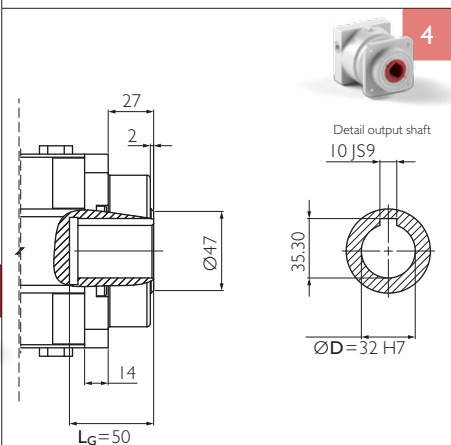
Example SR 100 A0, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42" hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage 4	12	16	2-stage 20	28	40
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	300	300	300	300	300	300
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	370	370	370	370	370	370
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 200	2 600	2 800	2 800	2 800	2 800
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000
Emergency stop torque ^{d)}		T _{2not}	[Nm]	800	800	800	800	800	800
Efficiency		η	[%]	96	93				
Lifetime		L _h	[h]	> 20 000					
Weight		M	[kg]	8	10				
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12					
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	41.0	32.0	38.7	38.4	36.8	38.7
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71					
Max. permitted housing temperature ^{g)}		T	[°C]	90					
Protection class				IP 65					
Direction of rotation				Same way input / output					
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300					
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	6 000					
Color				Red, RAL 3003					
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	2.83	2.76	2.69	2.23	1.83	1.60
	Ø19			2.83	2.76	2.69	2.23	1.83	1.60
	Ø24			2.84	2.77	2.70	2.24	1.84	1.61
	Ø32			6.04	5.97	5.90	5.44	5.04	4.81
	Ø35			8.67	8.60	8.53	8.07	7.67	7.44

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 50$ $9 \leq \varnothing d \leq 24$

result in LA

for motor shaft

 $51 < L \leq 64$ $24 < \varnothing d \leq 35$

result in LB

		1-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216

Output

Standard

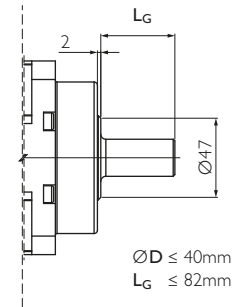
Optional



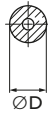
0



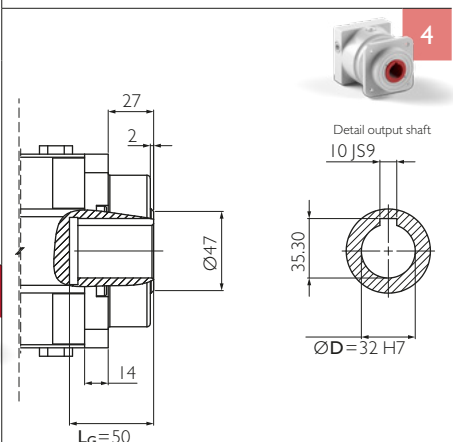
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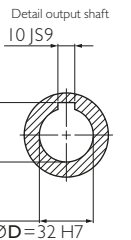
Detail output shaft


 $\varnothing D \leq 40\text{mm}$
 $L_G \leq 82\text{mm}$

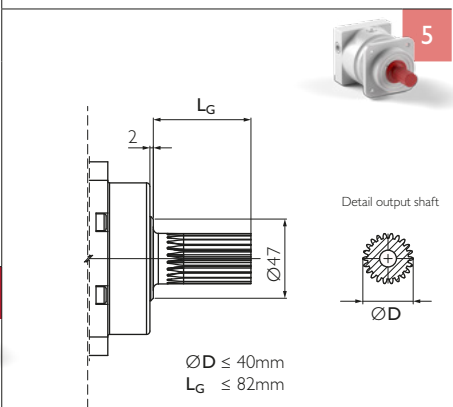
Option 3 on request. Adjustments can reduce capacity.



4

Detail output shaft
10 JS9

35.30

 $\varnothing D = 32\text{ H7}$ 

5

Detail output shaft

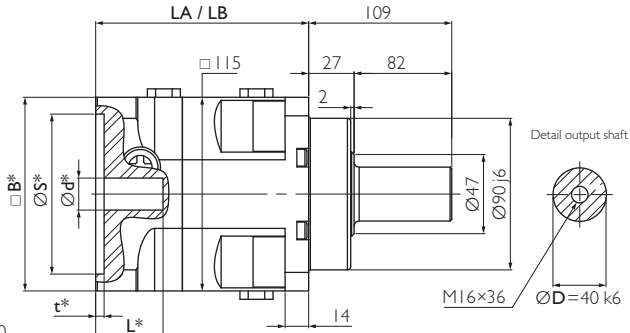
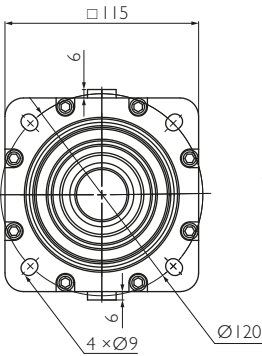

 $\varnothing D \leq 40\text{mm}$
 $L_G \leq 82\text{mm}$

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, 19°31'42" hardened (58⁺⁴/₋₁ HRC), ground, crowned

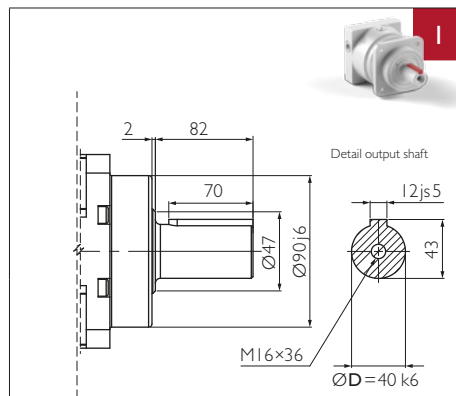
Quality 6f24 DIN 3962 / 63 / 67



Detail output shaft

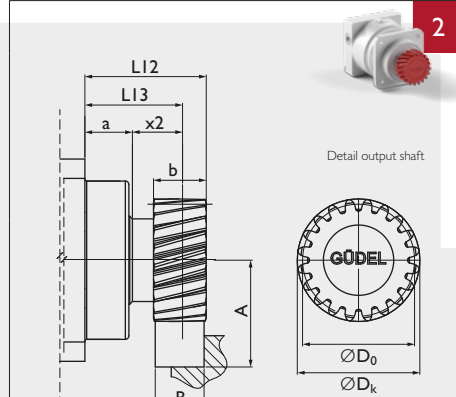
M16×36 $\varnothing D = 40\text{ k6}$

* depending on the motor: See pages 100 et seq.



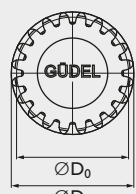
1

Detail output shaft

M16×36 $\varnothing D = 40\text{ k6}$ 

2

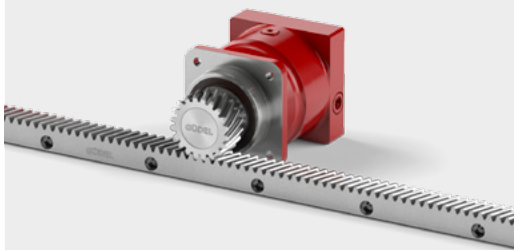
Detail output shaft



Example SR 100 A0. 3-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
Pinion 2	[-]	3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		3-stage									
				60	80	100	112	120	140	160	200	280	400
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	300	300	300	300	300	300	300	300	300	300
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	404	404	404	404	404	404	404	404	404	404
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800	3 800
Maximum input speed S5		n _{1max}	[rpm]	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500	4 500
Emergency stop torque ^{d)}		T _{2not}	[Nm]	800	800	800	800	800	800	800	800	800	800
Efficiency		η	[%]	90									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	12									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	38.4	38.4	34.3	37.0	37.0	38.4	37.0	38.4	37.0	37.0
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	6 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	2.23	2.22	1.59	1.83	1.59	1.82	1.60	1.59	1.59	1.59
	Ø19			2.23	2.22	1.59	1.83	1.59	1.82	1.60	1.59	1.59	1.59
	Ø24			2.24	2.23	1.60	1.84	1.61	1.83	1.61	1.60	1.60	1.60
	Ø32			5.44	5.43	4.80	5.04	4.80	5.03	4.81	4.80	4.80	4.80
	Ø35			8.07	8.06	7.43	7.67	7.44	7.66	7.44	7.43	7.43	7.43

* Other ratios available. 36, 64, 84, 180, 196, 300, 360, 500, 600, 700, 1000 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	7 540	4 107	4 805	16 163	7 565	12 980
Max acceleration torque	T _{2B}	[Nm]	200	109	127	515	241	413
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

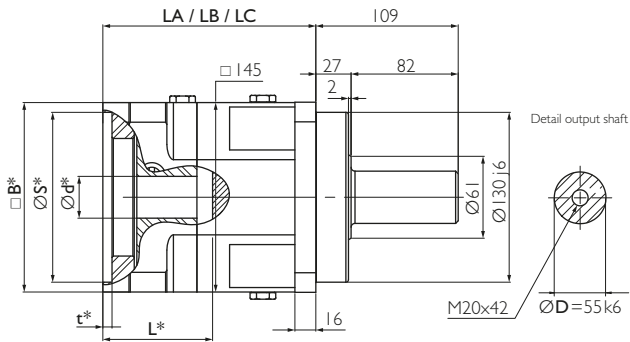
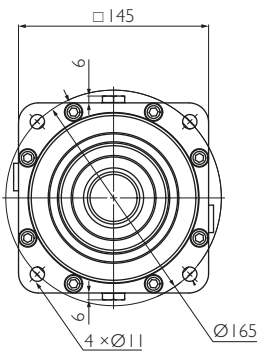
A	for motor shaft	$L \leq 51$	$14 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 63$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	

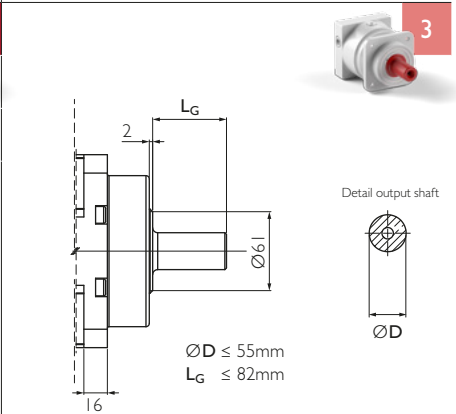
Output

Standard

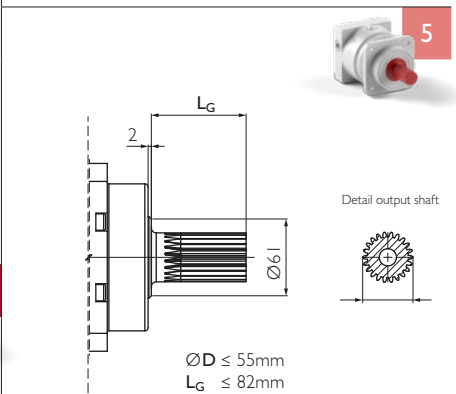
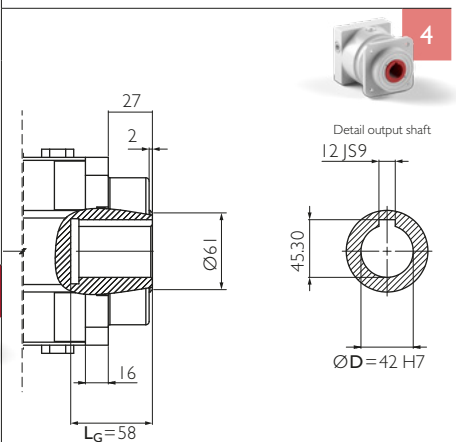
Optional



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.



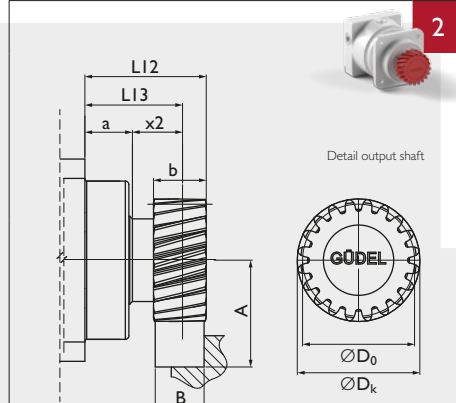
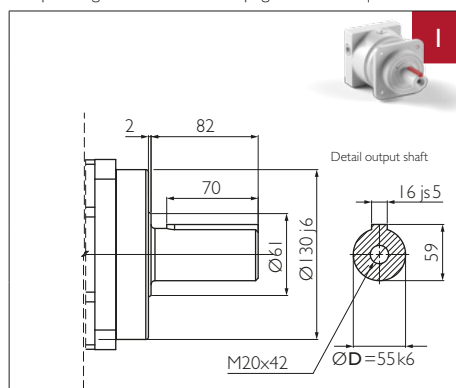
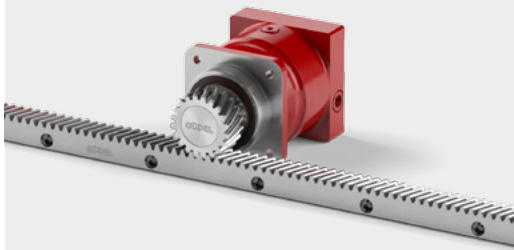
Option 5 on request. Adjustments can reduce capacity.



Example SR 140 A2, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage 4	12	16	2-stage 20		28	40
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	500	500	500	500	500	500	500
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	750	750	750	750	750	750	750
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 900	2 400	2 600	2 600	2 600	2 600	2 600
Maximum input speed S5		n _{1max}	[rpm]	3 600	3 600	3 600	3 600	3 600	3 600	3 600
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 300	1 300	1 300
Efficiency		η	[%]	96	93					
Lifetime		L _h	[h]	> 20 000						
Weight		M	[kg]	14	18					
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12						
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	106.2	85.0	95.7	102.1	95.7	95.7	95.7
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71						
Max. permitted housing temperature ^{g)}		T	[°C]	90						
Protection class				IP 65						
Direction of rotation				Same way input / output						
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700						
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300						
Color				Red, RAL 3003						
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	7.12	6.86	6.63	5.29	4.15	3.48	
	Ø19			7.12	6.86	6.63	5.29	4.15	3.48	
	Ø24			8.13	7.87	7.64	6.30	5.16	4.49	
	Ø32			10.33	10.07	9.84	8.50	7.36	6.69	
	Ø35			13.16	12.90	12.67	11.33	10.19	9.52	
	Ø38			18.35	18.09	17.86	16.52	15.38	14.71	
	Ø42			17.95	17.69	17.46	16.12	14.98	14.31	

- a) Nominal output torque when operating at n_{1N}.
b) 1 000 cycles per hour max.
c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.
d) Valid 1 000 times the gearbox life.

- e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.
f) Values for 300 rpm.
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
h) Depending on the motor output shaft Ø.
i) With n_{1N}=2500 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

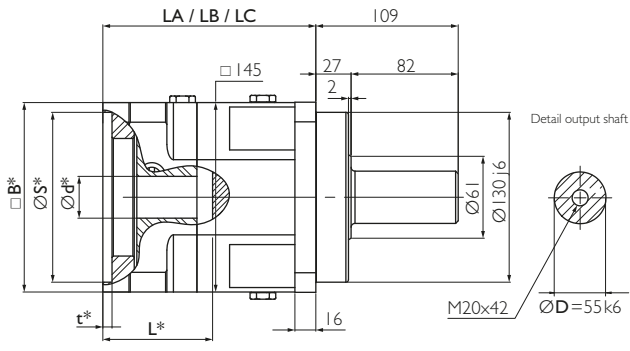
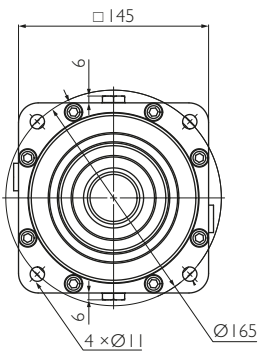
A	for motor shaft	$L \leq 51$	$14 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 63$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	

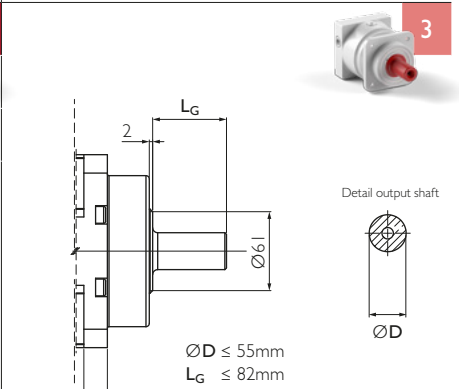
Output

Standard

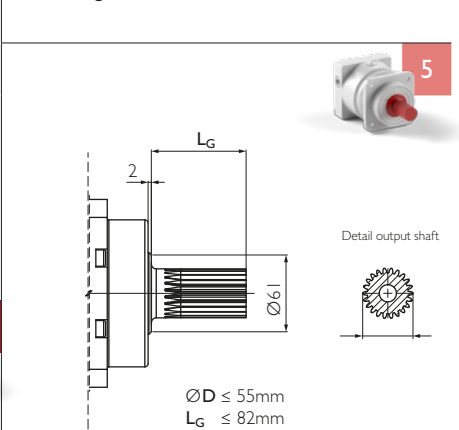
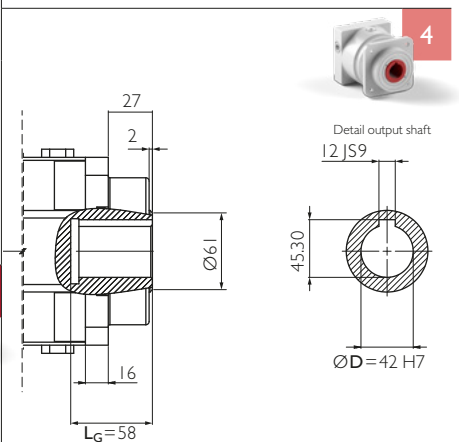
Optional



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.

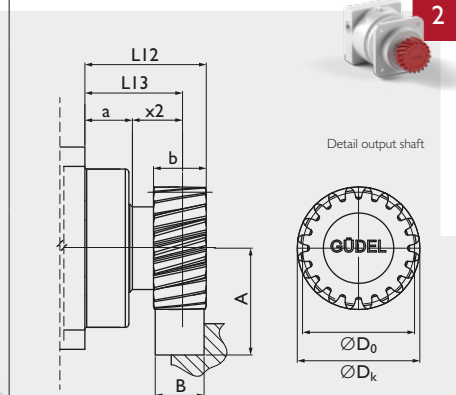
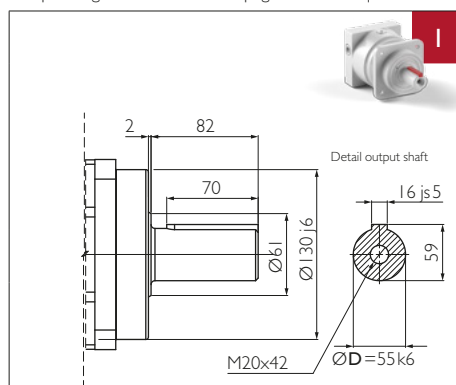
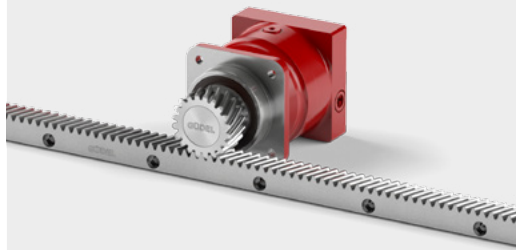


Option 5 on request. Adjustments can reduce capacity.

Example SR 140 A4, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
Pinion 2	[-]	4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		3-stage									
				60	80	100	112	120	140	160	200	280	400
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	500	500	500	500	500	500	500	500	500	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	750	750	750	750	750	750	750	750	750	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	3 500	
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	1 300	
Efficiency		η	[%]	90									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	22									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	92	92	84	86	86	92	86	92	86	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	5.28	5.27	3.44	4.14	3.47	4.11	3.47	3.46	3.45	3.44
	Ø19			5.28	5.27	3.44	4.14	3.47	4.11	3.47	3.46	3.45	3.44
	Ø24			6.29	6.28	4.45	5.15	4.48	5.12	4.48	4.47	4.46	4.45
	Ø32			8.49	8.48	6.65	7.35	6.68	7.32	6.68	6.67	6.66	6.65
	Ø35			11.32	11.31	9.48	10.18	9.51	10.15	9.51	9.50	9.49	9.48
	Ø38			16.51	16.50	14.67	15.37	14.70	15.34	14.70	14.69	14.68	14.67
	Ø42			16.11	16.10	14.27	14.97	14.30	14.94	14.30	14.29	14.28	14.27

* Other ratios available. 36, 64, 84, 180, 196, 300, 360, 500, 600, 700, 1 000 on request.

a) Nominal output torque when operating at n_{1N}.

b) Maximal 1 000 Zyklen pro Stunde

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	16 230	8 715	12 919	28 585	14 084	24 045
Max acceleration torque	T _{2B}	[Nm]	568	305	452	1 213	598	1 021
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

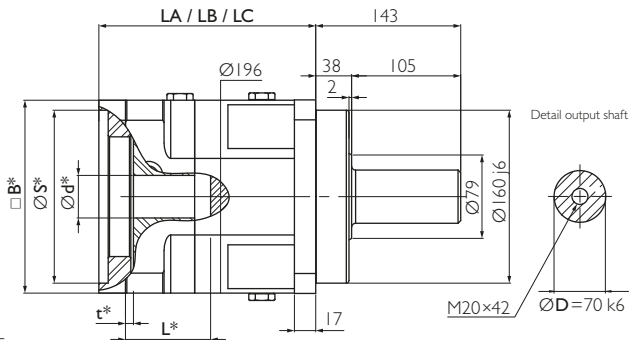
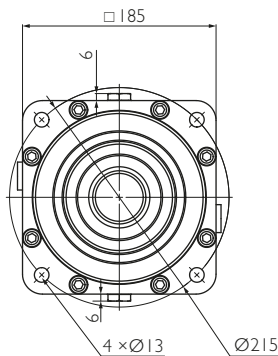
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		I-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



* depending on the motor: See pages 100 et seq.

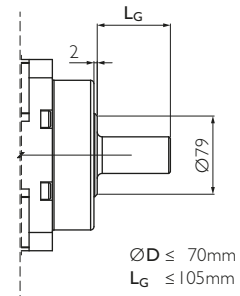
Output

Standard

Optional

0

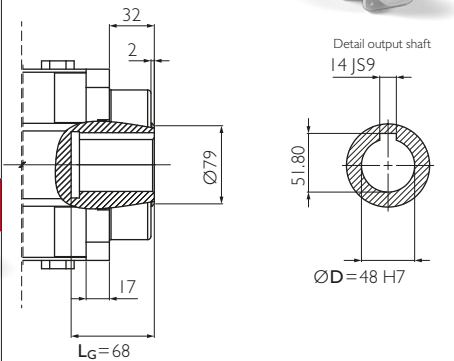
3



Detail output shaft

Option 3 on request. Adjustments can reduce capacity.

4



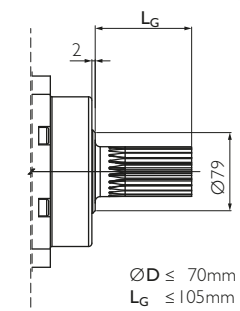
Detail output shaft

14 JS9

51.80

ØD=48 H7

5



Detail output shaft

ØD ≤ 70mm
LG ≤ 105mm

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

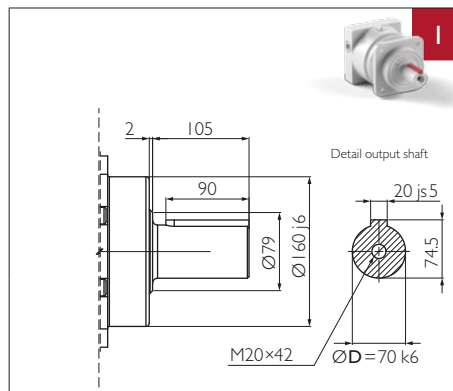
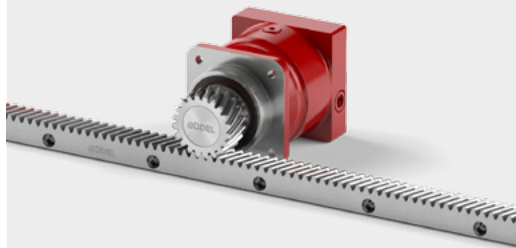
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example SR 180 A2, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



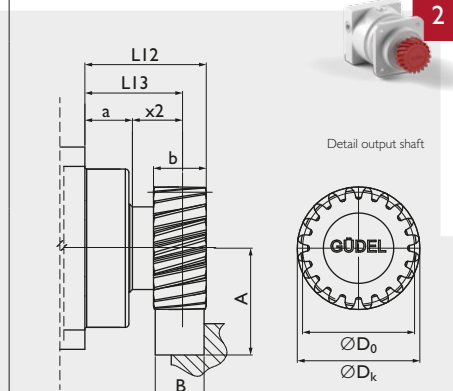
Detail output shaft

20 js5

74.5

M20x42

ØD=70 k6



Detail output shaft

20 js5

74.5

M20x42

ØD=70 k6

Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	4	13.33	20	77.441	40	92.88	84.883	—	89.5	69.5	31.5	38	1.5
Pinion 2	[-]	5	16.67	20	87.052	50	116.10	106.103	—	95.5	70.5	32.5	38	3.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios		i		I-stage 4	12	16	2-stage 20		28	40
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	1 100	1 100	1 100	1 100	1 100	1 100	1 100
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 500	1 500	1 500	1 500	1 500	1 500	1 500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 300	2 200	2 400	2 400	2 400	2 400	2 400
Maximum input speed S5		n _{1max}	[rpm]	3 100	3 600	3 600	3 600	3 600	3 600	3 600
Emergency stop torque ^{d)}		T _{2 not}	[Nm]	2 780	2 780	2 780	2 780	2 780	2 780	2 780
Efficiency		η	[%]	96	93					
Lifetime		L _h	[h]	> 20 000						
Weight		M	[kg]	32	39					
Angular backlash		j _t	[arcmin]	Precision P I ≤ I / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12						
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	191.8	147.5	172.5	182.7	172.5	172.5	172.5
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72						
Max. permitted housing temperature ^{g)}		T	[°C]	90						
Protection class				IP 65						
Direction of rotation				Same way input / output						
Max. radial force on output shaft ^{f)}		F _{r max}	[N]	Center of output shaft: 18 000 / End of output shaft: 13 000						
Max. axial force on output shaft ^{f)}		F _{a max}	[N]	15 000						
Color				Red, RAL 3003						
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	23.35	23.57	22.65	16.76	11.90	9.07	
	Ø24			24.40	24.62	23.70	17.81	12.95	10.12	
	Ø32			26.61	26.83	25.91	20.02	15.16	12.33	
	Ø35			29.53	29.75	28.83	22.94	18.08	15.25	
	Ø38			35.13	35.35	34.43	28.54	23.68	20.85	
	Ø42			34.63	34.85	33.93	28.04	23.18	20.35	
	Ø48			35.03	35.25	34.33	28.44	23.58	20.75	

- a) Nominal output torque when operating at n_{1N}.
b) 1 000 cycles per hour max.
c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.
d) Valid 1 000 times the gearbox life.

- e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.
f) Values for 300 rpm.
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
h) Depending on the motor output shaft Ø.
i) With n_{1N}=2500 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	28 585	14 084	24 045	44 505	23 785	40 048
Max acceleration torque	T _{2B}	[Nm]	1 213	598	1 021	2 361	1 262	2 125
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

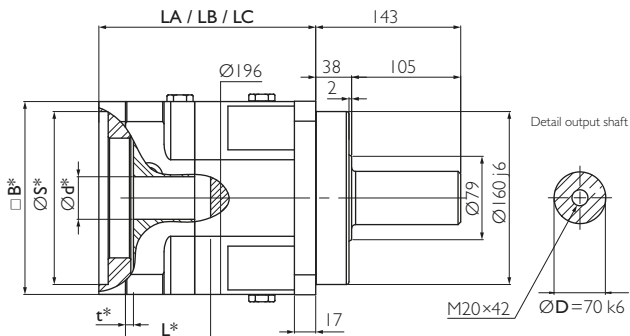
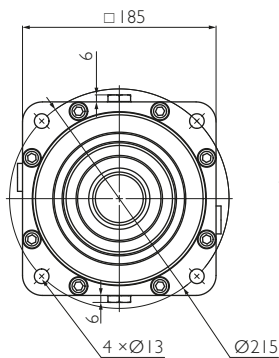
For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

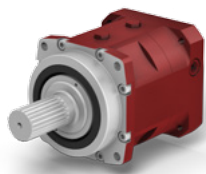
Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



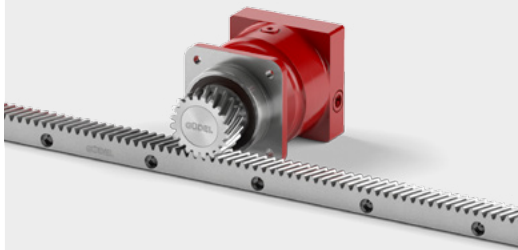
* depending on the motor: See pages 100 et seq.



Example SR 180 A5, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$\times 2$	a	M
Pinion 1	[-]	4	13.33	20	77.441	40	92.88	84.883	—	89.5	69.5	31.5	38	1.5
Pinion 2	[-]	5	16.67	20	87.052	50	116.10	106.103	—	95.5	70.5	32.5	38	3.0

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Output

Standard

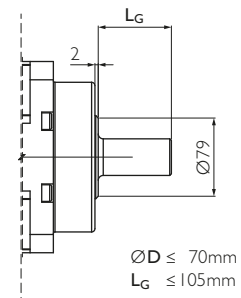
Optional



0



3



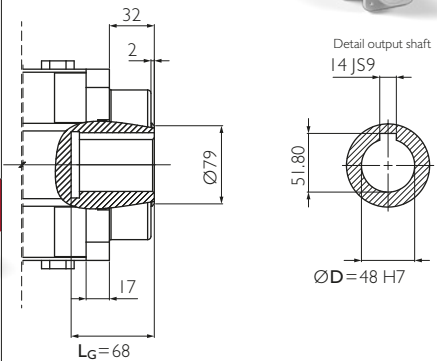
Detail output shaft



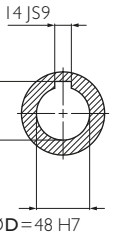
Option 3 on request. Adjustments can reduce capacity.



4



Detail output shaft



14 JS9

51.80

ØD=48 H7

ØD=70 k6

M20x42

20 js5

74.5

ØD=70 k6

M20x42

ØD=70 k6

ØD=70 k6

ØD=70 k6

ØD=70 k6

ØD=70 k6

ØD=70 k6

ØD=70 k6

ØD=70 k6

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ØD=70 k6

ØD=70 k6

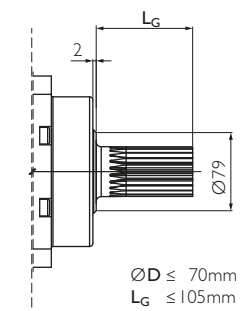
ØD=70 k6

ØD=70 k6

Option 5 on request. Adjustments can reduce capacity.



5



Detail output shaft



Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58⁺₄ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios *		i		3-stage									
				60	80	100	112	120	140	160	200	280	400
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	1 100	1 100	1 100	1 100	1 100	1 100	1 100	1 100	1 100	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	1 500	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	
Maximum input speed S5		n _{1max}	[rpm]	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	2 780	2 780	2 780	2 780	2 780	2 780	2 780	2 780	2 780	
Efficiency		η	[%]	90									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	46									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	173.4	173.4	173.1	164.1	164.1	173.4	164.1	140.0	164.1	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 18 000 / End of output shaft: 13 000									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	15 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	16.77	16.73	8.93	11.88	9.07	11.76	9.06	9.00	8.96	8.93
	Ø24			17.82	17.78	9.98	12.93	10.12	12.81	10.11	10.05	10.01	9.98
	Ø32			20.03	19.99	12.19	15.14	12.33	15.02	12.32	12.26	12.22	12.19
	Ø35			22.95	22.91	15.11	18.06	15.25	17.94	15.24	15.18	15.14	15.11
	Ø38			28.55	28.51	20.71	23.66	20.85	23.54	20.84	20.78	20.74	20.71
	Ø42			28.05	28.01	20.21	23.16	20.35	23.04	20.34	20.28	20.24	20.21
	Ø48			28.45	28.41	20.61	23.56	20.75	23.44	20.74	20.68	20.64	20.61

* Other ratios available. 36, 64, 84, 180, 196, 300, 360, 500, 600, 700, 1000 on request.

a) Nominal output torque when operating at n_{1N} .

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N} .
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N} .

h) Depending on the motor output shaft Ø.

i) With $n_{1N}=2500$ rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F_{2B}	[N]	28 585	14 084	24 045	44 505	23 785	40 048
Max acceleration torque	T_{2B}	[Nm]	1 213	598	1 021	2 361	1 262	2 125
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

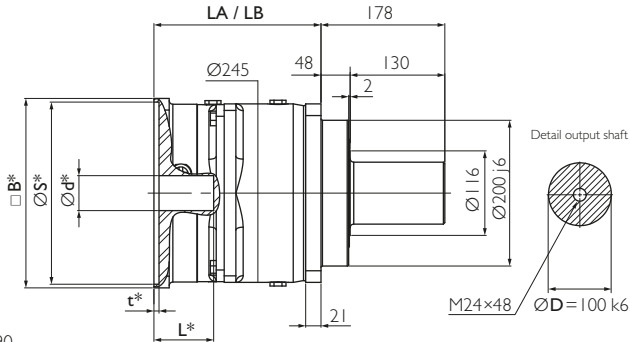
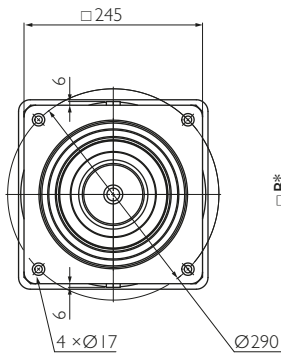
A	for motor shaft	$L \leq 85$	$24 \leq \varnothing d \leq 48$	result in LA
B	for motor shaft	$85 < L \leq 115$	$48 < \varnothing d \leq 55$	result in LB

Output

Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	

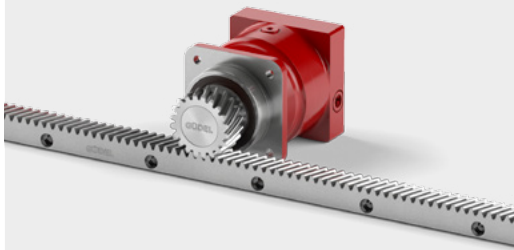


* depending on the motor: See pages 100 et seq.

Example SR 240 B4, 1-stage

Your ideal drive train

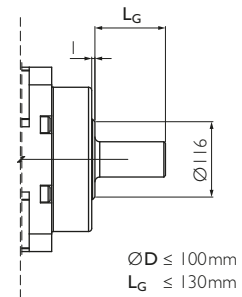
Function Package with gearbox, rack and pinion from Güdel



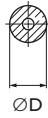
Pinion



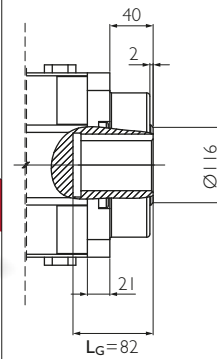
		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	5	16.67	24	97.662	50	137.32	127.324	—	120.5	95.5	47.5	48	5.4
Pinion 2	[-]	6	20.00	20	106.662	60	139.32	127.324	—	119.0	89.0	41.0	48	5.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

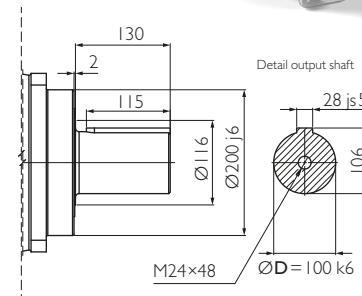
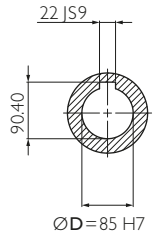
Detail output shaft



Option 3 on request. Adjustments can reduce capacity.

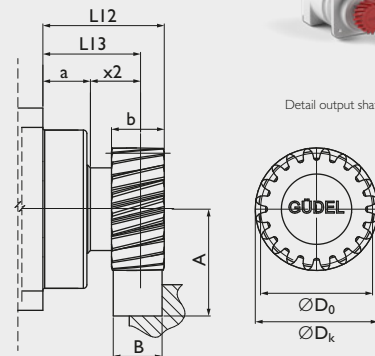


Detail output shaft

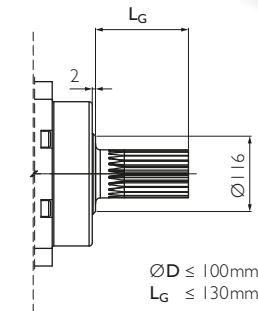
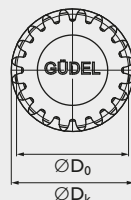


Detail output shaft

M24x48

 $\varnothing D = 100 \text{ k6}$ 

Detail output shaft



Detail output shaft

 $\varnothing D \leq 100 \text{ mm}$
 $L_G \leq 130 \text{ mm}$

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios		i		I-stage 4	I2	I6	2-stage 20			28	40
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	3 600	3 600	3 600	3 600	3 600	3 600	3 600	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	4 800	4 800	4 800	4 800	4 800	4 800	4 800	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	900	I 500	I 700	I 700	I 700	I 700	I 700	
Maximum input speed S5		n _{1max}	[rpm]	2 000	3 100	3 100	3 100	3 100	3 100	3 100	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	8 500	8 500	8 500	8 500	8 500	8 500	8 500	
Efficiency		η	[%]	96	93						
Lifetime		L _h	[h]	> 20 000							
Weight		M	[kg]	70	90						
Angular backlash		j _t	[arcmin]	Precision P I ≤ I / P 3 ≤ 3 / P 5 ≤ 5 / P I2 ≤ I2							
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	718.8	593.5	611.0	628.5	611.0	611.0	611.0	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 73							
Max. permitted housing temperature ^{g)}		T	[°C]	90							
Protection class				IP 65							
Direction of rotation				Same way input / output							
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 37 500 / End of output shaft: 25 000							
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000							
Color				Red, RAL 3003							
Inertia in kg.cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	83.3	79.1	74.9	73.3	34.0	22.9		
	Ø32			85.5	81.3	77.1	75.5	36.2	25.1		
	Ø35			90.8	86.6	82.4	80.8	41.5	30.4		
	Ø38			94.2	90.0	85.8	84.2	44.9	33.8		
	Ø42			93.7	89.5	85.3	83.7	44.4	33.3		
	Ø48			93.9	89.7	85.5	83.9	44.6	33.5		
	Ø55			116.5	112.3	108.1	106.5	67.2	56.1		

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

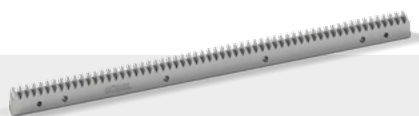
f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=1 800 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	44 786	29 748	39 992	63 300	-	59 005
Max acceleration torque	T _{2B}	[Nm]	2 851	1 894	2 546	4 030	-	3 756
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles:
1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input

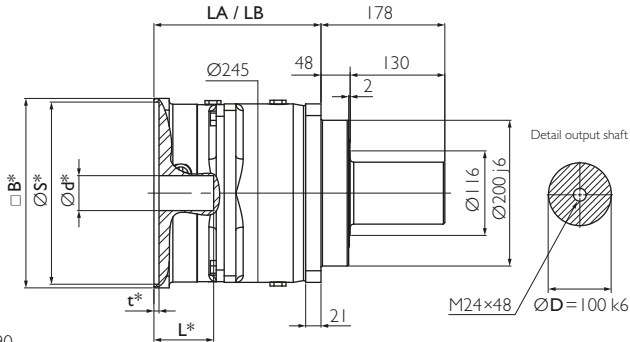
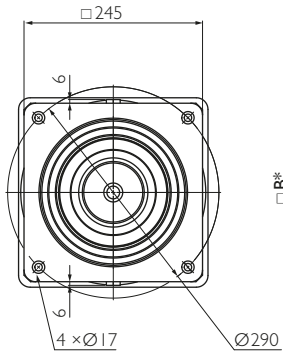
A	for motor shaft	$L \leq 85$	$24 \leq \varnothing d \leq 48$	result in LA
B	for motor shaft	$85 < L \leq 115$	$48 < \varnothing d \leq 55$	result in LB

Output

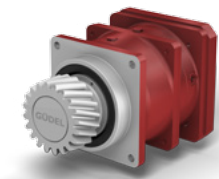
Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	



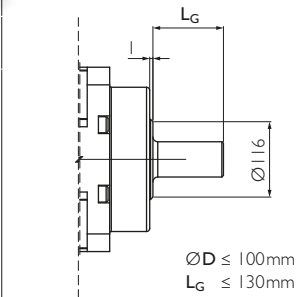
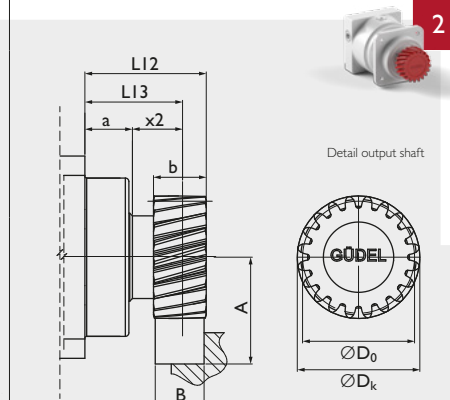
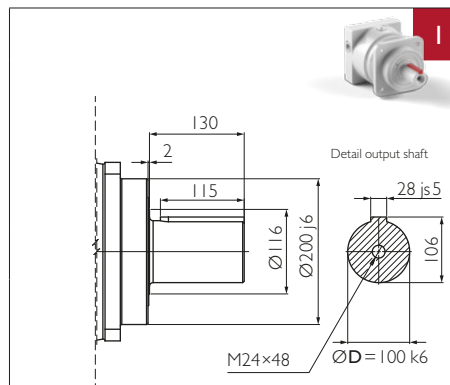
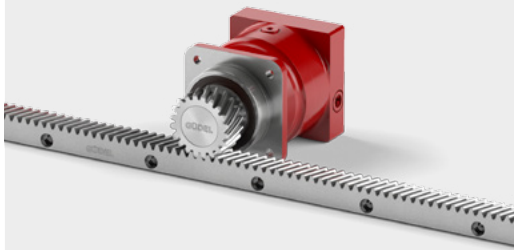
* depending on the motor: See pages 100 et seq.



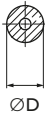
Example SR 240 B2, 1-stage

Your ideal drive train

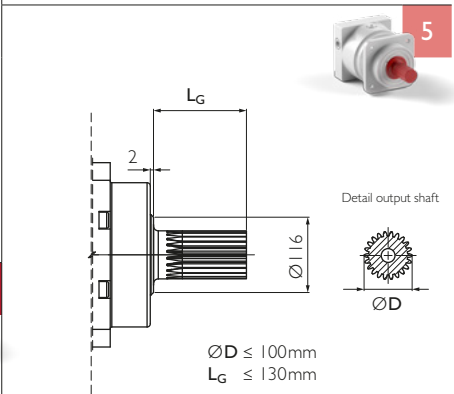
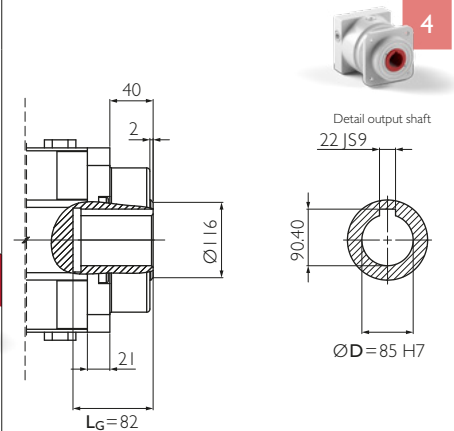
Function Package with gearbox, rack and pinion from Güdel



Detail output shaft



Option 3 on request. Adjustments can reduce capacity.



Detail output shaft



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Pinion



		m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
Pinion 1	[-]	5	16.67	24	97.662	50	137.32	127.324	—	120.5	95.5	47.5	48	5.4
Pinion 2	[-]	6	20.00	20	106.662	60	139.32	127.324	—	119.0	89.0	41.0	48	5.6

 m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Available ratios *		i		3-stage									
				60	80	100	112	120	140	160	200	280	400
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	2 100	
Maximum input speed S5		n _{1max}	[rpm]	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	3 100	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	8 500	8 500	8 500	8 500	8 500	8 500	8 500	8 500	8 500	
Efficiency		η	[%]	90									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	110									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	532.4	532.4	593.5	550.0	550.0	564.5	550.0	564.5	550.0	561.5
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 73									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 37 500 / End of output shaft: 25 000									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	78.0	74.2	22.3	33.9	23.4	33.9	22.8	22.8	22.4	22.3
	Ø32			80.2	76.4	24.5	36.1	25.6	36.1	25.0	25.0	24.6	24.5
	Ø35			85.5	81.7	29.8	41.4	30.9	41.4	30.3	30.3	29.9	29.8
	Ø38			88.9	85.1	33.2	44.8	34.3	44.8	33.7	33.7	33.3	33.2
	Ø42			88.4	84.6	32.7	44.3	33.8	44.3	33.2	33.2	32.8	32.7
	Ø48			88.6	84.8	32.9	44.5	34.0	44.5	33.4	33.4	33.0	32.9
	Ø55			111.2	107.4	55.5	67.1	56.6	67.1	56.0	56.0	55.6	55.5

* Other ratios available. 36, 64, 84, 180, 196, 300, 360, 500, 600, 700, 1 000 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.

At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

f) Values for 300 rpm.

g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=1 800 rpm no load.

Rack



			Pinion 1			Pinion 2		
			Q6	Q7	Q9	Q6	Q7	Q9
Max acceleration force	F _{2B}	[N]	44 786	29 748	39 992	63 300	-	59 005
Max acceleration torque	T _{2B}	[Nm]	2 851	1 894	2 546	4 030	-	3 756
Precision			PI		PI2	PI		PI2
Feed force			High	Medium	Elevated	High	Medium	Elevated

Above values for rack and pinion take into consideration a number of load cycles: 1x10⁶ for the rack; 1x10⁷ for the pinion. Both in pulsating operation.

For proper sizing follow flowchart
calculate your ideal drive train
on pages 140 et seq.

More on the technical datasheets
your ideal drive train on pages
124 et seq.

Input



for motor shaft

 $L \leq 45$ $6 \leq \varnothing d \leq 19$

result in LA

for motor shaft

 $45 < L \leq 55$ $19 < \varnothing d \leq 24$

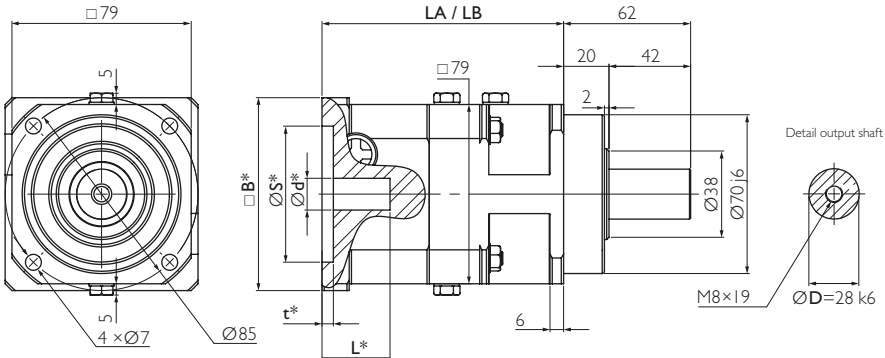
result in LB

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160

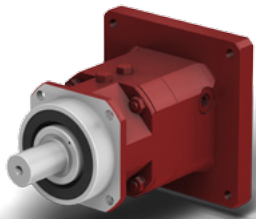
Output

Standard

Optional



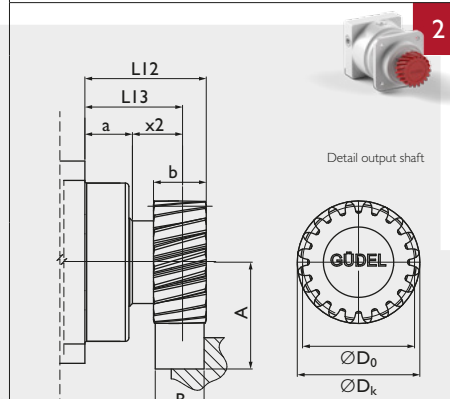
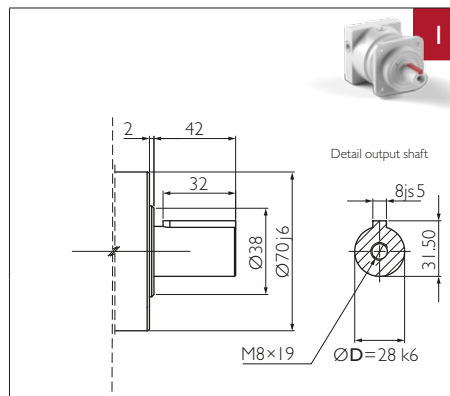
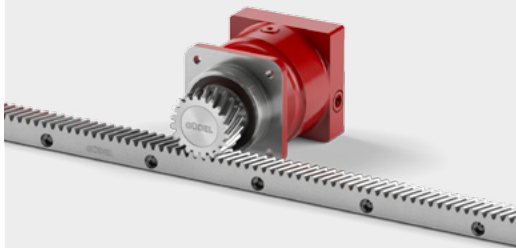
* depending on the motor: See pages 100 et seq.



Example PR 080 B0, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion

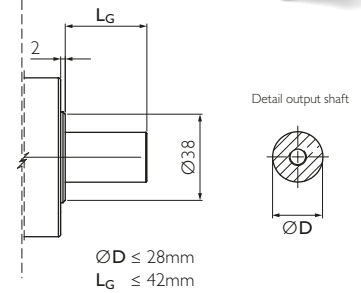
Pinion for PR on request



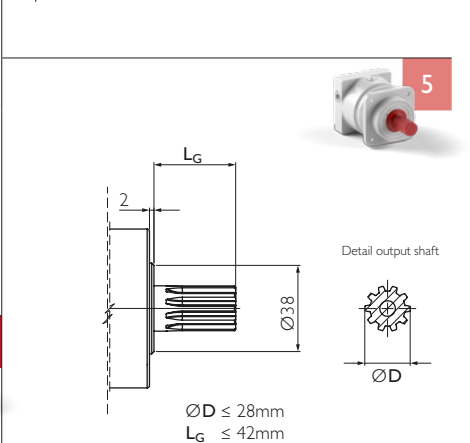
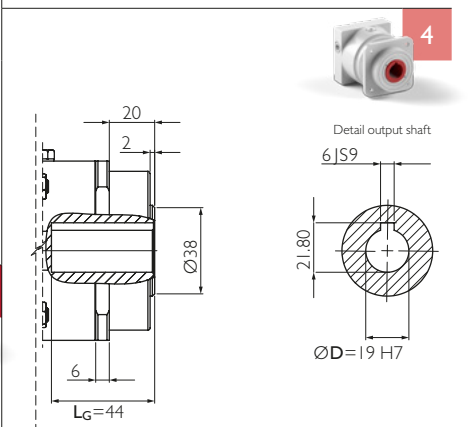
0



3



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

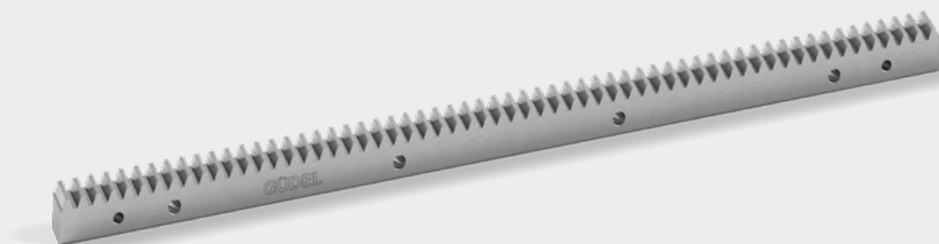
Available ratios		i		I-stage		2-stage				
				3	9	12	15	21	30	
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	120	120	120	120	120	120	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	160	160	160	160	160	160	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 300	2 300	2 600	2 800	2 800	2 800	
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 800	4 800	4 800	4 800	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	210	200	200	200	200	200	
Efficiency		η	[%]	94	91					
Lifetime		L _h	[h]	> 20 000						
Weight		M	[kg]	4	5					
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12						
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	12.2	11.6	12.2	11.6	11.6	11.6	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 70						
Max. permitted housing temperature ^{g)}		T	[°C]	90						
Protection class				IP 65						
Direction of rotation				Same way input / output						
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285						
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	3 600						
Color				Red, RAL 3003						
Inertia in kg.cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.62	0.62	0.46	0.40	0.34	0.31	
	Ø 14			1.18	1.17	1.01	0.95	0.90	0.86	
	Ø 19			1.19	1.19	1.03	0.96	0.91	0.88	
	Ø 24			2.01	2.00	1.84	1.78	1.73	1.69	

- a) Nominal output torque when operating at n_{1N}.
b) 1 000 cycles per hour max.
c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.
d) Valid 1 000 times the gearbox life.

- e) Valid for an input Ø of 19mm in 1-stage and 14mm in 2- and 3-stage.
f) Values for 300 rpm.
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.
h) Depending on the motor output shaft Ø.
i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Input

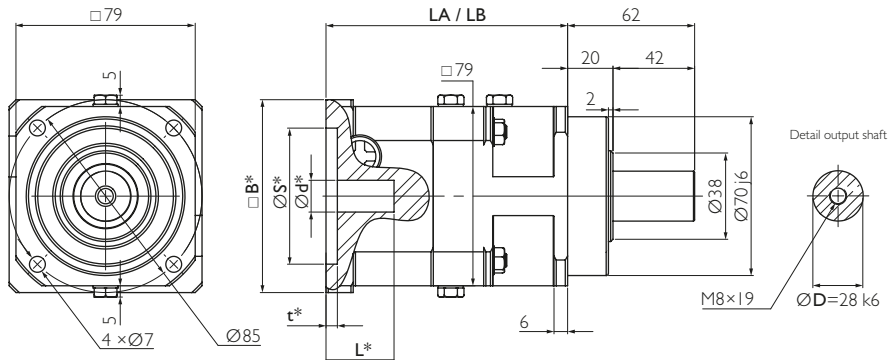
A	for motor shaft	$L \leq 45$	$6 \leq \varnothing d \leq 19$	result in LA
B	for motor shaft	$45 < L \leq 55$	$19 < \varnothing d \leq 24$	result in LB

Output

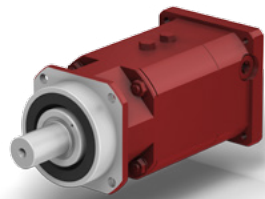
Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	106.5	128.5	150.5
LB	[mm]	116	138	160



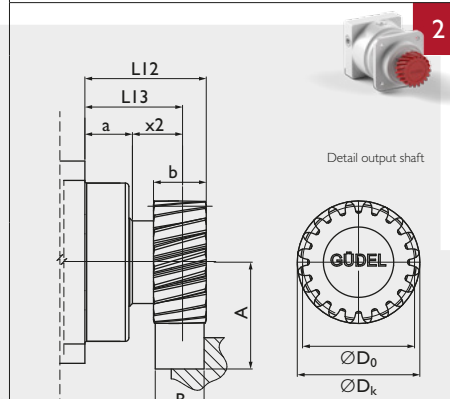
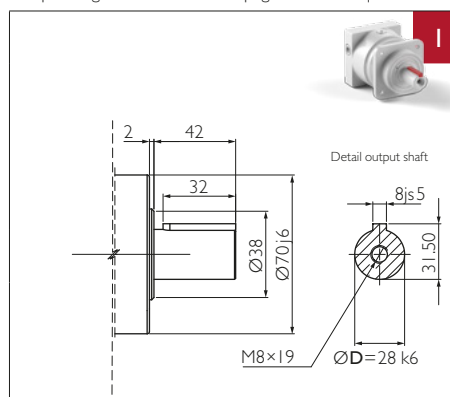
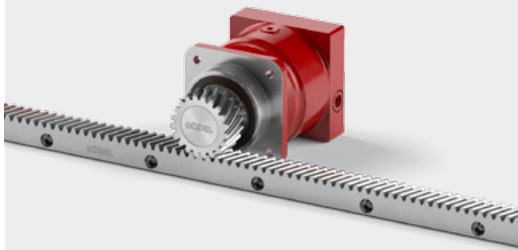
* depending on the motor: See pages 100 et seq.



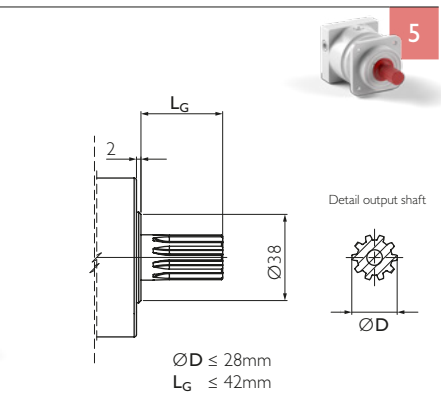
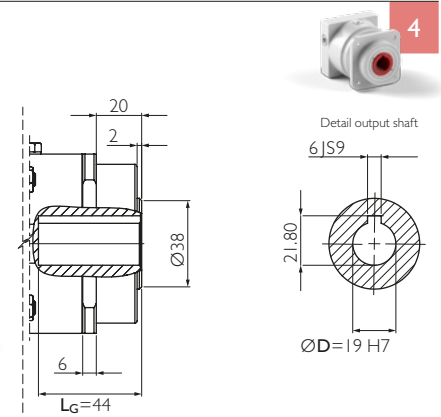
Example PR 080 A0, 3-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Pinion

Pinion for PR on request



Available ratios *		i		3-stage									
				36	45	60	75	90	105	120	150	210	300
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	120	120	120	120	120	120	120	120	120	120
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	160	160	160	160	160	160	160	160	160	160
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	3 000	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600	3 600
Maximum input speed S5		n _{1max}	[rpm]	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800	4 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	200	200	200	200	200	200	200	200	200	200
Efficiency		η	[%]	88									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	6									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	11.6	11.6	11.8	11.8	11.1	11.8	11.6	11.8	11.9	11.1
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 4 200 / End of output shaft: 3 285									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	3 600									
Color				Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø 11	J ₁	[kgcm ²]	0.46	0.40	0.46	0.40	0.31	0.34	0.31	0.31	0.31	0.31
	Ø 14			1.01	0.95	1.01	0.95	0.86	0.90	0.86	0.86	0.86	0.86
	Ø 19			1.03	0.96	1.03	0.96	0.88	0.91	0.88	0.88	0.88	0.88
	Ø 24			1.84	1.78	1.84	1.78	1.69	1.73	1.69	1.69	1.69	1.69

* Other ratios available. 27, 48, 63, 84, 147 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 19 mm in 1-stage and 14 mm in 2- and 3-stage.

f) Values for 300 rpm.

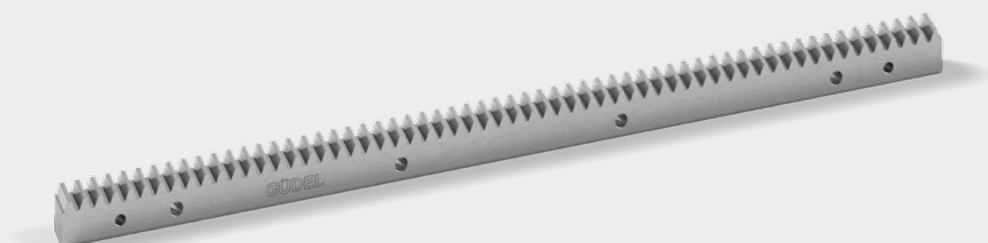
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Input

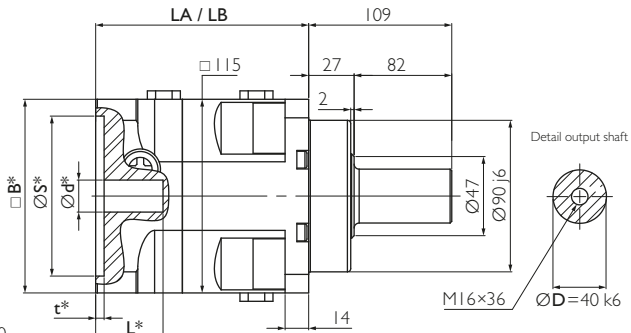
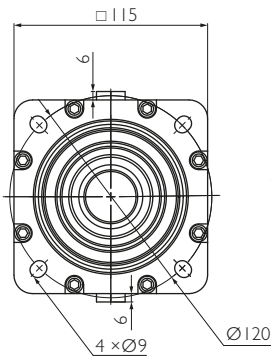
A	for motor shaft	$L \leq 50$	$9 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 64$	$24 < \varnothing d \leq 35$	result in LB

Output

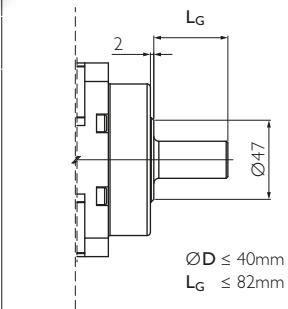
Standard

Optional

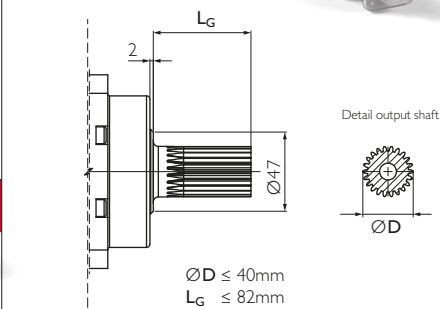
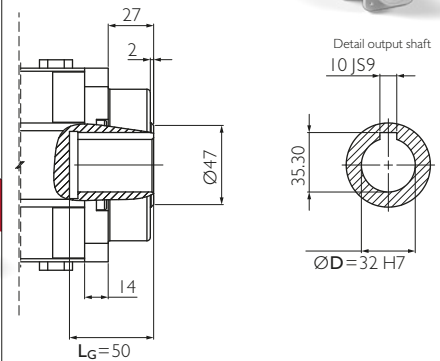
		1-stage	2-stage	3-stage
LA	[mm]	126	164	202
LB	[mm]	140	178	216



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

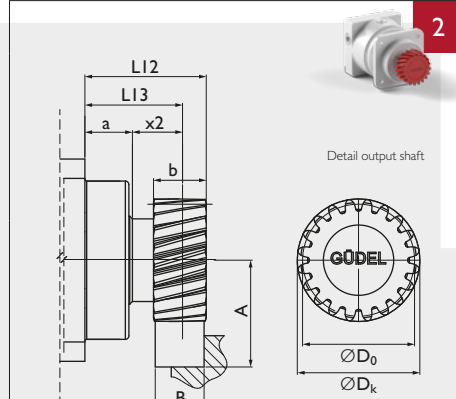
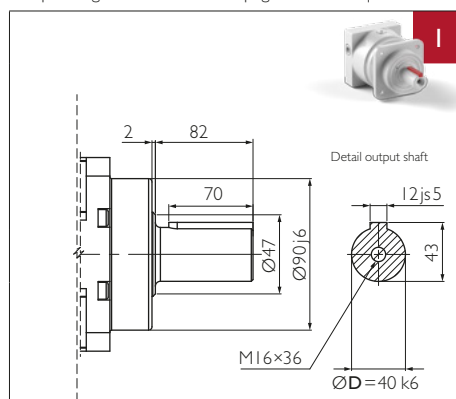
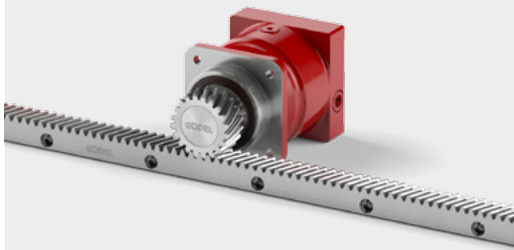
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example PR 100 A5, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion

Pinion for PR on request



Available ratios		i		I-stage 3	9	12	2-stage 15			21	30
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	348	350	350	350	350	350	350	350
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	556	500	500	500	500	500	500	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 000	2 000	2 300	2 500	2 500	2 500	2 500	2 500
Maximum input speed S5		n _{1max}	[rpm]	3 200	3 200	3 600	3 600	3 600	3 600	3 600	3 600
Emergency stop torque ^{d)}		T _{2not}	[Nm]	870	785	785	785	785	785	785	785
Efficiency		η	[%]	94	91						
Lifetime		L _h	[h]	> 20 000							
Weight		M	[kg]	8	10						
Angular backlash		j _t	[arcmin]	Precision P I ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12							
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	37.0	35.2	35.2	35.2	35.2	35.2	35.2	35.2
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71							
Max. permitted housing temperature ^{g)}		T	[°C]	90							
Protection class				IP 65							
Direction of rotation				Same way input / output							
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300							
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	6 000							
Color				Red, RAL 3003							
Inertia in kg.cm² ^{h)}	Ø14	J ₁	[kgcm²]	4.08	3.97	2.76	2.33	1.86	1.61		
	Ø19			4.08	3.97	2.76	2.33	1.86	1.61		
	Ø24			4.09	3.98	2.77	2.34	1.87	1.62		
	Ø32			7.29	7.18	5.97	5.54	5.07	4.82		
	Ø35			9.9	9.81	8.60	8.17	7.70	7.45		

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in I-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

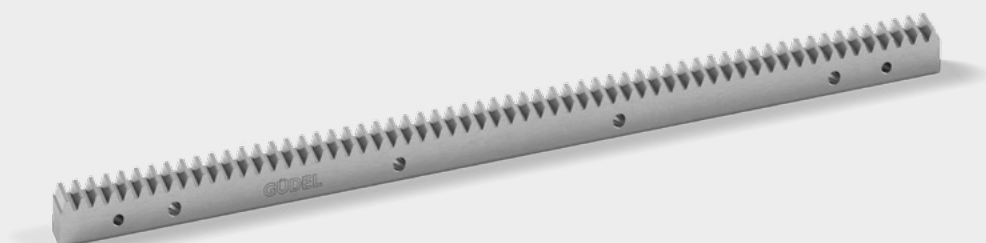
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Available ratios *		i		3-stage									
				36	45	60	75	90	105	120	150	210	300
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	350	350	350	350	350	350	350	350	350	350
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	500	500	500	500	500	500	500	500	500	500
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 700	3 300	3 300	3 300	3 300	3 300	3 300	3 300	3 300	3 300
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000	4 000
Emergency stop torque ^{d)}		T _{2not}	[Nm]	785	785	785	785	785	785	785	785	785	785
Efficiency		η	[%]	88									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	12									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	33.5	33.5	42.2	42.2	33.5	42.2	40.4	42.2	43.1	40.4
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 6 600 / End of output shaft: 4 300									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	6 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø14	J ₁	[kgcm ²]	2.76	2.28	2.23	2.21	1.61	1.82	1.60	1.59	1.59	1.59
	Ø19			2.76	2.28	2.23	2.21	1.61	1.82	1.60	1.59	1.59	1.59
	Ø24			2.77	2.29	2.24	2.22	1.62	1.83	1.61	1.60	1.60	1.60
	Ø32			5.97	5.49	5.44	5.42	4.82	5.03	4.81	4.80	4.80	4.80
	Ø35			8.60	8.12	8.07	8.05	7.45	7.66	7.44	7.43	7.43	7.43

* Other ratios available. 27, 48, 63, 84, 147 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 24 mm in 1-stage and 19 mm in 2- and 3-stage.

f) Values for 300 rpm.

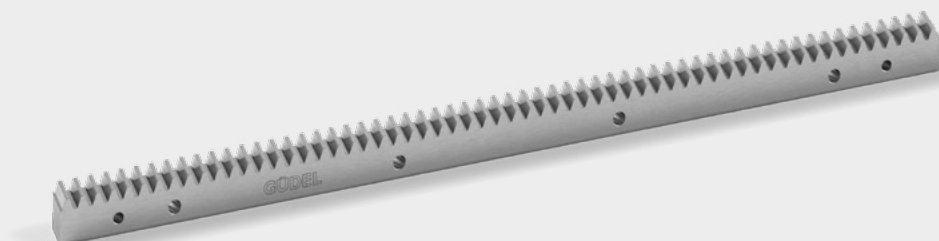
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



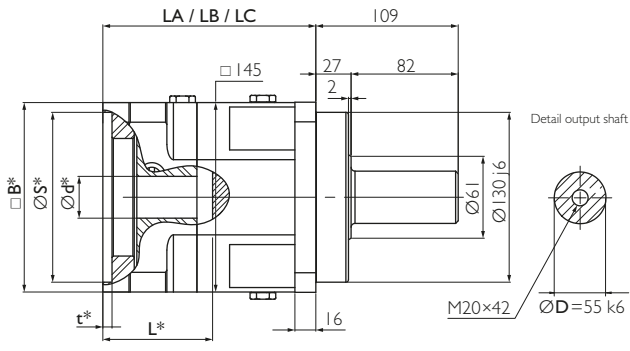
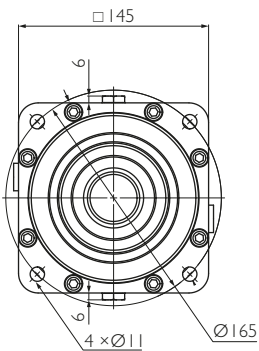
Input

A	for motor shaft	$L \leq 51$	$14 \leq \varnothing d \leq 24$	result in LA
B	for motor shaft	$51 < L \leq 63$	$24 < \varnothing d \leq 35$	result in LB
C	for motor shaft	$63 < L \leq 83$	$24 < \varnothing d \leq 42$	result in LC

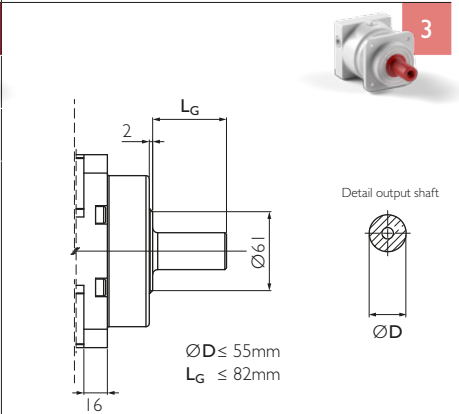
		I-stage	2-stage	3-stage
LA	[mm]	143	185	227
LB	[mm]	155	197	239
LC	[mm]	175	217	

Output

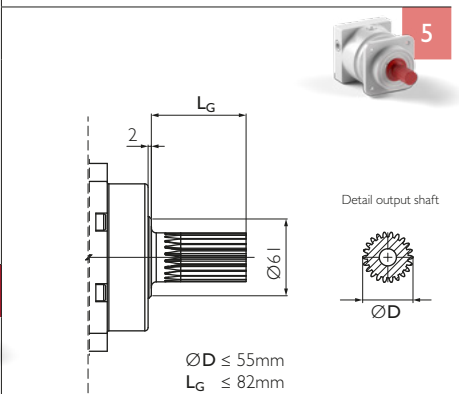
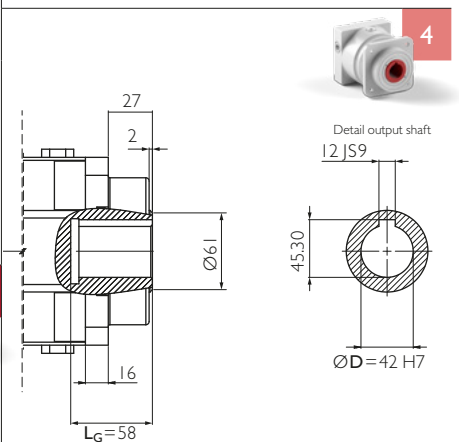
Optional



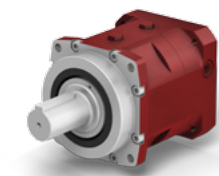
* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.



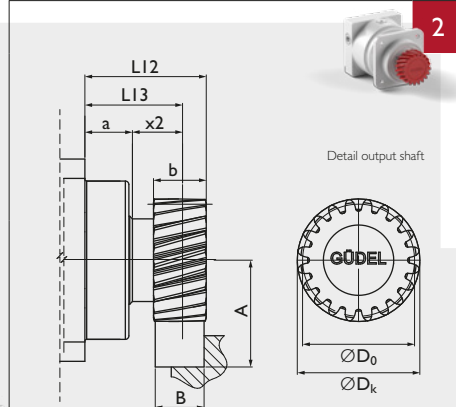
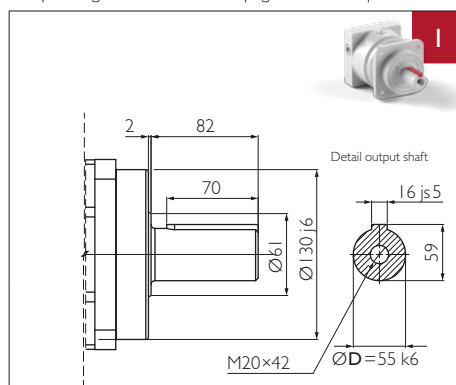
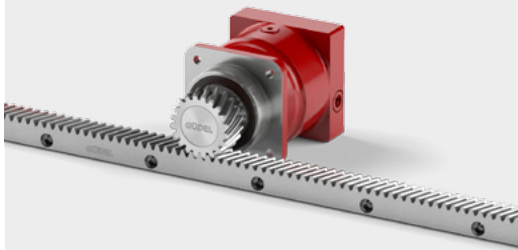
Option 5 on request. Adjustments can reduce capacity.



Example PR 140 AI, I-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion

Pinion for PR on request



Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios		i		I-stage 3	9	12	2-stage 15			21	30
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	700	700	700	700	700	700	700	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	900	900	900	900	900	900	900	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 500	1 600	2 500	2 500	2 500	2 500	2 500	
Maximum input speed S5		n _{1max}	[rpm]	2 500	2 600	3 200	3 200	3 200	3 200	3 200	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 250	1 250	1 250	1 250	1 250	1 250	1 250	
Efficiency		η	[%]	94	91						
Lifetime		L _h	[h]	> 20 000							
Weight		M	[kg]	14	18						
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤12							
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	103.3	93.1	93.1	93.1	93.1	93.1	93.1	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71							
Max. permitted housing temperature ^{g)}		T	[°C]	90							
Protection class				IP 65							
Direction of rotation				Same way input / output							
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700							
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300							
Color				Red, RAL 3003							
Inertia in kg.cm² ^{h)}	Ø14	J ₁	[kgcm²]	10.98	10.53	6.86	5.44	4.23	3.52		
	Ø19			10.98	10.53	6.86	5.44	4.23	3.52		
	Ø24			11.99	11.54	7.87	6.45	5.24	4.53		
	Ø32			14.19	13.74	10.07	8.65	7.44	6.73		
	Ø35			17.02	16.57	12.90	11.48	10.27	9.56		
	Ø38			22.21	21.76	18.09	16.67	15.46	14.75		
	Ø42			21.81	21.36	17.69	16.27	15.06	14.35		

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.

f) Values for 300 rpm.

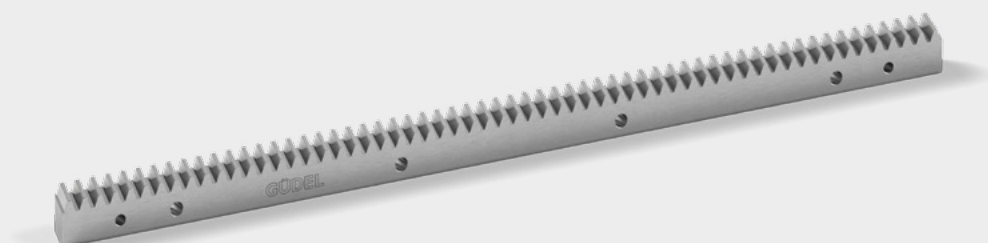
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Available ratios *		i		3-stage									
				36	45	60	75	90	105	120	150	210	300
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	700	700	700	700	700	700	700	700	700	700
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	900	900	900	900	900	900	900	900	900	900
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 200	2 900	2 900	3 500	3 500	3 500	3 500	3 500	3 500	3 500
Maximum input speed S5		n _{1max}	[rpm]	4 000	4 000	4 000	4 000	4 200	4 200	4 200	4 200	4 200	4 200
Emergency stop torque ^{d)}		T _{2not}	[Nm]	1 250	1 250	1 250	1 250	1 250	1 250	1 250	1 250	1 250	1 250
Efficiency		η	[%]	88									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	22									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	83.8	83.8	100.4	100.4	83.8	100.4	94.3	100.4	98.6	83.8
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 71									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 9 950 / End of output shaft: 6 700									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	10 300									
Color				Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø14	J ₁	[kg·cm ²]	6.83	5.42	5.28	5.22	3.51	4.11	3.47	3.46	3.46	3.44
	Ø19			6.83	5.42	5.28	5.22	3.51	4.11	3.47	3.46	3.46	3.44
	Ø24			7.84	6.43	6.29	6.23	4.52	5.12	4.48	4.47	4.47	4.45
	Ø32			10.04	8.63	8.49	8.43	6.72	7.32	6.68	6.67	6.67	6.65
	Ø35			12.87	11.46	11.32	11.26	9.55	10.15	9.51	9.50	9.50	9.48
	Ø38			18.06	16.65	16.51	16.45	14.74	15.34	14.70	14.69	14.69	14.67
	Ø42			17.66	16.25	16.11	16.05	14.34	14.94	14.30	14.29	14.29	14.27

* Other ratios available. 27, 48, 63, 84, 147 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 38 mm in 1-stage and 24 mm in 2- and 3-stage.

f) Values for 300 rpm.

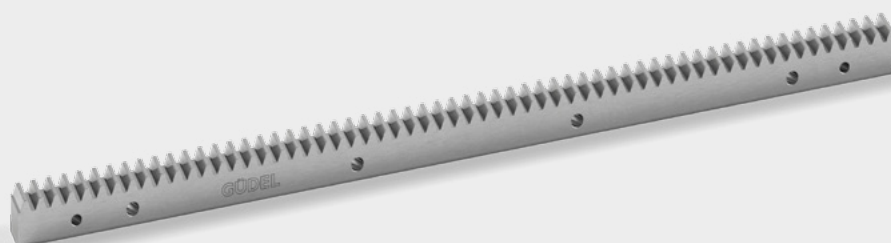
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Available ratios		i		I-stage		2-stage				
				3	9	12	15	21	30	
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	1 600	1 600	1 600	1 600	1 600	1 600	
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 925	1 900	1 900	1 900	1 900	1 900	
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 200	2 000	2 000	2 100	2 100	2 100	
Maximum input speed S5		n _{1max}	[rpm]	2 400	2 400	3 200	3 200	3 200	3 200	
Emergency stop torque ^{d)}		T _{2not}	[Nm]	3 000	3 000	3 000	3 000	3 000	3 000	
Efficiency		η	[%]	94	91					
Lifetime		L _h	[h]	> 20 000						
Weight		M	[kg]	32	39					
Angular backlash		j _t	[arcmin]	Precision P I ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12						
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	366.6	349.1	333.4	300.3	281.1	274.1	
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72						
Max. permitted housing temperature ^{g)}		T	[°C]	90						
Protection class				IP 65						
Direction of rotation				Same way input / output						
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 18 000 / End of output shaft: 13 000						
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	20 000						
Color				Red, RAL 3003						
Inertia in kg.cm ² ^{h)}	Ø19	J _I	[kgcm ²]	38.19	38.58	16.57	17.35	12.20	9.22	
	Ø24			39.24	39.63	17.62	18.40	13.25	10.27	
	Ø32			41.45	41.84	19.83	20.61	15.46	12.48	
	Ø35			44.37	44.76	22.75	23.53	18.38	15.40	
	Ø38			49.97	50.36	28.35	29.13	23.98	21.00	
	Ø42			49.47	49.86	27.85	28.63	23.48	20.50	
	Ø48			49.87	50.26	28.25	29.03	23.88	20.90	

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.

f) Values for 300 rpm.

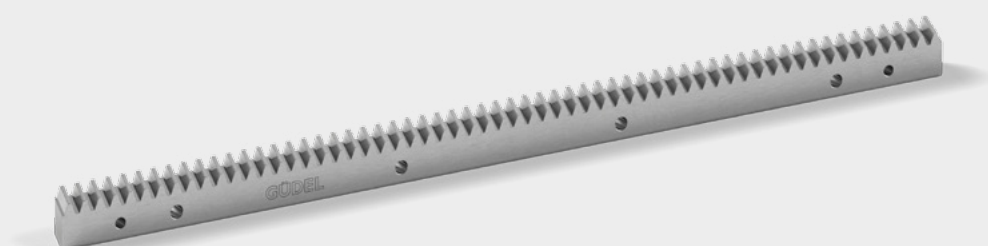
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

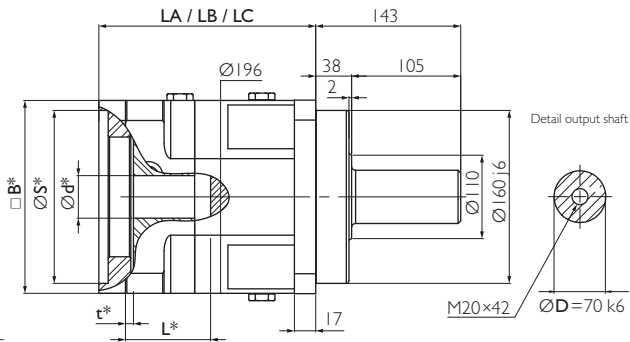
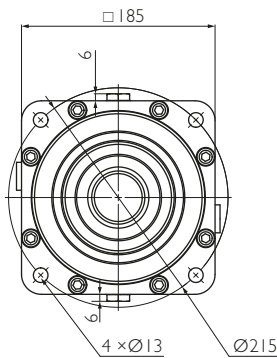
Rack for PR on request



Input

A	for motor shaft	$L \leq 60$	$19 \leq \varnothing d \leq 32$	result in LA
B	for motor shaft	$60 < L \leq 85$	$32 < \varnothing d \leq 48$	result in LB
C	for motor shaft	$85 < L \leq 111$	$32 < \varnothing d \leq 48$	result in LC

		1-stage	2-stage	3-stage
LA	[mm]	168	220	273
LB	[mm]	193	246	298
LC	[mm]	219	272	



* depending on the motor: See pages 100 et seq.

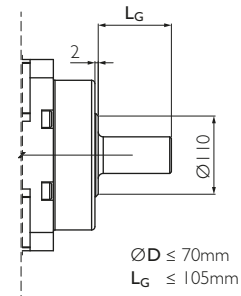
Output

Standard

Optional

0

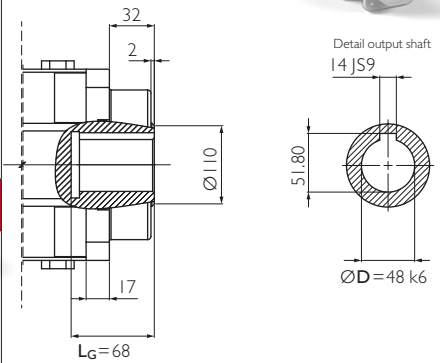
3



$\varnothing D \leq 70\text{mm}$
 $L_G \leq 105\text{mm}$

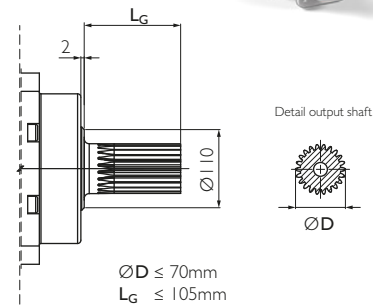
Option 3 on request. Adjustments can reduce capacity.

4



$\varnothing D = 48\text{ k6}$

5



$\varnothing D \leq 70\text{mm}$
 $L_G \leq 105\text{mm}$

Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

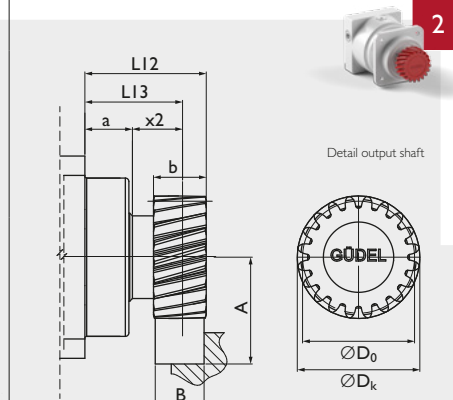
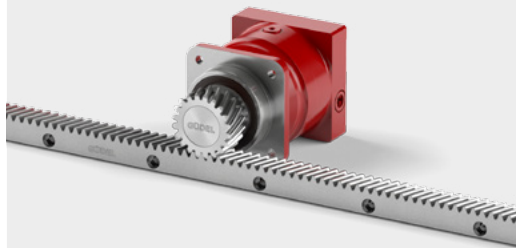
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-0} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Example PR 180 A4, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



2

Pinion

Pinion for PR on request



Available ratios *		i		3-stage									
				36	45	60	75	90	105	120	150	210	300
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600	1 600
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	1 900	1 900	1 900	1 900	1 900	1 900	1 900	1 900	1 900	1 900
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	2 200	2 700	2 700	2 700	2 700	2 700	2 700	2 700	2 700	2 700
Maximum input speed S5		n _{1max}	[rpm]	3 200	3 200	3 200	3 200	3 200	3 200	3 200	3 200	3 200	3 200
Emergency stop torque ^{d)}		T _{2not}	[Nm]	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000	3 000
Efficiency		η	[%]	88									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	46									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	300.0	270.3	270.3	270.3	246.8	270.3	300.0	270.3	253.1	220.5
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 72									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 18 000 / End of output shaft: 13 000									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	20 000									
Color				Red, RAL 3003									
Inertia in kg.cm ² ^{h)}	Ø19	J ₁	[kgcm ²]	23.60	17.37	16.77	16.52	9.22	11.77	9.07	9.01	8.96	8.93
	Ø24			24.65	18.42	17.82	17.57	10.27	12.82	10.12	10.06	10.01	9.98
	Ø32			26.86	20.63	20.03	19.78	12.48	15.03	12.33	12.27	12.22	12.19
	Ø35			29.78	23.55	22.95	22.70	15.40	17.95	15.25	15.19	15.14	15.11
	Ø38			35.38	29.15	28.55	28.30	21.00	23.55	20.85	20.79	20.74	20.71
	Ø42			34.88	28.65	28.05	27.80	20.50	23.05	20.35	20.29	20.24	20.21
	Ø48			35.28	29.05	28.45	28.20	20.90	23.45	20.75	20.69	20.64	20.61

* Other ratios available. 27, 48, 63, 84, 147 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 48 mm in 1-stage and 38 mm in 2- and 3-stage.

f) Values for 300 rpm.

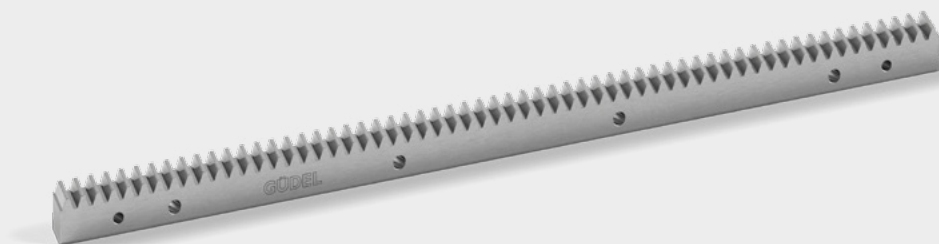
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=2500 rpm no load.

Rack

Rack for PR on request



Input

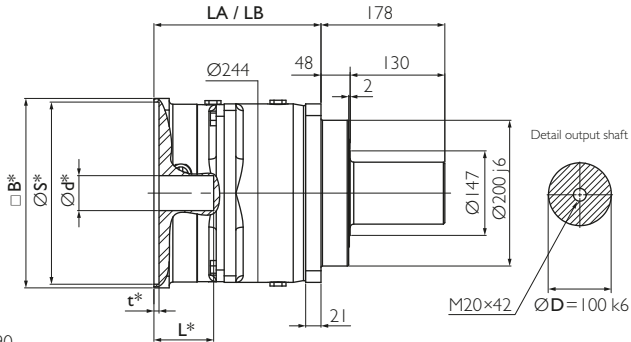
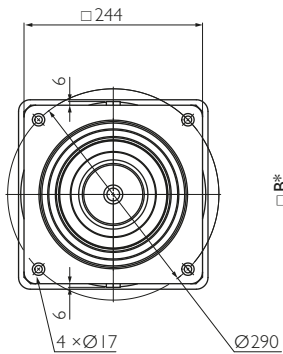
A	for motor shaft	$L \leq 85$	$24 \leq \varnothing d \leq 48$	result in LA
B	for motor shaft	$85 < L \leq 115$	$48 < \varnothing d \leq 55$	result in LB

Output

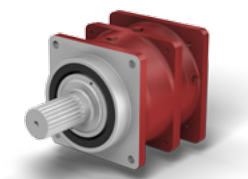
Standard

Optional

		1-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	



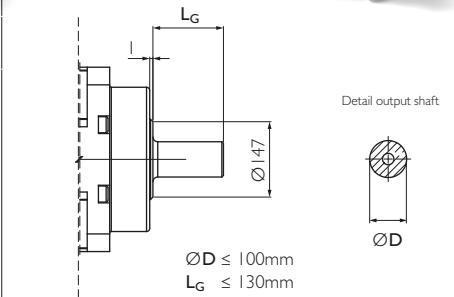
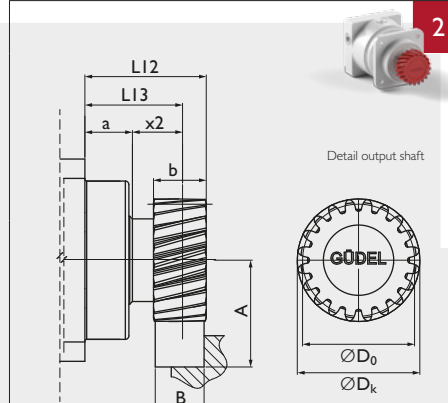
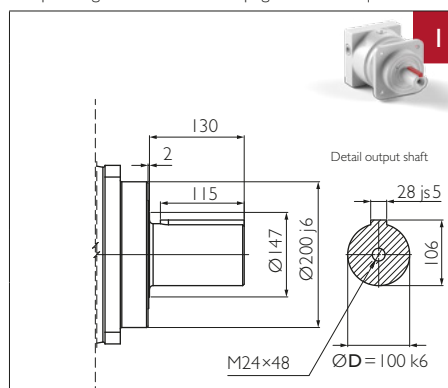
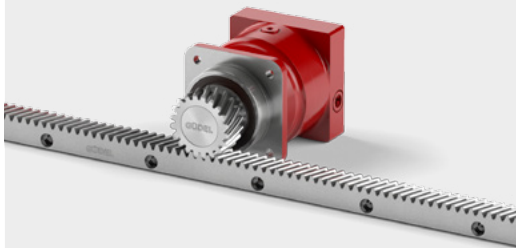
* depending on the motor: See pages 100 et seq.



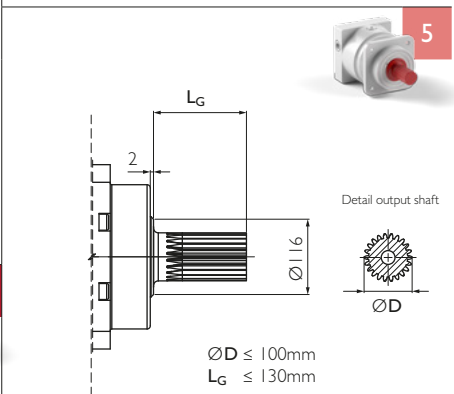
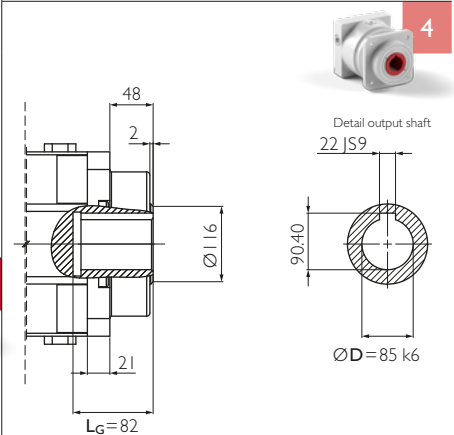
Example PR 240 A5, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Option 3 on request. Adjustments can reduce capacity.



Option 5 on request. Adjustments can reduce capacity.

Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58⁺⁴ HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Pinion

Pinion for PR on request



Available ratios		i		I-stage		2-stage			
				3	9	12	15	21	30
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	4 400	4 400	4 400	4 400	4 400	4 400
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	5 600	5 600	5 600	5 600	5 600	5 600
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	800	800	1 400	1 500	1 500	1 500
Maximum input speed S5		n _{1max}	[rpm]	1 600	1 600	2 800	2 800	2 800	2 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	8 500	8 500	8 500	8 500	8 500	8 500
Efficiency		η	[%]	94	91				
Lifetime		L _h	[h]	> 20 000					
Weight		M	[kg]	70	90				
Angular backlash		j _t	[arcmin]	Precision P I ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12					
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	814.7	730.3	756.6	779.8	805.9	736.1
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 74					
Max. permitted housing temperature ^{g)}		T	[°C]	90					
Protection class				IP 65					
Direction of rotation				Same way input / output					
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 37 500 / End of output shaft: 25 000					
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000					
Color				Red, RAL 3003					
Inertia in kg.cm ² ^{h)}	Ø24	J ₁	[kgcm ²]	161.0	146.0	79.1	55.0	35.4	23.6
	Ø32			163.2	148.2	81.3	57.2	37.6	25.8
	Ø35			168.5	153.5	86.6	62.5	42.9	31.1
	Ø38			171.9	156.9	90.0	65.9	46.3	34.5
	Ø42			171.4	156.4	89.5	65.4	45.8	34.0
	Ø48			171.6	156.6	89.7	65.6	46.0	34.2
	Ø55			194.2	179.2	112.3	88.2	68.6	56.8

a) Nominal output torque when operating at n_{1N}.

b) 1 000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1 000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

f) Values for 300 rpm.

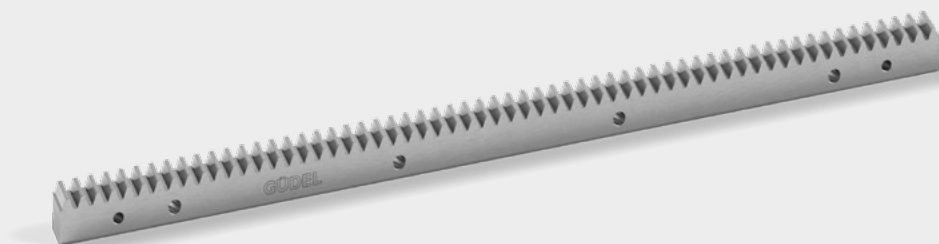
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

h) Depending on the motor output shaft Ø.

i) With n_{1N}=1 800 rpm no load.

Rack

Rack for PR on request



Input

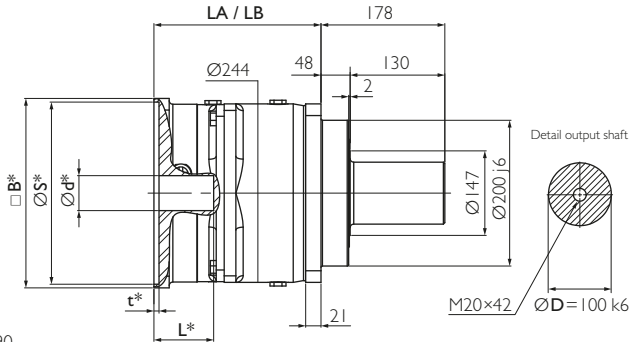
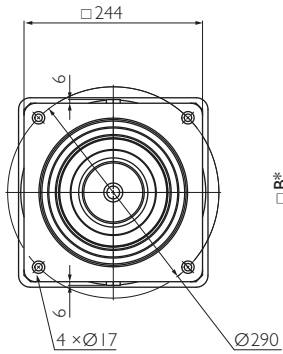
A	for motor shaft	$L \leq 85$	$24 \leq \varnothing d \leq 48$	result in LA
B	for motor shaft	$85 < L \leq 115$	$48 < \varnothing d \leq 55$	result in LB

Output

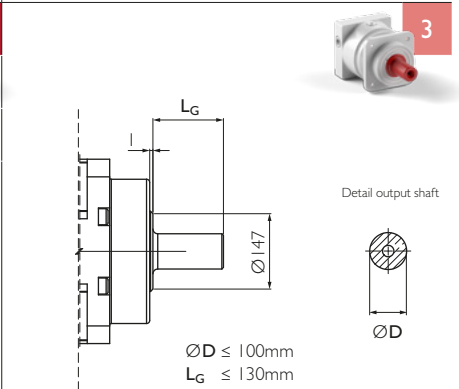
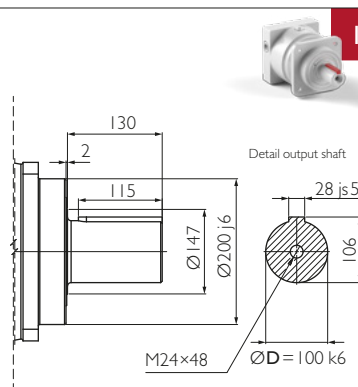
Standard

Optional

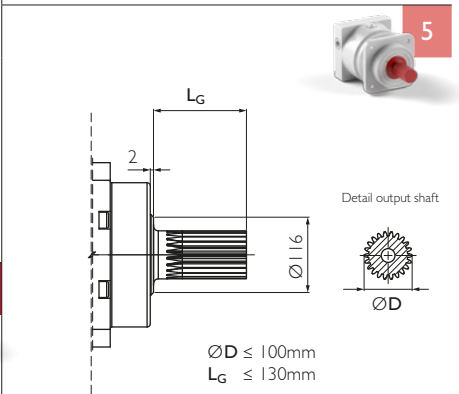
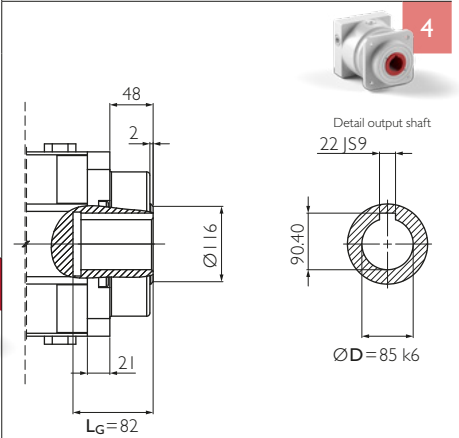
		1-stage	2-stage	3-stage
LA	[mm]	229	300	371
LB	[mm]	259	330	



* depending on the motor: See pages 100 et seq.



Option 3 on request. Adjustments can reduce capacity.

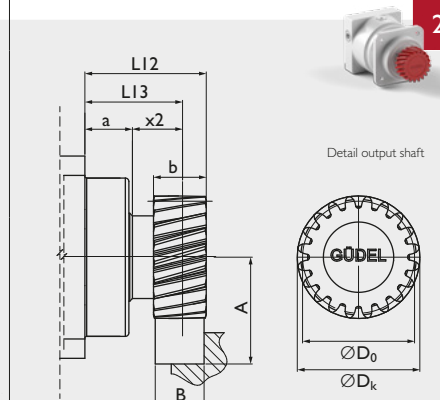
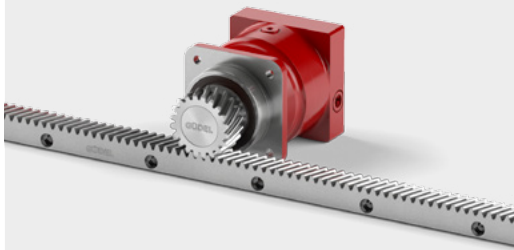


Option 5 on request. Adjustments can reduce capacity.

Example PR 240 B4, 1-stage

Your ideal drive train

Function Package with gearbox, rack and pinion from Güdel



Pinion

Pinion for PR on request



Material 16MnCr5 DIN 1.7131

Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$ hardened (58^{+4}_{-1} HRC), ground, crowned

Quality 6f24 DIN 3962 / 63 / 67

Available ratios *		i		3-stage									
				36	45	60	75	90	105	120	150	210	300
Nominal torque S5 ^{a)}		T _{2N}	[Nm]	4 400	4 400	4 400	4 400	4 400	4 400	4 400	4 400	4 400	4 400
Acceleration torque S5 ^{b)}		T _{2B}	[Nm]	5 600	5 600	5 600	5 600	5 600	5 600	5 600	5 600	5 600	5 600
Nominal input speed S5 ^{c)}		n _{1N}	[rpm]	1 600	1 900	1 900	1 900	1 900	1 900	1 900	1 900	1 900	1 900
Maximum input speed S5		n _{1max}	[rpm]	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800	2 800
Emergency stop torque ^{d)}		T _{2not}	[Nm]	8 500	8 500	8 500	8 500	8 500	8 500	8 500	8 500	8 500	8 500
Efficiency		η	[%]	88									
Lifetime		L _h	[h]	> 20 000									
Weight		M	[kg]	110									
Angular backlash		j _t	[arcmin]	Precision P 1 ≤ 1 / P 3 ≤ 3 / P 5 ≤ 5 / P 12 ≤ 12									
Torsionnal rigidity ^{e)}		C _{t2}	[Nm/arcmin]	680.9	701.3	660.6	701.3	660.6	701.3	680.9	692.6	718.8	660.6
Noise ⁱ⁾		L _{pA}	[dB(A)]	≤ 74									
Max. permitted housing temperature ^{g)}		T	[°C]	90									
Protection class				IP 65									
Direction of rotation				Same way input / output									
Max. radial force on output shaft ^{f)}		F _{rmax}	[N]	Center of output shaft: 37 500 / End of output shaft: 25 000									
Max. axial force on output shaft ^{f)}		F _{amax}	[N]	34 000									
Color				Red, RAL 3003									
Inertia in kg·cm ² ^{h)}	Ø24	J ₁	[kg·cm ²]	78.6	55.0	78.2	54.6	23.5	35.1	23.4	23.4	23.4	22.3
	Ø32			80.8	57.2	80.4	56.8	25.7	37.3	25.6	25.6	25.6	24.5
	Ø35			86.1	62.5	85.7	62.1	31.0	42.6	30.9	30.9	30.9	29.8
	Ø38			89.5	65.9	89.1	65.5	34.4	46.0	34.3	34.3	34.3	33.2
	Ø42			89.0	65.4	88.6	65.0	33.9	45.5	33.8	33.8	33.8	32.7
	Ø48			89.2	65.6	88.8	65.2	34.1	45.7	34.0	34.0	34.0	32.9
	Ø55			111.8	88.2	111.4	87.8	56.7	68.3	56.6	56.6	56.6	55.5

* Other ratios available. 27, 48, 63, 84, 147 on request.

a) Nominal output torque when operating at n_{1N}.

b) 1000 cycles per hour max.

c) Valid for an ambient temperature of 20°C and T_{2N}.
At higher ambient temperatures, please reduce speed.

d) Valid 1000 times the gearbox life.

e) Valid for an input Ø of 55 mm in 1-stage and 48 mm in 2- and 3-stage.

f) Werte für 300 U/min.

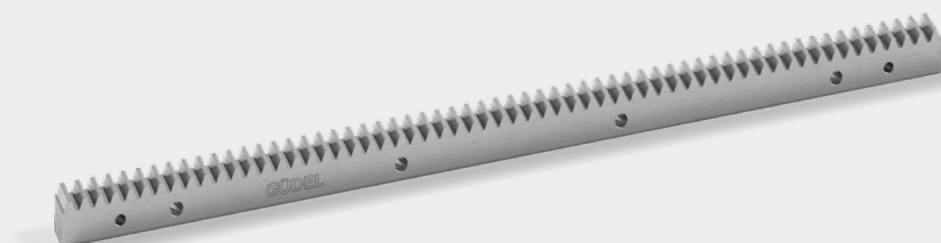
g) For other temperatures, please contact us. Nominal output torque when operating at n_{1N}.

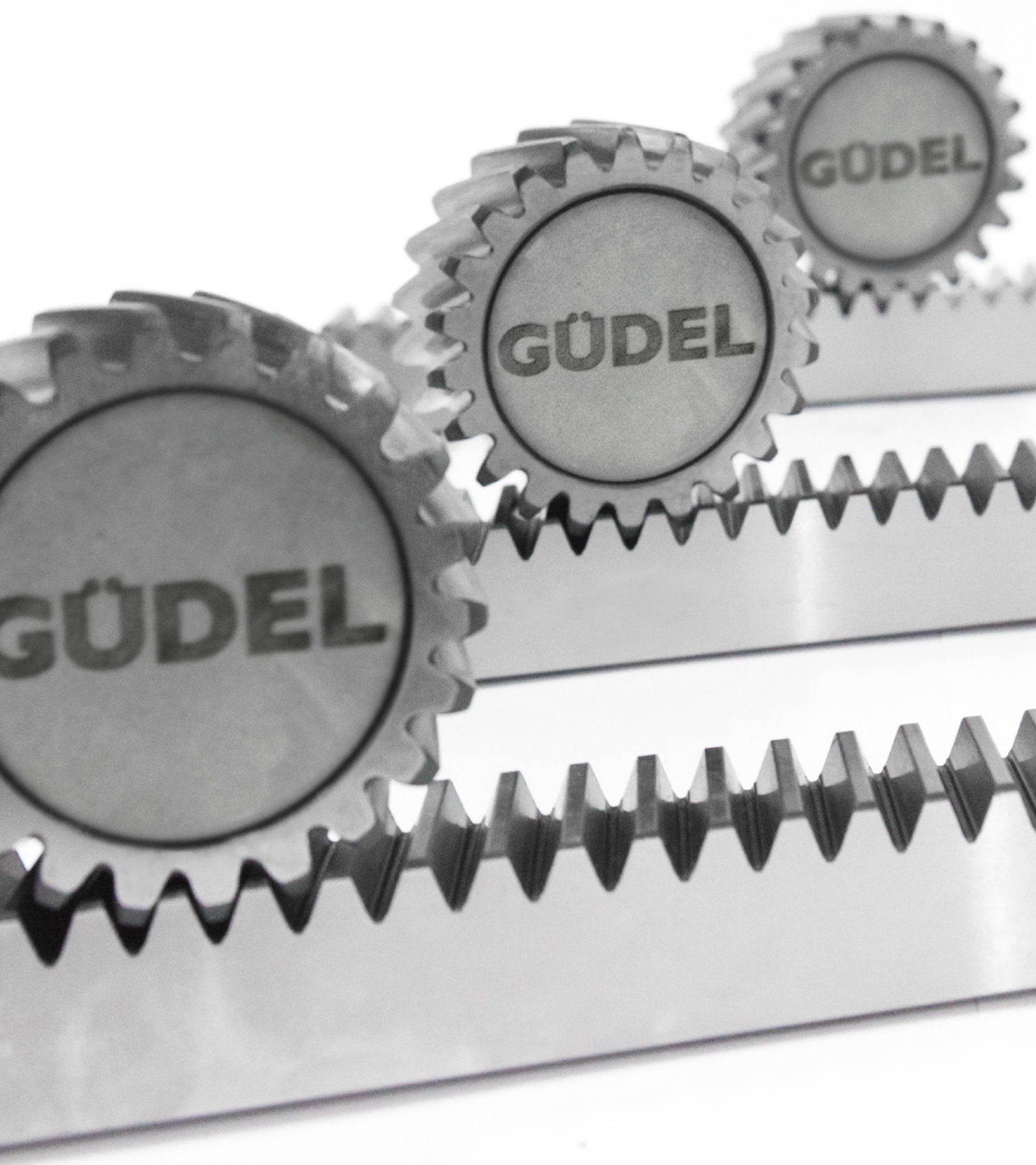
h) Depending on the motor output shaft Ø.

i) With n_{1N}=1800 rpm no load.

Rack

Rack for PR on request



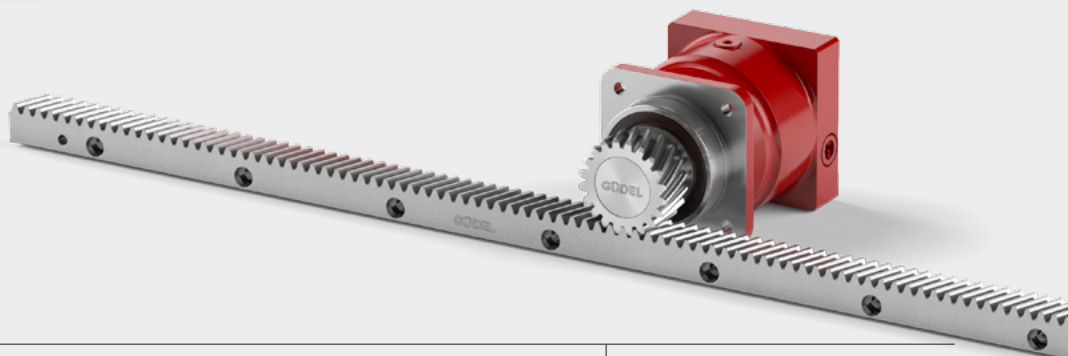


Your ideal drive train

GÜDEL

Rack & pinion programm

Our function package for your ideal drive train with gearbox, rack and pinion from Güdel.

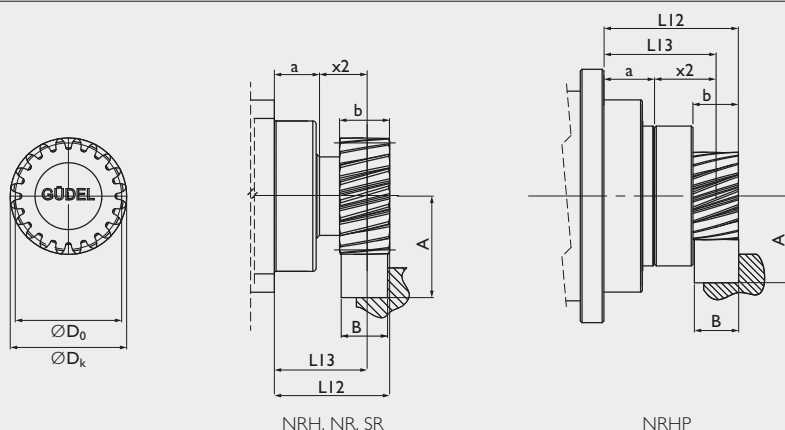


Pinion

Helical tooth, modular pitch



Hardened and ground



Material 16MnCr5 DIN 1.7131
Teeth pressure angle $\alpha = 20^\circ$, helical teeth left, $19^\circ 31' 42''$
hardened (58^{+4}_{-2} HRC), ground, crowned
Quality 6f24 DIN 3962 / 63 / 67

Geometrical information

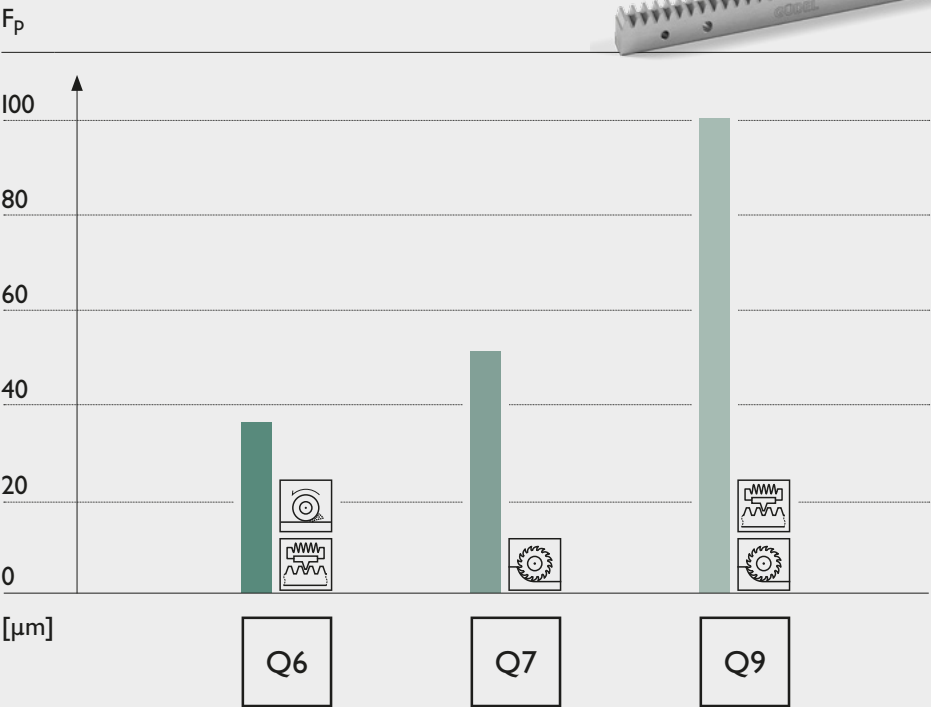
	Size	m_n	P_t	z	A	b	D_k	D_0	D_v	$L12$	$L13$	$x2$	a	M
NRH/NR/SR	080	2	6.67	20	43.221	25	46.44	42.441	—	52.5	40.0	20.0	20	0.3
	100	2	6.67	25	48.526	25	57.05	53.052	—	63.3	51.0	24.0	27	0.4
		3	10.00	20	57.831	30	69.66	63.662	—	69.0	54.0	27.0	27	0.7
	140	3	10.00	22	61.014	30	76.03	70.028	—	69.5	54.5	27.5	27	0.8
		4	13.33	20	77.441	40	92.88	84.883	—	79.0	59.0	32.0	27	1.6
NRHP	080	2	6.67	16	39.577	26	39.15	33.953	35.153	75.0	62.0	32.0	30	0.6
	100	2	6.67	16	39.577	26	39.15	33.953	35.153	77.0	64.0	35.0	29	1.0
		2	6.67	21	44.282	26	48.56	44.563	—	77.0	64.0	35.0	29	1.0
		2.5	8.33	16	43.471	26	48.94	42.441	43.941	77.0	64.0	35.0	29	1.0
		3	10.00	14	49.182	32	52.36	44.563	46.363	83.0	67.0	38.0	29	1.2
	140	2.5	8.33	21	49.352	26	60.70	55.704	—	89.0	76.0	38.0	38	1.9
		3	10.00	18	54.648	32	63.30	57.296	—	95.0	79.0	41.0	38	2.0
NR	180	4	13.33	20	77.441	40	92.88	84.883	—	83.5	63.5	31.5	32	1.5
		5	16.67	20	87.052	50	116.10	106.103	—	89.5	64.5	32.5	32	3.0
	240	5	16.67	24	97.662	50	137.32	127.324	—	112.5	87.5	47.5	40	5.4
		6	20.00	20	106.662	60	139.32	127.324	—	111.0	81.0	41.0	40	5.6
SR	180	4	13.33	20	77.441	40	92.88	84.883	—	89.5	69.5	31.5	38	1.5
		5	16.67	20	87.052	50	116.10	106.103	—	95.5	70.5	32.5	38	3.0
	240	5	16.67	24	97.662	50	137.32	127.324	—	120.5	95.5	47.5	48	5.4
		6	20.00	20	106.662	60	139.32	127.324	—	119.0	89.0	41.0	48	5.6

m_n : Normal module, P_t : Transverse pitch, z : Number of teeth, D_v : Shifted pitch circle diameter, D_0 : Pitch circle diameter, M : Weight [kg]

Your ideal drive train

Rack

Rack



Material



Steel

Processes



Hardened



Milled



Ground

Example of the cumulative pitch error F_p for module 4 based on length 1000mm.
Quality DIN 3962.

Geometrical information

Size	m_n	P_t	L	z	b	h
080 100	2	6.67	500.00	75	24	24
			1000.00	150		
			2000.00	300		
100 140	2.5	8.33	500.00	60	24	24
			1000.00	120		
			2000.00	240		
100 140	3	10.00	500.00	50	29	29
			1000.00	100		
			2000.00	200		
140 180	4	13.33	506.67	38	39	39
			1000.00	75		
			2000.00	150		
180 240	5	16.67	500.00	30	49	39
			1000.00	60		
			2000.00	120		
240	6	20.00	500.00	25	59	49
			1000.00	50		
			2000.00	100		

m_n : Normal module, P_t : Transverse pitch [mm], z: Number of teeth

Q6	Q6 +	Q7	Q9
Part No.	Part No.	Part No.	Part No.
246022	246122	155022	158022
246023	246123	155023	158023
246024	246124	155024	158024
246032	246132	155032	158032
246033	246133	155033	158033
246034	246134	155034	158034
246042	246142	155042	158042
246043	246143	155043	158043
246044	246144	155044	158044
246052	246152	155052	158052
246053	246153	155053	158053
246054	246154	155054	158054
246062	246162	155062	158062
246063	246163	155063	158063
246064	246164	155064	158064
246072	246172	-	158072
246073	246173	-	158073
246074	246174	-	158074



Module

Rack



Helical tooth, modular pitch



Hardened and ground

Material C45E DIN 1.1191

Profile all faces ground

Teeth pressure angle $\alpha = 20^\circ$

helical tooth system right

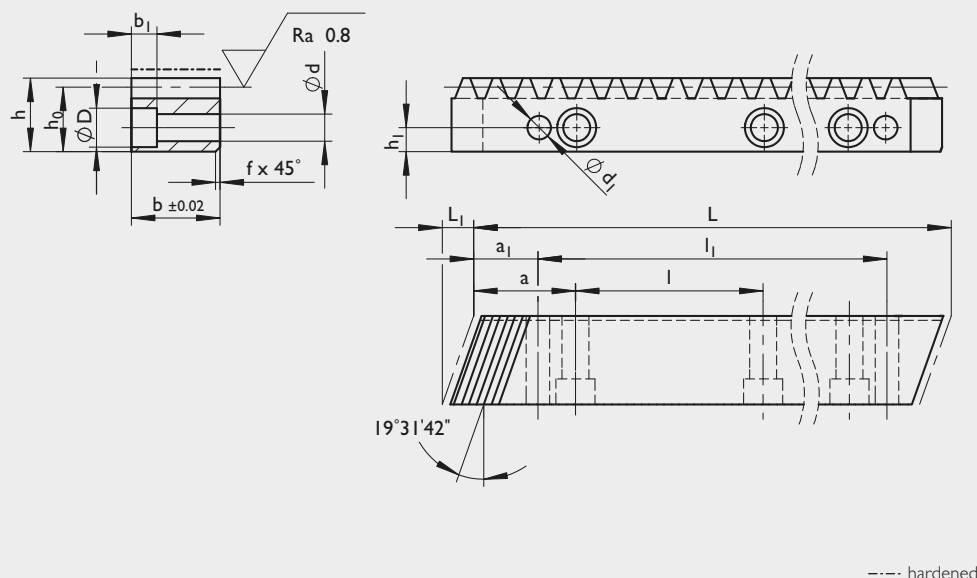
helix angle $19^\circ 31' 42''$ hardened (54^{+4}_{-0} HRC)

and ground

Quality 6h23 DIN 3962/63/67

 p_r [mm] tolerance of cut forcontinuous mounting $-0.05/-0.2$ F_{pL} [mm] based on length L

cumulative pitch error



Geometrical information

Size	m_n	p_t	L	L_l	z	b	h	h_0	f+0,5	a	l	h_l	d	D	b_l	a_l	l_l	d_l	F_{pL}	M	Part No.
080 100	2	6.67	500.00	8.5	75	24	24	22.0	1	62.5	125	8	7	11	7	31.7	436.6	5.7	0.025	2.0	246022
			1000.00		150														0.036	4.0	246023
			2000.00		300														0.058	8.0	246024
100 140	2.5	8.33	500.00	8.5	60	24	24	21.5	1	62.5	125	9	7	11	7	31.7	436.6	5.7	0.027	1.9	246032
			1000.00		120														0.036	3.9	246033
			2000.00		240														0.053	7.7	246034
100 140	3	10.00	500.00	10.3	50	29	29	26.0	1	62.5	125	9	10	15	9	35.0	430.0	7.7	0.028	2.8	246042
			1000.00		100														0.037	5.6	246043
			2000.00		200														0.054	11.2	246044
140 180	4	13.33	506.67	13.8	38	39	39	35.0	1	62.5	125	12	12	18	11	33.3	433.0	9.7	0.030	5.1	246055
			1000.00		75														0.036	10.1	246056
			2000.00		150														0.050	20.2	246057
180 240	5	16.67	500.00	17.4	30	49	39	34.0	1	62.5	125	12	14	20	13	37.5	425.0	11.7	0.028	6.0	246062
			1000.00		60														0.034	12.0	246063
			2000.00		120														0.045	24.1	246064
240	6	20.00	500.00	20.9	25	59	49	43.0	1	62.5	125	16	18	26	17	37.5	425.0	15.7	0.031	8.9	246072
			1000.00		50														0.036	18.0	246073
			2000.00		100														0.046	36.2	246074

 m_n : Normal module, p_t : Transverse pitch, z: Number of teeth, M: Weight [kg]



Module

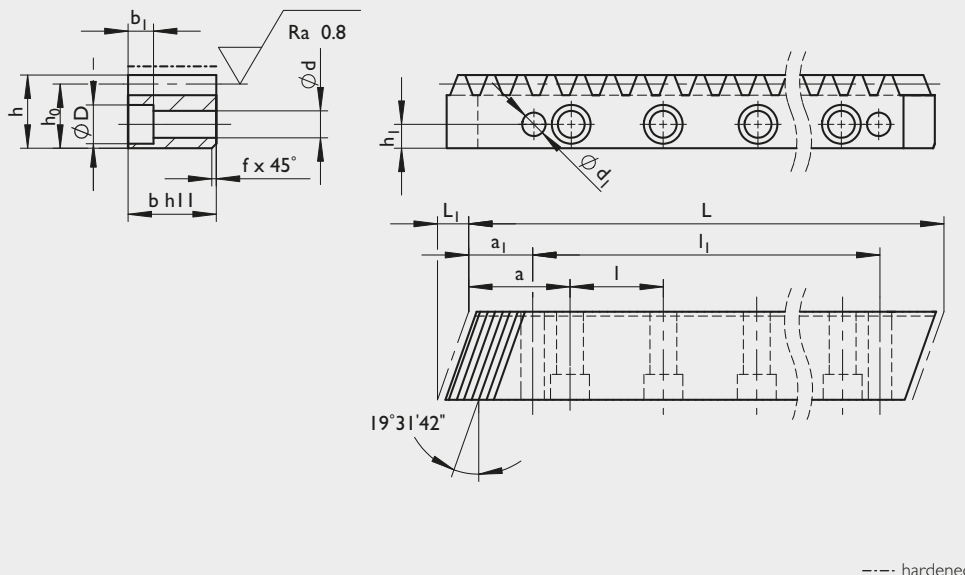
Rack



Helical tooth, modular pitch



Hardened and ground



Material C45E DIN 1.1191
 Profile all faces ground
 Teeth pressure angle $\alpha = 20^\circ$
 helical tooth system right
 helix angle $19^\circ 31' 42''$
 hardened (54⁺⁴ HRC)
 and ground
 Quality 6h23 DIN 3962/63/67
 p_r [mm] tolerance of cut for
 continuous mounting -0.05/-0.2
 F_{pL} [mm] based on length L
 cumulative pitch error



Geometrical information

Size	m _n	p _t	L	L _l	z	b	h	h ₀	f+0,5	a	l	h _l	d	D	b _l	a _l	l _l	d _l	F _{pL}	M	Part No.
080 100	2	6.67	500.00	8.5	75	24	24	22.0	2	62.5	62.5	8	7	11	7	31.7	436.6	5.7	0.025	2.0	246122
			1000.00		150												936.6		0.036	3.9	246123
			2000.00		300												1936.6		0.058	7.8	246124
100 140	2.5	8.33	500.00	8.5	60	24	24	21.5	2	62.5	62.5	9	7	11	7	31.7	436.6	5.7	0.027	1.9	246132
			1000.00		120												936.6		0.036	3.8	246133
			2000.00		240												1936.6		0.053	7.6	246134
100 140	3	10.00	500.00	10.3	50	29	29	26.0	2	62.5	62.5	9	10	15	9	35.0	430.0	7.7	0.028	2.7	246142
			1000.00		100												930.0		0.037	5.4	246143
			2000.00		200												1930.0		0.054	10.8	246144
140 180	4	13.33	506.67	13.8	38	39	39	35.0	2	62.5	62.5	12	12	18	11	33.3	433.0	9.7	0.030	4.9	246152
			1000.00		75												933.4		0.036	9.7	246153
			2000.00		150												1933.4		0.050	19.5	246154
180 240	5	16.67	500.00	17.4	30	49	39	34.0	3	62.5	62.5	12	14	20	13	37.5	425.0	11.7	0.028	5.8	246162
			1000.00		60												925.0		0.034	11.5	246163
			2000.00		120												1925.0		0.045	23.0	246164
240	6	20.00	500.00	20.9	25	59	49	43.0	3	62.5	62.5	16	18	26	17	37.5	425.0	15.7	0.031	8.5	246172
			1000.00		50												925.0		0.036	16.9	246173
			2000.00		100												1925.0		0.046	33.9	246174

m_n: Normal module, p_t: Transverse pitch, z: Number of teeth, M: Weight [kg]

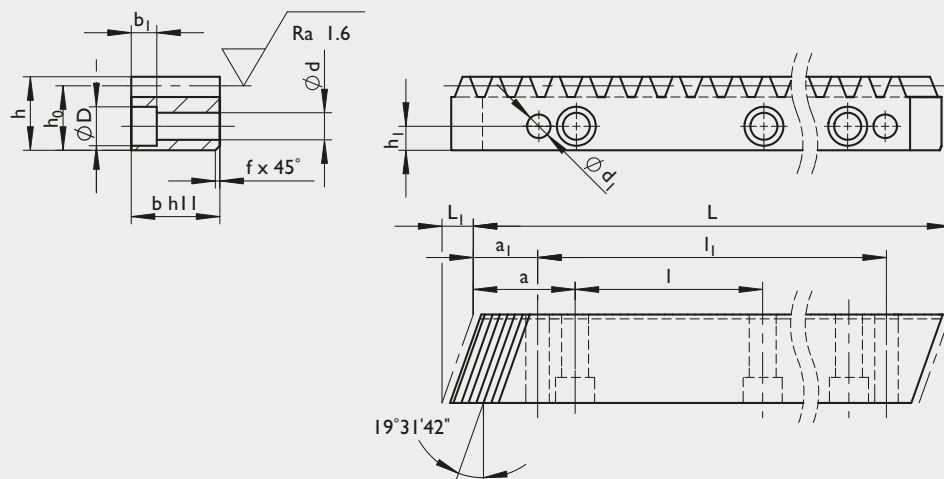


Helical tooth, modular pitch



Milled

Material 42CrMo4 DIN 1.7225
 Profile all faces milled
 Teeth pressure angle $\alpha = 20^\circ$
 helical tooth system right
 helix angle $19^\circ 31' 42''$
 milled
 Quality 7h25 DIN 3962/63/67
 pr [mm] tolerance of cut for
 continuous mounting -0.05/-0.2
 F_{pL} [mm] based on length L
 cumulative pitch error



Geometrical information

Size	m _n	p _t	L	L _l	z	b	h	h ₀	f+0,5	a	l	h _l	d	D	b _l	a _l	l _l	d _l	F _{pL}	M	Part No.
080 100	2	6.67	500.00	8.5	75	24	24	22.0	2	62.5	125	8	7	11	7	31.7	436.6	5.7	0.036	2.0	155022
			1000.00		150												936.6		0.050	4.0	155023
			2000.00		300												1936.6		0.077	8.0	155024
100 140	2.5	8.33	500.00	8.5	60	24	24	21.5	2	62.5	125	9	7	11	7	31.7	436.6	5.7	0.038	1.9	155032
			1000.00		120												936.6		0.050	3.9	155033
			2000.00		240												1936.6		0.075	7.7	155034
100 140	3	10.00	500.00	10.3	50	29	29	26.0	2	62.5	125	9	10	15	9	35.0	430.0	7.7	0.040	2.8	155042
			1000.00		100												930.0		0.051	5.6	155043
			2000.00		200												1930.0		0.073	11.2	155044
140 180	4	13.33	506.67	13.8	38	39	39	35.0	2	62.5	125	12	12	18	11	33.3	433.0	9.7	0.042	5.1	155052
			1000.00		75												933.4		0.051	10.1	155053
			2000.00		150												1933.4		0.070	20.2	155054
180 240	5	16.67	500.00	17.4	30	49	39	34.0	3	62.5	125	12	14	20	13	37.5	425.0	11.7	0.040	6.0	155062
			1000.00		60												925.0		0.048	12.0	155063
			2000.00		120												1925.0		0.062	24.1	155064

m_n: Normal module, P_t: Transverse pitch, z: Number of teeth, M: Weight [kg]



Module

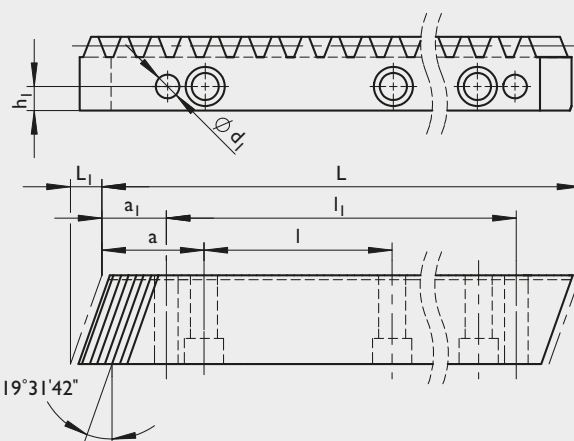
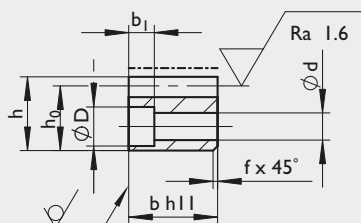
Rack



Helical tooth, modular pitch



Milled and ground



--- hardened

Material C45E DIN 1.1191
 Profile all faces milled
 Teeth pressure angle $\alpha = 20^\circ$
 helical tooth system right
 helix angle $19^\circ 31' 42''$
 hardened (54^{+4}_{-0} HRC)
 and milled
 Quality 9h27 DIN 3962/63/67
 p_r [mm] tolerance of cut for
 continuous mounting -0.05/-0.5
 F_{pL} [mm] based on length L
 cumulative pitch error



Geometrical information

Size	m _n	p _t	L	L _l	z	b	h	h ₀	f+0,5	a	l	h _l	d	D	b _l	a _l	l _l	d _l	F _{pL}	M	Part No.
080 100	2	6.67	500.00	8.5	75	24	24	22.0	2	62.5	125	8	7	11	7	31.7	436.6	5.7	0.073	2.0	158022
			1000.00		150												936.6		0.100	4.0	158023
			2000.00		300												1936.6		0.155	8.0	158024
100 140	2	8.33	500.00	8.5	60	24	24	21.5	2	62.5	125	9	7	11	7	31.7	436.6	5.7	0.076	1.9	158032
			1000.00		120												936.6		0.101	3.9	158033
			2000.00		240												1936.6		0.150	7.7	158034
100 140	3	10.00	500.00	10.3	50	29	29	26.0	2	62.5	125	9	10	15	9	35.0	430.0	7.7	0.080	2.8	158042
			1000.00		100												930.0		0.103	5.6	158043
			2000.00		200												1930.0		0.147	11.2	158044
140 180	4	13.33	506.67	13.8	38	39	39	35.0	2	62.5	125	12	12	18	11	33.3	433.0	9.7	0.083	5.1	158052
			1000.00		75												933.4		0.101	10.1	158053
			2000.00		150												1933.4		0.136	20.2	158054
180 240	5	16.67	500.00	17.4	30	49	39	34.0	3	62.5	125	12	14	20	13	37.5	425.0	11.7	0.080	6.0	158062
			1000.00		60												925.0		0.094	12.0	158063
			2000.00		120												1925.0		0.122	24.1	158064
240	6	20.00	500.00	20.9	25	59	49	43.0	3	62.5	125	16	18	26	17	37.5	425.0	15.7	0.087	8.9	158072
			1000.00		50												925.0		0.101	18.0	158073
			2000.00		100												1925.0		0.128	36.2	158074

m_n: Normal module, p_t: Transverse pitch, z: Number of teeth, M: Weight [kg]



Technical information

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Generate the code of your planetary gearbox

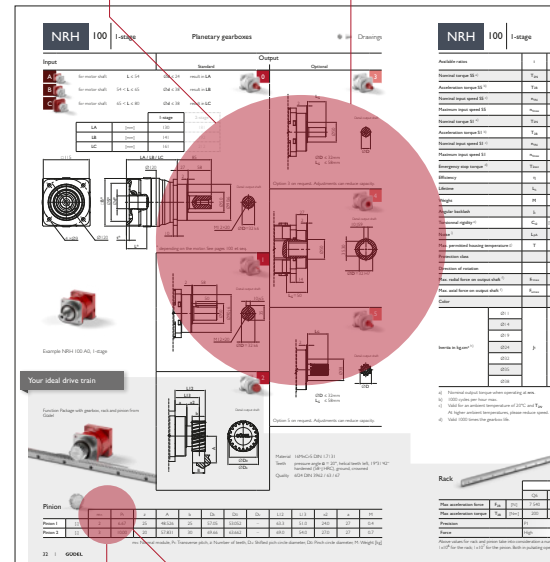
Output shafts (excl. output pinion)

D32

L58

D Diameter [mm]

L Shaft length [mm]



Output Pinion

z20

m3H

z Number of teeth

m Module

H Helical teeth
S Straight teeth

Type Size Ratio Configuration

NRH 100 - 4 - A 0

NRH
NRHP
NR
SR
PR

080
100
140
180
240

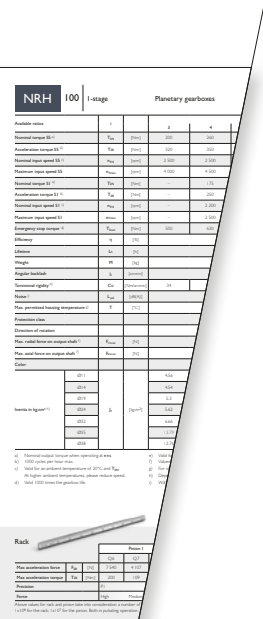
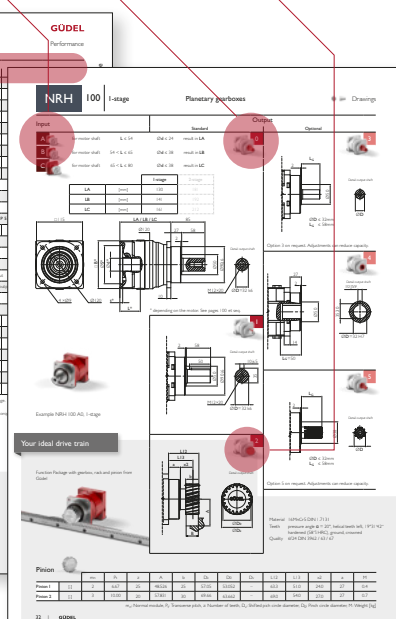
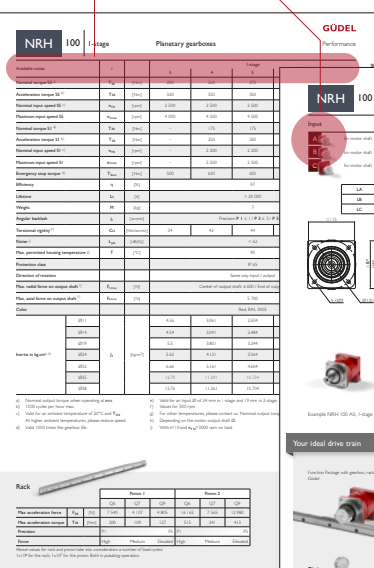
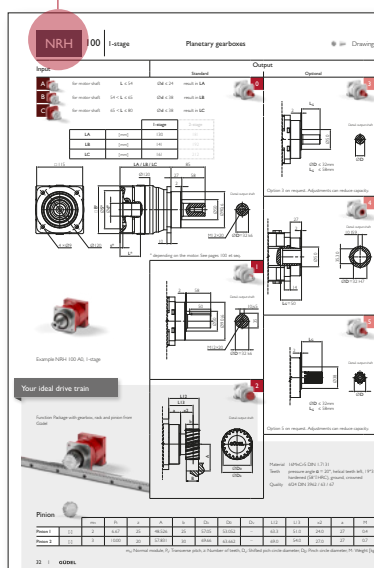
Add x for special gearbox. Not defined in the standard reference. A unique study number will be assigned.

NRH 100

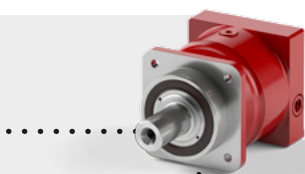
A Small
B Medium
C Long

0 Smooth
1 Keyway
3 Custom
4 Hollow
5 Spline

2 Pinion



See technical datasheets
on pages 28 et seq.



Example
NRH100-4-A0-D32-L58-TP-P3-AM

Planetary gearboxes

	T	A
100	100	100
150	150	150
200	200	200
250	250	250
300	300	300
350	350	350
400	400	400
450	450	450
500	500	500
550	550	550
600	600	600
650	650	650
700	700	700
750	750	750
800	800	800
850	850	850
900	900	900
950	950	950
1000	1000	1000
1050	1050	1050
1100	1100	1100
1150	1150	1150
1200	1200	1200
1250	1250	1250
1300	1300	1300
1350	1350	1350
1400	1400	1400
1450	1450	1450
1500	1500	1500
1550	1550	1550
1600	1600	1600
1650	1650	1650
1700	1700	1700
1750	1750	1750
1800	1800	1800
1850	1850	1850
1900	1900	1900
1950	1950	1950
2000	2000	2000
2050	2050	2050
2100	2100	2100
2150	2150	2150
2200	2200	2200
2250	2250	2250
2300	2300	2300
2350	2350	2350
2400	2400	2400
2450	2450	2450
2500	2500	2500
2550	2550	2550
2600	2600	2600
2650	2650	2650
2700	2700	2700
2750	2750	2750
2800	2800	2800
2850	2850	2850
2900	2900	2900
2950	2950	2950
3000	3000	3000
3050	3050	3050
3100	3100	3100
3150	3150	3150
3200	3200	3200
3250	3250	3250
3300	3300	3300
3350	3350	3350
3400	3400	3400
3450	3450	3450
3500	3500	3500
3550	3550	3550
3600	3600	3600
3650	3650	3650
3700	3700	3700
3750	3750	3750
3800	3800	3800
3850	3850	3850
3900	3900	3900
3950	3950	3950
4000	4000	4000
4050	4050	4050
4100	4100	4100
4150	4150	4150
4200	4200	4200
4250	4250	4250
4300	4300	4300
4350	4350	4350
4400	4400	4400
4450	4450	4450
4500	4500	4500
4550	4550	4550
4600	4600	4600
4650	4650	4650
4700	4700	4700
4750	4750	4750
4800	4800	4800
4850	4850	4850
4900	4900	4900
4950	4950	4950
5000	5000	5000
5050	5050	5050
5100	5100	5100
5150	5150	5150
5200	5200	5200
5250	5250	5250
5300	5300	5300
5350	5350	5350
5400	5400	5400
5450	5450	5450
5500	5500	5500
5550	5550	5550
5600	5600	5600
5650	5650	5650
5700	5700	5700
5750	5750	5750
5800	5800	5800
5850	5850	5850
5900	5900	5900
5950	5950	5950
6000	6000	6000
6050	6050	6050
6100	6100	6100
6150	6150	6150
6200	6200	6200
6250	6250	6250
6300	6300	6300
6350	6350	6350
6400	6400	6400
6450	6450	6450
6500	6500	6500
6550	6550	6550
6600	6600	6600
6650	6650	6650
6700	6700	6700
6750	6750	6750
6800	6800	6800
6850	6850	6850
6900	6900	6900
6950	6950	6950
7000	7000	7000
7050	7050	7050
7100	7100	7100
7150	7150	7150
7200	7200	7200
7250	7250	7250
7300	7300	7300
7350	7350	7350
7400	7400	7400
7450	7450	7450
7500	7500	7500
7550	7550	7550
7600	7600	7600
7650	7650	7650
7700	7700	7700
7750	7750	7750
7800	7800	7800
7850	7850	7850
7900	7900	7900
7950	7950	7950
8000	8000	8000
8050	8050	8050
8100	8100	8100
8150	8150	8150
8200	8200	8200
8250	8250	8250
8300	8300	8300
8350	8350	8350
8400	8400	8400
8450	8450	8450
8500	8500	8500
8550	8550	8550
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8950	8950	8950
9000	9000	9000
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9150	9150	9150
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9550	9550	9550
9600	9600	9600
9650	9650	9650
9700	9700	9700
9750	9750	9750
9800	9800	9800
9850	9850	9850
9900	9900	9900
9950	9950	9950
10000	10000	10000

Position

TP

HI Horizontal
VI Upright
V2 Downside
TP All positions*

*Add B for
option breather:
reduces the
pressure in SI.

Precision

P3

P Precision [arcmin]

Input

AM

AM Motor adaptation
AC Keyway shaft
AL Smooth shaft

Motor



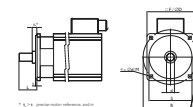
Example
NRH100-4-A2-z20-m3H-TP-P3-AM

Order reference

Choose your appropriate
motor interface

Code example

Motor flange diameter	Motor mounting diameter	Motor output shaft dimensions
R130 / d9	S110 / t3.5	d24 x L50
Flange diameter of flange hole or flange (mm)	Flange diameter of flange hole (mm) / Flange diameter of flange hole (mm)	Flange diameter (mm) / Flange length (mm)



See motor interfaces
on pages 134 et seq.

Positioning

Reliability – Regardless of the mounting position

Our high-performance planetary gearboxes can be used in any mounting orientation. Whether your application requires a horizontal output (HI), vertical with upright facing output (VI), or vertical with downward-facing output (V2) – the universal TP configuration covers any orientation.

For specific applications, including continuous operation together with high input speed, we recommend the use of an additional air vent (plug). This air vent plug can be installed at any time – even as a retrofit on installed gearboxes.

In order to optimize gearbox performance, we recommend specifying the actual mounting position VI, V2 or HI, especially for ratios requiring a 3-stage gearbox.

Mounting positions



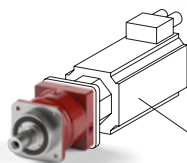
All positions



See general introduction about our
positioning on pages 18 et seq.

GÜDEL

Standard inputs

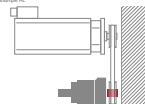


AM – Motor adaptability

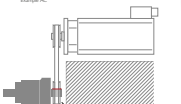
Optional inputs

For special applications, in which the motor cannot be directly mounted on the gearbox, it is possible to fit the gearbox with an optional input shaft.

Example AL



Example AC



AL – Smooth primary shaft

AC – Keyway primary shaft



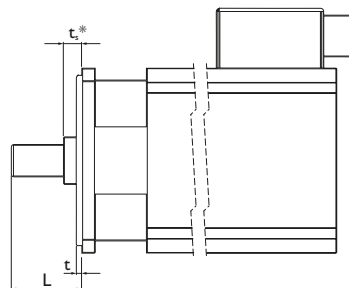
See general introduction about our
inputs on pages 14 et seq.

Choose your appropriate motor interface

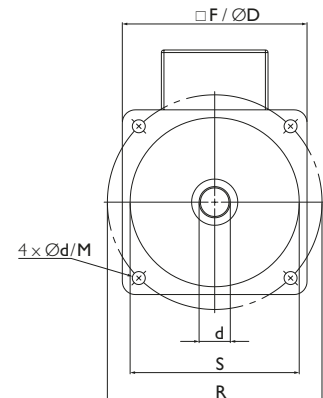
Code example

Motor fixing diameter		Motor centring diameter		Motor output shaft dimensions						
R130	/	d9	-	S110	/	t3.5	-	d24	x	L50

R Pitch diameter of fixing holes or threads [mm]	Ød Diameter of fixing holes [mm]	S Centering diameter [mm]	t Depth of centering shoulder [mm]	d Diameter [mm]	L Length [mm]
	M Diameter of fixing threads [mm]				



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



* On request

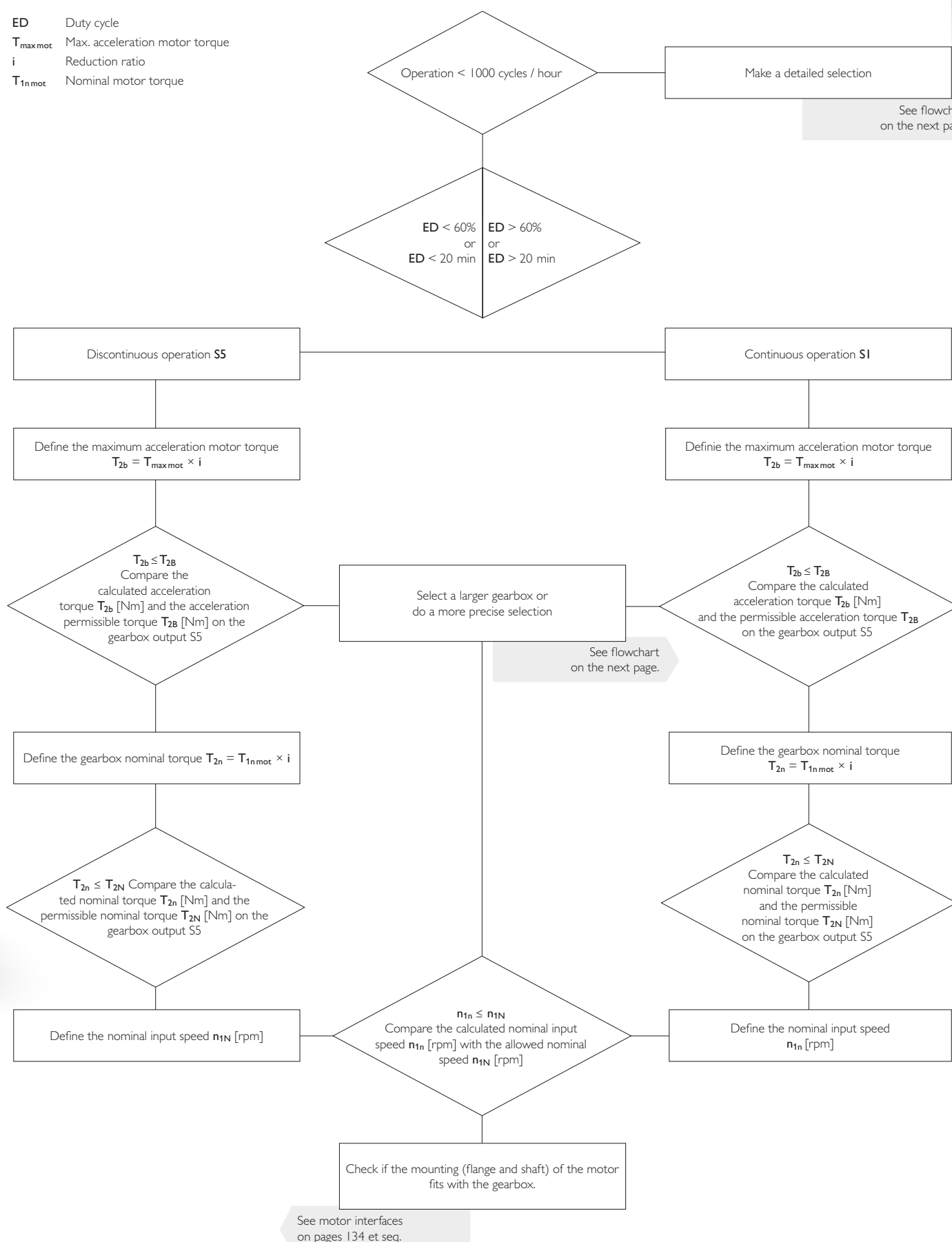
Calculate your planetary gearbox

This outline enables you to select your gearbox quickly. If you know which motor you will be using, you can create a preliminary design for your application.



Quick selection

ED Duty cycle
 $T_{\max \text{ mot}}$ Max. acceleration motor torque
 i Reduction ratio
 $T_{1n \text{ mot}}$ Nominal motor torque



Detail selection

$$ED = (t_b + t_c + t_d) / (t_b + t_c + t_d + t_e) \times 100 \%$$

$$ED = t_b + t_c + t_d [\text{min}]$$

$$Z_h = \frac{3600 [\text{s/h}]}{(t_b + t_c + t_d + t_e)}$$

F depends on Z_h (see Board I)

T_{2b} under application

$$T_{2bfs} = T_{2b} \times f_s$$

$n_{2\text{max}}$ under application

i depends on:

n Necessary output rotation speed (under application)

Λ Depending on inertia ratio,
indicative value: $1 \leq \Lambda \leq 10$

$$n_{1\text{max}} = n_{2\text{max}} \times i$$

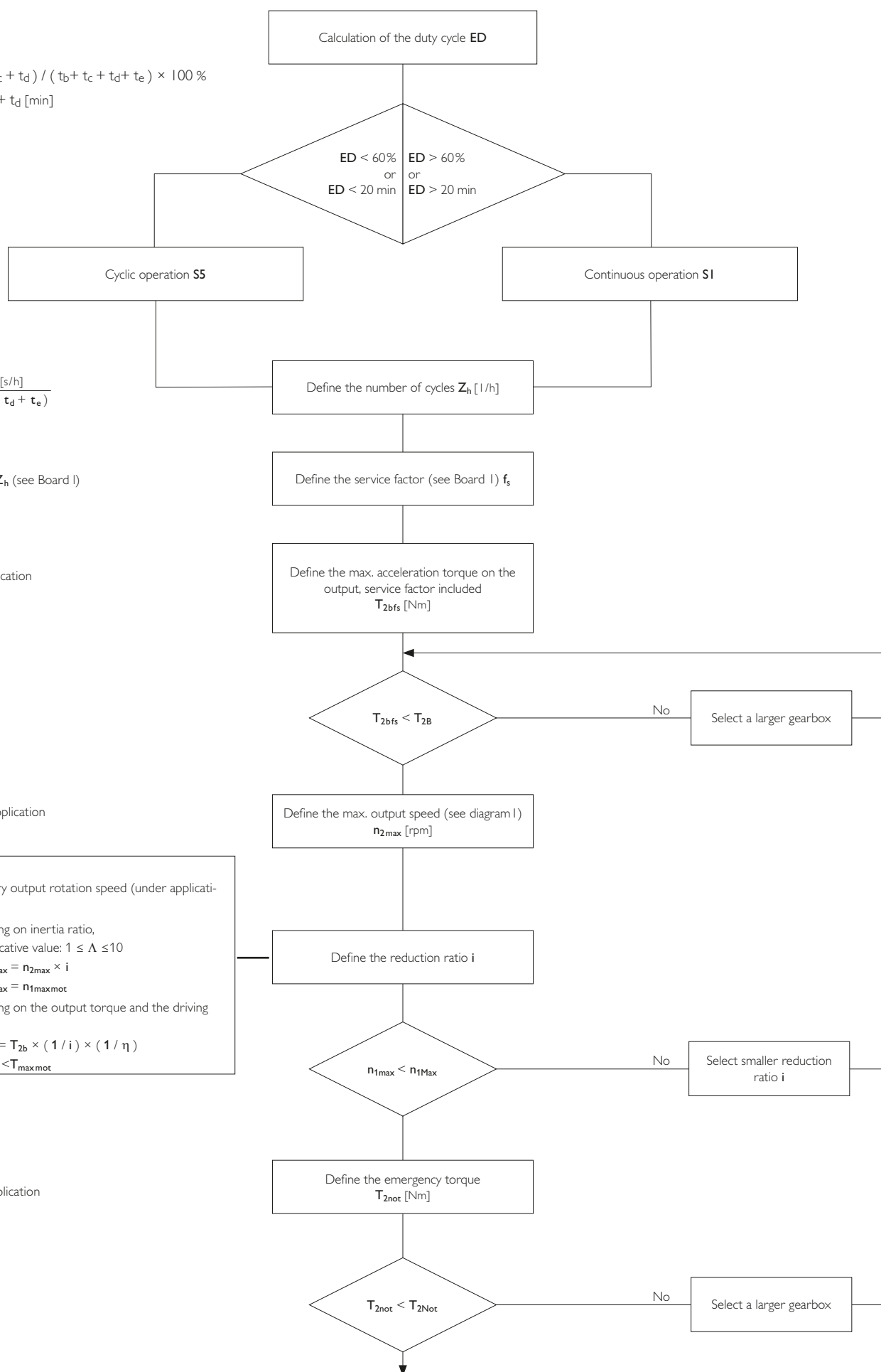
$$n_{1\text{max}} = n_{1\text{maxmot}}$$

T Depending on the output torque and the driving torque

$$T_{1b} = T_{2b} \times (1/i) \times (1/\eta)$$

$$T_{1b} < T_{\text{maxmot}}$$

$T_{2\text{not}}$ under application



$$T_{2m} = 3 \sqrt{\frac{|n_{2b}| \times t_b \times |T_{2b}|^3 + \dots + |n_{2n}| \times t_n \times |T_{2n}|^3}{|n_{2b}| \times t_b + \dots + |n_{2n}| \times t_n}}$$

$$n_{2m} = \frac{|n_{2b}| \times t_b + \dots + |n_{2n}| \times t_n}{t_b + \dots + t_n}$$

including dwell

$$n_{1m} = n_{2m} \times i$$

$$D_{W.Mot} < D_{tightening\ hub}$$

The motor shaft should be inserted a good distance into the tightening hub.

The motor shaft should be inserted a good distance into the tightening hub without effort.

$$T_{2maxmot} = T_{1maxmot} \times i \times \eta$$

When the engine is under full load, the gear must not be damaged. In the case of damage, limit the motor current.

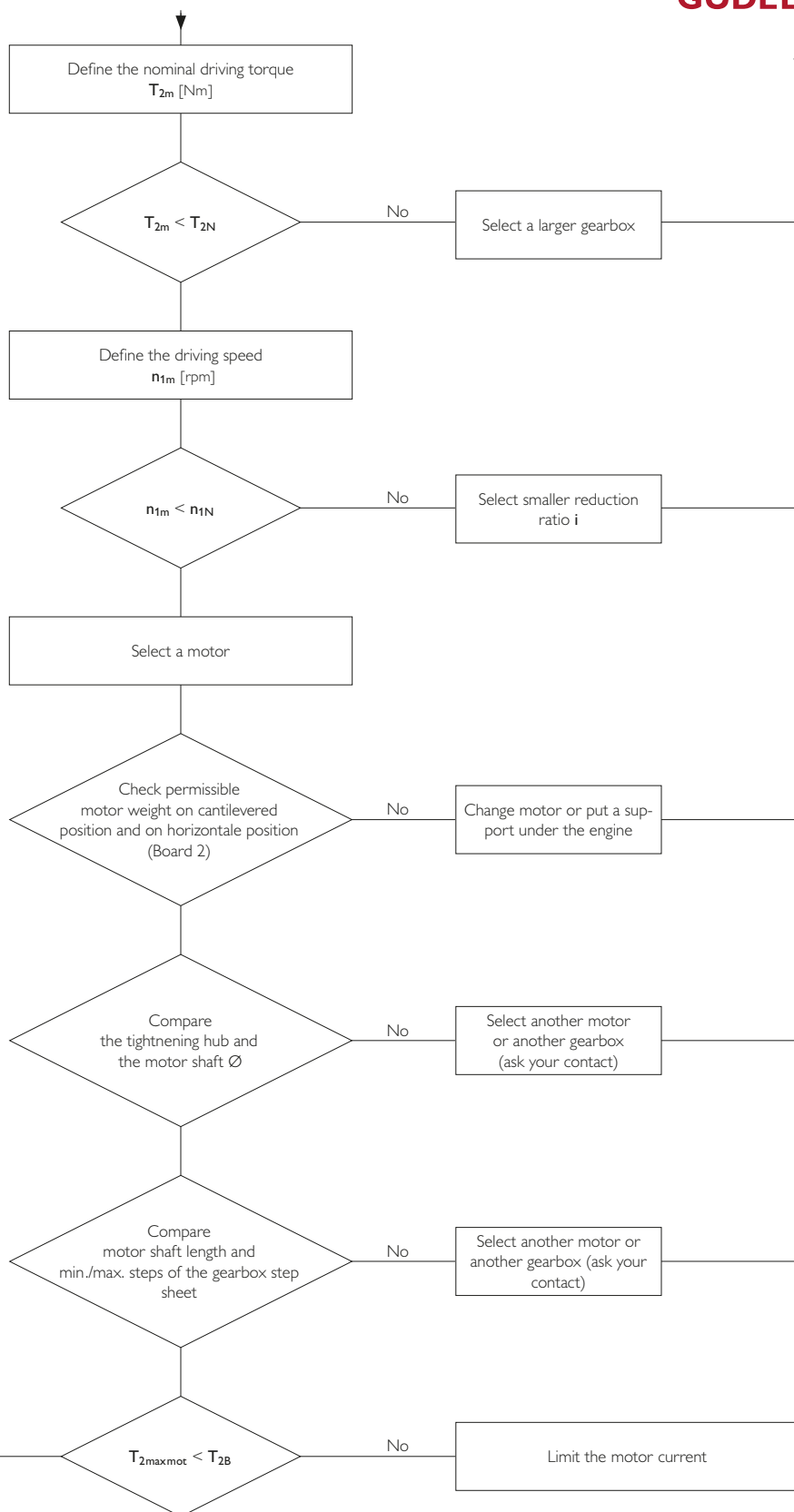
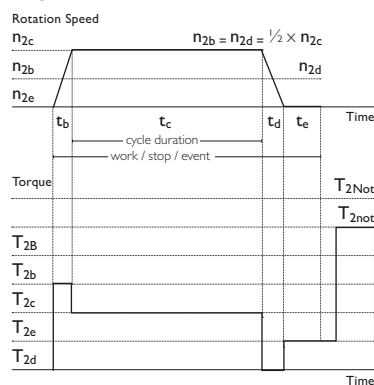


Diagram 1



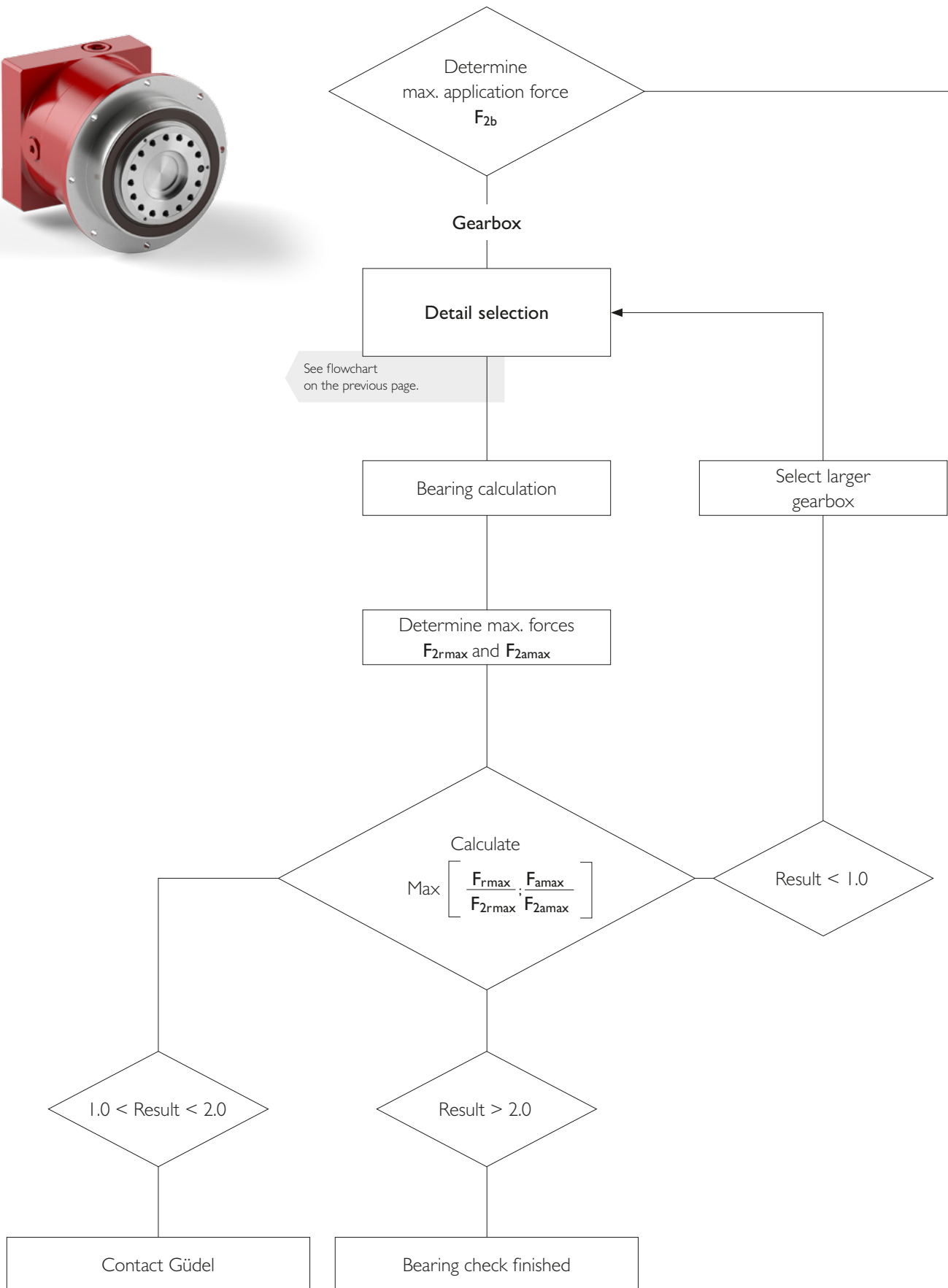
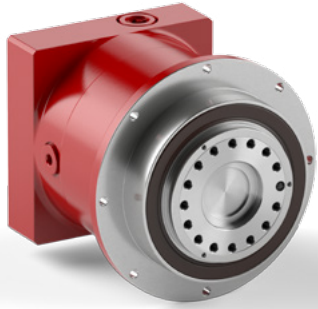
Board 1

Number of cycles p. h.	Z _h	[1/h]	1000	1500	2000	3000	4000	5000	6000	7000	8000	9000	10000
Shock factor	f _s	[-]	1	1.1	1.3	1.6	1.72	1.8	1.9	1.95	2	2.05	2.07

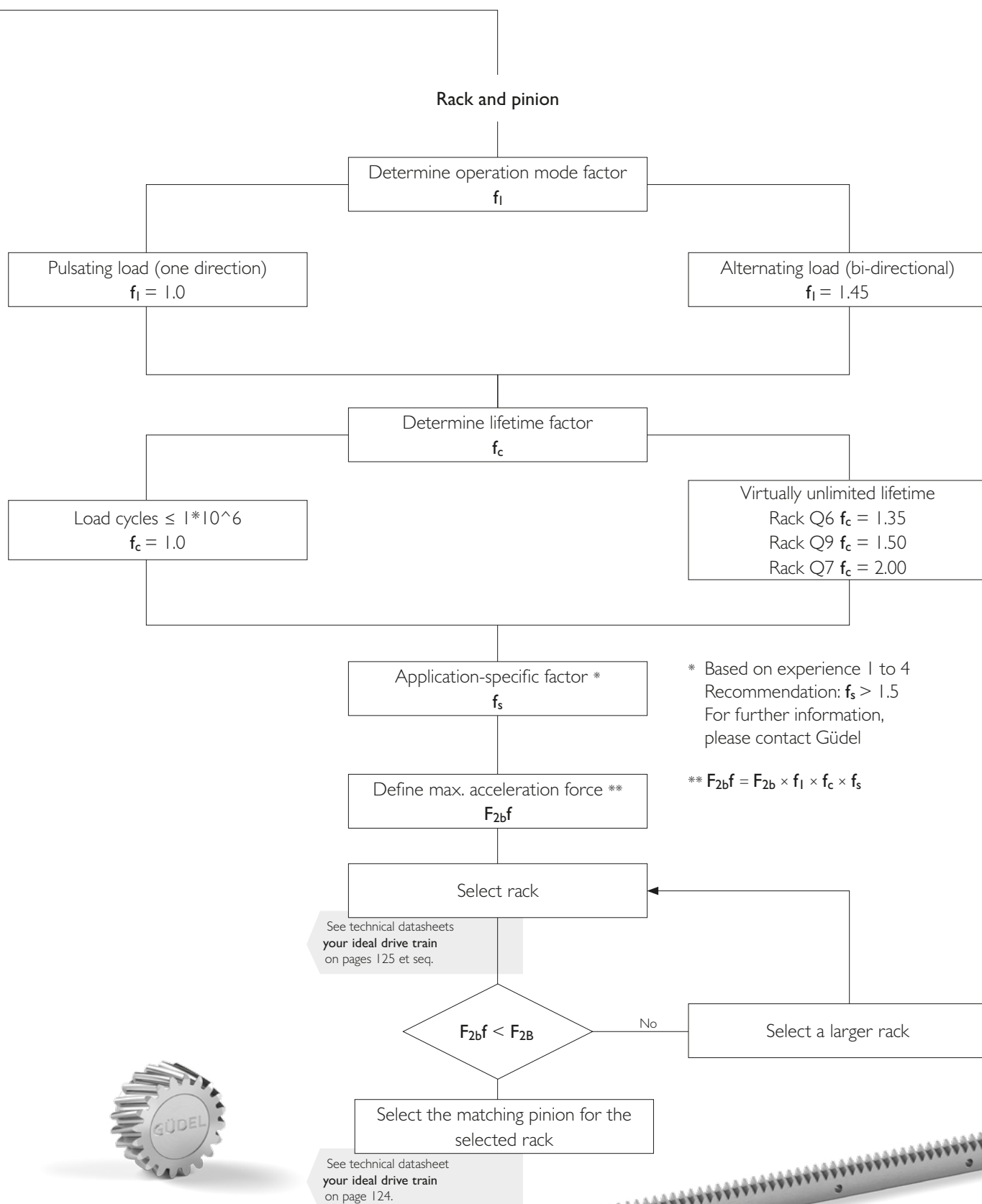
Board 2

Size	080	100	140	180	240
Max. motor weight	9.3	20	37	74	150

Calculate your ideal drive train



Function package selection





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GÜDEL

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