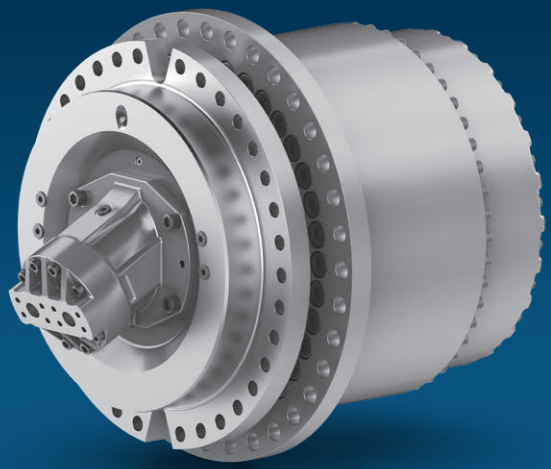
Winch Gearboxes GPT-W

Precise lifting with ZF winch gearboxes

ZF gearboxes GPT-W are drive components for winch applications, like crawler cranes, ship-, port- and container cranes, railway cranes, cranes on work ships or offshore platforms.



Features

- Sizes GPT-W 160 to 1100
- Rope pull forces from 400 to 1,200 kN
- Compact, space-saving planetary gearbox design
- Planet wheel carried in full-complement bearings
- Robust bearing system absorbing the forces exerted by the cable pull
- Simple mounting
- Easy oil change
- Integrated static multiple disk brake
- Low-noise operation
- Mounting for various motor suppliers and types

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Description

Winch gearboxes GPT-W are characterized by overall high efficiency and a compact design, which allows a direct installation into the cable drum.

As successor company of the former Lohmann + Stolterfoht GmbH, the ZF Industrieantriebe Witten GmbH incorporates decades of know-how into the design and production of winch drives.

Combined with state-of-the-art calculation methods, such as the Finite Element Method (FEM), gearboxes of the highest quality are produced, which are reliable even under the harshest and most challenging conditions.

The development and production expertise is supplemented by a unique long-term experience in the field of dynamic simulation and testing.

The gearbox types listed in this catalogue describe the standard range of ZF Industrieantriebe Witten GmbH. For any other gearbox types and/or sizes, please contact us.

Gearbox design

The design and high manufacturing quality result in gearboxes of exceptional resilience, reliability and low noise operation, e.g. by using case hardened gears and tempered, surface-hardened ring gears.

In addition, the ZF winch gearboxes GPT-W are easy to install and easy for maintenance in order to keep the subsequent operating costs as low as possible.

The listed max. output torques are short-term peak values for winch drive applications. For gearboxes transmitting higher torques than those indicated in this product catalogue, please contact us. Our aim is to find the optimum drive configuration right from the start.

Operating conditions

The gearboxes are designed for use at ambient temperatures of between −25°C and +40°C. Surfaces and sealings are laid-out for use in harsh environment.

We design gearboxes for your specific application and requirements.

Motor adaptions

The gearboxes are designed for direct flange attachment of variable or fixed displacement hydraulic motors. Electric motors are also possible.

Gearboxes can be supplied including mounted motors. Adaptations are possible for various motor suppliers and types.

Gearbox supply

ZF planetary gearboxes are delivered ready for installation, without oil filling and are painted with standard RAL colours. Blank surfaces of external flanges, shaft extensions and mounting faces are protected against corrosion.

Integrated spring pressure multi-disk brake

As standard feature, the gearbox is equipped with hydraulically released multiplate brake. Integrated on the input side for parking, the brake is designed for the respective motor torque.

T= 1.6 x T

Options

Upon request, the drives can be supplied with the following accessories:

Winch drum:
An individual winch drum can be designed to your specification. Gearbox and drum are designed and delivered as complete module.

Counter bearing:
In addition to the standard delivery scope, standard winch drives can also be delivered with a long-term endurance counter bearing. The bearing system is designed and produced by ZF acc. to your individual requirements.

Limit switches:
Special counter bearings can also be designed with a connection option for specific gear cam limit switches.

Design and classification

Collective load class

The gearbox design is based on long years of experience as well as on state of the art engineering tools.

The maximum output torques $T_{2\,max}$ indicated under technical data relate to FEM Section I (see below) as well as DIN 15020. Standard classification categories are time category **T5** and K-factor 1 corresponding to collective load class **L2** and driver unit class **M5**.

The reference output speed is 25 rpm max. If your winch requires any other classification, the output torque is to be converted by the K factor (see table). This conversion gives you the maximum admissible output torque for the new driver unit class selected.

Gearbox selection

1. Calculation of output torque

$$T_2 = \frac{F \times D_W}{2}$$

T_2 = Output torque [Nm]
F = Cable pull in [N]
D = Relevant winding diameter in [m]

2. Calculation of corrected output torque

$$T_{2K} = T_2 \times K$$

T_{2K} = Corrected output torque [Nm]
K = Factor according to the service time category and collective group given in the table

3. T_{2K} of the gearbox to be selected must be ≤ T_{2max}

Classification categories acc. to FEM, Section I, 3rd Edition 1998

(FEM: Fédération Européenne de la Manutention)

Service time category	T2	T3	T4	T5	T6	T7	T8
Assumed average service time per day in hours	0.25 – 0.5	0.5 – 1	1 – 2	2 – 4	4 – 8	8 – 16	> 16
Theoretical service life in hours	400 – 800	800 – 1,800	1,600 – 3,200	3,200 – 6,300	6,300 – 12,500	12,500 – 25,000	25,000 – 50,000

Collective load class				Driver unit class					
Collective groups	L1	light	Maximum loads occurring in exceptional cases only, side loads constantly	M 1 0.68	M 2 0.71	M 3 0.74	M 4 0.77	M 5 0.79	M 6 0.82	M 7 0.86
	L2	medium	Small, medium and maximum loads about equally distributed over service time	M 2 0.90	M 3 0.93	M 4 0.97	M 5 1.0	M 6 1.03	M 7 1.08	M 8 1.12
	L3	heavy	Loads always near maximum	M 3 1.17	M 4 1.22	M 5 1.26	M 6 1.30	M 7 1.36	M 8 1.43	M 8 1.50
	L4	very heavy	Always maximum load	M 4 1.53	M 5 1.59	M 6 1.64	M 7 1.71	M 8 1.78	M 8 1.87	M 8 1.98

Classification examples (see FEM Section I, 3rd Edition, Table T.2.1.3.5.)

Type of crane (Designation)	Component operated[1)]	Driver unit class				
		Hoisting	Swinging	Level luffing	Trolley travelling	Crane travelling
Assembly cranes		M 2 – M 3	M 2 – M 3	M 1 – M 2	M 1 – M 2	M 2 – M 3
Loading bridges	Hooks	M 5 – M 6	M 4	–	M 4 – M 5	M 5 – M 6
Loading bridges	Grab or magnet	M 7 – M 8	M 6	–	M 6 – M 7	M 7 – M 8
Workshop cranes		M 6	M 4	–	M 4	M 5
Overhead travelling cranes, ram cranes, scrapyard cranes	Grab or magnet	M 8	M 6	–	M 6 – M 7	M 7 – M 8
Unloading bridges, container gantry cranes	Hooks or spreaders	M 6 – M 7	M 5 – M 6	M 3 – M 4	M 6 – M 7	M 4 – M 5
Other portal cranes (with trolley and/or slewing ring)	Hooks	M 4 – M 5	M 4 – M 5	–	M 4 – M 5	M 4 – M 5
Unloading bridges, container gantry cranes (with trolley and/or slewing ring)	Grab or magnet	M 8	M 5 – M 6	M 3 – M 4	M 7 – M 8	M 4 – M 5
Berth cranes, shipyard cranes, dismantling cranes	Hooks	M 5 – M 6	M 4 – M 5	M 4 – M 5	M 4 – M 5	M 5 – M 6
Dockside cranes (slewable, gantry type, ...), floating cranes, floating sheerlegs	Hooks	M 6 – M 7	M 5 – M 6	M 5 – M 6	–	M 3 – M 4
Dockside cranes (slewable, gantry type, ...), floating cranes, floating sheerlegs	Grab or magnet	M 7 – M 8	M 6 – M 7	M 6 – M 7	–	M 4 – M 5
Floating cranes and floating sheerlegs for very high loads (normally above 100 t)		M 3 – M 4	M 3 – M 4	M 3 – M 4	–	–
Shipboard cranes	Hooks	M 4	M 3 – M 4	M 3 – M 4	M 2	M 3
Shipboard cranes	Grab or magnet	M 5 – M 6	M 3 – M 4	M 3 – M 4	M 4 – M 5	M 3 – M 4
Tower cranes for construction sites		M 4	M 5	M 4	M 3	M 3
Derrick tower gantry		M 2 – M 3	M 1 – M 2	M 1 – M 2	–	–
Railway cranes approv. for service in trains		M 3 – M 4	M 2 – M 3	M 2 – M 3	–	–
Vehicle-mounted cranes	Hooks	M 3 – M 4	M 2 – M 3	M 2 – M 3	–	–

[1)] The column shows some typical areas of winch use for informative purposes.

Design and classification

Technical data

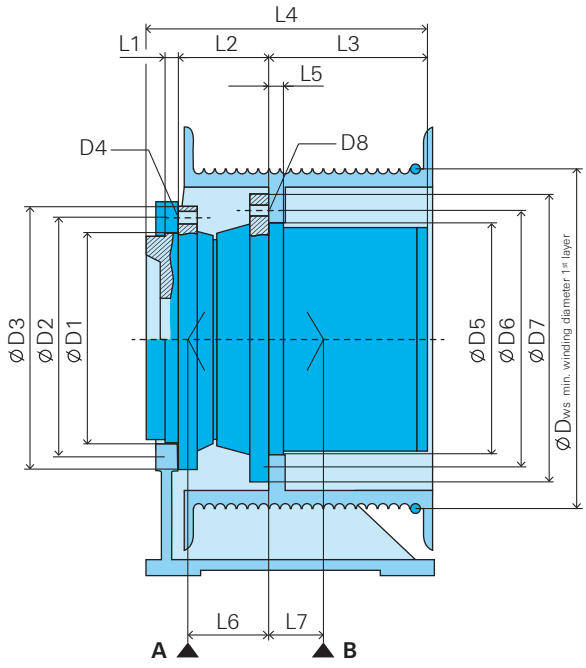
Type	Output torque[1] $T_{2\,max}$	Rope pull forces[2] max. kN	Transmission ratio i	Holding torque $T_{Br\,max}$ Nm
GPT 160 W3	140,000	370	133 • 210.8 • 251	1,400
GPT 220 W3	200,000	470	97.7 • 105.9 • 143.3 • 155.4 • 188.9 • 246.1 • 293	1,400
GPT 260 W3	240,000	530	155.4 • 188.1	1,450
GPT 330 W3	275,000	590	209.8 • 252	2,900
GPT 330 W3[3]	275,000	590	168.9 • 181.7	2x1,700
GPT 450 W4	325,000	680	293.4 • 421.7	2,300
GPT 580 W4	325,000	730	609.5	1,000
GPT 600 W3	435,000	760	243.5 • 289.5 • 326.5 • 580.2	1,800
GPT 800 W3	580,000	990	159.5 • 284.8 • 275.5 • 386.7	2,300
GPT 1100 W3[3]	800,000	1,200	401.5 • 599.7 • 614.9 • 532.5	2x1,700

[1] Design according to FEM L2, T5, M5

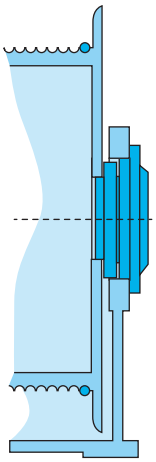
[2] Based on a theoretical 1st layer winding diameter D_{WS}

[3] 2 x motor input

Dimensions



Technical data of counter bearing on page 10



Optional

Dimensions, masses

Type	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm	D6 mm	D7 mm	D8 mm	D_{ws} mm
GPT 160 W3	450	510	560	30 x M24 x 2	535	600	650	30 x 30	750
GPT 220 W3	460	600	650	30 x M30	610	680	735	24 x 33	850
GPT 260 W3	560	630	685	28 x M30	620	750	810	28 x 33	–
GPT 330 W3	580	680	735	28 x M24	660	730	785	30 x 33	925
GPT 450 W4	580	680	735	36 x M30	670	750	810	36 x 33	–
GPT 580 W4	On request								
GPT 600 W3	670	750	815	30 x M30	885	975	1,055	24 x 39	–
GPT 600 W3	830	980	1,050	47 x M30	920	980	1,055	48 x 33	–
GPT 800 W3	1,100	1,230	1,310	47x M36	1,040	1,170	1,226	48 x 33	–
GPT 1100 W3	730	810	880	30 x M30	885	965	1,020	24 x 39	–

Type	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm	A + B C kN	A + B Co kN	Mass kg
GPT 160 W3	30	168	340	538	65	131.7	20,2	783	1,557	680
GPT 220 W3	21	170	350	560	60	155	35	710	1,560	820
GPT 220 W3	25	170	350	565	60	155	35	710	1,560	820
GPT 260 W3	55	175	412	642	30	163	37	930	930	950
GPT 330 W3	87	188	430	705	80	190	25	1,040	2,450	1,380
GPT 330 W3	20	188	430	705	70	190	25	1,040	2,450	1,380
GPT 450 W4	87	156	532	775	37	155	39	1,040	2,450	1,460
GPT 580 W4	On request									1,640
GPT 600 W3	60	242	459	1,167	75		On request			2,500
GPT 600 W3	30	229	673	1,332	64		On request			3,500
GPT 800 W3	72	503	585	1,524	100		On request			3,800
GPT 1100 W3	57	245	464	1,161	75		On request			6,700

Standard counter bearing

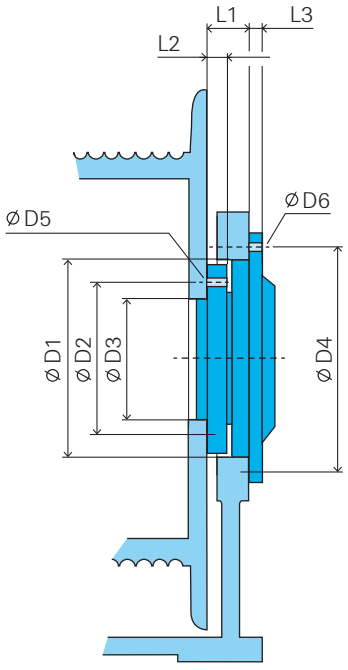
Counter bearings support and stabilize drum and gearbox.
Additional sizes on request.

Technical data

Gear Size	D1 H7/j6 mm	D2 mm	D3 H7/j6 mm	D4 mm	D5 mm
GPT 160 – 330	260	220	180	295	12 x Ø22

Gear Size	D6 mm	L1 mm	L2 mm	L3 mm	Mass approx. kg
GPT 160 – 330	8 x Ø18	102	25	20	30

Dimensions



Customer specification GPT-W

In order to work out a quotation for your **winch application**, we kindly ask you to fill out this spec sheet.

Please send your inquiry to **sales.ii@zf.com**

Please enclose existing drawings and diagrams.

Company:

Name/Dept.:

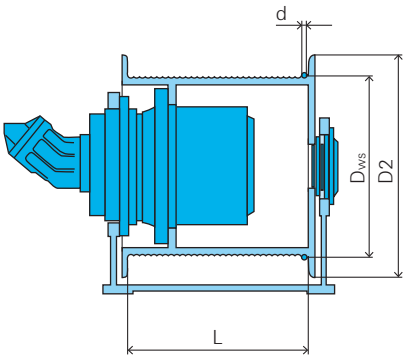
Location/City:

Phone:

E-mail:

Date:

Operating data / design (all values based on the 1. rope layer)



Standard scope of supply

Transmission unit

Optional scope of supply

- ☐ Counter bearing
- ☐ Rope drum
- ☐ Winch frame

Application

☐ Hoisting winch ☐ Boom hoist winch ☐ Auxiliary winch ☐ Pulling winch

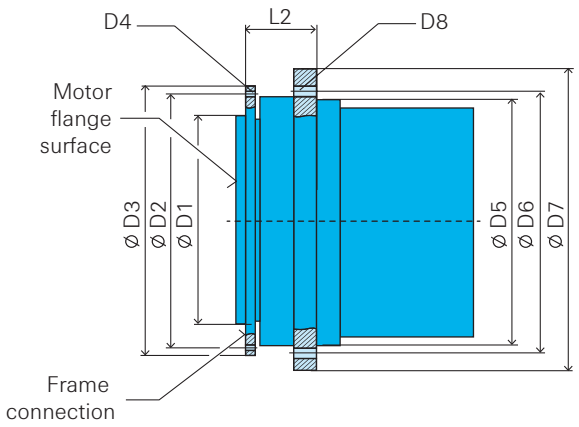
☐ Other: _____

Rating acc. to FEM Section I or alternatively load spectrum	T _____ L _____ M _____	
Ambient temperature	from _____ to _____	°C
Operating machine weight	_____	t
Lifting capacity, max.	_____	t
Rope pull (top rope layer)	F _____	N
Rope speed (1. rope layer)	V_1 _____	m/min
Rope speed (top rope layer)	V_2 _____	m/min
Rope diameter	d _____	mm
Number of rope layers, max.	Dws _____	
Winding diamet. (1. rope layer)	Dwx _____	mm
Winding diamet. (top rope layer)	D2 _____	mm
Width of rope drum	L _____	mm

Technical data gearbox

Gearbox size	GPT-W _____	
Max. output torque	$T_{2\,max}$ _____	kNm
Max. drive speed	n_2 _____	1/min
Ratio	i _____	
Multiple-disk parking brake	yes ☐ no ☐	
Min. parking torque	_____	Nm

Operating data / design



Dimensions of gearbox

Standard dimensions see valid “technical data sheet”.
For special requirements please complete table.

D1 _____ mm

D2 _____ mm

D3 _____ mm

D4 No./Thread _____ pcs. _____

D5 _____ mm

D6 _____ mm

D7 _____ mm

D8 No./Thread _____ pcs. _____

L2 _____ mm

Technical data gearbox

Release pressure, max. P_{max} _____ bar

Release pressure, min. P_{min} _____ bar

Top coat specific yes ☐ no ☐

Colour RAL no. _____

Technical motor data

Motor type hydraulic ☐ electric ☐

Motor - supplier _____

- type code _____

Details for hydraulic motor:

Displacement $V_{g\,min}$ _____ cm^3

Displacement $V_{g\,max}$ _____ cm^3

Working pressure Δp _____ bar

Input flow, max. $q_{v\,max}$ _____ l/min

Details for electric motor:

Nominal power _____ kW

rpm _____ /min

General information

Estimated number of gearboxes per year _____

Delivery date: Prototype/Serial start _____

Are there any legal requirements and/or other standards to be considered? yes ☐ no ☐ if yes, please specify

_____

_____

Further requirements (e.g. application details, customer drawings, type plate, limiting dimensions, noise and vibration requirements ...):

Additional product portfolio

Travel drive gearboxes

- Planetary gearboxes
  GPT/GFA
  Technical documentation
  ZF 77110

Swing gearboxes

- Planetary gearboxes
  GFB
  Technical documentation
  ZF 77201

Pump distribution gearboxes

- GFC
  Technical documentation
  ZF 77301

Industrial gearboxes

- Redulus GMH/GME
  Technical documentation
  ZF 76120
- Technical documentation
  Power packs
  ZF planetary gearboxes
  for industrial applications
  ZF 76121

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