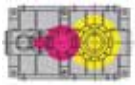
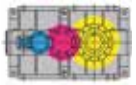
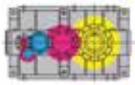
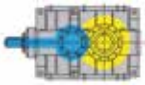
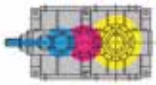
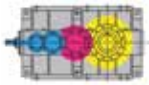
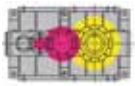
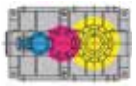
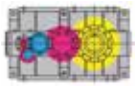
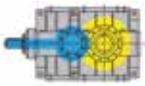
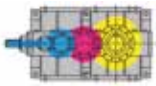
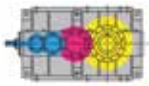
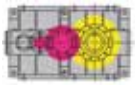
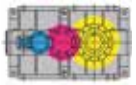
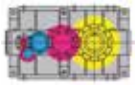
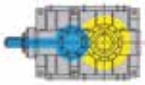
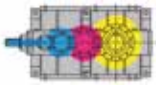
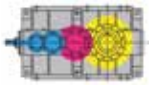
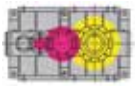
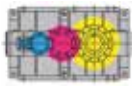
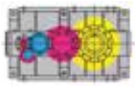
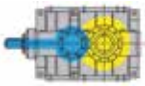
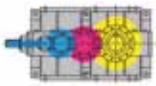
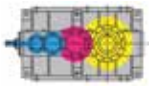
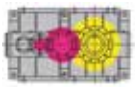
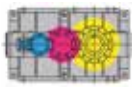
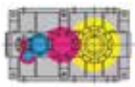
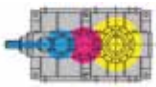
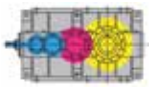
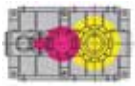
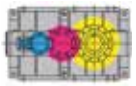
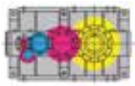
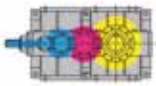
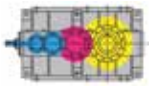
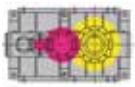
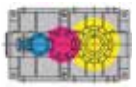
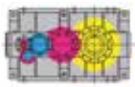
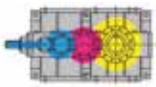
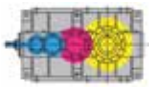
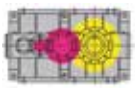
H series
Imperial units

Helical and bevel helical gear reducers

2582-01.02

Size T_{N2} [10^3 lbf in] - F_{r2} [10^3 lbf]	2I	3I	4I	CI	C2I	C3I
4000 **965 - 45**						
4001 **1080 - 45**						
4500 **1240 - 56**						
4501 **1415 - 56**						
5000 **1825 - 71**				–		
5001 **2215 - 71**				–		
5600 **2480 - 90**				–		
5601 **2790 - 90**				–		
6300 **3540 - 90**				–		
6301 **3985 - 90**				–		
7101 **6280 - 140**				–		
8001 **8850 - 200**				–		

Contents

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Your worldwide partner for high quality solutions

Who we are

In brief:

1953 Founded as a family business and still privately owned today

Rossi in the 70's

70's First in Italy to adopt a completely modular system for helical and bevel helical gear reducers; first in Italy to adopt a case hardened, tempered, ground gear pairs on helical and bevel helical gear reducers

80's Worm gear reducers and gearmotors with universal mounting, single-piece housing and ZI involute profile; Extension of the direct sales organization abroad with the addition of German, English, French and Spanish subsidiaries.

90's Helical and bevel helical gear reducers and gearmotors with universal mounting and single-piece housing; first transmission manufacturer in Italy and second in Europe to obtain Quality System Certification ISO 9001.

1994 The only manufacturer to offer 3-year-warranty

1997 Acquisition of Seimec (Rossi Motor Division)

2002 Acquisition of SMEI (Rossi Planetary Division, WIND)

Rossi Planetary Gear Reducer Division

2003 ISO 9001 - 2000 (Vision 2000)

2004 New affiliated company in U.S.A.
Habasit acquires important share in Rossi, to reinforce global presence and develop growth strategy

2009 (July) Habasit Holding owns 100% Rossi

2010 Logo and Company name change: from "Rossi Motoriduttori" to "Rossi S.p.A."

Rossi Industrial Gear Reducer Division, today

2014-'16 Our US, UK, Brazil and China subsidiaries move to new facilities, striving to improve our customer service thanks to our modern structures and technologies

For more than 60 years we have been developing our business for the most demanding applications in order to become one of the world's leading gearbox and gearmotor manufacturers. Even in the toughest environment, we are recognized for providing state of the art technology, solid value and commitment to our customers.

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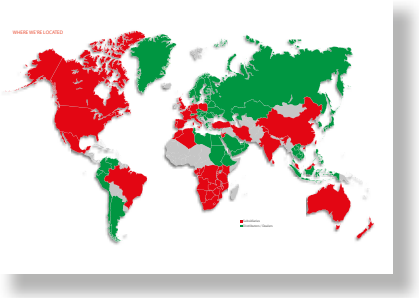
Where you can find us

Close to you, with facilities on six continents and each with a direct sales system to provide excellent service.
Visit our website to find your nearest facility.
We are where you need us to be.



What we believe in

Choosing the drive with the right technical specifications is vital for reliability and economy.
We believe in integrity, ethical behavior, experience, creativity, innovation, good teamwork and above all customer focus: this what we at Rossi believe in.
We strive to be a reliable company with the right flexibility and know-how to respond to all market requests, all over the world, in all application fields, without ignoring our commitment to the environment and value on all human safety

What we can do for you

Rossi employs highly skilled specialists in different fields, there to provide you with the support and experience needed to find the best solution for your application and commercial demands, and to accompany you step by step through the entire supply process.

What you can do for us, to help us improve

You are at the center of all we do, that is why we want your feedback and suggestions on how we can improve.
You know your business better than anyone and by knowing what works for you will allow us to improve our service offering to you.
We regard every relationship as a partnership and look for mutual benefits that will enhance our partnership at all times.

Who you can contact

A well-organized Global after-sale service with the sole purpose of getting our customers back up and running quickly and cost effectively.
Our online Rossi for You portal, allowing you to have 24/7/365 day access to all the documentations concerning our supplies, order tracking, and news in real time.

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What we do

Our wide standard product range and design allows us to provide the customer with the right engineered solution for every application including a 3 year worldwide warranty.

Gearmotors

Type of gear		Catalog
Worm gearmotors		A
Standardfit worm gearmotors		AS
Coaxial gearmotors		E
Standardfit coaxial gearmotors		ES
Helical and bevel helical gear reducers		G
Planetary (in-line and bevel helical) gearmotors		EP

Gear reducers

Type of gear		Catalog
Worm gear reducers		A
Helical gear reducers		G
Bevel Helical gear reducers		G
Heavy duty helical gear reducers		H
Heavy duty bevel helical gear reducers		H
Planetary (in-line and bevel helical) gear reducers		EP
Right angle shaft gear reducers		L
Shaft mounted helical gear units		P

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Motors

Type		Catalog
Asynchronous three-phase high efficiency and premium efficiency motors		TX
Standard and high efficiency brake motors		TX

Motion control

Type		Catalog
Worm, coaxial, helical and bevel helical servo gear reducers		SR

Specific industrial segments

Type		Catalog
Extruders, Parallel shaft gear reducers and gearmotors		GX
Combined units		
Slewing drives		EPS
Heavy duty gear reducers on swing bases		RE

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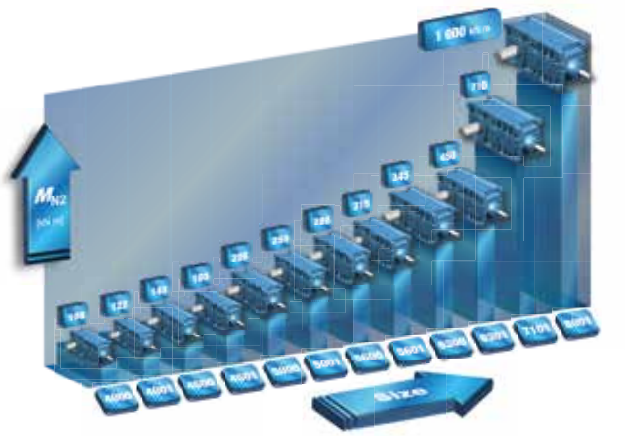
Features and **Benefits**

10 sizes with nominal torque from 965 to 3983 lbf inch

Increased performance maintaining the same final reduction center distance, when compared with Rossi's previous catalog H02

Sizes based on uniform incremental steps

- **Improved ratings for the same required torque and more compact gear reducers compared with previous catalog H02**



Gears designed, machined and measured according to high quality requirements (tooth grinding accuracy class ⩽ DIN 6, both for cylindrical and bevel gears)

Bevel gears machined in closed-loop grinding process with correction of the measured deviations

Gear housings made with single placement bore machining and controlled through very high precision three-dimensional measuring systems

Load rating, according to standards, based on surface durability (pitting) and tooth bending strength

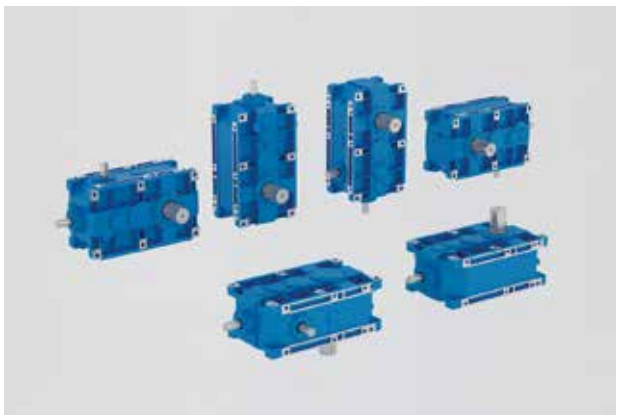
- **Reliable and repeatable performances, suitable to satisfy Customer specifications**

Horizontal center split housing cast in two halves from spheroidal cast iron (UNI ISO 1083) with reinforced stiffening ribs

- **Gear reducers suitable for low temperature operation (down to -40° F) without installation of accessories**

Flexible mounting arrangements - typical mountings include horizontal, vertical, inclined and oscillating mounting positions

- **Easy maintenance**



Features and **Benefits**

Standard painting to UNI EN ISO 12944-2 (corrosivity class C3)

Special painting cycles up to corrosivity class C5-M

- **Suitable for applications in aggressive or marine environments**
- **Possibility of international certifications**

Coating layers (Class C5-M)

Dual compound zink epoxy paint

Dual-compound epoxy primer

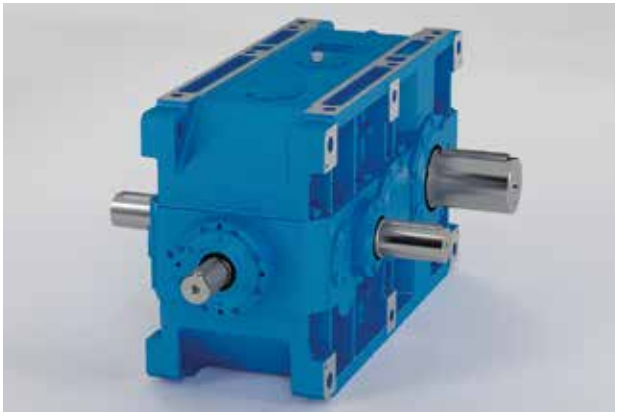
Water-based polyurethane enamel

Final on load inspection on test bench for all gear units manufactured, in order to grant high reliability and quality

- **Trouble-free commissioning**

Several non-standard designs for all sizes:
Additional intermediate shaft overhung for bevel helical gear reducers
Backstop device
High and low speed shaft seal with labyrinth and grease feeder (taconite)

- **Product configuration according to customer's specifications, stock availability**



Several accessories available for all sizes:
pre-arrangement for vibration monitoring devices
oil heater
oil temperature probes
bearing temperature probes

- **Remote control for an user friendly maintenance**
- **Totally reduced cost of ownership**

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Symbols and Units of Measurements
All dimensions in the catalog are expressed in mm except where otherwise stated

Symbol	Description	Unit
f	frequency	Hz
F	force	lb
F_r, F_a	radial (overhung) loads, axial (thrust) loads	lb
fs	service factor	–
ft	thermal factor	–
G	weight (weight force)	lb
i	transmission ratio	–
i_N	nominal transmission ratio	–
L_h	total duration of load cycle	h
L_{WA}	sound power level	dB(A)
m	mass	lb
M_b	bending moment	lb in
n	angular speed	rpm
n_1	gear reducer input speed (high speed)	rpm
n_2	gear reducer output speed (low speed)	rpm
n_{2eq}	load cycle equivalent speed	rpm
n_{N2}	gear reducer nominal output speed	rpm
n_{2i}	gear reducer output speed during load cycle interval i	rpm
P	power	hp
P_1	gear reducer input power (high speed shaft), motor power	hp
P_2	gear reducer output power (low speed shaft)	hp
P_{N2}	gear reducer nominal output power (low speed shaft)	hp
Pt	thermal power	hp
Pt_N	gear reducer nominal thermal power	hp
P_{1th}	gear reducer equivalent thermal power	hp
T	torque	lb in

Symbol	Description	Unit
T_2	gear reducer output torque (low speed shaft), derived from input power and speed	lb in
T_{2eq}	load cycle equivalent torque	lb in
T_{N2}	gear reducer nominal output torque (low speed shaft)	lb in
T_{2i}	gear reducer output torque (low speed shaft), during load cycle interval i	lb in
T_S	screw tightening torque	N m
T_{start}	motor starting torque	lb in
T_{brake}	motor braking torque	lb in
$T_{ambient}$	ambient temperature	°F
T_{oil}	oil temperature	°F
t	time	s
ta	starting time	s
tb	braking time	s
U	voltage	V
W	work, energy	10^6 lb in
WK	moment of inertia	lb ft^2
WK_0^2	moment of inertia (of mass) of the motor	lb ft^2
WK_1^2	moment of inertia (of mass) of the gear reducer referred to high speed shaft	lb ft^2
WK_R^2	external (gear reducer, coupling, driven machine) moment of inertia (of mass) referred to to high speed shaft	lb ft^2
z	starting frequency	starts/h
z_0	no load starting frequency	starts/h
α	angular acceleration	rad/s^2
η	efficiency	–
φ	plane angle	rad
$φa_1$	revolution of motor shaft during acceleration	rad
$φb_1$	revolution of motor shaft during deceleration	rad
ω	agular velocity	rad/s

Additional indexes (subscripts) and other symbols

Index	Description
N	nominal
1	relating to high speed shaft (input)
2	relating to low speed shaft (input)
max	maximum
min	minimum
eq	equivalent

Index	Description
th	thermal
c	cycle
–	from ... to
≈	approximately equal to
⩾	greater than or equal to
⩽	less than or equal to

Unit conversion table

Description	Imperial units			International System of Units (SI), Technical System (metric)		
Length, Distance	1 inch	[in]	=	0.0254	meter	[m]
	1 foot	[ft]	=	0.3048		
Mass	1 pound	[lb]	=	0.4536	kilogram	[kg]
	1 ounce	[oz]	=	0.0283		
Volume	1 US liquid gallon	[gal]	=	3.7854	liter	[l]
Temperature	1 Farenheit degree	[°F]	=	1.8 · °C + 32	Celsius degree	[°C]
Force	1 pound-force	[$lb_{(f)}$]	=	4.4482	newton	[N]
			=	0.4536	kilogram force	[$kg_{(f)}$]
Power	1 horse power	[hp]	=	0.7457	kilowatt	[kW]
Torque, Work	1 pound-force inch	[$lb_{(f)}$ in]	=	0.1130	newton meter, joule	[N m], [J]
			=	0.0115	kilogram-force meter	[$kg_{(f)}$ m]
	1 pound-force foot	[$lb_{(f)}$ ft]	=	1.3560	newton meter, joule	[N m], [J]
			=	0.1383	kilogram-force meter	[$kg_{(f)}$ m]
Pressure	1 pound-force per square inch (psi)	[$lb_{(f)}$/in^2]	=	0.0689	bar	[bar]
Moment of inertia	1 WK^2	[$lb_{(f)}$ ft^2]	=	0.0421	kilogram square-meter	[kg m^2]

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1 - General specifications

Closer size and performance steps; 5 size pairs (standard and strengthened) with final reduction center distance to R 20 series, for a total of 12 sizes with performance intervals by about 18%

Universal mounting: suitable for **horizontal** or **vertical mounting**

Rigid and precise spheroidal cast iron housing; high oil capacity

Gear pairs design especially studied to obtain high resistance, motion regularity, low noise and high efficiency with consequent low heating

High, reliable and tested performances

Prearranged for backstop device, possibility of double extension low and high speed shaft

Possibility of withstanding high loads on shaft ends

Possibility of obtaining multiple and 90° drives with no restriction on direction of rotation of input/output shafts

Manufacturing and product management flexibility

High manufacturing quality standard

Minimum maintenance requirements

Large size gear reducers **produced in series** specifically conceived for granting highest reliability in **heaviest application conditions**. This series combines and exalts the **traditional qualities** of helical and bevel helical gear reducers – **strength, efficiency, compactness, reliability** – with advantages derived from modern design, manufacturing and operating criteria – **universality and application ease, wide size range, service, economy** – the advantages typically associated with high quality gear reducers produced in series.

Main structural features

Main specifications are:

- **universal** mounting with feet integral with housing on 2 faces or frontal with spigot on low speed shaft cover (see ch. 6);
- closer size and performance steps; 5 size pairs (standard and strengthened) with final reduction center distance to R 20 series, for a total of **12 sizes** with performance intervals by about 18%; the size pairs are obtained with the same housing and many components in common;
- gear reducer overall sized so as to permit the transmission of **high nominal and maximum torques,** and to withstand **high loads on** the high and low speed **shaft ends**;
- cylindrical low speed shaft end with key (right, left or double extension);
- cylindrical high speed shaft end with key;
- possibility of **second high speed shaft extension** (excluding C3I);
- improved and upgraded modular construction both for component parts and assembled product;
- standardized dimensions and compliance with standards;
- **spheroidal cast iron** housing (400-15 UNI ISO 1083); stiffening ribs and high oil capacity;
- bearings: swinging roller bearings on low speed and intermediate shafts; **coupled** taper roller bearings plus one swinging roller bearing on high speed shafts with train of gears 2I, CI, C2I, C3I and intermediate train of gears CI and C2I, taper roller bearing plus one cylindrical roller bearing on high speed shaft with train of gears 3I;
- oil bath lubrication; synthetic or mineral oil (ch. 13) including filler plug with **valve**, drain and level plug; sealed;
- additional bearings lubrication through proper pipelines or pump;
- natural or forced cooling (by fan, coil or independent cooling unit with heat exchanger, see ch. 12);
- metal plugs; magnetic drain plug;
- paint: external coating in water-soluble dual-compound polyurethan enamel resistant to atmospheric and aggressive agents (corrosivity class C3 ISO 12944-2); suitable for further coats only with dual-compound products after degreasing and sanding; color blue RAL 5010 DIN 1843, other colors and/or painting cycles on request, see ch. . 12); internal protection in synthetic paint appropriate for resistance to mineral oils or to polyalphaolefines synthetic oils;
- optional designs: backstop device (always prearranged), shaft mounting arrangements, **hollow** low speed shaft with shrink disc or keyway, special paints, etc. (ch. 12).

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Train of gears

- 2, 3, 4 cylindrical gear pairs (helical gear units);
- 1 bevel gear pair plus 1, 2, 3 helical gear pairs (bevel helical type);
- 5 sizes pairs (normal and strengthened); with final reduction center distance to R 20 series for a total of **12 sizes**;
- nominal transmission ratios to R 20 series for trains of gears 2I (i_N = 10 ... 25); 3I (i_N = 25 ... 125, excluding i_N = 112), CI (i_N = 8 ... 20) and C2I (i_N = 20 ... 125, excluding i_N = 112); to R 10 series for 4I (i_N = 125 ... 315) and C3I (i_N = 125 ... 315);
- casehardened and hardened gear pairs in 16 CrNi4 or 20 MnCr5 (depending on size) and 18 NiCrMo5 steel, according to UNI 7846-78;
- helical toothed cylinddrical gear pairs with **ground** profile;
- GLEASON spiral bevel gear pairs with **ground** profile;
- gear load capacity calculated for tooth breakage and pitting.

Specific standards

- nominal transmission ratios and principal dimensions according to UNI 2016 (DIN 323-74, NF X 01.001, BS 2045-65, ISO 3-73);
- toothing profile to UNI 6587-69 (DIN 867-86, NF E 23.011, BS 436.2-70, ISO 53-74);
- shaft heights to UNI 2946-68 (DIN 747-76, NF E 01.051, BS 5186-75, ISO 496-73);
- medium series fixing holes to UNI 1728-83 (DIN 69-71, NF E 27.040, BS 4186-67, ISO/R 273);
- cylindrical shaft ends to UNI ISO 775-88 (DIN 748, NF E 22.051, BS 4506-70, ISO/R 775) with tapped butt-end hole to UNI 9321 (DIN 332 BI. 2-70, NF E 22.056) excluding correspondence d-D;
- parallel keys UNI 6604-69 (DIN 6885 BI. 1-68, NF E 27.656 and 22.175, BS 4235.1-72, ISO/R 773-69);
- mounting positions derived from CEI 2-14 (DIN EN 60034-7, IEC 34.7);
- load capacity verified according to UNI 8862, DIN 3990, AFNOR E 23-015, ISO 6336; thermal capacity verified.

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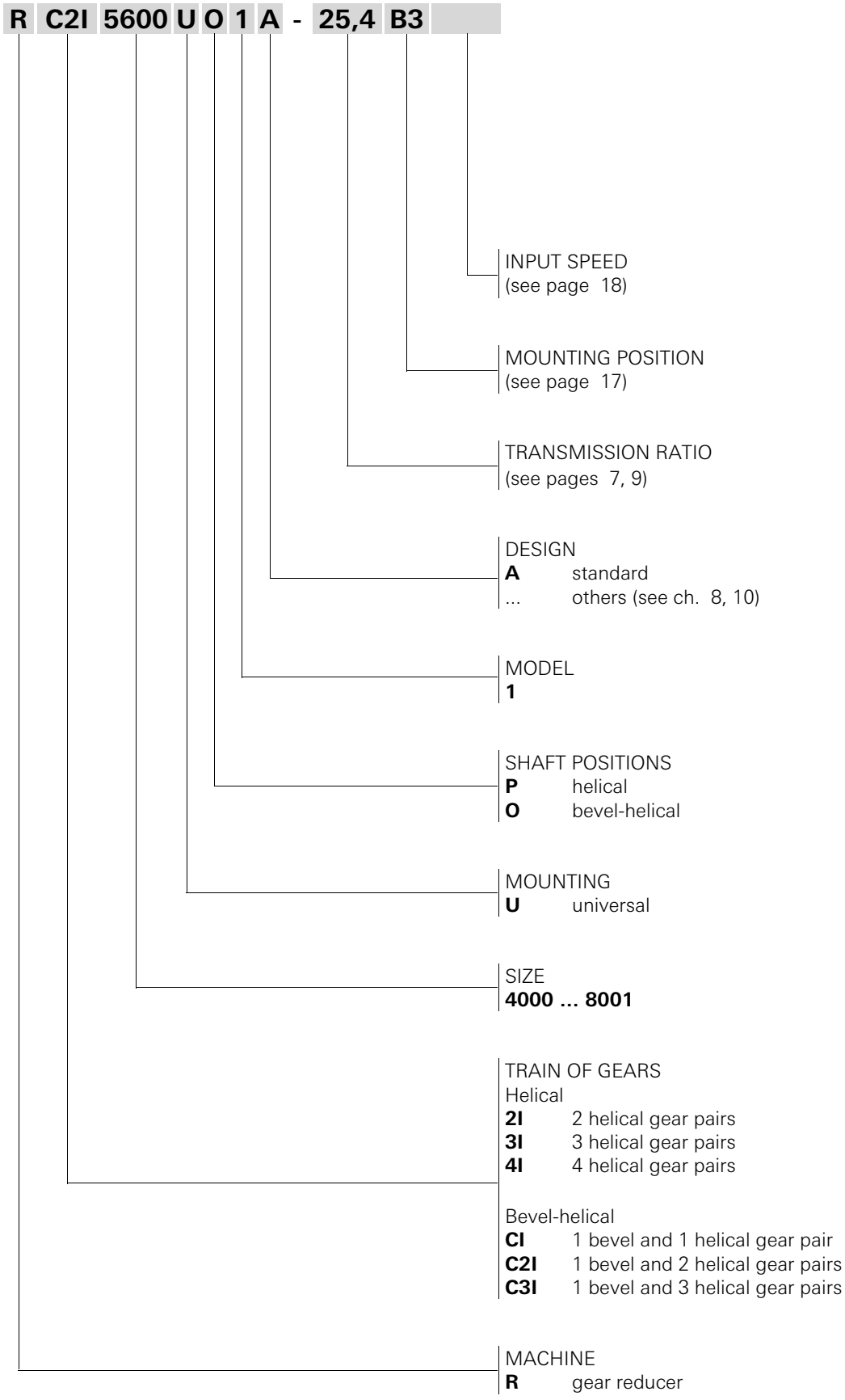
2 - Designation

Designation code



2

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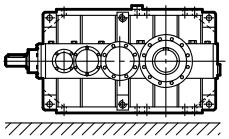
Gear reducer mounting position

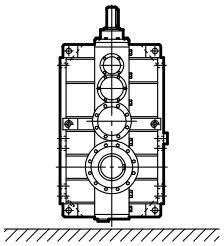
Mounting positions of gear reducers and gearmotors are stated at ch. 8, 10. Here following see some designation examples of important mounting positions.

1. **Standard** mounting position **B3**; in case of no specific needs, **prefer the adoption of B3 mounting positions** as it is the most advised from a technical and economic point of view (maximum simplification of lubrication system, lower oil splash, lower gear reducer heating, stock availability).

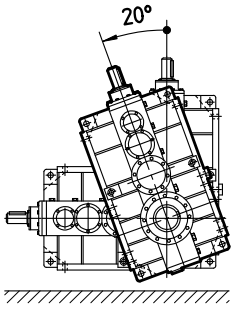


2. **Non-standard** mounting positions

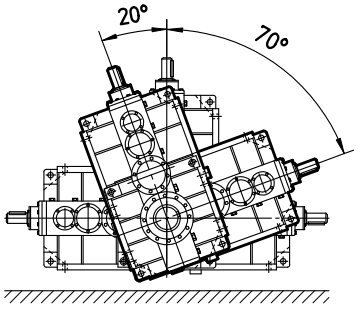
2a. Mounting position to catalog (see ch. 8, 10), **one only** and **fixed**, differing from B3; e.g.: mounting position **B6**



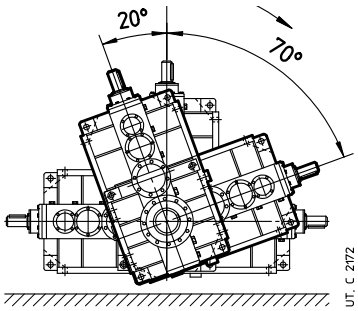
2b. **Inclined** and **fixed** mounting position ; e.g.: mounting position **B6 - 20° B3**



2c. **One only mounting** position **but defined within a predetermined angle**; e.g.: mounting position included among **B6 - 20° B3 / B6 - 70° B8**



2d. **Oscillatory mounting position** (gear reducer oscillating when running); e.g.: mounting position **B6 - 20° B3 / B6 - 70° B8 oscillatory**



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Input speed

The designation is **always** to be completed stating the **input speed** n_1, chosen among the available ones as per catalog: **1 800** rpm (4 poles 60 Hz), **1 500** rpm (4 poles 50 Hz), **1 200** rpm (6 poles 60 Hz), **1 000** rpm (6 poles 50 Hz), **750** rpm (8 poles 50 Hz), **90** rpm (applications at low input speed).

Example:

R C2I 4501 UO1H-81,2 B3 n_1 **= 1 800 rpm**

R 3I 5600 UP1A-127 B3 n_1 **= 1 000 rpm**

Accessories and non-standard designs

In the event of a gear reducer being required in a design different from those stated above, specify it in detail (ch. 12).

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3 - Service factor *fs*

3 - Service factor *fs*

Service factor *fs* takes into account the different running conditions (nature of load, running time, frequency of starting, speed n_2, other considerations) which must be referred to when performing calculations of gear reducer selection and verification.

The power and torques shown in the catalog are nominal values (i.e. valid for *fs* = 1).

The **minimum service factor required** is given by the following ratio:

$$\boldsymbol{fs} \text{ required} \geqslant \boldsymbol{fs}_1 \cdot \boldsymbol{fs}_2 \cdot \boldsymbol{fs}_3 \cdot \boldsymbol{fs}_4 \cdot \boldsymbol{fs}_5$$

where $fs_1 \ldots fs_5$ are stated in the following tables.

Service factor $\boldsymbol{fs}_1$ based on the **nature of load** and **running time**

Nature of load[1] of the driven machine		$\boldsymbol{fs}_1$ Running time [h/d]				
Ref.	Description	**2**	**4**	**8**	**16**	**24**
a	**Uniform**	1	1	1	1.18	1.32
b	**Moderate overloads** (1.6 times the normal load)	1.12	1.18	1.25	1.5	1.7
c	**Heavy overloads** (2.5 times the normal load)	1.4	1.5	1.7	2	2.24

Service factor $\boldsymbol{fs}_2$ based on **nature of load** and of **frequency of starting**

Nature of load[1] of the driven machine		$\boldsymbol{fs}_2$ Frequency of starting *z* [starts/h]					
Ref.	Description	**1**	**2**	**4**	**8**	**16**	**32**
a	**Uniform**	1	1.06	1.12	1.18	1.25	1.5
b	**Moderate overloads** (1.6 times the normal load)	1	1	1.06	1.12	1.18	1.4
c	**Heavy overloads** (2.5 times the normal load)	1	1	1	1.06	1.12	1.32

Service factor $\boldsymbol{fs}_3$ based on **motor type**

Motor type Description		$\boldsymbol{fs}_3$
Electric, turbine		1
Electric three-phase with brake		1.06 [4]
Internal combustion	multi-cylinder	1.25
	single-cylinder	1.5

Service factor $\boldsymbol{fs}_4$ based on **reliability level**

Reliability level [5]	$\boldsymbol{fs}_4$
Standard	1
Average	1.25
High	1.4

Service factor $\boldsymbol{fs}_5$ based on **output angular speed $\boldsymbol{n}_2$**

Output speed n_2 [min^{-1}]	$\boldsymbol{fs}_5$
> 560	1.32
560 – 355	1.25
355 – 224	1.18
224 – 140	1.12
140 – 90	1.06
⩽ 90	1

Details and considerations about service factor.

fs values stated above are valid for:

– maximum time on overload 15 s, on starting 3 s; if over and/or subject to heavy shock effect, consult us;

– a whole number of overload cycles (or start) **imprecisely completed** in 1, 2, 3 or 4 revolutions of low speed shaft; if **precisely**, a continuous overload should be assumed;

Motors having a starting torque not exceeding nominal values (star-delta starting, particular types of motor operating on direct current, and single-phase motors), and particular types of coupling between gear reducer and motor, and gear reducer and driven machine (flexible, centrifugal, fluid and safety couplings, clutches and belt drives) affect service factor favourably, allowing its reduction in certain heavy-duty applications; consult us for verification.

1) For indication on the type of load of the driven machine according to the application, see table on next page.
4) For Y- Δ starting, running with inverter or with «soft start» devices, $fs_3 = 1$.
5) Reliability degrees higher than normal are required in presence of very difficult maintenance, great importance of gear reducer in the production cycle, safety,etc.

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Classification of nature of load according to application

Application	Ref. load *
Stirrers and mixers	
Liquids:	
– constant density	**a**
– varying density, solids in suspension, high viscosity	**b**
concrete mixers, mullers, flash mixer-sconcrete mixers, mullers, flash mixers	**c**
	a
Feeders and batchers	**a, b**
rotary (roller, table, sector)	**c**
belt, screw, plate	
reciprocating, shaker	**a**
Compressors	**b**
centrifugal (single-stage, multi-stage)	**b**
rotary (vane, lobe, screw)	
axial	**b**
reciprocating:	**c**
– multi-cylinder	
– single-cylinder	
Elevators	**a, b**
belt, centrifugal or gravity discharge, screw jacks, escalators	**b**
bucket, arm and tray elevators, paddle wheel, hoists, skips	
man lifts, mobile scaffolding, passenger transport (cable cars, chair, ski, gondola lifts etc.)	**a, b**
Excavators and dredges	
cable reels, conveyors, pumps, winches (manoeuvring and utility), stackers, draining wheels	**b**
	c
cutter head drives, cutters, excavators (bucket ladder, paddle wheel, cutter)	**b**
vehicles:	**c**
– on rails	
– crawlers	**b**
Crushers and granulators	**c**
sugar cane, rubber, plastics	
minerals, stone	**b**
	b
Cranes, winches and travelling lifts	**a, b**
travel (bridge, trolley, forks)[1]	
slewing	
hoist [2]	**a**
Food	
cookers (cereals and malt), mash tubs	
slicers, dough mixers, meat grinders, beet slicers, centrifuges, peelers, wine-making plant, bottle/bin/cratewashers, rinsers, fillers, corkers, cappers, extruders, crate filling and emptying equipment	**b**
Paper mills	**a**
winders, suction rolls, dryers, embossing machinery, bleachers, press rolls, coating rolls, paper rolls, beaters, and pulpers	**b**
agitators, mixers, extruders, chip feeders, calenders, felt dryers and stretchers, rag grinders, washers, thickeners	**c**
cutters, chippers, calenders (super), felt whippers, glazing machines, presses	

Application	Ref. load *
Lumber and woodworking industries	**a, b**
mechanical loaders, pallet stackers	**b**
conveyors for:	**c**
– boards, chips, waste	
– logs	
machine tools (planing, cutting, cross-cut and re-sawing, tenoning, bevelling, moulding, sanding, sizing and scratch-brushing machinery etc.):	**b**
– feed drive	**b, c**
– cutter drive	
barkers:	**b**
– mechanical and hydraulic	**c**
– drum	
Oil industry	**b**
paraffin filter presses, chillers	**c**
rotary drilling equipment	
pumping equipment	
Textile industry	
calenders, cards, pickers, dryers, nappers, spinners, slashers, pads, soapers, washers, mangles, tenter frames, looms (Jacquard), warping machines, winders, knitting machines, dyeing machines, twisting frames, gig mills, cutters	
	b
Clay working machinery	
pug mills, extruders, rotary deslimers	**b**
brick and tile presses	**c**
Rubber and plastics industries	
extruders:	**b**
– plastics	**c**
– rubber	
mixing mills, warming mills, friction calenders, refiners, tubers and strainers, rolling mills	**b**
crackers, masticators	**c**
Wrapping and stacking machinery	
wrapping (film, cardboard), binding, strapping and labelling equipment	**a**
palletizing/depalletizing and stacking/unstacking machinery, palletizing robots	**b**
Engineering machine tools	
boring, shaping, planing, broaching, gear cutting and FMS machines, etc.:	**b**
– main drivers (cut and feed)	
auxiliary drives (tools magazine, chip conveyor, workpiece infeed)	**a**
Mechanisms	
indexing, crank and slotted link, Maltese cross, articulated parallelogram	**b**
rod and crank, cam control (cam and tappet, cam and rocker)	**c**
Metal mills	
shears:	
– trimming, cropping, facing	**b**
– for sheet/plate, ingots, billets	**c**

Application	Ref. load *
transverse drive rollers, draw benches, coilers, inverter, draglines, flattening rolls, bending rolls	**b**
pushers, descaling equipment, pipe welders, mill roll train drives, rolling mills, forging presses, billet croppers, power hammers, punches, impact extruders, tapping machines, straightening presses	**c**
Rollerways	
Mills	**b, c** [3]
rotary (rod, roller, pebble, ball)	**b**
hammer, pin crusher, centrifugal, impact, rolling (ball or roller)	**c**
Pumps	
rotary (gear, screw, lobe, vane) and axial	**a, b**
centrifugal:	
– liquids, constant density	**a**
– liquids, variable density or high viscosity	**b**
proportioning	**b**
alternative: single acting (⩾ 3 cylinders),⩾ double acting (⩽ 2 cylinders)	**b**
– single acting (2 cylinders), double acting single cylinder	**c**
Rotating drums	
dryers, chillers, rotary kilns, washing machines	**b**
tumblers, cement kilns	**c**
Transport conveyors	
belts (plastic, rubber, metal) for:	
– fine grade loose material	**a**
– coarse grade loose material or discrete items	**b**
belt, apron, bucket, slat, tray, roller, screw, chain, overhead rail, assembly	
drag (slat, flight, chain, Redler, etc.) ground level chain, flow accumulating	**b**
reciprocating, shaker	
overhead power rail	**b**
	c
Sewage treatment	4)
biological tanks (revolving disk)	
dewatering screws, collectors, rotary screens, thickeners, vacuum filters, anaerobic digestion tanks	**a**
aerators, rotary breakers	**b**
Screen and riddles	**c**
air washing, travelling water intake	
rotary (stone, gravel, cereals)	**a**
vibrating screens, riddles, jigs	**b**
Fans	**c**
small diameter (centrifugal, axial-flow)	**a**
large diameter (mines, furnaces, etc.) cooling towers (inducted or forced draft), ducted, piston	**b**

* Nature of load reference admits of modification where precise knowledge of duty is available.
1) In the traverse movement of the bridge usually it is necessary to have at least *fs* > 1.6 and in the storeyard cranes *fs* > 2 (container handling).
2) For selection of fs to F.E.M./I-10.1987, consu+lt us.
3) See cat. S.
4) See supplement to cat. A design.

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4 - Thermal power *P*t [hp]

4 - Thermal power *P*t [hp]

The nominal thermal power Pt_N, stated in red in the table, is that which can be applied at the gear reducer input, without exceeding 203 °F[1] (95 °C) approximately oil temperature when operating in following running conditions:

- input speed n_1 = 1 500 rpm
- mounting position B3;
- continuous duty S1;
- maximum ambient temperature 68 °F (20° C) (in the table the values referred to 104 °F (40° C) are stated);
- maximum altitude 3300 ft above sea level;
- air speed ⩾ 4 ft/s (typical value in presence of a self-cooled motor).

Nominal thermal power $\boldsymbol{Pt}_N$

T_{amb}	Train of gears	Gear reducer size Pt_N [hp] **4000, 4001**	**4500, 4501**	**5000, 5001**	**5600, 5601**	**6300, 6301**	**7101**	**8001**
52 °F (20° C)	**2I**	425	475	670	750	950	1120	1600
	3I	315	355	500	560	710	850	1180
	4I	236	265	375	425	530	630	900
	CI	400	560	–	–	–	–	–
	C2I	315	355	500	560	710	850	1180
	C3I	236	265	375	425	530	630	900
104 °F (40° C)	**2I**	315	355	500	560	710	850	1180
	3I	236	265	375	425	530	630	900
	4I	180	200	280	315	400	475	670
	CI	300	425	–	–	–	–	–
	C2I	236	265	375	425	530	630	900
	C3I	180	200	280	315	400	475	670

Always verify that the power applied $\boldsymbol{P}_1$ is lower than or equal to gear reducer thermal power $\boldsymbol{Pt}_N$ multiplied by correction coefficients $\boldsymbol{ft}_1$, $\boldsymbol{ft}_2$, $\boldsymbol{ft}_3$, $\boldsymbol{ft}_4$, $\boldsymbol{ft}_5$ (stated in the following tables) considering the various operating conditions:

$$\boldsymbol{P}_1 \leqslant \boldsymbol{Pt}_N \cdot \boldsymbol{ft}_1 \cdot \boldsymbol{ft}_2 \cdot \boldsymbol{ft}_3 \cdot \boldsymbol{ft}_4 \cdot \boldsymbol{ft}_5$$

When the power applied is not constant and when the exact load cycle is given, it is possible, or advisable, to calculate the equivalent power applied, according to the formula:

$$\boldsymbol{P}_{1eq_{th}} = \frac{1}{\eta} \sqrt[3]{\frac{P_{2_1}^3 \cdot t_1 + P_{2_2}^3 \cdot t_2 + \ldots + P_{2_i}^3 \cdot t_i + \ldots + P_{2_n}^3 \cdot t_n}{t_c}}$$

where:

η is the gear reducer efficiency (see ch. 6);

P_{2i} [hp] is the power, referred to the gear reducer output, required in the time interval t_i [s];

$t_c = t_1 + t_2 + \ldots + t_i + \ldots + t_n$ is the total duration of load cycle [s].

In these cases choose factor $\boldsymbol{ft}_2$ from the continuous duty column S1.

Whenever the thermal verification should not be satisfied, in spite the prearrangement of cooling system, it is possible to install an **independent cooling unit with heat exchanger** (see ch. 12); consult us.

Thermal power needs not be taken into account when maximum duration of continuous running time is 1 – 3 h (from small to large gear reducer sizes) followed by rest periods long enough to restore the gear reducer to near ambient temperature (likewise 2 – 4 h). For maximum ambient temperature higher than 122 °F (50° C) or lower than 32 °F (0° C) consult us.

1) Corresponding to an average temperature of the external housing surface of approximately 185 °F; locally housing temperature can achieve the oil temperature.
3) If, simultaneously, forced cooling with coil is acting, multiply the values by 1.8.
4) For positions, dimensions and design verification see ch. 12.
5) Value also valid for electric fan (installed by the Buyer).
6) With axial fan, values are to be multiplied by 1.12. Consult us.
7) (Duration of running on load / 60) · 100 [%].

Thermal factor ft_1 (= $ft_{1a} \cdot ft_{1b}$) according to **cooling system** and **input speed** n_1

Cooling system			$ft_{1a} \cdot ft_{1b}$ input speed n_1 [rpm] ⩾				
			750	**1 000**	**1 200**	**1 500**	**1 800**
ft_{1a}	Natural convection	train of gears 2I. CI	1.18	1.12	1.06	1	0.85
		3I. 4I. C2I. C3I	1.06	1.06	1.03	1	0.95
ft_{1b}	Forced cooling[3) 4) 6)]	with 1 radial fan (helical gear units)	1.12	1.18	1.25	1.32	1.4
		with 2 radial fans (helical gear units) with 1 radial fan (bevel helical gear units)	1.25	1.4	1.6	1.8[5)]	2
	with water coil[4)]		2				

Thermal factor ft_2 according to **ambient temperature** and **service**

Maximum ambient temperature °F (°C)	ft_2 Continuous duty **S1**	Intermittent duty **S3 ... S6** Cyclic duration factor [%] for 60 min running[7)] **60**	**40**	**25**	**15**
122 (50)	0.6	0.71	0.8	0.95	1
104 (40)	0.75	0.9	1	1.12	1.25
86 (30)	0.9	1.06	1.18	1.32	1.5
68 (20)	**1**	1.18	1.32	1.5	1.7
⩽ **50 (10)**	1.12	1.32	1.5	1.7	1.9

Thermal factor ft_4 according to **altitude of installation**

Altitude a.s.l. [ft]	ft_4
⩽3300	**1**
3300 – 6600	0.95
6562 – 9843	0.9
9843 – 13123	0.85
⩾ **13123**	0.8

Thermal factor ft_3 according to **mounting position** (see also ch. 8, 10): where it is not specified ft_3 = 1

Train of gears		ft_3 mounting position **B3**	**B6**	**B7**	**V5**	**V6**
2I		1	0.9	0.8	0.8	0.9
3I		1	0.9	0.8	0.8	0.9
4I		1	0.9	0.8	0.8	0.9
CI	UO1A, UO1A sin, UO1F, UO1F sin, UO1N, UO1N sin UO1V, UO1V sin, UO1S, UO1S sin, UO1L, UO1L sin	1	0.85	0.71	0.85 low speed wheel on the bottom 0.71 low speed wheel on the top	
	UO1H, UO1H sin, UO1G, UO1G sin, UO1M, UO1M sin	0.85	0.71	0.6	0.71 low speed wheel on the bottom 0.6 low speed wheel on the top	
C2I	UO1A, UO1Asin, UO1F, UO1Fsin, UO1N, UO1Nsin UO1V, UO1Vsin, UO1S, UO1Ssin, UO1L, UO1Lsin	1	0.9	0.8	0.9 low speed wheel on the top 0.8 low speed wheel on the bottom	
	UO1H, UO1H sin, UO1G, UO1G sin, UO1M, UO1M sin	0.9	0.8	0.71	0.8 low speed wheel on the top 0.71 low speed wheel on the bottom	
C3I		1	0.9	0.8	0.9 low speed wheel on the bottom 0.8 low speed wheel on the top	

Thermal factor ft_5 according to cooling air speed on housing

Air speed ft/s	Installation environment	ft_5
< 2.07	very small environment or without air movements or with protected gear reducer	consult us
2.07	small environment and with limited air movements	0.71
3.28	wide environment without air movements	0.9
4.10	wide environment with light air movements (e.g. gearmotor with self-cooled motor	**1**
8.2	open and cooled	1.18
13.12	with heavy air movements	1.32

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5 - Selection

5.1 - Preliminary considerations

Motor power

Taking into account the efficiency of the gear reducer, and other drives – if any – motor power is to be as near as possible to the power rating required by the driven machine: accurate calculation is therefore recommended.

The power required by the machine can be calculated, seeing that it is related directly to the power-requirement of the work to be carried out, to friction (starting, sliding of rolling friction) and inertia (particularly when mass and/or acceleration or deceleration are considerable). It can also be determined experimentally on the basis of tests, comparisons with existing applications, or readings taken with ammeters or wattmeters.

An oversized motor would involve: a greater starting current and consequently larger fuses and heavier cable; a higher running cost as power factor (cosφ) and efficiency would suffer; greater stress on the drive, causing danger of mechanical failure, drive being normally proportionate to the power rating required by the machine, not to motor power.

In such cases, a detailed description of duty requirement must be made available: duration and frequency per hour of work cycle, acceleration and deceleration requirements if any, inertia, loads deriving from friction and work. In the absence of such data it is essential to provide all details which will permit their determination.

Only high values of ambient temperature, altitude, frequency of starting or other particular conditions require an increase in motor power.

Input speed n_1

The maximum gear reducer input speed, valid for **continuous duty S1 and in absence of a forced lubrication system of gears and bearings** (**with eventual heat exchanger**), is stated in the following table according to train of gears and gear reducer size.

For intermittent duty or for particular needs, higher speeds are possible, but always lower than n_{1peak}; consult us.

Peak speed is admitted for a maximum duration of 5 s, including a proper rest period, or a low or null speed period for the cooling of gear reducer, especially on high speed shaft side.

For variable n_1, the selection should be carried out on the basis of n_{1max}, but it should also be verified on the basis of n_{1min}.

When there is a belt drive between motor and gear reducer, different input speeds n_1 should be examined in order to select the most suitable unit from engineering and economy standpoints alike.

Input speed should not be higher than 1 800 rpm, unless conditions make it necessary; better to take advantage of the transmission, and use an input speed lower than 900 rpm.

Size	Train of gears																	
	2I			**3I**			**4I**			**CI**			**C2I**			**C3I**		
	i_N	n_{1max} rpm	n_{1peak} rpm	i_N	n_{1max} rpm	n_{1peak} rpm	i_N	n_{1max} rpm	n_{1peak} rpm	i_N	n_{1max} rpm	n_{1peak} rpm	i_N	n_{1max} rpm	n_{1peak} rpm	i_N	n_{1max} rpm	n_{1peak} rpm
4000, 4001	all	1 600	2 120	all	1 800	2 240	all	1 800	2 360	8 ... 11,2 12,5 ... 18	1 250 1 600	2 120 2 120	20 ... 25 28 ... 40 45 ... 100	1 400 1 600 1 800	2 240 2 240 2 240	all	1 800	2 360
4500, 4501	all	1 600	2 120	all	1 800	2 240	all	1 800	2 360	8 ... 10 11,2 ...12,5 14 ... 20	1 180 1 250 1 600	2 120 2 120 2 120	22,4 ... 28 31,5 ... 45 50 ... 125	1 400 1 600 1 800	2 240 2 240 2 240	all	1 800	2 360
5000, 5001	all	1 250	2 000	⩽ 31,5 ⩾ 35,5	1 600 1 800	2 120 2 120	all	1 800	2 240	–	–	–	22,4 ... 25 28 ... 40 45 ... 100	1 180 1 250 1 600	2 120 2 120 2 120	all	1 800	2 240
5600, 5601	all	1 250	2 000	⩽ 40 ⩾ 45	1 600 1 800	2 120 2 120	all	1 800	2 240	–	–	–	25 ... 28 31,5 ... 45 50 ... 125	1 180 1 250 1 600	2 120 2 120 2 120	all	1 800	2 240
6300, 6301	all	1 060	1 900	⩽ 31,5 35,5 ... 50 ⩾ 56	1 400 1 600 1 800	2 000 2 000 2 000	all	1 800	2 120	–	–	–	28 ... 35,5 40 ... 56 63 ... 100	1 180 1 250 1 600	2 000 2 000 2 000	all	1 800	2 120
7101	⩽ 14 ⩾ 16	900 1 060	1 400	⩽ 35,5 40 ... 50 ⩾ 56	1 180 1 400 1 700	2 000	⩽ 160 ⩾ 200	1 600 1 800	2 120	–	–	–	⩽ 40 ⩾ 45	900 1 180	1 700	⩽ 125 160 ⩾ 200	1 400 1 600 1 800	2 120
8001	⩽ 14 ⩾ 16	800 900	1 250	⩽ 35,5 40 ... 50 ⩾ 56	950 1 120 1 400	1850	⩽ 160 ⩾ 200	1 320 1 600	2 000	–	–	–	⩽ 40 ⩾ 45	900 1 180	1 600	⩽ 125 160 ⩾ 200	1 180 1 250 1 600	2 000

5.2 - Determining the gear reducer size

Constant load

– Fill out the questionnaire for the selection on page 31; in particular, make available required output power P_2, the angular speeds n_2 and n_1, the running conditions (nature of load, frequency of starting h/d, frequency of starting z, other considerations) referring to ch. 3.
– Determine service factor fs required on the basis of running conditions (ch. 3).
– Select the gear reducer size (also, the train of gears and transmission ratio i at the same time) on the basis of n_2, n_1 and of a power P_{N2} greater than or equal to $P_2 \cdot fs$ (ch. 7 and 9).
– Calculate power P_1 required at input side of gear reducer using the formula P_2 / η, where $\eta = 0{,}97 \div 0{,}94$ is the efficiency of gear reducer (ch. 6).

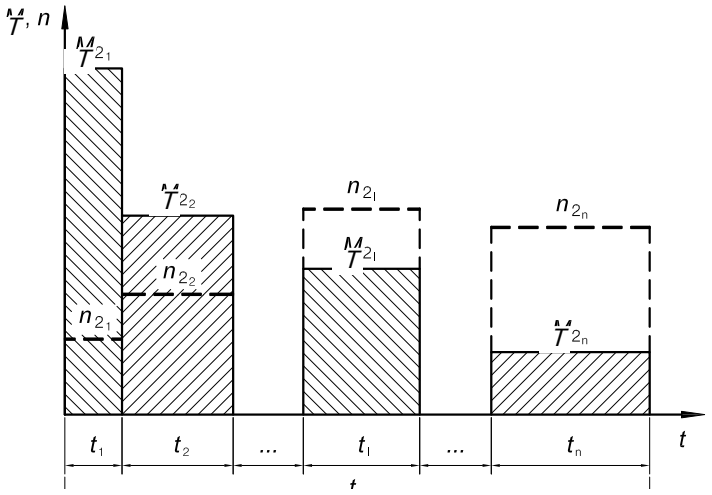
When for reasons of motor standardization, power P_1 applied at input side of gear reducer turns out to be higher than the power required (considering motor/gear reducer efficiency), it must be certain that this excess power applied will never be required, and frequency of starting z is so low as not to affect service factor (ch. 3).

Otherwise, make the selection by multiplying P_{N2} by P_1 applied P_1 required.

Calculations can also be made on the basis of torque instead of power; this method is even preferable for low n_2 values.

Variable load

– Fill out the questionnaire for the selection on page 31; in particular, make available the torque T_2 and the angular speed n_2 required at gear reducer output, the running conditions (nature of load, duration of running required, frequency of starting z, other considerations) referring to ch. 3.
– In presence of required torque T_2 and angular speed n_2 variable in time, according to a given load cycle, calculate the equivalent torque T_{2eq} and angular speed n_{2eq} with the following formulae:



$$T_{2eq} = \sqrt[p]{\frac{T_{21}^{p} \cdot n_{21} \cdot L_{h1} + T_{22}^{p} \cdot n_{22} \cdot L_{h2} + \ldots + T_{2i}^{p} \cdot n_{2i} \cdot L_{hi} + \ldots + T_{2n}^{p} \cdot n_{2n} \cdot L_{hn}}{n_{2eq} \cdot L_h}}$$

$$n_{2eq} = \frac{n_{21} \cdot L_{h1} + n_{22} \cdot L_{h2} + \ldots + n_{2i} \cdot L_{hi} + \ldots + n_{2n} \cdot L_{hn}}{L_h}$$

where:

T_{2eq}	[lbf in] is the equivalent torque of load cycle
T_{2i}	[lbf in] is the torque required (constant) of load level i
n_{2eq}	[rpm] is the equivalent speed in the load cycle
n_{2i}	[rpm] is the low speed shaft speed (constant) of load level i
t_i	[min] is the duration of interval i
t_c	[min] is the total duration of cycle ($t_1 + \ldots + t_i + \ldots + t_n$)
p = 6,61	for a running duration ⩽ 8 h/d
p = 3,33	for a running duration > 8 h/d

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5.3 - Verifications

- Verify possible radial loads F_{r1}, F_{r2} and axial loads F_{a2} according to instructions and values given in ch. 11.
- When a load chart is available, and/or there are overloads – due to starting on full load (especially with high inertias and low transmission ratios), braking, shocks, gear reducers in which the low speed shaft becomes driving member due to driven machine inertia, or other static or dynamic causes - verify that the maximum torque peak (ch. 6) is always lower than $\boldsymbol{T}_{2max}$ (see ch. 7, 9), if higher or if it cannot be evaluated in the above cases, install a safety device so that $\boldsymbol{T}_{2max}$ **will bever be exceeded**.
- Verify that the input speed is lower than or equal to n_{1max} (see ch. 5.1);
- Verify for each single interval *i* of the eventual load cycle that the required torque T_{2i} is lower than $\boldsymbol{T}_{2max}$ and that input speed (relevant to output shaft speed n_{2i}) is $n_{1i} \leqslant n_{1max}$ (see ch. 5.1);
- Verify the possible need for forced cooling (ch. 4 and 12).
- For gear reducers with **backstop device**, having particular i_N or low values of *f*s, verify load capacity of backstop device according to the values given in the table «Backstop device load capacity» (ch. 12).

5.4 - Selection questionnaire

Make available all data and information necessary for a correct gear reducer selection by filling out the questionnaire on next page.

Attach any technical specifications relevant to gear reducer, excluding data regarding the machine of the plant.

When possible, attach all possible drawings, pictures and/or any further information facilitating the technical and economic selection.

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1 Application conditions

Application / Industry sector

Type of machine to be driven

☐ new machine
☐ existing machine, running gear reducer currently applied

Ambient temperature [°F]
min | standard | max

Altitude [m above sea level]

Environment:
☐ normal (industrial) indoor
☐ normal (industrial) outdoor
☐ dusty
☐ corrosive / humid

Gear reducer position:
☐ small environment with limited air movement (v_{air} < 2.07 ft/s)
☐ wide environment with free air movement (v_{air} ⩾ 4.10 ft/s)
☐ open space, prot. against extremes of weather and solar radiance

2 Load data

Required output speed [rpm]
min | nominal | max

Torque required at low speed shaft [lbf in]
min | nominal | max

Required output power [hp]
min | nominal | max

Input speed (gear reducers) [rpm]
min | nominal | max

Nature of load:
☐ uniform
☐ moderate overloads
☐ heavy overloads

Frequency of starting [starts/h]

Machine moment of inertia [lb ft²]
min | standard | max

Running time [h/d]

Total duration [h]

Duty cycle (S1 ... S10)

Load cycle attached
☐ yes
☐ no

3 Motor

Motor type:
☐ asynchronous three-phase (a.c.)
☐ asynchr.three-phase with inverter
☐ d.c. motor with relevant converter
☐ int. combust. motor (single-cylinder)
☐ int. combust. motor (multi-cylinder)

Power P_1 [hp]
min | nominal | max

Nominal speed n_1 [rpm]
min | nominal | max

a.c. motor supply:
voltage [V] | frequency [Hz]

IEC motor size (a.c. motor)

Type of a.c. motor starting:
☐ direct
☐ Y / Δ
☐ soft starter / inverter

Electromagnetic motor
☐ parking brake
☐ work
☐ safety
Braking torque [lbf in]

Starting torque [lbf in]

Moment of inertia [lb ft²]

Electric motor design (a.c. and d.c.):
☐ with independent cooling fan
☐ with encoder:
☐ with tacho-generator

System of motor-gear reducer mounting:
☐ with coupling
☐ with trapezoidal belts
section | No. | d_m [in] | d_1 [in]
☐ with timing belt
section | No. | d_m [on]

Eventual limit to drive dimensions

4 Gear reducer

Mounting position

Direction of rotation of output shaft
☐ white arrow
☐ black arrow
☐ white and black arrow

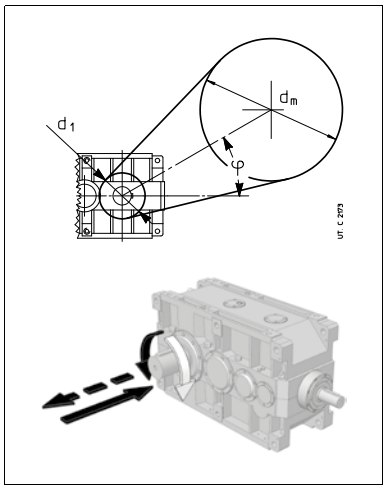
Backstop device (if present)
☐ free rotation, white arrow
☐ free rotation, black arrow

Type of admitted cooling
☐ with fan
☐ with coil
☐ with internal exchanger
☐ with UR O/A unit
☐ with UR O/W unit

Type of machine coupling
☐ shaft mounting
☐ with fluid / flexible coupling
☐ with cardan joint
☐ with toothed belt drive
pitch | d_m | d_1 | φ
☐ with chain
pitch | No. | z_2 | z_3 | overhang [in] | φ
☐ straight tooth cylindrical gear
pitch | No. | z_2 | z_3 | overhang [in] | φ

Eventual axial load F_a [lbf]

Eventual limit to drive dimensions



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6 - Structural and operational details

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Sound levels L_{WA} and L_{pA}

Standard production sound power level L_{WA} [dB(A)][1] and mean sound pressure level L_{pA} [dB(A)][2] assuming nominal load, and input speed n_1 = 1 500[3] rpm. Tolerance +3 dB(A).

If required, gear reducers can be supplied with reduced sound levels (normally 3 dB(A) less than tabulated values): consult us.

In case of gear reducers with fan cooling, add to the values in the table 3 dB(A) for 1 fan and 5 dB(A) for 2 fans.

Size	Helical gear reducers										Bevel helical gear reducers									
	R 2I				R 3I				R 4I				R CI				R C2I				R C3I	
	$i_N \leq 12{,}5$		$i_N \geq 14$		$i_N \leq 63$		$i_N \geq 71$		$i_N \leq 160$		$i_N \geq 200$		$i_N \leq 16$		$i_N \geq 18$		$i_N \leq 63$		$i_N \geq 71$			
	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}	L_{WA}	L_{pA}
4000 ... 4501	**105**	93	**102**	90	**101**	89	**98**	86	**95**	83	**92**	80	**101**	89	**96**	84	**98**	86	**96**	84	**92**	80
5000 ... 5601	**–**	–	**106**	94	**105**	93	**102**	90	**99**	87	**96**	84	**–**	–	**–**	–	**101**	89	**99**	87	**96**	84
6300, 6301	**–**	–	**110**	98	**109**	97	**106**	94	**103**	91	**100**	88	**–**	–	**–**	–	**104**	92	**102**	90	**99**	87
7101	**–**	–	**112**	100	**111**	99	**108**	96	**105**	93	**102**	90	**–**	–	**–**	–	**106**	94	**104**	92	**102**	90
8001	**–**	–	**114**	102	**113**	101	**110**	98	**107**	95	**104**	92	**–**	–	**–**	–	**107**	95	**105**	93	**103**	91

1) To ISO/CD 8579.
2) Mean value of measurement at 3.18 ft from external profile of gear reducer standing in free field on a reflecting surface.
3) In the speed range n_1 750 – 1 800 min^{-1}, sum to the table values: –3 dB(A) for 750 rpm; –2 dB(A) for 1000 rpm; –1 dB(A) for n_1 = 1 200 rpm; +2 dB(A) for n_1 = 1 800 rpm.

Efficiency

The efficiency stated in the table is rough and referred to nominal running conditions (torque, speed, temperature); it is necessary to keep in mind that the efficiency value can diminish considerably for values of $T_2 << T_{N2}$.

6

Nominal efficiency	Helical gear reducers			Bevel helical gear reducers		
	R 2I	R 3I	R 4I	R CI	R C2I	R C3I
η	0.970	0.955	0.940	0.970	0.955	0.940

Overloads

When a gear reducer is subjected to high static and dynamic overloads, the need arises for verifying that such overloads will always remain lower than T_{2max} (see ch. 7, 9).

Overloads are normally generated when one has:

– starting on full load (especially for high inertias and low transmission ratios), braking, shocks;
– gear reducers in which the low speed shaft becomes driving member due to driven machine inertia;
– applied power higher than that required; other static or dynamic causes.

The following general observations on overloads are accompanied by some formulae for carrying out evaluations in certain typical instances.

Where no evaluation is possible, install safety devices which will keep values within T_{2max}.

Starting torque

When starting on full load (especially for high inertias and low transmission ratios) verify that T_{2max} is equal to or greater than starting torque, by using the following formula:

$$T_2 \text{ start} = \left(\frac{T \text{ start}}{T_N} \cdot T_2 \text{ available} - T_2 \text{ required}\right) \frac{WK_R^2}{WK_R^2 + WK_0^2} + T_2 \text{ required}$$

where:
T start and T_N are the starting torque and the motor nominal torque, respectively;
T_2 required is the torque absorbed by the machine through work and frictions;
T_2 available is the output torque due to motor nominal power;
WK_0^2 is the moment of inertia (of mass) of the motor;
WK_R^2 is the external moment of inertia (of mass); gear reducers, couplings, driven machine referred to the motor shaft;
NOTE: when seeking to verify that starting torque is sufficiently high for starting, take into account starting friction, if any, in evaluating T_2 required.

Stopping machines with high kinetic energy (high moments of inertia combined with high speeds) with brake motor

$$\left(\frac{T_{brake}}{\eta} \cdot i + T_2 \text{ required}\right) \frac{WK_R^2}{WK_R^2 + WK_0^2} - T_2 \text{ required} < 1.6 \cdot T_{N2}$$

where:
T_{brake} is the braking torque applied on high speed shaft; for other symbols see above and ch. 1.

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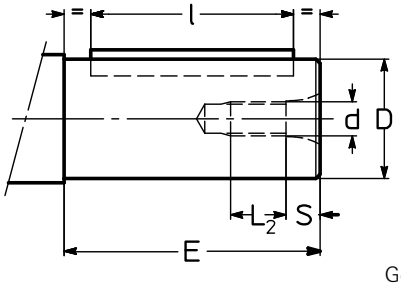
Moment of inertia (of mass) WK_1^2 [lb ft^2]

The moment of inertia is referred to the high speed shaft of gear reducer, design with only one single HSS and LSS end; the one referred to the low speed shaft is given by following ratio: $WK_2^2 = WK_1^2 \cdot i^2$.

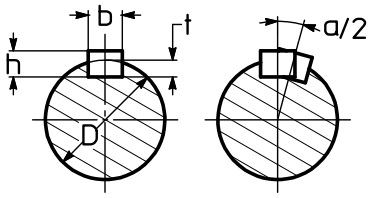
Train of gears	i_N	Gear reducer size[1] Moment of inertia of mass WK_1^2 [lb ft^2]									
		4000	**4001**	**4500**	**4501**	**5000**	**5001**	**5600**	**5601**	**6300**	**6301**
2I	10	16.92	17.37	–	–	–	–	–	–	–	–
	11.2	16.23	16.61	18.98	19.29	–	–	–	–	–	–
	12.5	11.08	11.34	17.96	18.25	–	–	–	–	–	–
	14	10.63	10.87	12.36	12.58	33.06	33.91	38.18	38.75	85.26	86.45
	16	10.23	10.44	11.75	11.91	31.63	32.34	36.12	36.62	80.97	81.35
	18	7.048	7.190	11.13	11.27	23.59	24.13	34.15	34.58	78.22	79.07
	20	6.787	6.906	10.68	10.80	22.69	23.14	32.99	33.36	56.72	56.95
	22.4	6.621	6.739	7.356	7.451	19.17	19.53	24.28	24.56	55.01	55.53
3I	25	4.983	5.055	7.072	7.143	18.75	19.06	20.46	20.67	–	–
	28	4.888	4.936	5.316	5.363	14.29	14.50	15.50	15.64	36.21	36.52
	31.5	4.794	4.841	5.149	5.197	13.95	14.12	15.02	15.14	35.03	35.14
	35.5	3.536	3.560	5.007	5.031	9.919	10.04	14.55	14.64	23.64	23.83
	40	3.465	3.488	3.702	3.726	9.706	9.801	14.26	14.36	22.92	22.99
	45	3.156	3.180	3.607	3.631	8.590	8.662	10.09	10.13	19.79	22.62
	50	3.109	3.132	3.251	3.275	8.448	8.519	8.875	8.923	19.36	19.41
	56	1.780	1.804	3.204	3.204	5.719	5.766	8.685	8.733	13.17	14.95
	63	1.756	1.780	1.851	1.875	5.624	5.672	5.909	5.933	12.89	12.91
	71	1.281	1.281	1.827	1.827	3.892	3.916	5.790	5.814	8.614	12.77
	80	1.258	1.258	1.329	1.329	3.844	3.868	4.010	4.034	8.448	8.472
	90	1.139	1.139	1.281	1.305	3.512	3.536	3.939	3.963	8.353	8.377
	100	1.115	1.115	1.281	1.281	3.488	3.512	3.892	3.916	7.523	7.523
	125	–	–	1.139	1.139	–	–	–	–	–	–
4I	125	1.044	1.044	1.068	1.068	3.037	3.061	3.109	3.109	6.526	6.550
	160	0.831	0.831	0.831	0.831	2.515	2.515	2.563	2.563	5.885	5.885
	200	0.498	0.498	0.522	0.522	1.187	1.187	1.210	1.210	2.658	2.658
	250	0.403	0.403	0.427	0.427	0.997	0.997	0.997	0.997	2.397	2.397
	315	0.356	0.356	0.403	0.403	0.854	0.854	0.997	0.997	1.993	1.993
CI	8	22.88	23.56	32.91	–	–	–	–	–	–	–
	9	21.74	22.38	30.47	31.06	–	–	–	–	–	–
	10	20.69	21.21	24.56	29.16	–	–	–	–	–	–
	11.2	20.05	20.55	22.99	23.37	–	–	–	–	–	–
	12.5	13.57	13.93	21.86	22.16	–	–	–	–	–	–
	14	13.19	13.50	15.05	15.28	–	–	–	–	–	–
	16	9.207	9.421	14.31	14.52	–	–	–	–	–	–
	18	8.970	9.160	10.11	–	–	–	–	–	–	–
C2I	20	9.445	9.563	9.682	9.801	–	–	–	–	–	–
	22.4	9.279	9.373	9.967	10.04	29.90	30.23	–	–	–	–
	25	9.112	9.207	9.706	9.777	29.33	29.62	31.11	31.30	–	–
	28	7.072	7.119	9.468	9.540	22.62	22.83	30.33	30.49	38.97	39.27
	31.5	6.953	7.024	7.356	7.380	22.26	22.45	23.40	23.54	37.90	37.99
	35.5	6.455	6.502	7.190	7.238	20.38	20.50	22.90	23.02	37.21	37.42
	40	6.383	6.431	6.621	6.668	20.15	20.27	20.86	20.95	27.74	27.81
	45	4.295	4.319	6.526	6.550	13.38	13.48	20.55	20.62	24.39	27.43
	50	4.248	4.271	4.414	4.414	13.24	13.31	13.69	13.74	23.97	24.02
	56	2.943	2.943	4.343	4.366	9.089	9.160	13.50	13.55	15.92	23.78
	63	2.895	2.919	2.990	3.014	9.018	9.041	9.279	9.326	15.66	15.69
	71	2.705	2.705	2.966	2.966	8.495	8.519	9.160	9.184	15.47	15.54
	80	2.682	2.705	2.943	2.943	8.448	8.472	9.089	9.112	10.51	10.51
	100	1.614	1.637	1.780	1.780	5.244	5.268	5.672	5.695	10.39	10.39
	125	–	–	1.637	1.637	–	–	5.292	5.292	–	–
C3I	125	1.210	1.234	1.234	1.258	3.868	3.868	3.939	3.939	7.570	7.570
	160	0.807	0.807	0.807	0.807	2.468	2.492	2.515	2.515	5.102	5.102
	200	0.641	0.641	0.641	0.641	2.065	2.065	2.088	2.088	3.251	4.010
	250	0.380	0.380	0.380	0.380	1.234	1.234	1.258	1.258	2.563	2.563
	315	0.308	0.308	0.308	0.308	1.044	1.044	1.068	1.068	1.542	1.542

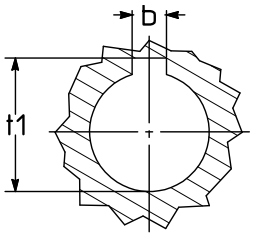
1) For sizes 7101 and 8001, consult us.

High and low speed shaft end



Gear reducer





UT.C 2099

(Hollow) machine shaft

Shaft end						Key	Keyway		
D Ø	**E**	**d** Ø	**S**	L_2	$\alpha/2_{max}$ arc min 1)	**b** × **h** × **l** h9 h11	**b** h9 hub N9 shaft	**t** shaft	t_1 shaft
38 k6	80	M10	7.6	18.4	3.27	10 × 8 × 70	10	5	41.3
48 k6	110	M12	9.5	22.5	3.08	14 × 9 × 90	14	5.5	51.8
55 m6	110	M12	9.5	22.5	2.75	16 × 10 × 90	16	6	59.3
60 m6	140	M16	12.7	27.3	2.46	18 × 11 × 110	18	7	64.4
65 m6	140	M16	12.7	27.3	2.33	18 × 11 × 110	18	7	69.4
70 m6	140	M16	12.7	27.3	2.55	20 × 12 × 125	20	7.5	74.9
75 m6	140	M16	12.7	27.3	2.38	20 × 12 × 125	20	7.5	79.9
80 m6	170	M20	16	34	2.23	22 × 14 × 140	22	9	85.4
90 m6	170	M20	16	34	1.99	25 × 14 × 140	25	9	95.4
100 m6	210	M24	19	41	1.79	28 × 16 × 180	28	10	106.4
110 m6	210	M24	19	41	1.63	28 × 16 × 180	28	10	116.4
120 m6	210	M30	22	45	1.78	B32 × 18 × 170	32	11	127.4
125 m6	210	M30	22	45	1.71	32 × 18 × 180	32	11	132.4
140 m6	250	M30	22	45	1.52	36 × 20 × 180	36	12	148.4
150 m6	245	M36	27	54	1.42	36 × 20 × 220	36	12	158.4
150 m6	250	M36	27	54	1.42	B36 × 20 × 210	36	12	158.4
180 m6	300	M36	27	54	1.18	45 × 25 × 250	45	15	190.4
190 m6	280	M36	27	54	1.12	B45 × 25 × 230	45	15	200.4
200 m6	280	M36	27	54	1.07	B45 × 25 × 230	45	15	210.4
200 m6	350	M36	27	54	1.07	45 × 25 × 320	45	15	210.4
210 m6	300	M36	27	54	1.02	B50 × 28 × 250	50	17	221.4
220 m6	300	M36	27	54	0.97	B50 × 28 × 250	50	17	231.4
240 m6	330	M45	33	67	1.06	B56 × 32 × 270	56	20	252.4
250 m6	330	M45	33	67	1.02	B56 × 32 × 270	56	20	262.4
270 m6	380	M45	33	67	0.94	B63 × 32 × 320	63	20	282.4
280 m6	380	M45	33	67	0.91	B63 × 32 × 320	63	20	292.4
300 m6	430	M45	33	67	0.85	B70 × 36 × 355	70	22	314.4
320 m6	430	M45	33	67	0.80	B70 × 36 × 355	70	22	334.4
360 m6	590	M45	33	67	1.45	B80 × 40 × 550	90	25	375.4
400 m6	660	M45	33	67	1.50	B90 × 45 × 610	90	28	417.4

1) Maximum angular disalignment of keyways on double extension shafts.

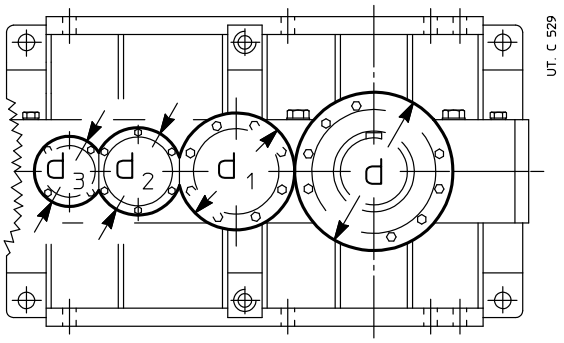
Plug dimensions

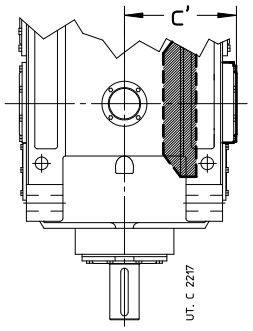
The filler, drain and level plugs have standard threading G 1" for size ⩽ 6301, G 1"¼ for size 7101, G 1"½ for size 8001.

Side-cover dimensions

The low speed shaft covers are machined for spigot. For cover height, consider the difference **C** – $\mathbf{H}_1$ (ch. 8 and 10); for trains of gears CI and C2I the cover dimensions on bevel wheel side are stated in the table.

Diameter tolerance ± 0.5 (excluding **d** dimension).



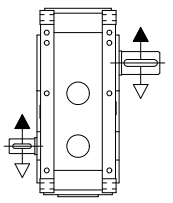


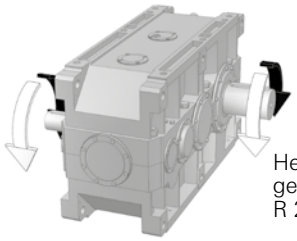
Size	Train of gears									
	2I				**3I, 4I, C2I, C3I**			**2I, 3I, 4I, CI C2I, C3I**		
	$\mathbf{d}_3$ Ø		$\mathbf{d}_2$ Ø		$\mathbf{d}_3$ Ø	$\mathbf{d}_2$ Ø	**c'** (C2I)	$\mathbf{d}_1$ Ø	**c'** (CI)	**d** Ø h7
	$i_N \leq 11.2$	$i_N \geq 12.5$	$i_N \leq 11.2$	$i_N \geq 12.5$						
4000, 4001	170	190	259	248	190	248	318	340	363[1]	432
	$i_N \leq 12.5$	$i_N \geq 14$	$i_N \leq 12.5$	$i_N \geq 14$						
4500, 4501	170	190	259	248	190	248	318	340	363[1]	472
5000, 5001	228		320		228	320	423[1]	388	–	530
5600, 5601	228		320		228	320	423	432	–	590
6300, 6301	248		362		248	362	468	510	–	648
7101	320		490		320	490	518	648	–	782[2]
8001	388		550		388	550	580	782	–	889[2]

1) Overhanging from **C** dimension (see ch. 10.1 and 10.2).

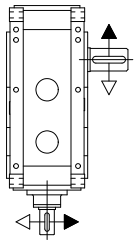
2) For hollow low speed shaf: 842 (size 7101), 969 (size 8001).

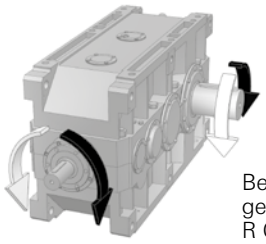
Direction of rotation



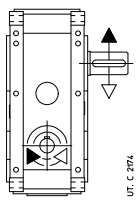


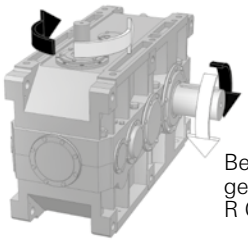
Helical gear reducer: R 2I ... UP1A





Bevel helical gear reducer: R C2I ... UO1A



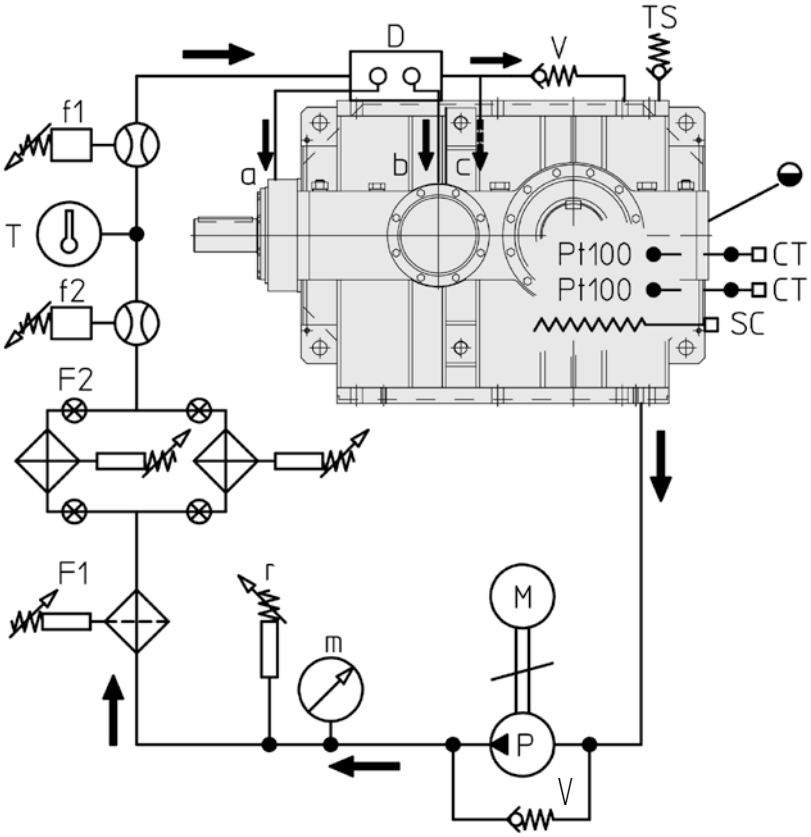


Bevel helical gear reducer: R C2I ... UO1V

The correspondence between gear reducer high speed shaft and low speed shaft direction of rotation is given at ch. 8 and 10 and it is according to design and train of gears. For the arrows' meaning interpretation refer to the examples on the left.

Forced lubrication of bearings and/or gears with motor pump: hydraulic circuit diagram

The bearings and/or the gears to be forced lubricated are determined by Rossi according to gear reducer and application.



As standard

a, b, c	Gear pair/bearing pipes
m	Pressure gauge (0 – 230 psi)
M	Motor pump (2 hp)
P	Pump (1.27 ft³/min)
T	Thermometer 32 – 248 °F (0 – 120 °C)
V	Safety valve
r	Minimum pressure gauge
TS	Filler plug
D	Flow rate
◒	Oil level (approx.)

On request

Pt100*	Oil temperature probe (separate)*
f1	Electric flow switch: vertical mounting
f2	Visible flow switch
F1	Filter
F2	Exchange filter
CT03N*, CT10N*	Control devices with 2 and 3 thresholds (separately supplied); supply 230 V 50 Hz*
SC*	Oil heater*

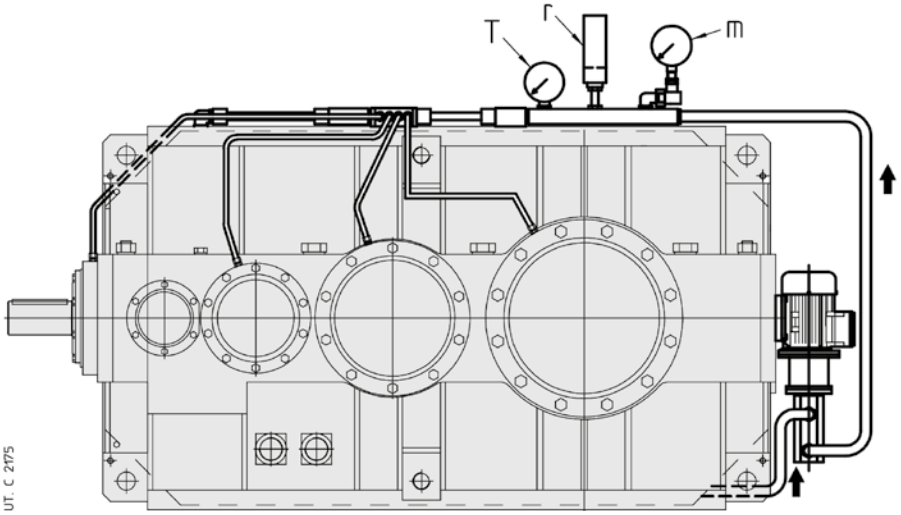
* On request, but necessary for gear reducer starting at $T_{ambient}$ (= T_{oil}) ≤ 77 °F (25 °C): pre-heat the oil with the heater.

Starting at low temperature (T_{oil} = $T_{ambient}$ ≤ 77 °F (25 °C)) of gear reducer with forced lubrication

Always foresee oil heater and 2-threshold signalling device CT03N + Pt100 and 3-threshold signalling device CT10N + Pt100..

- **CT03N** (2-threshold device) and relevant temperature probe Pt100, to pilot the heater; set the operating threshold at 122 °F (50 °C) (stopping the heater supply) and the reset threshold at 86 °F (30 °C).
- **CT10N** (3-threshold device) and relevant temperature probe Pt100 to start the motor pump and the motor of gear reducer; it is advised to delay the starting of gear reducer motor by at least 1 min from the motor pump starting so that oil is already circulating: the motor pump must run simultaneously with gear reducer; set the operating threshold at 86 °F (30 °C) to start the gear reducer and the motor pump, the reset threshold at 50 °F (10 °C) and the safety threshold at 194 °F (90 °C).

For starting at T_{oil} (= $T_{ambient}$) ≤ 32 °F (0 °C) it is necessary to adjust the calibration of devices CT03N and CT10N according to real ambient temperature (see also point B1 in the table at ch. 12 (8)).



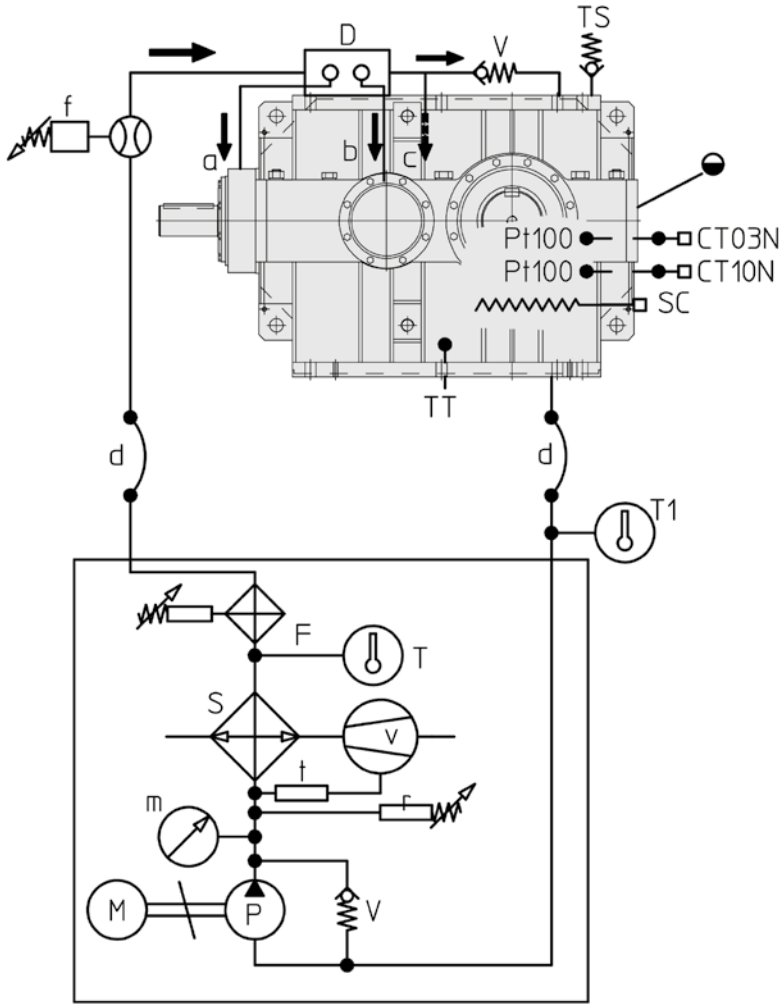
Example of forced lubrication with motor pump; the exact position of motor pump depends on the gear reducer size, train of gears, mounting position and available dimensions: for this reason, on request, a drawing of the specific solution will be supplied; pipes are usually realized with suction and delivery flexible pipes and with rigid pipes between the flow rate and the bearings.

UT. C 2175

2582-01.02

Bearing and/or gear pair forced lubrication with oil/air or oil/water independent cooling unit: hydraulic circuit diagram

The bearings and/or the gears to be forced lubricated are determined by Rossi according to gear reducer and application.



As standard

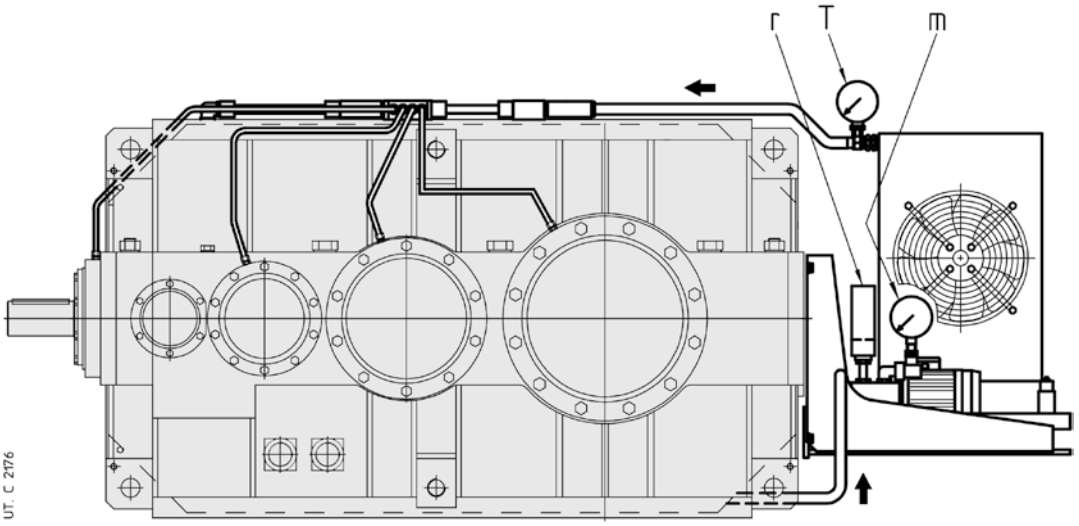
a, b, c	Gear pair/bearing pipes
d	Flexible connection (by Customer)
m	Pressure gauge (0 – 230 psi)
M	Motor pump (ch. 12 (10))
P	Pump (ch. 12 (10))
S	Oil/air or oil/water exchanger
v	Motor fan (UR O/A)
t	Fan thermostat 32÷ 194 °F (0 – 90 °C) (UR O/A)
T	Thermometer 32 – 248 °F (0 – 120 °C)
V	Safety valve
r	Minimum pressure gauge
TS	Filler plug
D	Flow rate
◒	Approx. oil level

On request

Pt100*	Oil temperature probe (loose)*
f	Flow switch (loose)
F	Filter with electric blockage warning (with UR O/A it is supplied loose)
CT03N*, CT10N*	Control devices with 2 and 3 thresholds (separately supplied); supply 230 V 50 Hz*
T1	Thermometer 32 – 248 °F (0 – 120 °C)
TT	Bi-metal type thermostat
SC*	Oil heater*

* On request, but necessary for gear reducer starting at $T_{ambient}$ (= T_{oil}) ≤ 77 °F (25 °C): pre-heat the oil with the heater.

For **starting at low temperature**: see previous page.



UT. C 2176

Example of forced lubrication with cooling unit: the exact position of cooling unit depends on the gear reducer size, on train of gears, mounting position and available dimensions: for this reason, on request, a drawing of specific solution is supplied; the pipes are usually realized with suction/delivery flexible pipes and with rigid pipes between the flow rate and the bearings.

2582-01.02

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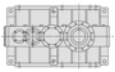
7 - Selection tables
(helical gear reducers)

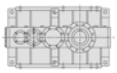
2582-01.02



n_1 = 1 800 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2I	10	180	2430 ▲ 840 (1360)	2680 ▲ 925 (1600)	–	–	–	–	–	–	–	–	–	–
	11,2	160	2140 ▲ 840 (1360)	2390 ▲ 940 (1600)	2540 ▲ 1010 (1850)	2740 ▲ 1090 (2180)	–	–	–	–	–	–	–	–
	12,5	140	1930 ▲ 840 (1400)	2160 ▲ 940 (1600)	2270 ▲ 1025 (1850)	2400 ▲ 1080 (2120)	–	–	–	–	–	–	–	–
	14	132	1700 ▲ 840 (1400)	1900 ▲ 940 (1600)	2080 ▲ 1045 (1900)	2290 ▲ 1150 (2180)	2890 ▲ 1415 (2800)	3250 ▲ 1595 (3150)	3990 ▲ 1985 (3750)	4510 ▲ 2245 (4250)	5920 ▲ 2965 (5300)	6470 ▲ 3245 (6150)	–	–
	16	112	1480 ▲ 840 (1360)	1590 ▲ 905 (1550)	1840 ▲ 1045 (1900)	2030 ▲ 1155 (2180)	2530 ▲ 1415 (2720)	2790 ▲ 1565 (3150)	3540 ▲ 1985 (3750)	4030 ▲ 2260 (4370)	5140 ▲ 2965 (5300)	5650 ▲ 3320 (6150)	–	–
	18	100	1360 ▲ 840 (1400)	1520 ▲ 940 (1600)	1590 ▲ 1035 (1800)	1670 ▲ 1095 (2060)	2310 ▲ 1415 (2720)	2600 ▲ 1595 (3150)	3100 ▲ 1985 (3650)	3450 ▲ 2200 (4120)	4640 ▲ 2965 (5000)	5160 ▲ 3300 (5800)	–	–
	20	90	1180 ▲ 840 (1400)	1310 ▲ 935 (1600)	1450 ▲ 1045 (1950)	1620 ▲ 1170 (2240)	2020 ▲ 1415 (2720)	2270 ▲ 1595 (3150)	2830 ▲ 1985 (3870)	3250 ▲ 2275 (4500)	4060 ▲ 2965 (5450)	4460 ▲ 3320 (6300)	–	–
	22,4	80	1070 ▲ 840 (1320)	1190 ▲ 940 (1500)	1280 ▲ 1045 (1850)	1390 ▲ 1135 (2120)	1800 ▲ 1415 (2800)	2020 ▲ 1595 (3150)	2480 ▲ 1985 (3650)	2850 ▲ 2275 (4250)	3660 ▲ 2965 (5150)	4100 ▲ 3320 (6000)	–	–
3I	25	71	953 840 (1500)	1010 890 (1700)	1160 ▲ 1045 (1700)	1300 ▲ 1170 (1950)	1630 ▲ 1415 (2650)	1840 ▲ 1595 (3070)	2210 ▲ 1985 (3750)	2530 ▲ 2275 (4250)	–	–	4540 ▲ 4085 (8250)	–
	28	63	882 885 (1500)	944 945 (1700)	1000 1020 (1950)	1080 1095 (2180)	1670 ▲ 1680 (3000)	1860 ▲ 1865 (3450)	1980 ▲ 2015 (4000)	2130 ▲ 2170 (4370)	2950 ▲ 2830 (5600)	3410 ▲ 3280 (6500)	4540 ▲ 4400 (8750)	–
	31,5	56	766 885 (1500)	858 990 (1750)	936 1080 (2000)	1000 1160 (2300)	1460 ▲ 1680 (2900)	1640 ▲ 1875 (3350)	1860 ▲ 2130 (4000)	2020 ▲ 2315 (4620)	2560 ▲ 2830 (5600)	2910 ▲ 3280 (6500)	4540 ▲ 5070 (10000)	–
	35,5	50	705 885 (1500)	774 970 (1750)	834 1105 (2060)	889 1180 (2240)	1330 1680 (2900)	1480 1875 (3350)	1640 ▲ 2150 (3870)	1860 ▲ 2430 (4370)	2340 ▲ 2890 (5800)	2720 ▲ 3350 (6700)	4510 ▲ 5580 (9750)	–
	40	45	611 885 (1450)	685 990 (1700)	766 1105 (2060)	817 1180 (2360)	1160 1680 (2900)	1300 1875 (3350)	1500 ▲ 2150 (4120)	1730 ▲ 2480 (4750)	2040 ▲ 2890 (5800)	2320 ▲ 3350 (6700)	3920 ▲ 5580 (10600)	–
	45	40	559 885 (1500)	627 990 (1700)	666 1105 (1950)	746 1240 (2240)	1060 1680 (3000)	1180 1875 (3450)	1300 2150 (3870)	1500 2480 (4500)	1850 ▲ 2950 (6000)	2170 ▲ 3420 (6900)	3450 ▲ 5540 (10900)	–
	50	35,5	486 885 (1500)	544 990 (1700)	608 1105 (2060)	681 1240 (2430)	924 1680 (3000)	1030 1875 (3450)	1180 2150 (4120)	1360 2480 (4750)	1700 ▲ 3115 (6000)	1830 ▲ 3420 (6900)	3010 ▲ 5580 (10900)	–
	56	31,5	440 885 (1500)	493 990 (1750)	529 1105 (1950)	592 1240 (2240)	858 1680 (3070)	957 1875 (3450)	1040 2150 (4000)	1190 2480 (4500)	1560 3135 (6000)	1760 3485 (6900)	2820 ▲ 5580 (10900)	3850 ▲ 7970 (15500)
	63	28	382 885 (1500)	428 990 (1750)	479 1105 (2120)	536 1240 (2430)	750 1680 (3070)	837 1875 (3450)	960 2150 (4250)	1110 2480 (4870)	1360 3140 (6000)	1550 3645 (6900)	2450 ▲ 5580 (10900)	3340 ▲ 7970 (15500)
	71	25	358 885 (1550)	401 990 (1750)	416 1105 (2000)	466 1240 (2300)	676 1680 (3070)	754 1875 (3550)	841 2150 (4000)	969 2480 (4620)	1250 3140 (6150)	1430 3645 (7100)	2220 ▲ 5580 (11200)	3040 ▲ 7970 (16000)
	80	22,4	311 885 (1550)	348 990 (1750)	389 1105 (2180)	436 1240 (2500)	591 1680 (3070)	660 1875 (3550)	756 2150 (4250)	871 2480 (5000)	1090 3140 (6150)	1240 3645 (7100)	1930 ▲ 5580 (11200)	2640 ▲ 7970 (16000)
	90	20	286 885 (1550)	321 990 (1750)	339 1105 (2060)	379 1240 (2360)	541 1680 (3070)	603 1875 (3550)	663 2150 (4120)	764 2480 (4750)	983 3140 (5800)	1140 3645 (6700)	1780 ▲ 5580 (11200)	2500 ▲ 7970 (16000)
	100	18	249 885 (1550)	278 990 (1750)	307 1105 (2180)	344 1240 (2500)	473 1680 (3070)	528 1875 (3550)	605 2150 (4250)	697 2480 (4870)	860 3140 (6150)	980 3645 (7100)	1540 ▲ 5580 (11200)	2170 ▲ 7970 (16000)
	125	14	–	–	246 1105 (1900)	275 1240 (2180)	–	–	484 2150 (3750)	558 2480 (4250)	–	–	–	–
4I	125	14	191 840 (1600)	214 940 (1800)	248 1105 (2240)	284 1265 (2500)	373 1680 (3150)	404 1825 (3650)	470 2150 (4250)	534 2445 (4870)	652 3055 (6150)	742 3540 (7100)	1210 ▲ 5750 (11200)	1810 ▲ 8190 (16000)
	160	11,2	158 885 (1600)	178 990 (1800)	195 1105 (2240)	226 1280 (2570)	303 1680 (3150)	333 1850 (3650)	382 2150 (4250)	437 2465 (4870)	530 3130 (6150)	590 3540 (7100)	979 ▲ 5750 (11200)	1400 ▲ 8190 (16000)
	200	9	132 885 (1600)	148 990 (1800)	163 1105 (2240)	188 1280 (2570)	226 1680 (3150)	252 1875 (3650)	285 2150 (4250)	327 2465 (4870)	403 3055 (6150)	459 3540 (7100)	777 5750 (11200)	1090 ▲ 8190 (16000)
	250	7,1	104 885 (1600)	117 990 (1800)	128 1105 (2240)	148 1280 (2570)	184 1680 (3150)	205 1875 (3650)	232 2150 (4250)	265 2465 (4870)	329 3140 (6150)	375 3645 (7100)	631 5750 (11200)	844 ▲ 8190 (16000)
	315	5,6	84,6 885 (1600)	94,8 990 (1800)	98,4 1105 (2060)	114 1285 (2360)	145 1680 (3150)	162 1875 (3650)	180 2150 (4120)	208 2480 (4750)	264 3140 (6150)	300 3645 (7100)	498 5750 (11200)	666 ▲ 8190 (16000)

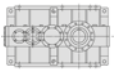
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 500 rpm

Train of gears	i_N	n_{N2} rpm	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in] 4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2I	10	150	2140 885 (1400)	2390 990 (1600)	–	–	–	–	–	–	–	–	–	–
	11,2	132	1880 885 (1400)	2100 990 (1600)	2280 1090 (1900)	2410 1150 (2180)	–	–	–	–	–	–	–	–
	12,5	118	1700 885 (1450)	1900 990 (1650)	2040 1105 (1900)	2150 1165 (2180)	–	–	–	–	–	–	–	–
	14	106	1490 885 (1450)	1670 990 (1650)	1840 1105 (1950)	1980 1190 (2180)	2560 ▲ 1505 (2800)	2840 ▲ 1670 (3250)	3600 ▲ 2150 (3870)	4030 ▲ 2405 (4370)	5220 ▲ 3140 (5450)	5770 ▲ 3475 (6300)	–	–
	16	95	1290 885 (1400)	1420 975 (1600)	1620 1105 (1950)	1820 1240 (2240)	2240 ▲ 1505 (2720)	2440 ▲ 1640 (3150)	3200 ▲ 2150 (3870)	3580 ▲ 2405 (4500)	4540 ▲ 3140 (5450)	5020 ▲ 3540 (6300)	–	–
	18	85	1190 885 (1400)	1340 990 (1600)	1410 1105 (1850)	1500 1180 (2120)	2050 ▲ 1505 (2800)	2290 ▲ 1680 (3250)	2800 ▲ 2150 (3650)	3100 ▲ 2375 (4250)	4090 ▲ 3140 (5150)	4610 ▲ 3540 (6000)	–	–
	20	75	1040 885 (1400)	1160 990 (1600)	1280 1105 (2000)	1430 1240 (2300)	1790 ▲ 1505 (2800)	2000 ▲ 1680 (3250)	2560 ▲ 2150 (4000)	2860 ▲ 2405 (4500)	3580 ▲ 3140 (5600)	3960 ▲ 3540 (6500)	–	–
	22,4	67	936 885 (1320)	1050 990 (1550)	1130 1105 (1850)	1250 1225 (2120)	1590 ▲ 1505 (2800)	1780 ▲ 1680 (3250)	2240 ▲ 2150 (3750)	2510 ▲ 2405 (4250)	3230 ▲ 3140 (5300)	3640 ▲ 3540 (6150)	–	–
3I	25	60	837 885 (1500)	907 960 (1750)	1020 1105 (1700)	1150 1240 (2000)	1450 ▲ 1505 (2650)	1620 ▲ 1680 (3070)	1990 ▲ 2150 (3750)	2230 ▲ 2405 (4370)	–	–	4080 ▲ 4405 (8750)	7860 ▲ 8390 (15000)
	28	53	779 940 (1500)	837 1005 (1750)	867 1060 (2000)	910 1110 (2240)	1470 1770 (3000)	1580 1910 (3450)	1680 2050 (4120)	1800 2205 (4370)	2510 ▲ 2890 (5800)	2900 ▲ 3350 (6700)	4080 ▲ 4745 (9500)	6940 ▲ 8410 (15000)
	31,5	47,5	676 940 (1550)	753 1045 (1750)	804 1115 (2060)	881 1220 (2360)	1290 1770 (2900)	1440 1985 (3350)	1600 2205 (4120)	1720 2360 (4750)	2180 ▲ 2890 (5800)	2480 ▲ 3350 (6700)	4080 ▲ 5470 (10600)	6020 ▲ 8410 (15000)
	35,5	42,5	622 940 (1550)	693 1045 (1750)	734 1170 (2120)	799 1270 (2300)	1170 1770 (3000)	1310 1985 (3450)	1450 2275 (3870)	1610 2530 (4500)	1990 2950 (5800)	2310 3420 (6900)	4000 ▲ 5930 (10000)	5440 ▲ 8410 (14500)
	40	37,5	540 940 (1500)	601 1045 (1700)	674 1170 (2120)	734 1275 (2430)	1020 1770 (3000)	1140 1985 (3450)	1320 2275 (4120)	1490 2565 (4750)	1730 2950 (5800)	1970 3420 (6900)	3470 ▲ 5930 (10900)	4730 ▲ 8410 (15500)
	45	33,5	494 940 (1550)	550 1045 (1750)	586 1170 (1950)	666 1330 (2240)	926 1770 (3070)	1040 1985 (3450)	1150 2275 (4000)	1280 2535 (4500)	1580 3010 (6000)	1850 3490 (6900)	3080 ▲ 5930 (10900)	4370 ▲ 8410 (15500)
	50	30	429 940 (1550)	477 1045 (1750)	535 1170 (2120)	608 1330 (2430)	810 1770 (3070)	907 1985 (3450)	1040 2275 (4250)	1170 2560 (4870)	1470 3230 (6000)	1560 3490 (6900)	2670 ▲ 5930 (10900)	3800 ▲ 8410 (15500)
	56	26,5	389 940 (1550)	433 1045 (1750)	465 1170 (2000)	529 1330 (2300)	752 1770 (3070)	843 1985 (3550)	913 2275 (4000)	1020 2540 (4620)	1340 3230 (6150)	1490 3535 (7100)	2500 5930 (11200)	3390 ▲ 8410 (16000)
	63	23,6	338 940 (1550)	376 1045 (1750)	421 1170 (2180)	479 1330 (2500)	658 1770 (3070)	737 1985 (3550)	846 2275 (4250)	954 2565 (5000)	1170 3230 (6150)	1330 3760 (7100)	2170 5930 (11200)	2940 ▲ 8410 (16000)
	71	21,2	316 940 (1550)	352 1045 (1750)	366 1170 (2060)	416 1330 (2360)	593 1770 (3070)	664 1985 (3550)	742 2275 (4120)	830 2545 (4750)	1070 3230 (6150)	1230 3760 (7100)	1970 5930 (11200)	2670 ▲ 8410 (16000)
	80	19	275 940 (1550)	306 1045 (1750)	343 1170 (2180)	389 1330 (2500)	519 1770 (3070)	581 1985 (3550)	666 2275 (4250)	752 2565 (5000)	933 3230 (6150)	1070 3760 (7100)	1710 5930 (11200)	2320 ▲ 8410 (16000)
	90	17	253 940 (1550)	282 1045 (1750)	298 1170 (2060)	339 1330 (2360)	474 1770 (3070)	531 1985 (3550)	584 2275 (4120)	656 2555 (4750)	842 3230 (5800)	980 3760 (6700)	1580 5930 (11200)	2200 ▲ 8410 (16000)
	100	15	220 940 (1550)	244 1045 (1750)	270 1170 (2180)	307 1330 (2500)	415 1770 (3070)	465 1985 (3550)	533 2275 (4250)	602 2565 (5000)	737 3230 (6150)	842 3760 (7100)	1370 5930 (11200)	1910 ▲ 8410 (16000)
	125	11,8	–	–	216 1170 (1900)	246 1330 (2180)	–	–	426 2275 (3750)	481 2565 (4250)	–	–	–	–
4I	125	11,8	164 865 (1600)	183 965 (1800)	207 1105 (2240)	239 1280 (2570)	327 1770 (3150)	353 1910 (3650)	391 2150 (4250)	448 2465 (4870)	546 3070 (6150)	619 3540 (7100)	1040 5930 (11200)	1550 ▲ 8410 (16000)
	160	9,5	140 940 (1600)	156 1045 (1800)	172 1165 (2240)	188 1280 (2570)	266 1770 (3150)	297 1985 (3650)	327 2215 (4250)	364 2465 (4870)	457 3230 (6150)	491 3540 (7100)	841 5930 (11200)	1200 ▲ 8410 (16000)
	200	7,5	117 940 (1600)	130 1045 (1800)	143 1170 (2240)	157 1280 (2570)	198 1770 (3150)	222 1985 (3650)	250 2265 (4250)	272 2465 (4870)	349 3170 (6150)	383 3540 (7100)	667 5930 (11200)	933 8410 (16000)
	250	6	91,9 940 (1600)	102 1045 (1800)	113 1170 (2240)	124 1280 (2570)	161 1770 (3150)	181 1985 (3650)	204 2275 (4250)	221 2465 (4870)	282 3230 (6150)	323 3760 (7100)	542 5930 (11200)	723 8410 (16000)
	315	4,75	74,8 940 (1600)	83,2 1045 (1800)	86,6 1170 (2060)	98,4 1330 (2360)	127 1770 (3150)	142 1985 (3650)	159 2275 (4120)	179 2565 (4750)	226 3230 (6150)	258 3760 (7100)	428 5930 (11200)	570 8410 (16000)

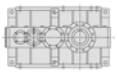
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 200 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2I	10	118	1710 885 (1400)	1920 995 (1650)	–	–	–	–	–	–	–	–	–	–
	11,2	106	1510 885 (1400)	1690 995 (1650)	1860 1110 (1950)	2000 1190 (2240)	–	–	–	–	–	–	–	–
	12,5	95	1360 885 (1450)	1520 995 (1650)	1640 1110 (1950)	1780 1205 (2240)	–	–	–	–	–	–	–	–
	14	85	1200 885 (1450)	1340 995 (1650)	1470 1110 (1950)	1590 1195 (2240)	2060 1515 (2900)	2310 1700 (3350)	2900 2160 (3870)	3240 2420 (4370)	4200▲ 3160 (5600)	4620▲ 3480 (6500)	7540▲ 5590 (9500)	10420▲ 7980 (13200)
	16	75	1040 885 (1400)	1160 995 (1600)	1300 1110 (1950)	1460 1245 (2240)	1800 1515 (2800)	2020 1695 (3250)	2570 2160 (3870)	2880 2420 (4500)	3650▲ 3160 (5600)	4040▲ 3560 (6500)	6540▲ 5590 (10000)	9060▲ 7980 (14500)
	18	67	957 885 (1450)	1070 995 (1650)	1130 1110 (1850)	1250 1220 (2120)	1650 1515 (2800)	1850 1700 (3250)	2250 2160 (3750)	2520 2420 (4250)	3290▲ 3160 (5150)	3710▲ 3560 (6000)	5910▲ 5590 (9500)	8190▲ 7980 (13600)
	20	60	831 885 (1450)	930 995 (1650)	1030 1110 (2000)	1150 1245 (2300)	1440 1515 (2800)	1620 1700 (3250)	2060 2160 (4000)	2300 2420 (4500)	2880▲ 3160 (5600)	3190▲ 3560 (6500)	5230▲ 5590 (10300)	7450▲ 7980 (14500)
	22,4	53	751 885 (1360)	841 995 (1550)	905 1110 (1900)	1010 1245 (2180)	1280 1515 (2900)	1440 1700 (3350)	1800 2160 (3750)	2020 2420 (4370)	2600▲ 3160 (5300)	2930▲ 3560 (6150)	4730▲ 5590 (9750)	6740▲ 7980 (14000)
3I	25	47,5	692 915 (1550)	751 995 (1750)	821 1110 (1750)	920 1245 (2000)	1170 1515 (2720)	1310 1700 (3150)	1600 2160 (3750)	1800 2420 (4370)	–	–	3380▲ 4560 (9000)	6320▲ 8430 (15500)
	28	42,5	624 940 (1550)	692 1040 (1750)	717 1095 (2000)	732 1120 (2240)	1180 1770 (3070)	1310 1975 (3550)	1380 2110 (4120)	1450 2220 (4500)	2020 2915 (5800)	2340 3380 (6700)	3380▲ 4910 (9750)	5560▲ 8430 (15500)
	31,5	37,5	542 940 (1550)	603 1045 (1800)	665 1150 (2060)	729 1260 (2360)	1030 1770 (3000)	1160 1990 (3450)	1320 2280 (4120)	1380 2385 (4750)	1760 2915 (5800)	2000 3380 (6700)	3380▲ 5660 (10600)	4830▲ 8430 (15500)
	35,5	33,5	498 940 (1550)	555 1045 (1800)	589 1170 (2120)	661 1315 (2300)	934 1770 (3000)	1050 1990 (3450)	1160 2285 (3870)	1290 2535 (4500)	1610 2975 (6000)	1860 3450 (6900)	3210▲ 5940 (10300)	4360▲ 8430 (14500)
	40	30	433 940 (1500)	482 1045 (1750)	540 1170 (2120)	608 1315 (2430)	817 1770 (3000)	918 1990 (3450)	1060 2285 (4250)	1200 2575 (4870)	1400 2975 (6000)	1590 3450 (6900)	2780 5940 (10900)	3790▲ 8430 (15500)
	45	26,5	396 940 (1550)	441 1045 (1750)	470 1170 (2000)	534 1330 (2300)	742 1770 (3070)	834 1990 (3550)	923 2285 (4000)	1030 2540 (4620)	1270 3035 (6000)	1490 3520 (7100)	2470 5940 (11200)	3500▲ 8430 (16000)
	50	23,6	344 940 (1550)	383 1045 (1750)	429 1170 (2120)	488 1330 (2430)	649 1770 (3070)	729 1990 (3550)	836 2285 (4250)	940 2565 (4870)	1180 3245 (6000)	1260 3540 (7100)	2140 5940 (11200)	3040▲ 8430 (16000)
	56	21,2	311 940 (1550)	347 1045 (1750)	373 1170 (2000)	424 1330 (2300)	603 1770 (3070)	677 1990 (3550)	733 2285 (4000)	817 2545 (4620)	1080 3245 (6150)	1190 3540 (7100)	2000 5940 (11200)	2710 8430 (16000)
	63	19	270 940 (1550)	301 1045 (1750)	338 1170 (2180)	384 1330 (2500)	527 1770 (3070)	593 1990 (3550)	679 2285 (4250)	766 2575 (5000)	937 3245 (6150)	1070 3770 (7100)	1740 5940 (11200)	2360 8430 (16000)
	71	17	253 940 (1550)	282 1045 (1750)	294 1170 (2060)	334 1330 (2360)	475 1770 (3070)	534 1990 (3550)	595 2285 (4120)	665 2550 (4750)	863 3245 (6150)	983 3770 (7100)	1580 5940 (11200)	2140 8430 (16000)
	80	15	220 940 (1550)	245 1045 (1750)	275 1170 (2180)	312 1330 (2500)	415 1770 (3070)	467 1990 (3550)	535 2285 (4250)	604 2575 (5000)	750 3245 (6150)	856 3770 (7100)	1370 5940 (11200)	1860 8430 (16000)
	90	13,2	203 940 (1550)	226 1045 (1750)	239 1170 (2060)	272 1330 (2360)	380 1770 (3070)	427 1990 (3550)	469 2285 (4120)	525 2555 (4750)	676 3245 (5800)	786 3770 (6700)	1260 5940 (11200)	1760 8430 (16000)
	100	11,8	176 940 (1550)	196 1045 (1750)	217 1170 (2180)	246 1330 (2500)	332 1770 (3070)	374 1990 (3550)	428 2285 (4250)	483 2575 (5000)	592 3245 (6150)	675 3770 (7100)	1100 5940 (11200)	1530 8430 (16000)
	125	9,5	–	–	173 1170 (1900)	197 1330 (2180)	–	–	342 2285 (3750)	386 2575 (4250)	–	–	–	–
4I	125	9,5	135 895 (1600)	151 1000 (1800)	166 1105 (2240)	191 1280 (2570)	262 1770 (3150)	292 1980 (3650)	313 2150 (4250)	359 2465 (4870)	452 3175 (6150)	495 3540 (7100)	830 5940 (11200)	1240 8430 (16000)
	160	7,5	112 940 (1600)	125 1045 (1800)	138 1170 (2240)	151 1280 (2570)	213 1770 (3150)	239 1990 (3650)	270 2285 (4250)	291 2465 (4870)	367 3245 (6150)	394 3555 (7100)	674 5940 (11200)	964 8430 (16000)
	200	6	93,6 940 (1600)	104 1045 (1800)	115 1170 (2240)	126 1280 (2570)	159 1770 (3150)	179 1990 (3650)	202 2285 (4250)	218 2465 (4870)	285 3245 (6150)	306 3540 (7100)	535 5940 (11200)	748 8430 (16000)
	250	4,75	73,6 940 (1600)	82 1045 (1800)	90,5 1170 (2240)	98,9 1280 (2570)	129 1770 (3150)	145 1990 (3650)	164 2285 (4250)	177 2465 (4870)	227 3245 (6150)	259 3770 (7100)	435 5940 (11200)	579 8430 (16000)
	315	3,75	59,9 940 (1600)	66,7 1045 (1800)	69,4 1170 (2060)	78,9 1330 (2360)	102 1770 (3150)	114 1990 (3650)	128 2285 (4120)	144 2575 (4750)	181 3245 (6150)	207 3770 (7100)	343 5940 (11200)	457 8430 (16000)

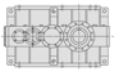
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 000 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2I	10	100	1430 **890** (1450)	1600 **1000** (1650)	–	–	–	–	–	–	–	–	–	–
	11,2	90	1260 **890** (1450)	1410 **1000** (1650)	1550 **1115** (1950)	1740 **1250** (2240)	–	–	–	–	–	–	–	–
	12,5	80	1140 **890** (1450)	1270 **1000** (1700)	1370 **1115** (1950)	1540 **1250** (2240)	–	–	–	–	–	–	–	–
	14	71	1000 **890** (1450)	1120 **1000** (1700)	1230 **1115** (2000)	1330 **1195** (2240)	1740 **1535** (2900)	1960 **1730** (3350)	2440 **2180** (4000)	2710 **2425** (4500)	3540 **3190** (5600)	3860 **3485** (6500)	6320▲ **5620** (9500)	8720▲ **8020** (13600)
	16	63	870 **890** (1450)	973 **1000** (1650)	1090 **1115** (2000)	1220 **1250** (2300)	1520 **1535** (2800)	1720 **1730** (3250)	2160 **2180** (4000)	2420 **2445** (4620)	3070 **3190** (5600)	3400 **3595** (6500)	5480 **5620** (10300)	7580▲ **8020** (14500)
	18	56	802 **890** (1450)	897 **1000** (1650)	947 **1115** (1900)	1060 **1250** (2180)	1390 **1535** (2900)	1570 **1730** (3350)	1900 **2180** (3750)	2130 **2445** (4370)	2770 **3190** (5300)	3120 **3595** (6150)	4950 **5620** (9750)	6860▲ **8020** (14000)
	20	50	696 **890** (1450)	779 **1000** (1650)	859 **1115** (2060)	964 **1250** (2360)	1220 **1535** (2900)	1370 **1730** (3350)	1730 **2180** (4000)	1940 **2445** (4620)	2430 **3190** (5800)	2680 **3595** (6700)	4380 **5620** (10600)	6240▲ **8020** (15000)
	22,4	45	629 **890** (1360)	704 **1000** (1600)	757 **1115** (1900)	850 **1250** (2180)	1080 **1535** (2900)	1220 **1730** (3350)	1520 **2180** (3870)	1700 **2445** (4370)	2190 **3190** (5450)	2460 **3595** (6300)	3960 **5620** (10000)	5640▲ **8020** (14000)
3I	25	40	593 **940** (1550)	660 **1050** (1800)	687 **1115** (1750)	771 **1250** (2060)	985 **1535** (2720)	1110 **1730** (3150)	1350 **2180** (3870)	1510 **2440** (4500)	–	–	3010 **4875** (9750)	5290▲ **8460** (15500)
	28	35,5	521 **940** (1550)	581 **1050** (1800)	638 **1170** (2060)	649 **1190** (2240)	983 **1775** (3070)	1110 **2010** (3550)	1230 **2255** (4250)	1230 **2255** (4500)	1720 **2970** (6000)	1990 **3445** (6900)	3010 **5250** (10600)	4650▲ **8460** (15500)
	31,5	31,5	452 **940** (1600)	504 **1050** (1800)	567 **1175** (2120)	645 **1340** (2430)	860 **1775** (3000)	974 **2010** (3450)	1110 **2300** (4250)	1230 **2540** (4870)	1490 **2970** (6000)	1700 **3445** (6900)	2970 **5970** (10900)	4040▲ **8460** (15500)
	35,5	28	416 **940** (1600)	464 **1050** (1800)	493 **1175** (2120)	561 **1340** (2300)	780 **1775** (3070)	883 **2010** (3550)	976 **2300** (4000)	1080 **2540** (4620)	1360 **3030** (6000)	1580 **3510** (7100)	2690 **5970** (10300)	3650▲ **8460** (14500)
	40	25	361 **940** (1550)	403 **1050** (1750)	453 **1175** (2120)	515 **1340** (2430)	683 **1775** (3070)	773 **2010** (3550)	891 **2300** (4250)	1000 **2595** (4870)	1190 **3030** (6000)	1350 **3510** (7100)	2330 **5970** (11200)	3180 **8460** (16000)
	45	22,4	331 **940** (1550)	368 **1050** (1750)	394 **1175** (2000)	448 **1340** (2300)	620 **1775** (3070)	701 **2010** (3550)	775 **2300** (4000)	857 **2545** (4620)	1130 **3230** (6150)	1250 **3540** (7100)	2070 **5970** (11200)	2930 **8460** (16000)
	50	20	287 **940** (1550)	320 **1050** (1750)	359 **1175** (2180)	409 **1340** (2500)	542 **1775** (3070)	613 **2010** (3550)	702 **2300** (4250)	789 **2585** (5000)	991 **3270** (6150)	1130 **3785** (7100)	1790 **5970** (11200)	2550 **8460** (16000)
	56	18	260 **940** (1550)	290 **1050** (1750)	313 **1175** (2060)	356 **1340** (2360)	503 **1775** (3070)	570 **2010** (3550)	615 **2300** (4120)	682 **2550** (4750)	906 **3270** (6150)	1040 **3695** (7100)	1680 **5970** (11200)	2270 **8460** (16000)
	63	16	226 **940** (1550)	252 **1050** (1750)	283 **1175** (2180)	322 **1340** (2500)	440 **1775** (3070)	498 **2010** (3550)	570 **2300** (4250)	643 **2595** (5000)	787 **3270** (6150)	896 **3790** (7100)	1460 **5970** (11200)	1970 **8460** (16000)
	71	14	212 **940** (1550)	236 **1050** (1750)	246 **1175** (2060)	280 **1340** (2360)	397 **1775** (3070)	449 **2010** (3550)	500 **2300** (4120)	555 **2555** (4750)	725 **3270** (6150)	823 **3790** (7100)	1320 **5970** (11200)	1790 **8460** (16000)
	80	12,5	184 **940** (1550)	205 **1050** (1750)	230 **1175** (2180)	262 **1340** (2500)	347 **1775** (3070)	393 **2010** (3550)	449 **2300** (4250)	507 **2595** (5000)	630 **3270** (6150)	717 **3790** (7100)	1150 **5970** (11200)	1560 **8460** (16000)
	90	11,2	169 **940** (1550)	189 **1050** (1750)	200 **1175** (2060)	228 **1340** (2360)	317 **1775** (3070)	359 **2010** (3550)	394 **2300** (4120)	439 **2560** (4750)	568 **3270** (5800)	658 **3790** (6700)	1060 **5970** (11200)	1470 **8460** (16000)
	100	10	147 **940** (1550)	164 **1050** (1750)	182 **1175** (2180)	206 **1340** (2500)	278 **1775** (3070)	314 **2010** (3550)	359 **2300** (4250)	405 **2595** (5000)	497 **3270** (6150)	566 **3790** (7100)	919 **5970** (11200)	1280 **8460** (16000)
	125	8	–	–	145 **1175** (1900)	165 **1340** (2180)	–	–	287 **2300** (3750)	324 **2595** (4250)	–	–	–	–
4I	125	8	119 **940** (1600)	133 **1050** (1800)	138 **1105** (2240)	159 **1280** (2570)	219 **1775** (3150)	247 **2010** (3650)	261 **2150** (4250)	299 **2465** (4870)	388 **3270** (6150)	412 **3540** (7100)	695 **5970** (11200)	1040 **8460** (16000)
	160	6,3	93,7 **940** (1600)	104 **1050** (1800)	115 **1175** (2240)	125 **1280** (2570)	178 **1775** (3150)	201 **2010** (3650)	227 **2300** (4250)	243 **2465** (4870)	308 **3270** (6150)	351 **3790** (7100)	565 **5970** (11200)	807 **8460** (16000)
	200	5	78,1 **940** (1600)	87,1 **1050** (1800)	96,3 **1175** (2240)	105 **1280** (2570)	133 **1775** (3150)	150 **2010** (3650)	169 **2300** (4250)	181 **2465** (4870)	240 **3270** (6150)	257 **3570** (7100)	448 **5970** (11200)	626 **8460** (16000)
	250	4	61,5 **940** (1600)	68,5 **1050** (1800)	75,8 **1175** (2240)	82,4 **1280** (2570)	108 **1775** (3150)	122 **2010** (3650)	138 **2300** (4250)	148 **2480** (4870)	190 **3270** (6150)	217 **3790** (7100)	364 **5970** (11200)	485 **8460** (16000)
	315	3,15	50 **940** (1600)	55,7 **1050** (1800)	58,1 **1175** (2060)	66,1 **1340** (2360)	85 **1775** (3150)	96,2 **2010** (3650)	107 **2300** (4120)	121 **2595** (4750)	152 **3270** (6150)	173 **3790** (7100)	287 **5970** (11200)	383 **8460** (16000)

▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 750 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2l	10	75	1080 900 (1500)	1210 1005 (1700)	–	–	–	–	–	–	–	–	–	–
	11,2	67	953 900 (1500)	1070 1005 (1700)	1170 1120 (2000)	1320 1260 (2300)	–	–	–	–	–	–	–	–
	12,5	60	860 900 (1500)	962 1005 (1750)	1040 1120 (2000)	1160 1260 (2300)	–	–	–	–	–	–	–	–
	14	53	757 900 (1500)	847 1005 (1750)	932 1120 (2060)	998 1200 (2300)	1330 1570 (3000)	1510 1780 (3450)	1860 2215 (4120)	2040 2430 (4500)	2690 3240 (5800)	2910 3500 (6700)	4770 5660 (10000)	6590 8080 (14000)
	16	47,5	657 900 (1450)	735 1005 (1700)	822 1120 (2060)	924 1260 (2360)	1170 1570 (2900)	1330 1780 (3350)	1650 2215 (4120)	1850 2485 (4750)	2340 3240 (5800)	2590 3650 (6700)	4140 5660 (10600)	5730 8080 (15000)
	18	42,5	606 900 (1500)	677 1005 (1700)	715 1120 (1950)	804 1260 (2240)	1070 1570 (3000)	1210 1780 (3450)	1440 2215 (3870)	1620 2485 (4500)	2110 3240 (5450)	2380 3650 (6300)	3740 5660 (10000)	5180 8080 (14500)
	20	37,5	526 900 (1500)	588 1005 (1700)	649 1120 (2060)	729 1260 (2360)	934 1570 (3000)	1060 1780 (3450)	1320 2215 (4120)	1480 2485 (4750)	1850 3240 (6000)	2040 3650 (6900)	3310 5660 (10900)	4710 8080 (15500)
	22,4	33,5	475 900 (1400)	531 1005 (1600)	572 1120 (1950)	643 1260 (2240)	830 1570 (3000)	943 1780 (3450)	1150 2215 (4000)	1300 2485 (4500)	1670 3240 (5600)	1880 3650 (6500)	3000 5660 (10300)	4260 8080 (14500)
3l	25	30	446 945 (1600)	497 1055 (1800)	519 1120 (1800)	584 1260 (2060)	755 1570 (2800)	857 1780 (3250)	1030 2215 (4000)	1140 2470 (4620)	–	–	2500 5400 (10900)	3990 8520 (16000)
	28	26,5	392 945 (1600)	437 1055 (1800)	479 1170 (2060)	540 1320 (2300)	740 1785 (3150)	846 2040 (3650)	944 2305 (4250)	1020 2500 (4620)	1320 3050 (6150)	1530 3535 (7100)	2500 5820 (11200)	3510 8520 (16000)
	31,5	23,6	341 945 (1600)	380 1055 (1800)	428 1185 (2180)	487 1350 (2500)	648 1785 (3070)	741 2040 (3550)	844 2325 (4250)	941 2590 (5000)	1200 3180 (6150)	1310 3535 (7100)	2250 6020 (11200)	3040 8490 (16000)
	35,5	21,2	313 945 (1600)	349 1055 (1800)	372 1185 (2180)	424 1350 (2300)	587 1785 (3070)	672 2040 (3550)	740 2325 (4120)	811 2545 (4750)	1030 3055 (6150)	1200 3540 (7100)	2030 6020 (10600)	2760 8520 (15000)
	40	19	272 945 (1550)	303 1055 (1750)	342 1185 (2180)	389 1350 (2500)	514 1785 (3070)	588 2040 (3550)	675 2325 (4250)	762 2620 (5000)	937 3190 (6150)	1020 3540 (7100)	1760 6020 (11200)	2390 8510 (16000)
	45	17	249 945 (1550)	277 1055 (1750)	297 1185 (2060)	339 1350 (2360)	466 1785 (3070)	533 2040 (3550)	587 2325 (4120)	645 2555 (4750)	864 3300 (6150)	938 3540 (7100)	1560 6020 (11200)	2210 8520 (16000)
	50	15	216 945 (1550)	241 1055 (1750)	272 1185 (2180)	309 1350 (2500)	408 1785 (3070)	467 2040 (3550)	532 2325 (4250)	596 2605 (5000)	752 3305 (6150)	852 3815 (7100)	1350 6020 (11200)	1920 8520 (16000)
	56	13,2	196 945 (1550)	218 1055 (1750)	236 1185 (2060)	269 1350 (2360)	379 1785 (3070)	433 2040 (3550)	466 2325 (4120)	513 2560 (4750)	687 3305 (6150)	803 3815 (7100)	1270 6020 (11200)	1710 8520 (16000)
	63	11,8	170 945 (1550)	189 1055 (1750)	214 1185 (2180)	243 1350 (2500)	332 1785 (3070)	379 2040 (3550)	432 2325 (4250)	485 2610 (5000)	597 3305 (6150)	677 3815 (7100)	1100 6020 (11200)	1490 8520 (16000)
	71	10,6	159 945 (1550)	178 1055 (1750)	186 1185 (2060)	212 1350 (2360)	299 1785 (3070)	341 2040 (3550)	379 2325 (4120)	418 2565 (4750)	550 3305 (6150)	622 3815 (7100)	1000 6020 (11200)	1350 8520 (16000)
	80	9,5	138 945 (1550)	154 1055 (1750)	174 1185 (2180)	198 1350 (2500)	261 1785 (3070)	299 2040 (3550)	341 2325 (4250)	383 2615 (5000)	478 3305 (6150)	541 3815 (7100)	868 6020 (11200)	1170 8520 (16000)
	90	8,5	127 945 (1550)	142 1055 (1750)	151 1185 (2060)	172 1350 (2360)	239 1785 (3070)	273 2040 (3550)	299 2325 (4120)	330 2570 (4750)	431 3305 (5800)	497 3815 (6700)	800 6020 (11200)	1110 8520 (16000)
	100	7,5	111 945 (1550)	123 1055 (1750)	137 1185 (2180)	156 1350 (2500)	209 1785 (3070)	239 2040 (3550)	272 2325 (4250)	307 2620 (5000)	377 3305 (6150)	427 3815 (7100)	694 6020 (11200)	966 8520 (16000)
	125	6	–	–	110 1185 (1900)	125 1350 (2180)	–	–	218 2325 (3750)	246 2620 (4250)	–	–	–	–
4l	125	6	89,6 945 (1600)	99,9 1055 (1800)	105 1125 (2240)	120 1280 (2570)	165 1785 (3150)	188 2040 (3650)	212 2325 (4250)	224 2465 (4870)	294 3305 (6150)	333 3815 (7100)	525 6020 (11200)	786 8520 (16000)
	160	4,75	70,5 945 (1600)	78,6 1055 (1800)	87,3 1185 (2240)	94,1 1280 (2570)	134 1785 (3150)	153 2040 (3650)	172 2325 (4250)	182 2465 (4870)	234 3305 (6150)	265 3815 (7100)	427 6020 (11200)	609 8520 (16000)
	200	3,75	58,8 945 (1600)	65,6 1055 (1800)	72,8 1185 (2240)	78,5 1280 (2570)	99,9 1785 (3150)	114 2040 (3650)	128 2325 (4250)	138 2490 (4870)	182 3305 (6150)	206 3815 (7100)	339 6020 (11200)	473 8520 (16000)
	250	3	46,3 945 (1600)	51,6 1055 (1800)	57,3 1185 (2240)	61,8 1280 (2570)	81,2 1785 (3150)	92,9 2040 (3650)	104 2325 (4250)	112 2495 (4870)	144 3305 (6150)	164 3815 (7100)	275 6020 (11200)	366 8520 (16000)
	315	2,36	37,6 945 (1600)	42 1055 (1800)	43,9 1185 (2060)	50 1350 (2360)	64 1785 (3150)	73,2 2040 (3650)	81,2 2325 (4120)	91,6 2620 (4750)	116 3305 (6150)	131 3815 (7100)	217 6020 (11200)	289 8520 (16000)

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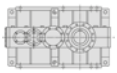
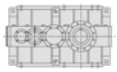


$n_1 \leqslant$ 90 rpm

Train of gears	i_N	n_{N2}	Gear reducer size											
			Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
2I	10	9	136 940 (1600)	151 1045 (1800)	–	–	–	–	–	–	–	–	–	–
	11,2	8	119 940 (1600)	133 1045 (1800)	147 1170 (2180)	167 1330 (2500)	–	–	–	–	–	–	–	–
	12,5	7,1	108 940 (1600)	120 1045 (1800)	129 1170 (2180)	147 1330 (2500)	–	–	–	–	–	–	–	–
	14	6,3	94,9 940 (1600)	106 1045 (1800)	117 1170 (2180)	124 1240 (2500)	181 1770 (3150)	213 2090 (3650)	242 2405 (4250)	250 2485 (4870)	332 3330 (6150)	356 3575 (7100)	600 5930 (10600)	823 8410 (15000)
	16	5,6	82,4 940 (1550)	91,7 1045 (1750)	103 1170 (2180)	117 1330 (2500)	158 1770 (3070)	186 2090 (3550)	215 2405 (4250)	234 2625 (5000)	295 3400 (6150)	339 3985 (7100)	521 5930 (11200)	716 8410 (16000)
	18	5	75,9 940 (1550)	84,5 1045 (1750)	89,4 1170 (2060)	102 1330 (2360)	144 1770 (3070)	170 2090 (3550)	188 2405 (4120)	202 2585 (4750)	277 3540 (5800)	311 3985 (6700)	470 5930 (10600)	647 8410 (15000)
	20	4,5	65,9 940 (1550)	73,3 1045 (1750)	81,1 1170 (2180)	92,2 1330 (2500)	126 1770 (3070)	149 2090 (3550)	172 2405 (4250)	191 2680 (5000)	233 3410 (6150)	268 3985 (7100)	416 5930 (11200)	589 8410 (16000)
	22,4	4	59,5 940 (1450)	66,3 1045 (1700)	71,5 1170 (2060)	81,2 1330 (2360)	112 1770 (3070)	133 2090 (3550)	151 2405 (4120)	162 2595 (4750)	218 3540 (5800)	246 3985 (6700)	376 5930 (10600)	532 8410 (15000)
3I	25	3,55	54,6 965 (1600)	61,2 1080 (1800)	64,9 1170 (1900)	73,7 1330 (2180)	102 1770 (2900)	121 2090 (3350)	134 2405 (4120)	147 2635 (4750)	–	–	349 6280 (11200)	498 8850 (16000)
	28	3,15	48,1 965 (1600)	53,8 1080 (1800)	57,4 1170 (2060)	65,3 1330 (2500)	90,8 1825 (3150)	110 2215 (3650)	118 2405 (4250)	130 2655 (4870)	179 3435 (6150)	207 3985 (7100)	324 6280 (11200)	438 8850 (16000)
	31,5	2,8	41,7 965 (1600)	46,7 1080 (1800)	53,7 1240 (2180)	61,4 1415 (2500)	79,5 1825 (3070)	96,4 2215 (3550)	108 2480 (4250)	121 2770 (5000)	160 3540 (6150)	177 3985 (7100)	281 6280 (11200)	380 8850 (16000)
	35,5	2,5	38,4 965 (1600)	43 1080 (1800)	46,7 1240 (2180)	53,4 1415 (2430)	72,1 1825 (3070)	87,4 2215 (3550)	94,7 2480 (4120)	106 2765 (4750)	144 3540 (6150)	161 3985 (7100)	254 6280 (10600)	344 8850 (15000)
	40	2,24	33,3 965 (1550)	37,3 1080 (1750)	42,9 1240 (2180)	49 1415 (2500)	63 1825 (3070)	76,5 2215 (3550)	86,4 2480 (4250)	97,2 2790 (5000)	125 3540 (6150)	138 3985 (7100)	221 6280 (11200)	299 8850 (16000)
	45	2	30,5 965 (1550)	34,1 1080 (1750)	37,3 1240 (2060)	42,6 1415 (2360)	57,2 1825 (3070)	69,4 2215 (3550)	75,1 2480 (4120)	84,5 2790 (4750)	111 3540 (6150)	127 3985 (7100)	196 6280 (11200)	276 8850 (16000)
	50	1,8	26,5 965 (1550)	29,6 1080 (1750)	34,1 1240 (2180)	38,9 1415 (2500)	50,1 1825 (3070)	60,8 2215 (3550)	68,1 2480 (4250)	76,6 2790 (5000)	96,6 3540 (6150)	107 3985 (7100)	170 6280 (11200)	240 8850 (16000)
	56	1,6	24 965 (1550)	26,9 1080 (1750)	29,6 1240 (2060)	33,9 1415 (2360)	46,5 1825 (3070)	56,4 2215 (3550)	59,7 2480 (4120)	67,1 2790 (4750)	88,3 3540 (6150)	101 3985 (7100)	159 6280 (11200)	214 8850 (16000)
	63	1,4	20,8 965 (1550)	23,3 1080 (1750)	26,8 1240 (2180)	30,6 1415 (2500)	40,7 1825 (3070)	49,4 2215 (3550)	55,3 2480 (4250)	62,2 2790 (5000)	76,7 3540 (6150)	84,7 3985 (7100)	138 6280 (11200)	186 8850 (16000)
	71	1,25	19,5 965 (1550)	21,8 1080 (1750)	23,3 1240 (2060)	26,6 1415 (2360)	36,6 1825 (3070)	44,5 2215 (3550)	48,5 2480 (4120)	54,5 2790 (4750)	70,6 3540 (6150)	77,8 3985 (7100)	125 6280 (11200)	169 8850 (16000)
	80	1,12	16,9 965 (1550)	19 1080 (1750)	21,8 1240 (2180)	24,9 1415 (2500)	32 1825 (3070)	38,9 2215 (3550)	43,6 2480 (4250)	49 2790 (5000)	61,4 3540 (6150)	67,8 3985 (7100)	109 6280 (11200)	146 8850 (16000)
	90	1	15,6 965 (1550)	17,5 1080 (1750)	19 1240 (2060)	21,7 1415 (2360)	29,3 1825 (3070)	35,6 2215 (3550)	38,2 2480 (4120)	43 2790 (4750)	55,4 3540 (5800)	62,3 3985 (6700)	100 6280 (11200)	139 8850 (16000)
	100	0,9	13,5 965 (1550)	15,2 1080 (1750)	17,2 1240 (2180)	19,7 1415 (2500)	25,6 1825 (3070)	31,1 2215 (3550)	34,8 2480 (4250)	39,2 2790 (5000)	48,4 3540 (6150)	53,5 3985 (7100)	87 6280 (11200)	121 8850 (16000)
	125	0,71	–	–	13,8 1240 (1900)	15,7 1415 (2180)	–	–	27,9 2480 (3750)	31,4 2790 (4250)	–	–	–	–
4I	125	0,71	11 965 (1600)	12,3 1080 (1800)	13,9 1240 (2240)	15,3 1365 (2570)	20,2 1825 (3150)	24,5 2215 (3650)	27,1 2480 (4250)	29,3 2680 (4870)	37,8 3540 (6150)	41,8 3985 (7100)	65,8 6280 (11200)	98,1 8850 (16000)
	160	0,56	8,64 965 (1600)	9,67 1080 (1800)	10,9 1240 (2240)	12,4 1405 (2570)	16,4 1825 (3150)	19,9 2215 (3650)	22 2480 (4250)	24,4 2750 (4870)	30 3540 (6150)	33,2 3985 (7100)	53,5 6280 (11200)	75,9 8850 (16000)
	200	0,45	7,21 965 (1600)	8,07 1080 (1800)	9,13 1240 (2240)	10,4 1415 (2570)	12,3 1825 (3150)	14,9 2215 (3650)	16,4 2480 (4250)	18,5 2790 (4870)	23,4 3540 (6150)	25,8 3985 (7100)	42,4 6280 (11200)	58,9 8850 (16000)
	250	0,355	5,67 965 (1600)	6,35 1080 (1800)	7,18 1240 (2240)	8,21 1415 (2570)	9,96 1825 (3150)	12,1 2215 (3650)	13,3 2480 (4250)	15 2790 (4870)	18,6 3540 (6150)	20,5 3985 (7100)	34,5 6280 (11200)	45,6 8850 (16000)
	315	0,28	4,61 965 (1600)	5,16 1080 (1800)	5,51 1240 (2060)	6,3 1415 (2360)	7,85 1825 (3150)	9,53 2215 (3650)	10,4 2480 (4120)	11,7 2790 (4750)	14,8 3540 (6150)	16,4 3985 (7100)	27,2 6280 (11200)	36 8850 (16000)



Summary of transmission ratios *i*

Train of gears	Nominal gear ratio i_N	Gear reducer size — Actual gear ratio *i*											
		4000	**4001**	**4500**	**4501**	**5000**	**5001**	**5600**	**5601**	**6300**	**6301**	**7101**	**8001**
2I	**10**	*9,86*	*9,86*	–	–	–	–	–	–	–	–	–	–
	11,2	*11,2*	*11,2*	*11,4*	*11,4*	–	–	–	–	–	–	–	–
	12,5	*12,4*	*12,4*	*12,9*	*12,9*	–	–	–	–	–	–	–	–
	14	*14,1*	*14,1*	*14,3*	*14,3*	*14**	*14**	*14,2**	*14,2**	*14,3*	*14,3*	*14,1*	*14,6*
	16	*16,3*	*16,3*	*16,2*	*16,2*	*16**	*16**	*16**	*16**	*16,5*	*16,8*	*16,3*	*16,8*
	18	*17,6*	*17,6*	*18,7*	*18,7*	*17,5**	*17,5**	*18,3*	*18,3*	*18,3*	*18,3*	*18**	*18,6*
	20	*20,3*	*20,3*	*20,6*	*20,6*	*20**	*20**	*20**	*20**	*20,9*	*21,3*	*20,3*	*20,4*
	22,4	*22,5**	*22,5**	*23,3*	*23,3*	*22,5**	*22,5**	*22,8*	*22,8*	*23,1*	*23,1*	*22,5**	*22,6*
3I	**25**	*25,2*	*25,2*	*25,7*	*25,7*	*24,8*	*24,8*	*25,7*	*25,7*	–	–	*25,7*	*25,4*
	28	*28,7*	*28,7*	*29,1*	*29,1*	*28,7*	*28,7*	*29,1*	*29,1*	*27,4*	*27,5*	*27,7*	*28,8*
	31,5	*33*	*33*	*32,9*	*32,9*	*32,8*	*32,8*	*32,8*	*32,8*	*31,6*	*32,2*	*31,9*	*33,2*
	35,5	*35,9*	*35,9*	*37,9*	*37,9*	*36,1*	*36,1*	*37,4*	*37,4*	*35,2*	*35,2*	*35,3*	*36,8*
	40	*41,3*	*41,3*	*41,3*	*41,3*	*41,3*	*41,3*	*41*	*41*	*40,5*	*41,3*	*40,7*	*42,3*
	45	*45,2*	*45,2*	*47,4*	*47,4*	*45,5*	*45,5*	*47,1*	*47,1*	*45,5*	*44,9*	*45,9*	*45,8*
	50	*52,1*	*52,1*	*52*	*52*	*52**	*52**	*52**	*52**	*52,3*	*53,3*	*52,9*	*52,7*
	56	*57,4*	*57,4*	*59,7*	*59,7*	*56**	*56**	*59,3**	*59,3**	*57,3*	*56,6*	*56,5*	*59,1*
	63	*66,2*	*66,2*	*66*	*66*	*64**	*64**	*64**	*64**	*65,9*	*67,1*	*65,1*	*68,1*
	71	*70,6*	*70,6*	*75,9*	*75,9*	*71,1*	*71,1*	*73**	*73**	*71,6*	*73,1*	*71,6*	*74,9*
	80	*81,3*	*81,3*	*81,2*	*81,2*	*81,2*	*81,2*	*81,2*	*81,2*	*82,4*	*83,9*	*82,5*	*86,3*
	90	*88,2*	*88,2*	*93,3*	*93,3*	*88,8*	*88,8*	*92,7*	*92,7*	*91,3*	*91,3*	*89,5*	*91*
	100	*102*	*102*	*103*	*103*	*102*	*102*	*102*	*102*	*104*	*106*	*103*	*105*
	125	–	–	*129*	*129*	–	–	*127*	*127*	–	–	–	–
4I	**125**	*125*	*125*	*127*	*127*	*129*	*129*	*131*	*131*	*134*	*136*	*136*	*129*
	160	*159*	*159*	*162*	*162*	*159*	*159*	*161*	*161*	*168*	*171*	*168*	*166*
	200	*191*	*191*	*194*	*194*	*212*	*212*	*215*	*215*	*216*	*220*	*211*	*214*
	250	*243*	*243*	*246*	*246*	*261*	*261*	*265*	*265*	*272*	*277*	*260*	*277*
	315	*299*	*299*	*321*	*321*	*332*	*332*	*341*	*341*	*340*	*347*	*330*	*351*

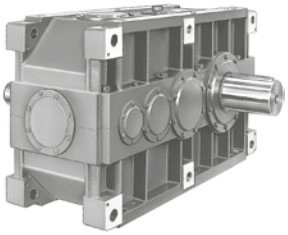
* **Finite** transmission ratio.

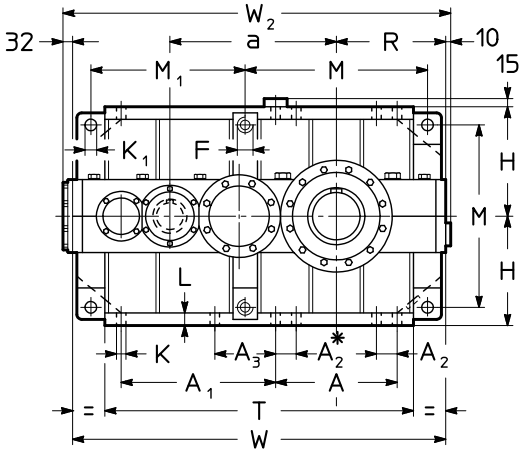
8 - Dimensions, designs, mounting positions
(helical gear reducers)

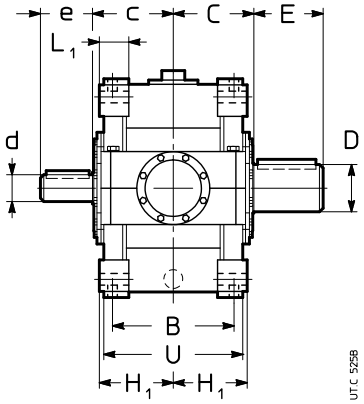
2582-01.02

8.1 - Gear reducers R 2I

Dimensions







* For size ⩾ 6300.

Size	a	A	A_1 M_1	A_2	A_3	B	C	c	F 1)	H h11 R	H_1 h12	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	W_2 2)	lb 4)	
4000	700	505	625	90	–	500	330	330	M45	450	296	39	48	52	116	750	1260	580	1525	1567	5110	5270
4001																					5290	5470
4500	750	505	675	90	–	500	358	330	M45	450	296	39	48	52	116	750	1310	580	1575	1617	5860	6060
4501																					6020	6260
5000	875	630	785	115	–	625	410	426[3]	M56	560	370	48	60	65	148	930	1575	725	1905	1947	10010	10320
5001																					10270	10630
5600	935	630	845	115	–	625	445	426	M56	560	370	48	60	65	148	930	1635	725	1965	2007	11970	12410
5601																					12240	12720
6300	1080	770	970	115	–	695	490	472	M56	630	406	48	60	65	148	1070	1900	795	2230	2272	16870	17480
6301																					17090	17810
7101	1270	930	1228	115	590	843	601	537	M56	710	481	48	66	71	185	1230	2279	943	2648	2676	28550	29650
8001	1430	1008	1286	145	596	944	682	600	M90	900	544	60	95	85	250	1574	2590	1064	3086	3114	43760	45350

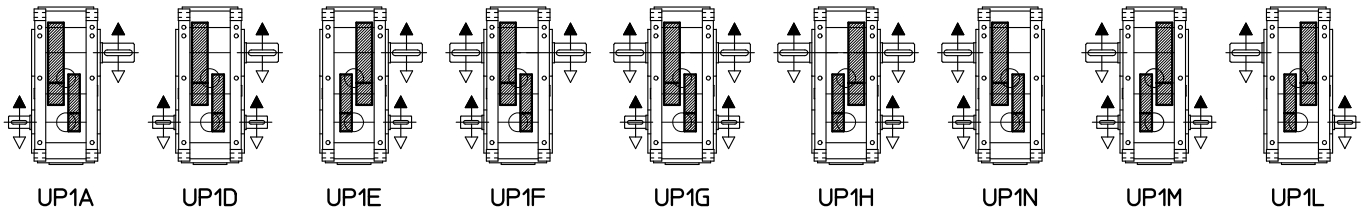
Size	D Ø	E	d Ø	e	d Ø	e
			$i_N \leqslant 11,2$		$i_N \geqslant 12,5$	
4000	190	280	110	210	90	170
4001	200					
			$i_N \leqslant 12,5$		$i_N \geqslant 14$	
4500	210	300	110	210	90	170
4501	220					
5000	240	330	–	–	110	210
5001	250					
5600	270	380	–	–	110	210
5601	280					
6300	300	430	–	–	125	210
6301	320					
7101	360	590	–	–	180	300
8001	400	660	–	–	200	350

1) Working length on thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6, dimension W_2 increases by approx. 20 for overall dimensions of filler plug.
3) **c** dimension overhangs from **C** dimension.
4) Values valid for double extension low speed shaft end.

8.1 - R 2I gear reducers

Designs (direction of rotation)

Solid low speed shaft (standard)



Hollow low speed shaft with shrink disc on machine opposite side (on request)

Hollow low speed shaft with shrink disc on machine side (on request)

Hollow low speed shaft with keyway (on request)

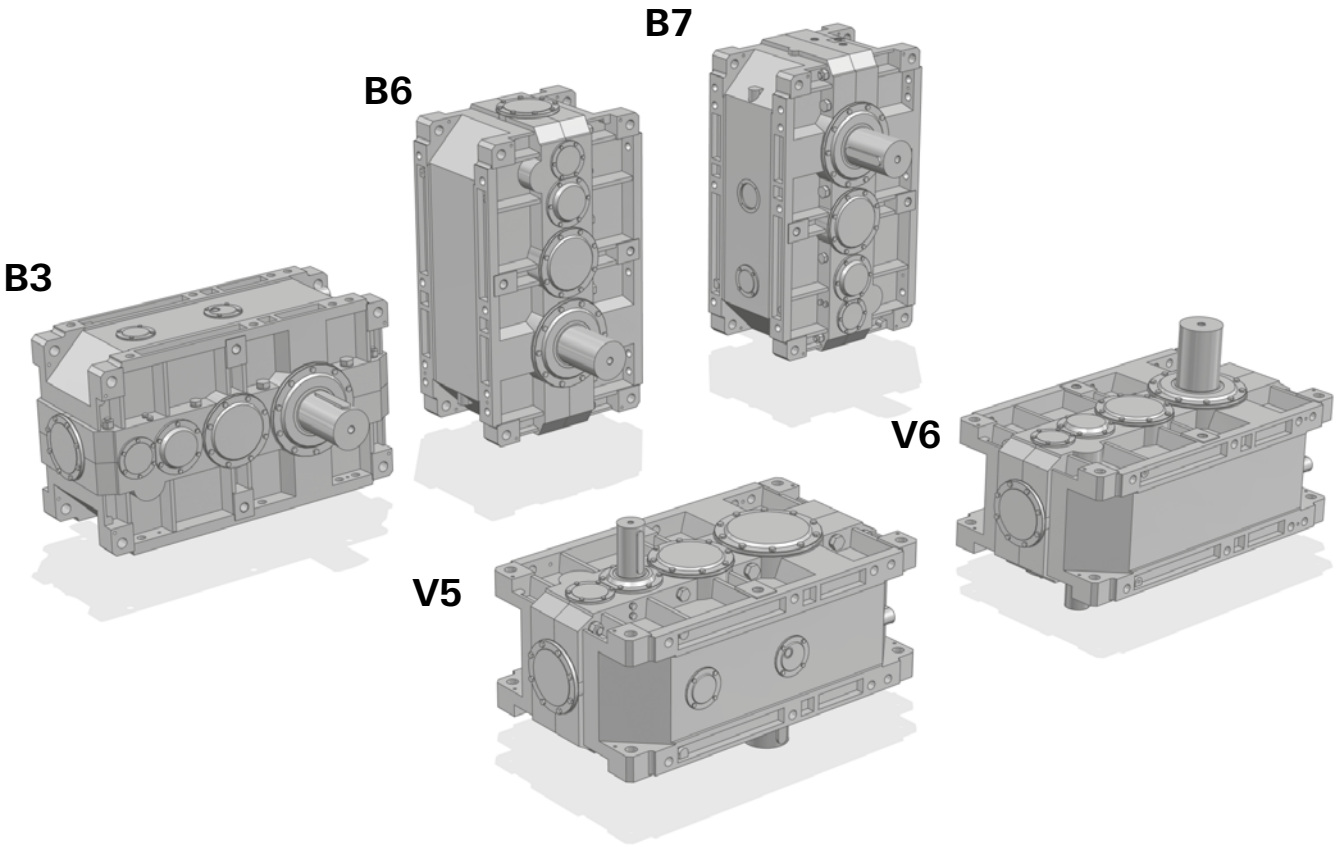
UT. C 2177

2582-01.02

8.1 - R 2I gear reducers

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



Possible high oil splash: for the corrective factor ft_3 of nominal thermal power Pt_N see ch. 4.

Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

Oil filler plug
Oil level plug
Oil drain plug

Oil filler plug on opposite side (not in view)
Oil level plug on opposite side (not in view)
Oil drain plug on opposite side (not in view)

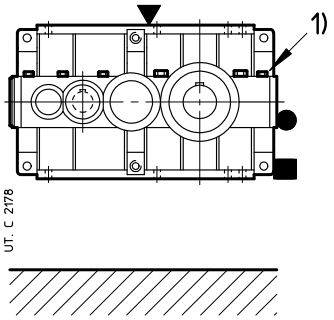
2582-01.02

8.1 - R 2I gear reducers

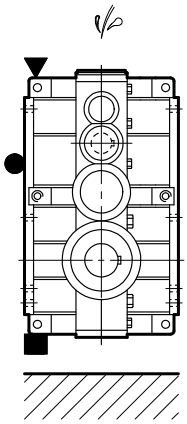
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

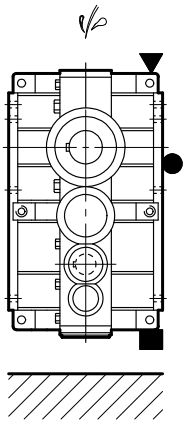
B3



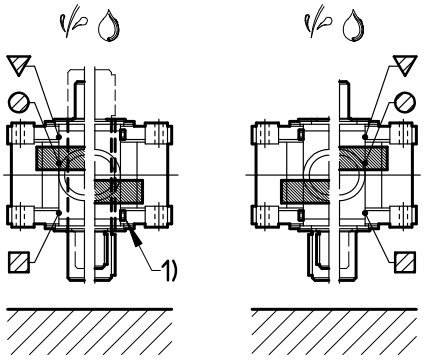
B6



B7

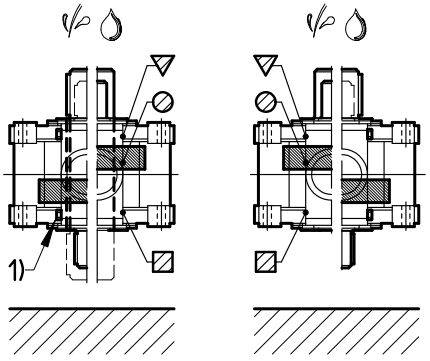


V5



UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

V6



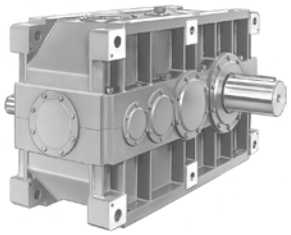
UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

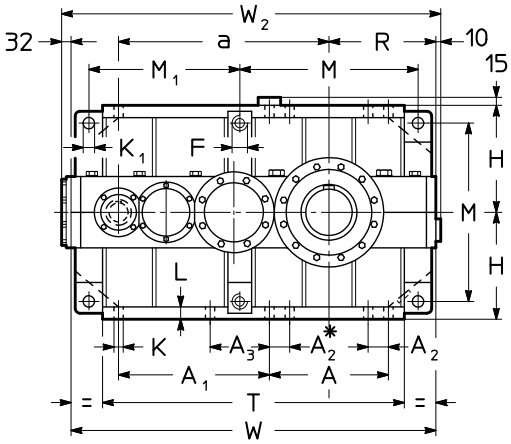
Size	Oil quantity [gal]				
	B3	B6	B7	V5, V6	
				with low speed shaft on bottom	with low speed wheel on top
4000, 4001	31	40	59	62	66
4500, 4501	30	37	62	59	66
5000, 5001	62	79	119	125	132
5600, 5601	59	70	119	119	132
6300, 6301	88	106	177	166	188
7101	148	177	296	264	296
8001	251	280	476	449	502

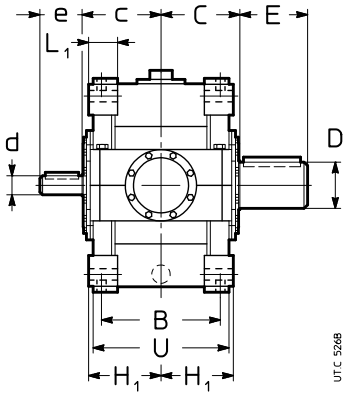
See notes at previous page.

8.2 - Gear reducers R 3I

Dimensions







* For sizes ⩾ 6300.

Size	a	A	A_1 M_1	A_2	A_3	B	C	c	F 1)	H h11 R	H_1 h12	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	W_2 2)	lb 3)	
4000 **4001**	900	505	625	90	–	500	330	325	M45	450	296	39	48	52	116	750	1260	580	1525	1567	5220 5400	5380 5580
4500 **4501**	950	505	675	90	–	500	358	325	M45	450	296	39	48	52	116	750	1310	580	1575	1617	5950 6130	6150 6370
5000 **5001**	1125	630	785	115	–	625	410	405	M56	560	370	48	60	65	148	930	1575	725	1905	1947	10190 10450	10490 10800
5600 **5601**	1185	630	845	115	–	625	445	405	M56	560	370	48	60	65	148	930	1635	725	1965	2007	12190 12460	12630 12940
6300 **6301**	1380	770	970	115	–	695	490	455	M56	630	406	48	60	65	148	1070	1900	795	2230	2272	17110 17330	17730 18060
7101	1630	930	1228	115	590	843	601	510	M56	710	481	48	66	71	185	1230	2279	943	2648	2676	29080	30180
8001	1880	1008	1286	145	596	944	682	577	M90	900	544	60	95	85	250	1574	2590	1064	3086	3114	45040	46630

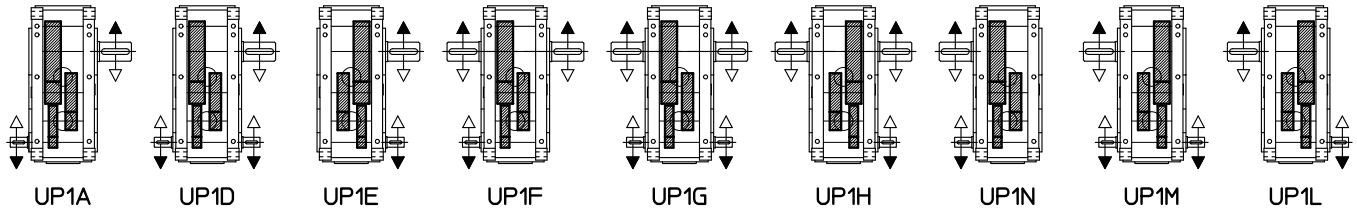
Size	D Ø	E	d Ø	e	d Ø	e
			$i_N \leqslant 50$		$i_N \geqslant 56$	
4000 **4001**	190 200	280	80	170	65	140
			$i_N \leqslant 56$		$i_N \geqslant 63$	
4500 **4501**	210 220	300	80	170	65	140
			$i_N \leqslant 50$		$i_N \geqslant 56$	
5000 **5001**	240 250	330	100	210	80	170
			$i_N \leqslant 56$		$i_N \geqslant 63$	
5600 **5601**	270 280	380	100	210	80	170
			$i_N \leqslant 50$		$i_N \geqslant 56$	
6300 **6301**	300 320	430	110	210	90	170
7101	360	590	120	210	–	–
8001	400	660	150	250	–	–

1) Working length on thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6, dimension W_2 increases by approx. 20 for overall dimensions of filler plug.
3) Values valid for double extension low speed shaft end.

8.2 - Gear reducers R 3I

Designs (direction of rotation)

Solid low speed shaft (standard)



Hollow low speed shaft with shrink disc on machine opposite side (on request)

Hollow low speed shaft with shrink disc on machine side (on request)

Hollow low speed shaft with keyway (on request)

8

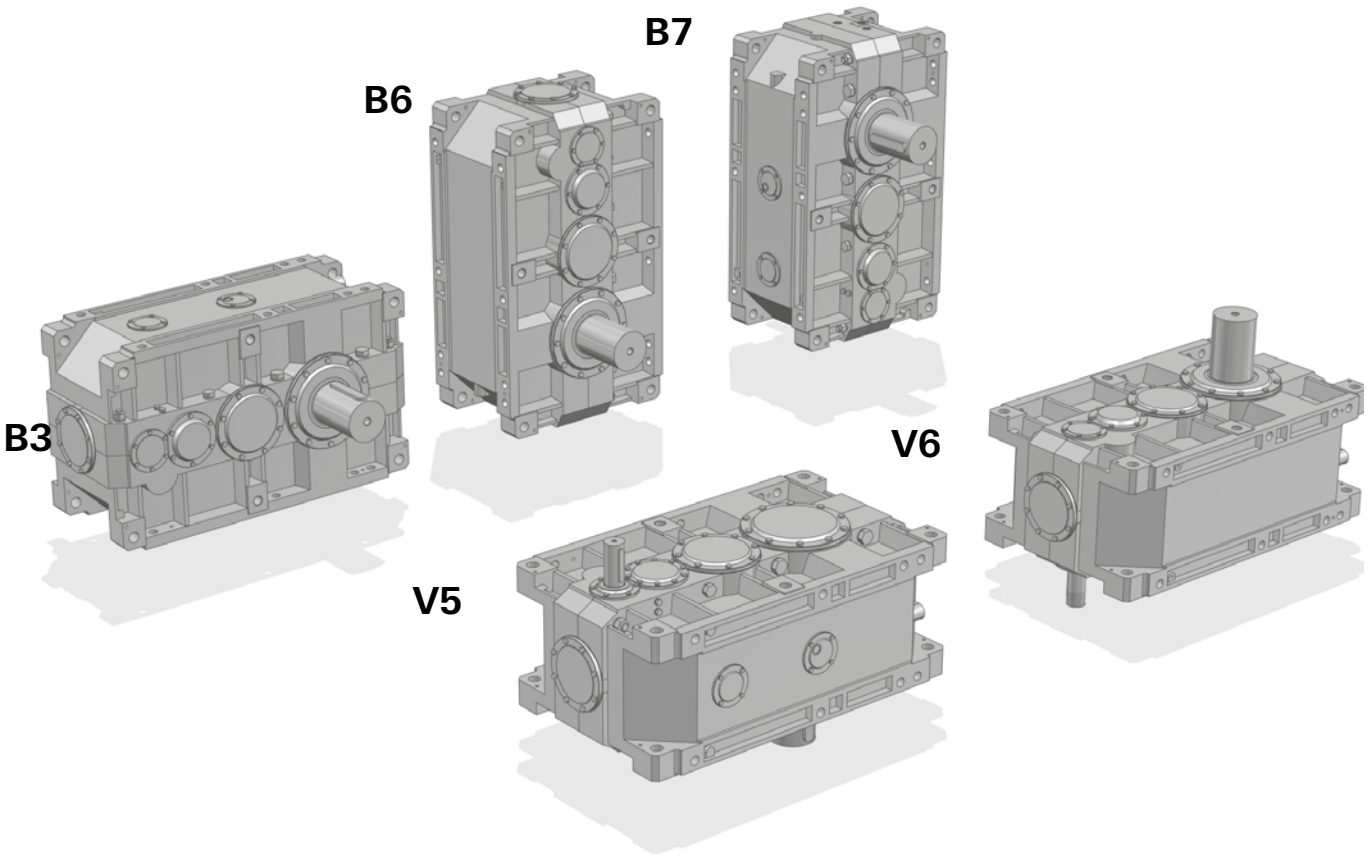
UT. C 2179

2582-01.02

8.2 - Gear reducers R 3I

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



Possible high oil splash: for the corrective factor ft_3 of nominal thermal power Pt_N see ch. 4.

Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

Oil filler plug
Oil level plug
Oil drain plug

Oil filler plug on opposite side (not in view)
Oil level plug on opposite side (not in view)
Oil drain plug on opposite side (not in view)

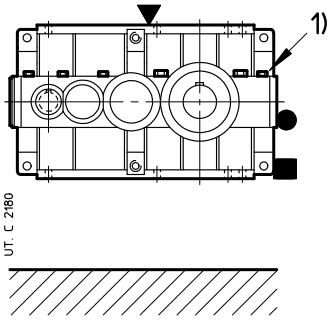
2582-01.02

8.2 - Gear reducers R 3I

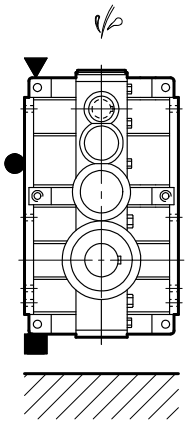
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

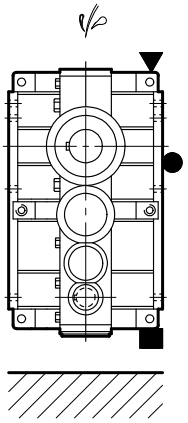
B3



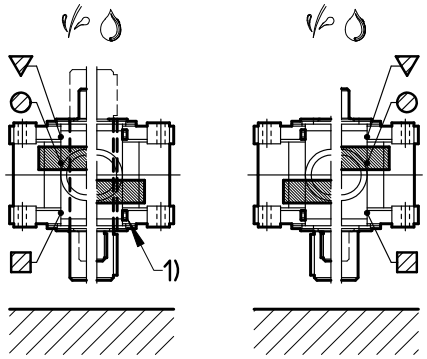
B6



B7

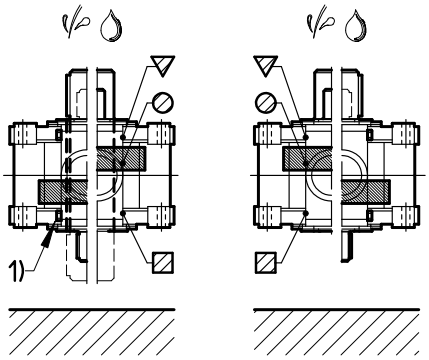


V5



UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

V6



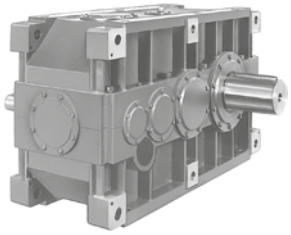
UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

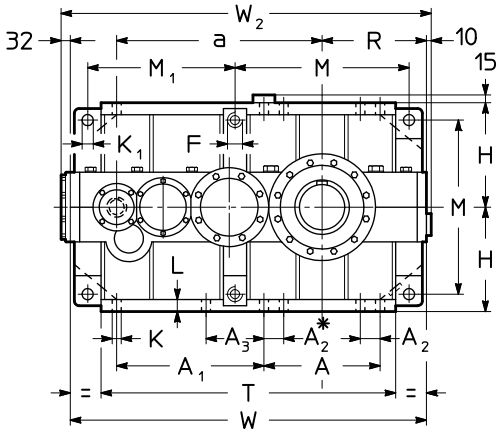
Size	Oil quantity [gal]				
	B3	B6	B7	V5, V6	
				with low speed shaft on bottom	with low speed wheel on top
4000, 4001	37	62	59	62	66
4500, 4501	37	62	59	62	66
5000, 5001	74	119	119	119	132
5600, 5601	74	119	119	119	132
6300, 6301	106	166	177	166	188
7101	166	251	280	264	296
8001	280	476	449	476	502

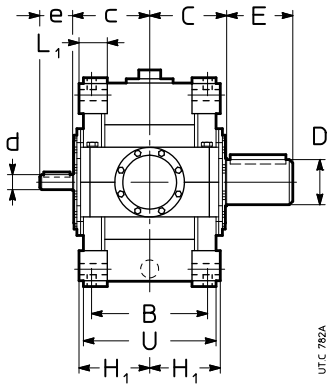
2582-01.02

8.3 - Gear reducers R 4I

Dimensions







* For sizes ⩾ 6300.

Size	a	A	A_1 M_1	A_2	A_3	B	C	c	F 1)	H h11 R	H_1 h12	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	W_2 2)	lb 3)	
4000 **4001**	900	505	625	90	–	500	330	325	M45	450	296	39	48	52	116	750	1260	580	1525	1567	5200 5360	5360 5530
4500 **4501**	950	505	675	90	–	500	358	325	M45	450	296	39	48	52	116	750	1310	580	1575	1617	5840 6000	6040 6240
5000 **5001**	1125	630	785	115	–	625	410	405	M56	560	370	48	60	65	148	930	1575	725	1905	1947	10210 10450	10520 10800
5600 **5601**	1185	630	845	115	–	625	445	405	M56	560	370	48	60	65	148	930	1635	725	1965	2007	12170 12430	12610 12920
6300 **6301**	1380	770	970	115	–	695	490	455	M56	630	406	48	60	65	148	1070	1900	795	2230	2272	17040 17260	17660 17990
7101	1630	930	1228	115	590	843	601	540	M56	710	481	48	66	71	185	1230	2279	943	2648	2676	29170	30270
8001	1880	1008	1286	145	596	944	682	577	M90	900	544	60	95	85	250	1574	2590	1064	3086	3114	45020	46610

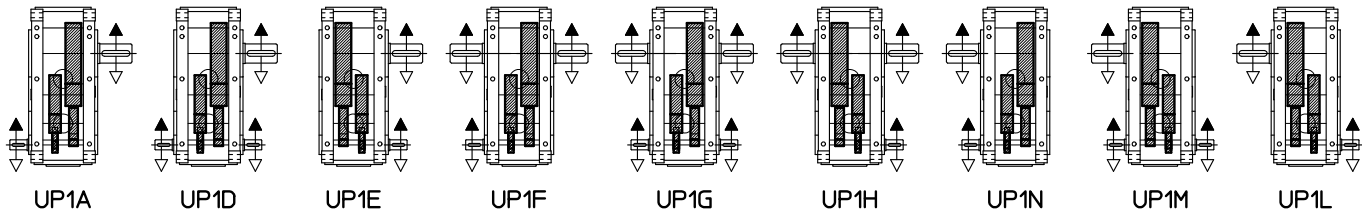
Size	D Ø	E	d Ø 4) $i_N \leqslant 160$	e	d Ø $i_N \geqslant 200$	e
4000 **4001**	190 200	280	55	110	48	110
4500 **4501**	210 220	300	55	110	48	110
5000 **5001**	240 250	330	70	140	55	110
5600 **5601**	270 280	380	70	140	55	110
6300 **6301**	300 320	430	75	140	60	140
7101	360	590	90	170	–	–
8001	400	660	110	210	–	–

1) Working length on thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6, dimension W_2 increases by approx. 20 for overall dimensions of filler plug.
3) Values valid for double extension low speed shaft end.
4) For size ⩽ 6301, the second high speed shaft end (UP1D, UP1G, UP1M) has the dimensions of high speed shaft end for $i_N \geqslant 200$.

8.3 - Gear reducers R 4I

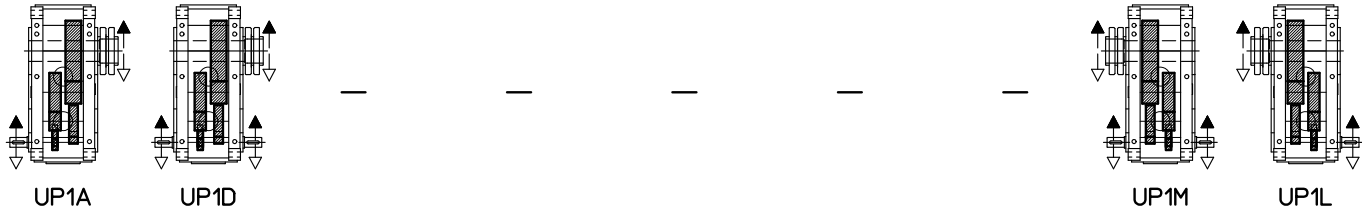
Designs (direction of rotation)

Solid low speed shaft (standard)



Hollow low speed shaft with shrink disc on machine opposite side (on request)

Hollow low speed shaft with shrink disc on machine side (on request)



Hollow low speed shaft with keyway (on request)

8

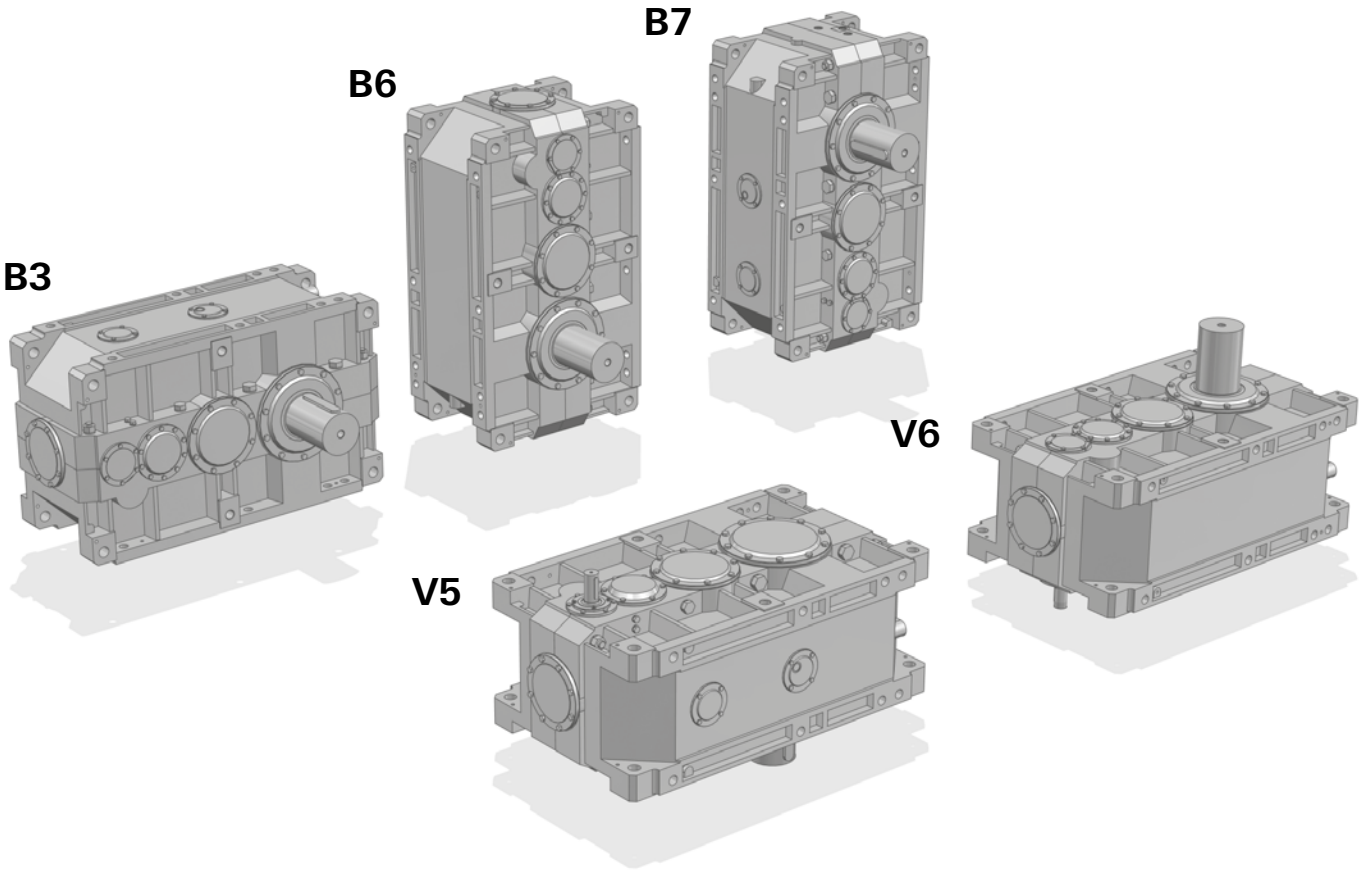
UT. C 2181

2582-01.02

8.3 - Gear reducers R 4I

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



Possible high oil splash: for the corrective factor ft_3 of nominal thermal power Pt_N see ch. 4.

Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

Oil filler plug
Oil level plug
Oil drain plug

Oil filler plug on opposite side (not in view)
Oil level plug on opposite side (not in view)
Oil drain plug on opposite side (not in view)

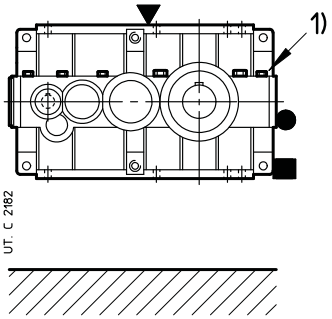
2582-01.02

8.3 - Gear reducers R 4I

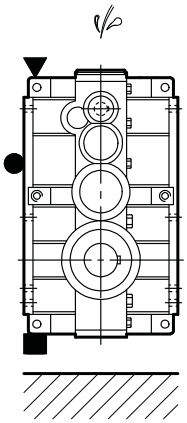
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

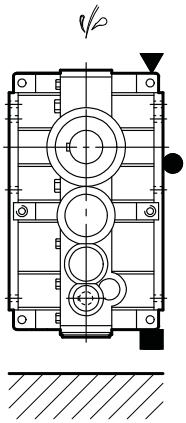
B3



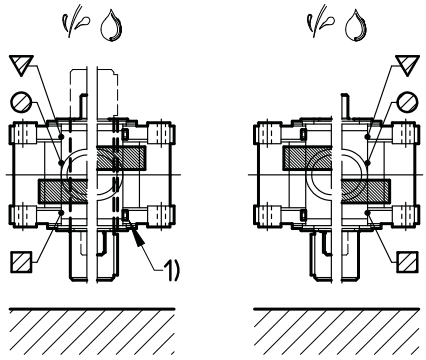
B6



B7

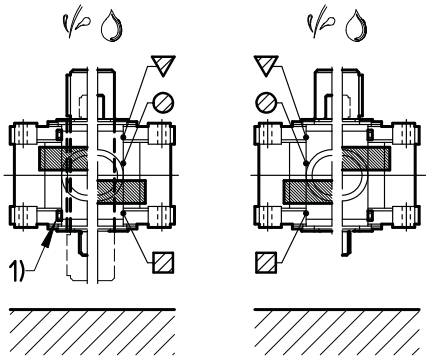


V5



UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

V6



UP1A UP1D UP1F UP1G	UP1E UP1H	UP1N	UP1M UP1L
UP1A* UP1D*	UP1M* UP1L*		

Size	Oil quantity [gal]				
	B3	B6	B7	V5, V6	
				with low speed shaft on bottom	with low speed wheel on top
4000, 4001	42	70	59	66	70
4500, 4501	42	70	59	66	70
5000, 5001	83	140	112	132	140
5600, 5601	83	140	112	132	140
6300, 6301	119	198	166	188	198
7101	198	296	280	296	296
8001	312	528	449	502	502

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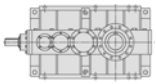
9 - Selection tables
(bevel helical gear reducers)

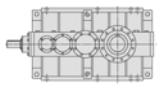
2582-01.02



n_1 = 1 800 rpm

Train of gears	i_N	n_{N2} rpm	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in] 4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	224	2380 ▲ **645** (1250)	2560 ▲ **695** (1400)	3030 ▲ **860** (1700)	–	–	–	–	–	–	–	–	–
	9	200	2290 ▲ **710** (1320)	2510 ▲ **775** (1500)	2710 ▲ **885** (1700)	2980 ▲ **975** (1950)	–	–	–	–	–	–	–	–
	10	180	1990 ▲ **710** (1320)	2240 ▲ **795** (1500)	2490 ▲ **885** (1750)	2750 ▲ **990** (1800)	–	–	–	–	–	–	–	–
	11,2	160	1800 ▲ **710** (1320)	2020 ▲ **795** (1500)	2170 ▲ **885** (1750)	2430 ▲ **990** (2000)	–	–	–	–	–	–	–	–
	12,5	140	1580 ▲ **710** (1320)	1710 ▲ **765** (1550)	1970 ▲ **885** (1700)	2200 ▲ **990** (1700)	–	–	–	–	–	–	–	–
	14	132	1420 ▲ **710** (1250)	1600 ▲ **795** (1450)	1710 ▲ **885** (1750)	1920 ▲ **990** (2000)	–	–	–	–	–	–	–	–
	16	112	1240 ▲ **710** (1320)	1330 ▲ **755** (1450)	1560 ▲ **885** (1650)	1690 ▲ **960** (1850)	–	–	–	–	–	–	–	–
	18	100	1120 ▲ **710** (1280)	1260 ▲ **795** (1450)	1330 ▲ **865** (1750)	–	–	–	–	–	–	–	–	–
C2I	20	90	1220 ▲ **840** (1450)	1320 ▲ **910** (1650)	1230 ▲ **885** (1650)	1330 ▲ **955** (1900)	–	–	–	–	–	–	–	–
	22,4	80	1100 ▲ **865** (1450)	1210 ▲ **945** (1650)	1280 ▲ **1020** (2000)	1390 ▲ **1105** (2240)	2160 ▲ **1680** (2900)	2360 ▲ **1835** (3350)	–	–	–	–	–	–
	25	71	978 ▲ **885** (1400)	1080 ▲ **975** (1600)	1180 ▲ **1060** (2000)	1280 ▲ **1160** (2300)	1840 ▲ **1635** (2800)	2010 ▲ **1790** (3250)	2420 ▲ **2150** (4000)	2740 ▲ **2435** (4500)	–	–	–	–
	28	63	902 ▲ **885** (1450)	1010 ▲ **990** (1650)	1050 ▲ **1090** (1850)	1150 ▲ **1195** (2120)	1730 ▲ **1680** (2900)	1930 ▲ **1875** (3350)	2120 ▲ **2150** (3750)	2420 ▲ **2460** (4250)	2650 ▲ **2655** (5300)	2960 ▲ **2965** (6000)	–	–
	31,5	56	783 ▲ **885** (1450)	877 ▲ **990** (1650)	980 ▲ **1105** (2000)	1080 ▲ **1220** (2300)	1500 ▲ **1665** (2900)	1690 ▲ **1875** (3350)	1930 ▲ **2150** (4000)	2230 ▲ **2480** (4620)	2450 ▲ **2830** (5600)	2710 ▲ **3185** (6300)	–	–
	35,5	50	716 ▲ **885** (1450)	802 ▲ **990** (1700)	853 ▲ **1105** (1900)	955 ▲ **1240** (2180)	1370 ▲ **1680** (2900)	1530 ▲ **1875** (3350)	1700 ▲ **2150** (3750)	1950 ▲ **2480** (4370)	2320 ▲ **2965** (5600)	2630 ▲ **3365** (6300)	–	–
	40	45	622 ▲ **885** (1450)	696 ▲ **990** (1700)	778 ▲ **1105** (2060)	872 ▲ **1240** (2360)	1200 ▲ **1680** (2900)	1340 ▲ **1875** (3350)	1540 ▲ **2150** (4120)	1770 ▲ **2480** (4750)	2150 ▲ **3100** (5800)	2410 ▲ **3540** (6700)	–	–
	45	40	568 **885** (1500)	636 **990** (1700)	677 ▲ **1105** (1950)	758 ▲ **1240** (2240)	1090 ▲ **1680** (3000)	1210 ▲ **1875** (3450)	1350 ▲ **2150** (3870)	1550 ▲ **2480** (4500)	1980 ▲ **3140** (5800)	2280 ▲ **3645** (5600)	–	–
	50	35,5	493 **885** (1500)	552 **990** (1700)	617 **1105** (2060)	691 **1240** (2360)	952 ▲ **1680** (3000)	1060 ▲ **1875** (3450)	1220 ▲ **2150** (4120)	1400 ▲ **2480** (4750)	1720 ▲ **3140** (5800)	1960 ▲ **3645** (6700)	–	–
	56	31,5	448 **885** (1500)	501 **990** (1750)	537 **1105** (1950)	601 **1240** (2240)	858 ▲ **1680** (3070)	957 ▲ **1875** (3450)	1070 ▲ **2150** (4000)	1230 ▲ **2480** (4500)	1570 ▲ **3140** (5800)	1800 ▲ **3645** (5600)	–	–
	63	28	388 **885** (1500)	435 **990** (1750)	487 **1105** (2120)	545 **1240** (2430)	750 ▲ **1680** (3070)	837 ▲ **1875** (3450)	960 ▲ **2150** (4250)	1110 ▲ **2480** (4870)	1360 ▲ **3140** (6000)	1550 ▲ **3645** (6700)	–	–
	71	25	358 **885** (1550)	401 **990** (1750)	423 **1105** (2000)	474 **1240** (2300)	686 ▲ **1680** (3070)	765 ▲ **1875** (3550)	841 ▲ **2150** (4000)	969 ▲ **2480** (4620)	1230 ▲ **3140** (5800)	1430 ▲ **3645** (5450)	–	–
	80	22,4	311 **885** (1550)	348 **990** (1750)	384 **1105** (2180)	430 **1240** (2430)	600 ▲ **1680** (3070)	670 ▲ **1875** (3550)	768 ▲ **2150** (4250)	885 ▲ **2480** (4870)	1070 ▲ **3140** (6150)	1220 ▲ **3645** (6900)	–	–
	90	20	286 **885** (1550)	321 **990** (1750)	339 **1105** (2060)	379 **1240** (2360)	549 ▲ **1680** (3070)	612 ▲ **1875** (3550)	673 ▲ **2150** (4120)	776 ▲ **2480** (4750)	969 ▲ **3140** (5800)	1120 ▲ **3645** (6700)	–	–
	100	18	249 **885** (1550)	278 **990** (1750)	307 **1105** (2180)	344 **1240** (2500)	480 ▲ **1680** (3070)	536 ▲ **1875** (3550)	614 ▲ **2150** (4250)	708 ▲ **2480** (4870)	884 ▲ **3140** (5300)	1030 ▲ **3645** (6150)	1370 ▲ **4885** (9750)	2180 ▲ **8190** (16000)
	125	14	–	–	246 **1105** (1900)	275 **1240** (2180)	–	–	491 ▲ **2150** (3750)	566 ▲ **2480** (4250)	–	–	–	–
C3I	125	14	194 **885** (1550)	218 **990** (1750)	243 **1105** (2180)	272 **1240** (2500)	369 **1680** (3070)	412 **1875** (3550)	472 **2150** (4250)	544 **2480** (5000)	681 **3140** (6000)	718 **3375** (6700)	1260 ▲ **5750** (11200)	1720 ▲ **8190** (16000)
	160	11,2	154 **885** (1550)	172 **990** (1750)	193 **1105** (2180)	216 **1240** (2500)	293 **1680** (3070)	327 **1875** (3550)	375 **2150** (4250)	432 **2480** (5000)	545 **3140** (6150)	621 **3645** (7100)	1010 ▲ **5750** (11200)	1370 ▲ **8190** (16000)
	200	9	121 **885** (1550)	136 **990** (1750)	152 **1105** (2180)	170 **1240** (2500)	238 **1680** (3070)	265 **1875** (3550)	304 **2150** (4250)	351 **2480** (5000)	432 **3140** (6000)	497 **3645** (6700)	801 **5750** (11200)	1090 ▲ **8190** (16000)
	250	7,1	95,5 **885** (1550)	107 **990** (1750)	120 **1105** (2180)	134 **1240** (2500)	188 **1680** (3070)	209 **1875** (3550)	240 **2150** (4250)	276 **2480** (5000)	345 **3140** (6150)	394 **3645** (7100)	631 **5750** (11200)	859 ▲ **8190** (16000)
	315	5,6	77,7 **885** (1550)	87 **990** (1750)	97,3 **1105** (2180)	109 **1240** (2500)	148 **1680** (3070)	165 **1875** (3550)	189 **2150** (4250)	218 **2480** (5000)	272 **3140** (6150)	301 **3540** (7100)	498 **5750** (11200)	677 ▲ **8190** (16000)

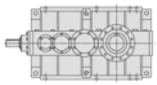
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 500 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	190	2040 ▲ **665** (1280)	2230 ▲ **730** (1450)	2580 ▲ **880** (1750)	–	–	–	–	–	–	–	–	–
	9	170	2030 ▲ **750** (1320)	2230 ▲ **830** (1550)	2390 ▲ **940** (1750)	2540 ▲ **995** (2000)	–	–	–	–	–	–	–	–
	10	150	1760 ▲ **750** (1320)	1970 ▲ **840** (1550)	2200 ▲ **940** (1850)	2420 ▲ **1045** (1850)	–	–	–	–	–	–	–	–
	11,2	132	1590 ▲ **750** (1360)	1780 ▲ **840** (1550)	1910 ▲ **940** (1750)	2130 ▲ **1045** (2060)	–	–	–	–	–	–	–	–
	12,5	118	1400 **750** (1360)	1520 **820** (1550)	1740 ▲ **940** (1750)	1930 ▲ **1045** (1750)	–	–	–	–	–	–	–	–
	14	106	1260 **750** (1280)	1410 **840** (1500)	1520 **940** (1800)	1640 **1010** (2000)	–	–	–	–	–	–	–	–
	16	95	1040 **710** (1360)	1110 **755** (1500)	1380 **940** (1650)	1520 **1035** (1900)	–	–	–	–	–	–	–	–
	18	85	995 **750** (1320)	1110 **840** (1500)	1120 **880** (1750)	–	–	–	–	–	–	–	–	–
C2I	20	75	1070 ▲ **885** (1500)	1150 ▲ **955** (1700)	1090 **940** (1700)	1120 **970** (1950)	–	–	–	–	–	–	–	–
	22,4	67	996 ▲ **940** (1500)	1070 ▲ **1010** (1700)	1110 ▲ **1060** (2000)	1190 ▲ **1135** (2240)	1890 ▲ **1770** (3000)	2120 ▲ **1980** (3450)	–	–	–	–	–	–
	25	60	864 ▲ **940** (1450)	962 ▲ **1045** (1650)	1030 ▲ **1115** (2000)	1140 ▲ **1240** (2300)	1660 ▲ **1770** (2900)	1810 ▲ **1930** (3350)	2130 ▲ **2275** (4000)	2400 ▲ **2565** (4620)	–	–	–	–
	28	53	797 **940** (1450)	887 **1045** (1700)	938 ▲ **1170** (1900)	1040 ▲ **1300** (2180)	1520 ▲ **1770** (2900)	1700 ▲ **1985** (3350)	1870 ▲ **2275** (3870)	2070 ▲ **2525** (4370)	2320 ▲ **2790** (5450)	2530 ▲ **3040** (6150)	–	–
	31,5	47,5	691 **940** (1450)	770 **1045** (1700)	863 **1170** (2060)	980 **1330** (2360)	1330 ▲ **1770** (2900)	1490 ▲ **1985** (3350)	1700 ▲ **2275** (4120)	1920 ▲ **2565** (4750)	2170 ▲ **3010** (5800)	2390 ▲ **3365** (6700)	–	–
	35,5	42,5	633 **940** (1500)	704 **1045** (1700)	750 **1170** (1950)	853 **1330** (2240)	1200 ▲ **1770** (3000)	1350 ▲ **1985** (3450)	1490 ▲ **2275** (3870)	1660 ▲ **2530** (4500)	2050 ▲ **3140** (5800)	2310 ▲ **3540** (6500)	–	–
	40	37,5	549 **940** (1500)	611 **1045** (1700)	685 **1170** (2060)	778 **1330** (2430)	1050 ▲ **1770** (3000)	1180 ▲ **1985** (3450)	1350 ▲ **2275** (4120)	1510 ▲ **2535** (4750)	1870 ▲ **3230** (6000)	2080 ▲ **3675** (6900)	–	–
	45	33,5	501 **940** (1500)	558 **1045** (1750)	596 **1170** (1950)	677 **1330** (2240)	954 **1770** (3070)	1070 **1985** (3450)	1190 ▲ **2275** (4000)	1320 ▲ **2535** (4500)	1700 ▲ **3230** (5800)	1960 ▲ **3760** (5800)	3170 ▲ **5930** (10900)	4360 ▲ **8410** (15500)
	50	30	435 **940** (1500)	484 **1045** (1750)	543 **1170** (2120)	617 **1330** (2430)	835 **1770** (3070)	935 **1985** (3450)	1070 **2275** (4250)	1210 **2555** (4870)	1470 ▲ **3230** (6000)	1680 ▲ **3760** (6700)	2750 ▲ **5930** (10900)	3780 ▲ **8410** (15500)
	56	26,5	395 **940** (1550)	440 **1045** (1750)	472 **1170** (2000)	537 **1330** (2300)	752 **1770** (3070)	843 **1985** (3550)	940 **2275** (4000)	1050 **2540** (4620)	1340 **3230** (6000)	1550 ▲ **3760** (6000)	2490 ▲ **5930** (10600)	3420 ▲ **8410** (15000)
	63	23,6	343 **940** (1550)	382 **1045** (1750)	428 **1170** (2180)	487 **1330** (2500)	658 **1770** (3070)	737 **1985** (3550)	846 **2275** (4250)	954 **2565** (5000)	1170 **3230** (6150)	1340 **3760** (6900)	2200 ▲ **5930** (11200)	3110 ▲ **8410** (16000)
	71	21,2	316 **940** (1550)	352 **1045** (1750)	372 **1170** (2060)	423 **1330** (2360)	602 **1770** (3070)	674 **1985** (3550)	742 **2275** (4120)	830 **2545** (4750)	1050 **3230** (5800)	1230 **3760** (5800)	1990 ▲ **5930** (10600)	2810 ▲ **8410** (15000)
	80	19	275 **940** (1550)	306 **1045** (1750)	338 **1170** (2180)	384 **1330** (2500)	527 **1770** (3070)	590 **1985** (3550)	677 **2275** (4250)	764 **2565** (4870)	921 **3230** (6150)	1050 **3760** (6900)	–	–
	90	17	253 **940** (1550)	282 **1045** (1750)	298 **1170** (2060)	339 **1330** (2360)	481 **1770** (3070)	539 **1985** (3550)	593 **2275** (4120)	666 **2555** (4750)	831 **3230** (5800)	967 **3760** (6700)	–	–
	100	15	220 **940** (1550)	244 **1045** (1750)	270 **1170** (2180)	307 **1330** (2500)	421 **1770** (3070)	472 **1985** (3550)	541 **2275** (4250)	611 **2565** (5000)	758 **3230** (5450)	884 **3760** (6150)	1230 ▲ **5270** (10600)	1870 ▲ **8410** (16000)
	125	11,8	–	–	216 **1170** (1900)	246 **1330** (2180)	–	–	433 **2275** (3750)	489 **2565** (4250)	–	–	–	–
C3I	125	11,8	172 **940** (1550)	191 **1045** (1750)	214 **1170** (2180)	227 **1240** (2500)	324 **1770** (3070)	363 **1985** (3550)	394 **2150** (4250)	454 **2480** (5000)	583 **3230** (6150)	629 **3545** (6900)	1080 ▲ **5930** (11200)	1470 ▲ **8410** (16000)
	160	9,5	136 **940** (1550)	151 **1045** (1750)	170 **1170** (2180)	189 **1305** (2500)	257 **1770** (3070)	288 **1985** (3550)	330 **2270** (4250)	360 **2480** (5000)	467 **3230** (6150)	534 **3760** (7100)	868 **5930** (11200)	1180 ▲ **8410** (16000)
	200	7,5	107 **940** (1550)	119 **1045** (1750)	134 **1170** (2180)	152 **1330** (2500)	209 **1770** (3070)	234 **1985** (3550)	268 **2275** (4250)	292 **2480** (5000)	370 **3230** (6150)	427 **3760** (6900)	688 **5930** (11200)	932 **8410** (16000)
	250	6	84,4 **940** (1550)	93,9 **1045** (1750)	105 **1170** (2180)	120 **1330** (2500)	165 **1770** (3070)	184 **1985** (3550)	211 **2275** (4250)	239 **2565** (5000)	296 **3230** (6150)	338 **3760** (7100)	542 **5930** (11200)	735 **8410** (16000)
	315	4,75	68,6 **940** (1550)	76,4 **1045** (1750)	85,6 **1170** (2180)	97,3 **1330** (2500)	130 **1770** (3070)	145 **1985** (3550)	167 **2275** (4250)	188 **2565** (5000)	233 **3230** (6150)	253 **3565** (7100)	428 **5930** (11200)	580 **8410** (16000)

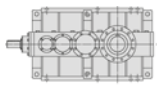
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 200 rpm

Train of gears	i_N	n_{N2}	Gear reducer size											
			Nominal output power P_{N2} [hp]											
			Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	150	1680 **685** (1280)	1790 **730** (1450)	2080 ▲ **890** (1800)	–	–	–	–	–	–	–	–	–
	9	132	1630 **755** (1360)	1790 **830** (1550)	1920 ▲ **945** (1750)	2050 ▲ **1005** (2000)	–	–	–	–	–	–	–	–
	10	118	1420 **755** (1360)	1580 **845** (1550)	1770 **945** (1900)	1940 ▲ **1050** (1900)	–	–	–	–	–	–	–	–
	11,2	106	1280 **755** (1360)	1430 **845** (1550)	1540 **945** (1800)	1710 **1050** (2060)	–	–	–	–	–	–	–	–
	12,5	95	1120 **755** (1360)	1250 **845** (1600)	1400 **945** (1800)	1550 **1050** (1800)	–	–	–	–	–	–	–	–
	14	85	1010 **755** (1280)	1130 **845** (1500)	1220 **945** (1800)	1320 **1020** (2060)	–	–	–	–	–	–	–	–
	16	75	858 **735** (1360)	887 **760** (1500)	1110 **945** (1700)	1230 **1050** (1950)	–	–	–	–	–	–	–	–
	18	67	800 **755** (1320)	887 **840** (1500)	909 **890** (1800)	–	–	–	–	–	–	–	–	–
C2I	20	60	857 **890** (1500)	927 **960** (1700)	872 **945** (1700)	908 **980** (1950)	–	–	–	–	–	–	–	–
	22,4	53	798 **940** (1500)	859 **1010** (1700)	893 **1065** (2060)	955 **1140** (2300)	1520 ▲ **1770** (3000)	1710 ▲ **1990** (3450)	–	–	–	–	3830 ▲ **4675** (9000)	6350 ▲ **8030** (13200)
	25	47,5	692 **940** (1450)	771 **1045** (1650)	827 **1120** (2060)	920 **1245** (2360)	1330 ▲ **1770** (2900)	1490 ▲ **1990** (3350)	1710 ▲ **2285** (4000)	1920 ▲ **2570** (4620)	–	–	3830 ▲ **5180** (10000)	6040 ▲ **8430** (14500)
	28	42,5	638 **940** (1500)	710 **1045** (1700)	752 **1170** (1900)	839 **1305** (2180)	1210 **1770** (3000)	1360 **1990** (3350)	1500 ▲ **2285** (3870)	1660 ▲ **2525** (4370)	1870 ▲ **2810** (5450)	2030 ▲ **3060** (6150)	3820 ▲ **5940** (10600)	5240 ▲ **8430** (15000)
	31,5	37,5	554 **940** (1500)	617 **1045** (1700)	692 **1170** (2060)	786 **1330** (2360)	1060 **1770** (3000)	1190 **1990** (3350)	1370 **2285** (4120)	1540 **2575** (4750)	1750 ▲ **3025** (5800)	1920 ▲ **3380** (6700)	3450 ▲ **5940** (10000)	4740 ▲ **8430** (14500)
	35,5	33,5	507 **940** (1500)	564 **1045** (1750)	602 **1170** (1950)	684 **1330** (2240)	964 **1770** (3000)	1080 **1990** (3450)	1200 **2285** (3870)	1330 **2530** (4500)	1650 ▲ **3160** (5800)	1850 ▲ **3560** (6500)	3050 ▲ **5940** (10000)	4310 ▲ **8430** (14500)
	40	30	440 **940** (1500)	490 **1045** (1750)	549 **1170** (2120)	624 **1330** (2430)	844 **1770** (3000)	948 **1990** (3450)	1090 **2285** (4250)	1210 **2545** (4870)	1500 **3245** (6000)	1670 **3685** (6900)	2760 ▲ **5940** (10000)	3900 ▲ **8430** (14500)
	45	26,5	402 **940** (1550)	447 **1045** (1750)	478 **1170** (2000)	543 **1330** (2300)	764 **1770** (3070)	859 **1990** (3550)	953 **2285** (4000)	1060 **2540** (4620)	1360 **3245** (5800)	1570 **3770** (6000)	2540 ▲ **5940** (10900)	3490 ▲ **8430** (16000)
	50	23,6	349 **940** (1550)	388 **1045** (1750)	435 **1170** (2120)	495 **1330** (2430)	669 **1770** (3070)	752 **1990** (3550)	861 **2285** (4250)	968 **2565** (4870)	1180 **3245** (6000)	1350 **3770** (6700)	2210 ▲ **5940** (11200)	3030 ▲ **8430** (16000)
	56	21,2	317 **940** (1550)	353 **1045** (1750)	379 **1170** (2000)	431 **1330** (2300)	603 **1770** (3070)	677 **1990** (3550)	755 **2285** (4000)	841 **2545** (4620)	1080 **3245** (6000)	1240 **3770** (6000)	1990 ▲ **5940** (10600)	2740 ▲ **8430** (15000)
	63	19	275 **940** (1550)	306 **1045** (1750)	343 **1170** (2180)	390 **1330** (2500)	527 **1770** (3070)	593 **1990** (3550)	679 **2285** (4250)	766 **2575** (5000)	938 **3245** (6150)	1070 **3770** (6900)	1760 ▲ **5940** (11200)	2490 ▲ **8430** (16000)
	71	17	253 **940** (1550)	282 **1045** (1750)	299 **1170** (2060)	339 **1330** (2360)	482 **1770** (3070)	542 **1990** (3550)	595 **2285** (4120)	665 **2550** (4750)	846 **3245** (6000)	984 **3770** (6000)	1590 ▲ **5940** (10600)	2260 ▲ **8430** (15000)
	80	15	220 **940** (1550)	245 **1045** (1750)	271 **1170** (2180)	308 **1330** (2500)	422 **1770** (3070)	474 **1990** (3550)	543 **2285** (4250)	613 **2575** (4870)	740 **3245** (6150)	844 **3770** (6900)	–	–
	90	13,2	203 **940** (1550)	226 **1045** (1750)	239 **1170** (2060)	272 **1330** (2360)	386 **1770** (3070)	433 **1990** (3550)	476 **2285** (4120)	533 **2555** (4750)	667 **3245** (5800)	775 **3770** (6700)	–	–
	100	11,8	176 **940** (1550)	196 **1045** (1750)	217 **1170** (2180)	246 **1330** (2500)	337 **1770** (3070)	379 **1990** (3550)	435 **2285** (4250)	490 **2575** (5000)	608 **3245** (5600)	709 **3770** (6300)	1020 **5450** (10900)	1500 ▲ **8430** (16000)
	125	9,5	–	–	173 **1170** (1900)	197 **1330** (2180)	–	–	348 **2285** (3750)	392 **2575** (4250)	–	–	–	–
C3I	125	9,5	137 **940** (1550)	153 **1045** (1750)	172 **1170** (2180)	183 **1245** (2500)	260 **1770** (3070)	292 **1990** (3550)	318 **2170** (4250)	363 **2480** (5000)	469 **3245** (6150)	520 **3670** (6900)	870 **5940** (11200)	1180 ▲ **8430** (16000)
	160	7,5	109 **940** (1550)	121 **1045** (1750)	136 **1170** (2180)	155 **1330** (2500)	206 **1770** (3070)	231 **1990** (3550)	265 **2285** (4250)	288 **2480** (5000)	375 **3245** (6150)	428 **3770** (7100)	696 **5940** (11200)	942 **8430** (16000)
	200	6	85,7 **940** (1550)	95,4 **1045** (1750)	107 **1170** (2180)	122 **1330** (2500)	167 **1770** (3070)	188 **1990** (3550)	215 **2285** (4250)	241 **2560** (5000)	297 **3245** (6150)	342 **3770** (6900)	552 **5940** (11200)	747 **8430** (16000)
	250	4,75	67,6 **940** (1550)	75,2 **1045** (1750)	84,4 **1170** (2180)	96 **1330** (2500)	132 **1770** (3070)	148 **1990** (3550)	170 **2285** (4250)	192 **2575** (5000)	238 **3245** (6150)	271 **3770** (7100)	435 **5940** (11200)	590 **8430** (16000)
	315	3,75	55 **940** (1550)	61,2 **1045** (1750)	68,7 **1170** (2180)	78,1 **1330** (2500)	104 **1770** (3070)	117 **1990** (3550)	134 **2285** (4250)	151 **2575** (5000)	187 **3245** (6150)	209 **3685** (7100)	343 **5940** (11200)	465 **8430** (16000)

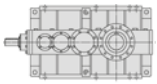
▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 1 000 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	125	1490 730 (1320)	1510 735 (1450)	1770 905 (1800)	–	–	–	–	–	–	–	–	–
	9	112	1370 765 (1360)	1490 830 (1600)	1620 950 (1800)	1740 1025 (2060)	–	–	–	–	–	–	–	–
	10	100	1190 765 (1360)	1330 855 (1600)	1490 950 (1900)	1630 1060 (1900)	–	–	–	–	–	–	–	–
	11,2	90	1080 765 (1400)	1200 855 (1600)	1290 950 (1800)	1440 1060 (2060)	–	–	–	–	–	–	–	–
	12,5	80	944 765 (1400)	1050 855 (1600)	1170 950 (1800)	1310 1060 (1800)	–	–	–	–	–	–	–	–
	14	71	853 765 (1320)	953 855 (1500)	1030 950 (1850)	1120 1040 (2060)	–	–	–	–	–	–	–	–
	16	63	741 760 (1360)	750 770 (1550)	930 950 (1700)	1040 1060 (1950)	–	–	–	–	–	–	–	–
	18	56	673 765 (1360)	741 840 (1550)	771 905 (1800)	–	–	–	–	–	–	–	–	–
C2I	20	50	720 895 (1500)	781 970 (1750)	734 950 (1750)	771 1000 (2000)	–	–	–	–	–	–	–	–
	22,4	45	666 940 (1500)	720 1020 (1750)	750 1075 (2060)	807 1155 (2300)	1270 1775 (3070)	1430 2010 (3450)	–	–	–	–	3410 ▲ 5000 (9250)	5560 ▲ 8430 (13600)
	25	40	578 940 (1500)	644 1050 (1700)	696 1130 (2060)	776 1260 (2360)	1110 1775 (3000)	1260 2010 (3350)	1440 2300 (4120)	1610 2575 (4750)	–	–	3410 ▲ 5540 (10300)	5060 ▲ 8460 (15000)
	28	35,5	533 940 (1500)	594 1050 (1750)	630 1175 (1950)	704 1315 (2240)	1010 1775 (3000)	1150 2010 (3450)	1260 2300 (3870)	1390 2530 (4500)	1580 2855 (5600)	1710 3090 (6150)	3190 ▲ 5970 (10900)	4380 ▲ 8450 (15500)
	31,5	31,5	463 940 (1500)	515 1050 (1750)	579 1175 (2120)	659 1340 (2430)	887 1775 (3000)	1000 2010 (3450)	1150 2300 (4250)	1290 2580 (4870)	1470 3060 (6000)	1610 3405 (6900)	2890 ▲ 5970 (10300)	3970 ▲ 8460 (14500)
	35,5	28	423 940 (1550)	471 1050 (1750)	504 1175 (2000)	573 1340 (2300)	805 1775 (3070)	911 2010 (3550)	1010 2300 (4000)	1110 2540 (4620)	1390 3190 (6000)	1560 3595 (6700)	2560 ▲ 5970 (10300)	3610 ▲ 8460 (14500)
	40	25	367 940 (1550)	409 1050 (1750)	460 1175 (2120)	523 1340 (2430)	705 1775 (3070)	798 2010 (3550)	912 2300 (4250)	1020 2565 (4870)	1260 3270 (6000)	1400 3710 (7100)	2310 ▲ 5970 (10000)	3260 ▲ 8460 (14500)
	45	22,4	335 940 (1550)	374 1050 (1750)	400 1175 (2000)	455 1340 (2300)	638 1775 (3070)	723 2010 (3550)	800 2300 (4000)	885 2545 (4620)	1140 3270 (6000)	1320 3790 (6000)	2130 5970 (11200)	2920 ▲ 8460 (16000)
	50	20	291 940 (1550)	324 1050 (1750)	365 1175 (2180)	415 1340 (2500)	559 1775 (3070)	632 2010 (3550)	723 2300 (4250)	812 2585 (5000)	994 3270 (6150)	1130 3790 (6900)	1850 5970 (11200)	2540 ▲ 8460 (16000)
	56	18	264 940 (1550)	295 1050 (1750)	317 1175 (2060)	361 1340 (2360)	503 1775 (3070)	570 2010 (3550)	634 2300 (4120)	703 2550 (4750)	907 3270 (6000)	1040 3790 (6000)	1670 5970 (10600)	2290 ▲ 8460 (15000)
	63	16	230 940 (1550)	256 1050 (1750)	288 1175 (2180)	327 1340 (2500)	440 1775 (3070)	498 2010 (3550)	570 2300 (4250)	643 2595 (5000)	788 3270 (6150)	897 3790 (6900)	1480 5970 (11200)	2090 ▲ 8460 (16000)
	71	14	212 940 (1550)	236 1050 (1750)	250 1175 (2060)	284 1340 (2360)	403 1775 (3070)	456 2010 (3550)	500 2300 (4120)	555 2555 (4750)	710 3270 (6000)	824 3790 (6000)	1340 5970 (10600)	1890 ▲ 8460 (15000)
	80	12,5	184 940 (1550)	205 1050 (1750)	227 1175 (2180)	258 1340 (2500)	352 1775 (3070)	399 2010 (3550)	456 2300 (4250)	514 2595 (5000)	621 3270 (6150)	707 3790 (6900)	–	–
	90	11,2	169 940 (1550)	189 1050 (1750)	200 1175 (2060)	228 1340 (2360)	322 1775 (3070)	365 2010 (3550)	400 2300 (4120)	445 2560 (4750)	560 3270 (5800)	649 3790 (6700)	–	–
	100	10	147 940 (1550)	164 1050 (1750)	182 1175 (2180)	206 1340 (2500)	282 1775 (3070)	319 2010 (3550)	365 2300 (4250)	412 2595 (5000)	511 3270 (5600)	594 3790 (6300)	906 5830 (11200)	1250 8460 (16000)
	125	8	–	–	145 1175 (1900)	165 1340 (2180)	–	–	292 2300 (3750)	329 2595 (4250)	–	–	–	–
C3I	125	8	115 940 (1550)	128 1050 (1750)	144 1175 (2180)	163 1335 (2500)	217 1775 (3070)	245 2010 (3550)	281 2300 (4250)	302 2480 (5000)	393 3270 (6150)	438 3705 (7100)	728 5970 (11200)	986 8460 (16000)
	160	6,3	91 940 (1550)	101 1050 (1750)	114 1175 (2180)	130 1340 (2500)	172 1775 (3070)	195 2010 (3550)	222 2300 (4250)	243 2515 (5000)	315 3270 (6150)	358 3790 (7100)	583 5970 (11200)	789 8460 (16000)
	200	5	71,6 940 (1550)	79,8 1050 (1750)	89,7 1175 (2180)	102 1340 (2500)	140 1775 (3070)	158 2010 (3550)	181 2300 (4250)	204 2595 (5000)	250 3270 (6150)	287 3790 (7100)	462 5970 (11200)	625 8460 (16000)
	250	4	56,4 940 (1550)	62,9 1050 (1750)	70,7 1175 (2180)	80,4 1340 (2500)	110 1775 (3070)	125 2010 (3550)	143 2300 (4250)	161 2595 (5000)	200 3270 (6150)	227 3790 (7100)	364 5970 (11200)	493 8460 (16000)
	315	3,15	45,9 940 (1550)	51,1 1050 (1750)	57,5 1175 (2180)	65,4 1340 (2500)	86,8 1775 (3070)	98,2 2010 (3550)	112 2300 (4250)	127 2595 (5000)	157 3270 (6150)	179 3790 (7100)	287 5970 (11200)	389 8460 (16000)

▲ Necessary forced lubrication with motor pump and possible heat exchanger (see ch. 6 and 12).



n_1 = 750 rpm

Train of gears	i_N	n_{N2} rpm	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in] 4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	95	1120 **735** (1360)	1170 **760** (1500)	1370 **930** (1850)	–	–	–	–	–	–	–	–	–
	9	85	1040 **775** (1400)	1120 **835** (1600)	1230 **965** (1850)	1340 **1055** (2120)	–	–	–	–	–	–	–	–
	10	75	906 **775** (1400)	1010 **865** (1600)	1130 **965** (1950)	1240 **1075** (2000)	–	–	–	–	–	–	–	–
	11,2	67	819 **775** (1450)	915 **865** (1600)	984 **965** (1850)	1100 **1075** (2120)	–	–	–	–	–	–	–	–
	12,5	60	718 **775** (1450)	802 **865** (1650)	893 **965** (1850)	995 **1075** (1850)	–	–	–	–	–	–	–	–
	14	53	649 **775** (1360)	725 **865** (1550)	780 **965** (1900)	867 **1070** (2120)	–	–	–	–	–	–	–	–
	16	47,5	558 **765** (1400)	578 **790** (1600)	708 **965** (1750)	789 **1075** (2000)	–	–	–	–	–	–	–	–
	18	42,5	512 **775** (1400)	558 **845** (1600)	594 **930** (1850)	–	–	–	–	–	–	–	–	–
C2I	20	37,5	546 **905** (1550)	595 **985** (1800)	558 **965** (1800)	594 **1025** (2060)	–	–	–	–	–	–	–	–
	22,4	33,5	501 **945** (1550)	545 **1025** (1800)	570 **1090** (2120)	618 **1180** (2360)	954 **1785** (3150)	1090 **2040** (3550)	–	–	–	–	2840 **5540** (9500)	4190 **8460** (14000)
	25	30	435 **945** (1500)	485 **1055** (1750)	529 **1145** (2120)	592 **1285** (2430)	835 **1785** (3070)	955 **2040** (3450)	1090 **2325** (4250)	1210 **2585** (4870)	–	–	2780 **6020** (10600)	3820 **8520** (15500)
	28	26,5	401 **945** (1550)	447 **1055** (1750)	476 **1185** (2000)	534 **1330** (2300)	763 **1785** (3070)	873 **2040** (3550)	954 **2325** (4000)	1040 **2540** (4620)	1210 **2920** (5800)	1300 **3135** (6300)	2410 **6020** (11200)	3300 **8480** (16000)
	31,5	23,6	348 **945** (1550)	388 **1055** (1750)	438 **1185** (2180)	498 **1350** (2500)	668 **1785** (3070)	764 **2040** (3550)	871 **2325** (4250)	970 **2590** (5000)	1120 **3110** (6150)	1220 **3450** (6900)	2180 **6020** (10600)	3000 **8520** (15000)
	35,5	21,2	319 **945** (1550)	355 **1055** (1750)	381 **1185** (2060)	433 **1350** (2360)	606 **1785** (3070)	693 **2040** (3550)	764 **2325** (4120)	836 **2545** (4750)	1060 **3240** (6150)	1190 **3650** (6900)	1930 **6020** (10600)	2720 **8500** (15000)
	40	19	276 **945** (1550)	308 **1055** (1750)	348 **1185** (2180)	396 **1350** (2500)	530 **1785** (3070)	607 **2040** (3550)	692 **2325** (4250)	771 **2590** (5000)	955 **3305** (6150)	1060 **3750** (7100)	1750 **6020** (10300)	2460 **8520** (15000)
	45	17	252 **945** (1550)	281 **1055** (1750)	302 **1185** (2060)	344 **1350** (2360)	481 **1785** (3070)	550 **2040** (3550)	606 **2325** (4120)	666 **2555** (4750)	866 **3300** (6000)	994 **3815** (6150)	1610 **6020** (11200)	2210 **8520** (16000)
	50	15	219 **945** (1550)	244 **1055** (1750)	276 **1185** (2180)	314 **1350** (2500)	421 **1785** (3070)	481 **2040** (3550)	548 **2325** (4250)	614 **2600** (5000)	754 **3305** (6150)	855 **3815** (6900)	1400 **6020** (11200)	1920 **8520** (16000)
	56	13,2	199 **945** (1550)	222 **1055** (1750)	240 **1185** (2060)	273 **1350** (2360)	379 **1785** (3070)	433 **2040** (3550)	481 **2325** (4120)	529 **2560** (4750)	688 **3305** (6150)	785 **3815** (6150)	1260 **6020** (10600)	1730 **8520** (15000)
	63	11,8	173 **945** (1550)	193 **1055** (1750)	217 **1185** (2180)	247 **1350** (2500)	332 **1785** (3070)	379 **2040** (3550)	432 **2325** (4250)	485 **2610** (5000)	598 **3305** (6150)	677 **3815** (7100)	1120 **6020** (11200)	1580 **8520** (16000)
	71	10,6	159 **945** (1550)	178 **1055** (1750)	189 **1185** (2060)	215 **1350** (2360)	303 **1785** (3070)	347 **2040** (3550)	379 **2325** (4120)	418 **2565** (4750)	539 **3305** (6150)	622 **3815** (6150)	1010 **6020** (10600)	1420 **8520** (15000)
	80	9,5	138 **945** (1550)	154 **1055** (1750)	171 **1185** (2180)	195 **1350** (2500)	265 **1785** (3070)	303 **2040** (3550)	346 **2325** (4250)	390 **2620** (5000)	471 **3305** (6150)	534 **3815** (7100)	–	–
	90	8,5	127 **945** (1550)	142 **1055** (1750)	151 **1185** (2060)	172 **1350** (2360)	243 **1785** (3070)	277 **2040** (3550)	303 **2325** (4120)	335 **2570** (4750)	425 **3305** (5800)	491 **3815** (6700)	–	–
	100	7,5	111 **945** (1550)	123 **1055** (1750)	137 **1185** (2180)	156 **1350** (2500)	212 **1785** (3070)	243 **2040** (3550)	277 **2325** (4250)	312 **2620** (5000)	388 **3305** (5800)	448 **3815** (6500)	702 **6020** (11200)	947 **8520** (16000)
	125	6	–	–	110 **1185** (1900)	125 **1350** (2180)	–	–	221 **2325** (3750)	250 **2620** (4250)	–	–	–	–
C3I	125	6	86,4 **945** (1550)	96,3 **1055** (1750)	109 **1185** (2180)	124 **1350** (2500)	163 **1785** (3070)	187 **2040** (3550)	213 **2325** (4250)	236 **2575** (5000)	299 **3305** (6150)	330 **3720** (7100)	550 **6020** (11200)	744 **8520** (16000)
	160	4,75	68,5 **945** (1550)	76,3 **1055** (1750)	86,1 **1185** (2180)	98 **1350** (2500)	129 **1785** (3070)	148 **2040** (3550)	169 **2325** (4250)	190 **2620** (5000)	239 **3305** (6150)	271 **3815** (7100)	440 **6020** (11200)	595 **8520** (16000)
	200	3,75	53,9 **945** (1550)	60,1 **1055** (1750)	67,8 **1185** (2180)	77,1 **1350** (2500)	105 **1785** (3070)	120 **2040** (3550)	137 **2325** (4250)	155 **2620** (5000)	189 **3305** (6150)	217 **3815** (7100)	349 **6020** (11200)	472 **8520** (16000)
	250	3	42,5 **945** (1550)	47,4 **1055** (1750)	53,4 **1185** (2180)	60,8 **1350** (2500)	82,9 **1785** (3070)	94,8 **2040** (3550)	108 **2325** (4250)	122 **2620** (5000)	151 **3305** (6150)	172 **3815** (7100)	275 **6020** (11200)	372 **8520** (16000)
	315	2,36	34,6 **945** (1550)	38,5 **1055** (1750)	43,5 **1185** (2180)	49,5 **1350** (2500)	65,3 **1785** (3070)	74,7 **2040** (3550)	85,1 **2325** (4250)	96 **2620** (5000)	119 **3305** (6150)	135 **3815** (7100)	217 **6020** (11200)	294 **8520** (16000)

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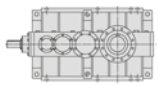
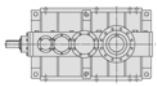


$n_1 \leqslant$ 90 rpm

Train of gears	i_N	n_{N2}	Gear reducer size Nominal output power P_{N2} [hp] Nominal output torque T_{N2} (T_{2max}) [10^3 lb in]											
		rpm	4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	8	11,2	138 750 (1450)	149 810 (1600)	173 985 (1950)	–	–	–	–	–	–	–	–	–
	9	10	136 840 (1550)	143 885 (1750)	158 1035 (2060)	173 1135 (2240)	–	–	–	–	–	–	–	–
	10	9	118 840 (1550)	132 940 (1750)	147 1045 (2060)	158 1140 (2120)	–	–	–	–	–	–	–	–
	11,2	8	107 840 (1550)	119 940 (1700)	128 1045 (2060)	143 1170 (2360)	–	–	–	–	–	–	–	–
	12,5	7,1	93,6 840 (1550)	104 935 (1750)	116 1045 (1950)	130 1170 (1950)	–	–	–	–	–	–	–	–
	14	6,3	84,6 840 (1450)	94,4 940 (1700)	101 1045 (2000)	110 1135 (2240)	–	–	–	–	–	–	–	–
	16	5,6	68,4 780 (1500)	73,1 830 (1650)	91,9 1045 (1900)	103 1170 (2180)	–	–	–	–	–	–	–	–
	18	5	66,7 840 (1450)	68,4 860 (1700)	75,2 985 (1950)	–	–	–	–	–	–	–	–	–
C2I	20	4,5	69,8 965 (1600)	78,2 1080 (1800)	68,4 985 (1900)	74,9 1080 (2180)	–	–	–	–	–	–	–	–
	22,4	4	61,4 965 (1600)	68,8 1080 (1800)	73,4 1170 (2180)	81,7 1300 (2500)	117 1825 (3150)	142 2215 (3650)	–	–	–	–	386 6280 (10000)	517 8710 (14500)
	25	3,55	53,3 965 (1550)	59,7 1080 (1750)	68,6 1240 (2180)	78,4 1415 (2500)	102 1825 (3070)	124 2215 (3550)	139 2480 (4250)	151 2680 (5000)	–	–	349 6280 (11200)	476 8850 (16000)
	28	3,15	49,1 965 (1550)	55 1080 (1750)	59,7 1240 (2060)	68,2 1415 (2360)	93,7 1825 (3070)	114 2215 (3550)	122 2480 (4120)	132 2675 (4750)	156 3125 (6150)	170 3405 (6900)	302 6280 (11200)	413 8850 (16000)
	31,5	2,8	42,7 965 (1550)	47,7 1080 (1750)	54,9 1240 (2180)	62,7 1415 (2500)	82 1825 (3070)	99,5 2215 (3550)	111 2480 (4250)	124 2760 (5000)	148 3425 (6150)	156 3660 (7100)	273 6280 (10600)	374 8850 (15000)
	35,5	2,5	39 965 (1550)	43,7 1080 (1750)	47,7 1240 (2060)	54,6 1415 (2360)	74,4 1825 (3070)	90,3 2215 (3550)	97,7 2480 (4120)	109 2755 (4750)	138 3540 (6150)	156 3985 (7100)	242 6280 (10600)	340 8850 (15000)
	40	2,24	33,9 965 (1550)	37,9 1080 (1750)	43,6 1240 (2180)	49,8 1415 (2500)	65,1 1825 (3070)	79 2215 (3550)	88,5 2480 (4250)	99,5 2790 (5000)	123 3540 (6150)	136 3985 (7100)	219 6280 (10900)	307 8850 (16000)
	45	2	30,9 965 (1550)	34,6 1080 (1750)	37,9 1240 (2060)	43,3 1415 (2360)	59 1825 (3070)	71,6 2215 (3550)	77,6 2480 (4120)	87,3 2790 (4750)	111 3540 (6150)	125 3985 (7100)	202 6280 (11200)	275 8850 (16000)
	50	1,8	26,9 965 (1550)	30,1 1080 (1750)	34,6 1240 (2180)	39,5 1415 (2500)	51,6 1825 (3070)	62,6 2215 (3550)	70,1 2480 (4250)	78,9 2790 (5000)	96,9 3540 (6150)	107 3985 (7100)	175 6280 (11200)	239 8850 (16000)
	56	1,6	24,4 965 (1550)	27,3 1080 (1750)	30,1 1240 (2060)	34,3 1415 (2360)	46,5 1825 (3070)	56,4 2215 (3550)	61,5 2480 (4120)	69,2 2790 (4750)	88,4 3540 (6150)	98,3 3985 (7100)	158 6280 (10600)	216 8850 (15000)
	63	1,4	21,2 965 (1550)	23,7 1080 (1750)	27,2 1240 (2180)	31,1 1415 (2500)	40,7 1825 (3070)	49,4 2215 (3550)	55,3 2480 (4250)	62,2 2790 (5000)	76,8 3540 (6150)	84,8 3985 (7100)	140 6280 (11200)	197 8850 (16000)
	71	1,25	19,5 965 (1550)	21,8 1080 (1750)	23,7 1240 (2060)	27,1 1415 (2360)	37,2 1825 (3070)	45,1 2215 (3550)	48,5 2480 (4120)	54,5 2790 (4750)	69,3 3540 (6150)	77,9 3985 (7100)	126 6280 (10600)	178 8850 (15000)
	80	1,12	16,9 965 (1550)	19 1080 (1750)	21,5 1240 (2180)	24,6 1415 (2500)	32,5 1825 (3070)	39,5 2215 (3550)	44,2 2480 (4250)	49,8 2790 (5000)	60,5 3540 (6150)	66,9 3985 (7100)	–	–
	90	1	15,6 965 (1550)	17,5 1080 (1750)	19 1240 (2060)	21,7 1415 (2360)	29,8 1825 (3070)	36,1 2215 (3550)	38,8 2480 (4120)	43,6 2790 (4750)	54,6 3540 (5800)	61,4 3985 (6700)	–	–
	100	0,9	13,5 965 (1550)	15,2 1080 (1750)	17,2 1240 (2180)	19,7 1415 (2500)	26 1825 (3070)	31,6 2215 (3550)	35,4 2480 (4250)	39,8 2790 (5000)	49,8 3540 (6150)	56,2 3985 (6900)	87,9 6280 (11200)	118 8850 (16000)
	125	0,71	–	–	13,8 1240 (1900)	15,7 1415 (2180)	–	–	28,3 2480 (3750)	31,8 2790 (4250)	–	–	–	–
C3I	125	0,71	10,6 965 (1550)	11,8 1080 (1750)	13,6 1240 (2180)	15,6 1415 (2500)	20 1825 (3070)	24,3 2215 (3550)	27,2 2480 (4250)	30,6 2790 (5000)	38,4 3540 (6150)	40,4 3800 (7100)	69 6280 (11200)	92,8 8850 (16000)
	160	0,56	8,39 965 (1550)	9,39 1080 (1750)	10,8 1240 (2180)	12,3 1415 (2500)	15,9 1825 (3070)	19,3 2215 (3550)	21,6 2480 (4250)	24,3 2790 (5000)	30,7 3540 (6150)	33,9 3985 (7100)	55,2 6280 (11200)	74,2 8850 (16000)
	200	0,45	6,6 965 (1550)	7,39 1080 (1750)	8,5 1240 (2180)	9,71 1415 (2500)	12,9 1825 (3070)	15,7 2215 (3550)	17,5 2480 (4250)	19,7 2790 (5000)	24,3 3540 (6150)	27,1 3985 (7100)	43,7 6280 (11200)	58,8 8850 (16000)
	250	0,355	5,21 965 (1550)	5,83 1080 (1750)	6,7 1240 (2180)	7,66 1415 (2500)	10,2 1825 (3070)	12,3 2215 (3550)	13,8 2480 (4250)	15,6 2790 (5000)	19,5 3540 (6150)	21,5 3985 (7100)	34,5 6280 (11200)	46,4 8850 (16000)
	315	0,28	4,23 965 (1550)	4,74 1080 (1750)	5,45 1240 (2180)	6,23 1415 (2500)	8,01 1825 (3070)	9,72 2215 (3550)	10,9 2480 (4250)	12,3 2790 (5000)	15,3 3540 (6150)	16,9 3985 (7100)	27,2 6280 (11200)	36,6 8850 (16000)



Summary of transmission ratios *i*

Train of gears	Nominal gear ratio i_N	Gear reducer size Actual gear ratio *i* 4000	4001	4500	4501	5000	5001	5600	5601	6300	6301	7101	8001
CI	**8**	*7,76*	*7,76*	*8,12*	–	–	–	–	–	–	–	–	–
	9	*8,82*	*8,82*	*9,33*	*9,33*	–	–	–	–	–	–	–	–
	10	*10,2*	*10,2*	*10,1*	*10,3*	–	–	–	–	–	–	–	–
	11,2	*11,3*	*11,3*	*11,7*	*11,7*	–	–	–	–	–	–	–	–
	12,5	*12,8*	*12,8*	*12,9*	*12,9*	–	–	–	–	–	–	–	–
	14	*14,2*	*14,2*	*14,7*	*14,7*	–	–	–	–	–	–	–	–
	16	*16,3*	*16,3*	*16,2*	*16,2*	–	–	–	–	–	–	–	–
	18	*18**	*18**	*18,7*	–	–	–	–	–	–	–	–	–
C2I	**20**	*19,7*	*19,7*	*20,6*	*20,6*	–	–	–	–	–	–	–	–
	22,4	*22,4*	*22,4*	*22,7*	*22,7*	*22,2*	*22,2*	–	–	–	–	*23,3*	*24*
	25	*25,8*	*25,8*	*25,8*	*25,8*	*25,4*	*25,4*	*25,4*	*25,4*	–	–	*25,7*	*26,6*
	28	*28*	*28*	*29,6*	*29,6*	*27,8*	*27,8*	*29*	*29*	*28,6*	*28,7*	*29,7*	*30,6*
	31,5	*32,3*	*32,3*	*32,2*	*32,2*	*31,8*	*31,8*	*31,8*	*31,8*	*32,9*	*33,6*	*32,8*	*33,8*
	35,5	*35,3*	*35,3*	*37,1*	*37,1*	*35**	*35**	*36,2*	*36,2*	*36,5*	*36,5*	*37,1*	*37,2*
	40	*40,7*	*40,7*	*40,6*	*40,6*	*40**	*40**	*40**	*40**	*41,2*	*41,9*	*41*	*41,1*
	45	*44,5*	*44,5*	*46,7*	*46,7*	*44,2*	*44,2*	*45,6*	*45,6*	*45,3*	*45,7*	*44,5*	*45,9*
	50	*51,3*	*51,3*	*51,2*	*51,2*	*50,5*	*50,5*	*50,5*	*50,5*	*52,2*	*53,1*	*51,3*	*52,9*
	56	*56,5*	*56,5*	*58,9*	*58,9*	*56**	*56**	*57,6*	*57,6*	*57,2*	*57,9*	*56,8*	*58,5*
	63	*65,1*	*65,1*	*64,9*	*64,9*	*64**	*64**	*64**	*64**	*65,8*	*67*	*64,1*	*64,3*
	71	*70,6*	*70,6*	*74,7*	*74,7*	*70**	*70**	*73**	*73**	*73*	*73*	*71*	*71,1*
	80	*81,3*	*81,3*	*82,3*	*82,3*	*80**	*80**	*80**	*80**	*83,5*	*85*	–	–
	90	*88,2*	*88,2*	*93,3*	*93,3*	*87,5**	*87,5**	*91,3*	*91,3*	*92,6*	*92,6*	–	–
	100	*102*	*102*	*103*	*103*	*100**	*100**	*100**	*100**	*101*	*101*	*102*	*107*
	125	–	–	*129*	*129*	–	–	*125**	*125**	–	–	–	–
C3I	**125**	*130*	*130*	*130*	*130*	*130**	*130**	*130**	*130**	*132*	*134*	*130*	*136*
	160	*164*	*164*	*164*	*164*	*164**	*164**	*164**	*164**	*165*	*168*	*163*	*170*
	200	*209*	*209*	*208*	*208*	*202*	*202*	*202*	*202*	*208*	*210*	*205*	*215*
	250	*265*	*265*	*264*	*264*	*256**	*256**	*256**	*256**	*260*	*265*	*260*	*272*
	315	*325*	*325*	*325*	*325*	*325*	*325*	*325*	*325*	*329*	*336*	*330*	*345*

9

2582-01.02

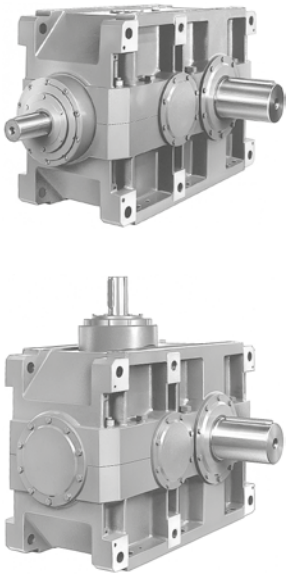
* **Finite** transmission ratio.

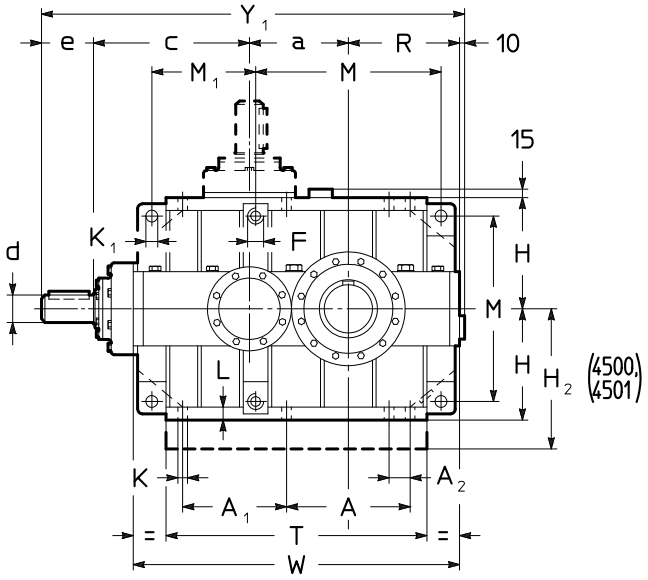
10 - Dimensions, designs, mounting positions
(bevel helical gear reducers)

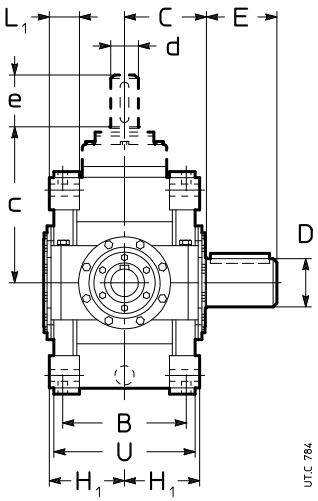
2582-01.02

10.1 - Gear reducers R CI

Dimensions







Size	a	A	A_1 M_1	A_2	B	C 3)	c	F 1)	H h11 R	H_1 h12	H_2 h11	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	lb 4)	
4000	400	505	420	90	500	330	605	M45	450	296	–	39	48	52	116	750	1055	580	1320	4940	5090
4001																				5090	5270
4500	450	505	470	90	500	358	605	M45	450	296	560	39	48	52	116	750	1105	580	1370	6060	6260
4501																				6240	6480

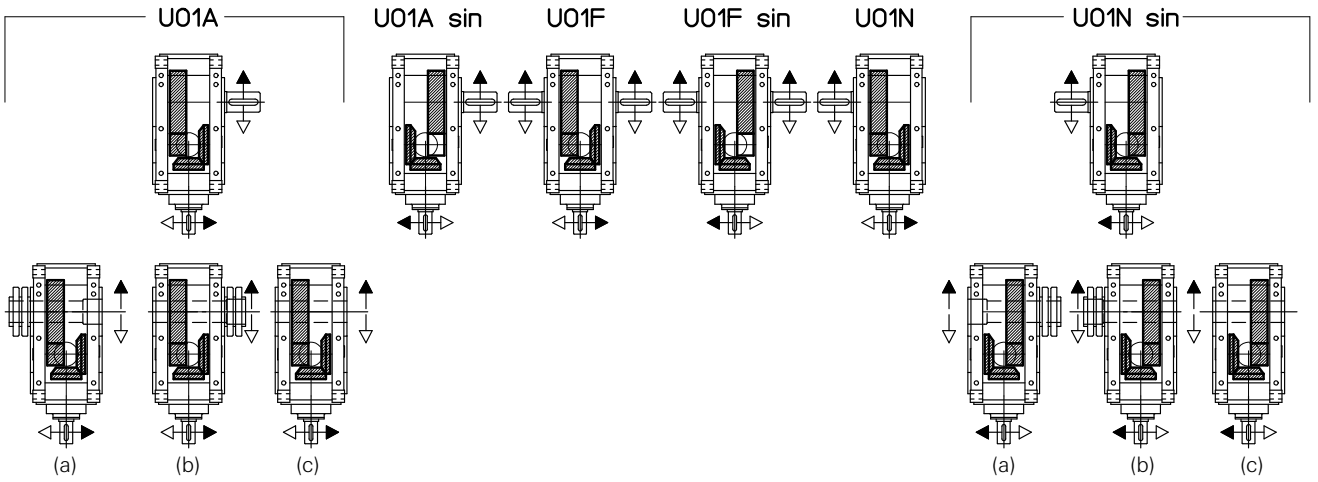
Size	D Ø	E	d Ø	e	Y_1 2)	d Ø	e	Y_1 2)
			$i_N \leq 11,2$			$i_N \geq 12,5$		
4000	190	280	110	210	1675	90	170	1635
4001	200							
			$i_N \leq 12,5$			$i_N \geq 14$		
4500	210	300	110	210	1725	90	170	1685
4501	220							

1) Working length of thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6, dimension Y_1 increases by approx. 20 for filler plug overall dimensions.
3) The cover on bevel wheel side overhangs from **C** dimension (see ch. 6) by 33 mm for sizes 4000, 4001 and 5 mm for sizes 5000, 5001.
4) Values valid for double extension low speed shaft.

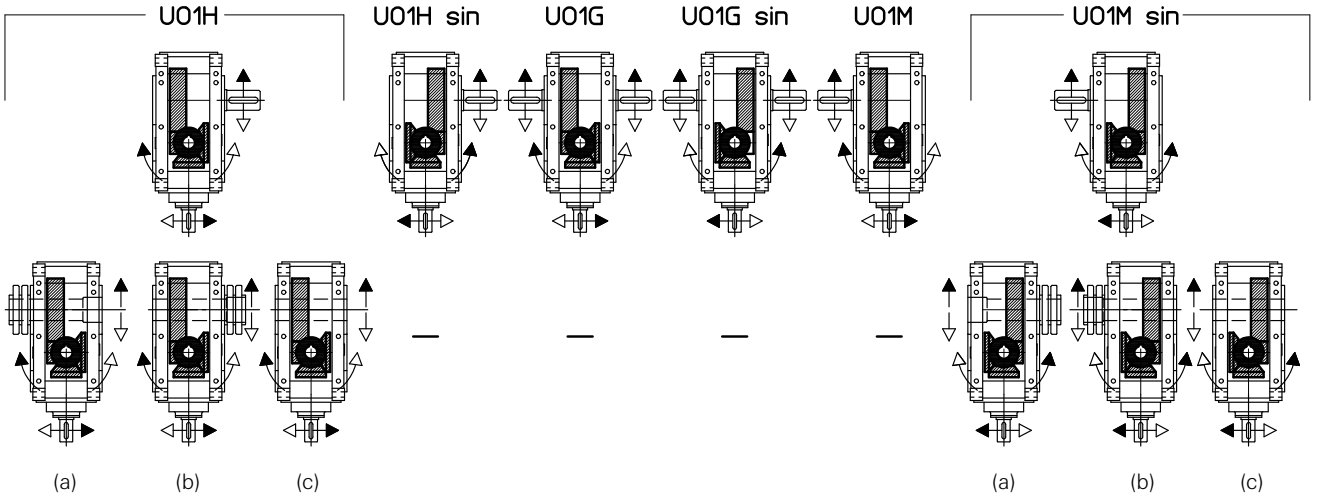
10.1 - Gear reducers R CI

Designs[1) 2)] (direction of rotation)

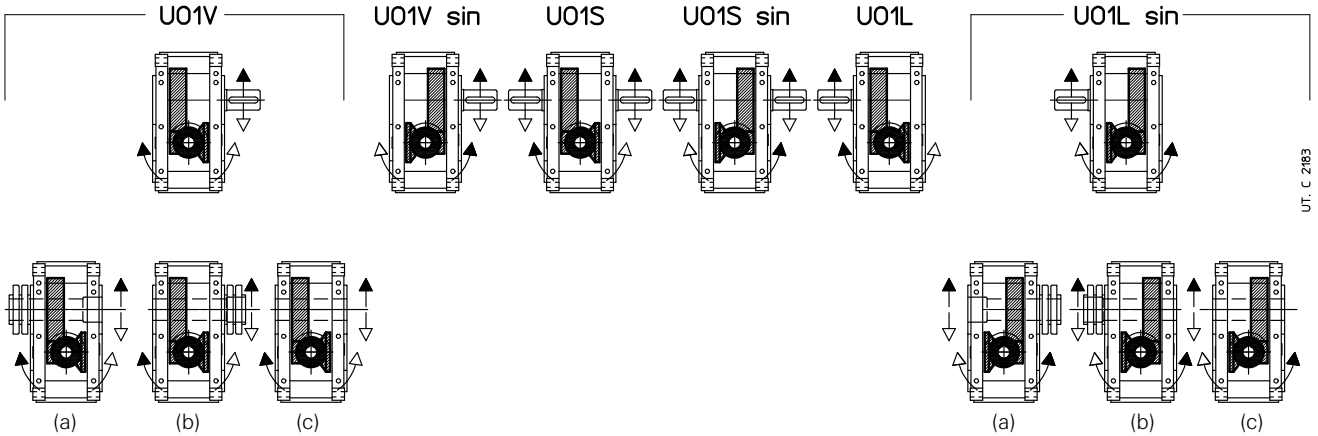
Solid low speed shaft (standard)



Solid low speed shaft (standard)



Solid low speed shaft (standard)

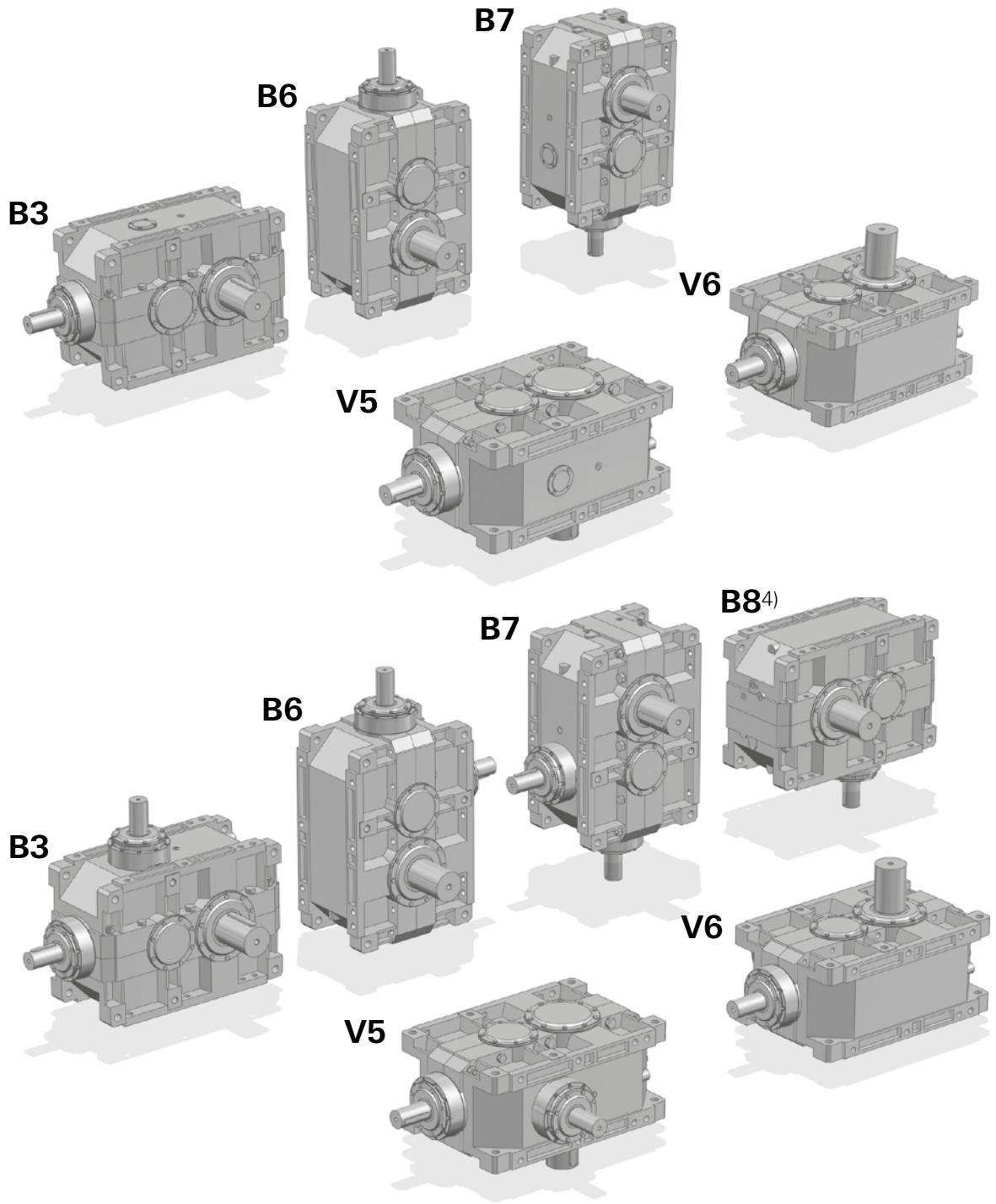


(a) Hollow low speed shaft **with shrink disc on machine opposite side** (on request, see ch. 12).
(b) Hollow low speed shaft **with shrink disc on machine side** (on request, see ch. 12).
(c) Hollow low speed shaft **with keyway** (on request, see ch. 12).
1) The housing of designs UO1A ... UO1N sin is not prearranged for other designs (UO1H ... UO1L sin).
2) For UO1A, UO1H, UO1V designs and derivatives it is recommended to adopt the black arrow direction of rotation; for UO1A sin, UO1H sin, UO1V sin designs and derivatives, the white arrow direction of rotation. If it is not possible, consult us.

10.1 - Gear reducers R CI

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



- Possible high oil splash: for the corrective factor f_{t3} of nominal thermal power Pt_N see ch. 4.
- Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).
2) for designs UO1H ... UO1M sin, UO1V ... UO1L sin.
3) for designs UO1A ... UO1N sin, UO1H ... UO1M sin.
4) Mounting position B8 available only for designs UO1V ... UO1L sin.

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

- Oil filler plug
- Oil level plug
- Oil drain plug

- Oil filler plug on opposite side (not in view)
- Oil level plug on opposite side (not in view)
- Oil drain plug on opposite side (not in view)

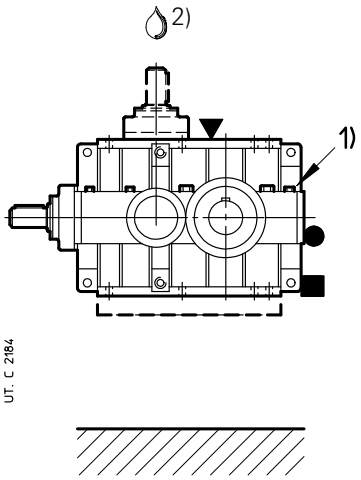
2582-01.02

10.1 - Gear reducers R CI

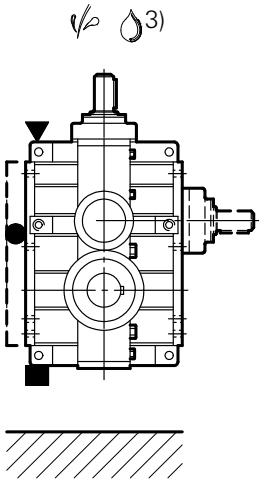
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

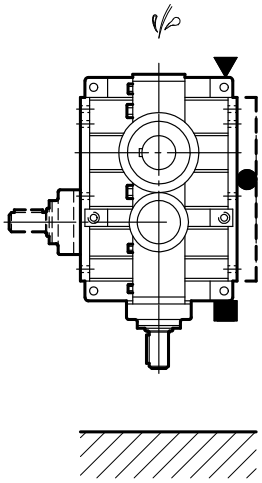
B3



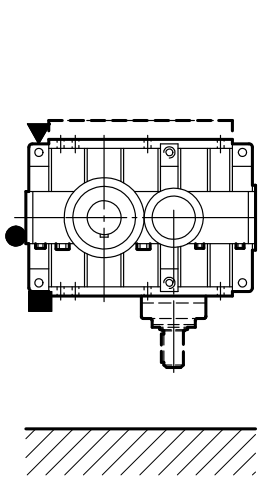
B6



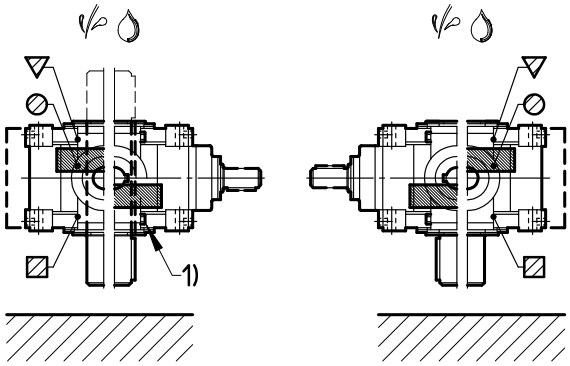
B7



B8[4]

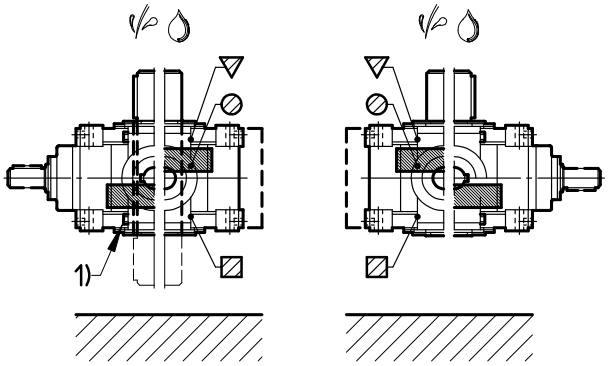


V5



UO1A UO1F	UO1A sin UO1F sin	UO1N	UO1N sin
UO1H UO1G	UO1H sin UO1G sin	UO1M	UO1M sin
UO1V UO1S	UO1V sin UO1S sin	UO1L	UO1L sin
UO1A* UO1H* UO1V	UO1N sin* UO1M sin* UO1L sin*		

V6



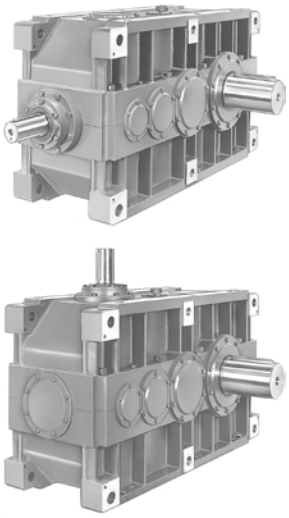
UO1A UO1F	UO1A sin UO1F sin	UO1N	UO1N sin
UO1H UO1G	UO1H sin UO1G sin	UO1M	UO1M sin
UO1V UO1S	UO1V sin UO1S sin	UO1L	UO1L sin
UO1A* UO1H* UO1V	UO1N sin* UO1M sin* UO1L sin*		

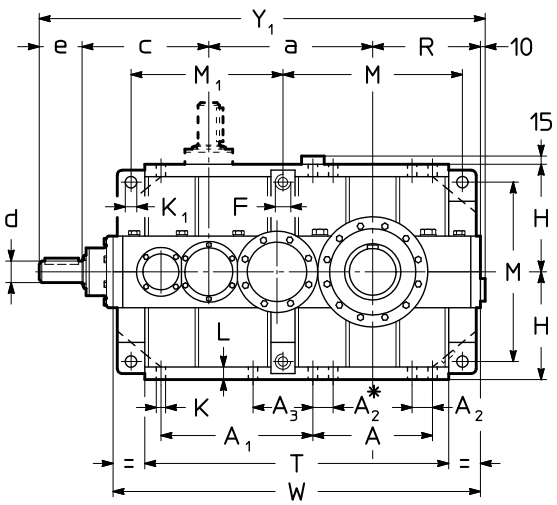
Size	Oil quantity [gal]					
	B3	B6	B7	B8[4]	V5, V6	
					with low speed shaft on bottom	with low speed wheel on top
4000, 4001 **4500, 4501**	26 35	40 50	42 56	26 35	30 37	31 45

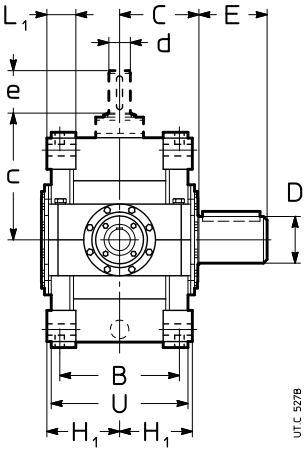
Notes at previous page.

10.2 - Gear reducers R C2I

Dimensions







* For sizes ⩾ 6300, only.

Size	a	A	A_1 M_1	A_2	A_3	B	C	c	F 1)	H h11 R	H_1 h12	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	lb 3)	
4000	700	505	625	90	–	500	330	480	M45	450	296	39	48	52	116	750	1260	580	1525	5380	5530
4001																				5560	5730
4500	750	505	675	90	–	500	358	480	M45	450	296	39	48	52	116	750	1310	580	1575	6130	6330
4501																				6280	6530
5000	875	630	785	115	–	625	410[4]	605	M56	560	370	48	60	65	148	930	1575	725	1905	10560	10870
5001																				10820	11180
5600	935	630	845	115	–	625	445	605	M56	560	370	48	60	65	148	930	1635	725	1965	12520	12960
5601																				12790	13270
6300	1080	770	970	115	–	695	490	605[5]	M56	630	406	48	60	65	148	1070	1900	795	2230	17530	18140
6301																				17770	18500
7101	1270	930	1228	115	590	843	601	833	M56	710	481	48	66	71	185	1230	2279	943	2648	29430	30530
8001	1430	1008	1286	145	596	944	682	934	M90	900	544	60	95	85	250	1574	2590	1064	3086	45300	46890

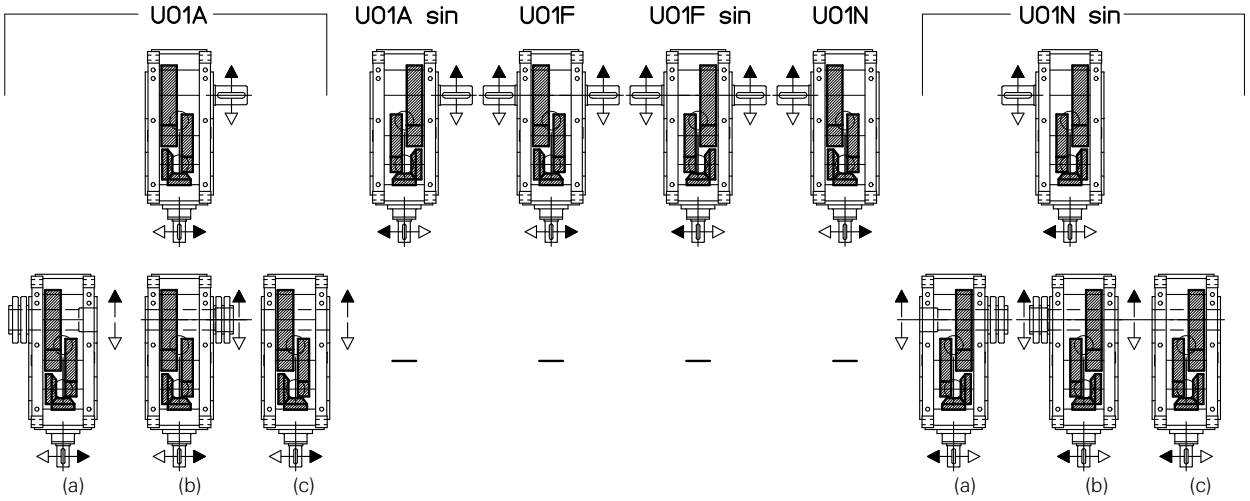
Size	D Ø	E	d Ø	e	Y_1 2)	d Ø	e	Y_1 2)
			$i_N \leqslant 40$			$i_N \geqslant 45$		
4000	190	280	90	170	1810	70	140	1780
4001	200							
			$i_N \leqslant 45$			$i_N \geqslant 50$		
4500	210	300	90	170	1860	70	140	1830
4501	220							
			$i_N \leqslant 40$			$i_N \geqslant 45$		
5000	240	330	110	210	2260	90	170	2220
5001	250							
			$i_N \leqslant 45$			$i_N \geqslant 50$		
5600	270	380	110	210	2320	90	170	2280
5601	280							
			$i_N \leqslant 50$[6]			$i_N \geqslant 56$[6]		
6300	300	430	110	210	2535	90	170	2495
6301	320							
			$i_N \leqslant 31,5$			$i_N \geqslant 35,5$		
7101	360	590	140	250	3073	110	210	3033
8001	400	660	150	245	3519	125	210	3474

1) Working length of thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6 dimension Y1 increases by approx. 20 for overall dimensions of filler plug.
3) Values valid for double extension low speed shaft.
4) The cover on bevel wheel side overhangs from **C** dimension (see ch. 6) by 13 mm.
5) The high speed shaft end shoulder is within dimension H.
6) For size 6301: $i_N \leqslant 56$ and $i_N \geqslant 63$, respectively.

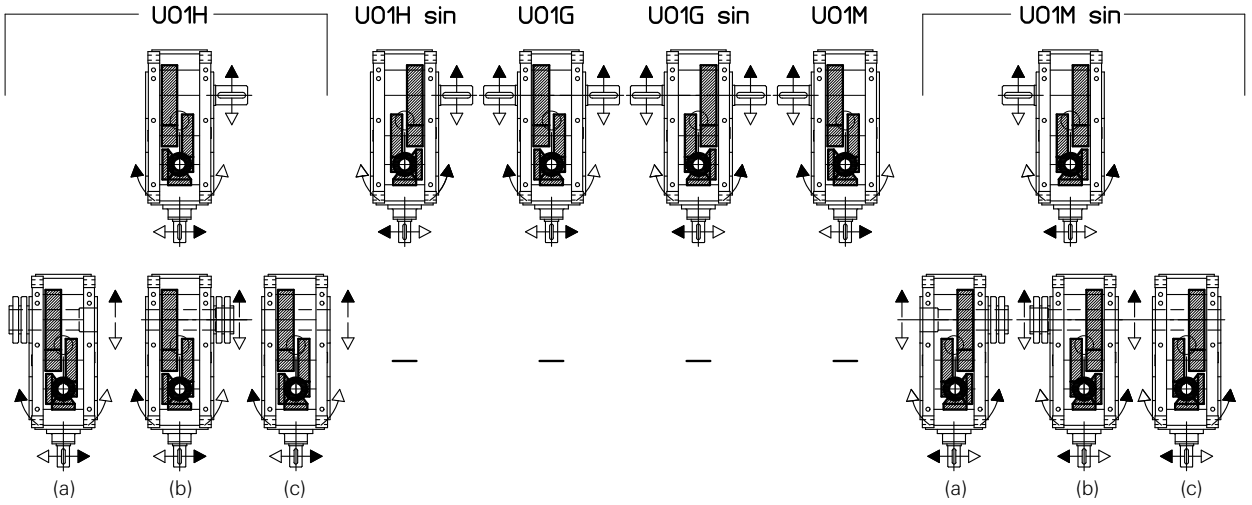
10.2 - Gear reducers R C2I

Designs[1) 2)] (direction of rotation)

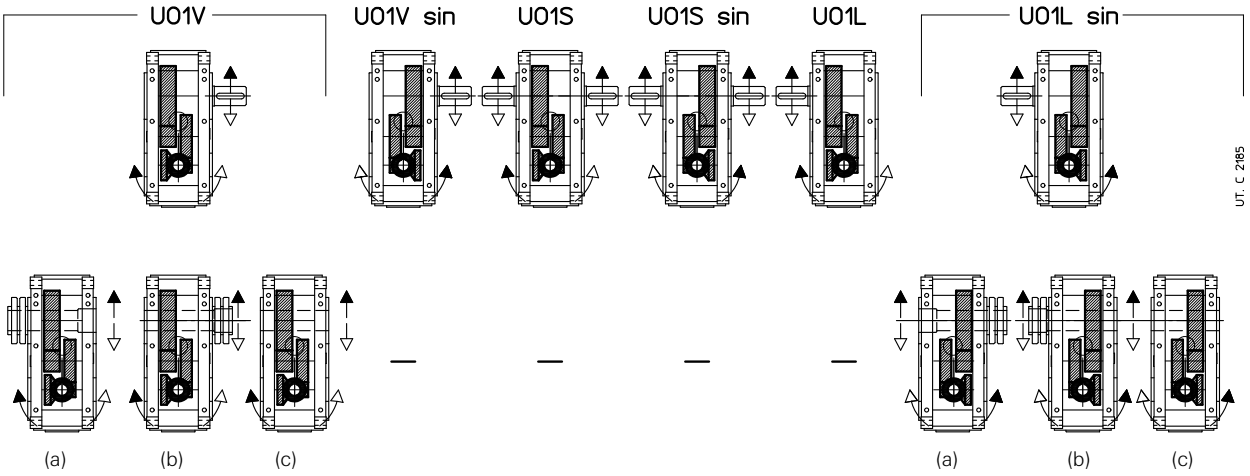
Solid low speed shaft (standard)



Solid low speed shaft (standard)



Solid low speed shaft (standard)

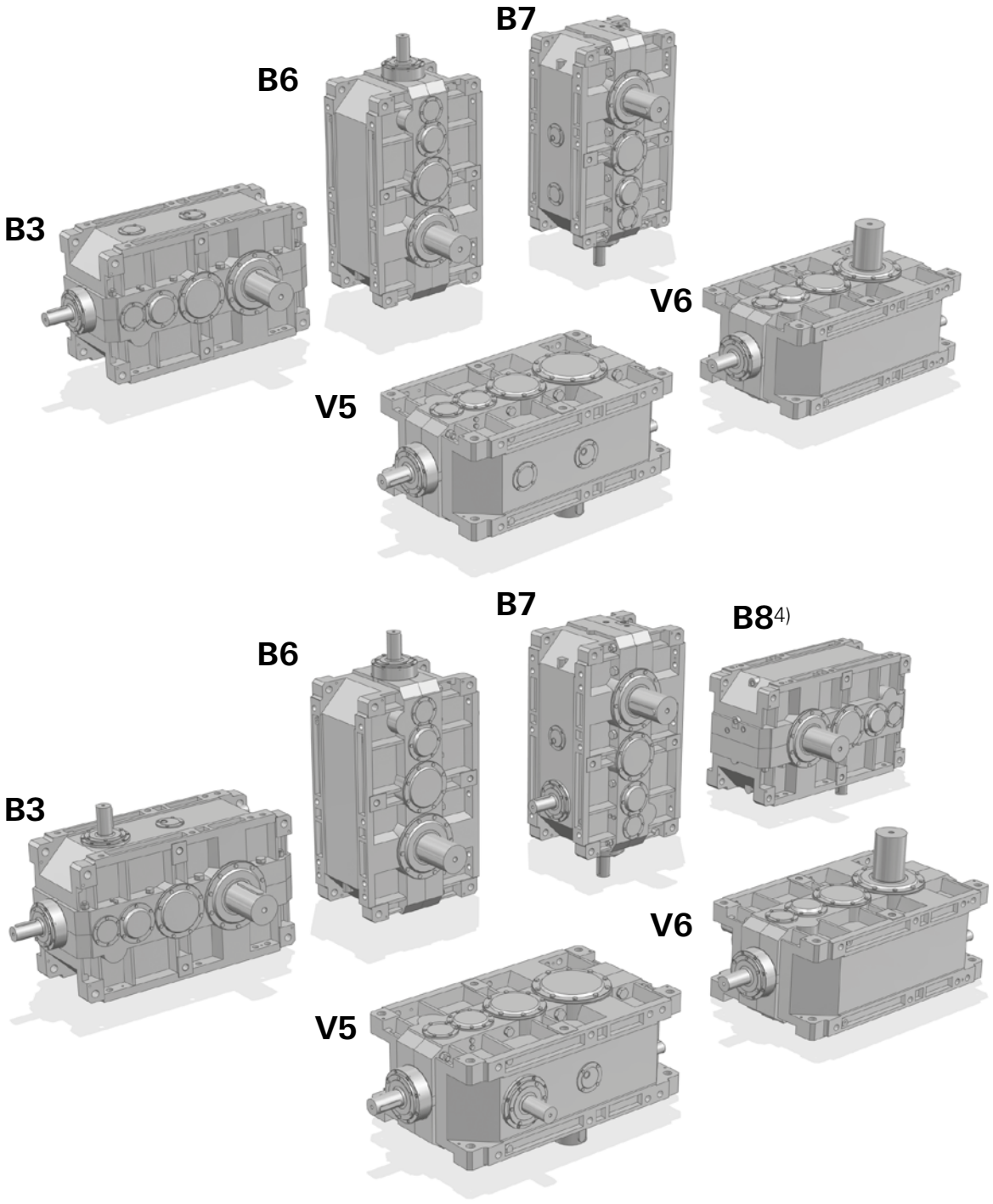


(a) Hollow low speed shaft **with shrink disc on machine opposite side** (on request, see ch. 12).
(b) Hollow low speed shaft **with shrink disc on machine side** (on request, see ch. 12).
(c) Hollow low speed shaft **with keyway** (on request, see ch. 12).
1) The housing of designs UO1A ... UO1N sin is not prearranged for other designs (UO1H ... UO1L sin).
2) For UO1A, UO1H, UO1V designs and derivatives it is recommended to adopt the black arrow direction of rotation; for UO1A sin, UO1H sin, UO1V sin designs and derivatives, the white arrow direction of rotation. If it is not possible, consult us.

10.2 - Gear reducers R C2I

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



Possible high oil splash: for the corrective factor f_{t3} of nominal thermal power Pt_N see ch. 4.

Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).

2) for designs UO1H ... UO1M sin, UO1V ... UO1L sin.

3) for designs UO1A ... UO1N sin, UO1H ... UO1M sin.

4) Mounting position B8 available only for designs UO1V ... UO1L sin.

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

Oil filler plug
Oil level plug
Oil drain plug

Oil filler plug on opposite side (not in view)
Oil level plug on opposite side (not in view)
Oil drain plug on opposite side (not in view)

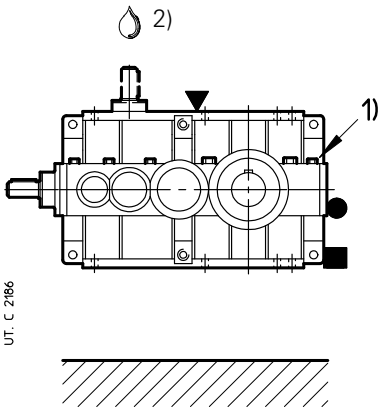
2582-01.02

10.2 - Gear reducers R C2I

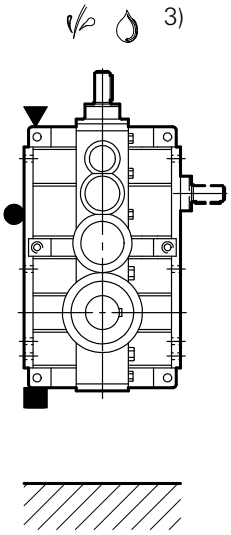
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

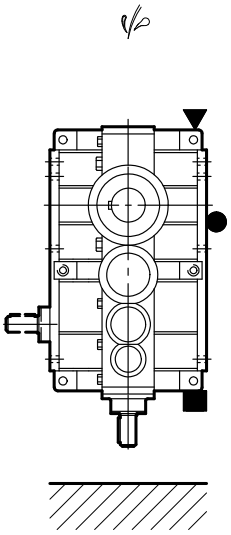
B3



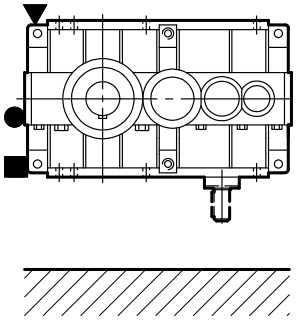
B6



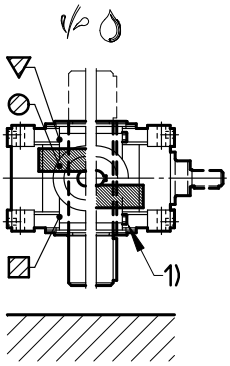
B7

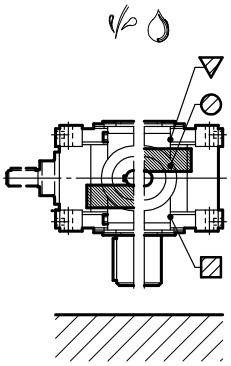


B8[4)]



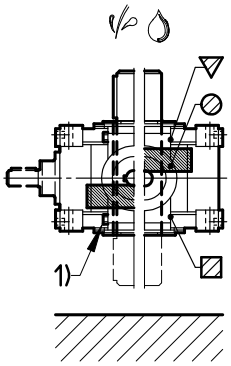
V5

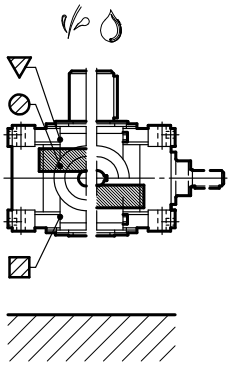




UO1A UO1F	UO1A sin UO1F sin	UO1N	UO1N sin
UO1H UO1G	UO1H sin UO1G sin	UO1M	UO1M sin
UO1V UO1S	UO1V sin UO1S sin	UO1L	UO1L sin
UO1A* UO1H* UO1V	UO1N sin* UO1M sin* UO1L sin*		

V6





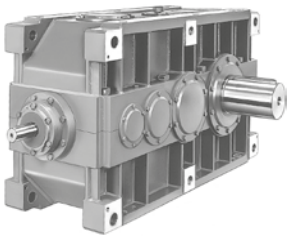
UO1A UO1F	UO1A sin UO1F sin	UO1N	UO1N sin
UO1H UO1G	UO1H sin UO1G sin	UO1M	UO1M sin
UO1V UO1S	UO1V sin UO1S sin	UO1L	UO1L sin
UO1A* UO1H* UO1V	UO1N sin* UO1M sin* UO1L sin*		

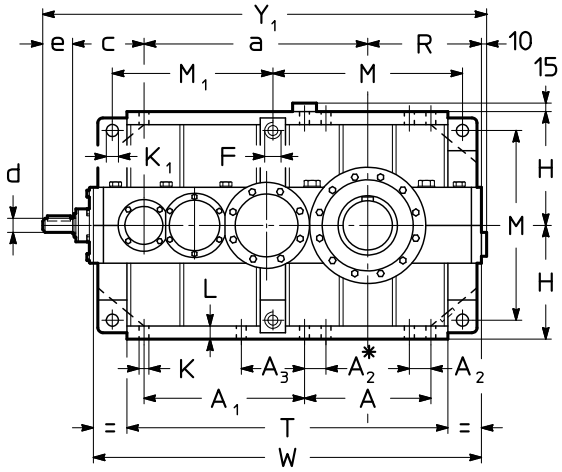
Size	Oil quantity [gal]					
	B3	B6	B7	B8[4)]	V5, V6	
					with low speed shaft on bottom	with low speed wheel on top
4000, 4001	35	59	59	35	59	66
4500, 4501	35	59	59	35	59	66
5000, 5001	70	119	112	70	119	125
5600, 5601	70	119	112	70	119	125
6300, 6301	99	166	166	99	166	188
7001	159	251	280	159	251	280
8001	264	449	449	264	449	476

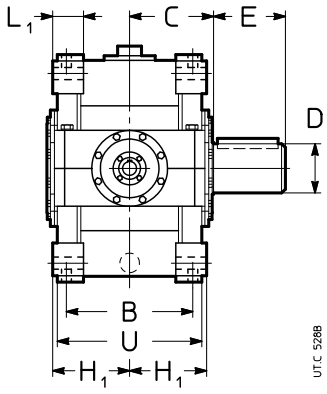
Notes at previous page.

10.3 - Gear reducers R C3I

Dimensions







* For sizes ⩾ 6300, only.

Size	a	A	A_1 M_1	A_2	A_3	B	C	F 1)	H h11 R	H_1 h12	K Ø	K_1 Ø H11	L	L_1	M	T	U	W	lb 3)
4000	900	505	625	90	–	500	330	M45	450	296	39	48	52	116	750	1260	580	1525	5270	5420
4001																			5420	5600
4500	950	505	675	90	–	500	358	M45	450	296	39	48	52	116	750	1310	580	1575	5840	6040
4501																			6000	6240
5000	1125	630	785	115	–	625	410	M56	560	370	48	60	65	148	930	1575	725	1905	10250	10560
5001																			10520	10870
5600	1185	630	845	115	–	625	445	M56	560	370	48	60	65	148	930	1635	725	1965	12190	12630
5601																			12410	12900
6300	1380	770	970	115	–	695	490	M56	630	406	48	60	65	148	1070	1900	795	2230	17000	17610
6301																			17240	17970
7101	1630	930	1228	115	590	843	601	M56	710	481	48	66	71	185	1230	2279	943	2648	29230	30340
8001	1880	1008	1286	145	596	944	682	M90	900	544	60	95	85	250	1574	2590	1064	3086	45080	46670

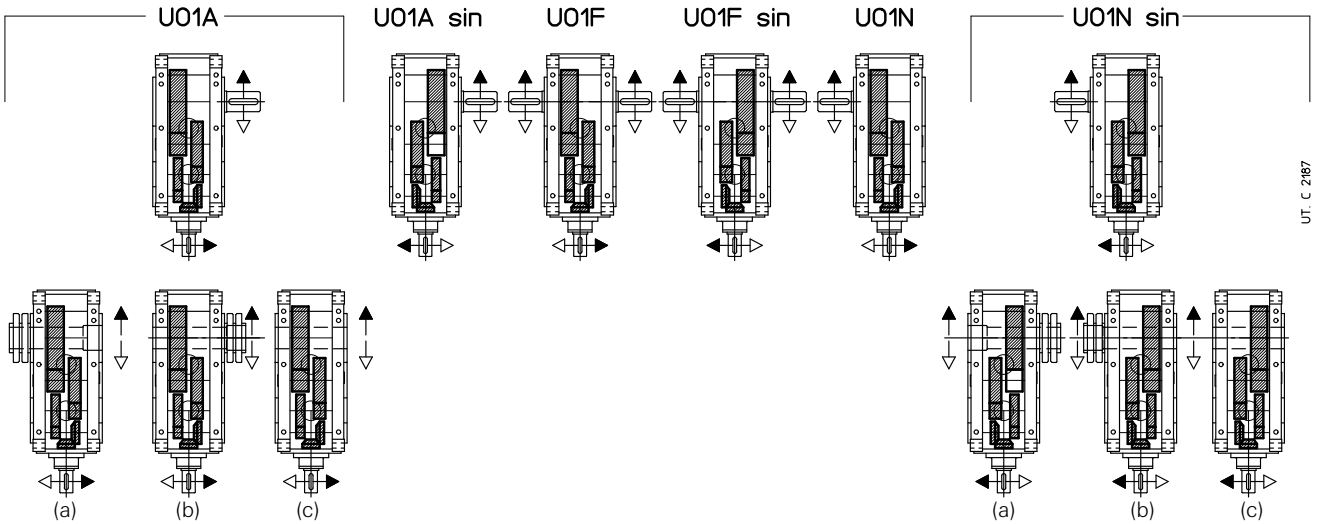
Size	D Ø	E	c	d Ø	e	Y_1 2)	c	d Ø	e	Y_1 2)	c	d Ø	e	Y_1 2)
			$i_N \leqslant 125$				$i_N = 160, 200$				$i_N \geqslant 250$			
4000	190	280	282	48	110	1752	282	48	110	1752	282	38	80	1722
4001	200													
			$i_N \leqslant 125$				$i_N = 160, 200$				$i_N \geqslant 250$			
4500	210	300	282	48	110	1802	282	48	110	1802	282	38	80	1772
4501	220													
			$i_N \leqslant 125$				$i_N = 160, 200$				$i_N \geqslant 250$			
5000	240	330	380	70	140	2215	357	55	110	2162	357	48	110	2162
5001	250													
			$i_N \leqslant 125$				$i_N = 160, 200$				$i_N \geqslant 250$			
5600	270	380	380	70	140	2275	357	55	110	2222	357	48	110	2222
5601	280													
			$i_N \leqslant 160$ 4)				$i_N = 200, 250$ 4)				$i_N = 315$			
6300	300	430	380	70	140	2540	357	55	110	2487	357	48	110	2487
6301	320													
			$i_N \leqslant 160$				$i_N = 200, 250$				$i_N = 315$			
7101	360	590	480	90	170	3000	480	70	140	2970	480	70	140	2970
			$i_N \leqslant 160$				$i_N = 200, 250$				$i_N = 315$			
8001	400	660	605	110	210	3605	605	90	170	3565	605	90	170	3565

1) Working length of thread 1,7 · F.
2) For mounting positions B6, B7, V5, V6 dimension Y_1 increases by approx, 20 for overall dimensions of filler plug.
3) Values valid for double extension low speed shaft end.
4) For size 6301: $i_N \leqslant 200$ and $i_N = 250$, respectively.

10.3 - Gear reducers R C3I

Designs[1) 2)] (direction of rotation)

Solid low speed shaft (standard)



(a) Hollow low speed shaft **with shrink disc on machine opposite side** (on request, see ch. 12).
(b) Hollow low speed shaft **with shrink disc on machine side** (on request, see ch. 12).
(c) Hollow low speed shaft **with keyway** (on request, see ch. 12).
1) The housing of designs UO1A ... UO1N sin is not prearranged for other designs (UO1H ... UO1L sin).
2) For UO1A, UO1H, UO1V designs and derivatives it is recommended to adopt the black arrow direction of rotation; for UO1A sin, UO1H sin, UO1V sin designs and derivatives, the white arrow direction of rotation. If it is not possible, consult us.

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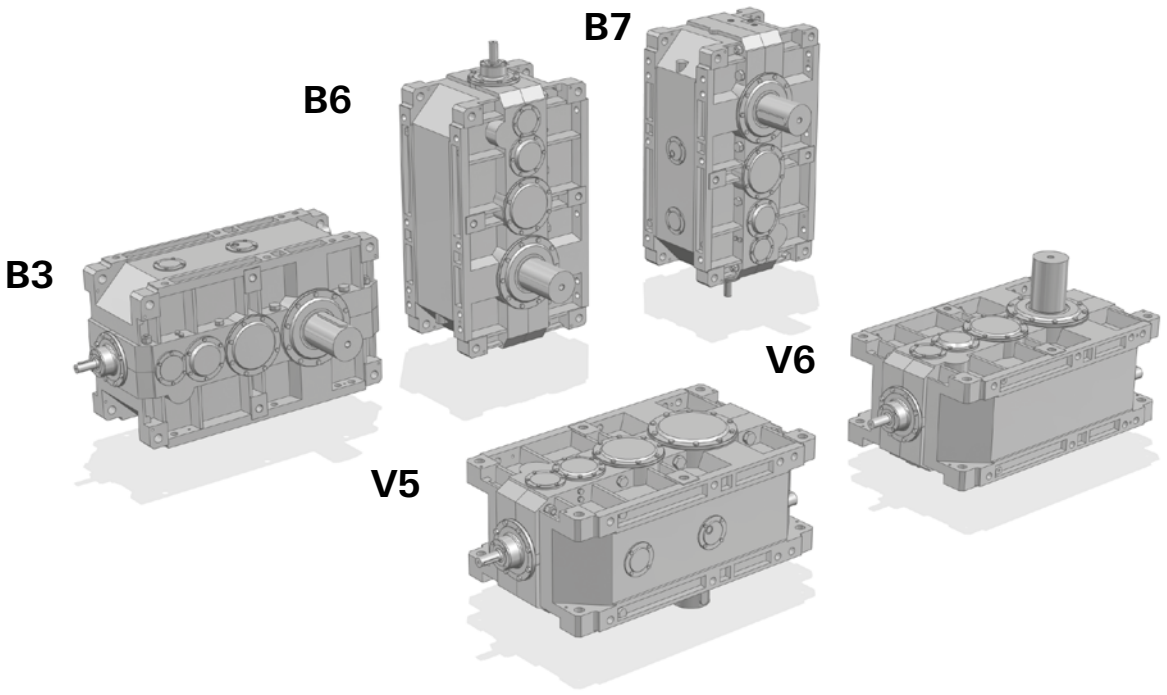
10.3 - Gear reducers R C3I

Mounting positions

Except specific needs, prefer mounting position B3 (see ch. 2).



Possible high oil splash: for the corrective factor ft_3 of nominal thermal power Pt_N see ch. 4.

Possible bearing lubrication pump: consult us for verification.

1) Mounting position **B3** may be identified from the position of the screw-heads as arrowed. The same is valid for mounting positions V5 and V6 with double extension or hollow low speed shaft: in these cases, consider the **position of low speed wheel**, for the identification of correct mounting position (see also «Designs» at the previous page).

* Valid in case of **hollow low speed shaft** (with shrink disc or keyway).

Oil filler plug
Oil level plug
Oil drain plug

Oil filler plug on opposite side (not in view)
Oil level plug on opposite side (not in view)
Oil drain plug on opposite side (not in view)

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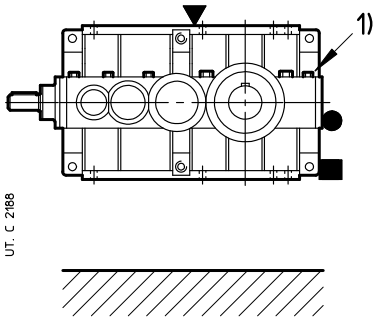
10.3 - Gear reducers R C3I

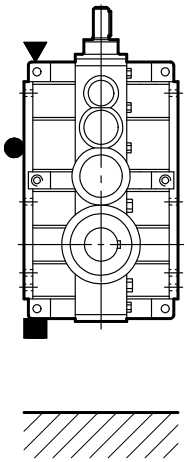
Lubrication - Plug position and oil quantity

Oil quantity are approximate for provisioning and can vary according to the design and specific application. The exact quantity the gear reducer is to be filled with is definitely given by the level.

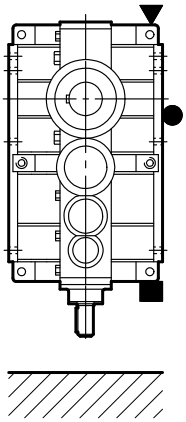
B3



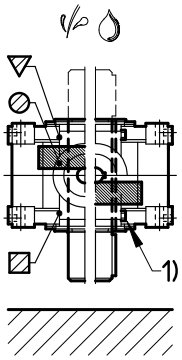
B6

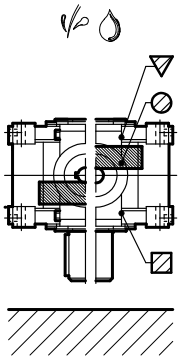


B7



V5

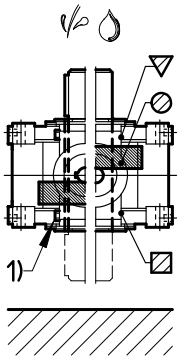


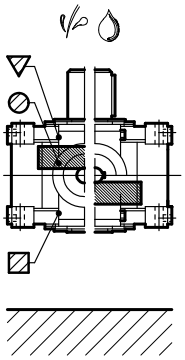


UO1A UO1F	UO1A sin UO1F sin
UO1A*	UO1N sin*

UO1N	UO1N sin

V6





UO1A UO1F	UO1A sin UO1F sin
UO1A*	UO1N sin*

UO1N	UO1N sin

Size	Oil quantity [gal]				
	B3	B6	B7	V5, V6	
				with low speed shaft below	with upper low speed wheel
4000, 4001	40	74	59	66	70
4500, 4501	40	74	59	66	70
5000, 5001	79	148	119	132	140
5600, 5601	79	148	119	132	140
6300, 6301	112	225	166	188	198
7001	188	349	264	280	296
8001	296	592	449	476	502

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11 - Radial loads

11.1 - Radial loads[1] (OHL) F_{r1} [10^3 lbf] on high speed shaft end

Radial loads generated on the shaft end by a drive connecting gear reducer and motor must be less than or equal to those given in the relevant table.

n_1	F_{r1} [10^3 lbf]																	
	4000 ... 4501			**5000 ... 5601**			**6300 ... 6301**					**7101**			**8001**		
rpm	**2I CI**	**3I C2I**	**4I C3I**	**2I**	**3I C2I**	**4I C3I**	**2I**	**3I**	**4I**	**C2I**	**C3I**	**2I**	**3I C2I**	**4I C3I**	**2I**	**3I C2I**	**4I C3I**
1 800	4.5	2.8	1.1	7.1	4.5	1.8	9	5.6	2.2	4.5	1.8	14.2	9	2.8	18	11.2	4.5
1 500	4.8	3	1.2	7.5	4.8	1.9	9.6	6	2.4	4.8	1.9	15.1	9.6	3	19.1	11.9	4.8
1 200	5	3.1	1.3	8	5	2	10.1	6.3	2.5	5	2	16	10.1	3.1	20.2	12.6	5
1 000	5.3	3.4	1.3	8.4	5.3	2.1	10.7	6.7	2.7	5.3	2.1	16.9	10.7	3.4	21.4	13.5	5.3
710	6	3.8	1.5	9.6	6	2.4	11.9	7.5	3	6	2.4	19.1	11.9	3.8	23.8	15.1	6
560	6.3	4	1.6	10.1	6.3	2.5	12.6	8	3.1	6.3	2.5	20.2	12.6	4	25.2	16	6.3
450	6.7	4.3	1.7	10.7	6.7	2.7	13.5	8.4	3.4	6.7	2.7	21.4	13.5	4.3	26.5	16.9	6.7
355	7.5	4.8	1.9	11.9	7.5	3	15.1	9.6	3.8	7.5	3	23.8	15.1	4.8	29.7	19.1	7.5
F_{r1max}	**7.5**	**4.8**	**1.9**	**11.9**	**7.5**	**3**	**15.1**	**9.6**	**3.8**	**7.5**	**3**	**23.8**	**15.1**	**4.8**	**29.7**	**19.1**	**7.5**

The radial load F_{r1} given by the following formula refers to the most common drives:

$$F_{r1} = \frac{189\ 09 \cdot P_1}{d \cdot n_1}\ [10^3\ \text{lbf}] \qquad \text{for timing belt drive}$$

$$F_{r1} = \frac{315\ 15 \cdot P_1}{d \cdot n_1}\ [10^3\ \text{lbf}] \qquad \text{for V-belt drive}$$

where:
P_1 [hp] is the power required at the input side of gear reducer;
n_1 [rpm] is the speed;
d [in] is the pitch diameter.

Radial loads given in the table are valid for overhung loads on centre line of high speed shaft end. i.e. operating at a distance of 0.5 · e (e = shaft end length) from the shoulder. If radial loads are in a different position. i.e. at a distance differing from 0.5 · e from shoulder. multiply the admissible radial load value by 1.25 (without exceeding the maximum value F_{r1max}. stated in the table) if acting at 0.315 · e . by 0.8 if acting at 0.8 · e .

It is always advisable **to mount the pulley against the shaft shoulder** and in any case to avoid that the pulley exceeds the shaft end.

An **axial load** of up to 0.2 times the value in the table is permissible. simultaneously with the radial load.

In absence of the radial load. an axial load may be acting on center line. not higher than 0.5 times the stated radial load.

IMPORTANT: tabulated values for radial load F_{r1} can increase considerably in certain instances (direction of rotation. angular position of load. etc.). If necessary and/or in presence of **misaligned** axial loads. consult us.

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11.1 - Radial loads[1] (OHL) F_{r1} [10^3 lbf] on high speed shaft end

V-belt drives

See the table for the driving pulleys advised for the various powers and motor polarities and the radial loads resulting on motor and gear reducer shaft ends.

The transmissions have been calculated with a service factor ⩾1.4; replace section SPA with SPB, section SPB with SPC, section SPC with 8V.in order to increase the service factor with the same d and belt number.

The radial loads have been calculated according to the formula: (315 150 · P_1) / ($d \cdot n_1$) at 60 Hz.

The radial load F_{r1}, referring to the selected motor pulley, must be lower than or equal to the one admitted by gear reducer.

IMPORTANT. For the good running of drive and in order not to overload motor and gear reducer bearings, reduce the overhung to a minimum and do not stress belts excessively. Pulleys with d ⩾ 16 must be dynamically balanced.

Motor			Motor pulley: belt number and section type, pitch diameter *d*[in], radial load F_{r1}[lb]													
P_1 hp	Size	andpolen.		***d***	F_{r1} ≈		***d***	F_{r1} ≈		***d***	F_{r1} ≈		***d***	F_{r1} ≈		***d***	F_{r1} ≈
1.5	90S	4	2 A	**3.55**	80	2 A	**4**	71	2 A	**4.5**	63	1 A	**5**	56	1 A	**5.6**	50
	90L	6	2 A	**3.55**	118	2 A	**4**	100	2 A	**4.5**	90	2 A	**5**	80	1 A	**5.6**	75
2	90L	4	2 A	**3.55**	106	2 A	**4**	95	2 A	**4.5**	80	2 A	**5**	75	1 A	**5.6**	67
	100LA	6	3 A	**3.55**	150	3 A	**4**	140	2 A	**4.5**	118	2 A	**5**	112	2 A	**5.6**	100
3	100LA	4	3 A	**3.55**	160	3 A	**4**	140	3 A	**4.5**	125	2 A	**5**	112	2 A	**5.6**	100
	112M	6	3 A	**4.5**	180	3 A	**5**	160	3 A	**5.6**	150	2 A	**6.3**	132	2 A	**7.1**	118
4	100LB	4	3 A	**4.5**	160	3 A	**5**	150	2 A	**5.6**	132	2 A	**6.3**	118	2 A	**7.1**	106
	132S	6	3 SPA	**4**	280	3 SPA	**4.5**	250	2 SPA	**5**	224	2 SPA	**5.6**	200	2 SPA	**6.3**	170
5.4	112M	4	3 A	**5**	200	3 A	**5.6**	180	3 A	**6.3**	160	2 A	**7.1**	140	2 A	**8**	125
	132M	6	3 SPA	**4.5**	335	3 SPA	**5**	300	2 SPA	**5.6**	265	2 SPA	**6.3**	236	2 SPA	**7.1**	212
7.5	132S	4	3 SPA	**4.5**	315	3 SPA	**5**	280	2 SPA	**5.6**	250	2 SPA	**6.3**	224	2 SPA	**7.1**	200
	132MB	6	3 SPA	**5.6**	375	3 SPA	**6.3**	335	2 SPA	**7.1**	280	2 SPA	**8**	250	2 SPA	**9**	224
10	132M	4	3 SPA	**5**	375	3 SPA	**5.6**	335	2 SPA	**6.3**	300	2 SPA	**7.1**	265	2 SPA	**8**	236
	160M	6	3 SPA	**6.3**	425	3 SPA	**7.1**	375	3 SPA	**8**	335	2 SPA	**9**	300	2 SPA	**10**	280
12.4	132MB	4	–	–	–	3 SPA	**5.6**	400	2 SPA	**6.3**	355	2 SPA	**7.1**	315	2 SPA	**8**	280
15	160M	4	3 SPA	**6.3**	450	3 SPA	**7.1**	400	3 SPA	**8**	355	2 SPA	**9**	315	2 SPA	**10**	280
	160L	6	3 SPA	**8**	500	3 SPA	**9**	450	3 SPA	**10**	400	2 SPA	**11.2**	375	2 SPA	**12.5**	335
20	160L	4	3 SPA	**7.1**	530	3 SPA	**8**	475	3 SPA	**9**	400	3 SPA	**10**	375	2 SPA	**11.2**	335
	180L	6	4 SPA	**8**	670	4 SPA	**9**	600	4 SPA	**10**	560	3 SPA	**11.2**	500	3 SPA	**12.5**	450
25	180M	4	4 SPA	**7.1**	670	4 SPA	**8**	560	4 SPA	**9**	500	3 SPA	**10**	475	3 SPA	**11.2**	425
	200LR	6	4 SPB	**8**	850	4 SPB	**9**	750	3 SPB	**10**	670	3 SPB	**11.2**	600	3 SPB	**12.5**	560
30	180L	4	4 SPA	**8**	710	4 SPA	**9**	630	4 SPA	**10**	560	3 SPA	**11.2**	500	3 SPA	**12.5**	450
	200L	6	4 SPB	**9**	900	4 SPB	**10**	800	3 SPB	**11.2**	750	3 SPB	**12.5**	670	3 SPB	**14**	600
40	200L	4	4 SPB	**9**	800	4 SPB	**10**	750	3 SPB	**11.2**	670	3 SPB	**12.5**	600	3 SPB	**14**	530
	225M	6	5 SPB	**10**	1120	5 SPB	**11.2**	1000	4 SPB	**12.5**	900	4 SPB	**14**	800	4 SPB	**16**	670
50	225S	4	5 SPB	**9**	1000	5 SPB	**10**	950	4 SPB	**11.2**	850	4 SPB	**12.5**	750	4 SPB	**14**	670
	250M	6	6 SPB	**10**	1400	6 SPB	**11.2**	1250	5 SPB	**12.5**	1120	5 SPB	**14**	1000	5 SPB	**16**	850
60	225M	4	5 SPB	**10**	1120	5 SPB	**11.2**	1000	4 SPB	**12.5**	900	4 SPB	**14**	800	4 SPB	**16**	710
75	250M	4	6 SPB	**10**	1400	6 SPB	**11.2**	1250	5 SPB	**12.5**	1120	5 SPB	**14**	1000	5 SPB	**16**	850
100	280S	4	6 SPB	**11.2**	1700	5 SPB	**12.5**	1500	5 SPB	**14**	1320	5 SPB	**16**	1180	–	–	–
125	280M	4	6 SPB	**12.5**	1900	5 SPC	**12.5**	1900	5 SPC	**14**	1700	4 SPC	**16**	1400	–	–	–
150	315S	4	6 SPC	**12.5**	2240	5 SPC	**14**	2000	4 SPC	**16**	1700	–	–	–	–	–	–
175	315M	4	6 SPC	**14**	2360	5 SPC	**16**	2000	4 SPC	**18**	1800	–	–	–	–	–	–
200	315MC	4	6 SPC	**16**	2360	6 SPC	**18**	2000	5 8V	**18**	2000	–	–	–	–	–	–

1) Not valid for power 12.37 hp: d ⩾ 140 mm.

Note: Pulley face width: **1 Z** 16, **2 Z** 28, **1 A** 20, **2 A-2 SPA** 35, **3 A-3 SPA** 50, **4 SPA** 65, **3 SPB** 63, **4 SPB** 82, **5 SPB** 101, **6 SPB** 120, **4 SPC** 110, **5 SPC** 136, **6 SPC** 162, **5 8V** 152.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Axial loads F_{a2}

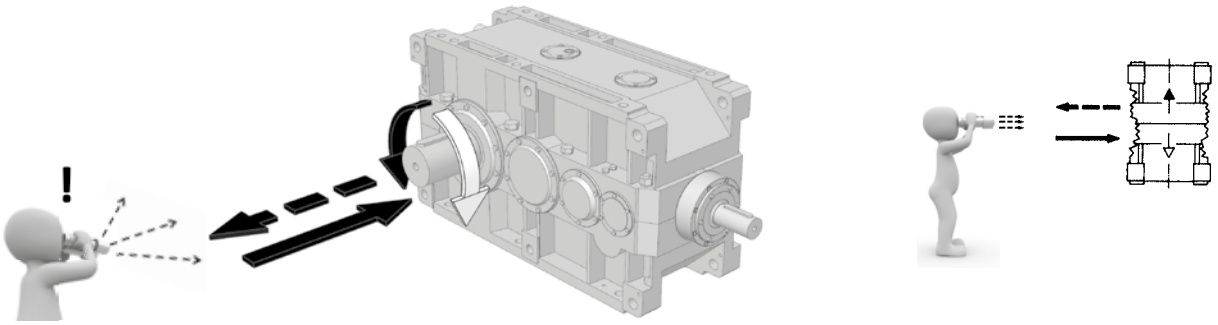
Permissible F_{a2} is shown in the column where direction of rotation of low speed shaft (black or white arrow) and direction of the axial force (solid or broken arrow) correspond to those of the gear reducer in question. Direction of rotation and direction of axial force may be established viewing the gear reducer from any point of the two output sides of low speed shaft, providing the same point is adopted for rotation and axial load (see fig. below).

Notes:

– white and black arrows of present chapter do not refer to the ones stating the correspondence of direction of rotation for the different designs (see ch. 8, 10, 12, 14);

– wherever possible, choose the load conditions corresponding to the column with highest admissible values.

– values stated in the table are valid for the center line axial load; in the event of a misaligned axial load, consult us.



Radial loads F_{r2}

Radial loads generated on the shaft end by a drive connecting gear reducer and motor must be less than or equal to those given in the relevant tables in the following pages.

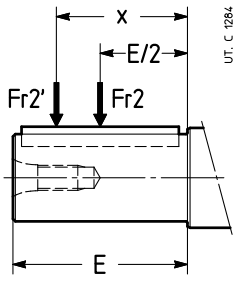
Normally, radial loads on low speed shaft ends are considerable: in fact there is a tendency to connect the gear reducer to the machine by means of a transmission with high transmission ratio (economizing on the gear reducer) and with small diameters (economizing on the drive, and for requirements dictated by overall dimensions). Bearing life and wear (which also affect gears unfavorably) and low speed shaft strength, clearly impose limits on permissible radial load.

Permissible radial loads given in the tables are therefore based on: the low speed shaft side where radial load is applied according to the design (see ch. 8 and 10), the product of speed n_2 [rpm] for the bearing duration L_h [h] required, the direction of rotation, the angular position φ [°] the load and torque M_2 [lbf in] required.

Permissible radial loads given in the tables are valid for overhung loads on center line of high speed shaft end, i.e. operating at a distance of 0,5 · E (E = shaft end length) from the shoulder. If radial loads are in a different position, i.e. at a distance differing from 0,5 E from shoulder, re-calculate the permissible value of radial load according to the following formula, trying not to exceed the maximum value F_{r2max}, stated in the tables:

For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

$$F'_{r2} = F_{r2} \cdot \frac{E/2 + y}{x + y} \quad [10^3 \text{ lbf}]$$



where:

F_{r2}' [lbf] is the permissible radial load acting at the distance x from shaft shoulder;

F_{r2} [lbf] is the permissible radial load acting on center line of high speed shaft end (see table on next page);

E [mm] is the shaft end length (see ch. 7, 9);

y [mm] is given in the table;

x [mm] is the distance between the shaft shoulder and the load application point.

	Gear reducer size											
	4000	**4001**	**4500**	**4501**	**5000**	**5001**	**5600**	**5601**	**6300**	**6301**	**7101**	**8001**
y	561	554	612	594	700	694	765	742	823	823	1010	1142

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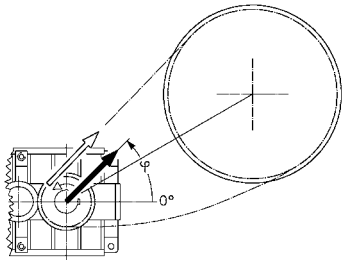
11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

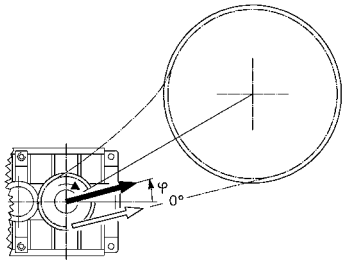
Radial load F_{r2} for the most common drives has the following value and angular position:

Rotation

$$F_{r2} = \frac{126.06 \cdot P_2}{d \cdot n_2} \text{ [10}^3\text{ lbf]}$$

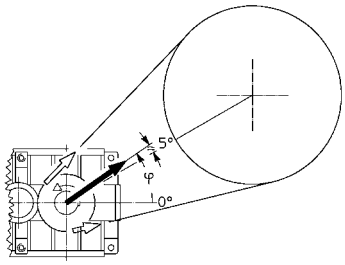
for chain drive (lifting in general); for toothed belt drive replace 126.06 with 189.09

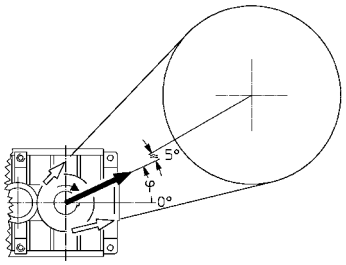




$$F_{r2} = \frac{315.15 \cdot P_2}{d \cdot n_2} \text{ [10}^3\text{ lbf]}$$

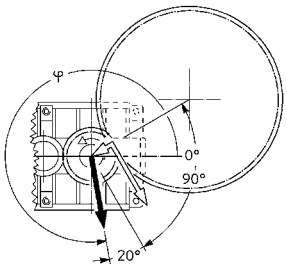
for V-belt drive

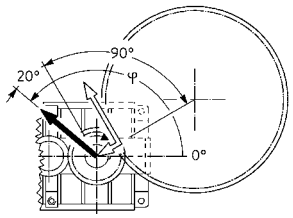




$$F_{r2} = \frac{134.11 \cdot P_2}{d \cdot n_2} \text{ [10}^3\text{ lbf]}$$

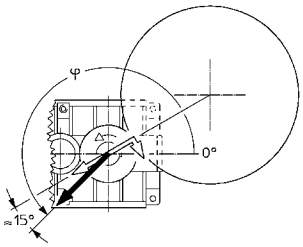
for spur gear pair drive

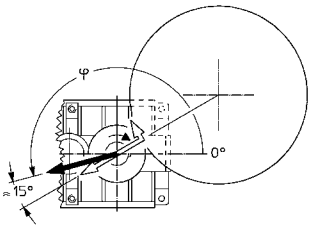




$$F_{r2} = \frac{447.55 \cdot P_2}{d \cdot n_2} \text{ [10}^3\text{ lbf]}$$

for friction wheel drive (rubber-on-metal)





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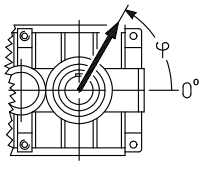
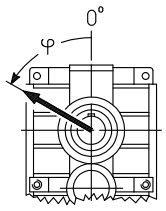
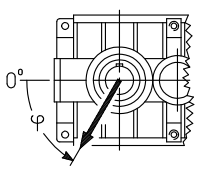
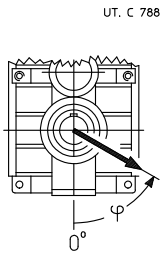
where: P_2 [hp] is power required at the output side of the gear reducer, n_2 [rpm] is the speed, d [in] is the pitch diameter.

IMPORTANT: 0° coincides with a straight line concurrent with the axis of the last reduction and orientated as shown above, and therefore it follows the rotation of the housing, as shown below.









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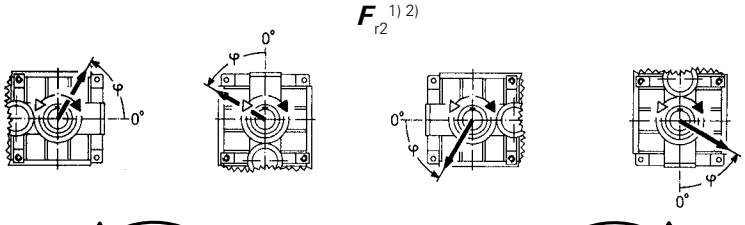
11

2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3)]

size **4000**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]																F_{a2} [1)]	
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	710	45	45	45	45	45	45	45	45	37.5	33.5	35.5	45	45	45	45	45	7.1	18
	500	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
450,000	710	45	45	45	45	45	45	45	45	33.5	28	31.5	40	45	45	45	45	5.6	18
	500	45	45	45	45	45	45	45	45	45	40	42.5	45	45	45	45	45	9	18
560,000	710	45	45	37.5	33.5	45	45	45	45	28	23.6	26.5	35.5	45	45	45	37.5	4	18
	500	45	45	45	45	45	45	45	45	40	35.5	37.5	45	45	45	45	45	9	18
710,000	710	45	45	23.6	21.2	33.5	45	45	45	23.6	20	22.4	31.5	45	45	45	33.5	2.8	18
	500	45	45	45	45	45	45	45	45	35.5	31.5	33.5	40	45	45	45	42.5	7.5	18
900,000	710	45	21.2	9	8	13.2	45	42.5	45	19	15	17	26.5	40	45	42.5	30	2	18
	500	45	45	45	45	45	45	45	45	31.5	28	30	35.5	45	45	45	37.5	6.3	18
	355	45	45	45	45	45	45	45	45	37.5	35.5	37.5	42.5	45	45	45	45	9	18
1,120,000	500	45	45	45	45	45	45	42.5	45	28	23.6	26.5	33.5	42.5	45	45	35.5	5.3	18
	355	45	45	45	45	45	45	45	45	33.5	31.5	33.5	37.5	45	45	45	40	8.5	18
1,400,000	500	45	45	37.5	35.5	45	40	40	42.5	23.6	21.2	22.4	30	37.5	45	40	31.5	4	18
	355	45	45	45	45	45	42.5	42.5	45	31.5	28	30	35.5	42.5	45	42.5	35.5	7.5	18
1,800,000	500	45	45	26.5	25	35.5	37.5	35.5	37.5	20	17	19	25	35.5	40	37.5	28	3	18
	355	45	45	45	45	45	40	37.5	40	28	25	26.5	31.5	37.5	42.5	40	33.5	6.3	17
2,240,000	500	42.5	33.5	18	17	25	33.5	33.5	35.5	17	14	16	22.4	31.5	37.5	33.5	25	2	17
	355	42.5	45	45	45	40	35.5	35.5	37.5	25	22.4	23.6	28	35.5	37.5	35.5	30	5.3	16
2,800,000	355	37.5	45	40	37.5	37.5	33.5	33.5	33.5	22.4	20	21.2	26.5	31.5	35.5	33.5	28	4.5	15
	250	40	42.5	45	42.5	37.5	35.5	33.5	35.5	28	25	26.5	30	33.5	37.5	35.5	31.5	7.1	14
3,550,000	355	35.5	40	33.5	31.5	35.5	31.5	30	31.5	19	17	18	22.4	30	33.5	31.5	25	3.55	14
	250	35.5	40	40	40	35.5	33.5	31.5	33.5	25	22.4	23.6	28	31.5	33.5	33.5	28	6	13.2
4,500,000	355	33.5	37.5	25	23.6	33.5	30	28	30	17	14	16	20	26.5	31.5	28	22.4	2.8	13.2
	250	33.5	37.5	37.5	35.5	33.5	31.5	30	31.5	22.4	20	21.2	25	30	31.5	30	26.5	5.3	12.5
		max **45**																max **9**	max **18**

size **4001**

355,000	850	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
450,000	850	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
560,000	850	45	45	45	45	45	45	45	45	45	42.5	45	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
710,000	850	45	45	45	45	45	45	45	45	42.5	37.5	40	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
900,000	850	45	45	45	45	45	45	45	45	37.5	31.5	33.5	45	45	45	45	45	8.5	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
1,120,000	600	45	45	45	45	45	45	45	45	45	40	42.5	45	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
1,400,000	600	45	45	45	45	45	45	45	45	40	35.5	37.5	45	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
1,800,000	600	45	45	45	45	45	45	45	45	33.5	31.5	33.5	40	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	42.5	40	42.5	45	45	45	45	45	9	18
2,240,000	600	45	45	45	45	45	45	45	45	31.5	26.5	30	37.5	45	45	45	40	8	18
	425	45	45	45	45	45	45	45	45	37.5	35.5	37.5	42.5	45	45	45	45	9	18
2,800,000	425	45	45	45	45	45	45	45	45	35.5	31.5	33.5	40	45	45	45	42.5	9	18
	300	45	45	45	45	45	45	45	45	40	37.5	40	45	45	45	45	45	9	18
3,550,000	425	45	45	45	45	45	42.5	40	42.5	31.5	28	30	35.5	45	45	45	37.5	9	18
	300	45	45	45	45	45	45	42.5	45	35.5	33.5	35.5	40	45	45	45	42.5	9	18
4,500,000	425	45	45	45	45	45	40	37.5	40	28	25	26.5	31.5	40	45	42.5	35.5	8	18
	300	45	45	45	45	45	42.5	40	42.5	33.5	31.5	31.5	35.5	42.5	45	45	37.5	9	18
		max **45**																max **9**	max **18**

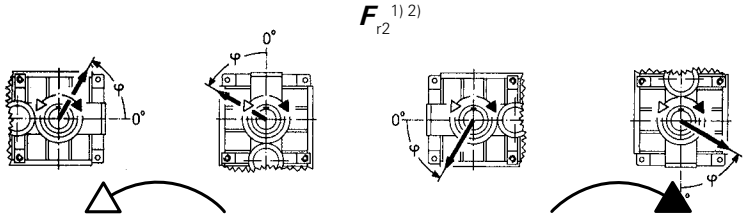
1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to $0.9 \cdot F_{r2max}$.
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3]

size **4000**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]									
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	710	45	45	45	45	45	45	45	45	28	21.2	22.4	33.5	45	45	45	45	7.1	18
	500	45	45	45	45	45	45	45	45	45	35.5	37.5	45	45	45	45	45	9	18
450,000	710	45	45	45	45	45	45	42.5	45	22.4	16	17	28	45	45	45	42.5	5.6	18
	500	45	45	45	45	45	45	45	45	37.5	31.5	33.5	42.5	45	45	45	45	9	18
560,000	710	45	45	45	45	45	45	37.5	40	17	11.8	12.5	22.4	45	45	45	35.5	4	18
	500	45	45	45	45	45	45	45	45	33.5	28	30	37.5	45	45	45	45	9	18
710,000	710	45	45	45	45	45	40	33.5	35.5	11.2	7.5	8	16	42.5	45	45	30	2.8	18
	500	45	45	45	45	45	45	42.5	45	30	23.6	25	33.5	45	45	45	42.5	7.5	18
900,000	710	45	45	45	45	45	35.5	30	31.5	–	–	–	7.5	35.5	45	45	21.2	2.24	18
	500	45	45	45	45	45	42.5	37.5	40	25	19	20	30	45	45	45	37.5	6.3	18
	355	45	45	45	45	45	45	42.5	45	33.5	30	31.5	37.5	45	45	45	45	9	18
1,120,000	500	45	45	45	45	45	37.5	33.5	35.5	20	15	17	25	42.5	45	45	33.5	5.3	18
	355	45	45	45	45	45	42.5	37.5	40	31.5	26.5	26.5	33.5	45	45	45	40	8.5	18
1,400,000	500	42.5	45	45	45	45	35.5	31.5	33.5	17	11.8	12.5	20	37.5	45	45	31.5	4	18
	355	45	45	45	45	45	40	35.5	37.5	28	22.4	23.6	31.5	42.5	45	45	37.5	7.5	18
1,800,000	500	37.5	45	45	45	45	31.5	26.5	30	12.5	8.5	9.5	16	33.5	45	45	26.5	3	18
	355	40	45	45	45	45	35.5	31.5	33.5	23.6	19	20	26.5	37.5	45	45	33.5	6.3	17
2,240,000	500	35.5	45	45	42.5	40	30	23.6	26.5	8.5	–	–	11.8	30	45	42.5	22.4	2.24	17
	355	37.5	45	45	45	42.5	33.5	30	31.5	20	16	17	23.6	35.5	45	42.5	31.5	5.3	16
2,800,000	355	35.5	45	45	45	37.5	30	26.5	28	17	13.2	14	20	31.5	42.5	40	28	4.5	15
	250	35.5	45	45	45	40	33.5	30	31.5	25	21.2	22.4	28	35.5	40	40	31.5	7.1	14
3,550,000	355	31.5	42.5	45	45	35.5	28	23.6	25	14	10.6	11.2	17	30	40	35.5	25	3.55	14
	250	33.5	40	45	42.5	35.5	31.5	28	30	22.4	18	19	25	31.5	37.5	35.5	30	6	13.2
4,500,000	355	30	40	45	42.5	33.5	25	21.2	22.4	11.2	8.5	9	14	26.5	35.5	33.5	21.2	2.8	13.2
	250	31.5	37.5	42.5	40	33.5	28	25	26.5	19	16	17	21.2	30	35.5	33.5	26.5	5.3	12.5
max **45**																		max **9**	max **18**

size **4001**

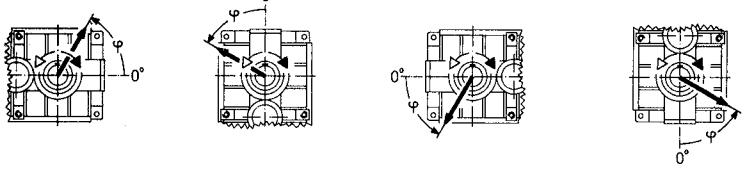
355,000	850	45	45	45	45	45	45	45	45	45	40	42.5	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
450,000	850	45	45	45	45	45	45	45	45	45	33.5	35.5	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
560,000	850	45	45	45	45	45	45	45	45	37.5	28	30	45	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
710,000	850	45	45	45	45	45	45	45	45	31.5	22.4	23.6	37.5	45	45	45	45	9	18
	600	45	45	45	45	45	45	45	45	45	40	40	45	45	45	45	45	9	18
900,000	850	45	45	45	45	45	45	42.5	45	23.6	17	18	30	45	45	45	45	7.5	18
	600	45	45	45	45	45	45	45	45	42.5	33.5	35.5	45	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	45	9	18
1,120,000	600	45	45	45	45	45	45	45	45	35.5	30	31.5	42.5	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	45	40	42.5	45	45	45	45	45	9	18
1,400,000	600	45	45	45	45	45	45	42.5	45	31.5	25	26.5	37.5	45	45	45	45	9	18
	425	45	45	45	45	45	45	45	45	42.5	35.5	37.5	45	45	45	45	45	9	18
1,800,000	600	45	45	45	45	45	45	37.5	40	26.5	20	21.2	31.5	45	45	45	45	8.5	18
	425	45	45	45	45	45	45	45	45	37.5	31.5	33.5	42.5	45	45	45	45	9	18
2,240,000	600	45	45	45	45	45	40	33.5	37.5	22.4	16	17	26.5	45	45	45	40	6.7	18
	425	45	45	45	45	45	45	40	42.5	33.5	28	30	37.5	45	45	45	45	9	18
2,800,000	425	45	45	45	45	45	42.5	37.5	40	30	23.6	25	33.5	45	45	45	42.5	9	18
	300	45	45	45	45	45	45	42.5	42.5	37.5	33.5	33.5	40	45	45	45	45	9	18
3,550,000	425	45	45	45	45	45	37.5	33.5	35.5	26.5	20	21.2	30	45	45	45	37.5	8.5	18
	300	45	45	45	45	45	42.5	37.5	40	33.5	30	30	35.5	45	45	45	42.5	9	18
4,500,000	425	40	45	45	45	45	35.5	30	31.5	22.4	17	18	26.5	40	45	45	35.5	7.1	18
	300	42.5	45	45	45	45	37.5	35.5	35.5	30	26.5	26.5	33.5	42.5	45	45	40	9	18
max **45**																		max **9**	max **18**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to $0.9 \cdot F_{r2max}$.
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3)]

size **4500**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]	
											
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315		
355,000	1000	56	56	56	56	56	56	56	56	8.5	22.4
	710	56	56	56	56	56	56	56	56	11.2	22.4
450,000	1000	56	56	56	53	56	56	56	56	6.3	22.4
	710	56	56	56	56	56	56	56	56	11.2	22.4
560,000	1000	56	56	42.5	37.5	56	56	56	56	4.5	22.4
	710	56	56	56	56	56	56	56	56	10	22.4
710,000	1000	56	50	25	22.4	33.5	56	53	56	2.8	22.4
	710	56	56	56	56	56	56	56	56	8.5	22.4
900,000	1000	56	–	–	–	–	53	47.5	53	2.24	22.4
	710	56	56	56	56	56	56	53	56	7.1	22.4
	500	56	56	56	56	56	56	56	56	11.2	22.4
1,120,000	710	56	56	53	50	56	53	50	53	5.6	22.4
	500	56	56	56	56	56	56	53	56	10	22.4
1,400,000	710	56	56	40	37.5	53	47.5	45	47.5	4.5	22.4
	500	56	56	56	56	56	50	50	53	8.5	22.4
1,800,000	710	53	50	28	25	35.5	45	40	45	3	22.4
	500	53	56	56	56	53	47.5	45	47.5	7.5	21.2
2,240,000	710	50	33.5	17	15	23.6	40	37.5	40	1.9	21.2
	500	50	56	56	56	50	45	42.5	45	6.3	20
2,800,000	500	47.5	53	50	45	45	40	37.5	40	5.3	19
	355	47.5	53	53	50	47.5	42.5	40	42.5	8	18
3,550,000	500	42.5	50	37.5	35.5	42.5	37.5	35.5	37.5	4	18
	355	45	47.5	50	47.5	42.5	37.5	37.5	40	7.1	17
4,500,000	500	40	47.5	30	26.5	37.5	33.5	31.5	33.5	3.15	17
	355	40	45	47.5	45	40	35.5	33.5	35.5	6	16
		max **56**								max **11**	max **22**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]	
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315		
355.000	1180	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	11.2	22.4
450.000	1180	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	11.2	22.4
560.000	1180	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	11.2	22.4
710.000	1180	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	11.2	22.4
900.000	1180	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	11.2	22.4
1.120.000	850	56	56	56	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	11.2	22.4
1.400.000	850	56	56	56	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	11.2	22.4
1.800.000	850	56	56	56	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	11.2	22.4
2.240.000	850	56	56	56	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	11.2	22.4
2.800.000	600	56	56	56	56	56	56	56	56	11.2	22.4
	425	56	56	56	56	56	56	56	56	11.2	22.4
3.550.000	600	56	56	56	56	56	56	53	56	11.2	22.4
	425	56	56	56	56	56	56	56	56	11.2	22.4
4.500.000	600	56	56	56	56	56	53	50	53	11.2	22.4
	425	56	56	56	56	56	53	53	56	11.2	22.4
		max **56**								max **11**	max **22**

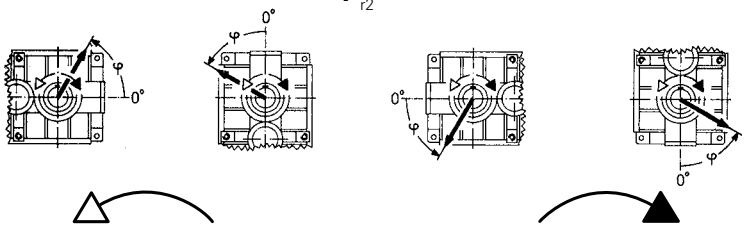
size **4501**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3)]

size **4500**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]									
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	1000	56	56	56	56	56	56	56	56	31.5	23.6	26.5	40	56	56	56	56	8.5	22.4
	710	56	56	56	56	56	56	56	56	50	42.5	45	56	56	56	56	56	11.2	22.4
450,000	1000	56	56	56	56	56	56	50	56	25	18	20	31.5	56	56	56	50	6.3	22.4
	710	56	56	56	56	56	56	56	56	45	35.5	37.5	50	56	56	56	56	11.2	22.4
560,000	1000	56	56	56	56	56	53	45	50	19	12.5	14	25	56	56	56	42.5	4.5	22.4
	710	56	56	56	56	56	56	56	56	37.5	31.5	33.5	45	56	56	56	56	10	22.4
710,000	1000	56	56	56	56	56	47.5	40	45	11.8	–	–	17	50	56	56	33.5	2.8	22.4
	710	56	56	56	56	56	56	50	53	33.5	26.5	28	37.5	56	56	56	50	8.5	22.4
900,000	1000	56	56	56	40	50	42.5	35.5	40	–	–	–	–	37.5	56	56	19	2.24	22.4
	710	56	56	56	56	56	50	45	47.5	28	21.2	22.4	33.5	53	56	56	45	7.1	22.4
	500	56	56	56	56	56	56	50	53	40	33.5	35.5	45	56	56	56	53	11.2	22.4
1,120,000	710	56	56	56	56	56	47.5	40	42.5	22.4	17	18	28	50	56	56	40	5.6	22.4
	500	56	56	56	56	56	53	47.5	50	35.5	31.5	31.5	40	56	56	56	50	10	22.4
1,400,000	710	50	56	56	56	56	42.5	35.5	40	18	12.5	14	22.4	45	56	56	33.5	4.5	22.4
	500	53	56	56	56	56	47.5	42.5	45	31.5	26.5	28	35.5	50	56	56	45	8.5	22.4
1,800,000	710	47.5	56	56	53	53	37.5	31.5	35.5	12.5	–	9.5	17	40	56	53	30	3	22.4
	500	50	56	56	56	53	42.5	37.5	40	28	22.4	23.6	31.5	47.5	56	53	40	7.5	21.2
2,240,000	710	42.5	56	47.5	42.5	47.5	33.5	30	31.5	–	–	–	11.8	33.5	56	50	23.6	1.9	21.2
	500	47.5	56	56	56	50	40	35.5	37.5	23.6	19	20	28	42.5	53	50	35.5	6.3	20
2,800,000	500	42.5	56	56	56	47.5	35.5	31.5	33.5	20	16	17	23.6	37.5	50	47.5	31.5	5.3	19
	355	45	53	56	56	47.5	40	35.5	37.5	30	25	26.5	31.5	42.5	50	47.5	37.5	8	18
3,550,000	500	40	53	56	56	42.5	33.5	30	31.5	17	12.5	13.2	20	35.5	47.5	45	28	4	18
	355	40	50	56	53	45	35.5	33.5	35.5	25	21.2	22.4	30	37.5	47.5	45	33.5	7.1	17
4,500,000	500	35.5	47.5	50	45	40	30	26.5	28	12.5	9	10	17	31.5	45	40	25	3.15	17
	355	37.5	47.5	53	50	40	33.5	30	31.5	22.4	18	19	25	35.5	42.5	40	31.5	6	16
		max **56**																max **11**	max **22**

size **4501**

355,000	1180	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
450,000	1180	56	56	56	56	56	56	56	56	56	53	56	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
560,000	1180	56	56	56	56	56	56	56	56	56	45	47.5	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
710,000	1180	56	56	56	56	56	56	56	56	47.5	35.5	40	56	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
900,000	1180	56	56	56	56	56	56	56	56	40	30	31.5	47.5	56	56	56	56	11.2	22.4
	850	56	56	56	56	56	56	56	56	56	47.5	50	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
1,120,000	850	56	56	56	56	56	56	56	56	53	42.5	45	56	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	56	11.2	22.4
1,400,000	850	56	56	56	56	56	56	56	56	45	35.5	37.5	53	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	56	50	53	56	56	56	56	56	11.2	22.4
1,800,000	850	56	56	56	56	56	56	53	56	37.5	30	31.5	45	56	56	56	56	11.2	22.4
	600	56	56	56	56	56	56	56	56	53	45	47.5	56	56	56	56	56	11.2	22.4
2,240,000	850	56	56	56	56	56	56	47.5	53	33.5	25	26.5	40	56	56	56	53	10.6	22.4
	600	56	56	56	56	56	56	56	56	47.5	40	42.5	53	56	56	56	56	11.2	22.4
2,800,000	600	56	56	56	56	56	56	50	53	42.5	35.5	35.5	47.5	56	56	56	56	11.2	22.4
	425	56	56	56	56	56	56	56	56	50	45	47.5	56	56	56	56	56	11.2	22.4
3,550,000	600	56	56	56	56	56	53	47.5	50	35.5	30	31.5	42.5	56	56	56	53	11.2	22.4
	425	56	56	56	56	56	56	53	53	45	40	42.5	50	56	56	56	56	11.2	22.4
4,500,000	600	56	56	56	56	56	47.5	42.5	45	31.5	25	28	37.5	56	56	56	47.5	10.6	22.4
	425	56	56	56	56	56	50	47.5	50	40	35.5	37.5	45	56	56	56	53	11.2	22.4
		max **56**																max **11**	max **22**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

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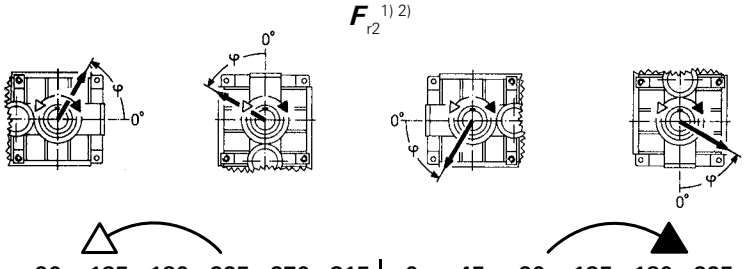
2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3]

size **5000**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]									
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	1400	71	71	71	71	71	71	71	71	56	47.5	53	67	71	71	71	71	9.5	28
	1000	71	71	71	71	71	71	71	71	71	67	71	71	71	71	71	71	14	28
450,000	1400	71	71	63	60	71	71	71	71	47.5	40	45	60	71	71	71	63	7.1	28
	1000	71	71	71	71	71	71	71	71	63	60	63	71	71	71	71	71	14	28
560,000	1400	71	71	42.5	40	60	71	71	71	40	33.5	37.5	53	71	71	71	56	4.75	28
	1000	71	71	71	71	71	71	71	71	60	53	56	67	71	71	71	71	12.5	28
710,000	1400	71	47.5	20	18	31.5	71	71	71	33.5	28	31.5	45	67	71	71	50	3.35	28
	1000	71	71	71	71	71	71	71	71	53	47.5	50	60	71	71	71	63	10.6	28
900,000	1400	–	–	–	–	–	–	–	–	22.4	18	20	33.5	56	71	63	37.5	3.75	28
	1000	71	71	71	71	71	71	71	71	45	40	42.5	53	71	71	71	60	8.5	28
	710	71	71	71	71	71	71	71	71	56	53	56	63	71	71	71	67	14	28
1,120,000	1000	71	71	67	63	71	67	63	71	40	33.5	37.5	47.5	63	71	67	53	6.7	28
	710	71	71	71	71	71	71	71	71	53	47.5	50	60	67	71	71	60	11.8	28
1,400,000	1000	71	71	50	45	63	63	60	63	33.5	30	31.5	42.5	60	67	63	47.5	5.3	28
	710	71	71	71	71	71	67	63	67	47.5	42.5	45	53	63	71	67	56	10.6	28
1,800,000	1000	67	60	31.5	30	45	56	53	60	28	23.6	26.5	35.5	53	63	56	40	3.35	28
	710	71	71	71	71	67	60	60	63	40	35.5	40	47.5	60	63	60	50	8.5	26.5
2,240,000	1000	63	37.5	17	15	25	53	50	53	23.6	20	22.4	31.5	47.5	56	53	35.5	2.12	26.5
	710	63	71	71	67	63	56	53	56	35.5	31.5	35.5	42.5	53	60	56	45	7.5	25
2,800,000	710	60	67	60	56	60	53	50	53	31.5	28	31.5	37.5	50	56	53	40	6	23.6
	500	60	67	67	63	60	53	53	56	40	37.5	40	45	53	56	53	47.5	10	22.4
3,550,000	710	56	63	45	42.5	53	47.5	45	47.5	28	23.6	26.5	33.5	45	50	47.5	35.5	4.75	22.4
	500	56	63	63	60	56	50	47.5	50	35.5	33.5	35.5	40	47.5	53	50	42.5	8.5	20
4,500,000	710	53	56	33.5	30	45	45	42.5	45	23.6	20	22.4	30	40	47.5	42.5	31.5	3.35	20
	500	53	56	60	56	50	47.5	45	47.5	33.5	30	31.5	37.5	45	50	47.5	40	7.5	19
max **71**																		max **14**	max **28**

size **5001**

355,000	1700	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	14	28
	1180	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	14	28
450,000	1700	71	71	71	71	71	71	71	71	67	60	63	71	71	71	71	71	14	28
	1180	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	14	28
560,000	1700	71	71	71	71	71	71	71	71	60	50	56	71	71	71	71	71	11.8	28
	1180	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	14	28
710,000	1700	71	71	63	60	71	71	71	71	50	42.5	47.5	63	71	71	71	71	9	28
	1180	71	71	71	71	71	71	71	71	71	63	67	71	71	71	71	71	14	28
900,000	1700	71	71	37.5	33.5	56	71	71	71	42.5	35.5	37.5	56	71	71	71	63	6.3	28
	1180	71	71	71	71	71	71	71	71	63	56	60	71	71	71	71	71	14	28
	850	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	14	28
1,120,000	1180	71	71	71	71	71	71	71	71	56	50	53	67	71	71	71	71	13.2	28
	850	71	71	71	71	71	71	71	71	67	63	67	71	71	71	71	71	14	28
1,400,000	1180	71	71	71	71	71	71	71	71	50	42.5	47.5	60	71	71	71	67	11.2	28
	850	71	71	71	71	71	71	71	71	63	56	60	71	71	71	71	71	14	28
1,800,000	1180	71	71	67	63	71	71	67	71	42.5	35.5	40	53	71	71	71	60	8.5	28
	850	71	71	71	71	71	71	71	71	56	50	53	63	71	71	71	67	14	28
2,240,000	1180	71	71	50	47.5	71	63	60	67	37.5	31.5	33.5	47.5	67	71	71	53	6.7	28
	850	71	71	71	71	71	71	67	71	50	45	47.5	56	71	71	71	63	12.5	28
2,800,000	850	71	71	71	71	71	63	60	63	45	40	42.5	50	63	71	67	56	10.6	28
	600	71	71	71	71	71	67	63	67	53	50	53	60	67	71	71	63	14	28
3,550,000	850	67	71	71	71	67	60	56	60	40	33.5	35.5	45	60	67	63	50	9	28
	600	67	71	71	71	67	63	60	63	47.5	45	47.5	53	63	67	63	56	13.2	26.5
4,500,000	850	63	71	60	56	63	53	50	53	33.5	30	31.5	40	53	63	60	45	7.5	26.5
	600	63	71	71	71	63	56	56	56	42.5	40	42.5	47.5	60	63	60	53	11.8	25
max **71**																		max **14**	max **28**

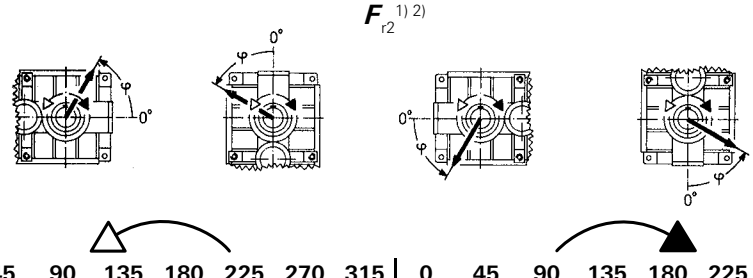
1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to $0.9 \cdot F_{r2max}$.
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3]

size **5000**

$n_2 \cdot L_h$	T_2	F_{r2} [1] [2]								F_{a2} [1]							
																	
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315
355,000	1400	71	71	71	71	71	71	71	71	37.5	28	30	47.5	71	71	71	71
	1000	71	71	71	71	71	71	71	71	63	53	56	71	71	71	71	71
450,000	1400	71	71	71	71	71	71	63	67	28	20	21.2	37.5	71	71	71	60
	1000	71	71	71	71	71	71	71	71	56	45	47.5	63	71	71	71	71
560,000	1400	71	71	71	71	71	67	56	60	20	12.5	14	28	71	71	71	50
	1000	71	71	71	71	71	71	67	71	47.5	37.5	40	56	71	71	71	71
710,000	1400	71	71	71	71	71	60	50	53	–	–	–	16	60	71	71	37.5
	1000	71	71	71	71	71	71	63	67	40	31.5	33.5	47.5	71	71	71	63
900,000	1400	67	71	63	56	71	53	42.5	47.5	–	–	–	–	–	–	–	–
	1000	71	71	71	71	71	63	56	60	33.5	26.5	28	40	71	71	71	56
	710	71	71	71	71	71	71	63	67	50	42.5	45	56	71	71	71	67
1,120,000	1000	71	71	71	71	71	60	50	53	28	20	21.2	33.5	63	71	71	50
	710	71	71	71	71	71	63	60	63	45	37.5	37.5	50	71	71	71	63
1,400,000	1000	63	71	71	71	71	53	45	47.5	21.2	15	16	28	56	71	71	45
	710	67	71	71	71	71	60	53	56	40	31.5	33.5	45	63	71	71	56
1,800,000	1000	60	71	71	71	67	47.5	40	42.5	14	–	–	20	50	71	67	35.5
	710	63	71	71	71	67	53	47.5	50	33.5	26.5	28	37.5	60	71	71	50
2,240,000	1000	53	71	67	60	63	42.5	35.5	37.5	–	–	–	12.5	42.5	71	63	30
	710	60	71	71	71	63	50	45	47.5	30	22.4	23.6	33.5	53	71	63	45
2,800,000	710	53	71	71	71	60	45	40	42.5	23.6	18	19	30	50	63	60	40
	500	56	67	71	71	60	50	45	47.5	35.5	31.5	31.5	40	53	63	63	47.5
3,550,000	710	50	67	71	71	56	40	35.5	37.5	19	14	15	23.6	45	60	56	35.5
	500	53	63	71	67	56	45	42.5	45	31.5	26.5	28	35.5	50	60	56	45
4,500,000	710	45	63	67	63	50	35.5	31.5	33.5	14	–	–	19	40	56	53	31.5
	500	47.5	60	67	63	53	42.5	37.5	40	28	22.4	23.6	31.5	45	56	53	40
max **71**																	

size **5001**

355,000	1700	71	71	71	71	71	71	71	71	60	45	47.5	71	71	71	71	71
	1180	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71	71
450,000	1700	71	71	71	71	71	71	71	71	47.5	35.5	37.5	60	71	71	71	71
	1180	71	71	71	71	71	71	71	71	71	63	67	71	71	71	71	71
560,000	1700	71	71	71	71	71	71	71	71	37.5	26.5	30	47.5	71	71	71	71
	1180	71	71	71	71	71	71	71	71	67	56	60	71	71	71	71	71
710,000	1700	71	71	71	71	71	71	60	67	28	19	20	35.5	71	71	71	67
	1180	71	71	71	71	71	71	71	71	60	47.5	50	67	71	71	71	71
900,000	1700	71	71	71	71	71	67	53	60	18	10.6	11.8	23.6	71	71	71	53
	1180	71	71	71	71	71	71	67	71	50	40	42.5	60	71	71	71	71
	850	71	71	71	71	71	71	71	71	67	60	60	71	71	71	71	71
1,120,000	1180	71	71	71	71	71	71	63	67	42.5	33.5	35.5	50	71	71	71	71
	850	71	71	71	71	71	71	71	71	60	50	53	67	71	71	71	71
1,400,000	1180	71	71	71	71	71	67	56	60	35.5	26.5	28	42.5	71	71	71	63
	850	71	71	71	71	71	71	67	71	53	45	47.5	60	71	71	71	71
1,800,000	1180	71	71	71	71	71	60	50	53	28	20	21.2	35.5	67	71	71	56
	850	71	71	71	71	71	67	60	63	47.5	37.5	40	53	71	71	71	67
2,240,000	1180	63	71	71	71	71	53	45	47.5	21.2	14	16	28	63	71	71	47.5
	850	71	71	71	71	71	63	53	56	40	33.5	33.5	47.5	71	71	71	63
2,800,000	850	67	71	71	71	71	56	47.5	50	35.5	28	30	40	63	71	71	56
	600	67	71	71	71	71	63	56	60	47.5	40	42.5	53	71	71	71	63
3,550,000	850	60	71	71	71	67	50	42.5	47.5	30	22.4	23.6	35.5	60	71	71	50
	600	63	71	71	71	71	56	50	53	42.5	35.5	37.5	47.5	67	71	71	60
4,500,000	850	56	71	71	71	63	45	37.5	42.5	23.6	18	19	31.5	53	71	71	45
	600	60	71	71	71	63	53	47.5	47.5	37.5	31.5	33.5	42.5	60	71	67	53
max **71**																	

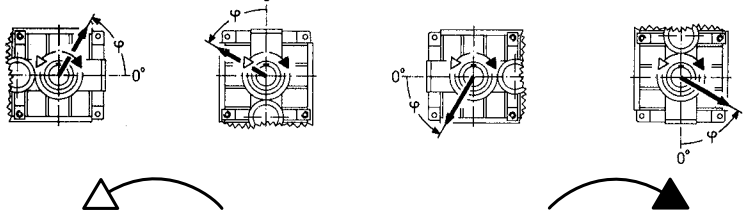
max **14**	max **28**
max **14**	max **28**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.9 · F_{r2max}.
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3)]

size **5600**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]	
											
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	2000	90	90	90	90	90	90	90	90	63	53	60	80	90	90	90	85	10.6	35.5
	1400	90	90	90	90	90	90	90	90	85	80	85	90	90	90	90	90	18	35.5
450,000	2000	90	90	80	75	90	90	90	90	53	45	50	67	90	90	90	75	8	35.5
	1400	90	90	90	90	90	90	90	90	75	67	71	90	90	90	90	90	17	35.5
560,000	2000	90	90	56	50	75	90	90	90	45	35.5	40	60	90	90	90	67	5.3	35.5
	1400	90	90	90	90	90	90	90	90	67	60	63	80	90	90	90	85	14	35.5
710,000	2000	90	45	18	16	26.5	90	85	90	31.5	25	30	45	80	90	85	56	3.75	35.5
	1400	90	90	90	90	90	90	90	90	60	53	56	71	90	90	90	75	11.8	35.5
900,000	2000	–	–	–	–	–	–	–	–	19	14	17	31.5	63	85	75	40	–	35.5
	1400	90	90	90	90	90	90	85	90	50	45	47.5	63	85	90	90	67	9.5	35.5
	1000	90	90	90	90	90	90	90	90	67	63	63	75	90	90	90	80	16	35.5
1,120,000	1400	90	90	75	71	90	80	75	85	45	37.5	40	56	75	90	85	63	7.5	35.5
	1000	90	90	90	90	90	85	85	85	63	56	60	71	85	90	90	75	14	35.5
1,400,000	1400	90	90	56	53	75	75	71	75	37.5	31.5	33.5	47.5	71	85	75	53	5.3	35.5
	1000	90	90	90	90	90	80	75	80	56	50	53	63	80	85	80	67	11.8	33.5
1,800,000	1400	85	67	35.5	31.5	47.5	67	63	71	30	25	28	40	63	75	71	47.5	3.35	33.5
	1000	85	90	90	90	85	75	71	75	47.5	42.5	45	56	71	80	75	60	10	31.5
2,240,000	1400	75	25	–	–	14	63	60	63	22.4	17	20	31.5	56	71	60	37.5	–	31.5
	1000	80	90	90	85	75	67	63	71	42.5	37.5	40	50	63	75	71	56	8.5	30
2,800,000	1000	75	85	71	67	71	63	60	63	37.5	31.5	35.5	45	60	71	63	50	7.1	28
	710	75	80	85	80	71	67	63	67	47.5	45	47.5	53	63	71	67	56	11.2	26.5
3,550,000	1000	67	80	56	53	67	56	56	60	31.5	26.5	30	40	56	63	60	45	5.3	26.5
	710	67	75	80	75	67	60	60	63	42.5	37.5	40	50	60	63	63	53	10	25
4,500,000	1000	63	71	40	37.5	53	53	50	53	26.5	22.4	25	33.5	50	60	53	37.5	3.75	25
	710	63	71	75	71	63	56	53	56	37.5	33.5	35.5	45	53	60	56	47.5	8.5	23.6
		max **90**																max **18**	max **36**

size **5601**

355,000	2360	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
450,000	2360	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
560,000	2360	90	90	90	90	90	90	90	90	90	75	80	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
710,000	2360	90	90	90	90	90	90	90	90	80	67	71	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
900,000	2360	90	90	90	90	90	90	90	90	67	53	60	80	90	90	90	90	14	35.5
	1700	90	90	90	90	90	90	90	90	90	80	85	90	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
1,120,000	1700	90	90	90	90	90	90	90	90	85	71	75	90	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
1,400,000	1700	90	90	90	90	90	90	90	90	75	63	67	85	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	90	85	85	90	90	90	90	90	18	35.5
1,800,000	1700	90	90	90	90	90	90	90	90	63	53	56	75	90	90	90	90	15	35.5
	1180	90	90	90	90	90	90	90	90	80	75	75	90	90	90	90	90	18	35.5
2,240,000	1700	90	90	90	90	90	90	85	90	56	45	47.5	67	90	90	90	80	12.5	35.5
	1180	90	90	90	90	90	90	90	90	75	67	67	80	90	90	90	90	18	35.5
2,800,000	1180	90	90	90	90	90	90	85	90	67	60	63	75	90	90	90	85	18	35.5
	850	90	90	90	90	90	90	90	90	80	71	75	85	90	90	90	90	18	35.5
3,550,000	1180	90	90	90	90	90	85	75	80	60	50	53	67	85	90	90	75	15	35.5
	850	90	90	90	90	90	90	85	85	71	63	67	75	90	90	90	85	18	35.5
4,500,000	1180	85	90	90	90	90	75	71	75	53	45	47.5	60	80	90	90	71	13.2	35.5
	850	90	90	90	90	90	80	75	80	63	56	60	71	85	90	90	75	18	35,5
		max **90**																max **18**	max **36**

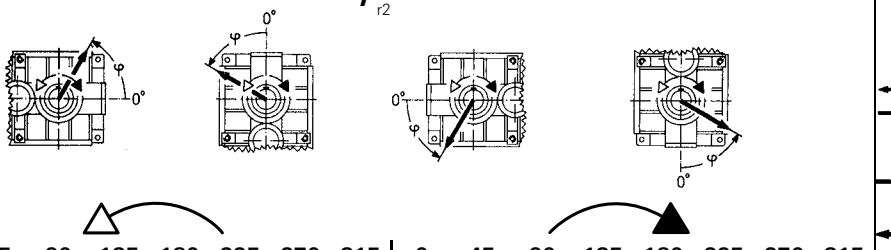
1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3]

size **5600**

$n_2 \cdot L_h$	T_2	F_{r2} [1] [2]																F_{a2} [1]	
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	2000	90	90	90	90	90	90	90	90	47.5	33.5	35.5	60	90	90	90	85	10.6	35.5
	1400	90	90	90	90	90	90	90	90	75	63	67	85	90	90	90	90	18	35.5
450,000	2000	90	90	90	90	90	90	80	85	35.5	25	26.5	45	90	90	90	71	8	35.5
	1400	90	90	90	90	90	90	90	90	67	53	56	75	90	90	90	90	17	35.5
560,000	2000	90	90	90	90	90	85	71	80	25	16	18	33.5	85	90	90	60	5.3	35.5
	1400	90	90	90	90	90	90	85	90	56	47.5	50	67	90	90	90	85	14	35.5
710,000	2000	90	90	90	75	90	75	63	71	–	–	–	15	71	90	90	40	3.75	35.5
	1400	90	90	90	90	90	85	75	85	47.5	37.5	40	60	90	90	90	75	11.8	35.5
900,000	2000	85	90	50	42.5	56	67	56	63	–	–	–	–	–	–	–	–	–	35.5
	1400	90	90	90	90	90	80	71	75	40	30	31.5	50	85	90	90	67	9.5	35.5
	1000	90	90	90	90	90	90	80	85	63	53	56	71	90	90	90	85	16	35.5
1,120,000	1400	85	90	90	90	90	71	63	67	31.5	23.6	25	40	75	90	90	60	7.5	35.5
	1000	90	90	90	90	90	80	75	75	56	45	47.5	63	85	90	90	75	14	35.5
1,400,000	1400	80	90	90	90	90	67	56	63	25	17	19	31.5	67	90	90	50	5.3	35.5
	1000	85	90	90	90	90	75	67	71	47.5	40	42.5	56	80	90	90	67	11.8	33.5
1,800,000	1400	71	90	85	75	80	60	50	53	16	–	–	22.4	60	90	80	40	3.35	33.5
	1000	80	90	90	90	85	67	60	63	40	33.5	35.5	47.5	71	90	85	60	10	31.5
2,240,000	1400	67	90	60	53	67	53	45	47.5	–	–	–	–	47.5	85	71	26.5	–	31.5
	1000	71	90	90	90	80	63	56	60	35.5	28	30	42.5	63	85	80	56	8.5	30
2,800,000	1000	67	85	90	90	71	56	50	53	30	22.4	23.6	35.5	60	80	71	47.5	7.1	28
	710	71	85	90	85	75	63	56	60	45	37.5	37.5	50	63	75	75	60	11.2	26.5
3,550,000	1000	63	80	90	85	67	50	50	47.5	23.6	17	19	30	53	71	67	42.5	5.3	26.5
	710	63	80	85	85	71	56	53	53	37.5	31.5	33.5	45	60	71	67	53	10	25
4,500,000	1000	56	75	75	67	63	47.5	40	42.5	18	–	–	23.6	47.5	67	63	35.5	3.75	25
	710	60	75	80	75	63	53	47.5	50	33.5	28	30	37.5	56	67	63	47.5	8.5	23.6
max **90**																		max **18**	max **36**

size **5601**

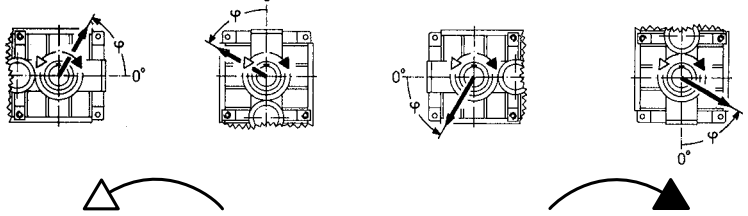
355,000	2360	90	90	90	90	90	90	90	90	90	80	85	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
450,000	2360	90	90	90	90	90	90	90	90	85	67	71	90	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
560,000	2360	90	90	90	90	90	90	90	90	75	56	60	85	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
710,000	2360	90	90	90	90	90	90	90	90	60	42.5	45	71	90	90	90	90	18	35.5
	1700	90	90	90	90	90	90	90	90	90	75	80	90	90	90	90	90	18	35.5
900,000	2360	90	90	90	90	90	90	85	90	47.5	31.5	33.5	56	90	90	90	90	11.8	35.5
	1700	90	90	90	90	90	90	90	90	80	63	67	90	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	18	35.5
1,120,000	1700	90	90	90	90	90	90	90	90	71	56	60	80	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	90	80	85	90	90	90	90	90	18	35.5
1,400,000	1700	90	90	90	90	90	90	85	90	60	47.5	50	71	90	90	90	90	18	35.5
	1180	90	90	90	90	90	90	90	90	85	71	75	90	90	90	90	90	18	35.5
1,800,000	1700	90	90	90	90	90	90	75	80	50	37.5	37.5	60	90	90	90	85	13.2	35.5
	1180	90	90	90	90	90	90	90	90	75	63	63	80	90	90	90	90	18	35.5
2,240,000	1700	90	90	90	90	90	80	67	71	40	30	31.5	50	90	90	90	75	10.6	35.5
	1180	90	90	90	90	90	90	80	85	67	56	56	75	90	90	90	90	18	35.5
2,800,000	1180	90	90	90	90	90	85	75	75	60	47.5	50	67	90	90	90	85	17	35.5
	850	90	90	90	90	90	90	80	85	75	63	67	80	90	90	90	90	18	35.5
3,550,000	1180	85	90	90	90	90	75	67	71	50	40	42.5	56	85	90	90	75	14	35.5
	850	90	90	90	90	90	85	75	80	67	56	60	71	90	90	90	85	18	35.5
4,500,000	1180	80	90	90	90	90	67	60	63	42.5	33.5	35.5	50	80	90	90	71	11.8	35.5
	850	85	90	90	90	90	75	67	71	60	50	50	63	85	90	90	80	18	33.5
max **90**																		max **18**	max **36**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to $0.71 \cdot F_{r2max}$
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3)]

size **6300**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]																F_{a2} [1)]	
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	2800	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
450,000	2800	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
560,000	2800	90	90	85	80	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
710,000	2800	90	90	75	67	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
900,000	2800	90	85	60	56	67	90	90	90	90	75	85	90	90	90	90	90	35.5	14
	2000	90	90	85	80	90	67	90	90	90	90	90	90	90	90	90	90	35.5	18
	1400	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,120,000	2000	90	90	80	71	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1400	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,400,000	2000	90	85	67	63	71	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1400	90	90	85	80	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,800,000	2000	90	75	60	56	63	85	90	90	90	90	90	90	90	90	90	90	35.5	16
	1400	90	90	75	71	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
2,240,000	2000	90	67	53	47.5	56	75	90	90	90	75	80	90	90	90	85	90	35.5	12.5
	1400	90	80	67	63	71	85	90	90	90	90	90	90	90	90	90	90	35.5	18
2,800,000	1400	90	75	63	60	63	80	90	90	90	90	90	90	90	90	85	90	35.5	18
	1000	90	85	75	71	75	85	90	90	90	90	90	90	90	90	90	90	35.5	18
3,550,000	1400	85	67	53	50	56	71	90	90	90	90	90	90	90	85	80	80	35.5	16
	1000	90	75	67	63	67	80	90	90	90	90	90	90	90	85	85	85	35.5	18
4,500,000	1400	75	60	47.5	45	50	63	80	90	85	80	90	90	90	75	71	75	35.5	13.2
	1000	80	71	60	56	63	71	85	90	85	90	90	90	90	80	75	80	35.5	18
max **90**																		max **36**	max **18**

size **6301**

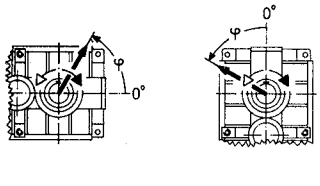
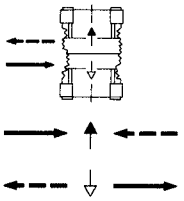
355,000	3550	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2500	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
450,000	3550	90	90	80	80	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2500	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
560,000	3550	90	90	71	63	80	90	90	90	90	80	80	90	90	90	90	90	35.5	16
	2500	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
710,000	3550	90	80	56	50	63	90	90	90	71	45	50	90	90	90	90	90	35.5	10
	2500	90	90	80	80	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
900,000	3550	90	71	45	40	50	80	90	90	25	16	16	45	90	90	90	90	35.5	6.3
	2500	90	90	80	71	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1800	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,120,000	2500	90	80	63	63	71	90	90	90	90	90	90	90	90	90	90	90	35.5	16
	1800	90	90	80	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,400,000	2500	90	80	56	56	63	80	90	90	90	80	80	90	90	90	90	90	35.5	14
	1800	90	90	80	80	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,800,000	2500	90	71	50	45	56	80	90	90	80	56	56	90	90	90	90	90	35.5	10
	1800	90	80	71	63	71	90	90	90	90	90	90	90	90	90	90	90	35.5	18
2,240,000	2500	90	56	40	35.5	45	71	90	90	50	31.5	35.5	80	90	90	80	80	35.5	8
	1800	90	80	56	56	63	80	90	90	90	90	90	90	90	90	90	90	35.5	16
2,800,000	1800	90	71	56	50	56	80	90	90	90	90	90	90	90	90	80	80	35.5	14
	1250	90	80	71	71	71	80	90	90	90	90	90	90	90	90	90	90	35.5	18
3,550,000	1800	80	56	50	45	50	71	80	90	90	71	80	90	90	80	80	80	35.5	12.5
	1250	80	71	63	56	63	80	90	90	90	90	90	90	90	80	80	80	35.5	18
4,500,000	1800	80	56	40	35.5	45	56	80	90	80	56	56	90	90	80	71	71	35.5	9
	1250	80	71	56	56	56	71	80	90	80	90	90	90	90	80	80	80	35.5	16
max **90**																		max **35.5**	max **18**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3)]

size **6300**

$n_2 \cdot L_h$	T_2	F_{r2} [1) 2)]								F_{a2} [1)]									
																			
rpm h	10^3 lbf in	0	45	90	135	180	225	270	315	0	45	90	135	180	225	270	315		
355,000	2800	90	90	80	80	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
450,000	2800	90	90	67	63	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
560,000	2800	90	80	53	50	67	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2000	90	90	90	85	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
710,000	2800	90	67	42.5	37.5	53	90	90	90	90	90	90	90	90	90	90	90	35.5	16
	2000	90	90	75	71	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
900,000	2800	90	53	30	28	40	90	90	90	90	90	90	90	90	90	80	90	35.5	11.2
	2000	90	90	63	63	75	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1400	90	90	90	85	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,120,000	2000	90	80	56	53	67	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1400	90	90	80	75	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,400,000	2000	90	67	47.5	42.5	56	90	90	90	90	90	90	90	90	90	80	90	35.5	17
	1400	90	90	71	67	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,800,000	2000	90	56	35.5	33.5	45	80	90	90	90	90	90	90	90	80	71	85	35.5	13.2
	1400	90	80	60	60	71	90	90	90	90	90	90	90	90	90	85	90	35.5	18
2,240,000	2000	90	47.5	30	26.5	37.5	71	90	90	90	90	90	90	90	71	63	75	35.5	10.6
	1400	90	71	53	50	63	90	90	90	90	90	90	90	90	80	75	85	35.5	18
2,800,000	1400	90	63	45	42.5	53	80	90	90	90	90	90	90	90	75	71	80	35.5	17
	1000	90	75	63	60	71	90	90	90	90	90	90	90	90	85	80	85	35.5	18
3,550,000	1400	85	53	37.5	35.5	47.5	71	90	90	90	90	90	90	85	67	63	71	35.5	14
	1000	90	71	56	53	63	80	90	90	90	90	90	90	90	75	71	80	35.5	18
4,500,000	1400	75	47.5	31.5	30	37.5	63	90	90	85	90	90	90	80	63	56	67	35.5	11.8
	1000	85	63	50	47.5	56	75	90	90	90	90	90	90	85	71	67	71	35.5	18
max **90**																		max **36**	max **18**

size **6301**

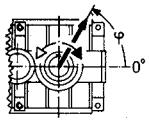
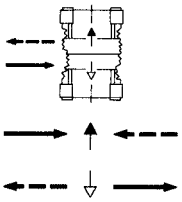
355,000	3350	90	90	56	53	71	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	2360	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
450,000	3350	90	71	42.5	37.5	56	90	90	90	90	90	90	90	90	90	90	90	35.5	16
	2360	90	90	85	80	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
560,000	3350	90	56	30	28	40	90	90	90	90	90	90	90	90	90	90	90	35.5	11.8
	2360	90	90	71	67	85	90	90	90	90	90	90	90	90	90	90	90	35.5	18
710,000	3350	90	37.5	18	16	25	80	90	90	90	90	90	90	90	90	80	90	35.5	7.1
	2360	90	85	60	56	75	90	90	90	90	90	90	90	90	90	90	90	35.5	18
900,000	3350	90	16	–	–	9	56	90	90	90	90	90	90	90	75	71	85	35.5	3
	2360	90	75	50	45	63	90	90	90	90	90	90	90	90	90	90	90	35.5	18
	1700	90	90	75	75	90	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,120,000	2360	90	63	40	37.5	50	90	90	90	90	90	90	90	90	90	80	90	35.5	15
	1700	90	90	67	63	80	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,400,000	2360	90	50	31.5	28	40	80	90	90	90	90	90	90	90	80	75	85	35.5	11.8
	1700	90	80	60	56	71	90	90	90	90	90	90	90	90	90	90	90	35.5	18
1,800,000	2360	90	37.5	21.2	19	28	67	90	90	90	90	90	90	90	71	63	75	35.5	8
	1700	90	67	50	47.5	60	90	90	90	90	90	90	90	90	85	80	90	35.5	18
2,240,000	2360	80	26.5	12.5	11.8	18	56	90	90	90	90	90	90	90	63	56	67	35.5	5.3
	1700	90	60	42.5	40	50	80	90	90	90	90	90	90	90	75	71	80	35.5	16
2,800,000	1700	90	53	33.5	31.5	42.5	71	90	90	90	90	90	90	90	71	63	75	35.5	12.5
	1180	90	71	56	53	63	85	90	90	90	90	90	90	90	80	75	85	35.5	18
3,550,000	1700	80	42.5	28	25	33.5	63	90	90	90	90	90	90	80	63	56	67	35.5	10
	1180	90	63	47.5	47.5	56	80	90	90	90	90	90	90	90	71	67	75	35.5	18
4,500,000	1700	71	35.5	20	19	26.5	56	90	90	85	90	90	90	75	56	50	60	35.5	7.5
	1180	80	56	42.5	40	50	71	90	90	90	90	90	90	80	67	63	71	35.5	16
max **90**																		max **36**	max **18**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **opposite low speed wheel side**[3]

size **7101**

$n_2 \cdot L_h$	T_2	F_{r2} [1] [2]								F_{a2} [1]									
																			
min^{-1}·h	10^3 lbf in	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**		
355,000	5600	106	112	112	112	112	112	95	90	112	112	112	112	112	100	106	112	45	22.4
355,000	4000	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	45	22.4
450,000	5600	90	112	112	112	112	112	80	71	112	112	112	112	90	56	60	112	45	22.4
450,000	4000	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	112	45	22.4
560,000	5600	71	112	112	112	112	100	63	60	112	112	112	112	28	16	17	47.5	45	20
560,000	4000	112	112	112	112	112	112	106	100	112	112	112	112	112	112	112	112	45	22.4
710,000	5600	56	100	112	112	112	80	50	42.5	56	25	30	90	–	–	–	–	45	13.2
710,000	4000	100	112	112	112	112	112	95	85	112	112	112	112	112	112	112	112	45	22.4
900,000	5600	31.5	71	112	112	112	53	26.5	22.4	112	80	95	90	–	–	–	–	45	7.1
900,000	4000	85	112	112	112	112	106	80	75	112	112	112	112	112	100	106	112	45	22.4
900,000	2800	112	112	112	112	112	112	112	106	112	112	112	112	112	112	112	112	45	22.4
1,120,000	4000	75	106	112	112	112	95	67	63	112	112	112	112	100	67	75	112	45	22.4
1,120,000	2800	106	112	112	112	112	112	100	95	112	112	112	112	112	112	112	112	45	22.4
1,400,000	4000	63	95	112	112	112	80	56	50	112	112	112	112	63	37.5	40	90	45	19
1,400,000	2800	95	112	112	112	112	106	90	85	112	112	112	112	112	112	112	112	45	22.4
1,800,000	4000	50	80	112	112	112	67	45	37.5	112	112	106	112	10	5.3	6	18	45	13.2
1,800,000	2800	80	106	112	112	112	95	75	71	112	112	112	112	112	112	112	112	45	22.4
2,240,000	2800	71	95	112	112	112	90	67	63	112	112	112	112	112	100	106	112	45	22.4
2,240,000	2000	90	112	112	112	112	100	90	85	112	112	112	112	112	112	112	112	45	22.4
2,800,000	2800	63	85	112	112	106	75	60	53	112	106	100	106	106	75	80	112	42.5	21.2
2,800,000	2000	85	100	112	112	112	95	80	75	112	112	106	112	112	112	112	112	45	22.4
3,550,000	2800	53	75	106	112	95	67	47.5	45	112	100	90	95	75	50	56	100	40	18
3,550,000	2000	75	90	112	112	106	85	71	67	112	106	100	106	112	112	112	112	45	22.4
4,500,000	2800	45	67	95	106	90	60	40	35.5	106	90	85	90	45	28	31.5	67	35.5	13.2
4,500,000	2000	67	85	100	106	95	75	63	60	112	95	90	95	112	106	112	112	40	22.4
		max **112**																max **45**	max **22.4**

size **8001**

355,000	8000	140	140	140	140	140	140	140	140	140	118	132	140	140	140	140	140	26.5	56
355,000	5600	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	28	56
450,000	8000	140	140	95	90	140	140	140	140	118	95	106	140	140	140	140	140	17	56
450,000	5600	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	28	56
560,000	8000	140	106	42.5	37.5	67	140	140	140	100	80	90	132	140	140	140	140	8.5	56
560,000	5600	140	140	140	140	140	140	140	140	140	132	140	140	140	140	140	140	28	56
710,000	8000	25	140	–	–	–	71	14	12.5	80	60	71	112	140	140	140	132	–	3.15
710,000	5600	140	140	140	140	140	140	140	140	132	118	125	140	140	140	140	140	28	56
900,000	8000	140	140	–	–	–	112	90	75	50	37.5	45	80	140	140	140	100	–	15
900,000	5600	140	140	140	140	140	140	140	140	118	100	112	140	140	140	140	140	26.5	56
900,000	4000	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	140	28	56
1,120,000	5600	140	140	118	112	140	140	140	140	100	85	95	125	140	140	140	140	20	56
1,120,000	4000	140	140	140	140	140	140	140	140	132	125	132	140	140	140	140	140	28	56
1,400,000	5600	140	140	80	71	112	140	140	140	85	71	80	112	140	140	140	125	13.2	56
1,400,000	4000	140	140	140	140	140	140	140	140	125	112	118	140	140	140	140	140	28	56
1,800,000	5600	140	80	33.5	30	53	140	140	140	71	56	63	95	140	140	140	112	6.3	56
1,800,000	4000	140	140	140	140	140	140	140	140	106	95	100	125	140	140	140	140	28	56
2,240,000	4000	140	140	140	132	140	140	140	140	95	85	90	112	140	140	140	125	23.6	56
2,240,000	2800	140	140	140	140	140	140	140	140	118	112	118	132	140	140	140	140	28	56
2,800,000	4000	140	140	112	106	140	140	132	140	85	71	80	100	140	140	140	112	19	56
2,800,000	2800	140	140	140	140	140	140	140	140	112	100	106	125	140	140	140	132	28	56
3,550,000	4000	140	140	80	75	112	125	118	125	71	60	67	90	125	140	132	100	13.2	56
3,550,000	2800	140	140	140	140	140	132	132	132	100	90	95	112	132	140	140	118	28	56
4,500,000	4000	140	100	50	45	71	118	106	118	60	50	53	80	112	140	125	90	8.5	56
4,500,000	2800	140	140	140	140	140	125	118	125	90	80	85	100	125	140	132	106	26.5	56
		max **140**																max **28**	max **56**

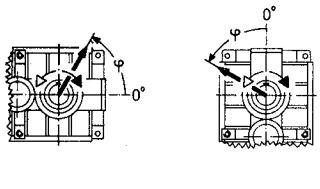
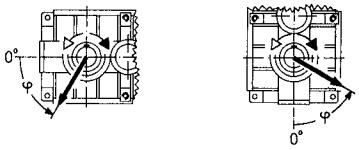
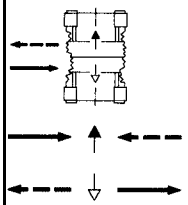
1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

2582-01.02

11.2 - Radial loads (OHL) F_{r2} [10^3 lbf] or axial loads F_{a2} [10^3 lbf] on low speed shaft end

Radial load on **low speed wheel side**[3]

size **7101**

$n_2 \cdot L_h$	T_2	F_{r2} [1] [2]																F_{a2} [1]	
																			
min^{-1}·h	10^3 lbf in	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**	**0**	**45**	**90**	**135**	**180**	**225**	**270**	**315**		
355,000	5600	56	112	112	112	112	75	40	37.5	112	112	112	112	112	112	112	112	45	18
355,000	4000	112	112	112	112	112	112	100	95	112	112	112	112	112	112	112	112	45	22.4
450,000	5600	33.5	112	112	112	112	47.5	22.4	20	112	112	112	112	112	112	112	112	45	10.6
450,000	4000	100	112	112	112	112	112	85	80	112	112	112	112	112	112	112	112	45	22.4
560,000	5600	10.6	80	112	112	112	18	6.3	6	112	112	100	112	112	112	112	112	45	3.75
560,000	4000	90	112	112	112	112	100	71	63	112	112	112	112	112	112	112	112	45	22.4
710,000	5600	–	33.5	10.6	9.5	21.2	–	–	–	112	95	90	112	112	112	112	112	6	–
710,000	4000	71	112	112	112	112	85	53	50	112	112	112	112	112	112	112	112	45	22.4
900,000	5600	–	35.5	35.5	30	71	–	–	–	112	85	75	95	85	63	71	112	15	–
900,000	4000	53	112	112	112	112	67	40	35.5	112	112	106	112	112	112	112	112	45	18
900,000	2800	100	112	112	112	112	112	85	80	112	112	112	112	112	112	112	112	45	22.4
1,120,000	4000	37.5	95	112	112	112	50	28	25	112	100	95	112	112	112	112	112	45	12.5
1,120,000	2800	90	112	112	112	112	100	71	71	112	112	112	112	112	112	112	112	45	22.4
1,400,000	4000	22.4	80	112	112	112	33.5	15	14	112	90	85	100	112	112	112	112	45	7.1
1,400,000	2800	75	112	112	112	112	90	63	60	112	112	106	112	112	112	112	112	45	22.4
1,800,000	4000	3.75	50	112	112	95	6.7	2.24	2	112	80	71	90	112	106	112	112	45	1.32
1,800,000	2800	63	106	112	112	112	75	50	47.5	112	100	95	106	112	112	112	112	45	22.4
2,240,000	2800	50	95	112	112	112	63	40	35.5	112	90	85	100	112	112	112	112	45	18
2,240,000	2000	80	112	112	112	112	90	71	67	112	106	100	112	112	112	112	112	45	22.4
2,800,000	2800	40	80	112	112	100	50	30	28	106	80	75	90	112	112	112	112	45	13.2
2,800,000	2000	71	100	112	112	112	80	60	56	112	95	90	100	112	112	112	112	45	22.4
3,550,000	2800	28	71	112	112	90	37.5	20	19	100	71	67	80	112	112	112	112	45	9.5
3,550,000	2000	63	90	112	112	106	71	50	47.5	106	90	85	95	112	112	112	112	45	22.4
4,500,000	2800	17	56	112	112	80	25	11.2	10.6	90	63	60	71	106	95	106	112	42.5	5.3
4,500,000	2000	53	85	112	112	95	60	42.5	40	100	80	75	85	112	112	112	112	45	19
max **112**																		max **45**	max **22.4**

size **8001**

355,000	8000	140	140	140	140	140	140	140	140	80	56	60	106	140	140	140	140	28	56
355,000	5600	140	140	140	140	140	140	140	140	140	132	140	140	140	140	140	140	28	56
450,000	8000	140	140	140	140	140	140	140	140	53	33.5	35.5	75	140	140	140	140	28	56
450,000	5600	140	140	140	140	140	140	140	140	140	112	118	140	140	140	140	140	28	56
560,000	8000	140	140	140	140	140	140	132	140	25	14	16	37.5	140	140	140	118	28	56
560,000	5600	140	140	140	140	140	140	140	140	118	95	100	140	140	140	140	140	28	56
710,000	8000	140	140	140	140	140	140	118	125	–	–	–	–	9	4.5	5.3	26.5	20	56
710,000	5600	140	140	140	140	140	140	140	140	100	75	80	118	140	140	140	140	28	56
900,000	8000	140	140	118	100	132	125	100	112	–	–	–	–	80	28	33.5	45	11.8	56
900,000	5600	140	140	140	140	140	140	140	140	80	56	60	100	140	140	140	140	28	56
900,000	4000	140	140	140	140	140	140	140	140	132	106	112	140	140	140	140	140	28	56
1,120,000	5600	140	140	140	140	140	140	125	132	60	40	45	80	140	140	140	132	28	56
1,120,000	4000	140	140	140	140	140	140	140	140	118	95	95	132	140	140	140	140	28	56
1,400,000	5600	140	140	140	140	140	132	112	118	42.5	26.5	30	56	140	140	140	112	28	56
1,400,000	4000	140	140	140	140	140	140	140	140	100	80	85	118	140	140	140	140	28	56
1,800,000	5600	140	140	140	140	140	118	95	106	19	11.2	12.5	30	132	140	140	85	20	56
1,800,000	4000	140	140	140	140	140	140	125	132	85	63	67	100	140	140	140	132	28	56
2,240,000	4000	140	140	140	140	140	125	112	118	71	50	56	85	140	140	140	125	28	56
2,240,000	2800	140	140	140	140	140	140	132	132	106	90	95	118	140	140	140	140	28	56
2,800,000	4000	140	140	140	140	140	118	100	106	56	40	42.5	71	132	140	140	106	28	56
2,800,000	2800	140	140	140	140	140	132	118	125	95	80	80	106	140	140	140	132	28	56
3,550,000	4000	125	140	140	140	140	106	90	95	40	28	30	53	118	140	140	95	23.6	53
3,550,000	2800	140	140	140	140	140	125	106	112	85	67	71	95	140	140	140	118	28	56
4,500,000	4000	118	140	140	132	140	95	75	85	26.5	17	19	37.5	106	140	140	75	19	47.5
4,500,000	2800	125	140	140	140	140	112	95	106	71	56	60	85	125	140	140	112	28	53
max **140**																		max **28**	max **56**

1) An axial load of up to 0.2 times the value in the table is permissible, simultaneously with the radial load. If exceeded consult us.
2) An unfavorable direction of load can limit F_{r2} to 0.71 · F_{r2max}
3) For radial loads acting simultaneously on both sides of double extension low speed shaft or for hollow low speed shaft, consult us.

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13 - Installation and maintenance

2582-01.02

13.1 - Safety

IMPORTANT: gear reducers and gearmotors supplied by Rossi are **components** and must be incorporated into machinery and **should not be commissioned before the machinery in which the components have been incorporated conforms to:**

- **Machinery directive 2006/42/EC and subsequent updatings; in particular, possible safety guards for shaft ends not being used and for eventually accessible fan cover passages (or other) are the Buyer's responsibility;**
- **«Electromagnetic compatibility (EMC)» 2004/108/EC and subsequent updatings.**

Attention! It is recommended to pay attention to all instructions of present handbook, all existing safety laws and standards concerning correct installation. Whenever personal injury or property damage may occur, foresee adequate supplementary protection devices against:

- **release or breakage of fastening screws;**
- **rotation or unthreading of the gear reducer from shaft end of driven machine following to accidental breakage of the reaction arrangement;**
- **the accidental breakage of shaft end of driven machine.**

If deviations from normal operation occur (temperature increase, unusual noise, etc.) immediately switch off the machine.

Installation

An incorrect installation, an improper use, the removing or disconnection of protection devices, the lack of inspections and maintenance, improper connections may cause severe personal injury or property damage. Therefore the component must be moved, installed, commissioned, handled, controlled, serviced and re-paired **exclusively by responsible qualified personnel specifically instructed** and have the necessary experience to **recognize** any **risks** connected with present products avoiding any possible emergencies.

Gear reducers and gearmotors of present handbook are normally suitable for installations in **industrial areas**: additional protection measures, if necessary, must be adopted and assured by the personnel responsible for the installation.

Attention! Components in non-standard design or with special executions or with constructive variations may differ in the details from the ones described here following and may require additional information.

Attention! For the installation use and maintenance of the **electric motor** of the possible motor-variator and/or the electric supply device (frequency converter, soft-start, etc.), and/or any optional electric devices (e.g.: independent cooling unit, etc.), consult the specific attached documentation.

If necessary, require it.

Maintenance

When operating on gear reducer or on components connected to it the machine must be at rest: disconnect motor (including auxiliary equipments) from power supply, gear reducer from load, be sure that safety systems are on against any accidental starting and, if necessary, pre-arrange mechanical locking devices (to be removed before commissioning).

Attention! During the running the gear reducers could have hot surfaces; Always wait that the gear reducer or the gearmotor to cool before carrying out any operations.

Further technical documentation (e.g. catalogs) can be downloaded from our website www.rossi-group.com.

13.2 - Application conditions and use limits

Gear reducers are designed **for industrial applications according to name plate data**, when no vibrations (permissible vibration velocity: v_{eff} < 0.14 in/s for $P_1 \leqslant$ 20 hp, v_{eff} < 0.18 in/s for P_1 > 20 hp), no nuclear radiations and important magnetic fields, with ambient temperature -4 °F (-20 °C) – +104 °F (+40 °C) with peaks at +122 °F (+50 °C), with air velocity ⩾ 4 ft/s, maximum altitude 3281 ft, and max relative humidity 80 % .

For continuous ambient temperature higher than 104 °F (+40 °C) or lower than -4 °F (-20 °C) consult us.

13.3 - General

Be sure that the structure on which gear reducer or gearmotor is fitted is plane, levelled and sufficiently dimensioned in order to assure fitting stability and vibration absence, keeping in mind all transmitted forces due to the masses, to the torque, to the radial and axial loads.

Position the gear reducer or gearmotor so as to allow a free passage of air for cooling both gear reducer and motor (especially at gear reducer and motor fan sides).

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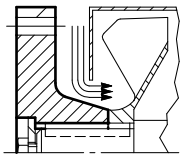


If there is fan on the gear reducer verify that there is sufficient space allowing for adequate circulation of cooling air also after fitting coupling protection. If a coupling protection is fitted smooth the coupling hub, if necessary.

Avoid: any obstruction to the air-flow; heat sources near the gear reducer that might affect the temperature of cooling-air and of gear reducer for radiation; insufficient air recycle or any other factor hindering the steady dissipation of heat.

Mount the gear reducer so as not to receive vibrations.

When external loads are present use pins or locking blocks, if necessary.

When fitting gear reducer and machine it is recommanded to use **locking adhesives** such as LOCTITE on the fastening screws (also on flange mating surfaces).

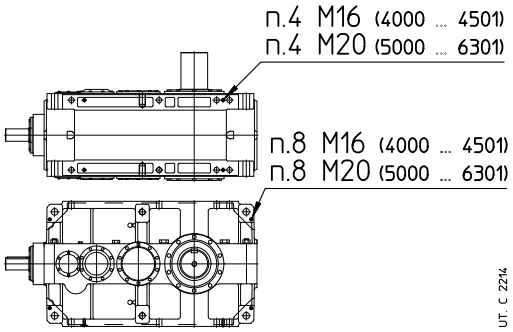
For outdoor installation or in a hostile environment protect the gear reducer or gearmotor with anticorrosion paint. Added protection may be afforded by water-repellent grease (especially around the rotary seating of seal rings and the accessible zones of shaft end).

Gear reducers should be protected wherever possible, and by whatever appropriate means, from solar radiation and extremes of weather; weather protection **becomes essential** when high or low speed shafts are vertically disposed.

For ambient temperatures greater than 104 °F (40 °C) or less than 32 °F (0 °C), consult us.

If overloads are imposed for long periods or if shocks or danger of jamming are considered, then motor-protection, electronic torque limiters, fluid couplings, safety couplings, control units or other similar devices should be fitted.

Attention! Bearing life, good shaft and coupling running depend on alignment precision between the shafts. Carefully align the gear reducer with the motor and the driven machine (with the aid of shims if need be), interposing flexible couplings whenever possible.



Gear reducers sizes ⩽ 6301 are equipped with **level threaded holes** on both feet surfaces and on the sides in order to permit an easy and precise positioning; after the adjustment, adequately shim.

Whenever a leakage of lubricant could cause heavy damages, increase the frequency of inspections and/or envisage appropriate control devices (e.g.: remote oil level gauge, lubricant for food industry, etc.).

In polluting surroundings, take suitable precautions against lubricant contamination through seal rings or other.

13.4 - Mounting of components on high and low speed shaft ends

Generally, it is recommended to machine the hole of parts keyed onto shaft end, tolerance H7. For high speed shaft end with D ⩾ 55 mm tolerance can be G7, provided that load is uniform and light. Further data according to the table «High and low speed shaft end» (ch. 6).

Before mounting, thoroughly clean mating surfaces with proper antirust products and lubricate against seizure and fretting corrosion.

Installation and removal operations should be carried out with the aid of **jacking screws** and **pullers** using the tapped hole at the shaft butt-end (see table in fig. 2) taking care to avoid impacts and shocks which may irreparably damage the bearings, the circlips or other parts or cause sparks; for H7/m6 and K7/j6 fits it is advisable that the part to be keyed is preheated to a temperature of 176 – 212 °F. (80 – 100 °C)

The couplings having a tip speed on external diameter up to 66 ft/s must be statically balanced; for higher tip speeds they must be dynamically balanced.

Where the transmission link between gear reducer and machine or motor generates shaft end loads, ensure that: loads do not rise above catalog values:

- loads do not rise above the values stated at ch. 11 and loads do not rise above the values of the application design;
- transmission overhang is kept to a minimum;
- drive-chains should not be tensioned (if necessary – alternating loads and/or motion – foresee suitable chain tighteners); if the peripheral speed of the chain is greater than 3.2 ft/s it is necessary to install proper malfunction markers such as aligning sensors, etc;
- in the gear transmission there is an adequate gear mesh (≈ 0,03 – 0,04 ·m) between pinion and rack (bushing);
- drive-belts should not be over-tensioned.

For splined couplings apply adequate products against oxydation.

13.5 - Machine shaft end

For the **shaft end** of **machine** where the hollow shaft of gear reducer is to be keyed (with shrink disc or with keyway, see ch. 12 (1) and (3)), are recommended h6 or j6 tolerances according to requirements. For dimensions see ch. 12 (1) and (3).

In order to have an easier installing and removing of gear reducers, use hollow shaft washer (on request, see ch. 12 (5)) offering a supplementary axial fastening beside the fastening of the shrink disc (if present). In these cases, when tightening the bolt, we recommend the use of a **locking adhesives** type LOCTITE 601. For vertical ceiling-type mounting, contact us. Parts in contact with the retaining ring must have sharp edges.

With hollow low speed shaft with shrink disc on machine opposite side, protect the cylindrical part of machine shaft end from shrink disc opposite side with proper products against fretting corrosion, see ch. 12.

Whenever **personal** injury or **property** damage may occur, foresee **adequate supplementary protection devices** against **rotation** or **unthreading** of the gear reducer from shaft end of driven machine following to accidental breakage of the reaction arrangements.

13.6 - Lubrication

Gear pairs are oil-bath lubricated.

Bearings are either oil-bathed or splashed with the exception of the top bearings which are lubricated with a pump (see ch. 12 (9)) or lubricated «for life» with grease (with or without NILOS ring according to speed).

Gear reducers are supplied **without oil**; before putting into service, fill to the specified level with **mineral oil** having the ISO viscosity grade given in the table, according to ambient temperature and output speed.

Under normal conditions the first and the second speed range are for trains of gears **2I** and **CI**, the third is for trains of gears **3I**, **4I**, **C2I** and **C3I**, while the fourth is for particular applications.

When it is required to increase oil change interval («long life»), the ambient temperature range, and/or to reduce oil temperature, use **synthetic oil** with **polyalphaolefines** basis having ISO viscosity grade as indicated in the table.

For continuous duty, the use of synthetic oil is recommended in the following case of gear reducers with size and mounting position marked with (see ch. 8, 10) and bevel helical gear reducers with double extension high speed shaft.

An overall guide to oil-change interval is given in the table, and assumes pollution-free surroundings. When heavy overloads are present, halve the values.

Apart from running hours:
- replace mineral oil at least each 3 years;
- replace or regenerate synthetic oil each 5 – 8 years according to gear reducer size, running and environmental conditions.

Never mix different makes of synthetic oil; if oil-change involves switching to a type different from that used hitherto, then give the gear reducer a through clean-out.

Seal rings: duration depends on several factors such as dragging speed, temperature, ambient conditions, etc.: as a rough guide, it can vary from 3 150 to 25 000 h.

ISO viscosity grade
Mean kinematic viscosity [cSt] at 104 °F (40 °C).

Speed n_2 rpm	Ambient temperature[1] mineral oil			synthetic oil	
	-4 – 32 °F (-20 – 0 °C)	32 – 68 °F (0 – 20 °C)	68 – 104 °F (20 – 40 °C)	-4 – 32 °F (-20 – 0 °C)	32 – 104 °F (0 – 40 °C)
> **224**	150	150	150	150	150
224 – **22.4**	150	150	220	220	220
22.4 – **5.6**	150	220	320	320	320
< **5.6**	220	320	460	460	460

Oil temperature °F	Oil temperature °C	Oil change interval [h] mineral oil	Oil change interval [h] synthetic oil
⩽ **149**	⩽ 65	8 000	25 000
149 – **176**	65 – 80	4 000	18 000
176 – **203**	80 – 95	2 000	12 500
203 – **230**[1]	95 – 110[1]	—	9 000

Oil types

Manufacturer	**PAO synthetic oil** ISO VG 150 ... 460	mineral oil ISO VG 150 ... 460
AGIP	Blasia SX	Blasia
ARAL	Degol PAS	Degol BG
BP	Enersyn EPX	Energol GR XP
CASTROL	Alphasyn EP	Alpha SP
FUCHS	Renolin Unisys CLP	Renolin CLP
KLÜBER	Klübersynth GEM4	Klüberoil GEM1
MOBIL	Mobil SHC Gear	Mobilgear 600 XP
SHELL	Omala S4 GX	Omala S2 G
TEXACO	Pinnacle	Meropa
TOTAL	Carter SH	Carter EP

Warning: before unscrewing the filler plug with valve (symbol) wait until the unit has cooled and then open with caution.

1) Peaks of 18 °F (10 °C) above the ambient temperature range are acceptable. For the running at **cold starting** ($T_{amb} = T_{oil} \leqslant 77$ °F (25 °C)) and **forced lubrication systems**, **always foresee the oil heater** (see ch. 13 (7)).

2) Values admissible for not continuous duty, only.

13.7 - Gear reducer starting at low ambient temperature ($T_{amb} = T_{oil} \leqslant$ 77 °F (25 °C))

The **minimum** ambient temperature (equal to the oil one) to which it is allowed to start the gear reducer, depends on lubrication system and type of lubricant applied.

Gear reducers with splash lubrication

The gear reducer can be started with ambient/oil temperature ⩾ - 4 °F (-20 °C), keeping in mind to follow the lubricant viscosity instructions stated on ch. 13.6.

In presence of an eventual independent cooling unit with heat exchanger (but without forced lubrication, see also point A1 in table at ch. 12 (8)), it is necessary to drive the motorpump starting when achieving oil temperature of 140 °F.

Gear reducers with forced lubrication of bearings

In presence of forced lubrication systems of bearings (see ch. 6 and ch. 12 (8) and (9)), the gear reducer can be started only if oil temperature is ⩾ 77 °F (25 °C), following the lubricant viscosity instructions as per ch. 13.6.

Therefore, before gear reducer starting it is necessary to pre-heat the oil bath through the use of heaters (see ch. 12 (10)) up to a temperature of 77 °F (25 °C).

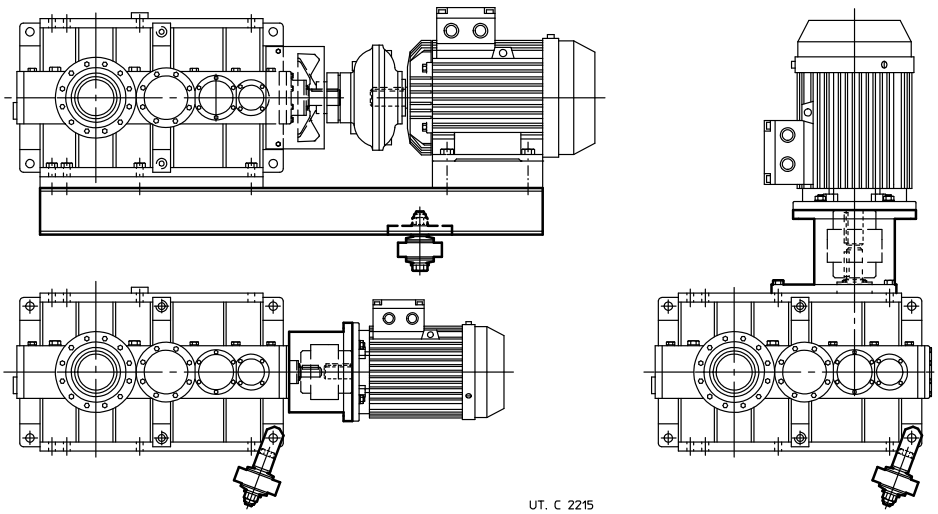
13.8 - Shaft mounting arrangements

The strength and shape of the housing offer advantageous possibilities for shaft mounting even – for instance – in the case of gearmotor with belt drive, hydraulic coupling, etc.

A few possible examples of shaft mounting arrangements are shown.

IMPORTANT. When shaft mounted, the gear reducer must be supported both axially and radially (also for mounting positions B3 ... B8) by the machine shaft end, as well as anchored against rotation only, by means of a reaction having **freedom of axial movement** and sufficient **clearance** in its couplings to permit minor oscillations always in evidence without provoking dangerous overloading on the gear reducer. Lubricate with proper products the hinges and the parts subject to sliding; when mounting the screws it is recommended to apply locking adhesives type LOCTITE 601.

In case of axial fastening with elastic constraint, in B3 or B8 mounting position, ensure that housing oscillation while running does not exceed the perfectly horizontal position.



Semi flexible and economic reaction arrangement (see ch. (ch. 12 (7)): with bolt using disc springs, with bolt and fork using disc springs.

13.9 - Tightening torques

Unless otherwise stated, usually it is sufficient to use screws in class 8.8.

Before tightening the bolt be sure that the eventual centering of flanges are inserted properly.

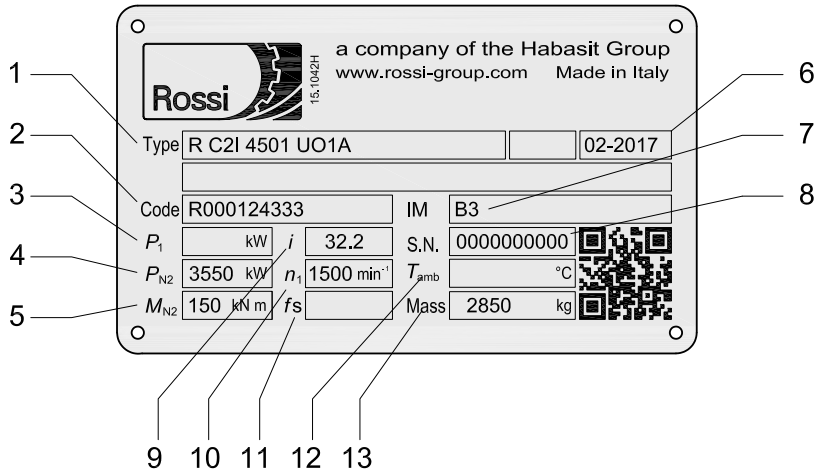
In general, the bolts are to be diagonally tightened with the maximum tightening torque.

The bolts of shrink disc must be gradually and uniformly tightened, with continuous sequence (not diagonally!) and in several phases up to the reaching of maximum tightening torque.

Before tightening, carefully degrease the screws; in the event of heavy vibrations, heavy duties, frequent drive inversions apply a proper thread-locking sealant Loxeal 23-18 or equivalent.

Bolts DIN 931 DIN 912	Tightening torque *Ts* [lbf in]			
	Feet, flanges and threaded holes at the shaft butt-end			Shrink disc
	Class 8.8	Class 10.9	Class 12.9	Class 10.9
M10	442	619	752	–
M12	752	1062	1283	–
M16	1814	2566	3097	–
M20	3540	4956	6018	4336
M24	6283	8850	10619	7434
M27	8938	12389	15044	11062
M30	12212	17257	20796	–
M36	22124	31416	37168	–
M45	44248	61947	74336	–
M56	86726	122124	146018	–

13.10 - Nameplate



1 Designation
2 Manufacturing code
3 Installed power [kW]
4 Nominal power on low speed shaft [kW], at input speed n_1
5 Nominal low speed shaft torque [kN m], at input speed n_1
6 Month and year of production
7 Serial number
8 Mounting position
9 Transmission ratio
10 High speed shaft input speed [min^{-1}]
11 Service factor
12 Ambient temperature if different from conditions stated on catalog [°C]
13 Approximative gear reducer weight [kg]

12 - Accessories and non-standard designs

ATTENTION. The simultaneous presence on the same gear reducer of two or more accessories or non-standard designs is not always possible: consult us for verification.

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(1) Hollow low speed shaft with shrink disc

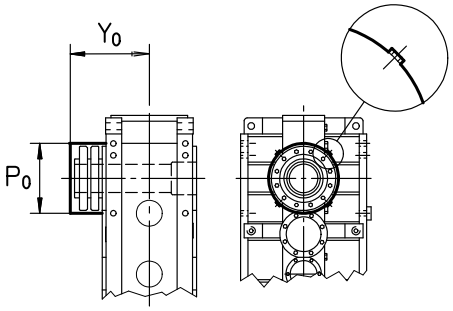
Opposite side to machine

Stepped hollow low speed shaft with shrink disc on **machine opposite side**; this design **facilitates** installation and removal and **affords a notable increase in rigidity** of keying and resistance to bending and torsional-stresses at the shaft end of driven machine.

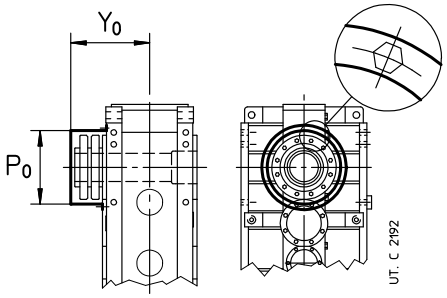
Safety guards made of steel for shrink disc, supplied **as standard**.

IMPORTANT. The shoulder diameter of the driven machine shaft end abutting with the gear reducer must be at least (1,12 – 1,18) · D (with stepped hollow shaft (1,18 – 1,25) · D).

Possible gear reducer designs are given at ch. 7 and 9.

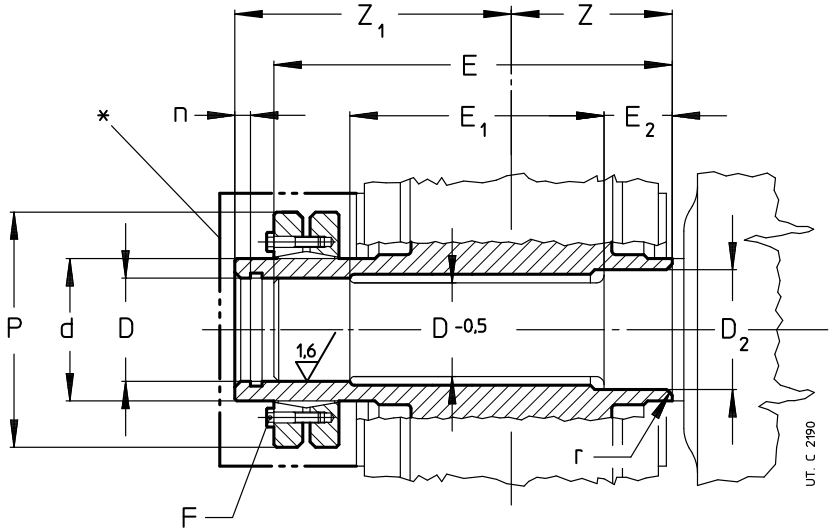


4000 ... 5601
7101, 8001



6300, 6301

Gear reducer size	P_0 Ø	Y_0
4000, 4001	449	522
4500, 4501	479	534
5000, 5001	536	635
5600, 5601	608	659
6300, 6301	750	752
7101	850	990
8001	977	1127



Gear reducer size	D Ø H7 / h6, j6	D_2** Ø	E	E_1	E_2	1)	F 2)	T_S 3) lbf in	n	d Ø	P Ø	r	Z	Z_1	T_{2SD} 4) 10^3 lbf in	Δm lb
4000, 4001	210	220	788	480	165	130	M20 n. 14	4336	14	260	430	5	330	497	2250	-155
4500, 4501	230	240	799	465	180	130	M20 n. 16	4336	14	280	460	5	330	508	2895	-310
5000, 5001	260	270	970	600	200	165	M20 n. 20	4336	16	320	520	6	410	605	4045	-355
5600, 5601	290	300	992	572	225	180	M20 n. 24	4336	16	360	590	6	410	627	5365	-595
6300, 6301	325	335	1 110	650	250	200	M24 n. 21	7434	18	400	660	7	460	700	7715	-905
7101	360	370	1 394	782	280	225	M27 n.28	11062	20	460	770	7	551	899	14600	-970
8001	400	410	1 606	886	315	250	M27 n. 34	11062	20	530	910	8	626	1036	18760	-795

1) Values valid for **R 4I**.
2) Screws UNI 5737-88 class 10.9
3) Screw tightening torque.
4) Maximum torque value transmissible by shrink disc.
5) In presence of «Labyrinth seal and low speed shaft greaser» (ch. 12.(12), it is necessary to increase E dimension (E_2) by the A quantity stated in the table at ch. 12.(12).

* Protection for hollow low speed shaft with shrink disc, as standard.

** Each hollow shaft type (standard, stepped, with shrink disc) has a slightly oversized diameter **D** at the input to facilitate the assembly of gear reducer on machine shaft end: this, however, does not affect the connection reliability.

Supplementary description when ordering by **designation: hollow low speed shaft with shrink disc, on machine opposite side.**

Side to machine

Stepped hollow low speed shaft with shrink disc on **machine side** (interposed between gear reducer and machine); this design **facilitates** installation and removal and **affords** a notable increase in rigidity of keying, **reduces** the deformations of machine shaft end, **avoiding** the necessity of safety guards on the unit itself. Moreover, since deformability of keying area is greater ($d - D_2 < d - D$) and friction area acts on a greater diameter ($D_2 > D$), maximum transmissible torque increases by 18 – 25% compared to the solution with shrink disc on opposite side to machine.

For the shaft end of driven machine on which gear reducer stepped hollow low speed shaft must be keyed, it is possible to adopt both «long» and «short» shaft end of driven machine: dimensions as per table.

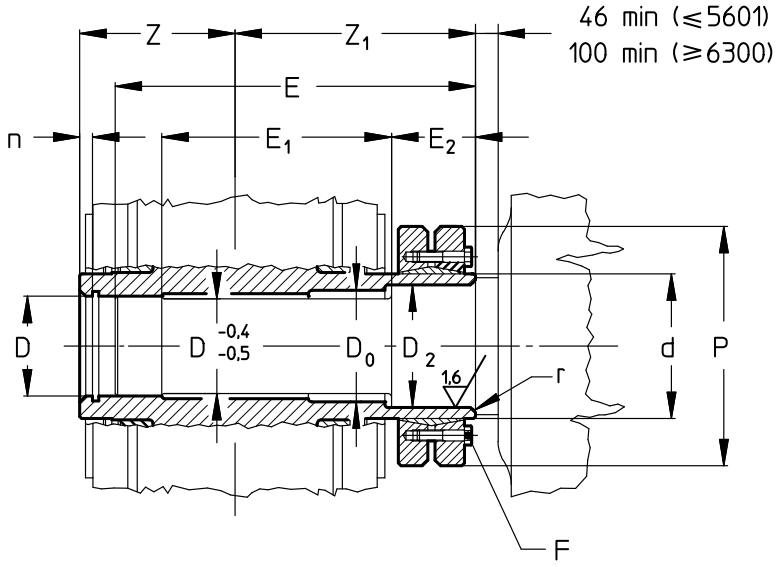
In the first case (fig. a), where the «long» shaft end of driven machine acts as a guide, mounting operations are facilitated.

In the second case (fig. b), the reduced axial dimension of the «short» shaft end of driven machine, limits the mounting and removing overall dimensions at the very least (consult us).

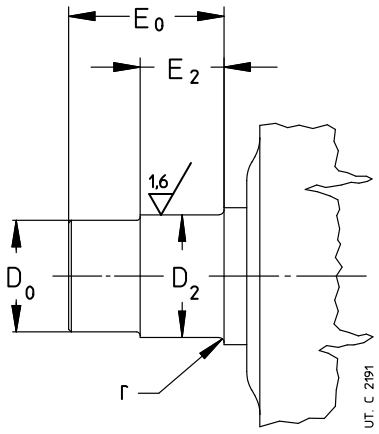
In both cases the rigidity and the resistance to bending and torsional stresses at the shaft and of driven machine do not change, since the only surface through which torque transmission occurs is the D_2 one.

IMPORTANT. The shoulder diameter of the driven machine shaft end abutting with the gear reducer must be at least (1,18 – 1,25) · D.

Possible gear reducer designs are given at ch. 8 and 10.



(a)
Stepped hollow low speed shaft with locking assembly and «long» machine shaft end



(b)
«Short» shaft end of driven machine (excluding sizes 7101, 8001)

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Gear reducer size	D Ø H7 / h6, j6	D2 ** Ø	D0 Ø	E	E0	E1	E2	1)	F 2)	TS 3) lbf in	n	d Ø	P Ø	r	Z	Z1	T2SD 4) 10³ lbf in	Δm lb
4000, 4001	210	220	215	754	307	446	165	130	M20 n. 14	4336	14	260	430	5	330	463	2520	-175
4500, 4501	230	240	232	768	342	434	180	130	M20 n. 14	4336	14	280	460	5	330	477	3210	-330
5000, 5001	260	270	265	935	380	565	200	165	M20 n. 16	4336	16	320	520	6	410	570	4435	-420
5600, 5601	290	300	295	958	428	538	225	180	M20 n. 16	4336	16	360	590	6	410	593	5825	-660
6300, 6301	325	335	330	1 063	475	603	250	200	M24 n. 18	7434	18	400	660	7	460	653	8300	-1015
7101	360	370	–	1 335	–	774	327	327	M27 n. 28	11062	20	460	770	7	551	840	15045	-1015
8001	400	410	–	1 548	–	879	400	400	M27 n. 34	11062	20	530	910	8	626	978	19115	-880

1) Values valid for **R 4I**.
2) Screws UNI 5737-88 class 10.9.
3) Screw tightening torque.
4) Maximum torque value transmissible by shrink disc.
** Each hollow shaft type (standard, stepped, with shrink disc) has a slightly oversized diameter **D** at the input to facilitate the assembly of gear reducer on machine shaft end: this, however, does not affect the connection reliability.

Supplementary description when ordering by **designation: hollow low speed shaft with shrink disc, on machine side.**

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(2) Hollow low speed shaft with keyway (sizes 4000 ... 6301)

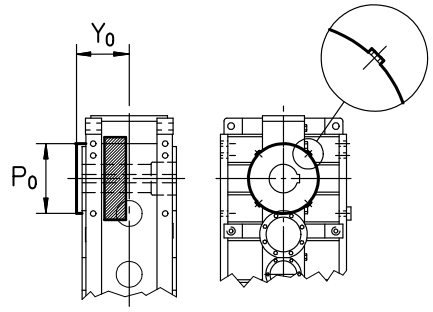
Hollow low speed shaft, normal (fig. a) or stepped (fig. b), with keyway. With required torque higher than table values, two keyways at 120° are necessary.

Safety guards made of steel on the area not used by hollow low speed shaft with keyway, supplied **as standard**. The safety guard is to be mounted on low speed wheel side (wheel opposite side for R 4I; see also ch. 8 and 10).

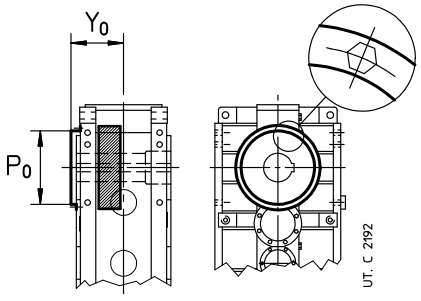
Hollow low speed shaft washer (see ch. 12 (5), available on request.

Important: the shoulder diameter of the driven machine shaft end abutting with the gear reducer must be at least (1,12 ÷ 1,18) · D (with stepped hollow shaft (1,18 ÷ 1,25) · D).

Design not possible for sizes 7101 and 8001.

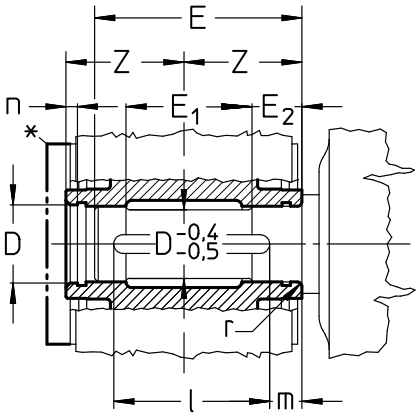


4000 5601

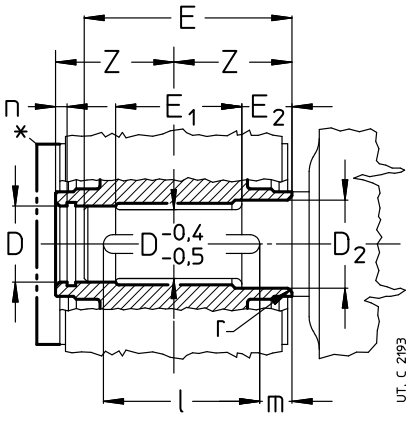


6300, 6301

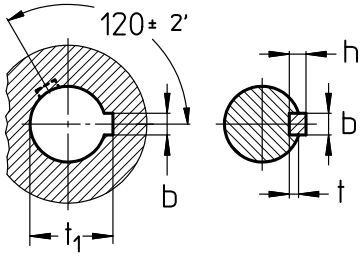
Gear reducer size	P_0 Ø	Y_0 ≈
4000, 4001	437	359
4500, 4501	479	362
5000, 5001	536	445
5600, 5601	598	445
6300, 6301	657	620



(a)
Hollow low speed shaft
with keyway



(b)
Stepped hollow low speed shaft
with keyway



Gear reducer size	Hollow shaft				Shaft end of driven machine						Parallel key	Keyway			T_2	Δm
	D** Ø H7 / h6, j6	**D_2**** Ø H7 / h6, j6	**n**	**Z**	**E** 3)	**E_1**	**E_2** 3)	**E_2** 1) 3)	**m**	**r**	**b** × **h** × **l** h9 h11	**b** $H9_{hub}$ $N9_{shaft}$	**t** shaft	**t_1** hub	2) 10^3 lbf in	lb
4000, 4001	200	210	14	330	620	300	165	130	10	5	45 × 25 × 600	45	15	210,4	**990**	-330
4500, 4501	220	230	14	330	620	300	180	130	10	5	50 × 28 × 600	50	17	231,4	**1240**	-530
5000, 5001	250	260	16	410	775	400	200	165	13	6	56 × 32 × 750	56	20	262,4	**1980**	-660
5600, 5601	280	290	16	410	775	400	225	180	13	6	63 × 32 × 750	63	20	292,4	**2210**	-925
6300, 6301	310	320	18	460	870	400	250	200	15	7	70 × 36 × 840	70	22	324,4	**3140**	-1475

1) Values valid for **R 4I**.
2) Value of transmissible torque with keyway. For higher values, two keyways at 120° are necessary.
3) In presence of «Labyrinth seal and low speed shaft greaser» (ch. 12.(12)), it is necessary to increase E dimension (E_2) by the A quantity stated in the table at ch. 12.(12).

* Hollow low speed shaft protection with keyway, as standard.

** Each hollow shaft type (standard, stepped, with shrink disc) has a slightly oversized diameter **D** at the input to facilitate the assembly of gear reducer on machine shaft end: this, however, does not affect the connection reliability.

Supplementary description when ordering by **designation**: **hollow low speed shaft with keyway, hollow low speed shaft with two keyways**, **stepped hollow low speed shaft with keyway**, **stepped hollow low speed shaft with two keyways.**

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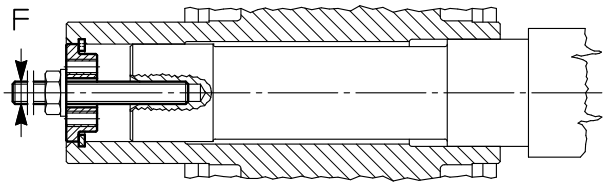
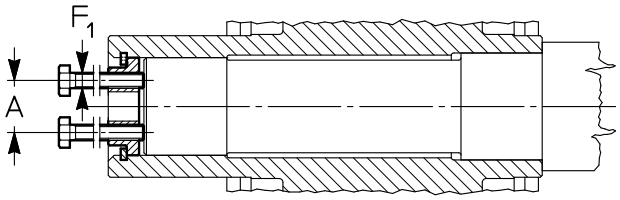
(3) Hollow low speed shaft washer

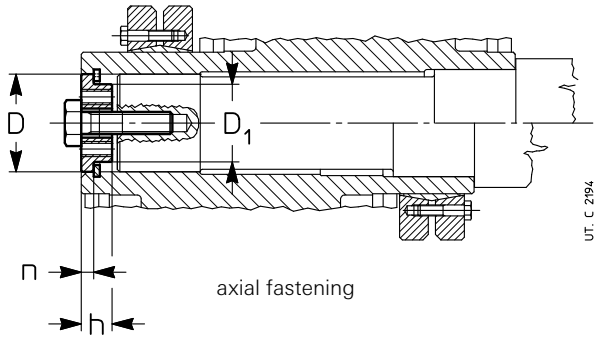
Washer, retaining ring and screw for axial fastening of gear reducer with hollow low speed shaft with shrink disc or with keyway.



installing



removing



axial fastening

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Gear reducer size	A		D		D_1		F	F_1	h	n	Axial fastening bolt
		1)	Ø	Ø 1)	Ø	1)					UNI 5737-88
4000, 4001	144	134	210	200	180	170	M30	M24	34	14	M30 × 90
4500, 4501	164	144	230	220	200	190	M30	M24	34	14	M30 × 90
5000, 5001	178	168	260	250	225	215	M36	M30	40	16	M36 × 110
5600, 5601	208	198	290	280	255	245	M36	M30	40	16	M36 × 110
6300, 6301	228	218	325	310	285	270	M36	M30	45	18	M36 × 110
7101	228	–	360	–	319	–	M45	M36	50	20	M45 × 150
8001	268	–	400	–	359	–	M45	M36	50	20	M45 × 150

1) Dimension valid for design with hollow low speed shaft with keyway.

Supplementary description when ordering by **designation**: **hollow low speed shaft washer with shrink disc** or **hollow low speed shaft washer with keyway**.

2582-01.02

(4) Backstop device

Backstop device (with centrifugal disjunction for size ⩾ 5000) available for helical gear reducers with $i_N \geqslant$ **12,5** ($i_N \geqslant$ **14** for sizes 4500, 4501) and bevel helical gear reducers with $i_N \geqslant$ **12,5** ($i_N \geqslant$ **14** for sizes 4500, 4501). The maximum overload capacity of device is equal to **2** · M_{2BS} (see table).

Possible configurations and designs are stated in the following figures.

R 2I

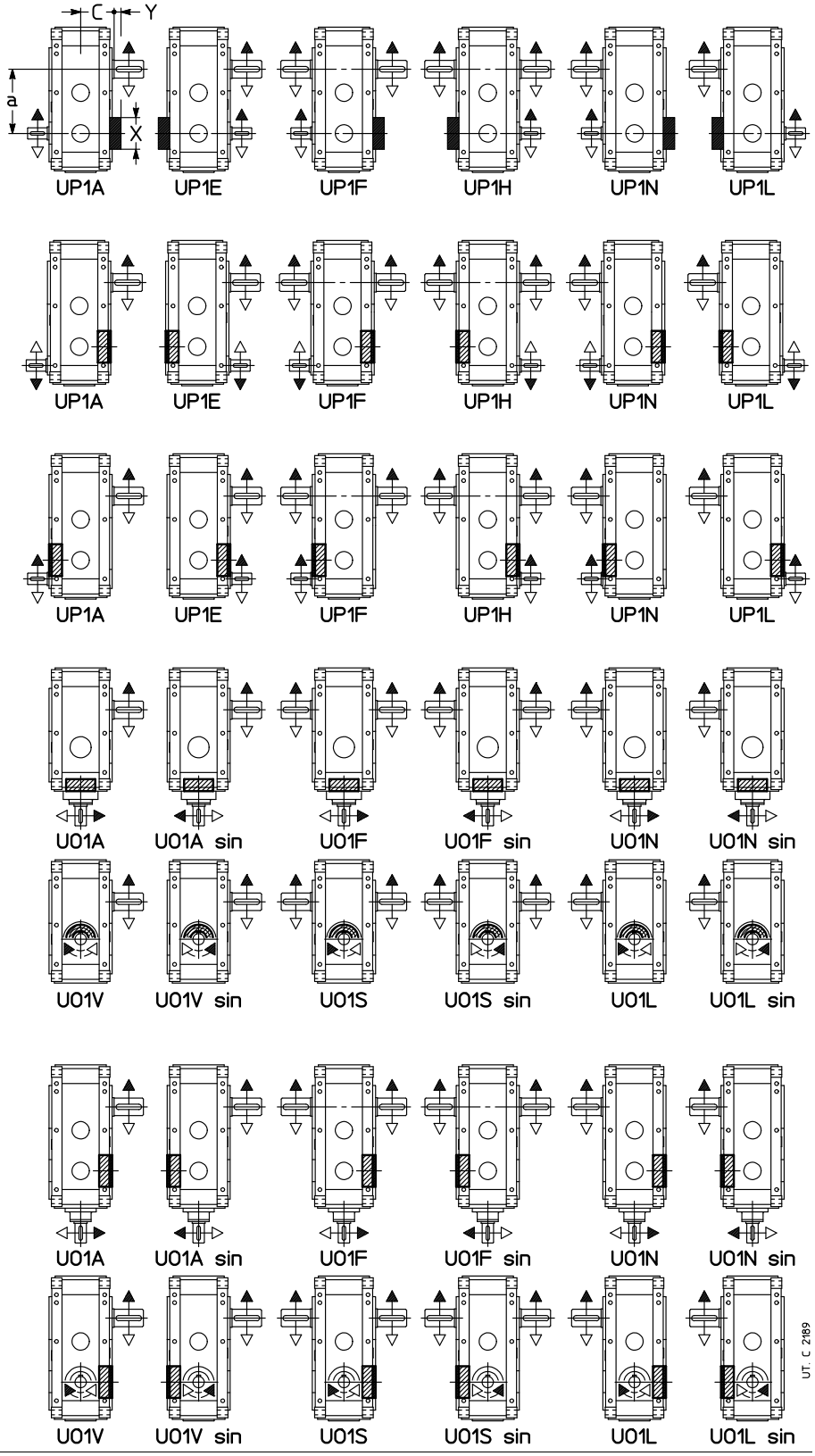
R 2I	X Ø	Y Ø
4000, 4001	248	13
4500, 4501	248	-15
5000, 5001	320	15
5600, 5601	320	-20
6300, 6301	378	-19
7101	460	144
8001	460	167

R 3I[1)]

R 4I[1)]

R CI

R C2I[1)], **R C3I**[1) 2)]



1) Backstop device does not project from dimension **C**.
2) Designs UO1V ... UO1L sin not possible for train of gears C3I.

Backstop device load capacity

Low speed shaft nominal torque of backstop device when this is lower than T_{N2} of gear reducer (see ch. 7, 9). Maximum permissible overload equal to **1,7 · T_{2BS}**.

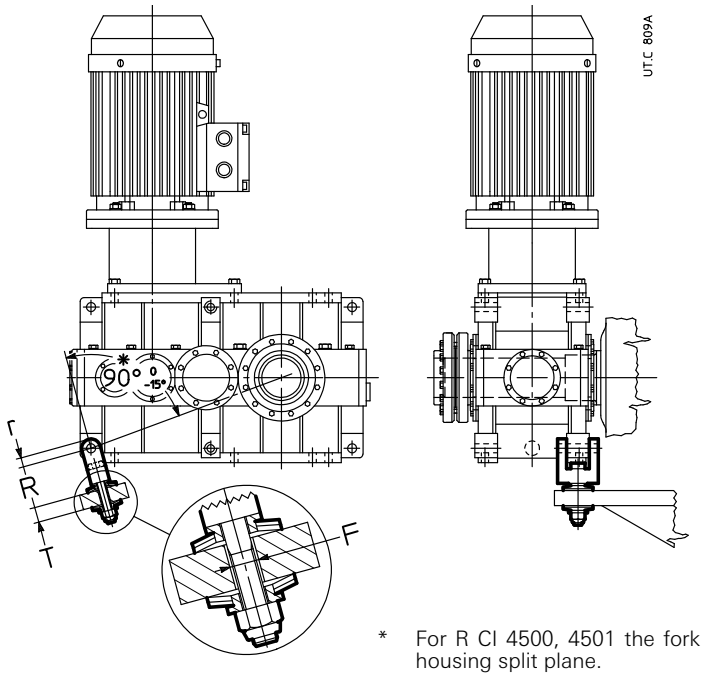
Train of gears	i_N	T_{2BS} [10^3 lbf in]					
		4001	**4501**	**5001**	**5601**	**6301**	**7101**
3I	25	840	–	–	–	–	5575
	28	990	990	1980	1980	2965	–
	31,5	–	1105	–	2210	3320	–
	35,5	990	1240	1980	2480	2965	–
	40	–	1105	–	–	3320	–
	45	–	1240	–	2480	–	–
4I	⩽ 250	–	1240	–	2480	–	–
C2I	20	840	–	–	–	–	–
	22,4	990	990	1980	–	–	–
	25	–	1105	–	2210	–	–
	28	990	1240	1980	–	–	–
	31,5	–	1150	–	2210	–	–
	35,5	–	1240	–	2480	–	–

Supplementary description when ordering by **designation**: **backstop device, white or black arrow free-rotation**.

(5) Reaction bolt using disc springs (sizes 4000 ... 6301)

Reaction bolt using disc springs with fork for shaft mounting of motor - coupling - gear reducer group (see ch. 13); available also the only reaction bolt using disc springs: consult us.

Design not possible for sizes 7101 and 8001.



* For R CI 4500, 4501 the fork axes is perpendicular to the housing split plane.

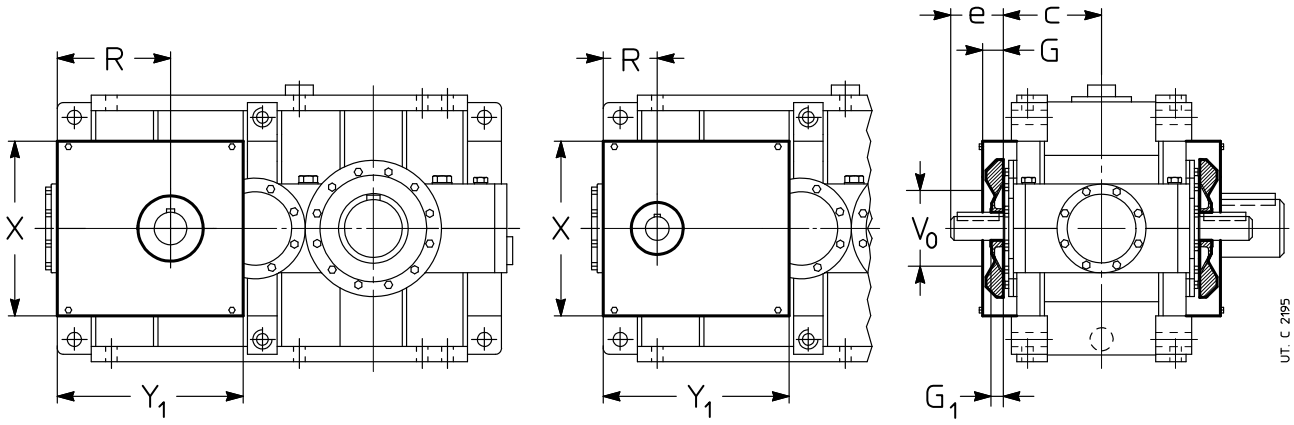
Gear reducer size	Screw UNI 5737-88	Disc spring DIN 2093	**T**	**F** Ø	**R**	**r**
4000 ... 4501	M45 × 260	A 125 n. 2	55	50	211	50
5000 ... 5601	M56 × 300	A 160 n. 2	70	62	274	60
6300, 6301	M56 × 300	A 160 n. 3	70	62	284	60

Supplementary description when ordering by **designation**: **reaction bolt using disc springs and fork**.

(6) Fan cooling

The **helical** gear reducers **R 2I 4000 ... 5601** and **R 3I 4000 ... 6301** can be supplied with **one** or **two** cooling fans keyed on high speed shafts. For dimensions **e**, and **c** see ch. 8.

For sizes 7101 and 8001, consult us.



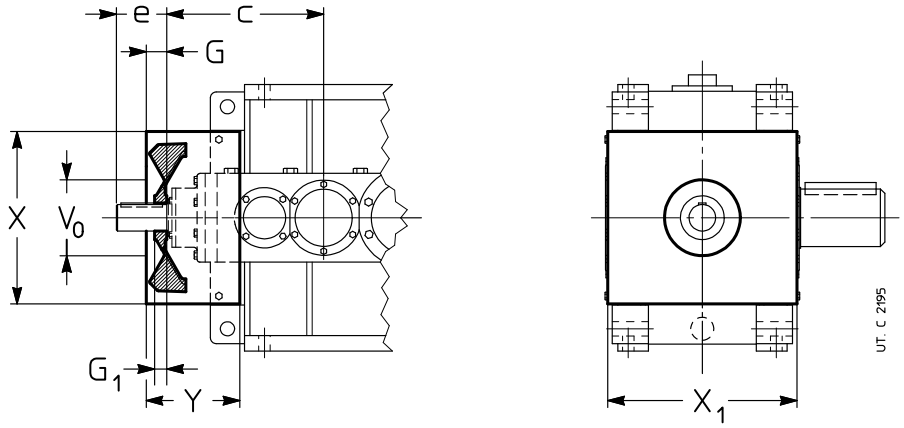
R 2I **R 3I**

Gear reducer size	2I				3I				
	G 1)	**G_1** 2)	**R**	**V_0** Ø	**G_1** 2)	**R**	**V_0** Ø	**X**	**Y_1**
4000 ... 4501	63	50	363	220	40	163	175	590	633
5000 ... 5601	75	50	453	290	50	203	220	740	795
6300, 6301	75	–	–	–	50	203	220	880	980

1) Bolts projecting 6 mm from **G** dimension.
2) The high speed shaft end length is equal to **e - G_1**.

The **bevel helical** gear reducers of size and train of gears **stated in the table** can be supplied fitted with **one** fan keyed on the high speed shaft. For dimensions **e** and **c** see ch. 10.

For sizes 7101 and 8001, consult us.



Gear reducer size			**G**	**G_1**	**V_0** Ø	**X**	**X_1**	**Y**
CI	**4000 ... 4501**		80	40	280	590	640	345
C2I	**4000 ... 4501**		72	47	220	590	640	310
	5000 ... 5601		80	40	290	740	800	380
	6300, 6301		80	40	290	880	872	330
C3I	**6300, 6301**	i_N = 160	57	32	220	880	872	380

1) Bolts projecting 6 mm from dimension **X_1** each side.
2) The high speed shaft end length is equal to **e - G_1**.

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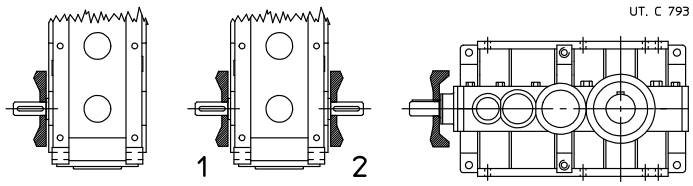
With double extension high speed shaft designs both extensions are **accessible** even with fan: personnel safety-guards are the Buyer's responsibility (2006/42/EEC).

The possible designs and the position of fans are shown below.



Temperature of cooling air must not exceed ambient temperature.

Also available independent cooling unit with heat exchanger (see ch. 12 (10)); consult us for verification.

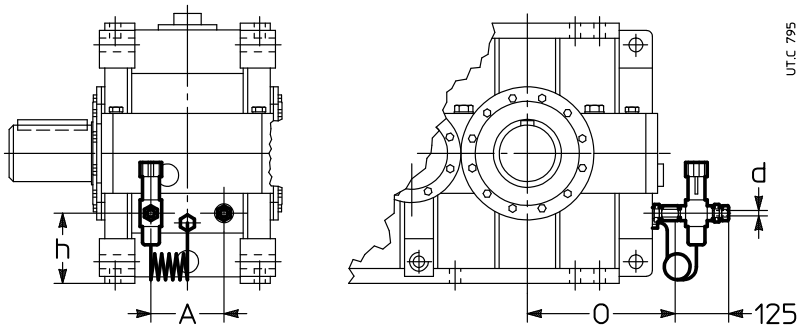
Supplementary description when ordering by **designation**: **fan cooling**; in designs with double extension high speed shaft state – only for helical gear reducers – if pos. **1** or **2** or **... with 2 fans**

(7) Water cooling by coil (sizes 4000 ... 6301)

Coil made of copper alloy for gear reducer water cooling. On request, available also stainless steel coil (AISI 316) or cupro-nickel, consult us.

Design not possible for vertical mounting positions (V5, V6) with low speed shaft wheel positioned on the bottom.

Design not possible for sizes 7101 and 8001.



UT.C 795

Gear reducer size	A	d Ø	h	O
4000 ... 4501	180	16	250	472
5000 ... 5601	225	16	310	577
6300, 6301	280	16	320	647

Cooling water specifications:

- be not too hard;
- be at max temperature 68 °F (20 °C);
- capacity 2.6 – 5.2 gal/min;
- pressure 29 – 58 psi (2 – 4 bar).

A polished metallic pipe (with external diameter **d** stated on table) is sufficient for the connection.

The load loss of coil, according to capacity and water pressure, is approximately 9 – 12 psi.

On request **thermostatic valve** which, automatically and without auxiliary supply need, permits water circulation when gear reducer oil reaches the set temperature; the valve sensor is equipped with immersion bulb. Mounting and setting, adjustable within 122 – 194 °F (50 – 90 °C), are Buyer's responsibility.

For ambient temperature lower than 32 °F (0 °C) consult us.

Supplementary description when ordering by **designation**: **water cooling by coil** or **water cooling by coil and thermostatic valve**.

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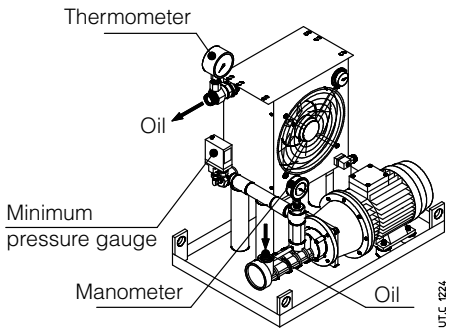
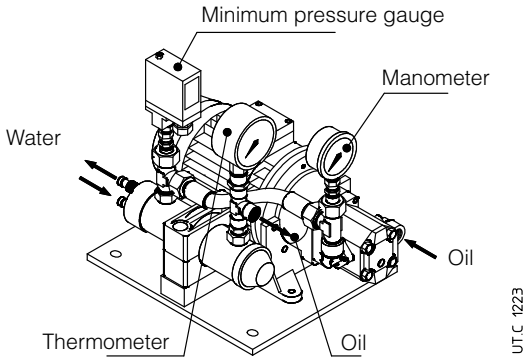
(29) Independent cooling unit



Oil/Air



Oil/Water

Additional cooling device in the event that the other forced cooling systems are not sufficient for the dissipation of thermal power produced by gear reducer during operation (see ch. 4).

Including:

– **oil/air heat exchanger** (O/A; with thermostat and adjustable control knob 32 – 194 °F (0 – 90 °C) or **oil/water heat exchanger** (O/W),
– **motor pump**: screw pump with fluoro rubber seals (gear pump for UR O/W5.4 hp – UR O/W 28 hp); 4 pole motor B3/B5; motor-pump connection with coupling;
– **motor fan** (O/A) (three-phase or single phase supply, see next table)
– **analogic manometer** 0 – 250 psi (0 – 16 bar) mounted between pump and exchanger;
– **analogic thermometer** 32 – 250 °F (0 – 120 °C) mounted at exchanger output;
– **low pressure switch** (with on-off switch) mounted between pump and exchanger;
– **supporting frame** with nameplate.

On request, several accessories are at disposal (supplied separately, assembled by Customer) in order to satisfy all functionality and safety needs.

– **oil temperature probe Pt100**;
– **2-threshold signalling device CT03** (necessary also the oil temperature probe Pt100) for the mounting on rail to DIN EN 50022;
– **3-threshold signalling device CT10** (necessary also the oil temperature probe Pt100) for the mounting on rail to DIN EN 50022;
– **bi-metal type thermostat**;
– **flow gauge**;
– **filter** (with optical-electric blockage warning and one or two filters M60)

Connections realized by flexible pipes (type SAE 100 R1, maximum length 6 ft) between gear reducer and cooling unit and the assembly of accessories and signalling devices are Buyer's responsibility.

For the heat exchanger power required by the independent cooling unit:

$$\boldsymbol{P}_S \geq (\boldsymbol{P}_1 - \boldsymbol{Pt}_N \cdot \boldsymbol{ft}_1 \cdot \boldsymbol{ft}_2 \cdot \boldsymbol{ft}_3 \cdot \boldsymbol{ft}_4) \cdot (\mathbf{1} - \boldsymbol{\eta}) \cdot \mathbf{K}_1$$

where:

P_S	nominal power of unit [hp], i.e. the power dissipated by hot oil at approx. 176 °F (80 °C) and cooling air at 104 °F (40 °C) (O/A) or cooling water at 68 °F (20°C) (O/W) with stated capacity (see next table);
P_1	power at gear reducer input [hp] (consider the power installed when being uncertain about the power absorbed).
Pt_N	nominal thermal power of gear reducer [hp] (see ch. 4);
ft_1	thermal factor according to input speed (see ch. 4);
ft_2	thermal factor according to ambient temperature (see ch. 4);
ft_3	thermal factor according to mounting position (see ch. 4);
ft_4	thermal factor according to altitude (see ch. 4); for UR O/A derate also the exchanger power: multiply P_S by 0.85 (for 3 300 – 8 200 ft a.s.l.) or by 0.71 (for 8 200 – 16 400 ft a.s.l.);
η	gear reducer efficiency (see ch. 6);

K_1 = 1.18 takes into account the decrease of the exchanger efficiency due to dirt on the external surface.

Notes on page 347.

1) Oil connection valid for UR O/A 21 hp.
2) Oil connections valid when filter is present.
3) It is advisable to delay the gear reducer motor starting by at least 1 min compared to the motor pump starting.
4) The oil filter requires that cooling unit is started with oil already warm: refer to case A1 or B1.

Designation	Nominal power P_S hp	kW	Heat exchanger code	Oil motor pump motor 3~ hp	flow rate ft³/min	Motor fan motor hp	flow rate ft³/min	Oil connections intake	delivery	Exchanger capacity ft³	lb
UR O/A 7hp	**6.7**	5	AP 300 E	2	1.1	0.20 1~	540	1" (1¼")[2]	1" (1¼")[2]	0.07	130
UR O/A 9hp	**9.4**	7	AP 300/2 E	2	1.1	0.20 1~	770			0.13	145
UR O/A 13hp	**13**	10	AP 430 E	2	1.1	0.15 3~	1620			0.13	155
UR O/A 17hp	**17**	13	AP 430/2 E	2	1.1	0.19 3~	2060			0.19	165
UR O/A 21hp	**21**	16	AP 580 EB	3	2	0.19 3~	2830			0.53	210
UR O/A 28hp	**28**	21	AP 680 EB	3	2	1.41 3~	5180			0.57	260
UR O/A 35hp	**35**	26	AP 730 EB	4	2	1.41 3~	5180	1¼"	1½" (1")[1]	0.57	280
UR O/A 40hp	**40**	30	AP 730 EB	4	2.8	1.41 3~	5180			0.57	280
UR O/A 54hp	**54**	40	AP 830 EB	3	2	1.74 3~	6770			0.71	310
UR O/A 62hp	**62**	46	AP 830 EB	4	2.8	1.74 3~	6770			0.71	310

Designation	Nominal power P_S hp	kW	Heat exchanger code	Oil motor pump motor 3~ hp	flow rate ft³/min	Water pipe flow rate ft³/min	connections	Oil connections intake	delivery	Exchanger capacity ft³	lb
UR O/W 5hp	**5.4**	4	T60CB1	0.5	0.6	≥ 0.3 (≤ 1.1)	Ø12 mm	G ½"	G ½"	0.01	30
UR O/W 8hp	**8**	6	T60CB2	0.5	0.6	≥ 0.4 (≤ 1.1)	Ø12 mm	G ½"	G ½"	0.02	35
UR O/W 12hp	**12**	9	T80CB2	0.75	0.6	≥ 0.6 (≤ 1.1)	Ø12 mm	G ½"	G ½"	0.04	40
UR O/W 17hp	**17**	13	MS84P2	1.5	1.1	≥ 0.9 (≤ 1.6)	G ½"	G ¾"	G ¾"	0.04	70
UR O/W 28hp	**28**	21	MS134P1	2	1.1	≥ 1.4 (≤ 3.9)	G 1"	G ¾"	G ¾"	0.11	95
UR O/W 42hp	**42**	31	MS134P1	3	2	≥ 1.8 (≤ 3.9)	G 1"	G 1¼"	G 1¼"	0.11	120
UR O/W 67hp	**67**	50	MS134P2	4	2.8	≥ 2.8 (≤ 3.9)	G 1"	G 1¼"	G 1¼"	0.16	155

Starting mode and required accessories

Ref.	Gear reducer lubrication system	Gear reducer starting mode	T_{amb} °F (°C)	Required accessories	Required oil type	Description and remarks
A1	Splash lubrication	Without oil pre-heating	32 – 77 (0 – 25)	Pt100 + CT10	Mineral oil or synthetic oil (preferable)	**Gear reducer starting and subsequent motor-pump starting with warm oil**. The motor-pump is managed by the **three-threshold** oil temperature control system (Pt100 + CT10). Set the three-threshold device CT10 with: – operating temperature 140 °F (60 °C) (starting of motor-pump); – restoring temperature 104 °F (40 °C); – warning temperature 194 °F (90° C).
A2	Splash lubrication	Without oil pre-heating	> 77 (> 25)	–	Polyalphaolefine based synthetic oil	**Simultaneous starting of gear reducer and motor-pump** Oil filter not possible[4].
B1	Forced lubrication (bearings and/or gears)	With oil pre-heating	32– 77 (0 – 25)	Pt100 + CT03 Pt100 + CT10 Oil heater	Mineral oil or synthetic oil (preferable)	**Simultaneous starting of gear reducer and motor-pump after oil pre-heating**[3]. The oil heater is managed by the **two-threshold** oil temperature control system (Pt100 + CT03). The motor-pump and the gear reducer motor are managed by the **three-threshold** oil temperature control system (Pt100 + CT10). Set the two-threshold device CT03 with: – operating temperature 122 °F (50 °C) (oil heater disconnection); – restoring temperature 86 °F (30° C). Set the three-threshold device CT10 with: – operating temperature 104°F (40 °C) (starting of motor-pump and gear reducer motor); – restoring temperature 50 °F (10 °C); – warning temperature 194 °F (90° C).
B2	Forced lubrication (bearings and/or gears)	Without oil pre-heating	> 77 (> 25)	–	Polyalphaolefine based synthetic oil	**Simultaneous starting of gear reducer and motor-pump**[3] Oil filter not possible[4].

See notes on page 112.

Additional description when ordering by **designation**:

independent oil-air cooling unit UR O/A ... or **independent oil-water cooling unit UR O/W ...** , possibly integrated, when required by the application, with description: «**Forced lubrication ...**» and the statement of bearings and/or gear pairs to be lubricated. For dimensions, accessories and further technical details, see specific literature.

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(9) Forced bearing lubrication

All gear reducers according to train of gears, design, transmission ratio, mounting position, input speed and duty cycle can be equipped with a non-oil-bath forced bearing lubrication system through **internal piston pump** (size 4000 ... 4501) or external **lubrication system with motor pump** (see ch. 6).

The following table indicates the cases (see at ch. 8, 10) where – **according to the only mounting position** and for continous duty – it is necessary to foresee the bearing lubrication. For other operating conditions, consult us.

Train of gears	Performance	Presence of **lubrication pump** Mounting position					
		B3	**B6**	**B7**	**B8**	**V5**	**V6**
2I	**all**	–	–	–	n.a.	P	P
3I	**all**	–	–	–	n.a.	P	P
4I	**all**	–	–	–	n.a.	P	P
CI	**UO1A ... UO1N sin**	–	P	–	n.a.	P	P
	UO1H ... UO1M sin	P	P	–	n.a.	P	P
	UO1V ... UO1L sin	P	–	–	–	P	P
C2I	**UO1A ... UO1N sin**	–	P	–	n.a.	P	P
	UO1H ... UO1M sin	P	P	–	n.a.	P	P
	UO1V ... UO1L sin	P	–	–	–	P	P
C3I	**all**	–	P	–	n.a.	P	P

– Forced bearing lubrication not necessary.
P Forced bearing lubrication necessary (with pump or motor pump).
n.a. Mounting position not foreseen.

For cases highlighted with ▲ ch. 7 and 9, foresee the lubrication with **motor pump** and possible heat exchanger (see ch. 4, 6, 12 (10)).

IMPORTANT. For the running at cold starting ($T_{ambient} = T_{oil} \leqslant 77$ °F (25 °C)) and lubrication systems (see also ch. 6 and 12 (11)), **always foresee the oil heater** (see ch. 12 (12)).

In general, when the maximum system reliability is required, in presence of particulary heavy load cycles or hard ambient conditions, it is recommended to evaluate the possibility to install anyway the bearing lubrication motor pump; consult us.

Supplementary description when ordering by **designation**: **bearing lubrication pump** or **bearing lubrication motor pump**.

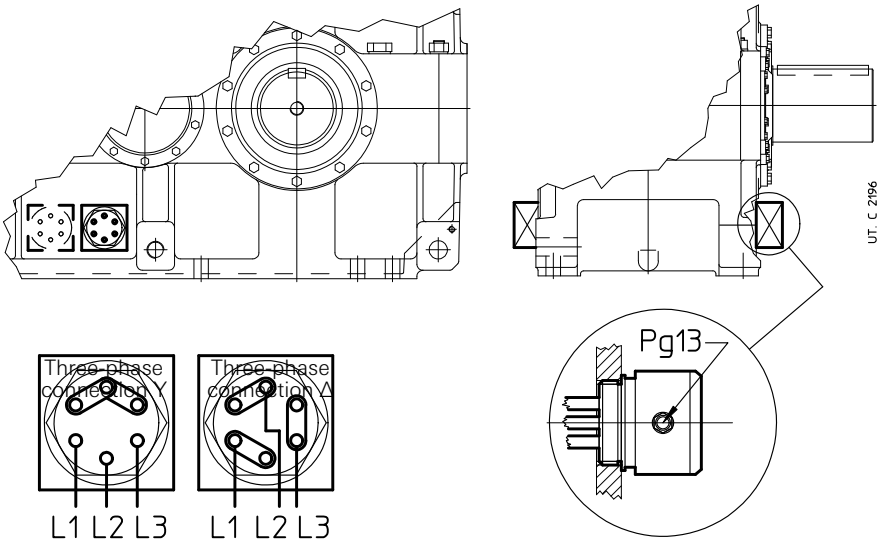
(10) Oil heater

Oil heater for gear reducer starting at low ambient temperature.

Specify the design «Oil temperature probe» together with this design.

The heater is piloted through proper control device (at customer's care e.g..: PLC or supplied by Rossi e.g. 2-threshold signalling device CT03N or three-threshold signalling device CT10N) releasing when achieving the pre-set oil temperature.

IMPORTANT. The data stated in the table refer to mounting positions **B3**; for other mounting positions, consult us.



Gear reducer size	**P** kW
4000, 4001	n. 2 × 1.5
4500, 4501	n. 2 × 1.5
5000, 5001	n. 2 × 3
5600, 5601	n. 2 × 3
6300, 6301	n. 2 × 3.5
7101	n. 2 × 7.5
8001	n. 2 × 9

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The design can be not compatible with other designs, consult us.

Features:
- specific power 2W/in$^{2;}$
- three-phase supply Δ230 Y400 V 50-60 Hz;
- stainless steel resistors AISI 321;
- metallic terminal box; cable gland Pg13; protection IP 65;
- Horizontal mounting with oil bath lubrication;
- max oil temperature 194 °F (90 °C);
- threaded brass joint G 2"½;
- available also in explosion-proof design ATEX II 2G EExd IIC T4: consult us.

Available also in a version equipped with integrated thermostat.

Supplementary description when ordering by **designation**: **oil heater** or **oil heater with thermostat.**

(11) Special painting cycles

Special painting cycles (base color blue RAL 5010), see following table, according to corrosivity class of operating environment. Other protections or colors on request: consult us.

Application field	Features	Corrosivity class ISO 12944-2	Durability classes ISO 12944-2	Description	Average final thickness on machined parts µm	Code
Applications in aggressive environments	Good resistance to atmospheric and aggressive agents	C4	Low	Dual-compound epoxy primer + Water-soluble dual-compound enamel with acrylic-polyurethan resins	150	**1HRAL5010** (blue)
			Medium	Dual-compound epoxy primer (× 2) + Water-soluble dual-compound enamel with acrylic-polyurethan resins	200	**2HRAL5010** (blue)
			High	Dual-compound epoxy primer (× 4) + Water-soluble dual-compound enamel with acrylic-polyurethan resins	300	**3HRAL5010** (blue)
Outdoor applications in saline environment 1)	Excellent resistance to atmospheric and aggressive agents Outdoor applications in saline environment	C 5 - M	Medium	Sanding + Dual-compound antirust primer with zinc phosphates + Dual-compound epoxy primer + Water-soluble dual-compound enamel with acrylic-polyurethan resins	300	**2IRAL5010** (blue)
Outdoor applications in chemically aggressive environment and high humidity industrial areas 1)	Excellent resistance to atmospheric and aggressive agents Outdoor applications in chemically aggressive environment (fertilizers, etc.)	C 5 - I	Medium	Sanding + Dual-compound antirust primer with zinc phosphates + Dual-compound epoxy primer + Water-soluble dual-compound enamel with epoxy resins	300	**2LRAL5010** (blue)

1) In these cases, according to the application type, it is advised to adopt specific construction measures and accessories/components able to offer an adequate protection for the installation environment: consult us.

Supplementary description when ordering by **designation**: **special paint ...** (see code stated in the table; e.g.: «**special painting cycle 2HRAL5010**».

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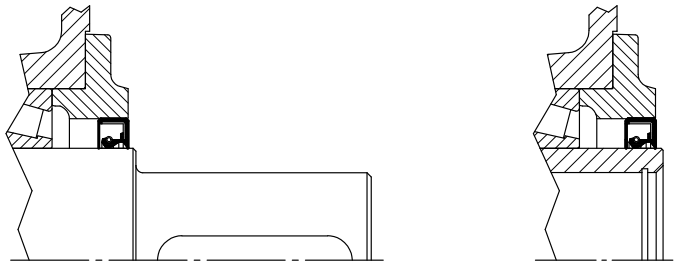
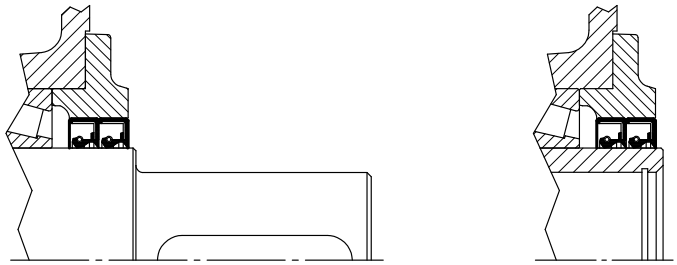
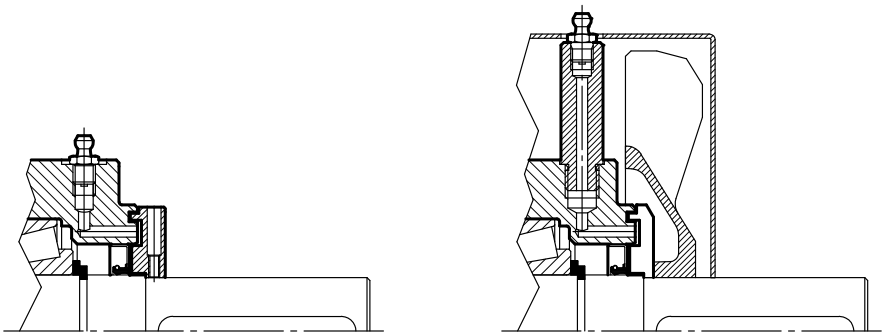
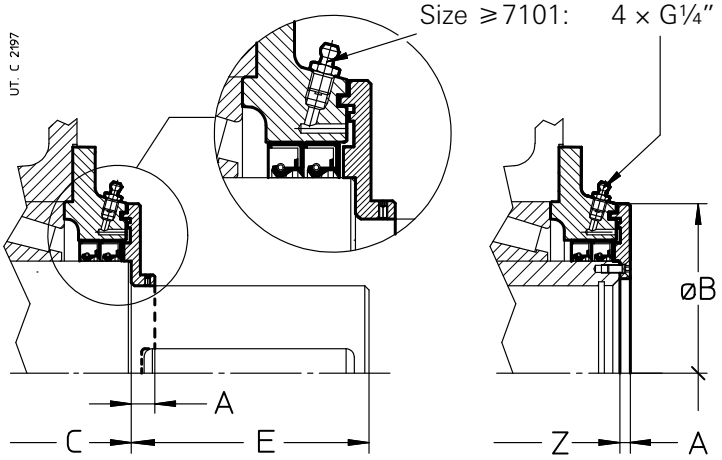
(12) High and low speed shaft seals

Available seal types (standard and on request) on high and low speed shafts are stated in the following table.

Seal type	Scheme
Standard	
Double seal on high speed shaft Quite polluting environment and/or outdoor **Low speed shaft double seal** Quite polluting environment and/or outdoor	 Supplementary description when ordering by **designation**: **double seal on high speed shaft**. **double seal on low speed shaft**.
High speed shaft seal with labyrinth and grease feeder («taconite») Very polluting environment (e.g.: mining industry)	 Supplementary description when ordering by **designation**: **high speed shaft seal with labyrinth and grease feeder.**
Low speed shaft double seal with labyrinth and grease feeder («taconite») Very polluting environment (e.g.: mining industry) 1)	Size ⩽ 6301: 2 × G¼" Size ⩾ 7101: 4 × G¼"  Supplementary description when ordering by **designation**: **low speed shaft seal with labyrinth and grease feeder.**

Gear reducer size	A	A 2)	B Ø
4000, 4001	19	9	328
4500, 4501	19	9	368
5000, 5001	19	11	402
5600, 5601	22	11	462
6300, 6301	24	13	496
7101	0	10	653
8001	0	10	759

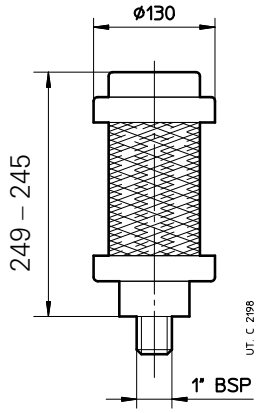
See notes at following page.

Notes.

- Acrylonitrilic seal ring compound as standard; fluoro compound seal rings are available on request (e.g.: for high temperatures, for aggressive environments or for high rotation speeds, etc.); specify in the designation: **fluoro compound seal**.
- The **high speed shaft double seal** is usually **not advised** as the increased heating reduces the seal life.
- In case of **double seal**, the external seal ring can be mounted on the contrary (e.g. water jets); specify in the designation: **external ring mounted on the contrary**.
- The design **high speed shaft seal with labyrinth and greaser** can be supplied only after technical feasibility evaluation by Rossi: consult us.
- The **hollow shaft with shrink disc** (see ch. 12 (1)) can be supplied with **labyrinth seal** only on shrink disc **opposite side**.

For the supplementary description when ordering by **designation**, see table on the previous page.

(13) Desiccant breather

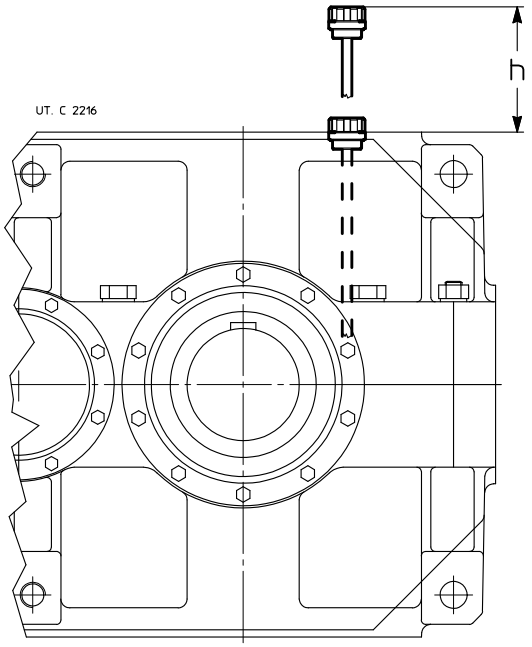


Desiccant breather with 3 stage filtration design: solid contaminant filter 2 µm, water vapor adsorbent bed in silica gel, activated carbon final filter. This filter traps water vapor and solid contaminant particles and keeps them from entering the gear box and simultaneously holds oil vapors inside the gear box.

Key features:
– replacement cartridge with true-life indicator of filter conditions
– alkali, oil, non-oxidizing acids, salt water and mineral and synthetic oils resistant;
– shock resistant cover and housing
– temperature range of application: -82 °F – +199 °F.

Supplementary description when ordering by **designation**: **Desiccant breather**

(14) Oil level plug with dip stick



Gear reducer size	h ≈		
	2I, CI	**3I, C2I**	**4I, C3I**
4000, 4001	630	630	560
4500, 4501	710	630	560
5000, 5001	800	800	710
5600, 5601	900	800	710
6300, 6301	1000	900	800
7101	1120	1000	900
8001	1250	1120	1000

The data stated in the table refer to mounting position **B3** and **splash lubrication**. For further details about operating conditions, consult us.

Supplementary description when ordering by **designation**: **Oil level with dip stick**

1) The labyrinth disc overhangs from A dimension and from shaft shoulder; the working length of low speed shaft end will be therefore equal to E - A (for dimension C and E see ch. 8 and 10); for dimension Z see ch. 12 (1), (3).
2) Values valid for hollow shaft (with keyway or shrink disc).

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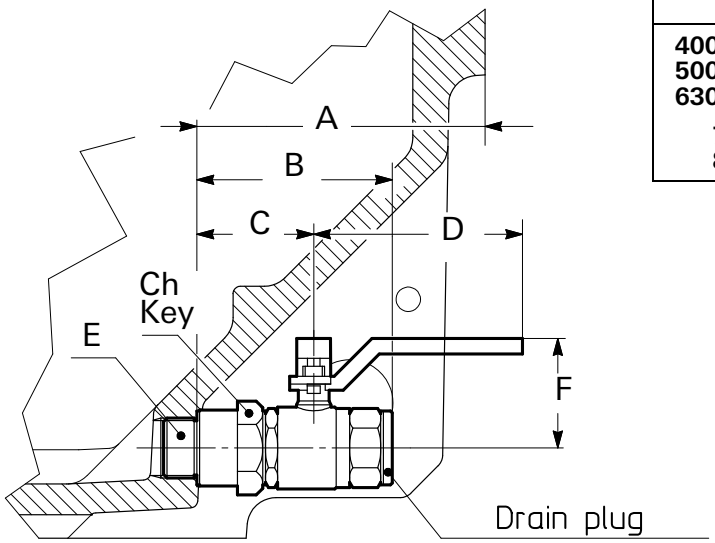
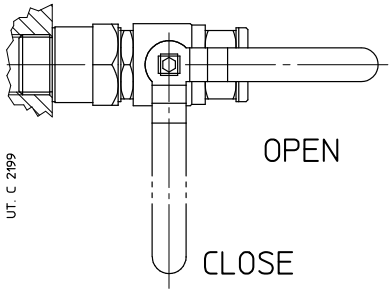
(15) Oil drain tap

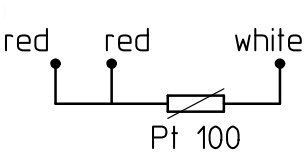


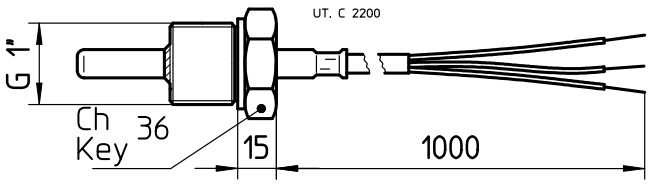
Gear reducer size	A	B	C	D	Ch Key	E	F
4000, 4501	158	106	66	115	46	G1″	60
5000, 5601	208	106	66	115	46	G1″	60
6300, 6301	190	106	66	115	46	G1″	60
7101	225	158	95	138	55	G1″¼	75
8001	280	170	102	158	60	G1″½	91



In a closed position, the tap lever does not overhang from gear reducer.
Additional description when ordering by **designation**: **oil drain tap**

(16) Oil temperature probe





Remote oil temperature gauge; installation (at Buyer's responsibility) instead of an existing drain plug, or into a hole properly pre-arranged. The temperature gauge is realized with a thermo-resistor Pt100 having following features:
– platinum wire with 100 Ω at 32 °F (0 °C) according to EN 60751;
– precision class B according to EN 60751;
– operation temperature field -40 °F – +328 °F (-40 °C – +200 °C);
– max current 3 mA;
– 3 wires connection according to IEC 751 (see fig. below);
– stainless steel probe AISI 316; diameter 6 mm;
– cable 1 m long with free end.
For the connection of probe to relevant signalling device CT03 or CT10 (on request, consult us) use a protected section cable ⩾ 1.5 mm2 positioned separately from power cables.
In case of gear reducer supplied **filled with oil** foresee the probe equipped with **immersion bulb** (pre-mounted in the factory), its position is to be agreed with Rossi; consult us.
Supplementary description when ordering by **designation**: **oil temperature probe**.

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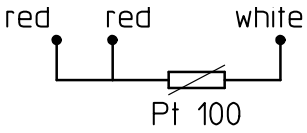
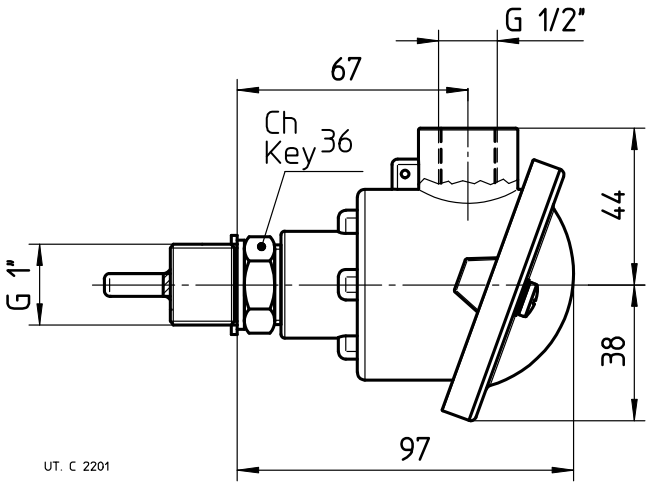
(17) Oil temperature probe with terminal box and ammetric transducer 4 ÷ 20 mA





Remote oil temperature gauge, with terminal box and amperometric transducer; installation (at Buyer's responsibility) instead of drain plug. The temperature gauge is realized with a thermo-resistor Pt100 having following features:
– platinum wire with 100 Ω at 32 °F (0 °C) according to EN 60751;
– precision class B according to EN 60751;
– temperature range -40 °F – +328 °F (-40 °C – +200 °C);
– 3 wires connection according to IEC 751 (see fig. below);
– stainless steel probe AISI 316; diameter 6 mm;
– amperometric transducer with output signal 4 – 20 mA;
– alluminium terminal block (supplied without cable gland);
– protection IP65;
– input cables G ½''.
For the connection of probe to relevant signalling device CT03N or CT10N (on request, consult us) use a protected section cable ⩾ 1,5 mm² positioned separately from power cables.

ATTENTION. Accessory available only after technical feasibility evaluation by Rossi: consult us.

In case of gear reducer supplied **filled with oil** foresee the probe equipped with **immersion bulb** (pre-mounted in the factory), its position is to be agreed with Rossi; consult us.

Supplementary description when ordering by **designation**: **oil temperature probe with ammetric transducer.**

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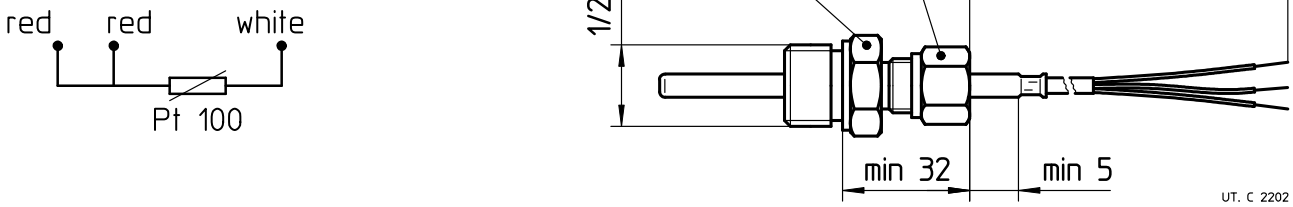
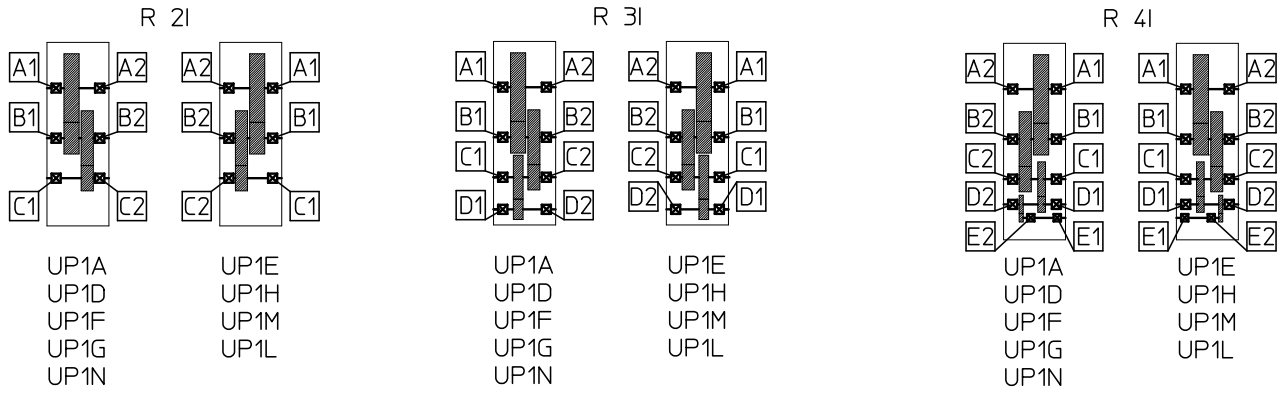
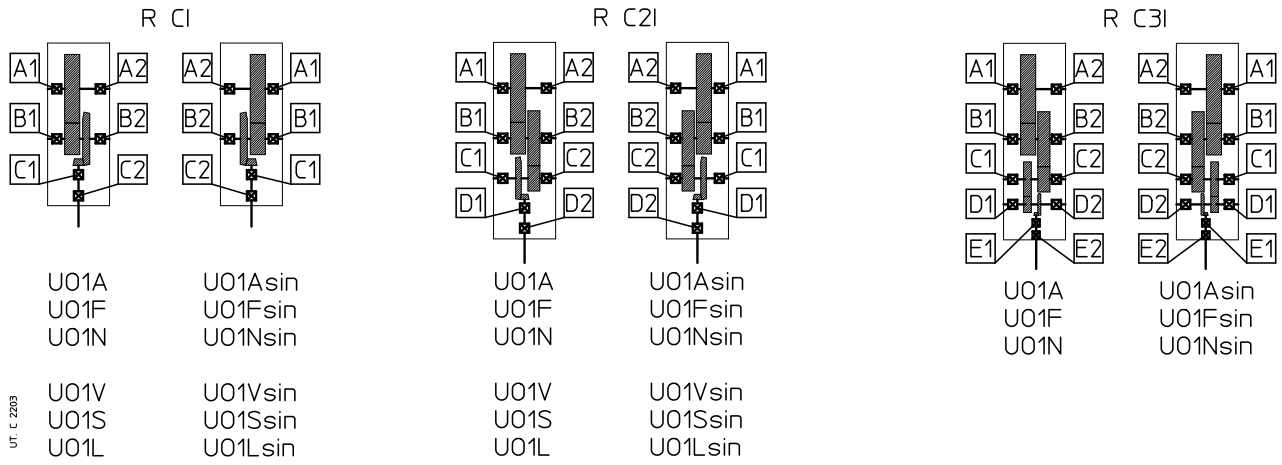
(18) Bearing temperature probe







Probe for the remote monitoring of bearing temperature; installation (Buyer's responsibility) in a hole properly pre-arranged, next to a bearing **to be agreed during order phase** (for the most common cases, in order to facilitate the identification of bearing to be monitored, refer to following scheme).

The temperature gauge is realized with a thermo-resistor Pt100 having following features:

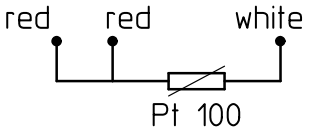
- platinum wire with 100 Ω at 32 °F (0 °C) according to EN 60751;
- precision class B according to EN 60751;
- operation temperature field -40 °F – 328 °F (-40 °C – + 200 °C);
- max current 40 mA;
- 3 wire connection according to IEC 751 (see fig. on the top);
- stainless steel AISI 316 flat probe; diameter 6 mm;
- stainless steel **sliding** steel;
- cable 1 m long with free end.

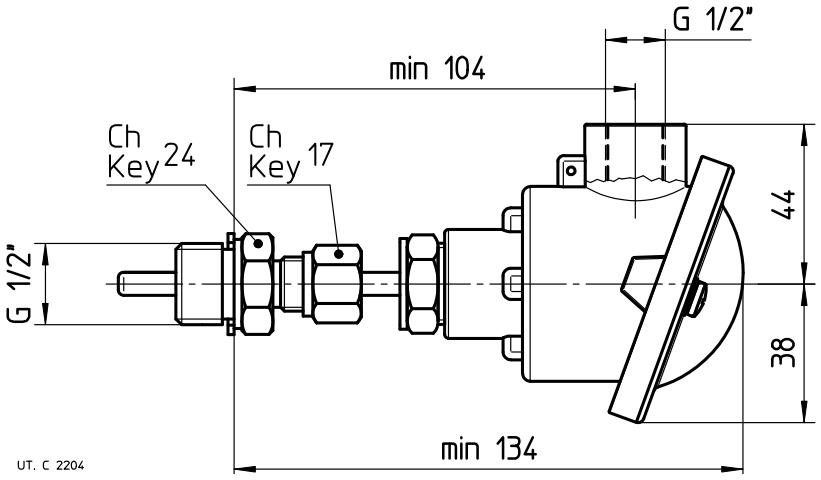
For the connection of probe to relevant signalling device CT03N or CT10N (on request, consult us) use a protected section cable ⩾ 1,5 mm² positioned separately from power cables.

ATTENTION. Accessory available only after technical feasibility evaluation by Rossi: consult us.

Supplementary description when ordering by **designation**: **bearing temperature probe**.

(19) Bearing temperature probe with terminal box and ammetric transducer 4 – 20 mA





Probe for remote bearing temperature monitoring, with terminal box and ammetric transducer; installation (at Buyer's responsibility) in a threaded hole properly pre-arranged next to a bearing to be agreed when ordering (for the most common cases, in order to facilitate the identification of the bearing to be monitored, it is possible to refer to the scheme at point (18)).

The temperature gauge is realized with a thermo-resistor Pt100 having following features:

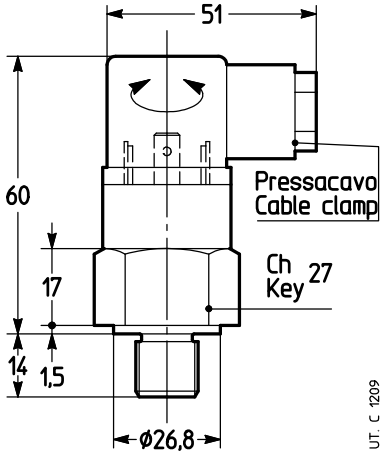
- platinum wire with 100 Ω at 32 °F (0 °C) according to EN 60751;
- precision class B according to EN 60751;
- operation temperature field -40 °F – 328 °F (-40 °C – +200 °C);
- 3 wire connection according to IEC 751 (see fig. on the top);
- ammetric transducer with output signal 4 – 20 mA;
- alluminium terminal block (supplied without cable gland);
- IP65 protection;
- input cables G ½'';
- stainless steel AISI 316 flat probe; diameter 6 mm;
- stainless steel **sliding** steel;
- cable 1 m long with free end.

For the connection of probe to relevant signalling device CT03N or CT10N (on request, consult us) use a protected section cable ⩾ 1,5 mm² positioned separately from power cables.

ATTENTION. Accessory available only after technical feasibility evaluation by Rossi: consult us.

Supplementary description when ordering by **designation**: bearing temperature probe with **ammetric transducer.**

(20) Bi-metal type thermostat



Bi-metal type thermostat for maximum oil temperature control.

Thermostat specifications:

- NC contact with maximum current 10 A 240 V a.c. (5 A - 24 V c.c.);
- G 1/2" thread connection;
- cable gland Pg09 DIN 43650;
- protection IP65;
- operating temperature 194 °F ± 9 °F (90 ± 5 °C) (further operating temperatures are available on request);
- differential temperature 59 °F (15 °C).

Mounting into a threaded plug (position to be defined according to mounting position and mounting arrangement: consult us) and oil bath lubrication is Buyer's responsibility.

ATTENTION. Accessory available only after technical feasibility evaluation by Rossi: consult us.

Supplementary description when ordering by **designation**: **bi-metal type thermostat**.

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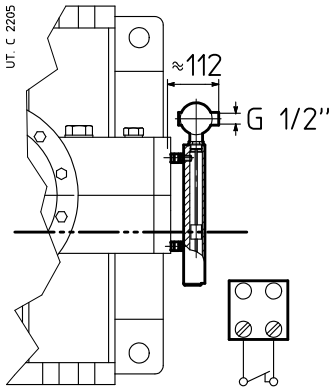
(21) Oil level switch with float



It is a level control device with reed contacts in a supporting stem moved by the magnetic field activated by the magnets included in the float.

The float and the supporting stem are included in a hollow column of not magnetic material connected to the gear reducer housing through communicating vessels.

Connecting features:
- 2 wires connection;
- max voltage: 350 V;
- maximum current: 1.5 A;
- 1 cable input 1/2" UNI 6125 – IP65;
- G 1" brass joint.

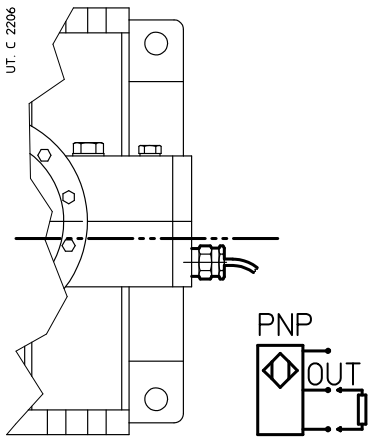
The switch is supplied ready for use; when level goes down approx 5 mm, the switch goes on and contact opens.

When filling oil in the gear reducer it is necessary to verify that device is properly calibrated. If any problems occur during this operation contact Rossi.

ATTENTION. Accessory available only after technical feasibility evaluation by Rossi: consult us.

Supplementary description when ordering by **designation: oil level switch with float.**

(22) Oil optical probe



Optical scanner, without mobile parts, for the constant control of oil level, inside the gear reducer at rest (e.g. control before starting the machine or the plant).

Features:
- stainless steel probe;
- operation temperature range -40 °F – +257 °F (-40 °C – +125 °C);
- d.c. supply 12 – 28 V (other types on request; consult us);
- PNP output (other types on request, consult us), max 100 mA;
- G 1/2" thread connection.

Supplementary description when ordering by **designation**: **oil optical probe.**

12

(24) Remote temperature indicator instrument with set point

Digital thermometer (dimensions 72×72×130 mm DIN 43700) to be used with oil or bearing temperature probe; moreover, it is equipped with switching contact (automatic reset) when reaching the (adjustable) temperature set point.

Supplementary description when ordering by **designation**: **remote temperature indicator instrument with set point.**

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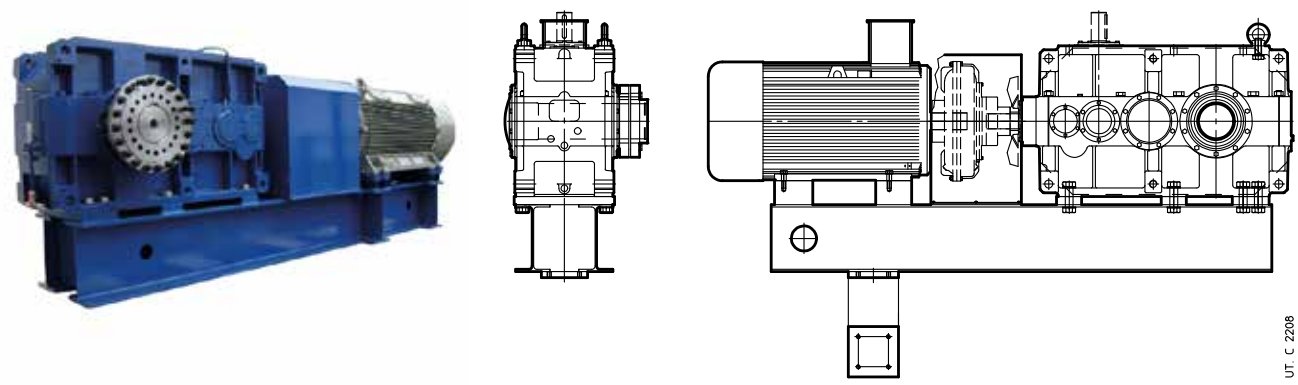
Various

– Drive units



Drive units include an electric motor and a (helical or bevel helical) gear reducer, assembled on a swing base made of electrically-welded and annealed steel, properly sized, and connected through a coupling.

Swing base

The swing base structure is made of hollow profiles or beams properly combined, treated and machined. The project is made to maximize the swing base strength, in order to optimize costs and performance. All swing bases have been verified for bending, considering the highest load condition among the ones foreseen on this catalog.

On each swing plate there are machined surfaces for fitting and jacking screws for alignment of the components of the drive unit.

The matching point for the reaction arm has been defined in order to optimize the swing base fixing, so to minimize the stress on swing base and transmission components.

The standard supply includes the reaction point with elastic bush supplied separately (assembly is up to Customer). If necessary the complete reaction arm can be quoted and supplied, subject to agreement with Customer about characteristics and dimensions.

Gear reducer

The standard arrangement for this type of drive units is shaft mounted, with gearbox with hollow low speed shaft. Connection between gearbox and machine shaft is possible with keyway or shrink disc. On request it is possible to supply covers for rotating parts.

As alternative the option for shaft mounting with solid cylindrical low speed shaft, complete with rigid flanged coupling, is available.

Joint

The coupling can be of different types: flexible, basic hydraulic, or hydraulic with simple or double delayed fill chamber. Both types of coupling can be supplied with drum pulley for failsafe shoe brake. On request the option with disc brake is also available.

Both the coupling and the safety or parking brake (if any) are protected with a steel guard fixed to the swing base.

For further details see cat. RE: consult us.

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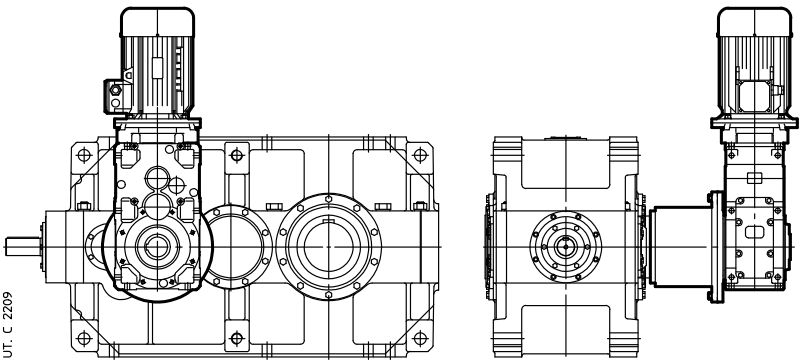
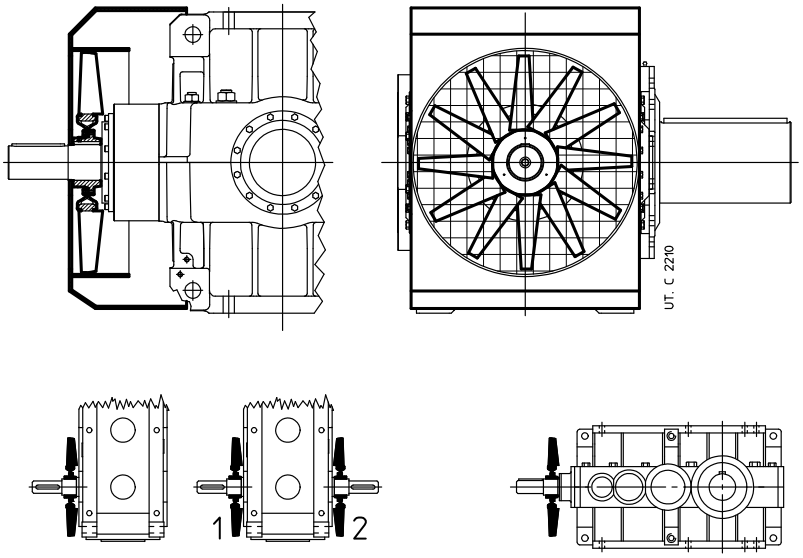
– Auxiliary drive



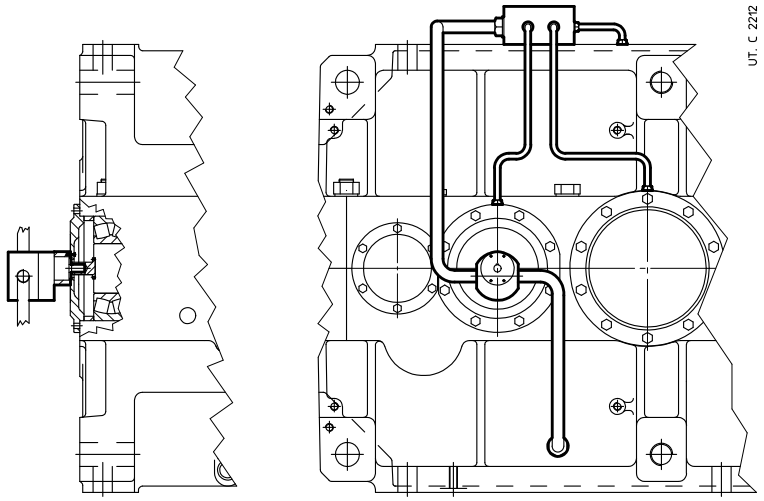
Additional motor drive with bevel helical gearmotor (cat. G, trains of gears CI, ICI, C2I) connected with main gear reducer through bell, coupling and free wheel.

– Axial fan cooling



Forced cooling by axial fan for applications with one direction of rotation only (to be specified when ordering); for thermal factor values ft_{1b} see ch. 4. The possible designs are those illustrated below. Dimensions on request: consult us.

– Pump driven by gear reducer



External gear pump driven directly by a gear reducer shaft for the forced lubrication of bearings and/or gears. Self-priming operation, with non-return valve, single acting (one-way applications) or double-acting (bidirectional applications); absence of electrical power; flow rate proportional to the shaft rotational speed of the gear unit.. Dimensions and other specifications, on request: consult us.

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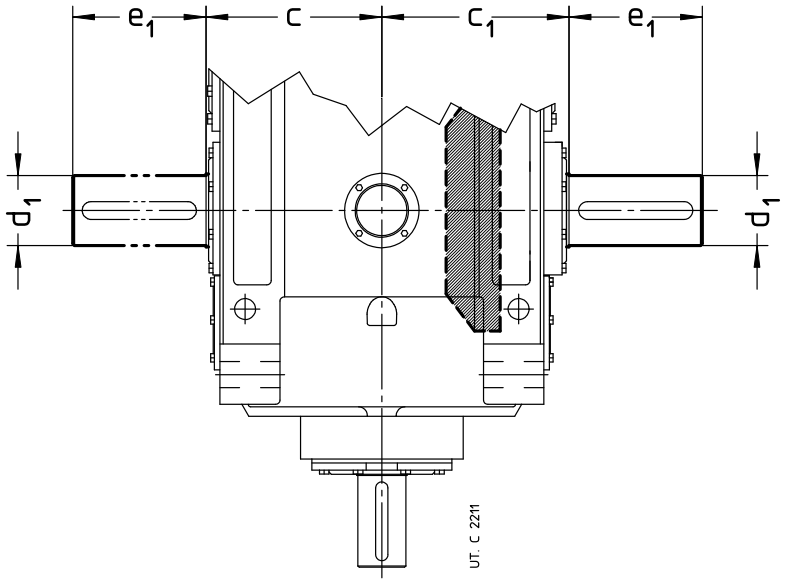
– Additional intermediate shaft overhung for bevel helical gear reducers



Additional (single or double) overhung of first reduction stage pinion shaft (bevel helical gear reducers' bevel wheel) for the realization of combined units or the application of auxiliary devices (e.g.: external backstop device). Main shaft end dimensions as per following table (for other dimensions see ch. 6). For sizes 7101 and 8001, consult us.

Size	R CI				R C2I				R C3I			
	c	**c_1**	**d_1** Ø	**e_1**	**c**	**c_1**	**d_1** Ø	**e_1**	**c**	**c_1**	**d_1** Ø	**e_1**
4000 ... 4501	330	370	120	210	335	335	90	170	325	325	65	140
5000 ... 5601	–	–	–	–	430	430	110	210	405	405	80	170
6300, 6301	–	–	–	–	475	475	125	210	435	435	90	170

In the following table the first reduction stage transmission ratios are stated – according to total transmission ratios – thanks to which it is possible to calculate the rotation speed of auxiliary overhung.

Train of gears	Nominal transmission ratio i_N					u_{N1} 1)
	4000, 4001	**4500, 4501**	**5000, 5001**	**5600, 5601**	**6300, 6301**	
CI	– $i_N \leq 11,2$ $12,5 \leq i_N \leq 14$ $i_N \geq 16$ –	$i_N \leq 9$ $10 \leq i_N \leq 12,5$ $14 \leq i_N \leq 16$ $i_N \geq 18$ –	–	–	–	2 2,5 3,15 4 5
C2I	$i_N \leq 25$ $28 \leq i_N \leq 40$ $45 \leq i_N \leq 50$ $56 \leq i_N \leq 80$ $i_N \geq 90$	$i_N \leq 28$ $31,5 \leq i_N \leq 45$ $50 \leq i_N \leq 56$ $63 \leq i_N \leq 90$ $i_N \geq 100$	$i_N \leq 25$ $28 \leq i_N \leq 40$ $45 \leq i_N \leq 50$ $56 \leq i_N \leq 80$ $i_N \geq 90$	$i_N \leq 28$ $31,5 \leq i_N \leq 45$ $50 \leq i_N \leq 56$ $63 \leq i_N \leq 90$ $i_N \geq 100$	$i_N \leq 31,5$ $40 \leq i_N \leq 50$ $56^{2)} \leq i_N \leq 71$ $i_N \geq 80$	2 2,5 3,15 4 5
C3I	– $i_N = 125$ $160 \leq i_N \leq 200$ $i_N \geq 250$ –	– $i_N = 125$ $160 \leq i_N \leq 200$ $i_N \geq 250$ –	– $i_N = 125$ $160 \leq i_N \leq 200$ $i_N \geq 250$ –	– $i_N = 125$ $160 \leq i_N \leq 200$ $i_N \geq 250$ –	$i_N = 125$ $i_N = 160$ $200^{3)} \leq i_N \leq 250$ $i_N \geq 315$	2 2,5 3,15 4 5

1) First reduction stage nominal transmission ratio.
2) For R C2I 6301 with $i_N = 56$: $u_{N1} = 2,5$ instead of 3,15.
3) For R C3I 6301 with $i_N = 200$: $u_{N1} = 2,5$ instead of 3,15.

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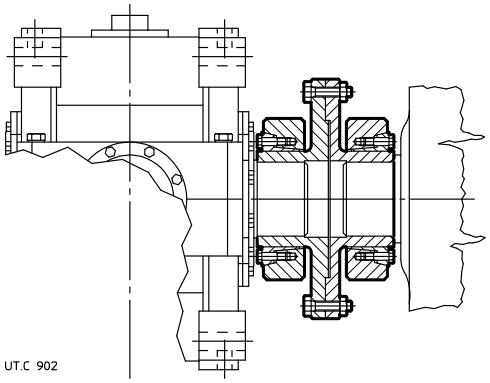
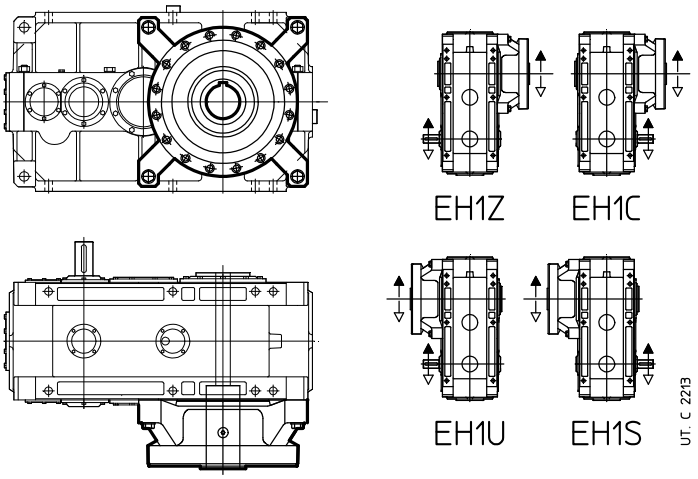
– **Low speed shaft with flange coupling for shaft mounting arrangements**



Low speed cylindrical shaft without keyway for application of a flange coupling for drive unit shaft mounting.

– **Design for extruders**



Helical gear reducers sizes 4000 ... 4501 equipped with external auxiliary support to allow the coupling with single screw extruders (see ch. GX).

12

– **Pre-arrangement for vibration monitoring devices**

Position, number and dimension of holes to be agreed when ordering.

– **ATEX design**

For the application in potentially explosive atmospheres to ATEX 2014/34/UE category 2 GD (zone 1 (gas) or 21 (dust)) or 3 GD (zone 2 (gas) or 22 (dust)), surface temperature T 135 °C (T4).

These are the main variations of the product:

- fluoro-rubber seal rings (double seal rings on low speed shaft for cat. 2 GD);
- metal plugs; filler plug with filter and valve;
- special name plate with ATEX mark and indication of application limits;
- external protection with water soluble dual compound polyurethan conductive enamel, color grey RAL 7040, corrosivity class C3 ISO 12944-2;
- oil temperature probe and eventual bearing temperature probe (cat. 2 GD).

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Technical formulae

[illegible]

Index of revisions

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Page 36	Completed table with missing values
Page 52	Modified figures of mounting positions
Page 57	Modified figures of mounting positions
Page 61	Modified figures of mounting positions
Pages 64-69	New selection tables (bevel helical gear reducers)
Page 75	Modified figures of mounting positions
Page 79	Modified figures of mounting positions
Page 83	Modified figures of mounting positions
Page 88	Added note about radial and axial loads in case of hollow or double extension shafts
Page 102	Added note about machine shaft end dimension in case of design 12.(12)
Page 102	Added note about hollow low speed shaft tollerance
Page 104	Added note about machine shaft end dimension in case of design 12.(12)
Page 104	Added note about hollow low speed shaft tollerance
Page 104	Modified M_2 values in the table
Page 104	Added on machine shaft end diameter abutting with gear reducer
Page 106	Modified limit transmission ratios for design 12.(4)
Page 108	Amended value of X dimension (4000 ... 4501) in the table
Page 112	Updated table of design 12.(9)
Page 113	Updated table of design 12.(11)
Page 118	Updated bearing identification scheme 12.(18)
Page 120	Removed option 12.(23)

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	Range extension through the introduction of new sizes 7101 and 8001
Page 24	Updated table Nominal thermal power
Page 28	Updated table Input speed
Page 34	Updated table Sound levels
Page 36	Updated table Low and high speed shaft end
Page. 37	Updated table Side cover dimensions
ch. 7	Updated selection tables (parallel shaft gear reducers)
Page 50	Updated figures of mounting positions and dimensional tables
Page 53	Updated oil quantity table
Page 54	Updated figures of mounting positions and dimensional tables
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Page 58	Updated figures of mounting positions and dimensional tables
Page 61	Updated oil quantity table
ch. 9	Updated selection tables (right angle shaft gear reducers)
Page 76	Updated figures of mounting positions and dimensional tables
Page 79	Updated oil quantity table
Page 80	Updated figures of mounting positions and dimensional tables
Page 82	Updated figures of mounting positions
Page 83	Updated oil quantity table
Page 86	Modified radial loads table
Page 100	Added axial and radial loads table sizes 7101-8001
Page 101	Added axial and radial loads table sizes 7101-8001
Page 102	Updated tables
Page 103	Updated table
Page 105	Updated table
Page 115	Updated table
Page 116	Updated table
Page 130	Inserted new nameplate and updated table

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Page 76 Updated dimensional table

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