Swing Gearboxes GFB

Highest precision with ZF swing gearboxes

GFB planetary gearboxes are swing gears. They are suitable for use in excavators and cranes of all types, in ship unloading equipment, and in all applications where accurate positioning is needed.

Features

- Standard output torques between 40 and 740 kNm
- Swing gearboxes for various mobile and industrial applications as well as wind industry
- Compact, space-saving planetary design
- Two-, three or four-staged
- Easy mounting
- Comfortable oil change
- Integrated spring-applied multiple-disk brake
- Low-noise operation
- High efficiency
- Long life-time

Description

GFB gearboxes are designed with two, three or four stages and include an integrated multi-disk brake, an output pinion and optionally a motor.

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 swing 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.

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 swing gearboxes GFB 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 swing drive applications.

For gearboxes transmitting higher torques or showing different dimensions 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.

Oil change and lubrication

Except for regular oil changes the gearboxes do not require maintenance. Oil changes may conveniently be made from the outside. The oil change intervals for different operating conditions are also specified in the operating manual. The gear teeth and bearings are splash lubricated.

The pinion-side antifriction bearing of the output shaft is grease-lubricated for life.

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 swing gearbox is listed in another driver unit class, 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

T_2 = Output torque [Nm]
T_{2K} = Corrected output torque

K factor according to device time category and collective group given in the table.

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

T_{2K} of the gearbox to be selected must be ≤ $T_{2\ max}$ (according to this product catalog).

Spring applied multi-disk brake
$T_{Br\ sta.\ min} = 1.3 \times T_2$ (input torque)

The holding torque multiplies with the selected transmission ratio.

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
Calculated 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 with K-factor						
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	medi-um	Small, medium and maxi-mum 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, scrap yard 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 gantry 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 shearlegs	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 shearlegs	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 approx. 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] This column shows some typical uses for general information.

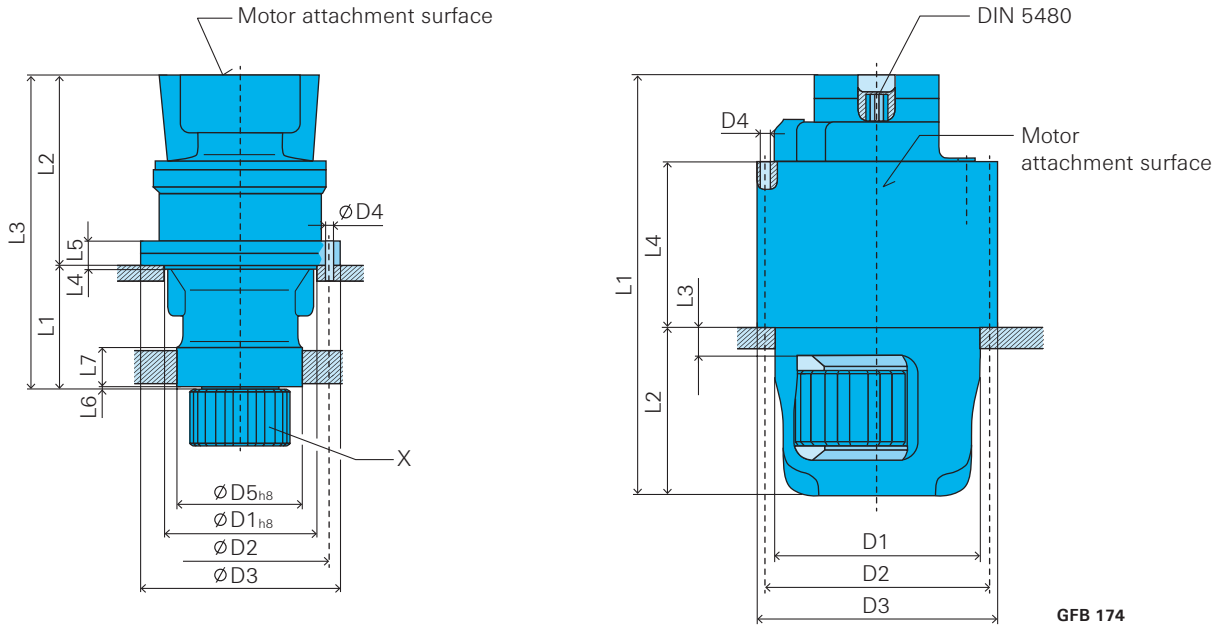
Dimensions and technical data

Technical data

Type	Application	Output torque[1)] $T_{2\,max}$ Nm	Gear ratio from/to i
GFB 118 T4	others	40,000	710.89
GFB 144 T2	excavator	54,000	49.28
GFB 150 T2	excavator	62,000	62.2
GFB 174 T2	excavator	115,000	63.6

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

Dimensions



GFB 174

X = The gearing of the output pinion (module, number of teeth, tooth width, etc.) is determined by the customer's ring gear.

Type	Mass kg	D1 mm	D2 mm	D3 mm	D4 mm	D5 mm
GFB 118 T4	530	440	500	540	30 x Ø22	360
GFB 144 T2	1,000	n/a	520	562	24 x Ø26	460
GFB 150 T2	1,100	n/a	520	562	24 x Ø26	460
GFB 174 T2	1,880	600	660	700	34 x Ø26	–

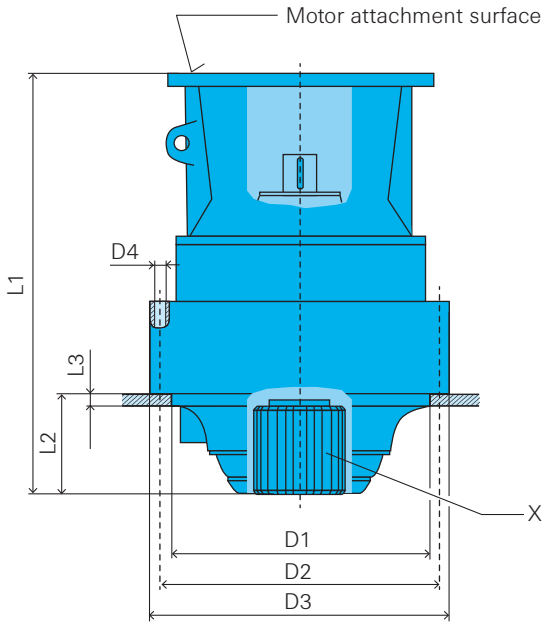
Type	L1 mm	L2 mm	L3 mm	L4 mm	L5 mm	L6 mm	L7 mm
GFB 118 T4	399.5	458	797.5	14	80	4	90.5
GFB 144 T2	85	655	942	n/a	655	30	n/a
GFB 150 T2	85	655	942	n/a	655	30	n/a
GFB 174 T2	1,234	495	85	481	–	–	–

Technical data

Type	Application	Output torque[1)] $T_{2\,max}$ Nm	Gear ratio from/to i	Mass kg
GFB 215	rope shovel/dragline	130,000	45.8	2,100
GFB 390	rope shovel/dragline	740,000	32.26	11,000

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

Dimensions



X = The gearing of the output pinion (module, number of teeth, tooth width, etc.) is governed by the customer's ring gear.

Type	D1 mm	D2 mm	D3 mm	D4 mm
GFB 215	820	910	850	16 x Ø39
GFB 390	1,330	1,440	1,540	36 x Ø52

Type	L1 mm	L2 mm	L3 mm
GFB 215	1,283	180	25
GFB 390	2,155	511	60

Customer specification GFB

In order to work out a quotation for your **swing 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:

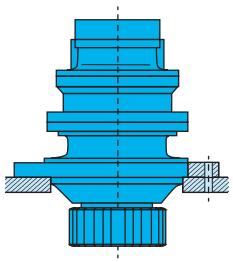
Phone:

E-mail:

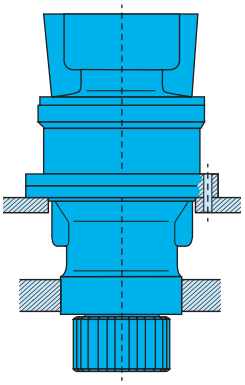
Date:

Operating data / design

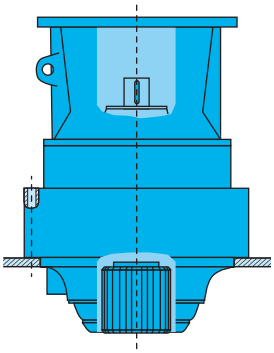
☐ One centering seat with motor



☐ Two centering seats with motor



☐ With inner splined shaft



Type of machine

Rating acc. to FEM section I — T _____ L _____ M _____

or alternative load spectrum _____

Ambient temperature from/to _____ °C

Operating machine weight _____ t

Hydraulic lifting power, max. _____ t

Superstructure speed n_o _____ rpm

Superstructure torque T_o _____ rpm

Duty cycles per minute _____

Gearbox

GFB _____

Output torque, max. $T_{2\,max}$ _____ rpm

Output speed, max. $n_{2\,max}$ _____ rpm

Ratio i _____

Output pinion

No. of teeth z _____

Module m _____ mm

Tooth width b _____ mm

Pressure angle _____ degrees

Profile shift coefficient x _____

Pinion mounting position ☐ bottom ☐ top ☐ horizontal

Gearbox with eccentricity ☐ no ☐ yes _____ mm

Operating data/design

Slewing ring

Slewing ring manufacturer _____

Type _____

Design of slewing ring internal gearing ☐ external gearing ☐

No. of teeth slewing ring z _____ mm

Tooth width of slewing ring b _____ mm

Center dist. pinion – gear ring _____ mm

Brake

Multi-disk parking brake yes ☐ no ☐ if yes: wet ☐ dry ☐

Min. parking torque of multi-disk parking brake _____ Nm

With mech. unlocking device yes ☐ no ☐

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

Winch gearboxes

- Planetary gearboxes
  GPT-W
  Technical documentation
  ZF 77502

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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