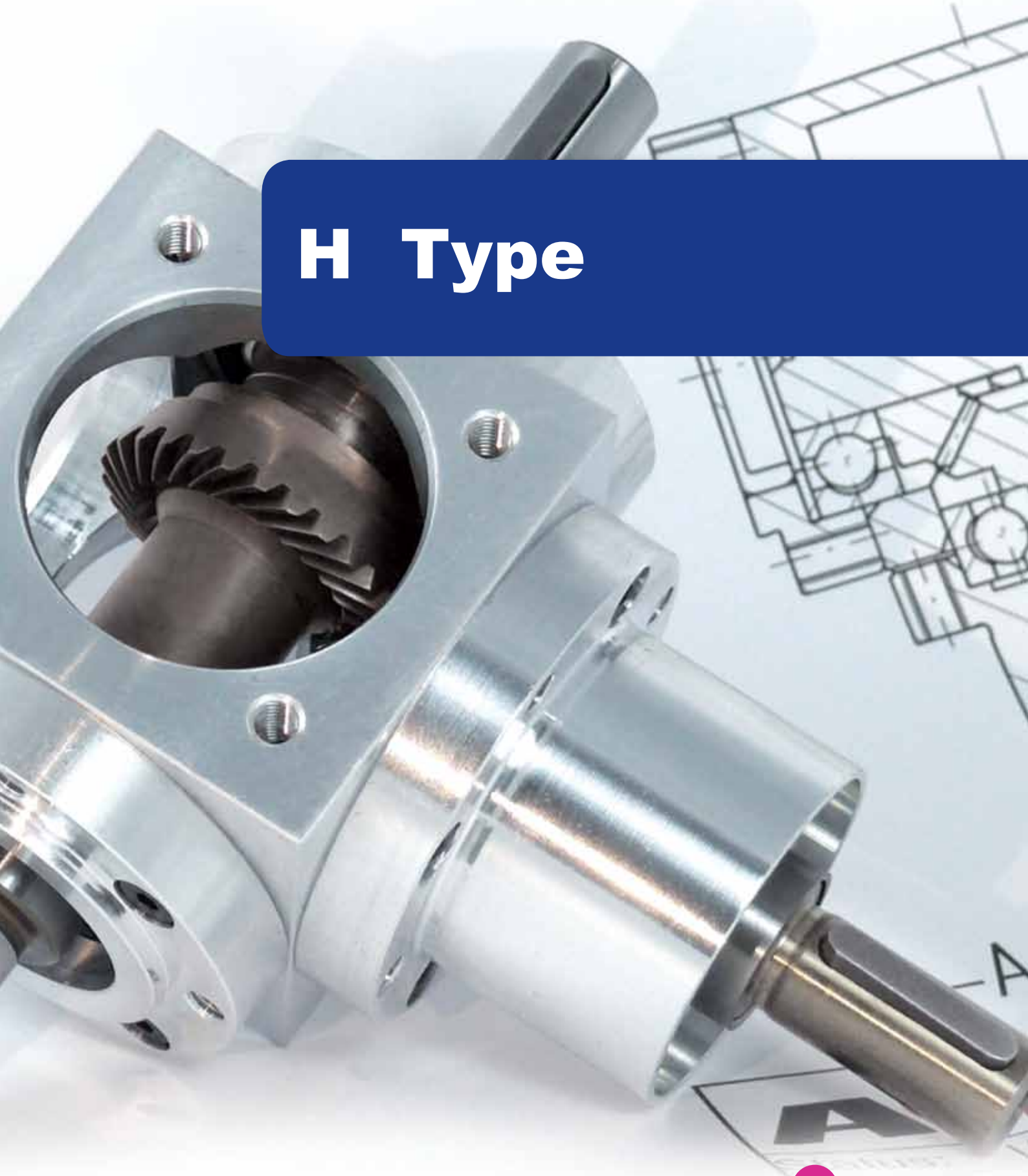
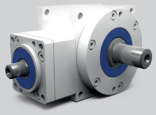
Produktkatalog | *Product-Catalogue*

H Type



ATEK
ANTRIEBSTECHNIK



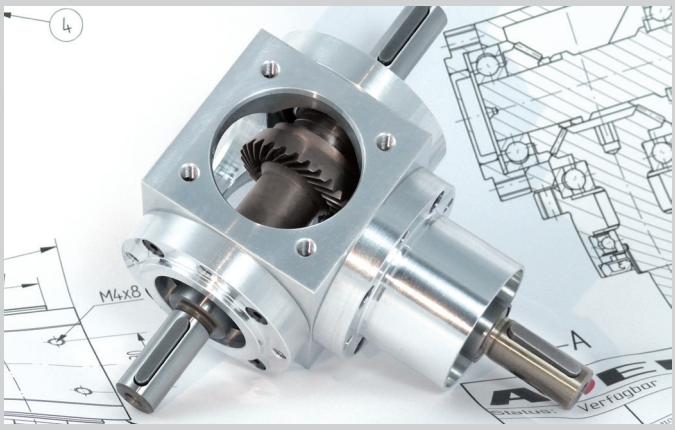
Hypoid gearboxes

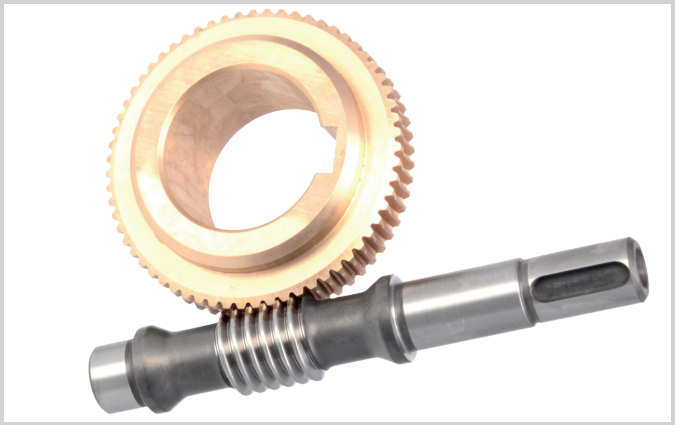
Gear ratios: i = 8:1 to 15:1
Maximum output torque: 1700 Nm
6 gearbox sizes with edge lengths of 090 to 260 mm
Speeds up to n_1 = 8000 rpm

Dynamic, powerful, compact
Housing made of aluminium
Hypoid gear sets
Axial offset between drive and output-
Maintenance-free

ATEK ANTRIEBSTECHNIK

2 Contents





Legal information:
We give no warranty for the correctness of the contents, in spite of thorough processing. With the publishing of this catalogue, all previous catalogues are rendered invalid. We reserve the right to change the design, weight, and dimensions of our angular gearboxes. Deliveries and services are provided according to our “General Terms and Conditions”.

ATEK Antriebstechnik

As a medium-sized gearbox manufacturer, today we look back on over 75 years of tradition. For more than 30 years, everything for us has “revolved” around right-angle power transmission.

Today, as from the beginning, we are driven by one thing: solving your drive-engineering problems. – technically competent, economical, reliable and fast!

Developed and assembled in the Hamburg metropolitan region and distributed throughout the world, our range of products comprising single-stage angular gearboxes has allowed us to secure a large market share which has been steadily growing for the past number of years.

The modularly structured product range primarily comprises bevel gears and worm gears and the servo series which can be combined with modern servo-motors. Our angular gearboxes stand out thanks to their compact build, extensive performance spectrum and variety of feasible step-up/down ratios. Thanks to our enormous warehouse we can often supply our standard series within a matter of hours.
Be it for application-specific drive train solutions for special machine construction or series products for general machine construction: The ATEK modular system leaves nothing to be desired.

Our customers benefit from well-engineered drive train solutions, top-quality products and processes, established know-how and very reasonable value for money.

In addition to a worldwide distribution network which guarantees competent, on-site support, round-the-clock contact and communication can also be established over the Internet. A gearbox configurator is available via our www.atek.de homepage, from which customers and interested parties can download the 3D CAD data of all ATEK bevel gearboxes, worm gearboxes and servo gearboxes, thus allowing them to be more effectively integrated into the construction and supply process.

1939
Formation of Willi Glapiak turnery in Hamburg

1978
Change of legal form into a GmbH (limited liability company)

1983
Merger of Willi Glapiak GmbH and ATEK Ingenieurbüro f. Antriebstechnik to today’s ATEK Antriebstechnik Willi Glapiak GmbH and transfer of the company seat to Rellingen

1985
Focussing on single-stage bevel gearboxes and worm gearboxes

Our motto is Vmax…
and not only with regard to the rotational speed of our products

Drive
Our hallmark:
Excellent ability to supply

Efficient logistics:
High parts availability at our locations and those of our partners

Fast and almost constant reachability

Know-how
Realisation of our high quality standards through selected, highly specialised suppliers and a qualified and experienced staff team

Our processes are subject to continuous monitoring

Our management system is certified

Performance
Whether standard or special manufacture, maintenance or advisory service...
Your drive-engineering task definition
is our challenge!

We set benchmarks as to reliability, dynamics, and high precision

We stand for long-standing partnerships, loyalty and confidence

1995
Inclusion of servo gearboxes (Ad-Servo series) into the product range

1997
Relocation to Prisdorf / Expansion of production capacities

Since 2002
Internationalisation / Development / extension of foreign markets

2009
Inclusion of miniature gearboxes (L series) into the product range

2012
Inclusion of hypoid gears (HC series) into the product range

2013
Relocation to Rellingen with renewed expansion of production capacities

4 General

4.1 Gearboxes

“A gearbox is a machine element used to change movement parameters. Sometimes, the change of a force or a torque plays the decisive role. The movement to be changed is often a rotary movement.” (Wikipedia)
ATEK offers angular gearboxes of the following types that deflect the direction of a rotary movement by 90° and, if desired, also change the rotational speed and the torque.

Bevel gearboxes – types

L	miniature
LC	prepared for the mounting of a servo-motor
V	with free shaft ends
HDV	Hygiene-design bevel gearboxes
VS	the through-shaft is fast-running
VL	prepared for the mounting of an IEC standard motor
VLM	complete with IEC motor
VC	prepared for the mounting of a servo-motor

Hypoid gearboxes – types

H	with free shaft ends
HC	prepared for the mounting of a servo-motor

Worm gearboxes – types

S	with free shaft ends
SL	prepared for the mounting of an IEC standard motor
SLM	complete with IEC motor
SC	prepared for the mounting of a servo-motor

4.2 Legal classification

The gearboxes are “incomplete machines” within the meaning of the Machinery Directive. They are designed for the European market. In non-EU countries, the respective provisions must be observed. The gearbox must not be put into service until it has been ascertained, if appropriate, that the machine into which the gearbox is to be installed complies with the Directive 3006/42/EC.

4.3 Designations

4.3.1 Designations used

Drive
The shaft of the gearbox that is supplied with energy is designated as drive shaft.

Output
The shaft(s) of the gearbox from which energy is taken is/are designated as output shaft(s).

Designation of gearbox sides
The 6 surfaces of the gearbox housing are designated with the numbers 1–6.
They indicate the fixing side and the installation position.

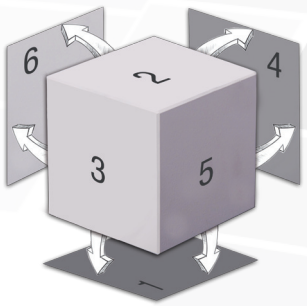


Figure **4.3.1-1; Gearbox sides**

Threaded mounting hole
All gearboxes provide many mounting options on all sides.
For details, please refer to the type-specific information.

Fixing side
The fixing side is the side of the gearbox on which it is connected to the machine rack. It is important, among other things, for the determination of the arrangement of the vent filters. For details, please refer to the type-specific information.

Installation position
The installation position defines the gearbox side which is directed downwards during operation. In the above Figure, the installation position 1 is shown. The information on the installation position is needed for assessing the lubricating conditions, the determination of the vent filter arrangement, and the design of the roller bearings.

Gear ratio

"In engineering, an apparatus with a gear/transmission ratio is a device which transforms the value of a physical variable into another value of the same variable where both values are in a constructively determined ratio to each other." (Wikipedia)

For the gearboxes, the gear ratio (transmission ratio) [i] is defined as:

$$i = \frac{\text{teeth number}_{\text{output}}}{\text{teeth number}_{\text{drive}}}$$

The transmitted variables are rotational speed [n] and torque [T]

$$i = \frac{n_{\text{drive}}}{n_{\text{output}}} \text{ and } i = \frac{T_{\text{output}}}{T_{\text{drive}}} * \frac{1}{\eta}$$

Efficiency

The efficiency [η] is the ratio of power output to power input. The efficiencies specified in the tables can be achieved at maximum permissible rated output during continuous operation. They are guidance values for run-in gearboxes at operating temperature with standard sealing.

Rotational direction of the shaft

The shaft's rotational direction is always seen from the shaft end face towards the gearbox centre.
It is indicated as "clockwise" = CW or "counterclockwise" = CCW

4.4 Corrosion protection

4.4.1 Prime-coated C1 (standard)

If no additional information is given, ATEK gearboxes are delivered with a prime coat of epoxy-resin based two-component paint base.

Example of order code: V 090 1:1 E0 -9.9- 700/0000

Gearbox part	Material	Protection	Application
Housing	Grey cast iron	1x prime coat	Layer thickness > 40 µm
Flanges	Grey cast iron or steel	1x prime coat	Layer thickness > 40 µm
Shafts	C45	greased	

Table **4.4.1-1**

The layer thickness of the surface protection alters the fits defined in the dimensional sketches.
If fits are not to receive corrosion protection, please notify us thereof.

4.4.2 Varnished C2

Upon request, ATEK gearboxes can be varnished in standard and special colour shades. Please contact us.
Example of order code: V 090 1:1 E0 -9.9- 700/C2

Gearbox part	Material	Protection	Application
Housing	Grey cast iron	1x prime coat, 1x covering varnish	Layer thickness > 80 µm
Flanges	Grey cast iron or steel	1x prime coat, 1x covering varnish	Layer thickness > 80 µm
Shafts	C45	greased	

Table **4.4.2-1**

The layer thickness of the surface protection alters the fits defined in the dimensional sketches.
If fits are not to receive corrosion protection, please notify us thereof.

4.4.3 Varnished C3

Upon request, ATEK gearboxes can be equipped with a paint system for the use in an environment exposed to sulphur dioxide.
Please contact us. Example of order code: V 090 1:1 E0 -9.9- 700/C3

Gearbox part	Material	Protection	Application
Housing	Grey cast iron	2x prime coat, 1x covering varnish 1x covering varnish	Layer thickness > 120 µm
Flanges	Grey cast iron or steel	2x prime coat, 1x covering varnish 1x covering varnish	Layer thickness > 120 µm
Shafts	C45	greased	

Table **4.4.3-1**

The layer thickness of the surface protection alters the fits defined in the dimensional sketches.
If fits are not to receive corrosion protection, please notify us thereof.

4.4.4 Varnished C4

Upon request, ATEK gearboxes can be equipped with a paint system for the use in an industrial environment exposed to salt.
Please contact us. Example of order code: V 090 1:1 E0 -9.9- 700/C4

Gearbox part	Material	Protection	Application
Housing	Grey cast iron	1x zinc protection, 1x prime coat 1x covering varnish	Layer thickness > 160 µm
Flanges	Grey cast iron or steel	1x zinc protection, 1x prime coat 1x covering varnish	Layer thickness > 160 µm
Shafts	C45	greased	

Table **4.4.4-1**

The layer thickness of the surface protection alters the fits defined in the dimensional sketches.
If fits are not to receive corrosion protection, please notify us thereof.

4.4.5 Electroplated

Chemically plated with nickel. Example of order code: V 090 1:1 E0 -9.9- 700/KB

Gearbox part	Material	Protection	Application
Housing	Grey cast iron	Ni	~30 µm
Flanges	Grey cast iron or steel	Ni	~30 µm
Shafts	Stainless steel	greased	

Table **4.4.5-1**

4.4.6 Aluminium

Valid for all miniature gearboxes
Example of order code: L 045 1:1 E0 -9.9- 700/0000

Gearbox part	Material	Protection	Application
Housing	Aluminium	-	-
Flanges	Aluminium	-	-
Shafts	C45	greased	

Table **4.4.6-1**

4.4.7 Coated (anodised)

Aluminium anodised
Example of order code: L 045 1:1 E0 -9.9- 700/EL

Gearbox part	Material	Protection	Application
Housing	Aluminium	Anodised coating	~10 µm
Flanges	Aluminium	Anodised coating	~10 µm
Shafts	C45	greased	

Table **4.4.7-1**

4.4.8 Stainless steel

ATEK gearboxes with the “HD” type designation as a prefix will be delivered in a stainless-steel design.
See chapter 7 “Hygiene-design gearboxes”

4.5 Protection classes

Protection class	Seal
IP 54 (standard)	Standard seal NBR, form A
IP 56	Special seal, form AS

Table **4.5-1**

Other protection classes are available on request.

4.6 Shaft types

4.6.1 Construction types

The construction types are classified by rotational direction and design of the output shaft.

Overhung-mounted output shaft	A0	F0
Drive shaft and output shaft have the **same direction of rotation**	B0	G0
Drive shaft and output shaft have **opposite directions of rotation**	C0	H0
One **continuous output shaft** made of solid material	D0	J0
One **continuous hollow shaft** at the output	E0	K0

4.6.2 Solid shaft

In the standard design, a shaft fit with the ISO tolerance field 6 is provided.
The parallel keyways of the individual shafts are aligned with each other during the assembly. Due to the gear meshing, positional deviations may occur.

4.6.3 Hollow shaft

The order code of the hollow shaft design is coded with 4 characters. The first two characters define the construction type. The third character defines the type of force transmission, and the fourth character defines the gearbox side with the selected force transmission.

1st numeral	2nd numeral	3rd numeral	4th numeral
Construction types		Force transmission	On gearbox side
E	0	K (splined shaft)	5
K	1	N (groove)	6
	2	S (clamping hub)	0 (5+6)
		P (polygon shaft)	

Standard hollow shaft E0N* (K0N*) *- Gearbox sides

The output shaft will be constructed as a hollow shaft with the ISO tolerance field 7. It will then be delivered with a parallel keyway: according to DIN 6885, Sheet 1. (Order code E0N, K0N) Many gearbox sizes can also be delivered with an enlarged hollow shaft bore (order code /SH).

Hollow shaft with splined hub profile E0K* (K0K*) *- Gearbox sides

The hollow shaft gearboxes can also be delivered with a hollow shaft with splined shaft profile according to DIN ISO 14.
(Order code E0K, K0K)

Hollow shaft with shrink disc E0S* (K0S*) *- Gearbox sides
The hollow shaft with shrink disc enables non-positive (frictional) transmission of the torque. The bore of the hollow shafts is stepped for easier mounting and has a bronze bushing on the guide side. (Order code E0S, K0S)

Hollow shaft with polygon profile (E0P*, K0P*) *- Gearbox sides
The hollow shaft gearboxes can also be delivered with a hollow shaft with polygon profile according to DIN 32711. (Order code E0P, K0P)

4.7 Lubricants

ATEK gearboxes are factory-filled with synthetic oils. Especially for applications in machines of the food industry and pharmaceutical industry, the gearboxes can optionally be delivered with NOTOX lubricants (order code /NT) that meet the requirements according to NSF H-1. All lubricant designations and alternatives can be gathered from the lubricant table on page 423.
No oil change will be necessary during the gearbox lifetime if the mechanical and thermal limit ratings are observed.
The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.

4.8 Radial shaft seal rings

The rotating shafts are sealed by radial shaft seal rings according to DIN3761.
In the standard application, the type A made of NBR material (nitrile butadiene rubber) is used. In a dust-bearing environment, the type AS with an additional dust lip is used. For oil temperatures up to 130°C, shaft seal rings made of FCR (fluorocarbon rubber) can be used.

4.9 Gearbox data and layout

4.9.1 Lifetime
In case of intended use, the lifetime of all gearbox elements will be more than 15,000 hours. The precondition is that the layout and the operation are according to the guidelines of the catalogue.

4.9.2 Noise generation
The noise generation depends on many factors. Examples are gearbox size, speed, direction of rotation, lubrication, and installation position. Other important influences result from the installation conditions.

4.9.3 Output and torque values
The values in the performance tables are valid for the lubrication with synthetic oils. A lubricant temperature of 90°C is taken as a basis for the thermal limit rating. If an exceeding of the permissible oil temperature is safely prevented by special measures (e.g. oil cooler) examination of the thermal limit rating may be refrained from.

In special cases, e.g. in case of very short operating time or only static load, an increase of the permissible torques is possible, if appropriate.

The permissible rated power inputs $\mathbf{P_{1N}}$ and rated output torques $\mathbf{T_{2N}}$, which are listed in the performance tables, are valid for shock-free operation, 10 hours of daily operation period, 10 run-ups per hour. The rated thermal outputs $\mathbf{P_{1Nt}}$ and output torques $\mathbf{T_{2Nt}}$, respectively, are valid for an ambient temperature of 20°C and continuous operation. The maximum output torque $\mathbf{T_{2max}}$ may be achieved during short-time load peaks, but must not be exceeded. The operating conditions according to the design factors are presupposed. (see 4.8.6.2)

4.9.4 On-period ED
The on-period (ED, abbrev. for German term Einschaltdauer) designates a maximum permissible operating interval of a piece of equipment after which a rest period is required in order not to damage or destroy the piece of equipment. The rated modes are specified, inter alia, in the DIN VDE 0530-1. The on-period can be indicated dimensionless as a percentage value (ratio of useful life to the observation period). Generally, the utilisation period is indicated in addition to the percentage value. If not, the utilisation period is considered to be 10 minutes. (Wikipedia)

VDE 0530-1	Operating mode
S1	Continuous operation, constant load
S2	Short-time operation, constant load
S3	Intermittent operation without influence of starting on the temperature
S4	Intermittent operation with influence of starting on the temperature
S5	Intermittent operation with influence of starting and braking on the temperature
S6	Continuous operation with intermittent load
S7	Continuous operation with starting and braking
S8	Continuous operation with load change

4.9.5 Abbreviations used

Abbreviation	[Unit]	Designation
F_r	[N]	Radial force
F_a	[N]	Axial force
i_{ist}	[-]	Actual gear ratio
i	[-]	Nominal gear ratio
P_1	[kW]	effective input power
P_2	[kW]	effective output power
P_{1N}	[kW]	permissible nominal input power, mechanical
P_{1Nt}	[kW]	permissible nominal input power, thermal
P_{1m}	[kW]	corrected input power, mechanical
P_{1t}	[kW]	corrected input power, thermal
T_1	[Nm]	input torque
T_{1B}	[Nm]	permissible acceleration torque at the input drive (servo gearbox)
T_{1NOT}	[Nm]	permissible input torque in case of emergency shut-off (servo gearbox)
T_2	[Nm]	effective output torque
T_{2B}	[Nm]	permissible acceleration torque at the output drive
T_{2N}	[Nm]	permissible nominal output torque, mechanical
T_{2NOT}	[Nm]	permissible output torque in case of emergency shut-off
T_{2Nt}	[Nm]	permissible nominal output torque, thermal
T_{2m}	[Nm]	corrected output torque, mechanical
T_{2max}	[Nm]	maximum permissible output torque
T_{2t}	[Nm]	corrected output torque, thermal
T_A	[Nm]	starting torque
J	[kgcm^2]	inertia moment
J_1	[kgcm^2]	inertia moment related to the fast-rotating shaft
$J_{ex.\ red.}$	[kgcm^2]	external inertia moments reduced to drive shaft
J_{mot}	[kgcm^2]	inertia moment of the motor
N_1		fast-rotating shaft
N_2		slowly rotating shaft
f_1	[-]	operating factor
f_2	[-]	starting factor
f_3	[-]	lubrication factor
f_4	[-]	temperature factor
f_5	[-]	duty-cycle factor
f_{MB}	[-]	mass acceleration factor
n_1	[rpm]	speed of fast-rotating shaft
n_2	[rpm]	speed of slowly rotating shaft
t_u	[°C]	ambient temperature
η	[-]	efficiency
η'	[-]	efficiency in case of driving worm gear

4.9.6 Layout

Calculation of power and torque

The following relations exist between the power (P), the torque (T) and the rotational speed (n):

$P_1 = T_1 * n_1$

$n_1 = n_2 * i$

$P_2 = T_2 * n_2$

P_1: Power is input to the shaft (torque and rotational direction have the same sense of rotation)
P_2: Power is taken off (torque and rotational direction have an opposite sense of rotation)
n_1: speed of fast-rotating shaft
n_2: speed of slowly rotating shaft
The following formulas apply to the (normal) case where power is input to the fast-rotating shaft (the shaft N_1 is driven): $P_2 = P_1 * \eta$

Required input power with **given** output torque and output speed of the **driven machine**

$$P_1\,[kW] = \frac{T_2\,[Nm] * n_2\,[rpm]}{\eta * 9550}$$

Formula 1

Available output torque with **given** input power and input speed of the **driving machine**

$$T_2\,[Nm] = \frac{P_1\,[kW] * i * \eta * 9550}{n_1\,[rpm]}$$

Formula 2

When selecting the gearbox size, it is necessary to consider the influences that the gearbox will be exposed to later.
This is done through the design factors specified below.
The transmittable power, or the torque, may be reduced by these factors!
In order to determine the gearbox size, the required input power or the output torque must be calculated by means of the operating factors.
Mechanical and thermal influences are taken account of by the formulas.

Mechanical:
$P_{1m} = P_1 * f_1 * f_2 * f_3$
$T_{2m} = T_2 * f_1 * f_2 * f_3$

The following conditions apply:
$P_{1m} < P_{1N}$
$T_{2m} < T_{2N}$

Thermal:
$P_{1t} = P_1 * f_3 * f_4 * f_5$
$T_{2t} = T_2 * f_3 * f_4 * f_5$

The following conditions apply:
$P_{1t} < P_{1Nt}$
$T_{2t} < T_{2Nt}$

Design factors (f_1, f_2, f_3, f_4, f_5, f_6)

Operating factor f_1

Determination of load group f_{MB}

$$f_{MB} = \frac{J_{ex.\,red.}}{J_{mot}}$$

f_{MB}	Group	Examples
< 0.25	G low load / without shocks	Filling machines, elevators, light conveyor spirals, light conveyor belts, blowers, small agitators, inspection machines, assembly lines, machine tool auxiliary drives, centrifuges, packaging machines.
< 3.00	M medium load / slight shocks	Reels, agitators, slat conveyors, calendering machines, cargo lifts, mixers, balancing machines, heavy conveyor belts, sheet-metal bending machines, road construction machines, planing machines, shears, extruders, machine tool main drives, kneading machines, weaving looms, light roller beds.
< 10.00	S high load / severe shocks	Excavators, heavy mixers, presses, edge mills, rolling mills, heavy roller beds, cold-rolling mills, stone crushers, eccentric presses, cutting heads, edge-forming machines, belt conveyors (parcelled cargo/goods), barking drums, running gears, punching machines, piston pumps, rotary furnaces, mills/pulverisers, plate turnover devices.

Table **4.9.6-1**

Determination of operating factor f_1

Driving machine	Load group	Operating hours / day			
	fMB	<0.5	3	10	24
Electric motor	G	0.80	0.90	1.00	1.25
Hydraulic motor	M	0.90	1.00	1.25	1.50
Turbine	S	1.00	1.25	1.50	1.75
Combustion engine	G	0.90	1.00	1.25	1.50
4-6-cylinder engine	M	1.00	1.25	1.50	1.75
	S	1.25	1.50	1.75	2.00
Combustion engine	G	1.00	1.25	1.50	1.75
1-2-cylinder engine	M	1.25	1.50	1.75	2.00
	S	1.50	1.75	2.00	2.25

Table **4.9.6-2**

Starting factor f_2

Starts per hour	up to 10	10-60	60-500	500-1500
f_2	1.0	1.1	1.2	1.3

Table **4.9.6-3**

Lubrication factor f_3

	Synthetic oil	Mineral oil	Mineral oil
	Bevel gearboxes, worm gearboxes	Worm gearboxes	Worm gearboxes
	All sizes	Size 040-080	Size 100-200
f_3	1.0	1.2	1.25

Table **4.9.6-4**

Temperature factor f_4

The factor f_4 considers the influence of the ambient temperature

t_u [°C]	10	20	30	40	50
f_4	0.9	1	1.15	1.4	1.7

Table **4.9.6-5**

Operating mode / duty-cycle factor f_5

The operating mode is defined via the duty cycle (on-period). The on-period can be indicated dimensionless as a percentage value.

$$ED = \frac{\text{Loading time}}{\text{Observation period}} * 100\%$$

Generally, the utilisation period is indicated in addition to the percentage value. If not, the utilisation period is considered to be 10 minutes.

	Operating mode	On-period
S1	Continuous operation	more than 60% of the cycle time or longer than 20 minutes
S5	Cyclic operation	Here, the on-period is less than 60% of the process procedure and less than 20 minutes

Table **4.9.6-6**

Principally, the limit values for speed, torque, acceleration and temperature must be observed in all operating modes.

On-period in %	100	80	60	40	20
f_5	1.0	0.95	0.86	0.75	0.56

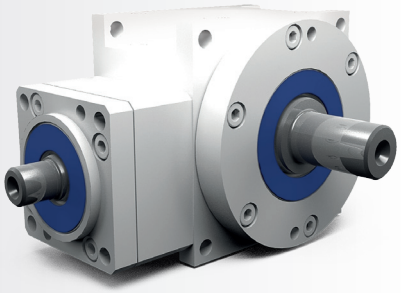
Table **4.9.6-7**

4.10 Maintenance and starting-up

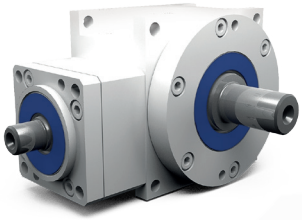
For information on starting-up and maintenance, please refer to the operating instructions. They can be found on the Internet by accessing www.atek.de/download. There you can also find information on the Machinery Directive 2006/42 EC.

4.11 Ordering

ATEK gearboxes are available in many variants. When a gearbox is first ordered, we will define a unique article number. In case of follow-up orders, it is enough to specify our article number to reorder exactly the same gearbox type.



8.1 Type overview



Type H – Hypoid gearboxes

Gear ratios: i = 8:1 to 15:1 (others upon request)
Maximum output torque: 1450 Nm
6 gearbox sizes with edge lengths of 090 to 260 mm
Low-backlash construction < 4 angular minutes possible
Housing made of aluminium

8.2 General construction

The axles intersect in the gearbox at the distance A in an angle of 90°.

Gearbox size	090	115	140	170	215	260
A [mm]	9	14	18	23	32	42

The edge length of the housing is reflected in the gearbox size (example: H 090: the housing edge length is 90 mm, with the viewing direction towards the output side of the gearbox). The housings are made of aluminium, the shaft suspension units are made of steel or casting.

8.2.1 Toothing

ATEK hypoid gearboxes have gear sets with high-quality hypoid toothing made of hardened carburised steel. A gear set comprises one pinion shaft (small number of teeth / small diameter) and one bevel gear (large number of teeth / large diameter).
Gear sets with spiral toothing offer the advantage of very favourable engagement factors (high meshing ratio). Therefore they are predestined for usage with high loads. On hypoid gear sets, the axial offset between pinion shaft and gear results in higher sliding motion rates in the tooth contact. This makes it possible to achieve especially great running smoothness and a high transmission accuracy.

8.2.2 Construction types

Due to the modular system, different gearbox construction types can be configured. The construction types vary in

Construction type	consists of:
B0 through E0	1 gear set

Table **8.2.2-1**

The variants differ in the type of the shafts, the rotational direction thereof, and the possibility to use a robot flange interface (B0R and C0R).

8.2.3 Threaded mounting holes

The sides 1 and 2 of the gearboxes are machined and may be used as mounting surfaces. The flange on side 3 has also threaded mounting holes. On the sides 5 and 6, fastening can be made via through bores.
You have the following available ordering options:

Order code	Threaded mounting holes are in the housing surfaces on the gearbox side	Threaded mounting holes are in the flanges on the gearbox side
0	-	3
9	1, 2	3

Table **8.2.3-1**

Please enquire other mounting options.
The standard version of the mounting / fastening has the order code 9.
Example of order code: H 090 12:1 D0 9.1

8.2.4 Installation position

The gearboxes can be used in all installation positions. The recommended installation position is the position in which the shafts are horizontal.
These are the installation positions 1 and 2. The installation position is defined by the gearbox side directed downwards during operation and will be indicated by the corresponding gearbox side. Example of order code for the installation position 1: H 090 12:1 D0 9.1

8.2.5 Shaft designation – allocation to the gearbox sides

The fast-rotating shaft has the speed $\mathbf{n_1}$ and is identified by $\mathbf{N_1}$. The hypoid pinion is located on this shaft. The slowly rotating shaft has the speed $\mathbf{n_2}$ and is identified by $\mathbf{N_2}$. The hypoid gear is located on this shaft. The gearbox sides are identified by the numerals 1 to 6. (See Figure 4.3.1-1; Gearbox sides)

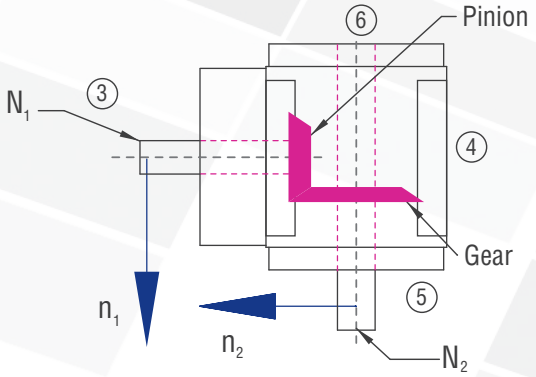


Figure **8.2.5-1; Shaft designations**

8.2.6 Preferred direction of rotation

If the clockwise (CW) direction of rotation (viewing direction from shaft end face of the fast-rotating shaft towards the gearbox centre) is selected, a lower noise level is generated.

8.2.7 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type. The efficiency is about 95%. The efficiency specified relates to the permissible nominal load and is a guidance value for run-in gearboxes at operating temperature with standard sealing.

8.2.8 Lubrication

The H-series gearboxes have lifetime lubrication.

8.2.9 Vent filter

If venting is required (B1 or C1) the gearboxes will be delivered with a vent filter. The vent bores will be equipped with screw plugs for transport. The vent filter will be enclosed as a separate item and must be mounted in the intended position prior to commissioning. An elbow may be required. Please adhere to the operating instructions!

8.2.10 Low-backlash construction

For low-friction running, the tooth space in the gear set is manufactured larger than the tooth. When the direction of rotation is changed, this results in a rotation angle until the counter-rotating tooth flanks contact each other. This rotation angle is called circumferential backlash.

Circumferential backlash, measuring method

The circumferential backlash is measured after the drive shaft (N_1) has been fixed. A force of around 2% of the nominal torque is applied to the output shaft (N_2) in both rotational directions. A tooth backlash will result between the two final positions. This can be measured as rotation angle and is indicated in minutes of arc [arcmin].

Circumferential backlash, type

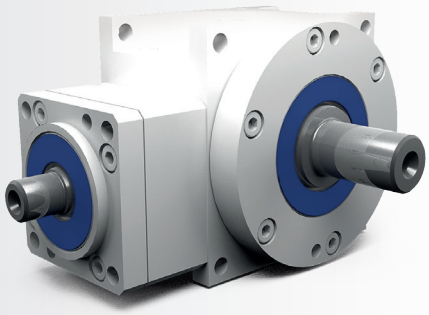
Ordering option	Gear set	090 - 115	140 - 260
/0000	Standard	<=5 arcmin	<=4 arcmin
/S2	Standard	-	-
/S1	Standard	-	-
/S0	Special gear set	<=3 arcmin	<=2 arcmin

Table **8.2.10-1**

8.3 Type H – Standard hypoid gearboxes

8.3.1 Features

Gear ratios: i = 8:1 to 15:1 (others upon request)
Maximum output torque: 1450 Nm
6 gearbox sizes with edge lengths of 090 to 260 mm
Low-backlash construction < 4 angular minutes possible
Housing made of aluminium



8.3.2 Models

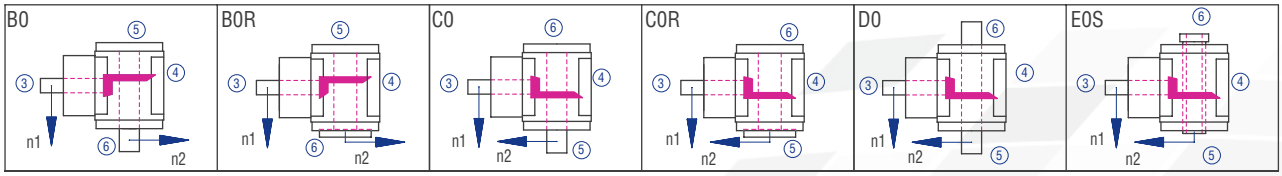


Figure **8.3.2-1; Models**

8.3.3 Gearbox sides

The example shows the Model C0

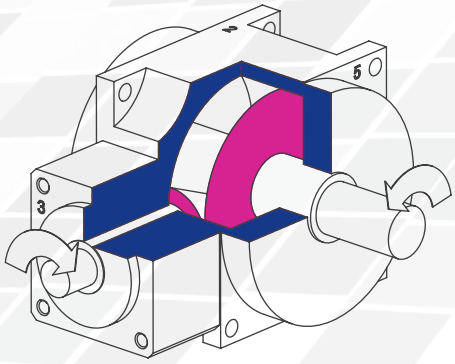


Figure **8.3.3-2; Gearbox sides**

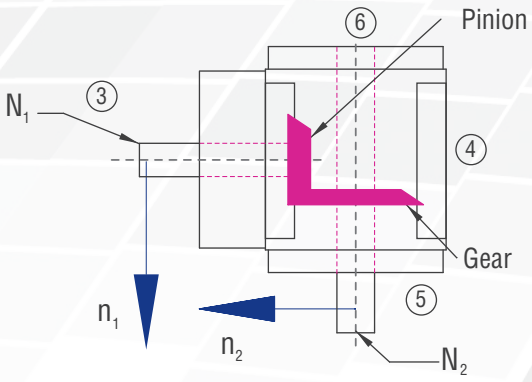


Figure **8.3.3-1; Shaft designations**

8.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
H	090	12:1	C0-	1.	1-	200	/S1
Description	Size; Table 8.3.5-1	Table 8.3.5-1	Figure 8.3.2-1; Models	Side on which fixing is made; Table 8.2.3-1; Figure 4.3.1-1 Gearbox sides	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft	S1 Standard

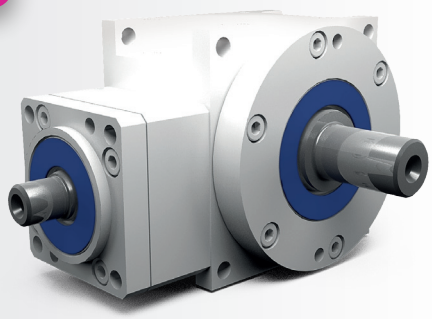
8.3.5 Overview of performance data

Selection table: gearbox size; gear ratio; rotational speed

			8:1			10:1			12:1			15:1		
Size	N_{1MAX} [rpm]	N_1 [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
090	8000	3200	36	54	72	36	54	72						
		3900							26	40	52	25	38	50
115	8000	2700	71	107	143	71	107	143						
		3300							52	79	108	50	75	100
140	7000	2200	142	215	289	143	215	290						
		2800							98	146	195	97	145	194
170	6000	1800	267	398	529	267	398	530						
		2300							188	280	370	182	278	369
215	5000	1200	723	1084	1450	723	1084	1450						
		1600							512	767	1022	512	767	1022
260	4500	1000	1444	2165	2887	1444	2165	2887						
		1300							1023	1533	2044	1023	1533	2044

Table **8.3.5-1**

8.3.6 Type H 090 – Standard hypoid gearboxes



Characteristics

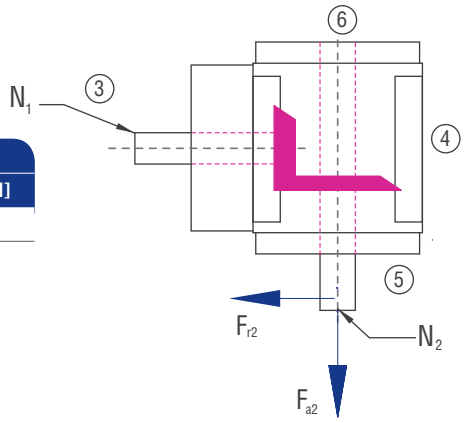
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 5 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
3200	8000	36	54	72	36	54	72	0	0	0	0	0	0
3900	8000	0	0	0	0	0	0	26	40	52	25	38	50

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
3300	1650	3300	1650	3300	1650	3300	1650



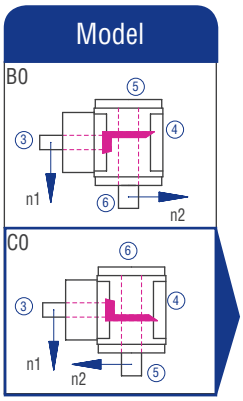
Gearbox inertia moments/mass

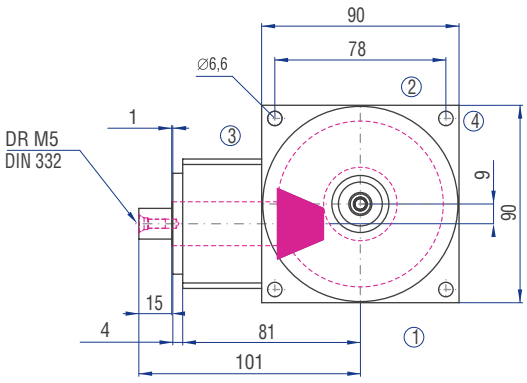
Inertia moment J_1 related to the fast-rotating shaft (N_1)

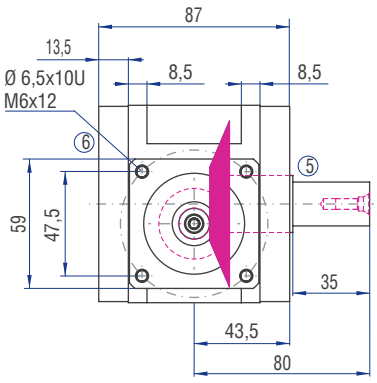
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
0.1700	0.1500	0.1400	0.1300	3.5

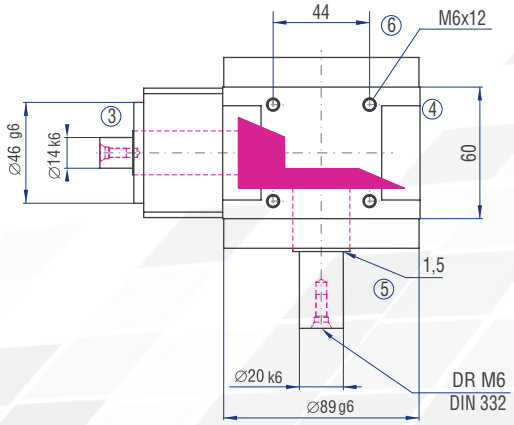
The mass of the gearbox may deviate depending on the type and the gear ratio.

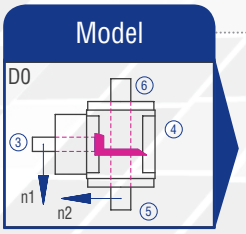
8.3.6 Type H 090 – Standard hypoid gearboxes

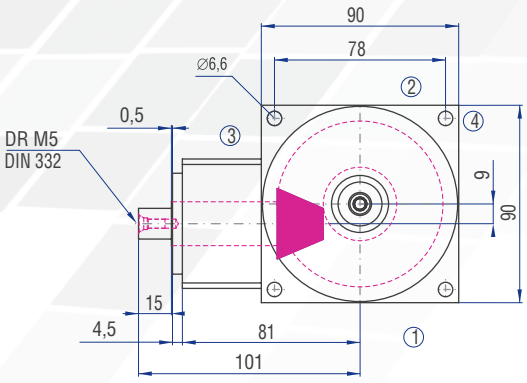


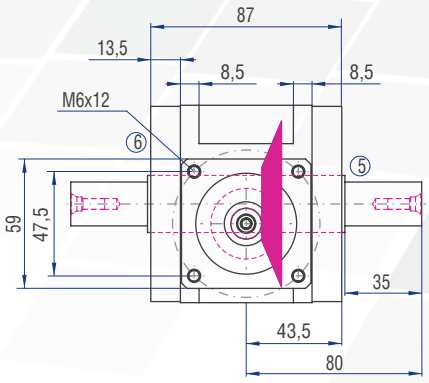


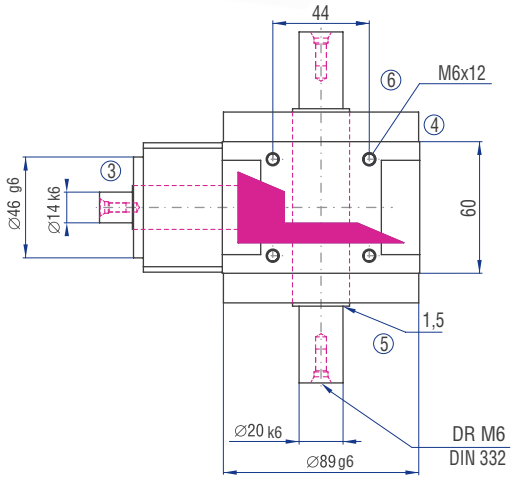




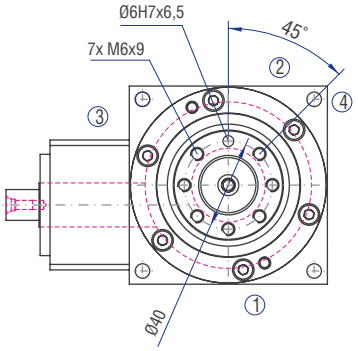


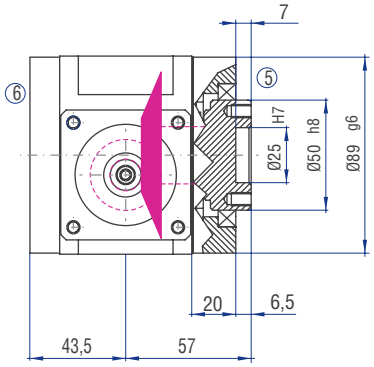


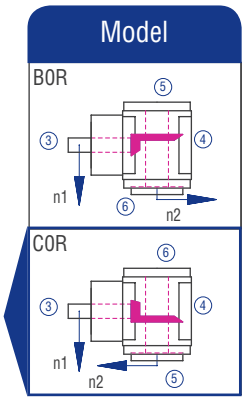


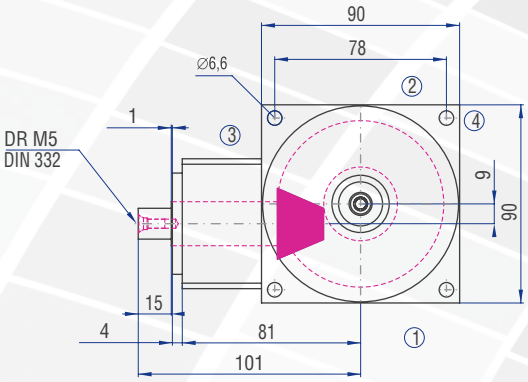


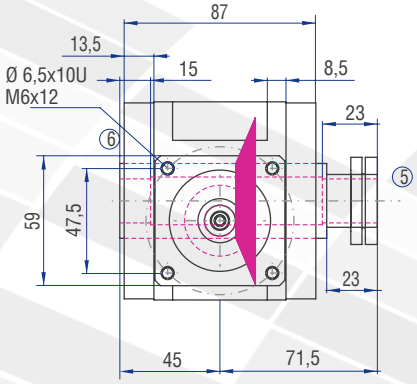
The dimensions of the Models not shown can be figured by mirroring available dimensions.

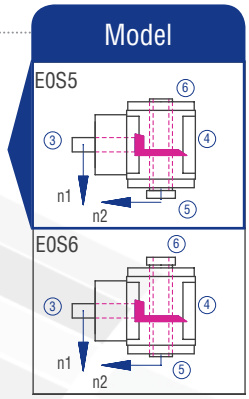

Ø6H7x6,5
7x M6x9
45°
Ø40

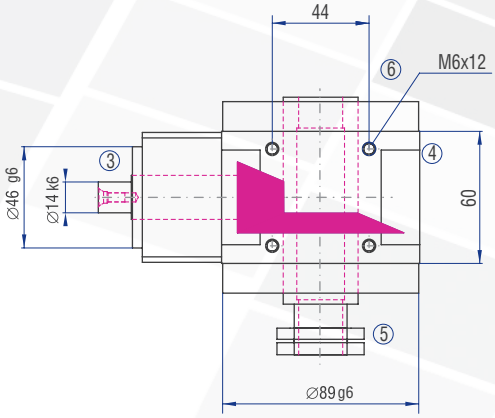

7
H7
Ø25
h8
Ø50
g6
Ø89
20
6,5
43,5
57

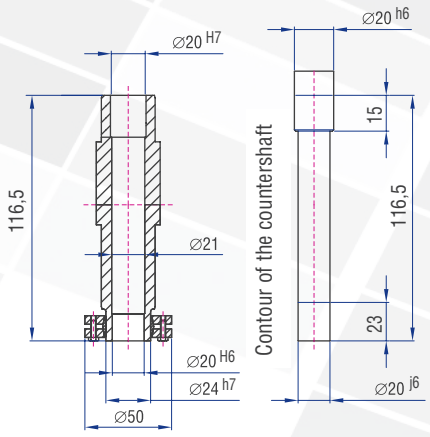

Model
B0R
C0R
n1
n2


90
78
Ø6,6
DR M5
DIN 332
1
9
90
15
4
81
101

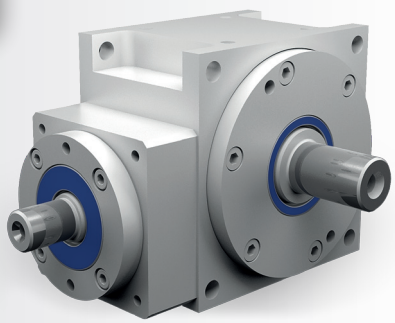

87
13,5
15
8,5
Ø 6,5x10U
M6x12
23
59
47,5
23
45
71,5


Model
E0S5
E0S6
n1
n2


44
M6x12
Ø46 g6
Ø14 k6
60
Ø89 g6


Ø20 H7
116,5
Ø21
Ø20 H6
Ø24 h7
Ø50
Contour of the countershaft
Ø20 h6
15
116,5
23
Ø20 j6

8.3.7 Type H 115 – Standard hypoid gearboxes



Characteristics

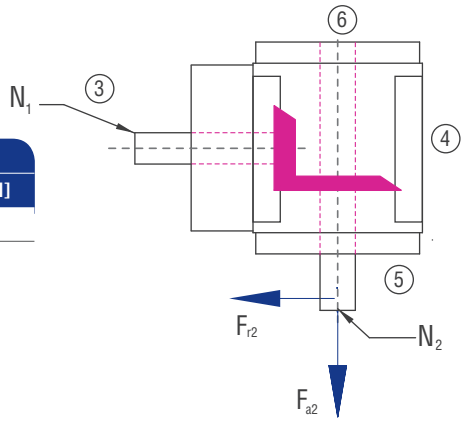
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 5 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
2700	8000	71	107	143	71	107	143	0	0	0	0	0	0
3300	8000	0	0	0	0	0	0	52	79	108	50	75	100

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
4900	2450	4900	2450	4900	2450	4900	2450



Gearbox inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

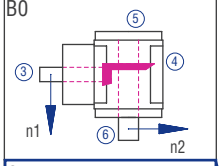
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
0.4300	0.3800	0.3600	0.3400	5.5

The mass of the gearbox may deviate depending on the type and the gear ratio.

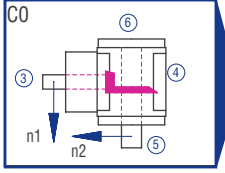
8.3.7 Type H 115 – Standard hypoid gearboxes

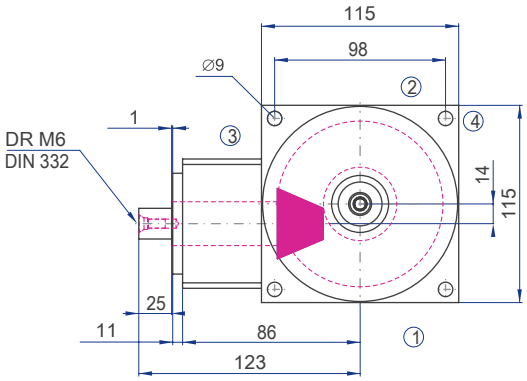
Model

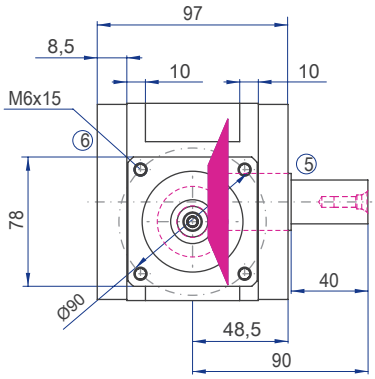
B0

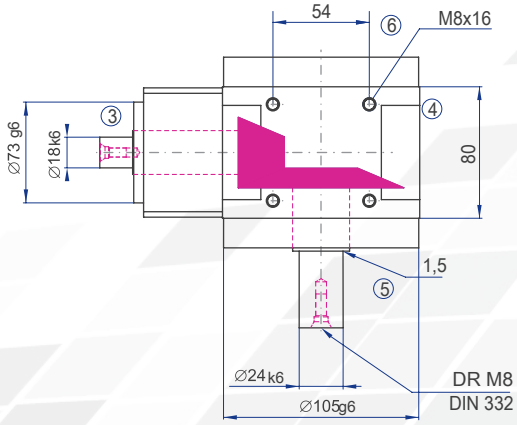


C0



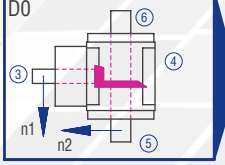


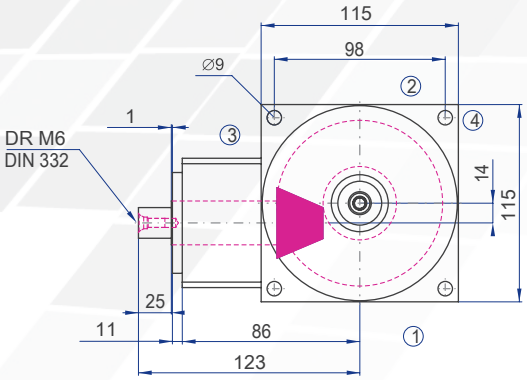


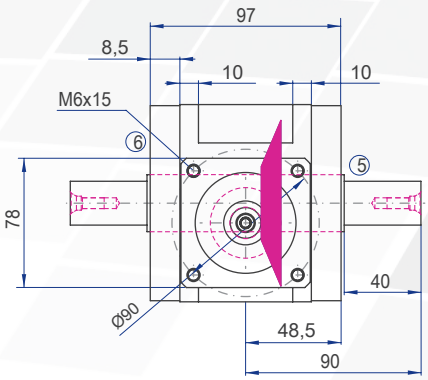


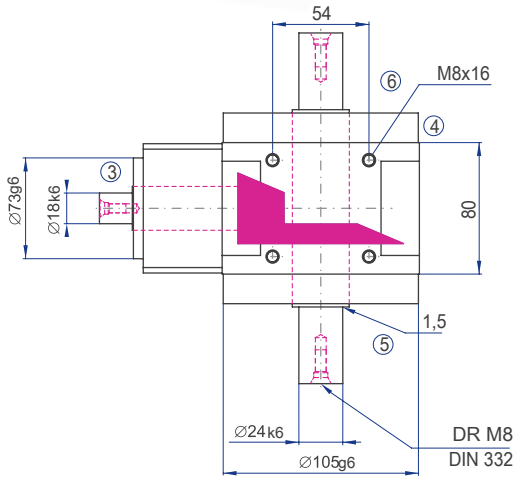
Model

D0

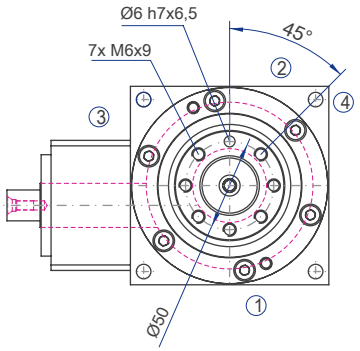


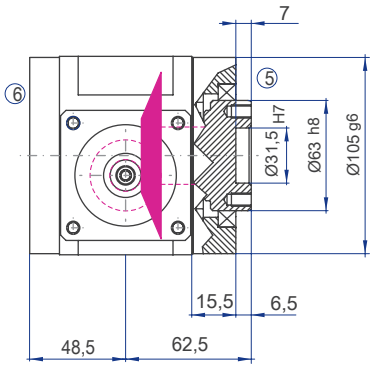


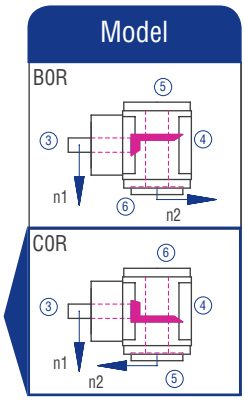


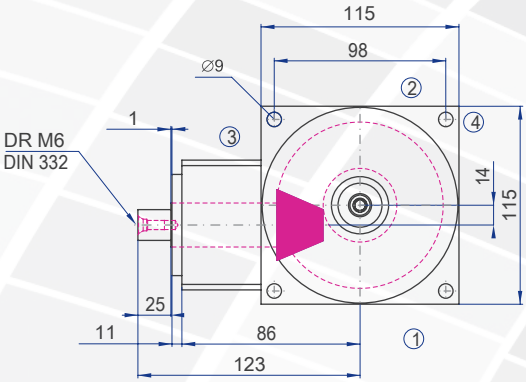


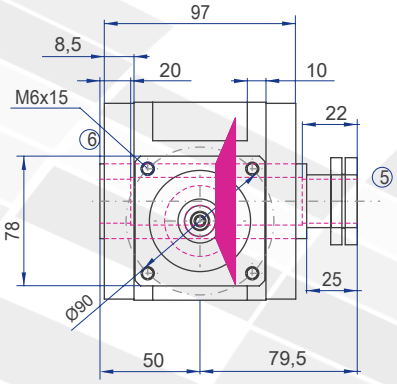
The dimensions of the Models not shown can be figured by mirroring available dimensions.

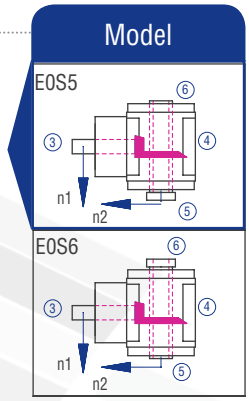

Ø6 h7x6,5
7x M6x9
45°
Ø50

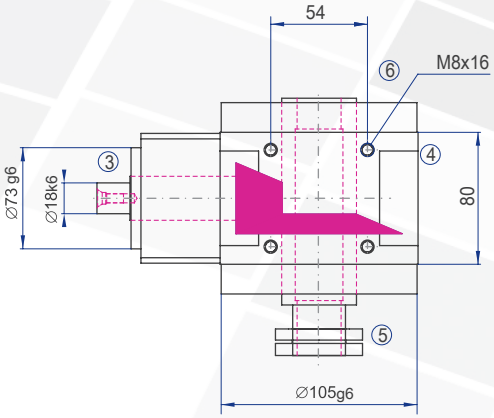

7
Ø31,5 H7
Ø63 h8
Ø105 g6
15,5
6,5
48,5
62,5

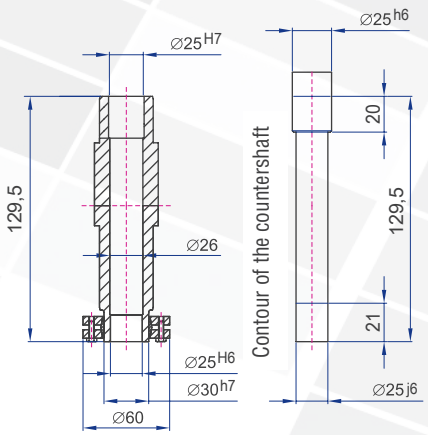

Model
B0R
C0R
n1
n2


115
98
Ø9
DR M6
DIN 332
1
14
115
25
11
86
123

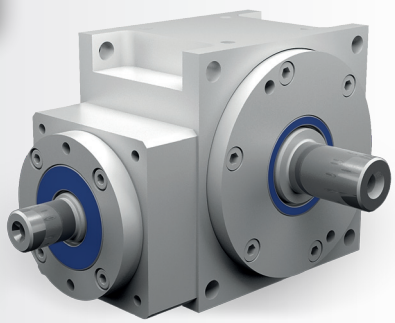

97
8,5
20
10
M6x15
22
78
25
Ø90
50
79,5


Model
E0S5
E0S6
n1
n2


54
M8x16
Ø73 g6
Ø18k6
80
Ø105g6


Ø25 H7
129,5
Ø26
Ø25 H6
Ø30 h7
Ø60
Contour of the countershaft
Ø25 h6
20
129,5
21
Ø25 j6

8.3.8 Type H 140 – Standard hypoid gearboxes



Characteristics

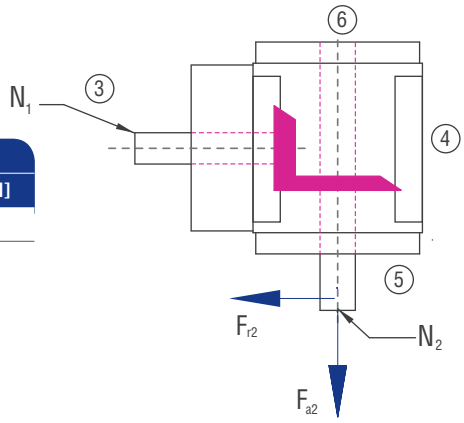
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 4 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
2200	7000	142	215	289	143	215	290	0	0	0	0	0	0
2800	7000	0	0	0	0	0	0	98	146	195	97	145	194

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
7200	3600	7200	3600	7200	3600	7200	3600



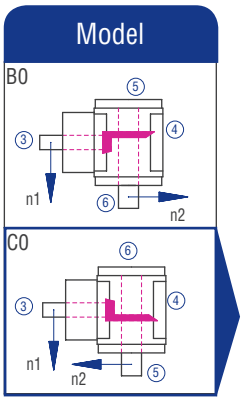
Gearbox inertia moments/mass

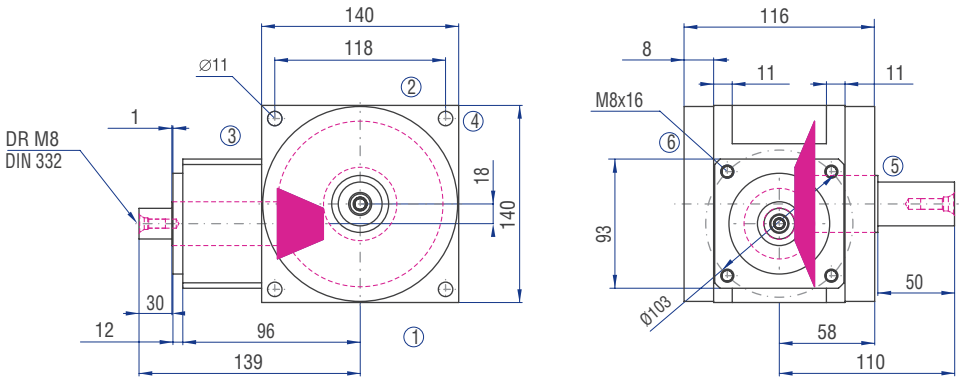
Inertia moment J_1 related to the fast-rotating shaft (N_1)

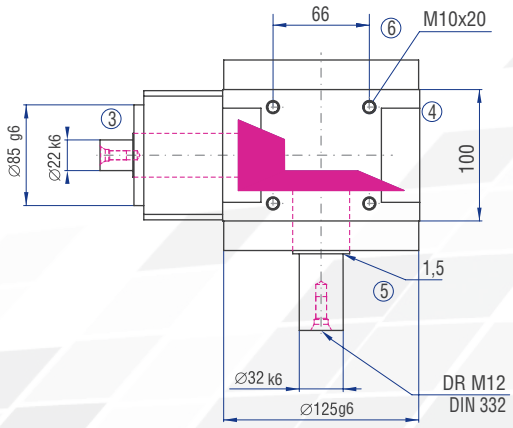
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
1.1200	1.0000	0.8800	0.8100	9.5

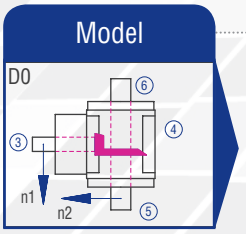
The mass of the gearbox may deviate depending on the type and the gear ratio.

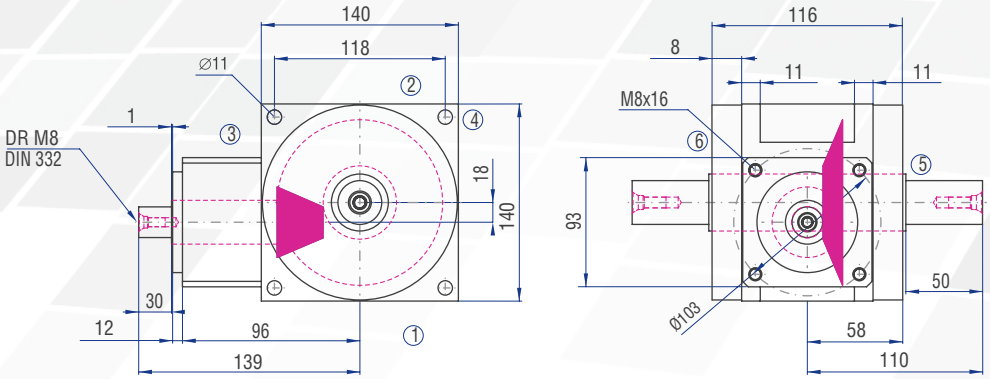
8.3.8 Type H 140 – Standard hypoid gearboxes

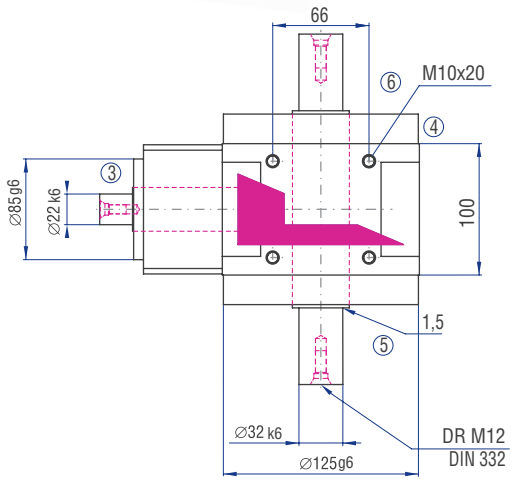




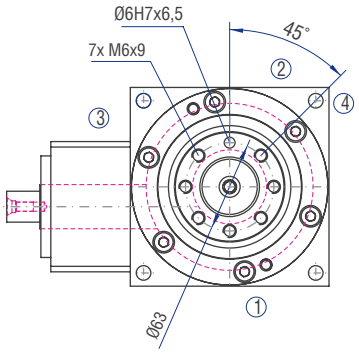


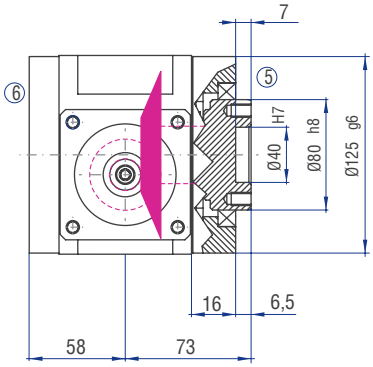


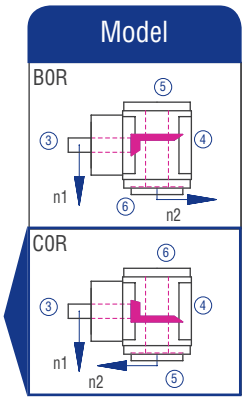


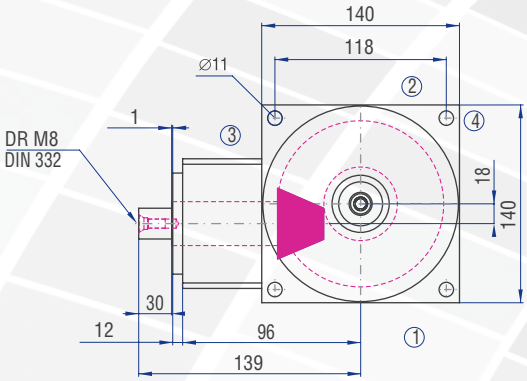


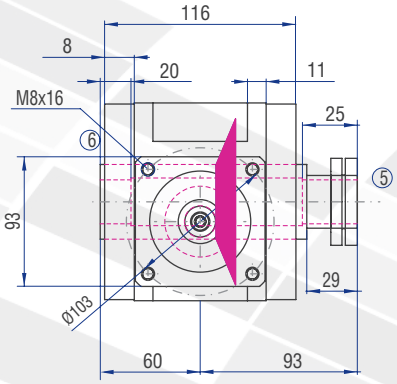
The dimensions of the Models not shown can be figured by mirroring available dimensions.

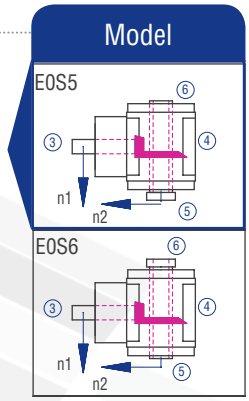

Ø6H7x6,5
7x M6x9
45°
Ø63

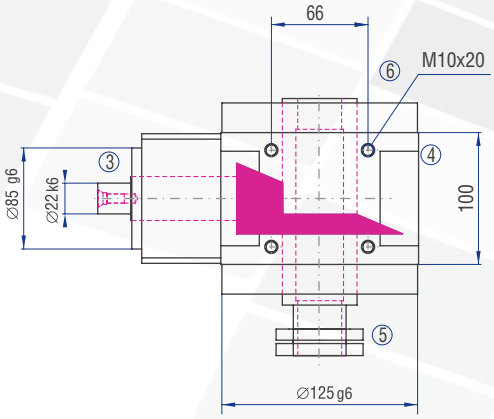

7
Ø40 H7
Ø80 h8
Ø125 g6
16
6,5
58
73

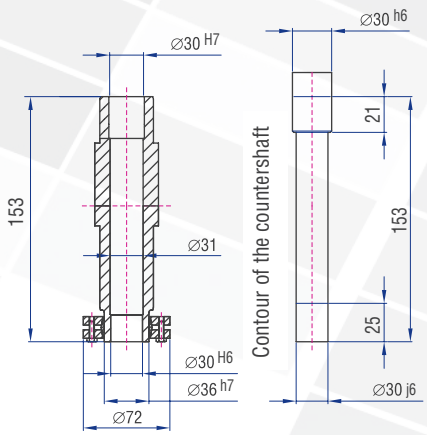

Model
B0R
C0R
n1
n2


140
118
Ø11
DR M8
DIN 332
1
18
140
30
12
96
139

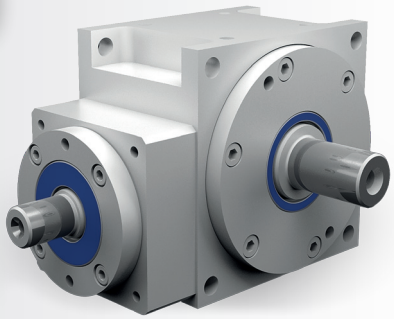

116
8
20
11
M8x16
25
93
29
Ø103
60
93


Model
E0S5
E0S6
n1
n2


66
M10x20
Ø85 g6
Ø22k6
100
Ø125 g6


Ø30 H7
153
Ø31
Ø30 H6
Ø36 h7
Ø72
Contour of the countershaft
Ø30 h6
21
153
25
Ø30 j6

8.3.9 Type H 170 – Standard hypoid gearboxes



Characteristics

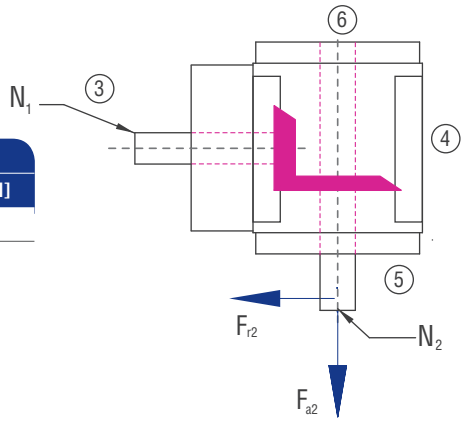
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 4 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
1800	6000	267	398	529	267	398	530	0	0	0	0	0	0
2300	6000	0	0	0	0	0	0	188	280	370	182	278	369

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
10000	5000	10000	5000	10000	5000	10000	5000



Gearbox inertia moments/mass

Inertia moment J_1 related to the fast-rotating shaft (N_1)

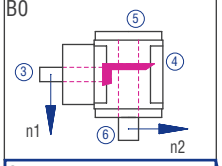
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
2.8500	2.4600	2.2500	2.0700	12.5

The mass of the gearbox may deviate depending on the type and the gear ratio.

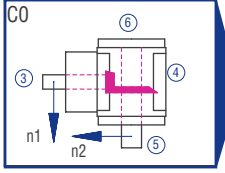
8.3.9 Type H 170 – Standard hypoid gearboxes

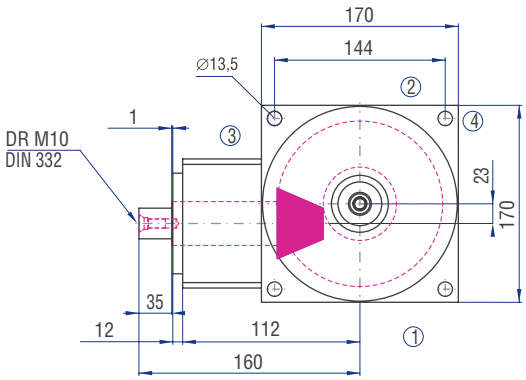
Model

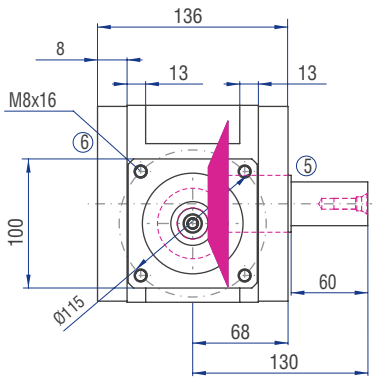
B0

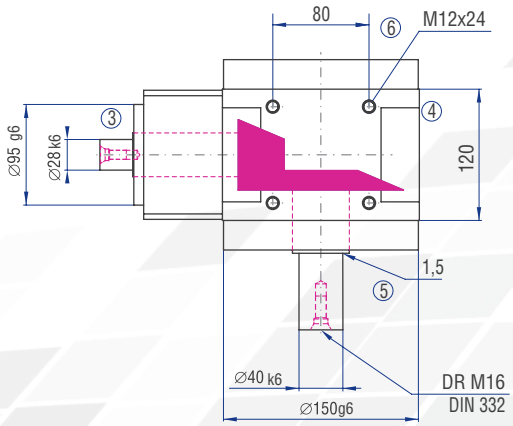


C0



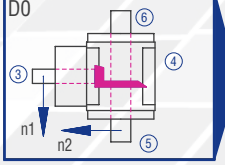


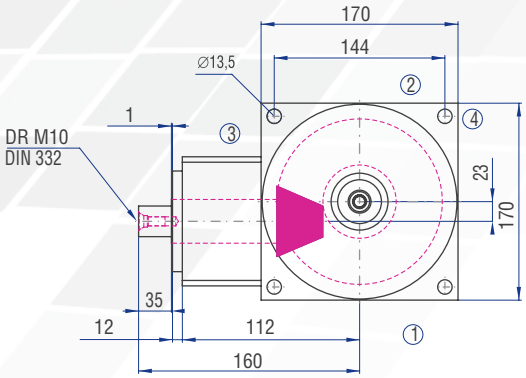


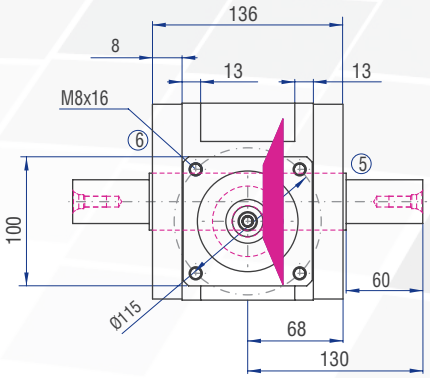


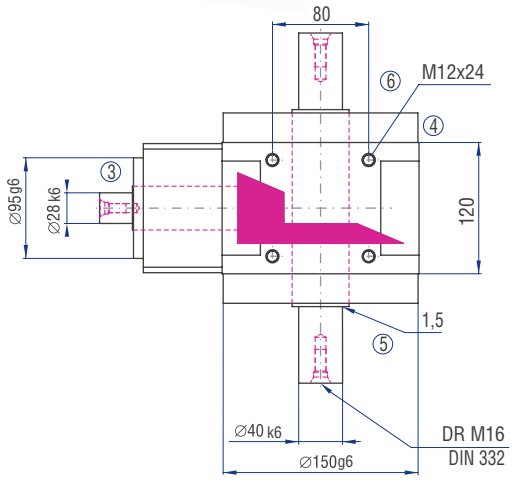
Model

D0

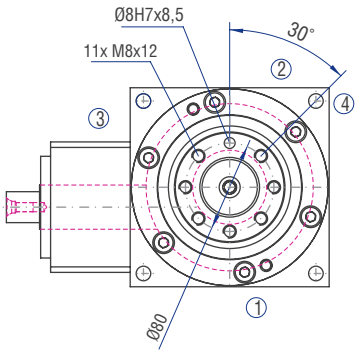


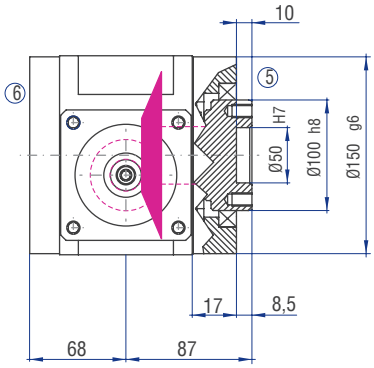


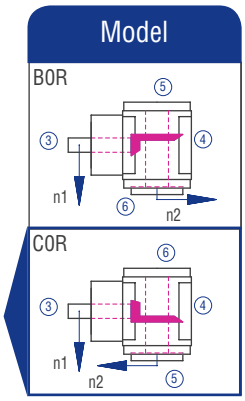


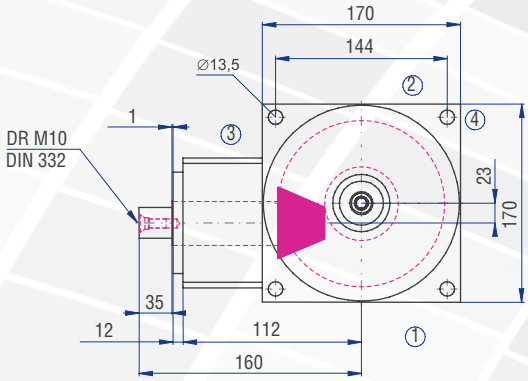


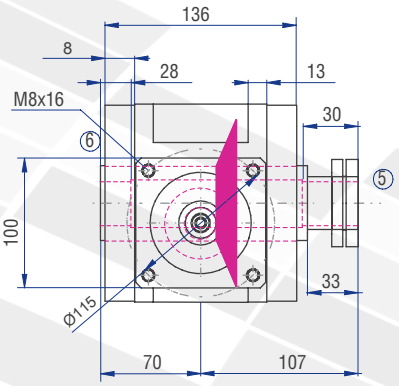
The dimensions of the Models not shown can be figured by mirroring available dimensions.

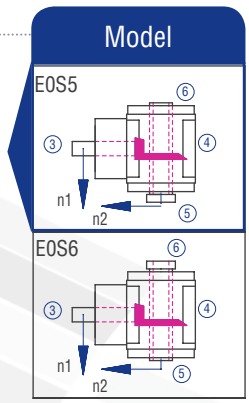

Ø8H7x8,5
11x M8x12
30°
Ø80

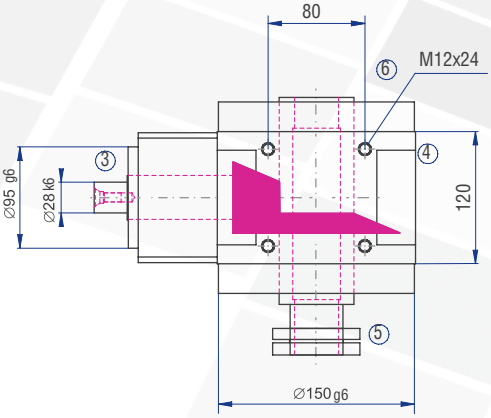

10
H7
Ø50
Ø100 h8
Ø150 g6
17
8,5
68
87

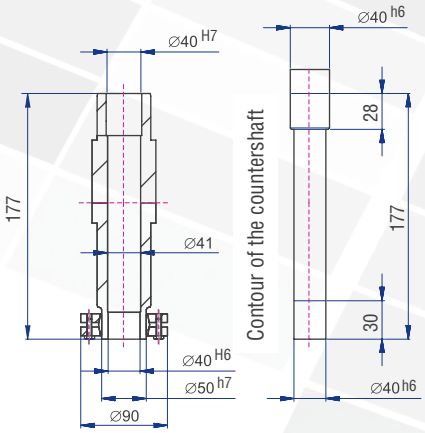

Model
B0R
C0R
n1
n2


170
144
Ø13,5
DR M10
DIN 332
1
23
170
35
12
112
160

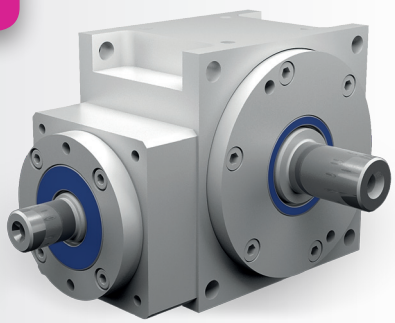

136
8
28
13
M8x16
30
100
33
Ø115
70
107


Model
E0S5
E0S6
n1
n2


80
M12x24
Ø95 g6
Ø28 k6
120
Ø150 g6


Ø40 H7
177
Ø41
Ø40 H6
Ø50 h7
Ø90
Contour of the countershaft
Ø40 h6
28
177
30
Ø40 h6

8.3.10 Type H 215 – Standard hypoid gearboxes



Characteristics

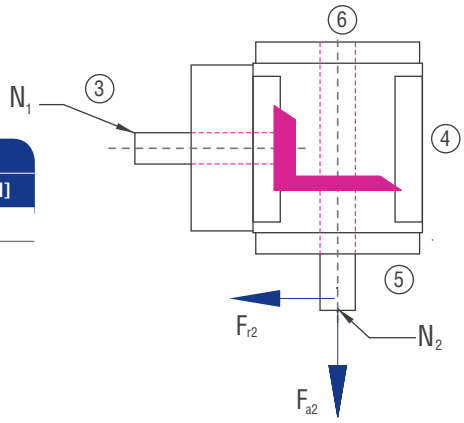
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 4 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
1200	5000	723	1084	1450	723	1084	1450	0	0	0	0	0	0
1600	5000	0	0	0	0	0	0	512	767	1022	512	767	1022

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
15000	7500	15000	7500	15000	7500	15000	7500



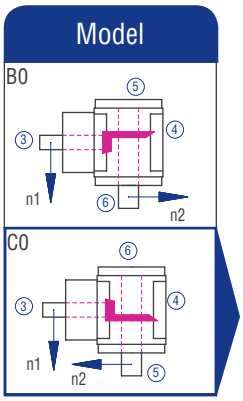
Gearbox inertia moments/mass

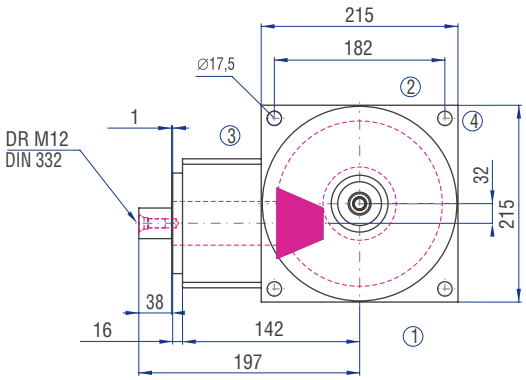
Inertia moment J_1 related to the fast-rotating shaft (N_1)

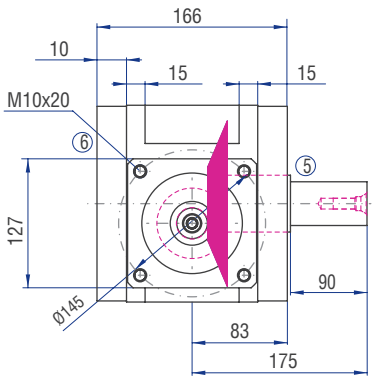
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
8.9500	7.3800	6.4700	5.7600	32.5

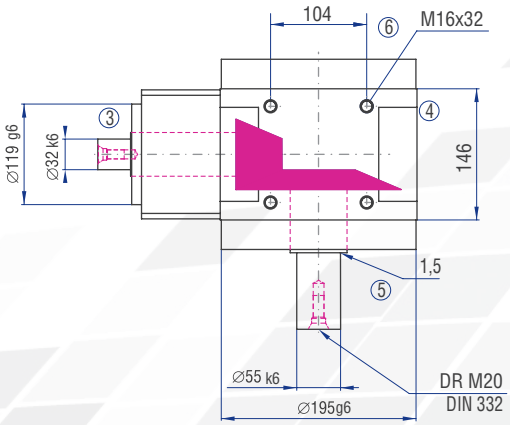
The mass of the gearbox may deviate depending on the type and the gear ratio.

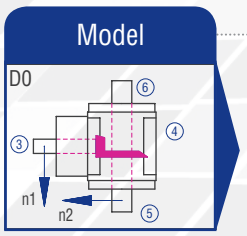
8.3.10 Type H 215 – Standard hypoid gearboxes

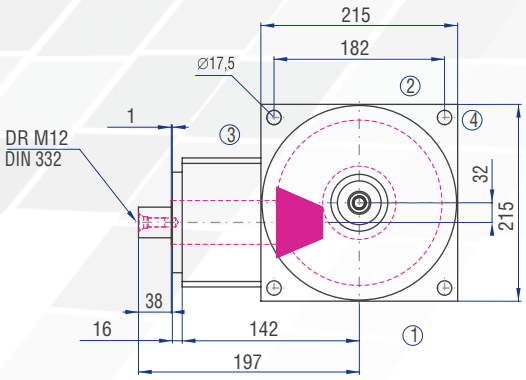


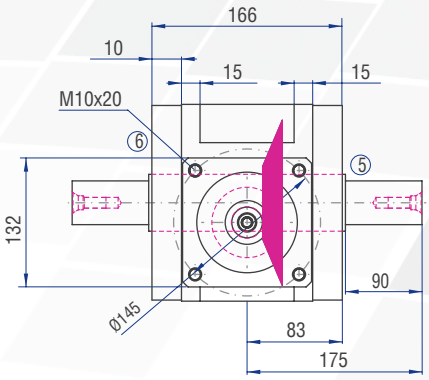


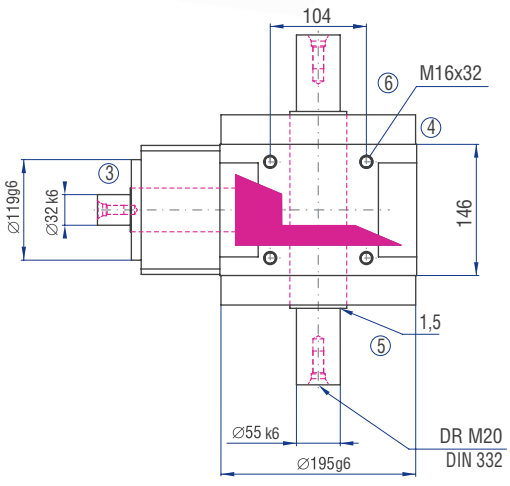




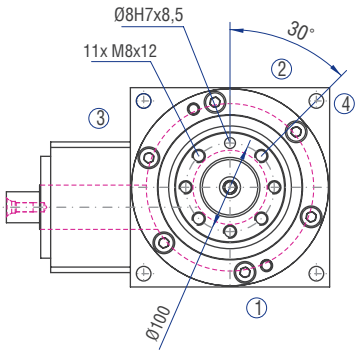


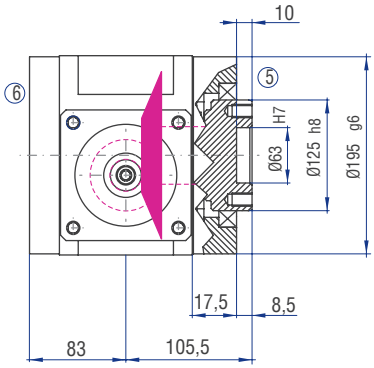


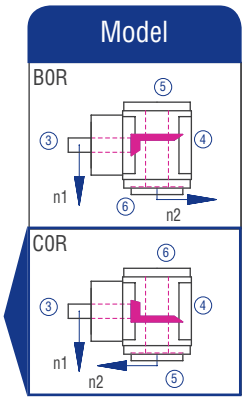


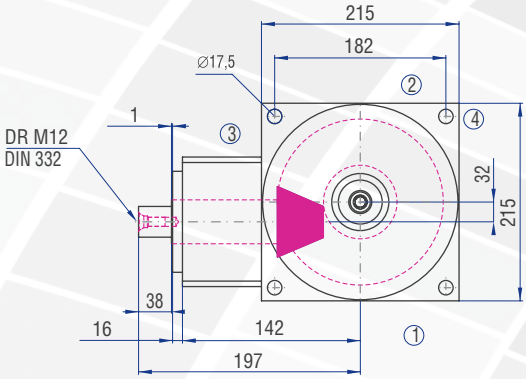


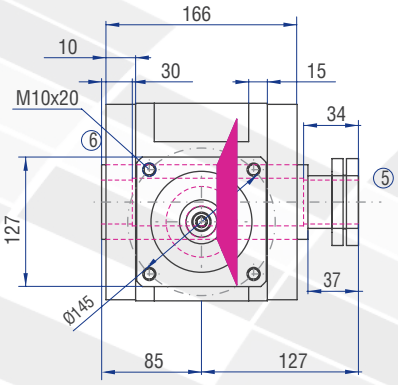
The dimensions of the Models not shown can be figured by mirroring available dimensions.

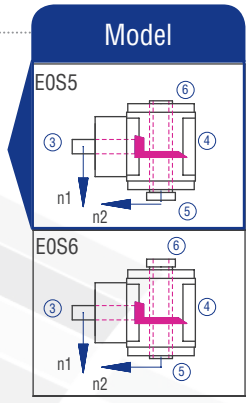

Ø8H7x8,5
11x M8x12
30°
Ø100

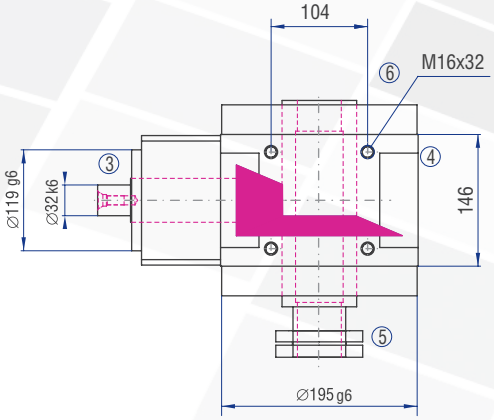

10
H7
Ø63
Ø125 h8
Ø195 g6
17,5
8,5
83
105,5

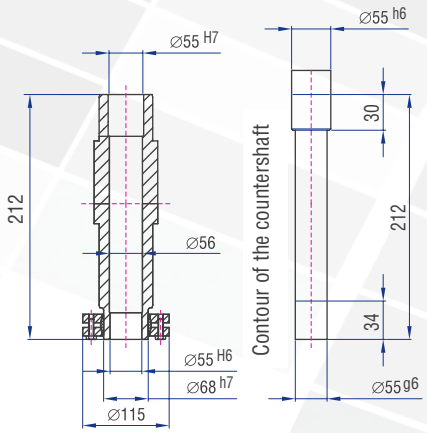

Model
B0R
C0R
n1
n2


215
182
Ø17,5
DR M12
DIN 332
1
32
215
38
16
142
197

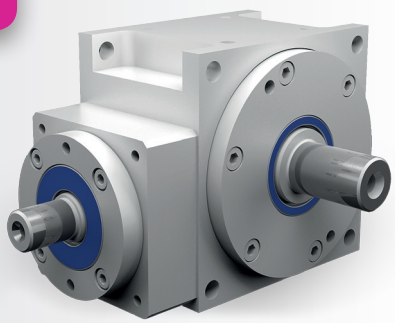

166
10
30
15
M10x20
34
127
37
Ø145
85
127


Model
E0S5
E0S6
n1
n2


104
M16x32
Ø119 g6
Ø32k6
146
Ø195 g6


Ø55 H7
212
Ø56
Ø55 H6
Ø68 h7
Ø115
Contour of the countershaft
Ø55 h6
30
212
34
Ø55 g6

8.3.11 Type H 260 – Standard hypoid gearboxes



Characteristics

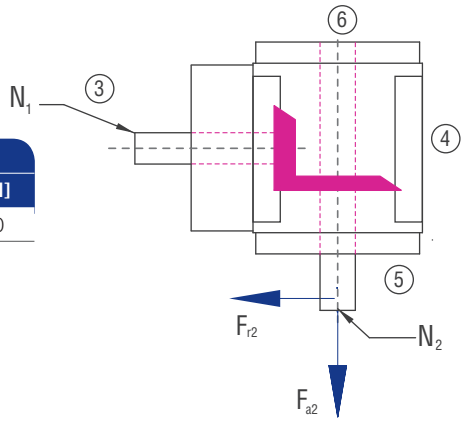
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel or casting	
Threaded mounting holes	On the sides 1, 2 and 3	See chapter 8.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
Radial shaft seal ring	NBR, form A	See chapter 4.8
Ambient temperature	- 10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
Circumferential backlash	< 4 arcmin	See chapter 8.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept < 90°C. The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.	See chapter 8.2.8
Lubricants	Synthetic lubricants	See chapter 8.2.8

Performance data

		8:1			10:1			12:1			15:1		
N_1 [rpm]	N_{1MAX} [rpm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]	T_{2N} [Nm]	T_{2B} [Nm]	T_{2NOT} [Nm]
1000	4500	1444	2165	2887	1444	2165	2887	0	0	0	0	0	0
1300	4500	0	0	0	0	0	0	1023	1533	2044	1023	1533	2044

Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

10:1		12:1		15:1		8:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
22500	11250	22500	11250	22500	11250	22500	11250



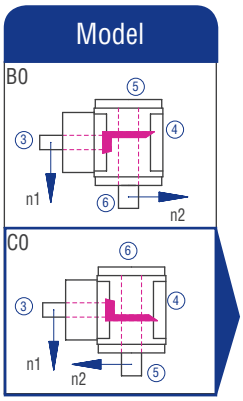
Gearbox inertia moments/mass

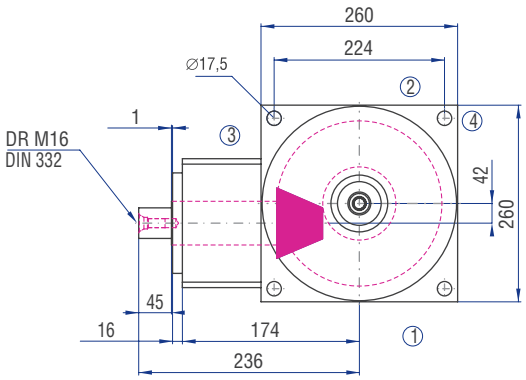
Inertia moment J_1 related to the fast-rotating shaft (N_1)

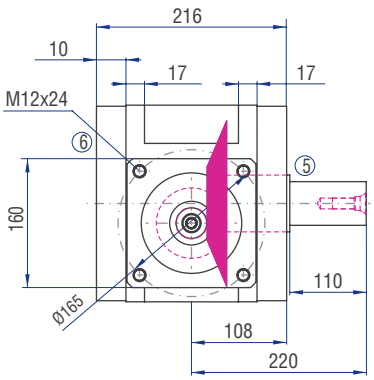
Inertia moment [kgcm^2]				Mass ca. [kg]
8:1	10:1	12:1	15:1	
27.0700	21.4300	18.1400	15.5300	60

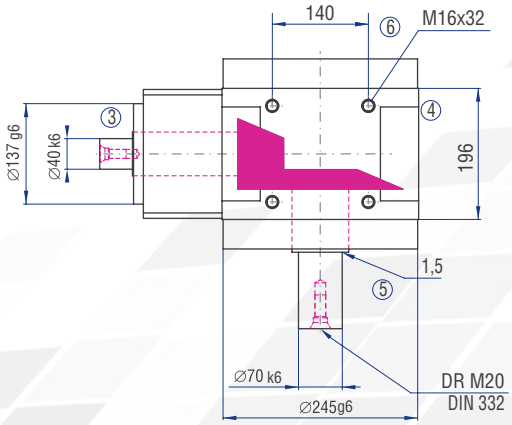
The mass of the gearbox may deviate depending on the type and the gear ratio.

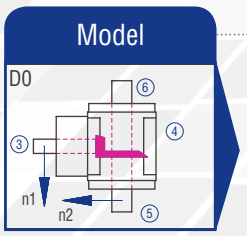
8.3.11 Type H 260 – Standard hypoid gearboxes

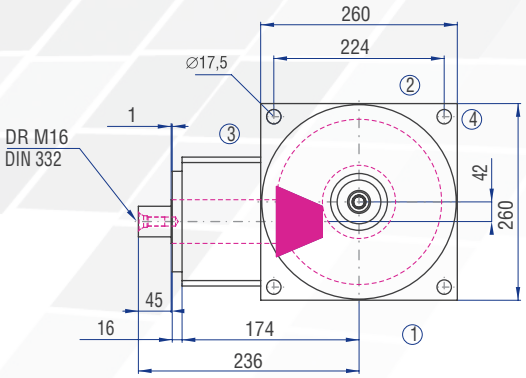


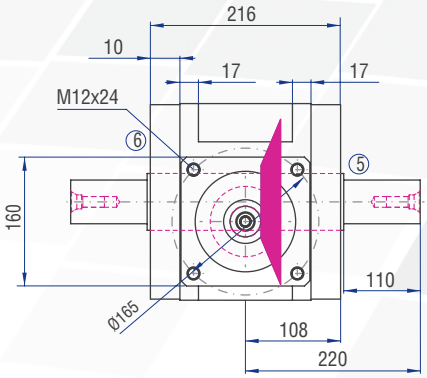


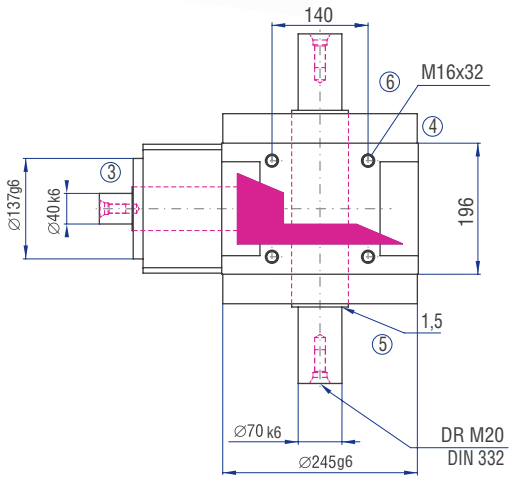




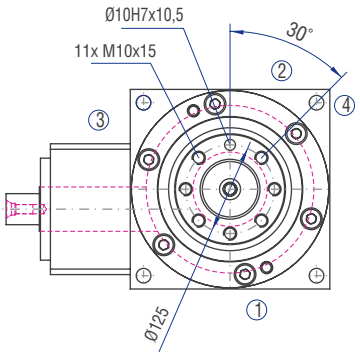


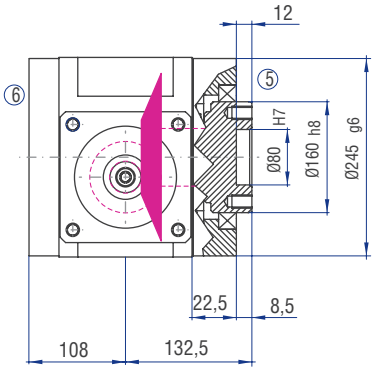


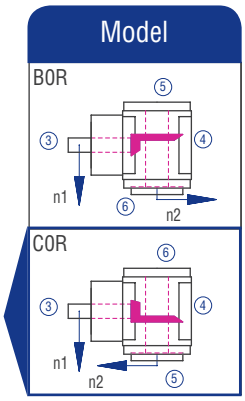


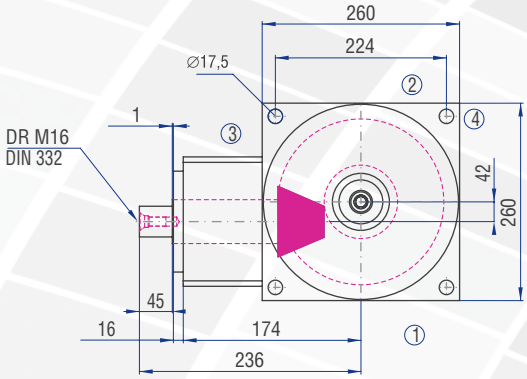


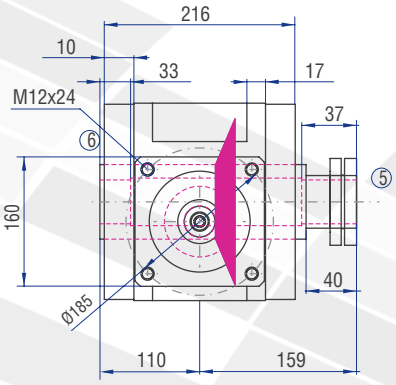
The dimensions of the Models not shown can be figured by mirroring available dimensions.

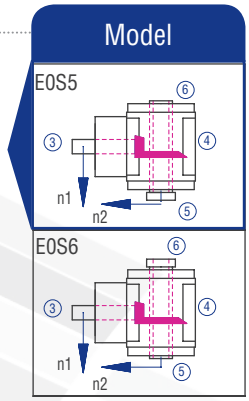

Ø10H7x10,5
11x M10x15
30°
Ø125

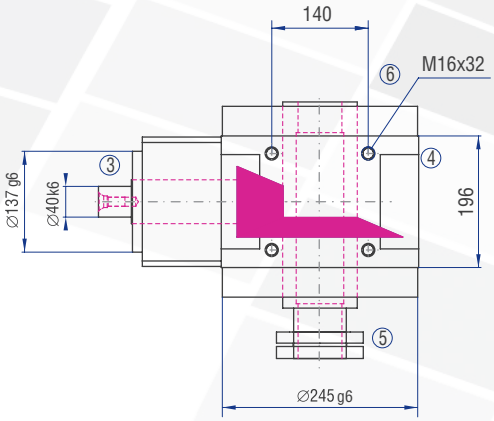

12
Ø80 H7
Ø160 h8
Ø245 g6
22,5
8,5
108
132,5

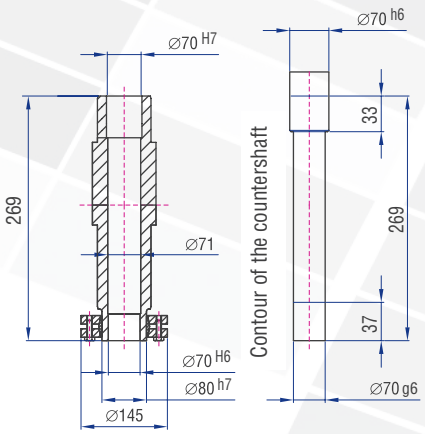

Model
B0R
C0R
n1
n2


260
224
Ø17,5
DR M16
DIN 332
1
42
260
45
16
174
236


216
10
33
17
M12x24
37
160
40
Ø185
110
159


Model
E0S5
E0S6
n1
n2


140
M16x32
Ø137 g6
Ø40k6
196
Ø245 g6


Ø70 H7
269
Ø71
Ø70 H6
Ø80 h7
Ø145
Contour of the countershaft
Ø70 h6
33
269
37
Ø70 g6

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