

**TNA / TNB**  
High Speed Gears

## TNA/TNB

The slide bearing gear units of the TNA/TNB types are the result of the continuous development of our range of high-speed propulsion components. The series – a very successful part of the RENK portfolio already since the mid 1980s – was comprehensively optimized in 2014.

Many years of experience and the employment of the most advanced design and analysis tools resulted in an optimized portfolio of high performance turbo gear units for a wide range of applications. Gear units of this series are available with center distances from 200 to 500 mm. With eight different sizes in each of the two design widths, the ideal gear unit can be selected for the specific application. As a rule, the TNA type is used for transmission ratios from 1 to 4, while the TNB type is chosen for transmission ratios from 4 to 8. But for customized designs, also higher ratios are possible. The gear units of the TNA/TNB types can be used to transmit power of up to 12 MW at speeds of as much as 25,000 rpm.

The gear teeth designed according to DIN, AGMA, ISO or API standards as required by the customer are case hardened and ground, and the teeth geometry is optimized for the respective application and running parameters.



For the shaft bearings, plain journal bearings in an offset design are used that are optimized to perfection. For higher speeds, tilting pad journal bearings are installed. For bearing the gear shaft, one plain journal bearing is additionally provided with axial stop collars as a standard. Optionally, a separate axial thrust bearing can be installed.

Dimensionally stable ribbed casings, optimized in terms of casting and manufacturing engineering and made of EN-GJL 250 ensure low vibrations and quiet running.

Apart from the standard installation, the gear units can also be installed with matching API 670 compliant radial and axial vibration absorbers at all bearing positions as well as casing vibration absorbers.

A rotor turning device is available in different sizes that can be fitted at the gear unit as an option to allow slow turning of steam or gas turbines during the warm-up or cooling-down phase.

For supplying surrounding drivetrain components with oil, a gear or screw pump that is mechanically driven by the free gear shaft end can be attached directly to the gear unit.

All gear units undergo a no-load trial run at operating speed. Parameters such as efficiency, noise performance, vibrations and the functioning of the lubricating system are thoroughly monitored and documented. If required, also a trial run at a load of up to 6.5 MW is possible without back-to-back setup.

## Rating design

For the rating design of the gear unit size, we need specific information on relevant service parameters. The more accurate and detailed information you provide, the better we can tailor the gear unit to your specific requirements. The gear units of the optimized TNA/TNB types are subject to a high degree of standardization. Some connection parameters have already been defined so as to ensure optimum costs. What is standardized and which options are available can be seen from Table 1.

For a specific inquiry, we would suggest you consider the following questions and points:

- For which application will the gear unit be used?
- What will be the drive and the driven components?
- Are any components provided with an axial bearing?
- What maximum power/torque will have to be transmitted?
- What speed will be required at the respective shaft end?
- What service factor do you desire? (Table 2)
- Are there any requirements/constraints as regards the available installation space?
- Are there any special ambient conditions to be observed (e.g. very low temperatures below -20°C)?
- Will a special coat of paint be required (e.g. for offshore applications or installation in aggressive atmospheres)?
- Do you wish to supply other components with oil by an oil pump that is mechanically driven by the gear unit?
- Which oil do you intend to use? Viscosity? Damage load stage (FZG)?

We shall gladly send you an inquiry form for you to complete so as to provide us with the information we need.

Service factors $S_f$			
Machine	Drive		
	Electric motor	Turbine	Combustion engine
<b>Fan</b>			
Radial	1.4	1.6	1.7
<b>Compressors</b>			
Radial	1.4	1.6	1.7
Axial	1.4	1.6	1.7
Rotating piston (axial, radial, screw, etc.)	1.7	1.7	2.0
Piston	2.0	2.0	2.3
<b>Fan</b>			
Radial	1.4	1.6	1.7
Compressed air	1.4	1.6	1.7
Forced draught	1.7	2.0	2.2
<b>Generators, exciters</b>			
Base load, continuous duty	1.1	1.1	1.3
Operation with peak loads	1.3	1.3	1.7
<b>Pumps</b>			
Radial (all, except those below)	1.3	1.5	1.7
Radial boiler feed pumps	1.7	2.0	-
Hot-oil radial boiler feed pumps for hot oil delivery	1.7	2.0	-
High-speed radial pumps above 3,600 rpm	1.7	2.0	-
Radial water pump	1.5	1.7	2.0
Rotational, axial flow pumps (all types)	1.5	1.5	1.8
Gear pumps	1.5	1.5	1.8
Piston pumps	2.0	2.0	2.3

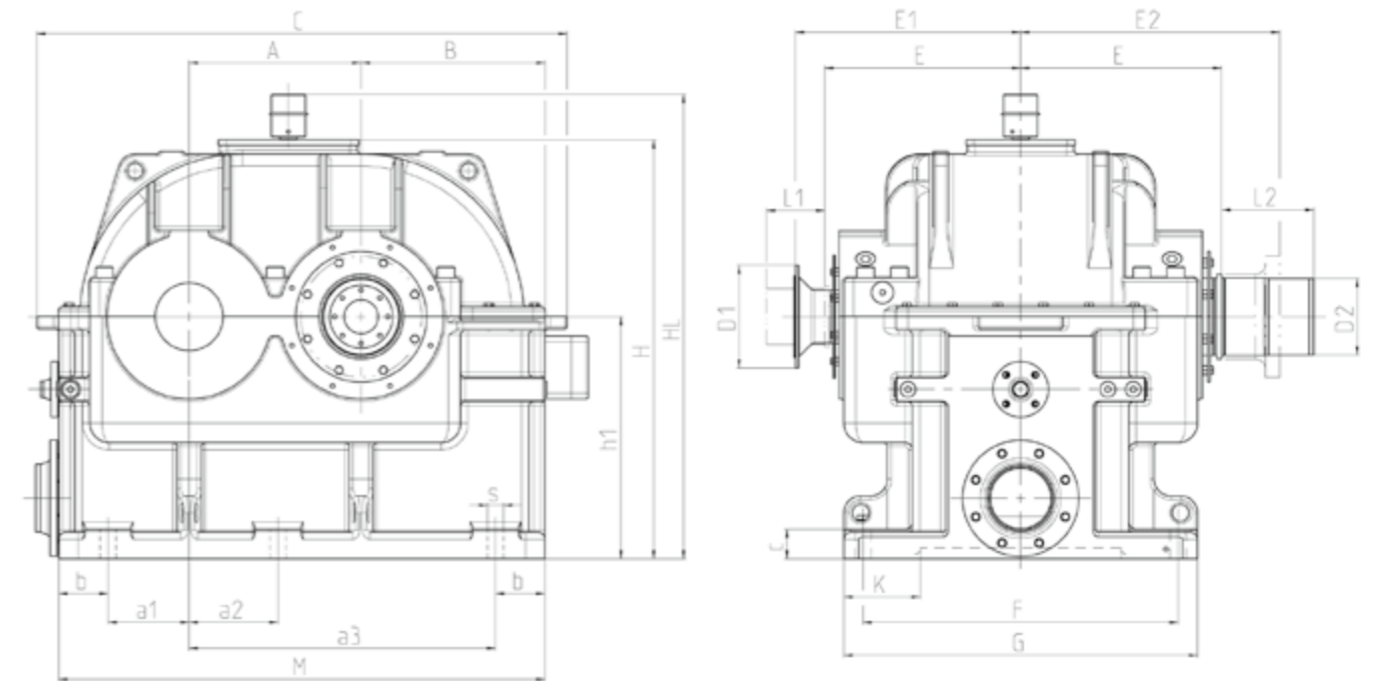
Table 2

# Technical design

	Standard	Option	Additional effort
<b>Design</b>			
DIN 3990	X		
AGMA 6011/ 421.06		X	
API 613		X	X
API 677		X	X
<b>Shaft arrangement</b>			
L - R	X		
R - L		X	
<b>Direction of rotation (view on shaft end face)</b>			
cw (clockwise)	X		
ccw (counter-clockwise)		X	
<b>High-speed shaft bearings</b>			
Hydrodynamic plain journal bearings	X		
Radial tilting pad bearings		X	X
<b>Low-speed shaft bearings</b>			
Combined radial/axial sliding bearings, type: tapered land TN 65133 / TN 65134	X		
Separate axial bearing in tilting pad design		X	X
<b>Oil ports feed (i) / return (o)</b>			
Casing side pinion shaft, SAE flanges	i / o		
Casing side gear shaft, SAE flanges		i / o	
Casing bottom, SAE hole pattern		- / o	
<b>Bearing temperature instrumentation</b>			
1x double PT100 each per radial bearing position	X		
1x double PT100 per axial bearing surface	X		
Temperature monitoring for special requirements		X	X
<b>Vibration monitoring instrumentation</b>			
2x connecting points for shaft vibration sensors per radial	X		
1x connecting point for casing vibration sensor	X		
2x shaft vibration sensors per radial bearing		X	X
Measurement of axial displacement		X	X
Key phasor		X	X
Equipment for special requirements		X	X
<b>Accessories/special requirements</b>			
Oil pump (attached directly on the shaft or driven via a pump gear set)		X	X
Electrical rotor turning gear		X	X
Manual turning option		X	X
Backstop		X	X
Full load trial run at up to 6.5 MW		X	X
<b>Equipment conforming to ATEX 94/9/EC</b>			
ATEX		X	X

Table 1

# Dimensions



Size	Type	Casing dimensions									Shaft dimensions						Bolts						
		A	B	C	G	H	H_L	M	c	h1	D1 <sub>max</sub>	L1	D2 <sub>max</sub>	L2	E	E1	E2	a1	a2	a3	F	S	Number of bolts
280	TNA	280	312	914	600	695	789	824	40	400	120	180	130	220	335	408	458	140	145	500	520	26	6
	TNB		337	899	510	719	813	809			95	160	105	180	290	348	388	107.5	162.5	532.5	450		
315	TNA	315	344		650	776	870		50	450	130	220	150	260	365	438	508	150	160	560	590	26	
	TNB		361	1000	560	791	885	910			105	180	120	180	315	388	428	120	170	590	500		
355	TNA	355	380		730	865	959		61	500	150	260	170	280	415	503	558	167.5	182.5	632.5	650	33	
	TNB		410	1095	620	881	975	1005			120	180	130	220	340	443	458	135	195	665	540		
400	TNA	400	427	1219	820	927	1021	1129	60	530	170	280	190	300	460	548	608	182.5	207.5	707.5	740	33	
	TNB		452	1200	640	953	1047	1110			120	180	150	220	360	453	508	147.5	222.5	742.5	560		
450	TNA	450	482	1364	900	1100	1194	1274	65	650	170	280	190	300	485	578	638	205	245	795	790	39	
	TNB			1334	700	1125	1219	1244			130	220	170	280	390	478	538	165	255	835	610		
500	TNA	500	525	1490	970	1200	1294	1400	70	710	190	300	220	320	535	613	708	240	290	890	860	39	
	TNB			1444	780	1230	1324	1354			150	220	190	300	430	518	578	195	200	935	690		

We reserve the right to changes made in the interests of technical improvement.

# RENK Propulsion Technology from Rheine

**RENK: the name for propulsion technology. RENK AG ranks among the world's foremost manufacturers of propulsion components and test systems. In tracked vehicle transmissions, slide bearings and naval gear units, RENK is world market leader.**



*The Rheine plant's state-of-the-art manufacturing equipment, generous workshop architecture and sophisticated logistics ensure optimum processing of all products.*

Underpinning this success are more than 140 years of experience and development work in propulsion technology and the combined capabilities of more than 2,200 employees worldwide who with vast commitment, creativity and attention to detail ensure that RENK AG is able to uphold and further expand its leadership in various markets.

The RENK plant in Rheine specializes in the production of gear units and couplings of different designs. Over 480 employees develop and manufacture a wide range of all-steel couplings as well as gear units for tankers, container ships and ferries, high-speed turbo gear units for industrial plants and gear units for offshore wind turbines in a power range of 5 MW and higher.

For decades, RENK has been one of the leading manufacturers of turbo gear units. The superior quality of the products is supported by the most advanced computer-aided design and manufacturing (CAD/CAM).

The proven high-speed turbo gear unit series TS, TB and TL with steel casing and TCS, TNA/TNB with cast iron casing are used in the energy, oil and gas sectors as well as in all other industries to transmit power with a simultaneous change in speed. The current range covers powers of up to 80 MW and speeds of as much as 55,000 rpm.

Uncompromising quality – that applies to everything we do: from the first planning meeting to product development, manufacturing and quality control.

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