ATEK
DRIVE SOLUTIONS
BRAKES · GEARS · MOTORS

PRODUCT CATALOGUE
2026

GEARBOX TECHNOLOGY

as from 01/2026

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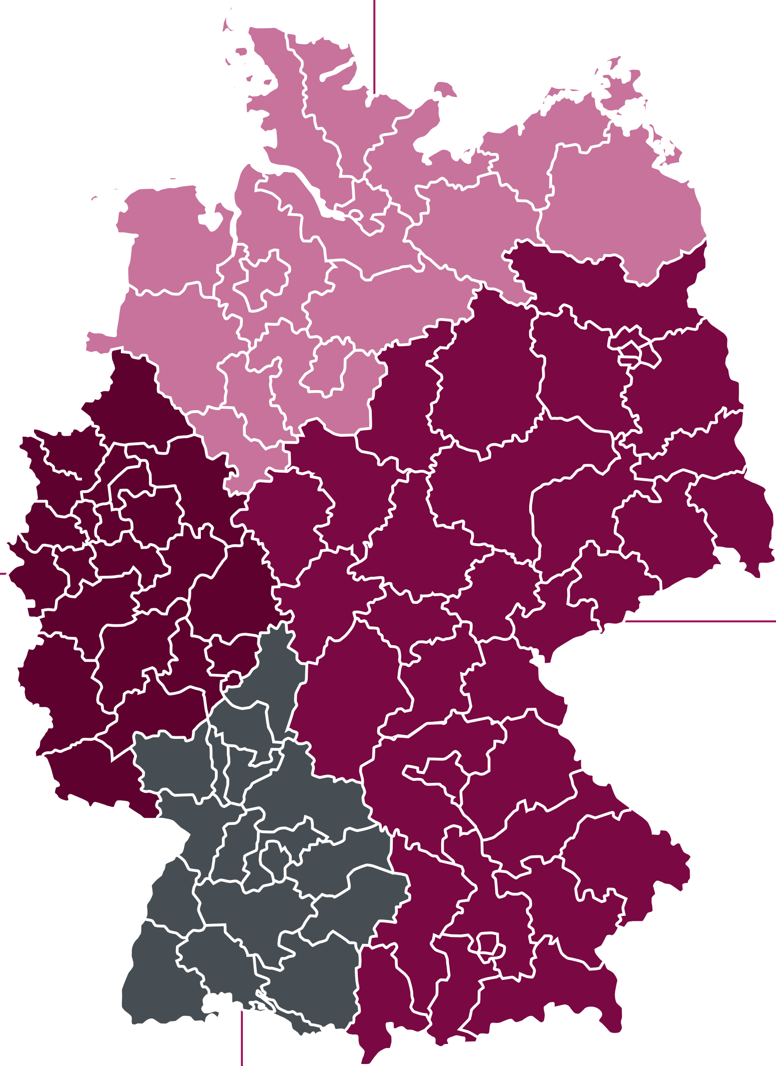

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4.1 Gearboxes

"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.

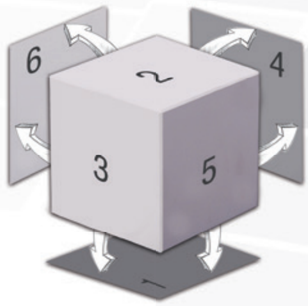


Figure **4.3.1-1; Gearbox sides**

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 EOS* (KOS*) *- 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 EOS, KOS)

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

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 385.
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 (f1, f2, f3, f4, f5, f6)

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

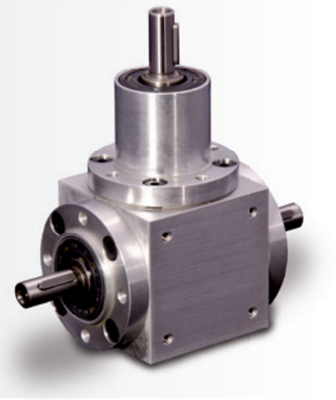
Table **4.9.6-7**

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.



5.1 Type overview

Type L – Miniature bevel gearboxes

Gear ratios: i = 1:1 to 4:1
Maximum output torque: 16 Nm
2 gearbox sizes with edge lengths of 035 to 045 mm
Low-backlash construction < 10 angular minutes possible
Housing made of aluminium

5.2 General construction

The axles intersect in the gearbox in an angle of 90°.
Housing and cover(s) are made of aluminium. Upon request, the aluminium parts can be anodised.
The edge length of the housing is reflected in the gearbox size (example: L 035 – housing edge length 35 mm).

Toothing

ATEK bevel gearboxes have gear sets with high-quality spiral toothing made of hardened carburised steel. A gear set comprises one bevel pinion (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, combined with optimal running smoothness and high transmission accuracy.

5.2.1 Construction types

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

Construction type	consists of:	
A0 through E0	1 gear set	
F0 through K0	1 gear set	+ 1 bevel pinion or bevel gear
Branch-off gearbox	1 gear set	+ 2–3 bevel pinions/gears

Table **5.2.1-1**

The variants differ in type and number of the shafts, the rotational direction of the shafts and their support by bearings.

5.2.2 Threaded mounting holes

All 6 sides of the gearboxes are machined and may be used as mounting surfaces. All flanges always have threaded mounting holes. 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, 5, 6
1, 2, 3, 4, 5, 6	1, 2, 4	3, 5, 6
9	1, 2, 4	3, 5, 6

Table **5.2.2-1**

The standard version of the mounting / fastening has the order code 9.
Example of order code: L 045 1:1 D0 9
Please enquire other mounting options.

5.2.3 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. Please contact us for consultation if the angle of the gearbox side directed downwards deviates more than 15° from the horizontal position.

5.2.4 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 bevel pinion is located on this shaft.
The slowly rotating shaft has the speed $\mathbf{n_2}$ and is identified by $\mathbf{N_2}$. The bevel 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)

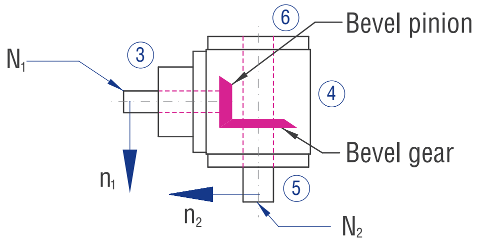


Figure **5.2.4-1; Shaft designations**

5.2.5 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 1 to 2 dB(A) lower noise level is generated.

5.2.6 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type. With gearboxes having only one gear set, an efficiency of 97% can be achieved. With gearboxes having several gear meshings, an efficiency of 94% can be achieved. The efficiencies specified in the tables relate to the permissible nominal load and are guidance values for run-in gearboxes at operating temperature with standard sealing and filled with oil of viscosity grade 220.

5.2.7 Lubrication

The L-series gearboxes have lifetime lubrication.

5.2.8 Vent filter

No venting is provided for the miniature gearboxes.

5.2.9 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 ($\mathbf{N_1}$) has been fixed. A force of around 2% of the nominal torque is applied to the output shaft ($\mathbf{N_2}$) 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	1:1; 2:1	3:1; 4:1
/0000	Standard	<=30 arcmin	<=30 arcmin
/S2	Standard	<=10 arcmin	<=12 arcmin
/S1	Standard	u.r.	u.r.
/S0	Special gear set	u.r.	u.r.

Table **5.2.9-1**

Abbreviation: u.r. = upon request

5.2.10 Corrosion protection

A coloured anodic coating can be applied to the housing and flanges (See chapter 4.4.7).
Please enquire the possible colours.

5.3 Type L – Miniature bevel gearboxes

5.3.1 Features

Gear ratios: i = 1:1 to 4:1
Maximum output torque: 16 Nm
2 gearbox sizes with edge lengths of 035 to 045 mm
Low-backlash construction < 8 angular minutes possible
Housing made of aluminium

035 – 045 mm

5.3.2 Models

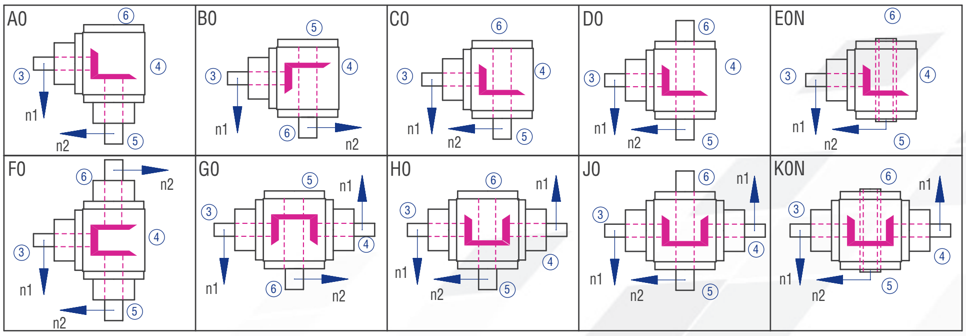


Figure **5.3.2-1; Models**

5.3.3 Gearbox sides

The example shows the Model CO

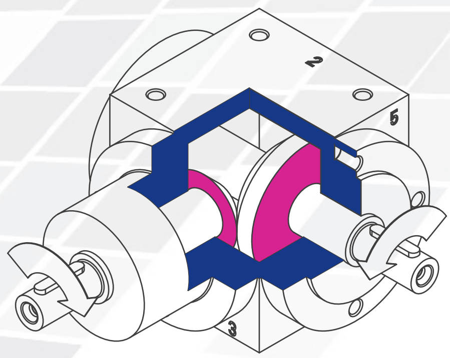


Figure **5.3.3-2; Gearbox sides**

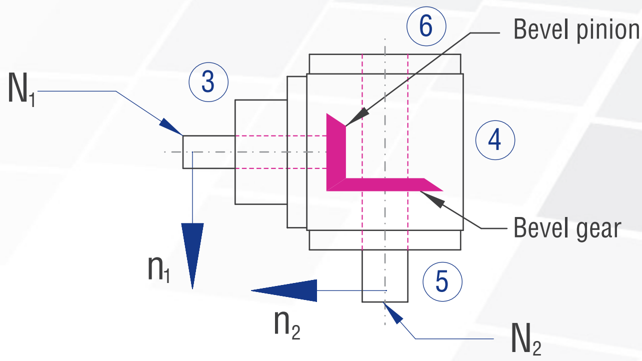


Figure **5.3.3-1; Shaft designations**

5.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
L	045	1:1	CO-	1.	1-	1500	/0000
Description	Housing edge length; Table 5.3.5-1	Table 5.3.5-1	Figure 5.3.2-1; Models	Gearbox side on which fixing is made; Table 5.2.2-1; Figure 4.3.1-1; Gearbox sides	Gearbox side directed downwards; Figure 4.3.1-1; Gearbox sides	slowly rotating shaft; Table 5.3.5-1	Standard

Table **5-4**

5.3.5 Overview of performance data

Size	n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]
035	3000	3000	0.66	2.0									
	2400	2400	0.63	2.4									
	1500	1500	0.50	3.0									
	1000	1000	0.39	3.5									
	750	750	0.30	3.6									
	500	500	0.22	4.0									
	250	250	0.12	4.5									
	50	50	0.03	4.5									
045	3000	3000	1.32	4.0	1500	0.74	4.5	1000	0.33	3.0	750	0.29	3.5
	2400	2400	1.19	4.5	1200	0.63	4.8	800	0.30	3.4	600	0.24	3.6
	1500	1500	0.99	6.0	750	0.41	5.0	500	0.19	3.5	375	0.16	3.8
	1000	1000	0.77	7.0	500	0.30	5.5	333	0.15	4.0	250	0.11	4.0
	750	750	0.60	7.3	375	0.24	5.7	250	0.12	4.2	188	0.09	4.2
	500	500	0.44	8.0	250	0.17	6.0	167	0.08	4.5	125	0.06	4.3
	250	250	0.25	9.0	125	0.09	6.5	83	0.05	5.0	63	0.03	4.5
	50	50	0.05	9.0	25	0.02	7.0	17	0.01	5.5	13	0.01	4.5

Table **5.3.5-1**

5.3.6 Type L 035 – Miniature bevel gearboxes

Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 5.2
Gear ratio	1:1	
Housing / Flanges	Aluminium	See chapter 5.2
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 5.2.2
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 5.2.9
Protection class	IP 54	See chapter 4.5
Corrosion protection	-	See chapter 5.2.10
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 5.2.7
Lubricant	Synthetic lubricants	See chapter 5.2.7

Performance data

n_1 [rpm]	1:1			2:1			3:1			4:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	0.66	2.0									
2400	2400	0.63	2.4									
1500	1500	0.50	3.0									
1000	1000	0.39	3.5									
750	750	0.30	3.6									
500	500	0.22	4.0									
250	250	0.12	4.5									
50	50	0.03	4.5									
P_{1Nt} [kW]		0.35										
T_{2max} [Nm]		8.00										

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

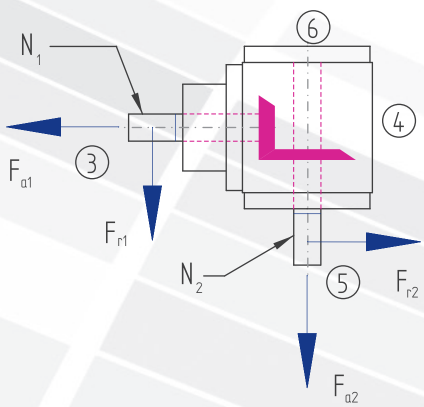
n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
	10	5	20	10	30	15	50	25	70	35	90	45

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

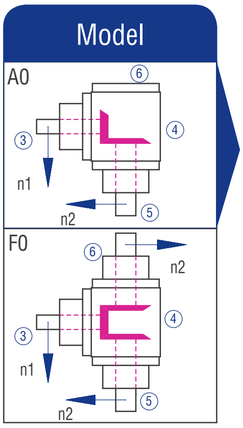
n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
	30	15	50	25	80	40	120	60	150	75	220	110

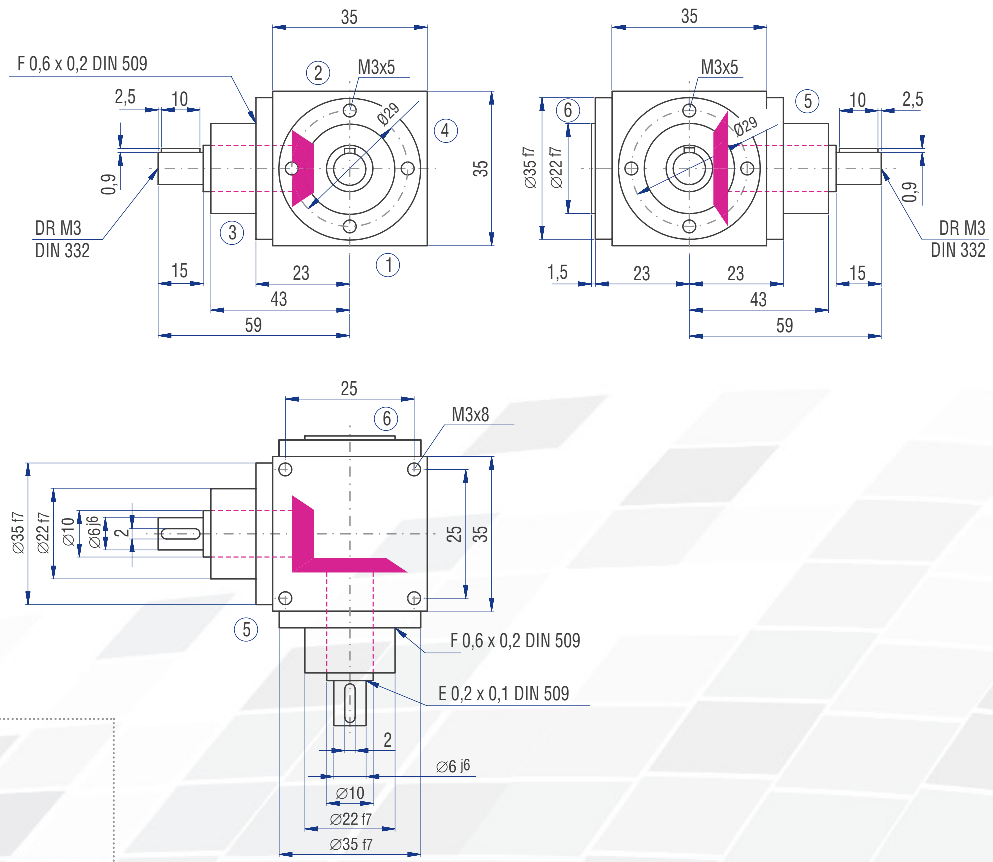
Inertia moments/mass

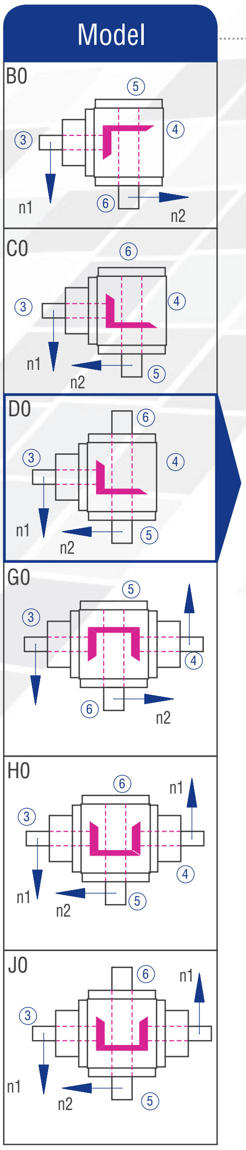
Model	Inertia moment [$kgcm^2$]				Mass ca.[g]
	1:1	2:1	3:1	4:1	
A0	0.0204				230
B0	0.0219				225
C0	0.0219				225
D0	0.0224				230
E0N	0.0149				210
F0	0.0306				290
G0	0.0321				285
H0	0.0321				285
J0	0.0326				290
K0N	0.0251				270

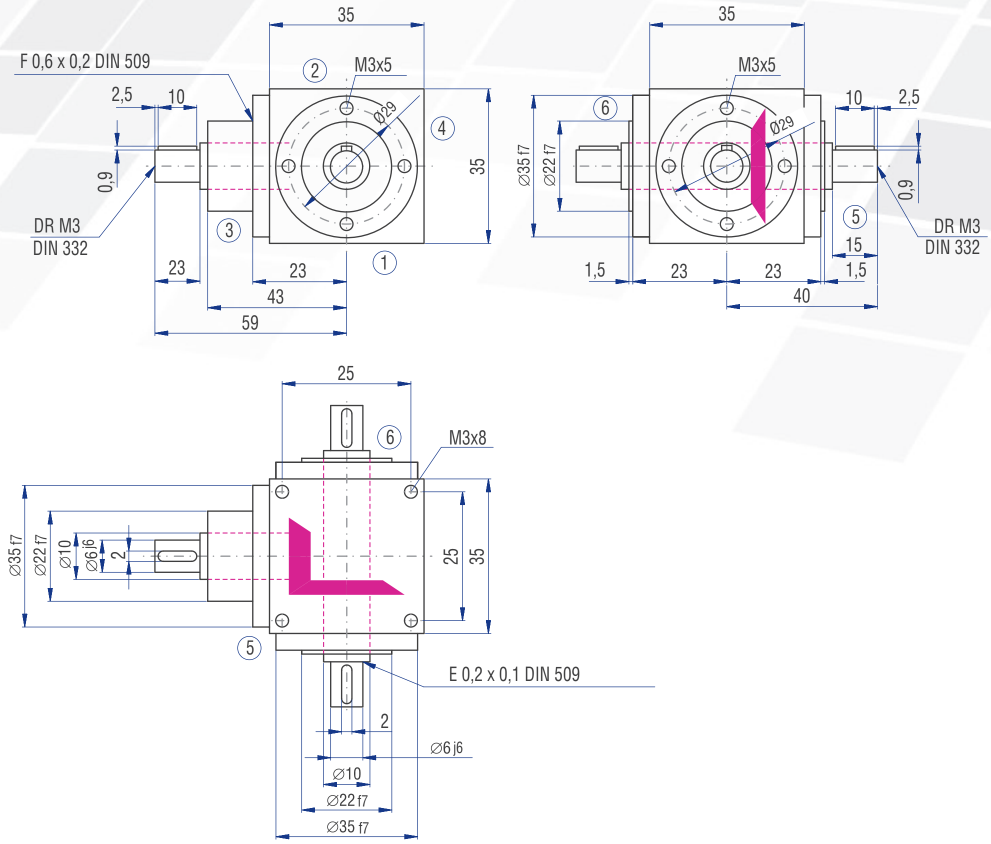


The mass of the gearbox may deviate depending on the gear ratio.









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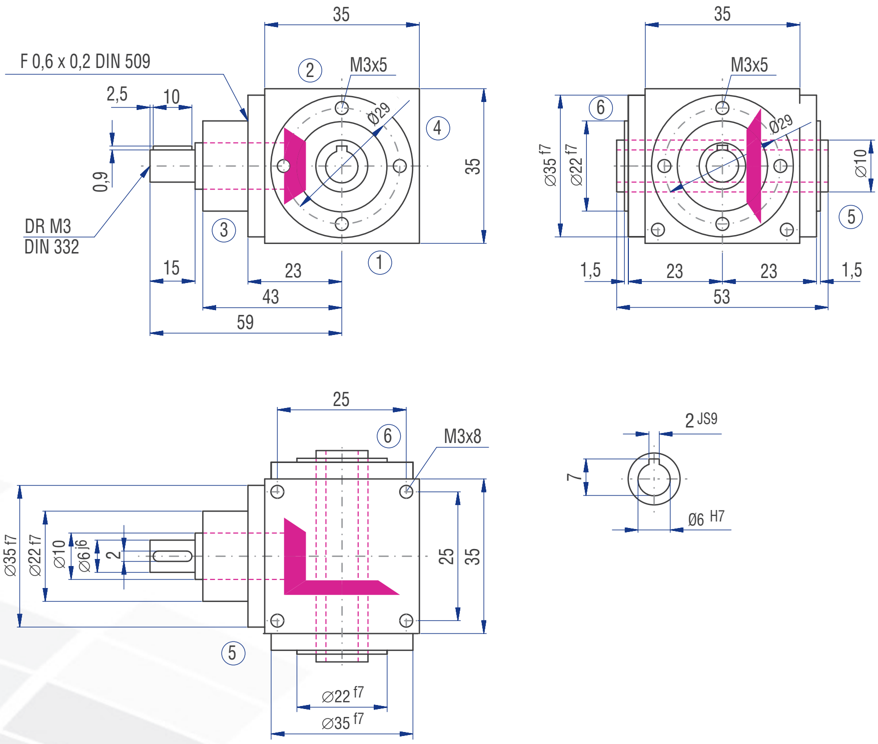
The dimensions of the Models not shown can be figured by mirroring available dimensions.


35
F 0,6 x 0,2 DIN 509
2,5
10
M3x5
Ø29
0,9
DR M3
DIN 332
15
23
43
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35
Ø35 f7
Ø22 f7
Ø10
1,5
23
23
1,5
53
25
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Ø22 f7
Ø10
Ø6 j6
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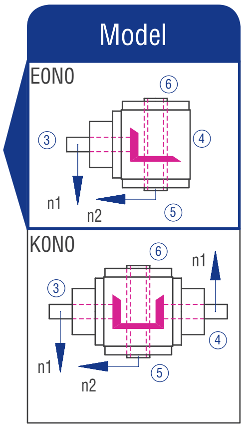
25
35
Ø22 f7
Ø35 f7
2 JS9
7
Ø6 H7


Model
E0N0
n1
n2
K0N0
n1
n1
n2

5.3.7 Type L 045 – Miniature bevel gearboxes

Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 5.2
Gear ratio	1:1 to 4:1	
Housing / Flanges	Aluminium	See chapter 5.2
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 5.2.2
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 5.2.9
Protection class	IP 54	See chapter 4.5
Corrosion protection	-	See chapter 5.2.10
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 5.2.7
Lubricant	Synthetic lubricants	See chapter 5.2.7

Performance data

n_1 [rpm]	1:1			2:1			3:1			4:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	1.32	4.0	1500	0.74	4.5	1000	0.33	3.0	750	0.29	3.5
2400	2400	1.19	4.5	1200	0.63	4.8	800	0.30	3.4	600	0.24	3.6
1500	1500	0.99	6.0	750	0.41	5.0	500	0.19	3.5	375	0.16	3.8
1000	1000	0.77	7.0	500	0.30	5.5	333	0.15	4.0	250	0.11	4.0
750	750	0.60	7.3	375	0.24	5.7	250	0.12	4.2	188	0.09	4.2
500	500	0.44	8.0	250	0.17	6.0	167	0.08	4.5	125	0.06	4.3
250	250	0.25	9.0	125	0.09	6.5	83	0.05	5.0	63	0.03	4.5
50	50	0.05	9.0	25	0.02	7.0	17	0.01	5.5	13	0.01	4.5

	1:1	2:1	3:1	4:1
P_{1Nt} [kW]	0.60	0.60	0.60	0.60
T_{2max} [Nm]	16.00	12.00	10.00	8.00

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

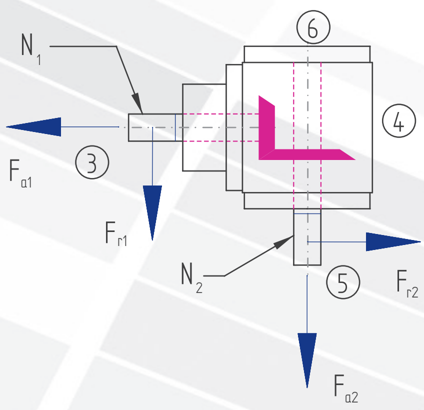
n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
	80	40	100	50	120	60	150	75	200	100	250	125

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

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
	100	50	170	85	220	110	300	150	400	200	500	250

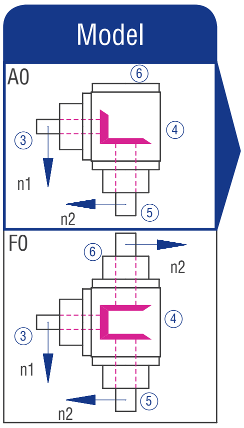
Inertia moments/mass

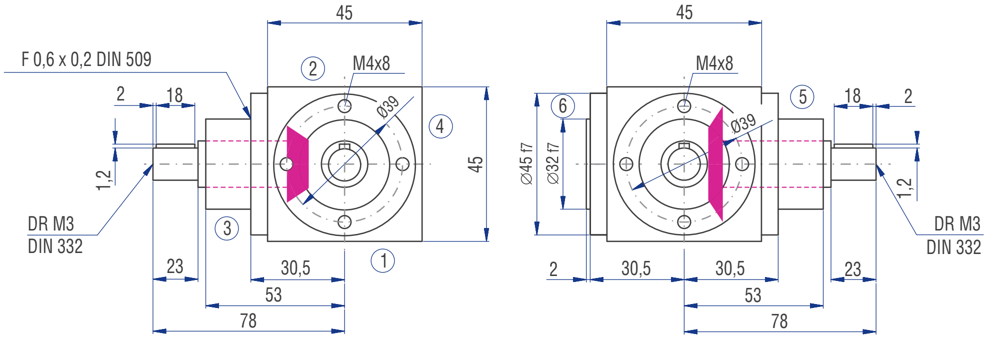
Model	Inertia moment [kgcm^2]				Mass ca.[g]
	1:1	2:1	3:1	4:1	
A0	0.0630	0.0340	0.0310	0.0300	510
B0	0.1380	0.0550	0.0390	0.0350	500
C0	0.1380	0.0550	0.0390	0.0350	500
D0	0.1400	0.0550	0.0390	0.0350	530
E0N	0.1310	0.0530	0.0380	0.0350	460
F0	0.0630	0.0340	0.0310	0.0300	700
G0	0.2010	0.0870	0.0700	0.0660	660
H0	0.2010	0.0870	0.0700	0.0660	660
J0	0.2030	0.0880	0.0700	0.0660	690
K0N	0.1940	0.0860	0.0690	0.0650	620

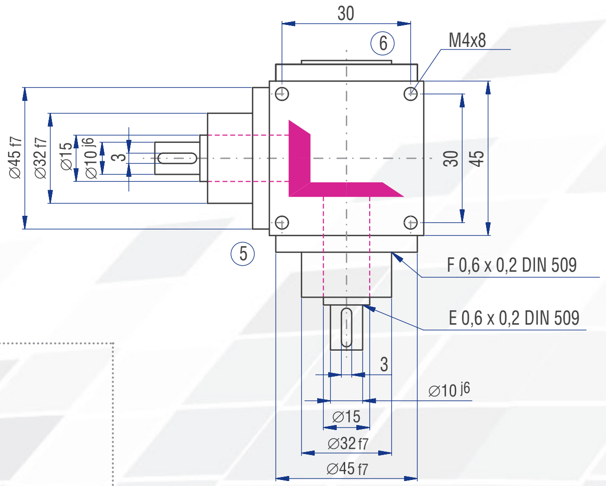


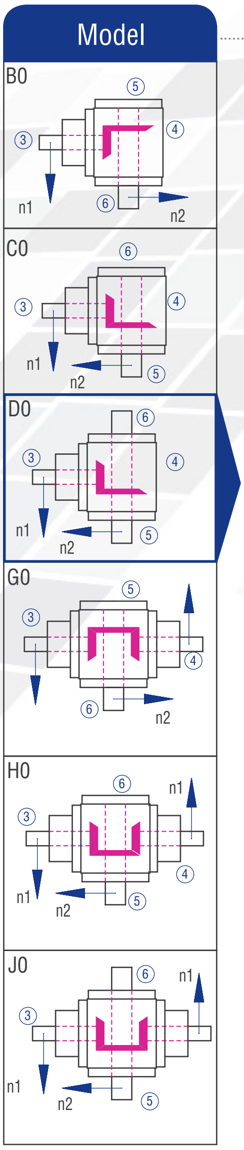
The mass of the gearbox may deviate depending on the gear ratio.

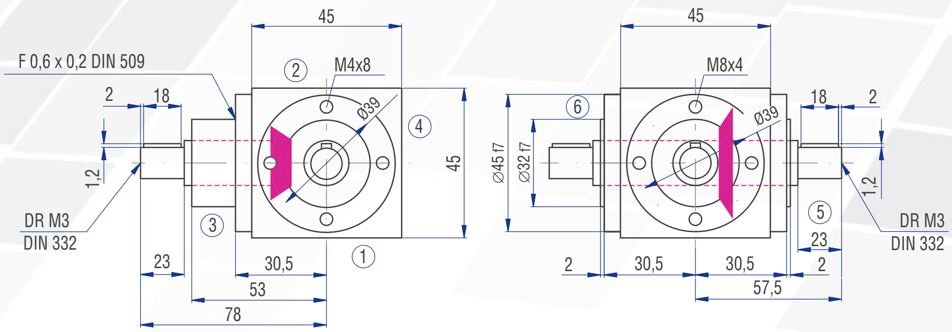
5.3.7 Type L 045 – Miniature bevel gearboxes

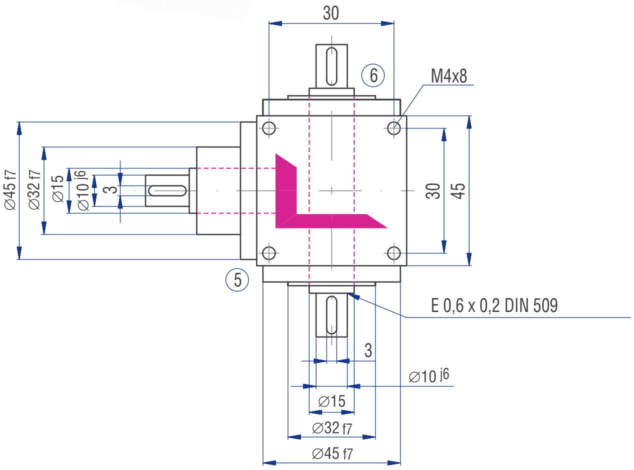




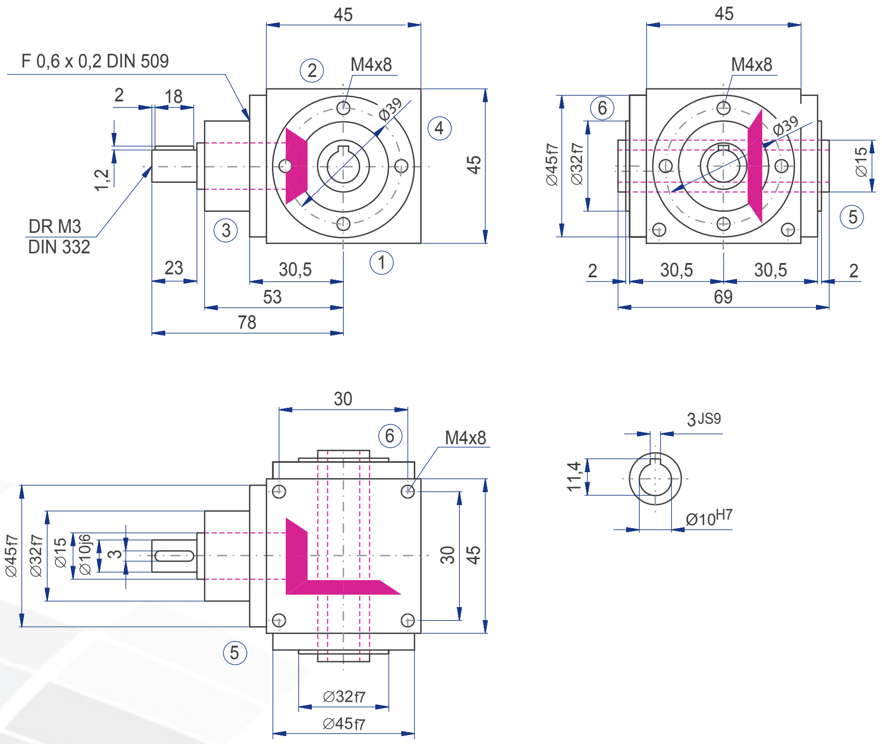






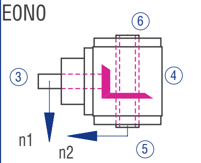


The dimensions of the Models not shown can be figured by mirroring available dimensions.

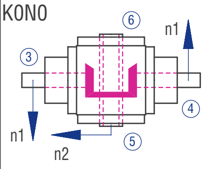


Model

E0N0

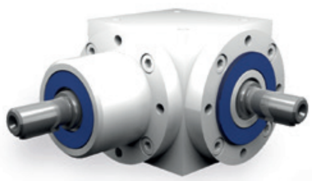


K0N0



6 Bevel gearboxes

6.1 Type overview

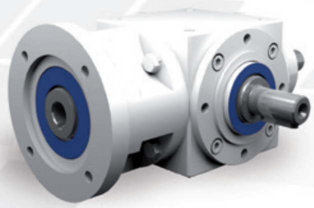


Type V – Standard bevel gearboxes

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 5400 Nm
9 gearbox sizes with edge lengths of 065 to 350 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron or steel

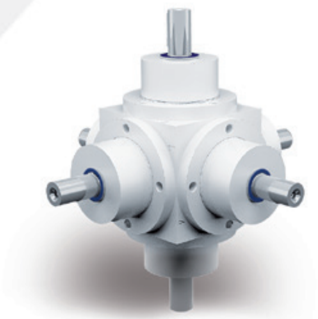
Type VS – Type V with step-up ratio

Gear ratios: i = 1:1.5 and 1:2
Maximum output torque: 1200 Nm
6 gearbox sizes with edge lengths of 090 to 260 mm
Low-backlash construction < 10 angular minutes possible
Larger shaft diameter (N_2), slowly rotating
Housing made of grey cast iron or steel



Type VL – Type V with flange

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 2310 Nm
8 gearbox sizes with edge lengths of 065 to 260 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron or steel



Multi shaft gearbox – with additional shafts

for gear ratios of 1.5:1 to 6:1 with type V
for gear ratios of 1.5:1 to 2:1 with type VS
with solid shaft or hollow shaft
up to 6 shaft ends

6.2 General construction

A bevel gearbox enables alternatively stepping-down or stepping-up.
The axles intersect in the gearbox in an angle of 90°. The edge length of the housing is reflected in the gearbox size (example: V 120 – housing edge length 120 mm).

6.2.1 Toothing

ATEK bevel gearboxes have gear sets with high-quality spiral toothing made of hardened carburised steel. A gear set comprises one bevel pinion (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, combined with optimal running smoothness and high transmission accuracy.

6.2.2 Construction types

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

Construction type	No. of gear sets	Additional gears
A0 through E0	1 gear set	
F0 through K0	1 gear set	+ 1 bevel pinion or bevel gear
Branch-off gearbox	1 gear set	+ 2–3 bevel pinions/gears

Table **6.2.2-1**

The construction types differ in type and number of the shafts, the rotational direction of the shafts and their support by bearings.
Example of order code: V 090 1:1 A0 - 1.1 -1000 /0000

6.2.3 Threaded mounting holes

All 6 sides of the gearboxes are machined and may be used as mounting surfaces. All flanges always have threaded mounting holes. You have the following available ordering options:

Ordering options	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, 5, 6
1, 2, 3, 4, 5, 6	1, 2, 4	3, 5, 6
9	1, 2, 4	3, 5, 6

Table **6.2.3-1**

The standard version has the order code 9.
Example of order code for mounting option 9: V 090 1:1 A0 - 9.1 -1000 /0000
Other mounting options must be enquired.

6.2.4 Installation position

The installation position is defined by the gearbox side directed downwards during operation and will be indicated by the associated numeral. The gearboxes can be used in all installation positions. The technically most favourable and thus recommended installation position is the position in which the shafts are horizontal. These are the installation positions 1 and 2.
Please contact us for consultation if the angle of the gearbox side directed downwards deviates more than 15° from the horizontal position.
For an optimal technical design of the gearboxes, we principally ask to specify the installation position.
Example of order code for installation position 2: V 090 1:1 A0 - 1.2 -1000 /0000

6.2.5 Shaft designation – allocation to the gearbox sides

The fast-rotating shaft has the speed n_1 and is identified by N_1.
The bevel pinion is located on this shaft. The slowly rotating shaft has the speed n_2 and is identified by N_2. The bevel 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)

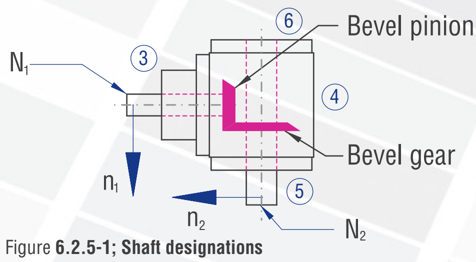


Figure **6.2.5-1; Shaft designations**

6.2.6 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 1 to 2 dB(A) lower noise level is generated.

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6.2.7 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type.
With gearboxes having only one gear set, an efficiency of 97% can be achieved. With gearboxes having several gear meshings, an efficiency of 94% can be achieved. The efficiencies specified in the tables relate to the permissible nominal load and are guidance values for run-in gearboxes at operating temperature with standard sealing.

6.2.8 Lubrication

With the bevel gearboxes, different conditions for the lubrication will arise depending on gearbox size, rotational speed, on-period, temperature, and type of application. The decisive variable is the circumferential speed of the bevel gear. Depending thereon, different oil quantities and viscosities will be used.
These will be defined by ATEK based on your ordering details (rotational speed, on-period, and ambient temperature).
They will be reflected in the type designation. You can find the itemisation in the example: V 090 1:1 C0 - 1.1 -1000 /B0

Here, /B0 means:

	Abbreviation	Explanation	Reference
Letter	B	Oil viscosity 220	Table 6.2.8-1
Numeral	0	no venting	Table 6.2.8-2

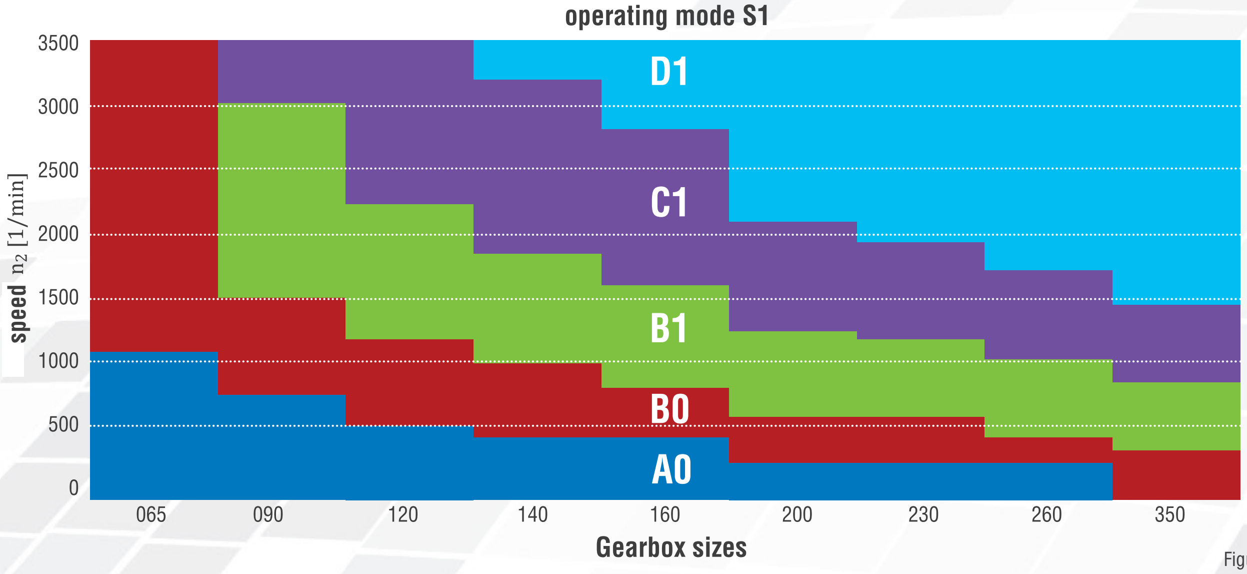


Figure **6.2.8-1**

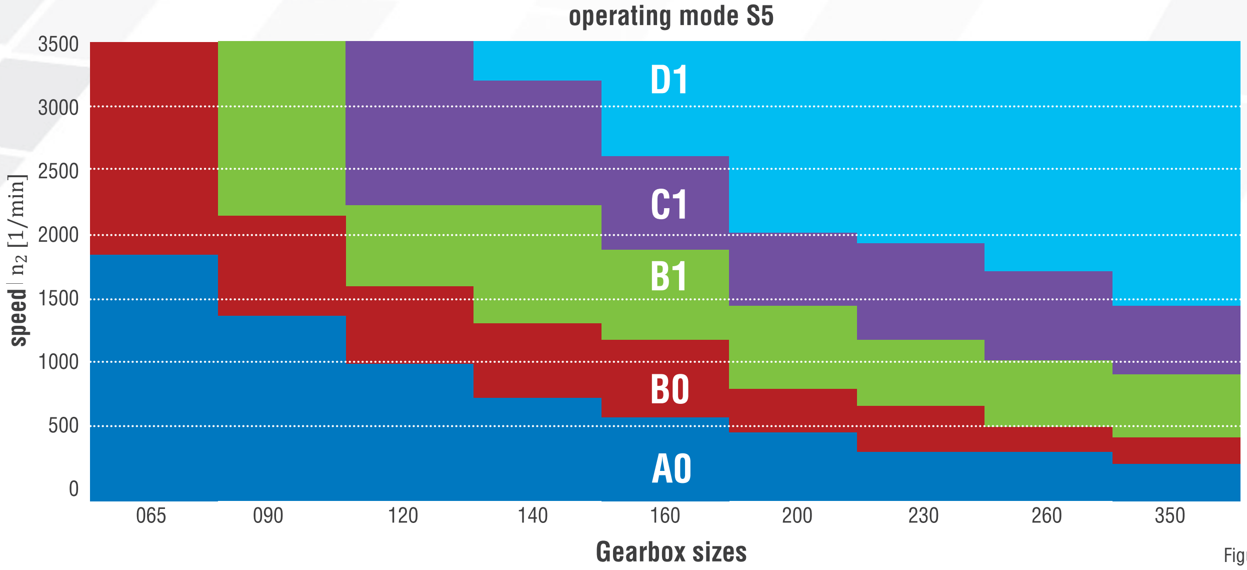


Figure **6.2.8-2**

For the abbreviations, refer to the following tables.

Oil viscosity table

Letter	Viscosity
A	460
B	220
C	68
D	Injection lubrication
F	Fluid grease

Table **6.2.8-1**

Depending on the gearbox size, injection lubrication may be necessary in case of high rotational speeds.
In case of very low rotational speeds, lubrication by fluid grease is also possible.

Numeral	Vent filter
0	No
1	Yes

Table **6.2.8-2**

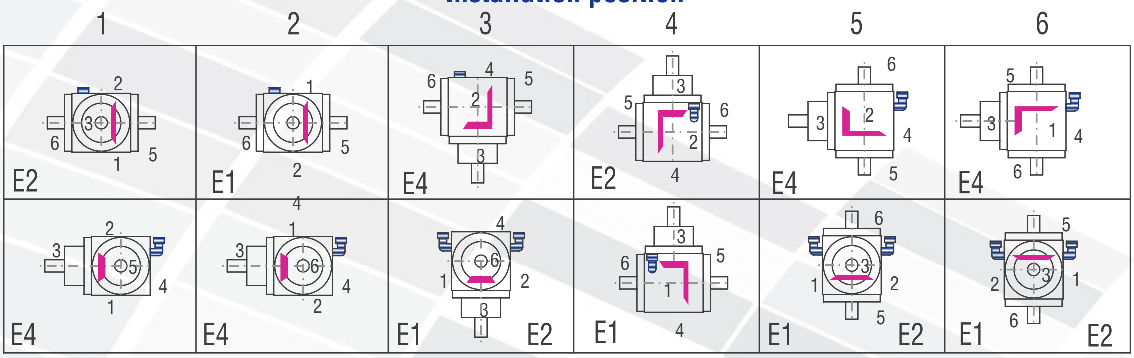
6.2.9 Vent filter

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!

Gearbox size	V065	V090	V120	V140	V160	V200	V230	V350
Pipe thread	G1/4	G1/4	G3/8	G3/8	G1/2	G1/2	G1/2	G1/2

The position of the filter will be specified in the order documents. Please refer to the following table for the position of the filter.
The meaning here, for example: /B1-E4 = oil viscosity 220; vent filter on side 4.

Installation position



Straight standard filter — Filter with pipe elbows

Figure **6.2.9-1**

6.2.10 Low-backlash construction

For optimal 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 shaft N_1 has been fixed. A force of around 2% of the nominal torque is applied to the 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

All ATEK bevel gearboxes can be delivered as low-backlash types. (u.r. – upon request)

Ordering option	Gear set	1:1, 2:1	3:1, 4:1, 5:1, 6:1
/0000	Standard	<=30 arcmin	<=30 arcmin
/S2	Standard	<=10 arcmin	<=10 arcmin
/S1	Standard	<=6 arcmin	u.r.
/S0	Special gear set	<=4 arcmin	u.r.

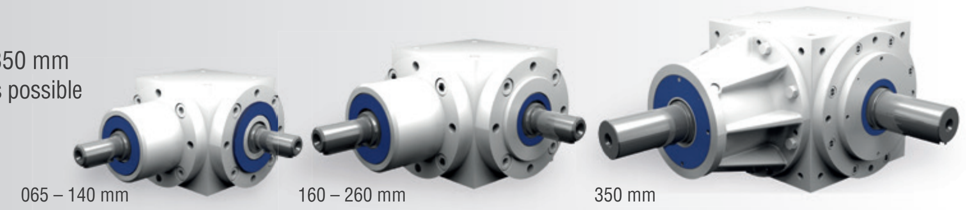
Abbreviation: u.r. – upon request

Table **6.2.10-1**

6.3 Type V – Standard bevel gearboxes

6.3.1 Features

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 5400 Nm
9 gearbox sizes with edge lengths of 065 to 350 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron or steel



6.3.2 Models

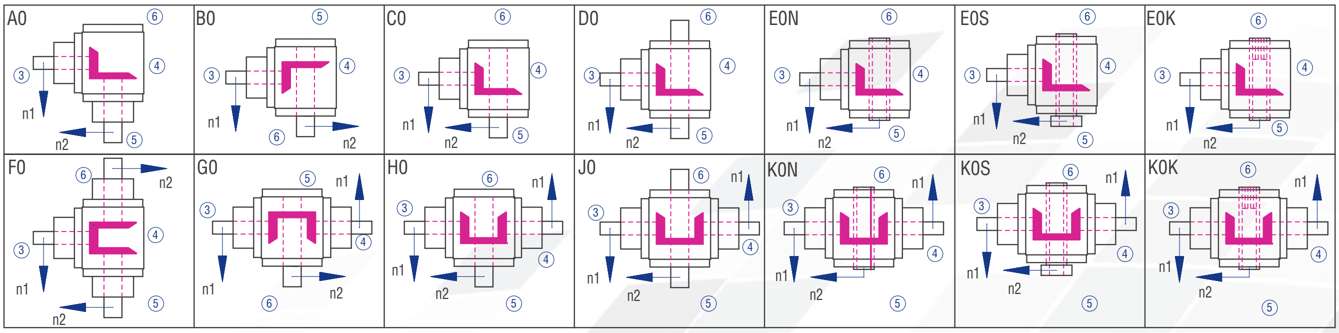


Figure **6.3.2-1; Models**

6.3.3 Gearbox sides

The example shows the Model C0

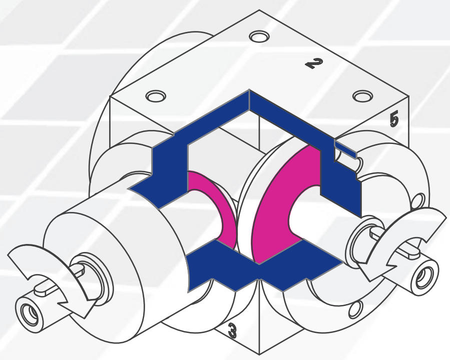


Figure **6.3.3-1; Gearbox sides**

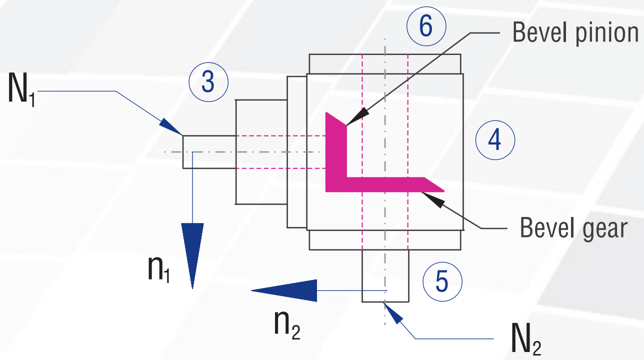


Figure **6.3.3-2; Shaft designations**

6.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
V	065	1:1	C0-	1.	1-	1500	/0000
Description	Housing edge length; Table 6.3.5-1	Table 6.3.5-1	Figure 6.3.2-1; Models	Gearbox side on which fixing is made; Table 6.2.3-1; Figure 4.3.1-1; Gear-box sides	Gearbox side directed down-wards; Figure 4.3.1-1; Gearbox sides	Slowly rotating shaft; Table 6.3.5-1	Standard

Table **6.3.4-1**

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6.3.5 Overview of performance data

Size	n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
		n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
065	3000	3000	3.31	10	2000	2.20	10	1500	1.65	10	1000	1.10	10									
	2400	2400	2.65	10	1600	1.76	10	1200	1.32	10	800	0.88	10									
	1500	1500	1.82	11	1000	1.21	11	750	0.91	11	500	0.61	11									
	1000	1000	1.32	12	667	0.88	12	500	0.66	12	333	0.44	12									
	750	750	1.07	13	500	0.72	13	375	0.54	13	250	0.33	12									
	500	500	0.83	15	333	0.55	15	250	0.41	15	167	0.24	13									
	250	250	0.47	17	167	0.31	17	125	0.23	17	83	0.12	13									
	50	50	0.10	18	33	0.07	18	25	0.05	18	17	0.03	14									
090	3000	3000	8.93	27	2000	5.51	25	1500	3.80	23	1000	2.54	23	750	1.90	23	600	1.52	23	500	1.25	23
	2400	2400	7.41	28	1600	4.59	26	1200	3.17	24	800	2.12	24	600	1.65	25	480	1.32	25	400	1.09	25
	1500	1500	5.29	32	1000	3.20	29	750	2.23	27	500	1.49	27	375	1.12	27	300	0.89	27	250	0.74	27
	1000	1000	3.75	34	667	2.35	32	500	1.71	31	333	1.14	31	250	0.85	31	200	0.68	31	167	0.53	29
	750	750	3.06	37	500	1.93	35	375	1.32	32	250	0.88	32	188	0.66	32	150	0.53	32	125	0.40	29
	500	500	2.20	40	333	1.36	37	250	0.94	34	167	0.63	34	125	0.47	34	100	0.37	34	83	0.27	29
	250	250	1.21	44	167	0.74	40	125	0.50	36	83	0.33	36	63	0.25	36	50	0.20	36	42	0.14	30
	50	50	0.28	50	33	0.16	45	25	0.10	37	17	0.07	37	13	0.05	37	10	0.04	37	8	0.03	33
120	3000	3000	21.82	66	2000	13.45	61	1500	9.26	56	1000	6.39	58	750	4.96	60	600	3.97	60	500	2.95	54
	2400	2400	18.52	70	1600	11.46	65	1200	8.07	61	800	5.56	63	600	4.43	67	480	3.44	65	400	2.53	57
	1500	1500	13.56	82	1000	8.60	78	750	6.03	73	500	4.08	74	375	3.06	74	300	2.38	72	250	1.75	64
	1000	1000	10.14	92	667	6.32	86	500	4.46	81	333	3.01	82	250	2.18	79	200	1.76	80	167	1.22	66
	750	750	8.51	103	500	5.18	94	375	3.55	86	250	2.40	87	188	1.69	82	150	1.42	86	125	0.94	68
	500	500	6.34	115	333	3.85	100	250	2.54	92	167	1.66	90	125	1.16	84	100	0.98	89	83	0.63	69
	250	250	3.39	123	167	1.99	100	125	1.35	98	83	0.87	95	63	0.60	87	50	0.51	92	42	0.33	71
	50	50	0.72	130	33	0.41	100	25	0.29	107	17	0.21	110	13	0.12	90	10	0.10	95	8	0.06	66
140	3000	3000	39.68	120	2000	24.91	113	1500	16.53	100	1000	12.12	110	750	8.51	103	600	6.61	100	500	5.18	94
	2400	2400	37.04	140	1600	22.22	126	1200	14.68	111	800	11.46	130	600	7.34	111	480	5.56	105	400	4.58	104
	1500	1500	26.78	162	1000	17.08	155	750	11.41	138	500	8.05	146	375	4.96	120	300	3.80	115	250	2.95	107
	1000	1000	20.28	184	667	12.87	175	500	8.38	152	333	5.87	160	250	3.75	136	200	2.73	124	167	2.06	112
	750	750	16.20	196	500	10.47	190	375	6.86	166	250	4.60	167	188	3.06	148	150	2.15	130	125	1.61	117
	500	500	11.46	208	333	7.34	200	250	4.96	180	167	3.20	174	125	2.12	154	100	1.50	136	83	1.09	119
	250	250	5.92	215	167	3.76	204	125	2.62	190	83	1.62	177	63	1.12	162	50	0.79	143	42	0.56	121
	50	50	1.21	220	33	0.76	210	25	0.55	200	17	0.34	180	13	0.23	170	10	0.17	150	8	0.11	120
160	3000				2000	40.78	185	1500	28.11	170	1000	20.94	190	750	14.88	180	600	11.90	180	500	7.09	129
	2400	2400	57.67	218	1600	36.15	205	1200	25.53	193	800	17.81	202	600	13.23	200	480	10.48	198	400	5.98	136
	1500	1500	42.99	260	1000	27.78	252	750	20.25	245	500	12.68	230	375	9.09	220	300	7.11	215	250	3.95	143
	1000	1000	31.96	290	667	20.59	280	500	14.88	270	333	8.99	245	250	6.61	240	200	4.96	225	167	3.01	164
	750	750	25.63	310	500	16.26	295	375	11.57	280	250	6.89	250	188	5.17	250	150	3.97	240	125	2.43	176
	500	500	18.19	330	333	11.56	315	250	8.27	300	167	4.79	260	125	3.58	260	100	2.76	250	83	1.72	187
	250	250	9.64	350	167	6.07	330	125	4.41	320	83	2.56	280	63	1.86	270	50	1.49	270	42	0.92	199
	50	50	2.09	380	33	1.29	355	25	0.98	355	17	0.57	305	13	0.39	280	10	0.32	290	8	0.18	197
200	3000				2000	72.75	330	1500	51.25	310	1000	46.29	420	750	28.93	350	600	19.84	300	500	11.45	208
	2400				1600	63.49	360	1200	45.24	342	800	39.24	445	600	26.45	400	480	17.99	340	400	9.60	218
	1500	1500	74.40	450	1000	48.17	437	750	35.13	425	500	28.38	515	375	18.81	455	300	12.57	380	250	6.54	237
	1000	1000	56.21	510	667	37.13	505	500	27.56	500	333	20.37	555	250	13.36	485	200	9.26	420	167	4.74	258
	750	750	45.88	555	500	30.31	550	375	22.32	540	250	15.98	580	188	10.54	510	150	7.27	440	125	3.98	289
	500	500	34.17	620	333	22.57	615	250	16.81	610	167	11.04	600	125	7.23	525	100	5.18	470	83	2.79	304
	250	250	19.56	710	167	12.70	690	125	9.37	680	83	5.76	630	63	3.79	550	50	2.78	505	42	1.44	311
	50	50	4.13	750	33	2.73	750	25	2.07	750	17	1.29	690	13	0.80	580	10	0.58	525	8	0.28	306
230	3000				2000	99.20	450	1500	87.63	530	1000	44.09	400	750	36.37	440	600	33.73	510	500	20.17	366
	2400				1600	91.35	518	1200	80.02	605	800	39.68	450	600	32.74	495	480	29.10	550	400	18.08	410
	1500	1500	87.63	530	1000	72.20	655	750	59.11	715	500	29.76	540	375	24.80	600	300	21.00	635	250	13.50	490
	1000	1000	71.65	650	667	56.21	765	500	45.19	820	333	23.33	635	250	18.60	675	200	15.76	715	167	9.92	540
	750	750	60.76	735	500	45.47	825	375	36.79	890	250	19.29	700	188	15.19	735	150	12.73	770	125	7.78	565
	500	500	45.19	820	333	33.79	920	250	26.73	970	167	14.07	765	125	10.95	795	100	9.15	830	83	5.42	590
	250	250	26.73	970	167	20.57	1120	125	16.88	1225	83	7.58	825	63	5.99	870	50	5.07	920	42	2.82	610
	50	50	7.00	1270	33	4.89	1330	25	3.66	1330	17	1.63	870	13	1.35	980	10	1.09	990	8	0.57	625
260	3000				2000	189.58	860	1500	133.92	810	1000	85.97	780	750	57.87	700	600	46.29	700	500	27.27	495
	2400				1600	158.72	900	1200	112.43	850	800	72.39	821	600	51.58	780	480	40.21	760	400	23.12	524
	1500	1500	157.07	950	1000	104.71	950	750	78.53	950	500	49.60	900	375	37.20	900	300	29.10	880	250	16.36	594
	1000	1000	115.73	1050	667	77.19	1050	500	57.87	1050	333	36.34	990	250	28.93	1050	200	21.82	990	167	12.93	702
	750	750	96.72	1170	500	64.48	1170	375	48.36	1170	250	28.93	1050	188	22.73	1100	150	18.19	1100	125	10.91	792
	500	500	72.75	1320	333	47.72	1300	250	35.27	1280	167	20.43	1110	125	16.26	1180	100	13.23	1200	83	8.06	878
	250	250	42.44	1540	167	27.43	1490	125	20.12	1460	83	11.16	1220	63	8.61	1250	50	7.11	1290	42	4.35	940
	50	50	9.64	1750	33	6.18	1700	25	4.55	1650	17	2.55	1360	13	1.82	1320	10	1.47	1330	8	0.87	951
350	2400										800	160.48	1820	600	113.75	1720	480	78.83	1490	400	56.88	1290
	1500	1500	267.84	1620	1000	206.19	1870	750	200.06	2420	500	122.35	2220	375	78.95	1910	300	56.54	1710	250	41.61	1510
	1000	1000	210.53	1910	667	188.55	2560	500	155.41	2820	333	96.26	2620	250	58.14	2110	200	42.33	1920	167	31.41	1710
	750	750	195.92	2370	500	141.42	2560	375	129.37	3130	250	81.29	2950	188	47.95	2320	150	35.88	2170	125	24.25	1760
	500	500	155.41	2820	333	112.63	3070	250	94.52	3430	167	59.34	3230	125	34.72	2520	100	26.67	2420	83	16.72	1820
	250	250	94.52	3440	167	67.11	3650	125	54.15	3930	83	34.26	3730	63	19.43	2820	50	16.09	2920	42	9.28	2020
	50	50	24.47	4440	33	16.34	4500	25	12.79	4640	17	7.79	4240	13	4.17	3030	10	3.56	3230	8	1.95	2120

Table **6.3.5-1**

Bevel gearboxes

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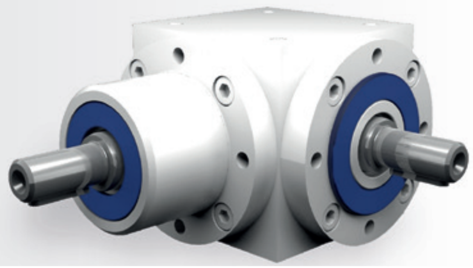
6.3.6 Type V 065 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 3:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	3.31	10	2000	2.20	10	1500	1.65	10	1000	1.10	10									
2400	2400	2.65	10	1600	1.76	10	1200	1.32	10	800	0.88	10									
1500	1500	1.82	11	1000	1.21	11	750	0.91	11	500	0.61	11									
1000	1000	1.32	12	667	0.88	12	500	0.66	12	333	0.44	12									
750	750	1.07	13	500	0.72	13	375	0.54	13	250	0.33	12									
500	500	0.83	15	333	0.55	15	250	0.41	15	167	0.24	13									
250	250	0.47	17	167	0.31	17	125	0.23	17	83	0.12	13									
50	50	0.10	18	33	0.07	18	25	0.05	18	17	0.03	14									

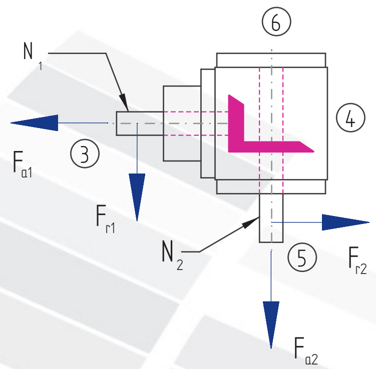
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	1.6	1.6	1.6	1.6			
T_{2max} [Nm]	25	25	25	23			

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	180	90	250	125	300	150	350	175	450	225	550	275
> 12	150	75	210	105	250	125	290	145	380	190	460	230

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	300	150	400	200	500	250	650	325	750	375	900	450
> 12	250	125	330	165	420	210	540	270	630	315	750	375



Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	0.38880	0.24060	0.18390	0.10360				2.3
B0	0.42310	0.31110	0.23300	0.10010				2.2
C0	0.42310	0.31110	0.23300	0.10010				2.2
D0	0.43300	0.31550	0.23550	0.10120				2.3
E0N	0.47540	0.36340	0.28530	0.15240				2.1
E0S	0.60120	0.48920	0.41110	0.27820				2.1
F0	0.58320	0.32700	0.23250	0.12520				2.7
G0	0.61750	0.46530	0.36830	0.18210				2.6
H0	0.61750	0.46530	0.36830	0.18210				2.6
J0	0.62740	0.46970	0.37080	0.18320				2.7
K0N	0.66980	0.51760	0.42060	0.23440				2.5
K0S	0.79560	0.64340	0.54640	0.36020				2.5

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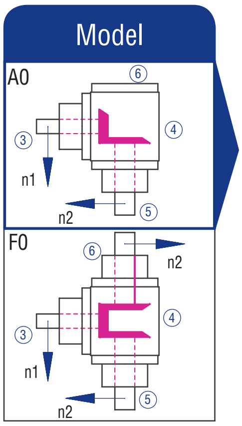
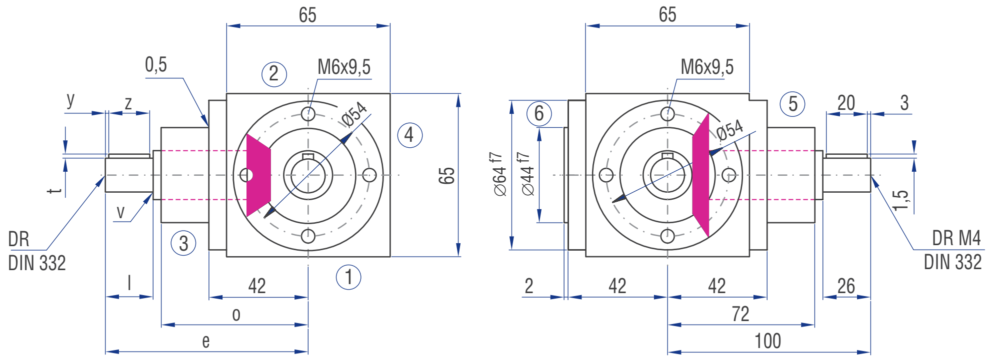
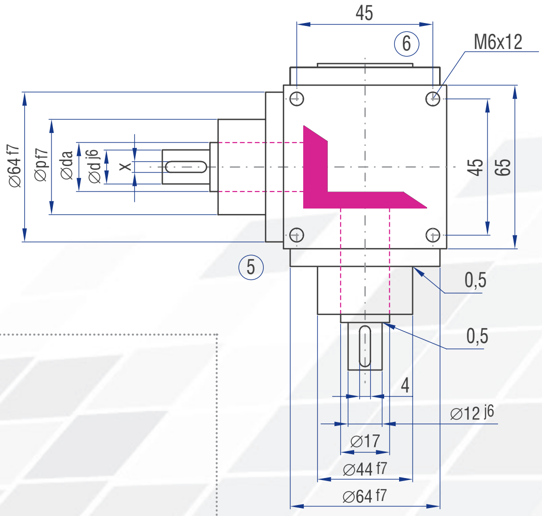
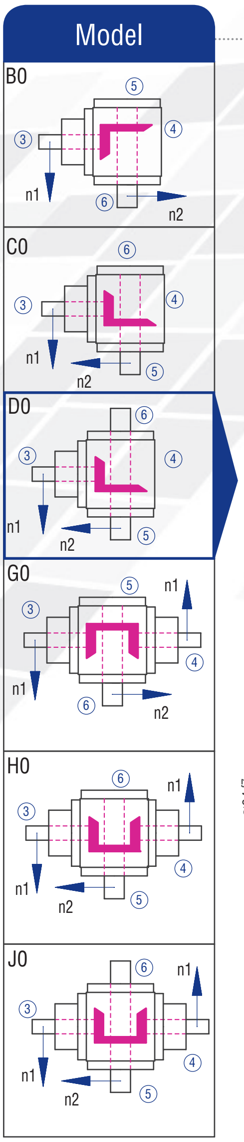
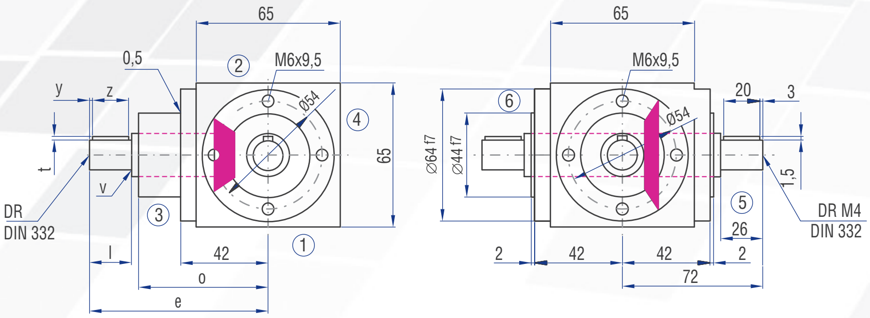


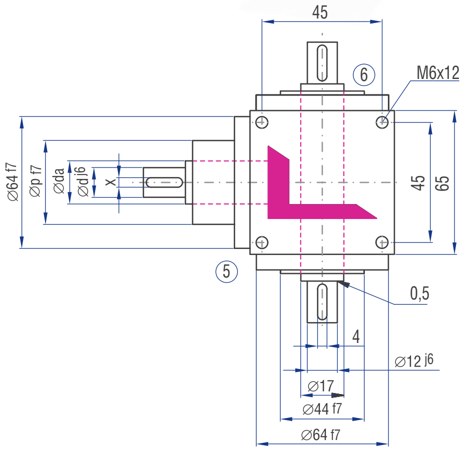




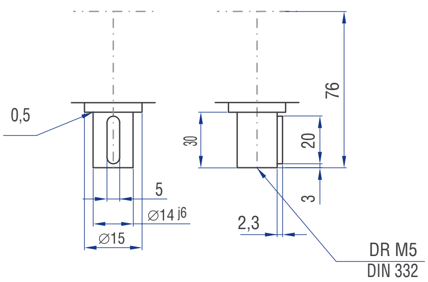
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	12	12	12	12			
da [mm]	17	17	17	17			
l [mm]	26	26	26	26			
v [mm]	0.5	0.5	0.5	0.5			
x [mm]	4	4	4	4			
y [mm]	3	3	3	3			
z [mm]	20	20	20	20			
t [mm]	1.5	1.5	1.5	1.5			
e [mm]	100	100	100	100			
o [mm]	72	72	72	72			
p [mm]	44	44	44	44			
DR M	4	4	4	4			







Implementation VV



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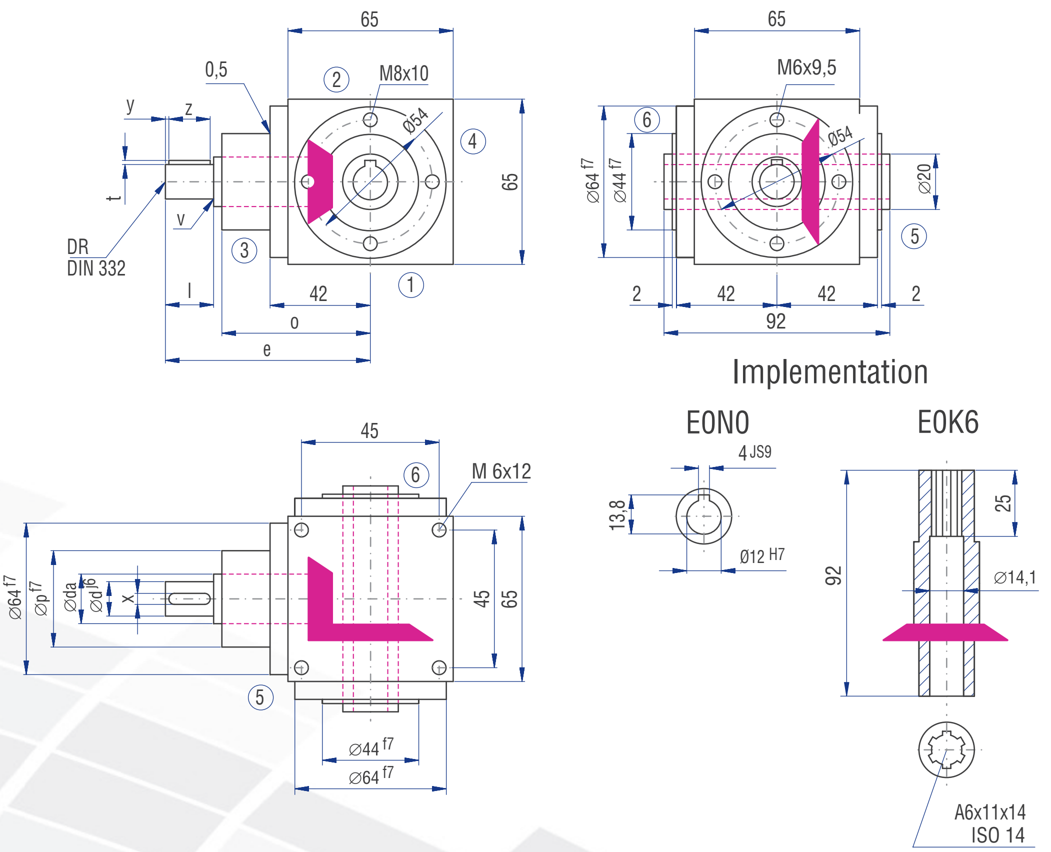
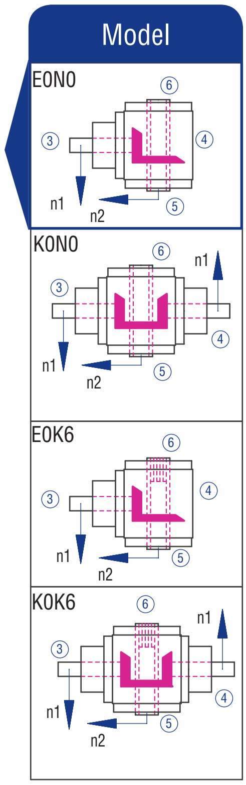
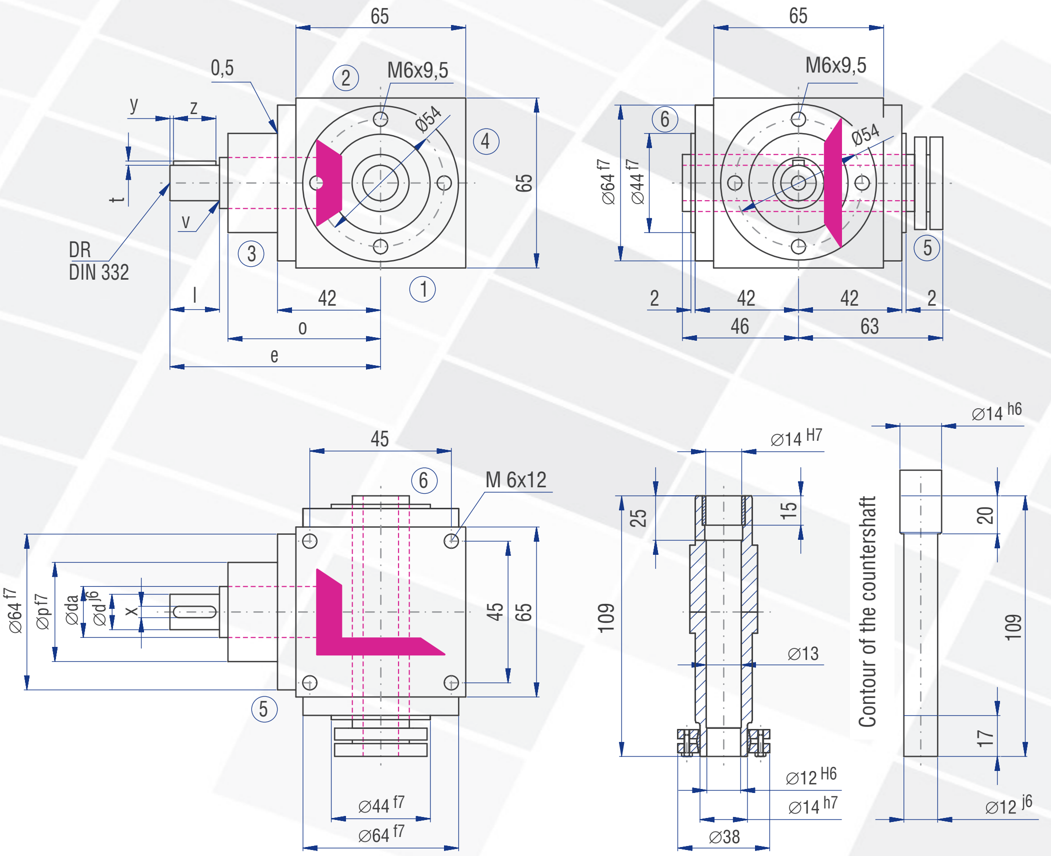
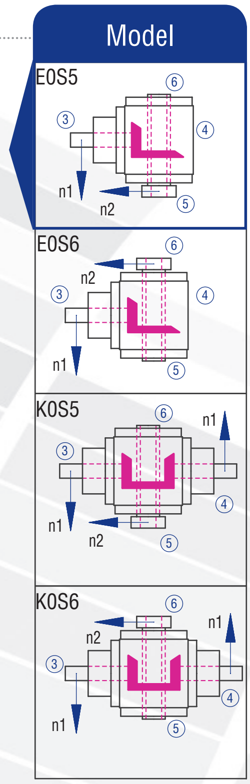
The dimensions of the Models not shown can be figured by mirroring available dimensions.









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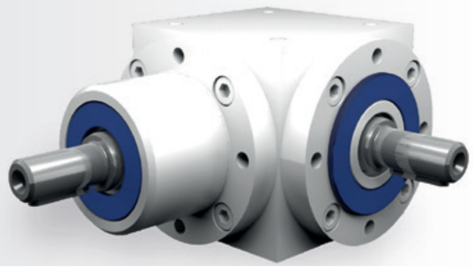
6.3.7 Type V 090 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	8.93	27	2000	5.51	25	1500	3.80	23	1000	2.54	23	750	1.90	23	600	1.52	23	500	1.25	23
2400	2400	7.41	28	1600	4.59	26	1200	3.17	24	800	2.12	24	600	1.65	25	480	1.32	25	400	1.09	25
1500	1500	5.29	32	1000	3.20	29	750	2.23	27	500	1.49	27	375	1.12	27	300	0.89	27	250	0.74	27
1000	1000	3.75	34	667	2.35	32	500	1.71	31	333	1.14	31	250	0.85	31	200	0.68	31	167	0.53	29
750	750	3.06	37	500	1.93	35	375	1.32	32	250	0.88	32	188	0.66	32	150	0.53	32	125	0.40	29
500	500	2.20	40	333	1.36	37	250	0.94	34	167	0.63	34	125	0.47	34	100	0.37	34	83	0.27	29
250	250	1.21	44	167	0.74	40	125	0.50	36	83	0.33	36	63	0.25	36	50	0.20	36	42	0.14	30
50	50	0.28	50	33	0.16	45	25	0.10	37	17	0.07	37	13	0.05	37	10	0.04	37	8	0.03	33

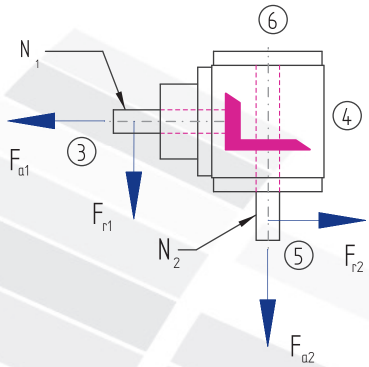
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	3.8	3.8	3.8	3.8	3.8	3.8	3.8
T_{2max} [Nm]	105	80	80	70	70	60	50

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	300	150	400	200	470	235	580	290	700	350	800	400
> 30	250	125	330	165	390	195	490	245	590	295	670	335

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

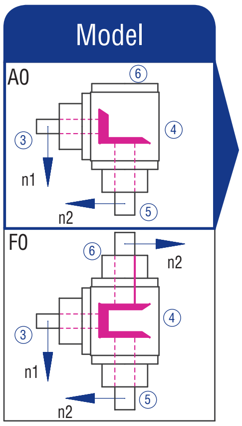
n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	500	250	660	330	800	400	950	475	1250	625	1500	750
> 30	420	210	550	275	670	335	790	395	1040	520	1250	625

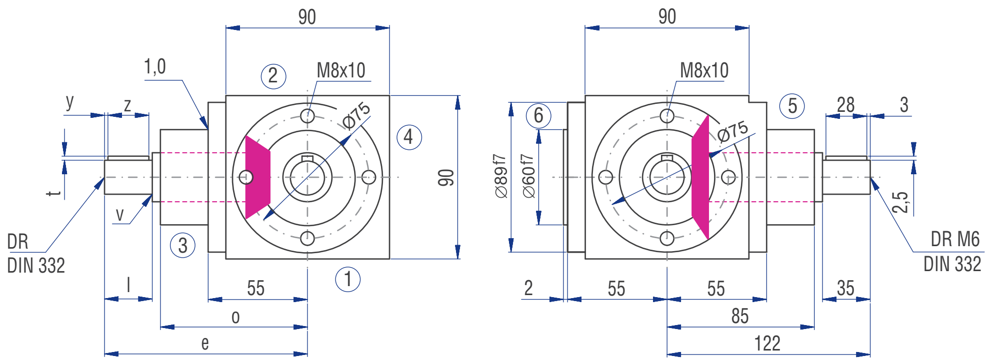


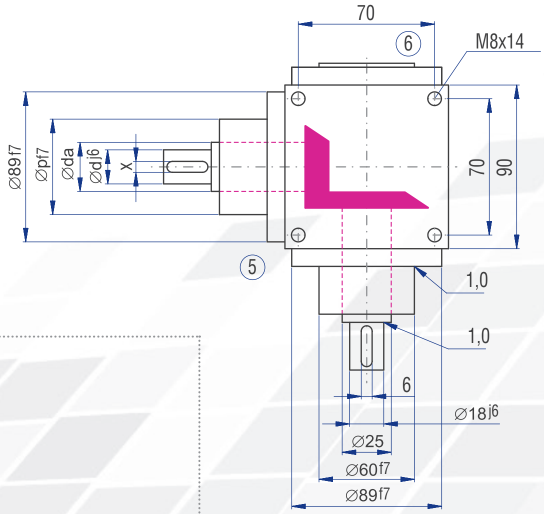
Inertia moments/mass

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

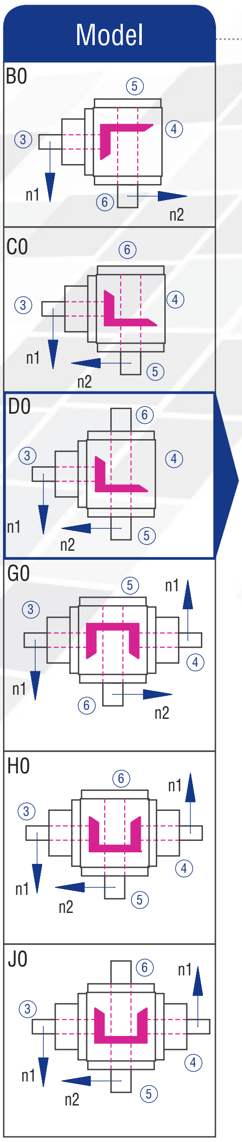
Model	Inertia moment [kgcm^2]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	2.55900	1.48220	1.14370	0.88840	0.36310	0.32480	0.30620	5.1
B0	3.35430	2.18330	1.36520	1.04650	0.46070	0.39330	0.35020	5.4
C0	3.35430	2.18330	1.36520	1.04650	0.46070	0.39330	0.35020	5.4
D0	3.38270	2.19590	1.37230	1.04960	0.46250	0.39450	0.35100	5.5
E0N	3.25070	2.13720	1.33930	1.03500	0.45420	0.38920	0.34730	5.0
E0S	3.92130	2.43530	1.50690	1.10950	0.49610	0.41600	0.36600	5.2
F0	3.83850	2.05080	1.46360	1.03050	0.44300	0.37600	0.34180	6.3
G0	4.63380	3.09680	2.18900	1.79270	0.74380	0.66690	0.62090	6.9
H0	4.63380	3.09680	2.18900	1.79270	0.74380	0.66690	0.62090	6.9
J0	4.66220	3.10940	2.19610	1.79580	0.74560	0.66810	0.62170	7.0
K0N	4.53020	3.05070	2.16310	1.78120	0.73730	0.66280	0.61800	6.5
K0S	5.20080	3.34880	2.33070	1.85570	0.77920	0.68960	0.63670	6.7

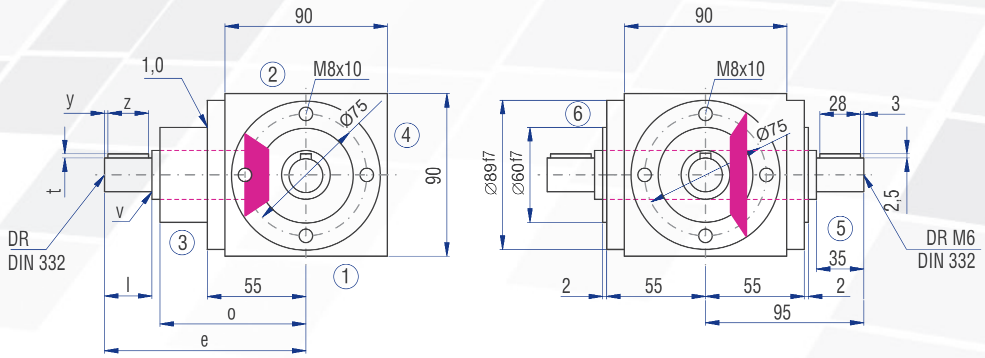


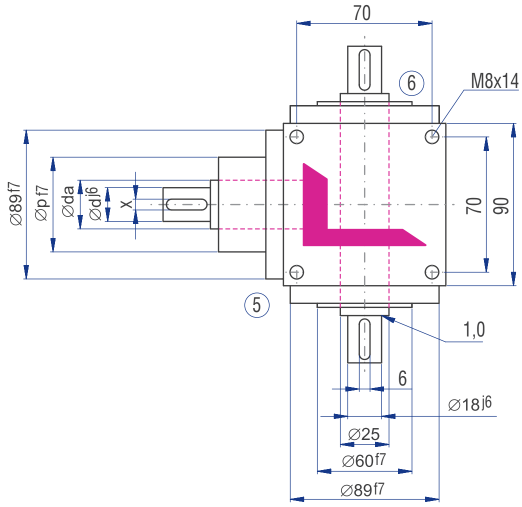




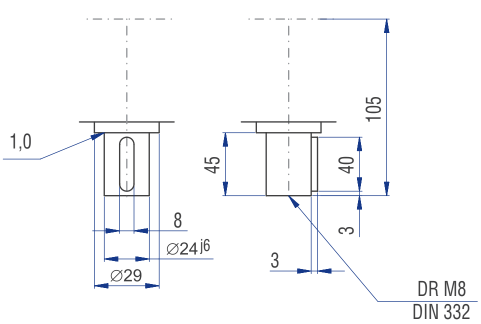
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	18	18	18	12	12	12	12
da [mm]	25	25	25	20	20	20	20
l [mm]	35	35	35	35	35	35	35
v [mm]	1	1	1	0.5	0.5	0.5	0.5
x [mm]	6	6	6	4	4	4	4
y [mm]	3	3	3	3	3	3	3
z [mm]	28	28	28	28	28	28	28
t [mm]	2.5	2.5	2.5	1.5	1.5	1.5	1.5
e [mm]	122	122	122	122	132	132	132
o [mm]	85	85	85	85	95	95	95
p [mm]	60	60	60	60	60	60	60
DR M	6	6	6	4	4	4	4



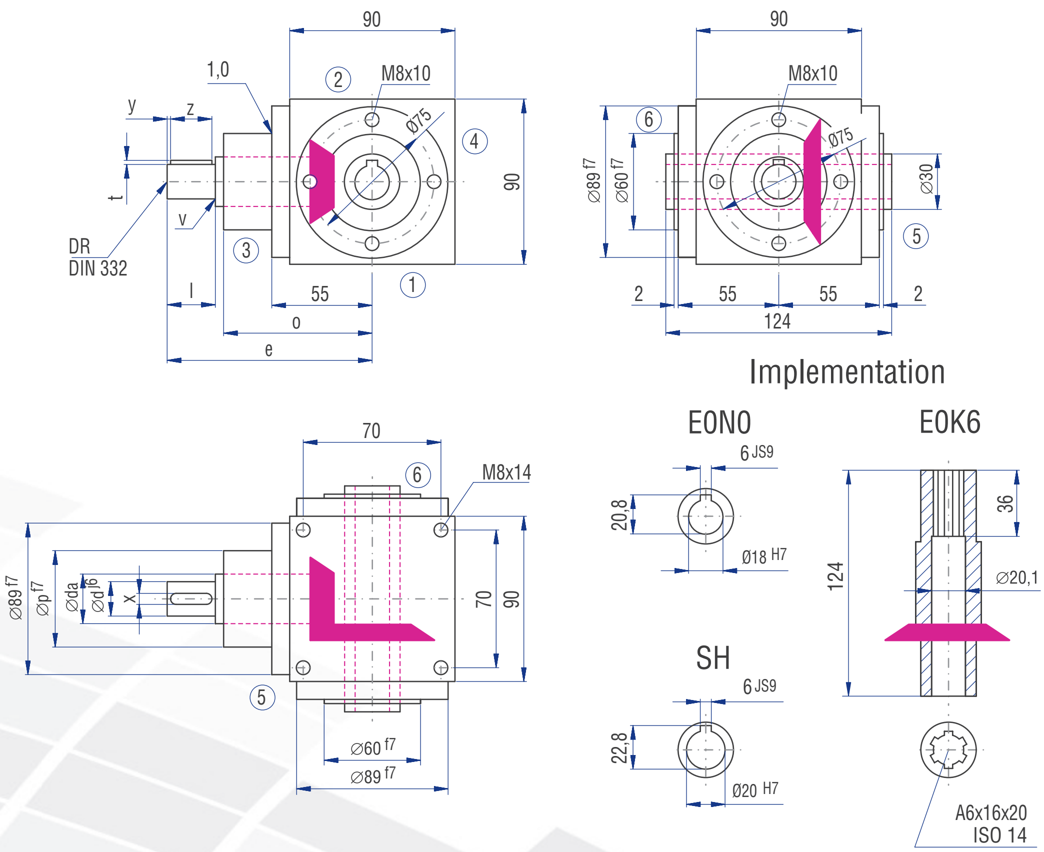




Implementation VV



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



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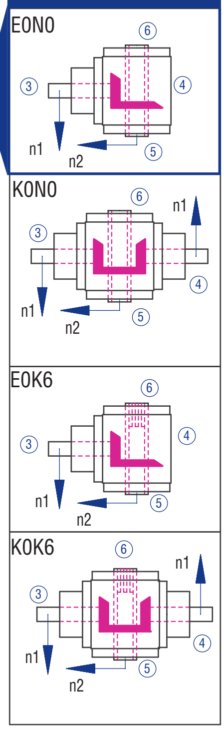

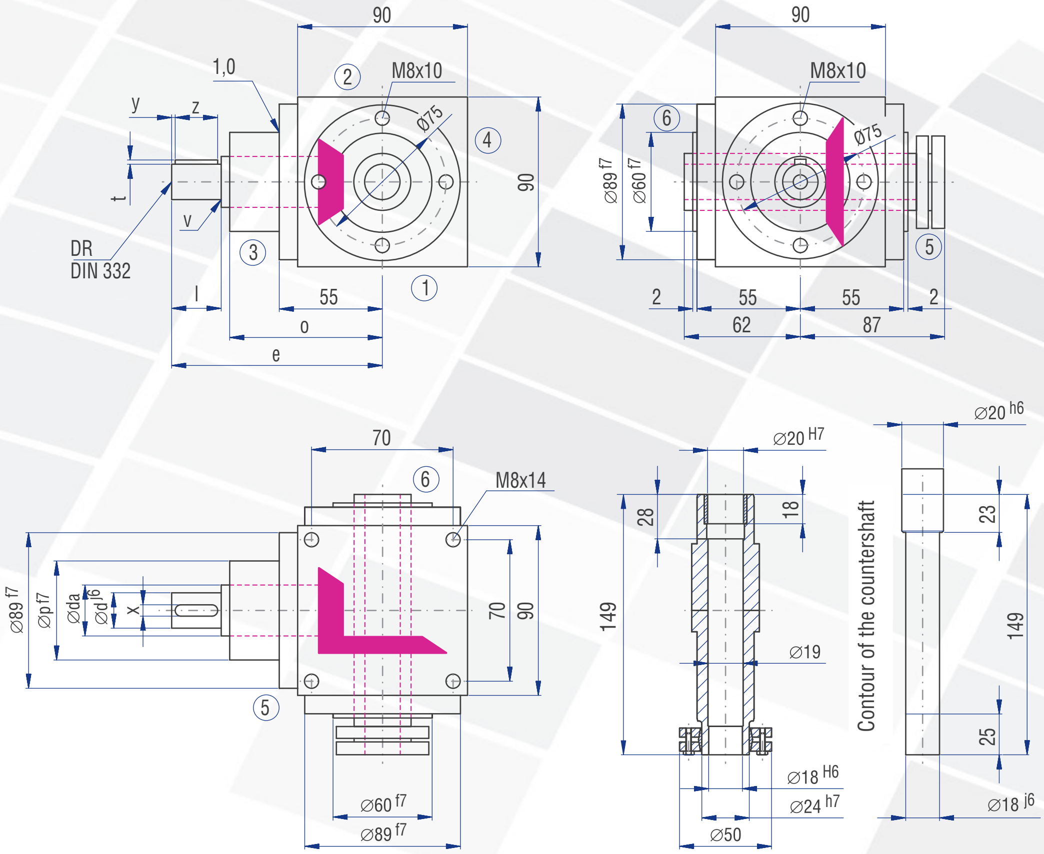

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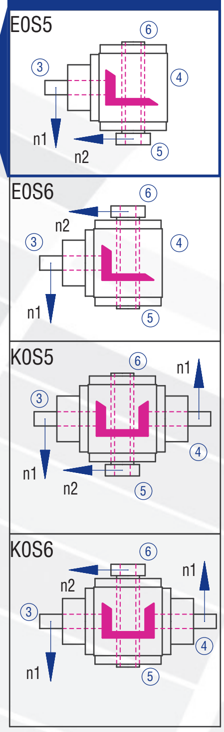

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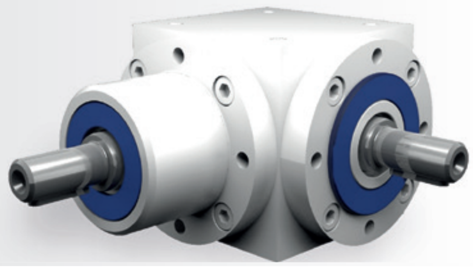


Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	21.82	66	2000	13.45	61	1500	9.26	56	1000	6.39	58	750	4.96	60	600	3.97	60	500	2.95	54
2400	2400	18.52	70	1600	11.46	65	1200	8.07	61	800	5.56	63	600	4.43	67	480	3.44	65	400	2.53	57
1500	1500	13.56	82	1000	8.60	78	750	6.03	73	500	4.08	74	375	3.06	74	300	2.38	72	250	1.75	64
1000	1000	10.14	92	667	6.32	86	500	4.46	81	333	3.01	82	250	2.18	79	200	1.76	80	167	1.22	66
750	750	8.51	103	500	5.18	94	375	3.55	86	250	2.40	87	188	1.69	82	150	1.42	86	125	0.94	68
500	500	6.34	115	333	3.85	100	250	2.54	92	167	1.66	90	125	1.16	84	100	0.98	89	83	0.63	69
250	250	3.39	123	167	1.99	100	125	1.35	98	83	0.87	95	63	0.60	87	50	0.51	92	42	0.33	71
50	50	0.72	130	33	0.41	100	25	0.29	107	17	0.21	110	13	0.12	90	10	0.10	95	8	0.06	66

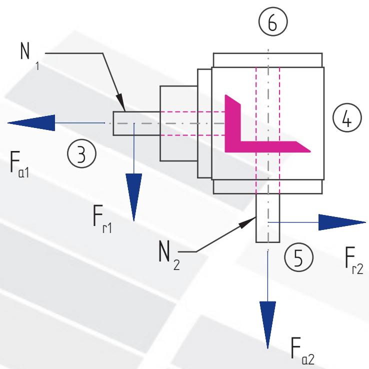
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	6.2	6.2	6.2	6.2	6.2	6.2	6.2
T_{2max} [Nm]	220	169	169	155	155	140	120

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	470	235	620	310	720	360	900	450	1150	575	1400	700
> 80	390	195	520	260	600	300	750	375	960	480	1170	585

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

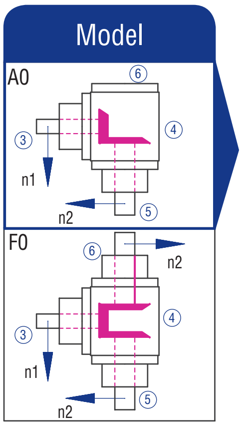
n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	750	375	1000	500	1250	625	1500	750	1900	950	2200	1100
> 80	630	315	830	415	1040	520	1250	625	1580	790	1830	915

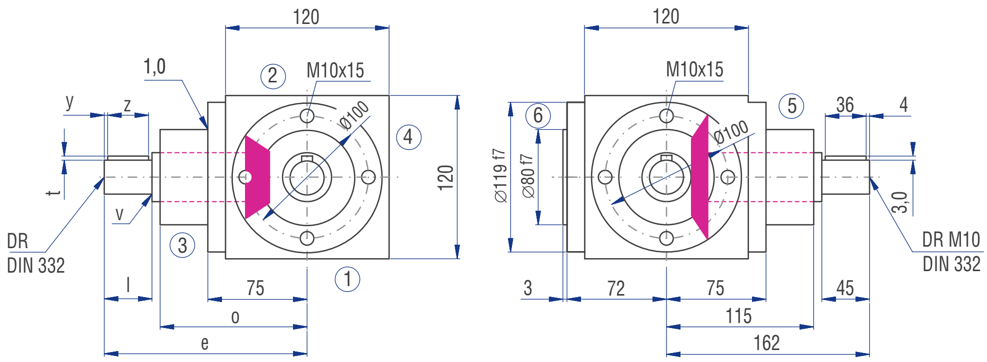


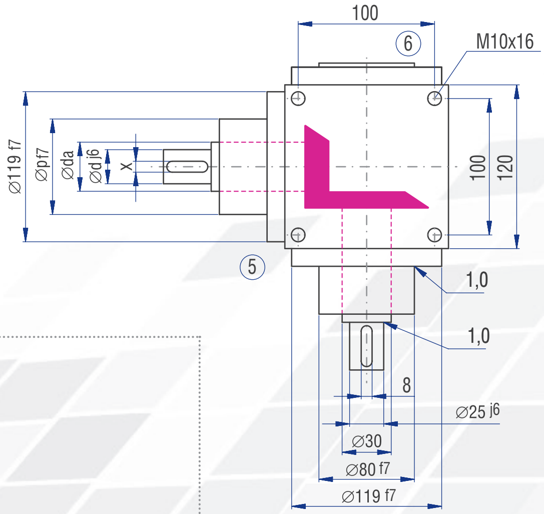
Inertia moments/mass

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

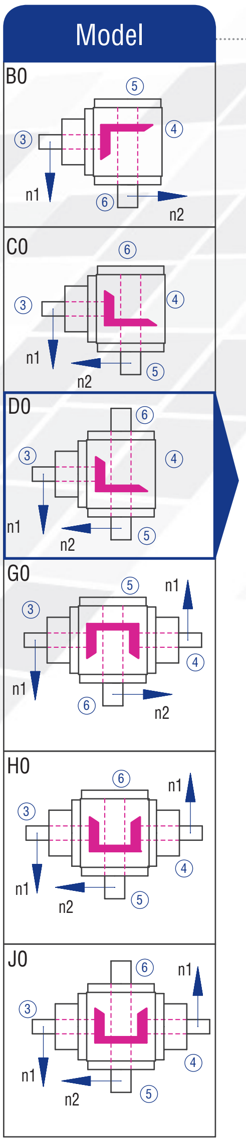
Model	Inertia moment [kgcm²]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	10.4976	4.84090	3.64650	2.31590	1.21640	0.75160	0.67660	12.6
B0	15.3022	7.44410	4.97470	3.01230	1.67290	1.05930	0.89820	12.3
C0	15.3022	7.44410	4.97470	3.01230	1.67290	1.05930	0.89820	12.3
D0	15.5996	7.57620	5.04900	3.04530	1.69150	1.07120	0.90650	12.5
E0N	15.1939	7.39590	4.94760	3.00030	1.66610	1.05500	0.89520	12.0
E0S	16.9812	8.19030	5.39440	3.19880	1.77780	1.12650	0.94490	12.3
F0	15.7464	7.17370	4.95870	2.89910	1.54440	0.96150	0.82240	15.0
G0	20.5510	9.95220	7.30900	4.74500	2.56120	1.60090	1.42900	14.7
H0	20.5510	9.95220	7.30900	4.74500	2.56120	1.60090	1.42900	14.7
J0	20.8484	10.0843	7.38330	4.77800	2.57980	1.61280	1.43730	14.9
K0N	20.4427	9.90400	7.28190	4.73300	2.55440	1.59660	1.42600	14.4
K0S	22.2300	10.6984	7.72870	4.93150	2.66610	1.66810	1.47570	14.7

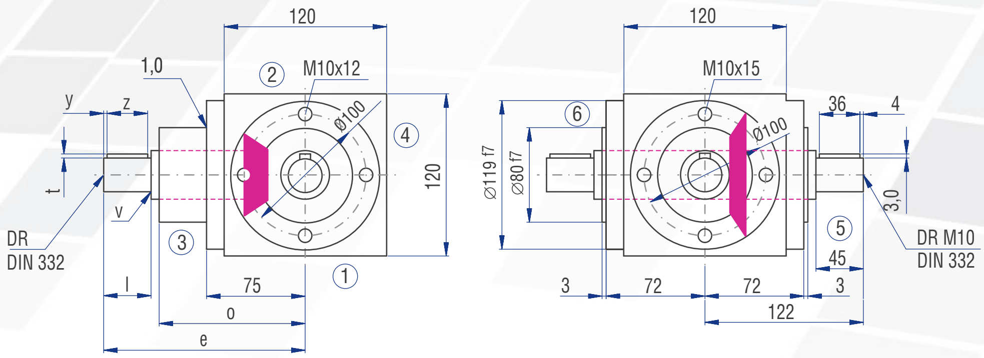


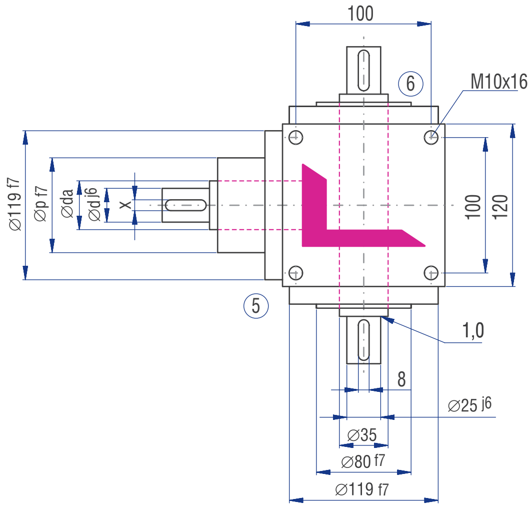




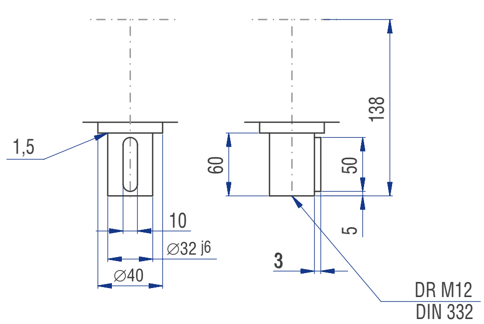
	Gear ratio						
	1:1	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
d [mm]	25	25	25	20	20	15	15
da [mm]	30	30	30	25	25	20	20
l [mm]	45	45	45	45	45	35	35
v [mm]	1	1	1	1	1	0.5	0.5
x [mm]	8	8	8	6	6	5	5
y [mm]	4	4	4	4	4	4	4
z [mm]	36	36	36	36	36	28	28
t [mm]	3	3	3	2.5	2.5	2	2
e [mm]	162	162	162	162	172	162	162
o [mm]	115	115	115	115	125	125	125
p [mm]	80	80	80	80	80	70	70
DR M	10	10	10	6	6	5	5



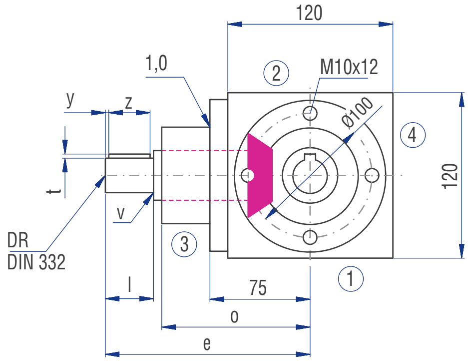


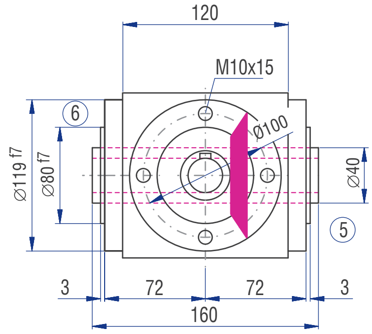


Implementation VV



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





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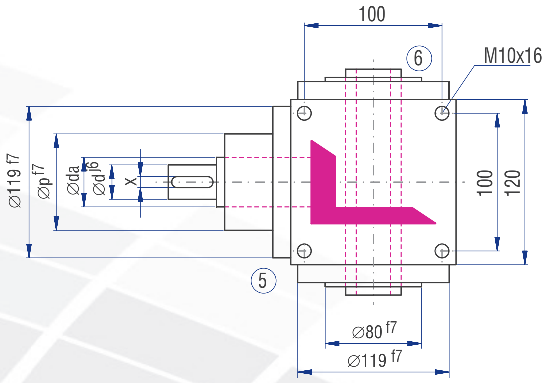
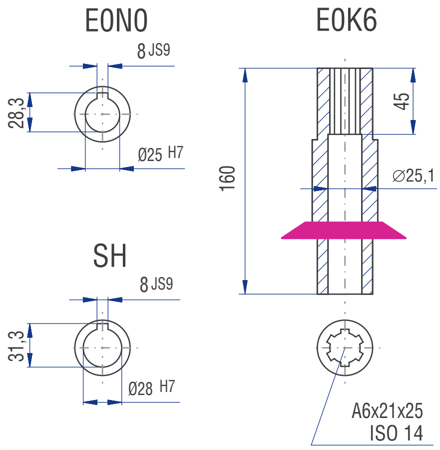
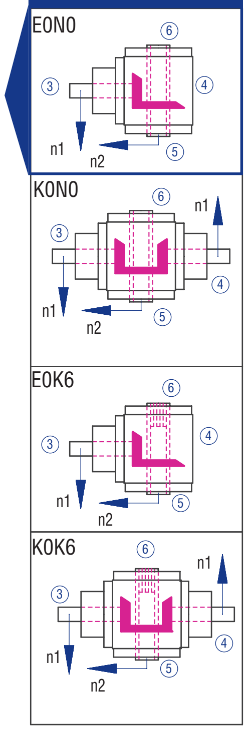
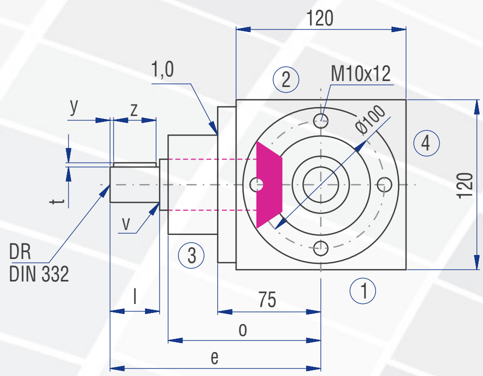
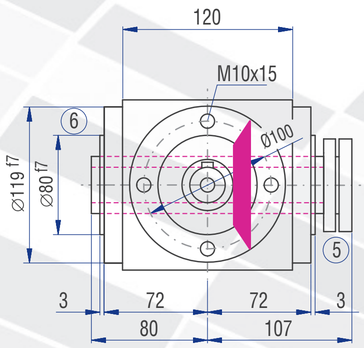


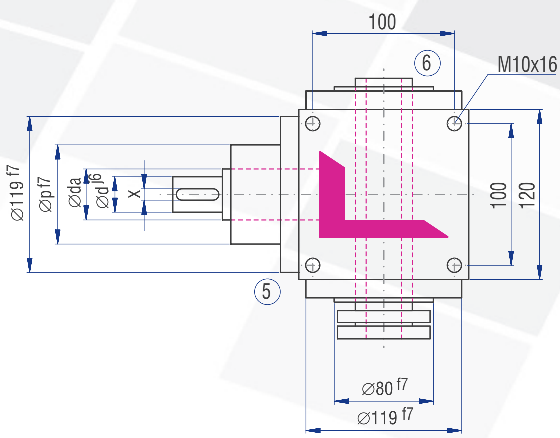


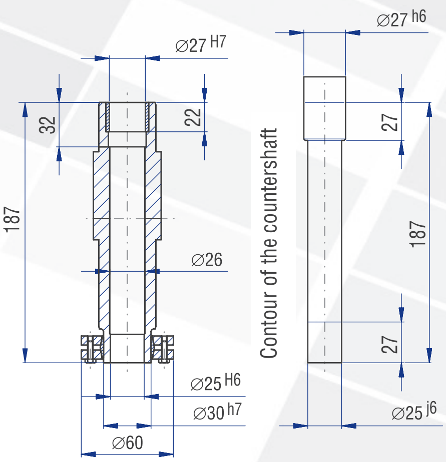
Model











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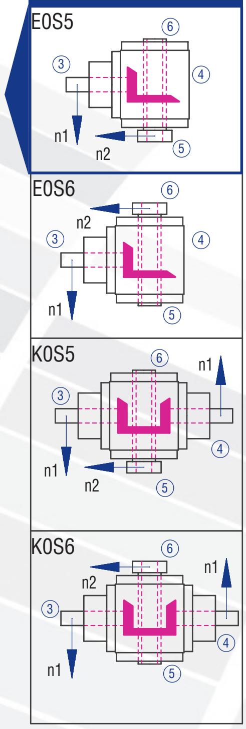

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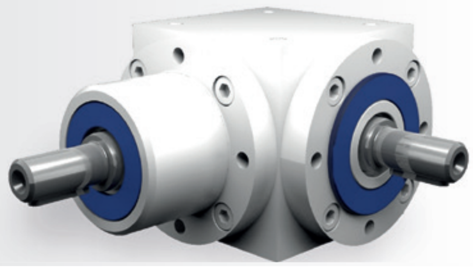
6.3.9 Type V 140 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]	5:1 n_2 [rpm]	5:1 P_{1N} [kW]	5:1 T_{2N} [Nm]	6:1 n_2 [rpm]	6:1 P_{1N} [kW]	6:1 T_{2N} [Nm]
3000	3000	39.68	120	2000	24.91	113	1500	16.53	100	1000	12.12	110	750	8.51	103	600	6.61	100	500	5.18	94
2400	2400	37.04	140	1600	22.22	126	1200	14.68	111	800	11.46	130	600	7.34	111	480	5.56	105	400	4.58	104
1500	1500	26.78	162	1000	17.08	155	750	11.41	138	500	8.05	146	375	4.96	120	300	3.80	115	250	2.95	107
1000	1000	20.28	184	667	12.87	175	500	8.38	152	333	5.87	160	250	3.75	136	200	2.73	124	167	2.06	112
750	750	16.20	196	500	10.47	190	375	6.86	166	250	4.60	167	188	3.06	148	150	2.15	130	125	1.61	117
500	500	11.46	208	333	7.34	200	250	4.96	180	167	3.20	174	125	2.12	154	100	1.50	136	83	1.09	119
250	250	5.92	215	167	3.76	204	125	2.62	190	83	1.62	177	63	1.12	162	50	0.79	143	42	0.56	121
50	50	1.21	220	33	0.76	210	25	0.55	200	17	0.34	180	13	0.23	170	10	0.17	150	8	0.11	120

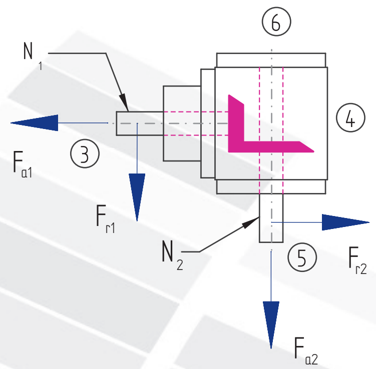
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	10.0	10.0	10.0	10.0	10.0	10.0	10.0
T_{2max} [Nm]	430	358	320	280	280	250	200

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	700	350	870	435	1150	575	1370	685	1700	850	2000	1000
> 140	590	295	730	365	960	480	1140	570	1420	710	1670	835

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	1300	650	1700	850	2000	1000	2500	1250	3000	1500	3800	1900
> 140	1082	541	1420	710	1670	835	2080	1040	2500	1250	3170	1585



Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	26.2670	11.8569	8.6762	6.43560	1.84320	1.53200	1.37080	19.0
B0	36.0994	18.7513	12.2785	7.95470	2.69780	2.21130	1.84260	18.5
C0	36.0994	18.7513	12.2785	7.95470	2.69780	2.21130	1.84260	18.5
D0	37.0815	19.1878	12.5241	8.06390	2.75920	2.25060	1.86980	19.0
E0N	32.6630	17.2240	11.4194	7.57290	2.48300	2.07390	1.74710	18.0
E0S	39.0643	20.0691	13.0198	8.28420	2.88310	2.32990	1.92490	18.7
F0	39.4005	17.6940	11.9596	7.89490	2.66410	2.05740	1.73560	23.0
G0	49.2329	24.7711	17.6713	12.9310	3.72020	3.21800	2.84860	22.7
H0	49.2329	24.7711	17.6713	12.9310	3.72020	3.21800	2.84860	22.7
J0	50.2150	25.2076	17.9169	13.0402	3.78160	3.25730	2.87580	23.2
K0N	45.7965	23.2438	16.8122	12.5492	3.50540	3.08060	2.75310	22.2
K0S	52.1978	26.0889	18.4126	13.2605	3.90550	3.33660	2.93090	22.9

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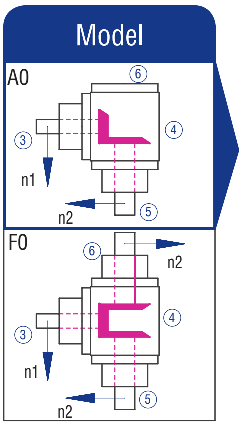
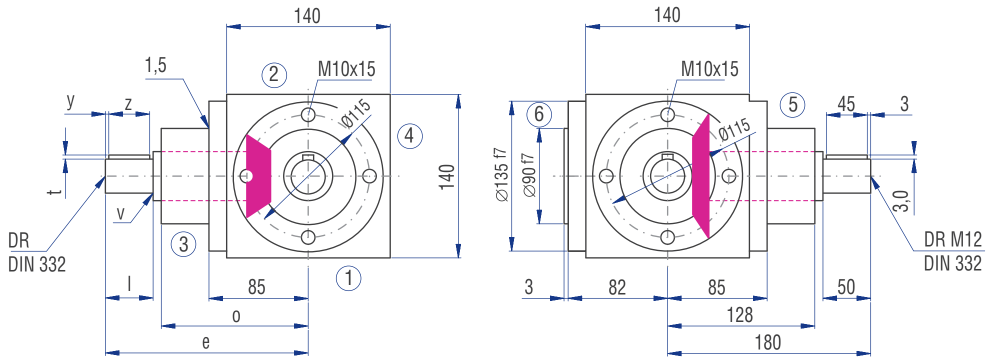
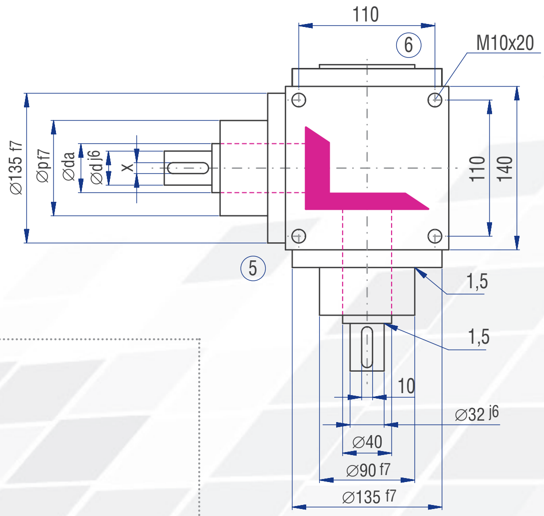
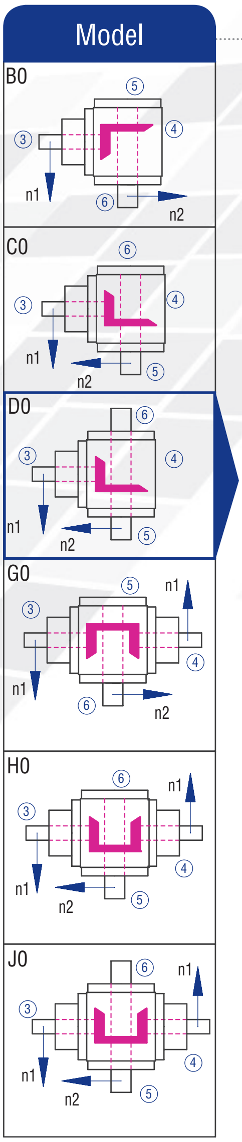
6.3.9 Type V 140 – Standard bevel gearboxes

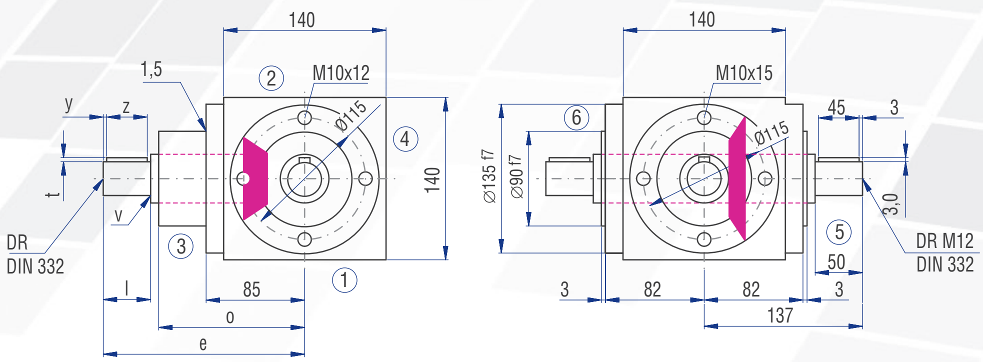


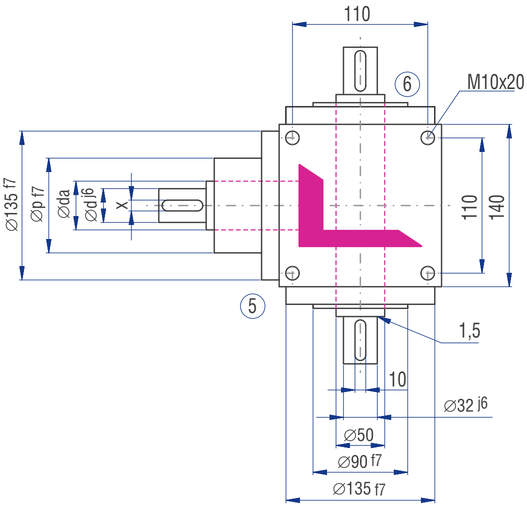




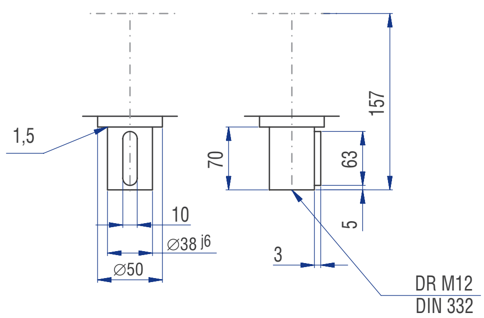
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	32	32	32	28	24	24	24
da [mm]	40	40	40	40	40	40	40
l [mm]	50	50	50	50	50	50	50
v [mm]	1.5	1.5	1.5	1	1	1	1
x [mm]	10	10	10	8	8	8	8
y [mm]	3	3	3	3	3	3	3
z [mm]	45	45	45	45	45	45	45
t [mm]	3	3	3	3	3	3	3
e [mm]	180	180	180	180	195	195	195
o [mm]	128	128	128	128	143	143	143
p [mm]	90	90	90	90	85	85	85
DR M	12	12	12	10	8	8	8







Implementation VV



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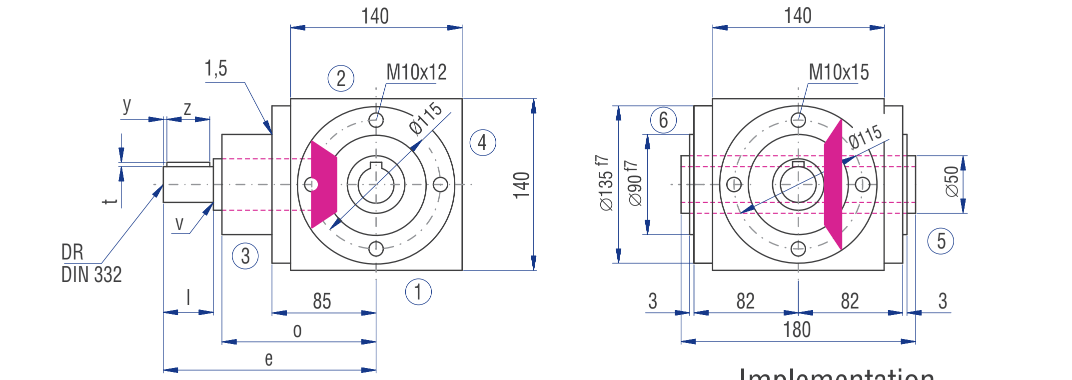
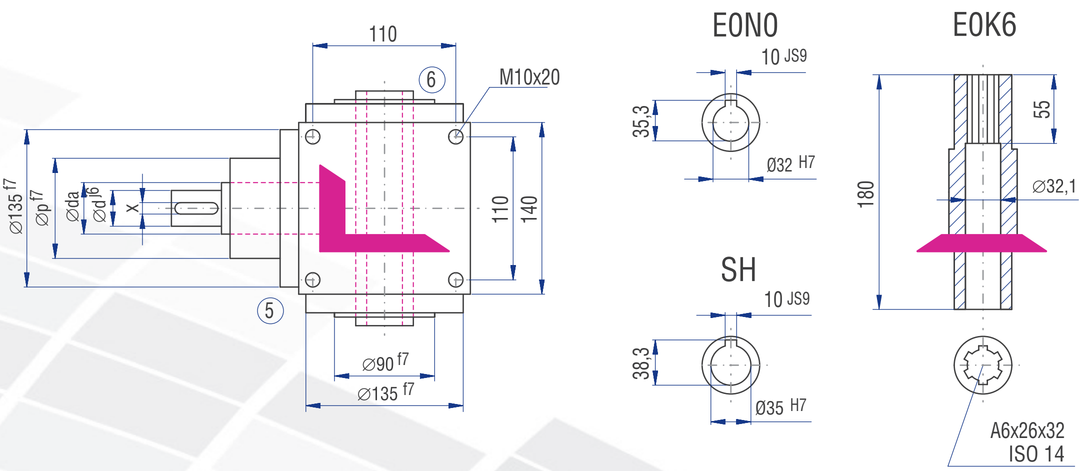
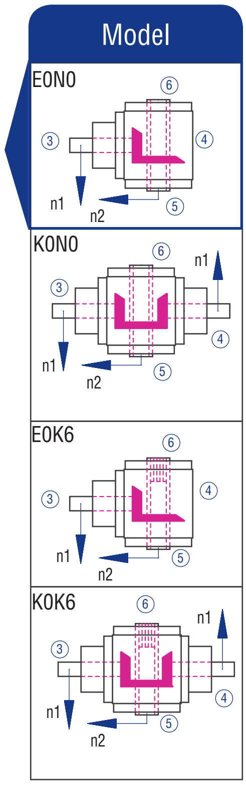
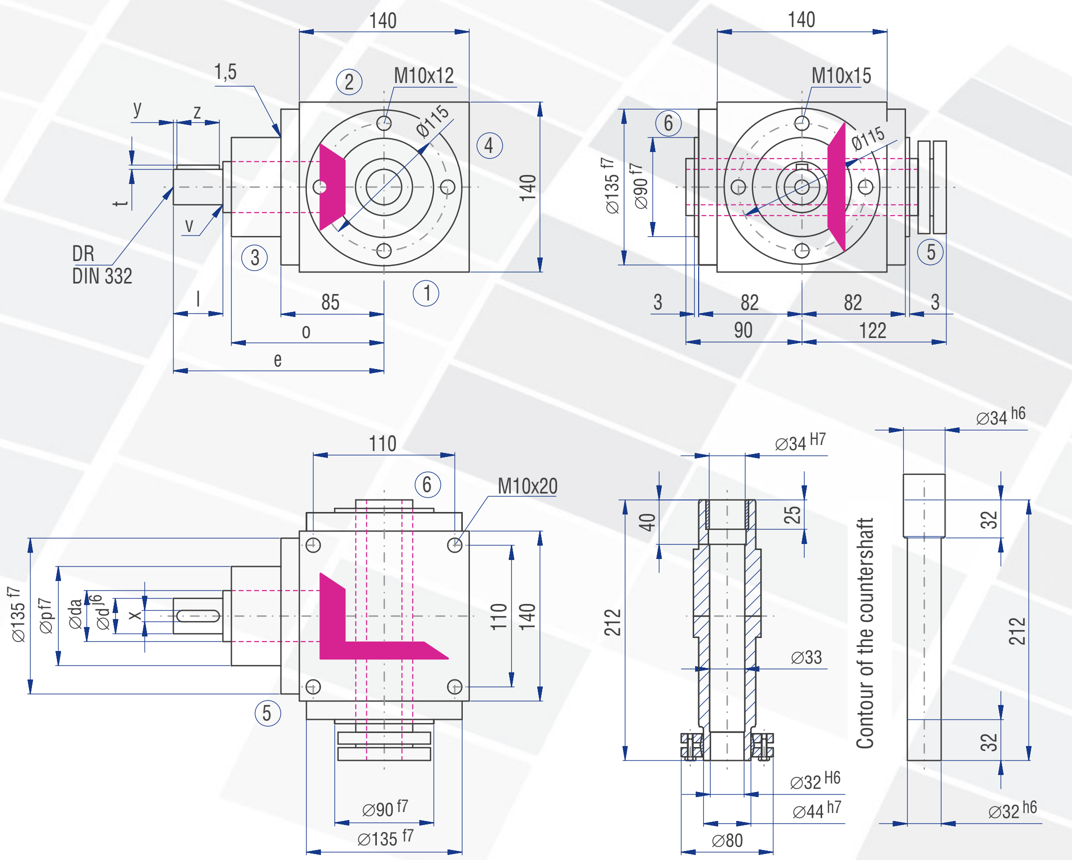
The dimensions of the Models not shown can be figured by mirroring available dimensions.

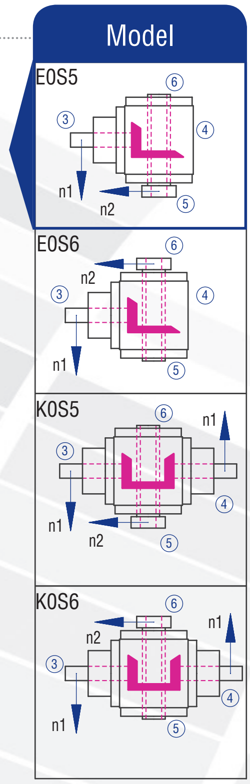


Implementation

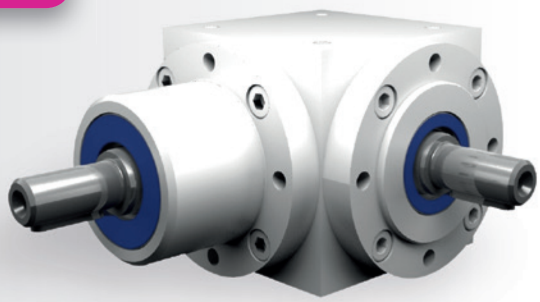








6.3.10 Type V 160 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	40.78	185	1500	28.11	170	1000	20.94	190	750	14.88	180	600	11.90	180	500	7.09	129
2400	2400	57.67	218	1600	36.15	205	1200	25.53	193	800	17.81	202	600	13.23	200	480	10.48	198	400	5.98	136
1500	1500	42.99	260	1000	27.78	252	750	20.25	245	500	12.68	230	375	9.09	220	300	7.11	215	250	3.95	143
1000	1000	31.96	290	667	20.59	280	500	14.88	270	333	8.99	245	250	6.61	240	200	4.96	225	167	3.01	164
750	750	25.63	310	500	16.26	295	375	11.57	280	250	6.89	250	188	5.17	250	150	3.97	240	125	2.43	176
500	500	18.19	330	333	11.56	315	250	8.27	300	167	4.79	260	125	3.58	260	100	2.76	250	83	1.72	187
250	250	9.64	350	167	6.07	330	125	4.41	320	83	2.56	280	63	1.86	270	50	1.49	270	42	0.92	199
50	50	2.09	380	33	1.29	355	25	0.98	355	17	0.57	305	13	0.39	280	10	0.32	290	8	0.18	197

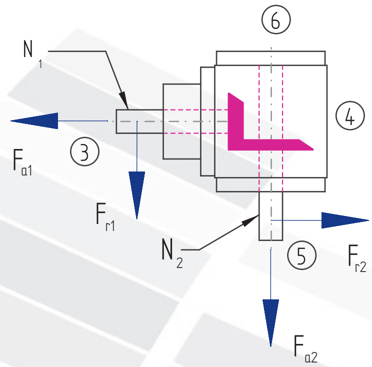
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	15.0	15.0	15.0	15.0	15.0	15.0	15.0
T_{2max} [Nm]	660	650	650	457	422	420	350

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	1200	600	1600	800	1900	950	2200	1100	2850	1425	3300	1650
> 220	1000	500	1340	670	1590	795	1840	920	2380	1190	2750	1375

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2000	1000	2800	1400	3300	1650	4000	2000	5000	2500	6500	3250
> 220	1670	835	2340	1170	2750	1375	3340	1670	4170	2085	5420	2710



Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	29.6710	19.6374	12.3589	8.9516	6.4348	2.2733	2.0901	28.5
B0	31.5527	32.0243	20.1006	12.0803	8.4198	3.6887	2.9407	28.0
C0	31.5527	32.0243	20.1006	12.0803	8.4198	3.6887	2.9407	28.0
D0	32.5820	32.4818	20.3579	12.1947	8.4841	3.7299	2.9693	28.5
E0N	34.3851	33.1416	20.6658	12.3315	8.5611	3.7791	3.0048	27.0
E0S	40.6750	35.9371	22.2382	13.0304	8.9542	4.0307	3.1795	27.5
F0	44.5065	26.2309	16.0678	10.6000	7.3620	2.8667	2.5022	35.0
G0	46.3882	45.0681	28.7506	19.3835	13.9274	5.3686	4.6187	34.5
H0	46.3882	45.0681	28.7506	19.3835	13.9274	5.3686	4.6187	34.5
J0	47.4175	45.5256	29.0079	19.4979	13.9917	5.4098	4.6473	35.0
K0N	49.2206	46.1854	29.3158	19.6347	14.0687	5.4590	4.6828	34.0
K0S	55.5105	48.9809	30.8882	20.3336	14.4618	5.7106	4.8575	34.5

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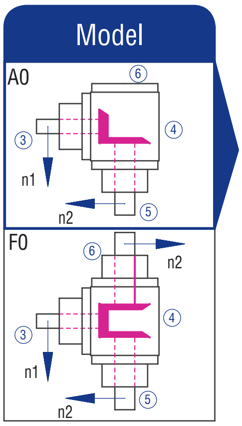
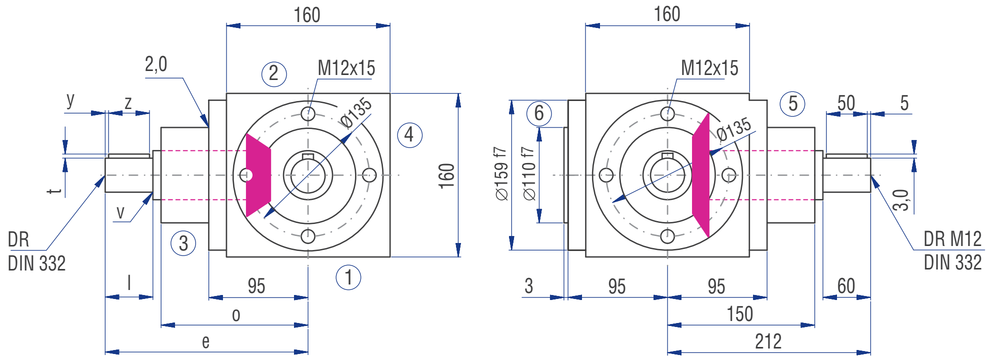
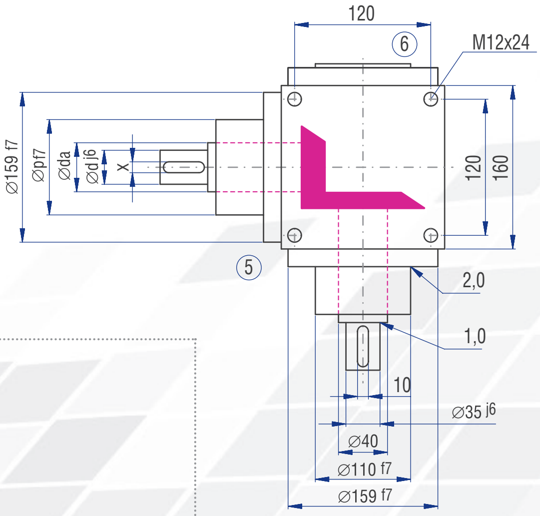
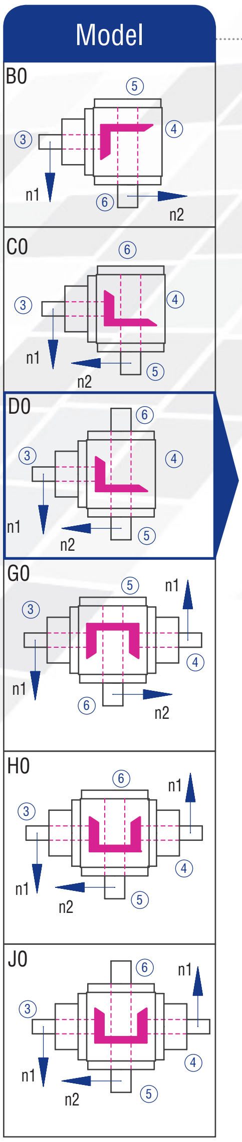
6.3.10 Type V 160 – Standard bevel gearboxes

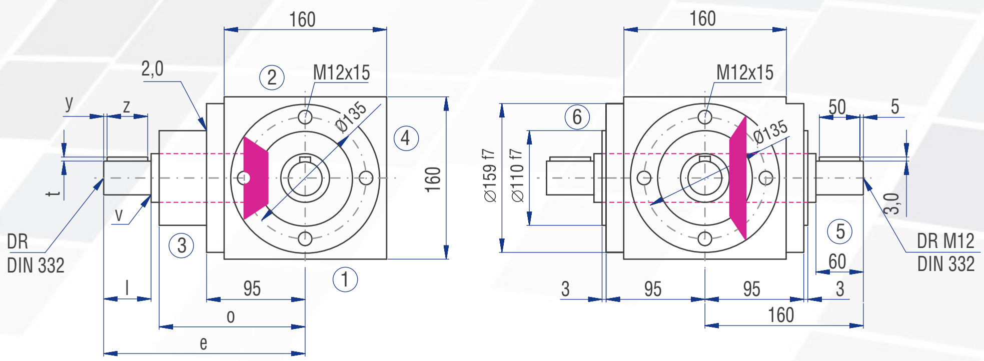


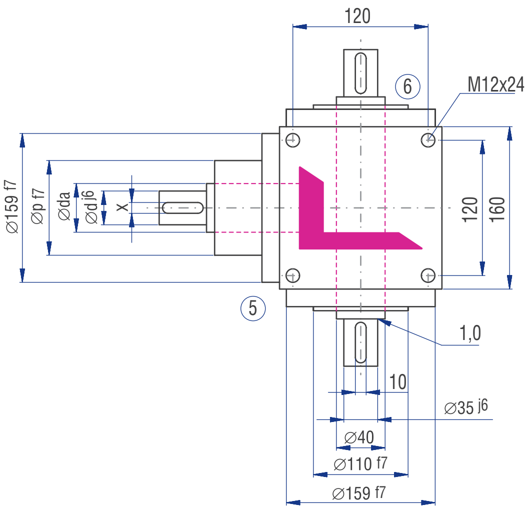




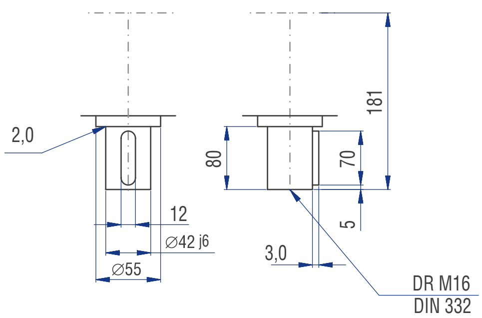
	Gear ratio						
	1:1	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
d [mm]	35	35	35	28	24	24	24
da [mm]	40	40	40	40	40	25	25
l [mm]	60	60	60	60	60	60	60
v [mm]	1.5	1.5	1.5	1	1	0.5	0.5
x [mm]	10	10	10	8	8	8	8
y [mm]	5	5	5	5	5	5	5
z [mm]	50	50	50	50	50	50	50
t [mm]	3	3	3	3	3	3	3
e [mm]	212	212	212	212	232	232	232
o [mm]	150	150	150	150	170	170	170
p [mm]	110	110	110	100	100	100	100
DR M	12	12	12	10	8	8	8







Implementation VV



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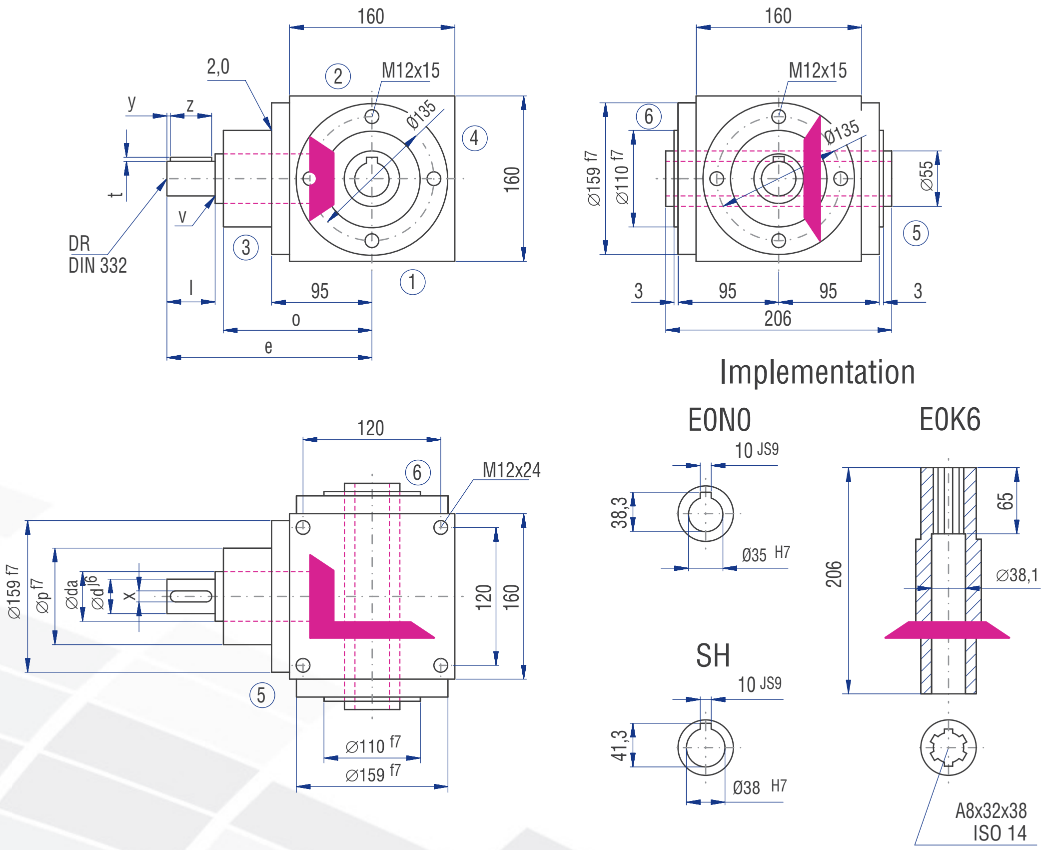
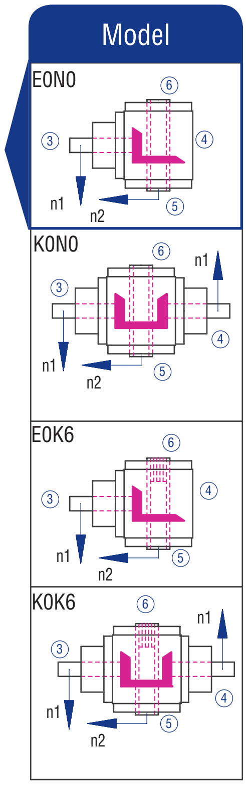
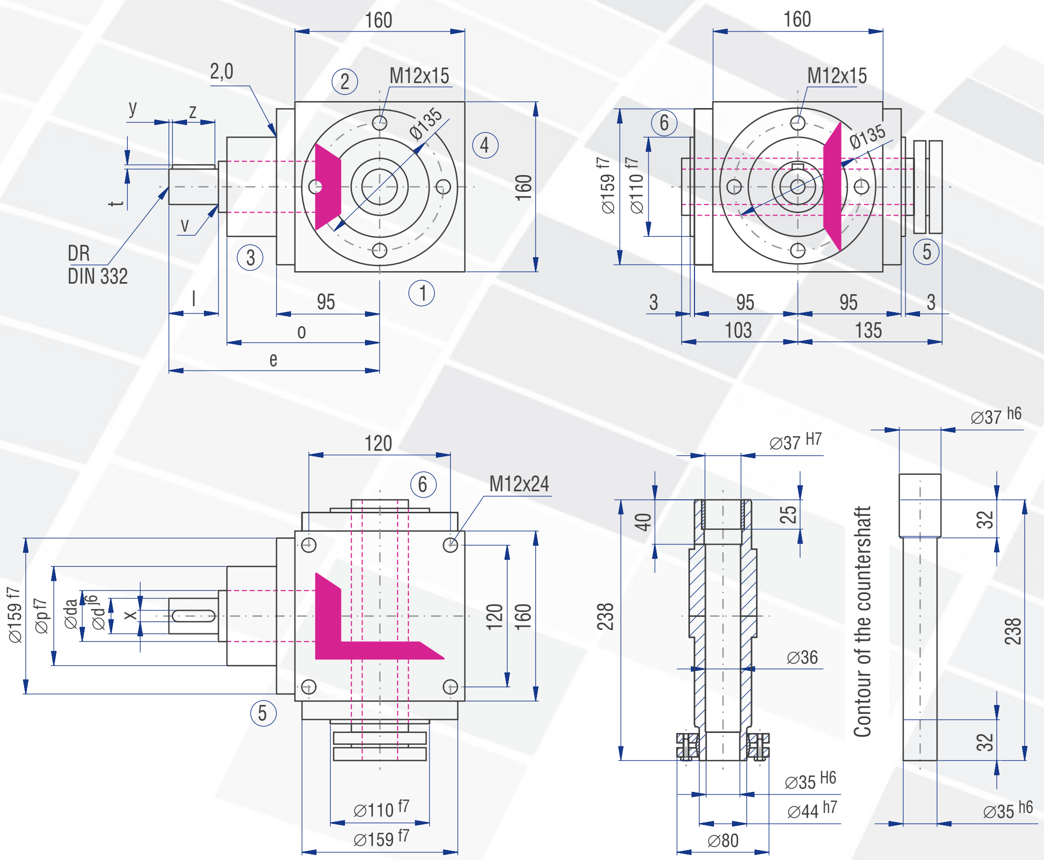
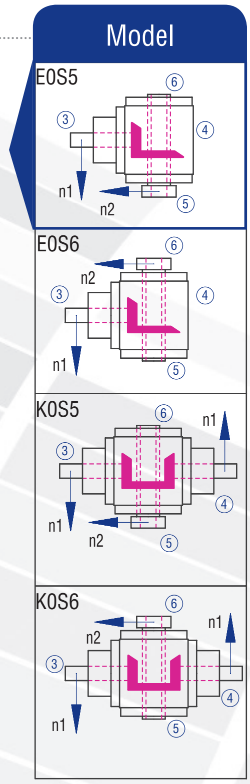
The dimensions of the Models not shown can be figured by mirroring available dimensions.

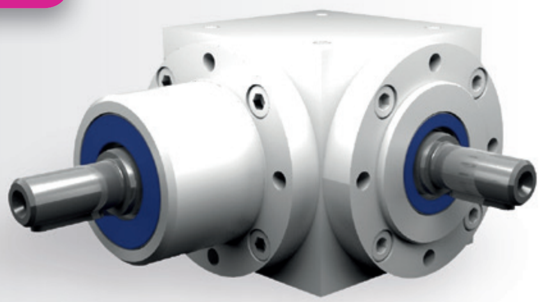

160
2,0
2
M12x15
y
z
Ø135
4
160
t
v
DR
DIN 332
3
l
95
1
o
e
6
Ø159 f7
Ø110 f7
Ø55
5
3
95
95
3
206
Implementation
E0N0
E0K6
10 JS9
38,3
Ø35 H7
65
206
Ø38,1
SH
10 JS9
41,3
Ø38 H7
A8x32x38
ISO 14
120
M12x24
Ø159 f7
Øp f7
Øda
Ød j6
x
120
160
Ø110 f7
Ø159 f7


Model
E0N0
K0N0
E0K6
K0K6
n1
n2


160
2,0
2
M12x15
y
z
Ø135
4
160
t
v
DR
DIN 332
3
l
95
1
o
e
6
Ø159 f7
Ø110 f7
5
3
95
95
3
103
135
120
M12x24
Ø159 f7
Øp f7
Øda
Ød j6
x
120
160
Ø110 f7
Ø159 f7
Ø37 H7
40
25
238
Ø36
Ø35 H6
Ø44 h7
Ø80
Contour of the countershaft
Ø37 h6
32
238
32
Ø35 h6


Model
E0S5
E0S6
K0S5
K0S6
n1
n2

6.3.11 Type V 200 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	72.75	330	1500	51.25	310	1000	46.29	420	750	28.93	350	600	19.84	300	500	11.45	208
2400				1600	63.49	360	1200	45.24	342	800	39.24	445	600	26.45	400	480	17.99	340	400	9.60	218
1500	1500	74.40	450	1000	48.17	437	750	35.13	425	500	28.38	515	375	18.81	455	300	12.57	380	250	6.54	237
1000	1000	56.21	510	667	37.13	505	500	27.56	500	333	20.37	555	250	13.36	485	200	9.26	420	167	4.74	258
750	750	45.88	555	500	30.31	550	375	22.32	540	250	15.98	580	188	10.54	510	150	7.27	440	125	3.98	289
500	500	34.17	620	333	22.57	615	250	16.81	610	167	11.04	600	125	7.23	525	100	5.18	470	83	2.79	304
250	250	19.56	710	167	12.70	690	125	9.37	680	83	5.76	630	63	3.79	550	50	2.78	505	42	1.44	311
50	50	4.13	750	33	2.73	750	25	2.07	750	17	1.29	690	13	0.80	580	10	0.58	525	8	0.28	306

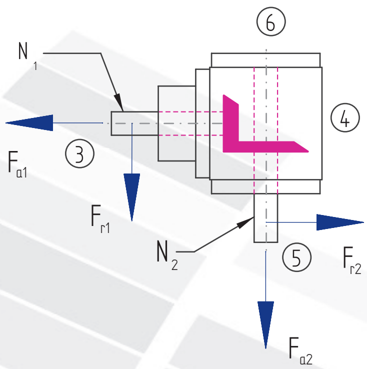
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	26.0	26.0	26.0	26.0	26.0	26.0	26.0
T_{2max} [Nm]	1090	980	980	910	860	860	625

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 500	2200	1100	1700	850	3200	1600	3900	1950	5000	2500	6200	3100
> 500	1840	920	1420	710	2670	1335	3250	1625	4170	2085	5170	2585

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 500	3200	1600	4300	2150	5000	2500	6500	3250	8000	4000	10000	5000
> 500	2670	1335	3580	1790	4170	2085	5420	2710	6670	3335	8330	4165

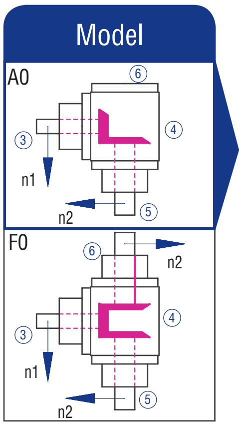


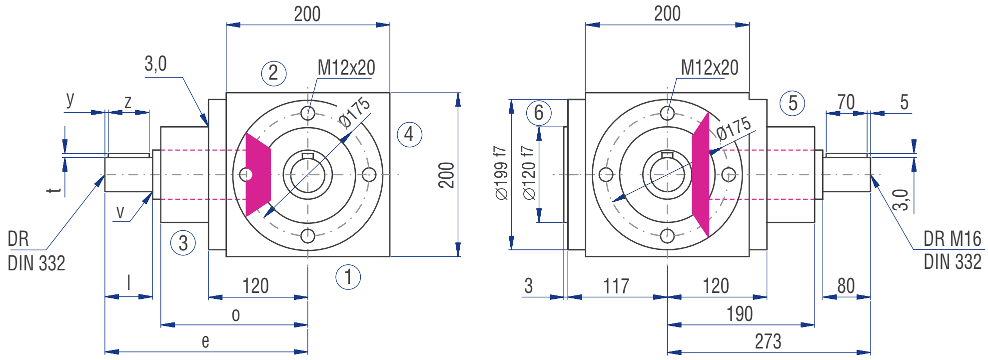
Inertia moments/mass

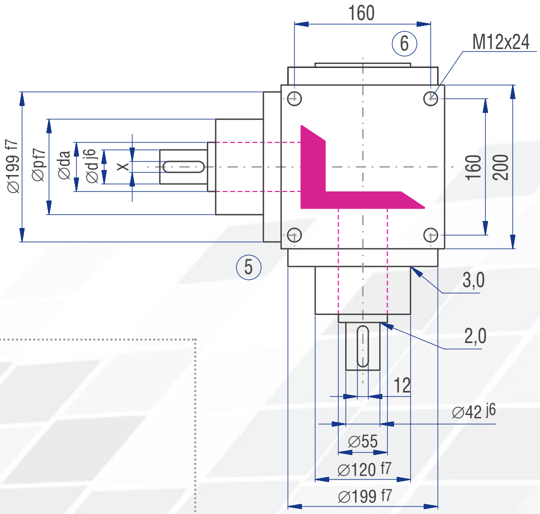
Inertia moment J_1 related to the fast-rotating shaft (N_1)

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	121.2522	57.6950	36.3095	18.8322	14.2651	6.1470	5.3881	52.0
B0	174.7000	103.5829	71.6215	34.1931	22.7181	12.8770	10.0616	48.0
C0	174.7000	103.5829	71.6215	34.1931	22.7181	12.8770	10.0616	48.0
D0	177.8173	104.9684	72.4008	34.5395	22.9130	13.0016	10.1482	50.0
E0N	201.3904	109.0276	76.4341	35.2209	23.3588	13.8070	10.7075	48.0
E0S	222.4124	118.3707	81.6896	37.5567	24.6726	14.6479	11.2914	49.3
F0	181.8783	84.6400	51.4661	25.5685	18.0543	8.5721	7.0721	60.0
G0	235.3261	134.3330	92.7745	46.2891	33.1941	16.5990	13.7656	58.0
H0	235.3261	134.3330	92.7745	46.2891	33.1941	16.5990	13.7656	58.0
J0	238.4434	135.7185	93.5538	46.6355	33.3890	16.7236	13.8522	60.0
K0N	262.0165	139.7777	97.5871	47.3169	33.8348	17.5290	14.4115	58.0
K0S	283.0385	149.1208	102.8426	49.6527	35.1486	18.3699	14.9954	59.3

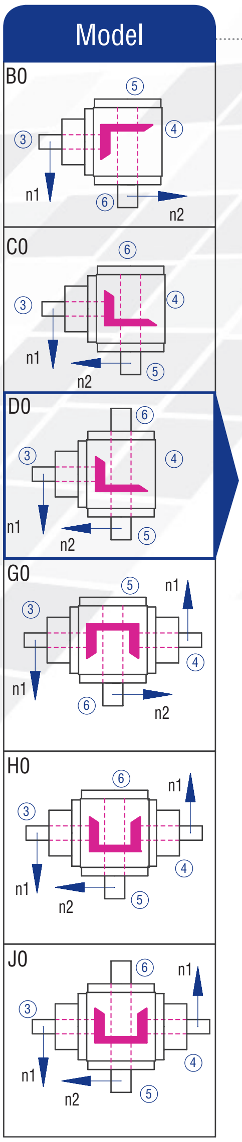
6.3.11 Type V 200 – Standard bevel gearboxes

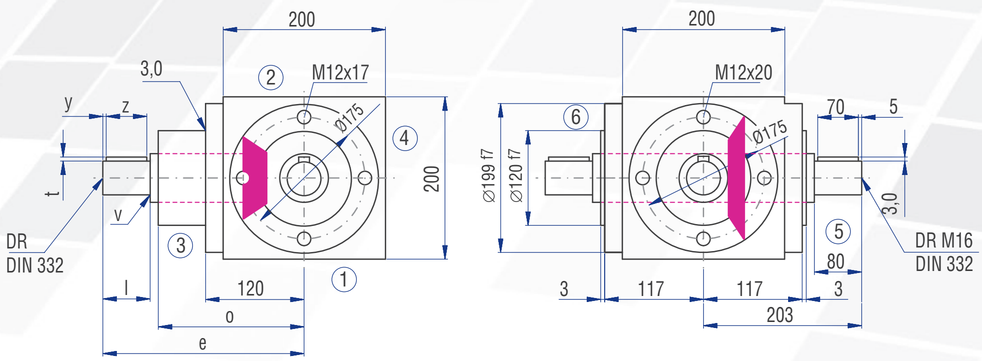


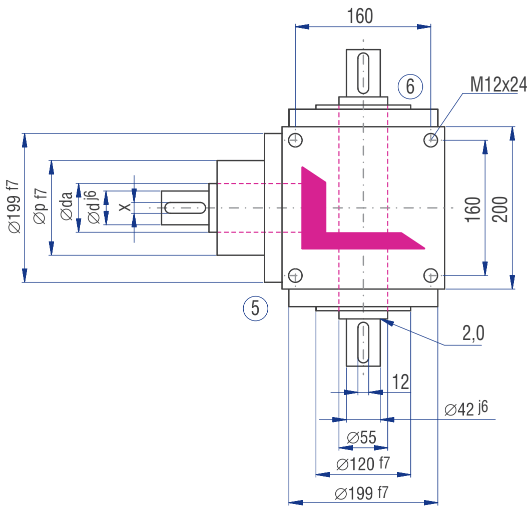




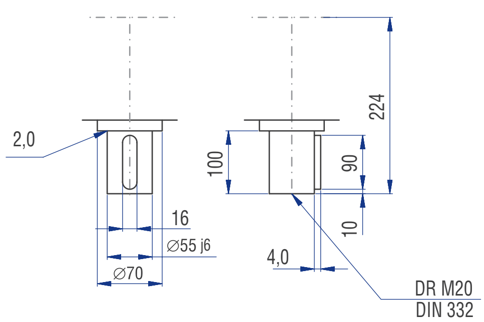
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	42	42	42	35	35	28	28
da [mm]	55	55	55	40	40	30	30
l [mm]	80	80	80	68	68	68	68
v [mm]	2	2	2	1	1	0	0
x [mm]	12	12	12	10	10	8	8
y [mm]	5	5	5	3	3	3	3
z [mm]	70	70	70	63	63	63	63
t [mm]	3	3	3	3	3	3	3
e [mm]	273	273	273	261	261	261	261
o [mm]	190	190	190	190	190	190	190
p [mm]	120	120	120	120	120	110	110
DR M	16	16	16	12	12	10	10







Implementation VV



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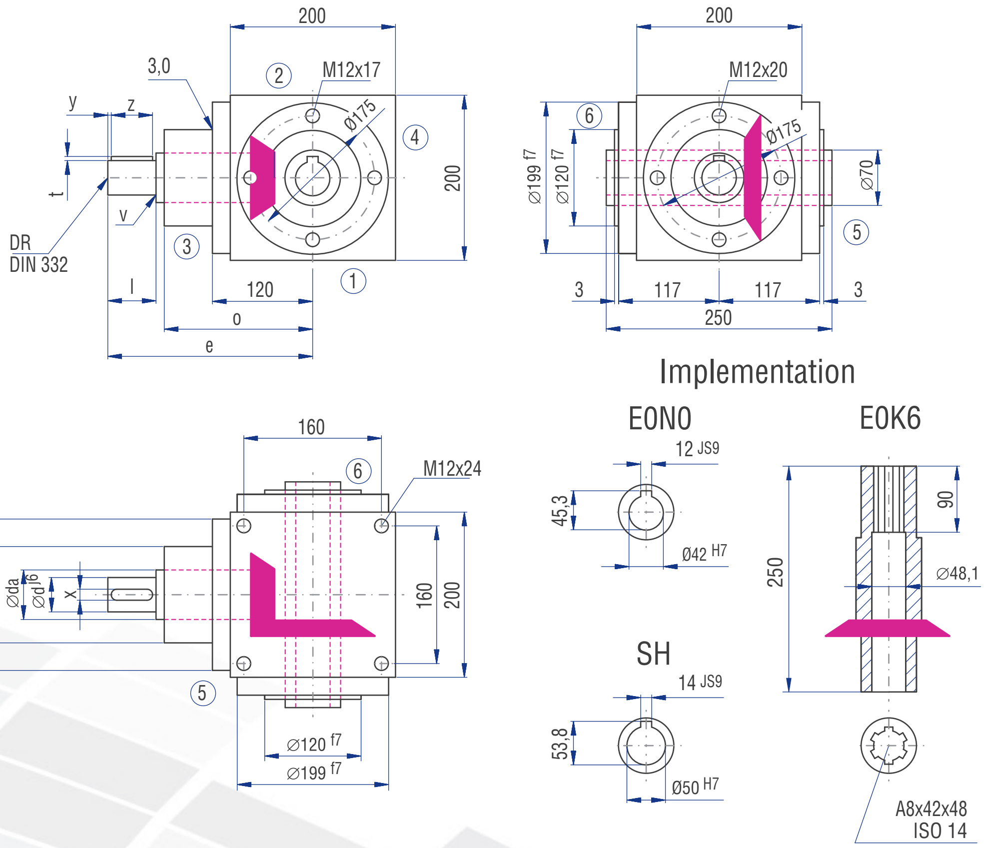
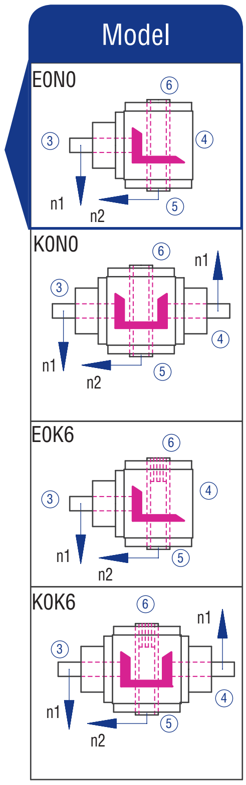
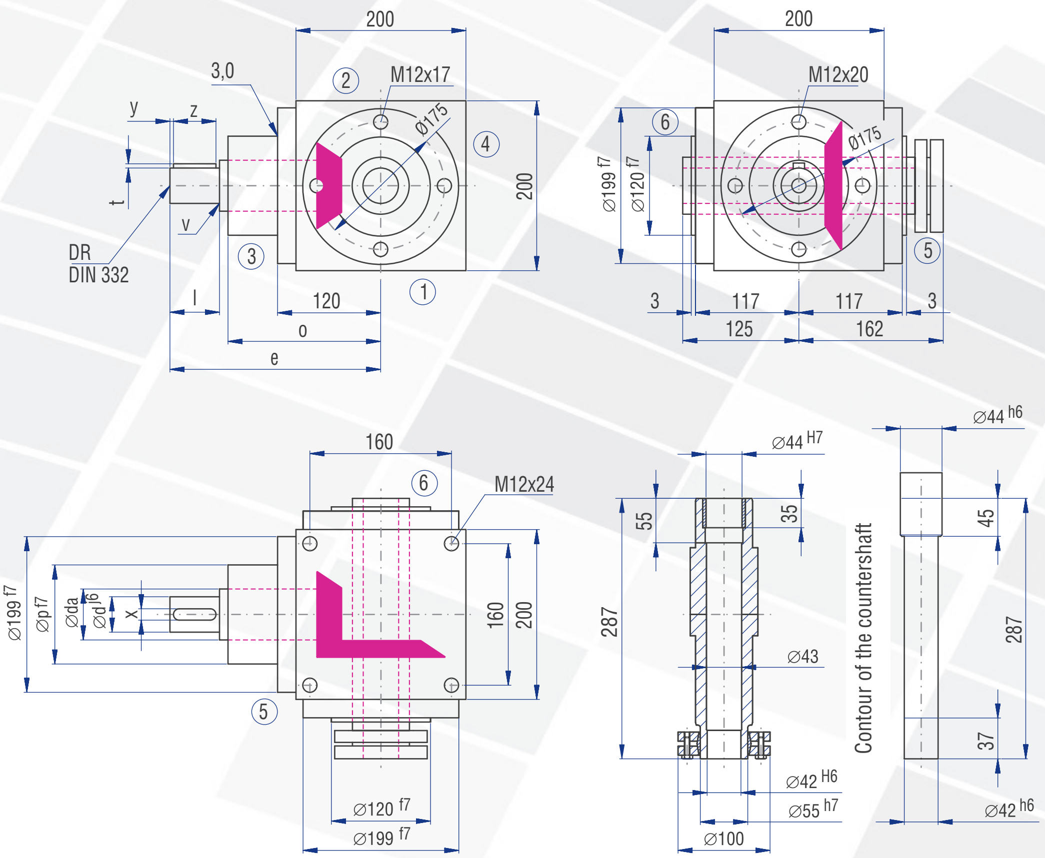
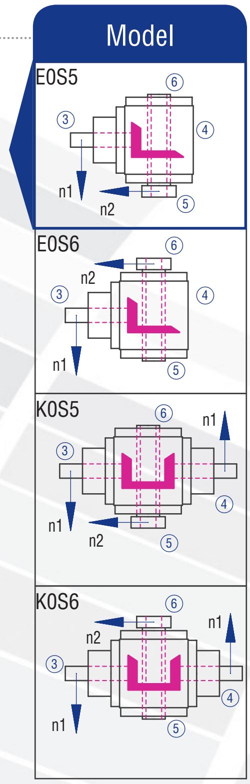
The dimensions of the Models not shown can be figured by mirroring available dimensions.

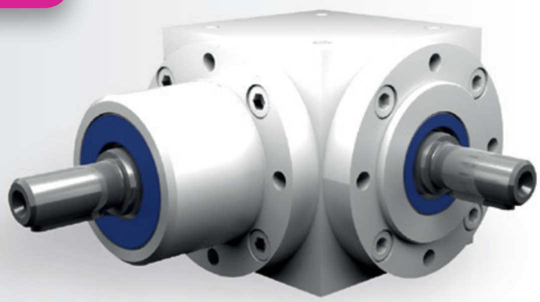

200
3,0
2
M12x17
Ø175
4
y
z
t
v
DR
DIN 332
3
l
120
1
o
e
200
M12x20
6
Ø199 f7
Ø120 f7
Ø70
5
3
117
117
3
250
Implementation
E0N0
E0K6
12 JS9
45,3
Ø42 H7
90
250
Ø48,1
SH
14 JS9
53,8
Ø50 H7
A8x42x48
ISO 14
160
M12x24
Ø199 f7
Øp f7
Øda
Ød j6
x
160
200
Ø120 f7
Ø199 f7


Model
E0N0
K0N0
E0K6
K0K6
n1
n2


200
3,0
2
M12x17
Ø175
4
y
z
t
v
DR
DIN 332
3
l
120
1
o
e
200
M12x20
6
Ø199 f7
Ø120 f7
5
3
117
117
3
125
162
160
M12x24
Ø199 f7
Øp f7
Øda
Ød j6
x
160
200
Ø120 f7
Ø199 f7
Ø44 H7
55
35
287
Ø43
Ø42 H6
Ø55 h7
Ø100
Contour of the countershaft
Ø44 h6
45
287
37
Ø42 h6


Model
E0S5
E0S6
K0S5
K0S6
n1
n2

6.3.12 Type V 230 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]	5:1 n_2 [rpm]	5:1 P_{1N} [kW]	5:1 T_{2N} [Nm]	6:1 n_2 [rpm]	6:1 P_{1N} [kW]	6:1 T_{2N} [Nm]
3000				2000	99.20	450	1500	87.63	530	1000	44.09	400	750	36.37	440	600	33.73	510	500	20.17	366
2400				1600	91.35	518	1200	80.02	605	800	39.68	450	600	32.74	495	480	29.10	550	400	18.08	410
1500	1500	87.63	530	1000	72.20	655	750	59.11	715	500	29.76	540	375	24.80	600	300	21.00	635	250	13.50	490
1000	1000	71.65	650	667	56.21	765	500	45.19	820	333	23.33	635	250	18.60	675	200	15.76	715	167	9.92	540
750	750	60.76	735	500	45.47	825	375	36.79	890	250	19.29	700	188	15.19	735	150	12.73	770	125	7.78	565
500	500	45.19	820	333	33.79	920	250	26.73	970	167	14.07	765	125	10.95	795	100	9.15	830	83	5.42	590
250	250	26.73	970	167	20.57	1,120	125	16.88	1,225	83	7.58	825	63	5.99	870	50	5.07	920	42	2.82	610
50	50	7.00	1,270	33	4.89	1,330	25	3.66	1,330	17	1.63	870	13	1.35	980	10	1.09	990	8	0.57	625

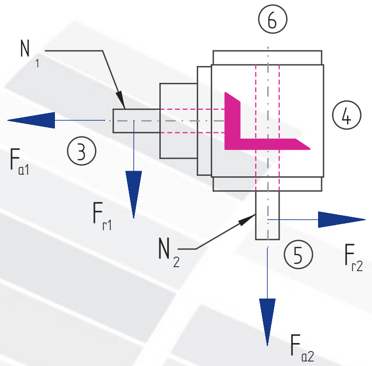
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	34.0	34.0	34.0	34.0	34.0	34.0	34.0
T_{2max} [Nm]	1500	1400	1400	1300	1300	1200	1000

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	4600	2300	5150	2575	7200	3600	9450	4725	11250	5625	13100	6550
> 750	3832	1916	4290	2145	6000	3000	7876	3938	9376	4688	10918	5459

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	5850	2925	8650	4325	10500	5250	12250	6125	15000	7500	19000	9500
> 750	4876	2438	7208	3604	8750	4375	10208	5104	12500	6250	15830	7915

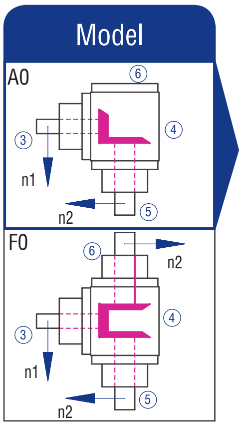


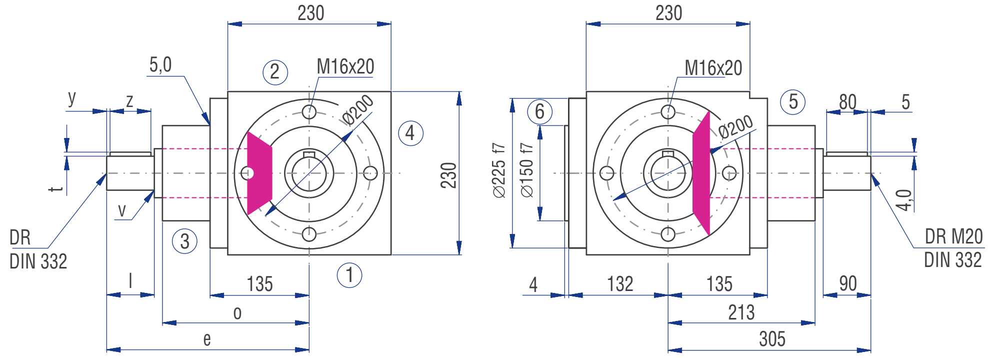
Inertia moments/mass

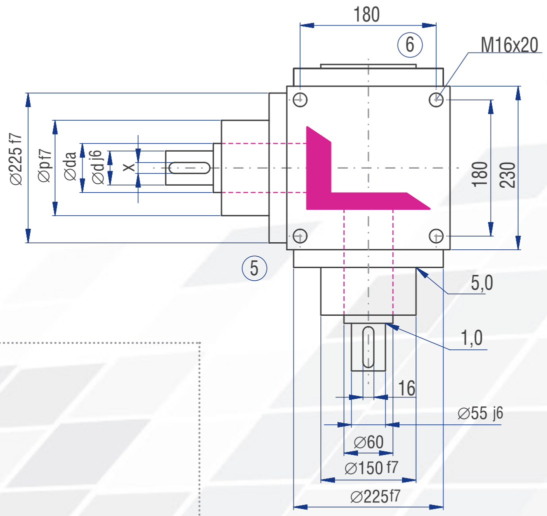
Inertia moment J_1 related to the fast-rotating shaft (N_1)

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	506.0000	215.0000	132.0000	55.0000	48.0000	42.0000	37.0000	79.0
B0	502.0000	220.0000	136.0000	57.0000	49.0000	42.0000	38.0000	76.0
C0	502.0000	220.0000	136.0000	57.0000	49.0000	42.0000	38.0000	76.0
D0	512.0000	224.0000	138.0000	58.0000	49.0000	43.0000	38.0000	78.0
E0N	512.0000	229.0000	142.0000	60.0000	50.0000	43.0000	38.0000	71.0
E0S	573.0000	256.0000	157.0000	67.0000	54.0000	46.0000	40.0000	72.0
F0	759.0000	332.0000	201.0000	77.0000	63.0000	53.0000	45.0000	97.0
G0	755.0000	318.0000	200.0000	91.0000	82.0000	72.0000	68.0000	100.0
H0	755.0000	318.0000	200.0000	91.0000	82.0000	72.0000	68.0000	100.0
J0	765.0000	322.0000	202.0000	92.0000	82.0000	73.0000	68.0000	102.0
K0N	765.0000	327.0000	206.0000	94.0000	83.0000	73.0000	68.0000	95.0
K0S	826.0000	354.0000	221.0000	101.0000	87.0000	76.0000	70.0000	96.0

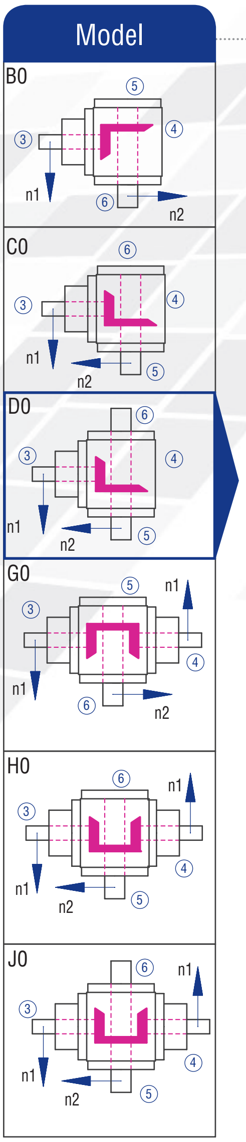
6.3.12 Type V 230 – Standard bevel gearboxes

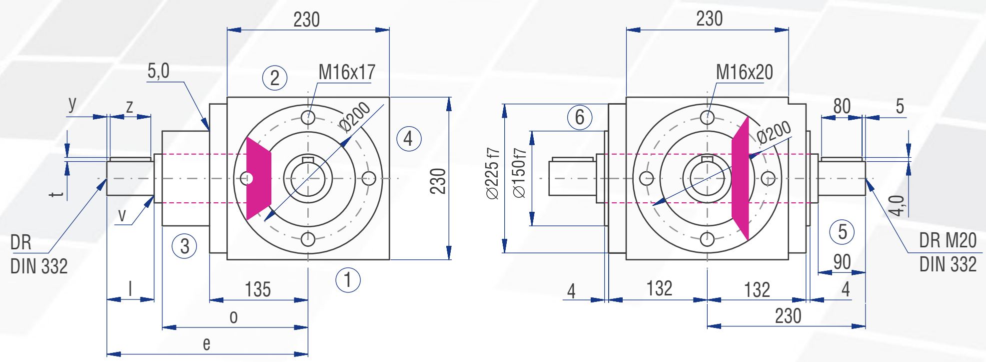


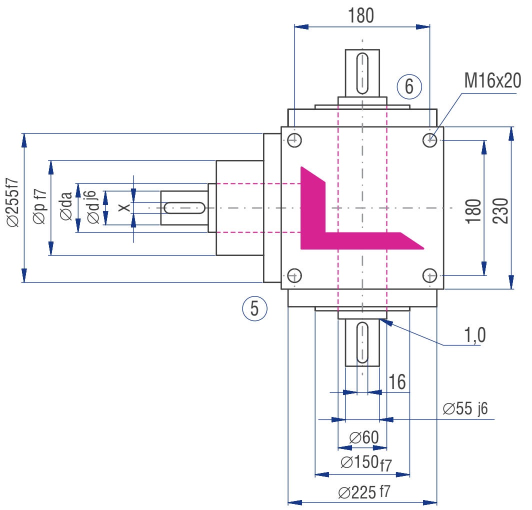




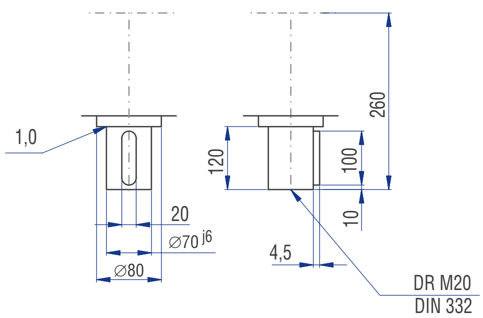
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	55	55	55	40	40	35	35
da [mm]	60	60	60	50	50	45	45
l [mm]	90	90	90	80	80	70	70
v [mm]	1	1	1	1	1	1	1
x [mm]	16	16	16	12	12	10	10
y [mm]	5	5	5	5	5	3	3
z [mm]	80	80	80	70	70	63	63
t [mm]	2.5	2.5	2.5	3	3	3	3
e [mm]	305	305	305	310	310	300	300
o [mm]	213	213	213	228	228	228	228
p [mm]	150	150	150	140	140	140	140
DR M	20	20	20	16	16	16	16



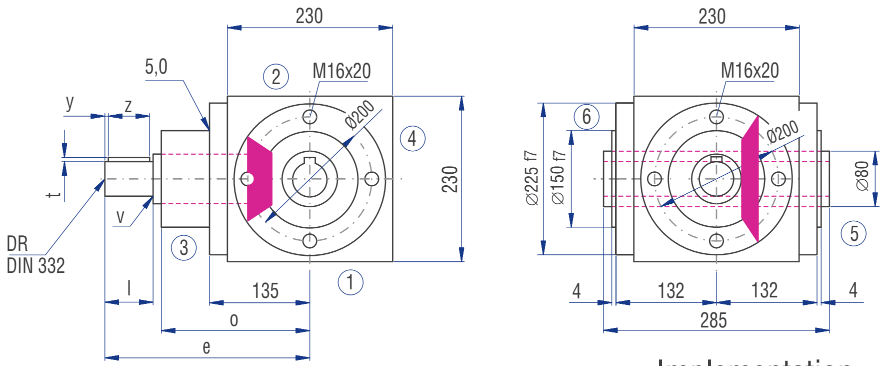


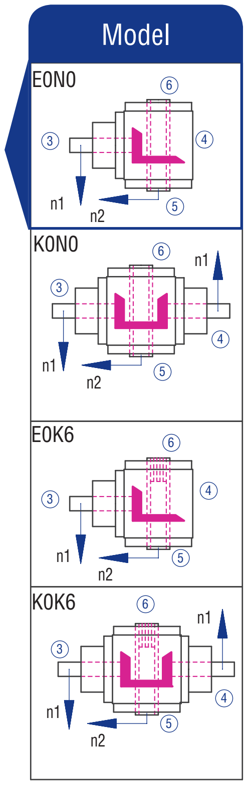


Implementation VV

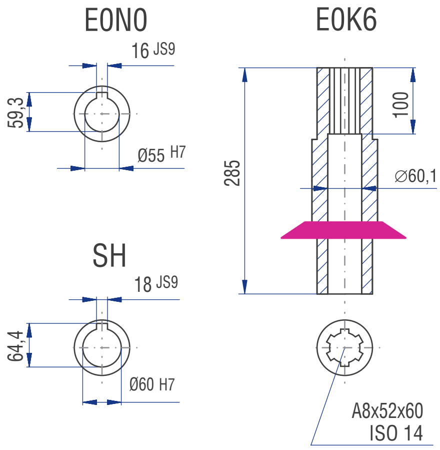


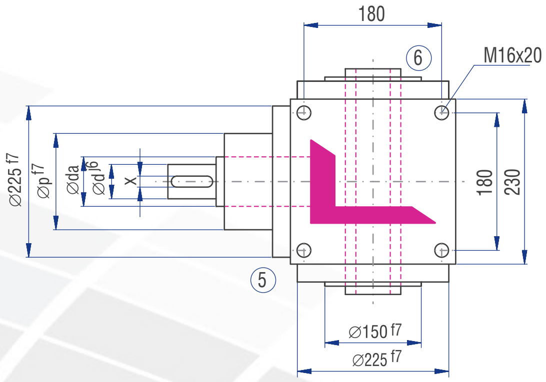
The dimensions of the Models not shown can be figured by mirroring available dimensions.

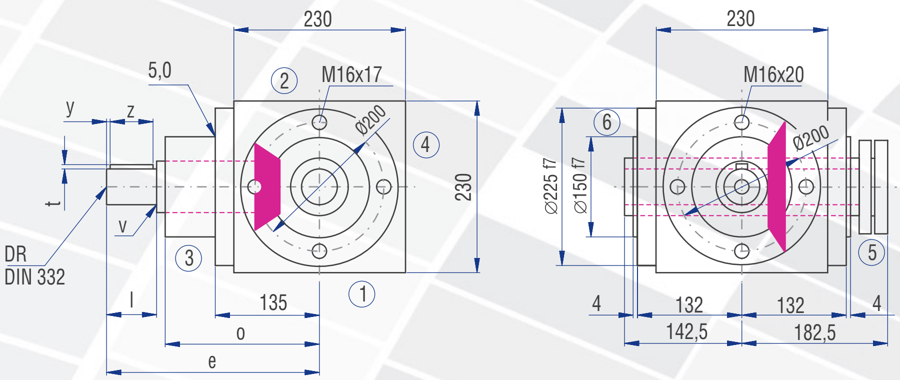


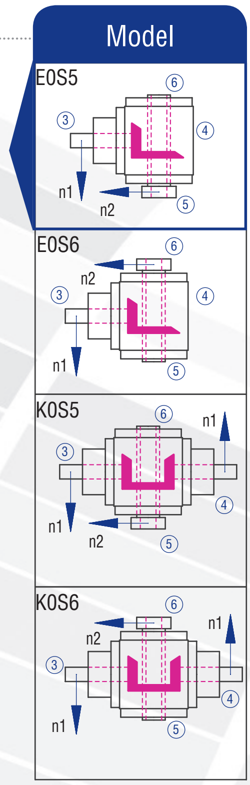


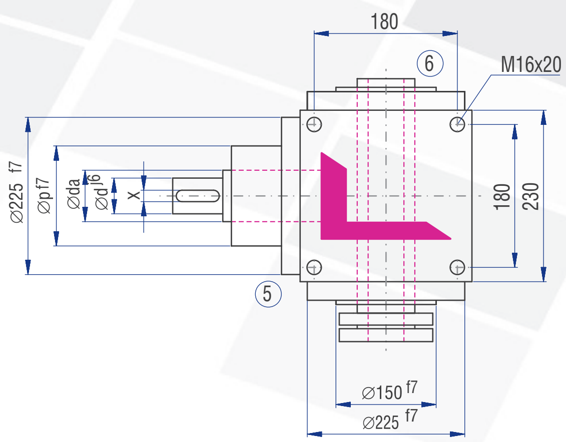
Implementation

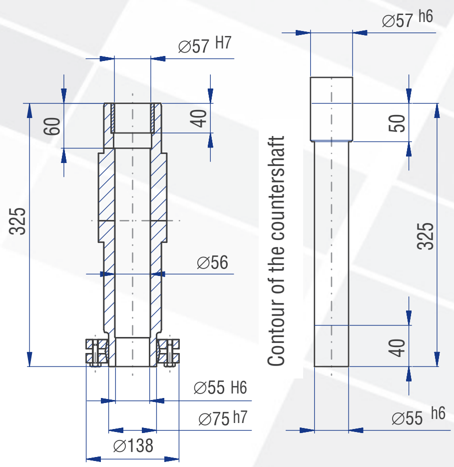












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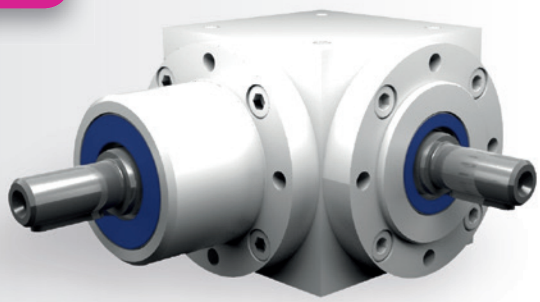
6.3.13 Type V 260 – Standard bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	189.58	860	1500	133.92	810	1000	85.97	780	750	57.87	700	600	46.29	700	500	27.27	495
2400				1600	158.72	900	1200	112.43	850	800	72.39	821	600	51.58	780	480	40.21	760	400	23.12	524
1500	1500	157.07	950	1000	104.71	950	750	78.53	950	500	49.60	900	375	37.20	900	300	29.10	880	250	16.36	594
1000	1000	115.73	1,050	667	77.19	1,050	500	57.87	1,050	333	36.34	990	250	28.93	1,050	200	21.82	990	167	12.93	702
750	750	96.72	1,170	500	64.48	1,170	375	48.36	1,170	250	28.93	1,050	188	22.73	1,100	150	18.19	1,100	125	10.91	792
500	500	72.75	1,320	333	47.72	1,300	250	35.27	1,280	167	20.43	1,110	125	16.26	1,180	100	13.23	1,200	83	8.06	878
250	250	42.44	1,540	167	27.43	1,490	125	20.12	1,460	83	11.16	1,220	63	8.61	1,250	50	7.11	1,290	42	4.35	940
50	50	9.64	1,750	33	6.18	1,700	25	4.55	1,650	17	2.55	1,360	13	1.82	1,320	10	1.47	1,330	8	0.87	951

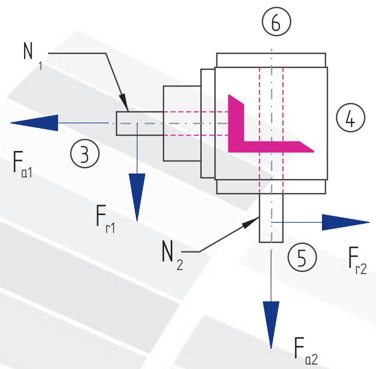
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	42.0	42.0	42.0	42.0	42.0	42.0	42.0
T_{2max} [Nm]	2310	2100	2100	1940	1940	1910	1730

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 950	7000	3500	8600	4300	11200	5600	15000	7500	17500	8750	20000	10000
> 950	5830	2915	7170	3585	9330	4665	12500	6250	14580	7290	16670	8335

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 950	8500	4250	13000	6500	16000	8000	18000	9000	22000	11000	28000	14000
> 950	7080	3540	10830	5415	13330	6665	15000	7500	18330	9165	23330	11665



Inertia moments/mass

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

Model	Inertia moment [kgcm^2]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	814.200	305.933	194.275	85.0833	46.7738	37.2840	31.8083	85.0
B0	827.440	168.262	281.335	117.221	66.6638	50.0136	40.7039	85.0
C0	827.440	168.262	281.335	117.221	66.6638	50.0136	40.7039	85.0
D0	841.850	383.556	284.938	52.2667	67.5644	50.5900	41.1042	88.0
E0N	828.690	413.262	287.898	120.110	68.2888	51.0536	41.4261	82.0
E0S	892.340	441.551	303.810	127.180	72.2656	53.5988	43.1936	84.9
F0	1221.300	486.867	296.050	130.317	72.2175	53.5680	43.1167	105.0
G0	1234.540	293.262	373.835	157.071	87.9938	71.0136	61.2039	109.0
H0	1234.540	293.262	373.835	157.071	87.9938	71.0136	61.2039	109.0
J0	1248.950	508.556	377.438	92.1167	88.8944	71.5900	61.6042	112.0
K0N	1235.790	538.262	380.398	159.960	89.6188	72.0536	61.9261	106.0
K0S	1299.440	566.551	396.310	167.030	93.5956	74.5988	63.6936	108.9

Bevel gearboxes

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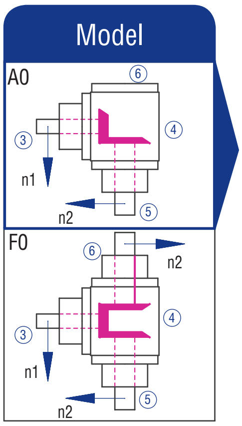
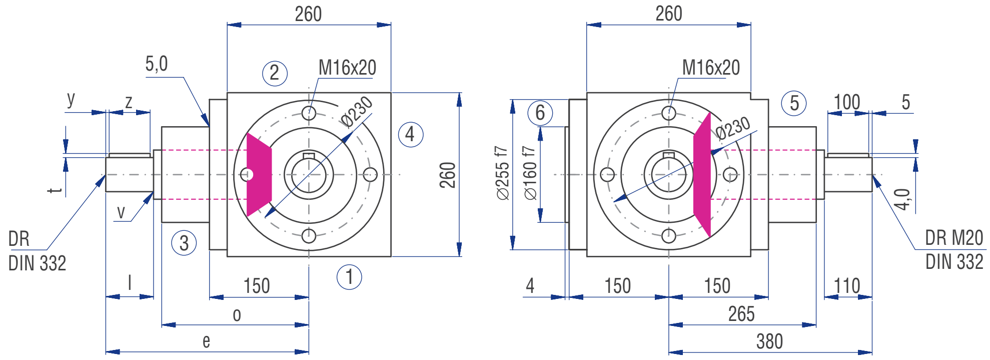
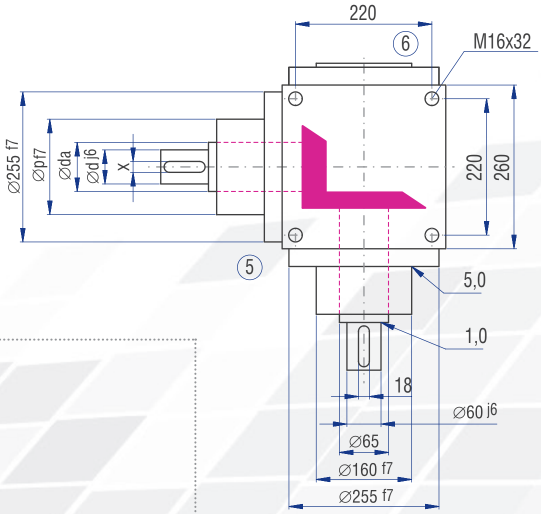
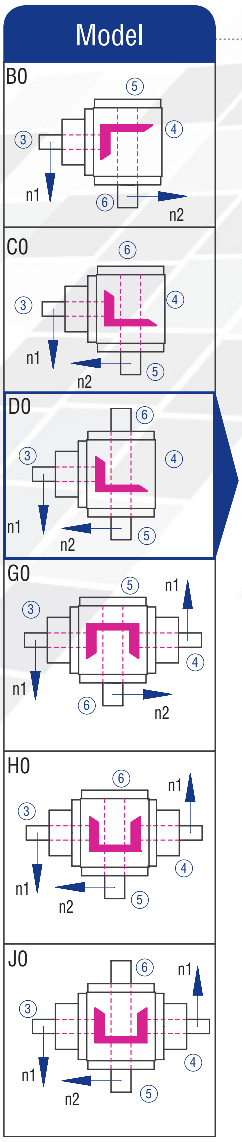
6.3.13 Type V 260 – Standard bevel gearboxes

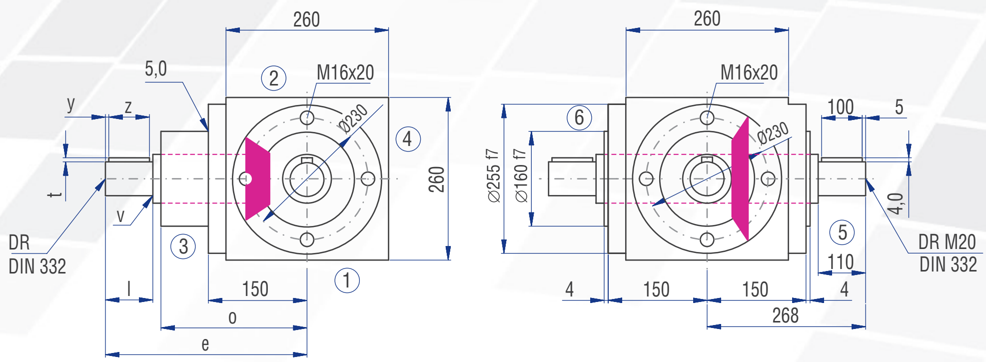


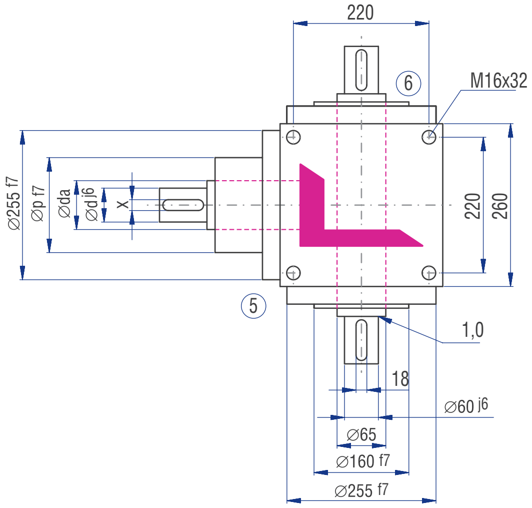




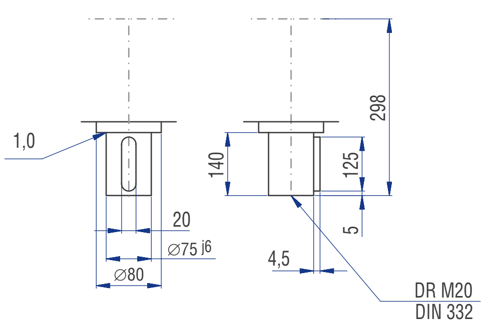
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	60	60	60	45	45	45	45
da [mm]	65	65	65	65	65	65	65
l [mm]	110	110	110	90	90	90	90
v [mm]	1	1	1	1.5	1.5	1.5	1.5
x [mm]	18	18	18	14	14	14	14
y [mm]	5	5	5	5	5	5	5
z [mm]	100	100	100	80	80	80	80
t [mm]	4	4	4	3.5	3.5	3.5	3.5
e [mm]	380	380	380	360	360	360	360
o [mm]	265	265	265	265	265	265	265
p [mm]	160	160	160	160	160	160	160
DR M	20	20	20	16	16	16	16



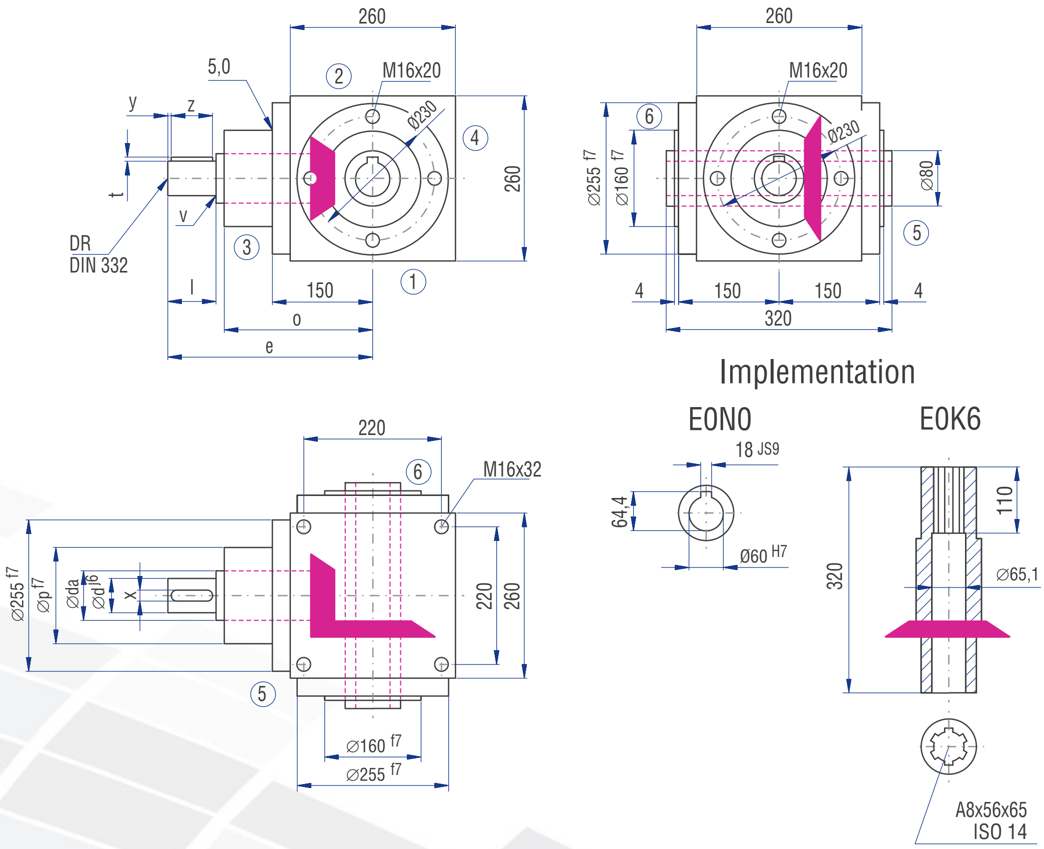




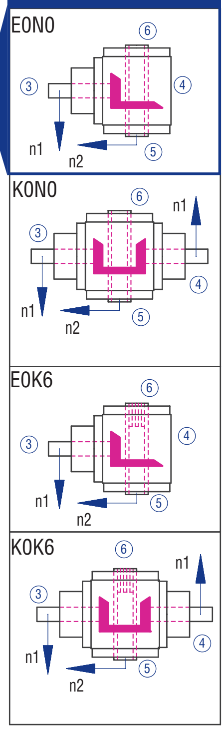
Implementation VV

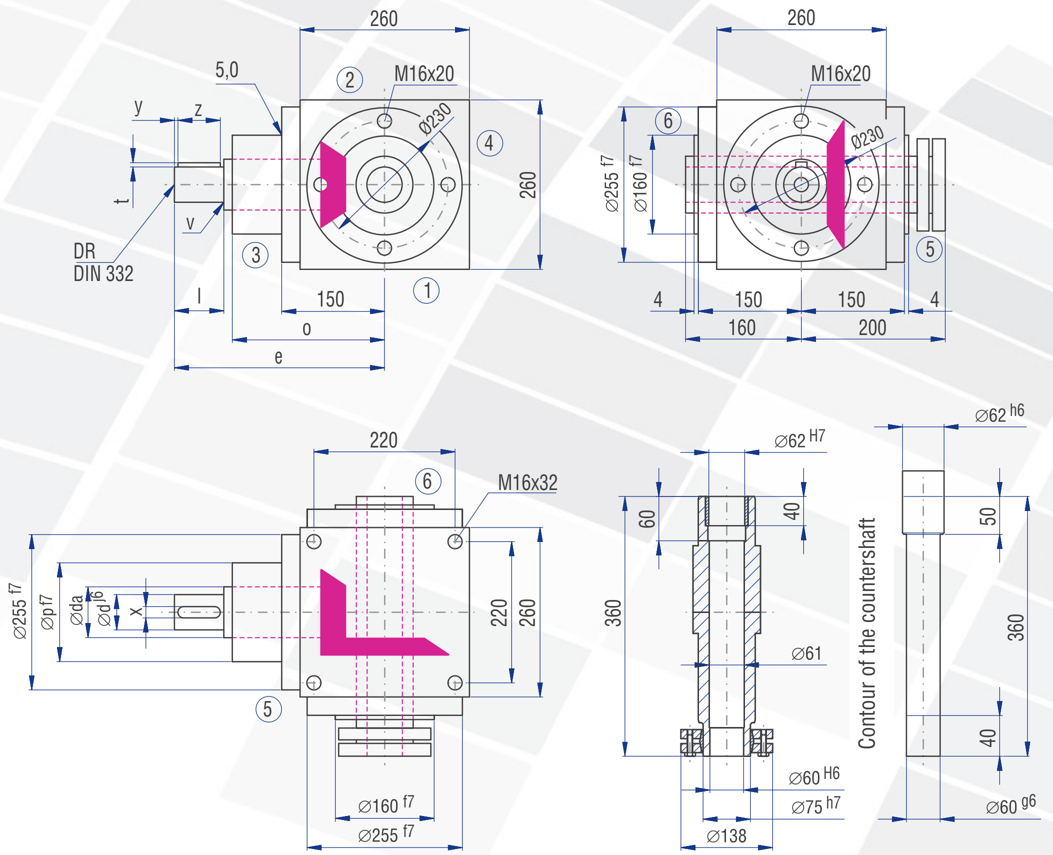


The dimensions of the Models not shown can be figured by mirroring available dimensions.

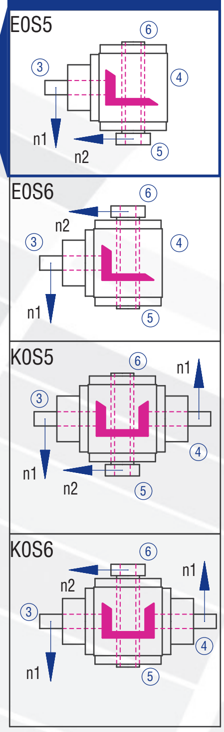

260
5,0
2
M16x20
Ø230
4
y
z
t
v
DR
DIN 332
3
1
150
l
o
e
260
6
Ø255 f7
Ø160 f7
Ø80
5
4
150
150
4
320
Implementation
E0N0
E0K6
220
M16x32
18 JS9
64,4
Ø60 H7
110
320
Ø65,1
Ø255 f7
Øp f7
Øda
Ød j6
x
220
260
Ø160 f7
Ø255 f7
A8x56x65
ISO 14

Model

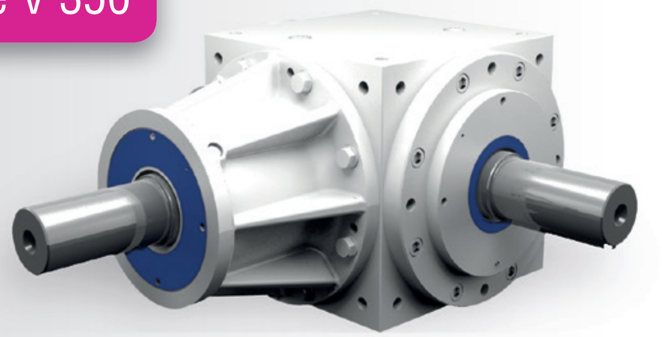

E0N0
K0N0
E0K6
K0K6
n1
n2


260
5,0
2
M16x20
Ø230
4
y
z
t
v
DR
DIN 332
3
1
150
l
o
e
260
6
Ø255 f7
Ø160 f7
5
4
150
150
4
160
200
220
M16x32
Ø255 f7
Øp f7
Øda
Ød j6
x
220
260
Ø160 f7
Ø255 f7
Ø62 H7
60
40
360
Ø61
Ø60 H6
Ø75 h7
Ø138
Contour of the countershaft
Ø62 h6
50
360
40
Ø60 g6

Model


E0S5
E0S6
K0S5
K0S6
n1
n2

6.3.14 Standard bevel gearboxes – Type V 350



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
2400										800	160.48	1,820	600	113.75	1,720	480	78.83	1,490	400	56.88	1,290
1500	1500	267.84	1,620	1000	206.19	1,870	750	200.06	2,420	500	122.35	2,220	375	78.95	1,910	300	56.54	1,710	250	41.61	1,510
1000	1000	210.53	1,910	667	188.55	2,560	500	155.41	2,820	333	96.26	2,620	250	58.14	2,110	200	42.33	1,920	167	31.41	1,710
750	750	195.92	2,370	500	141.42	2,560	375	129.37	3,130	250	81.29	2,950	188	47.95	2,320	150	35.88	2,170	125	24.25	1,760
500	500	155.41	2,820	333	112.63	3,070	250	94.52	3,430	167	59.34	3,230	125	34.72	2,520	100	26.67	2,420	83	16.72	1,820
250	250	94.52	3,440	167	67.11	3,650	125	54.15	3,930	83	34.26	3,730	63	19.43	2,820	50	16.09	2,920	42	9.28	2,020
50	50	24.47	4,440	33	16.34	4,500	25	12.79	4,640	17	7.79	4,240	13	4.17	3,030	10	3.56	3,230	8	1.95	2,120

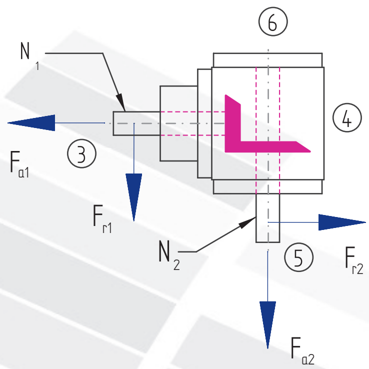
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} kW]	90.0	90.0	90.0	90.0	90.0	90.0	90.0
T_{2max} [Nm]	5400	5200	5000	4500	3500	3500	2300

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 2400	14500	7250	15000	7500	17500	8750	22500	11250	27500	13750	33000	16500
> 2400	12000	6000	12500	6250	14500	7250	18700	9350	23000	11500	27500	13750

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 2400	17500	8750	18100	9050	21100	10550	26150	13075	34200	17100	40200	20100
> 2400	14500	7250	15080	7540	17580	8790	21790	10895	28500	14250	33500	16750



Inertia moments/mass

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

Model	Inertia moment [kgcm²]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	3388.00	1707.00	1021.00	585.000	473.000	296.000	261.000	269.0
B0	3634.00	1793.00	1063.00	605.000	485.000	304.000	266.000	280.0
C0	3634.00	1793.00	1063.00	605.000	485.000	304.000	266.000	280.0
D0	3699.00	1822.00	1079.00	612.000	489.000	306.000	268.000	287.0
E0N	3459.00	1716.00	1019.00	586.000	474.000	297.000	262.000	259.0
E0S	3694.00	1820.00	1078.00	612.000	489.000	306.000	268.000	264.0
F0	5082.00	2593.00	1573.00	805.000	606.000	386.000	317.000	340.0
G0	5328.00	2613.00	1533.00	969.000	825.000	511.000	471.000	372.0
H0	5328.00	2613.00	1533.00	969.000	825.000	511.000	471.000	372.0
J0	5393.00	2642.00	1549.00	976.000	829.000	513.000	473.000	379.0
K0N	5153.00	2536.00	1489.00	950.000	814.000	504.000	467.000	351.0
K0S	5388.00	2640.00	1548.00	976.000	829.000	513.000	473.000	356.0

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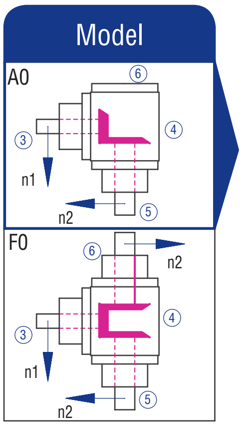
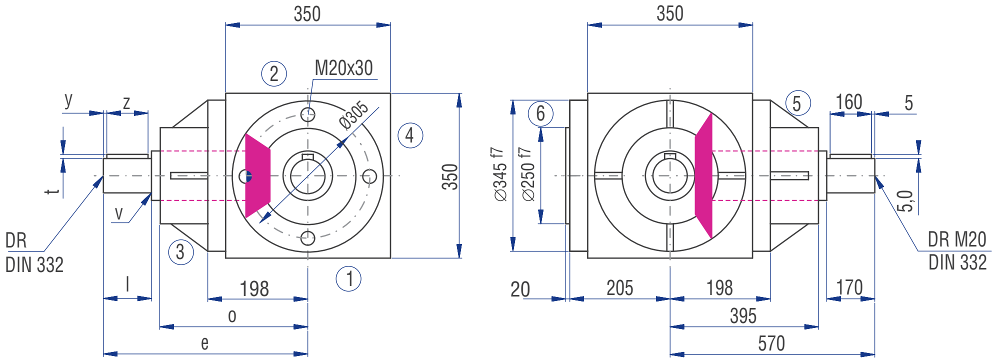
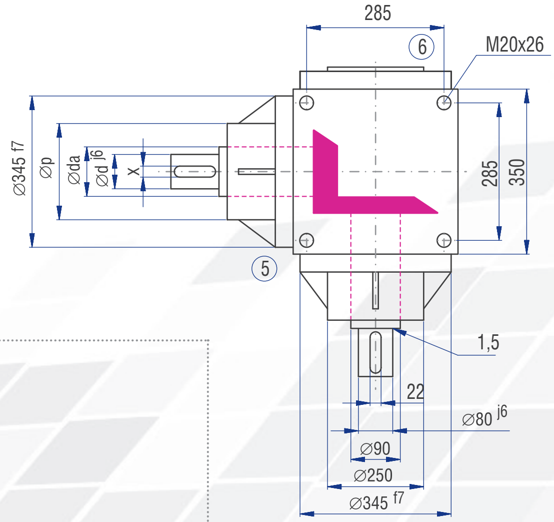
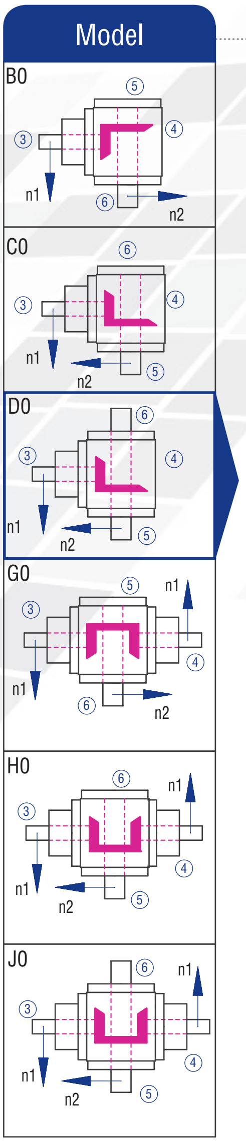
6.3.14 Standard bevel gearboxes – Type V 350

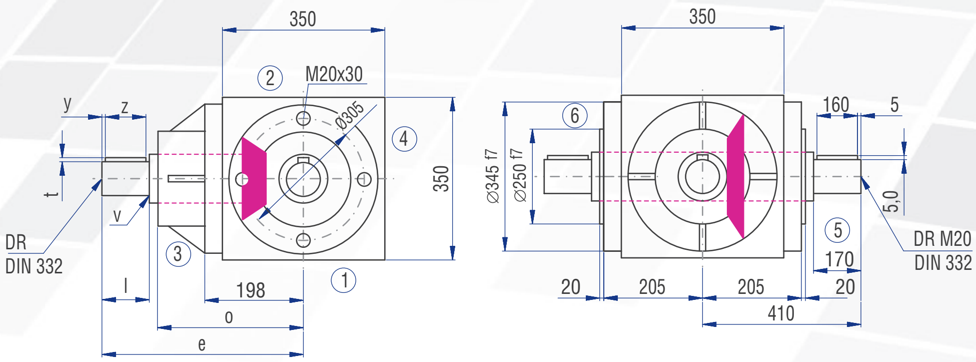


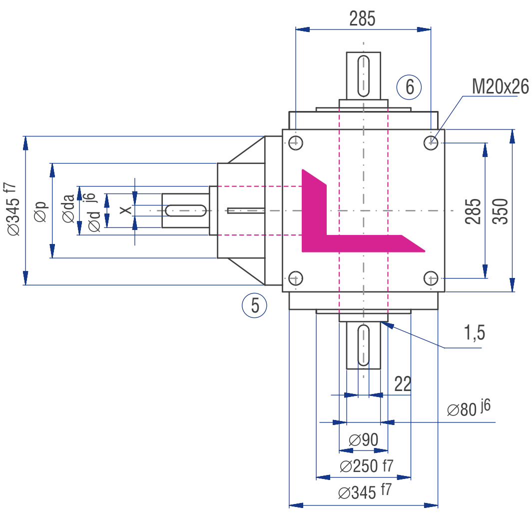




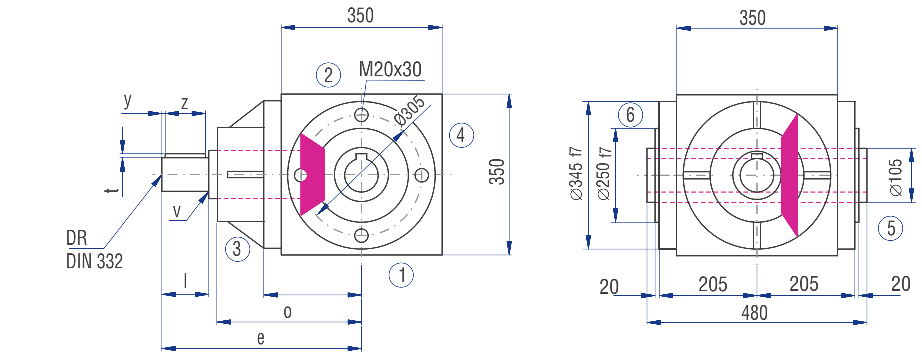
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	80	80	80	65	65	55	55
da [mm]	90	90	90	90	90	72	72
l [mm]	170	170	170	140	140	110	110
v [mm]	1.5	1.5	1.5	1.5	1.5	1.5	1.5
x [mm]	22	22	22	18	18	16	16
y [mm]	5	5	5	7.5	7.5	10	10
z [mm]	160	160	160	125	125	90	90
t [mm]	5	5	5	4	4	4	4
e [mm]	570	570	570	540	540	510	510
o [mm]	395	395	395	395	395	395	395
p [mm]	250	250	250	250	250	250	250
DR M	20	20	20	20	20	20	20



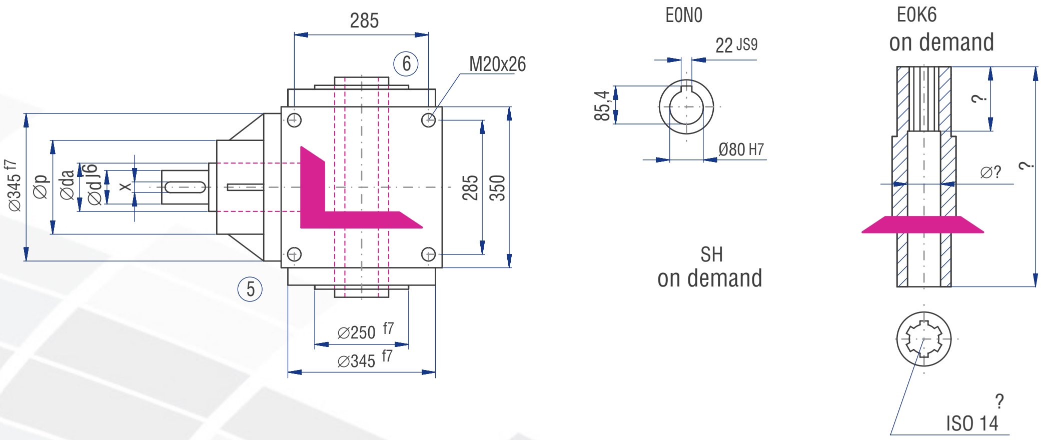


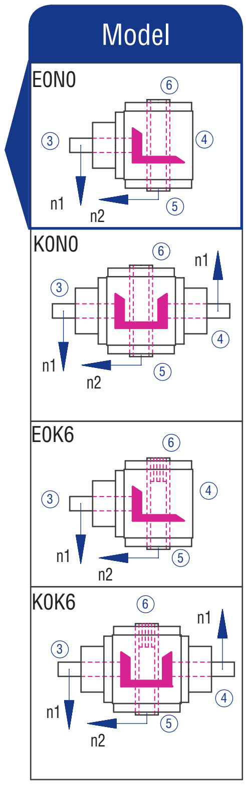


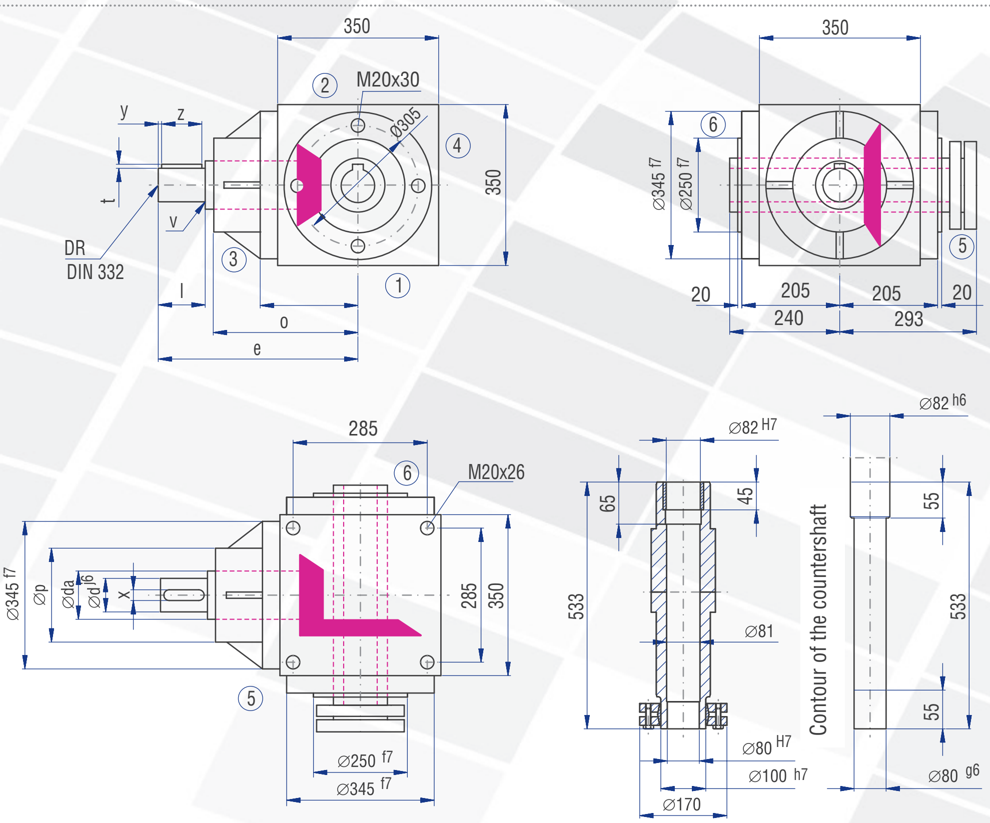
The dimensions of the Models not shown can be figured by mirroring available dimensions.

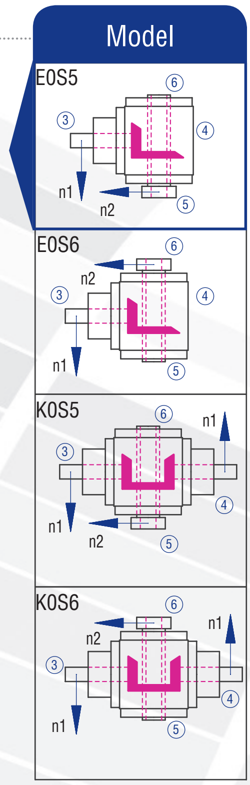


Implementation









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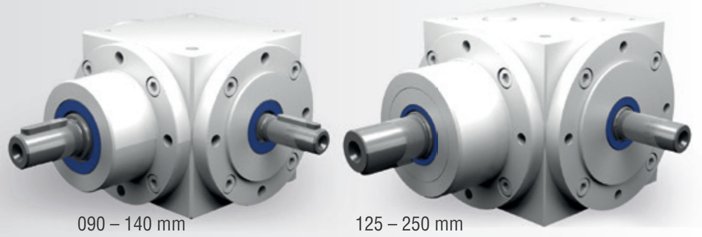
6.4 Type VS – Type V with step-up ratio

6.4.1 Features

Gear ratios: i = 1:1.5 to 1:2
Maximum output torque: 1200 Nm
7 gearbox sizes with edge lengths of 090 to 260 mm
Larger shaft diameter (N_2), slowly rotating
Low-backlash construction < 10 angular minutes possible
Housing made of grey cast iron or steel

The through-shaft (N_1) is fast-running



6.4.2 Models

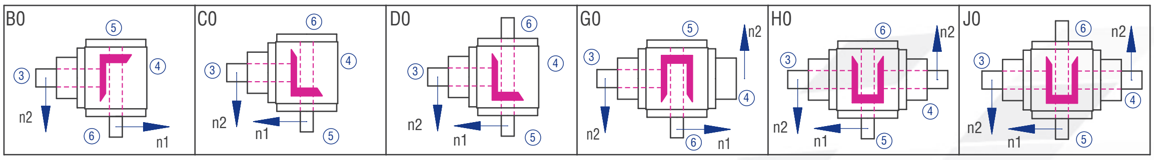


Figure **6.4.2-1; Models**

6.4.3 Gearbox sides

The example shows the Model C0

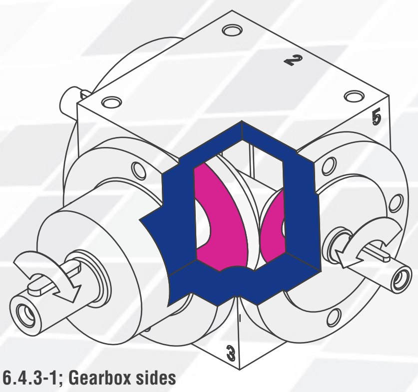


Figure **6.4.3-1; Gearbox sides**

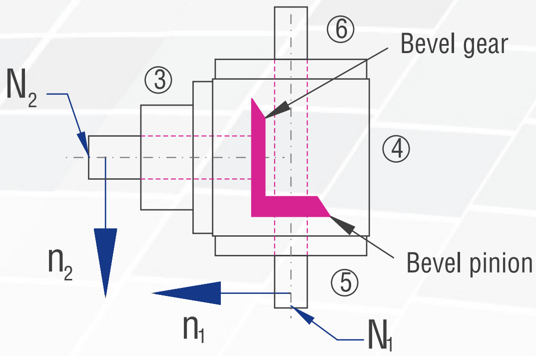


Figure **6.4.3-2; Shaft designations**

6.4.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
VS	090	1.5:1	C0-	1.	1-	1500	/0000
Description	Housing; Table 6.4.5-1	Table 6.4.5-1	Figure 6.4.2-1; Models	Gearbox side on which fixing is made Table 6.2.3-1; Figure 4.3.1-1; Gear-box sides	Gearbox side directed down-wards; Figure 4.3.1-1; Gearbox sides	Slowly rotating shaft; Table 6.4.5-1	Standard

Table **6.4.4-1**

6.4.5 Overview of performance data

Size	n_1 [rpm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]
090	3000	2000	5.51	25	1500	3.80	23
	2400	1600	4.59	26	1200	3.17	24
	1500	1000	3.20	29	750	2.23	27
	1000	667	2.35	32	500	1.65	30
	750	500	1.93	35	375	1.24	30
	500	333	1.36	37	250	0.82	30
	250	167	0.74	40	125	0.41	30
	50	33	0.15	40	25	0.08	30
120	3000	2000	13.45	61	1500	9.26	56
	2400	1600	11.46	65	1200	8.07	61
	1500	1000	8.60	78	750	6.03	73
	1000	667	6.32	86	500	4.40	80
	750	500	5.18	94	375	3.30	80
	500	333	3.70	100	250	2.20	80
	250	167	1.84	100	125	1.10	80
	50	33	0.37	100	25	0.22	80
140	3000	2000	24.91	113	1500	16.53	100
	2400	1600	22.22	126	1200	14.68	111
	1500	1000	17.08	155	750	11.41	138
	1000	667	12.87	175	500	8.38	152
	750	500	10.47	190	375	6.86	166
	500	333	7.34	200	250	4.96	180
	250	167	3.76	204	125	2.48	180
	50	33	0.76	210	25	0.50	180
160	3000	2000	40.78	185	1500	28.11	170
	2400	1600	36.15	205	1200	25.53	193
	1500	1000	27.78	252	750	20.25	245
	1000	667	20.59	280	500	14.88	270
	750	500	16.26	295	375	11.57	280
	500	333	11.56	315	250	8.27	300
	250	167	6.07	330	125	4.41	320
	50	33	1.29	355	25	0.88	320
200	3000	2000	72.75	330	1500	51.25	310
	2400	1600	63.49	360	1200	45.24	342
	1500	1000	48.17	437	750	35.13	425
	1000	667	37.13	505	500	27.56	500
	750	500	30.31	550	375	21.90	530
	500	333	22.02	600	250	14.60	530
	250	167	11.04	600	125	7.30	530
	50	33	2.18	600	25	1.46	530
230	3000	2000	99.20	450	1500	87.63	530
	2400	1600	91.35	518	1200	80.02	605
	1500	1000	72.20	655	750	59.11	715
	1000	667	56.21	765	500	45.19	820
	750	500	45.47	825	375	36.79	890
	500	333	33.79	920	250	26.73	970
	250	167	20.57	1120	125	16.88	1225
	50	33	4.89	1330	25	3.66	1330
260	3000	2000	189.58	860	1500	133.92	810
	2400	1600	158.72	900	1200	112.43	850
	1500	1000	104.71	950	750	78.53	950
	1000	667	73.50	1000	500	57.87	1050
	750	500	55.11	1000	375	48.36	1170
	500	333	36.70	1000	250	33.07	1200
	250	167	18.40	1000	125	16.53	1200
	50	33	3.64	1000	25	3.31	1200

Table **6.4.5-1**

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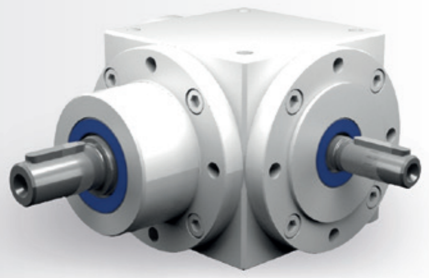
6.4.6 Type VS 090 – Type V with step-up ratio

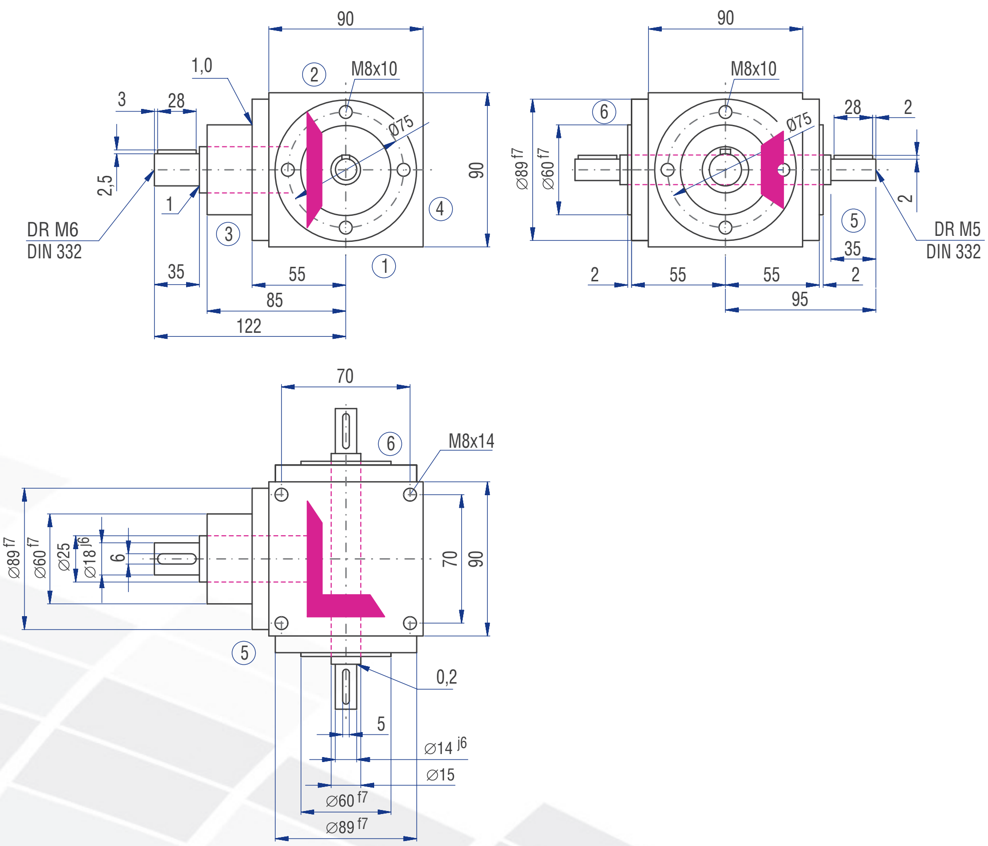


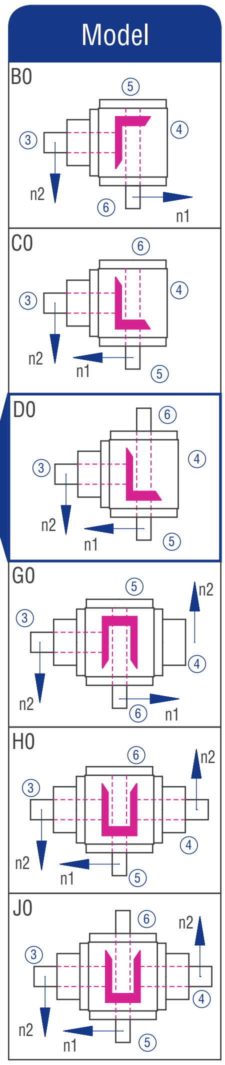
Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	5.51	25	1500	3.80	23
2400	1600	4.59	26	1200	3.17	24
1500	1000	3.20	29	750	2.23	27
1000	667	2.35	32	500	1.65	30
750	500	1.93	35	375	1.24	30
500	333	1.36	37	250	0.82	30
250	167	0.74	40	125	0.41	30
50	33	0.15	40	25	0.08	30
P_{1Nt} [kW]	3.8			3.8		
T_{2max} [Nm]	40			30		





Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	300	150	400	200	470	235	580	290	700	350	800	400
> 30	250	125	330	165	390	195	490	245	590	295	670	335

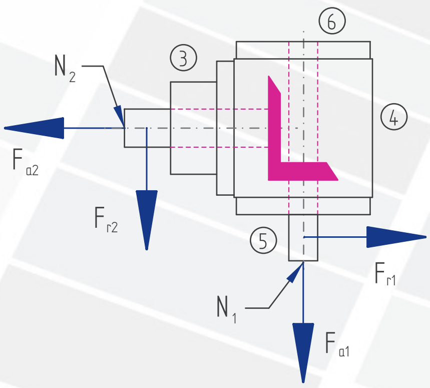
Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 20	390	195	510	255	620	310	730	365	960	480	1150	575
> 20	320	160	420	210	510	255	610	305	800	400	960	480

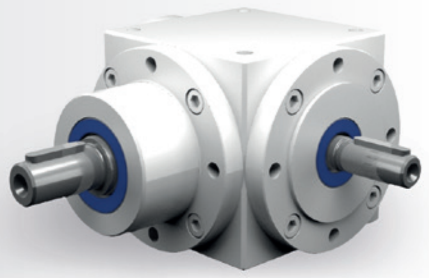
Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²] 1.5:1	Inertia moment [kgcm²] 2:1	Mass ca. [kg]
BO	2.40750	1.82000	5.1
CO	2.40750	1.82000	5.1
DO	2.45250	1.90000	5.1
GO	4.20750	3.12000	6.6
HO	4.20750	3.12000	6.6
JO	4.25250	3.20000	6.6



6.4.7 Type VS 120 – Type V with step-up ratio



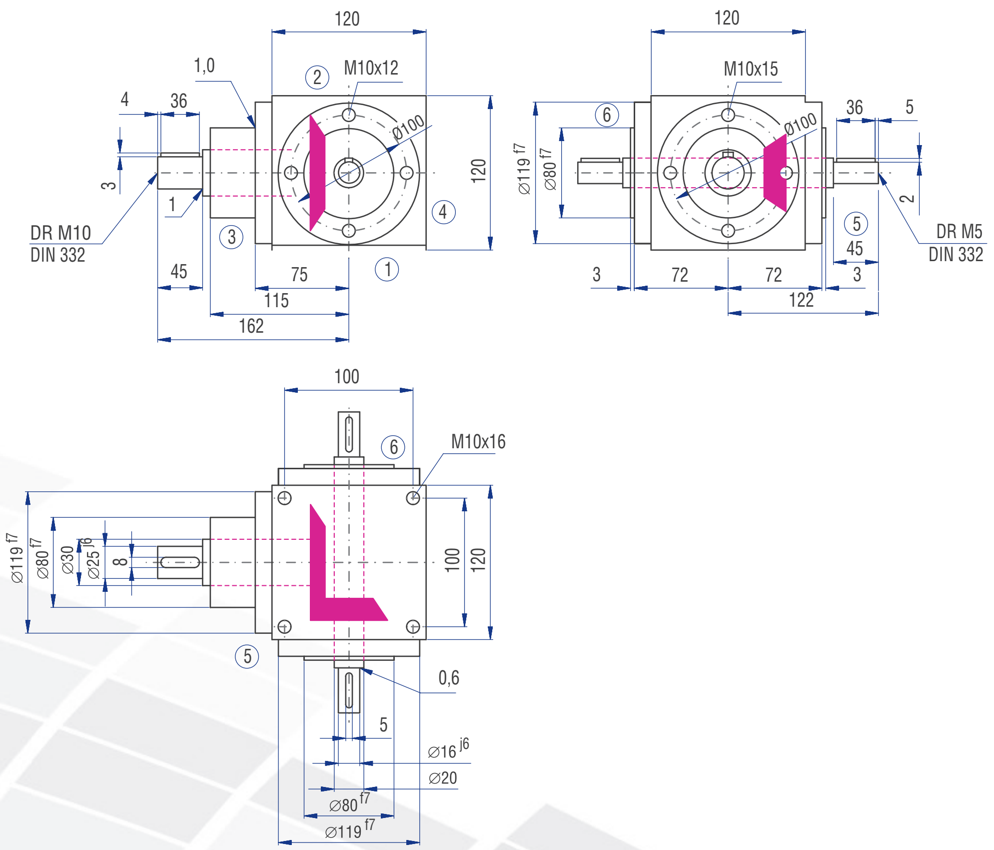
Characteristics

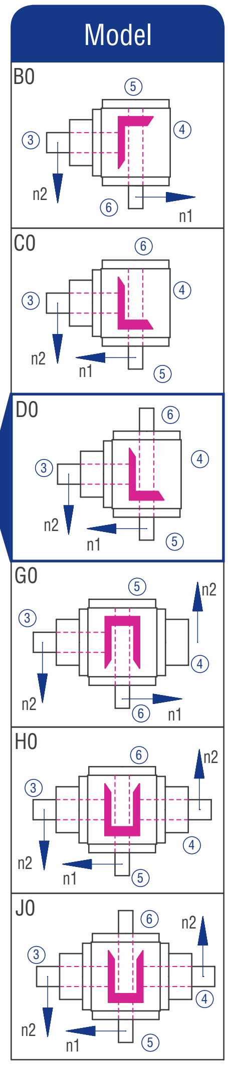
Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	13.45	61	1500	9.26	56
2400	1600	11.46	65	1200	8.07	61
1500	1000	8.60	78	750	6.03	73
1000	667	6.32	86	500	4.40	80
750	500	5.18	94	375	3.30	80
500	333	3.70	100	250	2.20	80
250	167	1.84	100	125	1.10	80
50	33	0.37	100	25	0.22	80

	1.5:1	2:1
P_{1Nt} [kW]	6.2	6.2
T_{2max} [Nm]	100	80





Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	470	235	620	310	720	360	900	450	1150	575	1400	700
> 80	390	195	520	260	600	300	750	375	960	480	1170	585

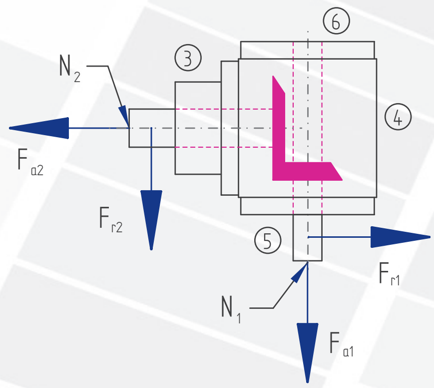
Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 60	580	290	770	385	960	480	1150	575	1460	730	1690	845
> 60	480	240	640	320	800	400	960	480	1220	610	1410	705

Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm^2]		Mass ca.[kg]
	1.5:1	2:1	
BO	9.60000	9.80000	11.5
CO	9.60000	9.80000	11.5
DO	9.70000	9.90000	11.5
GO	16.3000	16.4000	15.0
HO	16.3000	16.4000	15.0
JO	16.4000	16.5000	15.0



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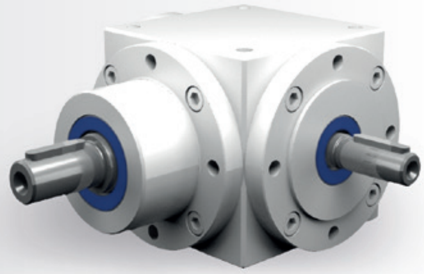
6.4.8 Type VS 140 – Type V with step-up ratio

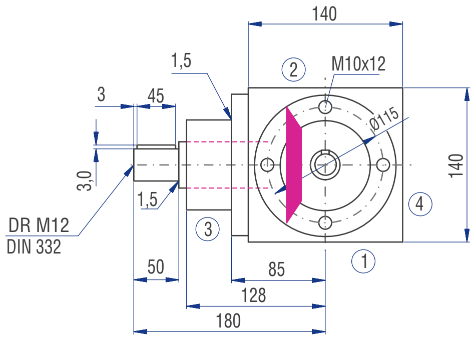


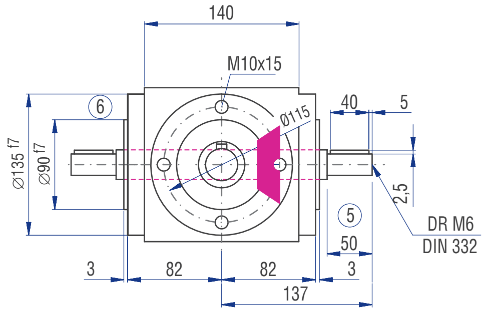
Characteristics

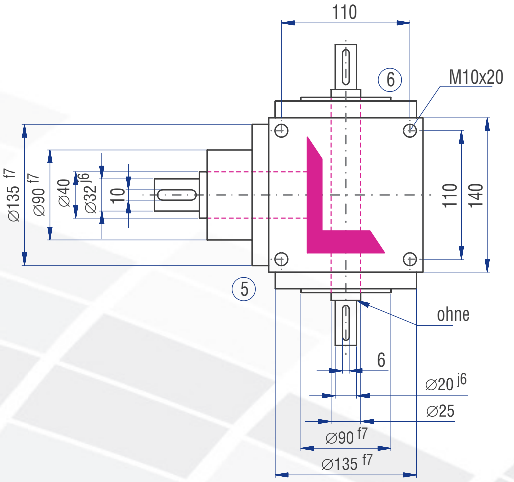
Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

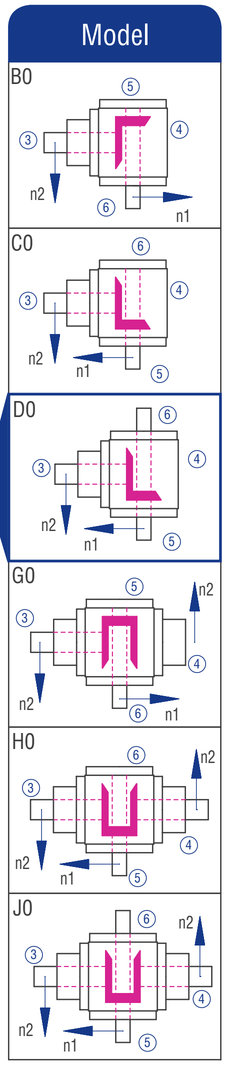
Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	24.91	113	1500	16.53	100
2400	1600	22.22	126	1200	14.68	111
1500	1000	17.08	155	750	11.41	138
1000	667	12.87	175	500	8.38	152
750	500	10.47	190	375	6.86	166
500	333	7.34	200	250	4.96	180
250	167	3.76	204	125	2.48	180
50	33	0.76	210	25	0.50	180
P_{1Nt} [kW]	10.0			10.0		
T_{2max} [Nm]	210			180		









Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	700	350	870	435	1150	575	1370	685	1700	850	2000	1000
> 140	590	295	730	365	960	480	1140	570	1420	710	1670	835

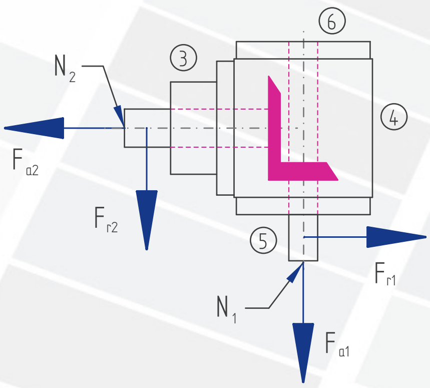
Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 90	1210	605	1750	875	2020	1010	2230	1115	3010	1505	3540	1770
> 90	1010	505	1460	730	1680	840	1860	930	2500	1250	2950	1475

Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²]		Mass ca.[kg]
	1.5:1	2:1	
BO	29.8000	24.2000	18.5
CO	29.8000	24.2000	18.5
DO	30.0000	24.2000	18.8
GO	49.1000	41.4000	22.7
HO	49.1000	41.4000	22.7
JO	49.4000	41.4000	23.0



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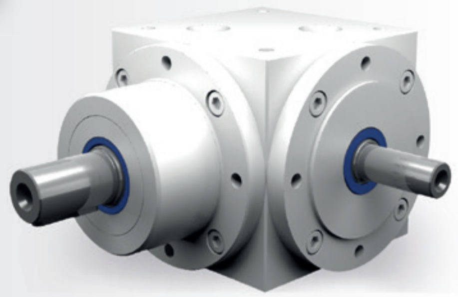
6.4.9 Type VS 160 – Type V with step-up ratio



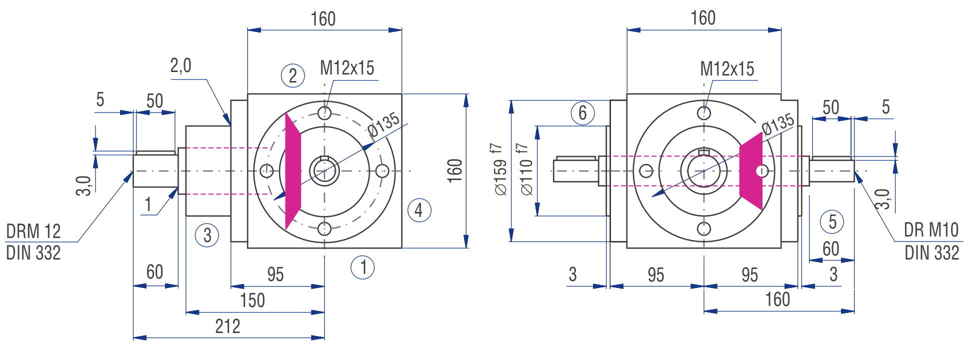
Characteristics

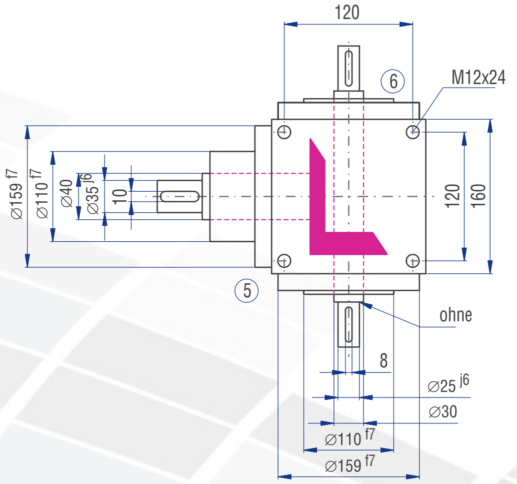
Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

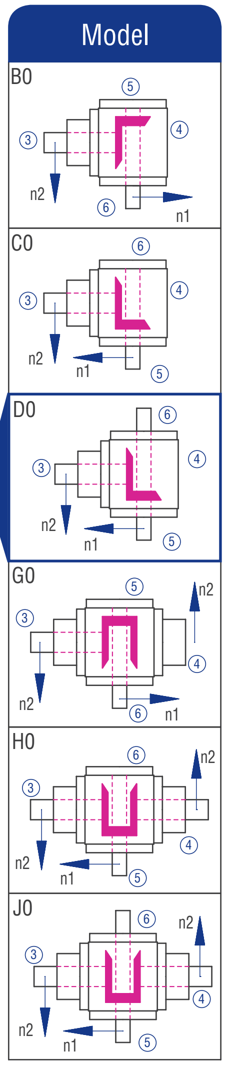
Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	40.78	185	1500	28.11	170
2400	1600	36.15	205	1200	25.53	193
1500	1000	27.78	252	750	20.25	245
1000	667	20.59	280	500	14.88	270
750	500	16.26	295	375	11.57	280
500	333	11.56	315	250	8.27	300
250	167	6.07	330	125	4.41	320
50	33	1.29	355	25	0.88	320

	1.5:1	2:1
P_{1Nt} [kW]	15.0	15.0
T_{2max} [Nm]	360	320







Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	1200	600	1600	800	1900	950	2200	1100	2850	1425	3300	1650
> 220	1000	500	1340	670	1590	795	1840	920	2380	1190	2750	1375

Permissible radial force Fr1 and axial force Fa1 on shaft N1

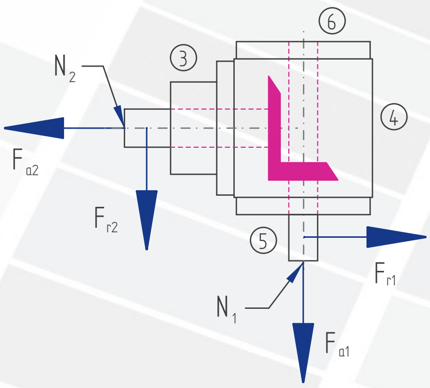
n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 150	1670	835	2330	1165	2750	1375	3330	1665	4170	2085	5420	2710
> 150	1390	695	1940	970	2290	1145	2780	1390	3470	1735	4510	2255

Inertia moments/mass

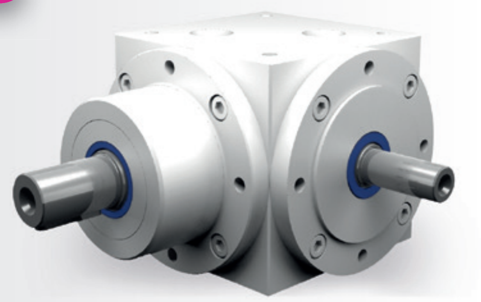
Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²] 1.5:1	Inertia moment [kgcm²] 2:1
B0	67.0000	56.0000
C0	67.0000	56.0000
D0	68.0000	57.0000
G0	110.000	99.0000
H0	110.000	99.0000
J0	111.000	100.000

Mass ca.[kg]
27.0
27.0
27.4
33.5
33.5
33.9



6.4.10 Type VS 200 – Type V with step-up ratio



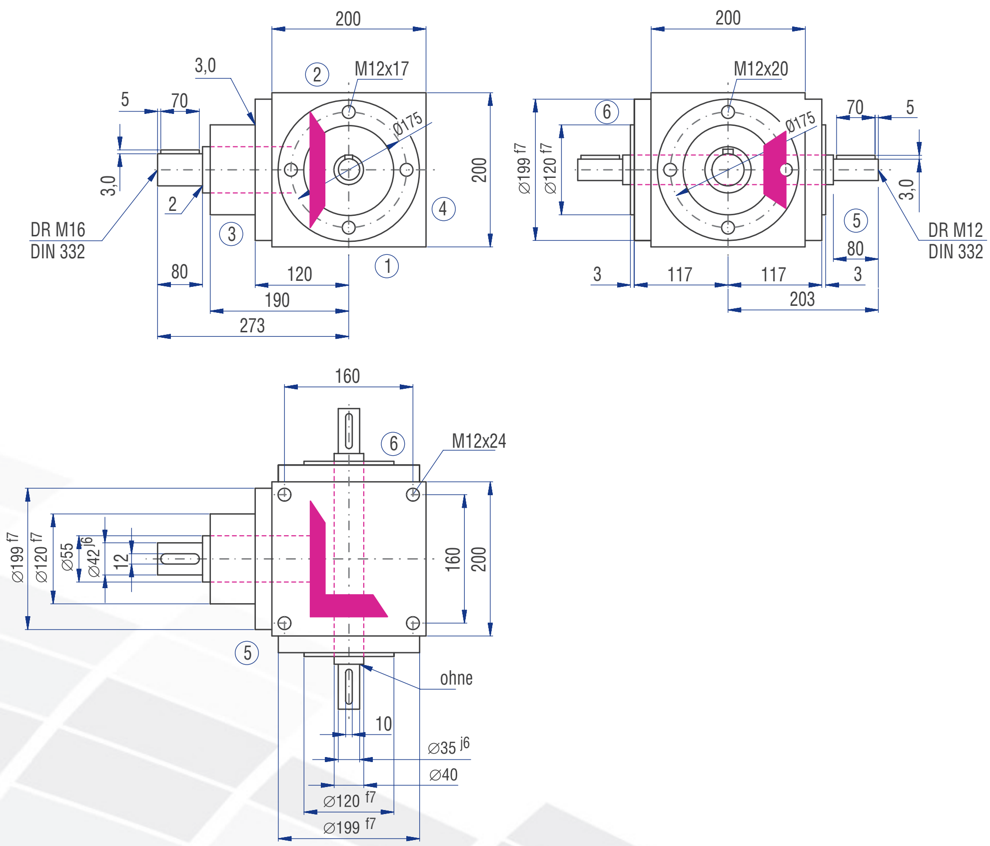
Characteristics

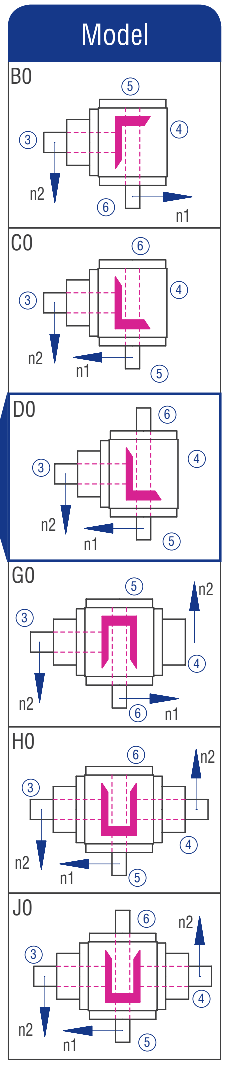
Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	72.75	330	1500	51.25	310
2400	1600	63.49	360	1200	45.24	342
1500	1000	48.17	437	750	35.13	425
1000	667	37.13	505	500	27.56	500
750	500	30.31	550	375	21.90	530
500	333	22.02	600	250	14.60	530
250	167	11.04	600	125	7.30	530
50	33	2.18	600	25	1.46	530

	1.5:1	2:1
P_{1Nt} [kW]	26.0	26.0
T_{2max} [Nm]	600	530





Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 500	2200	1100	1700	850	3200	1600	3900	1950	5000	2500	6200	3100
> 500	1840	920	1420	710	2670	1335	3250	1625	4170	2085	5170	2585

Permissible radial force Fr1 and axial force Fa1 on shaft N1

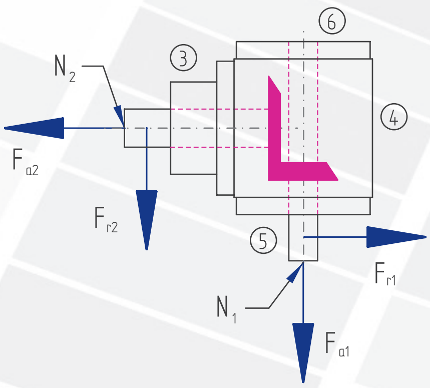
n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 350	2670	1335	3580	1790	4170	2085	5420	2710	6670	3335	8330	4165
> 350	2220	1110	2990	1495	3470	1735	4510	2255	5560	2780	6940	3470

Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²]	
	1.5:1	2:1
BO	225.000	235.000
CO	225.000	235.000
DO	227.000	239.000
GO	367.000	419.000
HO	367.000	419.000
JO	369.000	423.000

Mass ca.[kg]
48.0
48.0
50.0
58.0
58.0
60.0



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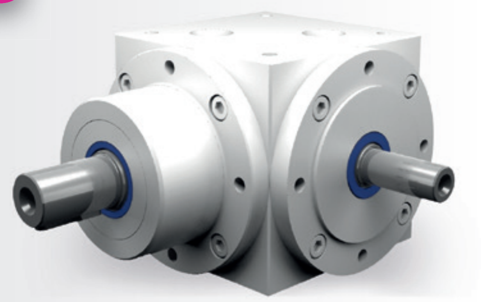
6.4.11 Type VS 230 – Type V with step-up ratio



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	99.20	450	1500	87.63	530
2400	1600	91.35	518	1200	80.02	605
1500	1000	72.20	655	750	59.11	715
1000	667	56.21	765	500	45.19	820
750	500	45.47	825	375	36.79	890
500	333	33.79	920	250	26.73	970
250	167	20.57	1,120	125	16.88	1,225
50	33	4.89	1,330	25	3.66	1,330

	1.5:1	2:1
P_{1Nt} [kW]	34.0	34.0
T_{2max} [Nm]	1400	1400

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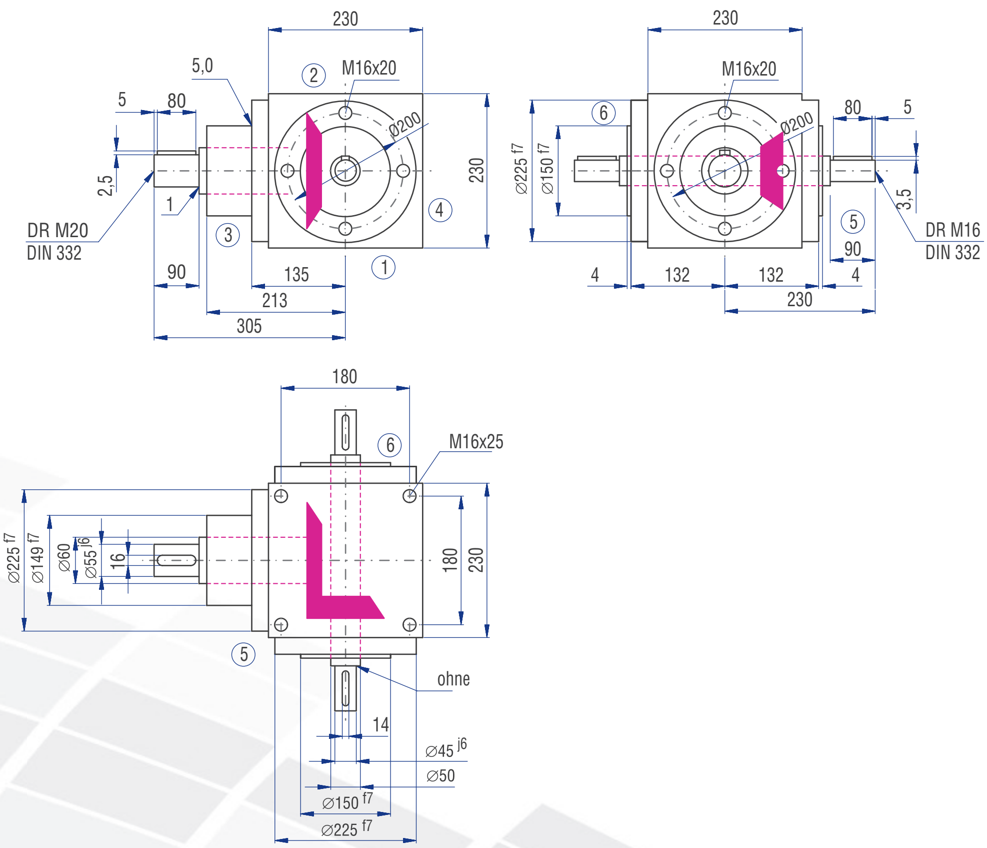
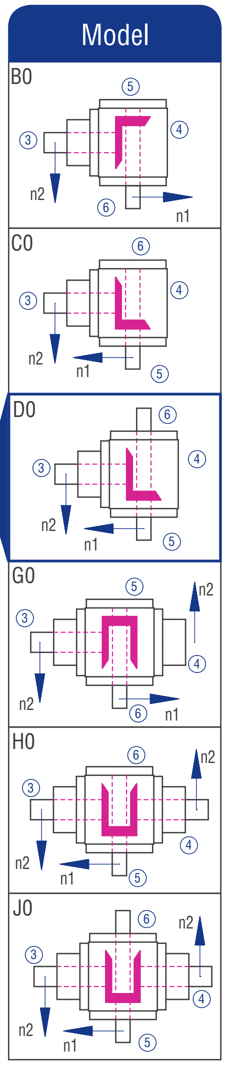




Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	4600	2300	5150	2575	7200	3600	9450	4725	11250	5625	13100	6550
> 750	3832	1916	4290	2145	6000	3000	7876	3938	9376	4688	10918	5459

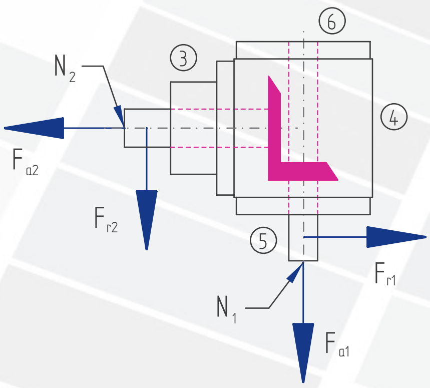
Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
Not specified												

Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²] 1.5:1	Inertia moment [kgcm²] 2:1	Mass ca. [kg]
B0	440.000	528.000	75.0
C0	440.000	528.000	75.0
D0	442.000	532.000	77.0
G0	661.000	749.000	98.0
H0	661.000	749.000	98.0
J0	663.000	753.000	100.0



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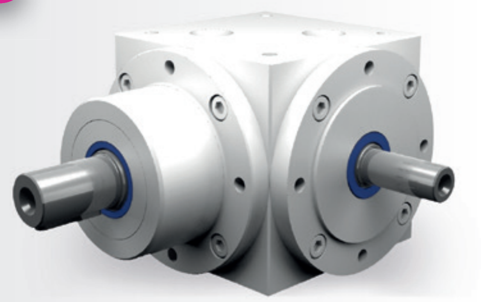
6.4.12 Type VS 260 – Type V with step-up ratio



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1.5:1 to 2:1	
Housing / Flanges	Grey cast iron; steel	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Not deliverable	
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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricant	Synthetic lubricants	See chapter 6.2.8

Performance data

n_1 [rpm]	1.5:1			2:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	2000	189.58	860	1500	133.92	810
2400	1600	158.72	900	1200	112.43	850
1500	1000	104.71	950	750	78.53	950
1000	667	73.50	1,000	500	57.87	1,050
750	500	55.11	1,000	375	48.36	1,170
500	333	36.70	1,000	250	33.07	1,200
250	167	18.40	1,000	125	16.53	1,200
50	33	3.64	1,000	25	3.31	1,200

	1.5:1	2:1
P_{1Nt} [kW]	42.0	42.0
T_{2max} [Nm]	1000	1200

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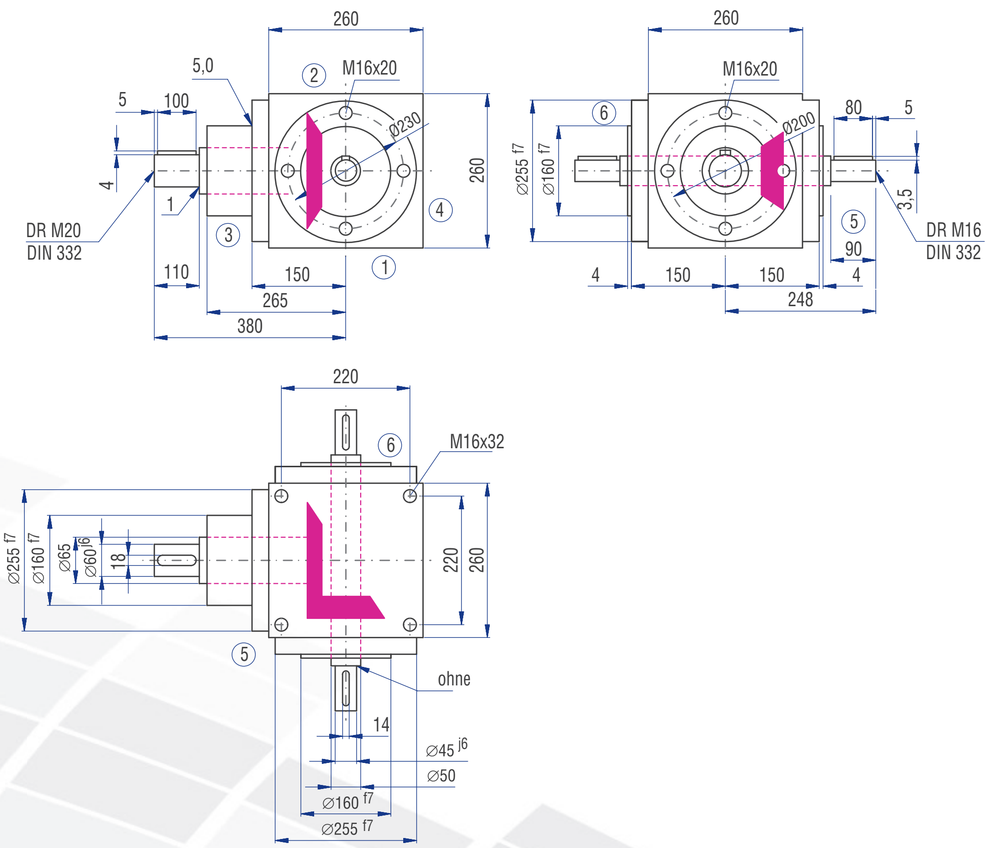
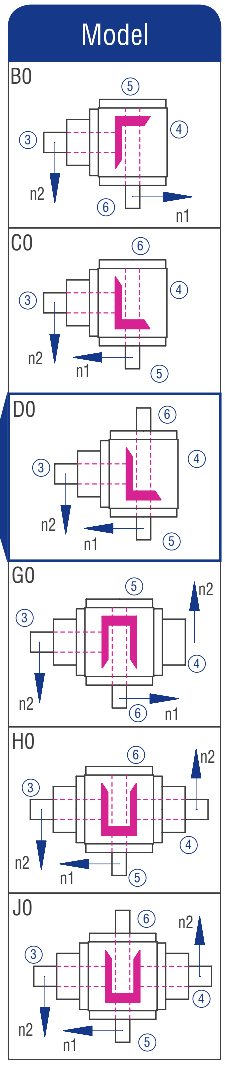




Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	1500		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	4600	2300	5150	2575	7200	3600	9450	4725	11250	5625	13100	6550
> 750	3832	1916	4290	2145	6000	3000	7876	3938	9376	4688	10918	5459

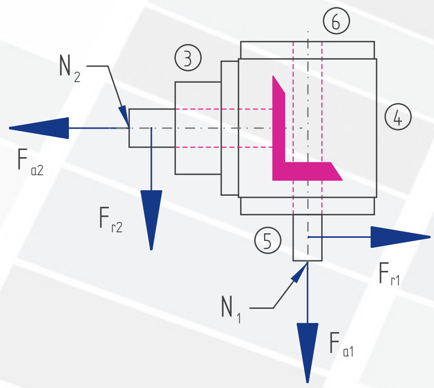
Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1000		500		250		100		50	
T_{1N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 650	7010	3505	10900	5450	13000	6500	15000	7500	18000	9000	22000	11000
> 650	5840	2920	9080	4540	10800	5400	12500	6250	15000	7500	18000	9000

Inertia moments/mass

Inertia moment J_2 related to the slowly rotating shaft (N_2)

Model	Inertia moment [kgcm²]		Mass ca. [kg]
	1.5:1	2:1	
BO	810.000	751.000	83.0
CO	810.000	751.000	83.0
DO	818.000	763.000	84.5
GO	1344.000	1366.000	107.0
HO	1344.000	1366.000	107.0
JO	1354.000	1378.000	108.5

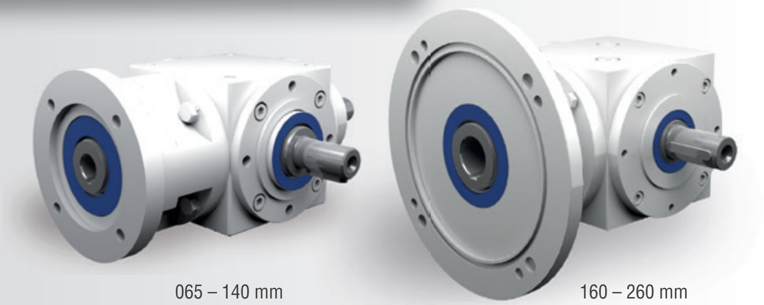


ATEK ANTRIEBSTECHNIK

6.5 Type VL – Type V with flange for motor mounting

6.5.1 Features

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 2310 Nm
8 gearbox sizes with edge lengths of 065 to 260 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron or steel



065 – 140 mm

160 – 260 mm

6.5.2 Models

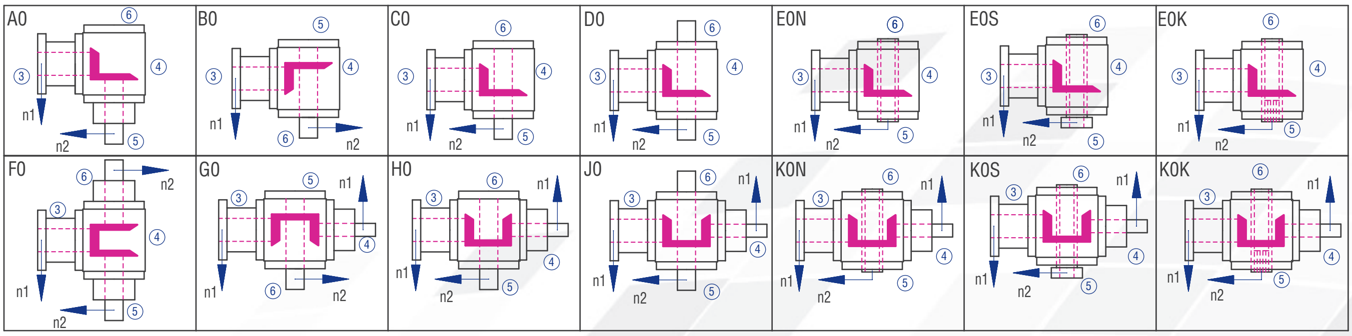


Figure **6.5.2-1; Models**

6.5.3 Gearbox sides

The example shows the Model C0

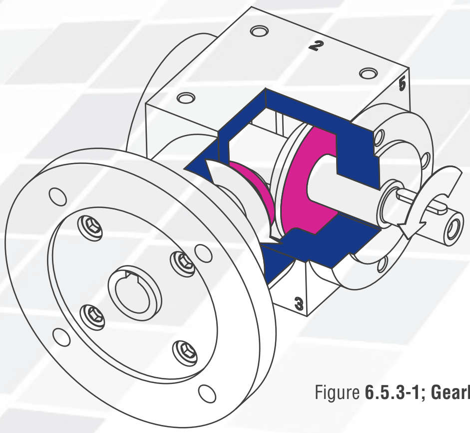


Figure **6.5.3-1; Gearbox sides**

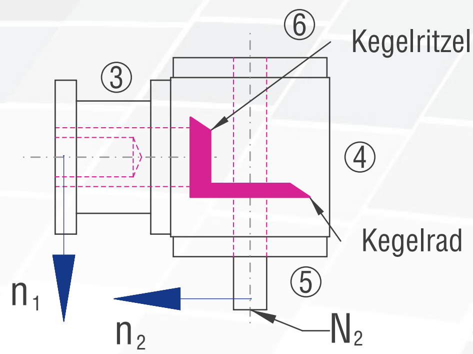


Figure **6.5.3-2; Shaft designations**

6.5.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
VL	065	1:1	C0-	1.	1-	1500	/0000
Description	Size Table 6.5.5-1	Table 6.5.5-1	Figure 6.5.2-1	Gearbox side on which fixing is made; Table 6.2.3-1; Figure 4.3.1-1; Gearbox sides	Gearbox side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 6.5.5-1	Standard
	D120	/14x30					
	Flange diameter	Shaft diameter x length					

Table **6.5.4-1**

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6.5.5 Overview of performance data

P1 [kW]	n2 [rpm]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	i [-]	IEC motor	Gearbox size	P1NT [kW]
0.12	1340	0.81	11	25	1:1	063A-4	065	1.6
	893	1.22	11	25	1.5:1	063A-4	065	1.6
	670	1.62	11	25	2:1	063A-4	065	1.6
	593	1.84	13	25	1.5:1	063B-6	065	1.6
	447	2.44	11	23	3:1	063A-4	065	1.6
	296	3.68	12	23	3:1	063B-6	065	1.6
0.18	2680	0.61	10	25	1:1	063A-2	065	1.6
	1787	0.91	10	25	1.5:1	063A-2	065	1.6
	1340	1.22	10	25	1:1	063B-4	065	1.6
	893	1.83	10	25	1.5:1	063B-4	065	1.6
	670	2.44	10	25	2:1	063B-4	065	1.6
	593	2.75	10	25	1.5:1	071A-6	065	1.6
	450	3.63	11	23	3:1	063B-4	065	1.6
	445	3.67	10	25	2:1	071A-6	065	1.6
	335	4.87	27	70	4:1	063B-4	090	3.8
	296	5.52	11	23	3:1	071A-6	065	1.6
	268	6.09	27	60	5:1	063B-4	090	3.8
	224	7.29	25	50	6:1	063B-4	090	3.8
	178	9.17	31	60	5:1	071A-6	090	3.8
	167	9.75	32	70	4:1	080A-8	090	3.8
	148	11.03	29	50	6:1	071A-6	090	3.8
	112	14.58	30	50	6:1	080A-8	090	3.8
0.25	2700	0.84	10	25	1:1	063B-2	065	1.6
	1800	1.26	10	25	1.5:1	063B-2	065	1.6
	1350	1.68	10	25	1:1	071A-4	065	1.6
	890	2.55	10	25	1:1	071B-6	065	1.6
	675	3.36	10	25	2:1	071A-4	065	1.6
	540	4.20	23	60	5:1	063B-2	090	3.8
	450	5.04	27	70	3:1	071A-4	090	3.8
	450	5.04	11	25	3:1	071A-4	065	1.6
	337	6.72	27	70	4:1	071A-4	090	3.8
	296	7.65	31	70	3:1	071B-6	090	3.8
	270	8.40	27	60	5:1	071A-4	090	3.8
	225	10.08	25	50	6:1	071A-4	090	3.8
	178	12.74	31	60	5:1	071B-6	090	3.8
	148	15.33	29	50	6:1	071B-6	090	3.8
	134	16.93	32	60	5:1	080B-8	090	3.8
	112	20.25	30	50	6:1	080B-8	090	3.8
0.37	2800	1.20	10	25	1:1	071A-2	065	1.6
	1400	2.40	10	25	2:1	071A-2	065	1.6
	1350	2.49	10	25	1:1	071B-4	065	1.6
	933	3.60	10	23	3:1	071A-2	065	1.6
	900	3.73	29	40	1.5:1	071B-4	090	3.8
	675	4.97	10	25	2:1	071B-4	065	1.6
	675	4.97	27	30	2:1	071B-4	090	3.8
	600	5.59	32	40	1.5:1	080A-6	090	3.8
	560	5.99	23	60	5:1	071A-2	090	3.8
	450	7.46	27	70	3:1	071B-4	090	3.8
	337	9.95	27	70	4:1	071B-4	090	3.8
	270	12.43	27	60	5:1	071B-4	090	3.8
	225	14.92	25	50	6:1	071B-4	090	3.8
	180	18.65	31	60	5:1	080A-6	090	3.8
	150	22.38	29	50	6:1	080A-6	090	3.8
0.55	2810	1.78	10	25	1:1	071B-2	065	1.6
	1873	2.66	10	23	1.5:1	071B-2	065	1.6
	1405	3.55	10	25	2:1	071B-2	065	1.6
	936	5.33	10	23	3:1	071B-2	065	1.6
	936	5.33	23	70	3:1	071B-2	090	3.8
	906	5.50	29	40	1.5:1	080A-4	090	3.8
	702	7.10	23	70	4:1	071B-2	090	3.8
	680	7.34	27	30	2:1	080A-4	090	3.8
	600	8.32	32	40	1.5:1	080B-6	090	3.8
	562	8.88	23	60	5:1	071B-2	090	3.8
	453	11.01	27	70	3:1	080A-4	090	3.8
	340	14.68	27	70	4:1	080A-4	090	3.8
	300	16.63	31	70	3:1	080B-6	090	3.8
	272	18.35	72	140	5:1	080A-4	120	6.2
	227	21.98	25	50	6:1	080A-4	090	3.8
	180	27.72	31	60	5:1	080B-6	090	3.8
	172	28.93	82	155	4:1	090L-8	120	6.2
	150	33.27	67	120	6:1	080B-6	120	6.2
	138	36.16	86	140	5:1	090L-8	120	6.2
	115	43.39	69	120	6:1	090L-8	120	6.2

P1 [kW]	n2 [rpm]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	i [-]	IEC motor	Gearbox size	P1NT [kW]
0.75	1880	3.62	25	40	1.5:1	080A-2	090	3.8
	1410	4.83	23	30	2:1	080A-2	090	3.8
	1360	5.00	32	105	1:1	080B-4	090	3.8
	940	7.24	23	70	3:1	080A-2	090	3.8
	906	7.50	29	40	1.5:1	080B-4	090	3.8
	705	9.65	23	70	4:1	080A-2	090	3.8
	680	10.01	27	30	2:1	080B-4	090	3.8
	606	11.22	86	100	1.5:1	090S-6	120	6.2
	564	12.06	27	60	5:1	080A-2	090	3.8
	453	15.01	27	70	3:1	080B-4	090	3.8
	340	20.01	27	70	4:1	080B-4	090	3.8
	303	22.43	82	155	3:1	090S-6	120	6.2
	272	25.02	72	140	5:1	080B-4	120	6.2
	227	29.98	64	120	6:1	080B-4	120	6.2
	182	37.39	80	140	5:1	090S-6	120	6.2
	152	44.77	67	113	6:1	090S-6	120	6.2
	138	49.31	86	140	5:1	100LA-8	120	6.2
	115	59.17	69	118	6:1	100LA-8	120	6.2
1.1	2820	3.54	27	105	1:1	080B-2	090	3.8
	1880	5.31	25	40	1.5:1	080B-2	090	3.8
	1410	7.08	23	30	2:1	080B-2	090	3.8
	940	10.62	23	70	3:1	080B-2	090	3.8
	920	10.85	78	100	1.5:1	090S-4	120	6.2
	705	14.16	23	70	4:1	080B-2	090	3.8
	690	14.46	73	80	2:1	090S-4	120	6.2
	606	16.45	86	100	1.5:1	090L-6	120	6.2
	564	17.69	60	140	5:1	080B-2	120	6.2
	460	21.70	74	155	3:1	090S-4	120	6.2
	345	28.93	74	155	4:1	090S-4	120	6.2
	303	32.90	82	155	3:1	090L-6	120	6.2
	276	36.16	72	140	5:1	090S-4	120	6.2
	227	43.87	79	155	4:1	090L-6	120	6.2
	182	54.83	80	140	5:1	090L-6	120	6.2
	152	65.66	67	120	6:1	090L-6	120	6.2
	138	72.32	86	140	5:1	100LB-8	120	6.2
1.5	1420	9.58	56	80	2:1	090S-2	120	6.2
	946	14.38	58	155	3:1	090S-2	120	6.2
	920	14.79	78	100	1.5:1	090L-4	120	6.2
	710	19.17	60	155	4:1	090S-2	120	6.2
	690	19.72	73	80	2:1	090L-4	120	6.2
	613	22.19	78	100	1.5:1	100LA-6	120	6.2
	568	23.96	60	140	5:1	090S-2	120	6.2
	460	29.58	74	155	3:1	090L-4	120	6.2
	345	39.45	74	155	4:1	090L-4	120	6.2
	306	44.38	82	155	3:1	100LA-6	120	6.2
	276	49.31	72	140	5:1	090L-4	120	6.2
	230	59.17	64	120	6:1	090L-4	120	6.2
	184	73.96	80	140	5:1	100LA-6	120	6.2
	154	88.37	113	200	6:1	100LA-6	140	10
	140	97.21	130	250	5:1	112M-8	140	10
	117	116.31	118	200	6:1	112M-8	140	10
2.2	1893	10.54	61	100	1.5:1	090L-2	120	6.2
	1420	14.06	56	80	2:1	090L-2	120	6.2
	940	21.23	78	100	1.5:1	100LA-4	120	6.2
	710	28.11	60	155	4:1	090L-2	120	6.2
	626	31.85	80	100	1.5:1	112M-6	120	6.2
	568	35.14	60	140	5:1	090L-2	120	6.2
	470	42.47	74	155	3:1	100LA-4	120	6.2
	352	56.62	74	155	4:1	100LA-4	120	6.2
	313	63.70	82	155	3:1	112M-6	120	6.2
	188	106.17	124	250	5:1	112M-6	140	10
	157	127.13	165	200	6:1	112M-6	160	15
	141	141.56	240	420	5:1	132SB-8	160	15
	118	169.15	178	200	6:1	132SB-8	160	15

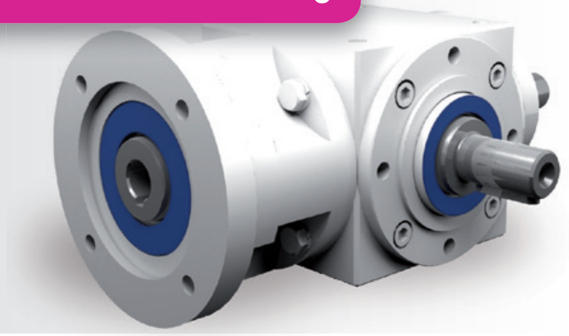
Table **6.5.5-1**

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
3	1880	3.62	25	40	1.5:1	080A-2	090	3.8
	1410	4.83	23	30	2:1	080A-2	090	3.8
	1360	5.00	32	105	1:1	080B-4	090	3.8
	940	7.24	23	70	3:1	080A-2	090	3.8
	906	7.50	29	40	1.5:1	080B-4	090	3.8
	705	9.65	23	70	4:1	080A-2	090	3.8
	680	10.01	27	30	2:1	080B-4	090	3.8
	606	11.22	86	100	1.5:1	090S-6	120	6.2
	564	12.06	27	60	5:1	080A-2	090	3.8
	453	15.01	27	70	3:1	080B-4	090	3.8
	340	20.01	27	70	4:1	080B-4	090	3.8
	303	22.43	82	155	3:1	090S-6	120	6.2
	272	25.02	72	140	5:1	080B-4	120	6.2
	227	29.98	64	120	6:1	080B-4	120	6.2
	182	37.39	80	140	5:1	090S-6	120	6.2
	152	44.77	67	113	6:1	090S-6	120	6.2
4	138	49.31	86	140	5:1	100LA-8	120	6.2
	115	59.17	69	118	6:1	100LA-8	120	6.2
	2820	3.54	27	105	1:1	080B-2	090	3.8
	1880	5.31	25	40	1.5:1	080B-2	090	3.8
	1410	7.08	23	30	2:1	080B-2	090	3.8
	940	10.62	23	70	3:1	080B-2	090	3.8
	920	10.85	78	100	1.5:1	090S-4	120	6.2
	705	14.16	23	70	4:1	080B-2	090	3.8
	690	14.46	73	80	2:1	090S-4	120	6.2
	606	16.45	86	100	1.5:1	090L-6	120	6.2
	564	17.69	60	140	5:1	080B-2	120	6.2
	460	21.70	74	155	3:1	090S-4	120	6.2
	345	28.93	74	155	4:1	090S-4	120	6.2
	303	32.90	82	155	3:1	090L-6	120	6.2
	276	36.16	72	140	5:1	090S-4	120	6.2
	227	43.87	79	155	4:1	090L-6	120	6.2
5.5	182	54.83	80	140	5:1	090L-6	120	6.2
	152	65.66	67	120	6:1	090L-6	120	6.2
	138	72.32	86	140	5:1	100LB-8	120	6.2
	1420	9.58	56	80	2:1	090S-2	120	6.2
	946	14.38	58	155	3:1	090S-2	120	6.2
	920	14.79	78	100	1.5:1	090L-4	120	6.2
	710	19.17	60	155	4:1	090S-2	120	6.2
	690	19.72	73	80	2:1	090L-4	120	6.2
	613	22.19	78	100	1.5:1	100LA-6	120	6.2
	568	23.96	60	140	5:1	090S-2	120	6.2
	460	29.58	74	155	3:1	090L-4	120	6.2
	345	39.45	74	155	4:1	090L-4	120	6.2
	306	44.38	82	155	3:1	100LA-6	120	6.2
	276	49.31	72	140	5:1	090L-4	120	6.2
	230	59.17	64	120	6:1	090L-4	120	6.2
	184	73.96	80	140	5:1	100LA-6	120	6.2
	154	88.37	113	200	6:1	100LA-6	140	10
	140	97.21	130	250	5:1	112M-8	140	10
7.5	117	116.31	118	200	6:1	112M-8	140	10
	1893	10.54	61	100	1.5:1	090L-2	120	6.2
	1420	14.06	56	80	2:1	090L-2	120	6.2
	940	21.23	78	100	1.5:1	100LA-4	120	6.2
	710	28.11	60	155	4:1	090L-2	120	6.2
	626	31.85	80	100	1.5:1	112M-6	120	6.2
	568	35.14	60	140	5:1	090L-2	120	6.2
	470	42.47	74	155	3:1	100LA-4	120	6.2
	352	56.62	74	155	4:1	100LA-4	120	6.2
	313	63.70	82	155	3:1	112M-6	120	6.2
	188	106.17	124	250	5:1	112M-6	140	10
	157	127.13	165	200	6:1	112M-6	160	15
	141	141.56	240	420	5:1	132SB-8	160	15
	118	169.15	178	200	6:1	132SB-8	160	15
	240	283.5	485	860	4:1	160MB-6	200	26
	192	354.4	420	860	5:1	160MB-6	200	26
	160	425.3	540	1000	6:1	160MB-6	230	34
	144	472.5	1100	1910	5:1	160LB-8	260	42
	144	472.5	770	1200	5:1	160LB-8	230	34

Table **6.5.5-1**

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
9	2910	28.06	120	430	1:1	132MA-2	140	10
	1940	42.09	113	210	1.5:1	132MA-2	140	10
	1430	57.10	260	660	1:1	132MC-4	160	15
	1430	57.10	162	430	1:1	132MC-4	140	10
	970	84.18	190	457	3:1	132MA-2	160	15
	953	85.65	252	360	1.5:1	132MC-4	160	15
	953	85.65	155	210	1.5:1	132MC-4	140	10
	727	112.24	180	422	4:1	132MA-2	160	15
	715	114.20	138	180	2:1	132MC-4	140	10
	715	114.20	245	320	2:1	132MC-4	160	15
	582	140.30	180	420	5:1	132MA-2	160	15
	476	171.30	230	457	3:1	132MC-4	160	15
	357	228.40	220	422	4:1	132MC-4	160	15
	286	285.50	380	860	5:1	132MC-4	200	26
	238	342.59	490	1000	6:1	132MC-4	230	34
11	1940	51.40	330	600	1.5:1	160MA-2	200	26
	1465	68.10	450	1090	1:1	160MB-4	200	26
	976	102.20	437	600	1.5:1	160MB-4	200	26
	732	136.20	425	530	2:1	160MB-4	200	26
	640	155.90	505	600	1.5:1	160LA-6	200	26
	582	171.50	300	860	5:1	160MA-2	200	26
	488	204.40	515	910	3:1	160MB-4	200	26
	366	272.50	455	860	4:1	160MB-4	200	26
	293	340.60	380	860	5:1	160MB-4	200	26
	240	415.80	485	860	4:1	160LA-6	200	26
	192	519.80	990	1910	5:1	160LA-6	260	42
	182	546.80	1100	1940	4:1	180L-8	260	42
	146	683.50	1100	1910	5:1	180L-8	260	42
15	1953	69.70	330	600	1.5:1	160MB-2	200	26
	1465	92.90	450	1090	1:1	160LA-4	230	34
	1465	92.90	450	1090	1:1	160LA-4	200	26
	976	139.30	437	600	1.5:1	160LA-4	200	26
	732	185.80	425	530	2:1	160LA-4	200	26
	646	210.40	505	600	1.5:1	180L-6	200	26
	586	232.20	300	860	5:1	160MB-2	200	26
	488	278.70	515	910	3:1	160LA-4	200	26
	366	371.60	455	860	4:1	160LA-4	200	26
	293	464.50	880	1910	5:1	160LA-4	260	42
	242	561.18	675	1300	4:1	180L-6	230	34
	242	561.20	1050	1940	4:1	180L-6	260	42
	194	701.50	990	1910	5:1	180L-6	260	42
	146	932.10	1100	1910	5:1	200LB-8	260	42
18.5	1960	85.60	330	600	1.5:1	160L-2	200	26
	1470	114.20	450	1090	1:1	180M-4	200	26
	980	171.30	437	600	1.5:1	180M-4	200	26
	975	172.10	1050	2310	1:1	200LA-6	230	34
	975	172.10	1050	2310	1:1	200LA-6	260	42
	735	228.40	425	530	2:1	180M-4	200	26
	650	258.20	1000	1000	1.5:1	200LA-6	260	42
	588	285.40	300	860	5:1	160L-2	200	26
	490	342.50	515	910	3:1	180M-4	200	26
	490	342.53	366	1000	6:1	160L-2	230	34
	367	456.70	455	860	4:1	180M-4	200	26
	325	516.43	635	1300	3:1	200LA-6	230	34
	325	516.40	990	1940	3:1	200LA-6	260	42
	294	570.90	880	1910	5:1	180M-4	260	42
	294	570.88	635	1200	5:1	180M-4	230	34
	243	690.70	1050	1940	4:1	200LA-6	260	42
	195	860.70	990	1910	5:1	200LA-6	260	42
22	1470	135.80	450	1090	1:1	180L-4	230	34
	1470	135.80	450	1090	1:1	180L-4	200	26
	980	203.70	437	600	1.5:1	180L-4	200	26
	735	271.60	425	530	2:1	180L-4	200	26
	650	307.10	1000	1000	1.5:1	200LB-6	260	42
	590	338.29	510	1200	5:1	180M-2	230	34
	490	407.30	515	910	3:1	180L-4	200	26
	487	409.80	1050	1200	2:1	200LB-6	260	42
	367	543.90	900	1940	4:1	180L-4	260	42
	367	543.12	600	1300	4:1	180L-4	230	34
	294	678.90	880	1910	5:1	180L-4	260	42
	243	821.40	1050	1940	4:1	200LB-6	260	42

6.5.6 Type VL 065 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 3:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

Performance data

n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]	5:1 n_2 [rpm]	5:1 P_{1N} [kW]	5:1 T_{2N} [Nm]	6:1 n_2 [rpm]	6:1 P_{1N} [kW]	6:1 T_{2N} [Nm]
3000	3000	3.31	10	2000	2.20	10	1500	1.65	10	1000	1.10	10									
2400	2400	2.65	10	1600	1.76	10	1200	1.32	10	800	0.88	10									
1500	1500	1.82	11	1000	1.21	11	750	0.91	11	500	0.61	11									
1000	1000	1.32	12	667	0.88	12	500	0.66	12	333	0.44	12									
750	750	1.07	13	500	0.72	13	375	0.54	13	250	0.33	12									
500	500	0.83	15	333	0.55	15	250	0.41	15	167	0.24	13									
250	250	0.47	17	167	0.31	17	125	0.23	17	83	0.12	13									
50	50	0.10	18	33	0.07	18	25	0.05	18	17	0.03	14									

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	1.6	1.6	1.6	1.6			
T_{2max} [Nm]	25	25	25	23			

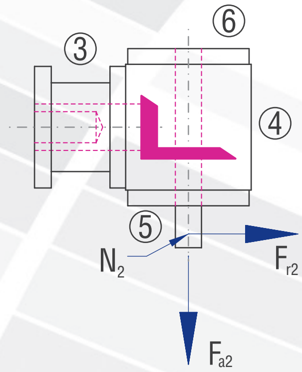
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	300	150	400	200	500	250	650	325	750	375	900	450
> 12	250	125	330	165	420	210	540	270	630	315	750	375

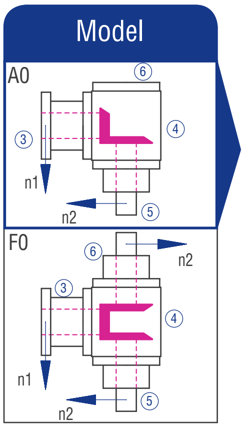
Inertia moments/mass

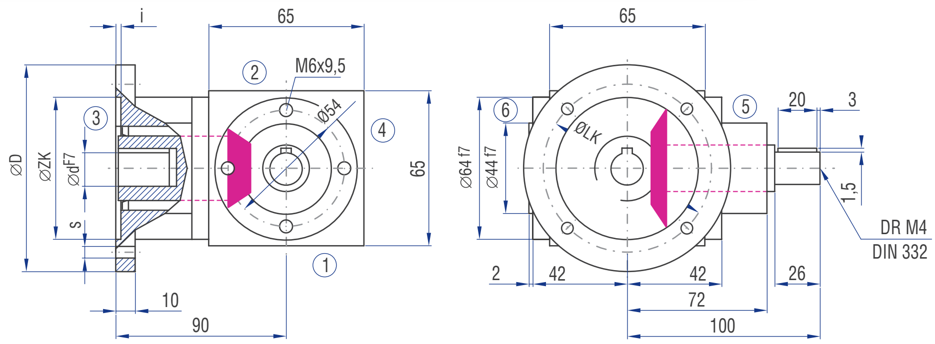
Inertia moment J_1 related to the fast-rotating shaft (N_1)

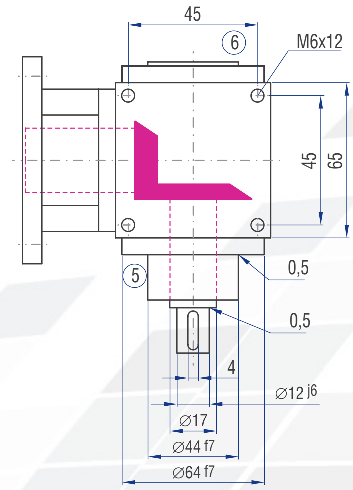
Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	0.62060	0.48590	0.43630	0.37670				3.3
B0	0.65490	0.55640	0.48540	0.37320				3.2
C0	0.65490	0.55640	0.48540	0.37320				3.2
D0	0.66480	0.56080	0.48790	0.37430				3.3
E0N	0.70720	0.60870	0.53770	0.42550				3.1
E0S	0.83300	0.73450	0.66350	0.55130				3.1
F0	0.81500	0.57230	0.48490	0.39830				3.7
G0	0.84930	0.71060	0.62070	0.45520				3.6
H0	0.84930	0.71060	0.62070	0.45520				3.6
J0	0.85920	0.71500	0.62320	0.45630				3.7
K0N	0.90160	0.76290	0.67300	0.50750				3.5
K0S	1.02740	0.88870	0.79880	0.63330				3.5

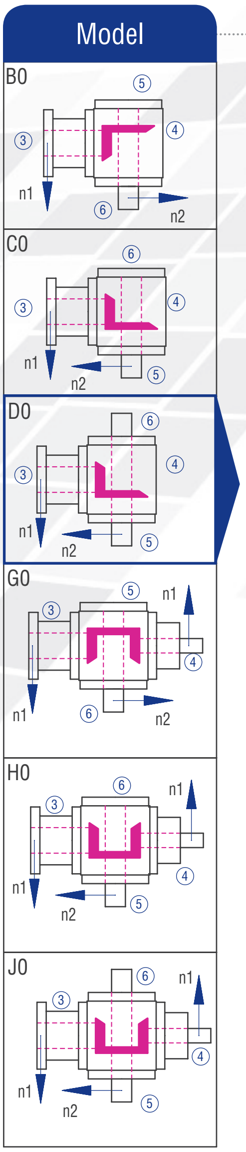


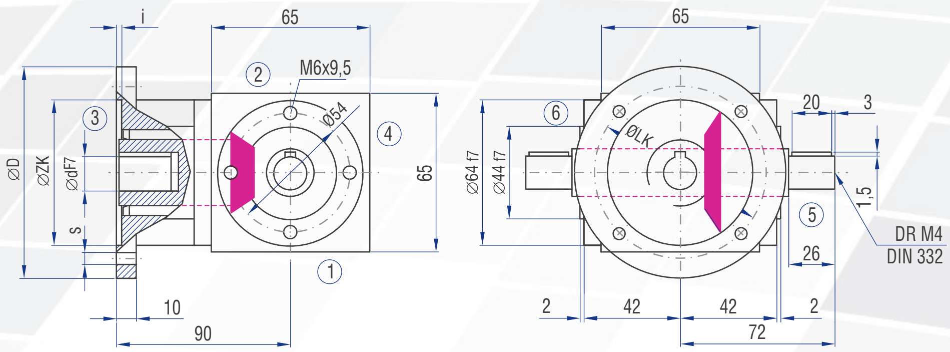
6.5.6 Type VL 065 – Type V with flange for motor mounting

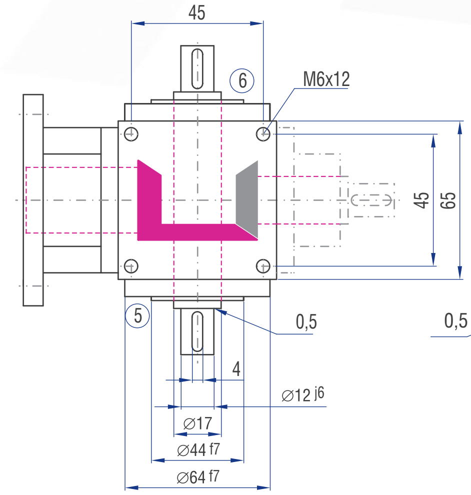




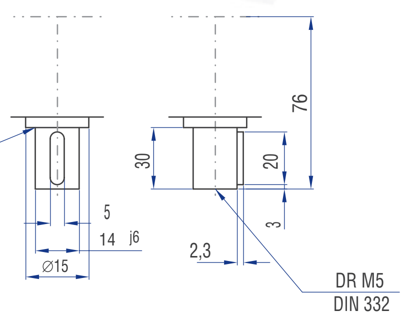




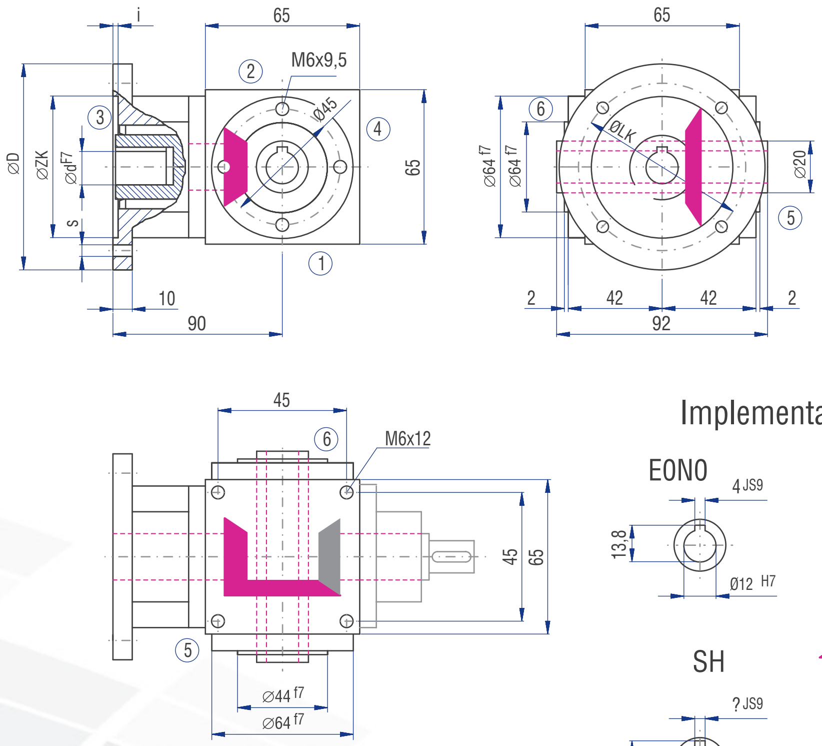




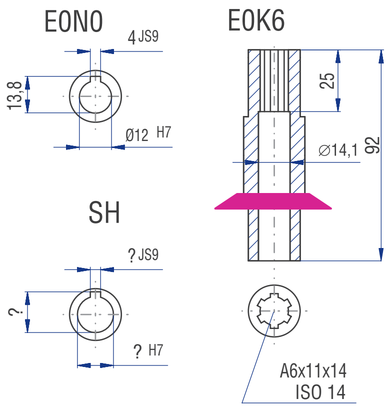
Implementation VV
on demand

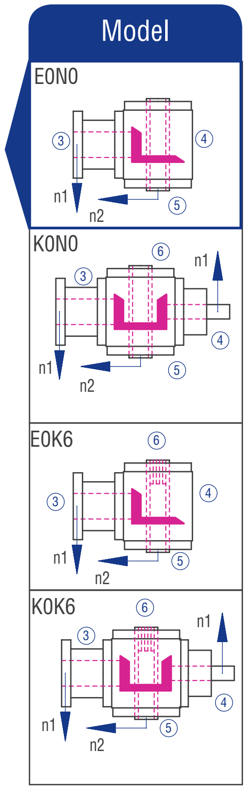


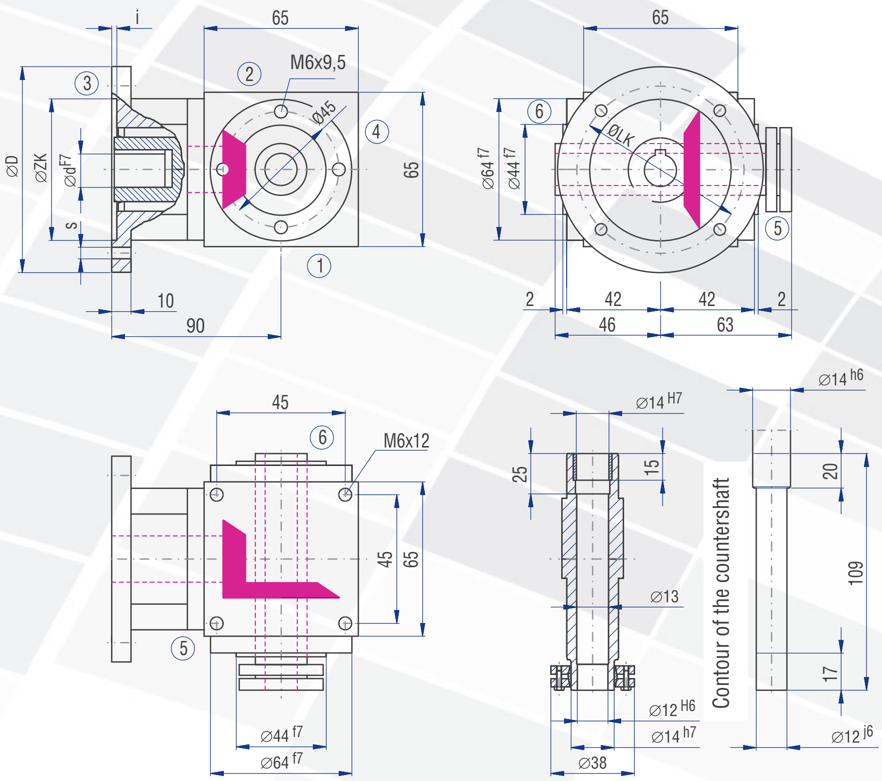
IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
63	B14	11x23	120	100	80	7	3
	B5	11x23	140	115	95	9	3
71	B14	14x30	105	85	70	7	3
	B14	14x30	140	115	95	9	3

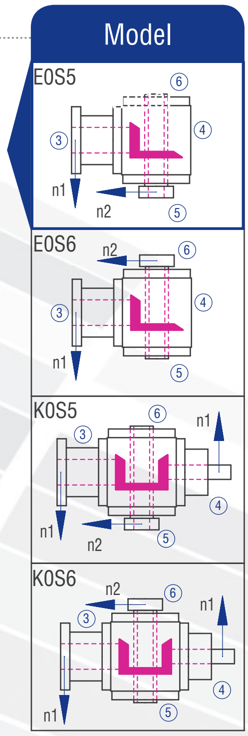


Implementation









The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

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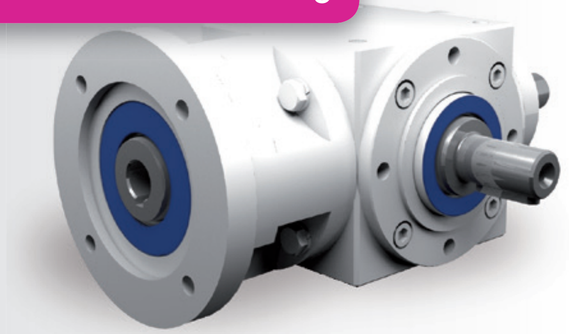
6.5.7 Type VL 090 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	8.93	27	2000	5.51	25	1500	3.80	23	1000	2.54	23	750	1.90	23	600	1.52	23	500	1.25	23
2400	2400	7.41	28	1600	4.59	26	1200	3.17	24	800	2.12	24	600	1.65	25	480	1.32	25	400	1.09	25
1500	1500	5.29	32	1000	3.20	29	750	2.23	27	500	1.49	27	375	1.12	27	300	0.89	27	250	0.74	27
1000	1000	3.75	34	667	2.35	32	500	1.71	31	333	1.14	31	250	0.85	31	200	0.68	31	167	0.53	29
750	750	3.06	37	500	1.93	35	375	1.32	32	250	0.88	32	188	0.66	32	150	0.53	32	125	0.40	29
500	500	2.20	40	333	1.36	37	250	0.94	34	167	0.63	34	125	0.47	34	100	0.37	34	83	0.27	29
250	250	1.21	44	167	0.74	40	125	0.50	36	83	0.33	36	63	0.25	36	50	0.20	36	42	0.14	30
50	50	0.28	50	33	0.16	45	25	0.10	37	17	0.07	37	13	0.05	37	10	0.04	37	8	0.03	33

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	3.8	3.8	3.8	3.8	3.8	3.8	3.8
T_{2max} [Nm]	105	80	80	70	70	60	50

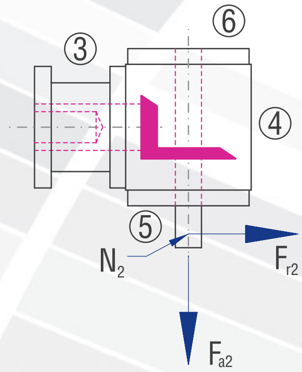
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
$<$ 30	500	250	660	330	800	400	950	475	1250	625	1500	750
$>$ 30	420	210	550	275	670	335	790	395	1040	520	1250	625

Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	2.88400	1.82740	1.48200	1.22120	1.15050	1.09920	1.09330	6.7
B0	3.67930	2.52850	1.70350	1.37930	1.24810	1.16770	1.13730	7.0
C0	3.67930	2.52850	1.70350	1.37930	1.24810	1.16770	1.13730	7.0
D0	3.70770	2.54110	1.71060	1.38240	1.24990	1.16890	1.13810	7.1
E0N	3.57570	2.48240	1.67760	1.36780	1.24160	1.16360	1.13440	6.6
E0S	4.24630	2.78050	1.84520	1.44230	1.28350	1.19040	1.15310	6.8
F0	4.16350	2.39600	1.80190	1.36330	1.23040	1.15040	1.12890	7.9
G0	4.95880	3.44200	2.52730	2.12550	1.53120	1.44130	1.40800	8.5
H0	4.95880	3.44200	2.52730	2.12550	1.53120	1.44130	1.40800	8.5
J0	4.98720	3.45460	2.53440	2.12860	1.53300	1.44250	1.40880	8.6
K0N	4.85520	3.39590	2.50140	2.11400	1.52470	1.43720	1.40510	8.1
K0S	5.52580	3.69400	2.66900	2.18850	1.56660	1.46110	1.42380	8.3



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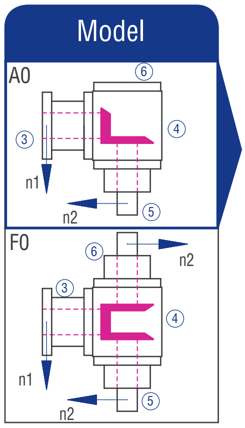
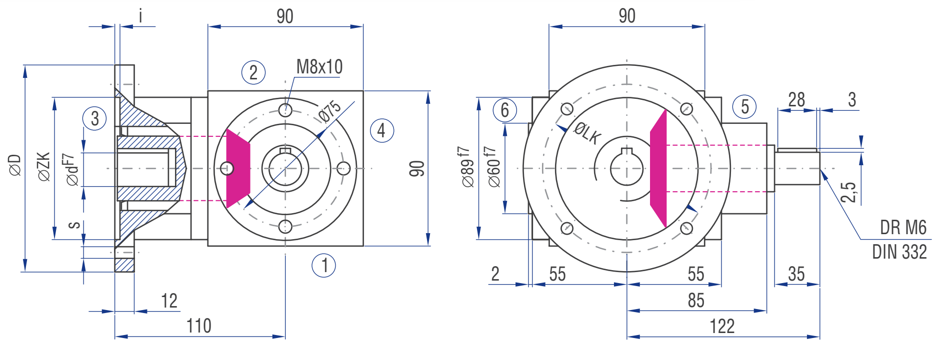
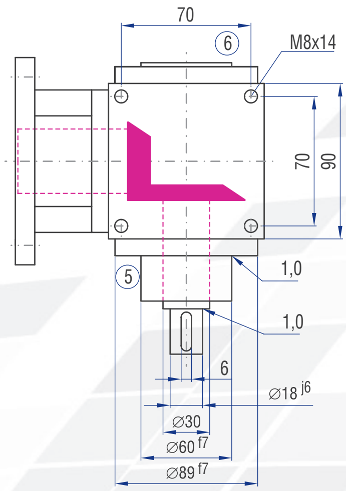
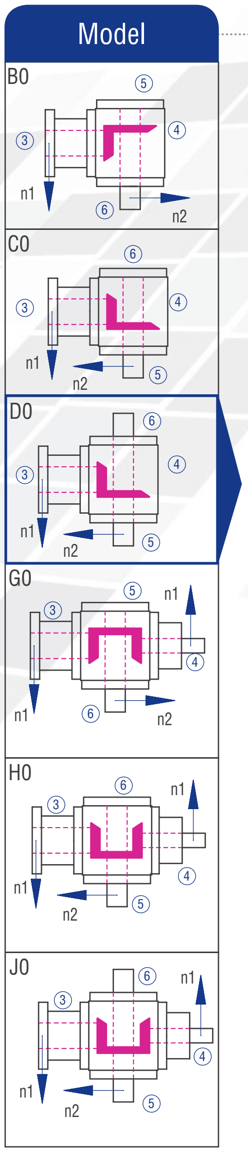
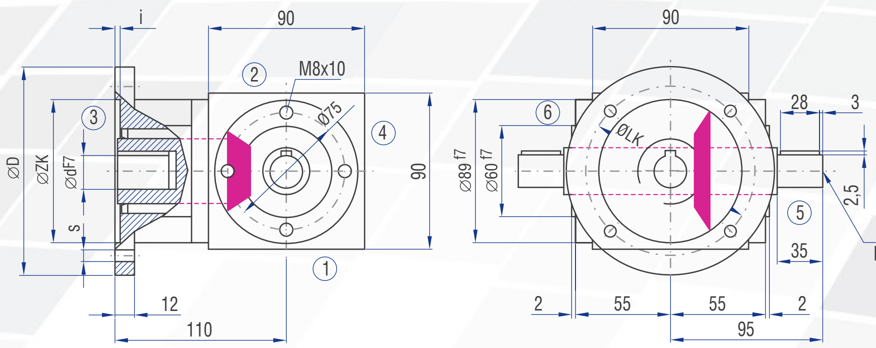
6.5.7 Type VL 090 – Type V with flange for motor mounting

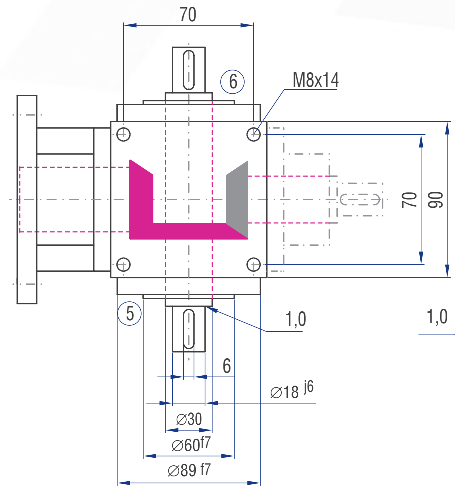




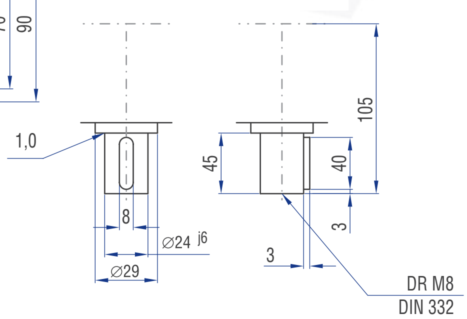




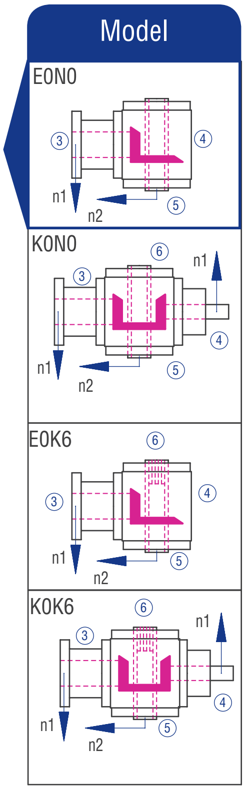


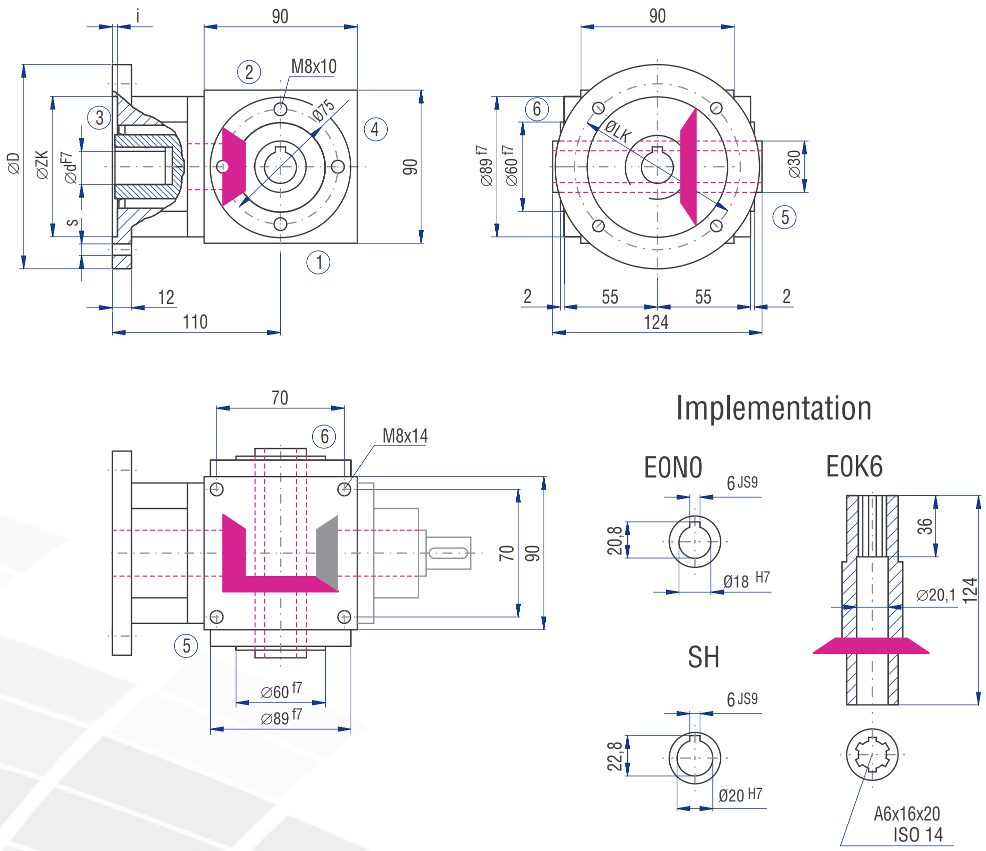


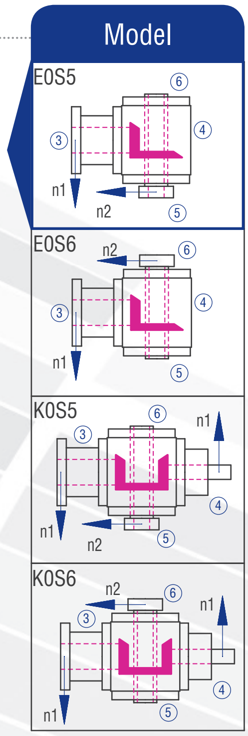
Implementation VV

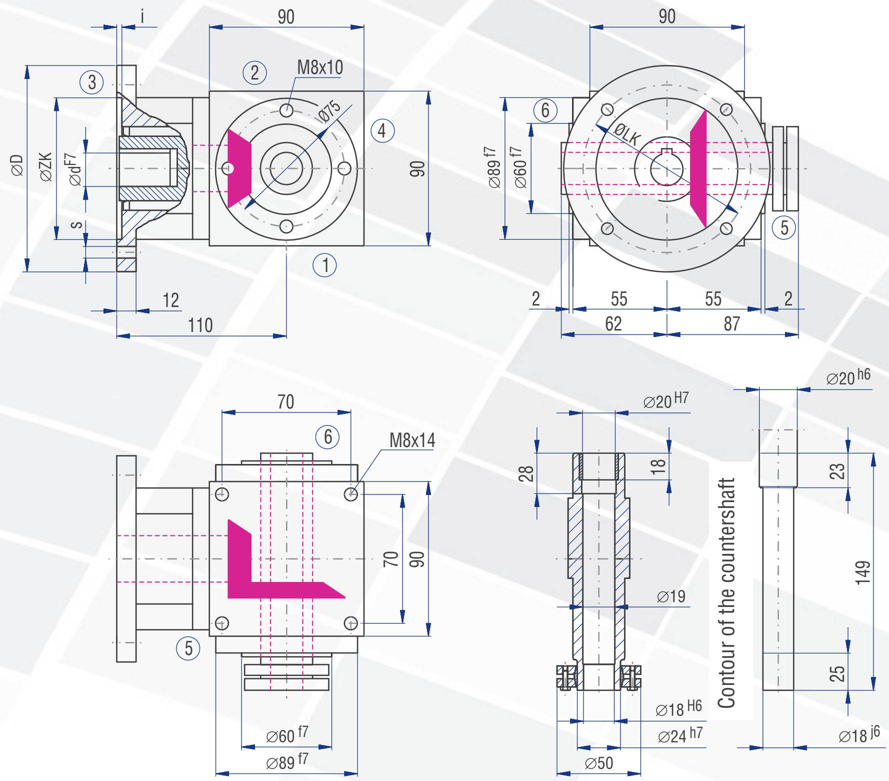


IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
63	B14	11x23	120	100	80	7	3
	B5	11x23	140	115	95	9	3
71	B14	14x30	140	115	95	9	3
	B5	14x30	160	130	110	9	4
80	B14	19x40	120	100	80	7	3
	B14	19x40	160	130	110	9	4



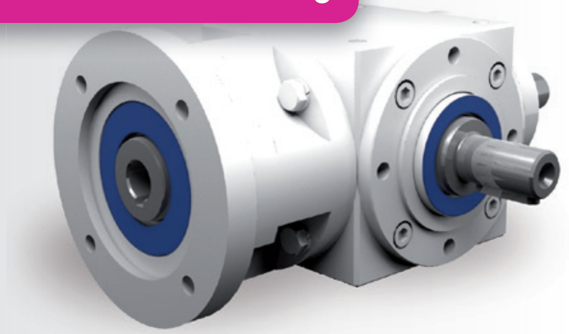






The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

6.5.8 Type VL 120 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	21.82	66	2000	13.45	61	1500	9.26	56	1000	6.39	58	750	4.96	60	600	3.97	60	500	2.95	54
2400	2400	18.52	70	1600	11.46	65	1200	8.07	61	800	5.56	63	600	4.43	67	480	3.44	65	400	2.53	57
1500	1500	13.56	82	1000	8.60	78	750	6.03	73	500	4.08	74	375	3.06	74	300	2.38	72	250	1.75	64
1000	1000	10.14	92	667	6.32	86	500	4.40	80	333	3.01	82	250	2.18	79	200	1.76	80	167	1.22	66
750	750	8.51	103	500	5.18	94	375	3.30	80	250	2.40	87	188	1.69	82	150	1.42	86	125	0.94	68
500	500	6.34	115	333	3.70	100	250	2.20	80	167	1.66	90	125	1.16	84	100	0.98	89	83	0.63	69
250	250	3.39	123	167	1.84	100	125	1.10	80	83	0.87	95	63	0.60	87	50	0.51	92	42	0.33	71
50	50	0.72	130	33	0.37	100	25	0.22	80	17	0.21	110	13	0.12	90	10	0.10	95	8	0.06	66

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	6.2	6.2	6.2	6.2	6.2	6.2	6.2
T_{2max} [Nm]	220	169	80	155	155	140	120

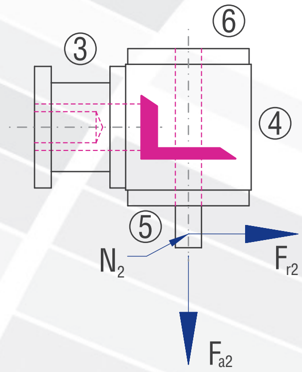
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	750	375	1000	500	1250	625	1500	750	1900	950	2200	1100
> 80	630	315	830	415	1040	520	1250	625	1580	790	1830	915

Inertia moments/mass

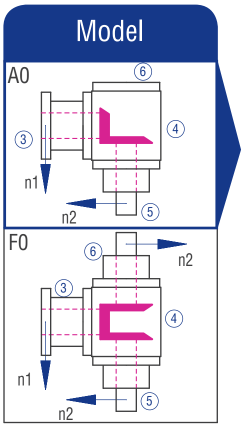
Inertia moment J_1 related to the fast-rotating shaft (N_1)

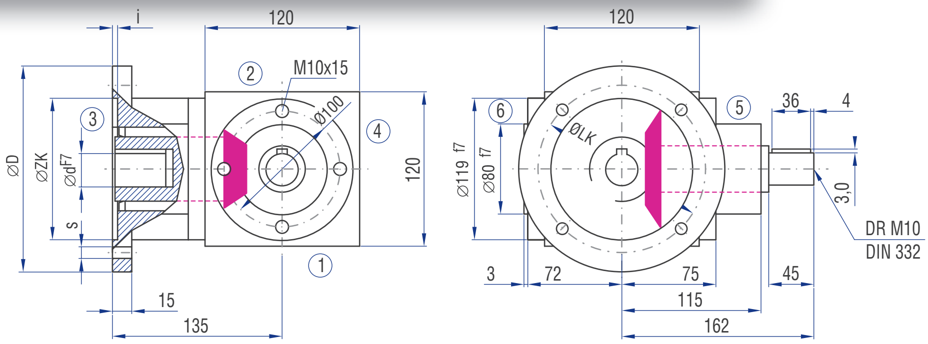
Model	Inertia moment [$kgcm^2$]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	12.5824	6.93340	5.40030	4.79750	4.46280	4.29660	4.22670	15.6
B0	17.3870	9.53660	6.72850	5.49390	4.91930	4.60430	4.44830	15.3
C0	17.3870	9.53660	6.72850	5.49390	4.91930	4.60430	4.44830	15.3
D0	17.6844	9.66870	6.80280	5.52690	4.93790	4.61620	4.45660	15.5
E0N	17.2787	9.48840	6.70140	5.48190	4.91250	4.60000	4.44530	15.0
E0S	19.0660	10.2828	7.14820	5.68040	5.02420	4.67150	4.49500	15.3
F0	17.8312	9.26620	6.71250	5.38070	4.79080	4.50650	4.37250	18.0
G0	22.6358	12.0447	9.06280	7.22660	5.80760	5.14590	4.97910	17.7
H0	22.6358	12.0447	9.06280	7.22660	5.80760	5.14590	4.97910	17.7
J0	22.9332	12.1768	9.13710	7.25960	5.82620	5.15780	4.98740	17.9
K0N	22.5275	11.9965	9.03570	7.21460	5.80080	5.14160	4.97610	17.4
K0S	24.3148	12.7909	9.48250	7.41310	5.91250	5.21310	5.02580	17.7

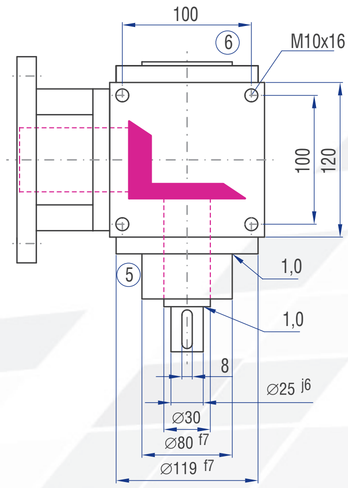


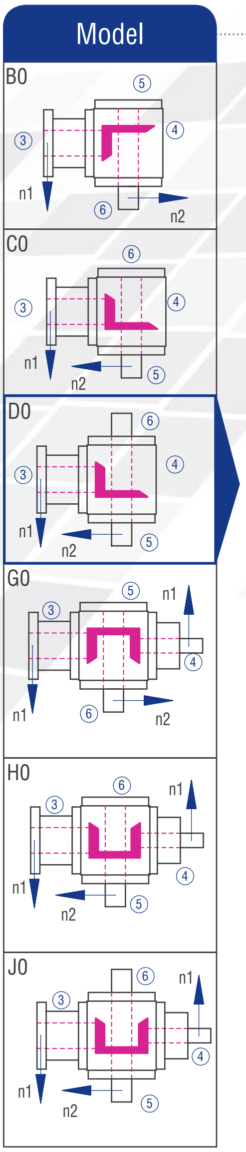
Bevel gearboxes

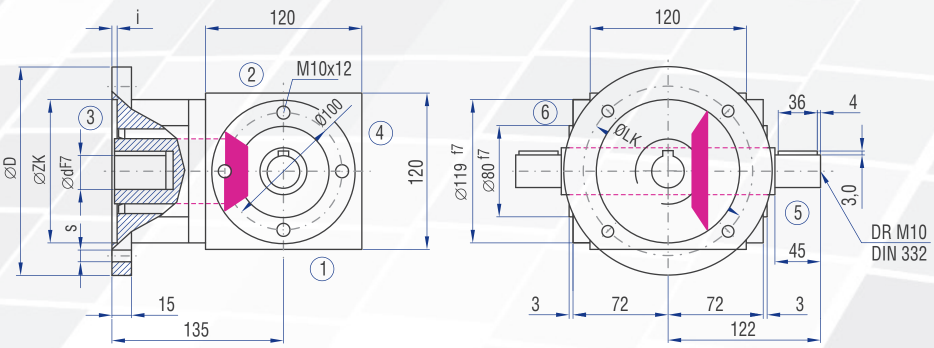
6.5.8 Type VL 120 – Type V with flange for motor mounting

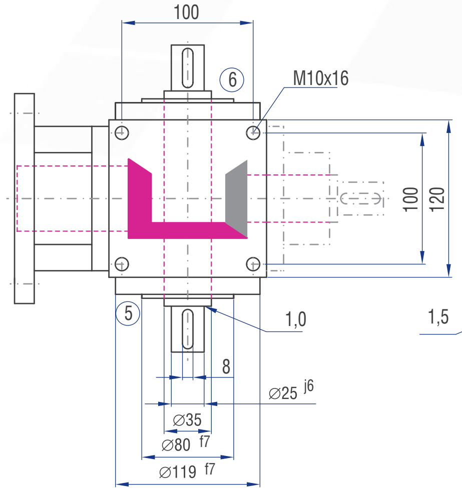




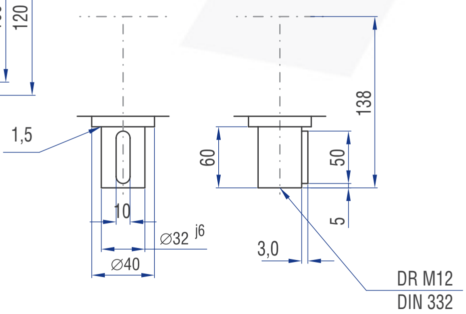








Implementation VV



IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
71	B14	14x30	140	115	95	9	3
80	B14	19x40	160	130	110	9	4
	B5	19x40	200	165	130	11	4
90	B14	24x50	160	130	110	9	4
	B5	24x50	200	165	130	11	4
100	B14	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5
112	B14	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5

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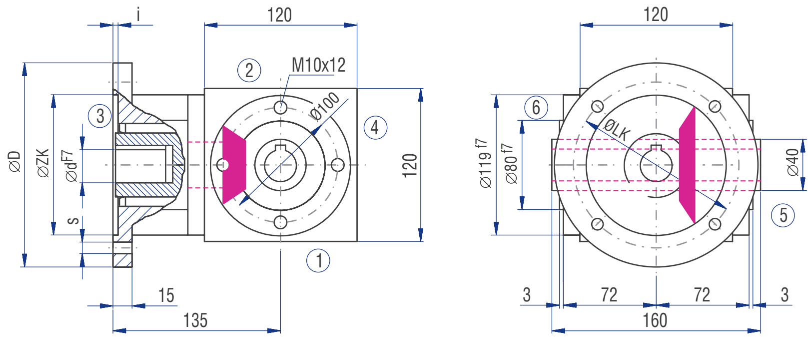
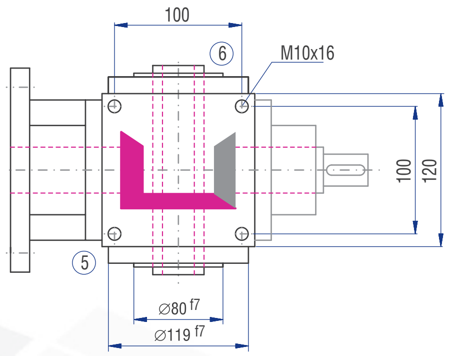
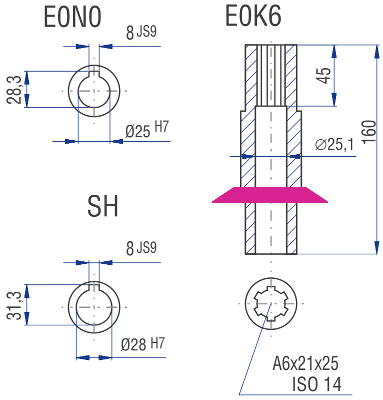
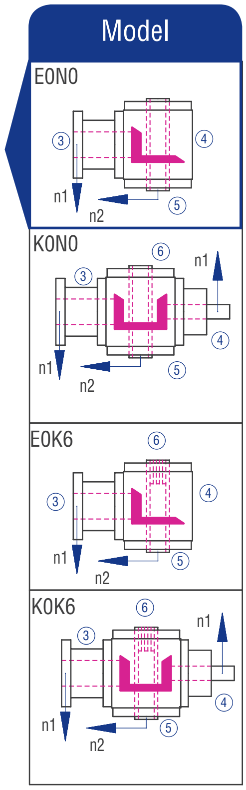
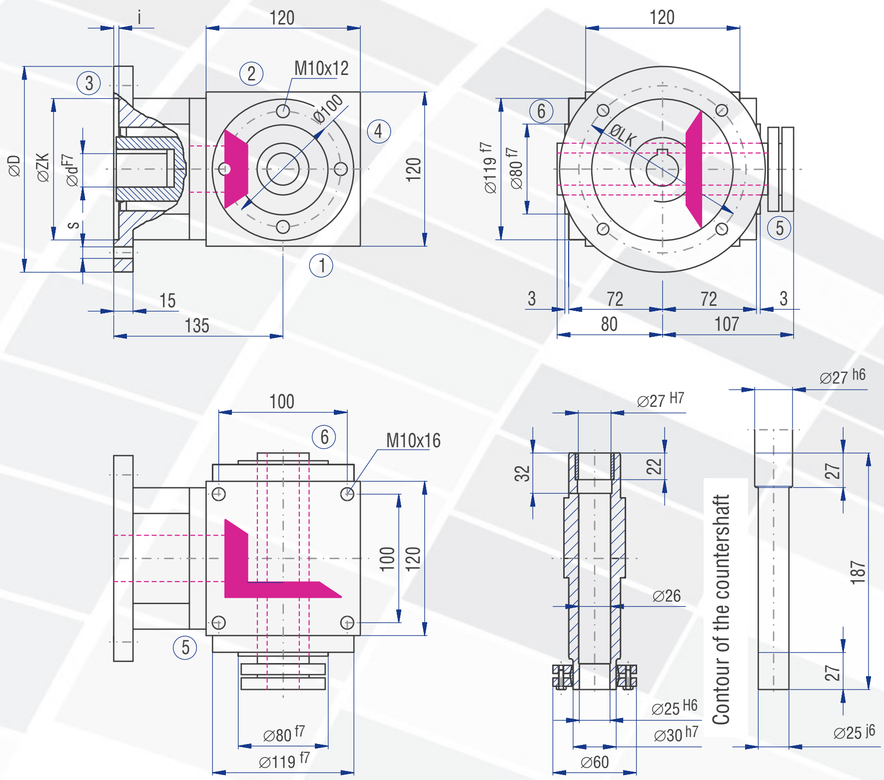


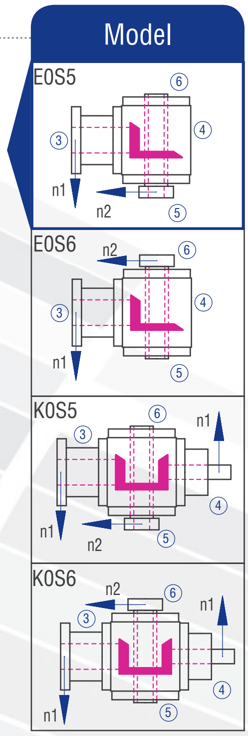


Implementation

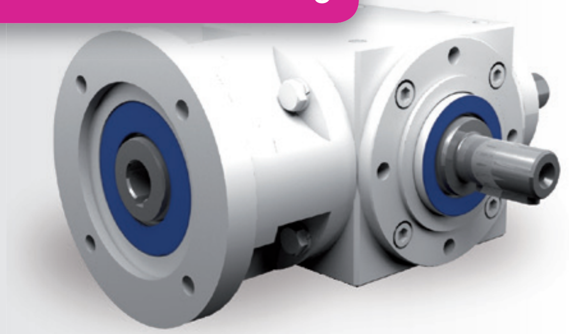








The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

Performance data

n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]	5:1 n_2 [rpm]	5:1 P_{1N} [kW]	5:1 T_{2N} [Nm]	6:1 n_2 [rpm]	6:1 P_{1N} [kW]	6:1 T_{2N} [Nm]
3000	3000	39.68	120	2000	24.91	113	1500	16.53	100	1000	12.12	110	750	8.51	103	600	6.61	100	500	5.18	94
2400	2400	37.04	140	1600	22.22	126	1200	14.68	111	800	11.46	130	600	7.34	111	480	5.56	105	400	4.58	104
1500	1500	26.78	162	1000	17.08	155	750	11.41	138	500	8.05	146	375	4.96	120	300	3.80	115	250	2.95	107
1000	1000	20.28	184	667	12.87	175	500	8.38	152	333	5.87	160	250	3.75	136	200	2.73	124	167	2.06	112
750	750	16.20	196	500	10.47	190	375	6.86	166	250	4.60	167	188	3.06	148	150	2.15	130	125	1.61	117
500	500	11.46	208	333	7.34	200	250	4.96	180	167	3.20	174	125	2.12	154	100	1.50	136	83	1.09	119
250	250	5.92	215	167	3.76	204	125	2.48	180	83	1.62	177	63	1.12	162	50	0.79	143	42	0.56	121
50	50	1.21	220	33	0.76	210	25	0.50	180	17	0.34	180	13	0.23	170	10	0.17	150	8	0.11	120

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	10.0	10.0	10.0	10.0	10.0	10.0	10.0
T_{2max} [Nm]	430	358	180	280	280	250	200

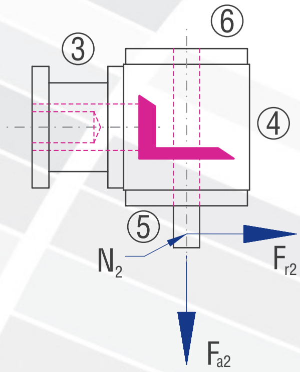
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< **140**	1300	650	1700	850	2000	1000	2500	1250	3000	1500	3800	1900
> **140**	1082	541	1420	710	1670	835	2080	1040	2500	1250	3170	1585

Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	34.6752	23.0606	18.4863	16.3939	15.2904	14.8851	14.6758	24.0
B0	45.8411	28.2365	21.6470	17.4945	15.7845	15.3137	14.9457	23.5
C0	45.8411	28.2365	21.6470	17.4945	15.7845	15.3137	14.9457	23.5
D0	46.8232	28.6730	21.8926	17.6037	15.8459	15.3530	14.9729	24.0
E0N	42.4047	26.7092	20.7879	17.1127	15.5697	15.1763	14.8502	23.0
E0S	48.8060	29.5543	22.3883	17.8240	15.9698	15.4323	15.0280	23.7
F0	46.4752	30.6161	22.2113	18.2717	16.4716	15.6611	15.2424	28.0
G0	58.9746	34.2563	27.0398	22.4708	16.8069	16.3204	15.9517	27.7
H0	58.9746	34.2563	27.0398	22.4708	16.8069	16.3204	15.9517	27.7
J0	59.9567	34.6928	27.2854	22.5800	16.8683	16.3597	15.9789	28.2
K0N	55.5382	32.7290	26.1807	22.0890	16.5921	16.1830	15.8562	27.2
K0S	61.9395	35.5741	27.7811	22.8003	16.9922	16.4390	16.0340	27.9



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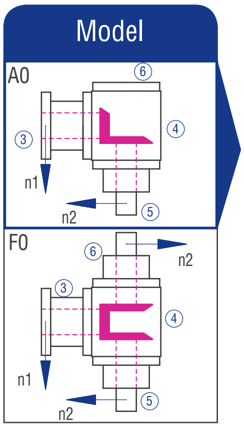
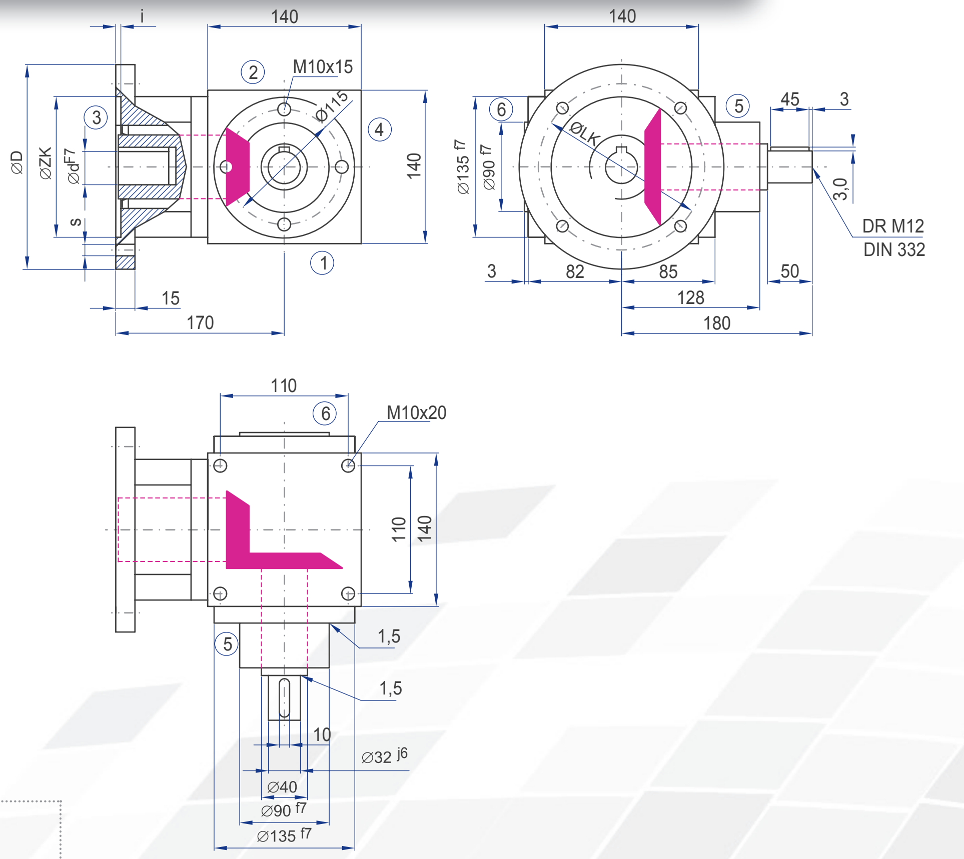
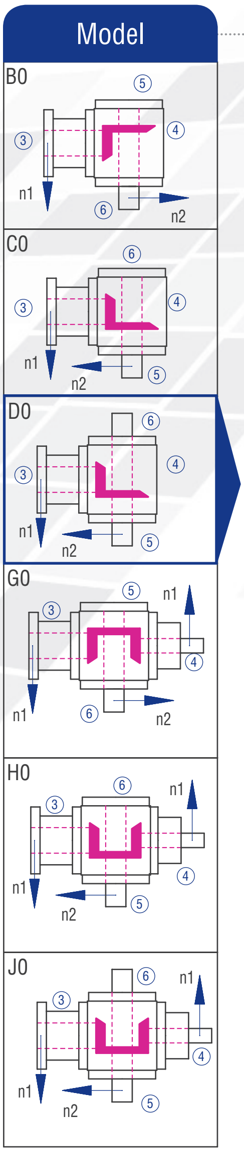
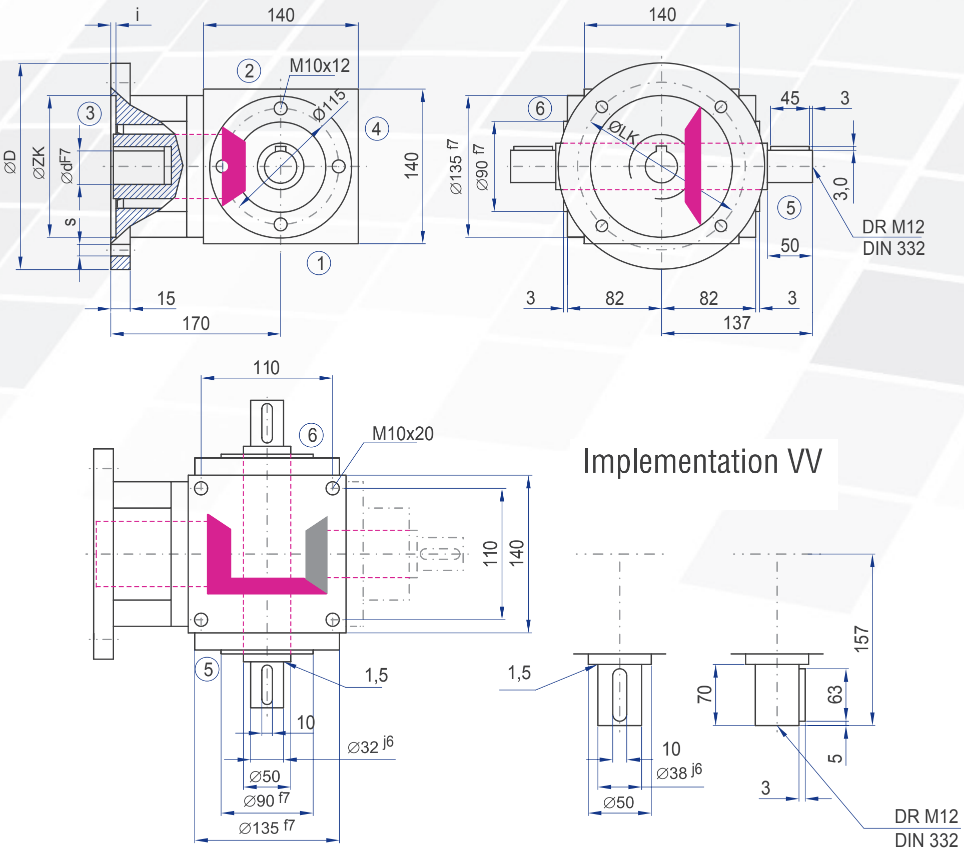
6.5.9 Type VL 140 – Type V with flange for motor mounting









IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
90	B14	24x50	160	130	110	9	4
	B5	24x50	200	165	130	11	4.5
100	B14	28x60	200	165	130	11	4.5
	B5	28x60	250	215	180	14	5
112	B14	28x60	200	165	130	11	4.5
	B5	28x60	250	215	180	14	5
132	B14	38x80	200	165	130	11	4.5
	B5	38x80	250	215	180	14	5

Gear ratios 3:1 through 6:1 only with intermediate flange or shortened motor shaft.

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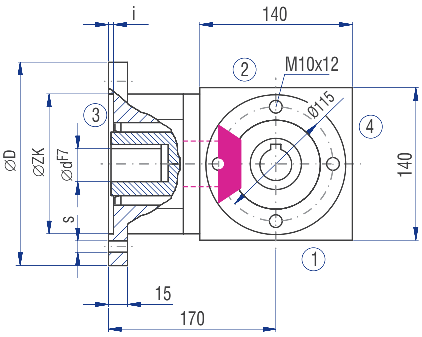
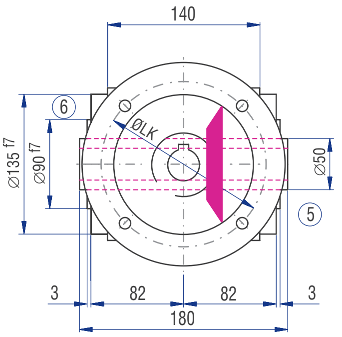
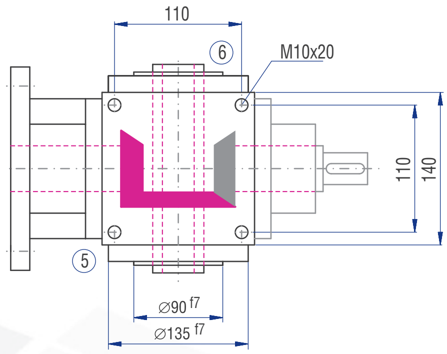
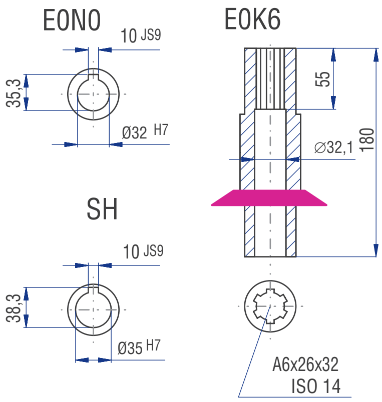
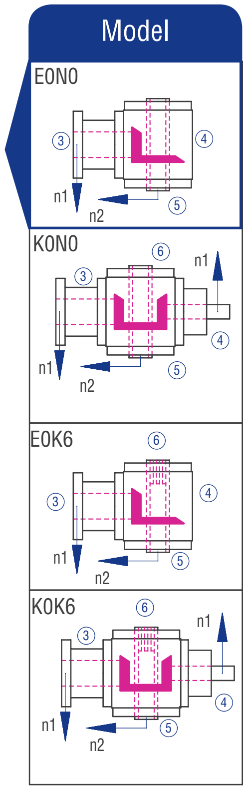


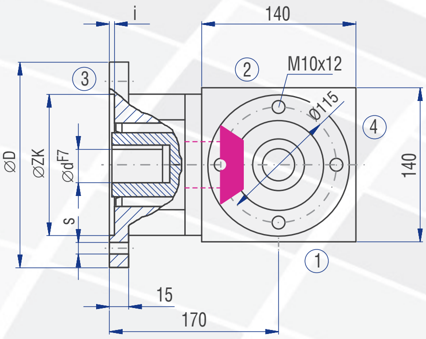


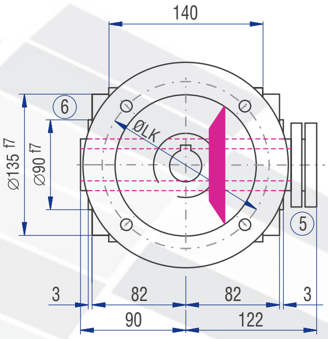


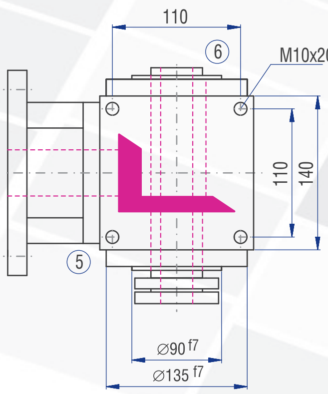
Implementation

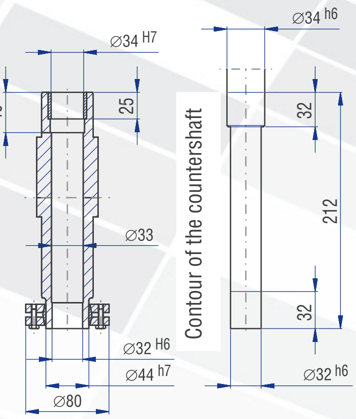


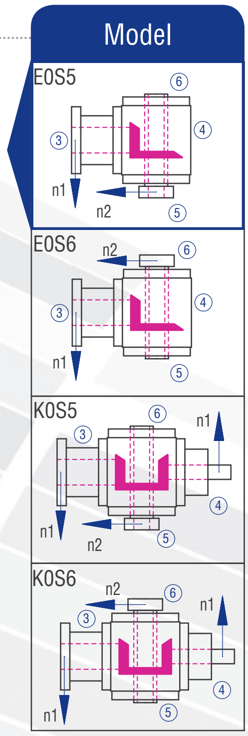












The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

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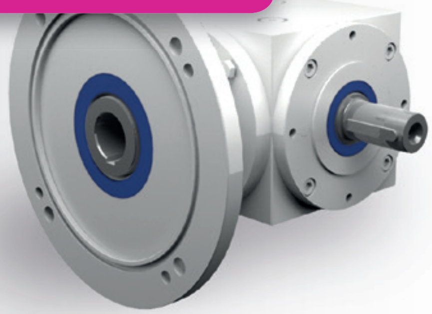
6.5.10 Type VL 160 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	40.78	185	1500	28.11	170	1000	20.94	190	750	14.88	180	600	11.90	180	500	7.09	129
2400	2400	57.67	218	1600	36.15	205	1200	25.53	193	800	17.81	202	600	13.23	200	480	10.48	198	400	5.98	136
1500	1500	42.99	260	1000	27.78	252	750	20.25	245	500	12.68	230	375	9.09	220	300	7.11	215	250	3.95	143
1000	1000	31.96	290	667	20.59	280	500	14.88	270	333	8.99	245	250	6.61	240	200	4.96	225	167	3.01	164
750	750	25.63	310	500	16.26	295	375	11.57	280	250	6.89	250	188	5.17	250	150	3.97	240	125	2.43	176
500	500	18.19	330	333	11.56	315	250	8.27	300	167	4.79	260	125	3.58	260	100	2.76	250	83	1.72	187
250	250	9.64	350	167	6.07	330	125	4.41	320	83	2.56	280	63	1.86	270	50	1.49	270	42	0.92	199
50	50	2.09	380	33	1.29	355	25	0.88	320	17	0.57	305	13	0.39	280	10	0.32	290	8	0.18	197

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	15.0	15.0	15.0	15.0	15.0	15.0	15.0
T_{2max} [Nm]	660	360	320	457	422	420	350

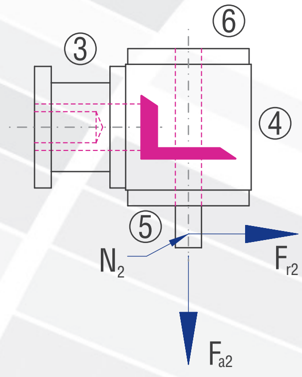
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2000	1000	2800	1400	3300	1650	4000	2000	5000	2500	6500	3250
> 220	1670	835	2340	1170	2750	1375	3340	1670	4170	2085	5420	2710

Inertia moments/mass

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

Model	Inertia moment [kgcm²]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	42.4880	32.2050	25.0090	22.8169	21.8333	21.4119	21.2266	36.5
B0	44.3697	44.5919	32.7507	25.9456	23.8183	22.8273	22.0772	36.0
C0	44.3697	44.5919	32.7507	25.9456	23.8183	22.8273	22.0772	36.0
D0	45.3990	45.0494	33.0080	26.0600	23.8826	22.8685	22.1058	36.5
E0N	47.2021	45.7092	33.3159	26.1968	23.9596	22.9177	22.1413	35.0
E0S	53.4920	48.5047	34.8883	26.8957	24.3527	23.1693	22.3160	35.6
F0	57.3235	38.7985	28.7179	24.4653	22.7605	22.0053	21.6387	43.0
G0	59.2052	57.6357	41.4007	33.2488	29.3259	24.5072	23.7552	42.5
H0	59.2052	57.6357	41.4007	33.2488	29.3259	24.5072	23.7552	42.5
J0	60.2345	58.0932	41.6580	33.3632	29.3902	24.5484	23.7838	43.0
K0N	62.0376	58.7530	41.9659	33.5000	29.4672	24.5976	23.8193	41.5
K0S	68.3275	61.5485	43.5383	34.1989	29.8603	24.8492	23.9940	42.1



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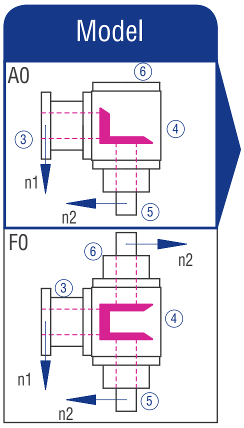
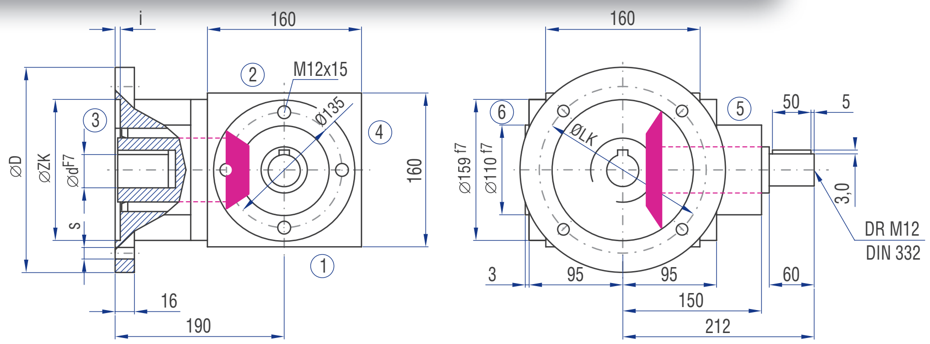
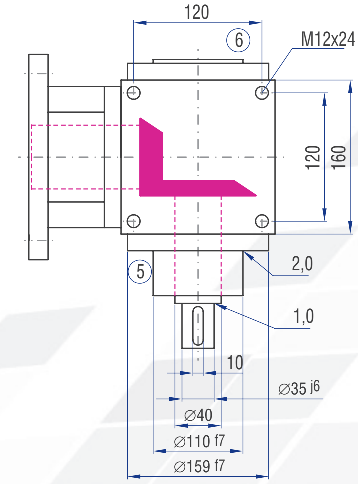
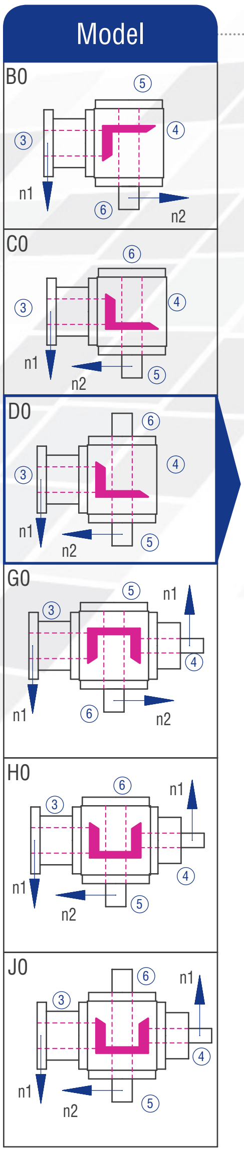
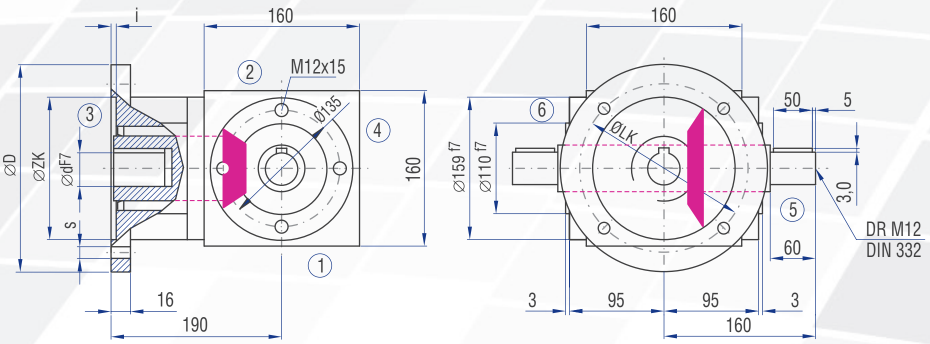
6.5.10 Type VL 160 – Type V with flange for motor mounting

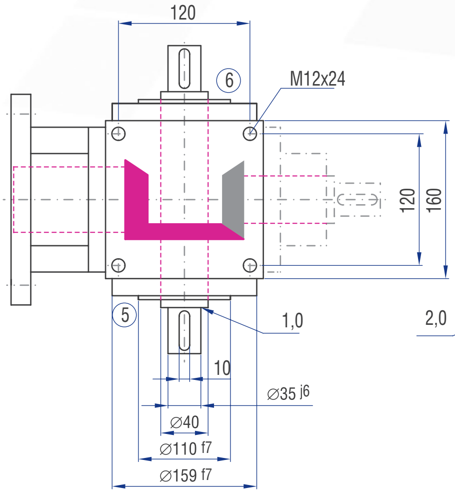




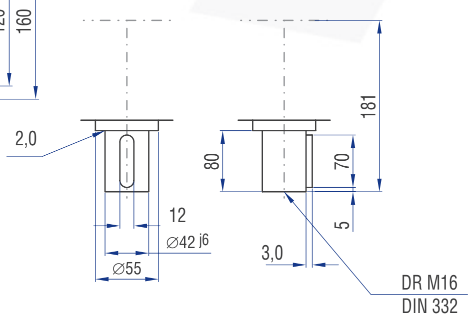








Implementation VV



IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
100	B14	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5
112	B5	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5
132	B14	38x80	200	165	130	11	4
	B5	38x80	300	265	230	14	5

Gear ratios 3:1 through 6:1 only with intermediate flange or shortened motor shaft.

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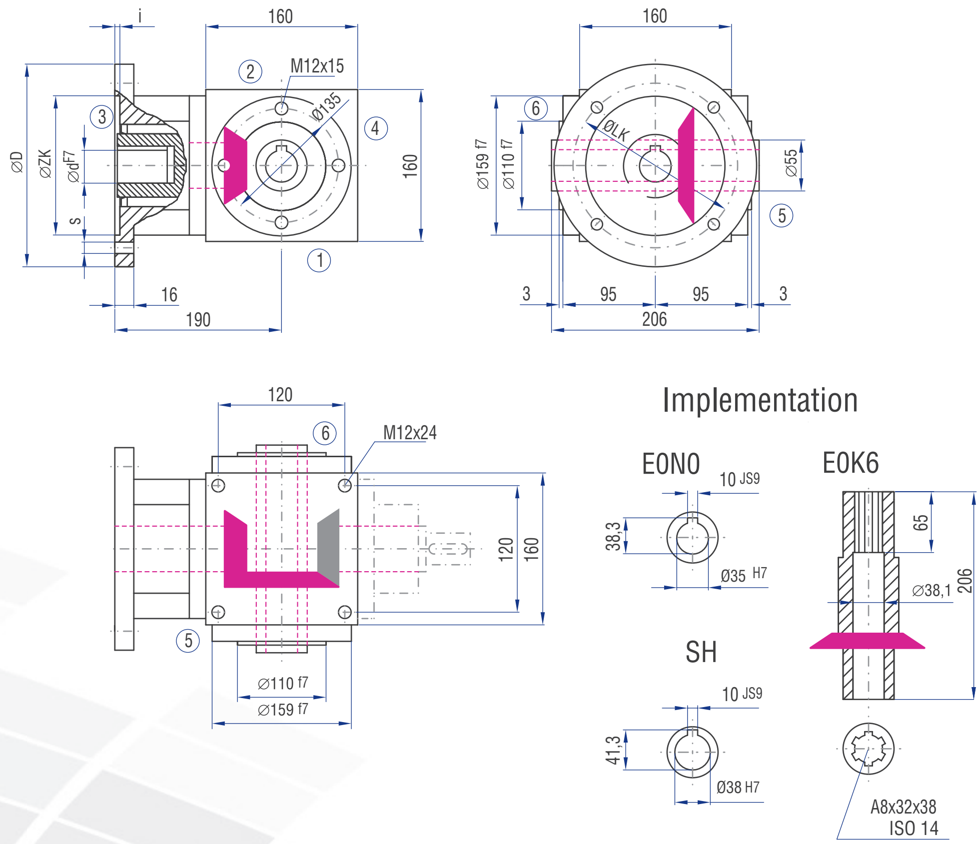

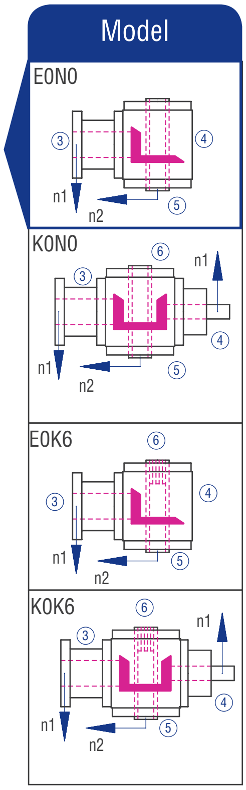

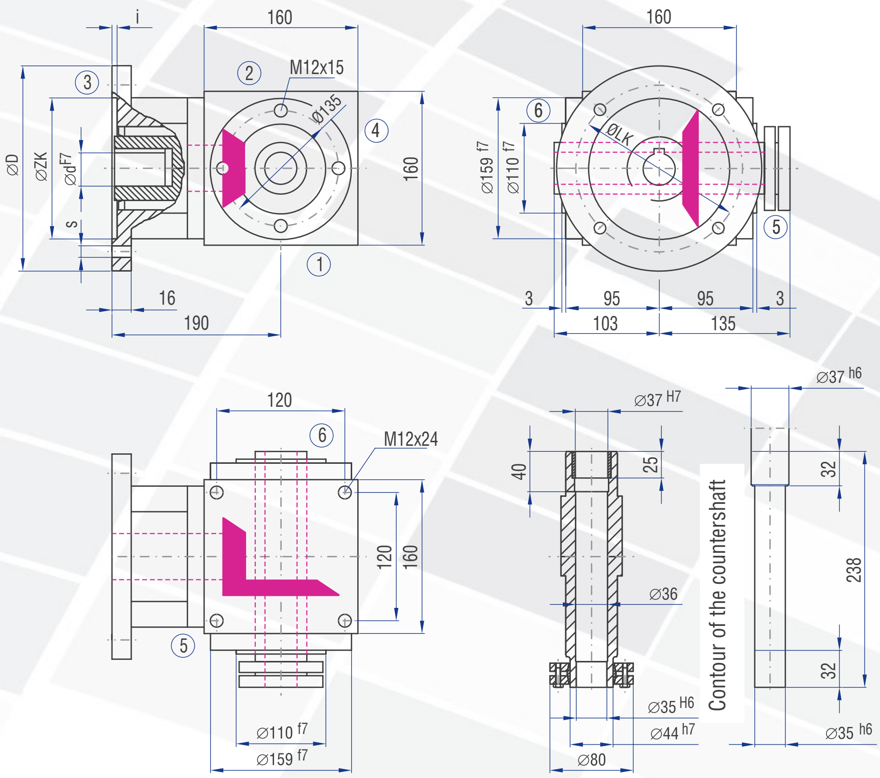

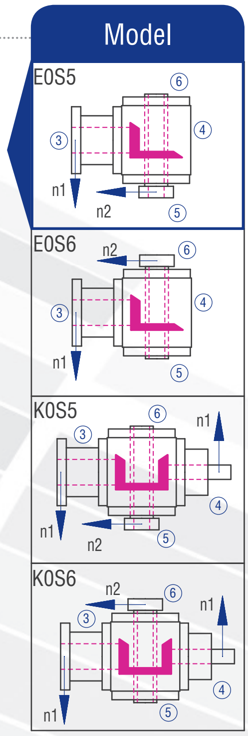

The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

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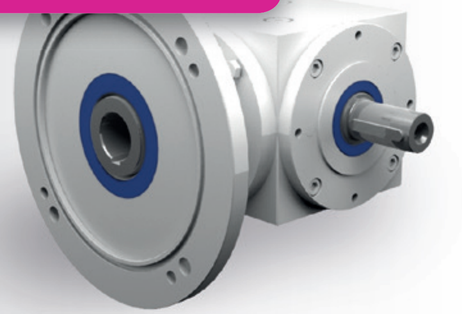
6.5.11 Type VL 200 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	72.75	330	1500	51.25	310	1000	46.29	420	750	28.93	350	600	19.84	300	500	11.45	208
2400				1600	63.49	360	1200	45.24	342	800	39.24	445	600	26.45	400	480	17.99	340	400	9.60	218
1500	1500	74.40	450	1000	48.17	437	750	35.13	425	500	28.38	515	375	18.81	455	300	12.57	380	250	6.54	237
1000	1000	56.21	510	667	37.13	505	500	27.56	500	333	20.37	555	250	13.36	485	200	9.26	420	167	4.74	258
750	750	45.88	555	500	30.31	550	375	21.90	530	250	15.98	580	188	10.54	510	150	7.27	440	125	3.98	289
500	500	34.17	620	333	22.02	600	250	14.60	530	167	11.04	600	125	7.23	525	100	5.18	470	83	2.79	304
250	250	19.56	710	167	11.04	600	125	7.30	530	83	5.76	630	63	3.79	550	50	2.78	505	42	1.44	311
50	50	4.13	750	33	2.18	600	25	1.46	530	17	1.29	690	13	0.80	580	10	0.58	525	8	0.28	306

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	26.0	26.0	26.0	26.0	26.0	26.0	26.0
T_{2max} [Nm]	1090	600	530	910	860	860	625

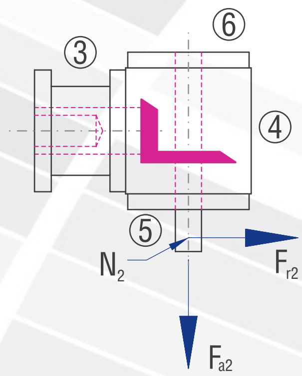
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 500	3200	1600	4300	2150	5000	2500	6500	3250	8000	4000	10000	5000
> 500	2670	1335	3580	1790	4170	2085	5420	2710	6670	3335	8330	4165

Inertia moments/mass

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

Model	Inertia moment [kgcm^2]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	160.794	103.333	79.4024	66.6041	62.5170	60.9854	60.2444	64.0
B0	214.242	149.221	114.714	81.9650	70.9700	67.7153	64.9180	60.0
C0	214.242	149.221	114.714	81.9650	70.9700	67.7153	64.9180	60.0
D0	217.359	150.606	115.494	82.3114	71.1649	67.8400	65.0046	62.0
E0N	240.932	154.665	119.527	82.9928	71.6107	68.6453	65.5638	60.0
E0S	261.954	164.009	124.783	85.3286	72.9245	69.4862	66.1478	61.3
F0	221.420	130.278	94.5590	73.3404	66.3062	63.4105	61.9285	72.0
G0	274.868	179.971	135.867	94.0610	81.4460	71.4373	68.6220	70.0
H0	274.868	179.971	135.867	94.0610	81.4460	71.4373	68.6220	70.0
J0	277.985	181.356	136.647	94.4074	81.6409	71.5620	68.7086	72.0
K0N	301.558	185.416	140.680	95.0888	82.0867	72.3673	69.2678	70.0
K0S	322.580	194.759	145.936	97.4246	83.4005	73.2082	69.8518	71.3



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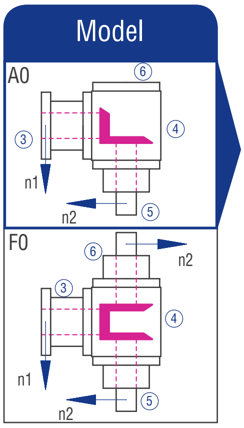

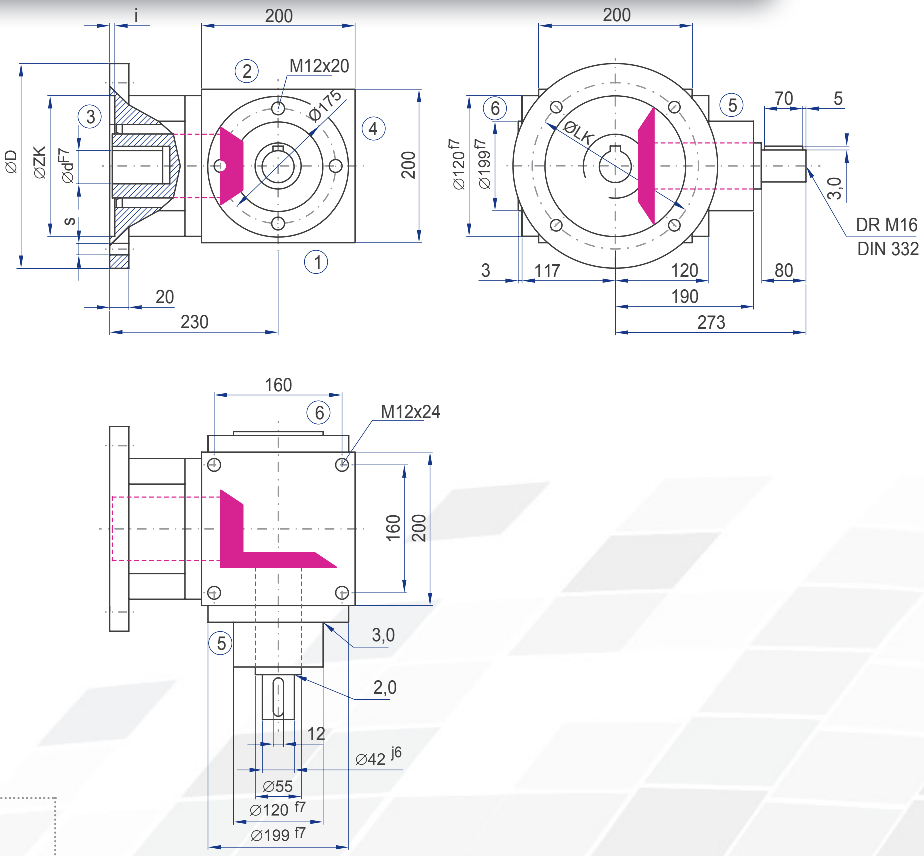

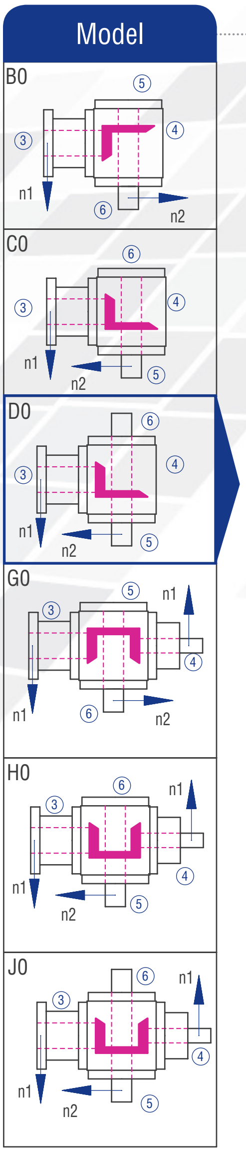

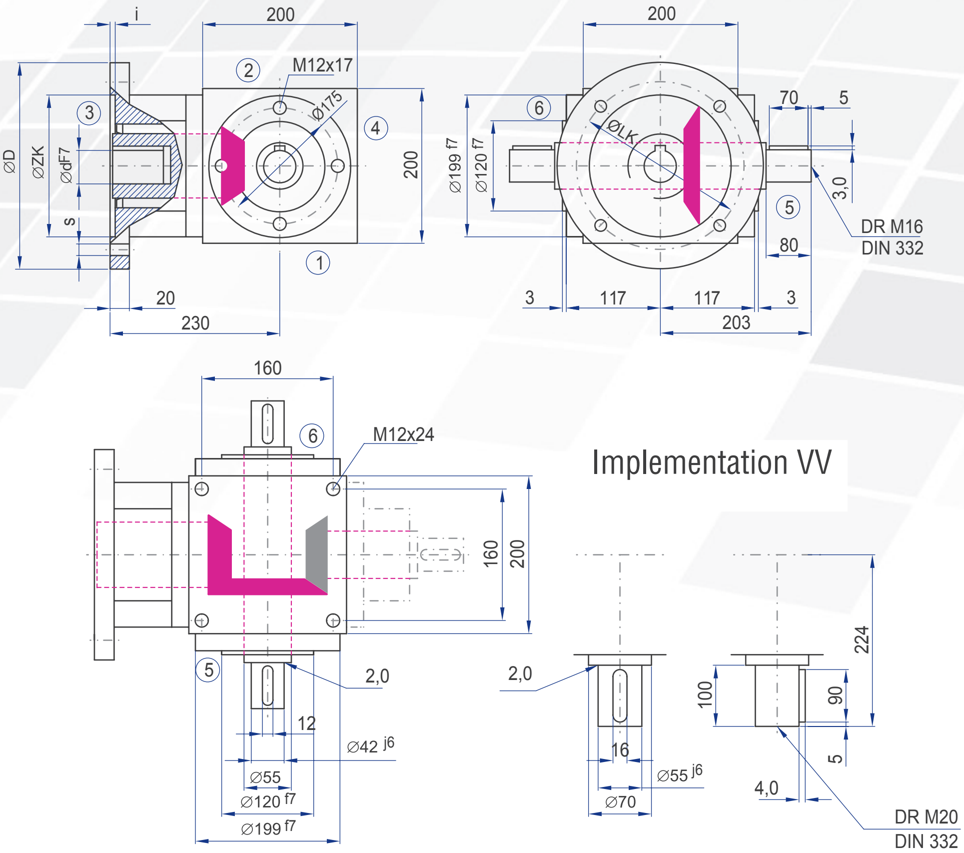

IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
100	B14	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5
112	B5	28x60	200	165	130	11	4
	B5	28x60	250	215	180	14	5
132	B14	38x80	200	165	130	11	4
	B5	38x80	300	265	230	14	5
160	B5	42x110	350	300	250	18	6
180	B5	48x110	350	300	250	18	6

Gear ratios 3:1 through 6:1 only with intermediate flange or shortened motor shaft.

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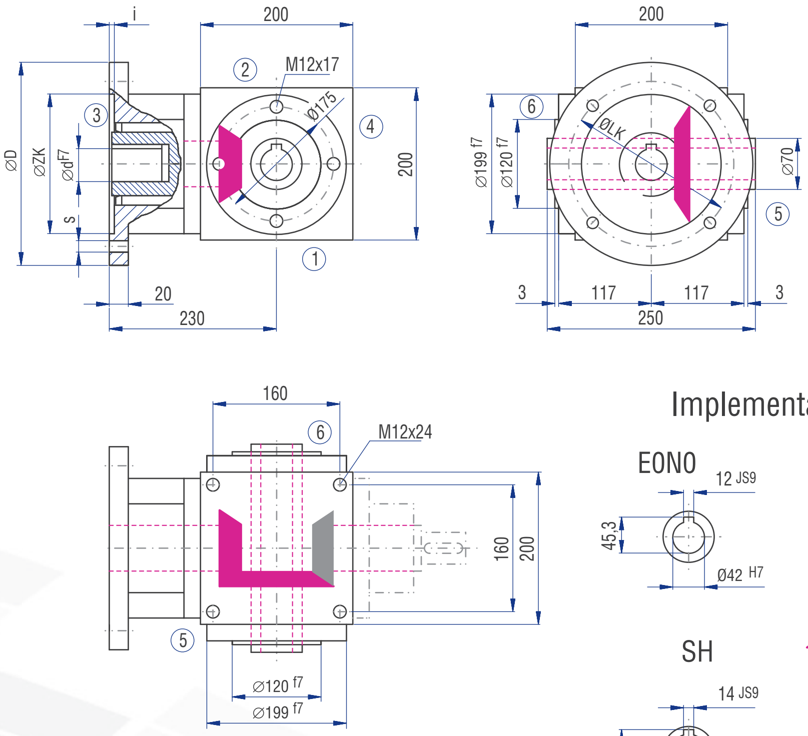
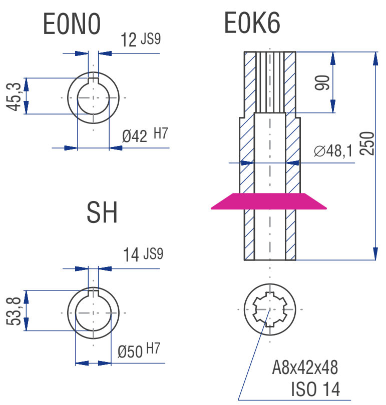
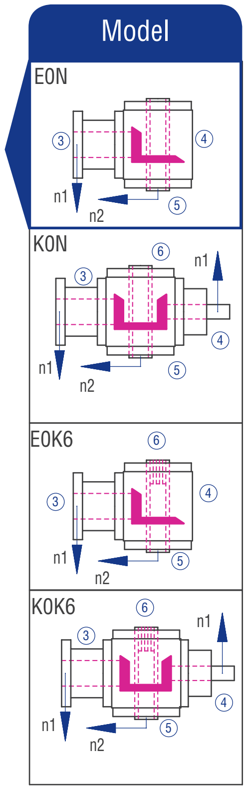
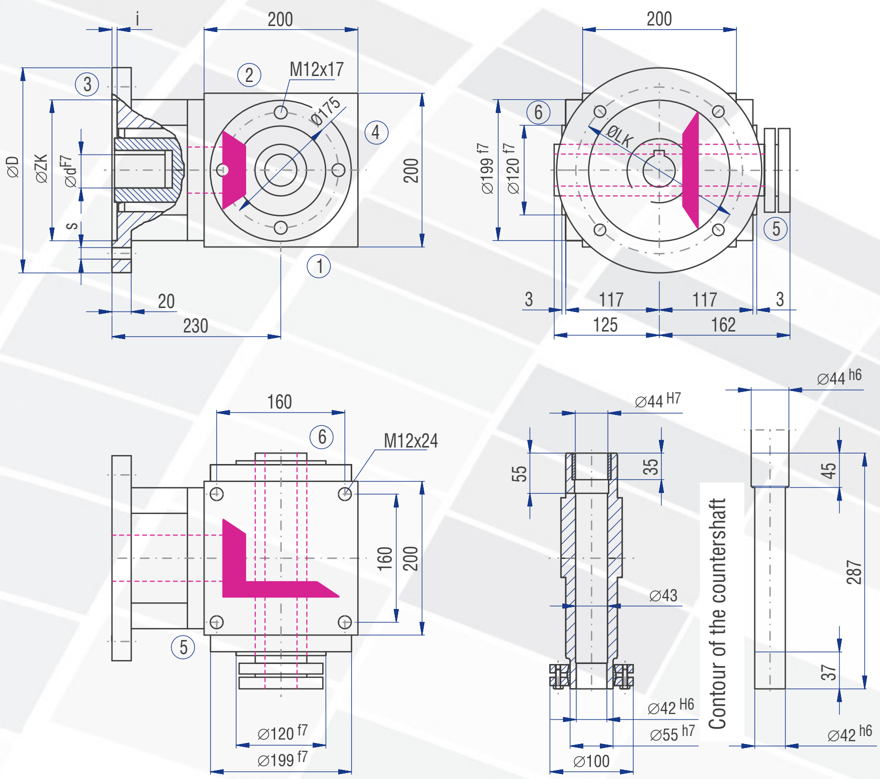
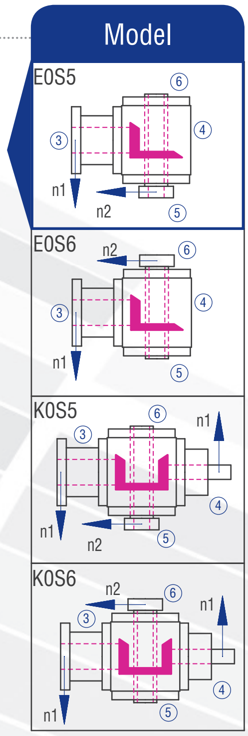


Implementation









The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

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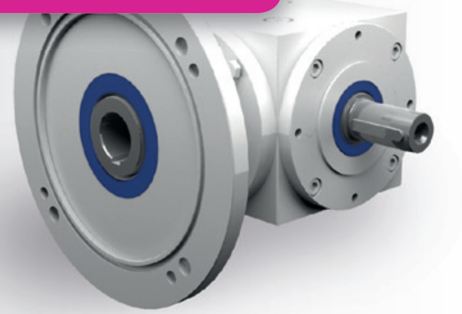
6.5.12 Type VL 230 – Type V with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

ATEK ANTRIEBSTECHNIK

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	99.20	450	1500	87.63	530	1000	44.09	400	750	36.37	440	600	33.73	510	500	20.17	366
2400				1600	91.35	518	1200	80.02	605	800	39.68	450	600	32.74	495	480	29.10	550	400	18.08	410
1500	1500	87.63	530	1000	72.20	655	750	59.11	715	500	29.76	540	375	24.80	600	300	21.00	635	250	13.50	490
1000	1000	71.65	650	667	56.21	765	500	45.19	820	333	23.33	635	250	18.60	675	200	15.76	715	167	9.92	540
750	750	60.76	735	500	45.47	825	375	36.79	890	250	19.29	700	188	15.19	735	150	12.73	770	125	7.78	565
500	500	45.19	820	333	33.79	920	250	26.73	970	167	14.07	765	125	10.95	795	100	9.15	830	83	5.42	590
250	250	26.73	970	167	20.57	1,120	125	16.88	1,225	83	7.58	825	63	5.99	870	50	5.07	920	42	2.82	610
50	50	7.00	1,270	33	4.89	1,330	25	3.66	1,330	17	1.63	870	13	1.35	980	10	1.09	990	8	0.57	625

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	34.0	34.0	34.0	34.0	34.0	34.0	34.0
T_{2max} [Nm]	1500	1400	1400	1300	1300	1200	1000

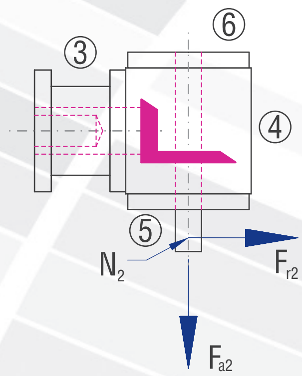
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

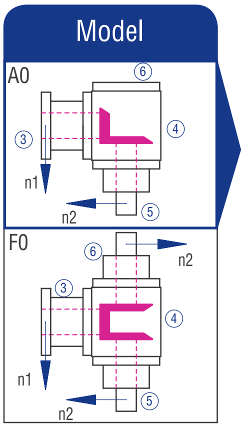
n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	5850	2925	8650	4325	10500	5250	12250	6125	15000	7500	19000	9500
> 750	4876	2438	7208	3604	8750	4375	10208	5104	12500	6250	15830	7915

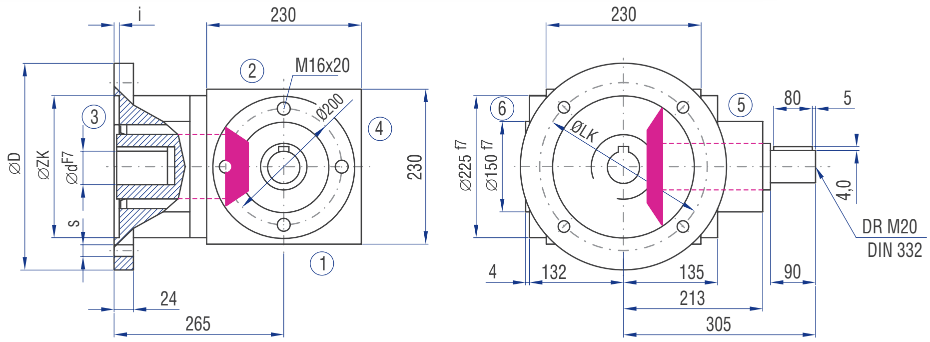
Inertia moments/mass

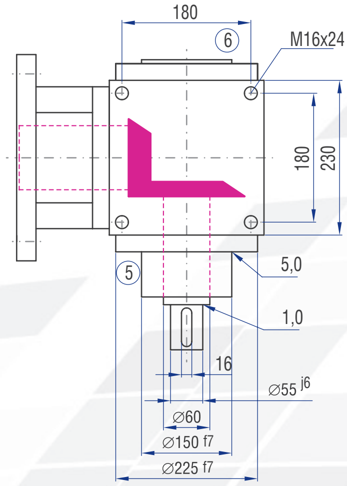
Inertia moment J_1 related to the fast-rotating shaft (N_1)

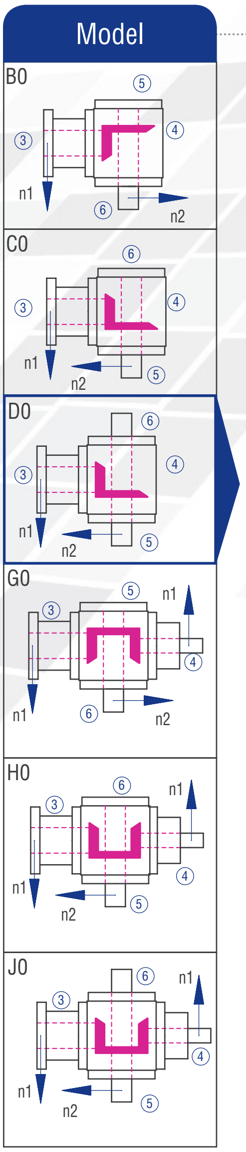
Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	577.000	287.000	203.000	141.000	134.000	131.000	126.000	94.0
B0	573.000	292.000	207.000	143.000	135.000	131.000	127.000	112.0
C0	573.000	292.000	207.000	143.000	135.000	131.000	127.000	112.0
D0	583.000	296.000	209.000	144.000	135.000	132.000	127.000	91.0
E0N	583.000	301.000	213.000	146.000	136.000	132.000	127.000	86.0
E0S	644.000	328.000	228.000	153.000	140.000	135.000	129.000	87.0
F0	830.000	404.000	272.000	163.000	149.000	142.000	134.000	112.0
G0	826.000	390.000	271.000	177.000	168.000	161.000	157.000	115.0
H0	826.000	390.000	271.000	177.000	168.000	161.000	157.000	115.0
J0	836.000	394.000	273.000	178.000	168.000	162.000	157.000	117.0
K0N	836.000	399.000	277.000	180.000	169.000	162.000	157.000	110.0
K0S	897.000	426.000	292.000	187.000	173.000	165.000	159.000	111.0

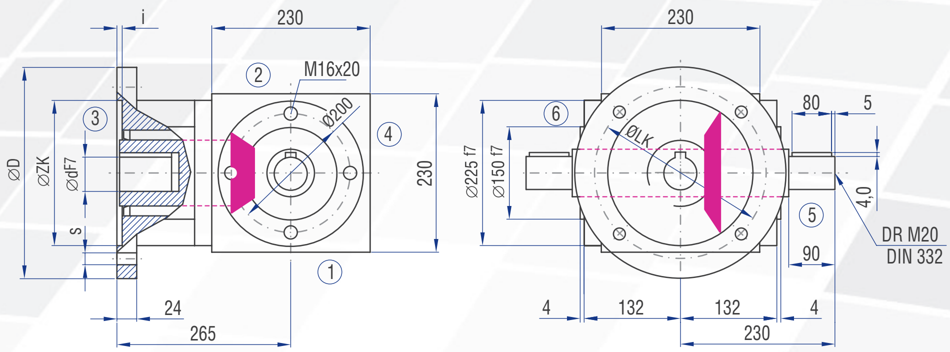


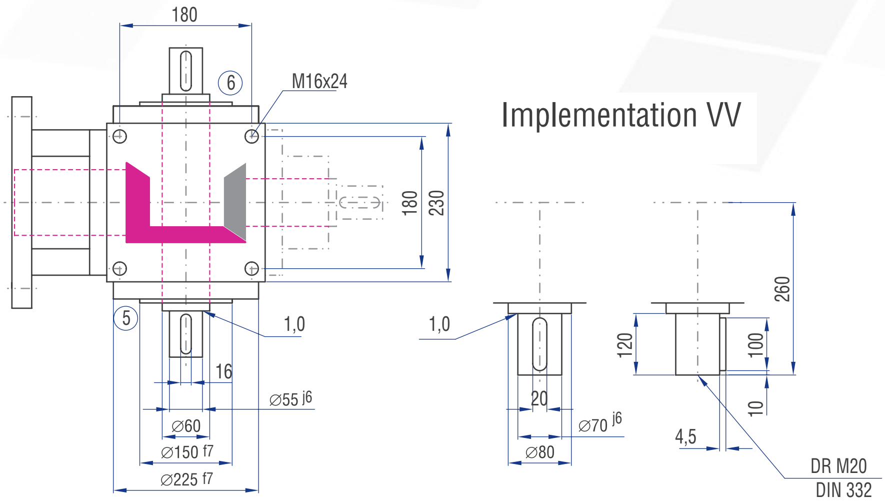












IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
132	B5	38x80	300	265	230	14	5
160	B5	42x110	350	300	250	18	6
180	B5	48x110	350	300	250	18	6
200	B5	55x110	400	350	300	18	6

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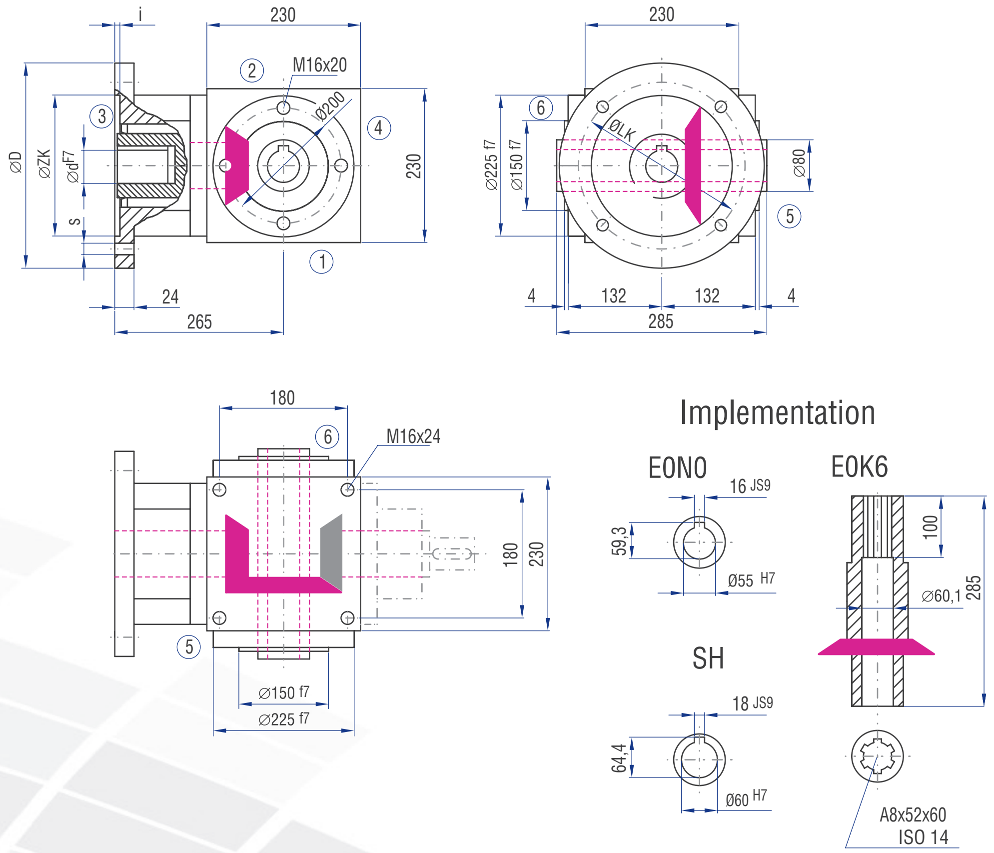
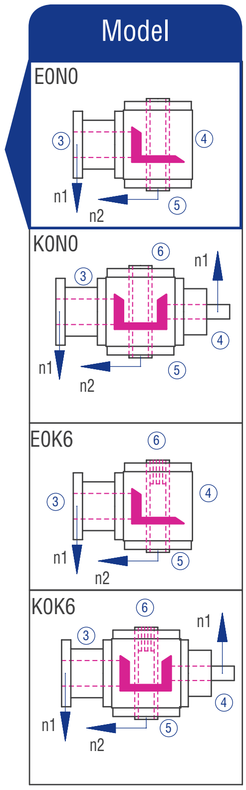
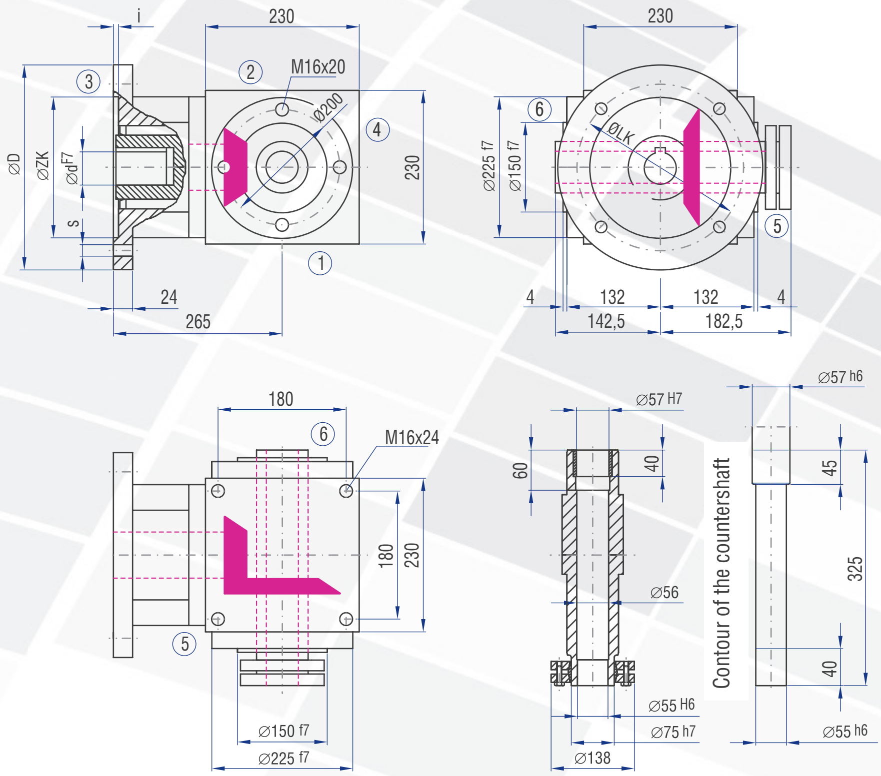
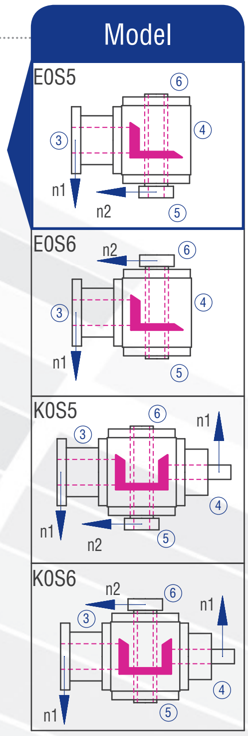








The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

6.5.13 Type VL 260 – Type V with flange for motor mounting

Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Flange	Suited for the mounting of IEC motors	
Coupling	Three-piece claw coupling	

ATEK ANTRIEBSTECHNIK

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000				2000	189.58	860	1500	133.92	810	1000	85.97	780	750	57.87	700	600	46.29	700	500	27.27	495
2400				1600	158.72	900	1200	112.43	850	800	72.39	821	600	51.58	780	480	40.21	760	400	23.12	524
1500	1500	157.07	950	1000	104.71	950	750	78.53	950	500	49.60	900	375	37.20	900	300	29.10	880	250	16.36	594
1000	1000	115.73	1,050	667	73.50	1,000	500	57.87	1,050	333	36.34	990	250	28.93	1,050	200	21.82	990	167	12.93	702
750	750	96.72	1,170	500	55.11	1,000	375	48.36	1,170	250	28.93	1,050	188	22.73	1,100	150	18.19	1,100	125	10.91	792
500	500	72.75	1,320	333	36.70	1,000	250	33.07	1,200	167	20.43	1,110	125	16.26	1,180	100	13.23	1,200	83	8.06	878
250	250	42.44	1,540	167	18.40	1,000	125	16.53	1,200	83	11.16	1,220	63	8.61	1,250	50	7.11	1,290	42	4.35	940
50	50	9.64	1,750	33	3.64	1,000	25	3.31	1,200	17	2.55	1,360	13	1.82	1,320	10	1.47	1,330	8	0.87	951

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	42.0	42.0	42.0	42.0	42.0	42.0	42.0
T_{2max} [Nm]	2310	1000	1200	1940	1940	1910	1730

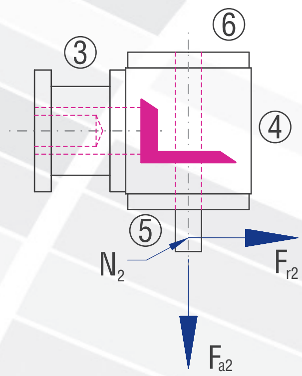
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

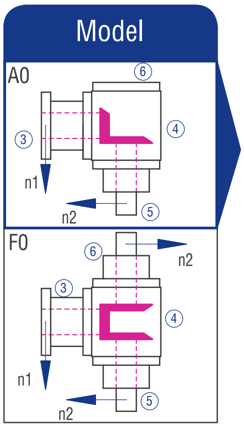
n_2 [rpm]	3000		1000		500		250		100		50	
T_{2N} [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 950	8500	4250	13000	6500	16000	8000	18000	9000	22000	11000	28000	14000
> 950	7080	3540	10830	5415	13330	6665	15000	7500	18330	9165	23330	11665

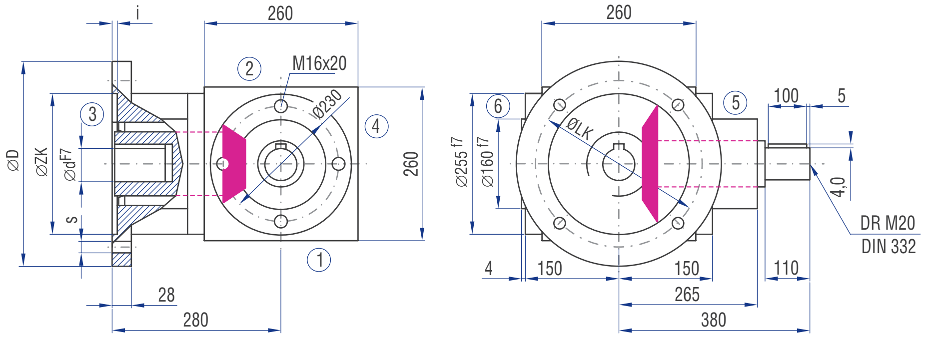
Inertia moments/mass

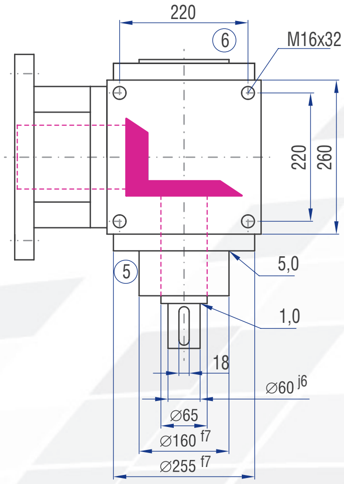
Inertia moment J_1 related to the fast-rotating shaft (N_1)

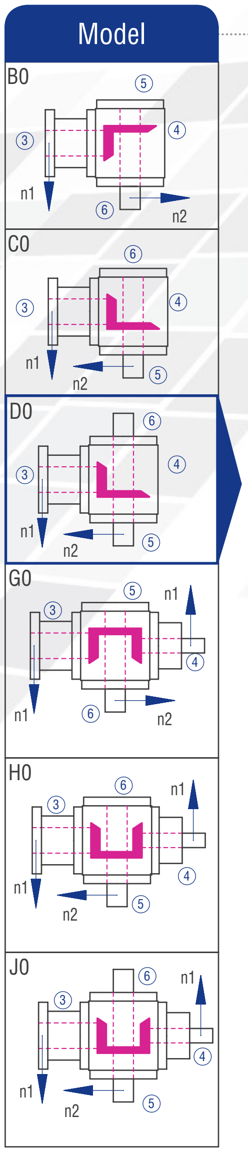
Model	Inertia moment [kgcm²]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	826.100	347.183	202.675	136.373	115.804	105.534	100.558	100.0
B0	839.340	209.512	289.735	168.511	135.694	118.264	109.454	100.0
C0	839.340	209.512	289.735	168.511	135.694	118.264	109.454	100.0
D0	853.750	424.806	293.338	103.557	136.594	118.840	109.854	103.0
E0N	840.590	454.512	296.298	171.400	137.319	119.304	110.176	97.0
E0S	904.240	482.801	312.210	178.470	141.296	121.849	111.944	99.9
F0	1233.20	528.117	304.450	181.607	141.248	121.818	111.867	120.0
G0	1246.44	334.512	382.235	208.361	157.024	139.264	129.954	124.0
H0	1246.44	334.512	382.235	208.361	157.024	139.264	129.954	124.0
J0	1260.85	549.806	385.838	143.407	157.924	139.840	130.354	127.0
K0N	1247.69	579.512	388.798	211.250	158.649	140.304	130.676	121.0
K0S	1311.34	607.801	404.710	218.320	162.626	142.849	132.444	123.9

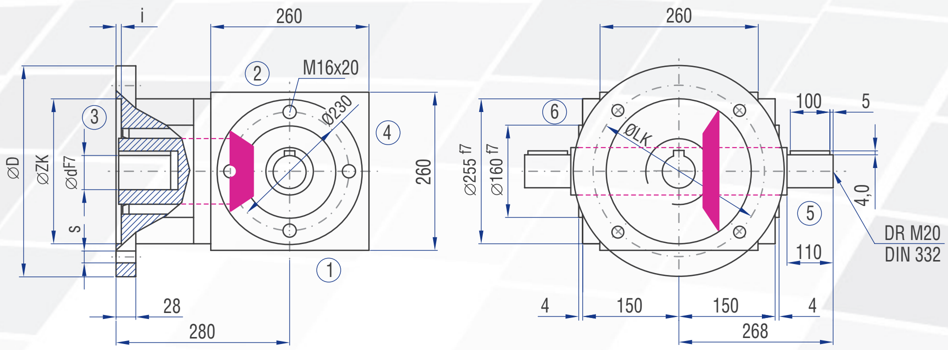


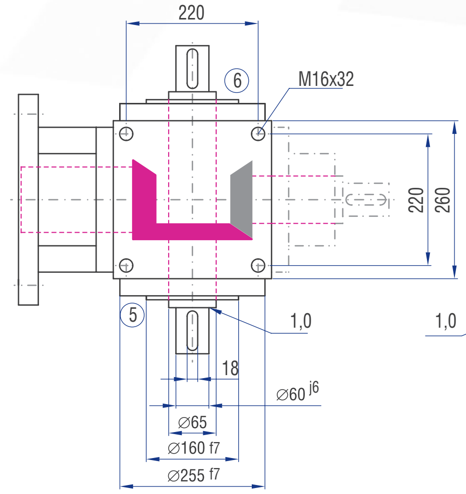




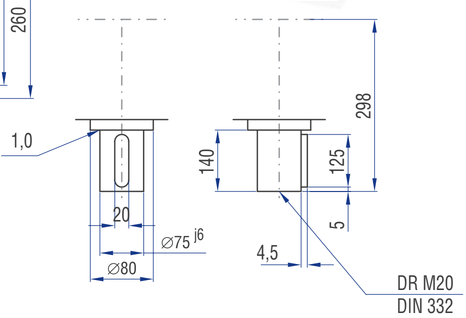




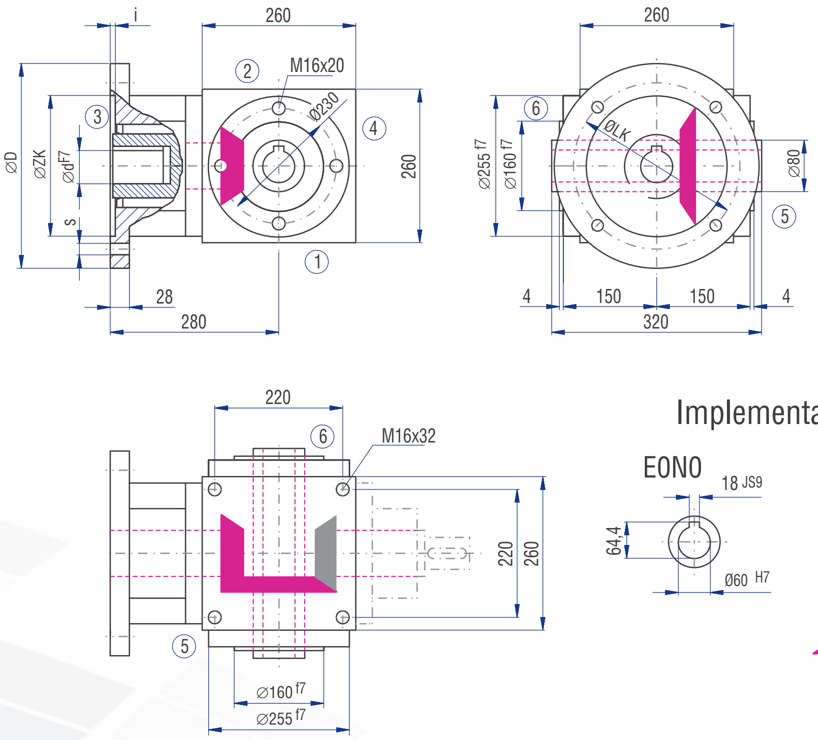




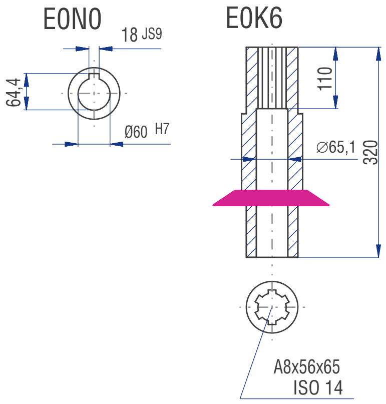
Implementation VV

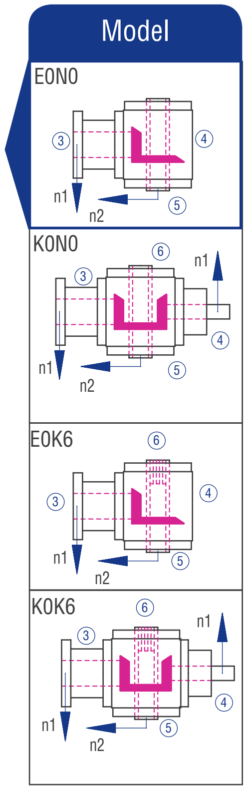


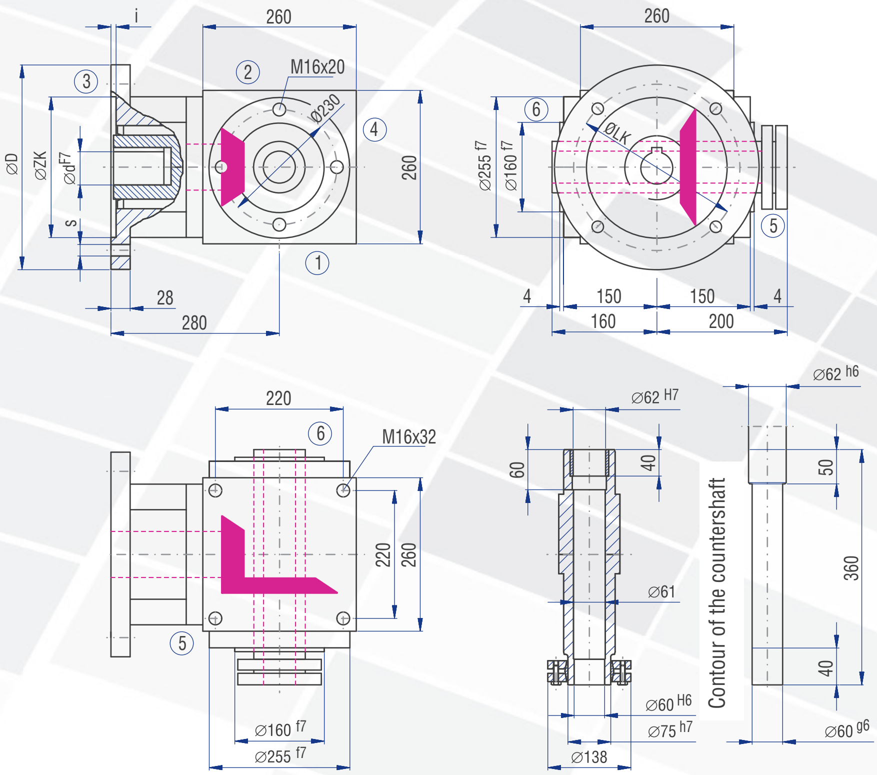
IEC motor	Model	Shaft (dxl)	D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]
132	B5	38x80	300	265	230	14	5
160	B5	42x110	350	300	250	18	6
180	B5	48x110	350	300	250	18	6
200	B5	55x110	400	350	300	18	6

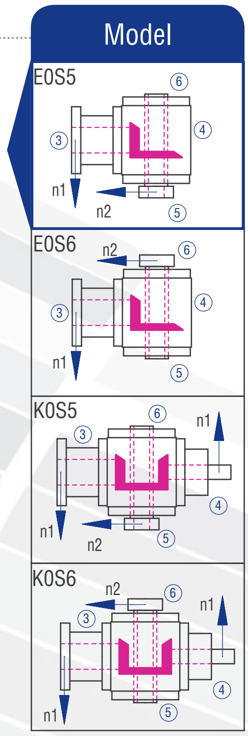


Implementation









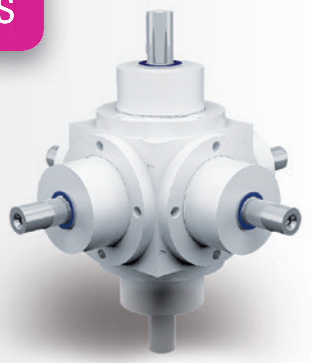
The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

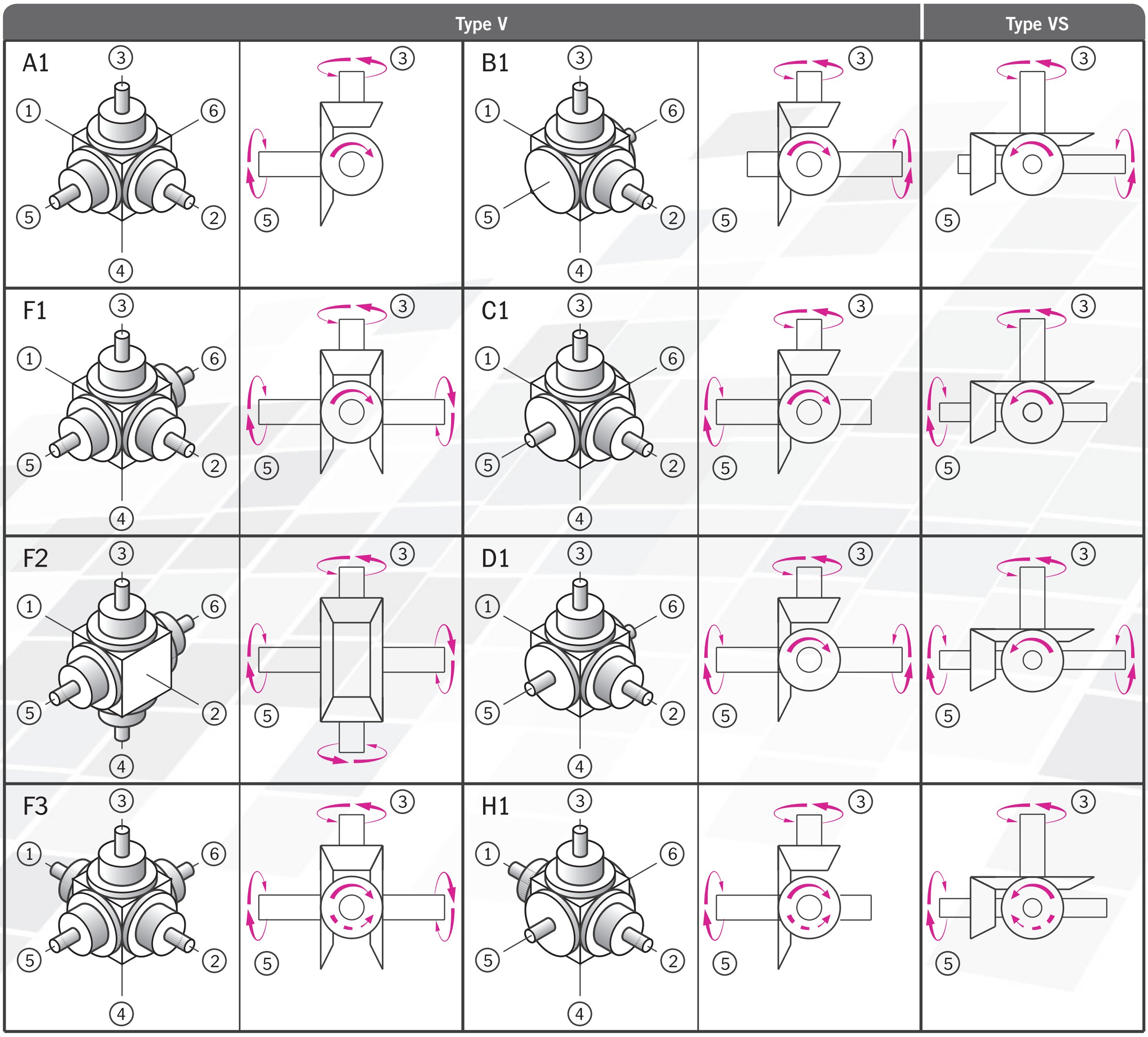
ATEK ANTRIEBSTECHNIK

6.6 Multi shaft bevel gearboxes – with additional shafts

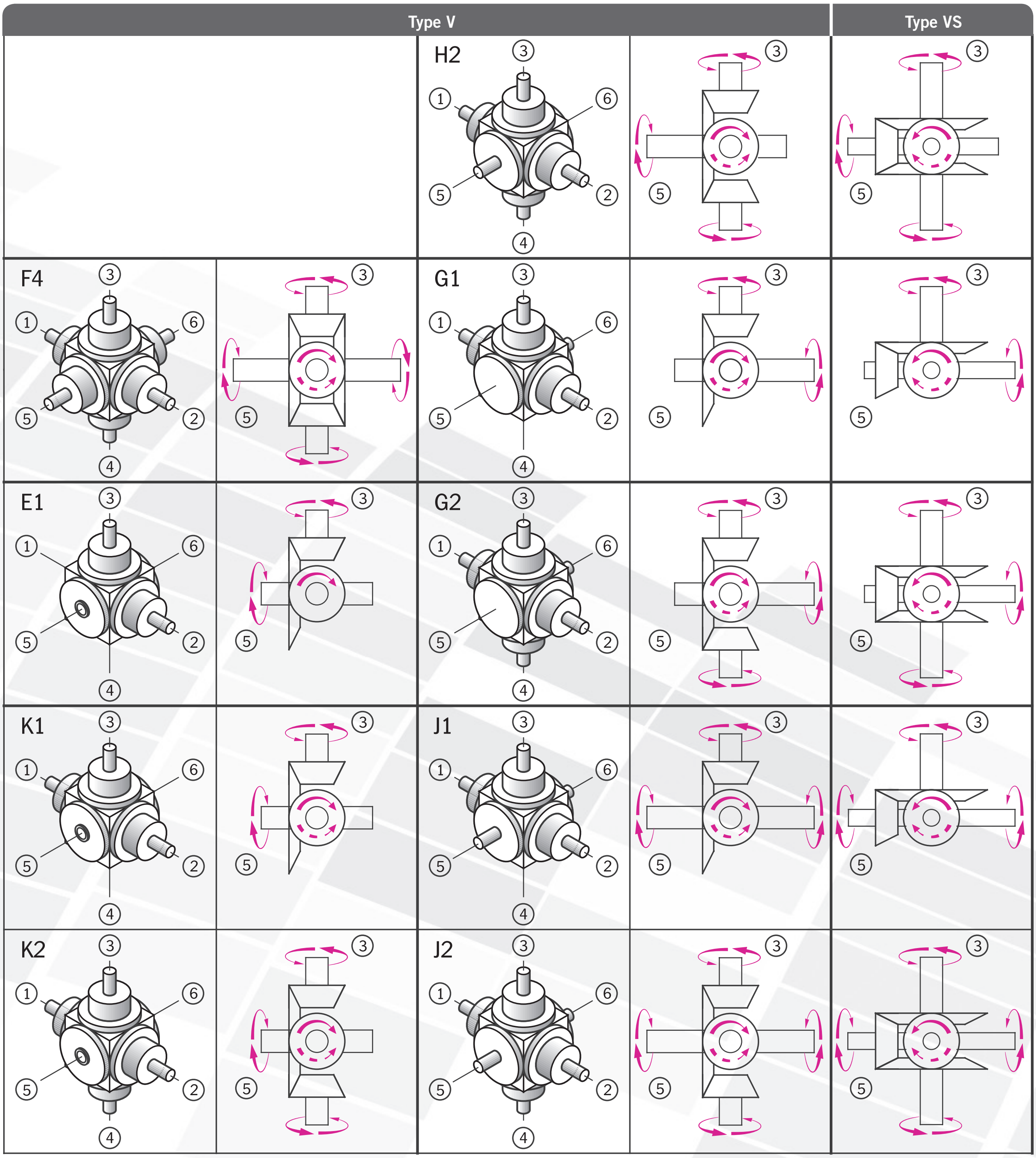
6.6.1 Features

for gear ratios of 1.5:1 to 6:1 with type V
for gear ratios of 1.5:1 to 2:1 with type VS
with solid shaft or hollow shaft
up to 6 shaft ends



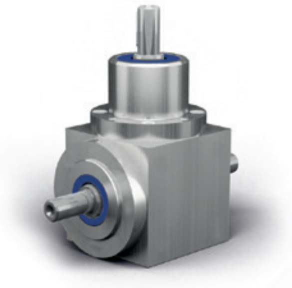


The modular system of our bevel gearboxes makes it possible to manufacture a variety of type variants. In the standard gearboxes, the shafts are always arranged in one plane. In Multi shaft gearboxes, additional shafts can be arranged perpendicular to this plane. The dimensions and permissible loads correspond to the standard types. The power flow is defined by the application. The gear ratio of 1:1 is only possible with type F2 (*). Apart from that, all gear ratios are available. Only one gear ratio may be realised within one gearbox.



7 Hygiene-design gearboxes

7.1 Type overview



Type HDV – Hygiene-design bevel gearboxes

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 430 Nm
4 gearbox sizes with edge lengths of 065 to 140 mm
Low-backlash construction < 10 angular minutes possible
All outside parts made of VA steel

7.2 Type HDV – Hygiene-design bevel gearboxes

The HDV-series gearboxes are intended for the use in food and pharmaceutical industries (including offshore and rough conditions). They are based on our proven standard gearboxes from the range of single-stage bevel gearboxes (V series) and have therefore the same external dimensions.

They vary in the following features:

- All outside parts are made of high-quality stainless steel.
- The shaft seal rings installed in the type have an additional dust lip.
- The housing and the flanges do not contain any bores or other dust pockets.
- Required mounting bores will be drilled application-specifically according to your specifications.
- The dimensions of the gearboxes are identical to those of the type-V gearboxes.
- Etched type plate
- No vent filters
- Surface roughness < Ra 0.8
- NOTOX lubrication

Hygiene-design gearboxes

7.2.1 General construction

The axles intersect in the gearbox in an angle of 90°. Housing, cover(s) and shafts are made of stainless steel.
The edge length of the housing is reflected in the gearbox size (example: HDV 065 – housing edge length 65 mm).

7.2.2 Toothing

ATEK bevel gearboxes have gear sets with high-quality spiral toothing made of hardened carburised steel. A gear set comprises one bevel pinion (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, combined with optimal running smoothness and high transmission accuracy.

7.2.3 Construction types

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

Construction type	consists of:	
A0 through E0	1 gear set	
F0 through K0	1 gear set	+ 1 bevel pinion or bevel gear

Table **7.2.3-1**

The variants differ in type and number of the shafts, the rotational direction of the shafts and their support by bearings.

7.2.4 Threaded mounting holes

All 6 sides of the gearboxes are machined and may be used as mounting surfaces. The standard version has no threaded mounting holes. Threaded mounting holes will be drilled according to your requirements.

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	-	-
1	1	
2	2	
3		3
4	4	
5		5
6		6

Table **7.2.4-1**

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The standard version of the mounting / fastening has the order code 0.
Example of order code: HDV 090 1:1D0 1.1 500/0000

The size and the position of the threaded mounting holes correspond to those of the type V (page 29 and following)

	HDV 065	HDV 090	HDV 120	HDV 140
Thread size	M6 x 12	M8 x 14	M10 x 16	M10 x 20
Grid spacing (mm)	45	70	100	110

Tabelle **7.2.4-2**

7.2.5 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. Please contact us for consultation if the angle of the gearbox side directed downwards deviates more than 15° from the horizontal position.

7.2.6 Shaft designation – allocation to the gearbox sides

The fast-rotating shaft has the speed n1 and is identified by N1. The bevel pinion is located on this shaft.
The slowly rotating shaft has the speed n2 and is identified by N2. The bevel 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)

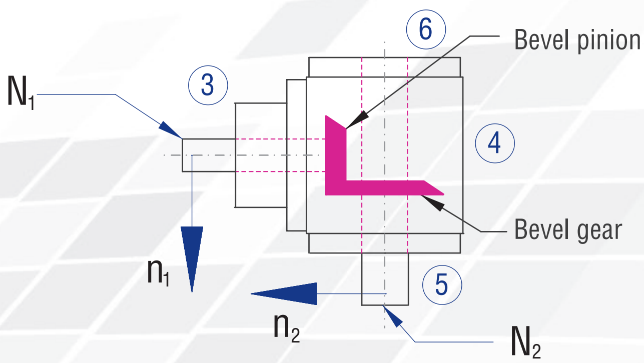


Figure **7.2.6-1; Shaft designations**

7.2.7 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 1 to 2 dB(A) lower noise level is generated.

7.2.8 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type.
With gearboxes having only one gear set, an efficiency of 97% can be achieved. With gearboxes having several gear meshings, an efficiency of 94% can be achieved. The efficiencies specified in the tables relate to the permissible nominal load and are guidance values for run-in gearboxes at operating temperature with standard sealing and filled with oil of viscosity grade 220.

7.2.9 Lubrication

The HDV-series gearboxes have lifetime NOTOX lubrication.

7.2.10 Vent filter

No venting is provided.

7.2.11 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 (N1) has been fixed. A force of around 2% of the nominal torque is applied to the output shaft (N2) 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	1:1 2:1	3:1 4:1 5:1 6:1
/0000	Standard	<=30 arcmin	<=30 arcmin
/S2	Standard	<=10 arcmin	<=10 arcmin
/S1	Standard	<=6 arcmin	u.r.
/S0	Special gear set	<=4 arcmin	u.r.

Abbreviations: ✓- yes, is possible

7.2.12 Corrosion protection

Housing, flanges and shafts are made of rust-proof stainless steel.

7.2 Type HDV – Hygiene-design bevel gearboxes

7.2.13 Features

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 430 Nm
4 gearbox sizes with edge lengths of 065 to 140 mm
Low-backlash construction < 10 angular minutes possible
All outside parts made of VA steel

7.2.14 Models

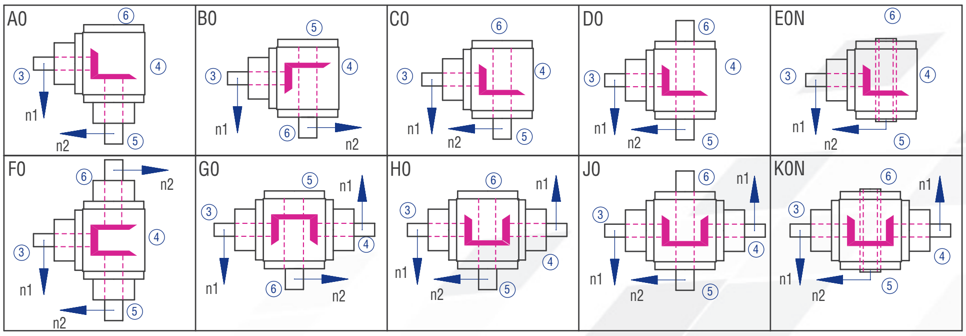


Figure **7.2.14-1; Models**

7.2.15 Gearbox sides

The example shows the Model C0

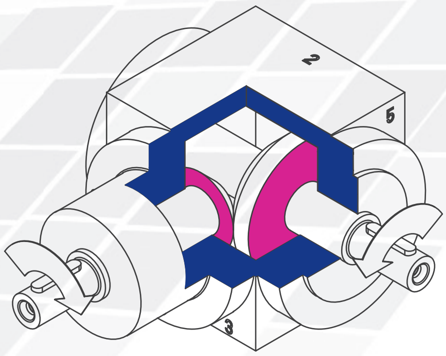


Figure **7.2.15-1; Gearbox sides**

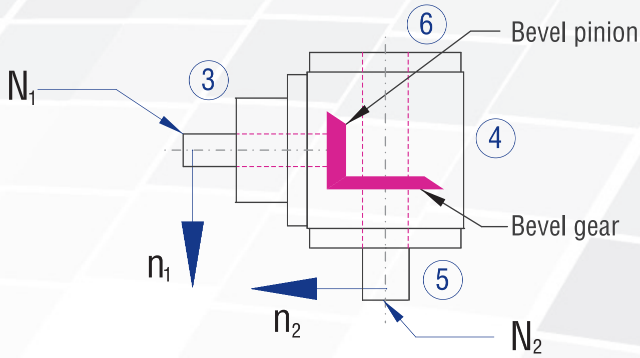


Figure **7.2.15-2; Shaft designations**

7.2.16 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
HDV	065	1:1	C0-	1.	1-	500	/0000
Description	Housing edge length; Table 7.2.17-1	Table 7.2.17-1	Figure 7.2.14-1; Models	Side on which fixing is made; Table 7.2.4-1; Figure 4.3.1-1 Gearbox sides	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 7.2.17-1	S1 Standard

7.2.17 Overview of performance data

Size	n_1 [rpm]	1:1 n_2 [rpm]	1:1 P_{1N} [kW]	1:1 T_{2N} [Nm]	1.5:1 n_2 [rpm]	1.5:1 P_{1N} [kW]	1.5:1 T_{2N} [Nm]	2:1 n_2 [rpm]	2:1 P_{1N} [kW]	2:1 T_{2N} [Nm]	3:1 n_2 [rpm]	3:1 P_{1N} [kW]	3:1 T_{2N} [Nm]	4:1 n_2 [rpm]	4:1 P_{1N} [kW]	4:1 T_{2N} [Nm]	5:1 n_2 [rpm]	5:1 P_{1N} [kW]	5:1 T_{2N} [Nm]	6:1 n_2 [rpm]	6:1 P_{1N} [kW]	6:1 T_{2N} [Nm]
065	3000	3000	3,31	10	2000	2,20	10	1500	1,65	10	1000	1,10	10									
	2400	2400	2,65	10	1600	1,76	10	1200	1,32	10	800	0,88	10									
	1500	1500	1,82	11	1000	1,21	11	750	0,91	11	500	0,61	11									
	1000	1000	1,32	12	667	0,88	12	500	0,66	12	333	0,44	12									
	750	750	1,07	13	500	0,72	13	375	0,54	13	250	0,33	12									
	500	500	0,83	15	333	0,55	15	250	0,41	15	167	0,24	13									
	250	250	0,47	17	167	0,31	17	125	0,23	17	83	0,12	13									
	50	50	0,10	18	33	0,07	18	25	0,05	18	17	0,03	14									
090	3000	3000	8,93	27	2000	5,51	25	1500	3,80	23	1000	2,54	23	750	1,90	23	600	1,52	23	500	1,25	23
	2400	2400	7,41	28	1600	4,59	26	1200	3,17	24	800	2,12	24	600	1,65	25	480	1,32	25	400	1,09	25
	1500	1500	5,29	32	1000	3,20	29	750	2,23	27	500	1,49	27	375	1,12	27	300	0,89	27	250	0,74	27
	1000	1000	3,75	34	667	2,35	32	500	1,71	31	333	1,14	31	250	0,85	31	200	0,68	31	167	0,53	29
	750	750	3,06	37	500	1,93	35	375	1,32	32	250	0,88	32	188	0,66	32	150	0,53	32	125	0,40	29
	500	500	2,20	40	333	1,36	37	250	0,94	34	167	0,63	34	125	0,47	34	100	0,37	34	83	0,27	29
	250	250	1,21	44	167	0,74	40	125	0,50	36	83	0,33	36	63	0,25	36	50	0,20	36	42	0,14	30
	50	50	0,28	50	33	0,16	45	25	0,10	37	17	0,07	37	13	0,05	37	10	0,04	37	8	0,03	33
120	3000	3000	21,82	66	2000	13,45	61	1500	9,26	56	1000	6,39	58	750	4,96	60	600	3,97	60	500	2,95	54
	2400	2400	18,52	70	1600	11,46	65	1200	8,07	61	800	5,56	63	600	4,43	67	480	3,44	65	400	2,53	57
	1500	1500	13,56	82	1000	8,60	78	750	6,03	73	500	4,08	74	375	3,06	74	300	2,38	72	250	1,75	64
	1000	1000	10,14	92	667	6,32	86	500	4,46	81	333	3,01	82	250	2,18	79	200	1,76	80	167	1,22	66
	750	750	8,51	103	500	5,18	94	375	3,55	86	250	2,40	87	188	1,69	82	150	1,42	86	125	0,94	68
	500	500	6,34	115	333	3,85	100	250	2,54	92	167	1,66	90	125	1,16	84	100	0,98	89	83	0,63	69
	250	250	3,39	123	167	1,99	100	125	1,35	98	83	0,87	95	63	0,60	87	50	0,51	92	42	0,33	71
	50	50	0,72	130	33	0,41	100	25	0,29	107	17	0,21	110	13	0,12	90	10	0,10	95	8	0,06	66
140	3000	3000	39,68	120	2000	24,91	113	1500	16,53	100	1000	12,12	110	750	8,51	103	600	6,61	100	500	5,18	94
	2400	2400	37,04	140	1600	22,22	126	1200	14,68	111	800	11,46	130	600	7,34	111	480	5,56	105	400	4,58	104
	1500	1500	26,78	162	1000	17,08	155	750	11,41	138	500	8,05	146	375	4,96	120	300	3,80	115	250	2,95	107
	1000	1000	20,28	184	667	12,87	175	500	8,38	152	333	5,87	160	250	3,75	136	200	2,73	124	167	2,06	112
	750	750	16,20	196	500	10,47	190	375	6,86	166	250	4,60	167	188	3,06	148	150	2,15	130	125	1,61	117
	500	500	11,46	208	333	7,34	200	250	4,96	180	167	3,20	174	125	2,12	154	100	1,50	136	83	1,09	119
	250	250	5,92	215	167	3,76	204	125	2,62	190	83	1,62	177	63	1,12	162	50	0,79	143	42	0,56	121
	50	50	1,21	220	33	0,76	210	25	0,55	200	17	0,34	180	13	0,23	170	10	0,17	150	8	0,11	120

Table **7.2.17-1**

7.2.18 Type HDV 065 – Hygiene-design bevel gearboxes

Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 7.2.2
Gear ratios	1:1 to 3:1	
Housing / Flanges	1.4581 / 1.4305	See chapter 7.2.1
Threaded mounting holes	Customer-specific	See chapter 7.2.4
Shaft	1.4305, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	1.4305, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 7.2.11
Protection class	IP 56	See chapter 4.5
Corrosion protection	-	See chapter 7.2.12
Bearing life L10h:	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 7.2.9
Lubricants	Synthetic lubricant, NSF-approved (NOTOX)	See chapter 7.2.9
Type plate	Etched	

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	3.31	10	2000	2.20	10	1500	1.65	10	1000	1.10	10									
2400	2400	2.65	10	1600	1.76	10	1200	1.32	10	800	0.88	10									
1500	1500	1.82	11	1000	1.21	11	750	0.91	11	500	0.61	11									
1000	1000	1.32	12	667	0.88	12	500	0.66	12	333	0.44	12									
750	750	1.07	13	500	0.72	13	375	0.54	13	250	0.33	12									
500	500	0.83	15	333	0.55	15	250	0.41	15	167	0.24	13									
250	250	0.47	17	167	0.31	17	125	0.23	17	83	0.12	13									
50	50	0.10	18	33	0.07	18	25	0.05	18	17	0.03	14									

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	1.4	1.4	1.4	1.4			
T_{2max} [Nm]	25	25	25	23			

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

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

The permissible radial forces depend on torque, rotational speed and direction.
They must be calculated for the respective case of application. Please enquire these.

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	180	90	250	125	300	150	350	175	450	225	550	275
> 12	150	75	210	105	250	125	290	145	380	190	460	230

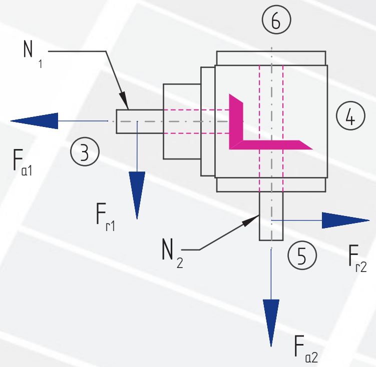
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	300	150	400	200	500	250	650	325	750	375	900	450
> 12	250	125	330	165	420	210	540	270	630	315	750	375

Inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass [kg]
A0	0.3888	0.2406	0.1839	0.1036				2.3
B0	0.4231	0.3111	0.2330	0.1001				2.2
C0	0.4231	0.3111	0.2330	0.1001				2.2
D0	0.4330	0.3155	0.2355	0.1012				2.3
E0N	0.4754	0.3634	0.2853	0.1524				2.1
E0S	0.6012	0.4892	0.4111	0.2782				2.1
F0	0.5832	0.3270	0.2325	0.1252				2.7
G0	0.6175	0.4653	0.3683	0.1821				2.6
H0	0.6175	0.4653	0.3683	0.1821				2.6
J0	0.6274	0.4697	0.3708	0.1832				2.7
K0N	0.6698	0.5176	0.4206	0.2344				2.5
K0S	0.7956	0.6434	0.5464	0.3602				2.5



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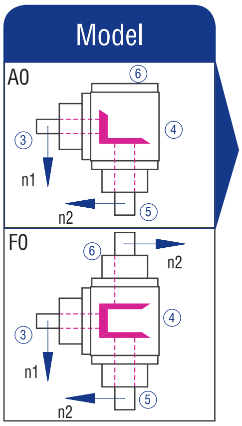
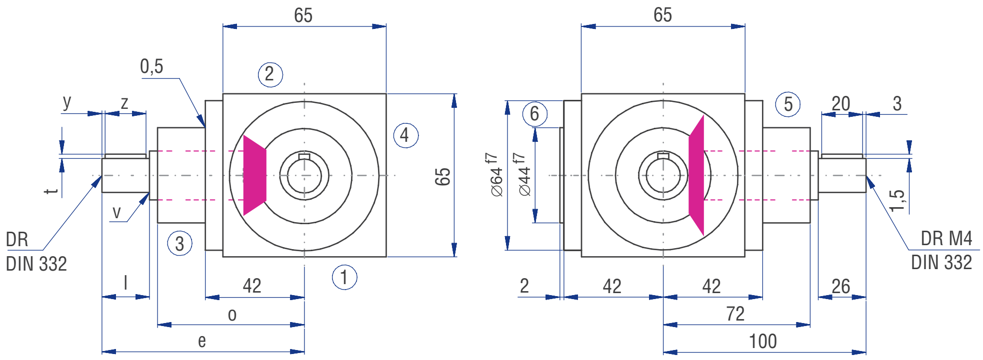
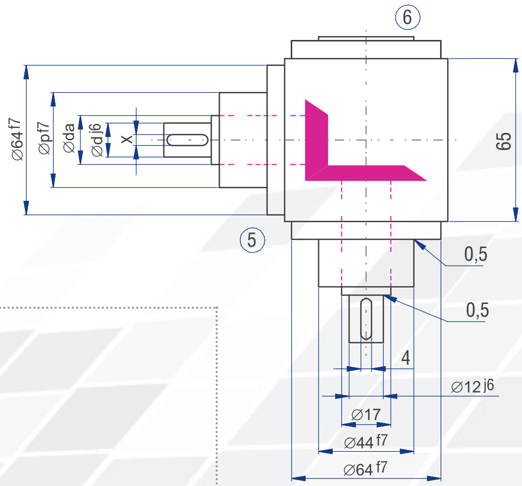
7.2.18 Type HDV 065 – Hygiene-design bevel gearboxes

Model

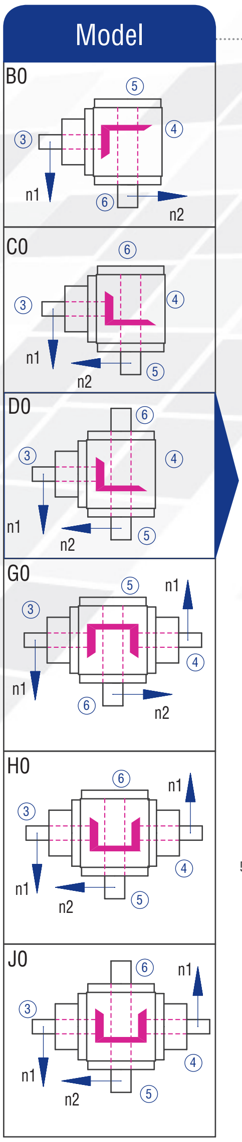


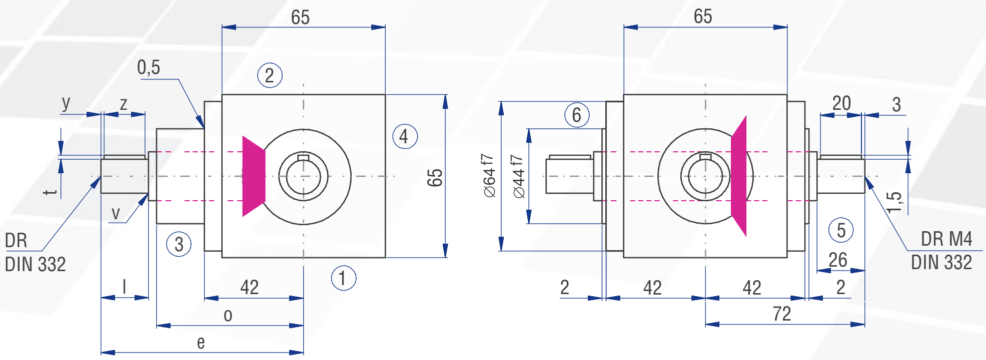


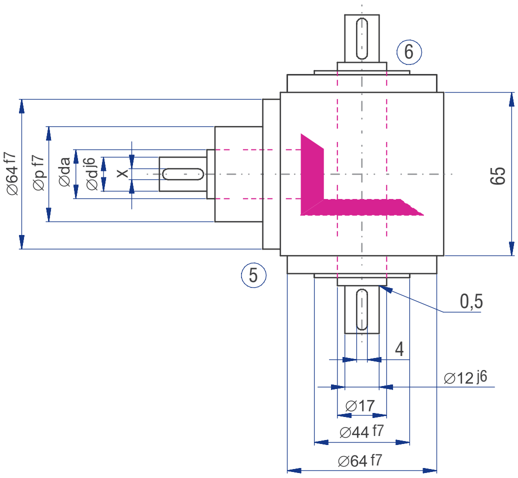


	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	17	17	17	17			
da [mm]	12	12	12	12			
l [mm]	100	100	100	100			
v [mm]	26	26	26	26			
x [mm]	72	72	72	72			
y [mm]	44	44	44	44			
z [mm]	1.5	1.5	1.5	1.5			
t [mm]	0.5	0.5	0.5	0.5			
e [mm]	4	4	4	4			
o [mm]	3	3	3	3			
p [mm]	20	20	20	20			
DR M	4	4	4	4			

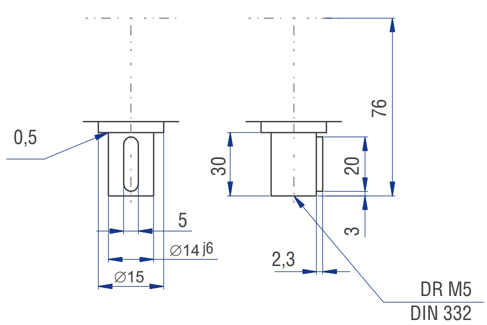
Model







Implementation VV



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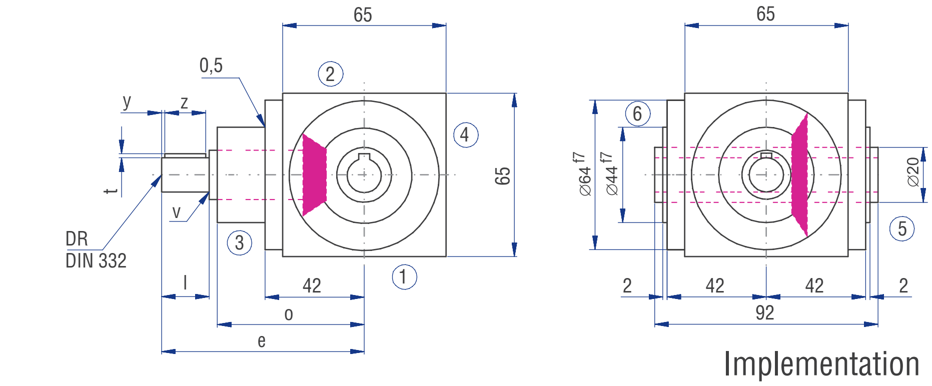
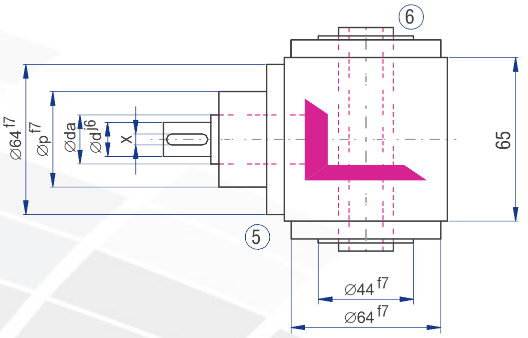
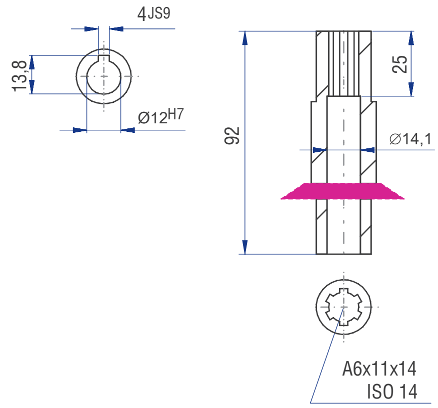
The dimensions of the Models not shown can be figured by mirroring available dimensions.



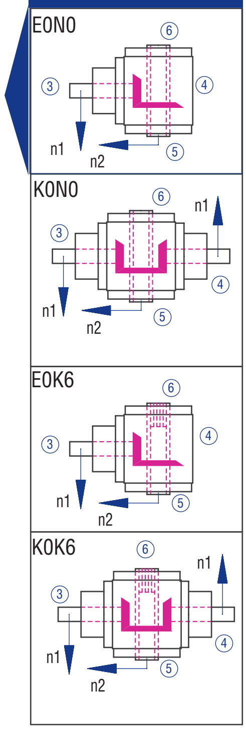


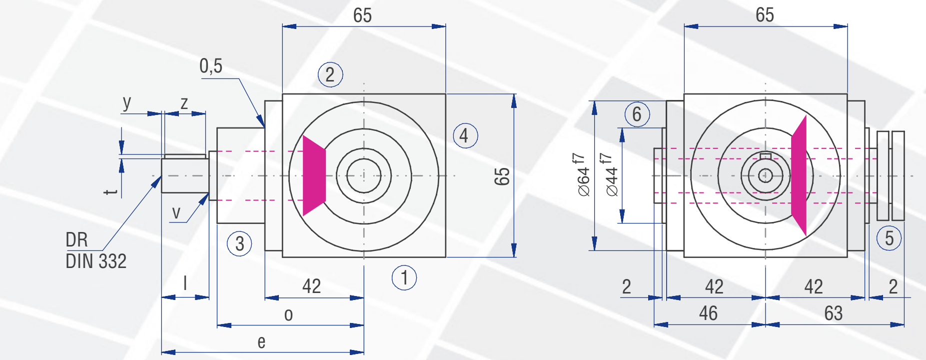
Implementation

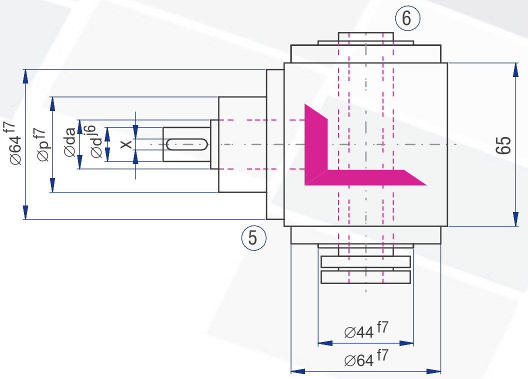
E0N0 E0K6

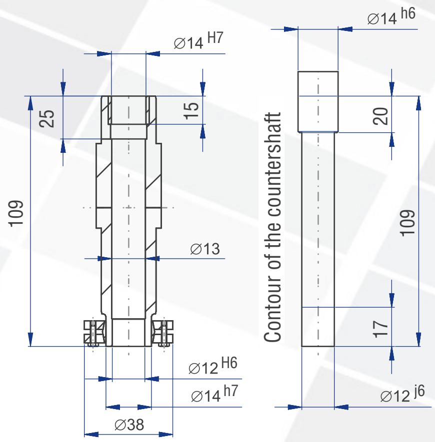


Model

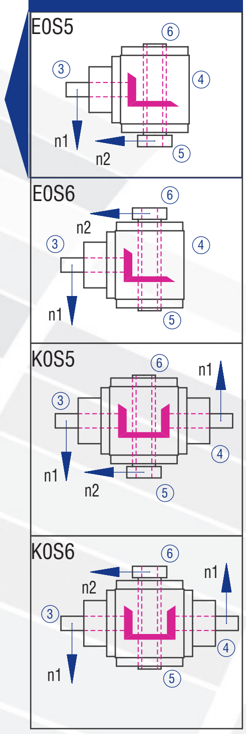




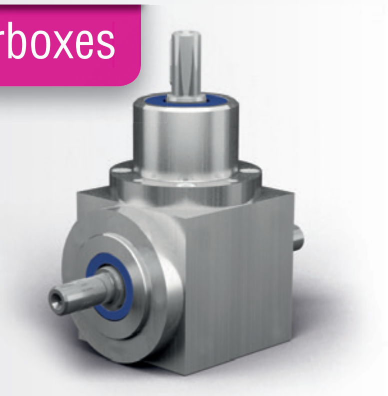




Model



7.2.19 Type HDV 090 – Hygiene-design bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 7.2.2
Gear ratios	1:1 to 6:1	
Housing / Flanges	1.4581 / 1.4305	See chapter 7.2.1
Threaded mounting holes	Customer-specific	See chapter 7.2.4
Shaft	1.4305, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	1.4305, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 7.2.11
Protection class	IP 56	See chapter 4.5
Corrosion protection	-	See chapter 7.2.12
Bearing life L10h:	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 7.2.9
Lubricants	Synthetic lubricant, NSF-approved (NOTOX)	See chapter 7.2.9
Type plate	Etched	

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	8.93	27	2000	5.51	25	1500	3.80	23	1000	2.54	23	750	1.90	23	600	1.52	23	500	1.25	23
2400	2400	7.41	28	1600	4.59	26	1200	3.17	24	800	2.12	24	600	1.65	25	480	1.32	25	400	1.09	25
1500	1500	5.29	32	1000	3.20	29	750	2.23	27	500	1.49	27	375	1.12	27	300	0.89	27	250	0.74	27
1000	1000	3.75	34	667	2.35	32	500	1.71	31	333	1.14	31	250	0.85	31	200	0.68	31	167	0.53	29
750	750	3.06	37	500	1.93	35	375	1.32	32	250	0.88	32	188	0.66	32	150	0.53	32	125	0.40	29
500	500	2.20	40	333	1.36	37	250	0.94	34	167	0.63	34	125	0.47	34	100	0.37	34	83	0.27	29
250	250	1.21	44	167	0.74	40	125	0.50	36	83	0.33	36	63	0.25	36	50	0.20	36	42	0.14	30
50	50	0.28	50	33	0.16	45	25	0.10	37	17	0.07	37	13	0.05	37	10	0.04	37	8	0.03	33

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	3.4	3.4	3.4	3.4	3.4	3.4	3.4
T_{2max} [Nm]	105	45	80	70	70	60	50

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

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

The permissible radial forces depend on torque, rotational speed and direction.
They must be calculated for the respective case of application. Please enquire these.

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	300	150	400	200	470	235	580	290	700	350	800	400
> 30	250	125	330	165	390	195	490	245	590	295	670	335

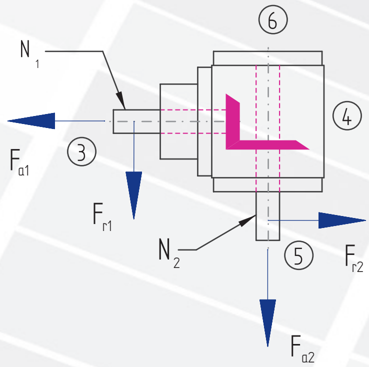
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	500	250	660	330	800	400	950	475	1250	625	1500	750
> 30	420	210	550	275	670	335	790	395	1040	520	1250	625

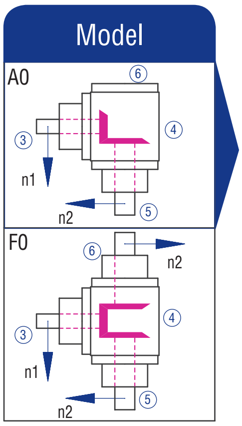
Inertia moments/mass

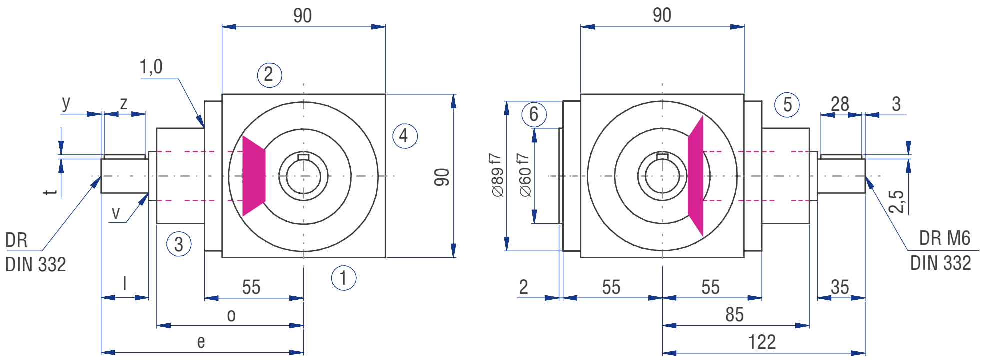
The mass of the gearbox may deviate depending on the gear ratio.

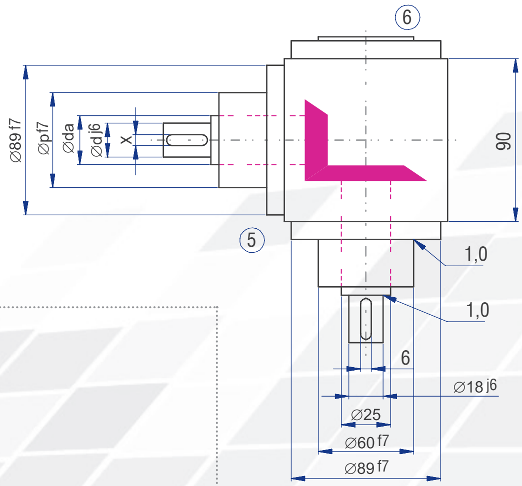
Model	Inertia moment [kgcm²]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	2.5590	1.4822	1.1437	0.8884	0.3631	0.3248	0.3062	5.1
B0	3.3543	2.1833	1.3652	1.0465	0.4607	0.3933	0.3502	5.4
C0	3.3543	2.1833	1.3652	1.0465	0.4607	0.3933	0.3502	5.4
D0	3.3827	2.1959	1.3723	1.0496	0.4625	0.3945	0.3510	5.5
E0N	3.2507	2.1372	1.3393	1.0350	0.4542	0.3892	0.3473	5.0
E0S	3.9213	2.4353	1.5069	1.1095	0.4961	0.4160	0.3660	5.2
F0	3.8385	2.0508	1.4636	1.0305	0.4430	0.3760	0.3418	6.3
G0	4.6338	3.0968	2.1890	1.7927	0.7438	0.6669	0.6209	6.9
H0	4.6338	3.0968	2.1890	1.7927	0.7438	0.6669	0.6209	6.9
J0	4.6622	3.1094	2.1961	1.7958	0.7456	0.6681	0.6217	7.0
K0N	4.5302	3.0507	2.1631	1.7812	0.7373	0.6628	0.6180	6.5
K0S	5.2008	3.3488	2.3307	1.8557	0.7792	0.6896	0.6367	6.7



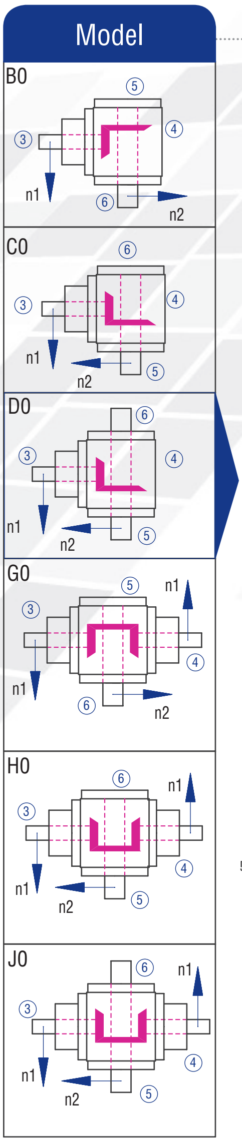
7.2.19 Type HDV 090 – Hygiene-design bevel gearboxes

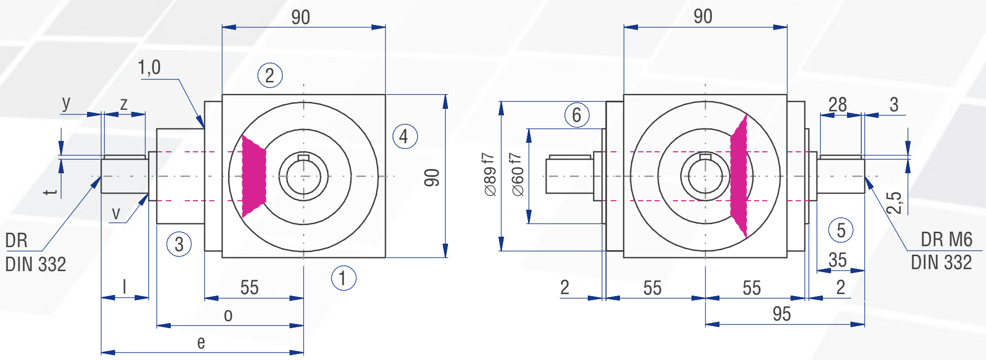


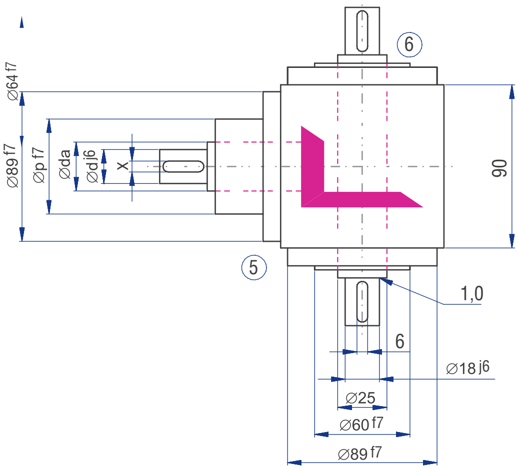




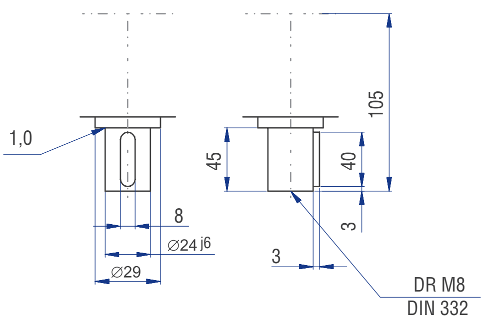
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	25	25	25	20	20	20	20
da [mm]	18	18	18	12	12	12	12
l [mm]	122	122	122	122	132	132	132
v [mm]	35	35	35	35	35	35	35
x [mm]	85	85	85	85	95	95	95
y [mm]	60	60	60	60	60	60	60
z [mm]	2.5	2.5	2.5	1.5	1.5	1.5	1.5
t [mm]	1	1	1	0.5	0.5	0.5	0.5
e [mm]	6	6	6	4	4	4	4
o [mm]	3	3	3	3	3	3	3
p [mm]	28	28	28	28	28	28	28
DR M	6	6	6	4	4	4	4







Implementation VV



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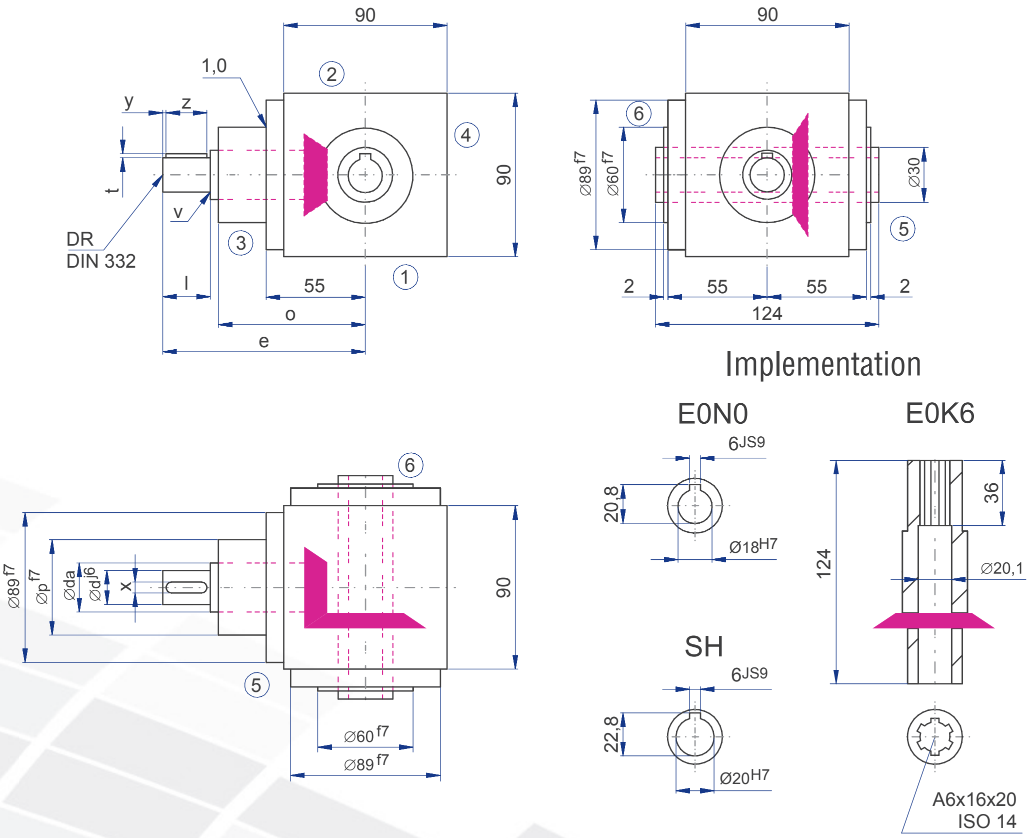
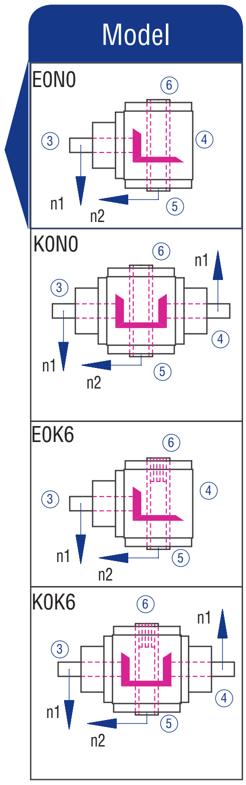
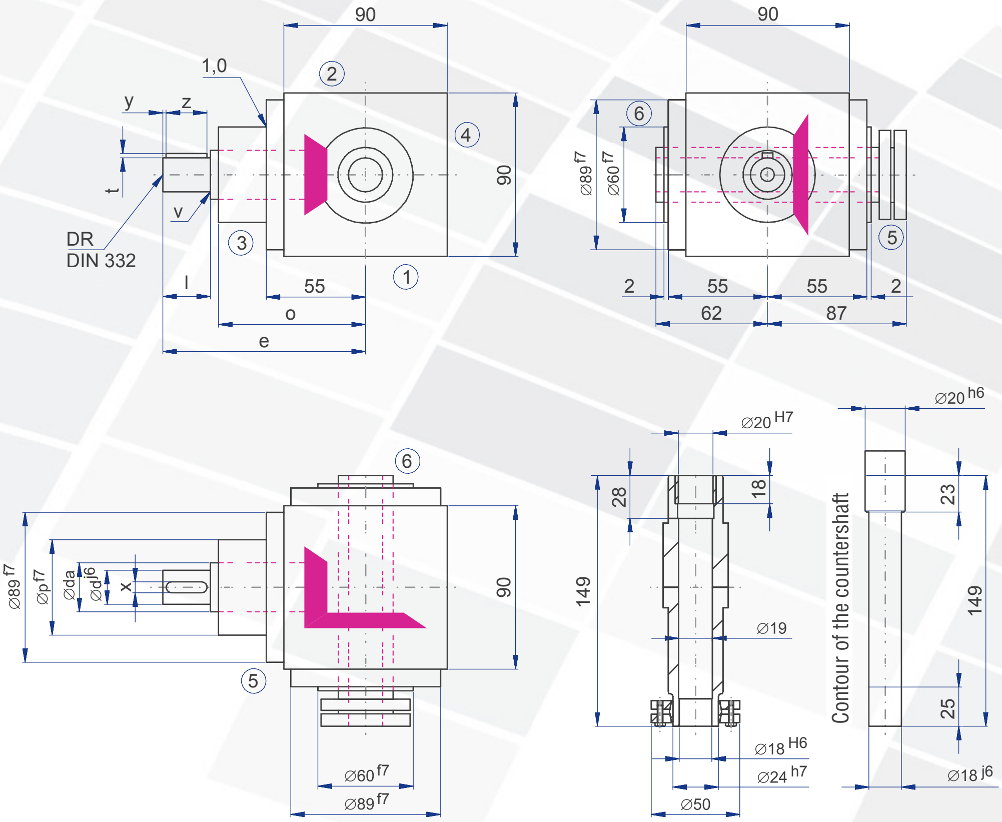
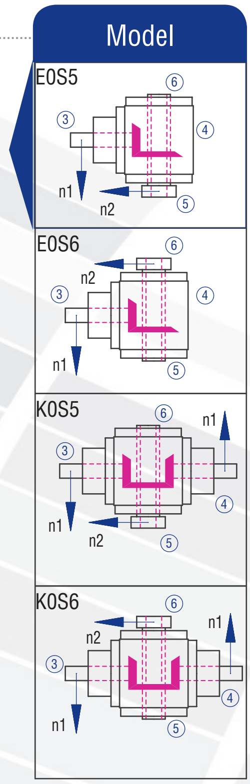
The dimensions of the Models not shown can be figured by mirroring available dimensions.









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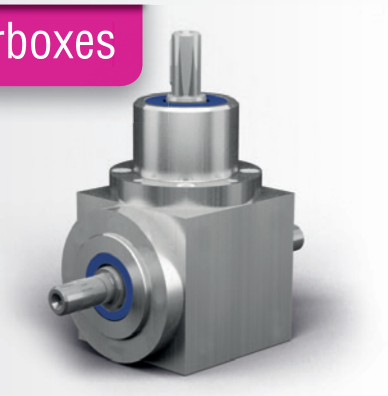
7.2.20 Type HDV 120 – Hygiene-design bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 7.2.2
Gear ratios	1:1 to 6:1	
Housing / Flanges	1.4581 / 1.4305	See chapter 7.2.1
Threaded mounting holes	Customer-specific	See chapter 7.2.4
Shaft	1.4305, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	1.4305, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 7.2.11
Protection class	IP 56	See chapter 4.5
Corrosion protection	-	See chapter 7.2.12
Bearing life L10h:	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 7.2.9
Lubricants	Synthetic lubricant, NSF-approved (NOTOX)	See chapter 7.2.9
Type plate	Etched	

Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	21.82	66	2000	13.45	61	1500	9.26	56	1000	6.39	58	750	4.96	60	600	3.97	60	500	2.95	54
2400	2400	18.52	70	1600	11.46	65	1200	8.07	61	800	5.56	63	600	4.43	67	480	3.44	65	400	2.53	57
1500	1500	13.56	82	1000	8.60	78	750	6.03	73	500	4.08	74	375	3.06	74	300	2.38	72	250	1.75	64
1000	1000	10.14	92	667	6.32	86	500	4.46	81	333	3.01	82	250	2.18	79	200	1.76	80	167	1.22	66
750	750	8.51	103	500	5.18	94	375	3.55	86	250	2.40	87	188	1.69	82	150	1.42	86	125	0.94	68
500	500	6.34	115	333	3.85	100	250	2.54	92	167	1.66	90	125	1.16	84	100	0.98	89	83	0.63	69
250	250	3.39	123	167	1.99	100	125	1.35	98	83	0.87	95	63	0.60	87	50	0.51	92	42	0.33	71
50	50	0.72	130	33	0.41	100	25	0.29	107	17	0.21	110	13	0.12	90	10	0.10	95	8	0.06	66

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	5.6	5.6	5.6	5.6	5.6	5.6	5.6
T_{2max} [Nm]	220	100	169	155	155	140	120

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

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

The permissible radial forces depend on torque, rotational speed and direction.
They must be calculated for the respective case of application. Please enquire these.

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	470	235	620	310	720	360	900	450	1150	575	1400	700
> 80	390	195	520	260	600	300	750	375	960	480	1170	585

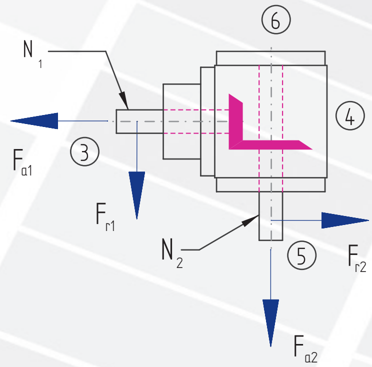
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	750	375	1000	500	1250	625	1500	750	1900	950	2200	1100
> 80	630	315	830	415	1040	520	1250	625	1580	790	1830	915

Inertia moments/mass

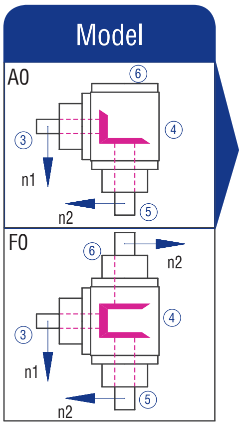
The mass of the gearbox may deviate depending on the gear ratio.

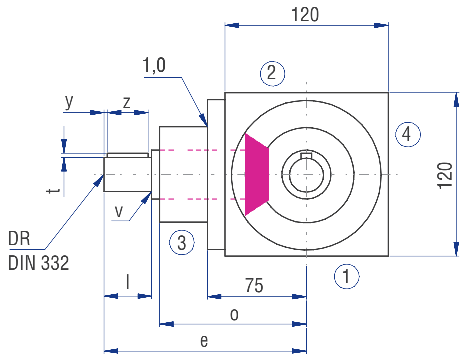
Model	Inertia moment [kgcm^2]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	10.4976	4.8409	3.6465	2.3159	1.2164	0.7516	0.6766	12.6
B0	15.3022	7.4441	4.9747	3.0123	1.6729	1.0593	0.8982	12.3
C0	15.3022	7.4441	4.9747	3.0123	1.6729	1.0593	0.8982	12.3
D0	15.5996	7.5762	5.0490	3.0453	1.6915	1.0712	0.9065	12.5
E0N	15.1939	7.3959	4.9476	3.0003	1.6661	1.0550	0.8952	12.0
E0S	16.9812	8.1903	5.3944	3.1988	1.7778	1.1265	0.9449	12.3
F0	15.7464	7.1737	4.9587	2.8991	1.5444	0.9615	0.8224	15.0
G0	20.5510	9.9522	7.3090	4.7450	2.5612	1.6009	1.4290	14.7
H0	20.5510	9.9522	7.3090	4.7450	2.5612	1.6009	1.4290	14.7
J0	20.8484	10.0843	7.3833	4.7780	2.5798	1.6128	1.4373	14.9
K0N	20.4427	9.9040	7.2819	4.7330	2.5544	1.5966	1.4260	14.4
K0S	22.2300	10.6984	7.7287	4.9315	2.6661	1.6681	1.4757	14.7

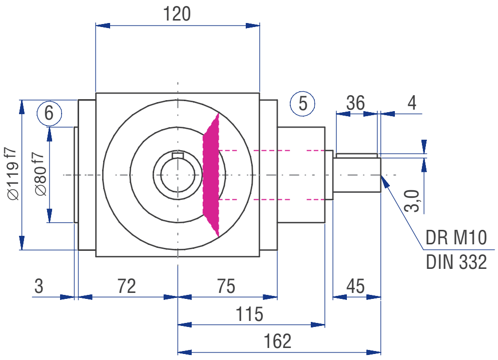


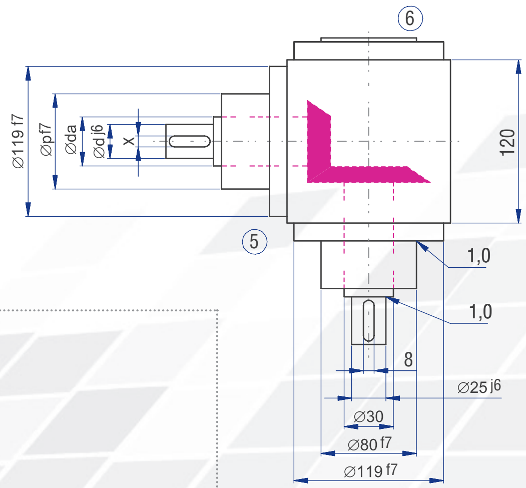
7.2.20 Type HDV 120 – Hygiene-design bevel gearboxes

Model



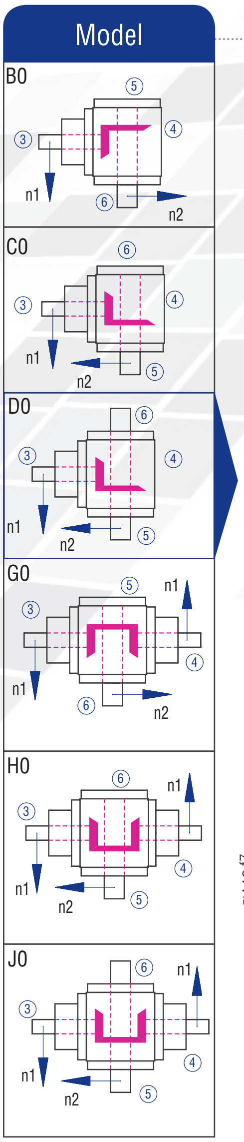


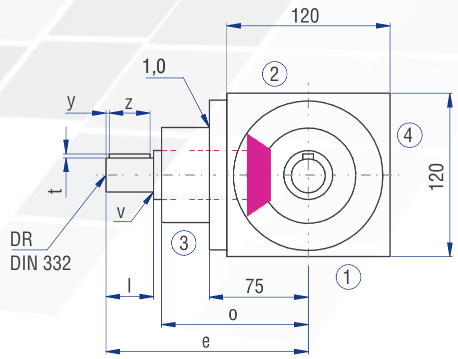


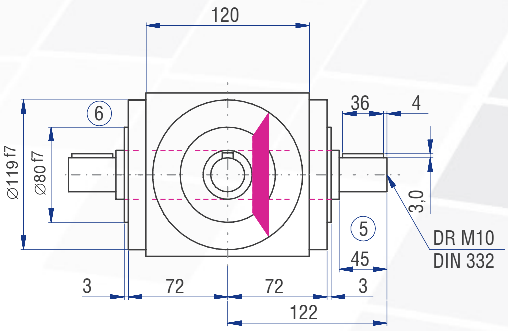


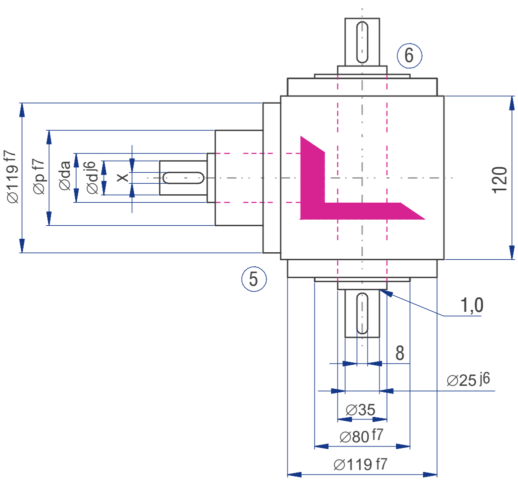
	Gear ratio						
	1:1	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
d [mm]	30	30	30	25	25	20	20
da [mm]	25	25	25	20	20	15	15
l [mm]	162	162	162	162	172	162	162
v [mm]	45	45	45	45	45	35	35
x [mm]	115	115	115	115	125	125	125
y [mm]	80	80	80	80	80	70	70
z [mm]	3	3	3	2.5	2.5	2	2
t [mm]	1	1	1	1	1	0.5	0.5
e [mm]	8	8	8	6	6	5	5
o [mm]	4	4	4	4	4	4	4
p [mm]	36	36	36	36	36	28	28
DR M	10	10	10	6	6	5	5

Model

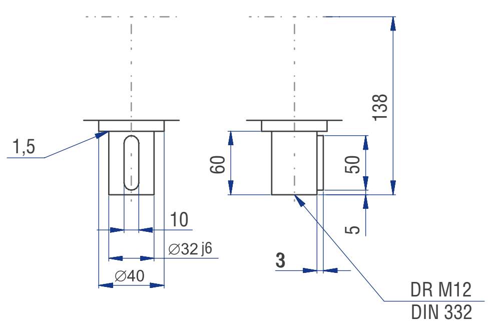








Implementation VV



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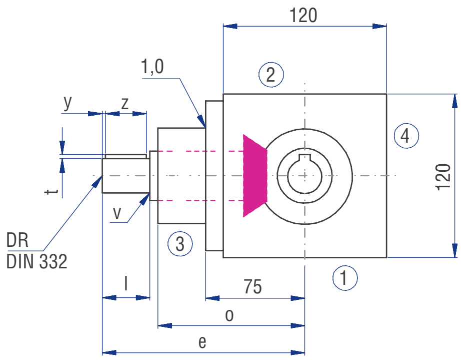

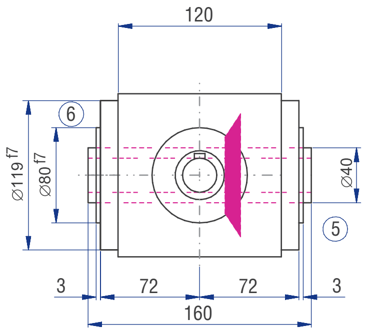

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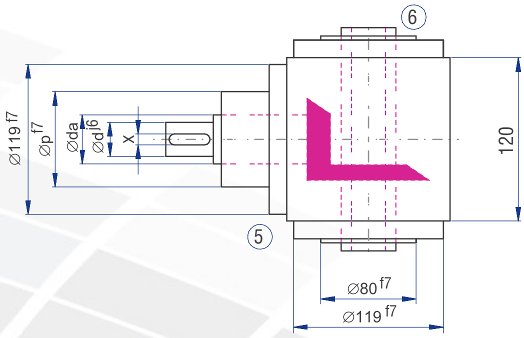

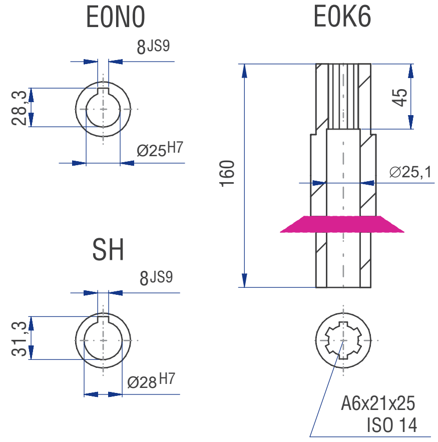

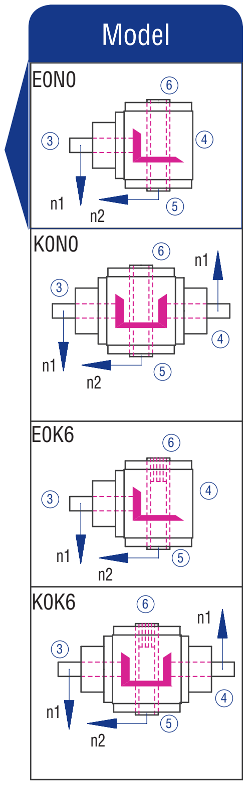

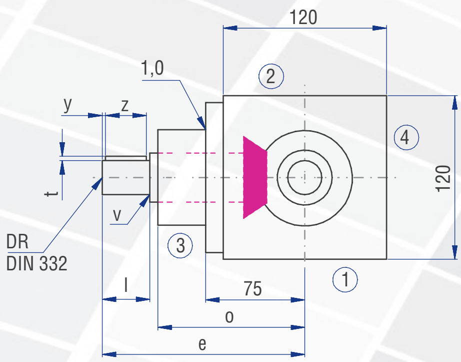

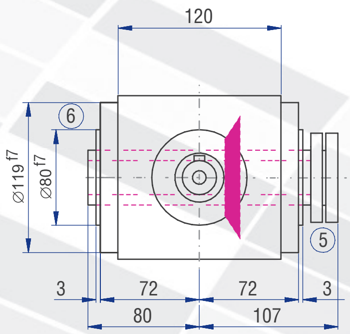

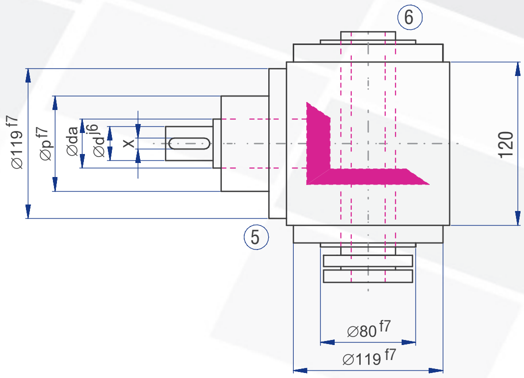

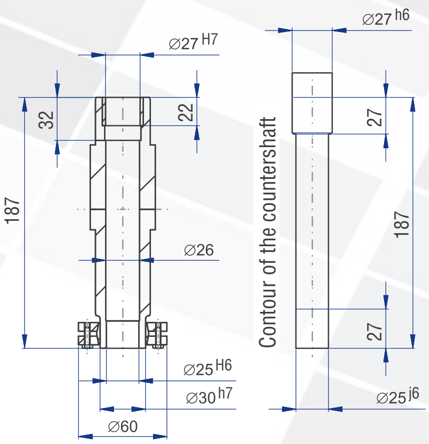

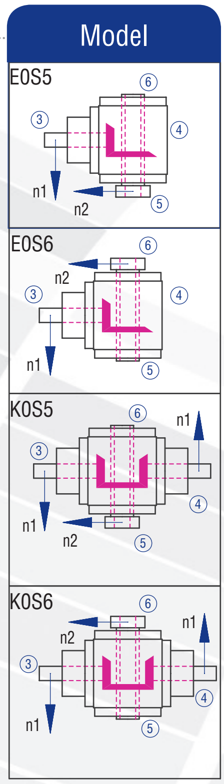

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7.2.21 Type HDV 140 – Hygiene-design bevel gearboxes

Characteristics

Characteristic	Standard	Option
Toothing	Spiral toothed bevel gear set	See chapter 7.2.2
Gear ratios	1:1 to 6:1	
Housing / Flanges	1.4581 / 1.4305	See chapter 7.2.1
Threaded mounting holes	Customer-specific	See chapter 7.2.4
Shaft	1.4305, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	1.4305, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 7.2.11
Protection class	IP 56	See chapter 4.5
Corrosion protection	-	See chapter 7.2.12
Bearing life L10h:	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 7.2.9
Lubricants	Synthetic lubricant, NSF-approved (NOTOX)	See chapter 7.2.9
Type plate	Etched	

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Performance data

n_1 [rpm]	1:1			1.5:1			2:1			3:1			4:1			5:1			6:1		
	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]	n_2 [rpm]	P_{1N} [kW]	T_{2N} [Nm]
3000	3000	39.68	120	2000	24.91	113	1500	16.53	100	1000	12.12	110	750	8.51	103	600	6.61	100	500	5.18	94
2400	2400	37.04	140	1600	22.22	126	1200	14.68	111	800	11.46	130	600	7.34	111	480	5.56	105	400	4.58	104
1500	1500	26.78	162	1000	17.08	155	750	11.41	138	500	8.05	146	375	4.96	120	300	3.80	115	250	2.95	107
1000	1000	20.28	184	667	12.87	175	500	8.38	152	333	5.87	160	250	3.75	136	200	2.73	124	167	2.06	112
750	750	16.20	196	500	10.47	190	375	6.86	166	250	4.60	167	188	3.06	148	150	2.15	130	125	1.61	117
500	500	11.46	208	333	7.34	200	250	4.96	180	167	3.20	174	125	2.12	154	100	1.50	136	83	1.09	119
250	250	5.92	215	167	3.76	204	125	2.62	190	83	1.62	177	63	1.12	162	50	0.79	143	42	0.56	121
50	50	1.21	220	33	0.76	210	25	0.55	200	17	0.34	180	13	0.23	170	10	0.17	150	8	0.11	120

	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
P_{1Nt} [kW]	9.0	9.0	9.0	9.0	9.0	9.0	9.0
T_{2max} [Nm]	430	210	320	280	280	250	200

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

Permissible radial force F_{r1} and axial force F_{a1} on shaft N_1

The permissible radial forces depend on torque, rotational speed and direction.
They must be calculated for the respective case of application. Please enquire these.

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	700	350	870	435	1150	575	1370	685	1700	850	2000	1000
> 140	590	295	730	365	960	480	1140	570	1420	710	1670	835

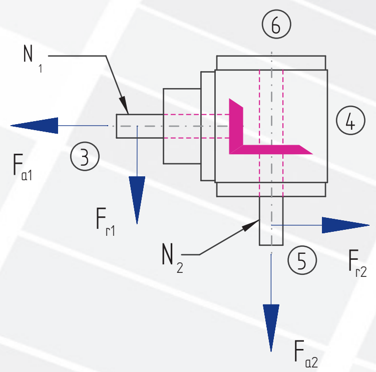
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	1300	650	1700	850	2000	1000	2500	1250	3000	1500	3800	1900
> 140	1082	541	1420	710	1670	835	2080	1040	2500	1250	3170	1585

Inertia moments/mass

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

Model	Inertia moment [kgcm^2]							Mass [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	26.2670	11.8569	8.6762	6.4356	1.8432	1.5320	1.3708	19.0
B0	36.0994	18.7513	12.2785	7.9547	2.6978	2.2113	1.8426	18.5
C0	36.0994	18.7513	12.2785	7.9547	2.6978	2.2113	1.8426	18.5
D0	37.0815	19.1878	12.5241	8.0639	2.7592	2.2506	1.8698	19.0
E0N	32.6630	17.2240	11.4194	7.5729	2.4830	2.0739	1.7471	18.0
E0S	39.0643	20.0691	13.0198	8.2842	2.8831	2.3299	1.9249	18.7
F0	39.4005	17.6940	11.9596	7.8949	2.6641	2.0574	1.7356	23.0
G0	49.2329	24.7711	17.6713	12.9310	3.7202	3.2180	2.8486	22.7
H0	49.2329	24.7711	17.6713	12.9310	3.7202	3.2180	2.8486	22.7
J0	50.2150	25.2076	17.9169	13.0402	3.7816	3.2573	2.8758	23.2
K0N	45.7965	23.2438	16.8122	12.5492	3.5054	3.0806	2.7531	22.2
K0S	52.1978	26.0889	18.4126	13.2605	3.9055	3.3366	2.9309	22.9



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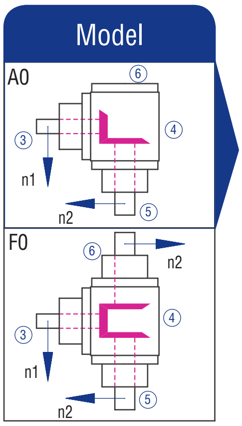
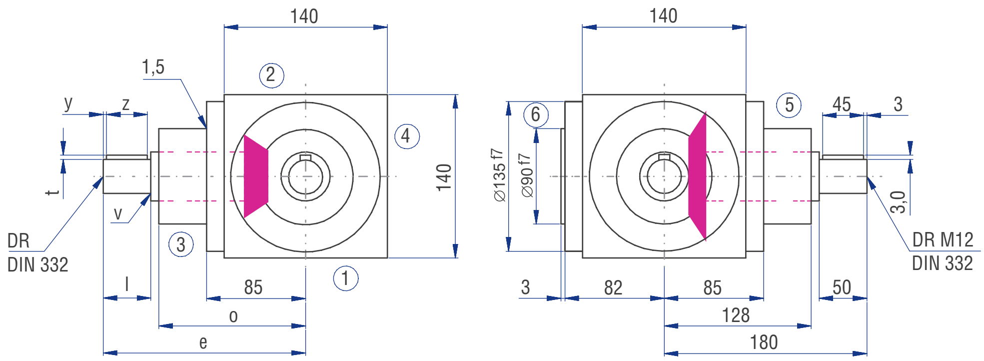
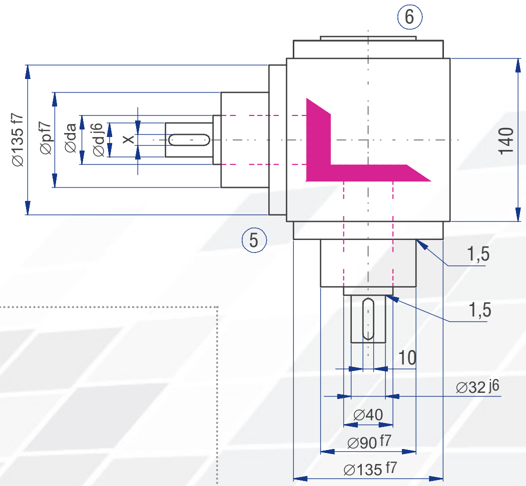
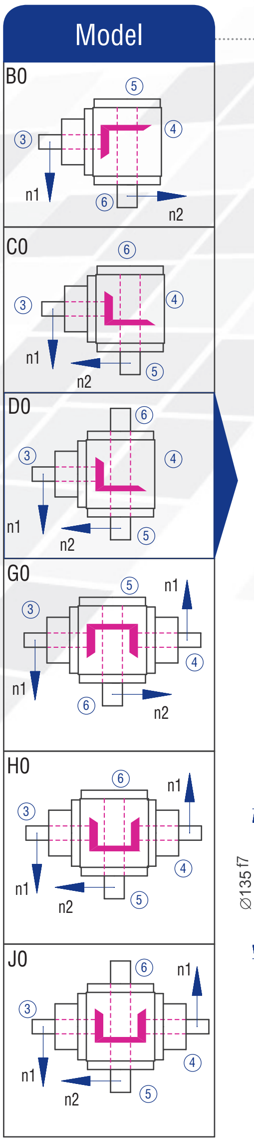
7.2.21 Type HDV 140 – Hygiene-design bevel gearboxes

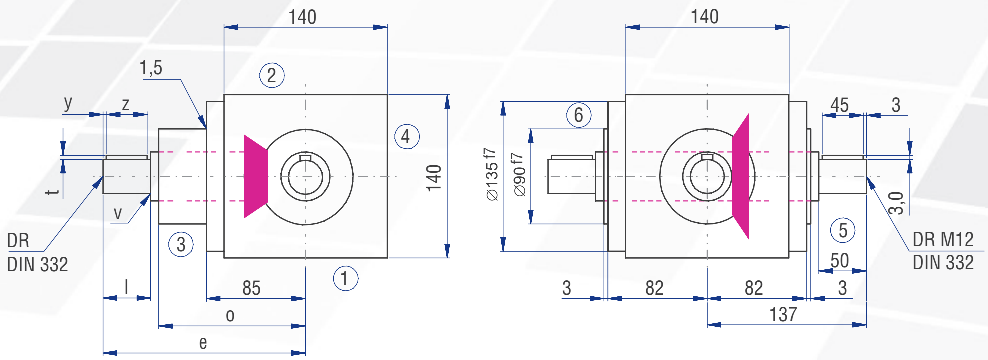


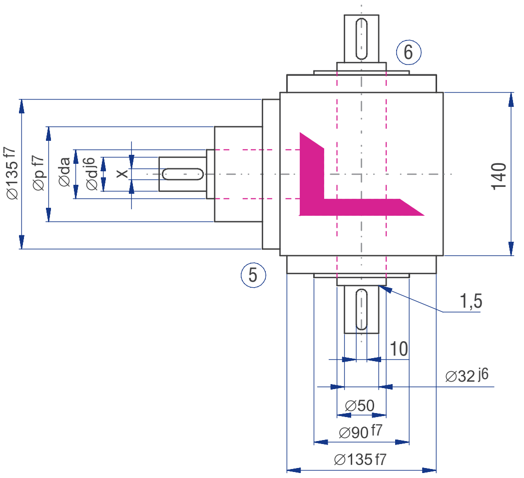




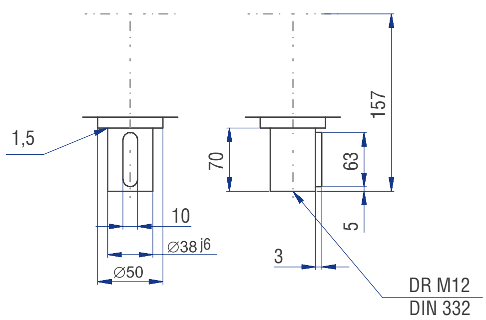
	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
d [mm]	40	40	40	40	40	40	40
da [mm]	32	32	32	28	24	24	24
l [mm]	180	180	180	180	195	195	195
v [mm]	50	50	50	50	50	50	50
x [mm]	128	128	128	128	143	143	143
y [mm]	90	90	90	90	85	85	85
z [mm]	3	3	3	3	3	3	3
t [mm]	1.5	1.5	1.5	1	1	1	1
e [mm]	10	10	10	8	8	8	8
o [mm]	3	3	3	3	3	3	3
p [mm]	45	45	45	45	45	45	45
DR M	12	12	12	10	8	8	8



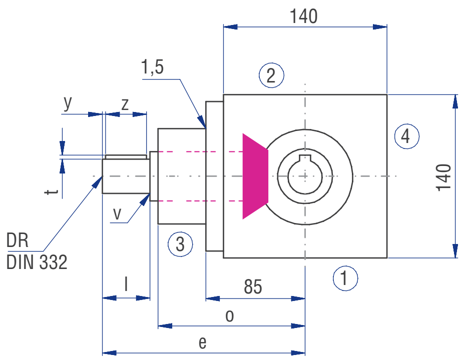


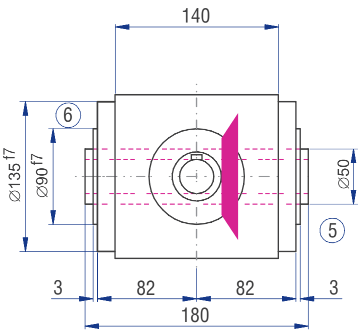


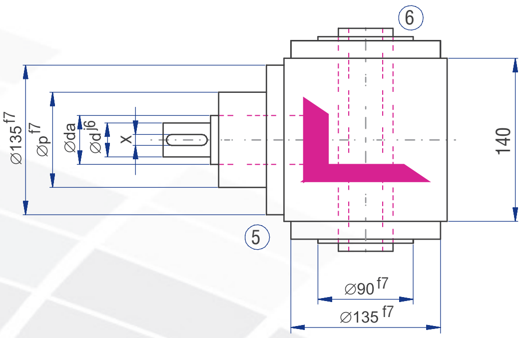
Implementation VV



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







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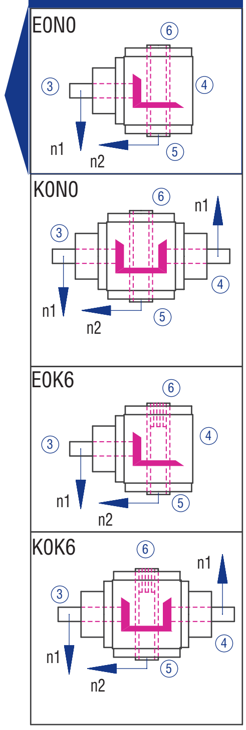

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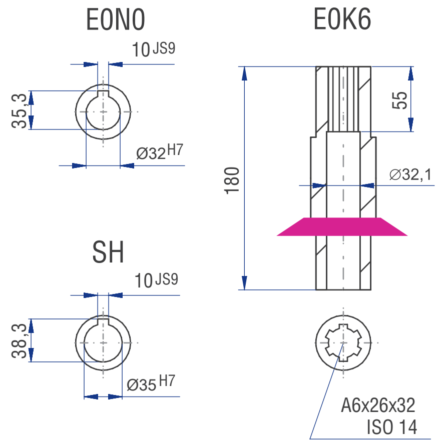

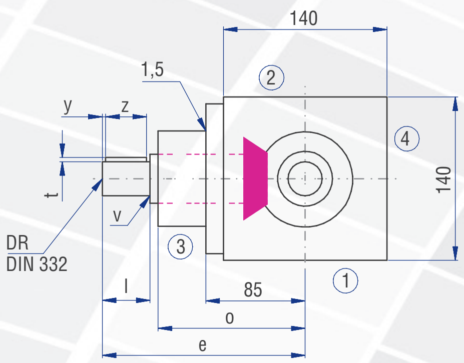

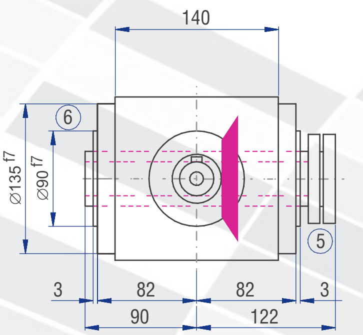

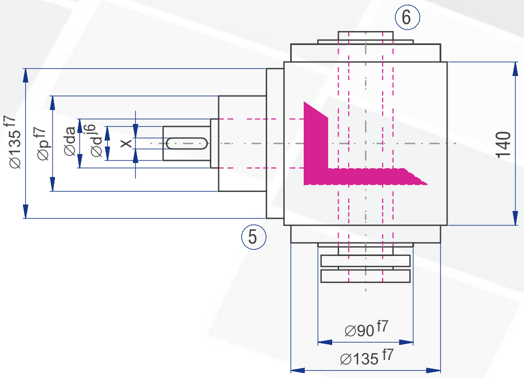

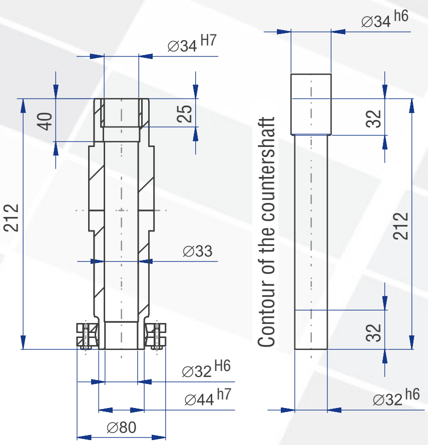

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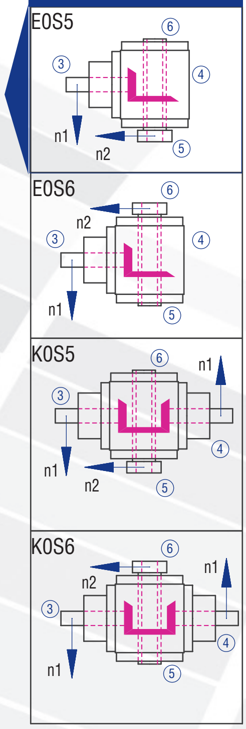

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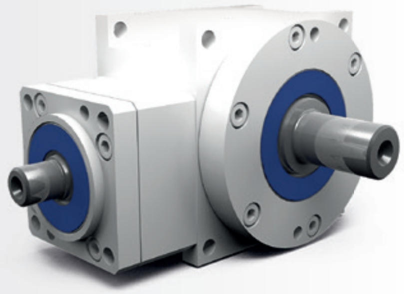
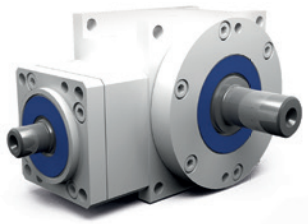
8 Hypoid gearboxes



8.1 Type overview



Type H – Hypoid gearboxes

Gear ratios: i = 3:1 to 15:1
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

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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)

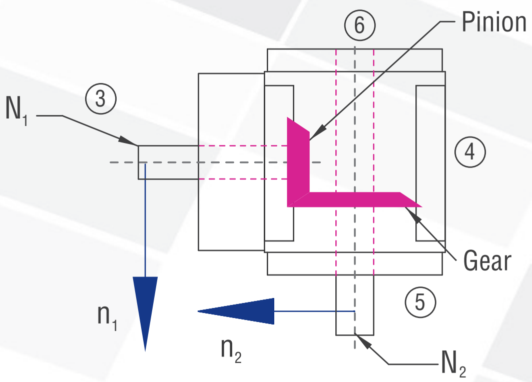


Figure **8.2.5-1; Shaft designations**

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

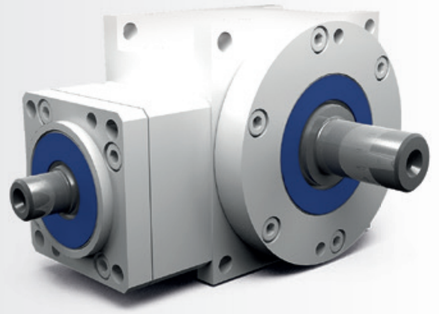
Ordering option	Gear set	090 - 115	140 - 260
/0000	Standard	<=5 arcmin	<=4 arcmin
/S2	Standard	-	-
/S1	Standard	-	-
/S0	Special gear set	<=3 arcmin	<=2 arcmin

Table **8.2.10-1**

8.3 Type H – Standard hypoid gearboxes

8.3.1 Features

Gear ratios: i = 3:1 to 15:1
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

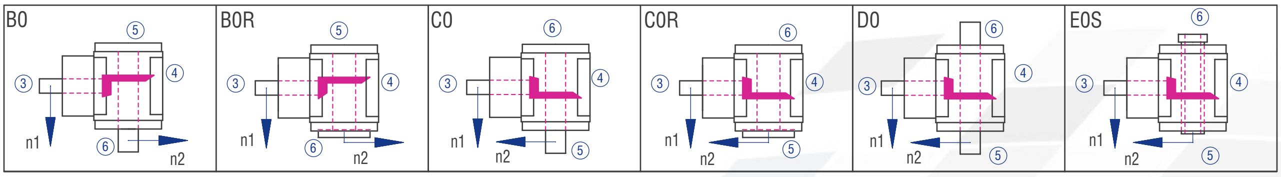


Figure **8.3.2-1; Models**

8.3.3 Gearbox sides

The example shows the Model CO

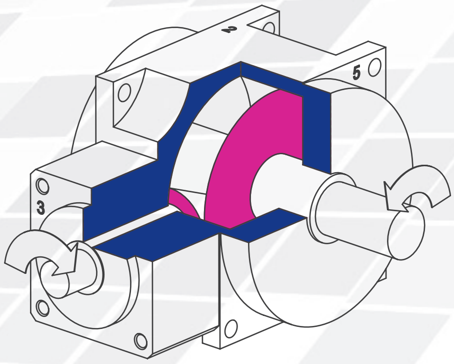


Figure **8.3.3-2; Gearbox sides**

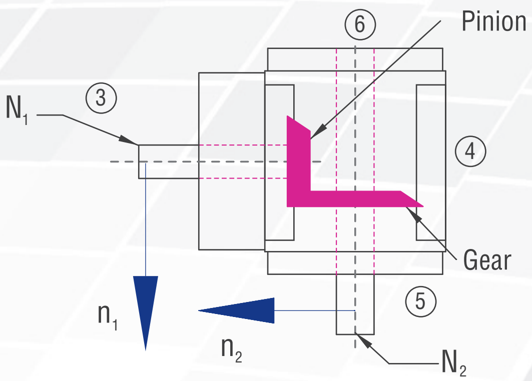


Figure **8.3.3-1; Shaft designations**

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	CO-	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

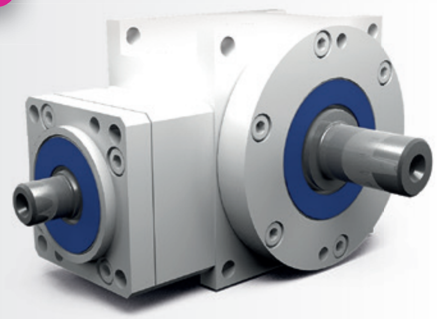
8.3.5 Overview of performance data

Selection table: gearbox size; gear ratio; rotational speed

			3:1			4:1			5:1			6:1			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]	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	3900																			25	39	51	25	39	51
		3200										36	54	72	36	54	72	36	54	72						
		2100	36	54	72	36	54	72	36	54	72															
115	8000	3300																			51	77	102	51	77	102
		2700										71	107	143	71	107	143	71	107	143						
		1800	71	107	143	71	107	143	71	107	143															
140	7000	2800																			97	145	193	97	145	193
		2200										142	215	286	142	215	286	142	215	286						
		1500	142	215	286	142	215	286	142	215	286															
170	6000	2300																			182	275	365	182	275	365
		1800										266	398	528	266	398	528	266	398	528						
		1150	266	398	528	266	398	528	266	398	528															
215	5000	1600																			512	767	1022	512	767	1022
		1200										723	1084	1450	723	1084	1450	723	1084	1450						
		700	723	1084	1450	723	1084	1450	723	1084	1450															
260	4500	1300																			1023	1533	2044	1023	1533	2044
		1000										1444	2165	2880	1444	2165	2880	1444	2165	2880						
		550	1444	2165	2880	1444	2165	2880	1444	2165	2880															

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	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

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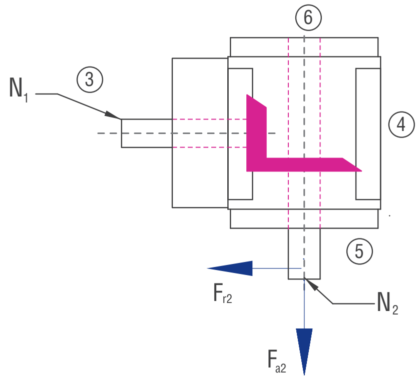
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1			4:1			5:1			6:1			8:1			10:1			12:1			15:1		
		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]	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]
3900	8000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	39	51	25	39	51
3200	8000	0	0	0	0	0	0	0	0	0	36	54	72	36	54	72	36	54	72	0	0	0	0	0	0
2100	8000	36	54	72	36	54	72	36	54	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	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	3300	1650	3300	1650	3300	1650	3300	1650

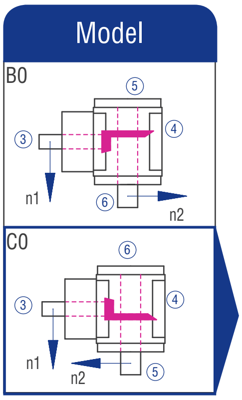
Hypoid gearboxes

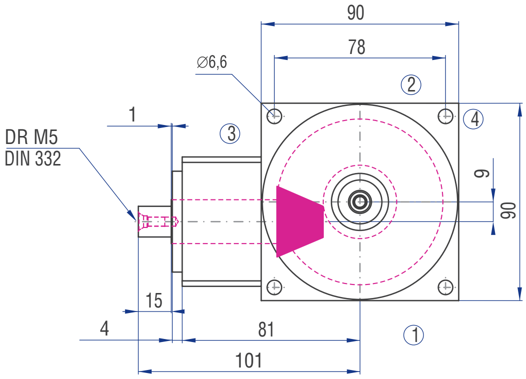
Gearbox inertia moments/mass

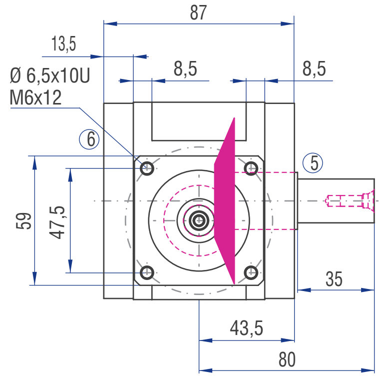
Inertia moment J_1 related to the fast-rotating shaft (N_1)

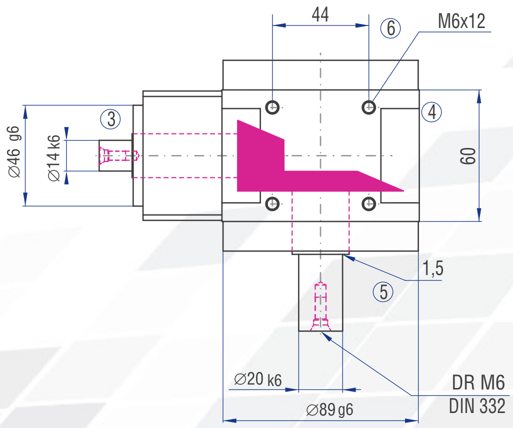
Inertia moment [kgcm²]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
0,3900	0,3000	0,2300	0,2200	0,1700	0,1500	0,1400	0,1300	3.5

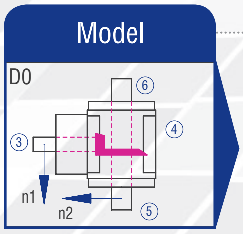
The mass of the gearbox may deviate depending on the type and the gear ratio.

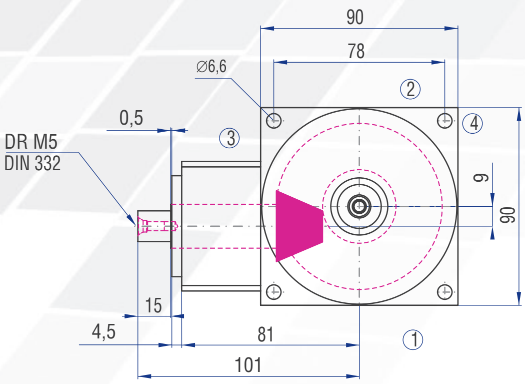


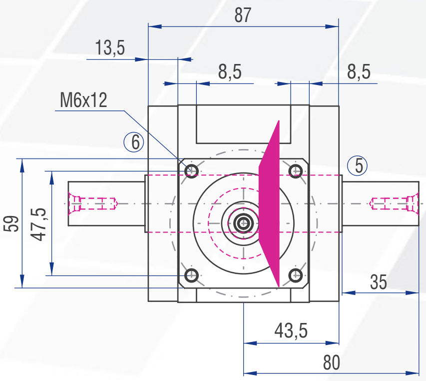


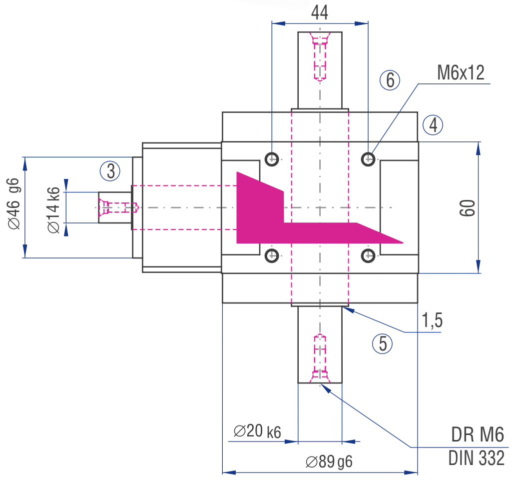












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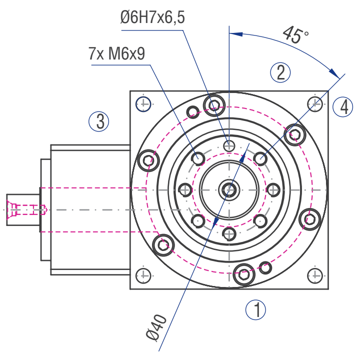
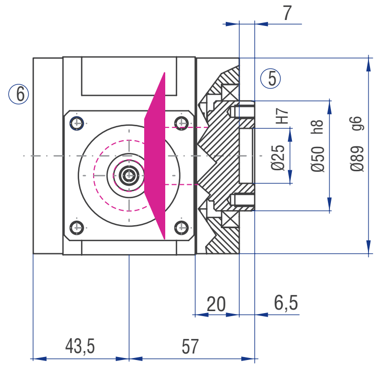
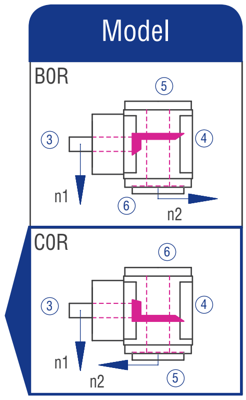
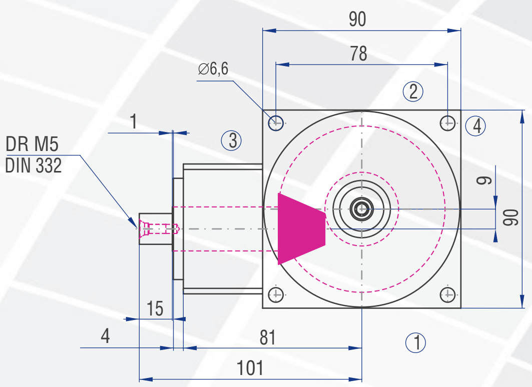
The dimensions of the Models not shown can be figured by mirroring available dimensions.

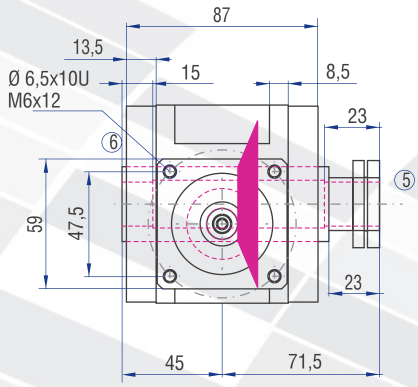


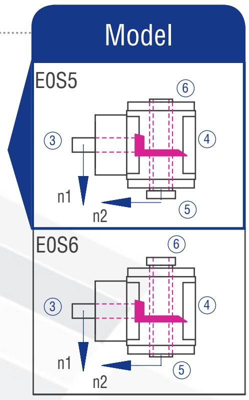


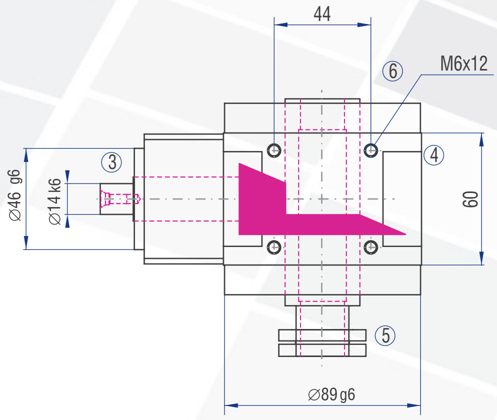


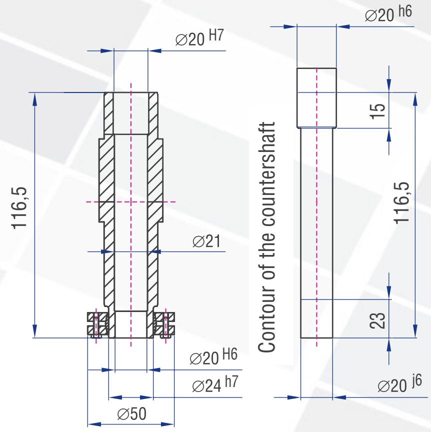
Hypoid gearboxes











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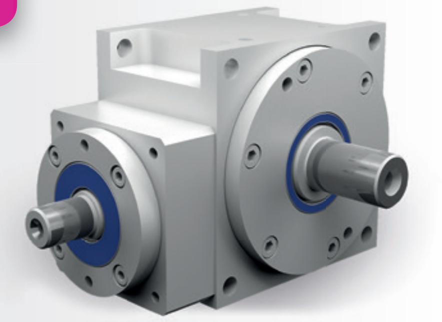
8.3.7 Type H 115 – Standard hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

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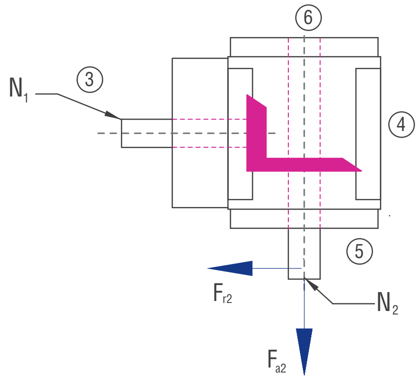
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1			4:1			5:1			6:1			8:1			10:1			12:1			15:1		
		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]	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]
3300	8000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	77	102	51	77	102
2700	8000	0	0	0	0	0	0	0	0	0	71	107	143	71	107	143	71	107	143	0	0	0	0	0	0
1800	8000	71	107	143	71	107	143	71	107	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	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	4900	2450	4900	2450	4900	2450	4900	2450

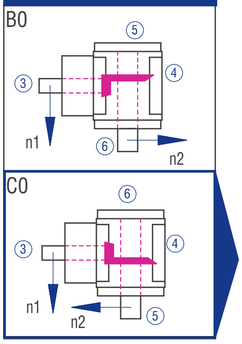
Gearbox inertia moments/mass

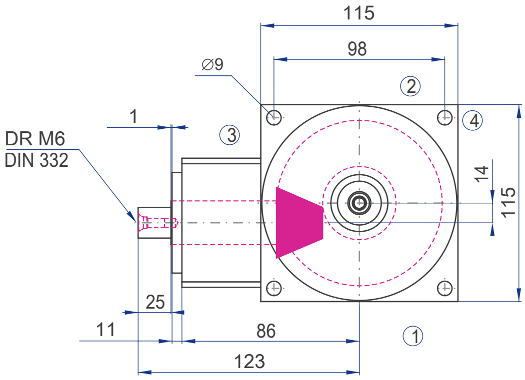
Inertia moment J_1 related to the fast-rotating shaft (N_1)

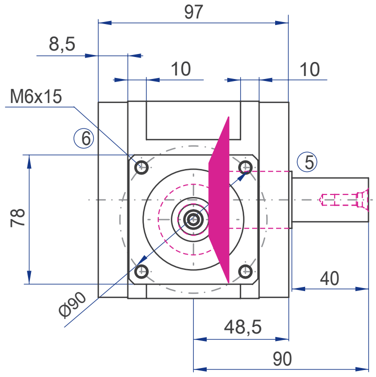
Inertia moment [kgcm²]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
0,9800	0,7300	0,5800	0,5200	0,4300	0,3800	0,3600	0,3400	5.5

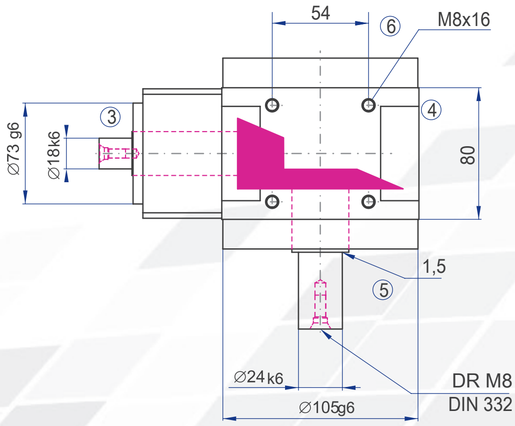
The mass of the gearbox may deviate depending on the type and the gear ratio.

Model

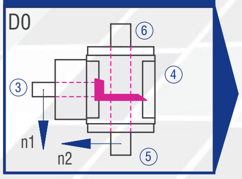


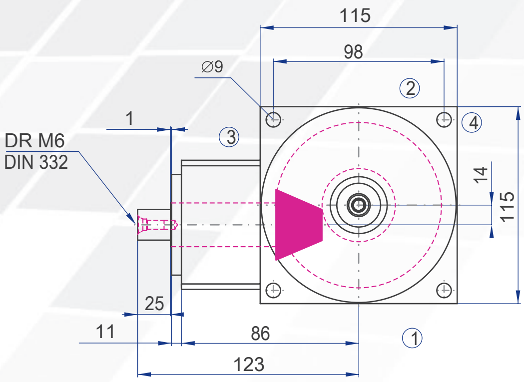


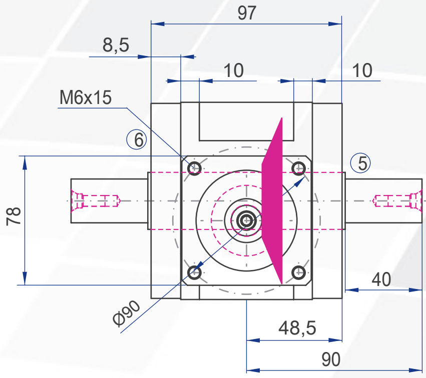


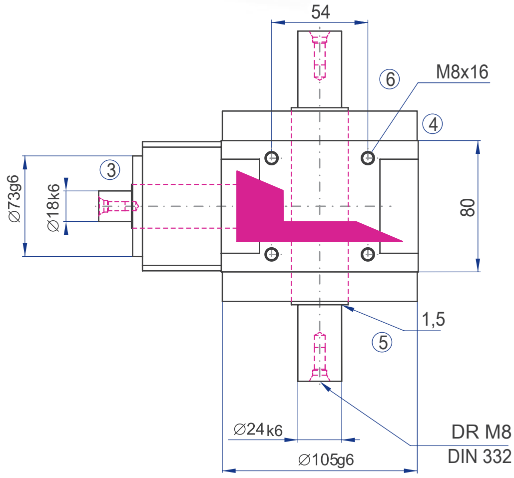


Model

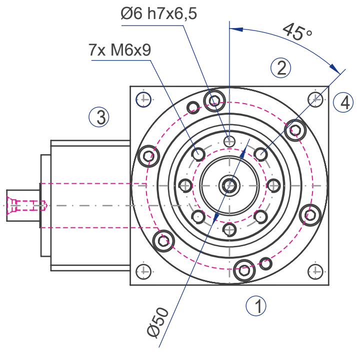


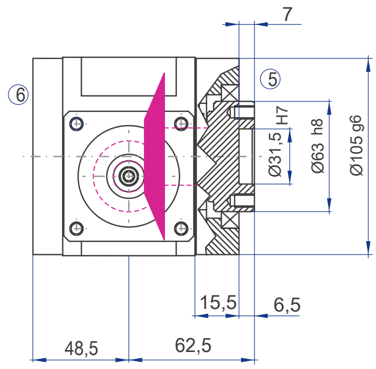


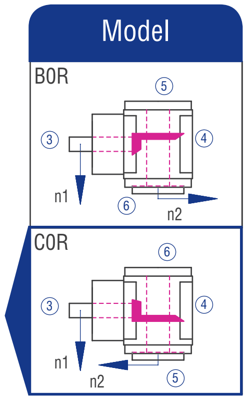




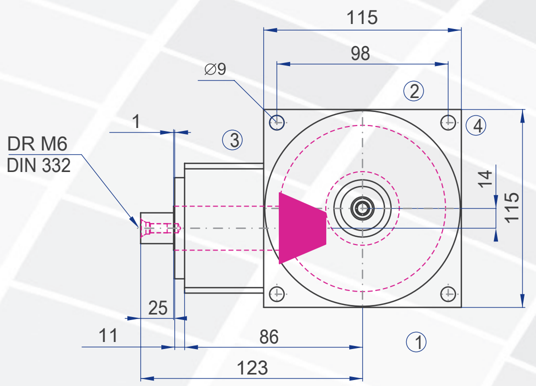
The dimensions of the Models not shown can be figured by mirroring available dimensions.

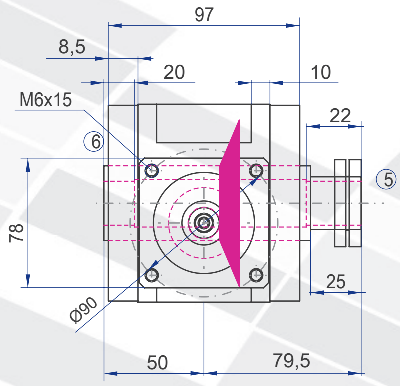


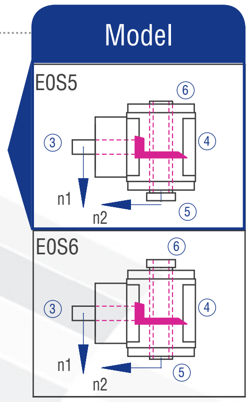


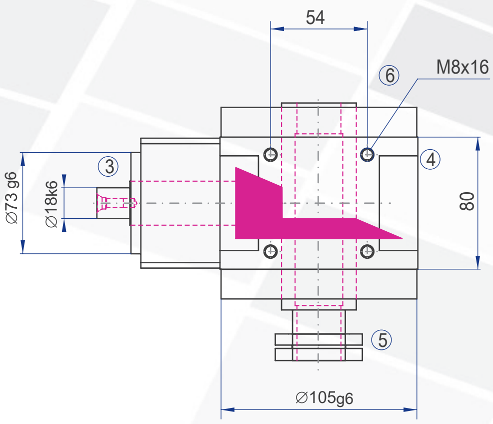


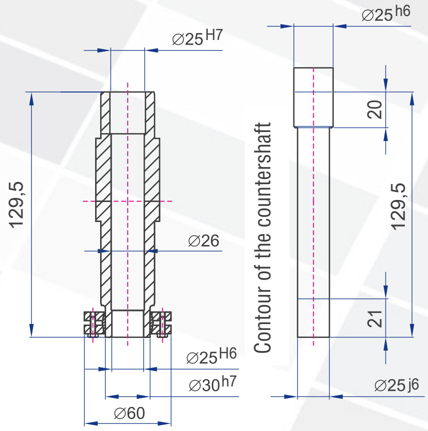
Hypoid gearboxes



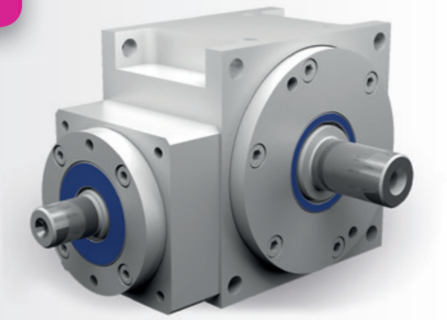








8.3.8 Type H 140 – Standard hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

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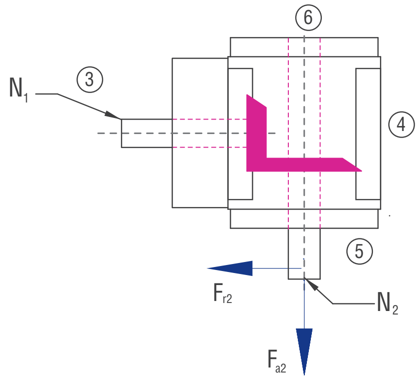
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1 T_{2N} [Nm]	3:1 T_{2B} [Nm]	3:1 T_{2NOT} [Nm]	4:1 T_{2N} [Nm]	4:1 T_{2B} [Nm]	4:1 T_{2NOT} [Nm]	5:1 T_{2N} [Nm]	5:1 T_{2B} [Nm]	5:1 T_{2NOT} [Nm]	6:1 T_{2N} [Nm]	6:1 T_{2B} [Nm]	6:1 T_{2NOT} [Nm]	8:1 T_{2N} [Nm]	8:1 T_{2B} [Nm]	8:1 T_{2NOT} [Nm]	10:1 T_{2N} [Nm]	10:1 T_{2B} [Nm]	10:1 T_{2NOT} [Nm]	12:1 T_{2N} [Nm]	12:1 T_{2B} [Nm]	12:1 T_{2NOT} [Nm]	15:1 T_{2N} [Nm]	15:1 T_{2B} [Nm]	15:1 T_{2NOT} [Nm]
2800	7000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	145	193	97	145	193
2200	7000	0	0	0	0	0	0	0	0	0	142	215	286	142	215	286	142	215	286	0	0	0	0	0	0
1500	7000	142	215	286	142	215	286	142	215	286	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

3:1 F_{r2} [N]	3:1 F_{a2} [N]	4:1 F_{r2} [N]	4:1 F_{a2} [N]	5:1 F_{r2} [N]	5:1 F_{a2} [N]	6:1 F_{r2} [N]	6:1 F_{a2} [N]	8:1 F_{r2} [N]	8:1 F_{a2} [N]	10:1 F_{r2} [N]	10:1 F_{a2} [N]	12:1 F_{r2} [N]	12:1 F_{a2} [N]	15:1 F_{r2} [N]	15:1 F_{a2} [N]
7200	3600	7200	3600	7200	3600	7200	3600	7200	3600	7200	3600	7200	3600	7200	3600

Gearbox inertia moments/mass

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

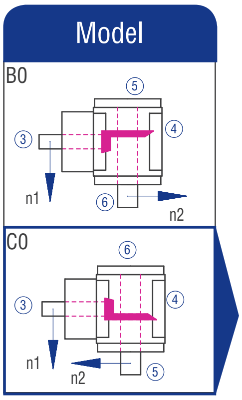
Inertia moment [kgcm^2] 3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1
2,4200	1,7700	1,4100	1,4100	1,1200	1,0000	0,8800	0,8100

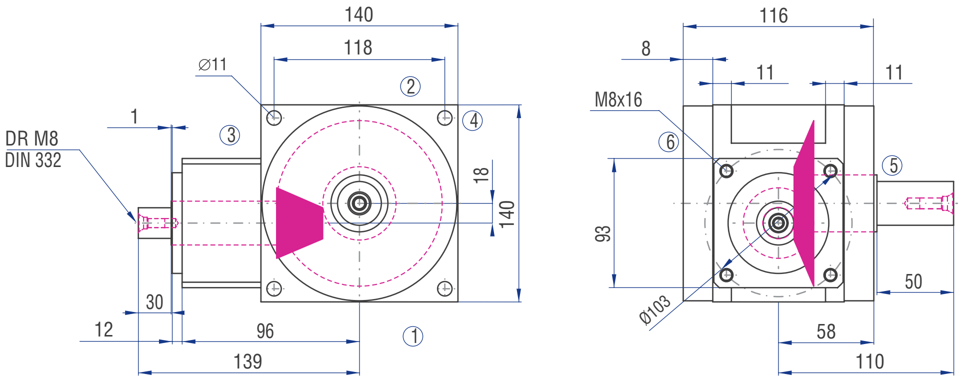
Mass ca. [kg]
9.5

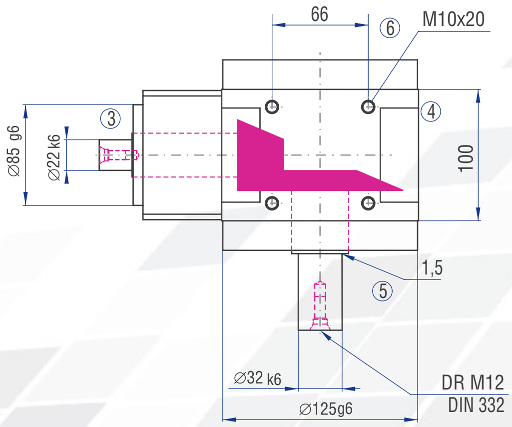
The mass of the gearbox may deviate depending on the type and the gear ratio.

8.3.8 Type H 140 – Standard hypoid gearboxes

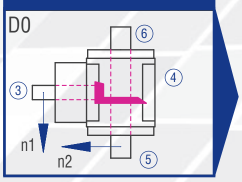
Model

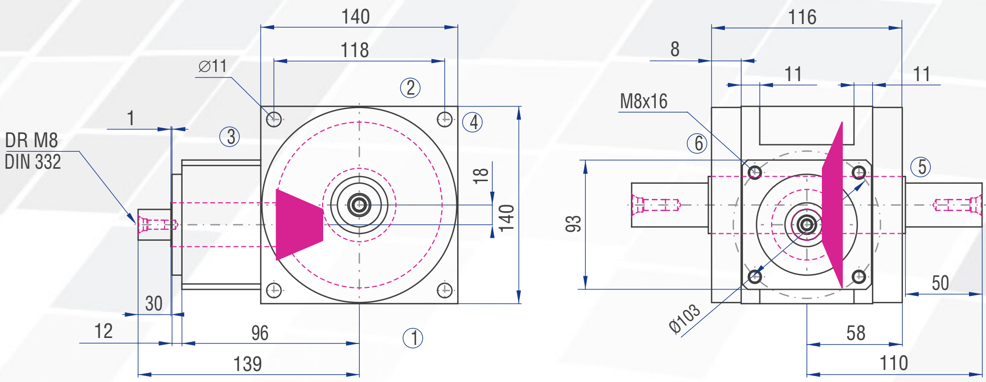


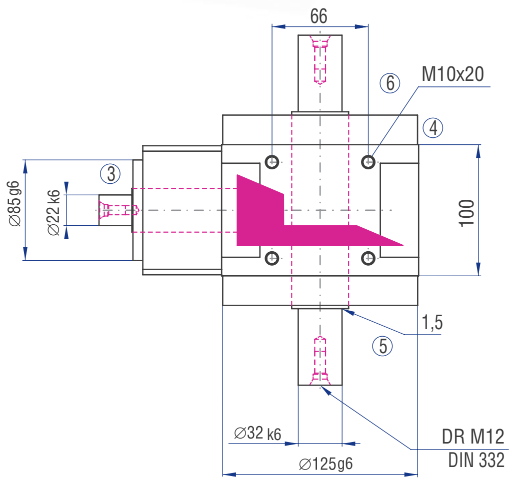




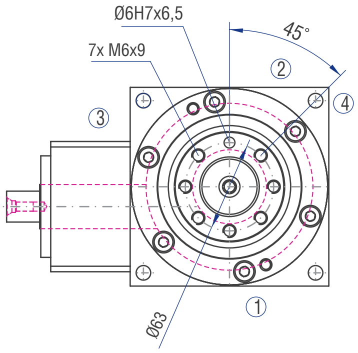
Model

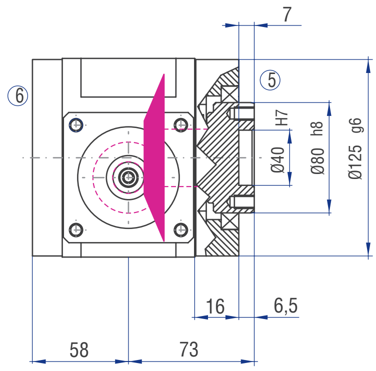


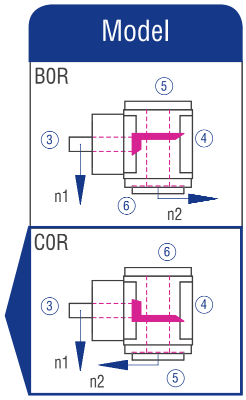


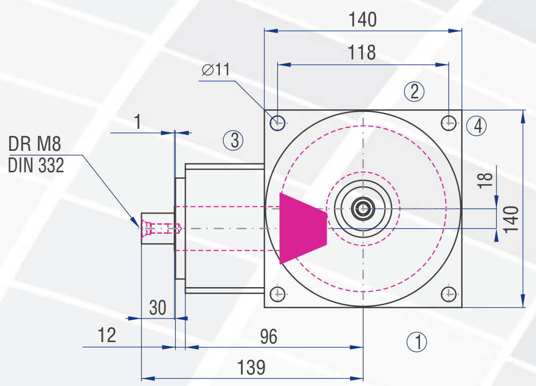


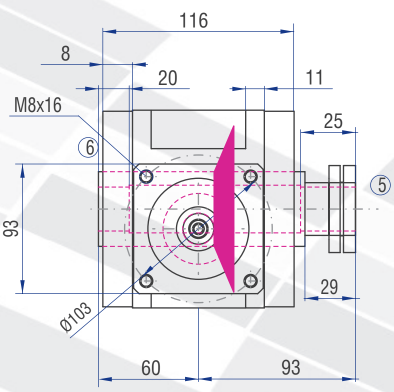
The dimensions of the Models not shown can be figured by mirroring available dimensions.

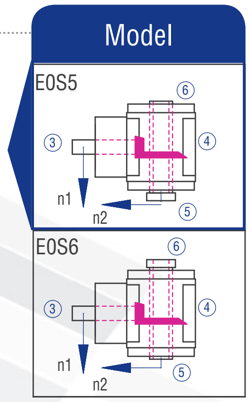


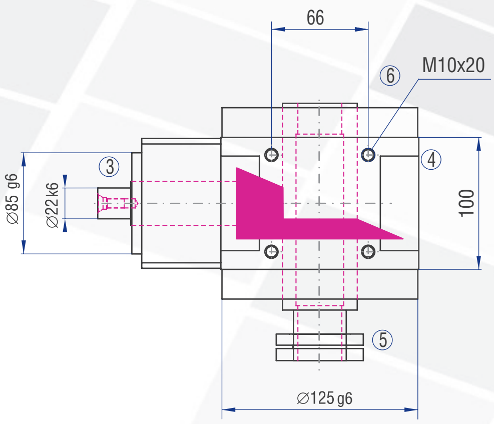


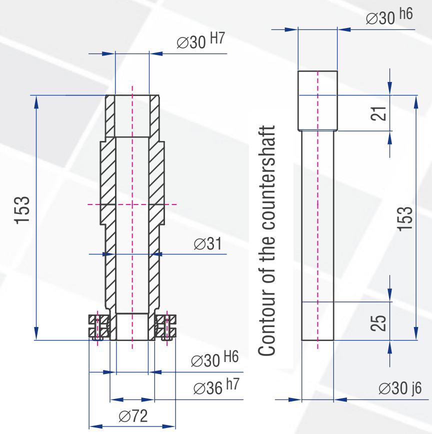












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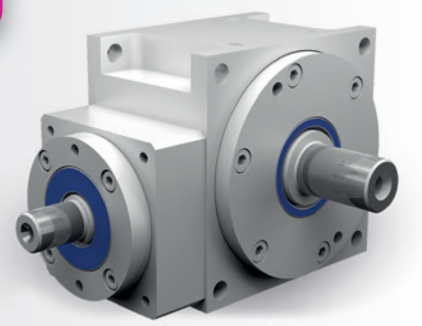
8.3.9 Type H 170 – Standard hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

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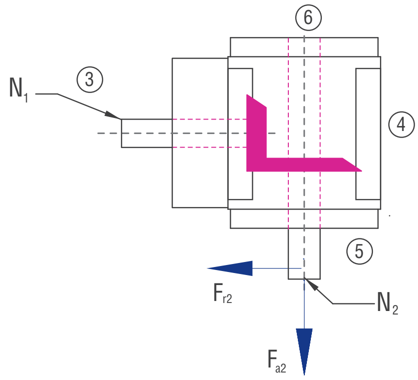
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1 T_{2N} [Nm]	3:1 T_{2B} [Nm]	3:1 T_{2NOT} [Nm]	4:1 T_{2N} [Nm]	4:1 T_{2B} [Nm]	4:1 T_{2NOT} [Nm]	5:1 T_{2N} [Nm]	5:1 T_{2B} [Nm]	5:1 T_{2NOT} [Nm]	6:1 T_{2N} [Nm]	6:1 T_{2B} [Nm]	6:1 T_{2NOT} [Nm]	8:1 T_{2N} [Nm]	8:1 T_{2B} [Nm]	8:1 T_{2NOT} [Nm]	10:1 T_{2N} [Nm]	10:1 T_{2B} [Nm]	10:1 T_{2NOT} [Nm]	12:1 T_{2N} [Nm]	12:1 T_{2B} [Nm]	12:1 T_{2NOT} [Nm]	15:1 T_{2N} [Nm]	15:1 T_{2B} [Nm]	15:1 T_{2NOT} [Nm]
2300	6000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	182	275	365	182	275	365
1800	6000	0	0	0	0	0	0	0	0	0	266	398	528	266	398	528	266	398	528	0	0	0	0	0	0
1150	6000	266	398	528	266	398	528	266	398	528	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

3:1 F_{r2} [N]	3:1 F_{a2} [N]	4:1 F_{r2} [N]	4:1 F_{a2} [N]	5:1 F_{r2} [N]	5:1 F_{a2} [N]	6:1 F_{r2} [N]	6:1 F_{a2} [N]	8:1 F_{r2} [N]	8:1 F_{a2} [N]	10:1 F_{r2} [N]	10:1 F_{a2} [N]	12:1 F_{r2} [N]	12:1 F_{a2} [N]	15:1 F_{r2} [N]	15:1 F_{a2} [N]
10000	5000	10000	5000	10000	5000	10000	5000	10000	5000	10000	5000	10000	5000	10000	5000

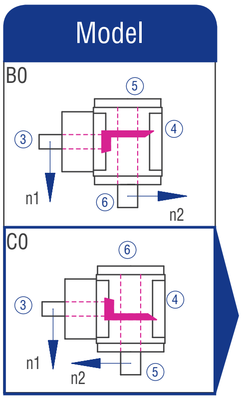
Gearbox inertia moments/mass

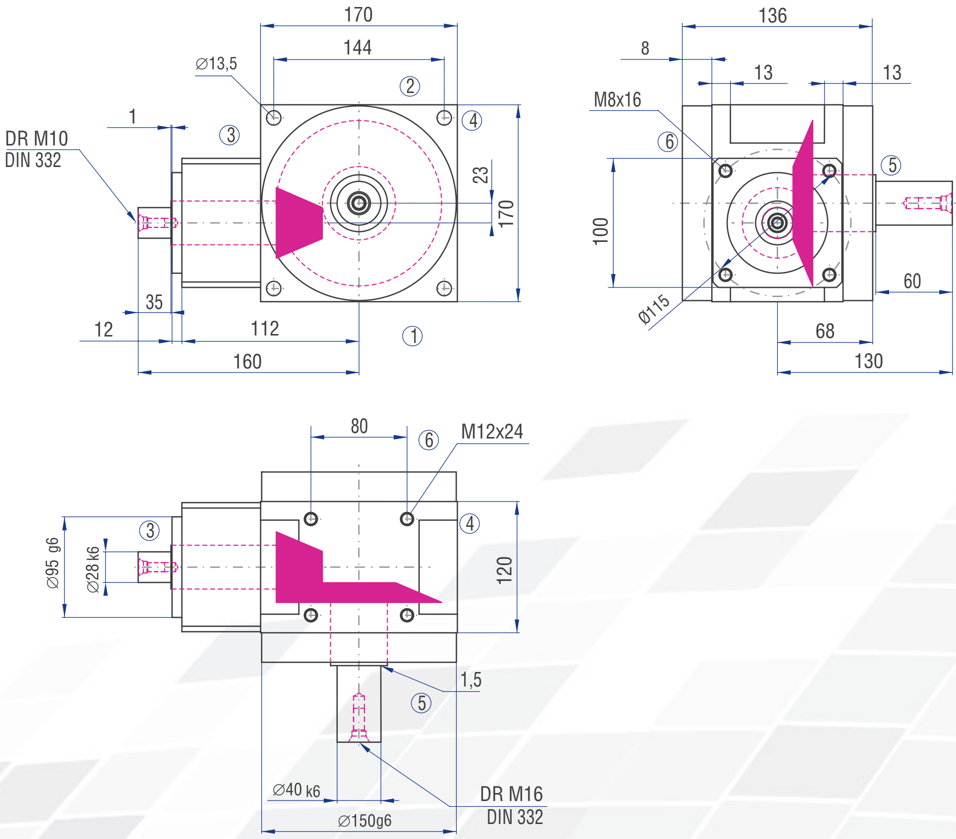
Inertia moment J_1 related to the fast-rotating shaft (N_1)

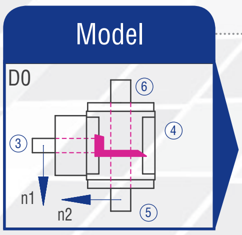
Inertia moment [kgcm²] 3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	Mass ca. [kg]
7,1200	5,0900	4,0000	3,6500	2,8500	2,4600	2,2500	2,0700	15.5

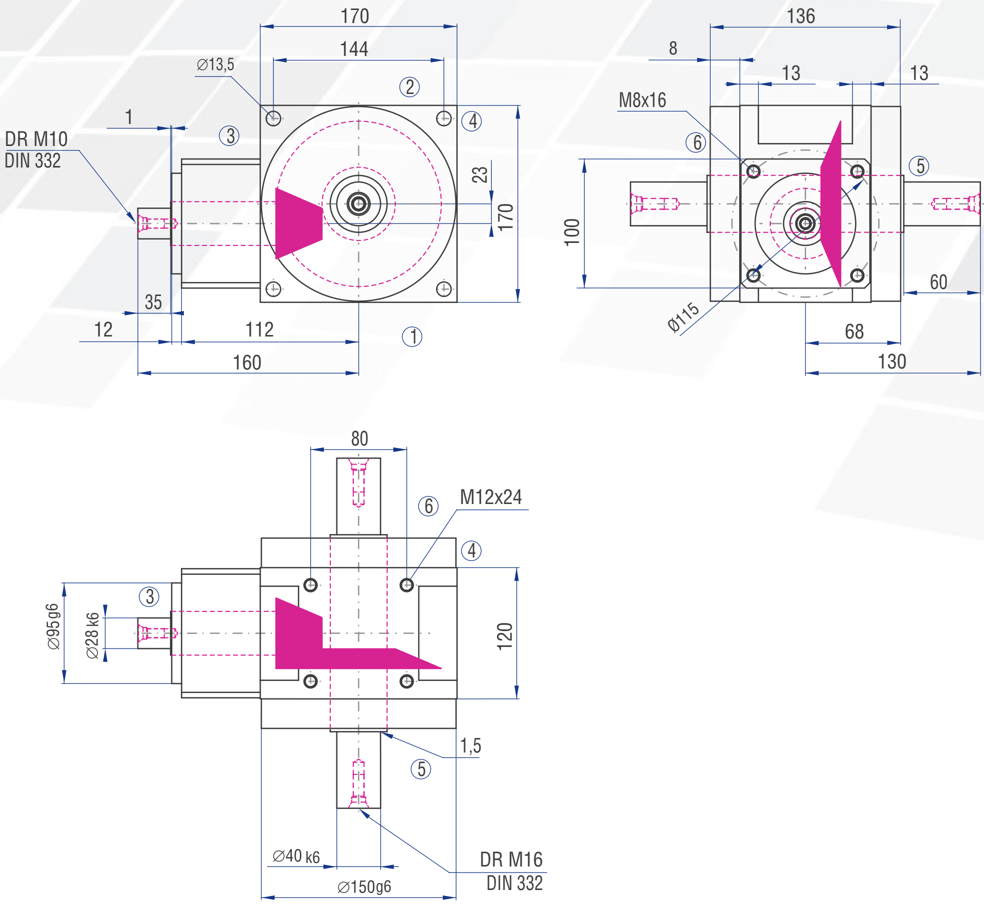
The mass of the gearbox may deviate depending on the type and the gear ratio.

8.3.9 Type H 170 – Standard hypoid gearboxes

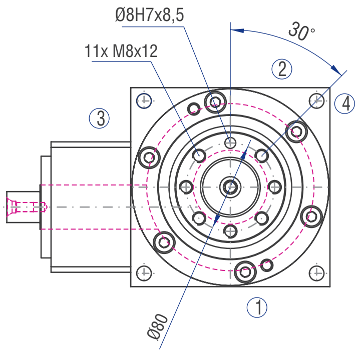


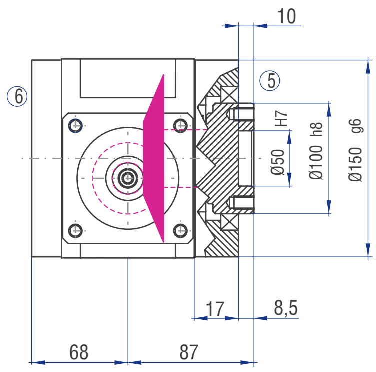


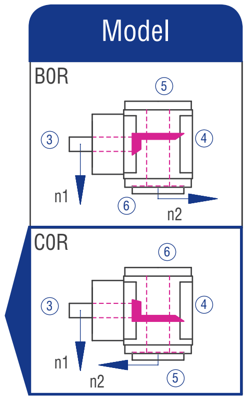


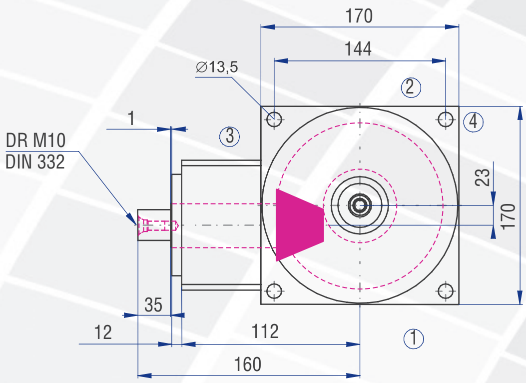


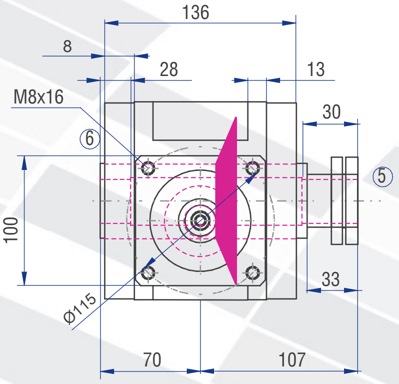
The dimensions of the Models not shown can be figured by mirroring available dimensions.

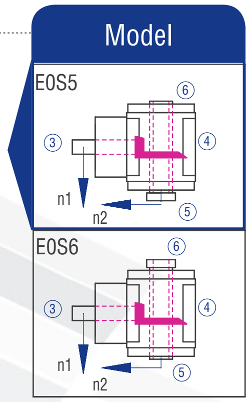


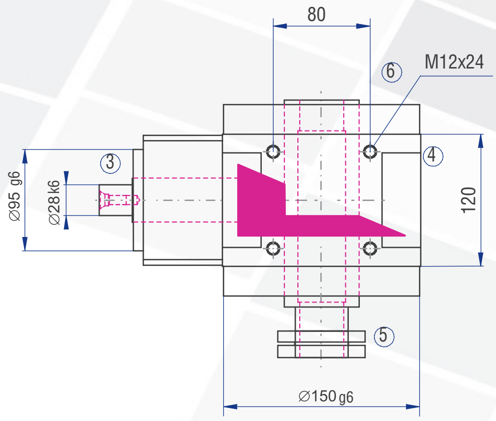


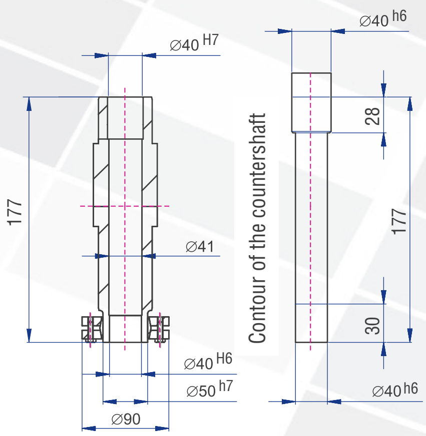












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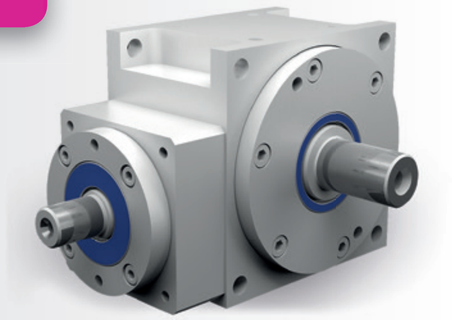
8.3.10 Type H 215 – Standard hypoid gearboxes

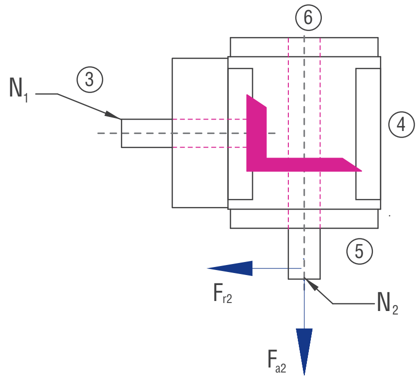


Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

N_1 [rpm]	N_{1MAX} [rpm]	3:1			4:1			5:1			6:1			8:1			10:1			12:1			15:1		
		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]	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]
1600	5000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	512	767	1022	512	767	1022
1200	5000	0	0	0	0	0	0	0	0	0	723	1084	1450	723	1084	1450	723	1084	1450	0	0	0	0	0	0
700	5000	723	1084	1450	723	1084	1450	723	1084	1450	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

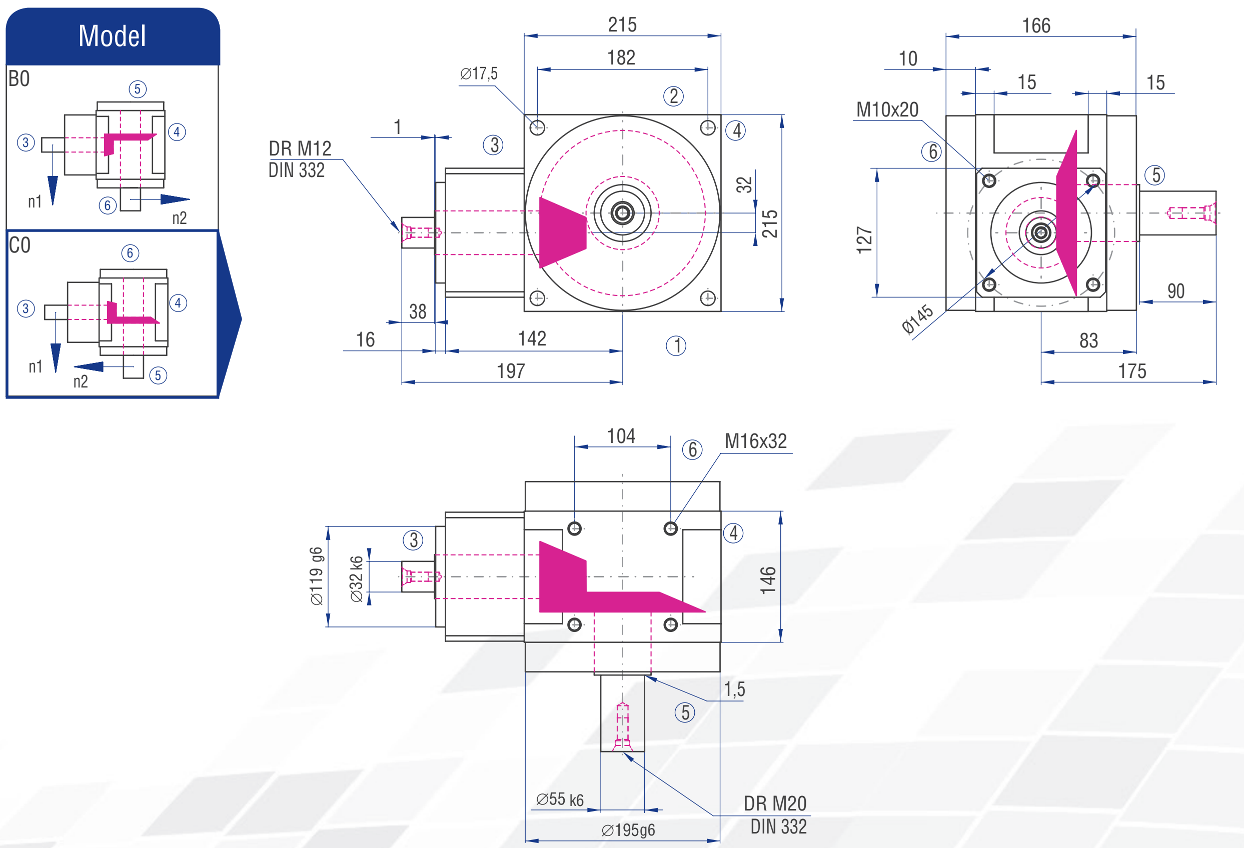
3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
15000	7500	15000	7500	15000	7500	15000	7500	15000	7500	15000	7500	15000	7500	15000	7500

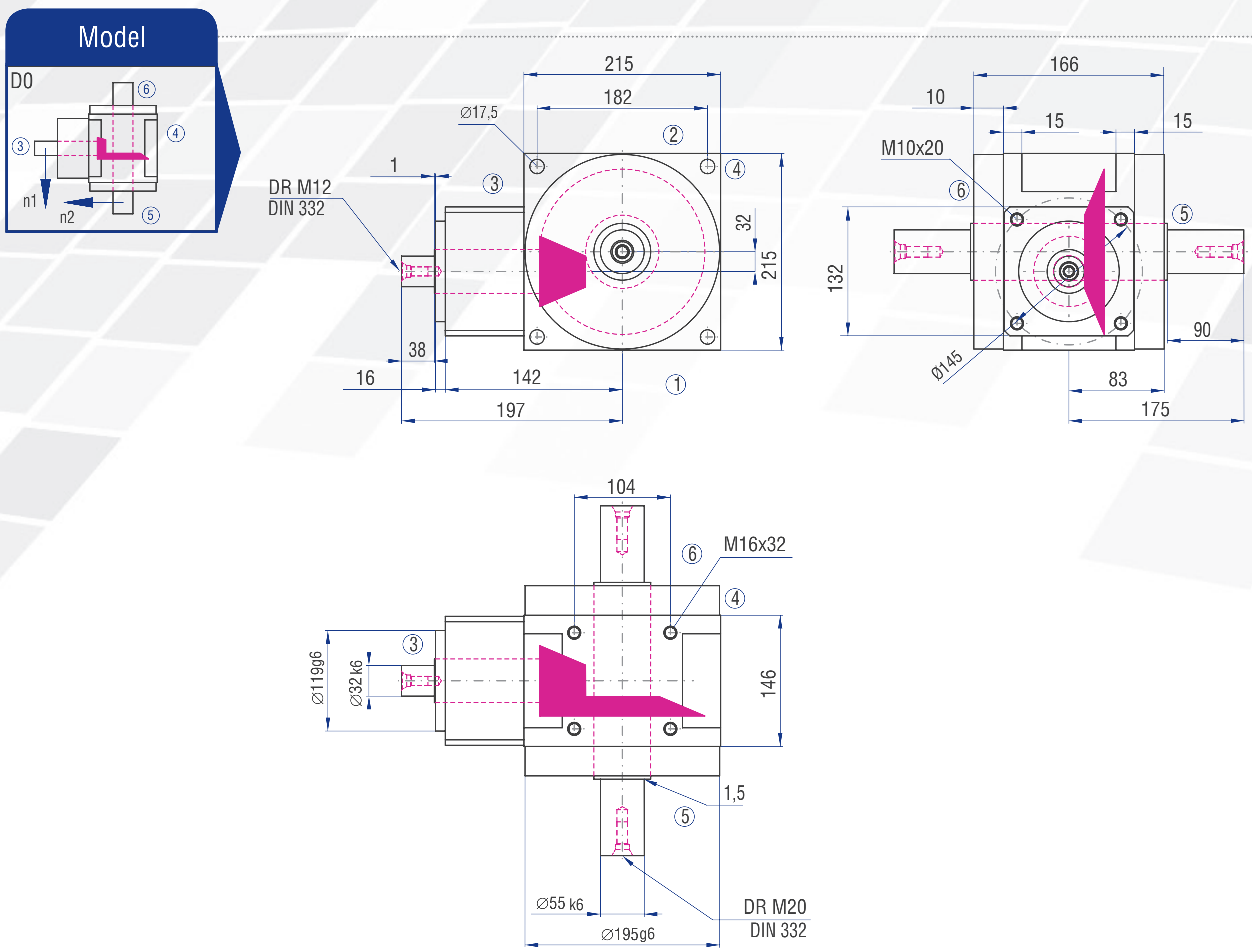
Gearbox inertia moments/mass

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

Inertia moment [kgcm^2]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
26,9600	17,4400	13,5300	12,2500	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.





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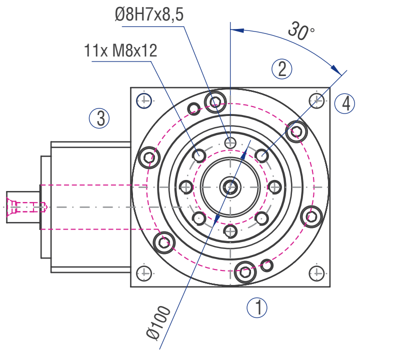
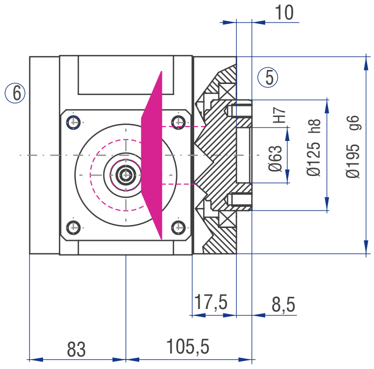
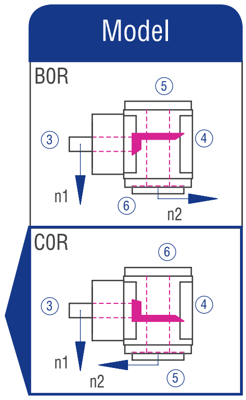
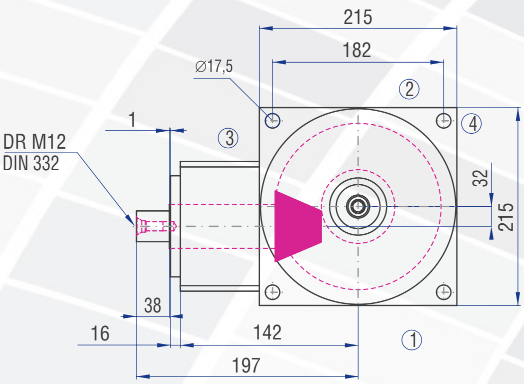
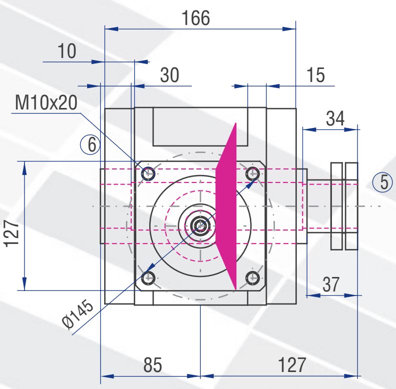
The dimensions of the Models not shown can be figured by mirroring available dimensions.

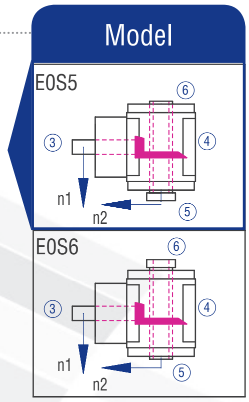


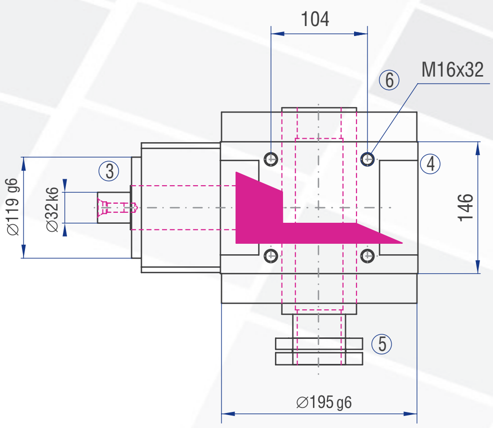


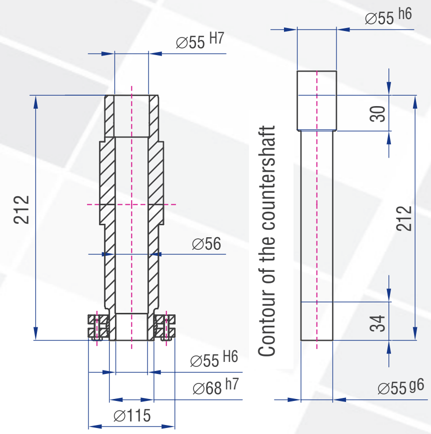












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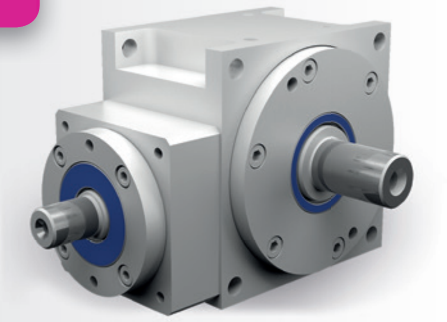
8.3.11 Type H 260 – Standard hypoid gearboxes

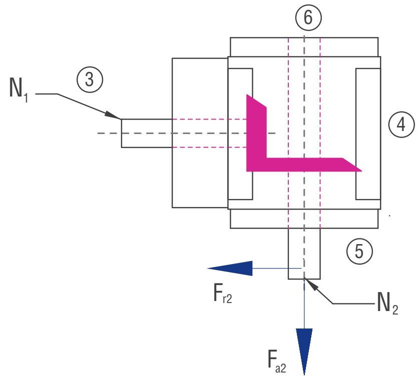


Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened hypoid bevel gears	See chapter 8.2.1
Gear ratio	3:1 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 64	See chapter 4.5
Corrosion protection	Prime coat; layer thickness >40 µm	See chapter 4.4
Bearing life L10h	more than 30,000h in S5 operation	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

N_1 [rpm]	N_{1MAX} [rpm]	3:1			4:1			5:1			6:1			8:1			10:1			12:1			15:1		
		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]	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]
1300	4500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1023	1533	2044	1023	1533	2044
1000	4500	0	0	0	0	0	0	0	0	0	1444	2165	2880	1444	2165	2880	1444	2165	2880	0	0	0	0	0	0
550	4500	1444	2165	2880	1444	2165	2880	1444	2165	2880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	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	22500	11250	22500	11250	22500	11250	22500	11250

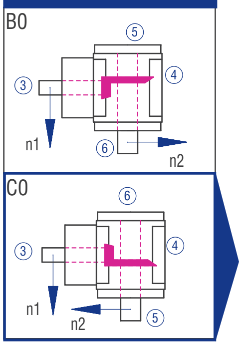
Gearbox inertia moments/mass

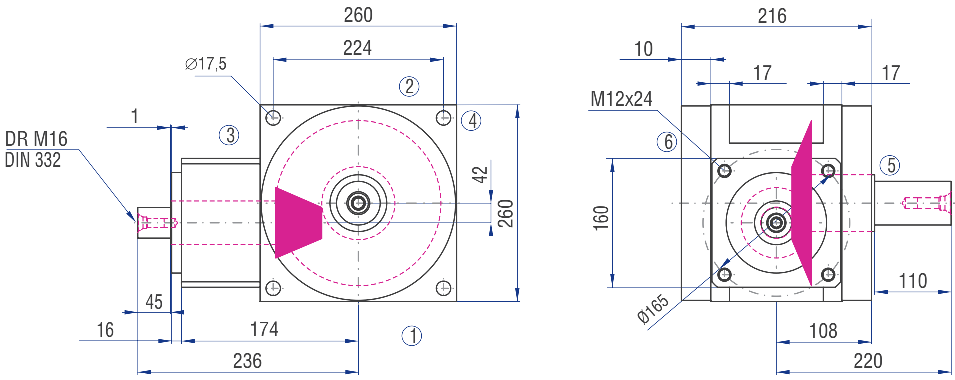
Inertia moment J_1 related to the fast-rotating shaft (N_1)

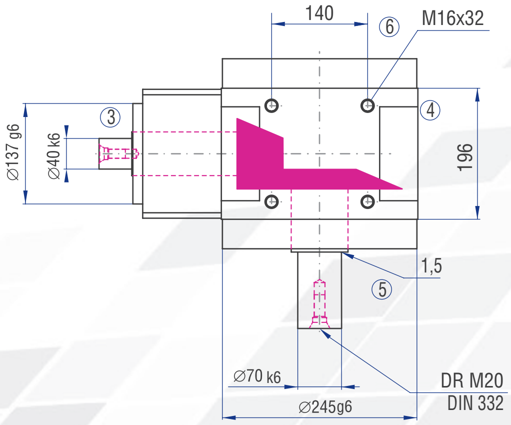
Inertia moment [kgcm²]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
91,4700	62,4300	44,2900	39,5500	27,0700	21,4300	18,1400	15,5300	60

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

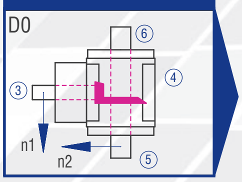
Model

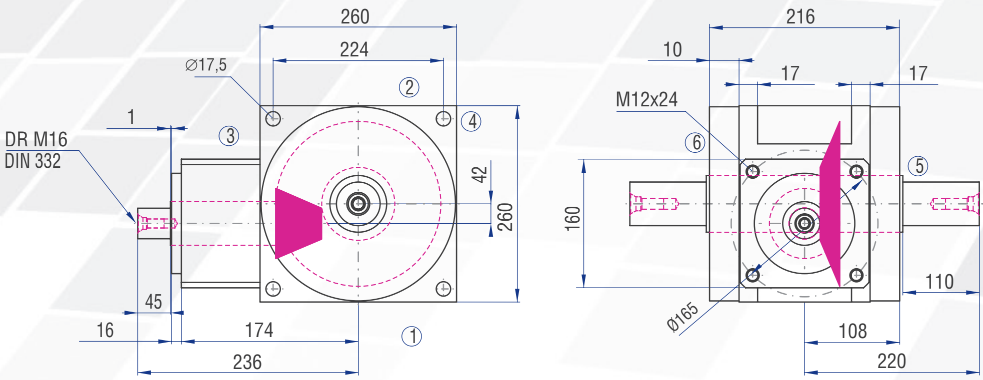


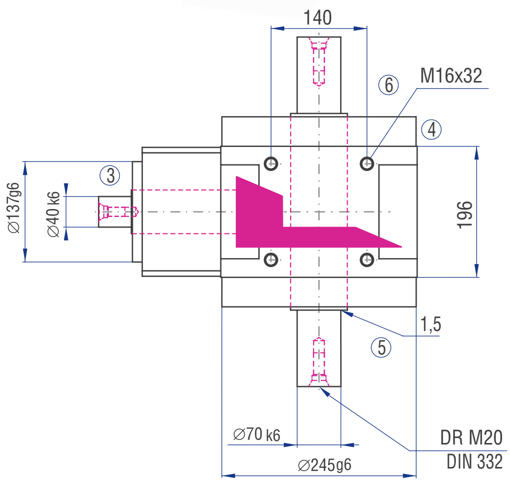




Model







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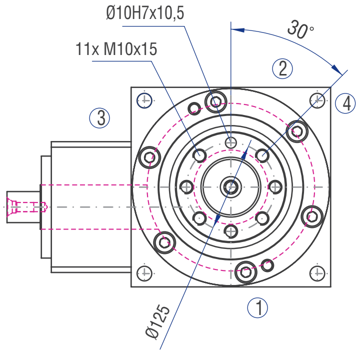
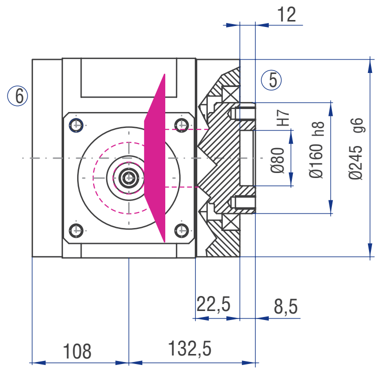
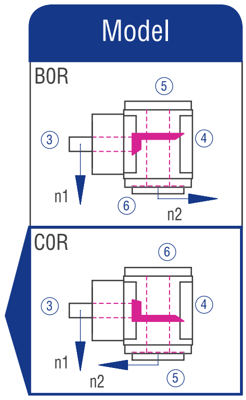
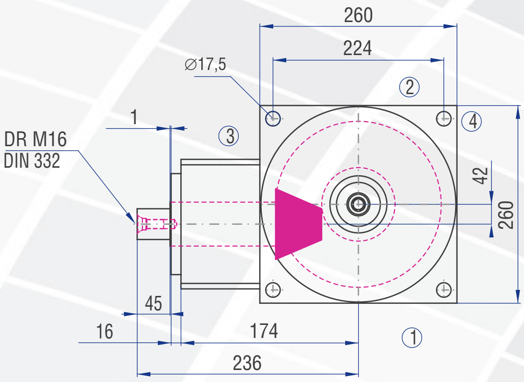
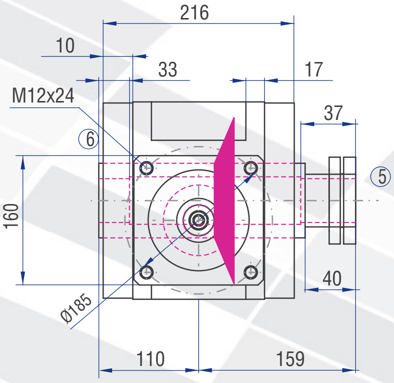
The dimensions of the Models not shown can be figured by mirroring available dimensions.

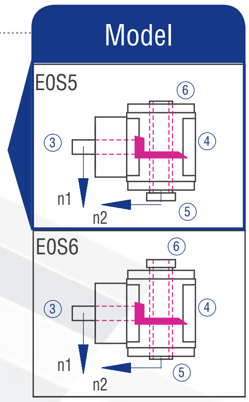

Ø10H7x10,5
11x M10x15
30°
Ø125
1
2
3
4

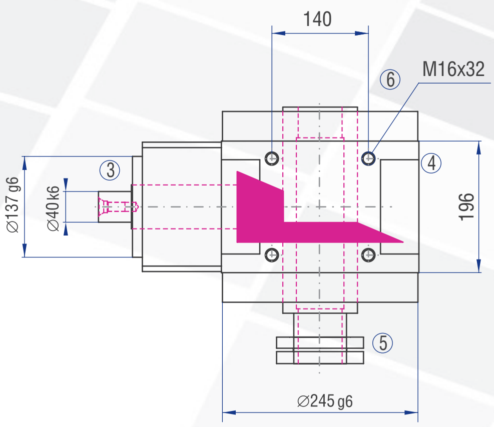

12
5
6
Ø80 H7
Ø160 h8
Ø245 g6
22,5
8,5
108
132,5

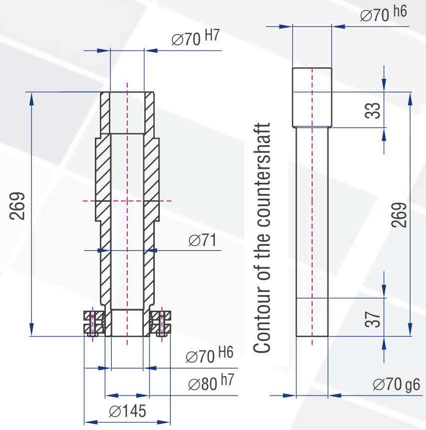

Model
BOR
COR
n1
n2
3
4
5
6


260
224
Ø17,5
1
DR M16
DIN 332
42
260
45
16
174
236
1
2
3
4

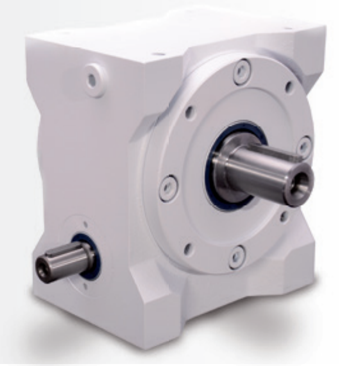

216
10
33
17
M12x24
37
160
Ø185
40
110
159
5
6


Model
E0S5
E0S6
n1
n2
3
4
5
6

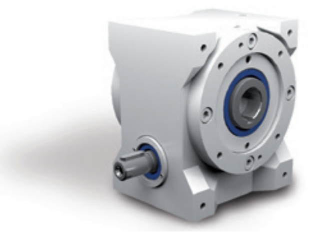

140
M16x32
Ø137 g6
Ø40k6
196
Ø245 g6
3
4
5
6


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

9 Worm gearboxes

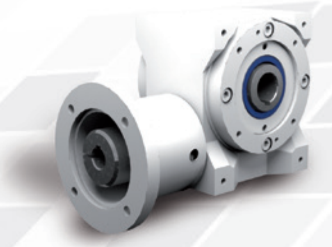


9.1 Type overview



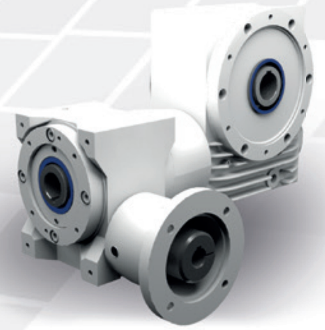
Type S – Standard worm gearboxes

Gear ratios: i = 01:1 to 83:1
Maximum output torque: 1765 Nm
5 sizes, centre-to-centre distance of 040 to 100 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron



Type SL – Type S with flange for motor mounting

Gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
5 sizes, centre-to-centre distance of 040 to 100 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron



Double worm gear unit

Primary gear, available as type S, SL, SLM on SC
9 standard-size combinations
For gear ratios up to 6890:1
Output speeds of 0.1 to 8 rpm

9.2 General construction

Due to its mode of operation, a worm gearbox enables high step-down ratios.
In worm gearboxes, both shafts intersect in a defined distance (A). This centre-to-centre distance is reflected in the specification of the gearbox size. (Example: S 100 – centre-to-centre distance 100 mm)

9.2.1 Toothing

A gear set consists of worm shaft and worm gear.
The worm shaft made of carburised steel is hardened, the toothing is ground. The worm gear consists of a high-quality bronze alloy, the toothing is milled.

9.2.2 Construction types

Due to the modular system, different gearbox construction types can be configured. The variants differ in the type of the shafts, the rotational direction of the shafts, and the support by bearings.

9.2.3 Threaded mounting holes

The housing surface on the side 1 and the flange surfaces on the sides 5 and 6 are machined and may be used as mounting surfaces. All flanges always have threaded mounting holes.
You have the following available ordering options:

Gearbox size	Ordering options	Threaded mounting holes are in the housing surfaces on the gearbox side	Threaded mounting holes are in the flanges on the gearbox side
040-250	1	1	5, 6
040-100	2	1, 2	5, 6
040-100	3	1, 3	5, 6
040-100	4	1, 4	5, 6
040-100	5	1, 5	5, 6
040-100	6	1, 6	5, 6
125-250	2	1, 2	5, 6

Table **9.2.3-1**

The standard version has the order code 1.
Please enquire other mounting options.

9.2.4 Installation position

The installation position is defined by the gearbox side directed downwards during operation and will be indicated by the associated numeral.

The gearboxes can be used in all installation positions. The technically most favourable and thus recommended installation position is the installation position 1. In this position, the worm shaft is horizontal and located at the bottom.

Please contact us for consultation if the angle of the gearbox side directed downwards deviates more than 15° from the horizontal position. The performance data and torques listed in the selection tables are only valid if the gearboxes are used in the installation positions 1, 5 or 6. The values must be reduced by 10%, if the worm shaft is vertical or located at the top (installation position 3, 4 or 2).

9.2.5 Shaft designation – allocation to the gearbox sides

The worm shaft is the fast-rotating shaft. It has the speed n_1 and is identified by N_1.
The slowly rotating shaft has the speed n_2 and is identified by N_2. The worm gear is located on this shaft.
The gearbox sides are identified by the numerals 1 to 6. For the allocation of the shafts to the gearbox sides, please refer to the Figure 8.2.5-1 and the Figure 4.3.1-1 Gearbox sides.

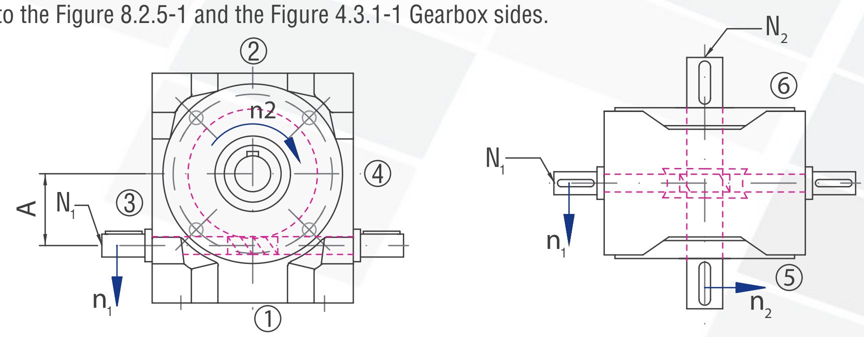


Figure **9.2.5-1**

Worm gearboxes

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9.2.6 Rotational direction and gear ratio

As standard, the worm gearboxes are delivered with right-handed worm shafts. This results in rotational directions according to Figure 8.2.5-1. In the special design, delivery with left-handed gear teeth is also possible. Please enquire this.

Please refer to the performance tables for the possible gear ratios. Principally, the **actual** gear ratio i_{ist} must be taken into account for the layout. In some cases, this deviates from the nominal gear ratio i.

9.2.7 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type.

Starting efficiency

The efficiency is always lower during the starting phase and in the cold operating state since the lubricating film is not formed until the sliding motion has started. Therefore a higher torque is needed.
The starting efficiencies listed below are guidance values and valid for run-in gearboxes.
These starting efficiencies must be taken into account for the layout.

Number of threads	Gear ratio range	Starting efficiency	Pitch
1	83 – 62	0.30 – 0.40	3° – 3.5°
1	53 – 30	0.40 – 0.50	5° – 6°
2	26 – 15	0.56 – 0.65	10° – 12°
4	13 – 7.5	0.68 – 0.75	19° – 23°
6	5	0.74 – 0.82	28° – 32°

Table **9.2.7-1**

Operating efficiency

The tooth flanks of worm gearboxes in the as-delivered condition are not yet fully smoothed. Therefore the gearboxes should be run in with approx. 50% of the nominal data, if possible, before they are operated under load.
The efficiencies specified in the performance tables relate to the permissible nominal data and are guidance values for run-in gearboxes with standard sealing that have operating temperature, and an oil viscosity of 460 mm^2/s.

Step-up drive

Due to the high efficiency of the ATEK worm gear sets it is possible to drive the gearboxes with 4-thread and 6-thread worm shafts also from the worm gear side and thus to generate a stepping-up.

The efficiency with a driving worm gear is calculated by the formula: $\eta' = 2 - (1 / \eta)$

Self-locking

The self-locking is directly related to the efficiency of the gearbox. Please refer to chapter 9.2.11 Self-locking for more information.

9.2.8 Lubrication

Different conditions for the lubrication of the toothing and the roller bearings will arise depending on gearbox size, installation position, rotational speed and on-period. In order to ensure these optimally, different oil quantities and viscosities are used.
These will be defined by ATEK based on your ordering details (rotational speed, on-period, and ambient temperature).
They will be reflected in the type designation. You can find the itemisation in the example S 125 10:1 C0 -9.1- 200/A1

/A1 means:

Position	Abbreviation	Explanation	Reference
1	A	Oil viscosity 460	Table 9.2.8-1
2	1	with venting	Table 9.2.8-2

The worm gearboxes are factory-filled with synthetic polyglycol oil and are normally maintenance-free.

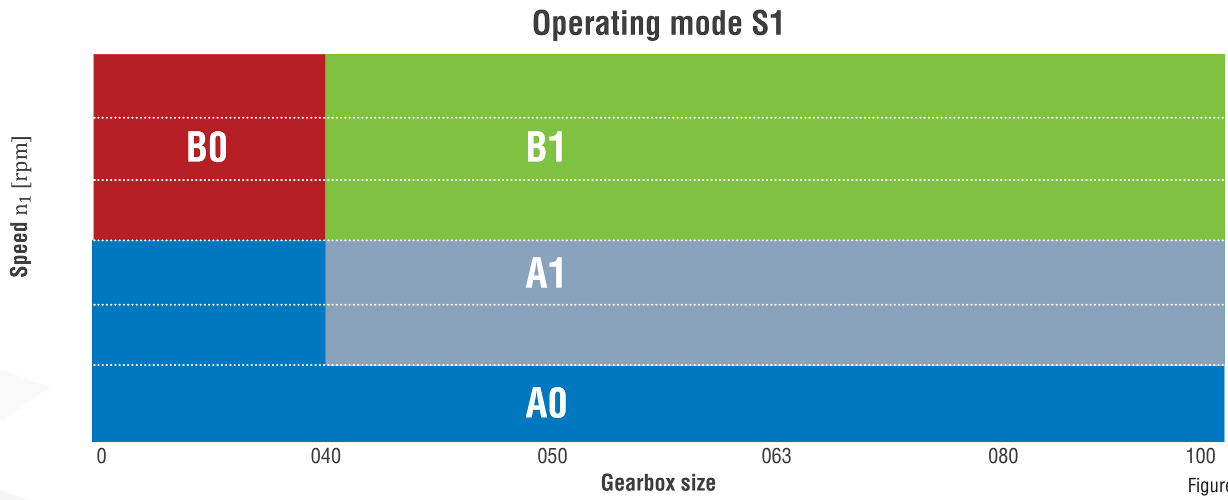


Figure **9.2.8-1**

Oil viscosity table

Code; numeral 1	Viscosity
A	460
B	220
C	not available
D	Injection lubrication
F	Fluid grease

Table **9.2.8-1**

In case of very low rotational speeds, lubrication by fluid grease is also possible.
At operating temperatures over 50°C, high pressure will develop through air expansion in the gearbox. Then a permanent pressure compensation must be ensured. To this end, the use of a vent filter is prescribed.

Code; numeral 2	Vent filter
0	No
1	Yes

Table **9.2.8-2**

9.2.9 Vent filter

If venting is required 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!

The position will be specified in the order documents. Please refer to Figure 8.2.9-1; Installation positions, for the position of the filter. Here, E4, for example, means: Venting on side 4.

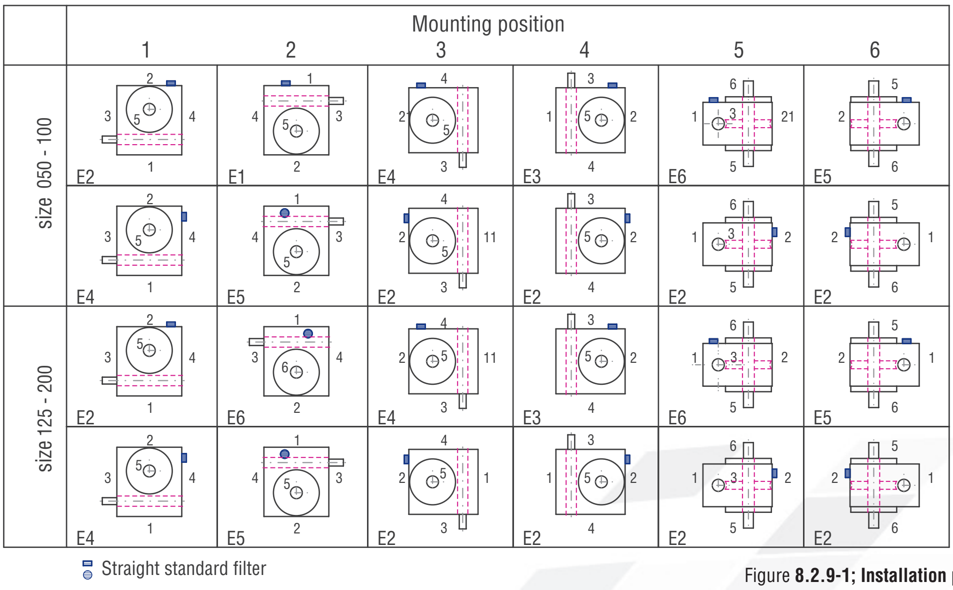


Figure **8.2.9-1; Installation positions**

9.2.10 Low-backlash construction

For optimal 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

All ATEK worm gearboxes can be delivered as low-backlash types.
The following values can be set with standard gear sets:

Ordering option	Gear set	040 – 125	160 – 250
/0000	Standard	<=30 arcmin	<=30 arcmin
/S2	Standard	<=10 arcmin	u.r.
/S1	Standard	<=6 arcmin	u.r.
/S0	Special gear set	<=3–6 arcmin	u.r.

Table **8.2.10-1**

Abbreviation: u.r. – upon request

9.2.11 Self-locking

Worm gearboxes are self-locking if the gearboxes cannot be driven from the worm gear side.
The self-locking is directly related to the efficiency of the gearbox. If self-locking is demanded the corresponding efficiency of the gearbox with driving worm must be below 0.5. If a gearbox must be unconditionally self-locking, or alternatively, unconditionally not self-locking, we ask to contact us for consultation, giving a description of the case of application.

Static self-locking

Worm gearboxes are statically self-locking if starting from standstill with driving worm gear is impossible.
The self-locking depends on the pitch of the toothing. The angle is 2.5° to 5°. Please enquire these.

Vibrations may override / deactivate the self-locking. Therefore a self-locking toothing cannot always take the place of a brake or an anti-reversing device.

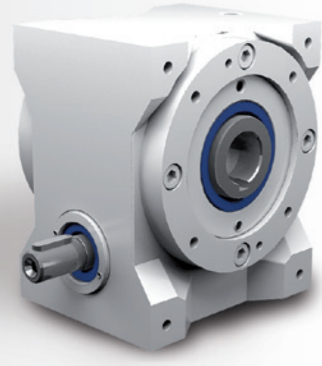
Dynamic self-locking

Worm gearboxes are dynamically self-locking if, with rotating gearbox mechanism, continued operation is impossible due to torque action on the worm gear (output side) of the gearbox. The overrun occurring after switching-off depends on the rotating masses on the drive side. Dynamic self-locking is only possible with very large gear ratios in the range of low driving speeds. Please enquire these.

Limits

If driven parts have high mass inertia moments no self-locking must occur during the run-down process. Extremely high load peaks may occur in case of sudden blocking of the gearbox. In such cases, a gearbox with multistart worm should be used whenever possible. Also, if a braking motor or a separate brake is used on the drive side, the braking torque must not be too high, and it must be mitigated by using an additional flywheel mass on the drive side

9.3 Type S – Standard worm gearboxes



9.3.1 Features

Nominal gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
8 sizes, centre-to-centre distance of 040 bis 100 mm
Low-backlash construction < 6 angular minutes possible
Housing made of grey cast iron

9.3.2 Models

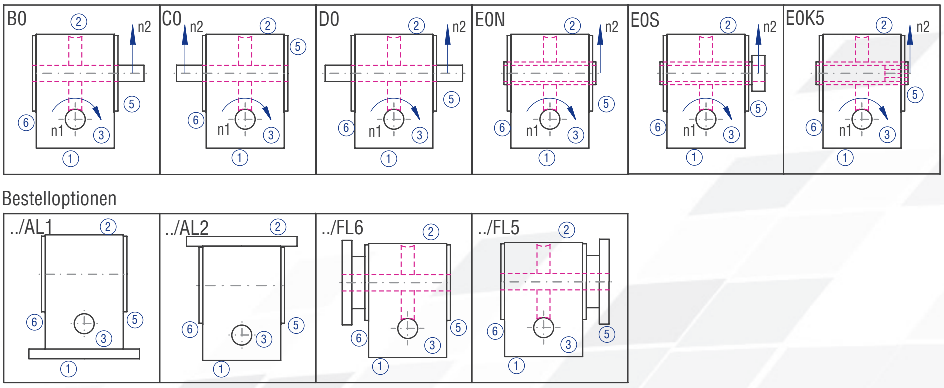


Figure **9.3.2-1; Models**

9.3.3 Gearbox sides

The example shows the Model B0

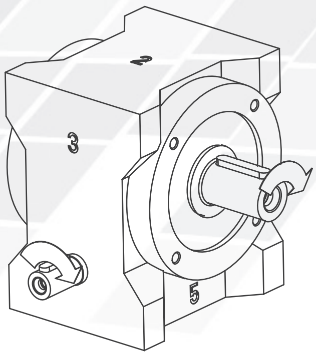


Figure **9.3.3-1; Gearbox sides**

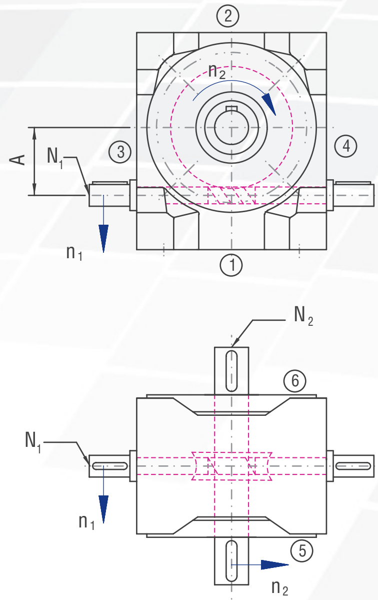


Figure **9.3.3-2; Shaft designations**

9.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
S	063	10:1	B0-	1.	1-	150	/0000
Description	Centre-to-centre distance A; Table 9.3.5-1	Table 9.3.5-1	Figure 9.3.2-1; Models	Gearbox side on which fixing is made Table 9.2.3-1 Figure 4.3.1-1; Gearbox sides	Side directed downwards Figure 4.3.1-1; Gearbox sides	Slowly rotating shaft; Table 9.3.5-1	Standard

Table **9.3.4-1**

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9.3.5 Overview of performance data

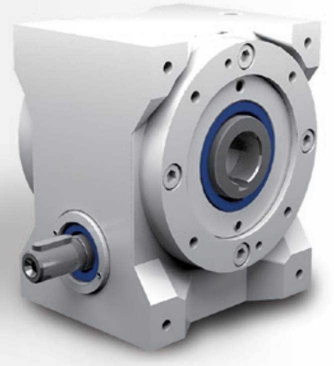
size	n_1	10:1					20:1					30:1					40:1				
	[1/min]	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	300,0	1,39	39	1,28	0,91	150,0	0,82	43	0,77	0,84	100,0	0,53	36	0,51	0,75	75,0	0,48	44	0,46	0,72
	1500	150,0	0,77	43	0,83	0,90	75,0	0,49	50	0,49	0,82	50,0	0,37	50	0,33	0,73	37,0	0,32	56	0,30	0,70
	1000	100,0	0,55	45	0,69	0,88	50,0	0,36	53	0,42	0,80	33,0	0,29	57	0,28	0,70	25,0	0,25	63	0,25	0,67
	750	75,0	0,43	47	0,63	0,87	37,0	0,28	55	0,38	0,78	25,0	0,24	60	0,26	0,68	18,0	0,20	66	0,23	0,65
	500	50,0	0,32	50	0,87	0,85	25,0	0,21	58	0,34	0,76	16,0	0,18	65	0,23	0,64	12,0	0,15	71	0,21	0,62
	150	15,0	0,13	64	0,00	0,81	7,5	0,09	75	0,00	0,71	5,0	0,08	82	0,00	0,57	3,8	0,07	91	0,00	0,56
050	3000	300,0	3,02	85	2,82	0,93	150,0	1,54	81	1,70	0,87	100,0	1,12	82	1,14	0,79	75,0	0,87	80	1,02	0,76
	1500	150,0	1,64	91	1,88	0,92	75,0	1,03	106	1,12	0,85	50,0	0,79	113	0,76	0,77	37,0	0,65	118	0,68	0,75
	1000	100,0	1,15	94	1,56	0,90	50,0	0,73	110	0,93	0,83	33,0	0,59	121	0,63	0,74	25,0	0,52	134	0,57	0,71
	750	75,0	0,96	103	1,40	0,89	37,0	0,63	123	0,84	0,81	25,0	0,54	144	0,06	0,72	18,0	0,41	137	0,52	0,69
	500	50,0	0,71	112	1,23	0,87	25,0	0,47	133	0,74	0,78	16,0	0,42	157	0,50	0,68	12,0	0,31	147	0,46	0,65
	150	15,0	0,26	130	0,00	0,82	7,5	0,18	158	0,00	0,72	5,0	0,18	201	0,00	0,59	3,8	0,13	183	0,00	0,57
063	3000	300,0	4,15	121	4,16	0,94	150,0	2,95	161	2,52	0,88	100,0	1,94	143	1,66	0,80	75,0	1,54	149	1,50	0,78
	1500	150,0	2,94	170	2,89	0,93	75,0	1,70	186	1,73	0,88	50,0	1,38	204	1,15	0,80	37,0	1,08	207	1,04	0,77
	1000	100,0	2,26	194	2,41	0,92	50,0	1,32	212	1,44	0,86	33,0	1,11	237	0,97	0,77	25,0	0,85	237	0,87	0,75
	750	75,0	1,83	207	2,15	0,91	37,0	1,14	237	1,29	0,84	25,0	0,97	268	0,86	0,75	18,0	0,74	264	0,78	0,72
	500	50,0	1,30	216	1,86	0,89	25,0	0,86	259	1,12	0,81	16,0	0,75	296	0,75	0,71	12,0	0,57	288	0,69	0,68
	150	15,0	0,51	265	0,00	0,83	7,5	0,34	310	0,00	0,74	5,0	0,36	403	0,00	0,61	3,8	0,24	348	0,00	0,59
080	3000	300,0	6,58	197	5,92	0,94	150,0	4,24	240	3,59	0,89	100,0	3,47	272	2,41	0,82	75,0	2,62	267	2,14	0,80
	1500	150,0	4,96	297	4,47	0,94	75,0	3,04	344	2,67	0,89	50,0	2,52	395	1,81	0,82	37,0	1,87	381	1,58	0,80
	1000	100,0	3,79	340	3,79	0,94	50,0	2,37	399	2,26	0,88	33,0	2,03	456	1,54	0,80	25,0	1,49	443	1,35	0,78
	750	75,0	3,15	373	3,36	0,93	37,0	2,05	450	2,01	0,86	25,0	1,78	530	1,38	0,78	18,0	1,31	501	1,21	0,75
	500	50,0	2,35	408	2,86	0,91	25,0	1,57	498	1,72	0,83	16,0	1,38	593	1,18	0,75	12,0	1,02	553	1,05	0,71
	150	15,0	0,96	513	0,00	0,84	7,5	0,64	615	0,00	0,75	5,0	0,63	760	0,00	0,63	3,8	0,40	625	0,00	0,61
100	3000	300,0	18,55	555	8,57	0,94	150,0	10,84	614	5,44	0,89	100,0	7,53	590	3,50	0,82	75,0	6,33	645	3,32	0,80
	1500	150,0	11,75	703	6,35	0,94	75,0	6,87	778	3,99	0,89	50,0	4,78	748	2,60	0,82	37,0	4,01	817	2,42	0,80
	1000	100,0	8,95	803	5,49	0,94	50,0	5,28	888	3,44	0,88	33,0	3,60	825	2,27	0,80	25,0	3,13	933	2,09	0,78
	750	75,0	7,45	882	4,95	0,93	37,0	4,45	975	3,10	0,86	25,0	3,19	950	2,06	0,78	18,0	2,65	1025	1,90	0,76
	500	50,0	5,79	1006	4,30	0,91	25,0	3,47	1112	2,69	0,84	16,0	2,51	1080	1,81	0,75	12,0	2,13	1169	1,67	0,72
	150	15,0	2,02	1095	0,00	0,85	7,5	1,49	1441	0,00	0,76	5,0	1,18	1437	0,00	0,64	3,8	1,00	1581	0,00	0,62

Table **9.3.5-1**

size	n_1	53:1					62:1					83:1				
	[1/min]	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η	n_2 [1/min]	P_{1N} [kW]	T_{2N} [Nm]	P_{1NT} [kW]	η
040	3000	57,0	0,39	44	0,42	0,68	48,0	0,36	45	0,35	0,63	36,0	0,25	36	0,32	0,56
	1500	28,0	0,21	46	0,28	0,65	24,0	0,20	48	0,23	0,59	18,0	0,14	37	0,21	0,52
	1000	18,0	0,15	48	0,24	0,63	16,0	0,15	51	0,20	0,56	12,0	0,10	38	0,18	0,50
	750	14,0	0,13	51	0,22	0,61	12,0	0,12	53	0,18	0,54	9,0	0,08	38	0,17	0,48
	500	9,4	0,09	55	0,20	0,59	8,1	0,09	56	0,16	0,51	6,0	0,05	38	0,15	0,46
	150	2,8	0,04	72	0,00	0,55	2,4	0,03	57	0,00	0,45	1,8	0,02	38	0,00	0,42
050	3000	57,0	0,65	77	0,92	0,73	48,0	0,61	81	0,75	0,67	36,0	0,39	59	0,70	0,58
	1500	28,0	0,38	85	0,62	0,69	24,0	0,42	105	0,50	0,64	18,0	0,21	63	0,47	0,56
	1000	18,0	0,27	88	0,52	0,67	16,0	0,31	109	0,43	0,60	12,0	0,15	64	0,41	0,54
	750	14,0	0,22	91	0,48	0,64	12,0	0,25	112	0,39	0,57	9,0	0,12	66	0,37	0,52
	500	9,4	0,16	95	0,43	0,61	8,1	0,18	113	0,36	0,53	6,0	0,09	69	0,34	0,49
	150	2,8	0,06	110	0,00	0,55	2,4	0,06	113	0,00	0,45	1,8	0,03	75	0,00	0,44
063	3000	57,0	1,16	143	1,34	0,76	48,0	0,82	110	1,10	0,69	36,0	0,75	129	0,99	0,66
	1500	28,0	0,80	191	0,96	0,74	24,0	0,66	175	0,76	0,68	18,0	0,46	152	0,69	0,63
	1000	18,0	0,58	200	0,78	0,71	16,0	0,53	202	0,65	0,65	12,0	0,33	152	0,59	0,59
	750	14,0	0,47	207	0,71	0,68	12,0	0,46	221	0,59	0,62	9,0	0,26	152	0,54	0,56
	500	9,4	0,34	217	0,63	0,65	8,1	0,34	226	0,52	0,57	6,0	0,19	152	0,49	0,52
	150	2,8	0,14	248	0,00	0,56	2,4	0,12	226	0,00	0,47	1,8	0,07	152	0,00	0,44
080	3000	57,0	1,78	234	1,93	0,78	48,0	1,40	194	1,55	0,70	36,0	1,10	196	1,43	0,68
	1500	28,0	1,04	271	1,41	0,77	24,0	1,01	279	1,15	0,70	18,0	0,90	304	1,04	0,65
	1000	18,0	0,76	284	1,20	0,74	16,0	0,81	325	0,98	0,68	12,0	0,64	304	0,90	0,61
	750	14,0	0,61	294	1,09	0,71	12,0	0,69	352	0,89	0,65	9,0	0,49	304	0,82	0,59
	500	9,4	0,45	308	0,96	0,68	8,1	0,54	393	0,78	0,61	6,0	0,35	304	0,73	0,55
	150	2,8	0,18	352	0,00	0,58	2,4	0,23	448	0,00	0,49	1,8	0,13	304	0,00	0,46
100	3000	57,0	4,76	615	3,04	0,78	48,0	4,59	645	2,39	0,70	36,0	3,33	591	2,24	0,68
	1500	28,0	2,63	670	2,19	0,77	24,0	2,91	817	1,74	0,70	18,0	1,74	599	1,61	0,66
	1000	18,0	1,92	704	1,88	0,74	16,0	2,17	886	1,52	0,68	12,0	1,23	599	1,40	0,62
	750	14,0	1,53	728	1,71	0,72	12,0	1,70	886	1,39	0,65	9,0	0,94	599	1,28	0,61
	500	9,4	1,11	762	1,51	0,69	8,1	1,21	886	1,24	0,61	6,0	0,67	599	1,15	0,57
	150	2,8	0,45	870	0,00	0,59	2,4	0,44	886	0,00	0,50	1,8	0,24	599	0,00	0,47

Table **9.3.5-1**

9.3.6 Type S 040 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
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 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

ATEK ANTRIEBSTECHNIK

Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	1,39	0,77	0,55	0,43	0,32	0,13
		T_{2N} [Nm]	39	43	45	47	50	64
		P_{1NT} [kW]	1,28	0,83	0,69	0,63	0,87	0,00
		Efficiency	0,91	0,90	0,88	0,87	0,85	0,81
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	0,82	0,49	0,36	0,28	0,21	0,09
		T_{2N} [Nm]	43	50	53	55	58	75
		P_{1NT} [kW]	0,77	0,49	0,42	0,38	0,34	0,00
		Efficiency	0,84	0,82	0,80	0,78	0,76	0,71
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	0,53	0,37	0,29	0,24	0,18	0,08
		T_{2N} [Nm]	36	50	57	60	65	82
		P_{1NT} [kW]	0,51	0,33	0,28	0,26	0,23	0,00
		Efficiency	0,75	0,73	0,70	0,68	0,64	0,57
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,48	0,32	0,25	0,20	0,15	0,07
		T_{2N} [Nm]	44	56	63	66	71	91
		P_{1NT} [kW]	0,46	0,30	0,25	0,23	0,21	0,00
		Efficiency	0,72	0,70	0,67	0,65	0,62	0,56

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,39	0,21	0,15	0,13	0,09	0,04
		T_{2N} [Nm]	44	46	48	51	55	72
		P_{1NT} [kW]	0,42	0,28	0,24	0,22	0,20	0,00
		Efficiency	0,68	0,65	0,63	0,61	0,59	0,55
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,36	0,20	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	45	48	51	53	56	57
		P_{1NT} [kW]	0,35	0,23	0,20	0,18	0,16	0,00
		Efficiency	0,63	0,59	0,56	0,54	0,51	0,45
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,25	0,14	0,10	0,08	0,05	0,02
		T_{2N} [Nm]	36	37	38	38	38	38
		P_{1NT} [kW]	0,32	0,21	0,18	0,17	0,15	0,00
		Efficiency	0,56	0,52	0,50	0,48	0,46	0,42

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	73	83	77	59	97	90	77	107	99	87	72	64

Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 10	250	125	310	155	350	175	400	200	450	225	550	275

Permissible radial force Fr2 and axial force Fa2 on shaft N2

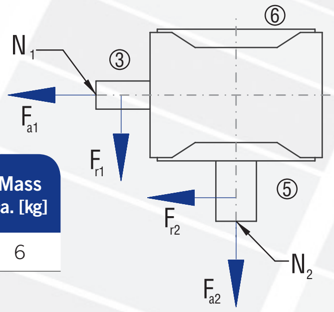
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

Inertia moments/mass

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

	Inertia moment [kgcm^2] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.33	0.25	0.18	0.15	0.19	0.15	0.13	0.18	0.14	0.12	0.13	0.12

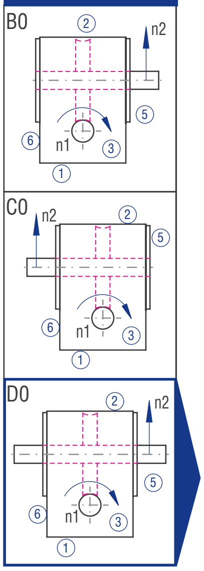
Mass ca. [kg]
6

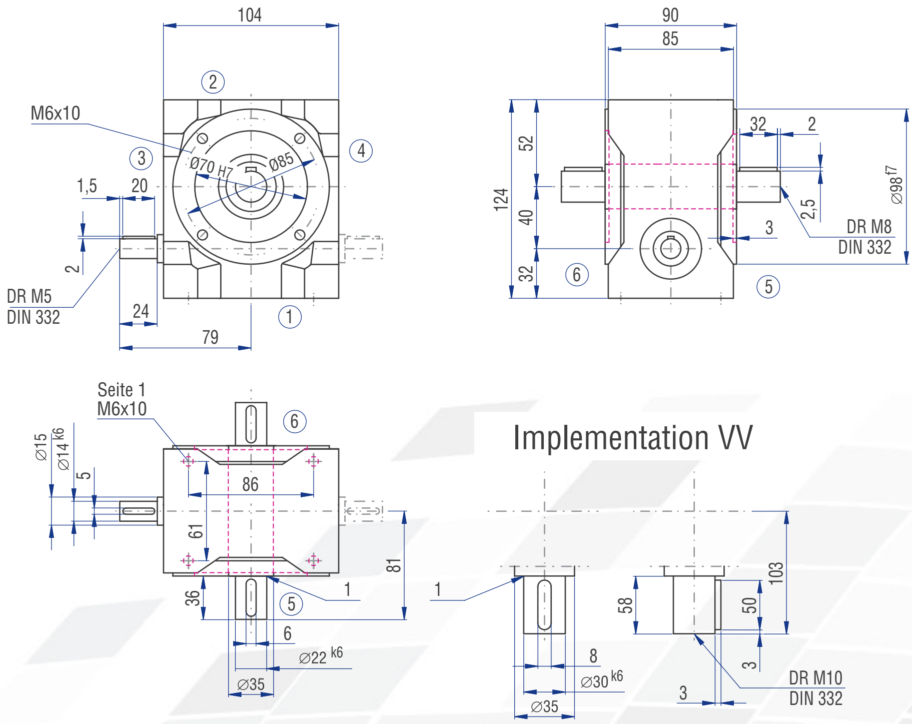


The mass of the gearbox may deviate depending on the gear ratio and the type.

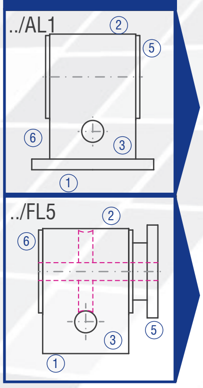
9.3.6 Type S 040 – Standard worm gearboxes

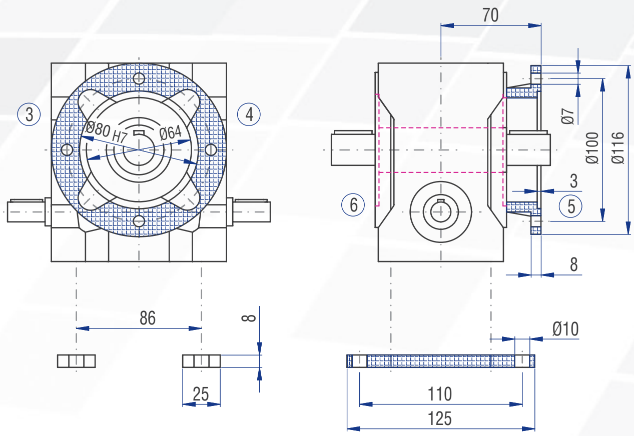
Model



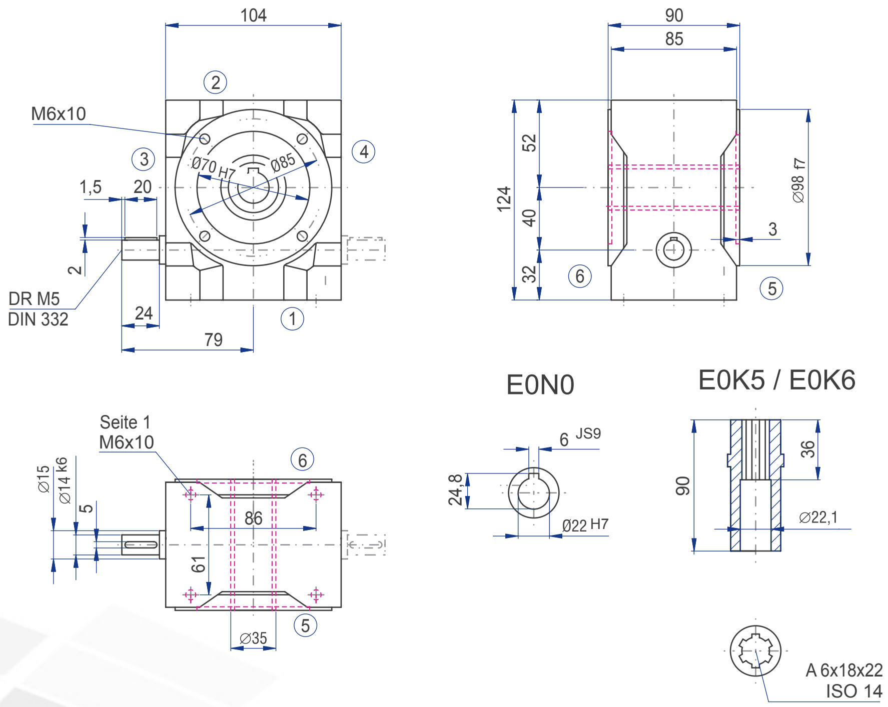


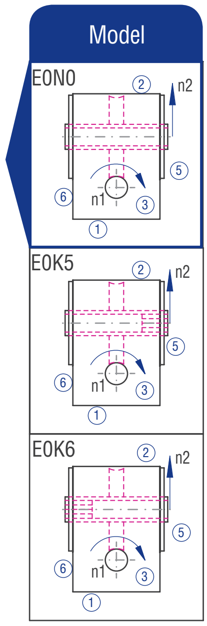
Option



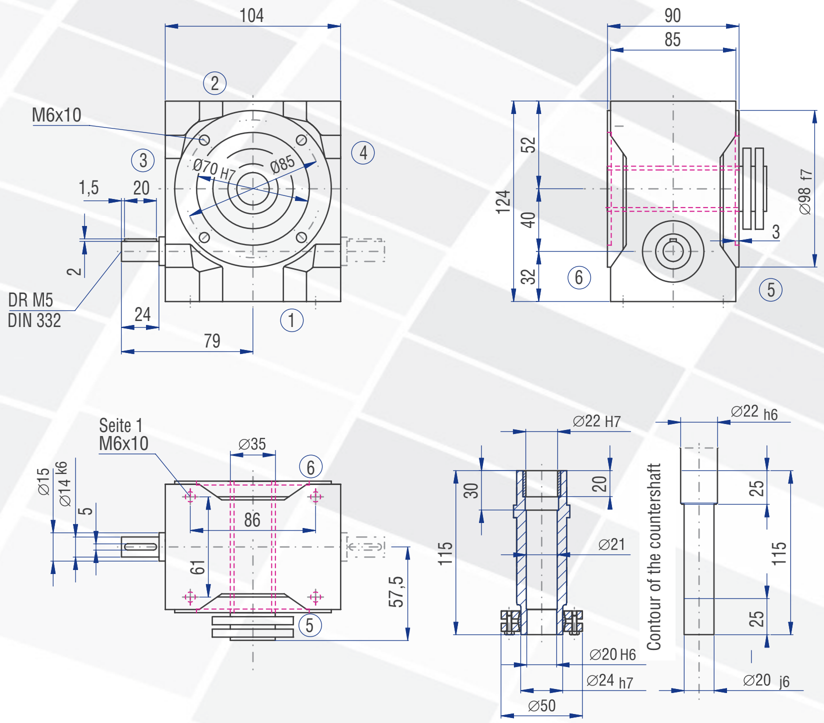


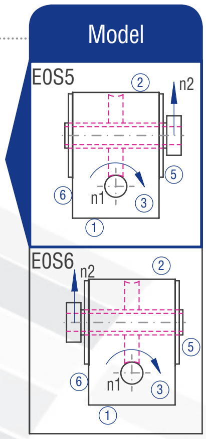
The dimensions of the Models not shown can be figured by mirroring available dimensions.



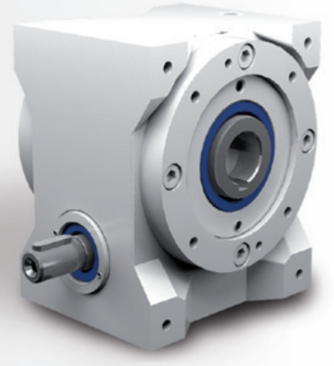


Worm gearboxes





9.3.7 Type S 050 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
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 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

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Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	38:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	3,02	1,64	1,15	0,96	0,71	0,26
		T_{2N} [Nm]	85	91	94	103	112	130
		P_{1NT} [kW]	2,82	1,88	1,56	1,40	1,23	0,00
		Efficiency	0,93	0,92	0,90	0,89	0,87	0,82
20:1	38:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	1,54	1,03	0,73	0,63	0,47	0,18
		T_{2N} [Nm]	81	106	110	123	133	158
		P_{1NT} [kW]	1,70	1,12	0,93	0,84	0,74	0,00
		Efficiency	0,87	0,85	0,83	0,81	0,78	0,72
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,12	0,79	0,59	0,54	0,42	0,18
		T_{2N} [Nm]	82	113	121	144	157	201
		P_{1NT} [kW]	1,14	0,76	0,63	0,06	0,50	0,00
		Efficiency	0,79	0,77	0,74	0,72	0,68	0,59
40:1	38:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,87	0,65	0,52	0,41	0,31	0,13
		T_{2N} [Nm]	80	118	134	137	147	183
		P_{1NT} [kW]	1,02	0,68	0,57	0,52	0,46	0,00
		Efficiency	0,76	0,75	0,71	0,69	0,65	0,57

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,65	0,38	0,27	0,22	0,16	0,06
		T_{2N} [Nm]	77	85	88	91	95	110
		P_{1NT} [kW]	0,92	0,62	0,52	0,48	0,43	0,00
		Efficiency	0,73	0,69	0,67	0,64	0,61	0,55
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,61	0,42	0,31	0,25	0,18	0,06
		T_{2N} [Nm]	81	105	109	112	113	113
		P_{1NT} [kW]	0,75	0,50	0,43	0,39	0,36	0,00
		Efficiency	0,67	0,64	0,60	0,57	0,53	0,45
83:1	83:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,39	0,21	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	59	63	64	66	69	75
		P_{1NT} [kW]	0,70	0,47	0,41	0,37	0,34	0,00
		Efficiency	0,58	0,56	0,54	0,52	0,49	0,44

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	150	167	152	100	195	179	137	219	197	145	120	112

Permissible radial force F_{r1} and axial force F_{a1} on shaft N1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 15	590	295	730	365	820	410	940	470	1050	525	1300	650
> 15	450	225	560	280	630	315	720	360	810	405	1000	500

Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

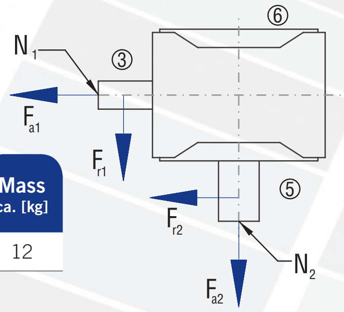
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.95	0.73	0.58	0.49	0.60	0.50	0.44	0.57	0.48	0.42	0.47	0.42

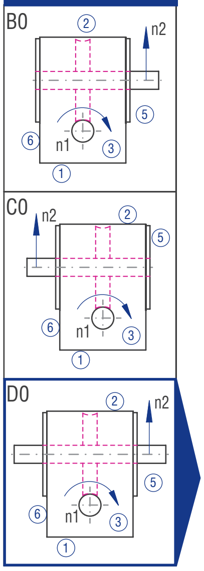
Mass ca. [kg]
12

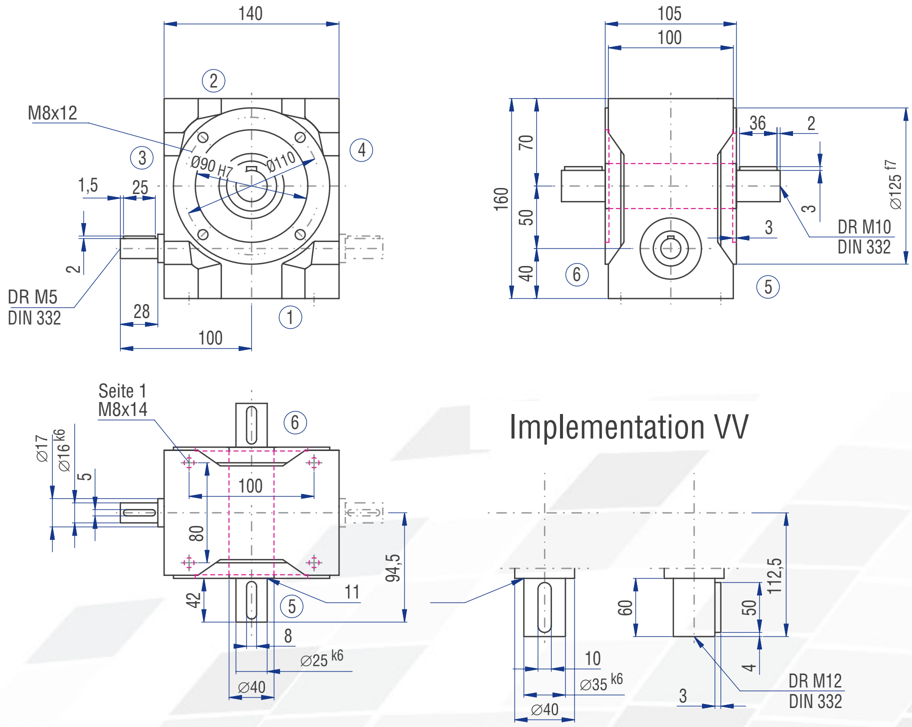


The mass of the gearbox may deviate depending on the gear ratio and the type.

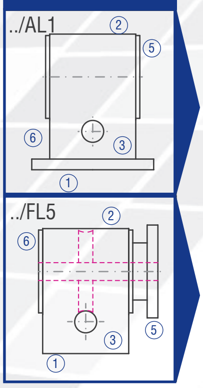
9.3.7 Type S 050 – Standard worm gearboxes

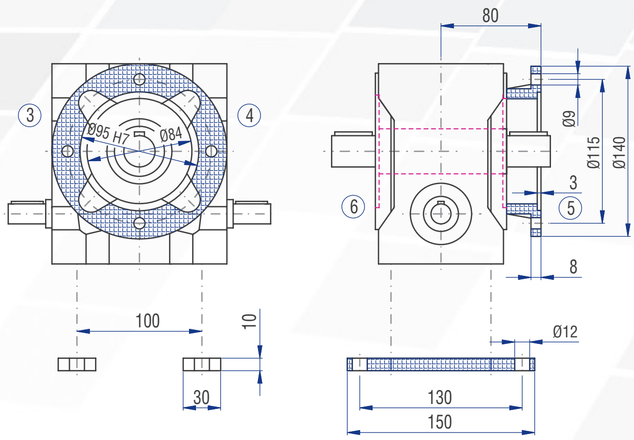
Model



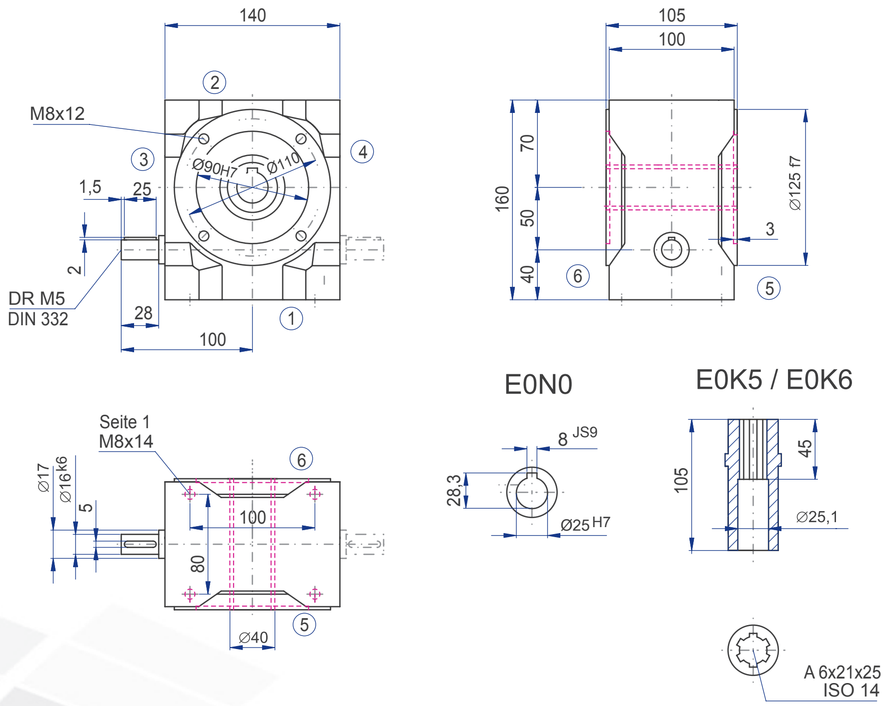


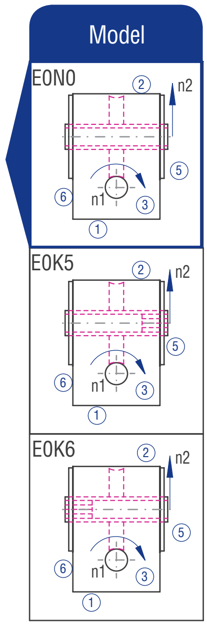
Option

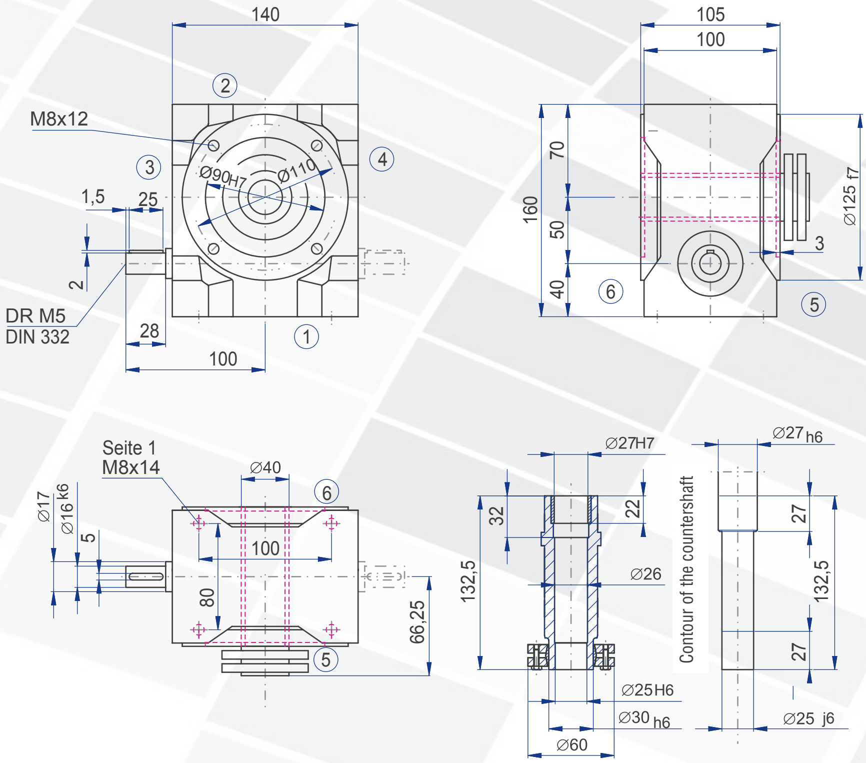


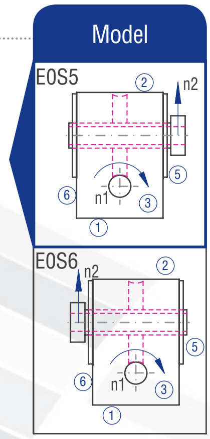


The dimensions of the Models not shown can be figured by mirroring available dimensions.

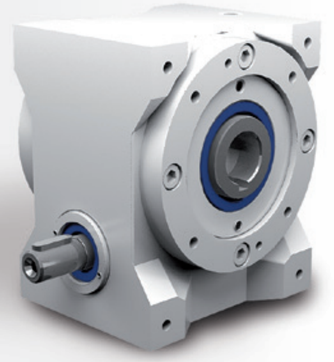

140
M8x12
1,5
25
2
DR M5
DIN 332
28
100
Ø90H7
Ø110
105
100
160
70
50
40
Ø125 f7
3
E0N0
E0K5 / E0K6
Seite 1
M8x14
Ø17
Ø16 k6
5
80
Ø40
8 JS9
28,3
Ø25 H7
105
45
Ø25,1
A 6x21x25
ISO 14


Model
E0N0
n2
n1
E0K5
n2
n1
E0K6
n2
n1


140
M8x12
1,5
25
2
DR M5
DIN 332
28
100
Ø90H7
Ø110
105
100
160
70
50
40
Ø125 f7
3
Seite 1
M8x14
Ø40
Ø17
Ø16 k6
5
100
80
66,25
Ø27H7
32
22
132,5
Ø26
Ø25H6
Ø30 h6
Ø60
Contour of the countershaft
Ø27 h6
27
132,5
27
Ø25 j6


Model
E0S5
n2
n1
E0S6
n2
n1

9.3.8 Type S 063 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
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 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

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Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	4,15	2,94	2,26	1,83	1,30	0,51
		T_{2N} [Nm]	121	170	194	207	216	265
		P_{1NT} [kW]	4,16	2,89	2,41	2,15	1,86	0,00
		Efficiency	0,94	0,93	0,92	0,91	0,89	0,83
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	2,95	1,70	1,32	1,14	0,86	0,34
		T_{2N} [Nm]	161	186	212	237	259	310
		P_{1NT} [kW]	2,52	1,73	1,44	1,29	1,12	0,00
		Efficiency	0,88	0,88	0,86	0,84	0,81	0,74
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,94	1,38	1,11	0,97	0,75	0,36
		T_{2N} [Nm]	143	204	237	268	296	403
		P_{1NT} [kW]	1,66	1,15	0,97	0,86	0,75	0,00
		Efficiency	0,80	0,80	0,77	0,75	0,71	0,61
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	1,54	1,08	0,85	0,74	0,57	0,24
		T_{2N} [Nm]	149	207	237	264	288	348
		P_{1NT} [kW]	1,50	1,04	0,87	0,78	0,69	0,00
		Efficiency	0,78	0,77	0,75	0,72	0,68	0,59

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,16	0,80	0,58	0,47	0,34	0,14
		T_{2N} [Nm]	143	191	200	207	217	248
		P_{1NT} [kW]	1,34	0,96	0,78	0,71	0,63	0,00
		Efficiency	0,76	0,74	0,71	0,68	0,65	0,56
62:1	61:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,82	0,66	0,53	0,46	0,34	0,12
		T_{2N} [Nm]	110	175	202	221	226	226
		P_{1NT} [kW]	1,10	0,76	0,65	0,59	0,52	0,00
		Efficiency	0,69	0,68	0,65	0,62	0,57	0,47
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,75	0,46	0,33	0,26	0,19	0,07
		T_{2N} [Nm]	129	152	152	152	152	152
		P_{1NT} [kW]	0,99	0,69	0,59	0,54	0,49	0,00
		Efficiency	0,66	0,63	0,59	0,56	0,52	0,44

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	295	334	306	222	395	355	295	437	360	310	240	246

Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 20	820	410	1000	500	1130	565	1320	660	1420	710	1850	925
> 20	630	315	770	385	870	435	1020	510	1090	545	1420	710

Permissible radial force Fr2 and axial force Fa2 on shaft N2

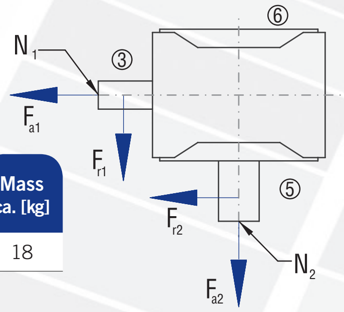
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	2.17	1.64	1.14	0.94	1.33	0.94	0.82	1.25	0.90	0.79	0.97	0.80

Mass ca. [kg]
18



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

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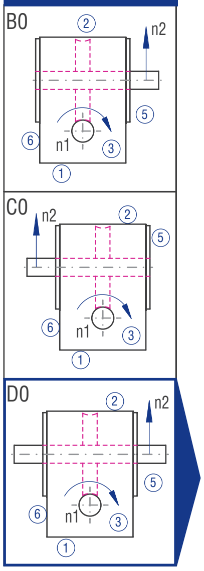
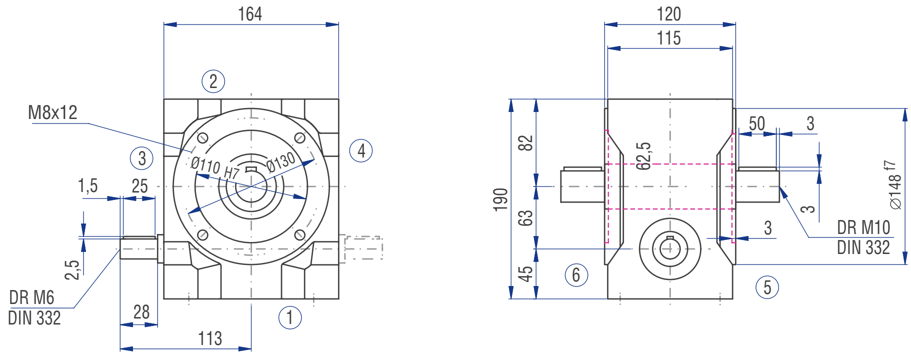
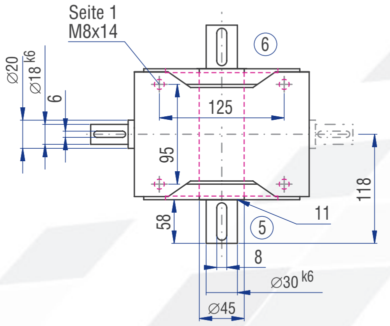
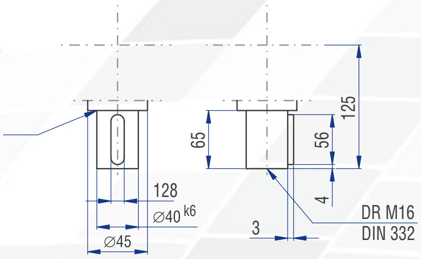
Model



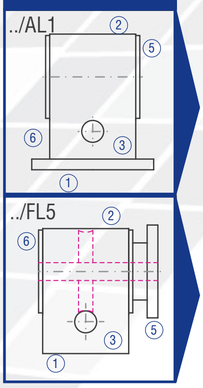


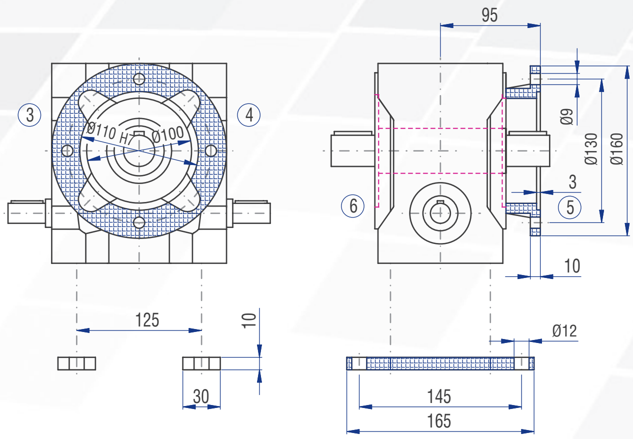


Implementation VV

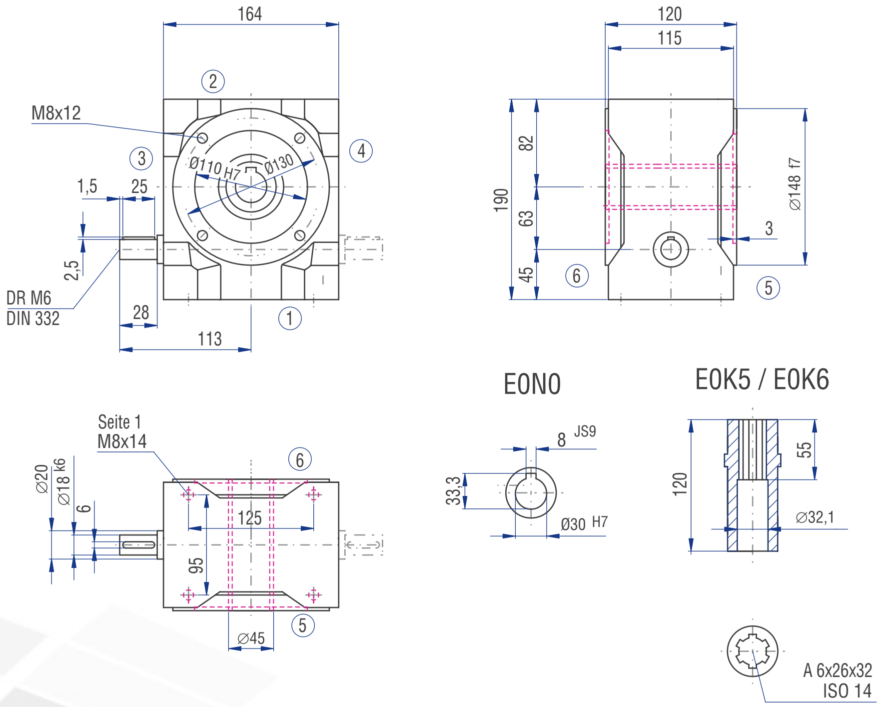


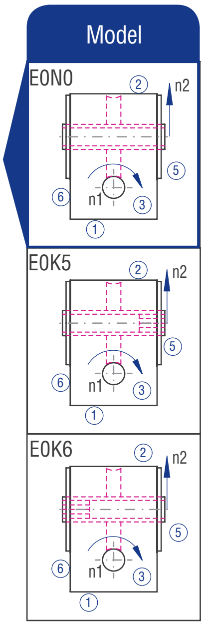
Option



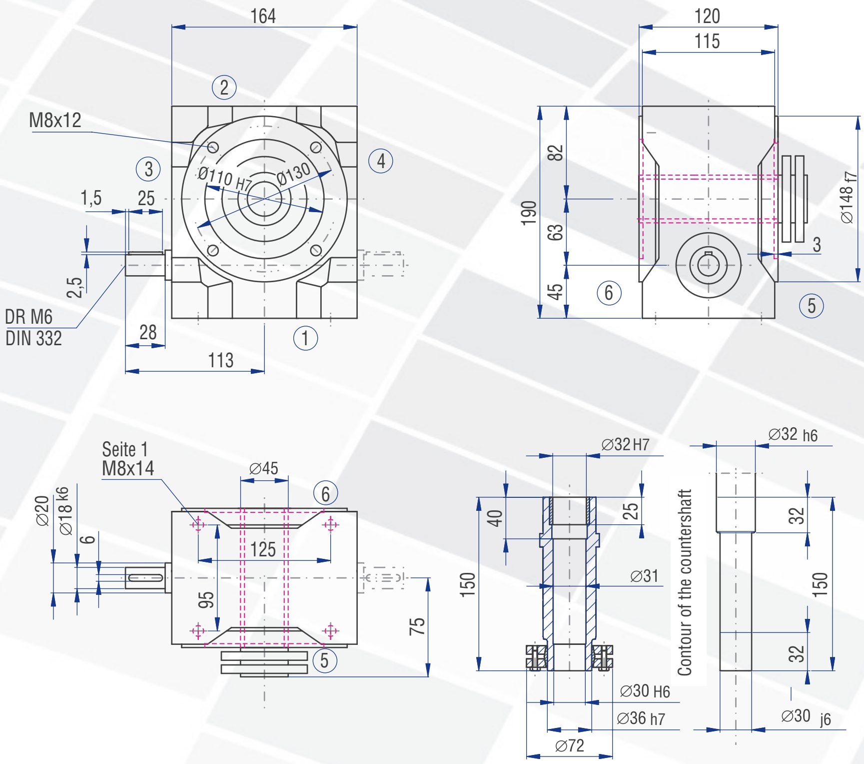


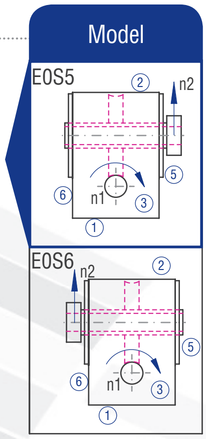
The dimensions of the Models not shown can be figured by mirroring available dimensions.



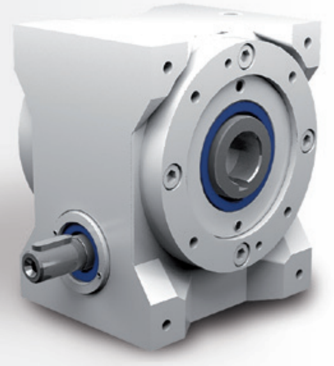


Worm gearboxes





9.3.9 Type S 080 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
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 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

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Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	6,58	4,96	3,79	3,15	2,35	0,96
		T_{2N} [Nm]	197	297	340	373	408	513
		P_{1NT} [kW]	5,92	4,47	3,79	3,36	2,86	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,84
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	4,24	3,04	2,37	2,05	1,57	0,64
		T_{2N} [Nm]	240	344	399	450	498	615
		P_{1NT} [kW]	3,59	2,67	2,26	2,01	1,72	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,83	0,75
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	3,47	2,52	2,03	1,78	1,38	0,63
		T_{2N} [Nm]	272	395	456	530	593	760
		P_{1NT} [kW]	2,41	1,81	1,54	1,38	1,18	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,63
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	2,62	1,87	1,49	1,31	1,02	0,40
		T_{2N} [Nm]	267	381	443	501	553	625
		P_{1NT} [kW]	2,14	1,58	1,35	1,21	1,05	0,00
		Efficiency	0,80	0,80	0,78	0,75	0,71	0,61

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	53:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,78	1,04	0,76	0,61	0,45	0,18
		T_{2N} [Nm]	234	271	284	294	308	352
		P_{1NT} [kW]	1,93	1,41	1,20	1,09	0,96	0,00
		Efficiency	0,78	0,77	0,74	0,71	0,68	0,58
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	1,40	1,01	0,81	0,69	0,54	0,23
		T_{2N} [Nm]	194	279	325	352	393	448
		P_{1NT} [kW]	1,55	1,15	0,98	0,89	0,78	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,49
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	1,10	0,90	0,64	0,49	0,35	0,13
		T_{2N} [Nm]	196	304	304	304	304	304
		P_{1NT} [kW]	1,43	1,04	0,90	0,82	0,73	0,00
		Efficiency	0,68	0,65	0,61	0,59	0,55	0,46

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	610	695	625	321	826	725	432	920	780	480	480	510

Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 35	1000	500	1250	625	1420	710	1600	800	1780	890	2200	1100
> 35	770	385	960	480	1090	545	1230	615	1470	735	1690	845

Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040

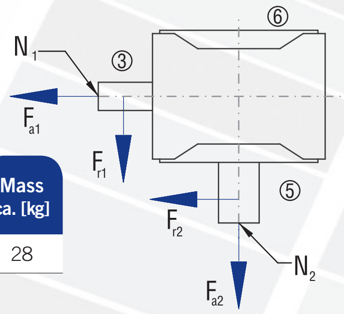
Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	5.82	4.22	2.96	2.26	3.26	2.40	1.91	3.01	2.26	1.82	2.51	1.91

Mass ca. [kg]
28

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



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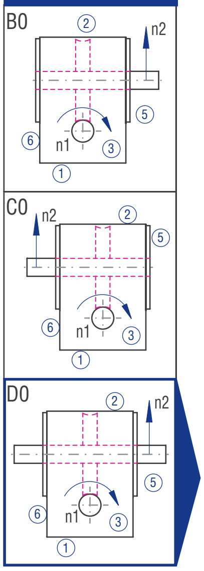
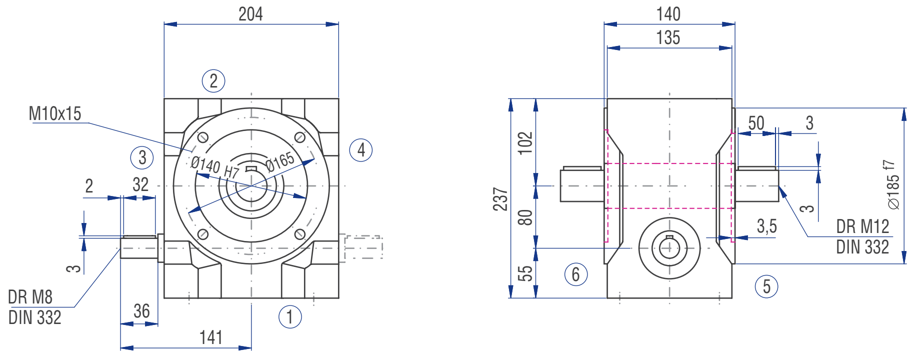
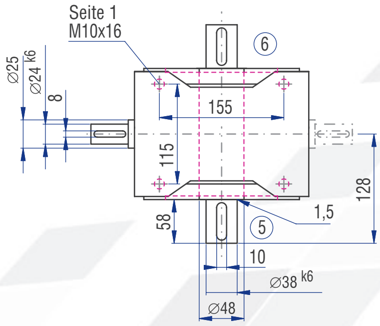
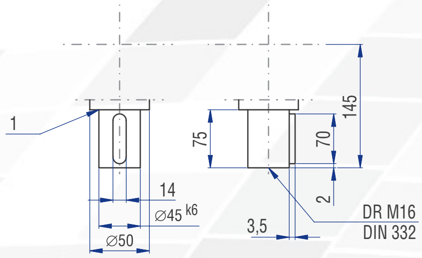
Model



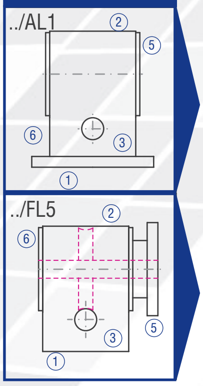


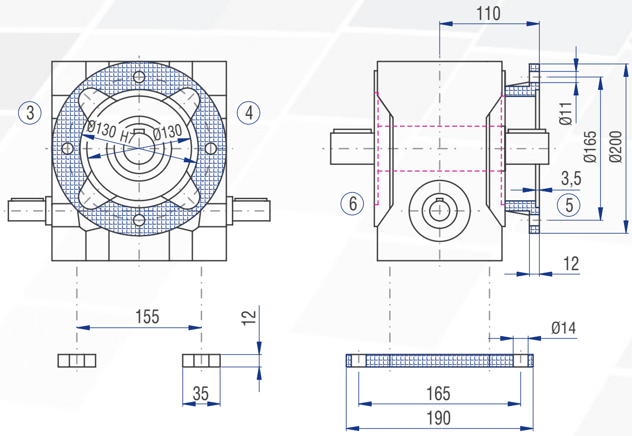


Implementation VV

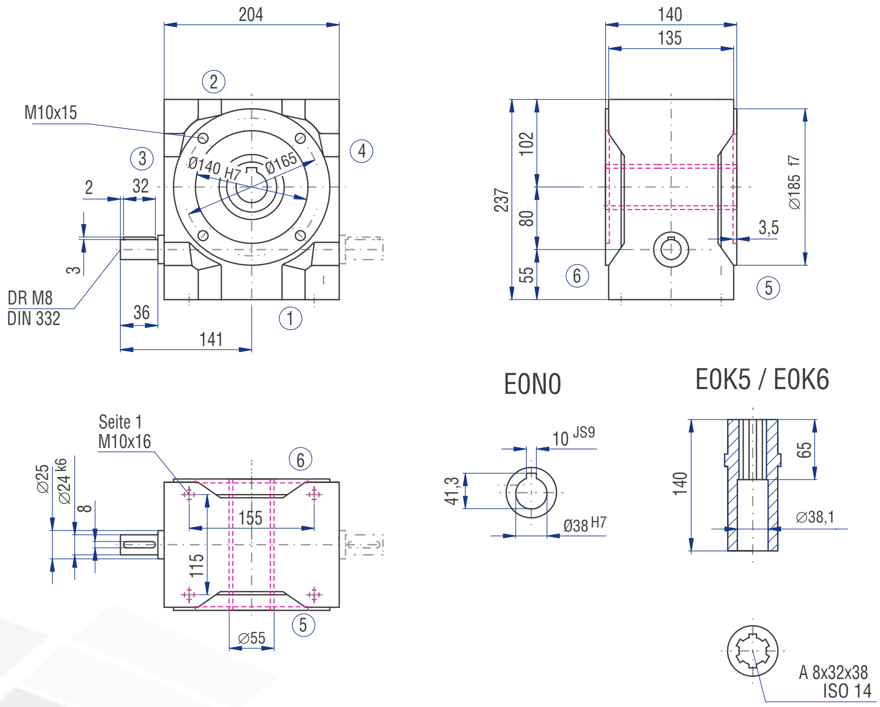


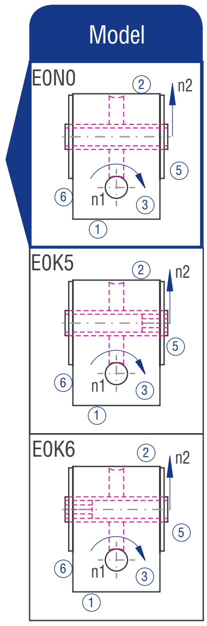
Option

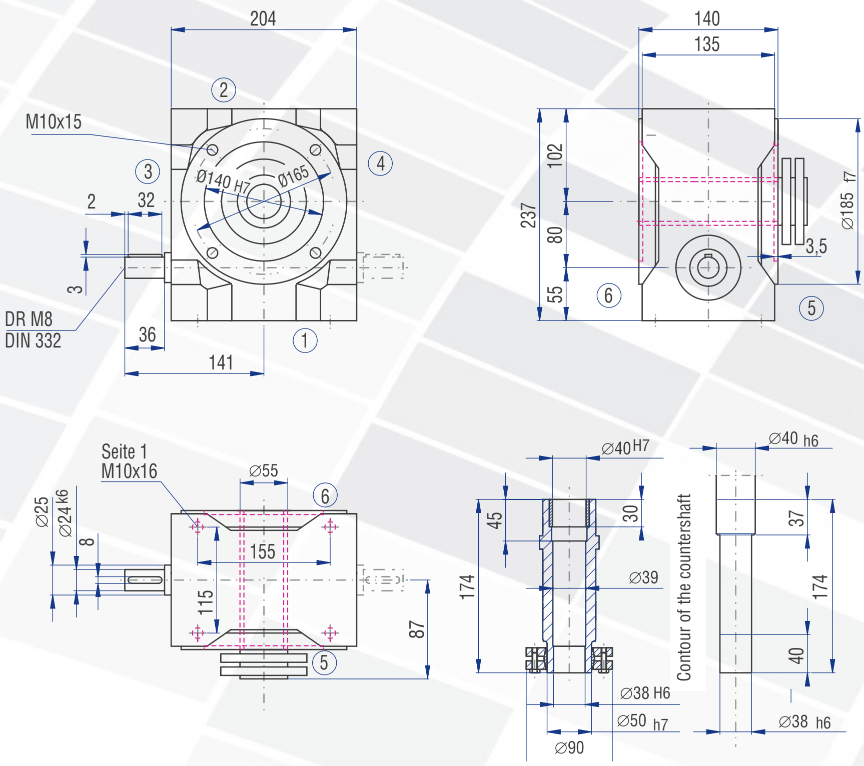


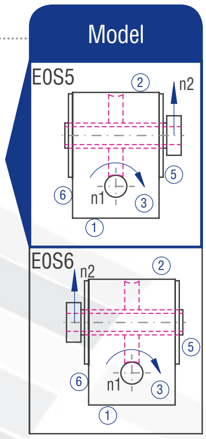


The dimensions of the Models not shown can be figured by mirroring available dimensions.









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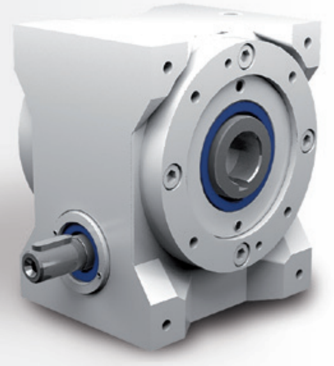
9.3.10 Type S 100 – Standard worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
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 9.2.8
Lubricant	Synthetic lubricants	See chapter 9.2.8

ATEK ANTRIEBSTECHNIK

Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	18,55	11,75	8,95	7,45	5,79	2,02
		T_{2N} [Nm]	555	703	803	882	1.006	1.095
		P_{1NT} [kW]	8,57	6,35	5,49	4,95	4,30	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,85
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	10,84	6,87	5,28	4,45	3,47	1,49
		T_{2N} [Nm]	614	778	888	975	1.112	1.441
		P_{1NT} [kW]	5,44	3,99	3,44	3,10	2,69	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,84	0,76
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	7,53	4,78	3,60	3,19	2,51	1,18
		T_{2N} [Nm]	590	748	825	950	1.080	1.437
		P_{1NT} [kW]	3,50	2,60	2,27	2,06	1,81	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,64
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	6,33	4,01	3,13	2,65	2,13	1,00
		T_{2N} [Nm]	645	817	933	1.025	1.169	1.581
		P_{1NT} [kW]	3,32	2,42	2,09	1,90	1,67	0,00
		Efficiency	0,80	0,80	0,78	0,76	0,72	0,62

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	4,76	2,63	1,92	1,53	1,11	0,45
		T_{2N} [Nm]	615	670	704	728	762	870
		P_{1NT} [kW]	3,04	2,19	1,88	1,71	1,51	0,00
		Efficiency	0,78	0,77	0,74	0,72	0,69	0,59
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	4,59	2,91	2,17	1,70	1,21	0,44
		T_{2N} [Nm]	645	817	886	886	886	886
		P_{1NT} [kW]	2,39	1,74	1,52	1,39	1,24	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,50
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	3,33	1,74	1,23	0,94	0,67	0,24
		T_{2N} [Nm]	591	599	599	599	599	599
		P_{1NT} [kW]	2,24	1,61	1,40	1,28	1,15	0,00
		Efficiency	0,68	0,66	0,62	0,61	0,57	0,47

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	1190	1360	1090	736	1610	1440	980	1765	1582	1080	1040	1000

Permissible radial force Fr1 and axial force Fa1 on shaft N1

n_1 [rpm]	3000		1500		1000		750		500		150	
T_1 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	1250	625	1600	800	1800	900	2000	1000	2250	1125	2650	1325
> 80	960	480	1230	615	1380	690	1540	770	1730	865	2040	1020

Permissible radial force Fr2 and axial force Fa2 on shaft N2

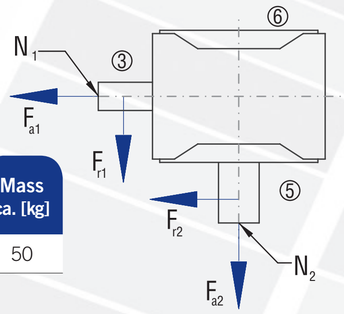
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1	Mass ca. [kg]
J1	22.38	17.88	14.03	12.28	15.17	12.37	11.34	14.50	11.96	11.10	12.56	11.34	50

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



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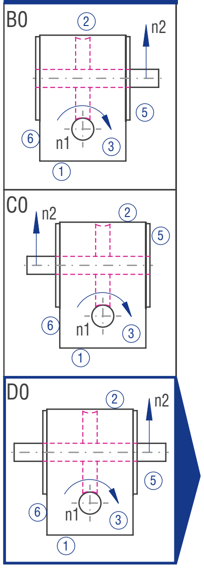
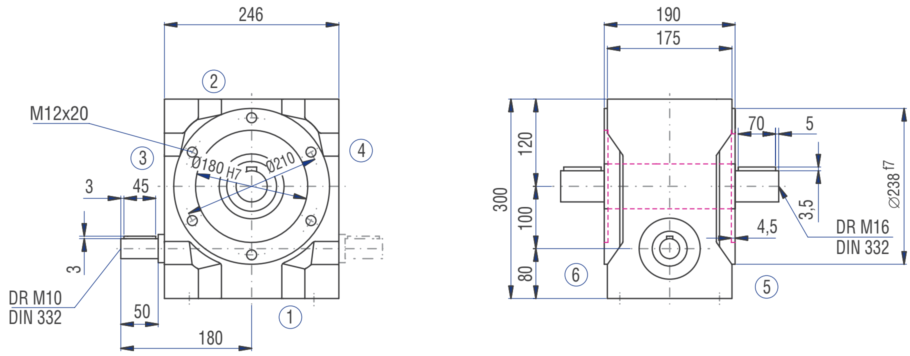
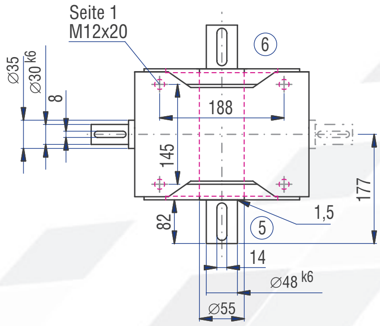
9.3.10 Type S 100 – Standard worm gearboxes

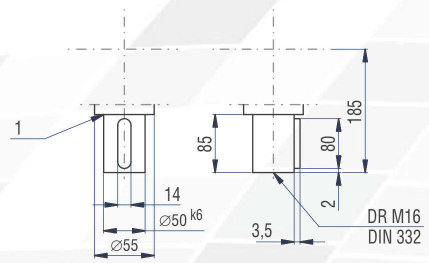
Model



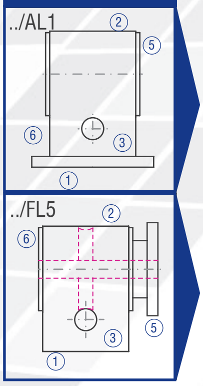


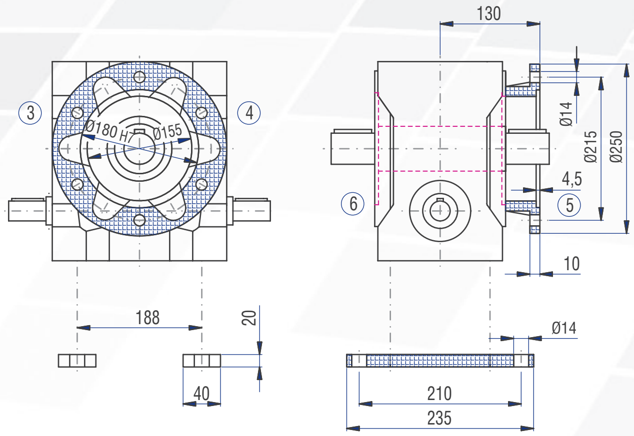


Implementation VV

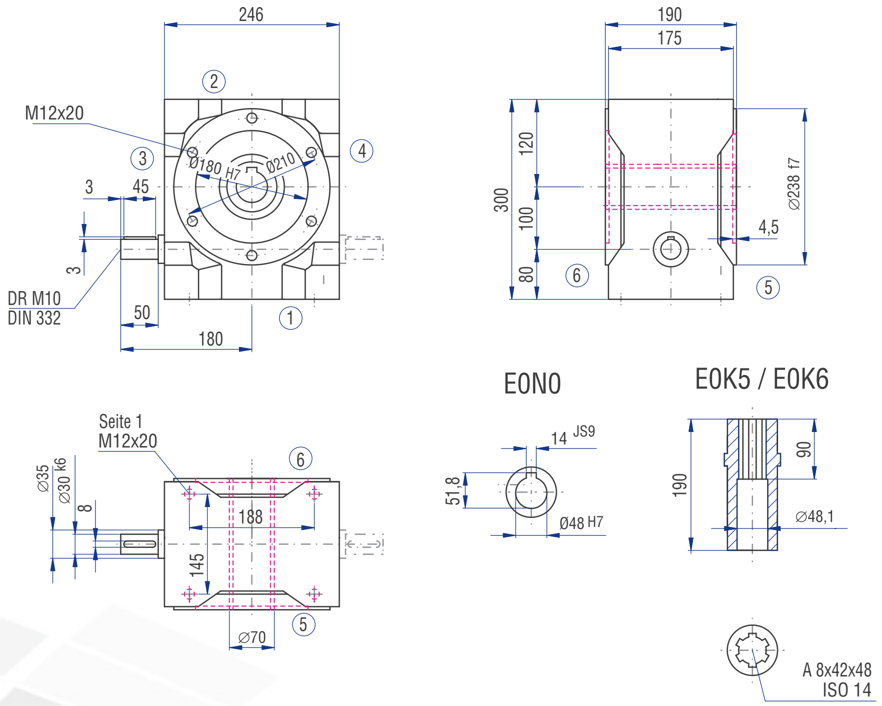


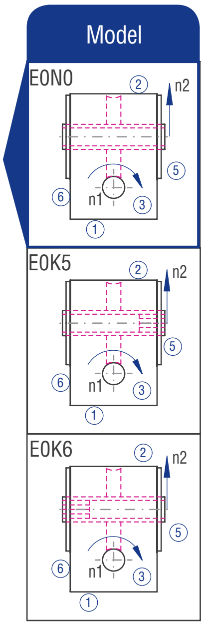
Option

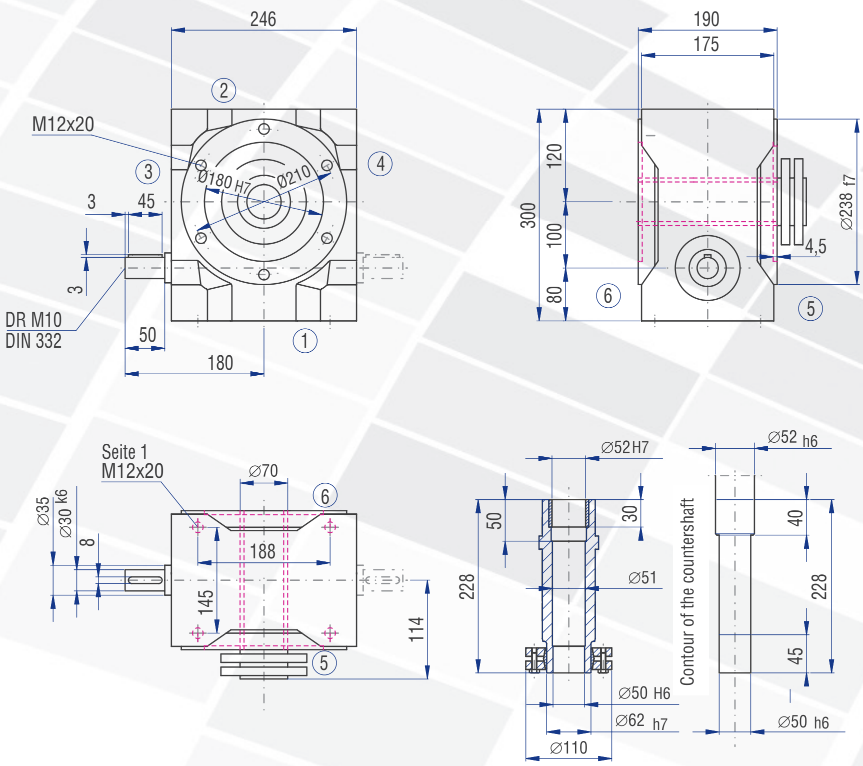


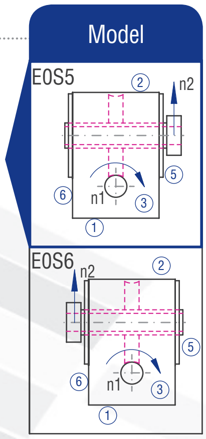


The dimensions of the Models not shown can be figured by mirroring available dimensions.


246
M12x20
2
3
4
Ø180 H7
Ø210
3
45
3
DR M10
DIN 332
50
180
1
190
175
300
120
100
80
6
5
Ø238 f7
4,5
E0N0
E0K5 / E0K6
Seite 1
M12x20
6
Ø35
Ø30 k6
8
188
145
Ø70
5
14 JS9
51,8
Ø48 H7
190
90
Ø48,1
A 8x42x48
ISO 14

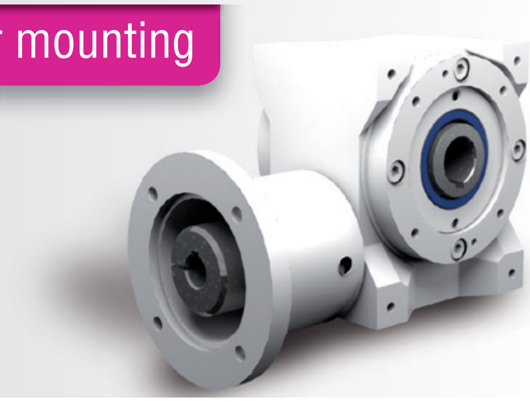

Model
E0N0
E0K5
E0K6
n1
n2


246
2
M12x20
3
4
Ø180 H7
Ø210
3
45
3
DR M10
DIN 332
50
180
1
190
175
300
120
100
80
6
5
Ø238 f7
4,5
Seite 1
M12x20
Ø70
6
Ø35
Ø30 k6
8
188
145
5
114
Ø52H7
50
30
228
Ø51
Ø50 H6
Ø62 h7
Ø110
Contour of the countershaft
Ø52 h6
40
228
45
Ø50 h6


Model
E0S5
E0S6
n1
n2

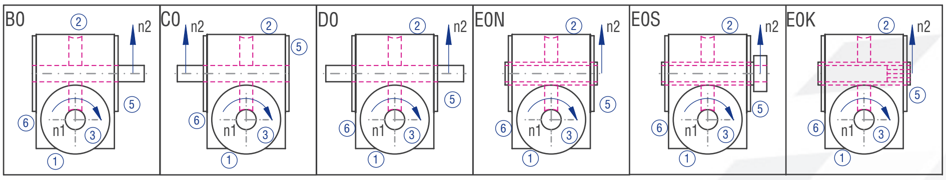
9.4 Type SL – Type S with flange for motor mounting

9.4.1 Features



Nominal gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
5 sizes, centre-to-centre distance of 040 to 100 mm
Low-backlash construction < 6 angular minutes possible
Suitable for fitting IEC standard motors
Drive side with hollow-bored shaft and flange
Housing made of grey cast iron

9.4.2 Models



Bestelloptionen

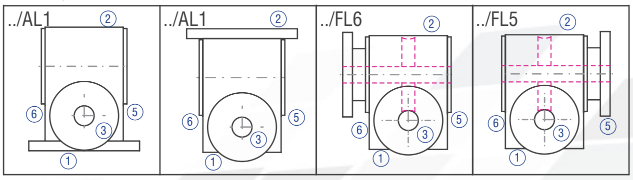


Figure **9.4.2-1; Models**

9.4.3 Gearbox sides

The example shows the Model B0 (right picture without motor flange)

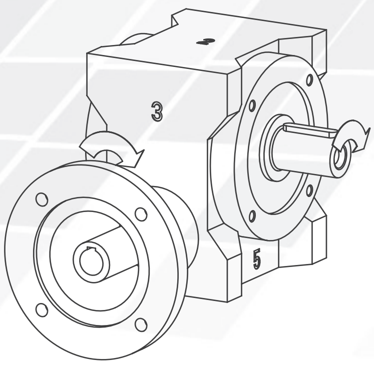


Figure **9.4.3-1; Gearbox sides**

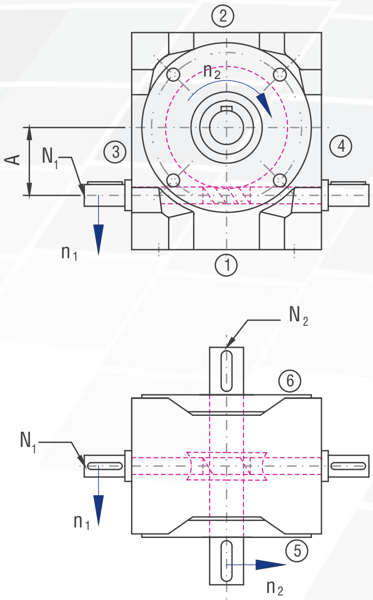


Figure **9.4.3-2; Shaft designations**

9.4.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
SL	063	10:1	B0-	1.	1-	150	/0000
Description	Centre-to-centre distance A; Table 9.4.5-1	Table 9.4.5-1	Figure 9.4.2-1; Models	Side on which fixing is made; Table 9.2.3-1; Figure 4.3.1-1 Gearbox sides	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 9.4.5-1	Standard
	D120	/14x30					
	Flange diameter	Shaft diameter x length					

Table **9.4.4-1**

9.4.5 Overview of performance data

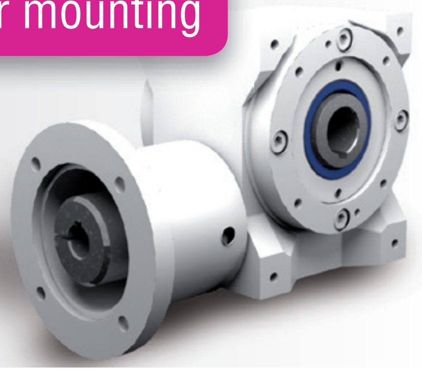
size	n_1 [1/min]	10:1 n_2 [1/min]	10:1 P_{1N} [kW]	10:1 T_{2N} [Nm]	10:1 P_{1NT} [kW]	10:1 η	20:1 n_2 [1/min]	20:1 P_{1N} [kW]	20:1 T_{2N} [Nm]	20:1 P_{1NT} [kW]	20:1 η	30:1 n_2 [1/min]	30:1 P_{1N} [kW]	30:1 T_{2N} [Nm]	30:1 P_{1NT} [kW]	30:1 η	40:1 n_2 [1/min]	40:1 P_{1N} [kW]	40:1 T_{2N} [Nm]	40:1 P_{1NT} [kW]	40:1 η
040	3000	300,0	1,39	39	1,28	0,91	150,0	0,82	43	0,77	0,84	100,0	0,53	36	0,51	0,75	75,0	0,48	44	0,46	0,72
	1500	150,0	0,77	43	0,83	0,90	75,0	0,49	50	0,49	0,82	50,0	0,37	50	0,33	0,73	37,0	0,32	56	0,30	0,70
	1000	100,0	0,55	45	0,69	0,88	50,0	0,36	53	0,42	0,80	33,0	0,29	57	0,28	0,70	25,0	0,25	63	0,25	0,67
	750	75,0	0,43	47	0,63	0,87	37,0	0,28	55	0,38	0,78	25,0	0,24	60	0,26	0,68	18,0	0,20	66	0,23	0,65
	500	50,0	0,32	50	0,87	0,85	25,0	0,21	58	0,34	0,76	16,0	0,18	65	0,23	0,64	12,0	0,15	71	0,21	0,62
	150	15,0	0,13	64	0,00	0,81	7,5	0,09	75	0,00	0,71	5,0	0,08	82	0,00	0,57	3,8	0,07	91	0,00	0,56
050	3000	300,0	3,02	85	2,82	0,93	150,0	1,54	81	1,70	0,87	100,0	1,12	82	1,14	0,79	75,0	0,87	80	1,02	0,76
	1500	150,0	1,64	91	1,88	0,92	75,0	1,03	106	1,12	0,85	50,0	0,79	113	0,76	0,77	37,0	0,65	118	0,68	0,75
	1000	100,0	1,15	94	1,56	0,90	50,0	0,73	110	0,93	0,83	33,0	0,59	121	0,63	0,74	25,0	0,52	134	0,57	0,71
	750	75,0	0,96	103	1,40	0,89	37,0	0,63	123	0,84	0,81	25,0	0,54	144	0,06	0,72	18,0	0,41	137	0,52	0,69
	500	50,0	0,71	112	1,23	0,87	25,0	0,47	133	0,74	0,78	16,0	0,42	157	0,50	0,68	12,0	0,31	147	0,46	0,65
	150	15,0	0,26	130	0,00	0,82	7,5	0,18	158	0,00	0,72	5,0	0,18	201	0,00	0,59	3,8	0,13	183	0,00	0,57
063	3000	300,0	4,15	121	4,16	0,94	150,0	2,95	161	2,52	0,88	100,0	1,94	143	1,66	0,80	75,0	1,54	149	1,50	0,78
	1500	150,0	2,94	170	2,89	0,93	75,0	1,70	186	1,73	0,88	50,0	1,38	204	1,15	0,80	37,0	1,08	207	1,04	0,77
	1000	100,0	2,26	194	2,41	0,92	50,0	1,32	212	1,44	0,86	33,0	1,11	237	0,97	0,77	25,0	0,85	237	0,87	0,75
	750	75,0	1,83	207	2,15	0,91	37,0	1,14	237	1,29	0,84	25,0	0,97	268	0,86	0,75	18,0	0,74	264	0,78	0,72
	500	50,0	1,30	216	1,86	0,89	25,0	0,86	259	1,12	0,81	16,0	0,75	296	0,75	0,71	12,0	0,57	288	0,69	0,68
	150	15,0	0,51	265	0,00	0,83	7,5	0,34	310	0,00	0,74	5,0	0,36	403	0,00	0,61	3,8	0,24	348	0,00	0,59
080	3000	300,0	6,58	197	5,92	0,94	150,0	4,24	240	3,59	0,89	100,0	3,47	272	2,41	0,82	75,0	2,62	267	2,14	0,80
	1500	150,0	4,96	297	4,47	0,94	75,0	3,04	344	2,67	0,89	50,0	2,52	395	1,81	0,82	37,0	1,87	381	1,58	0,80
	1000	100,0	3,79	340	3,79	0,94	50,0	2,37	399	2,26	0,88	33,0	2,03	456	1,54	0,80	25,0	1,49	443	1,35	0,78
	750	75,0	3,15	373	3,36	0,93	37,0	2,05	450	2,01	0,86	25,0	1,78	530	1,38	0,78	18,0	1,31	501	1,21	0,75
	500	50,0	2,35	408	2,86	0,91	25,0	1,57	498	1,72	0,83	16,0	1,38	593	1,18	0,75	12,0	1,02	553	1,05	0,71
	150	15,0	0,96	513	0,00	0,84	7,5	0,64	615	0,00	0,75	5,0	0,63	760	0,00	0,63	3,8	0,40	625	0,00	0,61
100	3000	300,0	18,55	555	8,57	0,94	150,0	10,84	614	5,44	0,89	100,0	7,53	590	3,50	0,82	75,0	6,33	645	3,32	0,80
	1500	150,0	11,75	703	6,35	0,94	75,0	6,87	778	3,99	0,89	50,0	4,78	748	2,60	0,82	37,0	4,01	817	2,42	0,80
	1000	100,0	8,95	803	5,49	0,94	50,0	5,28	888	3,44	0,88	33,0	3,60	825	2,27	0,80	25,0	3,13	933	2,09	0,78
	750	75,0	7,45	882	4,95	0,93	37,0	4,45	975	3,10	0,86	25,0	3,19	950	2,06	0,78	18,0	2,65	1025	1,90	0,76
	500	50,0	5,79	1006	4,30	0,91	25,0	3,47	1112	2,69	0,84	16,0	2,51	1080	1,81	0,75	12,0	2,13	1169	1,67	0,72
	150	15,0	2,02	1095	0,00	0,85	7,5	1,49	1441	0,00	0,76	5,0	1,18	1437	0,00	0,64	3,8	1,00	1581	0,00	0,62

Table **9.3.5-1**

size	n_1 [1/min]	53:1 n_2 [1/min]	53:1 P_{1N} [kW]	53:1 T_{2N} [Nm]	53:1 P_{1NT} [kW]	53:1 η	62:1 n_2 [1/min]	62:1 P_{1N} [kW]	62:1 T_{2N} [Nm]	62:1 P_{1NT} [kW]	62:1 η	83:1 n_2 [1/min]	83:1 P_{1N} [kW]	83:1 T_{2N} [Nm]	83:1 P_{1NT} [kW]	83:1 η
040	3000	57,0	0,39	44	0,42	0,68	48,0	0,36	45	0,35	0,63	36,0	0,25	36	0,32	0,56
	1500	28,0	0,21	46	0,28	0,65	24,0	0,20	48	0,23	0,59	18,0	0,14	37	0,21	0,52
	1000	18,0	0,15	48	0,24	0,63	16,0	0,15	51	0,20	0,56	12,0	0,10	38	0,18	0,50
	750	14,0	0,13	51	0,22	0,61	12,0	0,12	53	0,18	0,54	9,0	0,08	38	0,17	0,48
	500	9,4	0,09	55	0,20	0,59	8,1	0,09	56	0,16	0,51	6,0	0,05	38	0,15	0,46
	150	2,8	0,04	72	0,00	0,55	2,4	0,03	57	0,00	0,45	1,8	0,02	38	0,00	0,42
050	3000	57,0	0,65	77	0,92	0,73	48,0	0,61	81	0,75	0,67	36,0	0,39	59	0,70	0,58
	1500	28,0	0,38	85	0,62	0,69	24,0	0,42	105	0,50	0,64	18,0	0,21	63	0,47	0,56
	1000	18,0	0,27	88	0,52	0,67	16,0	0,31	109	0,43	0,60	12,0	0,15	64	0,41	0,54
	750	14,0	0,22	91	0,48	0,64	12,0	0,25	112	0,39	0,57	9,0	0,12	66	0,37	0,52
	500	9,4	0,16	95	0,43	0,61	8,1	0,18	113	0,36	0,53	6,0	0,09	69	0,34	0,49
	150	2,8	0,06	110	0,00	0,55	2,4	0,06	113	0,00	0,45	1,8	0,03	75	0,00	0,44
063	3000	57,0	1,16	143	1,34	0,76	48,0	0,82	110	1,10	0,69	36,0	0,75	129	0,99	0,66
	1500	28,0	0,80	191	0,96	0,74	24,0	0,66	175	0,76	0,68	18,0	0,46	152	0,69	0,63
	1000	18,0	0,58	200	0,78	0,71	16,0	0,53	202	0,65	0,65	12,0	0,33	152	0,59	0,59
	750	14,0	0,47	207	0,71	0,68	12,0	0,46	221	0,59	0,62	9,0	0,26	152	0,54	0,56
	500	9,4	0,34	217	0,63	0,65	8,1	0,34	226	0,52	0,57	6,0	0,19	152	0,49	0,52
	150	2,8	0,14	248	0,00	0,56	2,4	0,12	226	0,00	0,47	1,8	0,07	152	0,00	0,44
080	3000	57,0	1,78	234	1,93	0,78	48,0	1,40	194	1,55	0,70	36,0	1,10	196	1,43	0,68
	1500	28,0	1,04	271	1,41	0,77	24,0	1,01	279	1,15	0,70	18,0	0,90	304	1,04	0,65
	1000	18,0	0,76	284	1,20	0,74	16,0	0,81	325	0,98	0,68	12,0	0,64	304	0,90	0,61
	750	14,0	0,61	294	1,09	0,71	12,0	0,69	352	0,89	0,65	9,0	0,49	304	0,82	0,59
	500	9,4	0,45	308	0,96	0,68	8,1	0,54	393	0,78	0,61	6,0	0,35	304	0,73	0,55
	150	2,8	0,18	352	0,00	0,58	2,4	0,23	448	0,00	0,49	1,8	0,13	304	0,00	0,46
100	3000	57,0	4,76	615	3,04	0,78	48,0	4,59	645	2,39	0,70	36,0	3,33	591	2,24	0,68
	1500	28,0	2,63	670	2,19	0,77	24,0	2,91	817	1,74	0,70	18,0	1,74	599	1,61	0,66
	1000	18,0	1,92	704	1,88	0,74	16,0	2,17	886	1,52	0,68	12,0	1,23	599	1,40	0,62
	750	14,0	1,53	728	1,71	0,72	12,0	1,70	886	1,39	0,65	9,0	0,94	599	1,28	0,61
	500	9,4	1,11	762	1,51	0,69	8,1	1,21	886	1,24	0,61	6,0	0,67	599	1,15	0,57
	150	2,8	0,45	870	0,00	0,59	2,4	0,44	886	0,00	0,50	1,8	0,24	599	0,00	0,47

Table **9.3.5-1**

9.4.6 Type SL 040 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [1/min] 3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	1,39	0,77	0,55	0,43	0,32	0,13
		T_{2N} [Nm]	39	43	45	47	50	64
		P_{1NT} [kW]	1,28	0,83	0,69	0,63	0,87	0,00
		Efficiency	0,91	0,90	0,88	0,87	0,85	0,81
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	0,82	0,49	0,36	0,28	0,21	0,09
		T_{2N} [Nm]	43	50	53	55	58	75
		P_{1NT} [kW]	0,77	0,49	0,42	0,38	0,34	0,00
		Efficiency	0,84	0,82	0,80	0,78	0,76	0,71
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	0,53	0,37	0,29	0,24	0,18	0,08
		T_{2N} [Nm]	36	50	57	60	65	82
		P_{1NT} [kW]	0,51	0,33	0,28	0,26	0,23	0,00
		Efficiency	0,75	0,73	0,70	0,68	0,64	0,57
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,48	0,32	0,25	0,20	0,15	0,07
		T_{2N} [Nm]	44	56	63	66	71	91
		P_{1NT} [kW]	0,46	0,30	0,25	0,23	0,21	0,00
		Efficiency	0,72	0,70	0,67	0,65	0,62	0,56

i	i ist		n_1 [1/min] 3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,39	0,21	0,15	0,13	0,09	0,04
		T_{2N} [Nm]	44	46	48	51	55	72
		P_{1NT} [kW]	0,42	0,28	0,24	0,22	0,20	0,00
		Efficiency	0,68	0,65	0,63	0,61	0,59	0,55
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,36	0,20	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	45	48	51	53	56	57
		P_{1NT} [kW]	0,35	0,23	0,20	0,18	0,16	0,00
		Efficiency	0,63	0,59	0,56	0,54	0,51	0,45
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,25	0,14	0,10	0,08	0,05	0,02
		T_{2N} [Nm]	36	37	38	38	38	38
		P_{1NT} [kW]	0,32	0,21	0,18	0,17	0,15	0,00
		Efficiency	0,56	0,52	0,50	0,48	0,46	0,42

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	73	83	77	59	97	90	77	107	99	87	72	64

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

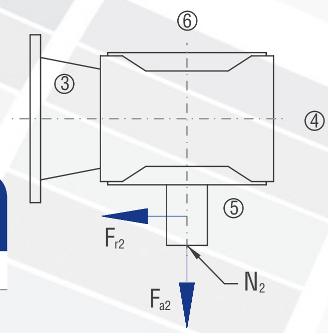
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

Inertia moments/mass

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

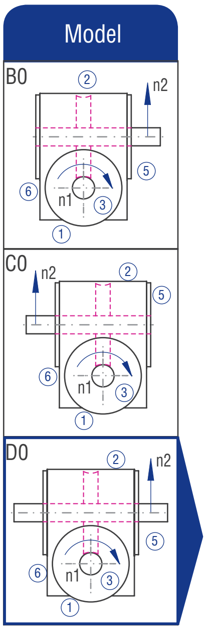
	Inertia moment [kgcm^2] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	0.68	0.60	0.53	0.50	0.54	0.50	0.48	0.53	0.49	0.47	0.48	0.47

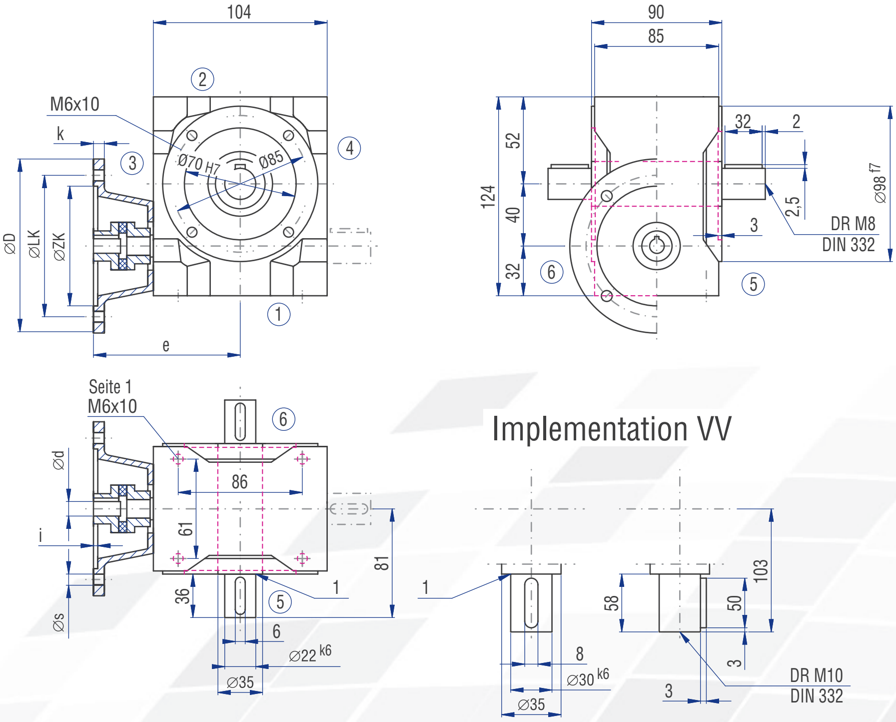
Mass ca. [kg]
7

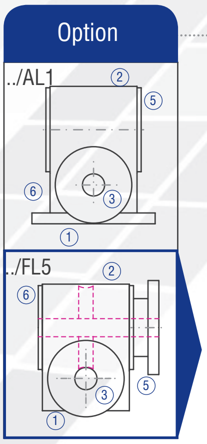


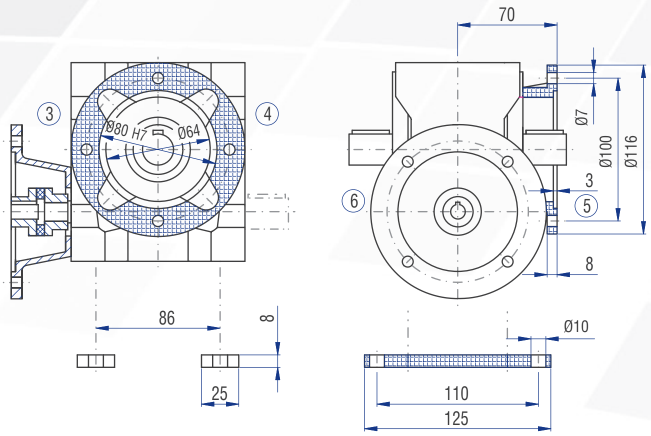
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

ATEK ANTRIEBSTECHNIK



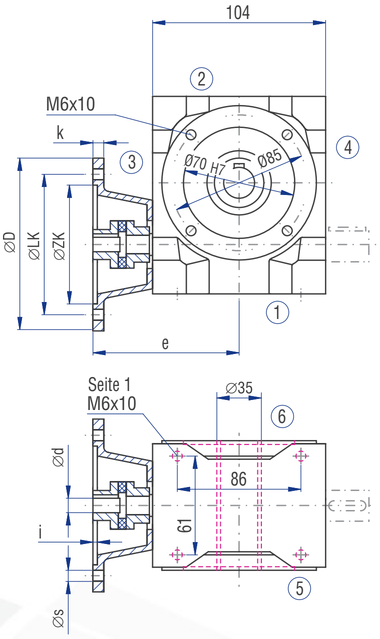


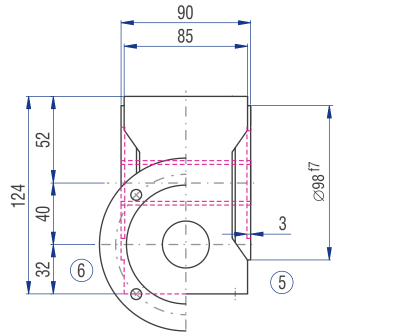




IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
63	B14	11x23	120	100	80	7	3	10	121
	B5	11x23	140	115	95	9	3	10	121
71	B14	14x30	140	115	95	9	3	10	121
	B14	14x30	105	85	70	7	3	10	121

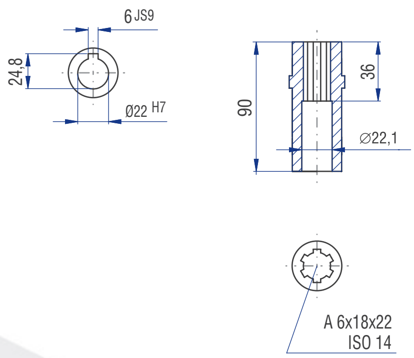
The dimensions of the Models not shown can be figured by mirroring available dimensions.

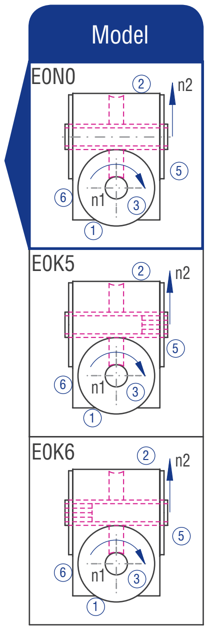




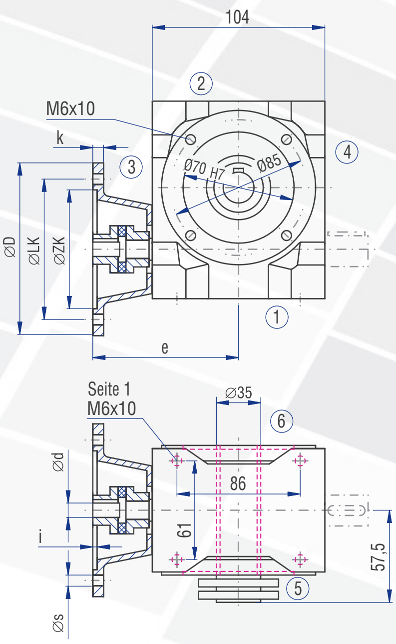
E0N0

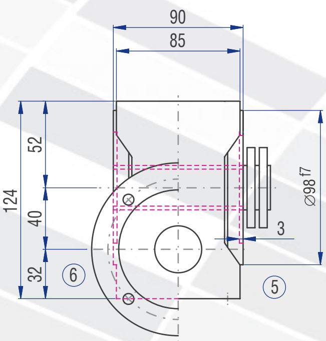
E0K5 / E0K6

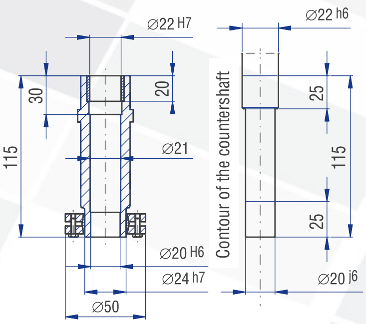


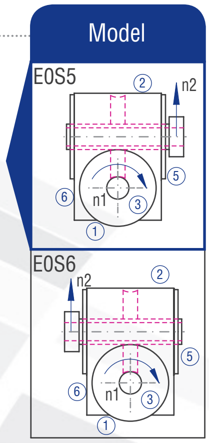


Worm gearboxes



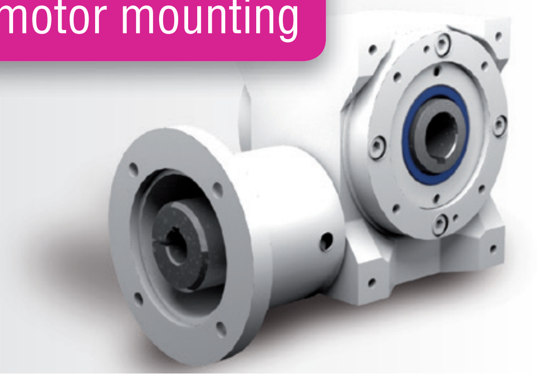






ATEK ANTRIEBSTECHNIK

9.4.7 Type SL 050 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

ATEK ANTRIEBSTECHNIK

Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	38:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	3,02	1,64	1,15	0,96	0,71	0,26
		T_{2N} [Nm]	85	91	94	103	112	130
		P_{1NT} [kW]	2,82	1,88	1,56	1,40	1,23	0,00
		Efficiency	0,93	0,92	0,90	0,89	0,87	0,82
20:1	38:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	1,54	1,03	0,73	0,63	0,47	0,18
		T_{2N} [Nm]	81	106	110	123	133	158
		P_{1NT} [kW]	1,70	1,12	0,93	0,84	0,74	0,00
		Efficiency	0,87	0,85	0,83	0,81	0,78	0,72
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,12	0,79	0,59	0,54	0,42	0,18
		T_{2N} [Nm]	82	113	121	144	157	201
		P_{1NT} [kW]	1,14	0,76	0,63	0,06	0,50	0,00
		Efficiency	0,79	0,77	0,74	0,72	0,68	0,59
40:1	38:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	0,87	0,65	0,52	0,41	0,31	0,13
		T_{2N} [Nm]	80	118	134	137	147	183
		P_{1NT} [kW]	1,02	0,68	0,57	0,52	0,46	0,00
		Efficiency	0,76	0,75	0,71	0,69	0,65	0,57

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	0,65	0,38	0,27	0,22	0,16	0,06
		T_{2N} [Nm]	77	85	88	91	95	110
		P_{1NT} [kW]	0,92	0,62	0,52	0,48	0,43	0,00
		Efficiency	0,73	0,69	0,67	0,64	0,61	0,55
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,61	0,42	0,31	0,25	0,18	0,06
		T_{2N} [Nm]	81	105	109	112	113	113
		P_{1NT} [kW]	0,75	0,50	0,43	0,39	0,36	0,00
		Efficiency	0,67	0,64	0,60	0,57	0,53	0,45
83:1	83:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,39	0,21	0,15	0,12	0,09	0,03
		T_{2N} [Nm]	59	63	64	66	69	75
		P_{1NT} [kW]	0,70	0,47	0,41	0,37	0,34	0,00
		Efficiency	0,58	0,56	0,54	0,52	0,49	0,44

Worm gearboxes

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	150	167	152	100	195	179	137	219	197	145	120	112

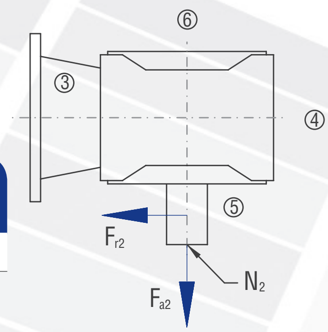
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1	Mass ca. [kg]
J1	2.03	1.81	1.66	1.57	1.68	1.58	1.52	1.65	1.56	1.50	1.55	1.50	14

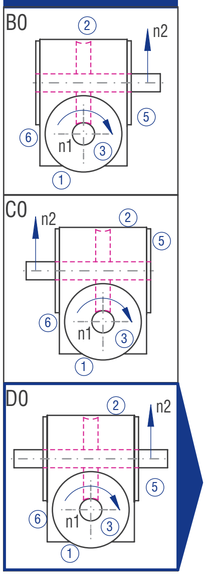


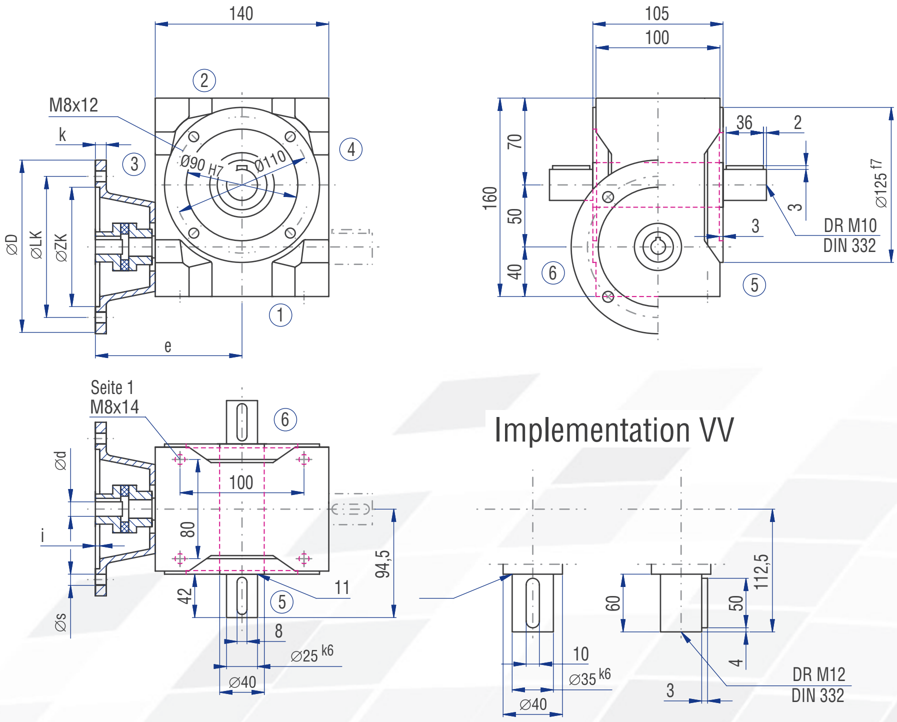
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

ATEK ANTRIEBSTECHNIK

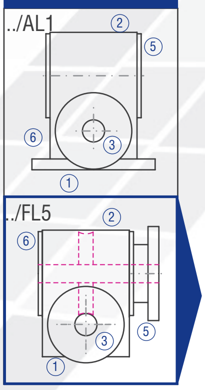
9.4.7 Type SL 050 – Type S with flange for motor mounting

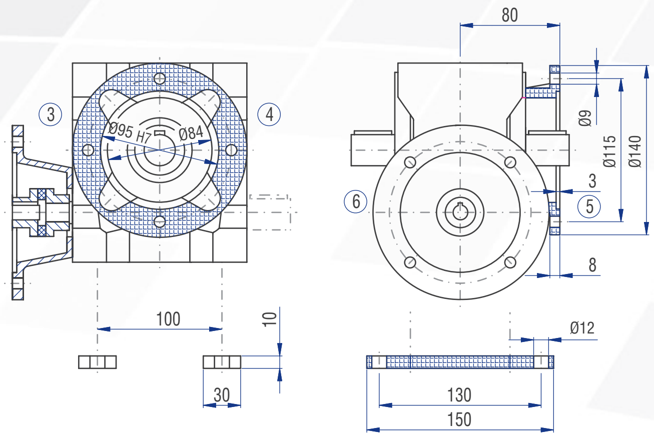
Model





Option





IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
63	B14	11x23	120	100	80	7	3	9	150
80	B14	19x40	120	100	80	7	3	9	150
	B14	19x40	160	130	110	9	4	10	150
90	B14	24x50	160a	130	110	9	4	20	160

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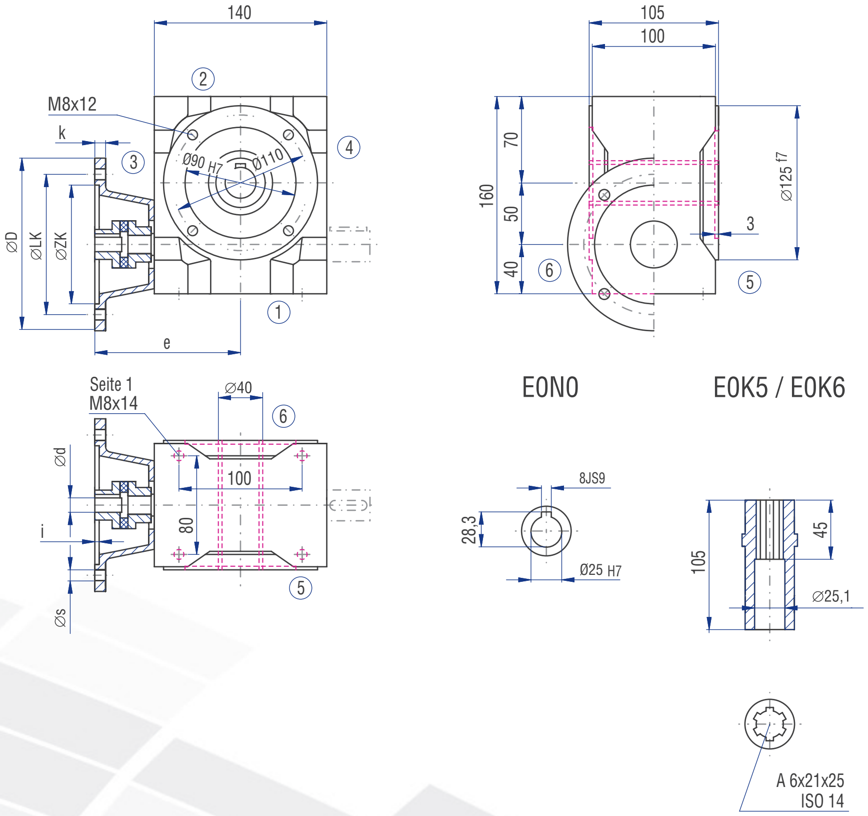
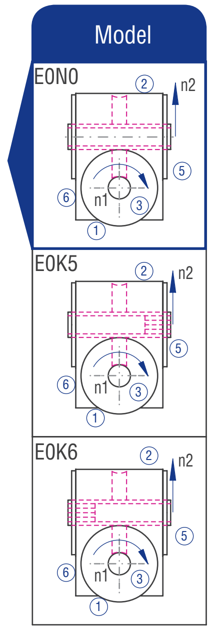
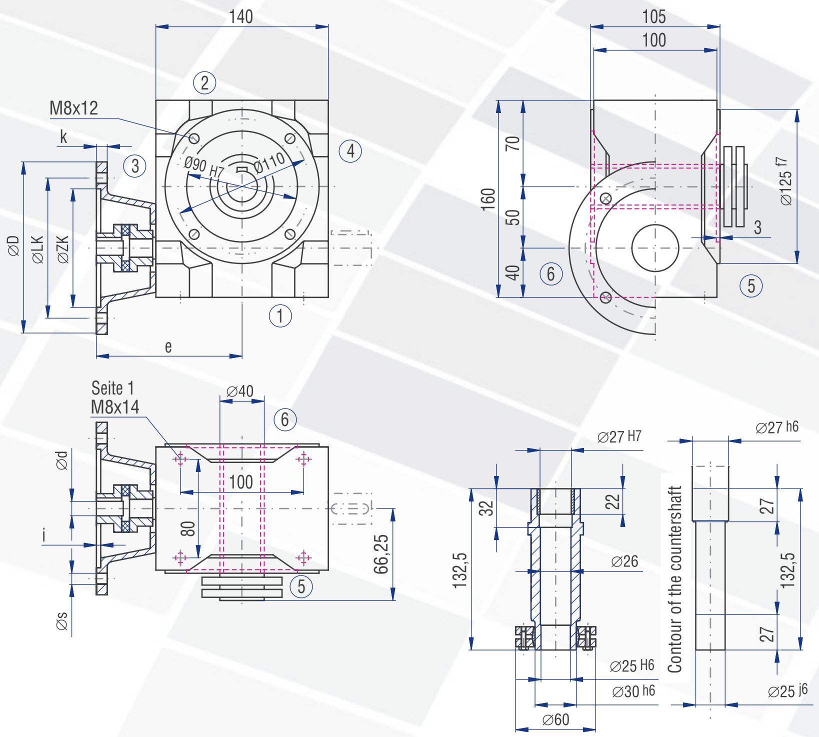
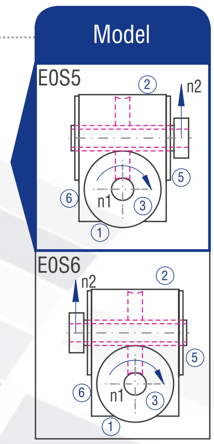
The dimensions of the Models not shown can be figured by mirroring available dimensions.



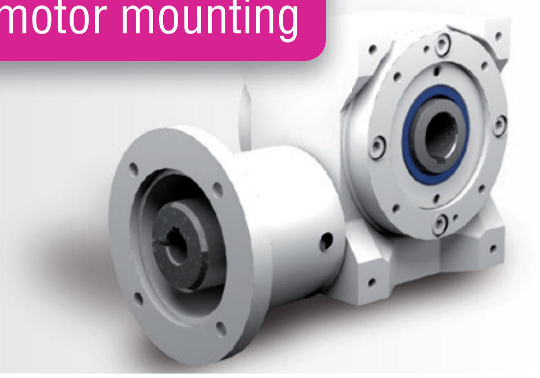


Worm gearboxes





9.4.8 Type SL 063 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
10:1	39:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	4,15	2,94	2,26	1,83	1,30	0,51
		T_{2N} [Nm]	121	170	194	207	216	265
		P_{1NT} [kW]	4,16	2,89	2,41	2,15	1,86	0,00
		Efficiency	0,94	0,93	0,92	0,91	0,89	0,83
20:1	39:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	2,95	1,70	1,32	1,14	0,86	0,34
		T_{2N} [Nm]	161	186	212	237	259	310
		P_{1NT} [kW]	2,52	1,73	1,44	1,29	1,12	0,00
		Efficiency	0,88	0,88	0,86	0,84	0,81	0,74
30:1	29:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	1,94	1,38	1,11	0,97	0,75	0,36
		T_{2N} [Nm]	143	204	237	268	296	403
		P_{1NT} [kW]	1,66	1,15	0,97	0,86	0,75	0,00
		Efficiency	0,80	0,80	0,77	0,75	0,71	0,61
40:1	39:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	1,54	1,08	0,85	0,74	0,57	0,24
		T_{2N} [Nm]	149	207	237	264	288	348
		P_{1NT} [kW]	1,50	1,04	0,87	0,78	0,69	0,00
		Efficiency	0,78	0,77	0,75	0,72	0,68	0,59

i	i ist		n1 [1/min] 3000	1500	1000	750	500	150
53:1	51:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,16	0,80	0,58	0,47	0,34	0,14
		T_{2N} [Nm]	143	191	200	207	217	248
		P_{1NT} [kW]	1,34	0,96	0,78	0,71	0,63	0,00
		Efficiency	0,76	0,74	0,71	0,68	0,65	0,56
62:1	61:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	0,82	0,66	0,53	0,46	0,34	0,12
		T_{2N} [Nm]	110	175	202	221	226	226
		P_{1NT} [kW]	1,10	0,76	0,65	0,59	0,52	0,00
		Efficiency	0,69	0,68	0,65	0,62	0,57	0,47
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	0,75	0,46	0,33	0,26	0,19	0,07
		T_{2N} [Nm]	129	152	152	152	152	152
		P_{1NT} [kW]	0,99	0,69	0,59	0,54	0,49	0,00
		Efficiency	0,66	0,63	0,59	0,56	0,52	0,44

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	295	334	306	222	395	355	295	437	360	310	240	246

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

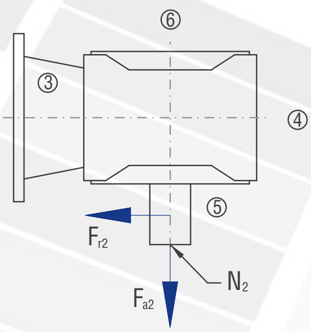
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

Inertia moments/mass

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

	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	3.25	2.72	2.22	2.02	2.41	2.02	1.90	2.33	1.98	1.87	2.05	1.88

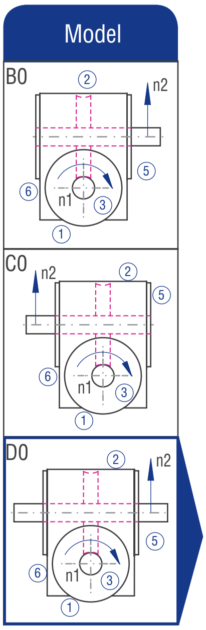
Mass ca. [kg]
21

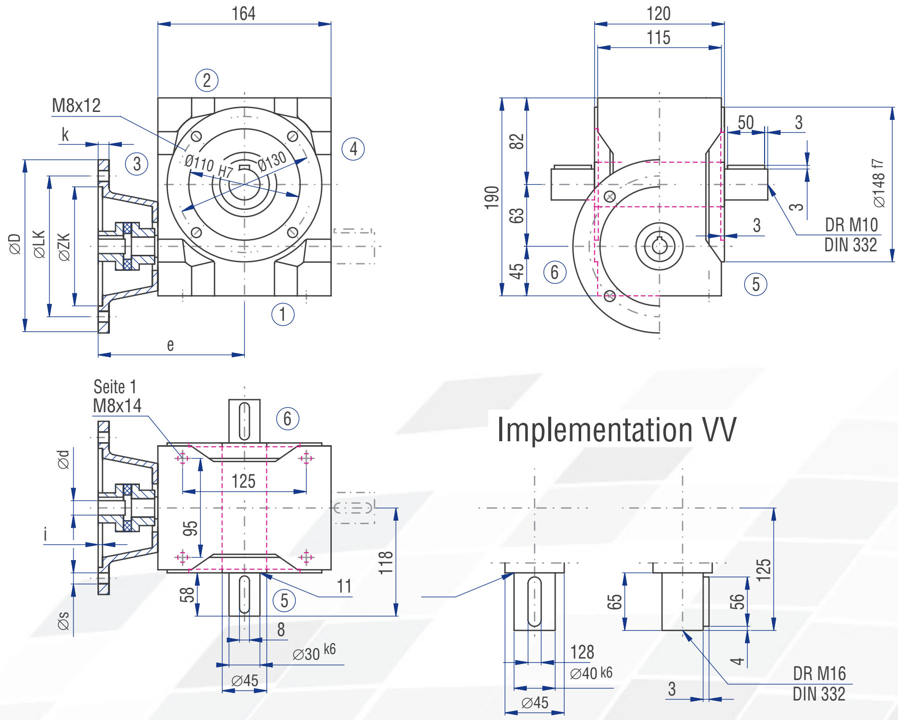


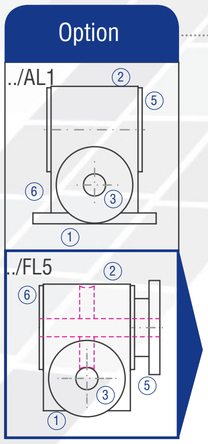
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

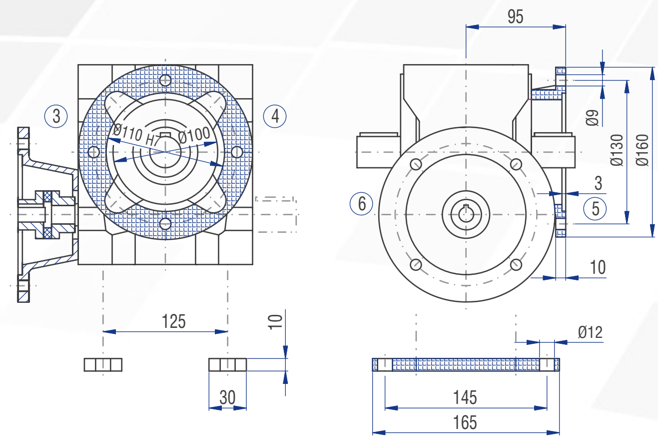
ATEK ANTRIEBSTECHNIK

9.4.8 Type SL 063 – Type S with flange for motor mounting





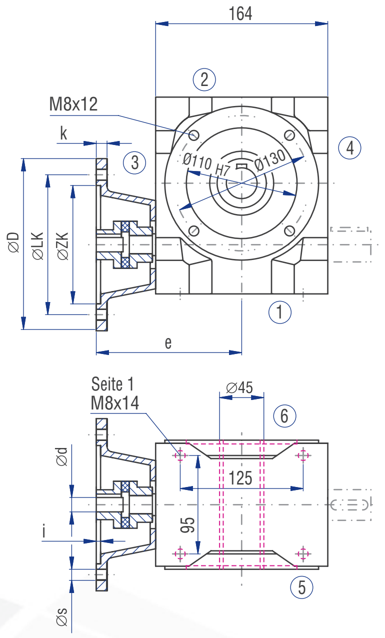


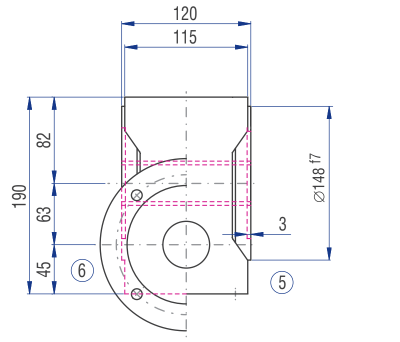


IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
71	B5	14x30	160	130	110	9	4	10	163
80	B14	19x40	160	130	110	9	4	10	163
	B5	19x40	200	165	130	11	4	10	175
90	B14	24x50	160a	130	110	9	4	10	175
	B5	24x50	200	165	130	11	4	10	175
100	B14	28x60	200a	165	130	11	4	20	185
112	B14	28x60	200a	165	130	11	4	20	185

ATEK ANTRIEBSTECHNIK

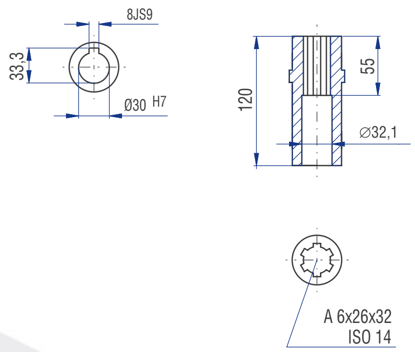
The dimensions of the Models not shown can be figured by mirroring available dimensions.

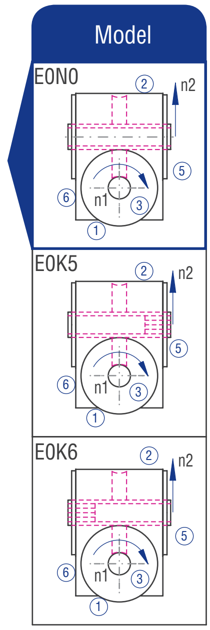




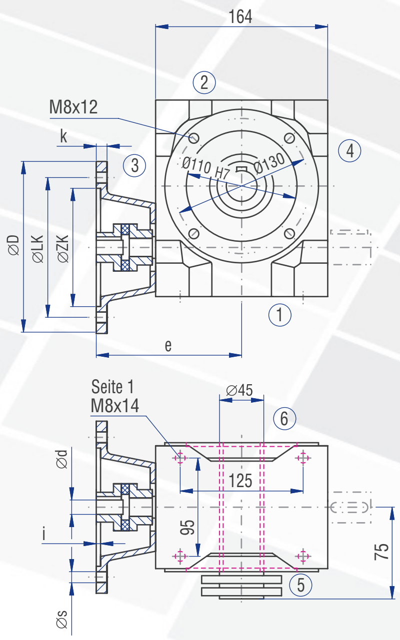
E0N0

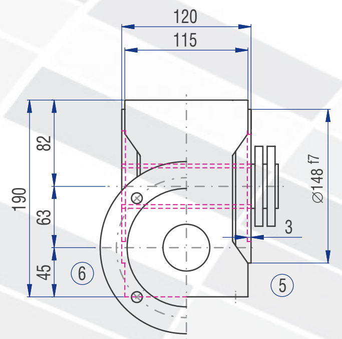
E0K5 / E0K6

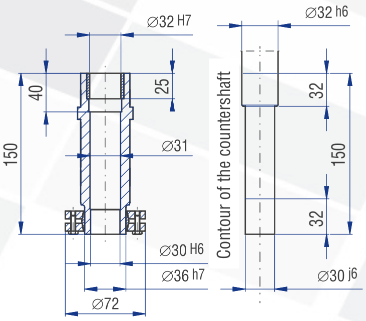


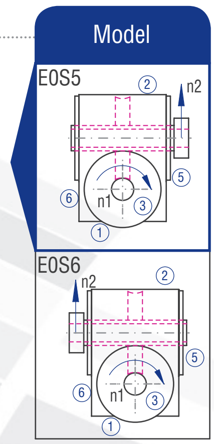


Worm gearboxes









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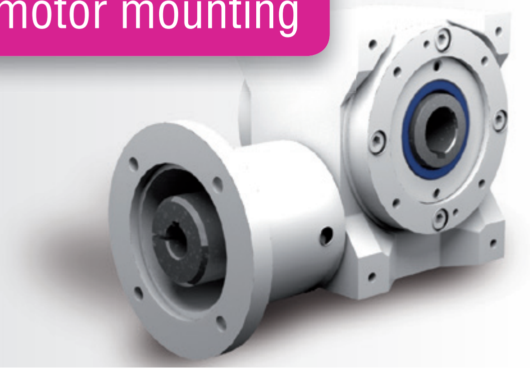
9.4.9 Type SL 080 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n1 [1/min]					
			3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	6,58	4,96	3,79	3,15	2,35	0,96
		T_{2N} [Nm]	197	297	340	373	408	513
		P_{1NT} [kW]	5,92	4,47	3,79	3,36	2,86	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,84
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	4,24	3,04	2,37	2,05	1,57	0,64
		T_{2N} [Nm]	240	344	399	450	498	615
		P_{1NT} [kW]	3,59	2,67	2,26	2,01	1,72	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,83	0,75
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	3,47	2,52	2,03	1,78	1,38	0,63
		T_{2N} [Nm]	272	395	456	530	593	760
		P_{1NT} [kW]	2,41	1,81	1,54	1,38	1,18	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,63
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	2,62	1,87	1,49	1,31	1,02	0,40
		T_{2N} [Nm]	267	381	443	501	553	625
		P_{1NT} [kW]	2,14	1,58	1,35	1,21	1,05	0,00
		Efficiency	0,80	0,80	0,78	0,75	0,71	0,61

i	i ist		n1 [1/min]					
			3000	1500	1000	750	500	150
53:1	53:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	1,78	1,04	0,76	0,61	0,45	0,18
		T_{2N} [Nm]	234	271	284	294	308	352
		P_{1NT} [kW]	1,93	1,41	1,20	1,09	0,96	0,00
		Efficiency	0,78	0,77	0,74	0,71	0,68	0,58
62:1	62:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	1,40	1,01	0,81	0,69	0,54	0,23
		T_{2N} [Nm]	194	279	325	352	393	448
		P_{1NT} [kW]	1,55	1,15	0,98	0,89	0,78	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,49
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	1,10	0,90	0,64	0,49	0,35	0,13
		T_{2N} [Nm]	196	304	304	304	304	304
		P_{1NT} [kW]	1,43	1,04	0,90	0,82	0,73	0,00
		Efficiency	0,68	0,65	0,61	0,59	0,55	0,46

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	610	695	625	321	826	725	432	920	780	480	480	510

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

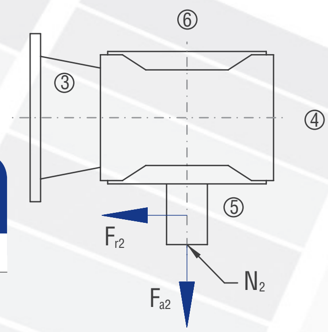
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040

Inertia moments/mass

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

	Inertia moment [$kgcm^2$]											
	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	6.90	5.30	4.04	3.34	4.34	3.48	2.99	4.09	3.34	2.90	3.59	2.99

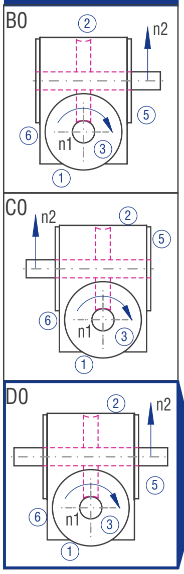
Mass ca. [kg]
33

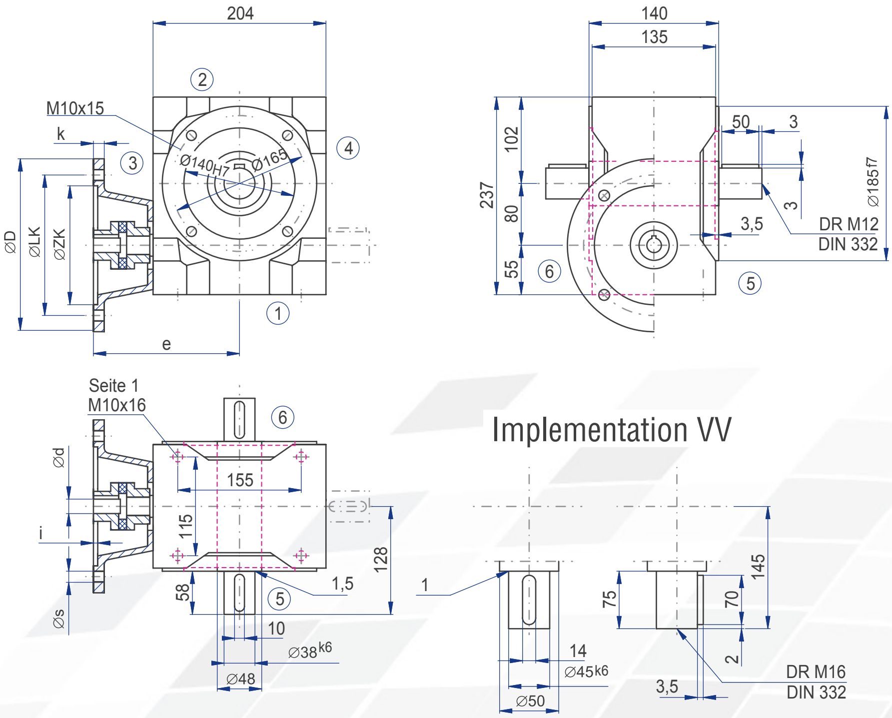


The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

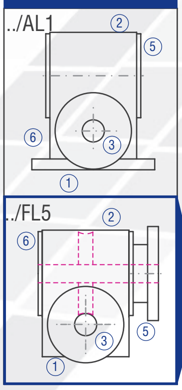
9.4.9 Type SL 080 – Type S with flange for motor mounting

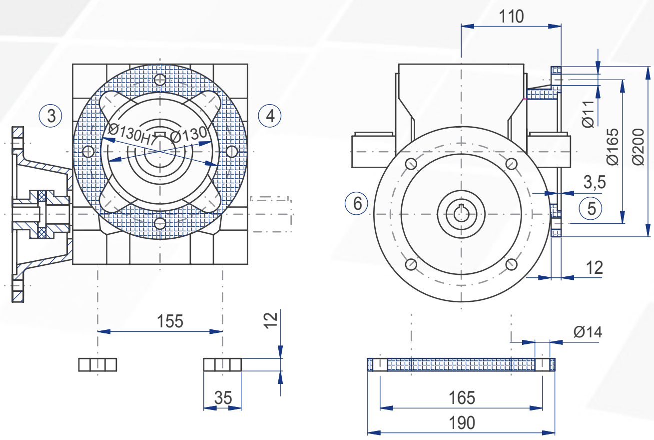
Model





Option





IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
71	B5	14x30	160	130	110	9	4	10	183
80	B14	19x40	160	130	110	9	4	10	183
	B5	19x40	200	165	130	11	4	10	195
90	B14	24x50	160a	130	110	9	4	10	195
	B5	24x50	200	165	130	11	4	10	195
100	B14	28x60	200a	165	130	11	4	20	205
112	B14	28x60	200a	165	130	11	4	20	205

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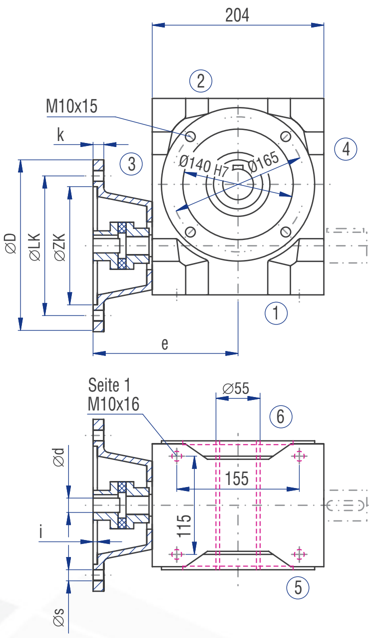
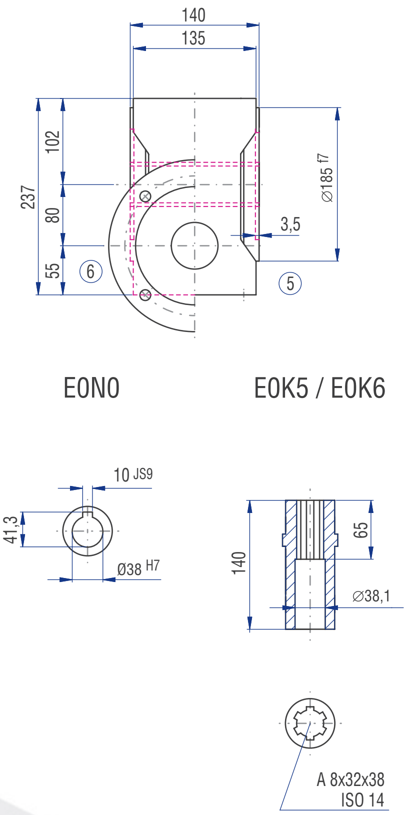
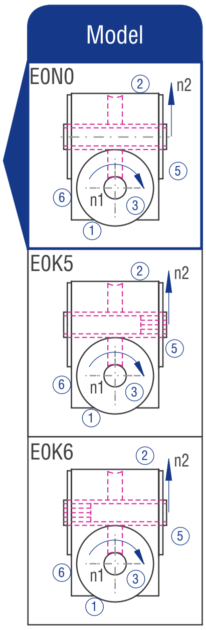
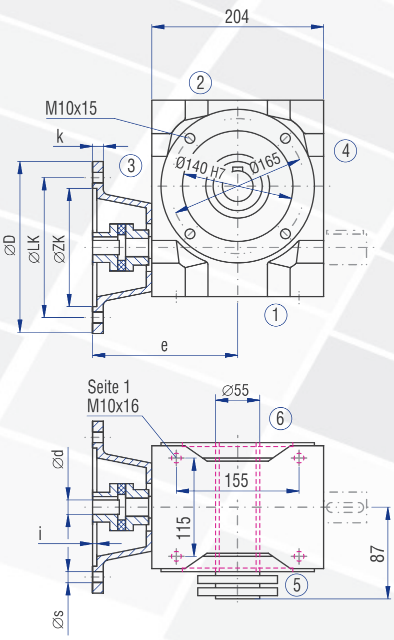
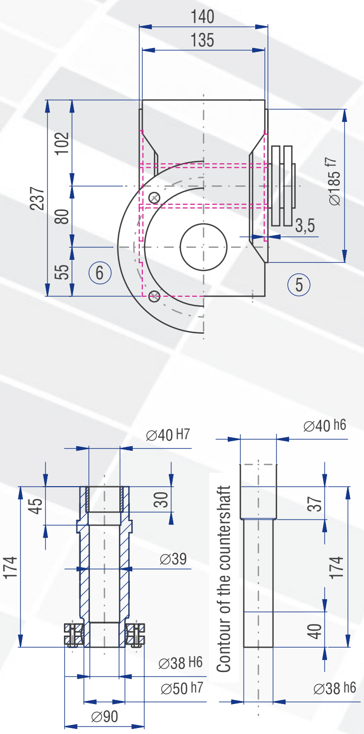
The dimensions of the Models not shown can be figured by mirroring available dimensions.

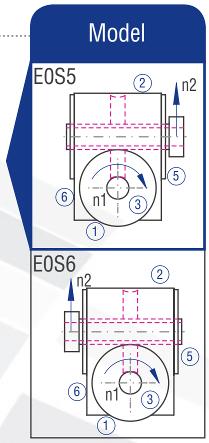

204
M10x15
k
ØD
ØLK
ØZK
Ø140 H7
Ø165
e
Seite 1
M10x16
Ø55
155
115
Ød
i
Øs


140
135
237
102
80
55
Ø185 f7
3,5
E0N0
E0K5 / E0K6
10 JS9
41,3
Ø38 H7
140
65
Ø38,1
A 8x32x38
ISO 14

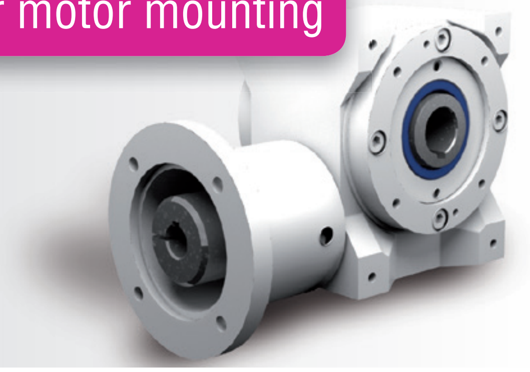

Model
E0N0
E0K5
E0K6
n1
n2


204
M10x15
k
ØD
ØLK
ØZK
Ø140 H7
Ø165
e
Seite 1
M10x16
Ø55
155
115
87
Ød
i
Øs


140
135
237
102
80
55
Ø185 f7
3,5
Ø40 H7
45
30
Ø39
174
Ø38 H6
Ø50 h7
Ø90
Contour of the countershaft
Ø40 h6
37
174
40
Ø38 h6


Model
E0S5
E0S6
n1
n2

9.4.10 Type SL 100 – Type S with flange for motor mounting



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required if the oil temperature is kept below 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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Flange	Suited for the mounting of IEC motors, models IM B5 and B14	
Coupling	Three-piece claw coupling	

Performance data

i	i ist		n_1 [1/min] 3000	1500	1000	750	500	150
10:1	40:4	n_2 [1/min]	300,0	150,0	100,0	75,0	50,0	15,0
		P_{1N} [kW]	18,55	11,75	8,95	7,45	5,79	2,02
		T_{2N} [Nm]	555	703	803	882	1.006	1.095
		P_{1NT} [kW]	8,57	6,35	5,49	4,95	4,30	0,00
		Efficiency	0,94	0,94	0,94	0,93	0,91	0,85
20:1	40:2	n_2 [1/min]	150,0	75,0	50,0	37,0	25,0	7,5
		P_{1N} [kW]	10,84	6,87	5,28	4,45	3,47	1,49
		T_{2N} [Nm]	614	778	888	975	1.112	1.441
		P_{1NT} [kW]	5,44	3,99	3,44	3,10	2,69	0,00
		Efficiency	0,89	0,89	0,88	0,86	0,84	0,76
30:1	30:1	n_2 [1/min]	100,0	50,0	33,0	25,0	16,0	5,0
		P_{1N} [kW]	7,53	4,78	3,60	3,19	2,51	1,18
		T_{2N} [Nm]	590	748	825	950	1.080	1.437
		P_{1NT} [kW]	3,50	2,60	2,27	2,06	1,81	0,00
		Efficiency	0,82	0,82	0,80	0,78	0,75	0,64
40:1	40:1	n_2 [1/min]	75,0	37,0	25,0	18,0	12,0	3,8
		P_{1N} [kW]	6,33	4,01	3,13	2,65	2,13	1,00
		T_{2N} [Nm]	645	817	933	1.025	1.169	1.581
		P_{1NT} [kW]	3,32	2,42	2,09	1,90	1,67	0,00
		Efficiency	0,80	0,80	0,78	0,76	0,72	0,62

i	i ist		n_1 [1/min] 3000	1500	1000	750	500	150
53:1	52:1	n_2 [1/min]	57,0	28,0	18,0	14,0	9,4	2,8
		P_{1N} [kW]	4,76	2,63	1,92	1,53	1,11	0,45
		T_{2N} [Nm]	615	670	704	728	762	870
		P_{1NT} [kW]	3,04	2,19	1,88	1,71	1,51	0,00
		Efficiency	0,78	0,77	0,74	0,72	0,69	0,59
62:1	63:1	n_2 [1/min]	48,0	24,0	16,0	12,0	8,1	2,4
		P_{1N} [kW]	4,59	2,91	2,17	1,70	1,21	0,44
		T_{2N} [Nm]	645	817	886	886	886	886
		P_{1NT} [kW]	2,39	1,74	1,52	1,39	1,24	0,00
		Efficiency	0,70	0,70	0,68	0,65	0,61	0,50
83:1	82:1	n_2 [1/min]	36,0	18,0	12,0	9,0	6,0	1,8
		P_{1N} [kW]	3,33	1,74	1,23	0,94	0,67	0,24
		T_{2N} [Nm]	591	599	599	599	599	599
		P_{1NT} [kW]	2,24	1,61	1,40	1,28	1,15	0,00
		Efficiency	0,68	0,66	0,62	0,61	0,57	0,47

	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
T_{2max} [Nm]	1190	1360	1090	736	1610	1440	980	1765	1582	1080	1040	1000

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

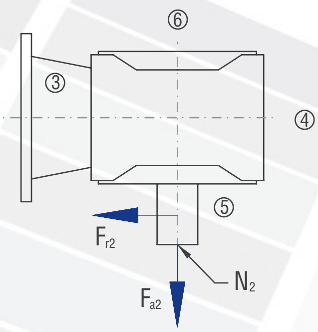
n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

Inertia moments/mass

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

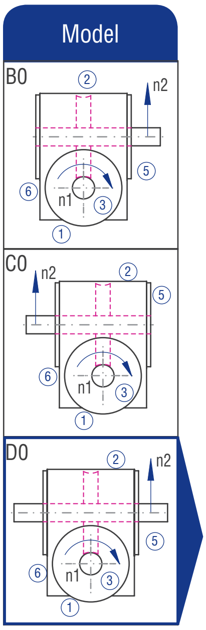
	Inertia moment [kgcm²] 5:1	7.5:1	10:1	13:1	15:1	20:1	26:1	30:1	40:1	53:1	62:1	83:1
J1	30.63	26.13	22.28	20.53	23.42	20.62	19.59	22.75	20.21	19.35	20.81	19.59

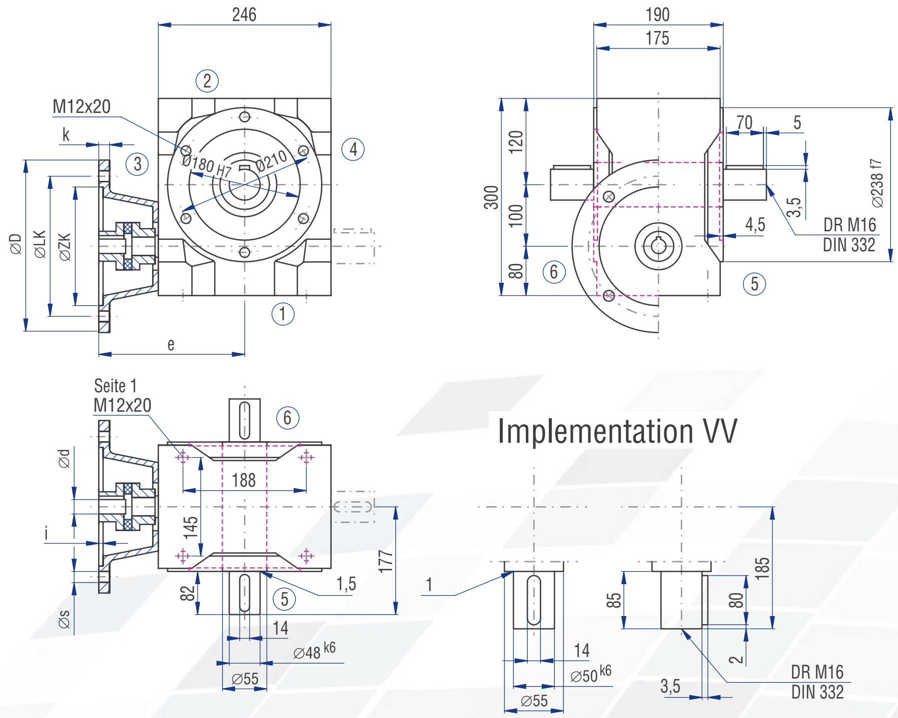
Mass ca. [kg]
55

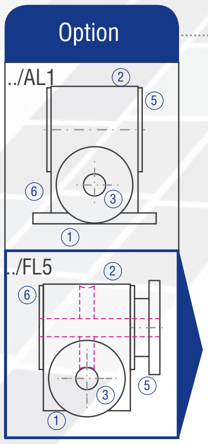


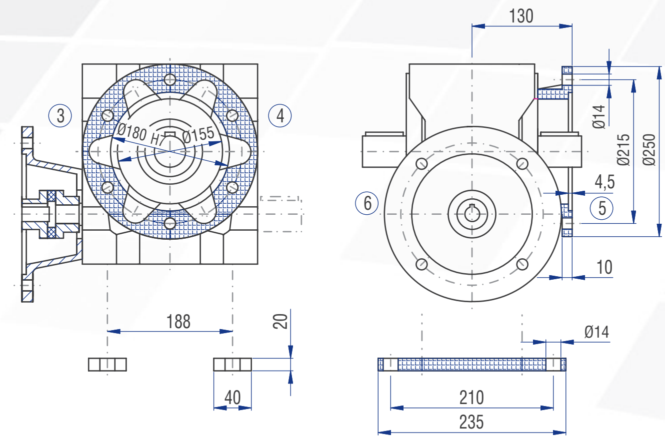
The mass of the gearbox may deviate depending on the flange size, the type and the gear ratio.

9.4.10 Type SL 100 – Type S with flange for motor mounting



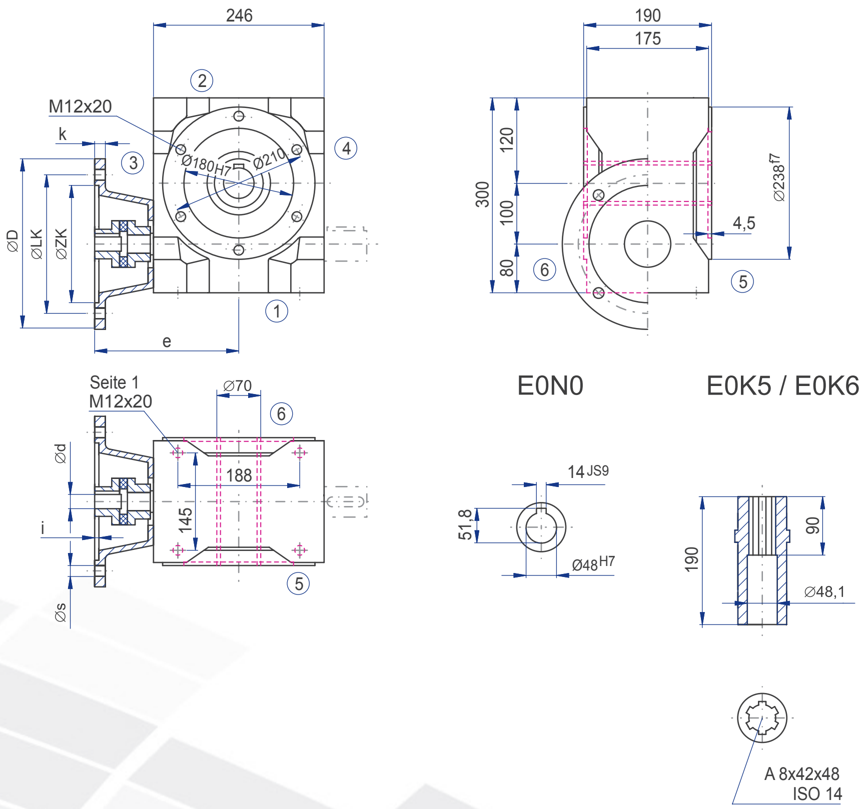


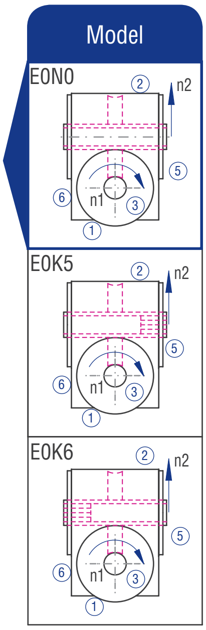




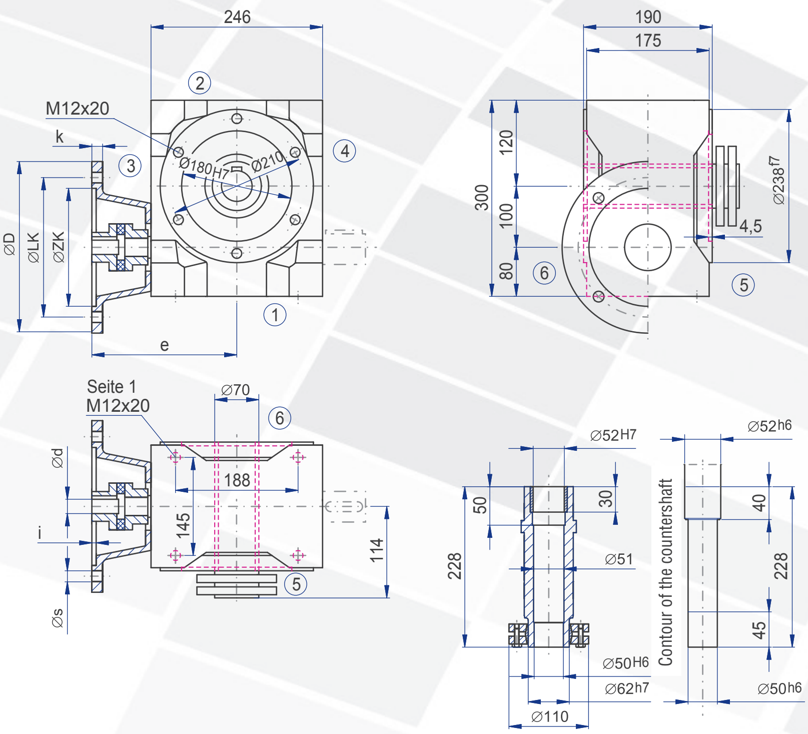
IEC motor	Model	Motor shaft (dxl)	Flange diameter D [mm]	LK [mm]	ZK [mm]	s [mm]	i [mm]	k [mm]	e [mm]
90	B5	24x50	200	165	130	M10	4	18	235
100	B5	28x60	250	215	180	14	5	18	245
112	B5	28x60	250	215	180	14	5	18	245
132	B5	38x80	300	265	230	14	5	18	265

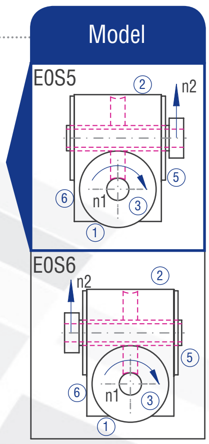
The dimensions of the Models not shown can be figured by mirroring available dimensions.





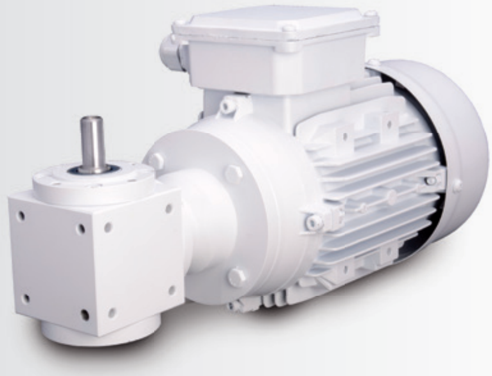
Worm gearboxes





ATEK ANTRIEBSTECHNIK

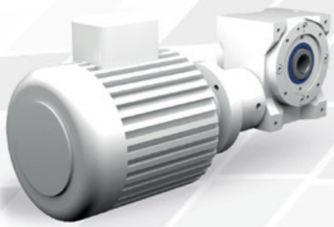
10 Gearbox motors



10.1 Type overview

Type VLM – type VL with motor

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 2310 Nm
8 gearbox sizes with edge lengths of 065 to 260 mm
Low-backlash construction < 6 angular minutes possible
With mounted IEC standard motor
Housing made of grey cast iron or steel



Type SLM – Type SL with motor

Nominal gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
5 sizes, centre-to-centre distance of 040 to 100 mm
Low-backlash construction < 6 angular minutes possible
With mounted IEC standard motor
Housing made of grey cast iron

10.2 General construction

For the mounting of IEC standard motors, the drive shafts were changed such that the shaft journal of the motor can be inserted directly into the bore of the gearbox drive shaft. As types VLM and SLM, they are part of our product range.

The proven ATEK bevel gearbox and worm gearbox series form the basis for them. The combination of a large number of motor flanges and the insertable motor shaft journal enables the adaptation to a variety of IEC motors.

10.2.1 Motors

ATEK gearbox motors are available for ratings from 0.12 to 30 kW. The bevel gearbox motors are delivered with output speeds from 3000 to 140 rpm, the worm gearbox motors with output speeds from 590 to 8 rpm. Pole-changing motors, braking motors, explosion-proof motors and motors with pressure-proof enclosure are also available.

Type DS: three-phase asynchronous motor with cage rotor
Type DP: - pole-changing
Type DE: - explosion-proof
Type WS: single-phase AC motor

The motors conform to the relevant standards and regulations and the standardisation applied by the EC member states.

All motors come standard with:

- Insulation class “F”
- IP 55 protection rating
- Operating mode S1
- Model B5 or B14, DIN 42 950
- Normal voltage 230/400 V, 50 Hz
  230/400 V, 60 Hz
- In the efficiency class as valid from time to time

Bearing lubrication

The roller bearings of the motors have permanent grease lubrication and are, under normal operating conditions, maintenance-free for 12,000 to 20,000 service hours.

Voltage and frequency:

Motors wound for 50Hz may also be connected to 60Hz grids. The resulting changes in speed, output and torque are shown in the Table below. Conversion factors for the motor output data

Motor winding for 50Hz with:	Connection to 60Hz grid with:	Nominal speed	Nominal output	Nominal torque	Nominal current	Starting torque
230 V	230 V	1.20	1.00	0.83	1.00	0.69
400 V	400 V	1.20	1.00	0.83	1.00	0.69
460 V	460 V	1.20	1.00	0.83	1.00	0.69
500 V	500 V	1.20	1.00	0.83	1.00	0.69
230 V	265 V	1.20	1.15	0.96	1.00	0.92
400 V	460 V	1.20	1.15	0.96	1.00	0.92

Table **10.2.1-1**

Motor protection
For the pole-changing motors, it must be ensured that the windings are protected at all speeds.
If appropriate, special switches will be required.

Circuit breakers
In case of current-dependent motor protection, the circuit breaker must be set to the nominal current specified on the rating plate.
In case of higher numbers of switching actuations, cooling temperature variations or speed control with frequency converters, the motor protection is insufficient.

Complete PTC resistor protection
In case of complete PTC resistor protection, 3 temperature probes will be incorporated into the motor winding. The probes are temperature-dependent resistors that change the resistance almost abruptly at a specific response temperature. Combined with a triggering device, this effect is utilised to monitor the motor temperature.

Switching operation

Direct-on-line starting
In direct-on-line starting, the starting torque is 150 to 300% of the nominal torque, depending on power and number of poles.
The input surge currents amount to the 4-fold to 6-fold of the nominal current. Due to the high starting current, the respective regulations of the concerned electric power utility must be observed.

Star-delta starting
The breakaway starting current and the starting torque are about 1/3 of the values specified for direct-on-line starting.
The motor must have reached approximately the nominal speed prior to the change-over.

Braking motors
ATEK gearbox motors up to motor size 160 are also delivered as gear braking motors. The installed single-disc spring-loaded brake is a safety brake which brakes through spring force when the voltage has been switched off.
The direct-current brake coil is supplied via a rectifier installed in the motor. After the exciting current has been switched on, the magnetic field builds up, and the brake is released. In the as-new condition, the air gap between the brake solenoid and brake disc is set to 0.2 mm. If the maximum air gap of approx. 1.0 mm is exceeded the response time of the brake will increase strongly.

The air gap can be reset to 0.2 mm by adjustment.

Two braking motor types are available.
Type BL = low braking torques,
Type BH = high braking torques.

10.3 Type VLM – Type VL with motor (gearbox motor)

10.3.1 Features

Gear ratios: i = 1:1 to 6:1
Maximum output torque: 2310 Nm
8 gearbox sizes with edge lengths of 065 to 260 mm
Low-backlash construction < 6 angular minutes possible
With mounted IEC standard motor
Housing made of grey cast iron

10.3.2 Models

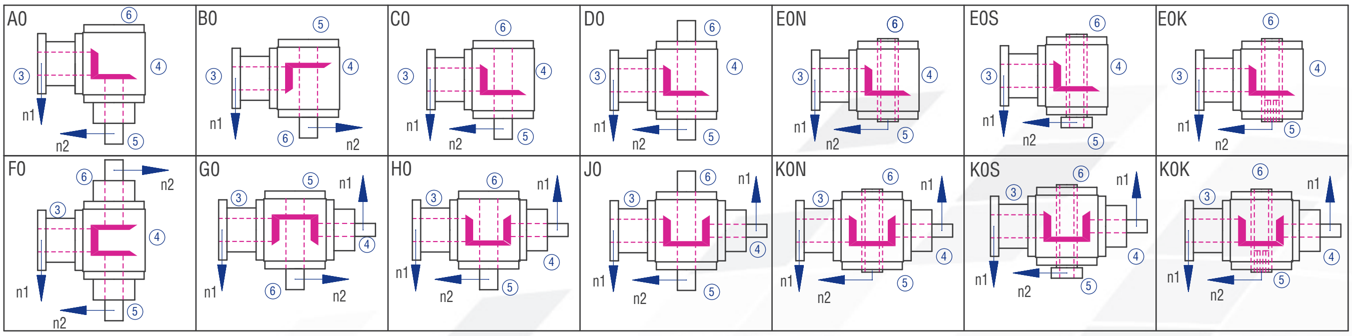


Figure **10.3.2-1; Models**

10.3.3 Gearbox sides

The example shows the Model C0

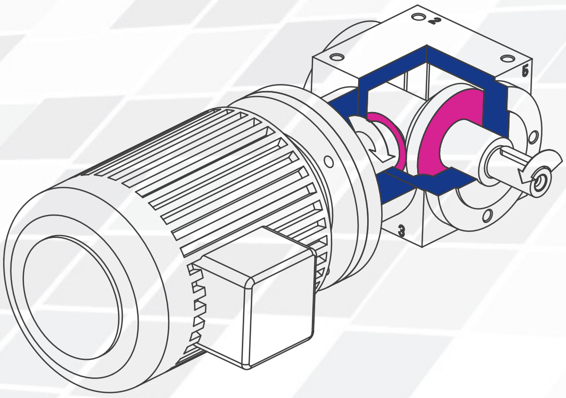


Figure **10.3.3-2; Gearbox sides**

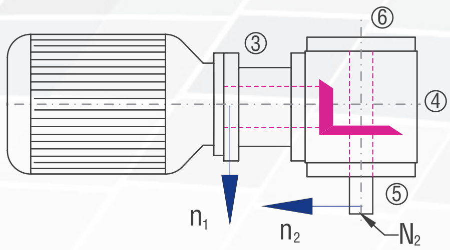


Figure **10.3.3-1; Shaft designations**

10.3.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
VLM	090	1:1	C0-	1.	1-	1500	/0000
Description	Size; Table 10.3.5-1	Table 10.3.5-1	Figure 10.3.2-1	Gearbox side on which fixing is made; Table 6.2.3-1; Figure 4.3.1-1 Gearbox sides	Gearbox side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 10.3.5-1	Standard
	DS 080	4	/00	-5			
	Motor type	Number of poles	Additional version	Connection box to the side			

Motor type: DS 080; three-phase motor
Number of poles: 4; speed of approx. 1500 rpm at 50 Hz
Connection box: 5; the motor connection box points to the gearbox side 5

ATEK ANTRIEBSTECHNIK

10.3.5 Overview of performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
0.12	1340	0.8	11	25	1:1	063A-4	065	1.6
	893	1.2	11	25	1.5:1	063A-4	065	1.6
	670	1.6	11	25	2:1	063A-4	065	1.6
	593	1.8	13	25	1.5:1	063B-6	065	1.6
	447	2.4	11	23	3:1	063A-4	065	1.6
	296	3.7	12	23	3:1	063B-6	065	1.6
0.18	2680	0.6	10	25	1:1	063A-2	065	1.6
	1787	0.9	10	25	1.5:1	063A-2	065	1.6
	1340	1.2	10	25	1:1	063B-4	065	1.6
	893	1.8	10	25	1.5:1	063B-4	065	1.6
	670	2.4	10	25	2:1	063B-4	065	1.6
	593	2.8	10	25	1.5:1	071A-6	065	1.6
	450	3.6	11	23	3:1	063B-4	065	1.6
	445	3.7	10	25	2:1	071A-6	065	1.6
	335	4.9	27	70	4:1	063B-4	090	3.8
	296	5.5	11	23	3:1	071A-6	065	1.6
	268	6.1	27	60	5:1	063B-4	090	3.8
	224	7.3	25	50	6:1	063B-4	090	3.8
	178	9.2	31	60	5:1	071A-6	090	3.8
	167	9.8	32	70	4:1	080A-8	090	3.8
	148	11.0	29	50	6:1	071A-6	090	3.8
	112	14.6	30	50	6:1	080A-8	090	3.8
0.25	2700	0.8	10	25	1:1	063B-2	065	1.6
	1800	1.3	10	25	1.5:1	063B-2	065	1.6
	1350	1.7	10	25	1:1	071A-4	065	1.6
	890	2.6	10	25	1:1	071B-6	065	1.6
	675	3.4	10	25	2:1	071A-4	065	1.6
	540	4.2	23	60	5:1	063B-2	090	3.8
	450	5.0	27	70	3:1	071A-4	090	3.8
	450	5.0	11	25	3:1	071A-4	065	1.6
	337	6.7	27	70	4:1	071A-4	090	3.8
	296	7.7	31	70	3:1	071B-6	090	3.8
	270	8.4	27	60	5:1	071A-4	090	3.8
	225	10.1	25	50	6:1	071A-4	090	3.8
	178	12.7	31	60	5:1	071B-6	090	3.8
	148	15.3	29	50	6:1	071B-6	090	3.8
	134	16.9	32	60	5:1	080B-8	090	3.8
	112	20.3	30	50	6:1	080B-8	090	3.8
0.37	2800	1.2	10	25	1:1	071A-2	065	1.6
	1400	2.4	10	25	2:1	071A-2	065	1.6
	1350	2.5	10	25	1:1	071B-4	065	1.6
	933	3.6	10	23	3:1	071A-2	065	1.6
	900	3.7	29	40	1.5:1	071B-4	090	3.8
	675	5.0	10	25	2:1	071B-4	065	1.6
	675	5.0	27	30	2:1	071B-4	090	3.8
	600	5.6	32	40	1.5:1	080A-6	090	3.8
	560	6.0	23	60	5:1	071A-2	090	3.8
	450	7.5	27	70	3:1	071B-4	090	3.8
	337	10.0	27	70	4:1	071B-4	090	3.8
	270	12.4	27	60	5:1	071B-4	090	3.8
	225	14.9	25	50	6:1	071B-4	090	3.8
	180	18.7	31	60	5:1	080A-6	090	3.8
	150	22.4	29	50	6:1	080A-6	090	3.8
0.55	2810	1.8	10	25	1:1	071B-2	065	1.6
	1873	2.7	10	23	1.5:1	071B-2	065	1.6
	1405	3.6	10	25	2:1	071B-2	065	1.6
	936	5.3	10	23	3:1	071B-2	065	1.6
	936	5.3	23	70	3:1	071B-2	090	3.8
	906	5.5	29	40	1.5:1	080A-4	090	3.8
	702	7.1	23	70	4:1	071B-2	090	3.8
	680	7.3	27	30	2:1	080A-4	090	3.8
	600	8.3	32	40	1.5:1	080B-6	090	3.8
	562	8.9	23	60	5:1	071B-2	090	3.8
	453	11.0	27	70	3:1	080A-4	090	3.8
	340	14.7	27	70	4:1	080A-4	090	3.8
	300	16.6	31	70	3:1	080B-6	090	3.8
	272	18.4	72	140	5:1	080A-4	120	6.2
	227	22.0	25	50	6:1	080A-4	090	3.8
	180	27.7	31	60	5:1	080B-6	090	3.8
	172	28.9	82	155	4:1	090L-8	120	6.2
	150	33.3	67	120	6:1	080B-6	120	6.2
	138	36.2	86	140	5:1	090L-8	120	6.2
	115	43.4	69	120	6:1	090L-8	120	6.2
0.75	1880	3.6	25	40	1.5:1	080A-2	090	3.8
	1410	4.8	23	30	2:1	080A-2	090	3.8
	1360	5.0	32	105	1:1	080B-4	090	3.8
	940	7.2	23	70	3:1	080A-2	090	3.8
	906	7.5	29	40	1.5:1	080B-4	090	3.8
	705	9.7	23	70	4:1	080A-2	090	3.8
	680	10.0	27	30	2:1	080B-4	090	3.8
	606	11.2	86	100	1.5:1	090S-6	120	6.2
	564	12.1	27	60	5:1	080A-2	090	3.8
	453	15.0	27	70	3:1	080B-4	090	3.8
	340	20.0	27	70	4:1	080B-4	090	3.8
	303	22.4	82	155	3:1	090S-6	120	6.2
	272	25.0	72	140	5:1	080B-4	120	6.2
	227	30.0	64	120	6:1	080B-4	120	6.2
	182	37.4	80	140	5:1	090S-6	120	6.2
	152	44.8	67	113	6:1	090S-6	120	6.2
	138	49.3	86	140	5:1	100LA-8	120	6.2
	115	59.2	69	118	6:1	00LA-8	120	6.2
1.1	2820	3.5	27	105	1:1	080B-2	090	3.8
	1880	5.3	25	40	1.5:1	080B-2	090	3.8
	1410	7.1	23	30	2:1	080B-2	090	3.8
	940	10.6	23	70	3:1	080B-2	090	3.8
	920	10.9	78	100	1.5:1	090S-4	120	6.2
	705	14.2	23	70	4:1	080B-2	090	3.8
	690	14.5	73	80	2:1	090S-4	120	6.2
	606	16.5	86	100	1.5:1	090L-6	120	6.2
	564	17.7	60	140	5:1	080B-2	120	6.2
	460	21.7	74	155	3:1	090S-4	120	6.2
	345	28.9	74	155	4:1	090S-4	120	6.2
	303	32.9	82	155	3:1	090L-6	120	6.2
	276	36.2	72	140	5:1	090S-4	120	6.2
	227	43.9	79	155	4:1	090L-6	120	6.2
	182	54.8	80	140	5:1	090L-6	120	6.2
	152	65.7	67	120	6:1	090L-6	120	6.2
	138	72.3	86	140	5:1	100LB-8	120	6.2
1.5	1420	9.6	56	80	2:1	090S-2	120	6.2
	946	14.4	58	155	3:1	090S-2	120	6.2
	920	14.8	78	100	1.5:1	090L-4	120	6.2
	710	19.2	60	155	4:1	090S-2	120	6.2
	690	19.7	73	80	2:1	090L-4	120	6.2
	613	22.2	78	100	1.5:1	100LA-6	120	6.2
	568	24.0	60	140	5:1	090S-2	120	6.2
	460	29.6	74	155	3:1	090L-4	120	6.2
	345	39.5	74	155	4:1	090L-4	120	6.2
	306	44.4	82	155	3:1	100LA-6	120	6.2
	276	49.3	72	140	5:1	090L-4	120	6.2
	230	59.2	64	120	6:1	090L-4	120	6.2
	184	74.0	80	140	5:1	100LA-6	120	6.2
	154	88.4	113	200	6:1	100LA-6	140	10
	140	97.2	130	250	5:1	112M-8	140	10
	117	116.3	118	200	6:1	112M-8	140	10
2.2	1893	10.5	61	100	1.5:1	090L-2	120	6.2
	1420	14.1	56	80	2:1	090L-2	120	6.2
	940	21.2	78	100	1.5:1	100LA-4	120	6.2
	710	28.1	60	155	4:1	090L-2	120	6.2
	626	31.9	80	100	1.5:1	112M-6	120	6.2
	568	35.1	60	140	5:1	090L-2	120	6.2
	470	42.5	74	155	3:1	100LA-4	120	6.2
	352	56.6	74	155	4:1	100LA-4	120	6.2
	313	63.7	82	155	3:1	112M-6	120	6.2
	188	106.2	124	250	5:1	112M-6	140	10
	157	127.1	165	200	6:1	112M-6	160	15
	141	141.6	240	420	5:1	132SB-8	160	15
	118	169.2	178	200	6:1	132SB-8	160	15

Table **10.3.5-1**

If the fed motor output exceeds the thermal limit rating of the gearbox, additional cooling measures will be needed.

ATEK ANTRIEBSTECHNIK

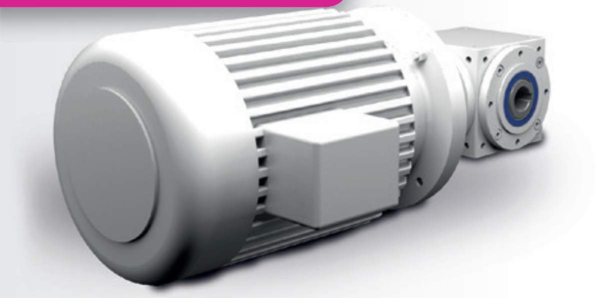
P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
3	2850	9.6	66	220	1:1	100L-2	120	6.2
	1900	14.3	61	100	1.5:1	100L-2	120	6.2
	1410	19.3	82	220	1:1	100LB-4	120	6.2
	940	29.0	78	100	1.5:1	100LB-4	120	6.2
	705	38.6	73	80	2:1	100LB-4	120	6.2
	633	43.0	175	210	1.5:1	132SB-6	140	10
	570	47.8	60	140	5:1	100L-2	120	6.2
	475	57.3	152	180	2:1	132SB-6	140	10
	470	57.9	74	155	3:1	100LB-4	120	6.2
	316	86.0	160	280	3:1	132SB-6	140	10
	282	96.5	115	250	5:1	100LB-4	140	10
	237	114.6	136	280	4:1	132SB-6	140	10
	235	115.8	145	350	6:1	100LB-4	160	15
	190	143.3	225	420	5:1	132SB-6	160	15
	177	153.3	250	422	4:1	132MB-8	160	15
	142	191.7	240	420	5:1	132MB-8	160	15
4	2860	12.7	66	220	1:1	112M-2	120	6.2
	1906	19.0	61	100	1.5:1	112M-2	120	6.2
	1420	25.6	82	220	1:1	112M-4	120	6.2
	946	38.3	78	100	1.5:1	112M-4	120	6.2
	710	51.1	73	80	2:1	112M-4	120	6.2
	633	57.3	175	210	1.5:1	132MA-6	140	10
	572	63.4	100	250	5:1	112M-2	140	10
	475	76.4	152	180	2:1	132MA-6	140	10
	355	102.2	120	280	4:1	112M-4	140	10
	355	102.2	220	422	4:1	112M-4	160	15
	316	114.6	160	280	3:1	132MA-6	140	10
	284	127.8	215	420	5:1	112M-4	160	15
	237	152.8	240	422	4:1	132MA-6	160	15
	190	191.0	225	420	5:1	132MA-6	160	15
	177	204.5	510	860	4:1	160MA-8	200	26
	142	255.6	440	860	5:1	160MA-8	200	26
5.5	2900	17.3	120	430	1:1	132SA-2	140	10
	1933	26.0	113	210	1.5:1	132SA-2	140	10
	1430	34.9	162	430	1:1	132SB-4	140	10
	953	52.3	155	210	1.5:1	132SB-4	140	10
	715	69.8	138	180	2:1	132SB-4	140	10
	633	78.8	175	210	1.5:1	132MB-6	140	10
	580	86.0	100	250	5:1	132SA-2	140	10
	476	104.7	146	280	3:1	132SB-4	140	10
	476	104.7	230	457	3:1	132SB-4	160	15
	357	139.6	220	422	4:1	132SB-4	160	15
	316	157.6	160	280	3:1	132MB-6	140	10
	316	157.6	245	457	3:1	132MB-6	160	15
	286	174.5	215	420	5:1	132SB-4	160	15
	238	209.4	580	910	3:1	160LA-8	200	26
	237	210.1	240	422	4:1	132MB-6	160	15
	190	262.6	420	860	5:1	132MB-6	200	26
	143	348.9	440	860	5:1	160LA-8	200	26
	119	418.7	565	1000	6:1	160LA-8	230	34
7.5	2900	23.5	120	430	1:1	132SB-2	140	10
	1933	35.2	113	180	1.5:1	132SB-2	140	10
	1430	47.6	162	430	1:1	132MB-4	140	10
	966	70.4	110	280	3:1	132SB-2	140	10
	953	71.4	155	210	1.5:1	132MB-4	140	10
	715	95.2	138	180	2:1	132MB-4	140	10
	640	106.3	505	600	1.5:1	160MB-6	200	26
	580	117.3	180	420	5:1	132SB-2	160	15
	480	141.8	500	530	2:1	160MB-6	200	26
	476	142.8	230	457	3:1	132MB-4	160	15
	476	142.8	146	280	3:1	132MB-4	140	10
	357	190.3	220	422	4:1	132MB-4	160	15
	320	212.6	555	910	3:1	160MB-6	200	26
	286	237.9	380	860	5:1	132MB-4	200	26
	240	283.5	485	860	4:1	160MB-6	200	26
	192	354.4	420	860	5:1	160MB-6	200	26
	160	425.3	540	1000	6:1	160MB-6	230	34
	144	472.5	1100	1910	5:1	160LB-8	260	42
	144	472.5	770	1200	5:1	160LB-8	230	34

Table **10.3.5-1**

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
9	2910	28.1	120	430	1:1	132MA-2	140	10
	1940	42.1	113	210	1.5:1	132MA-2	140	10
	1430	57.1	260	660	1:1	132MC-4	160	15
	1430	57.1	162	430	1:1	132MC-4	140	10
	970	84.2	190	457	3:1	132MA-2	160	15
	953	85.7	252	360	1.5:1	132MC-4	160	15
	953	85.7	155	210	1.5:1	132MC-4	140	10
	727	112.2	180	422	4:1	132MA-2	160	15
	715	114.2	245	320	2:1	132MC-4	160	15
	715	114.2	138	180	2:1	132MC-4	140	10
	582	140.3	180	420	5:1	132MA-2	160	15
	476	171.3	230	457	3:1	132MC-4	160	15
	357	228.4	220	422	4:1	132MC-4	160	15
	286	285.5	380	860	5:1	132MC-4	200	26
	238	342.6	490	1000	6:1	132MC-4	230	34
11	1940	51.4	330	600	1.5:1	160MA-2	200	26
	1465	68.1	450	1090	1:1	160MB-4	200	26
	976	102.2	437	600	1.5:1	160MB-4	200	26
	732	136.2	425	530	2:1	160MB-4	200	26
	640	155.9	505	600	1.5:1	160LA-6	200	26
	582	171.5	300	860	5:1	160MA-2	200	26
	488	204.4	515	910	3:1	160MB-4	200	26
	366	272.5	455	860	4:1	160MB-4	200	26
	293	340.6	380	860	5:1	160MB-4	200	26
	240	415.8	485	860	4:1	160LA-6	200	26
	192	519.8	990	1910	5:1	160LA-6	260	42
	182	546.8	1100	1940	4:1	180L-8	260	42
	146	683.5	1100	1910	5:1	180L-8	260	42
15	1953	69.7	330	600	1.5:1	160MB-2	200	26
	1465	92.9	450	1090	1:1	160LA-4	200	26
	1465	92.9	450	1090	1:1	160LA-4	230	34
	976	139.3	437	600	1.5:1	160LA-4	200	26
	732	185.8	425	530	2:1	160LA-4	200	26
	646	210.4	505	600	1.5:1	180L-6	200	26
	586	232.2	300	860	5:1	160MB-2	200	26
	488	278.7	515	910	3:1	160LA-4	200	26
	366	371.6	455	860	4:1	160LA-4	200	26
	293	464.5	880	1910	5:1	160LA-4	260	42
	242	561.2	1050	1940	4:1	180L-6	260	42
	242	561.2	675	1300	4:1	180L-6	230	34
	194	701.5	990	1910	5:1	180L-6	260	42
	146	932.1	1100	1910	5:1	200LB-8	260	42
18.5	1960	85.6	330	600	1.5:1	160L-2	200	26
	1470	114.2	450	1090	1:1	180M-4	200	26
	980	171.3	437	600	1.5:1	180M-4	200	26
	975	172.1	1050	2310	1:1	200LA-6	230	34
	975	172.1	1050	2310	1:1	200LA-6	260	42
	735	228.4	425	530	2:1	180M-4	200	26
	650	258.2	1000	1000	1.5:1	200LA-6	260	42
	588	285.4	300	860	5:1	160L-2	200	26
	490	342.5	515	910	3:1	180M-4	200	26
	490	342.5	366	1000	6:1	160L-2	230	34
	367	456.7	455	860	4:1	180M-4	200	26
	325	516.4	635	1300	3:1	200LA-6	230	34
	325	516.4	990	1940	3:1	200LA-6	260	42
	294	570.9	880	1910	5:1	180M-4	260	42
	294	570.9	635	1200	5:1	180M-4	230	34
	243	690.7	1050	1940	4:1	200LA-6	260	42
	195	860.7	990	1910	5:1	200LA-6	260	42
22	1470	135.8	450	1090	1:1	180L-4	230	34
	1470	135.8	450	1090	1:1	180L-4	200	26
	980	203.7	437	600	1.5:1	180L-4	200	26
	735	271.6	425	530	2:1	180L-4	200	26
	650	307.1	1000	1000	1.5:1	200LB-6	260	42
	590	338.3	510	1200	5:1	180M-2	230	34
	490	407.3	515	910	3:1	180L-4	200	26
	487	409.8	1050	1200	2:1	200LB-6	260	42
	367	543.9	900	1940	4:1	180L-4	260	42
	367	543.1	600	1300	4:1	180L-4	230	34
	294	678.9	880	1910	5:1	180L-4	260	42
	243	821.4	1050	1940	4:1	200LB-6	260	42

If the fed motor output exceeds the thermal limit rating of the gearbox, additional cooling measures will be needed.

10.3.6 Type VLM 065 – Type VL with motor (gearbox motor)



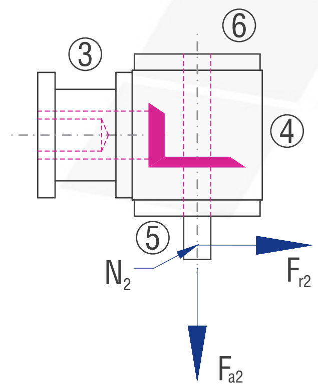
Characteristics

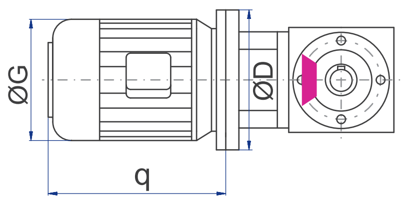
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	1:1 to 3:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

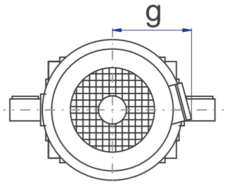
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	300	150	400	200	500	250	650	325	750	375	900	450
> 12	250	125	330	165	420	210	540	270	630	315	750	375

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
065	120.00	063	125.00	95.00	189.00	211.00
065	140.00	071	148.00	115.00	208.00	228.00





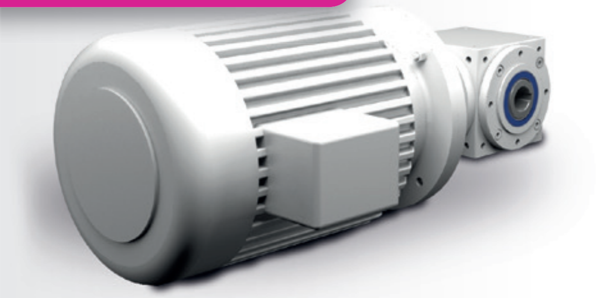


The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
0.12	1340	0.8	11	25	1:1	063A-4	065	1.6
	893	1.2	11	25	1.5:1	063A-4	065	1.6
	670	1.6	11	25	2:1	063A-4	065	1.6
	593	1.8	13	25	1.5:1	063B-6	065	1.6
	447	2.4	11	23	3:1	063A-4	065	1.6
	296	3.7	12	23	3:1	063B-6	065	1.6
0.18	2680	0.6	10	25	1:1	063A-2	065	1.6
	1787	0.9	10	25	1.5:1	063A-2	065	1.6
	1340	1.2	10	25	1:1	063B-4	065	1.6
	893	1.8	10	25	1.5:1	063B-4	065	1.6
	670	2.4	10	25	2:1	063B-4	065	1.6
	593	2.8	10	25	1.5:1	071A-6	065	1.6
	450	3.6	11	23	3:1	063B-4	065	1.6
	445	3.7	10	25	2:1	071A-6	065	1.6
	296	5.5	11	23	3:1	071A-6	065	1.6
0.25	2700	0.8	10	25	1:1	063B-2	065	1.6
	1800	1.3	10	25	1.5:1	063B-2	065	1.6
	1350	1.7	10	25	1:1	071A-4	065	1.6
	890	2.6	10	25	1:1	071B-6	065	1.6
	675	3.4	10	25	2:1	071A-4	065	1.6
	450	5.0	11	25	3:1	071A-4	065	1.6
0.37	2800	1.2	10	25	1:1	071A-2	065	1.6
	1400	2.4	10	25	2:1	071A-2	065	1.6
	1350	2.5	10	25	1:1	071B-4	065	1.6
	933	3.6	10	23	3:1	071A-2	065	1.6
	675	5.0	10	25	2:1	071B-4	065	1.6
0.55	2810	1.8	10	25	1:1	071B-2	065	1.6
	1873	2.7	10	23	1.5:1	071B-2	065	1.6
	1405	3.6	10	25	2:1	071B-2	065	1.6
	936	5.3	10	23	3:1	071B-2	065	1.6

10.3.7 Type VLM 090 – Type VL with motor (gearbox motor)



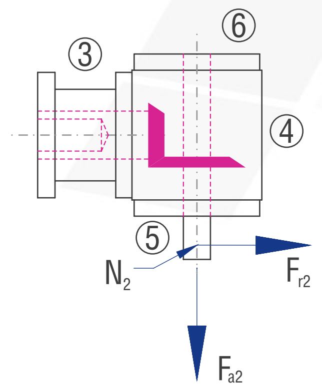
Characteristics

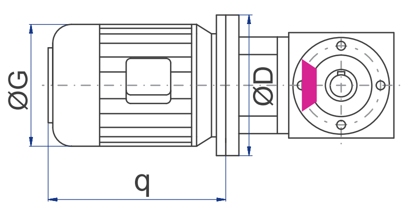
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

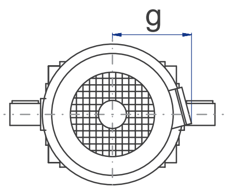
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	500	250	660	330	800	400	950	475	1250	625	1500	750
> 30	420	210	550	275	670	335	790	395	1040	520	1250	625

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
090	120.00	063	125.00	95.00	189.00	211.00
090	140.00	071	148.00	115.00	208.00	228.00
090	120.00	080	170.00	126.00	234.00	245.00







The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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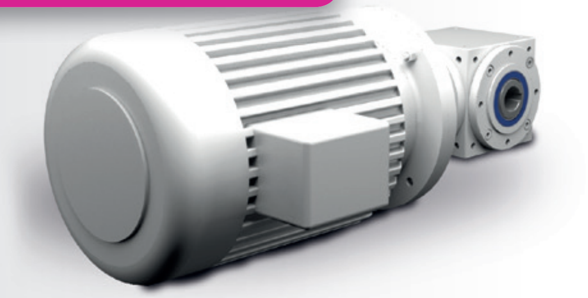
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
0.18	335	4.9	27	70	4:1	063B-4	090	3.8
	268	6.1	27	60	5:1	063B-4	090	3.8
	224	7.3	25	50	6:1	063B-4	090	3.8
	178	9.2	31	60	5:1	071A-6	090	3.8
	167	9.8	32	70	4:1	080A-8	090	3.8
	148	11.0	29	50	6:1	071A-6	090	3.8
	112	14.6	30	50	6:1	080A-8	090	3.8
0.25	540	4.2	23	60	5:1	063B-2	090	3.8
	450	5.0	27	70	3:1	071A-4	090	3.8
	337	6.7	27	70	4:1	071A-4	090	3.8
	296	7.7	31	70	3:1	071B-6	090	3.8
	270	8.4	27	60	5:1	071A-4	090	3.8
	225	10.1	25	50	6:1	071A-4	090	3.8
	178	12.7	31	60	5:1	071B-6	090	3.8
	148	15.3	29	50	6:1	071B-6	090	3.8
	134	16.9	32	60	5:1	080B-8	090	3.8
	112	20.3	30	50	6:1	080B-8	090	3.8
0.37	900	3.7	29	40	1.5:1	071B-4	090	3.8
	675	5.0	27	30	2:1	071B-4	090	3.8
	600	5.6	32	40	1.5:1	080A-6	090	3.8
	560	6.0	23	60	5:1	071A-2	090	3.8
	450	7.5	27	70	3:1	071B-4	090	3.8
	337	10.0	27	70	4:1	071B-4	090	3.8
	270	12.4	27	60	5:1	071B-4	090	3.8
	225	14.9	25	50	6:1	071B-4	090	3.8
	180	18.7	31	60	5:1	080A-6	090	3.8
	150	22.4	29	50	6:1	080A-6	090	3.8
0.55	936	5.3	23	70	3:1	071B-2	090	3.8
	906	5.5	29	40	1.5:1	080A-4	090	3.8
	702	7.1	23	70	4:1	071B-2	090	3.8
	680	7.3	27	30	2:1	080A-4	090	3.8
	600	8.3	32	40	1.5:1	080B-6	090	3.8
	562	8.9	23	60	5:1	071B-2	090	3.8
	453	11.0	27	70	3:1	080A-4	090	3.8
	340	14.7	27	70	4:1	080A-4	090	3.8
	300	16.6	31	70	3:1	080B-6	090	3.8
	227	22.0	25	50	6:1	080A-4	090	3.8
	180	27.7	31	60	5:1	080B-6	090	3.8
0.75	1880	3.6	25	40	1.5:1	080A-2	090	3.8
	1410	4.8	23	30	2:1	080A-2	090	3.8
	1360	5.0	32	105	1:1	080B-4	090	3.8
	940	7.2	23	70	3:1	080A-2	090	3.8
	906	7.5	29	40	1.5:1	080B-4	090	3.8
	705	9.7	23	70	4:1	080A-2	090	3.8
	680	10.0	27	30	2:1	080B-4	090	3.8
	564	12.1	27	60	5:1	080A-2	090	3.8
	453	15.0	27	70	3:1	080B-4	090	3.8
	340	20.0	27	70	4:1	080B-4	090	3.8
1.1	2820	3.5	27	105	1:1	080B-2	090	3.8
	1880	5.3	25	40	1.5:1	080B-2	090	3.8
	1410	7.1	23	30	2:1	080B-2	090	3.8
	940	10.6	23	70	3:1	080B-2	090	3.8
	705	14.2	23	70	4:1	080B-2	090	3.8

10.3.8 Type VLM 120 – Type VL with motor (gearbox motor)



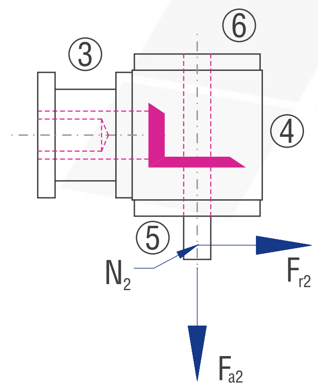
Characteristics

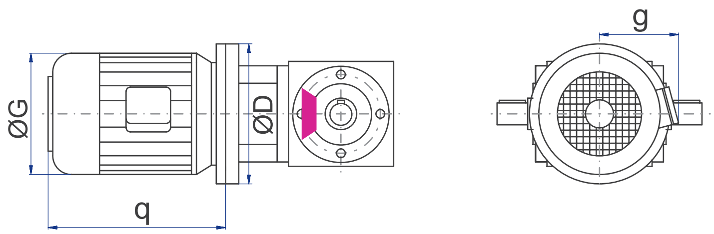
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

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

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	750	375	1000	500	1250	625	1500	750	1900	950	2200	1100
> 80	630	315	830	415	1040	520	1250	625	1580	790	1830	915

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
120	160.00	080	170.00	126.00	234.00	245.00
120	160.00	090L	185.00	142.00	272.00	298.00
120	160.00	090S	185.00	142.00	247.00	273.00
120	200.00	100	210.00	155.00	301.00	348.00
120	200.00	112	210.00	155.00	301.00	348.00





The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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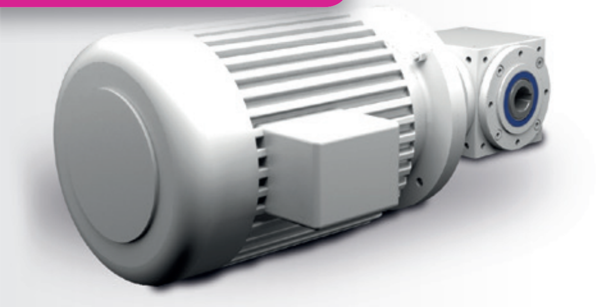
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
0.55	272	18.4	72	140	5:1	080A-4	120	6.2
	172	28.9	82	155	4:1	090L-8	120	6.2
	150	33.3	67	120	6:1	080B-6	120	6.2
	138	36.2	86	140	5:1	090L-8	120	6.2
	115	43.4	69	120	6:1	090L-8	120	6.2
0.75	606	11.2	86	100	1.5:1	090S-6	120	6.2
	303	22.4	82	155	3:1	090S-6	120	6.2
	272	25.0	72	140	5:1	080B-4	120	6.2
	227	30.0	64	120	6:1	080B-4	120	6.2
	182	37.4	80	140	5:1	090S-6	120	6.2
	152	44.8	67	113	6:1	090S-6	120	6.2
	138	49.3	86	140	5:1	100LA-8	120	6.2
	115	59.2	69	118	6:1	00LA-8	120	6.2
1.1	920	10.9	78	100	1.5:1	090S-4	120	6.2
	690	14.5	73	80	2:1	090S-4	120	6.2
	606	16.5	86	100	1.5:1	090L-6	120	6.2
	564	17.7	60	140	5:1	080B-2	120	6.2
	460	21.7	74	155	3:1	090S-4	120	6.2
	345	28.9	74	155	4:1	090S-4	120	6.2
	303	32.9	82	155	3:1	090L-6	120	6.2
	276	36.2	72	140	5:1	090S-4	120	6.2
	227	43.9	79	155	4:1	090L-6	120	6.2
	182	54.8	80	140	5:1	090L-6	120	6.2
	152	65.7	67	120	6:1	090L-6	120	6.2
	138	72.3	86	140	5:1	100LB-8	120	6.2
15	1420	9.6	56	80	2:1	090S-2	120	6.2
	946	14.4	58	155	3:1	090S-2	120	6.2
	920	14.8	78	100	1.5:1	090L-4	120	6.2
	710	19.2	60	155	4:1	090S-2	120	6.2
	690	19.7	73	80	2:1	090L-4	120	6.2
	613	22.2	78	100	1.5:1	100LA-6	120	6.2
	568	24.0	60	140	5:1	090S-2	120	6.2
	460	29.6	74	155	3:1	090L-4	120	6.2
	345	39.5	74	155	4:1	090L-4	120	6.2
	306	44.4	82	155	3:1	100LA-6	120	6.2
	276	49.3	72	140	5:1	090L-4	120	6.2
	230	59.2	64	120	6:1	090L-4	120	6.2
	184	74.0	80	140	5:1	100LA-6	120	6.2
2.2	1893	10.5	61	100	1.5:1	090L-2	120	6.2
	1420	14.1	56	80	2:1	090L-2	120	6.2
	940	21.2	78	100	1.5:1	100LA-4	120	6.2
	710	28.1	60	155	4:1	090L-2	120	6.2
	626	31.9	80	100	1.5:1	112M-6	120	6.2
	568	35.1	60	140	5:1	090L-2	120	6.2
	470	42.5	74	155	3:1	100LA-4	120	6.2
	352	56.6	74	155	4:1	100LA-4	120	6.2
	313	63.7	82	155	3:1	112M-6	120	6.2
3	2850	9.6	66	220	1:1	100L-2	120	6.2
	1900	14.3	61	100	1.5:1	100L-2	120	6.2
	1410	19.3	82	220	1:1	100LB-4	120	6.2
	940	29.0	78	100	1.5:1	100LB-4	120	6.2
	705	38.6	73	80	2:1	100LB-4	120	6.2
	570	47.8	60	140	5:1	100L-2	120	6.2
	470	57.9	74	155	3:1	100LB-4	120	6.2
4	2860	12.7	66	220	1:1	112M-2	120	6.2
	1906	19.0	61	100	1.5:1	112M-2	120	6.2
	1420	25.6	82	220	1:1	112M-4	120	6.2
	946	38.3	78	100	1.5:1	112M-4	120	6.2
	710	51.1	73	80	2:1	112M-4	120	6.2

10.3.9 Type VLM 140 – Type VL with motor (gearbox motor)



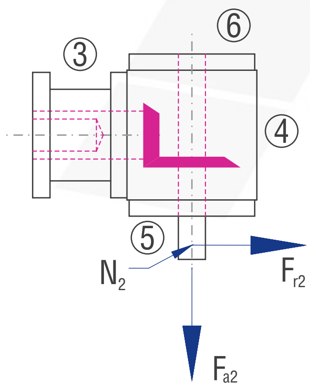
Characteristics

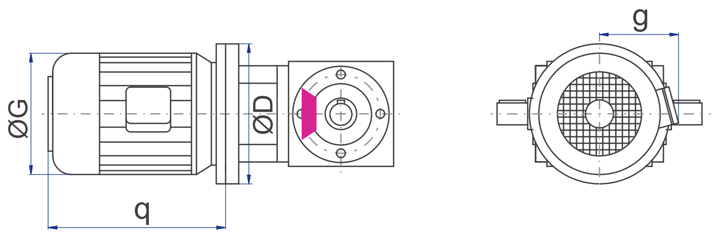
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

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

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	1300	650	1700	850	2000	1000	2500	1250	3000	1500	3800	1900
> 140	1082	541	1420	710	1670	835	2080	1040	2500	1250	3170	1585

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
140	200.00	100	210.00	155.00	301.00	348.00
140	200.00	112	210.00	155.00	301.00	348.00
140	200.00	132M	260.00	200.00	416.00	454.00
140	200.00	132S	260.00	200.00	390.00	428.00





The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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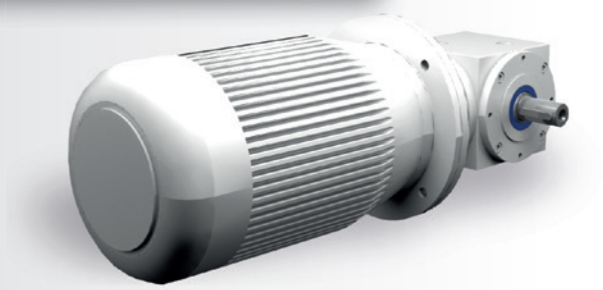
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
1.5	154	88.4	113	200	6:1	100LA-6	140	10
	140	97.2	130	250	5:1	112M-8	140	10
	117	116.3	118	200	6:1	112M-8	140	10
2.2	188	106.2	124	250	5:1	112M-6	140	10
3	633	43.0	175	210	1.5:1	132SB-6	140	10
	475	57.3	152	180	2:1	132SB-6	140	10
	316	86.0	160	280	3:1	132SB-6	140	10
	282	96.5	115	250	5:1	100LB-4	140	10
	237	114.6	136	280	4:1	132SB-6	140	10
4	633	57.3	175	210	1.5:1	132MA-6	140	10
	572	63.4	100	250	5:1	112M-2	140	10
	475	76.4	152	180	2:1	132MA-6	140	10
	355	102.2	120	280	4:1	112M-4	140	10
	316	114.6	160	280	3:1	132MA-6	140	10
5.5	2900	17.3	120	430	1:1	132SA-2	140	10
	1933	26.0	113	210	1.5:1	132SA-2	140	10
	1430	34.9	162	430	1:1	132SB-4	140	10
	953	52.3	155	210	1.5:1	132SB-4	140	10
	715	69.8	138	180	2:1	132SB-4	140	10
	633	78.8	175	210	1.5:1	132MB-6	140	10
	580	86.0	100	250	5:1	132SA-2	140	10
	476	104.7	146	280	3:1	132SB-4	140	10
	316	157.6	160	280	3:1	132MB-6	140	10
7.5	2900	23.5	120	430	1:1	132SB-2	140	10
	1933	35.2	113	180	1.5:1	132SB-2	140	10
	1430	47.6	162	430	1:1	132MB-4	140	10
	966	70.4	110	280	3:1	132SB-2	140	10
	953	71.4	155	210	1.5:1	132MB-4	140	10
	715	95.2	138	180	2:1	132MB-4	140	10
	476	142.8	146	280	3:1	132MB-4	140	10
9	2910	28.1	120	430	1:1	132MA-2	140	10
	1940	42.1	113	210	1.5:1	132MA-2	140	10
	1430	57.1	162	430	1:1	132MC-4	140	10
	953	85.7	155	210	1.5:1	132MC-4	140	10
	715	114.2	138	180	2:1	132MC-4	140	10

10.3.10 Type VLM 160 – Type VL with motor (gearbox motor)



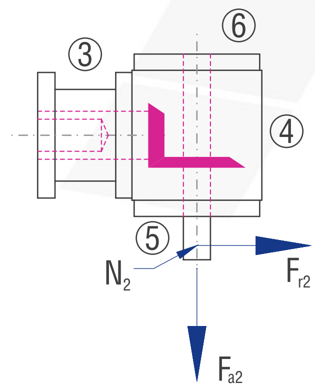
Characteristics

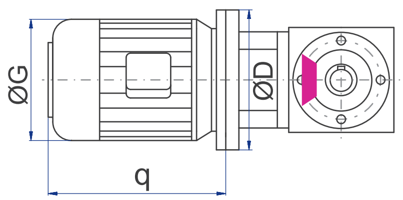
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

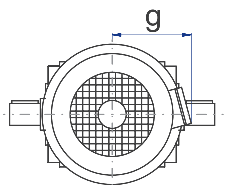
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< **220**	2000	1000	2800	1400	3300	1650	4000	2000	5000	2500	6500	3250
> **220**	1670	835	2340	1170	2750	1375	3340	1670	4170	2085	5420	2710

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
160	200.00	100	210.00	155.00	301.00	348.00
160	200.00	112	210.00	155.00	301.00	348.00
160	200.00	132M	260.00	200.00	416.00	454.00
160	200.00	132S	260.00	200.00	390.00	428.00







The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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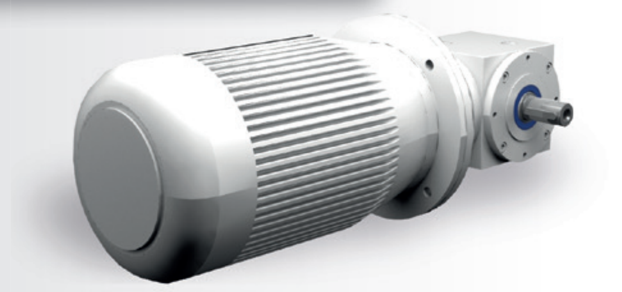
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
2.2	157	127.1	165	200	6:1	112M-6	160	15
	141	141.6	240	420	5:1	132SB-8	160	15
	118	169.2	178	200	6:1	132SB-8	160	15
3	235	115.8	145	350	6:1	100LB-4	160	15
	190	143.3	225	420	5:1	132SB-6	160	15
	177	153.3	250	422	4:1	132MB-8	160	15
	142	191.7	240	420	5:1	132MB-8	160	15
4	355	102.2	220	422	4:1	112M-4	160	15
	284	127.8	215	420	5:1	112M-4	160	15
	237	152.8	240	422	4:1	132MA-6	160	15
	190	191.0	225	420	5:1	132MA-6	160	15
5.5	476	104.7	230	457	3:1	132SB-4	160	15
	357	139.6	220	422	4:1	132SB-4	160	15
	316	157.6	245	457	3:1	132MB-6	160	15
	286	174.5	215	420	5:1	132SB-4	160	15
	237	210.1	240	422	4:1	132MB-6	160	15
7.5	580	117.3	180	420	5:1	132SB-2	160	15
	476	142.8	230	457	3:1	132MB-4	160	15
	357	190.3	220	422	4:1	132MB-4	160	15
9	1430	57.1	260	660	1:1	132MC-4	160	15
	970	84.2	190	457	3:1	132MA-2	160	15
	953	85.7	252	360	1.5:1	132MC-4	160	15
	727	112.2	180	422	4:1	132MA-2	160	15
	715	114.2	245	320	2:1	132MC-4	160	15
	582	140.3	180	420	5:1	132MA-2	160	15
	476	171.3	230	457	3:1	132MC-4	160	15
	357	228.4	220	422	4:1	132MC-4	160	15

10.3.11 Type VLM 200 – Type VL with motor (gearbox motor)



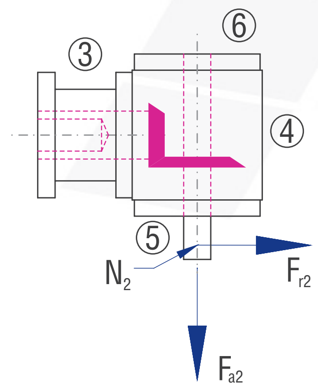
Characteristics

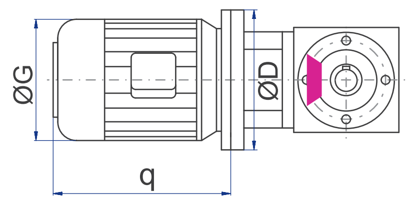
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

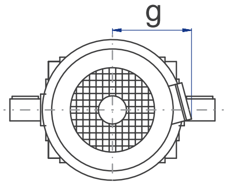
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2000	1000	2800	1400	3300	1650	4000	2000	5000	2500	6500	3250
> 220	1670	835	2340	1170	2750	1375	3340	1670	4170	2085	5420	2710

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
200	200.00	132M	260.00	200.00	416.00	454.00
200	350.00	160	320.00	245.00	540.00	0.00
200	350.00	180	320.00	245.00	580.00	0.00







The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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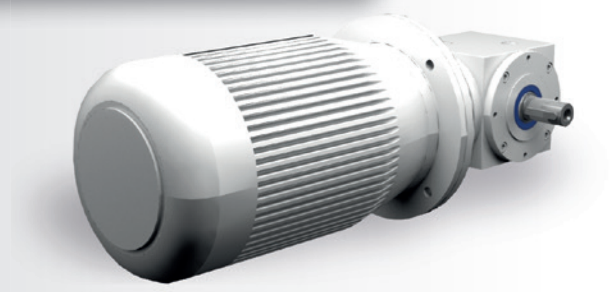
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
4	177	204.5	510	860	4:1	160MA-8	200	26
	142	255.6	440	860	5:1	160MA-8	200	26
5.5	238	209.4	580	910	3:1	160LA-8	200	26
	190	262.6	420	860	5:1	132MB-6	200	26
	143	348.9	440	860	5:1	160LA-8	200	26
7.5	640	106.3	505	600	1.5:1	160MB-6	200	26
	480	141.8	500	530	2:1	160MB-6	200	26
	320	212.6	555	910	3:1	160MB-6	200	26
	286	237.9	380	860	5:1	132MB-4	200	26
	240	283.5	485	860	4:1	160MB-6	200	26
	192	354.4	420	860	5:1	160MB-6	200	26
9	286	285.5	380	860	5:1	132MC-4	200	26
11	1940	51.4	330	600	1.5:1	160MA-2	200	26
	1465	68.1	450	1090	1:1	160MB-4	200	26
	976	102.2	437	600	1.5:1	160MB-4	200	26
	732	136.2	425	530	2:1	160MB-4	200	26
	640	155.9	505	600	1.5:1	160LA-6	200	26
	582	171.5	300	860	5:1	160MA-2	200	26
	488	204.4	515	910	3:1	160MB-4	200	26
	366	272.5	455	860	4:1	160MB-4	200	26
	293	340.6	380	860	5:1	160MB-4	200	26
	240	415.8	485	860	4:1	160LA-6	200	26
15	1953	69.7	330	600	1.5:1	160MB-2	200	26
	1465	92.9	450	1090	1:1	160LA-4	200	26
	976	139.3	437	600	1.5:1	160LA-4	200	26
	732	185.8	425	530	2:1	160LA-4	200	26
	646	210.4	505	600	1.5:1	180L-6	200	26
	586	232.2	300	860	5:1	160MB-2	200	26
	488	278.7	515	910	3:1	160LA-4	200	26
	366	371.6	455	860	4:1	160LA-4	200	26
18.5	1960	85.6	330	600	1.5:1	160L-2	200	26
	1470	114.2	450	1090	1:1	180M-4	200	26
	980	171.3	437	600	1.5:1	180M-4	200	26
	735	228.4	425	530	2:1	180M-4	200	26
	588	285.4	300	860	5:1	160L-2	200	26
	490	342.5	515	910	3:1	180M-4	200	26
	367	456.7	455	860	4:1	180M-4	200	26
22	1470	135.8	450	1090	1:1	180L-4	200	26
	980	203.7	437	600	1.5:1	180L-4	200	26
	735	271.6	425	530	2:1	180L-4	200	26
	490	407.3	515	910	3:1	180L-4	200	26

10.3.12 Type VLM 230 – Type VL with motor (gearbox motor)



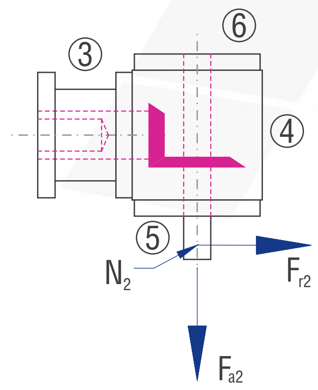
Characteristics

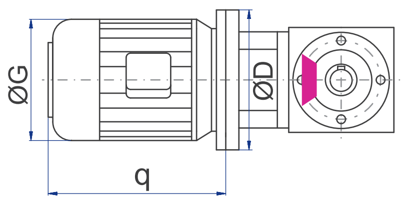
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

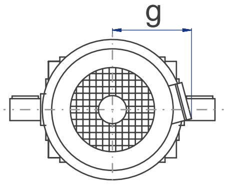
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 750	5850	2925	8650	4325	10500	5250	12250	6125	15000	7500	19000	9500
> 750	4876	2438	7208	3604	8750	4375	10208	5104	12500	6250	15830	7915

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
230	300.00	132M	260.00	200.00	416.00	454.00
230	350.00	160	320.00	245.00	540.00	0.00
230	350.00	180	320.00	245.00	580.00	0.00
230	400.00	200	360.00	275.00	640.00	0.00







The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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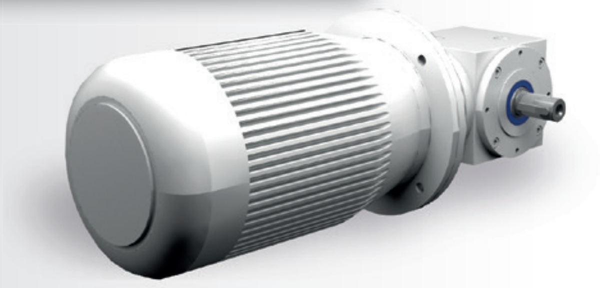
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
5.5	119	418.7	565	1000	6:1	160LA-8	230	34
7.5	160	425.3	540	1000	6:1	160MB-6	230	34
	144	472.5	770	1200	5:1	160LB-8	230	34
9	238	342.6	490	1000	6:1	132MC-4	230	34
15	1465	92.9	450	1090	1:1	160LA-4	230	34
	242	561.2	675	1300	4:1	180L-6	230	34
18.5	975	172.1	1050	2310	1:1	200LA-6	230	34
	490	342.5	366	1000	6:1	160L-2	230	34
	325	516.4	635	1300	3:1	200LA-6	230	34
	294	570.9	635	1200	5:1	180M-4	230	34
22	1470	135.8	450	1090	1:1	180L-4	230	34
	590	338.3	510	1200	5:1	180M-2	230	34
	367	543.1	600	1300	4:1	180L-4	230	34

10.3.13 Type VLM 260 – Type VL with motor (gearbox motor)



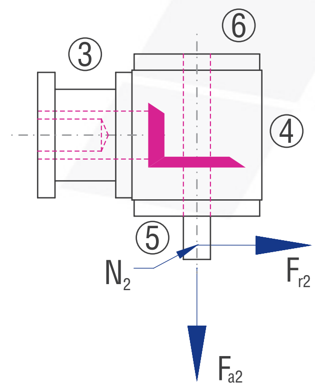
Characteristics

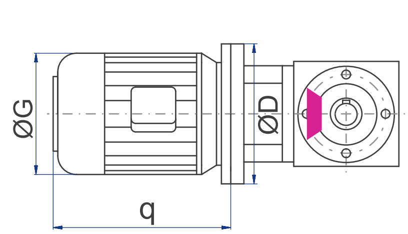
Characteristic	Standard	Option
Toothing	Bevel gear, spiral-toothed	See chapter 6.2.1
Gear ratio	3:1 to 6:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On all housing surfaces without flange and on all flanges.	See chapter 6.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 6.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 6.2.8
Lubricants	Synthetic lubricants	See chapter 6.2.8
Motor	IEC standard motor in the prescribed efficiency class	

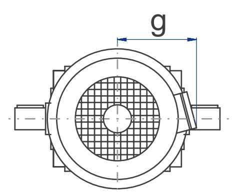
Permissible radial force F_{r2} and axial force F_{a2} on shaft N_2

n_1 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 950	8500	4250	13000	6500	16000	8000	18000	9000	22000	11000	28000	14000
> 950	7080	3540	10830	5415	13330	6665	15000	7500	18330	9165	23330	11665

Gearbox size	D [mm]	IEC motor	G [mm]	g [mm]	q [mm]	q_1 [mm]
260	350.00	160	320.00	245.00	540.00	0.00
260	350.00	180	320.00	245.00	580.00	0.00
260	400.00	200	360.00	275.00	640.00	0.00







The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the bevel gearbox, please refer to the chapter 6.3 Standard bevel gearboxes

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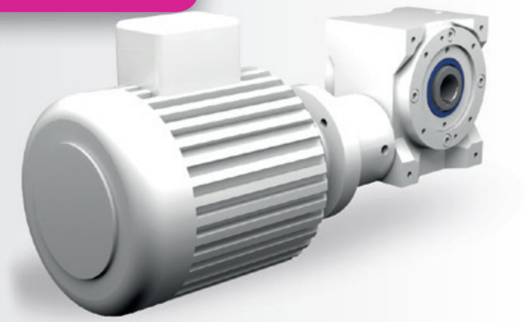
Performance data

P_1 [kW]	n_2 [rpm]	T_2 [Nm]	T_{2N} [Nm]	T_{2MAX} [Nm]	i [-]	IEC motor	Gearbox size	P_{1NT} [kW]
7.5	144	472.5	1100	1910	5:1	160LB-8	260	42
11	192	519.8	990	1910	5:1	160LA-6	260	42
	182	546.8	1100	1940	4:1	180L-8	260	42
	146	683.5	1100	1910	5:1	180L-8	260	42
15	293	464.5	880	1910	5:1	160LA-4	260	42
	242	561.2	1050	1940	4:1	180L-6	260	42
	194	701.5	990	1910	5:1	180L-6	260	42
	146	932.1	1100	1910	5:1	200LB-8	260	42
18.5	975	172.1	1050	2310	1:1	200LA-6	260	42
	650	258.2	1000	1000	1.5:1	200LA-6	260	42
	325	516.4	990	1940	3:1	200LA-6	260	42
	294	570.9	8 80	1910	5:1	180M-4	260	42
	243	690.7	1050	1940	4:1	200LA-6	260	42
	195	860.7	990	1910	5:1	200LA-6	260	42
22	650	307.1	1000	1000	1.5:1	200LB-6	260	42
	487	409.8	1050	1200	2:1	200LB-6	260	42
	367	543.9	900	1940	4:1	180L-4	260	42
	294	678.9	880	1910	5:1	180L-4	260	42
	243	821.4	1050	1940	4:1	200LB-6	260	42

10.4 Type SLM – Type SL with motor (gearbox motor)

10.4.1 Features

Nominal gear ratios: i = 10:1 to 83:1
Maximum output torque: 1765 Nm
5 sizes, centre-to-centre distance of 040 to 100 mm
Low-backlash construction < 6 angular minutes possible
With mounted IEC standard motor
Positive coupling between motor and gearbox
Housing made of grey cast iron



10.4.2 Models

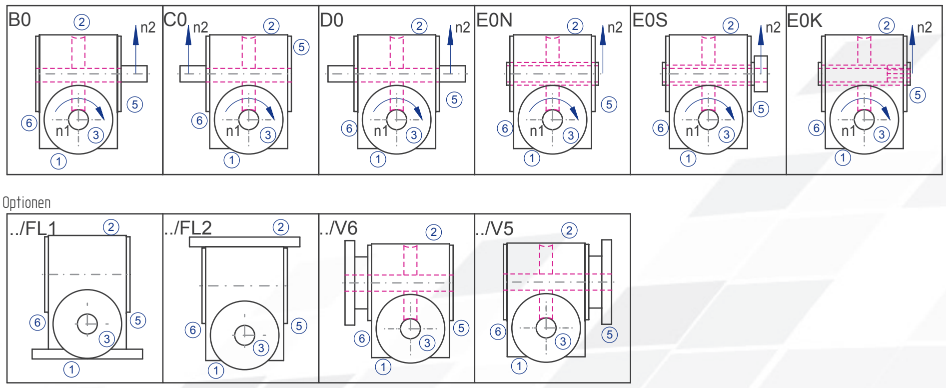


Figure **10.4.2-1; Models**

10.4.3 Gearbox sides

The example shows the Model B0 without motor

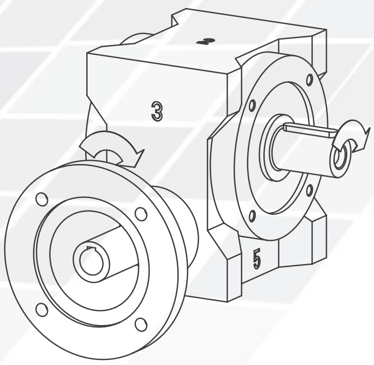


Figure **10.4.3-1; Gearbox sides**

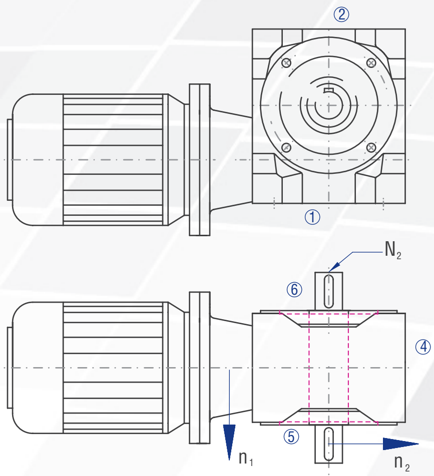


Figure **10.4.3-2; Shaft designations**

10.4.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
SLM	063	10:1	B0-	1.	1-	150	/0000
Description	Centre-to-centre distance Table 10.4.5-1	Table 10.4.5-1	Figure 10.4.2-1; Models	Gearbox side on which fixing is made Table 9.2.3-1; Figure 4.3.1-1 Gearbox sides	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 10.4.5-1	Standard
	DS 090	-4	/00	-5			
	Motor type	Number of poles	Additional version	Connection box to the side			

Motor type: DS 090; three-phase motor
Number of poles: 4; speed of approx. 1500 rpm (6000/4) at 50 Hz
Connection box: 5; the motor connection box points to the gearbox side 5

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10.4.5 Overview of performance data

P_1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Getriebe-größe	i [-]	IEC-Motor
0,18	275	5,7	39	77	040	9,75:1	063A-2
	137	11,3	43	77	040	9,75:1	063B-4
	69	20,4	50	90	040	19,5:1	063B-4
	46	27,3	50	107	040	29:1	063B-4
	34	35,4	56	99	040	39:1	063B-4
	31	38,8	57	107	040	29:1	071A-6
	26	43,0	46	87	040	52:1	063B-4
	23	50,1	63	99	040	39:1	071A-6
	22	46,1	48	72	040	63:1	063B-4
	18	65,9	137	197	050	38:1	080A-8
	17	67,7	88	145	050	51:1	071A-6
	16	60,2	63	112	050	83:1	063B-4
	14	73,7	109	120	050	62:1	071A-6
	13	84,6	91	145	050	51:1	080A-8
	11	89,1	112	120	050	62:1	080A-8
0,25	277	7,8	39	77	040	9,75:1	063B-2
	139	15,5	43	77	040	9,75:1	071A-4
	70	28,0	50	90	040	19,5:1	071A-4
	47	37,1	50	107	040	29:1	071A-4
	46	41,5	53	90	040	19,5:1	071A-4
	35	47,8	56	99	040	39:1	071A-4
	31	53,9	57	107	040	29:1	071B-6
	26	63,4	85	145	050	51:1	071A-4
	23	74,7	144	219	050	29:1	080B-8
	22	69,5	105	120	050	62:1	071A-4
	18	91,5	137	197	050	38:1	080B-8
	17	100,0	200	310	063	51:1	071B-6
	16	94,0	152	246	063	82:1	071A-4
	15	104,0	202	240	063	61:1	071B-6
	14	102,0	109	120	050	62:1	071B-6
	13	125,0	207	310	063	51:1	080B-8
	11	128,0	152	246	063	82:1	071B-6
	11	135,0	221	240	063	61:1	080B-8
	8	176,0	304	510	080	82:1	080B-8
0,37	288	11,2	39	77	040	9,75:1	071A-2
	139	22,9	43	77	040	9,75:1	071B-4
	70	41,4	50	90	040	19,5:1	071B-4
	47	57,9	113	219	050	29:1	071B-4
	47	62,4	110	179	050	19:1	080A-6
	36	73,6	118	197	050	38:1	071B-4
	31	84,3	121	219	050	29:1	080A-6
	26	101,0	191	310	063	51:1	071B-4
	24	105,0	134	197	050	38:1	080A-6
	23	111,0	144	219	050	29:1	090S-8
	22	103,0	105	120	050	62:1	071B-4
	22	109,0	175	240	063	61:1	071B-4
	18	136,0	137	197	050	38:1	090S-8
	18	139,0	200	310	063	51:1	080A-6
	17	150,0	264	360	063	39:1	090S-8
	16	139,0	152	246	063	82:1	071B-4
	15	153,0	202	240	063	61:1	080A-6
	13	185,0	207	310	063	51:1	090S-8
	11	196,0	304	510	080	82:1	080A-6
	11	199,0	221	240	063	61:1	090S-8
	8	261,0	304	510	080	82:1	090S-8
0,55	289	16,5	39	77	040	9,75:1	071B-2
	143	33,8	91	152	050	9,5:1	080A-4
	72	62,0	106	179	050	19:1	080A-4
	47	86,1	113	219	050	29:1	080A-4
	36	109,0	118	197	050	38:1	080A-4
	31	131,0	237	437	063	29:1	080B-6
	27	144,0	191	310	063	51:1	080A-4
	24	164,0	268	437	063	29:1	090L-8
	23	171,0	237	360	063	39:1	080B-6
	22	162,0	175	240	063	61:1	080A-4
	18	210,0	264	360	063	39:1	090L-8
	17	201,0	304	510	080	82:1	080A-4
	17	229,0	284	480	080	53:1	080B-6
	15	238,0	325	480	080	62:1	080B-6
	13	287,0	294	480	080	53:1	090L-8
	11	291,0	304	510	080	82:1	080B-6
	11	310,0	352	480	080	62:1	090L-8
0,75	297	22,4	85	152	050	9,5:1	080A-2
	143	46,1	91	152	050	9,5:1	080B-4
	72	84,6	106	179	050	19:1	080B-4
	47	122,0	204	437	063	29:1	080B-4
	47	131,0	212	355	063	19,5:1	090S-6
	35	158,0	207	348	063	39:1	080B-4
	31	178,0	237	437	063	29:1	090S-6
	26	212,0	271	480	080	53:1	080B-4
	24	224,0	268	437	063	29:1	100LA-8
	23	234,0	237	360	063	39:1	090S-6
	22	228,0	279	480	080	62:1	080B-4

P_1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Getriebe-größe	i [-]	IEC-Motor
0,75	18	295,0	704	1080	100	52:1	090S-6
	17	274,0	304	510	080	82:1	080B-4
	17	316,0	501	780	080	40:1	100LA-8
	15	325,0	325	480	080	62:1	090S-6
	14	348,0	886	1040	100	63:1	090S-6
	13	397,0	728	1080	100	52:1	100LA-8
	11	404,0	599	1000	100	82:1	090S-6
	11	423,0	886	1040	100	63:1	100LA-8
	8	546,0	599	1000	100	82:1	100LA-8
1,10	297	32,9	85	152	050	9,5:1	080B-2
	145	66,7	91	152	050	9,5:1	090S-4
	71	130,0	186	355	063	19,5:1	090S-4
	48	175,0	204	437	063	29:1	090S-4
	47	192,0	212	355	063	19,5:1	090L-6
	46	187,0	395	920	080	30:1	090S-4
	35	240,0	381	780	080	40:1	090S-4
	30	280,0	465	920	080	30:1	090L-6
	27	300,0	670	1080	100	52:1	090S-4
	23	356,0	443	780	080	40:1	090L-6
	23	356,0	530	920	080	30:1	100LB-8
	22	334,0	817	1040	100	63:1	090S-4
	18	432,0	704	1080	100	52:1	090L-6
	17	408,0	599	1000	100	82:1	090S-4
	17	464,0	501	780	080	40:1	100LB-8
	14	510,0	886	1040	100	63:1	090L-6
	13	582,0	728	1080	100	52:1	100LB-8
	11	592,0	599	1000	100	82:1	090L-6
	11	621,0	886	1040	100	63:1	100LB-8
1,50	299	44,6	85	152	050	9,5:1	090S-2
	145	90,9	91	152	050	9,5:1	090L-4
	142	93,8	170	306	063	9,75:1	090L-4
	71	178,0	186	355	063	19,5:1	090L-4
	46	255,0	395	920	080	30:1	090L-4
	46	274,0	399	725	080	20:1	100LA-6
	35	327,0	381	780	080	40:1	090L-4
	31	370,0	465	920	080	30:1	100LA-6
	27	409,0	670	1080	100	52:1	090L-4
	23	486,0	530	920	080	30:1	112M-8
	23	486,0	933	1582	100	40:1	100LA-6
	23	486,0	950	1765	100	30:1	112M-8
	22	456,0	817	1040	100	63:1	090L-4
	18	589,0	704	1080	100	52:1	100LA-6
	18	605,0	1025	1528	100	40:1	112M-8
	17	556,0	599	1000	100	82:1	090L-4
	15	649,0	886	1040	100	63:1	100LA-6
	11	847,0	886	1040	100	63:1	112M-8
2,20	299	65,3	85	152	050	9,5:1	090L-2
	145	135,0	170	306	063	9,75:1	100LA-4
	71	263,0	344	725	080	20:1	100LA-4
	47	367,0	395	920	080	30:1	100LA-4
	47	367,0	748	1765	100	30:1	100LA-4
	47	393,0	399	725	080	20:1	112M-6
	35	480,0	817	1582	100	40:1	100LA-4
	31	542,0	825	1765	100	30:1	112M-6
	27	599,0	670	1080	100	52:1	100LA-4
	24	683,0	933	1582	100	40:1	112M-6
	24	683,0	950	1765	100	30:1	132SB-8
	22	669,0	817	1040	100	63:1	100LA-4
	18	887,0	1025	1582	100	40:1	132SB-8
3,00	292	92,2	121	306	063	9,75:1	100L-2
	141	191,0	297	625	080	10:1	100LB-4
	71	359,0	778	1440	100	20:1	100LB-4
	47	500,0	748	1765	100	30:1	100LB-4
	35	655,0	817	1582	100	40:1	100LB-4
	24	931,0	933	1582	100	40:1	132SB-6
	24	931,0	950	1765	100	30:1	132MB-8
4,00	286	126,0	197	625	080	10:1	112M-2
	142	253,0	297	625	080	10:1	112M-4
	71	479,0	778	1440	100	20:1	112M-4
	47	666,0	748	1765	100	30:1	112M-4
5,50	290	170,0	555	1090	100	10:1	132SA-2
	143	345,0	703	1090	100	10:1	132SB-4
	72	649,0	778	1440	100	20:1	132SB-4
7,50	290	232,0	555	1090	100	10:1	132SB-2
	143	471,0	703	1090	100	10:1	132MB-4
9,00	291	278,0	555	1090	100	10:1	132MA-2

Table **10.4.5-1**

If the fed motor output exceeds the thermal limit rating of the gearbox, additional cooling measures will be needed.

Gearbox motors

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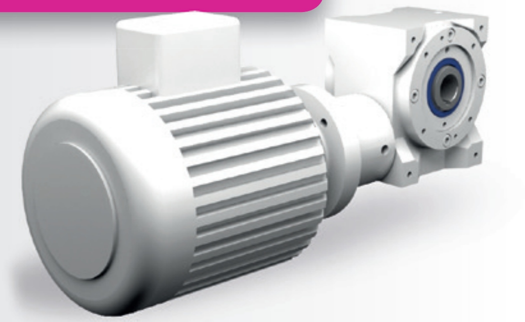
10.4.6 Type SLM 040 – Type SL with motor (gearbox motor)



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Motor	IEC standard motor in the prescribed efficiency class	

For the dimensions of the worm gearbox, please refer to chapter 9.3.6 Standard worm gearboxes, page 187

Performance data

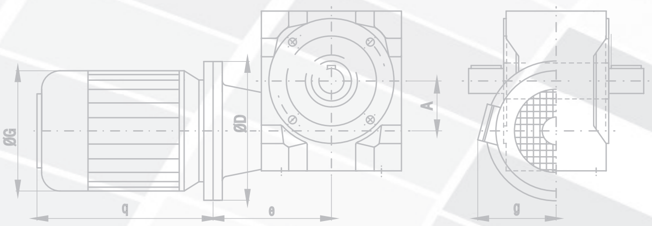
P1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Gearbox size	i [-]	IEC-Motor
0,18	275	5,7	39	77	040	9,75:1	063A-2
	137	11,3	43	77	040	9,75:1	063B-4
	69	20,4	50	90	040	19,5:1	063B-4
	46	27,3	50	107	040	29:1	063B-4
	34	35,4	56	99	040	39:1	063B-4
	31	38,8	57	107	040	29:1	071A-6
	26	43,0	46	87	040	52:1	063B-4
	23	50,1	63	99	040	39:1	071A-6
	22	46,1	48	72	040	63:1	063B-4
0,25	277	7,8	39	77	040	9,75:1	063B-2
	139	15,5	43	77	040	9,75:1	071A-4
	70	28,0	50	90	040	19,5:1	071A-4
	47	37,1	50	107	040	29:1	071A-4
	46	41,5	53	90	040	19,5:1	071A-4
	35	47,8	56	99	040	39:1	071A-4
	31	53,9	57	107	040	29:1	071B-6

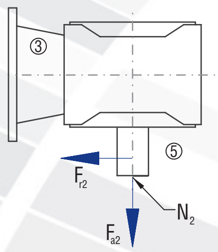
P1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Gearbox size	i [-]	IEC-Motor
0,37	288	11,2	39	77	040	9,75:1	071A-2
	139	22,9	43	77	040	9,75:1	071B-4
	70	41,4	50	90	040	19,5:1	071B-4
0,55	289	16,5	39	77	040	9,75:1	071B-2

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250

The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the worm gearbox, please refer to chapter 8.3 Worm gearboxes

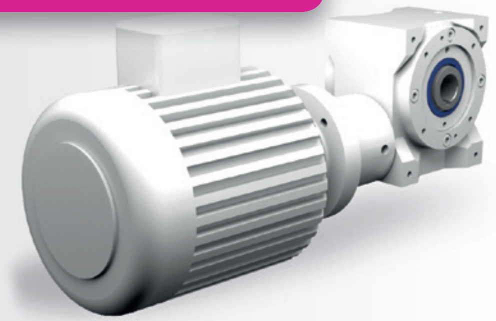




IEC Motor	D [mm]	G [mm]	g [mm]	q [mm]	q_1 [mm]	e [mm]	A [mm]
063	120	125	95	189	211	121	40
071	105	148	115	208	228	121	40

The value q1 applies to braking motors

10.4.7 Type SLM 050 – Type SL with motor (gearbox motor)



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection classes	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Motor	IEC standard motor in the prescribed efficiency class	

For the dimensions of the worm gearbox, please refer to chapter 9.3.7 Standard worm gearboxes, page 191

Performance data

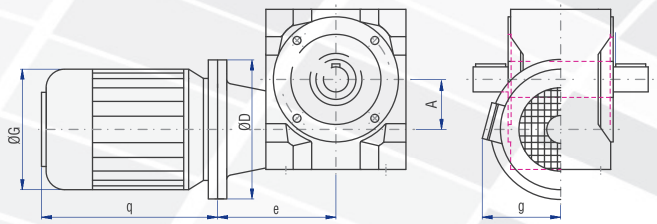
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
0,18	18	65,9	137	197	050	38:1	080A-8
	17	67,7	88	145	050	51:1	071A-6
	16	60,2	63	112	050	83:1	063B-4
	14	73,7	109	120	050	62:1	071A-6
	13	84,6	91	145	050	51:1	080A-8
	11	89,1	112	120	050	62:1	080A-8
0,25	26	63,4	85	145	050	51:1	071A-4
	23	74,7	144	219	050	29:1	080B-8
	22	69,5	105	120	050	62:1	071A-4
	18	91,5	137	197	050	38:1	080B-8
	14	102,0	109	120	050	62:1	071B-6
0,37	47	57,9	113	219	050	29:1	071B-4
	47	62,4	110	179	050	19:1	080A-6
	36	73,6	118	197	050	38:1	071B-4
	31	84,3	121	219	050	29:1	080A-6
	24	105,0	134	197	050	38:1	080A-6
	23	111,0	144	219	050	29:1	090S-8
	22	103,0	105	120	050	62:1	071B-4
	18	136,0	137	197	050	38:1	090S-8

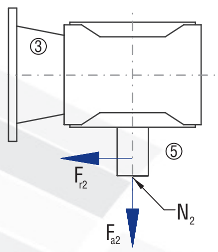
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
0,55	143	33,8	91	152	050	9,5:1	080A-4
	72	62,0	106	179	050	19:1	080A-4
	47	86,1	113	219	050	29:1	080A-4
	36	109,0	118	197	050	38:1	080A-4
0,75	297	22,4	85	152	050	9,5:1	080A-2
	143	46,1	91	152	050	9,5:1	080B-4
	72	84,6	106	179	050	19:1	080B-4
1,10	297	32,9	85	152	050	9,5:1	080B-2
	145	66,7	91	152	050	9,5:1	090S-4
1,50	299	44,6	85	152	050	9,5:1	090S-2
	145	90,9	91	152	050	9,5:1	090L-4
2,20	299	65,3	85	152	050	9,5:1	090L-2

Permissible radial force F_{r2} and axial force F_{a2} on shaft N2

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850

The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the worm gearbox, please refer to chapter 8.3 Worm gearboxes

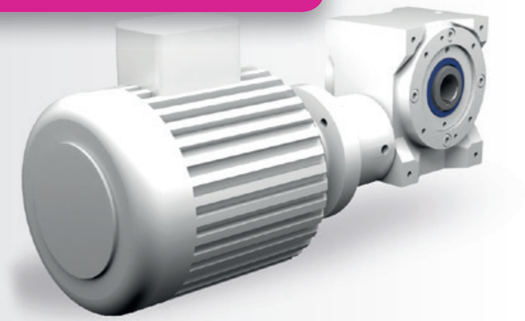




IEC Motor	D [mm]	G [mm]	g [mm]	q [mm]	q_1 [mm]	e [mm]	A [mm]
063	120	125	95	189	211	150	50
071	140	148	115	208	228	121	50
080	120	170	126	234	245	150	50
90L	140	185	142	272	298	121	50
90S	140	185	142	247	273	121	50

The value q1 applies to braking motors

10.4.8 Type SLM 063 – Type SL with motor (gearbox motor)



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection classes	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Motor	IEC standard motor in the prescribed efficiency class	

For the dimensions of the worm gearbox, please refer to chapter 9.3.8 Standard worm gearboxes, page 195

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Leistungsdaten

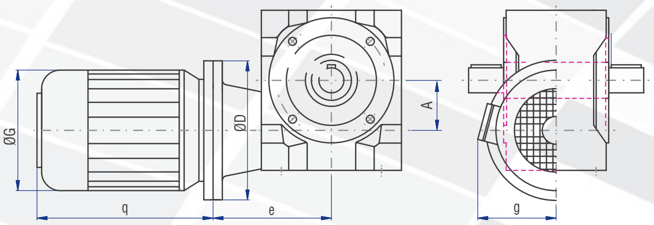
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
0,25	17	100,0	200	310	063	51:1	071B-6
	16	94,0	152	246	063	82:1	071A-4
	15	104,0	202	240	063	61:1	071B-6
	13	125,0	207	310	063	51:1	080B-8
	11	128,0	152	246	063	82:1	071B-6
	11	135,0	221	240	063	61:1	080B-8
0,37	26	101,0	191	310	063	51:1	071B-4
	22	109,0	175	240	063	61:1	071B-4
	18	139,0	200	310	063	51:1	080A-6
	17	150,0	264	360	063	39:1	090S-8
	16	139,0	152	246	063	82:1	071B-4
	15	153,0	202	240	063	61:1	080A-6
	13	185,0	207	310	063	51:1	090S-8
	11	199,0	221	240	063	61:1	090S-8
0,55	31	131,0	237	437	063	29:1	080B-6
	27	144,0	191	310	063	51:1	080A-4
	24	164,0	268	437	063	29:1	090L-8
	23	171,0	237	360	063	39:1	080B-6
	22	162,0	175	240	063	61:1	080A-4
	18	210,0	264	360	063	39:1	090L-8

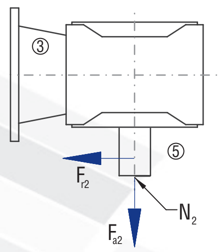
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
0,75	47	122,0	204	437	063	29:1	080B-4
	47	131,0	212	355	063	19,5:1	090S-6
	35	158,0	207	348	063	39:1	080B-4
	31	178,0	237	437	063	29:1	090S-6
	24	224,0	268	437	063	29:1	100LA-8
	23	234,0	237	360	063	39:1	090S-6
1,10	71	130,0	186	355	063	19,5:1	090S-4
	48	175,0	204	437	063	29:1	090S-4
	47	192,0	212	355	063	19,5:1	090L-6
1,50	142	93,8	170	306	063	9,75:1	090L-4
	71	178,0	186	355	063	19,5:1	090L-4
2,20	145	135,0	170	306	063	9,75:1	100LA-4
3,00	292	92,2	121	306	063	9,75:1	100L-2

Permissible radial force Fr2 and axial force Fa2 on shaft N2

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000

The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the worm gearbox, please refer to chapter 8.3 Worm gearboxes

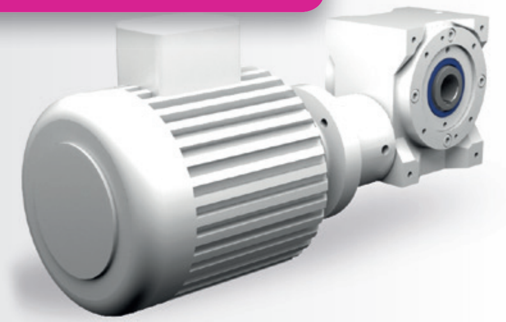




IEC Motor	D [mm]	G [mm]	g [mm]	q [mm]	q1 [mm]	e [mm]	A [mm]
071	160	148	115	208	228	163	63
080	160	170	126	234	245	163	63
90L	200	185	142	272	298	175	63
90S	200	185	142	247	273	175	63
100	200	210	155	301	348	175	63
112	200	210	155	301	348	175	63

The value q1 applies to braking motors

10.4.9 Type SLM 080 – Type SL with motor (gearbox motor)



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection classes	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Motor	IEC standard motor in the prescribed efficiency class	

For the dimensions of the worm gearbox, please refer to chapter 9.3.9 Standard worm gearboxes, page 199

Performance data

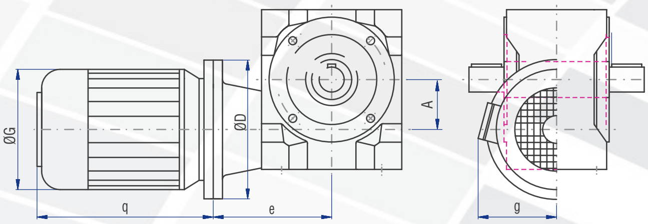
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
0,25	8	176,0	304	510	080	82:1	080B-8
0,37	11	196,0	304	510	080	82:1	080A-6
	8	261,0	304	510	080	82:1	090S-8
0,55	17	201,0	304	510	080	82:1	080A-4
	17	229,0	284	480	080	53:1	080B-6
	15	238,0	325	480	080	62:1	080B-6
	13	287,0	294	480	080	53:1	090L-8
	11	291,0	304	510	080	82:1	080B-6
	11	310,0	352	480	080	62:1	090L-8
0,75	26	212,0	271	480	080	53:1	080B-4
	22	228,0	279	480	080	62:1	080B-4
	17	274,0	304	510	080	82:1	080B-4
	17	316,0	501	780	080	40:1	100LA-8
	15	325,0	325	480	080	62:1	090S-6
1,10	46	187,0	395	920	080	30:1	090S-4
	35	240,0	381	780	080	40:1	090S-4
	30	280,0	465	920	080	30:1	090L-6
	23	356,0	443	780	080	40:1	090L-6
	23	356,0	530	920	080	30:1	100LB-8
	17	464,0	501	780	080	40:1	100LB-8

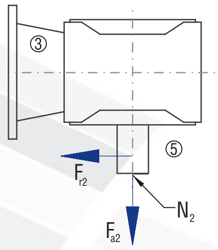
P1 [kW]	n2 [1/min]	T2 [Nm]	T2N [Nm]	T2 max [Nm]	Gearbox size	i [-]	IEC-Motor
1,50	46	255,0	395	920	080	30:1	090L-4
	46	274,0	399	725	080	20:1	100LA-6
	35	327,0	381	780	080	40:1	090L-4
	31	370,0	465	920	080	30:1	100LA-6
	23	486,0	530	920	080	30:1	112M-8
2,20	71	263,0	344	725	080	20:1	100LA-4
	47	367,0	395	920	080	30:1	100LA-4
	47	393,0	399	725	080	20:1	112M-6
3,00	141	191,0	297	625	080	10:1	100LB-4
4,00	286	126,0	197	625	080	10:1	112M-2
	142	253,0	297	625	080	10:1	112M-4

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040

The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the worm gearbox, please refer to chapter 8.3 Worm gearboxes

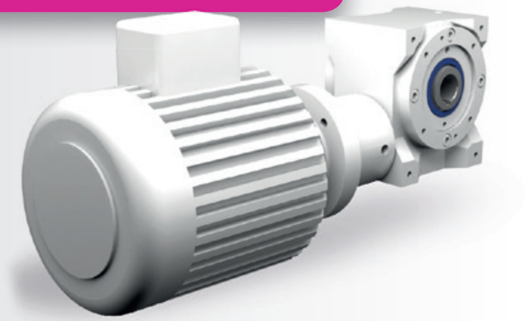




IEC Motor	D [mm]	G [mm]	g [mm]	q [mm]	q_1 [mm]	e [mm]	A [mm]
080	160	170	126	234	245	183	80
90L	200	185	142	272	298	195	80
90S	200	185	142	247	273	195	80
100	200	210	155	301	348	195	80
112	200	210	155	301	348	195	80

The value q1 applies to braking motors

10.4.10 Type SLM 100 – Type SL with motor (gearbox motor)



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 9.2.1
Gear ratio	10:1 to 83:1	
Housing / Flanges	Grey cast iron	
Threaded mounting hole	On gearbox side 1 and on the flanges	See chapter 9.2.3
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 30 arcmin	See chapter 9.2.10
Protection classes	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 9.2.8
Lubricants	Synthetic lubricants	See chapter 9.2.8
Motor	IEC standard motor in the prescribed efficiency class	

For the dimensions of the worm gearbox, please refer to chapter 9.3.10 Standard worm gearboxes, page 203

Performance data

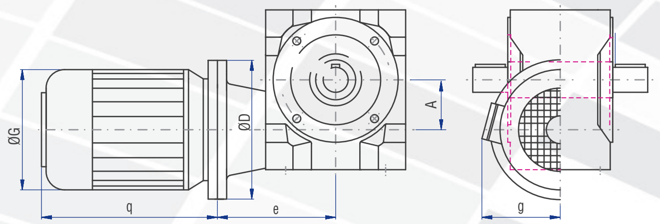
P_1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Gearbox size	i [-]	IEC-Motor
0,75	18	295,0	704	1080	100	52:1	090S-6
	14	348,0	886	1040	100	63:1	090S-6
	13	397,0	728	1080	100	52:1	100LA-8
	11	404,0	599	1000	100	82:1	090S-6
	11	423,0	886	1040	100	63:1	100LA-8
	8	546,0	599	1000	100	82:1	100LA-8
1,10	27	300,0	670	1080	100	52:1	090S-4
	22	334,0	817	1040	100	63:1	090S-4
	18	432,0	704	1080	100	52:1	090L-6
	17	408,0	599	1000	100	82:1	090S-4
	14	510,0	886	1040	100	63:1	090L-6
	13	582,0	728	1080	100	52:1	100LB-8
	11	592,0	599	1000	100	82:1	090L-6
	11	621,0	886	1040	100	63:1	100LB-8
1,50	27	409,0	670	1080	100	52:1	090L-4
	23	486,0	933	1582	100	40:1	100LA-6
	23	486,0	950	1765	100	30:1	112M-8
	22	456,0	817	1040	100	63:1	090L-4
	18	589,0	704	1080	100	52:1	100LA-6
	18	605,0	1025	1528	100	40:1	112M-8
	17	556,0	599	1000	100	82:1	090L-4
	15	649,0	886	1040	100	63:1	100LA-6
	11	847,0	886	1040	100	63:1	112M-8

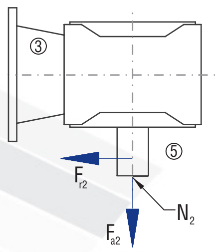
P_1 [kW]	n_2 [1/min]	T_2 [Nm]	T_{2N} [Nm]	$T_{2\,max}$ [Nm]	Gearbox size	i [-]	IEC-Motor
2,20	47	367,0	748	1765	100	30:1	100LA-4
	35	480,0	817	1582	100	40:1	100LA-4
	31	542,0	825	1765	100	30:1	112M-6
	27	599,0	670	1080	100	52:1	100LA-4
	24	683,0	933	1582	100	40:1	112M-6
	24	683,0	950	1765	100	30:1	132SB-8
	22	669,0	817	1040	100	63:1	100LA-4
	18	887,0	1025	1582	100	40:1	132SB-8
3,00	71	359,0	778	1440	100	20:1	100LB-4
	47	500,0	748	1765	100	30:1	100LB-4
	35	655,0	817	1582	100	40:1	100LB-4
	24	931,0	933	1582	100	40:1	132SB-6
	24	931,0	950	1765	100	30:1	132MB-8
4,00	71	479,0	778	1440	100	20:1	112M-4
	47	666,0	748	1765	100	30:1	112M-4
5,50	290	170,0	555	1090	100	10:1	132SA-2
	143	345,0	703	1090	100	10:1	132SB-4
	72	649,0	778	1440	100	20:1	132SB-4
7,50	290	232,0	555	1090	100	10:1	132SB-2
	143	471,0	703	1090	100	10:1	132MB-4
9,00	291	278,0	555	1090	100	10:1	132MA-2

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800

The mass inertia moment and the weight of the motor depend on the manufacturer. Please enquire the values of the overall system.
For the dimensions of the worm gearbox, please refer to chapter 8.3 Worm gearboxes

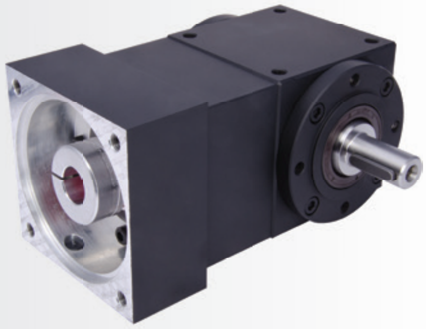




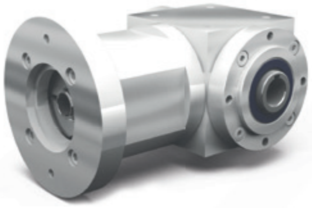
IEC Motor	D [mm]	G [mm]	g [mm]	q [mm]	q_1 [mm]	e [mm]	A [mm]
90L	200	185	142	272	298	235	100
90S	200	185	142	247	273	235	100
100	250	210	155	301	348	245	100
112	250	210	155	301	348	245	100
132M	300	260	200	416	454	265	100
132S	300	260	200	390	428	265	100

The value q1 applies to braking motors

11 Servo gearboxes (precision gearboxes)

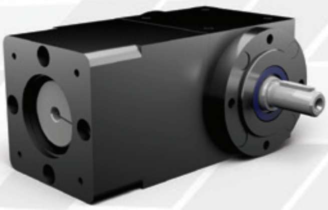


11.1 Type overview



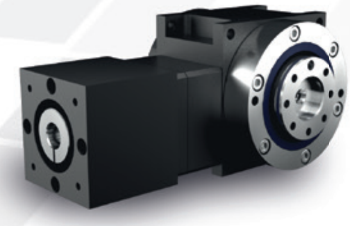
Type LC – Servo miniatur bevel gearboxes

Gear ratios: i = 1:1 to 4:1
Maximum output torque: 16 Nm
2 gearbox sizes with edge lengths of 035 to 45 mm
Suitable for fitting IEC standard motors
Low-backlash construction < 10 angular minutes possible
Housing made of aluminium



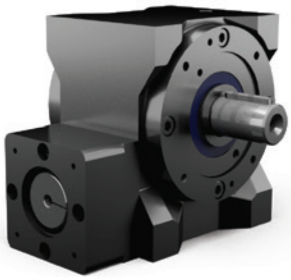
Type VC – Servo bevel gearboxes

Gear ratios: i = 1:1 to 6:1
Maximum acceleration torque on output: 700 Nm
6 gearbox sizes with edge lengths of 065 to 200 mm
Minimised circumferential backlash (optional)
Housing made of grey cast iron
Bevel gearboxes suitable for fitting servo-motors
Non-positive connection between motor and gearbox



Type HC – Servo hypoid gearboxes

Gear ratios: i = 3:1 to 15:1
Maximum acceleration torque on output: 2160 Nm
6 gearbox sizes; centre-to-centre distance: 090 to 260 mm
Minimised circumferential backlash (optional)
Housing made of aluminium
Hypoid gearboxes suitable for fitting servo-motors
Non-positive connection between motor and gearbox



Type SC – Servo worm gearboxes

Gear ratios: i = 10:1 to 20:1 (i > 26 upon request)
Maximum acceleration torque on output: 1100 Nm
5 gearbox sizes; centre-to-centre distance: 040 to 100 mm
Minimised circumferential backlash (optional)
Housing made of grey cast iron
Worm gearboxes suitable for fitting servo-motors
Non-positive connection between motor and gearbox

11.1.1 General

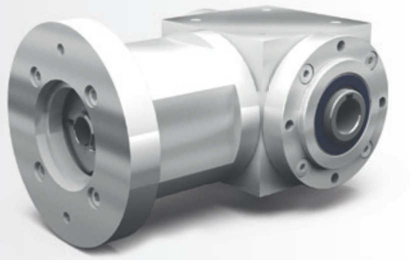
Special servo gearboxes have been developed for the requirements of highly dynamic servo-motors. The proven ATEK bevel gearbox and worm gearbox series form the basis for them. The combination of a large number of motor flanges and an insertable, zero-play clamp coupling enables the adaptation to the most servo-motors.

Due to the modular system, a later replacement of the motor flange and the coupling half on the motor side is very easy.

11.2 Type LC – Servo miniatur bevel gearboxes

11.2.1 Features

Gear ratios: i = 1:1 to 4:1
Maximum output torque: 16 Nm
2 gearbox sizes with edge lengths of 035 to 45 mm
Suitable for fitting IEC standard motors
Low-backlash construction < 10 angular minutes possible
Housing made of aluminium



The L-series miniature bevel gearboxes can be extended by a flange to attach a motor.

11.2.2 Models

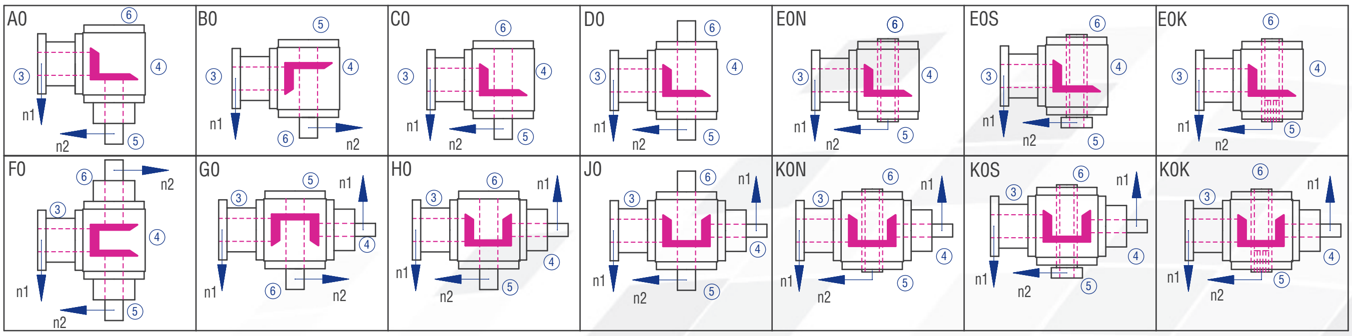


Figure **11.2.2-1; Models**

11.2.3 Gearbox sides

The example shows the Model C0

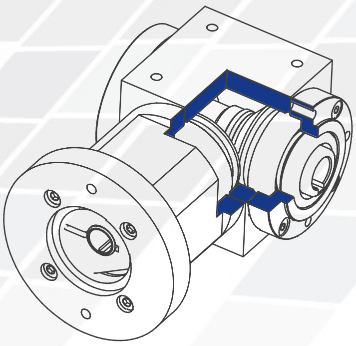


Figure **11.2.3-1; Gearbox sides**

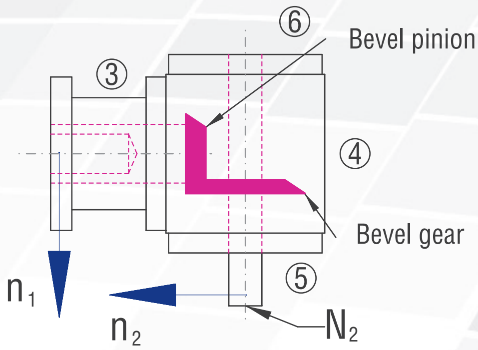


Figure **11.2.3-2; Shaft designations**

11.2.4 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
LC	045	1:1	C0-	1.	1-	1500	/0000
Description	Housing edge length;		Figure 5.3.2-1; Models;	Gearbox side on which fixing is made; Figure 4.3.1-1 Gearbox sides	Gearbox side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft;	Standard

Table **11.2.4-1**

ATEK ANTRIEBSTECHNIK

11.2.5 Characteristics

Characteristic	Standard	Option
Toothing	Bevel gear set, spiral-toothed	See chapter 5.2
Housing / Flanges	Aluminium	See chapter 5.2
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 5.2.2
Shaft	Drive shaft with clamping hub; fit with ISO 6 tolerance with parallel keyway: according to DIN 6885	See chapter 4.6.2
Hollow shaft	Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885	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	< 30 arcmin	See chapter 5.2.9
Protection class	IP 54	See chapter 4.5
Corrosion protection	-	See chapter 5.2.10
Bearing life L10h	more than 15,000h	See chapter 4.9.1
Oil change intervals	Not required	See chapter 5.2.7
Lubricants	Synthetic lubricants	See chapter 5.2.7

11.2.6 Dimensions

The dimensions of the gearboxes are identical with those of the L-type gearboxes
The motor-specific adapter flanges are under development. Please enquire gearboxes for your case of application.

11.3 Type VC – Servo bevel gearboxes

11.3.1 General construction

The VC gearbox type is based on the proven type V bevel gearboxes. The edge length of the housing is reflected in the gearbox size (example: VC 120 – housing edge length 120 mm).

11.3.2 Toothing

VC servo gearboxes have gear sets with high-quality spiral toothing made of hardened carburised steel. A gear set comprises one bevel pinion (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, combined with optimal running smoothness and high transmission accuracy.

11.3.3 Models

Due to the modular system, different gearbox Models can be configured.
The variants differ in type and number of the shafts, the rotational direction of the shafts and their support by bearings.

11.3.4 Threaded mounting holes

All sides of the gearboxes are machined and may be used as mounting surfaces.
All flanges always have threaded mounting holes. 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	-	5, 6
1, 2, 3, 4, 5, 6	1, 2, 4	5, 6
9	1, 2, 4	5, 6

Table **11.3.4-1**

The standard version of the mounting / fastening has the order code 9.
Please enquire other mounting options.

11.3.5 Installation position

The installation position is defined by the gearbox side directed downwards during operation and will be indicated by the corresponding gearbox side. The gearboxes can be used in all installation positions. The technically most favourable and thus recommended installation position is the position in which the shafts are horizontal. These are the installation positions 1 and 2.

11.3.6 Shaft designation – allocation to the gearbox sides

The fast-rotating shaft has the speed n_1 and is identified by N_1. The bevel pinion is located on this shaft.
The slowly rotating shaft has the speed n_2 and is identified by N_2. The bevel gear is located on this shaft.

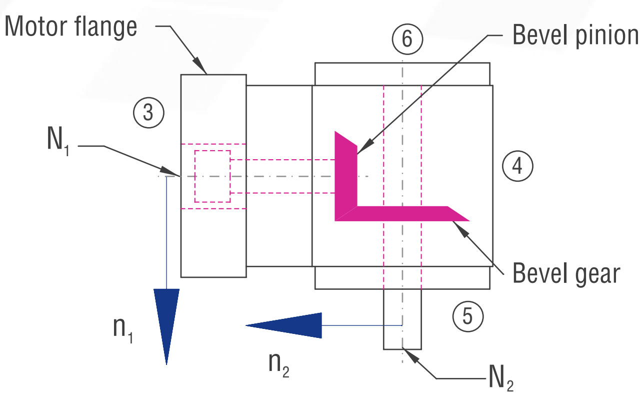


Figure **11.3.6-1**

11.3.7 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 1 to 2 dB(A) lower noise level is generated.

11.3.8 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type. With gearboxes having only one gear set, an efficiency of 97% can be achieved. With gearboxes having several gear meshings, an efficiency of 94% can be achieved. The efficiencies specified in the tables relate to the permissible nominal load and are guidance values for run-in gearboxes at operating temperature with standard sealing.

11.3.9 Lubrication (abbreviation code)

(Chapter as in "Bevel gearboxes", chapter 6.2.8) Different conditions for the lubrication of the toothing and the roller bearings will arise depending on gearbox size, installation position, rotational speed and on-period. In order to ensure these optimally, different oil quantities and viscosities are used. These will be defined by ATEK based on your ordering details (rotational speed, on-period, and ambient temperature). They will be reflected in the type designation.
You can find the itemisation in the example: VC 090 1:1 C0 -9.9- 2000/B0

Here, B0 means:

	Abbreviation	Explanation	Reference
Letter	B	Oil viscosity 220	Table 11.3.9-1
Numeral	0	no venting	Table 11.3.9-2

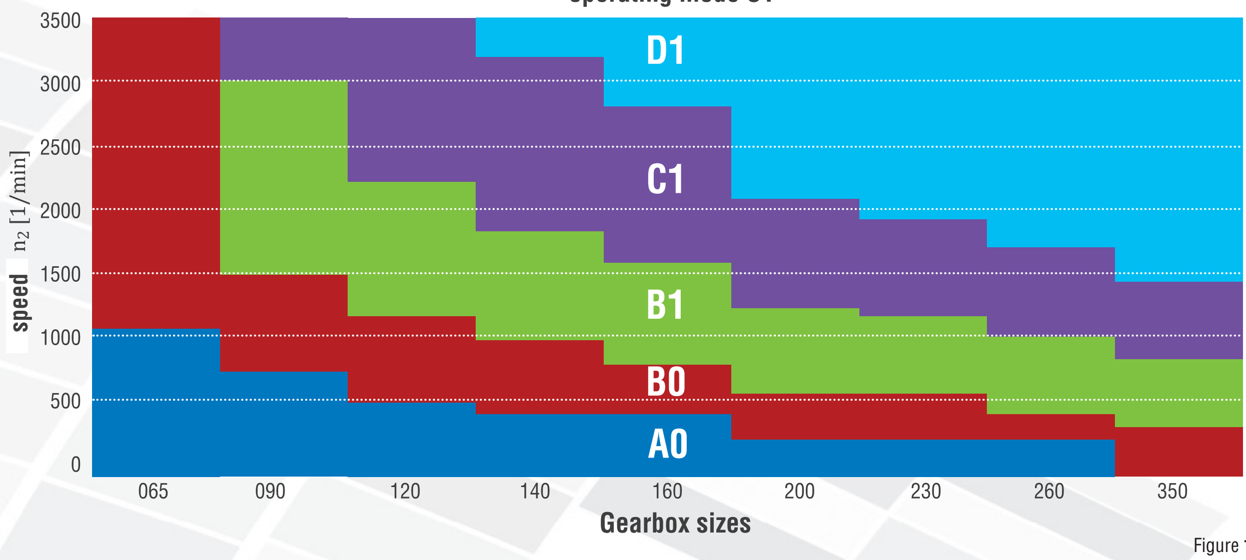


Figure **11.3.9-1**

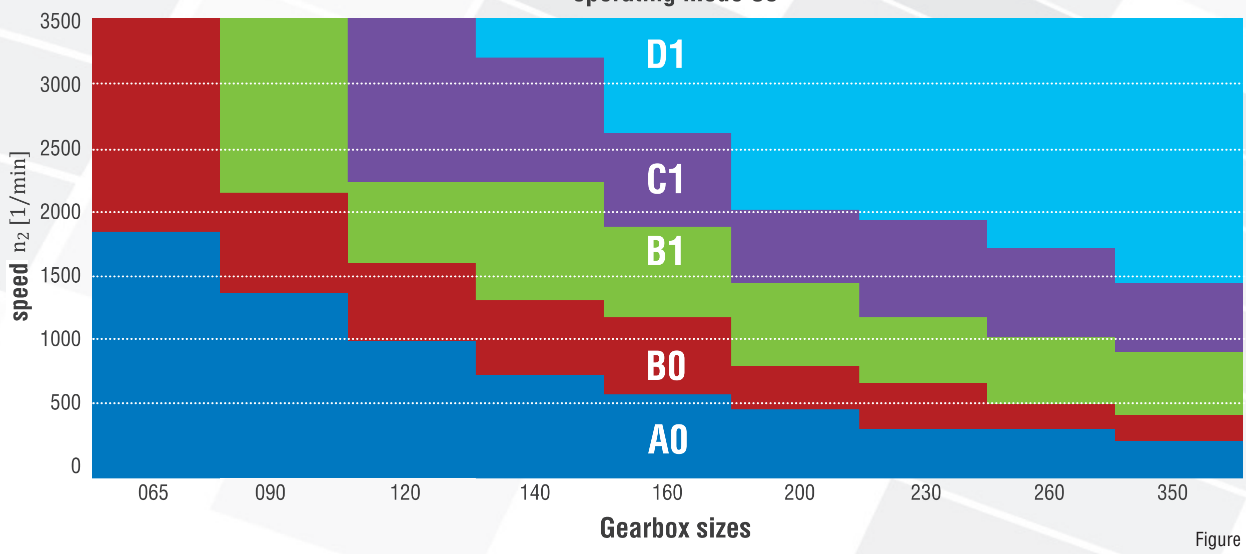


Figure **11.3.9-2**

Numeral 1	Oil viscosity
A	460
B	220
C	68
D	Injection lubrication
F	Fluid grease

Table 11.3.9-1

Depending on the gearbox size, injection lubrication may be necessary in case of high rotational speeds.
In case of very low rotational speeds, lubrication by fluid grease is also possible. At operating temperatures over 50°C, high pressure will develop through air expansion in the gearbox. Then a permanent pressure compensation must be ensured. To this end, the use of a vent filter is prescribed.

Numeral 2	Vent filter
0	No
1	Yes

Table 11.3.9-2

11.3.10 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 (included in the delivery) may be required. The position will be specified in the order documents. Please refer to the following table for the position of the filter. Here, E4, for example, means: Venting on side 4.

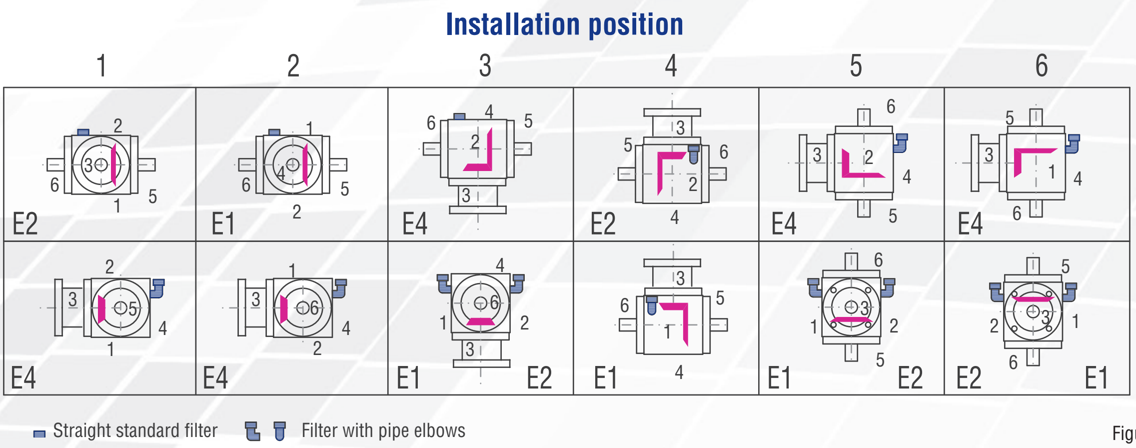


Figure 11.3.10-1

11.3.11 Low-backlash construction

For optimal 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

All ATEK bevel gearboxes can be delivered as low-backlash types.

Ordering option	Gear set	1:1 2:1	3:1 4:1 5:1 6:1
/0000	Standard	<=20 arcmin	<=20 arcmin
/S2	Standard	<=10 arcmin	<=10 arcmin
/S1	Standard	<=6 arcmin	u.r.
/S0	Special gear set	<=4 arcmin	u.r.

Table 11.3.11-1

Abbreviation: u.r. – upon request

ATEK ANTRIEBSTECHNIK

11.3.12 Connection of drive shaft to coupling

For torque transmission, a space-saving, zero-play connection in the form of a cone is implemented in the drive shaft. In case of extreme overloads, this non-positive connection is cut, thus preventing damage to the motor-side and gearbox-side elements. After an overload, our service department must be contacted.

11.3.13 Coupling

Two congruent coupling halves are positively connected by means of a plastic toothed ring under pretensioning. In case of extreme peak tensions and impact loads (emergency shut-off), a damping action is achieved through a slight distortion in the elastic range. The coupling is axially insertable and compensates angle errors as well as misalignments in the radial and axial direction. A later changeover to another motor is easily possible. The motor-side coupling hub is available in the following variants:

KN	KNN	SN
Clamping hub	Clamping hub with groove	Tension ring hub
For motor shafts without parallel key	1 For motor shafts with parallel key	For motor shafts without parallel key

Depending on the variant KN or KNN/SN, different torques can be transmitted.

Design of the coupling

Due to the dynamic characteristics of the servo-motors, the permissible acceleration torque and the emergency-stop torque must be considered when designing the servo gearboxes. The correct coupling hub can be selected by means of the table below on the basis of the maximum permissible torques on the motor shaft, acceleration torques ($\mathbf{T_{1B}}$) and emergency-stop torques ($\mathbf{T_{1Not}}$). These values must also be permissible on the gearbox!

Coupling	Hub	Coupling torques allowed [Nm]	Motor shaft diameter d [mm]										
Size			9	11	14	16	19	24	28	32	38	42	45
K 14	KN	T_{1B} [Nm]	5.3	5.6	6.1	6.5							
		T_{1NOT} [Nm]	7	9	13	15							
	KNN/SN	T_{1B} [Nm]	10	10	10	10							
		T_{1NOT} [Nm]	22	25	25	25							
K 19	KN	T_{1B} [Nm]	17	17	17	17	17	17					
		T_{1NOT} [Nm]	30	30	32	32	34	34					
	KNN/SN	T_{1B} [Nm]		17	17	17	17						
		T_{1NOT} [Nm]		30	32	34	34						
K 24	KN	T_{1B} [Nm]		35	36	39	39	43	46				
		T_{1NOT} [Nm]		45	45	50	60	65	70				
	KNN/SN	T_{1B} [Nm]		48	48	48	48	48	48				
		T_{1NOT} [Nm]			80	100	120	120	120				
K 28	KN	T_{1B} [Nm]			80	81	85	91	97	102	109		
		T_{1NOT} [Nm]			80	100	130	140	148	156	167		
	KNN/SN	T_{1B} [Nm]				128	128	128	128	128	128		
		T_{1NOT} [Nm]				140	240	240	240	240	240		
K 38	KN	T_{1B} [Nm]				94	98	104	109	113	122	126	130
		T_{1NOT} [Nm]				120	125	130	136	142	152	158	164
	KNN/SN	T_{1B} [Nm]						260	260	260	260	260	260
		T_{1NOT} [Nm]						500	500	500	500	500	500

Table **11.3.13-1**

11.3.14 Motor mounting

The servo-motor will be bolted to the motor flange of the gearbox on side 3. The flange number of the motor flange for the respective gearbox size is to be determined in Table 11.3.14-1.

Motor flange

ZK: Diameter of centring circle
LK: Diameter of pitch circles
L: Length of motor shaft
d: Diameter of motor shaft
i: Centring height
s: Thread

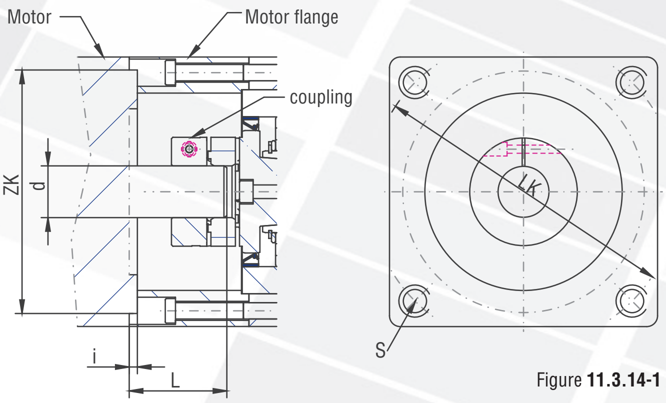


Figure **11.3.14-1**

The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.
The flange tolerances are dimensioned for servo-motors of tolerance class N.

Fitting dimensions of the servo-motor – gearbox size/flange no. (selection)

d [mm] less than or equal to	Gearbox size	Flange no.	L [mm]	LK [mm]	ZK [mm]
11	065	001	23	63	40
	065	002	23	63	40
	065	102	23	75	60
	065	202	23	90	60
14	065	103	30	75	60
	065	104	30	75	60
	065	201	30	90	60
	065	301	30	95	50
	065	401	30	100	80
	065	501	30	115	95
19	090	103	40	75	60
	090	201	40	90	60
	090	301	40	95	50
	090	401	40	100	80
	090	501	40	115	95
	090	601	40	130	95
	090	611	40	130	110
	090	701	40	145	110
	090	802	40	165	110
24	120	103	50	75	60
	120	201	50	90	60
	120	301	50	95	50
	120	401	50	100	80
	120	501	50	115	95
	120	601	50	130	95
	120	611	50	130	110
	120	701	50	145	110
	120	802	50	165	110
	120	811	50	165	130
32	140	403	60	100	80
	140	502	60	115	95
	140	601	60	130	95
	140	611	60	130	110
	140	616	60	130	110
	140	701	60	145	110
	140	802	60	165	110
	140	811	60	165	130
	140	902	60	215	130
	140	911	60	215	180
	160	403	60	100	80
	160	502	60	115	95
	160	601	60	130	95
	160	611	60	130	110
	160	616	60	130	110
	160	701	60	145	110
	160	802	60	165	110
	160	811	60	165	130
	160	902	60	215	130
	160	911	60	215	180
	200	614	60	130	110
	200	616	60	130	110
	200	802	60	165	110
	200	811	60	165	130
	200	902	60	215	130
	200	913	60	215	180
38	140	931	80	215	180
	160	931	80	215	180
	200	915	80	215	180

Table **11.3.14-1**

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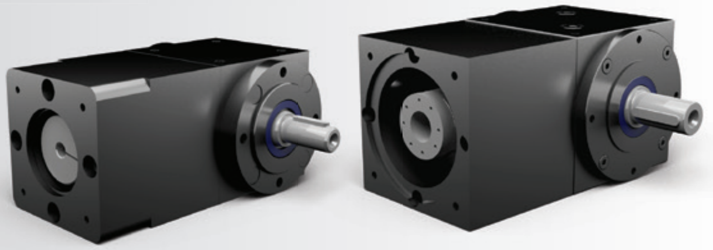
11.3 Type VC – Servo bevel gearboxes

11.3.15 Features

Gear ratios: i = 1:1 to 6:1
Maximum acceleration torques up to T_{2B} = 700 Nm
6 gearbox sizes with edge lengths of 065 to 200 mm
High efficiency
Minimized circumferential backlash (optional)
Bevel gearboxes suitable for fitting servo-motors
Zero-play three-piece claw coupling



065 – 140 mm   160 – 200 mm

11.3.15.1 Models

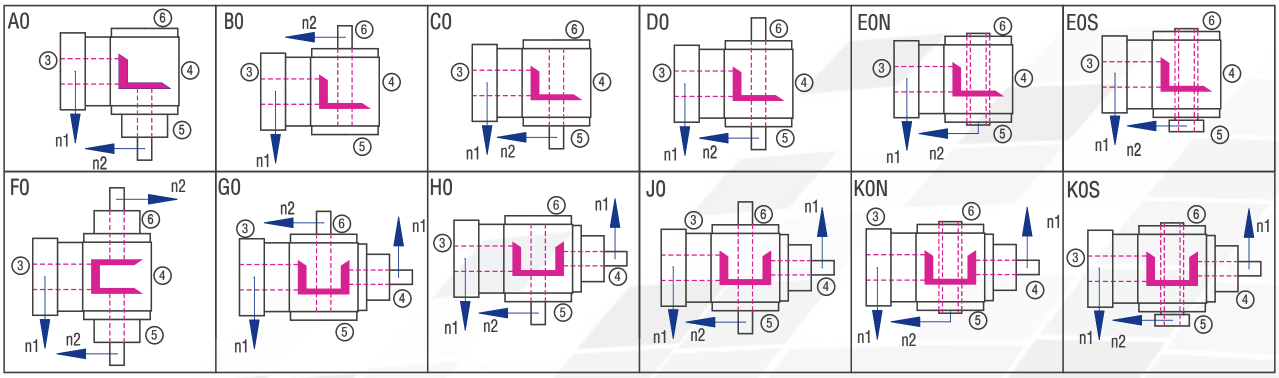


Figure **11.3.15-1; Models**

11.3.15.2 Gearbox sides

The example shows the Model C0

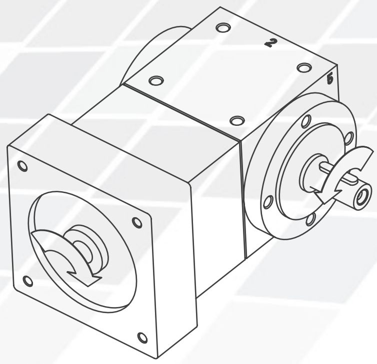


Figure **11.3.15-3; Gearbox sides**

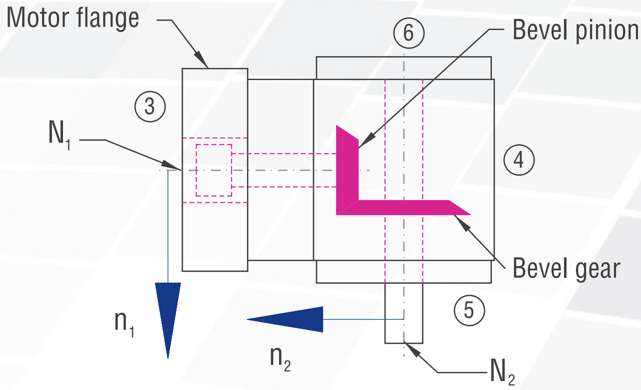


Figure **11.3.15-2; Gearbox sides**

11.3.15.3 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
VC	065	2:1	C0-	1.	1-	1500	/KN
Description	Size; Table 11.3.15-1	Table 11.3.15-1	Figure 11.3.15-1, Models	Gearbox side on which fixing is made; Table 11.3.4-1	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft; Table 11.3.15-1	Clamping hub
V080-	/	14 x 30	No. 301				
Flange		Motor shaft Ø x length	Flange no.				

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11.3.15.4 Overview of performance data

Selection table: gearbox size; gear ratio; rotational speed
Depending on the diameter of the motor shaft, lower torques may be possible in the operating mode S5.

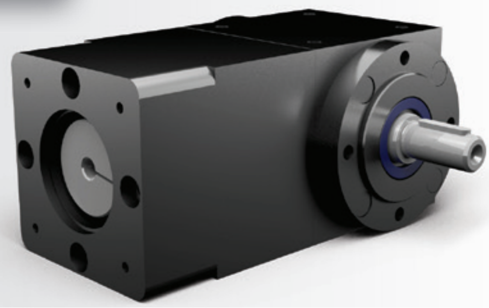
Operating mode S1		Gear ratio						
		1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
Gearbox sizes		T_{2N} [Nm]	T_{2N} [Nm]	T_{2N} [Nm]	T_{2N} [Nm]	T_{2N} [Nm]	T_{2N} [Nm]	T_{2N} [Nm]
065	4000	3.6	5.4	7.2	7.2			
	3000	4.8	7.2	9.6	9.6			
	2400	6	9	10	10			
	1500	8	10	10	10			
090	4000	8	12	17	21	21	21	21
	3000	11	17	23	23	23	23	23
	2400	14	21	24	24	25	25	25
	1500	17	25	27	27	27	27	27
120	4000		21	28	42	52	52	45
	3000	18	28	37	56	60	60	54
	2400	23	35	46	63	67	65	59
	1500	37	56	73	74	74	72	64
140	4000		34	45	68	85	90	85
	3000		45	60	90	103	100	95
	2400	37	56	75	113	111	105	102
	1500	60	90	120	130	120	115	108
160	4000				102	136	160	115
	3000		68	90	136	180	180	130
	2400	56	85	113	170	200	198	137
	1500	90	136	181	230	220	215	145
200	4000				177	235	275	190
	3000			157	235	314	300	210
	2400		147	196	294	393	340	225
	1500	157	236	314	472	455	380	240

Operating mode S2	Gear ratio						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} [Nm]	8	10	10	8	0	0	0
T_{2B} [Nm]	15	17	17	15	0	0	0
T_{2Not}	23	25	25	20	0	0	0
N_{1max}	4400	6000	6000	6000	0	0	0
T_{2N} [Nm]	25	25	25	23	23	23	23
T_{2B} [Nm]	40	37	36	36	36	36	31
T_{2Not}	50	50	60	60	60	50	45
N_{1max}	3200	4800	6000	6000	6000	6000	6000
T_{2N} [Nm]	50	61	65	58	60	60	54
T_{2B} [Nm]	70	105	98	95	87	92	71
T_{2Not}	150	140	140	140	140	120	110
N_{1max}	2400	3600	4800	6000	6000	6000	6000
T_{2N} [Nm]	120	113	110	110	105	100	95
T_{2B} [Nm]	180	200	190	177	162	143	122
T_{2Not}	260	280	280	260	260	220	200
N_{1max}	2100	3000	4200	5000	6000	6000	6000
T_{2N} [Nm]	180	185	185	190	180	180	130
T_{2B} [Nm]	350	330	320	280	270	270	200
T_{2Not}	480	500	550	400	400	380	350
N_{1max}	1800	2500	3200	4500	5000	6000	6000
T_{2N} [Nm]	350	330	320	420	350	300	210
T_{2B} [Nm]	700	690	600	630	550	505	315
T_{2Not}	980	850	800	850	800	800	625
N_{1max}	1500	2250	3000	4000	4500	5000	6000

Table **11.3.15-1**

	Operating mode	On-period
S1	Continuous operation	10 greater than 60% of the cycle time or longer than 20 minutes
S5	Cyclic operation	less than 60% of the process procedure and less than 20 minutes

11.3.16 Type VC 065 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 3:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000	3.6	4000	5.4	2667	7.2	2000	7.2	1333						
3000	4.8	3000	7.2	2000	9.6	1500	9.6	1000						
2400	6	2400	9	1600	10	1200	10	800						
1500	8	1500	10	1000	10	750	10	500						

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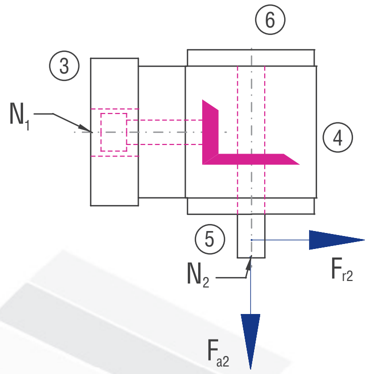
Torques in operating mode S5, dynamic operation

				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
Gear ratio i [-]				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} in S5 [Nm]				8	10	10	8			
n_{1max} in S5 [rpm]				4400	6000	6000	6000			
Coupling size	**Motor shaft d [mm]**	**Coupling type**		**1:1**	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
K14	9	KN	T_{2B} [Nm]	5.3	8.0	10.6	15.0			
			T_{2NOT} [Nm]	7.0	10.5	14.0	20.0			
		KNN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	22.0	25.0	25.0	20.0			
		SN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	22.0	25.0	25.0	20.0			
	11	KN	T_{2B} [Nm]	5.6	8.4	11.2	15.0			
			T_{2NOT} [Nm]	9.0	13.5	18.0	20.0			
		KNN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			
		SN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			
	14	KN	T_{2B} [Nm]	6.1	9.1	12.2	15.0			
			T_{2NOT} [Nm]	13.0	19.5	25.0	20.0			
		KNN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			
		SN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			
	16	KN	T_{2B} [Nm]	6.5	9.8	13.0	15.0			
			T_{2NOT} [Nm]	15.0	22.5	25.0	20.0			
		KNN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			
		SN	T_{2B} [Nm]	10.0	15.0	17.0	15.0			
			T_{2NOT} [Nm]	23.0	25.0	25.0	20.0			

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 12	300	150	400	200	500	250	650	325	750	375	900	450
> 12	250	125	330	165	420	210	540	270	630	315	750	375



Gearbox inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass ca. [kg]
A0	0.4740	0.2110	0.1830	0.1830				3.6
B0	0.4680	0.3190	0.2590	0.1940				3.5
C0	0.4680	0.3190	0.2590	0.1940				3.5
D0	0.4780	0.3230	0.2620	0.2380				3.6
E0N	0.5200	0.3710	0.3110	0.2320				3.4
E0S	0.6460	0.4968	0.4370	0.3570				3.4
F0	0.7080	0.2600	0.2040	0.1910				4.0
G0	0.7540	0.4730	0.3950	0.3200				3.9
H0	0.7540	0.4730	0.3950	0.3200				3.9

Inertia moments Coupling J [kgcm²]

K14	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
6	0.029	0.000	0.069
9	0.029	0.029	0.069
11	0.029	0.029	0.067
14	0.028	0.028	0.656
16	0.000	0.000	0.000

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

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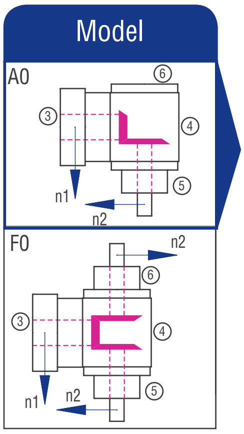
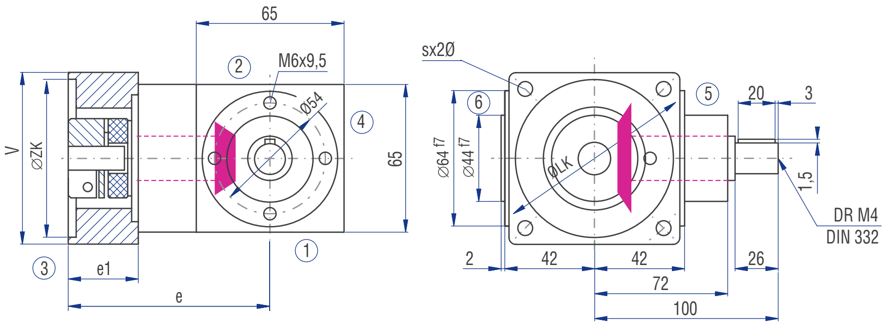
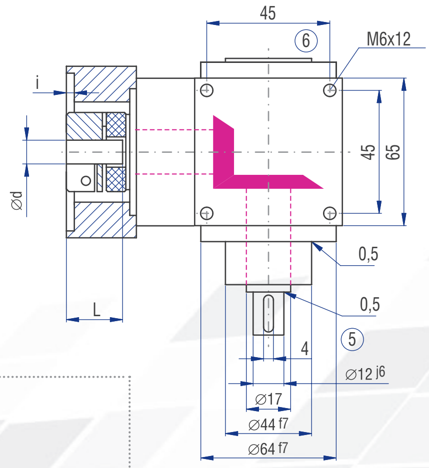




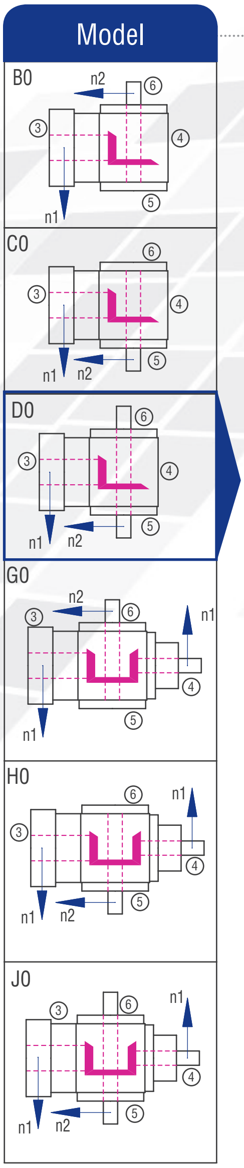


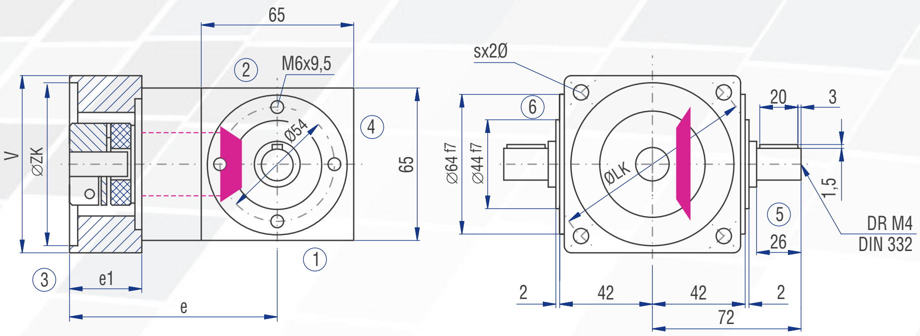
Motor mounting dimensions

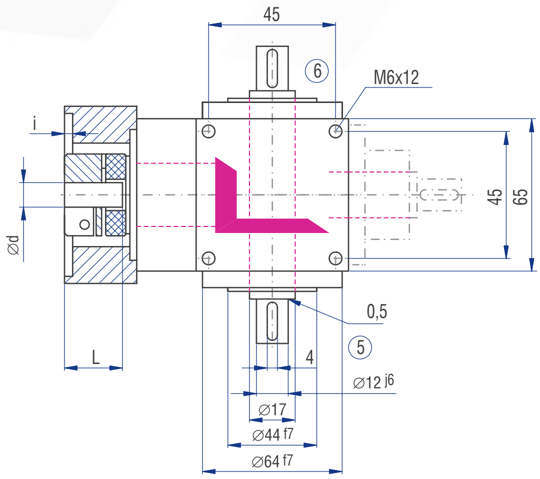
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
001	65	40	M4	63	11*23	3	104.5	30
002	65	40	M5	63	11*23	3	104.5	30
102	70	60	M5	75	11*23	3	101.0	26.5
103	70	60	M6	90	14*30	3	119.5	45
104	70	60	M5	75	14*30	3	119.5	45
201	80	60	M5	75	14*30	4	119.5	45
202	80	60	M5	90	11*23	4	101.0	26.5
301	80	50	M6	95	14*30	4	119.5	45
401	90	80	M6	100	14*30	4	119.5	45
501	100	95	M8	115	14*30	4	119.5	45

Table **11.3.16-1**

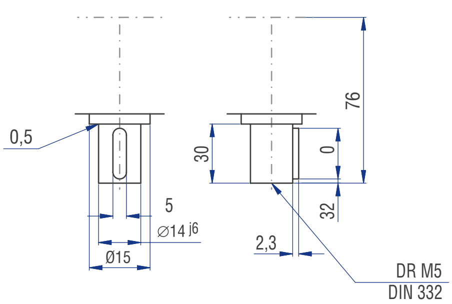
The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!







Implementation VV



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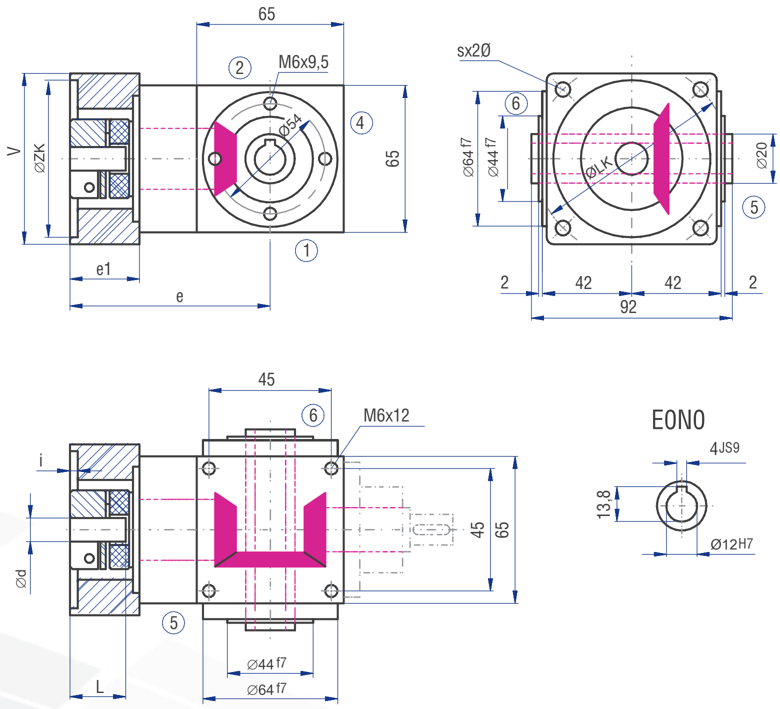
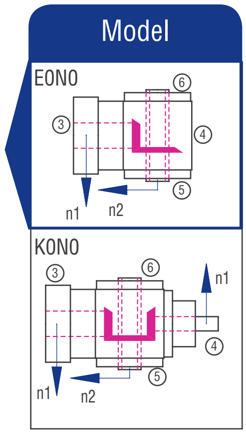
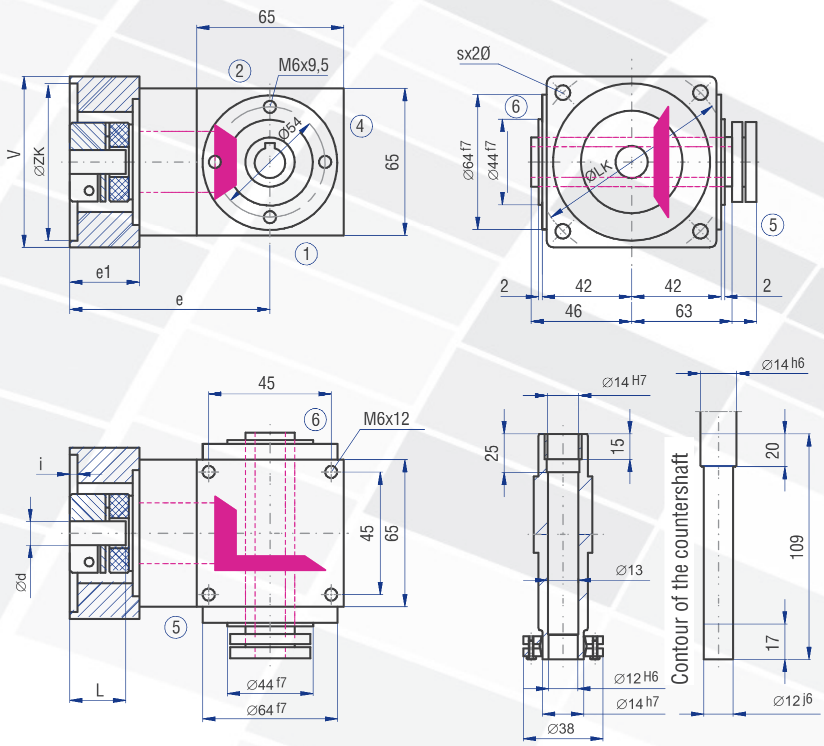
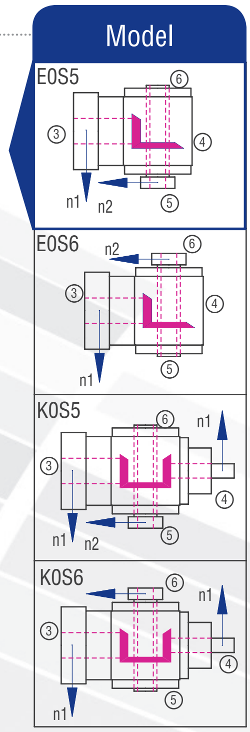
The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

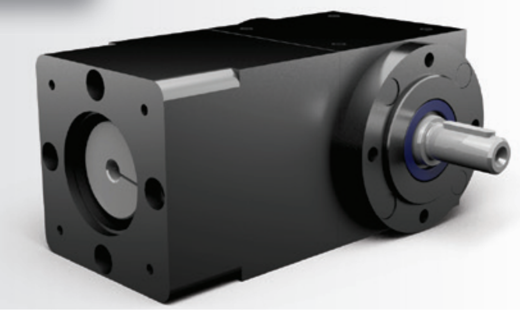

65
M6x9,5
Ø54
V
ØZK
e1
e
sx2Ø
Ø64 f7
Ø44 f7
ØLK
Ø20
2
42
42
2
92
45
M6x12
i
Ød
L
45
65
Ø44 f7
Ø64 f7
E0N0
4 JS9
13,8
Ø12 H7


Model
E0N0
n1
n2
K0N0
n1
n1
n2


65
M6x9,5
Ø54
V
ØZK
e1
e
sx2Ø
Ø64 f7
Ø44 f7
ØLK
2
42
42
2
46
63
45
M6x12
i
Ød
L
45
65
Ø44 f7
Ø64 f7
Ø14 H7
25
15
Ø13
Ø12 H6
Ø14 h7
Ø38
Contour of the countershaft
Ø14 h6
20
109
17
Ø12 j6


Model
E0S5
n1
n2
E0S6
n2
n1
K0S5
n1
n1
n2
K0S6
n1
n1

11.3.17 Type VC 090 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000	8	4000	12	2667	17	2000	21	1333	21	1000	21	800	21	667
3000	11	3000	17	2000	23	1500	23	1000	23	750	23	600	23	500
2400	14	2400	21	1600	24	1200	24	800	25	600	25	480	25	400
1500	17	1500	25	1000	27	750	27	500	27	375	27	300	27	250

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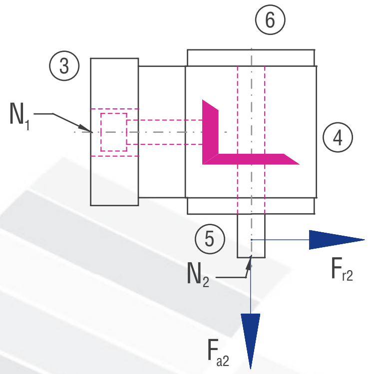
Torques in operating mode S5, dynamic operation

Gear ratio i [-]				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} in S5 [Nm]				25	25	25	23	23	23	23
n_{1max} in S5 [rpm]				3200	4800	6000	6000	6000	6000	6000
Coupling size	Motor shaft d [mm]	Coupling type		1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
K19	9	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
	11	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
		KNN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
		SN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
	14	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		KNN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		SN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
	16	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		KNN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		SN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
	19	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		KNN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		SN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
	24	KN	T_{2B} [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T_{2NOT} [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0

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



n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 30	500	250	660	330	800	400	950	475	1250	625	1500	750
> 30	420	210	550	275	670	335	790	395	1040	520	1250	625

Gearbox inertia moments/mass

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

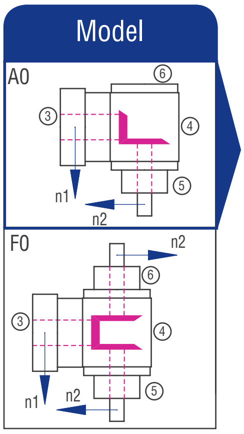
Model	Inertia moment [kgcm²]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	3.0540	2.3340	1.4510	1.2330	1.1450	1.1010	1.0700	6.6
B0	3.6690	2.7900	1.6950	1.3410	1.2060	1.1400	1.0970	6.9
C0	3.6690	2.7900	1.6950	1.3410	1.2060	1.1401	1.0970	6.9
D0	3.6974	2.8023	1.7020	1.3441	1.2075	1.1412	1.0980	7.0
E0N	3.5654	2.7440	1.6690	1.3294	1.1992	1.1360	1.0940	6.5
E0S	4.2360	3.0420	1.8370	1.4040	1.2412	1.1630	1.1130	6.7
F0	4.5140	3.1480	1.7490	1.4240	1.2610	1.1820	1.1220	7.8
G0	4.9490	3.7030	2.5190	2.0870	1.4890	1.4140	1.3670	8.4
H0	4.9490	3.7030	2.5190	2.0870	1.4890	1.4140	1.3670	8.4
J0	4.9770	3.7160	2.5260	2.0900	1.4910	1.4150	1.3680	8.5
K0N	4.8450	3.6570	2.4930	2.0760	1.4820	1.4100	1.3650	8.0
K0S	5.5160	3.9550	2.6600	2.1500	1.5240	1.4360	1.3830	8.2

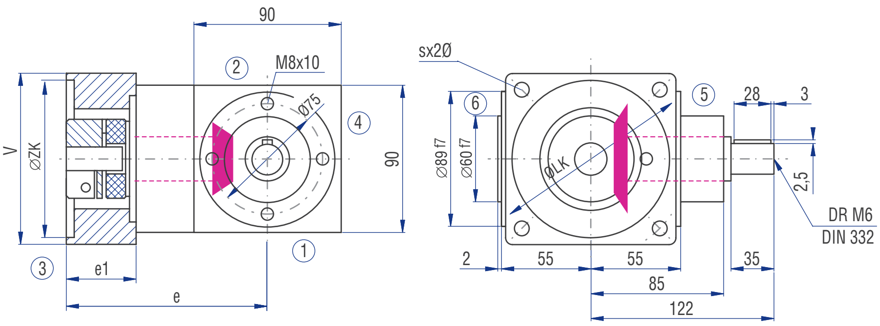
The mass of the gearbox may deviate depending on the flange size and the gear ratio.

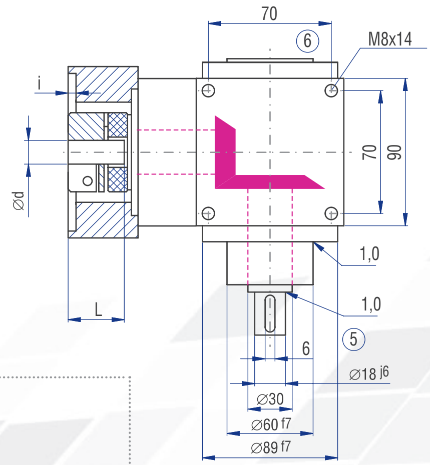
Inertia moments Coupling J [kgcm²]

K19	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
9	0.204	0.204	0.315
11	0.204	0.204	0.314
14	0.202	0.202	0.310
16	0.200	0.200	0.298
19	0.196	0.196	0.293
24	0.000	0.000	0.000

11.3.17 Type VC 090 – Servo bevel gearboxes





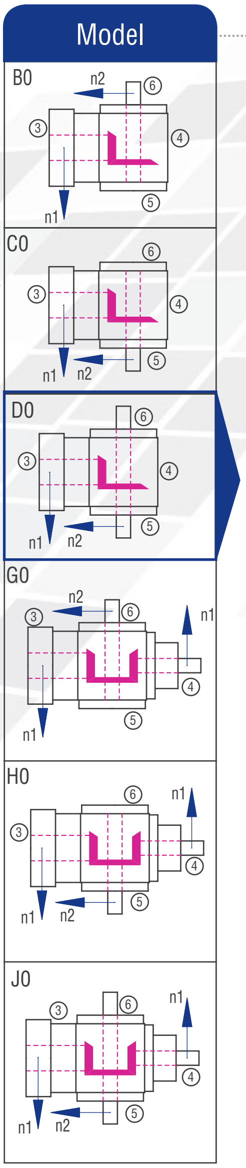


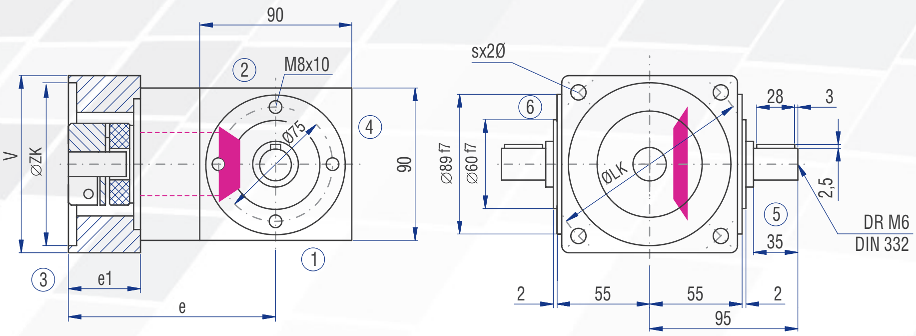
Motor mounting dimensions

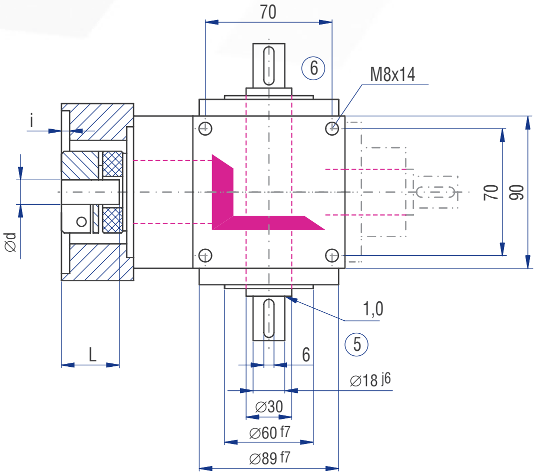
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
103	90	60	M6	75	19*40	3	140.0	45
201	90	60	M5	90	19*40	3	140.0	45
301	90	50	M6	95	19*40	4	140.0	45
401	90	80	M6	100	19*40	4	140.0	45
501	100	95	M8	115	19*40	4	140.0	45
601	115	95	M8	130	19*40	4	140.0	45
611	115	110	M8	130	19*40	5	140.0	45
701	120	110	M8	145	19*40	5	140.0	45
802	140	110	M10	165	19*40	5		45

Table **11.3.17-1**

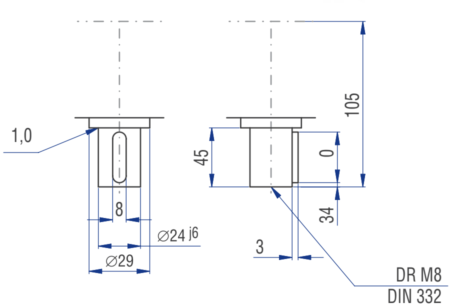
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



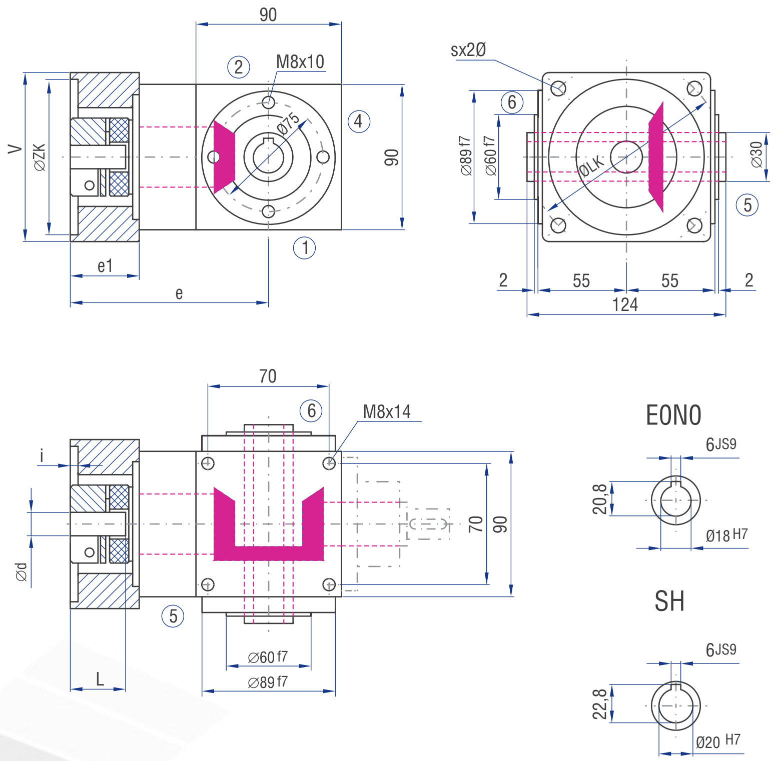


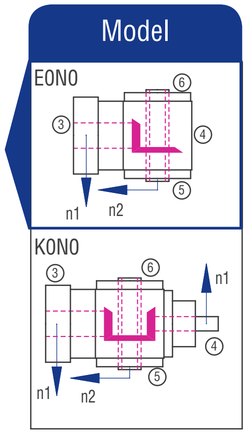


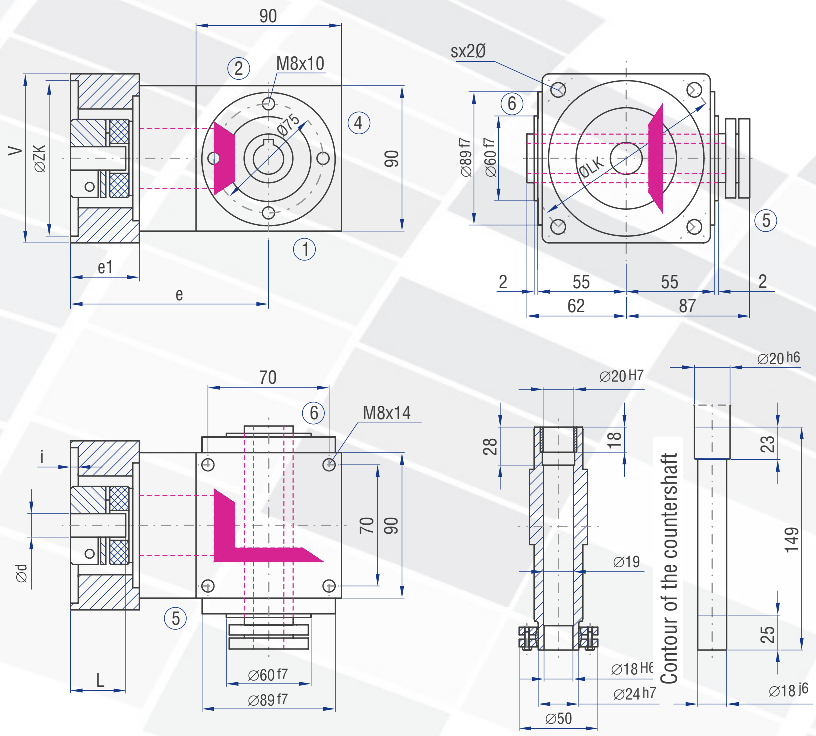
Implementation VV

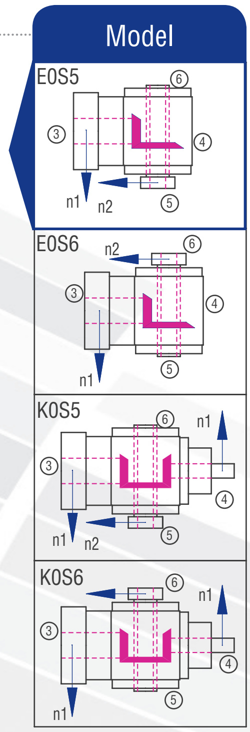


The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.









Servo gearboxes (precision gearboxes)

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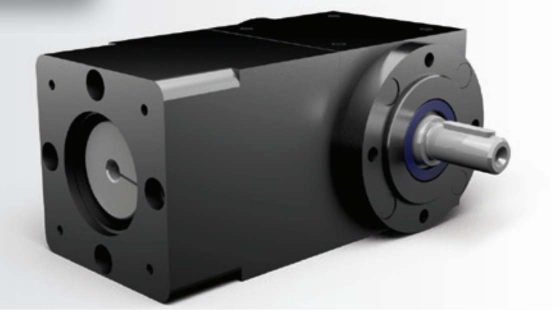
11.3.18 Type VC 120 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000		4000	21	2667	28	2000	42	1333	52	1000	52	800	45	667
3000	18	3000	28	2000	37	1500	56	1000	60	750	60	600	54	500
2400	23	2400	35	1600	46	1200	63	800	67	600	65	480	59	400
1500	37	1500	56	1000	73	750	74	500	74	375	72	300	64	250

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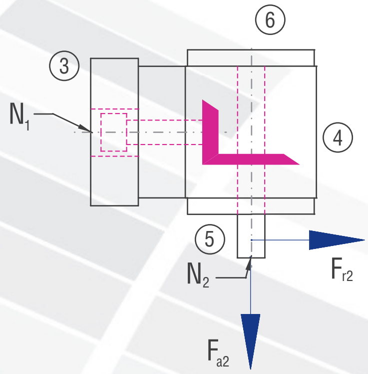
Torques in operating mode S5, dynamic operation

			Gear ratio i [-]	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
			T_{2N} in S5 [Nm]	50	61	65	58	60	60	54
			n_{1max} in S5 [rpm]	2400	3600	4800	6000	6000	6000	6000
Coupling size	Motor shaft d [mm]	Coupling type		1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
K24	11	KN	T_{2B} [Nm]	35.0	52.5	70.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	45.0	67.5	90.0	135.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	14	KN	T_{2B} [Nm]	36.0	54.0	72.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	45.0	67.5	90.0	135.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	80.0	120.0	140.0	140.0	140.0	120.0	110.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	80.0	120.0	140.0	140.0	140.0	120.0	110.0
	16	KN	T_{2B} [Nm]	39.0	58.5	78.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	50.0	75.0	100.0	140.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	100.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	100.0	140.0	140.0	140.0	140.0	120.0	110.0
	19	KN	T_{2B} [Nm]	39.0	58.5	78.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	60.0	90.0	120.0	140.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
	24	KN	T_{2B} [Nm]	43.0	64.5	86.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	65.0	97.5	130.0	140.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
	28	KN	T_{2B} [Nm]	46.0	69.0	92.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	70.0	105.0	140.0	140.0	140.0	120.0	110.0
		KNN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T_{2B} [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T_{2NOT} [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 80	750	375	1000	500	1250	625	1500	750	1900	950	2200	1100
> 80	630	315	830	415	1040	520	1250	625	1580	790	1830	915



Gearbox inertia moments/mass

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

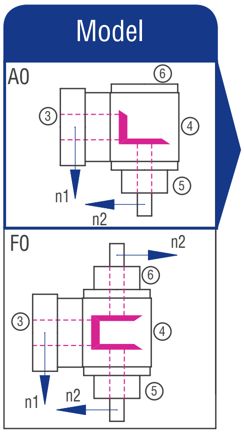
Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass ca. [kg]
A0	12.4450	6.8580	5.7210	4.6470	4.2780	4.0580	3.9250	17.6
B0	16.9680	8.8470	6.7790	5.1170	4.5420	4.2270	4.0430	17.3
C0	16.9680	8.8473	6.7790	5.1172	4.5420	4.2271	4.0430	17.3
D0	17.2660	8.9795	6.8534	5.1502	4.5610	4.2390	4.0511	17.5
E0N	16.8600	8.7992	6.7520	5.1051	4.5352	4.2230	4.0400	17.0
E0S	18.6470	9.5940	7.1990	5.3040	4.6470	4.2942	4.0894	17.3
F0	17.9750	9.8050	7.3040	5.4560	4.7980	4.4060	4.1750	20.0
G0	22.2170	11.3550	9.1130	6.8500	5.4300	4.7690	4.5740	19.7
H0	22.2170	11.3550	9.1130	6.8500	5.4300	4.7690	4.5740	19.7
J0	22.5140	11.4880	9.1880	6.8830	5.4490	4.7810	4.5820	19.9
K0N	22.1090	11.3070	9.0860	6.8380	5.4240	4.7640	4.5710	19.4
K0S	23.8960	12.1020	9.5330	7.0360	5.5350	4.8360	4.6200	19.7

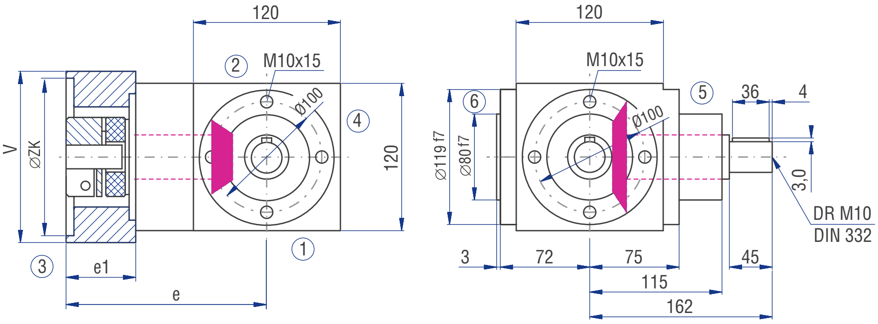
Inertia moments Coupling J [kgcm²]

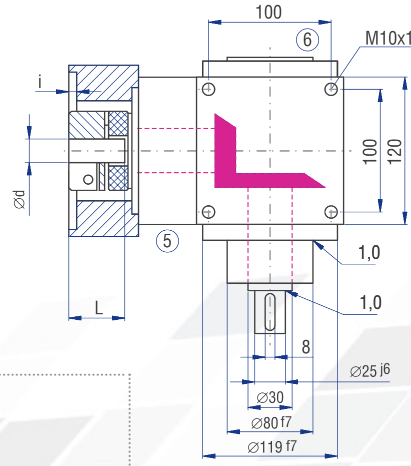
K24	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
11	0.812	0.812	1.374
14	0.810	0.810	1.360
16	0.808	0.808	1.350
19	0.803	0.803	1.340
24	0.787	0.787	1.290
28	0.765	0.765	1.274

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

11.3.18 Type VC 120 – Servo bevel gearboxes





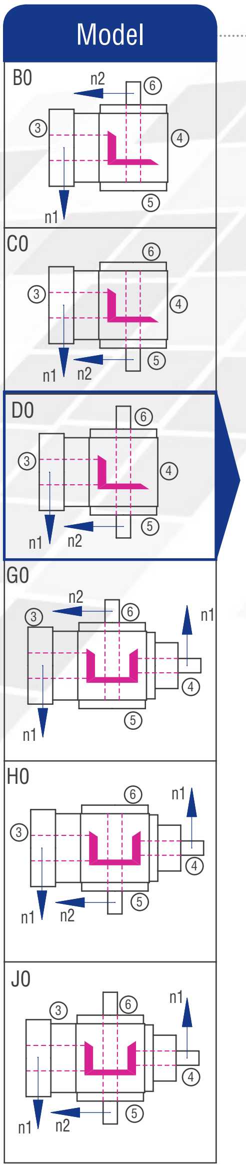


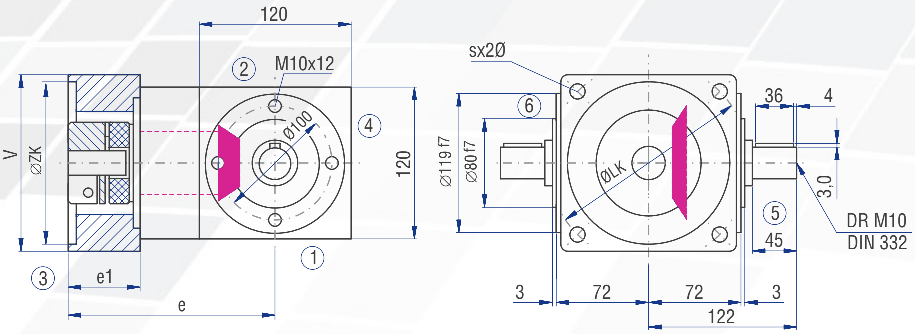
Motor mounting dimensions

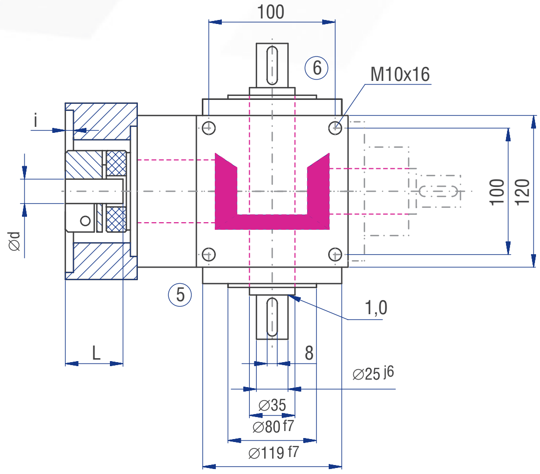
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
103	120	60	M6	75	24*50	3	170.0	54
201	120	60	M5	90	24*50	3	170.0	54
301	120	50	M6	95	24*50	4	170.0	54
401	120	80	M6	100	24*50	4	170.0	54
501	120	95	M8	115	24*50	4	170.0	54
601	120	95	M8	130	24*50	4	170.0	54
611	120	110	M8	130	24*50	5	170.0	54
701	120	110	M8	145	24*50	5	170.0	54
802	140	110	M10	165	24*50	5	170.0	54
811	140	130	M10	165	24*50	5	170.0	54

Table **11.3.18-1**

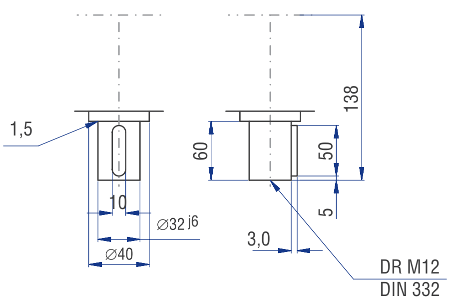
The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!







Implementation VV



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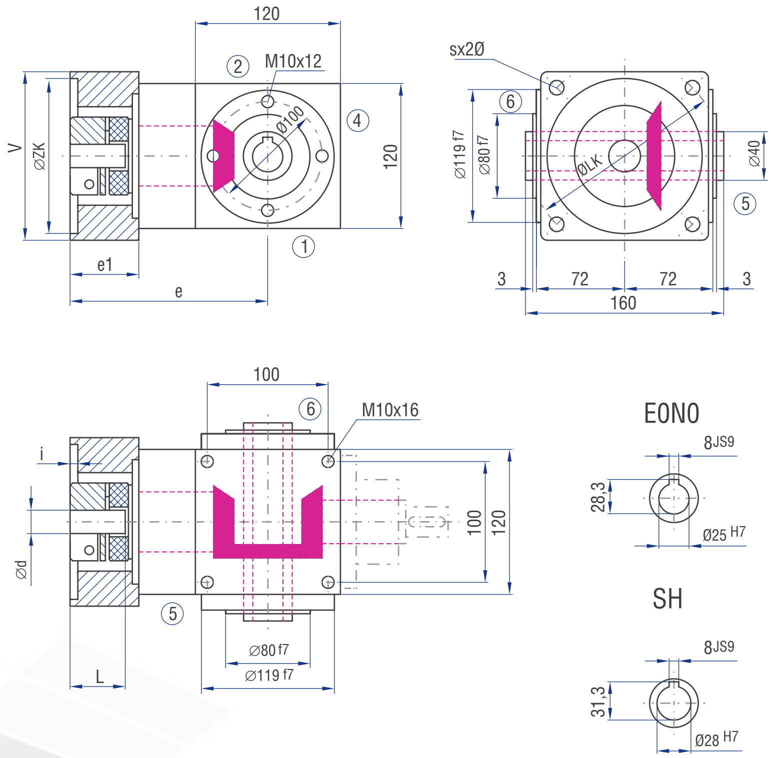
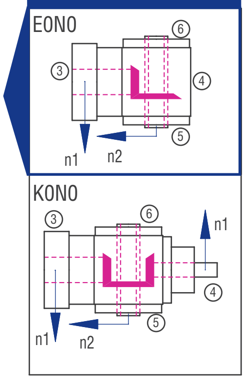
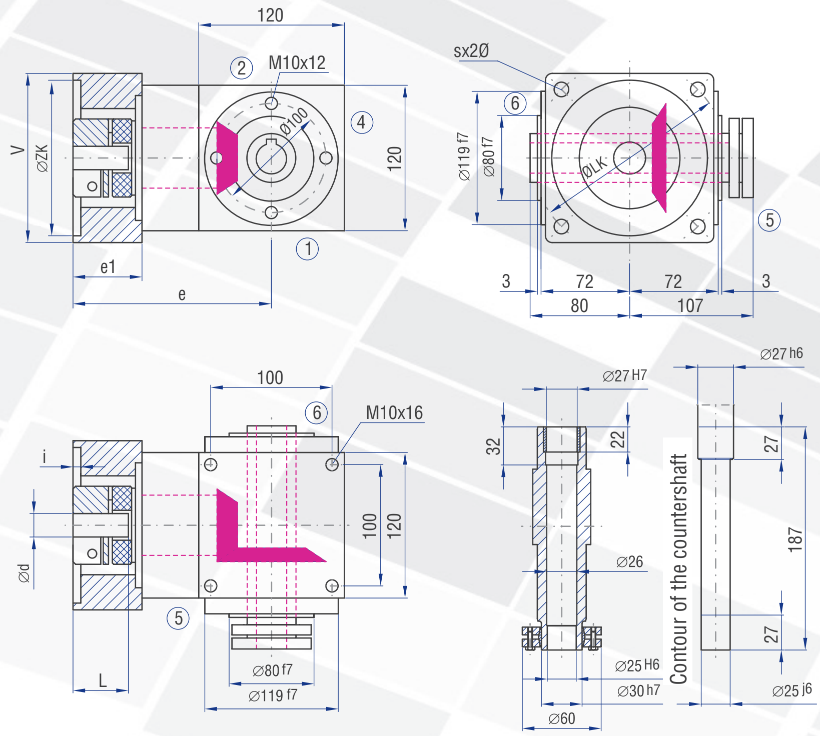
The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

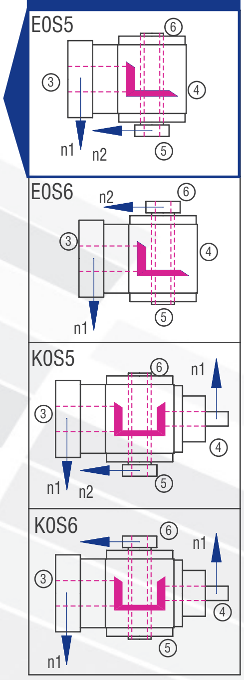


Model





Model



Servo gearboxes
(precision gearboxes)

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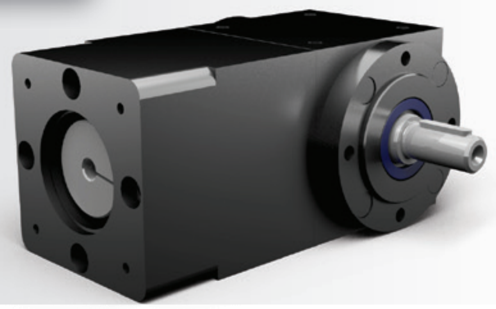
11.3.19 Type VC 140 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000		4000	34	2667	45	2000	68	1333	85	1000	90	800	85	667
3000		3000	45	2000	60	1500	90	1000	103	750	100	600	95	500
2400	37	2400	56	1600	75	1200	113	800	111	600	105	480	102	400
1500	60	1500	90	1000	120	750	130	500	120	375	115	300	108	250

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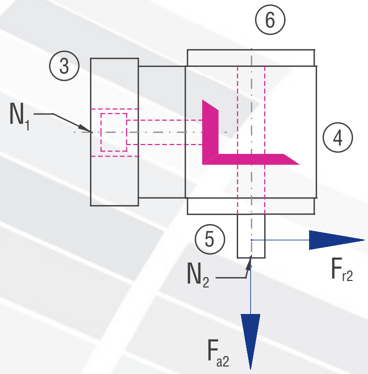
Torques in operating mode S5, dynamic operation

				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
Gear ratio i [-]				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} in S5 [Nm]				120	113	110	110	105	100	95
n_{1max} in S5 [rpm]				2100	3000	4200	5000	6000	6000	6000
Coupling size	**Motor shaft d [mm]**	**Coupling type**		**1:1**	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
K28	14	KN	T_{2B} [Nm]	80.0	120.0	160.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	80.0	120.0	160.0	240.0	260.0	220.0	200.0
	16	KN	T_{2B} [Nm]	81.0	121.5	162.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	100.0	150.0	200.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
	19	KN	T_{2B} [Nm]	85.0	127.5	170.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	130.0	195.0	260.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	24	KN	T_{2B} [Nm]	91.0	136.5	182.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	28	KN	T_{2B} [Nm]	97.0	145.5	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	148.0	222.0	280.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	32	KN	T_{2B} [Nm]	102.0	153.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	156.0	234.0	280.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	38	KN	T_{2B} [Nm]	109.0	163.5	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	167.0	250.5	280.0	260.0	260.0	220.0	200.0
		KNN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T_{2B} [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T_{2NOT} [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 140	1300	650	1700	850	2000	1000	2500	1250	3000	1500	3800	1900
> 140	1082	541	1420	710	1670	835	2080	1040	2500	1250	3170	1585



Gearbox inertia moments/mass

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

Model	Inertia moment [kgcm²]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	29.1040	17.6100	13.2250	10.3390	9.2700	8.8650	8.6550	26.0
B0	40.2700	22.7860	16.3860	11.4390	9.7640	9.2930	8.9250	25.5
C0	40.2700	22.7860	16.3860	11.4390	9.7640	9.2930	8.9250	25.5
D0	41.2520	23.2230	16.6310	11.5480	9.8250	9.3320	8.9520	26.0
E0N	36.8340	21.2590	15.5260	11.0570	9.5490	9.1560	8.8300	25.0
E0S	43.2350	24.1040	17.1270	11.7690	9.9490	9.4120	9.0070	25.7
F0	40.9040	25.1660	16.9500	12.2160	10.4510	9.6410	9.2220	30.0
G0	53.4040	28.8060	21.7780	16.4150	10.7860	10.3000	9.9310	29.7
H0	53.4040	28.8060	21.7780	16.4150	10.7860	10.3000	9.9310	29.7
J0	54.3860	29.2430	22.0240	16.5250	10.8480	10.3390	9.9580	30.2
K0N	49.9670	27.2790	20.9190	16.0340	10.5720	10.1620	9.8360	29.2
K0S	56.3690	30.1240	22.5200	16.7450	10.9720	10.4180	10.0130	29.9

Inertia moments Coupling J [kgcm²]

K28	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
14	0.000	0.000	0.000
16	1.827	1.827	3.366
19	1.821	1.821	3.350
24	1.804	1.804	3.270
28	1.779	1.779	3.190
32	1.741	1.741	3.030
38	1.649	1.649	2.898

Servo gearboxes (precision gearboxes)

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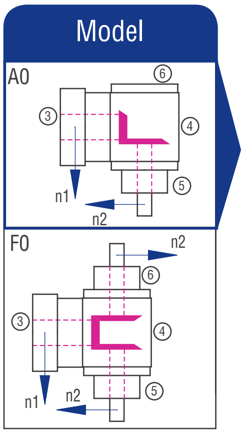
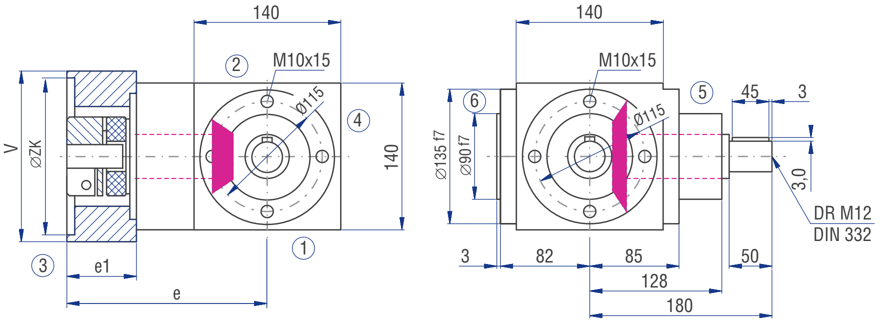
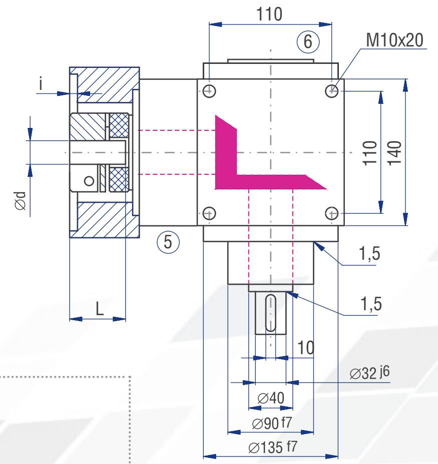




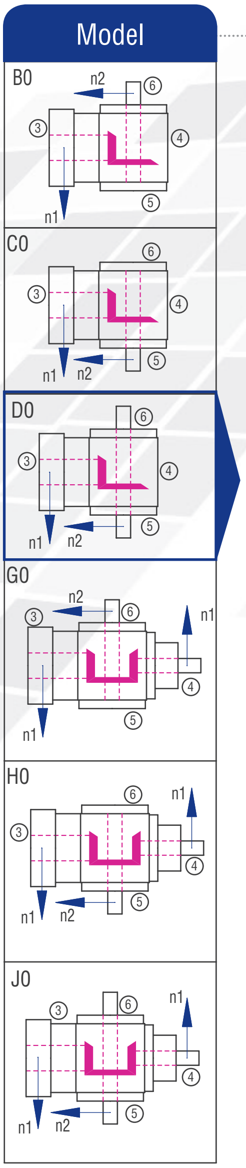


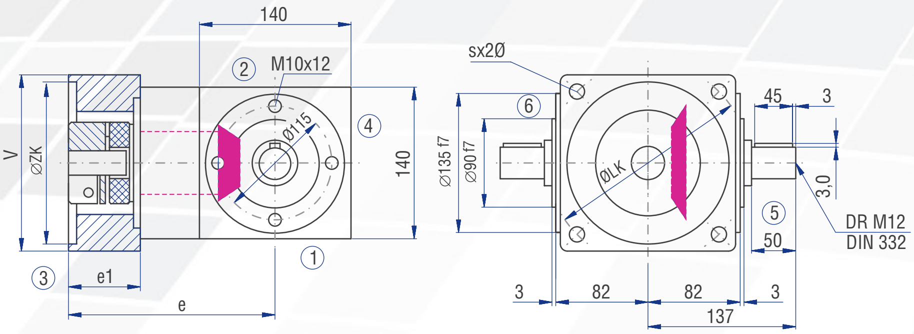
Motor mounting dimensions

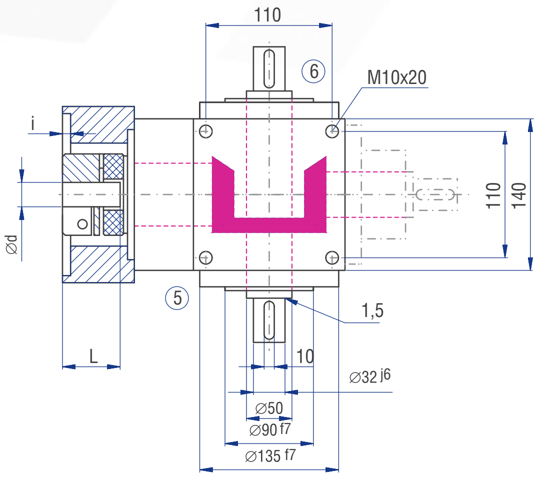
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
403	140	80	M6	100	32*60	4	196.0	61
502	140	95	M8	115	32*60	4	196.0	61
601	140	95	M8	130	32*60	4	196.0	61
611	140	110	M8	130	32*60	5	196.0	61
616	140	110	M10	130	32*60	5	196.0	61
701	140	110	M8	145	32*60	5	196.0	61
802	140	110	M10	165	32*60	5	196.0	61
811	140	130	M10	165	32*60	5	196.0	61
902	200	130	M12	215	32*60	6	196.0	61
911	200	180	M12	215	32*60	6	196.0	61
931	200	180	M12	215	38*80	6	241.0	107

Table **11.3.19-1**

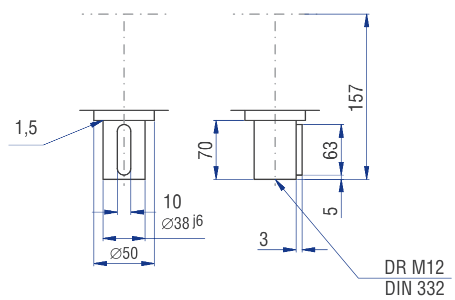
The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!



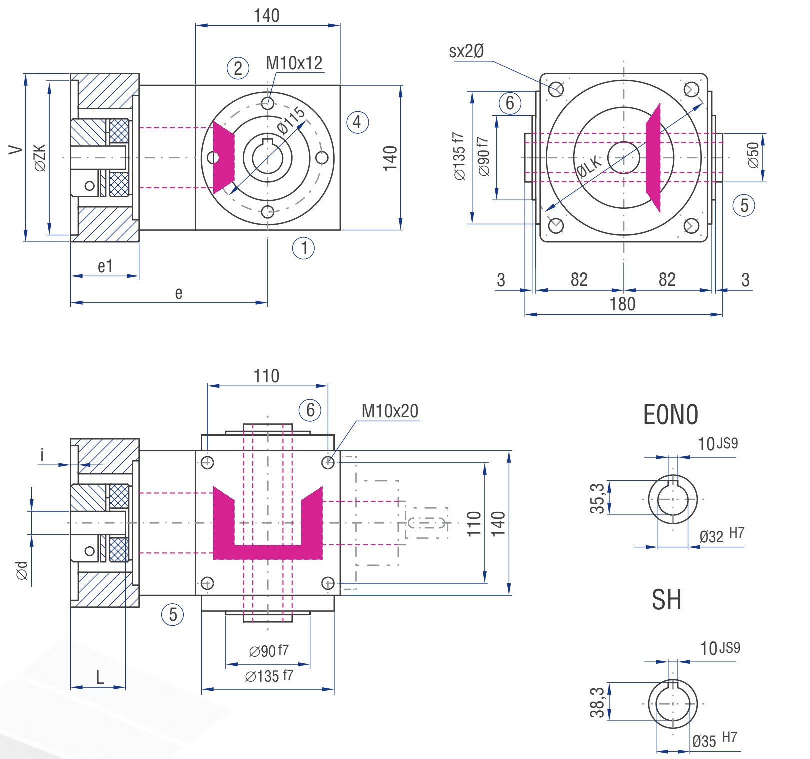


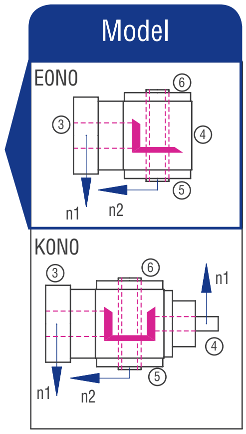


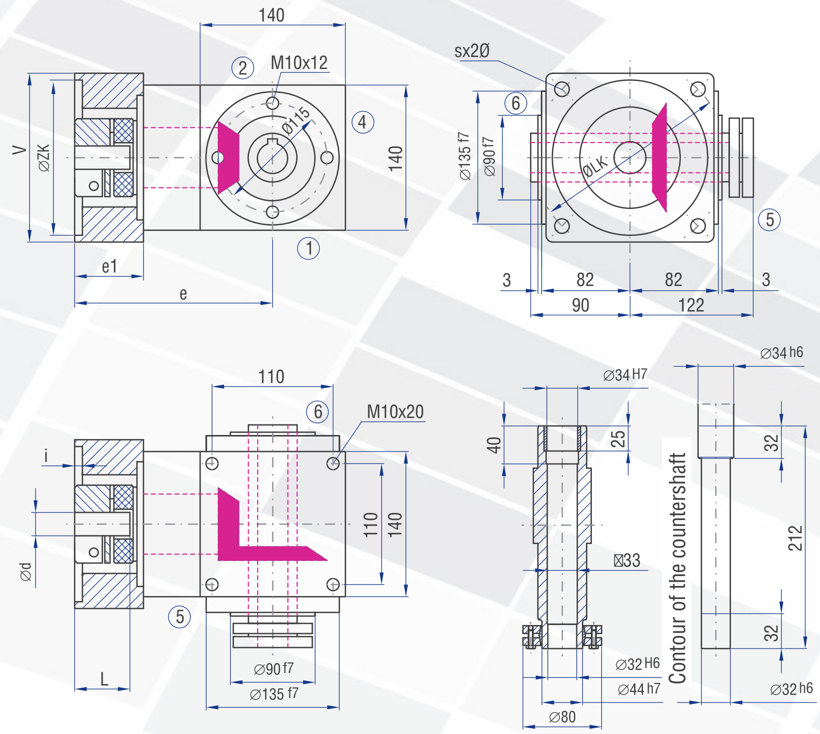
Implementation VV

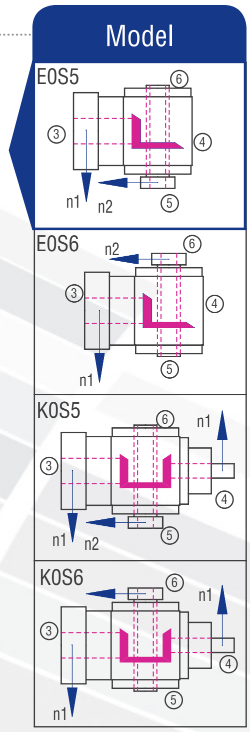


The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.



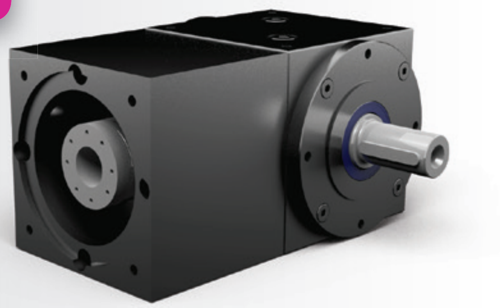






Servo gearboxes
(precision gearboxes)

11.3.20 Type VC 160 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000		4000		2667		2000	102	1333	136	1000	160	800	115	667
3000		3000	68	2000	90	1500	136	1000	180	750	180	600	130	500
2400	56	2400	85	1600	113	1200	170	800	200	600	198	480	137	400
1500	90	1500	136	1000	181	750	230	500	220	375	215	300	145	250

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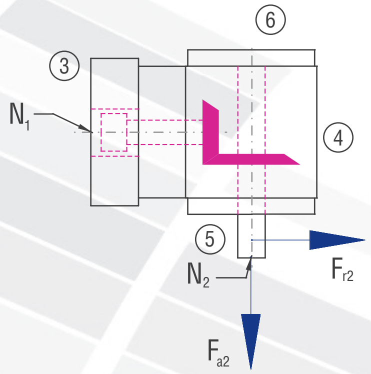
Torques in operating mode S5, dynamic operation

Gear ratio i [-]				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} in S5 [Nm]				180	185	185	190	180	180	130
n_{1max} in S5 [rpm]				1800	2500	3200	4500	5000	6000	6000
Coupling size	**Motor shaft d [mm]**	**Coupling type**		**1:1**	**1.5:1**	**2:1**	**3:1**	**4:1**	**5:1**	**6:1**
K28	14	KN	T_{2B} [Nm]	80.0	120.0	160.0	240.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	80.0	120.0	160.0	240.0	320.0	380.0	350.0
	16	KN	T_{2B} [Nm]	81.0	121.5	162.0	243.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	100.0	150.0	200.0	300.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
	19	KN	T_{2B} [Nm]	85.0	127.5	170.0	255.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	130.0	195.0	260.0	390.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	24	KN	T_{2B} [Nm]	91.0	136.5	182.0	273.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	28	KN	T_{2B} [Nm]	97.0	145.5	194.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	148.0	222.0	296.0	400.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	32	KN	T_{2B} [Nm]	102.0	153.0	204.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	156.0	234.0	312.0	400.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	38	KN	T_{2B} [Nm]	109.0	163.5	218.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	167.0	250.5	334.0	400.0	400.0	380.0	350.0
		KNN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T_{2B} [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T_{2NOT} [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2000	1000	2800	1400	3300	1650	4000	2000	5000	2500	6500	3250
> 220	1670	835	2340	1170	2750	1375	3340	1670	4170	2085	5420	2710



Gearbox inertia moments/mass

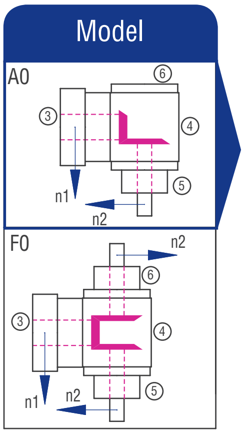
Inertia moment J_1 related to the fast-rotating shaft (N_1)

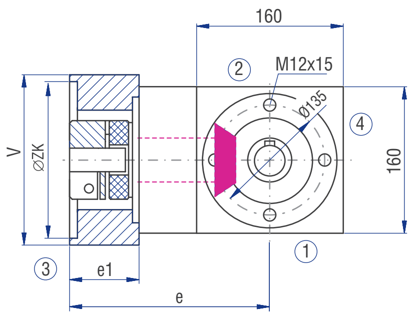
Model	Inertia moment [kgcm²]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	35.1340	36.4980	23.1260	16.3090	14.3010	13.6770	12.8680	38.5
B0	37.0520	37.5230	25.4770	17.3860	15.0700	14.1140	13.1640	38.0
C0	37.0520	37.5230	25.4770	17.3860	15.0700	14.1140	13.1640	38.0
D0	38.0810	37.9810	25.7340	17.5000	15.1340	14.1550	13.1930	38.5
E0N	39.8840	38.6400	26.0420	17.6370	15.2110	14.2040	13.2290	37.0
E0S	46.1740	41.4360	27.6150	18.3360	15.6040	14.4560	13.4030	37.6
F0	49.9340	54.4540	32.2260	20.0090	16.4450	15.2490	13.8350	45.0
G0	51.8870	50.5670	34.1270	24.6890	20.5770	15.7940	14.8420	44.5
H0	51.8870	50.5670	34.1270	24.6890	20.5770	15.7940	14.8420	44.5
J0	52.9160	51.0240	34.3840	24.8030	20.6420	15.8350	14.8710	45.0
K0N	54.7190	51.6840	34.6920	24.9400	20.7190	15.8840	14.9070	44.0
K0S	61.0090	54.4800	36.2650	25.6390	21.1120	16.1360	15.0810	44.5

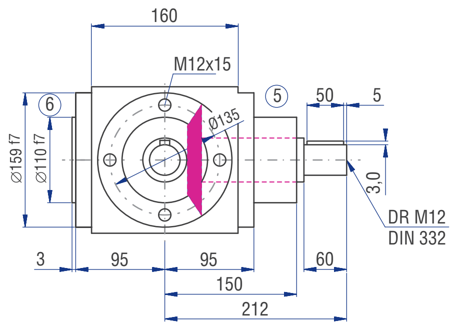
Inertia moments Coupling J [kgcm²]

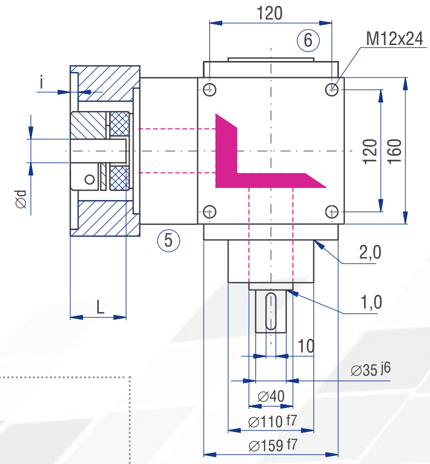
K28	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
14	0.000	0.000	0.000
16	1.827	1.827	3.366
19	1.821	1.821	3.350
24	1.804	1.804	3.270
28	1.779	1.779	3.190
32	1.741	1.741	3.030
38	1.649	1.649	2.898

11.3.20 Type VC 160 – Servo bevel gearboxes







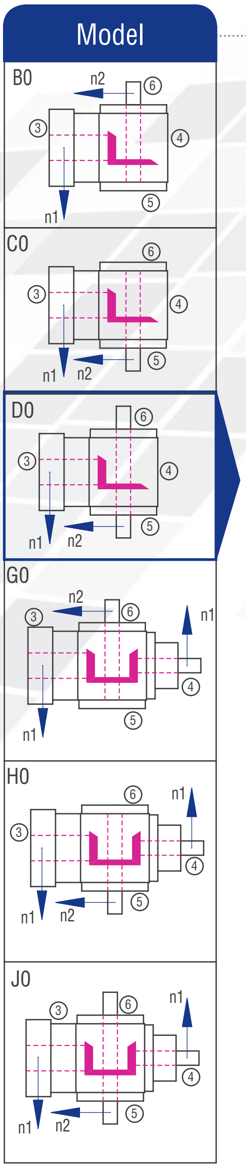


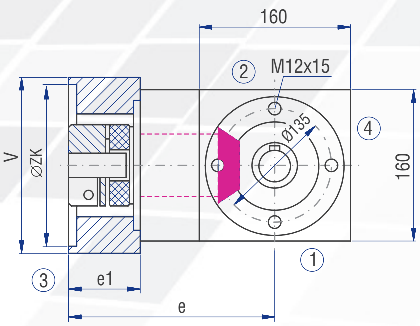
Motor mounting dimensions

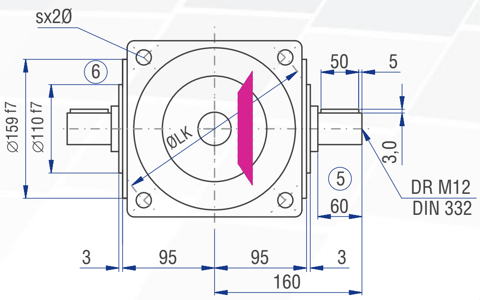
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
403	160	80	M6	100	32*60	4	215.0	62
502	160	95	M8	115	32*60	4	215.0	62
601	160	95	M8	130	32*60	4	215.0	62
611	160	110	M8	130	32*60	5	215.0	62
616	160	110	M10	130	32*60	5	215.0	62
701	160	110	M8	145	32*60	5	215.0	62
802	160	110	M10	165	32*60	5	215.0	62
811	160	130	M10	165	32*60	5	215.0	62
902	200	130	M12	215	32*60	6	215.0	62
911	200	180	M12	215	32*60	6		62
931	200	180	M12	215	38*80	6	260.0	62

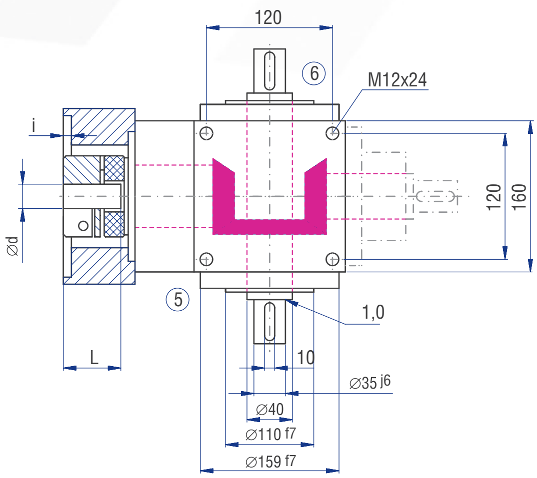
Table **11.3.20-1**

The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

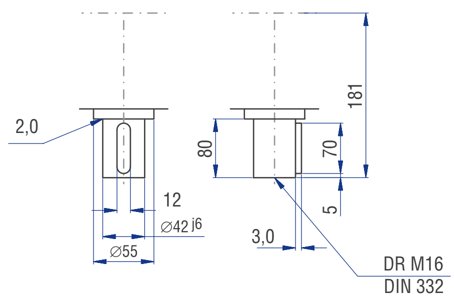




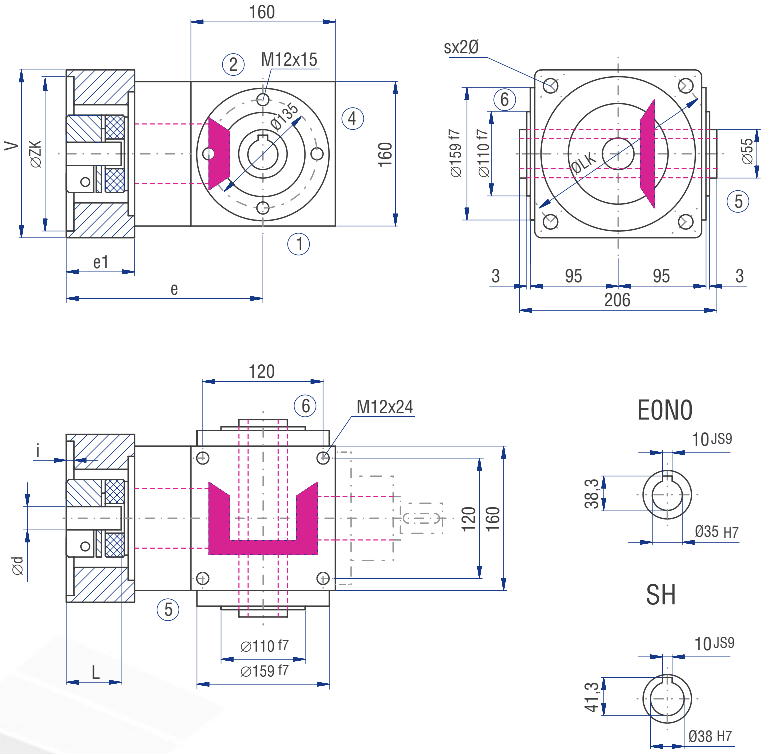




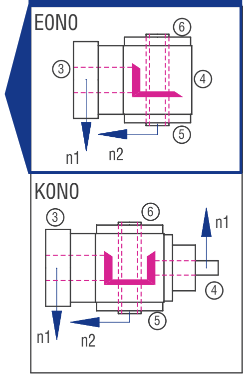
Implementation VV

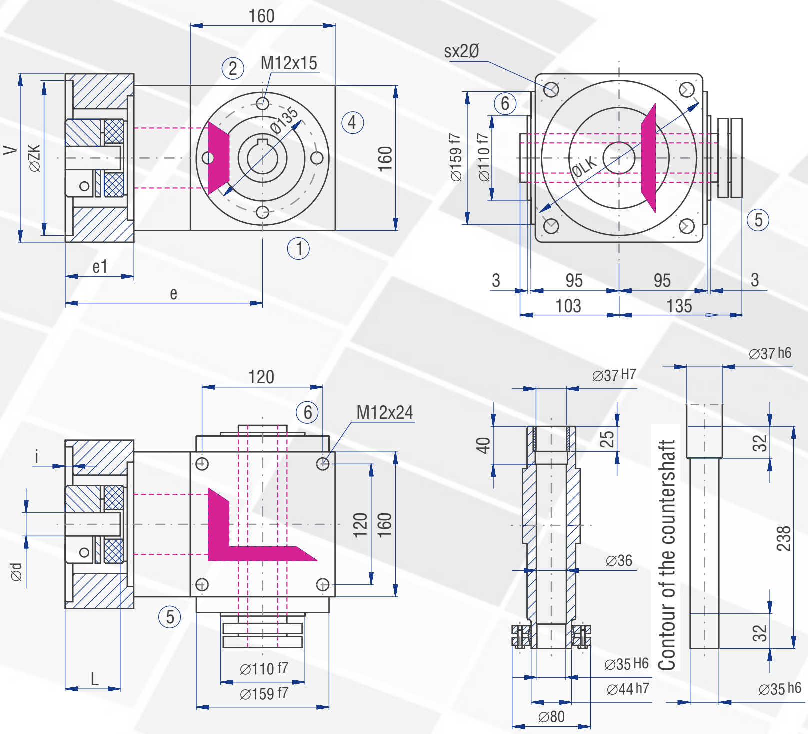


The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.

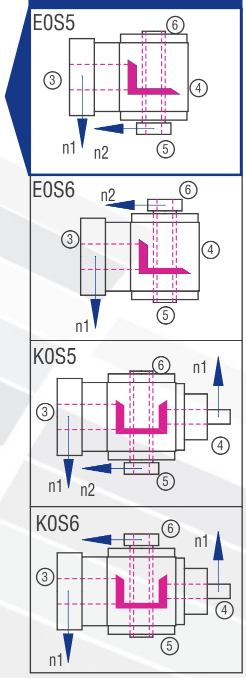


Model





Model



Servo gearboxes (precision gearboxes)

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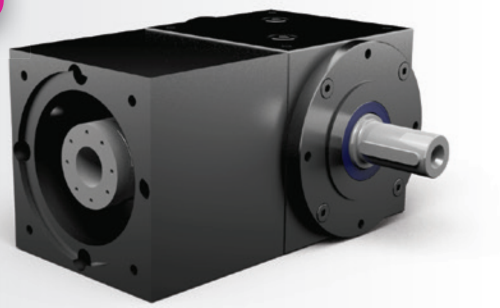
11.3.21 Type VC 200 – Servo bevel gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.3.2
Gear ratio	1:1 to 6:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On all housing surfaces without flange and on all flanges.	See chapter 11.3.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO 7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.3.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.3.9
Lubricants	Synthetic lubricants	See chapter 11.3.9
Motor flange	Aluminium	See chapter 11.3.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.3.13

Torques in operating mode S1

Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]	T_{2N} [Nm]	n_2 [rpm]
4000		4000		2667		2000	177	1333	235	1000	275	800	190	667
3000		3000		2000	157	1500	235	1000	314	750	300	600	210	500
2400		2400	147	1600	196	1200	294	800	393	600	340	480	225	400
1500	157	1500	236	1000	314	750	472	500	455	375	380	300	240	250

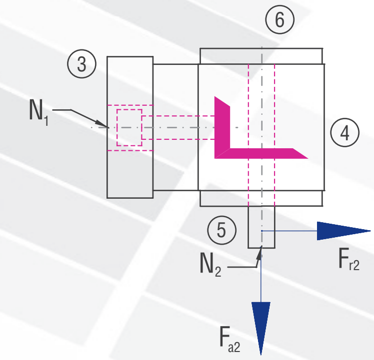
Torques in operating mode S5, dynamic operation

Gear ratio i [-]				1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
T_{2N} in S5 [Nm]				350	330	320	420	350	300	210
n_{1max} in S5 [rpm]				1500	2250	3000	4000	4500	5000	6000
Coupling size	Motor shaft d [mm]	Coupling type		1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
K38	16	KN	T_{2B} [Nm]	94.0	141.0	188.0	282.0	376.0	470.0	315.0
			T_{2NOT} [Nm]	120.0	180.0	240.0	360.0	480.0	600.0	625.0
	19	KN	T_{2B} [Nm]	98.0	147.0	196.0	294.0	392.0	490.0	315.0
			T_{2NOT} [Nm]	125.0	187.5	250.0	375.0	500.0	625.0	625.0
	24	KN	T_{2B} [Nm]	104.0	156.0	208.0	312.0	416.0	505.0	315.0
			T_{2NOT} [Nm]	130.0	195.0	260.0	390.0	520.0	650.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	28	KN	T_{2B} [Nm]	109.0	163.5	218.0	327.0	436.0	505.0	315.0
			T_{2NOT} [Nm]	136.0	204.0	272.0	408.0	544.0	680.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	32	KN	T_{2B} [Nm]	113.0	169.5	226.0	339.0	452.0	505.0	315.0
			T_{2NOT} [Nm]	142.0	213.0	284.0	426.0	568.0	710.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	38	KN	T_{2B} [Nm]	122.0	183.0	244.0	366.0	488.0	505.0	315.0
			T_{2NOT} [Nm]	152.0	228.0	304.0	456.0	608.0	760.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	42	KN	T_{2B} [Nm]	126.0	189.0	252.0	378.0	504.0	505.0	315.0
			T_{2NOT} [Nm]	158.0	237.0	316.0	474.0	632.0	790.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	45	KN	T_{2B} [Nm]	130.0	195.0	260.0	390.0	520.0	505.0	315.0
			T_{2NOT} [Nm]	164.0	246.0	328.0	492.0	656.0	800.0	625.0
		KNN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T_{2B} [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T_{2NOT} [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0

Servo gearboxes (precision gearboxes)

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

n_2 [rpm]	3000		1000		500		250		100		50	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 500	3200	1600	4300	2150	5000	2500	6500	3250	8000	4000	10000	5000
> 500	2670	1335	3580	1790	4170	2085	5420	2710	6670	3335	8330	4165



Gearbox inertia moments/mass

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

Model	Inertia moment [kgcm²] 1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	Mass ca. [kg]
A0	132.0410	109.2390	82.6690	54.0970	42.2810	38.6590	35.9260	64.0
B0	185.5150	119.4940	86.1880	55.8380	43.3230	40.0860	36.8890	60.0
C0	185.5200	119.4940	86.1880	55.8380	43.3230	40.0860	36.8890	60.0
D0	188.6320	120.8800	86.9670	56.1850	43.5180	40.2110	36.9750	62.0
E0N	212.2100	124.9400	91.0000	56.8660	43.9640	41.0160	37.5350	60.0
E0S	233.2300	134.2820	96.2560	59.2020	45.2780	41.8570	38.1180	61.3
F0	192.6410	171.8170	129.6190	74.4520	53.4810	46.3870	41.3200	72.0
G0	246.1410	150.2440	107.3410	67.9340	53.7990	43.8080	40.5930	70.0
H0	246.1410	150.2440	107.3410	67.9340	53.7990	43.8080	40.5930	70.0
J0	249.2580	151.6290	108.1200	68.2810	53.9940	43.9330	40.6790	72.0
K0N	272.8310	155.6890	112.1530	68.9620	54.4400	44.7380	41.2390	70.0
K0S	293.8530	165.0320	117.4090	71.2980	55.7540	45.5790	41.8220	71.3

Inertia moments Coupling J [kgcm²]

K38	KN	KNN	SN
d [mm]	J [kgcm²]	J [kgcm²]	J [kgcm²]
16	0.000	0.000	0.000
19	0.000	0.000	0.000
24	5.267	5.267	10.100
28	5.234	5.234	9.950
32	5.185	5.185	9.730
38	5.066	5.066	9.380
42	4.949	4.949	9.218
45	4.835	4.835	8.731

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

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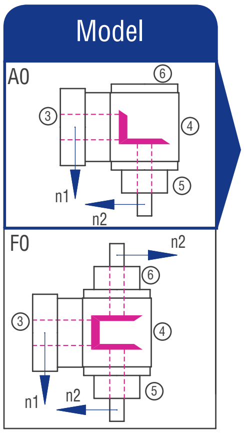
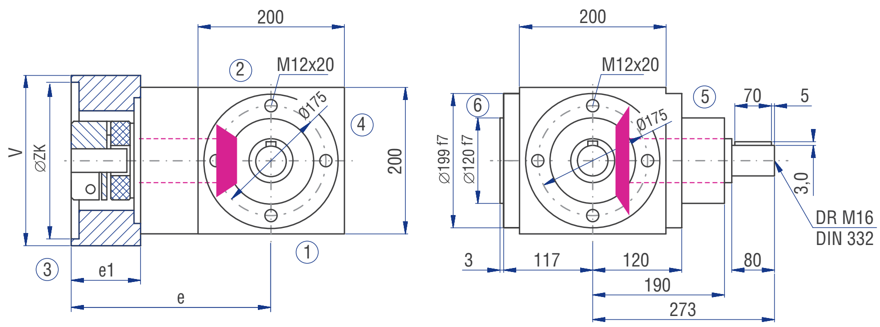
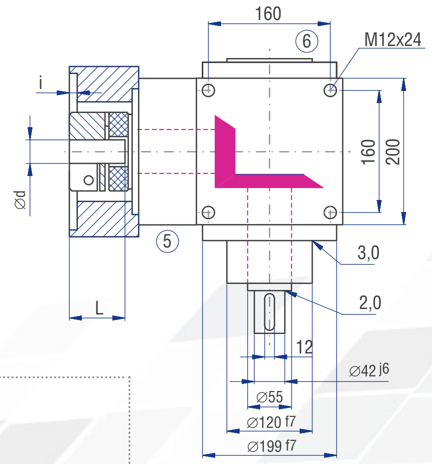




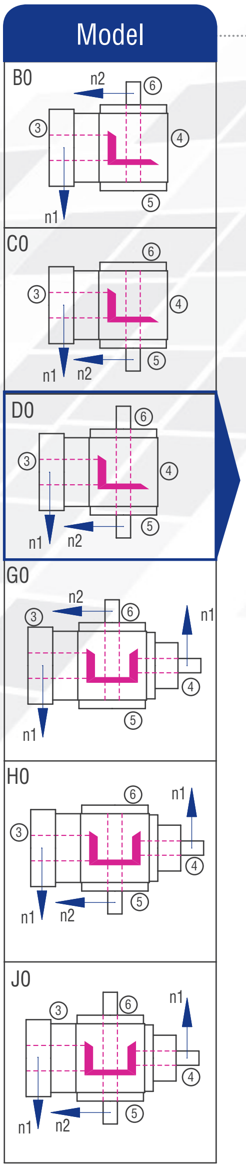


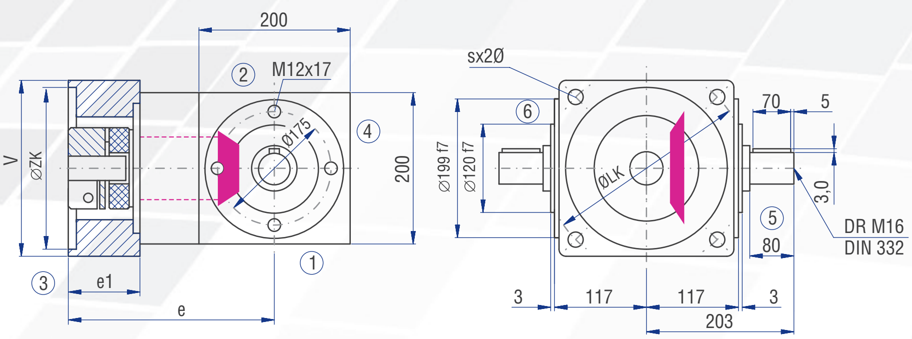
Motor mounting dimensions

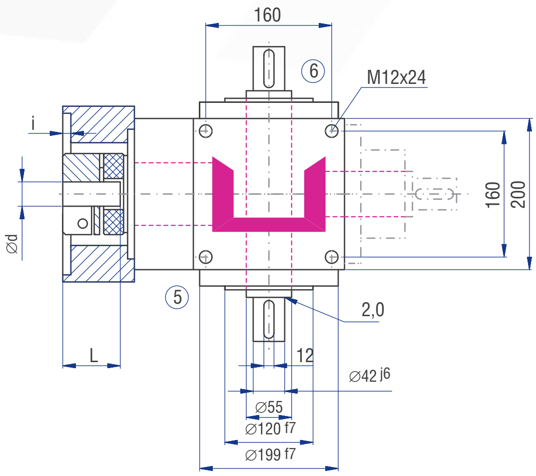
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxL [mm]	i [mm]	e [mm]	e1 [mm]
614	200	110	M8	130	32*60	5	262.0	76
616	200	110	M10	130	32*60	5	262.0	76
802	200	110	M10	165	32*60	5	262.0	76
811	200	130	M10	165	32*60	5	262.0	76
902	200	130	M12	215	32*60	6	262.0	76
913	200	180	M12	215	32*60	6	262.0	76
915	200	180	M12	215	38*80	6	274.0	88

Table **11.3.21-1**

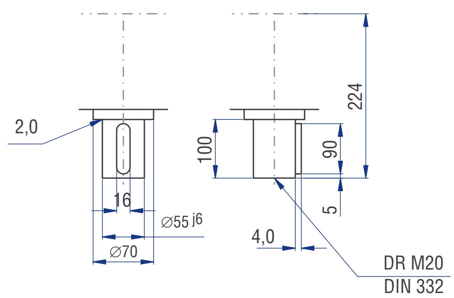
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



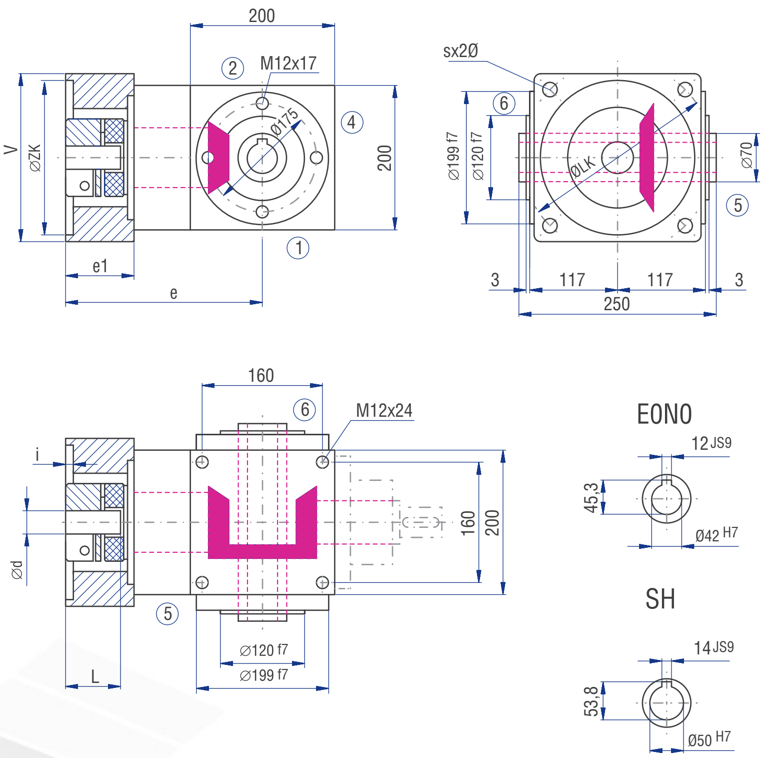


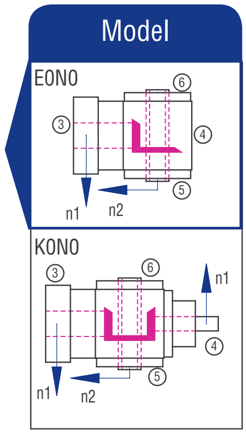


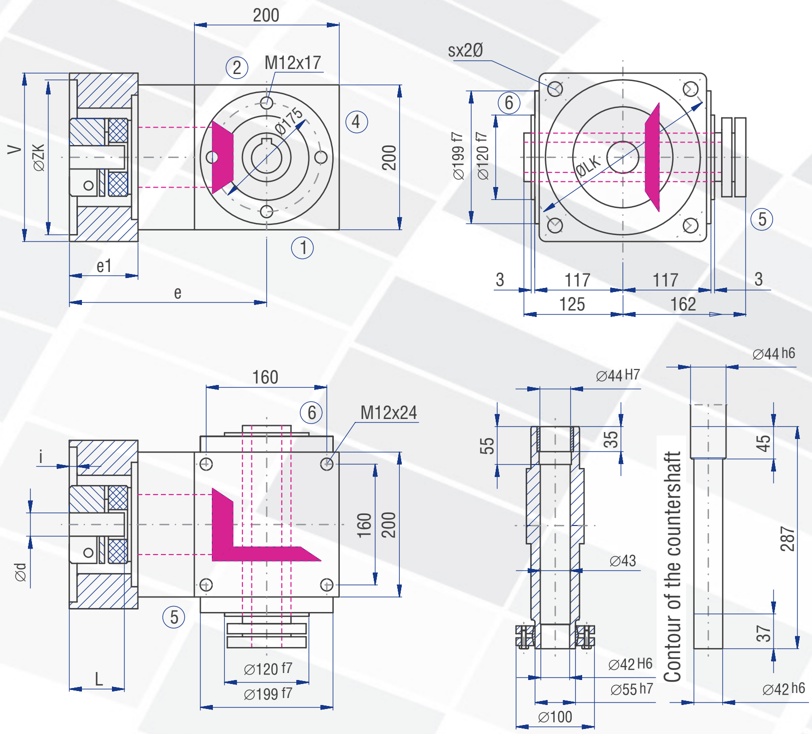
Implementation VV

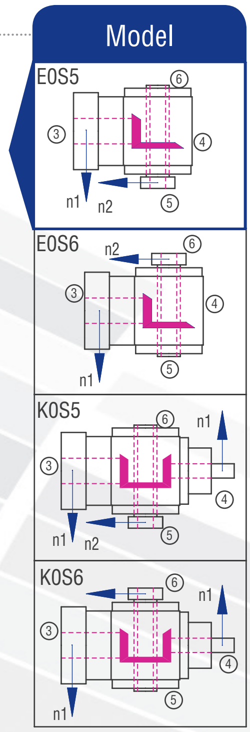


The dimensions of the Models not shown can be figured by mirroring available dimensions.
The shaft dimensions on side 4 follow from the dimensions of type A0.









Servo gearboxes (precision gearboxes)

11.4.1 General construction

The HC gearbox type is based on the proven type H bevel gearboxes.
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: HC 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.

11.4.2 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.

11.4.3 Models

Due to the modular system, different gearbox Models can be configured.

Model	consists of:
B0 through E0	1 gear set

Table **11.4.3-1**

The variants differ in the type of the shafts, the rotational direction thereof, and the possibility to use a robot flange interface (BR0 and CR0).

11.4.4 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:

Gearbox size	Ordering options	Threaded mounting holes are in the housing surfaces on the gearbox side	Threaded mounting holes are in the flanges on the gearbox side
040-250	1	1	5.6
040-100	2	1.2	5.6
040-100	4	1.4	5.6
040-100	5	1.5	5.6
040-100	6	1.6	5.6

Table **11.4.4-1**

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

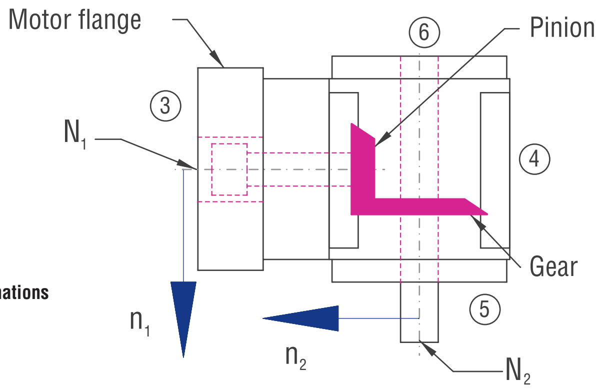
11.4.5 Installation position

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: HC 090 12:1 D0 9.1

11.4.6 Shaft designation – allocation to the gearbox sides

The fast-rotating shaft has the speed n_1 and is identified by N_1. The hypoid pinion is located on this shaft. The slowly rotating shaft has the speed n_2 and is identified by N_2. The hypoid gear is located on this shaft. The gearbox sides are identified by the numerals 1 to 6.

Figure **11.4.6-1; Shaft designations**



11.4.7 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.

11.4.8 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.

11.4.9 Lubrication

The H-series gearboxes have lifetime lubrication.

11.4.10 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!

11.4.11 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 $\mathbf{N_1}$ has been fixed. A force of around 2% of the nominal torque is applied to the output shaft $\mathbf{N_2}$ 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	Standard	<=3 arcmin	<=2 arcmin

Table **11.4.11-1**

11.4.12 Connection of drive shaft to coupling

For torque transmission, a zero-play coupling is located on the drive shaft

11.4.13 Coupling

The coupling compensates angle errors as well as misalignments in the radial and axial direction.
A later changeover to another motor is possible. The motor-side coupling hub is available in the following variants:

BK	BKN
Bellows coupling	Bellows coupling
For motor shafts without parallel key	For motor shafts with parallel key

Servo gearboxes (precision gearboxes)

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Design of the coupling

Torque T_1 **[Nm]** that can be transmitted by the coupling at a motor shaft diameter **d [mm]**

d [mm]	Gearbox size					
	090	115	140	170	215	260
5	7					
6	10					
7	9					
8	10.5	18				
9	12	20				
10	12	22				
11	12	33.1				
12	12	33.8				
13	12					
14	12	35	65			
15	12	35	65			
16	12	35	65			
17	12					
18	12	35	65			
19	12	35	65	150		
20	12	35	65			
21	12					
22	12					
24	12	35	65			
25		35	65		360	360
28		35	65			
30		35	65		360	360
32			65			
35			65		360	360
38			65			
40					360	800
42				150		
45					360	360
50					360	360
55					360	360
60					360	360
75						800

11.4.14 Motor mounting

The servo-motor will be bolted to the motor flange of the gearbox.
The flange number of the motor flange for the respective gearbox size is to be determined in Table 11.4.14-1.

Motor flange

The motor flange adapts the mounting bores of the servo-motor and gearbox flange. You can find the available flanges in Table 11.4.14-1.
Please contact us for other flanges.

ZK: Diameter of centring circle
LK: Diameter of pitch circles
L: Length of motor shaft
d: Diameter of motor shaft
i: Centring height
s: Thread

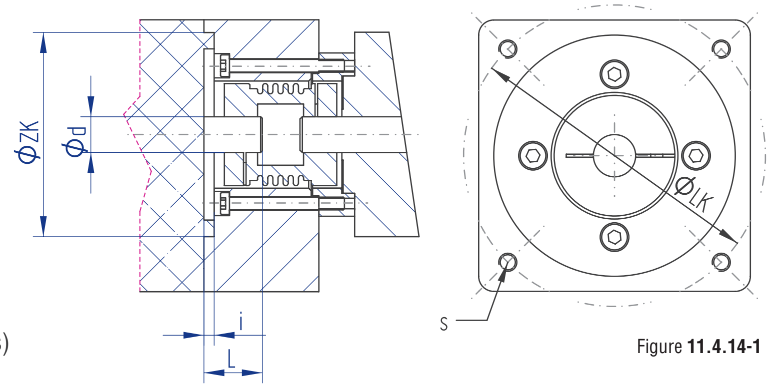


Figure **11.4.14-1**

The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.
The flange tolerances are dimensioned for servo-motors of tolerance class N.

Allocation: Fitting dimensions of the servo-motor – gearbox size/flange no. (selection)

d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Gearbox size	Flange no.
3	24	21	38	63	40	090	001
3	24	21	38	63	40	090	002
3	24	21	38	75	60	090	104
5	24	22	50	75	60	090	104
3	24	21	38	90	60	090	201
3	24	21	38	95	50	090	301
5	24	22	50	95	50	090	301
5	24	22	50	100	80	090	401
5	24	22	50	115	95	090	501
5	24	22	50	130	95	090	601
5	24	22	50	130	110	090	611
5	24	22	50	145	110	090	701
5	24	22	50	165	110	090	802
3	24	17.5	34.5	70	40	090	950
3	24	21	38	70	50	090	952
5	24	22	50	90	70	090	954
5	24	37	65	115	95	090	955
5	24	40	68	145	110	090	956
5	24	22	50	90	70	090	959
3	24	21	38	70	50	090	963
3	24	21	38	46	30	090	964
3	24	21	38	100	50	090	967
5	24	37	65	130	95	090	975
5	24	29	57	100	80	090	977
5	24	37	65	130	110	090	980
5	24	37	65	100	80	090	987
8	26	24	53	63	40	115	001
8	26	24	53	75	60	115	104
8	26	24	53	95	50	115	301
10	30	35.5	60	95	50	115	301
8	26	24	53	100	80	115	401
10	30	35.5	60	100	80	115	401
8	26	24	53	115	95	115	502
10	30	35.5	60	115	95	115	502
8	26	24	53	130	95	115	601
10	30	35.5	60	130	95	115	601
8	26	24	53	130	110	115	611
10	30	35.5	60	130	110	115	611
8	28	24	53	145	110	115	701
10	30	35.5	60	145	110	115	701
8	26	24	53	90	70	115	954
8	26	24	53	90	70	115	959
10	30	40.5	65	145	110	115	959
10	30	35.5	60	90	70	115	960
8	26	24	53	70	50	115	964
10	30	40.5	65	130	110	115	967
10	30	40.5	65	130	95	115	971
10	30	42.5	67	100	80	115	972
8	26	24	53	70	50	115	986

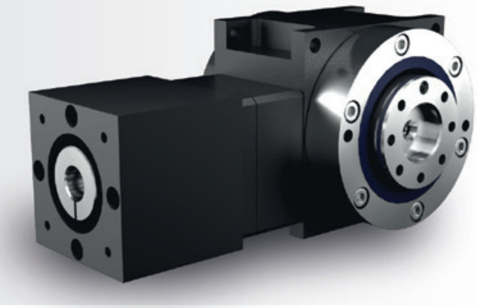
Table **11.4.14-1**

d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Gearbox size	Flange no.
14	38	31.5	60	95	50	140	301
14	38	31.5	60	100	80	140	401
14	38	32	60	115	95	140	502
14	38	31.5	60	115	95	140	502
14	38	32	60	130	95	140	601
14	38	31.5	60	130	95	140	601
14	38	32	60	130	110	140	611
14	38	31.5	60	130	110	140	611
14	38	31.5	60	145	110	140	701
14	38	32	60	165	110	140	802
14	38	31.5	60	165	110	140	802
14	38	32	60	165	130	140	811
14	38	32	60	215	130	140	902
14	38	32	60	215	180	140	911
14	38	52	80	215	180	140	932
14	38	47.5	76	145	110	140	950
14	38	37	66	145	110	140	951
14	38	31.5	60	90	70	140	960
14	38	38.5	67	100	80	140	972
19	42	39	65	115	95	170	502
19	42	39	65	130	95	170	601
19	42	39	65	130	110	170	611
19	42	39	65	165	110	170	802
19	42	39	65	165	130	170	811
19	42	46	80	165	130	170	811
19	42	39	65	215	130	170	902
19	42	46	80	215	130	170	902
19	42	39	65	215	180	170	911
19	42	46	80	215	180	170	912
19	42	84	110	215	180	170	931
19	42	77.5	103	215	180	170	932
19	42	44	70	145	110	170	951
19	42	46	80	200	114.3	170	952
19	42	84	110	200	114.3	170	952
24	60	44.5	82	165	130	215	811
24	60	44.5	82	215	130	215	902
24	60	44.5	82	215	180	215	913
24	60	56.5	94	200	114.3	215	952
24	60	72.5	110	300	250	215	960
24	60	56.5	94	265	230	215	961
24	60	79.5	117	215	180	215	963
24	60	44.5	75	165	130	260	811
24	60	44.5	75	215	130	260	902
24	60	44.5	75	215	180	260	913
40	75	61.5	110	350	300	260	916
24	60	50	87	200	114.3	260	952
24	60	50	87	265	230	260	961
24	60	72.5	103	300	250	260	962
24	60	79.5	110	215	180	260	963

Table **11.4.14-1**

11.4.15 Features

Gear ratios: i = 3:1 to 15:1 (others upon request)
Maximum acceleration torque on output: 2160 Nm
6 gearbox sizes with edge lengths of 090 to 260 mm
Minimised circumferential backlash (optional)
Housing made of aluminium
Hypoid gearboxes suitable for fitting servo-motors



11.4.15.1 Models

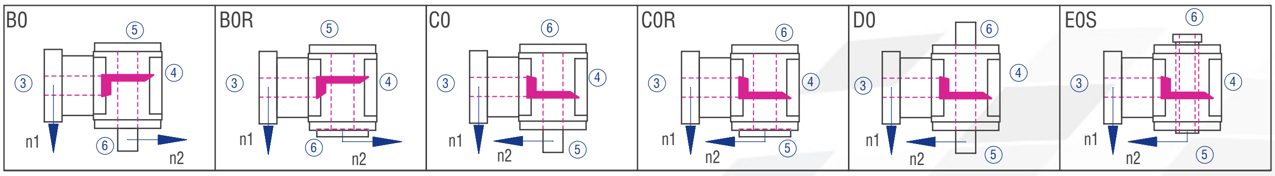


Figure **11.4.15-1; Models**

11.4.15.2 Gearbox sides

The example shows the Model CO

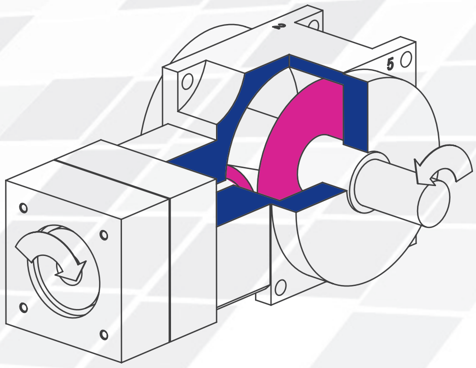


Figure **11.4.15-3; Gearbox sides**

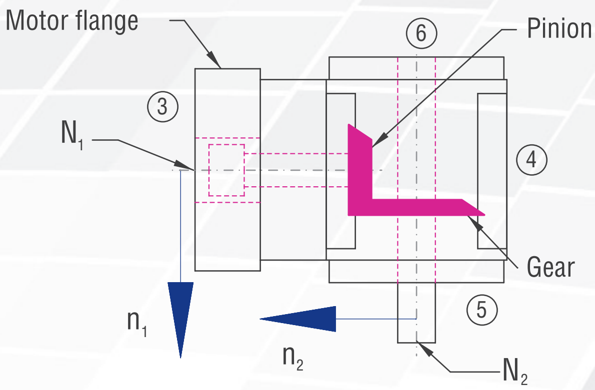


Figure **11.4.15-2; Shaft designations**

11.4.15.3 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
HC	090	12:1	CO-	1.	1-	200	/S1
Description	Size; Table 11.4.15-1	Table 11.4.15-1	Figure 11.4.15-1, Models	Side on which fix-ing is made; Table 11.4.4-1; Figure 4.3.1-1 Gearbox sides	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft	Low-backlash S1
		V080-	/	14 x 30	No. 301		
		Flange		Motor shaft Ø x length	Flange no.		

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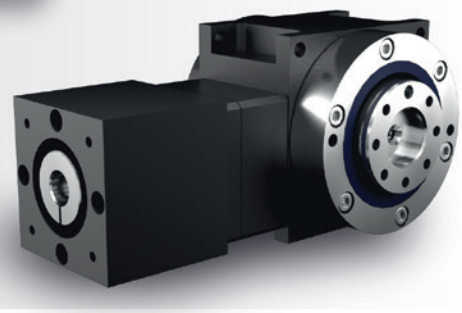
11.4.15.4 Overview of performance data

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 **11.4.15-1**

11.4.16 Type HC 090 – Servo hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

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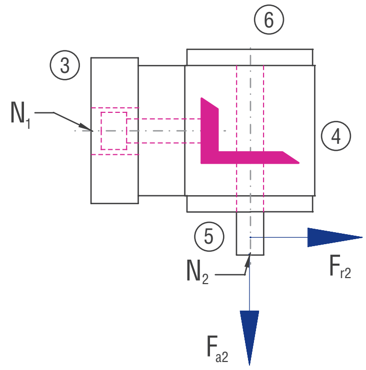
Performance data

		3:1			4:1			5:1			6:1			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]	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]
3900	8000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	25	39	51	25	39	51
3200	8000	0	0	0	0	0	0	0	0	0	36	54	72	36	54	72	36	54	72	0	0	0	0	0	0
2100	8000	36	54	72	36	54	72	36	54	72	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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

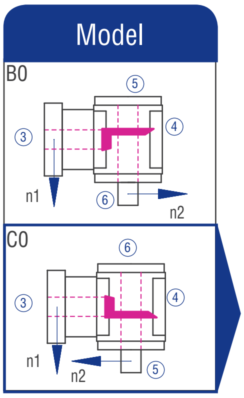
3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
3300	1650	3300	1650	3300	1650	3300	1650	3300	1650	3300	1650	3300	1650	3300	1650

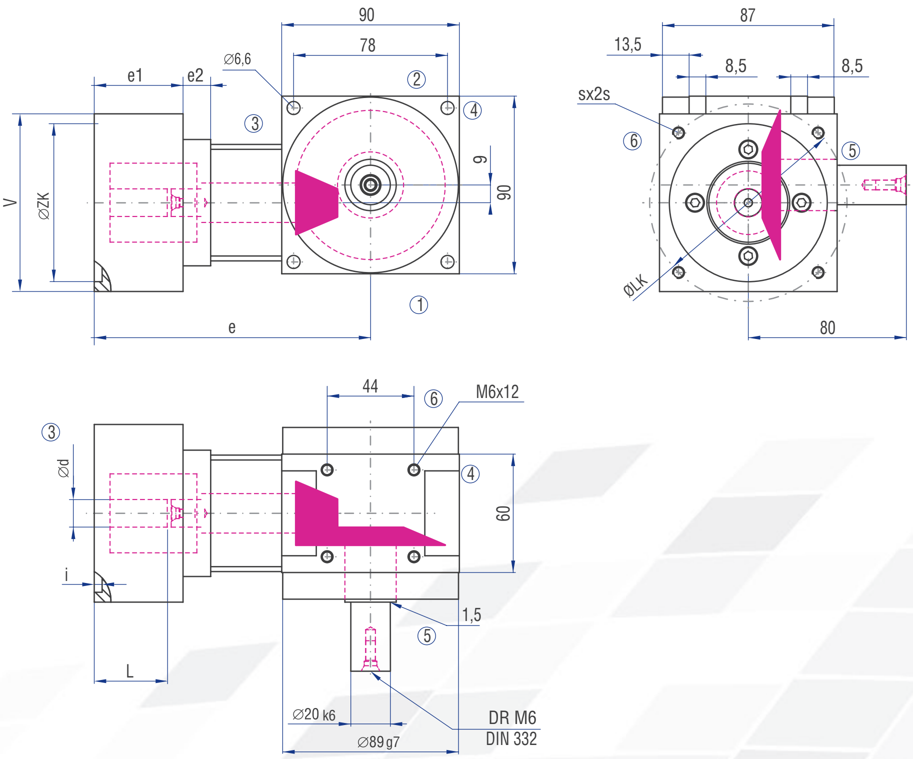
Gearbox inertia moments/mass

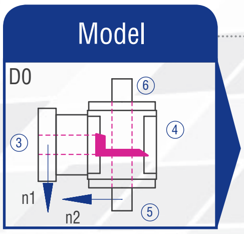
Inertia moment J_1 related to the fast-rotating shaft (N_1)

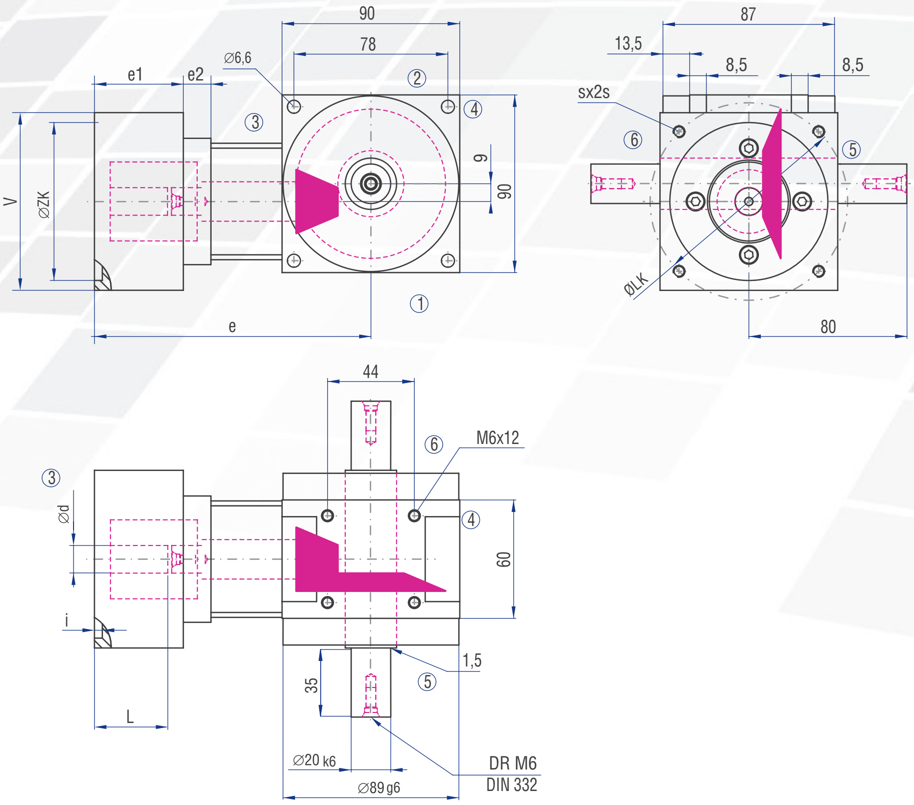
Inertia moment [kgcm^2]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
0,3900	0,3000	0,2300	0,2200	0,1700	0,1500	0,1400	0,1300	3.5

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

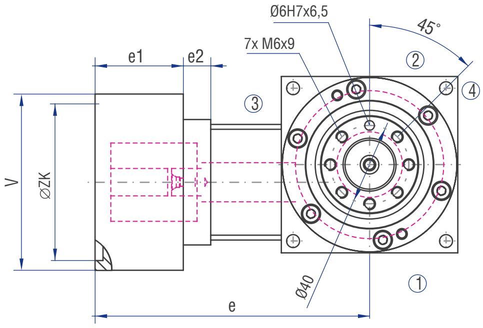


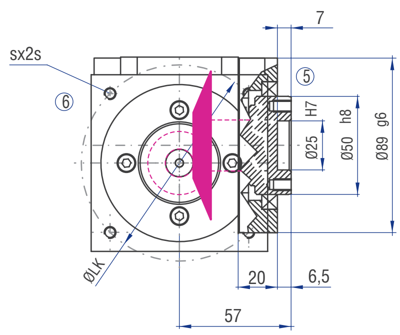




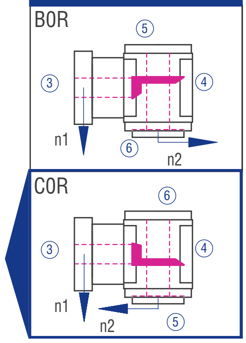


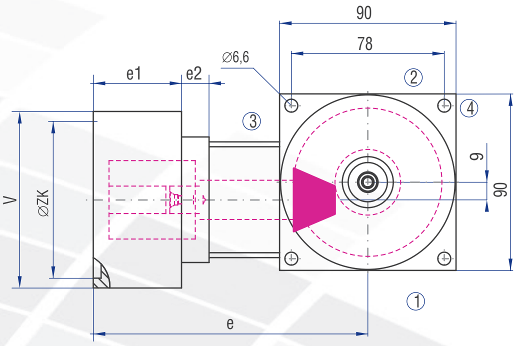
The dimensions of the Models not shown can be figured by mirroring available dimensions.

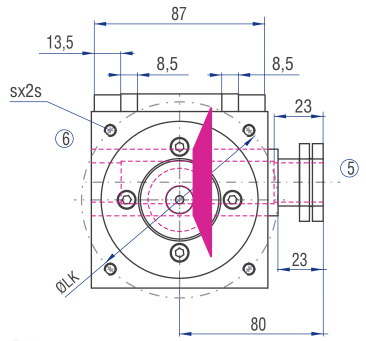




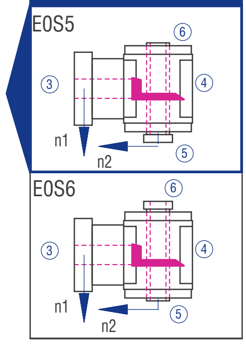
Model

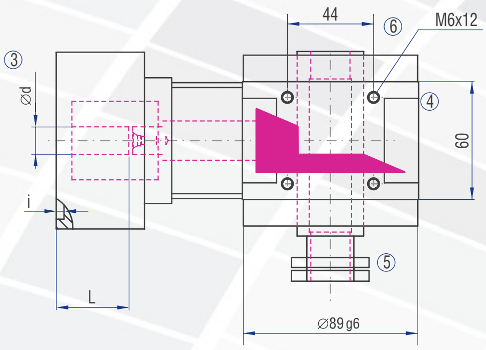


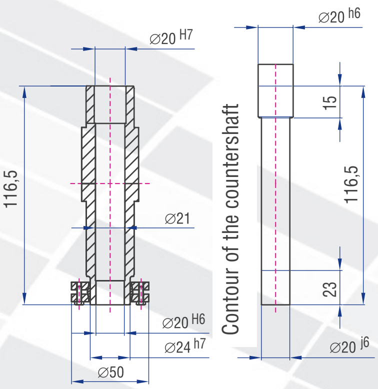




Model

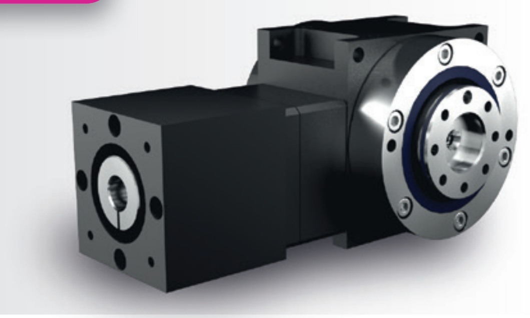






Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
001	3	24	21	38	63	40	M4	64	3.5	140	30	29
002	3	24	21	38	63	40	M5	64	3.5	140	30	29
104	3	24	21	38	75	60	M5	70	4	140	45	14
104	5	24	22	50	75	60	M5	88	3.5	152	45	26
201	3	24	21	38	90	60	M5	80	4	140	45	14
301	3	24	21	38	95	50	M6	80	4	140	45	14
301	5	24	22	50	95	50	M6	88	3.5	152	45	26
401	5	24	22	50	100	80	M6	88	4	152	45	26
501	5	24	22	50	115	95	M8	100	4	152	45	26
601	5	24	22	50	130	95	M8	120	4.5	152	45	26
611	5	24	22	50	130	110	M8	115	4.5	152	45	26
701	5	24	22	50	145	110	M8	120	4.5	152	45	26
802	5	24	22	50	165	110	M10	140	5	152	45	26
950	3	24	17.5	34.5	70	40	M4	64	3.5	136.5	26.5	29
952	3	24	21	38	70	50	M5	70	4	140	45	14
954	5	24	22	50	90	70	M5	88	4	152	45	26
955	5	24	37	65	115	95	M8	100	4	167	60	26
956	5	24	40	68	145	110	M8	120	10	170	63	26
959	5	24	22	50	90	70	M6	88	4	152	45	26
963	3	24	21	38	70	50	M4	70	4	140	45	14
964	3	24	21	38	46	30	M4	64	4	140	45	14
967	3	24	21	38	100	50	M6	90	3	140	45	14
975	5	24	37	65	130	95	M8	120	4.5	167	60	26
977	5	24	29	57	100	80	M6	88	6	159	52	26
980	5	24	37	65	130	110	M8	115	4.5	167	60	26
987	5	24	37	65	100	80	M6	88	4	167	60	26

11.4.17 Type HC 115 – Servo hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

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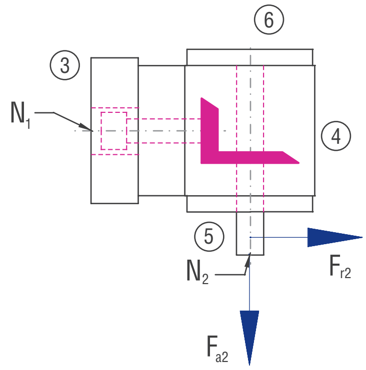
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1 T_{2N} [Nm]	3:1 T_{2B} [Nm]	3:1 T_{2NOT} [Nm]	4:1 T_{2N} [Nm]	4:1 T_{2B} [Nm]	4:1 T_{2NOT} [Nm]	5:1 T_{2N} [Nm]	5:1 T_{2B} [Nm]	5:1 T_{2NOT} [Nm]	6:1 T_{2N} [Nm]	6:1 T_{2B} [Nm]	6:1 T_{2NOT} [Nm]	8:1 T_{2N} [Nm]	8:1 T_{2B} [Nm]	8:1 T_{2NOT} [Nm]	10:1 T_{2N} [Nm]	10:1 T_{2B} [Nm]	10:1 T_{2NOT} [Nm]	12:1 T_{2N} [Nm]	12:1 T_{2B} [Nm]	12:1 T_{2NOT} [Nm]	15:1 T_{2N} [Nm]	15:1 T_{2B} [Nm]	15:1 T_{2NOT} [Nm]
3300	8000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	51	77	102	51	77	102
2700	8000	0	0	0	0	0	0	0	0	0	71	107	143	71	107	143	71	107	143	0	0	0	0	0	0
1800	8000	71	107	143	71	107	143	71	107	143	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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

3:1 F_{r2} [N]	3:1 F_{a2} [N]	4:1 F_{r2} [N]	4:1 F_{a2} [N]	5:1 F_{r2} [N]	5:1 F_{a2} [N]	6:1 F_{r2} [N]	6:1 F_{a2} [N]	8:1 F_{r2} [N]	8:1 F_{a2} [N]	10:1 F_{r2} [N]	10:1 F_{a2} [N]	12:1 F_{r2} [N]	12:1 F_{a2} [N]	15:1 F_{r2} [N]	15:1 F_{a2} [N]
4900	2450	4900	2450	4900	2450	4900	2450	4900	2450	4900	2450	4900	2450	4900	2450

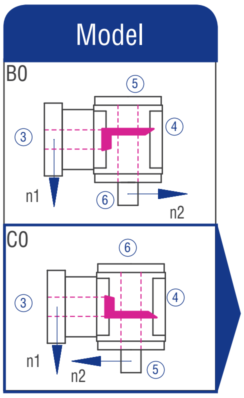
Gearbox inertia moments/mass

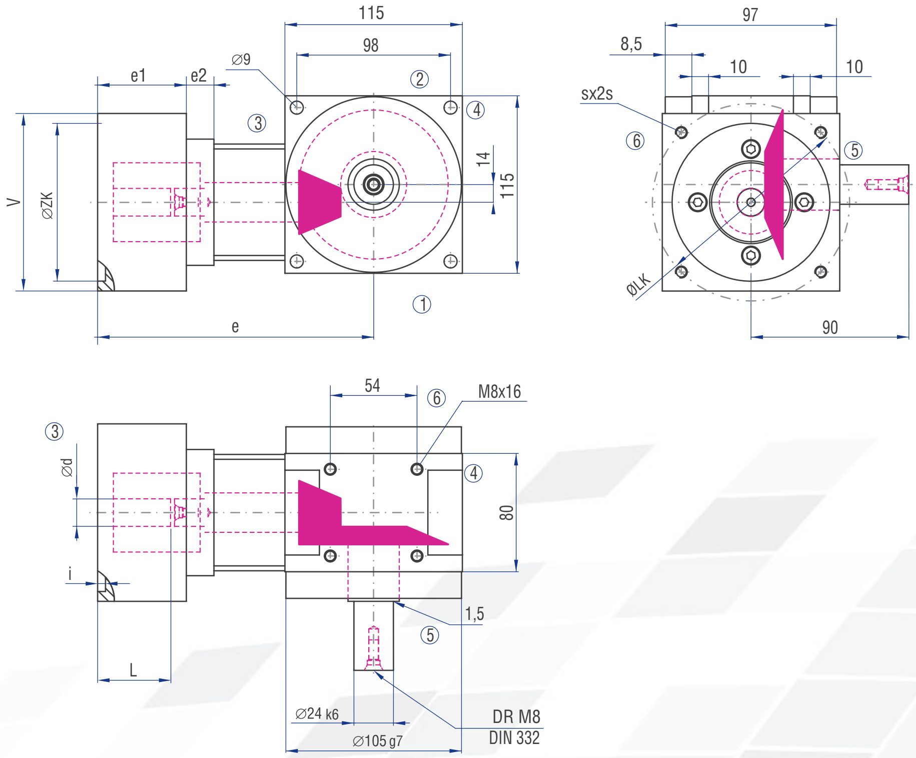
Inertia moment J_1 related to the fast-rotating shaft (N_1)

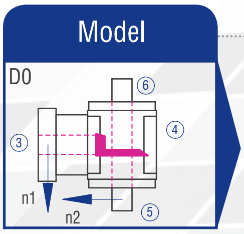
Inertia moment [kgcm^2] 3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	Mass ca. [kg]
0,9800	0,7300	0,5800	0,5200	0,4300	0,3800	0,3600	0,3400	5.5

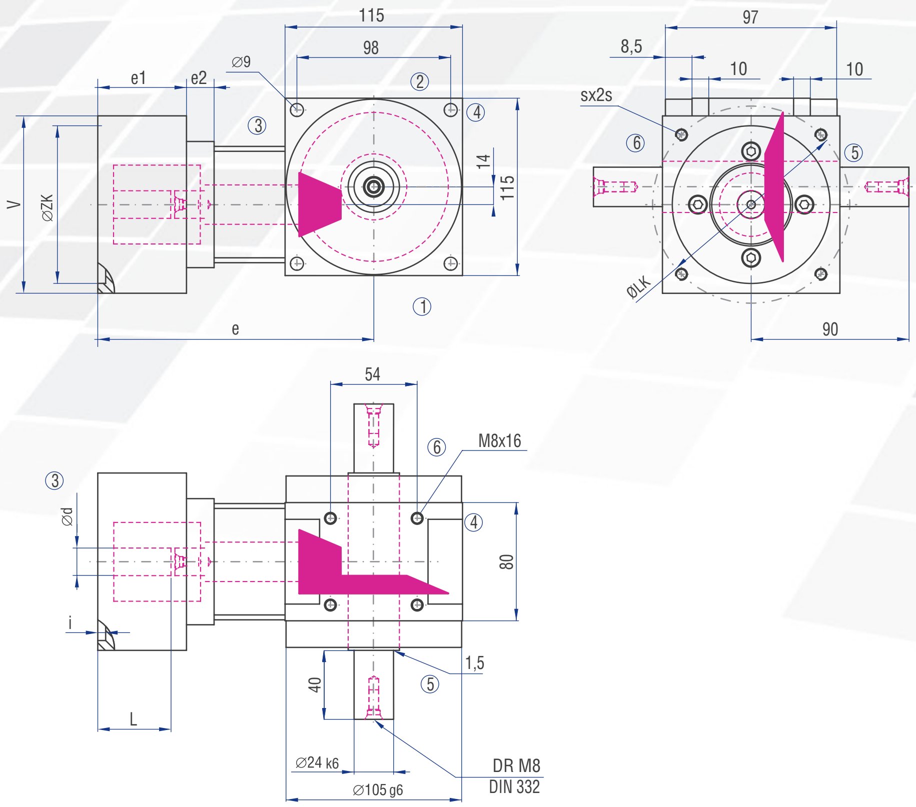
The mass of the gearbox may deviate depending on the type and the gear ratio.

11.4.17 Type HC 115 – Servo hypoid gearboxes









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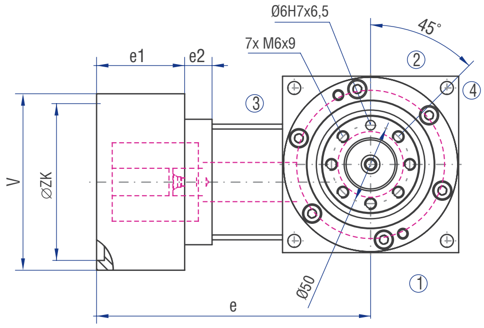
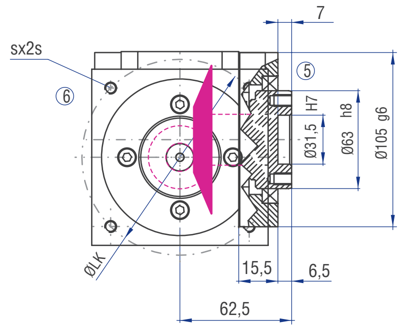
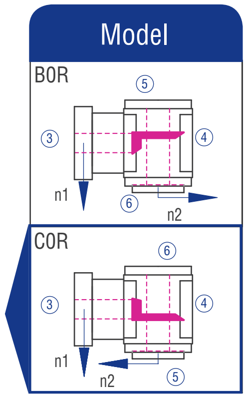
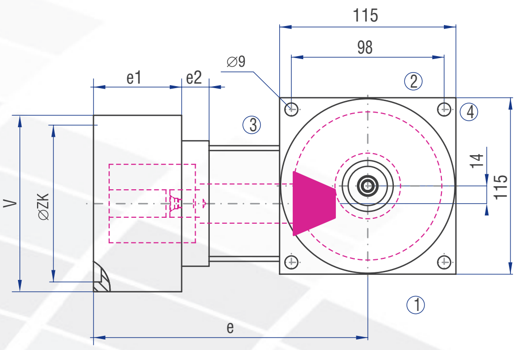
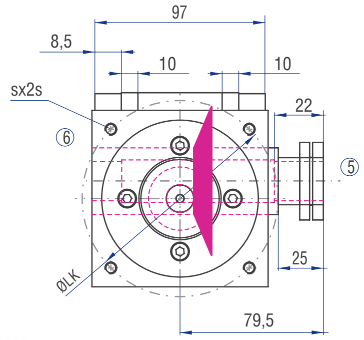
The dimensions of the Models not shown can be figured by mirroring available dimensions.

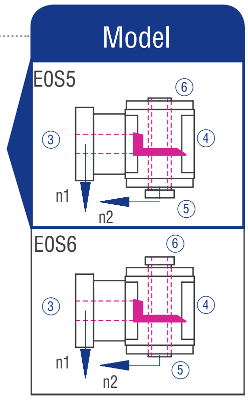


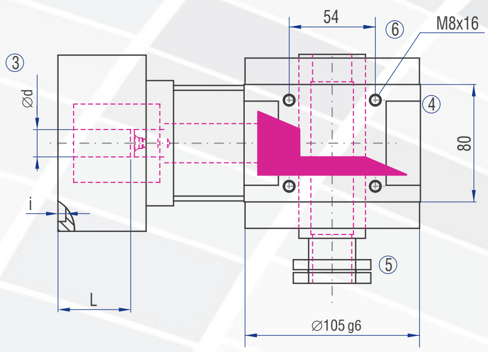


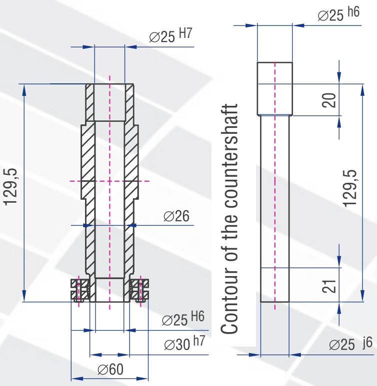








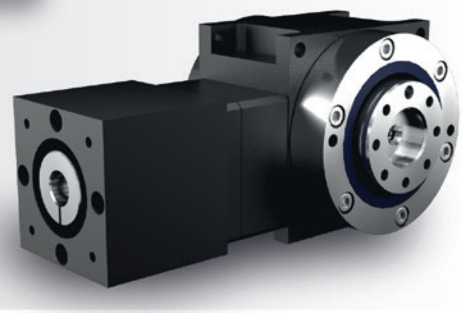




Servo gearboxes (precision gearboxes)

Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
001	8	26	24	53	63	40	M4	88	3	177.5	45	46
104	8	26	24	53	75	60	M5	88	3.5	177.5	45	46
301	8	26	24	53	95	50	M6	88	3.5	177.5	45	46
301	10	30	35.5	60	95	50	M6	119	3	184.5	54	44
401	8	26	24	53	100	80	M6	88	4	177.5	45	46
401	10	30	35.5	60	100	80	M6	119	5	184.5	54	44
502	8	26	24	53	115	95	M8	100	4	177.5	45	46
502	10	30	35.5	60	115	95	M8	119	27	184.5	54	44
601	8	26	24	53	130	95	M8	120	4.5	177.5	45	46
601	10	30	35.5	60	130	95	M8	119	27	184.5	54	44
611	8	26	24	53	130	110	M8	115	4.5	177.5	45	46
611	10	30	35.5	60	130	110	M8	119	27	184.5	54	44
701	8	28	24	53	145	110	M8	120	4.5	177.5	45	46
701	10	30	35.5	60	145	110	M8	119	27	184.5	54	44
954	8	26	24	53	90	70	M5	88	4	177.5	45	46
959	8	26	24	53	90	70	M6	88	4	177.5	45	46
959	10	30	40.5	65	145	110	M8	119	32	189.5	59	44
960	10	30	35.5	60	90	70	M6	119	8	184.5	54	44
964	8	26	24	53	70	50	M4	88	4	177.5	45	46
967	10	30	40.5	65	130	110	M8	119	32	189.5	59	44
971	10	30	40.5	65	130	95	M8	119	32	189.5	59	44
972	10	30	42.5	67	100	80	M6	119	5	191.5	61	44
986	8	26	24	53	70	50	M5	88	4	177.5	45	46

11.4.18 Type HC 140 – Servo hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

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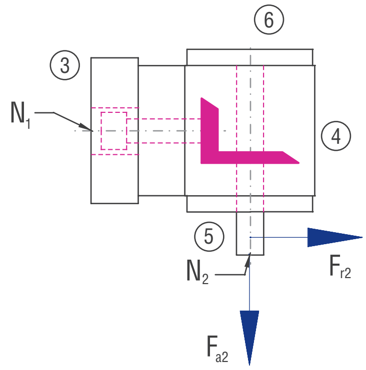
Performance data

		3:1			4:1			5:1			6:1			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]	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]
2800	7000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	97	145	193	97	145	193
2200	7000	0	0	0	0	0	0	0	0	0	142	215	286	142	215	286	142	215	286	0	0	0	0	0	0
1500	7000	142	215	286	142	215	286	142	215	286	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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

3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	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	7200	3600	7200	3600	7200	3600	7200	3600

Gearbox inertia moments/mass

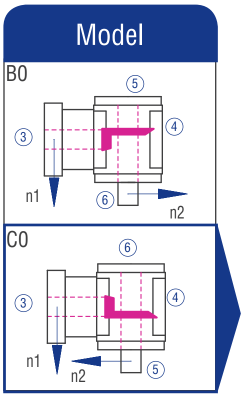
Inertia moment J_1 related to the fast-rotating shaft (N_1)

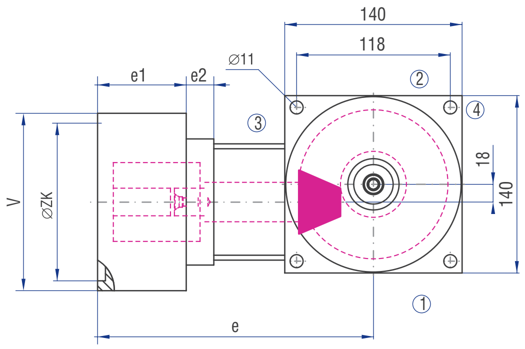
Inertia moment [kgcm^2]							
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1
2,4200	1,7700	1,4100	1,4100	1,1200	1,0000	0,8800	0,8100

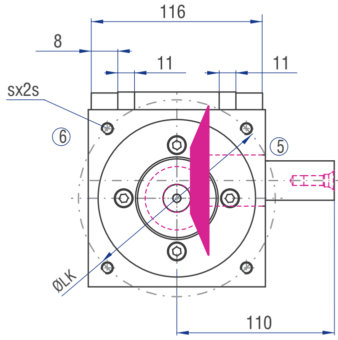
Mass ca. [kg]
9.5

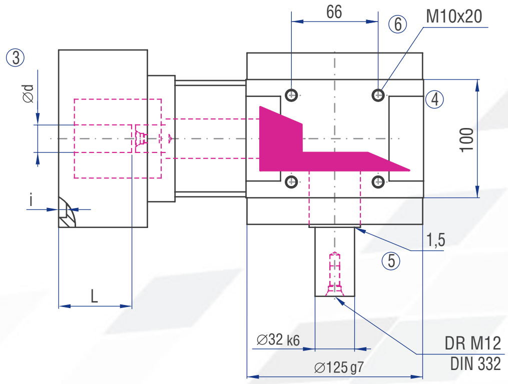
The mass of the gearbox may deviate depending on the type and the gear ratio.

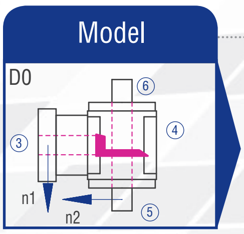
11.4.18 Type HC 140 – Servo hypoid gearboxes

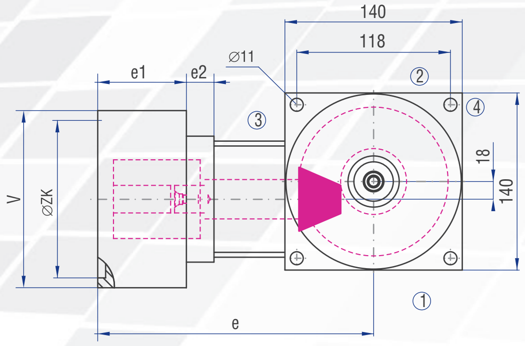


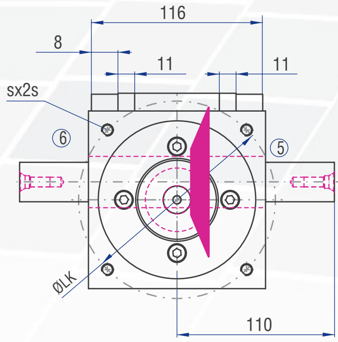


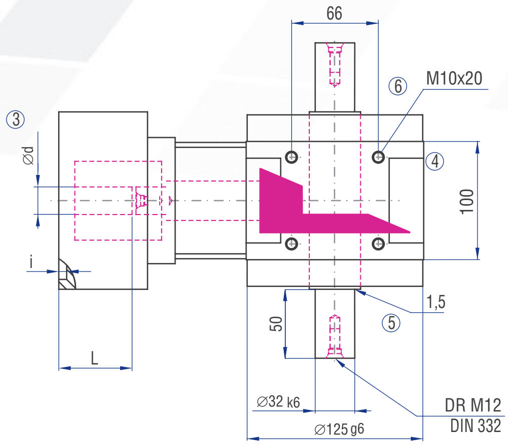












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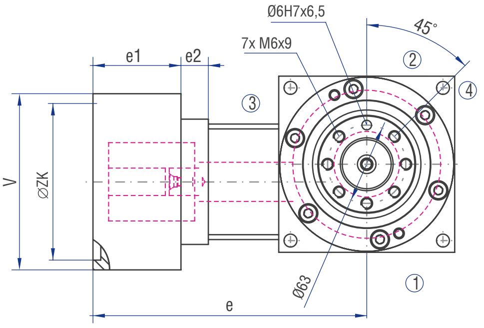
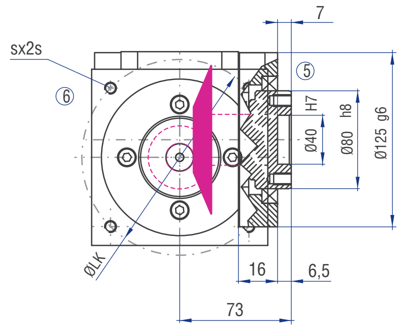
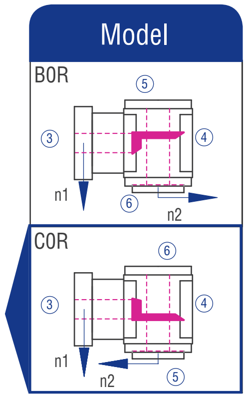
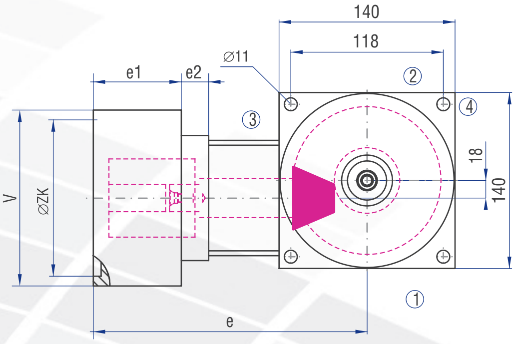
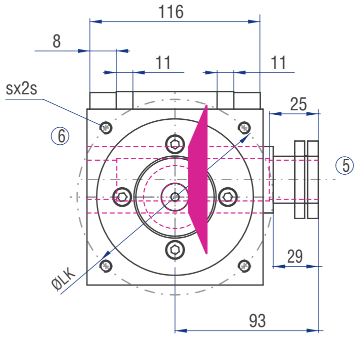
The dimensions of the Models not shown can be figured by mirroring available dimensions.

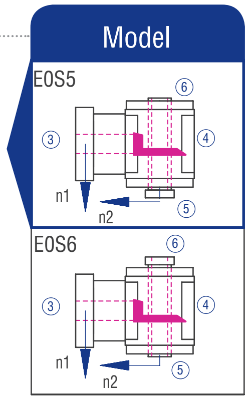


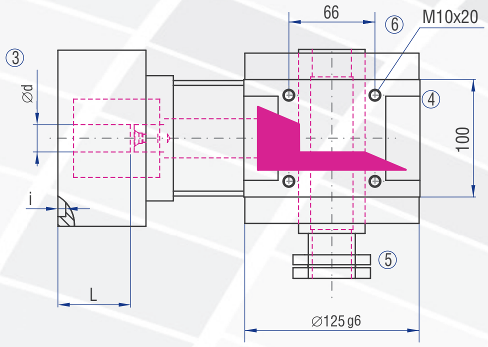


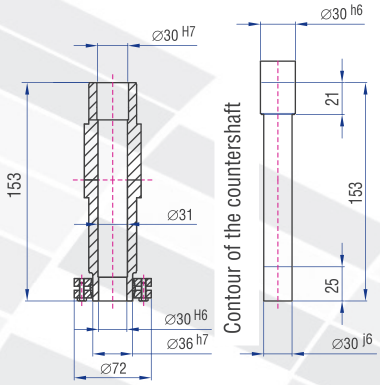






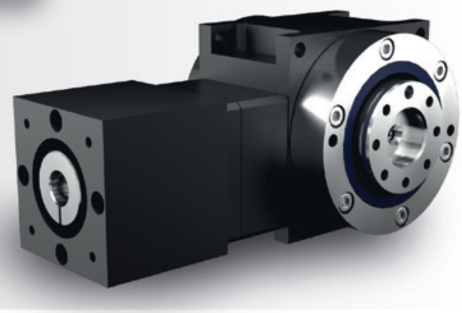






Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
301	14	38	31.5	60	95	50	M6	119	3	200	54	50
401	14	38	31.5	60	100	80	M6	119	5	200	54	50
502	14	38	32	60	115	95	M8	137	6	200.5	61	43.5
502	14	38	31.5	60	115	95	M8	119	27	200	54	50
601	14	38	32	60	130	95	M8	137	6	200.5	61	43.5
601	14	38	31.5	60	130	95	M8	119	27	200	54	50
611	14	38	32	60	130	110	M8	137	25	200.5	61	43.5
611	14	38	31.5	60	130	110	M8	119	27	200	54	50
701	14	38	31.5	60	145	110	M8	119	27	200	54	50
802	14	38	32	60	165	110	M10	137	5	200.5	61	43.5
802	14	38	31.5	60	165	110	M10	140	27	200	54	50
811	14	38	32	60	165	130	M10	137	16	200.5	61	43.5
902	14	38	32	60	215	130	M12	200	6	200.5	61	43.5
911	14	38	32	60	215	180	M12	200	5	200.5	61	43.5
932	14	38	52	80	215	180	M12	200	17	220.5	99.5	25
950	14	38	47.5	76	145	110	M8	119	7	216	70	50
951	14	38	37	66	145	110	M8	137	32	205.5	66	43.5
960	14	38	31.5	60	90	70	M6	119	8	200	54	50
972	14	38	38.5	67	100	80	M6	119	5	207	61	50

11.4.19 Type HC 170 – Servo hypoid gearboxes

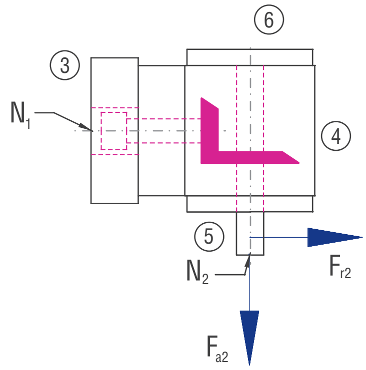


Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1 T_{2N} [Nm]	3:1 T_{2B} [Nm]	3:1 T_{2NOT} [Nm]	4:1 T_{2N} [Nm]	4:1 T_{2B} [Nm]	4:1 T_{2NOT} [Nm]	5:1 T_{2N} [Nm]	5:1 T_{2B} [Nm]	5:1 T_{2NOT} [Nm]	6:1 T_{2N} [Nm]	6:1 T_{2B} [Nm]	6:1 T_{2NOT} [Nm]	8:1 T_{2N} [Nm]	8:1 T_{2B} [Nm]	8:1 T_{2NOT} [Nm]	10:1 T_{2N} [Nm]	10:1 T_{2B} [Nm]	10:1 T_{2NOT} [Nm]	12:1 T_{2N} [Nm]	12:1 T_{2B} [Nm]	12:1 T_{2NOT} [Nm]	15:1 T_{2N} [Nm]	15:1 T_{2B} [Nm]	15:1 T_{2NOT} [Nm]
2300	6000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	182	275	365	182	275	365
1800	6000	0	0	0	0	0	0	0	0	0	266	398	528	266	398	528	266	398	528	0	0	0	0	0	0
1150	6000	266	398	528	266	398	528	266	398	528	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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

3:1 F_{r2} [N]	3:1 F_{a2} [N]	4:1 F_{r2} [N]	4:1 F_{a2} [N]	5:1 F_{r2} [N]	5:1 F_{a2} [N]	6:1 F_{r2} [N]	6:1 F_{a2} [N]	8:1 F_{r2} [N]	8:1 F_{a2} [N]	10:1 F_{r2} [N]	10:1 F_{a2} [N]	12:1 F_{r2} [N]	12:1 F_{a2} [N]	15:1 F_{r2} [N]	15:1 F_{a2} [N]
10000	5000	10000	5000	10000	5000	10000	5000	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]								
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	Mass ca. [kg]
7,1200	5,0900	4,0000	3,6500	2,8500	2,4600	2,2500	2,0700	15.5

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

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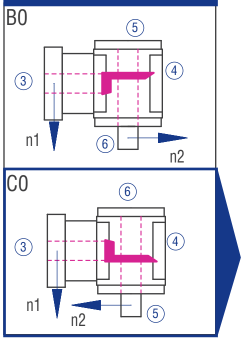
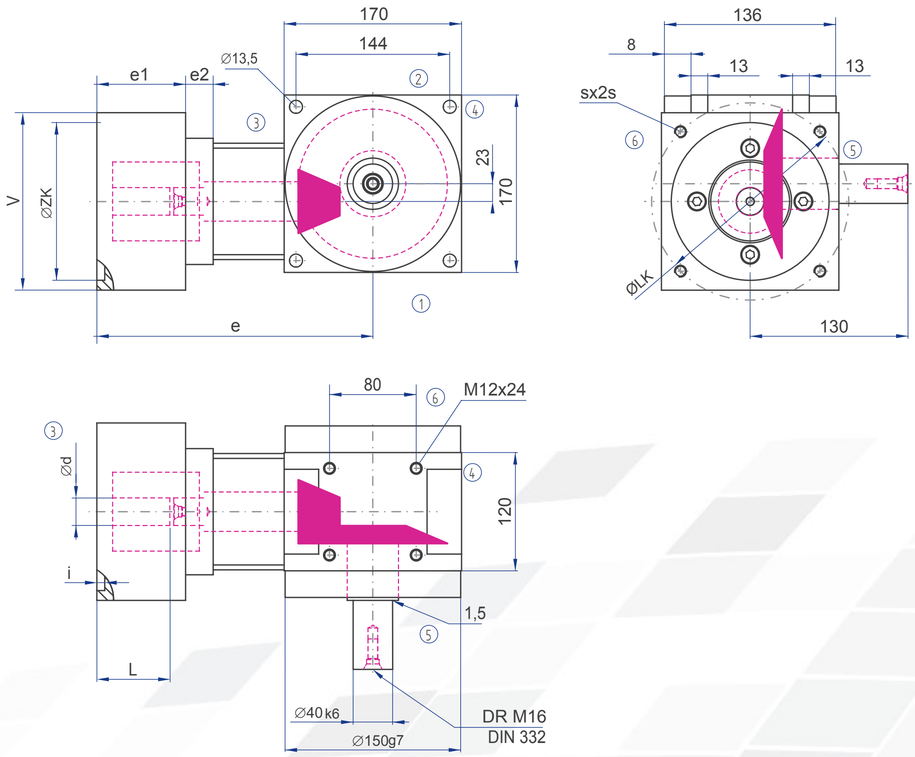
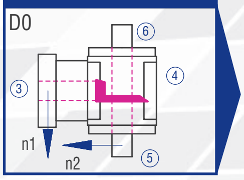
11.4.19 Type HC 170 – Servo hypoid gearboxes

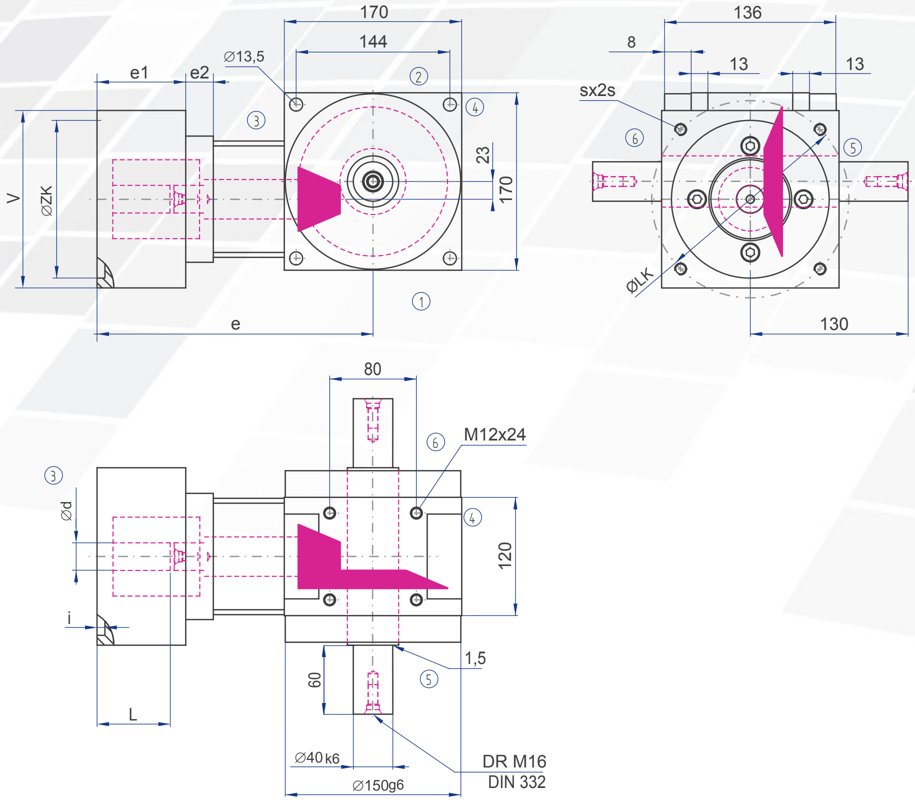
Model





Model





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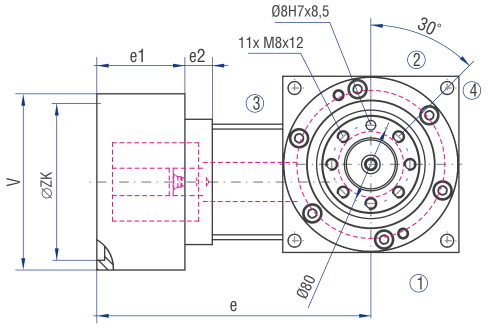
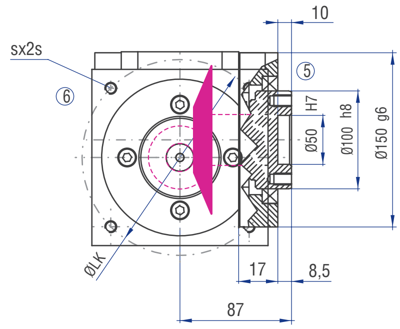
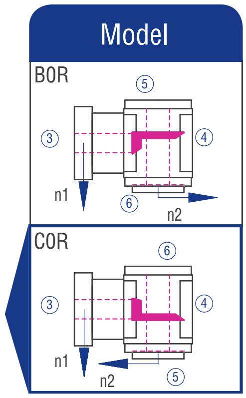
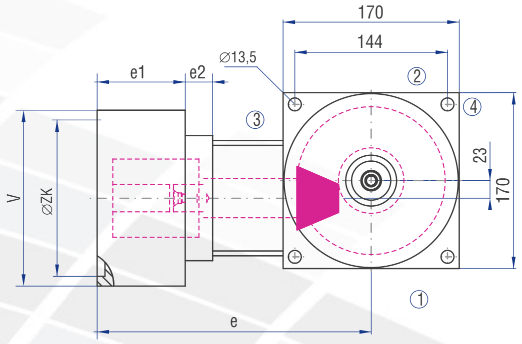
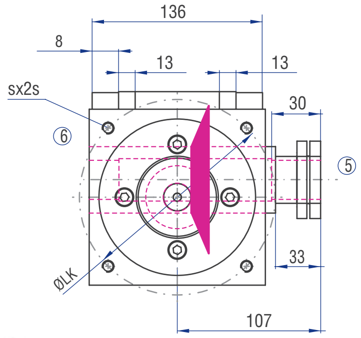
The dimensions of the Models not shown can be figured by mirroring available dimensions.

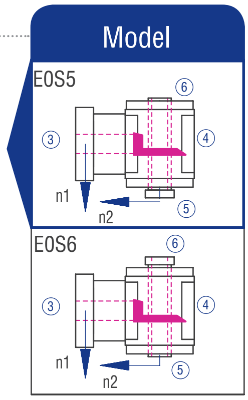


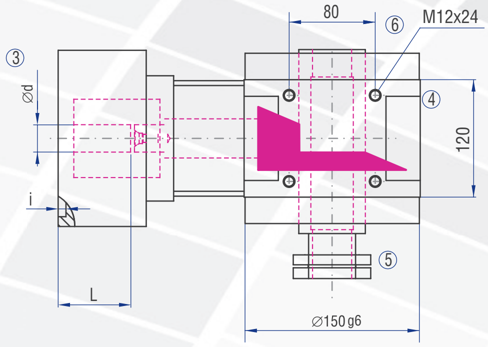


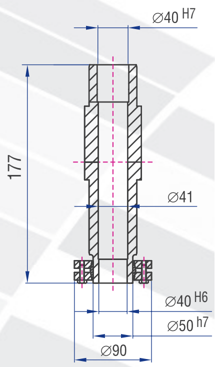


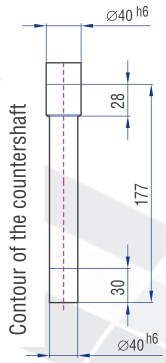






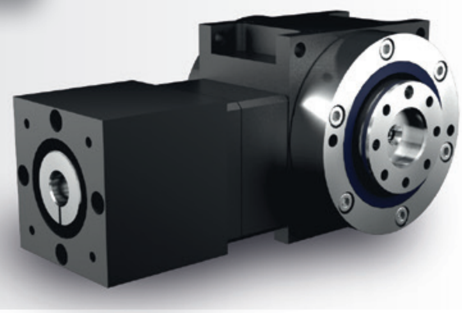






Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
502	19	42	39	65	115	95	M8	137	6	226.5	61	53.5
601	19	42	39	65	130	95	M8	137	6	226.5	61	53.5
611	19	42	39	65	130	110	M8	137	25	226.5	61	53.5
802	19	42	39	65	165	110	M10	137	5	226.5	61	53.5
811	19	42	39	65	165	130	M10	137	16	226.5	61	53.5
811	19	42	46	80	165	130	M10	157	5	242	62	68
902	19	42	39	65	215	130	M12	200	6	226.5	61	53.5
902	19	42	46	80	215	130	M12	200	5	242	62	68
911	19	42	39	65	215	180	M12	200	5	226.5	61	53.5
912	19	42	46	80	215	180	M12	200	5	242	62	68
931	19	42	84	110	215	180	M12	200	17	271.5	106	53.5
932	19	42	77.5	103	215	180	M12	200	17	265	99.5	53.5
951	19	42	44	70	145	110	M8	137	32	231.5	66	53.5
952	19	42	46	80	200	114.3	M12	200	6	242	62	68
952	19	42	84	110	200	114.3	M12	200	6	271.5	106	53.5

11.4.20 Type HC 215 – Servo hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

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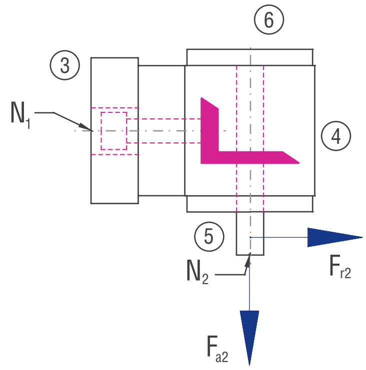
Performance data

N_1 [rpm]	N_{1MAX} [rpm]	3:1 T_{2N} [Nm]	3:1 T_{2B} [Nm]	3:1 T_{2NOT} [Nm]	4:1 T_{2N} [Nm]	4:1 T_{2B} [Nm]	4:1 T_{2NOT} [Nm]	5:1 T_{2N} [Nm]	5:1 T_{2B} [Nm]	5:1 T_{2NOT} [Nm]	6:1 T_{2N} [Nm]	6:1 T_{2B} [Nm]	6:1 T_{2NOT} [Nm]
1600	5000	0	0	0	0	0	0	0	0	0	0	0	0
1200	5000	0	0	0	0	0	0	0	0	0	723	1084	1450
700	5000	723	1084	1450	723	1084	1450	723	1084	1450	0	0	0

N_1 [rpm]	N_{1MAX} [rpm]	8:1 T_{2N} [Nm]	8:1 T_{2B} [Nm]	8:1 T_{2NOT} [Nm]	10:1 T_{2N} [Nm]	10:1 T_{2B} [Nm]	10:1 T_{2NOT} [Nm]	12:1 T_{2N} [Nm]	12:1 T_{2B} [Nm]	12:1 T_{2NOT} [Nm]	15:1 T_{2N} [Nm]	15:1 T_{2B} [Nm]	15:1 T_{2NOT} [Nm]
1600	5000	0	0	0	0	0	0	512	767	1022	512	767	1022
1200	5000	723	1084	1450	723	1084	1450	0	0	0	0	0	0
700	5000	0	0	0	0	0	0	0	0	0	0	0	0



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

3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	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	15000	7500	15000	7500	15000	7500	15000	7500

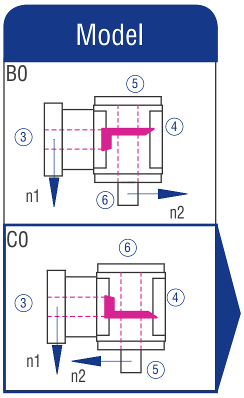
Gearbox inertia moments/mass

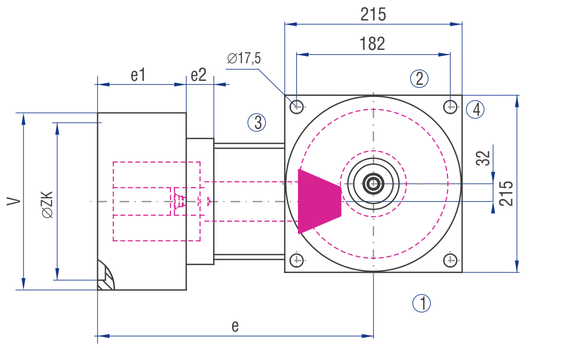
Inertia moment J_1 related to the fast-rotating shaft (N_1)

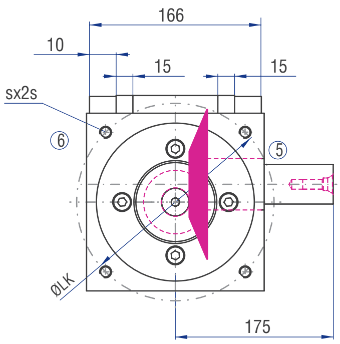
Inertia moment [kgcm²]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
26,9600	17,4400	13,5300	12,2500	8,9500	7,3800	6,4700	5,7600	32.5

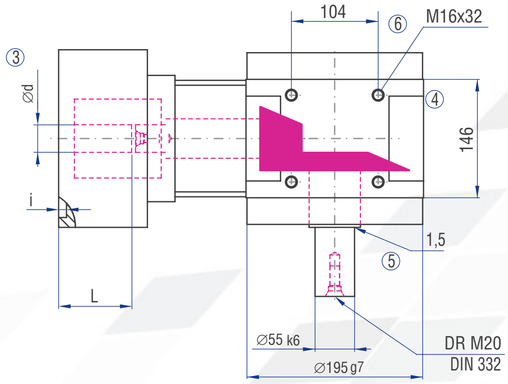
The mass of the gearbox may deviate depending on the type and the gear ratio.

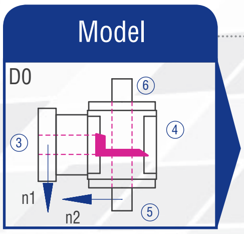
11.4.20 Type HC 215 – Servo hypoid gearboxes

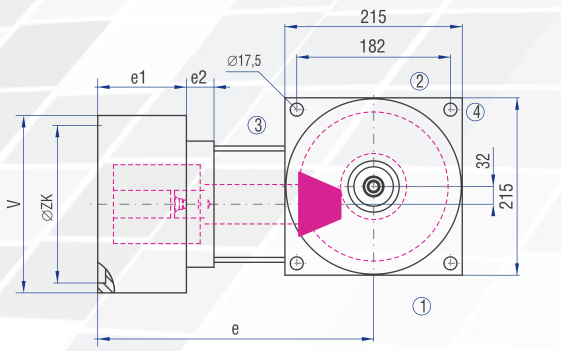


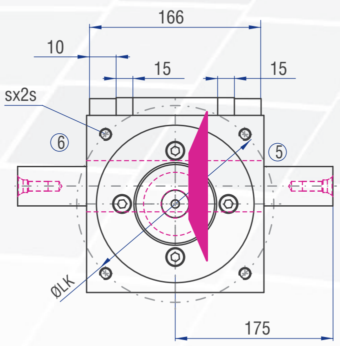


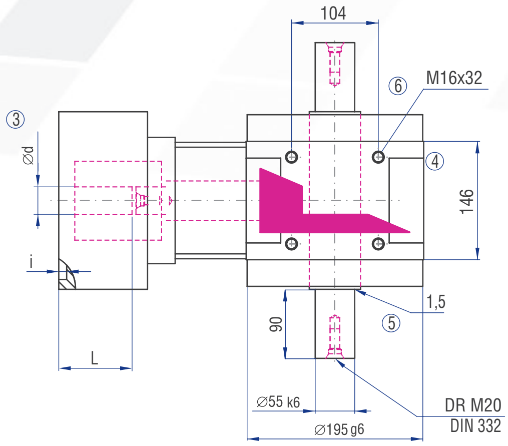




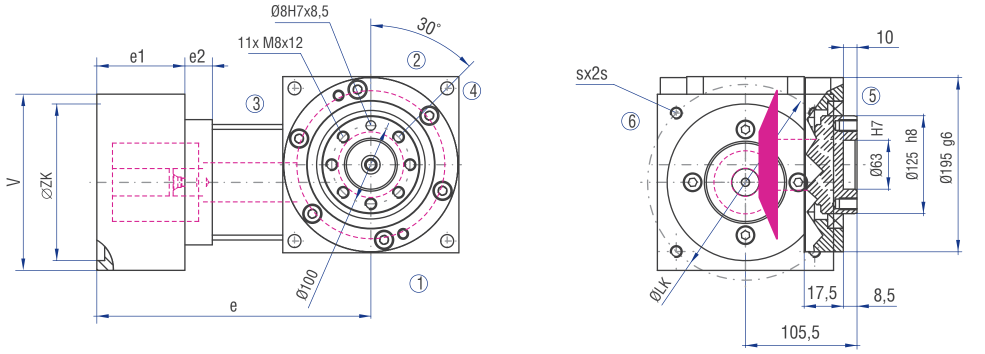


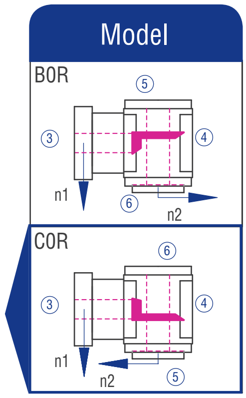


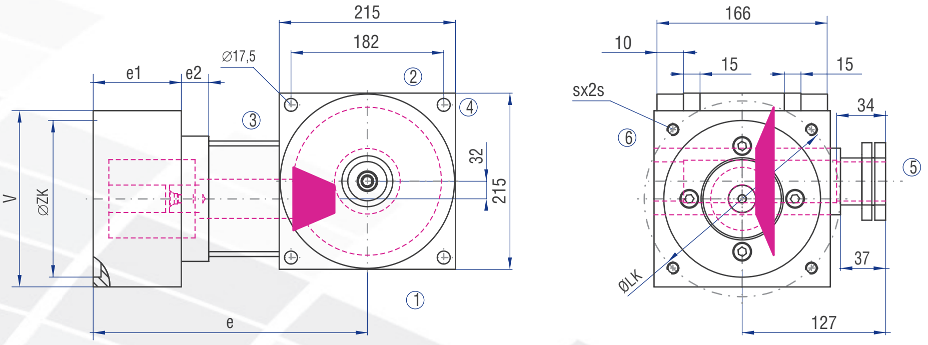


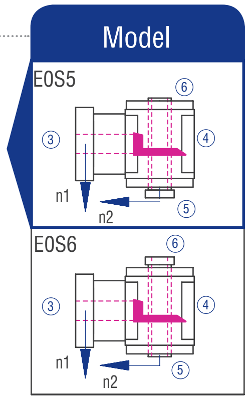


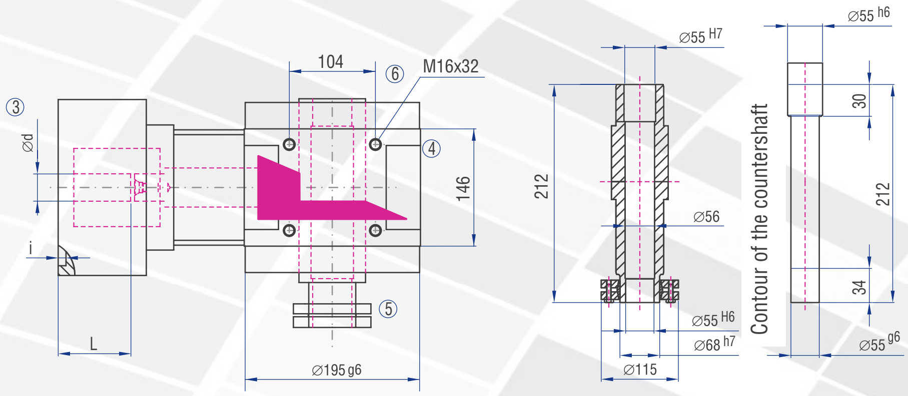
The dimensions of the Models not shown can be figured by mirroring available dimensions.





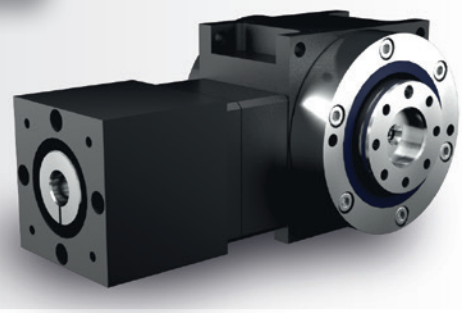






Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
811	24	60	44.5	82	165	130	M10	198	5	280.5	76	59
902	24	60	44.5	82	215	130	M12	198	5	280.5	76	59
913	24	60	44.5	82	215	180	M12	198	4.5	280.5	76	59
952	24	60	56.5	94	200	114.3	M12	198	10	292.5	88	59
960	24	60	72.5	110	300	250	M16	264	7	308.5	141	22
961	24	60	56.5	94	265	230	M12	264	6	292.5	88	59
963	24	60	79.5	117	215	180	M12	198	4.5	315.5	111	59

11.4.21 Type HC 260 – Servo hypoid gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
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 11.4.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
Bearing life L10h	more than 30,000h in S5 operation	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 11.4.9
Lubricants	Synthetic lubricants	See chapter 11.4.9
Motor flange	Aluminium	
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For motor shafts without parallel key Bellows coupling BK For motor shafts with parallel key Bellows coupling BKN	See chapter 11.4.13

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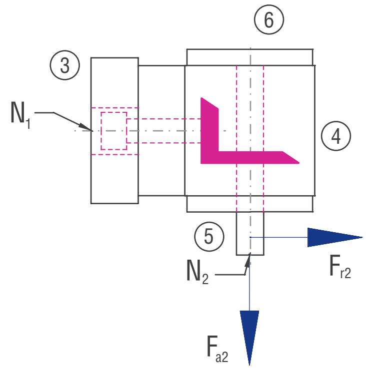
Performance data

		3:1			4:1			5:1			6:1			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]	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]
1300	4500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1023	1533	2044	1023	1533	2044
1000	4500	0	0	0	0	0	0	0	0	0	1444	2165	2880	1444	2165	2880	1444	2165	2880	0	0	0	0	0	0
550	4500	1444	2165	2880	1444	2165	2880	1444	2165	2880	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0



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

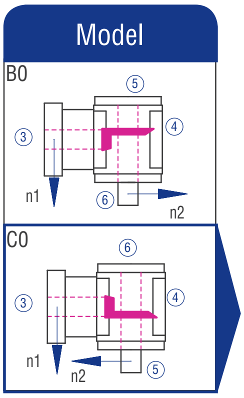
3:1		4:1		5:1		6:1		8:1		10:1		12:1		15:1	
F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]	F_{r2} [N]	F_{a2} [N]
22500	11250	22500	11250	22500	11250	22500	11250	22500	11250	22500	11250	22500	11250	22500	11250

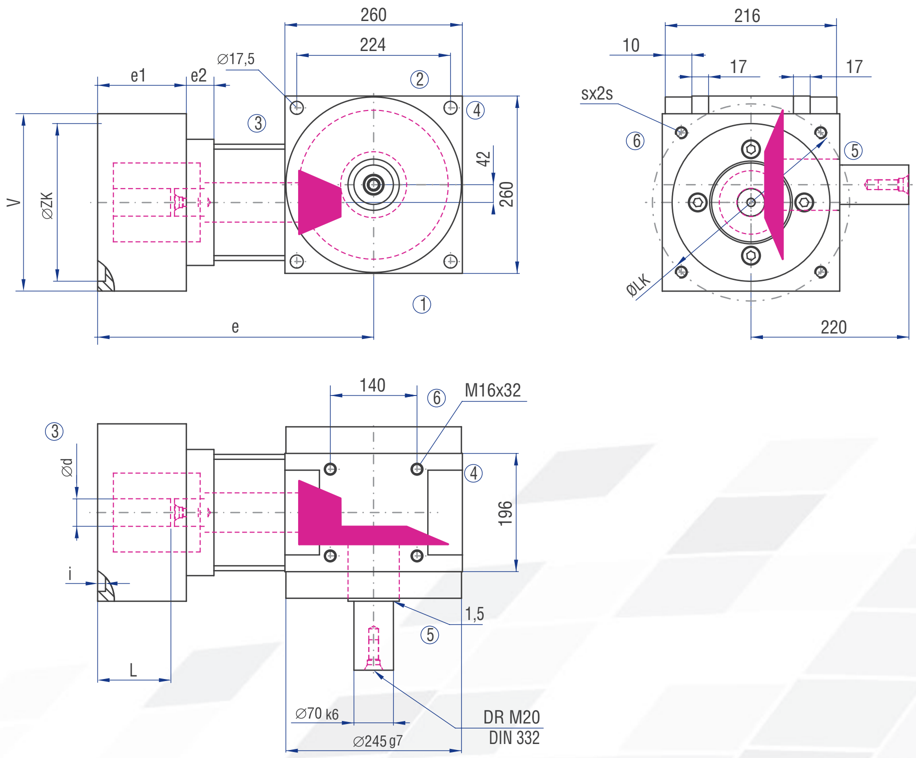
Gearbox inertia moments/mass

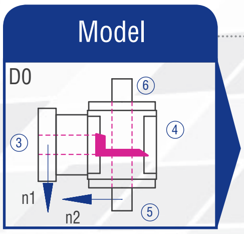
Inertia moment J_1 related to the fast-rotating shaft (N_1)

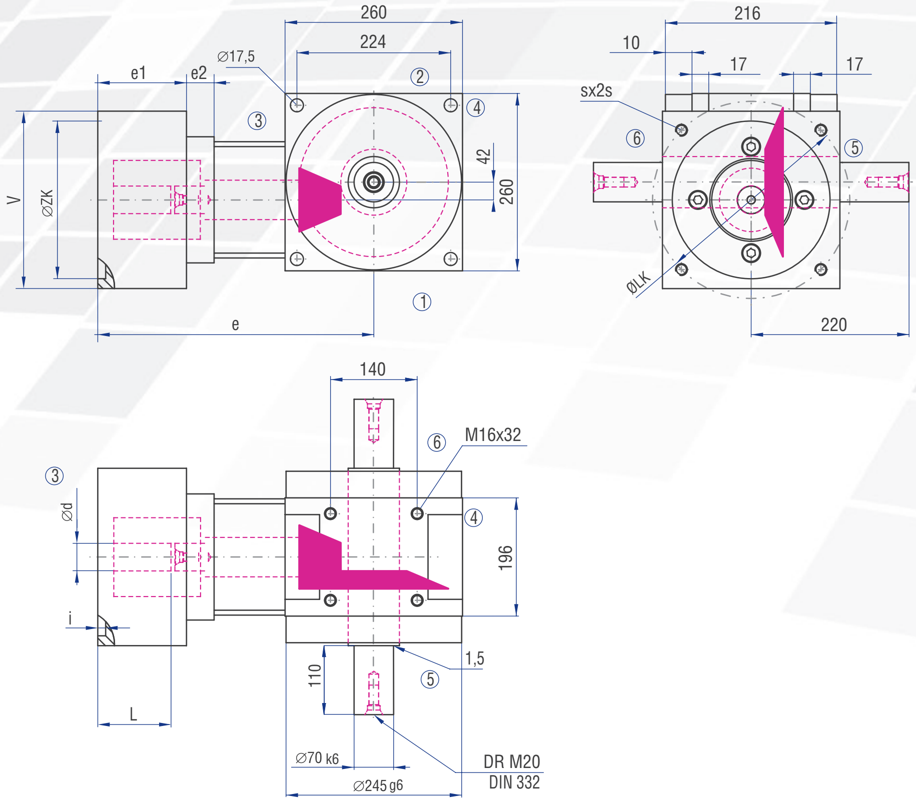
Inertia moment [kgcm²]								Mass ca. [kg]
3:1	4:1	5:1	6:1	8:1	10:1	12:1	15:1	
91,4700	62,4300	44,2900	39,5500	27,0700	21,4300	18,1400	15,5300	60

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

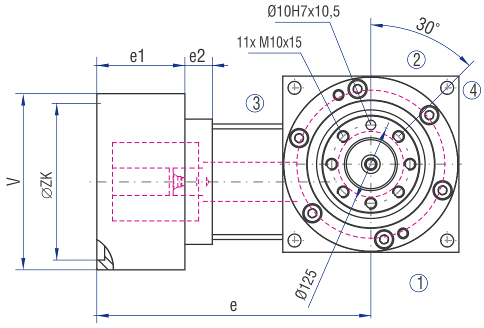


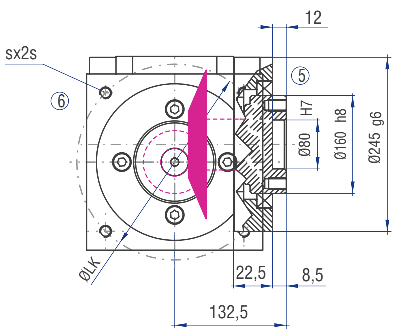


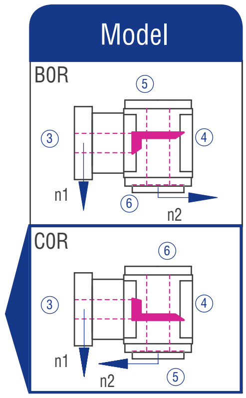


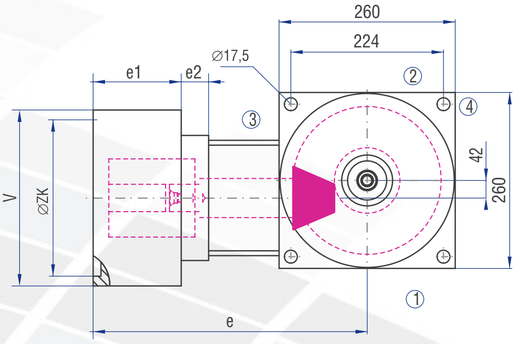


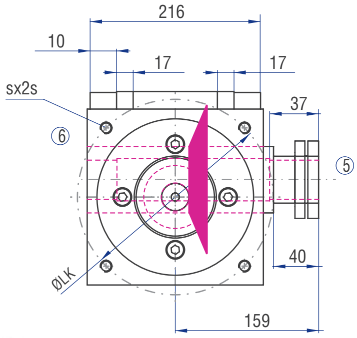
The dimensions of the Models not shown can be figured by mirroring available dimensions.

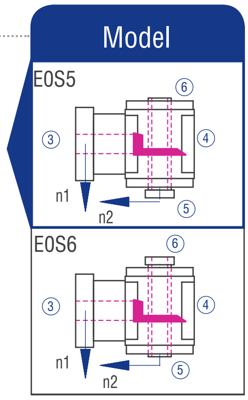


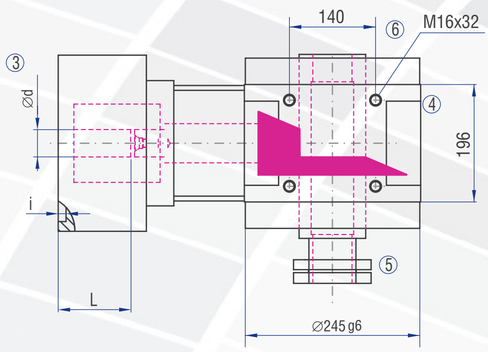


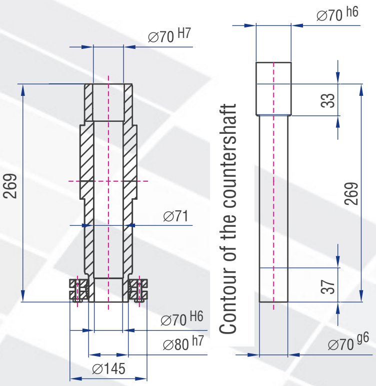












Flange no.	d min [mm]	d max [mm]	L min [mm]	L max [mm]	LK [mm]	ZK [mm]	Thread (s)	□ V [mm]	i [mm]	e [mm]	e1 [mm]	e2 [mm]
811	24	60	44.5	75	165	130	M10	198	5	312.5	76	59.5
902	24	60	44.5	75	215	130	M12	198	5	312.5	76	59.5
913	24	60	44.5	75	215	180	M12	198	4.5	312.5	76	59.5
916	40	75	61.5	110	350	300	M16	320	12	347.5	110	60.5
952	24	60	50	87	200	114.3	M12	198	10	324.5	88	59.5
961	24	60	50	87	265	230	M12	264	6	324.5	88	59.5
962	24	60	72.5	103	300	250	M16	264	6	340.5	104	59.5
963	24	60	79.5	110	215	180	M12	198	4.5	347.5	111	59.5

11.5 Type SC – Servo worm gearboxes

11.5.1 General construction

The SC AdServo gearboxes are based on the proven worm gearboxes of the S-type series. In worm gearboxes, both shafts intersect in a defined distance (A). This centre-to-centre distance is reflected in the specification of the gearbox size. (Example: S 100 – centre-to-centre distance 100 mm)

11.5.2 Toothing

A gear set consists of worm shaft and worm gear.
The worm shaft made of carburised steel is hardened, the toothing is ground. The worm gear consists of a high-quality bronze alloy, the toothing is milled.

11.5.3 Models

Due to the modular system, different gearbox Models can be configured. The variants differ in the type of the shafts, the rotational direction of the shafts, and the support by bearings.

11.5.4 Threaded mounting holes

All sides of the gearboxes are machined. The housing surface on the side 1 and the flange surfaces on the sides 5 and 6 may be used as mounting surfaces. All flanges always have threaded mounting holes.
You have the following available ordering options:

Gearbox size	Ordering options	Threaded mounting holes are in the housing surfaces on the gearbox side	Threaded mounting holes are in the flanges on the gearbox side
040-100	1	1	5, 6
040-100	2	1, 2	5, 6
040-100	3	1, 3	5, 6
040-100	4	1, 4	5, 6
040-100	5	1, 5	5, 6
040-100	6	1, 6	5, 6

Table **11.5.4-1**

The standard version has the order code 2.
Order code example: SC 050 5:1 B0 -1.2-600/0000
Please enquire other mounting options.

11.5.5 Installation position

The installation position is defined by the gearbox side directed downwards during operation and will be indicated by the corresponding numeral. The following is an order code example with the numeral 2. Order code example: SC 050 5:1 B0 -1.2-600/0000
Principally, the gearboxes can be used in all installation positions. The technically most favourable and thus recommended installation position is the installation position 1, in which the worm shaft is horizontal and located at the bottom.
For an optimal technical design of the gearboxes, we always ask to specify the installation position.
The performance data and torques listed in the selection tables are only valid if the gearboxes are used in the installation positions 1, 5 or 6. The values must be reduced by 10%, if the worm shaft is vertical or located at the top (installation position 3, 4 or 2).

11.5.6 Shaft designation – allocation to the gearbox sides

The worm shaft is the fast-rotating shaft.
It has the speed $\mathbf{n_1}$ and is identified by $\mathbf{N_1}$.
The slowly rotating shaft has the speed $\mathbf{n_2}$ and is identified by $\mathbf{N_2}$.
The worm gear is located on this shaft.
The gearbox sides are identified by the numerals 1 to 6.
For the allocation to the gearbox sides, please refer to the following figure and the Figure 4.3.1-1 Gearbox sides.

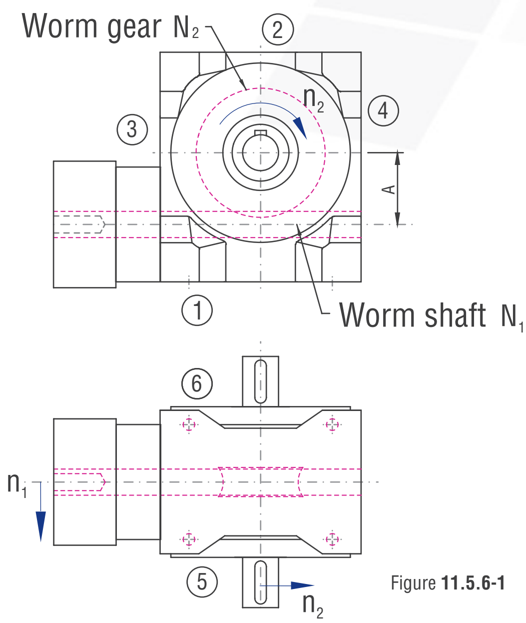


Figure **11.5.6-1**

11.5.7 Rotational direction and gear ratio

As standard, the worm gearboxes are delivered with right-handed worm gear sets. This results in the rotational directions according to Figure 11.5.6-1. In the special design, delivery with left-handed gear teeth is also possible. Please enquire this.
For the possible gear ratios, please refer to the performance tables. Principally, the actual gear ratio I_{ist} must be taken into account for the layout. In some cases, this deviates from the nominal gear ratio i.

11.5.8 Efficiency

The achievable efficiency depends on rotational speed, torque, installation position, sealing, and lubricant type.

Starting efficiency

The efficiency is always lower during the starting phase and in the cold operating state of the worm gearbox since the lubricating film is not formed until the sliding motion has started. Therefore a higher torque is needed. The starting efficiencies listed below are guidance values and valid for run-in gearboxes. These starting efficiencies must be taken into account for the layout.

Number of threads	Gear ratio range	Starting efficiency	Lead angle
2	26 – 15	0.56 – 0.65	10° – 12°
4	13 – 7.5	0.68 – 0.75	19° – 23°
6	5	0.74 – 0.82	28° – 32°

Table **11.5.8-1**

Operating efficiency

The tooth flanks of worm gearboxes in the as-delivered condition are not yet fully smoothed. This influence is even increased with high gear ratios. Therefore the gearboxes should be run in with approx. 50% of the nominal data, if possible, before they are operated under load. The efficiencies specified in the performance tables relate to the permissible nominal data and are guidance values for run-in gearboxes with standard sealing that have operating temperature.

11.5.9 Lubrication

Different conditions for the lubrication of the toothing and the roller bearings will arise depending on gearbox size, installation position, rotational speed and on-period. In order to ensure these optimally, different oil quantities and viscosities are used. These will be defined by ATEK based on your ordering details (rotational speed, on-period, and ambient temperature). They will be reflected in the abbreviation code of the type designation.
Example: SC 125 10:1 C0 -9.1- 200/A1

/A1 means:

	Abbreviation	Explanation	Reference
Letter	A	Oil viscosity 460	Table 11.5.9-1
Numeral	1	with venting	Table 11.5.9-2

The ATEK worm gearboxes are factory-filled with synthetic polyglycol oil and are normally maintenance-free.
Oil viscosity and venting option are dependent on the rotational speed

Operating mode: cyclic operation S1

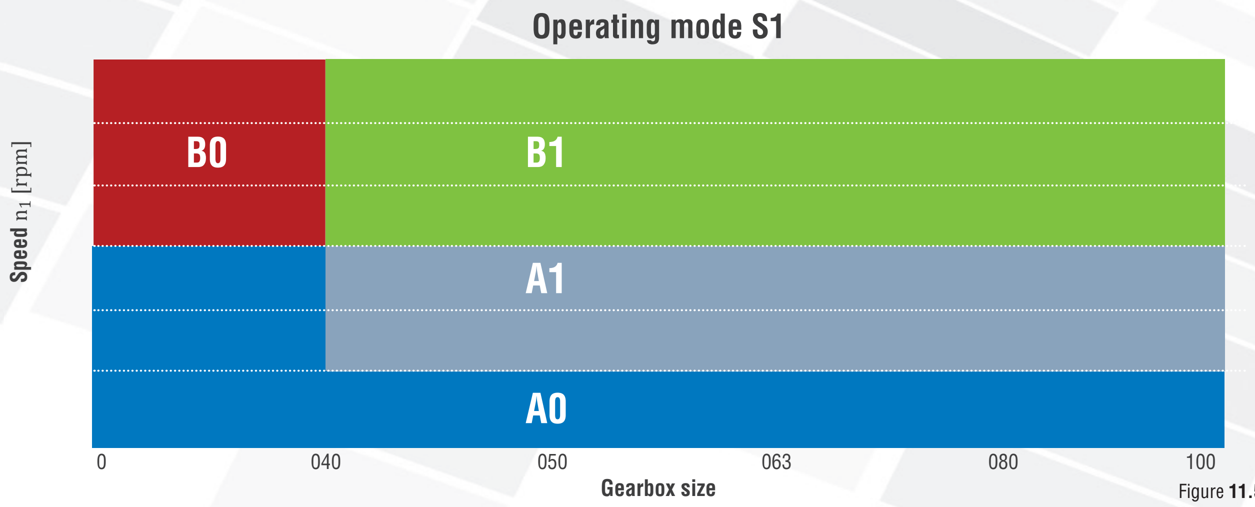


Figure **11.5.9-1**

For the meaning of the abbreviations A through E and 0, 1, please refer to the following tables.
Oil viscosity table

Letter	Viscosity
A	460
B	220
C	not available
D	Injection lubrication
F	Fluid grease

Table **11.5.9-1**

Injection lubrication may be necessary in case of high rotational speeds and large gearboxes. In case of very low rotational speeds, lubrication by fluid grease is also possible. At operating temperatures over 50°C, high pressure will develop through air expansion in the gearbox. Then a permanent pressure compensation must be ensured. To this end, the use of a vent filter is prescribed.

Numeral	Vent filter
0	No
1	Yes

Table **11.5.9-2**

11.5.10 Vent filter

If venting is required 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. The position will be specified in the order documents. Please refer to the table below for the position of the filter.
Here, E4, for example, means: Venting on side 4.

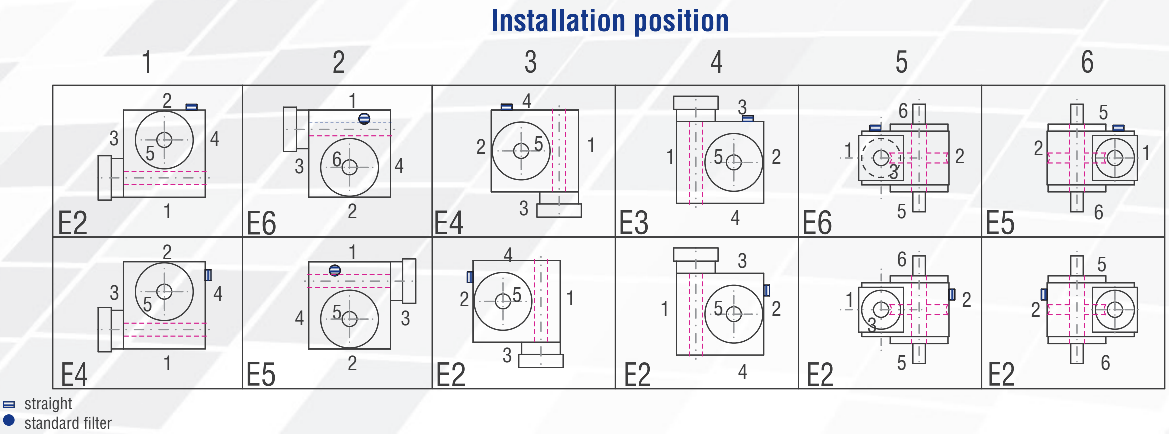


Figure **11.5.10-1**

11.5.11 Low-backlash construction

For optimal 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

All ATEK worm gearboxes can be delivered as low-backlash types. The following values can be set with standard gear sets for the different gearbox sizes:

Ordering option	Gear set	040 – 125
/0000	Standard	<=30 arcmin
/S2	Standard	<=10 arcmin
/S1	Standard	<=6 arcmin
/S0	Special gear set	<=3–6 arcmin

Table **11.5.11-1**

Abbreviation: u.r. – upon request

11.5.12 Connection of drive shaft to coupling

For torque transmission, a zero-play coupling is located on the drive shaft.

11.5.13 Coupling

Two congruent coupling halves are positively connected by means of a plastic toothed ring under pretensioning. In case of extreme peak tensions and impact loads (emergency shut-off), a damping action is achieved through a slight distortion in the elastic range. The coupling is axially insertable and compensates angle errors as well as misalignments in the radial and axial direction. A later changeover to another motor is easily possible. The motor-side coupling hub is available in the following variants:

KN	KNN	SN
Clamping hub	Clamping hub with groove	Tension ring hub
For motor shafts without parallel key	For motor shafts with parallel key	For motor shafts without parallel key

Depending on the variant KN or KNN/SN, different torques can be transmitted.

Design of the coupling

Due to the dynamic characteristics of the servo-motors, the permissible acceleration torque and the emergency-stop torque must be considered when designing the servo gearboxes. The correct coupling hub can be selected by means of the table below on the basis of the maximum permissible torques on the motor shaft, acceleration torques (T_{1B}) and emergency-stop torques (T_{1Not}).

Coupling Size	Hub	Coupling torques allowed [Nm]	Motor shaft diameter [mm]										
			9	11	14	16	19	24	28	32	38	42	45
K14	KN	T_{1B} [Nm]	5.3	5.6	6.1	6.5							
		T_{1NOT} [Nm]	7	9	13	15							
	KNN/SN	T_{1B} [Nm]	10	10	10	10							
		T_{1NOT} [Nm]	22	25	25	25							
K 19	KN	T_{1B} [Nm]	17	17	17	17	17	17					
		T_{1NOT} [Nm]	30	30	32	32	34	34					
	KNN/SN	T_{1B} [Nm]		17	17	17	17						
		T_{1NOT} [Nm]		30	32	34	34						
K 24	KN	T_{1B} [Nm]		35	36	39	39	43	46				
		T_{1NOT} [Nm]		45	45	50	60	65	70				
	KNN/SN	T_{1B} [Nm]		48	48	48	48	48	48				
		T_{1NOT} [Nm]			80	100	120	120	120				
K 28	KN	T_{1B} [Nm]			80	81	85	91	97	102	109		
		T_{1NOT} [Nm]			80	100	130	140	148	156	167		
	KNN/SN	T_{1B} [Nm]				128	128	128	128	128	128		
		T_{1NOT} [Nm]				140	240	240	240	240	240		
K 38	KN	T_{1B} [Nm]				94	98	104	109	113	122	126	130
		T_{1NOT} [Nm]				120	125	130	136	142	152	158	164
	KNN/SN	T_{1B} [Nm]						260	260	260	260	260	260
		T_{1NOT} [Nm]						500	500	500	500	500	500

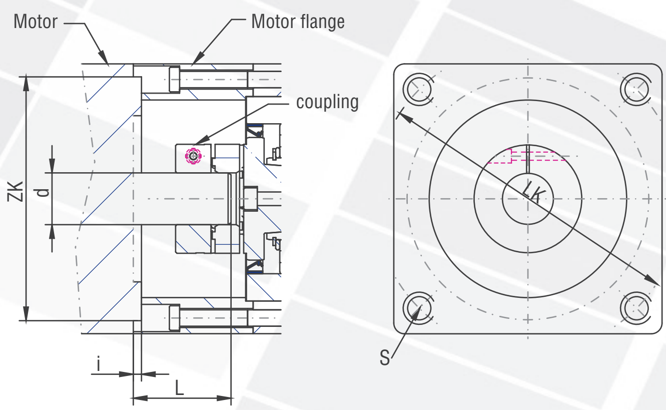
Table **11.5.13-1**

11.5.14 Motor mounting

The servo-motor will be bolted to the motor flange of the gearbox on side 3. The flange number of the motor flange for the respective gearbox size is to be determined in Table 11.5.14-1.

Motor flange

ZK: Diameter of centring circle
LK: Diameter of pitch circles
L: Length of motor shaft
d: Diameter of motor shaft
i: Centring height
s: Thread



The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.
The flange tolerances are dimensioned for servo-motors of tolerance class N.

Servo gearboxes (precision gearboxes)

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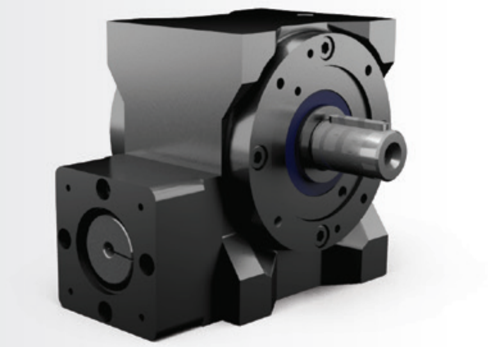
The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.
Fitting dimensions of the servo-motor – gearbox size/flange no. (selection)

d [mm] less than or equal to	L [mm]	LK [mm]	ZK [mm]	Gearbox size	Flange no.
11	23	63	40	040	002
	23	63	40	040	001
	23	75	60	040	102
	23	90	60	040	202
14	30	75	60	040	104
	30	95	50	040	301
	30	90	60	040	201
	30	75	60	040	103
	30	115	95	040	501
	30	100	80	040	401
19	40	165	110	040	802
	40	130	95	040	601
	40	130	110	040	611
	40	145	110	040	701
	40	165	110	050	802
	40	130	95	050	601
	40	95	50	050	301
	40	130	110	050	611
	40	90	60	050	201
	40	75	60	050	103
	40	115	95	050	501
	40	145	110	050	701
	40	100	80	050	401
	40	165	110	063	802
	40	130	95	063	601
	40	95	50	063	301
	40	130	110	063	611
	40	90	60	063	201
	40	75	60	063	103
	40	115	95	063	501
	40	145	110	063	701
	40	100	80	063	401
24	50	165	130	050	811
	50	165	130	063	811
	50	165	110	080	802
	50	165	130	080	811
	50	130	95	080	601
	50	95	50	080	301
	50	130	110	080	611
	50	90	60	080	201
	50	75	60	080	103
	50	115	95	080	501
	50	145	110	080	701
	50	100	80	080	401
32	60	100	80	080	403
	60	130	110	080	616
	60	215	130	080	902
	60	115	95	080	502
	60	215	180	080	911
	60	165	110	100	802
	60	165	130	100	811
	60	130	95	100	601
	60	130	110	100	611
	60	145	110	100	701
	60	100	80	100	403
	60	130	110	100	616
	60	215	130	100	902
	60	115	95	100	502
	60	215	180	100	911
38	80	215	180	080	932

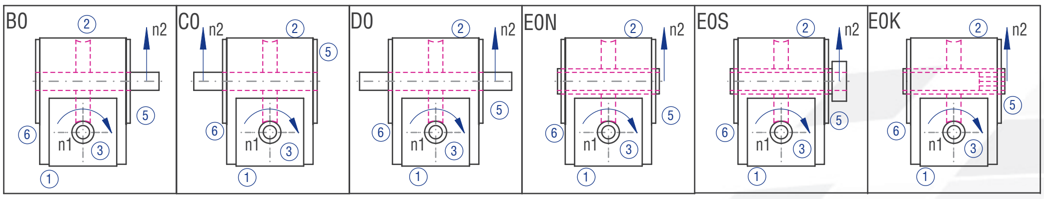
Table **11.5.14-1**

11.5.15 Features



Gear ratios: i = 10:1 to 20:1 (i > 26 upon request)
Maximum acceleration torques up to T_{2B} = 1100 Nm
5 gearbox sizes with 040 to 100 mm centre-to-centre distance
Optimised efficiency
Minimised circumferential backlash (optional)
Worm gearboxes with square flange, suitable for fitting servo-motors
Zero-play three-piece claw coupling

11.5.15.1 Models



Optionen

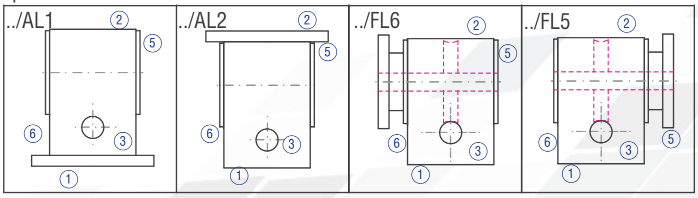


Figure **11.5.15-1; Models**

11.5.15.2 Gearbox sides

The example shows the Model B0

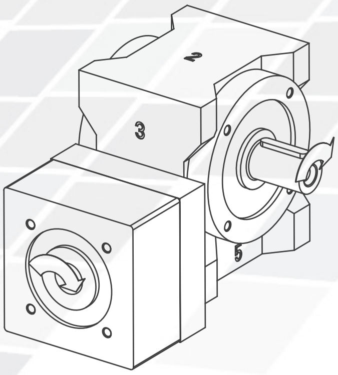


Figure **11.5.15-3; Gearbox sides**

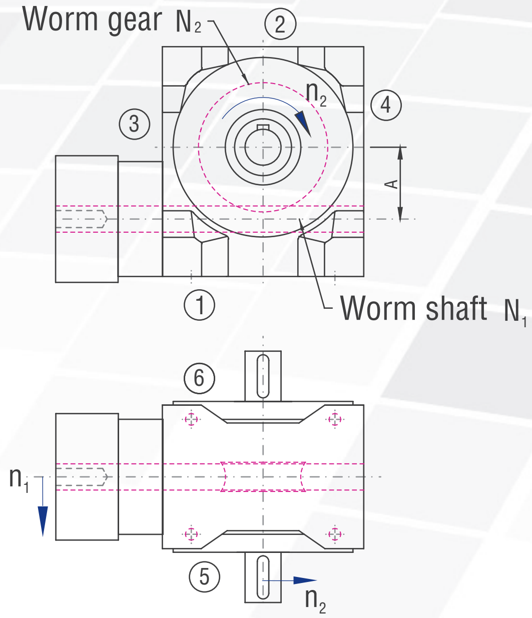


Figure **11.5.15-2; Shaft designations**

11.5.15.3 Order code

The order code reflects the customer specifications. Example:

Type	Size	Gear ratio	Model	Fixing side	Installation position	Speed n_2	Design
SC	050	5:1	B0-	1.	1-	600	/0000
Description	Size; Table 11.5.15-1	Table 11.5.15-1	Figure 11.5.15-1	Side on which fixing is made; Table 11.5.4-1	Side directed downwards; Figure 4.3.1-1 Gearbox sides	Slowly rotating shaft Table 11.5.15-1	Will be determined by ATEK
	V080-		/	14 x 30	No. 301		KN
	Flange			Motor shaft Ø x length	Flange no.		See chapter “Coupling”

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11.5.15.4 Overview of performance data

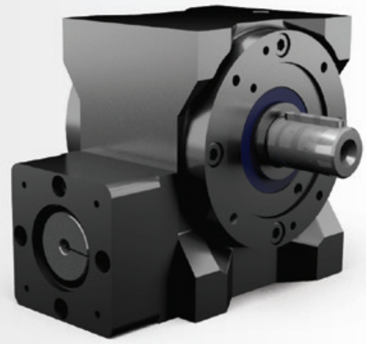
The performance data and torques listed in the selection tables are only valid if the gearboxes are used in the installation positions 1, 5 or 6. If the worm shaft is vertical or located at the top (installation position 3, 4 or 2), 90% of the values specified must be expected.
Please enquire other gear ratios.

i [-]	n_1 [1/min]	i_{ist}	n_2 [1/min]	040 T_{2N} [Nm]	050 T_{2N} [Nm]	063 T_{2N} [Nm]	080 T_{2N} [Nm]	100 T_{2N} [Nm]
10:1	4000	38:4	421		70,0			
		39:4	410	32,0		101,0		
		40:4	400				132,0	195,0
	3000	38:4	316		83,0			
		39:4	308	37,0		124,0		
		40:4	300				177,0	257,0
	2400	38:4	253		97,0			
		39:4	246	42,0		148,0		
		40:4	240				222,0	318,0
	1500	38:4	158		110,0			
		39:4	154	48,0		171,0		
		40:4	150				267,0	380,0
20:1	4000	38:2	211		72,0			
		39:2	205	36,0		116,0		
		40:2	200				153,0	236,0
	3000	38:2	158		85,0			
		39:2	154	41,0		141,0		
		40:2	150				203,0	308,0
	2400	38:2	126		98,0			
		39:2	123	46,0		166,0		
		40:2	120				253,0	380,0
	1500	38:2	79		111,0			
		39:2	77	51,0		190,0		
		40:2	75				303,0	452,0

	040	050	063	080	100
T_{2B} (S5) [Nm]	50	112	216	408	1006
T_{2Not} (S5) [Nm]	77	152	306	625	1090
N_1 max [U/min]	6000	5500	5000	4500	3200
T_{2B} (S5) [Nm]	58	133	259	498	1112
T_{2Not} (S5) [Nm]	90	179	355	725	1440
N_1 max [U/min]	6500	5500	5000	4500	3200

Table **11.5.15-1**

11.5.16 Type SC 040 – Servo worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 11.5.2
Gear ratio	10:1 to 20:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On gearbox side 1 and on the flanges	See chapter 11.5.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.5.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.5.9
Lubricants	Synthetic lubricants	See chapter 11.5.9
Motor flange	Aluminium	See chapter 11.5.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts clamping hub KN For smooth motor shafts tension ring hub SN For motor shafts with parallel key clamping hub with groove KNN	See chapter 11.5.13

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Torques in operating mode S1

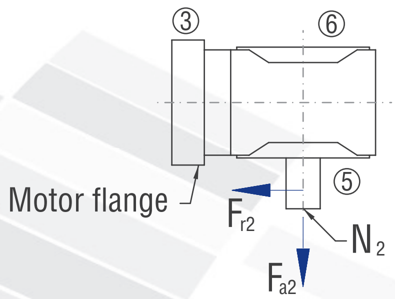
I rated	10:1		20:1	
I ist	39:4		39:2	
	n_2 [1/min]	T_{2N} [Nm]	n_2 [1/min]	T_{2N} [Nm]
4000	410	32	205	36
3000	308	37	154	41
2400	246	42	123	46
1500	154	48	77	51

Torques in operating mode S5

I rated			10:1		20:1	
T_{2N} [Nm]			43		50	
n_{1max} [U/min]			6000		6500	
Coupling size	d [mm]		KN	KNN/SN	KN	KNN/SN
K14	9	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	68,3	77,0	90,0	90,0
	11	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	14	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	16	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
K19	9	T_{2B}[Nm]	50,0		58,0	
		T_{2NOT}[Nm]	77,0		90,0	
	11	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	14	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	16	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	19	T_{2B}[Nm]	50,0	50,0	58,0	58,0
		T_{2NOT}[Nm]	77,0	77,0	90,0	90,0
	24	T_{2B}[Nm]	50,0		58,0	
		T_{2NOT}[Nm]	77,0		90,0	

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
		0		0		0		0		0		0
< 80	970	485	1250	625	1380	690	1600	800	1800	900	2500	1250



Gearbox inertia moments/mass

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

	Inertia moment [kgcm²]						
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm²]	0.3307	0.2454	0.1801	0.1458	0.1943	0.1476	0.1268

Mass ca. [kg]
7

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

Inertia moment Coupling J

	KN	KNN	SN
	J [kgcm²]	J [kgcm²]	J [kgcm²]
K14	0.0606	0.0606	0.1446
K19	0.4229	0.4229	0.6349

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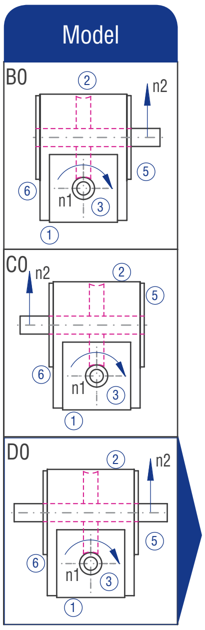
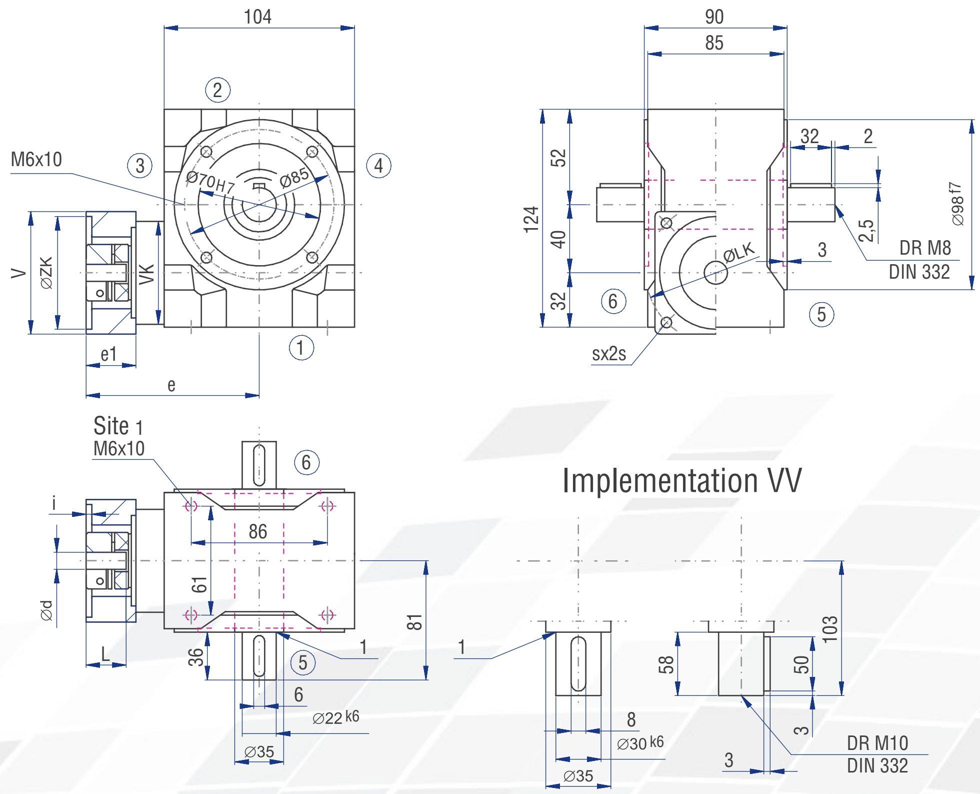
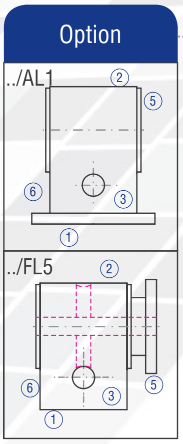
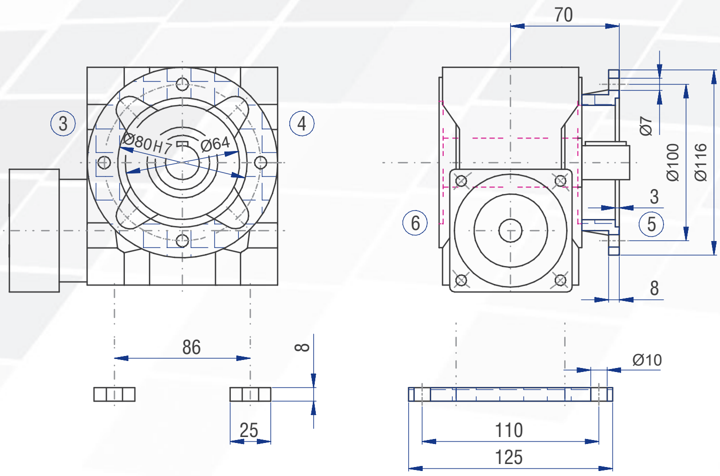






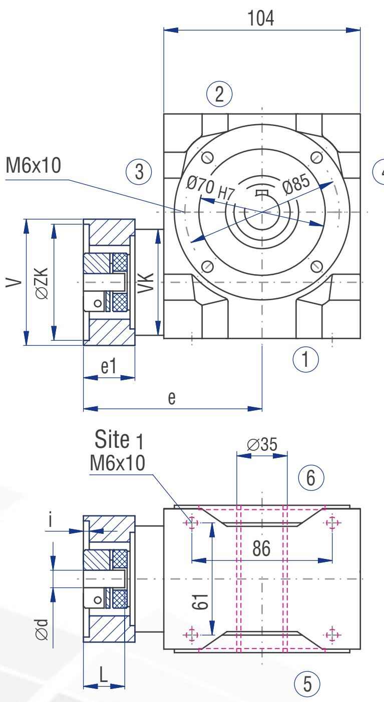


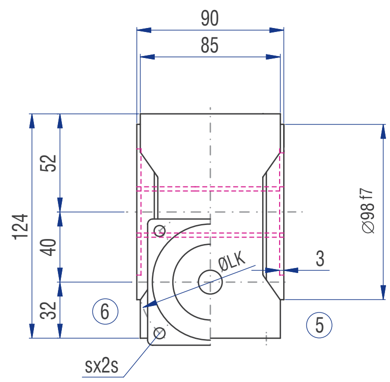
Motor dimensions

Flange no.	Motor shaft (dxL)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
001	11*23	M4	65	40	63	3	93.0	30.0
002	11*23	M5	65	40	63	3	93.0	30.0
102	11*23	M5	65	60	75	3	90.0	26.5
202	11*23	M5	65	60	90	4	90.0	26.5
103	14*30	M6	65	60	75	3	108.5	45.0
104	14*30	M5	65	60	75	3	108.5	45.0
201	14*30	M5	65	60	90	4	108.5	45.0
301	14*30	M6	65	50	95	4	108.5	45.0
401	14*30	M6	65	80	100	4	108.5	45.0
501	14*30	M8	65	95	115	4	108.5	45.0
601	19*40	M8	90	95	130	4	121.0	45.0
611	19*40	M8	90	110	130	5	121.0	45.0
701	19*40	M8	90	110	145	5	121.0	45.0
802	19*40	M10	90	110	165	5	121.0	45.0

The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

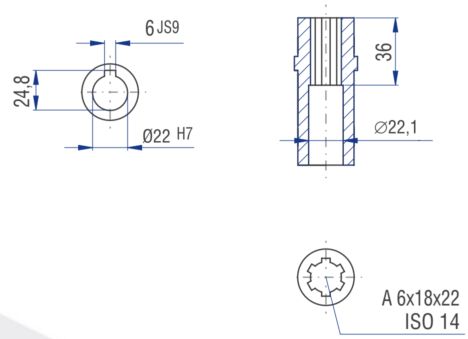
The dimensions of the Models not shown can be figured by mirroring available dimensions.



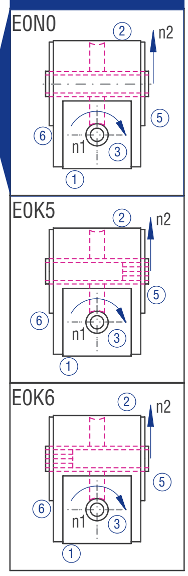


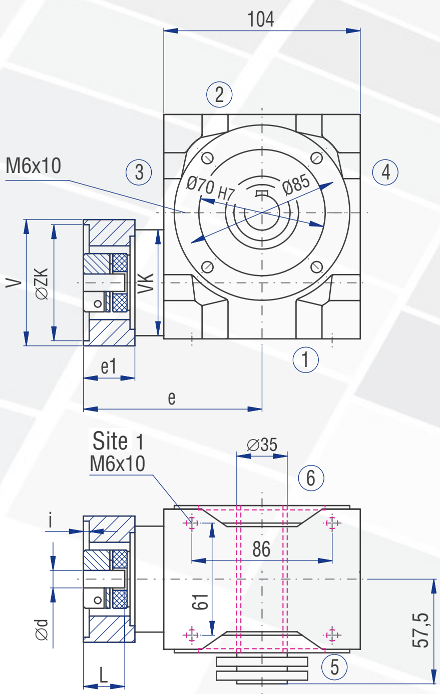
E0N0

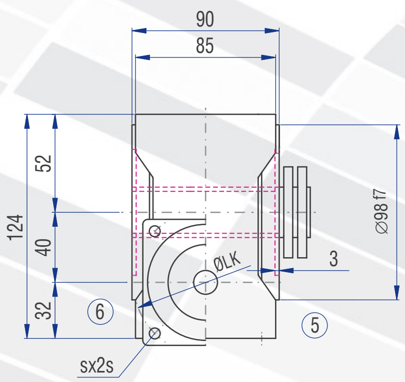
E0K5 / E0K6

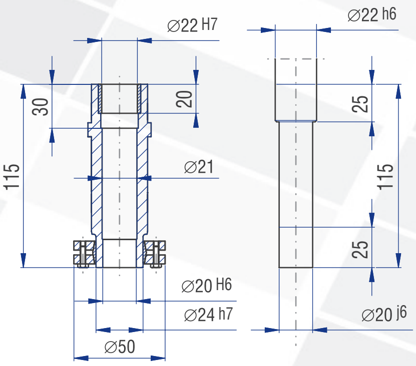


Model

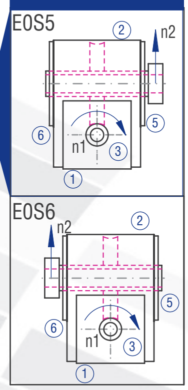






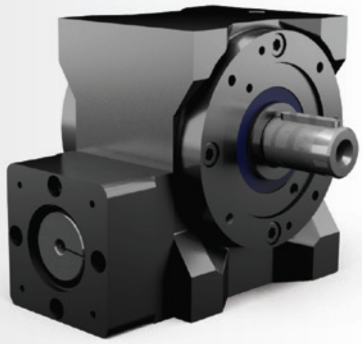


Model



Servo gearboxes (precision gearboxes)

11.5.17 Type SC 050 – Servo worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 11.5.2
Gear ratio	10:1 to 20:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On gearbox side 1 and on the flanges	See chapter 11.5.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.5.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.5.9
Lubricants	Synthetic lubricants	See chapter 11.5.9
Motor flange	Aluminium	See chapter 11.5.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.5.13

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Torques in operating mode S1

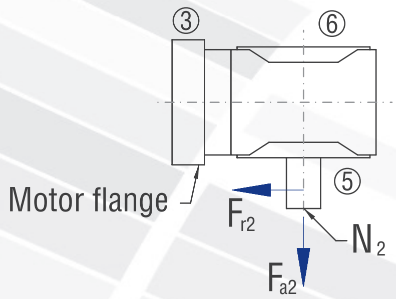
I rated	10:1		20:1	
I ist	38:4		38:2	
	n_2 [1/min]	T_{2N} [Nm]	n_2 [1/min]	T_{2N} [Nm]
4000	421	70	211	72
3000	316	83	158	85
2400	253	97	126	98
1500	158	110	79	111

Torques in operating mode S5

I rated			10:1		20:1	
T_{2N} [Nm]			91		106	
n_{1max} [U/min]			5500		5500	
Coupling size	d [mm]		KN	KNN/SN	KN	KNN/SN
K19	9	T_{2B}[Nm]	112,0		133,0	
		T_{2NOT}[Nm]	152,0		179,0	
	11	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	14	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	16	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	19	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	24	T_{2B}[Nm]	112,0		133,0	
		T_{2NOT}[Nm]	152,0		179,0	
K24	11	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	0,0	179,0	0,0
	14	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	16	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	19	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	24	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0
	28	T_{2B}[Nm]	112,0	112,0	133,0	133,0
		T_{2NOT}[Nm]	152,0	152,0	179,0	179,0

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 120	2000	1000	2400	1200	2850	1425	3350	1675	4000	2000	4800	2400
> 120	1540	770	1850	925	2190	1095	2580	1290	3080	1540	3700	1850



Gearbox inertia moments/mass

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

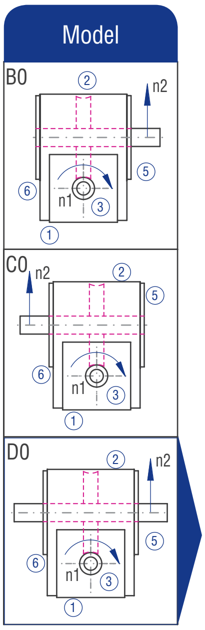
	Inertia moment [kgcm²]						
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm²]	0.9509	0.7327	0.5820	0.4876	0.6017	0.4996	0.4375

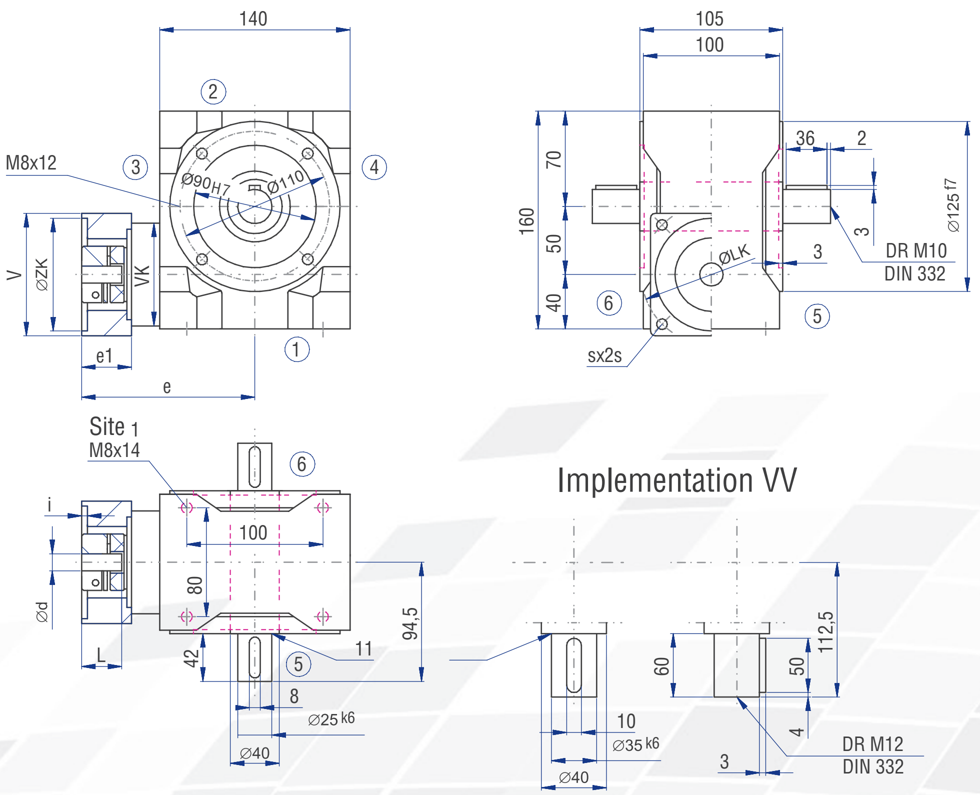
Mass ca. [kg]
13

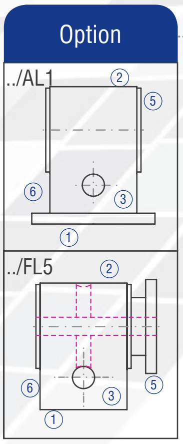
The mass of the gearbox may deviate depending on the flange size and the gear ratio.

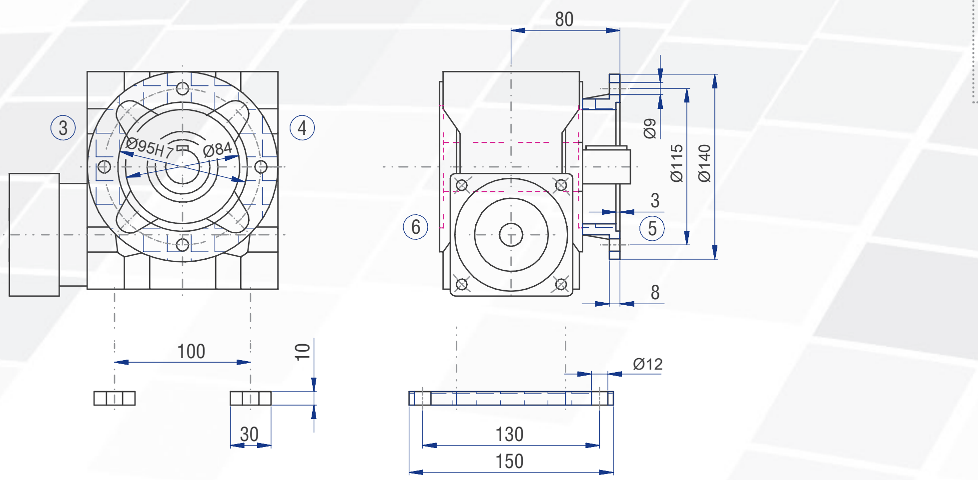
Inertia moments Coupling J

	KN	KNN	SN
	J [kgcm²]	J [kgcm²]	J [kgcm²]
K19	0.4229	0.4229	0.6349
K24	1.0910	1.0910	2.7750







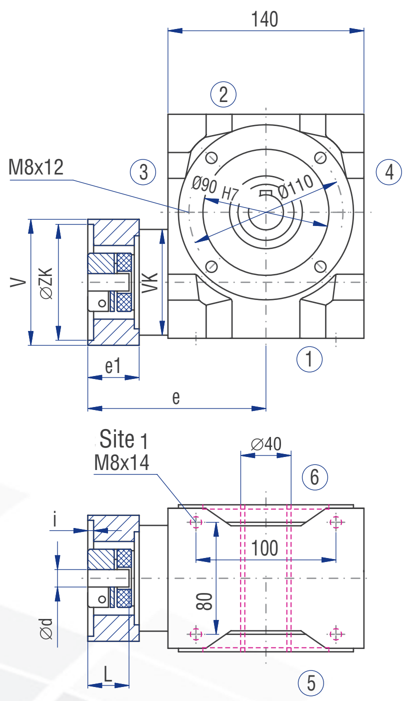


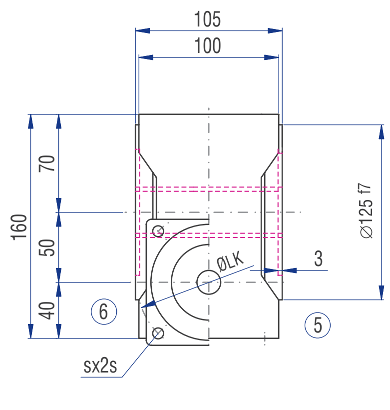
Motor dimensions

Flange no.	Motor shaft (dxL)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
103	19*40	M6	90	60	75	3	141.0	45.0
201	19*40	M5	90	60	90	3	141.0	45.0
301	19*40	M6	90	50	95	4	141.0	45.0
401	19*40	M6	90	80	100	4	141.0	45.0
501	19*40	M8	90	95	115	4	141.0	45.0
601	19*40	M8	90	95	130	4	141.0	45.0
611	19*40	M8	90	110	130	5	141.0	45.0
701	19*40	M8	90	110	145	5	141.0	45.0
802	19*40	M10	90	110	165	5	141.0	45.0
811	24*50	M10	120	130	165	5	155.0	54.0

The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

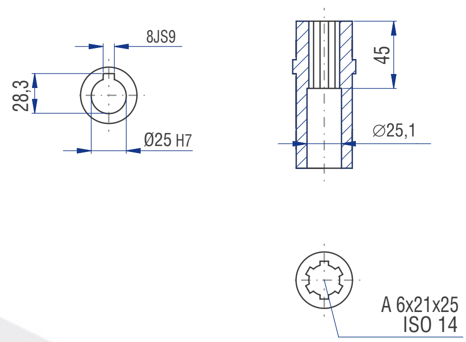
The dimensions of the Models not shown can be figured by mirroring available dimensions.

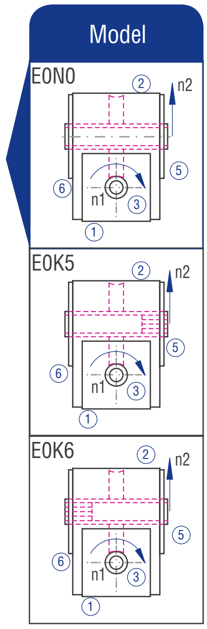


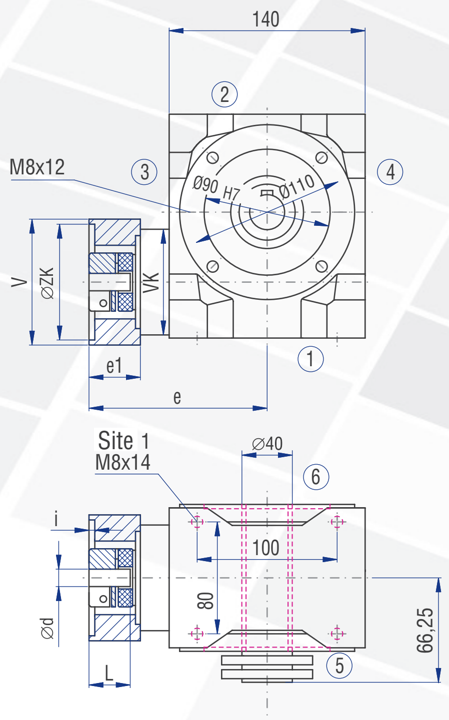


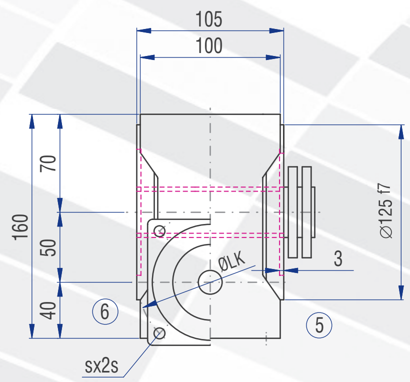
E0N0

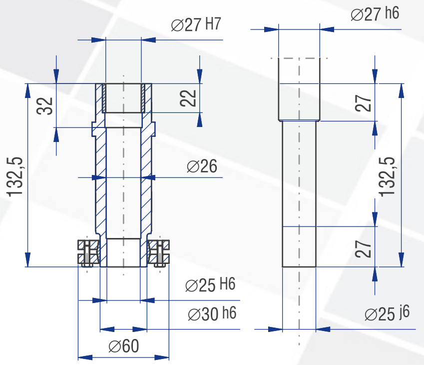
E0K5 / E0K6

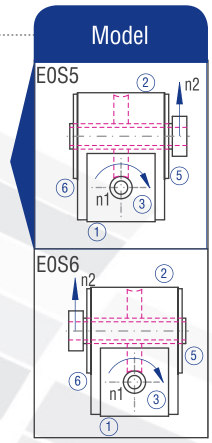








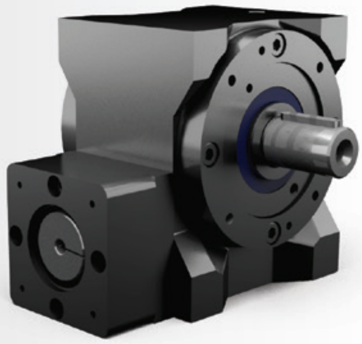




Servo gearboxes (precision gearboxes)

ATEK ANTRIEBSTECHNIK

11.5.18 Type SC 063 – Servo worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 11.5.2
Gear ratio	10:1 to 20:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On gearbox side 1 and on the flanges	See chapter 11.5.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.5.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.5.9
Lubricants	Synthetic lubricants	See chapter 11.5.9
Motor flange	Aluminium	See chapter 11.5.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts clamping hub KN For smooth motor shafts tension ring hub SN For motor shafts with parallel key clamping hub with groove KNN	See chapter 11.5.13

Table 9-13

Torques in operating mode S1

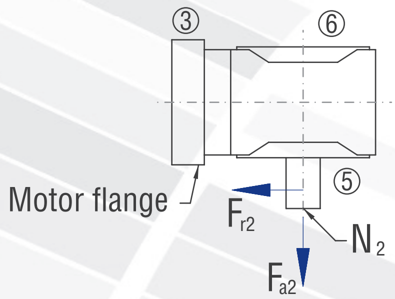
I rated	10:1		20:1	
I ist	39:4		39:2	
	n_2 [1/min]	T_{2N} [Nm]	n_2 [1/min]	T_{2N} [Nm]
4000	410	101	205	116
3000	308	124	154	141
2400	246	148	123	166
1500	154	171	77	190

Torques in operating mode S5

I rated			10:1		20:1	
T_{2N} [Nm]			170		186	
n_{1max} [U/min]			5000		5000	
Coupling size	d [mm]		KN	KNN/SN	KN	KNN/SN
K19	9	T_{2B}[Nm]	165,8		259,0	
		T_{2NOT}[Nm]	292,5		355,0	
	11	T_{2B}[Nm]	165,8	165,8	259,0	259,0
		T_{2NOT}[Nm]	292,5	292,5	355,0	355,0
	14	T_{2B}[Nm]	165,8	165,8	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	16	T_{2B}[Nm]	165,8	165,8	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	19	T_{2B}[Nm]	165,8	165,8	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	24	T_{2B}[Nm]	165,8		259,0	
		T_{2NOT}[Nm]	306,0		355,0	
K24	11	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	0,0	355,0	0,0
	14	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	16	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	19	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	24	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0
	28	T_{2B}[Nm]	216,0	216,0	259,0	259,0
		T_{2NOT}[Nm]	306,0	306,0	355,0	355,0

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 220	2700	1350	3150	1575	3800	1900	4500	2250	5200	2600	5200	2600
> 220	2080	1040	2420	1210	2920	1460	3460	1730	4000	2000	4000	2000



Gearbox inertia moments/mass

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

	Inertia moment [kgcm²]						
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm²]	2.1678	1.6423	1.1366	0.9368	1.3270	0.9445	0.8175

Mass ca. [kg]
20

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

Inertia moments Coupling J

	KN	KNN	SN
	J [kgcm²]	J [kgcm²]	J [kgcm²]
K19	0.4229	0.4229	0.6349
K24	1.0910	1.0910	2.7750

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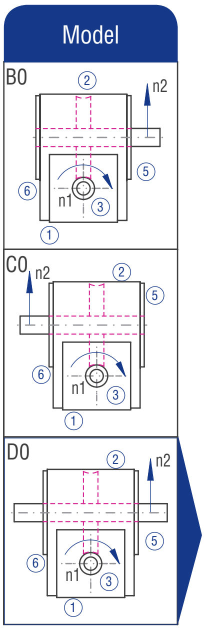
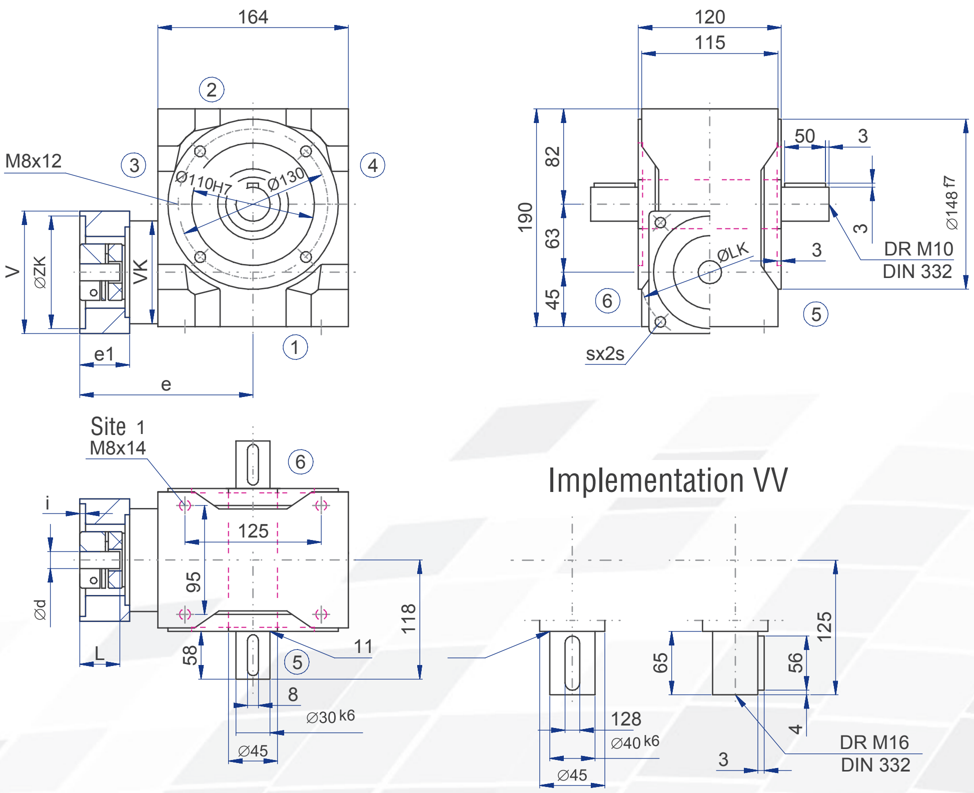
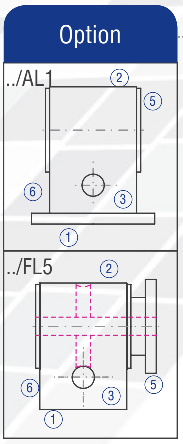
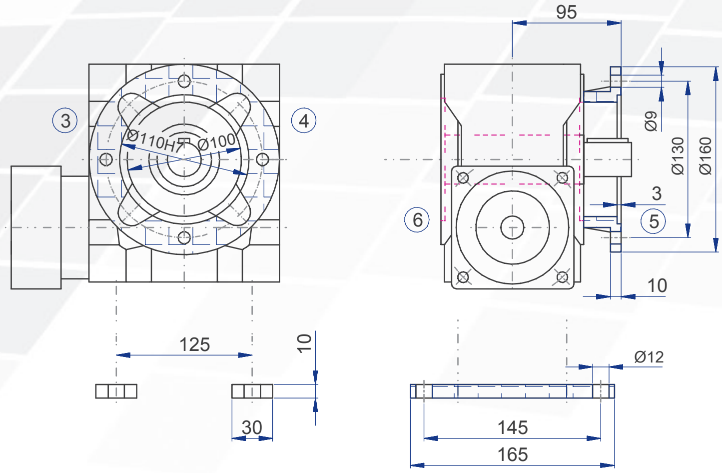
11.5.18 Type SC 063 – Servo worm gearboxes









Motor dimensions

Flange no.	Motor shaft (dxL)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
103	19*40	M6	90	60	75	3	154.0	45.0
201	19*40	M5	90	60	90	3	154.0	45.0
301	19*40	M6	90	50	95	4	154.0	45.0
401	19*40	M6	90	80	100	4	154.0	45.0
501	19*40	M8	90	95	115	4	154.0	45.0
601	19*40	M8	90	95	130	4	154.0	45.0
611	19*40	M8	90	110	130	5	154.0	45.0
701	19*40	M8	90	110	145	5	154.0	45.0
802	19*40	M10	90	110	165	5	154.0	45.0
811	24*50	M10	120	130	165	5	177.0	54.0

The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

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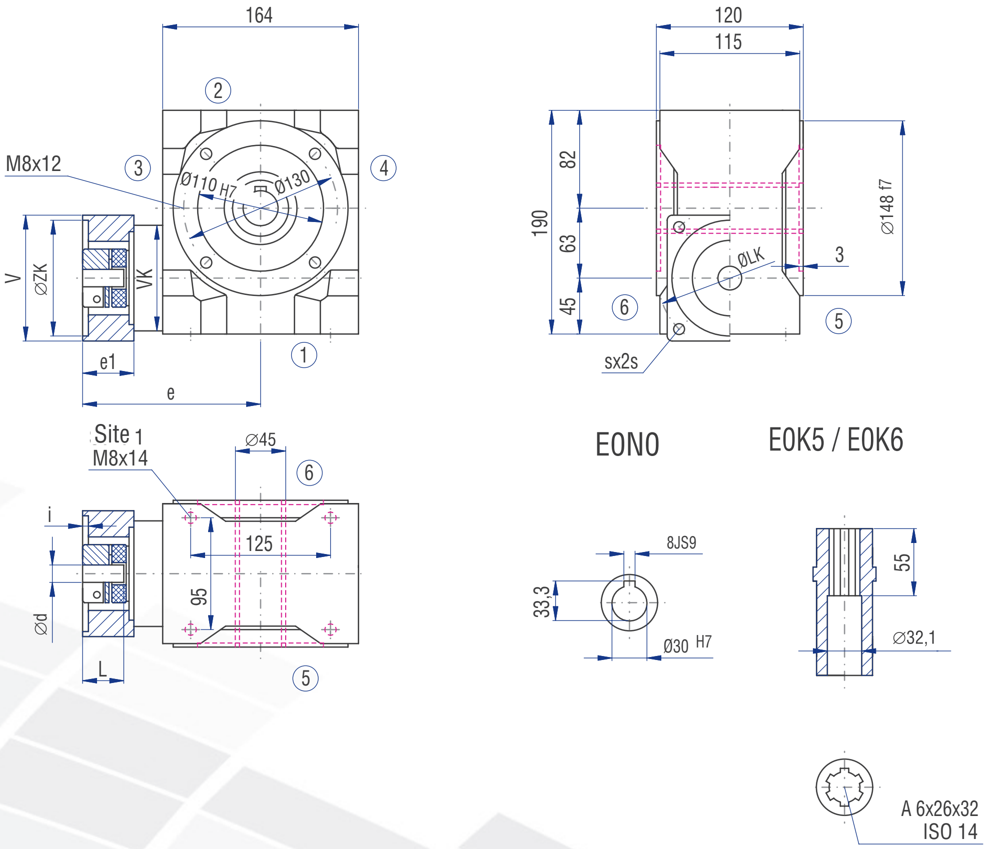
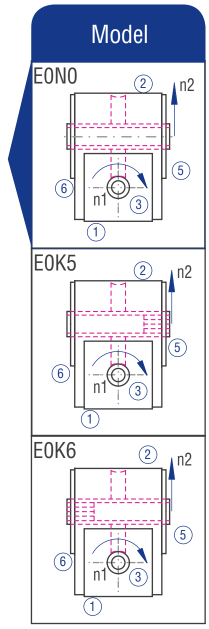
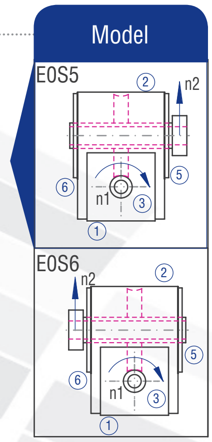
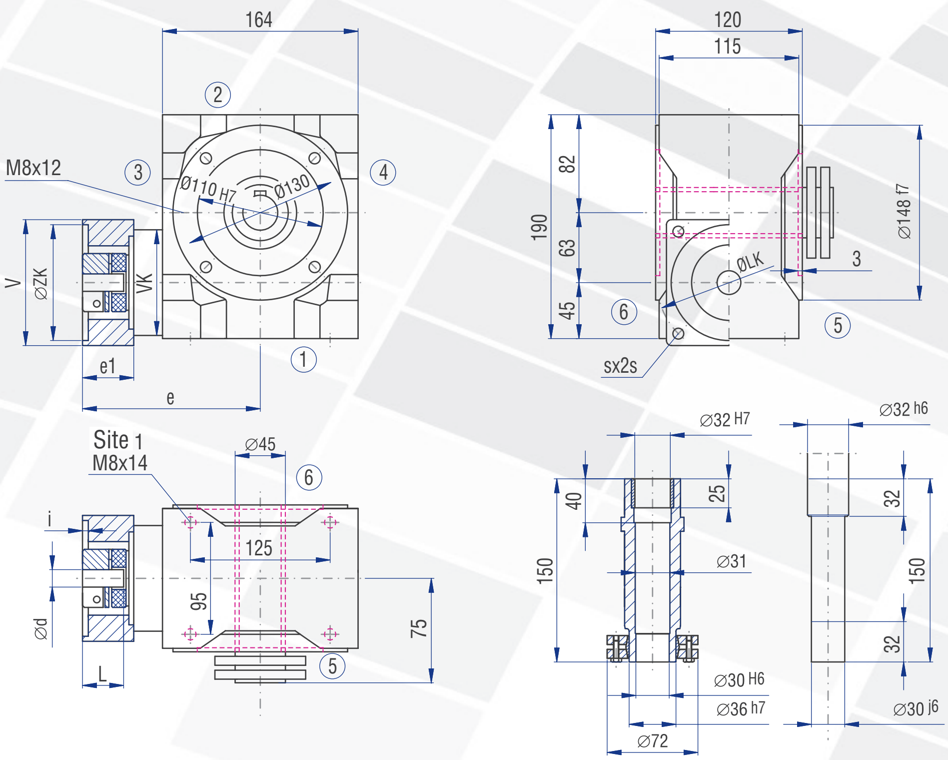
The dimensions of the Models not shown can be figured by mirroring available dimensions.





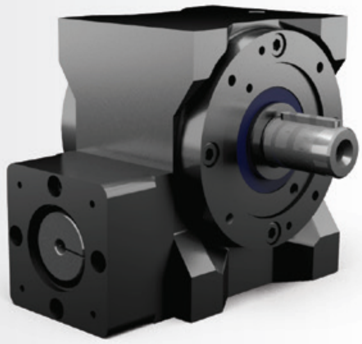




Servo gearboxes (precision gearboxes)

ATEK ANTRIEBSTECHNIK

11.5.19 Type SC 080 – Servo worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 11.5.2
Gear ratio	10:1 to 20:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On gearbox side 1 and on the flanges	See chapter 11.5.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.5.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.5.9
Lubricants	Synthetic lubricants	See chapter 11.5.9
Motor flange	Aluminium	See chapter 11.5.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.5.13

Torques in operating mode S1

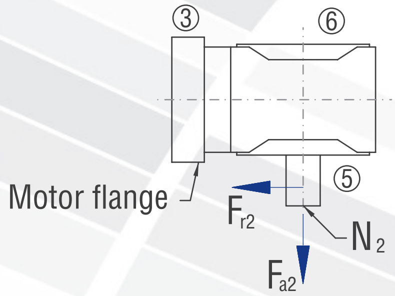
I rated	10:1		20:1	
I ist	40:4		40:2	
	n_2 [1/min]	T_{2N} [Nm]	n_2 [1/min]	T_{2N} [Nm]
4000	400	132	200	153
3000	300	177	150	203
2400	240	222	120	253
1500	150	267	75	303

Torques in operating mode S5

I rated			10:1		20:1	
T_{2N} [Nm]			297		344	
n_{1max} [U/min]			4500		4500	
Coupling size	d [mm]		KN	KNN/SN	KN	KNN/SN
K24	11	T_{2B}[Nm]	350,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	450,0	0,0	725,0	0,0
	14	T_{2B}[Nm]	360,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	450,0	625,0	725,0	725,0
	16	T_{2B}[Nm]	390,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	500,0	625,0	725,0	725,0
	19	T_{2B}[Nm]	390,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	600,0	625,0	725,0	725,0
	24	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	28	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
K28	14	T_{2B}[Nm]	408,0		498,0	
		T_{2NOT}[Nm]	625,0		725,0	
	16	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	19	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	24	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	28	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	32	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	38	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	0,0	725,0	0,0

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 430	3300	1650	3750	1875	4500	2250	5300	2650	6300	3150	7600	3800
> 430	2640	1320	3000	1500	3600	1800	4240	2120	5040	2520	6080	3040



Gearbox inertia moments/mass

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

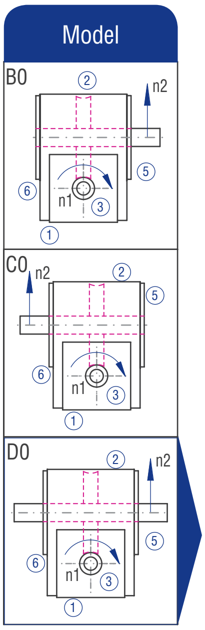
	Inertia moment [kgcm^2]						
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm^2]	5.8195	4.2167	2.9560	2.2634	3.2550	2.3977	1.9066

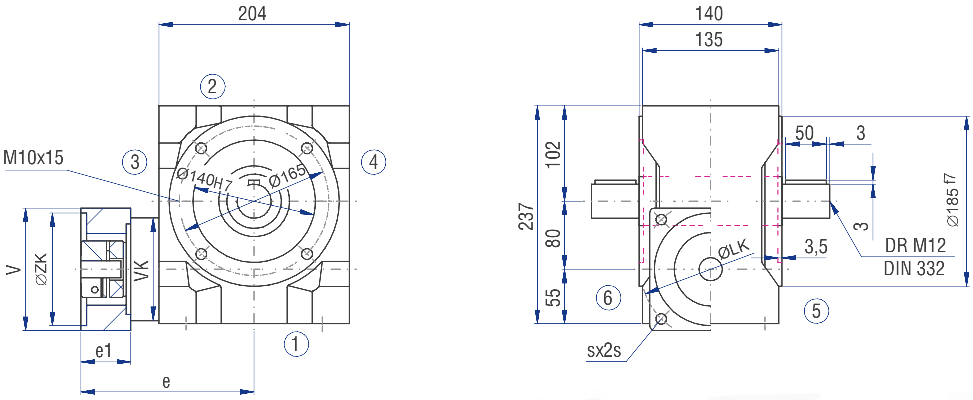
Mass ca. [kg]
30

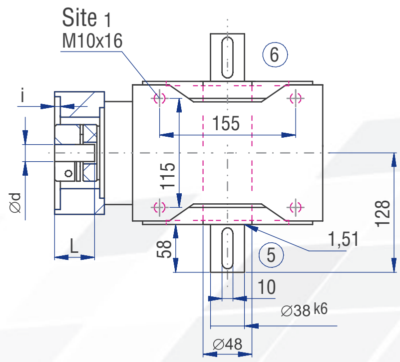
Inertia moments Coupling J

	KN	KNN	SN
	J [kgcm^2]	J [kgcm^2]	J [kgcm^2]
K24	1.0910	1.0910	2.7750
K28	4.1710	4.1710	6.4250

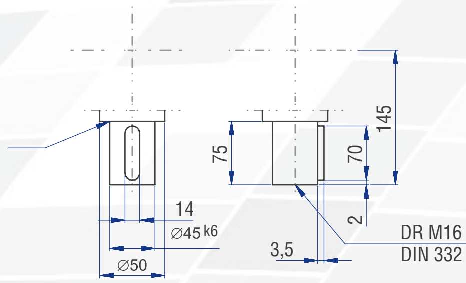
The mass of the gearbox may deviate depending on the flange size and the gear ratio.

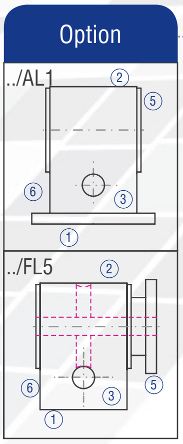


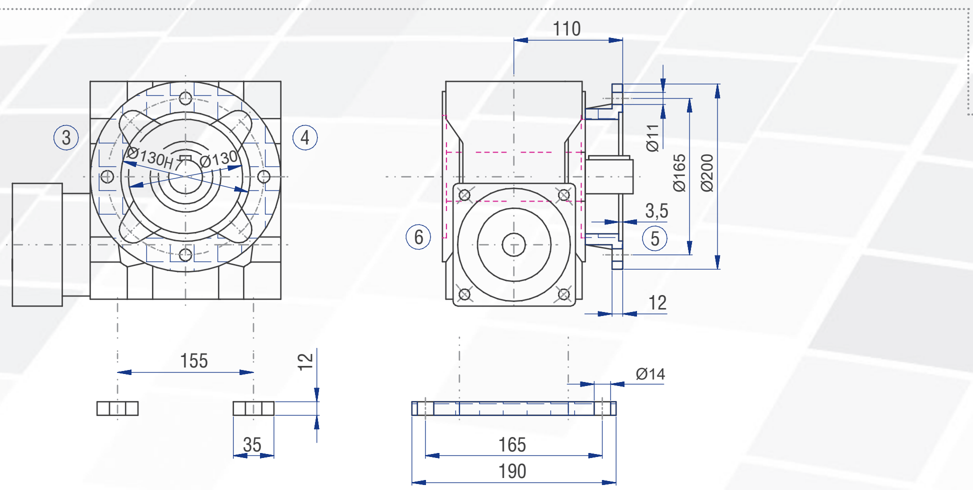




Implementation VV





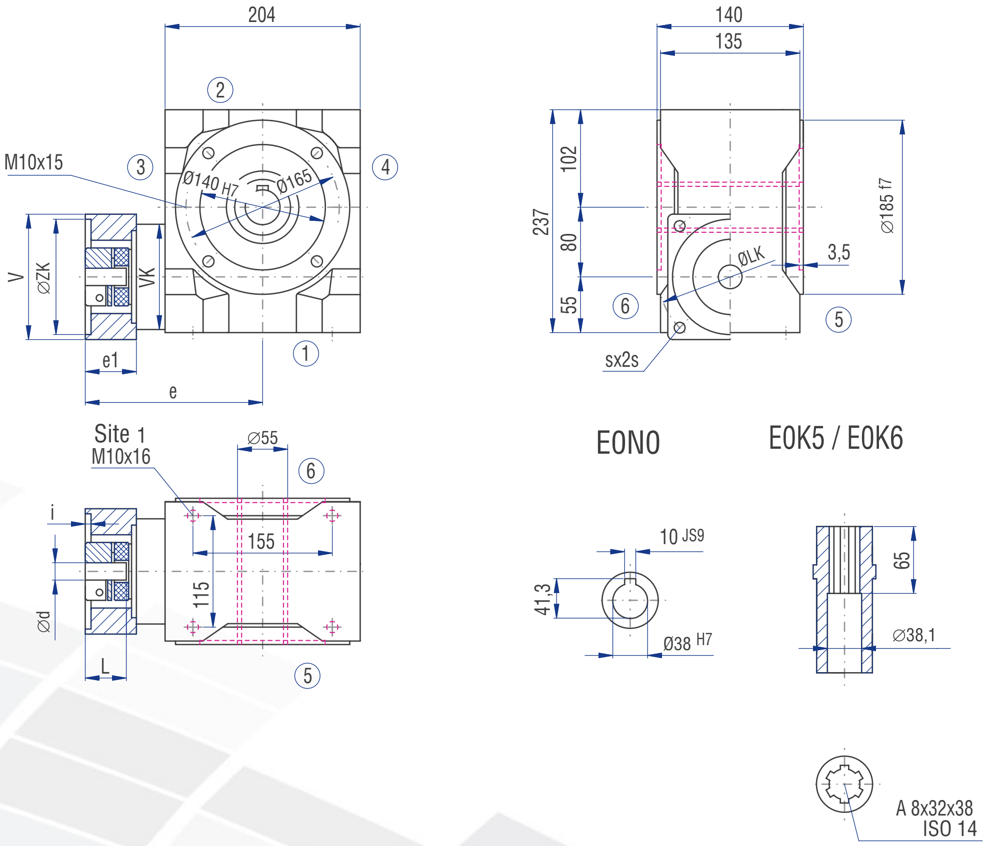


Motor dimensions

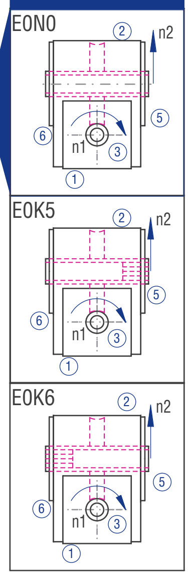
Flange no.	Motor shaft (dxL)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
103	24*50	M6	120	60	75	3	192.5	54.0
201	24*50	M5	120	60	90	3	192.5	54.0
301	24*50	M6	120	50	95	4	192.5	54.0
401	24*50	M6	120	80	100	4	192.5	54.0
501	24*50	M8	120	95	115	4	192.5	54.0
601	24*50	M8	120	95	130	4	192.5	54.0
611	24*50	M8	120	110	130	5	192.5	54.0
701	24*50	M8	120	110	145	5	192.5	54.0
802	24*50	M10	120	110	165	5	192.5	54.0
811	24*50	M10	120	130	165	5	192.5	54.0
403	32*60	M6	140	80	100	4	202.5	61.0
502	32*60	M8	140	95	115	4	202.5	61.0
616	32*60	M10	140	110	130	5	202.5	61.0
902	32*60	M12	140	130	215	6	202.5	61.0
911	32*60	M12	140	180	215	6	202.5	61.0
932	38*80	M12	160	180	215	6	241.0	99.5

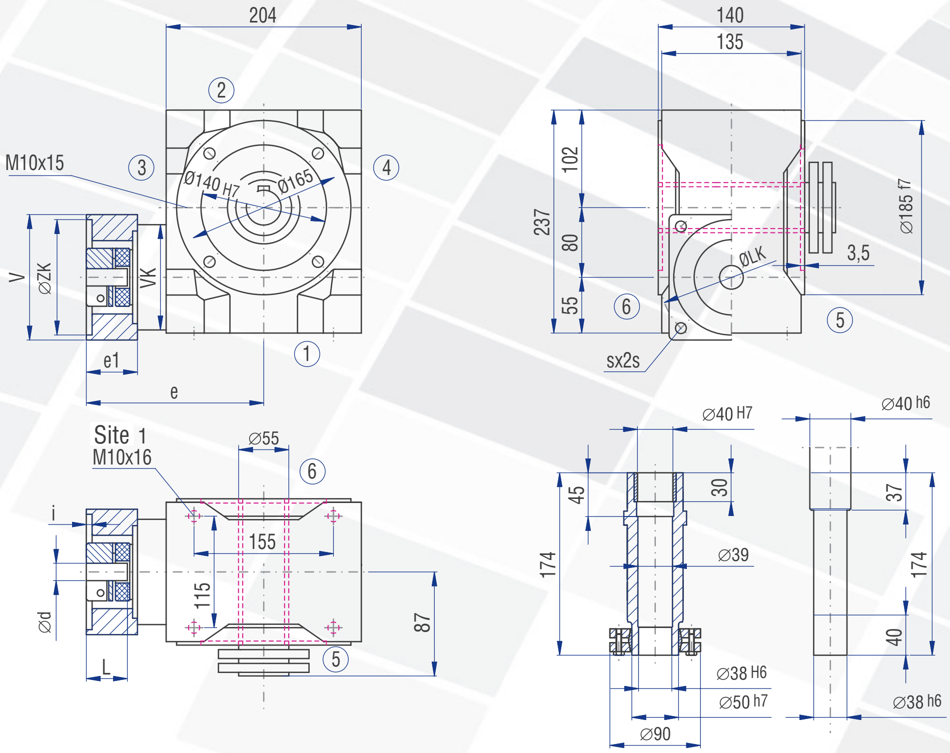
The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

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

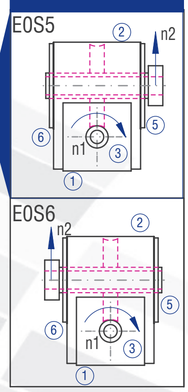


Model



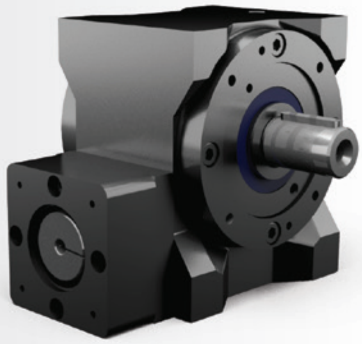


Model



Servo gearboxes
(precision gearboxes)

11.5.20 Type SC 100 – Servo worm gearboxes



Characteristics

Characteristic	Standard	Option
Toothing	Hardened and ground worm shaft / bronze worm gear	See chapter 11.5.2
Gear ratio	10:1 to 20:1	
Housing / Flanges	Grey cast iron / aluminium	
Threaded mounting holes	On gearbox side 1 and on the flanges	See chapter 11.5.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO j6 tolerance with parallel keyway: according to DIN 6885 Sheet 1	See chapter 4.6.2
Hollow shaft	Material 1 C45, shafts greased Fit with ISO H7 tolerance with parallel keyway: according to DIN 6885 Sheet 1	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	< 20 arcmin	See chapter 11.5.11
Protection class	IP 54	See chapter 4.5
Corrosion protection	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
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 11.5.9
Lubricants	Synthetic lubricants	See chapter 11.5.9
Motor flange	Aluminium	See chapter 11.5.14
Coupling	Insertable, flexible claw coupling, suitable for servo-motors For smooth motor shafts — clamping hub — KN For smooth motor shafts — tension ring hub — SN For motor shafts with parallel key — clamping hub with groove — KNN	See chapter 11.5.13

Torques in operating mode S1

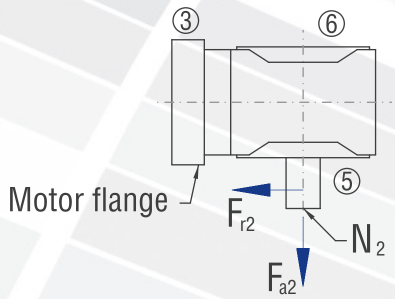
I rated	10:1		20:1	
I ist	40:4		40:2	
	n_2 [1/min]	T_{2N} [Nm]	n_2 [1/min]	T_{2N} [Nm]
4000	400	132	200	153
3000	300	177	150	203
2400	240	222	120	253
1500	150	267	75	303

Torques in operating mode S5

I rated			10:1		20:1	
T_{2N} [Nm]			297		344	
n_{1max} [U/min]			4500		4500	
Coupling size	d [mm]		KN	KNN/SN	KN	KNN/SN
K24	11	T_{2B}[Nm]	350,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	450,0	0,0	725,0	0,0
	14	T_{2B}[Nm]	360,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	450,0	625,0	725,0	725,0
	16	T_{2B}[Nm]	390,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	500,0	625,0	725,0	725,0
	19	T_{2B}[Nm]	390,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	600,0	625,0	725,0	725,0
	24	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	28	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
K28	14	T_{2B}[Nm]	408,0		498,0	
		T_{2NOT}[Nm]	625,0		725,0	
	16	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	19	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	24	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	28	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	32	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	625,0	725,0	725,0
	38	T_{2B}[Nm]	408,0	408,0	498,0	498,0
		T_{2NOT}[Nm]	625,0	0,0	725,0	0,0

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

n_2 [rpm]	200		125		75		50		30		10	
T_2 [Nm]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]	F_r [N]	F_a [N]
< 800	3650	1825	4000	2000	4750	2375	5600	2800	6700	3350	9500	4750
> 800	2920	1460	3200	1600	3800	1900	4480	2240	5360	2680	7600	3800



Gearbox inertia moments/mass

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

	Inertia moment [kgcm²]						
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm²]	22.3780	17.8750	14.0300	12.2840	15.1730	12.3740	11.3360

Mass ca. [kg]
53

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

Inertia moments Coupling J

	KN J [kgcm²]	KNN J [kgcm²]	SN J [kgcm²]
	4.1710	4.1710	6.4250
K38	8.4580	8.4580	19.6460

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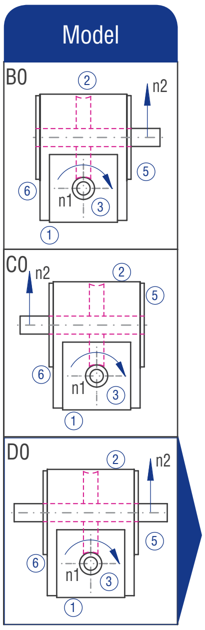
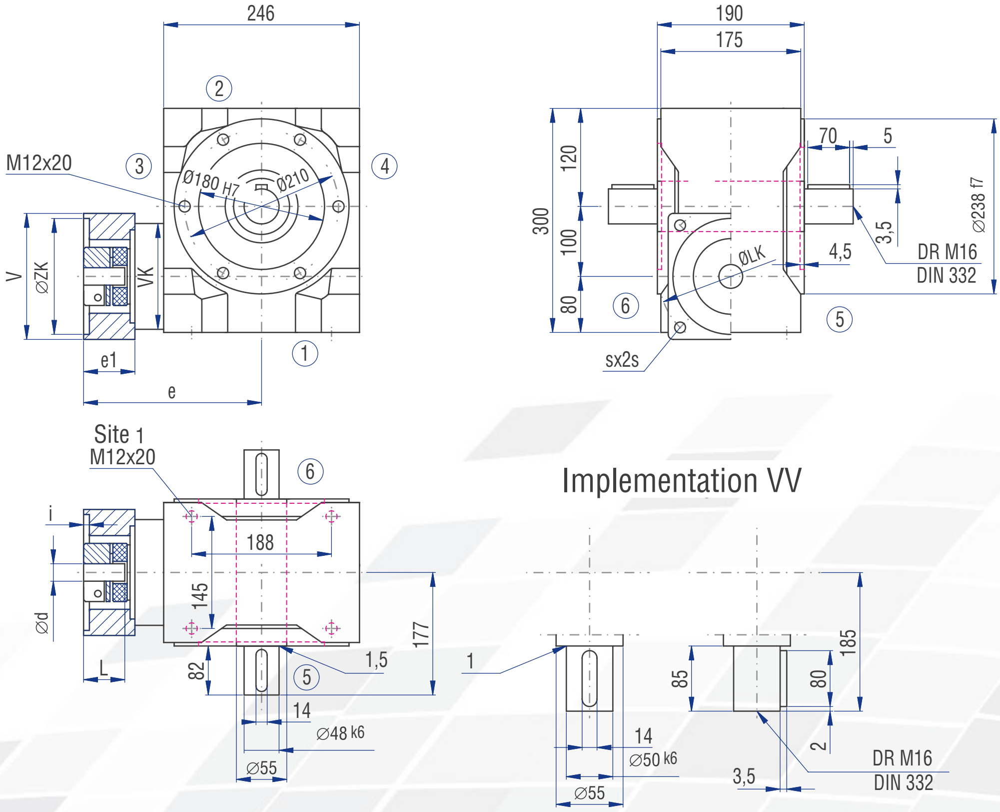
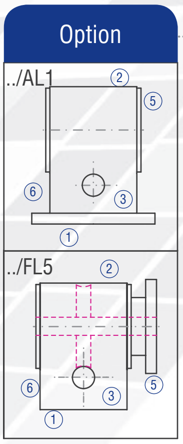
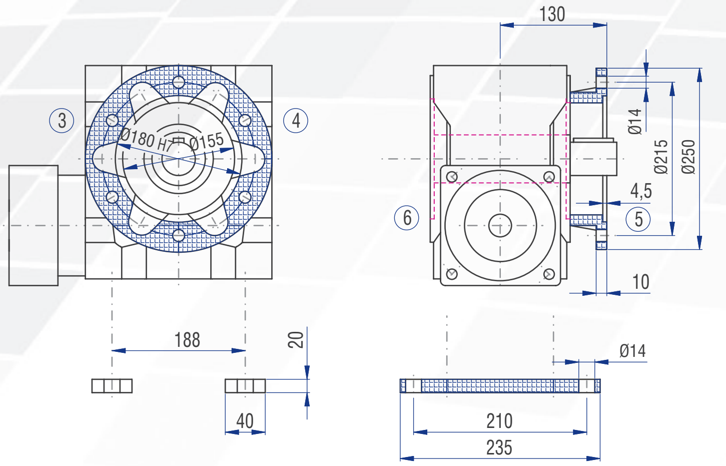






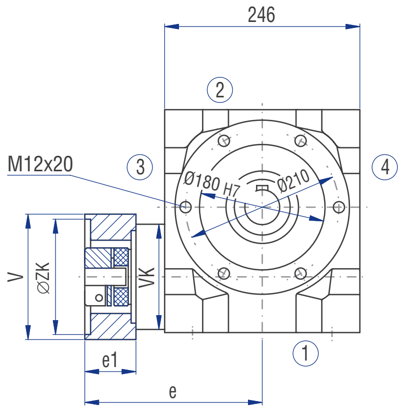


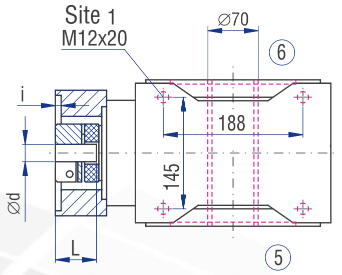
Motor dimensions

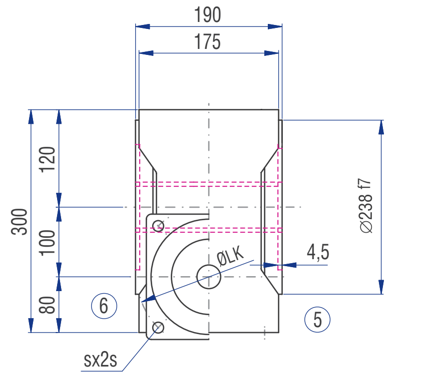
Flange no.	Motor shaft (dxL)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
601	32*60	M8	160	95	130	4	242.0	62.0
611	32*60	M8	160	110	130	5	242.0	62.0
701	32*60	M8	160	110	145	5	242.0	62.0
802	32*60	M10	160	110	165	5	242.0	62.0
811	32*60	M10	160	130	165	5	242.0	62.0
403	32*60	M6	160	80	100	4	242.0	62.0
502	32*60	M8	160	95	115	4	242.0	62.0
616	32*60	M10	160	110	130	5	242.0	62.0
902	32*60	M12	160	130	215	6	242.0	62.0
911	32*60	M12	160	180	215	6	242.0	62.0

The dimensions e and e1 will change for the coupling type “clamping hub with groove” (KNN). Please contact us for consultation!

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

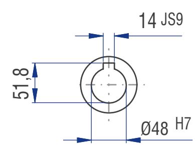


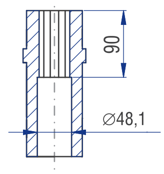


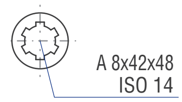


E0N0

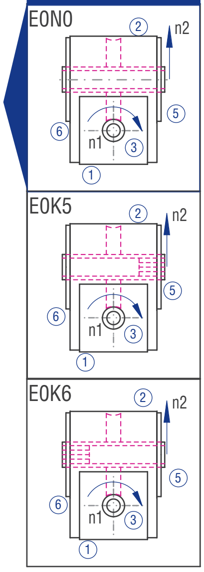
E0K5 / E0K6

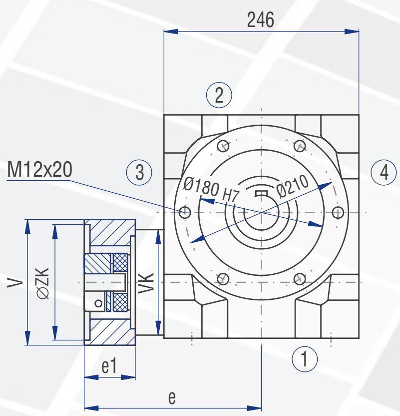


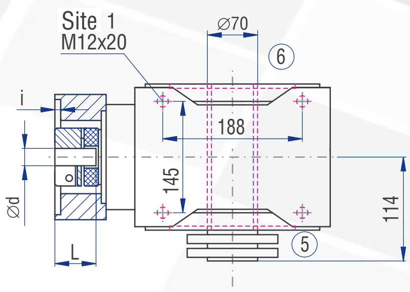


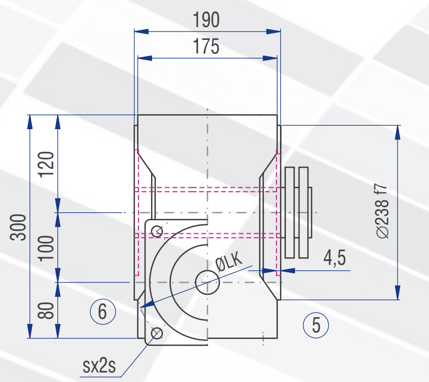


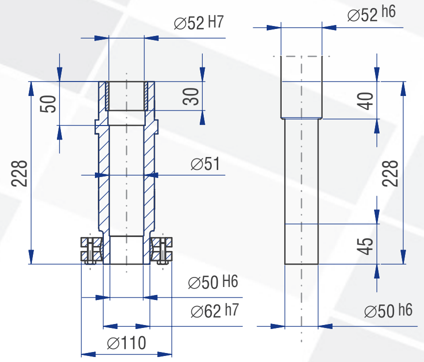
Model



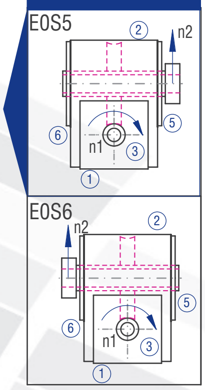




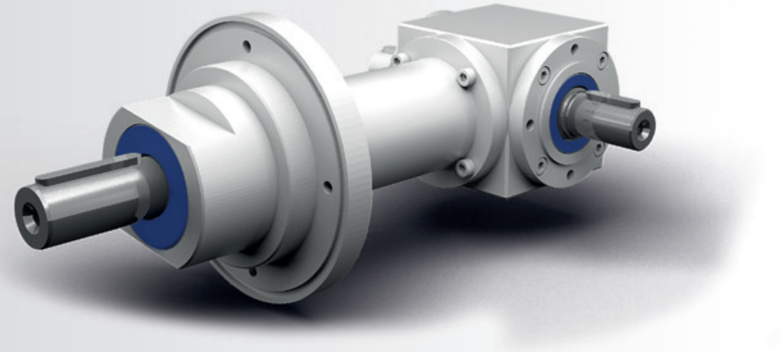




Model

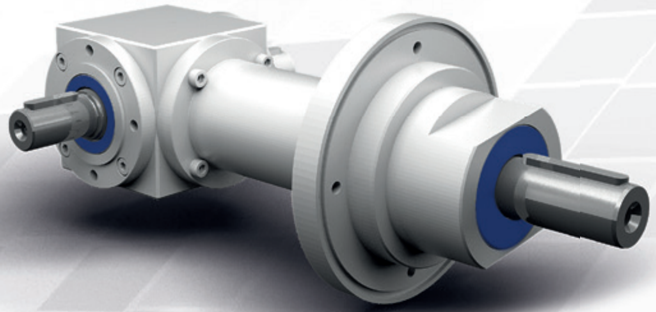


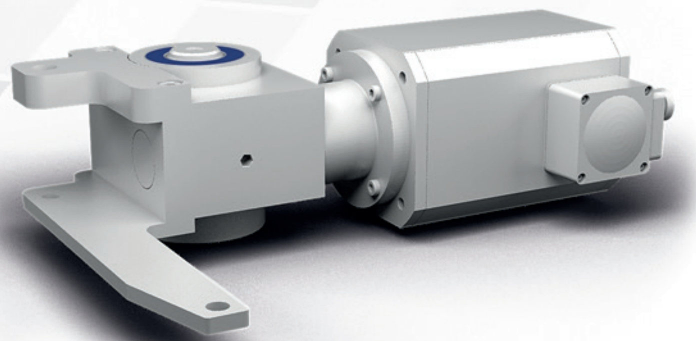
Servo gearboxes
(precision gearboxes)



In addition to our standard range of products, we develop and manufacture special gearboxes according to the customer's request. These are used, for example, in the food industry sector and in offshore facilities. In most cases, they are based on our proven solutions from the range of single-stage bevel and worm gearboxes. But also combinations and other solutions are possible.

Examples thereof are:





The special gearboxes profit from our long-term experience gained from our bevel and worm gearboxes.

12.1.1 Data collection

Below and in the Downloads section of the ATEK Internet site, you can find a questionnaire for the collection of the most important technical data of the gearbox to be developed.

Core data – company			
1.1	Company name		
1.2	Street + no.		
1.3	Postal code + location		
1.4	Phone number		
1.5	Fax number		
1.6	E-mail address		

Core data – interested person			
2.1	Name		
2.2	E-mail		
2.3	Phone number		

Selection				
6.1	Gearbox type			
6.2	Gearbox size			
6.3	Gear ratio	**i**		
6.4	Construction type			
6.5	Fixing side			
6.6	Installation position			

Power transmission			Unit	
7.1	Speed of fast-rotating shaft	n_1	[rpm]	
7.2	Speed of slowly rotating shaft	n_2	[rpm]	
7.3	Effective input power	P_1	[kW]	
7.4	Effective output torque	T_2	[Nm]	
7.5	Existing radial force (FR) and axial force (FA) at n1		[N]	
7.6	Existing radial force (FR) and axial force (FA) at n2		[N]	

Motor data		
8.1	Motor manufacturer and motor designation	

Flange data of motor to be mounted			
9.1	Flange	Standard/special	
9.2	Motor shaft	Standard/special	

Factors				
10.1	Operating factor	f_1		
10.2	Starting factor	f_2		
10.3	Ambient temperature	f_4	[°C]	
10.4	On-period per hour	f_5	%	

Special requirements				
13.1	Complete stainless steel type (incl. housing)	V2A	Yes/No	
13.2	No-Tox lubrication, with USDA approval	NT	Yes/No	
13.3	Type with reduced backlash (see catalogue)		S2/S1/S0/No	
13.4	Special colour	SF	RAL	

Project – Remarks / Notes	
14.1	

Our sales department would be pleased to assist you in completing the questionnaire and will discuss the special requirements with you in a personal dialogue.

ATEK ANTRIEBSTECHNIK

We offer gearboxes according to the EU Directive 2014/34/EU (ATEX) for the use in explosion-hazardous areas. These are gearboxes of the equipment group II in the category 2 for gases (G) and dust (D) for bevel gearboxes, and category 3 for worm gearboxes.

The first step for a safe work equipment according to the Ordinance on Industrial Safety and Health is hazard assessment. This is always an installation-related consideration. The operator having the knowledge on the installation must assess the hazards and ensure the implementation of the protective measures.

As part of the safety-related consideration, the operator defines the requirements for the equipment and component assemblies to be used. These data also form the basis for the planning and design of the gearboxes. Therefore we ask you to send us the attached project planning sheet fully completed and signed.

You will find the current version in the Downloads section of the ATEK Internet site.

The available types are:

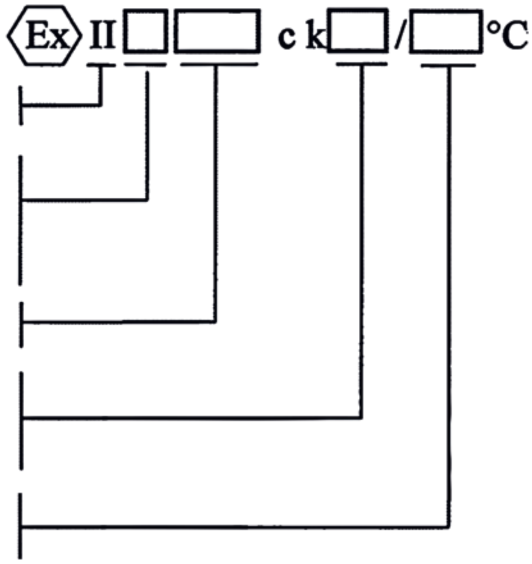
	Miniature bevel gearboxes	Bevel gearboxes	Hygiene-design bevel gearboxes	Worm gearboxes	Hypoid gearboxes
Category 2	Upon request	II 2G, II 2D	Upon request	Upon request	Upon request
Category 3	Upon request	II 3G, II 3D	Upon request	II 3G, II 3D	Upon request

12.1.1 Data collection

Gearbox design for explosion-proof drives

Company		Name	
Order no.		Offer no.	
Gearbox type	/AX	Application	
	Type - Size - Gear ratio - Constr. type - Mountg. - Instal. pos. - Speed/Model V 120 3:1 D0 -1 5- 500 / AX..		e.g. rotary table, auger, ...

Required explosion-proof model



Equipment group

Zone		Explosive atmosphere	Category
Gas	Dust		
1	21	occasionally	2
2	22	seldom, short-time	3

Explosive atmosphere I **G**=gas; **D**=dust; **G/D**=gas or dust

Temperature class I **T1** up to 450°C; **T2** up to 300°C; **T3** up to 200°C; **T4** up to 135°C;
(surface temperature at which the mixture will ignite)

max. surface temperature for dust deposits up to 5mm
(in °C, only required in dust-contaminated atmosphere)

Data for gearbox design			Your entry
S.., ..%ED	Operating mode and relative on-period (duty ratio) ED	[%]	
Z	Switching frequency	[per h]	
$\mathbf{n_1}$	Input speed	[rpm]	
$\mathbf{n_2}$	Output speed	[rpm]	
$\mathbf{n_{2\,max}}$	Maximum output speed	[rpm]	
$\mathbf{T_{2N}}$	Nominal torque	[Nm]	
$\mathbf{T_{2max}}$	e.g. max. acceleration/braking/emergency-stop torque	[Nm]	
$\mathbf{Z_{T2max}}$	Switching frequency $\mathbf{T_{2max}}$	[per h]	
$\mathbf{T_R}$	Retrodriving torque from mass inertia if > $\mathbf{T_{2N}}$	[Nm]	
$\mathbf{P_{1mot}}$	Motor output	[kW]	
H	Installation altitude <=1000	[m above MSL]	
$\mathbf{T_{Umg}}$	Ambient temperature >-20°C and <+60°C	[°C]	
IP	Required protection rating: IP54 or IP56	[-]	
$\mathbf{F_{Rn1} / F_{Rn2}}$	Lateral force in centre of drive shaft (for $\mathbf{n_1}$)/ output shaft(s) (for $\mathbf{n_2}$)	[N]	
$\mathbf{F_{An1} / F_{An2}}$	Axial force in centre of drive shaft (for $\mathbf{n_1}$)/ output shaft(s) (for $\mathbf{n_2}$)	[N]	

Please complete the table entirely, and, if possible, include a freehand sketch for illustrating the installation, operating and load conditions.
If frequency converters are used we ask for additional information on the frequency and voltage changes (at 87Hz)

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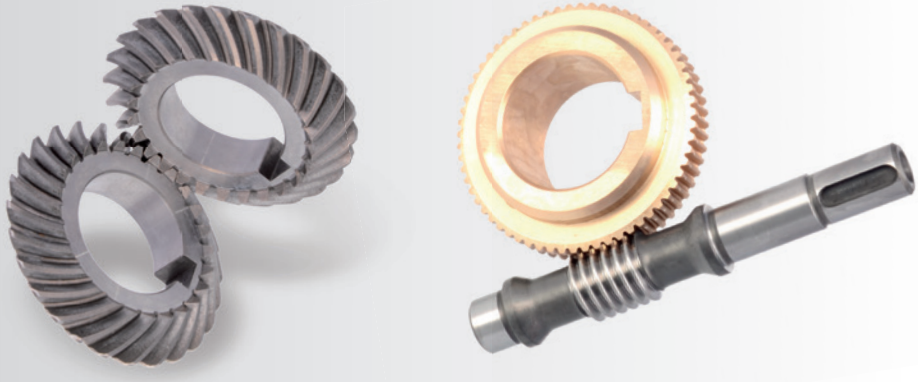
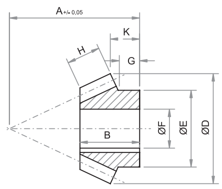
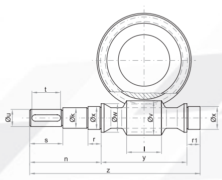




Bevel gear sets

Spiral toothing, case-hardened and lapped in pairs
Module 0.8 – 8.1
Gear ratios: $i = 1:1 – 1.5:1 – 2:1$
Max. output torques up to $T_{2max} = 5400$ Nm



Worm gear sets

Gear set for tailored solutions

14.1 Bevel gear sets

The housing dimensions of the gearboxes do not always fit, or the installation of a bevel gearbox as specified in the catalogue is made impossible or less useful by other circumstances. Then you can resort to ATEK bevel gear sets. ATEK delivers spiral-toothed bevel gear sets that are also used in the standard production gearboxes. The gear sets are manufactured according to the GLEASON® or KLINGELNBERG® method and are available from stock. Should you not find a suitable gear set in our dimension lists, please ask us nevertheless for a suitable set. In case of economically justifiable quantities (series application) we also develop and manufacture special gear sets – with all dimensions and gear ratios.

14.1.1 Housing

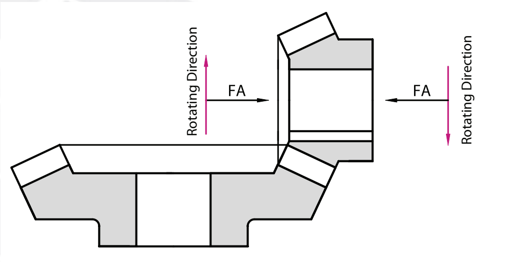
When designing the housings and bearing positions, attention must be paid that no inadmissible bending of the shafts can occur during operation. It is equally important that the housing and the parts to be installed are manufactured within the specified tolerances with respect to alignment, perpendicularity, fits/clearances, and smooth running.

Permissible hight difference between the two axes of the housing bores (bearing bores): ± 0.02 mm
Permissible deviation from shaft angle of 90°: ± 2 arcmin

The design should be constructed such that both the pinion and the gear can be adjusted to their required installation dimension. Moreover it is recommendable that the housing is designed such that at least one portion of the gear set in the installed condition can be observed for assessment of the tooth-contact pattern.

14.1.2 Support by bearings

For the selection of the correct support by bearings it is necessary to know the magnitude and direction of the tooth force and any potential additional external forces. For spiral-toothed bevel gears, the axial thrust forces resulting from the axial components of the tooth forces and acting on the bearings must be considered. The direction of the tooth forces depends on the bevel gears' direction of spiral and the rotational direction. On the standard bevel gear sets, the pinion has left-handed toothing, and the gear has right-handed toothing.

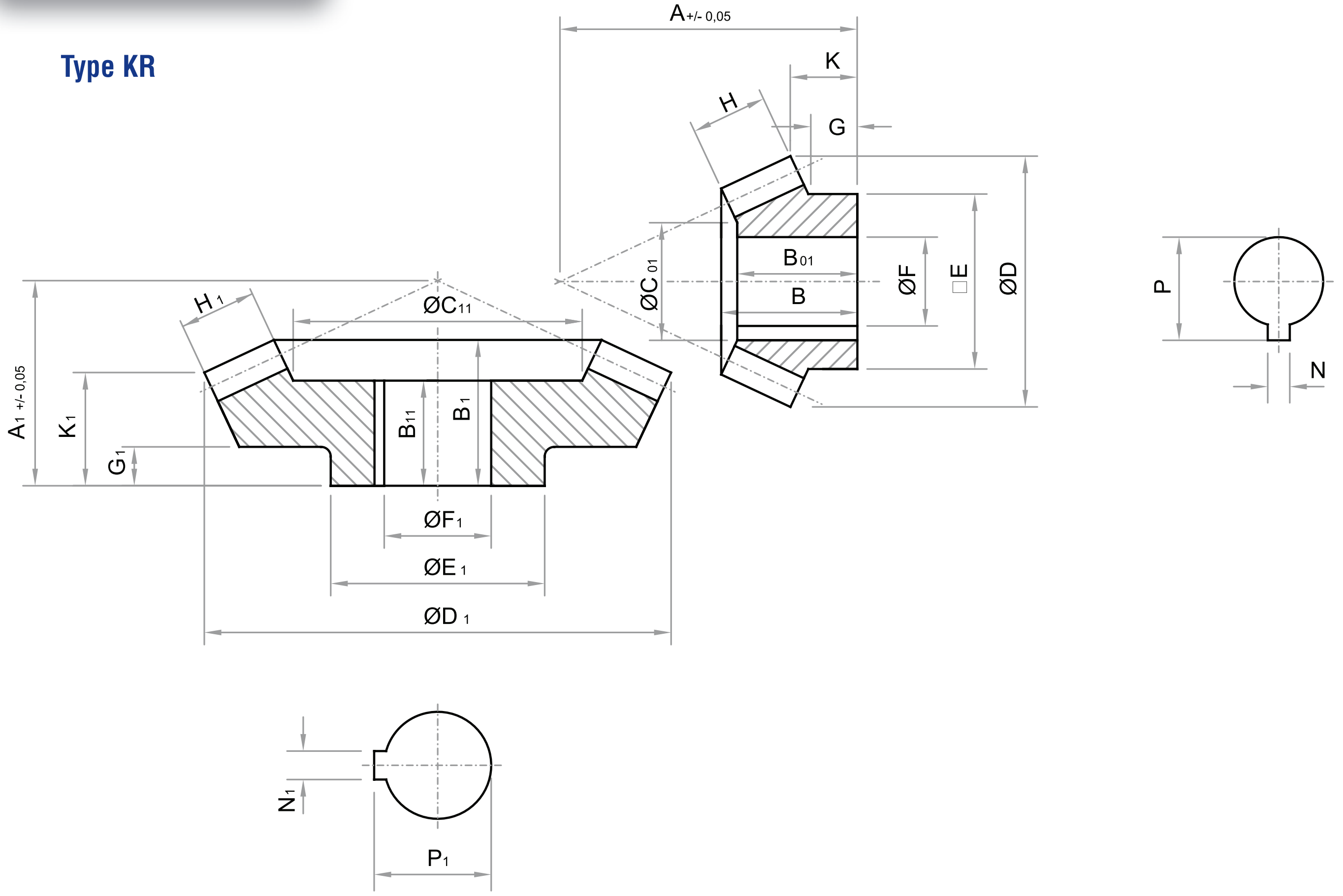


14.1.3 Circumferential backlash

The bevel gears are toothed for a predetermined backlash. The extent of the backlash depends on the module of the toothing.
If the selected backlash is too large or to small, noise may develop and premature wear may occur.

Transverse module	Backlash [mm]
bis - 2,5	0,05 - 0,12
2,6 - 4,2	0,12 - 0,19
4,3 - 6,4	0,19 - 0,22
> 6,5	0,25 - 0,36

Type KR

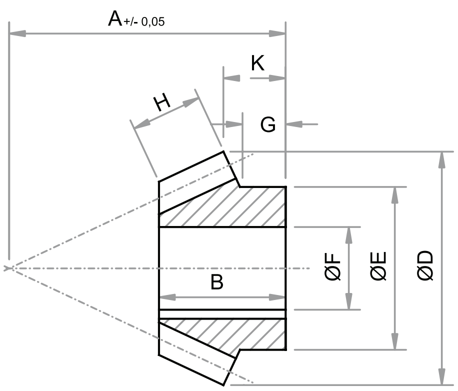


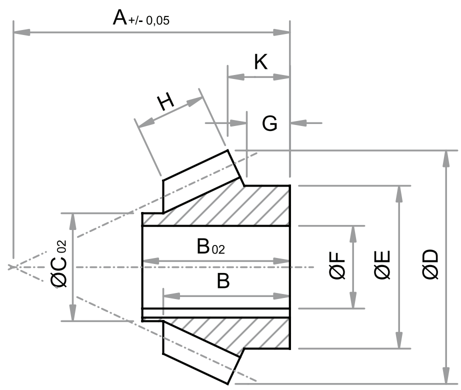
The measuremont below are approximate values.
If required please ask for a single measurement sheet.

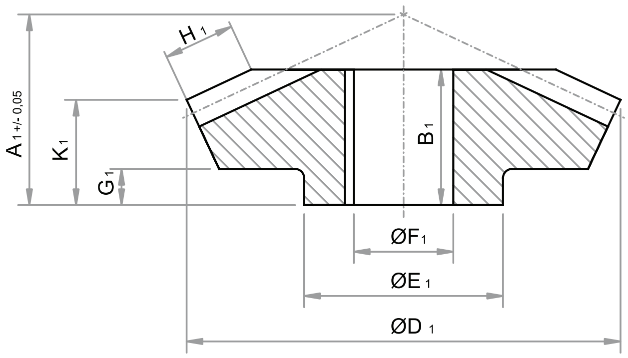
Tolerances:
Borings (øF, F1): ISO H6 - Keyways (N, N1): ISO P9

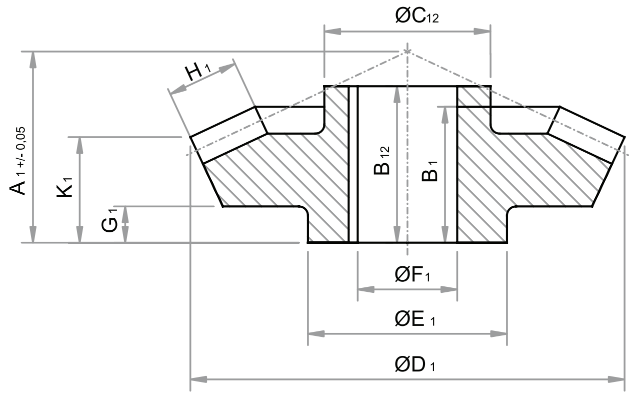
size	i	z1	z2	ms	T_{2N} [Nm]	A	B	B01	B02	C01	C02	D	E	F	G	H
065	1:1	27	27	1,5	18	27	15,4	14	-	23	-	44	25	17	4	12
088	1:1	26	26	2,3	50	35	14,6	12,5	-	38	-	62	42	30	3,5	12
	1,5:1	16	24	2,5	45	35	14,3	-	15,5	-	22	43	34	15	2	10
	2:1	18	36	1,5	25	35	15,5	-	-	-	-	30	22	15	2,5	9
110	1:1	30	30	2,7	130	50	23	19	-	46	-	82	36	25	7	20
	1,5:1	18	27	2,7	113	47	19,9	17	-	30	-	58	35	20	3	15
	2:1	15	30	2,7	80	47	19,5	17	-	28	-	46,5	35	20	5,8	14
140	1:1	30	30	3,2	220	56	22	-	25	-	52	98	56	40	1	18
	1,5:1	20	30	3,2	210	56	23,0	-	-	-	-	70	50	30	4	17
	2:1	18	36	2,7	180	56	23,4	21	-	29	-	53	47	20	7	16
156	1:1	30	30	4,9	380	62,5	24,7	-	30	-	60	115	60	40	0,5	25
	1,5:1	16	24	4,9	360	62,5	22,9	-	25	0	50	85	-	40	-	21
	2:1	16	32	4,8	320	65	27	-	27	-	28	64	50	25	6	21
200	1:1	32	32	4,8	750	83	34	-	40	-	75	157	75	55	0,5	35
	1,5:1	20	30	4,8	600	83	31,1	27	-	64	-	107	75	50	1	25
	2:1	15	30	4,8	530	83	28,2	25	-	50	-	84	65	35	1	23
230	1:1	30	30	5,8	900	98,5	38,5	-	50	-	90	181,3	100	65	1	40
	2:1	22	44	4	800	98,5	40	-	-	-	-	97,2	80	45	-	33
260	1:1	30	30	6,2	1750	110	48,8	-	60	-	80	186	80	65	1	42
	1,5:1	16	24	8,0	1000	110	46,1	40	-	80	-	139	80	45	5	37
	2:1	13	26	7,5	1200	110	44,5	40	-	52	-	106	80	45	7,6	34
350	1:1	32	32	7,5	3000	150	73,2	65	-	149,7	-	248,2	215	110	16,5	57
	1,5:1	20	30	8,1	2500	150	70	-	-	-	-	176,1	145	90	21,3	49

ATEK ANTRIEBSTECHNIK

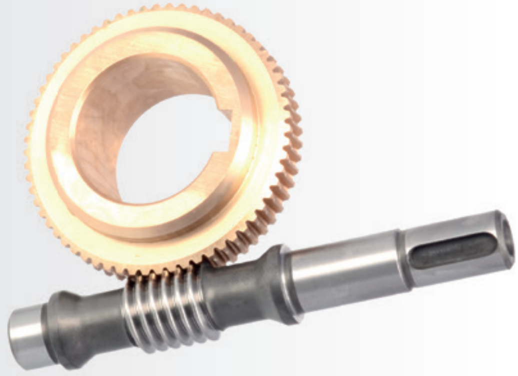








size	K	N	P	A1	B1	B11	B12	C11	C12	D1	E1	F1	G1	H1	K1	N1	P1
065	7,5	5	19,3	27	15,4	14	-	23	-	44	25	17	4	12	7,5	5	19,3
	6,1	8	33,3	35	14,6	12,5	-	38	-	62	42	30	3,5	12	6,1	8	33,3
088	6	5	17,3	35	21,5	12,5	-	38	-	62	42	30	3,5	10	16	8	33,3
	7,5	5	16,7	24	14,9	12,5	-	36	-	57	42	30	3,5	9	11	8	33,3
	11,5	8	28,3	44	18	-	19	-	48	82	55	40	1	18	3,8	12	43,3
110	8,3	6	22,8	44	26,1	19	-	48	-	82	52	40	1	15	18,5	12	43,3
	7,7	6	22,8	37	23,5	19	-	54	-	82	52	40	1	12	18,1	12	43,3
	9,8	12	43,3	55	21,5	-	-	-	-	98	65	50	1	18	8,8	14	53,8
140	8,9	8	33,3	55	34	25	-	58	-	100	65	50	1	17	24,5	14	53,8
	9	6	22,8	47,5	31,5	25	-	60	-	98	62	50	1	16	25	14	53,8
	8,3	12	43,3	62,5	25,8	-	30	-	60	115	60	40	0,5	25	7,5	12	43,3
156	5,6	12	43,3	62,5	37	30	-	76	-	115	65	40	12	21	25,1	12	43,3
	9,3	8	28,3	62,5	43,8	30	-	71	-	115	60	40	0,5	18	35,9	12	43,3
	10,3	16	59,3	83	33,5	-	41	-	85	154	75	55	0,5	33	11,2	16	59,3
200	10,2	14	53,8	83	50,2	45	-	100	-	155	75	55	1	25	36,3	16	59,3
	7,5	10	38,3	83	57,7	45	-	100	-	158	75	55	1	23	47,7	16	59,3
230	15,1	18	69,4	95	35	-	50	-	90	181,3	100	65	1	40	11,6	18	69,4
	12,8	14	48,8	95	66,7	50	-	96	-	177,9	100	65	11	33	52,8	18	69,4
	21	18	69,4	110	48,8	-	60	-	80	186	80	65	1	42	21,5	18	69,4
260	15,3	14	48,8	110	69,6	60	-	126	-	201	80	65	1	37	49,2	18	69,4
	14	14	48,8	110	80,4	60	-	117	-	200	80	65	1	35	65,1	18	69,4
350	34,1	28	116,4	150	73,2	65	-	149,7	-	248,2	215	110	16,5	57	34,1	28	116,4
	33,2	25	95,4	150	98,4	65	-	130	-	247,8	145	110	5	49	72,6	28	116,4



14.2 Worm gear Sets

You have the possibility to buy the worm gear sets we use.
Information can be found on our website www.atek.de in the Downloads section.

15 Service

Examination of gearboxes
Cost estimates for repairs and alterations
Handling of complaints
Preparation of spare part offers
Technical assistance on ATEK gearboxes

General information

Spare parts

Lubricant table

Local contacts

15.1 General information

Our service department will help you with technical assistance with regard to the ATEK gearboxes, prepare spare parts offers for you, and examine gearboxes. The department will prepare cost estimates for repairs and alterations, and support you in the handling of complaints.

We will be able to help you faster and to ascertain the required information more accurately if you communicate the serial number or the order number with the gearbox designation to us. You can find the serial number and the gearbox designation on the type plate.

The repair effort can often be determined only after a thorough examination. In such a case, we recommend to send us your gearbox. This will also apply in the case of a complaint when we have to determine the cause of the failure.

Prior to the shipment, the vent filters have to be removed, and the threaded holes must be plugged with dummy plugs.
Additionally, all mounted add-on parts must be removed.

Free delivery to:
ATEK Antriebstechnik Willi Glapiak GmbH
Service
Siemensstraße 47
D-25462 Rellingen

Contact:
E-mail: service@atek.de
Phone: +49 (0)4101 7953-0

15.3 Spare parts

It is principally possible to purchase spare parts by specifying the serial number.

The serial number enables us to identify the originally delivered parts as part of the traceability and to deliver appropriately.

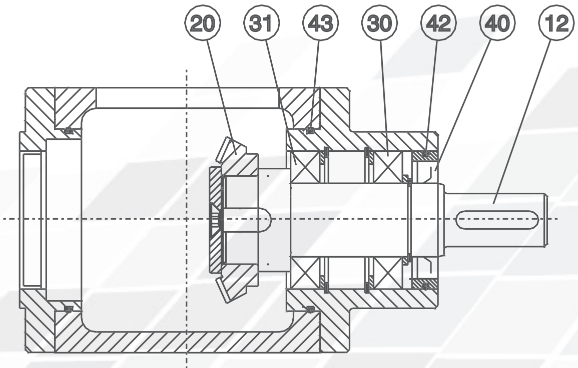
For spare part enquiries or orders, please use the following drawings of the individual gearbox types for the identification of the required parts.

Note: We cannot assume any warranty for the proper execution of a repair by the operator or any third party and for the functioning of the gearbox. We therefore recommend to send us the gearboxes for repair.

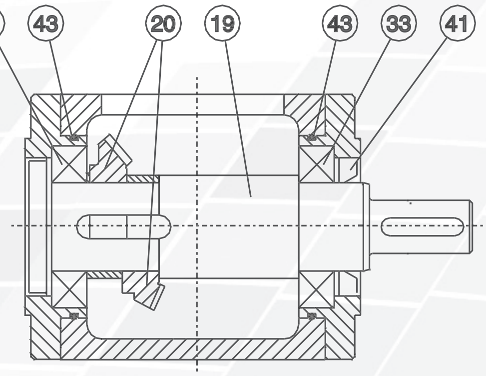
15.3 Spare parts

Type V

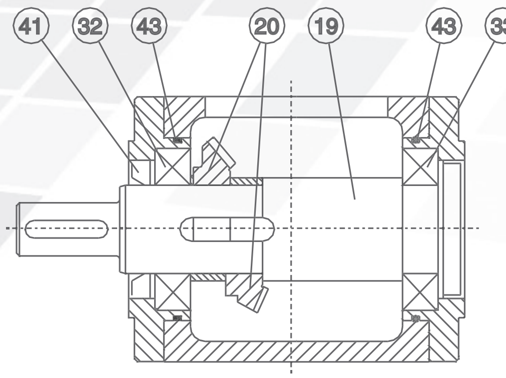
Construction type A (F)



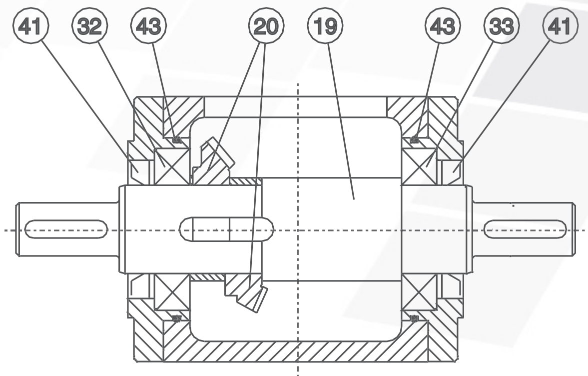
Construction type B (G)



Construction type C (H)



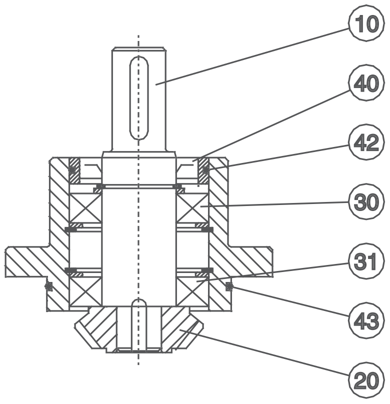
Construction type D (J)

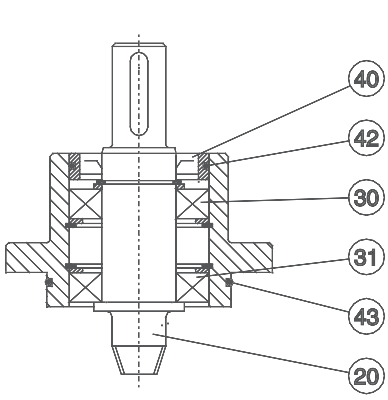


No.	Designation
10	Drive shaft
12	Output shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing

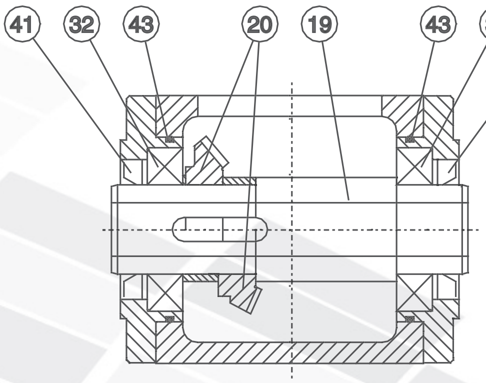
No.	Designation
32	Roller bearing
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring

ATEK ANTRIEBSTECHNIK

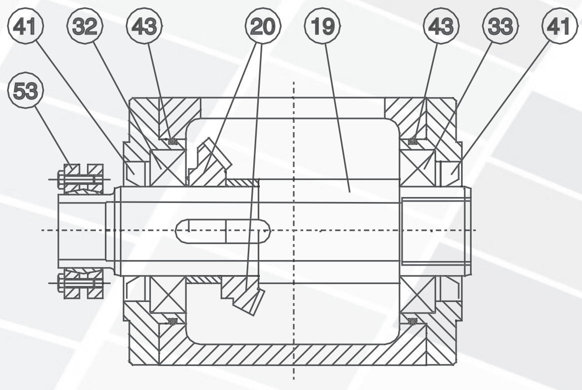




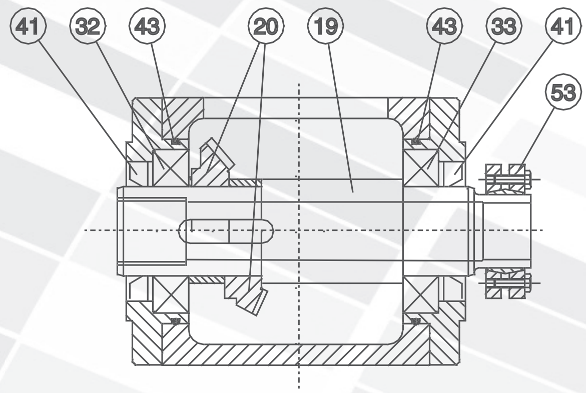
Construction type E (K)



Construction type E (K) - S5



Construction type E (K) - S6



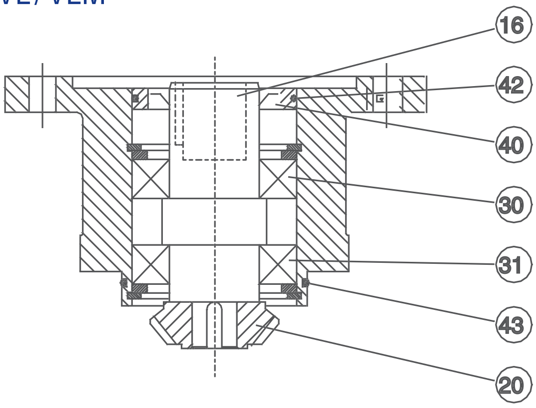
No.	Designation
10	Drive shaft
19	Drive shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing
32	Roller bearing

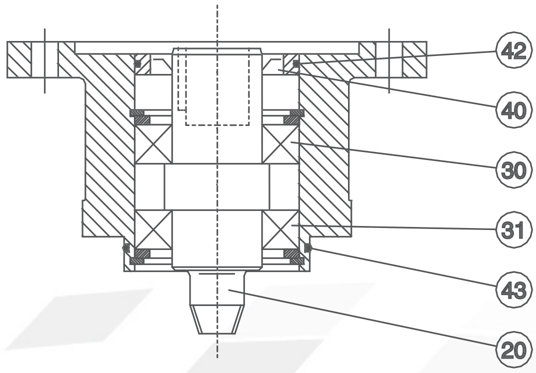
No.	Designation
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring
53	Clamping set

ATEK ANTRIEBSTECHNIK

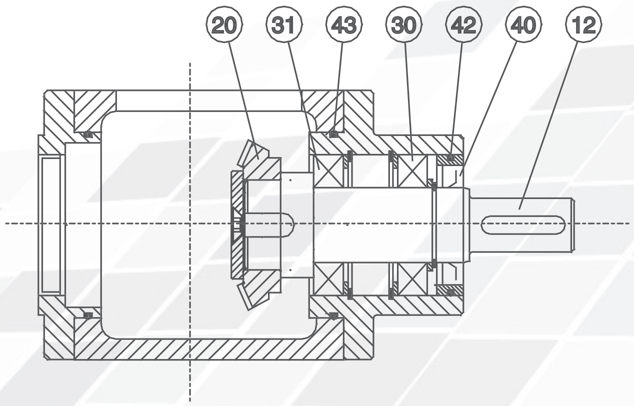
15.3 Spare parts

Type VL/VLM

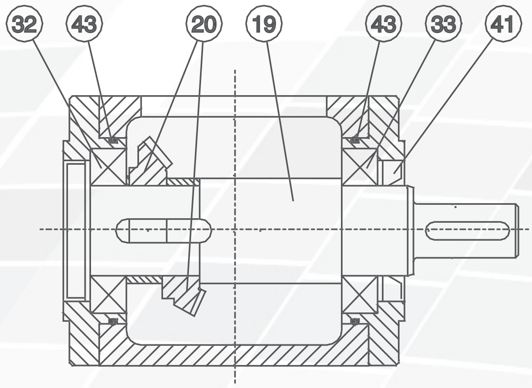




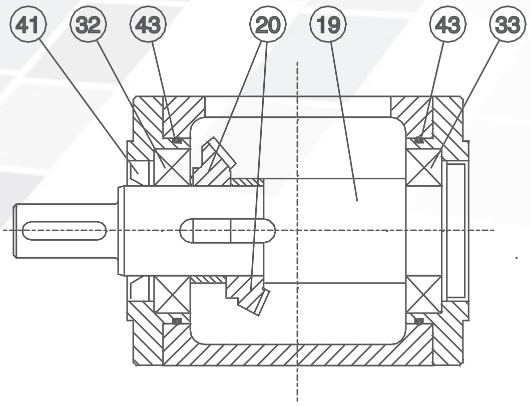
Construction type A (F)



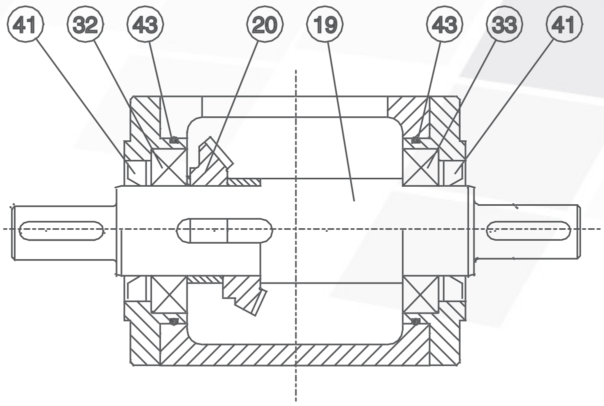
Construction type B (G)



Construction type C (H)



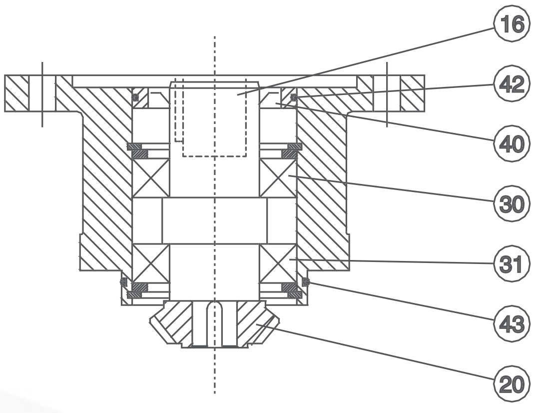
Construction type D (J)

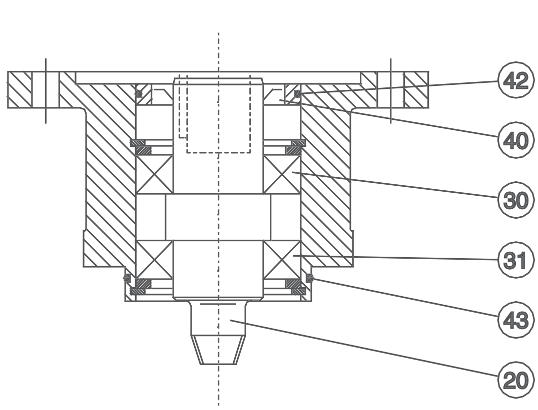


No.	Designation
12	Output shaft
16	Drive shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing

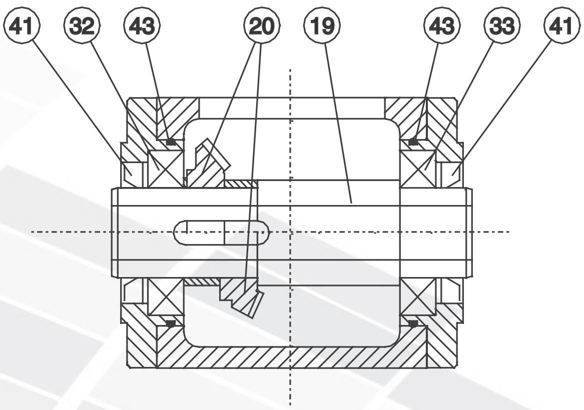
No.	Designation
32	Roller bearing
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring

ATEK ANTRIEBSTECHNIK

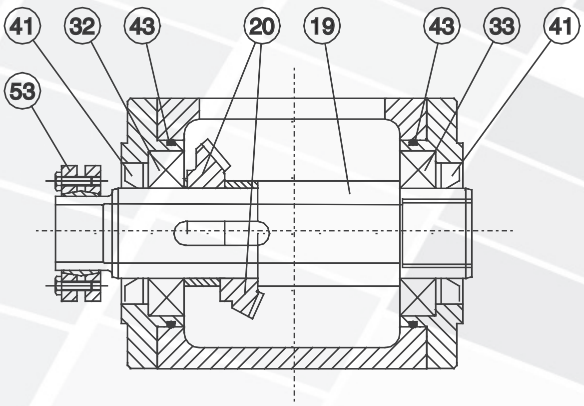




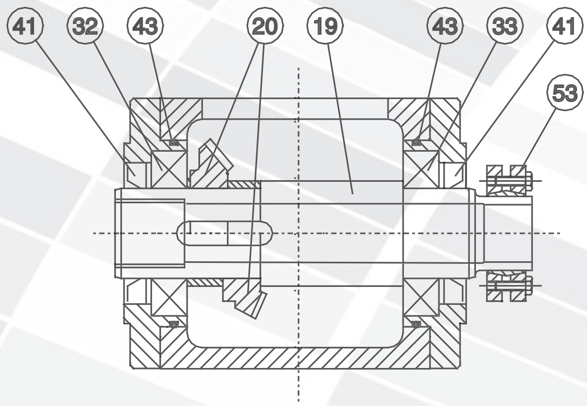
Construction type E (K)



Construction type E (K) - S5



Construction type E (K) - S6

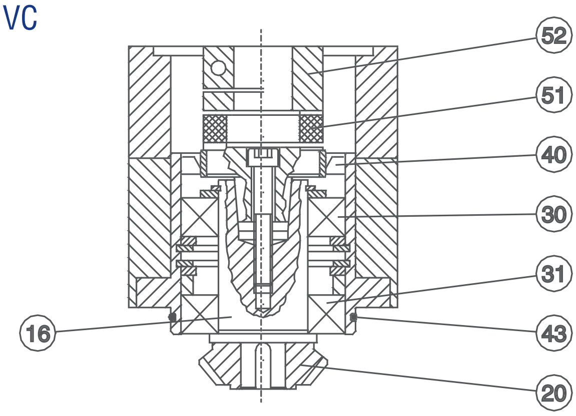


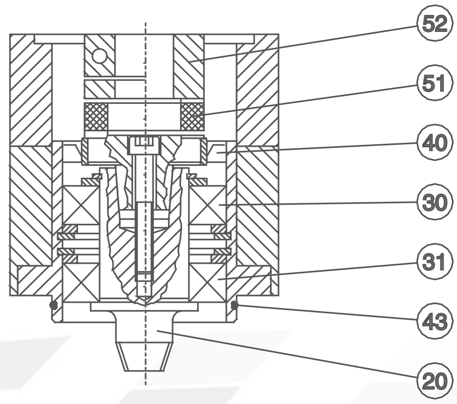
No.	Designation
16	Drive shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing
32	Roller bearing

No.	Designation
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring
53	Clamping set

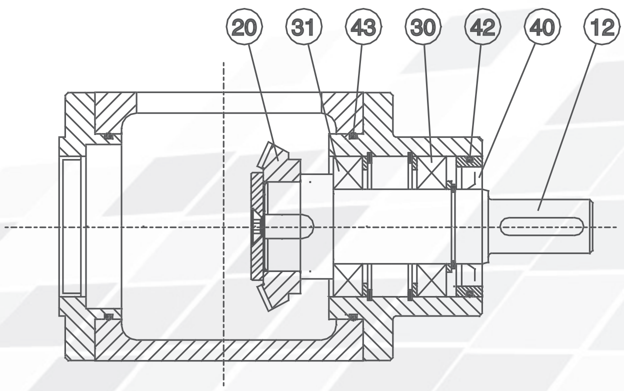
15.3 Spare parts

Type VC

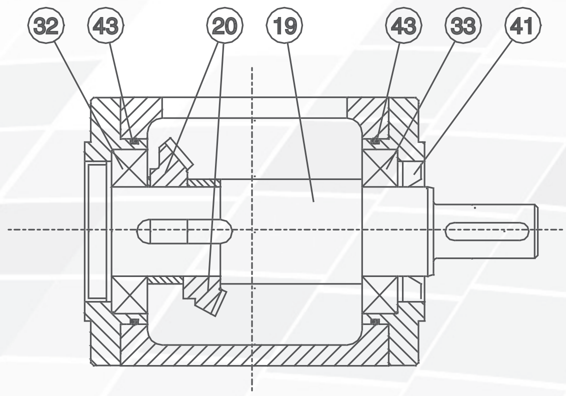




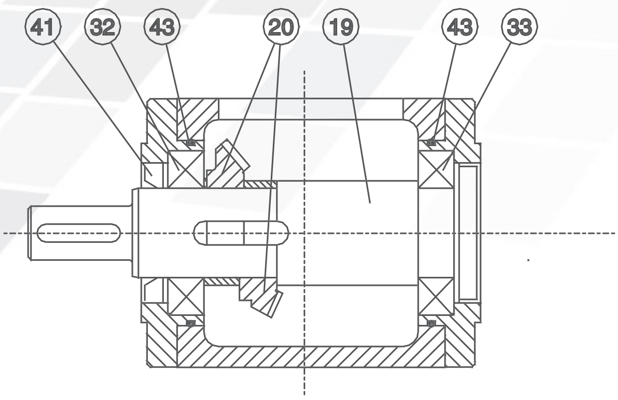
Construction type A (F)



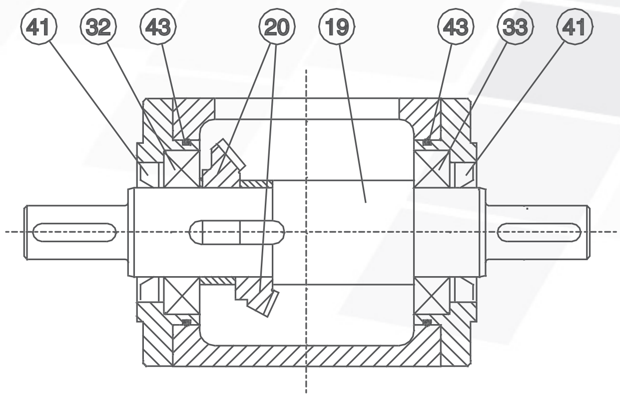
Construction type B (G)



Construction type C (H)



Construction type D (J)



No.	Designation
12	Output shaft
16	Drive shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing
32	Roller bearing

No.	Designation
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring
51	Toothed ring
52	Coupling

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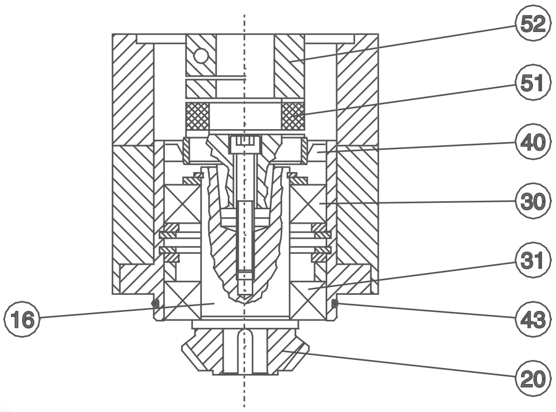
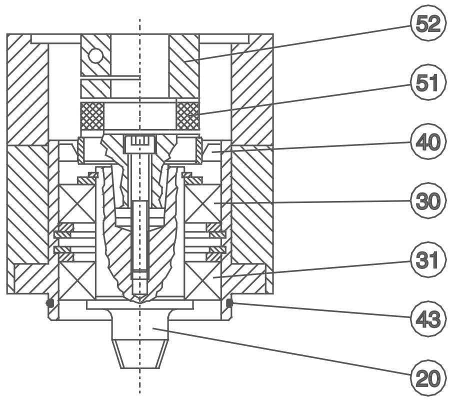
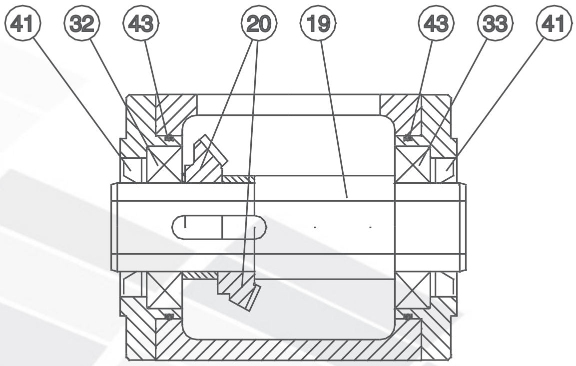
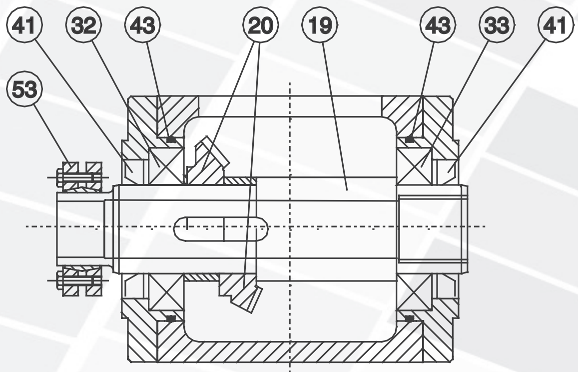




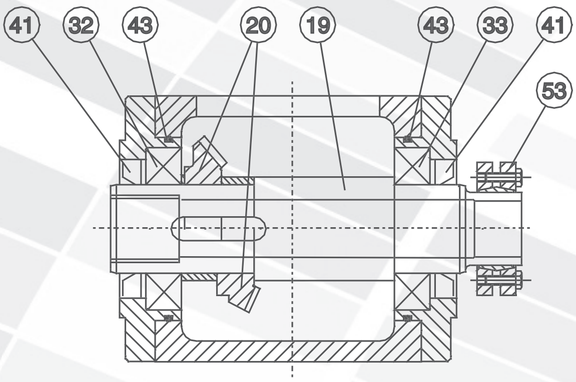
Construction type E (K)



Construction type E (K) - S5



Construction type E (K) - S6



No.	Designation
16	Drive shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing
32	Roller bearing
33	Roller bearing

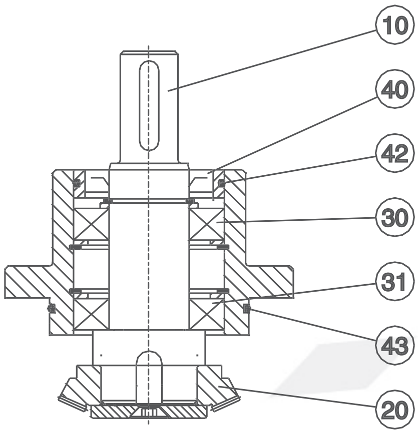
No.	Designation
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring
51	Toothed ring
52	Coupling
53	Clamping set

Service

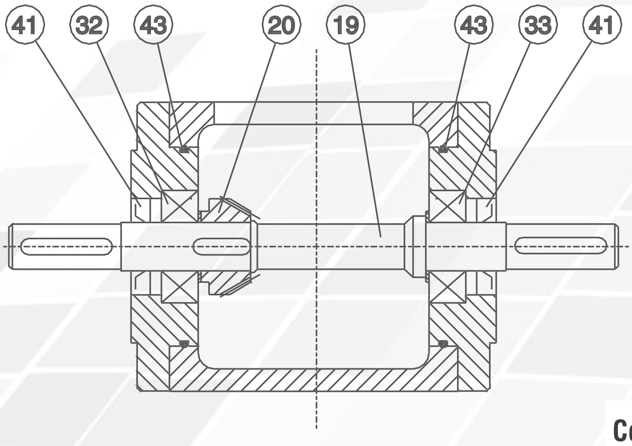
ATEK ANTRIEBSTECHNIK

15.3 Spare parts

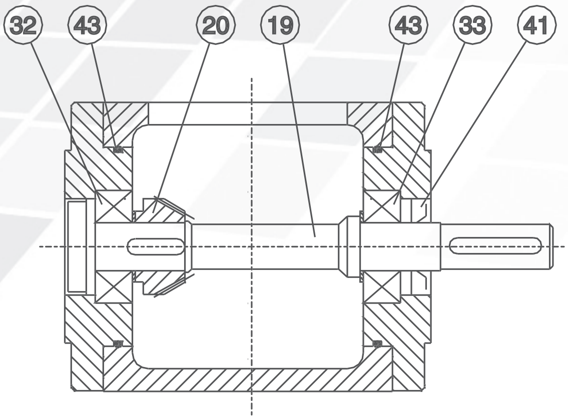
Type VS



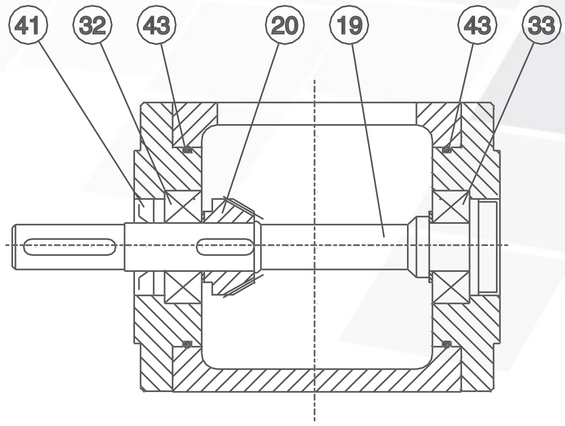
Construction type D.



Construction type B.



Construction type C.

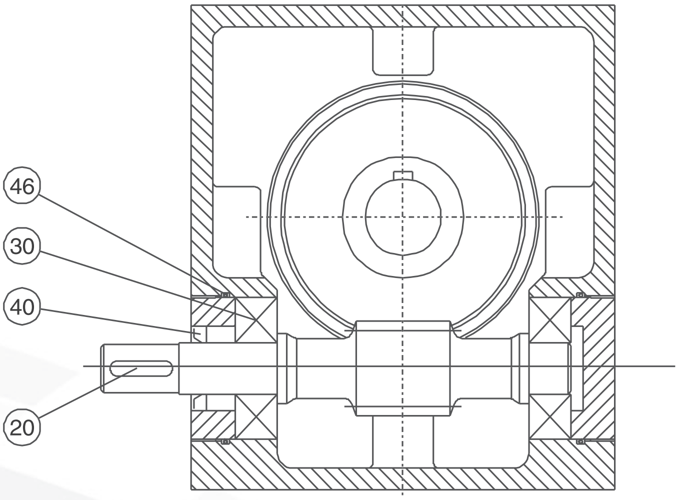


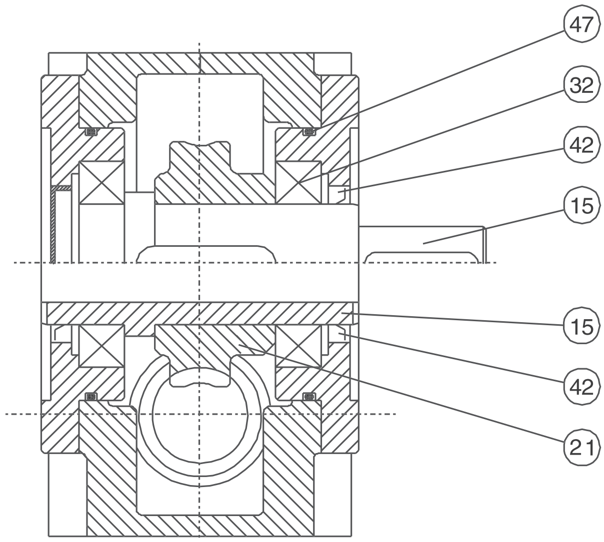
No.	Designation
10	Drive shaft
19	Output shaft
20	Bevel gear set
30	Roller bearing
31	Roller bearing
32	Roller bearing

No.	Designation
33	Roller bearing
40	Radial seal
41	Radial seal
42	O-ring
43	O-ring

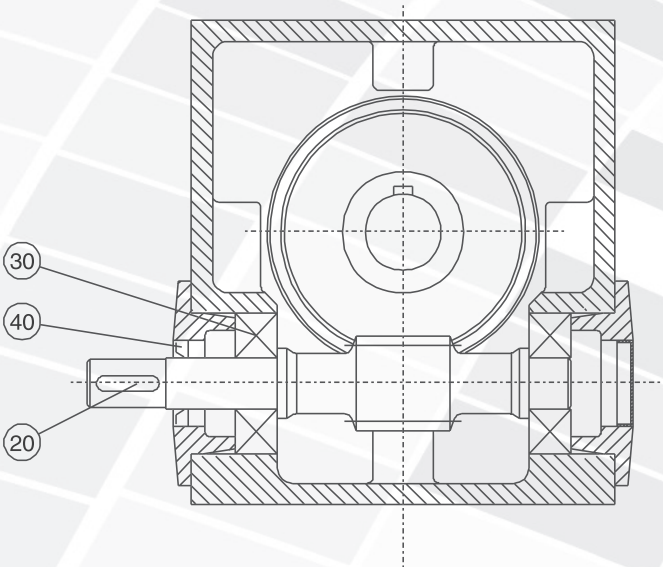
ATEK ANTRIEBSTECHNIK

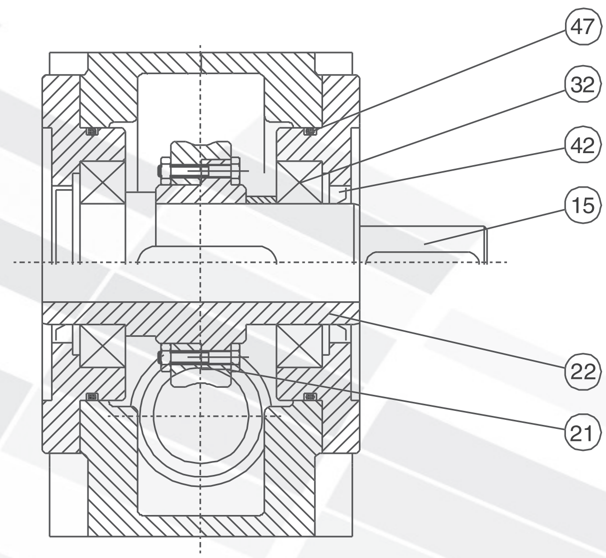
Type S 040 – 100





Type S 125 – 250



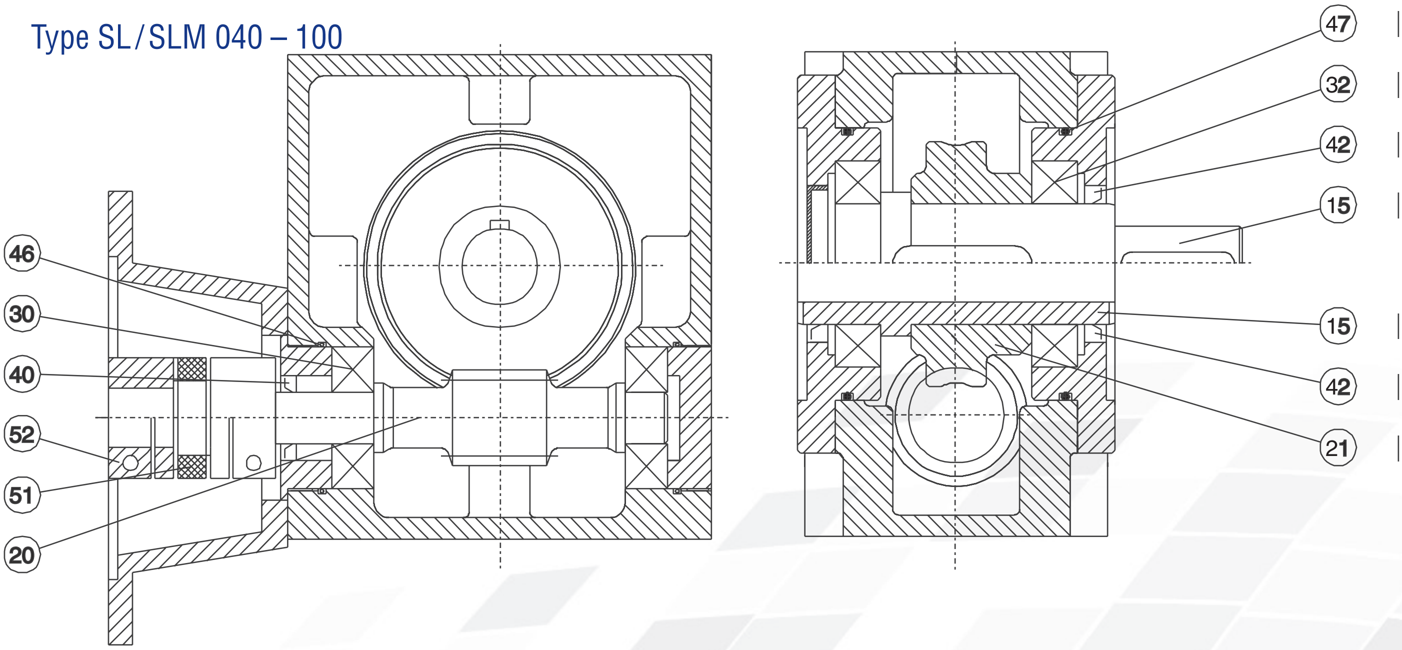


No.	Designation
15	Output shaft
20	Worm
21	Worm gear
22	Hub
30	Roller bearing

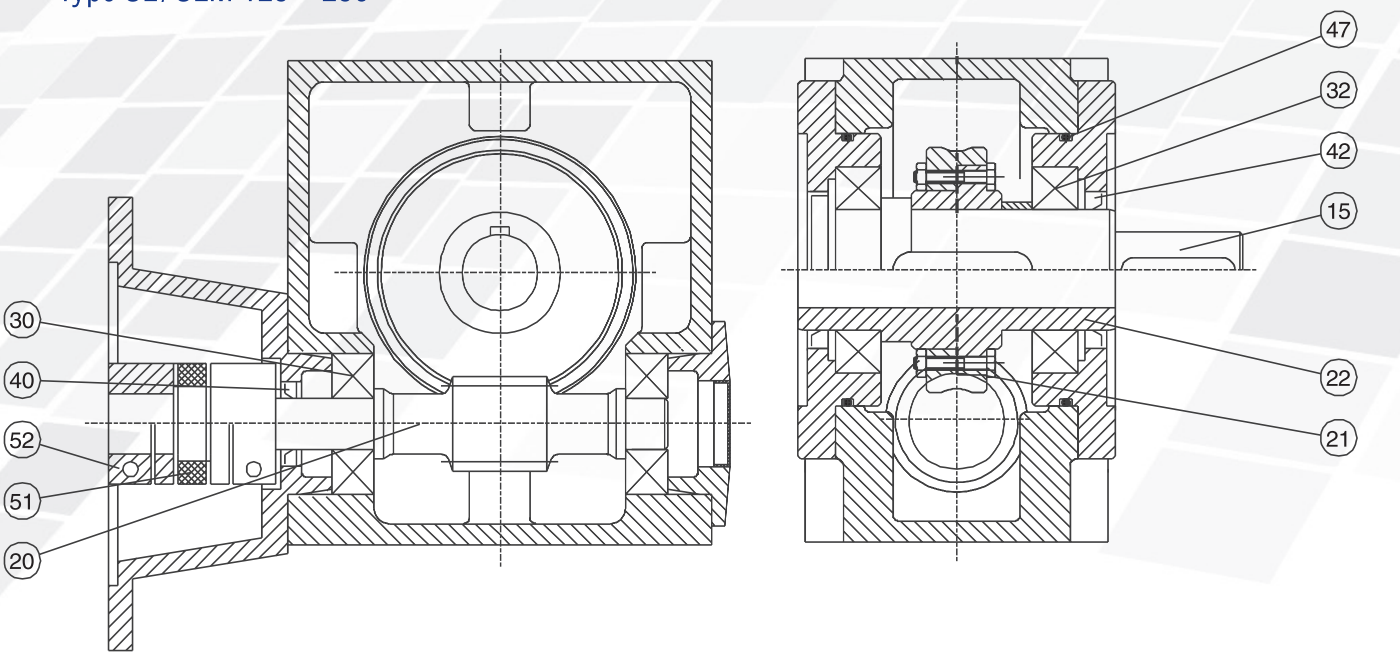
No.	Designation
32	Roller bearing
40	Radial seal
42	Radial seal
46	O-ring
47	O-ring

15.3 Spare parts

Type SL / SLM 040 – 100



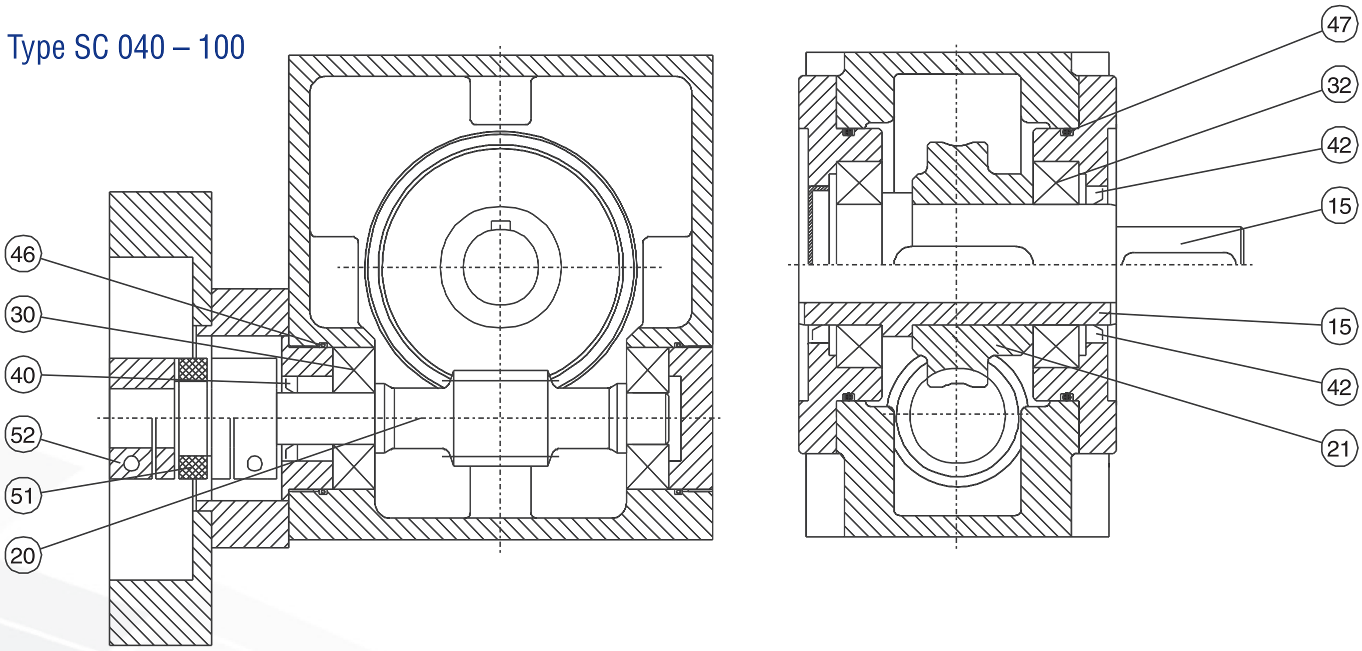
Type SL / SLM 125 – 250



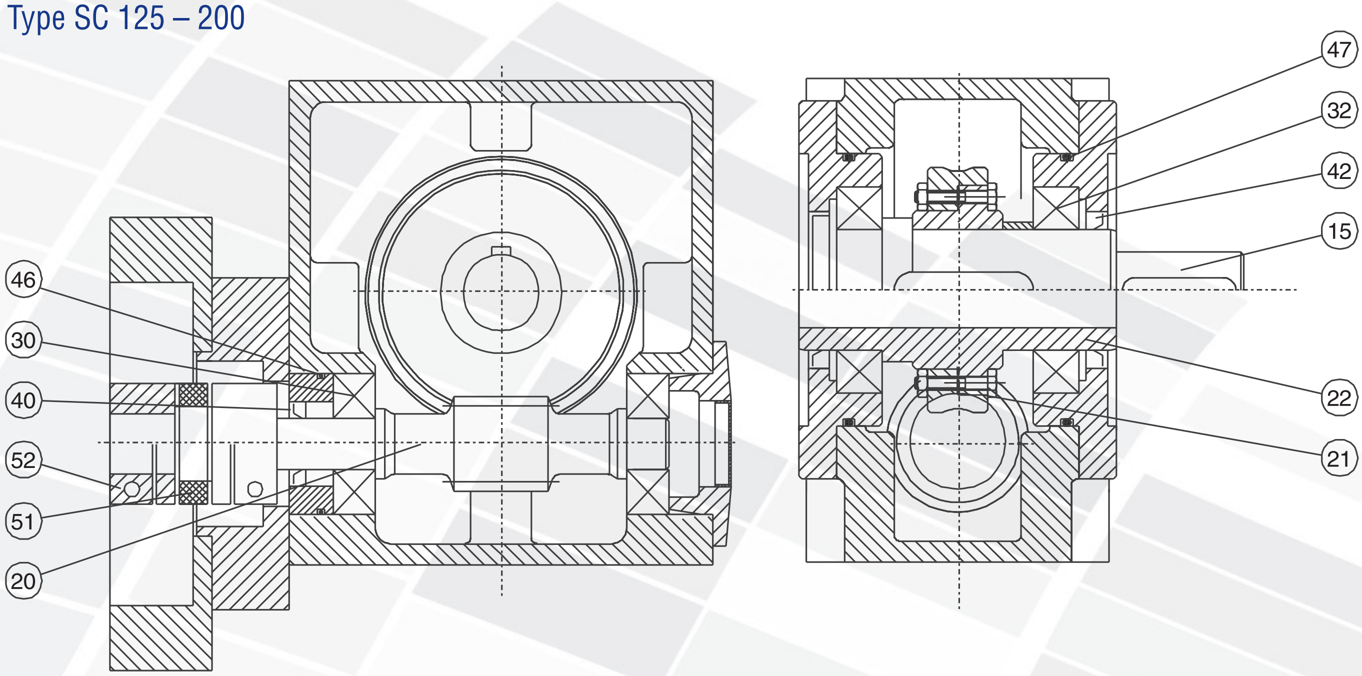
No.	Designation
15	Output shaft
20	Worm
21	Worm gear
22	Hub
30	Roller bearing
32	Roller bearing

No.	Designation
40	Radial seal
42	Radial seal
46	O-ring
47	O-ring
51	Toothed ring
52	Coupling

Type SC 040 – 100



Type SC 125 – 200



No.	Designation
15	Output shaft
20	Worm
21	Worm gear
22	Hub
30	Roller bearing
32	Roller bearing

No.	Designation
40	Radial seal
42	Radial seal
46	O-ring
47	O-ring
51	Toothed ring
52	Coupling

If you specify the serial number, you will receive the information on the lubricant quantities from our service department.

Oils	Identifier	ARAL	Castrol	KLÜBER LUBRICATION	Mobil	
Polyglycol-based synthetic gear oil CLP-PG (not mixable with mineral oil and other synthetic lubricants)	VG 680	Degol GS 680	"Alphasyn GS 680 Optigear Synthetic 800/680"	"Klübersynth GH 6-680"	-	Omala S4 WE 680
	VG 460	Degol GS 460	"Alphasyn GS 460 Alphasyn PG 460 Optigear Synthetic 800/460 Optigear Synthetic 1300/460"	"Klübersynth GH 6-460"	-	Omala S4 WE 460
	VG 220	Degol GS 220	"Alphasyn GS 220, Alphasyn PG 220 Optigear Synthetic 800/220 Optigear Synthetic 1300/220"	"Klübersynth GH 6-220"	-	Omala S4 WE 220
	VG 150	-	"Alphasyn PG 150 Optigear Synthetic 800/150"	"Klübersynth GH 6-150"	-	
	VG 100	-	Optigear Synthetic 800/100	"Klübersynth GH 6-100"	-	
	VG 68	-	_	"Klübersynth GH 6-80"	-	
Synthetic gear oils, polyalpha olefins, PAO CLP-HC	VG 460	-	"Alphasyn EP 460 Optigear Synthetic PD 460"	"Klübersynth GEM 4-460 N"	Mobil SHC Gear 460	Omala S4 GX 460
	VG 320	-	"Alphasyn EP 320 Optigear Synthetic PD 320 Optigear Synthetic 1510/320 "	"Klübersynth GEM 4-320 N"	Mobil SHC Gear 320	Omala S4 GX 320
	VG 220	-	"Alphasyn EP 220 Alphasyn HTX 220 Optigear Synthetic PD 220"	"Klübersynth GEM 4-220 N"	Mobil SHC Gear 220	Omala S4 GX 220
	VG 150	-	"Alphasyn EP 150 Optigear Synthetic PD 150"	"Klübersynth GEM 4-150 N"	Mobil SHC Gear 150	Omala S4 GX 150
Gear oils (mineral oils) CLP	VG 680		"Alpha EP 680 Alpha SP 680 Optigear BM 680 Optigear 1100/680"	"Klüberoil GEM 1-680 N"	Mobilgear 600 XP 680	Omala S2 G 680
	VG 460		"Alpha EP 460, Alpha SP 460 Optigear BM 460 Optigear EP 460 Optigear 1100/460"	"Klüberoil GEM 1-460 N"	Mobilgear 600 XP 460	Omala S2 G 460
	VG 320	Degol BG 320	"Alpha EP 320 Alpha SP 320 Optigear BM 320 Optigear EP 320 Optigear 1100/320"	"Klüberoil GEM 1-320 N"	Mobilgear 600 XP 320	Omala S2 G 320
	VG 220	Degol BG 220	"Alpha EP 220, Alpha SP 220 Optigear BM 220 Optigear EP 220 Optigear 1100/220"	"Klüberoil GEM 1-220 N"	Mobilgear 600 XP 220	Omala S2 G 220
	VG 100	Degol BG 100	"Alpha EP 100 Alpha SP 100 Optigear BM 100 Optigear EP 100 Optigear 1100/100"	"Klüberoil GEM 1-100 N"	Mobilgear 600 XP 100	Omala S2 G 100
	VG 68	Degol BG 68	"Alpha EP 68, Alpha SP 68 Optigear BM 68 Optigear EP 68 Optigear 1100/68"	"Klüberoil GEM 1-68 N"	Mobilgear 600 XP 68	Omala S2 G 680
Food-grade gear oils Gear lubricant with NSF-H1 approval CLP CKC	VG 460	_	Optileb GT 460 (PAO) Optileb GT 1800/460 (PG)	"Klüberoil 4 UH1-460 N (CLP HC), Klübersynth UH1 6-460 (CLP PG)"	Mobil SHC Cibus 460	-
	VG 220	_	Optileb GT 220 (PAO) Optileb GT 1800/220 (PG)	"Klüberoil 4 UH1-220 N (CLP HC), Klübersynth UH1 6-220 (CLP PG)"	Mobil SHC Cibus 220	-
	VG 150	_	Optileb GT 150 (PAO)	"Klüberoil 4 UH1-150 N (CLP HC), Klübersynth UH1 6-150 (CLP PG)"	Mobil SHC Cibus 150	-
	VG 68	_		"Klüberoil 4 UH1-68 N (CLP HC)"	--	-
Greases	Identifier					
Lubr. grease	DIN 51825					
-	KP 2 K-30	Aralub HLP 2	Spheerol EPL 2 Tribol GR 400-2 PD Tribol GR 100-2 PD	"Klüberplex BEM 41-132"	Mobilux EP 2	Gadus S2 V220 2 *)
Fluid grease	GP 00 K-30	Aralub LS-EP 00	"Spheerol EPL 00 Tribol GR 100-2 PD Tribol GR 3020/1000-00 PD"	"Klübersynth BEM 44-4600"	Mobilith SHC 007 (GPHC00K-30)	Gadus S2 V220 00
Food-grade multi-purpose grease NSF-H1	KHC 2 K-30	_	"Optileb GR UF 1 (KPHC1K-40)"	"Klübersynth UH1 64-62"	"Mobil SHC Polyrex 462 (KPF2P-20)"	-
Food-grade fluid grease NSF-H1	GHC 00 K-30	_	Optileb GR UF 00	Klübersynth UH1 14-1600, Klüberfood NH1 94-6000 (NLGI 000)	Mobil SHC Polyrex 005 (GPFHC00K-30)	-

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