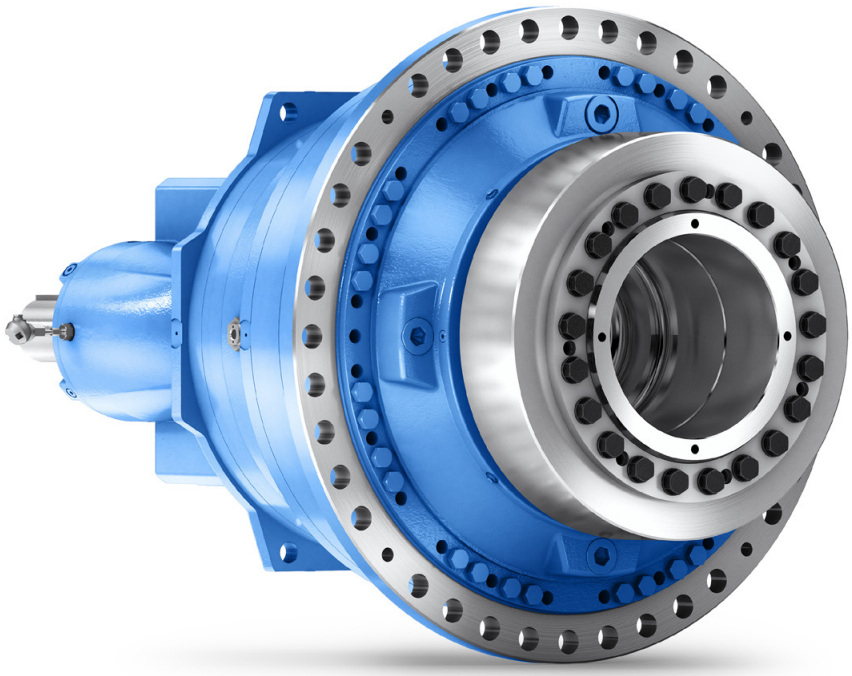
FLENDER GEAR UNIT
CATALOG **FLE 20.3**
EDITION 2020 EN



PLANETARY GEAR UNITS
PLANUREX 3

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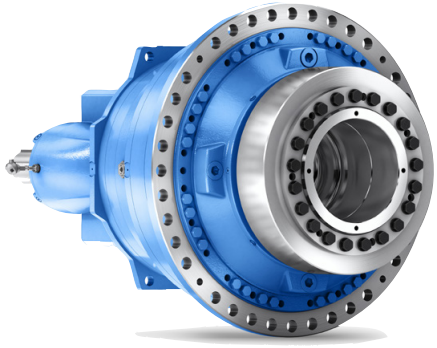
PLANETARY GEAR UNITS PLANUREX 3



Catalog FLE 20.3 Edition 2020 EN

The products and systems described in this catalog are manufactured/distributed under application of a certified quality management system in accordance with DIN EN ISO 9001 (Certified Registration No. 01 100 000708). The certificate is recognized by all IQNet countries.

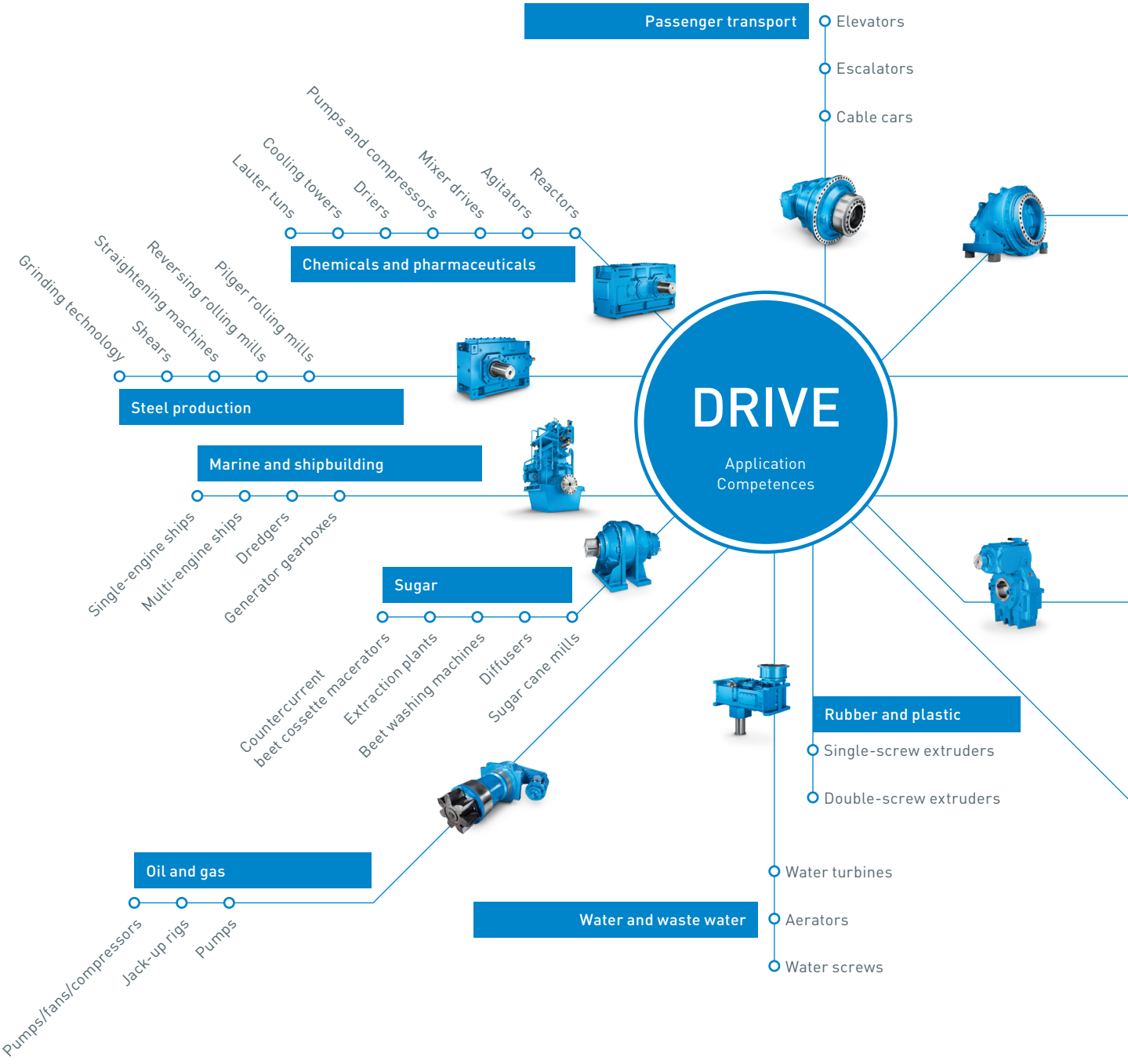
Competence	Benefit from good advice through interdisciplinary know-how.
Availability	We are there whenever and wherever you need us.
Maximum performance	The largest applications in the world are driven by us.
Quality	We see your most stringent demands as our duty.
Responsibility	You can expect commitment and trustworthiness from us.
Experience	Rely on modern thinking based on decades of experience.
Innovation	We are always thinking ahead. The goal: Your perfect solution.
Digitalization	The path to the right solution leads through information.
Reliability	You can rely on our products, as well as on us.
Flexibility	We are flexible in all of our processes.
Reliable partner	You can trust our products, our company, and us.

WE **MOVE** the WORLD

Flender stands for comprehensive knowledge of all aspects of mechanical drive technology and for maximum quality of products and services. For us, highly qualified and engaged employees have always been the key to innovative energy and performance capability. But they are also the basis for our special competence in consulting, which is supported by an almost unlimited range of products. Thanks to our comprehensive application know-how and decades of experience in many industries and in the acquisition of raw materials, we are able to competently advise our customers with an eye on their individual requirements.

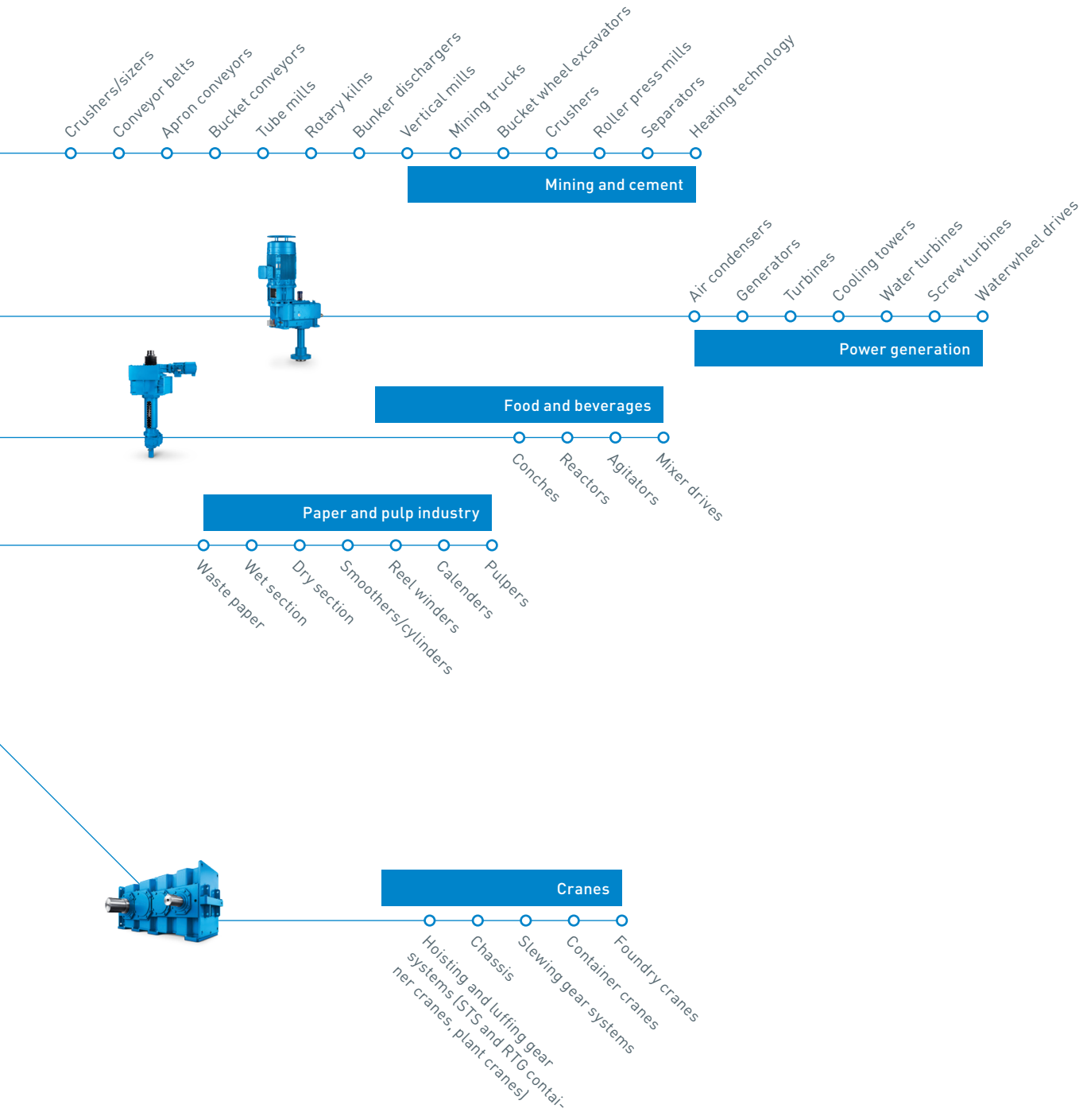
Our customers regard Flender as a reliable, investment-safe partner. All of our business relationships are based on trust, responsibility and traditional business ethics. In this spirit, together with our customers, we look forward to writing a new chapter in the history of Flender.

MILLIONS OF APPLICATIONS, **ONE CONCLUSION:** ABSOLUTE RELIABILITY.



The drive technology of Flender is simply reliable. This is verified by reference projects from all industries around the entire world in which our gear units have often been running reliably for many decades. In many applications, our components and systems ensure unflagging continuous operation.

Flender stands for reliable drives and efficient production, for available systems and stabile processes, for dependable partnership and competent consulting, for responsible acting and sustainable thinking. This is our aspiration.

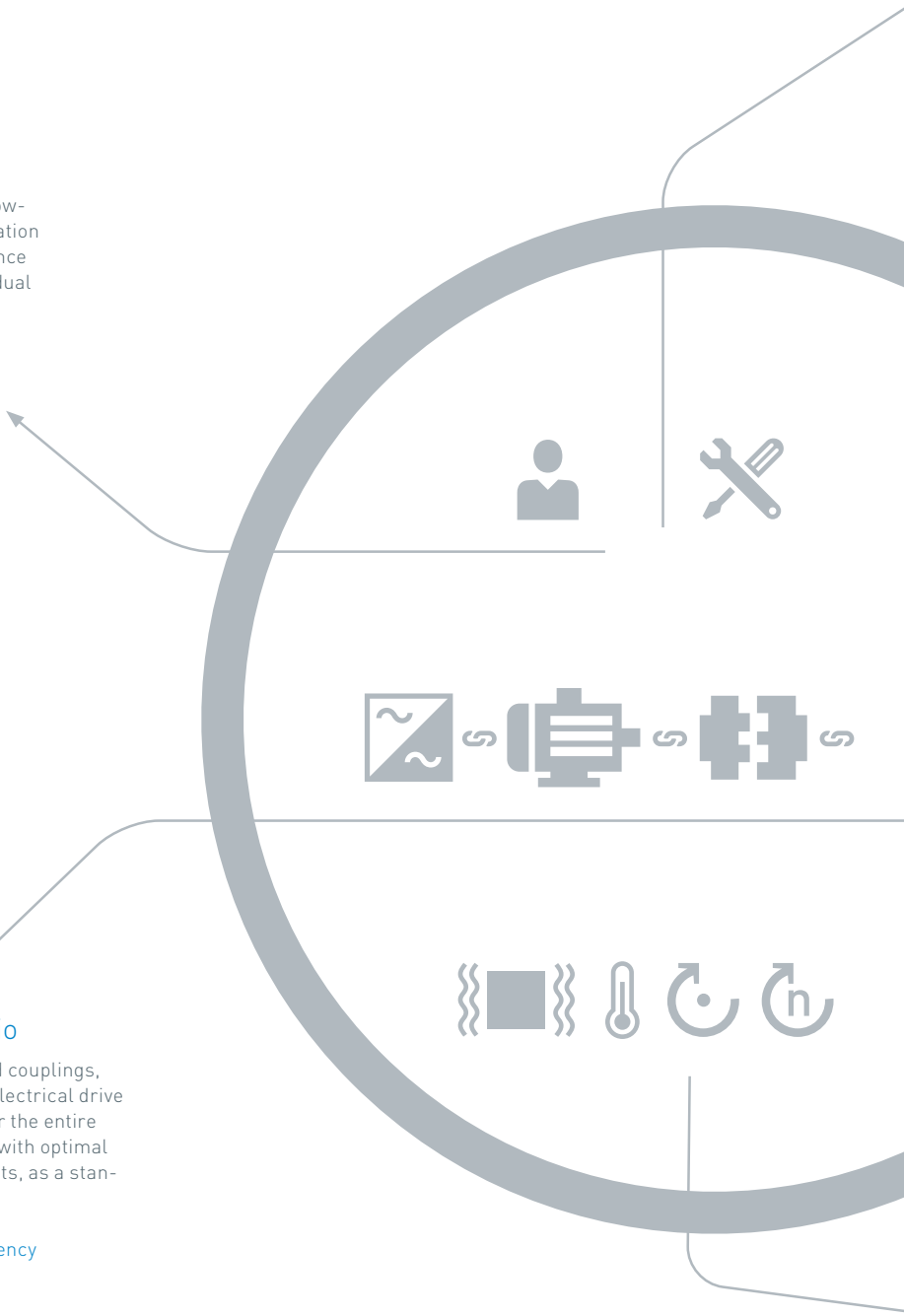


Flender's system competence turns first-class components into systems with tangible added value. Drive systems from Flender ensure maximum productivity, energy efficiency and reliability in any automation environment.

Consultation

Our customers use our interdisciplinary know-how, our application competence, our innovation strength and, last but not least, our experience to find the right drive system for their individual requirements.

Reduced engineering time, lower costs



Integrated drive portfolio

We not only provide gear units and couplings, but also have the competence in electrical drive technology that enables us to offer the entire drive train – perfectly integrated, with optimal interaction between all components, as a standard or individual solution.

Fewer interface risks, more efficiency

INDIVIDUAL SOLUTIONS.

We have the right solution for you, even if your requirements are special. We no longer have to newly develop every special solution. Many solutions are already available.

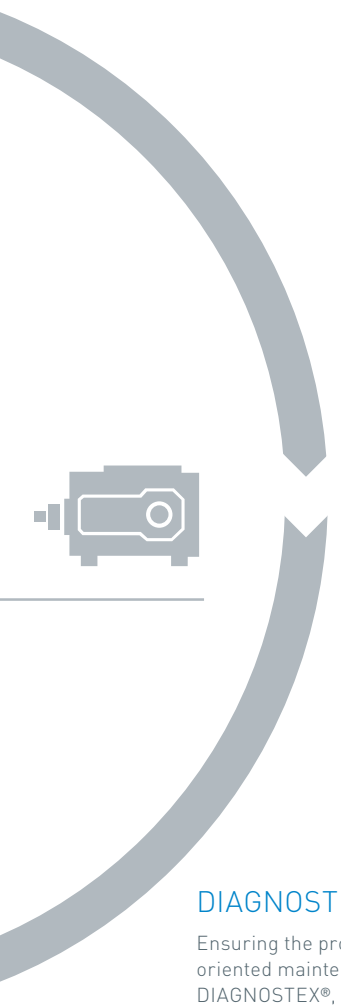
At **flender.com**, we provide application-specific solutions for your special requirements.

Use our online configurator, which allows you to create tailored product combinations.

Flender service

From diagnostics and support, replacement part and repair services, all the way to maintenance and retrofit services – the Flender service portfolio creates individual solutions, fully and completely tailored to the needs of our customers. In this way, a gear unit remains an original Flender gear unit.

Increased system availability, reduced lifecycle costs



DIAGNOSTEX

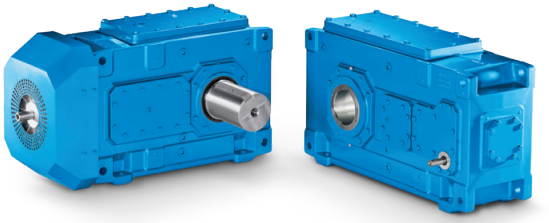
Ensuring the process stability requires status-oriented maintenance of the drive train. With DIAGNOSTEX®, sensors measure deviations of our gear units from the target status. These can be analyzed and evaluated in terms of maximized system availability.

Industrie 4.0, reduced costs

THE RIGHT GEAR UNIT SOLUTION FOR ANY REQUIREMENT

We provide helical and planetary gear units made up of standard modules or as a complete application solution.

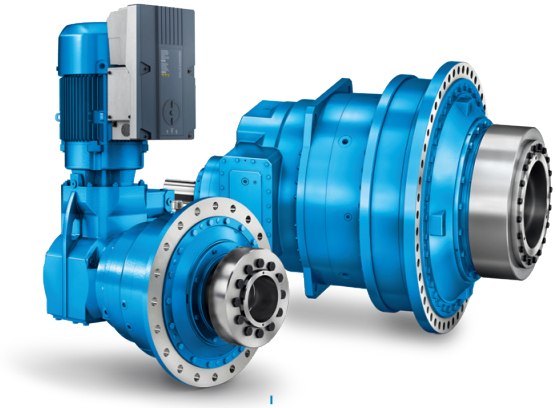
Helical and planetary gear units from Flender are modern drive solutions that satisfy the most varying and extreme demands, day after day and year after year. For decades, plant operators have been achieving high system reliability and low lifecycle costs in every conceivable industry with our helical gear units.



Helical and bevel helical gear units

Flender helical and bevel helical gear units are by far the most comprehensive range of industrial gear units in the world. It ranges from a multi-faceted universal gear unit portfolio and application-specific gear units to customer-specific solutions.

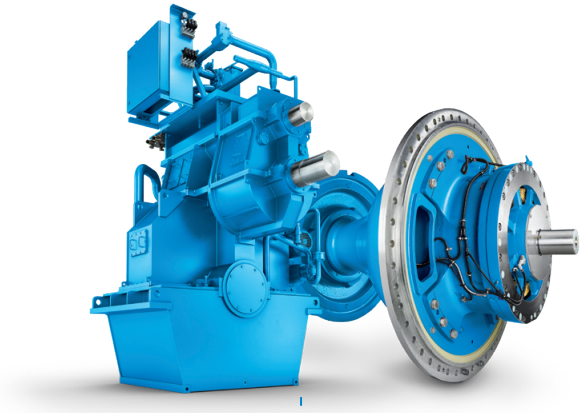
Nominal output torque: 3,300 Nm ... 1,400,000 Nm



Planetary gear units

With Flender planetary gear units, we provide a range of durable, reliable and finely graduated gear unit solutions. The series wins customers over due to its highly integrated planetary geared motor and maximum conformity with all international motor standards. It also brings quality and performance in a good ratio of lifecycle costs to price.

Nominal output torque: 10,000 Nm ... 5,450,000 Nm



Application-specific gear units

With application-specific gear units, Flender provides by far the most application solutions and thus covers nearly every drive-related need from hundreds of applications in industry and the acquisition of raw materials.

Nominal output torque: Up to 10,000,000 Nm

Customer-specific designs

Our experts are available at any time for special requirements during the development of new products. From designing and simulating complex drive solutions to implementing them, we work together with you to resolve multi-layered tasks.

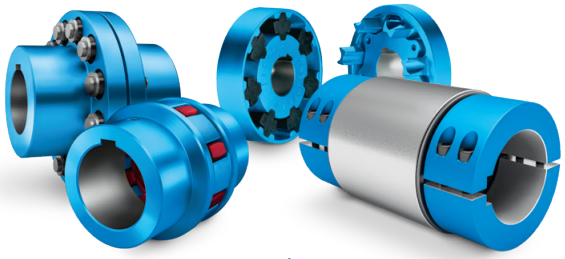
THE PERFECT COUPLING FOR THE PERFECT GEAR UNIT

We provide elastic, highly elastic, rigid and hydrodynamic solutions.

Regardless of which demands are made on the coupling: Low or high performance, demanding operating conditions or high ambient temperatures, dusty or hazardous environments – we have the right portfolio. Our comprehensive range of couplings offers a large number of sizes and designs with a torque range from 0.5 to 10,000,000 Nm.

In over 90 years of development, conception and production, our product portfolio has grown to its current level of diversity. Nearly every matured coupling solution is available as a standard item in our modular system. This saves our customers time and money.

We are a powerful and flexible player in every market in the world – just like our customers. The production of our coupling components aims for maximum quality. As a trio, the setup, material and design result in optimal coupling solutions – rugged, dependable, largely low-maintenance and, above all, available at any time, anywhere. We provide high quality, first class delivery performance, and comprehensive service.



Flexible couplings

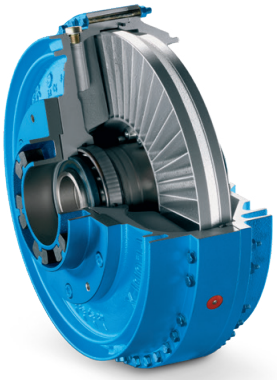
Our elastic couplings are pluggable and easy to install. The elastomer element equalizes the shaft offset and absorbs impacts from the motor or driven machine.

Nominal output torque: 12 Nm ... 1,300,000 Nm

Torsionally rigid couplings

Our compact steel couplings provide extremely precise transmission of high torques, especially in harsh operating conditions and extreme temperatures.

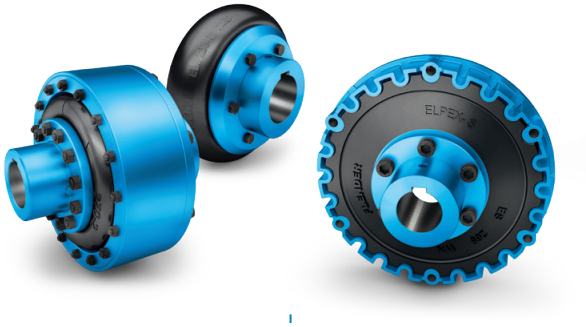
Nominal output torque: 92 Nm ... 7,200,000 Nm



Hydrodynamic couplings

Soft start, overload protection, torsional vibration damping – FLUDEX® fluid couplings allow the torque-limited approach and have very little slippage at rated load.

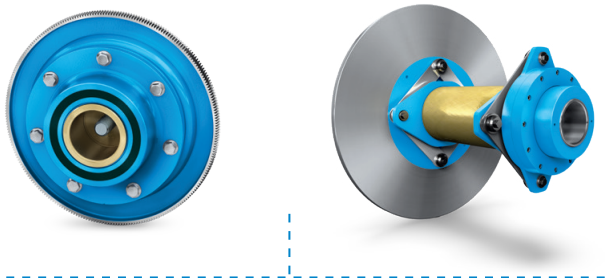
Power: 1.2 kW ... 2,500 kW



Highly-flexible couplings

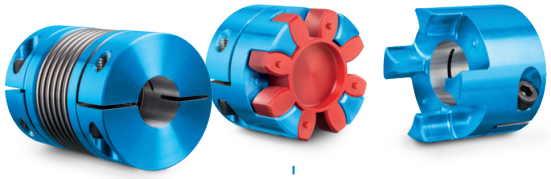
Highly flexible couplings are well-suited for connecting machines that operate asymmetrically. They are preferred for use in systems that are periodically operated.

Nominal output torque: 24 Nm ... 90,000 Nm



Application-specific couplings

Flender offers a variety of application-specific couplings for rail vehicles and use in wind energy generation.



Backlash-free couplings

Our couplings act as a modular interface between the motor and the work machine to ensure reliable, backlash-free power transmission in servodrives and positioning drives.

Nominal output torque: 0.1 Nm ... 5,000 Nm

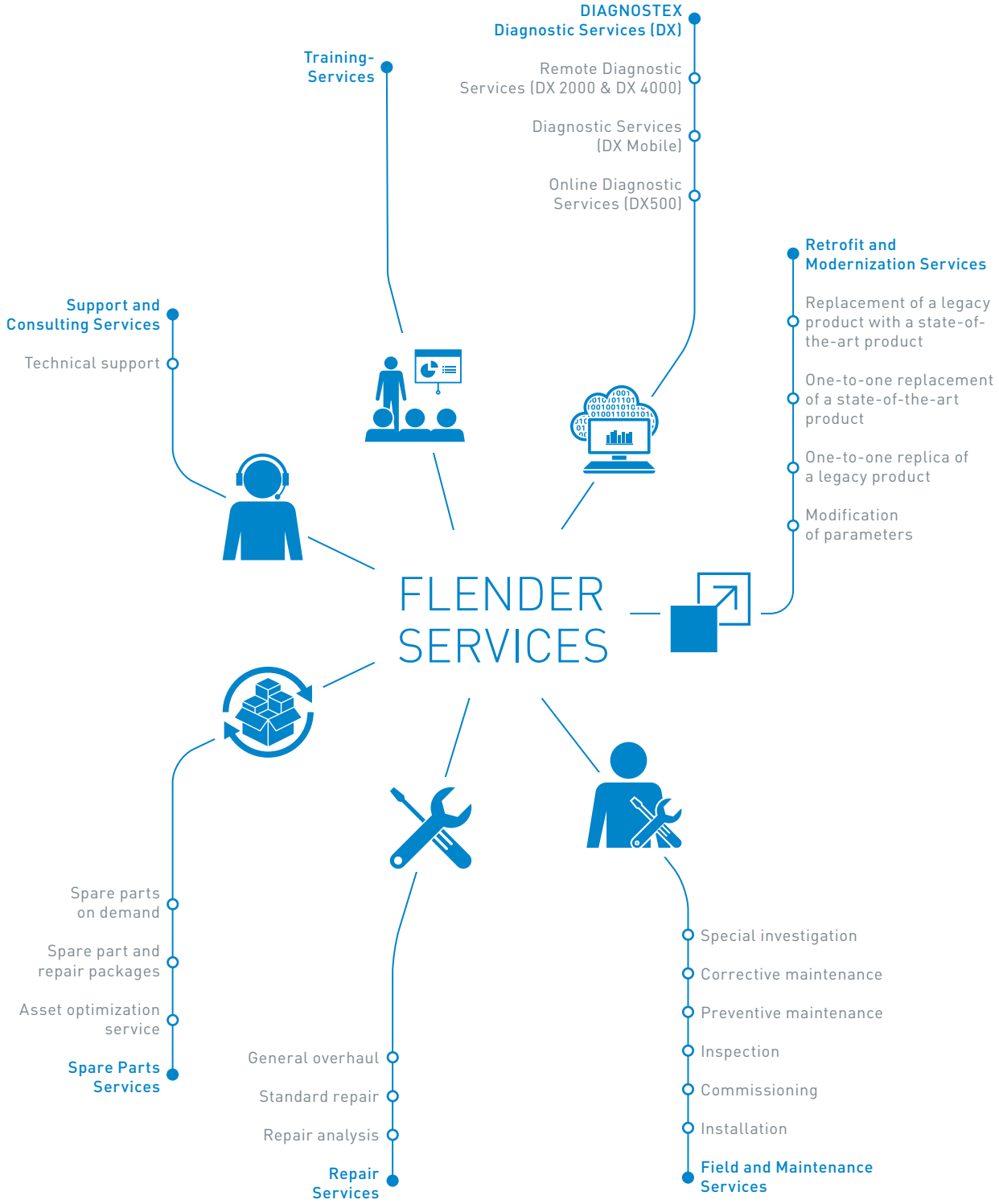
AN ORIGINAL FOR THE LONG TERM WITH ORIGINAL FLENDER SERVICES

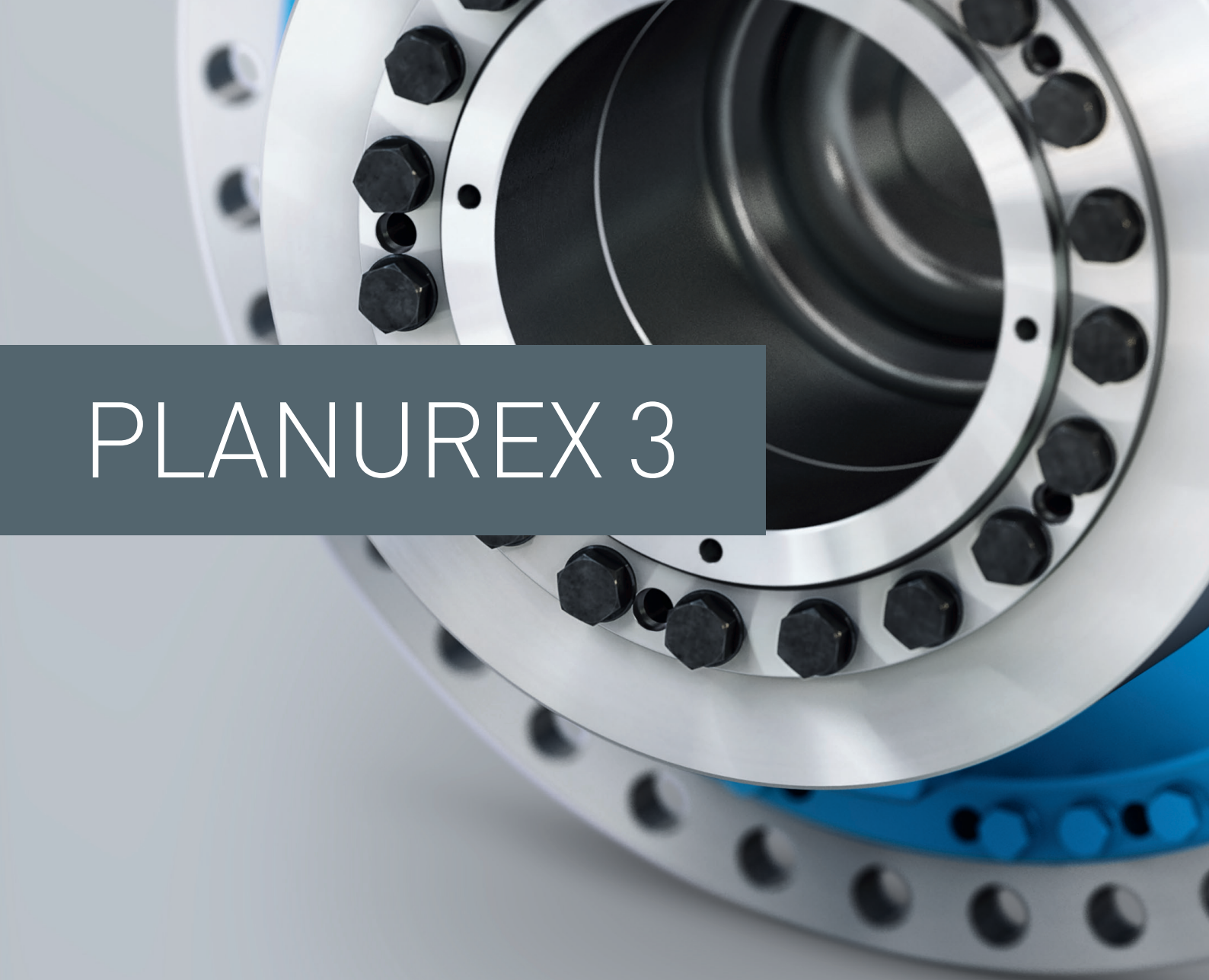
Ever increasing requirements make it more and more important for industrial plants to work with maximum productivity and efficiency. Flender Services give companies a decisive advantage over the competition in industry, the acquisition of raw materials and energy production. In view of the high cost pressure, increasing energy prices and stricter and stricter environmental stipulations, our services are becoming a decisive factor to success over the competition.

Enjoy the support of our service experts, from planning, development and operation to the modernization of your plant and benefit from our experience and in-depth know-how of your application – in more than 100 countries, seven days a week, 24 hours a day.

Reduce standstills, minimize downtimes due to failure, and increase the productivity, flexibility and cost efficiency of your plant.

OUR OFFER FOR GEAR UNITS AND COUPLINGS AT A GLANCE.



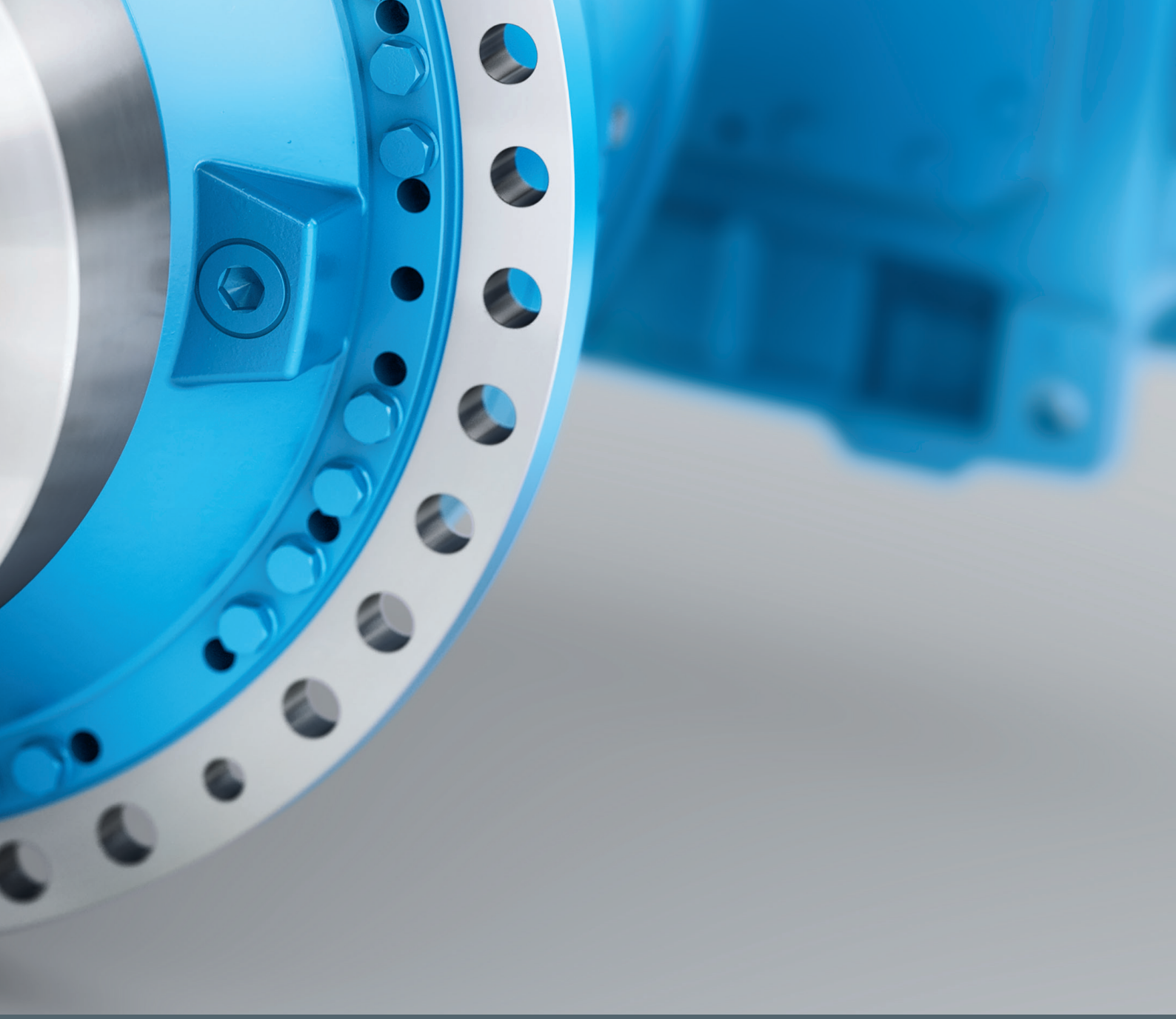


PLANUREX 3

EXTREMELY STRONG.

EXTREMELY COMPACT.

EXTREMELY EFFICIENT.

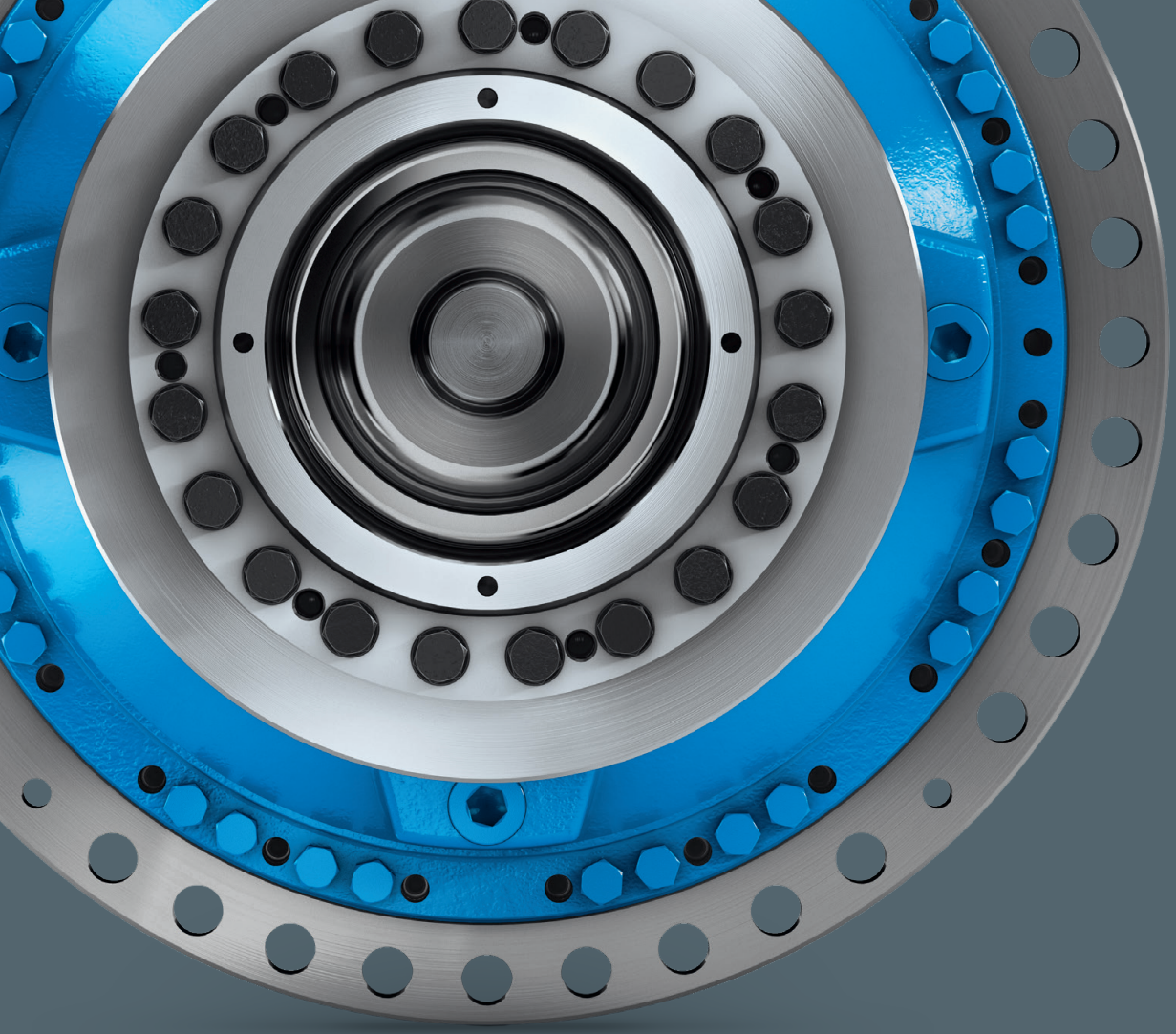


With PLANUREX® 3, you benefit from high efficiency. Rely on a very high power density and exploit the design options provided by the exceedingly compact PLANUREX 3 gear unit. Save installation space, material and costs.

The series' harmonically spaced torque steps avoid an oversized design, ensure that the solution is very close to the operating point of your application and make it easier to select the most suitable gear unit solution.

3-D design with FEM is a matter of course. At least with PLANUREX 3. Use our data when designing your plant and profit from maximum flexibility.

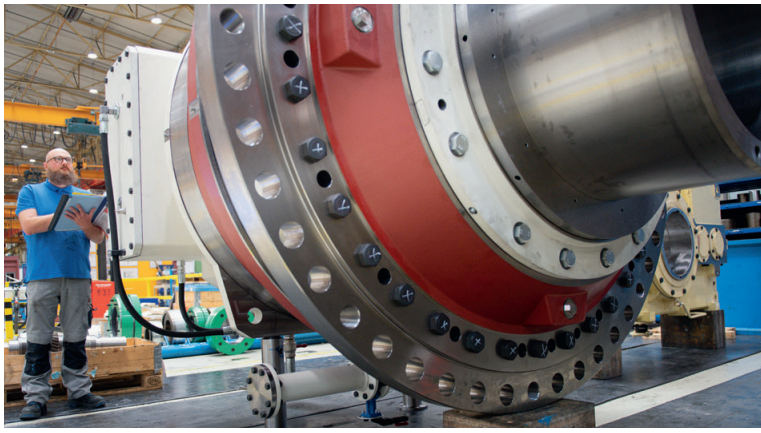
Compact gear units allow smaller and more economical driven machines and drive motors to be used. The rolling bearings on the input and output shafts are protected by high-performance seals as standard in order to achieve maximum plant availability in conjunction with low maintenance costs.



WITH PLANUREX 3, WE ARE REDEFINING YOUR EXPECTATIONS OF GEAR UNITS.

PREMIUM PLANETARY GEAR UNITS.

In the world of drive systems, the word "premium" has many facets. These result from your expectations of the product and how they are met. With the PLANUREX 3 series, we have redefined these expectations. PLANUREX 3 represents a new generation of premium planetary gear units that have extremely high power capacity, can be used in many applications and are setting new benchmarks in terms of quality, flexibility and ease of use. Only when you have the optimum version of everything can it be considered a premium gear unit.



Premium quality

How significant are system component reliability and durability to you in an industrial environment that primarily expects dependability from you?

PLANUREX 3 was designed using the latest methods based on many years of experience in the field. Manufactured according to the most advanced techniques, it hits the sweet spot in the area of interplay among power capacity, system availability and costs.

Premium expertise

How important is consultation expertise to you when it comes to quickly finding the right drive solution for your application?

No matter if it's about project planning, construction, optimization or replacement – a customer relationship only works well over the long term when we cooperate as equal partners.

Premium availability

What does global availability of drive components and service mean for plant constructors and operators?

Drive solutions that are available quickly due to international expertise in design, manufacturing and service ensure planning reliability and flexibility above all.

Premium standard

How important is highly precise design to you in a drive solution?

A standardized gear unit series in fine size increments enables you to use the optimum gear size for your application.

Specialization

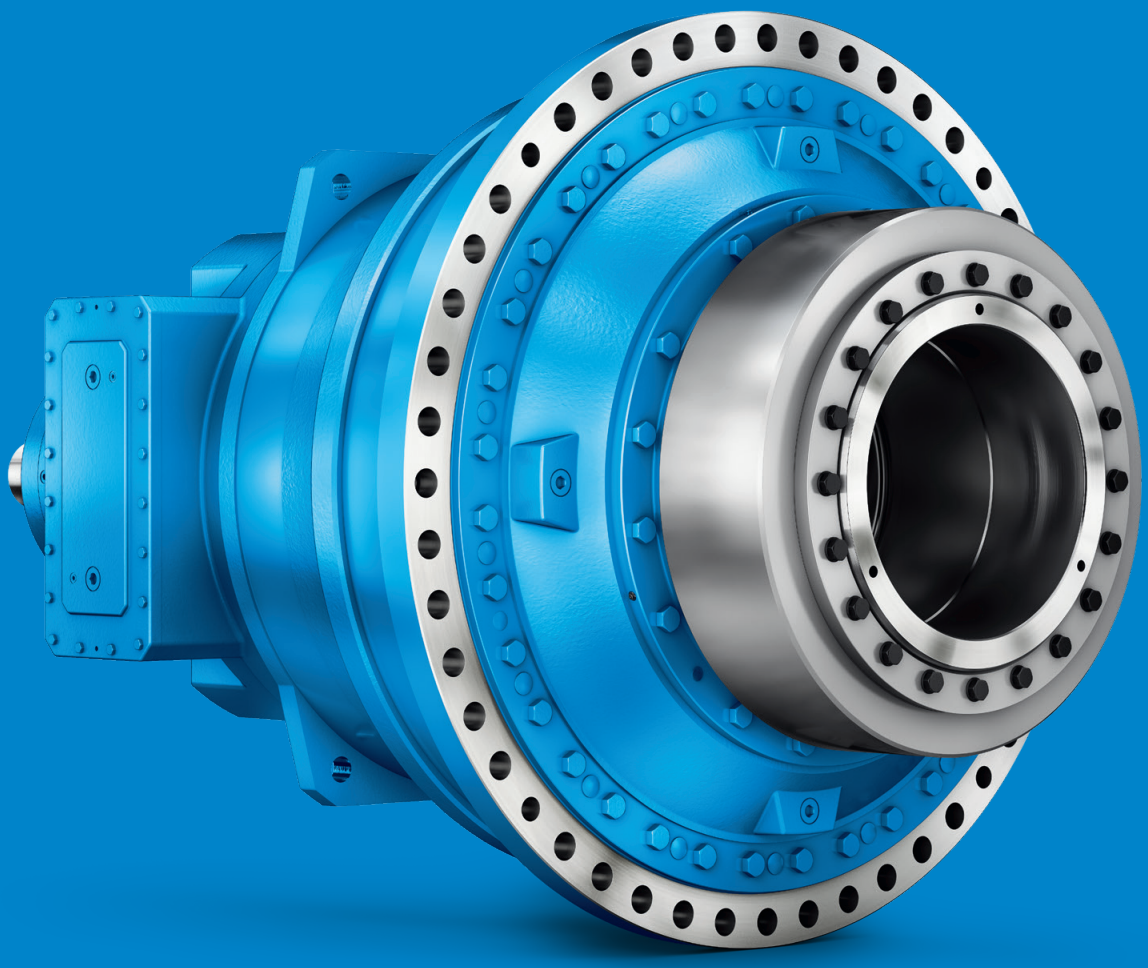
What degree of specialization can you expect from a premium gear unit?

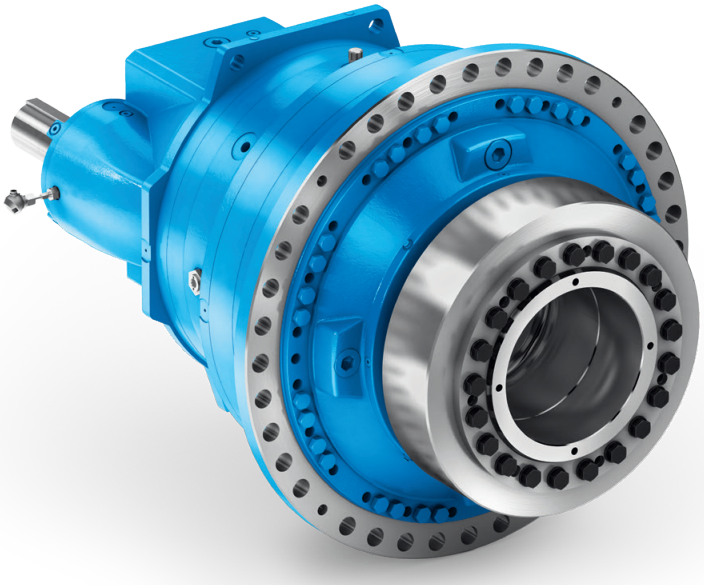
Even if you have highly specialized requirements, we have the right solution for you. We no longer have to develop each special solution from scratch. We have most of them already.

PLANUREX 3 AT A GLANCE.

With PLANUREX 3, Flender provides a gear unit series that features highly coordinated size increments. As a leading manufacturer, we can provide the optimum solution for you from our standard range.

We use state-of-the-art manufacturing technologies and top-quality materials, and we have a quality assurance system certified in accordance with ISO 9001 and 14001. The quality factor ensures greater output and provides a feeling of security.





YOUR BENEFITS

- **Space-saving installation** due to the highest power capacity: compact, light, powerful
- **Low running costs and high efficiency** due to optimized gear geometries and the high level of manufacturing quality
- **Process stability** due to high overload capacity, the highest quality and reliability
- **Investment security and convenience** thanks to a drive concept from a single source
- **Versatility** due to many sizes in coordinated increments close to the desired torque and a wide variety of combination options in the modular system
- **First-class engineering** due to 3-D design with FEM
- **High level of plant availability** through the use of high-performance seals as standard
- **Long service life** through application-oriented design and top-class quality
- **Maximization of plant availability** through optionally integrated Flender measuring systems

At **flender.com**, you will find the right product to meet your requirements. Have a look at the various solution options presented and then select the product that best meets your needs.

If desired, specify further product options to create your customized solution.

PLANUREX 3 MEANS DIVERSITY.

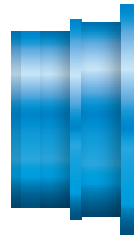
INPUT STAGES

Planetary stage

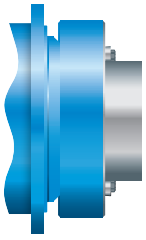
Helical gear stage

Bevel-helical gear stage

BASE GEAR UNIT

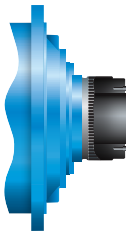


OUTPUT VARIANTS

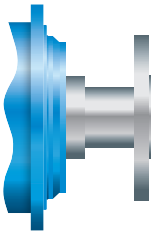


Hollow shaft for shrink disk

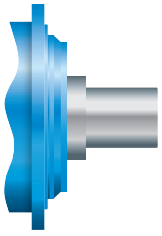
Hollow shaft with internal involute spline



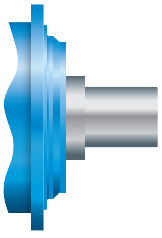
Hollow shaft with external involute spline



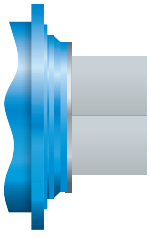
Flanged shaft



Solid shaft with parallel keyways



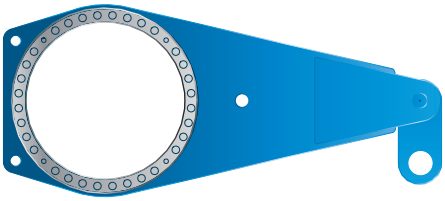
Solid shaft



Square shaft

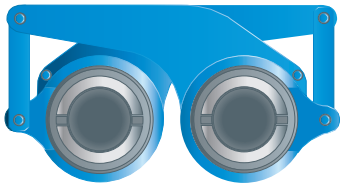
THOROUGHLY CONSIDERED MECHANICAL DRIVE TECHNOLOGY

We offer seamless systems technology with bevel gear sets and oil supply systems, swing bases and torque arms, hoods, motor bell housings, couplings and any other required add-on parts.

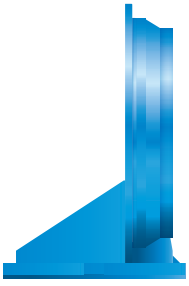


Torque arm

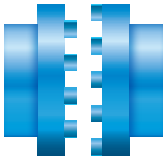
Torsion shaft support



Support – Chun version

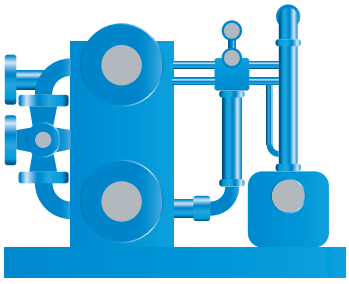


Gear unit base



Coupling

Motor bell housing

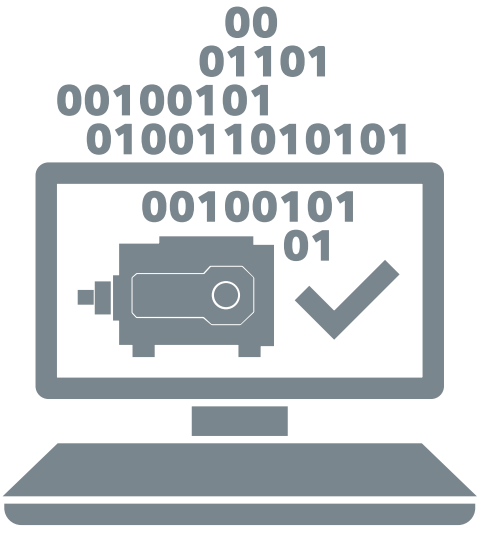


Oil supply system

Flender has been a partner to industries and has known the customers and their markets for decades already. Right from the start, we consistently used information gained from practice in order to keep developing our modular gear unit building blocks. Today, Flender offers you by far the largest number of application-specific solutions for industry and raw material extraction. For many applications, the solutions offered consist of established, standardized components. In the very rare cases in which we cannot offer a solution based on our modular system, we can also create customer-specific solutions. We provide a solution for any drive function and develop something new that is not featured in the catalog – customer-oriented, with expertise and high quality.

GEAR UNITS IN FOCUS, PROCESSES UNDER CONTROL.

In DIAGNOSTEX® sensors measure deviations from the target state of our gear units, allowing them to be analyzed and evaluated in order to achieve maximum plant availability.



DIAGNOSTEX is the next step towards the digital future of drive technology. DIAGNOSTEX makes our gear units digital – indeed, it practically brings them to life! – by enabling them to feel pain.

This property opens up entirely new horizons for the preventive maintenance of our mechanical drive technology. Suddenly, it becomes possible to install an effective diagnostics system and receive precise information from gear unit experts regarding the early detection of damage via remote service.

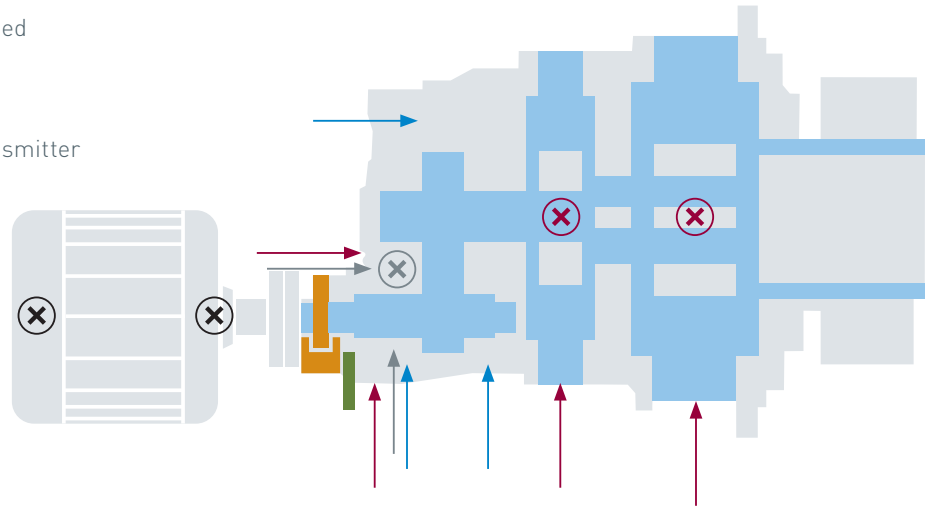
The necessary measures can be taken in good time and the planning of our services improved. In conjunction with an optimized spare-parts management, maintenance costs are reduced to an absolute minimum and gear unit failures are virtually eliminated.

DX Mobile Services offer a flexible and cost-effective solution for all PLANUREX 3 gear units.

SENSOR CONFIGURATION BASED ON PLANUREX 3 P3DH

- 6 x acceleration for gear units
- 2 x acceleration for motors
- 3 x temperature sensor
- 1 x rotational speed
- 1 x torque
- 3 x vibration transmitter

DIAGNOSTEX enables a large number of measuring points to be used for diagnostics. The scope of diagnosis must always be determined on a case-specific basis.

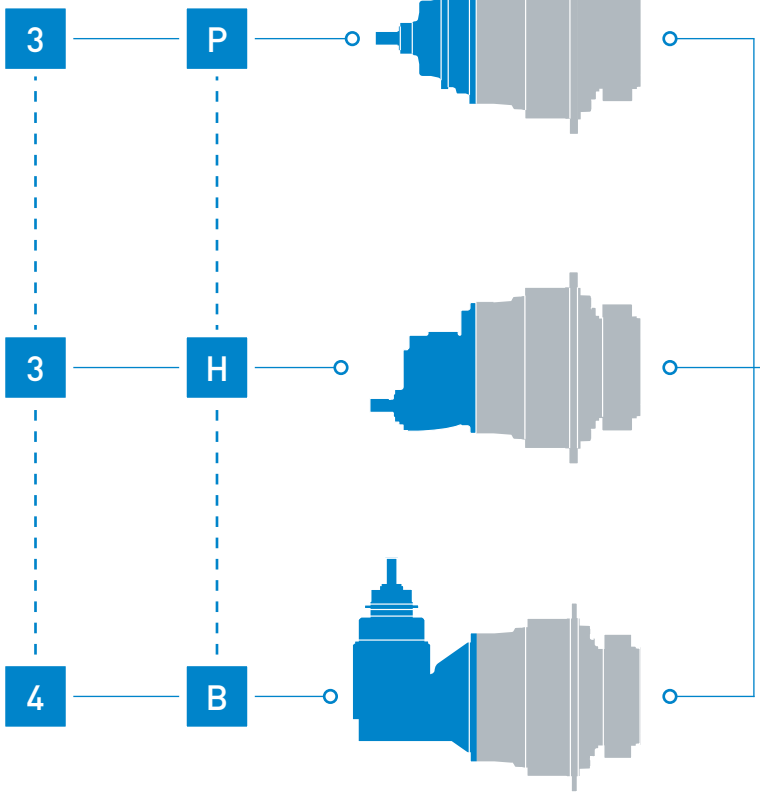


PLANUREX 3 DESIGNATION SYSTEM

1 BASIC GEAR UNIT

Planetary Gear Units
Output stage
Planetary stage

INPUT STAGES



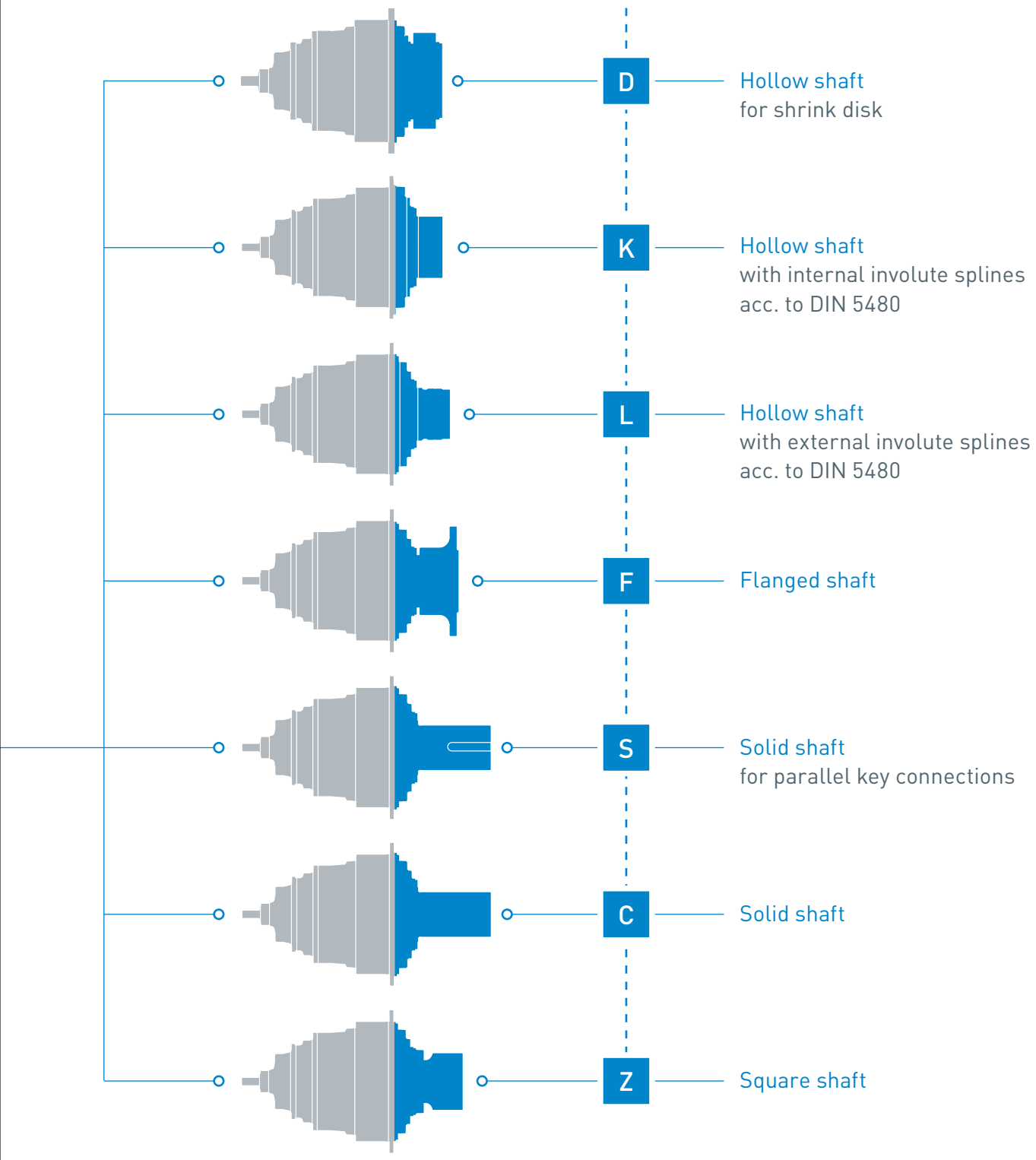
Planetary stage
Total number of gear stages: 3

Helical stage
Total number of gear stages: 3

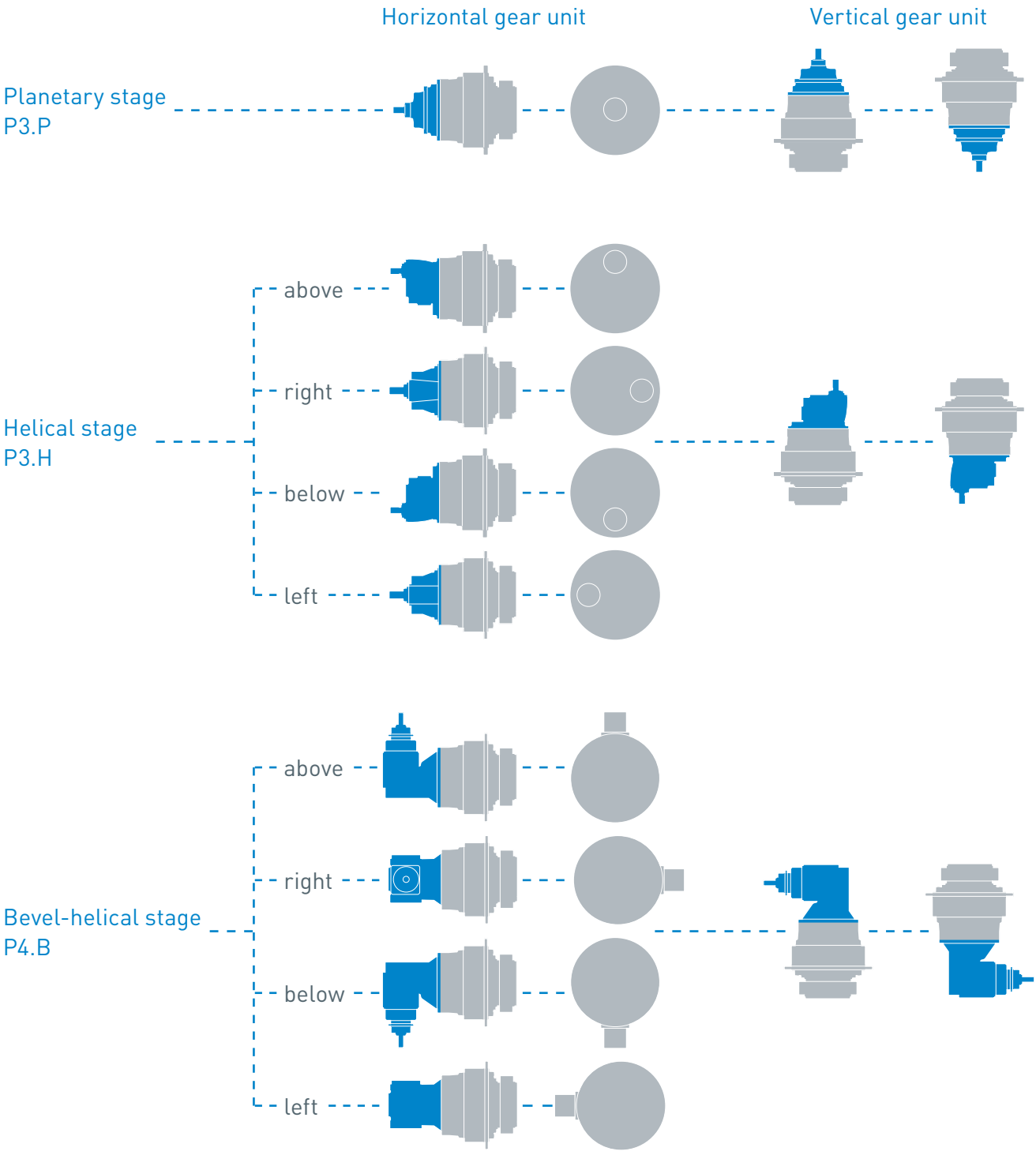
Bevel-helical stage
Total number of gear stages: 4

OUTPUT VARIANTS

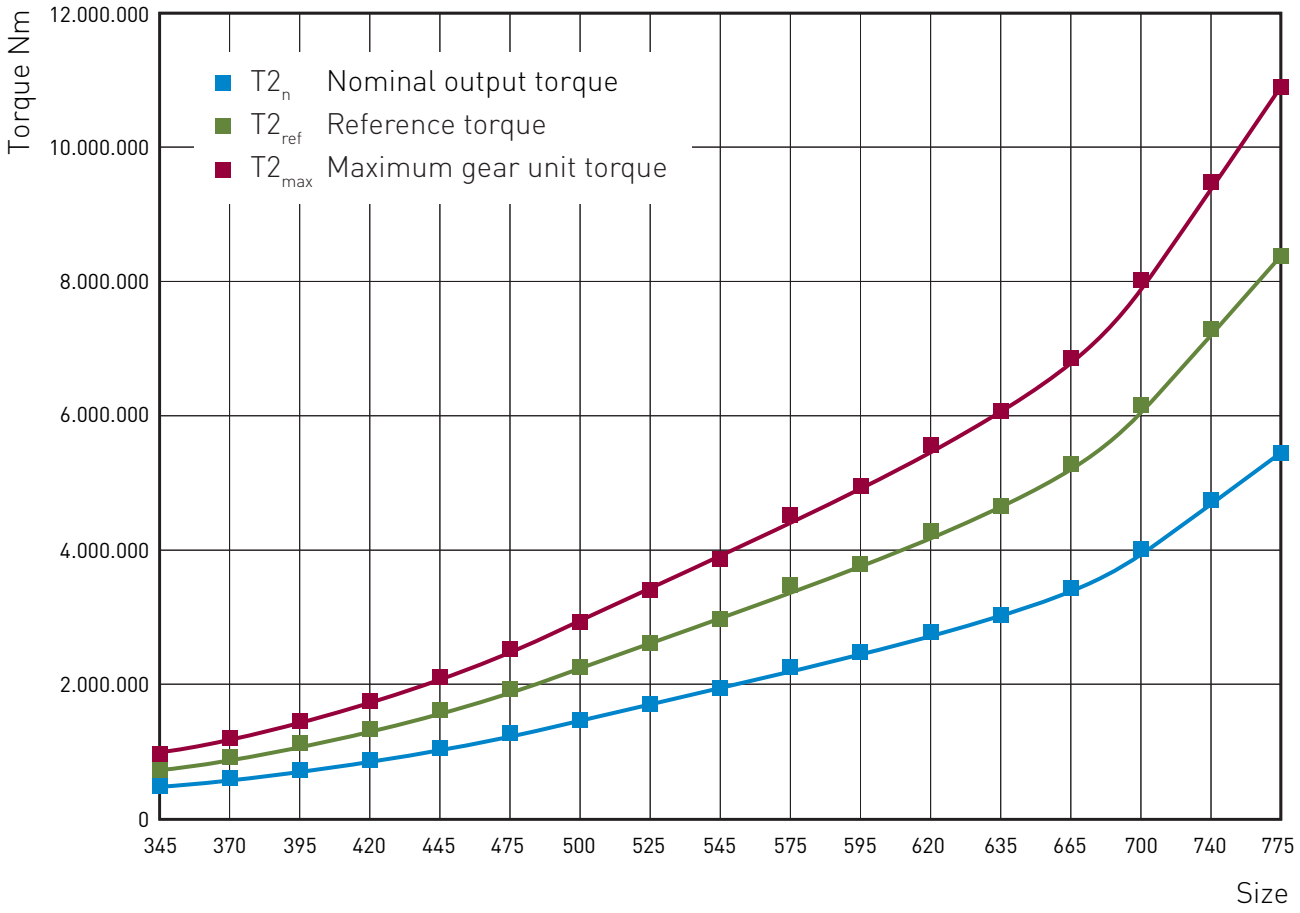
P 3 [ ] P



POSSIBLE SHAFT POSITIONS



TORQUES



Size	$T2_n$ Nm	$T2_{ref}$ Nm	$T2_{max}$ Nm
345	480,000	735,000	960,000
370	600,000	920,000	1,200,000
395	725,000	1,115,000	1,450,000
420	870,000	1,335,000	1,740,000
445	1,050,000	1,615,000	2,100,000
475	1,260,000	1,935,000	2,520,000
500	1,465,000	2,250,000	2,930,000
525	1,700,000	2,615,000	3,400,000
545	1,930,000	2,965,000	3,860,000
575	2,260,000	3,475,000	4,520,000
595	2,470,000	3,800,000	4,940,000
620	2,780,000	4,275,000	5,560,000
635	3,030,000	4,660,000	6,060,000
665	3,430,000	5,275,000	6,860,000
700	4,010,000	6,165,000	8,020,000
740	4,740,000	7,290,000	9,480,000
775	5,450,000	8,380,000	10,900,000

$T2_n$ Nominal output torque
permanent torque at an output speed of 20 min^{-1}

$T2_{ref}$ Reference torque
Torque for up to 30 load peaks per hour

$T2_{max}$ Maximum gear unit torque

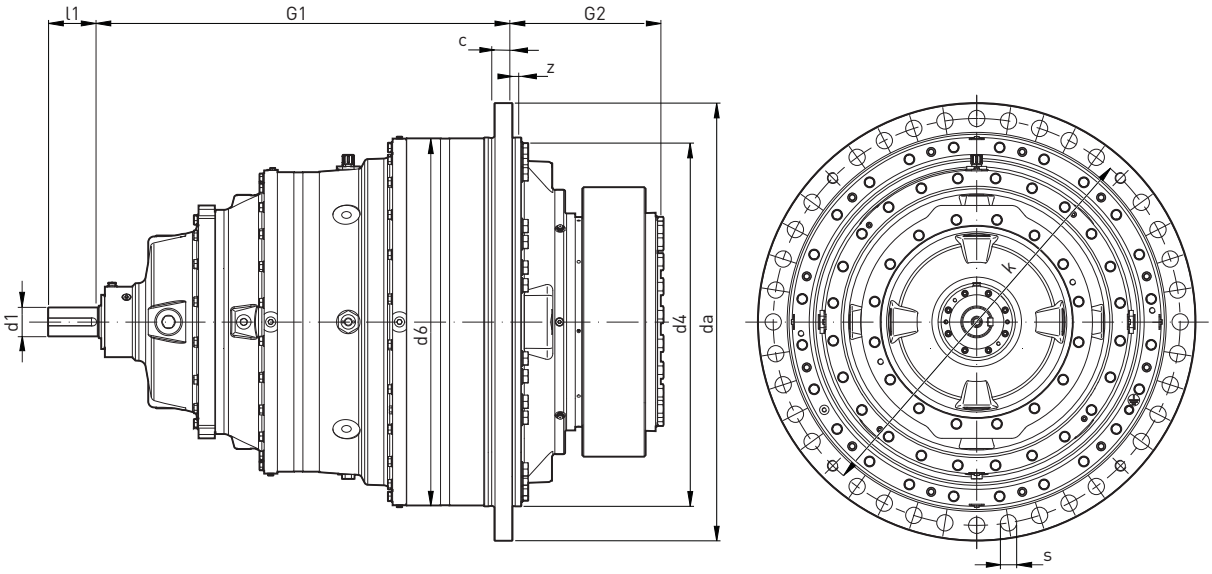
Note

The torques shown are reference values for dimensioning the gear unit sizes.
We would be pleased to make calculations for you to select the optimal gear unit sizes, especially for applications with short operating times and slow output speeds, or even for existing load collectives.

TYPES PLANUREX 3

TYPE P3DP

Coaxial planetary gear unit, output hollow shaft for shrink disk



Size	Nominal output torque T2N	Shaft end input side d1 [1]	l1	c	da	d4 h7	d6	G1	G2	k	z	Flange screws s	Number	Weight [2]	Oil quantity
	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		ca. kg	ca. l
345	480,000	70	120	45	1,045	890	885	1,037	367	975	29.5	39	36	2,250	80
370	600,000	70	120	45	1,108	953	948	1,072	402	1,035	29.5	39	40	2,660	90
395	725,000	80	140	50	1,210	1,020	1,015	1,144	410	1,125	24.5	45	36	4,370	115
420	870,000	80	140	53	1,265	1,080	1,074	1,180	433	1,180	25	45	36	3,800	135
445	1,050,000	90	160	57	1,360	1,150	1,143	1,281	451	1,265	30	52	32	4,500	165
475	1,260,000	100	180	58	1,470	1,225	1,218	1,361	465	1,360	27.5	62	28	5,400	190
500	1,465,000	100	180	63	1,515	1,282	1,274	1,404	503	1,408	30	62	32	6,130	210
525	1,700,000	130	210	75	1,745	1,495	1,485	1,621	565	1,630	30	62	32	9,050	375
545	1,930,000	130	210	80	1,805	1,530	1,525	1,655	580	1,430	30	70	40	9,800	390
575	2,260,000	130	210	80	1,905	1,630	1,610	1,713.5	610	1,780	30	70	40	11,420	430
595	2,470,000	130	210	85	1,945	1,660	1,645	1,767.5	617	1,820	30	70	40	12,380	450
620	2,780,000	150	240	85	2,040	1,760	1,760	1,876.5	635	1,915	30	70	40	14,950	590
635	3,030,000	150	240	90	2,105	1,810	1,810	1,889.5	662	1,980	30	70	40	15,700	610
665	3,430,000	150	240	95	2,255	1,975	1,970	1,964.5	692	2,130	30	70	40	19,350	710
700	4,010,000	150	240	100	2,305	2,005	2,005	1,978.5	756	2,170	30	78	40	20,470	740
740	4,740,000	170	270	110	2,490	2,190	2,180	2,167.5	807	2,355	30	78	40	26,350	1,060
775	5,450,000	170	270	120	2,645	2,335	2,330	2,208.5	832	2,510	30	78	40	29,500	1,150

Further output variants for type P3.P

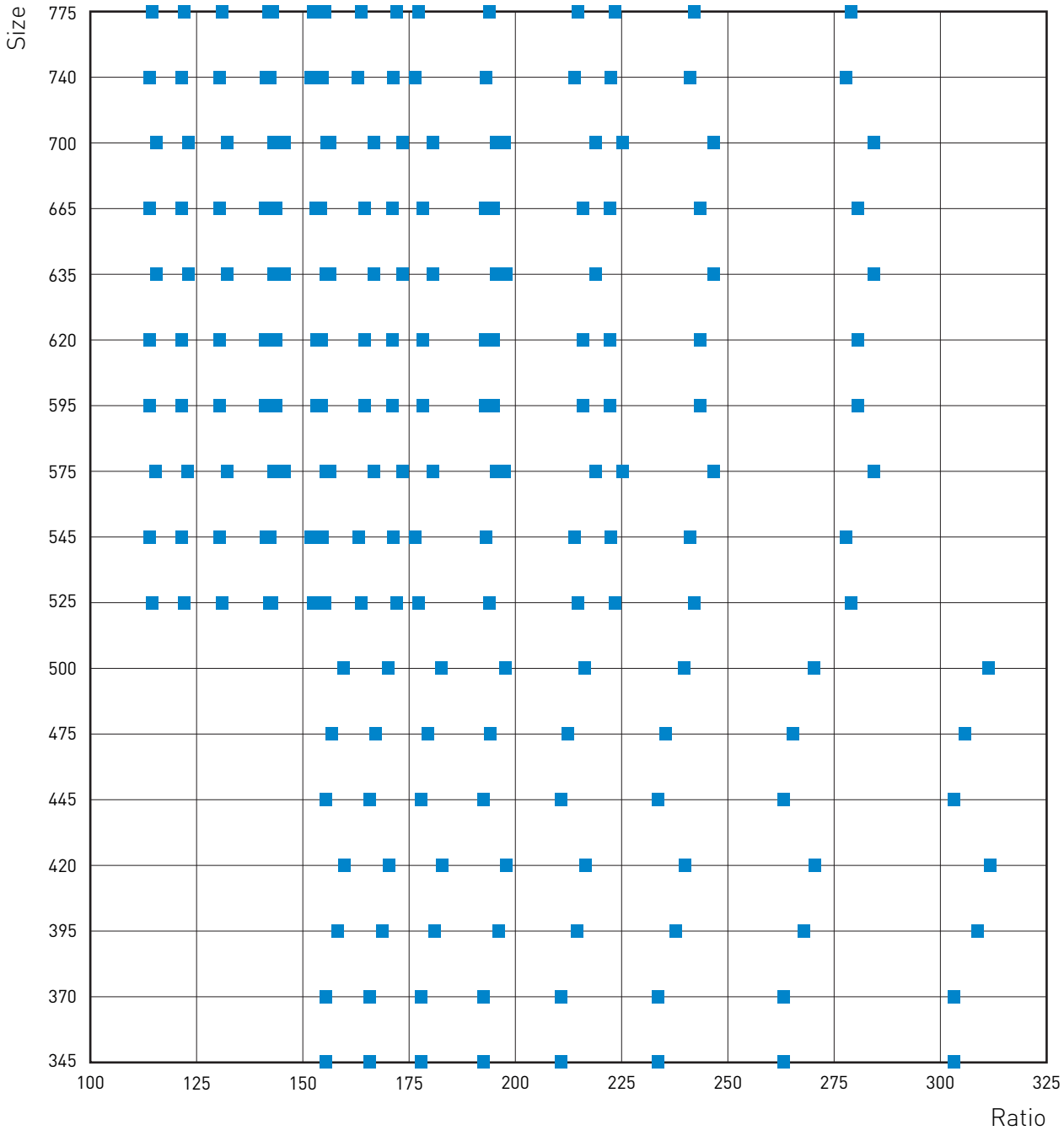
In addition to type P3DP - shown as an example with a hollow shaft for a shrink disk - there are other output variants for type P3.P

- Hollow shaft for mechanical shrink disk **Page 3/2**
- Hollow shaft for hydraulic shrink disk **Page 3/3**
- Hollow shaft with internal involute splines acc. to DIN 5480 **Page 3/4**
- Hollow shaft with external involute splines acc. to DIN 5480 **Page 3/5**
- Flanged shaft **Page 3/6**
- Solid shaft for parallel key connections **Page 3/7**
- Solid shaft **Page 3/8**
- Square shaft **Page 3/9**

[1] Shaft diameters d1 ⩽ 100 mm: Tolerance m6
Shaft diameters d1 > 100 mm: Tolerance n6

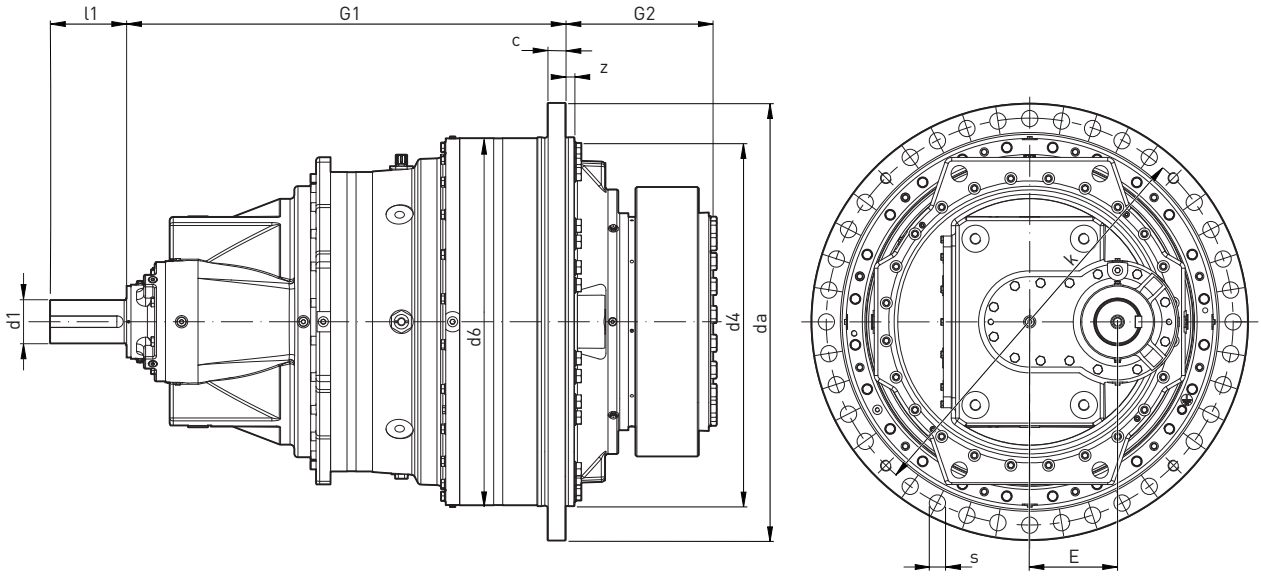
[2] Weight without shrink disk and oil filling

Available gear ratios for basic type P3.P



TYPE P3DH

Planetary gear unit with axial offset, output hollow shaft for shrink disk



Size	Nominal output torque T2N	Shaft end input side															Flange screws		Weight [2]	Oil quantity
		d1 [1]	l1	d1 [1]	l1	d1 [1]	l1	c	da	d4 h7	d6	E	G1	G2	k	z	s	Number		
	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		ca. kg	ca. l
		i < 80		80 ≤ i < 120		i ≥ 120														
345	480,000	**110**	190	**80**	140	**70**	120	45	1,045	890	885	216	1,080	367	975	29.5	39	36	2,400	80
370	600,000	**120**	210	**90**	160	**80**	140	45	1,108	953	948	238	1,180	402	1,035	29.5	39	40	2,900	100
395	725,000	**120**	210	**100**	180	**80**	140	50	1,210	1,020	1,015	243	1,216	410	1,125	24.5	45	36	3,500	120
420	870,000	**120**	210	**100**	180	**95**	160	53	1,265	1,080	1,074	260	1,287.5	433	1,180	25	45	36	4,100	140
445	1,050,000	**140**	240	**120**	210	**100**	180	57	1,360	1,150	1,143	280	1,389	451	1,265	30	52	32	4,800	170
475	1,260,000	**160**	270	**120**	210	**110**	190	58	1,470	1,225	1,218	296	1,451	465	1,360	27.5	62	28	5,900	200
500	1,465,000	**160**	270	**130**	210	**110**	190	63	1,515	1,282	1,274	312	1,511	503	1,408	30	62	32	6,800	230
		i < 90		i ≥ 90																
525	1,700,000	**160**	270	**140**	240			75	1,745	1,495	1,485	390	1,656	565	1,630	30	62	32	10,000	415
545	1,930,000	**160**	270	**140**	240			80	1,805	1,530	1,525	390	1,690	580	1,680	30	70	32	10,750	430
575	2,260,000	**170**	270	**160**	270			80	1,905	1,630	1,610	420	1,840	610	1,780	30	70	32	13,000	530
595	2,470,000	**170**	270	**160**	270			85	1,945	1,660	1,645	420	1,894	617	1,820	30	70	32	14,000	535
620	2,780,000	**180**	310	**170**	270			85	2,040	1,760	1,760	460	1,954	635	1,915	30	70	32	15,500	650
635	3,030,000	**180**	310	**170**	270			90	2,105	1,810	1,810	460	1,967	662	1,980	30	70	40	17,400	655
665	3,430,000	**200**	310	**180**	310			95	2,255	1,975	1,970	500	2,096	692	2,130	30	70	40	21,800	835
700	4,010,000	**200**	310	**180**	310			100	2,305	2,005	2,005	500	2,110	756	2,170	30	78	40	22,900	850
740	4,740,000	**220**	350	**200**	310			110	2,490	2,190	2,180	580	2,379	807	2,355	30	78	40	29,700	1,280
775	5,450,000	**220**	350	**200**	310			120	2,645	2,335	2,330	580	2,420	832	2,510	30	78	40	32,900	1,340

Further output variants for type P3.H

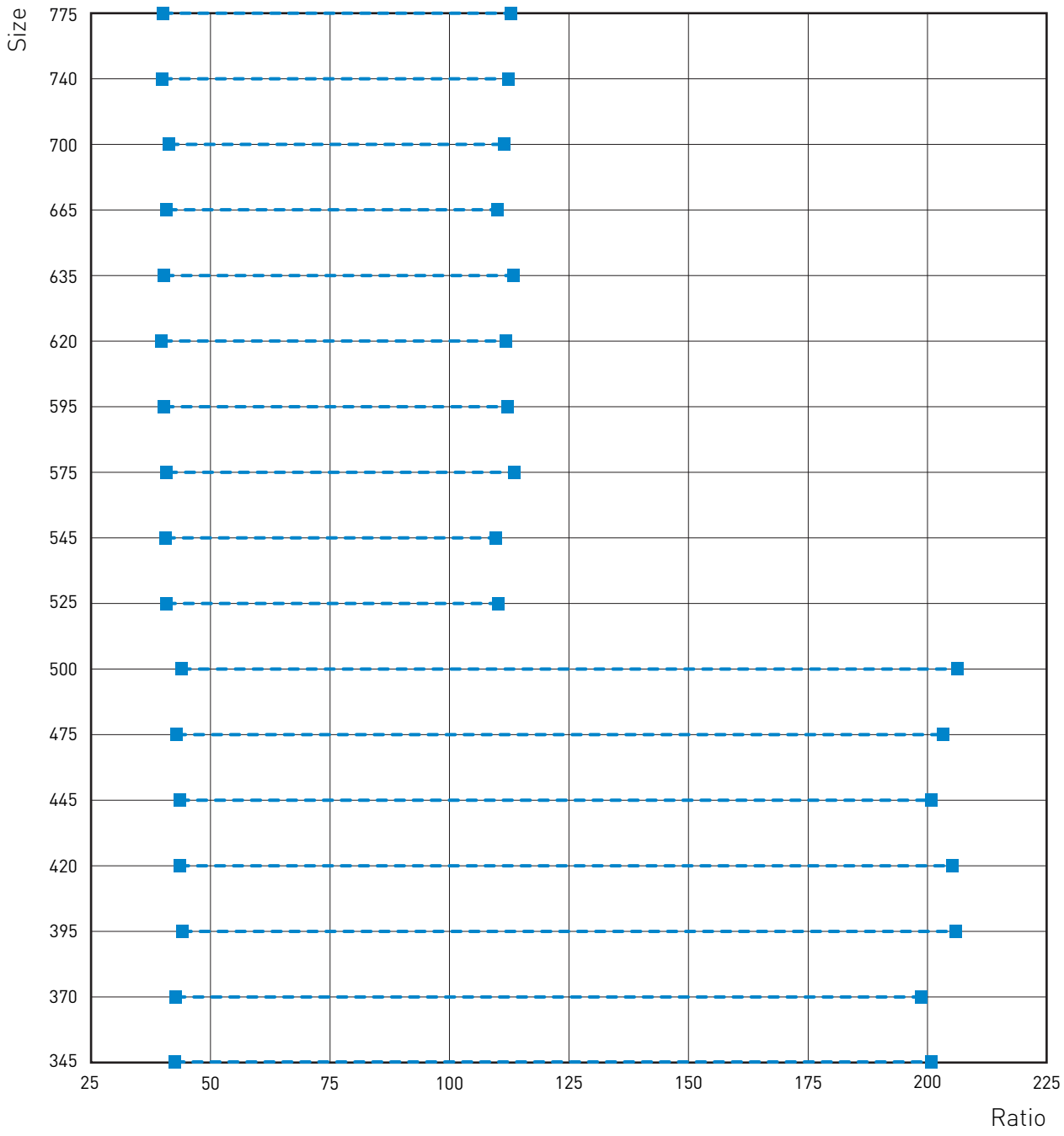
In addition to type P3DH - shown as an example with a hollow shaft for a shrink disk - there are other output variants for type P3.H

- Hollow shaft for mechanical shrink disk **Page 3/2**
- Hollow shaft for hydraulic shrink disk **Page 3/3**
- Hollow shaft with internal involute splines acc. to DIN 5480 **Page 3/4**
- Hollow shaft with external involute splines acc. to DIN 5480 **Page 3/5**
- Flanged shaft **Page 3/6**
- Solid shaft for parallel key connections **Page 3/7**
- Solid shaft **Page 3/8**
- Square shaft **Page 3/9**

[1] Shaft diameters d1 ≤ 100 mm: Tolerance m6
Shaft diameters d1 > 100 mm: Tolerance n6

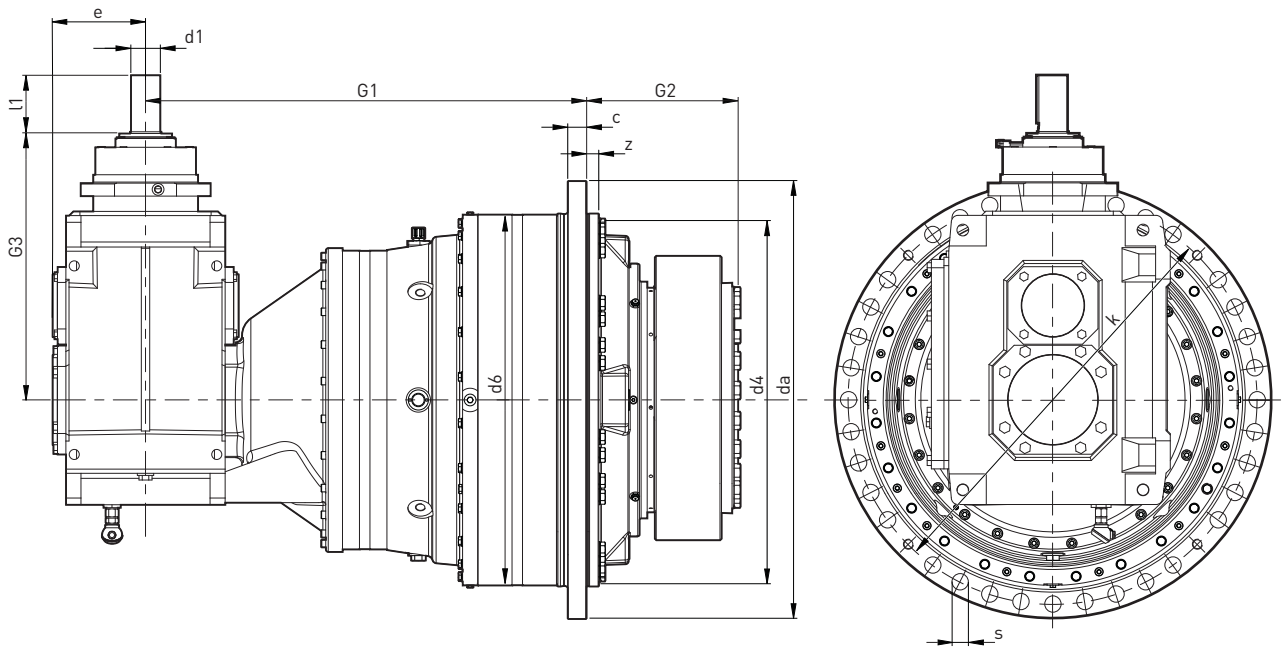
[2] Weight without shrink disk and oil filling

Available gear ratio ranges for basic type P3.H



TYPE P4DB

Planetary gear unit with angular offset, output hollow shaft for shrink disk



Size	Nominal output torque T2N	Shaft end input side d1 m6	l1	c	da	d4 h7	e	G1	G2	G3	k	z	Flange screws s	Number	Weight [1]	Oil quantity
	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		ca. kg	ca. l
345	480,000	70	135	45	1,045	890	222	992	367	640	975	29.5	39	36	3,117	100
370	600,000	80	165	45	1,108	953	265	1,077	402	755	1,035	29.5	39	40	4,087	140
395	725,000	80	165	50	1,210	1,020	265	1,110	410	755	1,125	24.5	45	36	4,600	150
420	870,000	90	165	53	1,265	1,080	312	1,211	433	925	1,180	25	45	36	6,029	210
445	1,050,000	90	165	57	1,360	1,150	312	1,274	451	925	1,265	30	52	32	6,751	230
475	1,260,000	110	205	58	1,470	1,225	370	1,408	465	1,070	1,360	27.5	62	28	8,739	290
500	1,465,000	110	205	63	1,515	1,282	370	1,451	503	1,070	1,408	30	62	32	9,582	310
525	1,700,000															
545	1,930,000															
575	2,260,000															
595	2,470,000															
620	2,780,000															
635	3,030,000															
665	3,430,000															
700	4,010,000															
740	4,740,000															
775	5,450,000															

on request

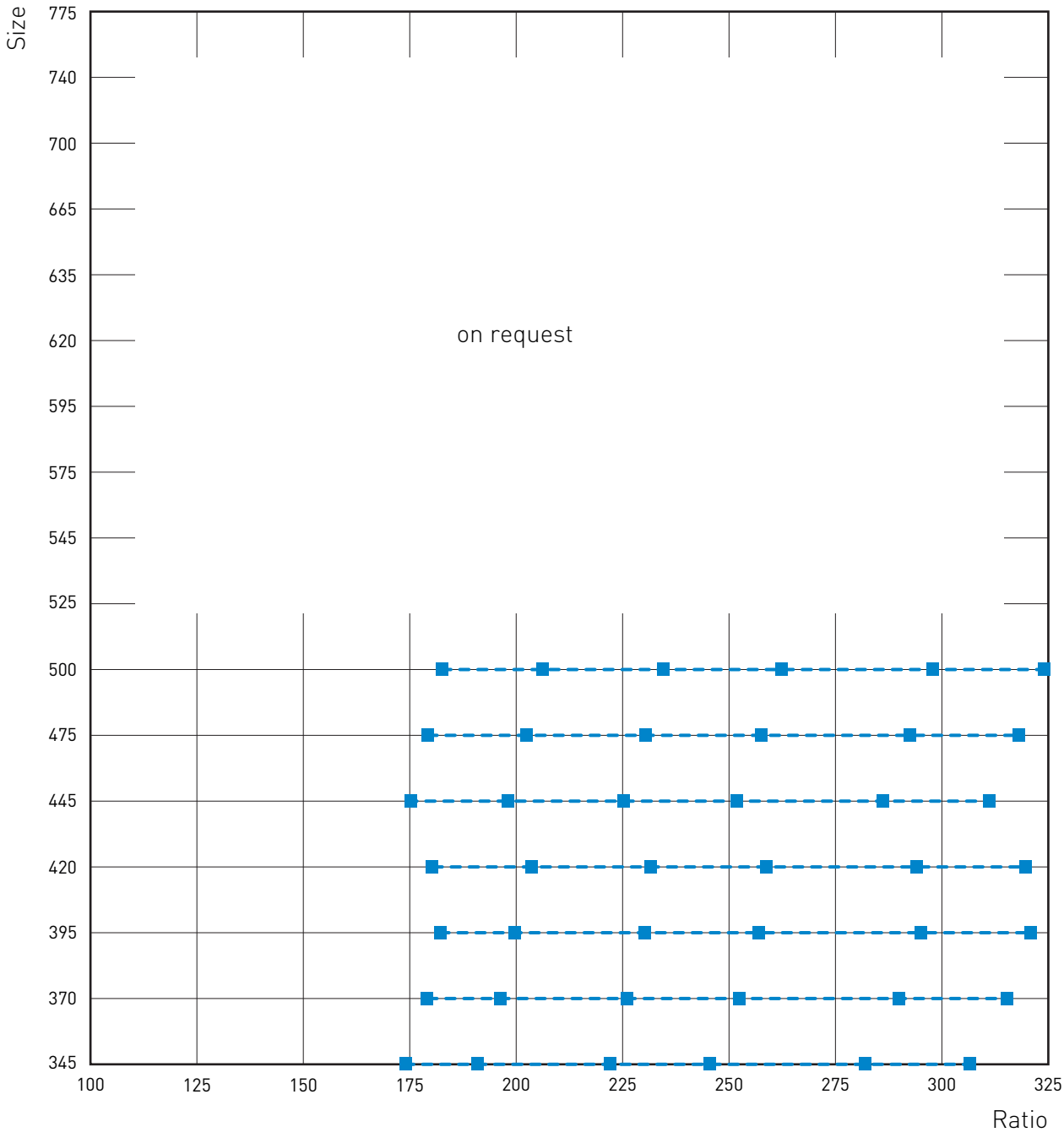
Further output variants for type P4.B

In addition to type P4DB - shown as an example with a hollow shaft for a shrink disk - there are other output variants for type P4.B

- Hollow shaft for mechanical shrink disk **Page 3/2**
- Hollow shaft for hydraulic shrink disk **Page 3/3**
- Hollow shaft with internal involute splines acc. to DIN 5480 **Page 3/4**
- Hollow shaft with external involute splines acc. to DIN 5480 **Page 3/5**
- Flanged shaft **Page 3/6**
- Solid shaft for parallel key connections **Page 3/7**
- Solid shaft **Page 3/8**
- Square shaft **Page 3/9**

[1] Weight without shrink disk and oil filling

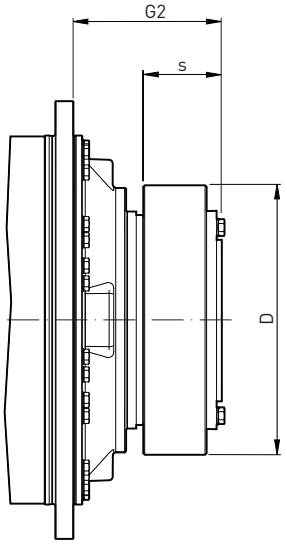
Available gear ratio ranges for basic type P4.B

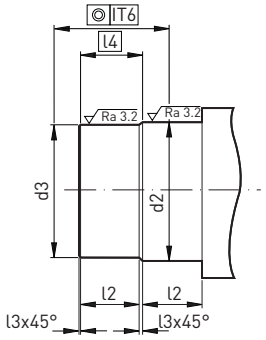


PLANUREX 3 OUTPUT VARIANTS

TYPES P.D.

Hollow shaft for mechanical shrink disk





Size	Nominal output torque	Shrink disk			Dimensions		Driven machine shaft dimensions					Weight
	T2N	Size	D	s	G2	Screw[1]	d2 g6	d3 g6	l2	l3	l4	
	Nm		mm	mm	mm		mm	mm	mm	mm	mm	kg
345	480,000	420	680	204	367	M27	330	325	152	2.5	154.5	300
370	600,000	440	725	214	402	M27	350	345	164	2.5	166.5	363
395	725,000	460	745	217	410	M27	370	365	164	2.5	166.5	376
420	870,000	480	790	233	433	M30	390	385	180	2.5	182.5	476
445	1,050,000	500	835	244	451	M30	410	400	188	5	193	593
475	1,260,000	530	890	261	465	M30	440	430	191	5	196	680
500	1,465,000	560	960	280	503	M30	460	450	215	5	220	862
525	1,700,000	660	1,020	311	565	M33	550	540	225	5	230	1,004
545	1,930,000	700	1,080	310.5	580	M33	570	560	242	5	247	1,141
575	2,260,000	750	1,150	338	610	M33	600	590	260	5	265	1,346
595	2,470,000	775	1,180	345	617	M33	620	610	265	5	270	1,402
620	2,780,000	800	1,230	363	635	M33	640	630	272	5	277	1,646
635	3,030,000	850	1,300	383	662	M36	695	685	275	5	280	1,942
665	3,430,000	900	1,350	405	692	M36	710	700	303	5	308	2,142
700	4,010,000	950	1,400	432	756	M36	750	740	320	5	325	2,425
740	4,740,000	1,000	1,460	452.5	807	M36	830	820	345	5	350	2,740
775	5,450,000	1,025	1,500	475, 5	832	M36	850	840	350	5	355	3,057

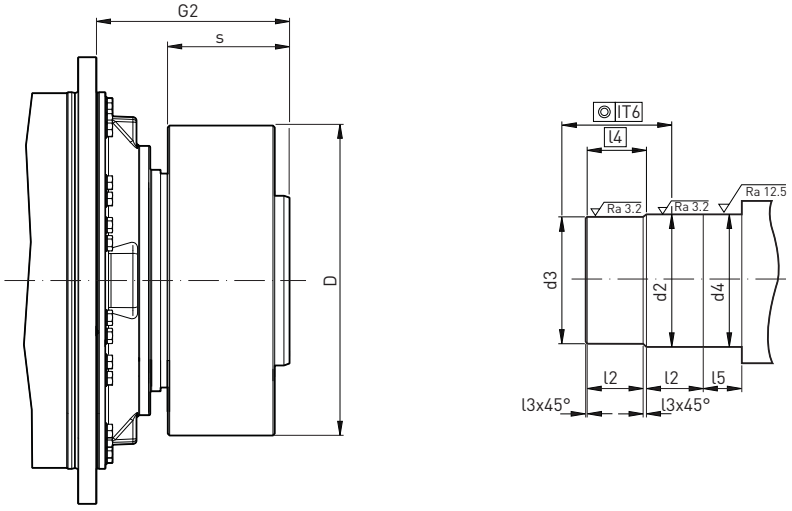
Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

[1] For assembly and disassembly, please see the relevant operating instructions

TYPES P.D.

Hollow shaft for hydraulic shrink disk



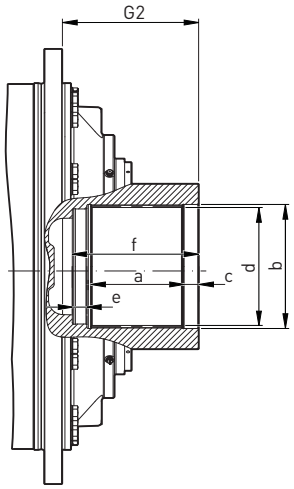
Size	Nominal output torque	Shrink disk			Dimensions	Driven machine shaft dimensions							Weight
	T2N	Size	D	s	G2	d2 h6	d3 h6	d4	l2	l3	l4	l5	
	Nm		mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	kg
345	480,000	420	780	305	468	330	325	330	152	2.5	154.5	101	706
370	600,000	440	810	320	508	350	345	350	164	2.5	166.5	106	798
395	725,000	460	840	330	523	370	365	370	164	2.5	166.5	113	883
420	870,000	480	880	360	560	390	385	390	180	2.5	182.5	127	1,073
445	1,050,000	500	940	380	587	410	400	410	188	5	193	136	1,328
475	1,260,000	530	980	390	594	440	430	440	191	5	196	129	1,466
500	1,465,000	560	1,030	410	633	460	450	460	215	5	220	130	1,705
525	1,700,000	660	1,160	420	674	550	540	550	225	5	230	109	2,005
545	1,930,000	700	1,210	460	729.5	570	560	570	242	5	247	149.5	2,345
575	2,260,000	750	1,260	490	762	600	590	600	260	5	265	152	2,705
595	2,470,000	775	1,350	530	802	620	610	620	265	5	270	185	3,300
620	2,780,000	800	1,310	520	792	640	630	640	272	5	277	157	2,974
635	3,030,000	850	1,430	560	839	695	685	695	275	5	280	177	3,895
665	3,430,000	900	1,520	590	877	710	700	710	303	5	308	185	4,752
700	4,010,000	950	1,590	620	944	750	740	750	320	5	325	188	5,429
740	4,740,000	1,000	1,650	640	994.5	830	820	830	345	5	350	187.5	5,951
775	5,450,000	1,025	1,700	660	1,016.5	850	840	850	350	5	355	184.5	6,567

Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

TYPES P.K.

Hollow shaft with internal involute splines acc. to DIN 5480



Size	Nominal output torque	Toothing acc. to DIN 5480	Tooth width	Centering I ØH7		Centering II ØH7		Dimensions	
	T2N		a	b	c	d	e	f	G2
	Nm		mm	mm	mm	mm	mm	mm	mm
345	480,000	300 x 6 x 30 x 48 x 9H	220	305	42.5	280	29	312.5	328.5
370	600,000	320 x 6 x 30 x 52 x 9H	237	325	44	300	39	332.5	363.5
395	725,000	340 x 6 x 30 x 55 x 9H	253	345	45.5	320	40.5	351.5	379.5
420	870,000	360 x 6 x 30 x 58 x 9H	271	365	47.5	340	34	373.5	416.5
445	1,050,000	380 x 6 x 30 x 62 x 9H	289	385	49.5	360	36	395.5	437.5
475	1,260,000	410 x 6 x 30 x 67 x 9H	297	415	52	390	38.5	408.5	459.5
500	1,465,000	440 x 6 x 30 x 72 x 9H	300	445	54.5	420	38.5	416.5	485.5
525	1,700,000								
545	1,930,000								
575	2,260,000								
595	2,470,000								
620	2,780,000								
635	3,030,000								
665	3,430,000								
700	4,010,000								
740	4,740,000								
775	5,450,000								

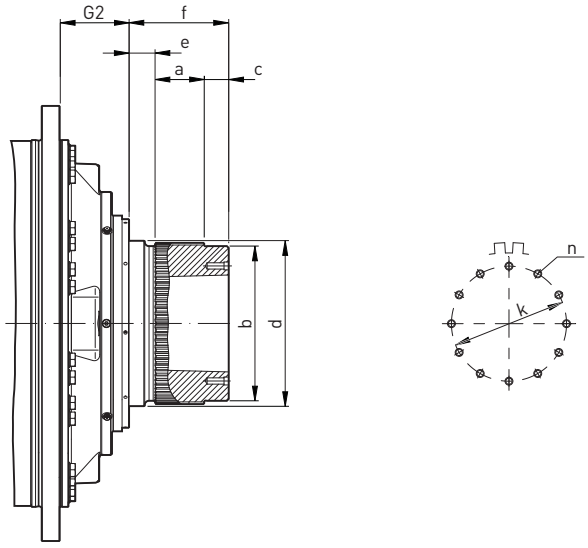
on request

Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

TYPES P.L.

Hollow shaft with external involute splines acc. to DIN 5480



Size	Nominal output torque	Toothing acc. to DIN 5480	Tooth width	Centering I Øp6		Centering II Øf7		Dimensions			
	T2N		a	b	c	d	e	f	k	n	G2
	Nm		mm	mm	mm	mm	mm	mm	mm		mm
345	480,000	410 x 6 x 30 x 67 x 8f	110	390	65.5	420	41	246	280	12xM20x49	163
370	600,000	430 x 6 x 30 x 70 x 8f	125	410	67	440	42.5	264	300	12xM20x49	188
395	725,000	450 x 6 x 30 x 74 x 8f	136	430	68	460	43.5	277	320	10xM20x49	193
420	870,000	470 x 6 x 30 x 77 x 8f	150	450	69.5	480	45	294	330	10xM24x54	200
445	1,050,000	490 x 6 x 30 x 80 x 8f	168	470	71	500	46.5	315	350	12xM24x54	207
475	1,260,000	520 x 6 x 30 x 85 x 8f	178	500	80	530	50.5	338	380	10xM24x54	204
500	1,465,000	550 x 6 x 30 x 90 x 8f	185	530	80	560	50.5	345	410	12xM24x54	223
525	1,700,000										
545	1,930,000										
575	2,260,000										
595	2,470,000										
620	2,780,000										
635	3,030,000										
665	3,430,000										
700	4,010,000										
740	4,740,000										
775	5,450,000										

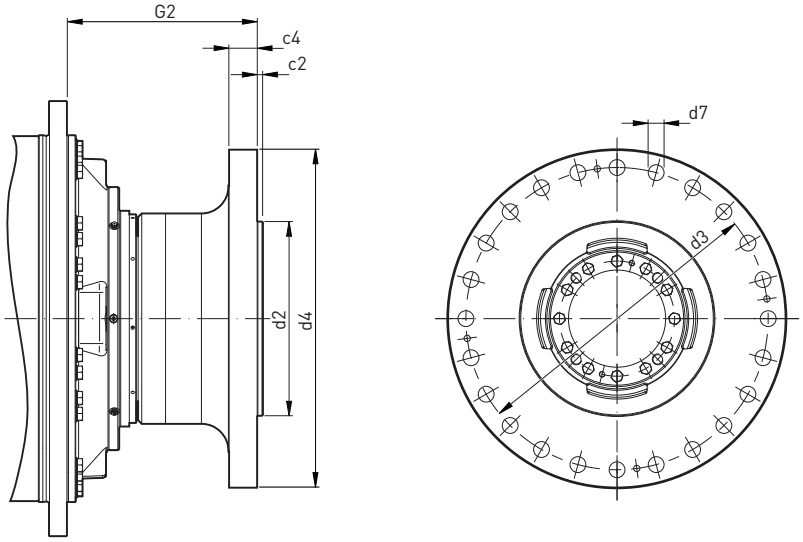
on request

Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

TYPES P.F.

Flanged shaft



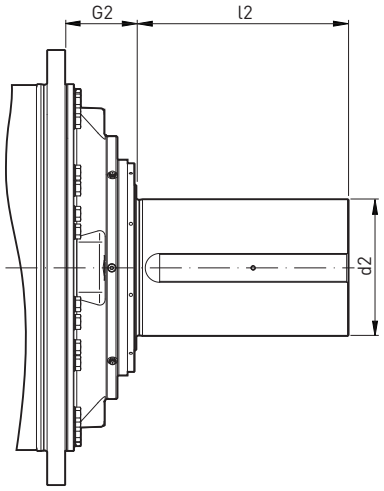
Size	Nominal output torque T2N Nm	Flange shaft dimensions C4 mm	C2 mm	d4 mm	d2 h6 mm	d3 mm	d7 H7 mm	Number	Dimensions G2 mm
345	480,000	68	14	860	460	760	44	20	468
370	600,000	78	16	900	500	800	44	22	513
395	725,000	78	16	940	540	840	44	24	529
420	870,000	88	18	1,000	590	890	50	22	576
445	1,050,000	88	18	1,050	640	940	50	24	597
475	1,260,000	98	20	1,100	690	990	50	28	629
500	1,465,000	98	20	1,150	740	1,040	50	28	655
525	1,700,000	on request							
545	1,930,000								
575	2,260,000								
595	2,470,000								
620	2,780,000								
635	3,030,000								
665	3,430,000								
700	4,010,000								
740	4,740,000								
775	5,450,000								

Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

TYPES P.S.

Solid shaft for parallel key connections



Size	Nominal output torque T2N Nm	Dimensions d2 n6 mm	l2 mm	G2 mm
345	480,000	340 [1]	550	168
370	600,000	360 [1]	590	193
395	725,000	380 [1]	590	198
420	870,000	420 [1]	650	205
445	1,050,000	440 [1]	690	212
475	1,260,000	460 [1]	750	209
500	1,465,000	500 [1]	790	228
525	1,700,000	550	880	250
545	1,930,000	570	915	274.5
575	2,260,000	600	960	277
595	2,470,000	620	1000	277
620	2,780,000	on request		
635	3,030,000			
665	3,430,000			
700	4,010,000			
740	4,740,000			
775	5,450,000			

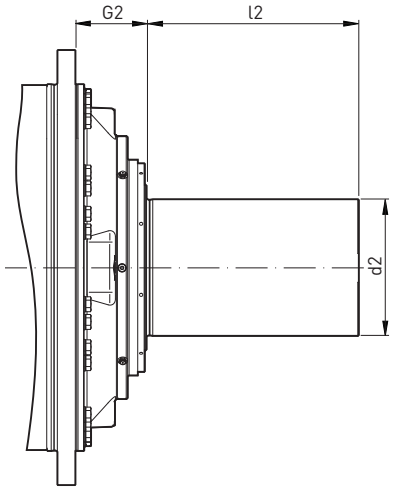
Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

[1] Shaft end with feather key as per DIN 6885 Part 1 and center hole

TYPES P.C.

Solid shaft



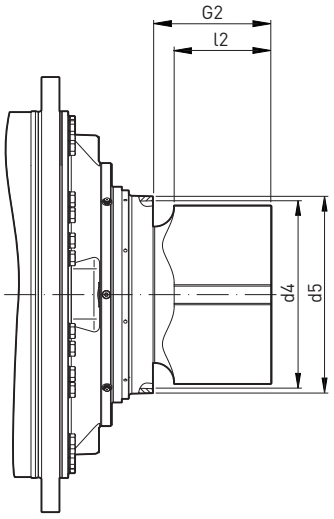
Size	Nominal output torque T2N Nm	Dimensions d2 n6 mm	l2 mm	G2 mm
345	480,000	340	550	168
370	600,000	360	590	193
395	725,000	380	590	198
420	870,000	420	650	205
445	1,050,000	440	690	212
475	1,260,000	460	750	209
500	1,465,000	500	790	228
525	1,700,000	550	880	259
545	1,930,000	570	915	274.5
575	2,260,000	600	960	277
595	2,470,000	620	1,000	277
620	2,780,000	on request		
635	3,030,000			
665	3,430,000			
700	4,010,000			
740	4,740,000			
775	5,450,000			

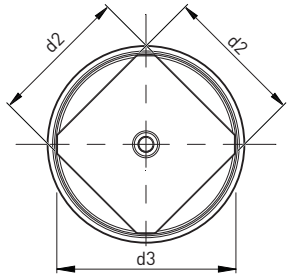
Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

TYPES P.Z.

Square shaft





Size	Nominal output torque T2N	Dimensions d2	l2	d3 -1	d4	d5	G2
	Nm	mm	mm	mm	mm	mm	mm
345	480,000	285 ± 0.3	220	380	401	417	274
370	600,000	310 ± 0.3	240	410	433	453	296.5
395	725,000	325 ± 0.3	250	410	433	453	305
420	870,000	345 ± 0.3	250	450	474	492	310
445	1,050,000	360 ± 0.3	265	455	474	492	325
475	1,260,000	385 ± 0.3	280	470	499	526	340
500	1,465,000	405 ± 0.3	301	465	499	526	360
525	1,700,000	430 ± 0.3	300	550	579	606	365
545	1,930,000	450 ± 0.3	320	550	579	606	385
575	2,260,000	470 ± 0.3	340	600	649	671	407.5
595	2,470,000	480 ± 0.3	350	620	649	671	417.5
620	2,780,000	510 ± 0.5	365	620	649	671	432.5
635	3,030,000	525 ± 0.5	380	690	719	756	450
665	3,430,000	575 ± 0.5	400	685	719	756	470
700	4,010,000	605 ± 0.5	440	760	789	811	510
740	4,740,000	635 ± 0.5	450	755	789	811	520
775	5,450,000	on request					

Input stages

- Type P3DP – coaxial planetary gear unit **Page 2/2**
- Type P3DH – planetary gear unit with axial offset **Page 2/4**
- Type P4DB – planetary gear unit with angular offset **Page 2/6**

ADD-ON PARTS PLANUREX 3

GEAR HOUSING BASE

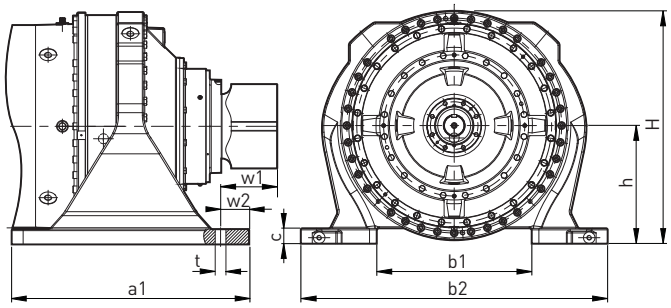


Fig. 1

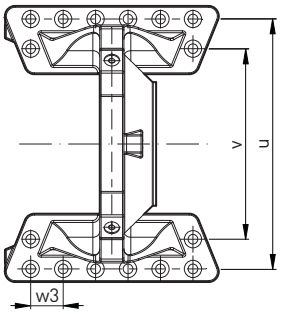


Fig. 2

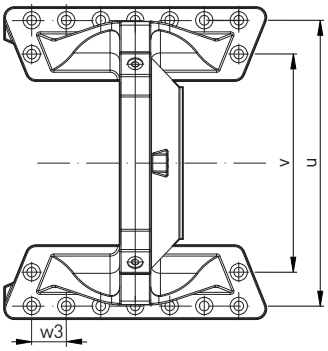


Fig. 3

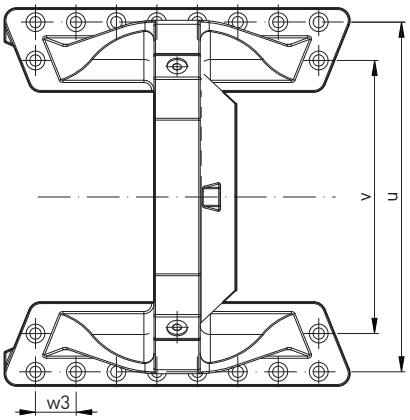
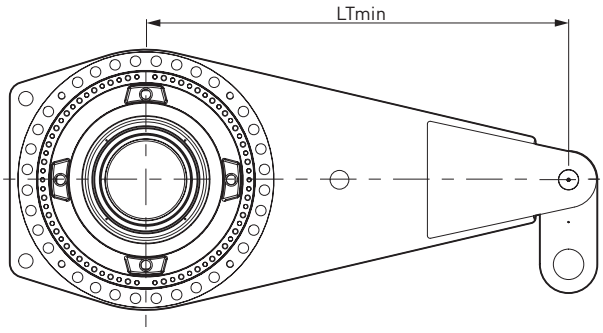


Fig. 4

Size	Nominal output torque	Dimensions											Bore	
	T2N	h	H	c ca.	a1 ca.	b1 ca.	b2 ca.	u	v	w1	w2	w3	Number	t
	Nm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm	mm		mm
345	480,000	465	915	72	971	580	1,410	830	1,250	388.5	155.5	165		
370	600,000	500	980	77	1,055	635	1,485	900	1,330	411.5	157.5	185		
395	725,000	580	1,135	75	1,248	730	1,640	1,010	1,480	356.5	184	220	Fig. 1	62
420	870,000	580	1,135	75	1,248	730	1,640	1,010	1,480	372	184	220		
445	1,050,000	615	1,205	75	1,323	785	1,715	1,060	1,550	359.5	181.5	240		
475	1,260,000	680	1,335	85	1,438	865	1,820	1,220	1,645	394.5	181.5	215		
500	1,465,000	680	1,335	85	1,438	865	1,820	1,220	1,645	419.5	181.5	215		
525	1,700,000	770	1,515	100	1,549	1,010	2,000	1,380	1,810	369.5	186.5	235		
545	1,930,000	830	1,634	115	1,688	1,080	2,107	1,425	1,895	327.5	190.5	260	Fig. 2	70
575	2,260,000	830	1,634	115	1,688	1,080	2,107	1,425	1,895	389.5	193.5	260		
595	2,470,000	850	1,675	120	1,724	1,100	2,110	1,450	1,925	388.5	199.5	265		
620	2,780,000	930	1,835	120	1,898	1,164	2,286	1,580	2,070	307.5	199.5	250		
635	3,030,000	930	1,835	120	1,898	1,164	2,286	1,580	2,070	355.5	199.5	250	Fig. 3	70
665	3,430,000	1,010	1,995	125	2,024	1,286	2,424	1,700	2,220	335.5	203.5	270		
700	4,010,000	1,120	2,215	140	2,386	1,424	2,646	1,890	2,420	244.5	214.5	280		
740	4,740,000	1,120	2,215	140	2,386	1,424	2,646	1,890	2,420	271.5	214.5	280	Fig. 4	78
775	5,450,000	on request												

TORQUE REACTION ARM ON ONE SIDE

for coupling bar



Size	Nominal output torque T2N Nm	Dimensions LTmin. mm
345	480,000	1,450
370	600,000	1,500
395	725,000	1,700
420	870,000	1,900
445	1,050,000	2,000
475	1,260,000	2,100
500	1,465,000	2,500
525	1,700,000	on request
545	1,930,000	
575	2,260,000	
595	2,470,000	
620	2,780,000	
635	3,030,000	
665	3,430,000	
700	4,010,000	
740	4,740,000	
775	5,450,000	

ADDITIONAL INFORMATION

KEY TO SYMBOLS

E_D	Operating cycle per hour % (e.g. E_D = 80% per hour)
f_1	Factor for driven machine (Table 1), **Page 5/4**
f_2	Factor for prime mover (Table 2), **Page 5/5**
f_3	Peak torque factor (Table 3), **Page 5/5**
F_{R2}	Permissible radial forces (kN) on shaft D2
i	Actual ratio
i_N	Nominal ratio
i_s	Required ratio
L_{h10}	Nominal bearing life (h)
n_1	Input speed (min^{-1})
n_2	Output speed (min^{-1})
n_{2LN}	Reference output speed for standard bearings (min^{-1})
n_{2LV}	Reference output speed for increased bearing life (min^{-1})
P_G	Required thermal capacity (kW)
P_{G1}	Thermal capacity (kW) for gear units without auxiliary cooling
P_N	Nominal power rating of gear unit (kW), see rating tables
$P_{erf.}$	Required power rating (kW)
P_2	Power rating of driven machine (kW)
P_{anfahr}	Starting power rating (kW)
t	Ambient temperature (°C)
T_A	Max. torque occurring on input shaft, e.g. peak operating, starting or braking torque (Nm)
T_{2N}	Nominal output torque (Nm)
T_2	Torque (Nm) of driven machine
$P_{2äq}$	Equivalent power rating (kW)
P_I, P_{II}, P_n	Fractions of power rating (kW) obtained from service classification
$T_{2äq}$	Equivalent torque (Nm)
T_I, T_{II}, T_n	Fractions of torque (Nm) obtained from service classification
X_I, X_{II}, X_n	Fractions of time (%) obtained from service classification

Dimensions in mm
Weights in kg
Oil quantities in litres
Fits acc. to DIN/ISO 286-2

GUIDELINES FOR SELECTION

Constant Power Rating

Determination of gear unit type and size

1.1 Find the transmission ratio

$$i_S = \frac{n_1}{n_2}$$

1.2 Determine the nominal power rating of the gear unit

$$P_N \geq P_{erf.} = P_2 \cdot f_1 \cdot f_2$$

1.3 Check for overdimensioning
It is not necessary to consult us, if:

$$3.33 \cdot P_2 \geq P_N$$

1.4 Check for maximum torque, e. g. peak operating, starting or braking torque

$$P_N \geq P_{anfahr} = \frac{T_A \cdot n_1}{9.550} \cdot f_3$$

Gear unit sizes and number of gear stages are given in rating tables depending on i_N and P_N

1.5 Check whether the actual ratio i as per tables on **pages 2/3**, **2/5** and **2/7** is acceptable

Variable Power Rating

For driven machines with constant speeds and variable power ratings, the gear unit can be designed according to the equivalent power rating.
For this, a working cycle where phases I, II...n require power P_I, P_{II}, ... P_n and the respective power ratings operate for time fractions X_I, X_{II}, ... X_n is taken as a basis.

The equivalent power rating can be calculated from these specifications with the following formula:

$$P_{2äq} = \sqrt[6,6]{P_I^{6,6} \cdot \frac{X_I}{100} + P_{II}^{6,6} \cdot \frac{X_{II}}{100} + \ldots + P_n^{6,6} \cdot \frac{X_n}{100}}$$

The size of the gear unit can then be determined analogously to points 1.1 ... 1.5 and 2.1 ... 2.3 as follows:

$$P_N \geq P_{erf.} = P_{2äq} \cdot f_1 \cdot f_2$$

Then, when P_N has been determined, the power and time fractions must be checked by applying the following requirements:

1) The individual power fractions P_I, P_{II}, ... P_n must be greater than $0.4 \cdot P_N$.
2) The individual power fractions P_I, P_{II}, ... P_n must not exceed $1.4 \cdot P_N$.
3) If power fractions P_I, P_{II}, ... P_n are greater than P_N, the sum of time fractions X_I, X_{II}, ... X_n must not exceed 10%.

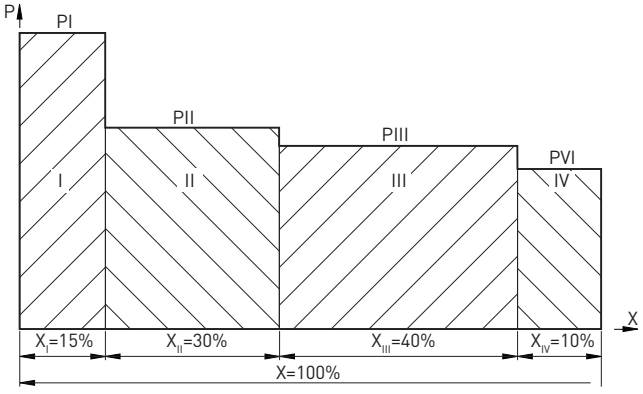
If any one of the three requirements is not met, $P_{2äq}$ and $P_{erf.}$ must be recalculated.

It must be borne in mind that a brief peak power rating not included in the calculation of $P_{2äq}$ must not be greater than $P_{max} = 2 \cdot P_N$.

In applications where the torque is variable but the speed constant the gear unit can be designed on the basis of the so-called equivalent torque.

A gear unit design which is finite-life fatigue-resistant can be sufficient for certain applications, for example, sporadic operation (lock-gate drives) or low output speeds ($n_2 < 4\ min^{-1}$).

Example: Service classification



SERVICE FACTORS, LOAD CLASSIFICATION SYMBOLS

Table 1: Factor for driven machine f_1

Driven machines	Effective daily operating period under load in hours		
	≤0.5	>0,5 ... 10	>10
	Factor for driven machine f_1		
Waste water treatment			
Thickeners (central drive)	–	–	1.2
Filter presses	1.0	1.3	1.5
Flocculation apparata	0.8	1.0	1.3
Aerators	–	1.8	2.0
Pumps			
– Centrifugal pumps	1.0	1.2	1.3
– Positive displacement pumps 1 piston	1.3	1.4	1.8
– Positive displacement pumps >1 piston	1.2	1.4	1.5
Raking equipment	1.0	1.2	1.3
Combined longitudinal and rotary rakes	1.0	1.3	1.5
Pre-thickeners	–	1.1	1.3
Screw pumps	–	1.3	1.5
Water turbines	–	–	2.0
Dredgers			
Bucket conveyors	–	1.6	1.6
Dumping devices	–	1.3	1.5
Caterpillar travelling gears	1.2	1.6	1.8
Bucket wheel excavators			
– as pick-up	–	1.7	1.7
– for primitive material	–	2.2	2.2
Cutter heads	–	2.2	2.2
Slewing gears [1]	–	1.4	1.8
Plate bending machines			
Plate bending machines	–	1.0	1.0
Chemical industry			
Extruders	–	–	1.6
Dough mills	–	1.8	1.8
Rubber calenders	–	1.5	1.5
Cooling drums	–	1.3	1.4
Mixers for			
– uniform media	1.0	1.3	1.4
– non-uniform media	1.4	1.6	1.7
Agitators for media with			
– uniform density	1.0	1.3	1.5
– non-uniform density	1.2	1.4	1.6
– non-uniform gas absorption	1.4	1.6	1.8
Toasters	1.0	1.3	1.5
Centrifuges	1.0	1.2	1.3

Driven machines	Effective daily operating period under load in hours		
	≤0.5	>0,5 ... 10	>10
	Factor for driven machine f_1		
Metal working mills			
Plate tilters	1.0	1.0	1.2
Ingot pushers	1.0	1.2	1.2
Winding machines	–	1.6	1.6
Cooling bed transfer frames	–	1.5	1.5
Roller straighteners	–	1.6	1.6
Roller tables			
– continuous	–	1.5	1.5
– intermittent	–	2.0	2.0
Reversing tube mills	–	1.8	1.8
Shears			
– continuous [1]	–	1.5	1.5
– crank type [1]	1.0	1.0	1.0
Continuous casting drivers [1]	–	1.4	1.4
Rolls			
– Reversing blooming mills	–	2.5	2.5
– Reversing slabbing mills	–	2.5	2.5
– Reversing wire mills	–	1.8	1.8
– Reversing sheet mills	–	2.0	2.0
– Reversing plate mills	–	1.8	1.8
Roll adjustment drives	0.9	1.0	–
Conveyors			
Bucket conveyors	–	1.4	1.5
Hauling winches	1.4	1.6	1.6
Hoists	–	1.5	1.8
Belt conveyors ≤ 150 kW	1.0	1.2	1.3
Belt conveyors ≥ 150 kW	1.1	1.3	1.4
Goods lifts [1]	–	1.2	1.5
Passenger lifts [1]	–	1.5	1.8
Apron conveyors	–	1.2	1.5
Escalators	1.0	1.2	1.4
Rail vehicles	–	1.5	–
Frequency converters			
Frequency converters	–	1.8	2.0
Reciprocating compressors			
Reciprocating compressors	–	1.8	1.9

Design for power rating of driven machine P2

[1] Designed power corresponding to max. torque

Driven machines	Effective daily operating period under load in hours		
	≤0.5	>0,5 ... 10	>10
	Factor for driven machine f_1		
Crane systems [2]			
Slewing gears [4]	1.0	1.4	1.8
Luffing gears	1.0	1.1	1.4
Travelling gears	1.1	1.6	2.0
Hoisting gears	1.0	1.1	1.4
Derricking jib cranes	1.0	1.2	1.6
Cooling towers			
Cooling tower fans	–	–	2.0
Blowers (axial and radial)	–	1.4	1.5
Food industry			
Cane sugar production			
– Cane knives [1]	–	–	1.7
– Cane mills	–	–	1.7
Beet sugar production			
– Beet cossettes macerators	–	–	1.2
– Extraction plants, Mechanical refrigerators, Juice boilers	–	–	1.4
– Sugar beet washing machines, Sugar beet cutters	–	–	1.5
Paper machines			
of all kind [3]	–	1.8	2.0
Pulper drives	on request		
Centrifugal compressors			
Centrifugal compressors	–	1.4	1.5
Cableways			
Material ropeways	–	1.3	1.4
To- and fro system aerial ropeways	–	1.6	1.8
T-bar lifts	–	1.3	1.4
Continuous ropeways	–	1.4	1.6
Cement industry			
Concrete mixer	–	1.5	1.5
Breakers [1]	–	1.2	1.4
Rotary kilns	–	–	2.0
Tube mills	–	–	2.0
Separators	–	1.6	1.6
Roll crushers	–	–	2.0

Table 2: Prime mover factor f_2

Prime movers	Prime mover factor f_2
Electric motors, hydraulic motors, turbines	1.0
Piston engines 4 - 6 cylinders cyclic variation 1 : 100 to 1 : 200	1.25
Piston engines 1 - 3 cylinders cyclic variation up to 1 : 100	1.5

Table 3: Peak torque factor f_3

	Load peaks per hour			
	1 - 5	6 - 30	31 - 100	>100
	Peak torque factor f_3			
Steady direction of load	0.50	0.65	0.70	0.85
Alternating direction of load	0.70	0.95	1.10	1.25

Design for power rating of driven machine P2

[1] Designed power corresponding to max. torque

[2] Load can be exactly classified, for instance, according to FEM 1001

[3] A check for thermal capacity is absolutely essential

[4] Load can be exactly classified according to the slewing gear specification.

The listed factors are empirical values. Prerequisite for their application is that the machinery and equipment mentioned correspond to generally accepted design and load specifications.

In case of deviations from standard conditions, please refer to us.

For driven machines which are not listed in this table, please refer to us.

THE PERFECT SOLUTION FOR YOUR APPLICATION.

PLANUREX 3 offers the most application solutions, such as drives for roller presses, tube mills, cement kilns and sugar presses.

The PLANUREX 3 modular system can be used to equip many other applications such as apron feeder drives, vertical mill drives and travel gear drives.

SUGAR MILL DRIVES

- Space-saving installation without specific requirements
- Low running costs and high efficiency due to optimized gear geometries and the high level of manufacturing quality
- A maximum of variability for the connection to the grinding roller through a number of different design options for the output shaft

ROLLER PRESS DRIVES

- Low weight reduces the load for the gear unit and the work machine
- High additional radial and axial forces from the universal joint shaft and from idle roller acceleration are absorbed by the standard bearings
- High overload capacity

CENTRAL DRIVES

- Coordinated size increments optimize both the size of the gear unit used and, thus, the costs
- Sufficiently sized bearings allow for accommodation of additional forces at the output
- In flanged or base-mounted versions

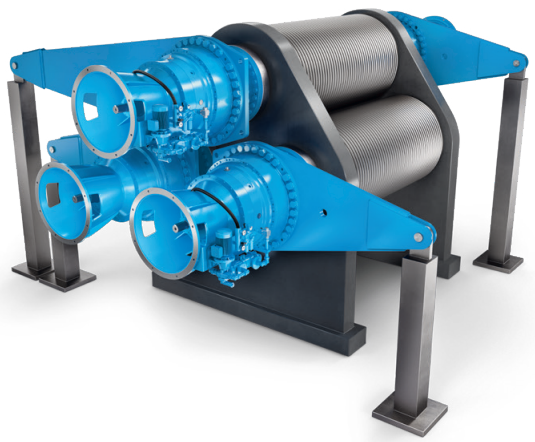
PURE ENERGY – EFFICIENT

Flender gear units have been proving their worth in the sugar industry for decades. Energy efficiency, reliability and efficient use of the available space are the most important factors that motivate our customers.

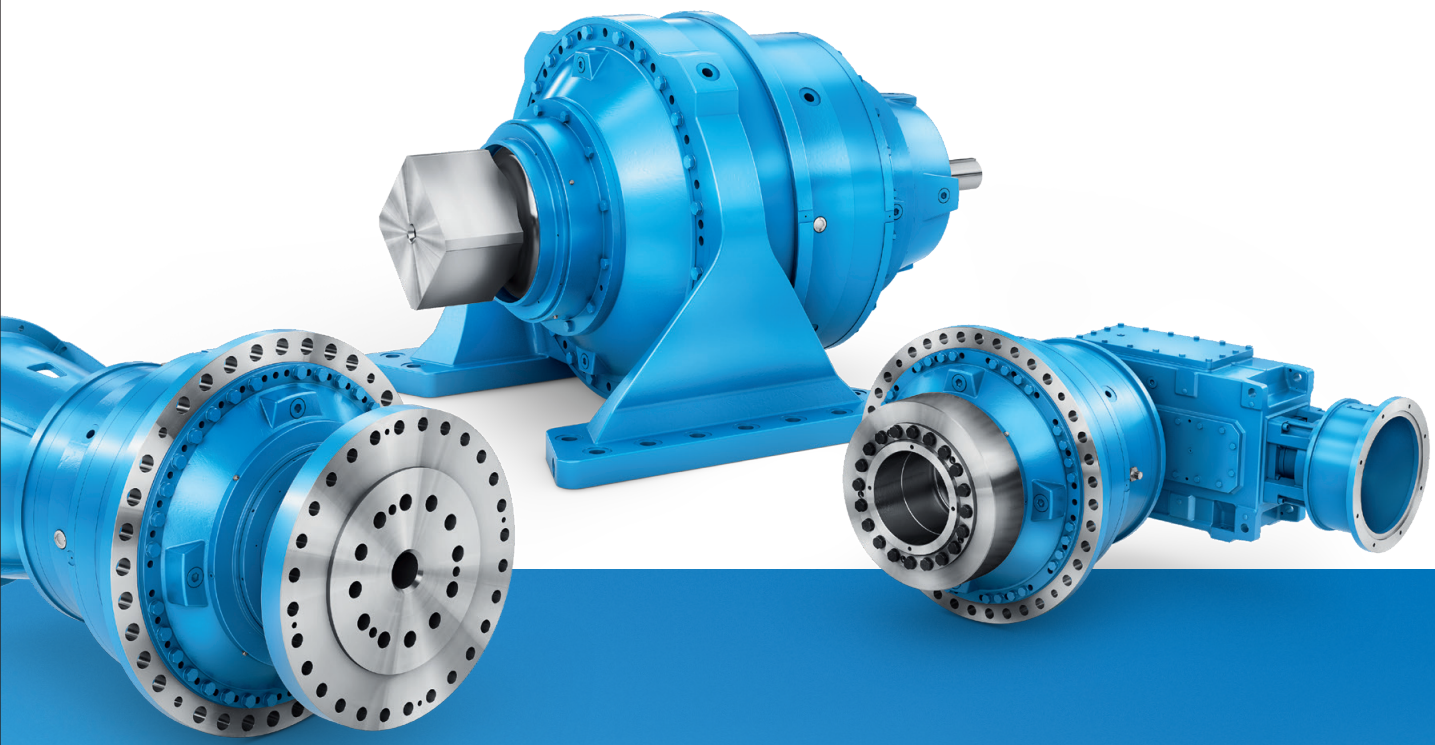
On the basis of the most extensive planetary gear unit experience in the world and our know-how as the leading manufacturer of wind turbine gear units, we develop unique solutions for the sugar industry which guarantee you a high level of availability, productivity and efficiency.

The immediate advantages of using PLANUREX 3 gear units lie in the cost benefits for drive systems and driven machines. These are influenced by various factors: Our gear units with a high power density are light and compact and thus reduce the load acting on the driven machine. Optimized gear geometries and meshing reduce the friction and increase the energy efficiency. New gear design and top manufacturing quality increase the reliability and service life and optimize the maintenance costs.

Compact gear units allow smaller and more economical driven machines and drive motors to be used. The rolling bearings on the input and output shafts are protected by high-performance seals as standard in order to achieve maximum plant availability in conjunction with low maintenance costs.



AND RELIABLE.

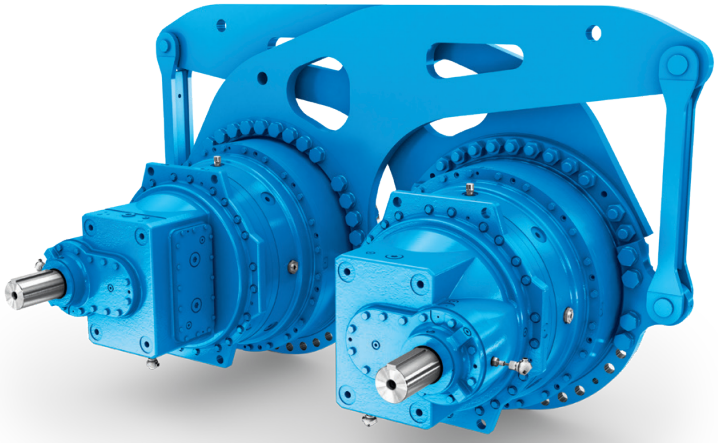


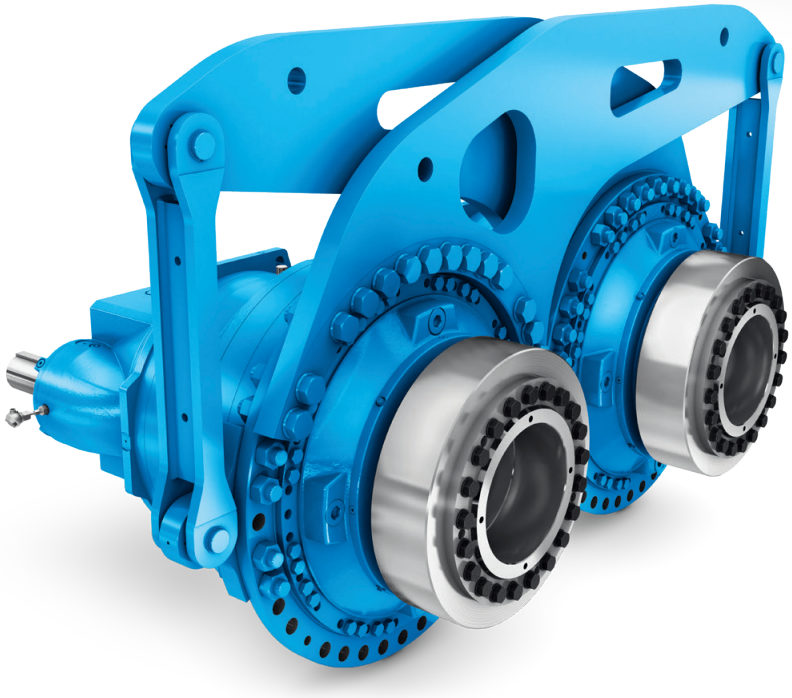
PRESS OUT EVEN MORE AVAILABILITY.

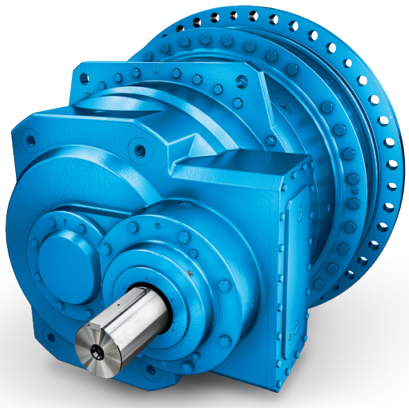
The standard solution PLANUREX 3 was developed for applications that place high demands on compactness, quality and price-performance ratio. This makes PLANUREX 3 the perfect drive for roller presses.

Benefit from the top plant performance made possible by the efficiency of the PLANUREX 3 gear units. Rely on a very high power density and exploit the design options provided by the exceedingly compact gear unit series. Save installation space, weight and costs.

The series' harmonically spaced torque steps avoid an oversized design, ensure that the solution is very close to the operating point of your application and make it easier to select the most suitable gear unit solution. PLANUREX 3 was designed using the latest methods based on many years of experience in the field.







MORE DRIVE, LOWER RUNNING COSTS.

Driving tube mills centrally via a spigot has long since established itself as a successful method in practice. Since driving from the front face eliminates girth gear transmission, relatively heavy-duty gear units are required even for small capacity ranges.

That makes PLANUREX 3 the perfect central drive for tube mills in the capacity range of up to 5.45 million Nm. Its low weight reduces the loading on the gear unit and machine. High radial and axial secondary forces are absorbed by the standard bearing arrangement. At the same time, the high overload capacity ensures operating reliability and stabilizes your process.

PLANUREX 3 central drives are extremely reliable and low-maintenance. Their compact design not only saves costs when purchasing a gear unit but also when designing mills and their supporting structures. So wherever investment and maintenance costs, space requirements, power consumption and noise emissions all have to strike a perfect balance, a PLANUREX 3 gear unit solution is the obvious choice.

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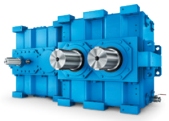
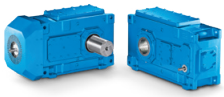
MD 20.1
FLEX-C10092-00-7600

FLENDER CHG
Helical gear units
MD 20.10
FLEX-C10088-00-7400



Gear units
Size 23-28
MD 20.11
FLEX-C10091-00-6300



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