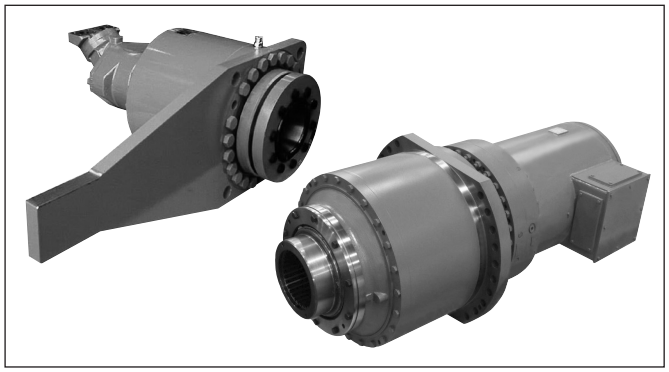
INDUSTRIAL GEARBOXES

REDULUS GMH/GME



- Nominal sizes from GMH/GME 160 to 7000
- Output torques between 70 and 3,300 kNm
- Suitable for installation of hydraulic or electric motor

Features

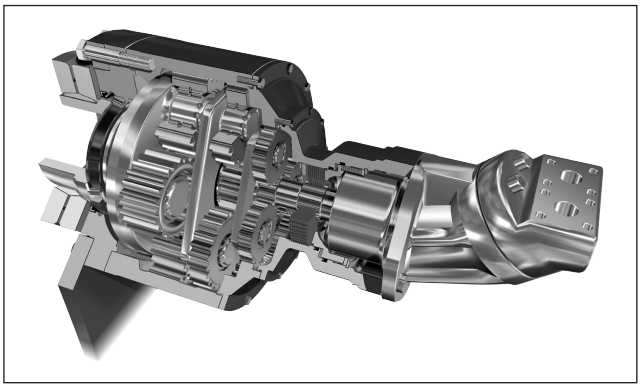
- Compact, space-saving planetary design
- Reliable, high-quality components
- Easy mounting
- High mechanical efficiency
- Silent operation

Content

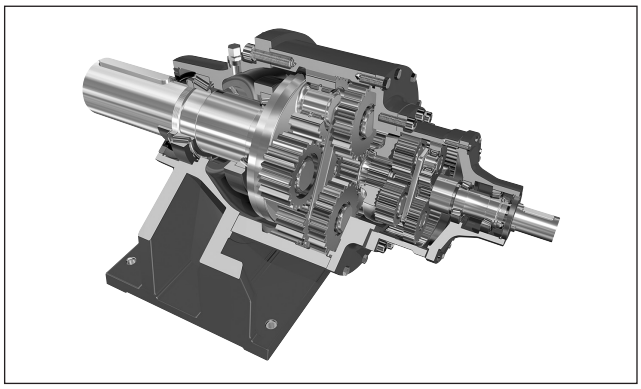
Description

ZF planetary gearboxes REDULUS GMH/GME are reliable drive components that have proved themselves successfully in a wide range of operating conditions.
Long years of experience and a wide spectrum of products have made us specialists for all kinds of demands of industrial applications.
Our quality management acc. to DIN EN ISO 9001 2000 constitutes the basis for a continuously high quality level.
A dedicated team of R&D-, design- and sales engineers makes sure that customer requests are transferred into the best technical and economical solution. Our state-of-the-art calculation programs for gearing design and component optimization help us to fulfill the highest technical standards.

The technical details in this catalogue will assist you in selecting the suitable planetary gearbox for your particular application. Additionally, our competent technical sales team will gladly provide advisory services even at the project stage.



Design Example REDULUS GMH



Design Example REDULUS GME

General Notes

The most characteristic features of our planetary gearboxes REDULUS GMH/GME are the compact design and the extremely high mechanical efficiency.
The design of the hydraulic drives REDULUS GMH with hydraulic motor plus planetary gearbox offers an intelligent solution for an efficient combination of hydrostatic power transmission and mechanical torque multiplication. We also offer planetary gearboxes for electric REDULUS GME as efficient supplement to the complete drive arrangement.

Design Variants
The ordering codes on pages 6/7 provide an overview of the available design variants.

Precise Transmission Ratios
The calculated precise transmission ratios are listed in the table on page 10.
The transmission ratio ranges of the individual gearbox sizes are shown on page 9.

Housings
Housings of nodular cast iron are standard. Where ring gears are part of the housing they are made of quenched-and-tempered steel. Other materials are available on request.

Output
Where the gearbox design features a shrink disk, this disk is included in the scope of supply. The hollow-shaft of the gearbox is designed in such a way that it will safely absorb the weight of the unit and the reaction forces exerted by the torque arm.

Input
For direct motor attachment the input shaft has been designed as sleeve with internal profile acc. to DIN 5480 for the accommodation of the motor shaft.

Seals
The standard scope of supply includes input- and output shaft sealed with radial shaft seal rings on replaceable wearing sleeves.

Mounting position
The gearboxes can be mounted in any position. However, the desired mounting position must be specified so that we can ensure proper lubrication.

Bearings
Gear wheels, planet carriers and shafts are carried exclusively in antifriction bearings.

Scope of Supply
ZF planetary gearboxes REDULUS are delivered ready for installation, but without oil filling. By default, an external paint coat (blue RAL 5015) is applied. The gearbox interior is protected against corrosion for a period of 24 months if the unit is stored in a dry place.
External flanges, shaft extensions and mating faces are adequately preserved.

Weights, Oil Volumes, Dimensions
The specified weights and oil volumes are average figures. Gearbox operators should rely on oil level readings rather than the specified oil volumes.
Figures and dimensions are not strictly binding. We reserve the right to make changes in line with technical progress.

Noise Characteristics
The gearbox design has been optimized with respect to noise generation. The noise levels produced are in conformity with the relevant provisions of VDI 2159.

Gear Teeth
Spur and planet gear wheels are straight-toothed, case-hardened and correctively ground. Ring gears are made of quenched and tempered nitrided material. Bevel gears are designed with HPG teeth or toothing is case-hardened and surface ground.
All gear teeth are designed for adequate fatigue strength at the rated torque indicated.

Lubrication
The gearboxes are designed for splash lubrication. Where gearboxes are mounted in inclined or vertical position, appropriate measures for effective lubrication will be taken.
Proprietary gear oils with EP-additives are suitable for lubrication. We recommend brands that have successfully passed the 12th load stage of FZG testing (A/8, 3/90) acc. to DIN 51354. Our gear oil recommendations are listed in the operation manual.

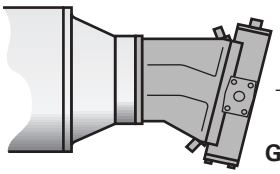
Cooling
Up to the admissible thermal power limit P_T, see page 12, cooling is achieved by heat dissipation through the gearbox housing. Where this limit is exceeded, cooling fans or water coolers are used. Please contact us for cooling in vertical mounting positions.

Further Notes
As prescribed by statutory provisions, all rotating parts must be protected against accidental contact. Local safety regulations must be complied with.
Commissioning and maintenance of the gearboxes must be performed in line with our operating manual. For shaft-mounted gearboxes with torque arm, it has to be to ensure that the torque arm is attached to the foundation in a manner to allow the gearbox to move with machine shaft displacement at any time without restraining forces acting on it.
Any coupling arranged between the gearbox and the prime mover must also be designed to allow such movement.

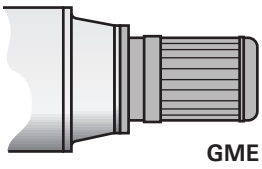
Hydraulic Motors
For proper operation of the hydraulic motors, please follow the motor manufacturer's instructions.

Electric Motor (Direct Attachment)
Please note that for this installation variant, the motor must be oil-tight and the motor locating bearing needs to be facing the gearbox.

Ordering Code



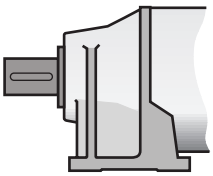
GMH



GME

0160	0200	0220	0300	0330	0425	0600	0615	0870
1,100	1,500	2,300	2,800	3,400	4,600	5,500	7,000	

S



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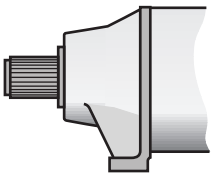
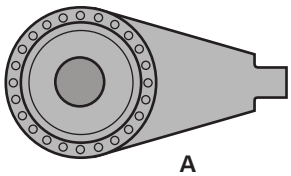


Z

N



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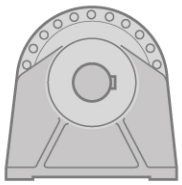

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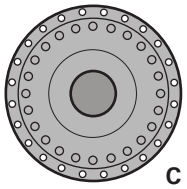

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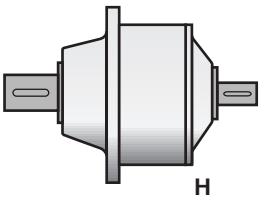

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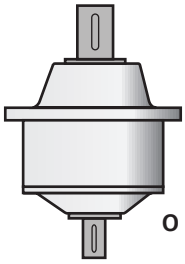

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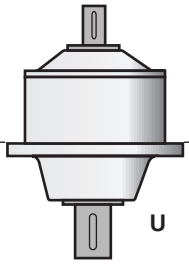

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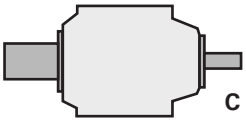

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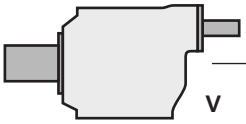

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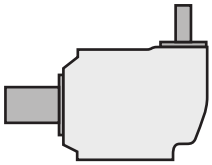

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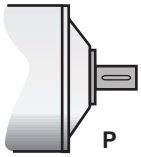

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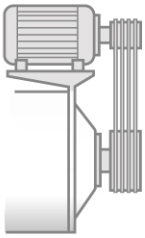

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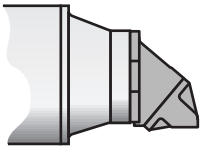
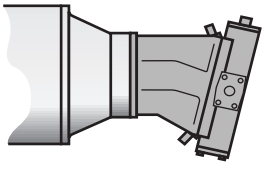
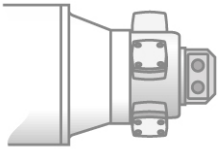






* on request

REDULUS GME 0220 T3 Z C O 64.4 H C O P

Type
GMH Hydraulic Drive
GME Electric Drive

Gearbox Size

Number of Gear Stages

Output Side
S hollow shaft
P shaft with key
Z male splined shaft
N female splined shaft

Housing Design
A torque arm
B * foot-mounted
C flange-mounted

Bremse
O without brake
B with brake

Gear Ratio

Mounting Position
H horizontal
O vertical, output upwards
U vertical, output downwards

Position of Input Shaft
C coaxial (standard)
V offset (angle spur gear stage)
W angle-type (bevel gear stage)

Cooling
O no cooling
W oil/water cooling compartment
E external cooling

Electric Drive
P shaft with key
D direct-attached motor
L motor bell housing and coupling
R * belt transmission

*** on request**

Hydraulic Drive

Standard gearboxes are listed in this catalogue. For any special gearboxes like superimposed gearboxes, jack-up gears, gear units for tunnel boring machines, etc. our technical sales team will gladly assist you.

Gearbox Selection

$$T_{2\ cont.} \geq f_S \bullet T_{op.}$$

$T_{2\ cont.}$ = Gearbox continuous output torque (Nm), see table on page 7

f_S = Service factor, see table page 6

$T_{op.}$ = Operating torque of driven machine (Nm)

For certain applications a gear unit design which is limited-life fatigue-resistant may be sufficient.
Our sales team will assist you in the calculation of the service time determination and the selection of the best gearbox for your particular application.

Service Factor f_S

Load Classification		Hydraulic motor	Electric motor
Uniform, no shock	U	0.75	0.75 - 0.90
Reversing operation, moderate shock	M	0.75 - 0.90	0.90 - 1.10
Reversing operation, heavy shock	H	0.90 - 1.10	1.10 - 1.30

Load Classification[1] of Driven Machines

Dredgers and Bucket Wheels
- Bucket wheel excavat. H
- Travel drives
  - track laying H
  - rail M
- Bucket wheels H
- Swing gears M
- Sand mixers M

Mining- and Mineral Products
- Crushers H
- Briquetting presses H
- Rotary tubular kilns H
- Roller presses H
- Clay mixers M

Chemical Industry
- Mixers M
- Agitators
  - pure liquids U
  - liquids and solids M
- Drying drums M

Petroleum Industry
- Drilling pumps H
- Filter presses M
- Pipeline pumps M
- Slush pumps M

Conveyors
Load
- uniformly U
- medium M
- heavy M
- Bucket conveyor M
- Assembly lines M
- Belt conveyors M
- Chain conveyors M
- Apron feeders M
- Screw conveyors M
- Inclined hoists H
- Dischargers M
- Car dumper H

Rubber and Plastics Extruders
- rubber H
- plastics M
- Calenders M
- Rubber kneaders H
- Mixers M
- Grinders, rubber M
- Mills, rubber H

Metallurgical Industry
- Revolving furnace M
- Converters H
- Slag ladle car U
- Sinter conveyors M
- Toothed roll crusher H
- Torpedo mixers M

Cranes
- Drive gears M
- Hoisting gears M
- Swing gears M
- Winches M

Metal Working Machinery
- Folding presses H
- Plate bending mach. M
- Plate straight. mach. H
- Eccentric presses H
- Hammers H
- Crank presses H
- Shears M
- Forging presses H
- Machine tools
  - main drives M
  - auxiliary drives U

Mills, Rotary Type
- Grinding pans H
- Ball mills H
- Tube mills H
- Bowl mill crushers H

Food Industry
- Bottling machines U
- Kneading machines M
- Mash tubs M
- Presses H
- Cane crushers M
- Sugar cane mill H
- Sugar cane cutters M
- Beet slicers M

Cableways
- Cable cars M
- Material conveyors H
- Drag lifts M
- Ropeways M

Rolling Mills
- Plate turnover gears M
- Ingot pushers H
- Ingot conveyors H
- Scale breakers H
- Walking beam convey. H
- Cross transp. drives M
- Cooling banks M
- Ladle turnables M
- Transfer skids M
- Tube weldings H
- Tube drawing mach. M
- Roller straighteners M
- Shears
  - plate H
  - wire M
  - billets H
  - cropping H
  - trimming M
- Conveying straight. M
- Conveying straight. H
- Roller adjust. equipm. M

Water Treatment
- Filter presses M
- Rotary aerators M
- Rake drives U
- Thickeners H

1) The load classifications indicated are based on experience. For driven machines other than listed or in case of operating conditions deviating from normal, please consult our sales department.

Standard Transmission Ratio Ranges
(Coaxial Gearbox Design)

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

i = required gearbox transmission ratio
n_1 = drive motor speed in min^{-1}
n_2 = driven machine speed in min^{-1}

Gearbox Size	Continuous Output Torque $T_{2\ cont.}$ Nm	Ratio Range 2-staged	Ratio Range 3-staged	Ratio Range 4-staged
160	70,000	18 - 24	62 - 252	305 - 576
200	78,600	28 - 56	87 - 265	514 - 2,334
220	105,000	19 - 28	64 - 366	*
300	117,000	28 - 56	87-312	514 - 1,506
330	150,000	21 - 24	89 - 303	*
425	162,000	28 - 56	121 - 265	489 - 981
600	300,000	24	*	*
615	245,000	29 - 55	123 - 265	478 - 981
870	328,000	29 - 55	154 - 502	529 - 1,137
1100	470,000	29 - 55	154 - 502	529 - 1,137
1500	670,000	29 - 55	154 - 502	529 - 1,137
2300	1,000,000	25 - 50	*	*
2800	1,300,000	26 - 50	*	*
3400	1,500,000	28 - 56	*	*
4600	2,050,000	*	*	*
5500	2,675,000	*	*	*
7000	3,300,000	*	*	*

* on request

Precise Ratios

Gearbox Sizes	2-staged	3-staged	4-staged
160	**18.37 • 20.71 • 24.00**	**94.71 • 102.60 • 104.25 • 140.51 • 192.59 • 211.77 • 252.00**	**305.03 • 398.57 • 576.00**
200	**28.23 • 30.53 • 33.33 • 47.37**	**109.02 • 265.26**	**1,136.84 • 1,504.34**
220	19.14 • 28.00	**64.43 • 81.23** • 98.69 • **106.92 • 144.38** • 146.43 • 156.41 • 189.91 • **247.06 • 366.00**	*
300	**30.53 • 33.33 • 36.84 • 39.47 • 47.37**	**87.41 • 312.42**	**794.31**
330	20.71	**113.93** • 169.86 • 210.86 • 253.01 • 303.43	*
425	**28.23 • 47.37**	**265.26**	*
600	*	*	*
615	**33.84**	*	*
870	**33.84**	**203.01**	*
1100	*	**214.29**	*
1500	*	*	*
2300	*	*	*
2800	*	**141.48**	*
3400	*	*	*
4600	*	*	*
5500	*	*	*
7000	*	*	*

bold type = preferred ratio

Mechanical Review

Gearbox Size	Continuous Output Torque $T_{2\ cont.}$ Nm	Output Speed for $L_{h\ 10}$ = 10,000 n_{Lh} min
160	70,000	27.1
200	78,600	80.9
220	105,000	37.1
300	117,000	115.5
330	150,000	16.2
425	162,000	89.4
600	300,000	27.8
615	245,000	50.7
870	328,000	91.4
1100	470,000	42.1
1500	670,000	40.7
2300	1,000,000	21.7
2800	1,300,000	19.7
3400	1,500,000	43.4
4600	2,050,000	12.5
5500	2,675,000	16.0
7000	3,300,000	8.1

The continuous output torques shown in this table are based on the following conditions:

- no-shock operation
- up to five starts per hour with an admissible start-up factor $C_{zul.}$ as high as 3-times the rated torque.

The exact admissible start-up factor for a specific gearbox size and type can be seen from the table on page 11.
In case of more frequent starts and higher start-up factors please contact our sales team.

Review of max. Starting Torque T_M

$$T_M \bullet i_{nom.} \bullet \frac{f_M}{T_{2\ cont.}} = C \leq C_{adm.}$$

T_M = rated motor torque
$i_{nom.}$ = transmission ratio
f_M = motor start-up factor
$T_{2\ cont.}$ = continuous output torque of gearbox
C = start-up factor
$C_{adm.}$ = admissible start-up factor

Gearbox Size	Related Output Torque	Admissible Start-up Factor related to Output-Side Attachment	
	T_N Nm	Flange-/ Foot-mounted $C_{adm.}$	Hollow Shaft with Shrink Disk $C_{adm.}$
160	70,000	3.0	2.0
200	78,600	2.6	2.3
220	105,000	3.0	2.3
300	117,000	2.3	2.1
330	150,000	2.5	1.6
425	162,000	2.4	2.4
600	300,000	3.0	*
615	245,000	2.0	2.0
870	328,000	2.6	2.2
1100	470,000	2.5	2.1
1500	670,000	2.7	2.2
2300	1,000,000	2.2	1.9
2800	1,300,000	*	*
3400	1,500,000	*	*
4600	2,050,000	*	*
5500	2,675,000	*	*
7000	3,300,000	*	*

* on request

Calculation of Bearing Life L_{h10}

$$L_{h10} = \left(\frac{T_{2\ cont.}}{T_{LH}}\right)^{10/3} \bullet \left(\frac{n_{LH}}{n_2}\right) \bullet 10{,}000\ h$$

L_{h10} = nominal bearing life in h
$T_{2\ cont.}$ = continuous output torque of gearbox in Nm, see page 7
T_2 = operating torque for calculation of bearing life in Nm
n_{LH} = gearbox output speed for L_{10h} = 10,000 h in min^{-1}, see page 8
n_2 = operating output speed of gearbox in Nm (speed of driven machine)

Additional forces

If there are any additional radial or axial forces acting on the input and/or output shaft, the shaft and bearing selection needs to be reviewed by our sales partner.

The following information is required for this review:
- dimensioned drawing with force application points
- specification of radial and/or axial forces
- lever arm in the event of circumferential forces (see design data sheet REDULUS GMH/GME, page 19)

Review of Thermal Loads

Next to the review of the mechanical loads, thermal loads need to be reviewed, too.

Admissible thermal power limit P_T

$$P_T = P_{th} \bullet f_W \bullet f_A$$

Additional cooling is not required in case of:

$$P_T > P_{requ.}$$

Additional cooling is required in case of:

$$P_T < P_{requ.}$$

Options for additional cooling:

- oil and water chamber on the gearbox
- built-on or separate fan
- connected oil/air or oil/water cooler

$P_{requ.}$ = required power of driven machine in kW
P_T = admissible thermal power of gearbox in kW
P_{th} = thermal limit rating in kW (see table page 10)
f_W = thermal factor (see table page 10)
f_A = load factor (see table page 10)

Thermal factor f_W

Relative Duty per hour in %	Ambient Temperature 10°	20°	30°	40°	50°
100	1.13	1.00	0.87	0.74	0.60
80	1.20	1.07	0.92	0.79	0.64
60	1.31	1.16	1.02	0.86	0.71
40	1.53	1.35	1.18	1.01	0.82
20	2.00	1.78	1.55	1.32	1.08

Load factor f_A

$$\frac{T_{Betr.}}{T_{2\ cont.}} \bullet 100 = \text{Utilization in \%}$$

%	20	30	40	50	60	70	80	90	100
f_A	0.52	0.66	0.77	0.83	0.88	0.92	0.95	1.00	1.00

$P_{op.}$ = operating torque of driven machine
$T_{2\ cont.}$ = continuous output torque of gearbox

Nominal thermal power limit P_{th} in kW

Gearbox Size	Location								
	Small Rooms			Large Rooms			Outdoors		
	Transmission Stages								
	2-staged	3-staged	4-staged	2-staged	3-staged	4-staged	2-staged	3-staged	4-staged
160	47	35	30	66	50	41	97	69	57
200	59	45	37	81	63	52	113	87	71
220	58	44		81	61		112	84	
300	80	60	48	110	84	68	153	116	94
330	69	52		97	73		133	100	
425	100	80	66	138	111	92	192	154	127
600	120			168			232		
615	130	100	81	179	139	114	249	193	157
870	156	121	96	216	170	134	301	235	186
1100	197	153	124	273	215	173	379	296	239
1500	303	227	182	419	314	251	582	436	349
2300	331	258	219	458	357	303	636	496	420
2800	370	291	248	512	403	344	712	560	478
3400	433	334	280	600	462	388	833	641	538
4600	494			691			955		
5500	744			1,030			1,434		
7000	877			1,228			1,695		

All figures are average values. We will be pleased to check your selection in questionable cases.

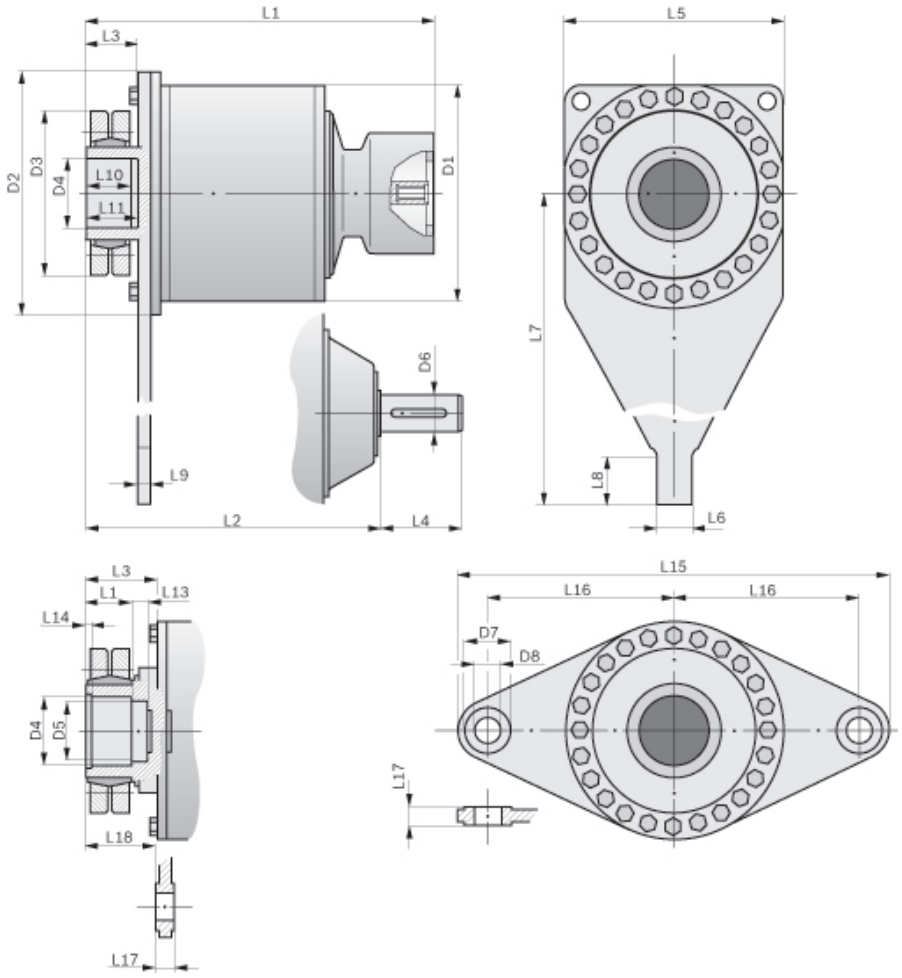
The figures are valid for:

- gearbox utilization 90 - 100 %
- relative duty factor ED = 100 %
- ambient temperature T_U = 20° C
- max. oil temperature $t_{oil\ max.}$ = 90° C
- horizontal mounting position

Heat transmission into the foundation has been assumed to be 10 %.

For a gearbox with a direct-attached hydraulic motor, the thermal limit rating given in the table must be multiplied with a factor of 1.25 for two-staged and 1.2 for three-staged types. (Assumed: approx. 60° C oil temperature in the hydraulic circuit).

Standard Dimensions for gearbox type: Hollow shaft with shrink disk (coaxial design)



Machine shaft strength
$R_e \geq 500\ N/mm^2$

Surface roughness of machine shaft
$R_a \leq 3.2\ \mu m$

Tolerance range for shaft diameter D_6
≤ diameter 50 mm: k6
> diameter 50 mm: m6

Keys acc. to DIN 6885 page 1

Splined shaft profile acc. to DIN 5480

The shown dimensions are standard values. Please contact our sales partner for special/further dimensions

Dimensions (in mm)

Gearbox Size	D1	D2	D3	D4	D5	D6			D7	D8	L1			L2			L3
				H7	H7	2-st	3-st	4-st			2-st	3-st	4-st	2-st	3-st	4-st	
160	545	545	405	180			55	40				863	789		755.5	846.5	116.5
200	600	600	430	200	180						790						243
220	610	735	460	220								870.5					288.5
300	705	705	460	220	200		80				885		1,038.5		1,039		262.5
330	660	785	460	220	200							951					
425	790	790	570	260	240						1,010	1,151					315
600	885																
615	900																
870	990	900	650	290	260							1,516					320
1100	1,100	990	660	310	280							1,188					
1500	1,140	1,100	770	360	330		80		180	130		1,698			1,502		
2300	1,270								*								
2800	1,365	1,170	850	400	360				*	180		1,727					350
3400	1,550								*								
4600	1,670								*								
5500	1,770								*								
7000	1,970								*								

* on request

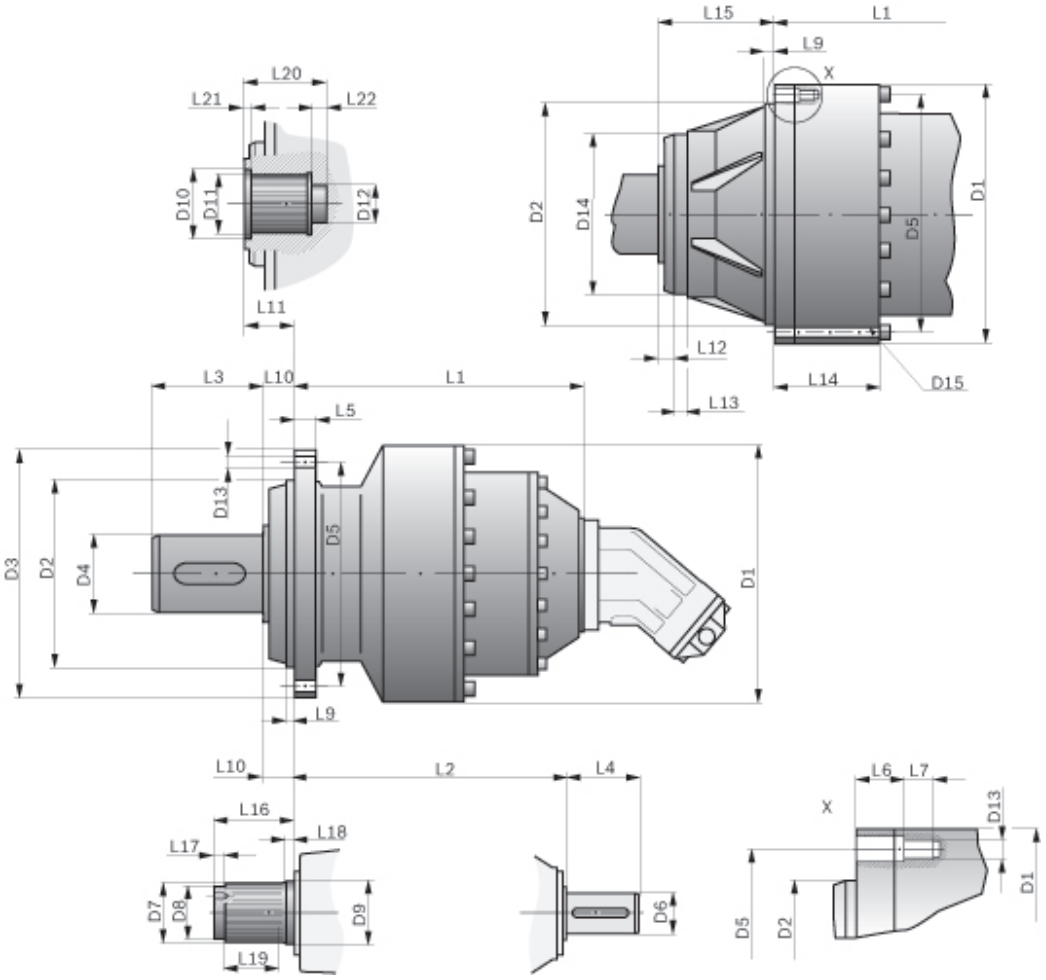
2-st = 2-staged, 3-st = 3-staged, 4-st = 4-staged

Gearbox Size	L4			L5	L6	L7	L8	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18
	2-st	3-st	4-st														
160		85	65	545	160	1,345	190	40	106	121							
200				600	120	1,050	100	30			158	117	38				
220				735	120	1,050	100	30	140	155							
300		85		705	140	1,355	110	30			176	128	40				
330											176	128	40				
425				790	160	1,460	120	40			201	150	43				
600																	
615				900	170	1,765	130	50			216	164	46				
870											216	164	46				
1100		140									247	198	42	2,040	900	70	352.5
1500				1,170	240	2,230	160	50			275	235	21	2,350	1,000		
2300									*								
2800									*								
3400									*								
4600									*								
5500									*								
7000									*								

* on request

2-st = 2-staged, 3-st = 3-staged, 4-st = 4-staged

Standard Dimensions for gearbox type: Flange-mount (coaxial design)



Tolerance range for shaft diameter D_6
≤ diameter 50 mm: k6
> diameter 50 mm: m6

Keys acc. to DIN 6885 page 1

Splined shaft profile and internal spline acc. to DIN 5480

The shown dimensions are standard values. Please contact our sales partner for special/further dimensions

Dimensions (in mm)

Gearbox Size	D1	D2	D3	D4	D5	D6			D7	D8	D9	D10	D11	D12	D13	D14	D15
		h7		m6		2-st	3-st	4-st		k6	k6	H7		H7		h7	
160	550	455	180	500											30xM24x2		
200	600	520			560	65						205	N 180x5x30x38x9H	180	30xM20x1.5		30xø22
220	610	500	730		675							202	N 200x5x30x38x9H		30xø26		
300	705	710	860		810	80						225	N 220x5x30x42x9H	200	36xø26		
330									*								
425									*								
600									*								
615									*								
870									*								
1100									*								
1500									*								
2300									*								
2800									*								
3400									*								
4600									*								
5500									*								
7000									*								

* on request

2-st = 2-staged, 3-st = 3-staged, 4-st = 4-staged

Gearbox Size	L1			L2			L3	L4			L5	L6	L7	L9	L10	L11	L12	L13	L14	L15	L16	L17	L18	L19	L20	L21	L22
	2-st	3-st	4-st	2-st	3-st	4-st		2-st	3-st	4-st																	
160		645	696				300					45	30	20						202.5	180	25	25	90			
200				670	685			140				35	38	10	195				260						200	50	30
220		750									41			10	157.5										120	20	
300			774	861				105			48			15	155										230	50	30
330											*																
425											*																
600											*																
615											*																
870											*																
1100											*																
1500											*																
2300											*																
2800											*																
3400											*																
4600											*																
5500											*																
7000											*																

* on request

2-st = 2-staged, 3-st = 3-staged, 4-st = 4-staged

Weights and Oil Volumes

Gearbox Size	Shrink Disk and Torque Arm						Flange Design					
	2-staged		3-staged		4-staged		2-staged		3-staged		4-staged	
	Weight kg	Oil Volume l	Weight kg	Oil Volume l	Weight kg	Oil Volume l	Weight kg	Oil Volume l	Weight kg	Oil Volume l	Weight kg	Oil Volume l
160			825	17.0	925	17.0			570	25.0	620	23.0
200	900	20.0					760	22.0	800	17.0		
220			1,075	20.0	1,250	25.0				30.0		
300	1,150	35.0	1,450	30.0			1,050	35.0	1,000		1,100	25.0
330			1,350*	30.0								
425	2,050	50.0	2,150	48.0								
600												
615			3,100	50.0								
870			4,100	90.0								
1100			5,700	140.0								
1500			6,500	250.0								
2300						-						
2800						-						
3400						-						
4600						-						
5500						-						
7000						-						

Indicated oil volumes apply to horizontal mounting position and mid-gearbox oil level. The gearbox weights do not include oil filling and motor.

You wish to receive an offer for a ZF gearbox REDULUS GMH/GME ?

To be able to quote, please send this customer specification to: sales.ii@zf.com

Please attach drawings, sketches, notes, etc.

Company: _____
Person in charge/Dept.: _____
Location/City: _____
Phone: _____
E-Mail: _____
Date: _____

Operating conditions / Design

It is mandatory to fill out all fields! For exceptions see footnotes.

Application _____

Working machine	☐ **hydraulical**		
	Hydraulic circuit	☐ open ☐ closed	
	Motor type code	_____	
	Displacement	$V_{g\ min.}$ _____	cm^3
	Displacement	$V_{g\ max.}$ _____	cm^3
	Flushing valve	☐ yes ☐ no	
	Speed sensor	☐ yes ☐ no	
	if yes, type	_____	
	Counter balance valve	☐ yes ☐ no	
	Pressure relief valve	☐ yes ☐ no	
	Setting	_____	bar
	Working pressure	Δ_p _____	bar
	Working pressure, max.	$\Delta_{p\ max.}$ _____	bar
	Input flow, max.	$q_{v\ max.}$ _____	l/min
	☐ **electrical**		
	Type	_____	
	Input power	_____	kW
Input speed		n_1 _____	min^{-1}
Ratio		i _____	min^{-1}
Output torque, continuous		$T_{2\ cont.}$ _____	Nm
Output torque, max.		$T_{2\ max.}$ _____	Nm
Duty cycle		ED _____	h/d
Starting frequency and level		_____	

Gearing calculation required ☐ no ☐ ISO ☐ DIN ☐ AGMA ☐ Others _____

You wish to receive an offer for a ZF gearbox REDULUS GMH/GME ?

To be able to quote, please send this customer specification to: sales.ii@zf.com

Please attach drawings, sketches, notes, etc.

Company: _____

Person in charge/Dept.: _____

Location/City: _____

Phone: _____

E-Mail: _____

Date: _____

Working factor ☐ Shock-free ☐ Minor impacts ☐ Alternating direction

Required bearing lifetime Lh_{10} _____ h

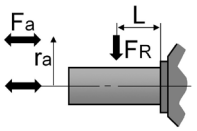
Ambient temperatures from/to _____ / _____ °C

Required load spectrum and expected service life [1)]

Condition	Output torque (Nm)	Radial load (N)	Output speed (rpm)	Time slices (%)
1				
2				
3				
4				

Expected service life _____ h

Additional forces at input and output shaft



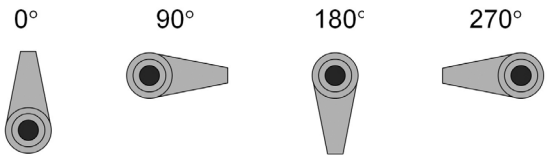
Input

F_a (kN)	r_a (mm)	F_R (kN)	L (mm)

Output

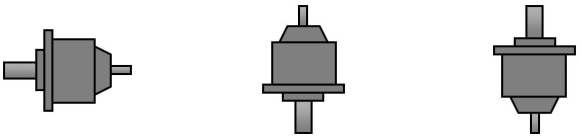
F_a (kN)	r_a (mm)	F_R (kN)	L (mm)

Mounting position of torque arm (viewed to output shaft)



☐ ☐ ☐ ☐

Mounting position of gearbox



Horizontal ☐ Output shaft (down) ☐ Output shaft (up) ☐

You wish to receive an offer for a ZF gearbox REDULUS GMH/GME ?

To be able to quote, please send this customer specification to: sales.ii@zf.com

Please attach drawings, sketches, notes, etc.

Company: _____

Person in charge/Dept.: _____

Location/City: _____

Phone: _____

E-Mail: _____

Date: _____

Estimated number of transmission units per year [1)] _____

Price range [1)] _____

Requested ship date RSD [1)] _____

Special application conditions _____

Further customer-specific requirements _____

Are there any legal requirements and/or other standards to be considered?

☐ no ☐ yes If yes, please specify _____

Others (e.g. load spectra, application-relevant data, customer drawings, nameplate):

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MOTION AND MOBILITY

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