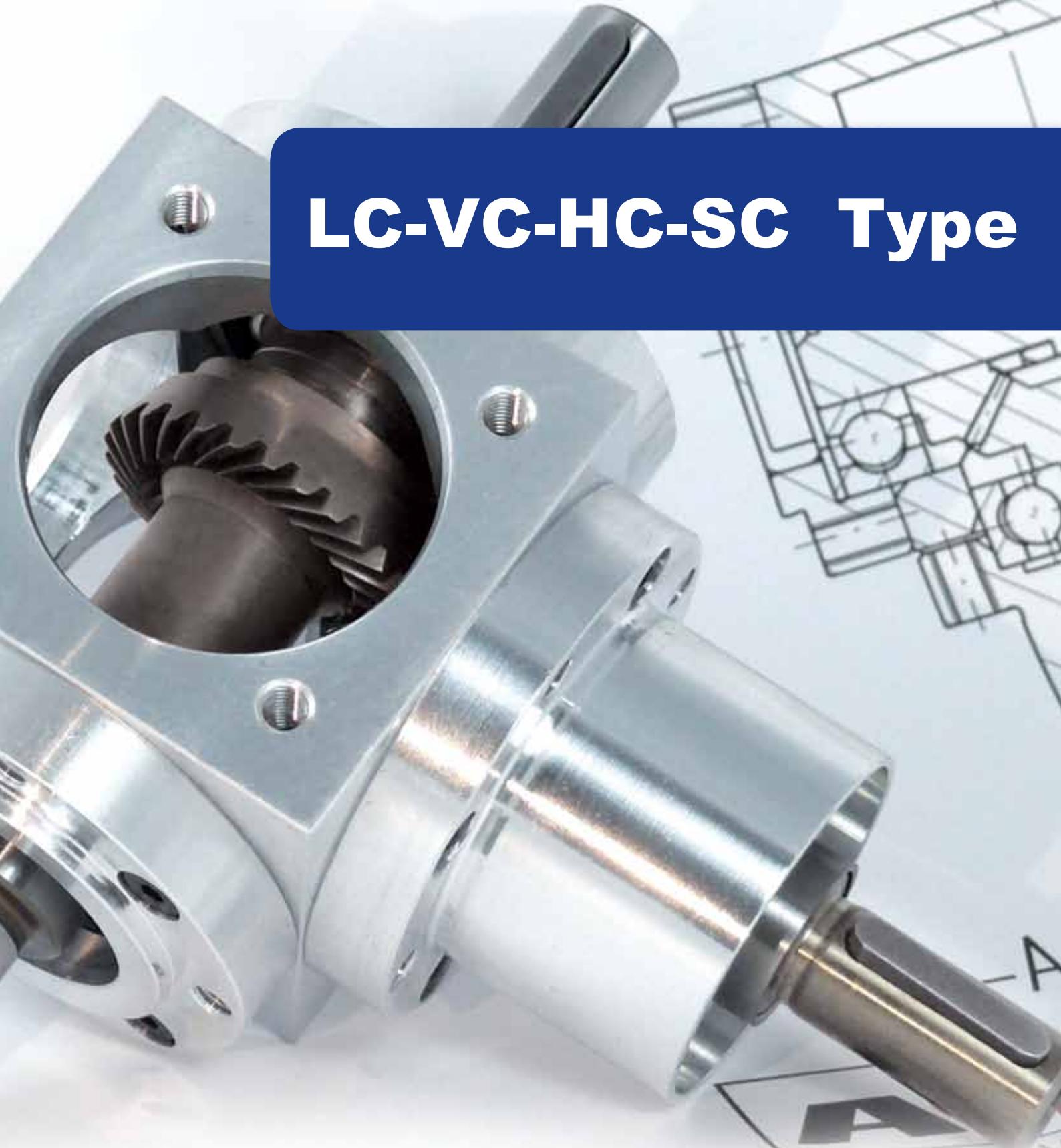


# LC-VC-HC-SC Type





## Servo gearboxes Precision gearboxes

Bevel gearboxes suitable for fitting servo-motors  
Worm gearboxes suitable for fitting servo-motors  
Gear ratios:  $i = 1:1$  to  $26:1$   
Maximum acceleration torque on output: 700 Nm  
6 gearbox sizes with edge lengths of 065 to 200 mm

High speeds up to  $n_1 = 6000$  rpm  
Minimized circumferential backlash (optional)  
High precision  
Housing made of grey cast iron

Miniature  
bevel gearboxes

Bevel  
gearboxes

Hypoid  
gearboxes

Hypoid  
gearboxes

Worm  
gearboxes

Gearbox  
motors

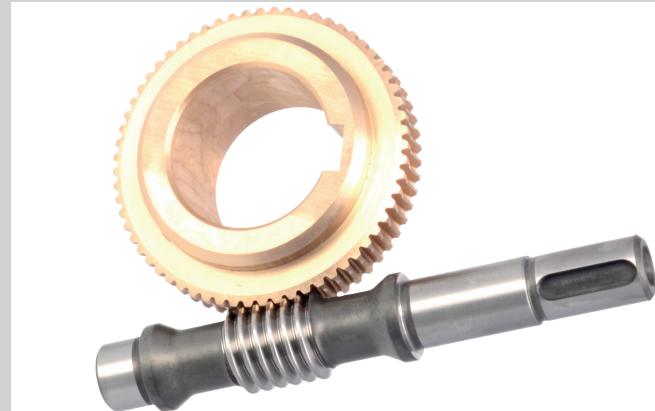
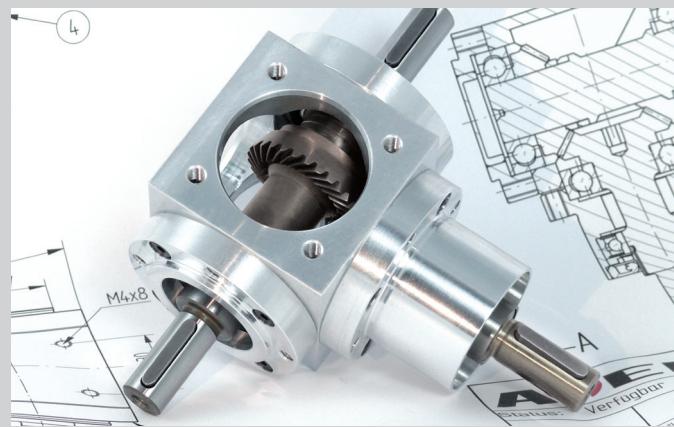
Servo  
gearboxes  
(precision  
gearboxes)

Spatial  
gearboxes

ATEX  
gearboxes

Gear sets

Service



### Legal information:

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

1	<b>Product and service specifications</b>	1
2	<b>Contents</b>	3
3	<b>The company</b>	5
4	<b>General</b>	7
	Gearboxes	7
	Legal classification	7
	Designations	7
	Corrosion protection	8
	Protection classes	10
	Shaft types	10
	Lubricants	11
	Radial shaft seal rings	11
	Gearbox data and layout	11
	Maintenance and starting-up:	14
	Ordering	14
5	<b>Miniature bevel gearboxes</b>	15
	Type overview	15
	General construction	16
	Type L – Miniature bevel gearboxes	19
6	<b>Bevel gearboxes</b>	29
	Type overview	29
	General construction	30
	Type V – Standard bevel gearboxes	33
	Type VS – Type V with step-up ratio	71
	Type VL – Type V with flange for motor mounting	87
	Branch-off bevel gearboxes – with additional shafts	123
7	<b>Hygiene-design gearboxes</b>	125
	Type overview	125
	General construction	126
	Type HDV – Hygiene-design bevel gearboxes	129
8	<b>Hypoid gearboxes</b>	147
	Type overview	147
	General construction	148
	Type H – Standard hypoid gearboxes	151
9	<b>Worm gearboxes</b>	177
	Type overview	177
	General construction	178
	Type S – Standard worm gearboxes	183
	Type SL – Type S with flange for motor mounting	223
10	<b>Gearbox motors</b>	263
	Type overview	263
	General construction	263
	Type VLM – Type VL with motor (gearbox motor)	267
	Type SLM – Type SL with motor (gearbox motor)	287
11	<b>Servo gearboxes (precision gearboxes)</b>	309
	Type overview	309
	Type LC – Servo bevel gearboxes	311
	Type VC – Servo bevel gearboxes	319
	Type HC – Servo hypoid gearboxes	351
	Type SC – Servo worm gearboxes	383
12	<b>Special gearboxes</b>	405
13	<b>ATEX gearboxes</b>	407
14	<b>Gear sets</b>	409
	Bevel gear sets / worm gear sets	409
15	<b>Service</b>	411
	General information	412
	Spare parts	413
	Lubricant table	423
	Local contacts	425

Miniatu  
bevel gearboxes

Bevel  
gearboxes

Hygiene-design  
gearboxes

Hypoid  
gearboxes

Worm  
gearboxes

Gearbox  
motors

Servo gearboxes  
(precision gearboxes)

Special  
gearboxes

ATEX  
gearboxes

Gear sets

Service

### 3 The company



## ATEK Antriebstechnik

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

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

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

The modularly structured product range primarily comprises bevel gears and worm gears and the servo series which can be combined with modern servo-motors. Our angular gearboxes stand out thanks to their compact build, extensive performance spectrum and variety of feasible step-up/down ratios. Thanks to our enormous warehouse we can often supply our standard series within a matter of hours. Be it for application-specific drive train solutions for special machine

construction or series products for general machine construction: The ATEK modular system leaves nothing to be desired.

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

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



1939  
Formation of Willi Glapiak turnery in Hamburg

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

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

1985  
Focussing on single-stage bevel gearboxes and worm gearboxes

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

## Drive

Our hallmark:  
Excellent ability to supply

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

Fast and almost constant  
reachability

## Know-how

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

Our processes are subject to continuous monitoring

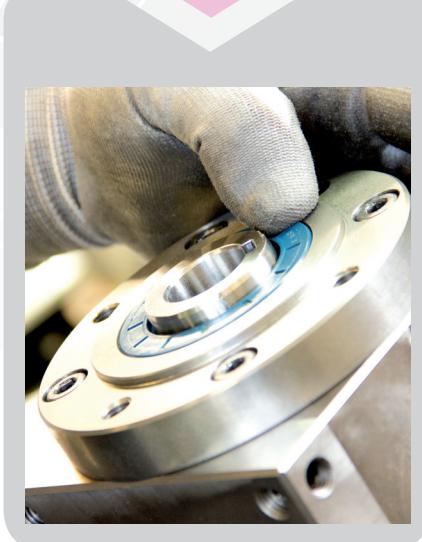
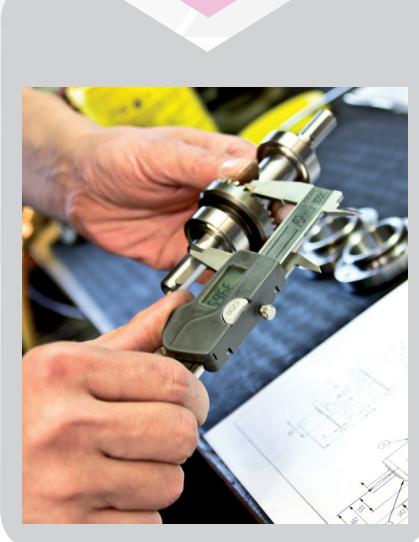
Our management system is certified

## Performance

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

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

We stand for long-standing partnerships, loyalty and confidence



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

**1997**  
Relocation to Prisdorf / Expansion of production capacities

**Since 2002**  
Internationalisation / Development / extension of foreign markets

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

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

**2013**  
Relocation to Rellingen with renewed expansion of production capacities

## 4.1 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.

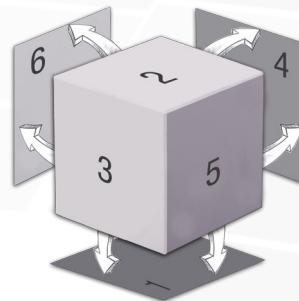


Figure 4.3.1-1; Gearbox sides

#### 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]

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

## 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	

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.

Table 4.4.1-1

## 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 <b>same direction of rotation</b>	B0	G0
Drive shaft and output shaft have <b>opposite directions of rotation</b>	C0	H0
One <b>continuous output shaft</b> made of solid material	D0	J0
One <b>continuous hollow shaft</b> 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 EON\* (KON\*) \*-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 EON, KON) Many gearbox sizes can also be delivered with an enlarged hollow shaft bore (order code /SH).

#### Hollow shaft with splined hub profile EOK\* (KOK\*) \*-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 EOK, KOK)

## 4 General

### 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 423.

No oil change will be necessary during the gearbox lifetime if the mechanical and thermal limit ratings are observed.

The lifetime of the bearings can be increased by the factor 1.5 if the oil is changed after the first 500 service hours and then every 5000 service hours.

## 4.8 Radial shaft seal rings

The rotating shafts are sealed by radial shaft seal rings according to DIN3761.

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

## 4.9 Gearbox data and layout

### 4.9.1 Lifetime

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

### 4.9.2 Noise generation

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

### 4.9.3 Output and torque values

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

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

The permissible rated power inputs  $P_{1N}$  and rated output torques  $T_{2N}$ , 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  $P_{1Nt}$  and output torques  $T_{2Nt}$ , respectively, are valid for an ambient temperature of 20°C and continuous operation. The maximum output torque  $T_{2max}$  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
<b>S1</b>	Continuous operation, constant load
<b>S2</b>	Short-time operation, constant load
<b>S3</b>	Intermittent operation without influence of starting on the temperature
<b>S4</b>	Intermittent operation with influence of starting on the temperature
<b>S5</b>	Intermittent operation with influence of starting and braking on the temperature
<b>S6</b>	Continuous operation with intermittent load
<b>S7</b>	Continuous operation with starting and braking
<b>S8</b>	Continuous operation with load change

#### 4.9.5 Abbreviations used

Abbreviation	[Unit]	Designation
<b>F<sub>r</sub></b>	[N]	Radial force
<b>F<sub>a</sub></b>	[N]	Axial force
<b>i<sub>ist</sub></b>	[-]	Actual gear ratio
<b>i</b>	[-]	Nominal gear ratio
<b>P<sub>1</sub></b>	[kW]	effective input power
<b>P<sub>2</sub></b>	[kW]	effective output power
<b>P<sub>1N</sub></b>	[kW]	permissible nominal input power, mechanical
<b>P<sub>1Nt</sub></b>	[kW]	permissible nominal input power, thermal
<b>P<sub>1m</sub></b>	[kW]	corrected input power, mechanical
<b>P<sub>1t</sub></b>	[kW]	corrected input power, thermal
<b>T<sub>1</sub></b>	[Nm]	input torque
<b>T<sub>1B</sub></b>	[Nm]	permissible acceleration torque at the input drive (servo gearbox)
<b>T<sub>1NOT</sub></b>	[Nm]	permissible input torque in case of emergency shut-off (servo gearbox)
<b>T<sub>2</sub></b>	[Nm]	effective output torque
<b>T<sub>2B</sub></b>	[Nm]	permissible acceleration torque at the output drive
<b>T<sub>2N</sub></b>	[Nm]	permissible nominal output torque, mechanical
<b>T<sub>2NOT</sub></b>	[Nm]	permissible output torque in case of emergency shut-off
<b>T<sub>2Nt</sub></b>	[Nm]	permissible nominal output torque, thermal
<b>T<sub>2m</sub></b>	[Nm]	corrected output torque, mechanical
<b>T<sub>2max</sub></b>	[Nm]	maximum permissible output torque
<b>T<sub>2t</sub></b>	[Nm]	corrected output torque, thermal
<b>T<sub>A</sub></b>	[Nm]	starting torque
<b>J</b>	[kgcm <sup>2</sup> ]	inertia moment
<b>J<sub>1</sub></b>	[kgcm <sup>2</sup> ]	inertia moment related to the fast-rotating shaft
<b>J<sub>ex. red.</sub></b>	[kgcm <sup>2</sup> ]	external inertia moments reduced to drive shaft
<b>J<sub>mot</sub></b>	[kgcm <sup>2</sup> ]	inertia moment of the motor
<b>N<sub>1</sub></b>		fast-rotating shaft
<b>N<sub>2</sub></b>		slowly rotating shaft
<b>f<sub>1</sub></b>	[-]	operating factor
<b>f<sub>2</sub></b>	[-]	starting factor
<b>f<sub>3</sub></b>	[-]	lubrication factor
<b>f<sub>4</sub></b>	[-]	temperature factor
<b>f<sub>5</sub></b>	[-]	duty-cycle factor
<b>f<sub>MB</sub></b>	[-]	mass acceleration factor
<b>n<sub>1</sub></b>	[rpm]	speed of fast-rotating shaft
<b>n<sub>2</sub></b>	[rpm]	speed of slowly rotating shaft
<b>t<sub>u</sub></b>	[°C]	ambient temperature
<b>η</b>	[-]	efficiency
<b>η'</b>	[-]	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<sub>1</sub>: Power is input to the shaft (torque and rotational direction have the same sense of rotation)

P<sub>2</sub>: Power is taken off (torque and rotational direction have an opposite sense of rotation)

n<sub>1</sub>: speed of fast-rotating shaft

n<sub>2</sub>: 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<sub>1</sub> is driven): P<sub>2</sub>=P<sub>1</sub>\*η

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

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

Formula 1

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

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

Formula 2

When selecting the gearbox size, it is necessary to consider the influences that the gearbox will be exposed to later.

This is done through the design factors specified below.

The transmittable power, or the torque, may be reduced by these factors!

In order to determine the gearbox size, the required input power or the output torque must be calculated by means of the operating factors.

Mechanical and thermal influences are taken account of by the formulas.

Mechanical:

$$P_{1m} = P_1 * f_1 * f_2 * f_3$$

$$T_{2m} = T_2 * f_1 * f_2 * f_3$$

The following conditions apply:

$$P_{1m} < P_{1N}$$

$$T_{2m} < T_{2N}$$

Thermal:

$$P_{1t} = P_1 * f_3 * f_4 * f_5$$

$$T_{2t} = T_2 * f_3 * f_4 * f_5$$

The following conditions apply:

$$P_{1t} < P_{1Nt}$$

$$T_{2t} < T_{2Nt}$$

### Design factors (f<sub>1</sub>, f<sub>2</sub>, f<sub>3</sub>, f<sub>4</sub>, f<sub>5</sub>, f<sub>6</sub>)

#### *Operating factor f<sub>1</sub>*

Determination of load group f<sub>MB</sub>

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

f <sub>MB</sub>	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			
		<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
<b>S1</b>	Continuous operation	more than 60% of the cycle time or longer than 20 minutes
<b>S5</b>	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](http://www.atek.de/download). There you can also find information on the Machinery Directive 2006/42 EC.

## 4.11 Ordering

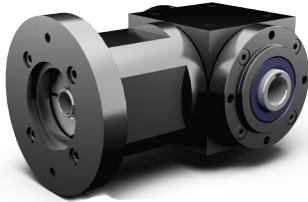
ATEK gearboxes are available in many variants. When a gearbox is first ordered, we will define a unique article number. In case of follow-up orders, it is enough to specify our article number to reorder exactly the same gearbox type.





## 11.1 Type overview

### Type LC – Servo 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:  $i = 8:1$  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:  $i = 5:1$  to  $26:1$  ( $i > 26$  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

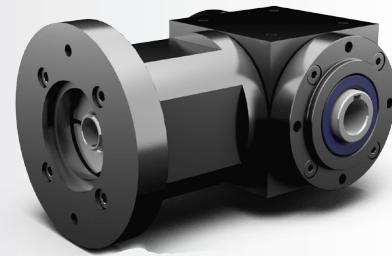
Special servo gearboxes have been developed for the requirements of highly dynamic servo-motors. The proven ATEK bevel gearbox and worm gearbox series form the basis for them. The combination of a large number of motor flanges and an insertable, zero-play clamp coupling enables the adaptation to the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

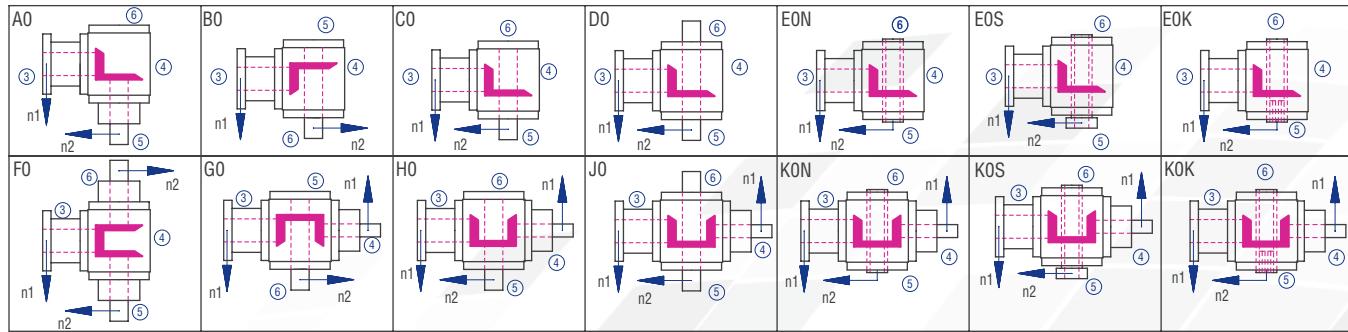


Figure 11.2.2-1; Models

## 11.2.3 Gearbox sides

The example shows the Model CO

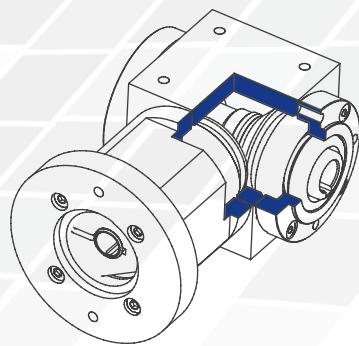


Figure 11.2.3-1; Gearbox sides

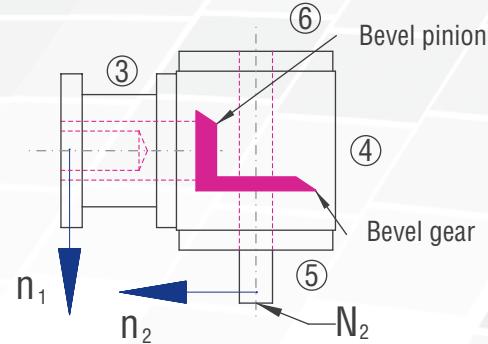


Figure 11.2.3-2; Shaft designations

## 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	CO-	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

## 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 Tothing

VC servo gearboxes have gear sets with high-quality spiral toothings 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 toothings 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.

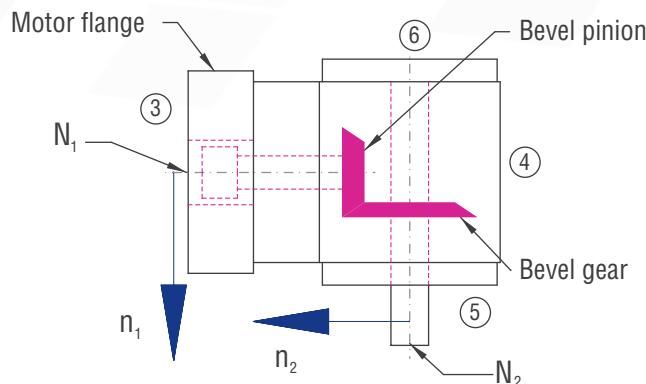


Figure 11.3.6-1

## 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

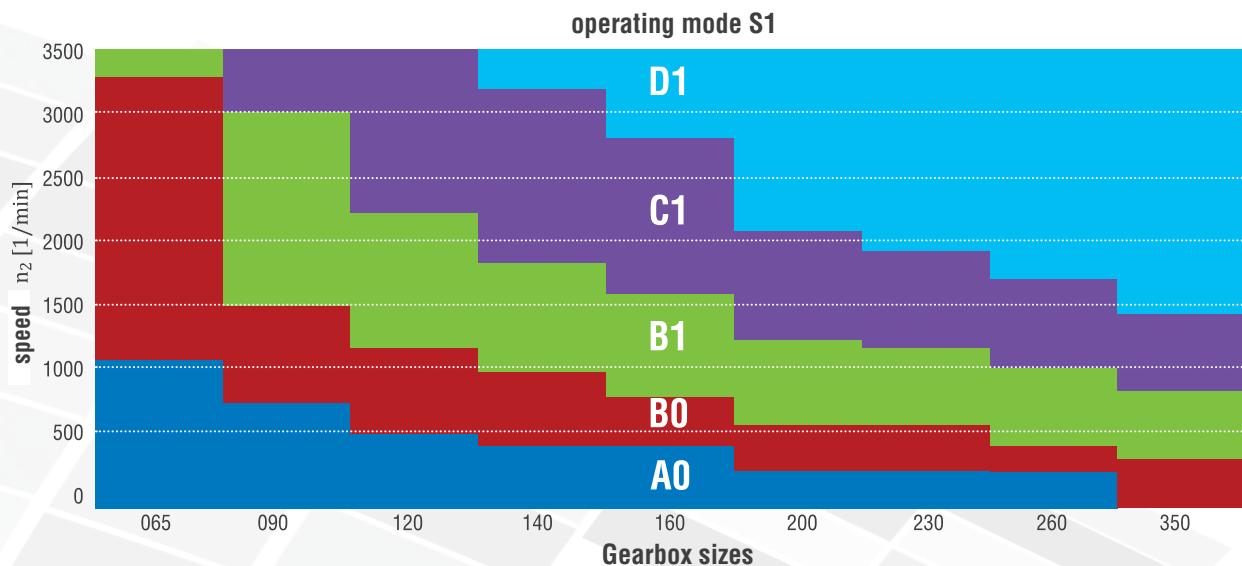


Figure 11.3.9-1

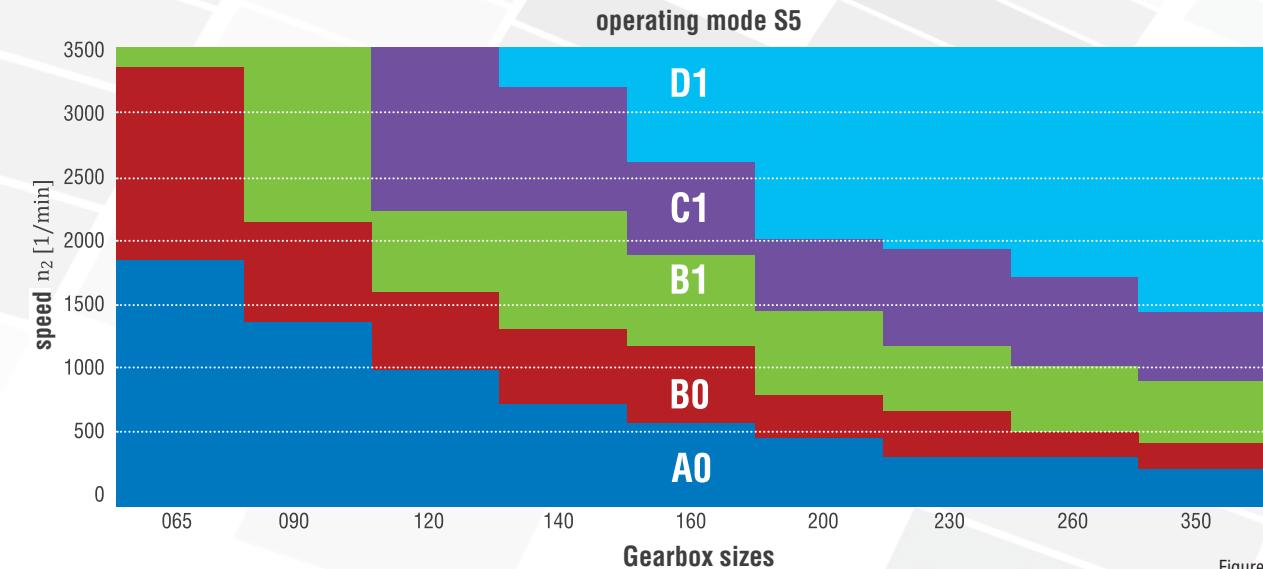


Figure 11.3.9-2

## 11.3 Type VC – Servo bevel gearboxes

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.

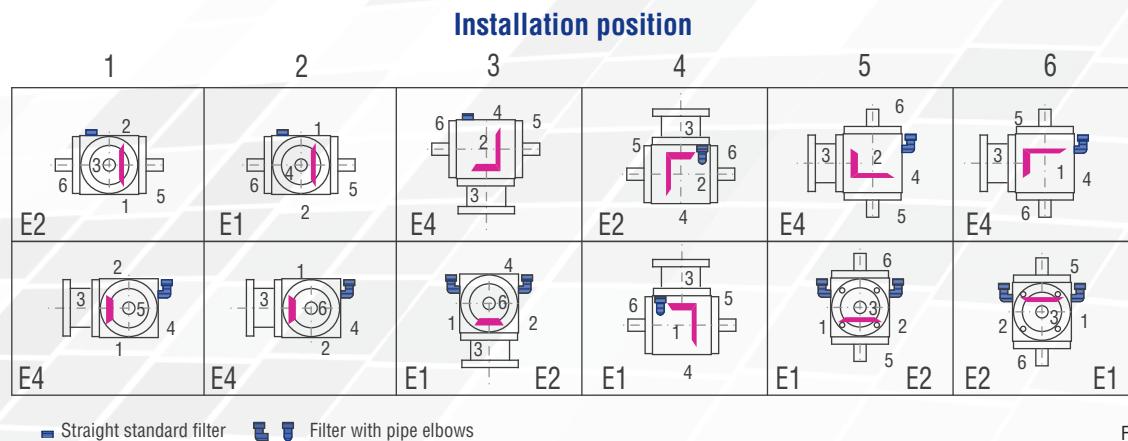


Figure 11.3.10-1

### 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

## 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 ( $T_{1B}$ ) and emergency-stop torques ( $T_{1NOT}$ ). These values must also be permissible on the gearbox!

Coupling	Hub	Coupling torques allowed [Nm]	Motor shaft diameter d [mm]										
			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	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
	KNN/SN	$T_{1B}$ [Nm]						260	260	260	260	260	260
		$T_{1NOT}$ [Nm]							500	500	500	500	500

Table 11.3.13-1

Selection gearbox

## 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

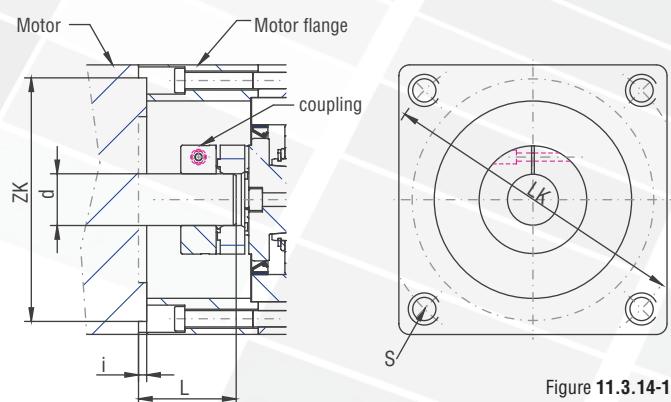


Figure 11.3.14-1

The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.

## 11.3 Type VC – Servo bevel gearboxes

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
	120	103	50	75	60
24	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
	140	403	60	100	80
32	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
38	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
	140	931	80	215	180
	160	931	80	215	180
	200	915	80	215	180

Table 11.3.14-1

Servo gearboxes  
(precision gearboxes)

ON LINE  
VISION

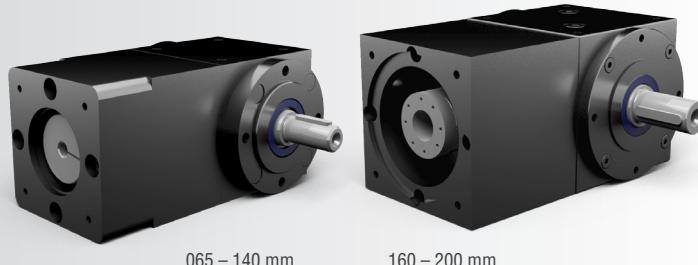
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# 11.3 Type VC – Servo bevel gearboxes

## 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



## 11.3.15.1 Models

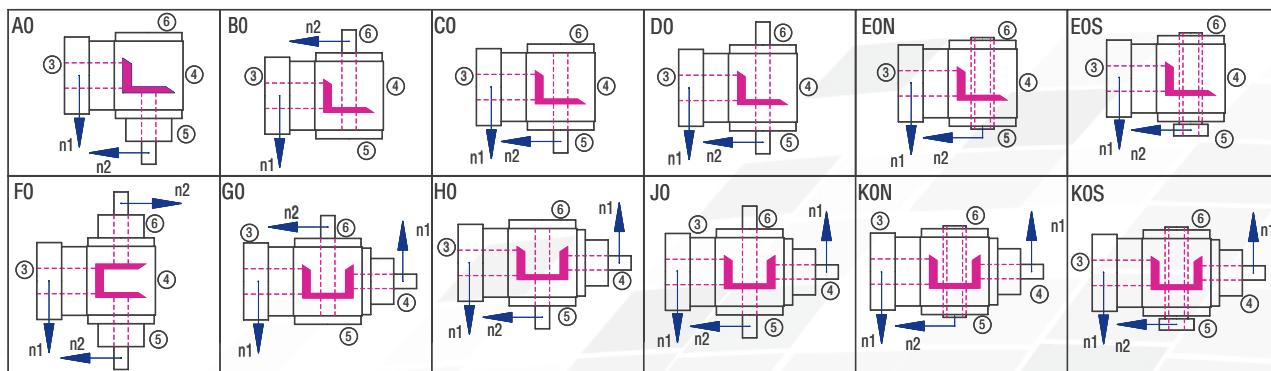


Figure 11.3.15-1; Models

## 11.3.15.2 Gearbox sides

The example shows the Model C0

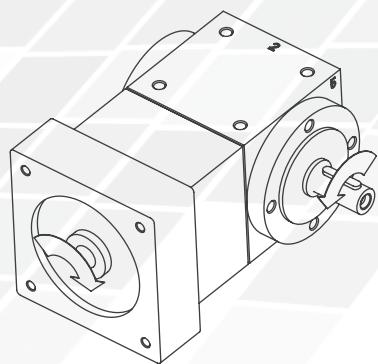


Figure 11.3.15-3; Gearbox sides

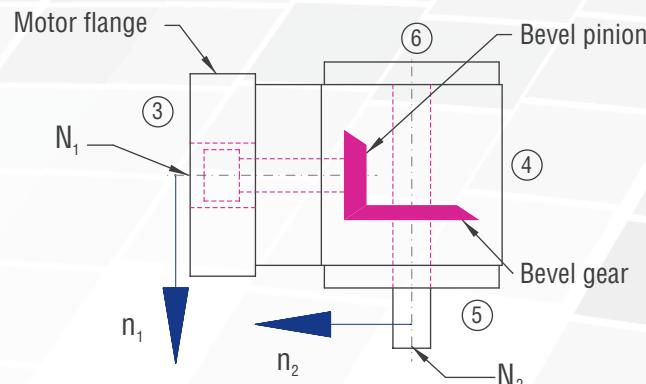


Figure 11.3.15-2; Gearbox sides

## 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 Gearbox sides	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 $\varnothing$ x length	Flange no.				

#### 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 <sub>2N</sub> [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 <sub>2N</sub> [Nm]	8	10	10	8	0	0	0
T <sub>2B</sub> [Nm]	15	17	17	15	0	0	0
T <sub>2Not</sub>	23	25	25	20	0	0	0
N <sub>1max</sub>	4400	6000	6000	6000	0	0	0
T <sub>2N</sub> [Nm]	25	25	25	23	23	23	23
T <sub>2B</sub> [Nm]	40	37	36	36	36	36	31
T <sub>2Not</sub>	50	50	60	60	60	50	45
N <sub>1max</sub>	3200	4800	6000	6000	6000	6000	6000
T <sub>2N</sub> [Nm]	50	61	65	58	60	60	54
T <sub>2B</sub> [Nm]	70	105	98	95	87	92	71
T <sub>2Not</sub>	150	140	140	140	120	110	
N <sub>1max</sub>	2400	3600	4800	6000	6000	6000	6000
T <sub>2N</sub> [Nm]	120	113	110	110	105	100	95
T <sub>2B</sub> [Nm]	180	200	190	177	162	143	122
T <sub>2Not</sub>	260	280	280	260	220	200	
N <sub>1max</sub>	2100	3000	4200	5000	6000	6000	6000
T <sub>2N</sub> [Nm]	180	185	185	190	180	180	130
T <sub>2B</sub> [Nm]	350	330	320	280	270	270	200
T <sub>2Not</sub>	480	500	550	400	400	380	350
N <sub>1max</sub>	1800	2500	3200	4500	5000	6000	6000
T <sub>2N</sub> [Nm]	350	330	320	420	350	300	210
T <sub>2B</sub> [Nm]	700	690	600	630	550	505	315
T <sub>2Not</sub>	980	850	800	850	800	800	625
N <sub>1max</sub>	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 For smooth motor shafts For motor shafts with parallel key	KN SN KNN	See chapter 11.3.13

## Torques in operating mode S1

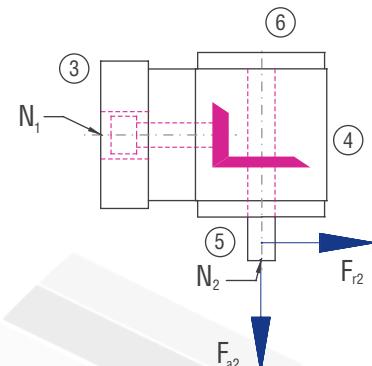
Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
	n1 [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]										
4000	3.6	4000	5.4	2667	7.2	2000	7.2	1333						
3000	4.8	3000	7.2	2000	9.6	1500	9.6	1000						
2400	6	2400	9	1600	10	1200	10	800						
1500	8	1500	10	1000	10	750	10	500						

## 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 <sub>2N</sub> in S5 [Nm]				8	10	10	8			
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	5.3	8.0	10.6	15.0			
			T <sub>2NOT</sub> [Nm]	7.0	10.5	14.0	20.0			
		KNN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	22.0	25.0	25.0	20.0			
		SN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	22.0	25.0	25.0	20.0			
	11	KN	T <sub>2B</sub> [Nm]	5.6	8.4	11.2	15.0			
			T <sub>2NOT</sub> [Nm]	9.0	13.5	18.0	20.0			
		KNN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			
		SN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			
K14	14	KN	T <sub>2B</sub> [Nm]	6.1	9.1	12.2	15.0			
			T <sub>2NOT</sub> [Nm]	13.0	19.5	25.0	20.0			
		KNN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			
		SN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			
	16	KN	T <sub>2B</sub> [Nm]	6.5	9.8	13.0	15.0			
			T <sub>2NOT</sub> [Nm]	15.0	22.5	25.0	20.0			
		KNN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			
		SN	T <sub>2B</sub> [Nm]	10.0	15.0	17.0	15.0			
			T <sub>2NOT</sub> [Nm]	23.0	25.0	25.0	20.0			

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 12	300	150	400	200	500	250
> 12	250	125	330	165	420	210



## Gearbox inertia moments/mass

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

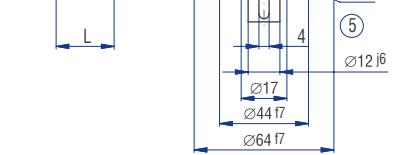
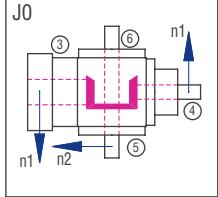
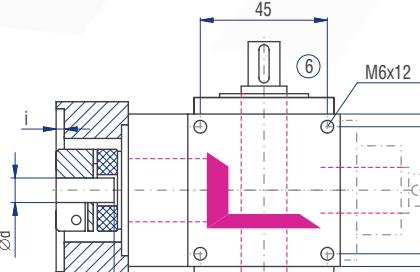
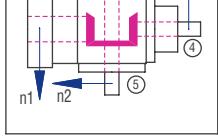
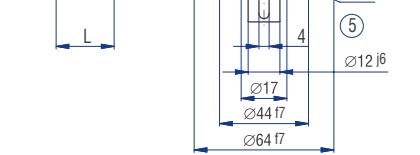
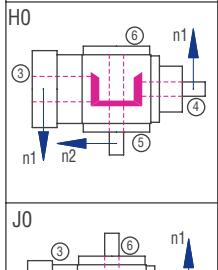
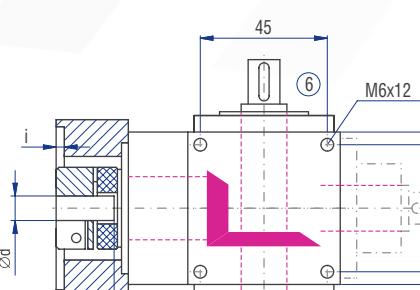
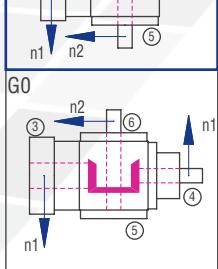
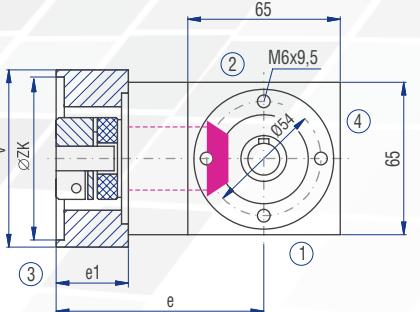
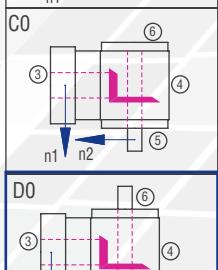
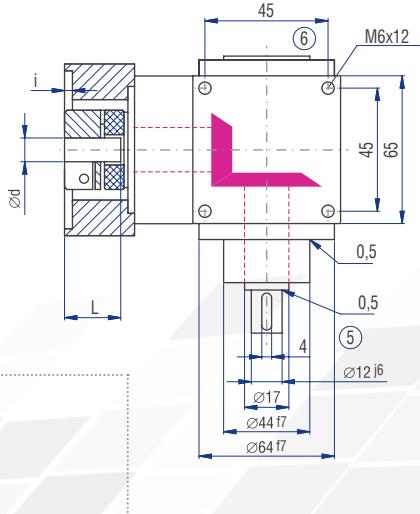
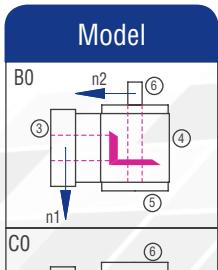
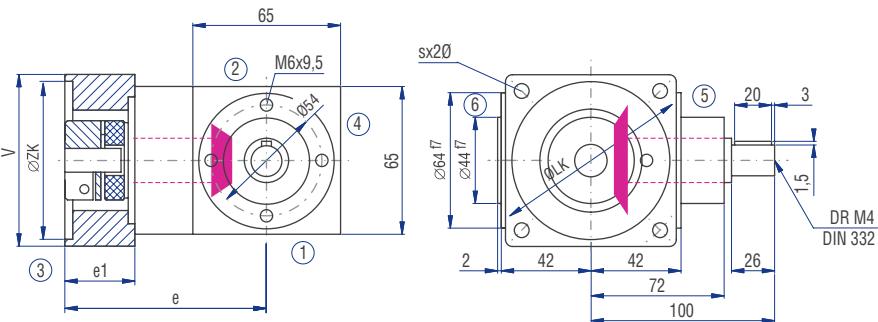
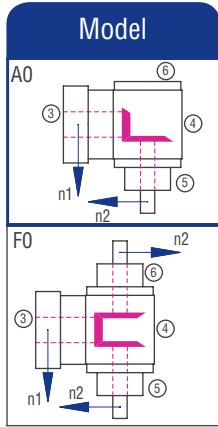
Model	Inertia moment [kgcm <sup>2</sup> ]						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
A0	0.4740	0.2110	0.1830	0.1830			
B0	0.4680	0.3190	0.2590	0.1940			
C0	0.4680	0.3190	0.2590	0.1940			
D0	0.4780	0.3230	0.2620	0.2380			
EON	0.5200	0.3710	0.3110	0.2320			
EOS	0.6460	0.4968	0.4370	0.3570			
F0	0.7080	0.2600	0.2040	0.1910			
G0	0.7540	0.4730	0.3950	0.3200			
H0	0.7540	0.4730	0.3950	0.3200			

## Inertia moments Coupling J [kgcm<sup>2</sup>]

K14	KN	KNN	SN
d [mm]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
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.

## 11.3.16 Type VC 065 – Servo bevel gearboxes

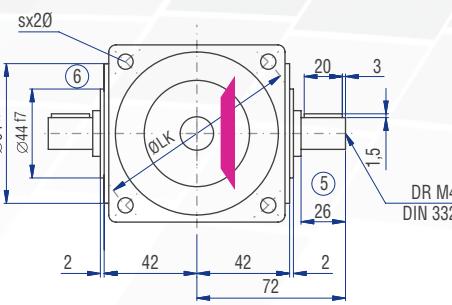


### Motor mounting dimensions

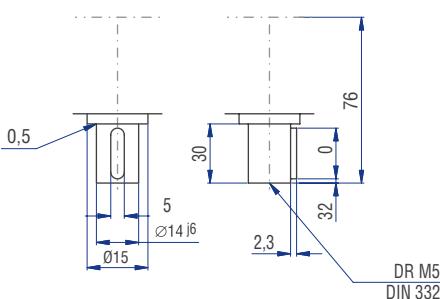
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxl [mm]	i [mm]	e [mm]	e1 [mm]
001	65	40	M4	63	11*23	3	104.5	30
002	65	40	M5	63	11*23	3	104.5	30
102	70	60	M5	75	11*23	3	101.0	26.5
103	70	60	M6	90	14*30	3	119.5	45
104	70	60	M5	75	14*30	3	119.5	45
201	80	60	M5	75	14*30	4	119.5	45
202	80	60	M5	90	11*23	4	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

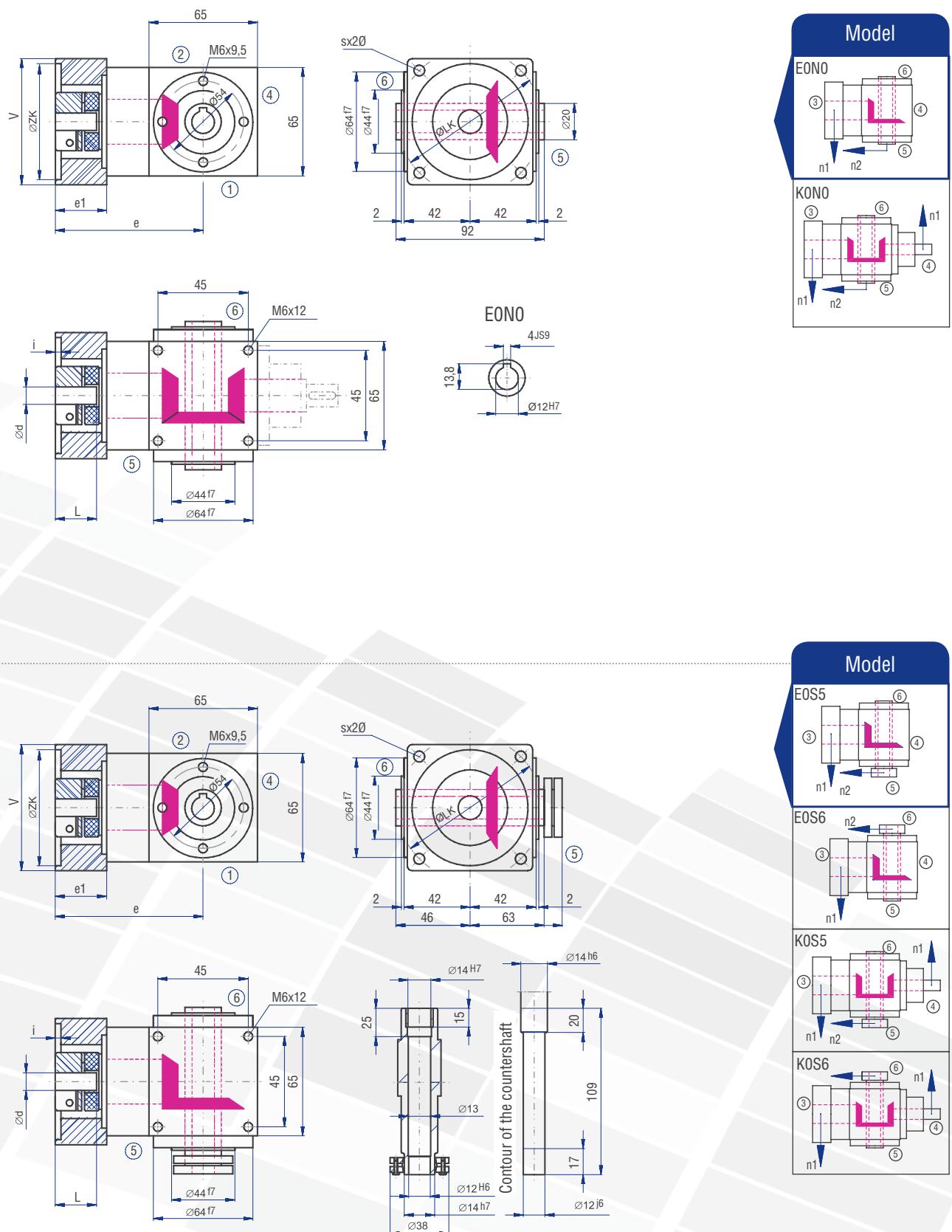
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



### Implementation VV



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.



# 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 For smooth motor shafts For motor shafts with parallel key	KN SN KNN	See chapter 11.3.13

## Torques in operating mode S1

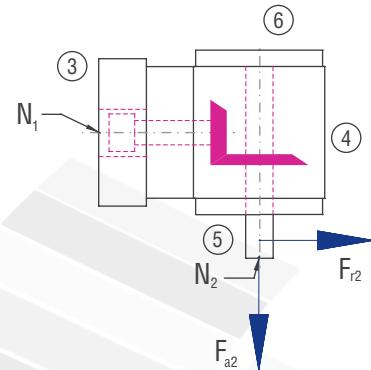
Gear ratio i [-]	1:1		1.5:1		2:1		3:1		4:1		5:1		6:1	
n1 [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [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

## 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 <sub>2N</sub> in S5 [Nm]				25	25	25	23	23	23	23
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
	11	KN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
		KNN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
		SN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
	14		T <sub>2NOT</sub> [Nm]	30.0	45.0	60.0	60.0	60.0	50.0	45.0
		KN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		KNN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		SN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
	16		T <sub>2NOT</sub> [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		KN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	32.0	48.0	60.0	60.0	60.0	50.0	45.0
		KNN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
	19	SN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		KN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		KNN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
	24		T <sub>2NOT</sub> [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0
		SN	T <sub>2B</sub> [Nm]	17.0	25.5	34.0	36.0	36.0	36.0	31.0
			T <sub>2NOT</sub> [Nm]	34.0	50.0	60.0	60.0	60.0	50.0	45.0

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50						
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [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<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

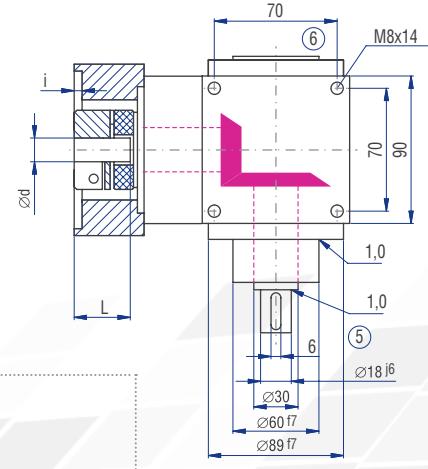
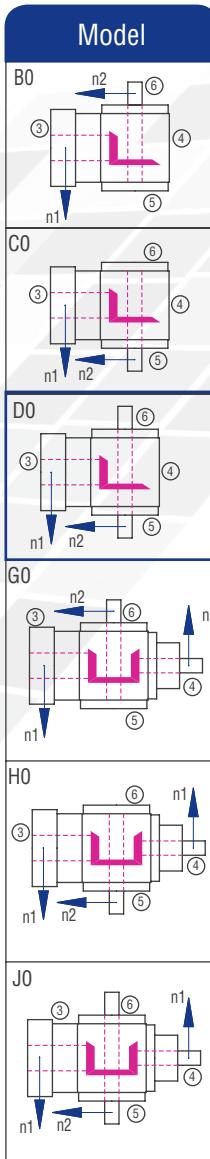
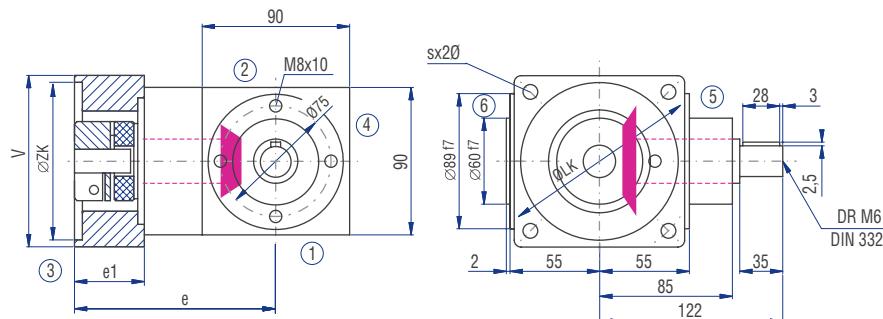
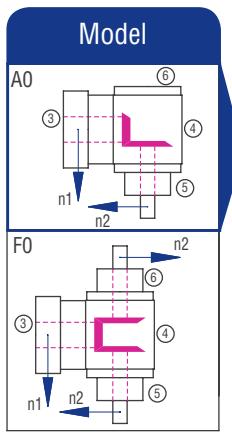
Model	Inertia moment [kgcm <sup>2</sup> ]						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
A0	3.0540	2.3340	1.4510	1.2330	1.1450	1.1010	1.0700
B0	3.6690	2.7900	1.6950	1.3410	1.2060	1.1400	1.0970
C0	3.6690	2.7900	1.6950	1.3410	1.2060	1.1401	1.0970
D0	3.6974	2.8023	1.7020	1.3441	1.2075	1.1412	1.0980
EON	3.5654	2.7440	1.6690	1.3294	1.1992	1.1360	1.0940
EOS	4.2360	3.0420	1.8370	1.4040	1.2412	1.1630	1.1130
F0	4.5140	3.1480	1.7490	1.4240	1.2610	1.1820	1.1220
G0	4.9490	3.7030	2.5190	2.0870	1.4890	1.4140	1.3670
H0	4.9490	3.7030	2.5190	2.0870	1.4890	1.4140	1.3670
J0	4.9770	3.7160	2.5260	2.0900	1.4910	1.4150	1.3680
KON	4.8450	3.6570	2.4930	2.0760	1.4820	1.4100	1.3650
KOS	5.5160	3.9550	2.6600	2.1500	1.5240	1.4360	1.3830

## Inertia moments Coupling J [kgcm<sup>2</sup>]

K19	KN	KNN	SN
d [mm]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
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

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

## 11.3.17 Type VC 090 – Servo bevel gearboxes

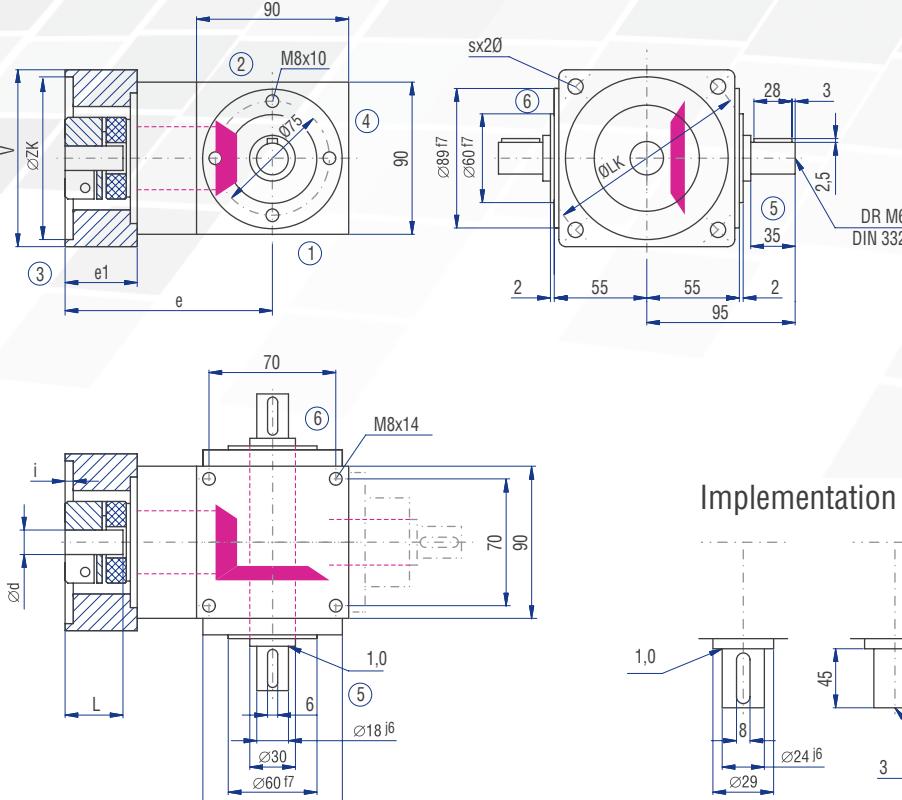


### Motor mounting dimensions

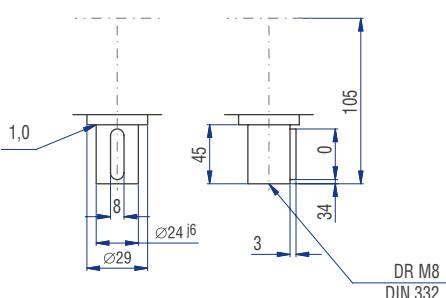
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxdl [mm]	i [mm]	e [mm]	e1 [mm]
103	90	60	M6	75	19*40	3	140.0	45
201	90	60	M5	90	19*40	3	140.0	45
301	90	50	M6	95	19*40	4	140.0	45
401	90	80	M6	100	19*40	4	140.0	45
501	100	95	M8	115	19*40	4	140.0	45
601	115	95	M8	130	19*40	4	140.0	45
611	115	110	M8	130	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

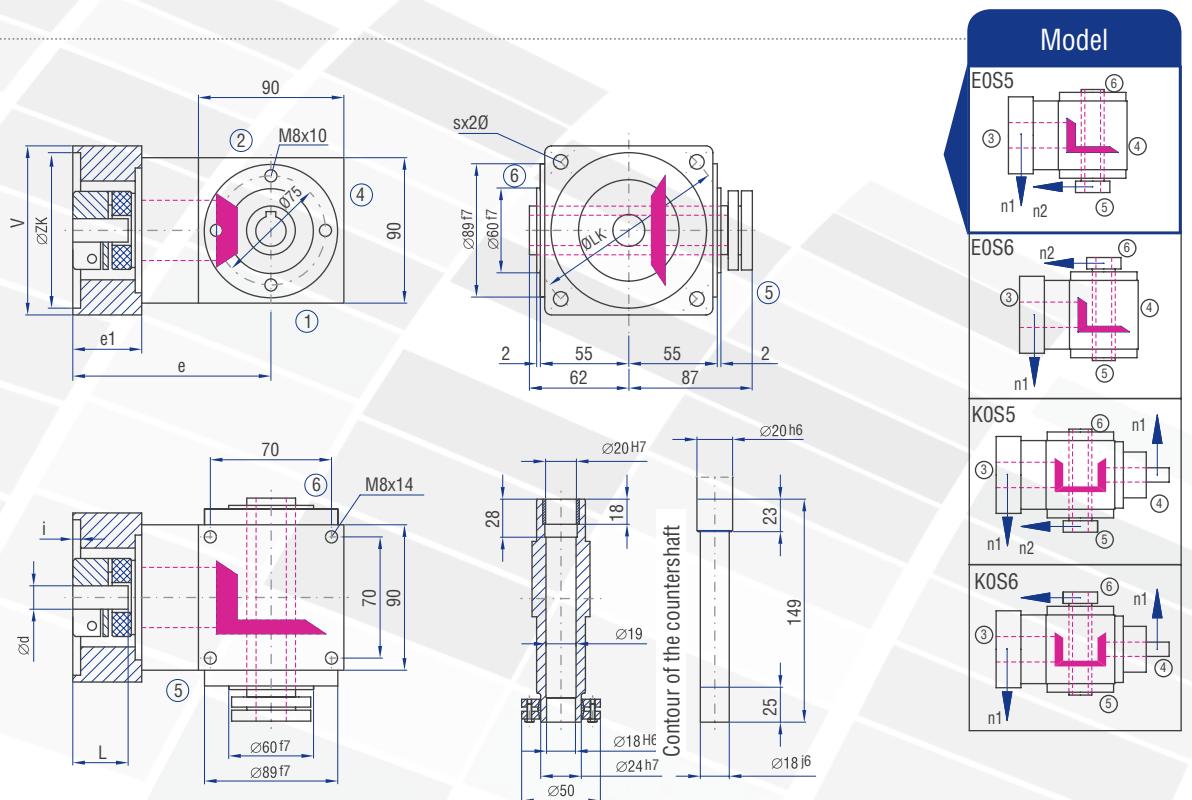
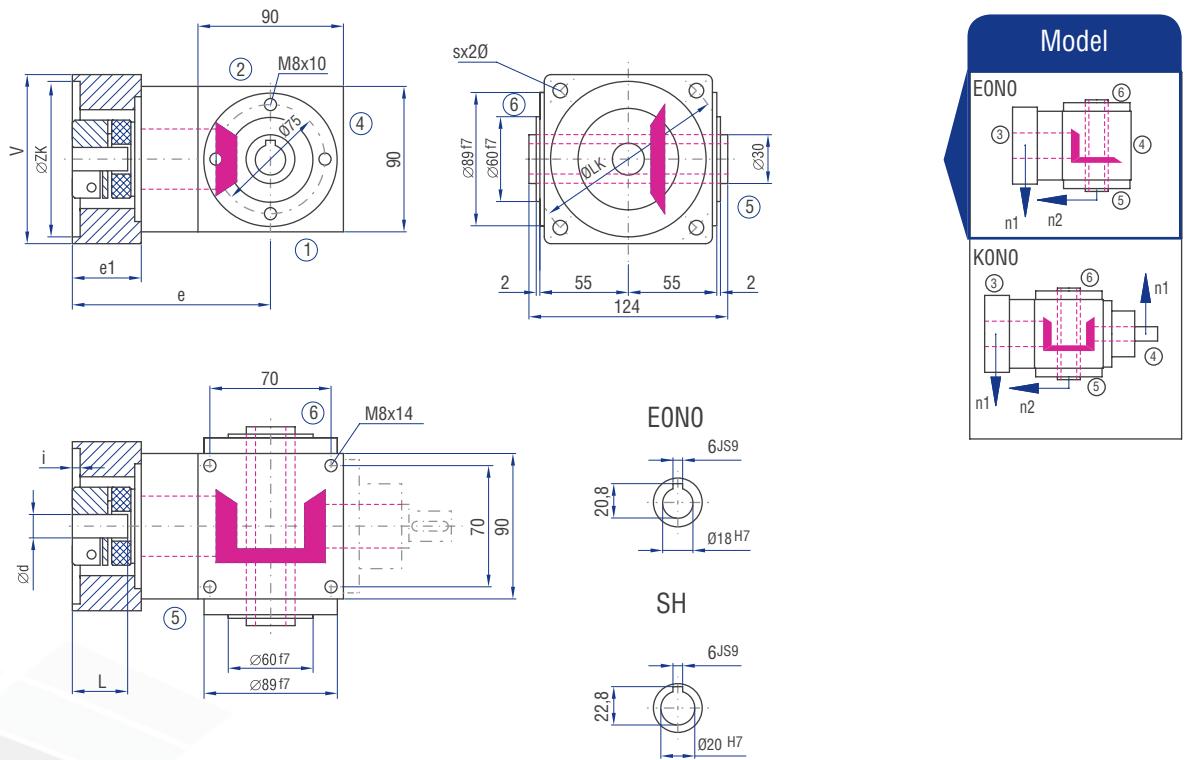
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



### 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.



# 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 For smooth motor shafts For motor shafts with parallel key	KN SN 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 <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [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

## 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 <sub>2N</sub> in S5 [Nm]				50	61	65	58	60	60	54
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	35.0	52.5	70.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	45.0	67.5	90.0	135.0	140.0	120.0	110.0
		KNN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
		SN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	0.0	0.0	0.0	0.0	0.0	0.0	0.0
			T <sub>2B</sub> [Nm]	36.0	54.0	72.0	95.0	87.0	92.0	71.0
	14	KN	T <sub>2NOT</sub> [Nm]	45.0	67.5	90.0	135.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		KNN	T <sub>2NOT</sub> [Nm]	80.0	120.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		SN	T <sub>2NOT</sub> [Nm]	80.0	120.0	140.0	140.0	140.0	120.0	110.0
K24	16	KN	T <sub>2B</sub> [Nm]	39.0	58.5	78.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	50.0	75.0	100.0	140.0	140.0	120.0	110.0
		KNN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	100.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	100.0	140.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	39.0	58.5	78.0	95.0	87.0	92.0	71.0
	19	KN	T <sub>2NOT</sub> [Nm]	60.0	90.0	120.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		KNN	T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		SN	T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
K24	24	KN	T <sub>2B</sub> [Nm]	43.0	64.5	86.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	65.0	97.5	130.0	140.0	140.0	120.0	110.0
		KNN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
		SN	T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
			T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	43.0	64.5	86.0	95.0	87.0	92.0	71.0
	28	KN	T <sub>2NOT</sub> [Nm]	70.0	105.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		KNN	T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0
			T <sub>2B</sub> [Nm]	48.0	72.0	96.0	95.0	87.0	92.0	71.0
		SN	T <sub>2NOT</sub> [Nm]	120.0	140.0	140.0	140.0	140.0	120.0	110.0

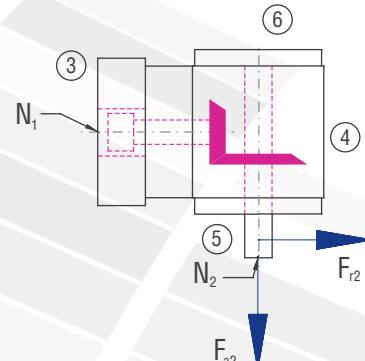
## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 80	750	375	1000	500	1250	625
> 80	630	315	830	415	1040	520

## Gearbox inertia moments/mass

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

Model	Inertia moment [kgcm <sup>2</sup> ]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
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
EON	16.8600	8.7992	6.7520	5.1051	4.5352	4.2230	4.0400	17.0
EOS	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
JO	22.5140	11.4880	9.1880	6.8830	5.4490	4.7810	4.5820	19.9
KON	22.1090	11.3070	9.0860	6.8380	5.4240	4.7640	4.5710	19.4
KOS	23.8960	12.1020	9.5330	7.0360	5.5350	4.8360	4.6200	19.7

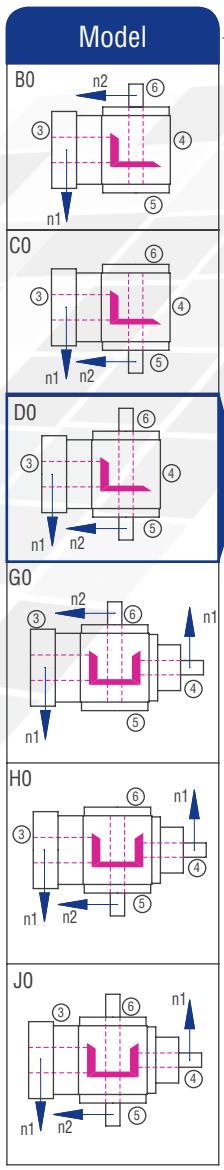
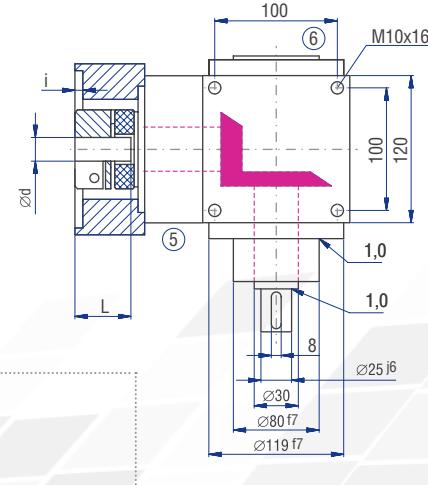
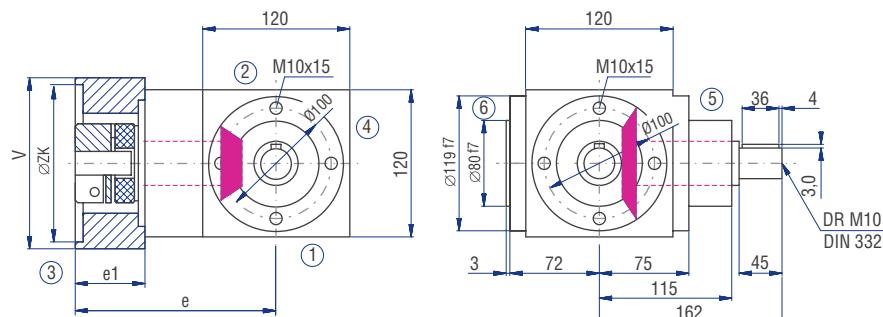
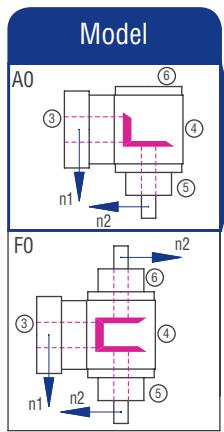


## Inertia moments Coupling J [kgcm<sup>2</sup>]

K24	KN	KNN	SN
d [mm]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
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

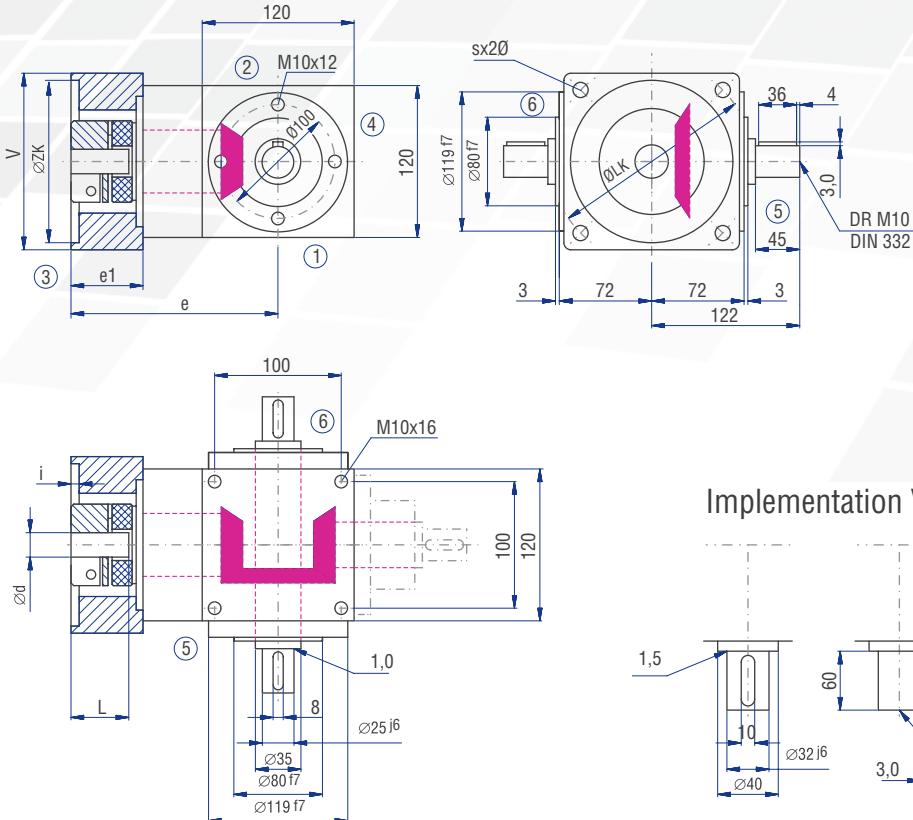


## Motor mounting dimensions

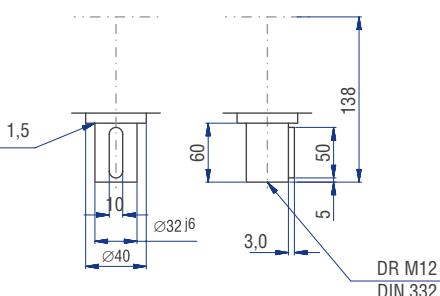
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxd [mm]	i [mm]	e [mm]	e1 [mm]
103	120	60	M6	75	24*50	3	170,0	54
201	120	60	M5	90	24*50	3	170,0	54
301	120	50	M6	95	24*50	4	170,0	54
401	120	80	M6	100	24*50	4	170,0	54
501	120	95	M8	115	24*50	4	170,0	54
601	120	95	M8	130	24*50	4	170,0	54
611	120	110	M8	130	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

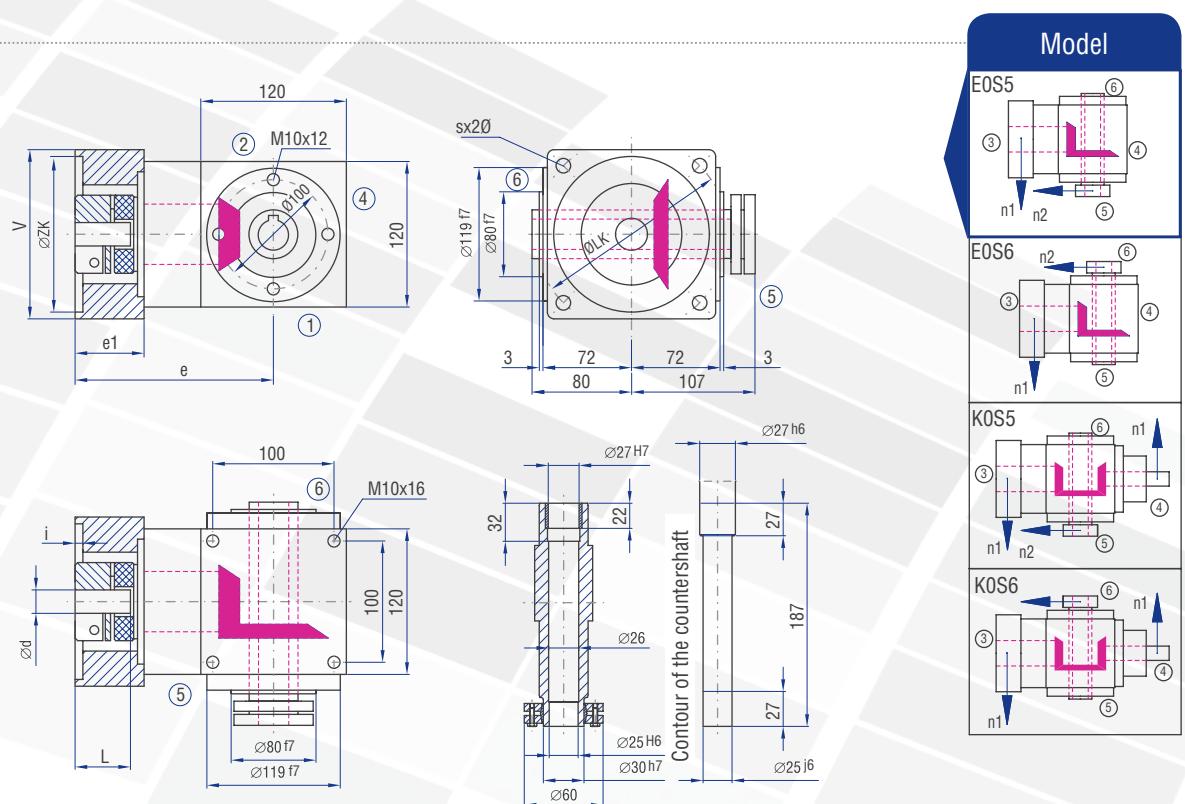
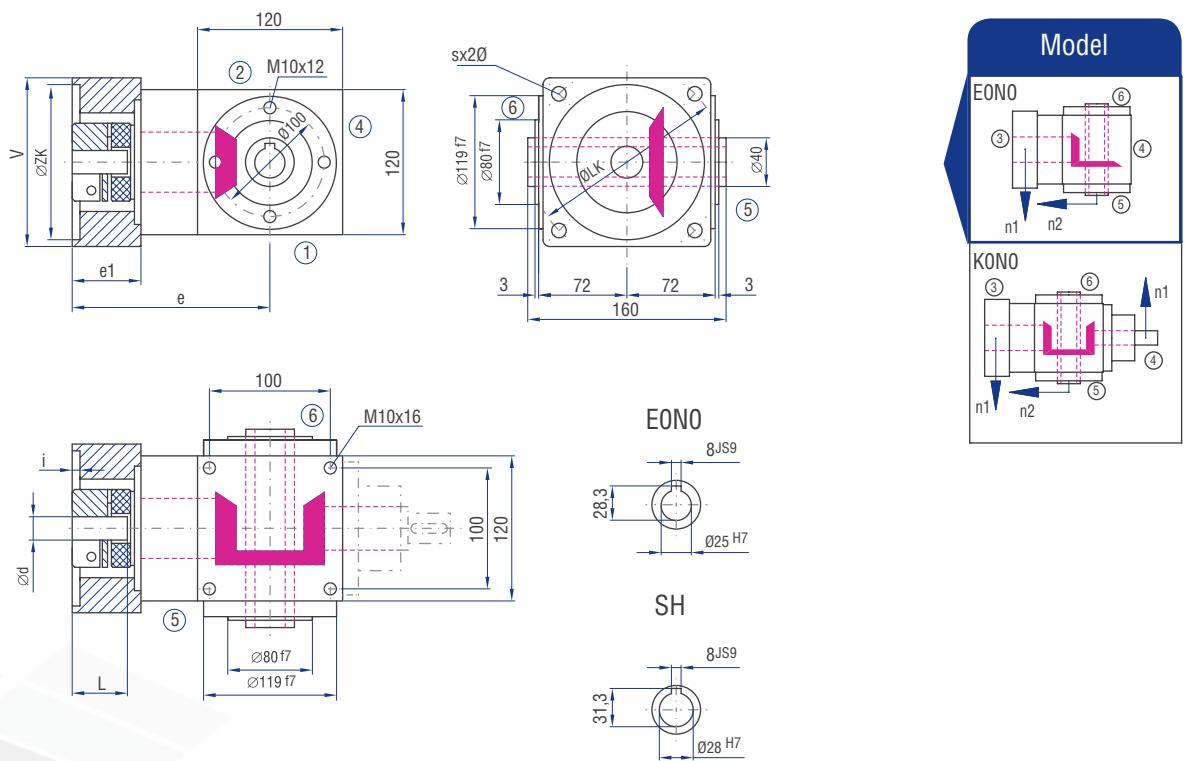
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



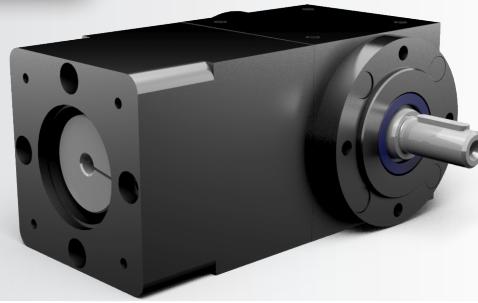
## Implementation VV



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.



# 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 For smooth motor shafts For motor shafts with parallel key	KN SN 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 <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]										
4000	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

## 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 <sub>2N</sub> in S5 [Nm]				120	113	110	110	105	100	95
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	80.0	120.0	160.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	80.0	120.0	160.0	240.0	260.0	220.0	200.0
	16	KN	T <sub>2B</sub> [Nm]	81.0	121.5	162.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	100.0	150.0	200.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
	19	KN	T <sub>2B</sub> [Nm]	85.0	127.5	170.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	130.0	195.0	260.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
K28	24	KN	T <sub>2B</sub> [Nm]	91.0	136.5	182.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	28	KN	T <sub>2B</sub> [Nm]	97.0	145.5	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	148.0	222.0	280.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
K28	32	KN	T <sub>2B</sub> [Nm]	102.0	153.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	156.0	234.0	280.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
	38	KN	T <sub>2B</sub> [Nm]	109.0	163.5	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	167.0	250.5	280.0	260.0	260.0	220.0	200.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	190.0	177.0	162.0	143.0	122.0
			T <sub>2NOT</sub> [Nm]	240.0	280.0	280.0	260.0	260.0	220.0	200.0

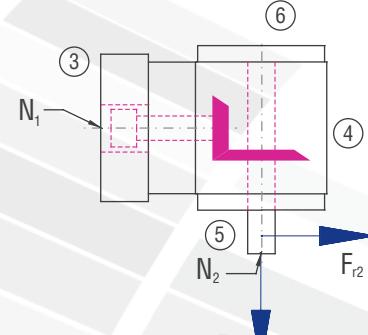
## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50						
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [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<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

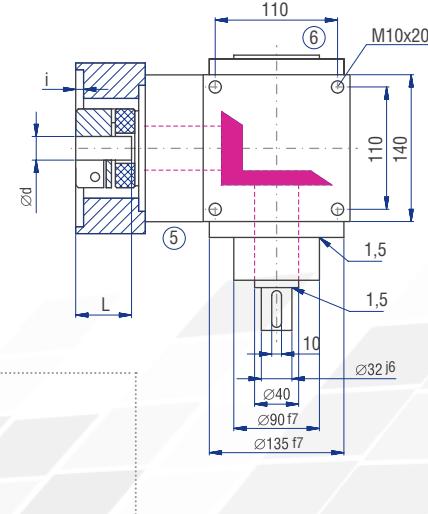
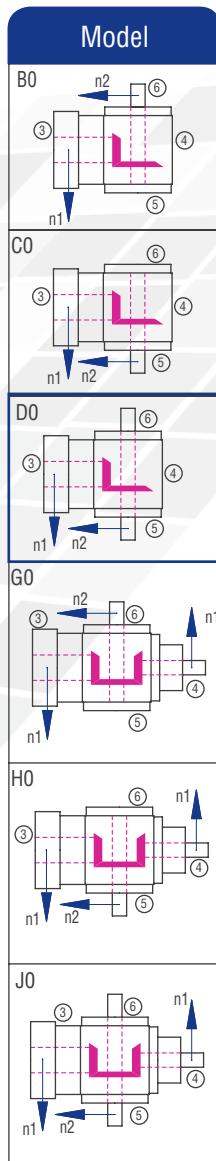
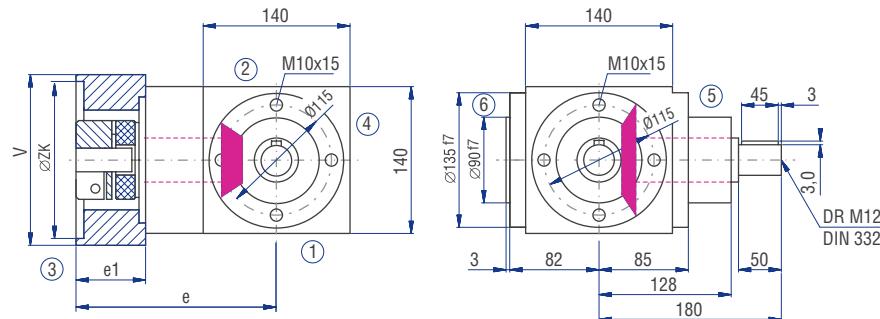
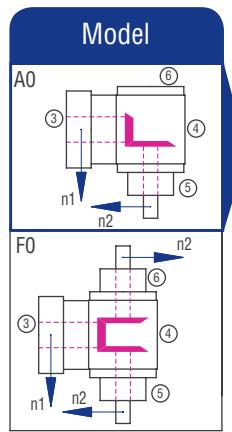
Model	Inertia moment [kgcm <sup>2</sup> ]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	29.1040	17.6100	13.2250	10.3390	9.2700	8.8650	8.6550	26.0
B0	40.2700	22.7860	16.3860	11.4390	9.7640	9.2930	8.9250	25.5
C0	40.2700	22.7860	16.3860	11.4390	9.7640	9.2930	8.9250	25.5
D0	41.2520	23.2230	16.6310	11.5480	9.8250	9.3320	8.9520	26.0
EON	36.8340	21.2590	15.5260	11.0570	9.5490	9.1560	8.8300	25.0
EOS	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
KON	49.9670	27.2790	20.9190	16.0340	10.5720	10.1620	9.8360	29.2
KOS	56.3690	30.1240	22.5200	16.7450	10.9720	10.4180	10.0130	29.9



## Inertia moments Coupling J [kgcm<sup>2</sup>]

K28	KN	KNN	SN
d [mm]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
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

# 11.3.19 Type VC 140 – Servo bevel gearboxes

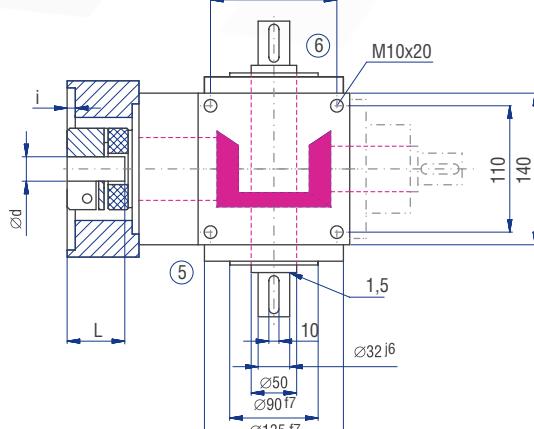
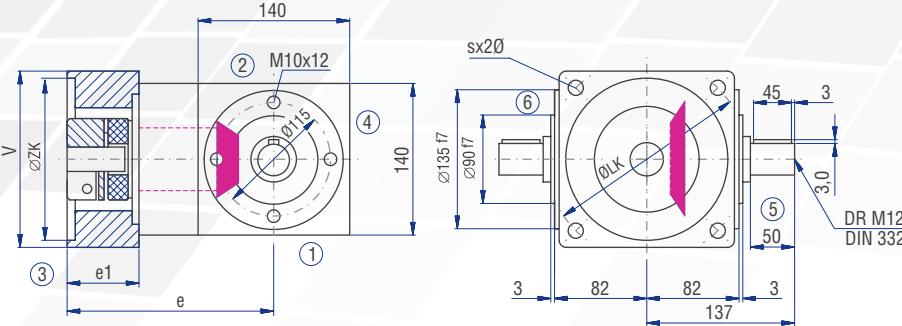


## Motor mounting dimensions

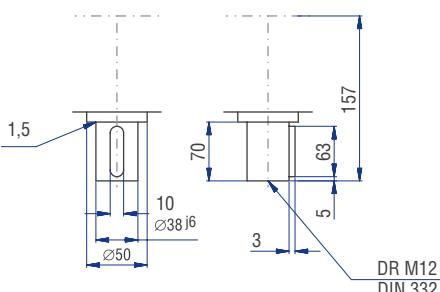
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxl [mm]	i [mm]	e [mm]	e1 [mm]
403	140	80	M6	100	32*60	4	196.0	61
502	140	95	M8	115	32*60	4	196.0	61
601	140	95	M8	130	32*60	4	196.0	61
611	140	110	M8	130	32*60	5	196.0	61
616	140	110	M10	130	32*60	5	196.0	61
701	140	110	M8	145	32*60	5	196.0	61
802	140	110	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

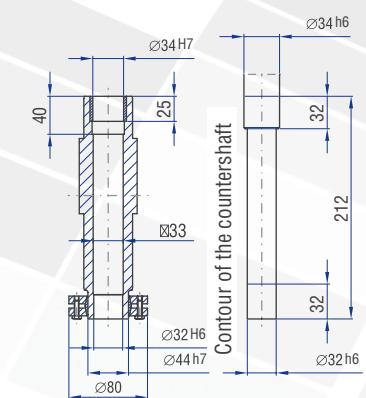
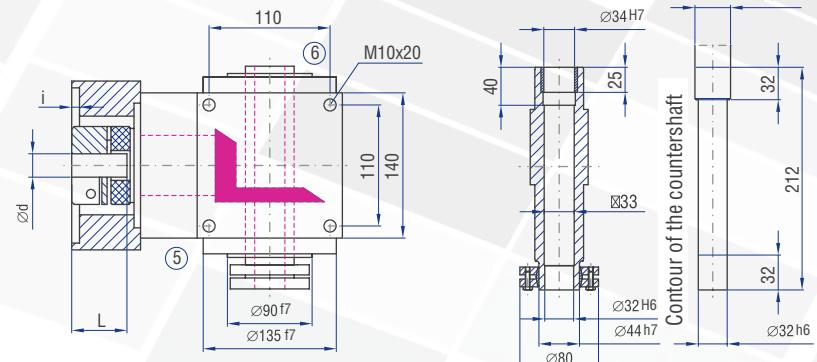
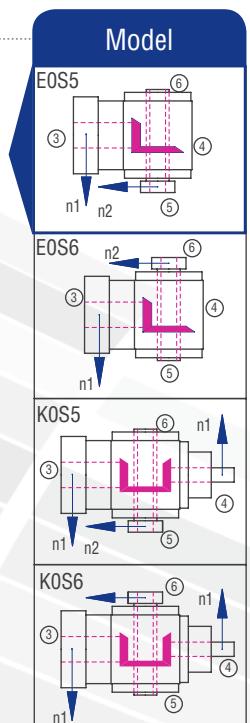
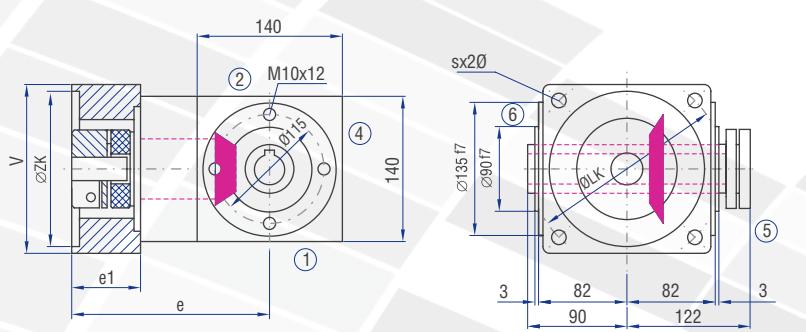
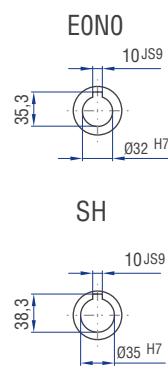
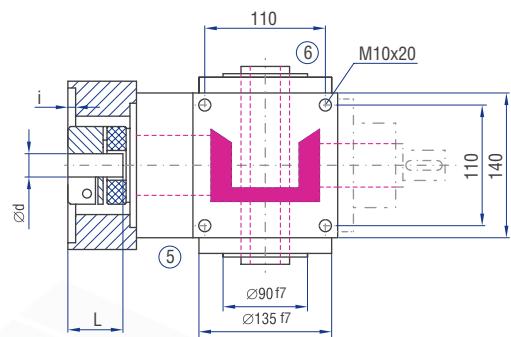
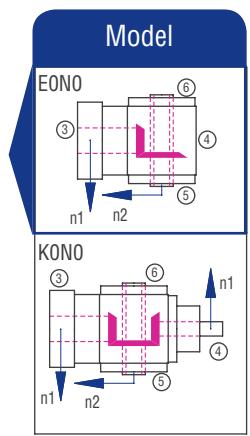
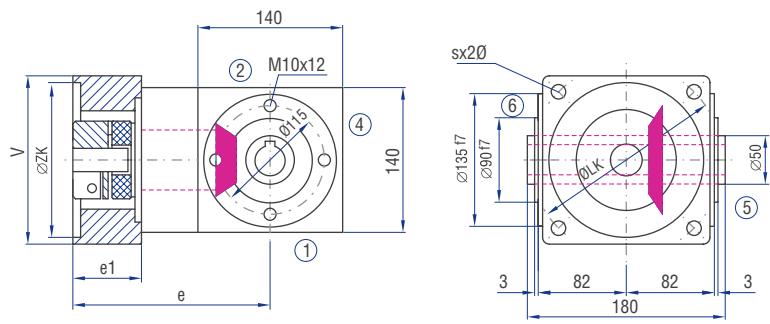
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



## 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.



# 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 For smooth motor shafts For motor shafts with parallel key	KN SN 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 <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [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

## 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 <sub>2N</sub> in S5 [Nm]				180	185	185	190	180	180	130
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	80.0	120.0	160.0	240.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	80.0	120.0	160.0	240.0	320.0	380.0	350.0
	16	KN	T <sub>2B</sub> [Nm]	81.0	121.5	162.0	243.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	100.0	150.0	200.0	300.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
	19	KN	T <sub>2B</sub> [Nm]	85.0	127.5	170.0	255.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	130.0	195.0	260.0	390.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
K28	24	KN	T <sub>2B</sub> [Nm]	91.0	136.5	182.0	273.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	140.0	210.0	280.0	400.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	28	KN	T <sub>2B</sub> [Nm]	97.0	145.5	194.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	148.0	222.0	296.0	400.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
K28	32	KN	T <sub>2B</sub> [Nm]	102.0	153.0	204.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	156.0	234.0	312.0	400.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
	38	KN	T <sub>2B</sub> [Nm]	109.0	163.5	218.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	167.0	250.5	334.0	400.0	400.0	380.0	350.0
		KNN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0
		SN	T <sub>2B</sub> [Nm]	128.0	192.0	256.0	280.0	270.0	270.0	200.0
			T <sub>2NOT</sub> [Nm]	240.0	360.0	480.0	400.0	400.0	380.0	350.0

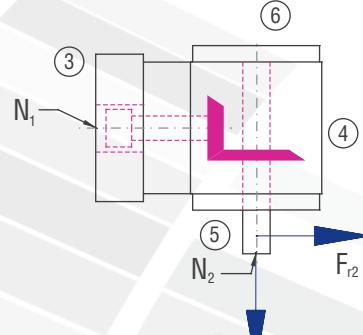
## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 220	2000	1000	2800	1400	3300	1650
> 220	1670	835	2340	1170	2750	1375

## Gearbox inertia moments/mass

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

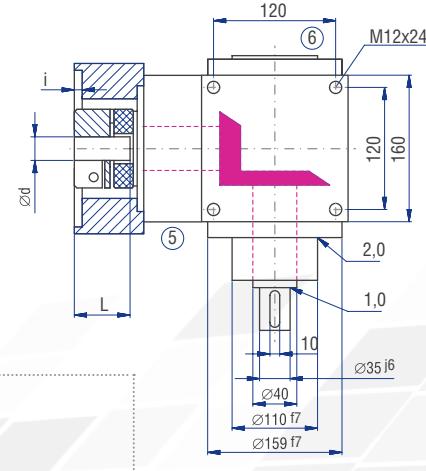
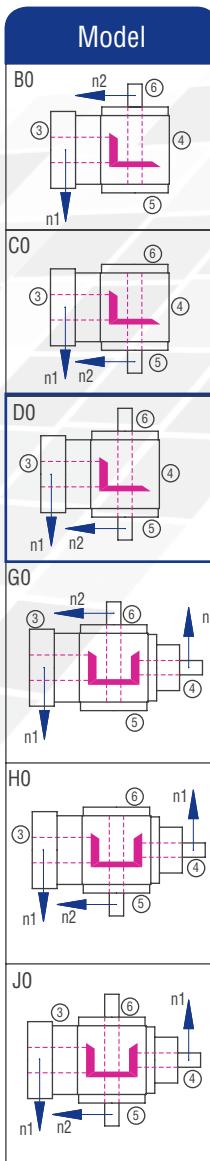
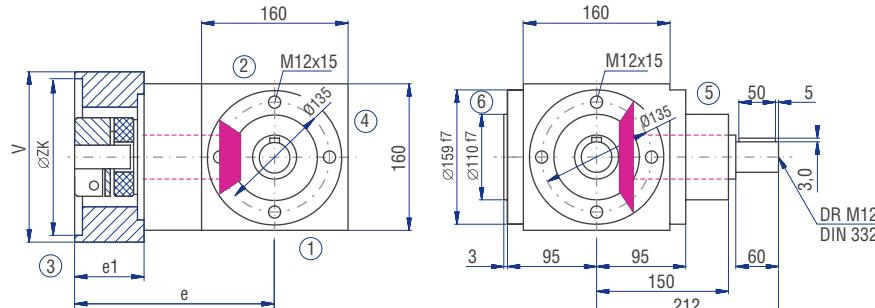
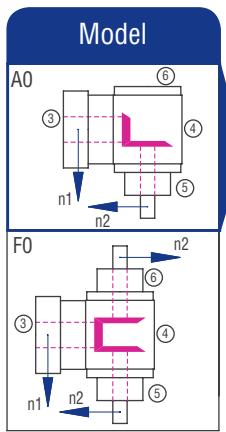
Model	Inertia moment [kgcm <sup>2</sup> ]							Mass ca. [kg]
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1	
A0	35.1340	36.4980	23.1260	16.3090	14.3010	13.6770	12.8680	38.5
B0	37.0520	37.5230	25.4770	17.3860	15.0700	14.1140	13.1640	38.0
C0	37.0520	37.5230	25.4770	17.3860	15.0700	14.1140	13.1640	38.0
D0	38.0810	37.9810	25.7340	17.5000	15.1340	14.1550	13.1930	38.5
EON	39.8840	38.6400	26.0420	17.6370	15.2110	14.2040	13.2290	37.0
EOS	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
JO	52.9160	51.0240	34.3840	24.8030	20.6420	15.8350	14.8710	45.0
KON	54.7190	51.6840	34.6920	24.9400	20.7190	15.8840	14.9070	44.0
KOS	61.0090	54.4800	36.2650	25.6390	21.1120	16.1360	15.0810	44.5



## Inertia moments Coupling J [kgcm<sup>2</sup>]

K28	KN	KNN	SN
d [mm]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
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

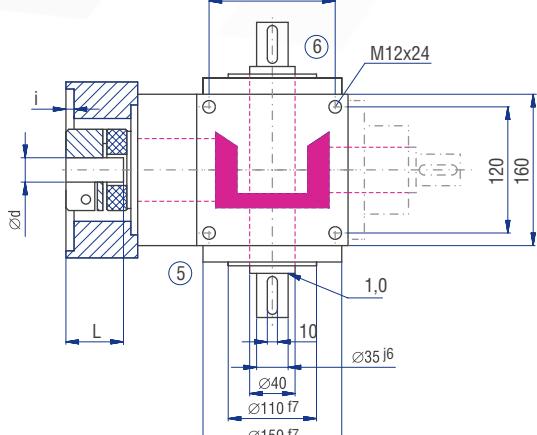
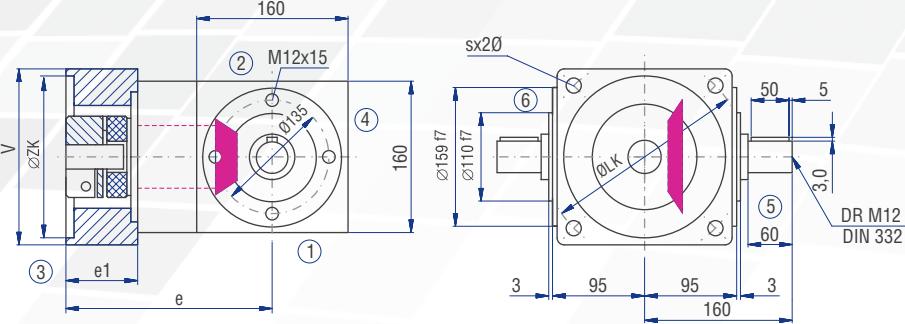


## Motor mounting dimensions

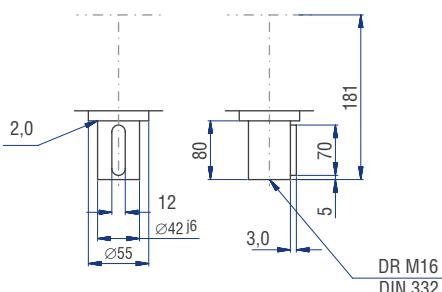
Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxl [mm]	i [mm]	e [mm]	e1 [mm]
403	160	80	M6	100	32*60	4	215.0	62
502	160	95	M8	115	32*60	4	215.0	62
601	160	95	M8	130	32*60	4	215.0	62
611	160	110	M8	130	32*60	5	215.0	62
616	160	110	M10	130	32*60	5	215.0	62
701	160	110	M8	145	32*60	5	215.0	62
802	160	110	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	215.0	62
931	200	180	M12	215	38*80	6	260.0	62

Table 11.3.20-1

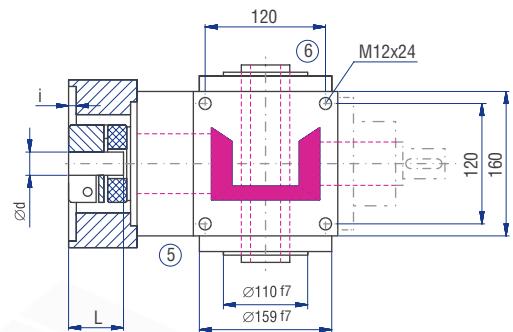
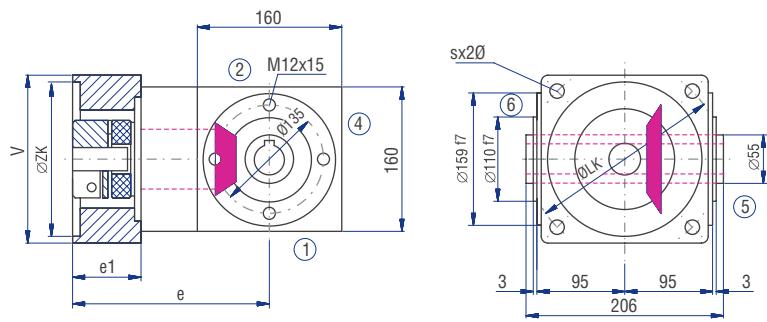
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



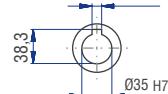
## Implementation VV



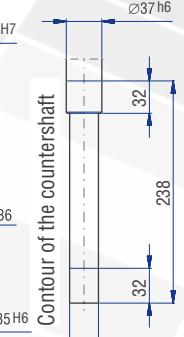
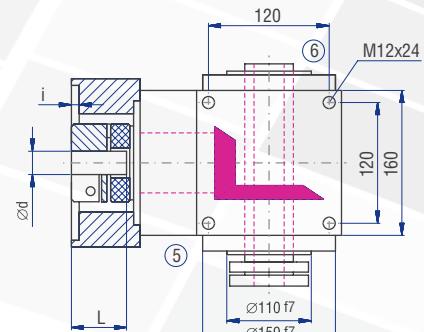
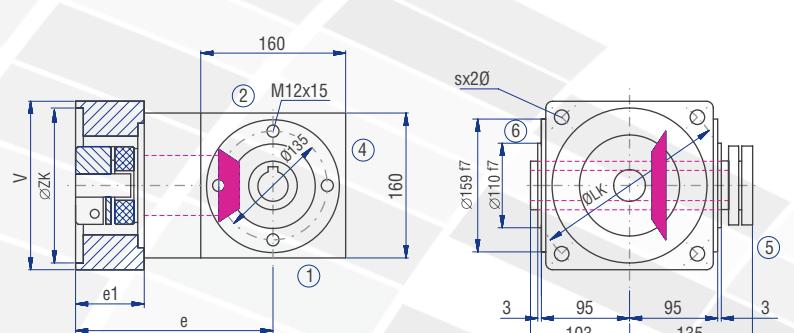
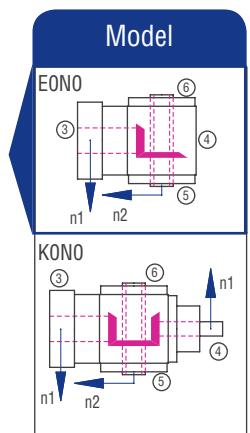
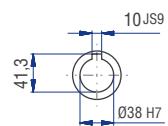
The dimensions of the Models not shown can be figured by mirroring available dimensions.  
The shaft dimensions on side 4 follow from the dimensions of type A0.



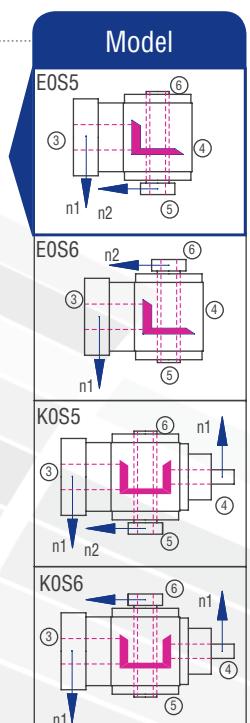
EONO



SH



Contour of the countershaft



# 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 For smooth motor shafts For motor shafts with parallel key	KN SN 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 <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]	n <sub>2</sub> [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 <sub>2N</sub> in S5 [Nm]				350	330	320	420	350	300	210
n <sub>1max</sub> 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 <sub>2B</sub> [Nm]	94.0	141.0	188.0	282.0	376.0	470.0	315.0
			T <sub>2NOT</sub> [Nm]	120.0	180.0	240.0	360.0	480.0	600.0	625.0
	19	KN	T <sub>2B</sub> [Nm]	98.0	147.0	196.0	294.0	392.0	490.0	315.0
			T <sub>2NOT</sub> [Nm]	125.0	187.5	250.0	375.0	500.0	625.0	625.0
	24	KN	T <sub>2B</sub> [Nm]	104.0	156.0	208.0	312.0	416.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	130.0	195.0	260.0	390.0	520.0	650.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	28	KN	T <sub>2B</sub> [Nm]	109.0	163.5	218.0	327.0	436.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	136.0	204.0	272.0	408.0	544.0	680.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	32	KN	T <sub>2B</sub> [Nm]	113.0	169.5	226.0	339.0	452.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	142.0	213.0	284.0	426.0	568.0	710.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	38	KN	T <sub>2B</sub> [Nm]	122.0	183.0	244.0	366.0	488.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	152.0	228.0	304.0	456.0	608.0	760.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	42	KN	T <sub>2B</sub> [Nm]	126.0	189.0	252.0	378.0	504.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	158.0	237.0	316.0	474.0	632.0	790.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
	45	KN	T <sub>2B</sub> [Nm]	130.0	195.0	260.0	390.0	520.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	164.0	246.0	328.0	492.0	656.0	800.0	625.0
		KNN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0
		SN	T <sub>2B</sub> [Nm]	260.0	390.0	520.0	630.0	550.0	505.0	315.0
			T <sub>2NOT</sub> [Nm]	500.0	750.0	800.0	850.0	800.0	800.0	625.0

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	3000	1000	500	250	100	50
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 500	3200	1600	4300	2150	5000	2500
> 500	2670	1335	3580	1790	4170	2085

## Gearbox inertia moments/mass

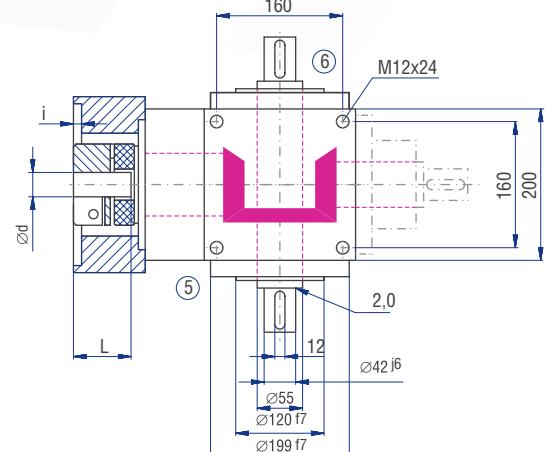
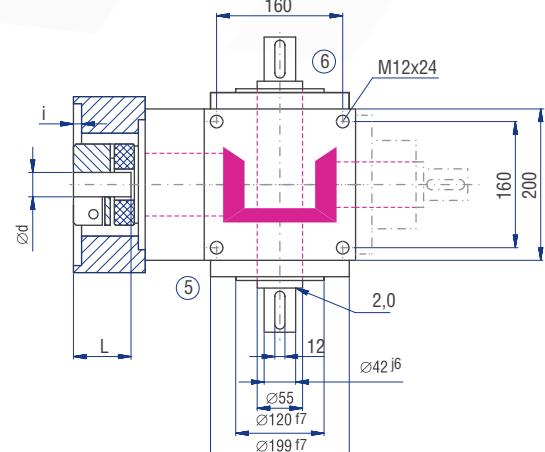
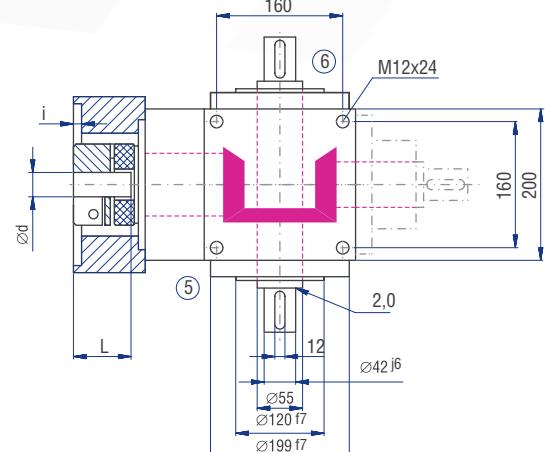
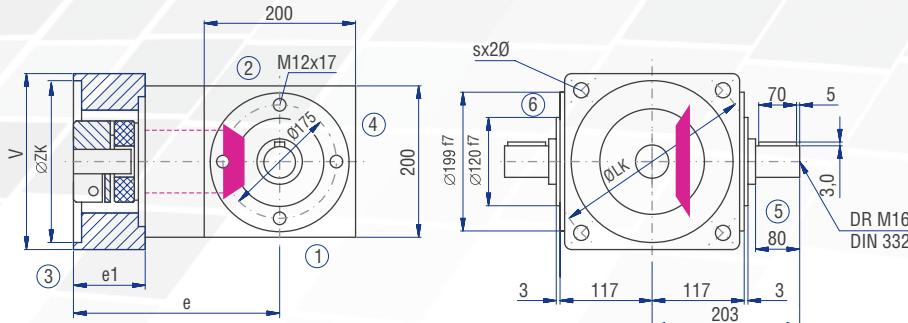
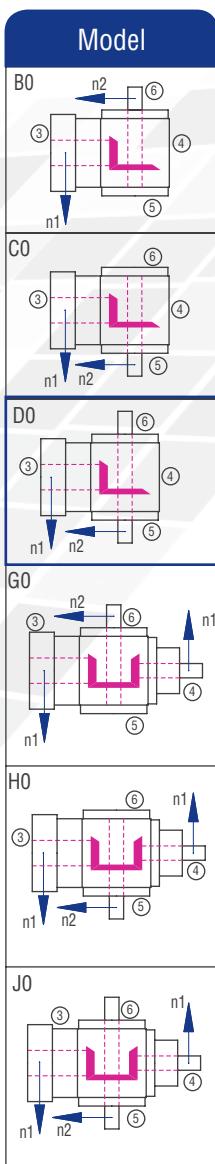
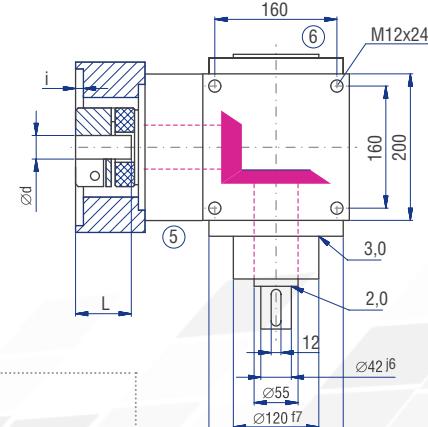
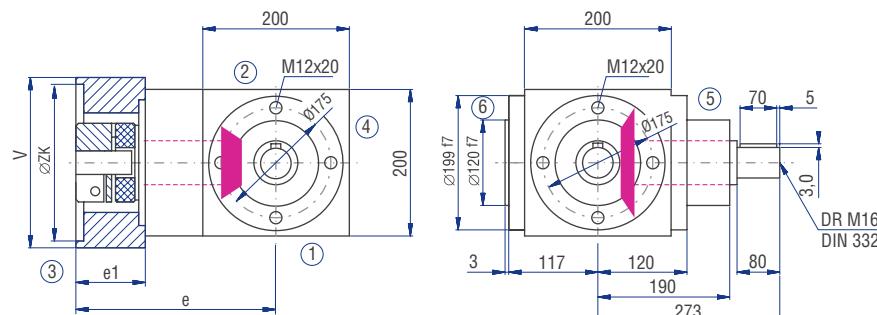
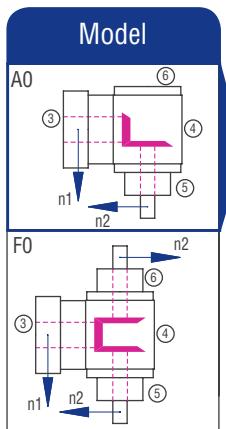
Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

Model	Inertia moment [kgcm <sup>2</sup> ] <sup>2</sup>						
	1:1	1.5:1	2:1	3:1	4:1	5:1	6:1
A0	132.0410	109.2390	82.6690	54.0970	42.2810	38.6590	35.9260
B0	185.5150	119.4940	86.1880	55.8380	43.3230	40.0860	36.8890
C0	185.5200	119.4940	86.1880	55.8380	43.3230	40.0860	36.8890
D0	188.6320	120.8800	86.9670	56.1850	43.5180	40.2110	36.9750
EON	212.2100	124.9400	91.0000	56.8660	43.9640	41.0160	37.5350
EOS	233.2300	134.2820	96.2560	59.2020	45.2780	41.8570	38.1180
F0	192.6410	171.8170	129.6190	74.4520	53.4810	46.3870	41.3200
G0	246.1410	150.2440	107.3410	67.9340	53.7990	43.8080	40.5930
H0	246.1410	150.2440	107.3410	67.9340	53.7990	43.8080	40.5930
J0	249.2580	151.6290	108.1200	68.2810	53.9940	43.9330	40.6790
KON	272.8310	155.6890	112.1530	68.9620	54.4400	44.7380	41.2390
KOS	293.8530	165.0320	117.4090	71.2980	55.7540	45.5790	41.8220

Mass ca. [kg]	Inertia moments Coupling J [kgcm <sup>2</sup> ]			
	K38	KN	KNN	SN
16	0.000	0.000	0.000	0.000
19	0.000	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.

# 11.3.21 Type VC 200 – Servo bevel gearboxes



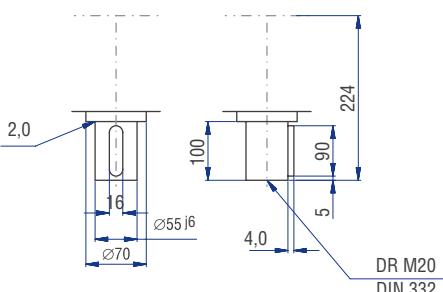
## Motor mounting dimensions

Flange no.	V [mm]	ZK [mm]	Thread	LK [mm]	Shaft dxdl [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

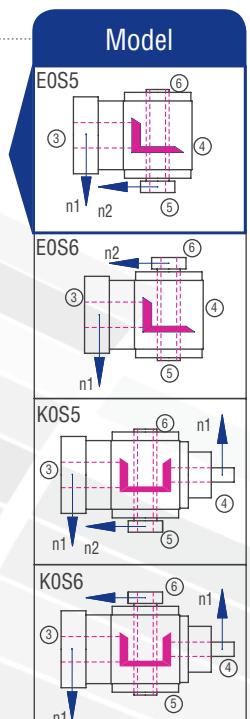
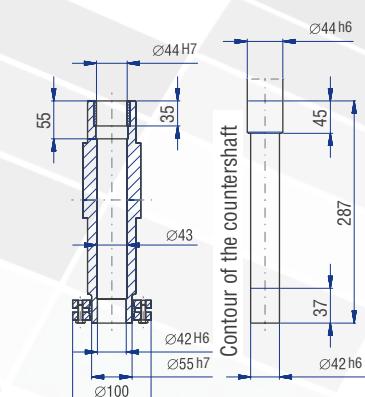
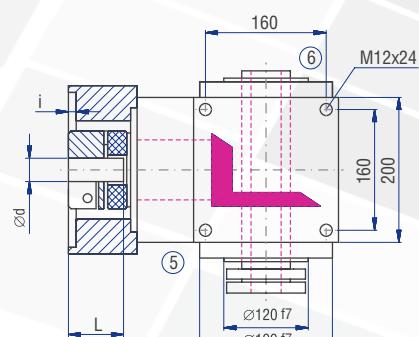
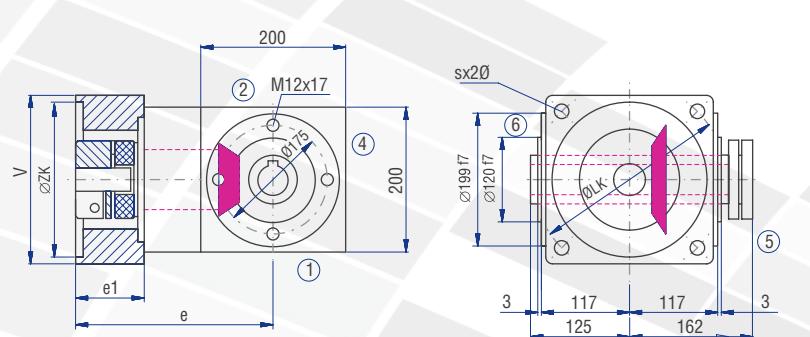
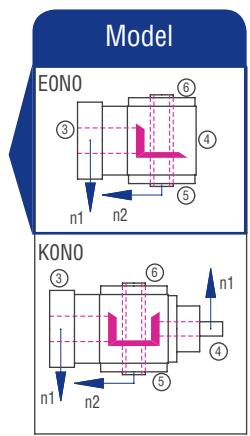
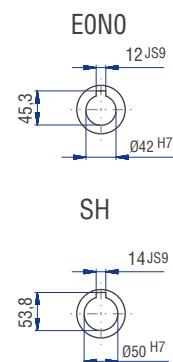
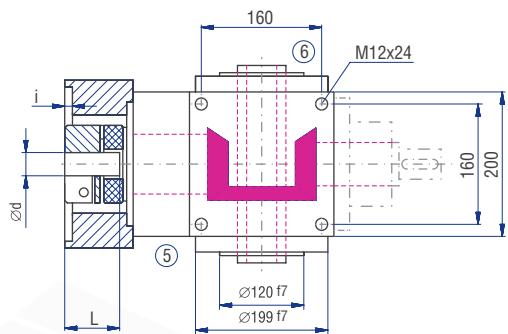
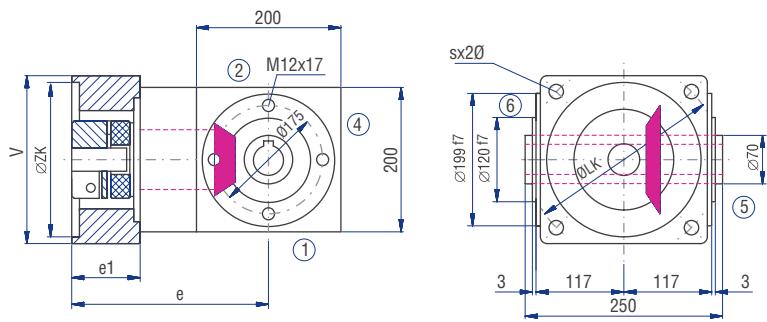
Table 11.3.21-1

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.



Selection guide  
Spare parts

# 11.4 Type HC – Servo hypoid 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 Tothing

ATEK hypoid gearboxes have gear sets with high-quality hypoid toothings 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 toothings 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 (BRO and CRO).

## 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

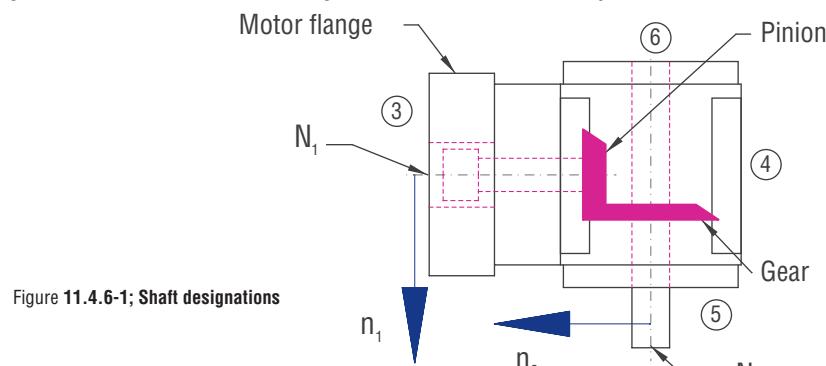
## 11.4.5 Installation position

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.



## 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  $N_1$  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	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

# 11.4 Type HC – Servo hypoid gearboxes

## 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

The values for the centring height (i) and the thread sizes (s) can be found on the respective pages.

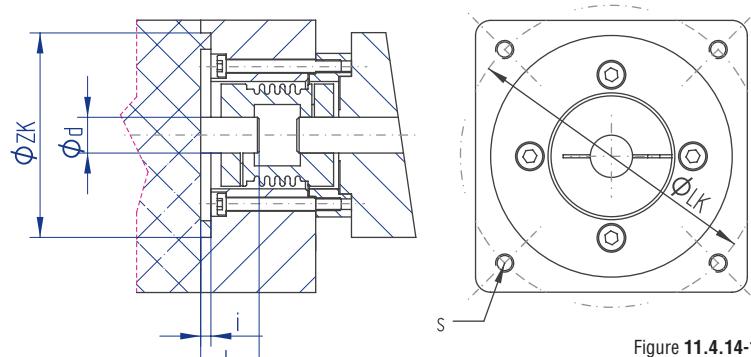


Figure 11.4.14-1

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

## 11.4 Type HC – Servo hypoid gearboxes

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

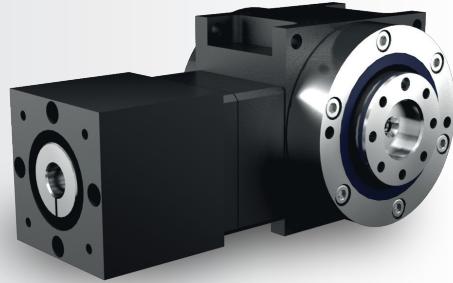
Table 11.4.14-1



# 11.4 Type HC – Servo hypoid gearbox

## 11.4.15 Features

Gear ratios:  $i = 8:1$  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

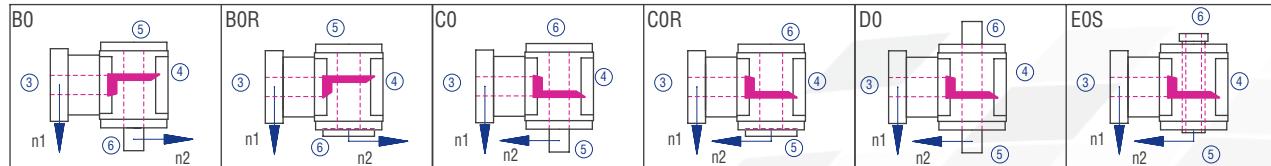


Figure 11.4.15-1; Models

## 11.4.15.2 Gearbox sides

The example shows the Model C0

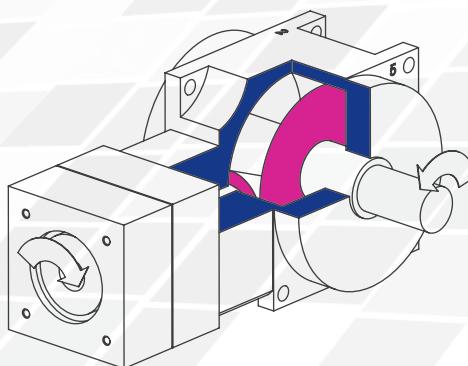


Figure 11.4.15-3; Gearbox sides

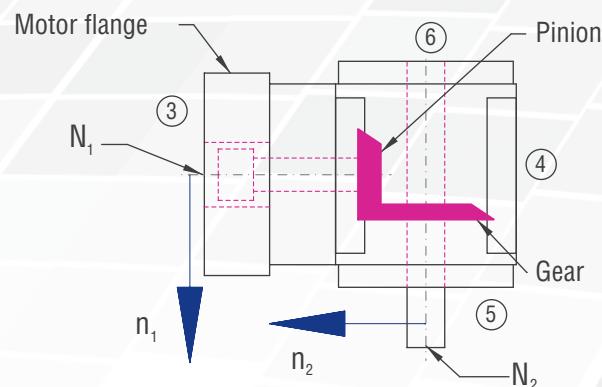


Figure 11.4.15-2; Shaft designations

## 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 <sub>2</sub>	Design
HC	090	12:1	C0-	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.		

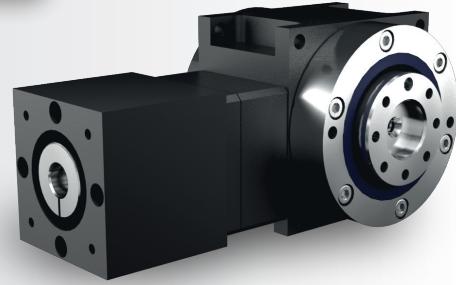
#### 11.4.15.4 Overview of performance data

Selection table: gearbox size; gear ratio; rotational speed

			8:1			10:1			12:1			15:1		
Size	$n_1\text{MAX}$ [rpm]	$n_1$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
<b>090</b>	8000	3200	36	54	72	36	54	72						
		3900							26	40	52	25	38	50
<b>115</b>	8000	2700	71	107	143	71	107	143						
		3300							52	79	108	50	75	100
<b>140</b>	7000	2200	142	215	289	143	215	290						
		2800							98	146	195	97	145	194
<b>170</b>	6000	1800	267	398	529	267	398	530						
		2300							188	280	370	182	278	369
<b>215</b>	5000	1200	723	1084	1450	723	1084	1450						
		1600							512	767	1022	512	767	1022
<b>260</b>	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

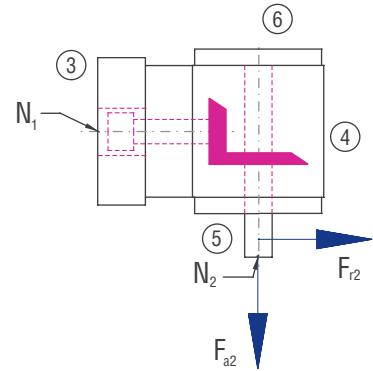
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 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 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 11.4.9
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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
3200	8000	36	54	72	36	54	72	0	0	0	0	0	0
3900	8000	0	0	0	0	0	0	26	40	52	25	38	50

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

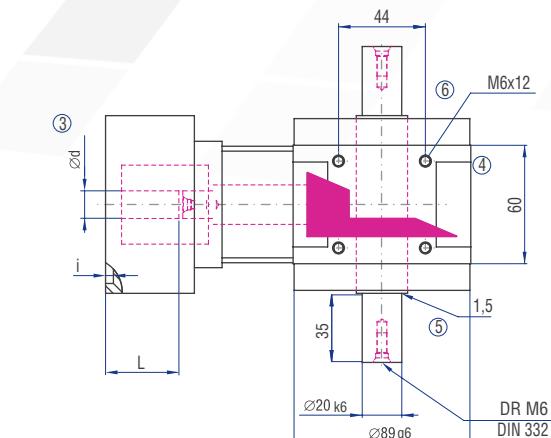
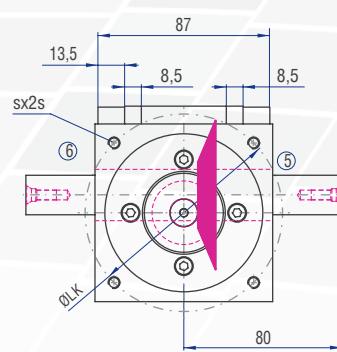
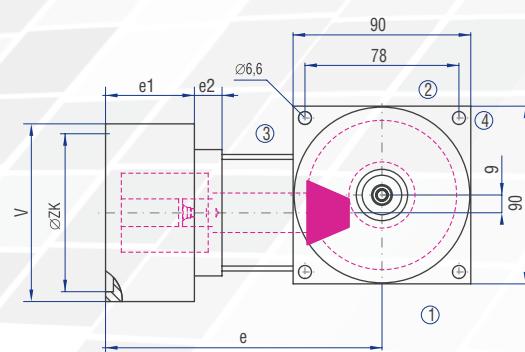
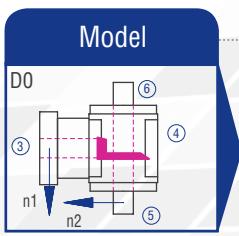
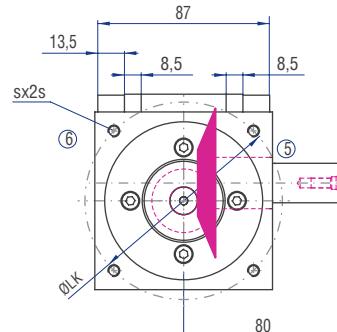
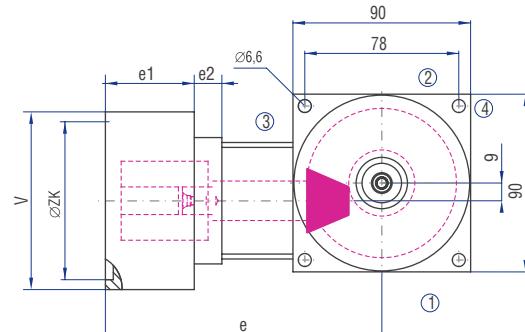
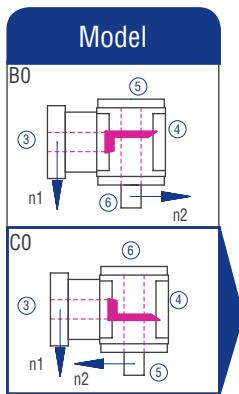


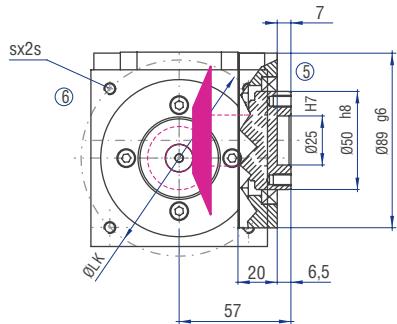
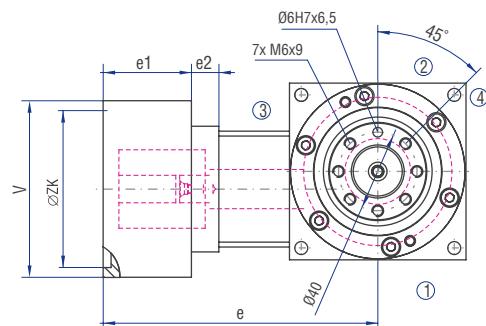
## Gearbox inertia moments/mass

Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

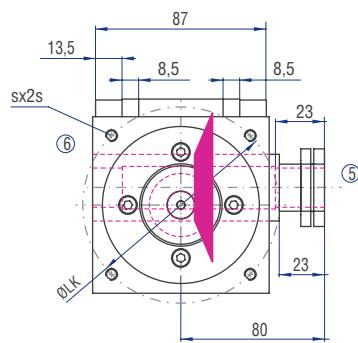
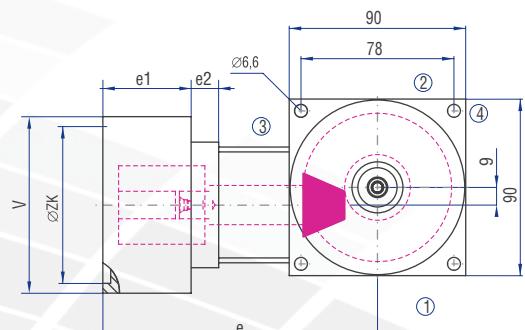
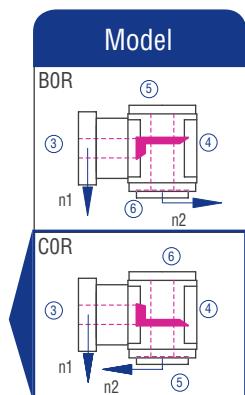
Inertia moment [kgcm <sup>2</sup> ]				Mass ca. [kg]		
8:1		10:1		12:1	15:1	3.5
0.1700		0.1500		0.1400	0.1300	

## 11.4.16 Type HC 090 – Servo hypoid gearboxes

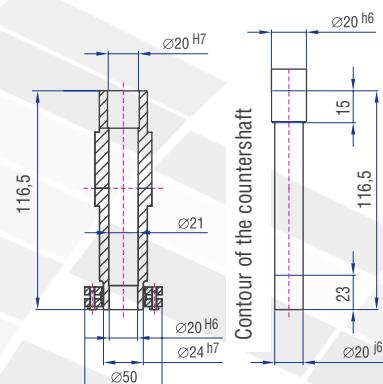
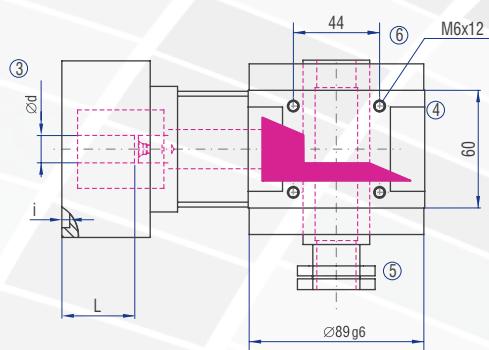
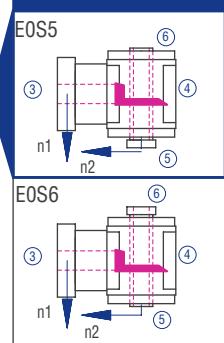




Model

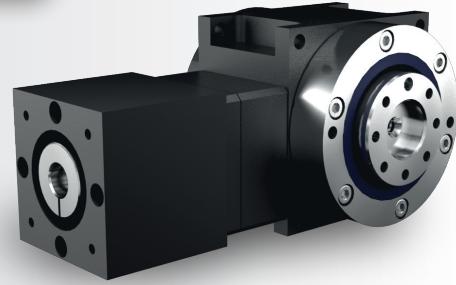


Model



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

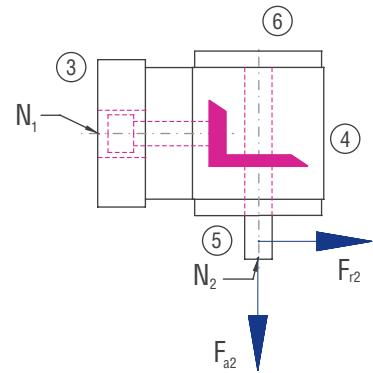
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 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 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 11.4.9
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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
2700	8000	71	107	143	71	107	143	0	0	0	0	0	0
3300	8000	0	0	0	0	0	0	52	79	108	50	75	100

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

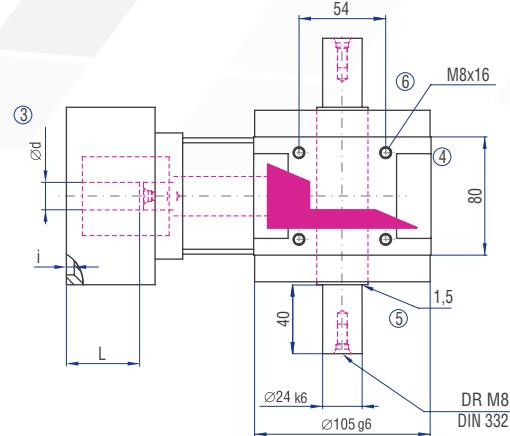
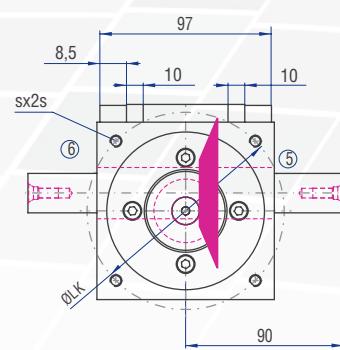
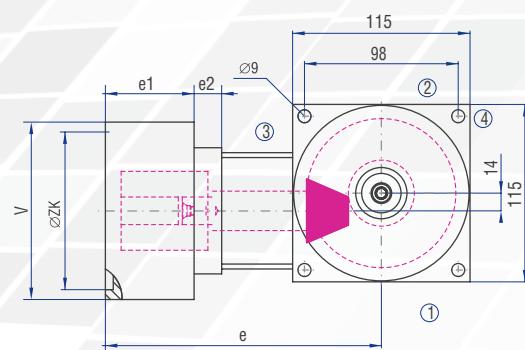
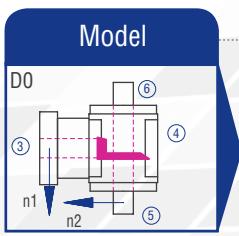
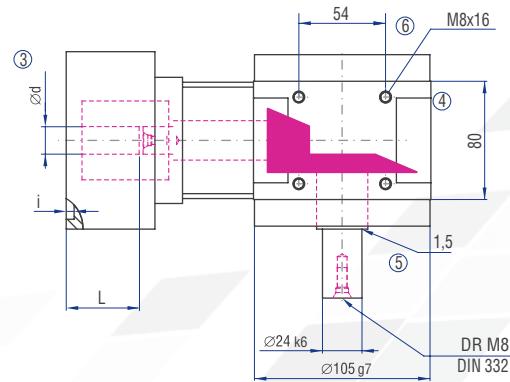
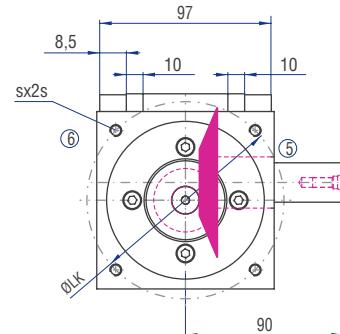
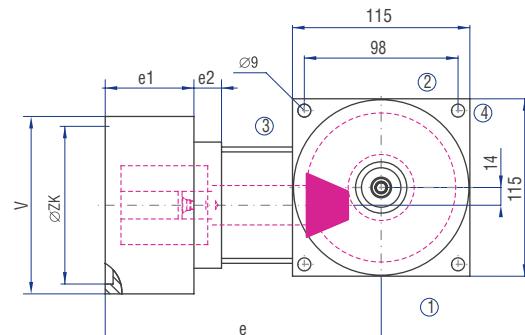
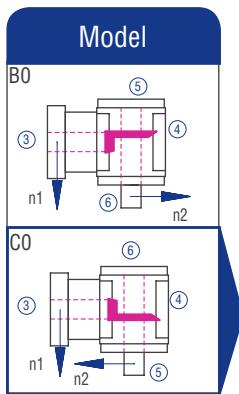


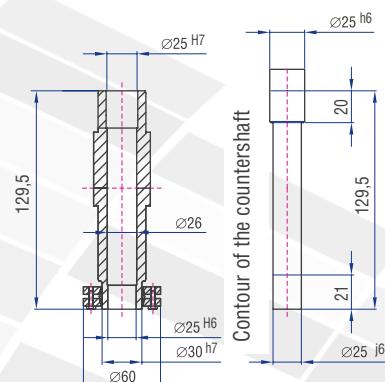
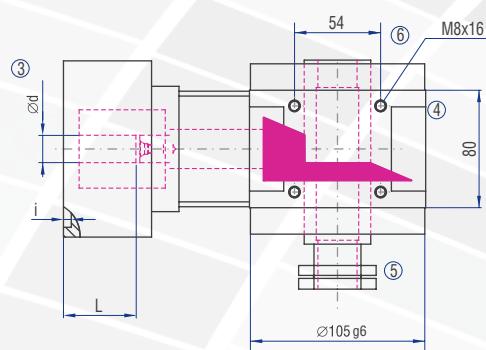
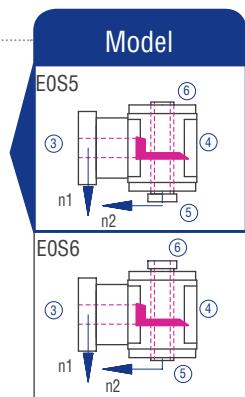
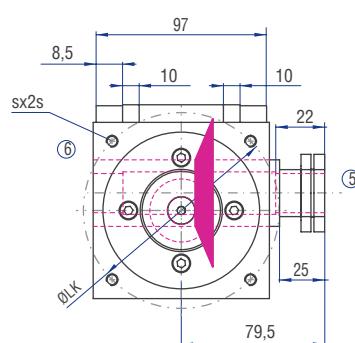
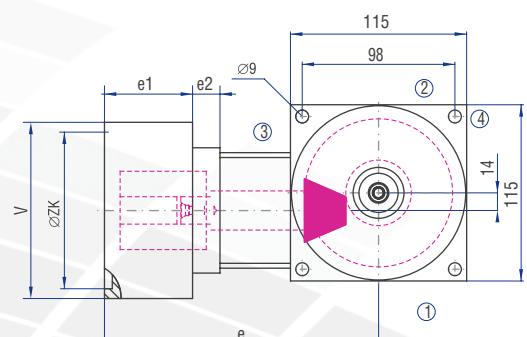
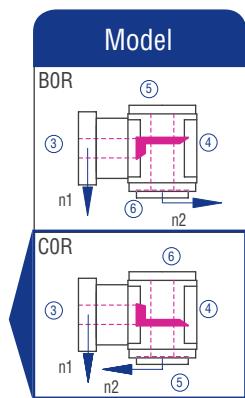
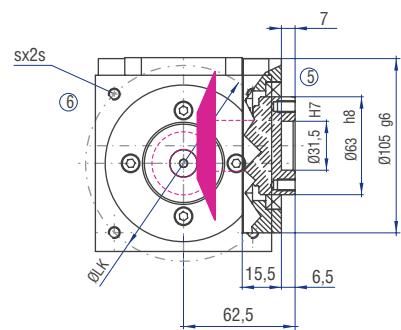
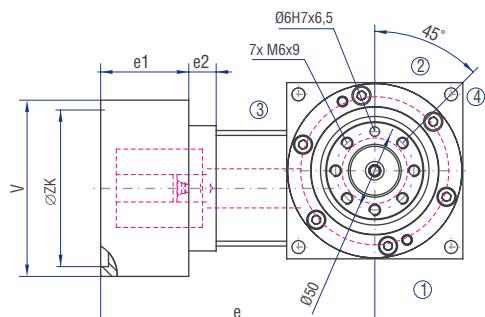
## Gearbox inertia moments/mass

Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

Inertia moment [kgcm <sup>2</sup> ]				Mass ca. [kg]	
8:1		10:1		12:1	15:1
0.4300		0.3800		0.3600	0.3400

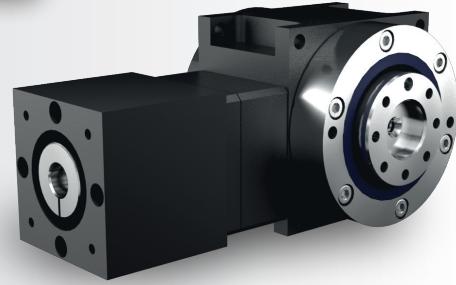
## 11.4.17 Type HC 115 – Servo hypoid gearboxes





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

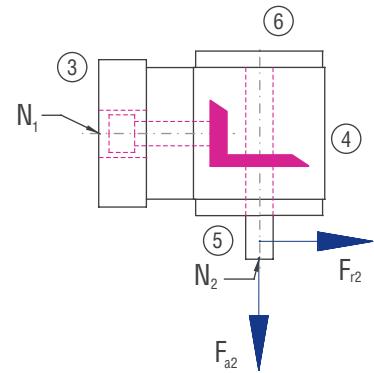
Characteristic	Standard	Option
<b>Toothing</b>	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
<b>Gear ratio</b>	8:1 to 15:1	
<b>Housing / Flanges</b>	Aluminium / steel	
<b>Threaded mounting holes</b>	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
<b>Shaft</b>	Material 1 C45, shaft ends greased Fit with ISO 6 tolerance	See chapter 4.6.2
<b>Hollow shaft</b>	Material 1 C45, shafts greased Fit with ISO 6 tolerance	See chapter 4.6.3
<b>Radial shaft seal ring</b>	NBR, form A	See chapter 4.8
<b>Ambient temperature</b>	-10°C to +90°C. The values of the performance tables are valid for +20°C	See chapter 4.9.3
<b>Circumferential backlash</b>	< 4 arcmin	See chapter 11.4.11
<b>Protection class</b>	IP 54	See chapter 4.5
<b>Corrosion protection</b>	Prime coat; layer thickness > 40 µm	See chapter 4.4.1
<b>Bearing life L10h</b>	more than 15,000h	See chapter 4.9.1
<b>Oil change intervals</b>	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
<b>Lubricants</b>	Synthetic lubricants	See chapter 11.4.9
<b>Motor flange</b>	Aluminium	
<b>Coupling</b>	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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
2200	7000	142	215	289	143	215	290	0	0	0	0	0	0
2800	7000	0	0	0	0	0	0	98	146	195	97	145	194

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

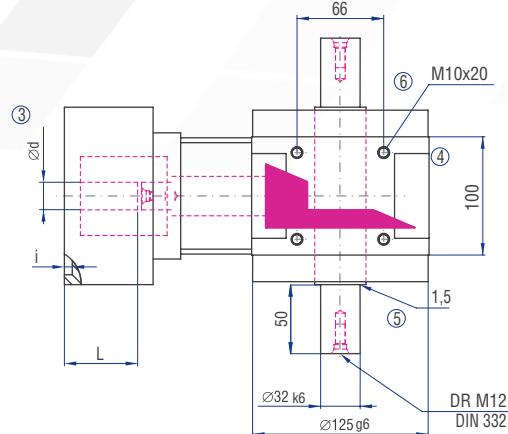
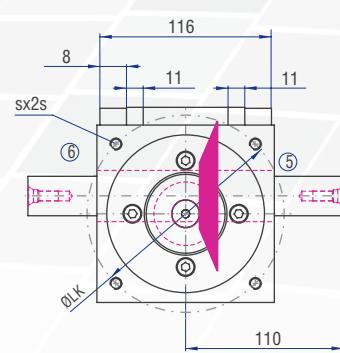
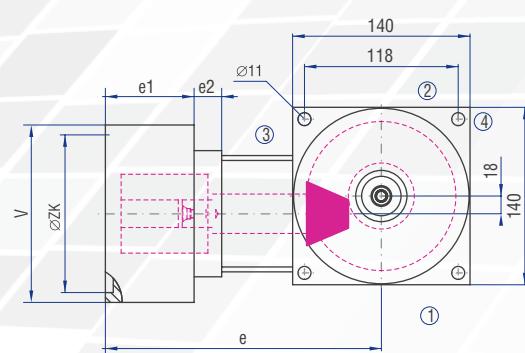
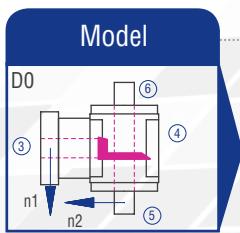
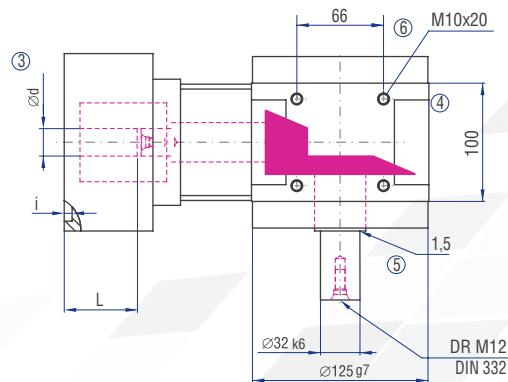
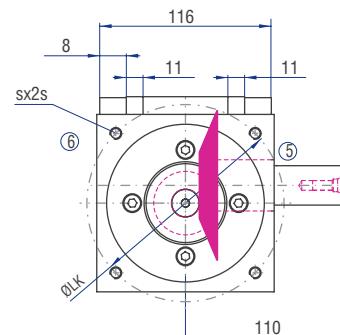
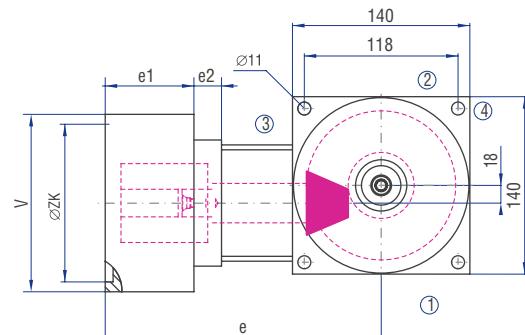
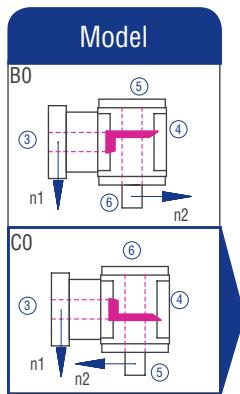


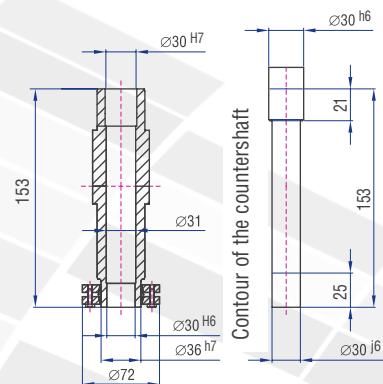
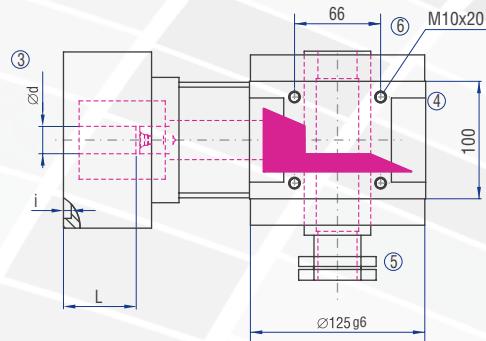
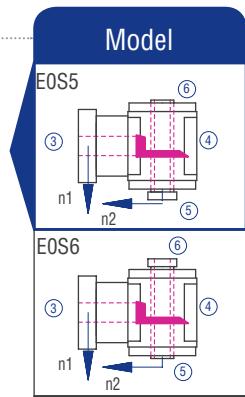
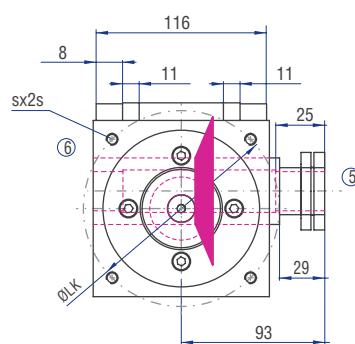
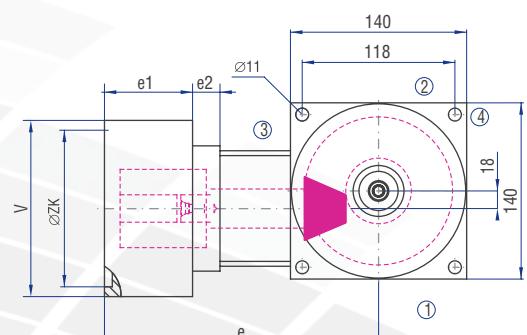
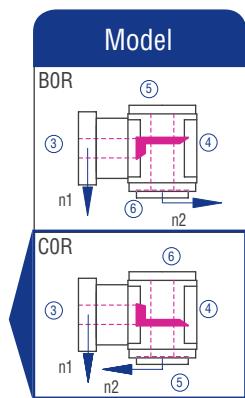
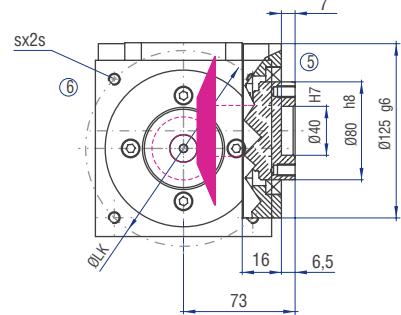
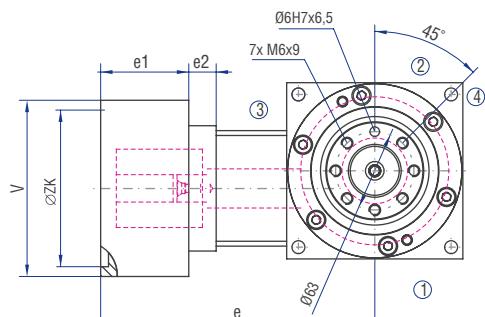
## Gearbox inertia moments/mass

Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

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

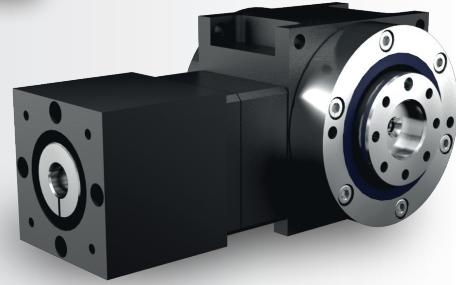
## 11.4.18 Type HC 140 – Servo hypoid gearboxes





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]
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

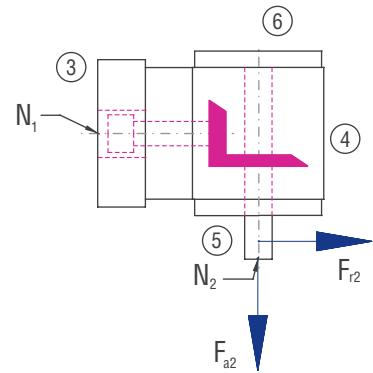
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 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 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 11.4.9
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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
1800	6000	267	398	529	267	398	530	0	0	0	0	0	0
2300	6000	0	0	0	0	0	0	188	280	370	182	278	369

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

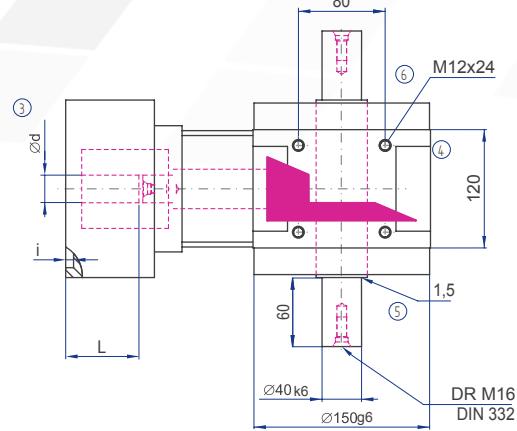
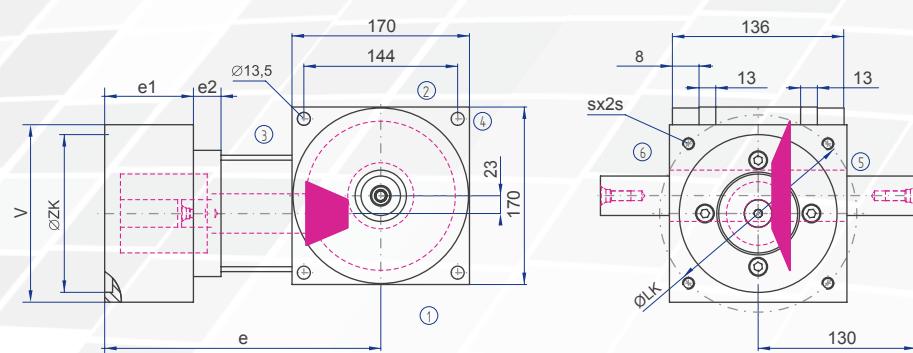
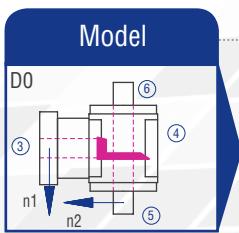
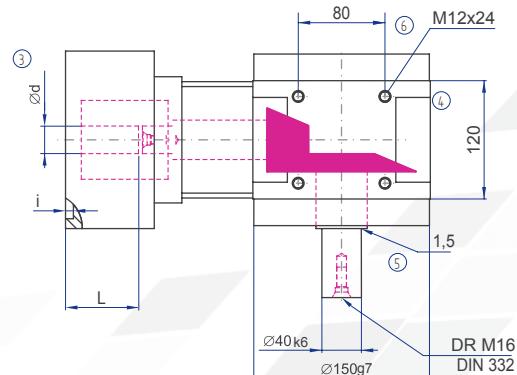
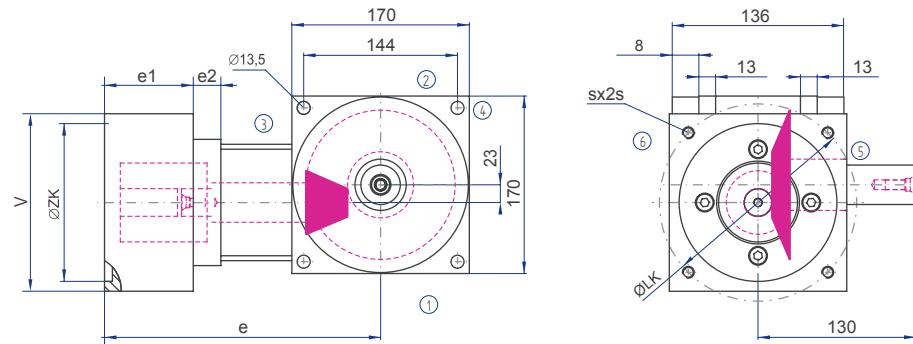
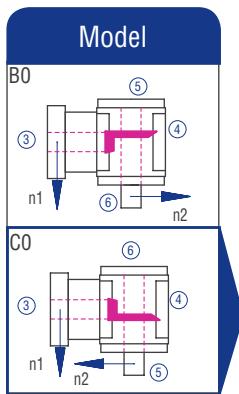


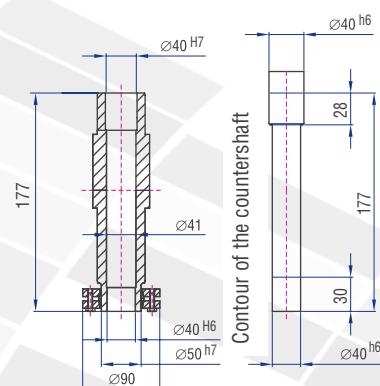
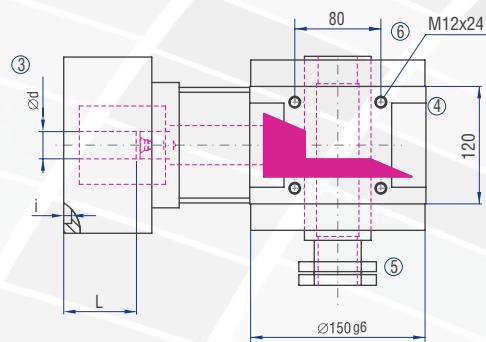
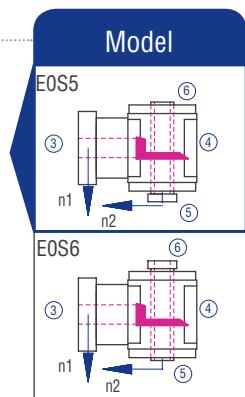
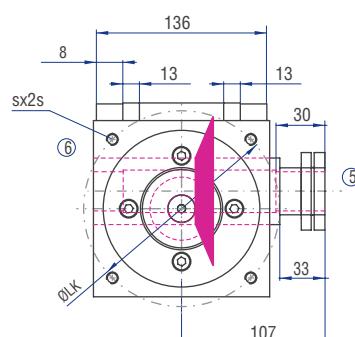
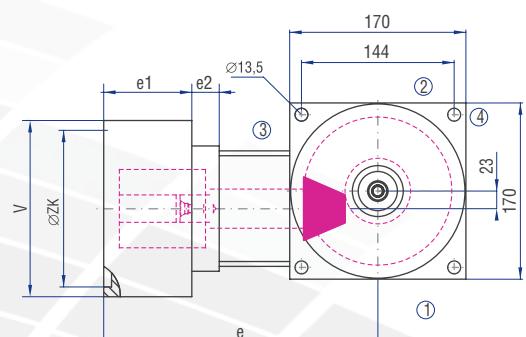
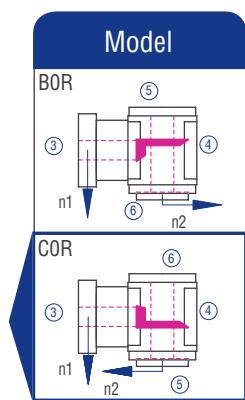
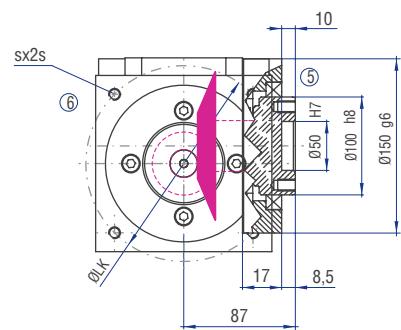
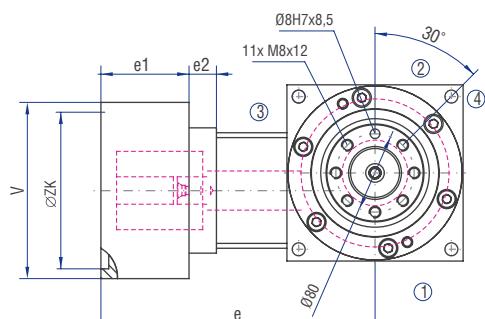
## Gearbox inertia moments/mass

Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

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

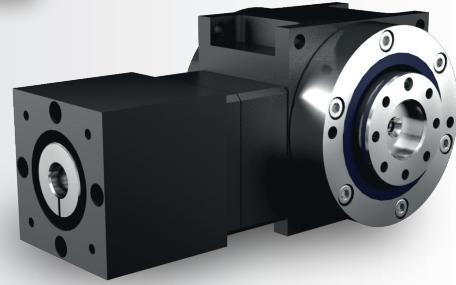
## 11.4.19 Type HC 170 – Servo hypoid gearboxes





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]
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

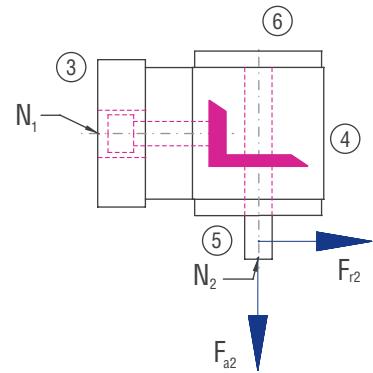
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 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 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 11.4.9
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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
1200	5000	723	1084	1450	723	1084	1450	0	0	0	0	0	0
1600	5000	0	0	0	0	0	0	512	767	1022	512	767	1022

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

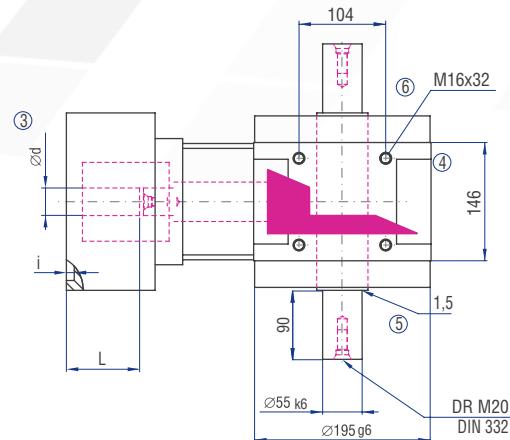
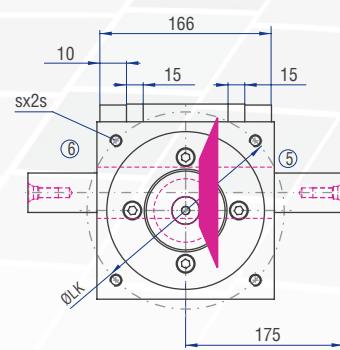
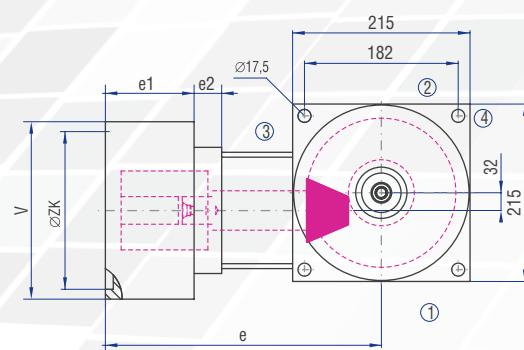
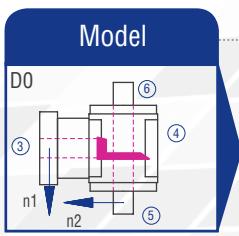
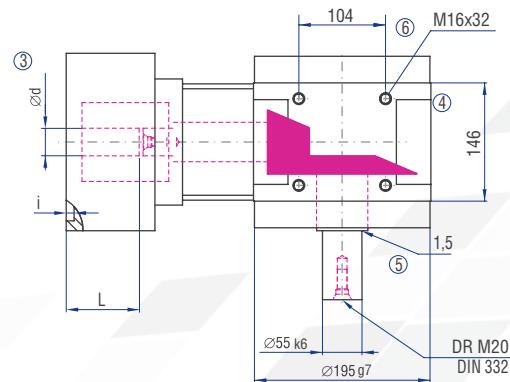
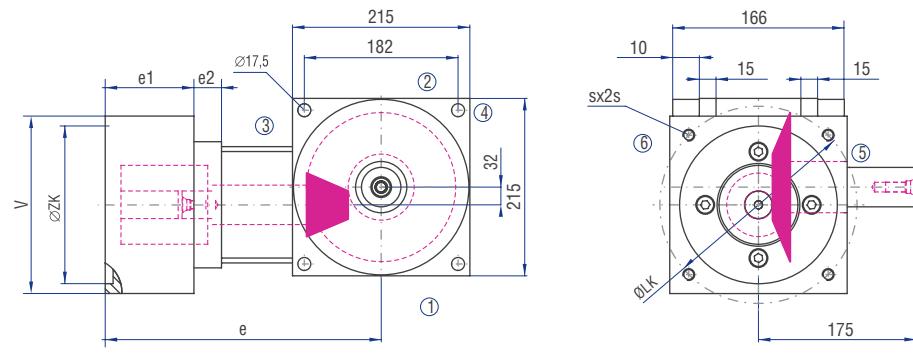
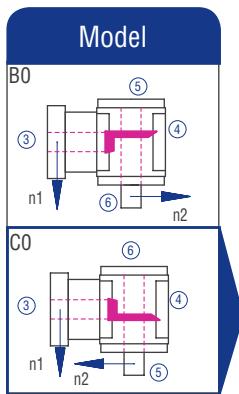


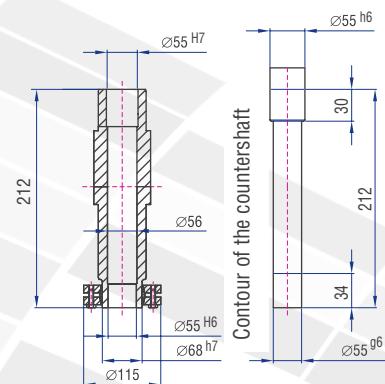
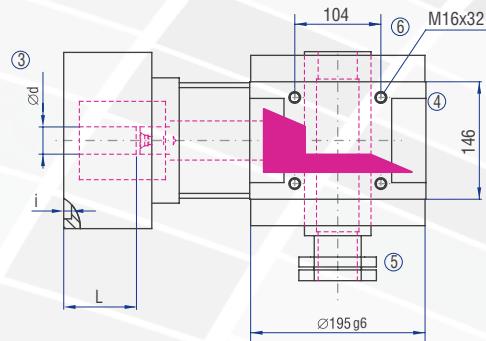
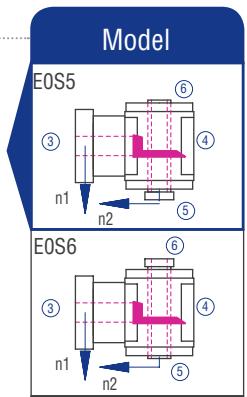
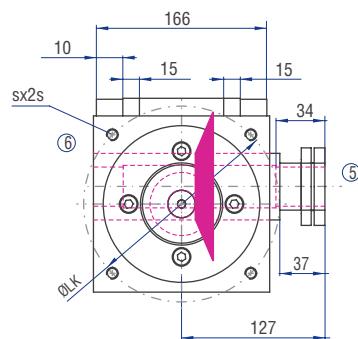
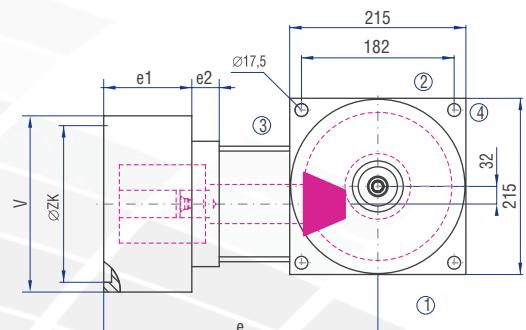
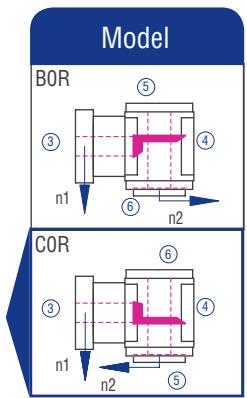
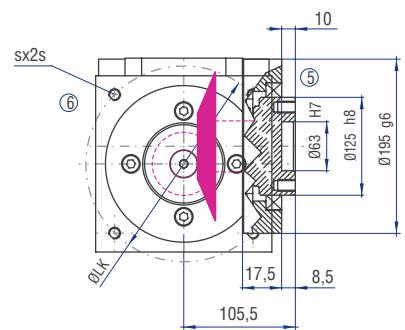
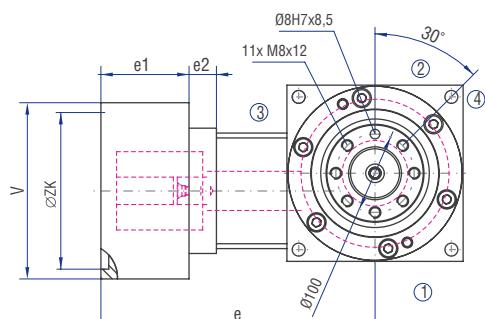
## Gearbox inertia moments/mass

Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

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

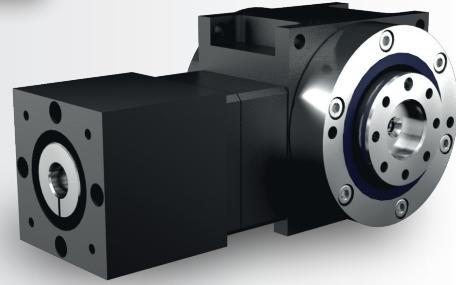
## 11.4.20 Type HC 215 – Servo hypoid gearboxes





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]
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

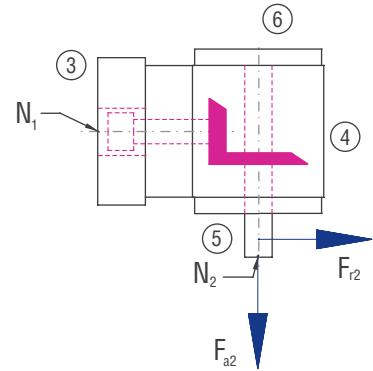
Characteristic	Standard	Option
Toothing	Spiral-toothed, hardened bevel gears	See chapter 11.4.2
Gear ratio	8:1 to 15:1	
Housing / Flanges	Aluminium / steel	
Threaded mounting holes	On the sides 1 and 2 and on the drive flange	See chapter 11.4.4
Shaft	Material 1 C45, shaft ends greased Fit with ISO 6 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 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 11.4.9
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 overview

		8:1			10:1			12:1			15:1		
$n_1$ [rpm]	$n_{1MAX}$ [rpm]	$T_{2N}$ [Nm]	$T_{2B}$ [Nm]	$T_{2NOT}$ [Nm]									
1000	4500	1444	2165	2887	1444	2165	2887	0	0	0	0	0	0
1300	4500	0	0	0	0	0	0	1023	1533	2044	1023	1533	2044

## Permissible radial force $F_{r2}$ and axial force $F_{a2}$ on shaft N<sub>2</sub>

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

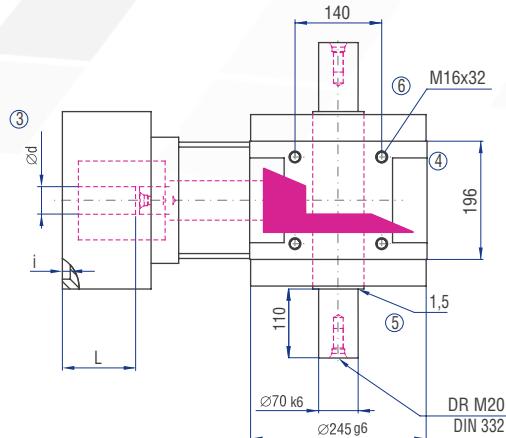
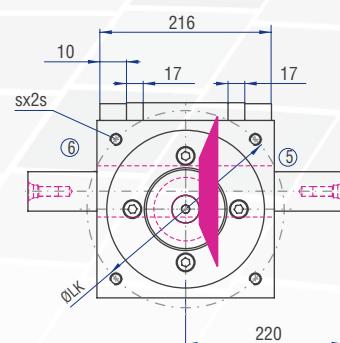
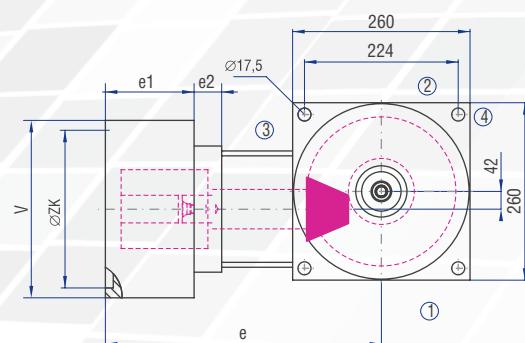
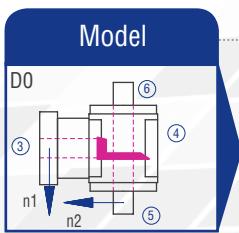
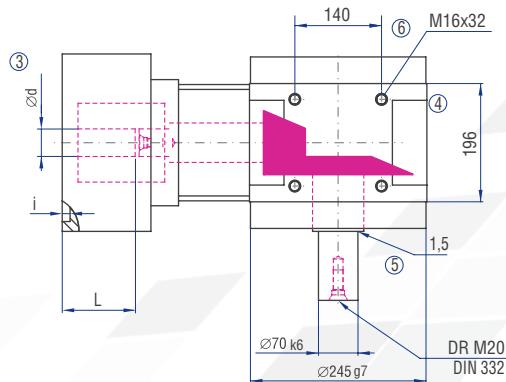
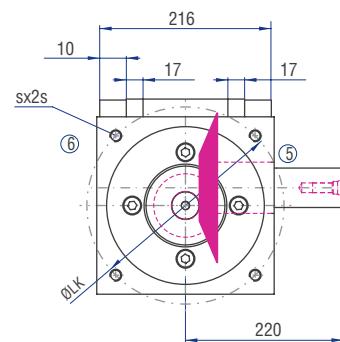
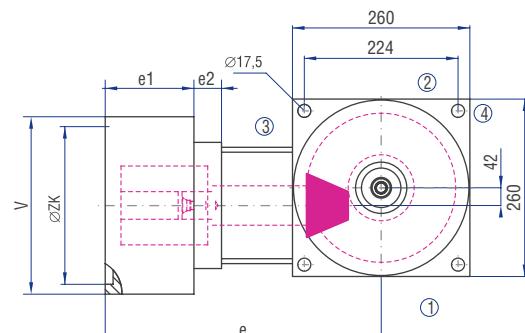
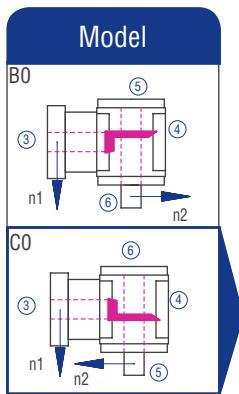


## Gearbox inertia moments/mass

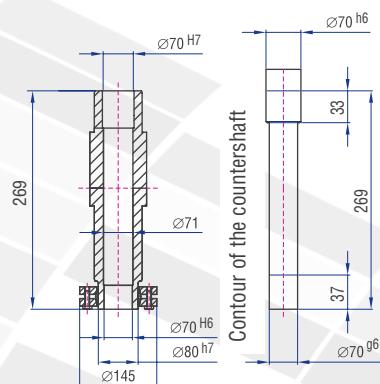
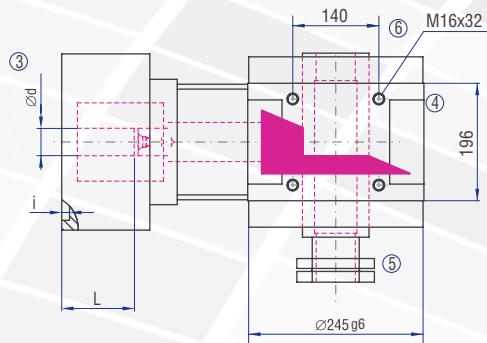
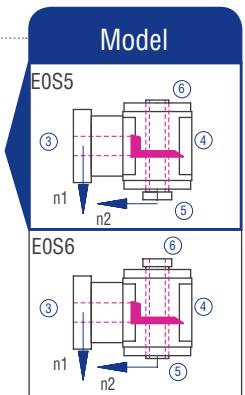
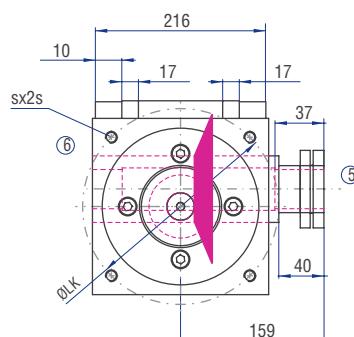
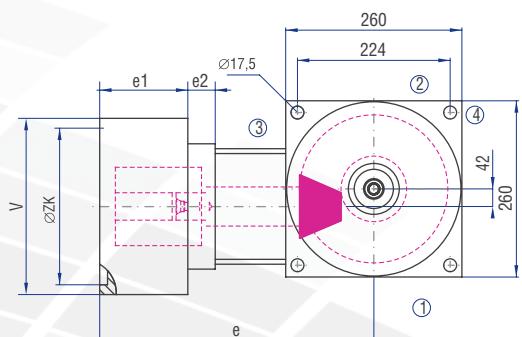
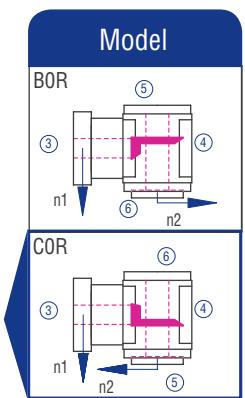
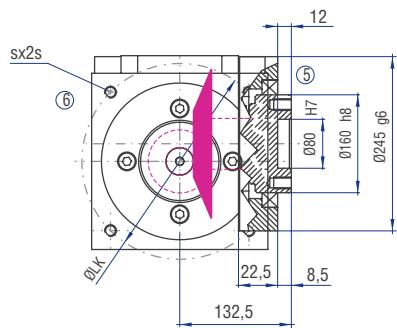
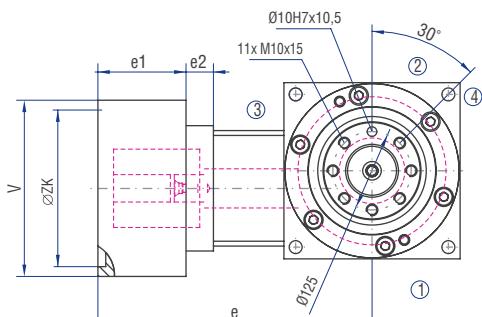
Inertia moment  $J_1$  related to the fast-rotating shaft (N<sub>1</sub>)

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

## 11.4.21 Type HC 260 – 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	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 Tothing

A gear set consists of worm shaft and worm gear.

The worm shaft made of carburised steel is hardened, the toothings are ground. The worm gear consists of a high-quality bronze alloy, the toothings are 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 <u>housing</u> surfaces on the gearbox side	Threaded mounting holes are in the <u>flanges</u> 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  $n_1$  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 to the gearbox sides, please refer to the following figure and the Figure 4.3.1-1 Gearbox sides.

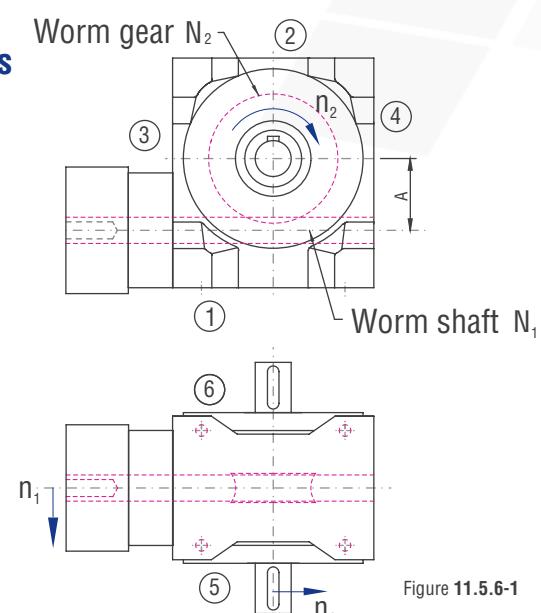


Figure 11.5.6-1

## 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  $i_{1st}$  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
Numerical	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

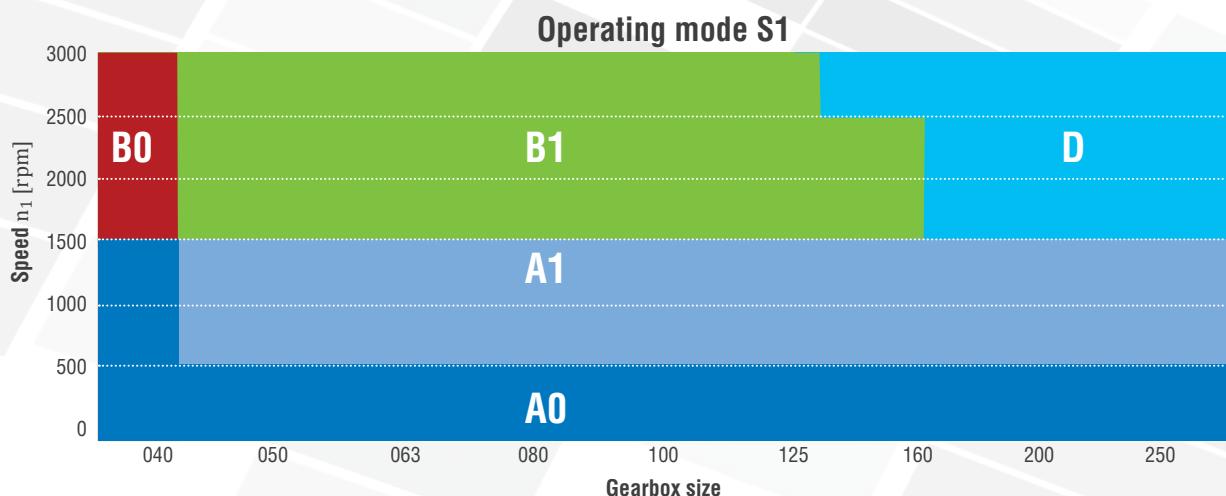


Figure 11.5.9-1

# 11.5 Type SC – Servo worm gearboxes

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.

Numerical value	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.

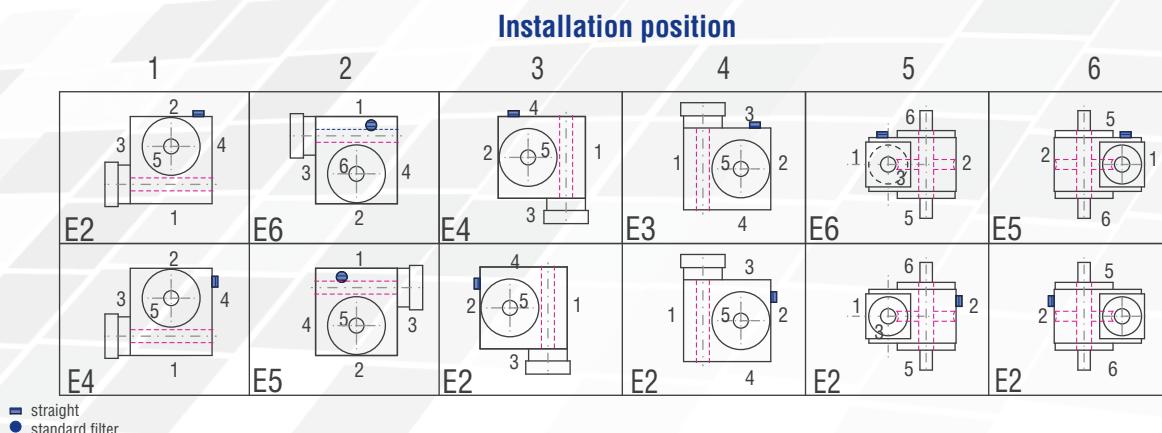


Figure 11.5.10-1

## 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 gearbox. 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	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				
		$T_{1NOT}$ [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

Servo gearboxes

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

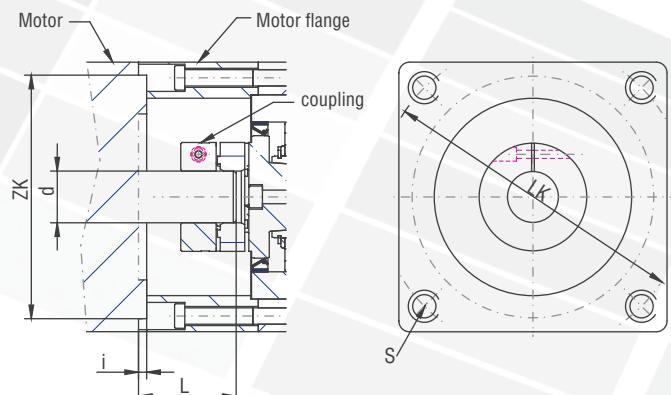
LK: Diameter of pitch circles

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.

## 11.5 Type SC – Servo worm gearboxes

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 Type SC – Servo worm gearboxes

## 11.5.15 Features

Gear ratios:  $i = 5:1$  to  $26:1$  ( $i > 26$  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

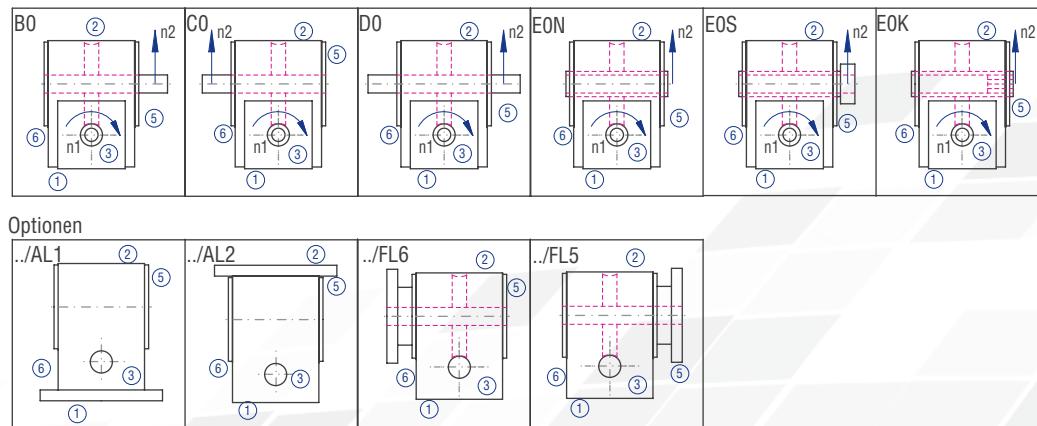


Figure 11.5.15-1; Models

## 11.5.15.2 Gearbox sides

The example shows the Model B0

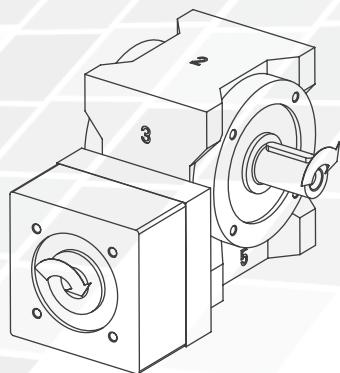


Figure 11.5.15-3; Gearbox sides

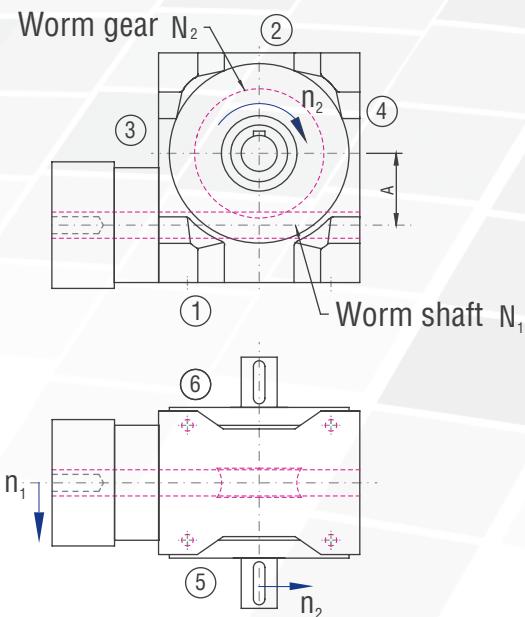


Figure 11.5.15-2; Shaft designations

## 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 $\varnothing \times$ length	Flange no.		See chapter "Coupling"	

## 11.5.15.4 Overview of performance data

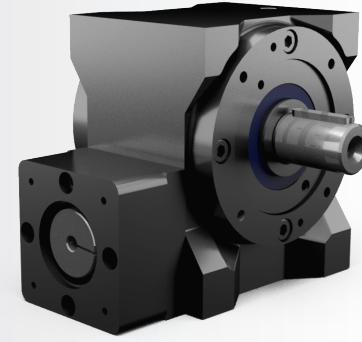
The performance data and torques listed in the selection tables are only valid if the gearboxes are used in the installation positions 1, 5 or 6. If the worm shaft is vertical or located at the top (installation position 3, 4 or 2), 90% of the values specified must be expected.  
Please enquire other gear ratios.

			040	050	063	080	100
i[-]	n <sub>1</sub> [1/min]	i <sub>ist</sub>	n <sub>2</sub> [1/min]	T <sub>2N</sub> [Nm]	T <sub>2N</sub> [Nm]	T <sub>2N</sub> [Nm]	T <sub>2N</sub> [Nm]
5:1	4000	29:6	828	23,0	48,0	69,0	
		30:6	800			96,0	127,0
	3000	29:6	621	28,0	60,0	89,0	
		30:6	600			132,0	173,0
	2400	29:6	497	33,0	72,0	109,0	
		30:6	480			168,0	218,0
7.5:1	1500	29:6	310	37,0	83,0	129,0	
		30:6	300			204,0	263,0
	4000	29:4	552	27,0	59,0	83,0	
		30:4	533			111,0	153,0
	3000	29:4	414	32,0	71,0	104,0	
		30:4	400			152,0	206,0
10:1	2400	29:4	331	37,0	82,0	125,0	
		30:4	320			192,0	258,0
	1500	29:4	207	41,0	94,0	146,0	
		30:4	200			233,0	311,0
	4000	38:4	421		70,0		
		39:4	410	32,0		101,0	
13:1	4000	40:4	400			132,0	195,0
		38:4	316		83,0		
	3000	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	
15:1	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
	4000	51:4	314		54,0	123,0	
		52:4	308	30,0			237,0
20:1	53:4	302				163,0	
	3000	51:4	235		56,0	128,0	
		52:4	231	31,0			304,0
	53:4	226				170,0	
	2400	51:4	188		58,0	133,0	
		52:4	185	32,0			371,0
26:1	53:4	181				177,0	
	1500	51:4	118		60,0	138,0	
		52:4	115	33,0			438,0
	4000	53:4	113				184,0
		29:2	276	30,0	62,0	96,0	
	3000	30:2	267			130,0	186,0
20:1	4000	29:2	207	35,0	76,0	119,0	
		30:2	200			175,0	248,0
	3000	29:2	166	40,0	91,0	142,0	
		30:2	160			221,0	309,0
	1500	29:2	103	44,0	105,0	166,0	
		30:2	100			266,0	371,0
26:1	4000	38:2	211		72,0		
		39:2	205	36,0		116,0	
	4000	40:2	200			153,0	236,0
		38:2	158		85,0		
	3000	39:2	154	41,0		141,0	
		40:2	150			203,0	308,0
26:1	2400	38:2	126		98,0		
		39:2	123	46,0		166,0	
	2400	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
26:1	4000	51:2	157		70,0	115,0	
		52:2	154	36,0			286,0
	4000	53:2	151			191,0	
		51:2	118		73,0	135,0	
	3000	52:2	115	37,0			361,0
		53:2	113			207,0	
26:1	2400	51:2	94		75,0	155,0	
		52:2	92	38,0			436,0
	2400	53:2	91			233,0	
	1500	51:2	59		77,0	175,0	
		52:2	58	39,0			511,0
	1500	53:2	57			239,0	

	040	050	063	080	100
T <sub>2B</sub> (S5) [Nm]	53	125	198	360	850
T <sub>2Not</sub> (S5) [Nm]	73	150	295	610	1190
N <sub>1</sub> max [U/min]	6000	5000	4500	4000	3000
T <sub>2B</sub> (S5) [Nm]	50	112	216	408	1006
T <sub>2Not</sub> (S5) [Nm]	77	152	306	625	1090
N <sub>1</sub> max [U/min]	6000	5500	5000	4500	3200
T <sub>2B</sub> (S5) [Nm]	39	66	151	210	523
T <sub>2Not</sub> (S5) [Nm]	59	100	222	321	736
N <sub>1</sub> max [U/min]	6000	5800	5300	4800	3500
T <sub>2B</sub> (S5) [Nm]	63	145	266	530	1025
T <sub>2Not</sub> (S5) [Nm]	97	195	395	826	1610
N <sub>1</sub> max [U/min]	6000	5000	4500	4000	3000
T <sub>2B</sub> (S5) [Nm]	58	133	259	498	1112
T <sub>2Not</sub> (S5) [Nm]	90	179	355	725	1440
N <sub>1</sub> max [U/min]	6500	5500	5000	4500	3200
T <sub>2B</sub> (S5) [Nm]	45	86	195	275	683
T <sub>2Not</sub> (S5) [Nm]	77	137	295	432	980
N <sub>1</sub> max [U/min]	6800	5800	5300	4800	3500
T <sub>2B</sub> (S5) [Nm]	58	125	223	439	932
T <sub>2Not</sub> (S5) [Nm]	83	167	334	695	1360
N <sub>1</sub> max [U/min]	6000	5000	4500	4000	3000

Table 11.5.15-1

### **11.5.16 Type SC 040 – Servo worm gearboxes**



# Characteristics

## Torques in operating mode S1

i rated	5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
i ist	29:6		29:4		39:4		52:4		29:2		39:2		52:2	
	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]												
4000	828	23	552	27	410	32	308	30	276	30	205	36	154	36
3000	621	28	414	32	308	37	231	31	207	35	154	41	115	37
2400	497	33	331	37	246	42	185	32	166	40	123	46	92	38
1500	310	37	207	41	154	48	115	33	103	44	77	51	58	39

## Torques in operating mode S5

Coupling size	d [mm]	I rated T <sub>2N</sub> [Nm] n <sub>1max</sub> [rpm]		5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
				41	45	43	32	48	50	38							
		6000	6000	6000	6000	6000	6000	6000	6500	6800							
K14	9	T <sub>2B</sub> [Nm]	25.6	48.3	38.4	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	33.8	73.0	50.8	83.0	68.3	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	11	T <sub>2B</sub> [Nm]	27.1	48.3	40.6	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	43.5	73.0	65.3	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	14	T <sub>2B</sub> [Nm]	29.5	48.3	44.2	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	62.8	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	16	T <sub>2B</sub> [Nm]	31.4	48.3	47.1	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	72.5	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
K19	9	T <sub>2B</sub> [Nm]	53.0		58.0		50.0		39.0		63.0		58.0		45.0		
		T <sub>2NOT</sub> [Nm]	73.0		83.0		77.0		59.0		97.0		90.0		77.0		
	11	T <sub>2B</sub> [Nm]	53.0	53.0	58.0	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	73.0	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	14	T <sub>2B</sub> [Nm]	53.0	53.0	58.0	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	73.0	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	16	T <sub>2B</sub> [Nm]	53.0	53.0	58.0	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	73.0	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	19	T <sub>2B</sub> [Nm]	53.0	53.0	58.0	58.0	50.0	50.0	39.0	39.0	63.0	63.0	58.0	58.0	45.0	45.0	
		T <sub>2NOT</sub> [Nm]	73.0	73.0	83.0	83.0	77.0	77.0	59.0	59.0	97.0	97.0	90.0	90.0	77.0	77.0	
	24	T <sub>2B</sub> [Nm]	53.0		58.0		50.0		39.0		63.0		58.0		45.0		
		T <sub>2NOT</sub> [Nm]	73.0		83.0		77.0		59.0		97.0		90.0		77.0		

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

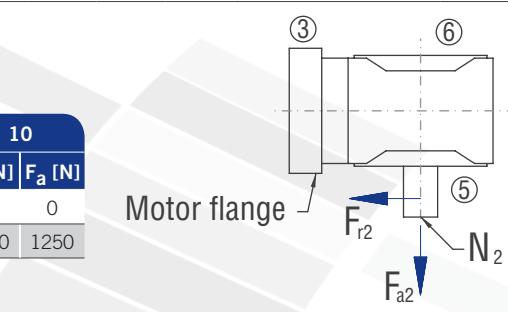
n <sub>2</sub> [rpm]	200	125	75	50	30	10		
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]						
0	0	0	0	0	0	0	0	0
< 80	970	485	1250	625	1380	690	1600	800
	1800	900	2500	1250				

## Gearbox inertia moments/mass

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm <sup>2</sup> ]	0.3307	0.2454	0.1801	0.1458	0.1943	0.1476	0.1268

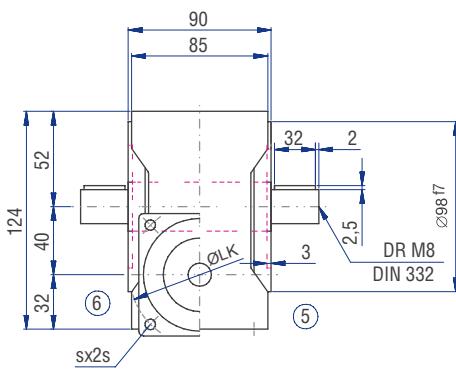
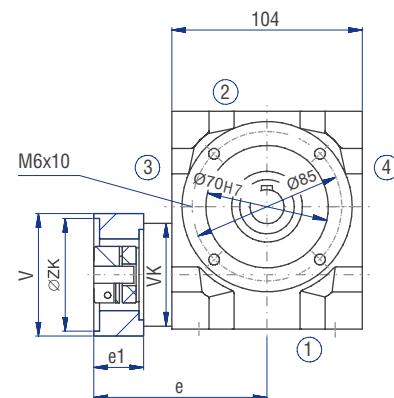
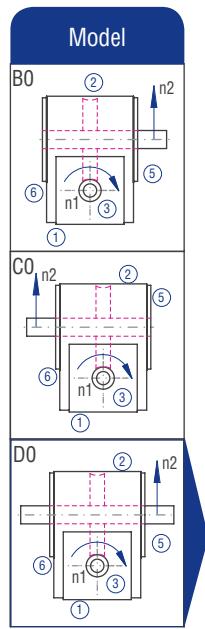
The mass of the gearbox may deviate depending on the flange size and the gear ratio.



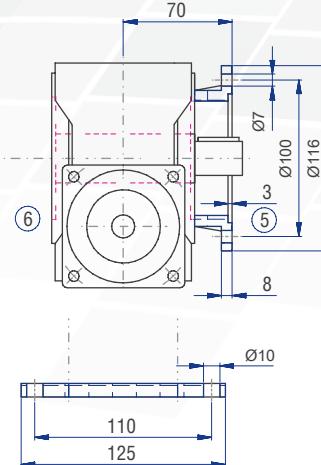
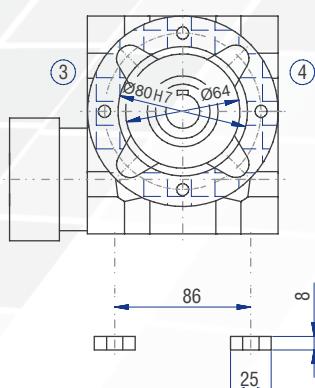
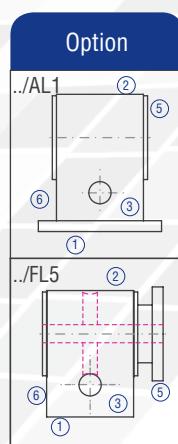
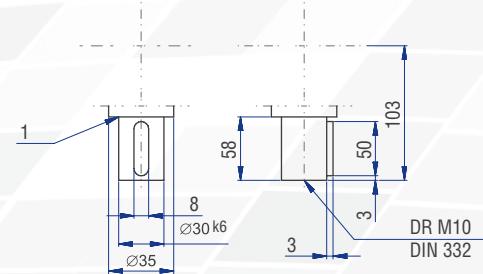
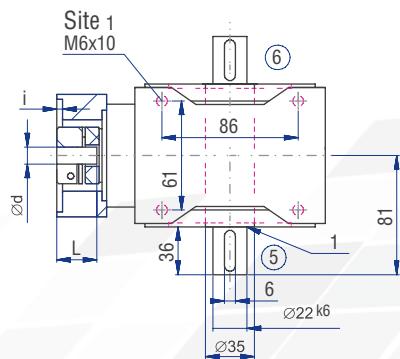
## Inertia moment Coupling J

	KN	KNN	SN
J [kgcm <sup>2</sup> ]			
K14	0.0606	0.0606	0.1446
K19	0.4229	0.4229	0.6349

## **11.5.16 Type SC 040 – Servo worm gearboxes**



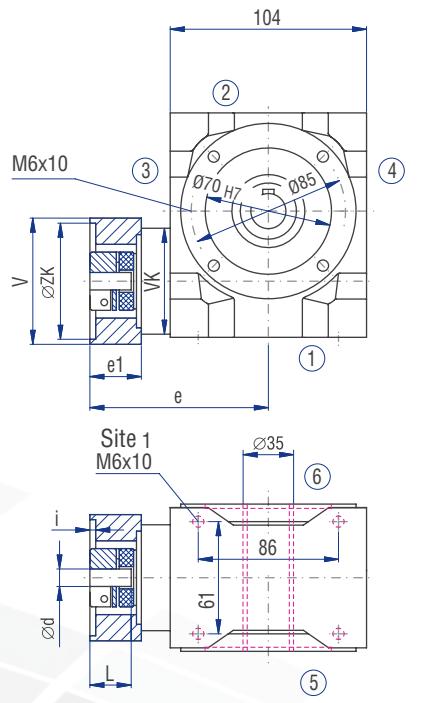
Implementation VV



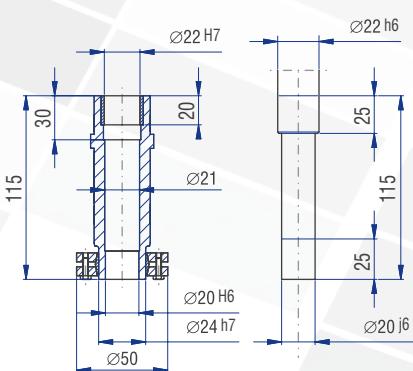
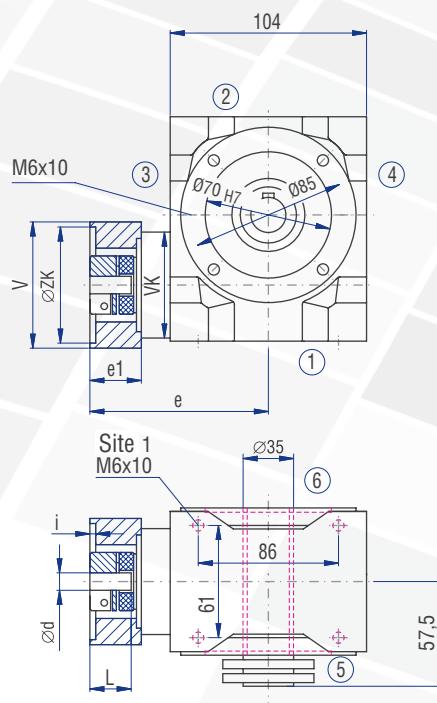
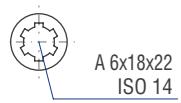
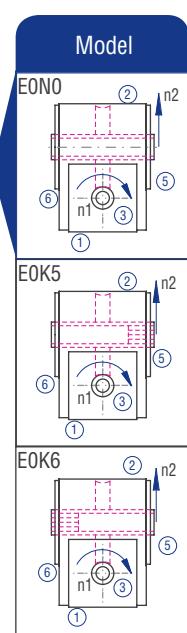
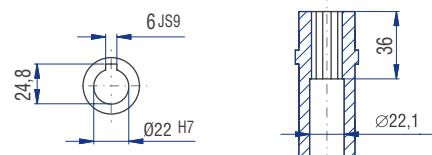
## **Motor dimensions**

Flange no.	Motor shaft (d*)	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

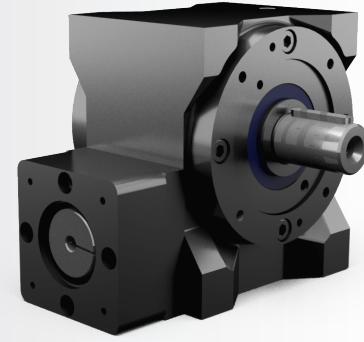
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



EONO EOK5 / EOK6



## **11.5.17 Type SC 050 – Servo worm gearboxes**



## Characteristics

## Torques in operating mode S1

I rated I ist	5:1 29:6		7.5:1 29:4		10:1 39:4		13:1 52:4		15:1 29:2		20:1 39:2		26:1 52:2	
	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]												
4000	828	48	552	59	421	70	314	54	276	62	211	72	157	70
3000	621	60	414	71	316	83	235	56	207	76	158	85	118	73
2400	497	72	331	82	253	97	188	58	166	91	126	98	94	75
1500	310	83	207	94	158	110	118	60	103	105	79	111	59	77

## Torques in operating mode S5

I rated T <sub>2N</sub> [Nm] n <sub>1max</sub> [rpm]		5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
		96		104		91		59		106		106		76	
		5000		5000		5500		5800		5000		5500		5800	
K19	d [mm]	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN
	9	T <sub>2B</sub> [Nm]	82.2		123.3		112.0		66.0		145.0		133.0		86.0
		T <sub>2NOT</sub> [Nm]	145.0		167.0		152.0		100.0		195.0		179.0		137.0
	11	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	145.0	145.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	14	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
K24		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	16	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	19	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	24	T <sub>2B</sub> [Nm]	82.2		123.3		112.0		66.0		145.0		133.0		86.0
K24		T <sub>2NOT</sub> [Nm]	150.0		167.0		152.0		100.0		195.0		179.0		137.0
	11	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	0.0	167.0	0.0	152.0	0.0	100.0	0.0	195.0	0.0	179.0	0.0	137.0
	14	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	16	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
K24		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	19	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	24	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0
	28	T <sub>2B</sub> [Nm]	125.0	125.0	125.0	125.0	112.0	112.0	66.0	66.0	145.0	145.0	133.0	133.0	86.0
K24		T <sub>2NOT</sub> [Nm]	150.0	150.0	167.0	167.0	152.0	152.0	100.0	100.0	195.0	195.0	179.0	179.0	137.0

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	200	125	75	50	30	10
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 120	2000	1000	2400	1200	2850	1425
> 120	1540	770	1850	925	2190	1095

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

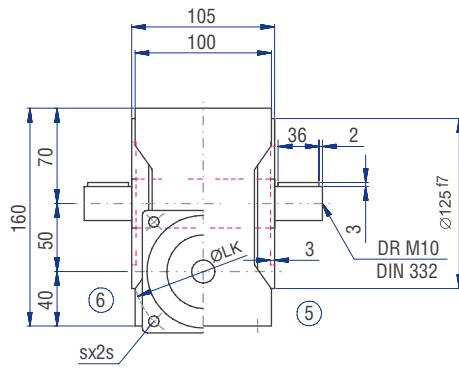
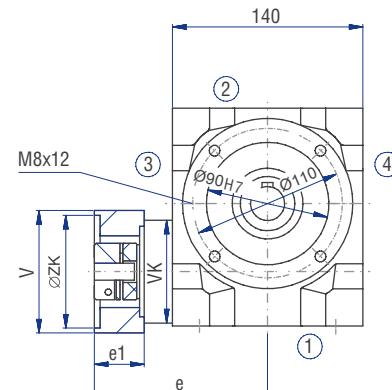
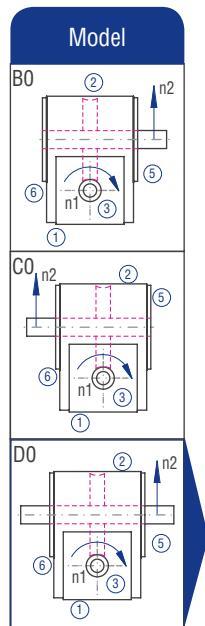
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm <sup>2</sup> ]	0.9509	0.7327	0.5820	0.4876	0.6017	0.4996	0.4375

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

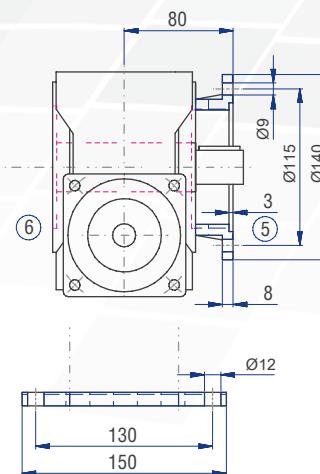
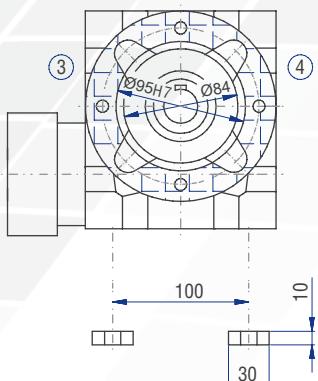
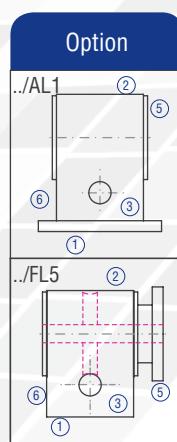
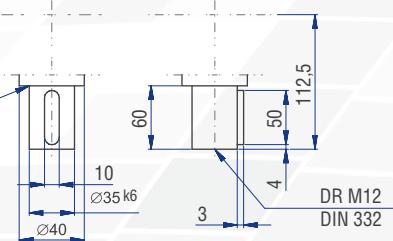
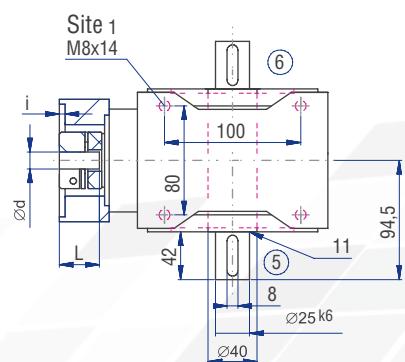
## Inertia moments Coupling J

Mass ca. [kg]	KN	KNN	SN
K19	0.4229	0.4229	0.6349
K24	1.0910	1.0910	2.7750

# 11.5.17 Type SC 050 – Servo worm gearboxes



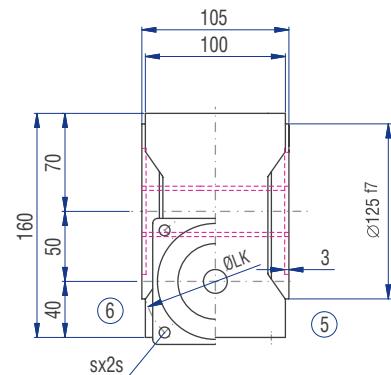
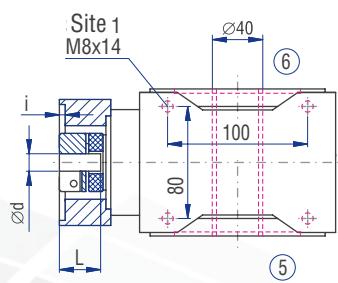
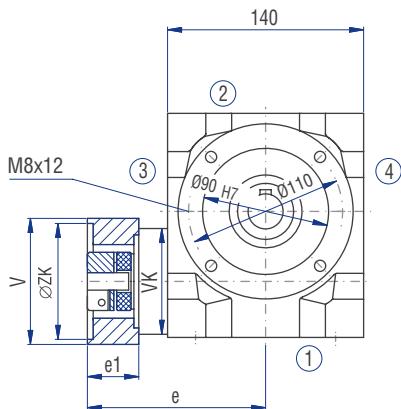
## Implementation VV



## Motor dimensions

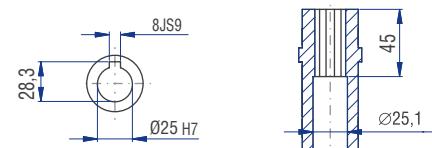
Flange no.	Motor shaft (d*)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
103	19*40	M6	90	60	75	3	141.0	45.0
201	19*40	M5	90	60	90	3	141.0	45.0
301	19*40	M6	90	50	95	4	141.0	45.0
401	19*40	M6	90	80	100	4	141.0	45.0
501	19*40	M8	90	95	115	4	141.0	45.0
601	19*40	M8	90	95	130	4	141.0	45.0
611	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!

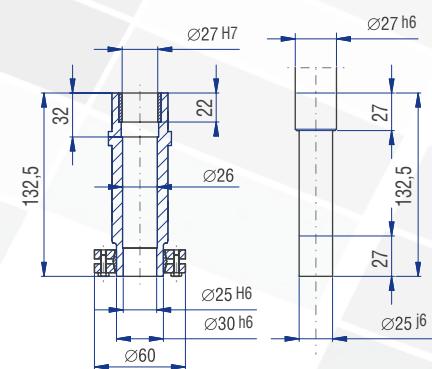
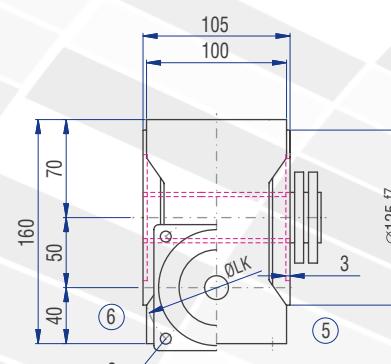
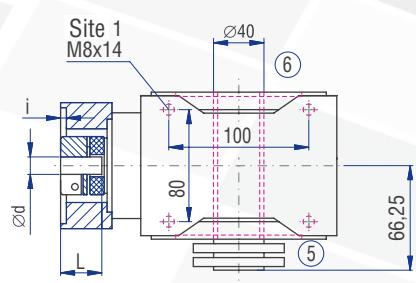
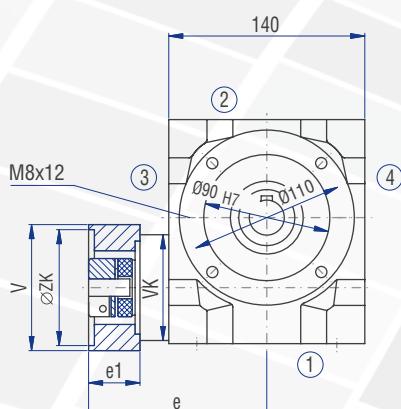
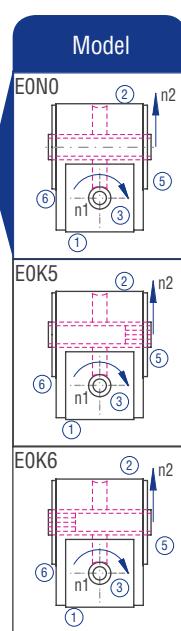


EONO

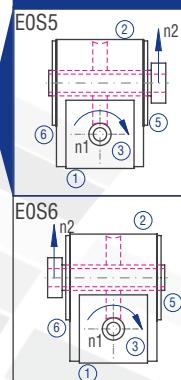
EOK5 / EOK6



A 6x21x25  
ISO 14



Model



Series gearbox  
models

## **11.5.18 Type SC 063 – Servo worm gearboxes**



## Characteristics

Table 9-13

## Torques in operating mode S1

I rated I ist	5:1 29:6		7.5:1 29:4		10:1 39:4		13:1 52:4		15:1 29:2		20:1 39:2		26:1 52:2	
	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]												
4000	828	69	552	83	410	101	314	123	276	96	205	116	157	115
3000	621	89	414	104	308	124	235	128	207	119	154	141	118	135
2400	497	109	331	125	246	148	188	133	166	142	123	166	94	155
1500	310	129	207	146	154	171	118	138	103	166	77	190	59	175

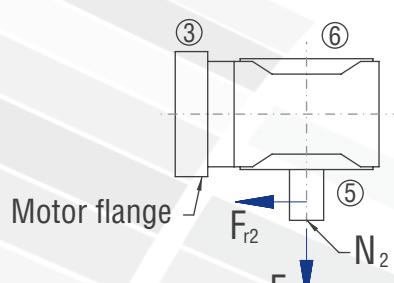
## Torques in operating mode S5

I rated T <sub>2N</sub> [Nm] n <sub>1max</sub> [rpm]		5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
		145		157		170		135		183		186		173	
		4500		4500		5000		5300		4500		5000		5300	
Coupling size	d [mm]	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN
	9	T <sub>2B</sub> [Nm]	82.2		123.3		165.8		151.0		246.5		259.0		195.0
		T <sub>2NOT</sub> [Nm]	145.0		217.5		292.5		222.0		395.0		355.0		295.0
	11	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	165.8	165.8	151.0	151.0	246.5	246.5	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	145.0	145.0	217.5	217.5	292.5	292.5	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	14	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	165.8	165.8	151.0	151.0	246.5	246.5	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	154.7	154.7	232.0	232.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
K19	16	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	165.8	165.8	151.0	151.0	246.5	246.5	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	154.7	164.3	232.0	246.5	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	19	T <sub>2B</sub> [Nm]	82.2	82.2	123.3	123.3	165.8	165.8	151.0	151.0	246.5	246.5	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	164.3	164.3	246.5	246.5	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	24	T <sub>2B</sub> [Nm]	82.2		123.3		165.8		151.0		246.5		259.0		195.0
		T <sub>2NOT</sub> [Nm]	164.3		246.5		306.0		222.0		395.0		355.0		295.0
K24	11	T <sub>2B</sub> [Nm]	169.2	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	217.5	0.0	326.3	0.0	306.0	0.0	222.0	0.0	395.0	0.0	355.0	0.0	295.0
	14	T <sub>2B</sub> [Nm]	174.0	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	217.5	295.0	326.3	334.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	16	T <sub>2B</sub> [Nm]	188.5	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	241.7	295.0	334.0	334.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	19	T <sub>2B</sub> [Nm]	188.5	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	290.0	295.0	334.0	334.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	24	T <sub>2B</sub> [Nm]	198.0	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	295.0	295.0	334.0	334.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0
	28	T <sub>2B</sub> [Nm]	198.0	198.0	223.0	223.0	216.0	216.0	151.0	151.0	266.0	266.0	259.0	259.0	195.0
		T <sub>2NOT</sub> [Nm]	295.0	295.0	334.0	334.0	306.0	306.0	222.0	222.0	395.0	395.0	355.0	355.0	295.0

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	200	125	75	50	30	10
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 220	2700	1350	3150	1575	3800	1900
> 220	2080	1040	2420	1210	2920	1460

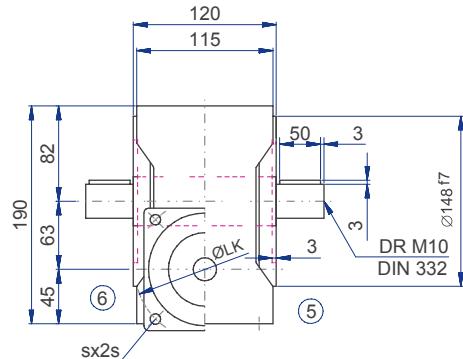
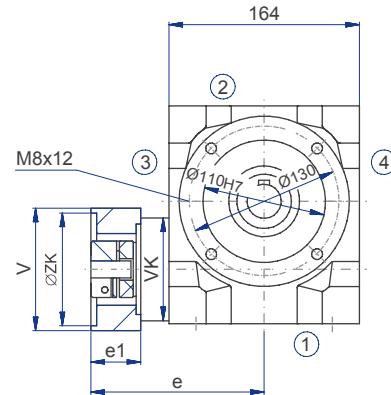
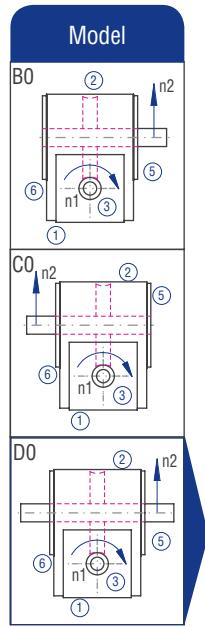
The mass of the gearbox may deviate depending on the flange size and the gear ratio.



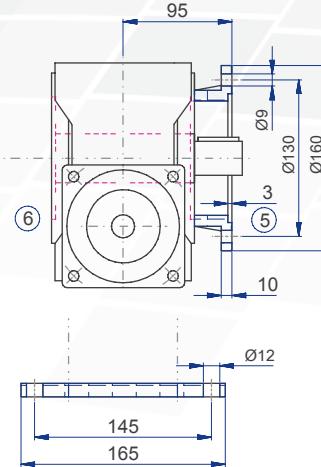
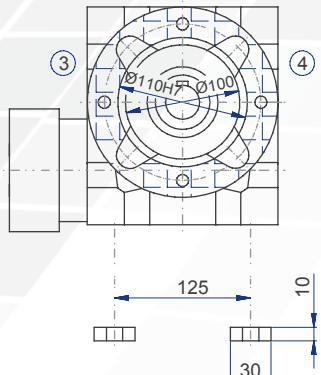
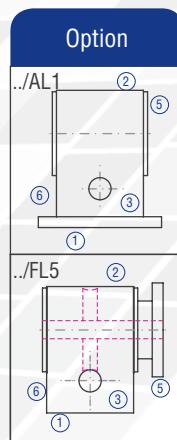
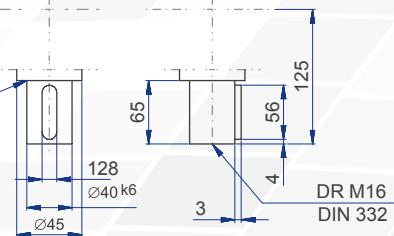
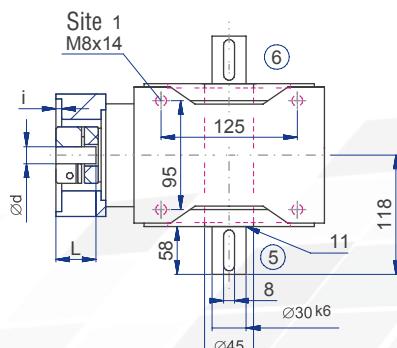
## Inertia moments Coupling J

Mass ca. [kg]	KN	KNN	SN
J [kgcm <sup>2</sup> ]			
K19	0.4229	0.4229	0.6349
K24	1.0910	1.0910	2.7750

# 11.5.18 Type SC 063 – Servo worm gearboxes



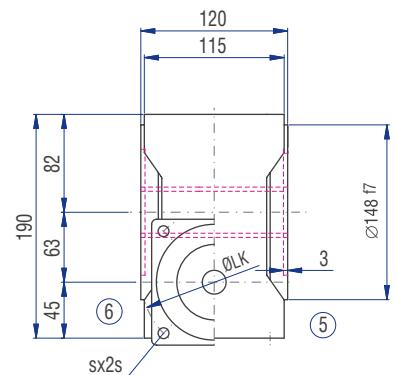
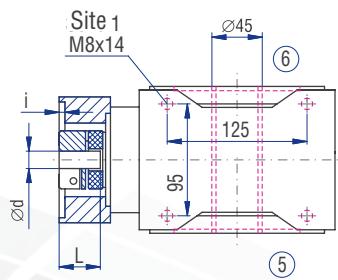
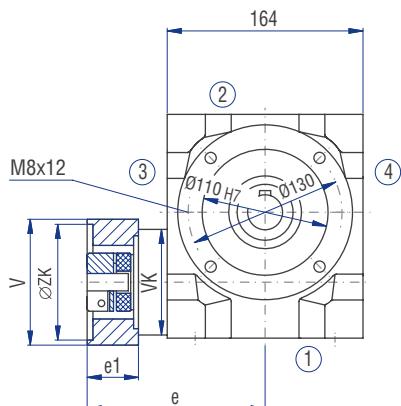
## Implementation VV



## Motor dimensions

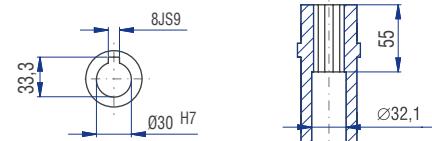
Flange no.	Motor shaft (d*)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
103	19*40	M6	90	60	75	3	154.0	45.0
201	19*40	M5	90	60	90	3	154.0	45.0
301	19*40	M6	90	50	95	4	154.0	45.0
401	19*40	M6	90	80	100	4	154.0	45.0
501	19*40	M8	90	95	115	4	154.0	45.0
601	19*40	M8	90	95	130	4	154.0	45.0
611	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!

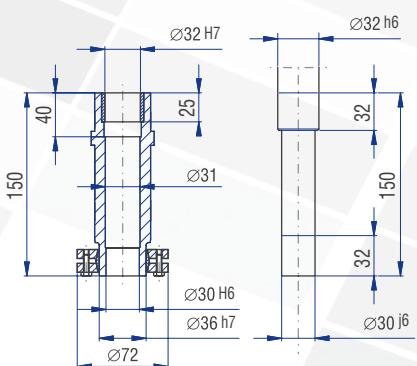
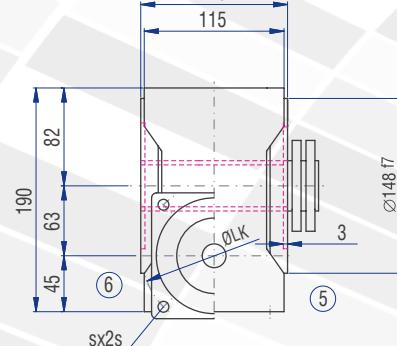
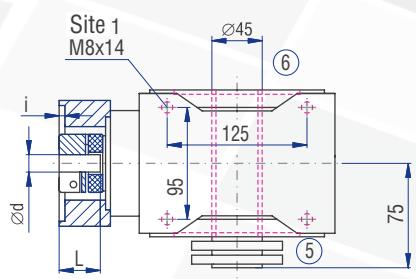
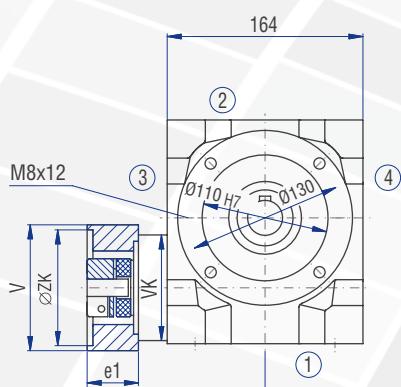
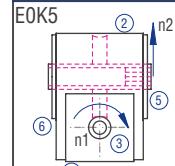
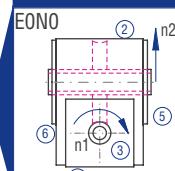


EONO

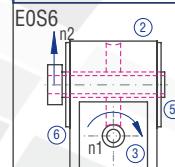
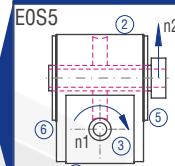
EOK5 / EOK6



Model



Model



Selection guide  
SPEZIAL GEARBOXES

## **11.5.19 Type SC 080 – Servo worm gearboxes**



## Characteristics

## Torques in operating mode S1

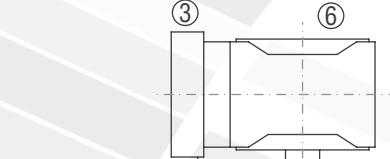
I rated I ist	5:1 29:6		7.5:1 29:4		10:1 39:4		13:1 52:4		15:1 29:2		20:1 39:2		26:1 52:2	
	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]												
4000	800	96	533	111	400	132	302	163	267	130	200	153	151	191
3000	600	132	400	152	300	177	226	170	200	175	150	203	113	207
2400	480	168	320	192	240	222	181	177	160	221	120	253	91	233
1500	300	204	200	233	150	267	113	184	100	266	75	303	57	239

## Torques in operating mode S5

I rated T <sub>2N</sub> [Nm] n <sub>1max</sub> [rpm]		5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
		250		289		297		187		352		344		245	
		4000		4000		4500		4800		4000		4500		4800	
K24	d [mm]	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN
	11	T <sub>2B</sub> [Nm]	175.0	240.0	262.5	360.0	350.0	408.0	210.0	210.0	525.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	225.0	0.0	337.5	0.0	450.0	0.0	321.0	0.0	675.0	0.0	725.0	0.0	432.0
	14	T <sub>2B</sub> [Nm]	180.0	240.0	270.0	360.0	360.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	225.0	400.0	337.5	600.0	450.0	625.0	321.0	321.0	675.0	826.0	725.0	725.0	432.0
	16	T <sub>2B</sub> [Nm]	195.0	240.0	292.5	360.0	390.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	250.0	500.0	375.0	695.0	500.0	625.0	321.0	321.0	750.0	826.0	725.0	725.0	432.0
K28	19	T <sub>2B</sub> [Nm]	195.0	240.0	292.5	360.0	390.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	300.0	600.0	450.0	695.0	600.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	24	T <sub>2B</sub> [Nm]	215.0	240.0	322.5	360.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	325.0	600.0	487.5	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	28	T <sub>2B</sub> [Nm]	230.0	240.0	345.0	360.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	350.0	600.0	525.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
		T <sub>2B</sub> [Nm]	360.0	439.0	408.0	210.0					530.0	498.0	275.0		
		T <sub>2NOT</sub> [Nm]	400.0	600.0	625.0	321.0					826.0	725.0			432.0
K28	14	T <sub>2B</sub> [Nm]	360.0	439.0	408.0	210.0					530.0	498.0	275.0		
		T <sub>2NOT</sub> [Nm]	400.0	600.0	625.0	321.0					826.0	725.0			432.0
	16	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	500.0	610.0	695.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	19	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	610.0	610.0	695.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	24	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	610.0	610.0	695.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	28	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	610.0	610.0	695.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	32	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	610.0	610.0	695.0	695.0	625.0	625.0	321.0	321.0	826.0	826.0	725.0	725.0	432.0
	38	T <sub>2B</sub> [Nm]	360.0	360.0	439.0	439.0	408.0	408.0	210.0	210.0	530.0	530.0	498.0	498.0	275.0
		T <sub>2NOT</sub> [Nm]	610.0	0.0	695.0	0.0	625.0	0.0	321.0	0.0	826.0	0.0	725.0	0.0	432.0

## Permissible radial force F<sub>r2</sub> and axial force F<sub>a2</sub> on shaft N<sub>2</sub>

n <sub>2</sub> [rpm]	200	125	75	50	30	10
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 430	3300	1650	3750	1875	4500	2250
> 430	2640	1320	3000	1500	3600	1800



## Gearbox inertia moments/mass

Inertia moment J<sub>1</sub> related to the fast-rotating shaft (N<sub>1</sub>)

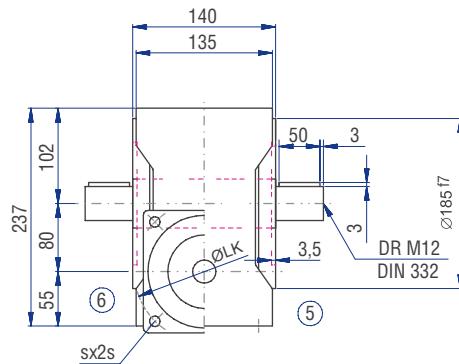
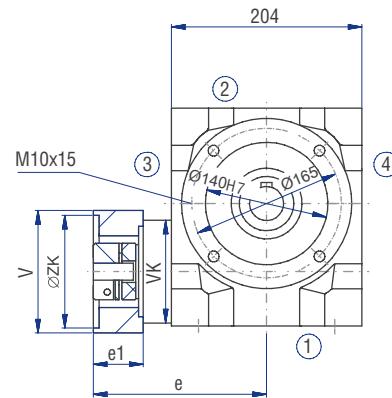
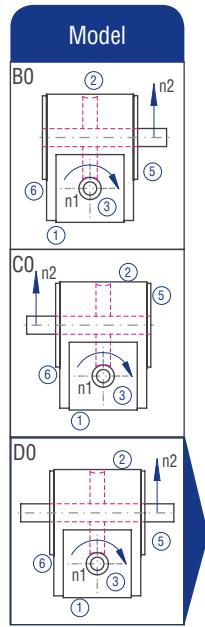
i rated [-]	5:1	7.5:1	10:1	13:1	15:1	20:1	26:1
J [kgcm <sup>2</sup> ]	5.8195	4.2167	2.9560	2.2634	3.2550	2.3977	1.9066

Mass ca. [kg]	KN	KNN	SN

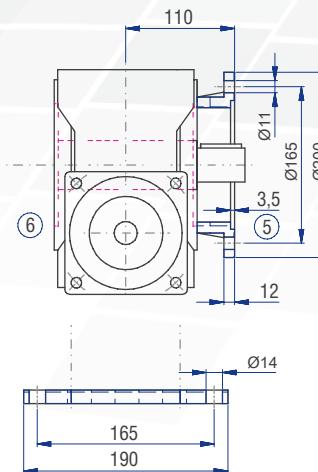
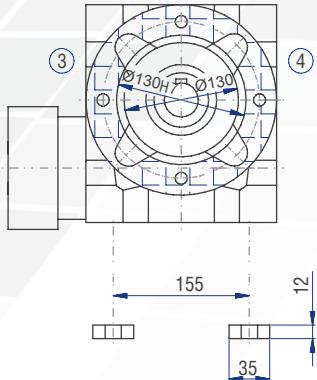
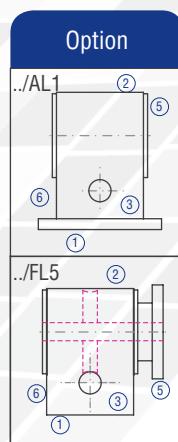
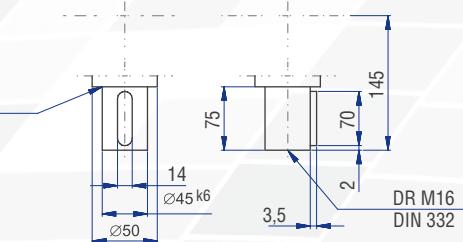
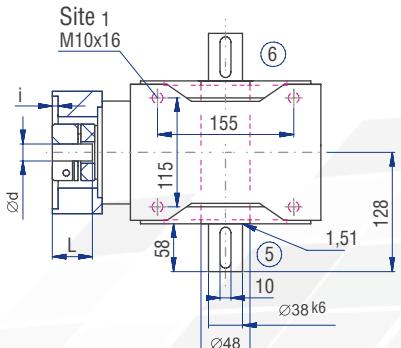
K24	1.0910	1.0910	2.7750
K28	4.1710	4.1710	6.4250

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

# 11.5.19 Type SC 080 – Servo worm gearboxes



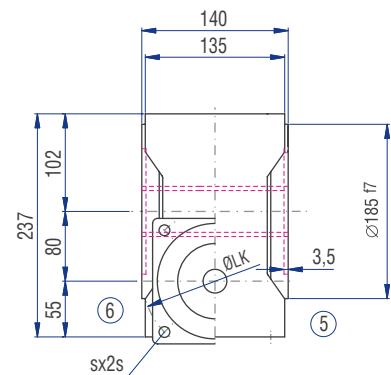
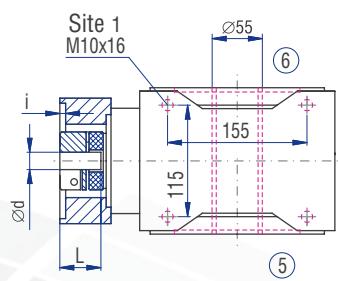
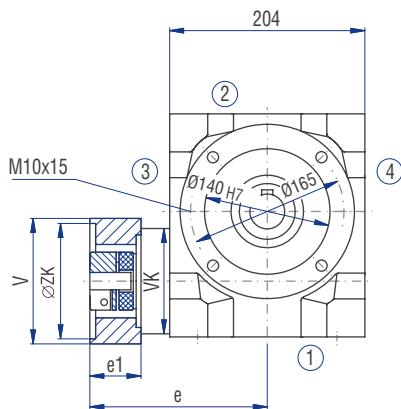
## Implementation VV



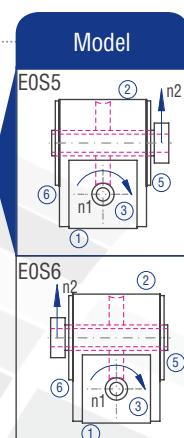
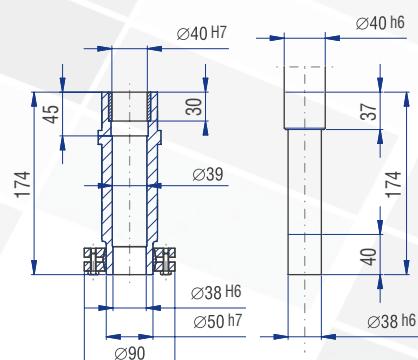
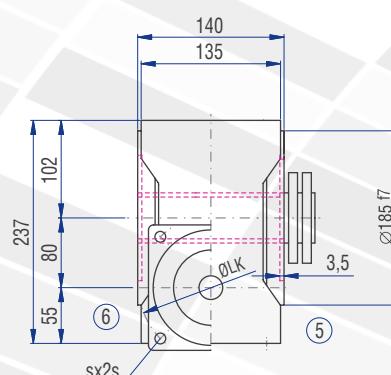
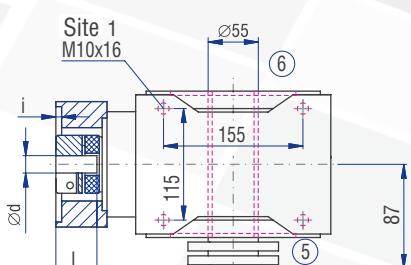
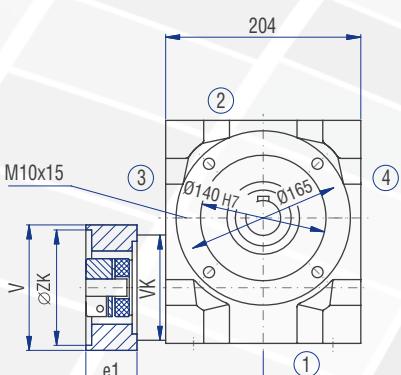
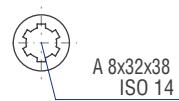
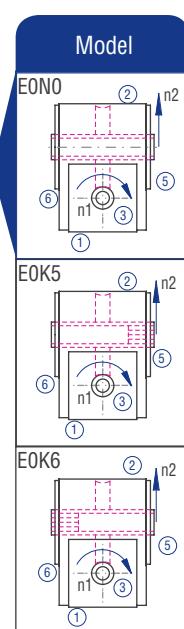
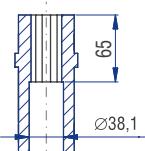
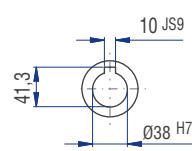
## Motor dimensions

Flange no.	Motor shaft (d*)	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

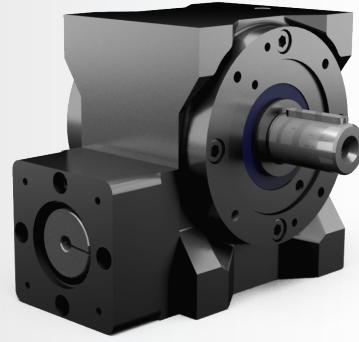
The dimensions e and e1 will change for the coupling type "clamping hub with groove" (KNN). Please contact us for consultation!



EONO EOK5 / EOK6



## **11.5.20 Type SC 100 – Servo worm gearboxes**



## Characteristics

## Torques in operating mode S1

I rated I ist	5:1 29:6		7.5:1 29:4		10:1 39:4		13:1 52:4		15:1 29:2		20:1 39:2		26:1 52:2	
	n <sub>2</sub> [rpm]	T <sub>2N</sub> [Nm]												
4000	800	96	533	111	400	132	302	163	267	130	200	153	151	191
3000	600	132	400	152	300	177	226	170	200	175	150	203	113	207
2400	480	168	320	192	240	222	181	177	160	221	120	253	91	233
1500	300	204	200	233	150	267	113	184	100	266	75	303	57	239

## Torques in operating mode S5

I rated T <sub>2N</sub> [Nm] n <sub>1max</sub> [rpm]		5:1		7.5:1		10:1		13:1		15:1		20:1		26:1	
		590		650		703		464		715		778		605	
		3000		3000		3200		3500		3000		3200		3500	
K28	d [mm]	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN	KN	KNN/SN
	14	T <sub>2B</sub> [Nm]	400.0		600.0		800.0		523.0		1025.0		1112.0		683.0
		T <sub>2NOT</sub> [Nm]	400.0		600.0		800.0		736.0		1200.0		1440.0		980.0
	16	T <sub>2B</sub> [Nm]	405.0	640.0	607.5	932.0	810.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	500.0	700.0	750.0	1050.0	1000.0	1090.0	736.0	736.0	1500.0	1610.0	1440.0	1440.0	980.0
	19	T <sub>2B</sub> [Nm]	425.0	640.0	637.5	932.0	850.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	650.0	1190.0	975.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	24	T <sub>2B</sub> [Nm]	455.0	640.0	682.5	932.0	910.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	700.0	1190.0	1050.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
K38	28	T <sub>2B</sub> [Nm]	485.0	640.0	727.5	932.0	970.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	740.0	1190.0	1110.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	32	T <sub>2B</sub> [Nm]	510.0	640.0	765.0	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	780.0	1190.0	1170.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	38	T <sub>2B</sub> [Nm]	545.0	640.0	817.5	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	835.0	0.0	1252.5	0.0	1090.0	0.0	736.0	0.0	1610.0	0.0	1440.0	0.0	980.0
	42	T <sub>2B</sub> [Nm]	470.0		705.0		940.0		523.0		1025.0		1112.0		683.0
		T <sub>2NOT</sub> [Nm]	600.0		900.0		1090.0		736.0		1610.0		1440.0		980.0
	45	T <sub>2B</sub> [Nm]	490.0		735.0		980.0		523.0		1025.0		1112.0		683.0
		T <sub>2NOT</sub> [Nm]	625.0		937.5		1090.0		736.0		1610.0		1440.0		980.0
	16	T <sub>2B</sub> [Nm]	520.0	850.0	780.0	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	650.0	1190.0	975.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	24	T <sub>2B</sub> [Nm]	545.0	850.0	817.5	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	680.0	1190.0	1020.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	32	T <sub>2B</sub> [Nm]	565.0	850.0	847.5	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	710.0	1190.0	1065.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	38	T <sub>2B</sub> [Nm]	610.0	850.0	915.0	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	760.0	1190.0	1140.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	42	T <sub>2B</sub> [Nm]	630.0	850.0	932.0	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	790.0	1190.0	1185.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0
	45	T <sub>2B</sub> [Nm]	650.0	850.0	932.0	932.0	1006.0	1006.0	523.0	523.0	1025.0	1025.0	1112.0	1112.0	683.0
		T <sub>2NOT</sub> [Nm]	820.0	1190.0	1230.0	1360.0	1090.0	1090.0	736.0	736.0	1610.0	1610.0	1440.0	1440.0	980.0

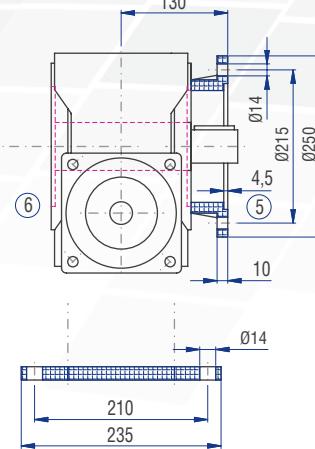
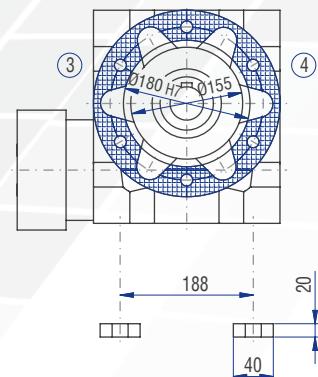
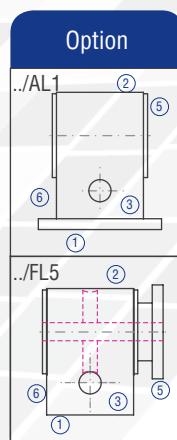
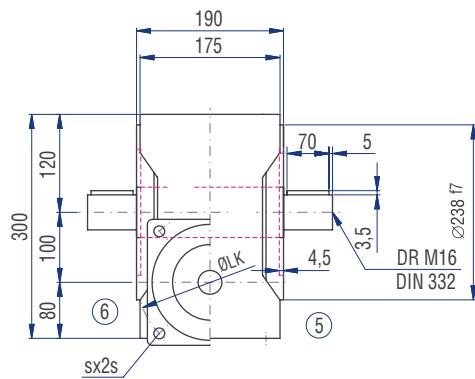
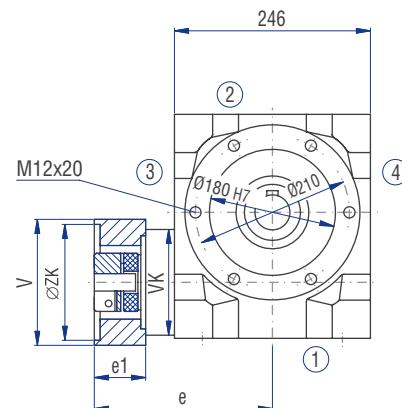
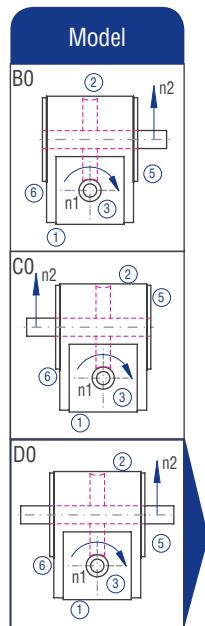
## Gearbox inertia moments/mass

n <sub>2</sub> [rpm]	200	125	75	50	30	10
T <sub>2</sub> [Nm]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]	F <sub>r</sub> [N]	F <sub>a</sub> [N]
< 800	3650	1825	4000	2000	4750	2375
> 800	2920	1460	3200	1600	3800	1900

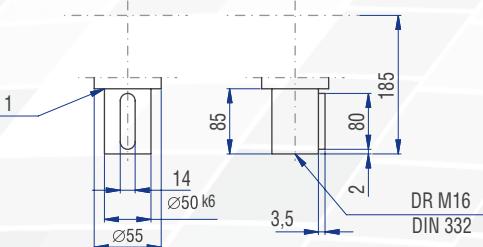
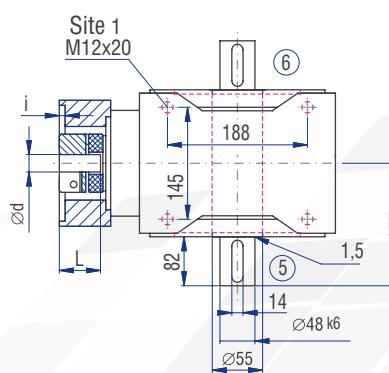
The mass of the gearbox may deviate depending on the flange size and the gear ratio.

J [kgcm <sup>2</sup> ]	KN	KNN	SN
	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]	J [kgcm <sup>2</sup> ]
53	4.1710	4.1710	6.4250
K38	8.4580	8.4580	19.6460

# 11.5.20 Type SC 100 – Servo worm gearboxes



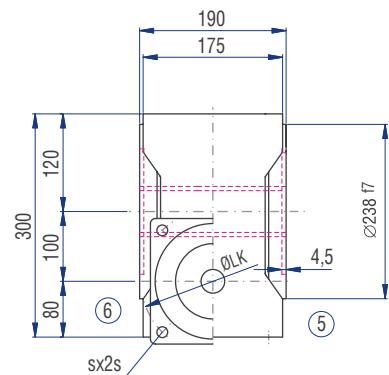
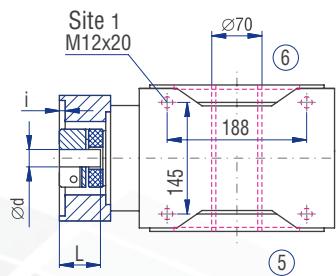
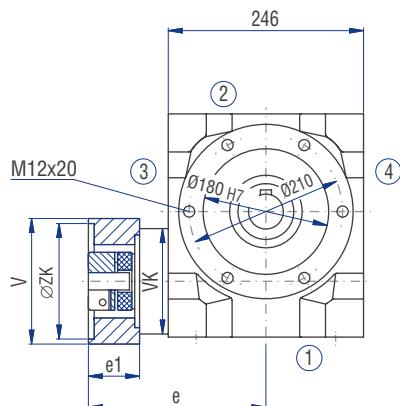
## Implementation VV



## Motor dimensions

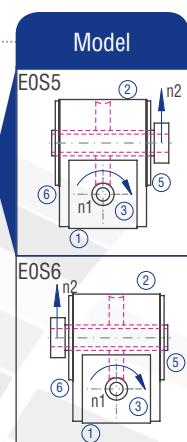
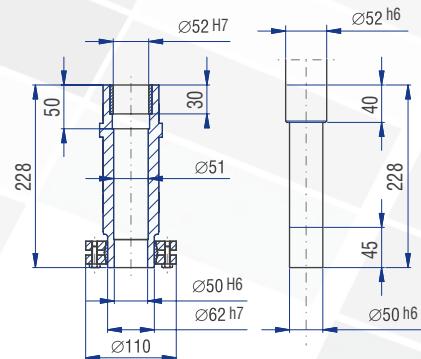
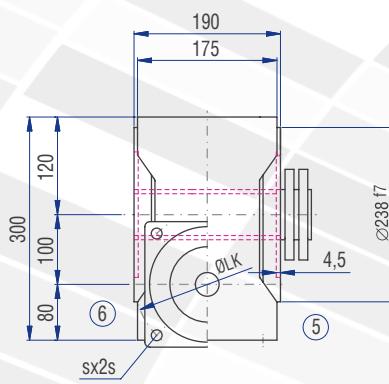
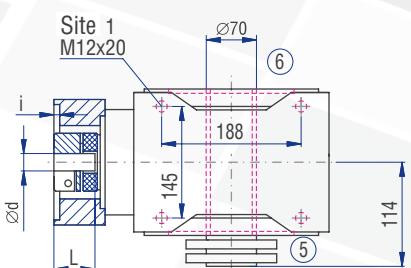
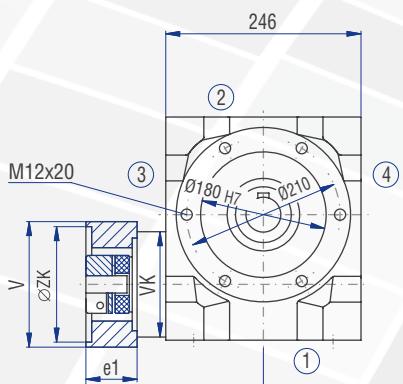
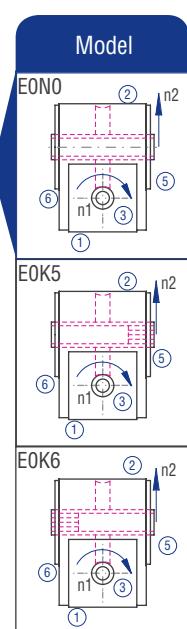
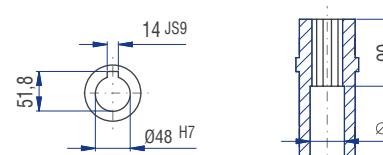
Flange no.	Motor shaft (d*s)	Thread (s)	V [mm]	ZK [mm]	LK [mm]	i [mm]	e [mm]	e1 [mm]
601	32*60	M8	160	95	130	4	242.0	62.0
611	32*60	M8	160	110	130	5	242.0	62.0
701	32*60	M8	160	110	145	5	242.0	62.0
802	32*60	M10	160	110	165	5	242.0	62.0
811	32*60	M10	160	130	165	5	242.0	62.0
403	32*60	M6	160	80	100	4	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!



EONO

EOK5 / EOK6



Selection parameters  
SPEZIALANTRIEBE



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